

Lower Colorado River Multi-Species Conservation Program



Balancing Resource Use and Conservation

Small Mammal Colonization at Habitat Creation Areas Along the Lower Colorado River: 2009



May 2010

Lower Colorado River Multi-Species Conservation Program

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Abstract

The Bureau of Reclamation is the lead agency for the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). One of the goals of the LCR MSCP is to create habitat for species covered under the Habitat Conservation Plan. *Sigmodon arizonae plenus* (Colorado River cotton rat) and *Sigmodon hispidus eremicus* (Yuma hispid cotton rat) are listed as covered species. Monitoring small mammals at current and future habitat creation sites will allow Reclamation to determine whether *Sigmodon* are colonizing these sites. Trapping continued at three habitat creation sites in spring 2009. The reduction in the number of sites trapped is because sites with confirmed *Sigmodon* presence were not trapped in 2009. No *Sigmodon* were trapped at the three sites surveyed in 2009. Trapping in future years will focus on areas that have a dense herbaceous understory or have been specifically planted to provide *Sigmodon* habitat. A protocol designed to obtain population demographic information is being developed and will be incorporated into post-restoration monitoring at the three sites.

Introduction

The Bureau of Reclamation (Reclamation) is the lead implementing agency for the Lower Colorado River Multi-Species Conservation Plan (LCR MSCP). The LCR MSCP is a 50-year cooperative Federal-State-Tribal-County-Private endeavor that will manage the natural resources of the LCR watershed, provide regulatory relief for the use of water resources of the river, and create native habitat types along the LCR. Implementation of the LCR MSCP began in October 2005. In order to restore native habitats, the LCR MSCP will create the following cover types: 1) 5,940 acres (2,404 ha) of cottonwood-willow (*Populus fremontii*/*Salix* spp.), 2) 1,320 acres (534 ha) of honey mesquite (*Prosopis glandulosa*), 3) 512 acres (207 ha) of marsh, and 4) 360 acres (146 ha) of backwaters.

One of the purposes for these efforts is to provide habitat for plant and animal species covered under the Habitat Conservation Plan (HCP), including *Sigmodon hispidus eremicus* (Yuma hispid cotton rat) and *Sigmodon arizonae plenus* (Colorado River cotton rat). Of the habitat to be created, 125 acres (50.6 ha) of habitat have been designated for *S. a. plenus*, and 76 acres (30.8 ha) of habitat have been designated for *S. h. eremicus*. While other covered species habitat acreages may overlap with these numbers, these amounts will be created with specific habitat characteristics for the two *Sigmodon* species. The range of these two species is assumed to not overlap. Those captured south of the Trigo and Chocolate mountains in the area of Imperial National Wildlife Refuge (NWR) and south to the Yuma, Arizona area are Yuma hispid cotton rats. Those captured north of the aforementioned mountain ranges are Colorado River cotton rats. The historic northernmost records of the Colorado River cotton rat is an area just south of Laughlin, Nevada (Hall 1946 and Bradley 1966). Currently, Reclamation has not found this species farther north than Havasu National Wildlife Refuge (NWR) near Needles, California.

Reclamation is increasing its understanding of restoration science through an adaptive management approach; therefore, monitoring of current habitat creation/restoration sites is crucial. A portion of the research conducted under Work Task C-27 is dedicated to developing a new monitoring protocol for restoration sites that have confirmed *Sigmodon* presence or have habitat planted specifically for *Sigmodon*. Using an adaptive management approach combined with long-term monitoring of restoration sites will allow the continued persistence of these two listed LCR MSCP species. Beginning in Fiscal Year 2010, permanent long-term trapping grids will be established at restoration sites with confirmed *Sigmodon* presence or at sites where appropriate habitat has been planted.

Study Areas

Beal Lake Riparian and Marsh Project

The Beal Lake site is adjacent to Beal Lake and Topock Marsh, inside Havasu NWR on the Arizona side of the Colorado River (Figure 1). It is a two-phase habitat creation project that was initiated in the spring of 2003. The 100-acre (40.5-ha) site is a joint effort between Reclamation and the Havasu NWR with the purpose of evaluating riparian restoration techniques for the

improvement of habitat for terrestrial and marsh LCR MSCP covered species. The site was planted with Fremont cottonwood, Goodding's willow (*Salix gooddingii*), coyote willow (*Salix exigua*), honey mesquite (*Prosopis glandulosa*), and screwbean mesquite (*Prosopis pubescens*). Currently, the site contains areas of all of species listed above. Arrowweed (*Pluchea sericea*) has begun to fill in the open areas and edges of most of the plots in the site.

