Valencia SWCD Willie Chavez Park South - Belen

5-year Monitoring Report

2016

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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 2.0
NRCS	Natural Resource Conservation Service
PC	Plot center
RGIS	Resource Geographic Information System
SWCD	Soil and Water Conservation District
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WQCC	Water Quality Control Commission
WSS	Web Soil Survey, a soils database of the NRCS

Purpose of Report

This report covers pre-treatment and 5-year-post-treatment vegetation monitoring assessments performed on a non-native phreatophyte removal project near Belen, NM submitted by the Valencia Soil and Water Conservation District to the Greater Rio Grande Watershed Alliance in 2011. Following a discussion of the ecological context, and our monitoring methods, we present pertinent background, observations, and assessment results for each project.

Ecological Context of Bosque Restoration

Neither the challenges nor the importance of working in the bosque and other riparian areas in New Mexico today should be underestimated. According to the New Mexico Department of Game and Fish Conservation Division, wetlands and riparian areas comprise approximately 0.6 percent of all land in New Mexico (2012). Despite this small percentage, estimates of New Mexican vertebrate species depending on wetland and riparian habitat for their survival ranges from 55% (New Mexico Department of Game and Fish Conservation Services Division, 2012) to 80% (Audubon New Mexico, 2013). These areas also provide flood mitigation, filtration of sediment and pollutants, and water for a variety of purposes including groundwater recharge (Audubon New Mexico, 2013). In addition, native vegetation such as cottonwoods 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 (2012) protocols

Due to the short timeframe between project selection and implementation in 2011/2012, only a narrow window was available to perform pre-treatment monitoring. That window was outside the optimum season for performing vegetation monitoring in this type of landscape. For that reason, a hasty monitoring protocol was developed. This protocol was based on placing photo point plots at locations distributed across the project area and representative of the diversity of the project area. In addition, an estimate of ground and canopy cover by percent within a 1/10 acre circular plot centered at the photo point was determined using ocular estimates. Overstory canopy was determined for a 1/10 acre circular area, also centered at the photo point. Finally, a Hink & Ohmart style vegetation structure assessment was performed. Vegetation species that were observed at each plot and in the project area were recorded. The plot size and density of observations limit the utility of this monitoring for describing overall site conditions or for generating any meaningful statistics.

Cover (%)											
Tree canopy	**Seedlings/saplings <5’/5 – 15’**		**Shrubs**		**Gramanoid**	**Forbs**	**Litter**	**Bare Soil**	**Rock**	**Gravel**	**Water or wet**

Figure 1. Categories used for percent cover estimates.

A base map of the project location was constructed using project boundary data provided by New Mexico State Forestry. Planned photo points were selected by visual inspection of May 2011 true-color digital orthorectified aerial photography obtained from the United States Department of Agriculture (http://datagateway.nrcs.usda.gov/). A GIS file for the photo point plots was created using ArcGIS software. Coordinates were derived from the GIS file and loaded into a Garmin GPS 60 CSx Global Positioning System and a Trimble 2005 GeoXM Global Positioning System. The Garmin GPS was used to navigate to the general location of the planned photo point. The actual location of the photo point was determined by visual inspection of the area and selection was based on the ability to physically occupy a position at or near the planned point. The coordinates of the photo point were then collected using the more precise Trimble GeoXM GPS.

Once the plot location was determined, a 1/100 acre radius plot was established by placing pin-flags at 11’ 9” from plot center in each cardinal direction. Photos were taken from plot center in each cardinal direction and from a distance north of plot center (66', where possible) toward plot center. Ocular estimates were made of understory canopy and ground cover within the 1/100 plot. Overstory canopy cover was estimated using a concave spherical densiometer, with measurements made in four cardinal directions, approximately mid-way between plot center and the edge of the 1/100 acre plot. This method provides an estimate of canopy cover for a 1/10 acre area centered on the plot. A Hink & Ohmart structure class determination was made using a worksheet developed by SWCA Environmental Consultants (see datasheet example in Appendix III). Finally, plant species observed within the 1/10 area around the plot were recorded, as were other comments document conditions at the plot.

