Valencia SWCD Los Lunas Bridge - Belen

10-year Monitoring Report

2023

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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 and 10-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.

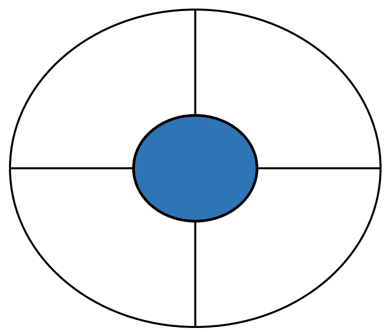


Figure 2. example of plot layout. The outer circle represents the 1/10 acre plot and the blue circle is the 1/100 plot

5 and 10-year revisits (2016 and 2022) protocols

To allow comparisons between site conditions, the original site protocols were employed for the 5 and 10-year revisits as well as newer protocols for the 10-year revisit.

Plot locations as recorded in 2011 and 2016 were found using a Garmin GPS, and all plot setup and measurements were the same as in 2011 and 2016, with a few exceptions. In 2016 a ground cover category was added for plant basal/bole, which was omitted from the ground cover in 2011. Further, for both 2016 and 2022 monitoring, 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 NMED as part of the modified NMRAM protocol employed for pre-treatment monitoring on GRGWA projects beginning in 2013. Additions in 2022 were the inclusion of NMFWRI's Riparian Common Stand Exam-based protocols (https://nmfwri.org/wpcontent/uploads/2020/07/GRGWA_plotprotocols_Instructions_datasheets_with cheatsheets_3.1.2020km.pdf) which added measurements of soil texture; ground and aerial cover on the entire plot as well as aerial cover by individual species, seedling and sapling tallies and individual tree measurements (Appendix III). Individual tree measurements included establishing a witness tree when available, measuring tree height, diameter at breast height (DBH), live crown base height and overall health of the tree. Fuel transects were also established. (Appendix IV).

For the sake of continuity, site visits were made around the same time of year as 5 and 10 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 V).

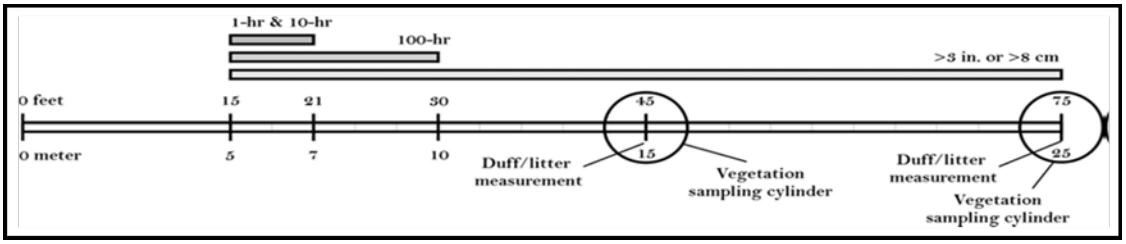


Figure 3. Example of fuels transect

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.

