

# New Mexico Department of Transportation DISTRICT 3

## FY 2020 MS4 Annual Report

Reporting Period: July 1, 2019 – June 30, 2020



Prepared by:

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**Bohannon**  **Huston**

Engineering

Spatial Data

Advanced Technologies

# Annual Report Format



## National Pollutant Discharge Elimination System Stormwater Program MS4 Annual Report Format



Check box if you are submitting an individual Annual Report with one or more cooperative program elements. ☒

Check box if you are submitting an individual Annual Report with individual program elements only. ☐

Check box if this is a new name, address, etc. ☐

### 1. MS4(s) Information

New Mexico Department of Transportation - District Three

Name of MS4

Keith Thompson Drainage Engineer  
Name of Contact Person (First) (Last) (Title)  
505-490-3752 Keith.Thompson@state.nm.us  
Telephone (including area code) E-mail

P.O. Box 91750

Mailing Address

Albuquerque NM 87199  
City State ZIP code

What size population does your MS4(s) serve? 741,318 NPDES number NMR04A010

What is the reporting period for this report? (mm/dd/yyyy) From Jul 1, 2019 to Jun 30, 2020

### 2. Water Quality Priorities

A. Does your MS4(s) discharge to waters listed as impaired on a state 303(d) list? ☒ Yes ☐ No

B. If yes, identify each impaired water, the impairment, whether a TMDL has been approved by EPA for each, and whether the TMDL assigns a wasteload allocation to your MS4(s). Use a new line for each impairment, and attach additional pages as necessary.

Impaired Water	Impairment	Approved TMDL	TMDL assigns WLA to MS4
Rio Grande NM 2105_50(Islet+)	E. coli	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Rio Grande NM 2105_50(Islet+)	Dissolved Oxygen	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Rio Grande NM 2105_50(Islet+)	PCBs-Fish Consumption Advi+	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Rio Grande NM 2105.1_51 (Tij+)	E. coli (no impairment, has TMDL)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No



## 2. B. Continued

Impaired Water	Impairment	Approved TMDL		TMDL assigns WLA to MS4	
Rio Grande NM 2105.1_51 (Ti <sub>+</sub> )	DO, Temperature, PCBs-Fish <sub>+</sub>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Tijeras Arroyo NM-9000.A_00 <sub>+</sub>	Nutrients	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Rio Grande NM-2105.1_00 (n <sub>+</sub> )	E. coli (no impairment, has TM <sub>+</sub> )	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Rio Grande NM-2105.1_00 (n <sub>+</sub> )	Gross Alpha, PCBs-Fish Consum <sub>+</sub>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No

C. What specific sources contributing to the impairment(s) are you targeting in your stormwater program?

Temperature, Gross Alpha, and PCBs: no action, not directly related to NMDOT roadways or operations. Nutrients working cooperatively with other MS4s. E. coli: NMDOT is part of a cooperative education/outreach program.

D. Do you discharge to any high-quality waters (e.g., Tier 2, Tier 3, outstanding natural resource waters, or other state or federal designation)? ☐ Yes ☒ No

E. Are you implementing additional specific provisions to ensure their continued integrity? ☐ Yes ☒ No

## 3. Public Education and Public Participation

A. Is your public education program targeting specific pollutants and sources of those pollutants? ☒ Yes ☐ No

B. If yes, what are the specific sources and/or pollutants addressed by your public education program?

NMDOT and MRGSQT brochures, educational displays, and outreach programs address litter, household hazardous waste, illicit discharges, failing septic systems, pet waste, and general stormwater quality awareness.

C. Note specific successful outcome(s) (e.g., quantified reduction in fertilizer use; NOT tasks, events, publications) fully or partially attributable to your public education program during this reporting period.

See attached MRGSQT Outcomes Report for a summary of educational outreach outcomes for the year.

D. Do you have an advisory committee or other body comprised of the public and other stakeholders that provides regular input on your stormwater program? ☐ Yes ☒ No

## 4. Construction

A. Do you have an ordinance or other regulatory mechanism stipulating:

Erosion and sediment control requirements? ☒ Yes ☐ No

Other construction waste control requirements? ☒ Yes ☐ No

Requirement to submit construction plans for review? ☒ Yes ☐ No

MS4 enforcement authority? ☒ Yes ☐ No

B. Do you have written procedures for:

Reviewing construction plans? ☒ Yes ☐ No

Performing inspections? ☒ Yes ☐ No

Responding to violations? ☒ Yes ☐ No

C. Identify the number of active construction sites  $\geq 1$  acre in operation in your jurisdiction at any time during the reporting period.

D. How many of the sites identified in 4.C did you inspect during this reporting period?

E. Describe, on average, the frequency with which your program conducts construction site inspections.

All projects within NMDOT right-of-way are inspected per the Construction General Permit (CGP) requirements.

F. Do you prioritize certain construction sites for more frequent inspections? ☐ Yes ☒ No

If Yes, based on what criteria?

All projects within NMDOT right-of-way are inspected per the Construction General Permit requirements.

G. Identify which of the following types of enforcement actions you used during the reporting period for construction activities, indicate the number of actions, or note those for which you do not have authority:

☐ Yes Notice of violation 0 No Authority ☐

☐ Yes Administrative fines 0 No Authority ☐

☐ Yes Stop Work Orders 0 No Authority ☐

☐ Yes Civil penalties 0 No Authority ☒

☐ Yes Criminal actions 0 No Authority ☒

☐ Yes Administrative orders 0 No Authority ☒

☐ Yes Other

H. Do you use an electronic tool (e.g., GIS, data base, spreadsheet) to track the locations, inspection results, and enforcement actions of active construction sites in your jurisdiction? ☒ Yes ☐ No

I. What are the 3 most common types of violations documented during this reporting period?

Typically NMDOT projects will have minor comments to contractors regarding BMPs, but nothing that has resulted in an enforcement action. NMDOT has the ability to enforce deficiencies through contract documents if escalation is required.

J. How often do municipal employees receive training on the construction program? Once per 4 years

## 5. Illicit Discharge Elimination

A. Have you completed a map of all outfalls and receiving waters of your storm sewer system? ☒ Yes ☐ No

B. Have you completed a map of all storm drain pipes and other conveyances in the storm sewer system? ☐ Yes ☒ No

C. Identify the number of outfalls in your storm sewer system. 7

D. Do you have documented procedures, including frequency, for screening outfalls? ☒ Yes ☐ No

E. Of the outfalls identified in 5.C, how many were screened for dry weather discharges during this reporting period?

See Item 10, Additional Info

F. Of the outfalls identified in 5.C, how many have been screened for dry weather discharges at any time since you obtained MS4 permit coverage? All

G. What is your frequency for screening outfalls for illicit discharges? Describe any variation based on size/type.

Outfalls are screened a minimum of once per Permit term.

H. Do you have an ordinance or other regulatory mechanism that effectively prohibits illicit discharges? ☐ Yes ☒ No

I. Do you have an ordinance or other regulatory mechanism that provides authority for you to take enforcement action and/or recover costs for addressing illicit discharges? ☐ Yes ☒ No

- J. During this reporting period, how many illicit discharges/illegal connections have you discovered?
- K. Of those illicit discharges/illegal connections that have been discovered or reported, how many have been eliminated?
- L. How often do municipal employees receive training on the illicit discharge program?

## 6. Stormwater Management for Municipal Operations

- A. Have stormwater pollution prevention plans (or an equivalent plan) been developed for:

All public parks, ball fields, other recreational facilities and other open spaces	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
All municipal construction activities, including those disturbing less than 1 acre	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
All municipal turf grass/landscape management activities	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
All municipal vehicle fueling, operation and maintenance activities	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
All municipal maintenance yards	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
All municipal waste handling and disposal areas	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Other

- B. Are stormwater inspections conducted at these facilities? ☒ Yes ☐ No

- C. If Yes, at what frequency are inspections conducted?

- D. List activities for which operating procedures or management practices specific to stormwater management have been developed (e.g., road repairs, catch basin cleaning).

Street sweeping, litter pickup, catch basin cleaning, culvert cleaning, scour repair, and water quality structure maintenance.

- E. Do you prioritize certain municipal activities and/or facilities for more frequent inspection? ☐ Yes ☒ No

- F. If Yes, which activities and/or facilities receive most frequent inspections?

- G. Do all municipal employees and contractors overseeing planning and implementation of stormwater-related activities receive comprehensive training on stormwater management? ☒ Yes ☐ No

- H. If yes, do you also provide regular updates and refreshers? ☒ Yes ☐ No

- I. If so, how frequently and/or under what circumstances?

Ongoing, as needed.

## 7. Long-term (Post-Construction) Stormwater Measures

- A. Do you have an ordinance or other regulatory mechanism to require:

Site plan reviews for stormwater/water quality of all new and re-development projects?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Long-term operation and maintenance of stormwater management controls?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Retrofitting to incorporate long-term stormwater management controls?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

- B. If you have retrofit requirements, what are the circumstances/criteria?

NMDOT will review STIP projects for opportunities to retrofit and incorporate appropriate control measures into redevelopment projects. NMDOT will not develop an inventory or priority ranking of potential retrofit projects.

- C. What are your criteria for determining which new/re-development stormwater plans you will review (e.g., all projects, projects disturbing greater than one acre, etc.)?

NMDOT will review STIP projects for opportunities to retrofit and incorporate appropriate control measures into redevelopment projects. NMDOT will not develop an inventory or priority ranking of potential retrofit projects.

D. Do you require water quality or quantity design standards or performance standards, either directly or by reference to a state or other standard, be met for new development and re-development? ☒ Yes ☐ No

E. Do these performance or design standards require that pre-development hydrology be met for:

Flow volumes ☐ Yes ☒ No

Peak discharge rates ☒ Yes ☐ No

Discharge frequency ☐ Yes ☒ No

Flow duration ☐ Yes ☒ No

F. Please provide the URL/reference where all post-construction stormwater management standards can be found.

[https://dot.state.nm.us/content/dam/nmdot/Infrastructure/Drain\\_Design\\_Manual.pdf](https://dot.state.nm.us/content/dam/nmdot/Infrastructure/Drain_Design_Manual.pdf)

G. How many development and redevelopment project plans were reviewed during the reporting period to assess impacts to water quality and receiving stream protection? [See Item 1](#)

H. How many of the plans identified in 7.G were approved? [See Item 1](#)

I. How many privately owned permanent stormwater management practices/facilities were inspected during the reporting period? [Not applicable](#)

J. How many of the practices/facilities identified in I were found to have inadequate maintenance? [Not applicable](#)

K. How long do you give operators to remedy any operation and maintenance deficiencies identified during inspections? [Not applicable, NMDOT is the](#)

L. Do you have authority to take enforcement action for failure to properly operate and maintain stormwater practices/facilities? ☐ Yes ☒ No

M. How many formal enforcement actions (i.e., more than a verbal or written warning) were taken for failure to adequately operate and/or maintain stormwater management practices?

N. Do you use an electronic tool (e.g., GIS, database, spreadsheet) to track post-construction BMPs, inspections and maintenance? ☐ Yes ☒ No

O. Do all municipal departments and/or staff (as relevant) have access to this tracking system? ☐ Yes ☒ No

P. How often do municipal employees receive training on the post-construction program?

## 8. Program Resources

A. What was the annual expenditure to implement MS4 permit requirements this reporting period?

B. What is next year's budget for implementing the requirements of your MS4 NPDES permit?

C. This year what is/are your source(s) of funding for the stormwater program, and annual revenue (amount or percentage) derived from each?

Source:  Amount \$  OR %

Source:  Amount \$  OR %

Source:  Amount \$  OR %

D. How many FTEs does your municipality devote to the stormwater program (specifically for implementing the stormwater program; not municipal employees with other primary responsibilities)?

E. Do you share program implementation responsibilities with any other entities? ☒ Yes ☐ No

Entity	Activity/Task/Responsibility	Your Oversight/Accountability Mechanism
	MRG Stormwater Quality Team	See Item 10, Additional Information for a more
	MS4 Technical Advisory Group (TAG)	complete response of cooperative programs
	Cooperative sampling program (CMC)	

## 9. Evaluating/Measuring Progress

A. What indicators do you use to evaluate the overall effectiveness of your stormwater management program, how long have you been tracking them, and at what frequency? These are not measurable goals for individual management practices or tasks, but large-scale or long-term metrics for the overall program, such as macroinvertebrate community indices, measures of effective impervious cover in the watershed, indicators of in-stream hydrologic stability, etc.

Indicator	Began Tracking (year)	Frequency	Number of Locations
<i>Example: E. coli</i>	2003	Weekly April–September	20
General Public Surveys	2014	typically two times per year	2
Nutrient Study	2014	Once per permit term	6
Adopt-a-highway tracking	pre MS4 Permit	monthly	12 roadways
Maintenance activity tracking	pre MS4 Permit	weekly	31 roadways
See Item 10, Additional Information			

B. What environmental quality trends have you documented over the duration of your stormwater program? Reports or summaries can be attached electronically, or provide the URL to where they may be found on the Web.

See Item 10, Additional Information for a more complete response

## 10. Additional Information

Please attach any additional information on the performance of your MS4 program, including information required in Parts I.C, I.D, and III.B. If providing clarification to any of the questions above, please provide the question number (e.g., 2C) in your response.

### Certification Statement and Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

☒ Yes ☐ No

Federal regulations require this application to be signed as follows: **For a municipal, State, Federal, or other public facility:** by either a principal executive or ranking elected official.

Signature

Jill N. Mosher  
Digitally signed by Jill N. Mosher  
Date: 2020.11.13 15:54:46 -07'00'

Jill N. Mosher, Assistant District Engineer

Name of Certifying Official, Title

11/13/2020

Date (mm/dd/yyyy)



New Mexico DEPARTMENT OF  
**TRANSPORTATION**  
MOBILITY FOR EVERYONE

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Date: December 1, 2020  
To: EPA Region 6  
From: Keith Thompson, NMDOT District 3 - Drainage Engineer  
Subject: **NPDES Stormwater Program MS4 Annual Report**  
**Item 10: Additional Information**  
**New Mexico Department of Transportation, District 3**  
**NPDES Permit NMR04A000, Permit Tracking Number ID NMR04A010**

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The items below provide additional information for each corresponding item in the MS4 Annual Report Format PDF for the reporting period July 1, 2019, to June 30, 2020.

1. The total population listed is 741,318 for the City of Albuquerque, which is classified as an Urbanized Area (UA) within NMDOT District 3. The 2010 U.S. Census population values for the urbanized areas and urban clusters were used for this population estimate.

NPDES Permit numbers: NMR04A000, Permit Tracking Number ID NMR04A010.

2. **2B:** Impaired Waters – Text box in the Environmental Protection Agency (EPA) Annual Report Format PDF form truncates the text. For clarity, impaired waters that the NMDOT District 3 discharges to within the City of Albuquerque MS4 area are summarized in Table 1 on page 2 of this memo. The impaired waters designations shown in Table 1 are from New Mexico Environment Department (NMED) Surface Water Quality Bureau 2018-2020, State of New Mexico CWA §303(d)/§305(b) Integrated List & Report. The Tijeras Arroyo (Four Hills Bridge to headwaters) TMDL was finalized in 2017 by NMED and is listed in Table 1, however, this impairment and TMDL are not included in the current NPDES MS4 Permit NMR04A000, December 2014.

**Table 1: Impaired Waters Summary Table**

Impaired Water*	Impairment	Approved TMDL?	TMDL Assigns WLA for MS4?
Rio Grande NM 2105_50 (Isleta Pueblo boundary to Tijeras Arroyo)	E. coli	Yes	Yes
	Dissolved Oxygen	No	N/A
	PCBs – Fish Consumption Advisory	No	N/A
Rio Grande NM-2105.1_51 (Tijeras Arroyo to Alameda Bridge)	E. coli (reach not impaired, but has TMDL)	Yes	Yes
	Dissolved Oxygen	No	N/A
	PCBs – Fish Consumption Advisory	No	N/A
	Temperature	No	N/A
Tijeras Arroyo NM-9000.A_001 (Four Hills Bridge to headwaters)	Nutrients	Yes	Yes
Rio Grande NM-2105.1_00 (non-pueblo Alameda Bridge to HWY 550 Bridge)	E. coli (reach not impaired, but has TMDL)	Yes	Yes
	Gross Alpha, Adjusted	No	N/A
	PCBs – Fish Consumption Advisory	No	N/A
	PCBs	No	N/A

\*Impaired water designation from New Mexico Environment Department (NMED) Surface Water Quality Bureau 2018-2020 State of New Mexico CWA §303(d)/§305(b) Integrated List & Report.

**2C:** NMDOT maintenance activities target collection, removal, and disposal of floatables, roadside litter, and sediment. NMDOT compliance with the Construction General Permit (CGP) requirements targets sedimentation concerns within the watershed.

NMDOT does not contribute to the temperature, gross alpha, or PCB impairments, as these pollutants are not directly related to NMDOT roadways or operations.

For E. coli, MS4s can be significant sources of E. coli because urban runoff can be affected by pet waste, illicit sewer connections, and failing septic systems – all of

which are not directly related to NMDOT roadways or operations. NMDOT is a member of the Mid-Rio Grande Stormwater Quality Team (MRGSQT) which organizes education and outreach related to reducing pet waste, preventing illicit sewer connections, and repairing failing septic systems (<http://www.KeepTheRioGrand.org/>). In addition, NMDOT requires utility permits to help ensure that illicit utility connections do not occur.

For nutrients, NMDOT is working with Bernalillo County and the City of Albuquerque related to nutrient concerns in the Tijeras Arroyo. NMDOT District 3 is a partner in the [Tijeras Creek Watershed Collaborative](#) – an interagency initiative focused on preserving and improving the Tijeras Creek Watershed ecological and cultural landscapes through public education and on-the-ground restoration.

3. No additional comments on information provided on the MS4 Annual Report Form. The MRGSQT Outcomes Report provides a summary of the educational outreach efforts and outcomes within the watershed. This report is included as an attachment to this Annual Report.
4. **4A:** Regulatory Mechanisms:  
NMDOT Standard Specifications for Highway and Bridge Construction – web link: <https://dot.state.nm.us/content/nmdot/en/standards.html#>, construction contract, and NPDES Manual – web link: <http://dot.state.nm.us/content/dam/nmdot/Infrastructure/NPDESM.pdf>. NMDOT led the effort in FY 2020 to update the NPDES Manual. This updated Manual will be completed in FY 2021 and will include updated regulatory information as well as added Green Stormwater Infrastructure (GSI) and Low Impact development (LID) Best Management Practices.  
**4B:** NMDOT Standard Specifications for Highway and Bridge Construction and EPA SWPPP inspection form (available in NPDES Manual). Links provided in 4A above.  
**4C:** In FY 2020, there were three (3) active NMDOT construction projects that were both within the MS4 boundary and disturbed greater than one (1) acre of bare ground. The three projects were: 1) CN A302022 – I-25 Broadway to Rio Bravo; 2) CN A301234 – US 550 in the Town of Bernalillo; and 3) A300280 – Rio Bravo Blvd. and I-25 Interchange.  
**4J:** NMDOT NPDES/SWPPP Qualified training is required every four (4) years, but is typically offered multiple times per year.
5. **5A:** An NMDOT outfall map for the City of Albuquerque MS4 area has been developed. This map is available upon request.  
**5B:** The vast majority of potential NMDOT storm drain outlets are short culverts under the roadways, and therefore do not need to be mapped to determine upstream sources. The limited networked storm drains within NMDOT ROW capture only NMDOT runoff. Mapping these will serve no benefit in locating illicit discharges entering NMDOT ROW from outside its jurisdiction.  
**5E & 5F:** There are seven (7) identified outfalls. One (1) of the seven (7) outfalls



discharges into an irrigation drain. During two inspections, the irrigation drain had been carrying water and the outfall was not able to be screened. NMDOT has determined that this drain is never dry, so outfall observation will not be possible at this location.

**5H:** NMDOT has no authority to issue an ordinance or other regulatory mechanism to prohibit illicit discharges.

**5I:** NMDOT has no authority to issue an ordinance or other regulatory mechanism to take enforcement action or recover costs for addressing illicit discharges.

**5J & 5K:** One (1) illicit discharge was discovered during this reporting period. This illicit discharge was investigated and eliminated.

**5L:** NMDOT does not have a stand-alone illicit discharge training program – this topic is covered in the general stormwater training, spill prevention and response training, as well as in the maintenance activity performance guidelines (such as emergency repairs/clean-up and litter pickup). All employees also have access to an illicit discharge educational brochure and report form – <http://dot.state.nm.us/content/dam/nmdot/Infrastructure/Illicit-Discharge-Brochure-and-Form.pdf>.

6. **6A:**

1. NMDOT does not have parks or ball fields.
2. All projects greater than (>) one (1) acre are required to develop a SWPPP; projects less than (<) one (1) acre are dealt with on a case-by-case basis.
3. NMDOT has negligible turf and landscaping.
4. NMDOT has an equivalent plan for vehicle fueling, operation and maintenance activities.
5. NMDOT has developed SWPPP type documents for the NMDOT facilities/maintenance yards within the MS4 area.
6. NMDOT has no municipal waste handling facilities.

**6B:** Stormwater inspections and are typically conducted by NMDOT once or twice per year.

**6G:** All employees who approve drainage plans and final stabilization temporary erosion control plans receive comprehensive training on stormwater management.

7. **7E:**

1. Pre-development hydrology flow volumes are not limited by NMDOT design standards. Stormwater retention is required within MS4 areas as required in the MS4 Permits (covering the Middle Rio Grande Permit and anticipating the regulations in the forthcoming state-wide permit).
2. Peak discharge rate limits are addressed in the current Drainage Design Manual (DDM).
3. Discharge frequency is not limited by NMDOT design standards.
4. Flow duration is not limited by NMDOT design standards.

**7F:** The web page link to NMDOT's Drainage Design Manual, which includes post-construction stormwater management standards, is:  
[http://dot.state.nm.us/content/dam/nmdot/Infrastructure/Drain\\_Design\\_Manual.pdf](http://dot.state.nm.us/content/dam/nmdot/Infrastructure/Drain_Design_Manual.pdf).

**7G & 7H:** Plan reviews were based on NMDOT tracking of commercial access drainage and grading projects, NMDOT internal projects, and local projects. A total of 97 plans were reviewed in FY 2020, with 24 of those within the UA.

**7I & 7J:** Not applicable; there are no privately-owned facilities within the NMDOT jurisdiction.

**7K through M:** Not applicable; NMDOT is the only operator post-construction and as a result, no enforcement authority or action is required.

8. **8A:** Dollar amounts shown reflect estimated expenditures from July 1, 2019, through June 30, 2020. Expenditures shown reflect consultant fees, contributions to the Stormwater Quality Team and the Water Quality Sampling Program, and costs for maintenance activities (litter pickup, street sweeping, drainage structure cleaning, etc.), within the MS4 boundary. The costs of the Drainage Design & Environmental Bureaus employee salaries, training, and travel expenses were **not** included in this MS4 program resources estimate.

1. Consultant fees = \$42,200
2. Stormwater Quality Sampling and MRGSQT = \$12,000
3. Contracted Weed and Litter Pick-Up Services = \$745,000
4. Roadway Sweeping = \$612,601
5. Maintenance and Litter Pickup activities = \$983,000
6. Total = \$2.39 Million

**8B:** Next year's budget for implementing NMDOT District 3's MS4 NPDES program is anticipated to be similar to this year's expenditures.

**8C:** NMDOT has no annual revenue or direct funding source for the MS4 program. The MS4 program budget (amounts shown) is allocated out of the general funding for the DOT.

**8E:** The text box in the EPA Annual Report PDF form does not allow enough space to enter a complete response. Complete response (Note – Table continues on p. 6):

Entity	Activity/Task/Responsibility	Your Oversight/Accountability Mechanism
NMDOT – District 3 Bernalillo County AMAFCA City of Albuquerque UNM Sandoval County Village of Corrales City of Rio Rancho Village of Los Ranchos	MS4 Technical Advisory Group (TAG) – various cooperative activities	Intergovernmental Agreement

<b>Entity</b>	<b>Activity/Task/ Responsibility</b>	<b>Your Oversight/ Accountability Mechanism</b>
Kirtland Air Force Base Town of Bernalillo SSCAFCA ESCAFCA Sandia National Laboratory (DOE)		
NMDOT – District 3 AMAFCA City of Albuquerque Bernalillo County Village of Corrales City of Rio Rancho Village of Los Ranchos Town of Bernalillo SSCAFCA ESCAFCA Sandoval County Ciudad Soil and Water Conservation District	Mid-Rio Grande Stormwater Quality Team (MRGSQT)	Intergovernmental Agreement
NMDOT – District 3 Bernalillo County AMAFCA City of Albuquerque UNM Sandoval County Village of Corrales City of Rio Rancho Village of Los Ranchos Town of Bernalillo SSCAFCA ESCAFCA	MS4 Compliance Monitoring Cooperative (CMC) – Wet Weather Monitoring	Intergovernmental Agreement
NMDOT – District 3 Bernalillo County Village of Los Ranchos AMAFCA	Development Review – Construction and Post- Construction Stormwater Management	Intergovernmental Agreement
NMDOT – District 3 Bernalillo County ABCWUA City of Albuquerque AMAFCA Village of Los Ranchos	Capacity, Management, Operations and Maintenance (CMOM) Plan Spill Response, emphasis on Fats, Oils and Grease (FOG)	Intergovernmental Agreement
NMDOT – District 3 Bernalillo County City of Albuquerque AMAFCA	Investigation and Resolution of IDDE	Shared without cost allocation

9. **9A:** NMDOT is a non-traditional MS4 and evaluating the overall effectiveness of its stormwater management program focuses on metrics collected specific to its roadway facilities. NMDOT tracks general public surveys with the Middle Rio Grande Stormwater Quality Team (MRGSQT) and nutrient study results for the Tijeras Arroyo with the City of Albuquerque and Bernalillo County. Large scale watershed or in-stream hydrologic studies are beyond the jurisdiction and reach of NMDOT. NMDOT tracks adopt-a-highway data (public participation litter removal program) including the number of volunteers and amount of trash removed for each of the six (6) NMDOT districts within the state. In addition, through NMDOT's Maintenance Management System (MMS) system, NMDOT tracks all their maintenance activities in each district including miles of roadway sweeping, litter removal, and drainage structure cleanings. Tracking this data assists NMDOT in evaluating the overall effectiveness of its activities related to stormwater management and MS4 Permit compliance.

**9B:** NMDOT has not been directly involved with creating these documents. Upon request, a list may be compiled for documents relating to this item. Trends and data collected by the CMC have been provided to New Mexico Environment Department (NMED) for additional analysis. Some additional information may also be found at <http://www.keeptheriogrand.org/reports-exhibits/>.

10. Support documents similar to those provided in the attachments of previous MS4 Annual Reports have been compiled and are on file at NMDOT offices. They have not been included in this report to keep this submittal a manageable size. These supporting documents are available upon request.

**Attachments:**

- Attachment 1 – FY 2020 MRGSQT Outcomes Report
- Attachment 2 – Compliance Monitoring Cooperative (CMC) – FY 2020 Stormwater Monitoring Contract Summary Memo

**Attachment 1**  
**FY 2020 MRGSQT Outcomes Report**



Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) • City of Albuquerque  
Bernalillo County • Town of Bernalillo • Village of Corrales • Ciudad Soil and Water Conservation District Eastern  
Sandoval County Arroyo Flood Control Authority (ESCAFCA) • Village of Los Ranchos de Albuquerque •  
Department of Transportation (NMDOT) • City of Rio Rancho • Sandoval County  
Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA)

# **Outcomes Report**

**for**

## **Fiscal Year 2019-2020**

**(July 1, 2019 - June 30, 2020)**

presented by

Dana Bloomquist



During the period from July 1, 2019, through June 30, 2020, the Mid Rio Grande Stormwater Quality Team (MRGSQT) continued its educational outreach activities. When pandemic quarantine restrictions took effect in March 2020, many in-person events were canceled and some ongoing outreach activities were reconfigured to accommodate this new reality. However, the majority of the year was business as usual. This report will highlight all activities, including the late-year programmatic pivots, including:

- Partnering with the Bosque Ecosystem Monitoring Program (BEMP), Arroyo Classroom and RiverXChange
- Continuing to maintain and update the [keeptheriogrand.com](http://keeptheriogrand.com) website, as well as post relevant information to the Keep the Rio Grand Facebook page
- Participating in high-profile community events, including the Los Ranchos Lavender Festival, the NM State Fair Parade, the Corrales Harvest Festival, the Rio Rancho Children's Water Festival and New Mexico's Animal Humane Society's Doggie Dash and Dawdle
- Repairing and strengthening hardware for the team's interactive kiosk and moving it to Albuquerque's South Valley Library
- Participating in a variety of community events throughout the year

Team partners and supporters disseminated information on stormwater quality and pollution prevention through municipal water quality reports to stakeholders. Specialty advertising giveaways relating to stormwater quality awareness were ordered (or reordered) for use at public events. MRGSQT's annual budget for all these activities, excluding Type 9 items, donated hours by team members and funding for Arroyo Classroom, RiverXChange and BEMP is \$103,000. The contractor, CWA Strategic Communications (CWA), donated \$119.45 in services during the 12-month period. The following is a review of the activities in which the Team has participated.

There is a possibility that there was some duplication in the counts of individuals who attended more than one event, but numbers are close.

## **WEBSITE ([www.keeptheriogrand.org](http://www.keeptheriogrand.org))**

CWA redesigned the website in October 2018 and has continued to maintain and update the content.

## **KEEP THE RIO GRAND FACEBOOK PAGE**

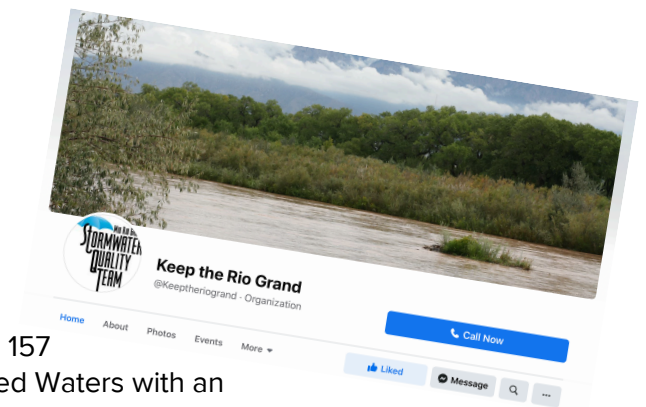
### **([www.facebook.com/Keeptheriogrand](https://www.facebook.com/Keeptheriogrand))**

In conjunction with the SQT website, a Facebook page continues to post information educating the general public about stormwater team members, MS4-related topics, events and more. The page has 157 "likes" (a 4% increase from the previous year) and the team occasionally boosts posts during events to obtain more visibility.

**Estimated number of individuals reached by this activity:** 157

**Permit Reference(s):** Part 1.C.2.b(i)(e) Discharges to Impaired Waters with an Approved TMDL, Impairment for Bacteria; Part 1.C.3.a Endangered Species Act Requirements, Dissolved Oxygen Strategy; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.e Control of Floatables; Part 1.D.5.g, Public Education and Outreach on Stormwater Impacts.

**Audience(s):** Children, Adults



## EVENTS

Between July 1, 2019, and June 20, 2020, MRGSQT members and their partner agencies reported participating in a total of 51 community outreach/educational events reaching adults and children.

**Estimated number of individuals reached by these community outreach/education events:** 84,675

**Permit Reference(s):** Part 1.C.2.b(i)(e) Discharges to Impaired Waters with an Approved TMDL, Impairment for Bacteria; Part 1.C.3.a Endangered Species Act Requirements, Dissolved Oxygen Strategy; Part 1.D.5.c(i)(f) and (h) Pollution Prevention/Good Housekeeping for Municipal/Co-permittee Operations; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.e Control of Floatables; Part 1.D.5.g, Public Education and Outreach on Stormwater Impacts.

**Audience(s):** Children, Adults

**Details can be found in Exhibit 1 at the end of this report.**

## GENERAL MATERIALS DISTRIBUTION/STORMWATER AWARENESS SURVEY

As appropriate, team members distribute materials at events in return for event attendees filling out a stormwater awareness survey. Total distribution correlates to number of surveys completed.

STORMWATER QUALITY TEAM Inventory July 1, 2019, through June 30, 2020			
Item	Starting Qty as of 7/1/2019	Distributed	Ending Qty as of 6/30/2020
"Keep the Rio Grand" Bumper Stickers *	250		631
"Reduce Stormwater Pollution at Home" Brochure * **	84		4,365
Dog-Shaped Poop Bag Dispensers	1,750	355	1,395
"Don't Contaminate the River" Oval Stickers	3,750	1,659	2,091
Poop Emoji Squeezies	1,464	1,243	221
Morphing Fish Bags	2,500	720	1,780
Silicone Pet Food Can Lids	1,311	240	1,071
New Pet Rack Cards *	4,394		4,424
FOG Rack Cards	4,412	143	4,269
No Poop Fairy Rack Cards	4,427	278	4,149
Professionals Harmful Chemicals Rack Card	4,720	293	4,427
Reduce Stormwater Pollution at Home Rack Card *	4,358		4,365
Large Stormwater display – 8 ft	1	-	1
Tabletop Stormwater display – 6 ft	1	-	1
SQT 6' x 3' banner	1	-	1
<b>TOTAL DISTRIBUTION</b>		<b>4,931</b>	

\* Inventory was inaccurate in the previous year, so these numbers show an increase from starting and ending quantities.

\*\* These materials were reprinted; the distributed number reflects the net decrease.

**Estimated number of individuals reached by these community outreach/education events:** 4,931

**Permit Reference(s):** Part 1.C.2.b(i)(e) Discharges to Impaired Waters with an Approved TMDL, Impairment for Bacteria; Part 1.C.3.a Endangered Species Act Requirements, Dissolved Oxygen



Strategy; Part 1.D.5.c(i)(f) and (h) Pollution Prevention/Good Housekeeping for Municipal/Co-permittee Operations; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.e Control of Floatables; Part 1.D.5.g, Public Education and Outreach on Stormwater Impacts.

**Audience(s):** Children, Adults

**Sample surveys and survey analytics can be found in Exhibit 2 at the end of this report.**

## EDUCATIONAL ACTIVITIES

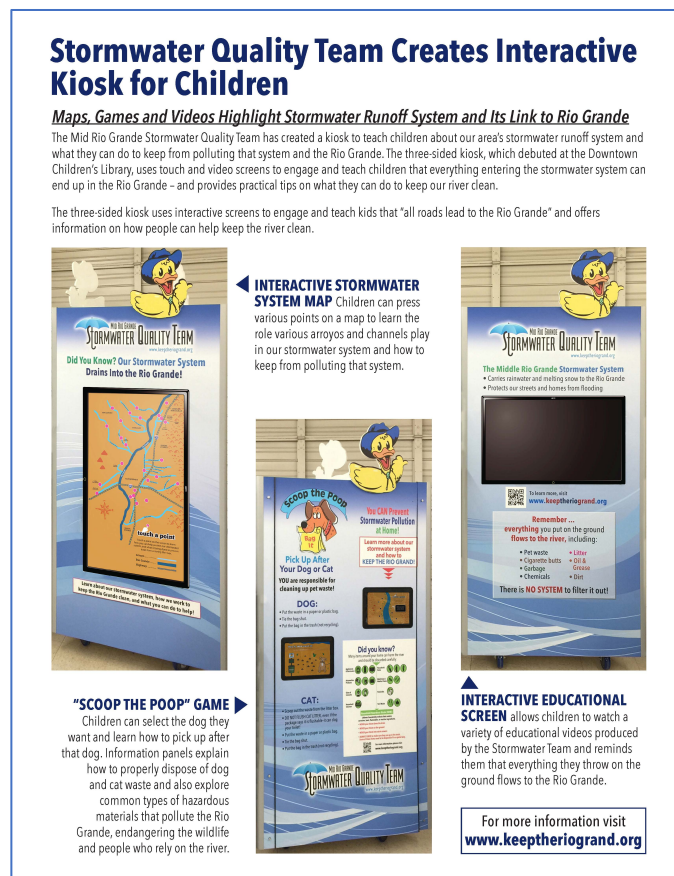
### Educational Kiosk at Albuquerque's Rudolfo Anaya North Valley Public Library and South Valley Public Library

At the beginning of the year, the team's interactive kiosk was installed at the Rudolfo Anaya North Valley Public Library. Over time and regular use, it became obvious that the kiosk would need some maintenance and repair. CWA contracted with a moving company to pack and move the kiosk from the Rudolfo Anaya North Valley Public Library to the CWA offices at the end of December, where we assessed the damage and determined what repairs needed to be made. Staff from SSCAFCA made those repairs.

Arrangements were then made with staff at the South Valley Public Library to move the kiosk there. It was moved and set up March 12<sup>th</sup>, the week before the pandemic quarantine took effect. The library was reopened June 2<sup>nd</sup>.

The kiosk is a valuable educational tool and we look forward to its use as the libraries are better able to accommodate regular activity so that children can learn from these kiosk features:

- An interactive stormwater system map of the Middle Rio Grande that allows children to press various points to learn the roles arroyos and channels play in the stormwater system and how to keep from polluting that system. The system stretches from Bernalillo on the north through Rio Rancho and into Albuquerque.
- A "Scoop the Poop" game that allows children to choose a dog and learn how to properly pick up after their dog. This is important because pet waste is a major source of E. coli contamination in the Rio Grande.
- An educational panel on common types of trash, debris and chemicals that pollute the Rio Grande, including appliances and electronics; automotive products such as oil, batteries and gasoline; fertilizers and pesticides; household cleaners; yard waste; and prescription and over-the-counter medicines.
- A touchscreen that includes facts about each arroyo and the Rio Grande.
- A touchscreen that allows viewers to select and watch stormwater-related videos:

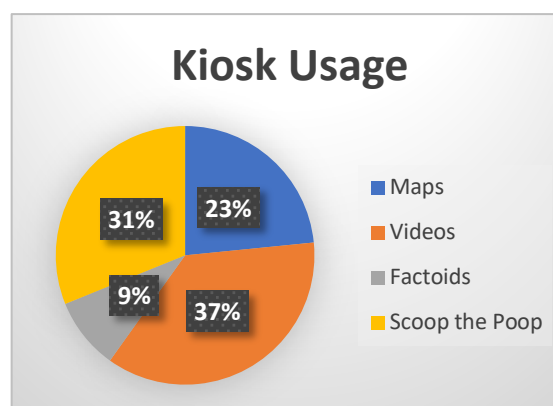


- Rio the Duck
- Keep the Rio Grand
- Scoop the Poop!
- 100 Billion Gallons
- Arroyo Safety
- Respect Your Arroyos

### Educational Kiosk Statistics

From July 1, 2019, to December 27, 2019, while the kiosk was installed at the Rudolfo Anaya North Valley Library, 36,192 people visited the library and had the opportunity to view information presented by the kiosk and interact with the kiosk. Of the 36,192 visitors, approximately 3,837 (primarily) children interacted with the kiosk.

From March 12, 2020, to June 30, 2020, after the kiosk was installed at the South Valley Library, only, 2,500 people visited the library (the library was closed March 16 – June 1) and had the opportunity to view information presented by the kiosk and interact with the kiosk. Of the 2,488 visitors, approximately 130 (primarily) children interacted with the kiosk. These numbers are understandably low, as visits to the library were still impacted by the pandemic and families continuing to self-quarantine.



July 2019				
	Map	Videos	Factoids	Scoop the Poop
People	188	386	118	275
Touches	2,399	386	367	738

August 2019				
	Map	Videos	Factoids	Scoop the Poop
People	156	301	97	212
Touches	1,751	301	252	534

September 2019				
	Map	Videos	Factoids	Scoop the Poop
People	183	350	35	235
Touches	2,015	350	144	541

October 2019				
	Map	Videos	Factoids	Scoop the Poop
People	145	268	0	200
Touches	1,991	268	0	443

November 2019				
	Map	Videos	Factoids	Scoop the Poop
People	145	89	44	157
Touches	1,870	89	138	381

June 2020				
	Maps	Videos	Factoids	Scoop the Poop
People	35	18	22	55
Touches	293	18	100	136

**Total estimated number of people reached by these educational activities:** 38,680

**Permit Reference(s):** Part 1.C.2.b(i)(e) Discharges to Impaired Waters with an Approved TMDL, Impairment for Bacteria; Part 1.C.3.a Endangered Species Act Requirements, Dissolved Oxygen Strategy; Part 1.D.5.c(i)(f) and (h) Pollution Prevention/Good Housekeeping for Municipal/Co-permittee Operations; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.e Control of Floatables; Part 1.D.5.g Public Education and Outreach on Stormwater Impacts.

**Audience(s):** Children, Adults

## STUDENTS AND TEACHERS REACHED THROUGH PARTNER EDUCATIONAL PROGRAMS – ARROYO CLASSROOM, RIVERXCHANGE AND BOSQUE ECOSYSTEM MONITORING PROGRAM (BEMP)

### Arroyo Classroom

The Arroyo Classroom program utilizes natural arroyos as outdoor classrooms and brings local animals into the classroom to educate and motivate third-grade students to respect the arroyos as important wildlife habitat. In the 2019-2020 school year, the program served 35 classes within the Rio Rancho Public School System, reaching approximately 37 teachers and 736 students. Their deliverables included 35 of 35 planned Watershed Presentations, 29 of 35 planned Arroyo Walks (six were not completed due to school closures because of the pandemic), 32 of 35 planned Bat Presentations (some classes doubled up due to a scheduling issue, but all classes were completed) and 35 of 35 planned Owl/Bird Presentations.



**For more information, see Exhibit 3, Arroyo Classroom's 2019-2020 report to the Mid Rio Grande Stormwater Quality Team.**

### RiverXchange

RiverXchange is an innovative, long-term outreach program that integrates water resource topics with computer technology, student writing and a hands-on curriculum to meet specific, measurable outcomes.



Since 2007, the program has enabled upper elementary classes from New Mexico to become “high-tech pen pals” with classes outside the state to share what they learn about the geography, culture and ecology of their local river and watershed. This year there were more 1,254 total participants. Each student spends about 25 hours engaged with the program over the course of the school year. The

curriculum incorporates hands-on activities and multiple classroom presentations by local water resources experts. During the 2019-2020 season, 38 fifth-grade classes, 19 of which were from Title I schools, participated in RiverXchange in New Mexico. RiverXchange worked with 26 classes (607 students) in Bernalillo County and 12 classes (325) students in Sandoval County. A total of 40 teachers were involved. Even with the impacts of the COVID-19 pandemic and the transition to a new education coordinator mid-year, RiverXchange was able to run smoothly with only a few classes missing a presentation or a field trip due to school closures mid-March.



***For more information, see Exhibit 4, RiverXchange's 2019-2020 report to the Mid Rio Grande Stormwater Quality Team.***

#### **Bosque Ecosystem Monitoring Program (BEMP)**

The main objective of the Stormwater Science outreach education program of the Bosque Ecosystem Monitoring Program (BEMP) is to teach students that the health of the Rio Grande is directly related to the health of the surrounding watershed, as well as what their responsibilities and opportunities are to help "Keep the Rio Grand." The Stormwater Science program includes a 1.5-hour classroom activity, a 4- to 5-hour study trip to the Rio Grande and optional curriculum extensions incorporating hands-on data analysis, graphing and system modeling. During the 2019-2020 school year, 737 students participated in Stormwater Science activities in their classrooms, in the field, both or in outreach events. The classroom program was delivered to 245 students in 14 classrooms at 3 different schools in Albuquerque. E. coli monitoring was conducted by 35 students from La Academia de Esperanza, the University of New Mexico and Bosque School. 53 students participated in the Stormwater Study Trip. BEMP participated in the Children's Water Festival, working with 300 4<sup>th</sup>-grade students and 12 teachers. Stormwater Science presentations during summer programming were made to 200 students in grades K-8. Additionally, BEMP participated in a Storytime in the Park program where one activity was shared with 750 families. From the end of March through June, approximately 10,100 students received BEMP activities through the five Grab & Go meal locations and free Little Libraries around the city. About 5,800 of those students received an activity with a stormwater science focus. Additionally, materials were placed on their website and posted on their social media accounts.



***For more information, see Exhibit 5, BEMP's 2019-2020 report to the Mid Rio Grande Stormwater Quality Team.***

**Total estimated number of people reached by these educational activities: 7,398**

**Permit Reference(s):** Part 1.C.2.b(i)(e) Discharges to Impaired Waters with an Approved TMDL, Impairment for Bacteria; Part 1.C.3.a Endangered Species Act Requirements, Dissolved Oxygen



Strategy; Part 1.D.5.c(i)(f) and (h) Pollution Prevention/Good Housekeeping for Municipal/Co-permittee Operations; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.e Control of Floatables; Part 1.D.5.g, Public Education and Outreach on Stormwater Impacts; Part 1.D.5.h Public Involvement and Participation.

**Audience(s):** Children, Adults

## PUBLIC EDUCATION CAMPAIGNS ON PROPER DISPOSAL OF FATS, OILS & GREASE

In November and December 2019, the cities of Albuquerque and Rio Rancho each ran public education campaigns on how to dispose of cooking grease properly. Their campaigns were timed to coincide with the holiday cooking season (Thanksgiving through Christmas).

### ***In Albuquerque:***

**Outdoor Boards** – two 14'x48' boards ran two weeks each month in November and December. The estimated number of people reached, with duplication, was 2,305,492.



**Television Advertising** – two two-week schedules each in November and December on Comcast (three zones), KOAT TV, KOB TV and KRQE TV. A total of 900 spots were placed for an estimated reach of 1,012,834.

**Radio Advertising** – two two-week schedules each in November and December targeting women 25+. A total of 491 spots ran on KOB AM/FM, KBQI FM, KPEK FM and KRST FM. Reach was estimated at 210,000.

### ***In Rio Rancho:***

**Digital Outdoor Boards** – Artwork ran on six boards during November and December. Alternating the red and green images, two boards ran for two weeks in November (11/18 – 12/1/19) and four boards ran one week (11/18 – 11/26/19). In December, artwork ran on all six boards for a week around Christmas (12/23 – 12/29/19). A total estimated audience of 184,321 adults (18 years of age and older) with duplication were reached.