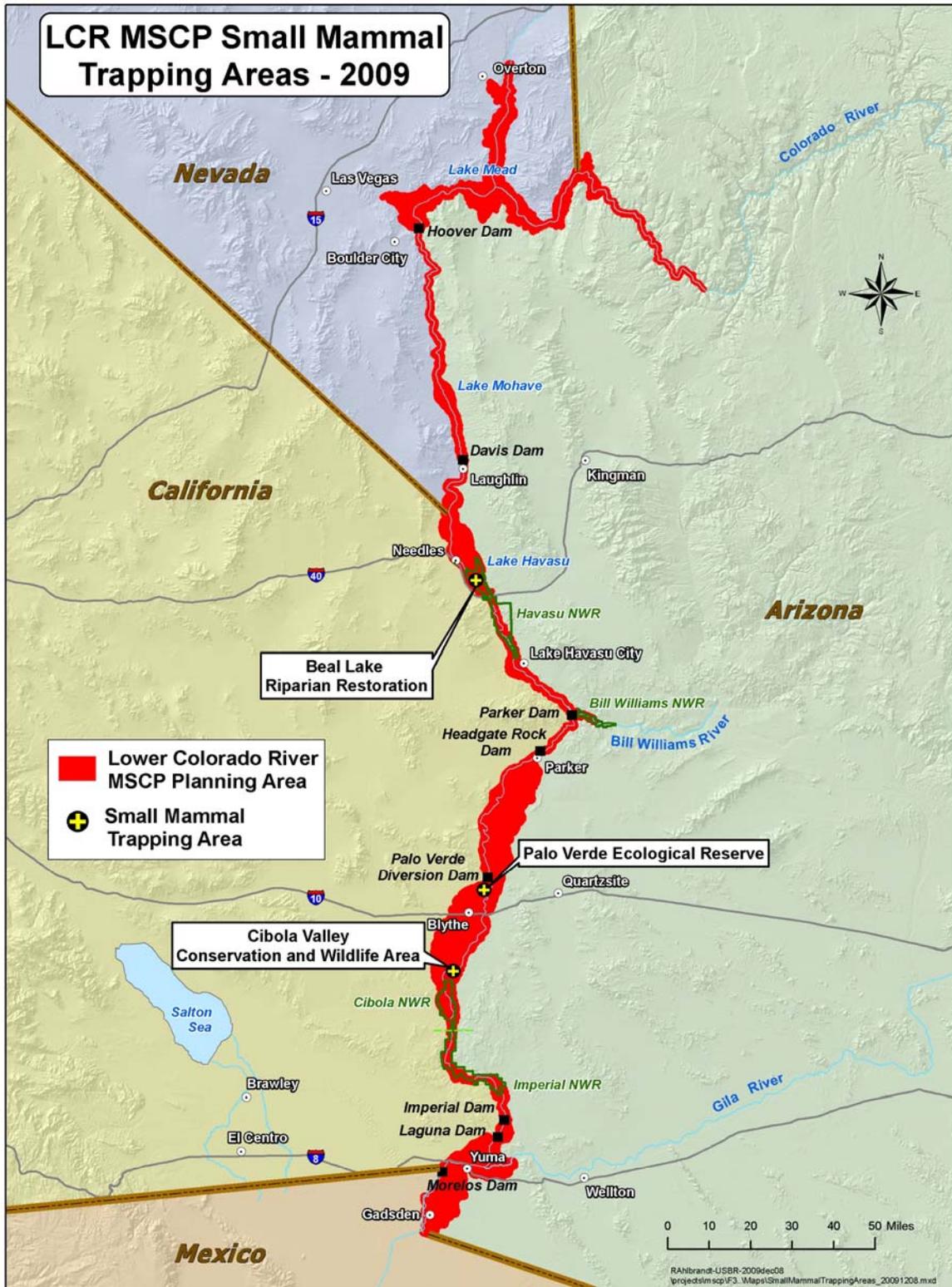
Palo Verde Ecological Preserve

Palo Verde Ecological Preserve (PVER) is located about 5 miles (8 km) north of Blythe, California along the California side of the Colorado River (Figure 1). It will encompass up to 1,300 acres (526 ha) when completed. The acreages will be separated into nine different phases, with one phase being planted every year. In the spring of 2006, a 31-acre (12.5-ha) nursery (Phase 1) was planted. Phase two was farmed for alfalfa (*Medicago sativa*) prior to conversion to native riparian habitat. In the spring of 2007, Phase 2 was planted with 80 acres (32.4 ha) of cottonwood, willow, and other riparian plants. Phase 3 was planted in the spring of 2008 and is also planted with cottonwood-willow habitat types. Phase 4 was planted in 2009 and contains mostly cottonwood-willow, with one plot of mesquite and a mix of native grasses .

Cibola Valley Conservation and Wildlife Area

Cibola Valley Conservation and Wildlife Area (CVCA) is located in Arizona adjacent to the Colorado River, about 15 miles (24 km) south of Blythe, California (Figure 1). It will encompass about 1,019 acres (412 ha) when completed. CVCA is a multi-phase plan in which the first three phases have been identified. Three phases include Fremont cottonwood, Goodding's willow, coyote willow, and other riparian plant species. Phase 1 was planted in the spring of 2006, and contains a 22-acre (9-ha) nursery and a 64-acre (26-ha) area of cottonwood-willow habitat. Phase 3 was planted in the spring of 2007, and contains over 80 acres (32 ha) of cottonwood-willow planted in different combinations. Phase 3 also includes 11 acres (4.5 ha) of *Baccharis* spp. mixed with some cottonwood and willow. Phase 2 was planted in the spring of 2008. Most of Phase 2 is planted with cottonwood-willow habitat, with one small area of honey mesquite and quailbush (*Atriplex lentiformis*). Phase 4 was planted with mesquite and quailbush. In addition to the habitat creation areas, a 194-acre (78.5-ha) area planted in alfalfa, which will be converted into habitat in the future, was monitored to obtain baseline data of a managed agricultural field.

Figure 1. Small mammal trapping locations.

