

Southern Sandoval County Arroyo Flood Control Authority

1041 Commercial Drive SE • Rio Rancho, NM 87124 Ph (505) 892-RAIN (7246) • Fax (505) 892-7241 **BOARD OF DIRECTORS**

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EXECUTIVE ENGINEER Charles Thomas, P.E.

December 1, 2019

U.S. EPA, Region 6 Water Quality Protection Division Operations Support Service (6WQ-O) 1445 Ross Avenue Dallas, Texas 75202-2733

RE: 2019 Annual Report, NPDES Permit No. NMR04A001

To whom it may concern:

The Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) is pleased to submit the 2016 Annual Report for NPDES Permit No. NMR04A000. SSCAFCA's permit tracking number, as assigned in our letter from EPA "Coverage under Middle Rio Grande (MRG) Watershed Based Municipal Sewer Separate Storm Sewer System General Permit (NPDES No. NMR04A000) is NMR04A001. This report covers the period from July 1, 2018 (the date of the letter from EPA authorizing coverage under NPDES Permit No. NMR04A000) to June 30, 2019.

Materials contained within this transmittal include our Annual Report compiled using the EPA's suggested Annual Report Format, a 2019 Annual Report Supplement, the volume of sediment removed from SSCAFCA's facilities, the Arroyo Classroom 2019 report, the River Xchange 2019 report, the Summary of Outcomes Report for the Mid Rio Grande Stormwater Quality Team, a profile of water quality projects that have been completed within the reporting period, memorandum developed on behalf of the Compliance Monitoring Cooperative for the dry season compliance sampling in 2019, and the DMR entry for 2019. EPA has authorized data entry of sample results for the Compliance Monitoring Cooperative to be entered into NetDMR by a single entity on behalf of other entities. A copy of the memorandum of understanding between SSCAFCA and AMAFCA as well as the letter from EPA authorizing this action are included in this report.

If you have any further questions, please feel free to contact David Gatterman at <u>dgatterman@sscafca.com</u> or at 505-892-7246.

Sincerely,

Charles Thomas, PE Executive Engineer SSCAFCA

2019 Annual Report Reporting Period – July 1, 2018 – June 30, 2019

TABLE OF CONTENTS

- 2019 Annual Report (in suggested EPA format)
- 2019 Annual Report supplement including trash removal volumes by facility
- 2019 Sediment Removal quantities from stormwater facilities
- 2019 Arroyo Classroom report
- 2019 RiverXchange Report
- 2018-2019 Stormwater Quality Team Outcomes Report
- Monitoring Activities
 - Memorandum of Understanding for NetDMR data entry by AMAFCA on behalf of SSCAFCA
 - o Summary Memorandums and sample results for 2019 dry season sampling
- Cooperative Agreements
 - Technical Advisory Group
 - o Stormwater Quality Team
 - Compliance Monitoring Cooperative

Annual Report Format

National Pollutant Discharge Elimination System Stormwater Program MS4 Annual Report Form									
Check box if you are submitting an individual Annual Report with cooperative program elements									
Check box if you are submitting an individual Annual Rep	ort with individual prog	gram elements							
Check box if this is a new name, address, etc.									
1. MS4(s) Information									
Southern Sandoval County Arroyo Flood Control Author	ity								
Name of MS4									
David Gatterman		Facility Operatio	ons Director						
Name of Contact Person (First) (Last)		(Title)							
505-892-7246 dgatterma	n@sscafca.com								
Telephone (including area code)	E-mail								
1041 Commercial Dr. SE									
Mailing Address									
Rio Rancho	NM	87124	7						
City	State	ZIP code	_						
What size population does your MS4(s) serve? 101,103	NPDI	ES number							
What is the reporting period for this report? (mm/dd/yyyy)	From Jul 1, 2018	to Jun 30, 20	019						
Water Quality PrioritiesA. Does your MS4(s) discharge to waters listed as in	paired on a state 303(d) list? 🛛 Yes	🗌 No						
B. If yes, identify each impaired water, the impairme whether the TMDL assigns a wasteload allocation additional pages as necessary.	nt, whether a TMDL hat to your MS4(s). Use a	as been approved by E new line for each imp	PA for each, and airment, and attach						
Impaired Water Impairment	Approv	ved TMDL TMDL as	ssigns WLA to MS4						
Rio Grande, HUC 13020203 eColi	Yes	□ No 🛛	Yes 🗌 No						
Rio Grande, HUC 13020203 PCB in fish tissue	Yes	No 🗌	Yes 🛛 No						
Rio Grande, HUC 13020203 PCB in water column	ן Yes	No 🗌	Yes 🛛 No						
Rio Grande, HUC 13020203 Gross Alpha	Yes	No 🗌	Yes 🛛 No						

2. B. Continued

Impair	red Water	Impairment	Approved	TMDL T	TMDL assigns WLA to MS4				
			Yes	🗌 No	Yes	🗌 No			
			Yes	🗌 No	Yes	🗌 No			
			Yes	🗌 No	Yes	🗌 No			
			Yes	🗌 No	Yes	🗌 No			
C.	What specific sources cont	ributing to the impairment(s) are yo	u targeting in	your stormy	water program	?			
Pet w	aste, floatables, illicit discha	rges							
D.	Do you discharge to any hi resource waters, or other st	gh-quality waters (e.g., Tier 2, Tier ate or federal designation)?	3, outstanding	g natural	Yes	🔀 No			
E.	Are you implementing add	itional specific provisions to ensure	their continue	ed integrity?	Yes	🔀 No			
3. А.	Public Education and Pu Is your public education pr pollutants?	blic Participation ogram targeting specific pollutants a	and sources o	f those	X Yes	🗌 No			
В.	If yes, what are the specific	c sources and/or pollutants addressed	d by your pub	lic education	n program?				
Pet w	aste, floatables, illicit discha	rges							
C.	Note specific successful of fully or partially attributed	$\frac{1}{1}$ (e.g., quantified reduction $\frac{1}{1}$ to your public education program	in fertilizer u during this re	ise; NOT tas	ks, events, pu od.	blications)			
See o	utcomes report from the Mi	ddle Rio Grande Storm Water Quali	ity Team						
D.	Do you have an advisory costakeholders that provides	ommittee or other body comprised o regular input on your stormwater pro	of the public a ogram?	nd other	Yes	🔀 No			
I. A.	Construction Do you have an ordinance	or other regulatory mechanism stipu	ılating:						
	Erosion and sediment cont	rol requirements?			X Yes	No No			
	Other construction waste c	control requirements?			X Yes	🗌 No			
	Requirement to submit cor	struction plans for review?			X Yes	🗌 No			
	MS4 enforcement authorit	y?			X Yes	No No			
B.	Do you have written proce	dures for:							
	Reviewing construction pl	ans?			🔀 Yes	No No			
	Performing inspections?				🖂 Yes	No No			
	Responding to violations?				X Yes	🗌 No			
C.	Identify the number of actire reporting period. 3	ve construction sites ≥ 1 acre in ope	ration in you	jurisdiction	at any time d	uring the			
D.	How many of the sites iden	ntified in 4.C did you inspect during	this reporting	g period?	3				
E.	Describe, on average, the	frequency with which your program	conducts con	struction site	e inspections.]			
A	II SSCAFCA-owned sites are	inspected by SSCAFCA personnel a	at a minimun	n weekly. Qu	ualified contra	actors inspect th			

