Santa Fe-Pojoaque SWCD La Cieneguilla Project (11.04)

10-year Monitoring Report

2022

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Santa Fe-Pojoaque SWCD

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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
DBH	Diameter at Breast Height
CSE	Common Stand Exam

Purpose of Report

This report covers pre-treatment and 5-year-post-treatment vegetation monitoring assessments performed on a non-native phreatophyte removal project south of 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 or 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 1/10 and 1/100 acre nestled radius plot was established by placing pin-flags at 11’ 9” and 37’ 3” 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 1/100th 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.

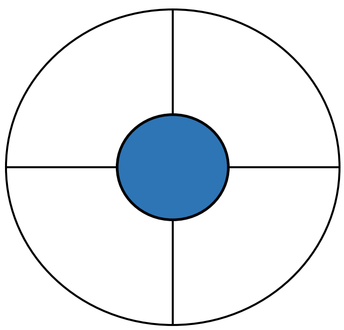


Figure 1. example of plot layout. The outer circle represents the 1/10 acre plot and the blue circle is the 1/100 plot

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 X). 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 VII).

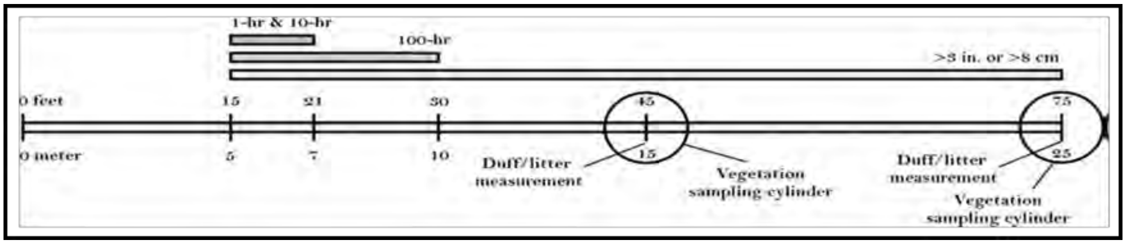


Figure 2. Example of fuels transect.

Personnel Involved

2022 Monitoring Team:

- Carmen Briones, Monitoring Program Assistant Manager / Crew Logistics
- Alex Makowicki, Ecological Monitoring Technician
- Patrick Clay Goetsch, Ecological Monitoring Technician
- Jordan Martinez, Ecological Monitoring Technician
- Annabella Miller, Student Technician

Other persons contacted 2022:

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

11.04 La Cieneguilla Project

SFP2 is an 11.5-acre project in Santa Fe County, south of the city of Santa Fe. The project is located in various fenced fields west of the Santa Fe River, southwest of the La Cieneguilla Petroglyphs. The nearest 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 22% Delvalle-Urban land complex, 0 to 2 percent slopes; 8% Cuyamungue-Riverwash complex, 0 to 2 percent slopes, flooded; and 70% Mirada-Bosquecito complex, 0 to 2 percent slopes, flooded. Ecological sites present include R035XA112NM Loamy, R036XB138NM Marshy, 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 Marshy ecological site type did not have a description available at the time of this report.

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 targeting the removal of non-native phreatophytes; scheduled for 2011-2012. Post-treatment monitoring was conducted November 16, 2022. The initial treatment prescription from New Mexico State Forestry included the removal of all invasive trees, followed by cut-stump herbicide to prevent resprouts. Slash over 3 inches in diameter was to be chipped or masticated and spread to a depth of less than 2 inches. Larger material (over 3 inches in diameter) was to be left in 4-foot lengths and piled. 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).

According to available inspection reports, herbicide retreatments of stump sprouts occurred on this site on October 22, 2013 and again in October 2014. The treated area consisted of two blocks totaling 2.9 acres each year. The second retreatment was expected to “be the last treatment needed to achieve a 90%+ non-native phreatophytes mortality rate.” (Fred Rossbach, GRGWA, 2014) Retreatment maps can be found in Appendix VI.

