

**Bosque Ecosystem Monitoring Program (BEMP):**  
**Report on 2014-15 Education and Monitoring to the**  
**Valencia Soil and Water Conservation District (VSWCD)**

**April, 2016**

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University of New Mexico

Prepared in cooperation with

Bosque School

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**Objective:** To collect and analyze abiotic and biotic data at BEMP sites in the Middle Rio Grande Bosque. Also, to involve K-12 and university students in the learning about and monitoring of the bosque and river system.

Data collected are posted on the BEMP website: [www.bemp.org](http://www.bemp.org) under “Science -> Data”. Reports are also available under “Science -> Reports”.

**Scope of work:** The Bosque Ecosystem Monitoring Program (BEMP) combines long-term ecological research with community outreach by involving K-12 teachers and their students in monitoring key indicators of structural and functional change in the Middle Rio Grande riparian forest, or “bosque.” In 1997, BEMP began as a collaboration between the Department of Biology at UNM and Bosque School in Albuquerque, with fewer than 200 participants. Now BEMP averages 6000 participants each year. The experiences of these community members support science education reform efforts and help to increase each person’s understanding and appreciation of science in general and the Rio Grande riparian ecosystem in particular. BEMP findings derived from K-12 student-gathered data are used by government agencies to inform multi-million dollar river and riparian management decisions.

BEMP has 32 monitoring sites along 300 miles of the Rio Grande, including 8 sites in Valencia County (Figure 1). BEMP monitors abiotic factors including depth to groundwater; water level in the ditches; precipitation; temperature; and water quality of the river, ditches, and groundwater. BEMP monitors biotic factors including litterfall of native and exotic trees; vegetation cover (includes species richness, abundance, and diversity); cottonwood monitoring (size and sex); woody debris/fuel load; surface-active arthropods; and tamarisk leaf beetle presence, abundance, and impact. BEMP tracks the impacts of restoration projects (mechanical clearing, wood chipping, mastication, bank-lowering), flooding, and fire on the biotic and abiotic variables mentioned above (Table 1).

BEMP data and interpretations are presented at three BEMP-hosted events throughout the year: the BEMP Fall Field Tour, the BEMP Data Users Meeting (in the summer), and the Crawford/Green Trails Symposium (February/March). The Field Tour and Data Users Meeting will be combined as of 2016.

Students from nearly 50 schools from Rio Arriba, Sandoval, Bernalillo, Valencia, Socorro, and Doña Ana counties are involved with BEMP (Table 1). BEMP involves traditional public, charter, parochial, private, alternative and home school students. Throughout the school year, BEMP staff deliver Common Core correlated classroom and field educational experiences. At the end of the school year, BEMP hosts two annual seminar-type student congresses in partnership with a variety of local agencies and organizations. Students present and share their experiences at their sites and in relation to classroom activities. Students also present at the Long-Term Ecological Research (LTER) Schoolyard Spanish Webinar in May. This is a symposium that connects BEMP Spanish-speaking students with Spanish-speaking students from other LTER sites (at this point, specifically, Puerto Rico).

**Data collection dates:** Depth to groundwater, water level in the nearby ditch or drain, precipitation, and litterfall are collected each month during the week of the third Tuesday. Surface-active arthropods are collected three times each year, in May, June and September. Vegetation cover is collected once a year in August/September. All other datasets are collected as funding permits (woody debris in the fall/winter; tamarisk leaf beetle in the summer).

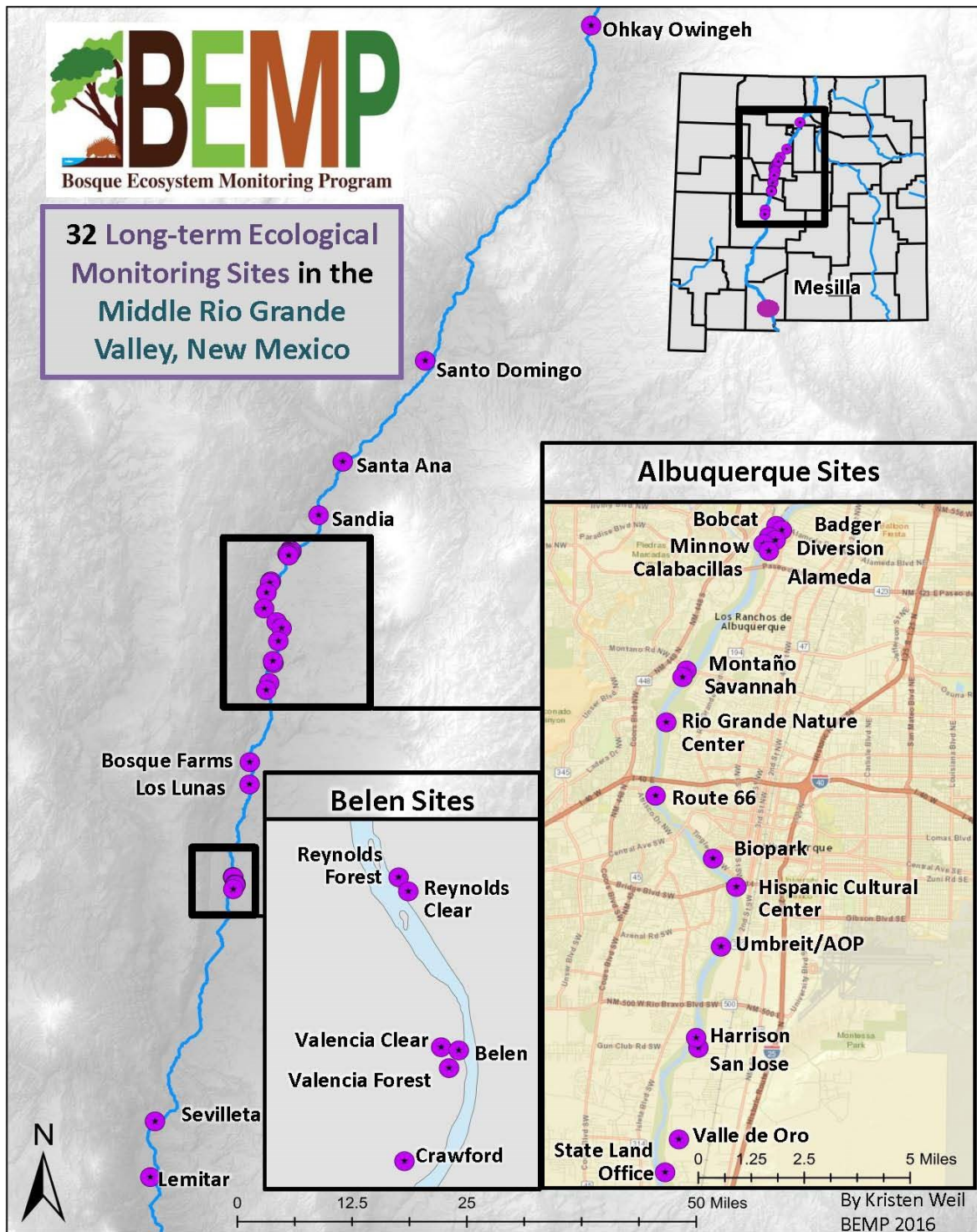


Figure 1: Map of 32 BEMP sites along the Rio Grande

Table 1. Summary of BEMP sites, including establishment date, monitoring group, the geographical location of the site, and a brief description of vegetation or site history.

