Santa Fe-Pojoaque SWCD SFP1 (Puerta del Cañon) Project

5-year Monitoring Report

2016

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for the
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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 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 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)

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

SFP1 Puerta del Cañon Project

SFP1 is a five-acre project in Santa Fe County, south of the city of Santa Fe. The project follows the Santa Fe River through a rocky canyon just north of La Cienega. 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 54% Ildefonso-Rock outcrop-Rubble land complez, 30 to 70 percent slopes; 26% Truehill-Penistaja family-Rock outcrop complex, 4 to 50 percent slopes; and 20% Cuyamungue-Riverwash complex, 0 to 2 percent slopes, flooded. 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 in the river bottom, followed by cut-stump herbicide to prevent resprouts. Cut material in accessible areas under 3 inches in diameter was to be chipped and spread to depths of 2 inches or less in non-grassy areas. Larger material (over 3 inches in diameter) was to be left in 4 foot lengths, above the high water mark. In inaccessible areas, slash was to be limbed and piled above the high water mark in piles not more than 4’ x 4’ x 4’ for burning at a later point. Material over 3 inches in diameter was to be piled separately. 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).

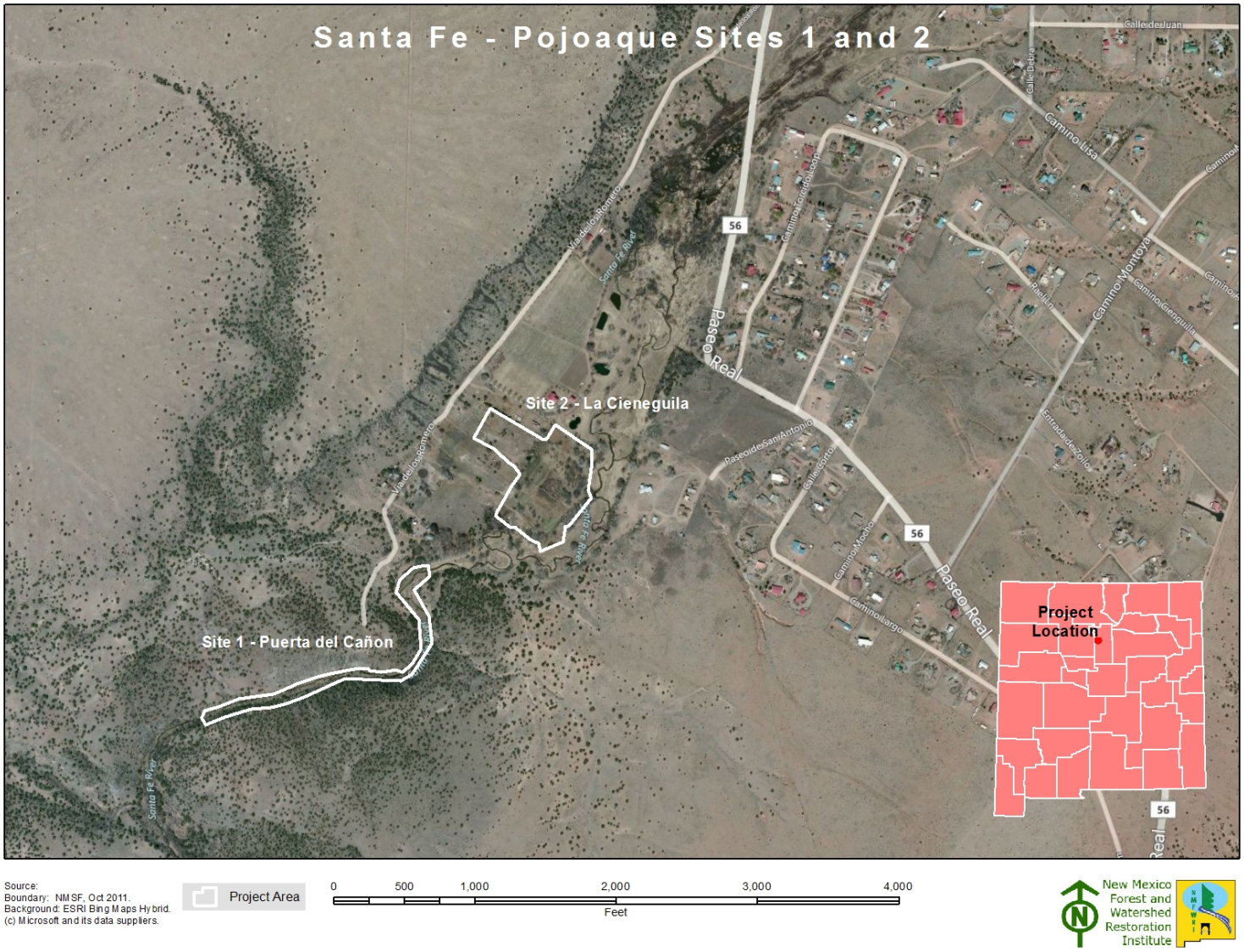

Figure 2. SFP1 in geographic context.

