2024 Annual Report

Reporting Period – July 1, 2023 – June 30, 2024

TABLE OF CONTENTS

National Pollutant Discharge Elimination System Stormwater Program

MS4 Annual Report Format

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

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

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

1. MS4(s) Information

Southern Sandoval County Flood Control Authority
Name of MS4

Andy | Edmondson | Facilities Operations Director
Name of Contact Person (First) (Last) (Title)

505.892.7246 | aedmondson@sscafca.com
Telephone (including area code) E-mail

1041 Commercial DR. SE
Mailing Address

Rio Rancho | NM | 87124
City State ZIP code

What size population does your MS4(s) serve? 109000 NPDES number

What is the reporting period for this report? (mm/dd/yyyy) From 2023-07-01 to 2024-06-30

2. Water Quality Priorities

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

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

Impaired Water	Impairment	Approved TMDL		TMDL assigns WLA to MS4	
Rio Grande, 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	☐ Yes	☑ No	☐ Yes	☑ No
Rio Grande, HUC 13020203	Gross Alpha	☐ Yes	☑ No	☐ Yes	☑ No

2. B. Continued

Impaired Water	Impairment	Approved TMDL		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 contributing to the impairment(s) are you targeting in your stormwater program?

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

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

3. Public Education and Public Participation

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

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

Pet Waste, floatables, illicit discharges

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

See outcomes report from the Middle Rio Grande Storm Water Quality Team

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

4. Construction

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

Erosion and sediment control requirements? ☑ Yes ☐ No

Other construction waste control requirements? ☑ Yes ☐ No

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

MS4 enforcement authority? ☑ Yes ☐ No

B. Do you have written procedures for:

Reviewing construction plans? ☑ Yes ☐ No

Performing inspections? ☑ Yes ☐ No

Responding to violations? ☑ Yes ☐ No

C. Identify the number of active construction sites ≥ 1 acre in operation in your jurisdiction at any time during the reporting period. 2

D. How many of the sites identified in 4.C did you inspect during this reporting period? 2

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

All SSSCAFCA-owned sites are inspected by SSCAFCA personnel at a minimum weekly. Qualified contractors inspect the sites per the individual SWPPP plans at each site.

F. Do you prioritize certain construction sites for more frequent inspections? ☐ 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		No Authority	☑
☐ Yes	Administrative fines		No Authority	☑
☐ Yes	Stop Work Orders		No Authority	☑
☐ Yes	Civil penalties		No Authority	☑
☐ Yes	Criminal actions		No Authority	☑
☐ Yes	Administrative orders		No Authority	☑
☑ Yes	Other	Contractual mechanisms		

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

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

No Violations noted. SSCAFCA has stop work authority on SSCAFCA-owned projects

J. How often do municipal employees receive training on the construction program? as needed

5. Illicit Discharge Elimination

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

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

C. Identify the number of outfalls in your storm sewer system. 8

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

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

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? 8

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

All SSCFACA owned facilities are inspected a minimum of once per year for a condition of facilities, assess control, and various other items.

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

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

J. During this reporting period, how many illicit discharges/illegal connections have you discovered? 3

K. Of those illicit discharges/illegal connections that have been discovered or reported, how many have been eliminated? 3

L. How often do municipal employees receive training on the illicit discharge program? As needed

6. Stormwater Management for Municipal Operations

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

All public parks, ball fields, other recreational facilities and other open spaces	☐ 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 maintenance activities	☐ Yes	☑ No
All municipal maintenance yards	☐ Yes	☑ No
All municipal waste handling and disposal areas	☐ Yes	☑ No

Other

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

C. If Yes, at what frequency are inspections conducted? N/A

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 cleaning of flood control facilities

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

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

Dams, Ponds, sediment control facilities

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

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

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

All technical staff are encouraged to training on storm water management.

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

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

Site plan reviews for stormwater/water quality of all new and re-development projects?	☑ Yes	☐ No
Long-term operation and maintenance of stormwater management controls?	☑ Yes	☐ No
Retrofitting to incorporate long-term stormwater management controls?	☑ Yes	☐ No

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

For all SSCAFCA owned projects, all site plan reviews.

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.

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

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

Flow volumes	☐ Yes	☑ No
Peak discharge rates	☑ Yes	☐ No
Discharge frequency	☐ Yes	☑ No
Flow duration	☐ Yes	☑ No

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

https://www.sscafca.org/resources/watershed-management-plans/

G. How many development and redevelopment project plans were reviewed during the reporting period to assess impacts to water quality and receiving stream protection? 29

H. How many of the plans identified in 7.G were approved? 19

I. How many privately owned permanent stormwater management practices/facilities were inspected during the reporting period? 0

J. How many of the practices/facilities identified in I were found to have inadequate maintenance? 0

K. How long do you give operators to remedy any operation and maintenance deficiencies identified during inspections? N/A

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

M. How many formal enforcement actions (i.e., more than a verbal or written warning) were taken for failure to adequately operate and/or maintain stormwater management practices? 0

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

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

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

8. Program Resources

A. What was the annual expenditure to implement MS4 permit requirements this reporting period? 105,000

B. What is next year's budget for implementing the requirements of your MS4 NPDES permit? 125,000

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

Source:	property tax mill	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)? 1

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

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
Example: 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, annually	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, I.D, and III.B. If providing clarification to any of the questions above, please provide the question number (e.g., 2C) in your response.

Certification Statement and Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. ☐ Yes ☐ No

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

Signature | Name of Certifying Official, Title | Date (mm/dd/yyyy)

SSCAFCA Facility listing and tasks completed 2023- 2024

Facility ID	Watershed	Faclity Name	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Structural/Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Access Control	Bank Restoration
BA_F0016	La Barranca	Campus Dam aka Upper SLO Dam	X		X	X	X	X	X	X
BL_F0013	Black Arroyo	Sunset Pond & Aldaba Storm Drain	X		X		X	X	X	X
BL_F0026	Black Arroyo	Montego court	X		X		X	X	X	X
BL_F0040	Black Arroyo	Athens Court	X				X	X		X
MO_F0017	Montoyas	Lomitas Negras Phase 1	X	X	X	X	X	X	X	X
MO_F0064	Montoyas	Tin Cup Pond	X		X		X	X	X	
MO_F0078	Montoyas	Tierra De Corrales Pond	X		X		X	X	X	
VE_F0010	Venada	Enchanted Hills Dam	X	X	X	X	X	X	X	X
VE_F0013	Venada	Santiago Channel	X	X	X	X	X	X	X	X
BL_F0034	Black Arroyo	Spur Channel		X	X	X	X	X	X	X
BL_F0035	Black Arroyo	Lisbon Channel (Tulip to Tarpon)	X	X	X	X	X	X	X	X
CW_F0010	Corrales	Upper Tree Farm Pond	X	X	X	X	X	X	X	X
MO_F0021	Montoyas	Lower MO water quality facility	X	X	X	X	X	X	X	X
VE_F0024	Venada	Encantado Channel North		X		X		X	X	X
BL_F0002	Black Arroyo	Sunset Channel	X		X		X	X	X	X
BL_F0003	Black Arroyo	Gateway Pond	X		X	X	X	X	X	X
BL_F0004	Black Arroyo	Tract 17 Pond	X		X	X	X	X	X	X
BL_F0006	Black Arroyo	Sugar Channel	X		X		X	X		X

X = activity authorized by LOP
Highligted = activity completed this reporting year

Facility ID	Watershed	Faclity Name	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Structural/Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Access Control	Bank Restoration
BL_F0008	Black Arroyo	East Branch Cabezon Channel		X		X	X	X	X	
BL_F0009	Black Arroyo	Trevino Channel (Golf Course to Nicklaus Park)	X		X		X	X		X
BL_F0014	Black Arroyo	Ivory Channel	X	X		X	X	X		X
BL_F0014	Black Arroyo	Ivory Channel	X	X		X	X	X	X	X
BL_F0015	Black Arroyo	Stallion Channel (powerline easement to Western Hills)	X		X		X	X	X	
BL_F0020	Black Arroyo	West Nicklaus Channel (Bogie to Lema)	X		X		X	X		X
BL_F0020	Black Arroyo	West Nicklaus Channel (Bogie to Lema)	X		X		X	X		X
BL_F0022	Black Arroyo	West Nicklaus Channel (Fairway to Casper)	X		X		X	X		X
BL_F0022	Black Arroyo	West Nicklaus Channel (Fairway to Casper)	X		X		X	X		X
BL_F0023	Black Arroyo	Black Arroyo Water Quality Pond	X		X		X	X		
BL_F0029	Black Arroyo	Arkansas Channel	X		X	X	X	X	X	
BL_F0030	Black Arroyo	Rodeo Channel	X		X		X	X		X
BL_F0031	Black Arroyo	Pecos Channel	X		X		X	X		X
BL_F0031	Black Arroyo	Pecos Channel	X	X	X	X	X	X	X	X
BL_F0032	Black Arroyo	Baltic Channel	X		X		X	X		X
BL_F0033	Black Arroyo	Bali Channel	X		X		X	X		X
BL_F0036	Black Arroyo	Lisbon Channel (Tarpoon to Southern)	X		X		X	X	X	X
BL_F0037	Black Arroyo	Lisbon Channel (Southern to Black Arroyo Trail Bridge)	X		X		X	X	X	X

X = activity authorized by LOP
Highligted = activity completed this reporting year

Facility ID	Watershed	Faclity Name	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Structural/Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Access Control	Bank Restoration
BL_F0038	Black Arroyo	Black Arroyo Wildlife Park			X		X	X	X	X
BL_F0039	Black Arroyo	Landing Trail Pond	X		X		X	X	X	X
CA_F0008	Callabacillas	Redwood Pond	X		X		X	X	X	X
CA_F0010	Calabacillas Arroyo	Calabacillas Arroyo Northern to Southern	X		X		X	X	X	X
CA_F0013	Callabacillas	Cholla Pond							X	
CO_F0002	Coronado	Bosque de Bernalillo Water Quality Facility	X		X		X	X	X	X
CO_F0005	Coronado	Joiner Pond Unit 20 Industrial Park		X	X	X	X	X	X	
CW_F0009	Corrales	Lower Tree Farm Pond	X		X		X	X	X	
CW_F0011	Corrales	Urban Pond - Stephanie Rd	X		X		X	X	X	
CW_F0013	Corrales	lower urban pond	X		X		X	X	X	
MO_F0002	Montoyas	Sportsplex Dam	X		X	X	X	X	X	
MO_F0010	Montoyas	Lomitas Negras Phase 2	X	X	X	X	X	X	X	X
MO_F0012	Montoyas	Harvey Jones Channel Corrales Rd to River	X	X	X	X	X	X	X	
MO_F0015	Montoyas	Corrales Heights Dam	X	X	X	X	X	X	X	X
MO_F0029	Montoyas	Lower MO Water Quality Facility to NM 528	X		X		X	X	X	X
MO_F0037	Montoyas	Dulcelina Curtis Channel		X		X	X	X	X	
MO_F0040	Montoyas	Harvey Jones Channel Inlet to Corrales Rd		X		X		X	X	X
MO_F0041	Montoyas	Sierra Norte Channel North Hills	X	X	X	X	X	X	X	X

X = activity authorized by LOP
Highligted = activity completed this reporting year

Facility ID	Watershed	Faclity Name	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Structural/Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Access Control	Bank Restoration
MO_F0042	Montoyas	Acadia Court Pond	X		X	X	X	X	X	
MO_F0043	Montoyas	Loma Pinon Loop Pond	X		X	X	X	X	X	
MO_F0045	Montoyas	Sundt Pond	X		X		X	X	X	
MO_F0046	Montoyas	Pam's Pond	X		X		X	X	X	
MO_F0047	Montoyas	Pond 116	X		X		X	X	X	X
MO_F0048	Montoyas	Cielo Norte Pond and Outfall Michelle Dr Pond	X		X	X	X	X	X	X
MO_F0049	Montoyas	Wilpett Pond 1 Northern Meadows	X		X		X	X	X	
MO_F0050	Montoyas	Wilpett Pond 2 Northern Meadows	X		X	X	X	X	X	
MO_F0051	Montoyas	Wilpett Pond 3 Northern Meadows	X		X		X	X	X	
MO_F0052	Montoyas	Wilpett Pond 4 Northern Meadows	X		X		X	X	X	
MO_F0053	Montoyas	Wilpett Pond 5 Northern Meadows	X		X		X	X	X	
MO_F0055	Montoyas	Clear Creek Pond Northern Meadows	X		X	X	X	X	X	
MO_F0056	Montoyas	Desert Willow Pond Northern Meadows	X		X		X	X	X	
MO_F0057	Montoyas	Flat Iron Pond Northern Meadows	X		X		X	X	X	
MO_F0057	Montoyas	Flat Iron Pond Northern Meadows	X		X		X	X	X	
MO_F0058	Montoyas	Havasua Falls Pond Northern Meadows	X		X		X	X	X	
MO_F0058	Montoyas	Havasua Falls Pond Northern Meadows	X		X		X	X	X	
MO_F0060	Montoyas	Sunny Meadows Pond	X		X		X	X	X	

X = activity authorized by LOP
Highligted = activity completed this reporting year

Facility ID	Watershed	Facility Name	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Structural/Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Access Control	Bank Restoration
MO_F0060	Montoyas	Sunny Meadows Pond	X		X		X	X	X	
MO_F0062	Montoyas	King Blvd Pond Northern Meadows	X		X		X	X	X	
MO_F0063	Montoyas	Marlow Meadows Pond	X		X		X	X	X	X
MO_F0065	Montoyas	Paseo Vista Pond	X		X		X	X	X	
MO_F0068	Montoyas	Sierra Norte Park	X		X	X	X	X	X	X
MO_F0069	Montoyas	Zia Pond		X	X	X	X	X	X	
MO_F0071	Walter Road Pond	Walter Road Pond	X		X		X	X	X	
MO_F0072	Montoyas	26th Ave Pond	X		X		X	X	X	
MO_F0072	Montoyas	26th Ave Pond	X		X		X	X	X	X
MO_F0073	Montoyas	25th Ave Pond	X		X		X	X	X	
MO_F0074	Montoyas	Inca Pond	X		X		X	X	X	
MO_F0075	Montoyas	Serene Pond	X		X	X	X	X	X	
MO_F0076	Montoyas	Rio Oso Pond	X		X		X	X	X	
MO_F0079	Montoyas	Copperton Pond	X		X		X	X	X	
MO_F0080	Montoyas	Angel Pond	X		X		X	X	X	
MO_F0081	Montoyas	Jade Pond	X		X		X	X	X	
NM_F0003	NM 528	Roskos Field Pond	X	X	X	X	X	X		
RA_F0001	Rainbow	Rainbow Pond	X		X	X	X	X	X	X

X = activity authorized by LOP
Highligted = activity completed this reporting year

Facility ID	Watershed	Faclity Name	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Structural/Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Access Control	Bank Restoration
RA_F0001	Rainbow	Rainbow Pond	X		X	X	X	X	X	X
RA_F0002	Rainbow	Rainbow Channel (Vancouver to Pecos Loop)	X		X	X	X	X	X	X
VE_F0026	Venada	Santa Fe Hills Pond	X		X		X	X	X	
VE_F0027	Venada	Sprint Pond	X		X		X	X	X	

X = activity authorized by LOP
Highligted = activity completed this reporting year

2023-2024 SSCAFCA Sediment Removal (CY)

Facility ID	Faclity Name	Removed (2024)
BA_F0016	Campus Dam aka Upper SLO Dam	100
BL_F0013	Sunset Pond & Aldaba Storm Drain	80
BL_F0026	Montego court	10
BL_F0040	Athens Court	20
MO_F0078	Tierra De Corrales Pond	90
VE_F0010	Enchanted Hills Dam	3000
VE_F0013	Santiago Channel	50
BL_F0034	Spur Channel	70
CW_F0010	Upper Tree Farm Pond	250
VE_F0024	Encantado Channel North	2400
	Total CY Removed	**6070**

Trash and IDDE removal report:

During the 2024 reporting year, 663 30-gallon trash bags worth of trash were removed from SSCAFCA-owned or operated facilities. This volume is Higher than in previous years. Although the monsoon season has been limited resulting in less runoff to our facilities, there was an increase in the number of trash and debris from homeless individuals living in SSCAFCA arroyos.

Facility ID	Faclity Name	Estimated Bags Removed (30 Gallon)
BL_F0003	Gateway Pond	2
BL_F0004	Tract 17 Pond	75 [1]
BL_F0009	Trevino Channel (Golf Course to Nicklaus Park)	1
BL_F0015	Stallion Channel (powerline easement to Western Hills)	121 [1]
BL_F0022	West Nicklaus Channel (Fairway to Casper)	1
BL_F0023	Black Arroyo Water Quality Pond	14
BL_F0034	Spur Channel	24 [2]
BL_F0036	Lisbon Channel (Tarpoon to Southern)	1
BL_F0037	Lisbon Channel (Southern to Black Arroyo Trail Bridge)	216 [1]
BL_F0038	Black Arroyo Wildlife Park	1
CA_F0010	Calabacillas Arroyo Northern to Southern	1
MO_F0002	Sportsplex Dam	1
MO_F0037	Dulcelina Curtis Channel	1
MO_F0041	Sierra Norte Channel North Hills	2
MO_F0048	Cielo Norte Pond and Outfall Michelle Dr Pond	1
MO_F0057	Flat Iron Pond Northern Meadows	1
MO_F0058	Havasua Falls Pond Northern Meadows	1
MO_F0060	Sunny Meadows Pond	1
NM_F0003	Roskos Field Pond	5
RA_F0002	Rainbow Channel (Vancouver to Pecos Loop)	44 [3]
VE_F0010	Enchanted Hills Dam	144 [1]
VE_F0024	Encantado Channel North	5
	Total	**663**

[1] Trash removed by trailer load - 72 bags/trailer

[2] Matress and Box springs -12 bags for queen size box or mattress

[3] Misc. Household items - furniture, toys

SSCAFCA 2023-2024 Dog Waste Removals (LBS)

Date:	TFP A	Sportsplex	Lisbon	Black Arroyo Trail
7/5/2023	5	9	2	6
7/12/2023	5	10	1	7
7/19/2023	5	12	2	7
7/26/2023	7	10	1	4
8/2/2023	4	12	2	13
8/9/2023	4	9	1	6
8/16/2023	3	10	1	4
8/23/2023	3	9	1	8
8/30/2023	5	7	2	5
9/6/2023	9	12	2	8
9/13/2023	5	8	2	6
9/20/2023	8	10	1	3
9/27/2023	6	9	2	5
10/4/2023	5	11	1	7
10/11/2023	4	7	2	6
10/18/2023	7	12	1	3
10/25/2023	3	7	1	4
11/1/2023	3	11	2	8
11/8/2023	7	10	1	4
11/15/2023	6	8	2	5
11/22/2023	8	11	2	7
11/29/2023	5	9	4	7
12/6/2023	5	8	2	7
12/13/2023	3	5	3	6
12/20/2023	8	6	2	4
1/10/2024	14	16	5	10
1/17/2024	10	7	2	8
1/24/2024	5	7	2	6
1/31/2024	11	8	3	7
2/7/2024	5	6	1	7
2/14/2024	10	6	2	4
2/21/2024	10	9	2	7
2/28/2024	8	6	2	5
3/6/2024	5	12	1	9
3/13/2024	6	9	3	4
3/20/2024	8	6	2	7
3/27/2024	8	6	2	4
4/3/2024	11	9	2	8
4/10/2024	3	5	2	4
4/17/2024	4	6	2	5
4/24/2024	9	5	3	4
5/1/2024	12	10	2	9
5/8/2024	10	8	1	6

SSCAFCA 2023-2024 Dog Waste Removals (LBS)

Date:	TFP A	Sportsplex	Lisbon	Black Arroyo Trail
5/15/2024	4	5	1	5
5/22/2024	8	6	2	5
5/29/2024	3	6	1	4
6/5/2024	5	6	1	5
6/12/2024	6	9	1	5
6/19/2024	3	8	2	4
6/26/2024	8	10	2	7
Totals	**319**	**423**	**92**	**299**
Total Removed all Channels				**1133**

23-24 OUTREACH

July, 2023 - Arroyo Awareness Month

July 6, - Arroyo Awareness Month – Town of Bernalillo Council Meeting

July 11 – Arroyo Awareness Month – Ivory Channel Ribbon Cutting

July 13 – Arroyo Awareness Month – Mariposa Neighborhood Association Meeting

July 26 – Arroyo Awareness Month – Alegria Neighborhood Association Meeting

July 26 – Arroyo Awareness Month – Sandoval County Commission Meeting

August 30th – Sandoval County Master Gardner's Tour of Harvey Jones

September 14 – Community Center Field Trip to Harvey Jones

October 21 – Rio Rancho Fall Festival

November 7 – Field Trip for New Mexico Flood Plain Mangers to various facilities

December 13 – Cleveland High School Presentation

March 5 – Tour of the Harvey Jones for LWCS

May 10 – Interview with Environmental Journalist Nik Kowsar

May 8 – RRHS Presentation

May 16 – Lomitas Negras Field Trip for City of Santa Fe Parks and Rec

On-Going/Year Long- Social Media Posts

Arroyo Classroom

1st quarter report 2023-2024

July - September

Submitted by:
Education Manager, Erin Blaz
Education Coordinator, Theresa Aragon

The Arroyo Classroom Team: Erin Blaz, Theresa Aragon, Astrid Mooney

Participating Schools:

	SCHOOL	**Number of classes**	**Number of Students**
Title I*	Enchanted Hills Elem.	5	101
	Martin Luther King Elem.*	5	110
	Sandia Vista Elem.	6	118
	Maggie Cordova Elem.*	5	89
	Cielo Azul Elem.*	5	107
	Puesta del Sol Elem.*	5	106
	Colinas del Norte*	4	84
	TOTALS	**35**	**715**

Task 1: Recruit and select classes.
Complete by August 2023. **Status: completed.**

Recruitment went quite smoothly this year. With many of our returning schools experiencing a lot of changes with new teachers joining their teams, we anticipated the need to recruit new schools to join the program. Fortunately, the lead teachers from several schools who were enlisted in the program in the past, not only began requesting an early application process, but they were eager to implement Arroyo Classroom with their new teachers. They proactively discussed the commitment of the program with the new staff to ensure the entire 3rd grade cohort was accepted into the program. As a result, all 7 schools from FY23 returned to Arroyo Classroom and out of the 35 teachers, 13 were new to the program. In total, Arroyo Classroom engaged 35 classes with 715 students.

Task 2: Review and revise evaluation and curriculum.
Complete by August 2023. **Status: completed.**

We have revised our pre and post surveys which aim to gather data around student growth and understanding about arroyo safety, the animals and plants who call the arroyos home, watershed health, environmental stewardship and concerns for our local stormwater.

Task 3: Coordinate classroom guest speakers.
Begin September 2023. On-going through January 2024. **Status: in process.**

All presentations have been fully scheduled through a streamlined process which allowed the teachers to schedule all 4 presentations through a shared document with our presenters. This improved scheduling process greatly reduced the amount of coordination time between the teachers and presenters which also allowed for real time communication when adjustments were needed in the schedule.

This year, through a necessary update to the compensation rate, we were able to retain Hawks Aloft as our only outside contractor for the program. Hawks Aloft is a great partner for this presentation as they have a team of educators and a variety of birds for the presentation.

Theresa Aragon, a biologist and educator with Ciudad SWCD, continued to offer a hands-on engagement presentation with Reptiles and Arthropods.

The Arroyo Walk Field trip will continue to be presented by Erin Blaz with Ciudad SWCD and the Watershed presentation will be offered by both Erin Blaz and Theresa Aragon.

Last year, weather was a factor in the amount of reschedules for the Arroyo Walk. The earlier than anticipated winter weather changes compelled the Ciudad education team to provide a more flexible coordination process to accommodate the unpredictable inclement weather we experienced for the walks. To accomplish this and to ease the scheduling for both the teachers and the presenters, we utilized a shared Google Sheet to allow real-time changes to be made which was especially beneficial for our bird presenter, Hawks Aloft.

The changing climate was also the driving factor in aiming to have the Reptile/Arthropod presentations completed by the second week of October to allow ample time for the animals to safely prepare and enter brumation before the fist freeze. For these reasons, the Arroyo Walks and Reptile/Arthropod presentations have been scheduled in the fall and we will continue to evaluate if this change has other benefits to the order of presentations such as tying in what wildlife students will see on their walk and how that relates to the animals brought into their classroom.

Task 4: Distribute Pre Surveys
Begin August 2023. **Status: completed.**

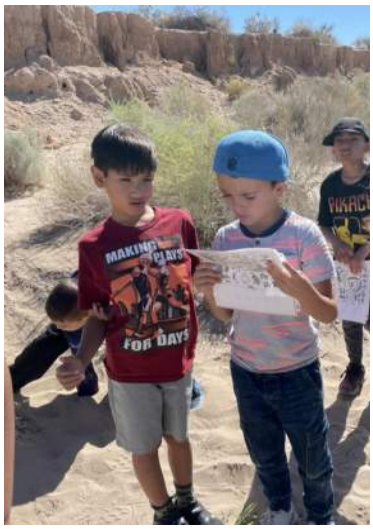
Pre-surveys were distributed earlier in the school year than usual due to an earlier program start date. A total of 480 pre-surveys were completed before the program started.

Task 5: Deliver Program
Begin August 2023. **Status: in progress.**

To accommodate reptile brumation and weather concerns, the Arroyo Classroom presentations were scheduled to start in late September and to be completed mid-October.

During the first quarter the following presentations were completed:
Arroyo Walk: 12/35
Reptiles: 21/35
Birds: 0/35
Watershed: 0/35






Pictures of Arroyo Walk with Maggie Cordova Students

Task 5: Distribute Post Surveys
Complete by March 2024. **Status: approaching.**

Collect and analyze teacher feedback.
Complete by March 2024. **Status: approaching.**

Staff will revise teacher feedback form and submit to teachers at the end of the program.

Task 5: Reporting to sponsors.

Midyear report by January 31, 2024.
Final report by June 1, 2024.

Arroyo Classroom

2nd quarter report 2023-2024

October- December

Submitted by:
Education Manager, Erin Blaz
Education Coordinator, Theresa Aragon

The Arroyo Classroom Team: Erin Blaz, Theresa Aragon, Astrid Mooney

Participating Schools:

	SCHOOL	**Number of classes**	**Number of Students**
Title I*	Enchanted Hills Elem.	5	101
	Martin Luther King Elem.*	5	110
	Sandia Vista Elem.	6	118
	Maggie Cordova Elem.*	5	89
	Cielo Azul Elem.*	5	107
	Puesta del Sol Elem.*	5	106
	Colinas del Norte*	4	84
	TOTALS	**35**	**715**

Task 1: Recruit and select classes.
Complete by August 2023. **Status: completed.**

Recruitment went quite smoothly this year. With many of our returning schools experiencing a lot of changes with new teachers joining their teams, we anticipated the need to recruit new schools to join the program. Fortunately, the lead teachers from several schools who were enrolled in the program in the past, not only began requesting an early application process, but they were eager to implement Arroyo Classroom with their new teachers. They proactively discussed the commitment of the program with the new staff to ensure the entire 3rd grade cohort was accepted into the program. As a result, all 7 schools from FY23 returned to Arroyo Classroom and out of the 35 teachers, 13 were new to the program. In total, Arroyo Classroom enrolled 35 classes with 715 students.

Task 2: Review and revise evaluation and curriculum.
Complete by August 2023. **Status: in progress**

We have revised our pre and post surveys which aim to gather data around student growth and understanding about arroyo safety, the animals and plants who call the arroyos home, watershed health, environmental stewardship and concerns for our local stormwater. This year Ciudad SWCD is able to make curriculum updates with an earlier end date for the program. Revisions began at the end of December 2023.

Task 3: Coordinate classroom guest speakers.
Begin August 2023. On-going through January 2024. **Status: Completed.**

All presentations were scheduled through a streamlined process which allowed the teachers to schedule all 4 presentations through a shared document with our presenters. This improved scheduling process greatly reduced the amount of coordination time between the teachers and presenters which also allowed for real time communication when adjustments were needed in the schedule.

Task 4: Distribute Pre Surveys
Begin August 2023. **Status: completed.**

Pre-surveys were distributed earlier in the school year than usual due to an earlier program start date. A total of 480 pre-surveys were completed before the program started.

Task 5: Deliver Program
Begin August 2023. **Status: in progress.**

All the Reptile, Arroyo Walk and Bird presentations were completed as scheduled by December 1st. The remaining Watershed presentations are scheduled to be completed by the end of January.

During the first quarter the following presentations were completed:
Arroyo Walk: 12/35
Reptiles: 35/35
Birds: 10/35
Watershed: 0/35

During the second quarter the following presentations were completed:
Arroyo Walk: 35/35
Reptiles: 35/35
Birds: 35/35
Watershed: 25/35

Task 5: Distribute Post Surveys
Complete by March 2024. **Status: In Progress.**

To increase participation, the post surveys were distributed to schools once they received all of their presentations, rather than all the schools receiving the survey at the same time. The final Post Survey will be distributed following the last watershed presentation January 24th.

As of December 20th, prior to winter break, 134 post surveys (8:35 classes) were completed and 25:35 classes received the surveys to complete. There was a delay in survey completion by one school due to internal security with the form.

As an incentive to complete the survey and to encourage feedback for the program, a certificate of completion of the program was offered to the classes during their last presentation. The certificate of recognition will be distributed once surveys have been completed.

Collect and analyze teacher feedback.
Complete by March 2024. **Status: approaching.**

Staff will revise teacher feedback form and submit to teachers at the end of the program.

Task 5: Reporting to sponsors.

Midyear report by January 31, 2024.
Final report by June 1, 2024.

Arroyo Classroom

3rd quarter report 2023-2024

January- March

Submitted by:
Education Manager, Erin Blaz
Education Coordinator, Theresa Aragon

Participating Schools:

	SCHOOL	**Number of classes**	**Number of Students**
Title I*	Enchanted Hills Elem.	5	101
	Martin Luther King Elem.*	5	110
	Sandia Vista Elem.	6	118
	Maggie Cordova Elem.*	5	89
	Cielo Azul Elem.*	5	107
	Puesta del Sol Elem.*	5	106
	Colinas del Norte*	4	84
	TOTALS	**35**	**715**

Arroyo Classroom

3rd quarter report 2023-2024

January- March

Submitted by:
Education Manager, Erin Blaz
Education Coordinator, Theresa Aragon

Task 1: Recruit and select classes.
Complete by August 2023. **Status: completed.**

Recruitment went quite smoothly this year. With many of our returning schools experiencing a lot of changes with new teachers joining their teams, we anticipated the need to recruit new schools to join the program. Fortunately, the lead teachers from several schools who were enrolled in the program in the past, not only began requesting an early application process, but they were eager to implement Arroyo Classroom with their new teachers. They proactively discussed the commitment of the program with the new staff to ensure the entire 3rd grade cohort was accepted into the program. As a result, all 7 schools from FY23 returned to Arroyo Classroom and out of the 35 teachers, 13 were new to the program. In total, Arroyo Classroom enrolled 35 classes with 715 students.

Task 2: Review and revise evaluation and curriculum.
Complete by August 2023. **Status: Completed.**

We have revised our pre and post surveys which aim to gather data around student growth and understanding about arroyo safety, the animals and plants who call the arroyos home, watershed health, environmental stewardship and concerns for our local stormwater. This year Ciudad SWCD is able to make curriculum updates with an earlier end date for the program. Revisions began at the end of December 2023.

Task 3: Coordinate classroom guest speakers.
Begin August 2023. On-going through January 2024. **Status: Completed.**

All presentations were scheduled through a streamlined process which allowed the teachers to schedule all 4 presentations through a shared document with our presenters. This improved scheduling process greatly reduced the amount of coordination time between the teachers and presenters which also allowed for real time communication when adjustments were needed in the schedule.

Task 4: Distribute Pre Surveys
Begin August 2023. **Status: completed.**

Arroyo Classroom

3rd quarter report 2023-2024

January- March

Submitted by:
Education Manager, Erin Blaz
Education Coordinator, Theresa Aragon

Pre-surveys were distributed earlier in the school year than usual due to an earlier program start date. A total of 480 pre-surveys were completed before the program started.

Task 5: Deliver Program
Begin August 2023. **Status: in progress.**

All the Reptile, Arroyo Walk and Bird presentations were completed as scheduled by December 1st. The Watershed presentations were completed in January.

During the first quarter the following presentations were completed:
Arroyo Walk: 12/35
Reptiles: 35/35
Birds: 10/35
Watershed: 0/35

During the second quarter the following presentations were completed:
Arroyo Walk: 35/35
Reptiles: 35/35
Birds: 35/35
Watershed: 25/35

During the third quarter the following presentations were completed:
Arroyo Walk: 35/35
Reptiles: 35/35
Birds: 35/35
Watershed: 35/35

Task 5: Distribute Post Surveys
Complete by March 2024. **Status: Complete.**

The final Post Survey was distributed following the last watershed presentation on January 24th.

As an incentive to complete the survey and to encourage feedback for the program, a certificate of completion of the program was offered to the classes during their last presentation.

Arroyo Classroom

3rd quarter report 2023-2024

January- March

Submitted by:
Education Manager, Erin Blaz
Education Coordinator, Theresa Aragon

After reminders and encouragement to the teachers to complete the post-survey, in total, 421 post surveys (24:35 classes) were completed.

The certificate of recognition will be distributed in May.

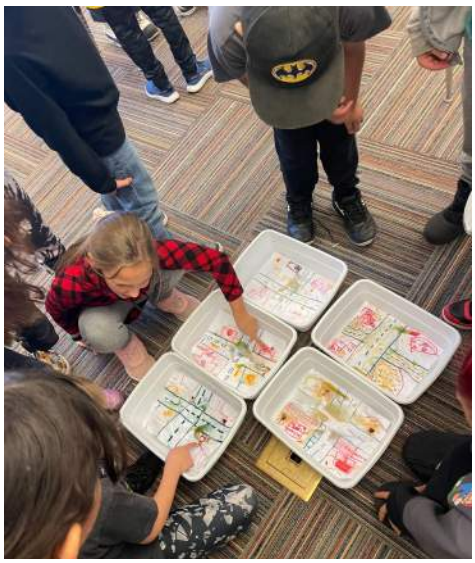
Collect and analyze teacher feedback.
Complete by March 2024. **Status: In Progress.**

Staff is reanalyzing the data to ensure a meaningful and effective feedback form is requested of the teachers. This new feedback form will be sent to the teachers in May.

Task 5: Reporting to sponsors.

Midyear report by January 31, 2024.
Final report by June 1, 2024.

Below: Students make observations about what happened to their urban watershed after it rains and talk about what actions they can take to protect it during the watershed presentation.



Ciudad Soil and Water Conservation District
100 Sun Ave NE Room 160
Albuquerque, NM 87109
505-510-3478

Watershed Stewards

1st Quarter Report
July-September 2023-2024
Submitted by Erin Blaz

Ciudad SWCDs agreement this year with SSCAFCA is to provide two tracks of educational programs. Track 1 provides programs focused on engaging SSCAFCA constituents in the Albuquerque Backyard Refuge program through a series of up to 12 classes. Track 2 provides six individual presentations to SSCAFCA constituents on environmental topics that range from wildlife to water conservation and field trips to sites of interest within the watershed. In order to support this programming, the agreement with SSCAFCA also allows Ciudad SWCD to contract with the Friends of Valle De Oro Refuge to provide coordination and presentations on the Backyard Refuge program and relevant educational topics. This agreement with Friends of Valle de Oro was executed on August 21, 2023 and Laurel Ladwig, the Albuquerque Backyard Refuge Program (ABRP) director joined our planning team shortly after.

During the month of August, Ciudad SWCD scheduled a field trip to tour the Harvey Jones Project with Meadowlark Senior Center for September 14. On the day of the event 8 participants joined Dave Gatterman of SSCAFCA and Cameron Weber of Rio Grande Return at the Harvey Jones project for an informative tour. Participants noted excitement for the project and many of them had never heard of the project or been to the area before. During this event, we also promoted the Jumpstart Your Backyard Refuge series.

The Jumpstart Your Backyard Refuge series was planned in late August and September by the planning team - Laurel Ladwig (ABRP), Erin Blaz and Theresa Aragon (Ciudad SWCD). We shared our series framework with Dyane Sonier, Resource Development Manager of the City of Rio Rancho, who suggested we offer the program through the City of Rio Rancho Library system to attract a larger audience. Dyane has also offered Backyard Refuge program educational presentations to the City of Rio Rancho and so Ciudad SWCD is working to collaborate with Dyane and the Keep Rio Rancho Beautiful program to maximize impact and engagement with our target audiences - adults and seniors in SSCAFCA boundaries.

During September, our planning team scheduled 4 classes with Esther Bone Library and confirmed Cameron Weber, of Rio Grande Return, and Mario Nuño-Whelan, of Pland Collaborative, to present as subject matter experts on establishing plants and rainwater harvesting, respectively. A promotional flyer was created in early September and posted at the library and through various facebook groups through our connections with the Master Gardeners who oversee the WaterWise Garden, which is adjacent to Ester Bone and will be used in the ‘Jumpstart’ series.

Harvey Jones Project photos, Sept 14, 2023 (above), Promotional Flyer (below)

Ciudad Soil and Water Conservation District
100 Sun Ave NE Room 160
Albuquerque, NM 87109
505-510-3478

Watershed Stewards

2nd Quarter Report
October-December 2023-2024

During the second quarter, Ciudad SWCD and Albuquerque Backyard Refuge Program, delivered a 4-class series entitled Jumpstart Your Backyard Refuge. These classes were held at the Esther Bone Library, 950 Pinetree Rd SE, Rio Rancho, NM 87124, and included time in the Rio Rancho WaterWise Garden (WWG) next door.

The series encouraged attendees to attend all classes with a prize on the last day, which was Judith Phillips' book, *Growing the Southwest Garden.* However, some attendees joined only for one or two classes. Four of the consistent attendees were SandCo Master Gardeners. Keep Rio Rancho Beautiful staff, Nick Dahl and Frank Chavez, also attended each class under the direction of Dyane Sonier from City of Rio Rancho, who also attended the first class. A feedback survey was distributed to all participants, but only 3 responded. Feedback was very positive of those 3, 2 of whom asked for more advanced topics, 1 said the rainwater harvesting was particularly interesting and wanted more information, and 2 stated they would certify their yard as a Backyard Refuge. To date, 2 participants did certify their yards with the Albuquerque Backyard Refuge program .

A description of the class topics and attendee numbers follows:

Oct 17 Class 1: Introduction with Laurel Ladwig - 14 attendees

- WHY to share your space with wildlife
- Overview of the Backyard Refuge program: certification levels, stewardship, resources
- Citizen Science: learning iNaturalist to identify plants/animals and contribute to local data

Oct 24 Class 2: Plant selection and care with Laurel Ladwig and Cameron Weber - 12 attendees

- Pesticide/herbicide/fertilizer alternatives
- Native plants and their specific functions for wildlife (forage, habitat)
- Planting demonstration- planting of 3 native species in Waterwise Garden

Partner Support: Coordination with SandCo Master Gardeners for planting locations in WWG

Oct 31 Class 3: Watering your BYR with Mario Nuño-Whelan, Landscape Architect and Laurel Ladwig - 12 attendees

- Planting the Rain Presentation on residential rainwater harvesting

Nov 14 Class 4: Planning your Backyard Refuge with Laurel Ladwig and Cameron Weber - 14 attendees

- Backyard Refuge Resources
- Wildlife Friendly Yard management
- Celebration & food

Upon completion of the series, the program team began to schedule the spring series of programming. Theresa Aragon, Ciudad SWCD Education Coordinator, is working on scheduling 4 single presentations. Erin and Laurel are working on the remaining classes with the Backyard Refuge Program. The first two classes at Esther Bone offer a deeper dive into wildlife-friendly yard care and the March 16th date is meant to attract participants of all ages. The spring classes will also offer a variety of weekend and evening dates/times to increase audience access. In addition to the dates below, we were invited to present at the Garden Expo at Loma Linda Colorado on April 6th. Mario Nuño-Whelan will be delivering his "Plant the Rain" presentation at this event on behalf of the single presentations, anticipating high attendance.

The following dates and classes are confirmed with Esther Bone. SSCAFCA has been invited to join us for the March 16 - Birds and Pollinator Day. The library calendar events are linked in titles for upcoming dates.

Jumpstart Your Backyard Refuge: Spring Series at Esther Bone			
Date & time	**Title**	**Presenter**	**Location**
Sat Jan 27 **11am -12 pm**	Seasonal Wildlife-Friendly Yard Care	Laurel	Esther Bone Hybrid
Description: Many of the standard practices for yard care don't take into account the importance and value of natural processes, like fallen leaves and dried stalks, that provide shelter and food for various life stages of all kinds of wildlife. Come learn with Laurel Ladwig,ABQ Backyard Refuge Program Director, about seasonal wildlife friendly yard practices that can work for you and support wildlife at the same time!			
Tuesday February 13 10am	Wildlife-Friendly Tree Care	Corva Rose	Esther Bone and Waterwise Garden
Description: Trees provide a wealth of beneficial services to habitats for both the human and non-human world! In this class with Corva Rose of Tree School NM you will learn some key seasonal care practices for these important features on our landscape and have fun while doing it!			
March 16 Sat 9-12	Wild Birds + Native Pollinators	Elliott Gordon, Xerces Ambassador and Mikal Deese, of On A Wing and A Prayer	Esther Bone and Waterwise Garden
Description: Join local habitat gardening experts and enthusiasts for a morning focused on			

Wild Birds and Native Pollinators to learn about why backyard refuges are so important in urban environments. Family activities, presentations, live education birds, and information on how to certify your own yard as a Backyard Refuge will be available at Esther Bone and the adjoining Waterwise Garden.

Presentation Schedule
9:30-10:30 Native Pollinators of New Mexico with Elliott Gordon, Xerces Ambassador
Did you know there are over 500 species of native bees in New Mexico? Learn more about how these unique and important species survive and contribute to the diverse landscape of New Mexico.
10:45-11:45 Wild Birds of New Mexico with Mikal Deese of On A Wing and Prayer
Meet some of Mikal's resident education birds while she takes you on their personal journeys, sometimes across continents, and learn about why the middle Rio Grande valley is an important destination and home to our winged friends.
(first come first served for presentations)

The following event was developed in partnership with Keep Rio Rancho Beautiful.

City of Rio Rancho Civic Center
3200 Civic Center Cir NE, Rio Rancho, NM 87144

April 20, 2024 - Tree Seedling Giveway
Time: 9-10am
Introduction to ABQ Backyard Refuge

Join this information session with ABQ Backyard Refuge (a program of Valle de Oro National Wildlife Refuge) to learn about how to transform your outdoor spaces into a refuge for migratory and native birds, pollinators and more. This talk will cover the basics of a backyard refuge, the importance of developing a refuge garden in an urban environment and what resources are available to support and certify your backyard refuge. Presentation attendees will get priority entry into the Tree Seedling GiveAway.

The following presentations are still being confirmed:

Jumpstart Your Backyard Refuge: Spring Series at Loma Colorado		
Date & time	**Title**	**Presenter**
April 1 **Monday April 1 or 15** **6:30-7:30**	Wildlife Geography	Laurel Ladwig
Description: Have you ever thought about the way a skunk maps the landscape? Or how an individual hummingbird remembers your neighborhood upon return from Mexico? If they could give directions, what would they say? Geographer Laurel Ladwig will discuss geography from a more-than-human lens to inspire us to remember our role in the		

entangled tapestry of life and learn about how to think like a “more-than-human” too.		
May 18 TBD	Climate Adapted Yard Care	Judith Philips + Joran Viers
Description: Hotter summers, more intense droughts and unpredictable precipitation are stressors for even the most arid adapted plants. Judith Phillips, author, landscape designer and native plant expert and advocate, and a local arborist will discuss some important yard care strategies to support your landscape in a changing climate, whether you are adapting an existing landscape or planning a new one.		
May 6 **Monday evening**	Wildlife-Friendly Yard Care	Laurel Ladwig
Description: Many of the standard practices for yard care don't take into account the importance and value of natural processes, like leaf litter, and can even be quite contradictory to them (think weedcloth!). Come learn with Laurel Ladwig, abq Backyard Refuge Program Director, about wildlife friendly yard practices that can work for you and support wildlife at the same time!		

Pictures of the Fall Jumpstart Your Backyard Refuge Series classes below:

Top left: Laurel Ladwig presenting, Top right: Cameron Weber demonstrates the Hori Hori knife

Bottom left: Mari Nuño-Whelan, dressed as milkweed for Halloween, presents “Plant the rain”, bottom right Cameron Weber demonstrates proper planting techniques for 5 gallon plants.

Ciudad Soil and Water Conservation District
100 Sun Ave NE Room 160
Albuquerque, NM 87109
505-510-3478

Watershed Stewards

3rd Quarter Report
January-March 2024

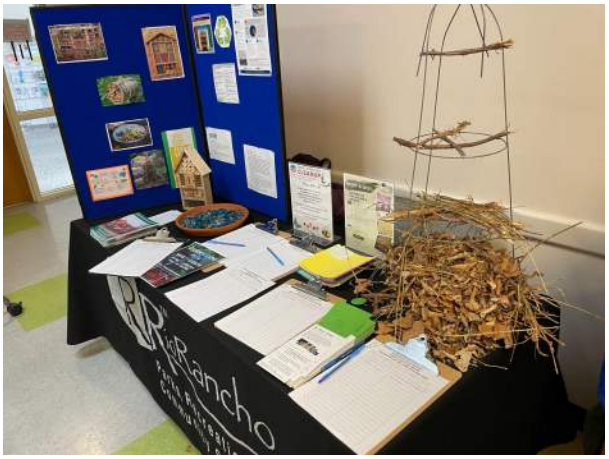
The third quarter was a productive quarter for the Watershed Stewards program. We continued with the delivery of education programs that focused on wildlife habitat restoration in partnership with and through our contract with the ABQ Backyard Refuge, with increasing turnout. These classes aim to increase participant knowledge of local wildlife, habitat needs and residential conservation practices. Using the Backyard Refuge Program as an entry-point of interest aims to connect our audience to their local environment. Working with the Esther Bone library has been a great success

In March, Ciudad SWCD staff met with two partners in Sandoval County to investigate other strategies for outreach to improve the program. Ciudad staff continued to meet with the Keep Rio Rancho Beautiful team, Dyane Sonier, Nick Dahl, and Frank Chavez, to discuss partnership opportunities for this fiscal year and beyond. These meetings helped us to provide additional funding to support presentations by subject matter experts Judith Phillips, Joran Viers, Cameron Weber and Hunter Ten Broeck. These presentations will be delivered in the 4th quarter. The additional support from the KRRB staff is invaluable to helping Ciudad achieve the broader goals of the watershed stewards program by connecting participants to other education and volunteer events. For example, KRRB staff has been providing sign- up sheets at presentations for other events with KRRB, such as composting classes and clean up events. As we experience holding collaborative events with KRRB, we are finding the program delivery is improving as participants are getting more well-rounded experience. When we educate the public on the need for voluntary conservation efforts, it is really important to be able to provide opportunities for engagement right away while people are excited. It also helps to build community with these participants and rapport with our organizations.

In addition to working with KRRB, Ciudad SWCD is also developing a relationship with the Sandoval County Master Gardeners, specifically Sam Thompson who is on the NM State Master Gardener Education Committee and has started a Pollinator Network Group with Mike Halverson at Santa Ana Nursery to increase pollinator habitat through the Middle Rio Grande. Sam has invited the Watershed Stewards program to table at the Corrales Garden Tour on June 2. We will do a brief talk about residential rainwater harvesting and provide a resource table.

Jumpstart Your Backyard Refuge: Spring Series at Esther Bone				
Date & time	**Title**	**Presenter**	**Location**	**Number of Attendees**
Sat Jan 27 **11am -12 pm**	Seasonal Wildlife-Friendly Yard Care	Laurel	Esther Bone Hybrid	7
Description: Many of the standard practices for yard care don't take into account the importance and value of natural processes, like fallen leaves and dried stalks, that provide shelter and food for various life stages of all kinds of wildlife. Come learn with Laurel Ladwig,ABQ Backyard Refuge Program Director, about seasonal wildlife friendly yard practices that can work for you and support wildlife at the same time!				
Tuesday February 13 **10am**	Wildlife-Friendly Tree Care	Corva Rose	Esther Bone and Waterwise Garden	8
Description: Trees provide a wealth of beneficial services to habitats for both the human and non-human world! In this class with Corva Rose of Tree School NM you will learn some key seasonal care practices for these important features on our landscape and have fun while doing it!				
March 16 Sat **9-12**	Wild Birds + Native Pollinators	Elliott Gordon, Xerces Ambassador and Mikal Deese, of On A Wing and A Prayer	Esther Bone and Waterwise Garden	47 total
Description: Join local habitat gardening experts and enthusiasts for a morning focused on *Wild Birds and Native Pollinators* to learn about why backyard refuges are so important in urban environments. Family activities, presentations, live education birds, and information on how to certify your own yard as a Backyard Refuge will be available at Esther Bone and the adjoining Waterwise Garden. Presentation Schedule **9:30-10:30 Native Pollinators of New Mexico with Elliott Gordon, Xerces Ambassador** Did you know there are over 500 species of native bees in New Mexico? Learn more about how these unique and important species survive and contribute to the diverse landscape of New Mexico. **10:45-11:45 Wild Birds of New Mexico with Mikal Deese of On A Wing and Prayer** Meet some of Mikal's resident education birds while she takes you on their personal journeys, sometimes across continents, and learn about why the middle Rio Grande valley is an important destination and home to our winged friends. (first come first served for presentations)				

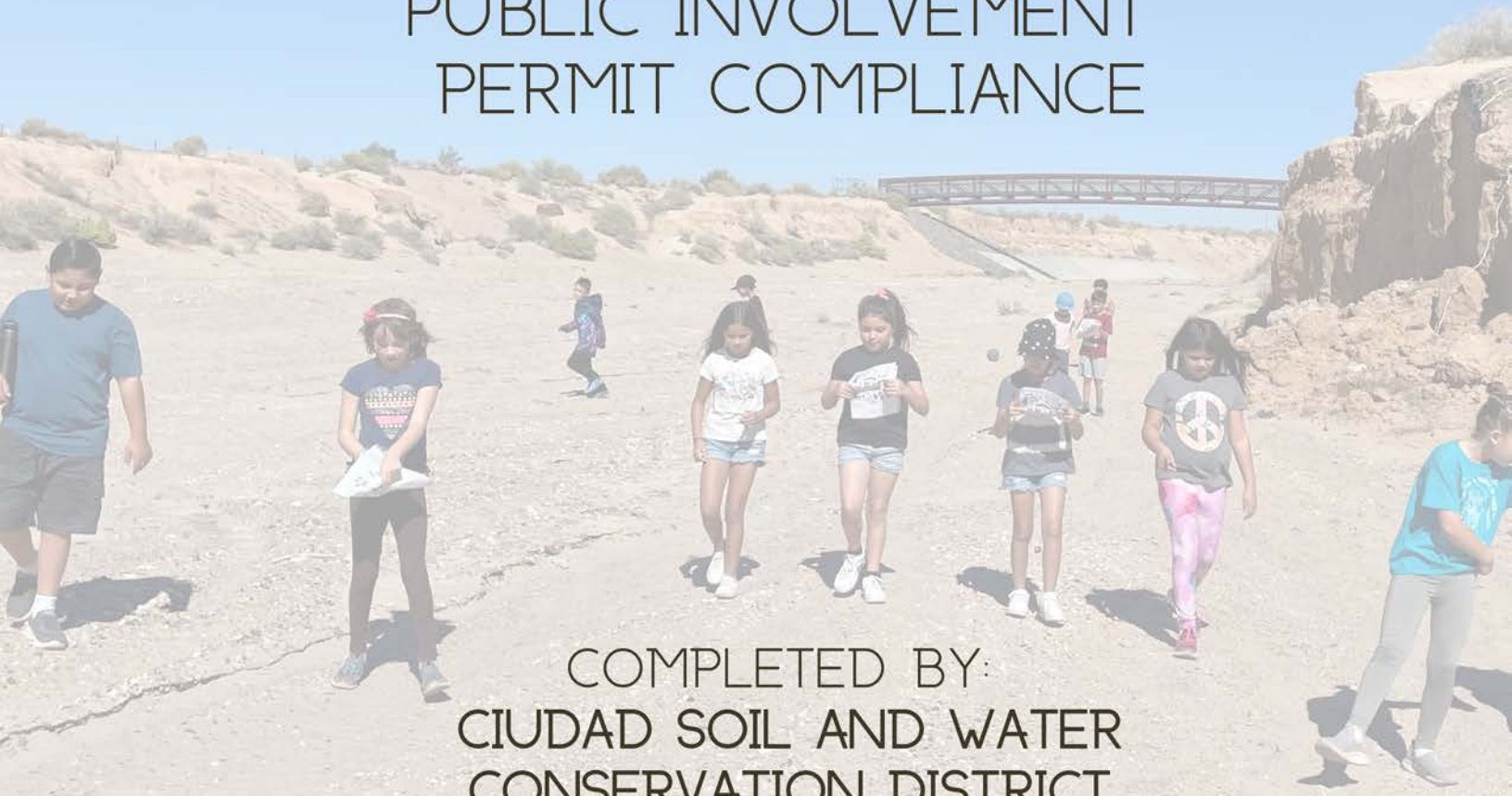
Above: Corva Rose and participants finishing up tree pruning and labeling future branch pruning on a tree in the WaterWise Garden. Below: Presentations and tabling on March 16 at Esther Bone.