Site Name	Date Established	Monitored by	Grade (s)	County	GPS Coordinates (NAVD 88 decimal degrees)	Site Description
Alameda	Apr 1997	Bosque School	6	Bernalillo	35.1880506, -106.646919	olive understory; one of the most native (90%) sections of the bosque throughout Albuquerque; oldest BEMP site
Albuquerque Overbank Project	established in 1998, BEMP took over in March 2014	La Academia de Esperanza HS	9-12	Bernalillo	35.04546, -106.6657	mature cottonwoods along east side of site, west side was lowered and experiences overbank flooding during high flows, lots of young cottonwoods and willows
Badger	Dec 2004 wells; Jul 2006 rest of site	Rio Rancho Cyber Academy	6	Bernalillo	35.19556856, -106.6416219	cottonwood-dominated bosque with elm sub-canopy; most wells have automated groundwater recording device as part of a collaboration between the US Army Corps of Engineers Urban Flood Demonstration and the University of New Mexico.
Belen	Feb 1998	Rio Grande Elementary	2	Valencia	34.6484315, -106.7377022	15 year-old cottonwoods, willows and Russian olives; experiences overbank flooding with high surface flow
BioPark	Feb 2007	Albuquerque Institute of Math and Science	7	Bernalillo	35.06688861, -106.7202778	medium sized cottonwoods over elm and Russian olive sub-canopy; wetland to the west of site, pond to the northwest of site
Bobcat	Dec 2004 wells; Aug 2006 rest of site	La Cueva	10 - 12	Bernalillo	35.19705633, -106.6439494	cottonwood-dominated bosque with a couple Gooding's willows; C well has automated groundwater recording device as part of a collaboration between the US Army Corps of Engineers Urban Flood Demonstration and the University of New Mexico.
Bosque Farms	Feb 2012	UNM interns	.	Valencia	34.848851, -106.714722	first site immediately south of Albuquerque; cottonwood-dominated bosque with some native grasses and willows on the east side, closer to the river
Calabacillas	Jan 2003	Volcano Vista HS	9-12	Bernalillo	35.19056822, -106.6491626	mature cottonwood-dominated bosque with little to no understory
Crawford	Sep 2008	UNM interns	.	Valencia	34.6375111, -106.7434661	strongly hydrologically connected, seep floods occurring at higher flows; northern section: cottonwoods in low-lying areas with saltcedar and kochia in higher areas, lots of cocklebur; southern section: yerba mansa, rushes and sedges, CFRP site
Diverson	Nov 2002	Bosque School	6	Bernalillo	35.191958, -106.6441893	sparse, pole-planted cottonwoods, few elm; very open and sandy site; DWDD located directly north of site;
Harrison	Spring 2003	Highland HS	9 - 12	Bernalillo	35.01505603, -106.6736953	located on a sand bar; covered with young cottonwoods, lots of willows, some seepwillow and some Russian olives; floods when river is high
Hispanic Cultural Center	fall 2001 started, finished Apr 2002	School on Wheels	10 - 12	Bernalillo	35.06881267, -106.6580575	cottonwood-dominated bosque with light understory of elm, Russian olive and Gooding's willows; tall wheatgrass getting denser each year
Lemitar	Sep 2002	Parkview Elementary	3	Socorro	34.16703188, -106.8899486	north of Socorro Nature Area; site outside the levee; xeric site; open landscape with a sparse cover of grasses, forbs, broom dalea, sand sage, and four-wing saltbush; handful of stunted cottonwoods and clumps of saltcedar
Los Lunas	Oct 1997	Los Lunas High School	9-12	Valencia	34.81236936, -106.7144580	large, older cottonwood overstory with mostly native understory of willow, New Mexico olive, wild currant, some Russian olive and saltcedar; yerba mansa covers much of the ground; experiencing more and more large branches falling; seep flood through a trough that runs through the center of the site

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Site Name	Date Established	Monitored by	Grade (s)	County	GPS Coordinates (NAVD 88 decimal degrees)	Site Description
Mesilla	Jun 2011	John Paul Taylor	5	Doña Ana	32.248328, -106.821014	primarily kochia with sparse wood chip piles and some native forbs
Minnow	Dec 2002	Bandelier Elementary	5	Bernalillo	35.1931509, 106.646915	cottonwood-dominated bosque with a couple Gooding's willows, otherwise little understory; wells have automated groundwater recording devices as part of a collaboration between the USACE Urban Flood Demonstration and UNM.
Montaño	May 2004	Bosque School	6	Bernalillo	35.14528819, -106.6803699	contains a few cottonwoods; northern section covered in kochia and tumbleweed; middle of site thick with tree of heaven
Ohkay Owingeh	Mar 2002	OOCs	4-5	Rio Arriba	36.0618, -106.0761	located by an extensive constructed wetland; periodically flooded by rising wetland water and a correspondingly rising adjacent water table; few large cottonwoods, history of few large fires, mostly native shrubs, vines, forbs and grasses
Reynolds Cleared	Spring 2004	Infinity High School	9-12	Valencia	34.65966431, -106.7421328	fairly open site with young cottonwood canopy of pole plantings, with kochia and tumbleweed and also NM olive planted by river
Reynolds Forest	Spring 2004	School of Dreams Academy	9-12	Valencia	34.66054583, -106.7429525	cottonwood overstory with a saltcedar and Russian olive understory; yerba mansa patches in northern section of site, wild currant interspersed; site continues to experience cottonwood dieback leading to the high woody debris load (prior to clearing in Feb 2012) - post 2013 clearing: kochia understory with thick woodchips from exotic clearing
Rio Grande Nature Center	Jun 1997	Wilson MS	6	Bernalillo	35.12675286, -106.6884322	numerous thin cottonwoods with some Russian olive understory; lots of clover; very open site
Route 66	Sep 2004	Jefferson MS	6-8	Bernalillo	35.1006408, -106.6914783	natural seep or trough in the center of the site that is thickly vegetated with willows with some elm and Russian olive; cottonwoods line the trough; east and west sides of the trough cleared by Albuquerque Open Space every few years and are vegetated by kochia and tumbleweed
Sandia	Feb 2016	Mountain View ES	3	Bernalillo	35.255, -106.5907	high intensity burn (2012) site with many dead standing and down cottonwoods (few living), revegetated with seepwillow and native grasses; some sunflowers, silverleaf nightshade, and occasional Russian olive.
San Jose	Dec 2015	NACA	12	Bernalillo	35.012375, -106.6727833	site installed in USACE constructed willow swale. High flow channel runs through the center of the swale and inundates around 2,500 cfs. Mature cottonwoods on west side of site
Santa Ana	Jul 1999	Bernalillo MS	7	Bernalillo	35.34284, -106.5458	Dying cottonwood gallery forest with understory of kochia
Santo Domingo (Kewa)	Jan 2008	Santo Domingo Nat Res Dept	.	Sandoval	35.50989, -106.3896	sparse cottonwood overstory with scattered juniper, New Mexico olive and willow understory; lots of grasses; horse activity at site
Savannah	Mar 2000	Bosque School	6	Bernalillo	35.14285294, -106.6819814	grasses and forbs with pockets of overstory cottonwood stretching above an understory of Russian olive and saltcedar
Sevilleta	Spring 2003	Cottonwood Valley Charter School	4	Socorro	34.25834233, -106.8831845	southern boundary of Sevilleta NWR upstream of San Acacia Diversion Dam; dense woody vegetation of mostly Russian olive and saltcedar mixed with smaller cottonwoods and a patchy understory of coyote willow; site has high groundwater salinity and soils contain heavy clay; occasional saltgrass dominated swards occur among trees



Site Name	Date Established	Monitored by	Grade (s)	County	GPS Coordinates (NAVD 88 decimal degrees)	Site Description
State Land Office	June, 2014	The International School	3-4	Bernalillo	34.96785, -106.6856	moderately dense mature cottonwood overstory with two large channels dug through site intended for stormwater runoff drainage to the river; some trenches with permanent standing water supporting coyote willow stands. Much of site outside of ditches covered with tumbleweed and kochia
Valencia Cleared	Spring 2003	Belen HS	9-12	Valencia	34.64863444, -106.7391728	few cottonwoods, Gooding's willows, Russian olives with large patches of wolfberry and ground cover of yerba masa
Valencia Forest	Spring 2003	Belen Family Schools	3-6	Valencia	34.64716225, -106.738482	was uncleared and dominated by cottonwood, Russian olive, saltcedar with a saltgrass meadow at the south end of the site; after fire and clearings, now almost entirely covered by kochia and tumbleweed with small patches of yerba mansa and saltgrass
Valle de Oro	January 2014	South Valley Academy	9-12	Bernalillo	34.97895, -106.6801	site was installed outside of levee system on a fallow farm field. No trees or shrubs, primarily various forb ground cover

## Results:

### *Education Outreach*

In the 2014-2015 schoolyear, 9766 community members (students, teachers, etc.) participated in science-related outreach activities along the Rio Grande (Figure 2). There were 6072 students in the field collecting long-term data about ecosystem variables and the ecological drivers of flood, fire, river flow, wildlife, climate and management for our University of New Mexico database. Of those, over 1000 students were involved in year-round monitoring with Common Core correlated classroom follow-up sessions. Of these 1000 students, 121 were involved in year-round monthly monitoring in Valencia County (103 were students from local K-12 schools) (Table 2). These numbers continue to remain steady from year to year, and are still limited due to staff time constraints and budgeting needs, as well as the flexibility of the schools and teachers involved. The number of students and schools involved has increased from the 2014-15 schoolyear to the current schoolyear.



Local students monitor the Bosque Farms BEMP site.