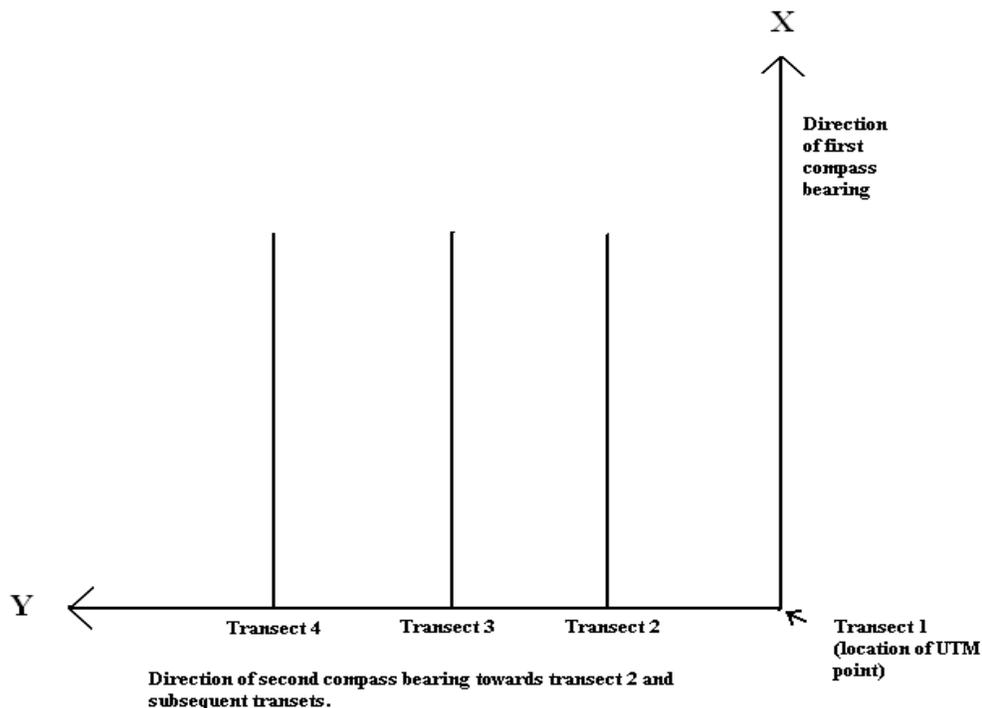


Methods

Traps were first placed in areas with the highest density of vegetation at ground level, which is known to be the preferred habitat of *Sigmodon* spp. along the LCR and elsewhere (Andersen and Nelson 1999). Once the densest habitats had been sampled, other less densely vegetated habitats were sampled. These surveys are focused on finding *Sigmodon* spp. All other captures are incidental to our main focus; therefore, the numbers of individuals of each species (including *Sigmodon*) reported here should be interpreted with caution.

Traps were baited with a mixture of oats, peanut butter, and vanilla. A small handful of cotton was also added to each trap to provide insulating cover for any animal trapped overnight. Sherman live traps were used, which are triggered by the animal stepping on a pressure plate that then closes a trap door behind the animal. Traps were set out in transects of 15 traps per transect whenever possible. Transects were then set out in a grid to cover as great an area as possible. Traps in each transect were 33 ft (10 m) apart, and each transect was 50 ft (15 m) apart. A UTM reading (NAD 83) was taken with a GPS unit at the location of the first trap of the first transect in the grid. At this point, a compass bearing (X) was taken in the direction of the first transect. A second bearing (Y) was also taken from this point perpendicular to the X bearing. In the Y direction, each subsequent transect in the grid was started at this bearing (see Figure 2). This enables replication of the grid and determination of the approximate location of a noteworthy capture in the future. Each transect is labeled by a letter, and each trap is numbered. For example, the first trap of the first transect of a grid would be labeled A-1 on the data sheet. Aerial maps of each site are also used and trapping areas are marked for future reference.

Figure 2. Diagram of a transect grid.



Trapping focused on areas of each site where cotton rat colonization was most likely. The 15 trap transect grid method does not always work when focusing on these areas. When not using the grid method, transects were placed so that the entire focus area was saturated with traps. Distance between traps varied, but the average was about 10 m. This enabled fewer traps to be used while increasing the capture rate. Because the focus of this effort is to find cotton rats, areas where it would be highly unlikely to find them were not trapped. This still allows ample captures of non-target species, which are more general in their habitat preferences. Also, for areas where planting has not yet occurred and bare ground and agriculture are the pre-treatment conditions, trapping will occur in adjacent areas if possible cotton rat habitat is present to discover whether there are nearby populations that would be likely to colonize sites.

Traps were set out in the afternoon and collected the following morning after sunrise. Captured animals were transferred into a clear plastic bag and identified to species. Animals were identified using a key to local small mammal species provided by UNLV, a key included in the Mammals of California field guide (Jameson and Peeters 2004), the Kays and Wilson field guide (2002), and the expertise of UNLV researchers. Measurements were taken if needed for identification. A standardized data sheet was used to list all animals captured, where in the grid they were captured, the location of the grid, and what ground cover/macrohabitat was found in the trapping area. All animals were released back into the trapping area once identification was made. Traps in which an animal had been captured were washed in a bleach water solution and then rinsed in plain water and set out to dry after each trapping day.

Results

A list of scientific and common names for all species captured during this project can be found in Appendix 1.

Beal Lake Riparian and Marsh Project

In 2006, 1,415 traps were set, with a total of 55 small mammals captured. In 2007, 575 traps were set, with a total of 81 small mammals captured. A total of 600 traps were set in 2008, with 32 total captures of small mammals (Table 1). A total of 225 traps were set in 2009. No cotton rats have been captured since 2006. Arrowweed was the dominant cover where most captures occurred. One new species, the southern grasshopper mouse (*Onychomys torridus*), was captured in 2008, bringing the total species captured at Beal to nine. Pocket mice (*Chaetodipus penicillatus*) and *Peromyscus* were the most commonly captured species.

Table 1. Summary of all captures at Beal.

