

Lower Colorado River Multi-Species Conservation Program



Balancing Resource Use and Conservation

Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River – 2009 Capture Surveys



May 2010

Lower Colorado River Multi-Species Conservation Program

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Multi-Species Conservation Program
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Abstract

The Bureau of Reclamation is the lead implementing agency for the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). Part of the LCR MSCP includes the creation of riparian habitat for covered species within the program area. Acoustic monitoring of covered bat species in habitat creation areas has been conducted since 2006. In 2007 a capture survey was initiated to determine the feasibility of capturing covered species to obtain more information than can be gathered from the acoustic monitoring surveys. This survey method was continued in 2008 and the protocol was refined in 2009. In 2009 a total of 526 bats of 12 species were captured from four different sites. Three of the four LCR MSCP species were captured including the western red bat (*Lasiurus blossevillii*), western yellow bat (*Lasiurus xanthinus*), and California leaf-nosed bat (*Macrotus californicus*). The western red bat was captured once in February 2009 during an exploratory survey that resulted from acoustic calls that were found during acoustic surveys. Four more red bats were captured in late summer from two different sites. The western yellow bat was captured at all four sites, although only captured on multiple surveys at one site. The California leaf-nosed bat was also captured at all four sites, with three of the sites having captures on multiple surveys. The Arizona myotis (*Myotis occultus*) was captured and was confirmed genetically at one site. The Arizona myotis was presumed to have been extirpated along the LCR. This is the first record since 1945. Surveys will continue at three of the sites and a new site will be added in 2010. The data will continue to aid the design of future habitat creation areas.

Introduction

The Bureau of Reclamation (Reclamation) is the lead implementing agency for the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). The LCR MSCP is a 50-year cooperative Federal-State-Tribal-County-Private effort to 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. 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* and *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 (LCR MSCP 2004).

The western red bat (*Lasiurus blossevillii*) and western yellow bat (*Lasiurus xanthinus*) are covered species under the program. The California leaf-nosed bat (*Macrotus californicus*) and Townsend's big-eared bat (*Corynorhinus townsendii*) are evaluation species under the program. The LCR MSCP uses a variety of methods to monitor covered bat species in these habitat creation areas. In the fall of 2006 a post-development bat survey using acoustic bat detectors was initiated by the Bureau of Reclamation Denver Technical Service Center (Broderick 2008). During these acoustic surveys in July and October 2007, a preliminary capture survey began at three of the locations in which acoustic data had been collected (Calvert 2009). In September, a fourth site was surveyed in which only exploratory acoustic work had been done. In 2008 a full season capture survey was conducted. The survey protocol was refined in 2009 and a second full survey season was conducted. Riparian habitat creation sites along the LCR have only minimally been surveyed for bats in the past (Brown 2006). This new survey is an attempt to increase effort and thus increase the capture of bats to discover whether LCR MSCP covered species are utilizing habitat creation sites.

There are a variety of reasons why bat surveys should include both acoustic and capture techniques. Not all species are successfully surveyed using only one of the two methods (O'Farrell and Gannon 1999). Species such as Townsend's big-eared bats, and California leaf-nosed bats are known to echolocate at low intensities, which are often missed using acoustic detectors. If there is a species identification question using acoustic data, then captures may confirm the presence of a species. Capturing bats allows for acoustic voucher calls to be made when releasing bats near a bat detector. The design of future habitat creation sites may also be aided by capturing bats. The location of mist-nets and traps at current sites may allow a better understanding of how bats use riparian areas. Acoustic data shows that most bats avoid cluttered areas and forage along edges of riparian forests, in corridors, and openings in forest canopies that create "flyways" for bats (Broderick 2008). Capture techniques may allow for more refined specifications on how to create corridors and flyways in future sites. This will allow for bats to use a larger area of these sites, as well as allowing biologists to more easily find locations to capture bats during future surveys.