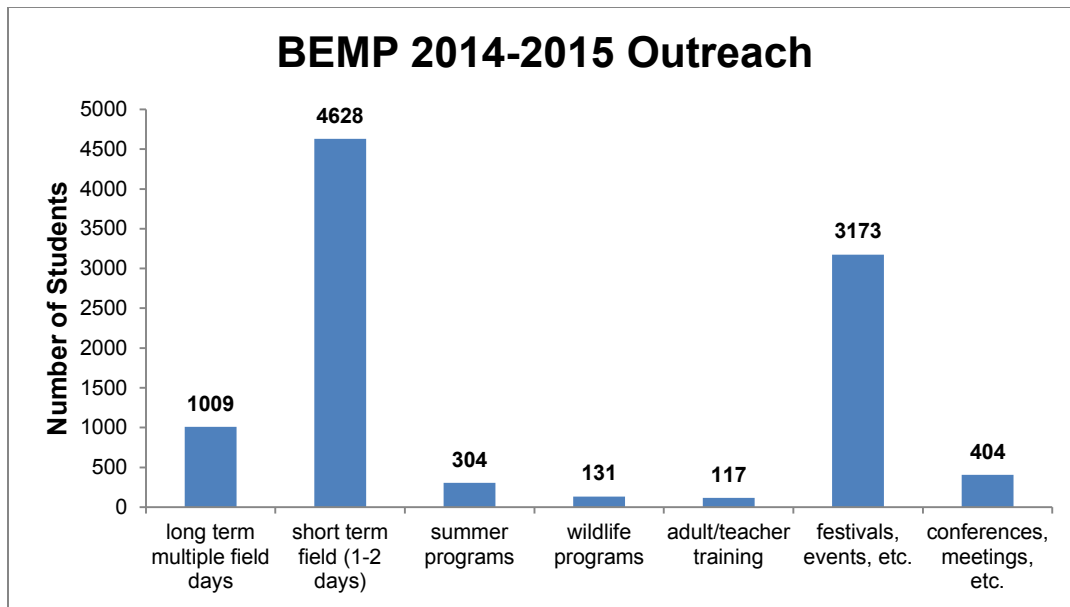


Figure 2. BEMP outreach numbers for the 2014-2015 schoolyear.

Table 2. Valencia County Outreach 2014-15 schoolyear included over 300 participants (BEMP Student Congress numbers include participants from multiple counties).

Valencia County Outreach 2014-2015				
<u>School/Association/Etc.</u>	<u>Students</u>	<u>Adults</u>	<u>Grade</u>	<u>Activity</u>
<b>Monthly Monitoring (MM) Classrooms</b>				
Los Lunas HS	15	2	HS	Los Lunas MM
Rio Grande Elementary x2	48	2	2nd	Belen -MM
School of Dreams Academy: Los Lunas	15	2	MS/HS	Reynolds Cleared MM
Infinity HS and Belen HS	25	2	various	Valencia Clear & Valencia Forest MM
University of New Mexico	18	0	college	MM, pitfalls, other field work
<b>7 classes; participant total:</b>	<b>121</b>	<b>8</b>		
<b>Community Activities</b>				
Whitfield Conservation Area Earth Day	35	15	various	BEMP table o' fun
7-12th BEMP/WW Student Congress	254	27	7th-12th	BEMP
4-6th BEMP Student Congress	250	30	4th-6th	BEMP
<b>Community activity total:</b>	<b>539</b>	<b>72</b>		
<b>Overall total:</b>	<b>660</b>	<b>80</b>		

## Monitoring Data:

### *Groundwater*

From 2013 to 2015, groundwater levels have increased at all sites, with four exceptions (Table 3). Declines in groundwater level between 2013 and 2014 ranged from 12 to 3 cm while increases in groundwater levels ranged from 1 to 10 cm. Between 2014 and 2015, there was only one site with a decrease in groundwater levels (of 3 cm), while the remaining 25 sites had increases ranging from 4 cm to 28 cm. As was seen during the drought years of 2008 to 2013 with the decline in groundwater levels, the recent incline is closely correlated with increases in river flow. The groundwater levels at most sites closely tracks river flow, with 50-82% correlation to river flow (Figures 3 -6; Table 3). There are a few exceptions to this. All of the sites within Valencia County, however, do have the strong correlation between depth to groundwater and river flow.



The Solinst water level meter (beeper) tape is used to demonstrate how deep cottonwood roots must be to reach the groundwater.



Table 3. Correlation between depth to groundwater (cm) and river flow (cfs) and mean annual depth to groundwater at each site. Sites are listed from north to south. Increasing groundwater levels from 2013 to 2015 are tightly correlated at most sites to increases in river flow. Cells highlighted in green indicate a 60-82% strong correlation ( $R^2$  value) between groundwater and river flow. Cells highlighted in purple indicate a moderate correlation of 42-59%. Cells highlighted in yellow indicate years when the groundwater levels declined rather than increased.

site name	site location	$R^2$ (correlation between) groundwater and river flow	2013 mean depth to groundwater (cm)	2014 mean depth to groundwater (cm)	2015 mean depth to groundwater (cm)
Badger	Albuquerque (above DWP Dam)	0.1264	244.665	237.187	229.822
Bobcat	Albuquerque (above DWP Dam)	0.4186	114.062	108.112	98.378
Diversion	Albuquerque	0.4145	248.003	241.453	222.603
Minnow	Albuquerque	0.7189	162.807	157.523	138.159
Calabacillas	Albuquerque	0.7775	176.39	168.82	140.731
Alameda	Albuquerque	0.6515	289.771	279.763	262.663
Montano	Albuquerque	0.587	175.012	165.238	155.245
Savannah	Albuquerque	0.6463	118.39	108.598	97.207
RGNC (Rio Grande Nature Center)	Albuquerque	0.5338	201.603	194.937	183.387
Rt 66	Albuquerque	0.6009	113.703	110.92	100.828
BioPark	Albuquerque	0.6215	147.733	150.608	133.11
National Hispanic Cultural Center (HCC)	Albuquerque	0.8127	132.451	130.509	117.052
Albuquerque Overbank Project (AOP)	Albuquerque	0.635		123.565	105.22
Harrison	Albuquerque	0.7611	117.936	111.038	97.039
Valle de Oro (VDO)	Albuquerque	0.0144		127.658	130.695
SLO (State Land Office)	Albuquerque	0.0386		134.732	130.09
Bosque Farms	Bosque Farms	0.7171	117.173	120.334	
Los Lunas	Los Lunas	0.558	152.953	152.065	129.173
Reynolds Forest	Belen	0.7248	134.445	128.278	111.612
Reynolds Cleared	Belen	0.7833	138.598	133.109	112.96
Valencia Cleared	Belen	0.7062	109.067	102.324	88.442
Belen	Belen	0.8168	134.015	131.007	112.466
Valencia Forest	Belen	0.6637	163.735	158.747	146.022
Crawford	Belen	0.7879	144.144	141.572	120.393
Sevilleta	Sevilleta National Wildlife Refuge	0.0095	170.79	182.673	165.798
Lemitar	Lemitar	0.0068	278.169	271.044	267.032

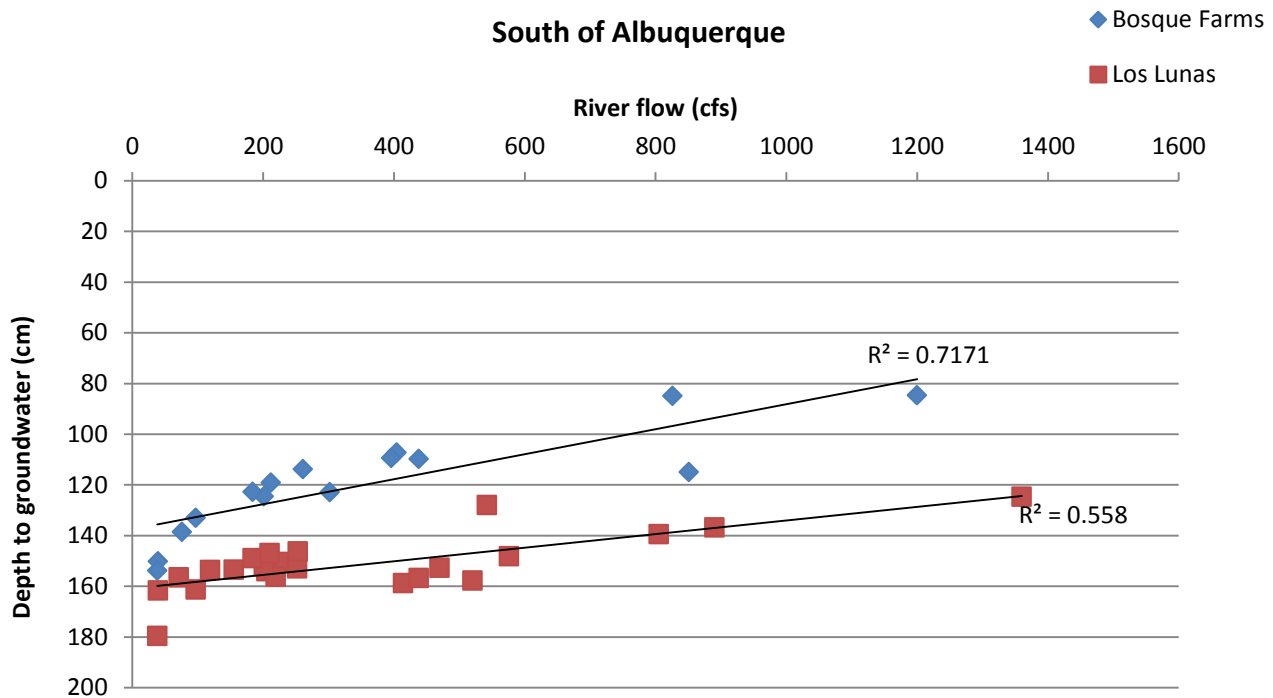


Figure 3. Depth to groundwater vs. river flow at Bosque Farms and Los Lunas (below Albuquerque). Trend lines and  $R^2$  values show strong correlation between groundwater level and river flow.

