Valencia SWCD Los Lunas Bridge - Belen

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

Contents

Acronyms and Abbreviations

Acronym, Abbreviation, or Term	Explanation or Definition as used by NMFWRI
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
NMFWRI	New Mexico Forest and Watershed Restoration Institute
NMHU	New Mexico Highlands University
NMRAM	New Mexico Rapid Assessment Method, version 2.0
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 has 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 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

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

Four Bosque Ecological Monitoring Program (BEMP) monitoring sites were located within the site: LL_1, LL_2, LL_3 and LL_4. The points followed a line northeast to southwest on the west side of the Rio Grande, between the levee road and drain. These sites were likely disturbed during the treatment activity. GRGWA monitoring now strives to integrate BEMP monitoring into the overall project monitoring scheme.

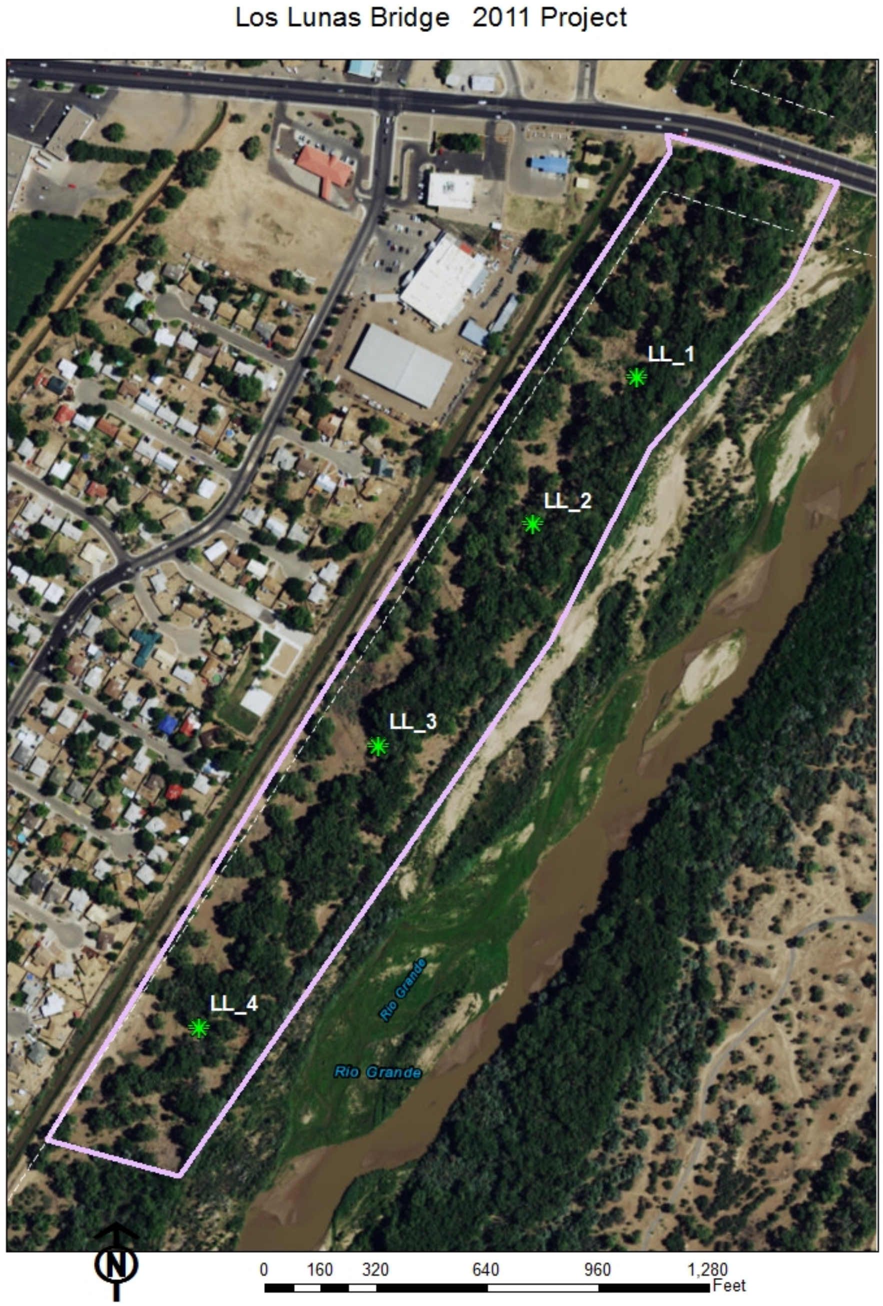


Figure 2. BEMP sites present on the Los Lunas Bridge project.

