

Valencia SWCD Belen 1, 2, 3, 4 Sites

5-year Monitoring Report

2016



Prepared by
Kathryn R Mahan & Daniel Hernandez
With the 2011/2012 work of Joe Zebrowski,
New Mexico Forest and watershed Restoration Institute
for the
Greater Rio Grande Watershed Alliance



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Acronyms and Abbreviations

Acronym, Abbreviation, or Term	Explanation or Definition as used by NMFWR
FSA	Farm Service Agency, a department of the USDA
GIS	Geographic Information Systems
GRGWA	Greater Rio Grande Watershed Alliance
LIDAR	Light detecting and ranging, a remote sensing technique using light to gather elevation data
NHNM	Natural Heritage New Mexico
NMDGF	New Mexico Department of Game and Fish
NMED SWQB	New Mexico Environment Department Surface Water Quality Bureau
NMFWR	New Mexico Forest and Watershed Restoration Institute
NMHU	New Mexico Highlands University
NMRAM	New Mexico Rapid Assessment Method, version 2.1
NRCS	Natural Resource Conservation Service
PC	Plot center
RGIS	Resource Geographic Information System
SWCD	Soil and Water Conservation District
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WQCC	Water Quality Control Commission
WSS	Web Soil Survey, a soils database of the NRCS

Purpose of Report

This report covers pre-treatment and 5-year-post-treatment vegetation monitoring assessments performed on non-native phreatophyte removal projects near Belen, NM submitted by the Valencia Soil and Water Conservation District to the Greater Rio Grande Watershed Alliance in 2011. Following a discussion of the ecological context, and our monitoring methods, we present pertinent background, observations, and assessment results for each project.

Ecological Context of Bosque Restoration

Neither the challenges nor the importance of working in the bosque and other riparian areas in New Mexico today should be underestimated. According to the New Mexico Department of Game and Fish Conservation Division, wetlands and riparian areas comprise approximately 0.6 percent of all land in New Mexico (2012). Despite this small percentage, estimates of New Mexican vertebrate species depending on wetland and riparian habitat for their survival ranges from 55% (New Mexico Department of Game and Fish Conservation Services Division, 2012) to 80% (Audubon New Mexico, 2013). These areas also provide flood mitigation, filtration of sediment and pollutants, and water for a variety of purposes including groundwater recharge (Audubon New Mexico, 2013). In addition, native vegetation such as cottonwoods have cultural significance to many communities.

As much as these areas are disproportionately important to ecosystems and human communities, they are equally disproportionately impacted by disturbance. Anthropogenic impacts with major consequences for our riparian areas include dams, reservoirs, levees, channelization, acequias and ditches, jetty jacks, riprap and Gabion baskets, urbanization, removal of native phreatophytes, grazing by domestic livestock, excessive grazing pressure by native ungulate populations absent natural predation cycles, beaver removal, logging, mining, recreation, transportation, introduction and spread of invasive exotic species, groundwater extraction, altered fire and flood regimes, drought and climate change (Committee on Riparian Zone Functioning and Strategies for Management, et al., 2002). Statewide, it is estimated that as much as 90% of New Mexico's historical riparian areas have been lost (Audubon New Mexico, 2013), and approximately 39% of our remaining perennial stream miles are impaired (New Mexico Department of Game and Fish Conservation Services Division, 2012).

New Mexico is fortunate enough to have the Middle Rio Grande Bosque, the largest remaining bosque in the Southwest (USDA USFS, 1996). However, over the past two decades, the number of fires in the bosque has been increasing. Historically, the primary disturbance regime in the bosque has been flooding, not fire, which means the system is not fire-adapted. In fact, native species like cottonwood resprout from their roots after floods and need wet soils to germinate from seed. Flooding also promotes decomposition of organic material and keeps the soil moist which reduces the likelihood of fire. Today, overbank flow is uncommon in many areas of the Rio Grande due to the heavy alteration of the channel and flow regimes (two obvious examples are the structures defining the upper and lower extent of the Middle Rio Grande: Cochiti Dam and Elephant Butte Reservoir). This has led to low fuel moisture content and high fuel loads, as well as increased human presence in the riparian area. As a result, bosque fires are more common and more severe: they kill cottonwoods and other native species, creating spaces which are filled by non-native species such as salt cedar, Russian olive, Siberian elm, and Tree-of-Heaven. We are constantly learning more about how these species can exploit and encourage a riparian fire regime, in addition to many other changes they bring to ecosystems.

Efforts geared toward the removal of these nonnative species can help to reduce fire risk, preserve native vegetation, and be part of a larger effort to restore the bosque and the watershed as a whole to a more natural and functional ecosystem. The Greater Rio Grande Watershed Alliance (GRGWA) has been working on these issues with a variety of collaborating organizations and agencies within the Rio Grande basin for several years. Since 2013, the New Mexico Forest and Watershed Restoration Institute (NMFWRI) has been working with GRGWA and the Claunch-Pinto Soil and Water Conservation District (SWCD) to begin construction of a geodatabase for all of GRGWA's non-native phreatophyte removal projects as well as to perform the formal pre- and post-treatment monitoring, utilizing a range of field methods as well as LIDAR analysis where appropriate and available.

Monitoring and Field Methods

Original (2012) protocols

Due to the short timeframe between project selection and implementation in 2011/2012, only a narrow window was available to perform pre-treatment monitoring. That window was outside the optimum season for performing vegetation monitoring in this type of landscape. For that reason, a hasty monitoring protocol was developed. This protocol was based on placing photo point plots at locations distributed across the project area and representative of the diversity of the project area. In addition, an estimate of ground and canopy cover by percent within a 1/10 acre circular plot centered at the photo point was determined using ocular estimates. Overstory canopy was determined for a 1/10 acre circular area, also centered at the photo point. Finally, a Hink & Ohmart style vegetation structure assessment was performed. Vegetation species that were observed at each plot and in the project area were recorded. The plot size and density of observations limit the utility of this monitoring for describing overall site conditions or for generating any meaningful statistics.

Cover (%)											
Tree canopy	Seedlings/saplings <5' / 5 – 15'		Shrubs		Gramanoid	Forbs	Litter	Bare Soil	Rock	Gravel	Water or wet

Figure 1. Categories used for 2012 percent cover estimates.

A base map of the project location was constructed using project boundary data provided by New Mexico State Forestry. Planned photo points were selected by visual inspection of May 2011 true-color digital orthorectified aerial photography obtained from the United States Department of Agriculture (<http://datagateway.nrcs.usda.gov/>). A GIS file for the photo point plots was created using ArcGIS software. Coordinates were derived from the GIS file and loaded into a Garmin GPS 60 CSx Global Positioning System and a Trimble 2005 GeoXM Global Positioning System. The Garmin GPS was used to navigate to the general location of the planned photo point. The actual location of the photo point was determined by visual inspection of the area and selection was based on the ability to physically occupy a position at or near the planned point. The coordinates of the photo point were then collected using the more precise Trimble GeoXM GPS.

Once the plot location was determined, a 1/100 acre radius plot was established by placing pin-flags at 11' 9" from plot center in each cardinal direction. Photos were taken from plot center in each cardinal direction and from a distance north of plot center (66', where possible) toward plot center. Ocular estimates were made of understory canopy and ground cover within the 1/100 plot. Overstory canopy cover was estimated using a concave spherical densiometer, with measurements made in four cardinal directions, approximately mid-way between plot center and the edge of the 1/100 acre plot. This method provides an estimate of canopy cover for a 1/10 acre area centered on the plot. A Hink & Ohmart structure class determination was made using a worksheet developed by SWCA Environmental Consultants (see datasheet example in Appendix III). Finally, plant species observed within the 1/10 area around the plot were recorded, as were other comments document conditions at the plot.

5-year revisit (2016) protocols

To allow comparisons between site conditions, the original site protocols were employed for the 5-year revisits.

Plot locations as recorded in 2012 were found using a Trimble GeoXT, and all plot setup and measurements were the same as in 2012, with two exceptions. A ground cover category was added for plant basal/bole, which was omitted from the ground cover in 2011/2012. Further, in addition to the original Hink and Ohmart structural classification, we recorded the structure type within a modified Hink and Ohmart classification system (see Appendix II). This second Hink and Ohmart-based system is used by the modified NMRAM protocol employed for pre-treatment monitoring on GRGWA projects from 2013 to the present (2017).

For the sake of continuity, site visits were made around the same time of year as 5 years prior, even though this was not the ideal season for plant identification in either case. It is worth noting that the winter of 2016/2017 was warmer than the winter of 2011/2012, so even though site visits were conducted around the same time of year, plant communities differed. This is especially obvious in the photographs (Appendix IV).