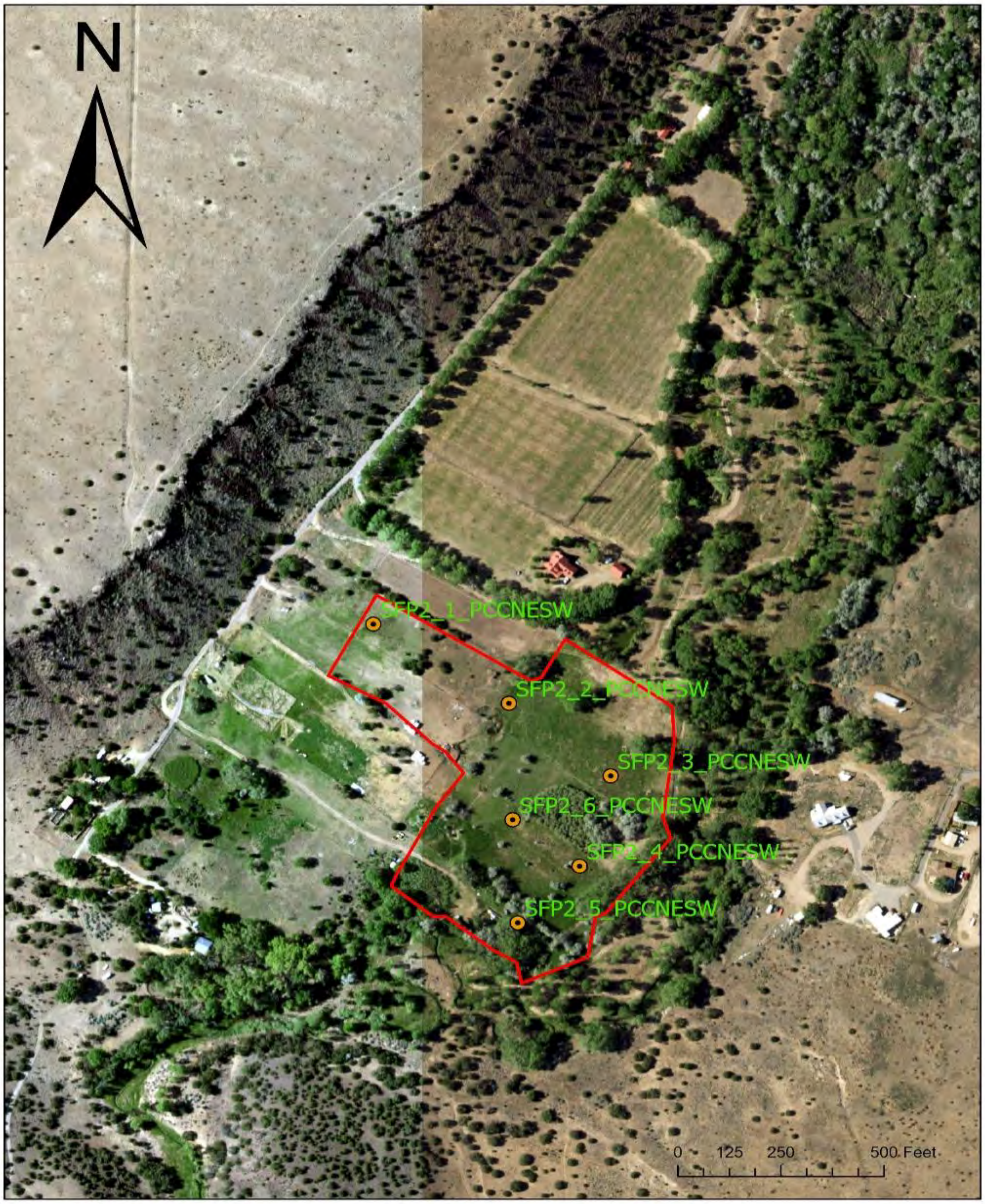


Figure 5. 11.04 in geographic context.

La Cieneguilla (11.04) Site Summary

2011 Site Observations: The project area consists of several fenced pastures interspersed with clumps of Coyote Willow, Cottonwood, Russian Olive, and Siberian Elm. Most of the project area is open, with the exception of the various size clumps of trees and shrubs. A few isolated One-seed Juniper also exist. These plots were assessed to fall in Hink & Ohmart Structure Classes 1, 3, 4, and 5.

2016 Site Observations: This project area had the lowest canopy cover and most obvious ongoing grazing of any re-visit. Some erosion, trampling, and other impacts were notable in wetter areas in multiple pastures. However, overall, the site also appeared to have the lowest incidence of resprouts among target non-native invasive phreatophytes species, and the lowest incidence of (identifiable) state-listed invasive exotic herbaceous species.

2022 Site Observations: The project area continues to be utilized as fenced pastureland for horses. There is little canopy cover, and the field was soggy in areas. Lots of asters and scattered ELAN stumps were present, and a spring was nearby one of the plots. A patch of coyote willows was found downhill from the spring. A mature cottonwood gallery grew along the river south of the plots, and came close to the westernmost plot, near a cowpen.

11.04 2011-2022 - Observed Plant Species

11.04 La Cieneguilla						
Vegetation Type/Year	***2011***		***2016***		***2022***	
Graminoids	*Typha L.*	*Cattail*	*Calamagrostis sp.* *Carex sp.* *Elymus canadensis L.* *Elymus smithii* *Panicum obtusum* *Poa pratensis L.* *Sporobulus spp.*	*Reed Grass* *Sedges* *Canada Wild Rye* *Western Wheatgrass* *Vinemesquite grass* *Kentucky Bluegrass* *Dropseed*	*Digitaria haller* *Dichanthelium sphaerocarpon* *Festuca arundinaceae*	*Crabgrass* *Roundseed panicgrass* *Tall Fescue*
Forbs	*Anemopsis californica* *Machaeranthera spp.* *Marrubium vulgare L.*	*Yerba Mansa* *Tansy Aster* *Horehound*	*Anemopsis californica* *Machaeranthera spp.* *Xanthium strumarium L.*	*Yerba Mansa* *Tansy Aster* *Cocklebur*	*Anemopsis californica* *Machaeranthera spp.* *Ambrosia psilostachya* *Bassia scopari* *Solanum elaeagnifolium* *Sphaeralcea* *Symphyotrichum ericoides*	*Yerba Mansa* *Tansy Aster* *Cuman Ragweed* *Kochia* *Silverleaf Nightshade* *Globemallow* *White Heath Aster*
Cactus						
Shrubs	*Salix Exigua*	*Coyote Willow*	*Salix Exigua* *Artemisia frigida* *Gutierrezia sarothrae*	*Coyote Willow* *Fringed Sagewort* *Broom snakeweed*	*Salix Exigua*	*Coyote Willow*
Trees	*Populus deltoides wislizeni* *Elaeagnus Angustifolia* *Juniperus monosperma*	*Rio Grande Cottonwood* *Russian Olive* *One-seeded Juniper*	*Populus deltoides wislizeni* *Elaeagnus Angustifolia*	*Rio Grande Cottonwood* *Russian Olive*	*Populus deltoides wislizeni* *Elaeagnus Angustifolia*	*Rio Grande Cottonwood* *Russian Olive*

In 2011, some species were noted but were noted as occurring within the project area but were not recorded on any specific plots. These included Annual sunflower (*Helianthus annus)* and Siberian elm (*Ulmus pumila*).

The new species that were found on plots in 2016 were almost entirely native species. However, Russian olive, the target species, was present both pre-treatment and post-treatment.

In 2022 a mix of new invasive/exotic plants established a presence on the site. Diversity of graminoids dropped drastically, with forbs increasing in diversity though many of these are exotics and pioneer species. Russian olive still has a presence in a few plots, but many plots where they had previously grown remained free of the species.

