



# Lower Colorado River Multi-Species Conservation Program

*Balancing Resource Use and Conservation*

## Small Mammal Colonization at Habitat Creation Areas along the Lower Colorado River: Fiscal Year 2011



December 2011

# Lower Colorado River Multi-Species Conservation Program Steering Committee Members

## **Federal Participant Group**

Bureau of Reclamation  
U.S. Fish and Wildlife Service  
National Park Service  
Bureau of Land Management  
Bureau of Indian Affairs  
Western Area Power Administration

## **Arizona Participant Group**

Arizona Department of Water Resources  
Arizona Electric Power Cooperative, Inc.  
Arizona Game and Fish Department  
Arizona Power Authority  
Central Arizona Water Conservation District  
Cibola Valley Irrigation and Drainage District  
City of Bullhead City  
City of Lake Havasu City  
City of Mesa  
City of Somerton  
City of Yuma  
Electrical District No. 3, Pinal County, Arizona  
Golden Shores Water Conservation District  
Mohave County Water Authority  
Mohave Valley Irrigation and Drainage District  
Mohave Water Conservation District  
North Gila Valley Irrigation and Drainage District  
Town of Fredonia  
Town of Thatcher  
Town of Wickenburg  
Salt River Project Agricultural Improvement and Power District  
Unit "B" Irrigation and Drainage District  
Wellton-Mohawk Irrigation and Drainage District  
Yuma County Water Users' Association  
Yuma Irrigation District  
Yuma Mesa Irrigation and Drainage District

## **Other Interested Parties Participant Group**

QuadState County Government Coalition  
Desert Wildlife Unlimited

## **California Participant Group**

California Department of Fish and Game  
City of Needles  
Coachella Valley Water District  
Colorado River Board of California  
Bard Water District  
Imperial Irrigation District  
Los Angeles Department of Water and Power  
Palo Verde Irrigation District  
San Diego County Water Authority  
Southern California Edison Company  
Southern California Public Power Authority  
The Metropolitan Water District of Southern California

## **Nevada Participant Group**

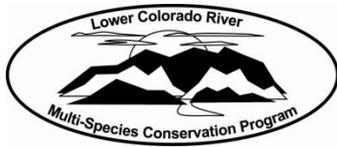
Colorado River Commission of Nevada  
Nevada Department of Wildlife  
Southern Nevada Water Authority  
Colorado River Commission Power Users  
Basic Water Company

## **Native American Participant Group**

Hualapai Tribe  
Colorado River Indian Tribes  
Chemehuevi Indian Tribe

## **Conservation Participant Group**

Ducks Unlimited  
Lower Colorado River RC&D Area, Inc.  
The Nature Conservancy



# **Lower Colorado River Multi-Species Conservation Program**

## **Small Mammal Colonization at Habitat Creation Areas along the Lower Colorado River: Fiscal Year 2011**

*Prepared by:*

Jeff Hill, Wildlife Group

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

**December 2011**

## **ACRONYMS AND ABBREVIATIONS**

CVCA	Cibola Valley Conservation and Wildlife Area
HCP	Habitat Conservation Plan
km	kilometer(s)
LCR	lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
m	meter(s)
NWR	National Wildlife Refuge
PIT	passive integrated transponder
PVER	Palo Verde Ecological Reserve
Reclamation	Bureau of Reclamation
UNLV	University of Nevada, Las Vegas

# CONTENTS

	Page
Abstract.....	iii
Introduction.....	1
Study Areas.....	2
Beal Lake Riparian and Marsh Project.....	2
Palo Verde Ecological Preserve.....	2
Cibola Valley Conservation and Wildlife Area.....	2
Cibola NWR Unit 1 Conservation Area.....	4
Imperial Ponds Conservation Area.....	4
Methods.....	4
Results.....	5
Beal Lake Riparian and Marsh Project.....	6
History of Trapping at Beal Lake Site.....	6
Palo Verde Ecological Reserve.....	6
History of Trapping at Palo Verde Ecological Reserve.....	7
Cibola Valley Conservation and Wildlife Area.....	8
History of Trapping at Cibola Valley Conservation Area.....	9
Cibola Unit #1 – Cornfield Nature Trails.....	9
History of Trapping at Cibola Unit #1.....	10
Imperial Ponds Conservation Area.....	10
History of Trapping at Imperial Ponds Conservation Area.....	11
Discussion.....	11
Literature Cited.....	13