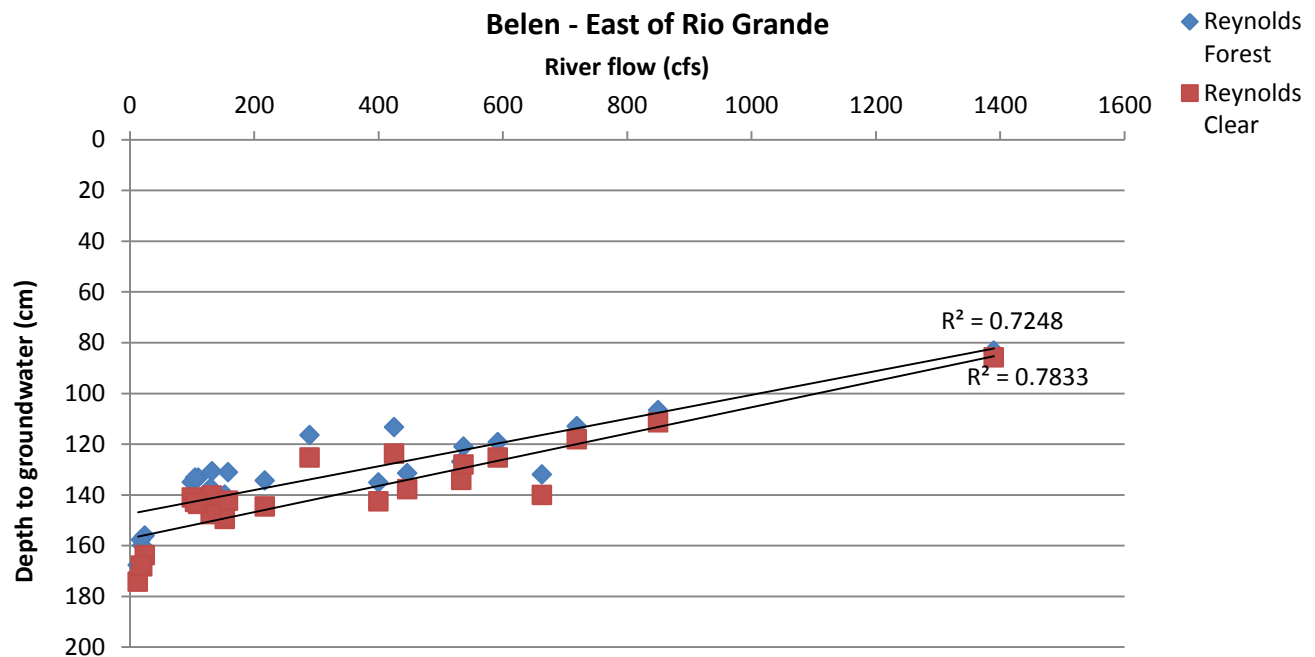


Figure 4. Depth to groundwater vs. river flow at two Belen BEMP sites. Trend lines and  $R^2$  values show strong correlation between groundwater level and river flow.

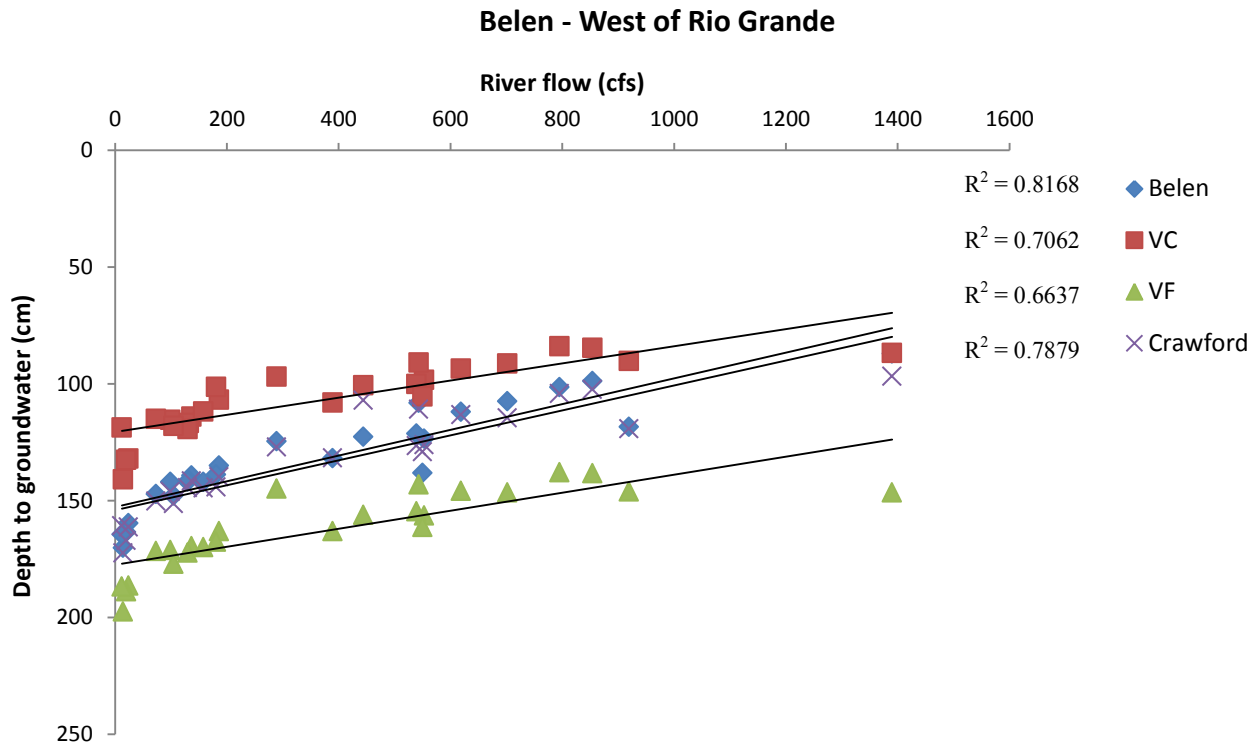


Figure 5. Depth to groundwater vs. river flow at four Belen BEMP sites. Trend lines and R<sup>2</sup> values show strong correlation between groundwater level and river flow.

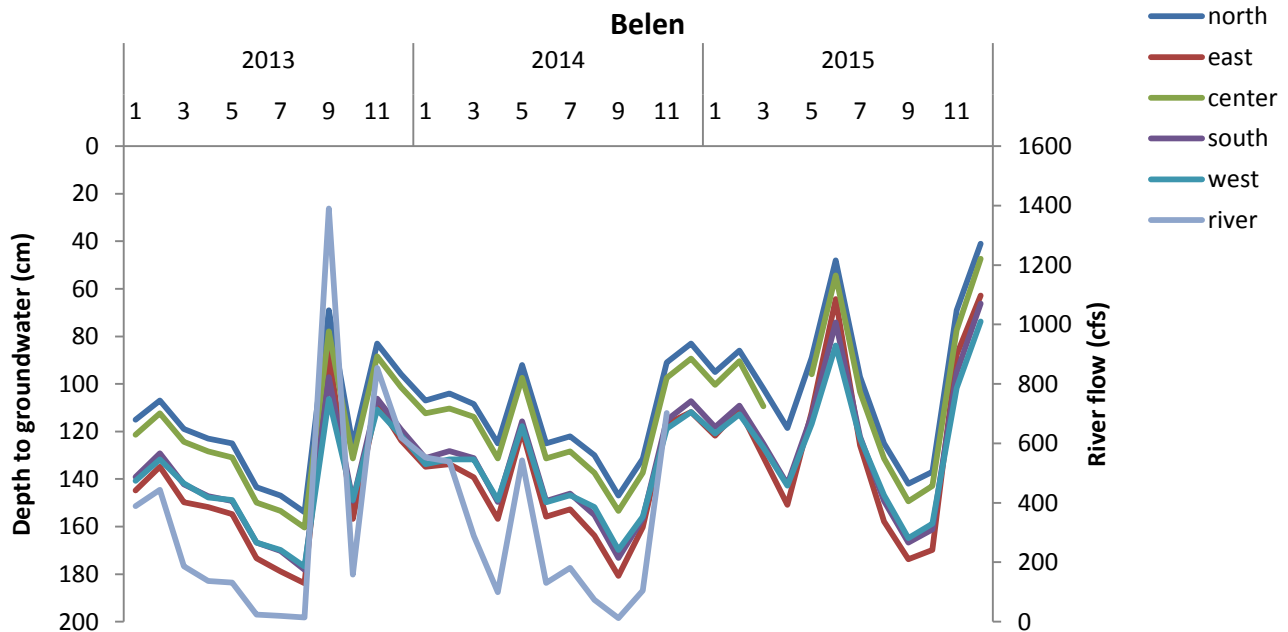


Figure 6. Depth to groundwater and river flow at the Belen BEMP site. Groundwater levels track closely with river flow (R<sup>2</sup> = 0.81).