	F.	Do you prioritize certain constructio	Yes	🔀 No								
		If Yes, based on what criteria?										
	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	\boxtimes									
		Yes Administrative fines	\boxtimes									
		Yes Stop Work Orders	\boxtimes									
		Yes Civil penalties		No Authority	\boxtimes							
		Yes Criminal actions		No Authority	\boxtimes							
		Yes Administrative orders		No Authority	\boxtimes							
		Yes Other Contractual me	echanisms f o									
	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?										
	I.	What are the 3 most common types of	of violations documen	ted during this r	eporting period?							
	No	violations noted. SSCAFCA has stop	work authority on S	SCAFCA-owned	projects							
	J.	How often do municipal employees r	receive training on the	e construction pr	ogram? As r	needed						
5.	A.	Illicit Discharge Elimination Have you completed a map of all out system?	falls and receiving w	aters of your stor	rm sewer	X Yes	🗌 No					
	B.	Have you completed a map of all sto sewer system?	rm drain pipes and ot	her conveyances	in the storm	X Yes	🗌 No					
	C.	Identify the number of outfalls in you	ur storm sewer system	n. 8								
	D.	Do you have documented procedures	s, including frequency	, for screening o	outfalls?	Xes Yes	🗌 No					
	E.	Of the outfalls identified in 5.C, how	many were screened	for dry weather	discharges durin	g this repor	ting period?					
	8	8										
	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?										
	G.	. What is your frequency for screening outfalls for illicit discharges? Describe any variation based on size/type.										
	Al	I SSCAFCA facilities are inspected at a	a minimum twice per	year (pre and p	ost monsoon) fo	or a condition	on of facility asse ₊					
	H.	Do you have an ordinance or other redischarges?	egulatory mechanism	that effectively p	prohibits illicit	Yes	🔀 No					
	I.	Do you have an ordinance or other re- to take enforcement action and/or rec	egulatory mechanism cover costs for addres	that provides au sing illicit discha	thority for you arges?	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?	0

	L. How often do municipal employees receive	training on the illicit discharge program?	As needed							
6.	6. Stormwater Management for Municipal (A. Have stormwater pollution prevention plans	Operations (or an equivalent plan) been developed for:	:							
	All public parks, ball fields, other recreational fa	acilities and other open spaces	Yes	🛛 No						
	All municipal construction activities, including	those disturbing less than 1 acre	Yes	🔀 No						
	All municipal turf grass/landscape management	activities	Yes	🔀 No						
	All municipal vehicle fueling, operation and ma	intenance activities	Yes	🔀 No						
	All municipal maintenance yards		Yes	🔀 No						
	All municipal waste handling and disposal areas	3	Yes	🔀 No						
	Other									
	B. Are stormwater inspections conducted at the	ese facilities? 🗌 Yes 🔀 No								
	C. If Yes, at what frequency are inspections con	nducted? NA								
	D. List activities for which operating procedures or management practices specific to stormwater management have been developed (e.g., road repairs, catch basin cleaning).									
	Pre and post monsoon inspection and cleanin	g of flood control facilities								
	E. Do you prioritize certain municipal activities inspection?	s and/or facilities for more frequent	X Yes	🗌 No						
	F. If Yes, which activities and/or facilities rece	3. If Yes, which activities and/or facilities receive most frequent inspections? Dams, ponds, se								
	G. Do all municipal employees and contractors stormwater-related activities receive compre	overseeing planning and implementation of the second secon	f nt? Xes	🗌 No						
	H. If yes, do you also provide regular updates a	nd refreshers?	🔀 Yes	🗌 No						
	I. If so, how frequently and/or under what circ	umstances? All technical staff are enco	uraged to seek tra	ining on sto						
7.	 Long-term (Post-Construction) Stormware A. Do you have an ordinance or other regulator 	ter Measures ry mechanism to require:								
	Site plan reviews for stormwater/water quality of	for stormwater/water quality of all new and re-development projects?								
	Long-term operation and maintenance of stormy	water management controls?	Xes Yes	🗌 No						
	Retrofitting to incorporate long-term stormwate	X Yes	🗌 No							
	B. If you have retrofit requirements, what are t	he circumstances/criteria?								
	For all SSCAFCA-owned projects, all site plan r	eviews								
	C What are your criteria for determining which	h new/re-development stormwater plans vo	u will review (e g	all						

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.)?

All SSCAFCA-owned projects are reviewed.

8.

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?	X Yes	🗌 No						
E.	Do these performance or design standards require that pre-development hydrology be met for								
Flo	ow volumes	Yes	🔀 No						
Pe	ak discharge rates	🔀 Yes	🗌 No						
Di	scharge frequency	Yes	🔀 No						
Flo	ow duration	Yes	🔀 No						
F.	Please provide the URL/reference where all post-construction stormwater management stand	ards can be fo	ound.						
W	atershed management plans are located at: http://sscafca.org/watershed-and-drain-manag	gement-plans							
G.	G. How many development and redevelopment project plans were reviewed during the reporting period to assess impacts to water quality and receiving stream protection?								
H.	How many of the plans identified in 7.G were approved?								
I.	How many privately owned permanent stormwater management practices/facilities were insp	ected during	the						
	reporting period?								
J.	How many of the practices/facilities identified in I were found to have inadequate maintenan	ce? 0							
K.	How long do you give operators to remedy any operation and maintenance deficiencies ident	ified during							
	inspections? NA	6							
Ŧ									
L.	maintain stormwater practices/facilities?	Yes 🛛	No						
M.	How many formal enforcement actions (i.e., more than a verbal or written warning) were take	en for failure (0						
	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						
0.	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?	needed							
A.	Program Resources What was the annual expenditure to implement MS4 permit requirements this reporting period	od? 140,77	9						
B.	What is next year's budget for implementing the requirements of your MS4 NPDES permit?	63588							
C.	This year what is/are your source(s) of funding for the stormwater program, and annual rever	ue (amount c)r						
	percentage) derived from each?								
	Source: Property tax mil levy Amount \$	OR %	100						
	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	
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Entity	Activity/Task/Responsibility	Your Oversight/Accountability Mechanism
See Attached	Storm Water Quality Team	Signed agreement
See Attached	Compliance Monitoring Cooperative	Signed agreement
See Attached	Technical Advisory Group	Signed agreement

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:</i> E. coli	2003	Weekly April–September	20
Various (EPA approved analyte list)	2016	Qualifying Events (up to 7)	2
Various (EPA approved analyte list)	2014	Wet season, anually	8
Please refer to attached Annual Report			
or SSCAFCA website for 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.

10. Additional Information

Please attach any additional information on the performance of your MS4 program, including information required in Parts I.C and III.B. If providing clarification to any of the questions on this form, 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
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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

Name of Certifying Official, Title

Date (mm/dd/yyyy)

2019 Annual Report Supplement (Reporting period 7/1/18 – 6/30/19) NPDES Permit NMR04A001 Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA)

This document is being provided as a supplement to the form that was provided by the EPA as the format for the Annual Report. The supplement is being used to provide more explanation to responses provided in the Annual Report form where specific circumstances of SSCAFCA's status require more information to be provided than is allowed on the form. Additionally, responses to permit required

Section 1, NPDES Number: The pdf form provided by the EPA does not allow for non-numeric data entry in this field. The NPDES number for our permit is NMR04A001

Section 4.A, "Do you have an ordinance or other regulatory mechanism stipulating: erosion control requirements; other construction waste control requirements; requirement to submit construction plans for review; and, MS4 enforcement authority?"

Response: On the form, SSCAFCA has indicated "yes" to all of these program elements. It should be noted that SSCAFCA only has jurisdictional authority over SSCAFCA-owned projects. The indication of "yes" on the Annual Report shall be in the context of SSCAFCA-owned projects only.

Section 4.B, "Do you have written procedures for: reviewing construction plans; performing inspections; and, responding to violations?"

Response: On the form, SSCAFCA has indicated "yes" to all of these program elements. It should be noted that SSCAFCA only has jurisdictional authority over SSCAFCA-owned projects. The indication of "yes" on the Annual Report shall be in the context of SSCAFCA-owned projects only.

Section 4.F, "Do you prioritize certain construction sites for more frequent inspections?"

Response: On the form, SSCAFCA has indicated "no" to this program element. Since SSCAFCA only has jurisdiction over SSCAFCA-owned projects, SSCAFCA inspects these projects with the same priority.

Section 4.H, "Do you use an electronic tool (e.g. GIS, data base, spreadsheet) to track locations, inspection results, and enforcement actions of active construction sites in your jurisdiction?"

Response: On the form, SSCAFCA has indicated "no" to this program element. Since SSCAFCA only has jurisdiction over SSCAFCA-owned projects and since there are relatively few of these projects underway at any one time, the usage of an electronic means of tracking was deemed to be not necessary and would provide more burden than assistance with regard to tracking these program items.

Section 4.I, "What are the 3 most common types of violations documented during the reporting period?"

Response: During the reporting period, SSCAFCA had three active SSCAFCA-owned construction projects. This project was inspected by SSCAFCA personnel and contractor personnel frequently and no violations were identified during the project.