Los Lunas Bridge Project

The project is located within Valencia County, NM, east of the city of Los Lunas (see Figure 1 below). It is on the west side of the Rio Grande, between the levee road and drain.

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 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 this site on January 30, 2012 as part of a restoration project non-native phreatophytes scheduled for 2011-2012. Post-treatment monitoring was conducted December 18, 2016; all sites are located on the west side of the Rio Grande, between the levee road and drain. The project was sponsored by the VSWCD. Restoration goals include enhancing wildlife and removing nonnative woody invasives.

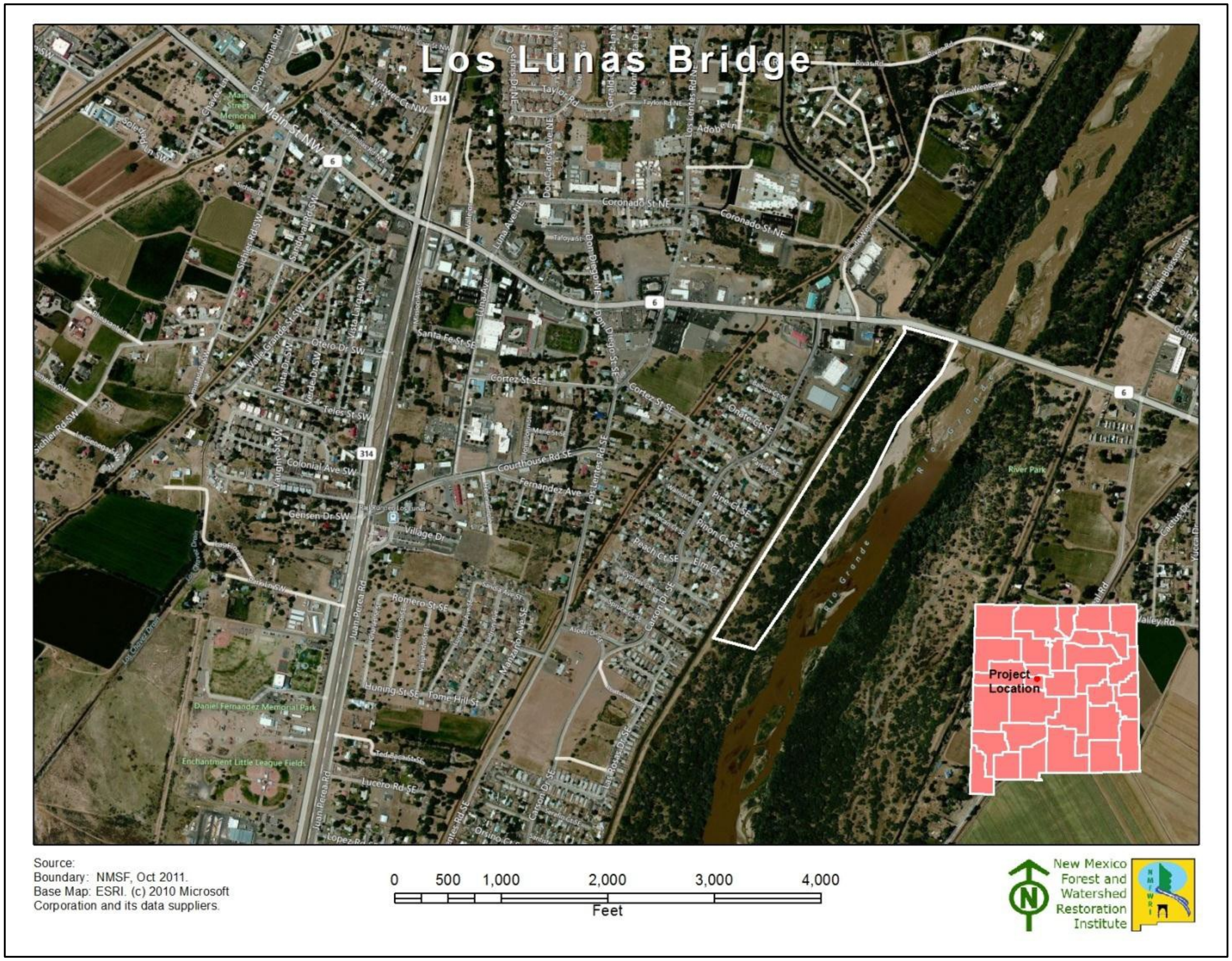


Figure 3. Los Lunas Bridge projects in geographic context.