MIDDLE RIO GRANDE WATERSHED

MS4 REPORT

EDUCATION & OUTREACH; PUBLIC INVOLVEMENT PERMIT COMPLIANCE



COMPLETED BY:
CIUDAD SOIL AND WATER CONSERVATION DISTRICT
JULY 2023-JUNE 2024

Introduction

For fiscal year 2024, The Middle Rio Grande Stormwater Quality Team (MRGSQT) and Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) provided Ciudad Soil and Water Conservation District (Ciudad SWCD) with a total $101,651.00 in funding to provide educational services in accordance with the requirements set forth in the EPA Municipal Separate Storm Sewer System Permit No. NMR04A000 (the MS4 Permit) for Education & Outreach and Public Involvement compliance. The funding provided by MRGSQT and SSCAFCA support the RiverXchange and Arroyo Classroom youth education programs, however Ciudad SWCD also provides additional educational services within the watershed outside the funding agreement that contributes to MS4 permit compliance. Ciudad SWCD is deeply invested in education and outreach programs as a strategy to address areas of natural resource concerns outlined in Ciudad SWCD's long-range action plan and demonstrates this commitment with years of successful educational programming. Ciudad SWCD is also a non-permittee member of the MRGSQT and our role is to promote collaborative, effective partnerships within the watershed. This report encompasses Ciudad SWCD's programs, activities and projects that contributed to the education and stewardship of watershed health in the Middle Rio Grande Watershed, reaching 7,319 individuals this fiscal year.

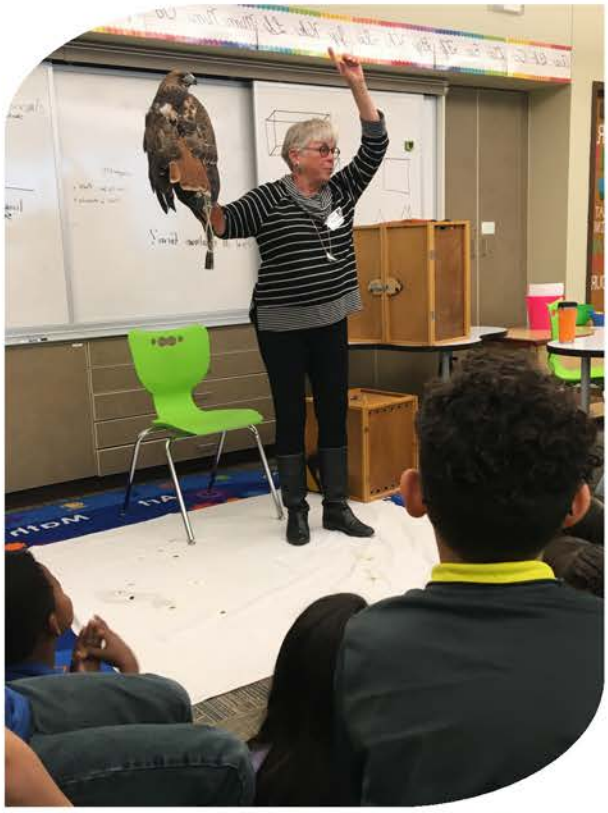
MRGSQT & SSCAFCA
FUNDED YOUTH PROGRAMS

RiverXchange®

RiverXchange® is a watershed education program for 5th graders which is comprised of guest speakers, hands-on activities and a conservation field trip with a class-led action project that incorporates the EarthForce organization's process for Environmental Action Civics. The EarthForce process is an educational approach where youth and adults work in partnership to identify a local environmental issue and engage with community members to take action by advocating for systemic changes to policies or practices. The EarthForce process aligns strongly with RiverXchange® objectives as it allows students and teachers to understand more deeply and think critically about watershed issues, while engaging a larger audience in taking action for change. RiverXchange® is appealing to teachers because it addresses many grade-level Next Generation Science Standards, social studies benchmarks, as well as Common Core Language Arts Standards and promotes project-based learning and access to outdoor learning.

Arroyo Classroom

The Arroyo Classroom program, for 3rd graders, consists of a four-part series of lessons utilizing the arroyos as outdoor classrooms. The lessons teach students about local desert plant and animal species, their physiological adaptations and their role in the environment by means of walking field trips and live wildlife visits to classrooms. All lessons include a component about conservation and arroyo safety, including discussions on ATV use, removal of pet waste, trash/debris and impacts on arroyo inhabitants and stormwater quality, set to grade-level science standards and age appropriate messages. Arroyo Classroom also supports the Next Generation Science Standards and increases access to outdoor learning.



"Students were engaged and learned a lot in the process. They felt that they actually could make a difference with their actions." -Beer, Cochiti ES, RiverXchange teacher

RIVERXCHANGE® 2023-2024

EDUCATION FOR UNDERSTANDING AND PROTECTING WATERSHED HEALTH

Executive Summary

During the 2023-2024 school year, RiverXchange® served **897** 5th grade students and **41** teachers across **13** schools, 10 of which were Title I schools. Each student engaged with a minimum of 10 hours of programming provided by Ciudad SWCD staff and partners. Classrooms who completed an action project engaged in an addition 5-10 hours of the program. Contributions from partner time, and student and adult volunteers on the conservation field trip provided a total of **$105,871.00 of in-kind match** this school year. MRSSQT provided $48,477.00 and SSCAFCA provided $22,374.00 for a total of **$70,851.00 in cash** for program coordination, bus costs, teacher stipends and materials.

41 Teachers

Teacher Professional Development

Teachers are invaluable participants in RiverXchange® and are a key audience for the program. RiverXchange® serves teachers by providing a teacher workshop that helps strengthen their own understanding of watershed health through experiencing science and project-based activities they can use in the classroom to support RiverXchange®, the Action Project, and other curriculum. Teachers learn from other teachers, partners and RiverXchange® staff at the teacher workshop and receive a stipend for attending, along with other materials and resources for their classrooms.

Post Program Teacher Feedback

Upon completion of the program, teachers are asked to fill out a survey providing feedback about the program. 27 participants responded, with overwhelmingly positive feedback. **97% of respondents said students had made meaningful connections between human actions, stormwater and pollution** with evidence such as "children [are] thinking about [the] use of various pollutants, and trying to keep things clean *'so they wouldn't get into the river'."*(Carty, Seven Bar ES)

"The greatest learning outcomes for my class as participants in RiverXchange was focusing on the **importance of water in our ecosystem**. Another **big learning outcome was to be stewards within our school community**. Many students were able to **discuss bigger issues they see towards the end of program compared to the beginning**." Martinez, Valle Vista ES

"My students are **more invested now** in taking care of the environment, protecting natural resources and **being more responsible stewards of their community**." Ortiz y Martinez, Chaparral ES

RIVERXCHANGE® CURRICULUM

EDUCATION FOR UNDERSTANDING AND PROTECTING WATERSHED HEALTH

The RiverXchange® Curriculum introduces a wide range of water resource topics with the goal of bringing awareness to their role in protecting watershed health. Within the curriculum, all *897 students engaged with grade-level appropriate lessons that covered the following required MS4 topics*:

897 Students

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF OIL, HOUSEHOLD HAZARDOUS WASTE
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

Presentations

Each class in RiverXchange® experienced presentations on Drinking Water, Wastewater, Stormwater and River History. Students in Rio Rancho Public schools also received an Agriculture & Water presentation.

Partners that provided these presentations are:

- Albuquerque Bernalillo County Water Utility Authority
- Sandia Labs
- City of Rio Rancho Utilities Department
- Sandoval County Cooperative Extension Services
- City of Albuquerque Open Space Division
- Ciudad Soil and Water Conservation District Board Chair, Steven Glass

303 trees planted

41 shrubs planted

Conservation Field Trip

Thanks to a long-standing partnership with City of Albuquerque Open Space Division, RiverXchange® students are able to participate in the Conservation Field Trip where they help to restore the Bosque riparian ecosystem by planting native species such as Cottonwood, Coyote Willow, Four Wing Saltbush, New Mexico Olive and seed native grasses. In addition to the **749 students** recorded in attendance across December through March this year, **112 adults** joined in the effort to steward the Bosque by learning restoration practices guided by Open Space and Ciudad SWCD staff.

RIVERXCHANGE® ACTION PROJECT

EDUCATION FOR UNDERSTANDING AND PROTECTING WATERSHED HEALTH

The RiverXchange® Action Project is a process by which students and teachers work together to determine an issue of concern, engage with stakeholders, decision-makers and community members to research their issue, and take informed action with the goal of changing or positively influencing a policy or practice to improve an environmental outcome.

Criteria for Action Projects to be submitted for an award:

- Student Voice and Participation
- Practicality
- Civic Engagement

4,471

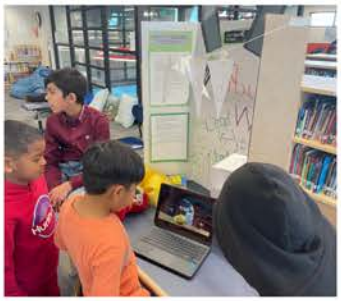
individuals impacted by action projects

News reports are a great tool to share student voices with other classes on campus!

Action Project Submissions

14 classes officially submitted their Action Projects for the reward of a pizza party, however, more teachers reported doing an Action Project in the teacher feedback. Of those who submitted, the projects varied from campus clean-ups, trash to treasure campaigns, water conservation campaigns, the creation of bilingual resources, and public service announcements. In total, teachers reported reaching 4,471 individuals through their projects, mostly from school-wide efforts by RiverXchange® students to educate others and change community practices such as littering. A few examples of the amazing RiverXchange® students are shared here!

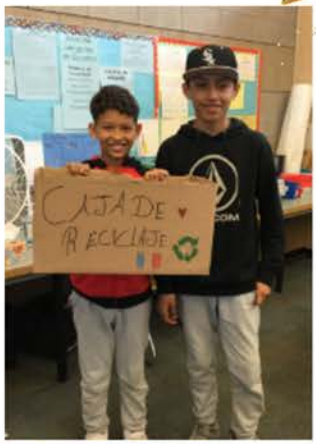
STUDENTS INVESTIGATE ISSUES AND USE THEIR VOICE TO SHARE THEIR KNOWLEDGE



Shown above are students who investigated the Villain of the Water Supply by doing literature research, talking to experts, and then presented their findings in an exhibition with over 50 members of community, families, and school admin in attendance. Each presentation included a proposed solution or action to take to address their issue of concern, like adding more "grates" to storm drains to filter out trash (above right).

"'Dear Person in Power, We believe that litter is a villain to Albuquerque's water supply. Are you aware of the litter in Albuquerque, New Mexico's water supply. Litter is poisoning the water supply. What goes into the storm drain goes into the Rio Grande River. When trash and dog poop and other things go in the storm drain all of that goes into the River."
-Excerpt of student letter from "Villian" exhibition

STUDENTS CREATE INVENTIVE WAYS TO ENGAGE PEERS IN THEIR CAMPAIGNS FOR CHANGE - "TRASH TO TREASURE"



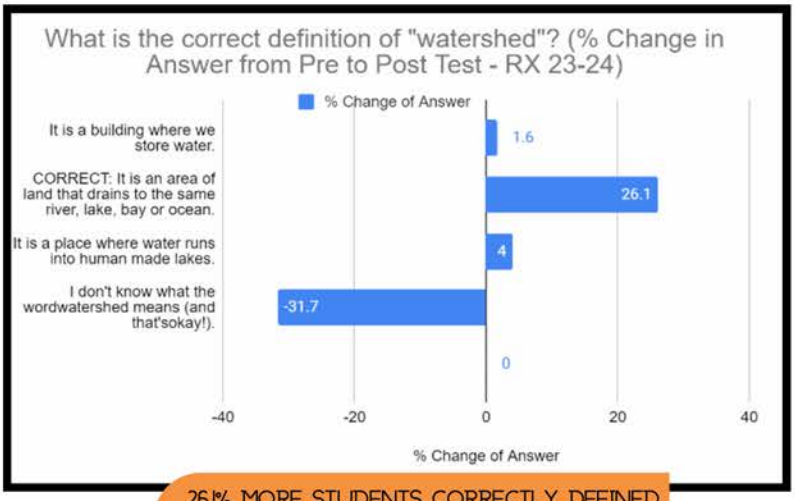
Pictured to the left are students who completed the action project process by completing a campus walk to identify environmental issues, talked with teachers and admin about concerns, selected litter as their issue, developed a plan to reduce litter, conducted a school survey to determine effective methods for change and created a Trash to Treasure recycling program to encourage recycling and teach about the impacts of litter!

RIVERXCHANGE®

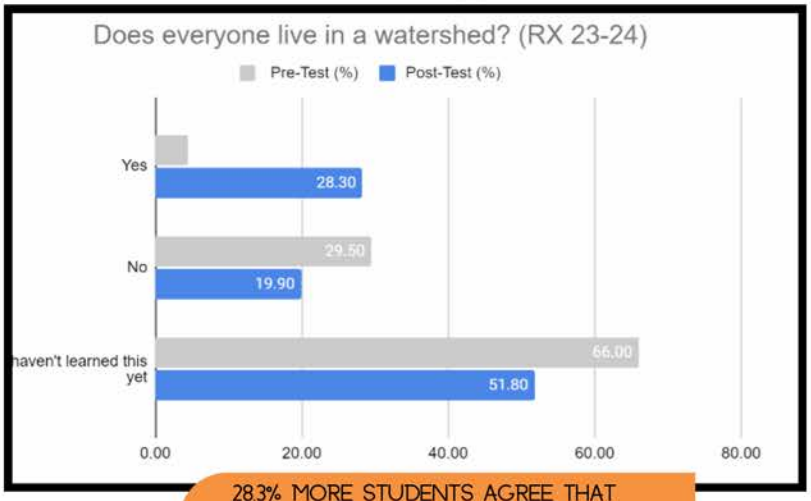
EDUCATION FOR UNDERSTANDING AND PROTECTING WATERSHED HEALTH

Program Evaluation

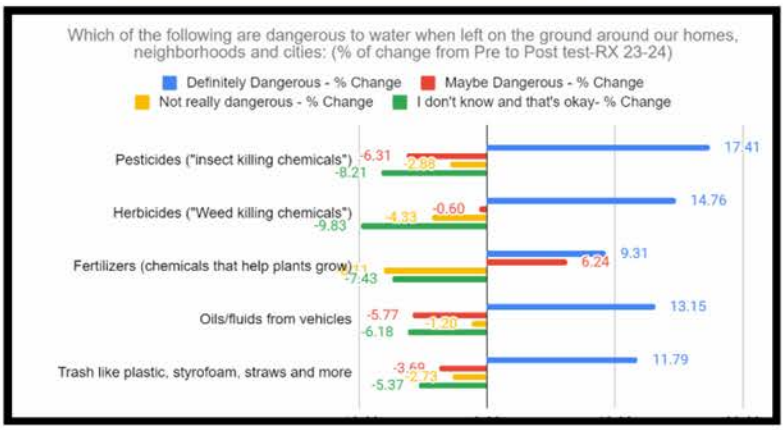
Qualitative evaluation of the program is compiled via teacher feedback through short answer questions, which concludes that the program was successful in helping students make connections between their actions, stormwater and watershed health and that the program was a positive experience for teachers. Quantitative evaluation is conducted through pre and post student surveys. The metrics of these surveys demonstrate a positive percentage change of correctly identifying the definition of a watershed and the impacts of pollution on water quality (i.e. pet waste, pesticides, herbicides, fertilizers, oils, and trash). 732 students completed the pre-survey and 492 students completed the post-survey.



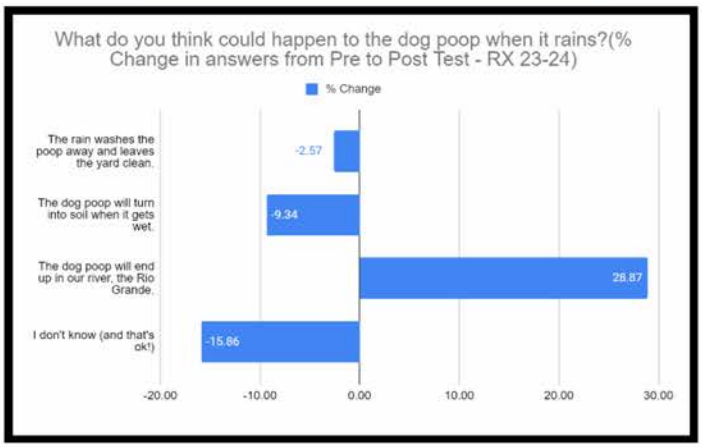
26.1% MORE STUDENTS CORRECTLY DEFINED "WATERSHED" AFTER THE PROGRAM



28.3% MORE STUDENTS AGREE THAT EVERYONE LIVES IN A WATERSHED AFTER THE PROGRAM



APPROXIMATELY 10%-20% MORE STUDENTS IDENTIFY THE ABOVE MS4 TOPICS AS DANGEROUS TO WATER AFTER THE PROGRAM



28.87% MORE STUDENTS IDENTIFY THAT DOG WASTE CAN END UP IN THE RIVER AFTER THE PROGRAM

ARROYO CLASSROOM 2023-2024

LOCAL WILDLIFE, HABITAT & ARROYO EDUCATION

Executive Summary

During the 2023-2024 school year, Arroyo Classroom served 715 3rd grade students and 36 teachers across 7 schools in Rio Rancho, 5 of which were Title I schools. Each student engaged in 4 hours of programming provided by Ciudad SWCD staff and contractors. SSCAFCA provided a total of **$30,800.00 in cash** for program coordination and delivery and a contract with Hawks Aloft Inc. for live wildlife presentations. Within the curriculum, *all 715 students engaged with grade level appropriate lessons that covered the following required MS4 topics*:

715 Students

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

Presentations

Arroyo Walk

The Arroyo Walk takes students out into the field to look for evidence of wildlife such as tracks, scat, exoskeletons and of course- live animals! Students also do plant adaptation investigations through sensory observations of plants. Throughout the walk, students naturally make observations of pollution and human impacts in the environment and discussions about ways to improve the environment through our own actions always take place. (Middle and top right images above)

Local Reptiles and Arthropods

Much like the bird presentation, the reptile and arthropod presentation introduces students to these local creatures, their key roles in the ecosystem and educates students about the importance to protect organisms who are often misunderstood, feared and considered pests. The presentation also focuses on how pollution and human behaviors can impact the habitat in which these creatures rely on to survive.(Bottom left image)

Local Birds

Hawks Aloft Inc. brings a wonderful experience to students with a visit of educational avian ambassadors to the classroom. Some of the birds that visit are: (depending on availability and cultural sensitivities) American Kestrels, Peregrine Falcons, Swansons Hawks, Burrowing Owls, Great Horned Owls or Turkey Vultures. Hawks Aloft help students understand how pollution and human behaviors can impact these birds and what they can do to protect these wonderful creatures. (Bottom right image)

Watershed Lesson

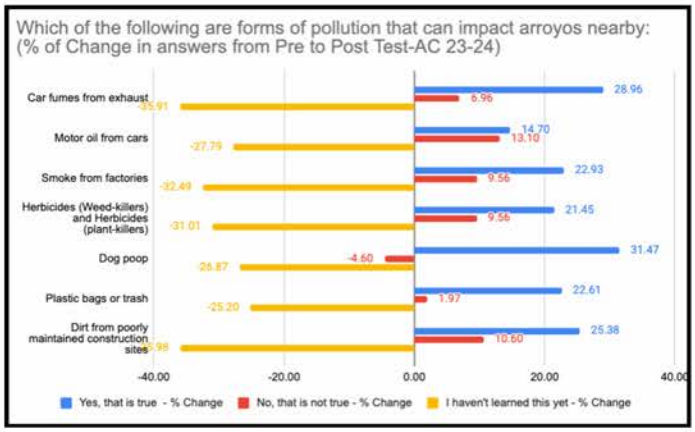
The watershed lesson help students build an understanding of how the water cycle interacts with the land. Working in groups, students use paper to mimic topography of the land and make it rain to see how water gathers in lakes and rivers. They they mimic adding pollution to the watershed to see where it ends up! (Top left image above)

ARROYO CLASSROOM 2023-2024

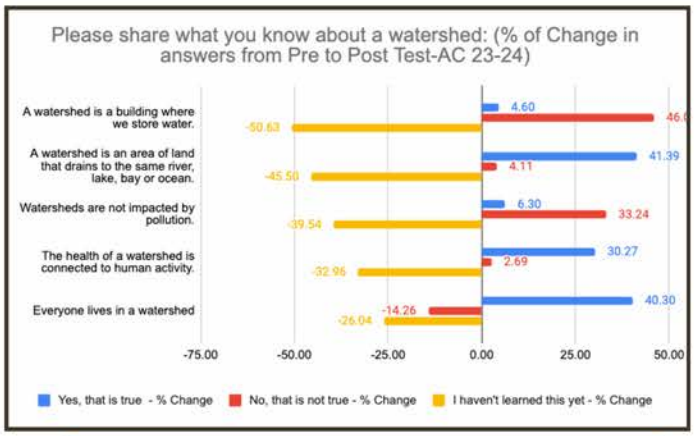
LOCAL WILDLIFE, HABITAT & ARROYO EDUCATION

Program Evaluation

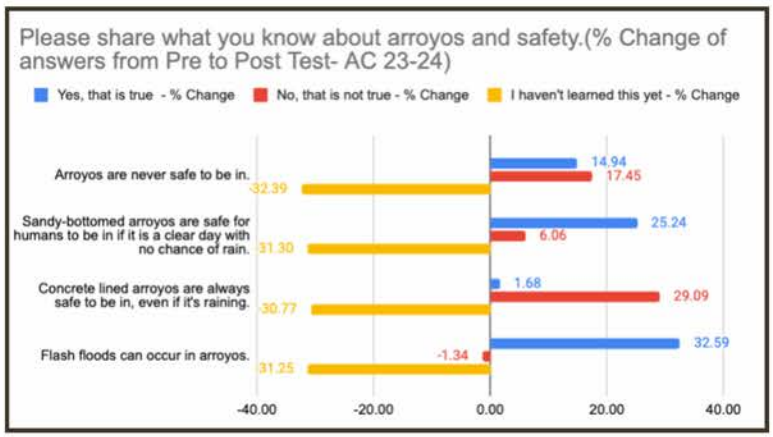
Qualitative evaluation of the program is compiled via teacher feedback (13 respondents) through short answer questions, which concludes that the program was successful in helping students make connections between their actions and impacts on local wildlife and their habitats (arroyos). Teachers also note this program helps them meet 3rd grade science standards. Quantitative evaluation is conducted through pre and post student surveys. The metrics of these surveys demonstrate a positive percentage change of correctly identifying the the impacts of pollution on the arroyo habitat and watershed (i.e. pet waste, pesticides, herbicides, fertilizers, oils, and trash). Additionally, students demonstrate growth in understanding arroyo safety. 481 students completed the pre-survey and 422 students completed the post-survey.



STUDENTS DEMONSTRATE AN INCREASE RANGING BETWEEN 15%-31% IN CORRECTLY IDENTIFYING COMMON POLLUTANTS IN THE LOCAL ENVIRONMENTAL



STUDENTS DEMONSTRATE AN INCREASE OF 30%-46% IN CORRECTLY UNDERSTANDING WATERSHED HEALTH CONCEPTS



APPROXIMATELY 30% MORE STUDENTS MADE AN IMPORTANT DISTINCTION THAT FLASH FLOODS HAPPEN IN ARROYOS AND CONCRETE ARROYOS ARE NEVER SAFE.

Post Program Teacher Feedback Quotes

What where the greatest learning outcomes for your class?

"They were fully engaged in the material and learning experiences, and retained that information. They really enjoyed learning about watersheds and were able to actively discuss topics concerning watersheds and our environment throughout the year." -Reed, Colinas Del Norte ES

"The students absolutely loved it, and gained new knowledge about outdoor observations. It also was a great prequel to our ecology unit later in the year!" - Schnittke, Sandia Vista ES

Students learning, applying and sharing their experiences with family." - Begay, Maggie Cordova ES

"Appreciating our environment and influencing them to respect arroyos and desert plants and environment." - Burns, Cielo Azul ES

2023-2024
CIUDAD SWCD EDUCATION PROGRAMS
(GRANTS FROM OTHER FUNDERS)

Watershed Stewards

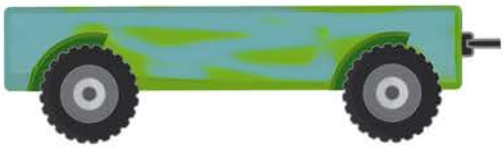
- Funding Provided by SSCAFCA, considered on a fiscal year basis.
- Objective: Local Conservation Education for Adult and Senior Citizens with a focus on MS4 topics.

Sponge City Middle and High School Stewardship Program

- Funding Provided by NM Soil and Water Conservation Commision via the Water Quality and Conservation Grant FY2024.
- Objective: Green Stormwater Infrastructure Education Program that aims to inspire students to visualize and implement GSI on their school campus.

Rolling River

- Funding provided by intergovernmental agreements with City of Albuquerque Open Space and Bernalillo County Open Space, and direct booking fees.
- Objective: The Rolling River is a mobile model of a watershed where we demonstrate MS4 topics to the public at school, community and other public events.



APS School Garden Conference

- Funding provided through an EPA subaward through the Bosque Ecosystem Monitoring Program.
- Objective: Support teacher professional development in watershed education.

WATERSHED STEWARDS 2023-2024

CONSERVATION EDUCATION FOR ADULTS AND SENIORS

Executive Summary

During the 2023-2024 fiscal year, the Watershed Stewards program engaged 267 participants in education and outreach opportunities across 19 events and certified 12 residences as an ABQ Backyard Refuge. The program's events were primarily held in the Rio Rancho area and Corrales, but also included field trips to the ABQ BioPark with Meadowlark Senior Center. The program benefited greatly this year from increased collaboration between Keep Rio Rancho Beautiful (under City of Rio Rancho Parks, Recreation and Community Services department), City of Rio Rancho Public Libraries, Sandoval County Master Gardeners, Ciudad SWCDs contract with ABQ Backyard Refuge (a program of Valle De Oro National Wildlife Refuge) and support from Rio Grande Return and other subject matter experts. Working with these partners to engage audiences in SSCAFCA's jurisdictional boundaries has proven to be beneficial in developing a program that truly encourages stewardship through education, training and community engagement.

Program Highlights

Ciudad SWCD chose to contract directly with ABQ Backyard Refuge for the program this year, as past years of hosting ABQ Backyard Refuge for Watershed Stewards programming demonstrated how an program like Backyard Refuge provides an anchor for residents to learn about how to implement voluntary conservation practices at home. By working with ABQ Backyard Refuge, we were able to provide a diverse set of learning opportunities with a clear goal; to increase ABQ Backyard Refuge certifications within SSCAFCA's boundaries. Presentations ranged from native plant selection and care, designing a backyard refuge, local wildlife, adapting to climate change, tree care and pruning, and rainwater harvesting. Regardless of the presentation or field trip, Ciudad SWCD, ABQ Backyard Refuge and Keep Rio Rancho Beautiful consistently promote awareness of MS4 topics and provide resources and opportunities to implement conservation practices that benefit the watershed.

267 participants

12 certified backyard wildlife refuges

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF OIL, HOUSEHOLD HAZARDOUS WASTE
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

PARTNERS:

Rio Rancho
Keep Rio Rancho Beautiful
KEEP AMERICA BEAUTIFUL AFFILIATE

ABQ Backyard Refuge Program

SPONGE CITY 2023-2024

MIDDLE AND HIGH SCHOOL STEWARDSHIP PROGRAM

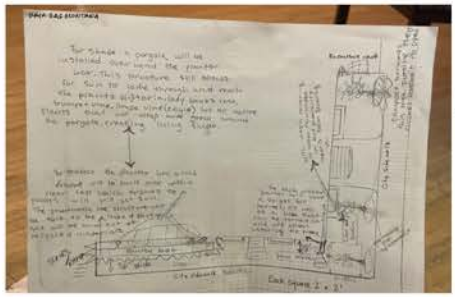
35 students

Executive Summary

The Sponge City Program aimed to work with middle and high school students to promote an understanding of watershed health and the use of rainwater harvesting in an urban environment as a design approach to improve watershed health. The program was delivered across 3 visits with each participating class: an introductory classroom lesson, a field trip to an important watershed feature, and a walking field trip in the urban environment. Two classes participated; one 8th grade gardening class from Mountain Mahogany and a 9th-12th grade permaculture class from Amy Biehl, for a total of 35 students. To ensure student engagement, the program was tailored to each class's needs. The 8th graders focused more on campus stewardship by implementing soil sponges and berms. The Amy Biehl class was able to complete a design proposal for an outdoor green space that included rainwater harvesting features. Each class was able to participate in stewardship activities, either at their school or a restoration site.

AMY BIEHL CHARTER HS

Top images across are from field trips to the Tijeras Bio-Zone Education Center, where students practiced building one rock dams and soil sponges while learning about watersheds. Pictured left and below are student working on and presenting their green space designs.



MOUNTAIN MAHOGANY COMMUNITY SCHOOL

Pictured left, students build soil sponges. Pictured below is small basin students dug out and filled with "sponge" materials to capture and absorb rainwater from a downspout for a Mountain Mahogany.

Sponsored by:

STATE OF NEW MEXICO
NEW MEXICO SOIL & WATER CONSERVATION DEPARTMENT OF AGRICULTURE

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF OIL, HOUSEHOLD HAZARDOUS WASTE
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

The Amy Biehl green space project aims to build an outdoor classroom, gardens, and rainwater harvesting features around the school that would replace concrete with permeable surfaces and tree canopy and tie into a GSI street project on Gold Ave. More funding is needed for the next phase.

ROLLING RIVER 2023-2024
MOBILE WATERSHED MODEL

880 VISITORS
12 EVENTS

The Rolling River is a mobile watershed education trailer that provides a hands-on opportunity for the public to observe and manipulate how how human impacts, like urban development and pollution, can create impaired waters in the Rio Grande.

Participants are asked to develop the natural watershed with farms, neighborhoods, and impervious surfaces, like paved parking lots and streets. They then "make it rain" on the watershed to see what happens to the water. Finally, we discuss how we can protect the watershed through conservation practices that prevent pollution of stormwater and water waste to improve water quality, wildlife habitat and protection of resources.

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF OIL, HOUSEHOLD HAZARDOUS WASTE
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

APS GARDEN CONFERENCE

Ciudad SWCD was able to support the APS School Garden this year thanks to a sub-award from BEMP's EE EPA grant. Ciudad SWCD helped to coordinate the conference and provided a Rainwater Harvesting presentation to 20 teachers, focused on the passive rainwater harvesting opportunities on school campuses to both teach about, and improve, watershed health in our city. Across the conference, 54 teachers engaged with outdoor learning practices, science curriculum, and local traditional ecological knowledge. Teachers also received garden materials and resources, and Ciudad SWCD was able to provide presenters with honorariums for their attendance with the sub- award.

54 TEACHERS
2 DAYS

ACKNOWLEDGEMENTS

Ciudad SWCD acknowledges the important contributions of the following organizations, municipalities and individuals who supported the outreach completed this year. Without these partnerships, we could not do what we do so effectively. We are endlessly grateful for our communities' support to educate about, and protect the Middle Rio Grande Watershed.

City of Albuquerque Open Space Division
Bernalillo County Open Space Division
Bernalillo County Natural Resource Services
City of Rio Rancho Parks, Recreation and Community Services
Keep Rio Rancho Beautiful
City of Rio Rancho Utilities Department
Albuquerque Bernalillo County Water Utility Authority
Sandia National Laboratories
Hawks Aloft Inc.
BEMP
Valle de Oro National Wildlife Refuge
Laurel Ladwig, Albuquerque Backyard Refuge Program
Shelby Stimson, Arid LID Coalition
Cameron Weber, Rio Grande Return
Judith Phillips, Design Oasis
Hunter Ten Broeck, WaterWise Landscapes Inc.
Mario Nuño-Whelan, Arid LID Coaltion
Joran Viers, JVHC Inc.
Mikal Deese, On a Wing and A Prayer
Corva Rose, Tree School NM
Nissa Patterson, Mountain Mahogany Community School
Sandra Mack, Amy Biehl Charter High School
Allison Martin, TOTAL NM
Susan Schipull, APS Garden Resources
Travis McKenzie, APS Polk MS

Sponsored by:

Mid Rio Grande Stormwater Quality Team
www.keeptheriograndg.org

Southern Sandoval County Arroyo Flood Control Authority

Ciudad SWCD Contacts

EDUCATION TEAM

ERIN BLAZ, EDUCATION MANAGER
erin@ciudadswcd.org
505-225-7487

THERESA ARAGON, EDUCATION COORDINATOR
theresa@ciudadswcd.org

Ciudad Soil & Water Conservation District

CIUDAD SOIL & WATER CONSERVATION DISTRICT
PO BOX PO Box 93463, Albuquerque, NM 87199

Outcome Report

for Fiscal Year 2023–2024

(July 1, 2023 to June 30, 2024)

Mid Rio Grande Stormwater Quality Team

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

PRESENTED BY

SUNNY505

Bernalillo County

Public Outreach and Education Tracking

FY2023: July 1, 2023 – June 30, 2024

Date	Location	Event Topic	Description of Education/Outreach Event Program/Materials	NRS Programs	Partner Organizations	Parti-cipants	Source for Participant Count
QI							
7/9/2023	25 Frost Rd.	HHW	HHW Collection Event	Stormwater Quality	Clean Harbors	58	sign in sheet
7/20/2023	Wilson & Co.	GSI/LID Standards Lunch & Learn	Lunch and a presentation about the new Bernalillo County Green Stormwater Infrastructure / Low Impact Development (GSI/LID) Standards for staff that work on Bernalillo County public and private development projects.	Stormwater / Review & Permitting		20	estimate
7/23/2023	Whispering Pines Community Center	HHW	HHW Collection Event	Stormwater Quality	Clean Harbors	17	sign in sheet
7/26/2023	GovDelivery news bulletin	Bulletin advertising 8/12/23 Passive Rainwater Harvesting Workshop	Natural Resources Services table in Bernalillo County tent. Provided information to educate County residents on stormwater quality, water conservation methods and incentive programs, and groundwater monitoring program.	Water Conservation, Stormwater Quality			GovDelivery subscribers
8/12/2023	Carlito Springs Open Space	Passive Rainwater Harvesting Workshop for Homeowners	Workshop for homeowners providing an overview of design, installation, and maintenance of residential-scale passive rainwater harvesting features, promoting Passive Rainwater Harvesting Field Guide	Stormwater Quality, Water Conservation	BernCo. Open Space	33	headcount at event
8/19/2023	Dennison Park	HHW	HHW Collection Event	Stormwater Quality	Clean Harbors	19	sign in sheet
8/23/2023	Virtual	GSI/LID Standards Lunch & Learn	Lunch and a presentation about the new Bernalillo County Green Stormwater Infrastructure / Low Impact Development (GSI/LID) Standards for staff that work on Bernalillo County public and private development projects.	Stormwater / Review & Permittin	Wilson & Co	54	Virtual meeting attendance count

8/28 & 8/30/2023	Smith Brasher Hall on CNM Campus	Rainwater Harvesting Workshop for ABC Tree Stewards	GSI Walk and Talk with ABC Tree Stewards at CNM Smith-Brasher Hall. Discussed GSI on site and how similar GSI/RWH features could be done at homes. Presentation promoted and content was drawn from Bernco Passive Water Harvesting Field Guide; attendees received free 55-gallon rain barrel.	Water Conservation, Stormwater Quality	ABC Tree Stewards, Tree New Mexico	20	headcount at event
8/31/2023	2023 StormCon, Dallas	GSI/LID Standards Lunch & Learn	Lunch and a presentation about the new Bernalillo County Green Stormwater Infrastructure / Low Impact Development (GSI/LID) Standards for staff that work on Bernalillo County public and private development projects.	Stormwater / Review & Permitting	BHI	50	estimage
9/1/2023	GovDelivery news bulletin	Bulletin advertising 9/16/23 L2L Graywater Workshop		Water Conservation			GovDelivery subscribers
9/5 – 9/15/2023	NM State Fair Grounds (300 San Pedro NE, Albuquerque, NM 87108)	Irrigation Efficiency Exhibit at the State Fair	Presented 6 display boards on irrigation efficiency and hands-on drip irrigation exhibit in collaboration with ABQ Master Gardeners	Water Conservation	ABQ Master Gardeners	20,000	Estimate of exhibit visitors provided by ABQ Master Gardeners
9/9/2023	McGrane Public Safety Complex	East Mountain Coalition of Neighborhoood Associations Fall meeting	Presented updates to the program and status of groundwater in EM	Groundwater		25	sign in sheet
9/10/2023	Fox Hills Property Owners Association Community Building	Presentation on Water Conservation Program for Fox Hills Property Owners Association	Overview of assistance provided to Bernalillo County residents including water efficiency consultations and water conservation incentive programs at request of Fox Hills Property Owners Association in East Mountains	Water Conservation		20	Headcount at event
9/16/202	Carlito Springs Open Space	L2L Graywater Workshop	Introduction to design, installation, and maintenance of laundry-to-landscape graywater systems, graywater regulations, and Bernalillo County's Graywater Incentive Program	Water Conservation		16	sign in sheet
9/21/2023	Los Vecinos	Vista Grande PROS Public Meeting	PROS outreach event- presented information on the Tijeras Creek Watershed Restoration Project	Stormwater	PROS	20	estimate
9/23/2023	108 Edelweiss (domestic household)	Annual neighborhood meeting	presented updates to the program and status of groundwater in EM, hydrogeological analysis of Heatherland Hills	Groundwater		30	Headcount at event

Q2							
10/1/2023	Corrales	Corrales harvest fest	Tabling event for Stormwater Quality Team; information about stormwater quality	Stormwater	Middle Rio Grande Stormwater Quality Team		
10/3/2023	Tijeras Creek Watershed Restoration Project	Urban Waters Tour of TCWRP	Presentation and walking tour of upcoming watershed restoration activities	Stormwater	Urban Waters, Ciudad SWCD, NMED	15	headcount at event
10/8/2023	Polk Middle School	HHW	HHW collection event	Stormwater	Clean Harbors	16	sign in sheet
10/19/2023	Fox Hills Neighborhood	Groundwater	Discussed Madera aquifer they source water from, among other water topics in the region	Groundwater		5	headcount at event
10/21/2023	Valle de Oro NWR	Passive Rainwater Harvesting at Home	Workshop on passive rainwater harvesting for homeowners at Build Your Backyard Refuge Day	Water Conservation, Stormwater Quality	ABQ Backyard Refuge Program	40	headcount at event
11/4/2023	Marble Open Space	Ribbon-cutting ceremony	Tabling event for Natural Resource Services	Water Conservation, Stormwater Quality	Open Space		sign in sheet
11/7/2023	East Central Ministries	Water-Smart Urban Gardens	Presentation for BernCo Urban Ag Program	Water Conservation	Open Space	10	headcount at event
11/14/2023	McGrane Public Safety Complex	Groundwater Focus Group	Focus group to discuss Hydrogeology initatives for FY2025–2030	Groundwater		6	sign in sheet
11/15/2023	NMDOT Outfall	Volunteer Cleanup	PDS organized cleanup of floatables – 1.72 tons	Stormwater	BernCo PDS	20	sign in sheet
11/15/2023	North Domingo Baca Multigenerational Center	Groundwater Focus Group	Focus group to discuss Hydrogeology initatives for FY2025–2030	Groundwater		15	sign in sheet + headcount
11/16/2023	McGrane Public Safety Complex	Groundwater Focus Group	Focus group to discuss Hydrogeology initatives for FY2025–2030	Groundwater		4	sign in sheet
Q3							
1/24/2024	Mountain View Community Center	Sustainability Project Public Meeting	Presented and solicited public input on proposed South Valley Street Tree and GSI Pilot Project	Water Conservation, Stormwater Quality	City of Albuquerque	16	sign in sheet
1/25/2024	Valle de Oro NWR	Valle de Oro Community Update Night	Tabled and solicited public input on proposed South Valley Street Tree and GSI Pilot Project	Water Conservation, Stormwater Quality			

1/30/2024	Westside Community Center	Sustainability Project Public Meeting	Presented and solicited public input on proposed South Valley Street Tree and GSI Pilot Project	Water Conservation, Stormwater Quality	City of Albuquerque	20	sign in sheet
2/1/2024	Los Padillas Community Center	Sustainability Project Public Meeting	Presented and solicited public input on proposed South Valley Street Tree and GSI Pilot Project	Water Conservation, Stormwater Quality	City of Albuquerque	17	sign in sheet
2/6/2024	Paradise Hills Community Center	Sustainability Project Public Meeting	Presented and solicited public input on proposed South Valley Street Tree and GSI Pilot Project	Water Conservation, Stormwater Quality	City of Albuquerque	15	sign in sheet
2/7/2024	Los Vecinos Community Center	Sustainability Project Public Meeting	Presented and solicited public input on proposed South Valley Street Tree and GSI Pilot Project	Water Conservation, Stormwater Quality	City of Albuquerque	38	sign in sheet
2/13/2024	Vista Grande Community Center	Groundwater impacts on gardening	East Mountain Gardeners Club meeting	Groundwater		25	sign in sheet from group
2/15/2024	El Nido Farm	Hands-On Rain Barrel and Passive Rainwater Harvesting Workshop for Tree Stewards	Hands-on workshop on how to install a rain barrel and passive rainwater harvesting features. NRS providing instruction for ABC Tree Steward's workshop.	Water Conservation, Stormwater Quality			sign in sheet
2/21/2024	Raymond G. Sanchez Community Center	Parks, Recreation, and Open Space Community Update Meeting	Presented and solicited public input on proposed South Valley Street Tree and GSI Pilot Project	Water Conservation, Stormwater Quality		unknown	
2/24/2024	El Nido Farm	Hands-On Rain Barrel and Passive Rainwater Harvesting Workshop for Tree Stewards	Hands-on workshop on how to install a rain barrel and passive rainwater harvesting features. NRS providing instruction for ABC Tree Steward's workshop.	Water Conservation, Stormwater Quality			
3/2/2024	113 Rio Bravo Blvd. SW (Rail Runner site)	HHW		Stormwater Quality	Clean Harbors		
3/6/2024	Gutierrez Hubbell House	Pajarito NA Meeting	South Valley Street Tree & GSI Project Presentation	Water Conservation, Stormwater Quality			

3/6–3/8/2024	Indian Pueblo Cultural Center	Land and Water Summit	Hybrid conference on protection of land and water resources in arid Southwest and GSI Project Tour. 2024 theme is “Catalyzing Change: Innovating and Adapting.”	Water Conservation, Stormwater Quality			
3/23/2024	Valle de Oro NWR	Build Your Backyard Refuge Day tabling	Presentation of table-top residential GSI model and passive rainwater harvesting field guide (handed out 50+ guides)	Water Conservation, Stormwater Quality			
3/30/2024	Rio Grande High School (Student Parking Lot) 2300 Arenal Rd SW	HHW		Stormwater Quality	Clean Harbors		
Q4							
4/17/2024	2400 Broadway – Land Management	PP/GH	Internal staff training with 20 Land Management field crew	Stormwater		20	sign in sheet
4/21/2024	Balloon Fiesta Park	Earth Day Festival	Passive rainwater harvesting workshop and tabling for Water Conservation and Stormwater Quality Programs	Water Conservation, Stormwater Quality	Arid LID Coalition		
4/27/2024	Raymond G Sanchez	HHW	HHW collection event	Stormwater Quality	Clean Harbors		
4/28/2024	Westside Community Center	South Valley Pride Day	Tabling for Water Conservation, Stormwater Quality, and Hydrogeology Programs at District 2 Community Event	Water Conservation, Stormwater Quality, Hydrogeology			
4/30/2024	Albuquerque Garden Center	Passive Rainwater Harvesting workshop	Workshop for Albuquerque Master Gardeners on design, installation, and maintenance of residential-scale passive rainwater harvesting features, promoting Passive Rainwater Harvesting Field Guide.	Water Conservation, Stormwater Quality			
5/1/2024	ABCWUA Mission	WaterSmart Academy GSI maintenance training	GSI maintenance training for landscape maintenance practitioners	Water Conservation, Stormwater Quality	ABCWUA	7	Headcount at event

5/4/2024	El Nido Farm	Hands-On Rain Barrel and Passive Rainwater Harvesting Installation Workshop for Tree Stewards & Rainwater Harvesting Ambassadors	Hands-on workshop on how to install a rain barrel and passive rainwater harvesting features. NRS providing instruction for ABC Tree Steward's workshop.	Water Conservation, Stormwater Quality	ABC Tree Stewards, Tree NM, Arid LID Coalition		
5/18/2024	Ben Greiner Field	HHW	HHW collection event	Stormwater Quality	Clean Harbors		
5/18/2024	East Central Ministries	Passive rainwater harvesting workshop	Workshop on design, installation, and maintenance of residential-scale passive rainwater harvesting features, promoting Passive Rainwater Harvesting Field Guide. Passive rainwater harvesting kits consisting of plants and mulch provided to participants. 10 am – 12 pm.	Water Conservation, Stormwater Quality	BernCo Open Space (Urban Ag Program), Arid LID Coalition		
6/1/2024	GHH	Flood Irrigation 101	Workshop coordinated by NRS and presented by MRGCD on efficient flood irrigation operations and infrastructure	Water Conservation	MRGCD		
6/8/2024	GHH	Drip Irrigation for Trees workshop	Workshop on how to efficiently irrigate trees with drip irrigation. Participants receive free tree drip irrigation kits.	Water Conservation	BernCo Open Space (Backyard Farming Series)		
6/15/2024	805 Barton Rd, Edgewood, NM (Route 66 Elementry School)	HHW	HHW collection event	Stormwater Quality	Clean Harbors		
6/15/2024	Gutierrez Hubbell House	Laundry-to-Landscape Graywater Systems workshop	Introduction to design, installation, and maintenance of laundry-to-landscape graywater systems, graywater regulations, and Bernalillo County's Graywater Incentive Program (10 am – 12 pm).	Water Conservation	BernCo Open Space (Backyard Farming Series & Urban Ag Program)		
6/15/2024	Carlito Springs Open Space	Carlito Springs Open Space Hydrogeology Walk and Talk	Carlito Springs Open Space Hydrogeology Walk and Talk – Discuss updates and history of the area. How a changing climate is affecting spring flow.	Groundwater	BernCo Open Space (Master Naturalist Program)	40	Headcount at event
6/25/2024	Carlito Springs Open Space	Carlito Springs Open Space Hydrogeology Walk and Talk	Carlito Springs Open Space Hydrogeology Walk and Talk – Discuss updates and history of the area. How a changing climate is affecting spring flow.	Groundwater	BernCo Open Space (Master Naturalist Program), East Mountain Gardners	15	Headcount at event
6/25/2024	25 Frost Rd.	HHW	HHW collection event	Stormwater Quality	Clean Harbors		


ONE
ALBUQUE
RQUE
city of albuquerque

City of Albuquerque

Public Participation Numbers

The City of Albuquerque has provided the following in support of the MS4 permit in fiscal year 2023:

City of Albuquerque MS4 Training:

SWPPP Test: 250 employees

SPCC Test: 63 employees

COA Parks and Open Space

	Volunteers	*Trash (yards)*
Día del Rio	33	3.3
Make a Difference Day	14	1.1
Six Spring Cleanup Days	282	17
National River Clean-up Day	79	24.5
National Trails Day	76	0.5
Total	**484**	**46.4**

COA Solid Waste

Number of people who have dropped off material at Household Hazardous Waste	13,096
Total lbs dropped off at HHW center	541,139
Total lbs recycled at HHW center	429,454
Total lbs re-used at HHW Material Reuse Center	12,414
Number of people re-using materials	1,674
Parti cipants in HHW/DMD Collecti on Event	152
Total lbs collected at Collection Event	13,425

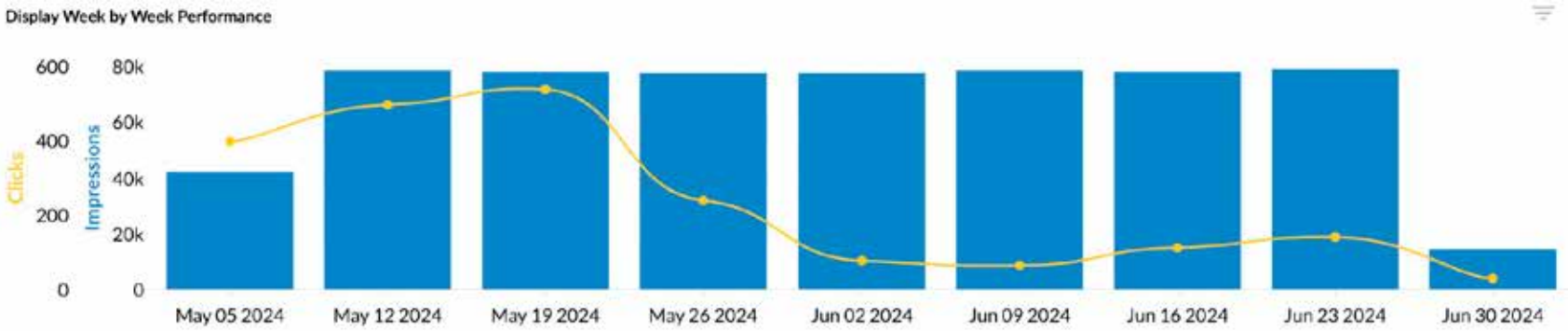
Stormwater Quality

Digital Media Performance

Campaign:
4/15/2024 - 6/30/2024

Programmatic Display

IMPRESSIONS DELIVERED	CLICKS	CTR
602,986	2,084	0.35%



HIGHEST PERFORMING AD SIZES

Mobile 320x50
Impressions: 114,852
Clicks: 372
CTR: 0.32%

728x90
Impressions: 60,567
Clicks: 206
CTR: 0.34%

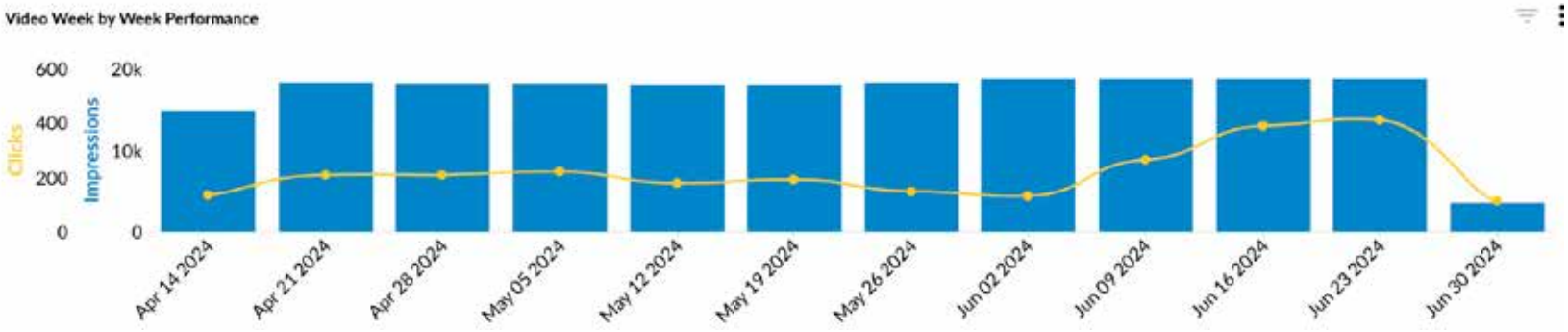
National average CTR for Display: 0.07%

SUNNY505

Mid Rio Grande Stormwater Quality Team

Pre-Roll Video

IMPRESSIONS DELIVERED	CLICKS	CTR	VIEW COMPLETION RATE
202,000	2,585	1.28%	75.31%



National average CTR for Pre-Roll: 0.12%

National average VCR for Pre-Roll: 35%

SUNNY505

Mid Rio Grande Stormwater Quality Team

OTT

VIEW COMPLETION RATES

IMPRESSIONS DELIVERED	50% COMPLETED	75% COMPLETED	100% COMPLETED
101,084	99.98%	99.84%	99.59%

DEVICE EXPOSURE

Smart TV

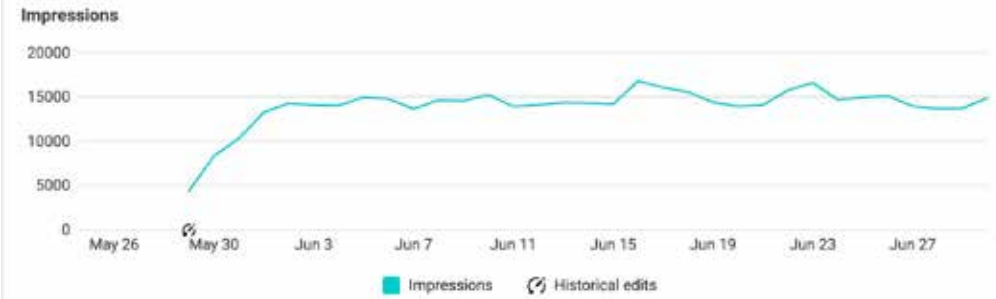
Set Top Box

Game Console

SUNNY505

Paid Social

USERS REACHED	IMPRESSIONS DELIVERED	CLICKS	CTR
94,654	460,702	6,771	1.47%



National average CTR for Paid Social: 1%

SUNNY505

Mid Rio Grande Stormwater Quality Team

YouTube

IMPRESSIONS DELIVERED	CLICKS	CTR
159,664	1,829	1.15%

DEVICE EXPOSURE

Desktop Device

Mobile Device

Tablet Device

National average CTR for YouTube Ads: 0.65%

SUNNY505

Village of Corrales

The Village of Corrales has no municipal storm sewer system. To handle stormwater flows from development, engineered grading and drainage (G & D) plans are required prior to any residential construction that will disturb more than 1,000 square feet. Engineers may design berms, swales, retention ponds and other aspects to keep new impervious surface (roofed or paved) stormwater flows on the subject property and not running into streets or adjacent properties.

