Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Palo Verde Ecological Reserve Annual Report 2006

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

November 2007

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Lower Colorado River Multi-Species Conservation Program

Palo Verde Ecological Reserve Annual Report 2006

Prepared by Gail Iglitz (Restoration Group) and Greg Clune (Wildlife Group)

Lower Colorado River
Multi-Species Conservation Program Office
Bureau of Reclamation
Lower Colorado Region
Boulder City, Nevada
http://www.lcrmscp.gov

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Background

Palo Verde Ecological Reserve (PVER) encompasses 1,352 acres of Colorado River historic floodplain near Blythe, California. Formerly, the property was known as the Riverview Ranch and was owned by the Travis family. The ranch was acquired by the Trust for Public Lands in the beginning of 2004. On September 3, 2004, the property was conveyed to the State of California. California has identified up to 1,300 acres of active agricultural lands on this property for habitat restoration for the Lower Colorado River Multi-Species Conservation Program (LCR MSCP).

As part of the LCR MSCP, the California Department of Fish and Game (CDFG) and the Bureau of Reclamation (Reclamation) are jointly planning the conversion of portions of PVER from agricultural crops to a mix of native plant species. After planting is complete, the created habitats will then be managed for species covered under the LCR MSCP throughout the 50-year life of the program.

1.0 Introduction

The LCR MSCP is a partnership of Federal and non-Federal stakeholders responding to the need to balance the use of LCR water resources and the conservation of native species and their habitat in compliance with the Endangered Species Act. This is a long-term (50-year) plan to conserve at least 26 species along the LCR from Lake Mead to the Southerly International Boundary with Mexico through the implementation of the Habitat Conservation Plan (HCP). In accordance with the goals outlined in the HCP, portions of agricultural land will be converted to native habitat along the LCR.

Purpose

For large habitat restoration sites such as PVER, which are developed over a number of years, restoration activities are divided into phases (Figure 1). The purpose of Phase 1 was to plant a riparian nursery to provide plant material for future riparian restoration efforts at PVER. The vegetation species propagated and maintained in the nursery are those used by the endangered and threatened and covered species along the LCR. These species will provide riparian habitats with a mosaic of vegetation including ground covers, trees and shrubs. The native plant nursery includes 20 acres in Field A with plantings of cottonwood (*Populus fremontii),* Goodding's willow (*Salix gooddingii*), coyote willow (*Salix exigua*), and mule's fat (*Baccharis salicifolia*), and 10 acres in Field B with plantings of honey mesquite (*Prosopis glandulosa* var. *torreyana*), saltbush *(Atriplex polycarpa*), quailbush *(Baccharis lentiformis)*, baccharis (*Baccharis sarothroides),* saltgrass (*Distichlis spicata),* and brittlebush (*Encelia farinosa*)for a total of 30 acres (Figure 2).

Location/Description

Palo Verde Ecological Reserve lies within the historic flood plain of the Colorado River in southeastern Riverside County as shown in the USGS-Blythe NE Quadrangle Map at the intersection of ranges 23 and 24 East and townships 5 and 6 South (Figure 1). The PVER is one of the northernmost parcels of agricultural land within the Palo Verde Valley and is accessed via eastern Second Avenue, 5 miles north of the town of Blythe, California, on State Highway 95, and 87 miles south of Needles on the same highway.

Existing infrastructure consists primarily of the irrigation system comprised of 9.2 miles of lined and unlined irrigation ditches and associated slide gates, a 100-horsepower electric pump, and approximately 14 miles of access roads. All of the acreage has been in agricultural crops of grain, small melons, and alfalfa since the late 1930s. Currently the land is leased and farmed with crops such as alfalfa and grain.

Water

The Palo Verde Irrigation District (PVID) has an entitlement to Colorado River water for use on up to 104,500 acres of land within the PVID pursuant to the contract between the United States and PVID dated February 7, 1933. California Department of Fish & Game is the landowner within PVID, and has the right to order Colorado River water from PVID and then pump the water from the PVID canal system to its fields. The CDFG will make Colorado River water available for the restoration acreage.

Agreements

An Agreement for Restoration Activities has been signed by both Parties. The document assures the land and water resources will be available for the 50-year term of the program.

Landownership

The property is owned and managed by CDFG, which leases approximately 1,000 acres to a local farmer who is growing alfalfa and small grain. California Department of Fish and Game intends to keep the land leased for agricultural crops until such time as the property is converted to riparian habitat. The proposed development schedule by phases is shown in Figure 1.

Figure 1: Palo Verde Ecological Reserve Phase Map.