**Print Advertising** – Two ads were each run on two separate pages in the *Rio Rancho Observer* (for a total of four ads) on one Sunday in November (11/24/19) and again on one Sunday in December (12/22/19) for a total of 128 column inches of ad space. Each ad was 4 columns by 4 inches in size. Circulation for the *Rio Rancho Observer* is 18,500.

**Total estimated audience reached:** 3,731,147

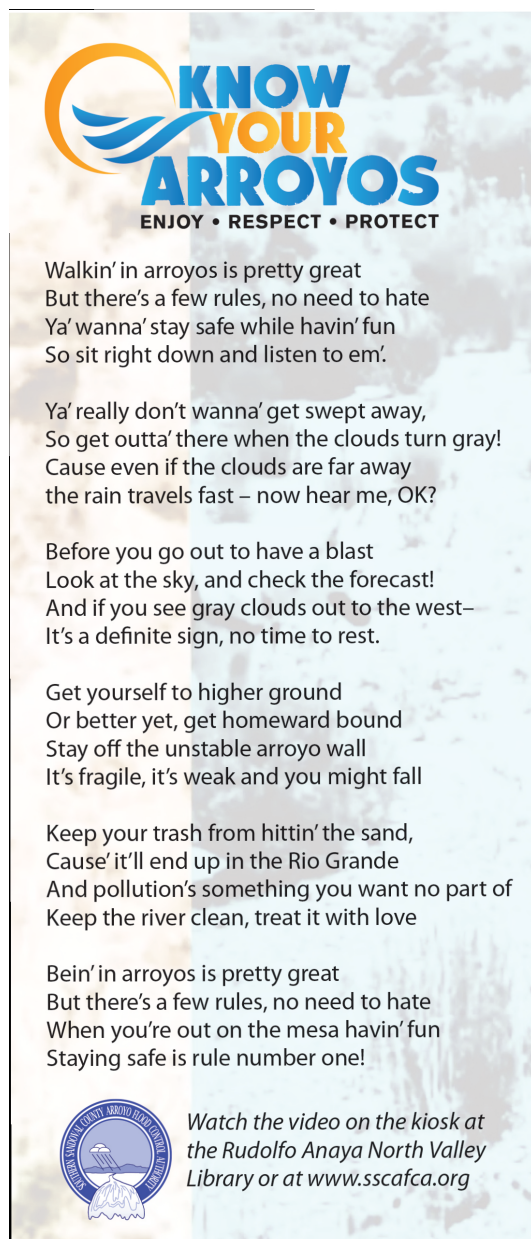
**Permit Reference(s):** Part 1.C.2 Discharges to Impaired Waters with and without an Approved TMDL; Part 1.C.3.a; Endangered Species Act Requirements, Dissolved Oxygen Strategy; Part 1.D.5.c(i)(f) Pollution Prevention/Good Housekeeping for Municipal Co-permittee Operations; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.g, Public Education and Outreach on Stormwater Impacts.

**Audience(s):** Children, Adults



## ARROYO SAFETY CAMPAIGN

MRGSQT member SSCAFCA continued its Arroyo Safety Campaign by producing a 1.5-minute video with help from a local girl scout troop. After an initial discussion about arroyo safety and best practices for staying safe, the troop met several times to brainstorm and develop strategies to reach their peers. Their solution was to create a “rap” song with accompanying video to share the message. One of the girls wrote the rap lyrics and several others took video footage, which were incorporated into the video. The video was posted (and boosted) on the Arroyo Safety Facebook page, the Mid Rio Grande Stormwater Quality Team’s (MRGSQT) website [www.keeptheriogrand.org](http://www.keeptheriogrand.org), YouTube, Instagram and the SSCAFCA website.



**KNOW YOUR ARROYOS**  
ENJOY • RESPECT • PROTECT

Walkin' in arroyos is pretty great  
But there's a few rules, no need to hate  
Ya' wanna' stay safe while havin' fun  
So sit right down and listen to em'.


Ya' really don't wanna' get swept away,  
So get outta' there when the clouds turn gray!  
Cause even if the clouds are far away  
the rain travels fast – now hear me, OK?

Before you go out to have a blast  
Look at the sky, and check the forecast!  
And if you see gray clouds out to the west–  
It's a definite sign, no time to rest.

Get yourself to higher ground  
Or better yet, get homeward bound  
Stay off the unstable arroyo wall  
It's fragile, it's weak and you might fall

Keep your trash from hittin' the sand,  
Cause' it'll end up in the Rio Grande  
And pollution's something you want no part of  
Keep the river clean, treat it with love

Bein' in arroyos is pretty great  
But there's a few rules, no need to hate  
When you're out on the mesa havin' fun  
Staying safe is rule number one!

 Watch the video on the kiosk at the Rudolfo Anaya North Valley Library or at [www.sscafca.org](http://www.sscafca.org)



In addition, an Arroyo Safety game to be played on mobile devices was developed and is now available on Apple's AppStore and GooglePlay. The goal is to teach basic Arroyo Safety messages through a fun game.



A news release was sent to the *Rio Rancho Observer* and social media announcements were made on the Arroyo Safety Facebook page, SSCAFCA's website and the Mid Rio Grande Stormwater Quality Team's website. All media provided the link to the AppStore and Googleplay to download the game.

**Total estimated audience reached:** 22,422

**Permit Reference(s):** Part 1.C.2 Discharges to Impaired Waters with an without an Approved TMDL; Part 1.C.3.a Endangered Species Act Requirements, Dissolved Oxygen Strategy; Part 1.D.5.c(i)(f) and (h) Pollution Prevention/Good Housekeeping for Municipal/Co-permittee Operations; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.g, Public Education and Outreach on Stormwater Impacts.

**Audience(s):** All ages, especially middle school students

## SEPTIC SYSTEM EDUCATION, OUTREACH AND ENFORCEMENT PROGRAM

Bernalillo County administers the septic system permitting program in the unincorporated portions of Bernalillo County under the Bernalillo County Wastewater Ordinance, ensuring the proper disposal of septic waste and proper operation and maintenance of septic systems. The wastewater ordinance was passed in 2015.

The County began a campaign in 2012 to get unpermitted systems permitted or properly abandoned, with an established goal of contacting a minimum of 300 unpermitted system or aging system owners per year. During the period July 1, 2019, to June 30, 2020, Bernalillo County had 579 total wastewater operator permits, 432 total wastewater system permits, as well as 67 septic abandonments and connections to public sewer utilities. Bernalillo County sent 813 letters through the "unpermitted and aging wastewater system campaigns" which resulted in an estimated 235 properties permitted (included in the total numbers listed above) for septic systems in FY2020.

**Total estimated audience reached:** 813

**Permit Reference(s):** Part 1.C.2.b(i)(e) Discharges to Impaired Waters with an Approved TMDL, Impairment for Bacteria; Part 1.C.3.a Endangered Species Act Requirements, Dissolved Oxygen Strategy; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.g, Public Education and



Outreach on Stormwater Impacts.

**Audience(s):** Adults

## NM STATE FAIR PARADE FLOAT

AMAFCA created a float for the State Fair Parade, which takes place every September in Albuquerque. With signs saying “Keep the Rio Grand” and “There is No Poop Fairy,” the team borrowed a concept developed by Greenville County Soil and Water Conservation District in South Carolina. A staff member dressed up as the “Poop Fairy” and tossed Poop Emoji Squeezies to the crowd.

**Total estimated audience reached:** 50,000

**Permit Reference(s):** Part 1.C.2.b(i)(e) Discharges to Impaired Waters with an Approved TMDL, Impairment for Bacteria; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.e Control of Floatables; Part 1.D.5.g, Public Education and Outreach on Stormwater Impacts; Part 1.D.5.h, Public Involvement and Participation.

**Audience(s):** All ages



## CHILDREN'S WATER FESTIVAL

The 2019 Children's Water Festival (Festival) was held Monday, October 21, and Tuesday, October 22, at the Santa Ana Star Center in Rio Rancho. Some 1,437 students, mostly 4<sup>th</sup>-graders, attended from 61 classrooms at Placitas Elementary School, St. Thomas Aquinas and all of the elementary schools in Rio Rancho Public Schools. The students attend three 30-minute presentations in a half-day format.

Eighteen presenters taught the classes and three to four schools were on site at one time. Schools attended a morning or afternoon program.

The principal focus of the Festival is to educate 4<sup>th</sup>-grade schoolchildren about water and its relationship to humans, animals and other natural resources in a fun and interactive atmosphere. The Festival's vision is to introduce students and teachers to new ideas, options and solutions so they will conserve and protect water for the future; lay the foundation for further learning; and reach as many students and teachers as possible.

**Total estimated audience reached:** 1,437

**Permit Reference(s):** Part 1.C.2.b(i)(e) Discharges to Impaired Waters with an Approved TMDL, Impairment for Bacteria; Part 1.C.3.a Endangered Species Act Requirements, Dissolved Oxygen Strategy; Part 1.D.5.c(i)(f) and (h) Pollution Prevention/Good Housekeeping for Municipal/Co-permittee Operations; Part 1.D.5.e Illicit Discharges and Improper Disposal; Part 1.D.5.e Control of Floatables; Part 1.D.5.g Public Education and Outreach on Stormwater





Impacts.

**Audience(s):** fourth-graders

***For more information, see Exhibit 6, Children's Water Festival Report, 2019-2020.***

## **DONATIONS/SPONSORSHIPS**

Stormwater Team members donated \$91,000 to organizations for additional educational and training programs.

MEMBER	AMOUNT DONATED	RECIPIENT	PURPOSE
AMAFCA	\$2,000	Land and Water Summit	For Public Involvement and Participation
Bernalillo County	\$5,000	Land and Water Summit	For Public Involvement and Participation
Bernalillo County	\$75,000	BEMP	For Education and Outreach
City of Rio Rancho	\$2,000	Land and Water Summit	For Public Involvement and Participation
Mid Rio Grande Stormwater Quality Team	\$5,000	Land and Water Summit	For Public Involvement and Participation
SSCAFCA	\$2,000	Land and Water Summit	For Public Involvement and Participation
	<b>\$91,000</b>		

## **ESTIMATED TOTAL NUMBER OF PEOPLE REACHED THROUGH ALL ADVERTISING, EDUCATIONAL AND PUBLIC OUTREACH ACTIVITIES DURING 2019-2020**

Obviously, some people were reached by more than one activity, but in gross numbers an estimated **3,943,687** people were reached with a stormwater quality/stormwater pollution prevention message during the 2019-2020 fiscal year.

# **Exhibit 1**

## **Event Participation 2019-2020**

NAME OF PROGRAM/EVENT	EVENT DATE	TYPE OF AUDIENCE	MS4 CATEGORY	TOTAL REACHED	NOTES
<b>2019</b>					
"There is No Poop Fairy" float in State Fair Parade	9/17/19	All Ages	AS, PW, SWP	50,000	Provided education information about Scoop the Poop, There is No Poop Fairy, why it is important to pick up after your pet as well as proper household hazardous waste disposal.
Corrales Harvest Festival	9/28 & 9/29/19	All Ages	AS, PW, SWP	10,000	Booth handing out information, swag and collecting surveys to determine public knowledge regarding stormwater issues.
Rio Rancho Children's Water Festival	10/21 & 10/22/19	Elementary Students and Teachers	SWP	1,437	Students attended from 61 classrooms; Placitas Elementary School, St. Thomas Aquinas and all of the elementary schools in Rio Rancho Public Schools. Students attend three 30-minute presentations in a half-day format. Up to 3 to 4 schools were on site at one time. Schools attended a morning or afternoon session.
Animal Humane's Doggie Dash and Dawdle	11/3/19	All Ages	AS, PW, SWP	4,000	Animal Humane's signature event and largest fundraiser; booth handing out information, swag and collecting surveys.
Georgia O-Keefe Elementary	12/5/19	All Ages	SWP	24	Planted 17 poles.
Zia Elementary	12/6/19	All Ages	SWP	20	Planted 17 poles.
John Baker Elementary	12/19/19	All Ages	SWP	29	Planted 25 poles.
EPA Region6 Stormwater Conference – Responding to Change: Dynamic Stormwater Management in Economic, Political and Climatic Transitions, Denton, TX	7/28 – 8/1/19	Adults	SWP	75	Kali Bronson, Bernalillo County Stormwater Program Compliance Manager, attended, served as a session moderator, and presented at the 2019 EPA Region 6 Stormwater Conference in Denton, TX. Attendance at the Bernalillo County presentation is estimated at 75 people.
Rocky Mountain Youth Corps	July 2019	Adults, Children	AS	53	In partnership with Bernalillo County Parks and Recreation, the youth corps participants worked to support and expand wildlife habitat throughout the South Valley while also leading environmental education activities for local youth. 8 Corps members and 2 Supervisors completed 1,400 hours of service, educated 43 local youth and led 4 field trips.
Southwest Conservation Corps	July 2019	Adults	SWP	5	Participants completed approximately 800 hours of work removing invasive species, constructing a trellis, removing fence and planting cottonwoods at Sanchez Farm Open Space the the Westside Community Center.
Valle de Oro Youth Corps	July 2019	Youth	SWP	5	Participants completed approximately 60 hours of work restoring Tijeras Creek, adobe hornos and performing La Plazita Garden maintenance.
2019 Arid LID Workshop	9/19 – 9/20/19	Adults	SWP	66	Arid LID is a coalition of interdisciplinary professionals in the Middle Rio Grande area working to promote the use of GSI and LID in development. The coalition held a workshop which brought together policy makers, engineers, biologists, developers, and others to educate and make future plans for GSI/LID opportunities. Attendance included 66 people.

NAME OF PROGRAM/EVENT	EVENT DATE	TYPE OF AUDIENCE	MS4 CATEGORY	TOTAL REACHED	NOTES
<b>2019</b>					
East Mountain Celebration	9/22/19	All Ages	SWP	1,500	This is a family-friendly event and kids enjoyed free activities like face painting, fun jumps, a petting zoo and obstacle courses. Both Bernalillo County and Tijeras Creek Watershed Collaborative had a water quality booth which provided information to educate County residents on stormwater quality, water conservation methods and incentive programs, and groundwater monitoring programs.
Tijeras Creek Watershed Collaborative Youth Conservation Corps Workday	10/5/19	All Ages	SWP	31	Bernalillo County is a partner in the Tijeras Creek Watershed Collaborative. The Youth Conservation Corps completed a workday helping to restore the creek. The group were also weeding in the area and repaired a spillway and berms. 31 people participated in the event and performed approximately 160 volunteer hours.
<b>2020</b>					
Georgia O'Keefe Elementary	1/9/20	All Ages	SWP	43	Planted 28 poles.
John Baker Elementary	1/10/20	All Ages	SWP	21	Planted 25 poles.
North Valley Elementary	2/6/20	All Ages	SWP	28	Planted 16 poles.
Sandia Vista Elementary	2/7/20	All Ages	SWP	34	Planted 28 poles.
North Valley Academy	2/13/20	All Ages	SWP	32	Planted 30 poles.
Martin Luther King Elementary	2/14/20	All Ages	SWP	49	Planted 30 poles.
Duranes Elementary	2/15/20	All Ages	SWP	31	Planted 26 poles.
7 Bar Elementary	2/20/20	All Ages	SWP	41	Planted 20 poles.
Monte Vista Elementary	2/21/20	All Ages	SWP	27	Planted 17 poles.
7 Bar Elementary	2/27/20	All Ages	SWP	32	Planted 24 poles.
Martin Luther King Elementary	2/28/20	All Ages	SWP	62	Planted 39 poles.
Zia Elementary	3/5/20	All Ages	SWP	49	Planted 17 poles.
Monte Vista Elementary	3/6/20	All Ages	SWP	53	Planted 32 poles.
Cochiti Elementary	3/11/20	All Ages	SWP	46	Planted 38 poles.
Martin Luther King Elementary	3/12/20	All Ages	SWP	57	Planted 38 poles.
Holy Ghost	1/23/20	All Ages	SWP	63	Planted 53 poles.
Cottonwood Gulch/RMYC	1/24/20	All Ages	SWP	24	Planted 41 poles.
Nahalot Shalom	1/26/20	All Ages	SWP	26	Planted 33 poles.
Peace Corps	2/8/20	All Ages	SWP	39	Planted 60 poles.
Congregation Albert	2/9/20	All Ages	SWP	34	Planted 28 poles.
Mountain Mahogany Families	2/29/20	All Ages	SWP	19	Planted 33 poles.
Sandia Civitans	3/7/20	Adults	SWP	16	Planted 100 poles.
Bernalillo County Septic Systems Permits, "Unpermitted" and Aging System Wastewater System Campaign Outreach Program	7/1/19 – 6/30/20	Adults	SSS	813	Bernalillo County had 579 total wastewater operator permits, 432 total wastewater system permits, as well as 67 septic abandonments and connections to public sewer utilities. Bernalillo County sent 813 letters through the "unpermitted and aging wastewater system campaigns" which resulted in an estimates 235 properties permitted (included in the total numbers listed above) for septic systems in FY2020.

NAME OF PROGRAM/EVENT	EVENT DATE	TYPE OF AUDIENCE	MS4 CATEGORY	TOTAL REACHED	NOTES
2020					
BernCo at A Glance Monthly Newsletters	7/1/19 – 6/30/20	Adults	SWP	12,000	An estimated 500 hardcopies of each newsletter are printed and distributed via County offices and provided at neighborhood association meetings by the neighborhood coordinator. The neighborhood coordinator also sends the monthly electronic newsletter to all County and City neighborhood associations. It is estimated that these monthly newsletters reach 1,000 people per month and 12,000 people annually.
Bernalillo County HHW Neighborhood Collection Events	7/1/19 – 6/30/20	AdAults	HHW	241	In FY2020, Bernalillo County hosted 7 HHW weekend neighborhood collection events in association with mini-cleanup events. During the 7 events, 241 individuals participated and 5,206 pounds of HHW were collected. An HHW report is available upon request. The HHW report includes historical trend analysis for this outreach program as well as specific collection data per location.
Bernalillo County Solid Waste Illegal Dumping Partnership (IDP) Educational Outreach	7/1/19 – 6/30/20	Adults	HHW	1,200	Hosted 15 community cleanup events. Participated in a virtual Junk Jog with the COA. Created a Tire Recycling and Disposal committee to educate business on the proper way to dispose of tires. Visits began September 2019 and will be ongoing. Distributed to date over 1,200 Carlos Coyote coloring books to various entities in the community.
Bosque Environmental Monitoring Program (BEMP) Monitoring and Educational Outreach Programs	7/1/19 – 6/30/20	Children	AS, ID, PW		Bernalillo County classrooms participated in monthly monitoring programs at 33 monitoring sites. BEMP provided in-classroom and field-based educational programming for 50 Bernalillo county schools. Bernalillo County gave \$75,000 in support of this program.
Bernalillo County Employee Training – Stormwater Quality Training and IDDE Training	7/1/19 – 6/30/20	Adults	SWP	71	Bernalillo County began using a video training service, Excal Visual, Inc., in FY 2018. In FY 2020, 41 people completed the IDDE training and 30 completed the Rain Check Training (general stormwater quality training).
Master Naturalists Volunteering at Bernalillo County Open Space	7/1/19 – 6/30/20	Adults	SWP		Master Naturalists volunteer at the Bernalillo County Open Space workday events as well as with tour and education events for the public. Since the program began in 2010, there have been more than 500 registered volunteers. In FY 2020, there were 906 documented volunteer hours.
RiverXchange Program by Ciudad Soil and Water Conservation District	2019 – 2020 Academic Year	Adults, Children	SWP	972	Bernalillo County supports RiverXchange which gave a series of presentations and hosted field trips for 38 5 <sup>th</sup> -grade classes. Program elements included addressing topics in stormwater, wastewater, drinking water, water use in agriculture and planting field trips. Attendance included 932 students and 40 teachers.


NAME OF PROGRAM/EVENT	EVENT DATE	TYPE OF AUDIENCE	MS4 CATEGORY	TOTAL REACHED	NOTES
<b>2020</b>					
Arroyo Classroom Program, by Ciudad Soil and Water Conservation District	2019 – 2020 Academic Year	Adults, Children	SWP	736	The program, partially funded by Bernalillo County, reaches 736 students in 35 classes. Both in-class presentations and a field trip to an arroyo habitat were part of the program. Students built a watershed model to facilitate their understanding of surface water pollution and prevention.
Annual Bosque Planting Day	2/22/20	Adults	SWP	167	Bernalillo County supported the Bosque Cultural Healing Garden Project for a day of reforestation with volunteers revitalizing the Albuquerque Bosque. Attendance is estimated at 167 volunteers.
Sponsorship of New Mexico Land and Water Summit	2/27 – 2/28/20	Adults	SWP	154	Bernalillo County provided the New Mexico Land and Water Summit with a sponsorship of \$5,000. Topics discussed at the summit included green stormwater infrastructure, watershed restoration and management, and public outreach and engagement. Attendees included 154 professionals in the fields of hydrology, landscape architecture, landscaping and engineering. The field trips included two Bernalillo County projects – Alameda Drain Train and South 2 <sup>nd</sup> Street Project.
New Mexico Arbor Day Celebration	3/14/20	All Ages	SWP		Bernalillo County sponsored an event promoting tree care, environmental responsibility and community involvement in making Albuquerque “greener.” The event included tree care and planting demos.
Talking Talons Youth Leadership	4/29/20	Children	SWP		Bernalillo County provided online resources and worksheets to teach 6 <sup>th</sup> -graders about land use impacts on stormwater and the river, human activities and their impacts, and things kids can do to reduce stormwater pollution.
Pueblo of Isleta Environment Department Alternative 2020 Environmental Fair	6/26/20	All Ages	SWP	250	Bernalillo County put together an online activity book with educational information about pet waste and watershed health for 250 fair participants
SSCAFCA Facility Outreach	2019-2020	All Ages	SWP		SSCAFCA deployed approximately 100 “There is no Poop Fairy” signs at all SSCAFCA-owned facilities to inform the public and encourage them to scoop and remove animal waste

AS: Animal Sources                      ID: Illicit Discharges                      SWP: General Stormwater Pollution Prevention  
 CON: Construction                      PW: Pet Waste  
 HHW: Household Hazardous Waste                      SSS: Septic & Sanitary Sewer Systems

## **Exhibit 2**

# **Sample Surveys and Survey Analytics 2019-2020**

The Mid Rio Grande Storm Water Quality Team organized a short survey addressing various water quality issues affecting the Rio Grande. The graphs on the following pages reflect the tallied results of the 10-question voluntary questionnaire from May 2014 – November 2019. The total number of surveys recorded are 5,830.



**Please Tell Us What You Think!**

What is your zip code? \_\_\_\_\_

Please tell us which category best describes your age:

☐ Younger than 18  
☐ 18-30  
☐ 31-50  
☐ 51-65  
☐ Older than 65

Storm water runoff is defined as rainfall that doesn't soak into the ground and collects on the ground surface. Do you think that storm water runoff affects the quality of water in the Rio Grande?

☐ Yes   ☐ No   ☐ Unsure

Which of the following would you be willing to do or are you currently doing at home or at work to improve the quality of storm water runoff? Check all that apply:

a. Pick up after your dog/pet and dispose of waste in the trash

☐ Currently Do   ☐ Will Do   ☐ Won't Do

b. Reduce, reuse, and recycle trash

☐ Currently Do   ☐ Will Do   ☐ Won't Do

c. Pay an additional minor monthly fee on your water bill

☐ Would Do   ☐ Won't Do

Note: If you answered "Would Do" above, how much would you be willing to pay?

☐ \$1   ☐ \$2   ☐ \$3   ☐ \$5   ☐ more than \$5

Turn over to complete the survey ➡

d. Reduce use of toxic chemicals outdoors (pesticides, herbicides, overuse of fertilizers)

☐ Currently Do   ☐ Will Do   ☐ Won't Do

e. Fix oil leaks on cars or trucks

☐ Currently Do   ☐ Will Do   ☐ Won't Do

f. Wash vehicle(s) at full- or self-service car wash

☐ Currently Do   ☐ Will Do   ☐ Won't Do

g. Dispose of household hazardous waste (such as paints or batteries), appliances and electronic devices properly at a collection facility or during a recycling event

☐ Currently Do   ☐ Will Do   ☐ Won't Do

h. Keep chemicals and trash, including leaf litter from blowers and swimming pool water, out of street gutters

☐ Currently Do   ☐ Will Do   ☐ Won't Do

Please make any comments below:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

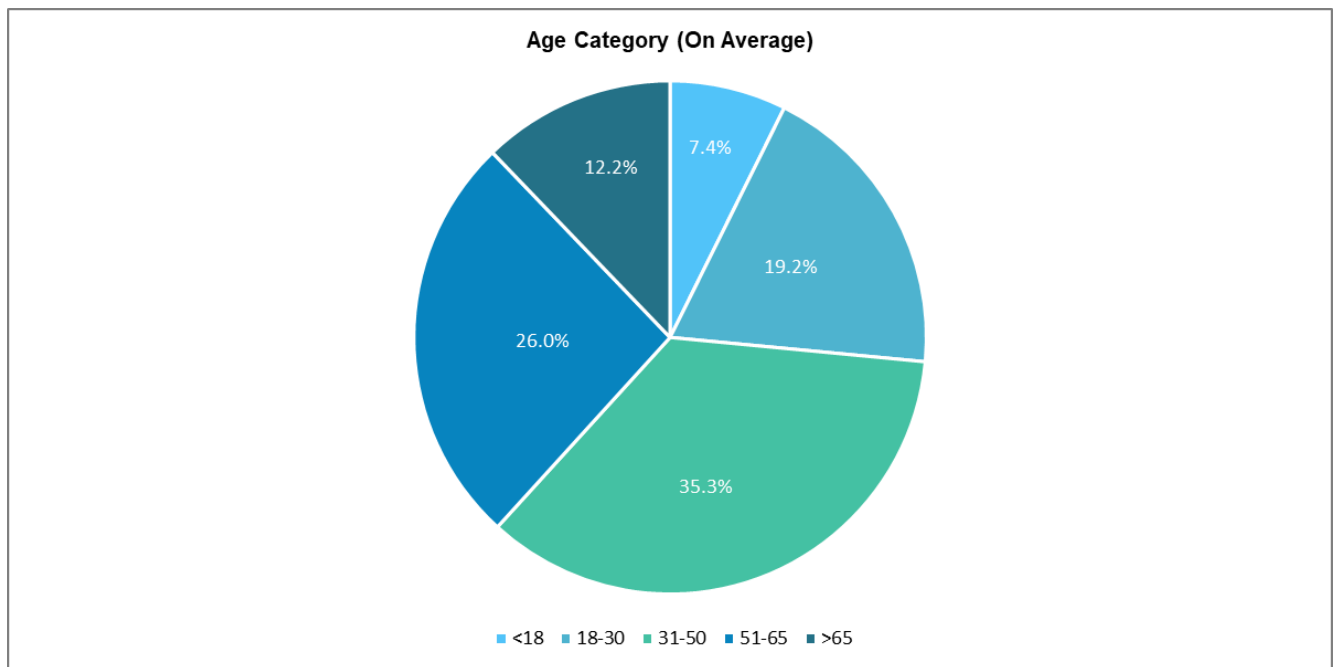
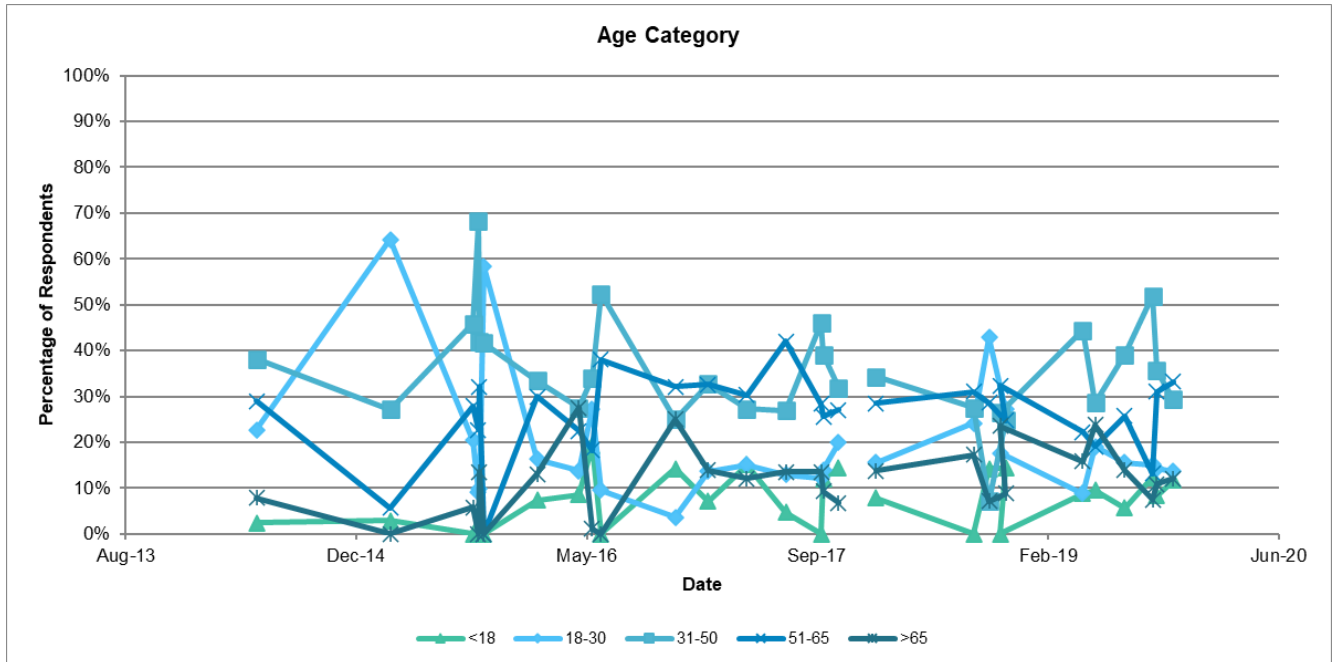
If you would like a reply, please list your name and email or daytime phone number:

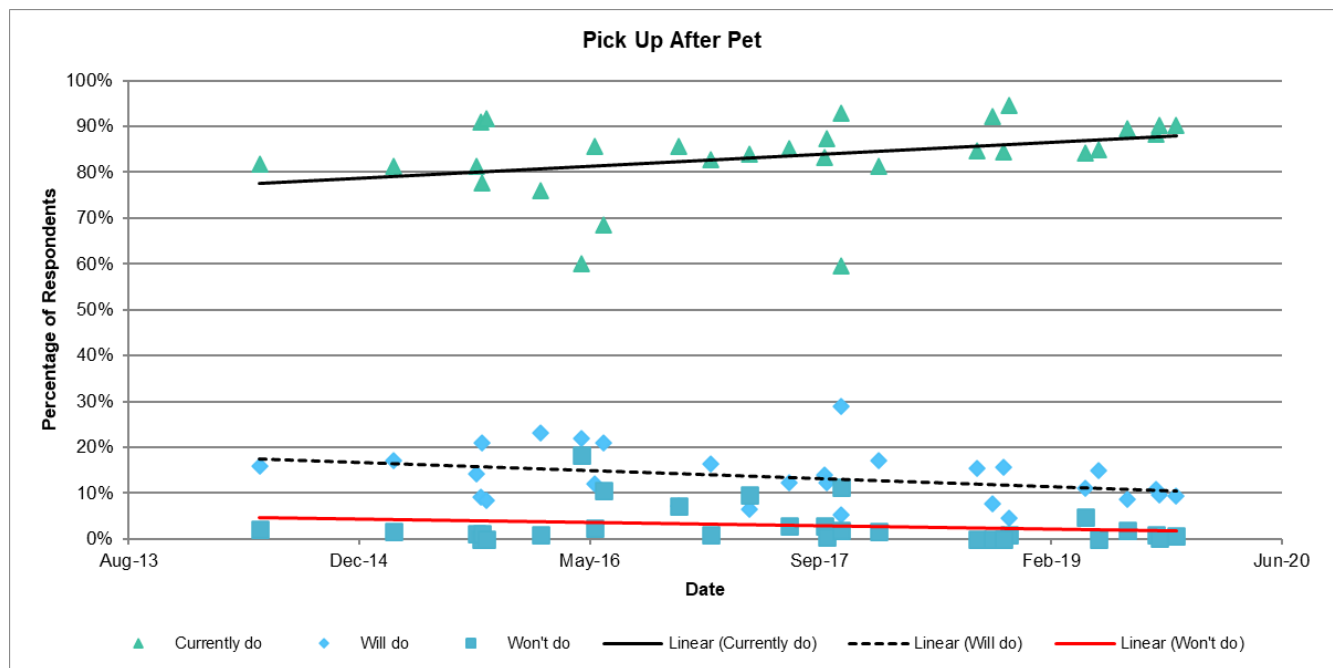
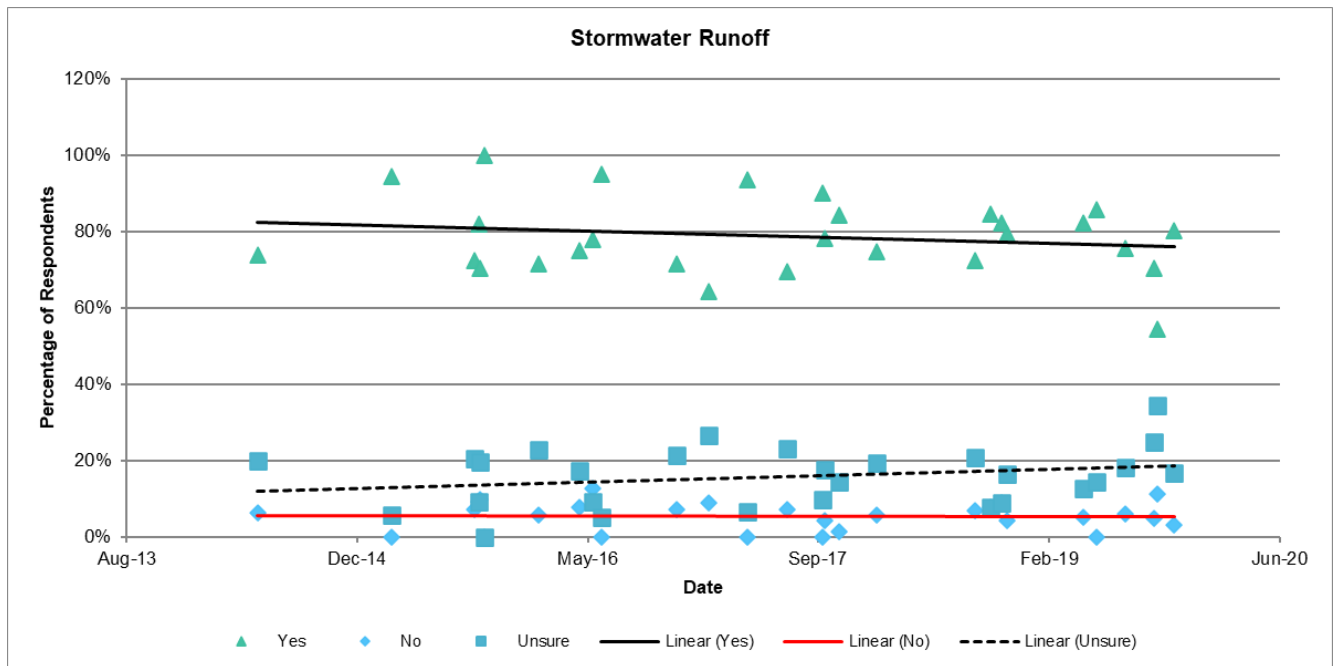
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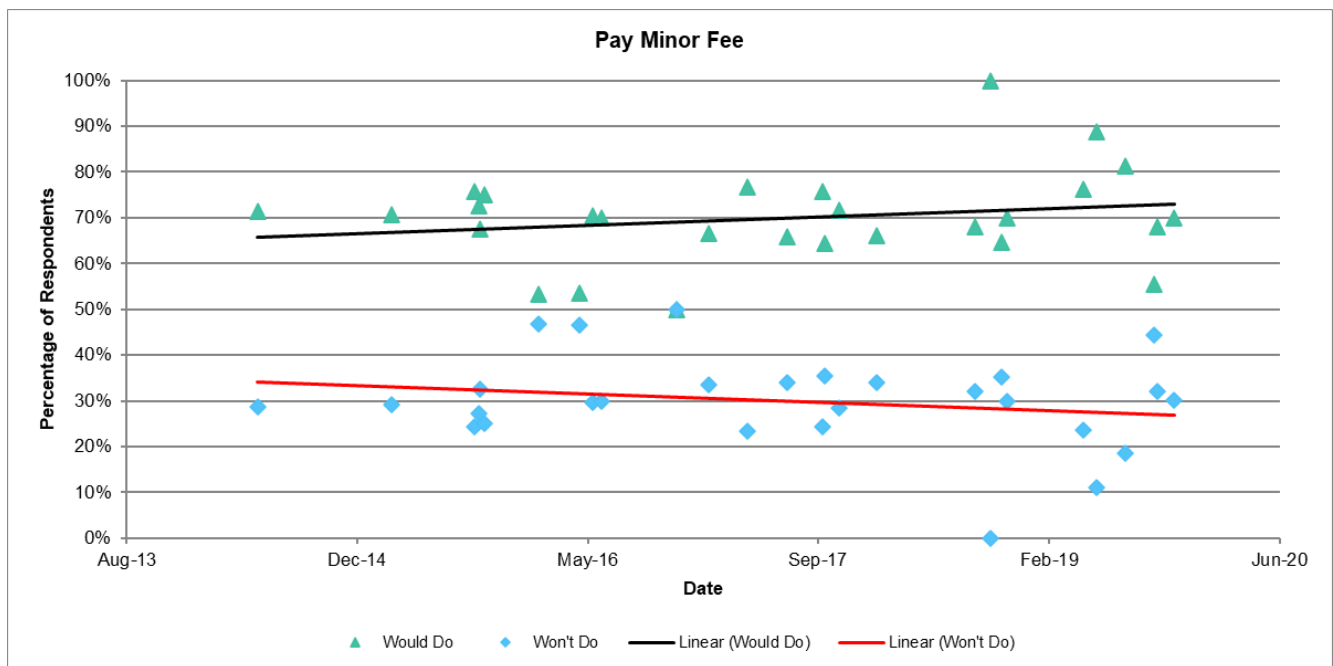
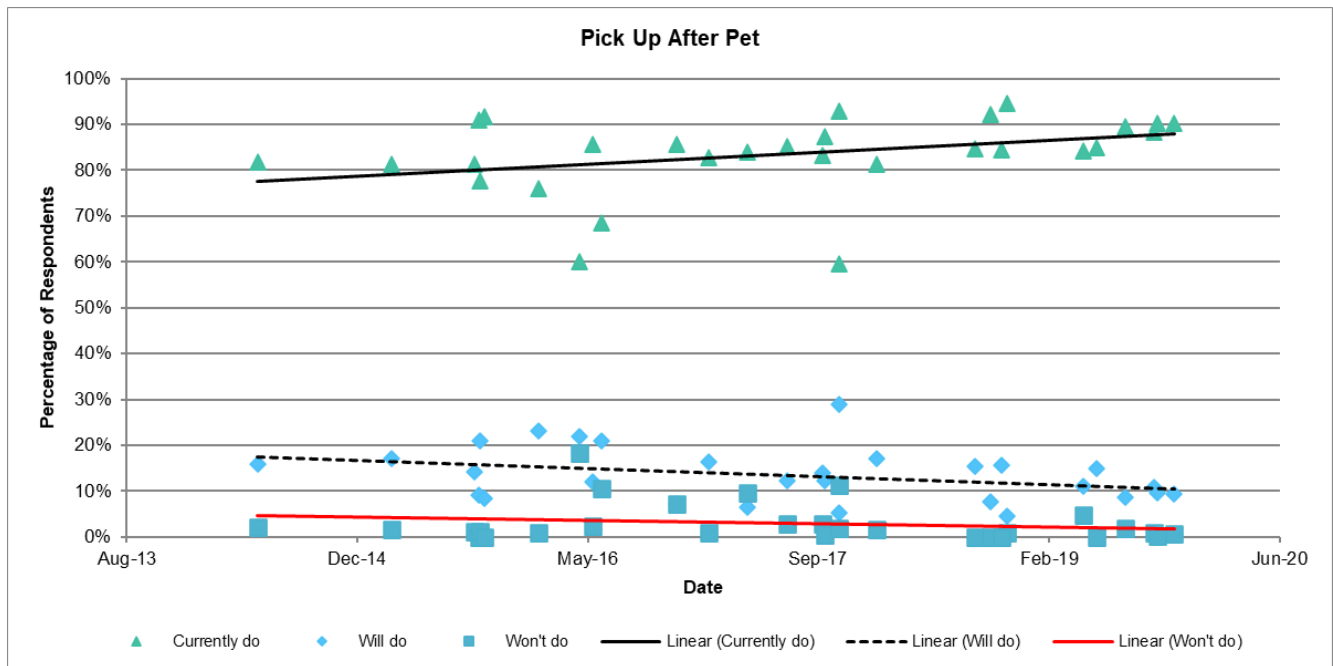
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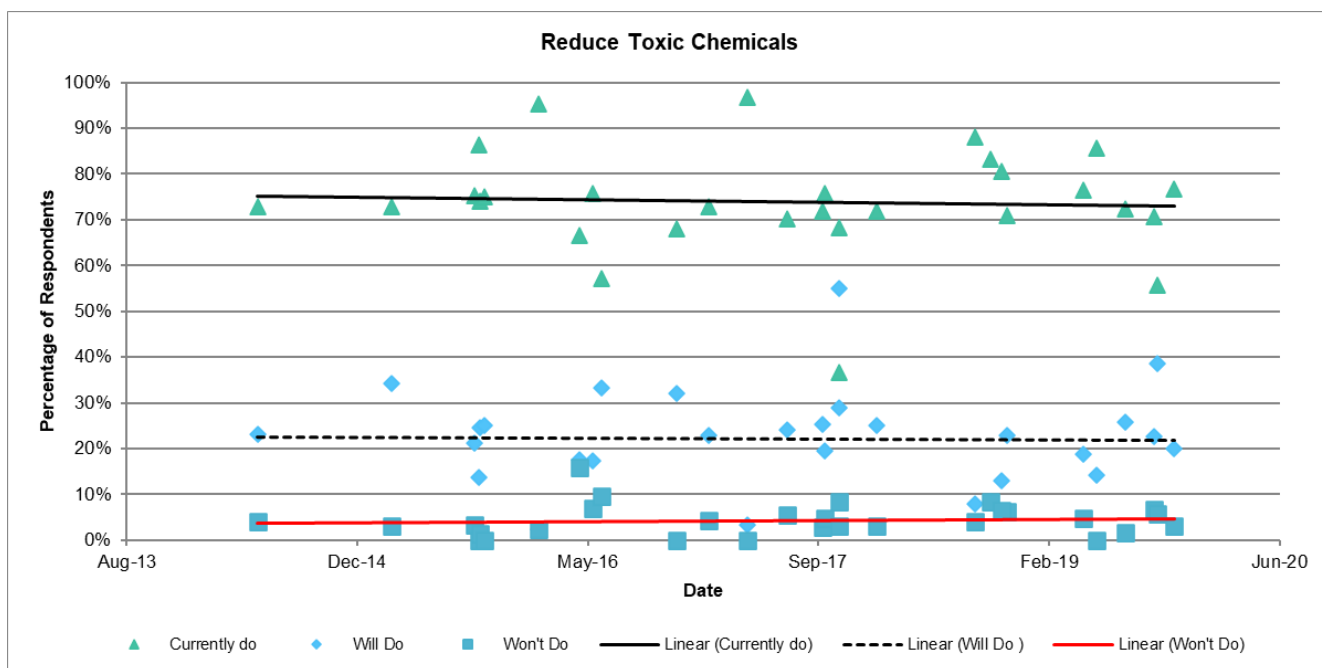
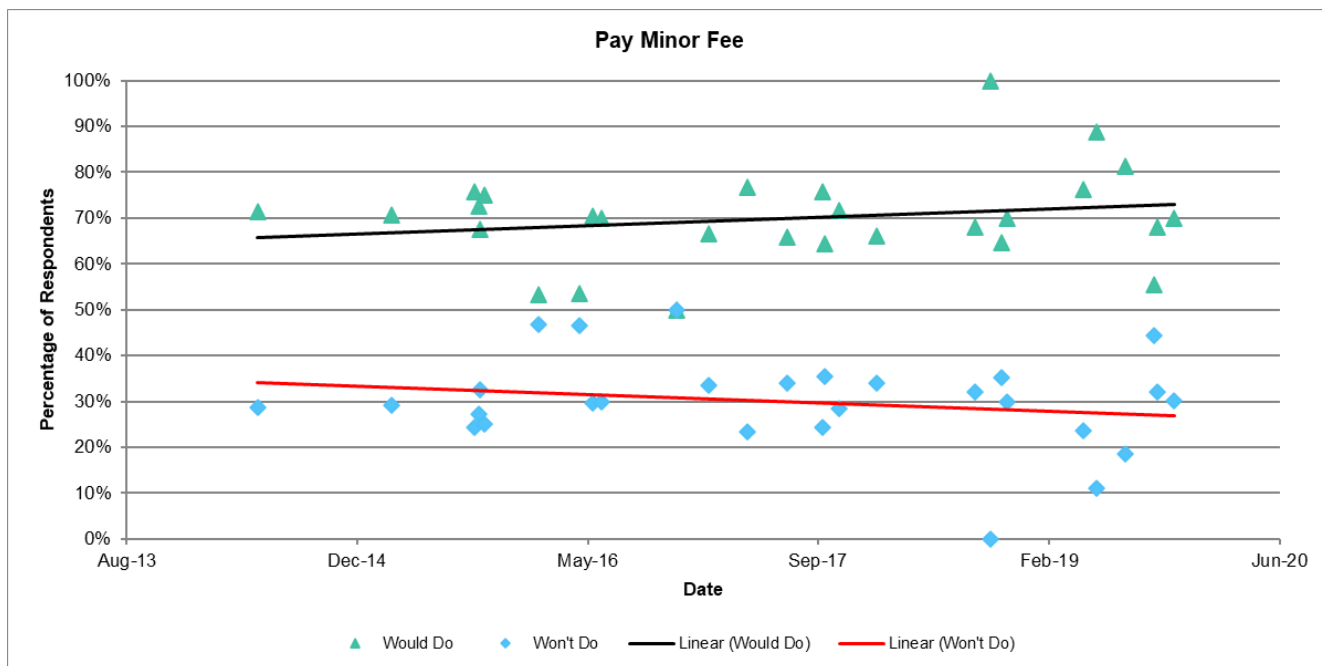
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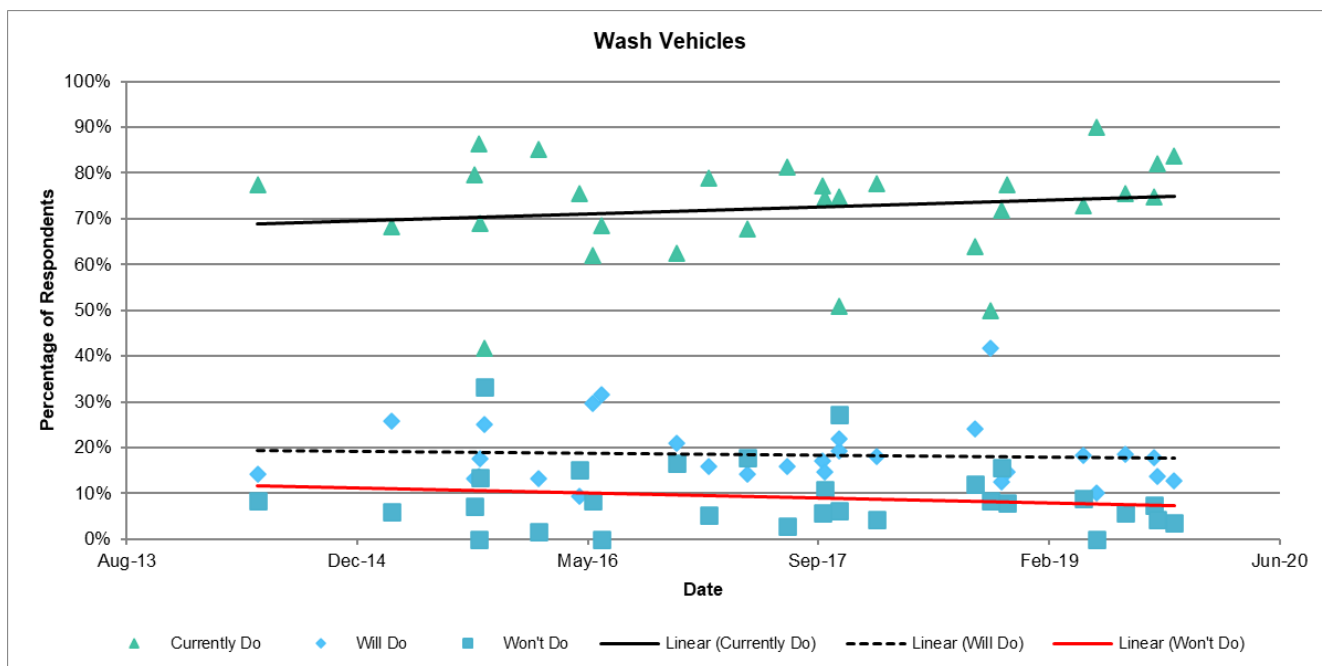
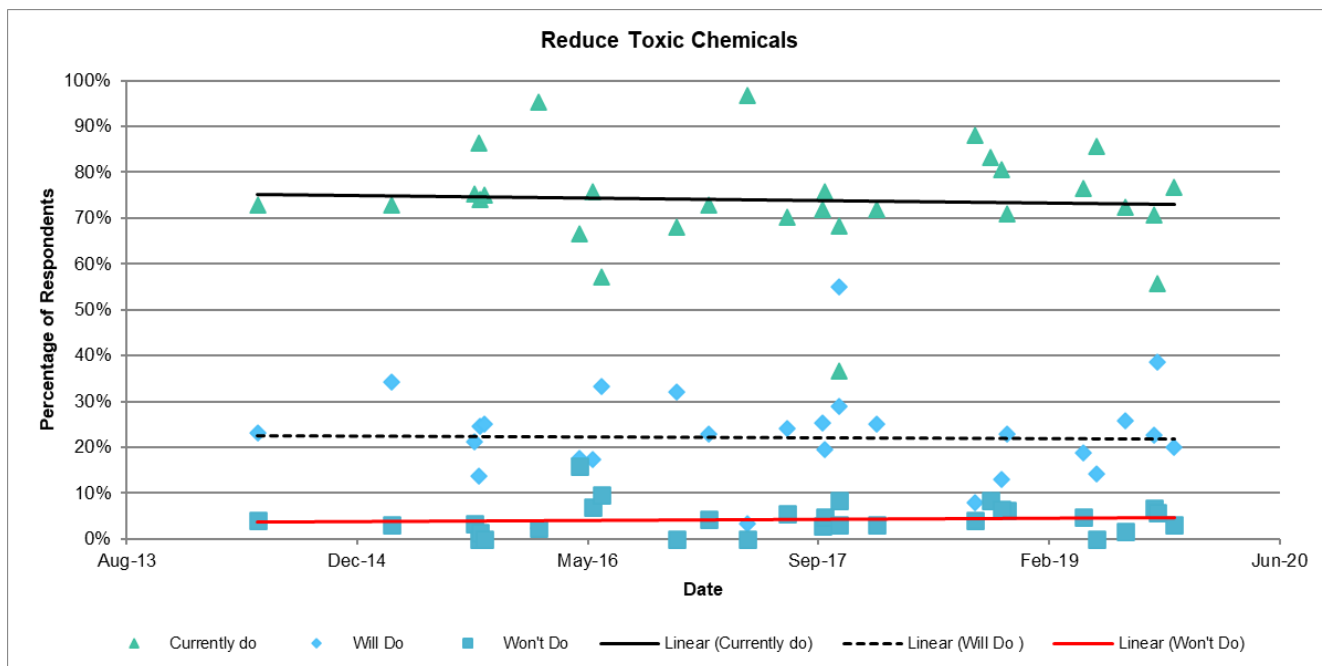