Section 6.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; all municipal construction activities including those disturbing less than 1 acre; all municipal turf grass/landscape management activities; all municipal vehicle fueling, operation, and maintenance activities; all municipal maintenance yards; and all municipal waste handling and disposal areas?"

Response: On the form, SSCAFCA has indicated "no" to these program elements. SSCAFCA does not currently own or operate any of the types of facilities indicated in the Annual Report form.

Section 6.B, "Are stormwater inspections conducted at these facilities?"

Response: On the form, SSCAFCA has indicated "no" to this program element. Since SSCAFCA does not own or operate any of these facility types, no inspections have occurred.

Section 7.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; long-term operation and maintenance of stormwater management controls; retrofitting to incorporate long-term stormwater management criteria?"

Response: On the form, SSCAFCA has indicated "yes" on all program elements. SSCAFCA does not have jurisdiction outside of SSCAFCA-owned projects. SSCAFCA does have internal polices directing staff with regard to the program elements. However, SSCAFCA does participate in some plan reviews with the City of Rio Rancho for those developments that may impact SSCAFCA facilities. During this annual report year, SSCAFCA reviewed four development plans meeting these criteria and identified Low Impact Development opportunities one three of these plans.

Section 7.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?"

Response: On the form, SSCAFCA has indicated "yes" on this program element. On SSCAFCA-owned projects, SSCAFCA is required by State Law, to abide by the 96 hour rule, requiring all flood control facilities to discharge all detained stormwater within 96 hours. Therefore, all SSCAFCA flood control projects drain within 96 hours.

Section 7.E, "Do these performance or design standards require that pre-development hydrology be met for: flow volumes; peak discharge rates; discharge frequency; and, flow duration?"

Response: On the form, SSCAFCA has indicated "no" on all program elements except for Peak Discharge Rates. SSCAFCA-owned projects are flood control projects that generate little to no excess stormwater on site as the vast majority (>99%) of these projects are not constructed from impermeable materials. These projects are constructed to manage up-stream flows from development and attenuate the hydrograph so that stormwater can be conveyed safely through downstream facilities. However, SSCAFCA-owned projects are designed to provide for attenuation of stormwater hydrographs from upstream and discharge at historical levels to the greatest extent practicable. **Section 7.I**, "How many privately owned permanent stormwater management practices/facilities were inspected during the reporting period?"

Response: On the form, SSCAFCA has indicated "0" for this program element. SSCAFCA does not have statutory authority to regulate private development, including regulation of post-development conditions.

Section 7.J, "How many practices/facilities identified in I were found to have inadequate maintenance?"

Response: On the form, SSCAFCA has indicated "0" for this program element. SSCAFCA does not have statutory authority to regulate private development or post-construction conditions in private development. However, SSCAFCA facilities inspected for routine maintenance during the reporting cycle had maintenance needs identified and carried out.

Section 7.L, "Do you have authority to take enforcement action for failure to property operate and maintain stormwater practices/facilities?"

Response: On the form, SSCAFCA has indicated "No" for this program element. SSCAFCA does not have statutory authority to regulate private development or post-construction conditions in private development.

Section 7.N, "Do you use an electronic tool (e.g. GIS, database, spreadsheet) to track post-construction BMPs, inspections, and maintenance?"

Response: On the form, SSCAFCA has indicated "Yes" for this program element. SSCAFCA uses a spreadsheet for reporting maintenance activities to the U.S. Army Corps of Engineers (USACE) as part of the Letter of Permission for maintenance work within the Waters of the United States. SSCAFCA facilities are, for the most part, considered Waters of the United States by the USACE.

Section 8.A, "What was the annual expenditure to implement the MS4 permit requirements this reporting period?"

Response: On the form, SSCAFCA has indicated a value of \$140,779. This funding went toward, dues to the Stormwater Quality Team, expenditures for operating the Arroyo Classroom program in Sandoval County through Cuidad Soil and Water Conservation District, SSCAFCA's contribution to the Compliance Monitoring Cooperative, funding for Senior Citizen outreach program (aka Watershed Stewards), sponsorship of the Xeriscape conference in Albuquerque, and sponsorship of the Children's Water Festival in Rio Rancho.

Section 8.B, "What is next year's budget for implementing the requirements of your MS4 NPDES permit?"

Response: On the form, SSCAFCA has indicated a value of \$63,588.17. This amount does not include salaries for personnel working on permit compliance issues. There are no projected capital outlay projects targeted at stormwater quality during the 2018-2019 reporting year, hence the reduced number.

Facility Id	Name	Invoice Date	Trash Removed (bags)
VE_P0012	Lower Venada Arroyo (NM528 to Rio Grande)	12/21/2018	1
MO_P0073	25th Ave Pond	1/7/2019	1
MO_P0048	Cielo Norte Pond and Outfall (Michelle Dr. Pond)	1/31/2019	1
MO_P0049	Wilpett Pond 1 (Northern Meadows)	3/13/2019	1
MO_P0050	Wilpett Pond 2 (Northern Meadows)	3/13/2019	1
MO_P0051	Wilpett Pond 3 (Northern Meadows)	3/13/2019	1
BL_P0014	Ivory Channel	2/5/2019	2
CA_P0008	Redwood Pond	2/8/2019	2
MO_P0052	Wilpett Pond 4 (Northern Meadows)	3/13/2019	2
BL_P0036	Lisbon Channel (Tarpon to Southern)	3/27/2019	2
MO_P0044	Lark Pond (High Range Subdivision)	3/27/2019	2
MO_P0059	James Road Pond	5/1/2019	2
MO_P0061	28th Ave Pond	3/1/2019	3
BL_P0031	Pecos Channel	3/4/2019	3
BL_P0028	West Branch Cabezon Channel	4/25/2019	3
BL_P0006	Sugar Channel	1/31/2019	4
BL_P0033	Bali Channel	2/8/2019	4
RA_P0002	Rainbow Channel (Vancouver to Pecos Loop)	2/22/2019	4
MO_P0055	Clear Creek Pond	3/31/2019	4
BL_P0004	Tract 17	4/8/2019	4
BL_P0039	Landing Trail Pond 1	6/15/2019	4
MO_P0074	Inca Pond	3/25/2019	5
MO_P0058	Havasua Falls Pond	4/8/2019	5
BL_P0016	Stallion Channel (Western Hills To Nicklaus)	4/29/2019	5
MO_P0062	King Blvd Pond	3/1/2019	6
BL_P0036	Lisbon Channel (Tarpon to Southern)	5/22/2019	6
MO_P0075	Serene Pond	4/23/2019	7
CW_P0011	Urban Pond - Stephanie Rd.	12/7/2018	8
BL_P0032	Baltic Channel	3/17/2019	8
NM_P0003	Roskos Field Pond	3/26/2019	8
BL_P0004	Tract 17	11/30/2018	9
VE_P0028	Encantado Channel South	6/10/2019	10
NM_P0003	Roskos Field Pond	6/6/2019	12
MO_P0045	Sundt Pond	5/22/2019	14
MO_P0060	Camino de Los Montoyas Pond (AKA Sunny Meadows Pond)	5/28/2019	15
VE P0028	Encantado Channel South	5/28/2019	15
 MO_P0056	Desert Willow Pond	5/28/2019	16
VE P0028	Encantado Channel South	6/15/2019	20
MO_P0065	Paseo Vista Pond	5/28/2019	22
MO_P0057	Flat Iron Pond	6/10/2019	27
MO_P0021	Lower Montoyas Water Quality Facility	1/1/2019	30
VE_P0017	Venada Arroyo (Unser Blvd to PDV)	1/16/2019	35

Total trash volume removed from facilities (7/1/18 - 6/30/19)