Puerta del Cañon (SFP1) Site Summary

2011 SFP1 Site observations: The project area follows a portion of the Santa Fe River. The project area begins in a relatively open area and then descends into a narrow canyon. An acequia runs parallel to the river through the canyon. Vegetation consists of a patchy mosaic of shrubs and trees, with a few dense stands of Russian olive and a few grassy areas. Plot SFP1_1 is in a relatively open area near the river bank. Plot SFP_1_2 is a rocky site, with a mix of shrubs, grasses, and a few nearby Russian olive. Plot SFP_1_3 is in a thick stand of Russian olive and salt cedar. SFP_1_4 is a relatively grassy area, with Russian olive, salt cedar, and one-seed juniper in the area. Since monitoring was done so late in the fall, relatively sparse forb and grasses cover may be attributed to seasonal dormancy. These plots were assessed to fall in Hink & Ohmart Structure Classes 1, 3, 4, and 6.

2016 SFP1 Site observations: This site is rocky with steep slopes, following the meanders of the Santa Fe River. The site has grassy banks with sparse cottonwood overstory. Juniper and Apache plume are common on the side slopes. Grazing is evident throughout the project area. Piles of slash, presumably from treatment, are found in the western portion of the project. Plots were assessed to fall in Hink and Ohmart structure classes 3, 5 and 6.

Cover: Aerial & ground cover was much the same in both years, although there was somewhat less tree cover and somewhat more litter in 2016 than in 2011.

	Average Aerial cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2011	33%	0%	0%	5%	2%	35%	2%
2016	26%	1%	0%	6%	0%	41%	2%

	Average Ground cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2011	24%	9%	17%	2%	12%	n/a
2016	36%	13%	16%	2%	8%	9%

SFP_1 2011-2016

Observed plant species (on plots)

Red plants found in 2011 only

Blue plants found in 2016 only

Green plants found both years

Grasses		Forbs	
Scientific name	**Common name**	***Scientific name***	**Common name**
Achnatherum hymenoides	Indian ricegrass		Unknown forb
Bothriochloa laguroides	Silver beardgrass/bluestem		Unknown thistle
Bouteloua curtipendula	Sideoats grama	*Achillea millefolium*	Yarrow
Bouteloua gracilis	Blue grama	*Aster sp.*	White aster
Bromus tectorum L.	Cheat grass	*Bassia prostrata*	Kochia
Calamagrostis sp.	Reed canary grass	*Dalea candida*	White prairie clover
Carex sp.	Sedges	*Descurainia pinnata*	Tansymustard
Dactylis glomerata L.	Orchard grass	*Equisetum sp.*	Horse tail
Elymus smithii	Western wheatgrass	*Gaura parviflora*	Velvet gaura
Juncus sp.	Rushes	*Salsola tragus L.*	Russian thistle
Sporobulus sp.	Dropseed	*Senecio vulgaris*	Groundsel
	Unknown	*Taraxacum officinale*	Dandelion
		Verbascum thapsus L.	Mullein
		Xanthium strumarium L.	Cocklebur

Shrubs		Trees	
Scientific name	**Common name**	***Scientific name***	**Common name**
Artemisia frigida	Fringed sagewort	*Elaeagnus angustifolia*	Russian olive
Cylindropuntia sp.	Cholla	*Juniperus monosperma*	Oneseed juniper
Ephedra sp.	Mormon tea/cota	*Pinus edulis*	Piñon
Ericameria nauseosa	Rubber rabbitbrush	*Populus angustifolia*	Narrowleaf cottonwood
Fallugia paradoxa	Apache plume	*Populus deltoides*	Rio Grande cottonwood
Gutierrezia sarothrae	Broom snakeweed	*Salix sp.*	Unknown willow
Ribes inerme	Gooseberry	*Tamarix ramosissima*	Salt cedar
Salix exigua	Coyote willow	*Ulmus pumila L.*	Siberian elm

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 crested wheatgrass (*Agropyron cristatum*), Rio Grande cottonwood (*Populus deltoides)*, and Siberian elm (*Ulmus pumila*).

The new species that were found on plots in 2016 included both natives and exotics. Cheatgrass, Russian thistle, Kochia, salt cedar and Siberian elm were among the most unwelcome additions. Russian olive, the target species, was present both pre-treatment and post-treatment.