Within the Commercial zone, stormwater retention areas must be built into Site Development Plan drawings before those applications can be heard by the Planning and Zoning Commission.

In FY24, the Village saw 22 residential grading and drainage plans prior to issuing building permits. There were three Commercial Site Development Plans that incorporated drainage (primarily retention ponding) into their designs, as required by Village Code.

The Public Works Department installed an underground stormwater conveyance near Burlbaw Lane, which has an extreme slope throughout the entire neighborhood. Traditionally this has been a trouble area where stormwater would race down the properties and across Loma Larga, one of Corrales' main north/south corridors, temporarily closing the road. A new, deeper retention area that is part of the project will now keep the flows from flooding the road, ditch, and ultimately the Rio Grande.

This fiscal year, the Corrales Bosque Advisory Commission in conjunction with the Corrales Fire Department continued their efforts to encourage dog waste pick-up along popular pedestrian areas into the Bosque and elsewhere in the Village. There are nine waste bag stations and trash receptacles located at Bosque access gates, Camino de la Tierra (entrance to popular Sand Dunes walking area) and at Quirks Lane. CBAC provided approximately 8500 dog poop bags in/near the Bosque, and an additional 500 bags at the other location, same as last fiscal. This will greatly reduce the amount of dog waste otherwise in danger of polluting the acequias, canals or Rio Grande.

The glass recycling area continues to operate. This fiscal, the Village recycled another 80.5 TONS of glass.

The Village is continuing the twice-a-year (spring and fall) community "Clean-Up" days, accepting nonhazardous and yard waste. Approximately 200 households per year participate. Our Code Enforcement Officer works with citizens throughout the year to have them remove trash, non-functional vehicles and other items that could leak fluids into the groundwater. There is no municipal water system; all structures are serviced by wells.

Every year during the Corrales Harvest Festival, which is attended by folks from throughout the metro, a Stormwater Team booth educates the public on the importance of keeping waste, oils, floatables and other items out of the river.

Children's Water Festival

Rio Rancho, 2023

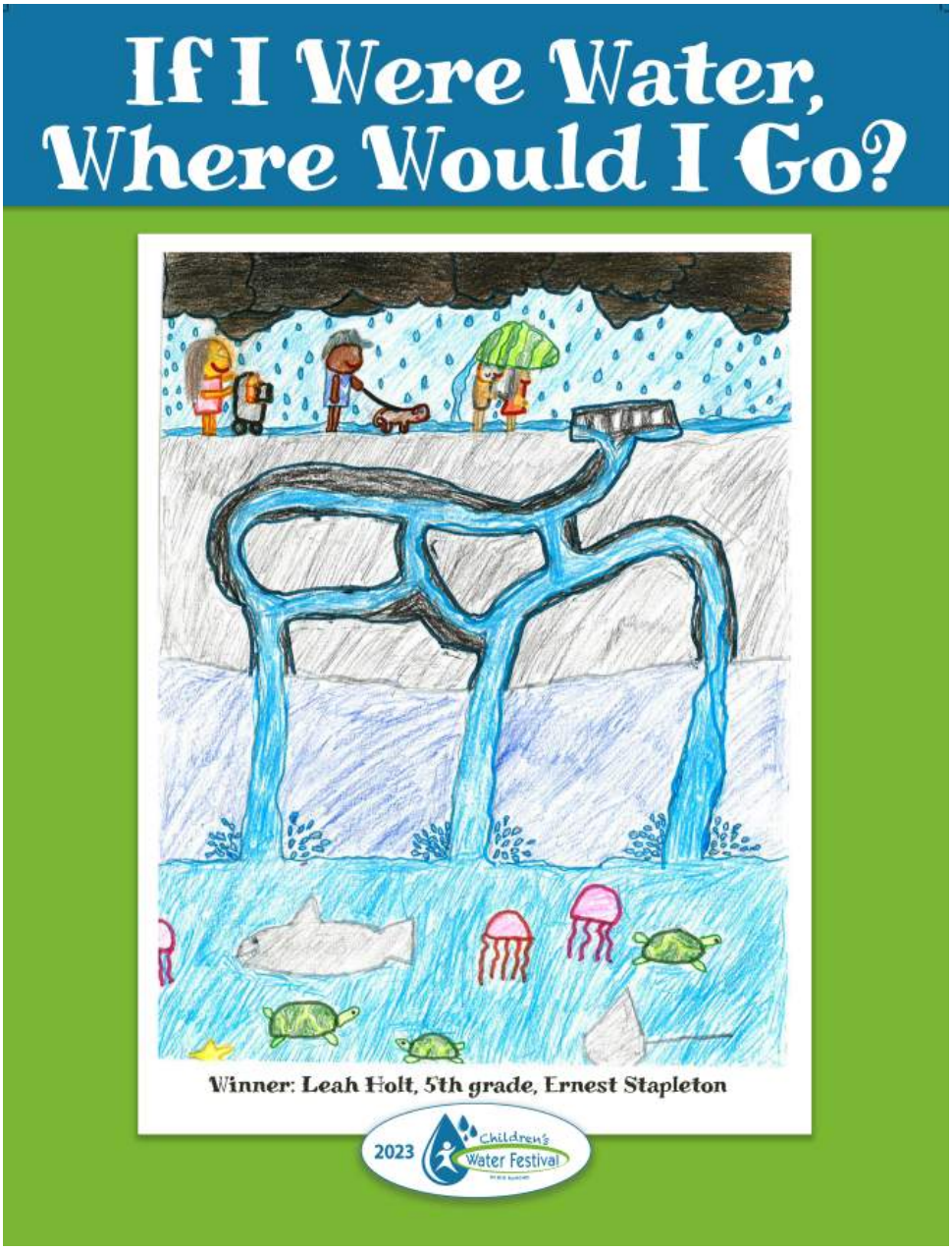


Table of Contents

Executive Summary

The 2023 Children's Water Festival (Festival) was held on Monday, October 23rd and Tuesday, October 24th at the Rio Rancho Events Center in Rio Rancho. Due to the pandemic, changes were made to the size and structure of the Festival to better accommodate the students and to give them a better all-around experience. Historically, fourth grade students attended the Festival. There was a change in school curriculum and for the past two years fifth grade students were invited to better fit into the schools' science learning objectives. Additionally, students attended from one-half of the Rio Rancho elementary schools' students, as the other half of the Rio Rancho elementary schools attended in 2022. Over 780 students from 34 classrooms, from Enchanted Hills, Vista Grande, Ernest Stapleton, St. Thomas Aquinas, Sandia Vista, Colinas Del Norte, and Cielo Azul Elementary Schools participated. Each class attend 4, 25-minute presentations. Seventeen hands-on presentations taught water-related ideas and concepts to the students.

The Festival had 49 presenters/associates and 18 volunteers to guide the classes to the assigned activity.

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

Students were evaluated on basic water knowledge after the Festival. There were eight questions asked of the students and they averaged between 55% to 90% correct on the questions. A more detailed breakdown is found in the Student Post-test Scores section.

The Festival costs an estimated $26,516.63. The City of Rio Rancho contributed $10,000 to the Festival and additional funding was raised through Ciudad Soil & Water Conservation District. Festival sponsors include: TLC Plumbing, Jacobs, Waste Management, Southern Sandoval County Arroyo Flood Control Authority, Carollo Engineering, Resource Wise, Daniel B. Stephens & Associates, Bright Ideas Promotional Products, and CWA Strategic Communications.

Introduction

The Children's Water Festival (Festival) has been held in Rio Rancho since 2007. The 2010 Festival was the first event hosted by the City of Rio Rancho's Water Conservation Office. This report is for the 2023 Festival; the twelfth event hosted by the Water Conservation Office. There was a two-year hiatus because of the Covid-19 Pandemic. As in years past, the Festival was held at the Rio Rancho Events Center and about 780 students attended from 34 fifth grade classrooms from Rio Rancho Public Schools and one private school. The event was held on Monday, October 23rd and Tuesday, October 24th.

Purpose and Intent

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

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

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

The Festival was designed specifically to introduce and explain new and unfamiliar water management tools to present and future water users and managers. Research concerning water conservation education indicates the targeted group of the Festival, fifth grade students, is ideal for achieving long-term goals. Through sharing water conservation and water quality tools at home and with extended family, the estimated 800 participants (students, teachers, and chaperones) represent a potential audience of 10,000 to 15,000 people for the Festival program.

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

The updated Water Resources Management Plan (Plan), adopted by the City of Rio Rancho Governing Body in 2020, details water efficiencies and water conservation measures to be taken by the City to better manage the existing water supplies. Policy E.5 of the Plan sets forth this initiative: "Continue consulting with and improving the partnership with Rio Rancho Public Schools to implement a robust water resources educational curriculum."

Additionally, the City of Rio Rancho Strategic Plan was formally adopted by the City of Rio Rancho Governing Body on March 25, 2009 and updated in September 28, 2023. One important element of the Infrastructure Strategies section of the Strategic Plan pertains to water sustainability and conservation to support growth and development of the City.

Funds

Festival Cost

The Festival costs are listed in the table below. Please note that the cost for the Rio Rancho Events Center is only for the personnel time, including two police officers per day for security. The pipe and drape for the booth setup was bought by the Festival in previous years so there is no pipe and drape rental. A private bus company is used because there has been issues in the past with the public-school buses not arriving at the schools on time to pick up the students and deliver them to the Festival.

Cost Description	**Amount**
Rio Rancho Events Center	$3,080.25
Catering for volunteers & presenters	$3,494.18
Buses (Herrera Coaches)	$11,029.00
T-shirts with art/logos (805 shirts)	$7,295.00
Supplies (paper, postage, thank you cards, etc.)	$618.20
Fiscal Partner	$1,000.00
Total	**$26,516.63**

Sponsorships

Through its fiscal partner, Ciudad Soil & Water Conservation District, the City of Rio Rancho was able to secure several sponsors to fund the Festival. Additionally, the City sponsored $10,000 for the Festival.

A heartfelt "thank you" to these valuable Festival partners!

Steering Committee

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

- City of Rio Rancho's Water Conservation Office
- New Mexico Environment Department – Surface Water Quality Bureau
- Citizen volunteers

Design of Festival

Students attended four presentations at the Water Festival.

Pre-Festival Activities

- Each school provides a lead fifth grade teacher who confirms their commitment to participate, provides the number and names of the teacher/classes and the number of anticipated students for each.
- Elementary schools are provided the information on how to participate in the student T-shirt artwork project; student art work is submitted to the Water Conservation Office and a winner is selected by the committee.
- Teachers received the T-shirts prior to the event in order for students to wear them to the festival.
- Students take a pre-test in order to gauge their knowledge prior to the event. A post-test is given after the event to see how much students learn. More information can be found in the Post-Test section of this report.

Rio Rancho Children's Water Festival Event

- The Water Festival functioned from 10 a.m. through 12 p.m.
- Students attending the Festival boarded on buses at 9:30 a.m. at their school.
- Each class was met by a guide/timekeeper who escorted them to each of their four assigned presentations.
- Presentations lasted 25 minutes and topics included: water quality, water conservation, water cycle, watersheds, wastewater, historical water use, ecosystems, weather, and built water infrastructure.
- All students received a Festival T-shirt. Leah Holt from Ernest Stapleton Elementary, was the winner of the T-shirt student artwork contest. Her design was displayed on the front of the T-shirt and Festival sponsor logos were on the back.

Leah Holt – T-shirt artwork winner from Ernest Stapleton Elementary class

Post-Festival Activities

- Teachers will receive a copy of this report.

All aspects of the Festival planning and implementation were created with the *Big Water Questions* in mind. Each presentation addressed at least one of the *Big Water Questions*, as well as the Festival's mission and objectives. The long-term outcome goal is that all elementary school students will be able to provide reasonable answers to these questions by the time they reach middle school.

Big Water Questions

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

Schools Attending the Festival

The following table outlines which schools attended.

Elementary School	**Number of Classes**
Enchanted Hills Elementary	5
Vista Grande Elementary	6
Ernest Stapleton Elementary	6
St. Thomas Aquinas Elementary	2
Sandia Vista Elementary	5
Colinas Del Norte Elementary	4
Cielo Azul Elementary	6
Totals	**34**

Festival Presentations

"Backyard Bass Fishing" activity. Students learned how water quality impacts aquatic life. Correct fishing technique was also taught and practiced.

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

Volunteers

The Festival could not be held without the assistance of a number of volunteers, presenters, and steering committee members. Volunteers were required to use the City's on-line application process to have a background check.

Lessons Learned

Steering Committee Comments from the Festival

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

Event Aspect	Overall Performance	Areas of Improvement
Communication/coordinating with schools	Good overall	Continue to prioritize meetings with the teachers early on regarding Water Festival logistics. It would be beneficial to contact teachers as soon as school year starts.
Transportation	Went well	Some buses were a little late picking up the students from school or from the event center. We will need direct contact with bus drivers going forward.
Presentations	Presenters were enthusiastic	Make sure to go over the key words/concepts. Give presenters the schedule ahead of time. Presenters should have enough material (or filler) to engage the students so they don't finish too early. Ensure that presenters are speaking at an appropriate volume for students and teachers to hear.
Transition between presentations	Average	More detailed trainings for guides. The guides had blue vests this year which made them easy to locate. Students should stay at current stations until end of allotted time.
Food	Good overall	Due to labor and food costs increasing, some items were adjusted to fit the budget.
Logistics (Public safety, RREC)	Good overall	Need sign in sheets for Master Gardeners. Also need separate sign in sheets for volunteers and presenters. Decorations were added this year- less balloons and more streamers going forward. Utilize the facility capabilities by using lights, banners, and sound system.

Break (20 minutes)	N/A	There was no break this year as we had morning sessions only for two days.
T-shirts	Above average	Order majority mediums and fewer smalls next year. Larger sizes were in demand this year – mostly large.
Training of guides/teachers, etc.	Could be better	No student should be by themselves. They need to be accompanied by teachers. Reminder should be announced at beginning of event.
General		Set up should be done many hours in advance so presenters can easily locate their station. Presenters swapped stations this year which made the map inaccurate and guides confused. This should be avoided next year and if it occurs, the map should be updated immediately. Have a media person help with medial release. Have a Water Festival webpage (need to discuss with city management). "Thank You" banner for sponsor did not fit our stand – we will need to adjust this for next year.

Action Items:

- Need to replenish the supply of SWAG – bags, fans, stress balls etc.

Festival Event

The two days of the Festival ran very smooth. A private bus company was used because of issues with RRPS buses the past several years.

We did not have a dedicated photographer this year. Volunteers and Staff took many photos asking the teachers what students to not photograph. Teachers were in charge of the photo release forms so they informed us of what students did not return the form. Photo release forms were collected the day of the event.

Appendix A - Working Timeline

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

- June 30 - Ask for sponsors
- July 30 - Update VIP list
- July 30 – Reach out to presenters
- August 1 – PO for RR Sponsorship
- August 1 – PO for Buses
- August 8 – RR schools starts
- August 20 – Design poster with the theme
- August 20 - Email teachers about CWF date and artwork delivery
- August 22 – Drop off artwork paperwork, poster, photo release forms
- September 6 – Email volunteers
- September 6 - Email reminder to teachers including schedule
- September 6 – Pick up artwork, photo release forms
- September 13 – Meeting to select the winner
- September 13 – Artwork to Rio Rancho T Shirts
- September 15 - Update VIP list and mail invitations
- September 20 - Meet with RREC about food, etc.
- October 13 – Pick up T Shirts
- October 15 - Email layout to RREC
- October 18 – Meeting to pack bags of t-shirts
- October 20 – Drop off bags this day
- October 23rd and 24th – Water Festival
- October 27– Remind teachers about post-test and teacher evaluation sheets. Volunteer feedback forms also sent out.

Appendix B – Festival Presentations

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

****

Basic Surface Water Treatment

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

Carollo Engineers
Rob Buss rbuss@carollo.com

****

Incredible Journey

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

NM Environment Department, Surface Water Quality Bureau
Heidi Henderson heidi.henderson@state.nm.us

A similar activity found on web: Incredible Journey, Project WET http://files.dnr.state.mn.us/education_safety/education/project_wet/sample_activity.pdf

****

Keep the Rio Grande

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

Middle Rio Grande Stormwater Quality Team
Xavier Pettes (505) 891-5045 xpettes@rrnm.gov

****

Leaky Faucet

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

Resource Wise
Lonnie Burke (505) 453-0027 lburke@resource-wise.com

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

****

Let's Settle This Outside

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

Jacobs

Bill Jaquez	(505) 891-5024	billy.jaquez@jacobs.com
Eric Jacquez	(505) 537-1712	Eric.Jaquez@jacobs.com

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

****

Rolling River

How does a river work? Students interact with a model watershed and watch the cause and effects of precipitation as it flows down-gradient from urban and rural environments. Students learn about "pervious" and "impervious" surfaces and their relationship with the water cycle, including pollutant transport and increased erosion. Students learn that their personal actions can protect their watershed.

Ciudad Soil and Water Conservation District

Steve Glass jstvglass@gmail.com

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

****

Sustainable Tomorrow

WM of New Mexico host a giant pong game designed to help students learn how to Reduce, Reuse and Recycle as ways to help conserve water and other natural resources. Following a short interactive presentation, students step up to a collection of mini basketballs labeled with different materials such as Plastic Water Bottle, Cardboard Box, Blue Jeans, etc. The object of the game is to get the material (noted on the basketball) into the correct bucket – either Recycle, Reuse or Reduce. In action, the game offers the dual challenge of learning what the greenest option for different materials was and then getting the bouncing ball into the right 3-gallon bucket.

Waste Management

Anne Spitza aspitza@wm.com

****

Olla Olé

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

Citizen

Cheri Vogel and Teresa Harner cheri_vogel@yahoo.com and tjarner@comcast.net

****

Wateropoly

Modeled after the game Monopoly, a board game that teaches children ways to conserve water and how water is wasted. The game involves math – adding, subtracting, multiplying and using fractions. Students will see how many gallons of water they have remaining at the end of the game.

City of Rio Rancho

Matthew Gachupin mgachupin@rrnm.gov

****

My Water Footprint

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

New Mexico Office of the State Engineer, Water Conservation Bureau

Ariana Gagnon arianna.gagnon@ose.nm.gov

****

Stormwater and Watersheds

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

Sandia National Laboratories
John Kay (505) 344-7240 jtkay@sandia.gov

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

****

Water Jeopardy

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

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

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

****

Flash Flooding

This activity demonstrates several ways flash flooding can occur utilizing our flood model. We allow the kids to use a pitcher of water to demonstrate rainfall and how rain-rate affects flash flooding. The model uses sponges to show how the ground can soak up a lot of that rainwater but eventually it runs off into the streams, arroyos and eventually rivers. If the ground or sponge is saturated, then all the rainfall runs off into the drainage areas. We have toy houses to show what happens to houses in flood prone areas and how to build levees to protect structures. We could change out the sponges or ground for a flat plexiglass surface to represent concrete. We could show how the "concrete" does not catch any rainfall and it immediately runs off causing flooding. We also demonstrate by moving our rain catcher how flooding changes with moving storms or how it changes with the speed of storms. These demonstrations let us have conversations with the kids and teachers about flood safety and preparedness.

National Oceanic & Atmospheric Administration, National Weather Service
Scott Overpeck scott.overpeck@noaa.gov

****

Build a Wastewater System

Students learn about the wastewater system and how they operate in a community. They learn how wastewater is generate in their homes and travels through piping to the wastewater treatment plant. Information regarding water treatment plants and pipe sizing is incorporated. Students build their own wastewater system by using different sized noodles for piping, and drawing their own city including homes, businesses and treatment plants.

City of Rio Rancho
Ethan Demello edemello@rrnm.gov

****

Water Cycle Paper Plates

Students discuss all aspects of the water cycle and the role it plays in water conservation. Paper plates will be used to visualize each step of the water cycle.

Albuquerque Open Space
Ellie Althoff ealthoff@cabq.gov

****

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

Bosque Eco System Monitoring Program
Zoe.Wadkins@bemp.org

****

Pump It Up! All About Aquifers
Students learn about the important role aquifers play in supplying water. Logistics of how aquifers work will be discussed and students will get to be their own aquifer on a smaller scale through soap push pumps.

United States Geological Survey
Lydia Coenen lcoenen@usgs.gov

****

Backyard Bass Fishing
What is fishing without fish? Students learn the importance of water quality and its affect on aquatic life. Proper and safe fishing techniques will also be taught and students will be able to practice.

New Mexico Department of Game and Fish
Dennis Segura dennis.segura@dgf.nm.gov

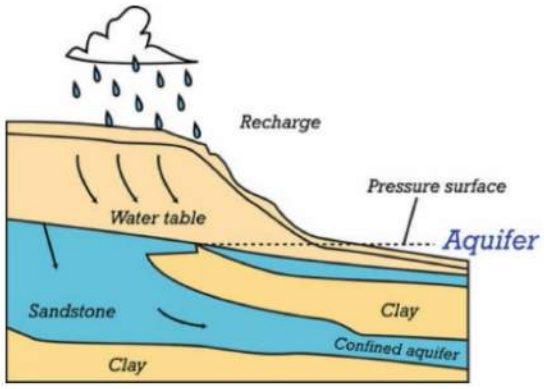
Appendix C - Post Test

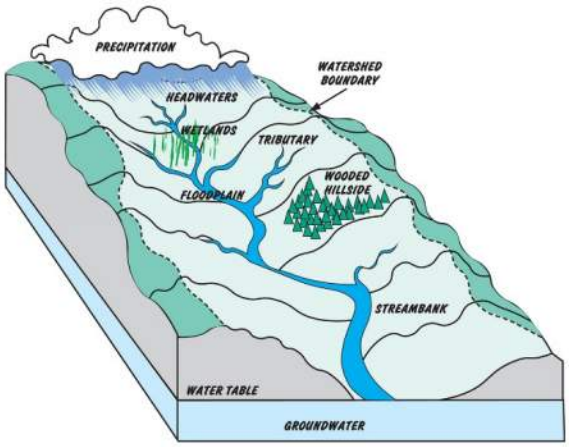
The Festival steering committee rewrote the student test in 2017; diagrams and pictures were added to help the students visualize the concepts. In 2019, Google Forms was used with the Rio Rancho students to take the tests. These tests were without diagrams and pictures.

The tests were written in Google Forms to be used and diagrams and pictures were added. Point values were assigned to the test questions based on teacher recommendation.

1. Many substances and objects can make river water dirty. Which of the following items can make the Rio Grande dirty?
   a) Trash
   b) Dog poop
   c) Leaky cars
   d) All the above

2. An **aquifer** is a layer of water-saturated porous rock. It lies below the water table. Most people who live in New Mexico get drinking water from a well drilled into an aquifer. If you live in Rio Rancho, is the water coming from your faucet from an aquifer?
   a) True
   b) False



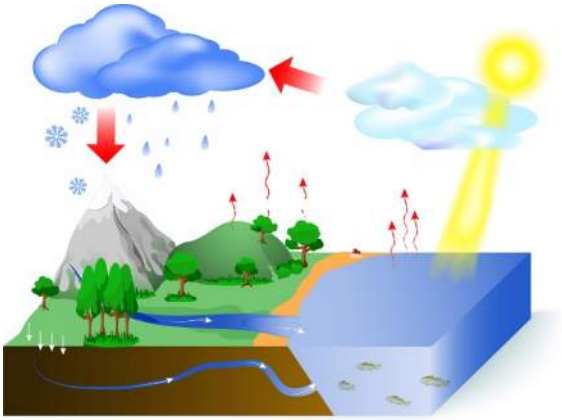


3. A **watershed** is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel. Is the following statement true or false: We all live in a watershed?
   a) False
   b) True

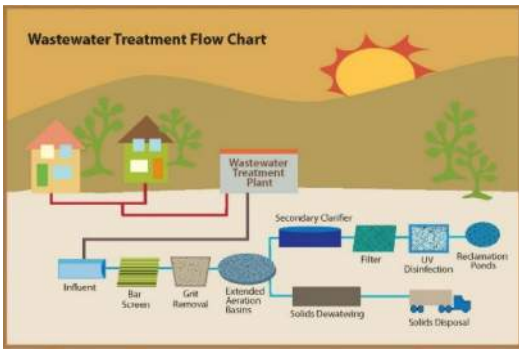
4. Everyone in Rio Rancho uses, on average, about 65 gallons of water per person per day. If you have four people in your home, what is your family's daily average water use?
   a) 260 gallons of water per day
   b) 200 gallons of water per day
   c) 2,600 gallons of water per day

5. Water users in our state include plants, animals, and people. Why is water so important to life?
   a) People need it to survive
   b) Plants need it to survive
   c) The river needs it to support nature
   d) All the above

6. The **water cycle** happens as the earth is warmed by the sun and water circulates between the earth's oceans, atmosphere, and land. Which of the following are terms associated with the water cycle?
   a) Pumping, Treatment, Delivery
   b) Evaporation, Condensation, Precipitation
   c) River, stream, aquifer



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



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

Appendix D – Student Tests Scores

The following table shows the percentage of correct answers on both the pre and post-test. The test was given through Google Forms and there was no distinction between specific classes. Not every student from every school provided pre and post-tests. The questions are in the same order as in Appendix C.

Post-Test Scores:

Question	Elementary School Name					
	Enchanted Hills	Cielo Azul	Ernest Stapleton	Sandia Vista	Vista Grande	Average
What makes water dirty?	74%	68%	92%	86%	78%	79%
Is water from the aquifer?	96%	88%	92%	84%	92%	90%
Do we live in a watershed?	46%	54%	65%	47%	65%	55%
How much water is used? (math equation)	90%	78%	80%	78%	82%	82%
Why is water important to life	77%	75%	80%	82%	84%	80%
Water cycle	64%	72%	65%	62%	64%	65%
How can we protect water?	90%	86%	95%	93%	88%	90%
What is wastewater?	77%	90%	87%	86%	85%	85%

*Note there was no data for St. Thomas Aquinas as they do not use the Google Forms format.

As in year's past, the students do not have a good understanding of what a watershed is or the fact that we all live in a watershed. They also had problems with what is the water cycle.

Pre-Tests Scores:

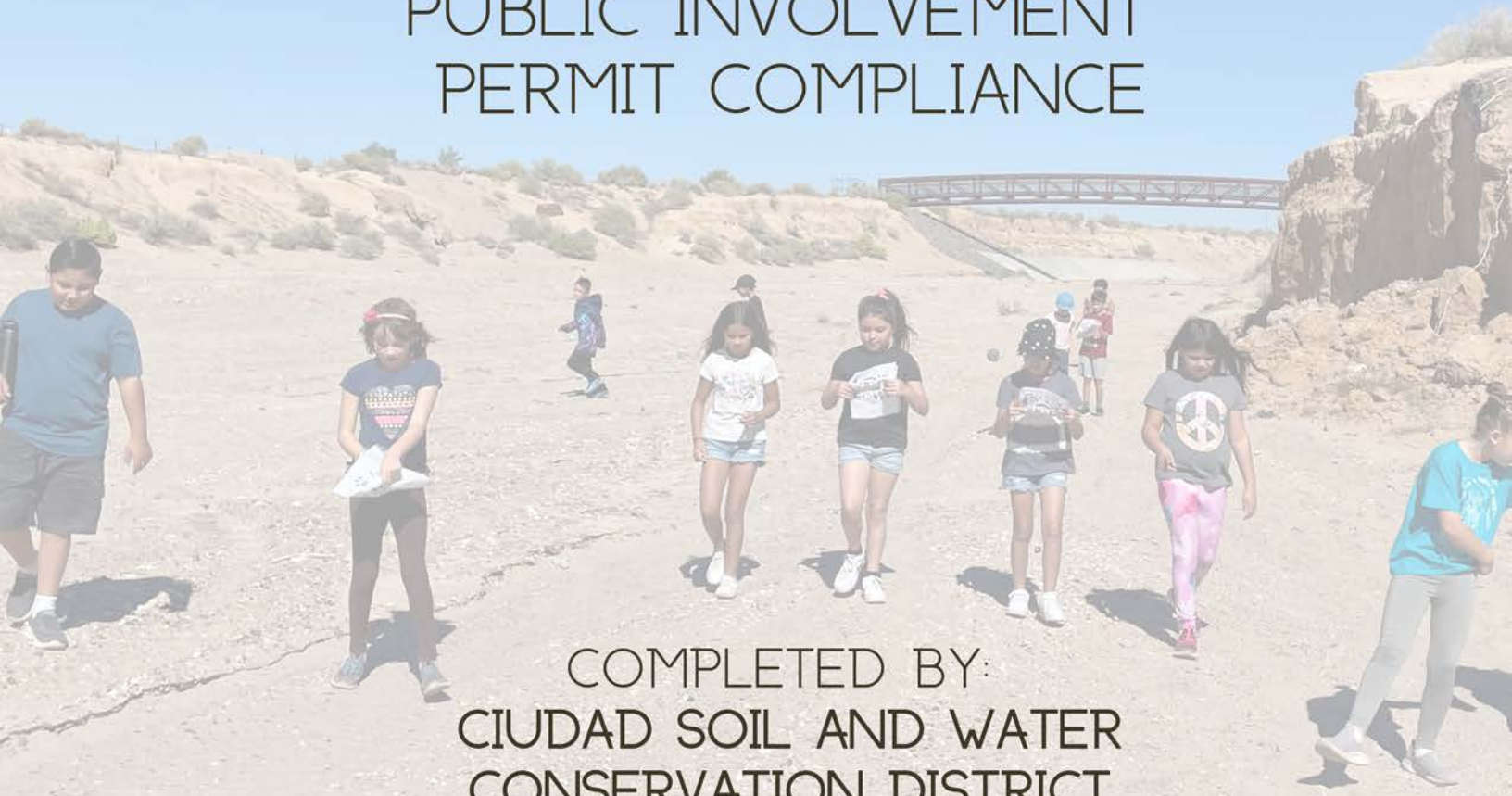
Question	Elementary School Name					
	Enchanted Hills	Cielo Azul	Ernest Stapleton	Sandia Vista	Vista Grande	Average
What makes water dirty?	71%	N/A	70%	69%	57%	66%
Is water from the aquifer?	76%	N/A	80%	72%	80%	77%
Do we live in a watershed?	42%	N/A	45%	45%	33%	41%
How much water is used? (math equation)	87%	N/A	71%	66%	66%	72%
Why is water important to life	80%	N/A	75%	74%	70%	74%
Water cycle	53%	N/A	62%	52%	54%	55%
How can we protect water?	83%	N/A	92%	84%	77%	84%
What is wastewater?	78%	N/A	84%	75%	79%	79%

*Cielo Azul only had one student take the pre-test so data percentage per answer was not calculated.

MIDDLE RIO GRANDE WATERSHED

MS4 REPORT

EDUCATION & OUTREACH; PUBLIC INVOLVEMENT PERMIT COMPLIANCE



COMPLETED BY:
CIUDAD SOIL AND WATER CONSERVATION DISTRICT
JULY 2023-JUNE 2024

Introduction

For fiscal year 2024, The Middle Rio Grande Stormwater Quality Team (MRGSQT) and Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) provided Ciudad Soil and Water Conservation District (Ciudad SWCD) with a total $101,651.00 in funding to provide educational services in accordance with the requirements set forth in the EPA Municipal Separate Storm Sewer System Permit No. NMR04A000 (the MS4 Permit) for Education & Outreach and Public Involvement compliance. The funding provided by MRGSQT and SSCAFCA support the RiverXchange and Arroyo Classroom youth education programs, however Ciudad SWCD also provides additional educational services within the watershed outside the funding agreement that contributes to MS4 permit compliance. Ciudad SWCD is deeply invested in education and outreach programs as a strategy to address areas of natural resource concerns outlined in Ciudad SWCD's long-range action plan and demonstrates this commitment with years of successful educational programming. Ciudad SWCD is also a non-permittee member of the MRGSQT and our role is to promote collaborative, effective partnerships within the watershed. This report encompasses Ciudad SWCD's programs, activities and projects that contributed to the education and stewardship of watershed health in the Middle Rio Grande Watershed, reaching 7,319 individuals this fiscal year.

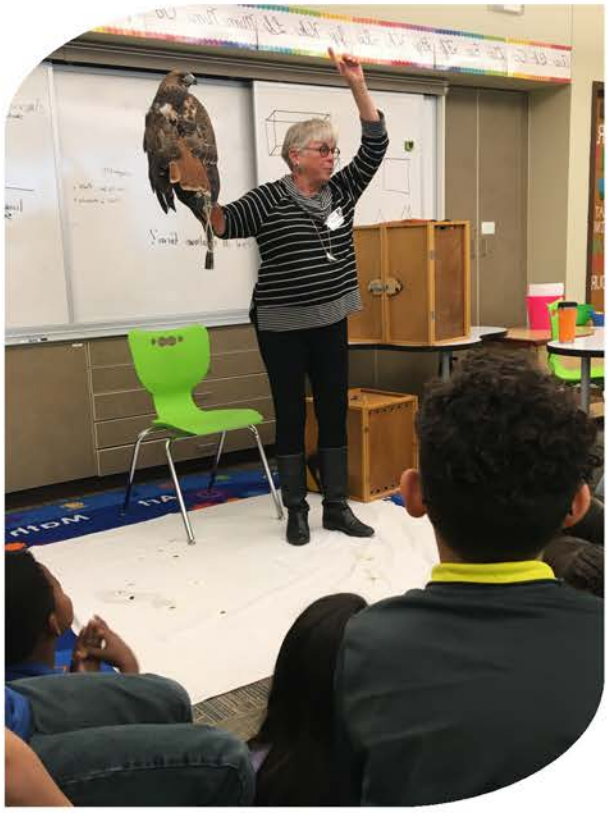
MRGSQT & SSCAFCA
FUNDED YOUTH PROGRAMS

RiverXchange®

RiverXchange® is a watershed education program for 5th graders which is comprised of guest speakers, hands-on activities and a conservation field trip with a class-led action project that incorporates the EarthForce organization's process for Environmental Action Civics. The EarthForce process is an educational approach where youth and adults work in partnership to identify a local environmental issue and engage with community members to take action by advocating for systemic changes to policies or practices. The EarthForce process aligns strongly with RiverXchange® objectives as it allows students and teachers to understand more deeply and think critically about watershed issues, while engaging a larger audience in taking action for change. RiverXchange® is appealing to teachers because it addresses many grade-level Next Generation Science Standards, social studies benchmarks, as well as Common Core Language Arts Standards and promotes project-based learning and access to outdoor learning.

Arroyo Classroom

The Arroyo Classroom program, for 3rd graders, consists of a four-part series of lessons utilizing the arroyos as outdoor classrooms. The lessons teach students about local desert plant and animal species, their physiological adaptations and their role in the environment by means of walking field trips and live wildlife visits to classrooms. All lessons include a component about conservation and arroyo safety, including discussions on ATV use, removal of pet waste, trash/debris and impacts on arroyo inhabitants and stormwater quality, set to grade-level science standards and age appropriate messages. Arroyo Classroom also supports the Next Generation Science Standards and increases access to outdoor learning.



"Students were engaged and learned a lot in the process. They felt that they actually could make a difference with their actions." -Beer, Cochiti ES, RiverXchange teacher

RIVERXCHANGE® 2023-2024

EDUCATION FOR UNDERSTANDING AND PROTECTING WATERSHED HEALTH

Executive Summary

During the 2023-2024 school year, RiverXchange® served **897** 5th grade students and **41** teachers across **13** schools, 10 of which were Title I schools. Each student engaged with a minimum of 10 hours of programming provided by Ciudad SWCD staff and partners. Classrooms who completed an action project engaged in an addition 5-10 hours of the program. Contributions from partner time, and student and adult volunteers on the conservation field trip provided a total of **$105,871.00 of in-kind match** this school year. MRSSQT provided $48,477.00 and SSCAFCA provided $22,374.00 for a total of **$70,851.00 in cash** for program coordination, bus costs, teacher stipends and materials.

41 Teachers

Teacher Professional Development

Teachers are invaluable participants in RiverXchange® and are a key audience for the program. RiverXchange® serves teachers by providing a teacher workshop that helps strengthen their own understanding of watershed health through experiencing science and project-based activities they can use in the classroom to support RiverXchange®, the Action Project, and other curriculum. Teachers learn from other teachers, partners and RiverXchange® staff at the teacher workshop and receive a stipend for attending, along with other materials and resources for their classrooms.

Post Program Teacher Feedback

Upon completion of the program, teachers are asked to fill out a survey providing feedback about the program. 27 participants responded, with overwhelmingly positive feedback. **97% of respondents said students had made meaningful connections between human actions, stormwater and pollution** with evidence such as "children [are] thinking about [the] use of various pollutants, and trying to keep things clean *'so they wouldn't get into the river'."*(Carty, Seven Bar ES)

"The greatest learning outcomes for my class as participants in RiverXchange was focusing on the **importance of water in our ecosystem**. Another **big learning outcome was to be stewards within our school community**. Many students were able to **discuss bigger issues they see towards the end of program compared to the beginning**." Martinez, Valle Vista ES

"My students are **more invested now** in taking care of the environment, protecting natural resources and **being more responsible stewards of their community**." Ortiz y Martinez, Chaparral ES

RIVERXCHANGE® CURRICULUM

EDUCATION FOR UNDERSTANDING AND PROTECTING WATERSHED HEALTH

The RiverXchange® Curriculum introduces a wide range of water resource topics with the goal of bringing awareness to their role in protecting watershed health. Within the curriculum, all *897 students engaged with grade-level appropriate lessons that covered the following required MS4 topics*:

897 Students

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF OIL, HOUSEHOLD HAZARDOUS WASTE
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

Presentations

Each class in RiverXchange® experienced presentations on Drinking Water, Wastewater, Stormwater and River History. Students in Rio Rancho Public schools also received an Agriculture & Water presentation.

Partners that provided these presentations are:

- Albuquerque Bernalillo County Water Utility Authority
- Sandia Labs
- City of Rio Rancho Utilities Department
- Sandoval County Cooperative Extension Services
- City of Albuquerque Open Space Division
- Ciudad Soil and Water Conservation District Board Chair, Steven Glass

303 trees planted

41 shrubs planted

Conservation Field Trip

Thanks to a long-standing partnership with City of Albuquerque Open Space Division, RiverXchange® students are able to participate in the Conservation Field Trip where they help to restore the Bosque riparian ecosystem by planting native species such as Cottonwood, Coyote Willow, Four Wing Saltbush, New Mexico Olive and seed native grasses. In addition to the **749 students** recorded in attendance across December through March this year, **112 adults** joined in the effort to steward the Bosque by learning restoration practices guided by Open Space and Ciudad SWCD staff.

RIVERXCHANGE® ACTION PROJECT

EDUCATION FOR UNDERSTANDING AND PROTECTING WATERSHED HEALTH

The RiverXchange® Action Project is a process by which students and teachers work together to determine an issue of concern, engage with stakeholders, decision-makers and community members to research their issue, and take informed action with the goal of changing or positively influencing a policy or practice to improve an environmental outcome.

Criteria for Action Projects to be submitted for an award:

- Student Voice and Participation
- Practicality
- Civic Engagement

4,471

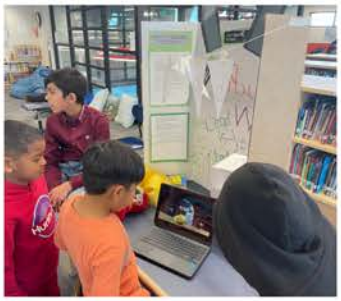
individuals impacted by action projects

News reports are a great tool to share student voices with other classes on campus!

Action Project Submissions

14 classes officially submitted their Action Projects for the reward of a pizza party, however, more teachers reported doing an Action Project in the teacher feedback. Of those who submitted, the projects varied from campus clean-ups, trash to treasure campaigns, water conservation campaigns, the creation of bilingual resources, and public service announcements. In total, teachers reported reaching 4,471 individuals through their projects, mostly from school-wide efforts by RiverXchange® students to educate others and change community practices such as littering. A few examples of the amazing RiverXchange® students are shared here!

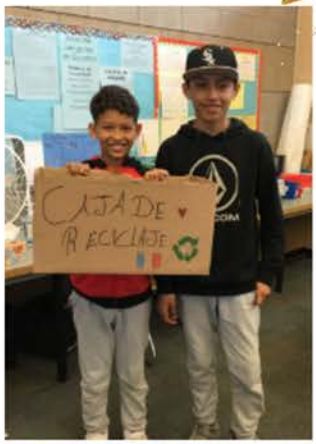
STUDENTS INVESTIGATE ISSUES AND USE THEIR VOICE TO SHARE THEIR KNOWLEDGE



Shown above are students who investigated the Villain of the Water Supply by doing literature research, talking to experts, and then presented their findings in an exhibition with over 50 members of community, families, and school admin in attendance. Each presentation included a proposed solution or action to take to address their issue of concern, like adding more "grates" to storm drains to filter out trash (above right).

"'Dear Person in Power, We believe that litter is a villain to Albuquerque's water supply. Are you aware of the litter in Albuquerque, New Mexico's water supply. Litter is poisoning the water supply. What goes into the storm drain goes into the Rio Grande River. When trash and dog poop and other things go in the storm drain all of that goes into the River."
-Excerpt of student letter from "Villian" exhibition

STUDENTS CREATE INVENTIVE WAYS TO ENGAGE PEERS IN THEIR CAMPAIGNS FOR CHANGE - "TRASH TO TREASURE"



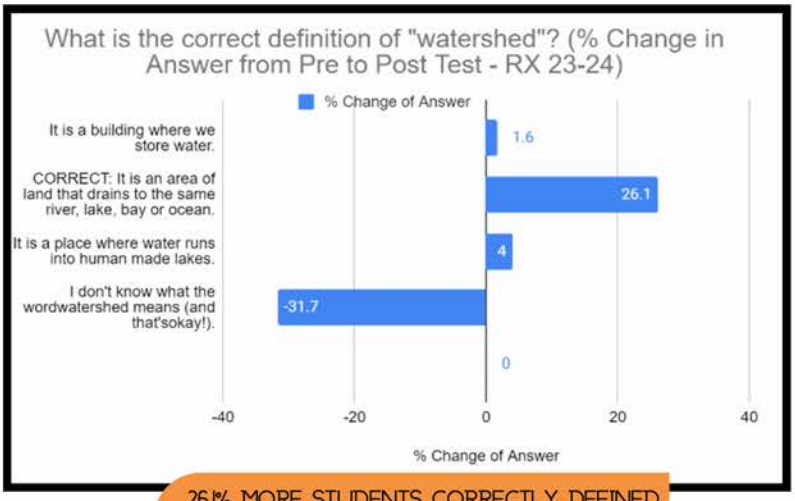
Pictured to the left are students who completed the action project process by completing a campus walk to identify environmental issues, talked with teachers and admin about concerns, selected litter as their issue, developed a plan to reduce litter, conducted a school survey to determine effective methods for change and created a Trash to Treasure recycling program to encourage recycling and teach about the impacts of litter!

RIVERXCHANGE®

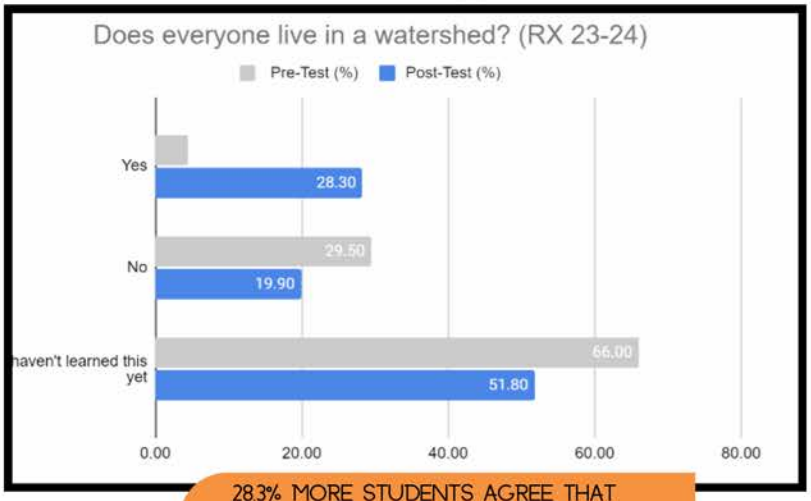
EDUCATION FOR UNDERSTANDING AND PROTECTING WATERSHED HEALTH

Program Evaluation

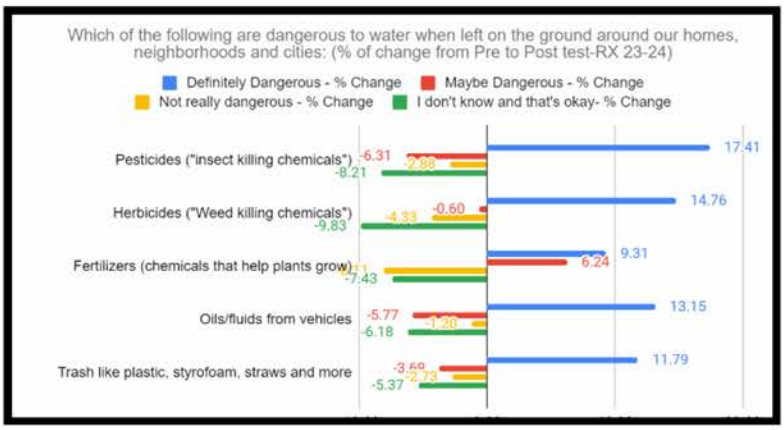
Qualitative evaluation of the program is compiled via teacher feedback through short answer questions, which concludes that the program was successful in helping students make connections between their actions, stormwater and watershed health and that the program was a positive experience for teachers. Quantitative evaluation is conducted through pre and post student surveys. The metrics of these surveys demonstrate a positive percentage change of correctly identifying the definition of a watershed and the impacts of pollution on water quality (i.e. pet waste, pesticides, herbicides, fertilizers, oils, and trash). 732 students completed the pre-survey and 492 students completed the post-survey.