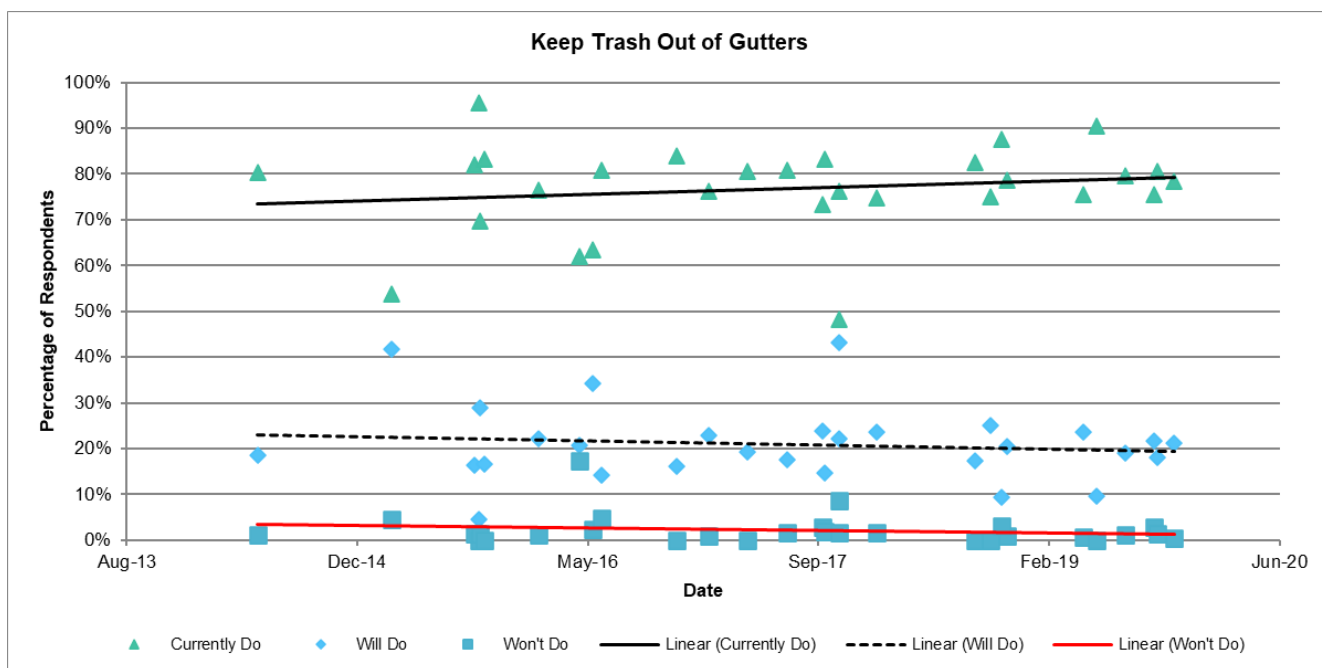
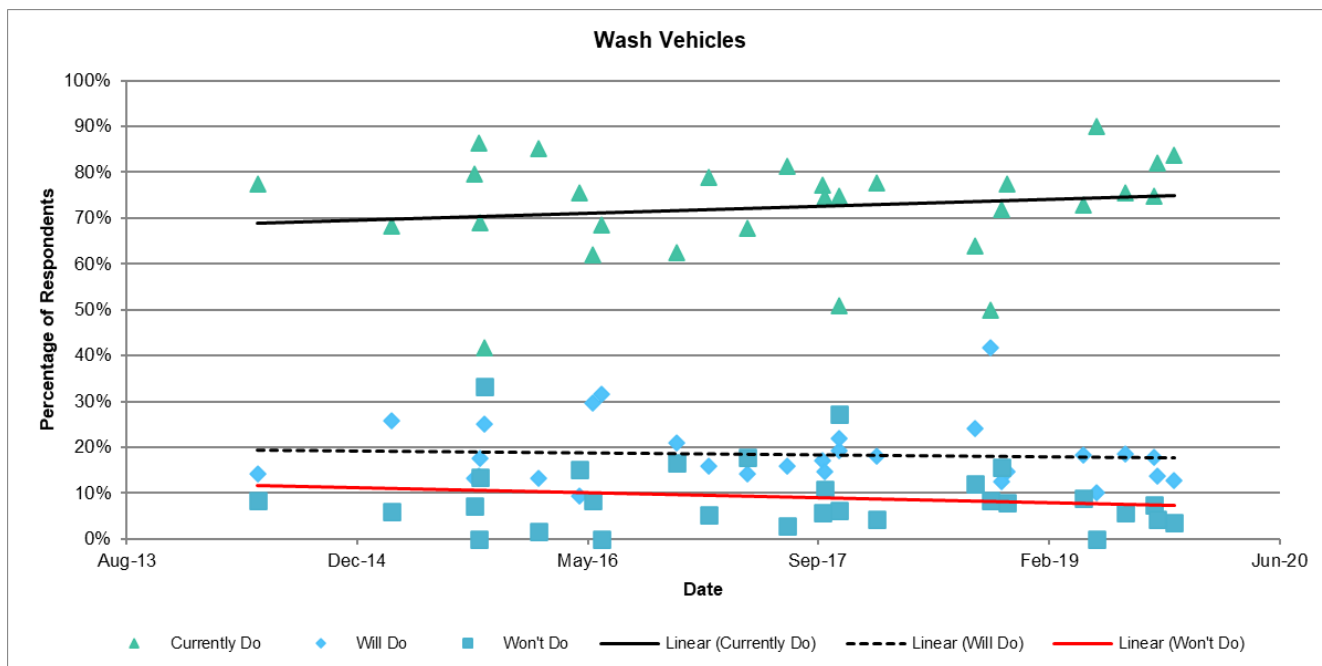


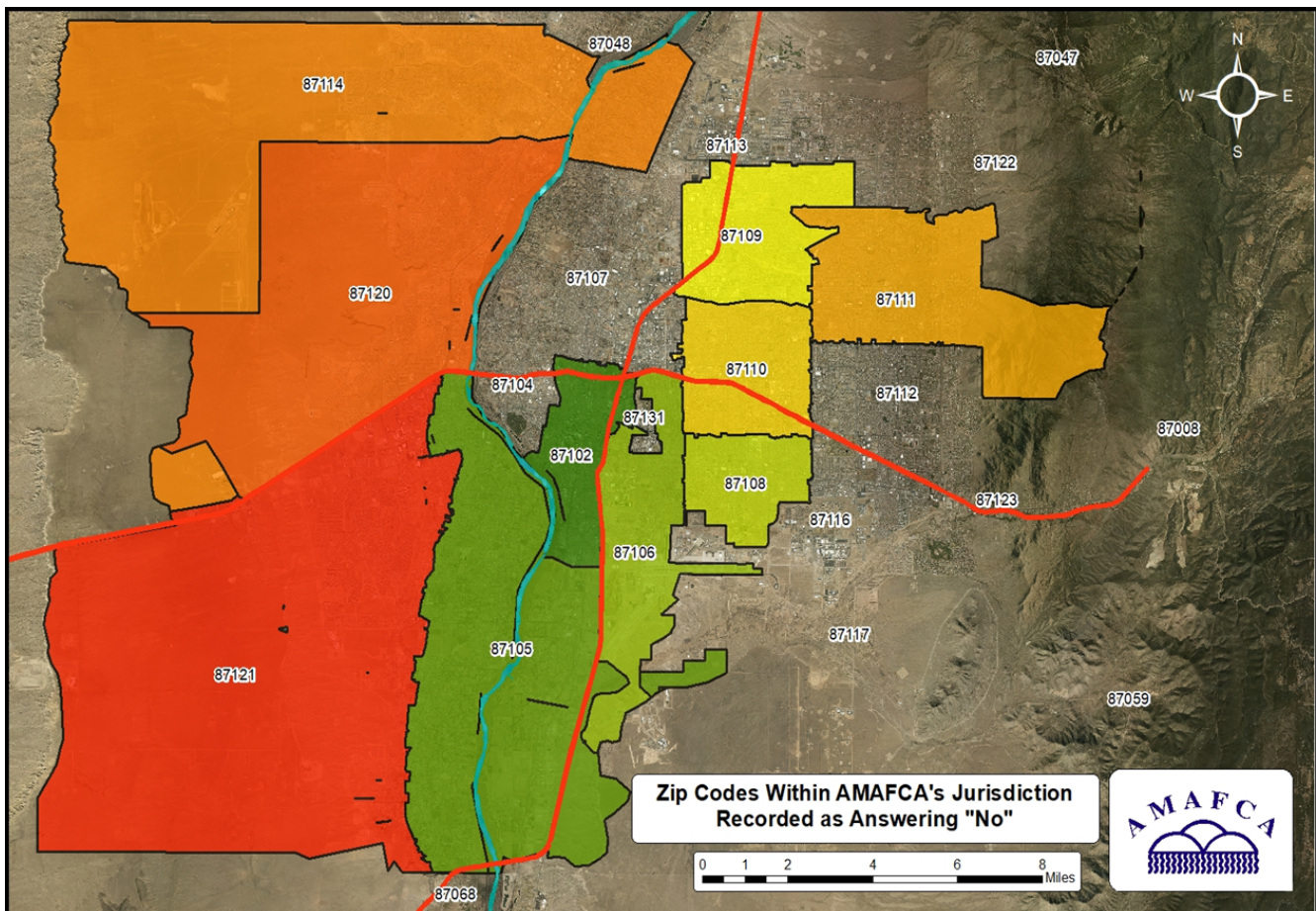
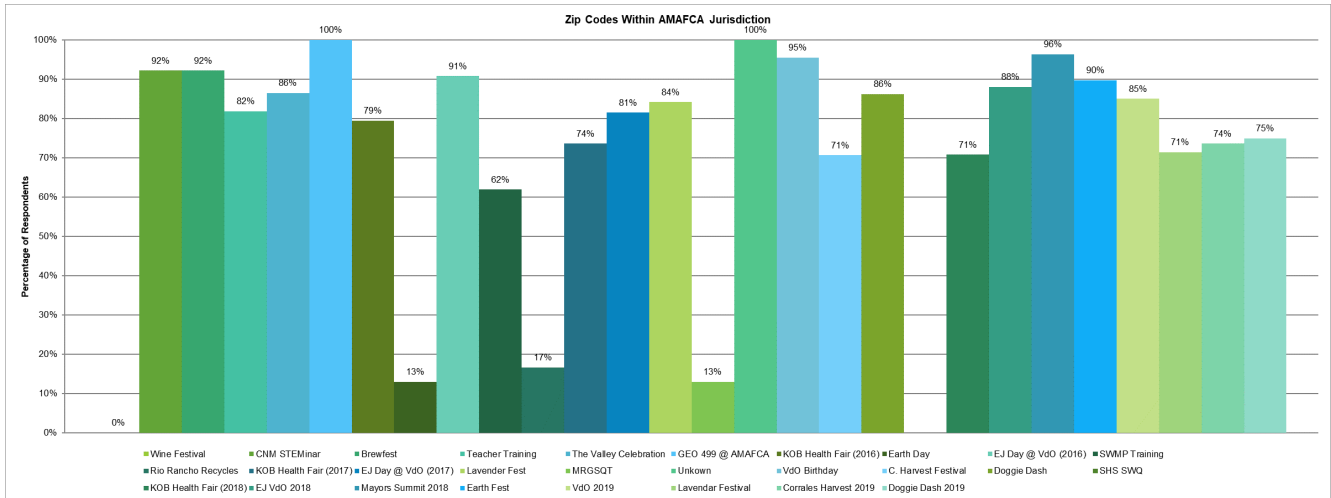




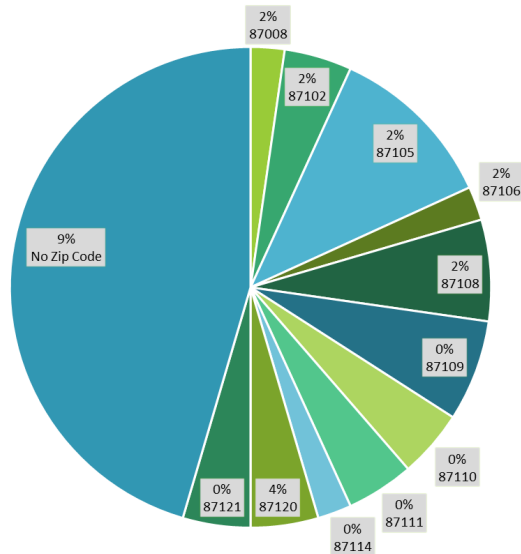








Zip Codes that Answered "No" to Pick Up Pet Waste Question



### Statistics for Pet Waste Question

Item	# of Respondents	% of Respondents
Total Number Who Answered No	56	
Total % w/in AMAFCA Jurisdiction		43%
Total Who Answered "Pet" Question	2,774	
% of Total "Pet" Votes		1.28%
Total "Already Do"	4,526	84.76%
Total "Will Do"	756	14.16%
Total "Wont Do"	108	2.02%
Total Question (Summation)	5,340	100.94%
Error		1.04%

Answered No to Pick up Pet Waste	Number of Votes	% of Votes
79109	1	2%
79782	1	2%
87008	1	2%
87043	1	2%
87044	1	2%
87047		0%
87048		0%
87059		0%
87068		0%
87102	2	4%
87104		0%
87105	5	9%
87106	1	2%
87107		0%
87108	3	5%
87109	3	5%
87110	2	4%
87111	2	4%
87112		0%
87113		0%
87114	1	2%
87116		0%
87117		0%
87120	2	4%
87121	2	4%
87122		0%
87123		0%
87124	1	2%
87131		0%
87144	3	5%
87528	1	2%
87557	1	2%
88310	1	2%
No Zip Code	20	36%
87024	1	2%



Survey Question	Answer	Mean $\pm$ MoE
Stormwater Runoff	Yes	78% $\pm$ 10%
	No	06% $\pm$ 4%
	Unsure	16% $\pm$ 7%
Pick up after pet	Currently do	83% $\pm$ 11%
	Will do	14% $\pm$ 7%
	Won't do	03% $\pm$ 3%
Reduce, Recycle, and Recycle Trash	Currently do	89% $\pm$ 10%
	Will do	10% $\pm$ 6%
	Won't do	01% $\pm$ 2%
Pay Minor Fee	Would Do	70% $\pm$ 11%
	Won't Do	30% $\pm$ 9%
Reduce Use of Toxic Chemicals	Currently do	74% $\pm$ 11%
	Will Do	22% $\pm$ 9%
	Won't Do	05% $\pm$ 4%
Fix Oil Leaks on Vehicle(s)	Currently do	79% $\pm$ 12%
	Will Do	17% $\pm$ 7%
	Won't Do	04% $\pm$ 3%
Wash Vehicles at <a href="#">Full or Self Service</a> Car wash	Currently Do	73% $\pm$ 13%
	Will Do	18% $\pm$ 8%
	Won't Do	09% $\pm$ 5%
Dispose Household Hazardous Waste	Currently Do	75% $\pm$ 12%
	Will Do	21% $\pm$ 8%
	Won't Do	03% $\pm$ 3%
Keep Chemicals/Trash Out of Street Gutters	Currently Do	77% $\pm$ 12%
	Will Do	20% $\pm$ 8%
	Won't Do	03% $\pm$ 3%

## **Exhibit 3**

### **Arroyo Classroom 2019-2020 Final Report**

# Arroyo Classroom

## 2019-2020 final report

submitted by  
Erin Blaz, CSWCD  
May 2020

### SUMMARY

The Arroyo Classroom program utilizes our natural arroyos as outdoor classrooms and brings local animals into the classroom to motivate 3<sup>rd</sup> graders to respect the arroyos as important wildlife habitat. Orilla Consulting, LLC developed the program in 2012 and initially implemented the program for 7 classes at Maggie Cordova Elementary in Rio Rancho. In 2013, the program grew to serve 20 classes. On July 1<sup>st</sup>, 2015, Orilla Consulting, LLC transferred the program to Ciudad Soil and Water Conservation District as part of the larger education and outreach efforts we are involved in throughout Bernalillo and Sandoval Counties. In the 2019-2020 school year, we served 35 classes within Rio Rancho Public Schools, reaching approximately 37 teachers and 736 students.

### Participating Schools

SCHOOL	Number of classes	Number of Students
Enchanted Hills Elem.	6	104
Martin Luther King Elem. *	6	145
Sandia Vista Elem.	4	79
Maggie Cordova Elem. *	7	151
Cielo Azul Elem. *	6	132
Puesta del Sol Elem. *	6	125
<b>TOTALS</b>	<b>35</b>	<b>736</b>

\* Title 1 school

## **Sponsor**

- Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA)

**Sponsor provided a total of \$17,762.77 in cash.**

## **Deliverables:**

*All presentations were completed except for 6 Arroyo Walks due to school closures due to the global pandemic.*

- Watershed Presentations: 35:35
- Arroyo Walk: 29:35
- Bat Presentations: 32:35 (some classes doubled up due to a scheduling issue, all classes completed)
- Owl/Bird Presentations: 35:35

## **Program Description**

The program consists of a four-part series of lessons, based on grade-level science standards and addressing areas of interest to SSCAFCA, such as bats, burrowing owls, ATV use, pet waste, and arroyo safety. Educators Melissa McLamb and Erin Blaz delivered two of the lessons – an introductory lesson about watersheds, and a walking field trip to nearby arroyo habitat. Justin Stevenson of RD Wildlife Management, LLC delivered a lesson using live microbats. Mikal Deese, certified wildlife rehabilitator of non-profit On A Wing And A Prayer, delivered presentations with a live Burrowing Owl or other birds of prey when requested.

The watershed lesson expounds on the water cycle, already integral in 3rd grade curriculum. This year, we developed a hands on lesson where students were able to build a model of a watershed. This lesson introduces the concept of a watershed to students, demonstrates how surface water becomes polluted through a variety of waste, and discusses the importance of keeping our arroyos clean.

The arroyo walk is a highlight for students and teachers, as the majority of participating classes only receive one other field trip during the school year, and students always come away learning something new and interesting about the uniqueness of arroyo habitat. This lesson is about the unique adaptations of arroyo animals and plants, incorporates a walk out to a nearby arroyo (when available) and extensive discussion about arroyo safety (*see lesson plan in Appendix A.*) Melissa first talked to students about the difference between concrete-lined channels and sandy-bottomed arroyos, and emphasized that it is never safe to go into concrete-lined channels, while sandy-bottomed arroyos can be visited when there are no clouds in the sky. Students searched for evidence of animals living in the arroyo banks, learned about how lizards and other cold-blooded animals are adapted to the desert environment by moving about to regulate their temperature. They also looked for certain adaptations of desert plants to minimize water loss in the desert.

In the lesson about bats, Justin discussed common myths about bats while pointing out how

these myths can pose issues for bat populations as he addressed each one. He taught students about species common in their area, including what habitat they prefer, what they eat, the challenges they face, and what to do if one sees an injured bat. He talked about how important bats are in keeping insect populations under control, shared ways to encourage and protect bats and emphasized that kids should not be frightened of them, but also should never touch a bat if they find one. Students were able to view two different species of live microbats.

This year in addition to the burrowing owl lesson Mikal Deese, certified wildlife rehabilitator of non-profit On A Wing And A Prayer,, was able to offer an alternative lesson using other birds of prey, as an accommodation for students and teachers that have cultural sensitivities to owls. When requested, Mikal brought in three birds for students to observe - an American Kestrel, Peregrine Falcon and a Swainson's Hawk. In this presentation Mikal gives a wonderful talk that covers habitat, behaviors and threats to these species. As a bird rehabilitator she also shares the personal story of each bird. After each bird, Mikal gives students a turn to ask questions and students sit attentively in and engage in a stimulating back and forth session sparked by their curiosity.

When presenting the burrowing owl, Mikal included a fun role-playing activity for students where they had to collect food (dried beans) and bring them back to their chicks. Some kids played adults, others were hungry chicks and in the midst of all the fun and chaos, important lessons are learned. Students get to experience the challenges in competing for food, and learn about human impacts on the food chain - some beans are colored differently and represent pesticides or poisons, which sadly kills off burrowing owls. Students also get to observe the burrowing owl up close and learn about ways to respect and protect their habitat.

## Evaluation

Teacher feedback for 2019-2020 was positive and encouraging. Teachers overwhelmingly say they choose to participate in Arroyo Classroom to teach about local ecology and conservation issues, incorporate more science in the classroom and to offer experiential learning opportunities. They find the presentations to be uniquely engaging and meaningful for their students. Teachers find that Arroyo Classroom is complementary to other 3rd grade units of study such as life cycles and animal adaptations and that the chance to have live animals in their classrooms really helps students integrate what they've learned. As one teacher puts it, "There is much more of an 'a ha' moment when students see this in natural forms versus a created classroom environment. Further, when they meet the animals, they like them and there is more of a connection that they can hurt that animal if they do not respect the environment" (Kelly, MLK).

Teachers continue to ask for extension activities and some kind of pre-presentation activity to help prime students for the content presented. With the addition of 3 classes this year, there was not as much additional time as was hoped to work on providing these resources to teachers. However the creation of online/virtual/at-home alternatives to our in-class presentations (in case of future school closures) will also provide us with resources teachers can use before and after presentations during normal programming.

### Highlights from teacher feedback:

"My students really got an understanding of conservation and their impact." -Lewis, MLK

"My students really enjoyed the program this year. I thought the changes to the owl/bird presentation made it so much more interactive! The greatest learning outcomes my students had were the connections they made to their surroundings and community. They were able to learn about an ecosystem that they basically lived in. They connected these ideas when learning about animal and plant reproduction and traits." - Eisenberg, MLK

"Exposure to local ecology and have students start thinking about how they can make a difference in our community to promote conservation. Increase curiosity and knowledge of local wildlife." - Cooper, Enchanted Hills

"We really enjoyed the owls and the bats! Students are more excited to learn about a subject when they have an experience to attach/ relate their learning to. We also enjoyed the hands-on activities provided with each of the lessons." -Davis, Puesta del Sol

"I believe this past year was the best year to date. The presenters were engaging and were able to manage student conduct in a knowledgeable way. The activities were also relevant and engaging. The introduction to watersheds allowed students a hands-on activity that related well to the content being taught. The arroyo walk is also a great way to expose the students to the environment directly around them, looking at it through a different lens". - O'Connor, MLK

## Survey Summary

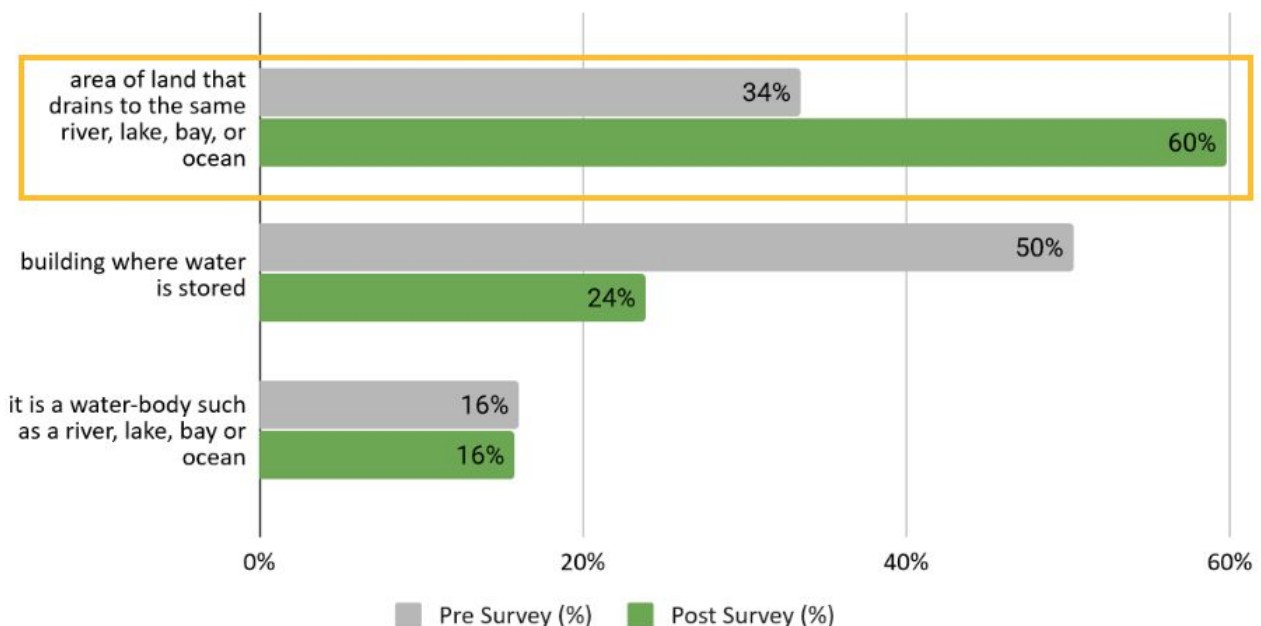
This is the second year that we've administered the pre and post surveys for Arroyo Classroom and we ran into a significant challenge in getting post-survey responses because it was distributed to teachers just before COVID-19 shut down the schools. It was recommended to teachers to share it on an online platform, like google classroom, but we only received 232 responses compared to 518 pre-survey responses.

Even with fewer responses this year, in reviewing the metrics there appear to be other challenges with the survey. Across questions a majority of students are answering correctly in the pre-survey. On one hand this is great news to hear that students have an awareness of what arroyos are, arroyo habit and arroyo safety. However, this doesn't tell us much about the program's impact. We will revisit these questions over the summer to try to narrow down the learning outcomes and growth we are looking for. This survey does not have behavior questions either. While we are finding behavior change questions have their own challenges to evaluate, it may be more significant to evaluate behavior change for Arroyo Classroom in order to see how their learning is translated.

## Survey Metrics:

### Item 1

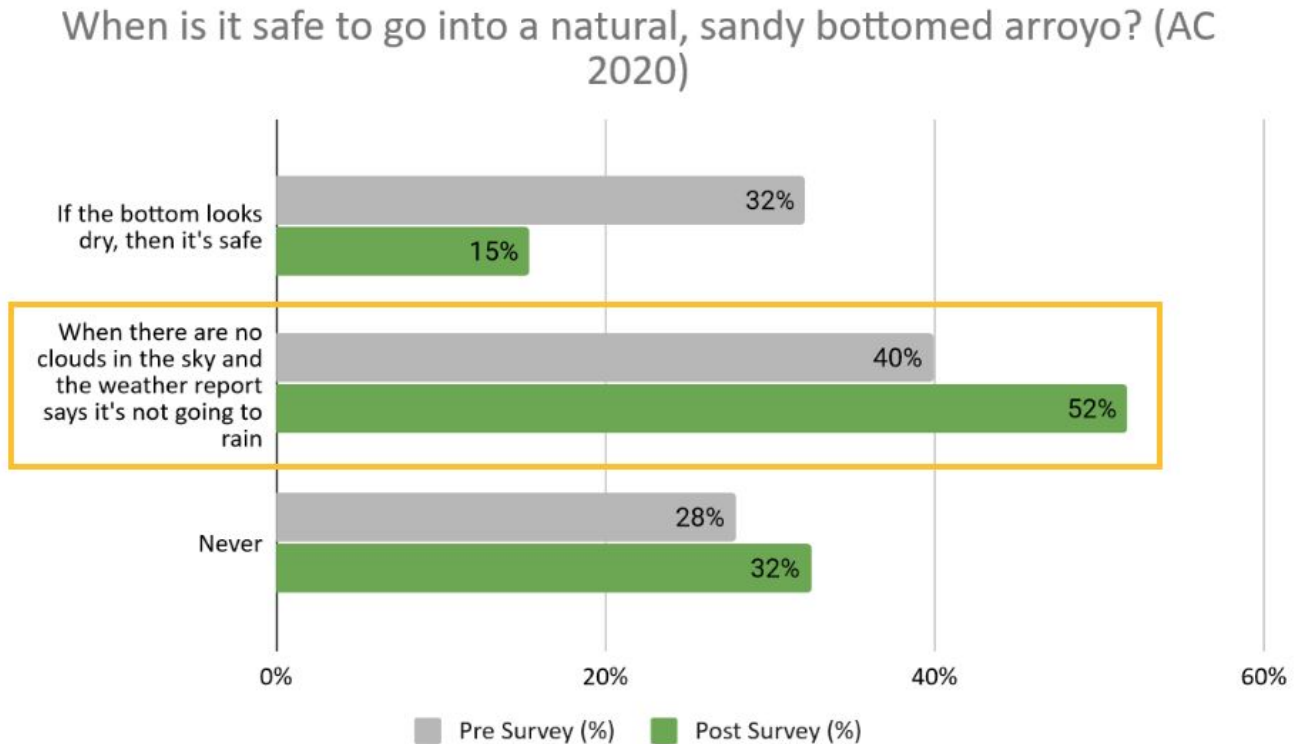
What is a watershed (also known as a catchment or drainage basin)?  
(AC 2020)



The increase in correct answers for 'what is a watershed' is notable. This could be a result of the improved watershed lesson that was implemented last year, or that teachers are doing a better job of reinforcing the concept. Another interesting finding is that there is an increase in kids claiming it is

never safe to go in an arroyo in the post-survey. This happened last year as well.

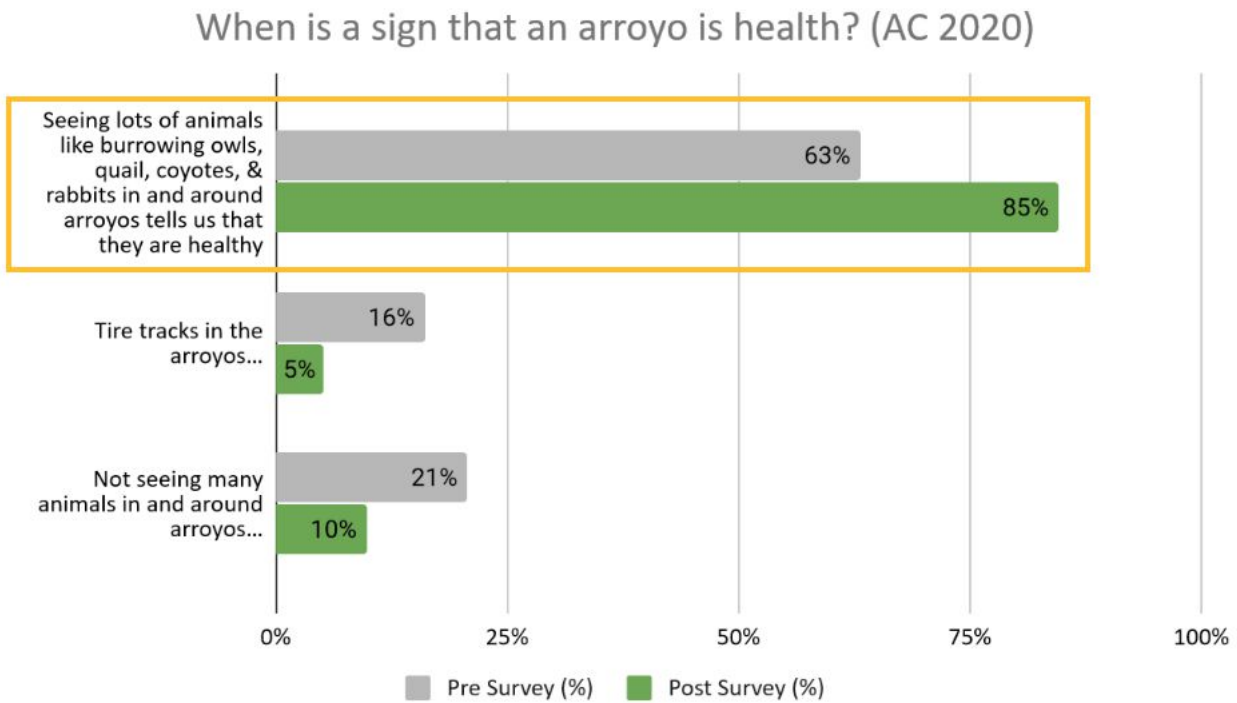
## Item 2



Another interesting finding is that there is an increase in kids claiming it is never safe to go in an arroyo in the post-survey. This happened last year as well. Extension activities that follow up on the presentation would be helpful in clarifying when it is safe to go in a sandy-bottomed arroyo. The Arroyo Walk can be a stimulating experience and some kids might just miss this information. It may be worth repeating in the watershed presentation as well.



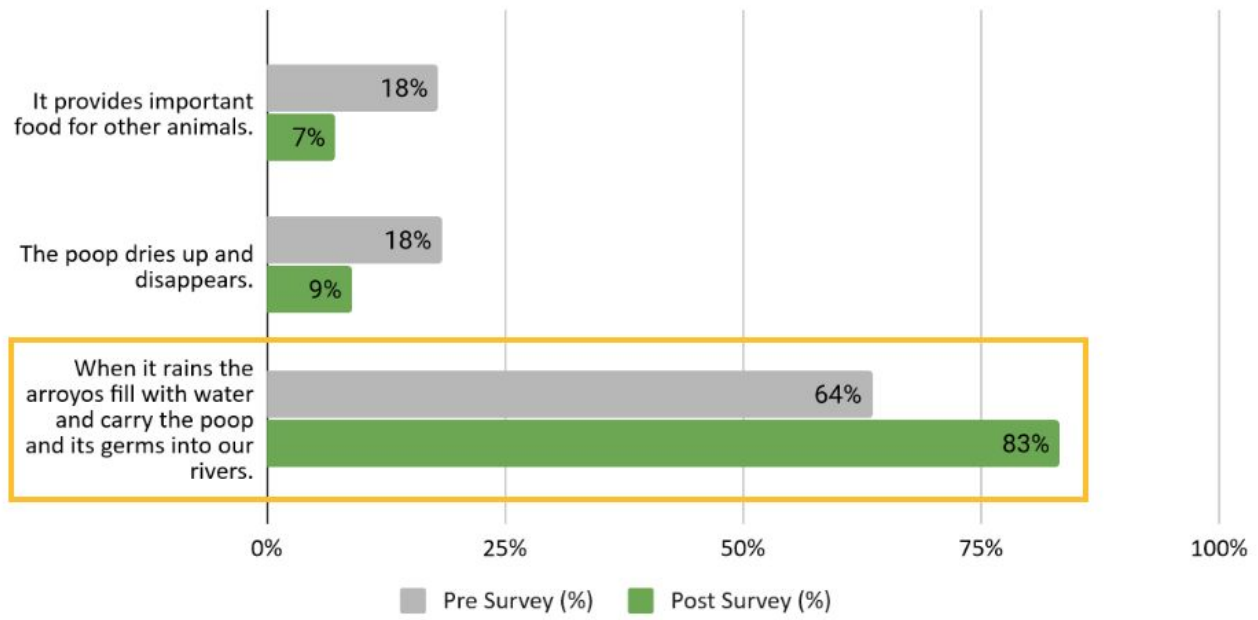
### Item 3



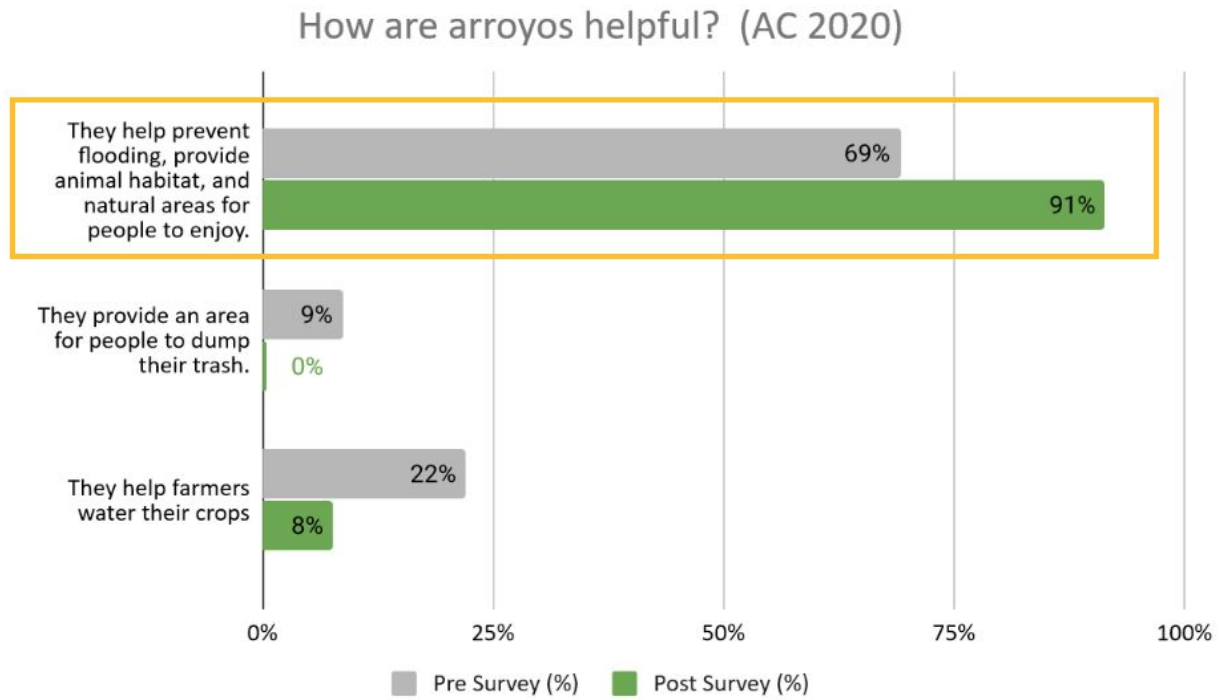
The incorrect answers in the question may be too leading. Kids might not understand the importance of species diversity when they answer this in the pre-survey, but they can assume that tire tracks and lack of animals is not a sign of health. They may have more contextual understanding in the post-survey, but we can not know for sure.