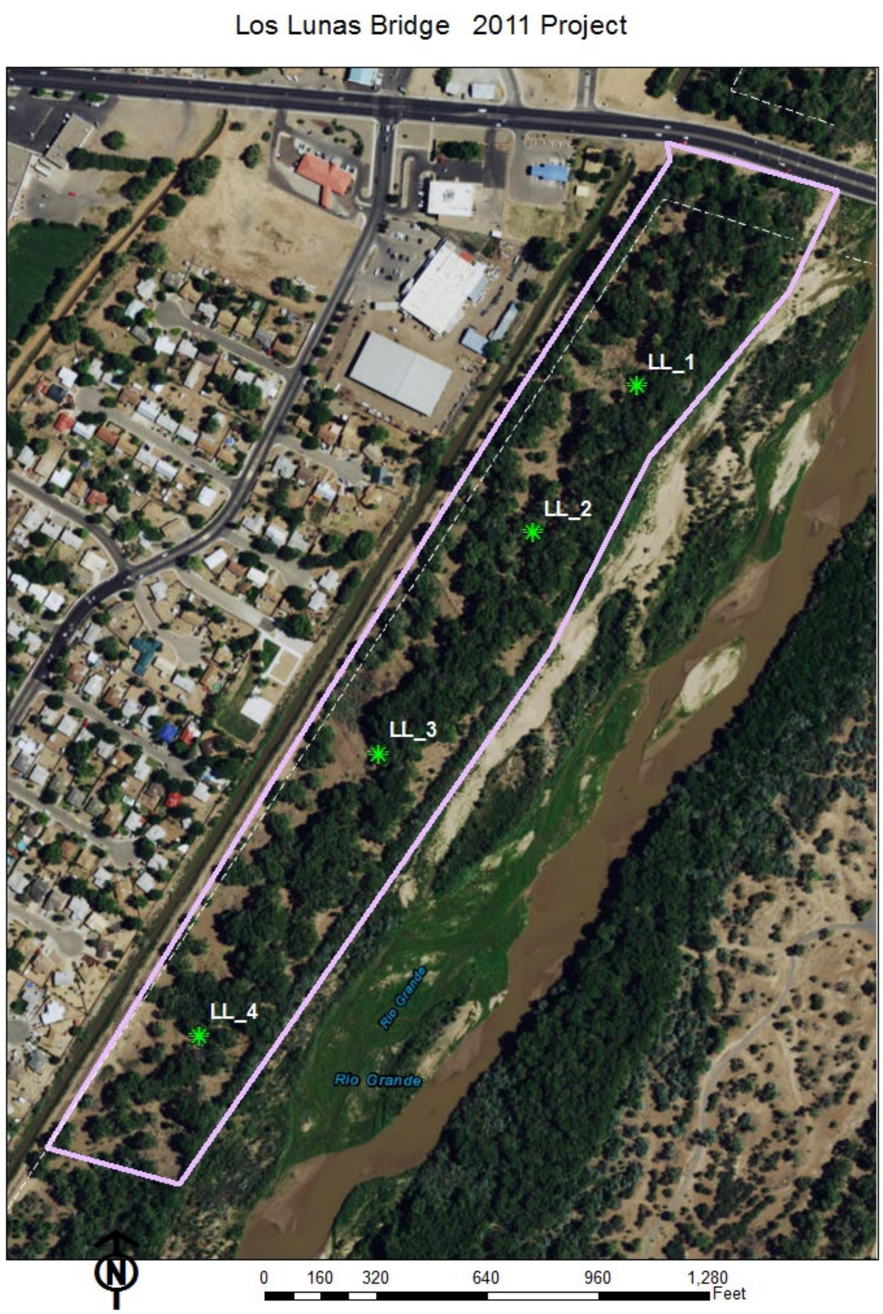


Figure 4. BEMP sites present on the Los Lunas Bridge project.

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.