## Tables

Table		Page
1	Summary of all captures at the Beal Lake site.....	6
2	Summary of all captures at PVER.....	7
3	Summary of all captures at CVCA.....	9
4	Summary of all captures at Cibola Unit #1.....	10
5	Summary of captures at cottonwood genetics field.....	10
6	Summary of all captures at Imperial Ponds Conservation Area.....	11

## Figures

Figure		Page
1	Small mammal trapping locations. ....	3
2	Area adjacent to PVER where cotton rats are currently being monitored. ....	8
3	Picture of habitat where a single <i>Sigmodon arizonae</i> was captured at CVCA.....	8

## Attachments

### Attachment

1	Scientific and Common Names of All Species Captured during the Project
---	--

## ABSTRACT

The Bureau of Reclamation (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. Colorado River cotton rat (*Sigmodon arizonae plenus*) and Yuma hispid cotton rat (*Sigmodon hispidus eremicus*) 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 four habitat creation sites in 2011. *Sigmodon* spp. have been documented at all four sites. *Sigmodon arizonae* continues to maintain large populations at Cibola Nature Trail and near Palo Verde Ecological Reserve. Trapping will continue to focus on areas that have a dense herbaceous understory or have been specifically planted to provide *Sigmodon* habitat. A protocol optimized to document presence of these rare species and obtain population demographic information is being developed and will be incorporated into post-restoration monitoring in fiscal year 2012.

# 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 lower Colorado River (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 hectares [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 Colorado River cotton rat (*Sigmodon arizonae plenus*) and Yuma hispid cotton rat (*Sigmodon hispidus eremicus*). 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*. The range of these two species does 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 are an area just south of Laughlin, Nevada (Hall 1946; Bradley 1966). Currently, Reclamation has not found this species farther north than Havasu 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 have been established at or near restoration sites with confirmed *Sigmodon* presence. Data collected under Work Task C-27 that was conducted within habitat creation areas are presented here as well as in the C-27 year-end report.

## 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 Reserve (PVER) is located about 5 miles (8 kilometers [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. Phase 5 was planted with 216 acres (87.41 ha) of cottonwood-willow land cover type in the spring of 2010.

### 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

Small Mammal Colonization at Habitat Creation Areas  
along the Lower Colorado River: Fiscal Year 2011