#### Item 4

What happens to dog poop that doesn't get picked up from our yards and around town? (AC 2020)



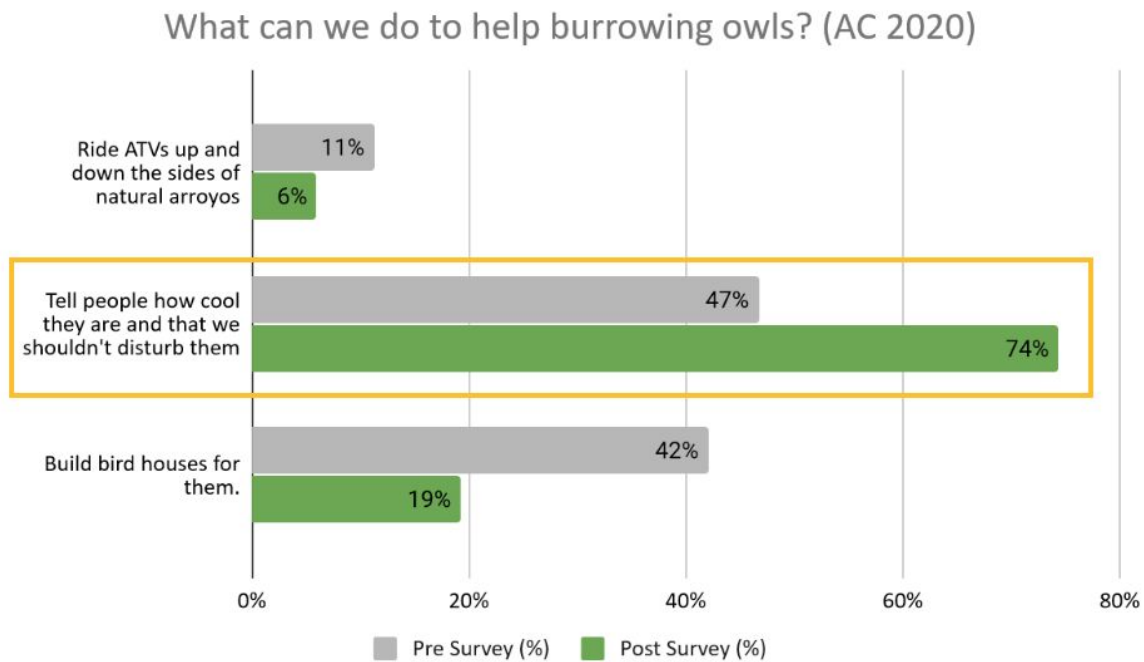
## Item 5



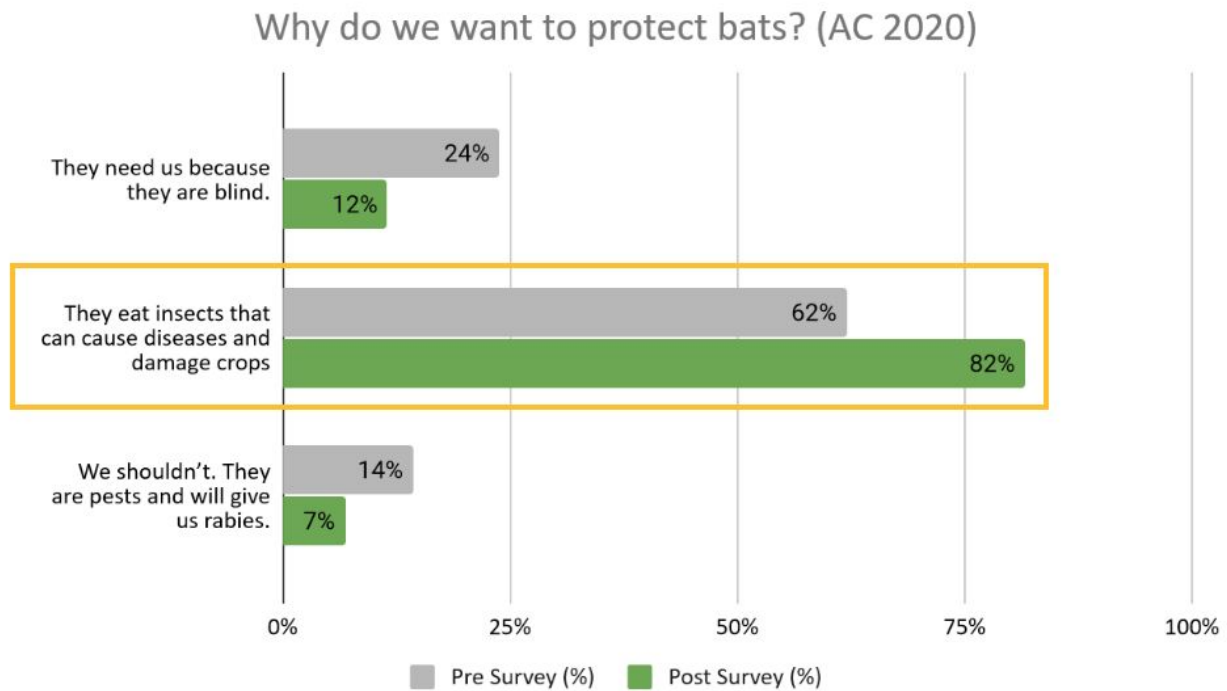
This question was adjusted to make the answers less obvious. The most important finding is that no one answered that arroyo is a place to dump trash in the post-survey!

The following items 6, 7 and 8 demonstrate similar patterns to those above where the majority of students are answering correctly on the pre-survey, with a positive increase in correct responses on the post. These results are also extremely similar to the year before and this is not particularly informative. The questions will need to be revised for next year.

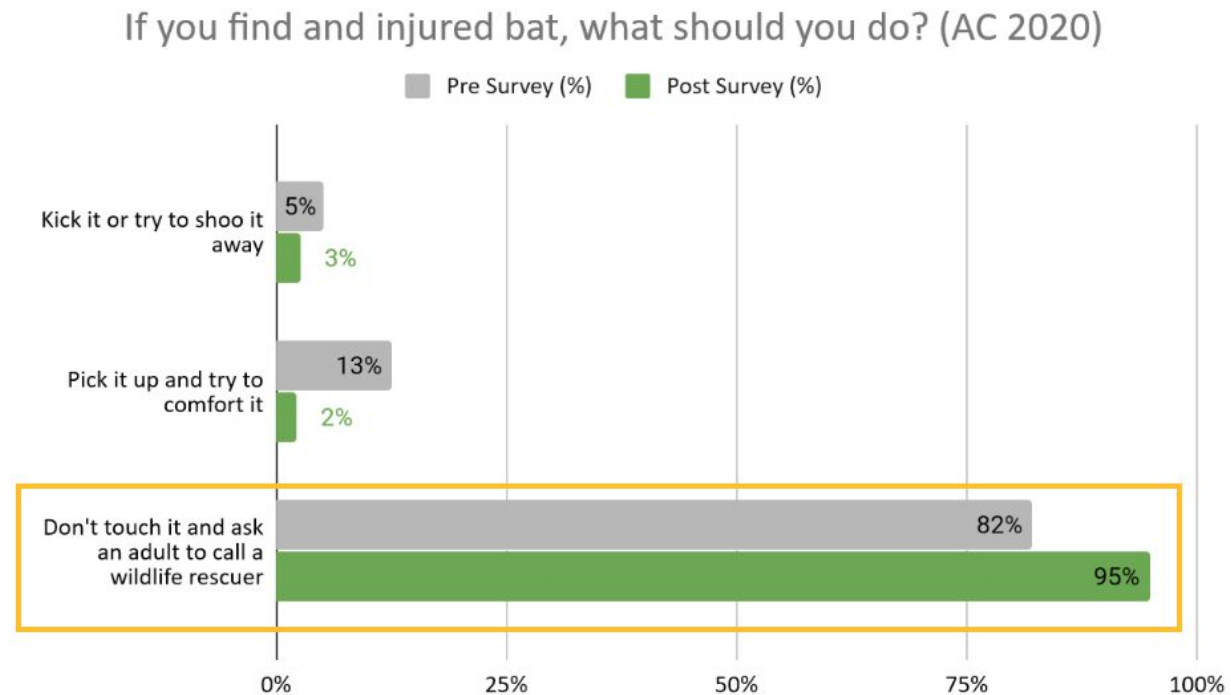
### Item 6



## Item 7



## Item 8



*Appendix A contains lesson plans; Appendix B contains supplemental materials; Appendix C contains photos.*



## Appendix A

### Lesson Plans

#### *Activity Guide for 3<sup>rd</sup> Grade – Animal and Plant Adaptations*

##### 1. What are we trying to teach the students in this activity?

Arroyos are cool places where animals live, animals and plants are adapted to live in the desert.

##### 2. How can we tie this activity to our teaching goals:

Our Goals	Where we can relate our goals to this activity
Animals live in arroyos	Look for evidence of animals.
We should visit arroyos carefully	Talk about when it is safe.
Picking up dog poop keeps germs out of our river	We'll probably see poop, talk about how it can make animals sick.

##### Supplies:

- Thermometers
- Clipboards
- Poster of leaf adaptations
- Wax paper
- Paper towels
- Tape

##### 3. How can we tie this activity to standards?

- Measure energy (temperature change)
- Posing a question, using numerical data, various methods to display results
- Animals and plants have adaptations that improve chances of survival
- Classifying animals and plants
- Living things cause changes to their environment, some detrimental, some beneficial

##### 5. How should this activity be organized?

###### I. Pre-activity (10 minutes)

- Do you ever visit/play in arroyos? What do you do?
- What are arroyos for? Managing stormwater to keep our town from flooding when we get a heavy rain. **Show first flush video.**
- Talk about arroyo safety – don't go into arroyos when you see clouds in the sky.
- Because our arroyos are natural, with sandy sides and bottom, they are safer.
- In Albuquerque, the arroyos have concrete sides and water travels so fast, it is really dangerous to ever go in arroyos. Some arroyos come from the canyon where it might be raining but you can't see.
- Our arroyos are home to all kinds of animals and plants, so they are a wonderful place to enjoy nature. What kinds of animals do you think might live in the arroyo?
- Walk out to arroyo

###### II. Lizard activity (15 min)

- 5min Look for evidence of animals. What kind of evidence? Scat, tracks, holes.

- What kind of animals live in holes (besides snakes)?
- What do you think makes it difficult to live out here? Heat, sunburn, not much water, cold at night. Animals and plants have special **adaptations** (special things about their bodies) that make it easier for them to live in this habitat.
- How do they get water? From plants, from condensation under rocks.
- How could they avoid heat? Stay in burrows or shade during the day, active at night.
- Some animals love the heat, though! Lizards are cold-blooded, which doesn't mean they are actually cold. It means their body temperature is determined by the environment. They need to absorb heat from their surroundings to function.
- Each student take a thermometer. This is a lizard, and it needs to maintain its body temperature at a certain level: fence lizard 35C (95F), whiptail 38.6C (101F). How can it keep from getting too hot? How can it keep from getting too cold? Lizards regulate their body temperature through behavior.
- Plants do kind of the same thing – hold one palm out flat, one sideways. Which feels hotter? Prickly pear cactus pads grow sideways instead of flat to keep themselves cool!

#### IV. Plant activity (15 min)

- What do plants need in order to survive? Water, sunlight, air, soil
- What makes it difficult for plants in the desert? It's so hot and there's so little rain.
- How do plants get water? **Show evapotranspiration diagram.** It's kind of like when we're hot, we sweat. But if we lose too much water from sweating we get dehydrated.
- How do they keep cool? Remember prickly pear? **Show pictures of hedgehog and prickly pear cacti.** Desert plants can shade themselves! Hedgehog cactus has lots of spines that shade the surface and also blocks the wind.
- The leaves of many desert plants are **adapted** so that they don't lose too much water.
- Show leaf adaptations poster (fuzzy, small, curled, waxy, green stems but no leaves)

#### If weather is ok:

- Out in arroyo, we'll do an investigation.
- How many of the plants we see will have these adaptations? Hypothesize.
- To be fair, we can't just pick the plants we like. Standing in one spot, collect the first 6 *different* leaves you see.
- Draw each one, and describe what adaptation it has.
- How many of your 6 leaves have one of the adaptations listed?
- Why don't all have it? Some plants avoid the heat by just growing and producing seed really fast before the weather gets hot, and then they just die off and leave their seeds to grow next year!
- Search for seeds.

#### If windy, inside activity:

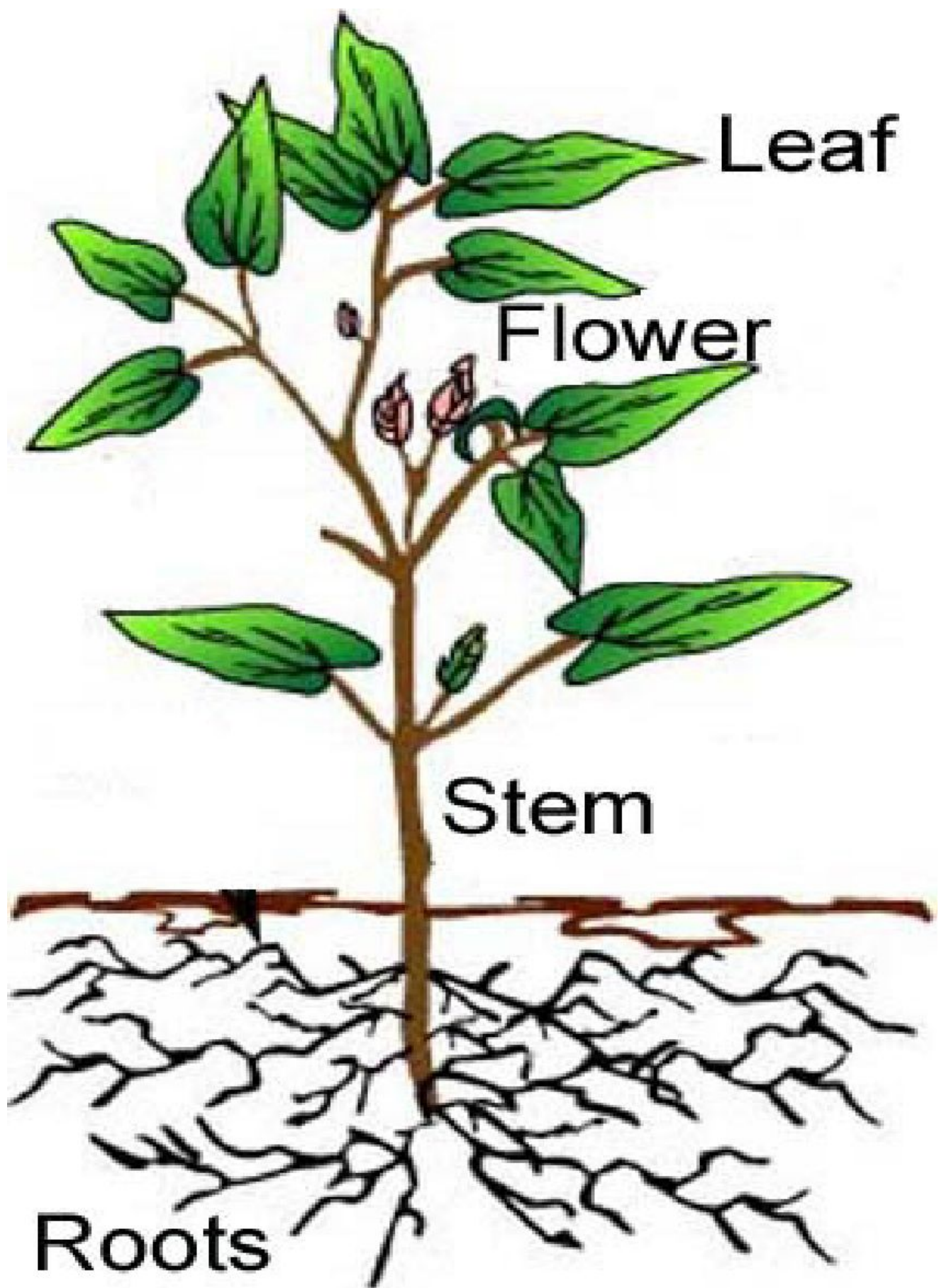
- Let's investigate one way they keep water. **Dab water on board, cover one spot with paper towel, one spot with wax paper.** Which do you think will evaporate faster?
- **Show prickly pear picture.** Make model of prickly pear pad: paper towels with wax paper taped around the outside. **Show cut prickly pear pad.**
- Maybe do an experiment: soak wax-covered and non wax-covered leaves in water and time how long they take to dry.

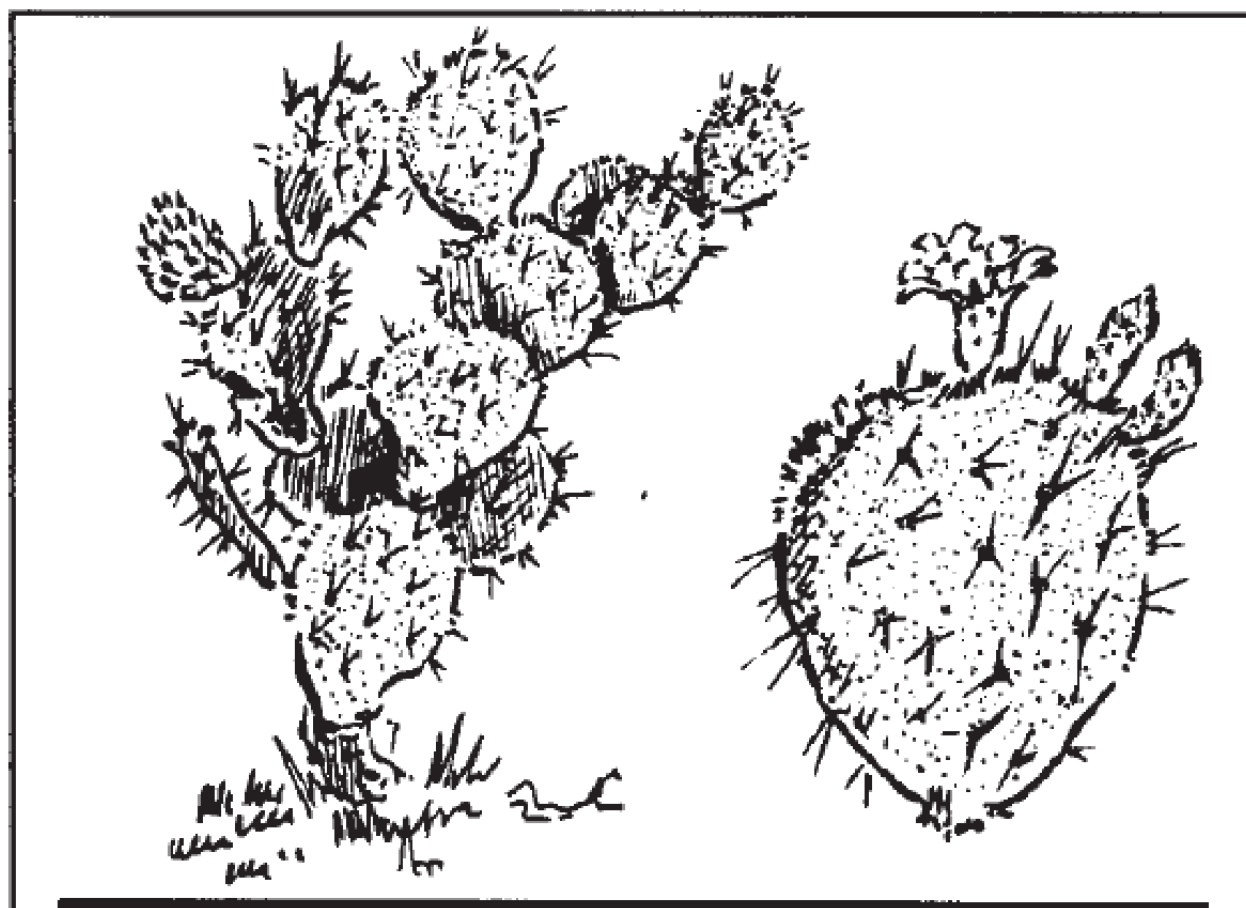
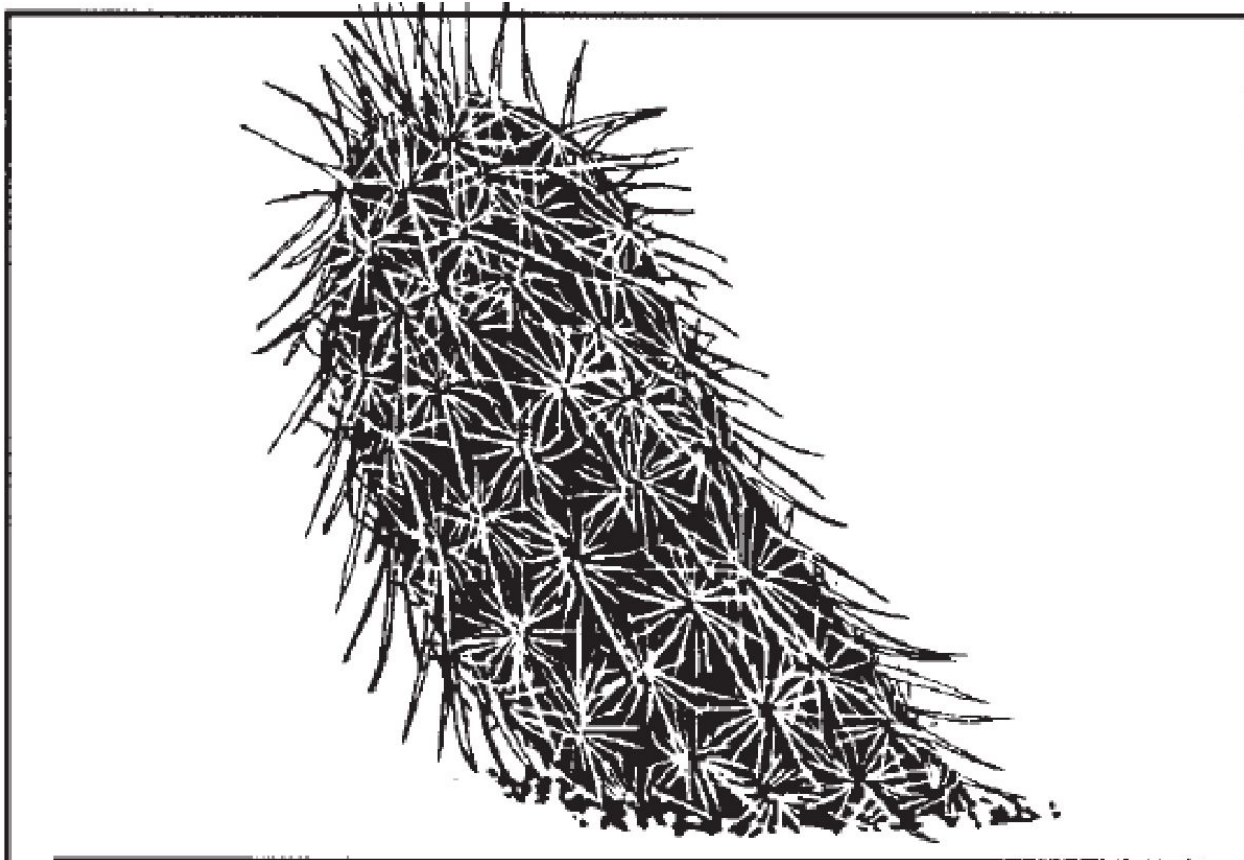
#### V. Conclusion (10 min)

- Arroyos are for flood control, and we shouldn't play in them when clouds are in the sky.
- But they are cool places where animals and plants live, and we can visit when it's clear weather.
- Animals and plants are adapted to live in the desert climate.
- What we do in arroyos affects the plants, and animals' habitats. Should we ride ATVs up the sides? That's something humans do to change our environment for the worse.
- Picking up dog poop is important because it can make animals sick. Where does the water go when it flows down the arroyo? The Rio Grande! Keeping dog poop out of the river is one way humans can change our environment for the better.
- Walk back to classroom

# **Leaf Adaptations**

- 1. Fuzzy leaves or lots of spines**
- 2. Small leaves**
- 3. Curled leaves**
- 4. Waxy leaves**
- 5. Green stems but no leaves!**







## **Build a Watershed Activity Guide for Arroyo Classroom**

1. What are we trying to teach the students in this activity?

**What is a watershed? How does the water cycle work? What are different forms of pollution and how does it impact our river? Arroyos lead to the river and carries different types of pollution with it.**

### **NM State Science Standards:**

<b>3<sup>rd</sup> Grade</b>
Water cycles through the atmosphere, plants, soil, and bodies of water in various forms.
Describe pollution and identify different types (can be naturally occurring or human made materials). Pollutants can get into our water and harm living things.
Some animals can survive better in certain environments, some will not survive at all.
Describe how roots take up water and soil nutrients, and leaves make food from sunlight.

2. How can we tie this activity to our teaching goals:

<b>Our Goals</b>	<b>Where we can relate our goals to this activity</b>
How does the water cycle work?	Describe the processes of the water cycle: evaporation, condensation, precipitation, collection, run-off and infiltration.
What is a watershed?	A watershed is all the land that drains into a river or other body of water, from mountain forests to riparian zone.
What makes water dirty?	Pollution comes from all over the watershed, and erosion is one form of pollution.
Why are arroyos important?	Arroyos provide important drainage in a storm event and provide unique and critical habitat for wildlife and plants.
How does vegetation help our river?	Forests, wetlands and healthy arroyos help keep the river clean and prevent flash floods. Plants in these areas slow the runoff of water into the river, reducing erosion and flooding. They can also remove nasty chemicals from the water by taking them up through their roots.

3. What is effective in this activity? Being in small groups, students enjoy creating the model and discussing what they are observing.

4. What makes this activity difficult to teach? Students get excited and want to play with materials while you are talking.

### **Activity Materials**

- Blank paper, markers, aluminum pans to capture water
- markers (ex: black for oil, brown for dog poop, red for trash)

- a watershed map (ex: SSCAFCA watershed map, It's All Connected in a Watershed poster)
- NM relief map

### **Preparation**

- Post watershed map
- Draw sketch of the water cycle
- Have materials laid out and desks arranged (papers, trays, sets of markers)
- Optional: write out key for marker colors (keep hidden until time to show students)

### **I. Intro – 5 minutes**

1. Introduce yourself and the Arroyo Classroom program: Respect and Know your Arroyos
2. Cover guidelines/expectations in order to be able to have a good time and learn together
3. Introduce what we will be learning: What is a watershed? Where does it go when it rains? We are going to find out how water moves across land, and through our arroyos, when it rains or snows. And learn about how it carries things with it as it flows.

### **II. Warm Up – 10-15 minutes**

1. How many of you used water before you came to school today? How did you use it?
2. How else do people use water on a daily basis?
3. Where do you think all this water comes from? (Discuss the aquifer and it's connection to precipitation). Point out groundwater shown on the "It's All Connected in a Watershed" poster.
4. Pull out the NM relief map. Discuss the purpose of a map. Walk through so each student can view. Introduce the concept of a "key". Have them help you find ABQ on the map and the Rio Grande. Point out the area of Rio Rancho. Explore the map together.

#### **Ask: (Really engage with students and listen to their ideas)**

- Has anyone heard of the term "watershed" before? You can highlight that it is a compound word. Have students share what they think of when they hear this word usually, "a shed full of water." It's kind of like that! Except the shed (or container) is an area of land. *Everyone lives, plays and works on land that draws to a body of water, like a river, lake, bay or ocean.*
- Point out the Rio Grande Watershed through the middle of the NM relief map.
- Where are there mountains and hills? Where do you see rivers and lakes?
- What would happen if we sprayed water on the mountain peaks, what will happen to it? *It will flow downhill.*
- Where does the water come from in nature? *Rain or snow*

### **III. Activity – 25 minutes**

**Where does the water go?** Let's find out by making our own model/map, similar to the relief map.

#### **Part A: 10 min**

While students are still sitting, demonstrate activity → crumpling paper to drawing on the ridges.

Identify the ridges. Ridge as high point of range of hills or mountains. Point out that it is where the

paper has a peak pointing up not down. Maybe identify the difference between a peak and a valley using the paper.

1. With your imagination, imagine that this piece of paper is a piece of land.
2. Crumple up the piece of paper and then smooth it back out most of the way. Leave it a bit crumpled, showing small ridges (high points) and valleys (low points).
3. Find the ridgelines (tops of the fold lines). Use the blue marker to color along the ridgelines on your “land”.

Model this for students briefly. Be sure everyone understands the activity. Ask students to crumple their paper and draw their ridgelines. Once they are complete - Hands on their head so we know they are ready for the next step.

Pair students (groups of 2 or 3), with teachers help. Assign roles 1-2, or 1-3.

Give Roles\*\*\*: We’re all observers, everyone will have a turn.

Have groups gather around their tray. Drawers can begin drawing their ridgelines. Announce that students have 30 more seconds when it seems that each group has enough ridgelines.

Next, demonstrate a “rain event”. Model for students the distance we want them to aim from as they spray (i.e. the length of your elbow to hand, vertically placed on the tray). And 4 sprays. (idea: Students can be drill sergeants about the three sprays, acknowledge that sometimes the spray bottles act funny but that we are trusting our classmates to count for themselves to do only four full sprays...).

**Ask:**

- What do you think will happen to your land when it “rains”?
  - What will happen to the blue ridge lines? / Where will the “rainwater” travel?
1. Altogether, sprayers squirt your model a few times to create a “rainstorm” over your land.
  2. Observe what happens.
  3. As your rainfall accumulates, watch the pathways where the excess “rainfall” travels.

With teachers, walk around to ask each pair to explain what the water is doing and show you rivers and streams in their model.

Have teachers help pick up all the spray bottles, and ask everyone to place their hands on their head and have a small group discussion about their observations.

**Part B: 15 min**

Have pairs switch roles, “disposers” can throw out previous model. Tell students they will keep the same number assigned earlier and tell them what role they will be playing. You could write these on a whiteboard.

### **What’s In the Water?**

*Experiment with how “pollutants” might travel through their watersheds.*

With a new piece of “land”, imagine this represents the City of Rio Rancho or the Rio Grande Watershed. Show one of the Watershed posters and point out all the human activity that happens in a watershed (driving cars, making things (manufacturing), farming, walking our dogs, etc.)

#### **Ask:**

- What might be on this land that we wouldn’t want in our water?
- What is pollution?
  - Have you ever seen it? What does it look like?

As students share, note the types of pollution on a poster or white board and create a key for groups to use. (Roads/Cars - black, Trash - Green, Dog poop-brown (and/or orange if you have more groups than markers)) Depending on the group, you could also identify Factories - Red

Before crumpling, have drawers (with their support drawers) mark their papers with the brown, red and black marker to represent farms, factories, houses, streets, dog poop and trash.

Announce that students have 30 more seconds when it seems that each group has drawn enough. Then ask all students to put their hands on their head.

Then have crumplers -crumple paper and then partially smooth it out.

Altogether, have sprayers spray the piece of paper.

#### **Ask:**

- What happened to the pollution when it rained?
- Describe what happened at the highest and lowest point in your watershed.
- How quickly did it spread? Are there any places on the land where it didn’t go?

### **WRAP UP: -5-10min**

#### **What do you think this means for our watershed - the Middle Rio Grande?**

*The water we drink comes from our watershed. Animals and plants also depend on this water. That’s why it’s important that we try not to pollute either the water or the land. Anything that pollutes the land will eventually wind up in the water.*

#### **What might be ways we could reduce pollution in our watershed?**

*By picking up trash and picking up dog poop if we have dogs. (I like to emphasize to this age group that **being responsible is powerful** and they can make a difference by caring and picking up their own trash. I also tell them that last year a whole grade level of 3rd graders at Cielo Azul Elementary helped pick up 1.8 tons of trash!)*

Thank the class for their attention and participation. Tell them we look forward to seeing them again and expect that they show the wildlife biologists the same respect they have shown us.

**\*\*\*Groups of 3: Each person gets to spray 3x. Model this for them.**

***For groups of 3, you'll need two blue markers for Part A.***

**May be helpful to tell students each turn has a Lead Role and a Supporting role (Supporting role noted in parentheses).**

Part A Roles:

- 1 - Drawers (+ spray)
- 2 - Crumplers (+ drawing / spray)
- 3 - 1st Spray (+ disposers) -- Spray 3, 2, 1

Part B Roles:

- 1 - 1st Spray (+ disposers)
- 2 - Drawers (+ spray) -- Spray 2, 1, 3
- 3 - Crumpler (+ draw)

**Groups of 2:**

Part A Roles:

- 1 - Crumpler / Drawer
- 2 - Sprayer / Disposer

Part B Roles:

- 1 - Sprayer / Disposer
- 2 - Crumpler / Drawer

## Appendix B Supplemental Materials

### -SSCAFCA Activity Book and Educational Videos:



### -SSCAFCA handouts:



## Did you know?



SSCAFCA protects our community from flooding and erosion caused by big rain storms, and works to keep **stormwater** clean. Stormwater flows down **arroyos** into the **Rio Grande**.

Bugs like to live in **stagnant water** that collects in ponds and low places in the arroyos. Insects like mosquitoes can carry diseases that make us sick.

Brought to you by:

Almost all U.S. bats feed exclusively on bugs, and 1 bat can eat between 600 and 1,000 mosquitoes and other insect pests in just one hour. One bat can eat its own weight in insects in a single night!

SSCAFCA provides **bat houses** to encourage bats to make their homes near our arroyos, and especially near **detention ponds** where stormwater runoff is captured and allowed to slowly drain.

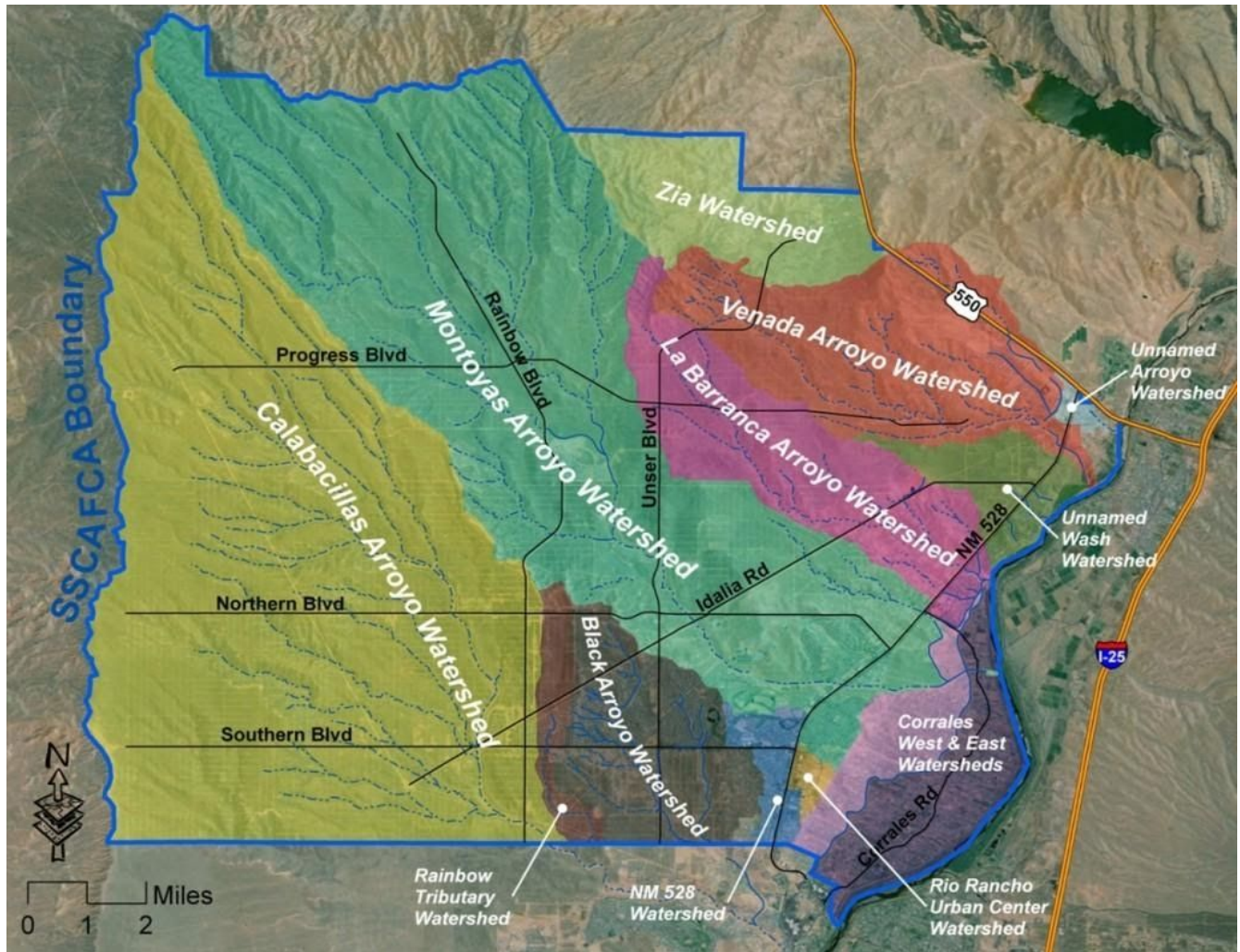
The more we help bats, the more pests they eat, so we don't have to spray pesticide that could wash down to the Rio Grande and **pollute** it.

## SSCAFCA





## SSCAFCA watershed map:





## Appendix C Program Photos



LEFT - Melissa McLamb discussing desert animal and plant adaptations by Maggie Cordova Arroyo.

BELOW - Students observing and discussing the watershed model.



ABOVE - Students having fun during the arroyo walk on school property. Students gather in between activities to discuss findings such as looking for evidence of wildlife (scat, tracks, burrows, etc.).

RIGHT- Mikal Deese with a Swainson's hawk at Maggie Cordova Elementary.





## **Exhibit 4**

### **RiverXchange 2019-2020 Final Report**



**Making Meaningful Connections by  
Integrating Water Resources Topics  
with Language Arts & Science**

***2020 Report***

Presented by  
Ciudad Soil & Water Conservation District

**May 2020**

# CONTENTS

<u>SUMMARY</u>	3
Program Strengths	3
Program Challenges and Opportunities	5
<u>PROGRAM DESCRIPTION</u>	8
Mission	8
The Big Water Questions	8
Background	9
Program Management and Financial Support	10
Participant Selection	11
Curriculum	12
<u>EVALUATION</u>	13
Blog Evaluation	13
Student Evaluation	19
Appendix 1 (Extension Activities)	39
Appendix 2 (Photos)	55

## SUMMARY

This year, funding enabled 38 NM classes (932 students and 38 teachers) to participate in RiverXchange® and learn about critical water resource issues in their watershed. The majority of participating classes were from Title I schools. Every NM class was connected to out-of-state partner classes on the blogging platform for a total of over 1,254 participants. All program costs and coordination are provided free of charge to NM teachers. Training, technical support, and curriculum materials are provided free of charge to partner teachers. The program required \$56,157.11 in cash and generated total match valued at **\$82,115.32** in the form of in-kind contributions including workshop space, classroom resources, presenters' time in the classroom, field trip docents, donated trees, as well as teachers' and students' time.

Even with the impacts of the COVID-19 pandemic and the transition to a new education coordinator mid-year, RiverXchange was able to run smoothly with only a few classes missing a presentation or a field trip due to school closures mid March. The end of the year teacher feedback responses confirm that this year's program was strong as any, as many spoke to their students increased ability to understand local water resources and the impacts of society on those resources, as well as how they can take part in protecting those resources, upon completion of the programs. The following sections discuss how coordination efforts were spent keeping RiverXchange a high quality, relevant program and responding to on-going needs and challenges.

### Presentations

Program presentations were completed as follows:

Agriculture: 29/38  
Stormwater: 38/38  
Wastewater: 38/38

Drinking Water: 36/36  
Planting Field Trips: 32/38

### Program Strengths

Teachers continue to report that the presentations are consistently high-quality, hands-on experiences that engage students; and that the field trip is a highlight of the year for all involved. The presentations explore different aspects of water usage in our community with professionals and experts in the field and continually reinforce to students how they can protect their watershed and the Rio Grande. The pole planting field trip allows students the opportunity to give back to the environment they have learned so much about and their enthusiasm for service learning is palpable on the trip! Furthermore, RiverXchange supports the active participation of teachers in the program by providing professional development opportunities, training to teachers on program implementation, extension activities, and access to a blogging platform for students to connect. RiverXchange incorporates STEM, place-based learning, hands-on activities; and puts conservation actions into the hands of local students and teachers while partnering with stakeholders in the community.

The following sections discuss highlights from RiverXchange this year:

## **I. Teacher Workshop**

The teacher workshops this year were held at Valle Del Oro and Bachechi Open Space. The workshop schedule included an introduction to the site as an educational resource, an overview of RiverXchange presentations and curriculum, a break-out session, blog training, presentation scheduling and lunch. During the RiverXchange overview, we encouraged teachers to introduce RiverXchange to their class using the River Geography activities. We emphasized that starting students off with an overview of our local watershed, including the Rio Grande is a great way to kick-off the program and bring context to the future presentations. We also suggested that introducing their watershed on the blog as their first class post would be a great way to synthesize this introduction.

This year we also choose to give teachers a focused break-out session with their 5th grade team to consider each presentation and plan how to integrate their own lessons or RiverXchange presentation extension activities to deepen their students' learning experience. The goal was to highlight teacher expertise and give teachers more time to share how they make RiverXchange work in their classrooms with each other. Teachers worked in groups to discuss an assigned presentation and what activities they recommend or wanted to try out. Then they presented to the whole group so that each presentation was covered. Teachers seemed to enjoy getting ideas from each other and the chance to share their practice with everyone. It also gave each 5th grade team a chance to talk about how they were going to integrate RiverXchange into their year.

The teacher workshop also included in-depth training on Kidblog. Each teacher was able to connect to their individual blog, navigate their page, and find important information that would help them be successful. Overall, the time at the teacher workshop felt productive, engaging, reciprocal and fun.

## **II. Teacher Feedback**

Every year teachers are asked to complete an evaluation survey to tell us why they choose RiverXchange, what works well and how we could improve. This year teachers continued to have positive feedback and shared that the presentations are exceptional and the field trip is “second to none!” Of the reasons teachers state that they participate in RiverXchange, teaching about water resources and incorporating more science into their classrooms are the top choices. Teachers also are finding more and more that RiverXchange helps their students achieve NM STEM READY! standards through hands-on experience, inquiry-based learning, solving real world problems, and engaging in the community. Some teachers still report that they struggle finding computer time and feel unsuccessful on the blog. We also had great feedback from our visually-impaired teachers about the field trip, but that it could be helpful to adapt the presentations for special education students or reach out to the teachers beforehand so they can support those students better.

Here are a few quotes about student’s greatest learning outcomes from participating in RiverXchange:

“A heightened sense of their surrounding community and the overall impact water has on our society.” - Peter Hornbecker, Colinas Del Norte

“Teamwork...the students loved working in groups during the presentations and the pole planting trip. Many of them were still talking about it before school was cancelled”. - Stanee Kitts, MLK

“Students became more aware of their environment close to their home and the impact their actions can have on the river.” -Debbie Beer, Duranes

“Their knowledge about the watershed and how to care for it. The content sticks with them so well because of all the experiential learning.” -Ashley Anthony, Monte Vista

“My students were able to move toward understanding water as something to think about, not just a given, unappreciated, unlimited resource.” -Rona Gomez, Georgia O’Keeffe

Finally, this quotes summarizes the opportunities teachers get from participating in RiverXchange:

“RiverXchange has helped me step outside my comfort zone to explore, demonstrate, and teach areas that are new to me. It was definitely a benefit as shared by students!” -Randi Sevigny, Seven Bar

### **III. Supporting Next Generation Science Standards**

The Next Generation Science Standards have been adopted by the New Mexico Department of Education and are in the second year of implementation. The framework of NGSS moves the focus from teaching science facts to the process of *doing* science and requires both curriculum developers and teachers to re-think science education instruction. RiverXchange supports many of the “3 Dimensions” of NGSS framework by delivering inquiry-based curriculum, hands-on learning opportunities and locally focused water resource topics. The next steps are to fully align RiverXchange to the NGSS, and while this is a lengthy process that requires practice before understanding, it will be key in both promoting RiverXchange as a 21st century science education program and encouraging the next generation of scientific thinking and problem solving.

## **Program Challenges and Opportunities**

In an effort to remain relevant to students, stay updated on current science and technology, and keep up with teacher needs, RiverXchange is constantly evolving. While at its core the deliverables remain constant, each iteration of the program aims to be a more improved, polished version of itself. As the recently hired Education Coordinator, I believe it is valuable to share some of the insights that I have gained as a consultant to the program, and document them here as a way to convey some of the challenges and opportunities that Melissa McLamb and I were responding to during our time working together. Especially as the program is now faced with new challenges and opportunities in responding to the COVID-19 pandemic, this section serves to hold that institutional knowledge and will be important to remember once things settle down.

### **I. Ensuring High Quality Presentations and In-kind Partnerships**

*Challenge: Maintaining our agreements for in-kind partner presentations when we lose a partner.*

RiverXchange is dependent on our in-kind partners to deliver the four in-class presentations and relies both on the availability of these partners and their expertly crafted lessons to meet our objectives. The only

drawback of such a strong partnership is that when an agency is no longer able to provide this service, it takes time to find another partner who can meet such a specific niche. This has been the experience with the agriculture presentation that was previously provided by Bernalillo County Extension to APS participants. As a response to this gap in 2018-2019, RiverXchange staff developed a presentation that explored the regional history of agriculture and irrigation techniques, which highlighted acequia culture and the effects of human settlement on the Rio Grande. During that year we entered discussions with CESOSS (Center for Social Sustainable Systems), as they were working on creating an Acequia Education Office in the South Valley and agreed they would be a good candidate for providing these presentations. However, the timeline for the development of the Acequia Office and their limited funds have proved to be barriers for now.

*Response: Maintaining a network of in-kind partners who can provide RiverXchange presentations.*

This year, we were able to call on the help of BernCo Master Naturalists and found that they are a well-suited group to recruit presenters from. This summer we intend to recruit Master Naturalists earlier to ensure availability and cover all presentations, as working with volunteers requires flexibility and grace. Furthermore, it should be noted here that all future RiverXchange staff should have an up to date understanding of each presentation and the capacity for networking to ensure partnering opportunities are easily accessible.

## **II. Kidblog: The current blogging platform**

The continued agreement with an educational contractor this year allowed for an increase in capacity for blogging support. Time was spent working with the Kidblog support specialist, Laura Kniffin, to understand the platform and how it can work with the specific needs of our program. The following changes this year were the result of those conversations.

- **Rostering:** Rostering is an efficient way to create new blogs and users using .CSV files at once, rather than doing each blog and user one by one.
- **Individual class blogs:** We returned to each class having their own blog rather than grouping two or three on one with the goal to reduce confusion on how the blog is used and encourage classes to build a more unique identity on their blog. It also allows returning teachers to keep the same blog year after year, and further reduces time spent getting new blogs set up for both teachers and coordinators.

## **III. Connecting NM classes with partner classes via Kidblog.**

In working closely with partner classes the previous year, our goal this year was to increase posting by partner classes and strengthen connection with NM classes. The following were challenges identified from the previous year and our responses in 2020-2021.

*Challenge: Creating strong partnerships with NM and out-of-state partners on the blog takes significant coordination.*

- **Out-of-state partners have varied schedules and the timing of their water-related lessons do not always line up well with our program.** This creates a challenge on both sides. Partner classes

are recruited on the premise that we will provide them with an active class on the blog that will be discussing water related topics. For a one-on-one partnership to be successful, the NM class has to be active and do so within a time frame that is convenient for the partner class and vice versa.

