Riparian Habitat Restoration at Four Sites in New Mexico and Texas: Shalem Colony, Vinton A and B, and Valley Creek Restoration Sites

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LIST OF ABBREVIATIONS / ACRONYMS

BA	Biological Assessment
BO	Biological Opinion
RGCP	Rio Grande Canalization Project
ROD	Record of Decision
U.S.	United States
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USIBWC	U.S. Section of the International Boundary and Water Commission
UTM	Universal Transverse Mercator

1.0 INTRODUCTION

Historically, the Rio Grande in southern New Mexico was characterized by a wide, active floodplain with numerous marshes, backwater, oxbow pools, and a fringe forest of cottonwoods (*Populus* spp.), willows (*Salix* spp.), and shrubby phreatophytes (USFWS 2005). Stream flows, although subject to great fluctuations, were believed to be perennial in all years. By 1880 however, most of the land along the river that could be irrigated was under development. Between 1938 and 1943, the United States (U.S.) Section of the International Boundary and Water Commission (USIBWC) constructed the Rio Grande Canalization Project (RGCP) spanning a 105-mile reach of the Rio Grande from Percha Diversion Dam, New Mexico to American Dam in El Paso, Texas. The RGCP was constructed to facilitate compliance with equitable allocation of water between the United States and Mexico under the U.S.-Mexico Convention of 1906 (Act of June 4, 1936, PL 648; 49 Stat. 1463), and to provide flood protection against a 100-year flood event. The RGCP straightened and channelized the river, armored the riverbanks, constructed levees, and cleared the floodplain. RGCP construction and subsequent floodplain and channel maintenance have significantly reduced the occurrence and extent of aquatic, riparian, and wetland habitat.

Riparian and wetland habitats support a variety of floral and faunal species and are an important habitat found along the floodplains of Rio Grande River system. These habitats support threatened and endangered species including the southwestern willow flycatcher (*Empidonax traillii extimus*). Changes and reductions to riparian systems including the removal or reduction of riparian vegetation, reductions in water flow, alteration of flow patterns, and physical modifications to waterways have caused decline of some riparian species' populations. A reduction in occurrence and extent of wetland and riparian habitat is evident along the RGCP.

The USIBWC recognized the need to accomplish flood control, water delivery, and operation and maintenance activities in a manner that enhanced or restored the riparian ecosystem. On June 4, 2009, the USIBWC issued a Record of Decision (ROD) on long-term management of the RGCP. The ROD authorized restoration of aquatic habitat and a mosaic of native riparian plant communities at 30 sites totaling more than 550 acres over 10 years (through 2019). The principal objectives of the restoration are to enhance river-floodplain hydrologic connectivity; reduce exotic vegetation; restore endangered species habitat; and reestablish riparian habitat. The RGCP *Conceptual Restoration Plan and Cumulative Effects Analysis, Rio Grande-Caballo Dam to American Dam, New Mexico and Texas* (2009) was developed in coordination with the U.S. Army Corps of Engineers (USACE). The plan focused on restoring healthy riparian function, improving terrestrial wildlife habitat at sites, and enhancing the natural riverine process. As part of the *Final Environmental Impact Statement (EIS): River Management Alternatives for the Rio Grande Canalization Project*, the 2009 USIBWC ROD on long-term management of the RGCP (USIBWC 2004, 2009) identified a phased implementation approach for restoration measures. Phase I included the collection of additional site-specific data and design of site-specific implementation plans, which was documented in the 2011 *Site Implementation Plans for the Rio Grande Canalization Project Restoration Implementation Plan* (TRC 2011). The Conceptual Restoration Plan and Site Implementation Plans will be guides for restoration site implementation, including the site improvement for flycatcher breeding habitat.

The 2011 Biological Assessment (BA) for implementation of the ROD included site-specific information and species data collected during the phased implementation (SWCA 2011). The U.S. Fish and Wildlife Service (USFWS) issued a Biological Opinion (BO) in August 2012, which provided Reasonable and Prudent Measures that the USIBWC would undertake to ensure the protection of the flycatcher including establishing and maintaining breeding habitat (USFWS 2012). Since the 2012 BO, restoration activities have included cessation of mowing on 1,838 acres of no-mow zones (which include most restoration sites) and the active management and restoration of 15 sites. In 2017 (IDEALS-AGEISS 2017), the BA was updated with information on the ROD implementation, changes in listed species status and critical habitat, and channel maintenance activities discussed in the River Management Plan (USIBWC 2016). In 2017, USIBWC consulted with the USFWS on the potential impacts to threatened and endangered species as a result of channel maintenance activities documented in USIBWC's River Management Plan for RGCP (USIBWC 2016), and USIBWC has been issued an updated BO for the actions (USFWS 2017).

In September 2017, USIBWC awarded Task Order IBM17T0011 to IDEALS-AGEISS for the implementation of a total of 70.9 acres of riparian habitat at four restoration sites along the RGCP in compliance with the ROD as well as the 2011 and 2017 BAs. One restoration site is north of Las Cruces, New Mexico (Shalem Colony), two are in Vinton, Texas (Vinton A and B), and one is in El Paso, Texas (Valley Creek; Figure 1-1). Table 1-1 lists the restoration goals of these sites.

This annual report is to describe the current conditions, the restoration monitoring activities, and results from October 2017 to October 2018 at the Shalem Colony, Vinton A and B, and Valley Creek restoration sites.

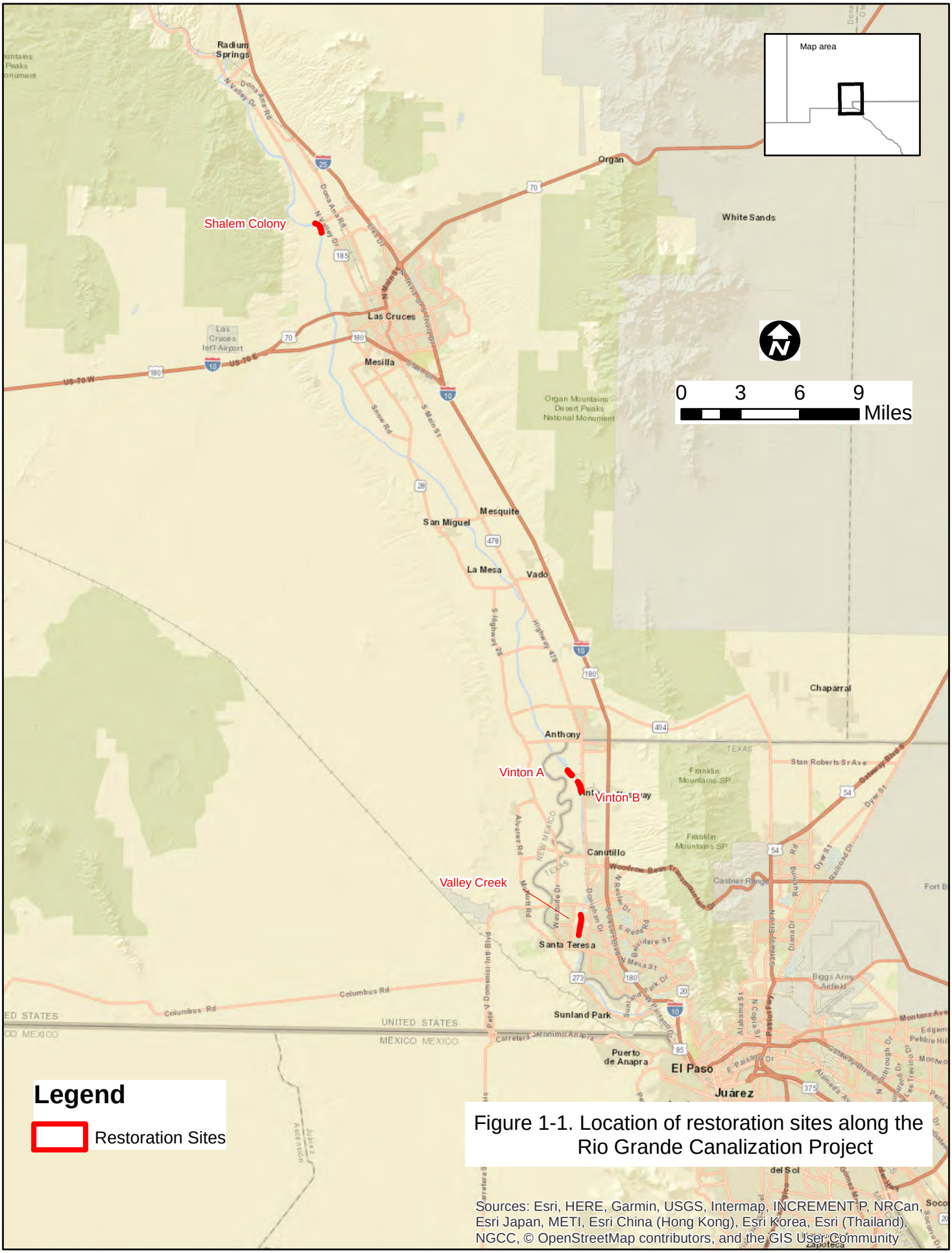

Figure 1-1. Location of restoration sites along the Rio Grande Canalization Project

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Table 1-1. Summary of Work Planned and Implemented at Habitat Restoration Sites

Site	Acres	Targeted Habitat	Planned Restoration Work	Restoration Work Implemented 2017-2018
Shalem Colony	14.2	Screwbean mesquite forest	The site is currently a well-developed mesquite forest. Coyote willow replacement would occur at the banks where saltcedars are extracted. Limited additional longstem plantings would be incorporated on the site to provide structural diversity. Few cottonwoods would be incorporated throughout the site but close to the river.	Completed saltcedar extraction. Approximately 0.5 acre of grass seeding was conducted in the highly disturbed areas.
Vinton A	14.7	Riparian forest	For this riparian forest site, a target of canopy of over 50 percent cover was planned. Longstem shrubs would be planted towards the levee road, but away from the bare ground adjacent to the levee, with cottonwoods scattered throughout the site (planted in groups) to provide some structural diversity at the site.	Saltcedars were extracted from the site and approximately 2.25 acres of grass seeding was placed in the disturbed areas.
Vinton B	20	Riparian woodland	Target canopy cover of approximately 50 percent. Planting regime calls for groupings of cottonwoods spread throughout the site and coyote willows planted along the river bank where saltcedar is removed. Clumps of Goodding's willows would be spaced throughout the site. Longstem shrubs would be planted towards the levee road, but away from the bare ground adjacent to the levee, and mixed with the native vegetation.	Coyote willows were transplanted along the river bank where saltcedars were extracted. Approximately 0.6 acre of grass seeding was conducted on the site.
Valley Creek	22	Open riparian woodland	Goodding's willow and cottonwood trees would be planted with an overall canopy cover of about 30 percent. Shrubs would form scattered patches throughout the area at a high density with some open areas. The clustering would assist with more uniform mowing areas and provides for a planting layout that minimizes encroachment along the trail path and thus provides a buffer between the trail and plantings.	Riverside areas where saltcedar were extracted were planted with transplanted coyote willows. Cottonwoods were planted in patches throughout the site. The site received 1.0 acre of grass seeding.

2.0 RESTORATION METHODOLOGY

Prior to conducting any work, the field crew established a minimum of three camera points for each restoration site (Table 2-1). Each camera point has a Global Positioning System (GPS) location and is permanently marked for future reference. Three photo points for each camera point (where the camera is located) were established and permanently marked (fencepost or rebar). The distance between camera and photo point and the azimuth was noted and an identification number was assigned to each photo and camera point. The points were given an adequate view of the site to document the anticipated growth of revegetated areas and to monitor the stability of in-stream work. Photo point information was collected during five periods of the project: pre-implementation monitoring, pre-restoration monitoring, and three times during post-restoration events (Appendix B). Additional photos were taken of any significant changes and points of interest. Photos were documented in accordance with Federal and National Archives and Records Administration regulations. Each photo meets the USIBWC requirements for pixel array and was uniquely numbered and labeled for identification. Qualitative monitoring field sheets developed by USIBWC were used to document conditions at each site during each monitoring period.