Study Areas

'Ahakhav Tribal Preserve

The 'Ahakhav Tribal Preserve ('Ahakhav) is a 150-acre (61-ha) site located south of Parker, Arizona on Colorado River Indian Tribes (CRIT) land (Figure 1). This site consists of fields of cottonwood, willow, and mesquite planted as part of an agreement between CRIT and the Bureau of Reclamation. The capture survey area was planted in 2001 and has the largest trees of the site. Cottonwood, Goodding's willow (*Salix gooddingii*), and coyote willow (*Salix exigua*) were planted in the area.

Cibola Valley Conservation and Wildlife Area

The Cibola Valley Conservation and Wildlife Area (CVCA) is a large-scale LCR MSCP project near Cibola, Arizona that involves the replacement of agricultural crops with native riparian habitat. In the last four years over 500 acres (202 ha) of habitat was created. Once all phases have been planted there will be over 1,000 acres (405 ha) of riparian habitat within CVCA. The capture survey area was an 86 acre (35 ha) section planted with cottonwood and willow that was planted in 2006.

Cibola NWR Nature Trail

The Cibola National Wildlife Refuge Nature Trail (Cibola NWR) is a 34-acre (13.8-ha) site located on the Cibola NWR south of Cibola, Arizona (Figure 1). Capture surveys took place in areas of the Nature Trail where tall cottonwood trees lined the trail. Goodding's willow, mule-fat (*Baccharis salicifolia*), screwbean mesquite (*Prosopis pubescens*), and honey mesquite are additional species found within the site.

Pratt Restoration Demonstration Site

The Pratt Restoration Demonstration (Pratt) site is a 12-acre (4.9-ha) site located north of Yuma, Arizona, between Laguna Dam, and Mitty Lake (Figure 1). Capture surveys were conducted in two areas of the site. The first area consisted of a corridor formed in the interior of the site along a small access road with a completely enclosed canopy of cottonwoods and willows. The second area was along a dirt road on the south boundary of the site. One side of the road contained a dense stand of *Baccharis* spp. interspersed with small cottonwoods. On the other side of the road, there were a few established Goodding's willows mixed with saltcedar (*Tamarix* spp.) and some mesquite. The rest of the Pratt site, as a whole, is comprised of cottonwood, Goodding's willow, and coyote willow.

Figure 1. Bat capture survey areas



Methods

Capture techniques used for this survey included mist nets and harp traps. The number and size of mist nets varied between sites depending on habitat in the site. Generally, the optimum number of nets and traps used at each site corresponded to what could be handled by the number of personnel available. Four net lengths were used, including 6-m (19.7 ft), 9-m (29.5 ft), 12-m (39.4 ft), and 18-m (60 ft) Avinet Inc. nets, which were all 2.6-m (8.5-ft) tall with a 38-mm (1.5-in) mesh size. One 30.5-m (100-ft) long by 6-m (20-ft) tall mist net was used when a joint effort between Reclamation and Arizona Game and Fish Department (AGFD) was conducted at the Pratt site. High net set ups were used at all of the sites. These high nets were constructed by stacking regular nets (8.5 ft [2.6 m] tall) on top of each other using poles in which a pulley system has been made to reach the higher stacked nets. The set up uses three nets stacked on top of each other, known herein as a triple (Figure 2). This pole set up was made by Bat Management and Conservation Inc. Depending on the width of the corridor, either 6-m, 9-m, 12-m or 18-m long nets were used in this system. A harp trap was also used to capture bats at some sites. The Faunatech, Austbat harp trap is 1.8 m (6 ft) wide and has 4.2 m² (45 ft²) of capture area. It is used when a corridor narrows where bats would be funneled into a tighter area (Figure 3).

Nets and traps were set up at a site where bats were most likely to be using an area as a flyway. Usually this involved natural corridors within a site, or roadways and trails that divided areas of habitat creating artificial corridors. The size of the net or trap used was determined by the width of the corridor, maximizing the area where bats could be captured. In some areas where it appeared that one single net may be easily avoidable by a bat, nets were placed together to make avoidance of one of the nets by the bat less likely. The first method was to set the nets parallel to each other in the hopes that a bat would avoid the first net by flying up and over, and then being captured in the second net when they would drop back down into their original flight pattern. The other method was to set nets up in a V or L formation, where a bat might be funneled into the capture area by avoiding one net, and being captured in the other. These techniques have been used successfully by Bat Conservation International. The triple high net was used in corridors to capture bats that fly higher and where single nets are easily avoided. During netting, an Anabat SD-1 bat detector (Titley Electronics) was connected to an HP iPAQ pocket PC in order to obtain reference calls of captured bats when released, as well as to discover whether bat activity in the area was changing over the course of the evening. This acoustic data was also used later on to determine whether any MSCP covered species were in the survey area, but not captured.