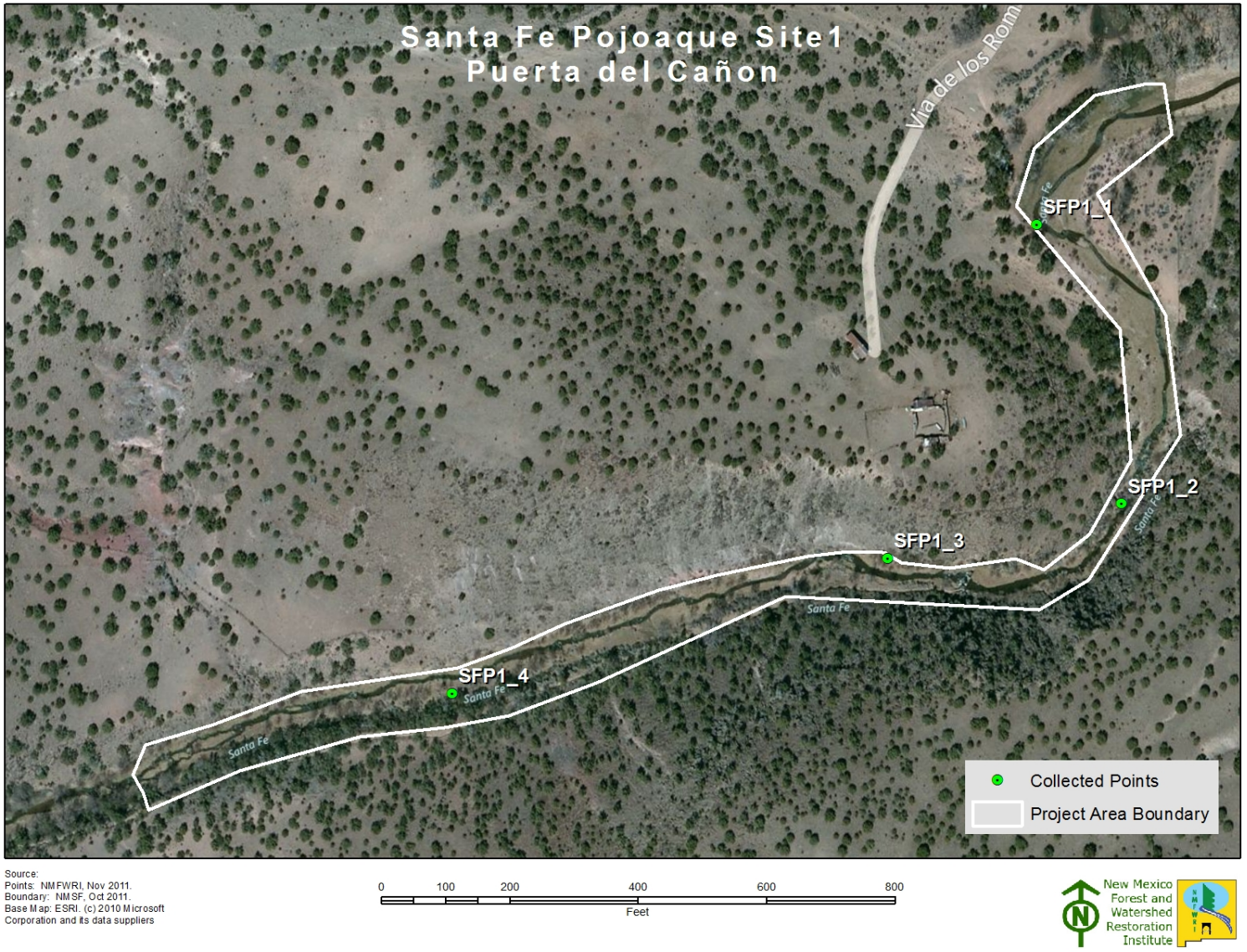

Figure 3. SFP1 plots.