### *Precipitation*

Precipitation peaks continue to occur in August (Figure 7). Late season tropical storms are leading to higher levels of precipitation late in the year. Evidence for monsoons shifting to later in the year is now present in BEMP data.

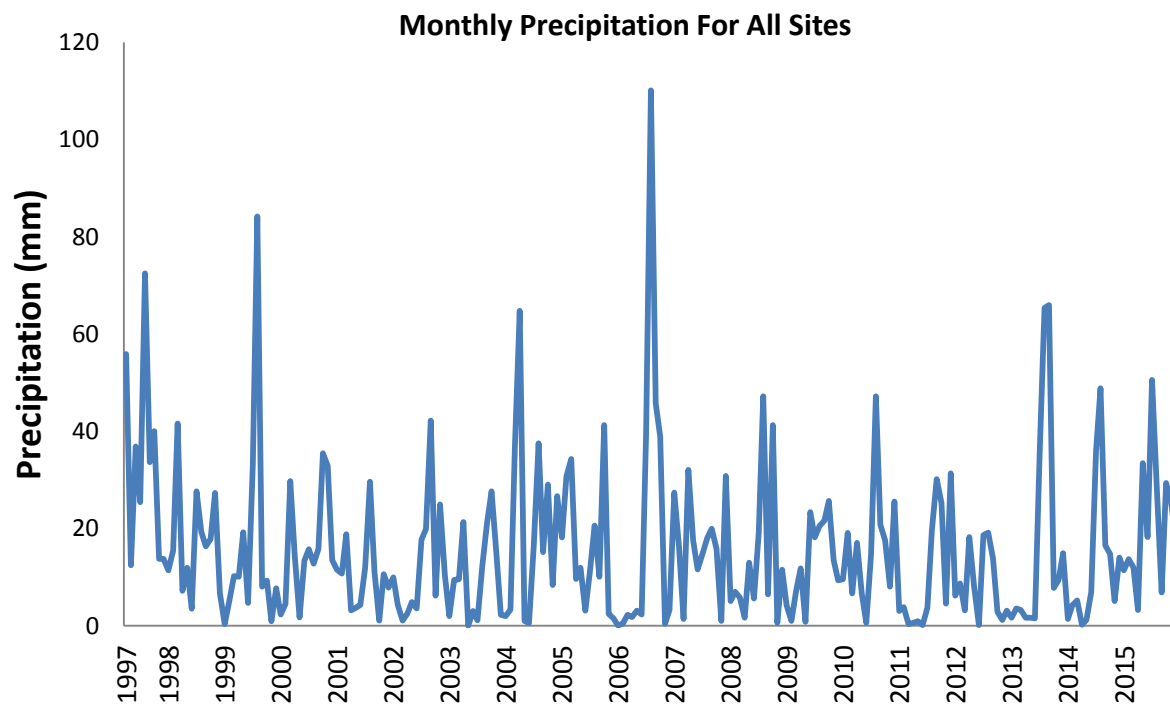


Figure 7. Precipitation averaged across all sites for each month.



### *Litterfall*

Cottonwoods remain the dominant species in leaf litter at 18 of the 30 sites (Figures 8 & 9). Exotic tree species make up 0 to 41% of the leaf litter at BEMP sites (Figure 9). Coyote willow or other native tree leaf fall can be as high as 30% of the leaf litter at a site, though as seen in the vegetation cover section, the cover of coyote willow is on a par with or exceeds cottonwood cover at a few sites.

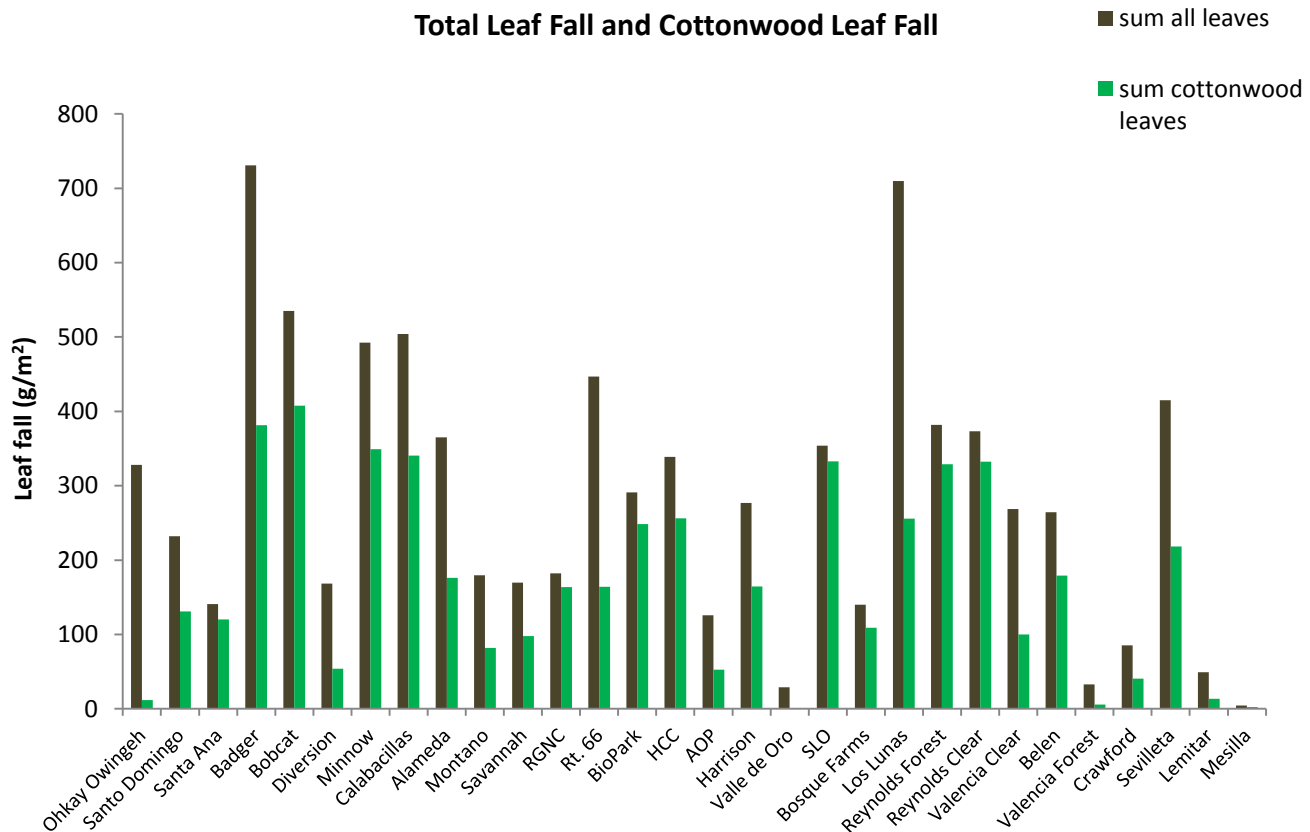


Figure 8. Sum of all litterfall (black) and cottonwoods only (green) across 30 sites from north to south

