Santa Fe-Pojoaque SWCD SFP4 & 5 (Thomas) Project

5-year Monitoring Report

2016

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for the
Greater Rio Grande Watershed Alliance

Soil & Water Conservation District

Clean Water, Healthy Earth

Santa Fe-Pojoaque SWCD

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 2.1
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 a non-native phreatophyte removal project on the Santa Fe River near Santa Fe, NM, submitted by the Santa Fe- Pojoaque 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 the 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 (2011) protocols

Due to the short timeframe between project selection and implementation in 2011, 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 2011 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 documenting 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 2011 were found using a Trimble GeoXT, and all plot setup and measurements were the same as in 2011, with two exceptions. A ground cover category was added for plant basal/bole, which was omitted from the ground cover in 2011. 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

2011 Monitoring Team:

- Joe Zebrowski, New Mexico Forest and Watershed Restoration Institute
- Terrell Treat, New Mexico State Forestry

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 2011:

- José Varela-Lopez, Santa Fe-Pojoaque Soil and Water Conservation District

Other persons contacted 2016:

- José Varela-Lopez, Santa Fe-Pojoaque Soil and Water Conservation District

SFP4_5 Thomas Project

The SFP 4&5 Thomas project is a fenced riparian area approximately 2100 feet by 300 feet. It crosses Paseo Real/NM56/Airport Road and the western edge of the limits of the City of Santa Fe.

The city of Santa Fe receives an average of 14.21 inches of rainfall annually. The average high temperature is 86 degrees in July, and the average low is 17 in December and January (U.S. Climate Data, 2017).

According to the NRCS Web Soil Survey, the project area is comprised of 70% Cuyamungue-Riverwash complex, 0 to 2 percent slopes, flooded; 16% Riovista gravelly loamy sand, 0 to 1 percent slopes; 9% Riverwash, flooded; 3% Pits, 2% Zepol silt loam, 0 to 2 percent slopes, flooded; and <1% Delvalle-Urban land complex, 0 to 2 percent slopes. Ecological sites present include R035XA112NM Loamy, R035XG114NM Gravelly, and F036XA005NM Riverine Riparian. (USDA NRCS, 2016)

The Loamy ecological site typically supports a grassland state dominated by blue grama, western wheatgrass, galleta, ring muhly, dropseeds, and/or threeawns. It can also be found in a piñon-juniper invaded state (dominated by piñon, juniper, and blue grama), a grass/succulent-mix state (dominated by blue grama, cholla and prickly pear), a shrub-dominated state (dominated by rabbitbrush or horsebrush and blue grama), as well as a bare state with sparse grass. (USDA NRCS n.d.).

The Gravelly ecological site type typically supports grassland with minor shrub and piñon-juniper components. Common dominant grass species include blue, black and sideoats grama, little bluestem, spike muhly, Western wheatgrass, New Mexico feathergrass, Indian ricegrass, and squirreltail. Common shrubs include fourwing saltbush, winterfat, Apache plume, rabbitbrush, soapweed yucca, sagebrush and broom snakeweed. The site can also be found in a shrub-encroached state dominated by rabbitbrush and blue grama; erosion is more common in this state (USDA NRCS n.d.).

The Riverine Riparian ecological site is made up of sediments adjacent to perennial streams and vegetation is determined largely by local hydrology. Examples of typical species at different strata include Fremont cottonwood, sandbar willow, Western wheatgrass, and Nebraska sedge (USDA NRCS n.d.).

Pre-treatment monitoring was conducted at this site on November 17, 2011 as part of a restoration project non-native phreatophytes scheduled for 2011-2012. Post-treatment monitoring was conducted September 30, 2016. The treatment prescription from New Mexico State Forestry included the removal of all invasive trees including juniper, followed with cut-stump herbicide and the removal of approximately 10 cottonwood snags. Slash was to be chopped and spread as chips to a depth of under 2 inches, outside of the high water area; larger woody material (over 3 inches) was to be removed from high water areas to outside the fence along the road to allow for public removal. Restoration goals include restoring the area for wildlife with native species, restoring more natural conditions through the creation of a more open canopy, and removing exotic, high-water consuming plants to increase surface water in low-lying areas and drainages (Stropki et al., 2010).