Personnel Involved

2012 Monitoring Team:

- Joe Zebrowski, New Mexico Forest and Watershed Restoration Institute
- Jill Wick, New Mexico Department of Game and Fish (Sites B1 and B2)
- Dave Lightfoot, SWCA Environmental Consultants (Sites B3 and B4)
- Cody Stropki, SWCA Environmental Consultants (Sites B3 and B4)

2016 New Mexico Forest and Watershed Restoration Institute Monitoring Team:

- Kathryn R Mahan, Ecological Monitoring Specialist
- Christopher B Martinez, Monitoring Technician (NMHU Student Intern)
- Daniel Hernandez, Ecological Monitoring Technician

Other persons contacted 2012:

- Charlie Lujan, Valencia Soil and Water Conservation District
- Madeline Miller, Valencia Soil and Water Conservation District

Other persons contacted 2016:

- Madeline Miller, Valencia Soil and Water Conservation District

Bosque Ecological Monitoring Program Sites

Two Bosque Ecological Monitoring Program (BEMP) monitoring sites were located at the northern end of project area Belen 1 and the southern portion of project area Belen 2. These sites were likely disturbed during the treatment activity. GRGWA monitoring now strives to integrate BEMP monitoring into the overall project monitoring scheme.



Figure 2. BEMP sites present on Belen projects.

Belen Projects

Belen projects 1, 2, 3 and 4 are located on state/Middle Rio Grande Conservancy District (MRCGD) property between the Rio Grande and the Lower Peralta Riverside Drain east of Belen in Valencia County, NM.

The nearby city of Los Lunas receives an average of 9.75 inches of precipitation annually. The average high temperature is 94 degrees in July, and the average low is 18 in December and January (U.S. Climate Data, 2017). According to the NRCS Web Soil Survey, the four project areas are comprised of <1% Riverwash (in Belen 1 and Belen 2) and the remainder Mixed alluvial land. Ecological sites within this project include R042XA055NM Salty Bottomland (USDA NRCS, 2016).

Salty Bottomland can support a range of plant communities which typically include cottonwood, salt cedar, mixed exotics (dominated by Russian olive/ Russian knapweed/ etc.), saltgrass and saltgrass-sacaton, and bottomland grassland (possibly dominated by saltgrass, giant sacaton, dropseed, muhly, burrograss, alkali sacaton, galleta, vinemesquite, and/or tobosa). Typically, the vegetation consists of a shrub/grass mixture characterized by fourwing saltbush and greasewood. Tall, mid-grass, and short grasses are present. Blue grama, foxtail, sand dropseed, spike dropseed, giant dropseed, New Mexico feathergrass and tansymustard are common. When the plant community deteriorates, there is an increase in amounts of shrubs and short grasses (USDA NRCS n.d.).

Pre-treatment monitoring was conducted at these sites on January 12, 2012 and February 7, 2012 as part of a restoration project non-native phreatophytes scheduled for 2011-2012. Post-treatment monitoring was conducted November 18, 2016, December 8, 2016, and December 16, 2016. All sites are located east of the Rio Grande and west of the Lower Peralta Riverside Drain. Sites 1, 2 and 3 are adjacent to one another; site 4 is approximately 0.4 miles north. The project was sponsored by the VSWCD. Restoration goals include enhancing wildlife and removing nonnative woody invasives. A fifth 2011 site, Belen 5, is approximately 0.5 north of Belen 4; this site was not monitored, as treatment began on the site before pre-treatment monitoring had been conducted.

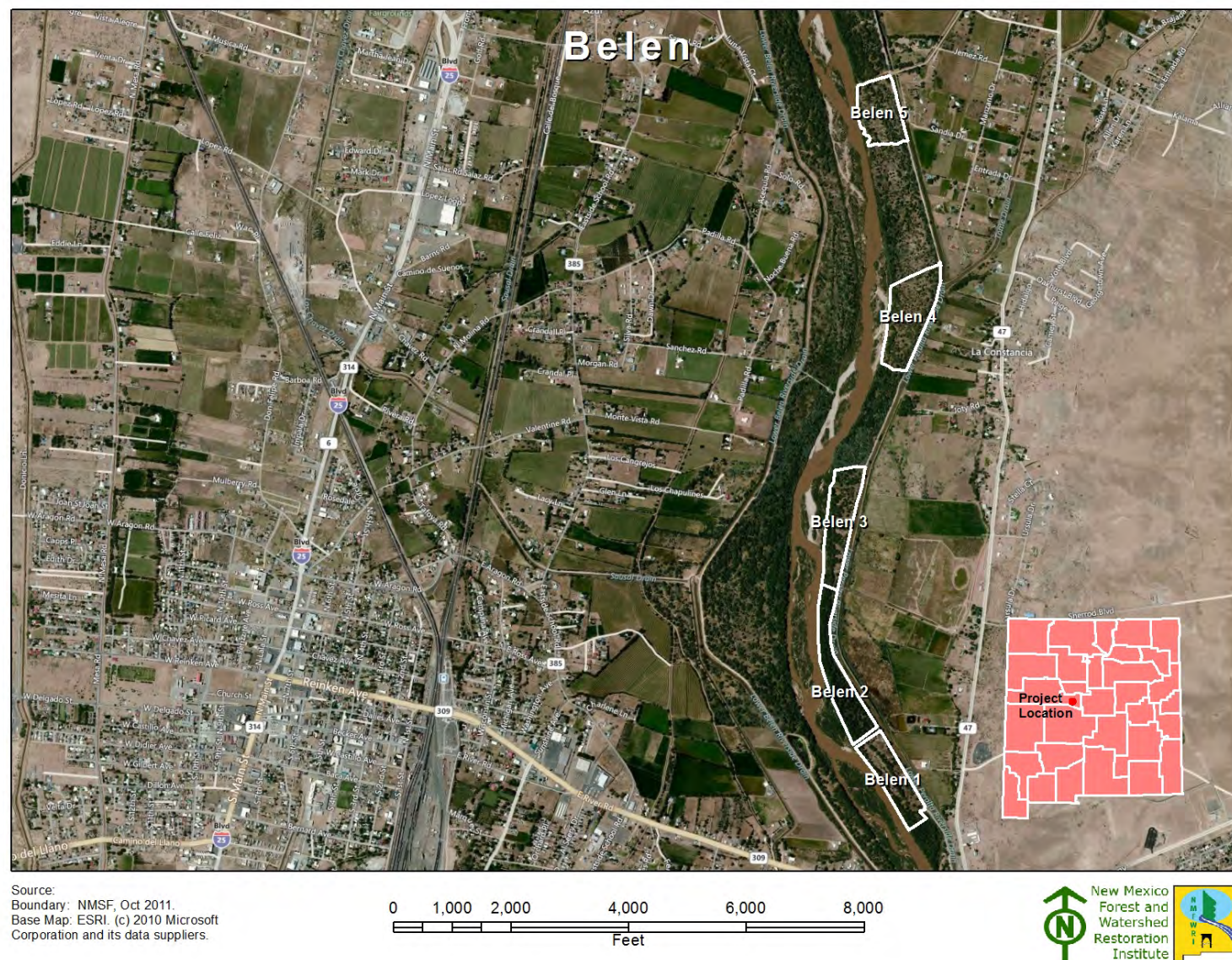


Figure 3. Belen projects in geographic context.

Belen 1

Site Summary

2012 Belen 1 Site observations: The project area is moderately to heavily wooded, with a light to moderately dense, multi-tiered understory. It had been treated in the mid-2000s. Much of the area consists of grassy openings. Since monitoring was done so late in the fall, sparse forb and grasses cover may be attributed to seasonal dormancy. The plots were assessed to fall in Hink & Ohmart Structure Classes 1, 2, and 6.

2016 Belen 1 Site observations: This project had several open areas supporting yerba mansa communities. The southern boundary was clearly marked by a solid wall of salt cedar. Resprouts of target species (salt cedar, Russian olive, Siberian elm) were observed on plots 2, 5 and 6. The plots were assessed to fall in Hink and Ohmart Structure classes 3 and 4.

Cover: Aerial & ground cover was much the same in both years.