Site Summary

2012 Los Lunas Bridge Site observations:

The project area is moderately wooded, with a light, multi-tiered understory. It had been treated in the mid-2000s. Much of the area consists of grassy openings. Large downed woody debris and masticated material was present throughout the site. Rows of jetty jacks, joined by cables, also traverse the site in several locations. 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 and 4. Identification of forb, grasses and some shrub species was also impacted by the limited plant identification skills of the monitoring team and by the season. Treatment by the NM Inmate Work Crew had already started in the northern portion of the project area; however, this did not affect the sampling sites.

2016 Los Lunas Bridge Site observations:

Tansyaster, silverleaf nightshade, coyote willow and Rio Grande cottonwood are some of the native species recorded in both 2012 and 2016. One of the target species, Russian olive, was present on plots both years, while Siberian elm and Salt cedar, were new additions in 2016. The plots were assessed to fall in Hink & Ohmart Structure Classes 2, 4 and 5. Identification of forb, grasses and some shrub species was also impacted by the limited plant identification skills of the monitoring team and by the season.

Cover: Aerial cover was greater in 2016, while ground cover was nearly 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	49	0	1	0	1	23	1
2016	66	1	2	3	3	24	14

	Average Ground Cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	76	4	0	0	0	0
2016	80	3	0	3	0	0

Los Lunas Bridge 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		Unknown
Elymus canadensis L.	Canada wild rye	*Conyza canadensis*	Marestail
Elymus elymoides	Squirreltail grass	*Helianthus annuus L.*	Sunflower
Panicum obtusum	Vinemesquite grass	*Psilactis asteroides*	Tansyaster
Sporobolus airoides	Alkali Sacaton	*Ratibida columnaris*	Mexican hat
Sporobolus contractus	Spike dropseed	*Salsola tragus L.*	Russian thistle
Thinopyrum intermedium	Intermediate wheatgrass	*Solanum elaeagnifolium*	Silverleaf nightshade

Shrubs		Trees	
Scientific name	**Common name**	***Scientific name***	**Common name**
Forestiera neomexicana	New Mexico olive	*Elaeagnus angustifolia*	Russian olive
Salix exigua	Coyote willow	*Populus deltoides*	Rio Grande Cottonwood
		Tamarix ramosissima	Salt cedar
		Ulmus pumila L.	Siberian elm

The majority of the "new" plants observed in 2016 were native species, although Russian thistle joined the herbaceous understory. Of the target species, Russian olive was present both years, and salt cedar and Siberian elm appeared in measurements in 2016. 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.

Figure 4. Los Lunas Bridge Plots

***Project**: Valencia SWCD* ***Project Unit**: Los Lunas Bridge* ***Plot**: LL_1*

LL_1 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2012	42%	0%	0%	0%	2%	0%	0%
2016	54%	0%	0%	5%	10%	5%	5%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2012	98%	2%	0%	0%	0%	n/a
2016	95%	0%	0%	0%	0%	5%

LL_1_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
		Coyote willow	Rio Grande Cottonwood
		New Mexico olive	Russian olive

2012 Hink & Ohmart Type: 2

LL_1_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Intermediate wheatgrass	Unknown forb	Coyote willow	Rio Grande Cottonwood
	Marestail		Russian olive

2016 Hink & Ohmart Type: 5 **2016 Modified Hink & Ohmart Type**: 5

2012 Comments: Masticated /mulched material present

2016 Comments: Center photo taken at 37 ft. due to limited visibility – coyote willow dominated the area. Yerba mansa was nearby. Terrain was uneven.

***Project**: Valencia SWCD* ***Project Unit**: Los Lunas Bridge* ***Plot**: LL_2*

LL_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%

LL_2_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
			Russian olive
			Rio Grande Cottonwood

2012 Hink & Ohmart Type: 4

LL_2_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Vine mesquite	Unknown	Coyote willow	Rio Grande Cottonwood
	Mexican hat		Russian olive
			Salt cedar

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

2012 Comments: Large down woody debris, masticated material and jetty jacks in the area.

2016 Comments: None

***Project**: Valencia SWCD* ***Project Unit**: Los Lunas Bridge* ***Plot**: LL_3*

LL_3 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2012	42%	0%	0%	1%	1%	45%	1%
2016	62%	0%	5%	5%	0%	50%	40%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2012	54%	0%	0%	0%	0%	n/a
2016	65%	5%	0%	0%	0%	30%