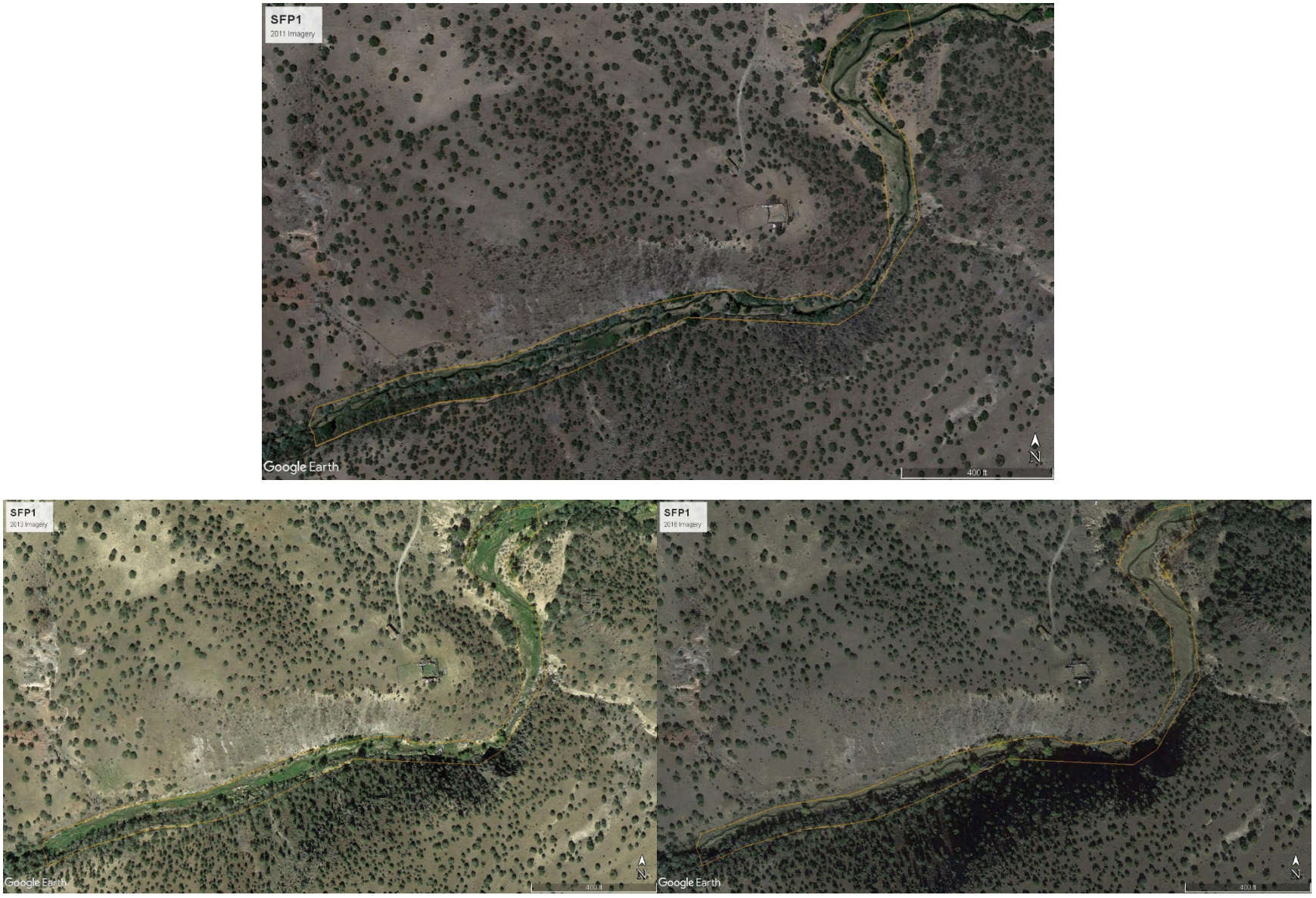

Figure 4. Google Earth imagery for SFP1 pre- and post-treatment.
2011 pre-treatment imagery is top; 2013 and 2016 post-treatment imagery on bottom.

***Project**: SFP SWCD* ***Project Unit**: SFP1* ***Plot**: SFP1_1*

SFP1_1 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	3%	0%	0%	3%	8%	7%	1%
2016	15%	2%	0%	10%	0%	20%	2%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	1%	3%	65%	8%	15%	n/a
2016	2%	8%	55%	5%	5%	5%

SFP1_1 2011 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
		Broom snakeweed	Oneseed juniper
		Cholla	Piñon
		Coyote willow	Russian olive
		Ephedra	

2011 Hink & Ohmart Type: 4 or 6

SFP1_1 2016 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
Reed canary grass	Groundsel	Broom snakeweed	Narrowleaf cottonwood
Rushes			Oneseed juniper
sedges			Piñon
unknown			Siberian elm
Western wheatgrass			

2016 Hink & Ohmart Type: 6 **2016 Modified Hink & Ohmart Type**: 7 (rock)

2011 Comments: None.

2016 Comments: Plot crosses river; cattle appear to have continuous river access. There is no stream shade and active bank undercutting on plot.

***Project**: SFP SWCD* ***Project Unit**: SFP1* ***Plot**: SFP1_2*

SFP1_2 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	3%	0%	0%	3%	8%	7%	1%
2016	15%	2%	0%	10%	0%	20%	2%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	1%	3%	65%	8%	15%	n/a
2016	2%	8%	55%	5%	5%	5%

SFP1_2 2011 Species Observed

Grasses	Forbs	Shrubs	Trees
Sideoats grama		Apache plume	Russian olive
Silver beardgrass		Coyote willow	

2011 Hink & Ohmart Type: 3

SFP1_2 2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Reed canary grass	White prairie clover	Apache plume	Narrowleaf cottonwood
Sideoats grama		Broom snakeweed	Rio Grande cottonwood
Silver beardgrass			Willow sp.

2016 Hink & Ohmart Type: 3 **2016 Modified Hink & Ohmart Type**: 2/6H

2011 Comments: None.

2016 Comments: This plot is especially cliffy and rocky. The river crossing includes a deep pool.

***Project**: SFP SWCD* ***Project Unit**: SFP1* ***Plot**: SFP1_3*

SFP1_3 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	97%	1%	0%	0%	0%	22%	0%
2016	50%	0%	0%	5%	0%	4%	1%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	75%	2%	1%	0%	0%	n/a
2016	75%	23%	0%	0%	0%	2%

SFP1_3 2011 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
		Coyote willow	Russian olive
			Salt cedar

2011 Hink & Ohmart Type: 4

SFP1_3 2016 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
Dropseed	Horsetail/scouring rush	Fringed sagewort	Narrowleaf cottonwood
Indian ricegrass	Russian thistle	Rubber rabbitbrush	Oneseed juniper
Orchard grass	Velvet gaura		Russian olive
Reed canary grass			

2016 Hink & Ohmart Type: 5 **2016 Modified Hink & Ohmart Type**: 5/6H

2011 Comments: None.

2016 Comments: This plot is downstream of the acequia diversion. It is steep, rocky with abundant slash on site. Salt is visible on the soil surface. Tires, glass and other debris were noted. Plot center stake was in tumbleweeds.