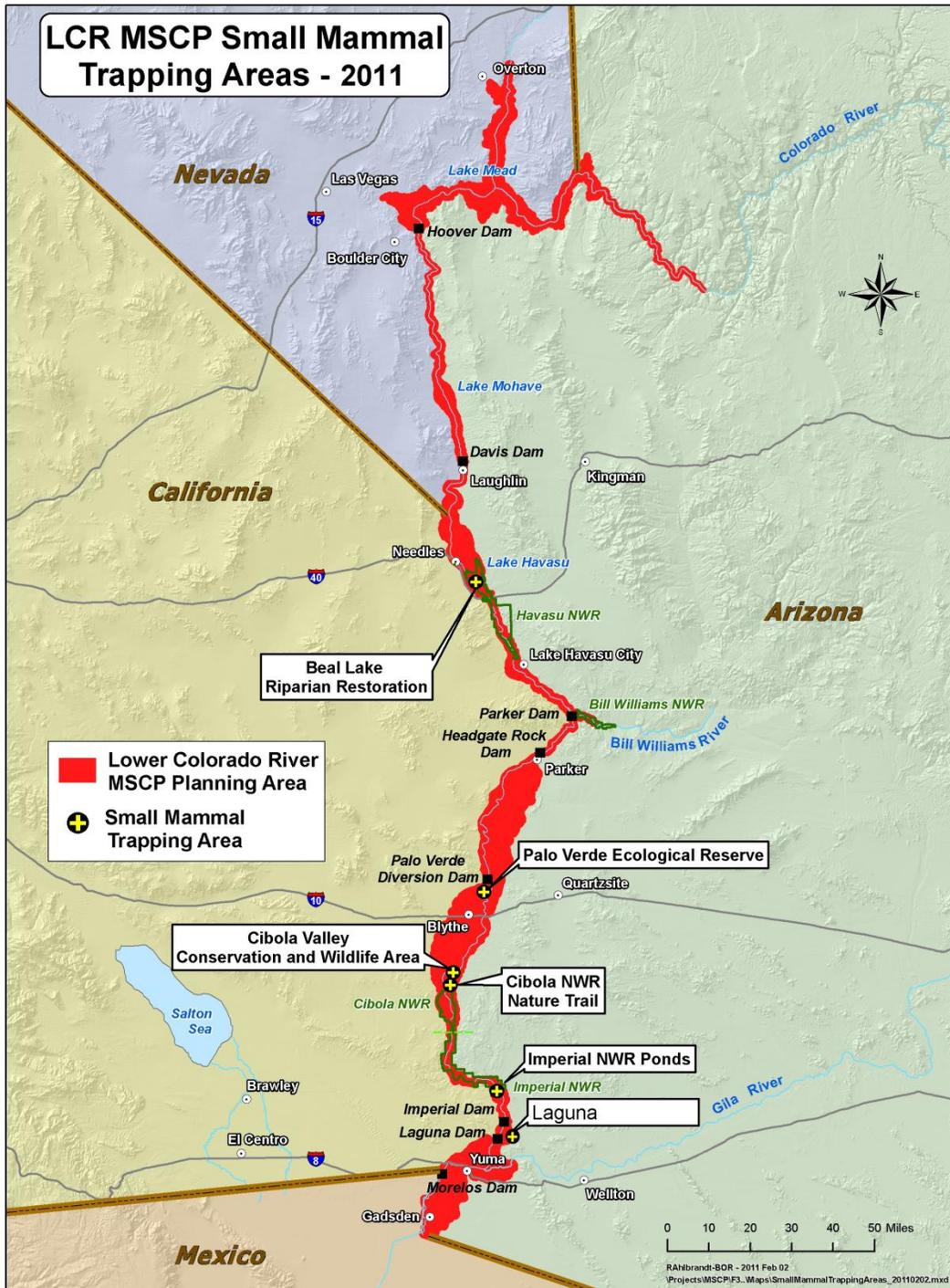


Figure 1.—Small mammal trapping locations.

**Small Mammal Colonization at Habitat Creation Areas  
along the Lower Colorado River: Fiscal Year 2011**

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*).

## **Cibola NWR Unit 1 Conservation Area**

The Unit 1 Conservation Area is located on Cibola NWR, which is located along the LCR south of Interstate 10 near Blythe, California, and Cibola, Arizona. The refuge was established in 1964 to provide habitat for wildlife (U.S. Fish and Wildlife Service 2007). The refuge is divided into six management units. Unit 1 is in the northernmost area of the refuge. The conservation area encompasses about 900 acres (364 ha) of Unit 1 and contains undeveloped areas, agricultural fields, and fields being used as research by Reclamation for the LCR MSCP (Garnett and Calvert 2007). One of these fields is the Nature Trail, which is a 34-acre (14-ha) section planted with cottonwood, willow, and mesquite in three distinct areas separated by trails. In the mesquite and willow areas, a dense understory of Johnsongrass (*Sorghum halepense*) and *Baccharis* spp. has become established. The cottonwood genetic fields also contain a dense understory of Johnsongrass.

## **Imperial Ponds Conservation Area**

The Imperial Ponds Conservation Area is located on the Imperial NWR, east of the Colorado River, near River Mile 59, just north of Martinez Lake. The project area is within a portion of the refuge known as the Intensive Management Area, which consists of fields and marshes that are managed for waterfowl, marsh birds, native fish, riparian obligate bird species, and other wildlife (Lenon and Dodge, in prep.). The entire Intensive Management Area is restricted from public access. Currently, the six ponds have been dredged, and excavated material from the ponds has been spread across some of the fields. These fields will be planted for waterfowl, and an additional 34 acres (14 ha) of cottonwood and willow habitat will be planted adjacent to the nursery as part of the Imperial Ponds Conservation Area (Lenon and Dodge, in prep.). Most of the edges of the site are edged in dense riparian vegetation including common reed (*Phragmites australis*), *Baccharis* spp., mesquite (*Prosopis* spp.), and some cottonwood and willow trees. Due to high soil salinity, no planting was conducted in 2010.

## **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

## Small Mammal Colonization at Habitat Creation Areas along the Lower Colorado River: Fiscal Year 2011

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. Trapping protocol changed depending on why trapping was conducted. For trapping under the C-27 work task, traps were set out in transects of 30 traps per transect at 10-meter [m] intervals, with two traps per station. Trapping under the F-3 work task was done with 15 traps per transect and one trap per station.