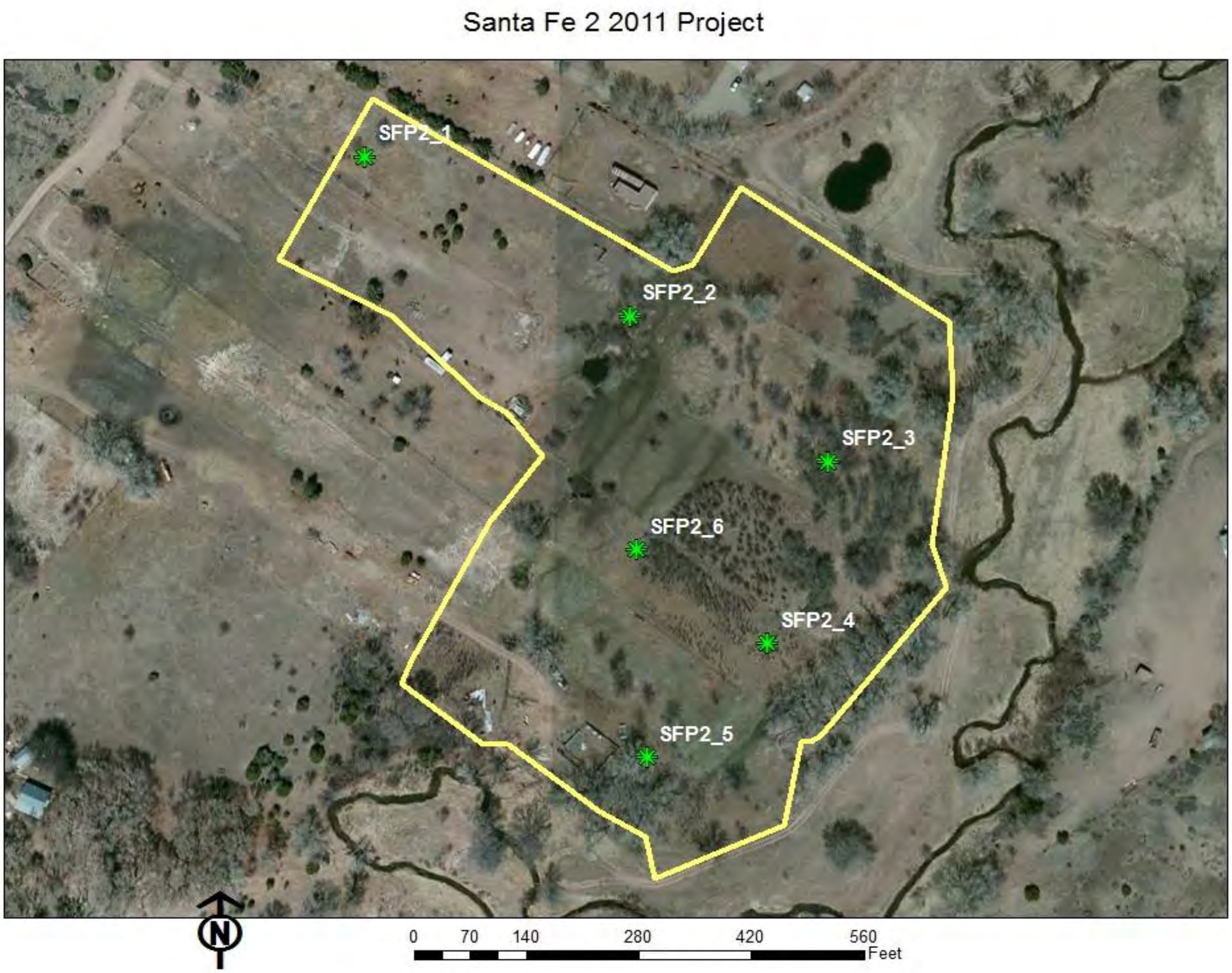


Figure 2. 11.04 plots.

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). Average basal area for the project was 29 sqft/ac. Figure 4 displays the average trees, seedlings and saplings per acre; species consisted of *Populus deltoides ssp. wislizenii, Elaeagnus angustifolia* and *Salix exigua. E. angustifolia* was the only sapling species recorded and had an average of 50 trees/acre. Seedlings consisted of *E. angustifolia* and *S. exigua, with S. exigua* being dominant. Of note is the high density of *S. exigua* which can take over open spaces after clearing has taken place. It should also be noted that *E. angustifolia* had a density of 5 trees per acre while *P. deltoides ssp. wislizenii* had a density of only 1.7 TPA. But when looking at basal area, *P. deltoides ssp. wislizenii* had a much higher basal area per acre, occupying 94% of the total basal area for all trees measured.

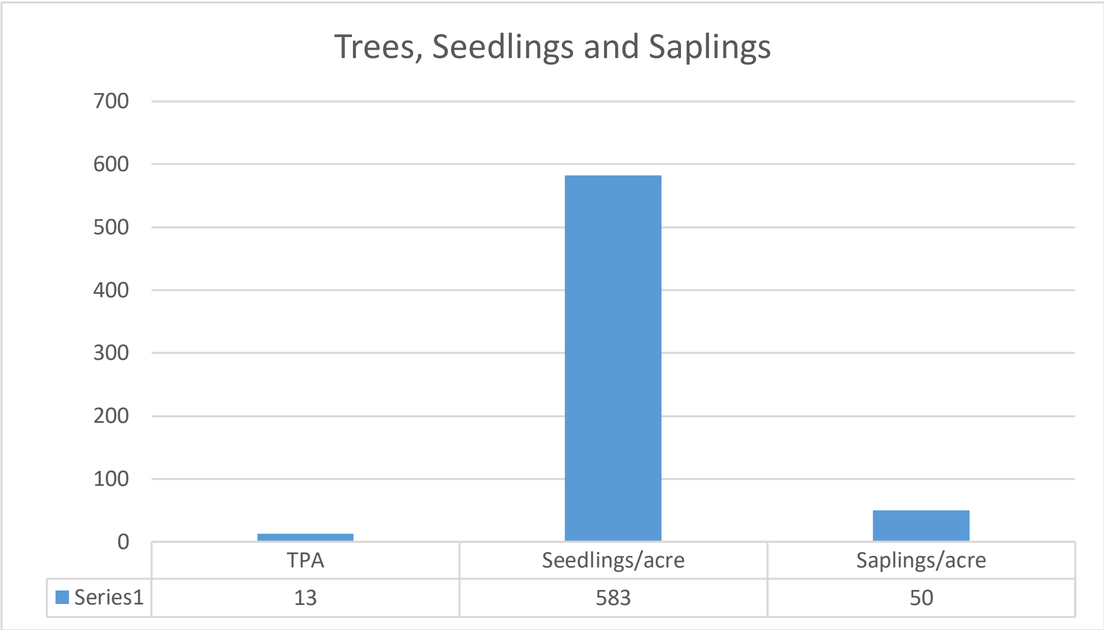


Figure 4. Average Trees per acre, Seedlings per acre, and Saplings per acre for entire plot