5-year revisit (2016) protocols

To allow comparisons between site conditions, the original site protocols were employed for the 5-year revisits.

Plot locations as recorded in 2012 were found using a Trimble GeoXT, and all plot setup and measurements were the same as in 2012, with two exceptions. A ground cover category was added for plant basal/bole, which was omitted from the ground cover in 2011/2012. Further, in addition to the original Hink and Ohmart structural classification, we recorded the structure type within a modified Hink and Ohmart classification system (see Appendix II). This second Hink and Ohmart-based system is used by the modified NMRAM protocol employed for pre-treatment monitoring on GRGWA projects from 2013 to the present (2017).

For the sake of continuity, site visits were made around the same time of year as 5 years prior, even though this was not the ideal season for plant identification in either case. It is worth noting that the winter of 2016/2017 was warmer than the winter of 2011/2012, so even though site visits were conducted around the same time of year, plant communities differed. This is especially obvious in the photographs (Appendix IV).

Personnel Involved

2012 Monitoring Team:

- Joe Zebrowski, New Mexico Forest and Watershed Restoration Institute
- Jill Wick, New Mexico Department of Game and Fish

2016 New Mexico Forest and Watershed Restoration Institute Monitoring Team:

- Kathryn R Mahan, Ecological Monitoring Specialist
- Christopher B Martinez, Monitoring Technician (NMHU Student Intern)
- Daniel Hernandez, Ecological Monitoring Technician

Other persons contacted 2012:

- Charlie Lujan, Valencia Soil and Water Conservation District
- Madeline Miller, Valencia Soil and Water Conservation District

Other persons contacted 2016:

- Madeline Miller, Valencia Soil and Water Conservation District

Willie Chavez Project

The project is located within Valencia County, NM, east of the city of Los Lunas (Figure 2). It is on the west side of the Rio Grande, between the levee road and drain.

The nearby city of Los Lunas receives an average of 9.75 inches of precipitation annually. The average high temperature is 94 degrees in July, and the average low is 18 in December and January (U.S. Climate Data, 2017). According to the NRCS Web Soil Survey, the two project areas are comprised of <1% River wash and the remainder Mixed alluvial land. Ecological sites within this project include R042XA055NM Salty Bottomland (USDA NRCS, 2016).

Salty Bottomland can support a range of plant communities which typically include cottonwood, salt cedar, mixed exotics (dominated by Russian olive/ Russian knapweed/ etc.), saltgrass and saltgrass-sacaton, and bottomland grassland (possibly dominated by saltgrass, giant sacaton, dropseed, muhly, burro grass, alkali sacaton, galleta, vinemesquite, and/or tobosa). Typically, the vegetation consists of a shrub/grass mixture characterized by fourwing saltbush and greasewood. Tall, mid-grass, and short grasses are present. Blue grama, foxtail, sand dropseed, spike dropseed, giant dropseed, New Mexico feathergrass and tansymustard are common. When the plant community deteriorates, there is an increase in amounts of shrubs and short grasses (USDA NRCS n.d.).

Pre-treatment monitoring was conducted at these sites on January 12, 2012 as part of a restoration project targeting non-native phreatophytes scheduled for 2011-2012. Post-treatment monitoring was conducted November 6, 2016. The two plots on-site are located west of the Rio Grande, between the levee and drain. The project was sponsored by the VSWCD. According to the Valencia SWCD Conservation Plan, restoration goals are to restore the area for wildlife use, address fire fuels and access concerns, and to remove non-native woody invasive plants.