Table 2-1. Established Photo Points for Each Restoration Site

Restoration Site[1]	Photo Point 1		Photo Point 2		Photo Point 3		Photo Point 4	
	UTM E	UTM N	UTM E	UTM N	UTM E	UTM N	UTM E	UTM N
Shalem Colony	326749	3583732	326975	3583524	327099	3583126	NA	NA
Vinton A	347322	3538824	347168	3539009	347272	3538862	NA	NA
Vinton B	348222	3537607	348134	3537847	348048	3538038	NA	NA
Valley Creek	348078	3525795	348099	3525933	348190	3526506	348270	3526977

[1] Specific bearings from each photo point are contained in Appendix A.
UTM Universal Transverse Mercator

2.1 Site Preparation

Prior to implementation of the restoration effort, two types of signage were posted within the restoration properties. Within each restoration site, two steel post signs and flexible delineator posts will be maintained at approximately 200 to 400 feet apart. Coordination with USIBWC and the City of El Paso for the Valley Creek restoration signage occurred to ensure notice to the public of restoration activities and to minimize disruption of recreational activities.

To protect native vegetation identified at the site, vegetation was flagged prior to site preparation. Exotic species were then removed in order to increase the current native habitat. Saltcedar (*Tamarisk spp*.) plants were cut near the base of the plant with a chainsaw, these branches were then run through a wood chipper with the woodchips being dispersed throughout the site. Following removal of the branches and trunks, a backhoe and excavator with a bucket and grappler (clasping thumb) attachment was used to extract the large root masses including the root crown. This removal process was used for saltcedars along the stream bank and throughout the restoration sites within the floodplain. Other low-growing noxious weeds (e.g., Russian thistle [*Salsola tragus*]) were grubbed using a compact skid steer with brush hog attachment. Site preparation began in January 2017, continued in concurrence with planting activities at other restoration sites, and was completed in May 2018.

Saltcedar extraction at Vinton B, 24 April 2018

Shalem Colony restoration site after saltcedar extraction, 23 February 2018

New invasive species growth identified during the monitoring phase and outside of the 30-foot buffer of the river channel or seasonal pond was treated with chemical application of herbicides. Identified species were treated in areas where mechanical methods are inaccessible or not appropriate. A Commercial Applicator, licensed by the New Mexico Department of Agriculture, determined the application concentrations and rates of the herbicide. Saltcedar re-sprouts were treated with Garlon® 4 herbicide in September 2018 outside the migratory bird nesting season (March 1 to August 31).

2.2 Native Planting

IDEALS-AGEISS developed restoration plans (IDEALS-AGEISS 2018) based on guidance from the RGCP Conceptual Restoration Plan (USACE 2009) and RGCP River Restoration Site Implementation Plans (TRC 2011). Within these plans, planting plans were presented (Appendix C) and planting activities in the field followed these plans. The following changes to the project were approved by USIBWC:

1. Coyote willows were transplanted from the islands being removed for channel maintenance.

2. The timing of the transplants necessitated completing the remaining pole plantings in winter 2018.

3. In hopes to increase survivorship, longstem shrub and potted tree planting occurred in fall 2018.

4. The City of El Paso requested that the 10 ash trees intended for Valley Creek not be planted. Desert willows (*Chilopsis linearis*) would be planted instead.

The 2017 BO allows the USIBWC to remove some vegetation within the channel that is suitable for the flycatcher as long as USIBWC continues to implement riparian habitat restoration and follows other requirements and recommendations (USFWS 2017). In the 2017 BO, the USFWS recommended that USIBWC transplant vegetation from islands slated for removal in the channel. Several islands in the El Paso area were slated for removal as part of the island channel maintenance. USIBWC worked with IDEALS-AGEISS to incorporate the vegetation transplant activities as part of this restoration task order.

Prior to USIBWC crews removing the island sediment, IDEALS-AGEISS extracted willows from islands designated for removal and transplanted them to Valley Creek and Vinton B sites. IDEALS-AGEISS crews used a front-end loader to extract clumps of coyote willows with the root balls, approximately 20 stems per bucket load, and placed them in an excavated trench within the floodplain along the riverbank. The trench was dug deep enough such that the root balls will be in contact with groundwater during the winter months when the water table is at its lowest. Once the willows and root balls were placed in the trench, it was then backfilled taking care to not damage newly transplanted willows and to eliminate any voids within the backfill material. Coyote willows from the islands were transplanted from January to March 2018.

Example of coyote willow transplanting from vegetated islands near Hatch New Mexico (Thurman I project).

Cottonwood pole planting, Valley Creek 16 April 2018

Cottonwood poles and Goodding's willow nursey stock for planting was purchased locally from Santa Ana Native Plants Bernalillo, New Mexico (cottonwoods) and Hydra Aquatic Albuquerque, New Mexico (Goodding's willows). Cottonwood poles and Goodding's willows were 12- to 16-feet long and approximately 2 to 3 inches in diameter. An auger was used to plant cuttings after the cuttings soaked for approximately 2 weeks. Planting was conducted in late winter/early spring months (February through April). Due to the timing for the transplants, not all sites were planted in the spring.

Based on other restoration sites, fall plantings for the long-stem shrubs seem to promote better survivorship; therefore; plantings of these species were moved to late fall 2018. Site specific planting maps based on the recommended plantings (see Table 2-2) were developed for each restoration site in the Restoration Plan (IDEALS-AGEISS 2018).

Table 2-2. Planting Requirements for the Four Restoration Sites

Planting	Shalem Colony	Vinton A	Vinton B	Valley Creek
Coyote willow poles	50	2,940	3,000	1,100
Gooding willow poles	10	441	200	220
Cottonwood poles	10	1,029	800	440
Longstem riparian shrubs	50	1,470	1,600	1,000
Arizona ash	0	5	5	10
Desert willow	0	5	0	10
Original conditions	▪ Mowing has been discontinued. ▪ The southern portion of the site has riparian vegetation along the river in the form of mixed vegetation dominated by tall screwbean mesquite with coyote willow and saltcedar. ▪ The northern portion of the site is a combination of mixed vegetation dominated by tall screwbean mesquite with saltcedar.	Dominant tree and shrub vegetation at the site consists of saltcedar, screwbean mesquite, and four-wing saltbush with ground cover consisting of forbs mixed with fescue and saltgrass.	Dominant tree and shrub vegetation at the site consists of saltcedar, screwbean mesquite, and four-wing saltbush with ground cover consisting of forbs mixed with fescue and saltgrass.	The bank has grass (*Sorghum halepense*), and intermittent narrow patches of coyote willow with widely scattered large cottonwood.

2.3 Groundwater Monitoring

During each monitoring period and assessment, groundwater levels were collected and analyzed at the existing USIBWC shallow groundwater monitoring wells at the restoration sites and the information will be used to supplement the groundwater monitoring data from the past several years. Groundwater measurements were taken to the top of the polyvinyl chloride (PVC) casing inside the steel protector.

2.4 Restoration Monitoring

A pre-implementation monitoring assessment was conducted on 19 and 25 October 2017 prior to any work at the sites in support of the restoration plan. Field crew identified and mapped the distribution of invasive species for removal and riparian habitat (specifically the willow species of interest) to be protected during restoration efforts. Wildlife species and floral species observed on the site were documented (Appendix A).

Once the noxious vegetation was removed, and the site prepped for planting, a pre-restoration assessment of the four sites was conducted. This assessment documented the remainder of the native vegetation on each site and the baseline habitat prior to planting and was conducted in March 2018.

Three post-restoration assessments were conducted in May, August, and October of 2018. During post-restoration efforts, native and non-native species were noted as well as approximate cover. Both random and fixed plot approaches (1/10th-acre plots) were used to approximate the type and percent of ground, brush, and canopy cover. The circular plots measure 37.2 feet in diameter. Immediately after planting, three to four fixed plots were established within each restoration site. In addition, during each monitoring session, three additional random plots were chosen and monitored if the site was planted. During the October 2018 monitoring session, all planted poles and willows were counted to determine survivorship. Percent cover and species composition were recorded on each site's field monitoring sheet (Appendix A). In addition, any changes in vegetation condition were noted on the field monitoring sheet, as well as stream bank conditions and any wildlife sightings.

3.0 RESULTS

3.1 Groundwater Monitoring

Groundwater levels are historically lower at the two Vinton sites compared to the Valley Creek site except during irrigation release periods when they are similar (Appendix A). The well at Valley Creek that was destroyed was re-established early in 2018 (VC-MW-1). Table 3-1 presents information tabulating current groundwater levels at the Vinton A, Vinton B, and Valley Creek restoration sites.

Table 3-1. Groundwater Monitoring Well Data

Site	Well ID	Site Visit Dates and Water Depth Below Surface Measured in Feet							
		Pre-implementa-tion 2017	Pre-restora-tion 2018	Post-restoration 2018/2019					
		Nov 2017	3/6/18	May 2018	Aug 2018	Oct 2018	April 2019	July 2019	Oct 2019
Valley Creek	VC-MW-1	Destroyed	8.32	8.06	3.21	6.80			
	VC-MW-2	5.02	8.14	2.27	8.2	6.00			
Vinton A	VA-MW-1	3.87	8.94	3.37	2.92	3.90			
	VA-MW-2	4.07	8.07	2.99	1.74	3.50			
Vinton B	VB-MW-1	4.25	10.22	4.26	2.99	4.00			
	VB-MW-2	3.79	Well dry-obstructed with sediment at 11.6	3.86	Unable to open	Unable to open			

3.2 Post-Restoration Site Conditions

Native forbs and grasses were found throughout all four restoration sites and made up a large part of the ground cover (Appendix A). Dominant vegetation at the four sites varied (Table 3-2). Kochia (*Kochia scoparia*), Bermuda grass (*Cynodon dactylon*), and camelthorn (*Alhagi maurorum*) were the most common non-native species to dominate the site during the August monitoring (when the largest diversity and covering of species was documented). These species were prevalent in the disturbed areas where saltcedar were removed, and kochia was prevalent in the coyote willow (*Salix exigua*) transplant areas of Vinton B and Valley Creek. Approximately 10.38 acres of saltcedar was removed: Valley Creek 0.61 acres, Vinton A 4.6 acres, Vinton B 3.9 acres, and Shalem Colony 1.27 acres. From September 19-21, 2018, IDEALS-AGEISS treated saltcedar re-sprouts with Garlon® 4 herbicide at Valley Creek, Vinton A, and Vinton B restoration sites.

3.2.1 Shalem Colony

USIBWC discontinued mowing along most of the site since the 1990s, leading to the mature screwbean mesquite (*Prosopis pubescens*) forest (>5 acres) with scattered saltcedar. The area has high abundance of large screwbean mesquite forming a large thicket of vegetation. The vegetation on the southern lateral along the bank at this site is bulrush (*Scirpus spp.*) and cattail (*Typha spp.*) in low abundance. The

southern portion of the site has riparian vegetation along the river in the form of mixed vegetation dominated by tall screwbean mesquite with coyote willow and saltcedar (showing the effects of *Diorhabda* infestation). Coyote willow is in moderate abundance and false seep willow (*Bacharis salicifolia*) occurs in low abundance. The main exotic species noted during the pre-implementation effort were saltcedar in moderate abundance and Russian thistle (*Salsola tragus*) in high abundance.