***Project**: SFP SWCD* ***Project Unit**: SFP1* ***Plot**: SFP1_4*

SFP1_4 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5'**	**Saplings 5-15'**	**Shrubs <5'**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2011	18%	0%	0%	15%	0%	50%	6%
2016	24%	0%	0%	10%	0%	90%	5%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2011	17%	25%	2%	0%	0%	n/a
2016	60%	10%	5%	1%	0%	26%

SFP1_4 2011 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
	Mullein	Apache plume	Oneseed juniper
	Unknown thistle	Cholla	Russian olive
		Gooseberry	Salt cedar
		Rubber rabbitbrush	

2011 Hink & Ohmart Type: 4

SFP1_4 2016 Species Observed

Grasses	**Forbs**	**Shrubs**	**Trees**
Blue grama	Cocklebur	Apache plume	Oneseed juniper
Cheatgrass	Dandelion	Gooseberry	
Kentucky bluegrass	Kochia	Rubber rabbitbrush	
Orchard grass	Mullein		
Sideoats grama	Tansymustard		
Western wheatgrass	Unknown forb		
	Unknown thistle		
	White aster		
	White prairie clover		
	Yarrow		

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

2011 Comments: None.

2016 Comments: Plot center was in a brush pile.

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
SFP1_1	35.5929	-106.1300
SFP1_2	35.5917	-106.1300
SFP1_3	35.5914	-106.1310
SFP1_4	35.5908	-106.1330

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 (1.5-5 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.

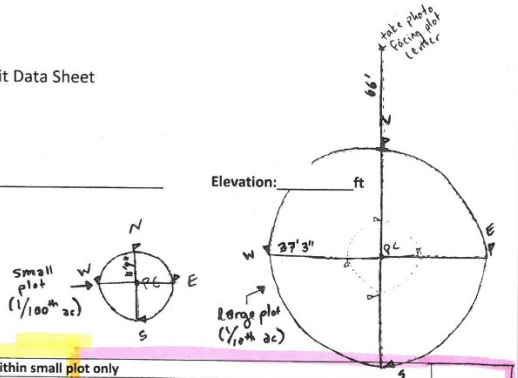
Appendix III – Sample Datasheet

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

take photo facing plot center



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 test. 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)

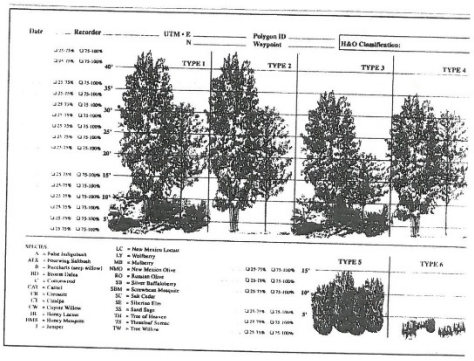
Species Observed in 1/10th ac plot (scientific name, common name, or USDA PLANTS code)