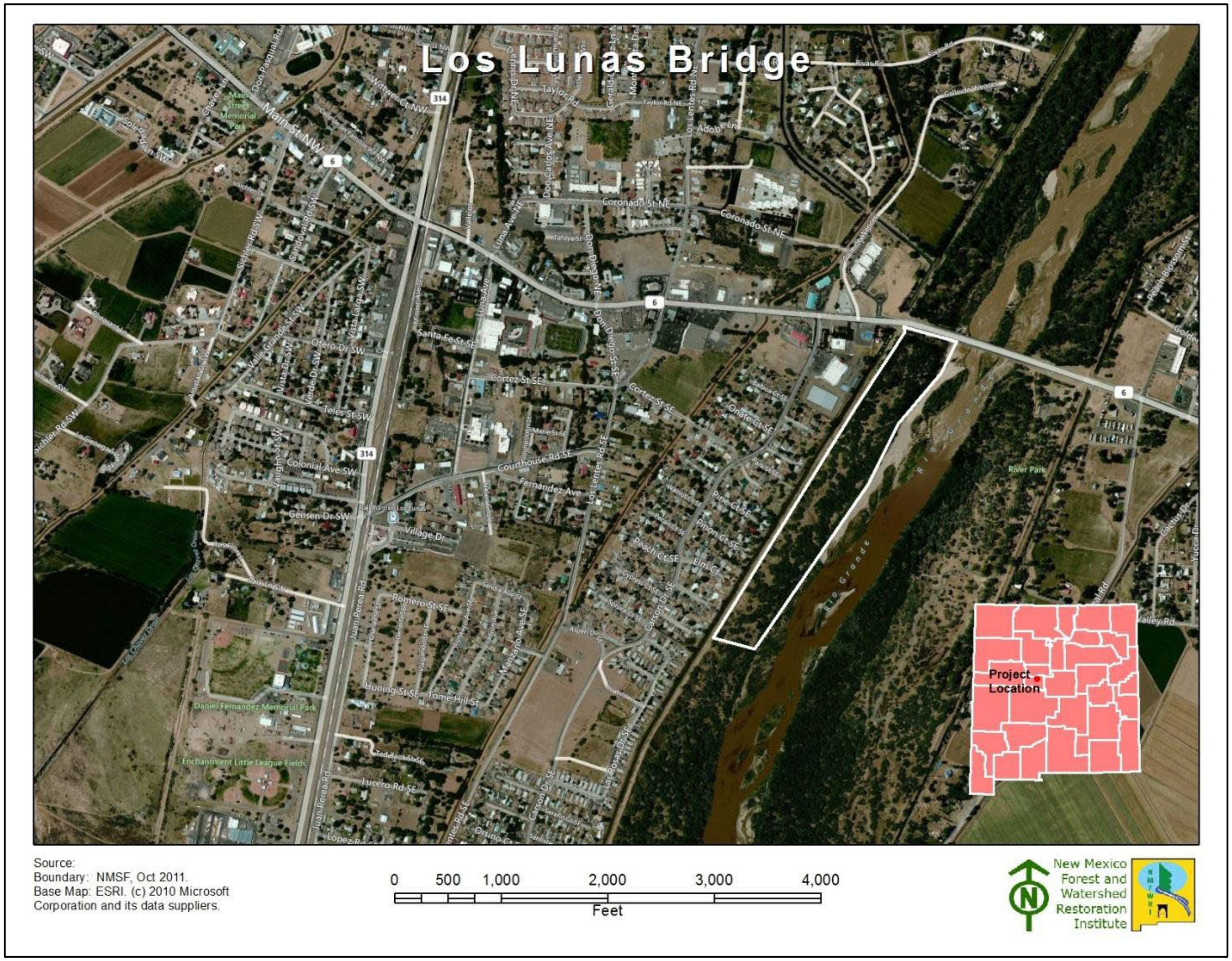


Figure 5. Los Lunas Bridge projects in geographic context.

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.

2023 Los Lunas Bridge Site Observations: The project area was rampant with homeless encampments and trash. Ecologically it contained dense stands of *S. exigua.* Throughout the project fallen cottonwoods were cut and organized in firewood piles and social trails ran through the area. The site serves many purpose for locals who are granted access through a permitting system via Middle Rio Grande Conservation District. Recently (winter 2023) there was a small fire in the area.

Los Lunas Bridge 2011-2023

Observed plant species

11.16 Los Lunas Bridge						
Vegetation Type/Year	2011		2016		2022	
Graminoids	X	Unknown	X	Unknown	*Elymus elymoides*	*Western Wheatgrass*
			Elymus elymoides	*Squirreltail grass*	*Sporobolus airoides*	*Alkali Sacaton*
			Sporobolus airoides	*Alkali Sacaton*	*Setaria leucopila*	*Streambed Bristlegrass*
			Elymus canadensis L.	*Canada wild rye*		
			Panicum obtusum	*Vinemesquite grass*		
			Sporobolus contractus	*Spike dropseed*		
			Thinopyrum intermedium	*Intermediate wheatgrass*		
Forbs	*Solanum elaeagnifolium*	*Silverleaf Nightshade*	*Solanum elaeagnifolium*	*Silverleaf Nightshade*	*Apocynum spp*	*Dogsbane*
	Helianthus annus	*Common Sunflower*	*Conyza canadensis*	*Marestail*		
			Psilactis asteroides	*Tansyaster*		
			Ratibida columnaris	*Mexican hat*		
			Salsola tragus L.	*Russian thistle*		
			X	*Unknown*		
Cactus						
Shrubs	*Salix exigua*	*Coyote Willow*	*Salix exigua*	*Coyote Willow*	*Salix exigua*	*Coyote Willow*
	Forestiera neomexicana	*New Mexico Olive*			X	*Unknown*
Trees	*Elaeagnus angustifolia*	*Russian Olive*	*Elaeagnus angustifolia*	*Russian Olive*	*Elaeagnus angustifolia*	*Russian Olive*
	Populus deltoides	*Rio Grande Cottonwood*	*Populus deltoides*	*Rio Grande Cottonwood*	*Populus deltoides*	*Rio Grande Cottonwood*
			Ulmus pumila	*Siberian Elm*	*Ulmus pumila*	*Siberian Elm*
			Tamarix ramosissima	*Salt Cedar*	*Morus alba*	*White Mulberry*

Figure 6. Species list for entire project area.

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 7. Shows the project area and plot locations

Tree Component

The tree component consists of data collected on the 1/10 acre plot Measurements of tree's diameter at breast height (DBH), height, live crown base height, condition (live, sick or dead), and any significant mistletoe damage. We analyze tree density using Trees Per Acre (TPA) and basal density Basal Area Per Acre (BA/AC). There was a large number of saplings within the project. Many of our plots were in open canopy areas and *S. exigua* is very good at filling in empty spaces.