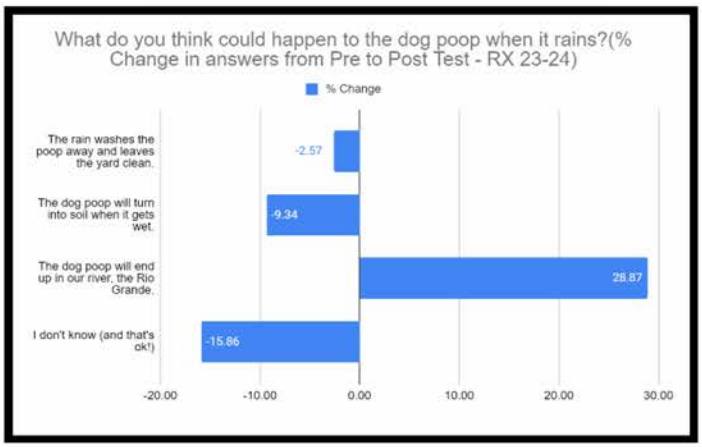
26.1% MORE STUDENTS CORRECTLY DEFINED "WATERSHED" AFTER THE PROGRAM



28.3% MORE STUDENTS AGREE THAT EVERYONE LIVES IN A WATERSHED AFTER THE PROGRAM



APPROXIMATELY 10%-20% MORE STUDENTS IDENTIFY THE ABOVE MS4 TOPICS AS DANGEROUS TO WATER AFTER THE PROGRAM



28.87% MORE STUDENTS IDENTIFY THAT DOG WASTE CAN END UP IN THE RIVER AFTER THE PROGRAM

ARROYO CLASSROOM 2023-2024

LOCAL WILDLIFE, HABITAT & ARROYO EDUCATION

Executive Summary

During the 2023-2024 school year, Arroyo Classroom served 715 3rd grade students and 36 teachers across 7 schools in Rio Rancho, 5 of which were Title I schools. Each student engaged in 4 hours of programming provided by Ciudad SWCD staff and contractors. SSCAFCA provided a total of **$30,800.00 in cash** for program coordination and delivery and a contract with Hawks Aloft Inc. for live wildlife presentations. Within the curriculum, *all 715 students engaged with grade level appropriate lessons that covered the following required MS4 topics*:

715 Students

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

Presentations

Arroyo Walk

The Arroyo Walk takes students out into the field to look for evidence of wildlife such as tracks, scat, exoskeletons and of course- live animals! Students also do plant adaptation investigations through sensory observations of plants. Throughout the walk, students naturally make observations of pollution and human impacts in the environment and discussions about ways to improve the environment through our own actions always take place. (Middle and top right images above)

Local Reptiles and Arthropods

Much like the bird presentation, the reptile and arthropod presentation introduces students to these local creatures, their key roles in the ecosystem and educates students about the importance to protect organisms who are often misunderstood, feared and considered pests. The presentation also focuses on how pollution and human behaviors can impact the habitat in which these creatures rely on to survive.(Bottom left image)

Local Birds

Hawks Aloft Inc. brings a wonderful experience to students with a visit of educational avian ambassadors to the classroom. Some of the birds that visit are: (depending on availability and cultural sensitivities) American Kestrels, Peregrine Falcons, Swansons Hawks, Burrowing Owls, Great Horned Owls or Turkey Vultures. Hawks Aloft help students understand how pollution and human behaviors can impact these birds and what they can do to protect these wonderful creatures. (Bottom right image)

Watershed Lesson

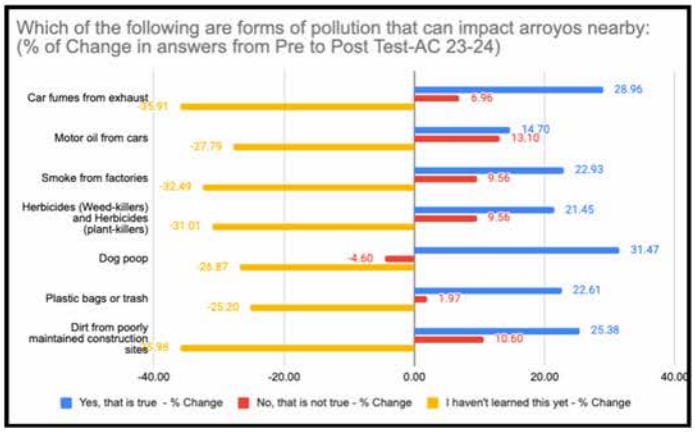
The watershed lesson help students build an understanding of how the water cycle interacts with the land. Working in groups, students use paper to mimic topography of the land and make it rain to see how water gathers in lakes and rivers. They they mimic adding pollution to the watershed to see where it ends up! (Top left image above)

ARROYO CLASSROOM 2023-2024

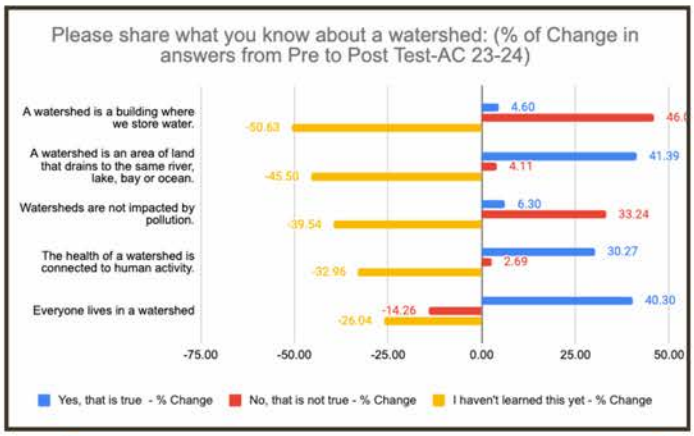
LOCAL WILDLIFE, HABITAT & ARROYO EDUCATION

Program Evaluation

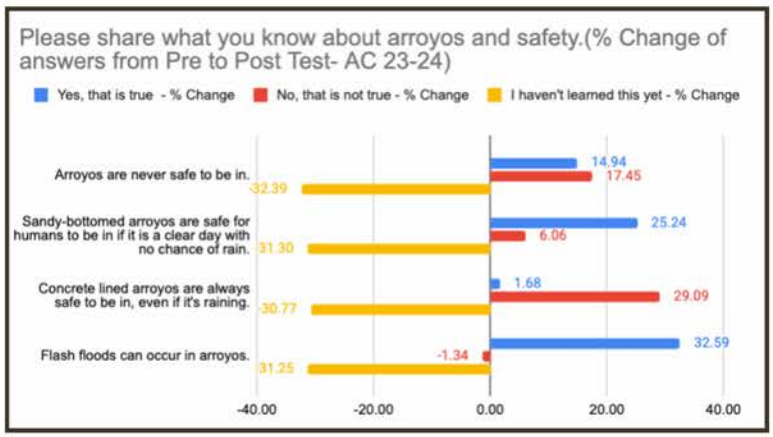
Qualitative evaluation of the program is compiled via teacher feedback (13 respondents) through short answer questions, which concludes that the program was successful in helping students make connections between their actions and impacts on local wildlife and their habitats (arroyos). Teachers also note this program helps them meet 3rd grade science standards. Quantitative evaluation is conducted through pre and post student surveys. The metrics of these surveys demonstrate a positive percentage change of correctly identifying the the impacts of pollution on the arroyo habitat and watershed (i.e. pet waste, pesticides, herbicides, fertilizers, oils, and trash). Additionally, students demonstrate growth in understanding arroyo safety. 481 students completed the pre-survey and 422 students completed the post-survey.



STUDENTS DEMONSTRATE AN INCREASE RANGING BETWEEN 15%-31% IN CORRECTLY IDENTIFYING COMMON POLLUTANTS IN THE LOCAL ENVIRONMENTAL



STUDENTS DEMONSTRATE AN INCREASE OF 30%-46% IN CORRECTLY UNDERSTANDING WATERSHED HEALTH CONCEPTS



APPROXIMATELY 30% MORE STUDENTS MADE AN IMPORTANT DISTINCTION THAT FLASH FLOODS HAPPEN IN ARROYOS AND CONCRETE ARROYOS ARE NEVER SAFE.

Post Program Teacher Feedback Quotes

What where the greatest learning outcomes for your class?

"They were fully engaged in the material and learning experiences, and retained that information. They really enjoyed learning about watersheds and were able to actively discuss topics concerning watersheds and our environment throughout the year." -Reed, Colinas Del Norte ES

"The students absolutely loved it, and gained new knowledge about outdoor observations. It also was a great prequel to our ecology unit later in the year!" - Schnittke, Sandia Vista ES

Students learning, applying and sharing their experiences with family." - Begay, Maggie Cordova ES

"Appreciating our environment and influencing them to respect arroyos and desert plants and environment." - Burns, Cielo Azul ES

2023-2024
CIUDAD SWCD EDUCATION PROGRAMS
(GRANTS FROM OTHER FUNDERS)

Watershed Stewards

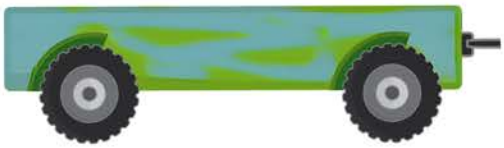
- Funding Provided by SSCAFCA, considered on a fiscal year basis.
- Objective: Local Conservation Education for Adult and Senior Citizens with a focus on MS4 topics.

Sponge City Middle and High School Stewardship Program

- Funding Provided by NM Soil and Water Conservation Commision via the Water Quality and Conservation Grant FY2024.
- Objective: Green Stormwater Infrastructure Education Program that aims to inspire students to visualize and implement GSI on their school campus.

Rolling River

- Funding provided by intergovernmental agreements with City of Albuquerque Open Space and Bernalillo County Open Space, and direct booking fees.
- Objective: The Rolling River is a mobile model of a watershed where we demonstrate MS4 topics to the public at school, community and other public events.



APS School Garden Conference

- Funding provided through an EPA subaward through the Bosque Ecosystem Monitoring Program.
- Objective: Support teacher professional development in watershed education.

WATERSHED STEWARDS 2023-2024

CONSERVATION EDUCATION FOR ADULTS AND SENIORS

Executive Summary

During the 2023-2024 fiscal year, the Watershed Stewards program engaged 267 participants in education and outreach opportunities across 19 events and certified 12 residences as an ABQ Backyard Refuge. The program's events were primarily held in the Rio Rancho area and Corrales, but also included field trips to the ABQ BioPark with Meadowlark Senior Center. The program benefited greatly this year from increased collaboration between Keep Rio Rancho Beautiful (under City of Rio Rancho Parks, Recreation and Community Services department), City of Rio Rancho Public Libraries, Sandoval County Master Gardeners, Ciudad SWCDs contract with ABQ Backyard Refuge (a program of Valle De Oro National Wildlife Refuge) and support from Rio Grande Return and other subject matter experts. Working with these partners to engage audiences in SSCAFCA's jurisdictional boundaries has proven to be beneficial in developing a program that truly encourages stewardship through education, training and community engagement.

Program Highlights

Ciudad SWCD chose to contract directly with ABQ Backyard Refuge for the program this year, as past years of hosting ABQ Backyard Refuge for Watershed Stewards programming demonstrated how an program like Backyard Refuge provides an anchor for residents to learn about how to implement voluntary conservation practices at home. By working with ABQ Backyard Refuge, we were able to provide a diverse set of learning opportunities with a clear goal; to increase ABQ Backyard Refuge certifications within SSCAFCA's boundaries. Presentations ranged from native plant selection and care, designing a backyard refuge, local wildlife, adapting to climate change, tree care and pruning, and rainwater harvesting. Regardless of the presentation or field trip, Ciudad SWCD, ABQ Backyard Refuge and Keep Rio Rancho Beautiful consistently promote awareness of MS4 topics and provide resources and opportunities to implement conservation practices that benefit the watershed.

267 participants

12 certified backyard wildlife refuges

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF OIL, HOUSEHOLD HAZARDOUS WASTE
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

PARTNERS:

Rio Rancho
Keep Rio Rancho Beautiful
KEEP AMERICA BEAUTIFUL AFFILIATE

ABQ Backyard Refuge Program

SPONGE CITY 2023-2024

MIDDLE AND HIGH SCHOOL STEWARDSHIP PROGRAM

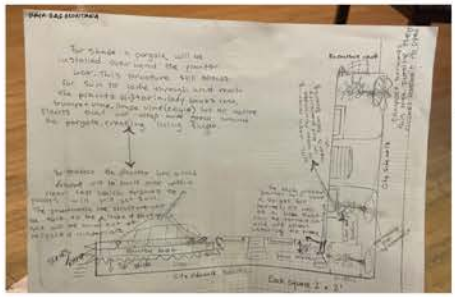
35 students

Executive Summary

The Sponge City Program aimed to work with middle and high school students to promote an understanding of watershed health and the use of rainwater harvesting in an urban environment as a design approach to improve watershed health. The program was delivered across 3 visits with each participating class: an introductory classroom lesson, a field trip to an important watershed feature, and a walking field trip in the urban environment. Two classes participated; one 8th grade gardening class from Mountain Mahogany and a 9th-12th grade permaculture class from Amy Biehl, for a total of 35 students. To ensure student engagement, the program was tailored to each class's needs. The 8th graders focused more on campus stewardship by implementing soil sponges and berms. The Amy Biehl class was able to complete a design proposal for an outdoor green space that included rainwater harvesting features. Each class was able to participate in stewardship activities, either at their school or a restoration site.

AMY BIEHL CHARTER HS

Top images across are from field trips to the Tijeras Bio-Zone Education Center, where students practiced building one rock dams and soil sponges while learning about watersheds. Pictured left and below are student working on and presenting their green space designs.



MOUNTAIN MAHOGANY COMMUNITY SCHOOL

Pictured left, students build soil sponges. Pictured below is small basin students dug out and filled with "sponge" materials to capture and absorb rainwater from a downspout for a Mountain Mahogany.

Sponsored by:

STATE OF NEW MEXICO
NEW MEXICO SOIL & WATER CONSERVATION DEPARTMENT OF AGRICULTURE

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF OIL, HOUSEHOLD HAZARDOUS WASTE
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

The Amy Biehl green space project aims to build an outdoor classroom, gardens, and rainwater harvesting features around the school that would replace concrete with permeable surfaces and tree canopy and tie into a GSI street project on Gold Ave. More funding is needed for the next phase.

ROLLING RIVER 2023-2024
MOBILE WATERSHED MODEL

880 VISITORS
12 EVENTS

The Rolling River is a mobile watershed education trailer that provides a hands-on opportunity for the public to observe and manipulate how how human impacts, like urban development and pollution, can create impaired waters in the Rio Grande.

Participants are asked to develop the natural watershed with farms, neighborhoods, and impervious surfaces, like paved parking lots and streets. They then "make it rain" on the watershed to see what happens to the water. Finally, we discuss how we can protect the watershed through conservation practices that prevent pollution of stormwater and water waste to improve water quality, wildlife habitat and protection of resources.

- PET WASTE MANAGEMENT
- PROPER DISPOSAL OF OIL, HOUSEHOLD HAZARDOUS WASTE
- PROPER DISPOSAL OF PESTICIDES, HERBICIDES AND FERTILIZERS
- IMPAIRED WATERS IN THE CITY/STATE
- WATERSHED MANAGEMENT

APS GARDEN CONFERENCE

Ciudad SWCD was able to support the APS School Garden this year thanks to a sub-award from BEMP's EE EPA grant. Ciudad SWCD helped to coordinate the conference and provided a Rainwater Harvesting presentation to 20 teachers, focused on the passive rainwater harvesting opportunities on school campuses to both teach about, and improve, watershed health in our city. Across the conference, 54 teachers engaged with outdoor learning practices, science curriculum, and local traditional ecological knowledge. Teachers also received garden materials and resources, and Ciudad SWCD was able to provide presenters with honorariums for their attendance with the sub- award.

54 TEACHERS
2 DAYS

ACKNOWLEDGEMENTS

Ciudad SWCD acknowledges the important contributions of the following organizations, municipalities and individuals who supported the outreach completed this year. Without these partnerships, we could not do what we do so effectively. We are endlessly grateful for our communities' support to educate about, and protect the Middle Rio Grande Watershed.

City of Albuquerque Open Space Division
Bernalillo County Open Space Division
Bernalillo County Natural Resource Services
City of Rio Rancho Parks, Recreation and Community Services
Keep Rio Rancho Beautiful
City of Rio Rancho Utilities Department
Albuquerque Bernalillo County Water Utility Authority
Sandia National Laboratories
Hawks Aloft Inc.
BEMP
Valle de Oro National Wildlife Refuge
Laurel Ladwig, Albuquerque Backyard Refuge Program
Shelby Stimson, Arid LID Coalition
Cameron Weber, Rio Grande Return
Judith Phillips, Design Oasis
Hunter Ten Broeck, WaterWise Landscapes Inc.
Mario Nuño-Whelan, Arid LID Coaltion
Joran Viers, JVHC Inc.
Mikal Deese, On a Wing and A Prayer
Corva Rose, Tree School NM
Nissa Patterson, Mountain Mahogany Community School
Sandra Mack, Amy Biehl Charter High School
Allison Martin, TOTAL NM
Susan Schipull, APS Garden Resources
Travis McKenzie, APS Polk MS

Sponsored by:

Mid Rio Grande Stormwater Quality Team
www.keeptheriograndg.org

Southern Sandoval County Arroyo Flood Control Authority

Ciudad SWCD Contacts

EDUCATION TEAM

ERIN BLAZ, EDUCATION MANAGER
erin@ciudadswcd.org
505-225-7487

THERESA ARAGON, EDUCATION COORDINATOR
theresa@ciudadswcd.org

Ciudad Soil & Water Conservation District

CIUDAD SOIL & WATER CONSERVATION DISTRICT
PO BOX PO Box 93463, Albuquerque, NM 87199

2023 - 2024 STORMWATER SCIENCE

BEMP • Zoe Wadkins Daniels
Education Director

Mid Rio Grande Stormwater Quality Team

BEMP
Bosque Ecosystem Monitoring Program

"Students have gained skills in working with new people, adults and children, and they have gained an understanding of river systems and human impacts on those systems." - Coyote Willow Family School Teacher

16,395 students.
63 schools and community organizations.
389 hours of education.

In-person & Synchronous Learning

4,140 students

Monthly Monitoring

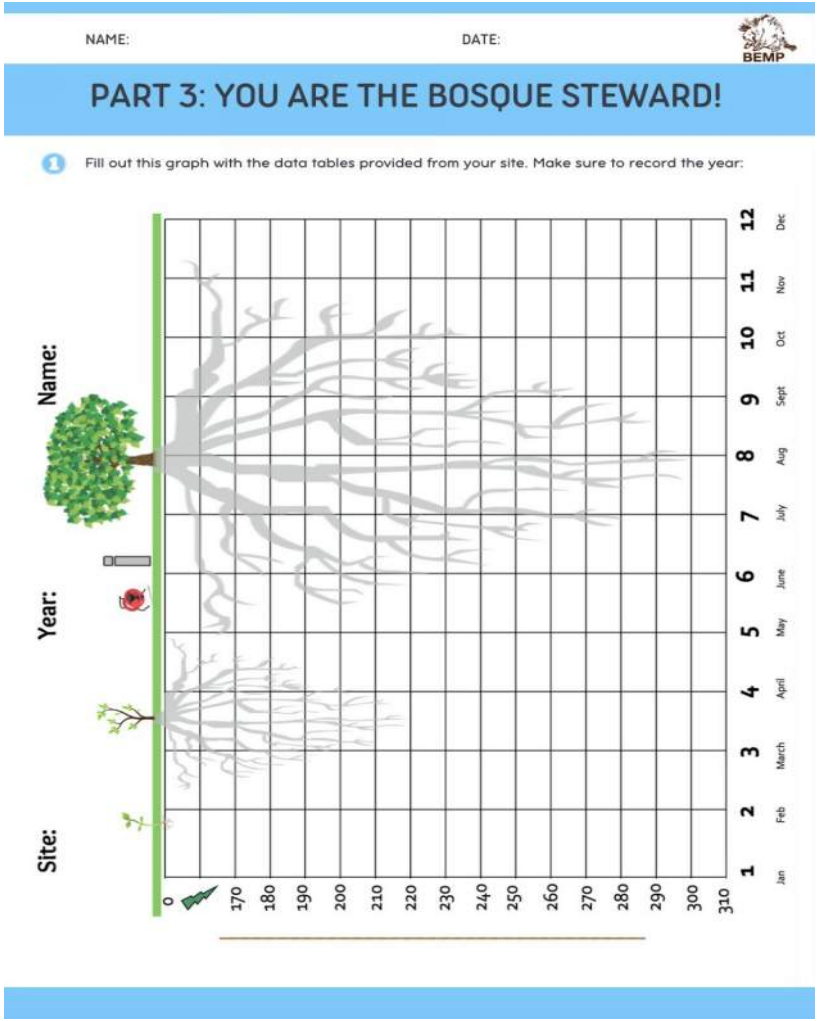
Study Trips

Summer Learning Support

Horizons ABQ + Project Feed the Hood + Youth Agricultural Cooperative

New Lessons

7th grade program



NAME: DATE:

BEMP

PART 3: YOU ARE THE BOSQUE STEWARD!

1 Fill out this graph with the data tables provided from your site. Make sure to record the year:

Name:

Year:

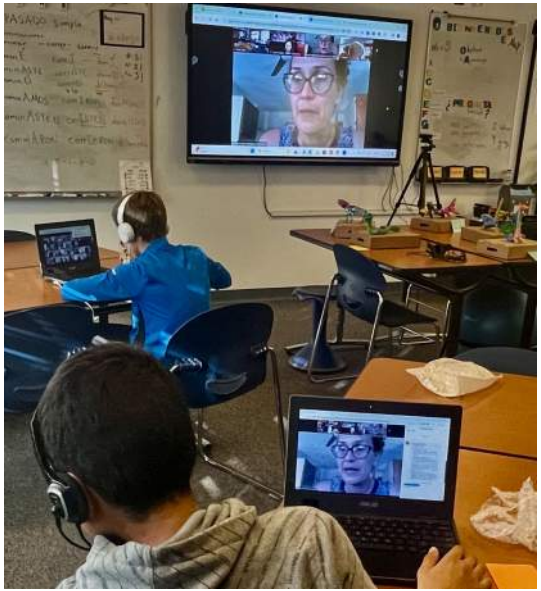
Site:

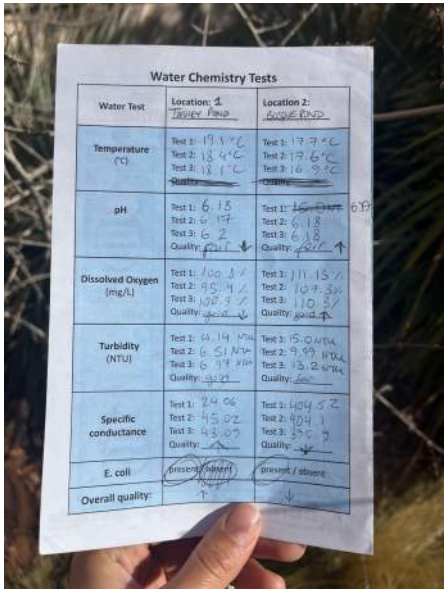
0 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310

1 Jan 2 Feb 3 March 4 April 5 May 6 June 7 July 8 Aug 9 Sept 10 Oct 11 Nov 12 Dec

IN THEIR OWN WORDS...

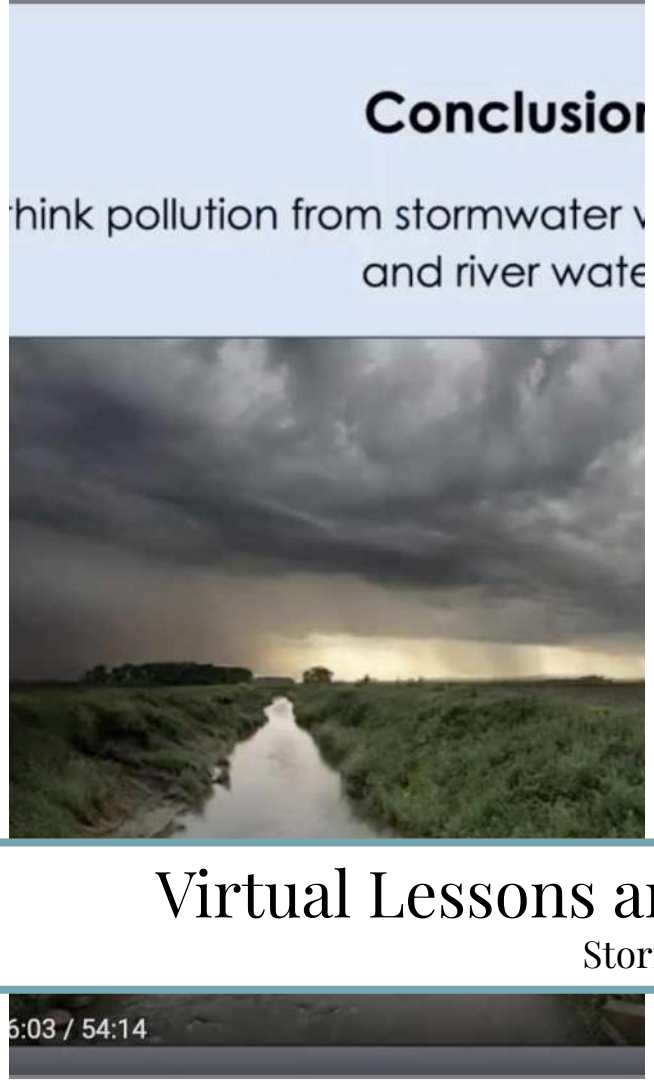
“I’m humbled to count myself as one of Cliff’s many cottonwood saplings along the vegetation transect line of BEMP’s history – a datapoint that serves as a constant reminder of the importance of local action in the global fight for environmental justice. The spirit of a BEMP alumni is a champion for the Middle Rio Grande, its students, and all the plants and animals – humans, coyotes, the Rio Grande Silvery Minnow, and many more - that depend on its waters for life.” - BEMP Alumnus and volunteer.

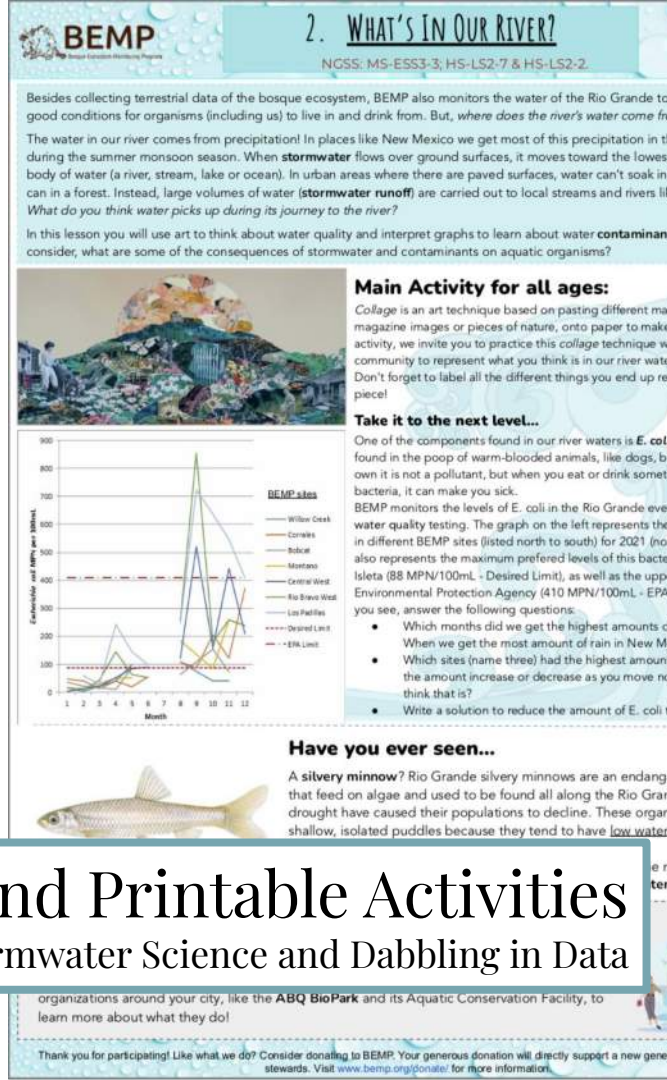




Asynchronous Learning

11,600 students served



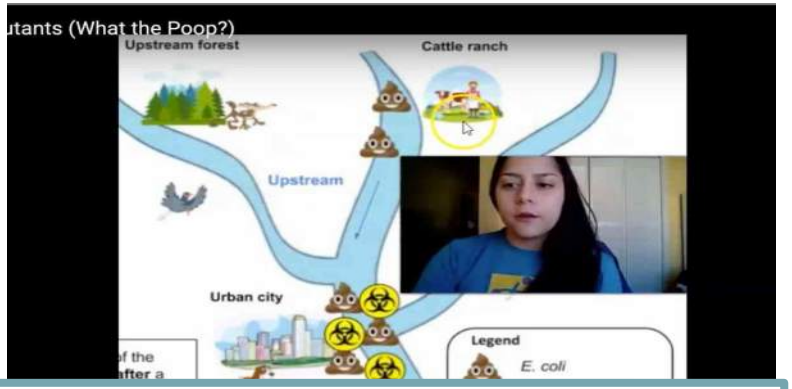


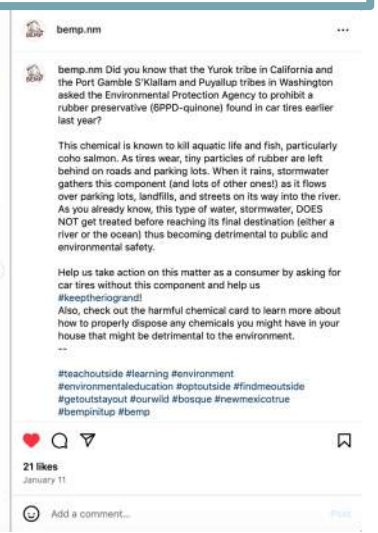
Virtual Lessons and Printable Activities

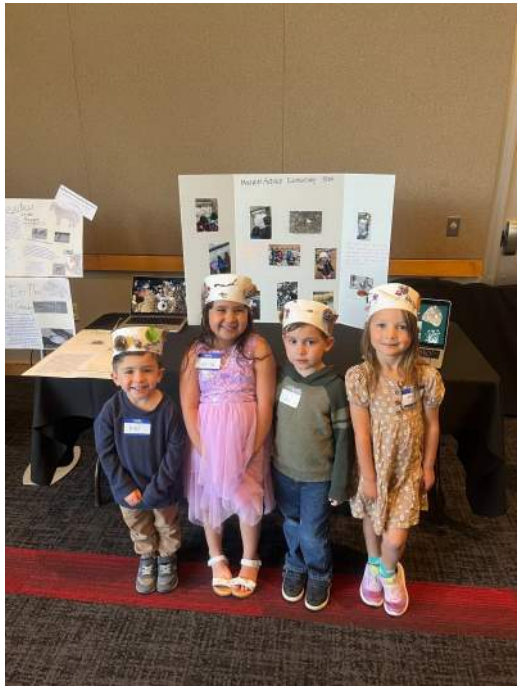
Stormwater Science and Dabbling in Data

Social Media and Youtube Videos

127,486 Reaches





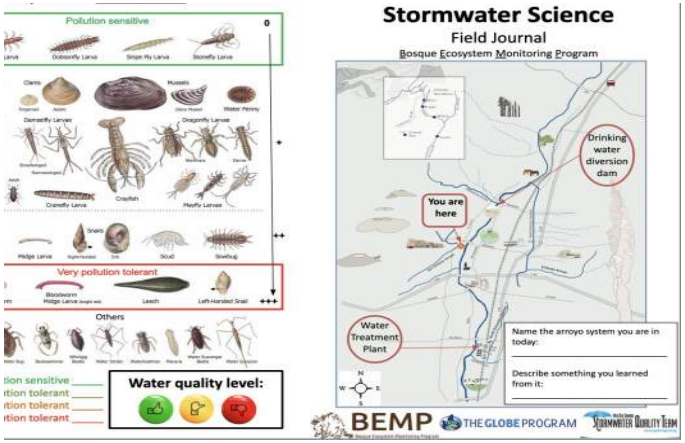


Events

Children's Water Festival, Luquillo-Sevilleta Virtual Symposium & Crawford Symposium - 655 participants

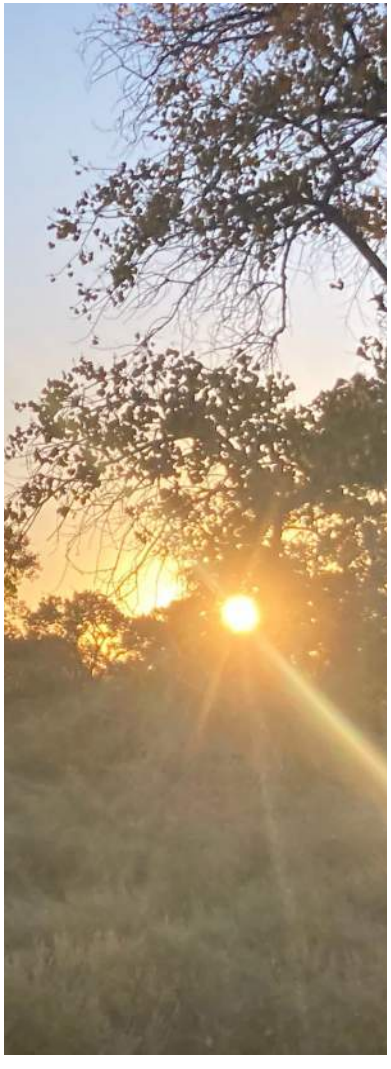
Watershed Education Collaboration Group

Connect our community by providing equitable access to watershed health *principles* and *education* by increasing awareness, scaffolding student learning and creating meaningful experiences to inspire a future generation.



Teacher Workshop Collaboration

Environmental Justice Community Days



Future movement 2024-2025:

Strengthen **relationships** with Title I schools.

Continue to provide both remote and in-person **learning experiences** to best fit all audiences.

Continue to provide **Stormwater Science concepts** during our Monthly Monitoring collections.

Expand Stormwater Science concepts to other lessons, especially our 7th grade program.

Expand our web of influence and focus on **community science** and **stewardship** components through collaboration with other organizations.

Strengthen **collaborations** with other organizations, reinforcing a water focus.

Offer **field work**, **data analysis**, and **public speaking** experience for students.

Continue to **increase accessibility** with Spanish translations.

THANK YOU!

BEMP PROPOSED BUDGET for FY25

Partial funding of BEMP Educator/Biologist staff (curriculum development, prep, program delivery in classroom, field, summer, and monthly monitoring)	**$25,500**
Partial funding of BEMP Education Manager staff for program oversight education outreach events (planning and coordination)	**$3,240**
Transportation costs for student participation in field study trips and outreach events, including translation costs & expenses for virtual materials	**$4,500**
Program materials (e.g., water testing kits, printing, poster boards)	**$500**
Administrative overhead costs at 18% of above total	**$6,073.2**
	TOTAL · $39,813.2

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Matthew Leister
Bosque Ecosystem Monitoring Program
1 University of New Mexico
Albuquerque, New Mexico 87106

Generated 6/24/2024 10:56:16 AM

JOB DESCRIPTION

BEMP

JOB NUMBER

885-6670-1

Eurofins Albuquerque
4901 Hawkins NE
Albuquerque NM 87109

See page two for job notes and contact information.

myEOL

Job Notes

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing South Central, LLC Project Manager.

Authorization

Generated
6/24/2024 10:56:16 AM

Authorized for release by
Colleen McNamara, Project Manager
colleen.McNamara@et.eurofinsus.com
(505)345-3975

Table of Contents

Definitions/Glossary

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job Narrative
885-6670-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 6/20/2024 3:40 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 13.8°C.

Receipt Exceptions
The Field Sampler was not listed on the Chain of Custody.

Biology
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Willow Creek

Date Collected: 06/20/24 10:12
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-1

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	ND		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Corrales

Date Collected: 06/20/24 11:16
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-2

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	63.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Bobcat

Date Collected: 06/20/24 11:54
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-3

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	30.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Montano

Date Collected: 06/20/24 12:39
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-4

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	52.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Central West

Date Collected: 06/20/24 13:35
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-5

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	134.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Rio Bravo West

Date Collected: 06/20/24 14:14
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-6

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	161.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Los Padillas

Date Collected: 06/20/24 14:47
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-7

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	305.0		10.0		MPN/100mL			06/20/24 17:04	1

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Blank
Date Collected: 06/20/24 15:00
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-8
Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	ND		1.0		MPN/100mL			06/20/24 17:04	1

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Method: 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Lab Sample ID: MB 885-7126/1
Matrix: Water
Analysis Batch: 7126

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	ND		1.0		MPN/100mL			06/20/24 17:04	1

QC Association Summary

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Biology

Analysis Batch: 7126

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
885-6670-1	Willow Creek	Total/NA	Water	9223B	
885-6670-2	Corrales	Total/NA	Water	9223B	
885-6670-3	Bobcat	Total/NA	Water	9223B	
885-6670-4	Montano	Total/NA	Water	9223B	
885-6670-5	Central West	Total/NA	Water	9223B	
885-6670-6	Rio Bravo West	Total/NA	Water	9223B	
885-6670-7	Los Padillas	Total/NA	Water	9223B	
885-6670-8	Blank	Total/NA	Water	9223B	
MB 885-7126/1	Method Blank	Total/NA	Water	9223B	

Lab Chronicle

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Willow Creek
Lab Sample ID: 885-6670-1
Date Collected: 06/20/24 10:12
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Corrales
Lab Sample ID: 885-6670-2
Date Collected: 06/20/24 11:16
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Bobcat
Lab Sample ID: 885-6670-3
Date Collected: 06/20/24 11:54
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Montano
Lab Sample ID: 885-6670-4
Date Collected: 06/20/24 12:39
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Central West
Lab Sample ID: 885-6670-5
Date Collected: 06/20/24 13:35
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Rio Bravo West
Lab Sample ID: 885-6670-6
Date Collected: 06/20/24 14:14
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Los Padillas
Lab Sample ID: 885-6670-7
Date Collected: 06/20/24 14:47
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Lab Chronicle

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Blank

Date Collected: 06/20/24 15:00
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Laboratory References:

EET ALB = Eurofins Albuquerque, 4901 Hawkins NE, Albuquerque, NM 87109, TEL (505)345-3975

Accreditation/Certification Summary

Client: Bosque Ecosystem Monitoring Program
Job ID: 885-6670-1
Project/Site: BEMP

Laboratory: Eurofins Albuquerque

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
New Mexico	State	NM9425, NM0901	02-26-25

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
9223B		Water	Escherichia coli

Oregon	NELAP	NM100001	02-26-25

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
9223B		Water	Escherichia coli

Chain-of-Custody Record

Client: Bosque Ecosystem Monitoring Program (BEMP)
Mailing Address: 1 University, MSC 032 2020 Alb. NM 87131
Phone #: (505) 206-3767
email or Fax#: Matt.Leister@BEMP.org
QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)
Accreditation: ☐ Az Compliance ☐ NELAC ☐ Other
☐ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: BEMP
Project #:
Project Manager: Matt Leister
Sampler:
On Ice: ☒ Yes ☐ No
# of Coolers: 1
Cooler Temp (including CF): 13.8 ± 0 = 13.8 (°C)

HALL ENVIRONMENTAL ANALYSIS LABO
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87
Tel. 505-345-3975 Fax 505-345-4107

885-6670 COC

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No.	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)	E Coli. Coliform Enumer
06/20/24	10:12	Surface Water	Willow Creek														X
06/20/24	11:16	Surface Water	Corrales														X
06/20/24	11:54	Surface Water	Bobcat														X
06/20/24	12:39	Surface Water	Montaño														X
06/20/24	13:35	Surface Water	Central West														X
06/20/24	14:14	Surface Water	Rio Bravo West														X
06/20/24	14:47	Surface Water	Los Padillas														X
06/20/24	15:00	D.I. Water	Blank														X

Analysis Request

Date	Time:	Relinquished by.	Received by	Via	Date	Time
06/20/24	15:19	McKenzie Williams		COD	Jun 20, 2024	1540
Date	Time	Relinquished by.	Received by	Via	Date	Time

Remarks:

Login Sample Receipt Checklist

Client: Bosque Ecosystem Monitoring Program

Job Number: 885-6670-1

Login Number: 6670
List Number: 1
Creator: Dominguez, Desiree

List Source: Eurofins Albuquerque

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	False	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Refer to Job Narrative for details.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
TCEQ Mtd 1005 soil sample was frozen/delivered for prep within 48H of sampling.	N/A	

AMAFCA

Albuquerque Metropolitan Arroyo Flood Control Authority

Educational and training opportunities provided to adult college students in the watershed.

April 16, 2024

What: Happy Hour celebrating the unanimous passage of the Complete Streets Ordinance
Where: Bow and Arrow Brewery, 608 McKnight Ave NW
When: TONIGHT 5:30-7:30pm

April 17, 2024

UNM SASLA & APA UNM is hosting a Lunch and Learn tomorrow from 12-1 pm in George Pearl Hall, Room 133.
It will be Jon Pena, PE with NV5. He'll be discussing the importance of site drainage, collaboration and working across disciplines. This one is really oriented toward students and new professionals.

SUNDAY, April 21

What: Earth Day Festival
Where: Balloon Fiesta Park
When: Sunday April 21, 10am-4pm
Tickets: $5/person or you can volunteer for Arid LID and get in FREE!

Friday, April 26th

What: National Arbor Day Celebration
Where: Civic Plaza, Albuquerque
When: 9:30am -1pm
NOTE: Tree Giveaways at 1030am!!!!

New Mexico Department of Transportation

Public Meetings FY24

CN A302370

- Project Name: S-Curve Area Study
- Date: November 15, 2023 (1st Meeting)
- Date: April 24, 2024 (2nd Meeting)

A301890

- Project Name: Gibson Interchange Reconstruction Project
- Date: February 22, 2024

A302380

- Project Name: I-40 Bridges over Tijeras Arroyo
- Date: May 16, 2024

2023 - 2024 STORMWATER SCIENCE

BEMP • Zoe Wadkins Daniels
Education Director

Mid Rio Grande Stormwater Quality Team

BEMP
Bosque Ecosystem Monitoring Program

"Students have gained skills in working with new people, adults and children, and they have gained an understanding of river systems and human impacts on those systems." - Coyote Willow Family School Teacher

16,395 students.
63 schools and community organizations.
389 hours of education.

In-person & Synchronous Learning

4,140 students

Monthly Monitoring

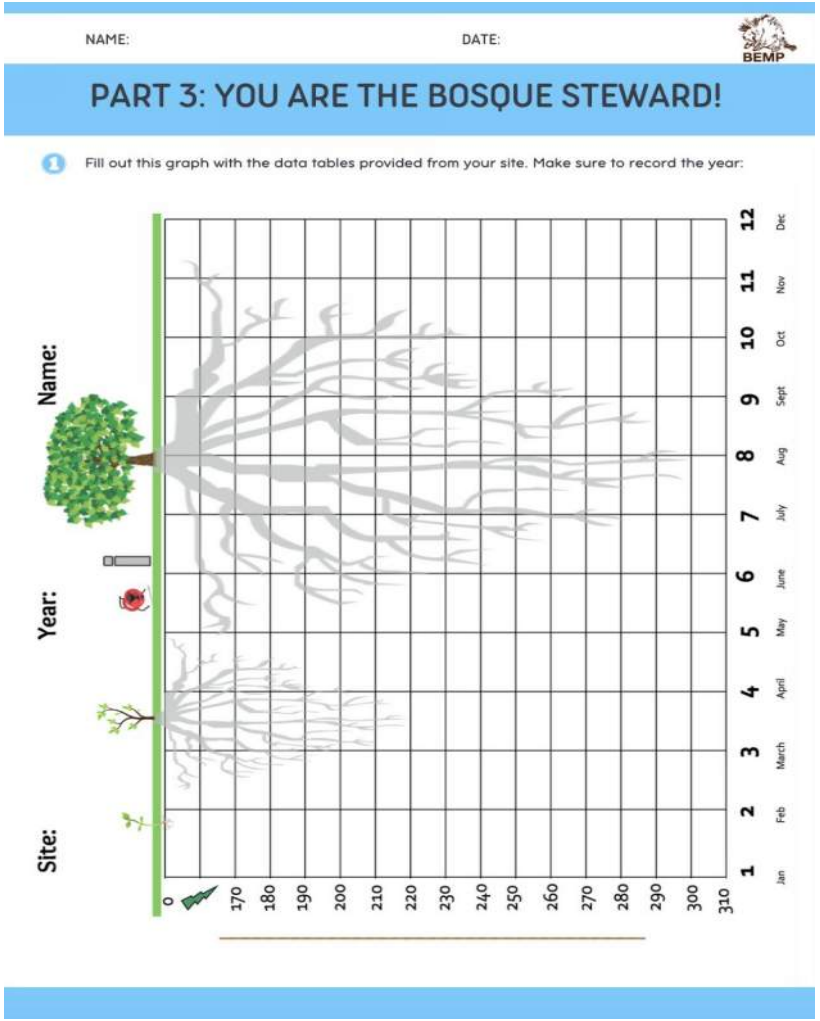
Study Trips

Summer Learning Support

Horizons ABQ + Project Feed the Hood + Youth Agricultural Cooperative

New Lessons

7th grade program



NAME: DATE:

BEMP

PART 3: YOU ARE THE BOSQUE STEWARD!

1 Fill out this graph with the data tables provided from your site. Make sure to record the year:

Name:

Year:

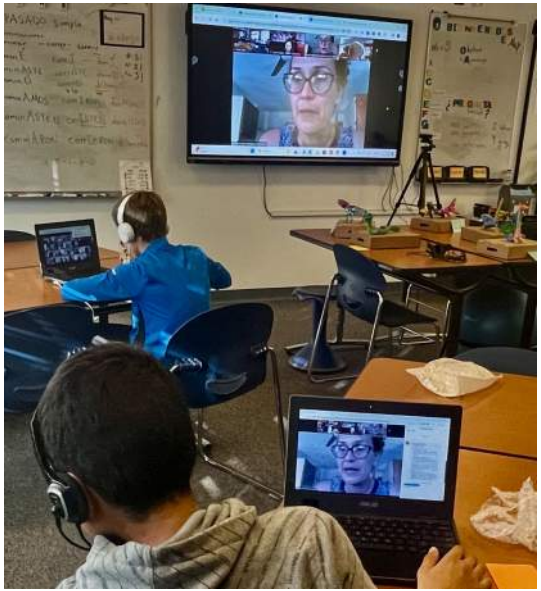
Site:

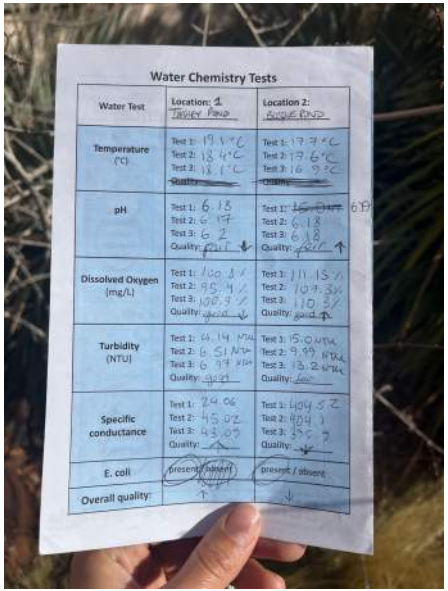
0 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310

1 Jan 2 Feb 3 March 4 April 5 May 6 June 7 July 8 Aug 9 Sept 10 Oct 11 Nov 12 Dec

IN THEIR OWN WORDS...

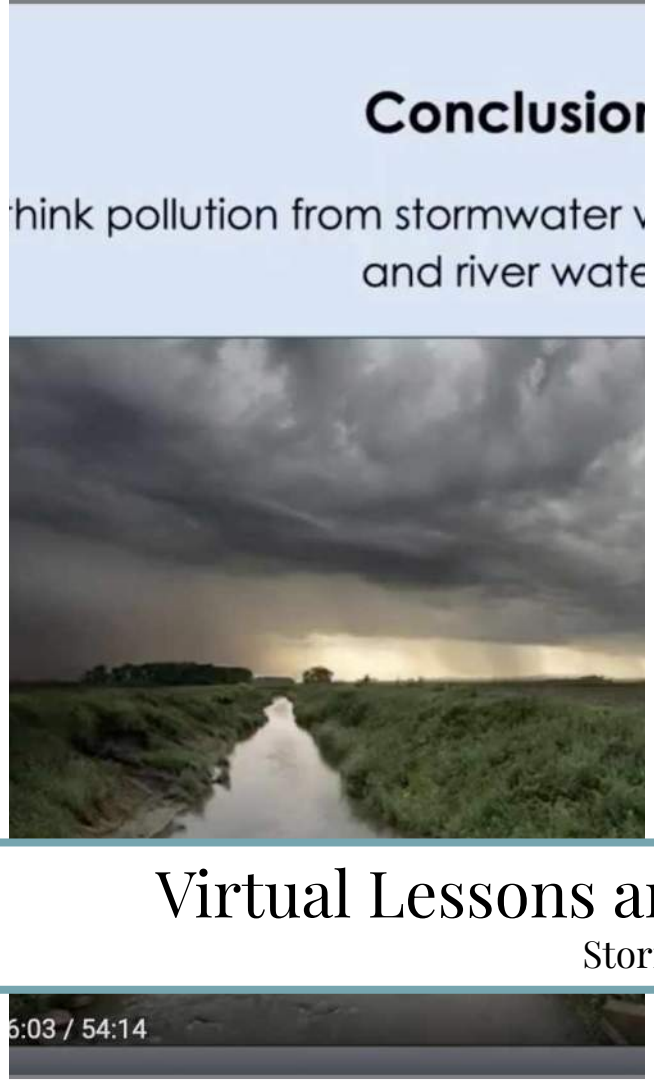
“I’m humbled to count myself as one of Cliff’s many cottonwood saplings along the vegetation transect line of BEMP’s history – a datapoint that serves as a constant reminder of the importance of local action in the global fight for environmental justice. The spirit of a BEMP alumni is a champion for the Middle Rio Grande, its students, and all the plants and animals – humans, coyotes, the Rio Grande Silvery Minnow, and many more - that depend on its waters for life.” - BEMP Alumnus and volunteer.