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 SFP1, 4 plots

SFPSWCD: Puerta del Cañon

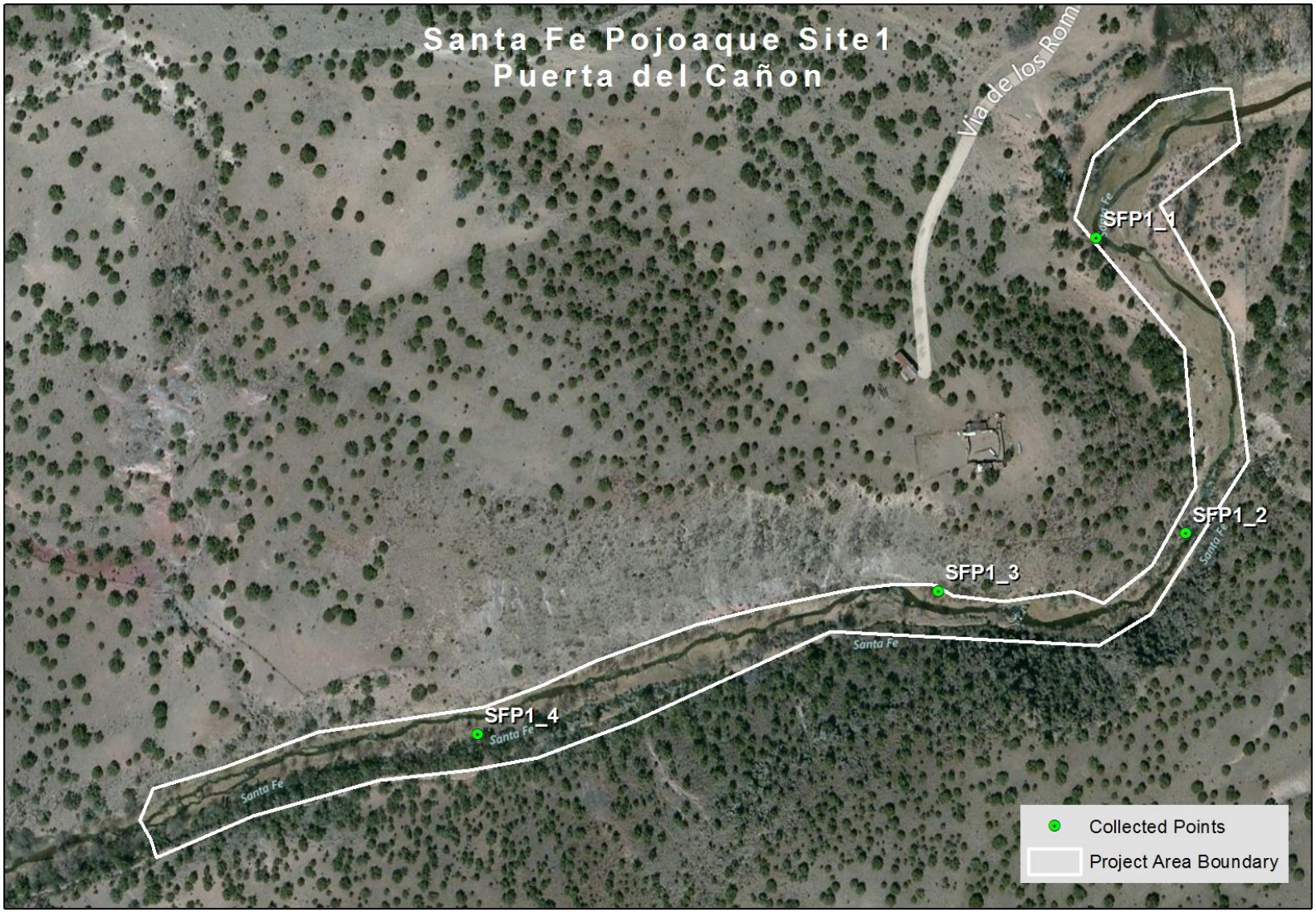
2011 photos: taken November 17, 2011 by Joe Zebrowski, NMFWRI

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

Contact:

Kathryn Mahan, Ecological Monitoring Specialist, NMFWRI

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

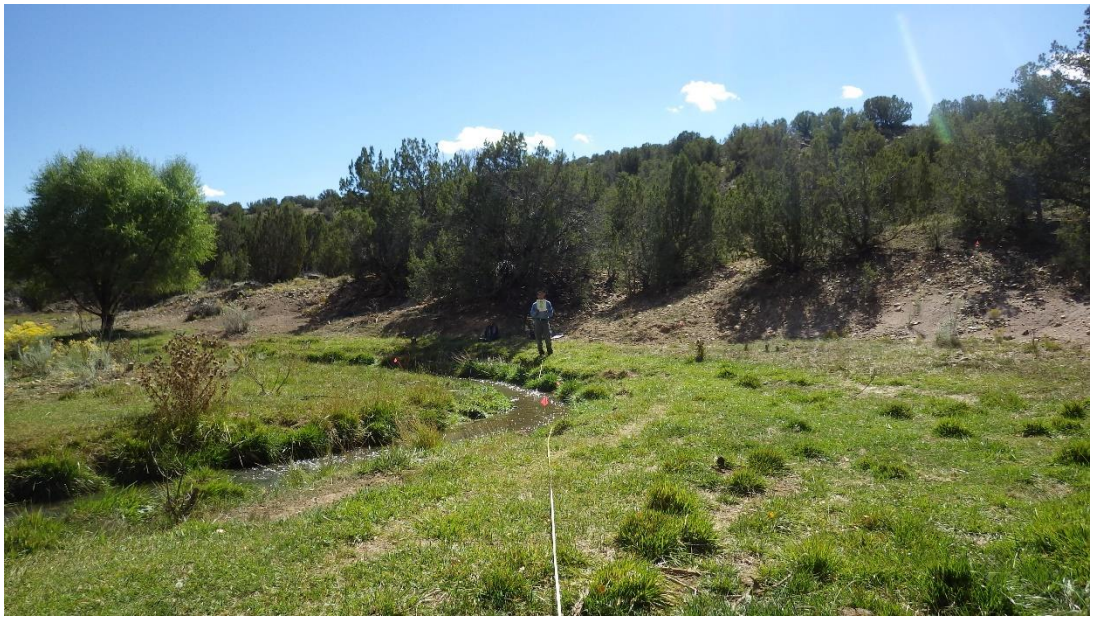


Source:
Points: NMFWRI, Nov 2011.
Boundary: NMSF, Oct 2011.
Base Map: ESRI. (c) 2010 Microsoft Corporation and its data suppliers