Species	2006	2007	2008	2009
<i>Sigmodon arizonae</i>	1	0	0	0
<i>Peromyscus eremicus</i>	8	42	17	7
<i>Peromyscus maniculatus</i>	13	9	6	9
<i>Chaetodipus penicillatus</i>	17	17	6	2
<i>Dipodomys merriami</i>	15	6	2	3
<i>Mus musculus</i>	0	4	0	2
<i>Neotoma albigula</i>	0	2	0	0
<i>Sylvilagus audubonii</i>	0	1	0	0
<i>Onychomys torridus</i>	0	0	1	0
unknown species	1	0	0	0
Totals	55	81	32	23

Palo Verde Ecological Preserve

In 2006 Phase 2 was trapped (195 trap nights) while it was still being farmed for alfalfa, with no captures. In the spring of 2007, Phase 2 was trapped again (255 trap nights) when it was a barren field prior to tree planting, and two deer mice (*Peromyscus maniculatus*) were captured. In the fall of 2007, Phase 2 was trapped (120 trap nights) as well as two additional areas. The edge of a drainage ditch along the west side of Phase 2 was trapped (59 trap nights), and the nursery was also trapped (60 trap nights). In 2008, 370 traps were set in Phase 2 and 40 traps were set in Phase 3. In 2009, 240 traps were set for one night. A summary of captures for each year can be found in Table 2. A total of four species have been captured at PVER, with the house mouse (*Mus musculus*) the most captured species. The herbaceous understory of the trapping areas was a mixture of alfalfa, Bermudagrass, and other grass species. No cotton rats were captured within the boundary of PVER; however, as part of the UNLV study, traps were set adjacent to PVER along a low bench of land that is partially inundated on the river (Figure 3). There is a population of *Sigmodon arizonae* on this island that is still present. The habitat in this area is dominated by an unknown shrub interspersed with areas of dense grasses, including dallisgrass (*Paspalum dilatatum*) and Bermudagrass (*Cynodon dactylon*). The areas surrounding the shrubby area are a mixture of bulrush (*Scirpus* spp.) and cattail (*Typha* spp.) that are inundated on a regular basis.

Table 2. Summary of all captures at PVER.

Species	2007	2008	2009
<i>Mus musculus</i>	27	60	30
<i>Peromyscus maniculatus</i>	2	6	4
<i>Peromyscus eremicus</i>	8	1	0
<i>Chaetodipus penicillatus</i>	6	5	0
Totals	43	72	34

Figure 3. Area adjacent to PVER where cotton rats were captured in 2008 and 2009.



Cibola Valley Conservation and Wildlife Area

In 2006, trapping was conducted in the spring (484 trap nights) before planting occurred on Phase 1, and then again after the first growing season in the fall (255 trap nights). Five deer mice were captured prior to planting, and only one was captured in the fall. The control alfalfa area was also trapped in 2006 (195 trap nights), with no captures. In the spring of 2007 there were no captures in Phase 1 (300 trap nights), three captures in the control area (300 trap nights), and one capture in Phase 3 pre-planting (150 trap nights). One of the control area captures was a Merriam's kangaroo rat (*Dipodomys merriami*); all other captures were deer mice. In the fall of 2007 there were 31 captures in Phase 1 (195 trap nights), no captures in the control area (45 trap nights), and four captures in Phase 3 (225 trap nights). In 2008, 450 traps were set in Phase 1, 150 traps in Phase 2, 450 traps in Phase 3, and 105 traps in the control field, with a total of 85 captures (Table 3). Phase 2, which was the last phase planted, had the highest capture rates for all four species captured in 2008 (Figure 4). Phases 2 and 3 were trapped in 2009 for a total of 195 trap nights. A total of five species have been captured at CVCA. No cotton rats have been captured at CVCA. A total of 645 traps have been set at the control agriculture field since 2006, with a total of three captures.

Table 3. Summary of all captures at CVCA.