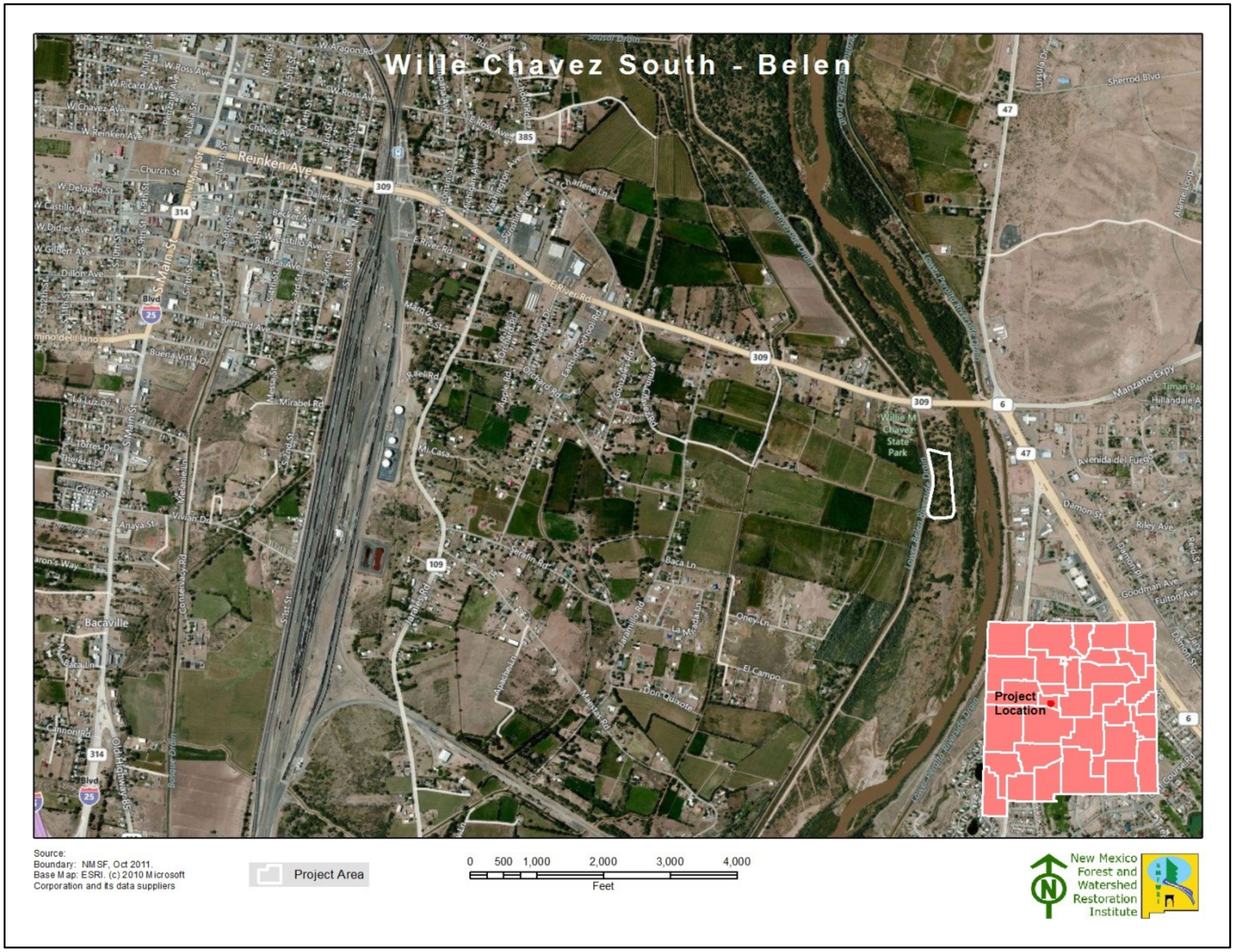

Figure 2.Willie Chavez Park South in geographic context.

Willie Chavez

Site Summary

2012 Willie Chavez Site observations:

The project area is moderately wooded, with a light, multi-tiered understory. It had been treated in the early 2000s. The project area is adjacent to a picnic area and there are several walking trails that pass through the project area. Much of the area consists of grassy openings. Salt grass was noted in the area and salt was noted on the soil surface in several areas. Since monitoring was done so late in the fall, sparse forb and grasses cover may be attributed to seasonal dormancy. The plots were assessed to fall in Hink & Ohmart Structure Classes 1 and 5.