TOTAL TRASH REMOVED (30 GALLON BAGS), 7/1/18-6/30/19

334

	Latitude	Longitude	Size of Structure (ac)	Length of Sediment Capacity channels (LF) (CYDS)	Sediment Area of Removed maint. impa (CYDS) (LF or Ac)	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Vactor Cleaning	Access Control	Slide Gate Servicing	Water Monitoring	WQ Structure Cleaning	Bank Restoration
		1	1.00	2400			×		V		N/						
Sugar Channel			1.09	3180			X		X		X						
Sunset Pond			5.2)	X		X		X	X		X				X
Cabezon Channel	25 2202 42	405 500 470	1.4	1700 40,800 (3-ft depth)		X	X	X	X	X	X		X				× ×
Tract 17 Pond	35.229243	-106.689473	15.9	20,000		X	×	X	X	X	X	X	X				X
Roskos Field Pond			0.7	4000		X	X	X	X	X	X	X					
			0.45	1322 13872 (3-ft depth)		X	X	X	X	X	Ň		N N				× ×
Gateway Pond			5.05	800-1200		X	+	X	X	X	X		X				X
Licken Channel (Targen Ave to Tulin Dd)	25.255.400	100 702070	//.88	4200	100 1400 15	V		v		X	X		X				v
Lisbon Channel (Southern Blud to Tarnen Ave)	55.255490	-100.705870	1.40	4300	100 1400 LF	<u> </u>		^ V		X	X		X				×
Lisbon Channel (Black Arroya Trail brdg to Southern)			1.7	4950		X	+ +	^ V		X	×		×				×
			1.10	1202		×	+ +	×		× ×	~ ~		^				
Padaa Channal			1.03	2860		×	1	×		^ V	~ 						^ V
Peros Channel			0.00	1950		× ×		×		^ V	^ V						^
Raltic Channel			0.45	2450		× ×		×		^ V	^ V						^
Bali Channel			0.30	1130		×		×		X	×						×
Snur Channel			0.20	578		~	×	X	x	X	x						X
Spur channel			0.55	578	ļļ		~	~	Χ	~	~	ļ					
MONTOYAS WATERSHED																	
Northern Blvd Sedimentation Basin			4.56	23.000)	Х		Х	Х		Х						, [
Sportsplex Dam Floodpool			33.48	44,500)	Х		Х	Х	Х	Х		Х				Х
Lower Montoyas Water Quality	35.256684	-106.617011		66,000	35000 3.44 Ac	Х		Х	Х	Х	Х		Х				
Harvey Jones Channel			6.98	5067 77,450)		Х		Х		Х		Х				1
Harvey Jones Channel Outlet			8.06			Х	Х	Х	Х	Х	Х		Х				1
Lomitas Negras Water Quality Facility	35.271609	-106.613651	28	45,673	7050 3.37 Ac	Х	Х	Х	Х	Х	Х		Х				Х
Dulcelina Curtis Channel			2.33	5088 38,100)		Х		Х		Х		Х				1
Corrales Heights Dam 1			35	15,000)	Х	Х	Х	Х	Х	Х		Х				Х
Dam 4 to 1 pipeline, note: this is conc pipe			0.46	3354			Х		Х		Х	Х	Х				
Tree Farm Pond A	35.222049	-106.641367	1.57	800)	х		Х		X	Х		Х				Х
Tree Farm Pond B	35.226728	-106.650958	1.01	600)	Х		Х		X	Х		Х				Х
Urban Pond A	35.234689	-106.652281	0.95	600)	Х		Х		X	Х		Х				Х
Urban Pond B	35.233181	-106.646225	6.63	1200)	X		Х		X	Х		Х				Х
Urban Pond C	35.226974	-106.636145	0.79	600)	X		Х		X	Х		Х				Х
Sierra Norte Channel - North Hills			0.62	1350		X	X	Х	Х	Х	Х		Х				Х
Acadia Court Pond			1.2	1900)	X		X		X	Х		X				X
Loma Pinon Loop Pond			0.33	530		X	+ +	X		X	X		X				X
Lark Pond - High Range Subdivision			0.98	1600		X		X		X	X		X				X
Sundt Pond			2.57	2500		X X		X		X	X		X				X
Parti S Portu			0.26	1200		×	+ +	×	v	X	×		×				×
Cielo Norte Pond and Outfall (Michelle Dr. Pond)			1.01	850)	×		×	×	× ×	×		×				 X
Northern Meadows Channel(S))		1.05			~		Λ	Х	X	~		~				
			32.7	7124			Х	Х	х	Х	Х						i – – – – – – – – – – – – – – – – – – –
Ponce De Leon			29.6	5157			x	X	X	X	X						·
Northern Meadows ponds	5						1 1			1							
Wilpett Pond 1			2.37	2500)	Х		Х		Х	Х		Х				Х
Wilpett Pond 2			1.5	1200		Х		Х		Х	Х		Х				Х
Wilpett Pond 3	35.320616	-106.710077	2.52	2700)	Х		Х		Х	Х		Х				Х
Wilpett Pond 4			2.22	2500)	Х		Х		Х	Х		Х				Х
Wilpett Pond 5	35.316833	-106.707385	2.51	2500)	Х		Х		X	Х		Х				Х
Wilpett Pond 6			4.98	5000)	Х		Х		Х	Х		Х				Х
Clear Creek Pond			1.6	800		Х		Х		Х	Х		Х				Х
Desert Willow Pond			2.36	1600		Х		Х		Х	Х		Х				Х

	Latitude	Longitude	Size of Structure (ac)	Length of channels (LF)	Sediment Capacity (CYDS)	Sediment Removed (CYDS)	Area of maint. impact (LF or Ac)	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Vactor Cleaning	Access Control	Slide Gate Servicing	Water Monitoring	WQ Structure Cleaning	Bank Restoration
Flat Iron Pond			3.22		1800			Х		Х		Х	Х		Х				Х
Havasua Falls Pond			1.18		1500			Х		Х		Х	Х		Х				Х
James Road Pond			1.22		1500			Х		Х		Х	Х		Х				Х
Camino de Los Montoyas Pond			1.18		800			Х		Х		Х	Х		Х				Х
Zia Park Pond			0.77	,	500			Х		Х		Х	Х		Х				Х
King Road Pond(s)			5		5500			Х		Х		Х	Х		Х				Х
Valley Meadows Pond			0.5		500			Х		Х		Х	Х		Х				Х
Tract H Pond			4.18		2500			Х		Х		Х	Х		Х				Х
VENADA WATERSHED																			
Lower Venada Channel (NM528 to WQ Feature)	35.313362	-106.571413	11.1		44,000			Х		X	Х	X	Х						
Lower Venada Channel (WQ Feature)			2.1									Х							ļ
Enchanted Hills Dam 1			8.55		14,000			Х	Х	Х	Х	Х	Х		Х				Х
Encantada Channel			12.5		1200				Х		Х		Х	Х		Х			Х
Chayote Pond			4.48		2500			Х		Х		Х	Х		Х				Х
Santa Fe Hills Pond			4.85		2500			Х		Х		Х	Х		Х				Х
Sprint Pond			9.05		4000			Х		Х		Х	Х		Х				Х
Mariposa Ponds	; T	1				1													
Mariposa Pond 1			3.55		1500			Х		Х		Х	Х						ļ
Mariposa Pond 2			5.58		1000			Х		Х		Х	Х						ļ
Mariposa Pond 3			2.14		800			Х		Х		Х	Х						L
Mariposa Pond 4			1.96		800			Х		Х		Х	Х						ļ
Mariposa Pond 5			2.23		1100			Х		Х		Х	Х						
Mariposa Pond 6			2.23		1100			Х		Х		Х	Х						L

BARRANCAS WATERSHED

BARRANCAS WATERSHED								
Campus Dam		24	20000	Х	Х	Х	Х	Х
	•	•			· · · · ·			

CORONADO WATERSHED

Bosque De Bernalillo WQ Feature		0.25	300		Х		Х		Х	
Coronado Channel (Sheriff's Posse to east boundary)		1404 Inft			Х		Х		Х	1
Joiner Pipeline and stilling basin		5.74	400			Х	Х	Х	Х	

CALABACILLAS WATERSHED

Redwood Pond		0.61	980	Х	Х	Х	Х			Х

Х	Х		Х
x			x
X			N
Х			х
Х	Х		

Arroyo Classroom

2018 - 2019 final report

submitted by Melissa McLamb, CSWCD June 2019

The Arroyo Classroom program utilizes our natural arroyos as outdoor classrooms and brings local animals into the classroom to motivate 3rd 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 1st, 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 2018-2019 school year, we served 34 classes within Rio Rancho Public Schools, reaching approximately 34 teachers and 790 students.