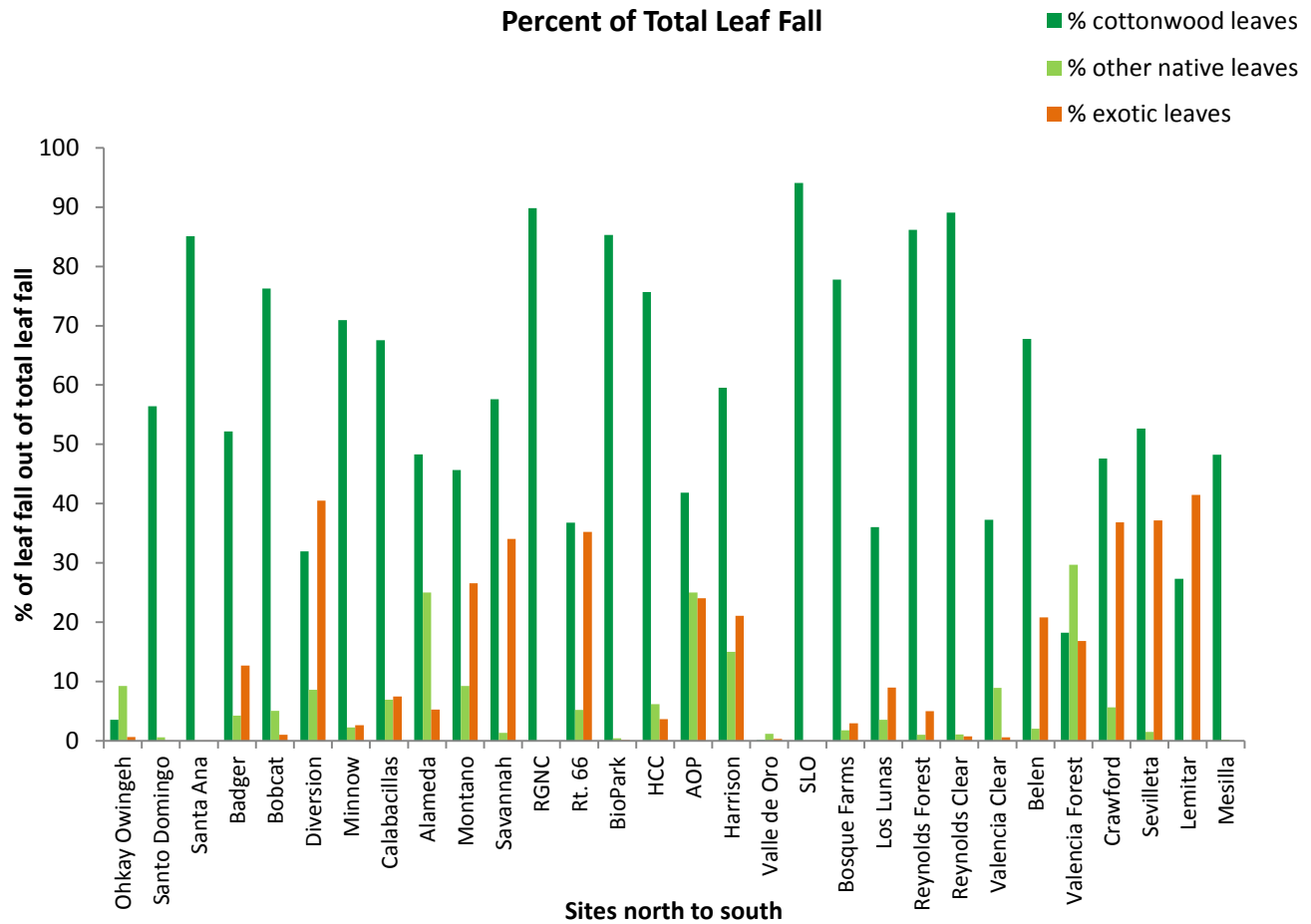


Figure 9: Percent of litterfall as cottonwood leaves (green), other native tree leaves (light green), or exotic tree leaves (orange) across 30 BEMP sites from north to south.



After collecting the leaves, second graders examine what lies underneath a litterfall tub at Belen.

*Vegetation Cover 2014*

Vegetation cover surveys are conducted in August/September. The botanists recently completed identifying samples in the herbarium and the final datasheets for 2015 were received in early March. These data are now being entered, QA/QC'ed, and will be analyzed for the next report. The 2014 vegetation cover data are presented here. Figures lump sites and are presented from north to south. As seen in the litterfall data, cottonwoods are the dominant species at most sites (Figures 10-11). Sites with disturbance have high kochia and/or tumbleweed cover.

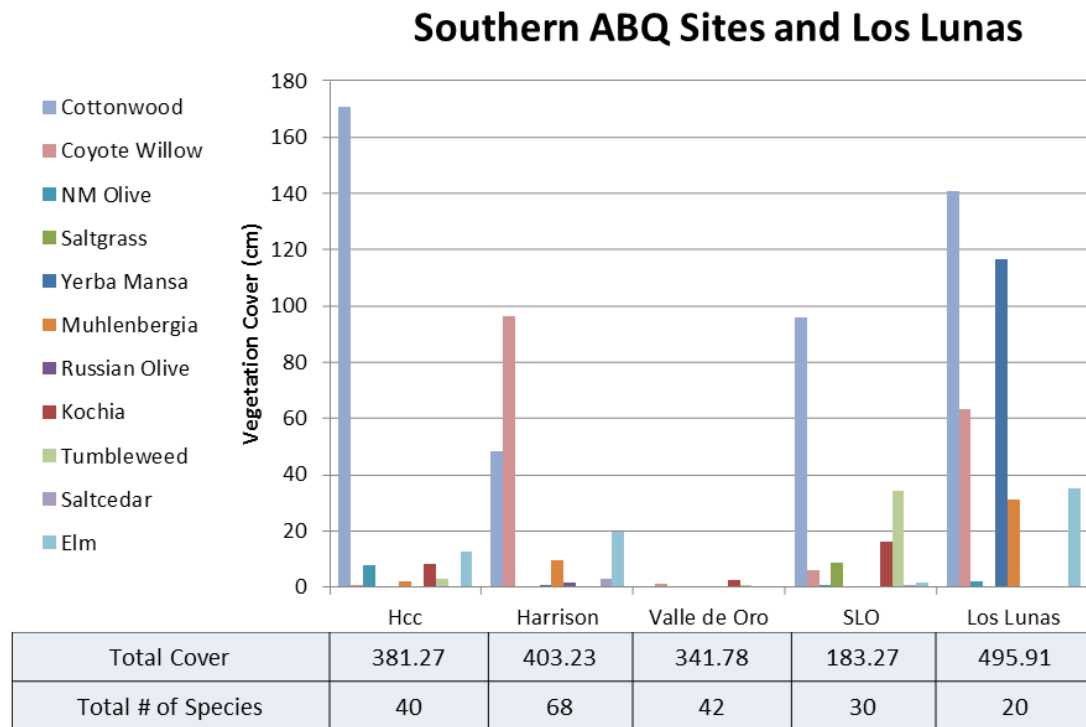


Figure 10. Total vegetation cover in centimeters and number of species found at the sites in southern Albuquerque and Los Lunas: Hispanic Cultural Center (HCC), Harrison, Valle de Oro, State Land Office (SLO), and Los Lunas.

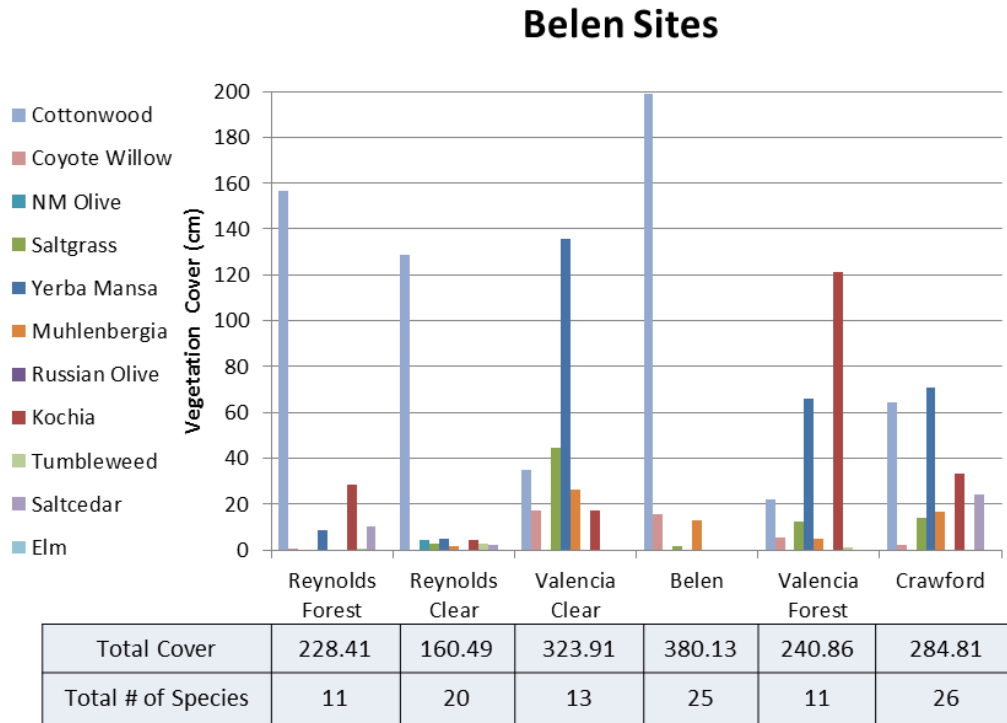


Figure 11. Total vegetation cover in centimeters and number of species found at the six sites in Belen: Reynolds Forest, Reynolds Clear, Valencia Clear, Belen, Valencia Forest, and Crawford.



Lush yerba mansa ground cover at Valencia Clear, with sparse cottonwood and Russian olive canopy.



*Tamarisk leaf beetle*

BEMP continued monitoring for tamarisk leaf beetle in 2015, but due to restrictions in funding, sampling was done at only sixteen sites spanning 260 miles of the Rio Grande. Of the sites sampled, all but three sites had beetles present (Figures 12 & 13). The three southernmost sites (Mesilla, Lemitar, and Sevilleta) did not have tamarisk leaf beetles in 2015, although the beetles were found in very low numbers at Lemitar in 2013 and 2014. In general, the high beetle numbers that were recorded at the pueblo sites north of Albuquerque in 2013 and 2014 decreased in 2015, while the low numbers counted at the Belen sites in 2013 and 2014 increased in 2015. Although overall beetle numbers were lower in Valencia County than in Albuquerque, severe defoliation to the saltcedar trees was evident (see picture below). Saltcedar defoliation levels ranged from severe to minimal at the BEMP sites, and refoilation occurred at only one site. For more detailed information, go to [bemp.org/reports](http://bemp.org/reports) for the BEMP Tamarisk Leaf Beetle Monitoring (2015) report.