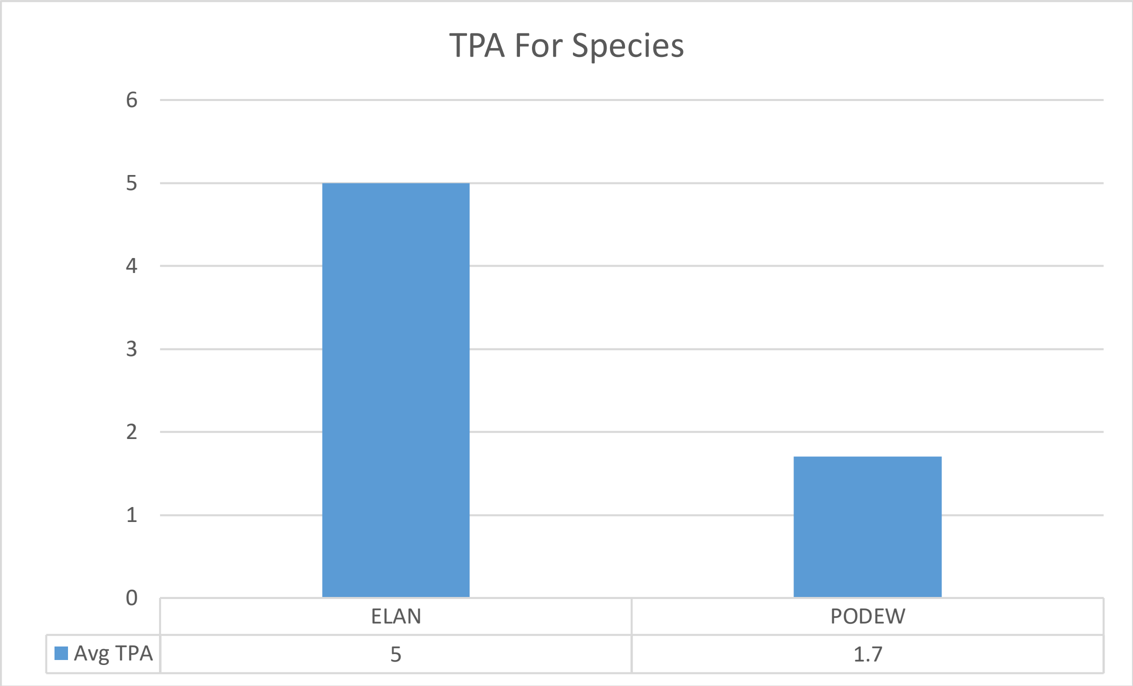


Figure 5. Average trees per acre by species for the entire plot

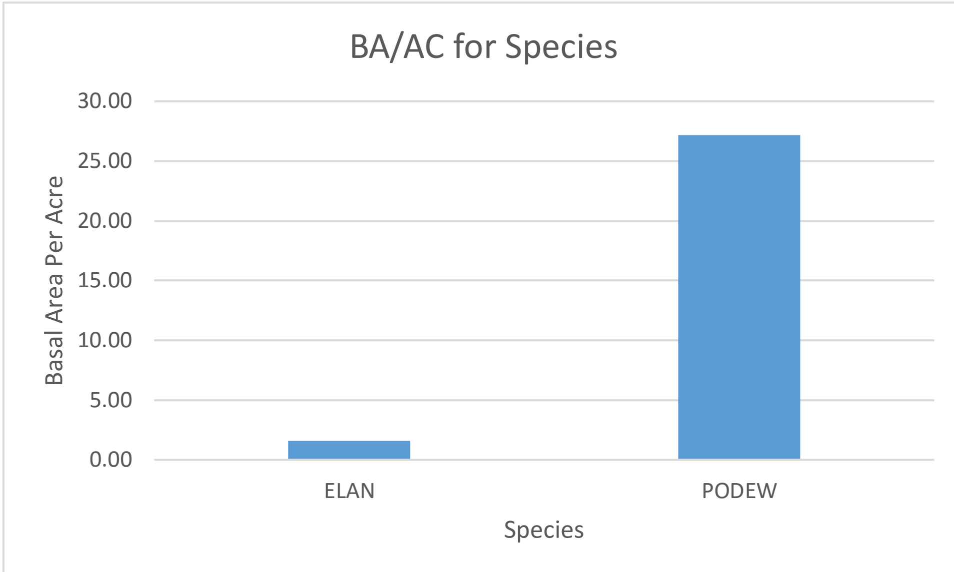


Figure 6. basal area for each species

11.04 La Cieneguilla October 2022				
Individual Plot Summary Table				
Macro Plot Name	Total number of sample trees on plot	Growing Stock		
		Number of growing stock sample trees on plot	Trees per Acre	Basal Area per Acre
11.04_1	0	0	0	0.00
11.04_2	0	0	0	0.00
11.04_3	0	0	0	0.00
11.04_4	2	2	20	2.69
11.04_5	6	6	60	169.85
11.04_6	0	0	0	0.00
Total	**Total number of sample trees on plot**	**Numbe r of growing stock sample trees on plot**	**Average for all Plots**	
			TPA	**BA/AC**
	8.00	**8.00**	**13.33**	**28.76**

Table 1. Stand table individual plot summary for La Cieneguilla

Understory and Bosque Floor Components

As described above, percent ground cover was estimated at each plot within the 1/100th acre subplot. Figures 6 and 7 display the project average cover for each metric. Total aerial cover may exceed 100% due to vegetation stacking on top of each other. Large changes occurred in the canopy cover and graminoid metrics. The loss of canopy cover can be attributed to the removal of large woody invasive species during treatment which creates more open canopy spaces.