Figure 2. SFP4_5 in geographic context.

Thomas Project (SFP4_5) Site Summary

2011 SFP4_5 Site observations: The project area has a near contiguous canopy along the channel of Cottonwood, Coyote Willow, Goodding's Black Willow, Russian Olive, and Siberian Elm, with some One-seed Juniper interspersed. A few open, sandy areas exist, characterized by clumps of Chamisa and grasses and scattered Cottonwood. Ducks were observed in the area and there was evidence of historic beaver activity. These plots were assessed to fall in Hink & Ohmart Structure Classes 2 and 3.

2016 SFP4_5 Site observations: The project has a dense canopy, especially immediately adjacent to the Santa Fe River, with a cottonwood overstory and coyote willow understory. Further from the channel, rubber rabbitbrush becomes dominant and more xeric grassy/open areas are present. Russian olive and Siberian elm are found throughout the project, especially on the north and south ends. A variety of nonnative herbaceous weedy species, such as Russian thistle, are also present, especially on the northern end of the project. Heavy mastication material is present in some areas. The plots were assessed to fall in Hink and Ohmart Structure Classes 1, 5 and 6.

Cover: Aerial & ground cover was much the same in both years, although there was a notable reduction in the cover of tall shrubs/saplings (5 to 15 feet) in 2016.

	Average Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	51%	0%	0%	18%	17%	35%	7%
2016	64%	3%	8%	15%	1%	31%	13%

	Average Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	45%	12%	1%	0%	0%	n/a
2016	41%	10%	2%	1%	1%	39%

Red plants found in 2011 only

Blue plants found in 2016 only

Green plants found both years

SFP_4_5 2011-2016

Observed plant species

Grasses		Forbs	
Scientific name	**Common name**	***Scientific name***	**Common name**
Achnatherum robustum	Sleepygrass		Unknown forb1
Bromus tectorum L	Cheatgrass		Unknown thistles
Dactylis glomerata L.	Orchard grass	*Ambrosia acanthicarpa*	Bursage
Elymus canadensis L.	Canada wild rye	*Anemopsis californica*	Yerba mansa
Elymus elymoides	Squirreltail	*Bassia prostrata*	Kochia
Elymus smithii	Western wheatgrass	*Chenopodium album L.*	Lambsquarters
		Cirsium vulgare	bull thistle
		Convolvulus arvense	bindweed
		Conyza canadensis	marestail
		Cucurbita foetidissima	Buffalo gourd
		Descurainia pinnata	Tansymustard
		Gaura parviflora	Velvet gaura
		Lactuca serriola L.	Prickly lettuce
		Lappula occidentalis	Western sticktight
		Machaeranthera canescens	Purple aster
		Melilotus albus	White sweetclover
		Salsola tragus L.	Russian thistle
		Senecio vulgaris	Groundsel
		Solanum elaeagnifolium	Silverleaf nightshade
		Thlaspi arvense L.	Field pennycress
		Verbascum thapsus L.	Mullein
		Xanthium strumarium	Rough cocklebur

Shrubs		Trees	
Scientific name	**Common name**	***Scientific name***	**Common name**
Cylindropuntia sp.	Cholla		Unknown
Ericameria nauseosa	Rubber rabbitbrush	*Elaeagnus angustifolia*	Russian olive
Gutierrezia sarothrae	Broom snakeweed	*Juniperus monosperma*	Oneseed juniper
Salix exigua	Coyote willow	*Populus deltoides*	Rio Grande cottonwood
		Salix gooddingii	Black willow
		Ulmus pumila	Siberian elm

The “new” species recorded in 2016 were a thorough mix of native and exotic species, including welcome additions such as yerba mansa, and unwelcome ones such as Russian thistle and cheatgrass. The target species found pre-treatment in 2011, Russian olive, Siberian elm, and one-seed juniper, were still present post-treatment in 2016, though some were 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.

Figure 3. SFP4_5 plots.