	Average Aerial Cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	57%	0%	2%	0%	1%	3%	19%
2016	54%	0%	3%	0%	0%	3%	18%

	Average Ground Cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	85%	2%	0%	0%	0%	n/a
2016	92%	2%	0%	0%	0%	6%

Belen_1 2012 & 2016

Observed plant species

Red plants found in 2012 only

Blue plants found in 2016 only

Green plants found both years

Grasses		Forbs	
Scientific name	Common name	Scientific name	Common name
	Unknown	<i>Anemopsis californica</i>	Yerba mansa
<i>Muhlenbergia asperifolia</i>	Scratchgrass	<i>Aster sp.</i>	Aster
<i>Sporobolus airoides</i>	Alkali Sacaton	<i>Bassia prostrata</i>	Kochia
<i>Sporobolus wrightii</i>	Giant sacaton	<i>Chenopodium album L.</i>	Lambsquarters
		<i>Conyza canadensis</i>	Marestail
		<i>Helianthus annuus L.</i>	Annual sunflower
		<i>Salsola tragus L.</i>	Russian thistle

Shrubs		Trees	
Scientific name	Common name	Scientific name	Common name
<i>Forestiera neomexicana</i>	New Mexico olive	<i>Elaeagnus angustifolia</i>	Russian olive
		<i>Populus deltoides</i>	Rio Grande Cottonwood
		<i>Salix gooddingii</i>	Black willow
		<i>Tamarix ramosissima</i>	Salt cedar
		<i>Ulmus pumila L.</i>	Siberian elm

The majority of the “new” plants observed in 2016 were native species, although kochia and Siberian elm also joined the mix. The target species found in 2012, Russian olive and salt cedar, were still present in 2016, as resprouts. In both years, identification of forb, grasses and some shrub species was impacted by both the plant identification skills of the monitoring team and by the season.



Source:
 Points: NMFWR, January 2012.
 Boundary: NMSF, Oct 2011.
 Base Map: ESRI. (c) 2010 Microsoft
 Corporation and its data suppliers

Figure 4. Belen 1 plots.

Project: Valencia SWCD**Project Unit: Belen 1****Plot: B1_1****B1_1 Aerial & Ground Cover**

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	48%	1%	0%	0%	2%	0%	3%
2016	38%	0%	0%	0%	0%	5%	15%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	95%	2%	0%	0%	0%	n/a
2016	95%	4%	0%	0%	0%	1%

B1_1_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
			Rio Grande Cottonwood

2012 Hink & Ohmart Type: 2**B1_1_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
Alkali Sacaton	Annual sunflower		Rio Grande Cottonwood
	Aster		
	Kochia		
	Lambsquarters		
	Russian thistle		

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type: 2****2012 Comments:** None.**2016 Comments:** BEMP plots visible on-site.

Project: Valencia SWCD**Project Unit: Belen 1****Plot: B1_2****B1_2 Aerial & Ground Cover**

Aerial cover							
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	79%	0%	0%	0%	0%	0%	10%
2016	76%	0%	10%	0%	0%	5%	5%

Ground cover						
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	89%	1%	0%	0%	0%	n/a
2016	90%	0%	0%	0%	0%	10%

B1_2_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
	Yerba mansa		Rio Grande Cottonwood

2012 Hink & Ohmart Type: 2**B1_2_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
	Annual sunflower		Black willow
	Kochia		Rio Grande cottonwood
	Russian thistle		Russian olive
	Yerba mansa		

2016 Hink & Ohmart Type: 3**2016 Modified Hink & Ohmart Type: 1****2012 Comments:** None.**2016 Comments:** None.

Project: Valencia SWCD**Project Unit:** Belen 1**Plot:** B1_3

B1_3 Aerial & Ground Cover

Aerial cover							
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	59%	0%	5%	0%	0%	0%	2%
2016	56%	0%	0%	0%	0%	0%	5%

Ground cover						
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	96%	2%	0%	0%	0%	n/a
2016	95%	0%	0%	0%	0%	5%

B1_3_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
			Rio Grande Cottonwood

2012 Hink & Ohmart Type: 2

B1_3_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
	Annual sunflower		Rio Grande cottonwood
	Kochia		
	Russian thistle		

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type:** 2**2012 Comments:** large down woody debris; masticated & mulched material present**2016 Comments:** open plot, near road

Project: Valencia SWCD**Project Unit:** Belen 1**Plot:** B1_4

B1_4 Aerial & Ground Cover

Aerial cover							
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	26%	0%	0%	0%	0%	0%	95%
2016	12%	0%	5%	0%	0%	0%	75%

Ground cover						
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	5%	0%	0%	0%	0%	n/a
2016	90%	0%	0%	0%	0%	10%

B1_4_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
	Russian thistle		Black willow
	Yerba mansa		

2012 Hink & Ohmart Type: 2/6

B1_4_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Scratch grass	Kochia	New Mexico olive	Rio Grande cottonwood
	Yerba mansa		

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type:** 2**2012 Comments:** None.**2016 Comments:** Abundant circles of yerba mansa.

Project: Valencia SWCD**Project Unit: Belen 1****Plot: B1_5****B1_5 Aerial & Ground Cover**

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	85%	0%	0%	2%	8%	5%	3%
2016	78%	0%	5%	0%	0%	0%	0%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	91%	1%	0%	0%	0%	n/a
2016	95%	0%	0%	0%	0%	5%

B1_5_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
unknown		New Mexico olive	Rio Grande cottonwood
			Russian olive

2012 Hink & Ohmart Type: 1**B1_5_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
Scratch grass	Yerba mansa		Black willow
	Marestail		Rio Grande cottonwood
			Russian olive
			Siberian elm

2016 Hink & Ohmart Type: 3**2016 Modified Hink & Ohmart Type: 1****2012 Comments:** None.**2016 Comments:** BEMP pipes on plots; lots of leaf litter.

Project: Valencia SWCD**Project Unit: Belen 1****Plot: B1_6****B1_6 Aerial & Ground Cover**

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	63%	0%	0%	0%	0%	8%	3%
2016	62%	0%	0%	0%	0%	10%	10%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	89%	0%	0%	0%	0%	n/a
2016	85%	10%	0%	0%	0%	5%

B1_6_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
Giant sacaton			Rio Grande cottonwood
			Russian olive
			Salt cedar

2012 Hink & Ohmart Type: 1/2**B1_6_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
Giant sacaton	Kochia		Salt cedar
			Rio Grande cottonwood
			Russian olive
			Siberian elm

2016 Hink & Ohmart Type: 3**2016 Modified Hink & Ohmart Type: 6****2012 Comments:** None.

2016 Comments: Old road present but not used recently, except perhaps by ORV for recreation. Wall of tall untreated salt cedar to the southwest of the plot.

Belen 2

Site Summary

2012 Belen 2 Site observations: The project area is densely wooded, with an abundance of fallen trees and tree limbs. No shrubs or herbaceous plants were observed in the understory. The site does not show evidence of having been treated. Jetty jacks, joined by cables, also traverse the site in the vicinity of plot B2_1. Since monitoring was done so late in the fall, lack of forb and grasses cover may be attributed to seasonal dormancy. The dense overstory canopy and large amount of coarse woody debris may also contribute to the sparse understory. The plots were assessed to fall in Hink & Ohmart Structure Class 2.

2016 Belen 1 Site observations: This project area was fairly open, with some cottonwood overstory and very little woody understory. Plots 1 and 2 had lots of down wood debris and cottonwood leaves; plots 3 and 4 had lots of kochia which made travel difficult and/or unpleasant. Jetty jacks are present throughout this project, some mostly buried and others full of limbs and debris. A lack of grass may be related to the seasonality, but more likely has to do with the heavy ground cover by other materials. The plots were assessed to fall in Hink and Ohmart classes 2, 4 and 6.

Cover: The average aerial cover for tree canopy dropped by over 30% cover post-treatment; aerial forb cover was much higher. Average ground cover values were comparable.

	Average Aerial Cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	87%	0%	3%	0%	0%	0%	0%
2016	56%	0%	0%	0%	0%	1%	48%

	Average Ground Cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	100%	0%	0%	0%	0%	n/a
2016	94%	4%	0%	0%	0%	3%