Trapping focused on areas of each site where cotton rat presence was most likely. This involved subjective opinion in where trapping effort would be focused. The goal of this project at this time is to determine if *Sigmodon* are present in an area and not to establish a systematic unbiased sample on our restoration sites. Research and design during fiscal year 2011 was focused on developing a protocol for sampling rare animals with specific habitat requirements (such as *Sigmodon*) that allow for systematic sampling to detect presence at restoration sites that will be cost effective and systematically sound (see work task C-27). When not using the grid method, transects were placed so that the entire focus area was saturated with traps. Because the focus of this effort is to find cotton rats, areas where it would be highly unlikely to find them were not trapped. These areas include bare ground and under dense high (> 5 m) tree canopy.

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 the University of Nevada, Las Vegas (UNLV), a key included in the Mammals of California Field Guide (Jameson and Peeters 2004; Hoffmeister 1986). Field notes were recorded in a notebook and include, at a minimum, the location of transects, what ground cover/macrohabitat was found in the trapping area, number of transects and traps, and number of each species captured. Voucher specimens were taken when appropriate, and all other animals were released back into the trapping area once identification was made.

## RESULTS

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

## Beal Lake Riparian and Marsh Project

No trapping was conducted at the Beal Lake site in 2011 due to prioritizing surveys within newly established habitat at other sites and lack of suitable habitat at the site.

### History of Trapping at Beal Lake Site

No cotton rats have been captured since 2006. 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). One new species, the southern grasshopper mouse (*Onychomys torridus*), was captured in 2008, bringing the total species captured at the Beal Lake site to nine. A total of 225 traps were set in 2009. Arrowweed was the dominant cover where most captures occurred. Pocket mice (*Chaetodipus penicillatus*) and *Peromyscus* were the most commonly captured species. The Beal Lake site was sampled in October 2009 for a total of 74 trap nights. Trapping was focused around fields K–M. The soils were very sandy with Bermuda grass (*Cynodon dactylon*), creating a relatively dense grassy layer interspersed with arrowweed. Other areas were dominated by cottonwoods. No *Sigmodon* were captured at the Beal Lake site in 2010.

Table 1.—Summary of all captures at the Beal Lake site

Species	FY06	FY07	FY08	FY09	FY10
<i>Sigmodon arizonae</i>	1	0	0	0	0
<i>Peromyscus eremicus</i>	8	42	17	7	11
<i>Peromyscus maniculatus</i>	13	9	6	9	0
<i>Chaetodipus penicillatus</i>	17	17	6	2	6
<i>Dipodomys merriami</i>	15	6	2	3	0
<i>Mus musculus</i>	0	4	0	2	2
<i>Neotoma albigula</i>	0	2	0	0	0
<i>Sylvilagus audubonii</i>	0	1	0	0	0
<i>Onychomys torridus</i>	0	0	1	0	0
Unknown species	1	0	0	0	0
Totals	55	81	32	23	19

## Palo Verde Ecological Reserve

*Sigmodon arizonae* have been detected in Phase 4 where a large amount of weeds, including alfalfa, Amaranth, Atriplex, and other non-native species, have created a dense shrubby, grassy layer approximately 0.5–1 m high. A total of 30 trap nights resulted in three females being captured in this plot. Three *Mus musculus*

**Small Mammal Colonization at Habitat Creation Areas  
along the Lower Colorado River: Fiscal Year 2011**

were also captured. This plot is directly across the dirt road from the accretion bench where a large population of *Sigmodon* is currently being monitored under C-27 (figure 2). No *Sigmodon* were captured during experimental trapping in Phase 5. The grassy area on the edges of the fields at the border of Phases 2 and 3 was trapped with less effort (45 trap nights). This area is dominated by thick *Cynodon* (~30 centimeters), *Baccaris*, and *Conyza*. Only *Mus musculus* was captured in this area.