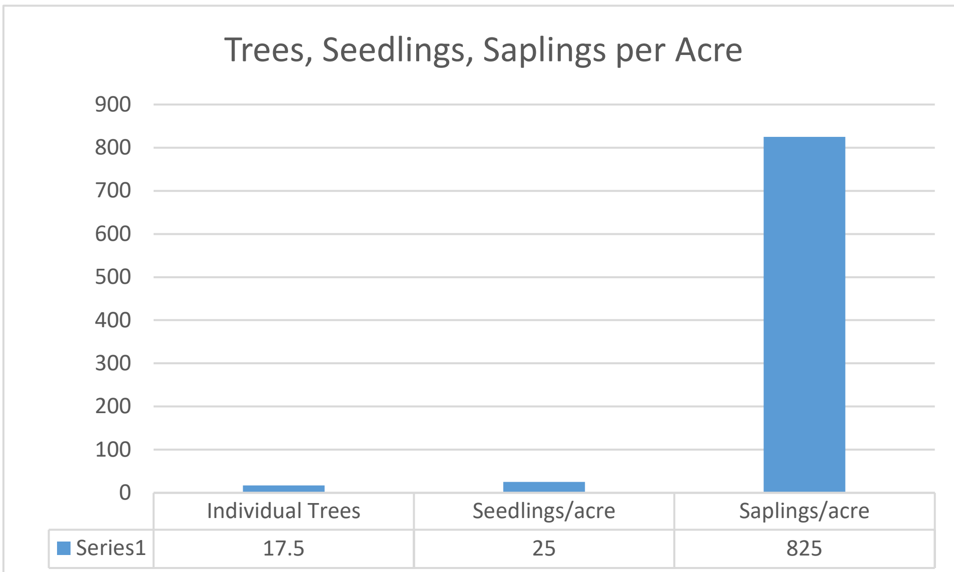


Figure 8. Displays Individual trees, seedlings and saplings per acre on the 1/10 acre plot

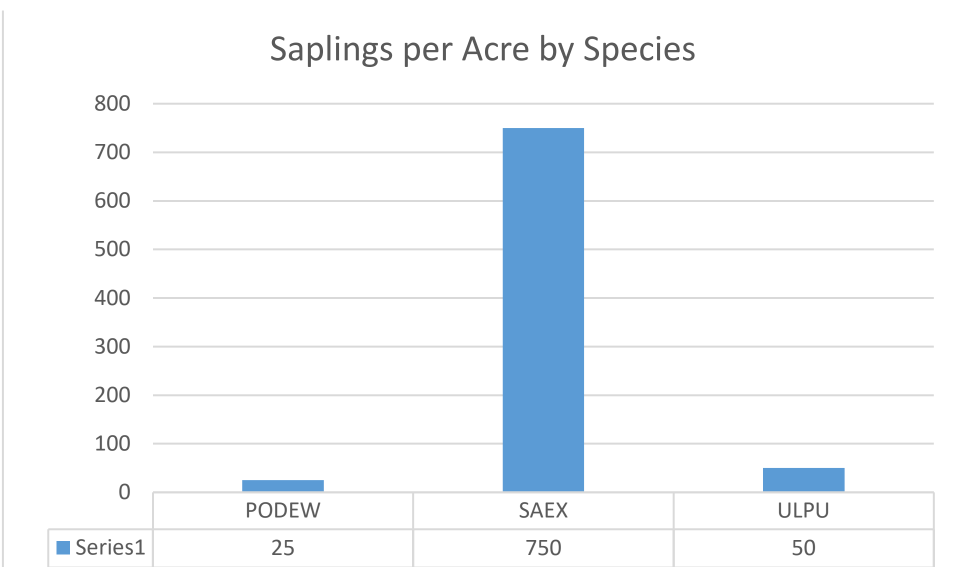
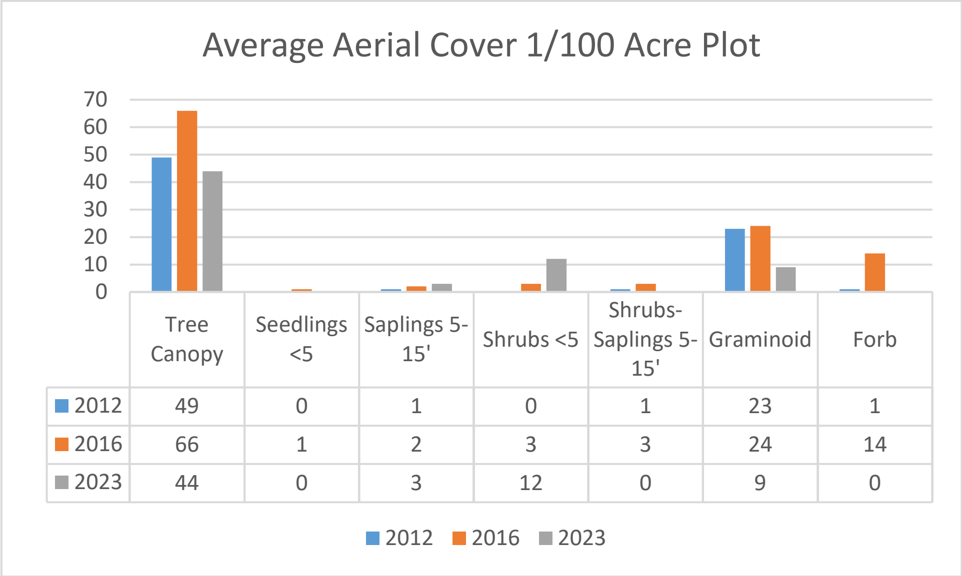