Shalem Colony continues to be dominated by screwbean mesquite (Table 3-2), and some large groves are present. During the August 2018 survey it was noted that sporadic re-sprouts of saltcedar were evident on the site. Moderate abundance (10 percent) of kochia (*Bassia scoparia*) and *Cynodin* (20 percent) also occur. Kochia (*Kochia scoparia*) continued to be the dominant non-native species noted during the October monitoring period as was white-sweet clover (*Melilotus alba*). Over 65 percent of the site is covered in natural vegetation. Limited planting will be added to this site in later fall/early winter 2018 as the screwbean mesquite forest is well established intermixed with some honey mesquite (*Prosopis glandulosa*) intermixed. Approximately 0.5 acre of grass seeding was conducted during August 2018 in disturbed areas on the site.

3.2.2 Vinton A

USIBWC discontinued mowing at the Vinton A site in 2011, and the site is nearly contiguous along the west side of the river with the Vinton B site. Prior to restoration efforts, the dominant tree and shrub vegetation at the site consisted of saltcedar, screwbean mesquite, and four-wing saltbush (*Atriplex canescens*). Good stands of mesquite occur sporadically through the site. Smooth pigweed is dense and abundant on the site with wolfberry (*Lycium spp.*) in low to moderate abundance. Saltcedar was present throughout the site in some dense stands and currently shows limited signs of stress from *Diorhabda*. Other invasive species on the site include moderate to high abundance of Russian thistle and sporadic Siberian elms (*Ulmus pumila*). In August, screwbean mesquite still dominated the sites in moderate abundance (30 percent) with coyote willows found along the banks (Table 3-2). Other species in moderate abundance were milkweed and *Solanum spp*. Vegetation cover in August at the Vinton A site was approximately 30 percent trees and shrubs and 70 percent grasses and forbs. During the August and October monitoring, it was noted that very sporadic re-sprouting of saltcedar occurred on the site. Other non-natives such as kochia and camel thorn (*Alhagi pesudalhagi*) were prevalent and comprised the herb/grass cover (Table 3-2). Grass seeding occurred during the week of 5 August 2018 in open areas throughout the site (2.25 acres) that sustained disturbance during restoration.

3.2.3 Vinton B

This 25-acre site on the west side of the river is a mixed-shrub habitat with scattered four-wing saltbush (*Atriplex canescens*) and rabbitbrush (*Chrysothamnus nauseosus*) in moderate abundance. Tall, dense patches of smooth pigweed (*Amaranthus powellii*) and screwbean mesquite are abundant through the site. Saltcedar dominated prior to restoration efforts. Siberian elms were found on the site as well as other non-native species such as fescue grass (*Festuca spp*.) and Russian thistle. The site has not been mowed since 2011. Approximately 1,561 of the recommended 3,000 coyote willows were transplanted along the bank at the Vinton B site and 0.6 acre of grass seeding was conducted (Figure 3-1). As of August, minimal saltcedar (less than 1 percent) remained at the Vinton B site and consisted of small re-growth sporadic individuals. August monitoring documented that large screwbean mesquite still occur in moderate

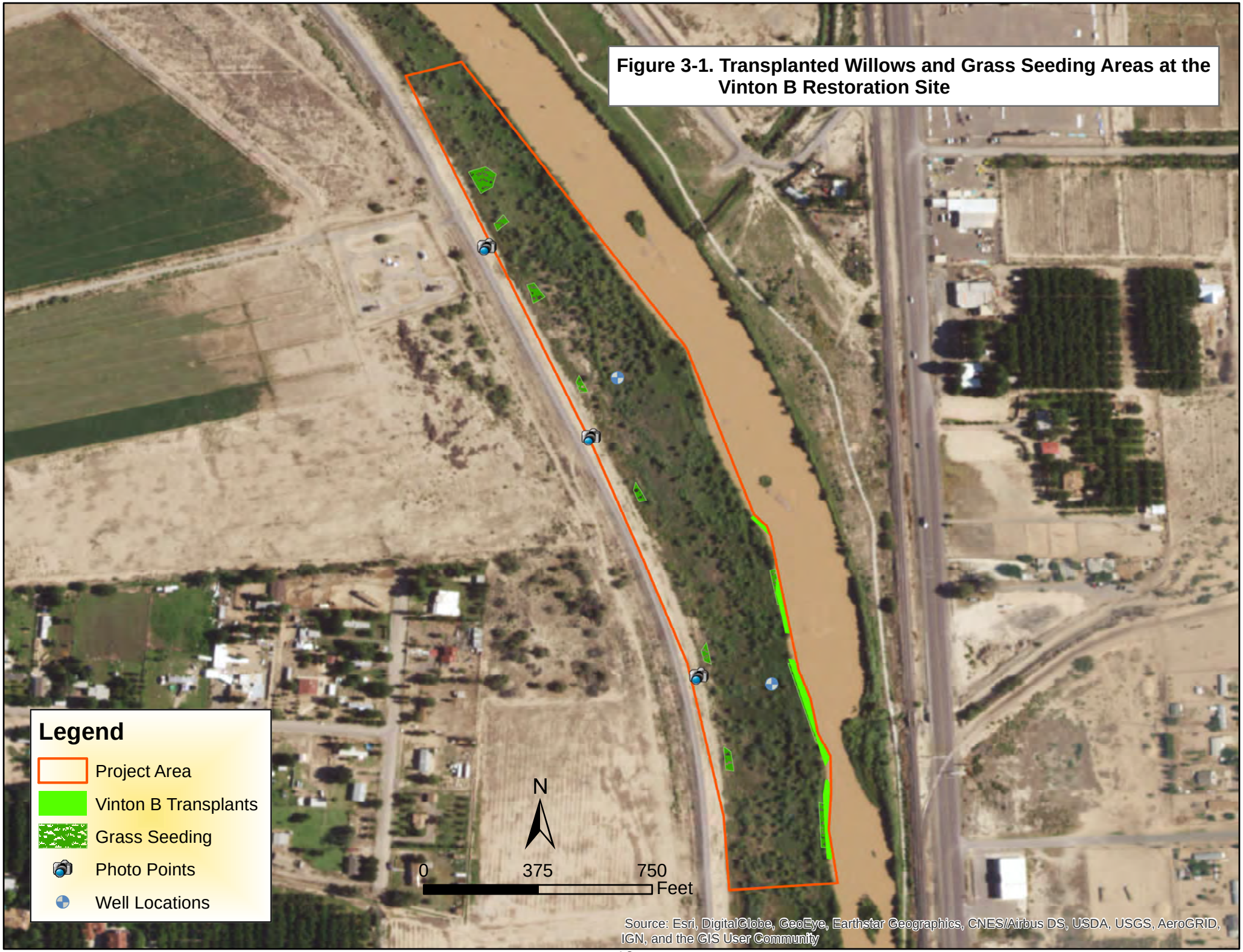

Figure 3-1. Transplanted Willows and Grass Seeding Areas at the Vinton B Restoration Site

abundance throughout the site as well as milkweed (*Apocynaceae*) and *Solanum*. Several other forb species make up the 70 percent grass and forb vegetation cover on the site (Table 3-2). In October, non-native species such as Bermuda grass, camel thorn, and kochia dominated the cover. Salt grass (*Distichlis spicata*) cover at this site has increased and now is approximately 20 percent cover at the site and is thriving.

3.2.4 Valley Creek

Valley Creek restoration site is a recreational lease to the City of El Paso. The City mows the site regularly and maintains it as a park. This site is adjacent to a large residential area and has pathways with permanent concrete benches. During the pre-implementation monitoring it was noted that ground cover appeared to be mostly fescue that is routinely maintained by mowing away from the river. The bank contained grass (*Sorghum halepense*), and intermittent narrow patches of coyote willow and false seep willow (*Bacharis salicifolia*) restricted to the top of the bank with widely scattered large cottonwood (*Populus deltoids*). Cattails are also found in small patches. Very few saltcedar remain after extraction and coyote willow transplantation. Approximately 1,291 coyote willows were transplanted along the bank at the site and 1.0 acre of grass seeding was conducted (1,100 willows were recommended; Figures 3-2 and 3-3). Coyote willows currently dominate the banks, and scattered cottonwoods are the next prevalent species (Table 3-2). Bermuda grass was the dominant cover noted in the August 2018 monitoring period. Low re-sprouting occurrence of saltcedar was noted in October 2018 and one large saltcedar remains on the site. Ground cover was dominated in October by Bermuda grass and salt grass. A variety of other native forbs, and exotics, were noted during the October monitoring at this site (Appendix A).

Table 3-2. Dominant Vegetation Cover Observed at the Four Restoration Sites, August 2018

Common Name	Scientific Name	Estimated Percent Cover			
		Shalem Colony	Vinton A	Vinton B	Valley Creek
Native Species					
Coyote willow	*Salix exigua*	20	5	>5	>5
Cottonwood	*Populus deltoides*	-	-	-	2
Screwbean mesquite	*Prosopis pubescens*	15	30	30	2
Honey mesquite	*Prosopis glandulosa*	15	-	5	-
Salt grass	*Distichlis spicata*	-	5	5	-
Willow baccharis	*Baccharis salicina*	-	2	-	low
Black nighshade	*Solanum nigrum*	-	5	5	-
Alkali sacaton	*Sporobolus airoides*	-	5	1	-
Wolfberry	*Lycium spp.*	5	1	1	-
Milkweed	Asclepias spp.	-	5	5	-
Prickly pear	*Opuntia spp.*	1	-	-	-
Ribes	*Ribes*	1	-	-	-
Jimson weed	*Datura stramonium*	-	-	2	-
Bulrush	*Typha spp.*	-	1	1	-
Muhly grass	*Muhlenbergia capillaris*	-	1	1	-
Spiny chloracantha	*Chloracantha spinosa*	-	-	-	5

Common Name	Scientific Name	Estimated Percent Cover			
		Shalem Colony	Vinton A	Vinton B	Valley Creek
Non-Native Species					
Saltcedar	*Tamarix chinensis*	1	2	1	1
Bermuda grass	*Cynodon dactylon*	20	30	30	80
Kochia	*Kochia scoparia*	10	20	20	-
Camelthorn	*Alhagi maurorum*	-	20	20	-

No recent evidence of herbivory was observed at any of the sites; although a dead beaver (*Castor canadensis*) was found on the Vinton A site. However, the IDEALS-AGEISS team biologists did observe other instances which had an impact, or the potential to impact, restoration efforts. Pocket gopher activity was pronounced at the Valley Creek, Vinton A, and Vinton B sites. This species has the potential to undermine root structure of planted poles. In addition, pole plantings at the Valley Creek site incurred damage from maintenance crews and vandalism due to a broken gate. As of October 2018, 317 cottonwood poles have been destroyed by maintenance crews mowing the floodplain and vandalism (18 cottonwoods damaged in June 2018) at the Valley Creek restoration site since being planted in April which has impacted the restoration efforts and is further described in Section 3.3.

Cottonwood trees damaged by vandals at Valley Creek, 21 June 2018


Figure 3-2. Grass Seeding Areas at the Valley Creek Restoration Site - North
N
0
325
650
Feet
Legend
Project Area
Grass Seeding
Photo Points
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Figure 3-3. Transplanted Willows and Grass Seeding Areas at the Valley Creek Restoration Site - South
N
0
350
700
Feet
Legend
Project Area
Valley Creek Transplants
Grass Seeding
Photo Points
Well Locations
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Wildlife species observed at the four restorations sites varied throughout the year (Appendix A) and were predominately avian. A diversity of avian species was noted during the October 2018 monitoring effort (Table 3-3).