- **Active participation on the blog varies by teacher by year.** A teacher might be super active on the blog one year and completely absent the next. Circumstances change year by year, it is hard to rely on one teacher behaving similar to the year before.
- **Organizing who is doing their water-focused unit at what point in the school year takes time that is not well spent if neither partner actively participates on the blog.**

*Response: Use coordination time available to make blog user-friendly and increase teachers fluency on the blog to increase active participation for NM and out-of-state classes.*

- **Teacher workshop included training on each teacher's actual blog.** Teacher's were able to work side by side on their own blog (rather than just see examples), ask direct questions and troubleshoot. This requires all blogs to be set up before the teacher workshop, but allows for better understanding.
- **Out-of-state partners attention increased.** Each partner was interviewed to better understand their goals and their timeline. They received one-on-one, virtual training on the blog, technical assistance and general support for implementing the blog in the classroom throughout the year.
- **NM and partner classes all connected on the blog.** Kidblog has a "Connection" function that links classes to other classes visibly on each blog page - where they can easily go to another classes blog, see posts and comment. This year in addition to having assigned partners, all classes were linked to all other RiverXchange classes under the "connection" feature on Kidblog. While the goal was to create more ease in finding active classes to comment on- the number of connections seemed to have over-stressed the system and slowed down loading times on Kidblog for our users. Even with improved accessibility to partner classes, there were only a few classes that corresponded with other out of state classes this year by sharing comments back and forth.
- **Distribution of monthly Mailchimp emails with blog highlights, tips and resources.** To further increase creative blog posting, instigate class connections, and improve Kidblog fluency, a monthly newsletter went out that provided a summary of blog activity, shout-outs for recent posts and updates on out-of-state partner posts with links directly to those blogs to see their work.

*Opportunity: Connect with regional upper elementary watershed programs that might provide sustained partnerships between teachers and programs over the years.*

In 2020, Ciudad SWCD acquired the licensed trademark of RiverXchange® from Amy White, which grants CSCWD the sole oversight of the program and the ability to evolve the way we meet the "exchange" mission so integral to the program. Considering the challenges with the blogging platform, teacher engagement on the blog and connecting NM students with out-of-state students, we have been in search of other opportunities. One avenue is to strengthen a partnership with an out-of-state program that is similar to RiverXchange and develop a long term relationship. Another is to explore in-state programs that are similar and devise a strategy that would allow our students to connect possibly through the blog, via snail mail or even create podcasts to share. Santa Fe Watershed Association manages a 5th grade program called My Water My Watershed and could be a great candidate to try for a stronger exchange between students - one that would connect students across watersheds along the Rio Grande.



## PROGRAM DESCRIPTION

### Mission

The mission of RiverXchange is to deepen students' and teachers' understanding and appreciation for their local river ecosystem, motivate participants to protect local water resources by conserving water and keeping their source water clean, and to provide a high quality, high impact outreach opportunity for funders and in-kind contributors.

### The Big Water Questions

The optional curriculum frames program outcomes as “guiding questions,” known as *Big Water Questions*. A long term goal of RiverXchange is that students understand these questions and can formulate logical, fact-based answers by the time they finish elementary school. We believe that students who can synthesize water facts to understand larger water issues will have the proper critical thinking skills and foundation for further discussion in middle and high school so that they will become informed citizens and voters on water issues.

#### *Understanding a Watershed*

- Is every place in the world part of a watershed?
- Where does your community's stormwater go?
- How can surface water become polluted?
- How does the water cycle relate to weather?
- How are groundwater and surface water connected?
- How can groundwater become polluted?
- What actions can all of us take to keep water clean?

#### *Water in Our Society*

- In what ways does our society use water?
- Where does your community's drinking water come from?
- Does everyone have the right to use as much water as they want?
- Where does your community's wastewater go?
- What actions can all of us take to conserve water?

#### *River Ecosystem*

- How does water affect living things in an ecosystem?
- What role do forests play in a watershed?
- What role do wetlands play in a watershed?
- What are some of the ways scientists can determine the health of a river, lake, bay or ocean?
- What actions can all of us take to improve the health of our ecosystem?

## Background

As producers of children's water festivals and other grade K12 water resources outreach in NM since 2007, the RiverXchange program creators observed early on that NM elementary teachers rarely incorporated water concepts in the classroom beyond what is required by the state (e.g., water cycle), and that most elementary teachers considered "water" strictly as a science topic. While teachers personally acknowledged the importance of conserving water and keeping source water clean, they continued to find that upper elementary students had little or no understanding of major water resources topics unless the teacher specifically integrates a wide range of water topics into the curriculum. For this reason, as well as successful festival work with upper elementary students, this age level was selected as the focus for the RiverXchange program.

RiverXchange was created to provide a free program that is fun, interesting, and easy to integrate into the normal curriculum. The hope was to motivate participants to explore water resources topics in depth. The program was originally designed to be carried out over eight months so that students spend more time developing a sense of pride and personal connection to their own river ecosystem, as well as a personal connection to a distant river ecosystem and the students who live near it. Today RiverXchange runs over the course of 3-4 months, as a response to the challenges of implementing a year-long curriculum with the ongoing demands on teachers and students time and requirements for testing and other curriculum.

RiverXchange began in 2007 as a pilot project of Experiential EE, LLC (under a services agreement with the New Mexico Water Conservation Alliance) and the National Great Rivers Research and Education Center, featuring partnerships between two fourth grade classes in Albuquerque, NM, and two fifth grade classes in Godfrey, IL. A curriculum was developed, a field trip to the river was coordinated, and partner classes "met" three times during the year via video tele-conferencing to present what they had learned.

After the pilot project, RiverXchange transitioned to a web-based technology called a wiki. This enabled the program to overcome limitations such as the high cost, availability, and time zone logistical issues associated with video teleconferencing – and easily involve more classes. The curriculum was updated to incorporate the writing component and classroom guest speakers were introduced to reduce teacher workload and bring up-to-date technical information into the classroom. In 2017, the program switched to a blogging platform called Kidblog, which is still being used today.

In 2012, ownership of RiverXchange transferred to Amy White of Orilla Consulting, LLC, who managed the program through July 2015. In August 2015, RiverXchange became part of the Ciudad Soil & Water Conservation District. In 2020, ownership and the trademark registration of RiverXchange® was transferred fully to Ciudad Soil and Water Conservation.

Since 2007, we have served over 18,500 students!

This year, the program featured the following components:

- Optional standards-based curriculum including hands on science and social studies lessons, as well as writing assignments
- KidBlog online posting and communication
- Partner class engagement support

- Teacher training on curriculum implementation and use of KidBlog
- Ongoing technical and motivational support
- Monthly newsletters to NM and out-of-state teachers
- End of year teacher survey
- Pre and post student surveys (NM only)
- Payment for teacher workshop substitute teachers (NM only)
- Coordination of at least four guest speakers into the classroom (NM only)
- Coordination of a field trip to the local river or important watershed feature (NM only)
- Field trip bus transportation payment (NM only)
- Field trip leadership and activity planning (NM only)

## **Program Management and Financial Support**

The program timeframe was July 1, 2018 through June 14, 2019. All components including fundraising, design, planning, implementation, and analysis were carried out by employees and contractors of Ciudad Soil & Water Conservation District, including:

Melissa McLamb  
Erin Blaz  
Jenny Lloyd-Strovas  
Astrid Hueghlin

### **Sponsors**

- Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA)
- Middle Rio Grande Stormwater Quality Team (MRGSQT)

**Sponsors provided a total of \$56,157.11 in cash.**

**MRGSQT - \$41,415.55 | SSCAFCA - \$14,741.56**

Program expenses included:

- Substitute teachers for NM teacher workshops
- Teacher workshop space rental and meals
- Field trip bus transportation for NM classes
- Field trip portable toilet rentals for NM classes
- Technology services
- Office and educational supplies
- Coordination services (planning, implementing and assessing all program components)
- Trademark Registration Fees
- Rain barrel project funds executed by The Nature Conservancy

### **New Mexico In-Kind Partners**

- Albuquerque Bernalillo County Water Utility Authority
- Bernalillo County - Public Works Division
- City of Albuquerque – Open Space Division

- City of Rio Rancho – Environmental Programs Office
- City of Rio Rancho — Parks, Recreation and Community Services Department
- Sandia Labs
- Sandoval County Cooperative Extension
- Southern Sandoval County Arroyo and Flood Control Authority

**In-Kind contributions totaled \$82,115.32.** For NM classes, in-kind contributions included classroom guest speakers, field trip docents, planting materials, workshop space and computer lab use, and teachers' and students' time attending the presentations and field trips. For partner classes, in-kind contributions were not calculated this year. Sponsors and in-kind partners were recognized on our website and in presentations.

## Participant Selection

All 38 participating NM classes were fifth grade classes, distributed as follows:

<b>Bernalillo County</b>	<b>Sandoval County</b>
North Valley Academy (3)	Colinas del Norte Elementary (5)*
Cochiti Elementary (3) *	Martin Luther King, Jr. Elementary (6)*
Duranes Elementary (1) *	Sandia Vista Elementary (1)
Georgia O'Keeffe Elementary (2)	
John Baker Elementary (1)	
Monte Vista Elementary (3)	
Seven Bar Elementary (5)	
Zia Elementary (4) *	
<b>26 classes, 607 students</b>	<b>12 classes, 325 students</b>
* Title 1 school	<b>TOTAL - 38 classes, 932 students, 40 teachers</b>

## Curriculum

A component of RiverXchange is the hands-on optional curriculum, which is offered to all participating teachers. It was developed to help students reach for deeper meaning through hands-on learning and reinforce what they have learned through the process of writing on the blog. Over the years, we have developed a curated list of activities from the curriculum, along with reflection prompts specific to each presentation. Organizers strive to incorporate emerging water resources issues into the curriculum, increase networking opportunities for teachers, reduce teacher workload, and align the curriculum with public school curriculum priorities.

Each class learns about its own local water resources issues through hands-on activities, classroom guest speakers, and a field trip. Students write about what they are learning via a private educational website that can be viewed by their partner classes. The computer technology and writing components provide a unique opportunity to reinforce what was learned, increase student motivation to learn, and collect valuable metrics about student performance.

Through RiverXchange, students take pride in sharing their knowledge of the local ecosystem and learning from their peers about another river ecosystem. Comparing the two geographical areas gives students a broader understanding of the importance of a river ecosystem to human and other life. Students gain the unique opportunity to share personal experiences and ask questions about a distant place. Teachers feel this kind of personal connection is a big deal for kids – many of whom have never traveled beyond their city limits.

All activities are correlated to NM state standards and benchmarks for Social Studies. All activities (because they require that students communicate information on the KidBlog) address Common Core Language Arts standards for writing. Some activities also address Common Core Mathematics and Science standards. As mentioned above, RiverXchange lessons and curriculum support the NGSS and will be evaluated for full alignment to the NGSS, beginning with the presentation activities and field trip. Projected date of completion: May 2021. For a summary of the RiverXchange Curriculum, see Appendix 1. For a summary of the extension activities, see Appendix 2.

### **Guest Speakers**

We coordinated at least three guest presentations to visit each NM classroom. In all cases, guest speakers were water resources professionals from local agencies. Topics included:

- watershed/nonpoint source pollution
- drinking water
- wastewater
- water and agriculture

### **Field Trips**

The program requires that all classes attend at least one field trip to their local river or important watershed feature, which should incorporate a service learning component if possible. Throughout the winter and spring, students planted 539 native trees and helped restore critical riparian habitat along the Rio Grande in Albuquerque near Shining River Parking Area, Albuquerque Open Space.

## **EVALUATION**

### **Blog Evaluation**

#### **Engagement**

Considerable effort was made to make the blog an effective resource and easily accessible to teachers. An instructional document was reviewed at the teacher workshop and made available to them to return to at any point. We also included links to curriculum and extension activities on their blog page, hoping that might encourage teachers to visit the blog more frequently. Additionally a monthly newsletter was sent out to encourage posting, with links to the instructional document and other helpful resources. Our aim was to continually remind teachers to post and make sure the information they needed was easily accessible.

Of our total number of classes, Kidblog was used by 71% of RiverXchange teachers this year and the number of blog posts ranged from 1 to 32 per class over the year. This is a similar rate of use to last year. Teacher feedback suggests that many still feel challenged about how to incorporate blogging into their classrooms as a lesson for students. One North Valley Academy teacher reached out directly for support and Erin Blaz visited his class to do an in-class tutorial of posting on the blog. This visit was highly informative as Erin was witness to some of the issues that occur from getting students onto the blog and submitting their work. However, other teachers still express that they think the blog is an important aspect to the program, as it allows students an opportunity to enhance writing skills, think critically and reflect upon what they have learned.

We ran a contest this year for creative and excellent blogging. We used a rubric to score posts for each class to determine the winner. While class use and posting was about the same as last year, this year posts were more creative and used a wider variety of media. Some favorites were videos using the changing river model, artwork that modeled stormwater impacts on a city and PSA's on poster boards that encourage water conservation. Two 1st place winners received \$75 gift certificates to Acorn Naturalists, and five 2nd place winners received \$25 gift certificates. The original 1st place prize was going to be a rolling river presentation or edible aquifer activity, but with school closures that was not possible.

Considering the likely need for online technology next year and teacher familiarity with the blog, RiverXchange will continue the use of Kidblog.

#### **Student Voices**

Student voices rang loud and clear this year in support of conserving water, keeping trash and pollution out of stormwater and the importance of Rio Grande!

The following are examples are from this year's students:

## NEW MEXICO CLASSES

Thank you for the presentation 😊.

What we learned was clean up dog poop, or if we don't the river will be contaminated water and will kill the fish. If you litter you can kill animals so we learned that we should CLEAN UP DOG POOP!

What can we do? We can put more trash cans and recycling bins, we can ban plastic stuff. We can save more water. The community can clean trash 🗑️. We should make more electric cars 🚗. We can stop pollution from happening in water 💧.

Hello Again! Today we'll be discussing a pretty fun topic. Storm water! A better name for storm water is polluted water! This is a bigger issue than lightning and thunder! **We need to help save local rivers anyway we can!**

In our presentation, we learned how contaminated our river gets every time it rains. These things get in to our river and poison it...

1. Pesticides. Pesticides hurt our river by running into the Rio Grande, poisoning our fish and killing our algae which is vital because the fish eat it!
2. Fertilizer. Extra fertilizer run into the Rio Grande because we put too much on same things with Pesticides! Any way the fertilizer does what it was meant to do under water. They make the algae grow too much and use up all the river oxygen, killing all the living things in the river!
3. Poop. All kinds of poop hurts our water! Cow poop, dog poop, etc. They release germs like E-coli into our water which is very difficult to filter out!
4. Factory oil. They harm our river by leaking or dumping their left over chemicals into the Rio Grande! The chemicals can harm the water in many ways!
5. Livestock. Livestock can harm our river by eroding the soil so we end up with silt and dirt all mixed in!
6. Trash. Trash is a very big factor. Trash floats through storm drains and blows in the wind to our river and kills fish because they swallow it.

There are a **lot** of things that pollute our water. We are not that happy about that.

Here are some solutions to the problems we have with our river pollution!

1. For your pesticides you can still put it on but just put the right amount on! The bag tells you how much to put on so put that amount on! Or you could use bug paper.
2. Fertilizer is the same. You can still use but just put the right amount on!
3. Pick up your animals poop! This will help decrease the pollution greatly!
4. You cant do a lot about the factory oils. But you can write letters to important figures asking to make dumping your chemicals in the river illegal!
5. How we can help the issue of livestock is, if you own livestock put a fence up around their pastures and living areas so they can not wander down to the river and pollute it!!!

6. For trash the easiest solution to this problem is to not litter and if you do pick it up!!! But we have a bigger idea! We will try to get plastic water bottles banned in our school and try **TRY** to get them banned in New Mexico! Plastic bags were banned so why cant plastic bottles be banned to!!! We can write letters and try to get people involved in what we are doing!!!





Trout ▾

The Bosque means forest in Spanish. People plant native trees in the Bosque because they don't regrow by themselves. We all agree that we all enjoy being at the Bosque because the feel of nature, planting trees, smelling fresh air, and helping the environment. As well as having the feeling of after planting a tree. We all felt proud, exhausted, and seeing the planted trees was beautiful. Our class planted 17 trees! We all love the beautiful nature as well. We recommend going to the bosque because you can ride your bike around or walk and see the sights, the smells, and the feeling. There are animals there too! Like fish, squirrels, porcupines, eagles and turtles. It is worth going to the Rio Grande.

Feb 27, 2020, 1:34pm (209.189.162.95) [Edit](#) | [Remove](#) | [Reply](#) | [Approve](#)



This image shows how everywhere that you go, you'll always see pollution, stores, neighborhoods, schools, farms, anywhere, you'll always see pollution. Not only will you see trash as pollution, you can see chemicals or polluted liquids like, Oil, Gasoline and Sewage. You can also see smoke from factories and animal droppings! We should always try to be responsible and try to stop throwing our trash on the roads.





## Waste Water



By **Snakes** on Jan 9, 2020

We learned about waste water presentation. There is a bar screen that catches every thing that clumps up that goes down the drain or toilet. Even though there is flush-able wipes your not supposed to flush them down the toilet because they can clog your toilet. Every thing that you flush down your toilet ends up turning into sludge. Waste water goes to a waste water facility and once it's cleaned it goes back into your house to be used as waste water again. A machine that cleans the waste water is called a clarifier and how the clarifier works is the waste water goes into a huge bucket and a metal arm skims the top of the big bucket of waste water and picks up the trash and waste. The last part of cleaning the waste water is called a digester, it injects chlorine into the dirty water and once that is done and the water is clean they relies it back into your homes.

## Pole Planting



By **Snakes** on Mar 9, 2020

We went on a field trip to plant cottonwoods. We planted them because older trees are dying and we don't want them to die out. We used augers to dig the holes for the cottonwoods. We had to dig holes 10ft to 12 ft deep to get to the water line and so the trees can take root. We split into teams and took turns twisting the augers. When we pulled the augers up from the ground it was heavy because of the dirt. As we got down to the mud it was even heaver. When we thought our hole was deep enough we would yell "tree check." The conservation officers would come and see if our hole was deep enough. The poles were limbs from older cottonwoods. At the end we sat at the bank of the river and had lunch. In all we planted 39 poles. It was a great learning expirience.

## PARTNER CLASSES

### Should you drink New Haven River Water?



By Quinby on Dec 6, 2019

After testing three different rivers for four different things. PH, Nitrates, Dissolved Oxygen, and Temperature, **New Haven water is not perfectly clean**, but still drinkable. After struggling through knee deep water, my class and I have established that water in New Haven is clean enough to drink, at least after you treat it. To go along with that, my class also used leaf-packs, nets with leaves in them, that allow animals to live inside of them. We put them in the Mill River, and retrieved them two months later. We found so many macro-invertebrates, it was hard to believe! We found a lot of Macro invertebrates that could only live in clean water, which means that they were group 1.

### FRESHWATER MUSSELS



By Wetland on Nov 25, 2019

Freshwater mussels live in streams they filter feed to stay alive. Freshwater mussels are related to water quality because. They filter feed and make the water clean. I learned that the mussels filter feed and made the foggy dirty water clean. I learned how the mussels life cycle goes. They are born and spit onto fish gills when they are ready they are dropped and the mussels grow.

### the housatonic river and long island sound



By Harbor Seals on Dec 6, 2019

the housatonic river starts in massachusetts and goes into long island sound. There are a lot of things to do in the housatonic river like fishing and activities like hunting for animals. There are alot of types of fish in the housatonic river like the striped bass, brown trout, blue fish, white perch, mouth bass, sea bass and many others.

## **Student Evaluation**

A key component of RiverXchange is measuring student learning outcomes. We collect quantitative data on learning outcomes and behavior changes by way of a pre and post survey. We make qualitative observations by reading what students submitted on KidBlog. In 2019 we were able to compile comparative metrics from the last 4 years of RiverXchange surveys to observe the longitudinal impacts of our program. Working with a team, we continue to refine the survey questions to better reflect RiverXchange learning objectives, while maintaining the ability to track comparative learning outcomes across years.

### **Pre/Post Behavior Survey**

In order to quantify the learning outcomes achieved through RiverXchange, we ask our teachers to have their students fill out a survey prior to, and upon completion of the program. This year's survey was updated in summer of 2019 to reflect the suggestions for improvements that were identified at the end of 2018-2019. The survey went from 18 questions to 13 in an effort to be more concise and eliminate questions that were found to be irrelevant to programmatic impact.

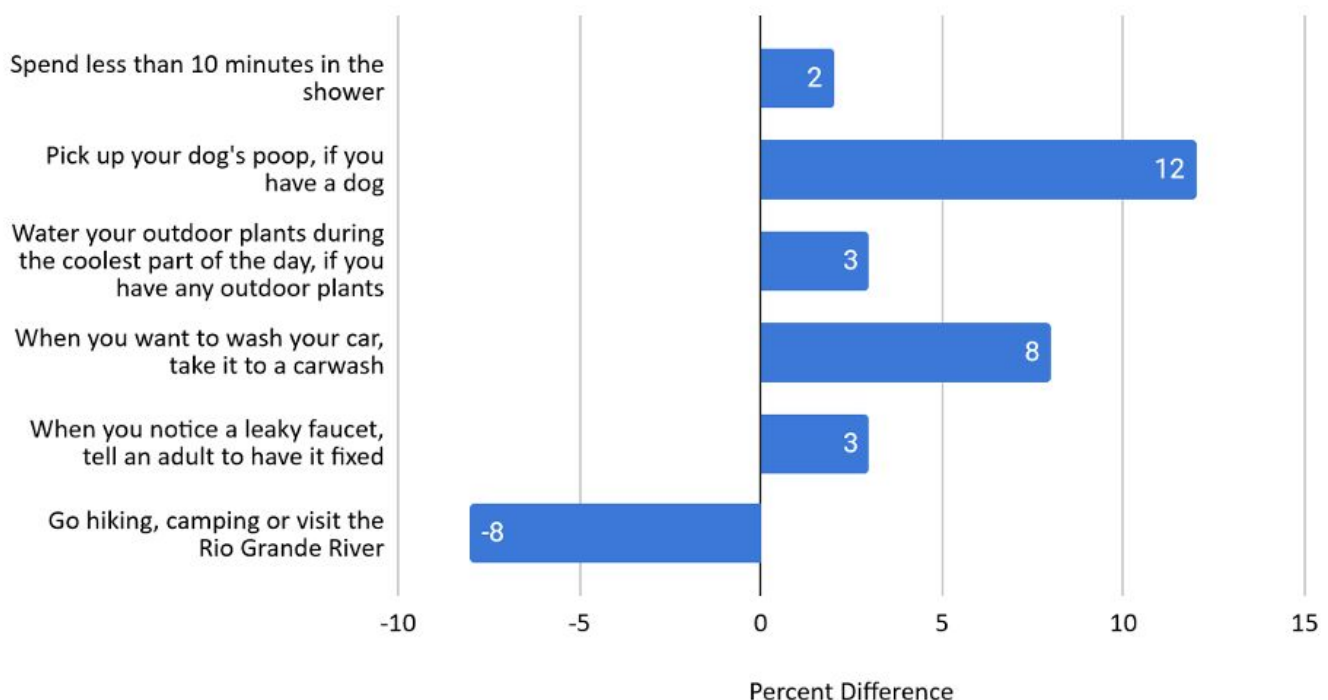
Below, you will find a series of graphs used to illustrate the change in responses between the pre and post surveys. This year, 795 students completed the pre-survey, while only 410 completed the post-survey. This was due to school closures occurring right after post-surveys were distributed to teachers. Most students completed the survey from home. In order to account for the discrepancy in participation, the number of each given answer has been calculated as a percent of the total number of responses received for each given survey.

The metrics demonstrate an overall positive increase in students' knowledge about local water resources, water conservation strategies, and human impacts on water quality. After participating in RiverXchange more students correctly defined a watershed, the annual precipitation in our region and the origin and outlet of the Rio Grande. In reviewing the graphs, notes were made below on findings that were significant, or on areas where the survey needs to improve. The first question below aims to understand how students' water conservation and environmental behaviors change after taking the program. The final question highlights some responses from the open ended question: *Do you think everyone has a right to water and why?* You will find some passionate, thoughtful, and critical responses that tell us that even if they don't fully understand what happens along the stormwater pathway yet, they overwhelmingly understand that water is life and has to be protected.

### Item # 1: How Often questions

The following two graphs demonstrate the percent change in responses on questions that reflect positive and negative behaviors in regards to water consumption and conservation. The questions are framed as “How often do you...?”

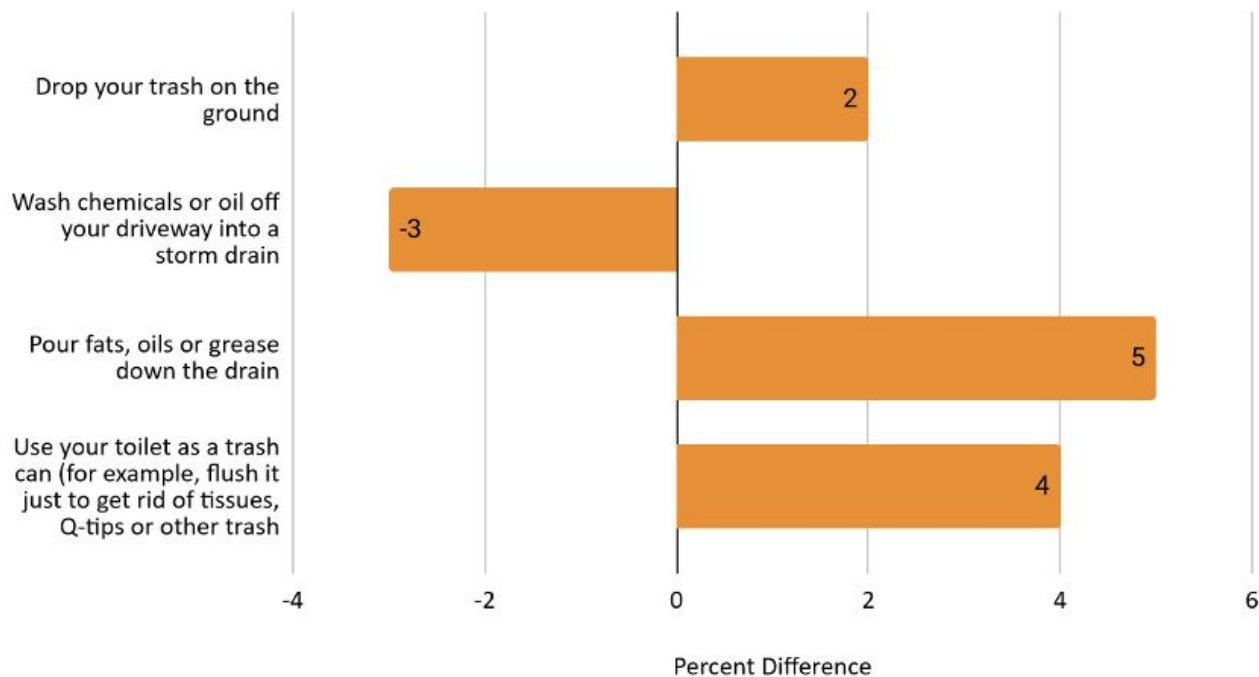
#### Change in Behavior of Students who ALWAYS:



- After going through RiverXchange, 12% more students said that they pick up their dog poop ( i.e. 12% more students said they learned from the program and report to have changed behaviors from the pre to the post test). However, in the pre-test, more students reported going hiking and visiting the Rio Grande than those who reported this behavior in the post-test. Two considerations are taken into account for the negative percent change in students reporting camping, hiking or visiting the river. One is that the stay-at-home order might have impacted their response and students are answering literally not in the context of normal family behaviors. Another is that once students participate in the pole planting field trip, where they walk a good distance to the river and find themselves surrounded by nature without a house in site, they might reconsider their initial answer with a different perspective on what it means to visit the river.



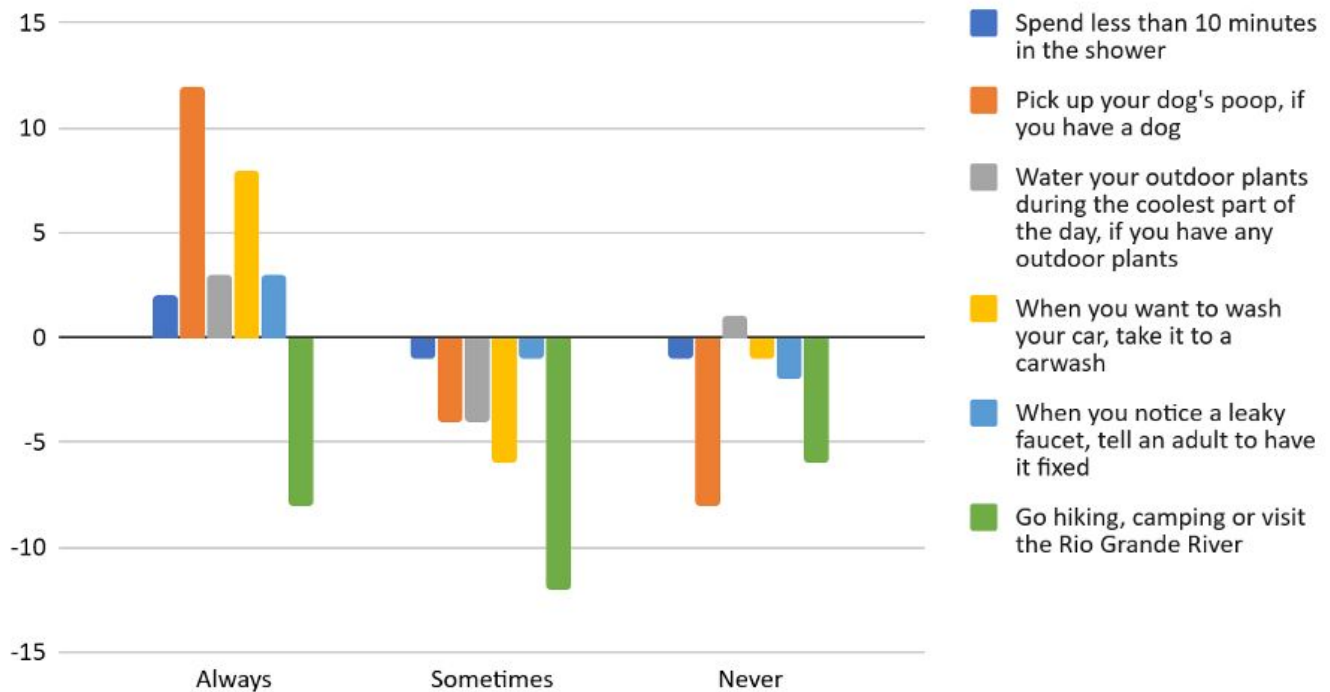
### Change in Behavior of Students Who NEVER:



- In the post-test, 5% more students reported to NEVER pour fats down the drain. This means that they gained valuable information from RiverXchange and report to change their behavior (likely because of the program itself). However, we see that more students reported to NEVER wash chemicals or oil off the driveway into a storm drain in the pre-test than they did in the post test, resulting in a negative number. Likely, this is just due to error since it's such a small percentage and that there was really no change.

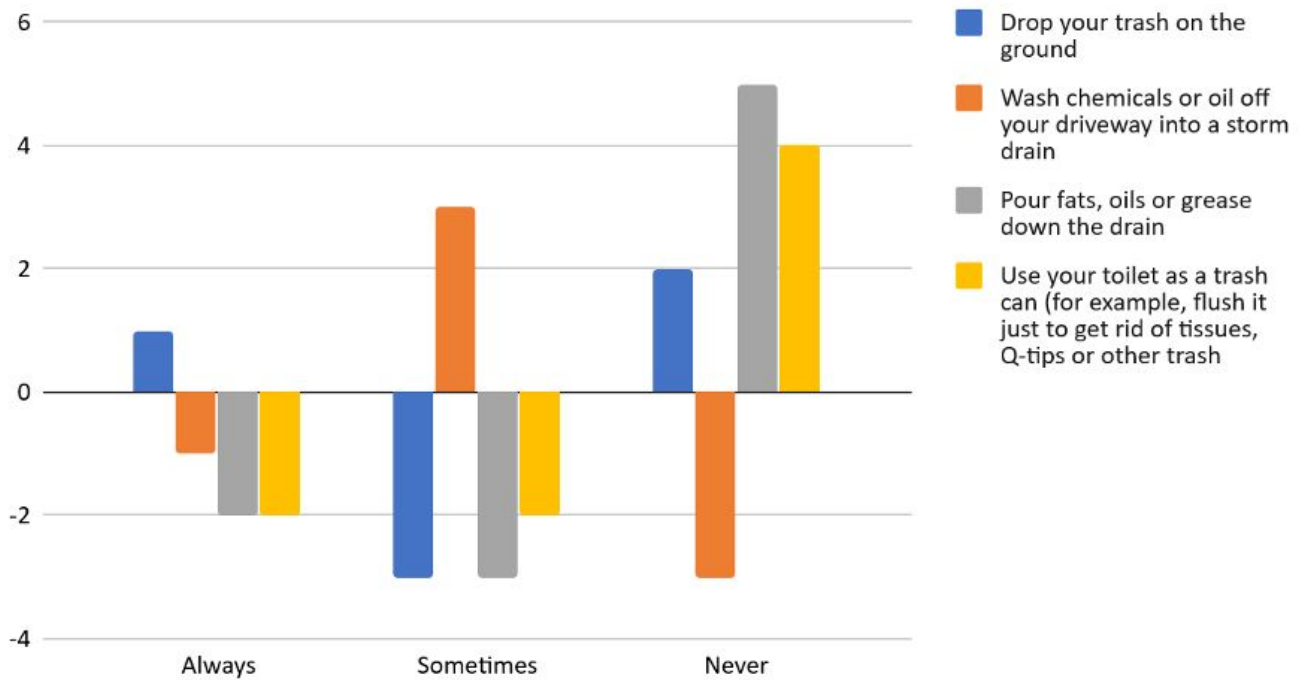
The following two percent change graphs include the 'sometimes' option for the 'How often' questions:

### Percent Change for Positive Behavior Items: Pre to Post Tests (RX 2020)



- Again, the most significant change is more students saying they always pick up their dog's poop. However, it appears that both 'sometime's' and 'no' answers decreased slightly, meaning that some students' behaviors changed for the positive.

### Percent Change for Negative Behavior Items: Pre to Post Tests (RX 2020)

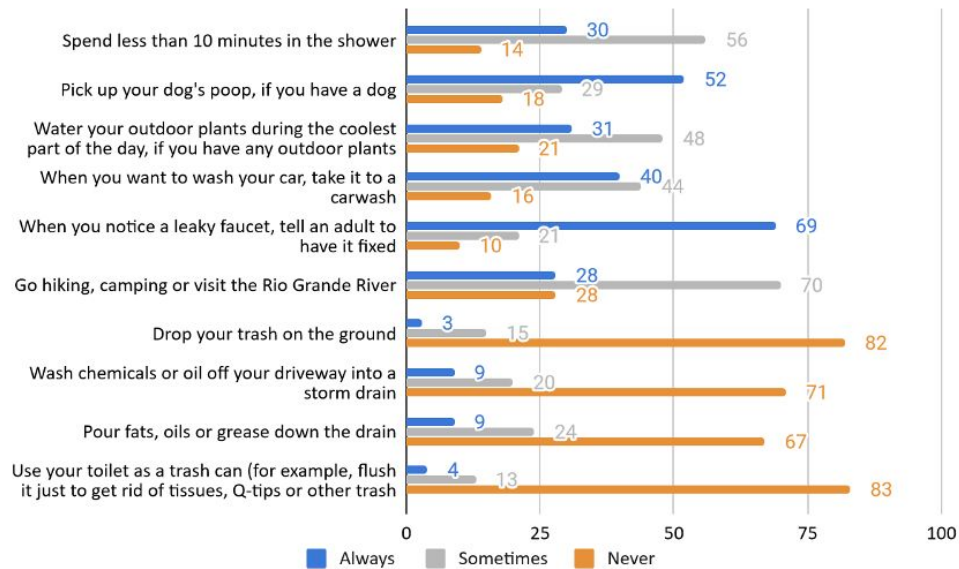


- The increase in responses from never to sometimes “washing chemicals into a storm drain” is interesting here. This may be a case of students answering more honestly if they observed or participated in this at home after they learned about stormwater pollution.

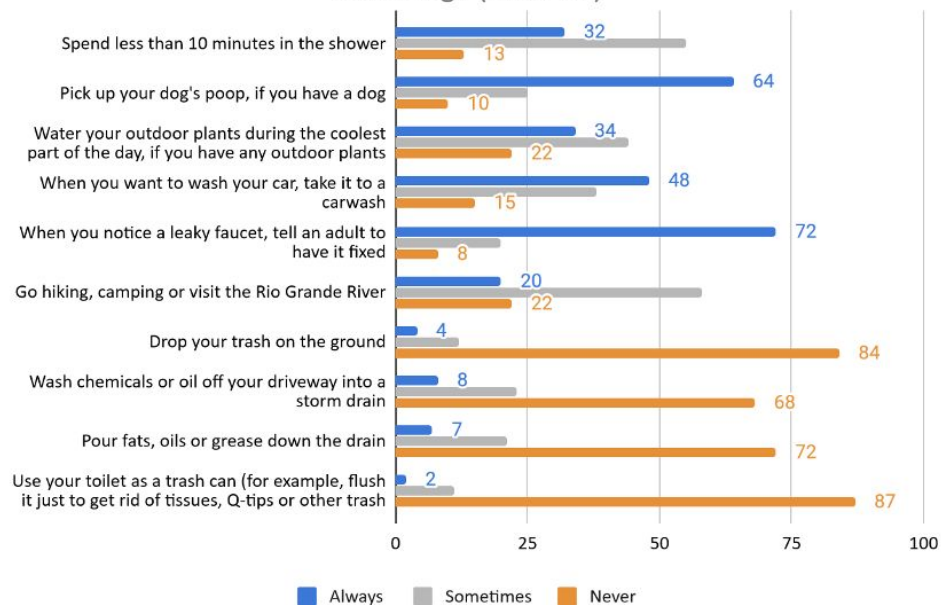


The following graphs are the raw percentages for the pre and post *how often* survey questions:

Pre-Test Percentages: How Often Do You and Your Family Do the Following? (RX 2020)



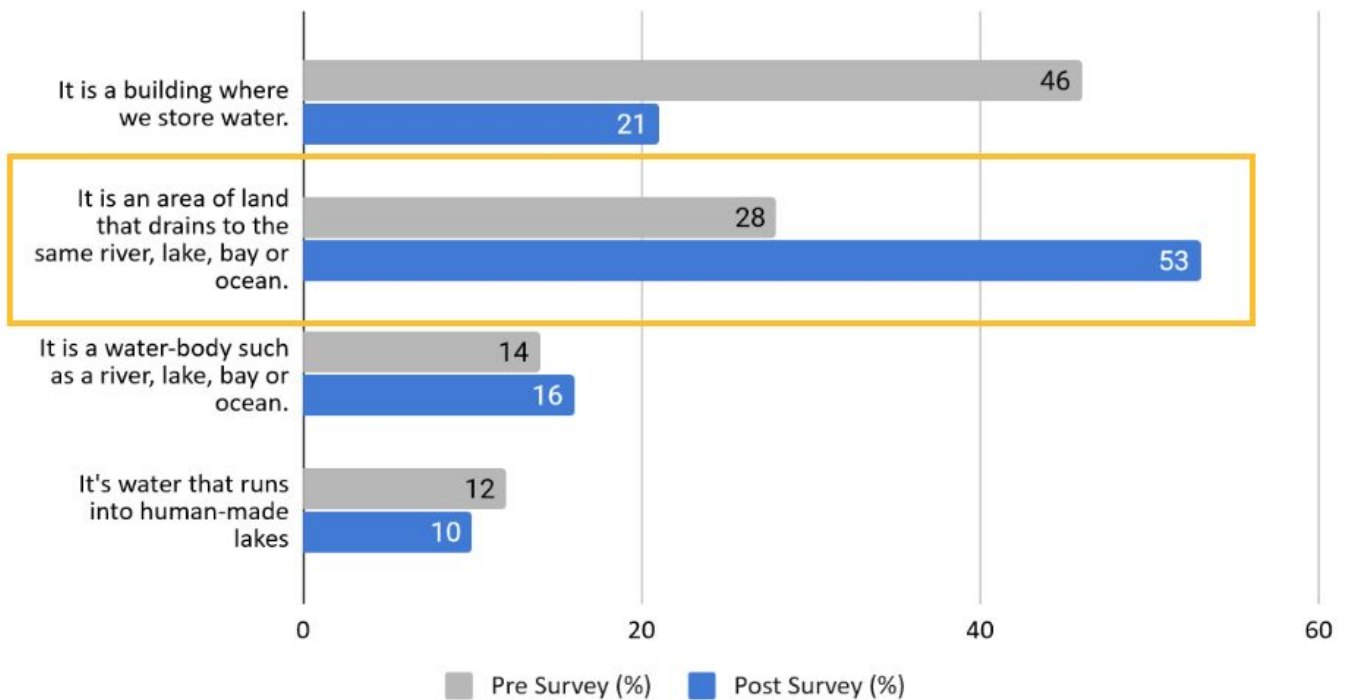
Post-Test Percentages: How Often Do You and Your Family Do the Following? (RX 2020)



The next section of survey questions correspond to the learning objectives of RiverXchange and demonstrate student learning outcomes from pre to post evaluation. Correct answers, where applicable have been noted with a yellow outline or stars.