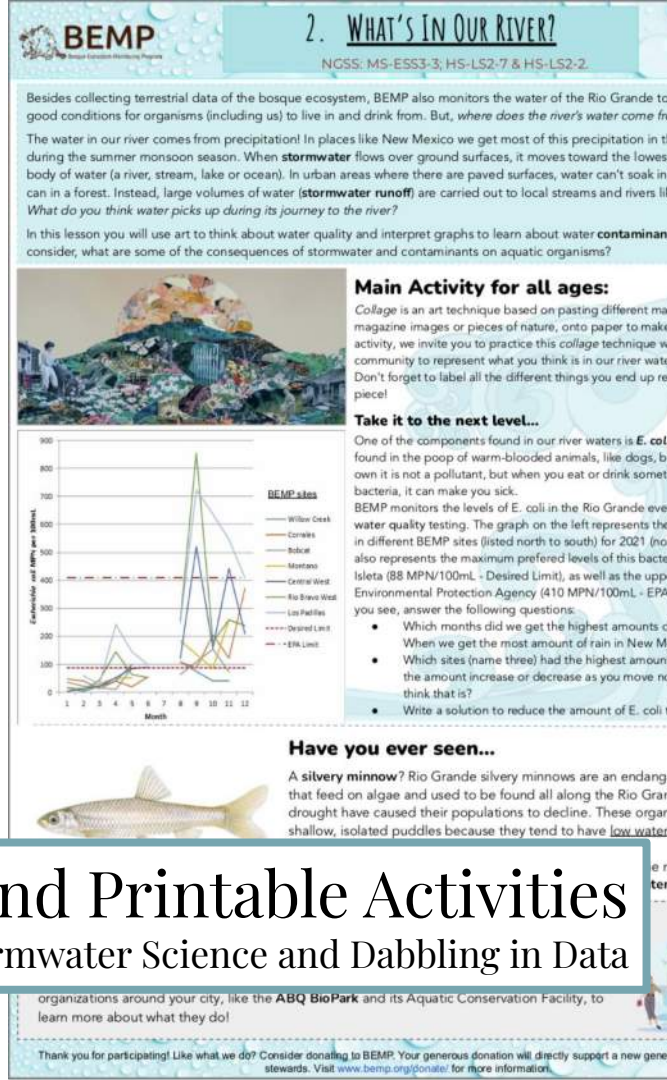




Asynchronous Learning

11,600 students served



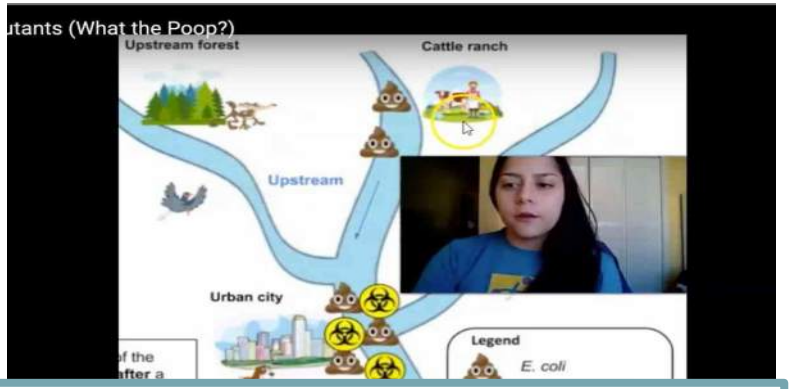


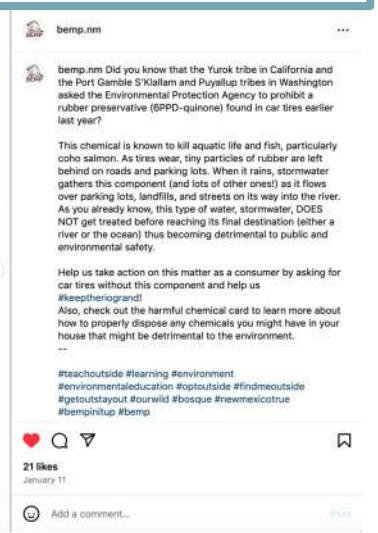
Virtual Lessons and Printable Activities

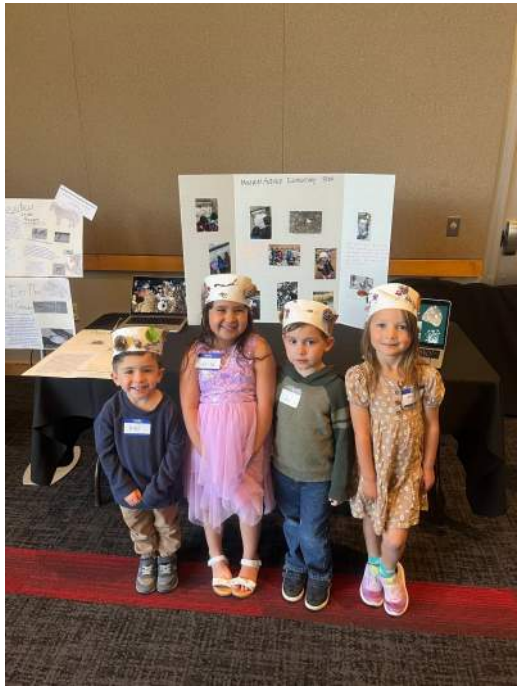
Stormwater Science and Dabbling in Data

Social Media and Youtube Videos

127,486 Reaches





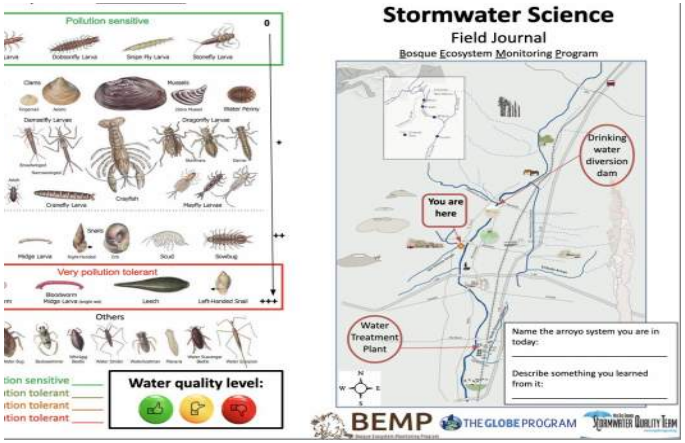


Events

Children's Water Festival, Luquillo-Sevilleta Virtual Symposium & Crawford Symposium - 655 participants

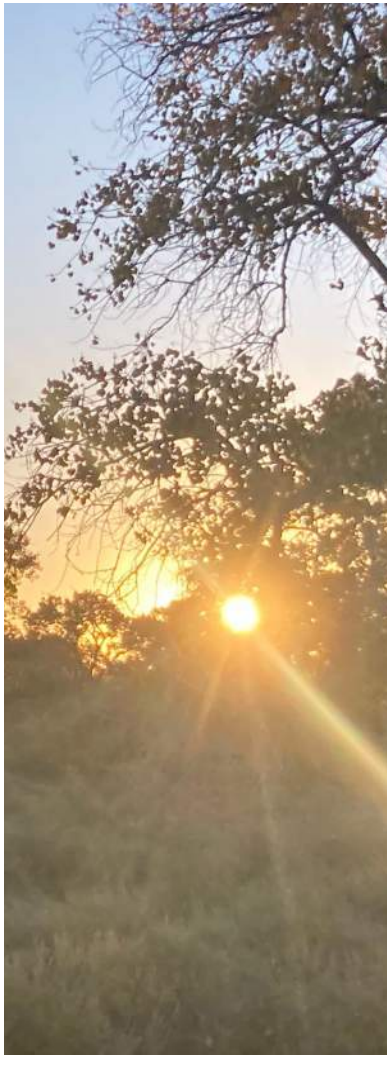
Watershed Education Collaboration Group

Connect our community by providing equitable access to watershed health *principles* and *education* by increasing awareness, scaffolding student learning and creating meaningful experiences to inspire a future generation.



Teacher Workshop Collaboration

Environmental Justice Community Days



Future movement 2024-2025:

Strengthen **relationships** with Title I schools.

Continue to provide both remote and in-person **learning experiences** to best fit all audiences.

Continue to provide **Stormwater Science concepts** during our Monthly Monitoring collections.

Expand Stormwater Science concepts to other lessons, especially our 7th grade program.

Expand our web of influence and focus on **community science** and **stewardship** components through collaboration with other organizations.

Strengthen **collaborations** with other organizations, reinforcing a water focus.

Offer **field work**, **data analysis**, and **public speaking** experience for students.

Continue to **increase accessibility** with Spanish translations.

THANK YOU!

BEMP PROPOSED BUDGET for FY25

Partial funding of BEMP Educator/Biologist staff (curriculum development, prep, program delivery in classroom, field, summer, and monthly monitoring)	**$25,500**
Partial funding of BEMP Education Manager staff for program oversight education outreach events (planning and coordination)	**$3,240**
Transportation costs for student participation in field study trips and outreach events, including translation costs & expenses for virtual materials	**$4,500**
Program materials (e.g., water testing kits, printing, poster boards)	**$500**
Administrative overhead costs at 18% of above total	**$6,073.2**
	TOTAL · $39,813.2

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Matthew Leister
Bosque Ecosystem Monitoring Program
1 University of New Mexico
Albuquerque, New Mexico 87106

Generated 6/24/2024 10:56:16 AM

JOB DESCRIPTION

BEMP

JOB NUMBER

885-6670-1

Eurofins Albuquerque
4901 Hawkins NE
Albuquerque NM 87109

See page two for job notes and contact information.

myEOL

Job Notes

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing South Central, LLC Project Manager.

Authorization

Generated
6/24/2024 10:56:16 AM

Authorized for release by
Colleen McNamara, Project Manager
colleen.McNamara@et.eurofinsus.com
(505)345-3975

Table of Contents

Definitions/Glossary

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job Narrative
885-6670-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 6/20/2024 3:40 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 13.8°C.

Receipt Exceptions
The Field Sampler was not listed on the Chain of Custody.

Biology
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Willow Creek

Date Collected: 06/20/24 10:12
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-1

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	ND		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Corrales

Date Collected: 06/20/24 11:16
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-2

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	63.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Bobcat

Date Collected: 06/20/24 11:54
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-3

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	30.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Montano

Date Collected: 06/20/24 12:39
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-4

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	52.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Central West

Date Collected: 06/20/24 13:35
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-5

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	134.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Rio Bravo West

Date Collected: 06/20/24 14:14
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-6

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	161.0		10.0		MPN/100mL			06/20/24 17:04	1

Client Sample Results

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Los Padillas

Date Collected: 06/20/24 14:47
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-7

Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	305.0		10.0		MPN/100mL			06/20/24 17:04	1

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Blank
Date Collected: 06/20/24 15:00
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-8
Matrix: Water

Method: SM 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	ND		1.0		MPN/100mL			06/20/24 17:04	1

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Method: 9223B - Coliforms, Total, and E.Coll (Colilert - Quanti Tray)

Lab Sample ID: MB 885-7126/1
Matrix: Water
Analysis Batch: 7126

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Escherichia coli	ND		1.0		MPN/100mL			06/20/24 17:04	1

QC Association Summary

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Biology

Analysis Batch: 7126

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
885-6670-1	Willow Creek	Total/NA	Water	9223B	
885-6670-2	Corrales	Total/NA	Water	9223B	
885-6670-3	Bobcat	Total/NA	Water	9223B	
885-6670-4	Montano	Total/NA	Water	9223B	
885-6670-5	Central West	Total/NA	Water	9223B	
885-6670-6	Rio Bravo West	Total/NA	Water	9223B	
885-6670-7	Los Padillas	Total/NA	Water	9223B	
885-6670-8	Blank	Total/NA	Water	9223B	
MB 885-7126/1	Method Blank	Total/NA	Water	9223B	

Lab Chronicle

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Willow Creek
Lab Sample ID: 885-6670-1
Date Collected: 06/20/24 10:12
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Corrales
Lab Sample ID: 885-6670-2
Date Collected: 06/20/24 11:16
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Bobcat
Lab Sample ID: 885-6670-3
Date Collected: 06/20/24 11:54
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Montano
Lab Sample ID: 885-6670-4
Date Collected: 06/20/24 12:39
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Central West
Lab Sample ID: 885-6670-5
Date Collected: 06/20/24 13:35
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Rio Bravo West
Lab Sample ID: 885-6670-6
Date Collected: 06/20/24 14:14
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Client Sample ID: Los Padillas
Lab Sample ID: 885-6670-7
Date Collected: 06/20/24 14:47
Matrix: Water
Date Received: 06/20/24 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Lab Chronicle

Client: Bosque Ecosystem Monitoring Program
Project/Site: BEMP

Job ID: 885-6670-1

Client Sample ID: Blank

Date Collected: 06/20/24 15:00
Date Received: 06/20/24 15:40

Lab Sample ID: 885-6670-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9223B		1	7126	SS	EET ALB	06/20/24 17:04

Laboratory References:

EET ALB = Eurofins Albuquerque, 4901 Hawkins NE, Albuquerque, NM 87109, TEL (505)345-3975

Accreditation/Certification Summary

Client: Bosque Ecosystem Monitoring Program
Job ID: 885-6670-1
Project/Site: BEMP

Laboratory: Eurofins Albuquerque

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
New Mexico	State	NM9425, NM0901	02-26-25

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
9223B		Water	Escherichia coli

Oregon	NELAP	NM100001	02-26-25

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
9223B		Water	Escherichia coli

Chain-of-Custody Record

Client: Bosque Ecosystem Monitoring Program (BEMP)
Mailing Address: 1 University, MSC 032 2020 Alb. NM 87131
Phone #: (505) 206-3767
email or Fax#: Matt.Leister@BEMP.org
QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)
Accreditation: ☐ Az Compliance ☐ NELAC ☐ Other
☐ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: BEMP
Project #:
Project Manager: Matt Leister
Sampler:
On Ice: ☒ Yes ☐ No
# of Coolers: 1
Cooler Temp (including CF): 13.8 ± 0 = 13.8 (°C)

HALL ENVIRONMENTAL ANALYSIS LABO
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87
Tel. 505-345-3975 Fax 505-345-4107

885-6670 COC

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No.	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)	E Coli. Coliform Enumer
06/20/24	10:12	Surface Water	Willow Creek														X
06/20/24	11:16	Surface Water	Corrales														X
06/20/24	11:54	Surface Water	Bobcat														X
06/20/24	12:39	Surface Water	Montaño														X
06/20/24	13:35	Surface Water	Central West														X
06/20/24	14:14	Surface Water	Rio Bravo West														X
06/20/24	14:47	Surface Water	Los Padillas														X
06/20/24	15:00	D.I. Water	Blank														X

Analysis Request

Date	Time:	Relinquished by.	Received by	Via	Date	Time
06/20/24	15:19	McKenzie Williams		COD	Jun 20, 2024	1540
Date	Time	Relinquished by.	Received by	Via	Date	Time

Remarks:

Login Sample Receipt Checklist

Client: Bosque Ecosystem Monitoring Program

Job Number: 885-6670-1

Login Number: 6670
List Number: 1
Creator: Dominguez, Desiree

List Source: Eurofins Albuquerque

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	False	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Refer to Job Narrative for details.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
TCEQ Mtd 1005 soil sample was frozen/delivered for prep within 48H of sampling.	N/A	

In partnership with the University of New Mexico and Sevilleta LTER

BOSQUE ECOSYSTEM MONITORING PROGRAM (BEMP)
SITE MONITORING REPORT FOR 2023

2023 ANNUAL SITE MONITORING TECHNICAL REPORT

Submitted

04/29/2024

2023 Final Report submitted to:

US Army Corps of Engineers, USACE Contract #: W912PP18C0023

US Bureau of Reclamation, Grant NO R21AP10166

Key personnel and contact information:

Dr. Kim Eichhorst, Program Director, kimde@unm.edu

Matt Leister, Science Director, matt.leister@bemp.org

Zoe Wadkins, Education Director, zoe.wadkins@bemp.org

Dr. Ara Winter, Information Manager, akooser@unm.edu

Contents

1 Introduction

Objective

To collect and analyze abiotic and biotic data at BEMP sites in the Rio Grande Bosque while involving K-12 and university students in learning about and monitoring this ecosystem.
All data and reports are available on the BEMP website, www.BEMP.org.

Scope of Work (updated from previous reports)

The Bosque Ecosystem Monitoring Program (BEMP) combines long-term ecological research with community outreach by involving K-12 teachers, their students, and students from the University of New Mexico in monitoring key indicators of structural and functional change in the Rio Grande riparian forest, or "bosque." In 1996, BEMP began as a program of the University of New Mexico's Department of Biology (under NSF Grant No. DEB-9420510, Amendment No. 004) and quickly became a collaboration between the University of New Mexico and Bosque School in Albuquerque, with fewer than 200 participants in its first year. Before the COVID-19 pandemic, BEMP was averaging approximately 9,000 participants annually. The BEMP outdoor education experience builds science skills, educates the community about the bosque ecosystem, and helps create a constituency for stewardship of the bosque. BEMP findings derived from student-gathered data are used by government agencies to inform multi-million dollar management decisions that impact the riparian corridor.

The 2023 reporting period covers 33 BEMP sites along 250 miles of the Rio Grande, including 32 sites within the Middle Rio Grande (Figure 1.1 and Table 1.1). Through the stakeholder driven and strategic location of these sites, BEMP studies the ecological drivers and effects of fire, flooding, climate change, and human alteration on the bosque ecosystem. Two-thirds of BEMP sites were installed by BEMP staff at the request of natural resource and water managers to monitor the long-term ecological impacts of restoration projects such as mechanical clearing, wood chipping, bank-lowering, and more recently, post burn recovery. The other third were installed to facilitate research opportunities or at the request of schools or other partners.

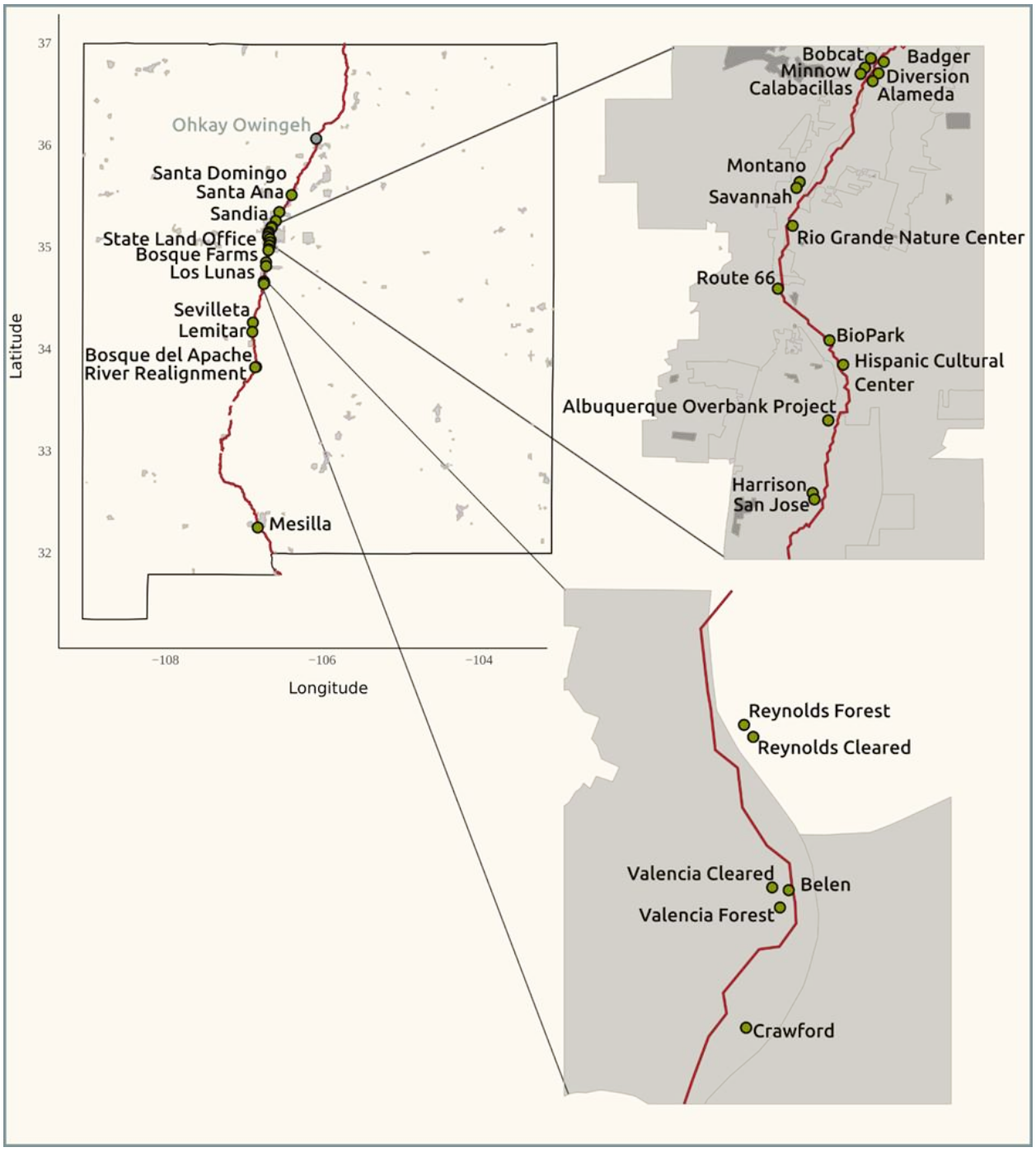


Figure 1.1. Map of 33 active BEMP sites along the Rio Grande; Ohkay Owingeh was not an active site for all of 2023.

Table 1.1. BEMP sites and locations along the Rio Grande by Reach, listed from north to south.
* denotes inactive site (either no longer active or temporarily inactive)

Site number	Site name	Latitude	Longitude	Reach
9	Ohkay Owingeh*	36.0618	-106.0761	Cochiti
24	Santo Domingo*	35.50989	-106.3896	Cochiti
5	Santa Ana	35.34284	-106.5458	Angostura
32	Sandia	35.255	-106.5907	Angostura
22	Bobcat	35.19705633	-106.6439494	Angostura
21	Badger	35.1956	-106.6402	Angostura
12	Minnow	35.19315094	-106.646915	Angostura
10	Diversion	35.1908	-106.6429	Angostura
11	Calabacillas	35.19056822	-106.6491626	Angostura
1	Alameda	35.1875	-106.6459	Angostura
17	Montano	35.14528819	-106.6803699	Angostura
6	Savannah	35.14285294	-106.6819814	Angostura
2	Rio Grande Nature Center (RGNC)	35.127	-106.6854	Angostura
20	Route 66	35.1006408	-106.6914783	Angostura
23	BioPark	35.079	-106.668	Angostura
8	Hispanic Cultural Center (HCC)	35.06881267	-106.6580575	Angostura
29	Albuquerque Overbank Project (AOP)	35.04546	-106.6657	Angostura

13	Harrison	35.01505603	-106.6736953	Angostura
31	San Jose	35.012375	-106.6728	Angostura
28	Valle de Oro	34.97895	-106.6801	Angostura
30	State Land Office (SLO)	34.96785	-106.6856	Angostura
27	Bosque Farm	34.848851	-106.714722	Isleta
3	Los Lunas	34.81236936	-106.714458	Isleta
19	Reynolds Forest	34.66054583	-106.7429525	Isleta
18	Reynolds Cleared	34.65966431	-106.7421328	Isleta
15	Valencia Cleared	34.64863444	-106.7391728	Isleta
4	Belen	34.6484315	-106.7377022	Isleta
16	Valencia Forest	34.64716225	-106.738482	Isleta
25	Crawford	34.63835	-106.74277	Isleta
14	Sevilleta	34.25834233	-106.8831845	San Acacia
7	Lemitar	34.16703188	-106.8899486	San Acacia
34	River Realignment	33.8227	-106.8419	San Acacia
33	Bosque del Apache (BDA)	33.8197	-106.8539	San Acacia
26	Mesilla	32.248328	-106.821014	South of San Marcial

BEMP monitors biotic and abiotic variables at our research sites. Our abiotic datasets include: depth to groundwater; water level in ditches and drains; precipitation; above- and below-ground temperature; and water quality in the Rio Grande. Our biotic datasets include litterfall; vegetation cover; surface-active arthropod richness and abundance; and tamarisk leaf beetle distribution, abundance and impact.

Timing of Data Collection (from previous reports)

Depth to groundwater, water level in nearby ditches and/or drains, precipitation, and litterfall are collected monthly, during the week of the third Tuesday of each month. Surface-active arthropods are collected three times each year, in the spring, summer, and fall. Vegetation cover is surveyed once each year in August-September. Tamarisk leaf beetle monitoring is conducted during the week of monthly monitoring from May-August, with some sites collected through September. BEMP collects other datasets as funding permits, including water quality of the river, ditches, and groundwater; fuel load/woody debris; cottonwood sex and diameter at breast height; cottonwood phenology; sunflower phenology; and seedling counts.

Site Updates

High river flows from May through early July, 2023 resulted in the inundation of numerous sites by overbank and seep flooding. Flooded sites were (north to south): in Bernalillo County: Minnow (Site #12), Diversion (Site #10), Alameda (Site #1), Route 66 (Site #20), Bio Park (Site #23), Hispanic Cultural Center (Site #8), Albuquerque Overbank Project (Site #29), Harrison (Site #13), San Jose (Site #31) and State Land Office (Site #30); in Valencia County: Bosque Farms (Site #27), Los Lunas (Site # 3), Reynolds Cleared (Site #18), Reynolds Forest (Site #19), Valencia Cleared (Site #15), Valencia Forest (Site #16), Belen (Site #4), and Crawford (Site #25) and in Socorro County: Bosque del Apache (Site #33) and River Realignment (Site #34). Collections were modified to accommodate the amount of flood water at each site while maintaining field crew safety. BEMP was unable to secure permission to monitor Santo Domingo (Site #24) from the local tribal authorities starting in June 2023.

In February 2023, there was a small, rapidly-contained fire at the Los Lunas BEMP site. The fire was primarily in the center of the site, scorching the center well and burning B, D, and E litterfall tubs and a few pitfall traps. The fire scorched the ground and a few cottonwoods but it was a low severity fire. This area flooded in April of 2023 and remained inundated through June. This allows for a comparison of post-fire recovery following flooding. Pictures and data visualizations of the Reynolds Forest and Los Lunas sites post-fire are in the last section of 6 Litterfall and Vegetation Cover, post-burn assessment.

2 Importance of long-term data, community science, and education outreach (from previous reports)

BEMP's mission is community science, education, and stewardship: equitable and inclusive hands-on student research essential to the management of the Rio Grande ecosystem.

The long-term data generated by BEMP have been used in informing predictive models, assessing restoration projects, tracking shifts in native and exotic vegetation, understanding bosque response to different ecosystem drivers (e.g., fire, flooding, clearing, impacts of climate change, introduction of biocontrol species), determining what ecotones are present, and how to transition former riparian areas to sustainable semi-arid ecosystems. Long-term monitoring of these sites is critical for understanding how the ecosystem responds to land management strategies and climate variability under rapidly changing means and variances. Long term data is necessary for effectively applying adaptive management and developing best practices strategies.

BEMP involves community members and students of all ages, from pre-K through high school, college, and graduate school to life-long learners volunteering in the program. Our primary focus is on elementary, middle , and high school students that participate in monthly fieldwork (long term educational engagement) to collect groundwater, precipitation, and litterfall data, as well as going out once or twice each year to participate in monitoring arthropods. Students have opportunities to participate in other data collections, including water quality, tamarisk leaf beetle, and monitoring fuel load. BEMP involves UNM undergraduate and graduate students in a semester-long internship experience through an upper division biology BEMP course, BIOL 408/508, where they learn about the bosque ecosystem, develop independent projects applying BEMP data, work with K-12 students and teachers, and play an integral role in regular field and lab work. The work of K-12 students in the field is facilitated and quality controlled by BEMP staff as well as the UNM interns. Having now played a role in our community for a couple of decades, we are starting to see the long-term impacts of our programming. Each year, there are a few UNM students in the BEMP course that had previously participated in BEMP as elementary, middle, and/or high school students. These students are often reconnected to their former schools and sites. BEMP has been part of a meaningful story for many students and community members. BEMP helps students connect with their local landscape, learn science through hands-on research, and communicate or present their understanding through math, writing, art, and other forms of expression. Several former BEMP students now have jobs with our partner agencies, including Bernalillo County

Water Utility Authority, City of Albuquerque Open Space, Middle Rio Grande Conservancy District, and New Mexico Interstate Stream Commission.

3 Outreach

BEMP hosted two events during 2023 to present new data, visualizations, and analyses: the Crawford Symposium and the Luquillo-Sevilleta Virtual Spanish Symposium. Both of these events feature student presentations. BEMP staff and students present BEMP data to managers, professionals, and students several times throughout the year depending on conference availability. In 2023, BEMP data were shared at conferences and workshops including the RiversEdge West Planting for the Future Conference, Climate Adaptation Science Center Fall Science Meeting, Audubon, Sevilleta All Hands Meeting, and the Rio Grande Basin Study. BEMP staff co-hosted a tour with the Rio Grande Basin Study of sites in the San Acacia and Isleta Reaches in June 2023. BEMP participated in multiple workshops, addressing issues around water, climate, fire, and vegetation, including workshops through the MRG Endangered Species Collaborative Program, Whitfield Wildlife Conservation Area, Rio Grande Basin Study, Valle de Oro National Wildlife Refuge and EJ-40 Air Network, Wetland Stakeholder Work Group, and San Acacia Science Forum.

STEM pathways and workforce development through BEMP

Over the last several years, the COVID-19 pandemic has had an unprecedented effect on the educational (and broader) sphere. Despite the many variations of learning that schools, teachers and community partners readjusted to, BEMP education did its best to meet our community's needs at every turn. Taking all necessary precautions to ensure public health and safety, BEMP education reached 5,900 students and adults through in-person contacts alone, engaging 56 different schools and community organizations throughout April of last year to today.

Instruction was provided in-person and remotely at field locations and in outdoor and on campus classrooms, through field monitoring collections, and in study-trips. We also offered an ongoing array of educational programming provided online through printable and electronic platforms, including self-led activities and video lessons. Through lessons focused on water quality and storm impacts, phenological observation, ecosystem monitoring, climate change, scientific processes, graphing and data analysis, students obtained a deeper understanding of nature while developing career-based skills in the sciences, public-speaking and presentation delivery. Moreover, university students participating in the Biology 408/508 internship course

conducted field and lab work during this time, engaging in an array of scientific, procedural and collection based skill sets as well as educating younger students and expanding their professional experience as Albuquerque's upcoming workforce.

If this time has taught us anything, it is the deep value of engaging audiences through our broader ecosystem, encouraging us all to see ourselves connected to, rather than separate from, one another and our more-than-human world.

4 Temperature

During the 2022-2023 reporting period, we collected data from OnSet temperature loggers at nine BEMP sites. Three loggers were initially installed at each selected site: a canopy air temperature logger attached to a tree near the canopy rain gauge, a canopy subsurface logger buried underground near the canopy rain gauge, and an open subsurface logger buried near the open rain gauge. Temperature data are logged hourly and downloaded annually by BEMP staff.

Complete temperature monitoring methodology can be found online at: https://secureservercdn.net/45.40.146.38/659.541.myftpupload.com/wp-content/uploads/2017/09/TempLoggerDownloadandDeploy.pdf

Data were run through a visual QA/QC to make sure plots follow the general expected seasonal patterns and historical trends. The data were then checked for the number of NA (missing data points) by site over time and for any points more than three standard deviations (SD) away from the z-score transformed data. The number of data points flagged as outside the three SD were minimal given the volume of data. Data points collected on the same day as the logger was handled for download were eliminated as they did not account for the full day, and as the logger position was disturbed in the download process.

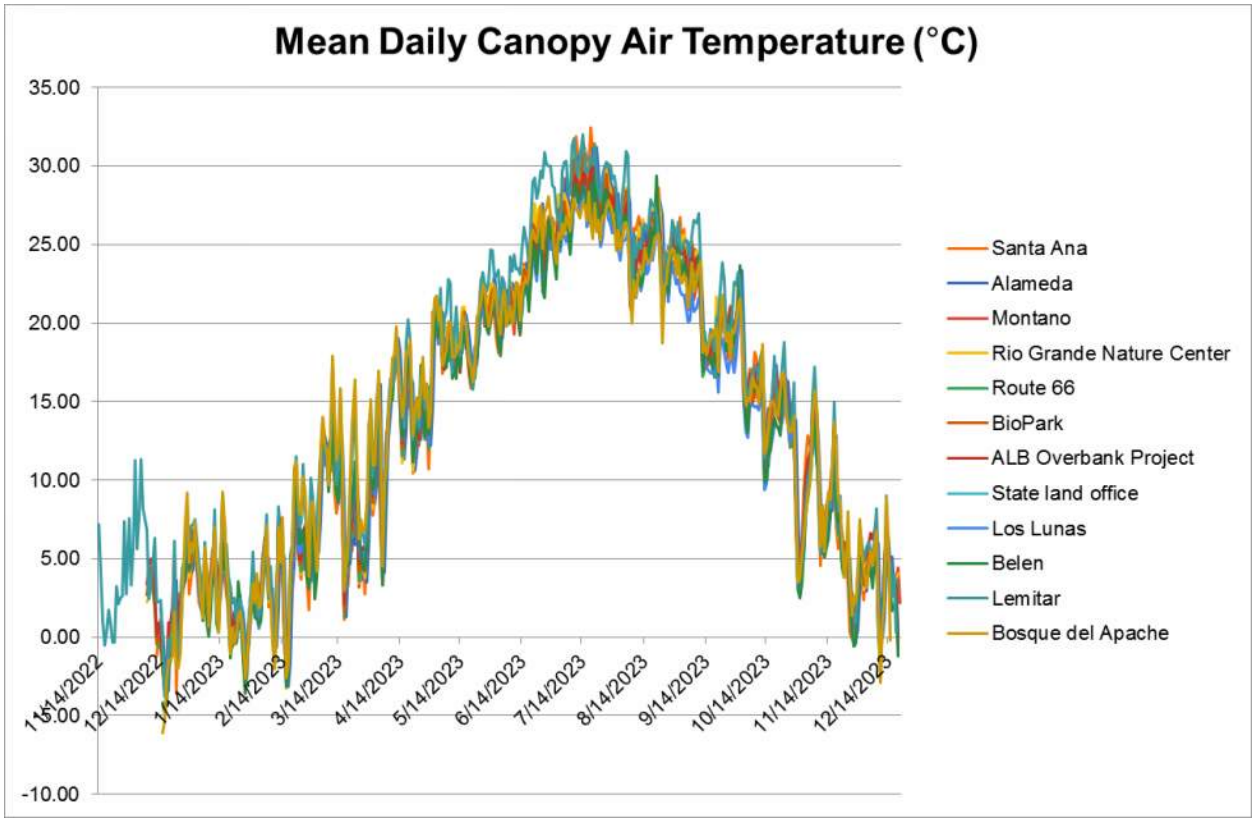


Figure 4.1. Mean daily air temperature (°C) under a canopy from December 2022 through December 2023 at Santa Ana, Albuquerque sites (Alameda, Montano, Rio Grande Nature Center, Route 66, BioPark, and State Land Office), Los Lunas, Belen, Lemitar, and Bosque del Apache.

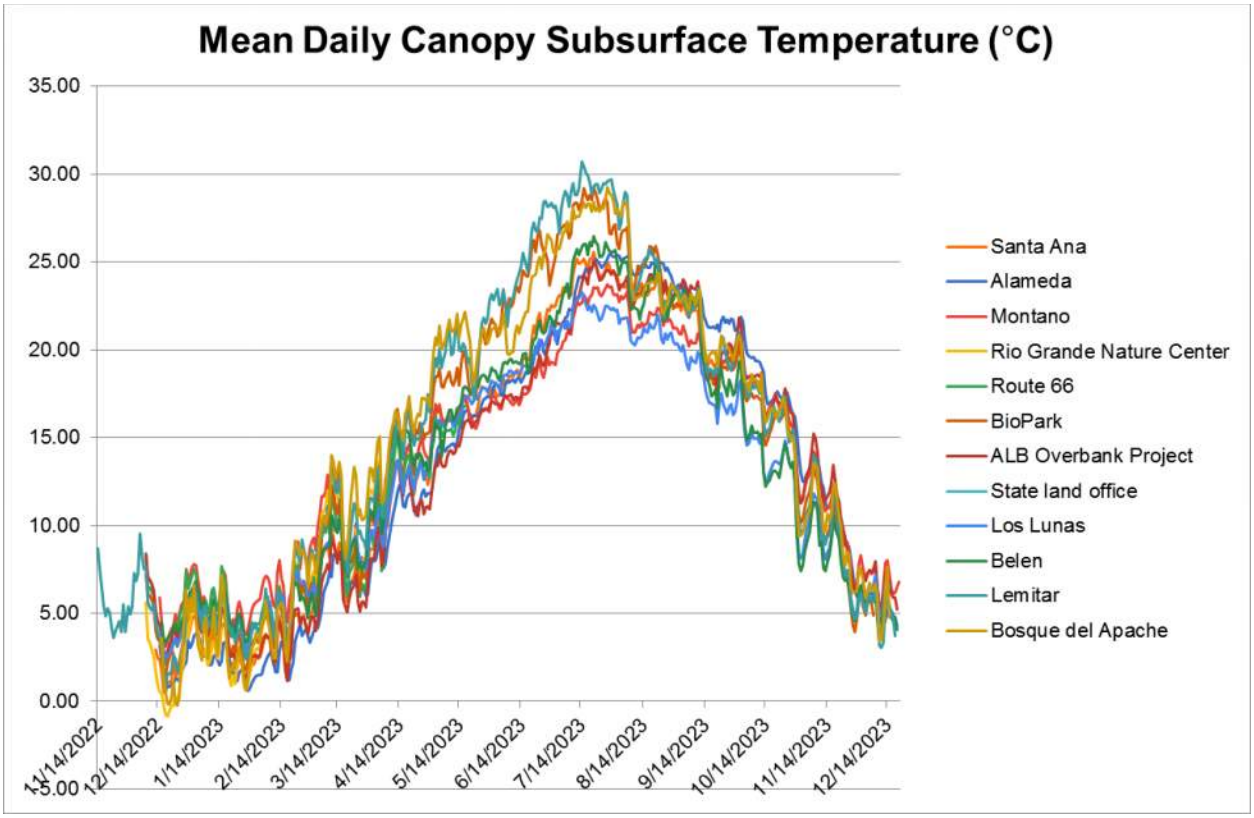


Figure 4.2 Mean daily subsurface temperature (°C) under a canopy from December 2022 through December 2023 at Santa Ana, Albuquerque sites (Alameda, Montano, Rio Grande Nature Center, Route 66, BioPark, and State Land Office), Los Lunas, Belen, Lemitar, and Bosque del Apache.

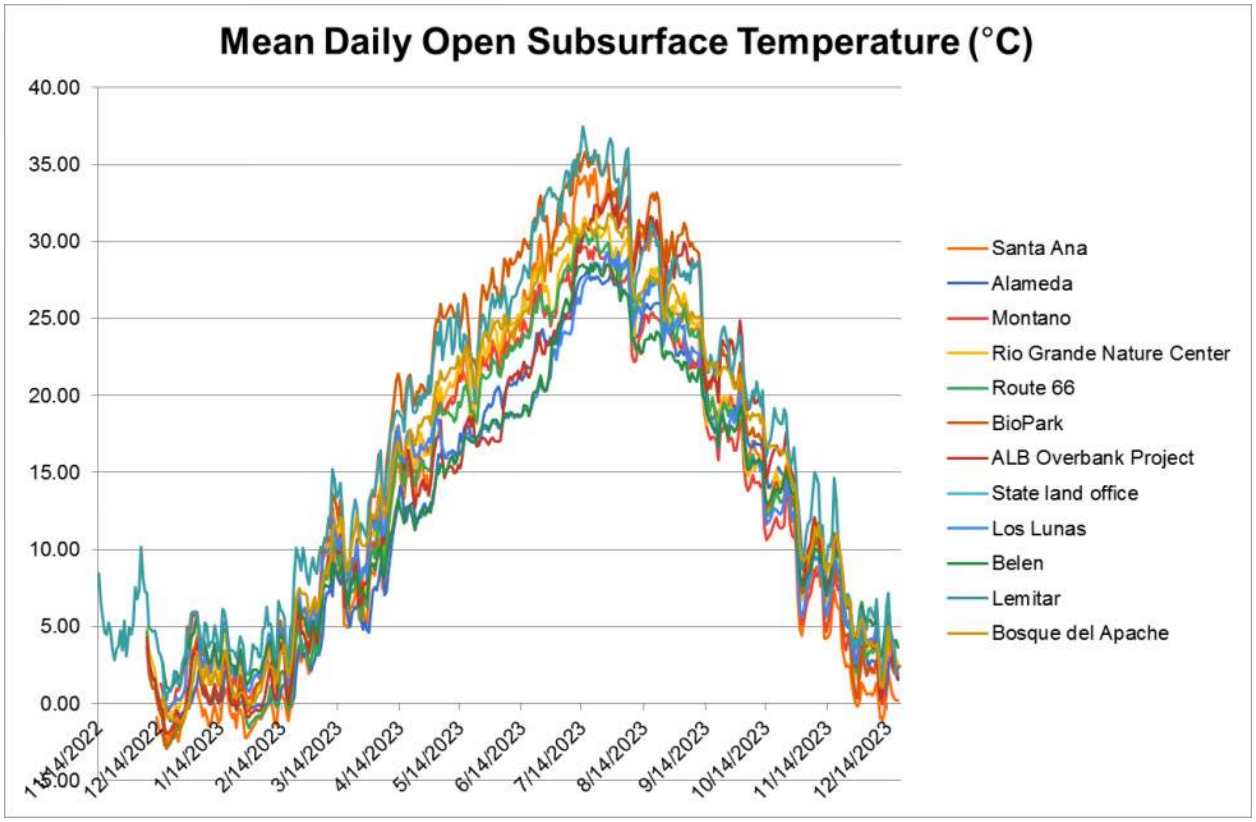


Figure 4.3 Mean daily subsurface temperature (°C) in the open from December 2022 through December 2023 at Santa Ana, Albuquerque sites (Alameda, Montano, Rio Grande Nature Center, Route 66, BioPark, and State Land Office), Los Lunas, Belen, Lemitar, and Bosque del Apache.

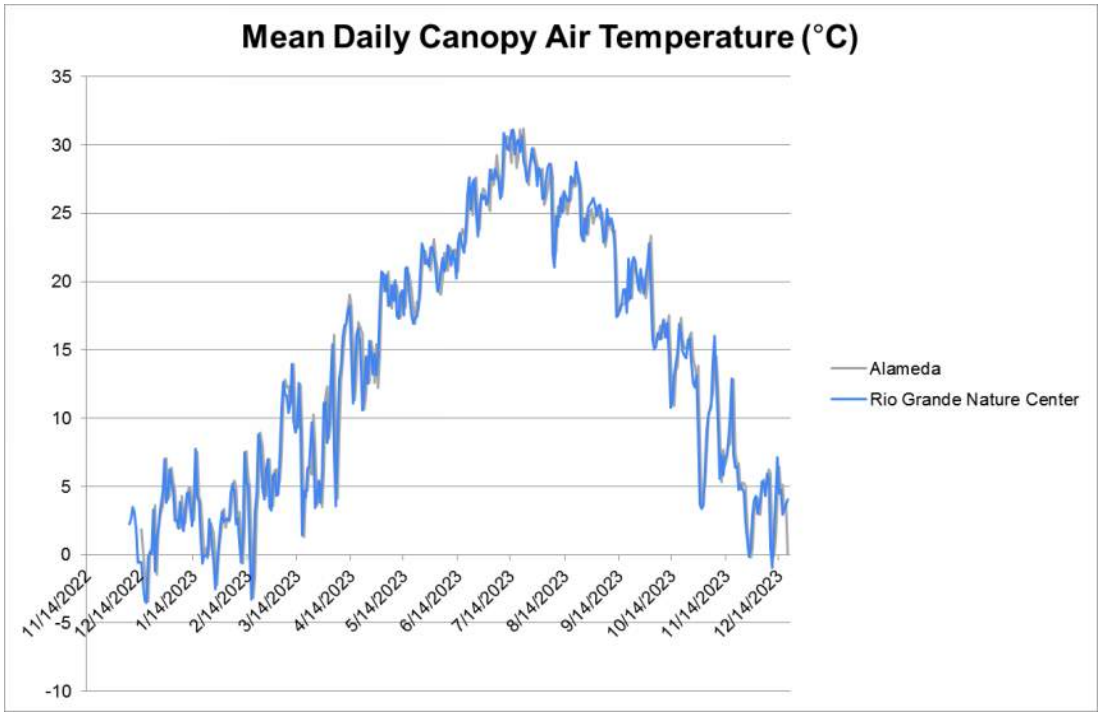


Figure 4.4 Mean air temperatures at Alameda (high canopy cover) and RGNC (low canopy cover) in Albuquerque.

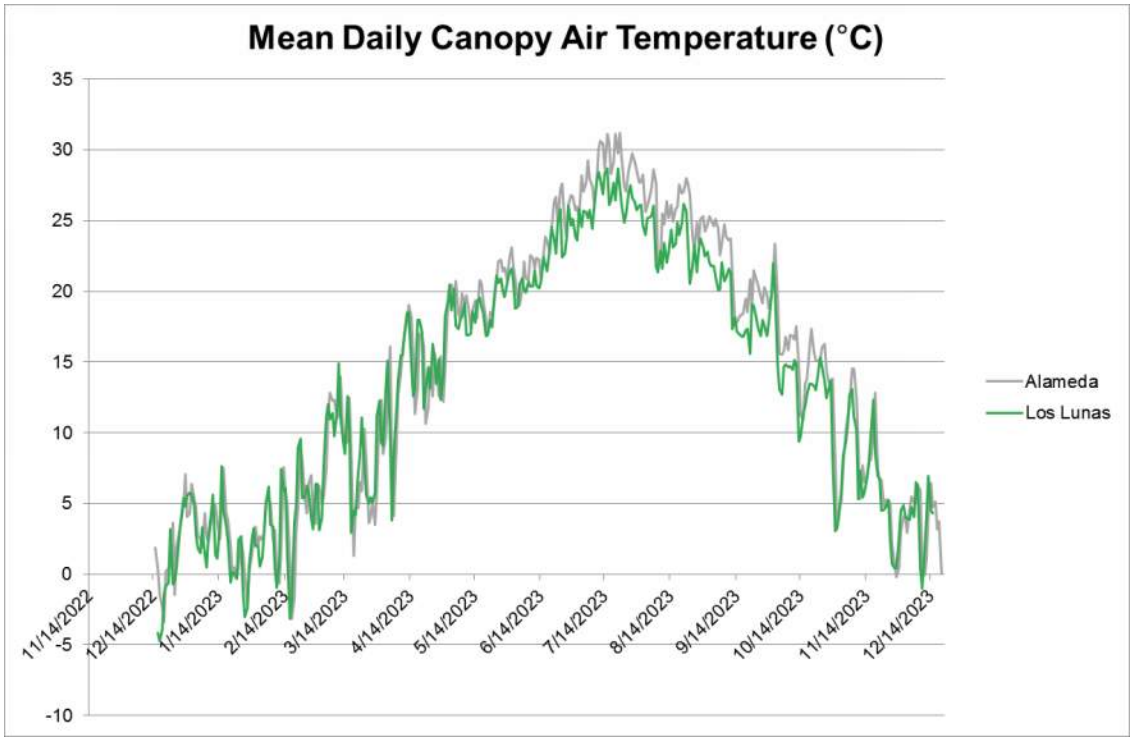


Figure 4.5 Mean air temperatures at Alameda (high canopy cover, urban area) and Los Lunas (high canopy cover, rural area).

Air temperatures show that the warmest sites fluctuate between the southernmost sites (Lemitar and Bosque del Apache), sites with low canopy cover (Santa Ana, Rt 66), and urban sites near bridges (Alameda, Rt 66).

Canopy loss is expected to expose affected areas to increased solar radiation, resulting in local elevated temperatures. This is expected to occur in regions where the dominant canopy trees (cottonwoods) die and are not replaced either through natural recruitment or plantings. As a result, microclimates within these areas will undergo noticeable shifts.

By comparing data from the subsurface temperature loggers beneath the existing canopy and in exposed areas within the same site, we not only gain insight into the insulating capacity of canopy trees within this ecosystem but will also be able to anticipate temperature shifts occurring in areas experiencing canopy loss without replacement.

The importance of canopy is demonstrated through a comparison of two Albuquerque sites, Alameda and RGNC (Figure 4.4). While RGNC is buffered by more farm fields and Candelaria Preserve, the cottonwood cover at Alameda is three times higher than at RGNC. Alameda is 1km (0.65 miles) south of the Alameda Bridge and 0.65 km (0.35 miles) north of Paseo del Norte Bridge. RGNC is 0.25 km (1 mile) south of the Montano Bridge and 0.25km (1 mile) north of I-40. Both sites are easily accessible and in the heart of the City. RGNC, with its declining canopy and sparse understory cover, is on average 0.11 °C warmer than Alameda with a maximum of 1.62 °C warmer. When considering the impact of urban areas on temperatures of the bosque, two sites with similar canopy cover were compared: Alameda and Los Lunas (almost 30 miles to the south) (Figure 4.5). Alameda is on average 1 °C warmer than Los Lunas with a maximum difference of 3.88 °C warmer.

5 Precipitation

Precipitation is measured at all of our sites, except for Bosque Farms (due to repeated vandalism). At each site, two Tru-Chek precipitation gauges are installed on a post; one under the forest canopy, and one out in the open. Each rain gauge is monitored and emptied by BEMP staff and community scientists once per month. A small amount of oil is added to the empty gauge to prevent evaporation and to ensure capture of the full month's precipitation.

More details on our methods for collecting precipitation data can be found here: https://github.com/BEMPscience/bemp_data/tree/master/precipitation

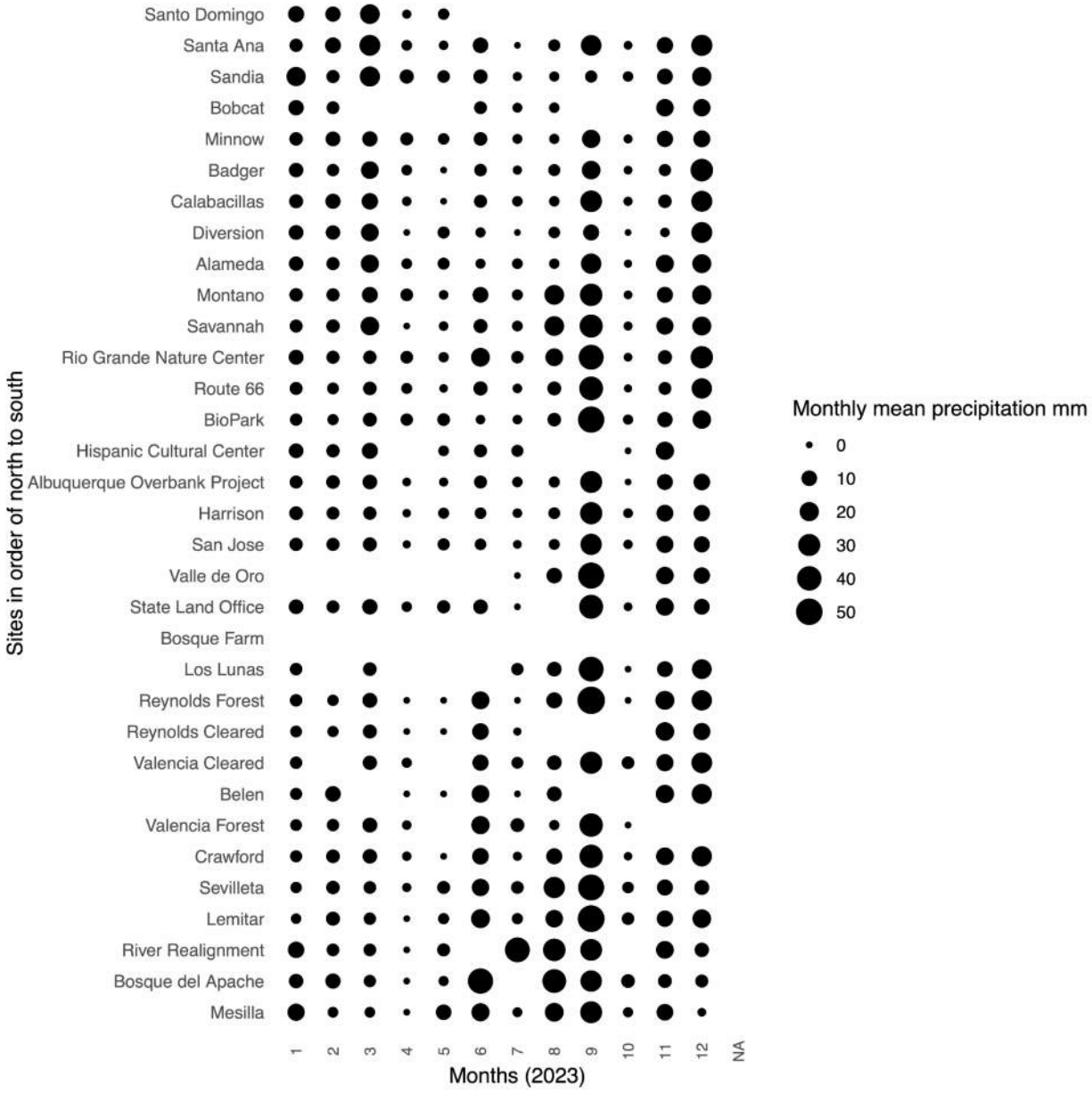


Figure 5.1 Mean monthly precipitation (mm) at each site for 2023.