Participating Schools

SCHOOL	Number of classes	Number of Students
Enchanted Hills Elem.	5	140
Martin Luther King Elem. *	6	158
Sandia Vista Elem.	4	84
Maggie Cordova Elem. *	7	162
Cielo Azul Elem. *	6	124
Puesta del Sol Elem. *	6	120
TOTALS	34	790

* Title 1 school

Deliverables to date:

All complete

- Watershed Presentations: 34:34
- Arroyo Walk: 34:34
- Bat Presentations: 34:34
- Owl Presentations: 34:34

Task 1: Recruit and select classes.

Complete by September 2018.

Status: completed.

All classes are returning classes and the program has a waiting list.

Task 2: Review and revise evaluation and curriculum.

Complete by May 2019.

Status: completed.

The pre and post survey was revised by classroom teachers and AC staff to better suit 3rd graders. We received positive feedback from teachers on new and updated presentations offered to their classrooms this year.

Task 3: Coordinate classroom guest speakers.

Begin September 2018. On-going through May 2019. Status: completed.

Guest speakers have been confirmed with up to date Professional Services Agreements. All presentations have been conducted.

Task 4: Collect and analyze teacher feedback.

Complete by May 2019.

Status: completed.

Status: completed.

Staff has developed a feedback form for teachers to issue out to teachers in April.

Task 5: Reporting to sponsors.

Midyear report by January 31, 2019. - *submitted Jan 2019* Final report by June 14, 2019.

Project Summary

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. Tavo Cruz of Envirological Services, Inc. delivered presentations with a live Burrowing Owl.

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, and 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.

In the owl presentation, Octavio talked with students about what time of year burrowing owls are in our arroyos, what habitat they need, and what we can do to support and protect them. Tavo emphasized the impact of riding ATVs up the sides of arroyos and encouraged ways to care for burrowing owl habitat. He taught students that burrowing owls are protected by federal law, and that 3rd graders could be ambassadors and protectors for the owls. Each student was able to observe the burrowing owl up close, one at a time. We worked in coordination with Wildlife Rescue to bring in the live burrowing owl for each presentation.

Evaluation

All 34 participating classes, participated in previous years and each teacher expressed interest in returning next year. Teacher feedback from this year also showed that teachers find that each presentation helped increase students understanding of local ecology while educating them about what they can do to protect wildlife habitats and/or water quality. Some teachers have requested extension activities to help them expand on content presented to their class. We plan to integrate additional lesson plans that teachers can easily use next year. We are also working on correlating our presentations to the newly adopted science standards, NM STEM Ready! This correlation will be complete by the start of next school year.

We were unable to confirm with Cielo Azul Elementary to plan for another Arroyo Clean Up event. We hope to work with the City of Rio Rancho next year by promoting their Campus Clean Up Contest and encouraging our participating classes and schools to organize such events.

Highlights from teacher feedback:

"Every year this program adds so much to our classroom and student engagement. The excitement of the owls and bat is amazing for our kiddos. The Arroyo walk is also exciting. I thought the changes to the watershed presentation was a great improvement to capture 3rd graders attention." - Evans, Sandia Vista Elementary

"They were able to identify how they fit into the habitat surrounding them and how they can help preserve different aspects of it. They were able to apply different ideas taught (water conservation, animal identification, ect.)" - Eisenberg, Martin Luther King, Elementary

"My kids always love the animals and what they learn about them. I love that the kids get a better understanding of arroyos and how the water shed works."- Florez, Maggie Cordova Elementary

Survey

We developed the survey this year in collaboration with select 3rd grade teachers to make it as relevant and age-appropriate for students. This is the first year we have had a single pre and post survey to distribute to students.

Survey Metrics:

Item 1



This age group of students are often very literal and may find the concept of a "watershed" confusing. We will find ways of making this more age appropriate for 3rd graders. It may require an adjustment to our incorrect answer options. We plan to implement extension activities next year as well, which will offer teachers the opportunity to review and expand on presentation content with students afterwards.



When is it safe to go into a natural, sandy bottomed arroyo?

When

The majority of students seem to understand when it is safe from the beginning of the program, perhaps in contrast to the other answer options. It is interesting to see that 30% of students still consider it is "never" safe to into a natural arroyo. This could be an idea that students are receiving from parents or guardians understanding of arroyo safety.

Item 3



What is a sign that an arroyo is healthy?

We see a 20% increase in student knowledge of species diversity being an indicator of arroyo health.

Item 4



We see a decrease in the incorrect answers from the pre to post survey as well as a 13% increase in students understanding of how dog poop can impact the water quality of the river.





How are arroyos helpful?

Students either already knew this or is was an easy assumption based on the answers. We will make one of the answers seem more probable next year and replace "They are used for irrigation" with "They help farmers water their crops".





This shows how the live animal presentations introduce students to the importance of not disturbing wildlife and that burrowing owls wouldn't utilize bird houses.

9





It seems that most students either already know this or they can figure it out based on the answer choices. Next year we will make the other choices more probable.





If you find an injured bat, what should you do?

Survey Summary

Overall, the survey findings are positive. This was a pilot year with using a single pre and post survey and we will continue to refine our questions with feedback from teachers. It is important that students understand the concept of a watershed. Next year we intend to support our classes with pre and post activities that will help teachers review and explore concepts from the presentations, which will strengthen learning outcomes for students.

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

Appendix A Lesson Plans

Activity Guide for 3rd 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	Talk about when it is safe.
carefully	
Picking up dog poop keeps	We'll probably see poop, talk about how it can make animals sick.
germs out of our river	

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:

3 rd Grade
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:

Our Goals	Where we can relate our goals to this activity
How does the water cycle	Describe the processes of the water cycle: evaporation, condensation,
work?	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	Arroyos provide important drainage in a storm event and provide
important?	unique and critical habitat for wildlife and plants.
How does vegetation help	Forests, wetlands and healthy arroyos help keep the river clean and
our river?	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 \rightarrow 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 hand 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.

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.

Brought to you by:

SSCAFCA



SSCAFCA watershed map:



Appendix C Program Photos



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







LEFT - 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.).



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

2019 Report

Presented by Ciudad Soil & Water Conservation District

June 2019

CONTENTS

SUMMARY	3
PROGRAM DESCRIPTION	6
Mission	6
The Big Water Questions	6
Background	7
Program Management and Financial Support	8
Participant Selection	9
Curriculum	9-10
EVALUATION	11
Blog Evaluation	11
Student Surveys	14
Appendix 1 (Extension Activities)	32
Appendix 2 (Photos)	48

SUMMARY

This year, funding enabled 36 NM classes (954 students and 39 teachers) to participate. The majority of participating classes were from Title I schools. Each NM class was partnered with another NM class and when possible another class outside the state for a total of over 1,338 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 \$51,881.62 in cash and generated total match valued at \$90,344.90 in the form of in-kind contributions including workshop space, classroom resources, presenters' time in the classroom, field trip docents, donated trees and shrubs, as well as teachers' and students' time.

With the support of two contract hires this year, we were able to focus more on strengthening our program in ways we haven't been able to in the previous three years with unanticipated personnel changes. Our primary accomplishments include: strengthening partnerships with teachers and volunteers who support us with in-class presentations, developing an effective place based lesson on acequias and agriculture, and offering consistent blog support and encouragement in order to increase the efficacy of the technology component. Also, we refined our extension activities this year and are on target to have all RiverXchange presentations correlated with the recently adopted New Mexico science standards, NM STEM Ready! by the end of the summer. Teachers commended us throughout the year on the value of the presentations and curriculum in their class experience.

Strengthening Partnerships

Understanding how RiverXchange meets the needs of participating teachers, students, in-kind donors, as well as how RiverXchange fits into the larger efforts of watershed education in our community, is critical for keeping RiverXchange relevant and impactful. This year, we met with a wide variety of educators and stakeholders in our field. We met with organizations including: Albuquerque Water Utility Authority (ABCWUA), Sandia Labs, Bosque Ecosystem Monitoring Project (BEMP), RiverSource, Sandia Mountain Natural History Center (SMNHC) and Center for Social Sustainable Systems (CESOSS). These meetings, as well as shadowing a few presentations offered by others, gave us and our collaborators an opportunity to establish or reconfirm program expectations, help us evaluate our educational offerings and find ways we can better support common learning objectives in watershed education. Strong partnerships are critical in informing us as we work to strengthen the program, remain relevant, and navigate unexpected changes.