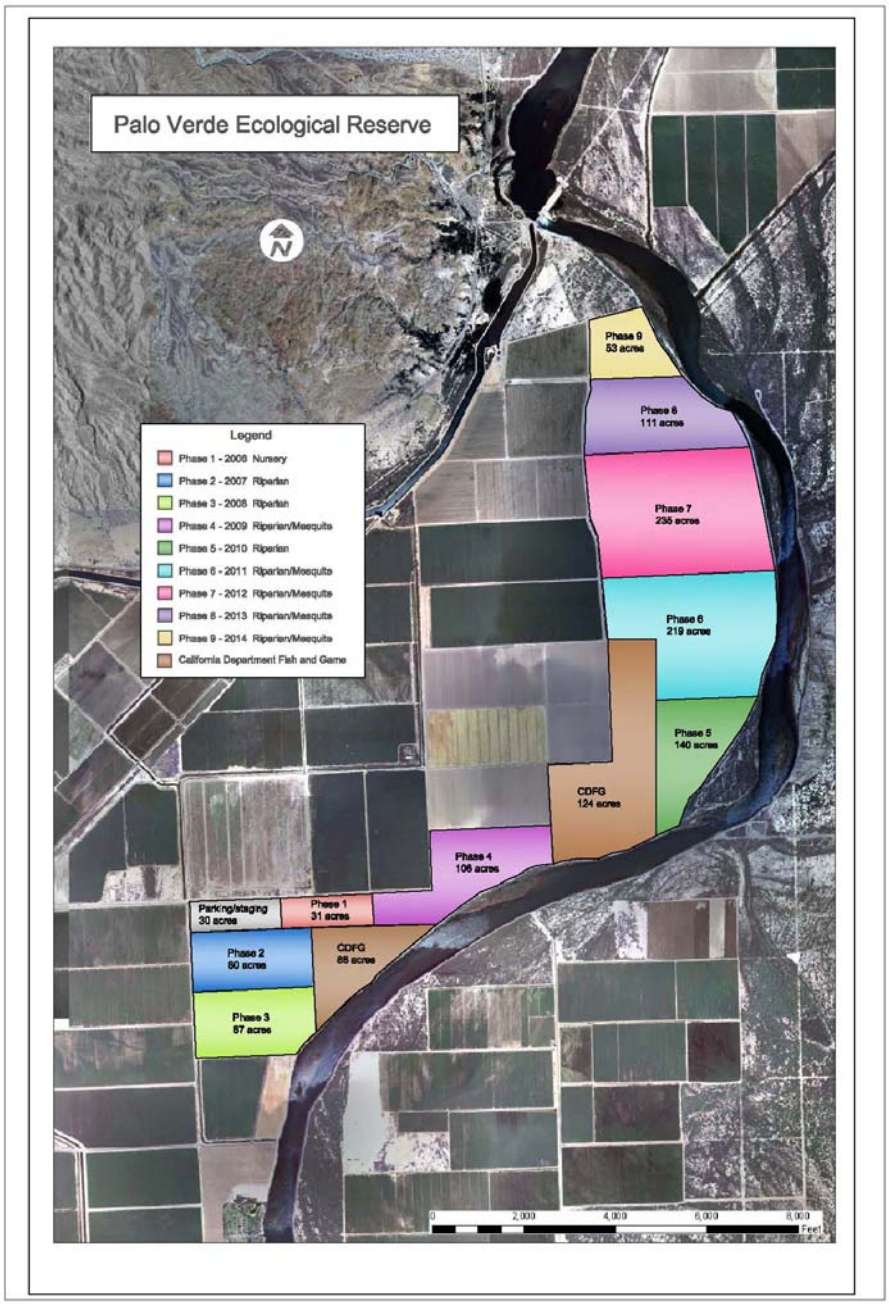