Belen_2 2012-2016

Observed plant species

Red plants found in 2012 only

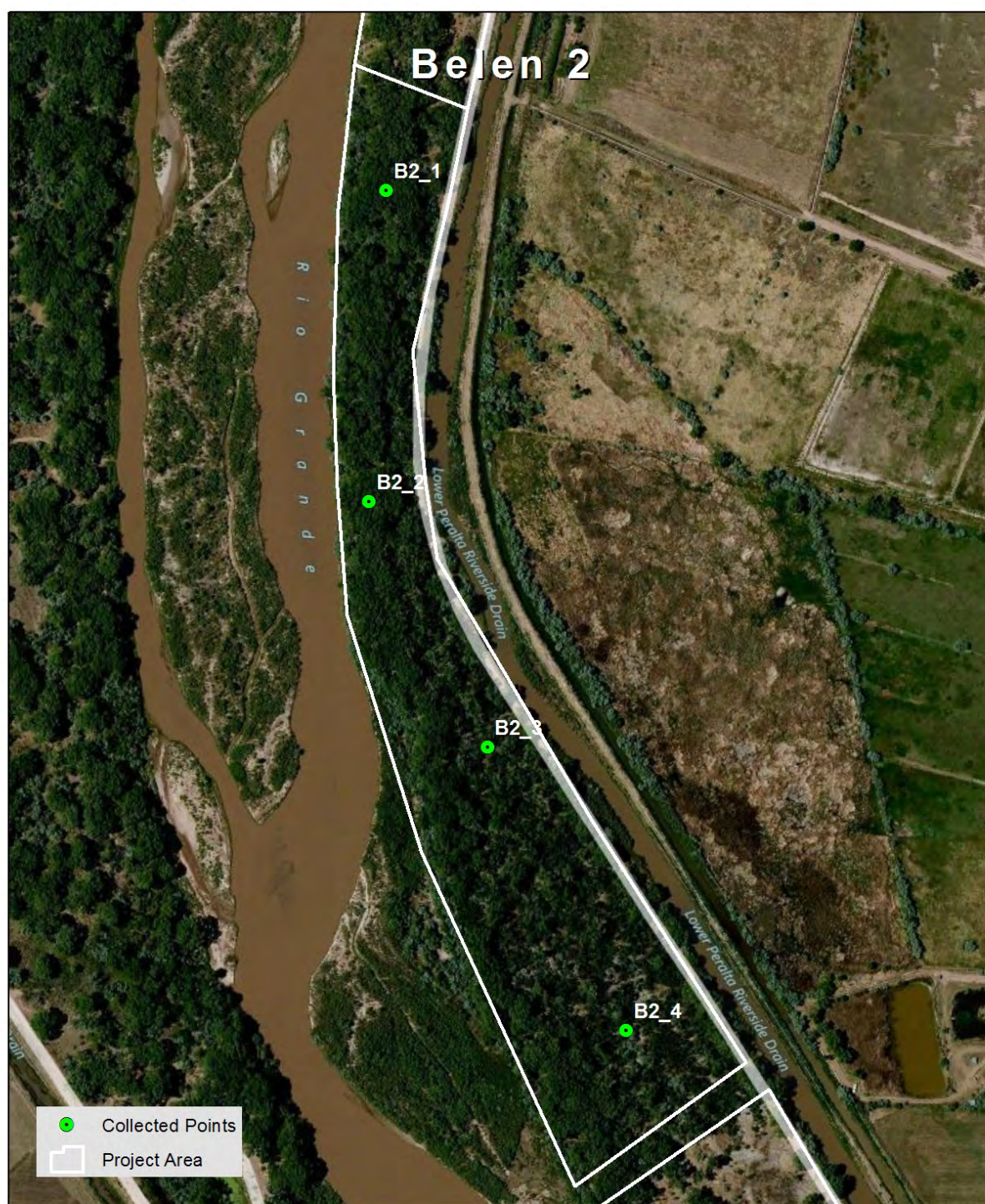
Green plants found both years

Blue plants found in 2016 only

Grasses		Forbs	
Scientific name	Common name	Scientific name	Common name
<i>Calamagrostis sp.</i>	Reed grass	<i>Bassia prostrata</i>	Kochia
		<i>Solanum elaeagnifolium</i>	Silverleaf nightshade

Shrubs		Trees	
Scientific name	Common name	Scientific name	Common name
<i>Baccharis salicina</i>	Seepwillow	<i>Elaeagnus angustifolia</i>	Russian olive
		<i>Populus deltoides</i>	Rio Grande cottonwood
		<i>Tamarix ramosissima</i>	Salt cedar
		<i>Ulmus pumila L.</i>	Siberian elm

At least two of the “new” plants observed in 2016 were native species; two or three were exotics including kochia and Siberian elm (the nativity status of reed grass is not clear). The target species found in 2012, Russian olive and salt cedar, were still present in 2016, as resprouts. In both years, identification of forb, grasses and some shrub species was impacted by both the plant identification skills of the monitoring team and by the season.



Source:
 Points: NMFWR, January 2012.
 Boundary: NMSF, Oct 2011.
 Base Map: ESRI. (c) 2010 Microsoft
 Corporation and its data suppliers

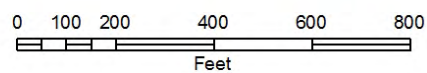


Figure 5. Belen 2 plots.

Project: Valencia SWCD**Project Unit: Belen 2****Plot: B2_1****B2_1 Aerial & Ground Cover**

	Aerial Cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	96%	0%	0%	0%	0%	0%	0%
2016	92%	0%	0%	0%	0%	0%	0%

	Ground Cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	100%	0%	0%	0%	0%	n/a
2016	100%	0%	0%	0%	0%	0%

B2_1_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
			Rio Grande cottonwood
			Russian olive

2012 Hink & Ohmart Type: 2**B2_1_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
			Rio Grande cottonwood
			Russian olive

2016 Hink & Ohmart Type: 2**2016 Modified Hink & Ohmart Type: 2****2012 Comments:** Heavy down woody debris; jetty jacks present.**2016 Comments:** Heavy litter cover with very little vegetation; jetty jacks present, full of branches and wrack.

Project: Valencia SWCD**Project Unit: Belen 2****Plot: B2_2****B2_2 Aerial & Ground Cover**

	Aerial Cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	96%	0%	0%	0%	0%	0%	0%
2016	92%	0%	0%	0%	0%	3%	0%

	Ground Cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	100	0	0	0	0	n/a
2016	95%	5%	0%	0%	0%	1%

B2_2_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
			Rio Grande cottonwood
			Russian olive

2012 Hink & Ohmart Type: 2**B2_2_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
Reed grass			Rio Grande cottonwood
			Russian olive

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type: 2**

2012 Comments: Heavy down woody debris; jetty jacks present. Densiometer was lost so canopy cover was estimated.

2016 Comments: There appears to be an old trail through the plot; jetty jacks are present but mostly buried. Plot is near the river; there is very little vegetation and lots of cover by woody debris and leaves.

Project: Valencia SWCD**Project Unit: Belen 2****Plot: B2_3****B2_3 Aerial & Ground Cover**

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	96%	0%	6%	0%	0%	0%	0%
2016	34%	0%	0%	0%	0%	0%	100%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	100%	0%	0%	0%	0%	n/a
2016	95%	0%	0%	0%	0%	5%

B2_3_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
			Rio Grande cottonwood
			Russian olive
			Salt cedar

2012 Hink & Ohmart Type: 2**B2_3_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
	Kochia	Seepwillow	Rio Grande cottonwood
	Silverleaf nightshade		Russian olive
			Salt cedar
			Siberian elm

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type: 2**

2012 Comments: Heavy down woody debris; jetty jacks present. Densiometer was lost so canopy cover was estimated. Old hummingbird nest found on-site.

2016 Comments: This plot was covered in 6-foot-tall kochia and heavy down woody debris (cottonwoods). Finding flags for plot, and even walking through the plot, was difficult.

Project: Valencia SWCD**Project Unit: Belen 2****Plot: B2_4****B2_4 Aerial & Ground Cover**

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	60%	0%	6%	0%	0%	0%	0%
2016	6%	0%	0%	0%	0%	0%	90%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	99%	1%	0%	0%	0%	n/a
2016	85%	10%	0%	0%	0%	5%

B2_4_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
			Rio Grande cottonwood
			Russian olive
			Salt cedar

2012 Hink & Ohmart Type: 2**B2_4_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
	Kochia		Rio Grande cottonwood
			Russian olive
			Salt cedar

2016 Hink & Ohmart Type: 4/6**2016 Modified Hink & Ohmart Type: 6H**

2012 Comments: Heavy down woody debris; jetty jacks present. Densiometer was lost so canopy cover was estimated. Cottonwood snags present.

2016 Comments: Russian olive slash present on-site; one crew member got Russian olive thorns in his foot through the sole of his boot. The plot was covered in kochia plants 2-4 feet tall; difficult walking.

Belen 3

Site Summary

2012 Belen 3 Site Observations: The project area is moderately wooded, with a light multi-tiered to mostly open, understory. Wetland areas exist in the northern portion of the project area. It had been treated in the mid-2000s. Much of the area consists of grassy openings. Since monitoring was done so late in the fall, sparse forb and grasses cover may be attributed to seasonal dormancy. The plots were assessed to fall in Hink & Ohmart Structure Classes 1, 2, and 3.

2016 Belen 3 Site Observations: This project has a relatively open cottonwood overstory, with many small to midsized Russian olives, as well as a variety of grasses, in the understory. Yerba mansa is also present in the vicinity of plot 3. The plots were assessed to fall into Hink and Ohmart class 4.

Cover: Average tree canopy was basically unchanged five years post-treatment, although slightly more forb and graminoid cover was found. This could be an effect of the seasonality. Average ground cover was comparable.