Table 3-3. Wildlife Species Observed at all Restoration Sites in October 2018

Scientific Name	Common Name	Observed at Restoration Site
Accipiter striatus	Sharp-shinned hawk	Valley Creek
Agelaius phoeniceus	Red-winged blackbird	Vinton A, Vinton B, Valley Creek
Ardea alba	Great egret	Vinton B, Valley Creek
Ardea herodias	Great blue heron	Vinton A, Vinton B
Buteo jamaicensis	Red-tailed hawk	Vinton A
Callipepla gambelii	Gambles quail	Vinton A
Cardinalis sinuatus	Pyrrhuloxia	Shalem Colony
Cathartes aura	Turkey vulture	Valley Creek
Charadrius vociferus	Killdeer	Vinton A, Valley Creek
Circus hudsonius	Northern harrier	Vinton A
Colaptes auratus	Red-shafted flicker	Valley Creek
Falco sparverius	American kestrel	Valley Creek
Geomys spp. or Cratogeomys spp.	Pocket gopher	Vinton A, Vinton B, Valley Creek
Haemorhous mexicanus	House finch	Vinton A, Valley Creek
Hirundo rustica	Barn swallow	Shalem Colony, Vinton A, Valley Creek
Melospiza lincolnii	Lincoln sparrow	Valley Creek
Mimus polyglottos	Northern mockingbird	Valley Creek
Passerculus sandwichensis	Savannah sparrow	Valley Creek
Pandion haliaetus	Osprey	Vinton A, Valley Creek
Porzana carolina	Sora	Vinton A
Regulus calendula	Ruby-crowned kinglet	Shalem Colony
Sayornis saya	Say's phoebe	Valley Creek
Sceloporus occidentalis	Western fence lizard	Valley Creek
Setophaga auduboni	Audubon's warbler	Valley Creek
Setophaga coronata	Yellow-rumped warbler	Shalem Colony
Sturnella neglecta	Western meadowlark	Vinton A
Zenaida asiatica	White-winged dove	Valley Creek
Zenaida macroura	Mourning dove	Shalem Colony, Vinton A, Vinton B, Valley Creek
Zonotrichia leucophrys	White-crowned sparrow	Vinton A, Vinton B

3.3 Native Planting Survivorship

During each monitoring event, IDEALS-AGEISS Team biologists inspected the transplanted willows and the pole plantings to document survival and evaluate their overall health status. With the number of trees to be planted, IDEALS-AGEISS recommended survivorship plots be established on each site to provide a sample of the site until the October 2018 monitoring when all planted species were accounted for. No plantings occurred at the Shalem Colony site. Dead trees were flagged during the May and August 2018 monitoring periods when noted, although flagging unfortunately did not last through the summer. In October 2018, the IDEALS-AGEISS Team biologists walked transects through the sites to identify all the plantings. Poles that appeared to be dormant or dead were examined for regrowth at the base of the pole and a "snap test" was applied to the outer branches when no regrowth was noted. Poles that showed no signs of regrowth and easily cracked or broke during snap tests were recorded as mortalities. Survivorship documented during the October 2018 monitoring period is noted in Table 3-4.

Example of cottonwood regrowth from the base, Valley Creek, 9 August 2018

Table 3-4. Plant Survivorship per Monitoring Event

	Vinton A		Vinton B		Valley Creek	
	Coyote Willow	Cottonwood	Coyote Willow	Cottonwood	Coyote Willow	Cottonwood
May 2018						
Alive	-	6	190	-	117	22
Stressed	-	9	0	-	0	25
Dead	-	0	0	-	1	0
Survival	-	100%	100%	-	99%	100%
August 2018						
Alive	-	0	105	-	111	13
Stressed	-	12	0	-	0	13
Dead	-	3*	0	-	0	5
Survival	-	80%	100%	-	100%	84%
October 2018						
Alive	-	1	1048	-	1288	65
Stressed	-	10	0	-	53	50
Dead	-	3	0	-	0	8
Survival	-	73%	100%	-	100%	94%**

*One tree unaccounted for and assumed dead for survivorship count
**Not including the destroyed trees

Per the request of the USFWS and stipulations in the 2017 BO, coyote willows were transplanted from islands being removed for channel maintenance. Willows were transplanted to both Valley Creek and the Vinton B restoration sites to fill in gaps along the banks where saltcedar extraction occurred. These clumps of willows were difficult to count in every bucket load, so USIBWC and IDEALS-AGEISS determined that an average of 20 willows was contained in each bucket load. Willow transplantation was extremely successful given that mature willows and root balls were transplanted at each site. At the Valley Creek site 1,290 willows were planted and nearly all were thriving; a few stressed willows were noted. Kochia was very prominent during the October monitoring periods and was found growing on the edge of the willow transplants towards the restoration site. At the Vinton B site approximately 1,561 willows were transplanted (based on bucket load estimates). Although it was not possible to count all the willows individually in the transplant area due to the density of the kochia growth and access to the willows, all the patches along the river bank were thriving and no stressed or dead willows were documented.

Very few cottonwoods were planted at the Vinton A site. Several of the trees showed signs of stress but they were not considered dead. Survival of cottonwoods at this site was 73 percent (Table 3-5). Valley Creek is regularly mowed by the City of El Paso, and the vast majority (317) of the trees were destroyed. Of the remaining cottonwoods at Valley Creek (123), 8 were determined dead during the October monitoring providing a 94-percent survivorship of the remaining plantings.

Table 3-5. Cottonwood Survival at Each Restoration Site – October 2018

	Vinton A	Valley Creek
Scope of Work Requirement	1029	440
Planted	15	440
Poles Located	14	123
Destroyed	0	317
2018 Mortality	4	8
Total Survived	11	115
Percent Survival	73	94

The USIBWC established a 15 percent mortality (85 percent survival) threshold for acceptable survival of planted poles and shrubs. The October 2018 monitoring session provided the baseline for the number of replacement plants. Although not all the transplanted coyote willows were counted at the Vinton A site, there was no obvious sign of die back and the thick kochia hampered the ability to access the willows. IDEALS-AGEISS believes that these willows are all thriving and with the exception of the additional willows to be added, does not recommend any compensation at this site. Four cottonwoods will be replaced at Vinton A. Based on our mortality data for the three monitoring periods at Valley Creek, the highest mortality encountered was 17 percent. Assuming that the 299 cottonwoods mowed by the City remained for monitoring in October 2018, and based on the highest mortality level we observed (17 percent), IDEALS-AGEISS recommends replanting 51 cottonwoods (17 percent of 299) at Valley Creek.

Longstem shrubs and 20 desert willows were planted at the Valley Creek restoration site at the end of October while the October 2018 monitoring was being conducted. Since these species were just planted, they were not considered in October 2018 survivorship counts.

**Longstem shrubs planted at Valley Creek restoration site,
24 October 2018**

4.0 CONCLUSIONS AND DISCUSSION

By the October 2018 monitoring period, not all the willows and cottonwoods were planted and the longstem shrub planting was scheduled for late fall 2018 at these four sites. Preliminary findings suggest that coyote willow transplants establish well and quickly along the river banks. Survivorship was 100 percent for the areas transplanted although the invasive species kochia tended to establish in the transplant areas. Many of the cottonwood poles remaining at the sites showed signs of stress although some also showed re-sprouting at the base of the pole. Irrigation peak releases occurred in Mid-March and June-July 2018, and an unusually late and minimal the monsoon season did not provide much moisture. Monitoring in the spring will help determine if these cottonwood poles did in fact survive the relatively dry summer. Maintenance activities by City of El Paso and vandalism at the Valley Creek site also affected cottonwood survival.

4.1 Shalem

The Shalem restoration site is a well-established mesquite forest. Restoration efforts are directed at enhancing/maintaining this habitat. This site receives a lot of recreational activity and is near a popular aquatic recreation site. Future plantings in this area may need to be marked to help prevent damage. This site is expected to continue to develop into good mesquite habitat.

4.2 Valley Creek

The Valley Creek site is maintained as park and does receive pedestrian and bicyclists activity. Since the City of El Paso does maintain the site for a park, mowing of the site will continue. USIBWC will change lease requirements to incorporate measures to avoid impacting restoration plantings during the mowing of the site. To prevent future destruction of the planted trees and to potentially appease the neighboring residential areas that prefer some open viewshed, a reduced density of clumping of cottonwood poles may be considered.

4.3 Vinton A and B

Groundwater levels at both Vinton sites are highly dependent on water availability in the river and vary considerably at the site based on historical records. Although not many plantings have occurred at this site, this variation might affect the future survivorship of the longstem and cottonwood plantings. Coyote willow transplants have been very successful at the Vinton B site, and is a recommended methodology for future plantings.

5.0 MANAGEMENT RECOMMENDATIONS

Although the sites are only 1-year post-restoration and not all the plantings have been conducted, preliminary observations may provide some insight for future restoration efforts.

- Continue communication with City of El Paso to ensure longstem shrub plantings and remaining cottonwoods are not damaged by maintenance activities.
- Continue to conduct willow transplants when possible. Transplantation of mature coyote willows with their established root balls provides high survivorship at the sites. In addition, the habitat is well on its way to establishment using these mature trees.
- Maintain and even improve outreach with neighbors in the vicinity of the restoration sites. Consider density and height of the tree species planted at the sites and the potential to block residential viewsheds.

6.0 REFERENCES

IDEALS-AGEISS. 2018. Habitat Restoration Plan for Shalem Colony, Vinton A and B, and Valley Creek Restoration Sites. January 2018.

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APPENDIX A

Monitoring Datasheets

Pre-Implementation Monitoring Datasheets

Pre-Implementation Qualitative Monitoring Field Sheet

Site Shalem Colony Date 19 Oct 2017

Participants C. Brith, D Bottcher, Ryan, Andrew Target habitat Screwbean msqt. Forest

Document conditions at restoration site prior to restoration work implementation:

Identifiable Native Species	Abundance (Sporadic individuals, Low, Moderate, High)	Comments
Screwbean Mesquite	At High > 4m in N. portion	Excellent large individuals forming Good thickets/stands
Coyote willow	Moderate	Could be developed in site
False Seep willow	low	
bullrush	-along banks-in river low	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Comments**
Saltcedar		
Salt Cedar	Moderate	Most can be removed w/o damage to Natives
Russian Thistle	High	

General Site Conditions: Adjacent to large pecan orchard - may be Suitable for Cuckoo - excellent old Screwbean msqt. grove. Sandy site Lots of Alkali Sacaton w/ pigweed n. open areas

Observed Wildlife: domestic dog, Coyote, Am Crow, Cottontail rabbit, white-crowned sparrow, Raccoon, House Finch, Spotted Towhee, Green-tailed Towhee, W.h. Ir-crowned sparrow, Pyrrhuloxia, American Kestrel

Photos Taken: 3 Seperate photo points established/staked with 3 photos taken at overlapping azimuths

max height of native vegetation 6 m

max height of non-native vegetation 5 m

Pre-Implementation Qualitative Monitoring Field Sheet

Site Valley Creek Date 25 oct 2017

Participants C. Bratt, D. Bartlett, Ryan, Andrew Target habitat

Document conditions at restoration site prior to restoration work implementation:

Identifiable Native Species	Abundance (Sporadic individuals, Low, Moderate, High)	Comments
Coyote willow	low	restricted patches on river bank
Cottonwood	low	a few trees at wide intervals
False Seep willow	low	Scattered along bank
Cat tail	low	few small patches
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Comments**
Saltcedar	Sparse - on river bank	

General Site Conditions: Park - minimal existing wildlife habitat mowed/maintained for walking trails

Observed Wildlife : gopher, domestic dog, Great blue Heron, bufflehead

Photos Taken: None

max height of native vegetation _____

max height of non-native vegetation _____

Pre-Implementation Qualitative Monitoring Field Sheet

Site Vinton A Date 25 oct. 2017

Participants C. Britt, D Babbitt, Ryan, Andrew Target habitat

Document conditions at restoration site prior to restoration work implementation:

Identifiable Native Species	Abundance (Sporadic individuals, Low, Moderate, High)	Comments
Screwbean mesq	Abundnt - mod	Some good stands - Sporadic
Four-wing Saltbush	Moderate - low	
Smooth Pigweed	dense - Abundnt	
Wolfberry	low - Moderate	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Comments**
Saltcedar	High - Moderate	Present throughout site Some dense stands
Russian thistle	High - Moderate	
Siberian elm	Sporadic	

General Site Conditions: Broad - moderately dense mixed Screwbean + Salt Cedar tree habitat with sub shrubs, pigweed + grasses

Observed Wildlife: Mallard duck, rock dove, killdeer, domestic ~~dog~~, ladder backed woodpecker, gopher . . . Green-tailed Towhee, Lincoln's Sparrow, Pyrrhuloxia, white-crowned sparrow, cattle egret, mourning dove, House finch

Photos Taken: 2 photo points established - 3 photos taken @ overlapping Azimuths

max height of native vegetation 6 m

max height of non-native vegetation 4m

Pre-Implementation Qualitative Monitoring Field Sheet

Site Hilton B Date 25 October 2017

Participants C. Burt, D Burlett, Ryan, Andrew Target habitat

Document conditions at restoration site prior to restoration work implementation:

Identifiable Native Species	Abundance (Sporadic individuals, Low, Moderate, High)	Comments
Screwbean Mesq	Moderate	Some nice trees not thick
Smooth Pigweed	Abundant	difficult to walk through - dense tall
four wing Saltbush	Moderate	Scattered shrubs
Rabbit brush	- low moderate	Scattered shrubs
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Comments**
Saltcedar	Moderate - dominant	
Siberian elm	- low	
fescue grass	- Moderate - high	
Russian thistle	Moderate	

General Site Conditions: Mixed Scrub habitat with dense pigweed Salt Cedar & Screwbean Mesq dominate

Observed Wildlife: Barn owl, killdeer, Northern Harrier, wx Sparrow, Mourning dove Ruby Crowned kinglet, gopher, bull snake, yellow-rumped warbler..... wildlife on back..

Photos Taken: 3 photo points established w/ 3 photos ea @ overlapping azimuths

max height of native vegetation 4M

max height of non-native vegetation 4M

Groundwater Levels Monitoring Field Sheet

Participants ANDREW GUERRA Date 12/8/17

Site	Well ID	TOC Elevation	Ground Surface Elevation	Casing Height	Date	Time	Water Level Reading TOC	Water Depth (Reading TOC - Casing Height)	Comments/Observations
Valley Creek	VC-MW-1	3755.64	3752.26	3.38	11/10/17	2:00 PM	—	—	WELL DESTROYED
	VC-MW-2	3754.72	3751.16	3.56	11/10/17	1:45 PM	8.58	5.02	NONE
Vinton A	VA-MW-1	3780.70	3777.44	3.46	11/10/17	4:45 PM	7.33	3.87	NONE
	VA-MW-2	3780.41	3776.76	3.43	11/10/17	4:15 PM	7.50	4.07	NONE
Vinton B	VB-MW-1	3777.12	3774.04	3.08	11/1017	3:45 PM	7.33	4.25	NONE
	VB-MW-2	3777.31	3773.60	3.71	11/10/17	3:15 PM	7.50	3.79	NONE

Pre-restoration Monitoring Datasheets

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site SHALEM COLONY Date 6 March 2018

Participants P. Houghton Target Habitat Screwbean Mesquite Forest

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Screwbean Mesquite	High	50-60%	Tall, mature trees, some have Mistletoe
Baccharis (seep willow)	Low	10%	
Coyote Willow	Low - Moderate	25%	Mostly near bank
Grasses	Low - Moderate	25%	Tall grasses in areas
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	Moderate	30%	Most near bank
Kochia	Low	10%	
Russian Thistle	Low	5%	

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 75%

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A		
					D	D	D		
Goodding's Willow					A	A	A		
					D	D	D		
Cottonwood					A	A	A		
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Screwbean Mesquite dominant, grasses & non-native forbs in patches, dissected by cleared paths/roads. Pecan Orchard adjacent to east.

Observed Wildlife: Northern Flicker, White-crowned Sparrow, Ladder-backed Woodpecker, Mourning Dove, White-winged Dove, Killdeer, Curve-billed Thrasher

Photos Taken: Nine photos total: Photopoint 1, Targets 1-3; Photopoint 2, Targets 1-3; Photopoint 3, Targets 1-3

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site VINTON A Date 6 March 2018

Participants Perrianne Houghton Target Habitat Riparian Forest

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Screwbean Mesquite	Moderate	35	
4-Wing Saltbush	Low	15	
Amaranth sp.	Moderate	25	Mixed w/ Kochia, dense
Wolfberry	Low	15	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	Moderate	30	Scattered
Kochia	Low - moderate	20	Dense in places
Russian Thistle	Low - moderate	25	

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 85%

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A		
					D	D	D		
Goodding's Willow					A	A	A		
					D	D	D		
Cottonwood					A	A	A		
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Scattered stands of Mesquite and salt cedar along bank & extending toward Levee. Amaranth, grasses & introduced forbs dense in places.

Observed Wildlife: Western Meadowlark, Turkey Vulture, Dark-eyed Junco, Spotted Towhee.

Photos Taken: → Photopoint 1, Targets 1-3; Photopoint 2, Targets 1-3; Photopoint 3, Targets 1-3. Nine photos total

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site VINTON B Date 6 March 2018

Participants P. Houghton Target Habitat Riparian Woodland

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Screwbean Mesquite	Moderate	35%	
4-wing Saltbush	Moderate-Low	25%	scattered
Rabbitbrush	Low	15%	
Amaranth sp.	High	60%	Dense in places & mixed w/Kochia
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	Moderate	~30%	Near bank & scattered
Kochia	Moderate	25%	
Russian Thistle	Low	10%	scattered

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 90%

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A		
					D	D	D		
Goodding's Willow					A	A	A		
					D	D	D		
Cottonwood					A	A	A		
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Most Mesquites and Salt Cedar are along and near bank, some toward levee. Amaranth (Pigweed) dense & high.

Observed Wildlife: White-crowned Sparrow, Northern Harrier, Gambel's Quail

Photos Taken: Nine photos total: Photopoint 1, Targets 1-3; Photopoint 2, Targets 1-3; Photopoint 3, Targets 1-3.

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site Valley Creek Date 02/05/18

Participants BZ PH Target Habitat Riparian Habitat

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Coyote Willow	Moderate-High on banks	5% total	Thick along banks.
Cottonwood	Sporadic	2%	
Baccharis	Sporadic along banks	1%	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	None	0%	almost all removed

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) _____

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A		
					D	D	D		
Goodding's Willow					A	A	A		
					D	D	D		
Cottonwood					A	A	A		
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Very open. Salt Cedar removed, Heavy Willow cover in 10ft strip along banks of river

Observed Wildlife: ~~ACE~~ AMKE, RSFL, LBWO, MoDo, NoMo

Photos Taken: At photo points 3per point

Participants P. Houghton Date 3/6/18

Groundwater Levels Monitoring Field Sheet

Site	Well ID	TOC Elevation	Ground Surface Elevation	Casing Height	Date	Time	Water Level Reading TOC	Water Depth (Reading TOC - Casing Height)	Comments/Observations
Valley Creek	VC-MW-1	3755.64	3752.26	3.38	3-6-18	8:50 AM	11.70	8.32	None
	VC-MW-2	3754.72	3751.16	3.56	3-6-18	9:23 AM	11.70	8.14	None
Vinton A	VA-MW-1	3780.70	3777.44	3.46	3-6-18	2:18 PM	12.40	8.94	None
	VA-MW-2	3780.41	3776.76	3.43	3-6-18	1:17 PM	11.50	8.07	None
Vinton B	VB-MW-1	3777.12	3774.04	3.08	3-6-18	3:30 PM	13.3	10.22	None
	VB-MW-2	3777.31	3773.60	3.71	3-6-18	3:48 PM	—	—	Well dry - obstructed with sediment at 15.3' from TOC

Post-restoration Monitoring Datasheets

May 2018

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site: Shalem Colony | Date: 16 May 2019

Participants: B. Z Volanek, W. Argo | Target Habitat: screwbean mesquite forest

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Mesquite (both)	moderate	50%	tall and mature
wolfberry	low	<5%	
coyote willow	low	20%	along bank
grasses	low	20%	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	sporadic	<1%	small

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 75% forest and ground cover

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A		
					D	D	D		
Goodding's Willow					A	A	A		no plantings
					D	D	D		
Cottonwood					A	A	A		
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: good mesquite w/ grass cover

Observed Wildlife: Nr. mocker, Gambels Qua., House finch, bullfrog, black chin hummingbird, cliff swallow, NOMO, potential SWFL

Photos Taken: photo points pkgr:rhetoxia

Site: Shalem Colony **Date:** 16 May 2018

Permanent Plot #1

326651 E
3583743 N

Species	Alive	Stressed	Dead
Coyote willow	live		
Goodding's willow			
Cottonwood			
honey mesquite	2		
SB mesquite	1		

Notes: Coyote willow in plot are natural
2% wolfberry; 2% guaco

Random Plot #1

no trees/shrubs have been planted so no random plots taken

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Permanent Plot #2

326972 E
3583436 N

Species	Alive	Stressed	Dead
Coyote willow	7		
Goodding's willow			
Cottonwood			
honey mesquite	1		
SB mesquite	1		

Notes: Coyote willows are natural
prickley pear (1); gooseberry (1)
2% wolfberry; 50% grass gr. cover

Random Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Permanent Plot #3

327027 E
3583300 N

Species	Alive	Stressed	Dead
Coyote willow	2		
Goodding's willow			
Cottonwood			
SB mesquite	3		

natural

Notes: guaco scattered on site

Random Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site Vinton A Date 16 May 2018

Participants B. Zvolanek, W. Argo Target Habitat riparian forest

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Mesquite	moderate	30-40%	
ground cover - grasses	moderate	20-30%	
salt bush	low	10-15%	
Wolfberry	low	10%	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	none	~~0~~	

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) ~25% groundcover + forest

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A		not planted
					D	D	D		
Goodding's Willow					A	A	A		not planted
					D	D	D		
Cottonwood					A	A	A		few planted
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Very open and no salt cedar

Observed Wildlife: road runner, RWB, merlin, cottontail, Gambels quail, no Dove, Mockingbird, cotton rat (dead), marine blue butterfly, common yellow throat, ladder back woodpecker, brown headed cowbird, western meadowlark

Photos Taken: photo points

Site: Vinton A

Date: 16 May 2016

Permanent Plot #1

347507 E
3534824 N

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			
honey mesquite	4		

Notes: Near river edge

Random Plot #1

all the trees/shrubs have not been planted so no random plots taken

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #2

347348 E
3534916 N

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			
honey mesquite	1		

Notes:

Random Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #3

347213 E
3534625 N

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	6	9	
SB mesquite	1		

Notes: Near VA-1 well
pea covering 25% of plot

Random Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site: Fenton B Date: 16 May 2018

Participants: B. Zvolanek, W. Argo Target Habitat: Riparian woodland habitat

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Mesquite - both	Moderate	50%	
wolfberry	low	<5%	
sunflower	moderate	10-15%	
rabbit brush	low	10-15%	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	sporadic	<1%	small regrowth

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 70 - 75%
Success of plantings: Sunflower grand cover