Once a bat was captured, species, age, sex, and reproductive status were determined. Measurements such as forearm and hind foot were also taken if it was necessary to identify species. If the species was one for which acoustic reference calls were needed, a small 1-in (2.5-cm) long glow stick was glued onto the ventral fur to be used as a light tag. Once the bat was released, it was followed by someone with the bat detector until it flew too far to be recorded by the detector. All acoustic file names saved on the HP iPAQ

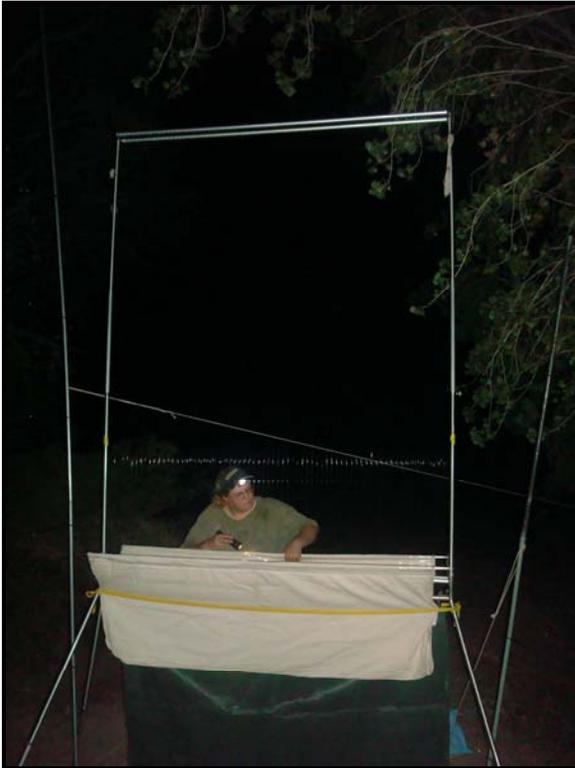
were written on the data sheet for species confirmation and then added to the acoustic reference library.

Surveys began at sunset and continued for 4.5 hours. Each site was surveyed once a month from May to September for a total of five survey sessions. If covered species were recorded acoustically during other times of the year, an exploratory survey was conducted. A minimum of two triple high set ups were used at each site. These standardizations were taken from an unpublished protocol that was created using data from the 2007 and 2008 surveys.

Figure 2. Triple high net set up



Figure 3. Harp trap set up at the Cibola Nature Trail



Results

See Appendix 1 for a list of common and scientific names of all species captured.

'Ahakhav Tribal Preserve

In addition to the summer survey sessions, an additional survey was conducted in February of 2009 due to potential western red bat acoustic calls that were recorded during the January acoustic survey. This survey resulted in capturing one male western red bat. One 12-m triple high set up was used for 3.5 hours and no other bats were captured during this survey.

For the regular summer survey, a total of two 12-m triple high set ups were used at the same locations during all five surveys. Nets were open for the entire 4.5 hours each night for a total of 22.5 hours of netting. A total of 151 bats of 10 species were captured (Table 1). Three covered species were captured, of which the California leaf-nosed bat had the highest capture rate, followed by the western yellow bat, and then the western red bat. While July had the highest capture rate, September had the most species captured (Figure 4). Western yellow bats were captured during every survey session except for September.

California leaf-nosed bats were captured during all but the May and June survey sessions. The western red bat was only captured during the September survey.