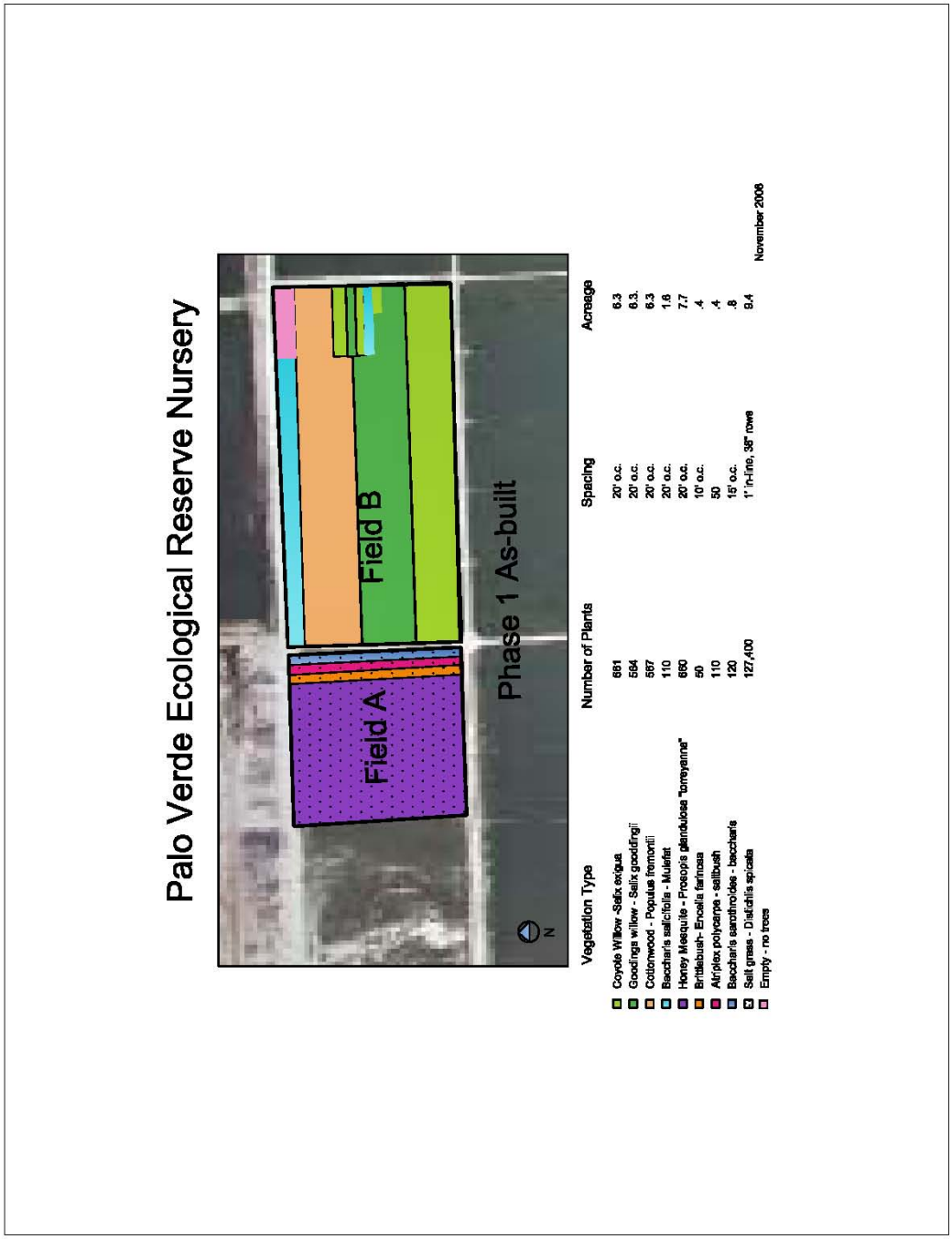