Figure 4. Google Earth imagery for SFP4_5 pre- and post-treatment.
2011 pre-treatment imagery is top; 2013 and 2015 post-treatment imagery on bottom.

***Project**: SFP SWCD* ***Project Unit**: SFP4_5* ***Plot**: SFP4_5_1*

SFP4_5_1 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	21%	0%	0%	30%	20%	0%	20%
2016	15%	0%	0%	15%	2%	75%	20%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	60%	20%	0%	0%	0%	n/a
2016	30%	0%	0%	0%	0%	70%

SFP4_5_1 2011 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
	kochia	Rubber rabbitbrush	Black willow
			Russian olive

2011 Hink & Ohmart Type: 3

SFP4_5_1 2016 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
Canada wild rye	Absinth wormwood	cholla	Black willow
Cheatgrass	Buffalo gourd	Rubber rabbitbrush	
Western wheatgrass	Kochia		
	Marestail		
	mullein		
	Prickly lettuce		
	Purple aster		
	Russian thistle		
	Unknown thistle		
	Velvet gaura		
	White sweetclover		

2016 Hink & Ohmart Type: 6 **2016 Modified Hink & Ohmart Type**: 6S

2011 Comments: None.

2016 Comments: Abundant plant species included Russian thistle and Western wheatgrass.

***Project**: SFP SWCD* ***Project Unit**: SFP4_5* ***Plot**: SFP4_5_2*

SFP4_5_2 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	94%	0%	0%	1%	10%	1%	0%
2016	98%	0%	0%	0%	0%	5%	5%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	90%	6%	3%	0%	0%	n/a
2016	65%	19%	10%	5%	1%	1%

SFP4_5_2 2011 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
		Coyote willow	Rio Grande cottonwood
			Russian olive

2011 Hink & Ohmart Type: 3

SFP4_5_2 2016 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
cheatgrass	Bull thistle	Coyote willow	Black willow
Western wheatgrass	Cocklebur		Rio Grande cottonwood
	groundsel		Siberian elm
	Kochia		
	Lambsquarters		
	Russian thistle		
	Unknown forbs		
	Western sticktight		
	White sweetclover		

2016 Hink & Ohmart Type: 1 **2016 Modified Hink & Ohmart Type**: 1

2011 Comments: None.

2016 Comments: This plot crosses a dry channel.

***Project**: SFP SWCD* ***Project Unit**: SFP4_5* ***Plot**: SFP4_5_3*

SFP4_5_3 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	42%	2%	0%	10%	25%	35%	8%
2016	85%	5%	25%	20%	0%	15%	20%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	40%	15%	2%	0%	0%	n/a
2016	40%	5%	0%	1%	0%	34%

SFP4_5_3 2011 Species Observed

Grasses	Forbs	Shrubs	Trees
		Coyote willow	Oneseed juniper
		Rubber rabbitbrush	Rio Grande cottonwood
			Russian olive

2011 Hink & Ohmart Type: 3

SFP4_5_3 2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Canada wild rye	Bindweed	Broom snakeweed	Oneseed juniper
Cheatgrass	Buffalo gourd	Coyote willow	Rio Grande cottonwood
saltgrass	groundsel	Rubber rabbitbrush	Siberian elm
Unknown	Kochia		
	Marestail		
	Mullein		
	Prickly lettuce		
	Purple aster		
	Russian thistle		
	Velvet gaura		
	Yerba mansa		

2016 Hink & Ohmart Type: 1 **2016 Modified Hink & Ohmart Type**: 1

2011 Comments: None.

2016 Comments: This plot required a river crossing. Trash and shells were found near plot center; coyote willow stands were very dense.