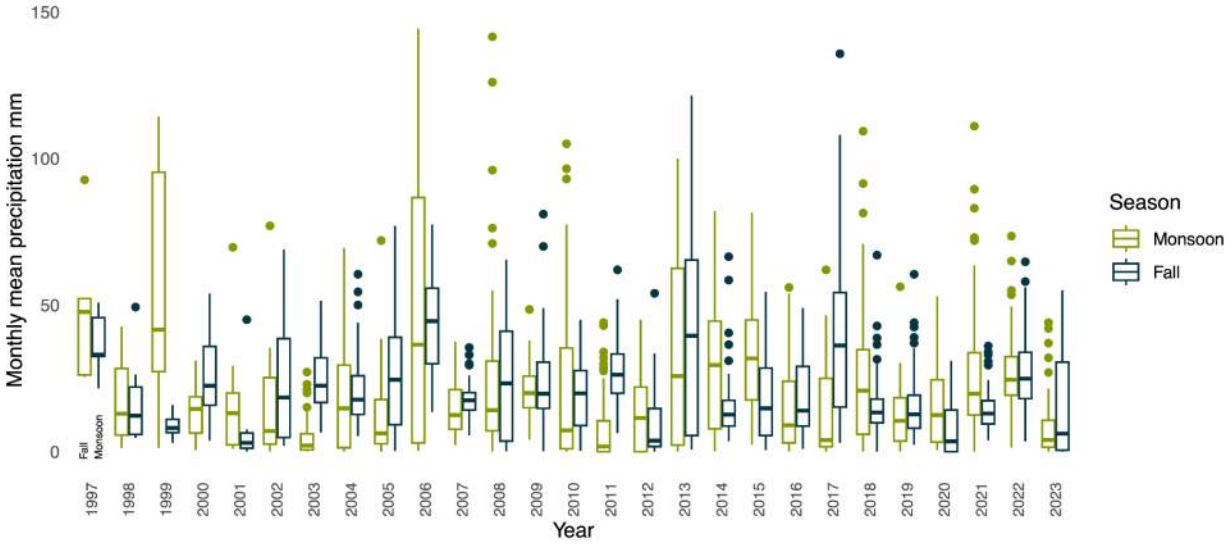


Figure 5.2 Boxplot of precipitation divided into the monsoon season (June - August) and fall storms (September-October). The number of sites has increased over time, starting with 3 sites in 1997 and reaching a maximum of 34 sites by 2018 and then dropping to 32 by 2023.

Long term precipitation trends

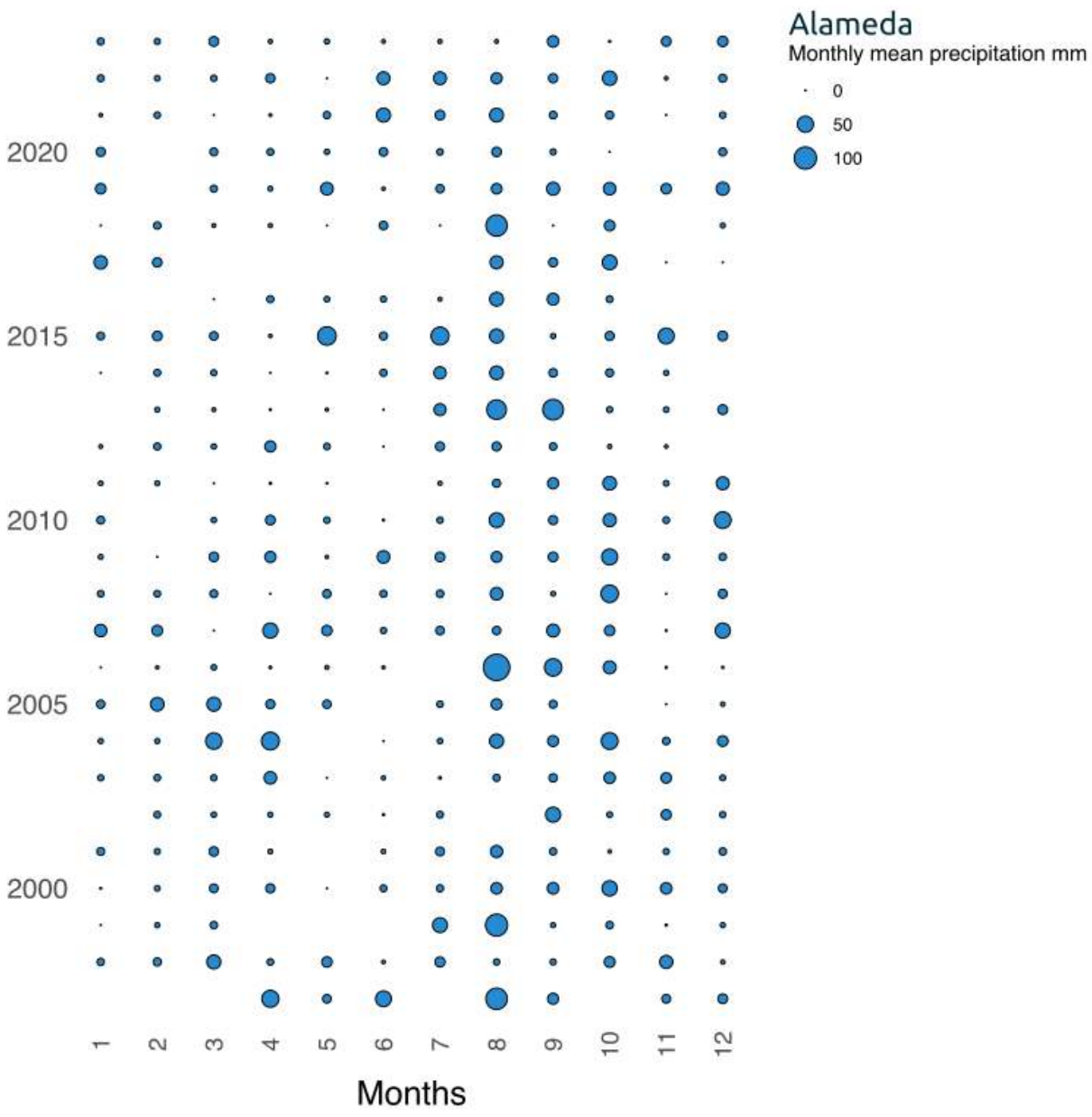


Figure 5.3 Mean monthly precipitation at Alameda from 1997 through 2023.

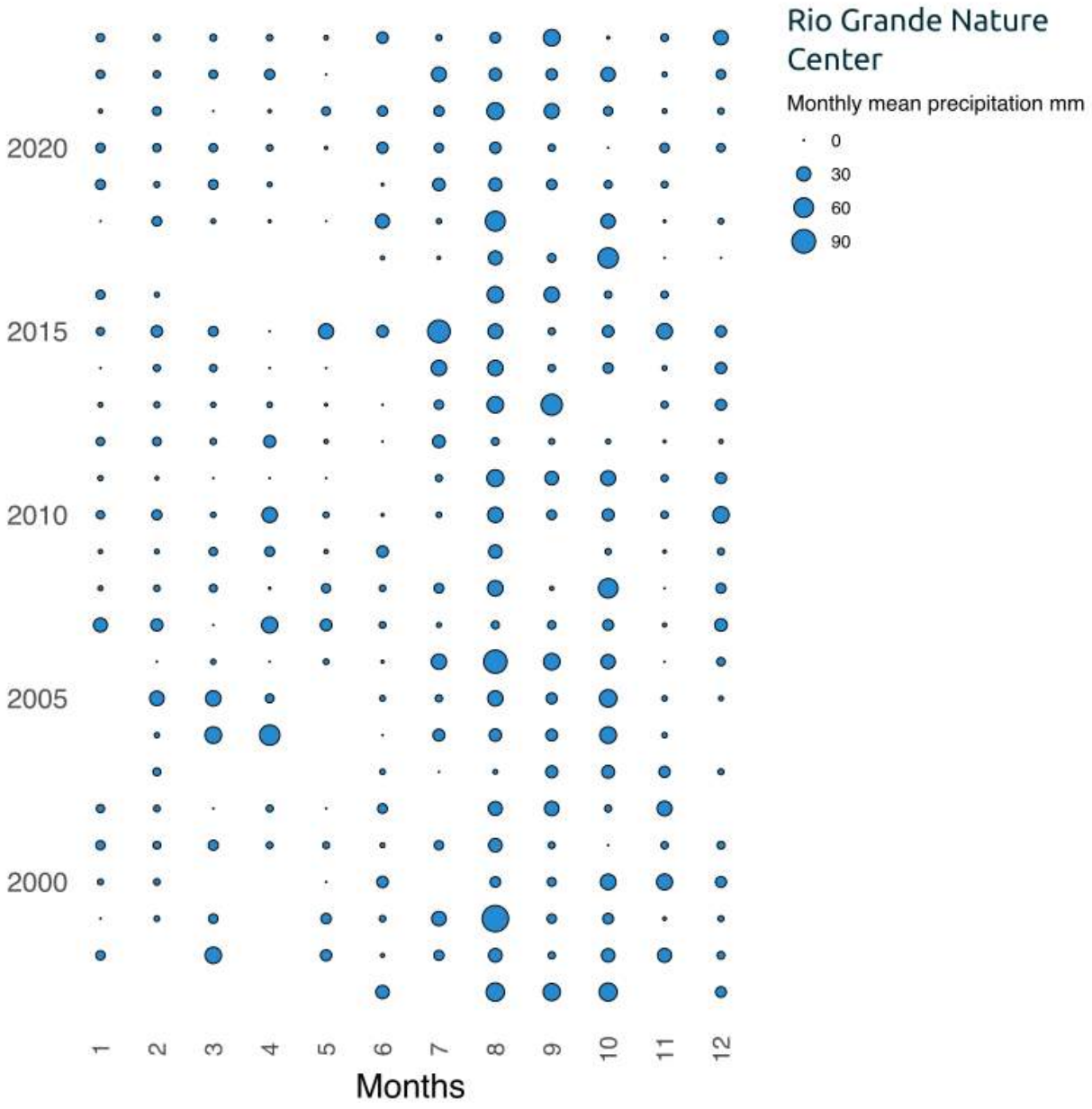


Figure 5.4 Mean monthly precipitation at RGNC from 1997 through 2023.

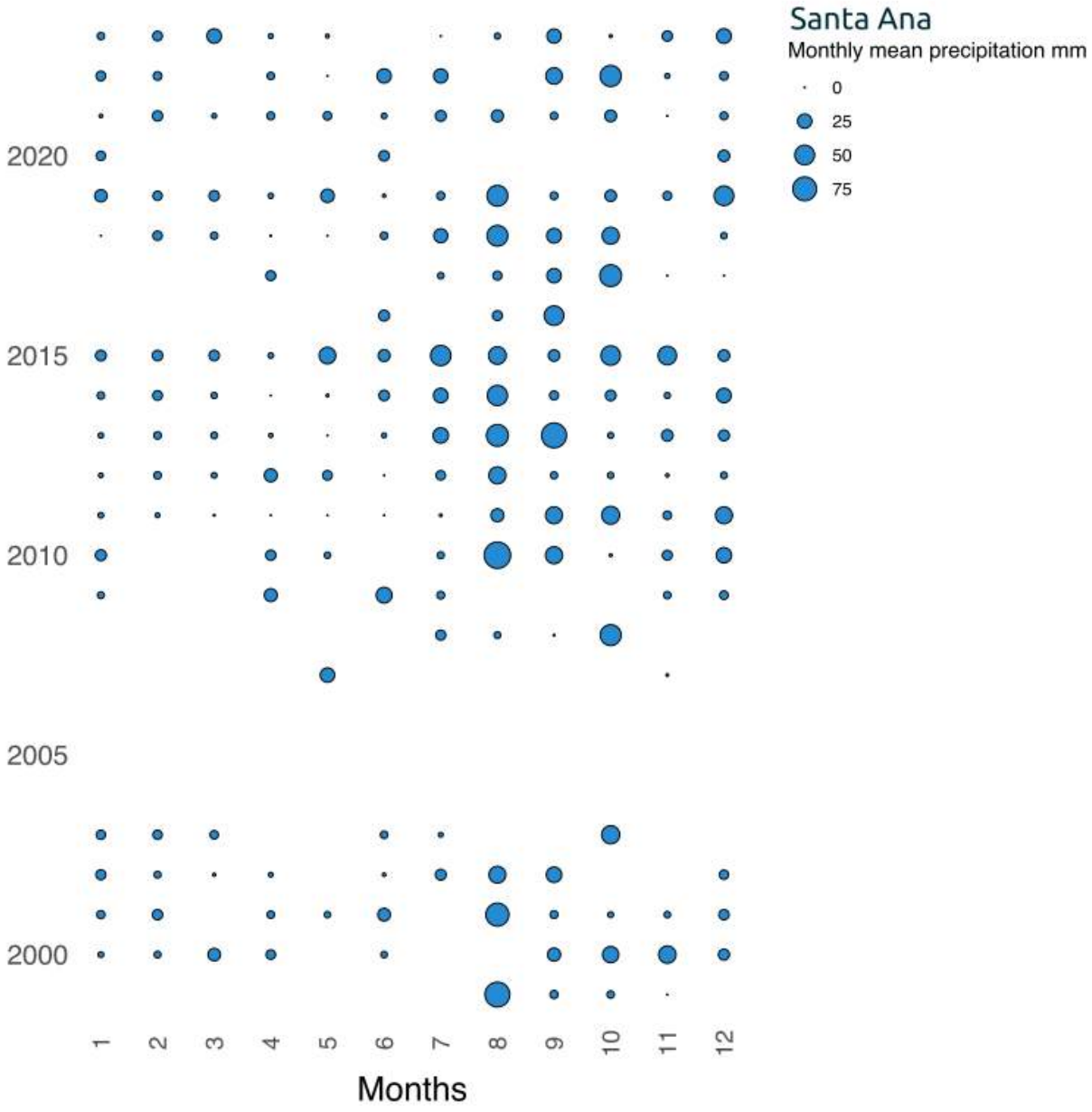


Figure 5.5 Mean monthly precipitation at Santa Ana from 1999 through 2023.

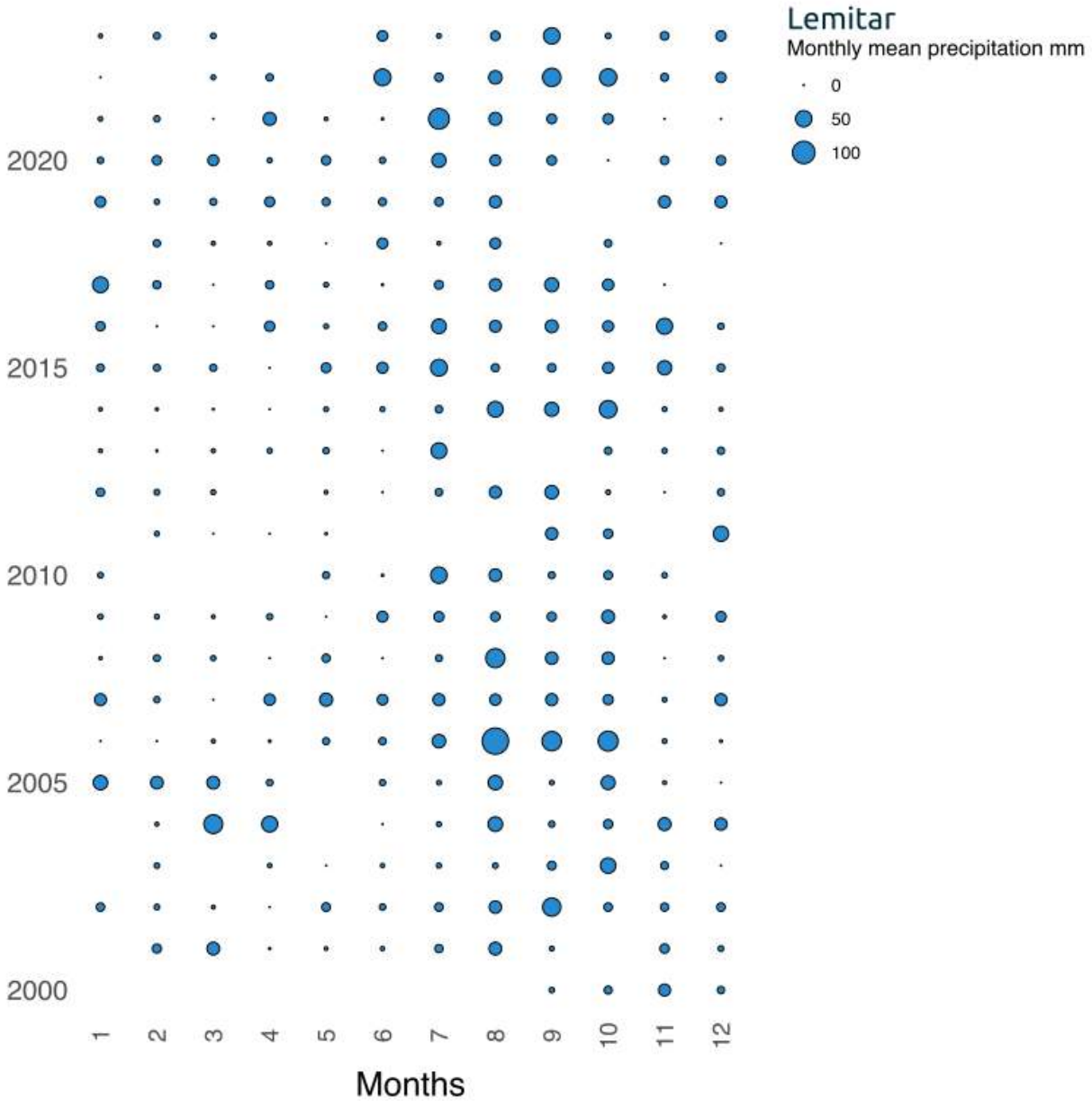


Figure 5.6 Mean monthly precipitation at Lemitar from 2000 through 2023.

While 2023 was a dry year, it is illustrative of the predicted shift towards greater precipitation events in the fall, after the historic monsoon season (mid-June to mid-September). Peak rainfall at most sites occurred in September. We compared monsoon season rains (typically defined as mid-June through September, but we used data from June-August) to fall rains (we used September and October rainfall). Even with the unevenness of having 3 months in the "monsoon" season and only two months in the "fall" season, we can see evidence of this potential shift of higher mean precipitation in fall, although it is not a strong shift in our data

at this point. The reduction of snowpack runoff, earlier snowmelt, and later fall storms will likely have an impact on the germination and growth of many different native riparian plants.

6 Depth to groundwater

Depth to groundwater is monitored at all BEMP sites except the Pueblos of Santa Ana and Santo Domingo. Pueblo of Sandia groundwater data are proprietary and must be requested through the Pueblo's Department of Natural Resources. Each month, BEMP staff along with UNM interns, K-12 students, and teachers monitor the five groundwater wells at BEMP sites. The nearby ditch/drain is also monitored and USGS river flow data are downloaded based on the monitoring day from the closest gauge to the north of each site.

Full monitoring methods can be found at:
https://github.com/BEMPscience/bemp_data/tree/master/depth_to_groundwater_data

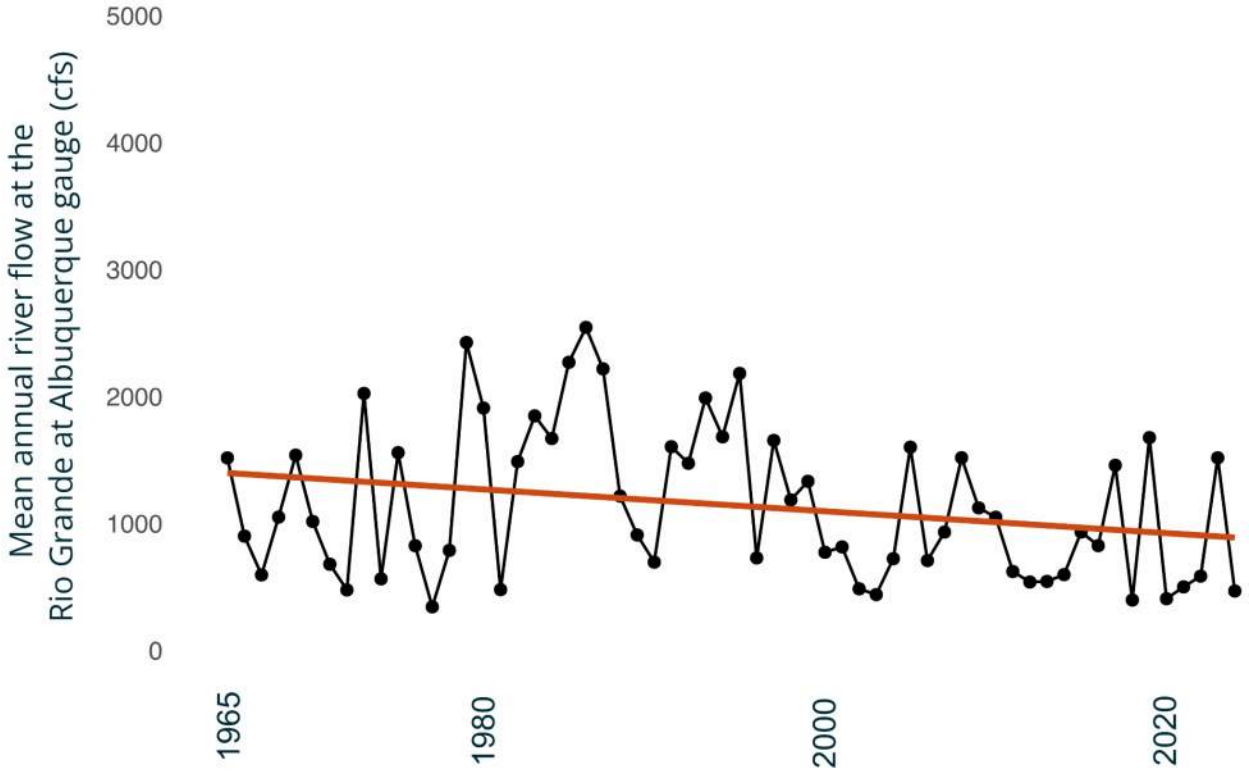


Figure 6.1 Mean annual river flow at the Albuquerque gauge over time. It is important to note that the Albuquerque gauge is located below Cochiti Dam which has regulated flows to the Rio Grande south of the dam since 1975. Prior to Cochiti Dam's construction, it was not unusual to see flows in the Rio Grande through Albuquerque peaking at or above 10 kcfs.

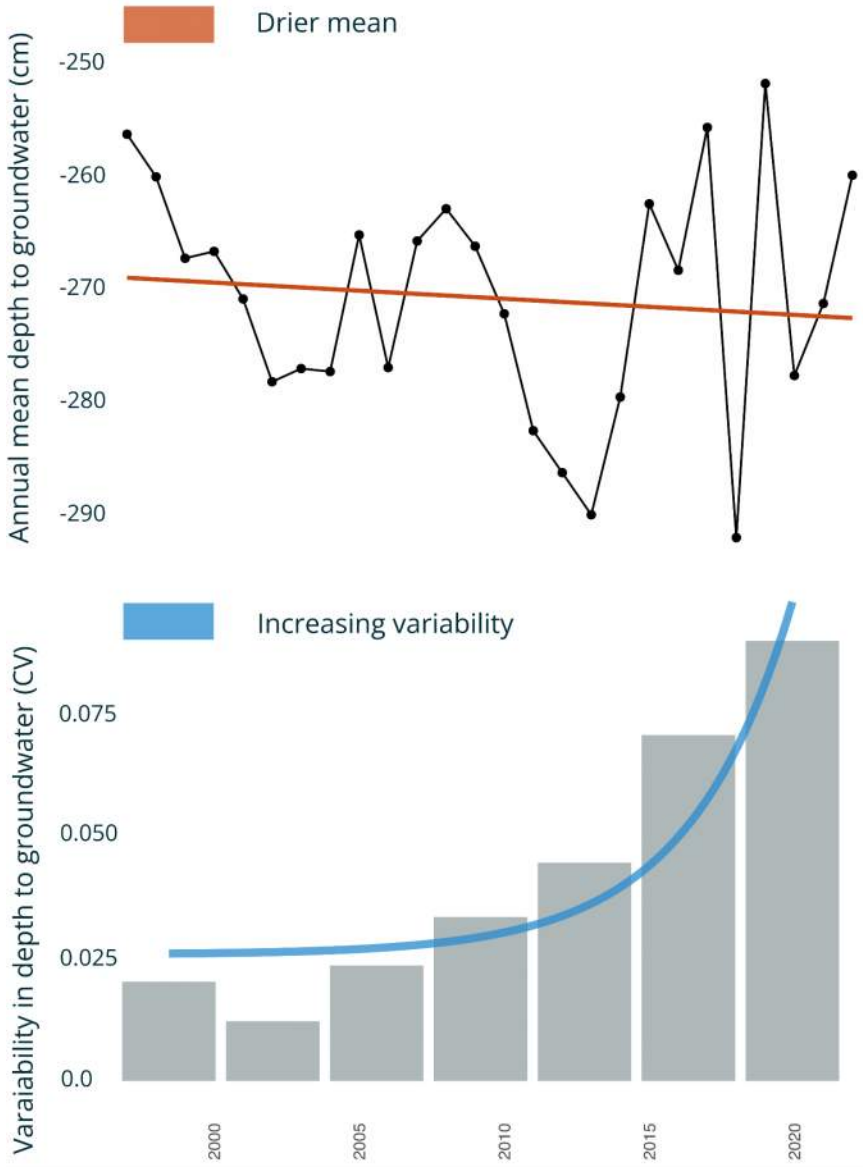


Figure 6.2 Figures showing the annual mean depth to groundwater and variability in depth to groundwater for the Alameda site.

The rapid changes in the mean and variance brought on by human-caused climate change may drive ecosystems into transition (riparian to semi-arid or arid). Climate change can cause more variability in snowpack between years, on top of overall declines in snowpack, leading to variability in river flow levels. Not all sites are impacted equally by this variability. For example, in response to high river flow, aggradation in some areas of the river can increase the likelihood of overbank flooding. Flooding can also lead to the Rio Grande flowing in sub-channels, increasing the proximity of some areas of the bosque to the river and thus decreasing depth to

groundwater more drastically. Soil profiles can also change the permeability of the soil, causing varying responses to changes in river flow.

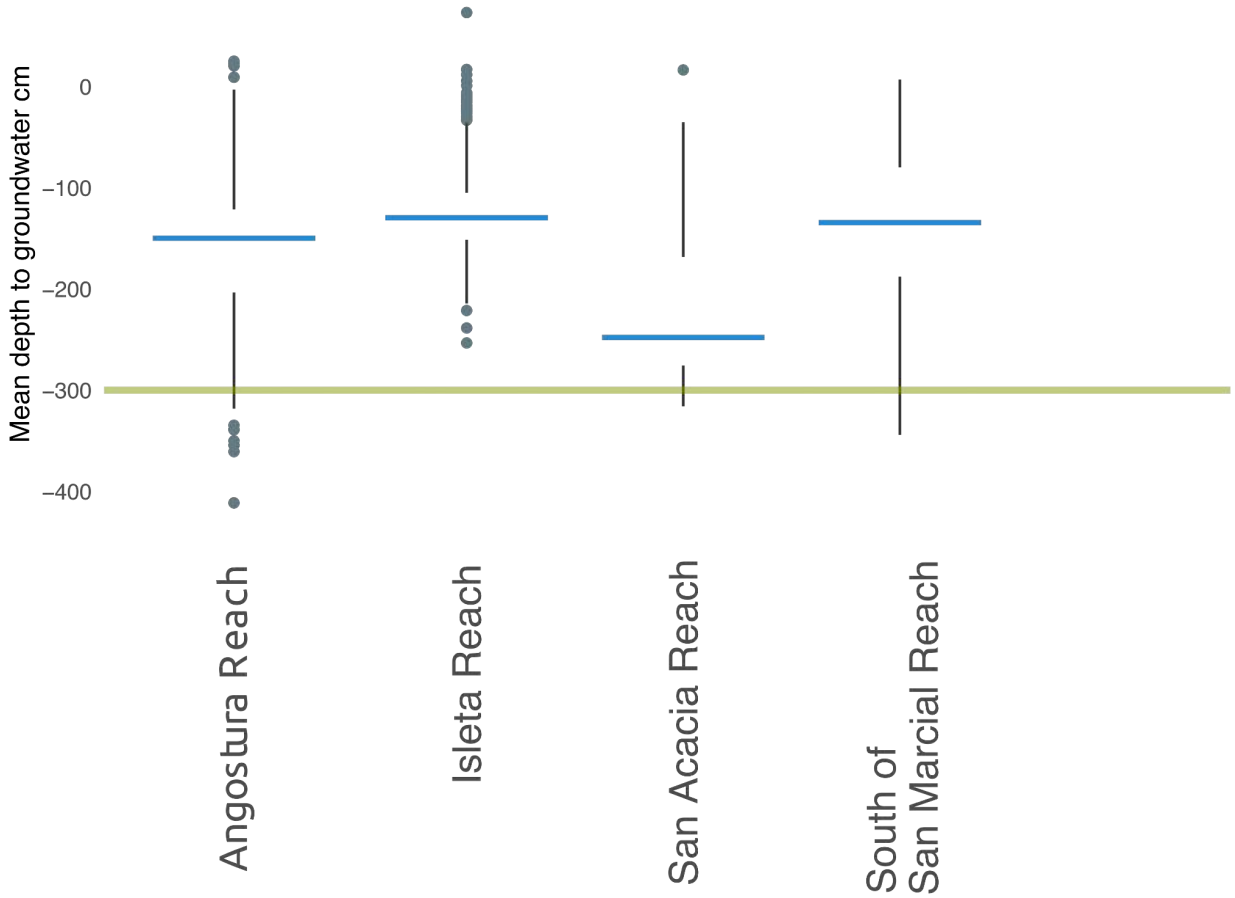


Figure 6.3 Mean depth to groundwater (cm) of BEMP sites with ten or more years of data organized by reaches of the Middle Rio Grande. Reaches are arranged north to south from left to right.

Angostura reach includes all sites within Albuquerque plus Sandia Pueblo; scouring due to proximity to Cochiti Dam as well as topography causes the riverbed in this reach to be the most degraded. The riverbed starts aggrading in lower Albuquerque and is more aggraded in the southern reaches. San Acacia is the most aggraded and experiences regular overbank flooding but also experiences longer periods of river drying. This, in addition to the placement of one

BEMP site (Lemitar) outside the levee, leads to the San Acacia Reach having the lowest mean monthly mean depth to groundwater. There is also greater variability in mean monthly mean depth to groundwater in the southern reaches than the Angostura Reach. This could be due to supplemental flows in the Angostura Reach preventing regular river drying, as groundwater levels are tightly correlated with river flow; although, 2022 and 2023 saw unusual summer drying in this reach.

Figure 6.5 Spark line plot of the mean monthly depth to groundwater across all BEMP sites. Time from 1997 to 2023 runs across the x-axis and the y-axis is depth to groundwater in cm. Sites are arranged from north to south by center point latitude.

Angostura Reach

The Angostura Reach comprises 19 sites. From north to south they are Santa Ana Pueblo, Sandia Pueblo, Bobcat, Badger, Minnow, Diversion, Calabacillas, Alameda, Montano, Savannah, Rio Grande Nature Center, Route 66, BioPark, Hispanic Cultural Center, Albuquerque Overbank Project, Harrison, San Jose, Valle de Oro NWR, and State Land Office. Groundwater data are not collected at Santa Ana. Groundwater data from Sandia Pueblo must be requested through the Pueblo's Natural Resources Department.

Isleta Reach

The Isleta reach comprises eight sites: Bosque Farms, Los Lunas, Reynolds Forest, Reynolds Cleared, Valencia Cleared, Belen, Valencia Forest, and Crawford. Similar groundwater fluctuations are exhibited by all sites throughout the Isleta reach, with peaks reflecting spikes in groundwater corresponding to recent flood events (2023, 2019, 2017) behaving more or less the same at all these sites. Los Lunas, which sees much higher peaks during recent flood events, is the sole exception. This is due to the site's positioning between the main river channel and a trough or flowing channel that fills during high flow events.

San Acacia and South of San Marcial Reaches

There are four BEMP sites that lie in the San Acacia Reach. These are Sevilleta, Lemitar, Bosque Del Apache, and River Realignment. The mean for this reach is the lowest of all the reaches, although this is skewed by the Lemitar site that is outside the levee system. As a result, Lemitar is less influenced by the river flow and there is a lower overall depth to groundwater and lower variability. As we go further south we get to an aggraded area of the Rio Grande that has many drying events as well as extreme flooding. This is shown by the variability in groundwater depth at the Bosque del Apache site in Figure 6.5.

Changes in mean and variance of depth groundwater in the shallow riparian aquifer.

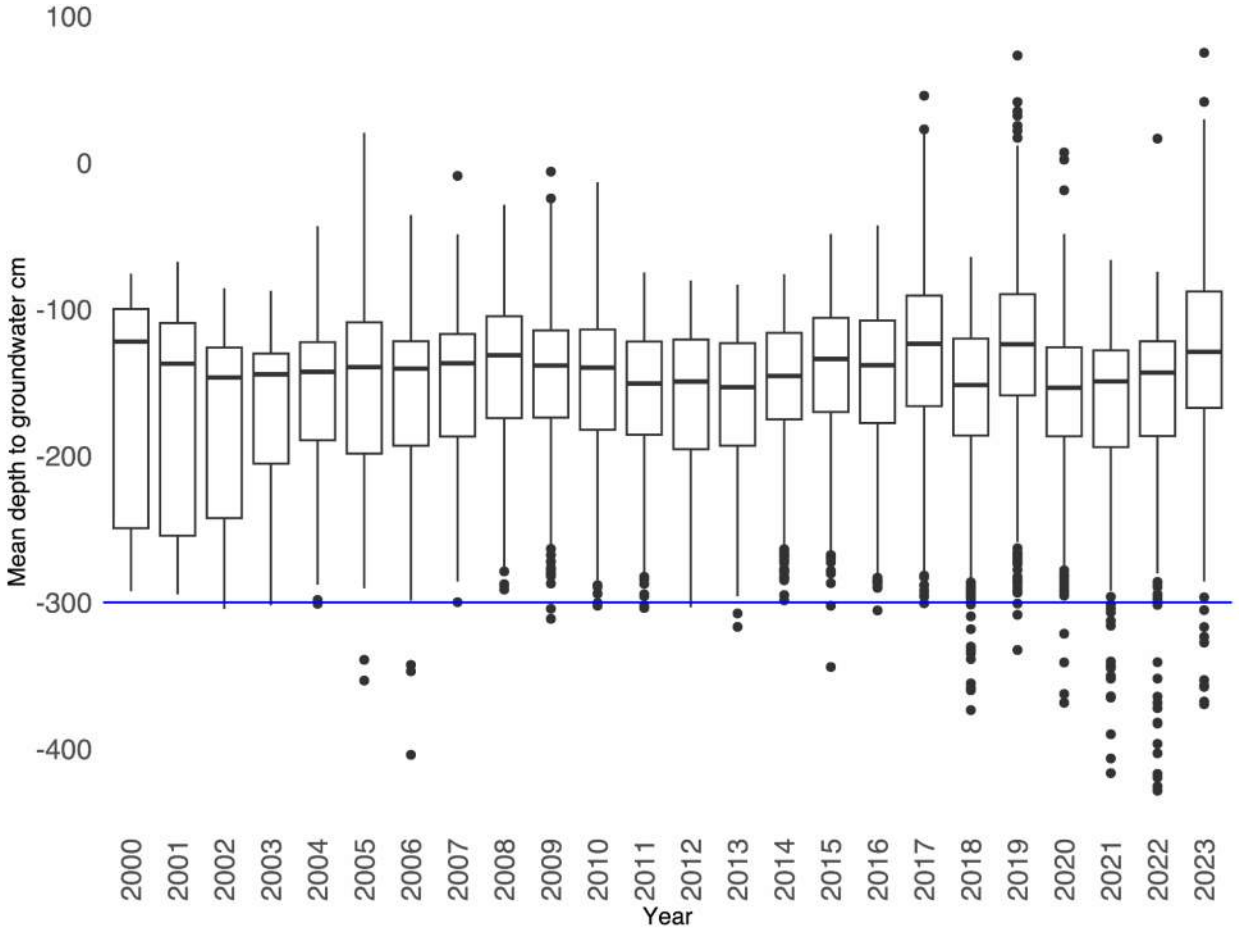


Figure 6.6 Boxplot of the mean monthly depth to groundwater across all BEMP sites from 2000 to 2023. The solid blue line is at 300 cm to show the threshold for established cottonwood trees. The black dots show the increasing number of outliers, especially toward drying events or declining groundwater. The flood events corresponding to high river flows in recent years (2017, 2019, and 2023) also have months with extremely low groundwater levels.

7 Litterfall and Vegetation Cover

Litterfall is any plant material that falls to the ground. BEMP litterfall data are categorized into leaves, reproductive parts, and wood from dominant tree species. It is collected monthly and then dried for 48 hours before being sorted and weighed. Litterfall is used to gauge plant productivity (leaves), reproductive effort (buds, flowers, seeds), and stress or senescence (wood).

Full monitoring methods can be found at:
https://github.com/BEMPscience/bemp_data/tree/master/leaf_litterfall

Vegetation cover surveys are conducted in August-September each year by a team of botanists and BEMP staff. Line intercept methods are used to monitor plant species along ten 30 meter transects at each of 27 sites. Herbarium work (identification of species) has been completed for 2023 data, which were entered, checked, and are being QA/QCed. Preliminary data through 2023 are included in this report.

Full monitoring methods can be found at:

https://github.com/BEMPscience/bemp_data/tree/master/additional_data_sets/vegetation_surveys/methods

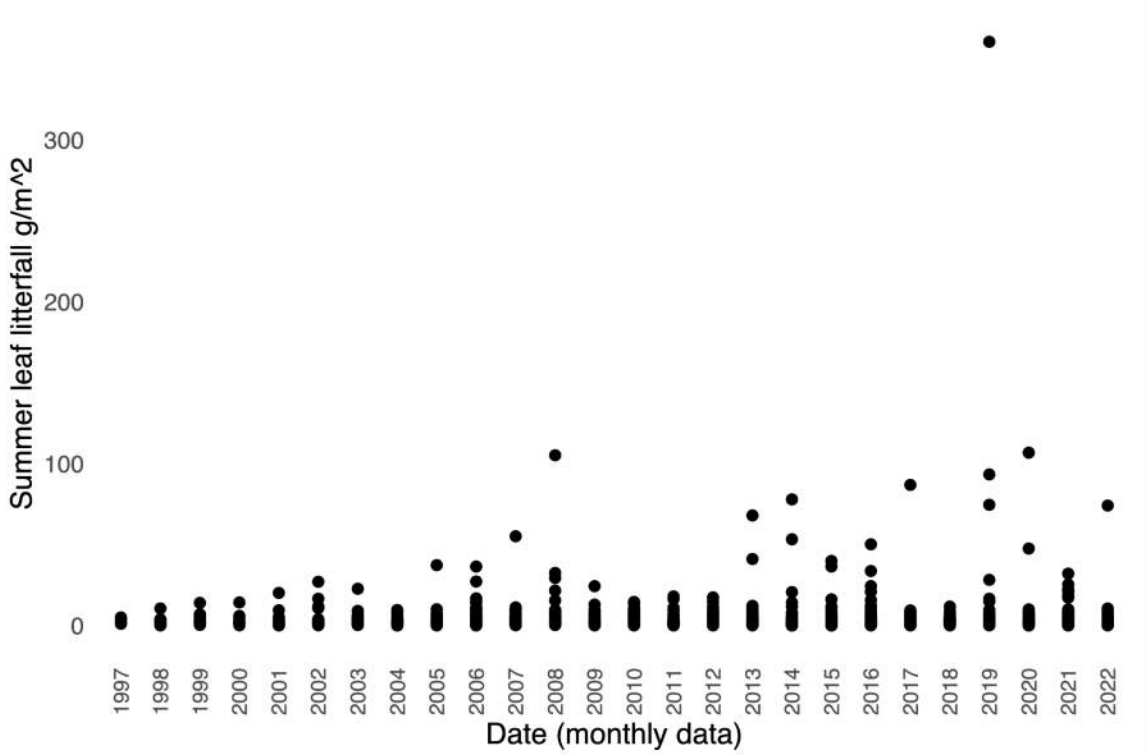


Figure 7.1 Change in leaf fall (g/m^2) during summer months, or "green fall", represents early leaf drop due to stress (e.g., heat, drought, defoliator outbreak, physical force from storms).

Most leaf fall biomass at BEMP sites is composed of cottonwood leaves. The shift toward increasing summer leaf drop most likely represents increasing stress on cottonwoods, although saltcedar early leaf drop due to defoliation from the tamarisk leaf beetle is a contributor to these numbers. Increasing outliers for higher leaf drop during flood years could also be due to the impact of long inundation periods (and potential anoxia) following years without.

Monthly litterfall of select plants.

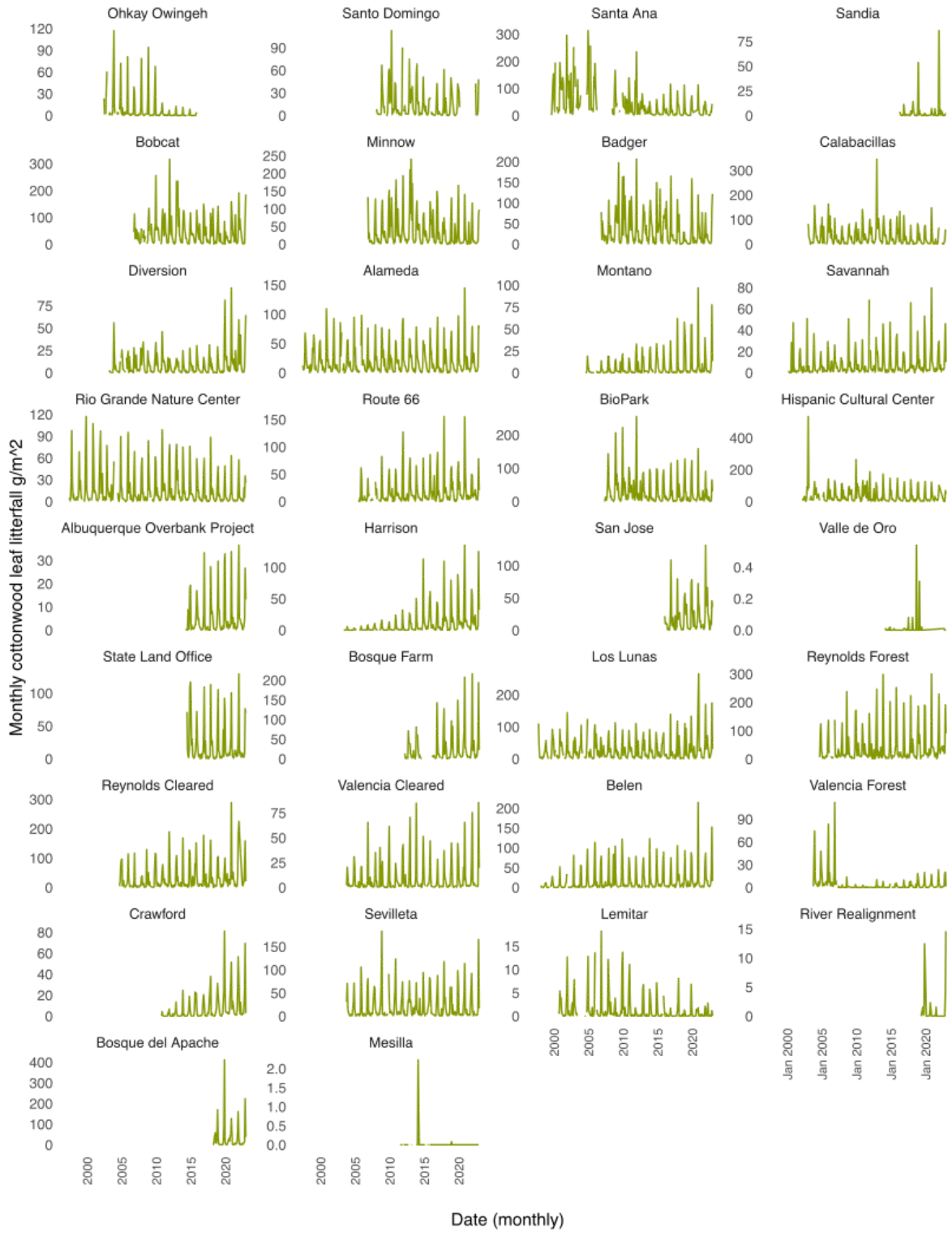


Figure 7.2 Monthly cottonwood leaf fall (g/m^2) shown across years for each site (listed north to south).

Annual litterfall trends

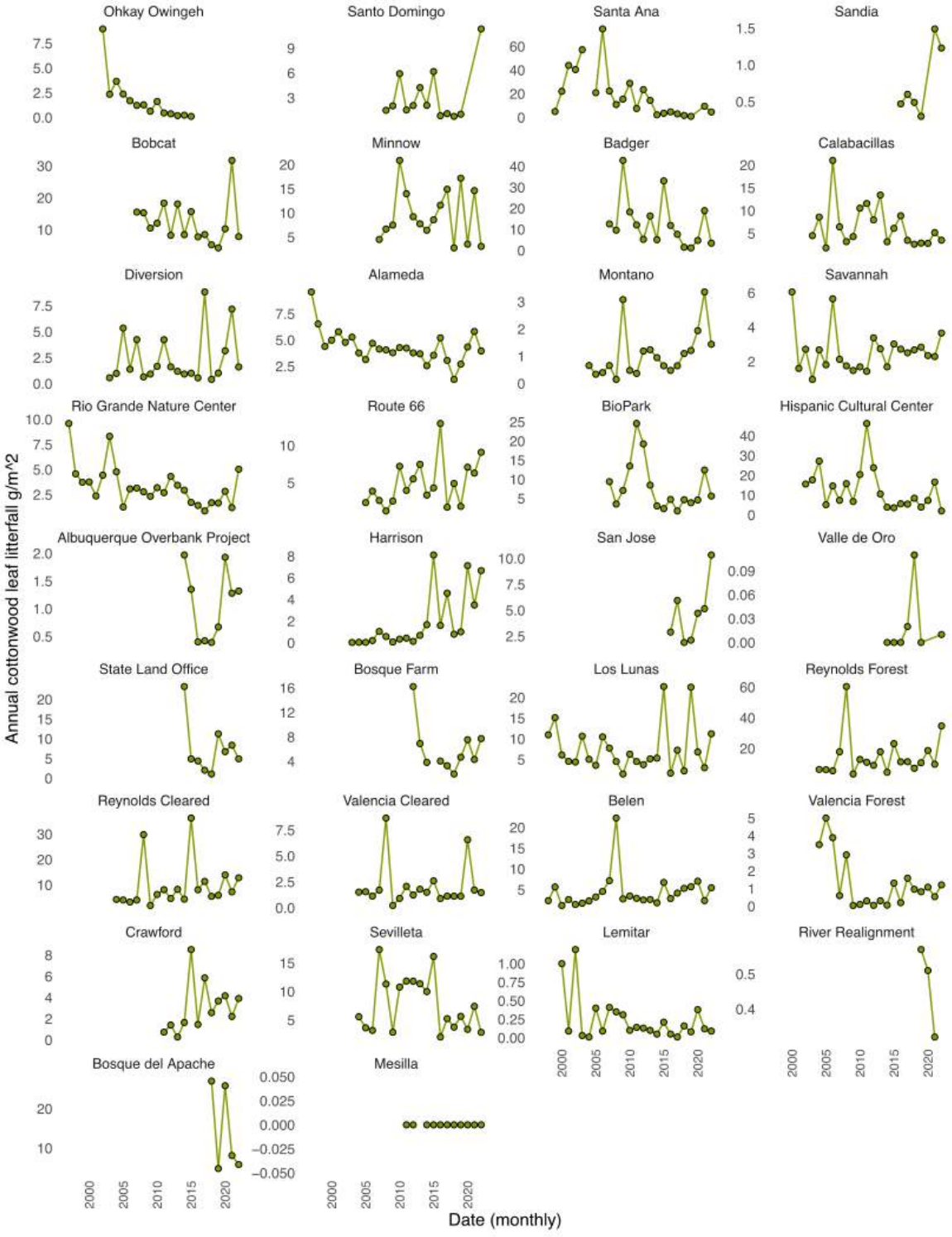


Figure 7.3 Annual sum of cottonwood leaf fall (g/m^2) across years for each site (listed north to south).