For example, one long term collaborating agency, Bernalillo County Extension, was unable to participate with us this year. In the past, they have offered the agriculture related presentation to all APS schools. Consequently, our staff designed and delivered a similar presentation that engaged students in a regional history of agriculture and irrigation techniques that highlighted acequia culture and the effects of human settlement on the Rio Grande. In our search for resources in the community, we discovered CESSOS, a possible future in-kind partner, who could offer a presentation more culturally relevant and significant for students.

We noticed an increase in blog postings, including postings of class projects this year. We held a contest for excellent and creative blogging with specific criteria and saw more class engagement due to this. Though a few teachers continue to report they face challenges with access to computer labs, many of our classrooms this year are already using technology such as Google Classroom or many have individual tablets for students. With technology being integrated into more classrooms worldwide, the blogging component of RiverXchange continues to be a unique, important offering of our program. The blog offers a protected, educational platform for teachers to guide and review student work, as well as an opportunity for the class to learn about digital citizenship. Using the blog, allows classes to experience the importance of meaningful communication to a broad, digital audience, while practicing creative collaboration and self-responsibility in the submission of work.

Teacher Workshop

Noticing a need for professional development for our teachers with the newly adopted science standards, we took the opportunity to educate teachers about NM STEM Ready! at our teacher workshop and show how the RiverXchange program and curriculum can help their students meet these in their classroom experience. With support from the Environmental Education Association of New Mexico (EEANM) and Seleana Connealy of NM EPSCoR (Established Program to Stimulate Competitive Research), we offered an introduction to the standards, offered practical tools to plan and demonstrate lesson correlation, using RiverXchange activities, and shared resources for learning more throughout the school year.

Teacher Feedback

Every year, we receive invaluable feedback from our teachers. Feedback this year continues to be positive. All participating teachers want to return and a few have asked to add other teachers from their fifth grade team. We are finding that the majority of our teachers choose our program to teach more about water resource issues and to incorporate more science into the classroom. This shows a major shift since the program's conception, at that time teachers were more drawn to the program as a way to incorporate more language arts curriculum. While the program still focuses on reflective and creative writing, we are also responding to current needs by emphasizing how RiverXchange can help teachers include more experiential learning and science in their classroom. Nearly 50% of teachers are also attracted to the program because the blog enables them to connect with other teachers and students in a thematic learning environment. Here are a few highlighted responses from our teachers on the greatest learning outcomes for their class:

"I was able to add experiential learning in science into my classroom lessons and truly engage the students." - Anonymous

"Students were able to fully understand where our water comes from, what a watershed is, how humans have impacted the environment and ecosystems. And maybe, more importantly, what we can do to help." - John Turrietta, MLK Elementary

"Awareness of their role in conserving and protecting water resources."- Dwayne Norris, Bandalier Elementary

"Working as a team and real life connection to science topics through our local watershed." - Tris Carty, Seven Bar Elementary "What a wonderful way to have students directly involved in their own watershed while learning hydrosphere concepts. The teamwork and concrete lessons were a great enhancement to our classroom." - Anonymous

"This group in particular, has learned so much from the experience. Many of them have never been to the bosque, or reflected upon the components and how/why they might have come to be there." -Anonymous

"The presentations were engaging and interactive. The demonstrations helped the students to understand more of our environment. I really enjoyed the speakers. The pole planting field trip was amazing! The kids felt very accomplished!"- Randi Sevigny, Seven Bar Elementary

Presentations

Program presentations were completed as follows:

Agriculture: 36/36 Stormwater: 36/36 Wastewater: 36/36 Drinking Water: 36/36 Planting Field Trips: 34/36 Landfill Field Trips: 5

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, we 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, we 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 our successful festival work with upper elementary students, this age level was selected as the focus for the RiverXchange program.

We created RiverXchange to provide a free program that is fun, interesting, and easy to integrate into the normal curriculum. Our hope was to motivate participants to explore water resources topics in depth. The program is 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.

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. The upper elementary level was chosen because of our successful festival work with this age group.

After the pilot project, we transitioned to a web-based technology called a wiki. This enabled us 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 we introduced classroom guest speakers to reduce teacher workload and bring up-to-date technical information into the classroom.

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. Since 2007, we have served over 18,000 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
- Coordination of class partnerships
- KidBlog online posting and communication
- Teacher training on curriculum implementation and use of KidBlog
- Ongoing technical and motivational support
- Online class postings
- 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 Jessica Garduño Erin Blaz Jenny Lloyd-Strovas

Sponsors

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

Sponsors provided a total of \$51,881.62 in cash. MRGSQT - \$31.768.40 | SSCAFCA - \$20,113.22

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)

New Mexico In-Kind Partners

- Albuquerque Water Utility Authority
- Bernalillo County Public Works Division
- CDM Smith, Inc.
- City of Albuquerque Open Space Division
- City of Rio Rancho Environmental Programs Office
- City of Rio Rancho Parks, Recreation and Community Services Department
- Daniel B. Stephens and Associates
- New Mexico Acequia Association
- Sandia Labs
- Sandoval County Cooperative Extension
- Southern Sandoval County Arroyo and Flood Control Authority

• UNM Maxwell Museum of Anthropology

In-Kind contributions totaled \$90,345. 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 36 participating NM classes were fifth grade classes, distributed as follows:

Bernalillo County	Sandoval County
Bandelier Elementary (4)	Colinas del Norte Elementary (5)*
Cochiti Elementary (3) *	Martin Luther King, Jr. Elementary (7)*
Duranes Elementary (1) *	Sandia Vista Elementary (1)
Georgia O'Keeffe Elementary (2)	Santo Domingo Elementary (1)
John Baker Elementary (1)	
Monte Vista Elementary (3)	
Seven Bar Elementary (5)	
Zia Elementary (4) *	
22 classes, 558 students	14 classes, 396 students
* Title 1 school	TOTAL - 36 classes, 954 students

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 to their pen pals. 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. 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 (Our staff had to provide the majority of these presentations as we were unable to find an in-kind partner to do so, after we received notice that our previous provider, Bernalillo County Extension, would be unable to in the foreseeable future. We expended more coordination hours than usual due to this. We anticipate having an in-kind partner to offer this come next school year.)

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. We coordinated all NM field trips. Throughout the winter and spring, students planted 518 native trees and 128 shrubs and helped restore critical riparian habitat along the Rio Grande in Albuquerque. In-kind funding from Rio Rancho Public Schools (RRPS) and Waste Management allowed us to offer an additional field trip to our RRPS classes which included a visit to the Sandoval County Landfill and Willow Creek Bosque.

Field Trip Locations

Alamo Farm Candelaria Farms Open Space Preserve Sandoval County Landfill / Willow Creek Bosque

EVALUATION

Blog Evaluation

Engagement

Of our total number of classes, Kidblog was used by 77% of RiverXchange teachers this year. Blog posts ranged from 1 to 41 per class over the year. We helped teachers who reached out with any need for technical support. As we did not hear of any issues from most of the teachers who did not blog, we can not be sure why they did not participate in this area. It is likely however, since many of these teachers have blogged in the past, that unpredictable circumstances made it challenging to integrate KidBlog into the classroom. One class did not blog because they did not have sufficient internet access (Santo Domingo ES). In general, we are satisfied that the majority of teachers utilize KidBlog in the specific method we train them on for RiverXchange. In addition, classes continued to use reflection groups for posting and this seemed to work smoothly for teachers.

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. The results from this rubric demonstrated that about half of classes posts met a satisfactory level of blogging. 32% of classes demonstrated above satisfactory posting and 13% of classes were exceptional. Four winners were chosen, two 1st place and two 2nd place winners, who won gift certificates to Acorn Naturalists and a River of Change model from the Bosque Education Guide (1st place only). In observing the quality of postings from the majority of classes, we determined the use of the KidBlog platform is an effective means to meet our education and outreach objectives.

Student Voices

The blog is not only a platform for student voices to be heard, it also provides a rare opportunity to informally assess student learning from RiverXchange. Even with a range of quantity and quality of postings, across the board, students voices resounded messages of water conservation and protection. While they might not always have a perfect grasp on the technicalities of water distribution and use in our community, we can see they are building knowledge about their watershed and water as a local resource.