Figure 9. Displays saplings species per acre on the 1/10 acre plot. *P. deltoides spp. Wislizeni, S. exigua* and *Ulmus pumila*

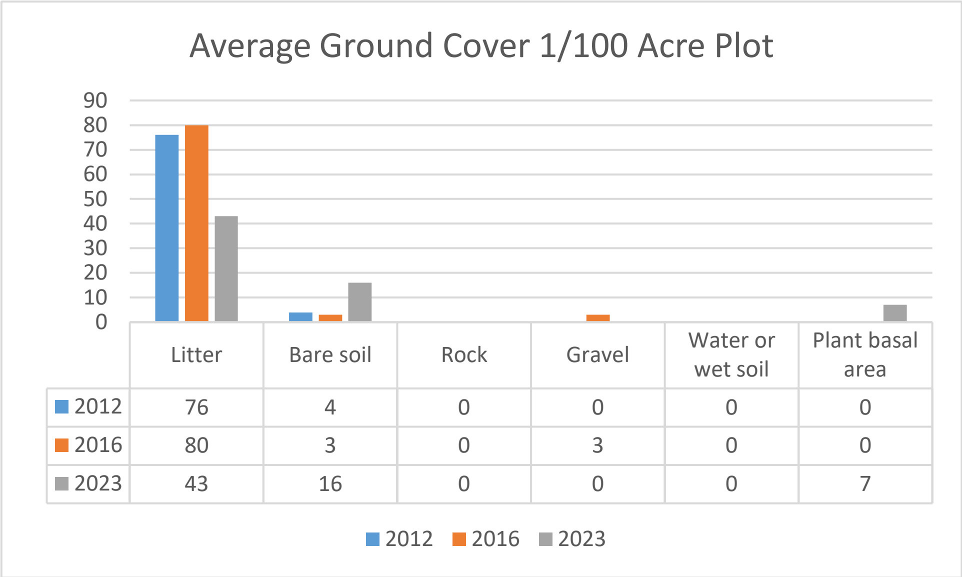
Understory and Bosque Floor Components

As described above, percent ground cover was estimated at each plot within the 1/100th acre subplot. Total aerial cover may exceed 100% due to vegetation stacking on top of each other. Of interest is the loss of canopy cover, graminoid cover and forb cover after 2016. Shrubs less then five feet increased. Within ground cover measurements, litter decreased coverage while bare soil increased.



	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
2023	44	0	3	12	0	9	0

Figure 10. Displays the average aerial cover for the entire



	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
2023	43	16	0	0	0	7

Figure 11. Displays average ground cover for the entire

***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%
2023	48%	0%	2%	75%	0%	1%	0%

	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%
2023	85%	0%	0%	0%	0%	15%

2012 Hink & Ohmart Type: 2

2016 Hink & Ohmart Type: 5

2016 Modified Hink & Ohmart Type: 5

2023 Hink & Ohmart Type: 5

2023 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.

2023 Comments: Open canopy of cottonwoods in the south and east, with dense willow thickets to the north and a patchy willow thicket to the west. Social trail to the east.

***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%
2023	73%	0%	0%	0%	0%	1%	0%

	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%
2023	99%	0%	0%	0%	0%	1%

2016 Hink & Ohmart Type: 2

2016 Modified Hink & Ohmart Type: 2

2023 Hink & Ohmart Type: 5

2023 Hink & Ohmart Type: 5

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

2016 Comments: None

2023 Comments: Mostly open with scattered cottonwoods, no herbaceous layer in understory, with dense woody debris to the south along with giant metal jacks. Social trail to the east.

***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%

2023	84	0	5	0	0	15	0

	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%
2023	3	92	0	0	0	5

2016 Hink & Ohmart Type: 2

2016 Modified Hink & Ohmart Type: 2

2023 Hink & Ohmart Type: 5

2023 Modified Hink & Ohmart Type: 5

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

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

2023 Comments: Open cottonwood canopy growing over dogbane in the north, with scattered Siberian elm and dense Russian olive to the south, open grass with some young cottonwoods and a patch of coyote willow to the west, with a social trail running through the eastern side of the area.

***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%
2023	57%	0%	10%	0%	0%	40%	0%

	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%
2023	70%	7%	0%	0%	0%	23%

2016 Hink & Ohmart Type: 2

2016 Modified Hink & Ohmart Type: 2

2023 Hink & Ohmart Type: 4

2023 Modified Hink and Ohmart Type: 2

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

2016 Comments: none.

2023 Comments: Open and grassy area with large cottonwood canopy to the north, dense coyote willow and grass to the east, with the south and west being open and grassy, with russian olive present in the south and a earth berm and levee jacks in the west.