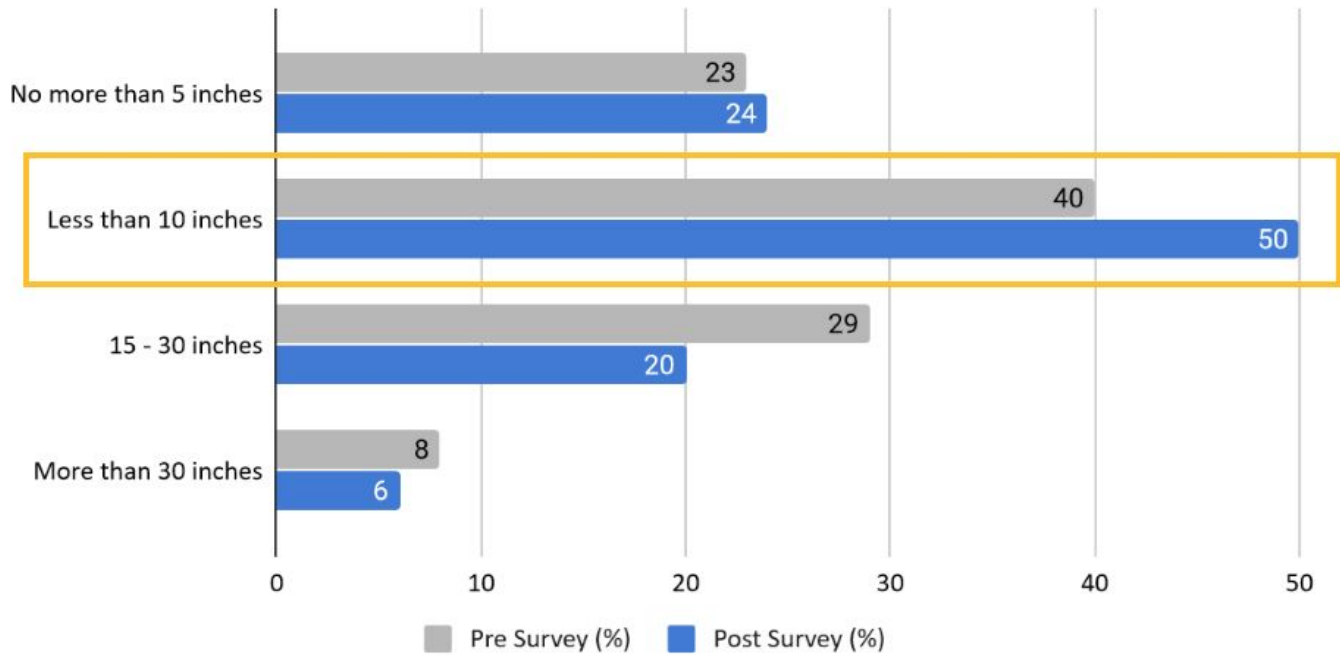
**Item # 2: What is the definition of a “watershed”?**

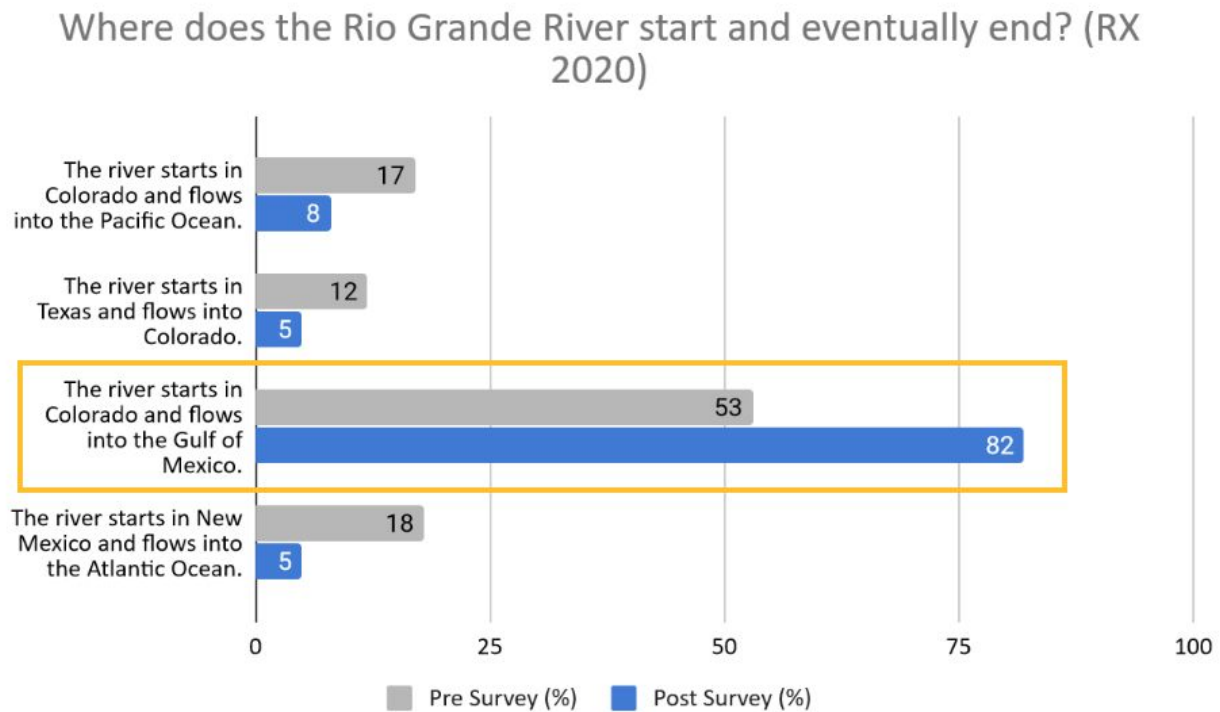
What is the definition of "watershed?" (RX 2020)



**Item #3: How much precipitation does your city receive each year on average?**

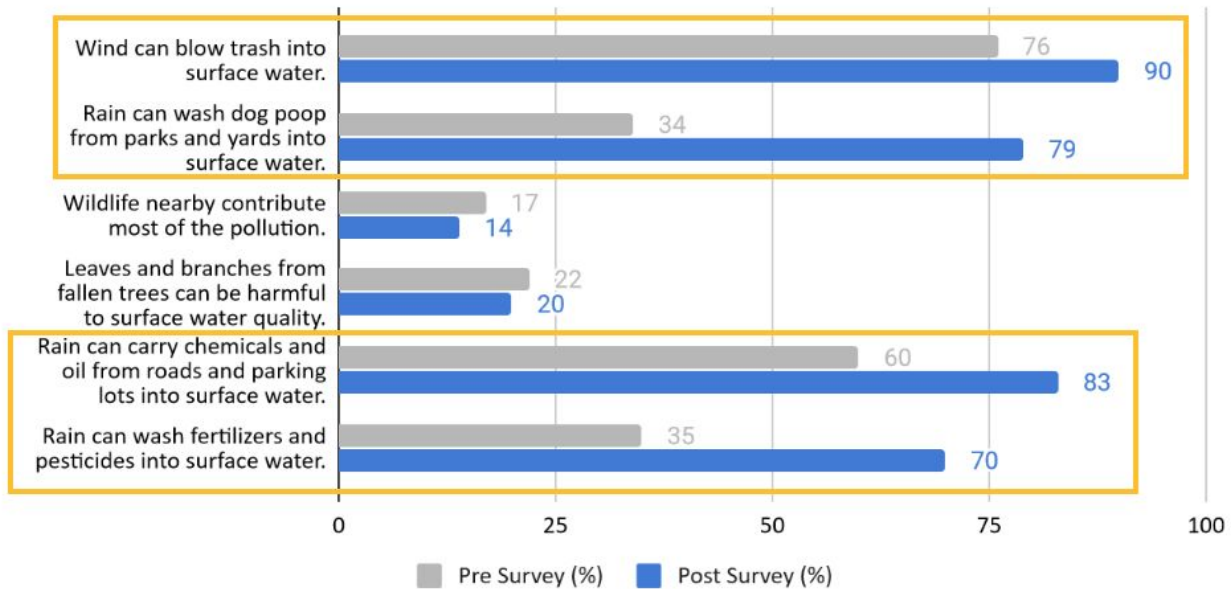
How much precipitation does your city (Albuquerque or Rio Rancho) receive each year, on average? (RX 2020)



**Item #4: Where does the Rio Grande River start and eventually end?**

**Item #5: How can surface water become polluted?**

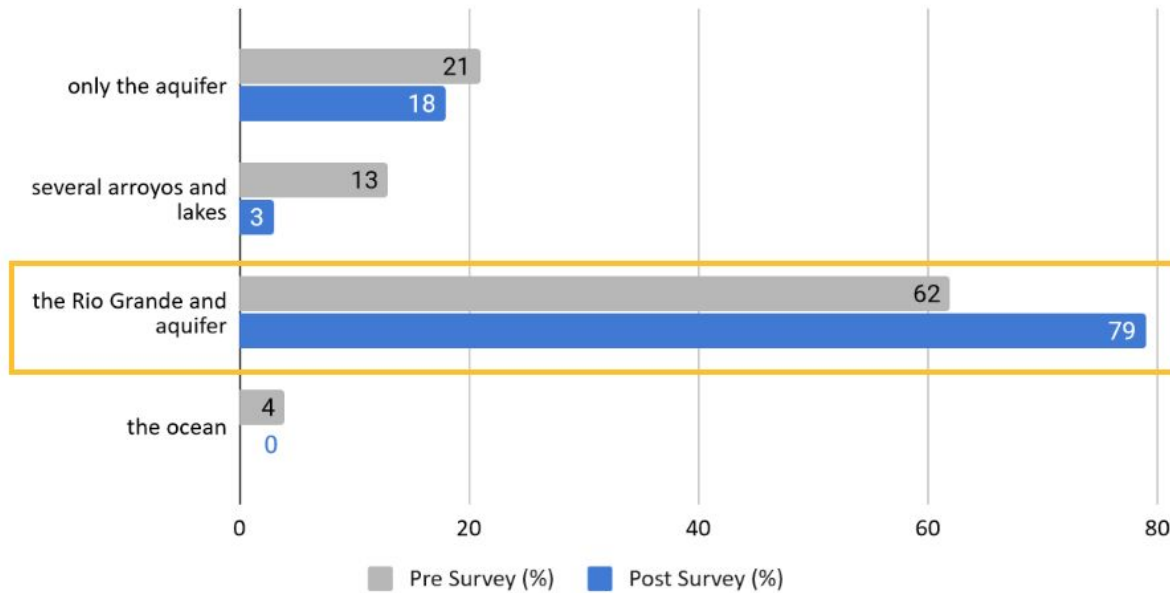
How can surface water (like a river, lake, bay or ocean) become polluted? Choose all answers that apply. (RX 2020)



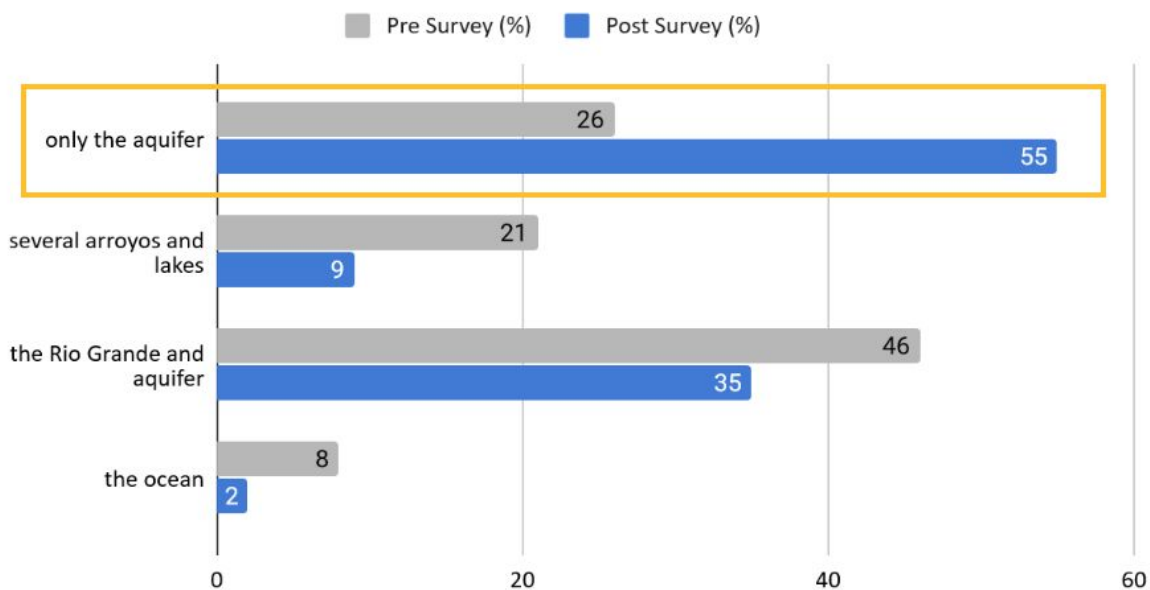
- Responses to this question were adjusted from last year to remove “all the pollution comes from factories” and “all the pollution comes from just a few people” as those answers seemed too obvious. Since this question allows for multiple responses, students who choose the incorrect answers are likely also choosing correct answers. We do see a reduction in the incorrect responses from pre to post survey. With the change in responses it may mean that our stormwater presentation may also need to incorporate some myth busting as well to clarify the incorrect responses.

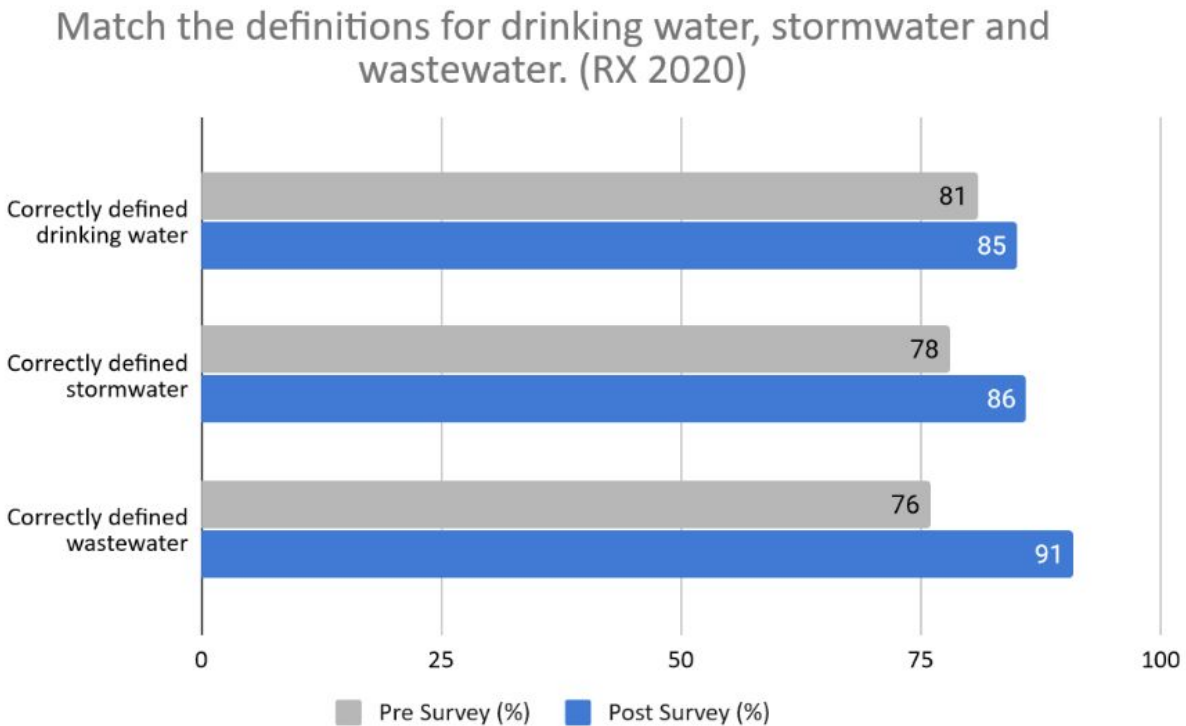
**Item #6: From what direct sources does ABQ/RR get their drinking water?** Students are directed to only answer the question for the city in which they live.

From what direct sources does Albuquerque get their drinking water? (RX 2020)



From what direct sources does Rio Rancho get their drinking water? (RX 2020)

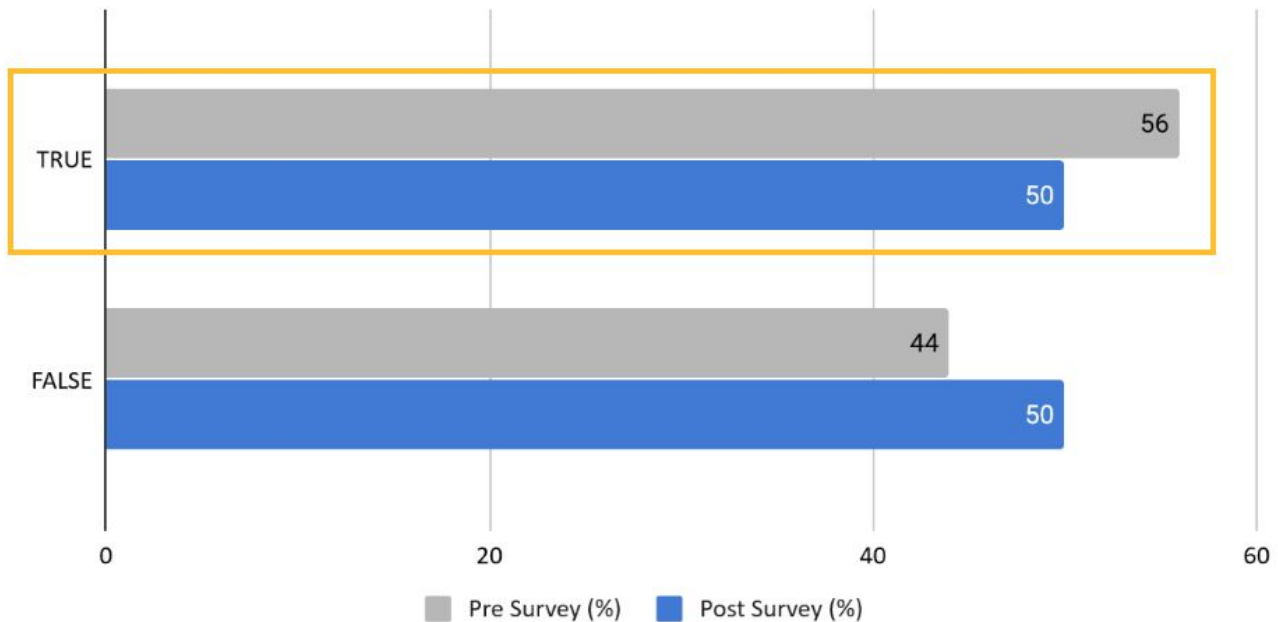


**Item #7: Match the definitions for drinking water, stormwater, and wastewater.**

- |
- The responses to this question do not suggest RiverXchange teaches these definitions to students as it may already be prior knowledge, although it may be that it is clear enough in the descriptions that students can easily choose answers correctly. We will explore if there is a better way to evaluate if students understand concepts that are taught about drinking water, wastewater and stormwater.

**Item #8: When it rains, your community's stormwater goes directly to...**

When it rains, your community's stormwater goes directly to the Rio Grande without being cleaned. (RX 2020)

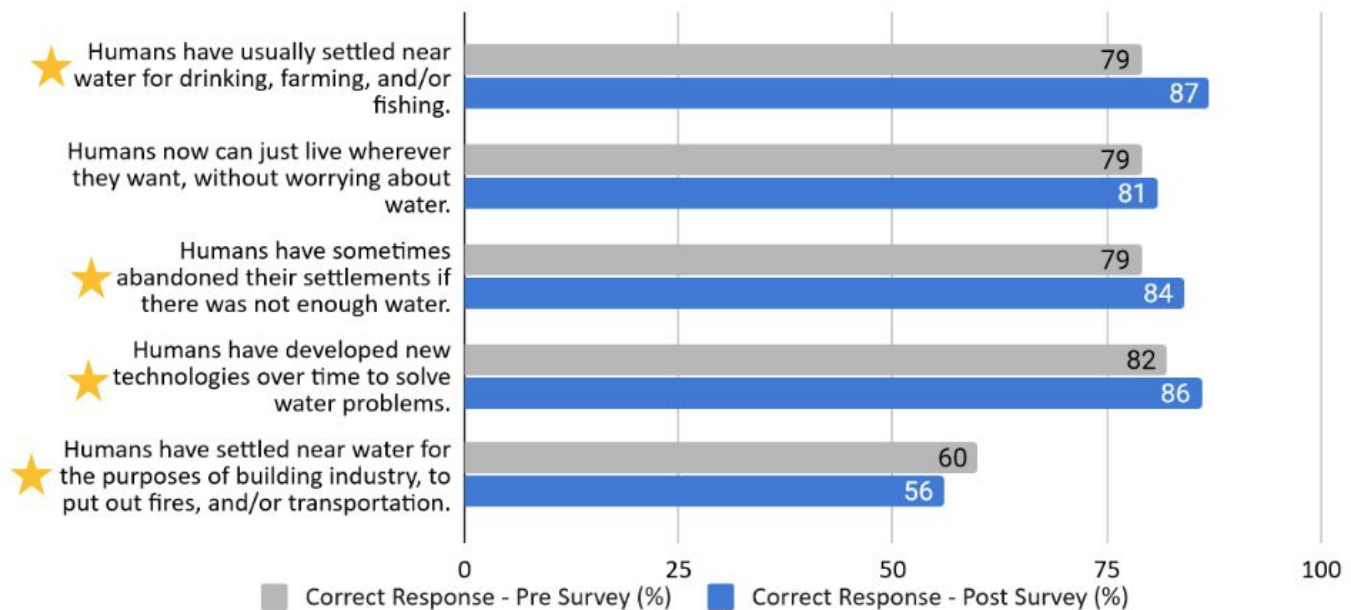


- This graph demonstrates a small decrease in correctly defining the stormwater pathway. This continues from last year, as we saw a similar percentage decrease in the correct answer. We met with presenters prior to program implementation this year and shared the concern about this misunderstanding and that it may be rooted in misinformation or confusion about a sewer drain versus a stormwater drain. However, we are still seeing similar results. It may be that there is confusion about a storm versus sewer drain. It could also be that presenters are discussing green stormwater infrastructure techniques that might lead students to think it is cleaned. They may also be another variable that is influencing this result that we have yet to identify.



**Item #9: Water has influences human settlements in the following ways:**

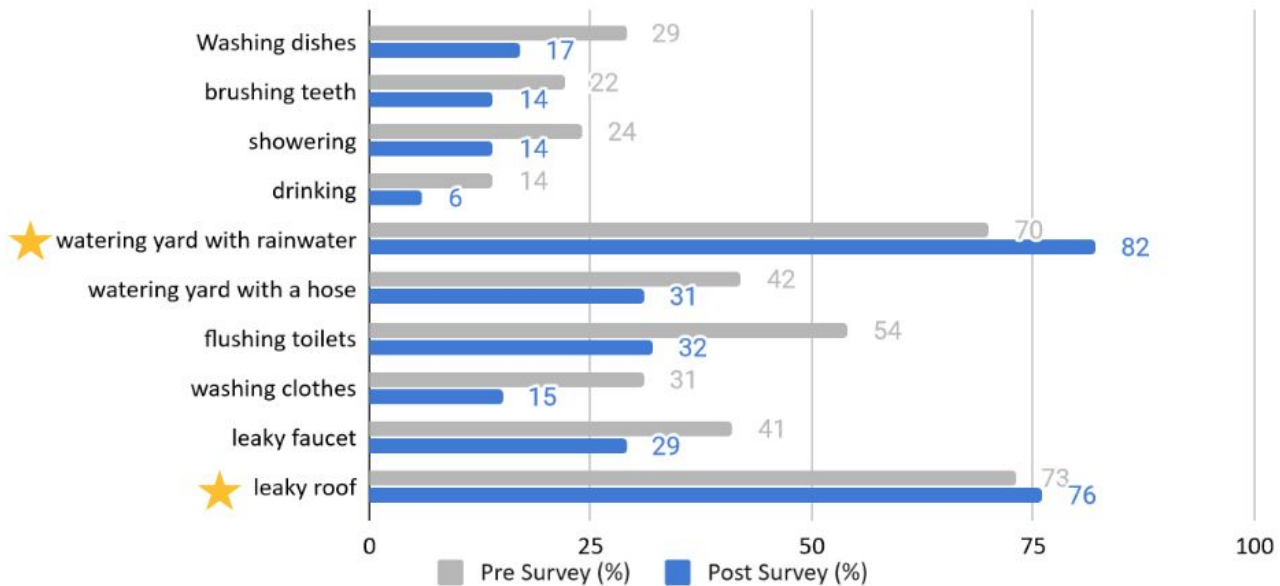
TRUE or FALSE. Water has influenced human settlements and culture in the following ways: (RX 2020)



- This question was adjusted from last year to allow students to choose true or false for each response, rather than only picking true answers. We see students are answering correctly in high percentages on the pre-survey but there is still positive growth for each answer, except the final “Humans have settled near water for the purpose of....” This could be the result of the changes made in the APS agriculture presentation that highlights the historical and cultural uses of the Rio Grande with a focus on Puebloan and Spanish settlements. The discussion does not always reach modern commercial uses of rivers that are more relevant to waterways outside of New Mexico.

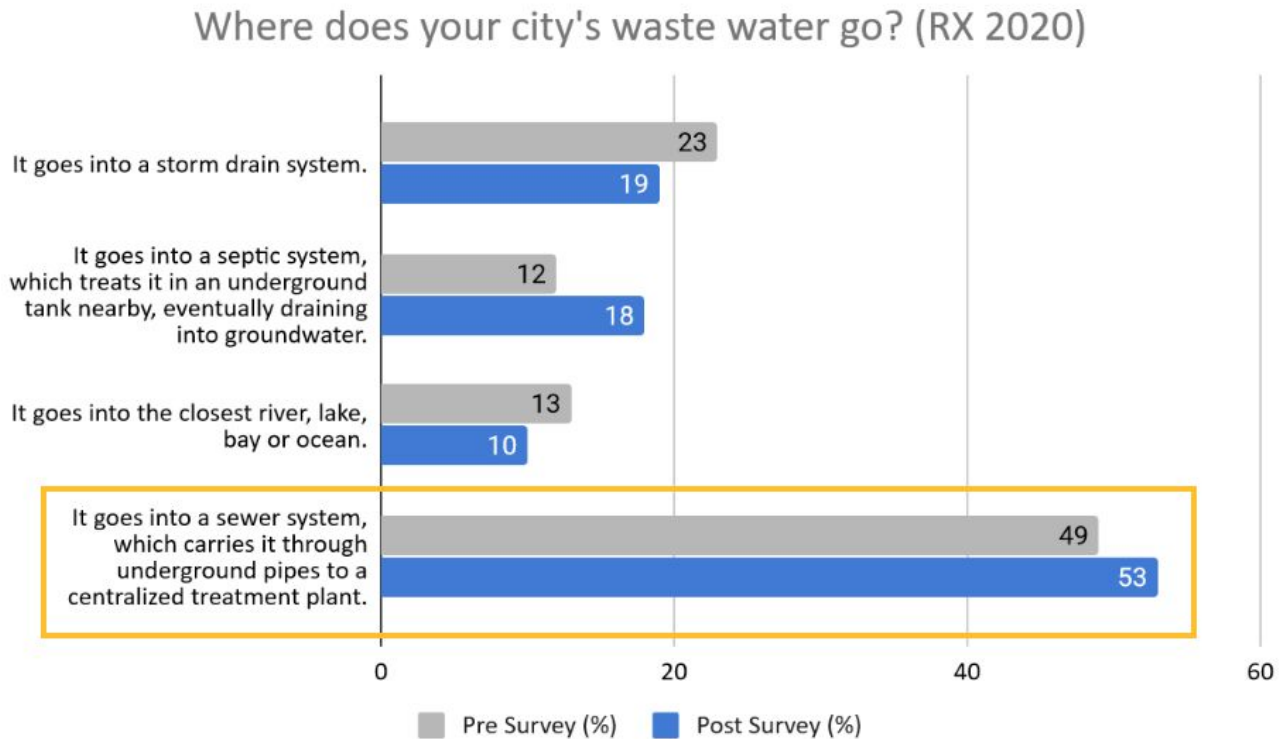
**Item #10: Which of these things DO NOT use our precious, clean drinking water?**

Which of these things DO NOT use our precious, clean drinking water? Choose all that apply. (RX 2020)



- This graph suggests that after participating in RiverXchange it was further clarified how often we use clean drinking water in our daily lives as the incorrect responses were reduced by 8-22 percent.

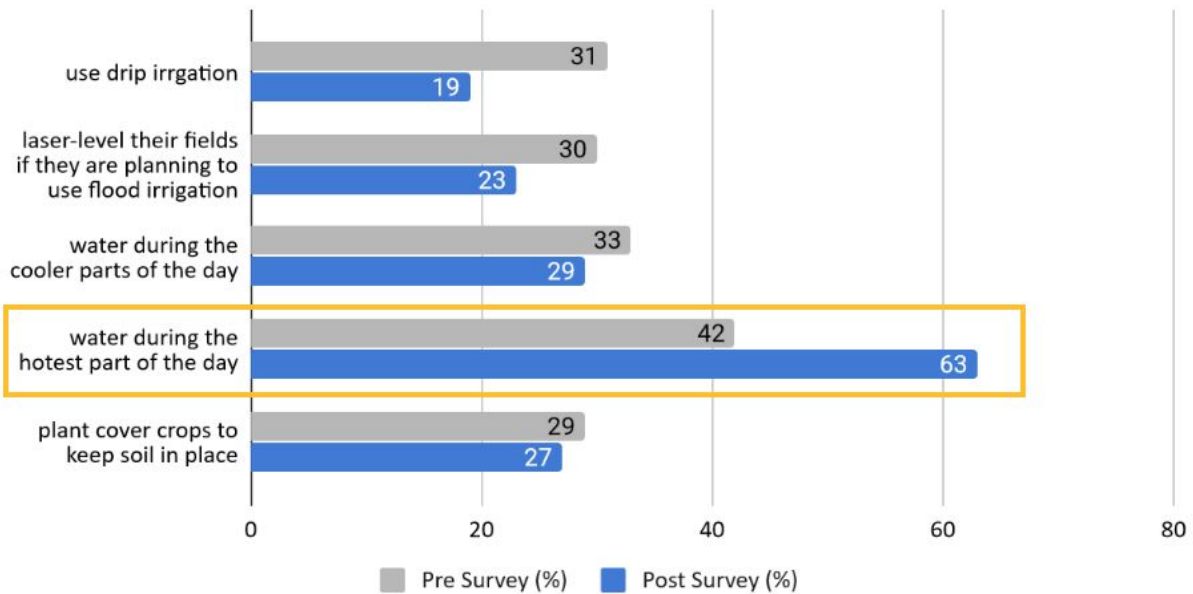
**Item #11: Where does your city's wastewater go?**



- This question was updated from last year's "When it rains, where does your community's stormwater go?" as the answer changes depending on where students live. The hope was that asking where your city's wastewater goes would prompt students to remember that Albuquerque and Rio Rancho have centralized treatment plants for the majority of residents. Considering that both incorrect answers saw a reduction in responses demonstrates that students are understanding that wastewater is either cleaned at a treatment plant or goes into a septic system (as is the case for many Rio Rancho students).

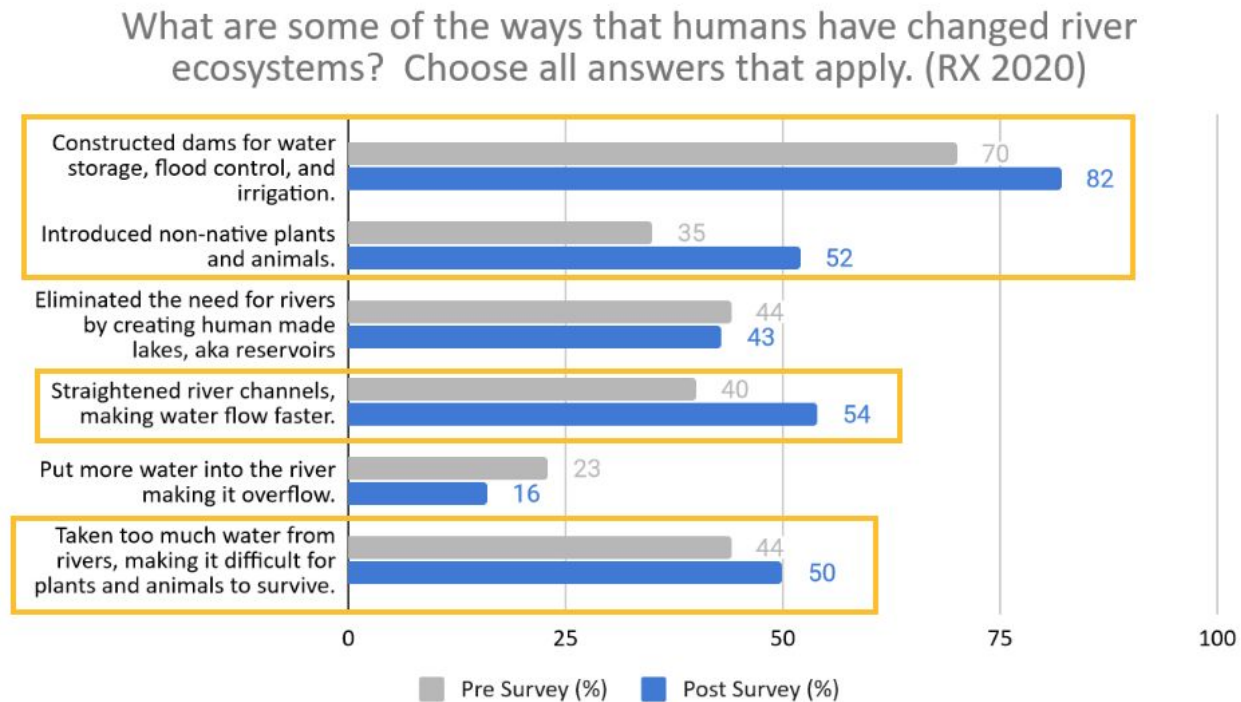
**Item #12: Which of the following is NOT a method farmers use to conserve?**

Which of the following is NOT a method that farmers use to conserve water. (RX 2020)



- Water conservation strategies for different farming methods and irrigation systems were only covered in the Sandoval County Extension agriculture presentation with Rio Rancho schools this year. Moving forward this question may need to be redefined or removed to account for the different presentations in each district.

**Item #13: What are some ways that humans have changed river ecosystems?**



- Overall this graph demonstrates that students increased their understanding of human impacts on river ecosystems. It is notable that their understanding of the impacts from the introduction of non-native species, straightening the river, and building dams significantly increased. The field trip experience really drives home a lot of key concepts about the Rio Grande's timeline and how anthropogenic influences on the river have impacted the riparian ecosystem.

**Item #14: Does you think everyone has a right to drinking water and why? (short answer)**

“Yes Everyone Has A Right To Drinking Water Because They Are Living Creatures They Need Water To Survive.”

“I think everyone should have a right to clean drinking water because water is a necessity to life.”

“Yes. If not everybody has water, then the human population will die off. I think that everybody should have access to water, especially in places where they don't have access to supplies of water.”

**“yes, I think that all people have the right to clean drinking water because humans need water to live and survive and people do have the right to live off of clean water for everyday use. Also all people should be treated fairly when it comes to drinking clean fresh water.”**

“Yes! I think this because the government can't be like you don't have money for us so you can't have water. That is basically starving them”

“Yes I do. I think this because everyone needs to drink water to survive and the water they drink should be clean so that they don't get sick or get a disease.”

“I think everyone has a right to drink clean drinking water because if we drinker dirty water, we would be like Mexico because in Mexico, the only water they drink is dirty water and the people who live there often get sick by the water.”

**“I think everyone doesn't have a right drinking water because some states have no clean water they still have water, but it's not all clean. Some people get sick from drinking dirty water all the time because there is no clean water.”**

“This is a yes and no question for me. I don't believe that people that waste our water should have any, but than again everyone needs water to survive. So I do think that people should have it because they need it, but some people just don't deserve it.”

“Yes , I think that everyone should have the right to have clean drinking water . As long as people don't waste it people should have it , and be great full for it to .”

“I think everyone has a right to drinking water but, some places in the world are really dry, so it's hard to find clean, decent drinking water.”

“Everyone of every race and country has the right to drinking water because it is a source of life and everyone in the world deserves it.”

**“I think everyone has a right to drinking water because, in order to live as humans and as a community, we must have water. Water is life! But I also think everyone has a right to know how to conserve it!”**

“Every one has a right to drink water because no one owns it”

Appendix 1 includes the extension activities from the RiverXchange curriculum, Appendix 2 includes photos.

## Appendix 1

### Extension Questions and Activities



#### Understanding Our Watershed:

#### *River Geography*



#### ❖ Suggested Reading:

##### ➤ Books:

- [\*Follow the Water from Brook to Ocean\*](#) by Arthur Dorros
- [\*Paddle-to-the-Sea\*](#) by Holling C. Holling
- [\*One Well: The Story of Water on Earth \(CitizenKid\)\*](#) Strauss, Rochelle

##### ➤ Articles:

- *Albuquerque Journal*: [“As Bad as it Gets: Drought Returns to New Mexico.”](#)
- *Albuquerque Journal*: [“Drought Affecting 99% of New Mexico.”](#)

#### ❖ Watch:

- Watch [Save Water - Save Our Rio!](#), a 17 minute video created by local summer camp students, sponsored by Albuquerque Water Utility Authority. Follow up with *When is the Drought Out?*  
[http://www.abcwua.org/education/pdfs/Drought\\_GraphingOption.pdf](http://www.abcwua.org/education/pdfs/Drought_GraphingOption.pdf)

#### ❖ Write a letter to your partners or create a project, explaining:

- what a watershed is
- the name of your river - this is also the name of your watershed!
- the journey of your river from its headwaters to the ocean

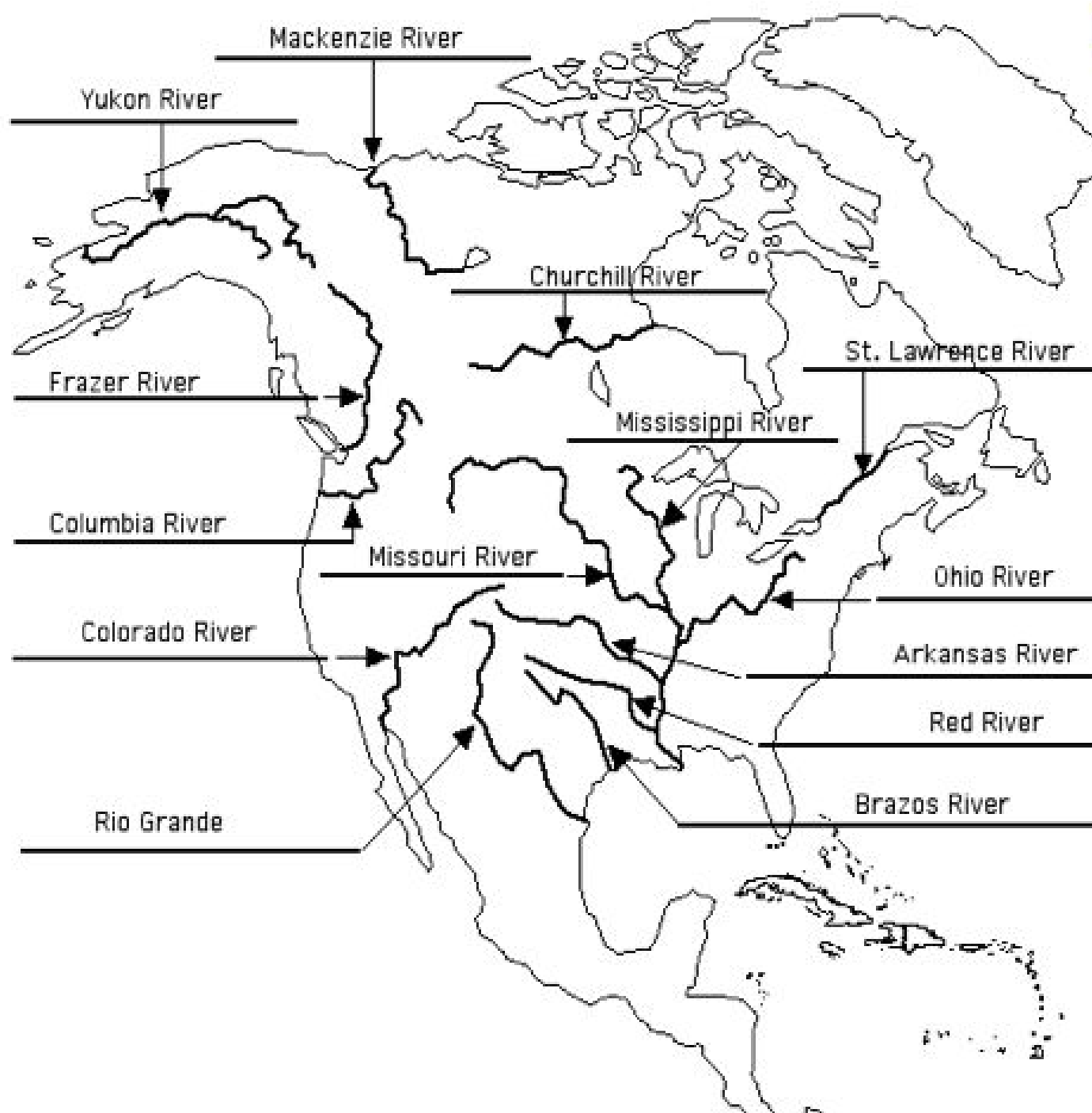


- what the river is like in your area - big/small, clear/muddy, fast/slow?
- how much precipitation your area receives each year, and what season gets the most precipitation

❖ **Want to explore further?** Refer to Project 1 in the RiverXchange Curriculum “Understanding a Watershed”.

- You can access the curriculum on your Kidblog homepage or by following this link:  
<https://riverxchange.com/teachers2/curriculumpage/>

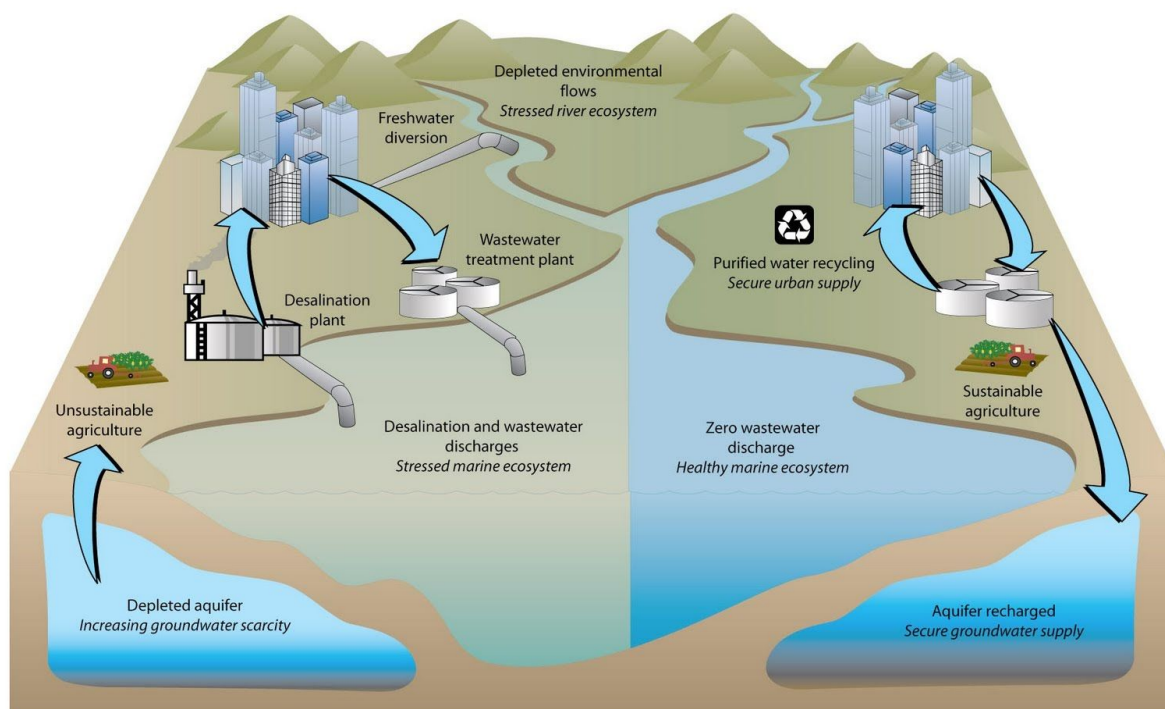
## North American River Map



# *The urban water cycle*

## Unsustainable

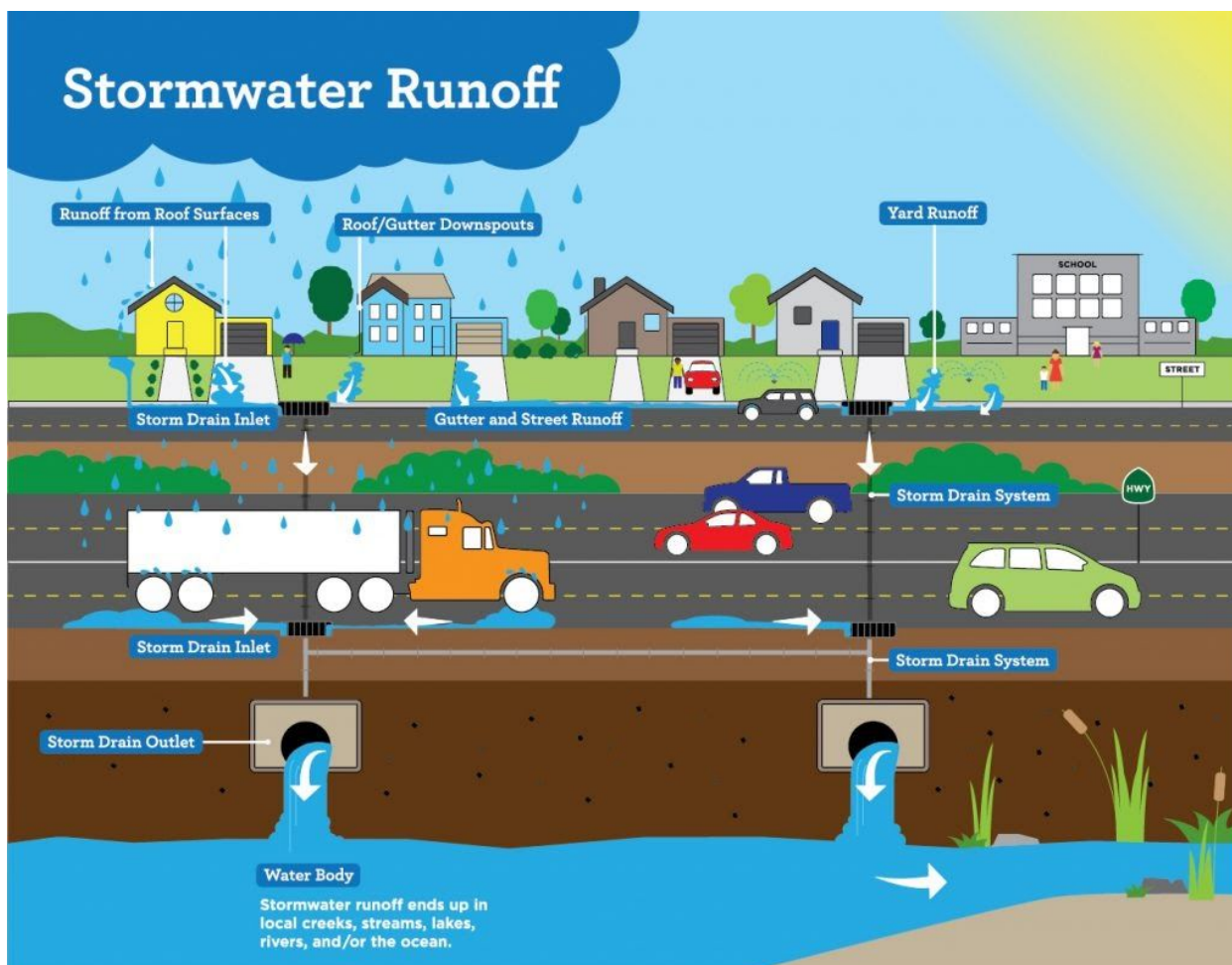
## Sustainable





## Understanding a Watershed:

### *Watershed Model / Infiltration and Runoff*



Graphic credit: City of Columbia, MO

**Enhance your student's blog posting and extend their learning beyond the Stormwater presentation with the following activities:**

#### ❖ Suggested Reading:

##### ➤ Articles:

- CNN article. 2013. "Garbage Man of the River"  
<http://www.cnn.com/2013/04/18/us/cnnheroes-pregracke-rivers-garbage>
- Science News for Kids article. 2012. "Suffocating Waters"  
<https://www.sciencenewsforstudents.org/article/suffocating-waters>

#### ❖ Watch:

- The Human Solution to Water Pollution video (to right of screen):  
<http://sscafca.org/teacher-resources/>
- The Majestic Plastic Bag video (mockumentary): <https://vimeo.com/14221747>
  - For a 60 minute class activity, include [this lesson](#) to explore the Great Pacific Garbage Patch and what students can do to respond.

- Explore [The Ocean Cleanup](#) project and how an 18 year old started with a simple idea which is now making a difference in the effort to clean up the world's oceans.

### ❖ Explore your watershed

- Follow the link below to zoom in and explore your watershed and the watershed that family and friends live in, perhaps even your RiverXchange partners who live outside of New Mexico! [Interactive Topographic Watershed Map of Earth](#)

### ❖ Lesson plan

- [Don't Trash Our Rio Activity Guide](#) - A math based extension where students learn how much trash is pulled from Albuquerque's storm drain system yearly, and calculate how many trash bags or classrooms it would fill. (Follow links for additional handouts)

### ● Reflection Questions

- Discuss how the gutters in our streets lead to **storm drains**, which often lead directly to the nearest body of water. Discuss the difference between **stormwater** and **wastewater** (from household drains and toilets).
- What is stormwater and where does your community's stormwater go?
- What did you learn about stormwater that was surprising to you?
- How do things that happen in your yard or your neighbor's yard impact the watershed?
- What have you noticed about stormwater in your own neighborhood?
- What are some things you can do to clean up stormwater?
- How can surface water become polluted?
- What's happens when rain falls on a pervious surface compared to an impervious surface? Give examples of impervious surfaces.
- How are groundwater and surface water connected?
- What are ways you can minimize stormwater pollution?