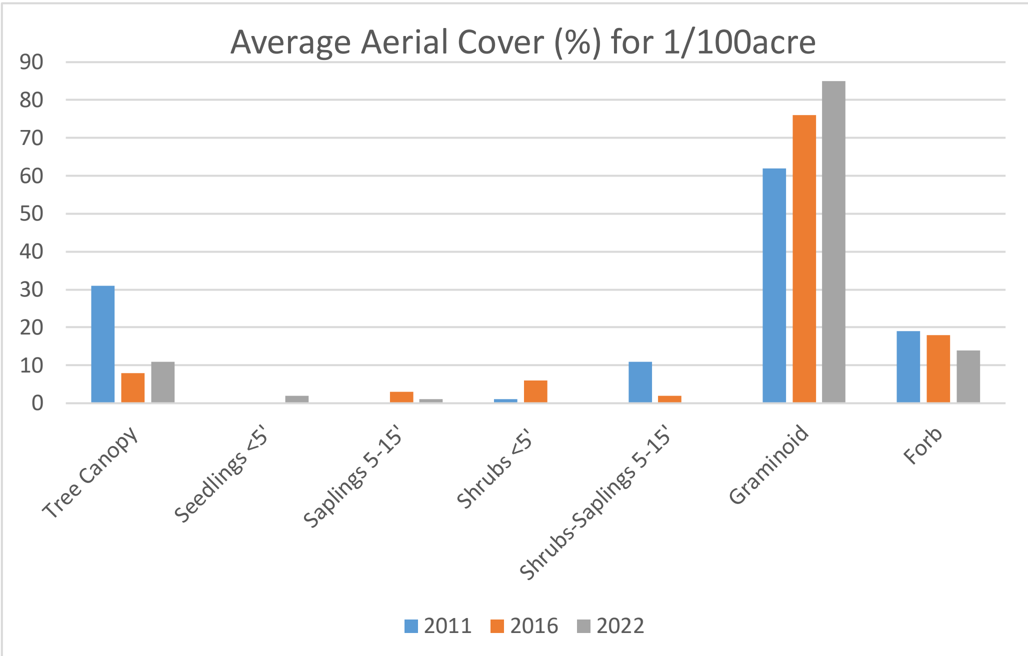


Figure 6. Average aerial cover for 1/100 acre plot for the entire project

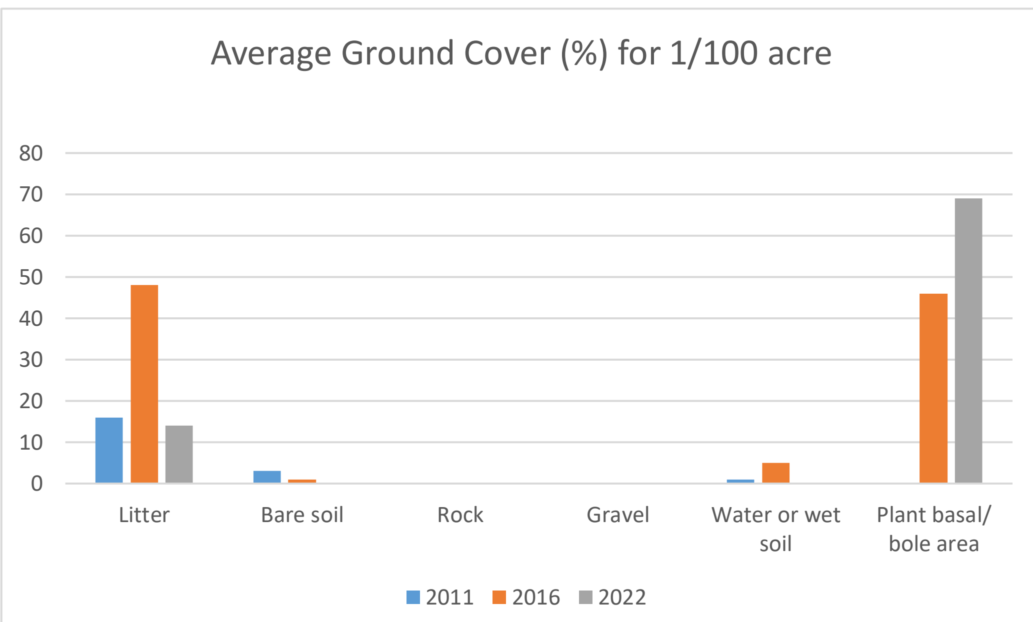


Figure 7. Average aerial cover for 1/100 acre plot for the entire project

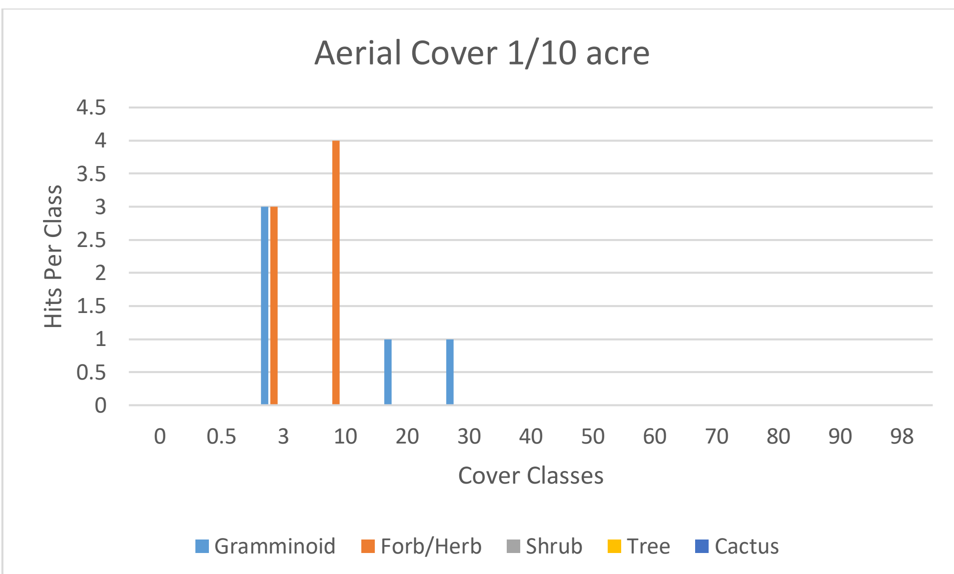
Cover: Tree canopy cover was notably less in 2016 than in 2011, although more sapling and shrubs were noted. Graminoid and forb cover were similar; litter cover was much higher in 2016. Graminoid and forbs generally compete for the same area of land and could be the reason Figure 6 shows an inverse relation between graminoid aerial cover and forb aerial cover. Also, of note is tree canopy was at its highest coverage in 2011 and graminoid was at it's lowest cover in 2011.

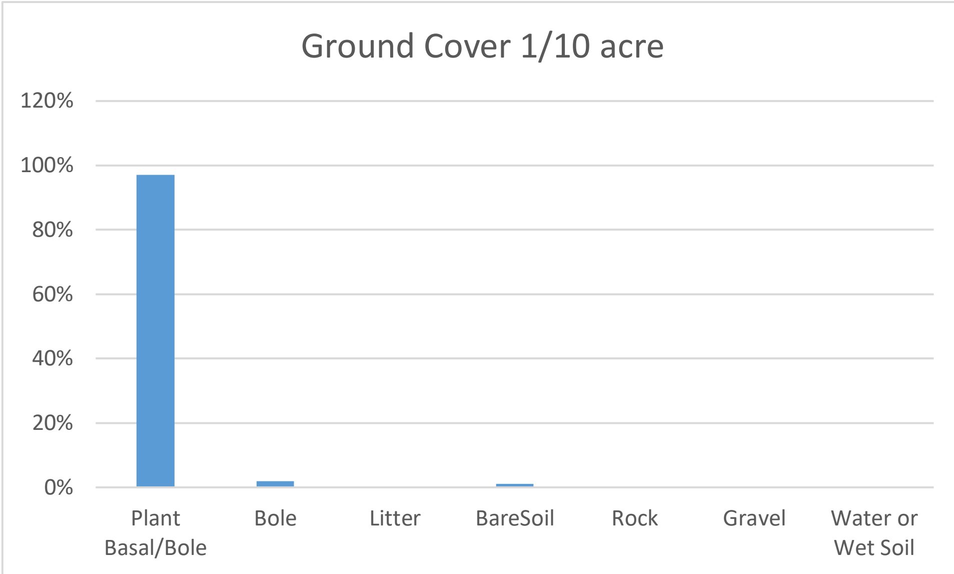
***Project**: SFP SWCD* ***Project Unit**: 11.04* ***Plot**: 11.04_1*

11.04 Aerial & Ground Cover

	Aerial Cover (%) 1/100 acre						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	19	0	0	0	0	45	45
2016	0	0	0	0	0	50	50
2022	0	0	0	0	0	55	45

	Ground Cover (%) 1/100 acre					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	5	5	0	0	0	n/a
2016	75	2	0	0	0	23
2022	0	0	0	0	0	100





2011 Hink & Ohmart Type: 4

2016 Hink & Ohmart Type: 6

2016 Modified Hink & Ohmart Type: 6H

2022 Hink & Ohmart Type: 6

2022 Modified Hink & Ohmart Type: 6H

2011 Comments: None.

2016 Comments: Cut stumps observed throughout plot, but none appeared to have re-sprouts. Horse grazing was evident at the time of the site visit.