2016 Willie Chavez Site observations:

Various gradients of moisture across the area were suggested by the herbaceous vegetation distribution; the project had several open areas supporting yerba mansa communities. The understory included mid-height coyote willow and Russian olives. A cottonwood overstory was present. The plots were assessed to fall in Hink and Ohmart Structure classes 1 and 5/6W.

Cover: Aerial cover was greater in 2016 and ground cover was much the same in both years.

	Average Aerial Cover						
Year	Tree Canopy	Seedlings <5	Saplings 5-15'	Shrubs <5	Shrubs-Saplings 5-15'	Graminoid	Forb
2012	13%	0%	0%	2%	6%	2%	59%
2016	33%	3%	8%	10%	0%	13%	63%

	Average Ground Cover					
Year	Litter	Bare soil	Rock	Gravel	Water or wet soil	Plant basal area
2012	40%	1%	0%	0%	0%	n/a
2016	48%	4%	1%	0%	0%	0%

Willie Chavez 2012 & 2016

Observed plant species summary

Red plants found in 2011 only

Green plants found both years

Blue plants found in 2016 only

Grasses		**Forbs**	
Scientific name	**Common name**	***Scientific name***	**Common name**
Pascopyrum smithii	Western wheatgrass		Unknown
		Anemopsis californica	Yerba mansa
		Bassia prostrata	Kochia
		Helianthus annuus L.	Sunflower
		Solanum elaeagnifolium	Silverleaf nightshade

Shrubs		**Trees**	
Scientific name	**Common name**	***Scientific name***	**Common name**
Salix exigua	Coyote willow	*Elaeagnus angustifolia*	Russian olive
		Populus deltoides	Rio Grande Cottonwood
		Robinia L.	Locust
		Salix gooddingii	Black willow

The majority of the "new" plants observed in 2016 were native species, although kochia also joined the mix. The target species found in 2012, Russian olive, was still present in 2016. In both years, identification of forb, grasses and some shrub species was impacted by both the plant identification skills of the monitoring team and by the season.

Willie Chavez 2011 Project

Figure 3. Willie Chavez plots.

***Project**: Valencia SWCD* ***Project Unit**: Willie Chavez* ***Plot**: WC_1*

WC_1 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2012	0%	0%	0%	3%	10%	0%	90%
2016	25%	5%	15%	20%	0%	0%	50%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2012	10%	0%	0%	0%	0%	n/a
2016	50%	5%	0%	0%	0%	n/a

WC_1_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
	Yerba mansa	Coyote willow	Rio Grande cottonwood
			Russian olive

2012 Hink & Ohmart Type: 5

WC_1_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
	Kochia	Coyote willow	Locust
	Silverleaf nightshade		Rio Grande cottonwood
	Sunflower		Russian Olive
	Unknown		
	Yerba mansa		

2016 Hink & Ohmart Type: 5 **2016 Modified Hink & Ohmart Type**: 5 or 6W

2012 Comments: None.

2016 Comments: None

***Project**: Valencia SWCD* ***Project Unit**: Willie Chavez* ***Plot**: WC_2*

WC_2 Aerial & Ground Cover

	Aerial cover						
Year	**Tree Canopy**	**Seedlings <5**	**Saplings 5-15'**	**Shrubs <5**	**Shrubs-Saplings 5-15'**	**Graminoid**	**Forb**
2012	25%	0%	0%	0%	1%	4%	28%
2016	40%	0%	0%	0%	0%	25%	75%

	Ground cover					
Year	**Litter**	**Bare soil**	**Rock**	**Gravel**	**Water or wet soil**	**Plant basal area**
2012	70%	1%	0%	0%	0%	n/a
2016	46%	2%	2%	0%	0%	50%

WC_2_2012 Species Observed

Grasses	Forbs	Shrubs	Trees
	Yerba mansa	Coyote willow	Rio Grande Cottonwood
			Russian olive
			Black willow

2012 Hink & Ohmart Type: 1

WC_2_2016 Species Observed

Grasses	Forbs	Shrubs	Trees
Western wheatgrass	Kochia	Coyote willow	Black willow
	Yerba mansa		Russian olive

2016 Hink & Ohmart Type: 1

2016 Modified Hink & Ohmart Type: 1

2012 Comments: None.

2016 Comments: Observer commented that the area was a possible playa formation.

Next steps (monitoring)

From here on out, the goal of the GRGWA/ NMFWRI is that all sites will be revisited for post-treatment monitoring in 5-year intervals. It is our intention and expectation that the data collected in these intervals will reflect any significant changes in disturbance and ecological function of the site.