### ❖ Want to explore further? Refer to Project 2 in the RiverXchange Curriculum "The Watershed".

- You can access the curriculum on your Kidblog homepage or by following the link below: <https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf>



**Water in Our Society:**

*Drinking Water*



**Enhance your student's blog posting and extend their learning beyond the Drinking Water presentation with the following activities:**

❖ **Suggested Reading:**

- **Book:** *A Long Walk to Water*, by Linda Sue Park (2010: Clarion Books)
- **Articles:**
  - **Albuquerque drinking water info**
    - from ABQ Water Utility Authority  
[http://www.abcwua.org/education/pdfs/WaterUse\\_Text.pdf](http://www.abcwua.org/education/pdfs/WaterUse_Text.pdf)
    - About the San Juan Chama Project, ABQ Journal 2008:  
<https://riverxchange.files.wordpress.com/2015/08/san-juan-chama-project.pdf>
  - **Santa Fe drinking water info**
    - Buckman Diversion, ABQ Journal 2010:  
<https://riverxchange.files.wordpress.com/2015/08/buckman-diversion.pdf>
  - **Santa Fe drinking water info**
    - Buckman Diversion, ABQ Journal 2010:  
<https://riverxchange.files.wordpress.com/2015/08/buckman-diversion.pdf>

### ❖ **Lesson Plan: The Water Project**

[https://thewaterproject.org/resources/WaterLogs\\_5to8.pdf](https://thewaterproject.org/resources/WaterLogs_5to8.pdf)

- Five simple activities and lessons to assist students in exploring how water scarcity may impact their lives and how they can contribute by conserving water.
- Suggested activity: Students log their personal use and observation of other forms of water use over two days, then discuss their findings and explore what would happen if water scarcity were an issue. Another lesson also includes a TRUE/FALSE game to learn about water and how it impacts the human body and communities.

### ❖ **Lesson Plan: Cleaning Water**

<http://seplessons.ucsf.edu/node/1754>

- Create a filter in class to clean contaminated water and investigate your findings with the lesson linked below. This activity can be done over the course of a few days in class, or you can demonstrate how a filter works with your class in a shorter lesson.

### ● **Reflection Questions**

- Where does your drinking water come from and what communities rely on it?
- Drinking water is used for much more than bathing, flushing toilets and drinking. What are other ways you and your community use drinking water?
- Did you learn anything surprising about how we use drinking water, if so what?
- What percentage of the Earth is covered in water? Out of that amount, how much is accessible fresh water? How much is available as drinking water and why is it important to conserve it?
- One third of the world's population does not have access to clean drinking water. How would your life be different if you had to walk miles to bring back water to your family?

### ❖ **Want to explore further?** Refer to Project 6 in the RiverXchange Curriculum “Drinking Water”.

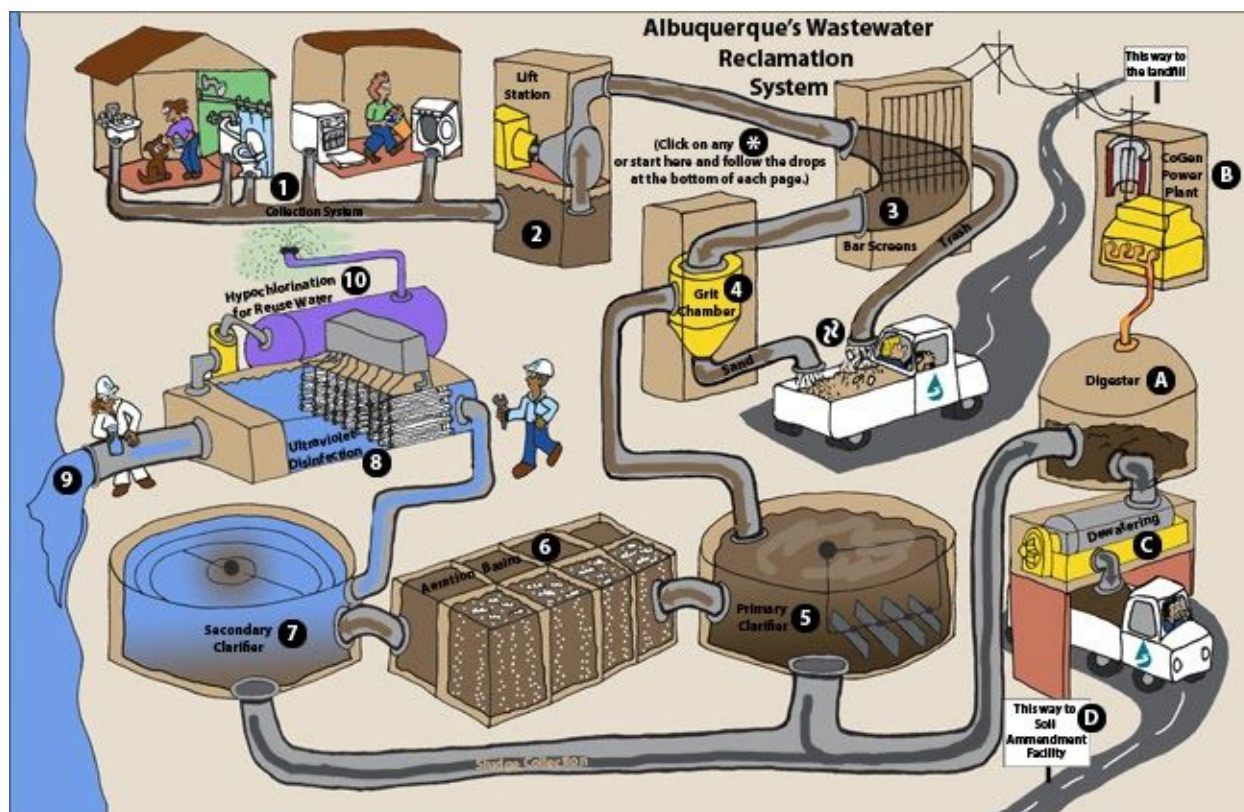
- You can access the curriculum on your Kidblog homepage or by following this link:  
<https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf>





## Water in Our Society:

## Wastewater / Groundwater



Enhance your student's blog posting and extend their learning beyond the Wastewater presentation with the following activities:

### ❖ Suggested Reading:

- KOAT news. 2015. "Aging Pipes Mean Higher Water Bills"  
<http://www.koat.com/news/aging-pipes-could-mean-water-bill-hike/34284754>
- Combined sewer overflows article, by Anne Jefferson, a geology professor from Kent State.  
<http://all-geo.org/highlyallochthonous/2013/03/combined-sewer-overflows-solving-a-19th-century-problem-in-the-21st-century/>

### ❖ Activities:

- Follow this link to the ABQ Water Utility Authority's website to navigate virtually through Albuquerque's wastewater system:  
[http://www.abcwua.org/Education/SWRP\\_home.html](http://www.abcwua.org/Education/SWRP_home.html)
  - Want to add a project-based learning component to this exercise? Use these questions and activities to go along with your tour:  
[http://www.abcwua.org/education/educators\\_WSDcur2\\_quest.html](http://www.abcwua.org/education/educators_WSDcur2_quest.html)

- Show students the [Septic System poster](#) (the poster can be shown on a smartboard and explain the difference between a **sewer system** and a **septic system** – they both treat wastewater essentially the same way, but a septic tank is right by the house and uses a drainfield in rural areas.
- Create a Public Service Announcement with your class inspired about what you’ve learned. Take a video and post it on the blog to share with your partner class!

### ❖ **Watch:**

- Watch one of these videos in class to review the process of wastewater and what students can do to take care of wastewater:  
<https://www.youtube.com/watch?v=Ldz29NqwK78> (An animation narrated by a young student)
- <https://www.youtube.com/watch?v=tuYB8nMFxQA> (A video of the water treatment process created by New Jersey American Water)
- Learn about recharging the aquifer in the City of Rio Rancho  
<https://rrnm.gov/4024/Rio-Rancho-Pure>

### ● **Reflection & Discussion:**

- What is wastewater and how does it impact your community?
- What is the difference between wastewater, stormwater and drinking water?
- How can you use what you’ve learned to make a difference at home and at school?
- What is the process of treating wastewater in your community? (For RRPS students, generally you are on a septic system). What is the difference between a sewer and septic system?
- What surprised you about the process of treating wastewater from the presentation?
- Why is it important to do what we can to keep certain things out of our wastewater, whether it goes to septic system or a wastewater treatment plant?

### ❖ **Want to explore further?** Refer to Project 8 in the RiverXchange Curriculum “Wastewater”.

- You can access the curriculum on your Kidblog homepage or by following this link:  
<https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf>





## Water in Our Society:

### *Commercial Uses of Our Waterways: Agriculture*



Photo credit: Erich Schlegel

**Enhance your student's blog posting and extend their learning beyond the Agriculture presentation with the following activities:**

#### ❖ **Suggested Reading:**

- **Book:** *Out of the Dust* by Karen Hesse (1997: Scholastic Press)  
Written from the poetic perspective of 14 year old Billie Jo as she narrates her family's struggle in Oklahoma during the years of the Depression and the Dust Bowl.
- **Articles:**
  - *ABQ Journal* article, 2013. "Deal Allows Farmers to Sell Irrigation Water"  
<http://www.abqjournal.com/221194/news/deal-allows-farmers-to-sell-irrigation-water.htm>
  - *National Geographic* article, 2014. "Parched: A New Dust Bowl Forms in the Heartland"  
<http://news.nationalgeographic.com/news/2014/05/140516-dust-bowl-drought-oklahoma-panhandle-food/>

- ❖ **Explore more about the Dust Bowl:** Check out the link below for an informative, interactive website developed by PBS. <http://www.pbs.org/kenburns/dustbowl/educators/overview/>

- ❖ **Lesson Plan: Soil is Not Trivial**

- Using facts about the Dust Bowl, students write questions and play a trivia activity focused around the establishment of a national soil conservation program and the importance of soil. Students then explore and/or develop a plan to address a local soil conservation issue.
- [http://www.ncagr.gov/SWC/educational/documents/FLP\\_soil\\_is\\_not\\_trivial.pdf](http://www.ncagr.gov/SWC/educational/documents/FLP_soil_is_not_trivial.pdf)

- ❖ **Write a short story**

- Write a short story from the perspective of someone who is living during, and affected by the Dust Bowl. Explore the PBS website link, or the suggested reading.

- ❖ **Lesson plan: Growing Plants**

- Students will use the story of *The Empty Pot* to explore literature and science, practicing story mapping and learning about the needs of plants and the importance of soil and water. Like the characters in the story, students will plant and observe the growth of seeds.
- [https://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=484&author\\_state=O&grade=3&search\\_term\\_lp=growing%20plants](https://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=484&author_state=O&grade=3&search_term_lp=growing%20plants)

- **Reflection Questions**

- What was the Dust Bowl and how did it impact people?
- What do you think are the major agricultural lessons for us from the Dust Bowl?
- How may we be able to prevent a dust bowl from occurring again?
- What is important for farmers to consider when planning how to irrigate their farm and why?
- How does agriculture relate to water and to our daily lives?
- What did you discover in your planting activity about the different types of irrigation?

- ❖ **Want to explore further?** Refer to Project 5 in the RiverXchange Curriculum “Commercial Uses of Our Waterways”.

- You can access the curriculum on your Kidblog homepage or by following this link: <https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf>





**Water in Our Society:**

## *Commercial Uses of Our Waterways: Acequias*



**Enhance your student's blog posting and extend their learning beyond the Agriculture presentation with the following activities:**

### ❖ **Suggested Reading:**

#### ➤ **Articles:**

- *ABQ Journal* article, 2013. "Deal Allows Farmers to Sell Irrigation Water"  
<http://www.abqjournal.com/221194/news/deal-allows-farmers-to-sell-irrigation-water.htm>
- *National Geographic* article, 2014. "Parched: A New Dust Bowl Forms in the Heartland"  
<http://news.nationalgeographic.com/news/2014/05/140516-dust-bowl-drought-oklahoma-panhandle-food/>

### ❖ **Watch:**

- [Nuestras Acequias](#) (20 minutes) and/or [South Valley Acequias](#) (4 minutes). Discuss the **acequia** system which was put in place by the Pueblo people and early Spanish settlers, how is it organized amongst the community and maintained? What is its cultural and ecological significance?

- Explore the acequia tradition further with [El Agua Es Vida](#) lessons.

### ❖ Lesson Plan: Prior Appropriation

- Using the [Prior Appropriation](#) activity guide, act out the two different methods of assigning water rights to all the water users. Discuss the difference between the Riparian Rights and Prior Appropriation doctrines. Research the history of water rights in your community and compare the differences in water rights issues with your partners' area. Prior Appropriation is used in the western states, which receive far less precipitation.

### ❖ Discuss

- How people have developed technological solutions to solve water problems. For example, many ancient settlements in the West were abandoned because of lack of water, but irrigation technology has made it easier to survive. Dams have made it easier to control the flow of rivers, reservoirs store water, and fish ladders are built so that dams don't prevent their migration. High-efficiency toilets and other appliances help conserve water.

### ● Reflection Questions

- What did you learn about acequias that you didn't know before this presentation?
- How are acequias important to life and culture in New Mexico?
- What would happen to the land if people didn't maintain acequias?
- What is important for farmers to consider when planning how to irrigate their farm and why?
- How does agriculture relate to water and to our daily lives?

### ❖ Want to explore further? Refer to Project 5 in the RiverXchange Curriculum "Commercial Uses of Our Waterways".

- You can access the curriculum on your Kidblog homepage or by following this link:  
<https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf>



## **River Ecosystems:** *Pole Planting Field Trip*



**Enhance your student's blog posting and extend their learning beyond the Field Trip with the following activities:**

### ❖ **Suggested Reading:**

- **For teacher:** Read or review the 1st part of Chapter 4 of the [Bosque Education Guide: A River of Change](#) and discuss with your class the history of the Rio Grande River, the changes made to its flow and channel, and the impact on the Bosque ecosystem.

### ❖ **Make a food web**

- Make a food web for our local ecosystem, identifying producers, consumers and decomposers, native species and invasive species, as well as local endangered species. Discuss how wildlife are “water users” too. Like humans, wildlife needs clean water to live, so as a community we must consider their needs when making choices about water. Use Bosque [plant](#) and [animal cards](#) to do [The Web](#) activity, discussing how all living things depend on each other.

### ❖ **Learn about the STRAW Project**

- An ongoing watershed restoration project first inspired by 4th graders in 1992, based in Marin Co. California! Add it to your school's library and show the documentary in class. <http://www.pointblue.org/our-science-and-services/conservation-science/conservation-trai>



[ning/straw-program](#) or read about the project in this article and discuss how youth can make an impact: <http://www.marinij.com/article/NO/20150325/NEWS/150329872>

● **Reflection & Discussion:**

- What did you learn about the history of the Rio Grande River and the floodplain we planted in? How does this history impact the future of cottonwoods in the area?
- Identify some common invasive species. Where did they come from and how are they impacting the Bosque?
- What is the process of planting cottonwoods and willows and why do we do it in the wintertime?
- After this field trip, how may you see and understand the Bosque differently?
- What did you most enjoy while being down in the Bosque?
- How can you apply what you learned or enjoyed on your field trip in your everyday life?

❖ **Want to explore further?** Refer to Project 9 in the RiverXchange Curriculum “Field Trip”.

- You can access the curriculum on your Kidblog homepage or by following the link below: <https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf>

## Appendix 2

### Photos

Below is a selection of images from our planting field trips:











Thank you for all your hard work and dedication to RiverXchange Melissa McLamb! We will miss you!



## **Exhibit 5**

# **Bosque Ecosystem Monitoring Program (BEMP) 2019-2020 Final Report**





## **Bosque Ecosystem Monitoring Program (BEMP) Report to the Storm Team of the 2019-2020 Stormwater Science Education Program**

The main objective of the *Stormwater Science* outreach education program is to teach students how the health of the Rio Grande is directly related to the health of the surrounding watershed and what their responsibility and opportunities are to help keep the “Rio Grand.” BEMP educators have developed a Stormwater Science program that includes a 90-minute classroom activity, a four-to-five-hour study trip to the Rio Grande, and optional curriculum extensions incorporating hands-on data analysis, graphing, and system modeling. **During the 2019-2020 school-year and before the schools shut down due to COVID-19, 737 students participated in Stormwater Science** activities in their classrooms, in the field, both, or in outreach events. The classroom program was delivered to **245 students in 14 classrooms at 3 different schools in Albuquerque.** After the schools shut down, BEMP continued to create new or adapted existing activities related to the Stormwater Science curriculum with the goal of creating equitable educational outreach during the pandemic (see section 10 for outreach numbers and further information).

In addition to the Stormwater Science outreach, BEMP actively involves students in water quality monitoring through the *E. coli* monitoring contract with the Mid Rio Grande Stormwater Quality Team. **11 students from La Academia de Esperanza (LADE), 21 University of New Mexico (UNM) undergraduates, and 3 students from Bosque School** were directly involved in water quality monitoring of the Rio Grande in support of this contract. Students are taught the proper protocols for collecting field parameters and *E. coli* data, but, consistent with our quality assurance plan, are only allowed to collect field parameter data. Typically, students then graph and analyze the data and are supported in presenting their findings at BEMP-supported conferences, professional conferences, and to policy makers; however, this year, these events were canceled due to COVID-19. During this school year, BEMP educators started to create a field journal specific to this water quality monitoring collection to help strengthen student learning and understanding of the data and bigger picture applications.

For the regular school curriculum, the BEMP Stormwater Science program targets middle and high school students using two main formats: an indoor classroom lesson and an outdoor field experience or *Stormwater Study Trip*. This year, during the pre-COVID-19 2019-2020 school year, we continued improving our existing curriculum by making it more NGSS aligned and age appropriate. We also started to incorporate a new assessment tool, [Plickers](#), to assess teaching and lesson content effectiveness. During the pandemic, COVID-19 limited the number of

students we could engage through classroom and field education; however, BEMP continued to support students with a variety of activities through the APS Grab & Go Lunch program in partnership with other STEM organizations across the state to support equitable education, BEMP's social media, and the BEMP's website (See section 10 of this document for more detailed information). BEMP also worked on adapting, when possible, all the spring events to become virtual events (Luquillo-Sevilleta Virtual Symposium and Crawford Symposium; see section 8). BEMP provides handouts for all activities in English and Spanish to better support inclusion and accessibility of STEM resources for New Mexico's diverse communities.

Note: This year, we have structured this report so that in the following sections, we will paraphrase and italicize from previous reports the parts of the curriculum or report that haven't changed and that we continue to adopt. We highlight new work from this contract year in a different, non-italicized paragraph

### **1. Classroom curriculum:** *Preparation and delivery of Stormwater Science activities in the classroom for middle and high school students (245 students)*

The core classroom curriculum and approaches utilizing the watershed model did not change during this school year:

*The principal objective for the middle school classroom curriculum is to demonstrate how some of our daily, individual actions impact the health of the Rio Grande. To reach that goal, students construct a model of the Rio Grande Watershed (See pages 2 & 15 of the curriculum attached as Appendix A & F). The watershed model has five different communities along the river: a cattle ranch, upstream and downstream eco-friendly towns, an urban city, and agricultural fields. Students add different 'runoff cards' to the river downstream of the communities where the runoff constituents originate. Some of the runoff is naturally occurring (e.g. turbidity) while some is human-caused (e.g. pesticides or oil). The model runs through two different scenarios: (1) before-the-storm and (2) after-the-storm. While working through different variations of the model, students record the number of runoff cards introduced into the river before and after a storm event (See handout table; page 2, appendix A). This helps them to conceptualize, quantify, and further discuss the impacts of these changes to the overall river health. Exploring these two scenarios demonstrates the harmful effects that stormwater contamination can have on aquatic organisms and downstream communities.*

*The high school classroom lesson builds upon these core concepts. After discussing the aforementioned watershed model, students learn about some key water quality parameters: temperature, conductivity, dissolved oxygen, turbidity, and dissolved organic matter. Students divide into groups assigned one parameter each. They must then predict how their parameter might be affected by a storm event along with providing justification for their prediction. Students are given graphed data of their parameter before and after actual storm events and must analyze the graphs to determine if the data supports their hypothesis. When classes have more time available, this activity is supplemented by two different curriculum extensions. The first curriculum extension uses the same key water quality parameters introduced in the regular classroom activity, but the students analyze provided data and create their own graphs. We provide (1) a blank graphing sheet with the axis labeled and with the river flow data (used as a reference to talk about the time gap between the increase in cfs and parameter peaking) and (2) a table with measurements for each parameter. This activity helps students learn how to analyze and graph data and then interpret the results, using skills aligned with Next Generation Science*



*Standards (NGSS). The second curriculum extension is a soil porosity and permeability experiment that deepens students' understanding of how different surfaces (natural vs. anthropogenic, permeable vs. impermeable) impact the overall water budget and water quality.*

BEMP updated the middle school classroom curriculum in the 2019-2020 school year to offer the lesson as two separate visits when time allows. The second session involves a graphing activity that includes a stronger action component (page 3, appendix A). The graphing exercise helps students conceptualize the recorded numbers and better understand the impacts of each of the different 'runoff cards' to the overall river health. The action component of the lesson intends to empower students to create change in their daily actions individually but also within their family and community to help keep the "Rio Grand."

This school year, following NGSS guidelines, we added a model/simulation into our high school classroom lesson from a scientific publication (page 4, appendix A) to illustrate the impact of storm surface runoff in the overall water quality of urban versus non-urban areas. This allows us to construct an explanation based on scientific evidence using students' local ecosystem while also hitting a variety of Disciplinary Core Ideas and Performance Expectations within the same NGSS domain (ESS – Earth and Space Science, in this case). This addition also gives high school students the chance to work with recent and local science research.

## **2. Stormwater Study Trip: Delivery and coordination of place-based Stormwater Science experiences (53 students)**

The structure and content of the Stormwater Study Trip did not significantly change from past years:

*The centerpiece of BEMP's stormwater outreach is the Stormwater Study Trip. This activity builds upon classroom activities and facilitates hands-on student experiences including performing water quality testing at the Rio Grande. The Stormwater Study Trip is a four to five-hour trip to the river during which students investigate how stormwater moves through the city and sweeps pollutants and debris into the river. Students also collect and interpret water quality data. The middle school version of the program begins with an explanation of the arroyo system in Albuquerque (See map page 5, appendix B) followed by an arroyo pollution survey where students examine and categorize the amount of visible pollutants (e.g. plastics, paper, dog poop, animal scat, etc.) in Albuquerque's San Antonio arroyo which drains into the bosque. In the arroyo, students test water quality using a LaMotte water quality monitoring kit (page 6, appendix B). When the students hike to the Rio Grande, they do additional water quality testing from two locations. Students then share their results with each other, compare Rio Grande and arroyo water quality data, and discuss what their results could mean in terms of the river's health. This section of the curriculum allows students to have a more hands-on learning experience involving different types of data collection and scientific tools. The high school Stormwater Study Trip uses a similar format with an emphasis on the water quality indices (percent EPT and biotic index) through analyzing collected macroinvertebrates. At the end, the goal for high school students is to connect and understand the two collected data sets and develop a deeper sense of how the system functions on a broader scale.*

In the 2019-2020 school year, BEMP revised the study trips in several ways to strengthen student learning, scientific practices, and stewardship on a local and global scale. This year, BEMP connected the study trips to GLOBE, or Global Learning and Observations to Benefit the Environment. This community science program connects data collection around the world to contribute to our global understanding of the Earth and its processes. BEMP staff redesigned the study trip handout for all grades to better reflect the GLOBE data entry layout in effort to strengthen the stewardship component of the program (pages 5-8, appendix B). BEMP adopted that tool as a way to compare the data collected in our ecosystem to other ecosystems across the globe while also stressing the importance of stewardship from a local to worldwide scale. This tool is being used mainly in our study trip portion of the curriculum.

As part of the high school study trips, BEMP has also began using a multiparameter sonde along with the LaMotte TesTabs that students have used in the past. The multiparameter sonde provides high resolution water quality measurements (temperature, conductivity, specific conductance, pH, turbidity and dissolved oxygen). Using the handout and any additional discussions led by BEMP educators, students learn how to compare results from different methodologies to see how accurate different scientific tools can be. In addition, BEMP staff have also begun to develop a new version of the study trip to work with students during monthly water chemistry monitoring. Part of this work has been spent developing a new handout so this experience has a stronger educational component. This will be further developed in the next school year. Also, the data collected during study trips is now saved in our local drive and can be shared with the Storm Team as requested.

During the 2019-2020 school year, BEMP stopped using the leaf packs for macroinvertebrate identification due to time constraints of the study trips and because of difficulties with the leaf packs themselves. Moving forward, BEMP wants to reassess this methodology in light of challenges we faced last year, as leaf packs ended up buried by sediment or swept away downstream because of the irregular water pulses in the Rio Grande.

BEMP also continued to include Stormwater Science concepts as a part of the after-school program, BEMP After School Science (BASS). A small group of high school students worked with BASS to analyze water samples and collect aquatic macroinvertebrates to gain insight into the overall health of their local ecosystems.

### **3. Elementary school outreach:** *Continued delivery and coordination of Stormwater Science experiences for elementary school students (300 students)*

BEMP participated again in the Children's Water Festival at the Santa Ana Star Center (300 students and 12 teachers) where BEMP educators, using a new macroinvertebrate activity (See page 9, appendix C), taught fourth grade students about their watershed, how humans impact the health of this system, how aquatic organisms are affected by pollution, and what everyone can do to improve the health of the Middle Rio Grande.

### **4. Monthly Monitoring:** *Continued development and delivery of Stormwater Science outreach during Monthly Monitoring*

From last year's report:

*BEMP monthly monitoring is often a space where educational concepts are introduced based upon what students encounter in the bosque or what they are currently studying in class. Because of this, Stormwater Science is only taught intermittently during Monthly Monitoring and has not yet been granularly tracked.*

BEMP continued to include stormwater science topics during the introductory monthly monitoring conversations and whenever appropriate. This helped students see the bigger picture of how the health of the *bosque* is directly tied to the health of the Rio Grande and its watershed.

Furthermore, in addition to the stormwater related conversations, BEMP also adapted an activity that was initially used in the 2018 Children's Water Festival to talk about stormwater related concepts like water pollution and the use of macroinvertebrates as bioindicators of water quality (See page 10, appendix D). The goal of this activity is for students to figure out which one of the four different communities in an imaginary watershed has the best water quality. To reach that goal, students identify the different types of macroinvertebrates that live in each of those communities using a key. The activity ends with a quick group brainstorm about ways to help keep the downstream ecosystems clean (pick up trash and dog poop, fix leaky cars, don't use chemicals, etc.). This activity was piloted during Fall 2019 and can be incorporated as part of the monthly monitoring educational curriculum in the future.

#### **5. Summer programming:** *Preparation and delivery of Stormwater Science presentations during summer programming (200 students + 750 families)*

As in past years, BEMP partnered with Horizons Albuquerque, a tuition-free academic enrichment program that intends to fill the summer learning gap that students from low-income families often encounter. Over six weeks during the summer of 2020, 200 students in grades K-8 learned about how storms impact the overall water quality of our river by working on two of the Stormwater Science activities created during the COVID-19 closure (See page 11 & 14, Appendix E). These activities help connect the students' learning with BEMP and Horizons to the places they live.

This summer, BEMP also partnered with the NM Out-of-School Time Network for their summer Storytime in the Park program where one of the Stormwater Science activities (page 11, appendix E) was given to the 750 families that participated in this year's event.

#### **6. Stormwater Science curriculum development:** *Continued development of Stormwater Science curriculum*

Part of the 2019-20 school year (before COVID-19 closure) was spent making changes to the Stormwater Science curriculum, continuing to make it more hands-on, engaging, and appropriate for a wider range of students according to NGSS principles. After the closure, BEMP staff shifted to develop curriculum, including Stormwater Science concepts, that would be easily accessible for the communities around New Mexico (see section 10 for more information).

#### **7. BEMP educational outreach events\*:** *Funding covers partial costs for classrooms to participate in Otter Day and BEMP Student Congress*

Because both of these events were scheduled to happen in April 2020, they were cancelled due to COVID-19. However, BEMP expanded the educational and community outreach during the closure through other platforms including the Grab and Go APS meal program, BEMP's social media, and BEMP's website (see section 10 for more details).

\*Funds that covered partial costs for these different BEMP educational outreach events were reallocated for printing and other materials, additional translation efforts to support accessible and equitable education, and staff time in order to continue to support the Stormwater Science program.

**8. Additional BEMP educational outreach and events\*:** *Funding covers partial costs for classrooms to participate in Luquillo-Sevilleta Virtual Symposium and Crawford Symposium (39 students)*

This year, due to the COVID-19 closure, BEMP continued to organize and deliver the two annual educational events where stormwater science concepts were presented by adopting a fully virtual approach. The [Luquillo-Sevilleta Virtual Symposium \(LSVS\)](#) brings together students involved with the Luquillo Long Term Ecological Research Site in Puerto Rico and students from Albuquerque to share their watershed research with each other via Zoom in Spanish. This year, the LSVS involved 31 students and 19 adults (See page 17, Appendix F). BEMP's Crawford Symposium is an annual conference honoring BEMP's co-founder Dr. Clifford Crawford which celebrates community science along the Middle Rio Grande and showcases environmental research by both students and professionals. The [Virtual Crawford Symposium](#) had 8 students and 4 adult presenters, with 60 participants during the live video screening and 210 views after the video was posted on our YouTube channel (page 17, Appendix F).

As part of our outreach, BEMP also participates in other types of activities labeled as "other" in the outreach table (See table page 18, appendix G). These activities included a variety of community educational outreach, ranging from variations of the regular study trip to a student independent research project presented at a water conference with different pueblo representatives in Nambe Pueblo.

**9. Plickers – Assessment tool:** *This tool was used to assess the overall effectiveness of the curriculum in the classroom and study trips*

For the 2019-2020 school year, BEMP started using an assessment tool, [Plickers](#), to monitor the effectiveness of the delivery and content in the Stormwater Science curriculum. Plickers is usually used by teachers to instantly collect multiple-choice responses from students. This tool doesn't require students to have any device; instead, BEMP staff provides printed cards with a unique design (similar to a QR code) to each student and then scans student responses using a phone app (See page 16, Appendix F). Although BEMP cannot publish the results of the assessments in this report due to a lack of IRB approval for research with human subjects, BEMP staff are using assessment results to learn what parts of the stormwater science curriculum are working well or could be improved. Due to time constraints in the classroom and field, BEMP will evaluate the continued use of this tool while also pursuing funding for more formal assessment of student learning.

**10. Outreach during COVID-19 closures:** *Continued delivery of Stormwater Science concepts through the APS Grab & Go Lunch program, BEMP's social media and BEMP's website (5811 students)*

Paraphrased and updated from BEMP's report to City of Albuquerque:

Due to the COVID-19 pandemic, Albuquerque Public Schools closed on March 16th, 2020, through the remainder of the 2019-2020 school year. During this time, BEMP continued educational support with 5 of the BASS schools (Van Buren MS, Arroyo del Oso ES, Sombra del Monte ES, Inez ES, and Comanche ES). As many students in New Mexico do not have consistent or reliable access to the Internet, computers, or printers for online distance learning, BEMP created equitable educational outreach through both virtual and physical access.

BEMP delivered weekly, bilingual STEAM activities to each school for distribution in the APS Grab & Go Lunch program. Each school requested at least 150 copies of the activities in English as well as 20-50 copies in Spanish. BEMP staff followed best practices for handling these materials with gloves, washing hands or using hand sanitizer frequently, and packing materials in Ziploc bags. Since early April, BEMP has collaborated with other STEAM organizations, such as NM MESA, Wild Friends and ABCWUA (for full list, see page 16, appendix F) to distribute these activities to even more schools and community locations around Albuquerque and New Mexico as a whole. The BEMP activities focus on getting students and their families to look outside and/or explore their yards and neighborhoods for life around them, while also collecting their own data. Four of those activities had a direct stormwater science focus (pages 11-14, appendix E).

From March 26 to June 30, 2020, approximately 10,100 students received BEMP activities through the five Grab & Go meal locations and free Little Libraries around the city. About 5,800 of those students received an activity with a stormwater science focus. During that time frame, BEMP also worked with Children's Choice coordinators at three of the schools to distribute 270 handouts to participating students, many of which were children of essential workers during the pandemic. For summer 2020's Storytime in the Park program through the NM Out-of-School Time Network, BEMP reached 750 families with a hands-on, place-based SWS activity.

In addition to distribution at the Grab & Go locations, these activities were also posted on BEMP's website ([www.bemp.org/education-resources](http://www.bemp.org/education-resources) ; See page 16, appendix F) using a GitHub database to keep track of engagement through the number of downloads and views. These numbers can be provided directly to the Storm Team upon request.

BEMP has also increased presence on social media, such as Facebook and Instagram, to reach more of the community. The weekly Grab & Go activities were shared on social media to engage people who might not get them from the schools. Every day of the week, BEMP staff highlighted BEMP activities, ecological information, and resources from partners. SWS related concepts were presented usually once a week in our Water Wednesday posts (Page 17, appendix F). These posts included topics like (1) water pollution and its effect on wildlife, along with how to help; (2) local water use/consumption; (3) good practices to reduce impacts on water quality; (4) FOG waste disposal; (5) options to reduce water usage, and more. Besides Water Wednesday, the

weeks that the Grab & Go activities were about stormwater concepts, BEMP also dedicated the full week in social media to talk about water-related topics. BEMP provided English and Spanish versions of all the activities and social media posts previously mentioned.

Table 1: Social media interactions from March 16 – June 30, 2020

	INSTAGRAM	FACEBOOK
REACHES	3344	5007
ENGAGEMENTS	539	509

Note: BEMP used Creator Studio to track Facebook and Instagram engagement through a variety of different metrics. “Reaches” refers to how many people saw either a specific post or any content from the social media pages. Then, “engagements” refers to the total number of likes, shares, clicks, and people clicking “see more” for longer posts.



## **Exhibit 6**

# **Children's Water Festival 2019 Report**

# Children's Water Festival

**Rio Rancho, 2019**

## \*Children's Water Festival\*



**RIO RANCHO \* 2019**

## **Table of Contents**

Executive Summary .....	3
Introduction .....	4
Purpose and Intent .....	4
Funds .....	5
Festival Cost .....	5
Sponsorships .....	6
Steering Committee .....	6
Design of Festival .....	6
Pre-Festival Activities .....	7
Rio Rancho Children’s Water Festival Event .....	7
Post-Festival Activities .....	8
Schools Attending the Festival .....	9
Festival Presentations .....	10
Volunteer Hours .....	10
Lessons Learned .....	11
Steering Committee Comments from the Festival .....	11
Comments from Teacher Evaluation Forms .....	11
Festival Event .....	14
Appendix A - Working Timeline .....	15
Appendix B – Teacher/Class Rotation Schedule .....	16
Appendix C – Festival Presentations .....	21
Appendix D – Information to Teachers .....	33
Appendix E - Pre and Post Test .....	36
Appendix F - Outcomes from Students’ Tests by Question .....	39

## Executive Summary

The 2019 Children's Water Festival (Festival) was held Monday, October 21<sup>st</sup> and Tuesday, October 22<sup>nd</sup> at the Santa Ana Star Center in Rio Rancho. 1,437 students, mostly fourth-graders, attended from 61 classrooms from Placitas Elementary School, St. Thomas Aquinas, and all of the elementary schools in Rio Rancho Public Schools. The students attend three 30 minute presentations in a half-day format. Eighteen presenters taught the classes and three to four schools were on-site at one time. Schools attended a morning or afternoon program.



The eighteen presentations represented twenty-one professional organizations that ranged from federal, state, regional governments, and private industry. The organizations all have water interests and focused on subjects such as the water cycle, water quantity and conservation, water distribution, and water quality/pollution.

Students were evaluated on basic water knowledge before and after the Festival. On average, for all testing returned, **the students showed an increase in knowledge of 6 percentage points on the post testing.**

A teacher wrote on the event evaluation, "Very well organized, thank you! My 9<sup>th</sup> year with this event and you guys always do a great job. I will say that activities this year were very hands on and engaging."

The Festival costs an estimated \$24,000. The City of Rio Rancho contributed \$10,000 to the Festival and additional funding was raised through the New Mexico Water Conservation Alliance 501(c)(3). Festival sponsors include: Jacobs, Waste Management, Southern Sandoval County Arroyo Flood Control Authority, NM Water, CWA Strategic Communication, Carollo Engineers, All Type, and Baker Utility Supply.

## Introduction

The Children's Water Festival (Festival) has been held in Rio Rancho since 2007. The 2010 Festival was the first event hosted by the City of Rio Rancho's Water Conservation Office. This report is for the 2019 Festival; the tenth event hosted by the Water Conservation Office. As in years past, the Festival was held at the Santa Ana Star Center. 1,437 students attending from 61 classrooms; Placitas Elementary School, St. Thomas Aquinas, and all of the elementary schools in Rio Rancho Public Schools. The event was held on Monday, October 21<sup>st</sup> and Tuesday, October 22<sup>nd</sup>.

## Purpose and Intent

The principal focus of the Festival is to educate fourth-grade school children about water and its relationship to humans, animals and other natural resources in a fun and interactive atmosphere. The Festival's vision is to:

- Introduce students and teachers to new ideas, options, and solutions so they will conserve and protect water for the future,
- Lay the foundation for further learning, and
- Reach as many students and teachers as possible.

Public participation is essential to successful water conservation, and educating the public promotes better water conservation planning and implementation. Early education influences the future acceptance of water conservation concepts. This early education experience also has shown that training efforts affected behavioral changes and improved water use practices. Water conservation goals are only as effective as water users' willingness to adopt and implement appropriate water conservation measures. Through special training activities, water users are taught proper water use practices and techniques. Efficient use of water supplies decreases waste and prevents degradation of water quality leading to healthier ecosystems for fish and wildlife, including locally listed endangered species, such as, the Rio Grande Silvery Minnow (*Hybognathus amarus*) and the Southwestern Willow Flycatcher (*Empidonax traillii extimus*).

The Festival was designed specifically to introduce and explain new and unfamiliar water management tools to present and future water users and managers. Research concerning water conservation education indicates the targeted group of the Festival, fourth-grade students, is ideal for achieving long-term goals. Through sharing water conservation and water quality tools at home and with extended family, the estimated 1,600 participants (students, teachers, and chaperones) represent a potential audience of 10,000 to 15,000 people for the Festival program.

A series of activities that cover a wide range of core curriculum areas were presented at the Festival. These activities included language arts, mathematics, science, social studies, visual arts, and health/wellness; all of which are tied to water conservation, water quality, and water quantity in the arid Southwest desert.

The updated Water Resources Management Plan (Plan), adopted by the City of Rio Rancho Governing Body in 2014, details water efficiencies and water conservation measures to be taken by the City to better manage the existing water supplies. Policy E.4 of the Plan sets forth this

initiative: “Continue consulting with and improving the partnership with Rio Rancho Public Schools to implement a robust water resources educational curriculum.”

Additionally, the City of Rio Rancho Strategic Plan was formally adopted by the City of Rio Rancho Governing Body on March 25, 2009 and updated August 2017. One important element of the Infrastructure Strategies section of the Strategic Plan pertains to water sustainability and conservation to support growth and development of the City.

## Funds

### *Festival Cost*

The Festival costs are listed in the table below. Please note that the cost for the Santa Ana Star Center is only for the personnel time, including two police officers per day for security. This will be the last year for pipe and drape rental as we have purchased the pipe and drape. The cost of the buses is estimated because not all invoices were received as of the report date.

Cost Description	Amount
Santa Ana Star Center	\$2,839.71
Pipe and Drape rental	\$3,000.00
Catering for volunteers & presenters	\$4,479.80
Buses *	\$4,000.00
T-shirts with art/logos (1,471 shirts)	\$7,420.00
Shadow box (for T-shirt winner)	\$42.07
Banner for Display Stand	\$72.00
Poster	\$76.00
White paper for T-shirt artwork	\$37.29
Thank you cards	\$88.66
Fiscal Sponsor	\$1,000.00
Olla activity supplies	\$504.97
Stamps for VIP invitations/thank you cards	\$63.50
<b>Total</b>	<b>\$23,624.00</b>

\*Estimated, final invoice still pending.



## ***Sponsorships***

Through its fiscal partner, the New Mexico Water Conservation Alliance, a 501(c)3 non-profit organization, the City of Rio Rancho was able to secure several sponsors to fund the Festival. Additionally, the City sponsored \$10,000 for the Festival.

## **A heartfelt “thank you” to these valuable Festival partners!**



## **Steering Committee**

The Festival was directed by a diverse steering committee. The core group contained members from:

- City of Rio Rancho's Water Conservation Office
- City of Rio Rancho's Keep Rio Rancho Beautiful Office
- Jacobs
- Sandoval County Master Gardeners
- Sandoval County Master Composters
- New Mexico Environment Department – Surface Water Quality Bureau
- Citizen volunteers

## **Design of Festival**

Students attended the Festival for a half day program that included three presentations. This ensures participation by all Rio Rancho fourth graders. There is a transition period in the middle of the day where the morning classes are leaving and the afternoon classes are arriving.

Teachers and students experienced the Festival in three parts: pre-Festival activities, the Festival itself, and post-Festival activities.

### ***Pre-Festival Activities***

- Each school provides a lead fourth grade teacher who confirms their commitment to participate, provides the number and names of the teacher/classes and the number of anticipated students for each.
- Elementary schools are provided the information on how to participate in the student T-shirt artwork project; student art work is submitted to the Water Conservation Office and a winner is selected.
- The pre-Festival tests are provided to the schools via Google Forms and the teachers administered the test to the students. The post-Festival tests were sent after the Festival, again via Google Forms. Two schools were given paper tests for the students because they were not able to do Google Forms for tests.
- Teachers received resource kit materials that included the T-shirts and miscellaneous items donated by our sponsors (e.g., pens, rulers.).

### ***Rio Rancho Children's Water Festival Event***



Students at the “Rio Grande Bosque Water Cycle” activity.

- The Water Festival ran from 9:45 a.m. through 1:30 p.m.
- Students attending the Festival in the morning boarded buses at 9:15 a.m. at their school. Students attending the afternoon program boarded the buses at 11:25 a.m.
- Each class was met by a guide/timekeeper who escorted them to each of their three assigned presentations.

- Presentations lasted 30 minutes and topics included: water quality, water conservation, water cycle, wastewater, ecosystems, and built water infrastructure.
- All students received a Festival T-shirt. Lilianna Lugo from Ms. Straley's class at Puesta del Sol Elementary, was the winner of the T-shirt student artwork contest. Her design was displayed on the front of the T-shirt and Festival sponsor logos were on the back.



Lilianna Lugo – T-shirt artwork winner from Ms. Straley's Puesta del Sol Elementary class

### ***Post-Festival Activities***

- Post-Festival tests were completed by students.
- Teacher evaluation forms were completed.
- Teachers will receive a copy of this report.

All aspects of the Festival planning and implementation were created with the *Big Water Questions* in mind. Each presentation addressed at least one of the *Big Water Questions*, as well as the Festival's mission and objectives. The long-term outcome goal is that all elementary

school students will be able to provide reasonable answers to these questions by the time they reach middle school.

### ***Big Water Questions***

- Why is water so important to life?
- How do all living things depend on each other?
- What is the water cycle?
- What is a watershed?
- Where does my drinking water come from?
- What makes water dirty?
- How much water does my family use?
- Who are the other water users in our society?
- How can I protect our water?
- Where does my wastewater go?

## **Schools Attending the Festival**

The following table outlines which schools attended.

<b>Elementary School</b>	<b>Number of Teachers</b>	<b>Number of Students</b>
Cielo Azul Elementary	6	156
Colinas del Norte Elementary	5	133
Enchanted Hills Elementary	6	137
Ernest Stapleton Elementary	6	136
Maggie Cordova Elementary	7	165
Martin Luther King Elementary	6	145
Placitas Elementary	1	27
Puesta del Sol Elementary	6	113
Rio Rancho Elementary	5	122
Sandia Vista Elementary	6	137
St. Thomas Aquinas Elementary	2	51
Vista Grande Elementary	5	115
<b>Totals</b>	<b>61</b>	<b>1,437</b>

## Festival Presentations

One teacher wrote, “My students loved all of the presentations we went to.”



“Let’s Settle This Outside” activity.  
Students learn about wastewater treatment while becoming a wastewater operator.

Each year the Festival relies on numerous professionals who volunteer their expertise and presentation time. These professionals represent federal, state and regional government entities, local engineering firms, and the school district. They choose presentations that represent their missions or specialties. A description of all the presentations, the presenters and their contact information has been provided in Appendix A.

## Volunteer Hours

The Festival could not be held without the assistance of a number of volunteers, presenters, and steering committee members. New in 2017, was a requirement that the volunteers use the City’s on-line application process to have a background check. It was hopeful that this year process would be smoother and it was not.

The table below lists an estimate of the in-kind volunteer hours.

Presenters	394.25 hours
Volunteers	185.25 hours
Steering Committee Meetings	66 hours
<b>Total Hours</b>	<b>645.5 hours</b>

## Lessons Learned

### *Steering Committee Comments from the Festival*

There were only a few comments from the steering committee including:

- Bus issues continued and were worse than last year. On the second day, we had four schools late because of bus issues, missing the entire first rotation. Next year, we will try to find a better solution for the transportation.
- Food for the vegetarian presenters and volunteers was very poor in 2018. We made sure that the vegetarian meal options were available especially since the meals were enchiladas one day and lasagna the other.
- A comment from last year was to have ice packs, or something quick, when a child either pinches a finger or trips. We had ice packs at the registration table this year. We did have a student get an elbow to his mouth and we were able to quickly have ice for the child.
- The food was awesome!