For all three years that surveys have been conducted, a total of 243 bats of 11 species have been captured (Table 2). The California leaf-nosed bat and western yellow bat were captured during all three years. The pallid bat (*Antrozous pallidus*) was the most captured species. The Mexican free-tailed bat (*Tadarida brasiliensis*) was the only species not captured in 2009. The western red bat and hoary bat (*Lasiurus cinereus*) were both new species for 2009. Arizona myotis (*Myotis occultus*) was confirmed from genetic samples taken this year. The *Myotis* species captured were those that escaped before species identification could be made. This is the same for all sites.

Table 1. All captures at 'Ahakhav Tribal Preserve, May-September 2009. MSCP species in bold

Species	May	June	July	August	September	Total
Pallid Bat	2	5	29	15	1	52
Big Brown Bat	4	2	17	11	1	35
Yuma Myotis	13	4	2	3	1	23
California Leaf-Nosed Bat	0	0	6	4	3	13
Arizona Myotis	8	1	1	1	1	12
Western Yellow Bat	2	1	2	1	0	6
Cave Myotis	3	0	0	0	2	5
Western Red Bat	0	0	0	0	1	1
Hoary Bat	0	0	0	0	1	1
California Myotis	0	0	0	1	0	1
<i>Myotis</i> species	2	0	0	0	0	2
Total	34	13	57	36	11	151

Figure 4. Species composition per survey at 'Ahakhav Tribal Preserve, May-September 2009

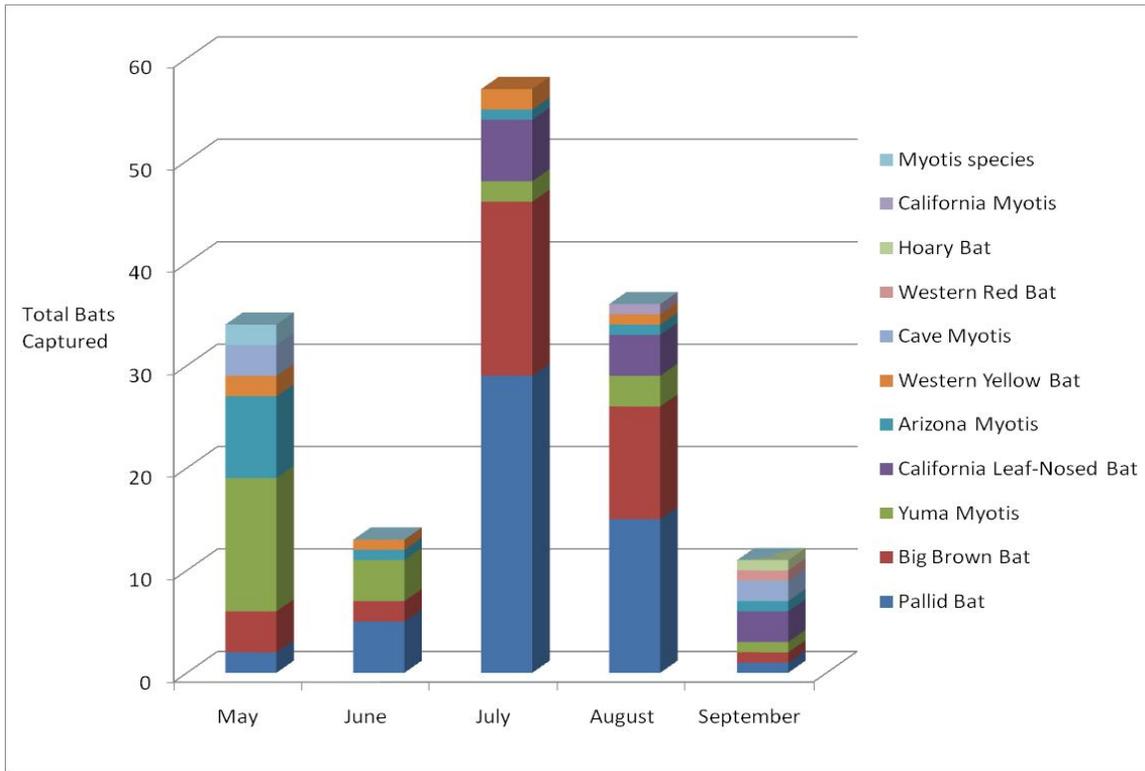


Table 2. All captures for all years at 'Ahakhav Tribal Preserve. MSCP species in bold