LL_3_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
	Tansyaster	Coyote willow	Rio Grande Cottonwood
	Silverleaf nightshade		Russian olive

2012 Hink & Ohmart Type: 4

LL_3_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Vinemesquite grass	Mexican hat	Coyote willow	Siberian elm
unknown	Silverleaf nightshade		Rio Grande Cottonwood
			Russian olive

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

2012 Comments: large down woody debris and masticated material present.

2016 Comments: Very good litter cover, four wing saltbush nearby.

***Project**: Valencia SWCD* ***Project Unit**: Los Lunas Bridge* ***Plot**: LL_4*

LL_4 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2012	58%	0%	1%	0%	0%	45%	2%
2016	72%	0%	%	0%	0%	25%	10%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2012	53%	10%	0%	0%	0%	n/a
2016	60%	5%	0%	10%	0%	25%

LL_4_2012 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
Unknown	Sunflower	Coyote willow	Rio Grande Cottonwood
		New Mexico olive	

2012 Hink & Ohmart Type: 5

LL_4_2016 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
Alkali sacaton	Russian thistle		Rio Grande Cottonwood
Canada wild rye			Russian olive
Spike dropseed			Salt cedar
Squirreltail			

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

2012 Comments: Large down woody debris and some masticated/mulched material present.

2016 Comments: none.

Next steps (monitoring)

From here on out, the goal of the GRGWA/ NMFWRI 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.

References

Audubon New Mexico. (2013). Water Matters: Water for New Mexico Rivers. Albuquerque, New Mexico: Utton Transboundary Resources Center.

Brown, J. K. (1974). Handbook for Inventorying Downed Woody Material, USDA Forest Service General Technical report INT-16. *Handbook for Inventorying Downed Woody Material*. Ogden, Utah: USDA Forest Serivce Intermountain Forest and Range Experiment Station.

Bureau of Land Management. (2006). *Grazing Management Processes and Strategies for Riparian-Wetland Areas, TR 1737-20 .*

Claunch-Pinto Soil and Water Conservation District on behalf of the Greater Rio Grande Watershed Aliance. (2015). *Request for Proposals for Greater Rio Grande Watershed Alliance Riparian Restoration Projects.* Mountainair, NM: Claunch-Pinto Soil and Water Conservation District.

Committee on Riparian Zone Functioning and Strategies for Management, et al. (2002). *Riparian Areas: Functions and Strategies for Management.* Washington, D.C.: National Academy Press.

Lightfoot, D. &. (2012). *Greater Rio Grande Watershed Alliance Riparian Restoration Effectiveness Monitoring Plan.* Albuquerque, NM: SWCA Environmental Consultants.

Lightfoot, David & Stropki, C. (2012). *Field Manual for Greater Rio Grande Watershed Alliance Riparian Restoration Effectiveness Monitoring.* Albuquerque, NM: SWCA Environmental Consultants.

Lizarazo, I., & Elsner, P. (2009). Fuzzy segmentation for object-based image classification. *International Journal of Remote Sensing, 30*.

Muldavin, E. B. (2011). New Mexico Rapid Assessment Method: Montaine Riverine Wetlands. Version 1.1. Final report to the New Mexico Environment Department, Surface Water Quality Bureau. 90 pp. and appendices.

New Mexico Department of Game and Fish Conservation Services Division. (2012). *Bridge and Road Construction/Reconstruction Guidelines for Wetland and Riparian Areas.*

U.S. Climate Data. (2017). *Climate New Mexico*. Retrieved from U.S. Climate Data: http://www.usclimatedata.com/climate/new-mexico/united-states/3201

USDA NRCS. (2016, 8 10). *Web soil Survey.* Retrieved from https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

USDA NRCS n.d. (n.d.). *Ecological Site Description Salty Bottomland R042XA055NM .*

USDA USFS. (1996, September). Ecology, Diversity, and Sustainability of the Middle Rio Grande Basin, RM-GTR-268. (D. M. Finch, & J. A. Tainter, Eds.) Fort Collins, Colorado.

Appendix I – Plot Coordinates Table

Name	Latitude	Longitude
LL_1	34.8031	-106.7210
LL_2	34.8019	-106.7220
LL_3	34.8001	-106.7230
LL_4	34.7979	-106.7250

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.