Figure 2: Native Nursery As-built planting plan.



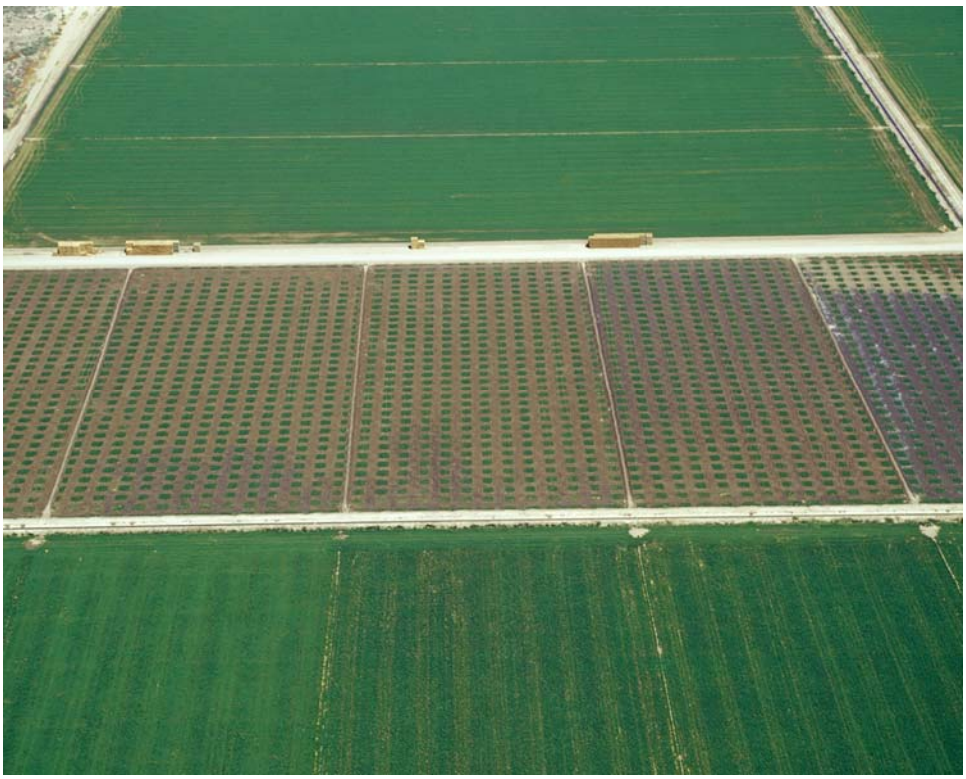
2.0 Planting

Planting Techniques

Field A

Field preparation started in March 2006; the trees were planted in April. An existing crop of alfalfa was left in the field and will serve as a cover crop. In preparation for planting, the field was disked with a tractor which had Global Positioning System (GPS) capability. A 4-foot wide disk was attached to the tractor and the GPS guiding unit was set for every 20 feet in two-dimensional x-y coordinates, creating an exact grid pattern on the ground (Figure 3). The trees were planted at the disked intersections.

Figure 3: Grid pattern in field.



Aerial view of tufts of alfalfa that remained after disking. Disked intersections provide an exact 20-foot on center grid pattern.

The soil in this field is considered "heavy", having more clay, which tends to hold moisture and form clods. Disking was not enough to break up the soil clods so that a conventional tree planter could be used for planting the trees. A Bobcat loader with an 8-inch auger was used to pre-drill holes for the trees for planting.

A contract for planting labor was competed and awarded to Nevada Conservation Corporation (NCC). Eight people were utilized for the planting event. The trees were placed in the pre-drilled holes and covered with soil; irrigation water was applied immediately after planting.

Four borders were disked in the field to control irrigation. The borders formed five planting checks. A check is the area of land between the borders. Coyote willow, Goodding's willow, Fremont cottonwood, and mule's fat were planted in the 20-acre field (Figure 2). The trees varied in pot size from 2-inch by 3-inch for Fremont cottonwood (Figure 4) to 1-gallon for Goodding's willow, coyote willow, and mule's fat (Figure 5).

Figure 4: Cottonwood trees.

Populus fremontii planted in rows. Alfalfa provided a ground cover for the nursery.

Figure 5: Mule's fat.

Two rows of mule's fat (*Baccharis salicifolia*) were planted along the road.

Photos taken in October 2006 show trees and ground cover 6 months after planting (Figure 6). The remaining alfalfa provides a ground cover and will fix nitrogen in the soil

for the next 3 years (through 2009; Figure 7). However, it was noted that where the ground was disturbed, a small amount of morning glory (*Ipomosa hederacea*), an invasive weed, was present, which will be addressed during the 2007 growing season by herbicide applications and hand picking.

Figure 6: Goodding's willow.

Goodding's willow. Photo taken in September 2006.

Plant material collected for propagation is generally collected from trees which are three years or older. The PVER nursery trees will be ready for plant material collection by the fall of 2007 (Figure 8). This would provide plant material for Phases 3-9.

Figure 7: Alfalfa ground cover.

Alfalfa has successfully kept invasive weeds to a minimum.

Figure 8: Cottonwood.

Cottonwood trees in September.

Field B

Field B is approximately 10 acres in size. The ground had been fallow for a number of years. Saltcedar *(Tamarix* spp.) and other invasive vegetation was present over the acreage. The ground preparation started in March. A D7 bulldozer with an 18-inch root plow attachment to was used to clear saltcedar (Figure 9). Once the vegetation was plowed and raked up to the surface, it was left to dry out for 2 weeks so that it could be burned (Figure 10). Final ground preparation included laser leveling, disking, and pre-irrigation. The ground was irrigated several times prior to planting so that the field capacity would be at 50% for mass transplanting of saltgrass.

Figure 9: D7 bulldozer.

D7 bulldozers with a root plow attachment plowing saltcedar and other vegetation in preparation for planting.

Figure 10: Burning saltcedar.

Saltcedar had been left to dry out for 2 weeks prior to burning.