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.

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Appendix I – Plot Coordinates Table

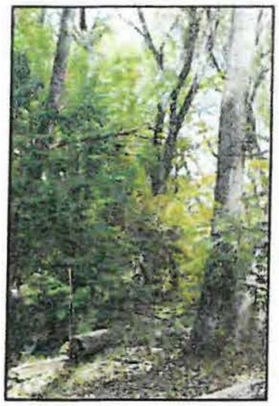
Name	Latitude	Longitude
LL_1	34.8031	-106.7210
LL_2	34.8019	-106.7220
LL_3	34.8001	-106.7230
LL_4	34.7979	-106.7250

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)

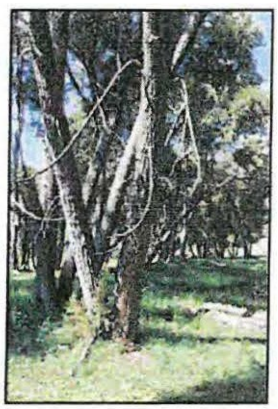
Vegetation Vertical Structure Type Definitions for NMRAM

Multiple-Story Communities (Woodlands/Forests)



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

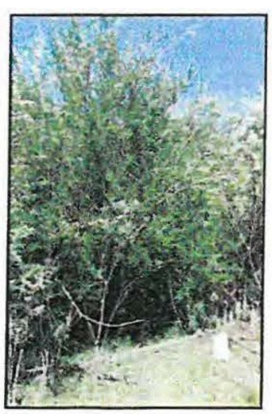
Tall mature to intermediate-aged trees (>5 m [>15 feet]) with canopy covering >25% of the area of the community (polygon)and understory layer (0-5 m [0-15 feet]) covering >25% of the area of the community (polygon). Substantial foliage is in all height layers. (This type incorporates Hink and Ohmart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



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

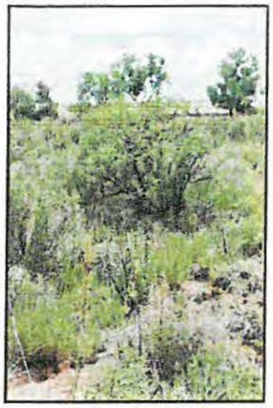
Tall mature to intermediate-aged trees (>5 m [>15 feet]) with canopy covering >25% of the area of the community (polygon) and understory layer (1-5 m [3-15 feet]) covering <25% of the area of the community (polygon). Majority of foliage is over 5 m (15 feet) above the ground. (This type incorporates 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.

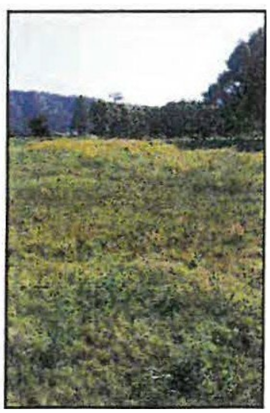


Type 6S-Short Shrub Stands.

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.

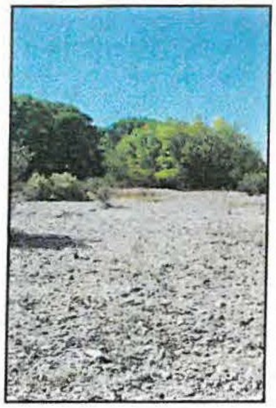
Type 6W-Herbaceous Wetland.

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.

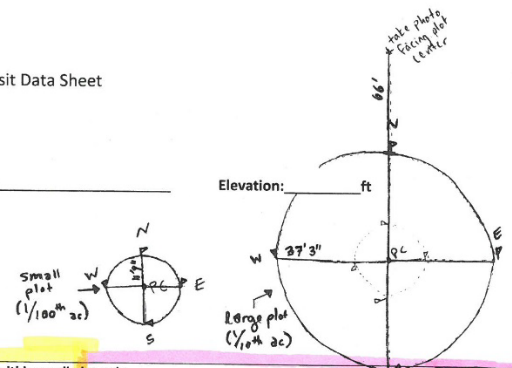
Appendix III – Sample Datasheet.