Species	2006	2007	2008	2009
<i>Mus musculus</i>	0	27	24	4
<i>Peromyscus maniculatus</i>	6	9	31	4
<i>Peromyscus eremicus</i>	0	1	27	0
<i>Chaetodipus penicillatus</i>	0	1	3	0
<i>Dipodomys merriami</i>	0	1	0	0
Totals	6	39	85	8

Discussion

This was the fifth year of small mammal trapping for Reclamation at habitat creation sites as part of the LCR MSCP. Reclamation's focus during these surveys has been on the presence or absence of *Sigmodon* spp.; therefore, even relative species abundance may not be correctly represented in these surveys. Traps were not set out equally among habitat types, and the number of traps varied with the size of available habitat in which *Sigmodon* spp might be found. Because of this, true comparisons between sites cannot be made in regards to total small mammal assemblages. This issue is being addressed by Reclamation personnel. Permanent trapping grids with the intent of estimating population size of all mammals captured are being established at sites where *Sigmodon* are present or where appropriate habitat is being developed.

One *Sigmodon* spp. was captured at Beal in 2006, but none have been captured since. Trapping outside of Beal has resulted in the discovery of Colorado River cotton rats at Pintail Slough in Havasu NWR. This site was an older attempt at restoration of cottonwood willow habitat. It is currently a mix of native and nonnative grasses forbs and trees, and there appears to be a stable population of *Sigmodon arizonae* present. Planting appropriate habitat at Beal is therefore likely to result in colonization by *Sigmodon arizonae* because of the close proximity of this population. The Pintail Slough population is currently being monitored in a broader habitat analysis of *Sigmodon* spp. along the river.

PVER and CVCA are very similar both in planting design and in being agricultural conversions. More trapping has occurred at CVCA because more phases have been planted. Because trapping prior to habitat conversion has resulted in few captures, it is recommended that no additional trapping occur in agricultural fields prior to planting. Also, as the mass-planted cottonwood and willow trees have grown and shaded out the herbaceous understory, captures have decreased (Phase 1 on Figure 3). The capture rates in these dense stands of riparian trees are similar to capture rates in other older habitat creation areas that Reclamation has trapped. Future trapping at these two sites will focus on areas where there is still a dense herbaceous understory. In cottonwood and willow plantings, this typically means that traps will be placed on edges of these stands where a strip of grassy vegetation occurs. The number of traps will be determined by the amount of habitat available and may not equal 500 traps per year. Future habitat creation at the PVER site includes planting some areas with native herbaceous plants with minimal planting of mesquite trees, which will allow enough sunlight for successful establishment of a native

herbaceous understory. Trapping in these phases will focus on areas where the native plants successfully grow into a dense understory. In 2009 native grass was planted in a couple of plots in Phase 4 of PVER. This habitat will be monitored closely over the next few years because it is next to a known population of *Sigmodon arizonae* that is being monitored under Work Task C-27.

The Imperial site was not trapped in 2009 because the presence of *Sigmodon hispidus* has already been determined and a monitoring protocol for this species has not been established. Trapping will not be conducted again until habitat creation occurs at Imperial (estimated to be 2010 or later). The Cibola NWR Nature Trail was trapped for the habitat and monitoring research (C-27) because the presence of a large stable population of *Sigmodon arizonae* has already been confirmed. Yuma East Wetlands is a site that is being considered for inclusion in the LCR MSCP. This site was trapped in September 2009 because several fields of alkali sacaton (*Sporobolus airoides*) had been planted and appeared to create habitat consistent with *Sigmodon* preferences. One individual of *Sigmodon hispidus* was captured at Yuma East Wetlands, but not in the alkali sacaton. It was captured in a mix of *Phragmites* and cattail.

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Appendix 1. Scientific and common names of all species captured during project.

Scientific Name	Common Name
<i>Sigmodon hispidus eremicus</i>	Yuma hispid cotton rat
<i>Sigmodon arizonae plenus</i>	Colorado River cotton rat
<i>Peromyscus eremicus</i>	Cactus mouse
<i>Peromyscus maniculatus</i>	Deer mouse
<i>Chaetodipus penicillatus</i>	Desert pocket mouse
<i>Dipodomys merriami</i>	Merriam's kangaroo rat
<i>Neotoma albigula</i>	White-throated woodrat
<i>Reithrodontomys megalotis</i>	Western harvest mouse
<i>Sylvilagus audubonii</i>	Desert cottontail
<i>Mus musculus</i>	House mouse
<i>Onychomys torridus</i>	Southern grasshopper mouse