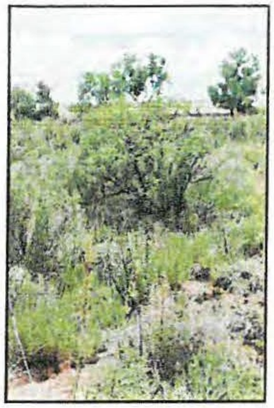
Type 2 -Low Structure Forest with little or no understory.

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.

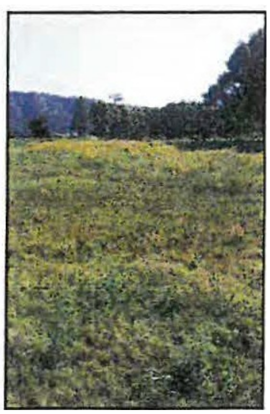


Type 6S-Short Shrub Stands.

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.

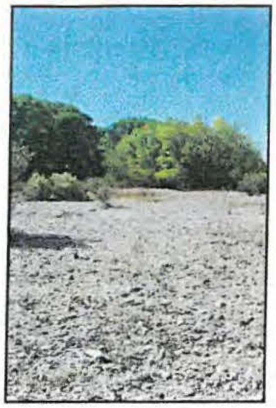
Type 6W-Herbaceous Wetland.

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.

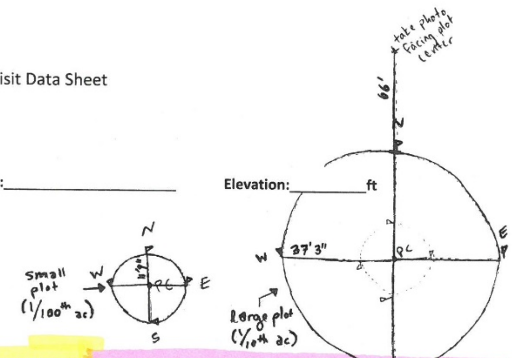
Bare ground, may include sparse woody or herbaceous vegetation, but total vegetation cover <10%. May be natural in origin (cobble bars) or anthropogenic in origin (graded or plowed earth) Photograph on Lower Gila River by Y. Chauvin, 2012.

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



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 Basal / Bole (est. ground cover)

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

Hink & Ohmart modified structural class for entire 1/10th acre plot (see NMRAM)

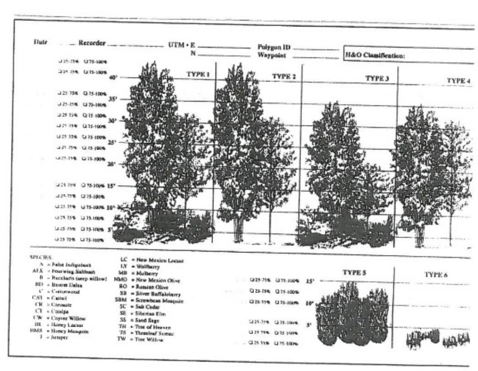
Species Observed in 1/10th ac plot (scientific name, common name, or USDA PLANTS code)

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 Los Lunas Bridge,
4 plots

VSWCD: Los Lunas Bridge

2011/2012 photos: taken January 30, 2012 by Joe Zebrowski, NMFWRI

2016/2017 photos: taken December 18, 2016 by Kathryn Mahan, NMFWRI

Contact:

Kathryn Mahan, Ecological Monitoring Specialist, NMFWRI

Office: 505.426.217 Cell: 620.288.0333 Email: krmahan@nmhu.edu

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

0 150 300 600 900 1,200
Feet

New Mexico Forest and Watershed Restoration Institute

LL_1C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)

LL_1N, facing north from center (2012 above, 2016 below)

LL_1E, facing east from plot center (2012 above, 2016 below)

LL_1S, facing south from center (2012 above, 2016 below)

LL_1W, facing west from center (2012 above, 2016 below)

LL_2C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)

LL_2N, facing north from plot center (2012 above, 2016 below)

LL_2E, facing east from center (2012 above, 2016 below)

LL_2S, facing south from plot center (2012 above, 2016 below)

LL_2W, facing west from center (2012 above, 2016 below)

LL_3C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)

LL_3N, facing north from center (2012 above, 2016 below)

LL_3E, facing east from center (2012 above, 2016 below)

LL_3S, facing south from center (2012 above, 2016 below)

LL_3W, facing west from center (2012 above, 2016 below)

LL_4C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)

LL_4N, facing north from center (2012 above, 2016 below)

LL_4E, facing east from center (2012 above, 2016 below)

LL_4S, facing south from center (2012 above, 2016 below)

LL_4W, facing west from center (2012 above, 2016 below)