***Project**: SFP SWCD* ***Project Unit**: SFP4_5* ***Plot**: SFP4_5_4*

SFP4_5_4 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	2%	0%	0%	50%	10%	55%	5%
2016	25%	5%	10%	40%	5%	20%	20%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	25%	15%	0%	0%	0%	n/a
2016	40%	15%	0%	0%	0%	45%

SFP4_5_4 2011 Species Observed

Grasses	Forbs	Shrubs	Trees
	Mullein	Coyote willow	Black willow
		Rubber rabbitbrush	Oneseed juniper
			Russian olive
			Siberian elm

2011 Hink & Ohmart Type: 3

SFP4_5_4 2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Canada wild rye	Bursage	Coyote willow	Russian olive
Squirreltail	Field pennycress	Rubber rabbitbrush	
unknown	Groundsel		
Western wheatgrass	Mullein		
	Prickly lettuce		
	Purple aster		
	Russian thistle		
	Silverleaf nightshade		
	Tansymustard		
	Velvet gaura		
	Yerba mansa		
	Western sticktight		
	Unknown forbs		
	Unknown thistle		

2016 Hink & Ohmart Type: 5/6

2016 Modified Hink & Ohmart Type: 5/6S

2011 Comments: None.

2016 Comments: Snails found on plot.

***Project**: SFP SWCD* ***Project Unit**: SFP4_5* ***Plot**: SFP4_5_5*

SFP4_5_5 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	94%	0%	0%	1%	20%	85%	0%
2016	95%	5%	5%	0%	0%	40%	0%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	10%	5%	0%	0%	1%	n/a
2016	30%	10%	0%	1%	3%	44%

SFP4_5_5 2011 Species Observed

Grasses	Forbs	Shrubs	Trees
		Coyote willow	Rio Grande cottonwood

2011 Hink & Ohmart Type: 2

SFP4_5_5 2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Canada wild rye	Kochia	Coyote willow	Rio Grande cottonwood
Cheatgrass	Lambsquarters		Russian olive
Orchard grass	Velvet gaura		unknown
Sleepygrass			

2016 Hink & Ohmart Type: 1

2016 Modified Hink & Ohmart Type: 1

2011 Comments: None.

2016 Comments: Evidence of recent flooding present on plot.

Next steps (monitoring)

Continuing forward, 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
SFP4_5_1	35.6306	-106.0902
SFP4_5_2	35.6299	-106.0913
SFP4_5_3	35.6285	-106.0923
SFP4_5_4	35.6285	-106.0937
SFP4_5_5	35.6277	-106.0948

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.

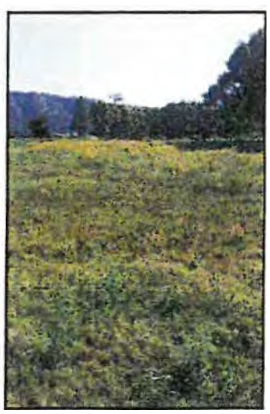
Young tree and shrub layer only (15-5 m [4.5-15 feet]) covering >25% of the area of the community (polygon). Stands dominated by tall shrubs and young trees, may include herbaceous vegetation underneath the woody vegetation. Photograph on San Francisco River by Y. Chauvin, 2012.

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.

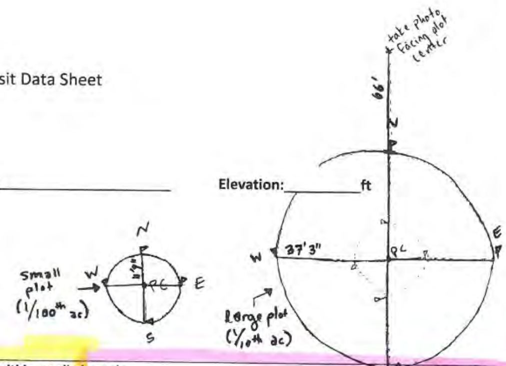
Bare ground, may include sparse woody or herbaceous vegetation, but total vegetation cover <10%. May be natural in origin (cobble bars) or anthropogenic in origin (graded or plowed earth) Photograph on Lower Gila River by Y. Chauvin, 2012.