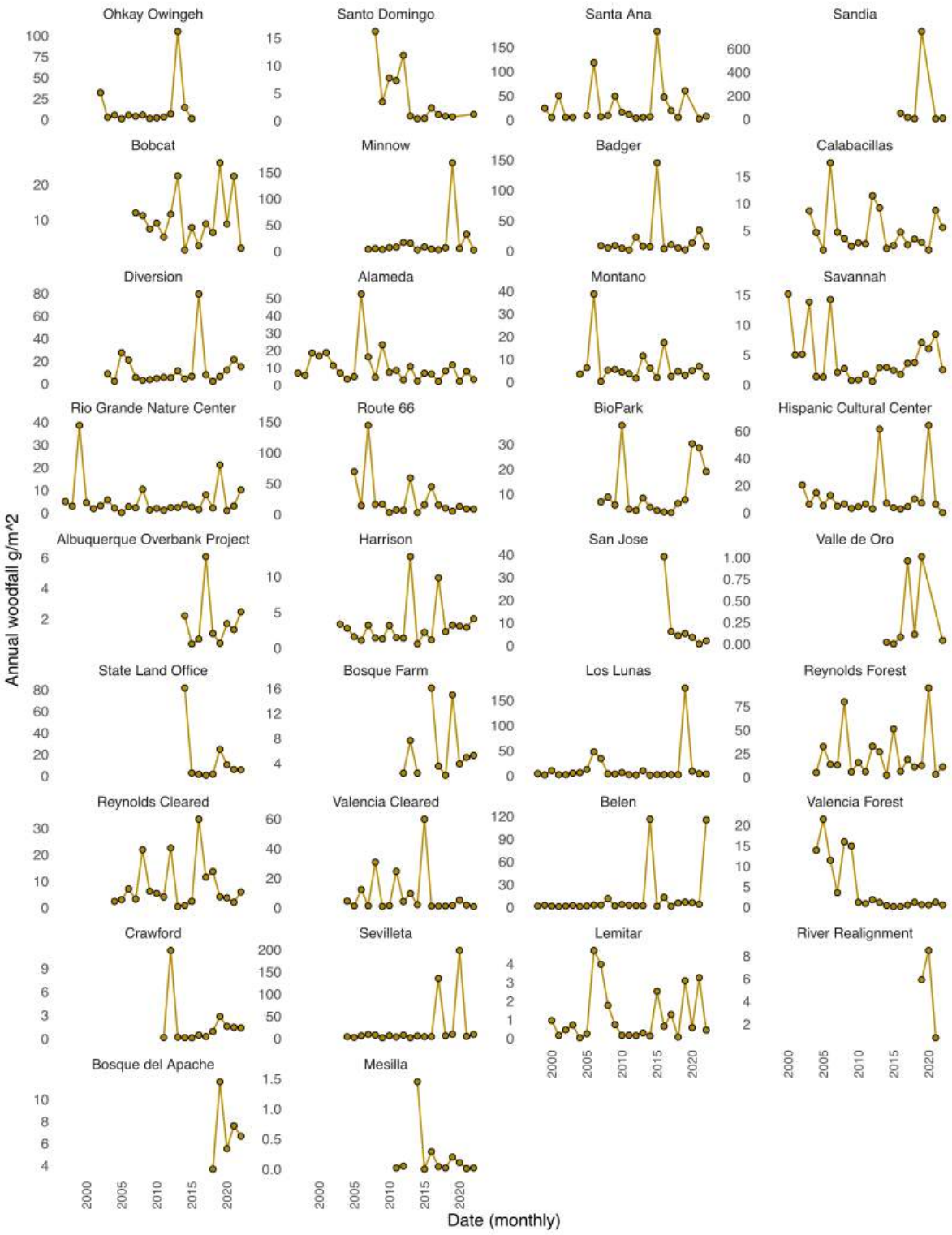


Figure 7.4 Annual sum of wood fall (g/m^2) across years for each site (listed north to south).

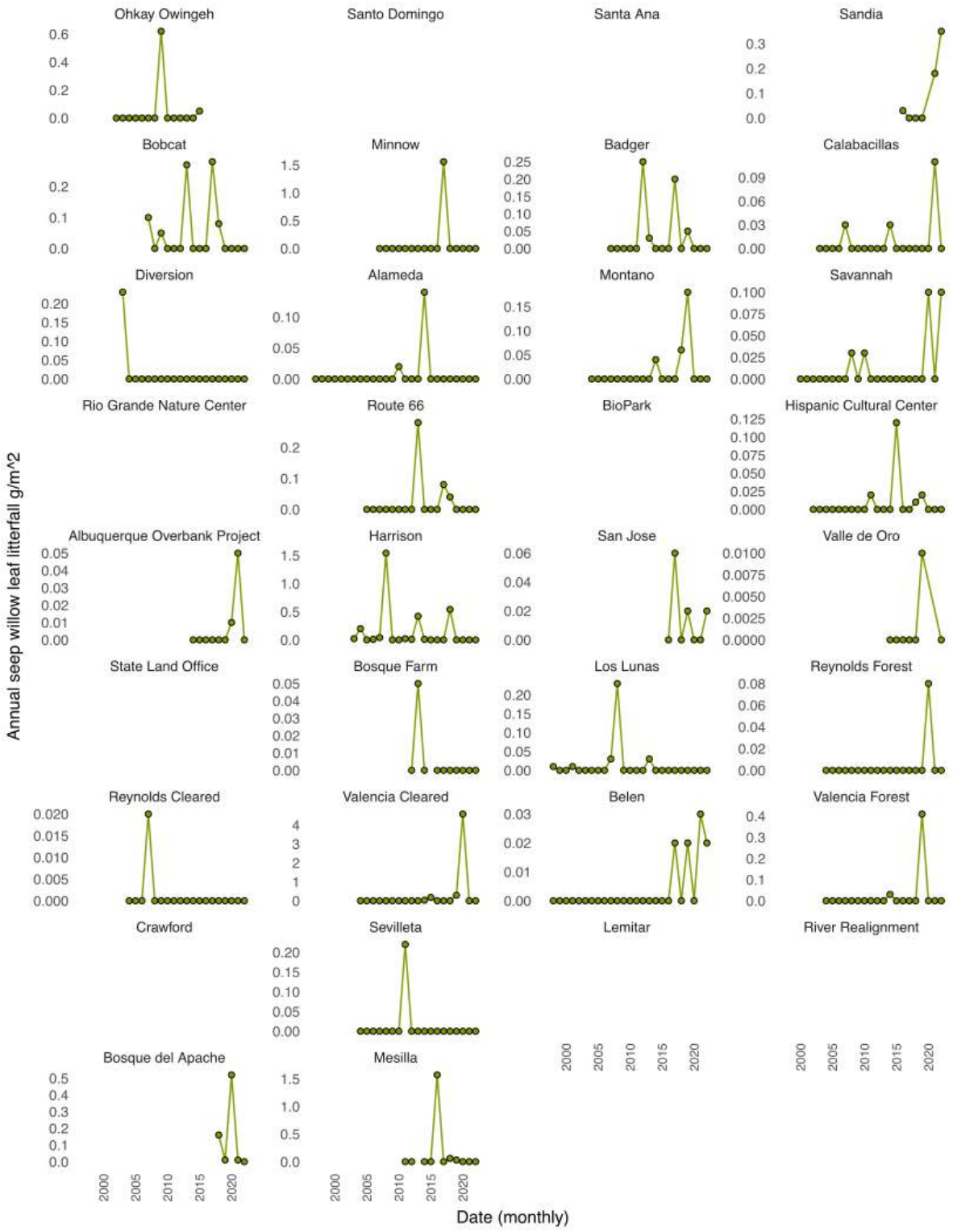


Figure 7.5 Annual sum of seepwillow (*Baccharis*) leaf fall (g/m^2) across years for each site (listed north to south). Y-axis is on a free-scale to better show data at individual sites.

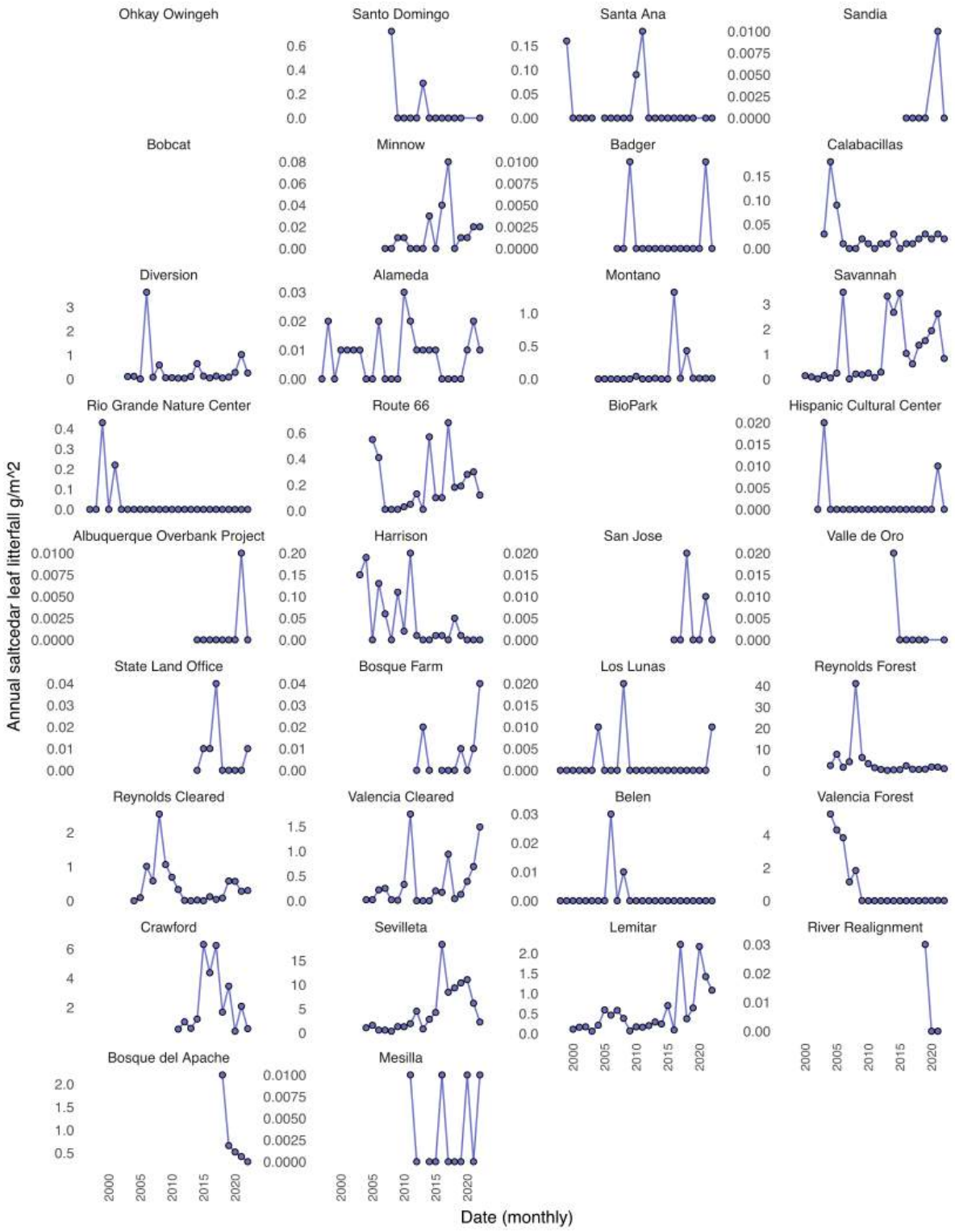


Figure 7.6 Annual sum of saltcedar leaf fall (g/m^2) across years for each site (listed north to south). Y-axis is on a free-scale to better show data at individual sites.

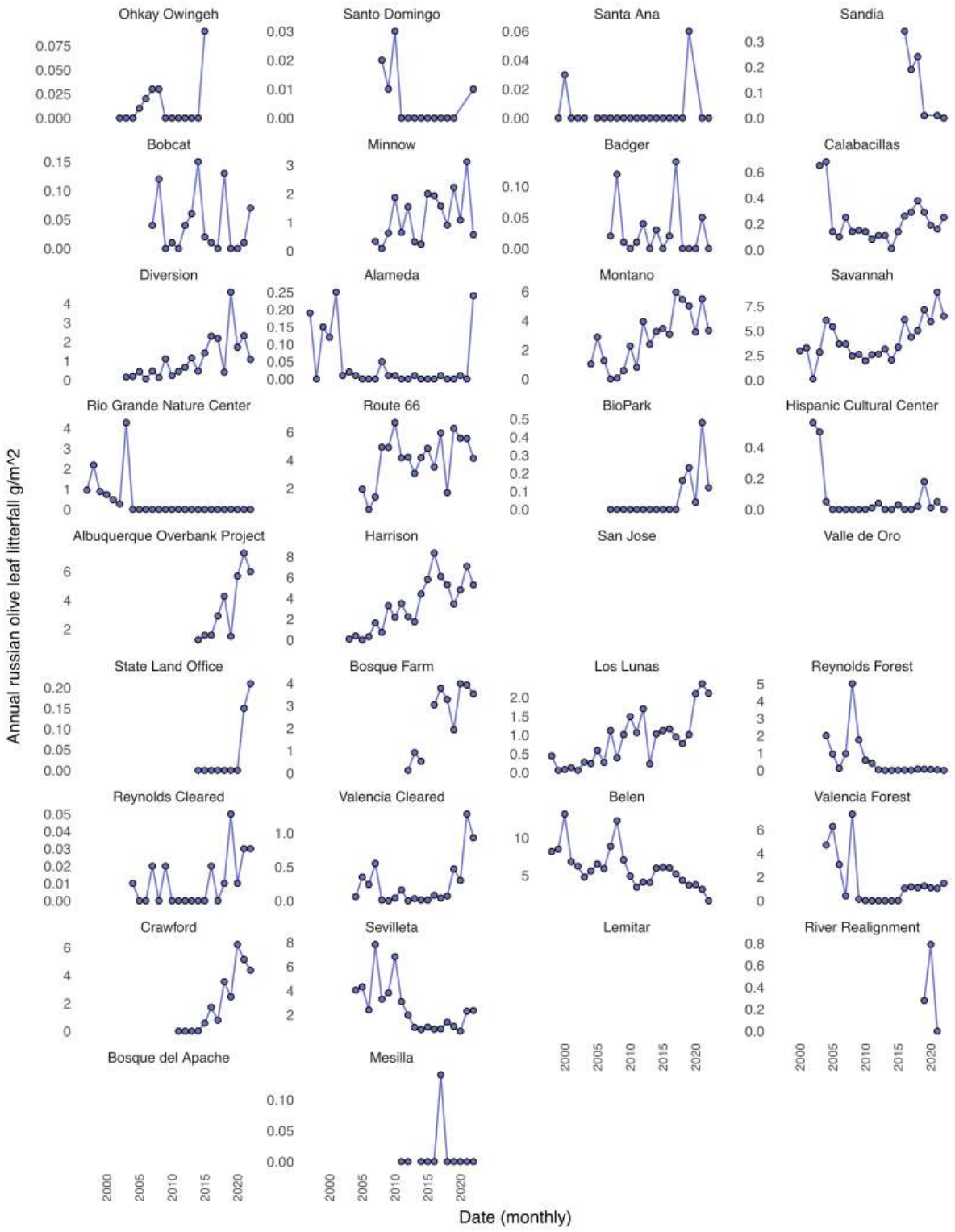


Figure 7.7 Annual sum of Russian olive leaf fall (g/m^2) across years for each site (listed north to south). Y-axis is on a free-scale to better show data at individual sites.

Annual vegetation cover

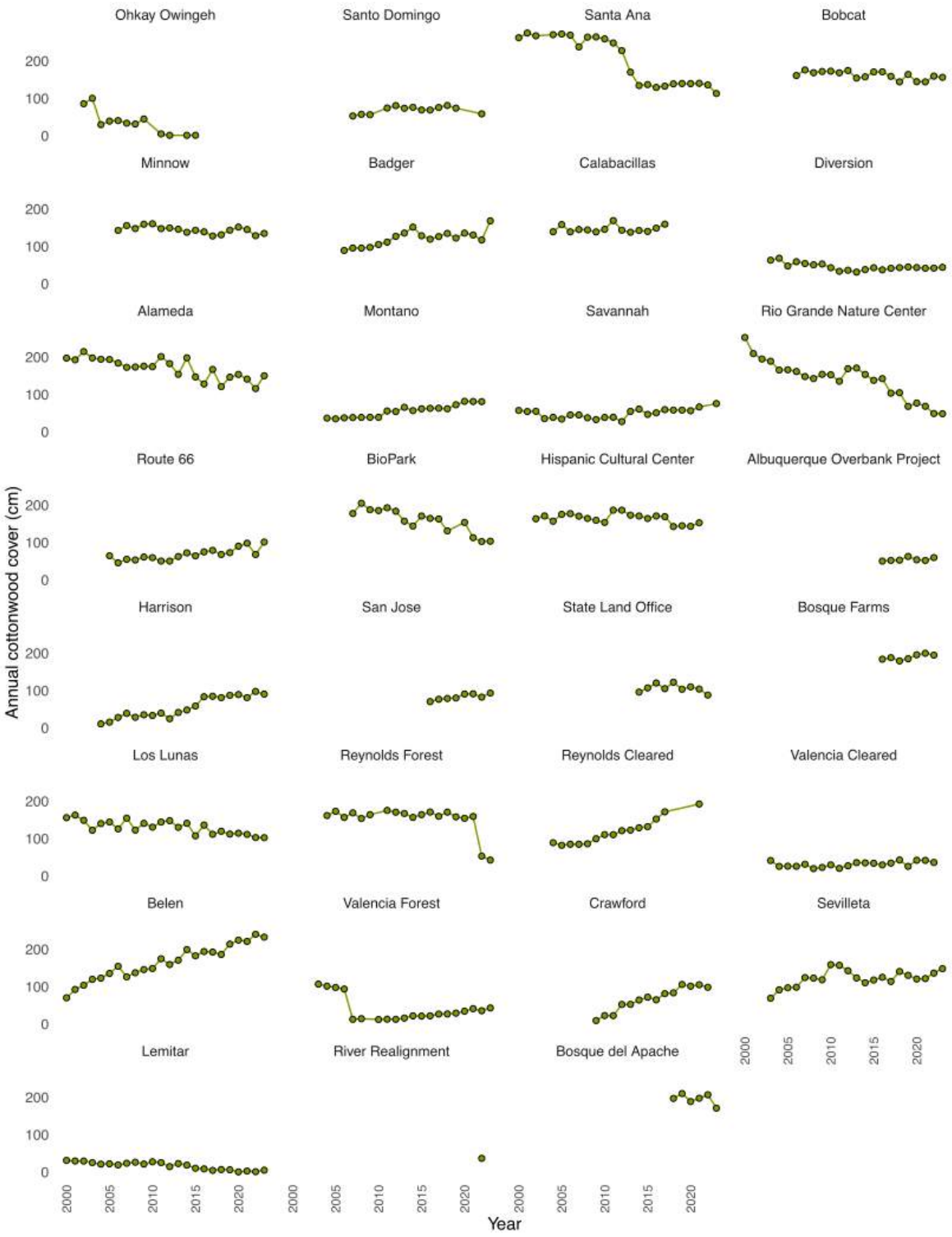


Figure 7.8 Annual cottonwood tree cover across BEMP sites. Sites are ordered from north to south. Typically sites north of I25/I40 have declining cover due to lower groundwater levels.

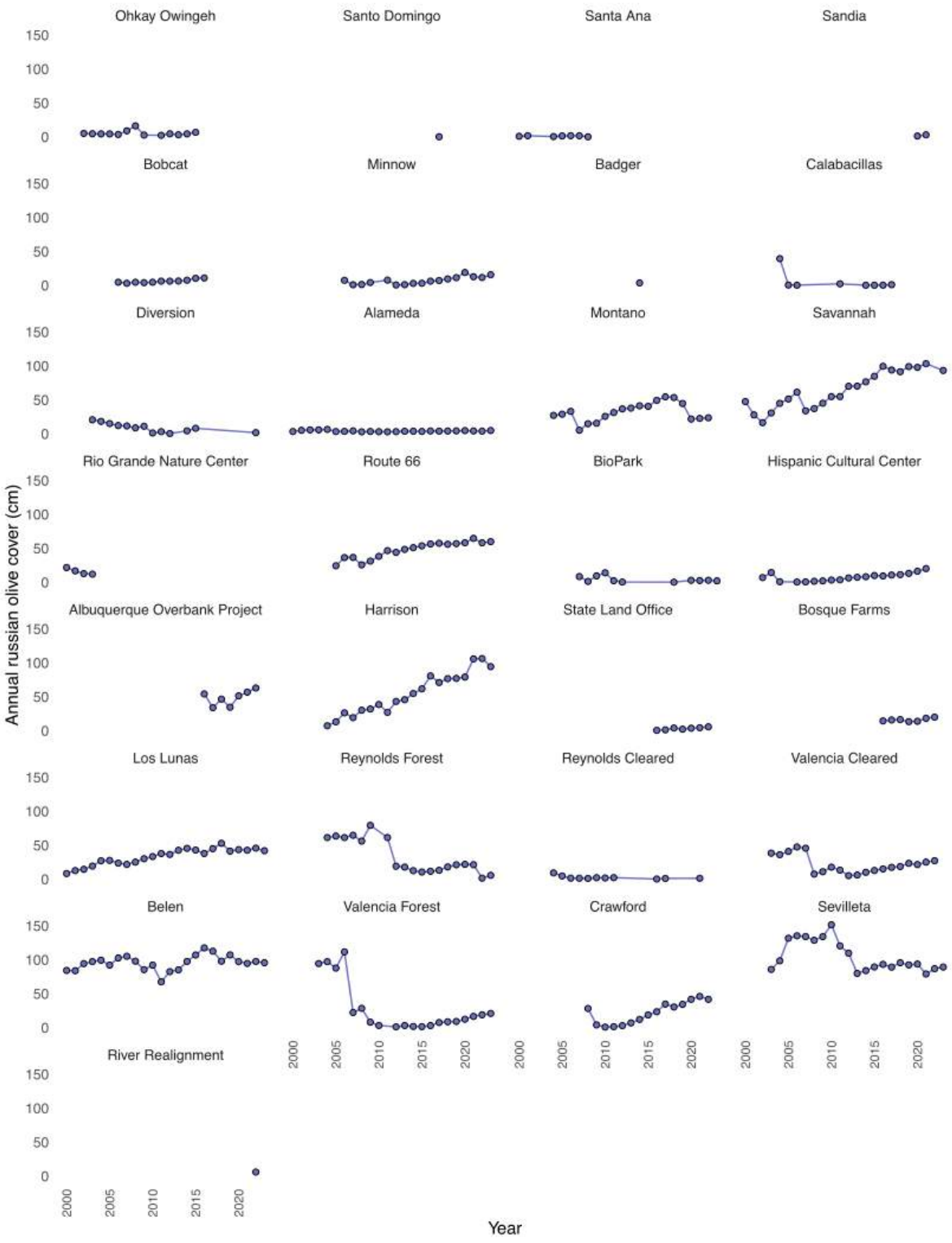


Figure 7.9 Annual Russian olive tree cover across BEMP sites. Sites are ordered from north to south. Russian olive cover continues to increase over time; however, the impact of exotic removal efforts show up as sharp decreases in cover.

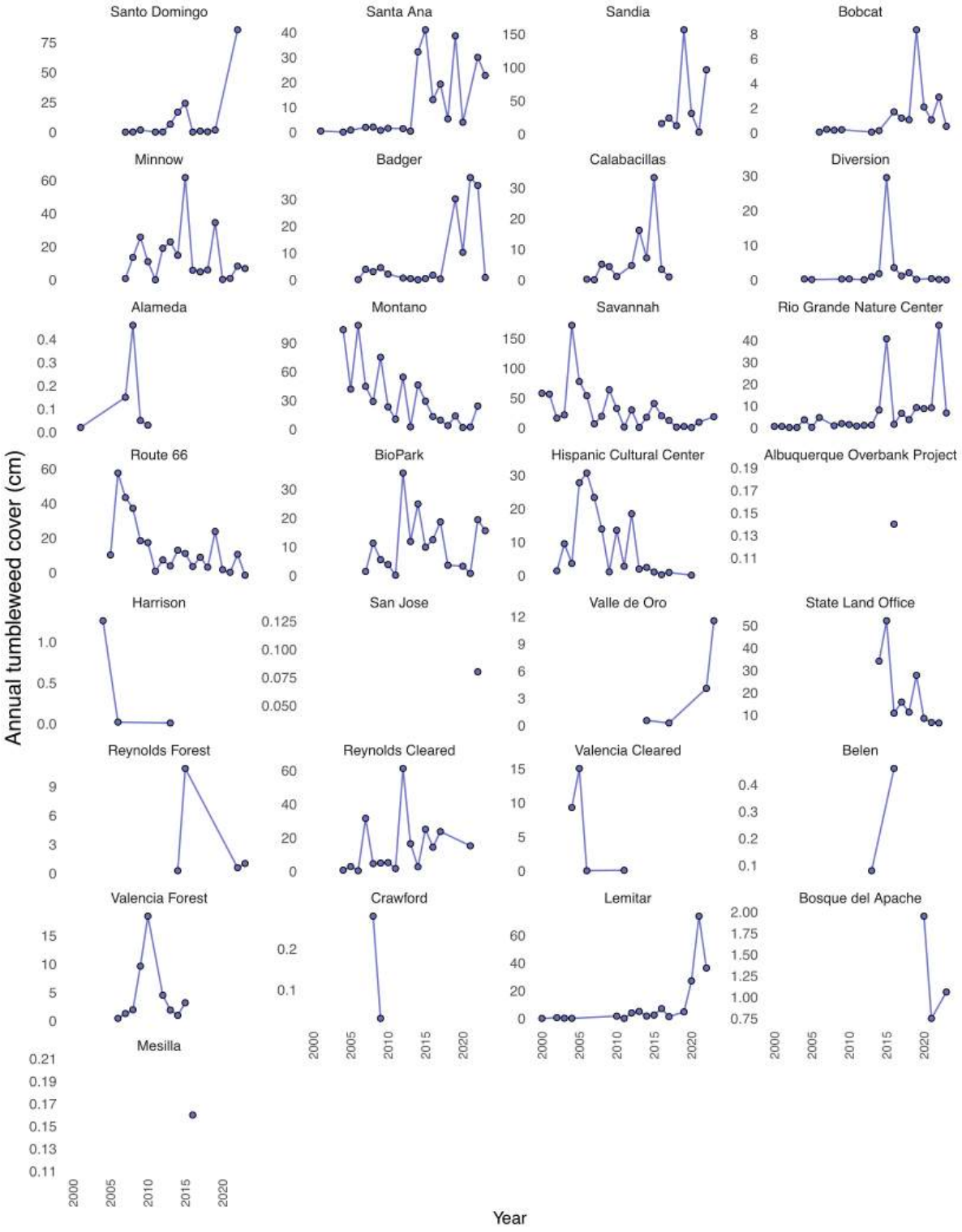


Figure 7.10 Annual tumbleweed cover across all BEMP sites. Tumbleweed cover varies quite a bit due to the interactions of exotic removal efforts, fire, and flooding.

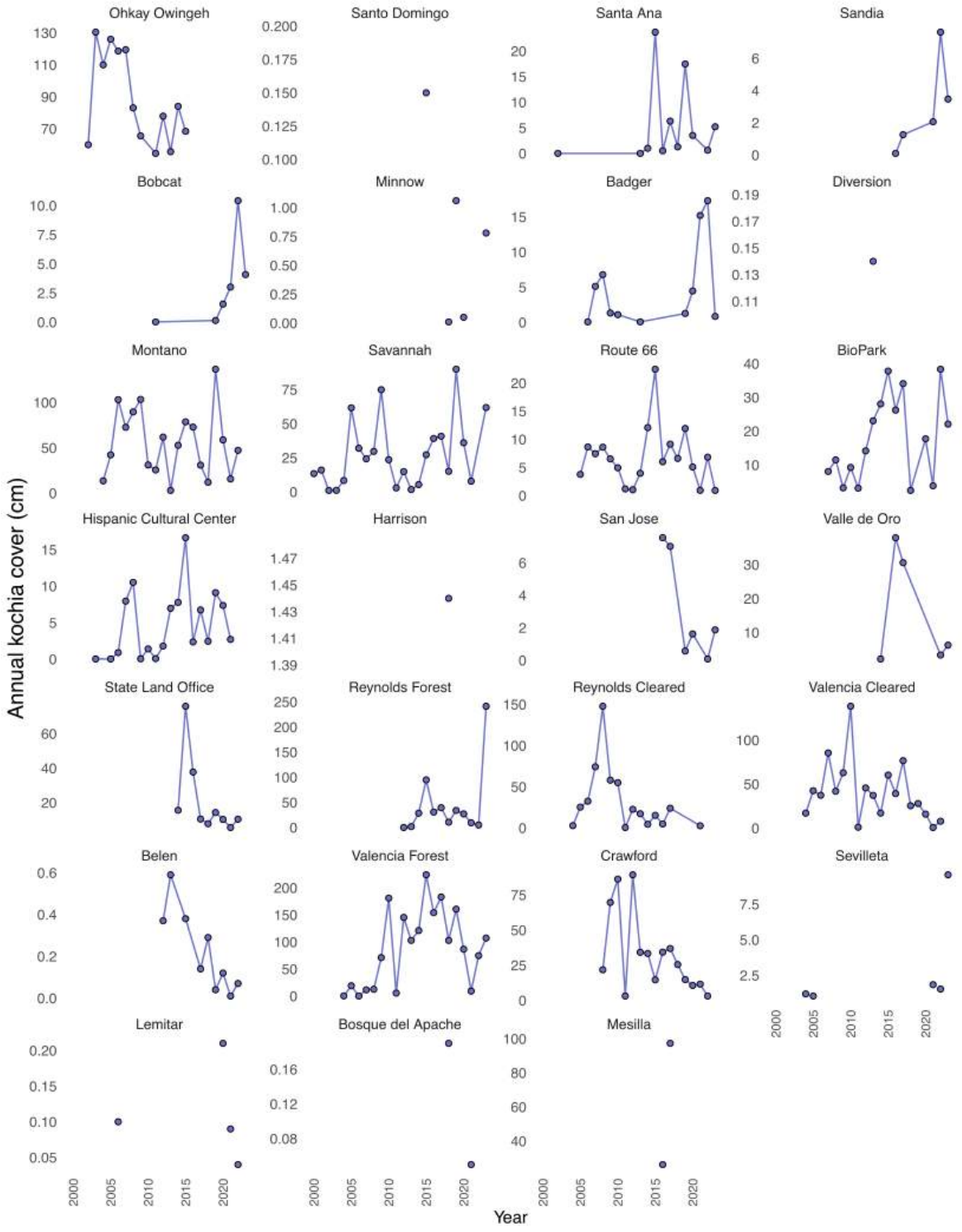


Figure 7.11 Annual kochia cover across all BEMP sites. Kochia cover is highly variable (similar to tumbleweed) due to the interactions of exotic removal efforts, fire, and flooding. In many places kochia is still persistent despite efforts to remove it but its cover relative to other plants is reduced.

Sites with higher groundwater are great for both bank-lowering and pole-planting projects or represent areas where bank-lowering or swales have been incorporated. These sites more often support younger trees and show increasing cottonwood cover. Sites with greater depths to groundwater or perched sites have little to no cottonwood recruitment and cover is decreasing over time. The sharp drop in cottonwood cover at Santa Ana starting in 2009 was part of a larger, expanding die-off of the bosque in that area. With the decrease in cottonwood cover (now 57% reduced from what it was in 2000) opening the canopy, squirrel grass, tumbleweed, and kochia started to increase in cover starting in 2011. The sharp decline in cottonwood cover at Valencia Forest in 2007 and at Reynolds Forest in 2022 were both due to fires in the Belen area. At both sites, this led to an increase in kochia and tumbleweed. Some sites have a slow, steady decline (Bobcat, Minnow, Los Lunas, Lemitar); others have a decline with small yet sharp drops due to localized fires (Ohkay Owingeh, BioPark, HCC). Alameda and Rio Grande Nature Center (RGNC) have more noticeable downward trends that are due to the dying cottonwood branches and trees at these sites. The cottonwood cover has declined by 25% at Alameda and by 80% at RGNC since the surveys done in 2000. As a non-flood site, the encroaching vegetation at RGNC is a mix of upland vegetation and invasive exotics, mostly tumbleweed. Tumbleweed has increased by over 800% at RGNC in the last 10 years. These downward trends in cottonwoods are also seen in the litterfall data, though leaf fall is more sporadic, as tree productivity responds more quickly to environmental changes. The spikes in wood fall also underline the cottonwood senescence at sites but are less indicative than cover as branches must actually fall into one of ten 40-cm diameter tubs at each site. Changes in fuel load will also be indicative of cottonwood health.

Seepwillow (*Baccharis* spp., also known as false willow or mule fat) is an important native understory shrub that has declined in this ecosystem. Seepwillow leaf fall is low compared to other species and the occasional peaks in leaf fall are still relatively small, representing leaves falling into tubs that are not always captured each year. Sites with steady seepwillow productivity levels include San Jose, a USACE-requested site with created swales that still successfully flood during higher river flows. San Jose has low saltcedar productivity, no Russian olive, and slowly increasing cottonwoods and coyote willows. Kochia and tumbleweed were only high immediately following swale construction and have remained low since then.

Exotic species such as saltcedar and Russian olive show a sporadic increase in productivity at many sites over time, with drops in productivity following targeted exotic removal projects. Russian olive cover is increasing at different rates across most sites, with drops due to management practices. Saltcedar is more sporadic than Russian olive, due to both mechanical removal and the changing outbreak cycle of the tamarisk leaf beetle. Some sites show gradual declines, like Russian olive at Belen and Sevilleta, where old growth stands are slowly dying back, or saltcedar at Crawford, which is being outcompeted by cottonwood after new establishment and repeated flooding.

Post burn assessment

Exotic recovery is particularly apparent at sites where treatment has not occurred (e.g., sites around the San Juan Chama Diversion Project Dam were cleared in 2004). Both Russian olive and saltcedar are slowly increasing. Sites with high TLB abundance show saltcedar recovery in years following TLB outbreaks. Post-burn areas that experienced flooding show native understory recovery (Los Lunas, which had no tumbleweed or kochia) while post-burn areas that did not experience flooding have high cover of exotic tumbleweed and kochia (Sandia, Reynolds Forest, Valencia Forest) (Figures 7.10 & 7.11). Both kochia and tumbleweed went from extremely low cover to abundant following the 2007 fire at Valencia Forest (Figures 7.10 & 7.11); while tumbleweed cover has been cyclic since then, kochia cover has remained relatively high (Figure 7.11). Yerba mansa has been declining in Los Lunas, but was recovering from the February 2023 fire by the time August vegetation surveys were completed. Reynolds Forest has a lower yerba mansa cover, but by August 2023, it had completely recovered from the April 2022 fire (Figure 7.12).

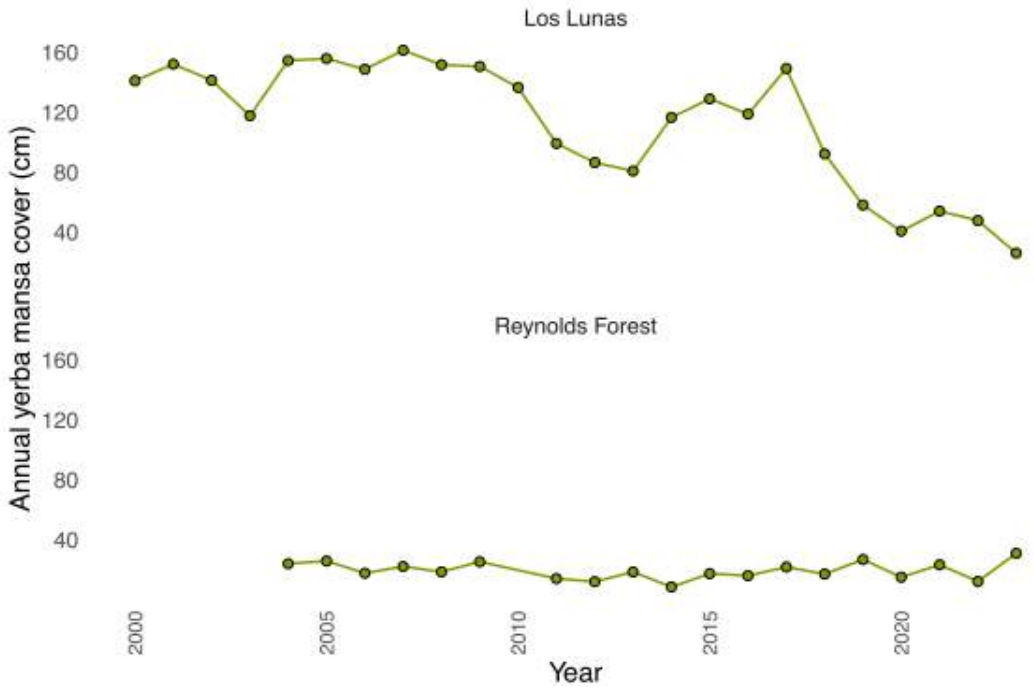


Figure 7.12 Annual yerba mansa cover at Los Lunas (partially burned in February 2023) and Reynolds Forest (severely burned in April 2022). Recovery happened quickly at both sites.

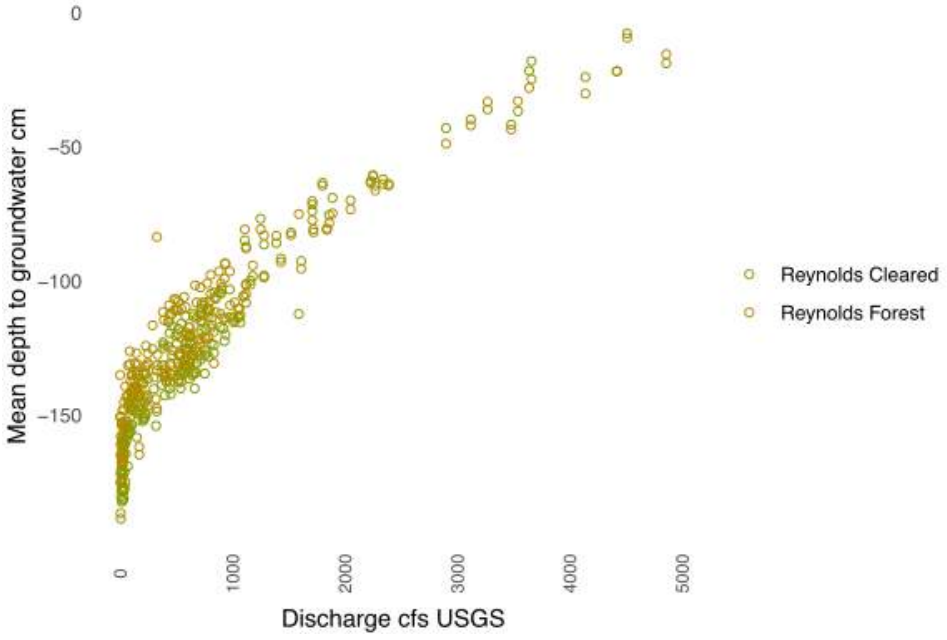


Figure 7.13 Mean depth to groundwater (cm) vs river flow (cfs) across years at Reynolds Cleared and Reynolds Forest. Groundwater levels are tightly correlated with river flow. Impacts of the Big Hole fire on groundwater can be assessed at the Reynolds Forest site.

Reynolds Forest BEMP site, May 17, 2022 (~1 month after the Big Hole fire); burned cavity from tree stump

Reynolds Forest BEMP site, May 17, 2022 (~1 month after the Big Hole fire)

Reynolds Forest BEMP site, May 17, 2022 (~1 month after the Big Hole fire); yerba mansa regrowth

Reynolds Forest BEMP site, June 22, 2022 (~2 months post fire); cottonwood resprouts in foreground, some golden currant resprouts, and thick kochia recruitment

Los Lunas BEMP site near center well, March 7, 2023, 1 week post-fire

UNM interns entering Los Lunas BEMP site, April 18, 2023, ~ 2 months post fire, floods starting

Los Lunas site, August 18, 2023, ~6 months post fire, 2 months post flood; yerba mansa regrowth

8 Surface-Active Arthropods

Surface active arthropods are monitored 3 times per year, in early May, late June, and early September through the use of pitfall traps. This report includes data through 2021. 2022 and 2023 arthropod samples are being processed, entered and checked. Full monitoring methods can be found at:
https://github.com/BEMPscience/bemp_data/tree/master/surface_active_arthropods

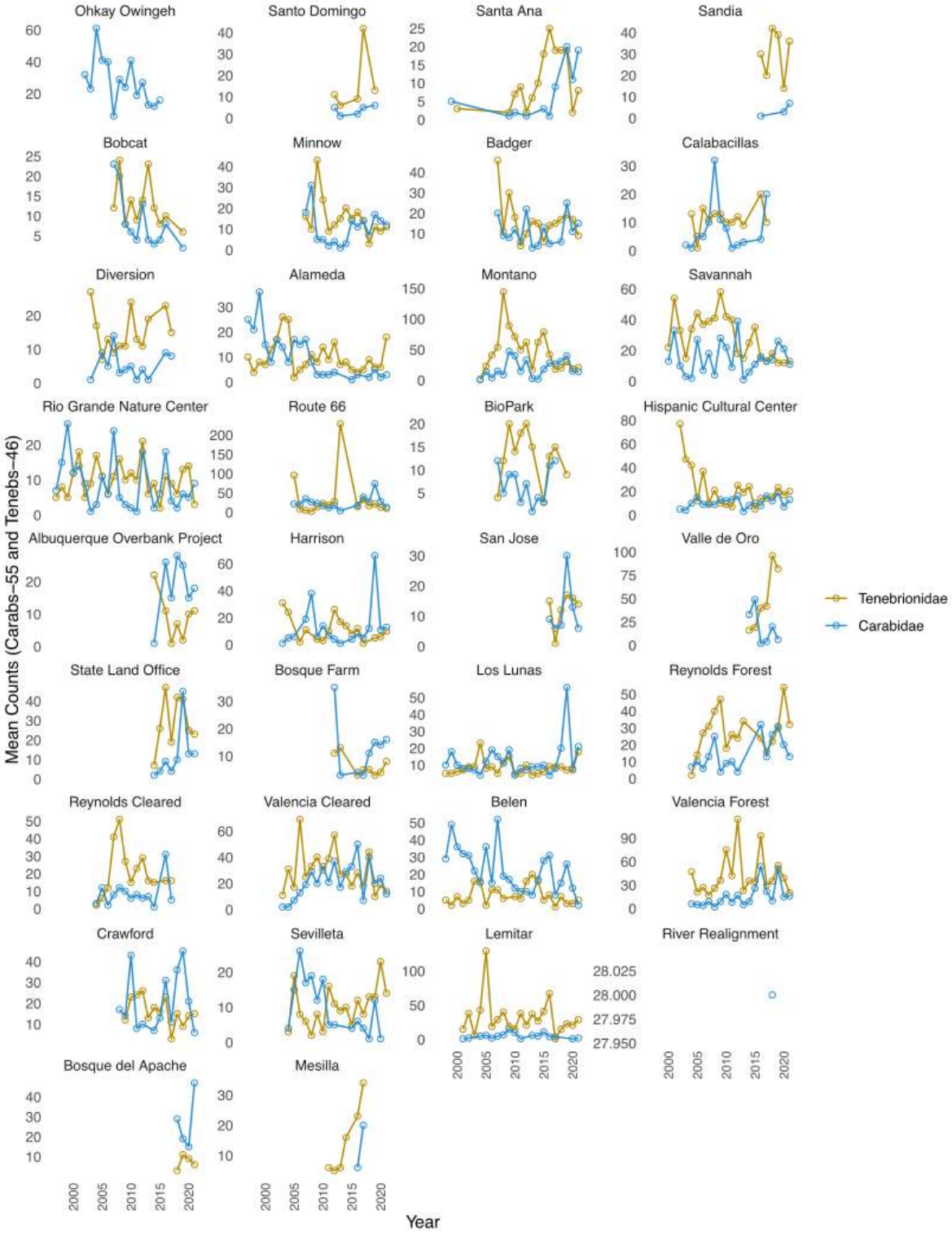


Figure 8.1 Annual mean darkling beetle (Tenebrionidae) and ground beetle (Carabidae) abundance across all sites.

Trends of surface active arthropods over time.

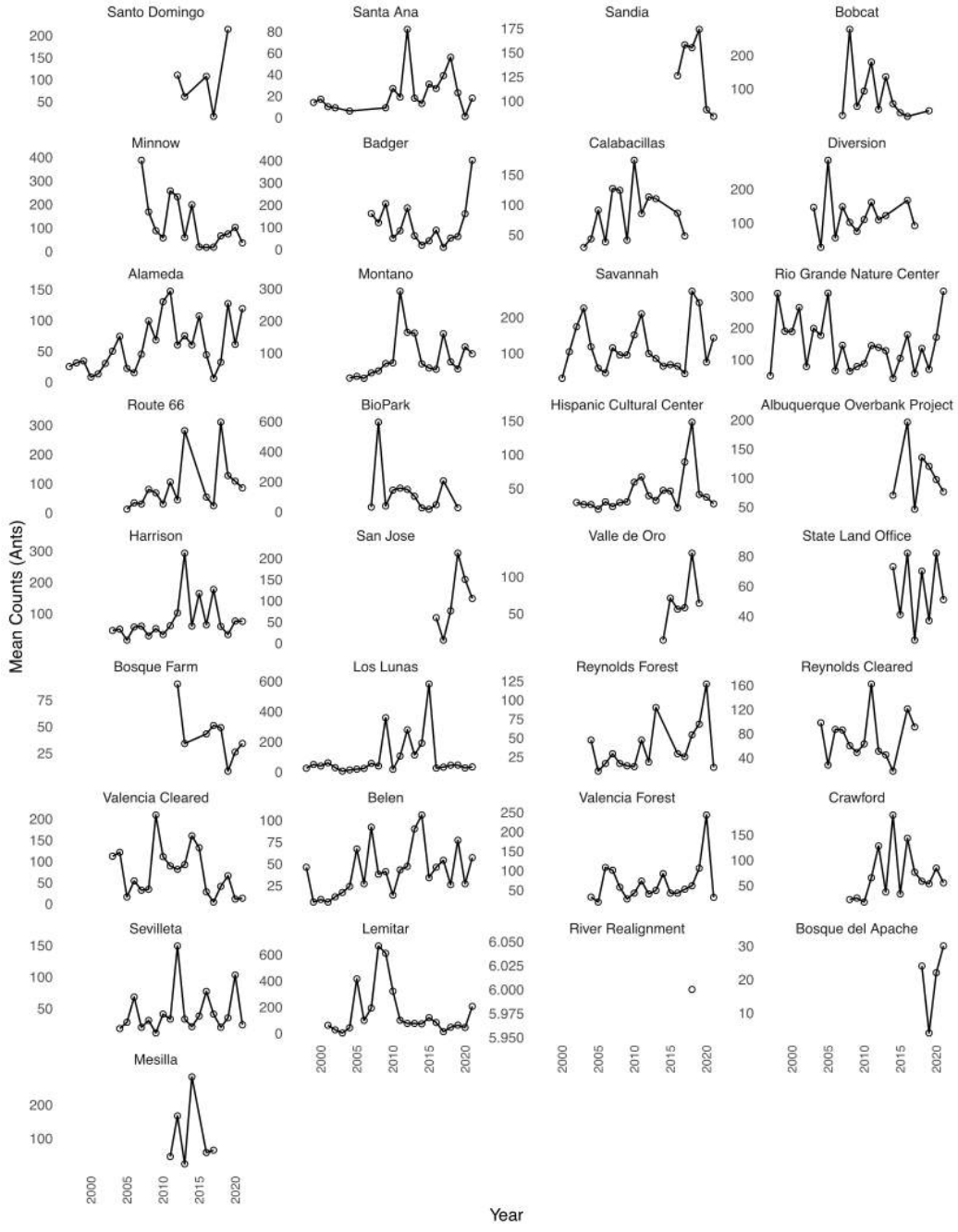


Figure 8.2 Annual mean ant (Formicidae) abundance across sites.

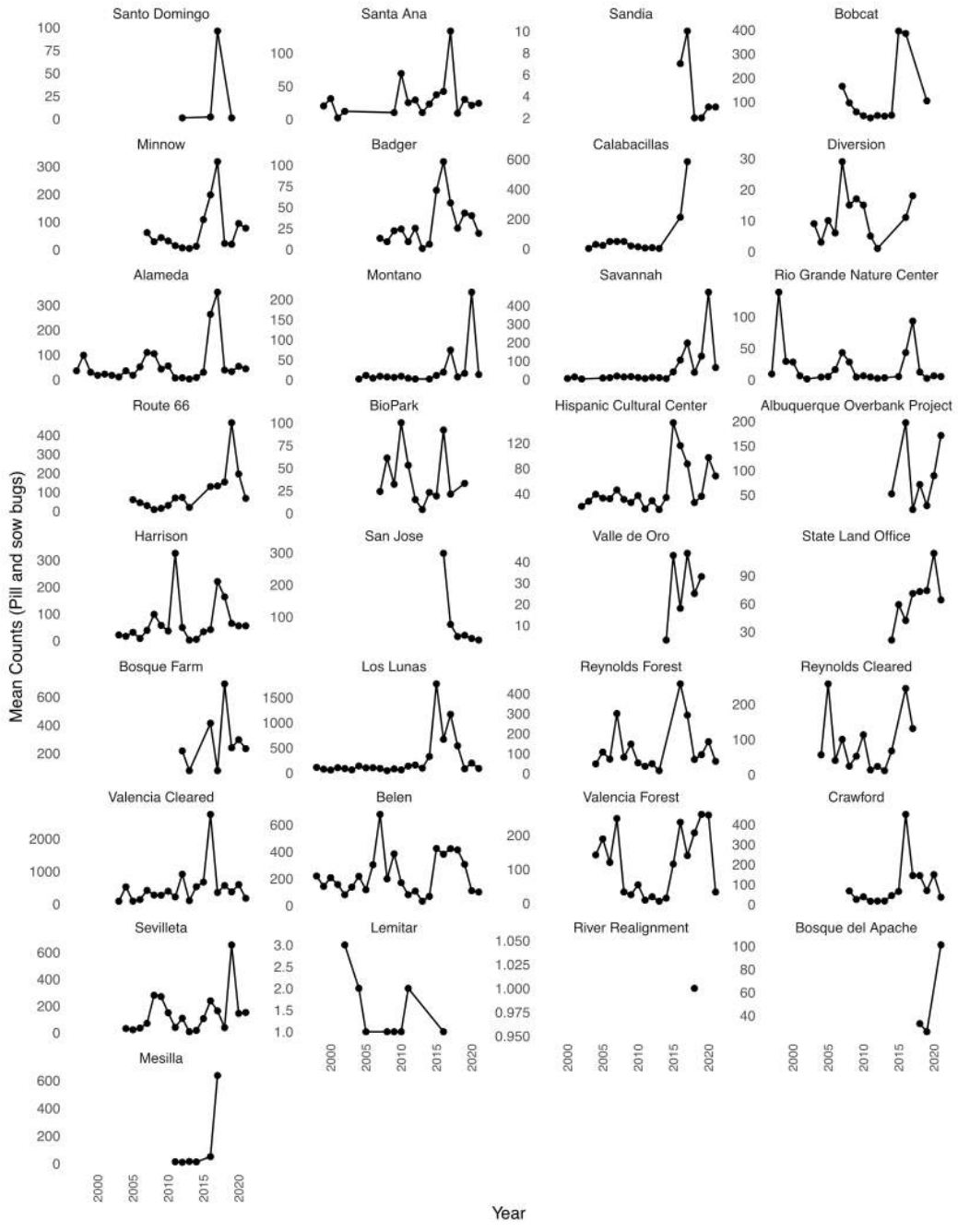


Figure 8.3 Annual mean Isopoda abundance across sites.