Species	2007 N=2 ¹	2008 N=5 ¹	2009 N=6 ¹	Total N=13 ¹
Pallid Bat	4	35	52	91
Big Brown Bat	0	9	35	44
Yuma Myotis	4	12	23	39
California Leaf-Nosed Bat	1	4	13	18
Arizona Myotis	5	0	12	17
Western Yellow Bat	4	4	6	14
Cave Myotis	6	0	5	11
California Myotis	1	1	1	3
Western Red Bat	0	0	2	2
Hoary Bat	0	0	1	1
Mexican Free-Tailed Bat	1	0	0	1
<i>Myotis</i> species	0	0	2	2
Total	26	65	152	243

¹N = number of survey sessions

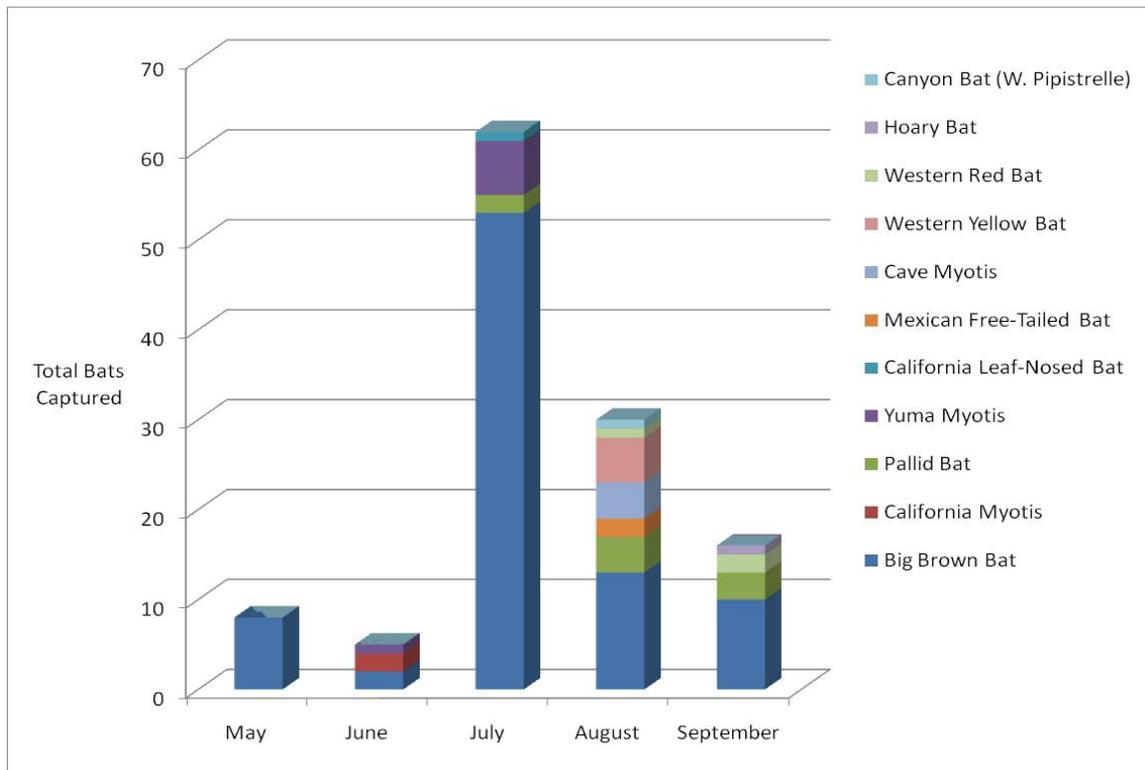
Cibola Valley Conservation and Wildlife Area

This was the first year that surveys were conducted at CVCA. Two triple high set ups were used in an L-formation across bisecting roads. In addition to the triple high nets, two single 6-m nets were set in parallel farther down one of the roads. The same numbers of nets and set ups were used during all surveys. Nets were open for 4.5 hours each of the five survey nights for a total of 22.5 hours of netting. A total of 121 bats of 11 species were captured at CVCA (Table 3). Three MSCP species were captured including the western yellow bat, western red bat, and California leaf-nosed bat. The big brown bat (*Eptesicus fuscus*) was the most captured species, and accounted for 71% of all captures. While July had the highest capture rate, August had the highest species richness (Figure 5).