2011 Datasheet with original Hink & Ohmart

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)

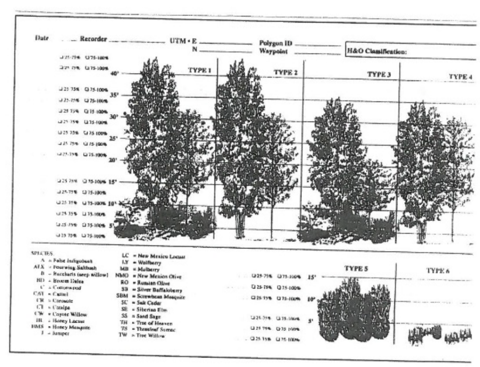
Grasses	Forbs	Shrubs	Trees

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)

2022 Sample datasheet

GRGWA Plot Description (1 of 2)

Observer: ______________________

Recorder: ______________________

Latitude (dd.dddddd): ______________________

Longitude (ddd.ddddd): ______________________

Elevation (ft): ______________________

Administrative Unit: ______________________

Project Unit: ______________________

Macroplot: ______________________

Date (DD/MM/YYYY): ______________________

Time: ______________________

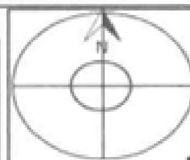
Macroplot Sizes		
Size (Acres)	1/100	1/10
Radius (Feet, Decimal Feet)	11.78	37.24
Radius (Feet, Inches)	11' 9"	37' 3"

Hill Slope (where steepest): ________ %

Aspect (circle one): N E S W

Aspect azimuth: ________ °

Mag Declination: ________ °



Describe Witness Tree(s): USE NATIVE TREES ONLY

Draw location of tree on plot

Color of Flagging Used: ______________________

Photo Azimuths: (1) of whiteboard at PC. (1) from 75 feet N looking south to PC (4) from PC in all four cardinal directions; (1) from each Brown's transect looking toward PC.

ORDER TAKEN: ______________________

Comments/Description of Plot:

Tree Canopy Cover (%) (densiometer)

________ + ________ + ________ + ________

Hink & Ohmart Dominant Structural Class

Original:

Modified:

Soil Texture (4 locations)

North: ______________________

East: ______________________

South: ______________________

West: ______________________

SMALL PLOT INCLUDES ALL SEEDLINGS OR SAPLINGS <5 INCHES DBH/DRC.

Species	Condition (Live, Dead, Sick)	Small Plot (1/100th Acre only) - Tree Regen, Shrubs & Cacti				
		Height classes—Seedlings (feet)				
		> 0 - 0.5'	> 0.5—1.5'	> 1.5' - 2.5'	>2.5' - 3.5'	>3.5' - 4.5'

Species	Condition (Live, Dead, Sick)	Small Plot (1/100th Acre only) - Tree Regen, Shrubs & Cacti				
		Diameter classes—Saplings (inches)				
		> 0 - 1"	>1-2"	>2-3"	>3-4"	>4-5"

New Mexico Forest and Watershed Restoration Institute

Plot Description Version: 4/3/2018, km

Precisions:
Slope: ±5 percent
Vegetation cover : ±1 class estimation or ±10%

GRGWA Plot Description (2 of 2)

List by Species	Status (L, D, S)	Nativity: N, E, I, Unk?	AERIAL COVER (%) (ENTIRE 1/10th acre plot) Estimate Aerial Cover % for Species by Lifeform				
			Tree	Shrub	Forb/herb	Gramanoid	Cactus
TOTALS							

GROUND COVER (%) (ENTIRE 1/10th acre plot) (must total 100 %)							
Plant basal	Bole	Litter	Bare soil	Rock (>2.5in)	Gravel (< 2.5 in)	Water, Wet Soil	Total (%)

Comments on Species Composition and/or Ground Cover:

GRGWA Trees

Observer/Recorder:__ Project/Site/Plot.__ Date

	1/lOth acre plot (37' 3" radius)								
Tree#	Species	Tree cond.	OBH	ORC	No. stems	Total Tree Ht	UCrBHt	Mistletoe (%)	Comments dam-age/disease, wit• ness tree, etc.

Appendix IV – Fuels Transect Data Sheet

GRGWA Surface Fuels

Sheet 1 of 1: Fine Woody Debris—Coarse Woody Debris

Observer ____________________

Recorder ____________________

Administrative Unit: ____________________

Project Unit: ____________________

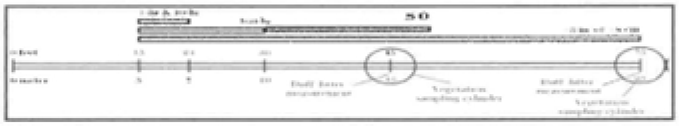
Macroplot: ____________________

Date (DD/MM/YYYY): ____________________

Time: ____________________

1-hour Transect Length - 6'	10-hour Transect Length - 6'
100-hour Transect Length - 35'	1000-hour Transect Length - 60'

Class		Diameter (in)
FWD	1-hr 10-hr 100-hr	0 to 0.25 0.25 to 1.0 1.0 to 3.0
CWD	1000-hr and greater	3.0 and greater



Fine Woody Debris (1, 10, 100 hr fuels)	Transect	Azimuth	Slope	1 - Hr Count	10 - Hr Count	100 - Hr Count	Comment
	1						
	2						

Coarse Woody Debris (1000 hr fuels)	Transect	Slope	Log No.	Log Diameter	Decay Class	Comment

Litter & Duff	Transect 1	45'	75'	Transect 2	45'	75'
	Litter Depth (in)			Litter Depth (in)		
	Duff Depth (in)			Duff Depth (in)		
	Comments?			Comments?		