UNM intern uses a sweep net to sample for tamarisk leaf beetles at the Crawford site in Belen.



Saltcedar in August, 2015 at the Crawford site in Belen.

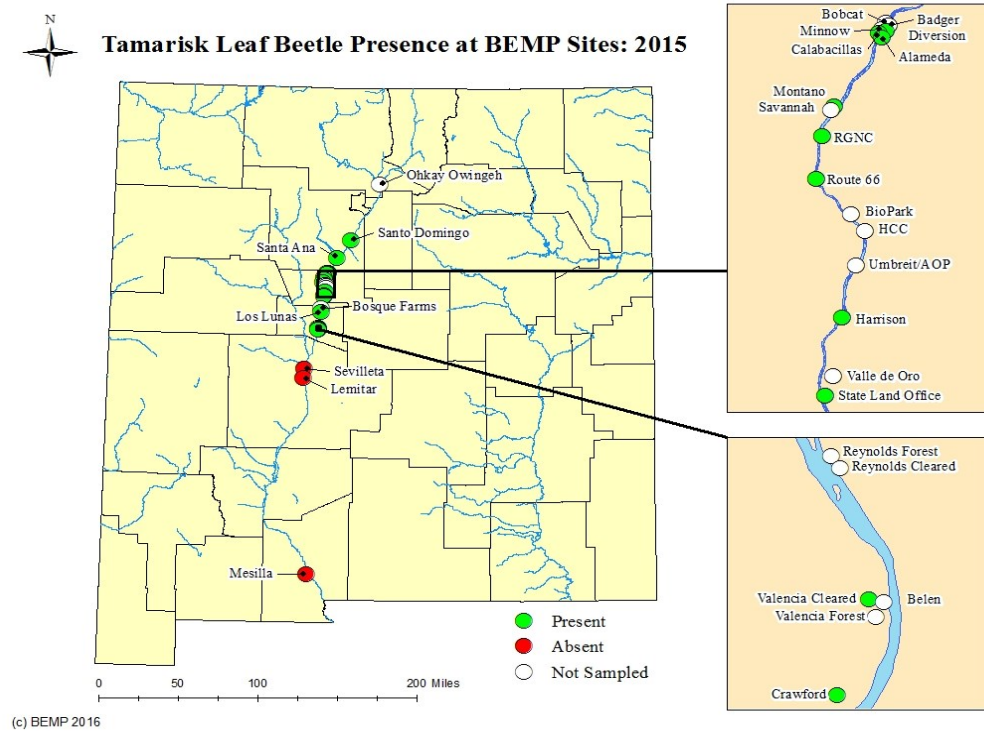


Figure 12. 2015 map of tamarisk leaf beetle presence at BEMP sites.

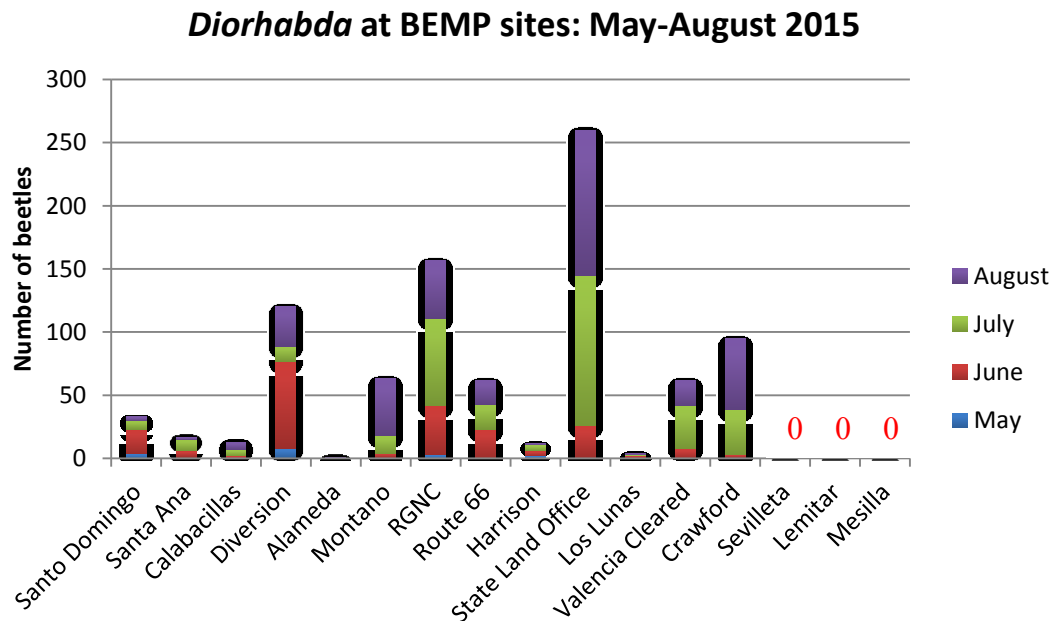


Figure 13. 2015 total numbers of tamarisk leaf beetle adults and larvae found at the 16 BEMP sites sampled. Sites are listed from north to south.

### *Woody Debris*

Woody debris/fuel load sampling is conducted each year at Albuquerque sites, and at all sites every 3-4 years (depending on funding). Woody debris monitoring will be conducted at all sites in 2015/16, but was not monitored in Valencia County in 2014 or 2015.

### *Surface-active arthropods*

Pitfall samples from 2015 are still being identified in the lab, and data are still being entered and checked. The annual sum of abundance for sites in 2014 show the highest abundances at Los Lunas and Belen, although not all sites in Belen, nor the wettest sites (Figure 14). Isopods represent the dominant arthropod captured at nine sites: Ohkay Owingeh, Santa Ana, Bobcat, BioPark, HCC, Los Lunas, Reynolds Clear, Valencia Clear, and Belen (Figure 14). Non-beetle insects represent the dominant arthropod captured at twelve sites: Minnow, Alameda, Montano, RGNC, AOP, Harrison, SLO, Valencia Forest, Crawford, Sevilleta, Lemitar and Mesilla (Figure 30). Beetles represent the dominant arthropod captured at three sites: Badger, Savannah, Valle de Oro (Figure 15).

Two families of beetles are often used as habitat indicators. Carabid beetles (or ground beetles) often indicate flood or wet habitat. Tenebrionid beetles (or darkling beetles) often represent dry habitat, though many can be found in moist bosque habitats. At Los Lunas, a seep flood site with dense native understory cover (Table 1), carabid beetles make up 51% of the beetles captured (Figure 16). At Valencia Clear, another site with dense understory cover and occasional seep flooding (although neither of these to the extent found at Los Lunas) (Table 1), carabids make up 29% of the beetles captured (Figure 31). At 15 of the 24 sites sampled, tenebrionid beetles make up the majority of the beetles captured (53 to 85%) (Figure 16). The sites with high tenebrionid captures do not consist solely of perched sites, but range from perched sites that do not experience flooding (Santa Ana, Bobcat, Minnow, Alameda, Montano, RGNC, Reynolds Clear, Valencia Forest, Lemitar, Mesilla) to site that experience seep flooding (AOP, Valencia Clear, Sevilleta) to sites that overbank flood (Harrison, Crawford).



On the left, carabid beetles are found in relatively high numbers at Valencia sites. On the right, a New Mexico whiptail lizard is rescued from a pitfall trap.

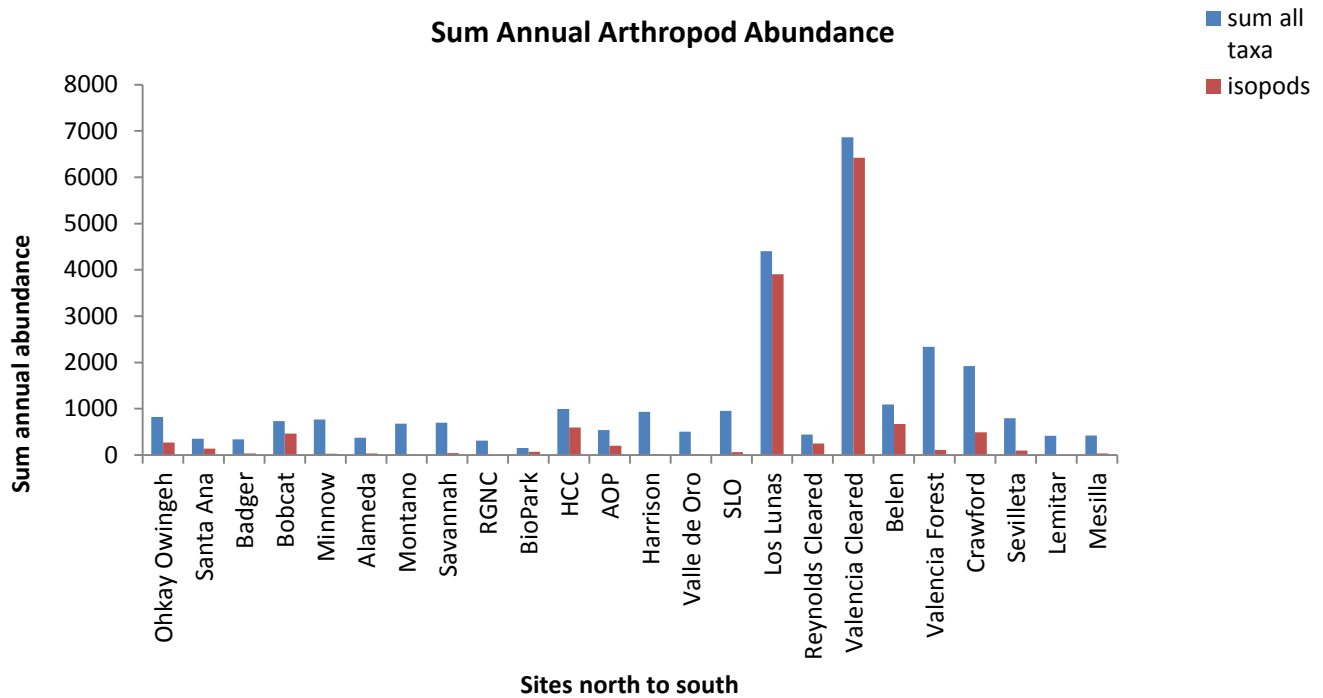


Figure 14. Total sum of annual arthropod abundance (based on three pitfall sessions per year) at sites north to south, and total annual isopod abundance.