2022 Comments: Open and grassy, horse pasture, fence to the North and South

***Project**: SFP SWCD* ***Project Unit**: 11.04* ***Plot**: 11.04_2*

11.04_2 Aerial & Ground Cover on 1/100th acre

	Aerial Cover (%)						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	58	0	0	0	0	80	12
2016	0	0	0	0	0	75	25
2022	1	0	0	0	0	85	5

	Ground Cover (%)					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	3	12	0	0	5	n/a
2016	28	2	0	0	30	40
2022	0	0	0	0	3	97

2011 Hink & Ohmart Type: 4

2016 Hink & Ohmart Type: 6

2016 Modified Hink & Ohmart Type: 6H

2022 Hink & Ohmart Type: 6

2022 Modified Hink & Ohmart Type: 6S

2011 Comments: Site was muddy.

2016 Comments: This plot had standing water near a pond with cattails. Despite the wetness of the site, wetland/hydrophilic vegetation was not observed. Trash and debris was present, as were plant pedestals (erosion).

2022 Comments: Fence crosses plot to the north, open and grassy. Lots of asters. Scattered ELAN stumps. Plot near a spring.

***Project**: SFP SWCD* ***Project Unit**: 11.04* ***Plot**: 11.04_3*

11.04_3 Aerial & Ground Cover

	Aerial Cover (%)						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	66	0	0	1	1	50	45
2016	0	0	0	0	0	100	20
2022	0	0	0	0	0	65	30

	Ground Cover (%)					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	5	0	0	0	0	n/a
2016	45	0	0	0	0	55
2022	0	0	0	0	0	100

2011 Hink & Ohmart Type: 5

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

2022 Hink & Ohmart Type: 6 **2022 Modified Hink & Ohmart Type:** 6H

2011 Comments: None.

2016 Comments: Most sedges on plot appeared dead. Horse was also present on plot.z

2022 Comments: Open, grassy, cottonwoods in background. Fence running NW, ELAN stumps scattered in plot.

***Project**: SFP SWCD* ***Project Unit**: 11.04* ***Plot**: 11.04_4*

11.04_4 Aerial & Ground Cover

	Aerial Cover (%)						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	0	0	1	2	30	85	2
2016	2	2	15	30	5	95	5
2022	6	3	5	0	0	95	3

	Ground Cover (%)					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	3	0	0	0	0	n/a
2016	50	0	0	0	0	50
2022	1	0	0	0	0	99

2011 Hink & Ohmart Type: 5

2016 Hink & Ohmart Type: 5

2016 Modified Hink & Ohmart Type: 6S

2022 Hink & Ohmart Type: 6

2022 Modified Hink & Ohmart Type: 6H

2011 Comments: None.

2016 Comments: Cows on plot with the field crew.

2022 Comments: Young willows in foreground, fence, dense willows in background. Open pasture, few Russian olives, open, grassy.

***Project**: SFP SWCD* ***Project Unit**: 11.04* ***Plot**: 11.04_5*

11.04_5 Aerial & Ground Cover

	Aerial Cover (%)						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	44	0	0	3	20	15	5
2016	47	0	0	5	5	40	5
2022	57	5	0	0	0	99	1

	Ground Cover (%)					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	80	0	0	0	0	n/a
2016	85	0	0	0	0	15
2022	80	0	0	0	0	20

2011 Hink & Ohmart Type: 1

2016 Hink & Ohmart Type: 3 **2016 Modified Hink & Ohmart Type**: 1

2022 Hink & Ohmart Type: 4 **2022 Modified Hink & Ohmart Type:** 2

2011 Comments: None.

2016 Comments: Plot crosses fence. Wet soils are nearby. Russian olive resprouts found.

2022 Comments: Through fence, scattered ELAN, grove of cottonwoods, willows in foreground. Cow-pen to the west.

***Project**: SFP SWCD* ***Project Unit**: 11.04* ***Plot**: 11.04_6*

11.04_6 Aerial & Ground Cover

	Aerial Cover (%)						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	0	0	0	1	15	98	2
2016	1	0	1	0	0	95	1
2022	0	2	0	0	0	99	1

	Ground Cover (%)					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	0	0	0	0	0	n/a
2016	5	0	0	0	0	95
2022	3	0	0	0	0	97

2011 Hink & Ohmart Type: 5/6

2016 Hink & Ohmart Type: 6

2016 Modified Hink & Ohmart Type: 6S

2022 Hink & Ohmart Type: 6

2022 Modified Hink & Ohmart Type: 6H

2011 Comments: None.

2016 Comments: None.

2022 Comments: Through fence, marshy. Patch of willows. Open pasture.

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.

Having collected data on three separate occasions (2011, 2016, 2022) our next steps will be to summarize the data collected and describe the progression of the site.

References

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

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.

Fred Rossbach, GRGWA. (2014). *Forest Contract Inspector Report: Greater Rio Grande Watershed Alliance (GRGWA), Santa Fe-Pojoaque SWCD, Jose Varela Re-treatment Projects.* GRGWA.

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

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 Gravelly R035XG114NM .*

USDA NRCS n.d. (n.d.). *Ecological Site Description Riverine Riparian F036XA005NM .*

USDA NRCS n.d. (n.d.). *Ecological Site Description Loamy R035XA112NM .*

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
11.04_1	35.5963	-106.1280
11.04_2	35.5958	-106.1270
11.04_3	35.5953	-106.1260
11.04_4	35.5946	-106.1260
11.04_5	35.5942	-106.1270
11.04_6	35.5950	-106.1270

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.