### *Comments from Teacher Evaluation Forms*

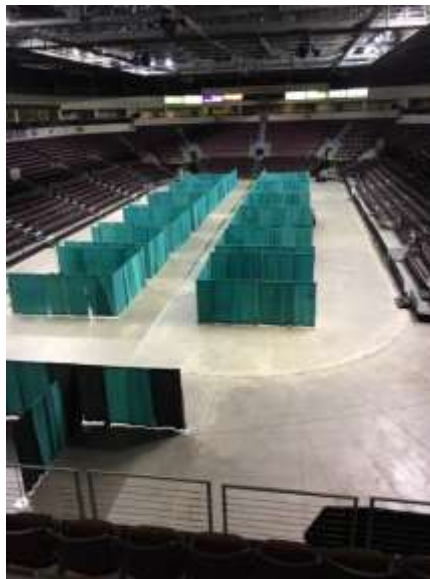
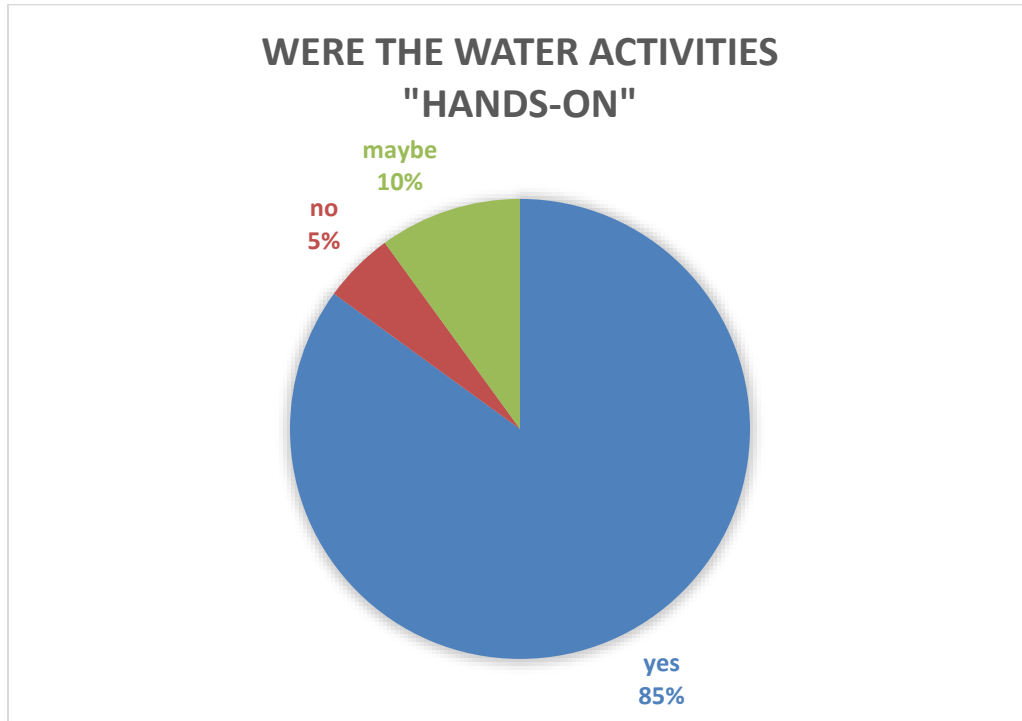
#### **Problems or issues you had with the buses**

- The bus for our wheel-chair accessibility was late, causing a domino effect for the other buses.
- We needed a special education bus for a wheelchair at MLK. The bus was not here. One class was supposed to go with this bus. We had to fit 6 classes on 2 buses. My class had to split up on the two buses. The students had to wait for the wheelchair accessible bus and that group was about an hour late.
- No specific problems.
- None. Our bus driver was wonderful, arrived on time, left on time. All was great!
- Only got 2 buses, when we ordered 3.
- Our bus was 30 minutes late. The transportation director (Liz) was very rude when I called to inquire about when the bus might arrive.



- SVE had no issues with buses. Thank you.
- Everything was fine with the transportation.

**Were the water activities your students attended informative and “hands-on” and did they learn anything from the activities?**



Festival layout.

**If there was an activity that could have been presented better, which one was it and how do you think it could be improved?**

- Our activities were all well done!
- All of our activities were great!
- To Discharge or Not presented by Insight Lighting. First of all, using an iPad to show a video of his business was not effective. It was a cool business, just hard to see. Only a few of the students were able to participate in hands on activities. However, I thought he was really interesting. Just a little tweaking would make the presentation even better.
- I think they were o.k.
- The water pollution one because students are crowded around and unable to see very well.
- My students loved all of the presentations we went to. I loved that they had one with a “make-and-take” activity. Other teachers from our school said there was a presenter that was less than professional with the students in her group. I do not know which presentation, but I believe that it was in the foyer of the Star Center.
- Some of the presentations were good, but a few only incorporated a small amount of students doing the “hands-on”.
- All were informative.
- Booth that was presented by UNM students could have been presented better. Although they tried to make it hands-on, they did not think of logistics. I think if they called on a few students to add items to the display one at a time, instead of all at once, it would increase focus and understanding. I appreciate the students taking their time to share. I just think they don’t think about the “how” as much as the “what” they would present.
- All of the activities were at least partly “hands-on”. Some more than others. Several years ago, there was an activity where the students acted out the water cycle. I would like to see more activities like that.

**How to improve overall organization**

- Seemed smaller and disorganized. It didn’t seem like the presenters put any effort to make the presentations child friendly. The water festival is becoming less hands on every year. It is very hard for fourth graders to sit and listen to a lecture for 30+ minutes and have only a small amount of time for a hands on activity.
- Very organized and easy. I would like to have more time. Due to buses and getting there we only have about an hour and 20 minutes for the booths and it was very fast. A longer day would be nice.
- I thought it was very organized. No improvement needs noted.
- Very well organized, thank you! My 9<sup>th</sup> year with this event and you guys always do a great job. I will say the activities this year were very hands on and engaging. We may need to look at moving this event to another grade level because our science standards have changed.
- It would have been nice to have attended sessions that covered different topics. Our first and third sessions were very similar about testing pH levels, oxygen, acidity, etc.. The first one was about Water Quality and each student got to participate. It was presented by USGS. It was very cool. The male presenter should probably talk a little less so the students have time to finish the activity. The second activity was about following the

path of the trash in the river. It was very well done. The message came across beautifully. Every student got to participate. I thought it was very well organized. Well done City of Rio Rancho.

- I just feel like it isn't exciting for kids. You hear festival and you get there nobody seems as though they want to be there. The volunteers seem to hate it and honestly, it isn't a fourth grade standard, so I feel as though a different grade should go.
- Have third graders attend as it is a third grade standard.
- Apply to grade level standards.
- I love the location being so close to our schools. However, it does become difficult to hear the presenters in this venue. Maybe have the presenters speak up a little?
- Because of the venue it was difficult to hear the presenters at times. Microphones?
- As always the water festival runs very efficiently. I appreciate you putting this all together. It is a classroom favorite of field trips.
- It is fine. It would be better if it was a little longer.

## **Festival Event**

The two days of the Festival ran very smooth except for issues with buses:

- St. Thomas Aquinas – the bus was late and students missed the first rotation
- ML King – the lift bus was late and those students on that bus missed the first rotation
- M. Cordova – two buses were late and the students missed the first rotation
- E. Stapleton – one of the buses was late causing one class to miss the first rotation

A new source for buses will be investigated for next year's water festival because this was the third year in a row that there has been issues with transportation.

The City of Santa Fe held their Water Fiesta on Tuesday and Wednesday, October 22<sup>nd</sup> and 23<sup>rd</sup>. All of our presenters decided to participate with our two days. The City of Rio Rancho was unable to participate with the Fiesta because of the conflict.

We did not have a dedicated photographer this year and there was a low return of the photo release forms from the parents. Because of this, we did not take very many photos. Many of the photographs of students in Appendix C are from prior years.

## Appendix A - Working Timeline

The following was used to ensure that steps of the Festival preparation were completed in a timely manner.

- April - Ask for sponsors (done 5/13/19)
- May update VIP list
- June 15 – Design poster with the theme
- August 1 – PO for RR Sponsorship
- August 1 – PO for Buses
- August 14 – RR schools starts
- August 20 - Email teachers about CWF date and artwork delivery
- August 22 – Drop off artwork paperwork, poster, photo release forms
- September 5 – email volunteers
- September 4 - email reminder to teachers including schedule
- September 5 – Pick up artwork, photo release forms
- September 11 – Meeting to select the winner
- September 11 – Artwork to Wayne at Rio Rancho T Shirts
- September 15 - update VIP list and mail invitations
- September meet with SASC about food, etc.
- October 11 – Pick up T Shirts
- October 15 - email layout to SASC
- October 15 – Meeting to pack bags
- October 17 – Drop off bags this week
- October 21<sup>st</sup> and 22<sup>nd</sup> – Water Festival
- October 28 – Remind teachers about post-test pickup
- November 30 - Pick up post-tests

## Appendix B – Teacher/Class Rotation Schedule

Booth	MON Oct 21 morning		9:45 – 10:15	10:18 – 10:48	10:51 – 11:21
#	Presentation	Category			
1	Incredible Journey – NMED	Water Cycle	Valdez Sandia Vista	XXXXXX XXXXXX	Ulibarri Puesta del Sol
2	RG Bosque Water Cycle - RGNC	Water Cycle	Armendariz Puesta del Sol	Andujo Colinas del Norte	Fox Sandia Vista
3	NM Past and Present – NM Cultural Services	Historical Perspective	Serna Puesta del Sol	Pichette Sandia Vista	Andujo Colinas del Norte
4	Water Jeopardy – Bohannon Huston	General Water	Silva Colinas del Norte	Serna Puesta del Sol	Wiberg Colinas del Norte
5	My Water Footprint – OSE	General Water	Morrisette Colinas del Norte	Niman Colinas del Norte	Rambaldi Sandia Vista
6	BEMPing it Up – BEMP	Ecosystems	Smith Puesta del Sol	Silva Colinas del Norte	XXXXXX XXXXXX
7	Leaky Faucet – RRPS	Conservation	Ulibarri Puesta del Sol	Morrisette Colinas del Norte	Serna Puesta del Sol
8	Olla Olé - SCMG	Historical Perspective	Wadsworth Sandia Vista	Armendariz Puesta del Sol	Straley Puesta del Sol
9	Watersheds & Aquifers – UNM	Source Water	Fox Sandia Vista	Straley Puesta del Sol	Silva Colinas del Norte
10	To Discharge or Not - Insight Lighting	Wastewater	Pichette Sandia Vista	Romero/Langdon Colinas del Norte	Armendariz Puesta del Sol
11	Basic Surface Water Treatment – Carollo	Water Quality	Niman Colinas del Norte	Smith Puesta del Sol	Glauvitz/Cook Sandia Vista
12	Nitrogen – The Other Cycle – Fish & Wildlife	Water Quality	Straley Puesta del Sol	Valdez Sandia Vista	Romero/Langdon Colinas del Norte
13	Stormwater & Watersheds – SNL	Watersheds	Glauvitz/Cook Sandia Vista	Wadsworth Sandia Vista	Morrisette Colinas del Norte
14	Weather or Not - NOAA	Weather	Wiberg Colinas del Norte	Ulibarri Puesta del Sol	Wadsworth Sandia Vista
15	Let's Settle this Outside – Jacobs	Wastewater	XXXXXX XXXXXX	Glauvitz/Cook Sandia Vista	Pichette Sandia Vista
16	Recycle Relay – Waste Management	General Water	Andujo Colinas del Norte	Rambaldi Sandia Vista	Niman Colinas del Norte
17	Keep the Rio Grande – Stormwater Team	Watersheds	Romero/Langdon Colinas del Norte	Wiberg Colinas del Norte	Smith Puesta del Sol

<b>18</b>	Water Quality- USGS	Water Quality	Rambaldi Sandia Vista	Fox Sandia Vista	Valdez Sandia Vista
	<b>18 Presenters</b>		<b>17 Classes</b>		



<b>Booth</b>	<b>MON Oct 21 afternoon</b>		<b>11:54 – 12:24</b>	<b>12:27 – 12:57</b>	<b>1:00 – 1:30</b>
<b>#</b>	<b>Presentation</b>	<b>Category</b>			
<b>1</b>	Incredible Journey – NMED	Water Cycle	Boldt Rio Rancho	Dannenberg Enchanted Hills	Armstead Cielo Azul
<b>2</b>	RG Bosque Water Cycle - RGNC	Water Cycle	Marsh Enchanted Hills	Lambson Cielo Azul	Fuchs Enchanted Hills
<b>3</b>	NM Past and Present – NM Cultural Services	Historical Perspective	Carey Enchanted Hills	Klein Rio Rancho	Bailey/Baum Rio Rancho
<b>4</b>	Water Jeopardy – Bohannon Huston	General Water	XXXXXX XXXXXX	Carey Enchanted Hills	Marsh Enchanted Hills
<b>5</b>	My Water Footprint – OSE	General Water	Estes/OS Cielo Azul	Bailey/Baum Rio Rancho	Griego/Murphy Rio Rancho
<b>6</b>	BEMPing it Up – BEMP	Ecosystems	Dannenberg Enchanted Hills	Armstead Cielo Azul	Lambson Cielo Azul
<b>7</b>	Leaky Faucet – RRPS	Conservation	Rivera Rio Rancho	Estes/OS Cielo Azul	Mandich Enchanted Hills
<b>8</b>	Olla Olé - SCMG	Historical Perspective	McCann Cielo Azul	Infantino Cielo Azul	Klein Rio Rancho
<b>9</b>	Watersheds & Aquifers – UNM	Source Water	Bailey/Baum Rio Rancho	Boldt Rio Rancho	McCann Cielo Azul
<b>10</b>	To Discharge or Not - Insight Lighting	Wastewater	Infantino Cielo Azul	Marsh Enchanted Hills	Wiebelhaus Enchanted Hills
<b>11</b>	Basic Surface Water Treatment – Carollo	Water Quality	Griego/Murphy Rio Rancho	XXXXXX XXXXXX	Boldt Rio Rancho
<b>12</b>	Nitrogen – The Other Cycle – Fish & Wildlife	Water Quality	Armstead Cielo Azul	Fuchs Enchanted Hills	Infantino Cielo Azul
<b>13</b>	Stormwater & Watersheds – SNL	Watersheds	Lambson Cielo Azul	Messenger Cielo Azul	XXXXXX XXXXXX
<b>14</b>	Weather or Not - NOAA	Weather	Fuchs Enchanted Hills	Griego/Murphy Rio Rancho	Rivera Rio Rancho
<b>15</b>	Let's Settle this Outside – Jacobs	Wastewater	Messenger Cielo Azul	Rivera Rio Rancho	Carey Enchanted Hills
<b>16</b>	Recycle Relay – Waste Management	General Water	Mandich Enchanted Hills	McCann Cielo Azul	Messenger Cielo Azul
<b>17</b>	Keep the Rio Grande – Stormwater Team	Watersheds	Klein Rio Rancho	Wiebelhaus Enchanted Hills	Dannenberg Enchanted Hills
<b>18</b>	Water Quality - USGS	Water Quality	Wiebelhaus Enchanted Hills	Mandich Enchanted Hills	Estes/OS Cielo Azul
	<b>18 Presenters</b>		<b>17 Classes</b>		

<b>Booth</b>	<b>TUE Oct 22 morning</b>		<b>9:45 – 10:15</b>	<b>10:18 – 10:48</b>	<b>10:51 – 11:21</b>
<b>#</b>	<b>Presentation</b>	<b>Category</b>			
<b>1</b>	Incredible Journey – NMED	Water Cycle	Grant Vista Hills	Pasternaki Vista Grande	Lawton St. Thomas
<b>2</b>	RG Bosque Water Cycle - RGNC	Water Cycle	XXXXXX XXXXXX	Walker/Haase Vista Grande	Landreth ML King
<b>3</b>	NM Past and Present – NM Cultural Services	Historical Perspective	Hollingshead Vista Grande	XXXXXX XXXXXX	Zeilman ML King
<b>4</b>	Water Jeopardy – Bohannon Huston	General Water	Walker/Haase Vista Grande	Lewis ML King	O’Conor ML King
<b>5</b>	My Water Footprint – OSE	General Water	Pasternaki Vista Grande	Landreth ML King	XXXXXX XXXXXX
<b>6</b>	BEMPing it Up – BEMP	Ecosystems	Griego St. Thomas	Kelly ML King	Hollingshead Vista Grande
<b>7</b>	Leaky Faucet – RRPS	Conservation	XXXXXX XXXXXX	Griego St. Thomas	Kelly ML King
<b>8</b>	Olla Olé - SCMG	Historical Perspective	Bird Vista Grande	Eisenberg/Fritch ML King	Lewis ML King
<b>9</b>	Vacant				
<b>10</b>	To Discharge or Not - Insight Lighting	Wastewater	Lawton St. Thomas	Bird Vista Grande	Walker/Haase Vista Grande
<b>11</b>	Basic Surface Water Treatment – Carollo	Water Quality	O’Conor ML King	Grant Vista Hills	Griego St. Thomas
<b>12</b>	Nitrogen – The Other Cycle – Fish & Wildlife	Water Quality	Lewis ML King	Zeilman ML King	Eisenberg/Fritch ML King
<b>13</b>	Stormwater & Watersheds – SNL	Watersheds	Landreth ML King	Hollingshead Vista Grande	Pasternaki Vista Grande
<b>14</b>	Weather or Not - NOAA	Weather	Eisenberg/Fritch ML King	XXXXXX XXXXXX	Grant Vista Hills
<b>15</b>	Vacant				
<b>16</b>	Recycle Relay – Waste Management	General Water	Kelly ML King	O’Conor ML King	Bird Vista Grande
<b>17</b>	Keep the Rio Grande – Stormwater Team	Watersheds	Zeilman ML King	Lawton St. Thomas	XXXXXX XXXXXX
	<b>15 Presenters</b>		<b>13 Classes</b>		

Booth	TUE Oct 22 afternoon		11:54 – 12:24	12:27 – 12:57	1:00 – 1:30
#	Presentation	Category			
1	Incredible Journey – NMED	Water Cycle	Zirpel M Cordova	Shafer M Cordova	Marcotte E Stapleton
2	RG Bosque Water Cycle - RGNC	Water Cycle	Rojas E Stapleton	Sidor M Cordova	Lautt E Stapleton
3	NM Past and Present – NM Cultural Services	Historical Perspective	Kirby E Stapleton	Olivas Placitas	Shafer M Cordova
4	Water Jeopardy – Bohannon Huston	General Water	Shafer M Cordova	Sheering M Cordova	Pineda M Cordova
5	My Water Footprint – OSE	General Water	Skousen M Cordova	Kirby E Stapleton	Sheering M Cordova
6	BEMPing it Up – BEMP	Ecosystems	Sheering M Cordova	Pineda M Cordova	Sidor M Cordova
7	Leaky Faucet – RRPS	Conservation	Marcotte E Stapleton	Lautt E Stapleton	Skousen M Cordova
8	Olla Olé - SCMG	Historical Perspective	Lowe E Stapleton	Presser M Cordova	XXXXXX XXXXXX
9	Vacant				
10	To Discharge or Not - Insight Lighting	Wastewater	Lautt E Stapleton	XXXXXX XXXXXX	Kirby E Stapleton
11	Basic Surface Water Treatment – Carollo	Water Quality	Zuniga E Stapleton	Zirpel M Cordova	Rojas E Stapleton
12	Nitrogen – The Other Cycle – Fish & Wildlife	Water Quality	XXXXXX XXXXXX	Lowe E Stapleton	Presser M Cordova
13	Stormwater & Watersheds – SNL	Watersheds	Sidor M Cordova	Marcotte E Stapleton	Zirpel M Cordova
14	Weather or Not - NOAA	Weather	Presser M Cordova	Skousen M Cordova	Zuniga E Stapleton
15	Vacant				
16	Recycle Relay – Waste Management	General Water	Pineda M Cordova	Zuniga E Stapleton	Olivas Placitas
17	Keep the Rio Grande – Stormwater Team	Watersheds	Olivas Placitas	Rojas E Stapleton	Lowe E Stapleton
	<b>15 Presenters</b>		<b>14 Classes</b>		

## Appendix C – Festival Presentations

This appendix lists all of the Festival presentations and contacts. For each section, there is the name of the presentation, a brief description of the activity, the correlation of the presentation with the Next Generation Science Standards (NGSS), the contact information of the presenter and if available, where the teacher can locate a similar presentation if they would like to teach it in the classroom.

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### Basic Surface Water Treatment

Students learn about processes used to clean water in a contemporary water treatment facility through an interactive process. This activity teaches children about the importance of water quality for drinking water.

*Next Generation Science Standards, Grades 3-5:  
Practice 2, Practice 3*

Carollo Engineers

Rob Buss      [rbuss@carollo.com](mailto:rbuss@carollo.com)



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### BEMPin' It Up

Students learn about the plants, mammals, arthropods, and water table along the Bosque and how they are all supported by water in the Rio Grande.

*Next Generation Science Standards, Grades 3-5:  
Practice 6, Practice 7*

Bosque Ecosystem Monitoring Program, UNM Dept. Biology & Bosque School  
Alex Levine [alex.levine@bosqueschool.org](mailto:alex.levine@bosqueschool.org)

Similar activity found on web: Habitats of the World, Discovery Education  
<http://www.discoveryeducation.com/teachers/free-lesson-plans/habitats-of-the-world.cfm>



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### **Incredible Journey**

During this activity, students become water molecules and move through the water cycle. They learn about the movement and distribution of water – as well as pollution – on the earth.

*Next Generation Science Standards, Grades 3-5:  
Practice 6, Practice 7*

NM Environment Department, Surface Water Quality Bureau  
Heidi Henderson [heidi.henderson@state.nm.us](mailto:heidi.henderson@state.nm.us)

A similar activity found on web: Incredible Journey, Project WET  
[http://files.dnr.state.mn.us/education\\_safety/education/project\\_wet/sample\\_activity.pdf](http://files.dnr.state.mn.us/education_safety/education/project_wet/sample_activity.pdf)



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### **Keep the Rio Grande**

*Keep the Rio Grande Activity* is an interactive game where the students become an arroyo supplying stormwater to the Rio Grande. The stormwater picks up a variety of items as the flow increases creating a flood of raindrops, trash, pet waste, bacteria, and plastics as the students pass the items down to the river. The students learn about stormwater quality and the impact we have on water in our neighborhoods and town. After the rain has stopped, students discuss the water and debris on the ground around them and at the end of the line the river. Then they are tasked with sorting all of the items to bins labeled: trash, compost, recycle and rain.

*Next Generation Science Standards, Grades 3-5:  
Practice 1, Practice 2*

Middle Rio Grande Stormwater Quality Team  
Xavier Pettes (505) 891-5045

[xpettes@rrnm.gov](mailto:xpettes@rrnm.gov)



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### **Leaky Faucet**

Students create a water leak and scientifically measure the leak using graduated cylinders over three tests. The students then compute the average milliliters of water leaked over one minute to the amount of gallons of water leaked and wasted over one year.

*Next Generation Science Standards, Grades 3-5:  
Practice 4, Practice 5*

Rio Rancho Public Schools

Lou Cusimano (505) 975-0326

[lou.cusimano@rrps.net](mailto:lou.cusimano@rrps.net)

A similar activity found on web: Leaky  
Faucet, Utah Education Network  
[http://www.uen.org/Lessonplan/preview.cgi  
?LPid=27247](http://www.uen.org/Lessonplan/preview.cgi?LPid=27247)



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**Let's Settle This Outside**

Students become wastewater operators and learn how the wastewater treatment plant cleans dirty water. They then create wastewater using everyday materials and clean the wastewater by sorting it into three stations: water, sludge, and trash.

*Next Generation Science Standards, Grades 3-5:  
Practice 1, Practice 2*

Jacobs

Bill Jaquez (505) 891-5024

Wendell McCall (505) 891-5017

[billy.jaquez@jacobs.com](mailto:billy.jaquez@jacobs.com)

[wmccall@rrnm.gov](mailto:wmccall@rrnm.gov)





A similar activity found on web:  
 Wastewater: We Treat it Right, City of  
 Boise  
[http://bee.cityofboise.org/media/216580/43385\\_Wastewater.pdf](http://bee.cityofboise.org/media/216580/43385_Wastewater.pdf)

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### **My Water Footprint**

A Water Footprint represents how a person uses water to meet their needs (direct use) and the water that others such growers, manufacturers, processors use (indirect use) to provide the products we purchase and use every day. The activity teaches the importance of water and introduces/explains the terms direct and indirect water use and challenges students to think of ways to conserve water. The students also create a collage that illustrates their water needs by incorporating both direct and indirect water use along with ways to conserve water.

*Next Generation Science Standards, Grades 3-5:  
 Practice 1, Practice 2*

New Mexico Office of the State Engineer, Water Conservation Bureau  
 Julie Valdez [julie.valdez@state.nm.us](mailto:julie.valdez@state.nm.us)



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### **New Mexico Past and Present**

Students learn where water comes from (the water cycle), where water is today in New Mexico, and what they can do to protect and conserve water. The students then become detectives using fossils to discover where water occurred in the past in New Mexico.

*Next Generation Science Standards, Grades 3-5:  
Practice 3, Practice 6*

New Mexico Museum of Natural History and Science

Mike Sanchez (505) 841-2583

[michael.sanchez1@state.nm.us](mailto:michael.sanchez1@state.nm.us)



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### **Nitrogen – the Other Cycle**

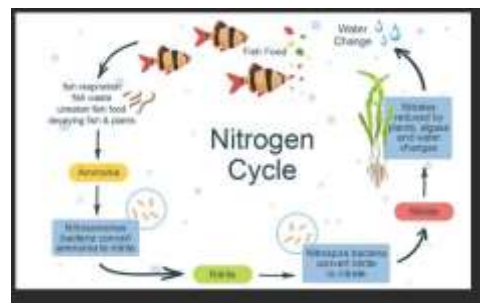
Students are introduced to the nitrogen cycle. Where is nitrogen found on Earth? Why is it important? They learn that nitrogen travels with the help of bacteria, water, fish, and plants in an aquatic system. Students role-play various organisms in the nitrogen cycle; nitrosomonas bacteria, nitrobacter bacteria, fish, or plants. Students learn how each organism creates or consumes various forms of nitrogen, creating a dependency on other organisms for provide food or to remove toxins from the aquatic environment.

*Next Generation Science Standards, Grades 3-5:  
Practice 6, Practice 7*

US Fish and Wildlife Service

Angela Palacios (505) 342-9900

[angela\\_palacios@fws.gov](mailto:angela_palacios@fws.gov)



A similar activity found on web: UCAR Center for Science Education  
<https://scied.ucar.edu/activity/nitrogen-cycle-game>

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### **Olla Olé**

Students learn the history of collecting water in the ancient southwestern United States using clay pots. They also learn how ollas (clay pots) were used as an irrigation technique for crops and then the students make an olla to take home for use.

*Next Generation Science Standards, Grades 3-5:  
 Practice 1, Practice 2*

Sandoval County Master Gardeners  
 Pat Barger [pfbarger@gmail.com](mailto:pfbarger@gmail.com)

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### **Recycle Relay**

Students were provided with examples of indirect water savings through recycling and learned about what resources are and how the use of resources, like water, is decreased when they recycled. Students participated in a fun, educational obstacle course made almost entirely of recycled materials. They navigated the obstacle course in relay teams, building communication and teamwork skills. Stations included a crab walk, army crawl, and trash bag hop.

*Next Generation Science Standards, Grades 3-5:  
 Practice 1*

Waste Management  
 Laila Amerman [lamerman@wm.com](mailto:lamerman@wm.com)

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### **Rio Grande Bosque Water Cycle**

In the semi-arid climate of New Mexico, our scarce precipitation limits the quantity of water available for use by plants, animals and humans. Students become water molecules traveling through a water cycle. The presentation emphasizes, with evidence and cause and effect, why we need to consider all water users when making water-use decisions.

*Next Generation Science Standards, Grades 3-5:  
Practice 6, Practice 7*

Rio Grande Nature Center

Tanja George (505) 344-7240

[Tanja.George@state.nm.us](mailto:Tanja.George@state.nm.us)

A similar activity found on web: Incredible Journey, Project WET

[http://files.dnr.state.mn.us/education\\_safety/education/project\\_wet/sample\\_activity.pdf](http://files.dnr.state.mn.us/education_safety/education/project_wet/sample_activity.pdf)



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### **Stormwater and Watersheds**

Students learn about watersheds by examining and manipulating watershed models. They learn that a watershed is the land area that drains to a water body such as a river or lake. They see for themselves how watersheds can influence water quality.

*Next Generation Science Standards, Grades 3-5:  
Practice 1, Practice 2*

Sandia National Laboratories

John Kay (505) 344-7240

[jtkay@sandia.gov](mailto:jtkay@sandia.gov)





A similar activity found on web: Protecting Our Water Resources, Midwest Research Institute (See Level 2)  
[http://www.stormwater.ucf.edu/toolkit/vol3/Contents/pdfs/Student%20Activities/student\\_activities.pdf](http://www.stormwater.ucf.edu/toolkit/vol3/Contents/pdfs/Student%20Activities/student_activities.pdf)

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### **To Discharge or Not**

Students learned the importance of how industrial process water is tested and brought to an acceptable pH level before it is allowed to be disposed of into the sanitary sewer prior to discharge to the river.

*Next Generation Science Standards, Grades 3-5:  
 Practice 1, Practice 3*

Insight Lighting, Inc.  
 Craig Barta (505) 348-0888  
[cbarta@insightlighting.com](mailto:cbarta@insightlighting.com)



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### **Water Jeopardy**

Students learn basic concepts and differences about groundwater vs. surface water supply for potable drinking water. The concepts are reinforced by participation in a Jeopardy game where students compete to determine the correct water “question” for a series of given “answers” (like the TV show).

*Next Generation Science Standards, Grades 3-5:  
 Practice 1*

Bohannon Huston, Inc.  
Nathan Roberts (505) 823-1000  
[nroberts@bhinc.com](mailto:nroberts@bhinc.com)



A similar activity found on web: The Water Cycle Jeopardy, Super Teacher Tools (online Flash game for up to 5 teams)  
<http://www.superteachertools.com/jeopardy/usergames/Jan201205/game1327973751.php>

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### **Water Quality**

Students learn about water quality and test their water sample for several parameters including pH, temperature, dissolved oxygen, and turbidity. Students learn about what these parameters mean, how they are related to each other, and why they are important for humans and organisms dependent on the water.

*Next Generation Science Standards, Grades 3-5:  
Practice 2, Practice 3*



United States Geological Survey  
Amy Galanter (505) 830-7939  
[agalanter@usgs.gov](mailto:agalanter@usgs.gov)

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## **Watersheds and Aquifers**

Students learn about watersheds by examining and manipulating both types of models. They learn that a watershed is the land area that drains to a water body such as a river or lake. The students also learn how drinking water comes from aquifers and how pollution can influence water quality.

*Next Generation Science Standards, Grades 3-5:  
Practice 1, Practice 2*

University of New Mexico, Civil  
Engineering  
Alysha Toya [atoya01@unm.edu](mailto:atoya01@unm.edu)



A similar activity found on web: Protecting Our Water Resources, Midwest Research Institute  
(See Level 2)  
[http://www.stormwater.ucf.edu/toolkit/vol3/Contents/pdfs/Student%20Activities/student\\_activities.pdf](http://www.stormwater.ucf.edu/toolkit/vol3/Contents/pdfs/Student%20Activities/student_activities.pdf)

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## **Weather or Not**

Students analyze meteorological and hydrological data to determine if a flash flood might occur, issue warnings, and monitor the flood event.

*Next Generation Science Standards, Grades 3-5:  
Practice 1, Practice 2, Practice 3,*

National Oceanic & Atmospheric Administration, National Weather Service  
Kerry Jones (505) 243-0702 [kerry.jones@noaa.gov](mailto:kerry.jones@noaa.gov)

A similar activity found on web: Create Your Own Water Cycle, The Water Project  
<http://thewaterproject.org/resources/lesson-plans/create-a-mini-water-cycle.php>





## Appendix D – Information to Teachers

The following information was included in the teacher packets.

### 2019 Children's Water Festival

Monday, October 21<sup>st</sup>

Tuesday October 22<sup>nd</sup>

#### Santa Ana Star Center

3001 Civic Center Circle NE  
Rio Rancho, NM 87144

Theme: “*Who are the other water users?*”

The Children's Water Festival has been arranged so **ALL** fourth-grade students in Rio Rancho can attend the event. This is a **FREE** event for the students and teachers using monies donated from local businesses who care about water-related education.

The water festival is organized with three activities in the morning and three activities in the afternoon. Each school will attend on one day at either the morning or afternoon session. Each class will attend three activities during their session.

#### Morning Session

9:45-10:15

10:18-10:48

10:51-11:21

#### Afternoon Session

11:54-12:24

12:27-12:57

1:00-1:30

#### Chaperones

It is recommend at least one adult be present for every ten students. Chaperones are responsible for their own transportation to the Star Center. They have not been included in the bus count. Please ask all chaperones and any volunteers from the school to wear their school badges. **We ask that only the approved chaperones attend from your school. Please no “extra” parents/grandparents that show up to watch; they will be turned away!** If you do have any of these “extras”, have them contact me prior to the event and I can assign them to be volunteers at the event.

#### Transportation

Buses are provided and paid by the Children's Water Festival. There will be no place or time for students to eat lunch at the Star Center, so plan on your students' lunch period to be at your school either before or after the water festival.

**RRPS TEACHERS ARE RESPONSIBLE FOR FILLING OUT THE TRIP TRACKER.**

- Morning Sessions - Schedule for 9:15 pick up and 11:25 pick up
- Afternoon Sessions – Schedule for 11:25 pick up and 1:30 pick up
- St. Thomas will be scheduled by City Staff

These are the schools that will be attending with dates and arrival times.

Elementary School	Lead Teacher	Email	Number Classes	Day	Time
Colinas Del Norte	Ashley Niman	<a href="mailto:ashley.niman@rrps.net">ashley.niman@rrps.net</a>	5	10/21	9:45
Puesta del Sol	Kristy Straley	<a href="mailto:kristy.straley@rrps.net">kristy.straley@rrps.net</a>	6	10/21	9:45
Sandia Vista	Merry Wadsworth Veronica Valdez (Mont.)	<a href="mailto:merry.wadsworth@rrps.net">merry.wadsworth@rrps.net</a> <a href="mailto:veronica.valdez@rrps.net">veronica.valdez@rrps.net</a>	6	10/21	9:45
Rio Rancho	Angela Murphy	<a href="mailto:angela.murphy@rrps.net">angela.murphy@rrps.net</a>	5	10/21	11:54
Cielo Azul	Karin McCann	<a href="mailto:karin.mccann@rrps.net">karin.mccann@rrps.net</a>	6	10/21	11:54
Enchanted Hills	Christina Mandich	<a href="mailto:christina.mandich@rrps.net">christina.mandich@rrps.net</a>	6	10/21	11:54
Vista Grande	Bethany Grant	<a href="mailto:bethany.grant@rrps.net">bethany.grant@rrps.net</a>	5	10/22	9:45
M.L. King	Sinta O'Connor	<a href="mailto:Sinta.oconnor@rrps.net">Sinta.oconnor@rrps.net</a>	6	10/22	9:45
St. Thomas	Pat Lawton	<a href="mailto:pat.lawton@stasnm.net">pat.lawton@stasnm.net</a>	2	10/22	9:45
M. Cordova	Amanda Garcia-Presser	<a href="mailto:amanda.garcia-presser@rrps.net">amanda.garcia-presser@rrps.net</a>	7	10/22	11:54
E. Stapleton	Carey Rojas	<a href="mailto:carey.rojas@rrps.net">carey.rojas@rrps.net</a>	6	10/22	11:54
Placitas	M. Olivas	<a href="mailto:molivas@bps.k12.nm.us">molivas@bps.k12.nm.us</a>	1	10/22	11:54
Total (as of 9/6/19)			61		

Water Conservation staff would love to meet with all your 4<sup>th</sup> grade teachers to go over the festival and the logistics. The meeting should take about 15 minutes or so.

Please contact Marian Wrage, Rio Rancho Environmental Programs Manager and Festival Director, if there are any questions and to schedule the meeting with your 4<sup>th</sup> grade team.

Marian's telephone number is (505) 896-8737, her cell is (505) 681-7325, and her email is [mwrage@rrnm.gov](mailto:mwrage@rrnm.gov).

The Rio Rancho Children's Water Festival funding has been provided by:

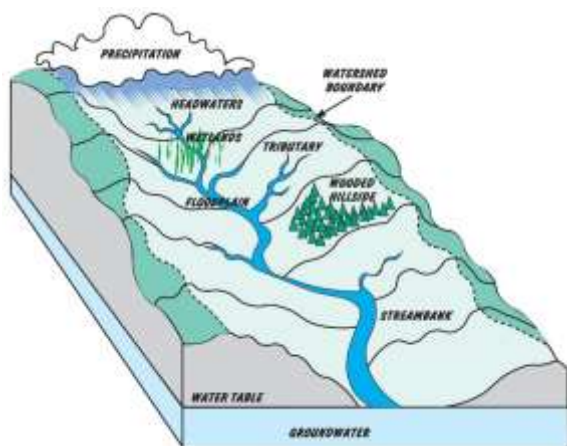
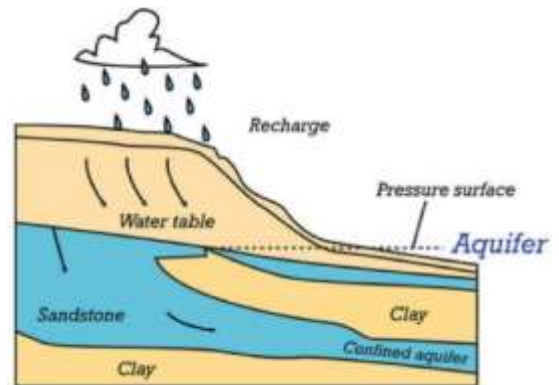
## SPONSORS



## Appendix E - Pre and Post Test

The Festival steering committee rewrote the student test in 2017; diagrams and pictures were added to help the students visualize the concepts. In 2019, Google Forms was used with the Rio Rancho students to take the tests. These tests were without diagrams and pictures. Google Forms was able to grade all the tests and run statistics on the answers. St. Thomas Aquinas and Placitas did not have that technology available so paper tests were given. Note that references to “Rio Rancho” on the test was changed to “Placitas” for the students attending from Placitas Elementary.

1. Many substances and objects can make river water dirty. Which of the following items can make the Rio Grande dirty?
  - a) Trash
  - b) Dog poop
  - c) Leaky cars
  - d) All the above
  
2. An **aquifer** is a layer of water-saturated porous rock. It lies below the water table. Most people who live in New Mexico get drinking water from a well drilled into an aquifer. If you live in Rio Rancho, is the water coming from your faucet from an aquifer?
  - a) True
  - b) False



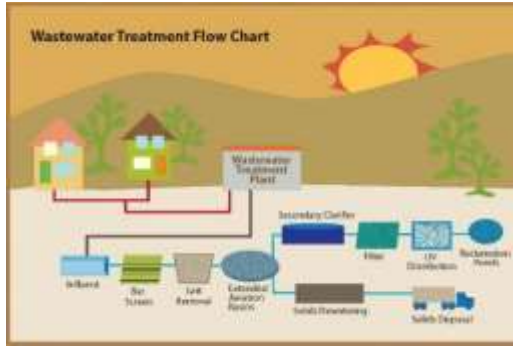
3. A **watershed** is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel. Is the following statement true or false: We all live in a watershed?
  - a) False
  - b) True

4. Everyone in Rio Rancho uses, on average, about 65 gallons of water per person per day. If you have four people in your home, what is your family's daily average water use?
- a) 260 gallons of water per day
  - b) 200 gallons of water per day
  - c) 2,600 gallons of water per day
5. Water users in our state include plants, animals, and people. Why is water so important to life?
- a) People need it to survive
  - b) Plants need it to survive
  - c) The river needs it to support nature
  - d) All the above
6. The **water cycle** happens as the earth is warmed by the sun and water circulates between the earth's oceans, atmosphere, and land. Which of the following are terms associated with the water cycle?
- a) Pumping, Treatment, Delivery
  - b) Evaporation, Condensation, Precipitation
  - c) River, stream, aquifer



7. How can we protect our water?
- a) Litter
  - b) Tell your parents when you see a leak
  - c) Pour chemicals on the ground





8. **Wastewater** (or sewer water) is the used water from toilets, showers, and clothes washers and it is too dirty to go straight into the river or into the ground. Septic tanks and wastewater treatment plants clean the water before it goes to the river or into the ground.
- a) True
  - b) False

## Appendix F - Outcomes from Students' Tests by Question

The following table shows the percentage of correct answers on both the pre and post-test. Because most of the answers were provided using Google Forms, there was no way to distinguish answers by class or school. Not every teacher from every school provided pre and post-tests. The questions are in the same order as in Appendix E.

*There was a 6 percentage point increase from pre- to post-tests for all the participating students.*

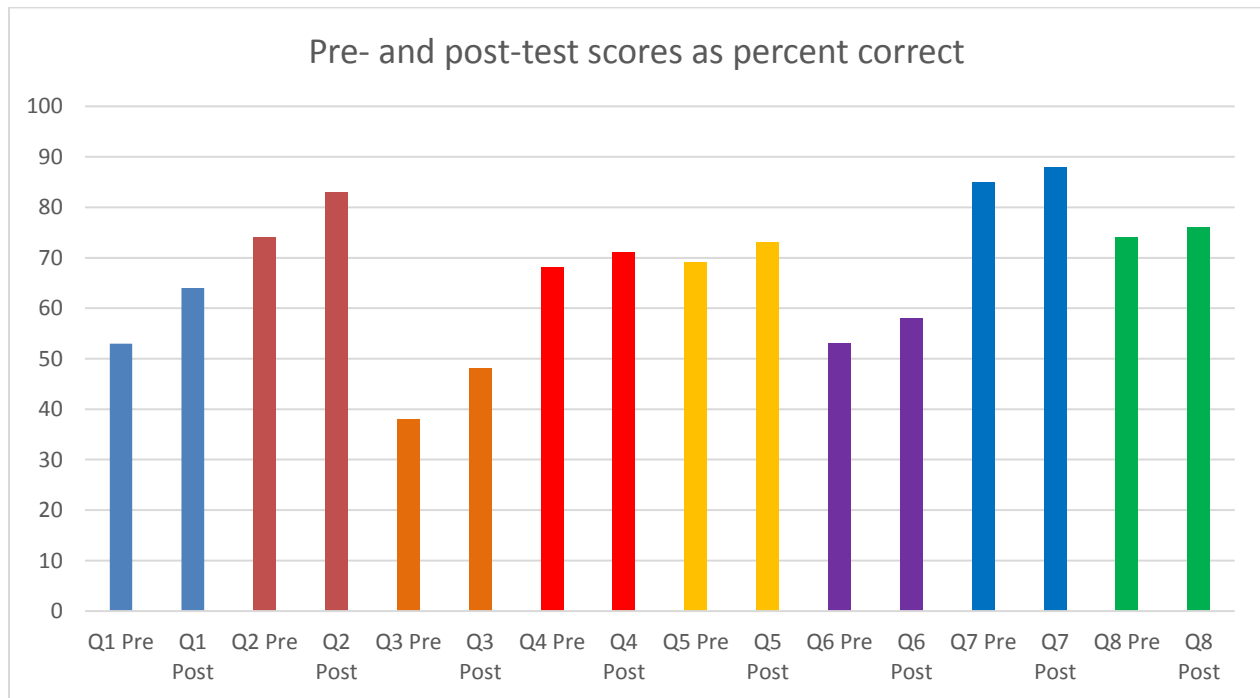


Table 1 shows the increase/decrease by question for the entire testing group.

Test Question	Increase from Pre to Post-Test
1 Makes river dirty	12%
2 DW come from	9%
3 Watershed	10%
4 How much Water	3%
5 H2O important to life	4%
6 Water Cycle	4%
7 Protect water	3%
8 Wastewater	2%

As in year's past, the students do not have a good understanding of what a watershed is or the fact that we all live in a watershed.

**Attachment 2**

**Compliance Monitoring Cooperative (CMC) –  
FY 2020 Stormwater Monitoring Contract Summary Memo**

Courtyard I  
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Albuquerque, NM  
87109-4335

[www.bhinc.com](http://www.bhinc.com)

voice: 505.823.1000  
facsimile: 505.798.7988  
toll free: 800.877.5332

## MEMORANDUM

**DATE:** October 29, 2020

**TO:** Patrick Chavez, PE, AMAFCA, Representative for Compliance Monitoring Cooperative (CMC) Members

**FROM:** Sarah Ganley, PE

**SUBJECT:** **CMC Stormwater Monitoring Reporting  
AMAFCA On-Call Task 28 – Contract Summary Memo**

Bohannon Huston, Inc. (BHI) has been tasked to perform water quality services for the Compliance Monitoring Cooperative (CMC) Stormwater Data Verification, Database, and Reporting for the Wet Weather Stormwater Quality Monitoring Program. This work is through an AMAFCA on-call contract, and the CMC has delegated AMAFCA to manage this Task Order. Included with this Task, the CMC members, except for the City of Albuquerque, have delegated AMAFCA to enter the CMC data into the EPA electronic Discharge Monitoring Report (DMR) forms. The scope of work for this Task includes data verification of the stormwater laboratory analysis results, compiling the analysis results into a database, and calculating the E. coli loading to compare with the Waste Load Allocation (WLA) for the qualifying storm events. The stormwater compliance monitoring is being conducted separately by Daniel B. Stephens & Associates, Inc. (DBS&A) and is not a part of this on-call Task.

This Task is being conducted to assist the CMC members with their comprehensive monitoring and assessment program for compliance under the 2014 Middle Rio Grande Watershed Based Municipal Separate Storm Sewer System (MS4) Permit, NPDES Permit No. NMR04A000 ("WSB MS4 Permit"). The WSB MS4 Permit was issued on December 22, 2014 for a 5-year term with an expiration date of December 19, 2019. In December 2019, the WSB MS4 Permit went into administrative continuance when EPA Region 6 did not issue a new MS4 Permit before the expiration date of the existing WSB MS4 Permit.

The required CMC sampling for the WSB MS4 Permit term (2014 to 2019) was completed in FY 2019. Until a new MS4 Permit is issued, no additional compliance stormwater sampling for the CMC is required. There were no CMC monitoring results required or obtained in FY 2020. No netDMR forms are required to be submitted to EPA for FY 2020 since there were no CMC monitoring results required or obtained in FY 2020.

If the CMC does continue wet weather compliance monitoring during administrative continuance of this MS4 Permit, the CMC members will summarize, as applicable, any wet weather monitoring activity, results, and E. coli loading calculations in future Annual Reports.

SG/ab