Table 3. All captures at CVCA, May-September 2009. MSCP species in bold

Species	May	June	July	August	September	Total
Big Brown Bat	8	2	53	13	10	86
Pallid Bat	0	0	2	4	3	9
Yuma Myotis	0	1	6	0	0	7
Western Yellow Bat	0	0	0	5	0	5
Cave Myotis	0	0	0	4	0	4
Western Red Bat	0	0	0	1	2	3
Mexican Free-Tailed Bat	0	0	0	2	0	2
California Myotis	0	2	0	0	0	2
California Leaf-Nosed Bat	0	0	1	0	0	1
Hoary Bat	0	0	0	0	1	1
Canyon Bat	0	0	0	1	0	1
Total	8	5	62	30	16	121

Figure 5. Species composition per survey at CVCA, May-September 2009



Cibola NWR Nature Trail

One 9-m and one 12-m triple high set up were used across two different parts of the trail. A side by side harp trap combination was used as well. All set ups remained the same during every survey. Nets were open for the entire 4.5 hours each night for a total of 22.5 hours of netting. A total of 166 bats of six species were captured (Table 4). The California leaf-nosed bat was the only covered species captured at the Nature Trail. While July had the highest capture rate, September had the most species captured (Figure 6). With 73% of the capture rate, the big brown bat was by far the most captured species.

For all three years that surveys have been conducted, a total of 222 bats of eight species have been captured (Table 5). The California leaf-nosed bat was captured during all three years. The western yellow bat has only been captured during one of the 12 total survey sessions at this site. The Mexican free-tailed bat was a new species captured in 2009.

Table 4. All captures at Cibola NWR, May-September 2009. MSCP species in bold

Species	May	June	July	August	September	Total
Big Brown Bat	19	3	77	21	1	121
California Myotis	4	12	5	3	3	27
Pallid Bat	0	1	4	2	1	8
Yuma Myotis	1	0	2	0	1	4
California Leaf-Nosed Bat	0	2	0	2	0	4
Mexican Free-Tailed Bat	1	0	0	0	0	1
<i>Myotis</i> species	0	0	0	0	1	1
Total	25	18	88	28	7	166