Saltgrass was mass transplanted on 1-foot inline spacing with 38 inches between rows. All 10 acres were to be planted; however, during the mass transplanting the ground became too dry (less than 50% field capacity) for the plantings. This resulted in planting only 3 acres at that time. The unplanted saltgrass plantings went back to the nursery for another month. The remaining 7 acres of saltgrass were eventually planted in May without any difficulties (Figure 11). One week after the initial grass planting, the NCC crew planted four rows of 1-gallon plants of baccharis, two rows of quailbush, and on row of saltbush over the top of the saltgrass (Figure 12).

Figure 11: Mass transplanting saltgrass.

Three acres of saltgrass were planted in April. The remaining 7 acres were planted in May.

Figure 12: Planting *Atriplex*.

One-gallon pot of *Atriplex* was planted 25 feet on center.

In October, some of the remaining saltgrass was seeding. Irrigation had been reduced in August so that the Bermuda grass would be stressed and die off. The grass was mowed in October prior to planting the mesquite trees.

The field was flagged so that a 20-foot on-center grid was in place. A Bobcat loader was used to pre-drill holes through the saltgrass and soil (Figure 13). A total of 660 honey mesquite trees were planted in the field through the saltgrass.

Figure 13: Augering holes.

Bobcat with a 12-inch auger was used to pre-drill the holes for the trees.

To protect the young trees; two treatments for rabbit determents were implemented. A total of 270 trees were enclosed in chicken wire (Figure 14). The trees were removed from their pots and rolled in chicken wire to cover the root ball and the plant. The entire roll was then planted; wood lathe was placed through the wire to hold the chicken wire in place. Two hundred and seventy of the trees had "garlic clips" hung on the branches. The clips have small tubes that contain concentrations of garlic oil. The clips will be effective in emitting a garlic scent for up to 6 months. A total of 120 trees were planted with no rabbit determents. Fifty brittlebush *(Encelia farinosa)* were planted in the last row adjacent to the existing saltbush.

Figure 14: Chicken wire around trees.

Chicken wire was wrapped around the mesquite trees.

A visual evaluation of the rabbit deterrent products will be made next spring. Rabbit damage if any will be noted.

Irrigation

Water was applied 13 times to field B and 11 times to field A in 2006. It is anticipated that in the 2007 growing season, field B will be irrigated once every 2 months from March through October. Field A will be kept on the same irrigation schedule.

Site Maintenance

There were no improvements to this site during 2007.

3.0 FY 2006 Monitoring

Post-development Monitoring (Phase 1)

Vegetation

Methods

Because Phase 1 will be used as a nursery, the standard vegetation protocol was not used. Survivorship monitoring was conducted in November 2006 for Field A and in January 2007 in Field B. Trees and shrubs were visually examined for signs of stress and counted as alive or dead.

Results

Field A

The cottonwood, willows, and mule's fat showed no visual signs of stress during the initial survivorship monitoring. Percent survival of Field A was 93% for cottonwoods, willows, and mule's fat. During the survey, 15 small patches of morning glory were observed around the cottonwood and willow trees. Trees in the morning glory areas appeared less vigorous than trees without morning glory patches.

Field B

The baccharis and saltbush showed no sign of stress during the initial survivorship monitoring in June 2006. In January 2007, percent survival for Field B was 0% for baccharis, 58% for saltbush, and 100% for mesquite. Encroachment of Bermuda grass is suspected to be a factor in the loss of baccharis and saltbush.

