

The Big Wash Xeroriparian Restoration Project

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Introduction

The Big Wash Xeroriparian Restoration Project is a 77 acre site located in the Big Wash floodplain, upstream of the Cañada del Oro Wash on property owned by Pima County (Figure 1). The project was implemented in 2008 as part of a restoration agreement for previous development of Rancho Vistoso subdivision. The developer, Vistoso Partners LLC (Vestar), restored retired agricultural and degraded buffer areas to a diverse self-sustaining Xeroriparian habitat based on nearby reference sites. Restoration included re-grading of disturbed agricultural land to create microtopography that mimics the adjacent natural area. Planting included hydroseeding and installation of 10,000 container and salvage plants.

Pre-Existing Conditions

The restoration site consisted of retired agricultural fields and degraded mesquite woodland bounded by commercial and residential development, as well as existing riparian and open space properties.

Restoration Goal

Convert retired agricultural land and degraded grassland-mesquite woodland into a self-sustaining widened riparian corridor with similar hydrology, topography, vegetation, and functions as found in the undeveloped Big Wash floodplain (Figure 2 and Table A).

Plant Community	Pre-Restoration (acres)	Post-Restoration (acres)
Agricultural Land	44.5	0
Semi-desert Grassland	31	29.5
Mesquite-Catclaw-Hackberry	1.5	33.2
Burrobrush/Streambed	0	14.3

*Includes 5.5 acres of existing vegetation to be preserved in place
Sources: PCR and WLB

Figure 2. View looking upstream of Big Wash. Transects across sections of Big Wash were used as reference plots to guide what might be appropriate vegetation and site contours for the restoration area.



Scientific Name	Common Name
<i>Acacia constricta</i>	whitethorn acacia
<i>Ambrosia deltoidea</i>	triangle-leaf bursera
<i>Aristida purpurea</i>	purple threeawn
<i>Aristida temipes</i>	spidergrass
<i>Atriplex canescens</i>	fourwing saltbush
<i>Baleya multiradiata</i>	desert marigold
<i>Bohreria barbodes</i>	cane beardgrass
<i>Bouteloua aristoides</i>	needle grama
<i>Bouteloua curtipendula</i>	sideoats grama
<i>Bouteloua rothrockii</i>	rothrock's grama
<i>Calliandra eriophylla</i>	fairyduster
<i>Cassia covessi</i>	desert senna
<i>Chilopsis linearis</i>	desert willow
<i>Datura wrightii</i>	sacred datura
<i>Digitalis californica</i>	arizona cottontop
<i>Encelia farinosa</i>	brittlebush
<i>Ercameria laricina</i>	turpentine bush
<i>Eriogonum fasciculatum</i> var. <i>potefolium</i>	flat-top buckwheat
<i>Eschscholzia mexicana</i>	mexican gold poppy
<i>Gutierrezia sarothrae</i>	snakeweed
<i>Kalimeris grandiflora</i>	arizona poppy
<i>Lesquerella gordonii</i>	bladderpod
<i>Lupinus sparsiflorus</i>	desert lupine
<i>Leptochloa dubia</i>	green sprangletop
<i>Lycium fremontii</i>	wolfberry
<i>Penstemon parryi</i>	parry's penstemon
<i>Plantago insularis</i>	Indian wheat
<i>Proboscidea parviflora</i>	devil's claw
<i>Psittosiphon cooperi</i>	paperflower
<i>Salvia columbiarum</i>	desert chia
<i>Setaria macrostachya</i>	plains bristlegass
<i>Sporobolus airoides</i>	alkali sacaton
<i>Sporobolus cryptandrus</i>	sand dropseed



Project Development and Implementation

Several adjacent reference sites were surveyed to assess vegetative and physical characteristics; plant communities identified include: (Table B-Handout)

- Burrobrush-Desertbroom (strand)
- Mesquite-Catclaw-Hackberry (overbank)
- Grassland-Mesquite (upland/overbank)
- Whitethorn-Cactus (upland)

A mix of mid- and understory species similar to those found at the reference sites were used to create a diverse xeroriparian plant community (Figure 3). Initially, the vegetation will be irrigated; as the vegetation matures and is established, supplemental irrigation will be reduced until no longer necessary, creating a self-sustaining plant community.

The project site was contoured to:

- Mimic topographic conditions on adjacent reference sites, resulting in microtopography of stream channels and upland areas
- Create intermittent stream channels that receive harvested stormwater from adjacent development

Each area was planted at a specific density and species composition (Figure 4):

- Streambank zone (Table C) was planted at a density of 235 trees and shrubs per acre
- Former agricultural area received 130 trees and shrubs per acre (Table D)
- Degraded grassland-mesquite woodland received 65 trees and shrubs per acre (Table D)
- Entire site was hydroseeded with native seed mix, a portion of which was collected within a 20-mile radius of the project site (Table E)

Site grading, installation of plants and irrigation installation was completed in winter, 2008. In an effort to coincide application of the seed mix with anticipated rainfall events, hydroseeding occurred in July 2009, prior to onset of the anticipated rainy season.