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Appendix I - Photopoint Table

Name	Latitude	Longitude
WC_1	34.6503	-106.7390
WC_2	34.6487	-106.7390

Appendix II – Modified Hink and Ohmart Categories, from NMRAM

The following is pages 39-41 in Muldavin et al.'s 2014 NMRAM for Montane Riverine Wetlands v 2.0 Manual (draft, not yet published)

Vegetation Vertical Structure Type Definitions for NMRAM

Multiple-Story Communities (Woodlands/Forests)

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

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

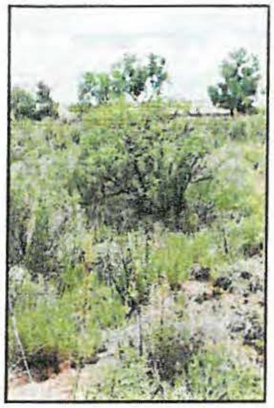
Type 2 -Low Structure Forest with little or no understory.

Tall mature to intermediate-aged trees (>5 m [>15 feet]) with canopy covering >25% of the area of the community (polygon) and understory layer (1-5 m [3-15 feet]) covering <25% of the area of the community (polygon). Majority of foliage is over 5 m (15 feet) above the ground. (This type incorporates Hink and Ohmart structure types 2 and 4.) Photograph on Diamond Creek by Y. Chauvin, 2012.

Single-story Communities (Shrublands, Herbaceous and Bare Ground)

Type 5 -Tall Shrub Stands.

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

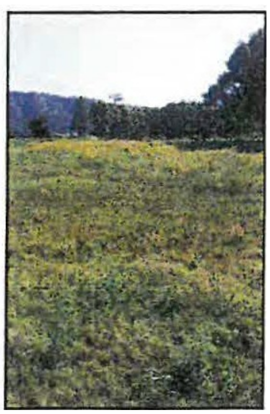


Type 6S-Short Shrub Stands.

Short stature shrubs or very young shrubs and trees (up to 1.5 m [up to 4.5 feet]) covering >10% of the area of the community (polygon). Stands dominated by short woody vegetation, may include herbaceous vegetation underneath the woody vegetation. Photograph on Lower Pecos River by E. Lindahl, 2008.

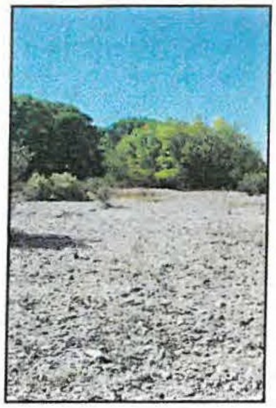
Type 6W-Herbaceous Wetland.

Herbaceous wetland vegetation covering >10% of the area of the community (polygon). Stands dominated by obligate wetland herbaceous species. Woody species absent, or <10% cover. Photograph of *Carex nebrascensis* meadow on upper Rio Santa Barbara by Y. Chauvin, 2009.



Type 6H-Herbaceous.

Herbaceous vegetation covering >10% of the area of the community (polygon). Stands dominated by herbaceous vegetation of any type except obligate wetland species. Woody species absent or <10% cover. Photograph on Diamond Creek by Y. Chauvin, 2012.



Type 7–Sparse Vegetation/Bare Ground.