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)

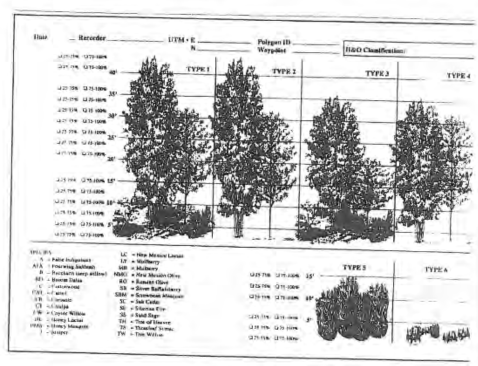
Species Observed in 1/10th ac plot (scientific name, common name, or USDA PLANTS code)

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 this site.

5-year Photo Comparisons for SFP4_5, 5 plots

SFPSWCD: Thomas Property

2011 photos: taken November 17, 2011 by Joe Zebrowski, NMFWRI

2016 photos: taken September 30, 2016 by Kathryn Mahan, NMFWRI

Contact:

Kathryn Mahan, Ecological Monitoring Specialist, NMFWRI

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Santa Fe Pojoaque 4/5
SFP4_5_1
SFP4_5_2
SFP4_5_3
SFP4_5_4
SFP4_5_5
Paseo Real
Paseo Real
eo Real
56
56
56
Santa Fe
Collected Points
Project Area
Source:
Points: NMFWRI, Nov 2011.
Boundary: NMSF, Oct 2011.
Base Map: ESRI. (c) 2010 Microsoft Corporation and its data suppliers
0 100 200 400 600 800
Feet
New Mexico Forest and Watershed Restoration Institute

SFP4_5_1C, facing center from as close to 66 feet as visually possible (2011 above, 2016 below)

SFP4_5_1N, facing north from center (2011 above, 2016 below)

SFP4_5_1E, facing east from plot center (2011 above, 2016 below)

SFP4_5_1S, facing south from center (2011 above, 2016 below)

SFP4_5_1W, facing west from center (2011 above, 2016 below)

SFP4_5_2C, facing center from as close to 66 feet as visually possible (2011 above, 2016 below)

SFP4_5_2N, facing north from plot center (2011 above, 2016 below)

SFP4_5_2E, facing east from center (2011 above, 2016 below)

SFP4_5_2S, facing south from plot center (2011 above, 2016 below)

SFP4_5_2W, facing west from center (2011 above, 2016 below)

SFP4_5_3C, facing center from as close to 66 feet as visually possible (2011 above, 2016 below)

SFP4_5_3N, facing north from center (2011 above, 2016 below)

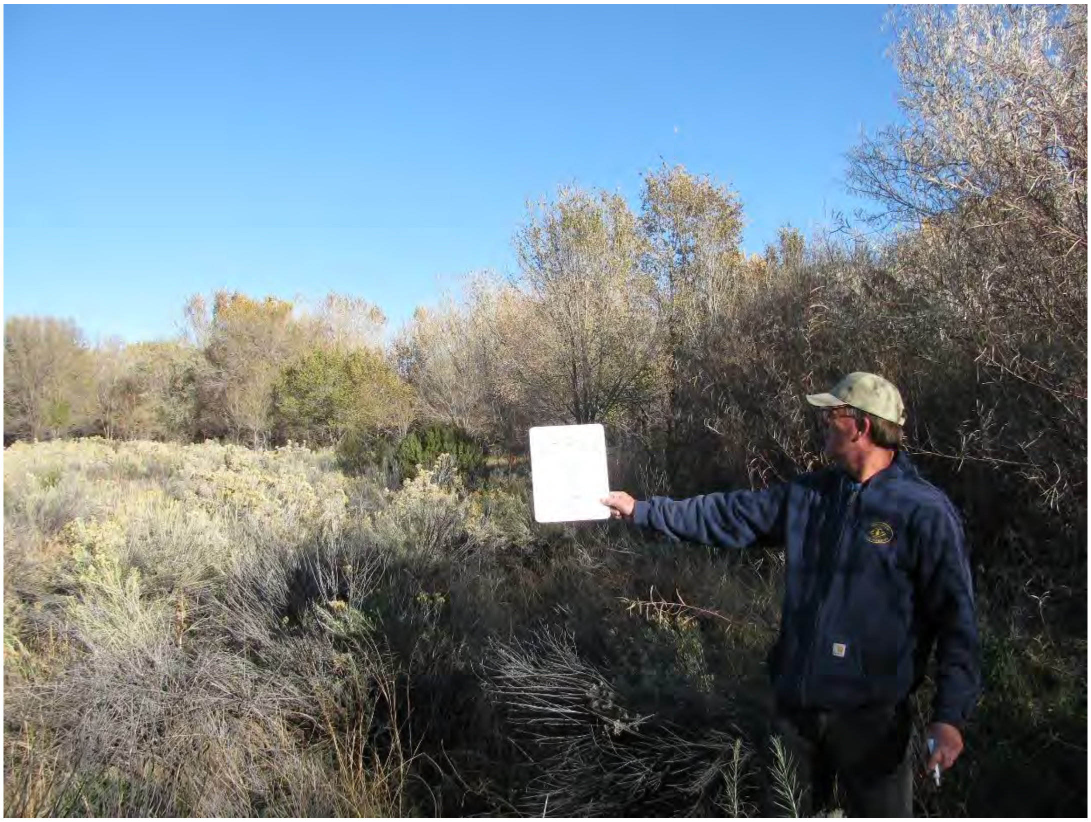
SFP4_5_3E, facing east from center (2011 above, 2016 below)