Discussion

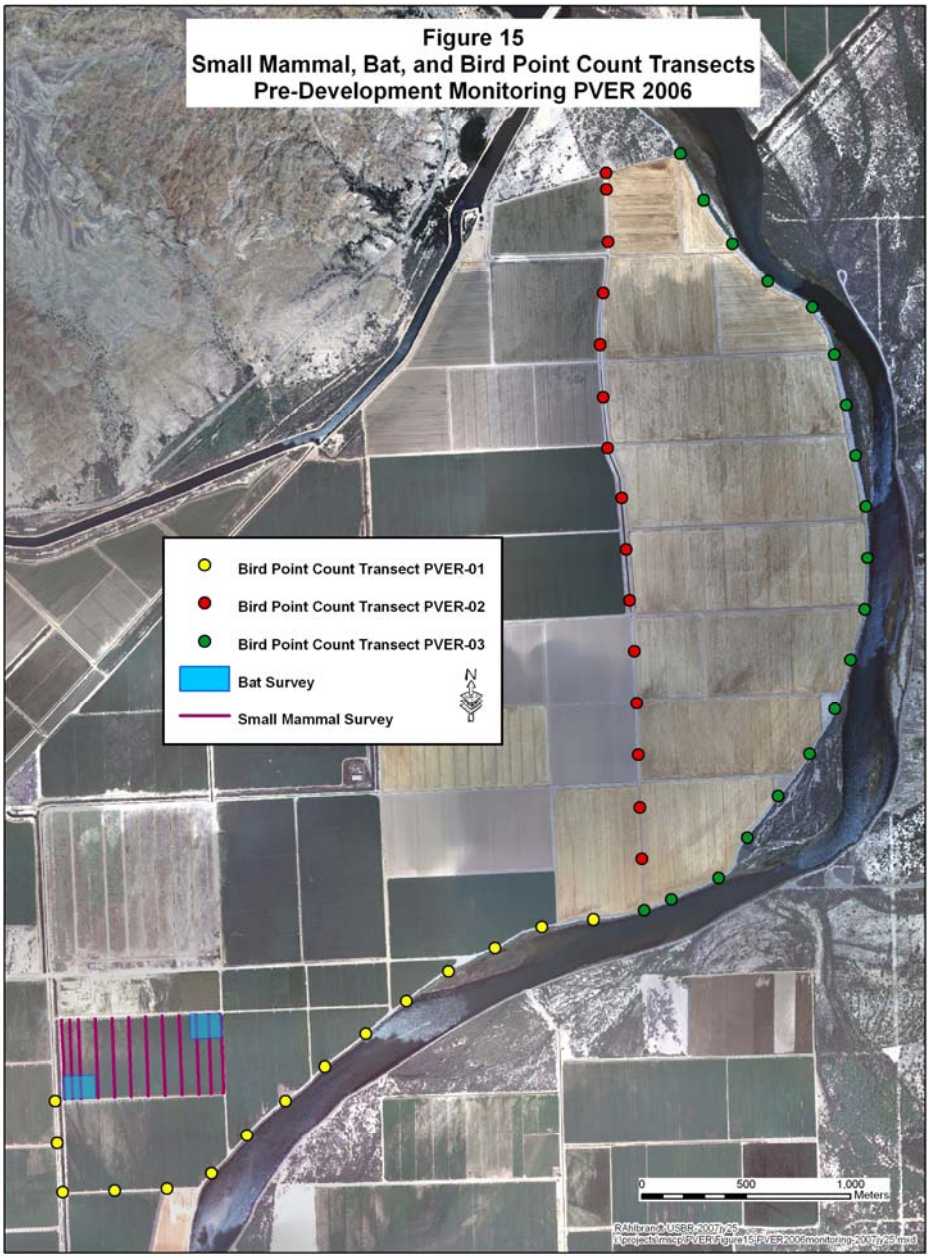
The planting of the nursery appeared to be very successful. Morning glory and Bermuda grass infestations will be monitored in the future.

Pre-development Monitoring (Phase 2)

Small Mammals

Methods

Predevelopment trapping of small mammals was conducted in Phase 2 on 17 October 2006 (Figure 15). Sherman traps were placed in parallel, linear transects of approximately 150 meters in length. A trap station was located at every 10 m along the transect, and one trap was located at each trap station. Transects were 15 m apart. The traps were baited with a mixture of peanut butter, oats, and vanilla. Traps were collected the following morning. One hundred and eighty traps were used for a total of 180 trap nights.



Results

No small mammals were captured.

Discussion

The alfalfa cover crop on Phase 2 was less than 0.5 m in height. The lack of vegetation for small mammals to hide in may be a reason for not capturing any small mammals (Rosenzweig 1973, Wondolleck 1978, Cameron and Spencer 1981, Price and Waser 1985, Hoffmeister 1986).

Bats

Susan Broderick of Reclamation's Denver Technical Service Center conducted monitoring of the bat species. The methods and results sections are taken from her report to the LCR MSCP: *Acoustic Bat Surveys Lower Colorado River Pilot Study April 2006*.

Methods

Predevelopment surveys were conducted in the northwest and southeast corners of Phase 2 on 4 April 2006 (Figure 15). Acoustic bat surveys were conducted using AnaBat II bat detectors. Bat calls were recorded directly onto compact flash cards. Ten units were deployed simultaneously in adjacent habitats and run continuously from dusk to dawn, recording all bat calls during an 11-hour period. The units were retrieved and downloaded the following day. Calls were analyzed comparing minimum frequency, duration, and shape of each call sequence (bat pass) with reference calls from libraries of positively identified bats from throughout the western United States, following the method outlined in Thomas et al. (1987). A bat pass is defined as a call sequence of duration greater than 0.5 milliseconds (ms) and consisting of more that two individual calls (Thomas 1998, O'Farrell and Gannon 1999, Broderick 2006). Due to difficulties in characterizing some of the bat calls, some of the bats were only identifiable to the genus level.