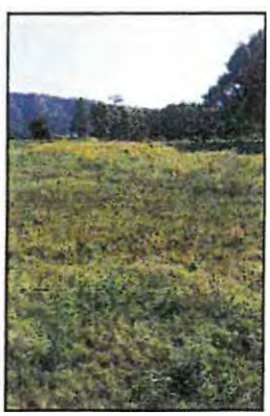
Young tree and shrub layer only (15-5 m [4.5-15 feet]) covering >25% of the area of the community (polygon). Stands dominated by tall shrubs and young trees, may include herbaceous vegetation underneath the woody vegetation. Photograph on San Francisco River by Y. Chauvin, 2012.

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.

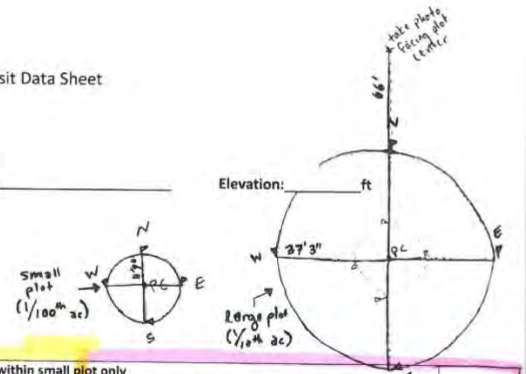
Appendix III – Sample Datasheets

2011 Data Sheets 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

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)

Cover % - Taken from/within small plot only

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)

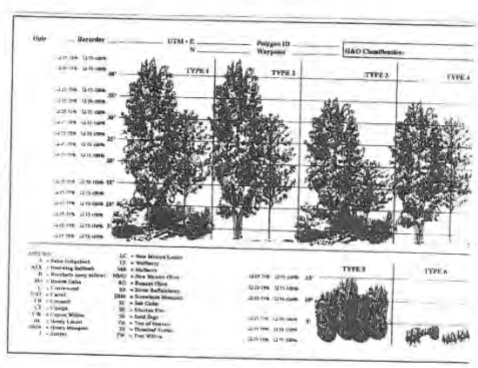
Grasses	Forbs	Shrubs	Trees

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 data sheets

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: ____________________

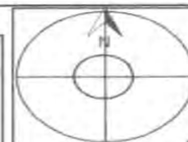
Macroplot Sizes		
Size (Acres)	1/100	1/10
Radius (Feet, Decimal Feet)	11.78	37.24
Radius (Feet, Inches)	11' 9"	37' 3"

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

	1/10th acre plot (37' 3" radius)								
Tree#	Species	Tree cond.	OBH	ORC	No. stems	Total Tree Ht	UCrBHt	Mistletoe (%)	Comments damage/disease, witness tree, etc.

Appendix IV – Fuels Transect Data Sheet

GRGWA Surface Fuels

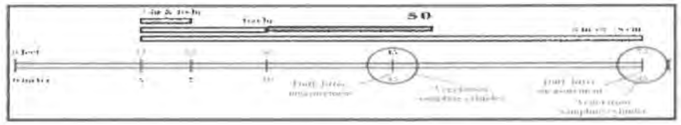
Sheet 1 of 1: Fine Woody Debris—Coarse Woody Debris

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.

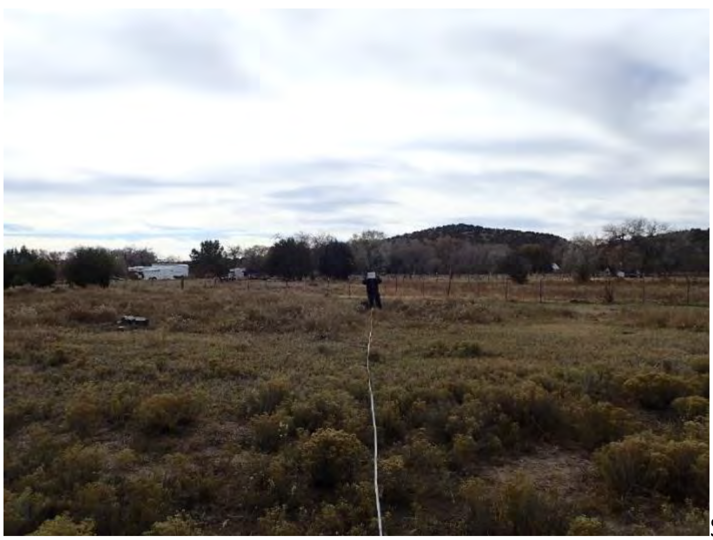
Appendix V – Retreatment Maps

Retreatment Areas: Areas were retreated in October 2013 & October 2014 (map from page 3 of GRGA Inspection Report, 11/01/13)

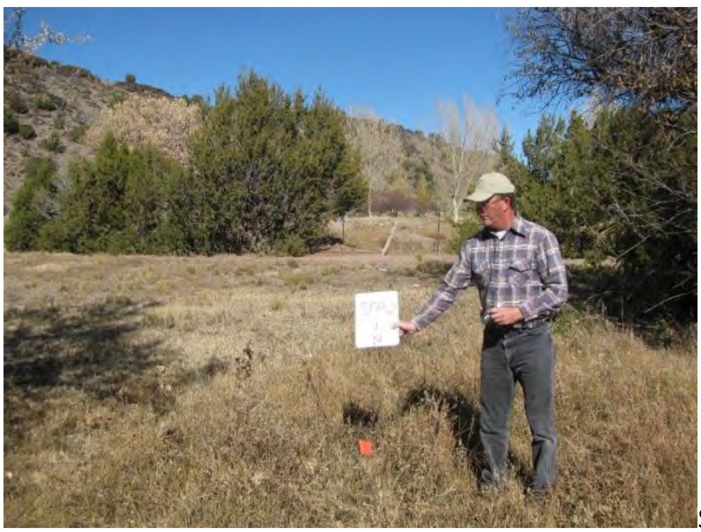
Appendix VI – Photo Pages

See the attached photo comparison pages for this site.