	Average Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	66%	0%	0%	0%	2%	31%	2%
2016	65%	4%	1%	1%	0%	38%	10%

	Average Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	64%	3%	0%	0%	0%	n/a
2016	72%	8%	0%	0%	0%	20%

Belen_3 2012-2016

Observed plant species

Red plants found in 2012 only

Blue plants found in 2016 only

Green plants found both years

Grasses		Forbs	
Scientific name	Common name	Scientific name	Common name
<i>Carex sp.</i>	Sedges		Unknown
<i>Elymus canadensis L.</i>	Canada wild rye		Unknown thistle
<i>Elymus elymoides</i>	Squirreltail	<i>Anemopsis californica</i>	Yerba mansa
<i>Juncus sp.</i>	Rushes	<i>Aster sp.</i>	Aster
<i>Muhlenbergia asperifolia</i>	Scratchgrass	<i>Chenopodium album L.</i>	Lambsquarters
<i>Panicum obtusum</i>	Vinemesquite grass	<i>Conyza canadensis</i>	Marestail
<i>Sporobolus airoides</i>	Alkali sacaton	<i>Equisetum sp.</i>	Horsetail
<i>Sporobolus wrightii</i>	Giant sacaton	<i>Gaura parviflora</i>	Velvetweed
		<i>Lappula occidentalis</i>	Western Sticktight
		<i>Melilotus sp.</i>	Yellow sweetclover
		<i>Opuntia Mill</i>	Pricklypear
		<i>Solanum elaeagnifolium</i>	Silverleaf nightshade

Shrubs		Trees	
Scientific name	Common name	Scientific name	Common name
<i>Baccharis salicina</i>	Seep willow	<i>Elaeagnus angustifolia</i>	Russian olive
<i>Ribes sp.</i>	Gooseberry	<i>Populus deltoides</i>	Rio Grande cottonwood
<i>Salix exigua</i>	Coyote willow	<i>Tamarix ramosissima</i>	Salt cedar

All 13 of the “new” plants identified in 2016 were additional native species; two species were found, including a thistle, which could not be identified. The 2012 target species found on plot, Russian olive and salt cedar, saw mixed results: salt cedar was not observed in 2016, but Russian olive resprouts were. In both years, identification of forb, grasses and some shrub species was impacted by both the plant identification skills of the monitoring team and by the season.



Source:
Points: NMFWR, February 2012.
Boundary: NMSF, Oct 2011.
Base Map: ESRI. (c) 2010 Microsoft
Corporation and its data suppliers

0 100 200 400 600 800
Feet



Figure 6. Belen 3 plots.

Project: Valencia SWCD**Project Unit: Belen 3****Plot: B3_1****B3_1 Aerial & Ground Cover**

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	10%	0%	0%	0%	5%	87%	5%
2016	56%	2%	3%	3%	0%	80%	10%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	8%	0%	0%	0%	0%	n/a
2016	75%	0%	0%	0%	0%	25%

B3_1_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
Giant sacaton	Yerba mansa	Seep willow	Rio Grande cottonwood
Rushes	Unknown		Russian olive
Sedges			

2012 Hink & Ohmart Type: 2/3**B3_1_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
Alkali sacaton	Equisetum	Seep willow	Rio Grande cottonwood
Canada wild rye	Marestail		Russian olive
Rushes	Yerba mansa		
Scratch grass			
Vine mesquite			

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type: 2/6W****2012 Comments:** Transition area between Hink & Ohmart types 2 and 3; wetland area; gophers present.**2016 Comments:** None.

Project: Valencia SWCD**Project Unit: Belen 3****Plot: B3_2**

B3_2 Aerial & Ground Cover

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	95%	0%	0%	0%	0%	1%	1%
2016	68%	10%	0%	0%	0%	15%	15%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	91%	7%	0%	0%	0%	n/a
2016	60%	10%	0%	0%	0%	30%

B3_2_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
Giant sacaton	Yellow sweet clover	Coyote willow	Rio Grande cottonwood
			Russian olive

2012 Hink & Ohmart Type: 1

B3_2_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Alkali sacaton	Aster		Rio Grande cottonwood
Squirreltail	Kochia		Russian olive
	Lambsquarters		
	Marestail		
	Sticktight		
	Unknown thistle		
	Velvet gaura		

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type: 2****2012 Comments:** Porcupine sign; old beaver sign.**2016 Comments:** Old beaver sign (large stumps) on plot; lots of down woody debris.

Project: Valencia SWCD**Project Unit:** Belen 3**Plot:** B3_3

B3_3 Aerial & Ground Cover

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	93%	0%	0%	0%	0%	4%	0%
2016	72%	0%	0%	1%	0%	20%	5%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	94%	2%	0%	0%	0%	n/a
2016	80%	15%	0%	0%	0%	5%

B3_3_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
Giant sacaton	Pricklypear cactus		Rio Grande cottonwood
			Russian olive
			Salt cedar

2012 Hink & Ohmart Type: 2

B3_3_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Alkali sacaton	Aster	Gooseberry	Rio Grande cottonwood
Canada wild rye	Kochia		
	Marestail		
	Pricklypear cactus		
	Silverleaf nightshade		
	Velvet gaura		

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type:** 2**2012 Comments:** Very open understory.**2016 Comments:** This is the nearest plot to the river; also near the road. This site has lots of bare ground and trash.

Belen 4

Site Summary

2012 Belen 4 Site Observations: The project area is moderately to lightly wooded, with a light multi-tiered to mostly open, understory. Wetland areas exist in the northern portion of the project area. It had been treated in the mid-2000s. Much of the area consists of grassy openings and scattered trees and shrubs. The soil is moist in some areas. Portions of the area are sandy with hummocks and salt on the surface. There is evidence of possible historic stream channels. Since monitoring was done so late in the fall, sparse forb and grasses cover may be attributed to seasonal dormancy. The plots were assessed to fall in Hink & Ohmart Structure Classes 2, 5, and 6.

2016 Belen 4 Site Observations: This project has a tall cottonwood overstory with a more open understory, although tall grasses have become a noticeable part of the community. Jetty jacks were found on plots 1 and 3. Otherwise bare areas are covered in cottonwood duff. Plots were assessed to fall into Hink and Ohmart class 4.

Cover: Average tree canopy was basically unchanged five years post-treatment, although more forb and graminoid cover was found. This could be an effect of the seasonality. Average ground cover was comparable.

	Average Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	50%	1%	2%	5%	0%	38%	1%
2016	51%	3%	5%	8%	0%	77%	4%

	Average Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	58%	3%	0%	0%	0%	n/a
2016	63%	5%	0%	0%	0%	32%

Belen_4 2012-2016

Observed plant species

Red plants found in 2012 only

Green plants found both years

Blue plants found in 2016 only

Grasses		Forbs	
Scientific name	Common name	Scientific name	Common name
<i>Muhlenbergia repens</i>	Creeping muhly		Unknown fabaceae
<i>Panicum obtusum</i>	Vine mesquite	<i>Ambrosia artemisiifolia</i>	Ragweed
<i>Sporobolus airoides</i>	Alkali sacaton	<i>Anemopsis californica</i>	Yerba mansa
<i>Sporobolus flexuosus</i>	Mesa dropseed	<i>Artemisia ludoviciana</i>	White sagebrush
<i>Sporobolus giganteus</i>	Giant dropseed	<i>Bassia prostrata</i>	Kochia
<i>Saccharum ravennae</i>	Ravennagrass	<i>Conyza canadensis</i>	Marestail
		<i>Helianthus annuus L.</i>	Annual sunflower
		<i>Yucca sp.</i>	Yucca

Shrubs		Trees	
Scientific name	Common name	Scientific name	Common name
<i>Baccharis sp.</i>	Willow	<i>Elaeagnus angustifolia</i>	Russian olive
<i>Forestiera neomexicana</i>	New Mexico olive	<i>Populus deltoides</i>	Rio Grande cottonwood
<i>Lycium spp.</i>	Wolfberry	<i>Salix gooddingii</i>	Black willow
<i>Prosopis pubescens</i>	Screwbean mesquite	<i>Tamarix ramosissima</i>	Salt cedar

The majority of the “new” plants identified in 2016 were additional native species; kochia and ravennagrass also joined the community as exotics, although it is likely ravennagrass was simply misidentified in 2012. One species was not identified. The 2012 target species found on plot, Russian olive and salt cedar, were both still present post-treatment as resprouts. In both years, identification of forb, grasses and some shrub species was impacted by both the plant identification skills of the monitoring team and by the season.



Source:
Points: NMFWR, Feb 2012.
Boundary: NMSF, Oct 2011.
Base Map: ESRI. (c) 2010 Microsoft Corporation and its data suppliers

Figure 7. Belen 4 plots.

Project: Valencia SWCD**Project Unit: Belen 4****Plot: B4_1****B4_1 Aerial & Ground Cover**

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	46%	0%	3%	15%	0%	20%	3%
2016	45%	5%	5%	25%	1%	75%	2%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	69%	8%	0%	0%	0%	n/a
2016	50%	5%	0%	0%	0%	45%

B4_1_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
Alkali sacaton	Annual sunflower	Screwbean mesquite	Rio Grande cottonwood
Mesa dropseed	White sagebrush	Wolfberry	Russian olive
Vinemesquite grass	Yucca		Salt cedar

2012 Hink & Ohmart Type: 2**B4_1_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
Alkali sacaton	Kochia	Wolfberry	Rio Grande cottonwood
Dropseed	Marestail		Russian olive
	Ragweed		Salt cedar
	Sunflower		

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type: 2****2012 Comments:** Jetty jacks present on site. Very sandy with open hummocks and patches of salt crust.**2016 Comments:** This plot is near and crossed by jetty jacks.