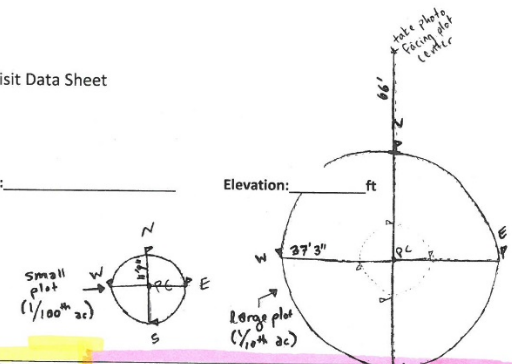
Bare ground, may include sparse woody or herbaceous vegetation, but total vegetation cover <10%. May be natural in origin (cobble bars) or anthropogenic in origin (graded or plowed earth) Photograph on Lower Gila River by Y. Chauvin, 2012.

Appendix III – Sample Datasheet

GRGWA 2011 Revisit Data Sheet

Project:
Project Unit:
Plot Number:
Lat (dd.dddd):_______________ **Long (ddd.dddd):**_______________ **Elevation:**_________**ft**

Date:	
Time:	
Plot size:	1/100th ac for understory ("small plot") 1/10th ac for overstory



aerial cover

Cover % - Taken from/within small plot only												
Tree canopy (use densiometer facing out at 11'9" flags)	**Seedlings <5'** (estimate aerial cover)	**Saplings 5-15'** (estimate aerial cover)	**Shrubs <5'** (estimate aerial cover)	**Shrubs 5-15'** (estimate aerial cover)	**Graminoid** (estimate aerial cover)	**Forb** (estimate aerial cover)	**Litter** (estimate ground cover)	**Bare soil** (estimate ground cover)	**Rock** (estimate ground cover)	**Gravel** (estimate ground cover)	**Water or wet soil** (estimate ground cover)	Plant Basal / Bole (est. ground cover)

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

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

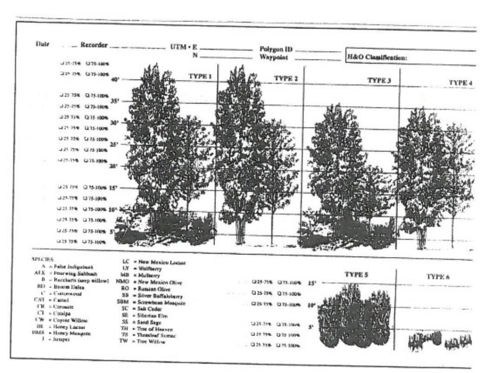
Species Observed in 1/10th ac plot (scientific name, common name, or USDA PLANTS code)

Grasses	Forbs	Shrubs	Trees

Photopoints needed (with whiteboard):

- PC showing whiteboard with name clearly legible
- North facing Center – 66'
- PC north to 11'9"
- PC east to 11'9"
- PC south to 11'9"
- PC west to 11'9"

Comments/Observations:



Unmodified Hink & Ohmart (courtesy of SWCA)

Appendix IV – Photo pages

See the attached photo comparison pages for each site.

5-year Photo Comparisons for Willie Chavez, 2 plots

VSWCD: Willie Chavez

2011/2012 photos: taken January 13, 2012 by Joe Zebrowski, NMFWRI

2016/2017 photos: taken Nov 6, 2016 by Kathryn Mahan, NMFWRI

Contact:

Kathryn Mahan, Ecological Monitoring Specialist, NMFWRI

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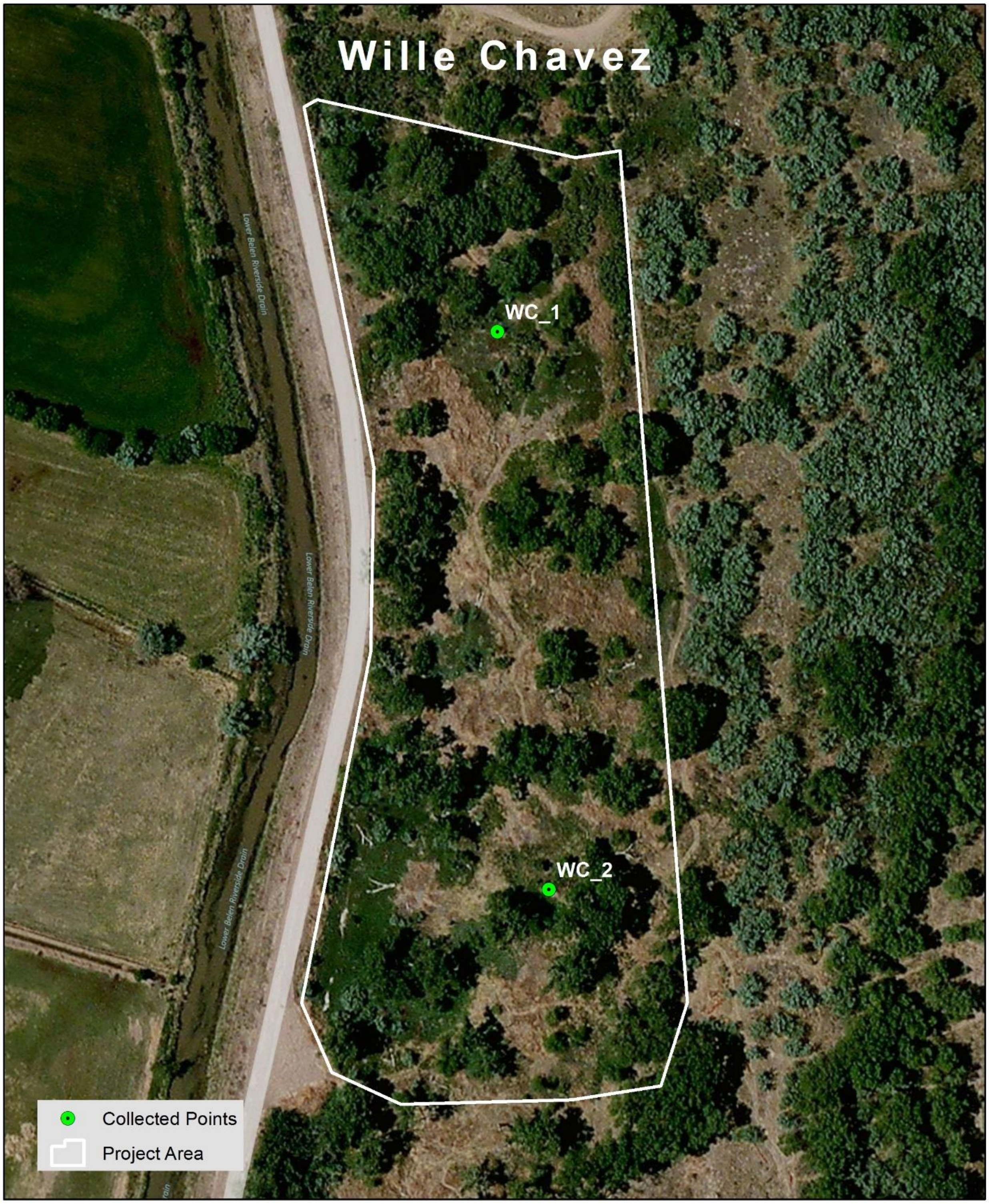

Source:
Points: NMFWRI, January 2012.
Boundary: NMSF, Oct 2011.
Base Map: ESRI. (c) 2010 Microsoft Corporation and its data suppliers

0 50 100 200 300 400
Feet

New Mexico Forest and Watershed Restoration Institute

WC_1C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)

WC_1N, facing north from center (2012 above, 2016 below)

WC_1E, facing east from plot center (2012 above, 2016 below)

WC_1S, facing south from center (2012 above, 2016 below)

WC_1W, facing west from center (2012 above, 2016 below)

WC_2C, facing center from as close to 66 feet as visually possible (2012 above, 2016 below)

WC_2N, facing north from plot center (2012 above, 2016 below)

WC_2E, facing east from center (2012 above, 2016 below)

WC_2S, facing south from plot center (2012 above, 2016 below)

WC_2W, facing west from center (2012 above, 2016 below)