0 100 200 400 600 800
Feet

New Mexico Forest and Watershed Restoration Institute

SFP1_1C, facing center from as close to 66 feet as visually possible (2011 above, 2016 below)



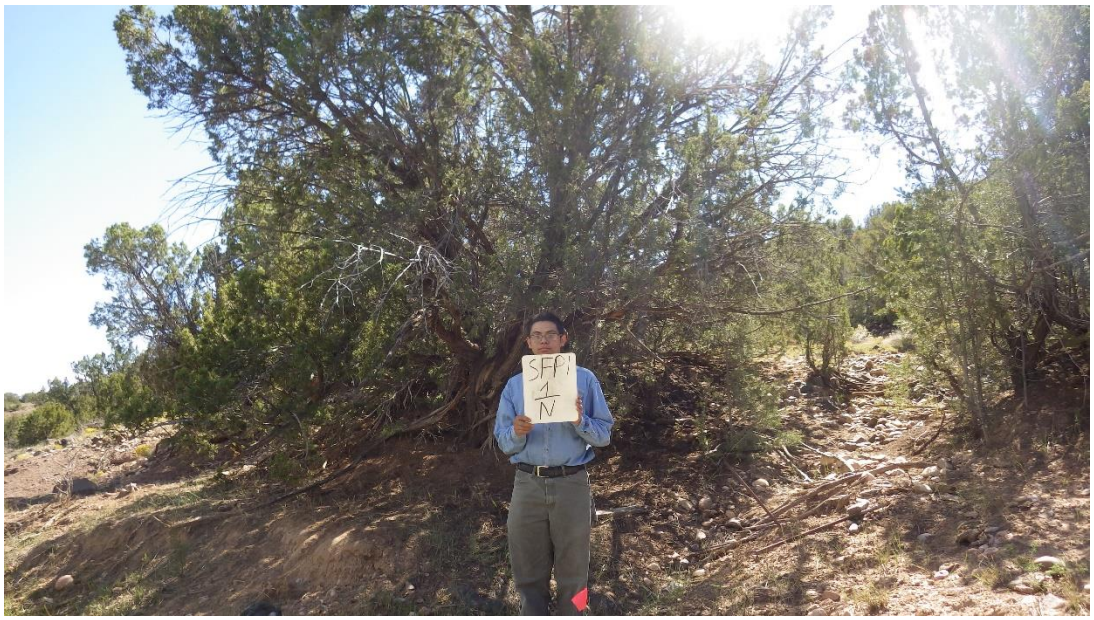
SFP1_1N, facing north from center (2011 above, 2016 below)

SFP1_1E, facing east from plot center (2011 above, 2016 below)

** Whiteboard is incorrectly labeled in 2016 photos for this plot.**

SFP1_1S, facing south from center (2011 above, 2016 below)

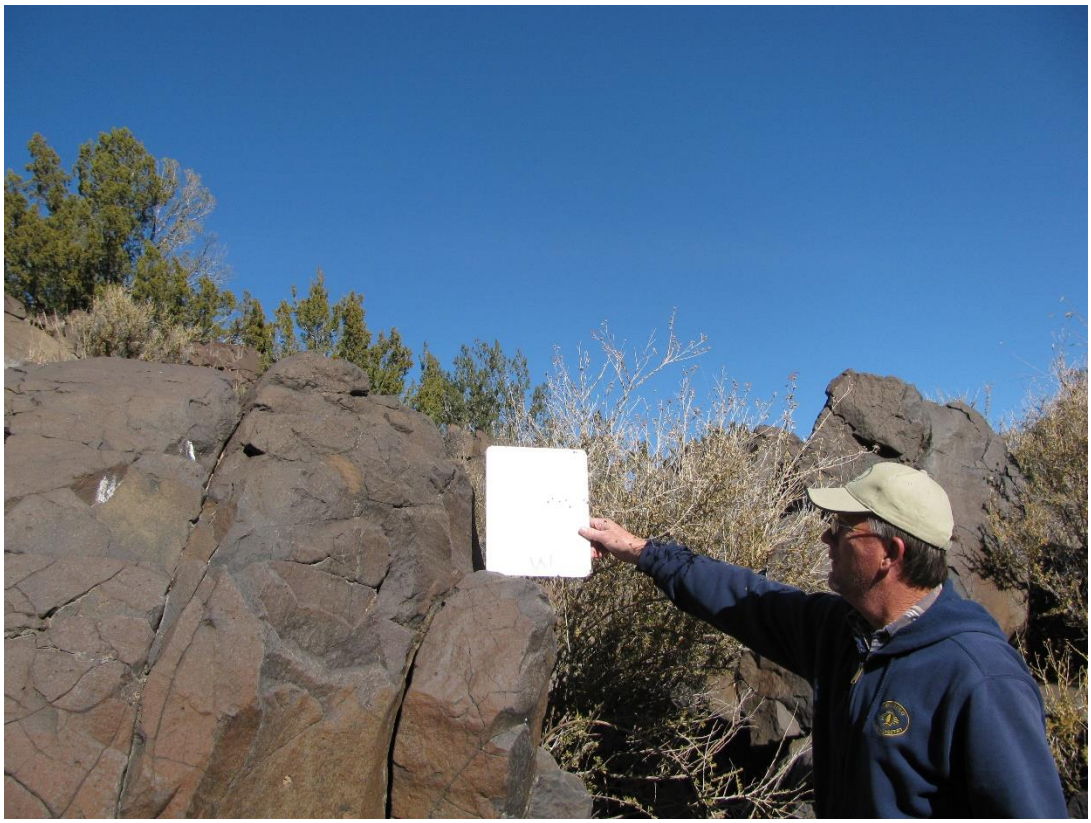
** Whiteboard is incorrectly labeled in 2016 photos for this plot.**