This year we continued to encourage group collaboration by setting up reflection groups at the start of the year with the hope that blog posts are a product of that collaboration. We also have tried to encourage teachers to get creative with posts - to do videos, pictures, or even voice recordings. We still see a majority of written-only posts, though some teachers integrated powerpoint projects, drawings and videos to posts. This is encouraging as the blog has the potential to truly catalyze project-based, hands-on, experiential learning by being a multimedia platform.

Blog Images

No Trash

By Gallegos Watery cycles on Oct 31, 2018

Keep our Environment Clean

Hello fellow water users. We have an issue with our trash. The plastic bag is one of the worst threats to our environment. It can destroy our watershed and we can lose all of the water and die. Trash can pollute the sea and can kill the animals. For example a plastic bag can look like a jellyfish and it can trick the turtle into eating it, and then the turtle will suffocate.

If we don't litter than our lakes and seas will not be so DIRTY! Some other ways to save our drinking water is to pick up dog poop, don't take long showers, turn off the water when you're done with it, fix leaky faucets, don't use pesticides, and only use a little fertilizer.

Fifty years ago people in Albuquerque believed that there was a lake under us. But no, we have a small portion of it and must use it carefully. If we don't take care of it we will not have enough of it to drink, water plants, and bathe.

Some facts are:

- The earth is made up of 70% salt water (not usable).
- . There are people all over the world who litter in our water.
- . The Pacific garbage patch is twice the size of Texas.
- Everyday the Rio Grande goes straight through New Mexico to the Gulf of Mexico.

Thanks for helping us save the environment!

"Learning about the Water Cycle" (image and quote below by Whitlock McGonagal)



"We made diagrams of our local water cycle, the Sandias to the Gulf Of Mexico as our main body of water."

Kidblog Quotes

"On the 13th of December we went to the Rio Grande bosque. When we went on our field trip we felt like this field trip was about friendship. We had fun with people we did not usually hang out with. We made some stronger friendships. It felt really good. We planted three trees and named them Skittles, RIP Mickey Mouse and Paw. We had to use shovels, an auger, and trees. The trees were cottonwoods. We did this so we can help our bosque. We also saved a live mouse. We were happy because our teacher got to help and she was in our group. Unfortunately, we also found a dead mouse and our chaperone got to take a picture. A lot of the tree starters varied from deep to like not even deep at all! Cottonwood trees are special because they can grow from a branch cut from another tree. They can live up to about 80 years old! Beavers like to eat young cottonwoods so the Open Space people use a metal fence around the trunk. This field trip was the best! It meant a lot to give back. We would love to come back!" (Gonzalez Contagious Intelligence)

"I will never forget that if you have a leaky faucet and do not know about it or just don't want to pay money to fix it, in a year over 86,000 gallons of water will be wasted." (Gomez Water Rush)

"A permeable surface means that water can soak into the top, such as grass or dirt. A impermeable surface means that water cannot soak into the top, such as a road or sidewalk. The problem with impermeable surfaces is that there is a lot more runoff from rain or water flowing down the streets." (Gomez River)

"When we learned about storm water we were surprised that just one storm can wash away all of our pollution into our watershed." (Rodriquez Africa)

"Wastewater comes from toilets, sinks, baths, showers, and drains. In Rio Rancho, this wastewater goes to a wastewater recycling plant where it is cleaned and put back into the aquifer. In order to be cleaned, people help the reclaimed water go through the plant." (Turrietta Galilei)

"When we went on the field trip we learned that the Rio Grande used to overflow. When it stoped, other plants took over like salt weed and tumble weeds. So when we planted the trees it helped. Our favorite part was planting them and feeling the accomplishment. Our whole group planted 10 TREES! We also learned that when a cottonwood tree branch falls in the mud it will sprout roots." (Yu Wonderwoman)

"The dust bowl impacted the people because it destroyed peoples farm and crops it was a time of depression and drought." (Shafer Storm)

Kidblog Partners

Due to staff transitioning at the start of the school year and other outside factors, we closed out the year with only two partner teachers who were actually set up on KidBlog and posting. One partner teacher was returning from the previous year and was able to post frequently without support. Two new partners were successfully trained over the phone in February, one of which did end up posting in late April. Detailed instructions for KidBlog were sent to all partner teachers who registered, however since none of them followed through it seems that over- the-phone training is the most effective way to ensure initial partner

success on the blog. We also plan to record a video training for partner teachers for next year to better assist them with integrated the blog in their classrooms.

Student Surveys

A key component of RiverXchange is it's measurable goals relating to student performance. We collected quantitative data on student performance by way of a pre and post survey and qualitative data by reading what students submitted on KidBlog. We also surveyed students about their actions before and after participating in RiverXchange.

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. Below, you will find a series of graphs used to illustrate the change in responses between the pre and post surveys. This year, 721 students completed the pre-survey, while 718 completed the post-survey. In order to account for this small 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. We continue to refine the survey and our programming year after year based on teacher feedback and metrics gathered from these surveys. We are also evaluating our metrics over the past six years to see how and if the results have been changing year to year. We have included a graph showing the changes for the behavior survey, at the end of Item 1. We expect to have more questions assessed by August 2019.

Item 1







Post-Test Percentages: How Often do you or your family do the following:

Percent Change of Positive Behavior Items: Pre to Post Tests



This graph illustrates an increase in positive behaviors after having received the RiverXchange presentations for the following behaviors: turning off the faucet when they brush their teeth, picking up their dog's poop, using a carwash service and spending less than 10 minutes in the shower. For many items we see an increase in positive behavior while also seeing a decrease in negative behaviors. For example, the question "How often do you pick up your dog's poop?", there is an increase in the response "Always or Very Often" while there is a decrease in the response "Never or Not Very Often." While these metrics are positive, we aim to have more significant positive findings in behavior metrics in future years.



Percent Change for Negative Behavior Items: Pre to Post Tests

This graph illustrates a decrease in negative behaviors after having received the RiverXchange presentations for all of the above listed behaviors except "Drop trash on the ground." It is likely that our students are unsure how to answer for the behaviors listed that may not feel applicable to them, for example, "How often do you wash chemicals or oil off your driveway into a gutter or storm drain?" For behaviors that are more specific to adults, it is more important to us that we capture students' understanding of the actions that are harmful to the watershed. As we revise our survey for next year, we will aim to make this behavior assessment more age appropriate for 5th grade students.

The following graphs show the percentage change between pre and post surveys on the behavior survey items since 2013. The graphs distinguish data for negative and positive behaviors. These graphs will be critical in our ongoing evaluation of the program.



We see an overall trend of positive change in many of the listed behaviors since 2013. The most notable and consistent change showing in students learning the importance of picking up their dog's poop. Inconsistencies can be due to a variety of reasons, including changes in presenters and personnel operating the program, and students may gauge their behavior differently at the end of the year, with what they've learned throughout the program. Seeing how we compare year to year in our metrics, allows us to identify

SOMETIMES Visit your local river

where we need to improve the learning outcomes for students. In 2015, we had an additional presentation for our participating classes which emphasized all positive behaviors. These graphs also emphasize for us the importance of training our presenters at the start of the program and emphasizing our teaching objectives with them throughout the school year.



The change in negative behaviors is not consistent over the years, though we do see the majority of items showing a positive change year to year.

Correct answers, where applicable have been noted with a yellow outline. Stars have been used to indicate where we are seeing large differences with positive outcomes.



Match the definitions for drinking water, stormwater and

Item 2

This graph does not demonstrate a significant change from pre to post. One possibility is that students are making educated guesses on the pre-survey and then are confident in their answer on the post-survey.





This graph demonstrates a 25% increase in correctly defining a watershed from the pre to post survey. Next year we intend to remove the option to answer "I don't know" in all survey questions as we have determined that we could better assess student knowledge without it. Students may choose "I don't know" in cases where they aren't confident of the answer though could guess the correct answer with a challenge to consider the question more thoroughly.