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A	190/190	~50% planted
					D	D	D		
Goodding's Willow					A	A	A		not planted until fall
					D	D	D		
Cottonwood					A	A	A		
					D	D	D		
Long Stem Shrub (specify in					A	A	A		not planted until fall
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: good mesquite & grand cover; very minimal salt cedar

Observed Wildlife: Gambles quail; house finch; cliff swallow, northern mockingbird, common yellow throat; RWB; blue grosbeak; black chin hummer, Mallard; ladder back woodpecker; spotted sandpiper; western kingbird, great horned owl; Swainson's Hawk, white wing & mourning dove; chipping sparrow, cottontail; jack rabbit; barn swallow; western meadowlark

Photos Taken: photo points

Site: Vinton B

Date: 16 May 2018

Permanent Plot #1

348313 E
3537465 N

transplant

Species	Alive	Stressed	Dead
Coyote willow	67	—	—
Goodding's willow			
Cottonwood			
honey mesquite	6		
SB mesquite	3		

Notes: kobeilinia about 10-20% of plot

Permanent Plot #2

348267 E
3537736 N

transplant

Species	Alive	Stressed	Dead
Coyote willow	38	—	—
Goodding's willow			
Cottonwood			
honey mesquite	3		

Notes: wet flower ground cover across the site

Permanent Plot #3

348094 E
3538091 N

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			
Honey mesquite	3		

Notes: no plantings yet
Dactyloctenium ~1%

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Random Plot #1

348314 E
3537519 N

transplant

Species	Alive	Stressed	Dead
Coyote willow	85		
Goodding's willow			
Cottonwood			

Notes: 1 small salt cedar; 20% kobeilinia

Random Plot #2

not enough planted to do other random plots

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Random Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site Valley Creek Date 15 May 2018

Participants B. Zvolanek, W. Argo Target Habitat open riparian woodland

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
cottonwood	sporadic individuals	2%	
screwbean mesq.	sporadic	1%	
coyote willow	low	25%	along bank
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	none	0	

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 0% shrub, 30-40% tree, 30-40% grasses/weeds

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow	transplant	normal		4-6'	A	A	A	117/118	
					D	D	D		
Goodding's Willow		—			A	A	A		not planted yet
					D	D	D		
Cottonwood		some stressed		3-5'	A	A	A	47/47	
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: very open park area w/ scattered large cottonwoods

Observed Wildlife: phainopepla, ~~Ravens~~, NoMo, barn swallow, cliff swallow, white wing dove, mourning dove, house finch, eurasian collared dove, black chinned hummingbird, chipping sparrow, blue grosbeak

Photos Taken: photo points

Site: Valley Creek

Date: 15 May 2018

Permanent Plot #1

348088 E
3525721 N

Species	Alive	Stressed	Dead
Coyote willow	79		1
Goodding's willow			
Cottonwood	2	2	

transplant

Notes: open area w/ flea bane along river
added 2' on the plot radius due to sidewalk

Permanent Plot #2

348127 E
3526036 N

Species	Alive	Stressed	Dead
Coyote willow	36	2	—
Goodding's willow	—	—	—
Cottonwood	4	3	—

Notes: added 4' on radius due to sidewalk

Permanent Plot #3

348161 E
3526171 N

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	7	2	—

Notes: _____

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Random Plot #1

≠ 348091 E
3525836 N

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	2	5	

Notes: _____

Random Plot #2

348160 E
3526261 N

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	3	7	
SB neoprene	1		

Notes: quarts scattered on plot

Random Plot #3

348192 E
3526423 N

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	4	6	

Notes: 1 natural lg cottonwood
chenopoda

Groundwater Levels Monitoring Field Sheet

Participants B. Zvolanek, W. Arjo Date 5/15/18 - 5/16/18

Site	Well ID	TOC Elevation	Ground Surface Elevation	Casing Height	Date	Time	Water Level Reading TOC	Water Depth (Reading TOC - Casing Height)	Comments/Observations
Valley Creek	VC-MW-1	3755.64	3752.26	3.6 ~~3.38~~	5/15/18	1415	11.66	8.06	
	VC-MW-2	3754.72	3751.16	3.56	5/15/18	1330	5.83	2.27	
Vinton A	VA-MW-1	3780.70	3777.44	3.46	5/16/18	0942	5.83	3.37	
	VA-MW-2	3780.41	3776.76	3.43	5/16/18	0910	6.42	2.99	
Vinton B	VB-MW-1	3777.12	3774.04	3.08	5/16/18	0841	7.34	4.26	
	VB-MW-2	3777.31	3773.60	3.71	5/16/18	0814	7.0	3.86	

Post-restoration Monitoring Datasheets

August 2018

Participants BRYAN ZVOLANEK, PERRIANNE HOUGHTON Date 08/29/18

Groundwater Levels Monitoring Field Sheet

Site	Well ID	TOC Elevation	Ground Surface Elevation	Casing Height	Date	Time	Water Level Reading TOC	Water Depth (Reading TOC - Casing Height)	Comments/Observations
Valley Creek	VC-MW-1	3755.64	3752.26	3.38	08/29/18	10:18	198cm	98cm	3.21 feet
	VC-MW-2	3754.72	3751.16	3.56	08/29/18	09:46	352cm	250cm	8.20 feet
Vinton A	VA-MW-1	3780.70	3777.44	3.46	08/29/18	12:22	199cm	89cm	2.92 feet
	VA-MW-2	3780.41	3776.76	3.43	08/29/18	12:57	173cm	53cm	1.74 feet
Vinton B	VB-MW-1	3777.12	3774.04	3.08	08/29/18	13:39	195cm	91cm	2.99 feet
	VB-MW-2	3777.31	3773.60	3.71	08/29/18				LOCK WOULD NOT OPEN STUCK SHUT
Shulem									
"									

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

1730

Site Shalem Colony Date 08/28/18

Participants Brian Zvolanek, Perrianne Houghton Target Habitat Riverine Restoration

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Screwbean	Moderate	15%	large thickets
Honey Mesquite		15%	
Coyote willow	low	20%	on banks
Wolfberry	low	5%	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	Sporadic	1%	resprouts need
Kochia	Moderate	10%	
Cynodon	Moderate	20%	

Opuntia 1%
Ribes 1%

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) _____

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A		
					D	D	D		
Goodding's Willow					A	A	A		no plantings
					D	D	D		
Cottonwood					A	A	A		
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: no planting yet, very similar to last visit, mesquite thickets & willows along river - grass & disturbed areas

Observed Wildlife: Mourning Dove, White-winged Dove, Roadrunner, House Finch, Barn swallow cottontail, phragmites

Photos Taken:

Site: Shalem Colony

Date: 08/28/18

Permanent Plot #1

Species	Alive	Stressed	Dead
Coyote willow	108		
Goodding's willow			
Cottonwood			
Hinds	2		
Screwbean	1		

Notes: Natural Coyote willow

Random Plot #1

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #2

Species	Alive	Stressed	Dead
Coyote willow	8		
Goodding's willow			
Cottonwood			
Hinds	1		
Screwbean	1		

Notes: Natural Coyote

Random Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #3

Species	Alive	Stressed	Dead
Coyote willow	2		
Goodding's willow			
Cottonwood			
Screwbean	3		

Notes:

Random Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

No random plots as no plantings present.

13:10 PM

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site Vinton A Date 08/29/18

Participants Bryan Zwicker, Penny Houghton Target Habitat Rio Grande Riverine Rest.

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Screwbean Mesquite	moderate	30%	
Coyote Willow	low	>5%	on banks
Sobanum	moderate	5%	
Milkweed	moderate	5%	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	Sporadic	2%	respects weed pulling
Kochia	High	30%	everywhere
Camel thorn	High	20%	everywhere

Bulrush - 1%
Saltgross - 5%
alkali Sacaton - 5%
Sedges: 1%
~~Rabbitbrush~~
muhly grass - 1%
wolfberry - 1%
Pucchonia - 2%
Saltbrush
Cynodon - 30%

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 30% tree/shrub
~~30~~% grass/forb

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow	X				A	A	A		
					D	D	D		
Goodding's Willow	X				A	A	A		
					D	D	D		
Cottonwood	poles	stressed			A	A	A	100%	mostly V. stressed 3 head of 15
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: lots of invasive early successional species. Gopher activity. No random plots done.

Observed Wildlife: White winged Dove, Crissal thrasher, cottontail, Gophers, Bullock's Oriole, N. Mockingbird, Barn Swallow, Western Kingbird, Spotted Sandpiper, black-chinned Hummer, Northern Harrier

Photos Taken:

13.10

Site: Vinton A

Date: 08/29/18

Permanent Plot #1

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			
Mesquite	4		

Notes: Mostly very stressed

Random Plot #1

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			
honey Mesquite	1		

Notes: Cocklebur + Camelthorn everywhere

Random Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	6	91	3

Notes: Mostly v. Stressed

Random Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

No random plots taken

15:00 1

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site Vinton B Date 08/29/18

Participants BRIAN ZUCLANGE, PERQUAVE HOUGHTON Target Habitat RECLAIMED Riverine Riparian

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Screwbean Mesquite	moderate	30%	
Coyote Willow	low	75%	along banks
Solanum	moderate	5%	
Milkweed	moderate	5%	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	Sporadic	1%	resprouts
Camel Thorn	High	20%	very common
Kochia	High	20%	very common

Jimsonweed 20%
Bulrush 1%
alkali sacaton 1%
Saltgrass 5%
muhlygrass 1%
wolfberry 1%
Bracharis 1%
Prosop Mesquite Sap
Cynodon 30%

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 30% shrub/tree 70% grass/forb

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow	transplant	thrive			A	A	A		
					D	D	D	100%	doing well
Goodding's Willow	X				A	A	A		
					D	D	D		
Cottonwood	X				A	A	A		
					D	D	D		
Long Stem Shrub (specify in	X				A	A	A		
					D	D	D		
Other	X				A	A	A		
					D	D	D		

General Site Conditions: Very similar to Vinton A. Some large mesquites, but mostly grass/forbs gopher activity.

Observed Wildlife: White winged dove, mourning dove, Barn swallow, Lincoln sparrow, cottontail

Photos Taken:

Site: Vinton B

Date: 08/29/18

Permanent Plot #1

Species	Alive	Stressed	Dead
Coyote willow	67		
Goodding's willow			
Cottonwood			
Screwbean	3		
honeymesquite	6		

Notes: all transplants doing well at edge of mesquite thicket

Permanent Plot #2

Species	Alive	Stressed	Dead
Coyote willow	38		
Goodding's willow			
Cottonwood			
mesquite	3		

Notes: transplant thriving

Permanent Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			
Honey	3		
screwbean	1		

Notes: lots of camel thorn & cynodon

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Random Plot #1

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Random Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Random Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

No random plots done

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet 9:55 AM

Site Valley Creek Date 08/29/18

Participants BRYAN ZVOLANEK, PERRIANNE HOUGHTON Target Habitat RIO GRANDE RESTORATION

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Cottonwood	Sporadic	2%	Nice adult trees
Screwbean	Sporadic	2%	Scattered adults
Coyote Willow	Sporadic	>5%	on banks
Chlorocantha Spinosa	Sporadic	5%	on banks
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	Sporadic to None	1%	very low
Cynodon		80%	dominant cover

buckhorn

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) _____

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow	transplant	thriving			A	A	A	100%	doing well
					D	D	D		
Goodding's Willow	none				A	A	A		
					D	D	D		
Cottonwood	poles	stressed			A	A	A	100%	about 1/3-1/2 survives
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Large gopher activity, Quite a few trees found on ground. Still some surviving Cottonwoods (about 1/3). Some poles mowed down. Almost no tamarisk

Observed Wildlife: Gopher, Black-chinned Hummer, Say's Phoebe, Lincoln Sparrow, Yellow-rumped

Photos Taken:

will gopher activity affect health of saplings?