Project: Valencia SWCD**Project Unit: Belen 4****Plot: B4_2****B4_2 Aerial & Ground Cover**

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	69%	1%	2%	0%	0%	3%	0%
2016	59%	5%	10%	0%	0%	75%	5%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	96%	1%	0%	0%	0%	n/a
2016	60%	5%	0%	0%	0%	35%

B4_2_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
Creeping muhly	White sagebrush	Willow	Rio Grande cottonwood
Giant dropseed			Russian olive
Vinemesquite grass			Salt cedar

2012 Hink & Ohmart Type: 2**B4_2_2016 Species Observed**

Grasses	Forbs	Shrubs	Trees
Creeping muhly	Ragweed	Wolfberry	Rio Grande cottonwood
Ravennagrass (?)	Unknown fabaceae		Russian olive
			Salt cedar

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type: 2****2012 Comments:** Coarse woody debris; swale; possible old channel. Open understory.**2016 Comments:** In photos, center photo was mislabeled on whiteboard.

Project: Valencia SWCD**Project Unit:** Belen 4**Plot:** B4_3

B4_3 Aerial & Ground Cover

	Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	36%	1%	0%	0%	0%	90%	0%
2016	48%	0%	0%	0%	0%	80%	5%

	Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	10%	0%	0%	0%	0%	n/a
2016	80%	5%	0%	0%	0%	15%

B4_3_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
Giant dropseed	Yerba mansa	New Mexico olive	Rio Grande cottonwood
Vinemesquite grass		Willow	Russian olive
			Salt cedar

2012 Hink & Ohmart Type: 2/5/6

B4_3_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Vinemesquite grass	Ragweed	Willow	Black willow
Dropseed	Yerba mansa		Rio Grande cottonwood
Ravennagrass			Russian olive
			Salt cedar

2016 Hink & Ohmart Type: 4**2016 Modified Hink & Ohmart Type:** 2

2012 Comments: Transition area between Hink and Ohmart classes. Swale/wetland area with possible historic channels; generally damp soil.

2016 Comments: More open than other plots.

Next steps (monitoring)

Continuing forward, the goal of the GRGWA/ NMFWR is that all sites will be revisited for post-treatment monitoring in 5-year intervals. It is our intention and expectation that the data collected in these intervals will reflect any significant changes in disturbance and ecological function of the site.

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Appendix I – Plot Coordinates Table

Plot_Name	Latitude	Longitude
B1_1	34.6598	-106.7420
B1_2	34.6593	-106.7410
B1_3	34.6583	-106.7410
B1_4	34.6577	-106.7400
B1_5	34.6568	-106.7400
B1_6	34.6566	-106.7390
B2_1	34.6667	-106.7450
B2_2	34.6646	-106.7450
B2_3	34.6630	-106.7440
B2_4	34.6611	-106.7430
B3_1	34.6721	-106.7440
B3_2	34.6700	-106.7450
B3_3	34.6684	-106.7450
B4_1	34.6811	-106.7400
B4_2	34.6799	-106.7410
B4_3	34.6784	-106.7410

Appendix II - Modified Hink and Ohmart categories, from NMRAM

The following is pages 39-41 in Muldavin et al.'s 2014 NMRAM for Montane Riverine Wetlands v 2.0 Manual (draft, not yet published)

Vegetation Vertical Structure Type Definitions for NMRAM

Multiple-Story Communities (Woodlands/Forests)



Type 1 – High Structure Forest with a well-developed understory.

Tall mature to intermediate-aged trees (>5 m [>15 feet]) with canopy covering >25% of the area of the community (polygon) and understory layer (0-5 m [0-15 feet]) covering >25% of the area of the community (polygon). Substantial foliage is in all height layers. (This type incorporates Hink and Ohmart structure types 1 and 3.) Photograph on Gila River by Y. Chauvin, 2012.



Type 2 –Low Structure Forest with little or no understory.

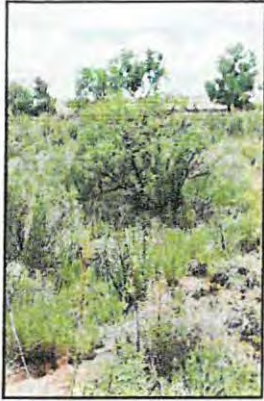
Tall mature to intermediate-aged trees (>5 m [>15 feet]) with canopy covering >25% of the area of the community (polygon) and understory layer (1-5 m [3-15 feet]) covering <25% of the area of the community (polygon). Majority of foliage is over 5 m (15 feet) above the ground. (This type incorporates Hink and Ohmart structure types 2 and 4.) Photograph on Diamond Creek by Y. Chauvin, 2012.

Single-story Communities (Shrublands, Herbaceous and Bare Ground)



Type 5 –Tall Shrub Stands.

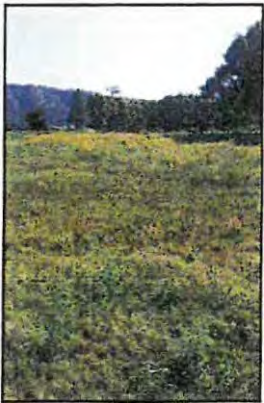
Young tree and shrub layer only (15-5 m [4.5-15 feet]) covering >25% of the area of the community (polygon). Stands dominated by tall shrubs and young trees, may include herbaceous vegetation underneath the woody vegetation. Photograph on San Francisco River by Y. Chauvin, 2012.

**Type 6S-Short Shrub Stands.**

Short stature shrubs or very young shrubs and trees (up to 1.5 m [up to 4.5 feet]) covering >10% of the area of the community (polygon). Stands dominated by short woody vegetation, may include herbaceous vegetation underneath the woody vegetation. Photograph on Lower Pecos River by E. Lindahl, 2008.

**Type 6W-Herbaceous Wetland.**

Herbaceous wetland vegetation covering >10% of the area of the community (polygon). Stands dominated by obligate wetland herbaceous species. Woody species absent, or <10% cover. Photograph of *Carex nebrascensis* meadow on upper Rio Santa Barbara by Y. Chauvin, 2009.

**Type 6H-Herbaceous.**

Herbaceous vegetation covering >10% of the area of the community (polygon). Stands dominated by herbaceous vegetation of any type except obligate wetland species. Woody species absent or <10% cover. Photograph on Diamond Creek by Y. Chauvin, 2012.



Type 7–Sparse Vegetation/Bare Ground.

Bare ground, may include sparse woody or herbaceous vegetation, but total vegetation cover <10%. May be natural in origin (cobble bars) or anthropogenic in origin (graded or plowed earth) Photograph on Lower Gila River by Y. Chauvin, 2012.

Appendix III – Sample Datasheet

GRGWA 2011 Revisit Data Sheet

Project:
Project Unit:
Plot Number:
Lat (dd.dddd): _____ Long (ddd.dddd): _____ Elevation: _____ ft

Date: _____
Time: _____

Plot size: 1/100th ac for understory ("small plot")
1/10th ac for overstory

Small plot
(1/100th ac)

Large plot
(1/10th ac)

Aerial cover												
Cover % - Taken from/within small plot only												
Tree canopy (use densiometer facing out at 11'9" flags)	Seedlings <5' (estimate aerial cover)	Saplings 5-15' (estimate aerial cover)	Shrubs <5' (estimate aerial cover)	Shrubs 5-15' (estimate aerial cover)	Graminoid (estimate aerial cover)	Forb (estimate aerial cover)	Litter (estimate ground cover)	Bare soil (estimate ground cover)	Rock (estimate ground cover)	Gravel (estimate ground cover)	Water or wet soil (estimate ground cover)	Plant Base/ Stem Lest- ground cover

Hink & Ohmart structural class for entire 1/10th ac plot (unmodified, see back):

Hink & Ohmart modified structural class for entire 1/10th ac plot (see NMRA):

Species Observed in 1/10th ac plot (scientific name, common name, or USDA PLANTS code)

Grasses	Forbs	Shrubs	Trees

Photopoints needed (with whiteboard):

- PC showing whiteboard with name clearly legible
- North facing Center – 66'
- PC north to 11'9"
- PC east to 11'9"
- PC south to 11'9"
- PC west to 11'9"

Comments/Observations:

Unmodified Hink & Ohmart
(courtesy of SWCA)

Appendix IV – Photo Pages

See the attached photo comparison pages for each site.