SFP4_5_3S, facing south from center (2011 above, 2016 below)

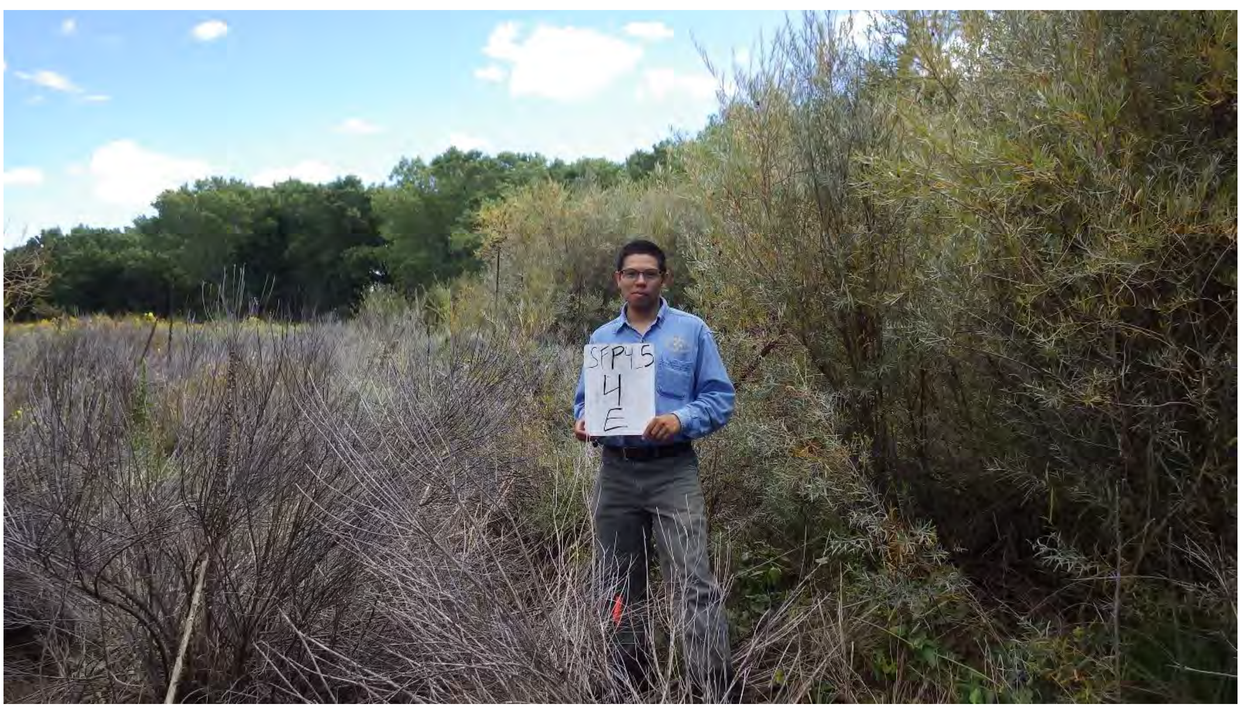
SFP4_5_3W, facing west from center (2011 above, 2016 below)