**History of Trapping at Palo Verde Ecological Reserve**

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 1 night. A summary of captures for each year can be found in table 2. A total of six 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, Bermuda grass, and other grass species. In 2010, two *Sigmodon* males were captured over 78 trap nights. In the fall of 2010, 58 individuals were captured in one night of trapping, with 3 *Sigmodon* captured in Phase 4. However, the number of traps was not noted, and thus trap night information is unavailable for that trapping session. No cotton rats were captured within the boundary of PVER prior to 2010; 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 Spanish false fleabane (*Pulicaria paludosa*), a non-native bushy forb that grows to approximately 1 m high, interspersed within the *Pulicaria* areas of dense grasses, including Bermuda grass and to a lesser extent dallis grass (*Paspalum dilatatum*). 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	2010	2011
<i>Mus musculus</i>	27	60	30	40	54
<i>Peromyscus maniculatus</i>	2	6	4	1	0
<i>Peromyscus eremicus</i>	8	1	0	3	1
<i>Chaetodipus penicillatus</i>	6	5	0	0	1
<i>Reithrodontomys megalotus</i>	0	0	0	2	2
<i>Sigmodon arizonae</i>	0	0	0	2	6
Totals	43	72	34	48	64

**Small Mammal Colonization at Habitat Creation Areas  
along the Lower Colorado River: Fiscal Year 2011**



**Figure 2.—Area adjacent to PVER where cotton rats are currently being monitored.**

## **Cibola Valley Conservation and Wildlife Area**

Four *Sigmodon arizonae* were captured over 30 trap nights in CVCA during the spring of 2011—three in Phase 1 and one in Phase 3. In total, nine captures were recorded.



**Figure 3.—Picture of habitat where a single *Sigmodon arizonae* was captured at CVCA.**

### **History of Trapping at Cibola Valley Conservation 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*); the others 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. Phases 2 and 3 were trapped in 2009 for a total of 195 trap nights. A single male *Sigmodon arizonae* was captured at CVCA in March 2010 with 59 trap nights. A total of six species have been captured at CVCA.

Table 3.—Summary of all captures at CVCA

<b>Species</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<i>Mus musculus</i>	0	27	24	4	0	0
<i>Peromyscus maniculatus</i>	6	9	31	4	0	3
<i>Peromyscus eremicus</i>	0	1	27	0	0	1
<i>Reithrodontomys megalotus</i>	0	0	0	0	0	1
<i>Chaetodipus penicillatus</i>	0	1	3	0	0	0
<i>Dipodomys merriami</i>	0	1	0	0	0	0
<i>Sigmodon arizonae</i>	0	0	0	0	1	4
Totals	6	39	85	8	1	9

### **Cibola Unit #1 – Cornfield Nature Trails**

A total of 80 *Sigmodon arizonae* were captured over 960 trap nights primarily in the dense Johnson grass that has invaded the open areas between mesquite trees in the center of the Nature Trail. In total, 420 individuals were captured. Trapping in the cottonwood genetics field over 60 trap nights during the spring of 2011 produced three *Sigmodon*.

**Small Mammal Colonization at Habitat Creation Areas  
along the Lower Colorado River: Fiscal Year 2011**

**History of Trapping at Cibola Unit #1**

Trapping was conducted in 2007, and one *Sigmodon* was recorded. Trapping in 2008 was intermittent, primarily to collect DNA samples. A total of 960 trap nights produced 63 *Sigmodon arizonae* at permanent trapping grids in the fall of 2009 and the spring of 2010. The long-term trapping grid was established in the fall of 2009 and is expected to continue until at least the spring of 2012.

Table 4.—Summary of all captures at Cibola Unit #1

Species	2007	2010	2011
<i>Mus musculus</i>	0	0	2
<i>Peromyscus maniculatus</i>	1	65	156
<i>Peromyscus eremicus</i>	4	19	96
<i>Chaetodipus penicillatus</i>	2	0	0
<i>Neotoma albigula</i>	0	4	23
<i>Sigmodon arizonae</i>	1	63	80
<i>Reithrodontomys megalotus</i>	0	94	70
Totals	8	245	420

Table 5.—Summary of captures at cottonwood genetics field

Species	2011
<i>Mus musculus</i>	2
<i>Peromyscus maniculatus</i>	0
<i>Peromyscus eremicus</i>	3
<i>Chaetodipus penicillatus</i>	0
<i>Neotoma albigula</i>	0
<i>Sigmodon arizonae</i>	3
<i>Reithrodontomys megalotus</i>	0
Totals	0

**Imperial Ponds Conservation Area**

No trapping was conducted at Imperial NWR in fiscal year 2011 due to confirmed presence in previous years. Trapping will continue once additional habitat is created.