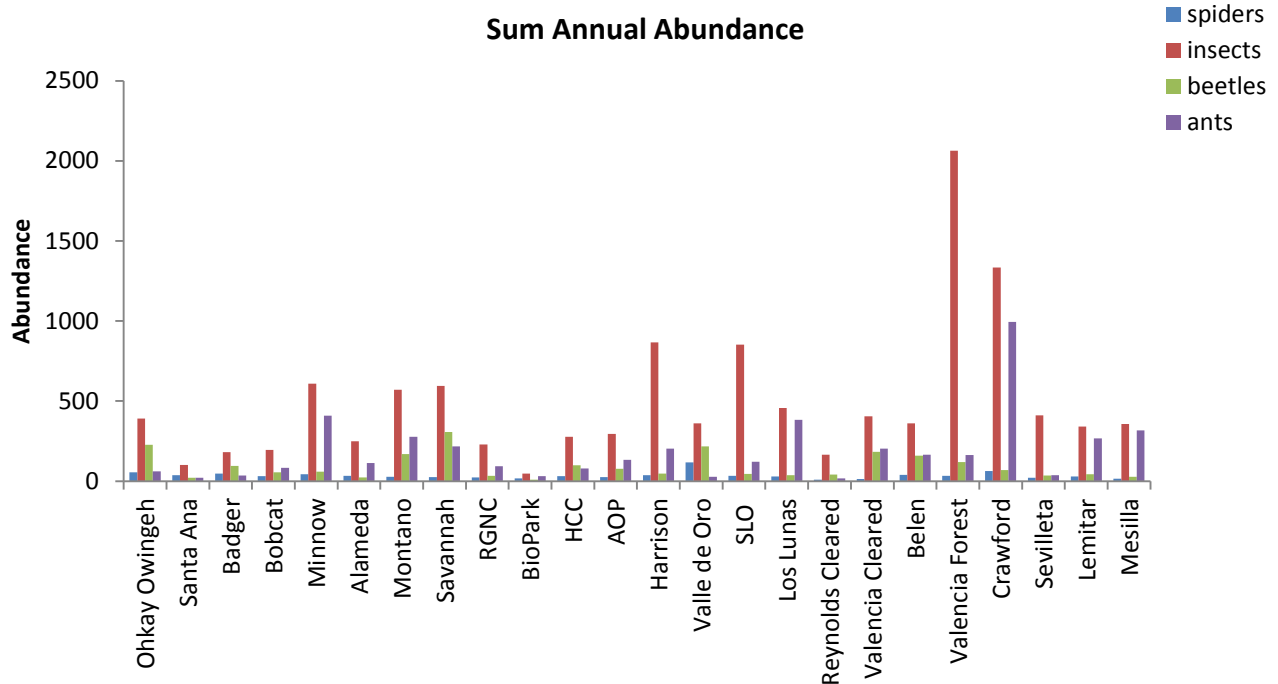


Figure 15. Total annual sum of spiders, insects, beetles and ants at all sites (listed north to south).



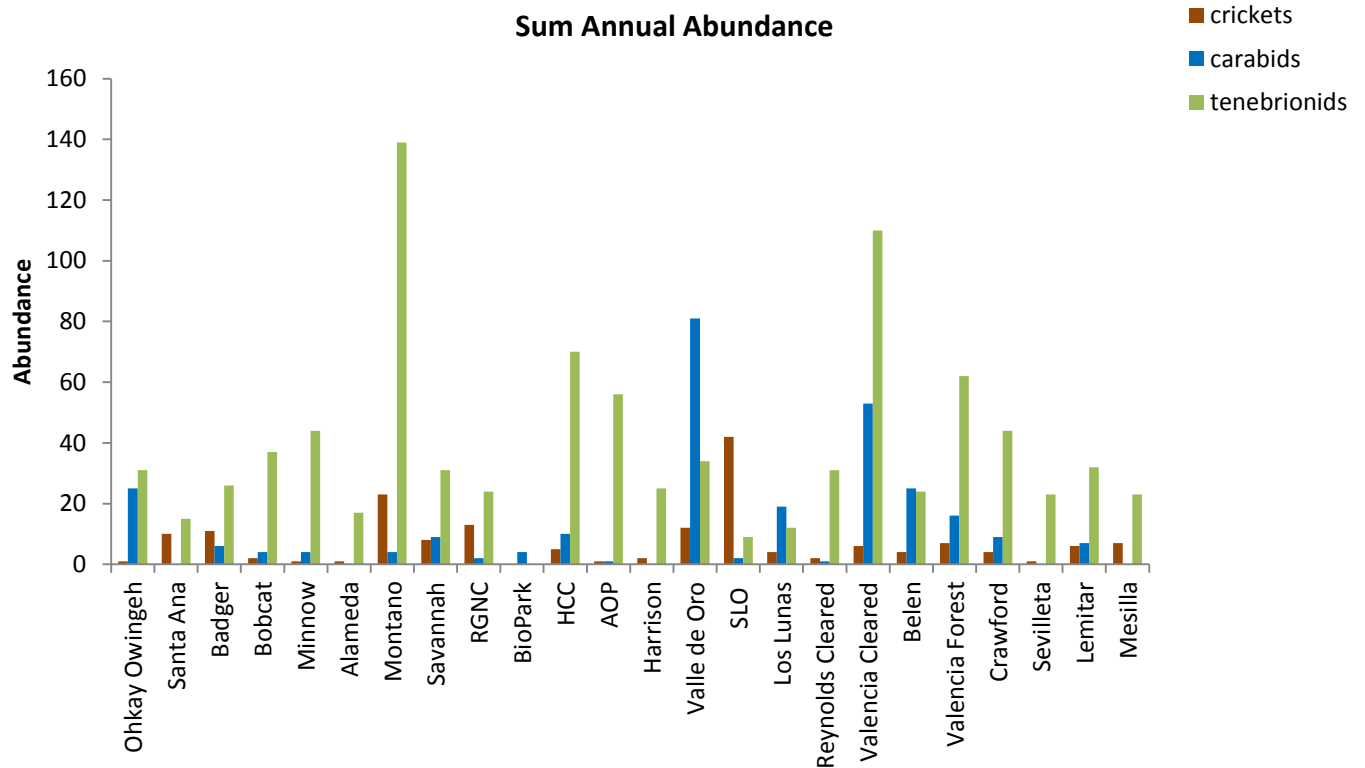


Figure 16. Total annual sum of crickets, carabid beetles and tenebrionid beetles at all sites (listed north to south).

### Concluding Remarks:

There were over 100 students involved in *year-round* monthly monitoring in Valencia County during the 2014-15 schoolyear, from five local schools (Los Lunas HS, Rio Grande Elementary, School of Dreams Academy, Infinity HS and Belen HS) as well as University of New Mexico students who participated in field monitoring at Valencia BEMP sites. School involvement at BEMP sites in Valencia County has been increased in the 2015-16 schoolyear. When one day events are taken into account, there were over 300 participants from Valencia County in BEMP last year.

Valencia bosque sites have a strong hydrological connection between groundwater and river flow, and as annual river flow fluctuates, the groundwater depth responds. As these sites tend to be less perched than sites to the north, overbank flooding still occurs at many Valencia County sites. The vegetation at these sites is indicative of this strong connection to the river, and native plants are dominant at most sites. The exception to this follows non-flooding disturbances, like fire or clearing events, where exotic *Kochia* cover is high. Tamarisk leaf beetle numbers remain low at Valencia sites, though they have increased over the past two years and severe defoliation of saltcedar has been documented in Belen. Total surface-active arthropod abundance and isopod abundance are highest at Valencia sites, most notably, the wettest sites (with either seep flooding or overbank flooding).