SFP2_1 Facing center from North at 66‘ (2011)


SFP2_1 Facing center from North at 66‘ (2016)


SFP2_1 Facing center from North at 75’ (2022)


SFP2_1N facing north from center at 11.8’ (2011)


SFP2_1N facing north from center at 11.8‘

(2016)


SFP2_1N facing north from center at 11.8’(2022)


SFP2_1E facing east from center at 11.8’ (2011)


SFP2_1E facing east from center at 11.8’ (2016)


SFP2_1E facing east from center at 11.8’ (2022)


SFP2_1S facing south from center at 11.8’

(2011)


SFP2_1S facing south from center at 11.8'

(2016)


SFP2_1S facing south from center at 11.8'

(2022)


SFP2_1W facing west from center at 11.8’ (2011)


SFP2_1W facing west from center at 11.8’ (2016)


SFP2_1W facing west from center at 11.8’ (2022)


SFP2_2C facing center from north at 66’(2011)


SFP2_2C facing center from north at 66' (2016)


SFP2_2C facing north from center at 66' (2022)


SFP2_2N facing north from center at 11.8’ (2011)

SFP2_2N facing north from center at 11.8’ (2016)


SFP2_2N facing north from center at 11.8‘ (2022)


SFP2_2E facing east from center at 11.8’ (2011)


SFP2_2E facing east from center at 11.8’ (2016)


SFP2_2E facing east from center at 11.8’ (2022)


SFP2_2S facing south from center at 11.8' (2011)


SFP2_2S facing south from center at 11.8' (2016)


SFP2_2S facing south from center at 11.8' (2022)


SFP2_3C facing center from north at 66' (2011)


SFP2_3C facing center from north at 66' (2016)


SFP2_3C facing center from north at 66' (2022)


SFP2_3N facing north from center at 11.8’ (2011)


SFP2_3N facing north from center at 11.8’ (2016)


SFP2_3N facing north from center at 11.8’ (2022)


SFP2_3E facing east from center at 11.8’ (2011)


SFP2_3E facing east from center at 11.8' (2016)


SFP2_3E facing east from center at 11.8' (2022)


SFP2_3S facing south from center at 11.8’ (2011)


SFP2_3S facing south from center at 11.8’ (2016)


SFP2_3S facing south from center at 11.8' (2022)


SFP2_3W facing west from center at 11.8' (2011)


SFP2_3W facing west from center at 11.8’ (2016)

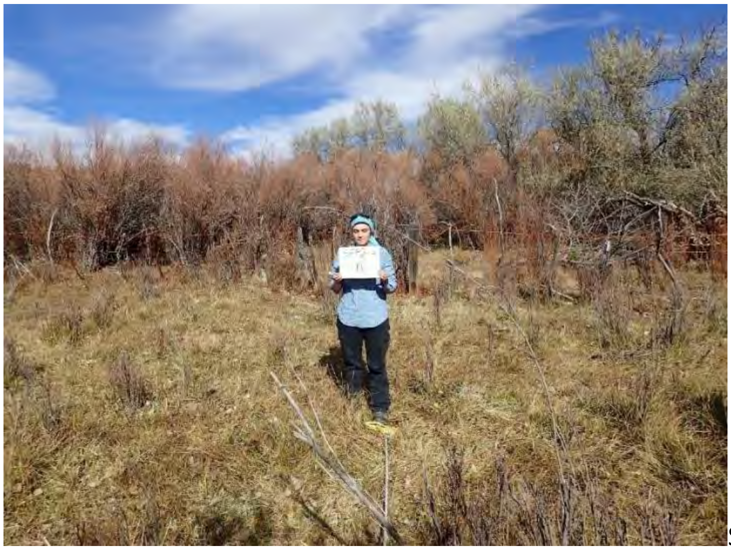

SFP2_3W facing west from center at 11.8’ (2022)


SFP2_4C facing center from north at 66' (2011)


SFP2_4C facing center from north at 66' (2016)


SFP2_4C facing center from north at 66’ (2022)


SFP2_4N facing north from center at 11.8’ (2011)


SFP2_4N facing north from center at 11.8' (2016)


SFP2_4N facing north from center at 11.8' (2022)


SFP2_4E facing east from center at 11.8' (2011)


SFP2_4E facing east from center at 11.8' (2016)


SFP2_4E facing east from center at 11.8' (2022)


SFP2_4S facing south from center at 11.8' (2011)


SFP2_4S facing south from center at 11.8’ (2016)


SFP2_4S facing south from center at 11.8’ (2022)


SFP2_4W facing west from center at 11.8' (2011)


SFP2_4W facing west from center at 11.8' (2016)


SFP2_4W facing west from center at 11.8’ (2022)


SFP2_5C facing center from north at 66’ (2011)


SFP2_5C facing center from north at 66' (2016)


SFP2_5C facing center from north at 66' (2022)


SFP2_5N facing north from center at 66' (2011)


SFP2_5N facing north from center at 66' (2016)


SFP2_5N facing north from center at 66’ (2022)


SFP2_5E facing east from center at 66’ (2011)


SFP2_5E facing east from center at 66’ (2016)


SFP2_5E facing east from center at 66’ (2022)


SFP2_5S facing south from center at 66’ (2011)


SFP2_5S facing south from center at 66’ (2016)


SFP2_5S facing south from center at 66’ (2022)


SFP2_5W facing west from center at 66’ (2011)

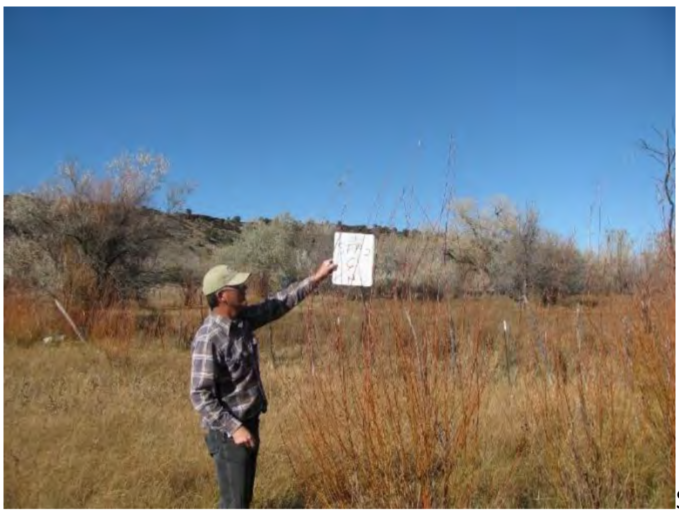

SFP2_5W facing west from center at 66’ (2016)


SFP2_5W facing west from center at 66’ (2022)


SFP2_6C facing center from north at 66’ (2011)


SFP2_6C facing center from north at 66’(2016)


SFP2_6C facing north from center at 66’ (2022)


SFP2_6N facing north from center at 11.8’ (2011)


SFP2_6N facing north from center at 11.8’ (2016)


SFP2_6N facing north from center at 11.8’ (2022)


SFP2_6E facing east from center at 11.8’ (2011)


SFP2_6E facing east from center at 11.8’ (2016)


SFP2_6E facing east from center at 11.8’ (2022)


SFP2_6S facing south from center at 11.8’ (2011)


SFP2_6S facing south from center at 11.8’ (2016)


SFP2_6S facing south from center at 11.8’ (2022)


SFP2_6W facing west from center at 11.8’ (2011)


SFP2_6W facing west from center at 11.8’ (2016)


SFP2_6W facing west from center at 11.8’ (2022)