8 dead Cottonwoods, moved down between plots

9:55 AM

Site: Valley Creek

Date: 08/29/18

Permanent Plot #1

Species	Alive	Stressed	Dead
Coyote willow	23		
Goodding's willow			
Cottonwood	2	2	

Notes: transplant looks good

Permanent Plot #2

Species	Alive	Stressed	Dead
Coyote willow	28		
Goodding's willow			
Cottonwood	1	3	3

Notes:

Permanent Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	1	3	2

Notes:

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

all very close together. do we want another PP further away?

Random Plot #1

348109
352 5973

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	3	1	1

Notes:

Random Plot #2

348131
3526073

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	2	2	
Bth Goodings	1		

Notes:

Random Plot #3

348182
3526328

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	4	2	

Notes: good cottonwoods

Very Stressed or Dead Between plots (orange flags)

Cotton 8 dead (moved)

Post-restoration Monitoring Datasheets

October 2018

Alkalai Sacaton
Amaranthus sp
Portacula sp
Chenopodium sp
Ash
Rhus trilobata
Ribes aureum
Fraxinus
Ambrosia

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site: Shalem Colony Date: 10/18/18

Participants: BZ, PH Target Habitat: Riverine Restoration

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Screwbean Mesquite	Moderate	30%	Some big groves
Cynodon Dactylon	Moderate	10%	
Coyote Willow	Low	~3%	on banks
Baccharis	Low	~1%	on banks
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar			
Kochia Scoparia	Low		
Melilotus alba	Low		

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) ~ 85%

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A		
					D	D	D		
Goodding's Willow					A	A	A		
					D	D	D		
Cottonwood					A	A	A		
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Very Muddy from rain

Observed Wildlife: Pyrrhuloxia, ruby-crowned kinglet, Yellow-rumped Warbler, Barn Swallow, Mourning Doves,

Photos Taken:

Site: Shalem Creek

Date: 10/18/18

Permanent Plot #1

Species	Alive	Stressed	Dead
Coyote willow	123		
Goodding's willow			
Cottonwood			
Honey Mesquite	2		
Screwbean	1		

Notes: Naturally occurring Willows

Random Plot #1

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Permanent Plot #2

Species	Alive	Stressed	Dead
Coyote willow	8		
Goodding's willow			
Cottonwood			
Honey Mesquite	1		
Screwbean	1		

Notes: _____

Random Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Permanent Plot #3

Species	Alive	Stressed	Dead
Coyote willow	2		
Goodding's willow			
Cottonwood			
Screwbean	3		

Notes: _____

Random Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Honey Mesquite
Solanum elaeagnifolium
Portulaca sp.
Baccharis Salicifolia or salicina
Lycium sp
Purple fall aster
alkali sacaton
Achnatherum hymenoides
Trianthema portulacastrum
Chloracantha spinosa
Melilotus albus
Chenopodium sp.
4-wing Saltbush
Asclepias subverticillata
Datura wrightii
Carex sp.
Juncus sp.
Russian Thistle

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site: Vinton A Date: 10/19/18

Participants: BZ, PH Target Habitat: Riverine Restoration

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Screwbean Mesquite	Low	5%	scattered groves
Cynodon dactylon	Moderate	20%	dominant grass
Distichlis spicata	Moderate	10%	doing better at this site than others
Coyote Willow	Low	5%	high on banks
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	Sporadic	1%	very low at this site
Kochia Scoparia	High	30%	out of control
Camelthorn	High	15%	dominant forb cover

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 80%

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow					A	A	A		
					D	D	D		
Goodding's Willow					A	A	A		
					D	D	D		
Cottonwood					A	A	A	A-1 S-10 D-3	T=14
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Kochia has invaded disturbed areas where tamarisk was taken out. Good sedge growth & even some Juncus coming up. Good saltgrass areas

Observed Wildlife: Yellow-faced pocket gopher, white-crowned sparrow, Killdeer, Sora!, Great Blue Heron, Northern Harrier, Osprey, Gambel's Quail, Western Meadowlark, Barn Swallow, Mourning Dove, Red-winged Blackbird, Red-tailed Hawk, House Finch

Photos Taken:

Site: Vinton A

Date: 10/19/18

Permanent Plot #1

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			
Honey Mesquite	4		

Notes: lots of Kochia

Random Plot #1

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			
Honey Mesquite	1		

Notes: Lots of Kochia

Random Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood	1	10	3

Notes: could not find one Cottonwood

Random Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes:

Asclepias subverticalla
Solanum elaeagnifolium
Chloracantha spinosa
fall purple aster
Cattail sp
Portulaca sp.
Carex
Datura wrightii
Honey Mesquite
Baccharis
Alkali sacaton
Melilotus alba
Achnatherum hymenoides
Chenopodium sp.

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site: Vinton B Date: 10/19/18

Participants: BZ PH Target Habitat: Riverine Restoration

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Screwbean Mesquite	Low	5%	Scattered Groves
Cynodendactylon	High	20%	
Distichlis spicata	High	20%	doing well!
Coyote Willow	Low	5%	high along banks
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar			
Kochia scoparia	High	~20%	not as bad as Vinton A, but not good.
Camel thorn	Moderate	10%	Dominant herb cover

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) 80%

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow		thriving			A	A	A		A- 1,048
					D	D	D		
Goodding's Willow					A	A	A		
					D	D	D		
Cottonwood					A	A	A		
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Kochia/bar grown in disturbed ground where tamarisk was removed cured in willow berms, Salt grass growth is good.

Observed Wildlife: yellow-faced pocket gopher, Mourning Dove, Great blue heron, white-crowned Sparrow, Great Egret, Red-winged Blackbird.

Photos Taken:

Site: Vinton B

Date: 10/19/18

Permanent Plot #1

Species	Alive	Stressed	Dead
Coyote willow	75		
Goodding's willow			
Cottonwood			
Honey Mesquite	6		
Screwbean Mes.	3		

Notes: transplant all alive

Random Plot #1

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Permanent Plot #2

Species	Alive	Stressed	Dead
Coyote willow	45		
Goodding's willow			
Cottonwood			
Honey Mesquite	3		

Notes: _____

Random Plot #2

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Permanent Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			
Honey Mesquite	3		
Screw bean	1		

Notes: _____

Random Plot #3

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Permanent Plot #4

Species	Alive	Stressed	Dead
Coyote willow			
Goodding's willow			
Cottonwood			

Notes: _____

Restoration Work Effectiveness - Qualitative Monitoring Field Sheet

Site Valley Creek Date 10/17/18

Participants ~~BZ~~, PH, WA Target Habitat Riverine Restoration

Kochia scoparia
Chloracantha Spinosa
Sporobolus airoides
Astragalus lentiginosus
Sphaerophysa Salsula
Russian thistle
Chenopodium leptophyllum
purple fall aster
Datura wrightii
~~Verbena~~
Portulaca oleracea
Melilotus albus
Elymus canadensis
Schoenoplectus pungens
Cyperus sp.
Amaranthus sp.
Typha sp.
Solanum elaeagn. folium

Identifiable Native Species	Abundance (None, Sporadic individuals, Low, Moderate, High)	Percent Cover (Estimate)	Comments
Coyote Willow	low	5%	
Cynodon dactylon	high	30%	ground cover
Distichlis spicata	high	30%	ground cover
screwbean mesquite	low	5%	
Identifiable Exotic (Non-Native) Species	**Abundance (None, Sporadic individuals, Low, Moderate, High, Monotypic)**	**Percent Cover (Estimate)**	**Comments**
Saltcedar	Low	~ 3%	one large missed + many resprouts.

OVERALL PERCENT COVER OF VEGETATION AT SITE (planted and naturally recruited) _____

Success of plantings:

Species	General Planting Area (s)	Vigor (stressed, normal, thriving)	Density (stems /acre)	Height Range	Survival Rate (average of 3 subplot counts) A = Alive, D = Dead Average = Sum A/ (Sum D + Sum A)				Comments
					Plot 1	Plot 2	Plot 3	Average	
Coyote Willow		thriving			A	A	A		A - 1288 S - 53
					D	D	D		
Goodding's Willow					A	A	A		
					D	D	D		
Cottonwood		normal			A	A	A		A - 65 S - 50 D - 8 Mowed/lost prev. → 317
					D	D	D		
Long Stem Shrub (specify in					A	A	A		
					D	D	D		
Other					A	A	A		
					D	D	D		

General Site Conditions: Very high kochia in front of transplants. Many poles topped. Lots of pocket gopher activity

Observed Wildlife: American kestrel, yellow-faced pocket gopher, fence lizard, red-winged blackbird, Audubon's warbler, Great Egret, Osprey, sharp-shinned hawk, House finch, Say's Phoebe, Lincoln's Sparrow, Savannah Sparrow, red-shafted flicker, Mourning Dove, White-winged Dove, Northern Mockingbird, Turkey Vulture, Killdeer, Barn Swallow

Photos Taken:

Participants 3Z, PH

Date

Groundwater Levels Monitoring Field Sheet

Site	Well ID	TOC Elevation	Ground Surface Elevation	Casing Height	Date	Time	Water Level Reading TOC	Water Depth (Reading TOC - Casing Height)	Comments/Observations
Valley Creek	VC-MW-1	3755.64	3752.26	3.38	10/17/18	1554			208cm 81.9 inches 6.8ft
	VC-MW-2	3754.72	3751.16	3.56	10/17/18	1520			183cm 72 inches 6ft
Vinton A	VA-MW-1	3780.70	3777.44	3.46	10/19/18	0818			120cm 47.2 inches 3.9ft
	VA-MW-2	3780.41	3776.76	3.43	10/19/18	0836			106cm 41.7 inches 3.5ft
Vinton B	VB-MW-1	3777.12	3774.04	3.08	10/19/18	0901			122cm 48 inches 4 ft
	VB-MW-2	3777.31	3773.60	3.71	10/19/18	0914			Couldnot open lock

Planting Field Sheets

Planting Field Sheet

Site VINTON A Date Planted Varies

Participants IDEALS Auger Depth ~9' Trench with mini excavator

Species	# Planted	Stock/Origin	Comments
Coyote Willow			
Goodding's Willow			
Cottonwood	15		4/24/18 ~9FT Deep w/mini excavator
Long Stem Shrub (specify in comments)			
Other			

General Location of trees planted AT north end of site. Area (acres) ~14.7ac

Provide GPS coordinates of planting locations or a sketch of the site: ~31°58'37.77" X 106°37'01.50"

Planting Field Sheet

Site Vinton B Date Planted See Below

Participants IDEALS Auger Depth ~10' Deep Trench

Species	# Planted	Stock/Origin	Comments
Coyote Willow Transplants	1561	Transplants from riverbed	3/7/18-3/14/18
Goodding's Willow			
Cottonwood			
Long Stem Shrub (specify in comments)			
Other			

General Location of trees planted Coyote along riverbanks Area (acres) ~20ac

Provide GPS coordinates of planting locations or a sketch of the site: $31.96508 X -106.60550 - 227 LF \times \frac{2.5 \text{ willow}}{LF} = 568 \text{ willow}$

$31.963572 X -106.605194 - 397 LF \times \frac{2.5 \text{ willow}}{LF} = 993 \text{ willow}$

Planting Field Sheet

Site Valley Creek Date Planted See Below

Participants IDEALS Auger Depth 9FT Auger / 9FT Track w/mini excavator

Species	# Planted	Stock/Origin	Comments
Coyote Willow	1290	Transplants from Riverbed	3/1/18 - 3/6/18
Goodding's Willow			
Cottonwood	440	Santa Ana Native Plants	4/16/18 - 4/17/18
Long Stem Shrub (specify in comments)			
Other			

General Location of trees planted Coyote along riverbank Others Throughout entire site Area (acres) ~22ac