## **History of Trapping at Imperial Ponds Conservation Area**

In 2006, 75 total traps were set out at the cottonwood-willow nursery, and an area across the road from the nursery, with a total of five small mammals captured. In 2007, a total of 297 traps (149 in March and 148 in October) were set out around the perimeter of most of the conservation area, and 60 rodents were captured. No cotton rats were captured in 2006, but six were captured in 2007 across the road from the nursery in a dense stand of vegetation dominated by common reed. One additional juvenile cotton rat was captured in the spring across the road from bare fields in a sparse mixture of common reed, arrowweed, and *Baccharis* spp. In 2008, 59 traps were set in the area where cotton rats had been captured in 2007. A total of 44 rodents were captured, including 1 cotton rat (table 6). No trapping was conducted in 2009. A total of 68 trap nights resulted in two *Sigmodon hispidus* caught in 2010. A total of seven species have been captured at Imperial Ponds Conservation Area.

Table 6.—Summary of all captures at Imperial Ponds Conservation Area

<b>Species</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2010</b>
<i>Sigmodon hispidus</i>	0	6	1	2
<i>Peromyscus eremicus</i>	4	34	37	8
<i>Peromyscus maniculatus</i>	0	1	0	0
<i>Chaetodipus penicillatus</i>	0	16	4	1
<i>Neotoma albigula</i>	0	2	0	3
<i>Reithrodontomys megalotus</i>	1	1	0	0
<i>Mus musculus</i>	0	0	2	1
Totals	5	60	44	15

## **DISCUSSION**

Rodent trapping and monitoring for Reclamation at habitat creation sites as part of the LCR MSCP has been ongoing since 2006. Reclamation’s primary 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 regard to 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 in sufficient numbers, and more information on the study

**Small Mammal Colonization at Habitat Creation Areas  
along the Lower Colorado River: Fiscal Year 2011**

design and preliminary results can be obtained under work task C-27. A two-stage protocol that incorporates presence-only sampling initially, and then once presence is documented, establishes a separate population monitoring methodology, is expected to be implemented in fiscal year 2013.

PVER and CVCA are very similar both in planting design and in being agricultural conversions. 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 or in gaps of trees where grassy and shrubby vegetation occurs. This type of scenario is where a single *Sigmodon* was captured in CVCA during Phase 3.

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 that is next to a large source population of *Sigmodon*. *Sigmodon* have since been detected in this phase; however, the vegetation is largely non-native, and the relatively few captures have been exclusively males, suggesting these individuals are dispersing from the source population and may or may not actually be residents. Those individuals were passive integrated transponder (PIT) tagged. Future trapping will help clarify whether a consistent, stable population is present or whether this area is a population sink.

*Sigmodon hispidus* are still present at Imperial Ponds Conservation Area; however, they appear to be uncommon. In 2010, alkali sacaton and *Baccharis* were planted around the ponds. These strips of shrubby and grassy vegetation will be monitored once established because they may provide habitat structure that is preferred by *Sigmodon*. At this time, no *Sigmodon* have been recorded in alkali sacaton although limited attempts at surveying that habitat have been made.

## LITERATURE CITED

- Andersen, D.C. and M. Nelson. 1999. Rodent use of anthropogenic and 'natural' desert riparian habitat, lower Colorado River, Arizona. *Regulated Rivers: Research & Management* 15:377–393.
- Bradley, W.G. 1966. Status of the cotton rat in Nevada. *Journal of Mammalogy* 47:349–350.
- Garnett, G. and A. Calvert. 2007. Cibola Unit 1 Development Plan. Lower Colorado River Multi-Species Conservation Program.
- Hall, E.R. 1946. *Mammals of Nevada*. University of Nevada Press, Reno and Las Vegas, NV.
- Hoffmeister, D.F. 1986. *Mammals of Arizona*. University of Arizona Press.
- Jameson, E.W. and H.J. Peeters. 2004. *Mammals of California; California Natural History Guide No. 66*. University of California Press. Berkeley and Los Angeles, CA.
- Kays, R.W. and D.E. Wilson. 2002. *Mammals of North America*. Princeton University Press. Princeton, NJ.
- U.S. Fish and Wildlife Service. Cibola National Wildlife Refuge. 1997. <http://www.fws.gov/southwest/refuges/CibolaNWR/>

# **ATTACHMENT 1**

Scientific and Common Names of All Species Captured  
during the Project

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