Results

In the northwest corner, nine bat passes were recorded from five species or species groups. In the southeast corner, three bat passes were recorded from three species or genus groups (Figure 16; Broderick 2006).

Figure 16. Bat activity at PVER April 2006.

PVER Phase 2	# bat passes/night	# bat passes/hr	# spp. or genus groups
NW corner	9	0.82	8
SE corner	3	0.27	3

Discussion

The low number of recorded calls at PVER phase 2 was not unexpected. Phase 2 and the surrounding farm fields contain alfalfa crops, which are often dry and do not produce much of an insect prey base for the bats. The farm fields and surrounding areas also lack any roosting habitats.

Birds

Methods

To sample the entire habitat at PVER, three point-count transects were established. Reclamation utilized a point-count protocol established by Great Basin Bird Observatory (2007) and Ralph et al. (1993). Two transects (labeled PVER-02 and PVER-03) were on the eastern levee road, near the river, and one transect (labeled PVER-01), was on the western edge of PVER, running north and south (Figure 15). Ten points were conducted

per transect at an interval of 250 m between points. All birds observed aurally or visually were recorded by species, distance from plot center (0-50 m, 50-100 m, >100 m), and time interval (0-3 min, 3-5 min, 5-10 min). Bird activity was characterized (mating/nesting evidence, flyover, family group, singing, calling, territorial display, observed, mated pair) and recorded. Individuals were recorded once. Each transect was surveyed three times. Point counts were conducted on 23 May, 20 and 21 June, and 18 and 19 July 2006. Transects began ½ hour before sunrise and ended by 10:00 a.m. (EST).

Data Analysis

Data from birds observed beyond 100 meters and recorded as flyovers were omitted from analysis. Data was compiled in a Microsoft Access database. Each transect was analyzed individually, combining the three survey dates. Species diversity, richness, and evenness for each transect was determined using a natural logarithm version (Nur et al. 1999) of Shannon's index (Krebs 1989). Evenness is a measurement of species similarity. Evenness equals 1.0 when there are similar proportions of all species. The Renkonen index (Krebs 1989) was used for quantitative indices of similarity between all three transects. The Renkonen index measures community similarity on a scale of 0 to 1, with 0 meaning that there is no overlap of species between sites and 1 meaning that there is complete species similarity between sites (Nur et al. 1999).

Results

Thirty-nine avian species, totaling 1,964 observations were recorded. On transect PVER-01, 18 species totaling 635 observations were recorded. Species richness was 18. The Shannon-Weaver Index was 1.36 and evenness was 0.47. For PVER-02, 24 species totaling 619 observations were recorded. Species richness was 24. The Shannon-Weaver Index was 1.6 and evenness was 0.50. Along PVER-03, 20 species, totaling 710 observations were recorded. Species richness was 20. The Shannon-Weaver Index was 1.70 and evenness was 0.55. The Renkonen index between all three transects was 0.28. Figure 17 summarizes the results.

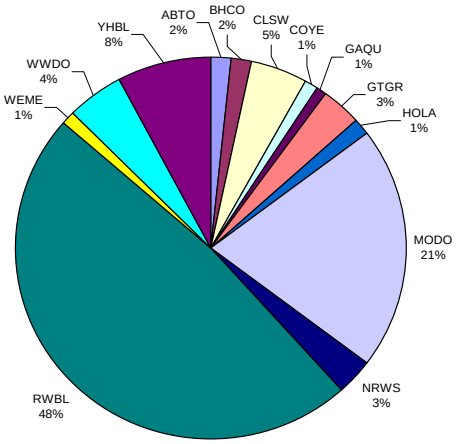
Figure 17. Species Richness, Shannon-Weaver Index, Evenness from Point Counts PVER 2006.

Transect	Species Richness	Shannon-Weaver Index	Evenness	Renkonen Index
PVER-01	18	1.36	0.47	-------
PVER-02	24	1.6	0.50	-------
PVER-03	20	1.70	0.55	-------
All	38	1.92	0.53	0.28

Three species: red-winged blackbirds (*Agelaius phoeniceus*), mourning doves (*Zenaida macroura*), and yellow-headed blackbirds (*Xanthocephalus xanthocephalus*) comprised 77% of the relative abundance for all three transects (Fig. 18).

Figure 18. Relative Abundance ≥1%, from Point Counts PVER-2006

(Species code are listed in Appendix 1.)