Figure 1. The restoration site is located on the east side of Big Wash, a tributary of the Cañada del Oro Wash, at the southwest corner of Oracle Road (Highway 77) and Tangerine in the Town of Oro Valley.



Figure 3. Restoration and hydrology plan.

Temporary nursery for salvaged and container plants. Nursery to be fenced with a 6' chain link fence and be irrigated with an automatic irrigation system.

Scientific Name	Common Name	Number of Plants*
<i>Acacia constricta</i>	Whitethorn Acacia	310
<i>Acacia greggii</i>	Catclaw Acacia	100
<i>Cercidium microphyllum</i>	Little-leaf Palo Verde	556
<i>Ferocactus wislizeni</i>	Arizona Barrel Cactus	122
<i>Opuntia engelmannii</i>	Engelmann's Prickly Pear	112
<i>Opuntia ssp.</i>	Cholla	222
<i>Prosopis velutina</i>	Velvet Mesquite	920
<i>Yucca elata</i>	Soaptree Yucca	53
Total Trees		1894
Total Shrubs/Other		509

*Numbers include both transplanted and container plants

Scientific Name	Common Name	Number of Plants*
<i>Acacia greggii</i>	Catclaw Acacia	300
<i>Celtis pallida</i>	Desert Hackberry	1296
<i>Cercidium floridum</i>	Blue Palo Verde	381
<i>Chilopsis linearis</i>	Desert Willow	216
<i>Clematis drummondii</i>	Virgin's Bower	78
<i>Lycium andersonii</i>	Anderson's Wolfberry	828
<i>Oleaya tesota</i>	Ironwood	739
<i>Prosopis velutina</i>	Velvet Mesquite	3263
<i>Ziziphus obtusifolia</i>	Greythorn	704
Total Trees		2966
Total Shrubs/Other		4899



Maintenance and Monitoring

Maintenance and monitoring is the responsibility of Vestar for five years or until specified success criteria are reached, whichever comes first; thereafter the District will take over maintenance of the project site. Success criteria are determined by monitoring vegetative characteristics, including cover, density, percent exotics, and diversity (Figures 5 and 6).

Project site maintenance includes activities that ensure the defined success criteria are reached. These are defined in a project-specific maintenance manual and include:

- Maintaining and replacing plants
- Checking and maintaining irrigation lines
- Repairing erosion damage
- Removing weeds in a timely manner
- Remedying mosquito problems



Both quantitative and qualitative characteristics of the site will be monitored annually or quarterly for the duration of the project. The site is being monitored for:

- Percent cover (TVV)
- Plant density and diversity
- Percent exotic species
- Seedling recruitment
- Plant mortality
- Ponding (mosquitoes)
- Soil erosion
- Channel and floodplain geometry
- Wildlife utilization

The restoration site has been included in the Tucson Bird Count's Park Monitoring Program to provide data on how birds use the site as vegetation becomes established. Three birding transects have been established and will be surveyed quarterly; after one year of project establishment, 21 species of birds were surveyed.

Before



Figure 5. View of retired agricultural field targeted for restoration. The field vegetation primarily consists of native and non-native annuals.

After



Figure 6. Same view as shown in Figure 5, post-construction - 7/17/2009.

Lessons Learned

Several problematic issues arose during project implementation and post-construction maintenance, most having to do with native plant procurement and appropriate invasive species control. Future restoration projects may benefit by incorporating these lessons learned:

- Place native plant specifications in project scope of work and restoration plan, with specific exclusion of hybridized and/or ornamental varieties
- Specify seed collection protocol for nursery propagated plants
- Allow adequate time for grow-out
- Ensure a qualified professional is verifying plants from the nursery are native
- Specify landscape contractor to be experienced in maintenance of a native restoration project
- Specify weed control be timed for the growth cycle of target species (Figure 7); provide flexible annual weed control schedule and methods manual (see maintenance manual)
- Specify meetings with maintenance supervisor and crew to review maintenance manual and schedule as often as needed until maintenance protocol is satisfactory
- Inspect maintenance activities on a regular basis
- Allow for flexibility and adaptive management throughout implementation and maintenance of the project

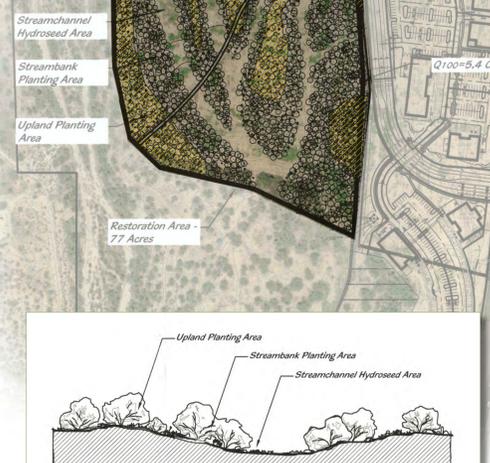


Figure 4. Typical section for topography and restoration planting plan.



Figure 7. Failure to control weeds lead to plant stress and eventual mortality - 8/20/2009.