SFP1_1W, facing west from center (2011 above, 2016 below)

** Whiteboard is incorrectly labeled in 2016 photos for this plot.**

SFP1_2C, facing center from as close to 66 feet as visually possible (2011 above, 2016 below)



Whiteboard is incorrectly labeled in 2011 photos for this plot.

SFP1_2N, facing north from plot center (2011 above, 2016 below)

Whiteboard is incorrectly labeled in 2011 photos for this plot.

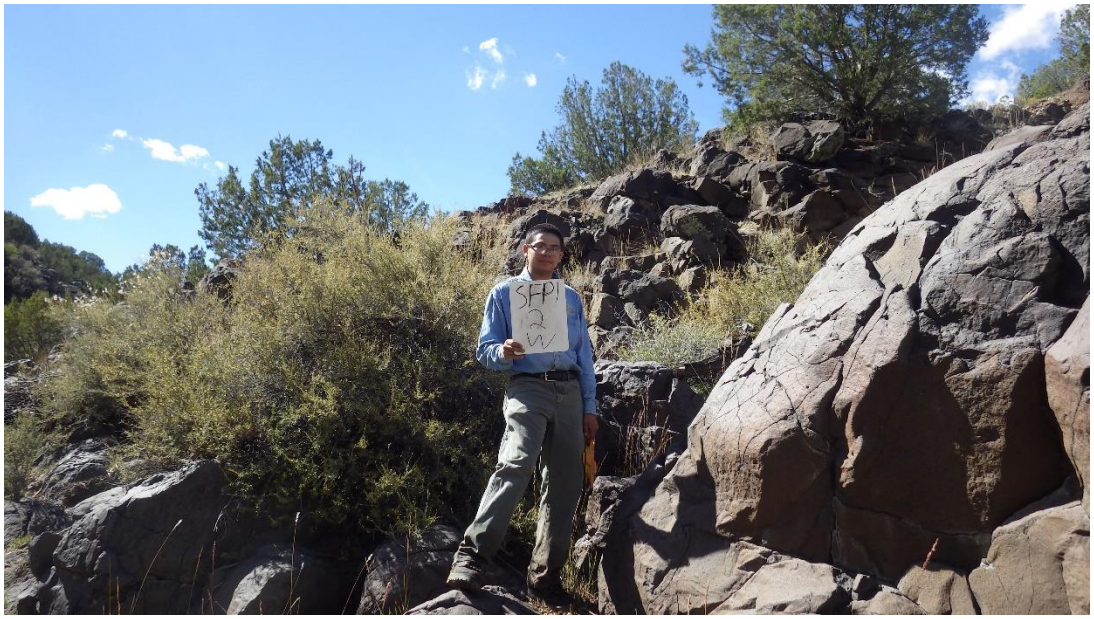
SFP1_2E, facing east from center (2011 above, 2016 below)

Whiteboard is incorrectly labeled in 2011 photos for this plot.

SFP1_2S, facing south from plot center (2011 above, 2016 below)

Whiteboard is incorrectly labeled in 2011 photos for this plot.

SFP1_2W, facing west from center (2011 above, 2016 below)



SFP1_3C, facing center from as close to 66 feet as visually possible (2011 above, 2016 below)

SFP1_3N, facing north from center (2011 above, 2016 below)

SFP1_3E, facing east from center (2011 above, 2016 below)

SFP1_3S, facing south from center (2011 above, 2016 below)

SFP1_3W, facing west from center (2011 above, 2016 below)

SFP1_4C, facing center from as close to 66 feet as visually possible (2011 above, 2016 below)

SFP1_4N, facing north from center (2011 above, 2016 below)

SFP1_4E, facing east from center (2011 above, 2016 below)

SFP1_4S, facing south from center (2011 above, 2016 below)

SFP1_4W, facing west from center (2011 above, 2016 below)