Precisions: Diameter: ±0.5 in ; decay class ±1 class ; Slope ±5 percent

Decay Class Description

1 All bark is intact. All but the smallest twigs are present. Old needles probably still present. Hard when kicked

2 Some bark is missing, as are many of the smaller branches. No old needles still on branches. Hard when kicked

3 Most of the bark is missing and most of the branches less than 1 in. in diameter also missing. Still hard when kicked

4. Looks like a class 3 log but the sapwood is rotten. Sounds hollow when kicked and you can probably remove wood from the outside with your boot. Pronounced sagging if suspended for even moderate distances

5. Entire log is in contact with the ground. Easy to kick apart but most of the piece is above the general level of the adjacent ground. If the central axis of the piece lies in or below the duff layer then it should not be included in the CWD sampling as these pieces act more like duff than wood when burned.

Appendix V – Photo pages

See the attached photo comparison pages for each site.


11.16_1C, facing center from north at 66' (2011)


11.16_1C, facing center from north at 66' (2016)


11.16_1C, facing center from north at 66’ (2022)


11.16_1N, facing north from center at 11.8’ (2011)


11.16_1N, facing north from center at 11.8’ (2016)


11.16_1N, facing north from center at 11.8’ (2022)


11.16_1E, facing east from center at 11.8’ (2011)


11.16_1E, facing east from center at 11.8’ (2016)


11.16_1E, facing east from center at 11.8’ (2022)


11.16_1S, facing south from center at 11.8’ (2011)


11.16_1S, facing south from center at 11.8’ (2016)


11.16_1S, facing south from center at 11.8' (2022)


11.16_1W, facing west from center at 11.8' (2011)


11.16_1W, facing west from center at 11.8' (2016)


11.16_1W, facing west from center at 11.8’ (2022)


11.16_2C, facing center from north at 66’ (2011)


11.16_2C, facing center from north at 66’ (2016)


11.16_2C, facing center from north at 66’ (2022)


11.16_2N, facing north from center at 11.8’ (2011)


11.16_2N, facing north from center at 11.8’ (2016)


11.16_2N, facing north from center at 11.8’ (2022)


11.16_2E, facing east from center at 11.8’ (2011)


11.16_2E, facing east from center at 11.8’ (2016)


11.16_2E, facing east from center at 11.8' (2022)


11.16_2S, facing south from center at 11.8' (2011)


11.16_2S, facing south from center at 11.8' (2016)


11.16_2S, facing south from center at 11.8' (2022)


11.16_2W, facing south at 11.8' (2011)


11.16_2W, facing west from center at 11.8' (2016)


11.16_2W, facing west from center at 11.8’ (2022)


11.16_3C, facing center from north at 66’ (2011)


11.16_3C, facing center from north at 66’ (2016)


11.16_2C, facing center from north at 66' (2022)


11.16_3N, facing north from center at 11.8' (2011)


11.16_3N, facing north from center at 11.8' (2016)


11.16_3N, facing north from center at 11.8’ (2022)


11.16_3E, facing east from center at 11.8’ (2011)


11.16_3E, facing east from center at 11.8’ (2016)


11.16_3E, facing east from center at 11.8’ (2022)


11.16_3S, facing south from center at 11.8’ (2011)


11.16_3S, facing south from center at 11.8’ (2016)


11.16_3S, facing south from center at 11.8' (2022)


11.16_3W, facing west from center at 11.8' (2011)

11.16_3W, facing west from center at 11.8' (2016)


11.16_3W, facing west from center at 11.8’ (2022)


11.16_4C, facing center from north at 66’ (2011)


11.16_4C, facing center from north at 66’ (2016)


11.16_4C, facing center from north at 66’ (2022)


11.16_4N, facing north from center at 11.8’ (2011)

11.16_4N, facing north from center at 11.8’ (2016)


11.16_4N, facing north from center at 11.8’ (2022)


1.16_4E, facing east from center at 11.8’ (2011)


11.16_4E, facing east from center at 11.8’ (2016)


11.16_4E, facing east from center at 11.8’ (2022)


11.16_4S, facing south from center at 11.8’ (2011)


11.16_4S, facing south from center at 11.8’ (2016)


11.16_4S, facing south from center at 11.8' (2022)


11.16_4W, facing west from center at 11.8' (2011)


11.16_4W, facing west from center at 11.8' (2016)


11.16_4W, facing west from center at 11.8' (2022)