Item 4



How much precipitation does your city (Albuquerque or Rio

While we see a 16% increase in the correct answer here, we would like to see this metric improve next year. We adjusted the increments of the choices this year as well and added "less than 5 inches". It's likely that students who chose "less than 5 inches" thought the lesser precipitation reflected their home desert environment. We will plan to emphasize annual precipitation in the program next year. Also, we see again students opting for the "I don't know" choice rather than perhaps choosing their best guess.



Where does the Rio Grande River start and eventually end?



Nearly 30% more students could answer this correctly at the end of the program.

Item 6



When it rains, where does your community's stormwater go?

This graph demonstrates a small decrease in correctly defining the stormwater pathway. We are not exactly sure where the misunderstanding is stemming from, but it may be rooted in misinformation about a sewer

drain versus a stormwater drain. Next year we will ensure that teachers and presenters are clear about the difference between these drains and educate students on the distinctions. These results also support the need for a presenter workshop where we communicate with presenters the overall goal of RiverXchange in order to reinforce the collective goals and desired outcomes of our funders and in-kind sponsors.

Item 7

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



We see a significant increase (15-23%) in the understanding that stormwater can carry chemicals, fertilizers and dog poop into the river.

Item 8

How has water influenced human settlements and culture? Choose all answers that apply.



While students show a basic understanding of how water has influenced human settlements and culture at the time of the pre-survey, the post-survey shows an increase in overall understanding after students have been through the RiverXchange program.

Item 9



From what direct sources does Albuquerque get their drinking water?





From what direct sources does Rio Rancho get their drinking

In previous years, all students, whether from APS or RRPS, could select the "river" or "groundwater/aquifer (wells)" as the correct answer to this question. To be more accurate this year, we offered students a similar question for both cities (Albuquerque and Rio Rancho). We also included an option reflecting that Albuquerque receives its drinking water from a combination of the river (surface water) and the aquifer. We also think it's important for students to understand where each city gets their drinking water. And we do see a significant increase in the correct answer for both questions. Next year, we will use the same terminology to signify the aquifer, instead of using "groundwater" and "aquifer."



Which of these things use our precious, clean drinking water? Choose all answers that apply.



Item 12

In areas where there aren't sewer systems leading wastewater to a centralized treatment plant, where does the wastewater go?



It appears that this question is either confusing to read or the students aren't understanding the information from the program. It is likely that our APS students do not get exposed to septic systems as is covered in the

wastewater presentation for our RRPS students. While there is an increase in the correct answer in the post survey, the results also show a misunderstanding of wastewater through a similar percentage of students choosing several incorrect answers. We intend to address this more in the curriculum next year.

Item 13



What actions can all of us take to improve the health of our

We see a 13% increase in the understanding that planting native plants can improve the health of our ecosystem. This may show learning of the significance of permeability in a landscape and how it can contribute to water conservation and support the health of the local environment.

Item 14

All of the following are ways farmers can conserve water and/or prevent pollution EXCEPT...



Our new presentation this year focused on acequia culture and history and water conservation did not address all of these items. With similar prompts, "All of the following EXCEPT..." we are noticing students may be choosing ALL the actions that apply rather than the one action that DOES NOT apply. Next year we will switch the question to picking all of the actions that apply to see if that yields better results.

How does water affect living things in an ecosystem? Choose all answers that apply.



It appears that the answers to this prompt are intuitive for the majority of students from the beginning of the year. Though we do notice a greater increase in the understanding that humans can change their behavior and learn to conserve water.

Item 16

What are some of the ways that humans have changed river ecosystems? Choose all answers that apply.



Through learning local water issues, including the history of the Middle Rio Grande, and planting native trees in the Bosque, students gained a significant understanding of the main ways humans have changed river ecosystems.

Item 17



Does everyone have the right to use as much water as they

While this answer is obvious to the majority of students, it shows a strong interest in and care for water conservation from future stewards of our watershed.

Item 18



All of the following are actions we can all take to conserve water EXCEPT (Choose only one)...?

The results in this graph are likely due to students misreading the question and picking ALL the actions we can take to conserve water instead of only choosing one action that DOES NOT conserve water. Next year we will switch the question to picking all of the actions that conserve water to see if that yields better results.

Appendix 1 includes the extension activities from the RiverXchange curriculum, Appendix 2 includes photos.
Appendix 1 Extension Questions and Activities





Suggested Reading:

- ≻ Books:
 - *Follow the Water from Brook to Ocean* by Arthur Dorros
 - <u>Paddle-to-the-Sea</u> by Holling C. Holling
 - <u>One Well: The Story of Water on Earth (CitizenKid)</u> Strauss, Rochelle
- ➤ Articles:
 - Albuquerque Journal: <u>"As Bad as it Gets: Drought Returns to New Mexico."</u>
 - Albuquerque Journal: "Drought Affecting 99% of New Mexico."
- Watch:
 - Watch <u>Save Water Save Our Rio!</u>, 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

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

- \succ 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: <u>https://riverxchange.com/teachers2/curriculumpage/</u>



North American River Map

The urban water cycle

Sustainable

Unsustainable



Clean Ocean Foundation 2009 - www.cleanocean.org

RX 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" <u>http://www.cnn.com/2013/04/18/us/cnnheroes-pregracke-rivers-garbage</u>
 - 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): <u>http://sscafca.org/teacher-resources/</u>
- > 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 <u>The Ocean Cleanup</u> 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! <u>Interactive Topographic Watershed Map of Earth</u>

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: <u>https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf</u>





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 <u>http://www.abcwua.org/education/pdfs/WaterUse_Text.pdf</u>
 - About the San Juan Chama Project, ABQ Journal 2008: <u>https://riverxchange.files.wordpress.com/2015/08/san-juan-chama-project.p</u> <u>df</u>
 - **Santa Fe drinking water info**
 - Buckman Diversion, ABQ Journal 2010: <u>https://riverxchange.files.wordpress.com/2015/08/buckman-diversion.pdf</u>
 - **Santa Fe drinking water info**
 - Buckman Diversion, ABQ Journal 2010: <u>https://riverxchange.files.wordpress.com/2015/08/buckman-diversion.pdf</u>

Lesson Plan: The Water Project

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: <u>https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf</u>

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

 Want to add a project-based learning component to this exercise? Use these questions and activities to go along with your tour: <u>http://www.abcwua.org/education/educators_WSDcur2_quest.html</u>

- Show students the <u>Septic System poster</u> (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: <u>https://www.youtube.com/watch?v=Ldz29NqwK78</u> (An animation narrated by a young student)
- <u>https://www.youtube.com/watch?v=tuYB8nMFxQA</u> (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?
- \circ $\,$ What surprised you about the process of treating was tewater 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: <u>https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf</u>

RX 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" <u>http://www.abqjournal.com/221194/news/deal-allows-farmers-to-sell-irrigation-water.htm</u>
- National Geographic article, 2014. "Parched: A New Dust Bowl Forms in the Heartland"

http://news.nationalgeographic.com/news/2014/05/140516-dust-bowl-drought-okla homa-panhandle-food/ Explore more about the Dust Bowl: Check out the link below for an informative, interactive website developed by PBS. <u>http://www.pbs.org/kenburns/dustbowl/educators/overview/</u>

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

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=0&g rade=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: <u>https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf</u>

RX 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" <u>http://www.abqjournal.com/221194/news/deal-allows-farmers-to-sell-irrigation-water.htm</u>
- National Geographic article, 2014. "Parched: A New Dust Bowl Forms in the Heartland" <u>http://news.nationalgeographic.com/news/2014/05/140516-dust-bowl-drought-okla</u> <u>homa-panhandle-food/</u>

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 <u>*El Agua Es Vida*</u> lessons.

Lesson Plan: Prior Appropriation

➤ Using the <u>Prior Appropriation</u> 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: <u>https://riverxchange.files.wordpress.com/2018/09/riverxchange-curriculum-20181.pdf</u>





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 <u>River of Change</u> and discuss with your class the history of the Rio Grande River, the changes made to it's 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 <u>plant</u> and <u>animal cards</u> to do <u>The Web</u> 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

Field trips



Students from Colinas del Norte at the Sandoval County Landfill. (Left) Receiving a presentation on the green waste composting operation with Robert Sanchez. (Below) At the top of the landfill, getting a tour of how the landfill works and question and answer with Chris Perea.



Below is a selection of images from our planting field trips at Alamo Farm and Candelaria Open Space Preserve.