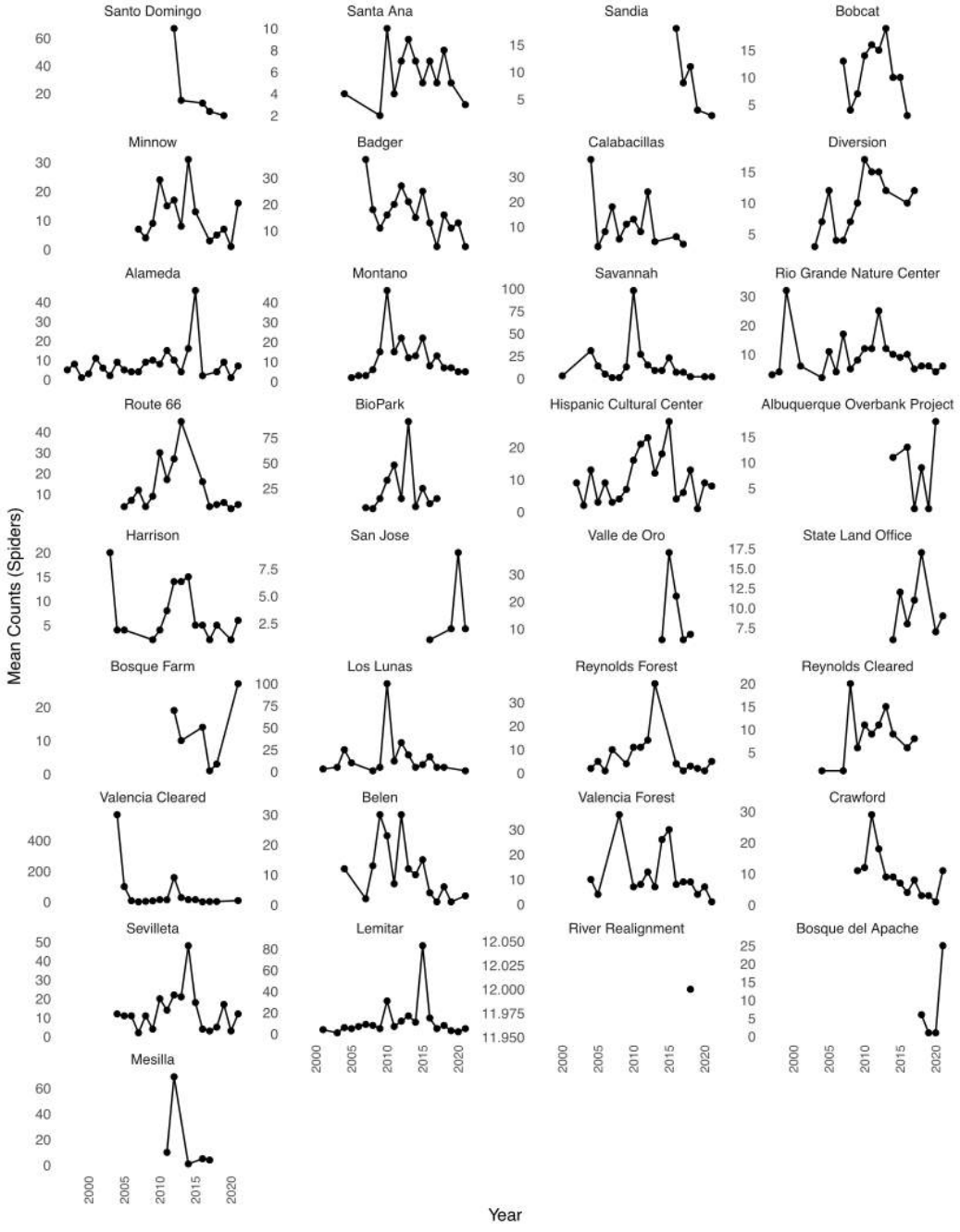


Figure 8.4 Annual mean spider (Araneae) abundance across sites.

In 2021 approximately 26,000 arthropods consisting of over 170 unique arthropod identifications were reported from BEMP sites. Belen (site# 4) had the lowest arthropod richness with 36 unique arthropod identifications, and State Land Office (site #30) had the highest richness with 56 unique arthropod identifications. Of the total arthropods identified, over 18,000 individuals were identified as Isopoda making these animals the dominant species collected in pitfall traps for 2021. Isopods are terrestrial crustaceans with two species found in the Middle Rio Grande, *Armadillidium vulgare* (pill bugs) and *Porcellio laevis* (sow bugs). These species are exotic decomposers introduced globally, and in our ecosystem, they fill niches previously dominated by crickets and other decomposers. Despite their exotic origin, these animals serve a valuable ecosystem function by aiding in the decomposition of leaf litter and fallen woody debris. Their sensitivity to moisture also makes them useful bioindicators. Pill bugs are known to be more tolerant of drier conditions while sow bugs tend to prefer relatively more mesic micro habitats. In 2021 approximately 15,000 pill bugs and 3,000 sow bugs were identified at BEMP sites. Unsurprisingly two of the most arid sites monitored, Sandia (site #32) and Lemitar (site #7) had fewer than ten pill bugs identified in 2021 (Figure 8.3).

Other indicator species include the darkling beetles (Tenebrionidae) and ground beetles (Carabidae). Tenebrionids can tolerate a variety of habitats but many are well adapted for arid environments where they are generalist omnivores feeding on fresh and decaying plant matter as well as decaying animals and occasionally fungi. Carabids form one of the most diverse families of beetles in North America, and although their diets can vary, a majority are predaceous and many are well adapted for mesic environments. At several sites where flooding has been known to occur, including Harrison (site # 13), Los Lunas (site # 3), Belen (site# 4), and Crawford (site# 25), increases in carabids following the flood events in 2017 and 2019 were documented. More arid sites, including Lemitar (site #7) and Sandia (site #32), tend to be dominated by the more xeric tenebrionids (Figure 8.1).

Ants (Formicidae) are a hyperdiverse family of insects. Species from the Middle Rio Grande form subterranean, eusocial colonies where they play important roles in ecosystems by helping to aerate soil, helping to disperse seeds, creating seed banks within their colonies, and eating a variety of living and dead organisms while being an important food source to other predators. Due to the subterranean habits of these arthropods, certain species, such as acrobat ants, (*Crematogaster* spp.) are better adapted to survival in areas prone to flooding than other species

commonly encountered in more arid environments such as harvester ants (*Pogonomyrmex* spp.). *Crematogaster* spp. were identified from 19 of the 24 sampled sites in 2021 and *Pogonomyrmex* spp. were identified from 11 of the 24 sampled sites in 2021. Tracking the occurrences of these and other ants throughout the Middle Rio Grande is important for monitoring shifts in the bosque ecosystem.

The spider, *Marinarozelotes barbatus* (Koch, 1866), has been collected at several BEMP sites located within Albuquerque since 2016. This spider is native to the Mediterranean region and was previously only documented in California within the United States before its discovery in New Mexico. Specimens have been found in pit traps at the Albuquerque Overbank Project , Harrison, San Jose, and State Land Office sites. Additionally, evidence of this spider has been documented at the BioPark BEMP site during a targeted collection effort in 2020. In 2021, this species was once again observed in traps from Albuquerque Overbank Project , Harrison, and San Jose sites. BEMP sites will continue to be monitored for evidence of this exotic species to track potential range expansions.

9 Tamarisk Leaf Beetle

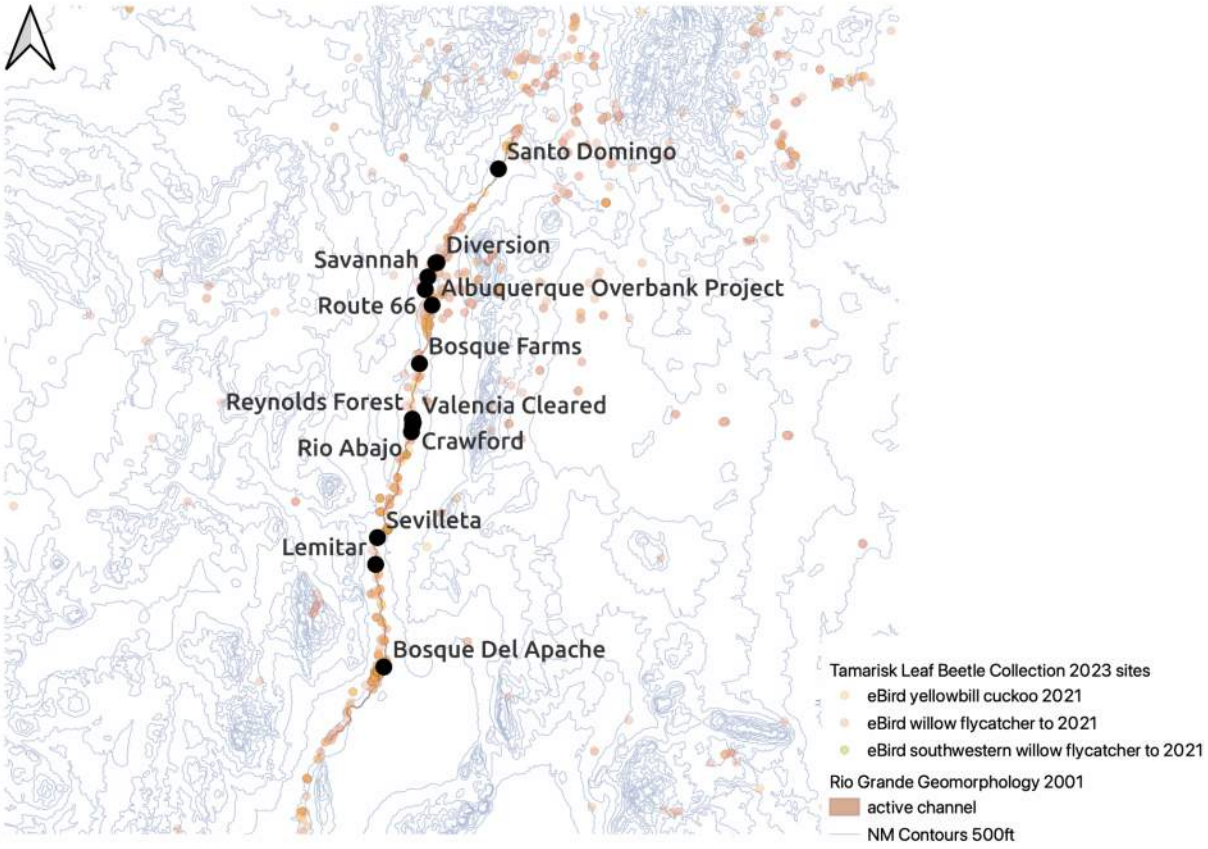


Figure 9.1 Current tamarisk leaf beetle monitoring sites for 2023 in bold. 500 foot contour intervals are in pale blue. Black circles are TLB collection sites. Tan-brown circles are ebird data from 2021 that are species of interest.

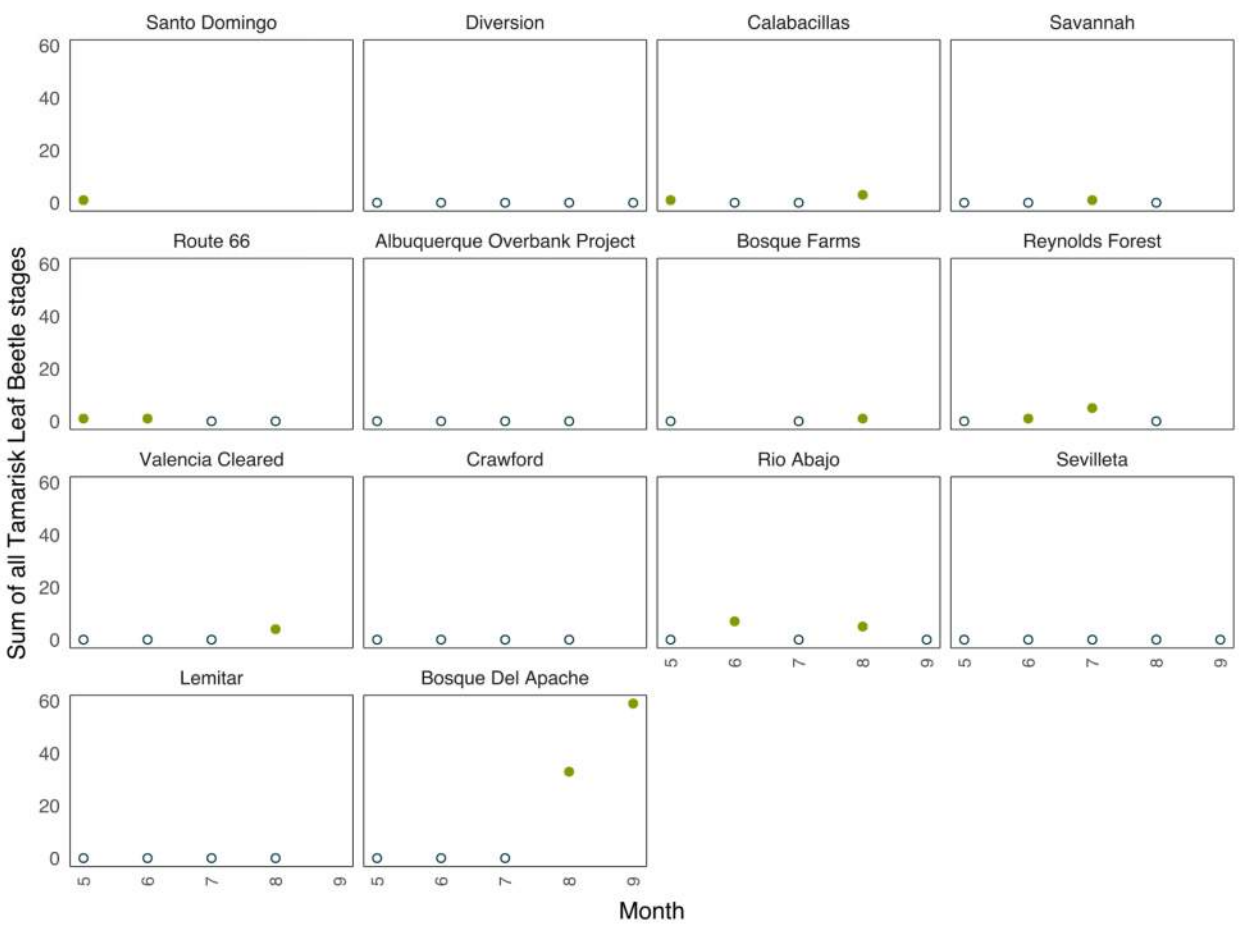


Figure 9.2 Total tamarisk leaf beetle for all life stages found at sites from May through August or September (four sites) 2023. All life stages include egg masses, early and late larvae, and adults. Hollow dots represent zeros; blanks indicate no collection. Sites are arranged from north to south.

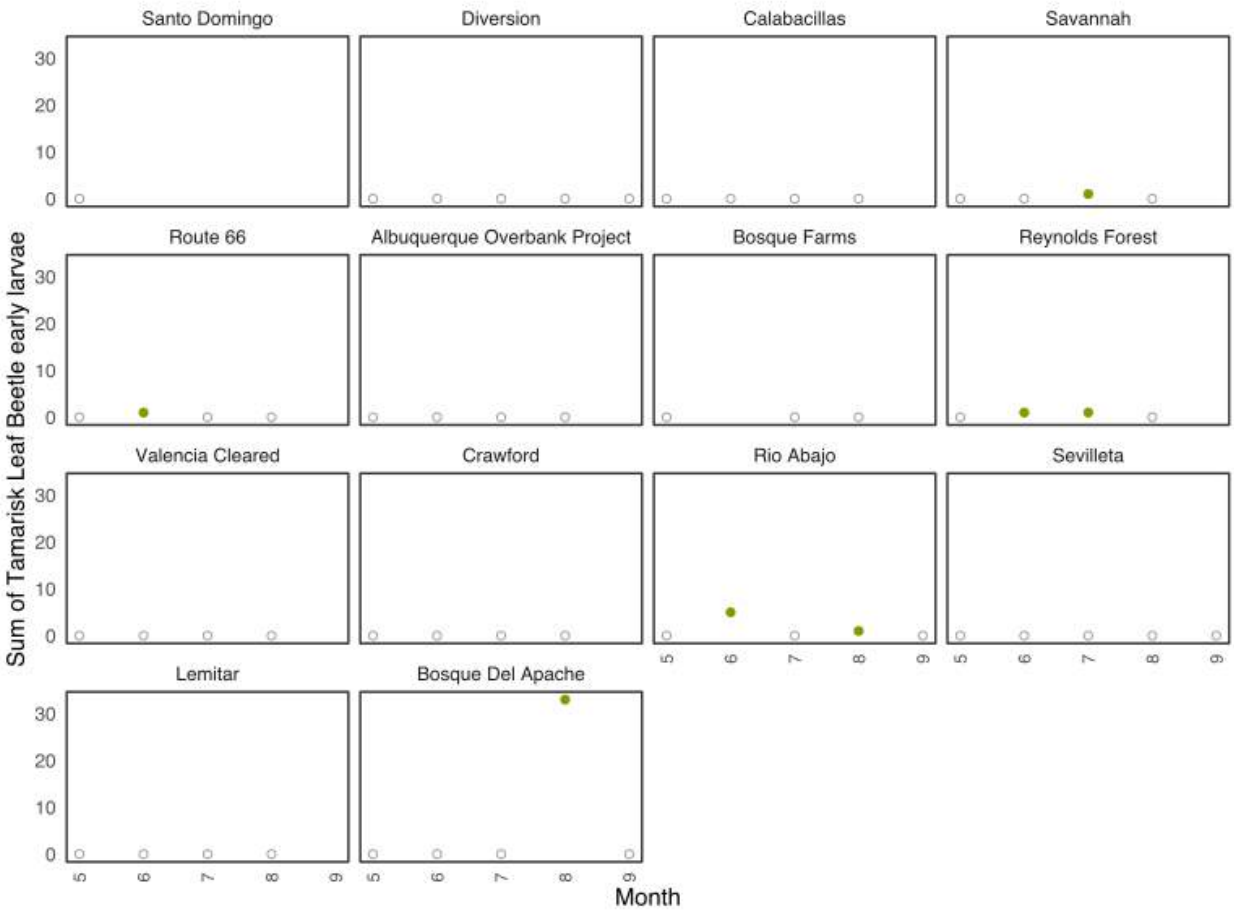


Figure 9.3 Total tamarisk leaf beetle early stage larvae found at sites from May through August or September (four sites) 2023. Hollow dots represent zeros; blanks indicate no collection. Sites are arranged from north to south.

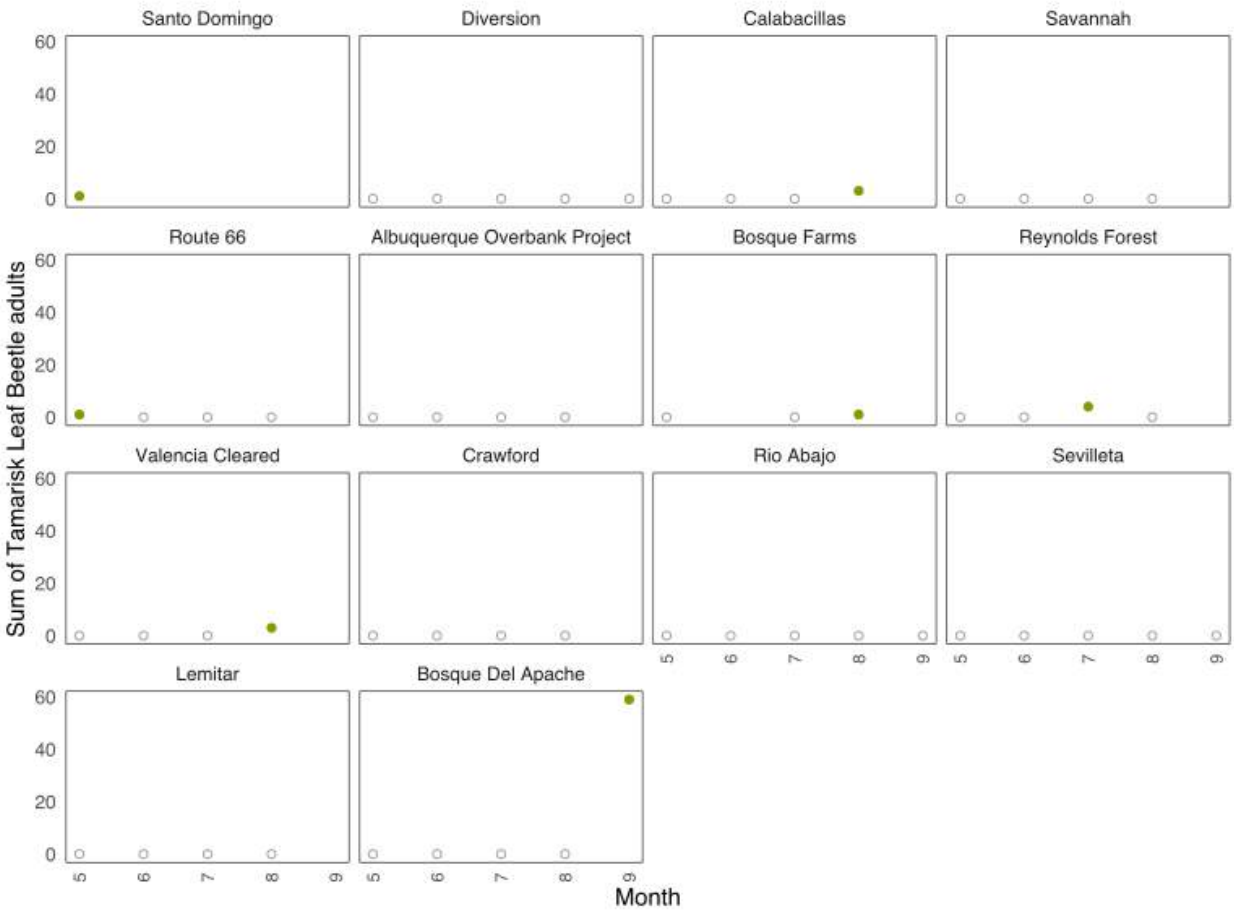


Figure 9.4 Total tamarisk leaf beetle adults found at all sites from May through August or September (four sites) 2023. Hollow dots represent zeros; blanks indicate no collection. Sites are arranged from north to south.

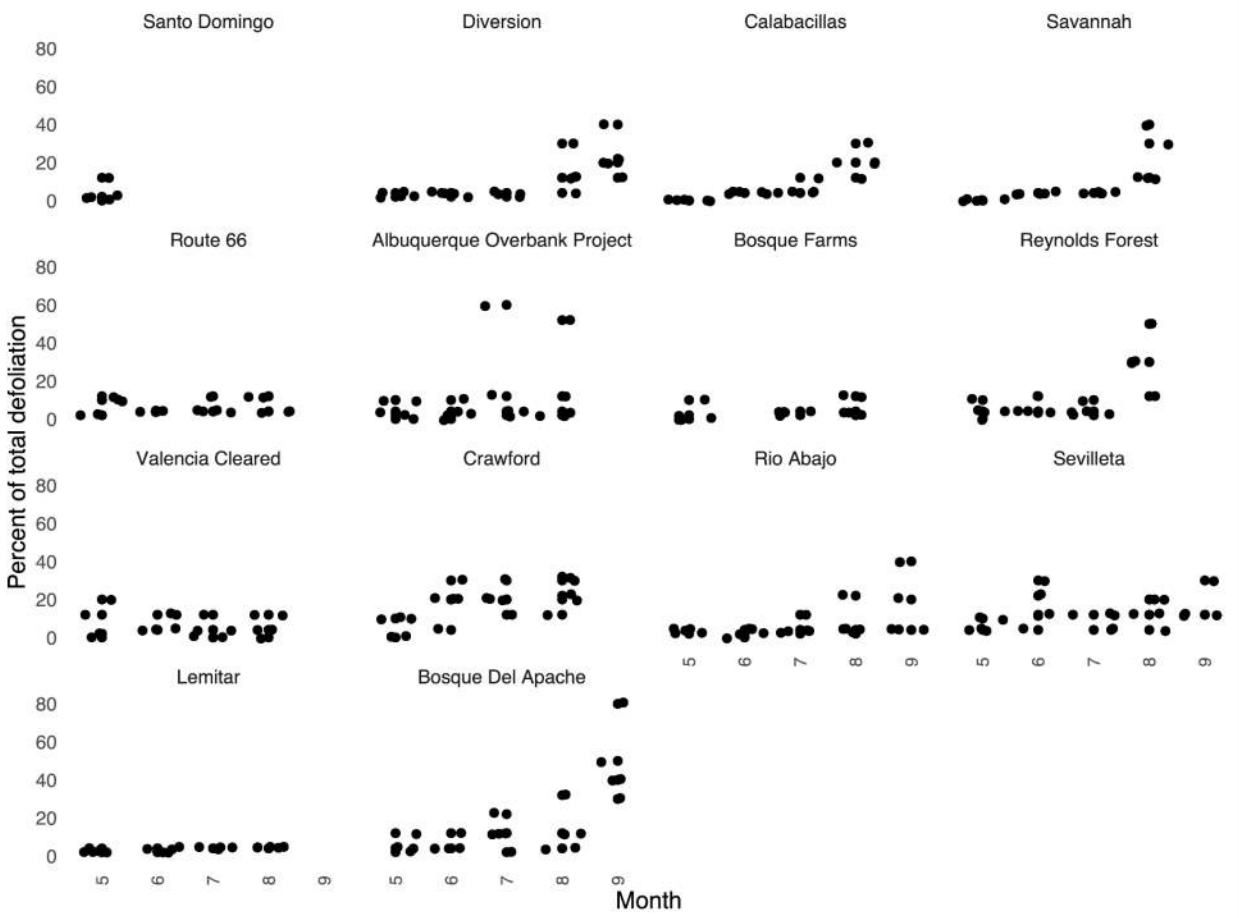


Figure 9.5 Percent total defoliation shown by tree across the sample sites for 2023. Total defoliation includes defoliation by both TLB and other defoliators.

Tamarisk leaf beetle (TLB) abundance was extremely low or absent at most sites in 2023. While many sites flooded, even sites that remained dry had low TLB abundance. Defoliation at many sites was dominated by the tamarisk leaf hopper, which was abundant this year. Bosque del Apache was the only site that had a large TLB presence, especially in September.

10 Water Quality

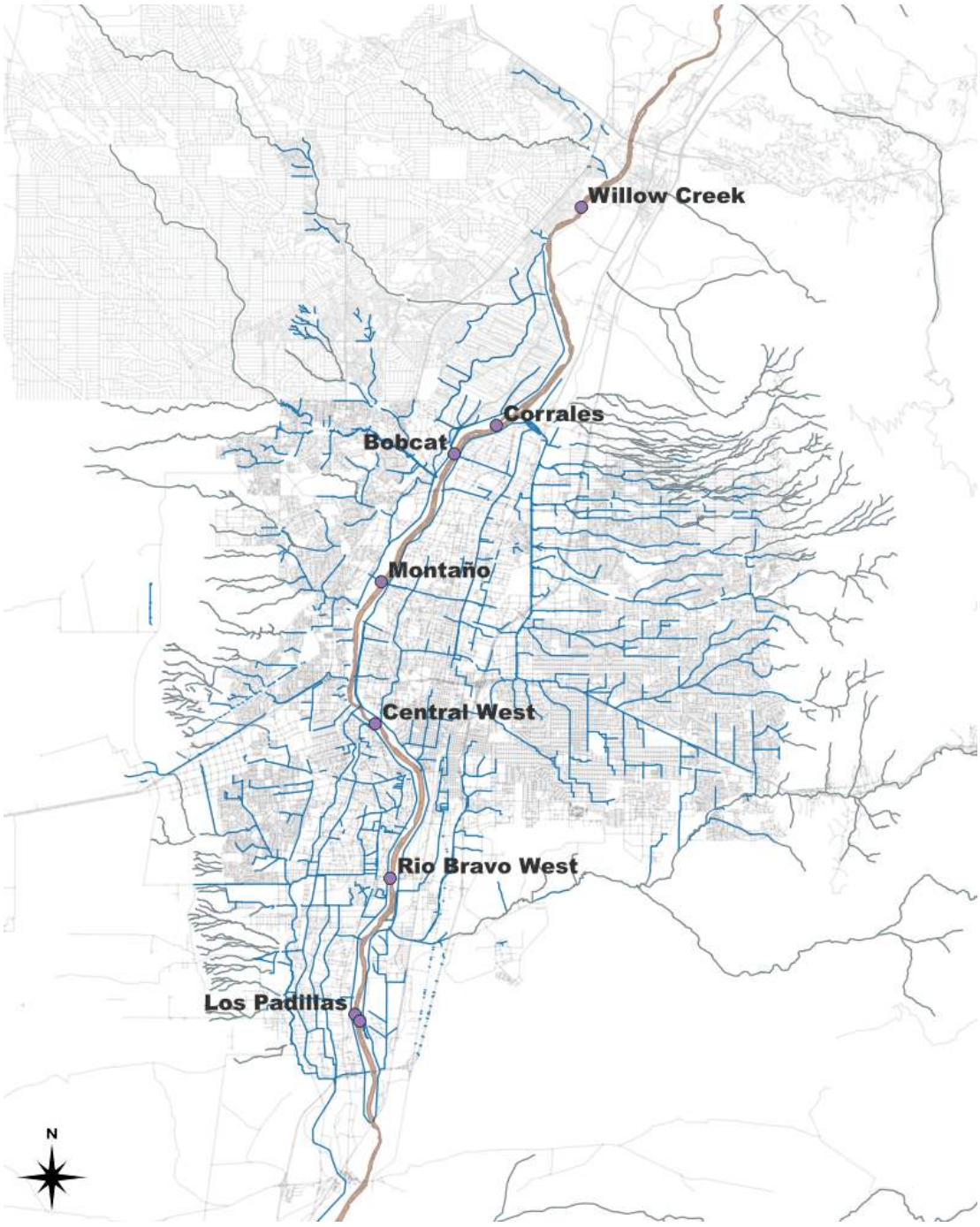


Figure 10.1. Storm water sampling locations for 2023. Additional GIS layers include arroyos, drains and ditches, city streets, and river center.

	Willow Creek	Corrales	Bobcat	Montano	Central West	Rio Bravo West	Los Padillas
February	3.1	7.4	6.3	6.3	4.1	27.2	31.8
March	7.5	2	7.5	7.5	6.3	8.4	9.7
April	<10	10	41	52	20	20	20
May	41	52	52	41	86	31	110
June	25.9	13.5	30.9	28.8	34.5	28.1	42.8
July	56.5	88.4	50.4	48	54.6	62.2	143.9
August	1607	2046	860	2909	2359	8164	261.3
September	85	118	121	63	216	63	313
October	39.9	160.7	119.8	261.3	971	369	9208
November	79.8	120.1	118.7	240	190.4	325.5	517.2
December	7.4	24.1	50.4	70.6	93.3	93.3	261.3

Table 10.1. *Escherichia coli* (MPN/100mL) samples with desired limit exceedances (88 MPN/100mL) highlighted in yellow and EPA limit exceedances (410 MPN/100mL) highlighted in orange. Sampling sites arranged from north to south.

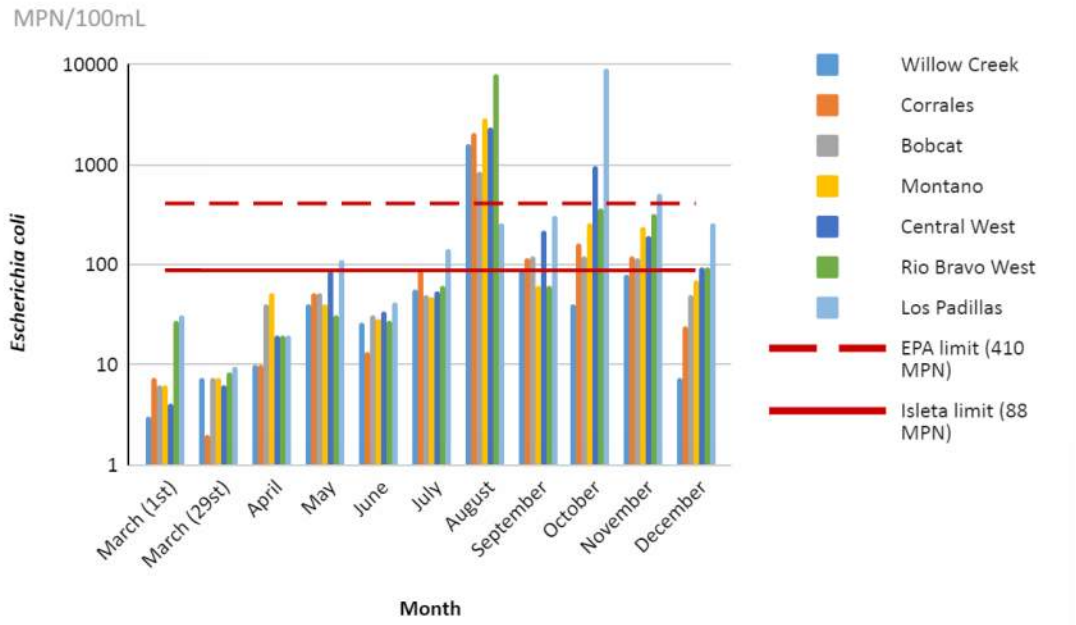


Figure 10.2 *Escherichia coli* (MPN/100mL) Log 10 scale at sampling sites across months.

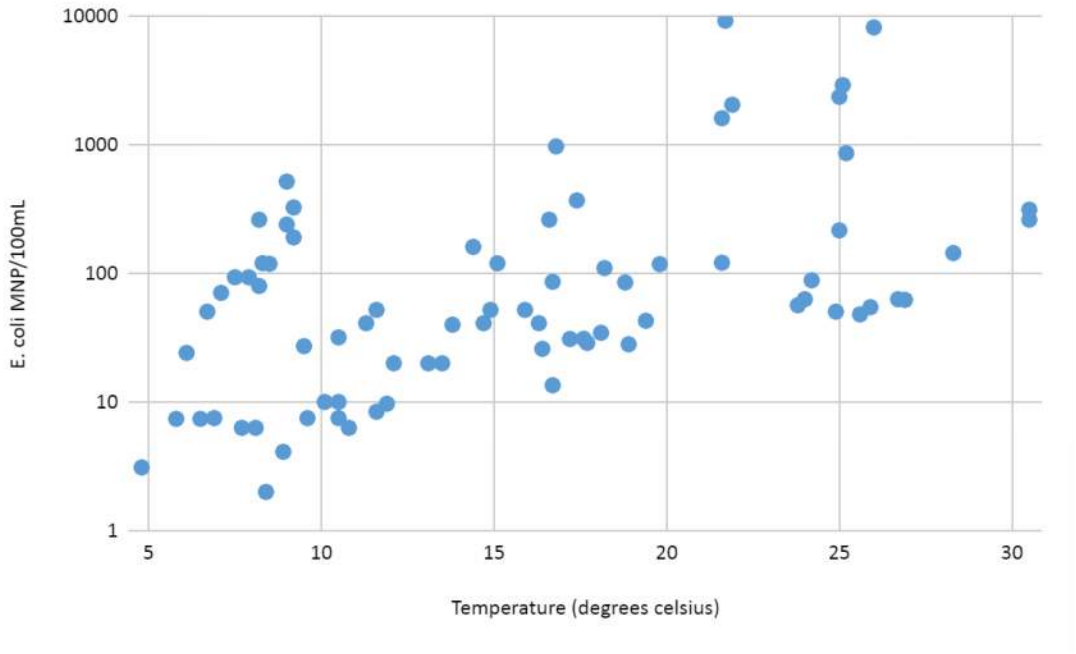


Figure 10.3 Log scale *Echeriachia coli* (MPN/100mL) vs. water temperature (degrees celsius).

Figure 10.4. Photo series of Rio Grande at Willow Creek sampling location facing upstream from March 1, 2023 – December 15, 2023, demonstrating variability in channel size and turbidity throughout the year.

BEMP is funded by the Mid Rio Grande Stormwater Quality Team to sample field parameters (specific conductance, dissolved oxygen, turbidity, and pH) and *Escherichia coli* levels in the Rio Grande. This sampling occurred monthly between March and December 2023 at seven locations seen in Figure 10.1. *Escherichia coli* levels exceeded the desired limits of 88 MPN/100mL and the EPA limits for a primary contact river of 410 MPN/100mL numerous

times during the sampling season (Table 10.1, Figure 10.2). Levels of *E. coli* are seen to increase as water flows through Albuquerque, with the highest concentration typically occurring at the southernmost sampling locations, and are positively correlated with increased water temperatures (Table 10.1, Figures 10.2 – 10.3). Monthly changes in river channel and turbidity can be seen in Figure 10.4. Sampling methodologies, details on sample sites, and results are further detailed in the 2023 Annual Stormwater Quality Technical Report, available on request.

11 Bayesian Structural Equation Models (riparian plant cover)

BEMP is constructing a Bayesian (data driven and generative model) structural equation model (SEM) using Stan (probabilistic modeling language) linking depth to groundwater, precipitation, leaf litterfall response (a proxy for productivity), vegetation cover, fire, flood, temperature, and exotic removals. Below are a couple of simple examples of SEMs, looking at one ecosystem driver (fire). Preliminary results of the SEM (Figures 11.1, 11.2, 11.3) show that native wetland plants, wet meadow grasses, and drop seed grasses all have higher cover at sites that have not burned. Sites that have burned show a variable response to fire (positive, negative, and minimal) depending on other factors (such as depth to groundwater, flooding, or management decisions, like reseeding).

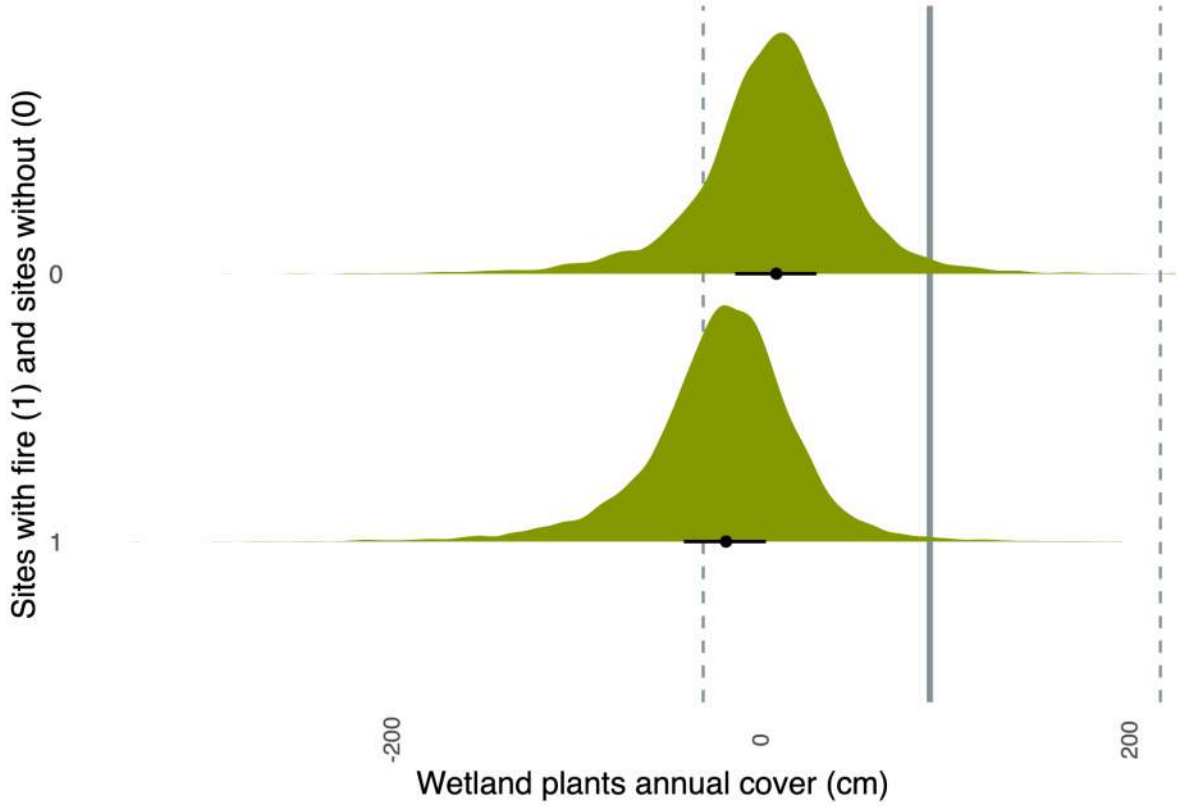


Figure 11.1 Wetland plant cover response to fire from the SEM. Posterior probability distribution (in green) with the 50% uncertainty intervals as black lines and point estimate as a black dot.

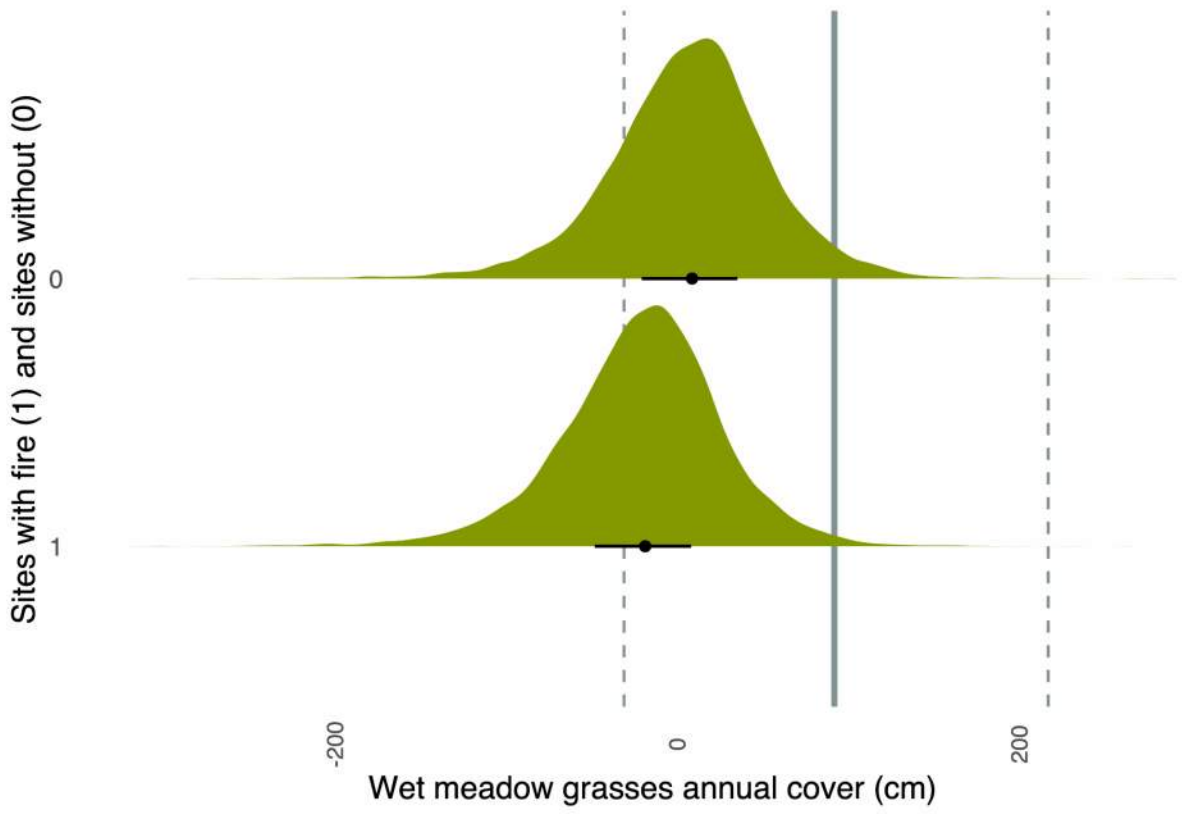


Figure 11.2 Wet meadow grasses cover response to fire from the SEM. Posterior probability distribution (in green) with the 50% uncertainty intervals as black lines and point estimate as a black dot.

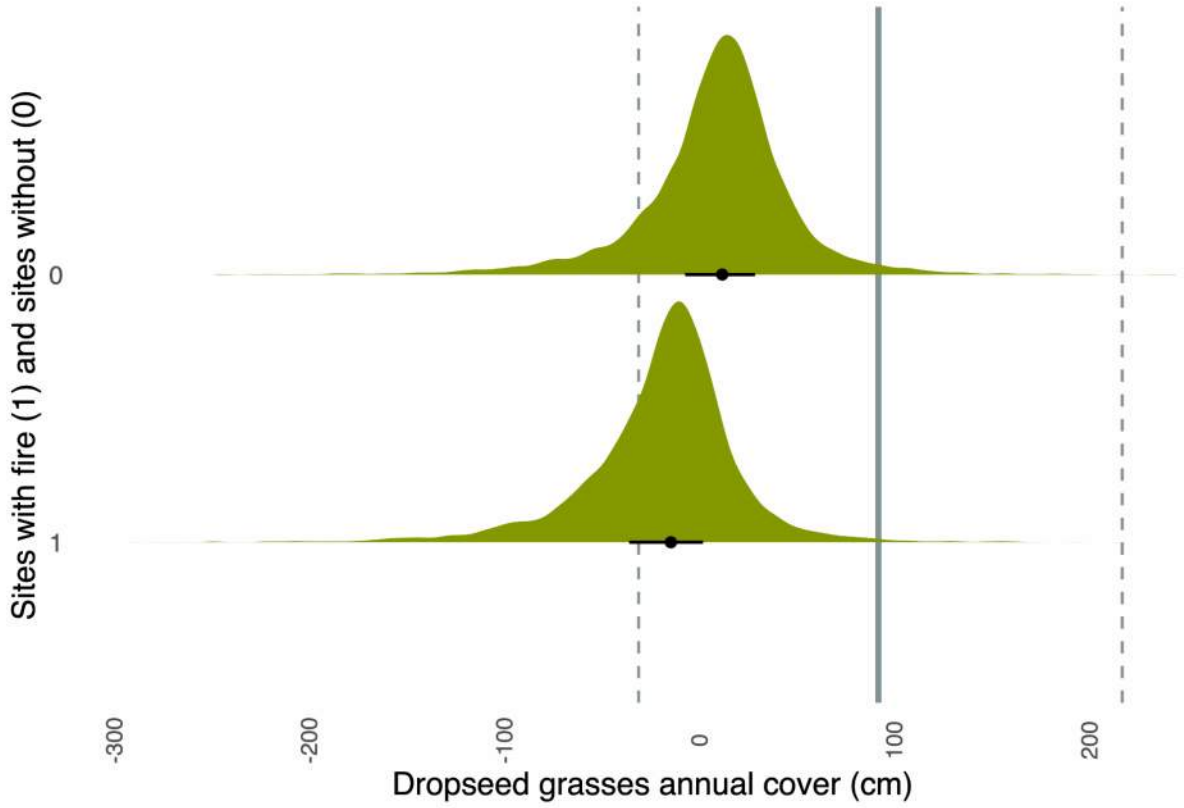


Figure 11.3 Dropseed grass (*Sporobolus* spp.) cover response to fire from the SEM. Posterior probability distribution (in green) with the 50% uncertainty intervals as black lines and point estimate as a black dot.

Kochia and tumbleweed have a different response to fire (Figure 11.4). Their combined cover increases at sites that have burned unless management action is taken to reduce their cover. This is particularly true at sites that have burned and do not flood within the same year.

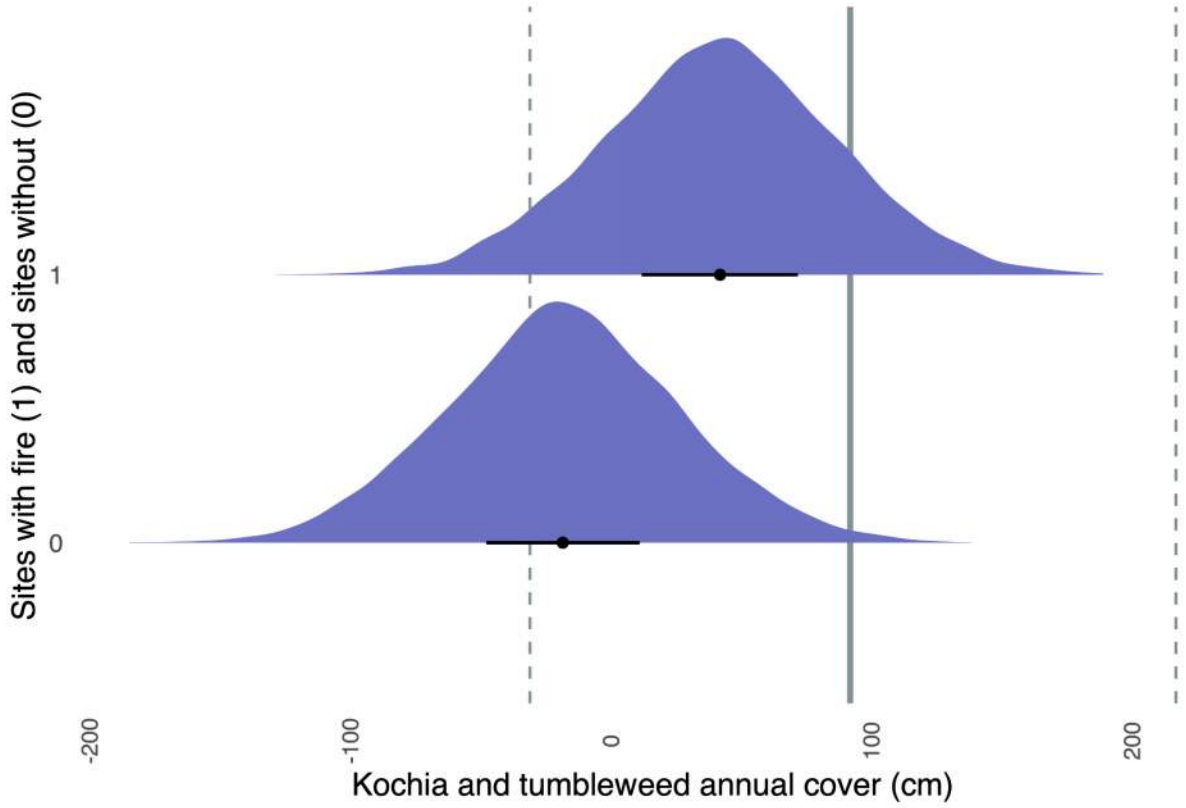


Figure 11.4 Kochia and tumbleweed cover response to fire from the SEM. Posterior probability distribution (in purple) with the 50% uncertainty intervals as black lines and point estimate as a black dot.

12 Implications for management

Data on depth to groundwater, precipitation, temperature, vegetation cover, litterfall, and indicator arthropod species are all critical for both determining what type of management strategies to use in different riparian areas and for monitoring the success of those strategies. Sites with higher groundwater levels are more likely to support successful cottonwood-willow restoration (e.g., San Jose), while sites with deeper groundwater levels require more earth-moving to establish deeper swales and wetlands in order to be successful (e.g., SLO). Establishing native vegetation following fires will depend greatly on the ability to get water on the site. Knowing what vegetation was on the site prior to the fire will aid in restoration efforts, as many native plants (e.g., golden currant, sedges, yerba mansa) are able to recover quickly after a fire, especially with stronger connections to groundwater. Without flooding, areas that were bare or disturbed generally support invasive exotics like tumbleweed and kochia following fires. These invasives can then persist for years.

Temperature data indicate that urban sites and sites with reduced canopy have warmer temperatures, directly impacting both vegetation and animals in those areas. The cooling benefits of a canopy are clearly seen at cottonwood and willow-dominated sites.

The shift to warmer temperatures, reduced spring river flows, and more variable precipitation events that occur later in the year will directly impact which species are able to thrive. Developing Bayesian SEMs to help inform management decisions, projects, and mitigation efforts will be key to maintaining ecosystem function with reduced water availability.