5-year Photo Comparisons for Belen1, 6 plots

VSWCD: Belen1

2011/2012 photos: taken January 12, 2012 by Joe Zebrowski, NMFWRI

2016/2017 photos: taken Dec 16, 2016 by Kathryn Mahan & Christopher Martinez, NMFWRI

Contact:

Kathryn Mahan, Ecological Monitoring Specialist, NMFWRI

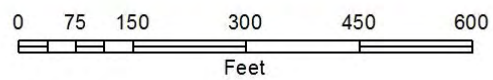
Office: 505.426.217

Cell: 620.288.0333

Email: krmahan@nmhu.edu



Source:
Points: NMFWR, January 2012.
Boundary: NMSF, Oct 2011.
Base Map: ESRI. (c) 2010 Microsoft
Corporation and its data suppliers





B1_1C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B1_1N, facing north from center (2012 above, 2016 below)





B1_1E, facing east from plot center (2012 above, 2016 below)





B1_1S, facing south from center (2012 above, 2016 below)





B1_1W, facing west from center (2012 above, 2016 below)





B1_2C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B1_2N, facing north from plot center (2012 above, 2016 below)





B1_2E, facing east from center (2012 above, 2016 below)





B1_2S, facing south from plot center (2012 above, 2016 below)





B1_2W, facing west from center (2012 above, 2016 below)





B1_3C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B1_3N, facing north from center (2012 above, 2016 below)





B1_3E, facing east from center (2012 above, 2016 below)





B1_3S, facing south from center (2012 above, 2016 below)





B1_3W, facing west from center (2012 above, 2016 below)





B1_4C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B1_4N, facing north from center (2012 above, 2016 below)





B1_4E, facing east from center (2012 above, 2016 below)





B1_4S, facing south from center (2012 above, 2016 below)





B1_4W, facing west from center (2012 above, 2016 below)





B1_5C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B1_5N, facing north from center (2012 above, 2016 below)





B1_5E, facing east from center (2012 above, 2016 below)





B1_5S, facing south from center (2012 above, 2016 below)





B1_5W, facing west from center (2012 above, 2016 below)





B1_6C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B1_6N, facing north from center (2012 above, 2016 below)





B1_6E, facing east from center (2012 above, 2016 below)





B1_6S, facing south from center (2012 above, 2016 below)





B1_6W, facing west from center (2012 above, 2016 below)



5-year Photo Comparisons for Belen2, 4 plots

VSWCD: Belen2

2011/2012 photos: taken January 12, 2012 by Joe Zebrowski, NMFWRI

2016/2017 photos: taken Dec 16, 2016 by Kathryn Mahan & Christopher Martinez, NMFWRI

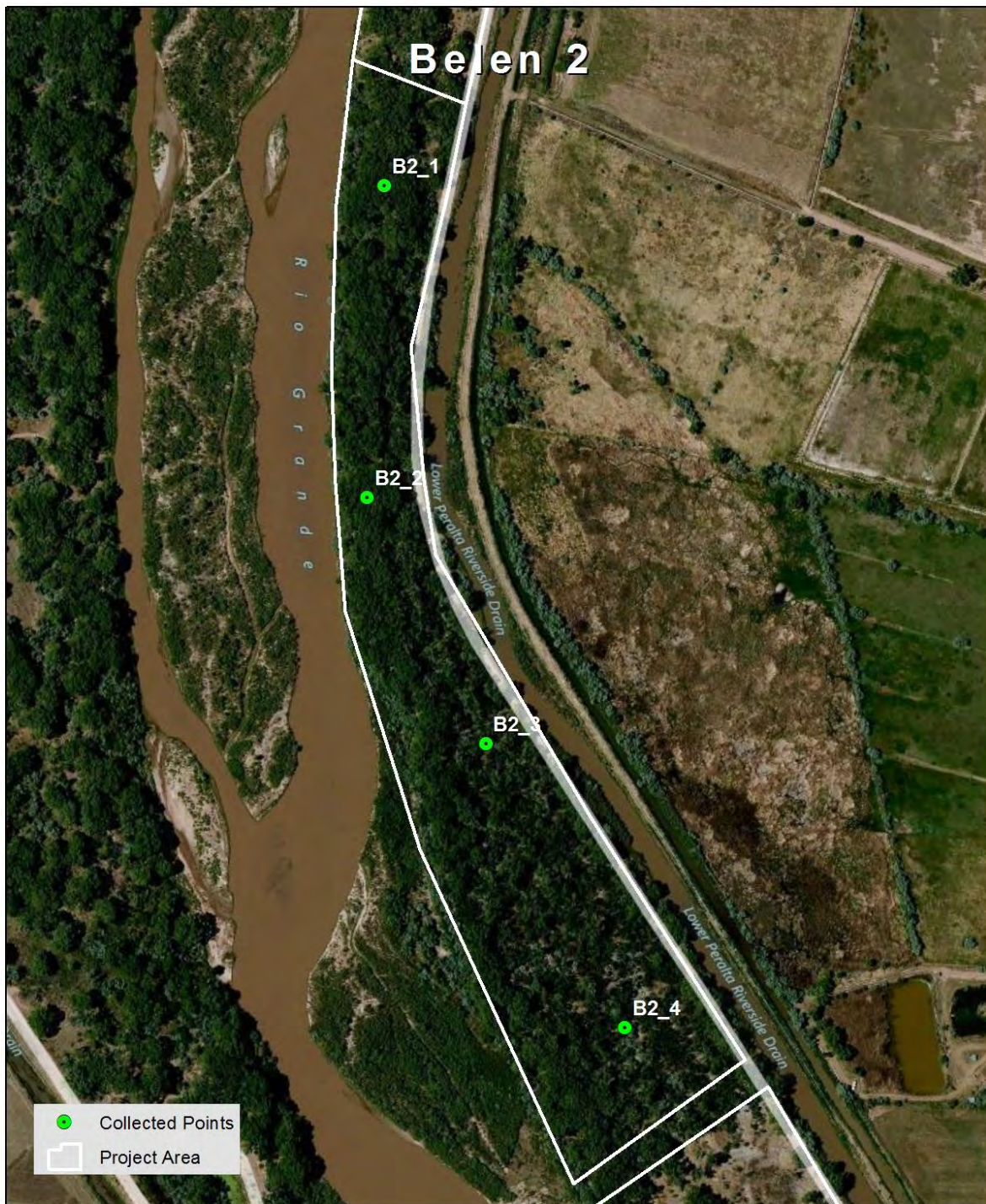
Contact:

Kathryn Mahan, Ecological Monitoring Specialist, NMFWRI

Office: 505.426.217

Cell: 620.288.0333

Email: krmahan@nmhu.edu



Source:
Points: NMFWR, January 2012.
Boundary: NMSF, Oct 2011.
Base Map: ESRI. (c) 2010 Microsoft
Corporation and its data suppliers

0 100 200 400 600 800
Feet





B2_1C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B2_1N, facing north from center (2012 above, 2016 below)





B2_1E, facing east from plot center (2012 above, 2016 below)





B2_1S, facing south from center (2012 above, 2016 below)





B2_1W, facing west from center (2012 above, 2016 below)





B2_2C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B2_2N, facing north from plot center (2012 above, 2016 below)





B2_2E, facing east from center (2012 above, 2016 below)





B2_2S, facing south from plot center (2012 above, 2016 below)





B2_2W, facing west from center (2012 above, 2016 below)





B2_3C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B2_3N, facing north from center (2012 above, 2016 below)





B2_3E, facing east from center (2012 above, 2016 below)





B2_3S, facing south from center (2012 above, 2016 below)





B2_3W, facing west from center (2012 above, 2016 below)





B2_4C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B2_4N, facing north from center (2012 above, 2016 below)





B2_4E, facing east from center (2012 above, 2016 below)





B2_4S, facing south from center (2012 above, 2016 below)





B2_4W, facing west from center (2012 above, 2016 below)



5-year Photo Comparisons for Belen3, 3 plots

VSWCD: Belen3

2011/2012 photos: taken February 7, 2012 by Joe Zebrowski, NMFWRI

2016/2017 photos: taken Dec 16, 2016 by Kathryn Mahan & Christopher Martinez, NMFWRI

Contact:

Kathryn Mahan, Ecological Monitoring Specialist, NMFWRI

Office: 505.426.217

Cell: 620.288.0333

Email: krmahan@nmhu.edu



Source:
Points: NMFWR, February 2012.
Boundary: NMSF, Oct 2011.
Base Map: ESRI. (c) 2010 Microsoft
Corporation and its data suppliers