SFP4_5_4C, facing center from as close to 66 feet as visually possible (2011 above, 2016 below)

SFP4_5_4N, facing north from center (2011 above, 2016 below)

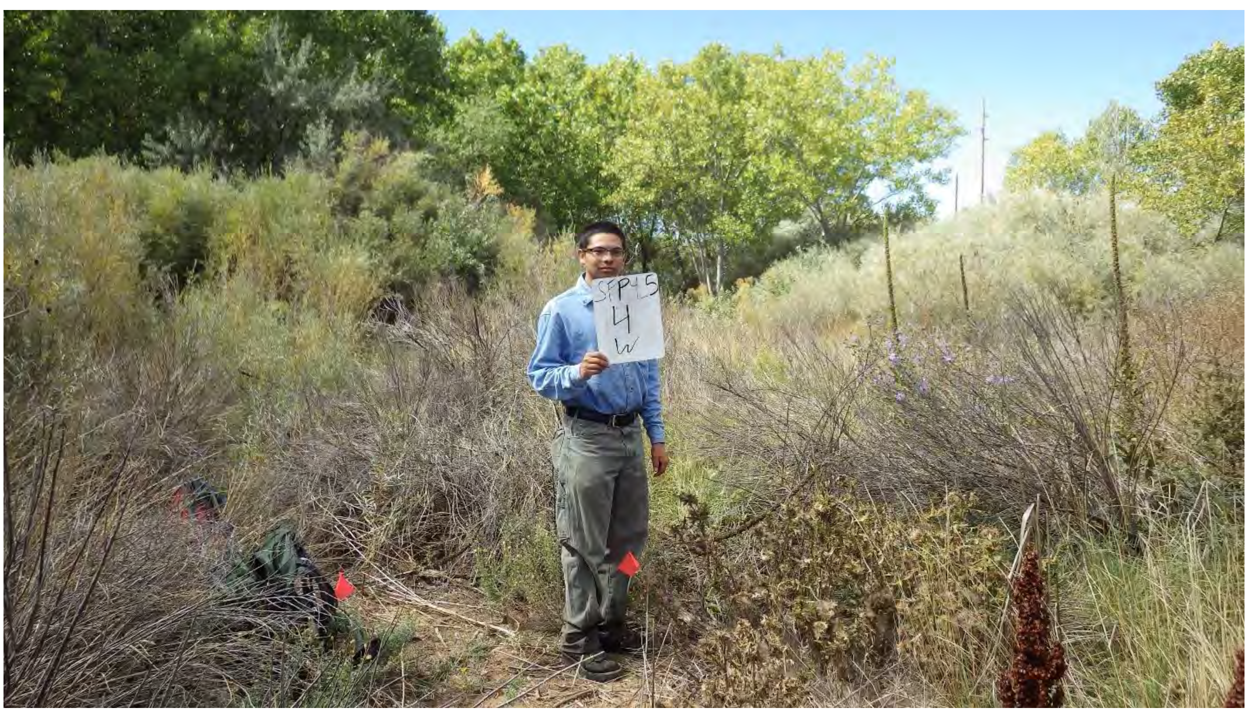


SFP4_5_4E, facing east from center (2011 above, 2016 below)



SFP4_5_4S, facing south from center (2011 above, 2016 below)

SFP4_5_4W, facing west from center (2011 above, 2016 below)



SFP4_5_5C, facing center from as close to 66 feet as visually possible (2011 above, 2016 below)

SFP4_5_5N, facing north from center (2011 above, 2016 below)

SFP4_5_5E, facing east from center (2011 above, 2016 below)

SFP4_5_5S, facing south from center (2011 above, 2016 below)

SFP4_5_5W, facing west from center (2011 above, 2016 below)