Discussion

With the exception of the nursery, the vegetation at PVER consists of alfalfa and grain crops. An abundance of blackbirds and mourning doves are typical of farm fields along the LCR (M. Voisine, Bureau of Reclamation, Boulder City, Nev., pers. obs). Transects showed low community similarity as expressed by the Renkonen Index (0.28). One transect ran along the river, a second along the river and through farm fields, and the third ran along the farms fields, following an irrigation canal that is continually filled with water. Each transect represents a slightly different but noticeable habitat within PVER.

Two Arizona Bell's vireos (*Vireo belli arizonae*) were recorded during two separate surveys at different points. Both times the vireos were recorded on the routes that follow the river and the observations were greater than 100 m away.

4.0 Established Land Cover and Habitat Credit

Phase 1 was established as a nursery to provide plant stock for future phases at PVER. No land cover classification and habitat credit will be determined at this time.

5.0 Adaptive Management Recommendations

Developed Conservation Area

Operation and Maintenance

No recommendations needed.

Soil Management

No recommendations needed.

Water Management

No recommendations needed.

Structural Management

No recommendations needed.

Wildfire Management

No recommendations needed.

Public Use

No recommendations needed.

Law Enforcement

No recommendations needed.

Future Habitat Creation Development

Operation and Maintenance

No recommendations needed.

Future Development

No recommendations needed.

Soil Management

No recommendations needed.

Water Management

No recommendations needed.

Structural Management

No recommendations needed.

Wildfire Management

No recommendations needed.

Public Use

No recommendations needed.

Law Enforcement

No recommendations needed.

Monitoring

No changes to the established monitoring plan are recommended at this time.

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Appendix 1: Avian Species Recorded at PVER, 2006

Common Name	Scientific Name	AOU CODE
Abert's towhee	*Pipilo aberti*	ABTO
American coot	*Fulica americana*	AMCO
Anna's hummingbird	*Calypte anna*	ANHU
Ash-throated flycatcher	*Myiarchus cinerascens*	ATFL
Bell's vireo	*Vireo bellii*	BEVI
Black-tailed gnatcatcher	*Polioptila melanura*	BRGN
Blue grosbeak	*Passerina caerulea*	BLGR
Brown-headed cowbird	*Molothrus ater*	BHCO
Caspian tern	*Sterna caspia*	CATE
Cattle egret	*Bubulcus ibis*	CAEG
Cliff swallow	*Petrochelidon pyrrhonota*	CLSW
Common raven	*Corvus corax*	CORA
Common yellowthroat	*Geothlypis trichas*	COYE
Crissal thrasher	*Toxostoma crissale*	CRTH
Gambel's quail	*Callipepla gambelii*	GAQU
Great blue heron	*Ardea herodias*	GBHE
Great egret	*Ardea alba*	GREG
Greater roadrunner	*Geococcyx californianus*	GRRO
Great-tailed grackle	*Quiscalus mexicanus*	GTGR
Green heron	*Butorides virescens*	GRHE
Horned lark	*Eremophila alpestris*	HOLA
House finch	*Carpodacus mexicanus*	HOFI
Killdeer	*Charadrius vociferus*	KILL
Ladder-backed woodpecker	*Picoides scalaris*	LBWO
Lesser nighthawk	*Chordeiles acutipennis*	LENI
Loggerhead shrike	*Lanius ludovicianus*	LOSH
Long-billed curlew	*Numenius americanus*	LBCU
Lucy's warbler	*Vermivora luciae*	LUWA
Mourning dove	*Zenaida macroura*	MODO
Northern mockingbird	*Mimus polyglottos*	NOMO
Northern rough-winged swallow	*Stelgidopteryx serripennis*	NRWS
Peregrine falcon	*Falco peregrinus*	PEFA
Pied-billed grebe	*Podilymbus podiceps*	PBGR
Prairie falcon	*Falco mexicanus*	PRFA
Redhead	*Aythya americana*	REDH
Red-winged blackbird	*Agelaius phoeniceus*	RWBL
Say's phoebe	*Sayornis saya*	SAPH
Snowy egret	*Egretta thula*	ANEG
Song sparrow	*Melospiza melodia*	SOSP
Tree swallow	*Tachycineta bicolor*	TRSW
Turkey vulture	*Cathartes aura*	TUVU

Common Name	**Scientific Name**	**AOU Code**
Unidentified hawk	NA	UNHA
Verdin	*Auriparus flaviceps*	VERD
Western kingbird	*Tyrannus verticalis*	WEKI
Western meadowlark	*Sturnella neglecta*	WEME
White-winged dove	*Zenaida asiatica*	WWDO
Yellow-breasted chat	*Icteria virens*	YBCH
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	YHBL