0 100 200 400 600 800
Feet



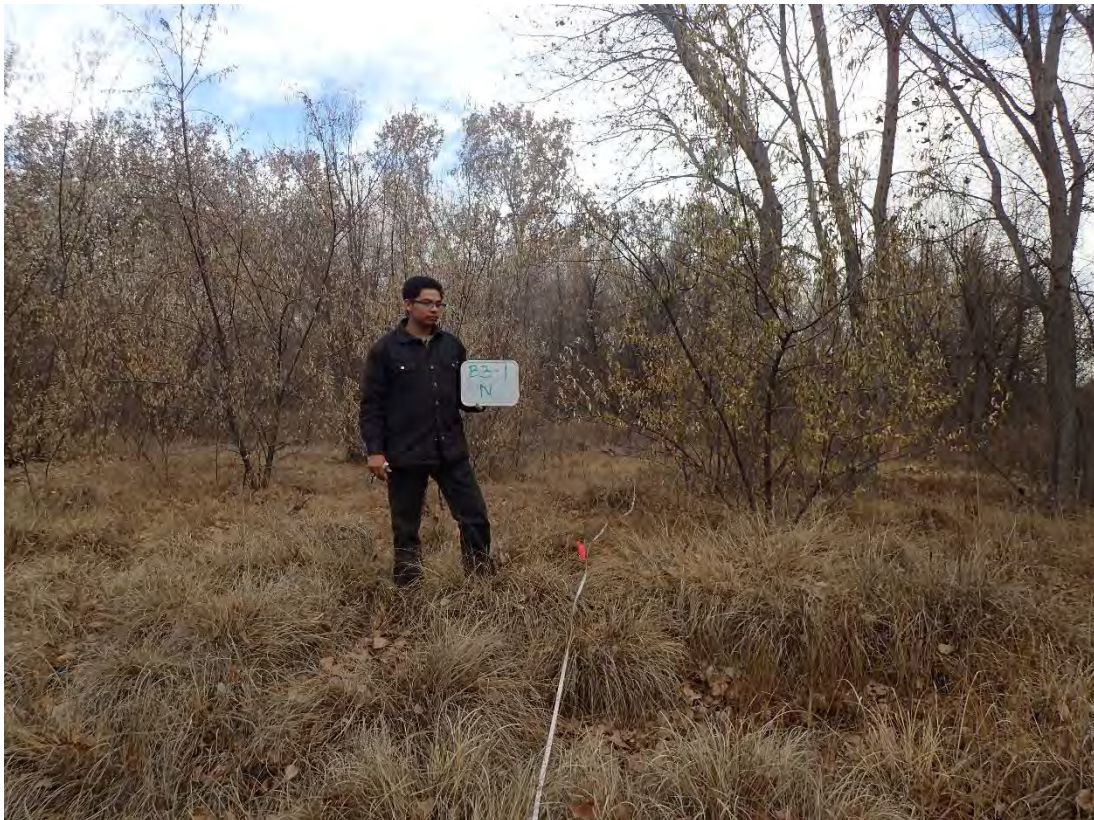


B3_1C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B3_1N, facing north from center (2012 above, 2016 below)





B3_1E, facing east from plot center (2012 above, 2016 below)





B3_1S, facing south from center (2012 above, 2016 below)





B3_1W, facing west from center (2012 above, 2016 below)





B3_2C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B3_2N, facing north from plot center (2012 above, 2016 below)





B3_2E, facing east from center (2012 above, 2016 below)





B3_2S, facing south from plot center (2012 above, 2016 below)





B3_2W, facing west from center (2012 above, 2016 below)





B3_3C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B3_3N, facing north from center (2012 above, 2016 below)





B3_3E, facing east from center (2012 above, 2016 below)





B3_3S, facing south from center (2012 above, 2016 below)





B3_3W, facing west from center (2012 above, 2016 below)



5-year Photo Comparisons for Belen4, 3 plots

VSWCD: Belen4

2011/2012 photos: taken February 7, 2012 by Joe Zebrowski, NMFWRI

2016/2017 photos: taken Dec 16, 2016 by Kathryn Mahan & Christopher Martinez, NMFWRI

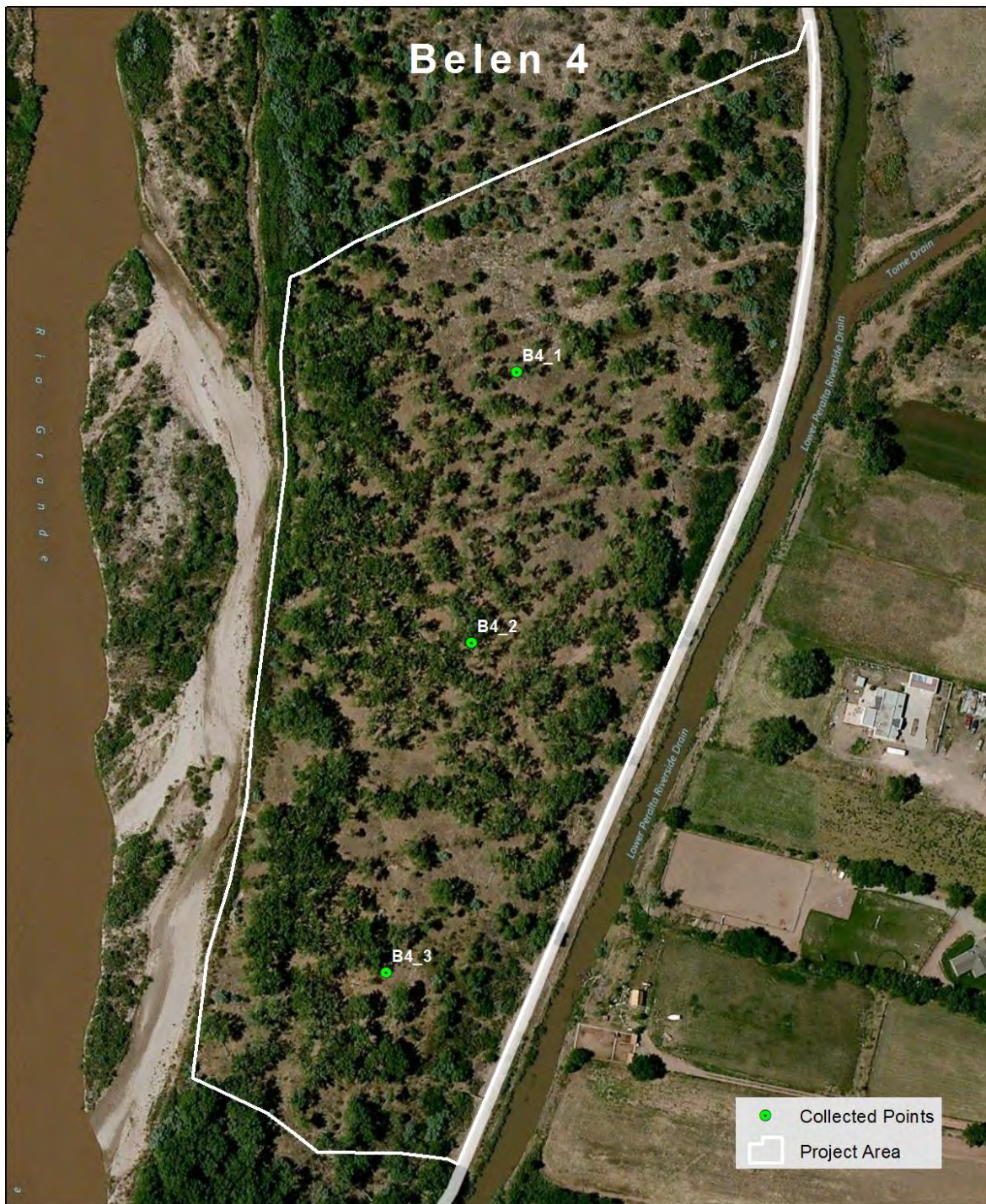
Contact:

Kathryn Mahan, Ecological Monitoring Specialist, NMFWRI

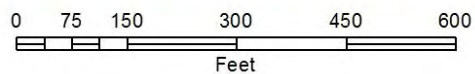
Office: 505.426.217

Cell: 620.288.0333

Email: krmahan@nmhu.edu



Source:
 Points: NMFWR, Feb 2012.
 Boundary: NMSF, Oct 2011.
 Base Map: ESRI. (c) 2010 Microsoft
 Corporation and its data suppliers





B4_1C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B4_1N, facing north from center (2012 above, 2016 below)





B4_1E, facing east from plot center (2012 above, 2016 below)





B4_1S, facing south from center (2012 above, 2016 below)





B4_1W, facing west from center (2012 above, 2016 below)





B4_2C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B4_2N, facing north from plot center (2012 above, 2016 below)





B4_2E, facing east from center (2012 above, 2016 below)





B4_2S, facing south from plot center (2012 above, 2016 below)





B4_2W, facing west from center (2012 above, 2016 below)





B4_3C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)





B4_3N, facing north from center (2012 above, 2016 below)





B4_3E, facing east from center (2012 above, 2016 below)





B4_3S, facing south from center (2012 above, 2016 below)





B4_3W, facing west from center (2012 above, 2016 below)