Provide GPS coordinates of planting locations or a sketch of the site: 31.860233 x -106.605003, 109 LF x 2.5 will/LF = 273 willow
31.859827 x -106.605072, 57 LF x 2.5 will/LF = 143 willow
31.857420 x -106.605583, 350 LF x 2.5 will/LF = 875 willow

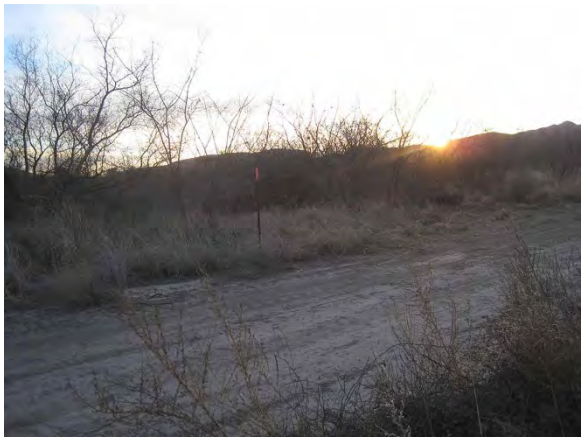
APPENDIX B

Repeat Photos

Shalem Colony Photos

Photo Point 1 Target 1

19 October 2017



6 March 2018

16 May 2018

28 August 2018

18 October 2018

Photo Point 1 Target 2

19 October 2017

6 March 2018

16 May 2018

28 August 2018

18 October 2018

Photo Point 1 Target 3

19 October 2017

6 March 2018

16 May 2018

28 August 2018

18 October 2018

Photo Point 2 Target 1

19 October 2017

6 March 2018

16 May 2018

28 August 2018

18 October 2018

Photo Point 2 Target 2

19 October 2017

6 March 2018

16 May 2018

28 August 2018

18 October 2018

Photo Point 2 Target 3

19 October 2017

6 March 2018

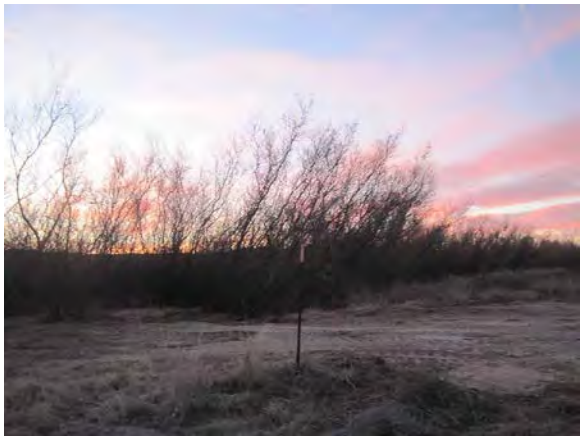
16 May 2018

28 August 2018

18 October 2018

Photo Point 3 Target 1

19 October 2017



6 March 2018

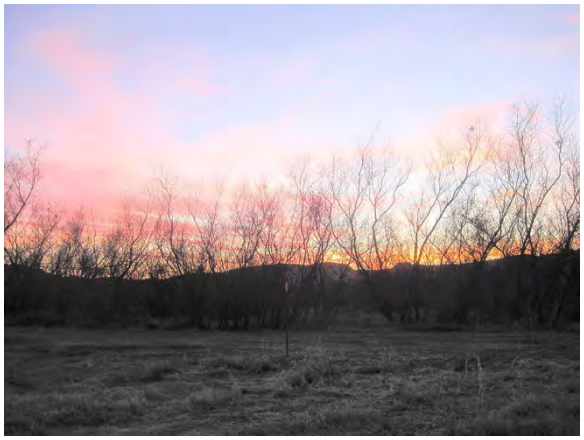
16 May 2018

28 August 2018

18 October 2018

Photo Point 3 Target 2

19 October 2017



6 March 2018

16 May 2018

28 August 2018

18 October 2018

Photo Point 3 Target 3

19 October 2017

6 March 2018

16 May 2018

28 August 2018

18 October 2018

Vinton A Photos

Photo Point 1 Target 1

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 1 Target 2

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 1 Target 3

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 2 Target 1

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 2 Target 2

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 2 Target 3

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 3 Target 1

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 3 Target 2

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 3 Target 3

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Vinton B Photos

Photo Point 1 Target 1

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 1 Target 2

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 1 Target 3

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 2 Target 1

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 2 Target 2

25 October 2017

6 March 2018

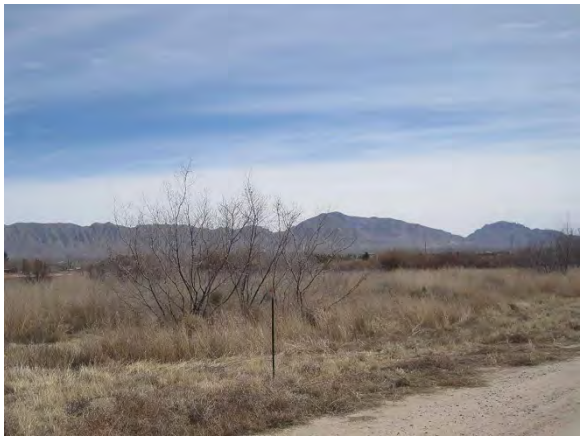
16 May 2018

29 August 2018

19 October 2018

Photo Point 2 Target 3

25 October 2017



6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 3 Target 1

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 3 Target 2

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Photo Point 3 Target 3

25 October 2017

6 March 2018

16 May 2018

29 August 2018

19 October 2018

Valley Creek Photos

Photo Point 1 Target 1

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 1 Target 2

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 1 Target 3

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 2 Target 1

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 2 Target 2

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 2 Target 3

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 3 Target 1

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 3 Target 2

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 3 Target 3

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 4 Target 1

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 4 Target 2

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

Photo Point 4 Target 3

10 November 2017

5 February 2018

15 May 2018

29 August 2018

17 October 2018

APPENDIX C

Planting Maps

APPENDIX C

Planting Maps

Legend

- Project Boundary
- Saltcedar Extraction
- Cottonwood
- Goodding Willow
- Coyote Willow
- Long Stem Shrubs

Riparian Habitat Restoration at Shalem Colony Plantings Layout

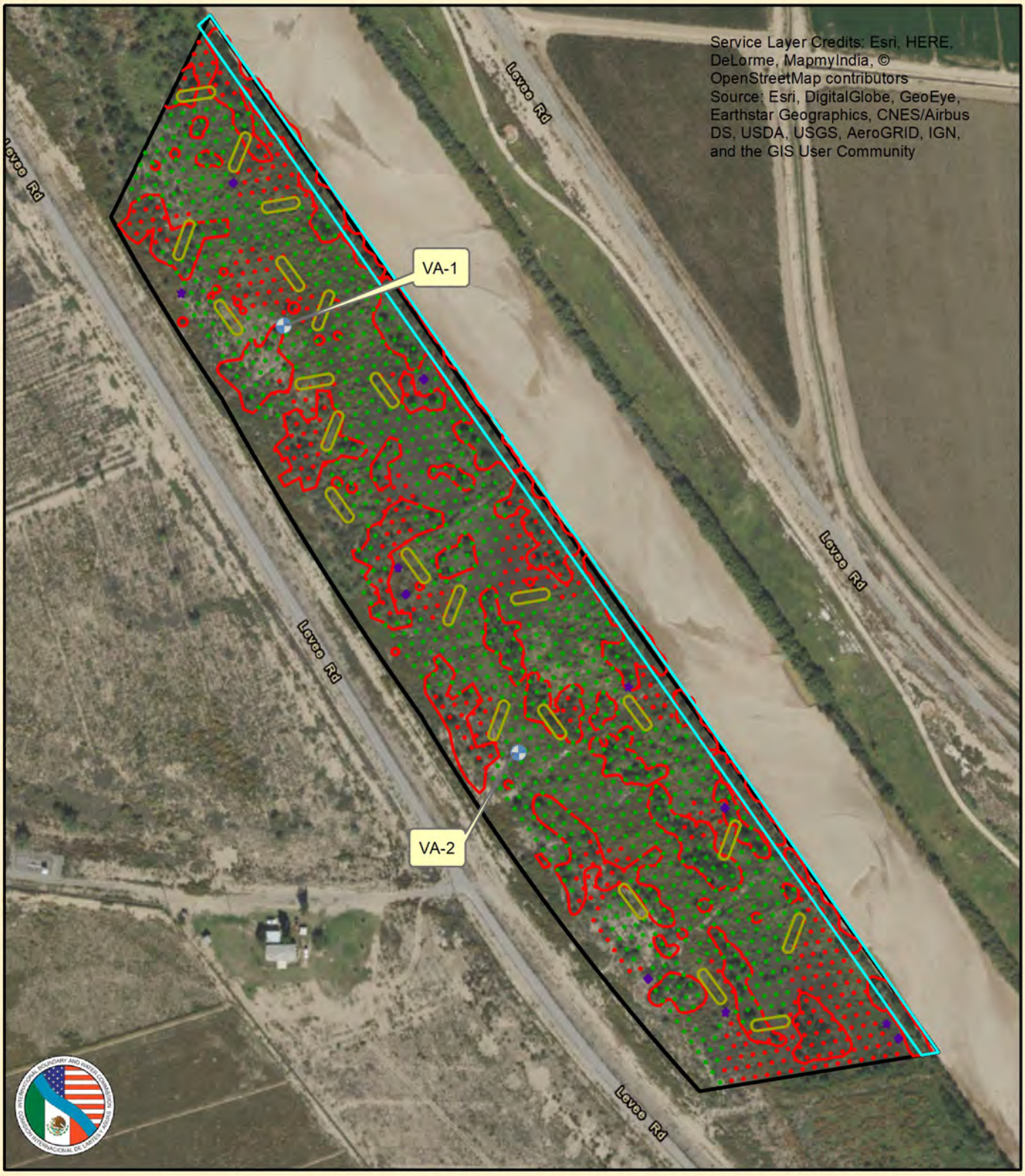
N

1:5,500

Feet
0 165 330 660

Meters
0 45 90 180

IDEALS-AGEISS, LLC



Legend

- Project Boundary
- Saltcedar Extraction
- Cottonwood
- Goodding Willow
- Coyote Willow
- Long Stem Shrubs
- Arizona Ash
- Well

Riparian Habitat Restoration at Vinton A Plantings Layout

N

1:2,750

Feet
0 80 160 320

Meters
0 20 40 80

IDEALS-AGEISS, LLC

Legend

- Project Boundary
- Saltcedar Extraction
- Cottonwood
- Goodding Willow
- Coyote Willow
- Long Stem Shrubs
- Arizona Ash
- Well

Riparian Habitat Restoration at Vinton B Plantings Layout

N

1:4,800

Feet
0 145 290 580

Meters
0 40 80 160

IDEALS-AGEISS, LLC

Legend

- Project Boundary
- Saltcedar Extraction
- Cottonwood
- Goodding Willow
- Coyote Willow
- Long Stem Shrubs
- Arizona Ash
- Pedestrian/Bike Path

Riparian Habitat Restoration at Valley Creek (North) Plantings Layout

N

1:3,800

Feet
0 115 230 460

Meters
0 30 60 120

IDEALS-AGEISS, LLC

Legend

- Project Boundary
- Saltcedar Extraction
- Cottonwood
- Goodding Willow
- Coyote Willow
- Long Stem Shrubs
- Arizona Ash
- Well
- Pedestrian/Bike Path

Riparian Habitat Restoration at Valley Creek (South) Plantings Layout

N

1:5,450

Feet
0 162.5 325 650

Meters
0 37.5 75 150

IDEALS-AGEISS, LLC