Figure 6. Species composition per survey at Cibola NWR, May-September 2009

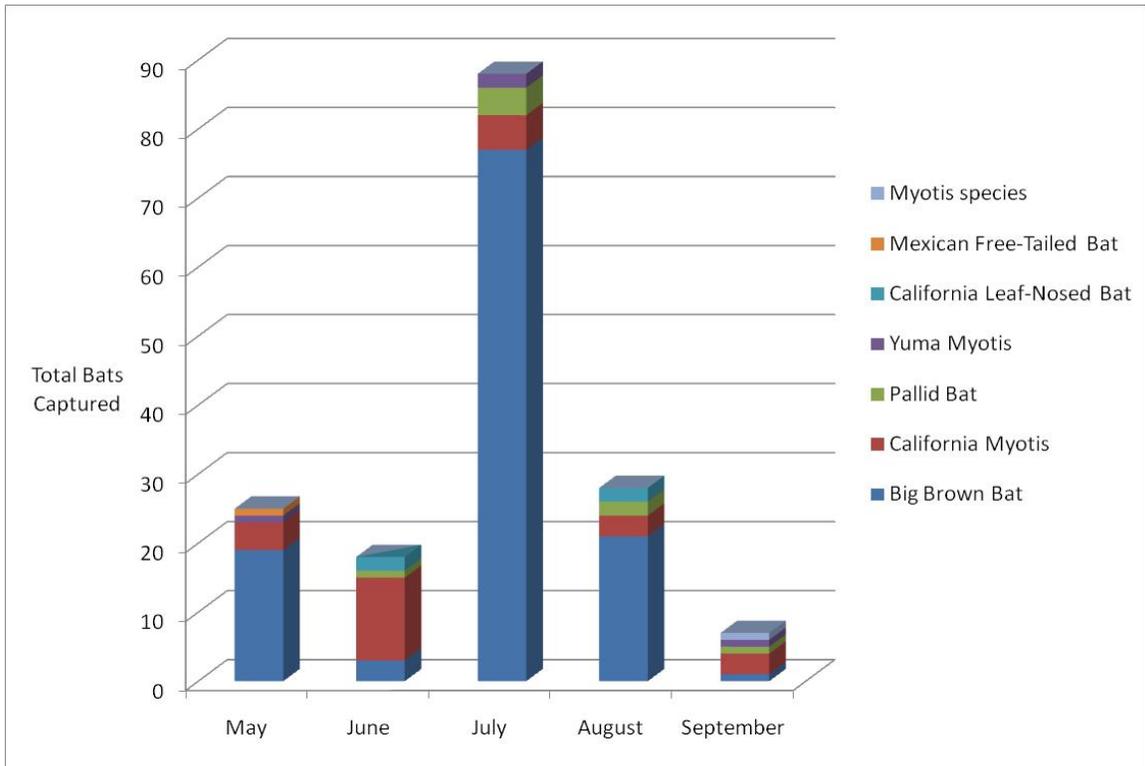


Table 5. All captures for all years at Cibola NWR

Species	2007 N=2 ¹	2008 N=5 ¹	2009 N=5 ¹	Total N=12 ¹
Big Brown Bat	2	13	121	136
California Myotis	0	3	27	30
California Leaf-Nosed Bat	14	4	4	22
Pallid Bat	1	13	8	22
Yuma Myotis	1	0	4	5
Hoary Bat	1	2	0	3
Western Yellow Bat	0	2	0	2
Mexican Free-Tailed Bat	0	0	1	1
<i>Myotis</i> species	0	0	1	1
Total	19	37	166	222

¹N = number of survey sessions

Pratt Restoration Demonstration Site

During the June, July, and August surveys, two 6-m triple high set ups were used in a Z-formation with a 30.5-m long and 6-m tall net supplied by AGFD. During the May survey, only one 6-m triple high net set was used, with the AGFD net in a V-formation. The AGFD net was not available during the September survey, so an 18-m triple high set was used along with one 6-m triple high net set in a V-formation. All of these net configurations were placed along a road on one side of the site. During all five surveys, two harp traps were set side by side within a small corridor that runs through the site. Nets were closed 1 hour early during the May survey due to windy conditions, but during all subsequent surveys, nets were open for the entire 4.5 hours for a total of 21.5 hours of netting. A total of 87 bats of eight species were captured (Table 6). The California leaf-nosed bat and the western yellow bat were the only covered species captured at Pratt. While July had the highest capture rate, August had the most species captured (Figure 7).

For all three years that surveys have been conducted, a total of 171 bats of eight species have been captured (Table 7). The California leaf-nosed bat was captured during all three years. The western yellow bat was captured once in 2007 and once in 2009. The California myotis (*Myotis californicus*), the canyon bat (*Parastrellus hesperus*), and the Mexican free-tailed bat were all new species captured at Pratt in 2009. The big brown bat and the pallid bat (*Antrozous pallidus*) combined for 68% of all captures.

Table 6. All captures at Pratt, May-September 2009. MSCP species in bold

Species	May	June	July	August	September	Total
Big Brown Bat	0	2	15	6	10	33
Yuma Myotis	0	11	5	1	1	18
Pallid Bat	0	4	2	3	8	17
California Leaf-Nosed Bat	0	2	0	1	2	5
Canyon Bat	0	0	2	2	1	5
California Myotis	0	3	0	1	0	4
Mexican Free-Tailed Bat	0	0	0	2	0	2
Western Yellow Bat	0	0	1	0	0	1
<i>Myotis</i> species	0	0	2	0	0	2
Total	0	22	27	16	22	87

Figure 7. Species composition per survey at Pratt, May-September 2009

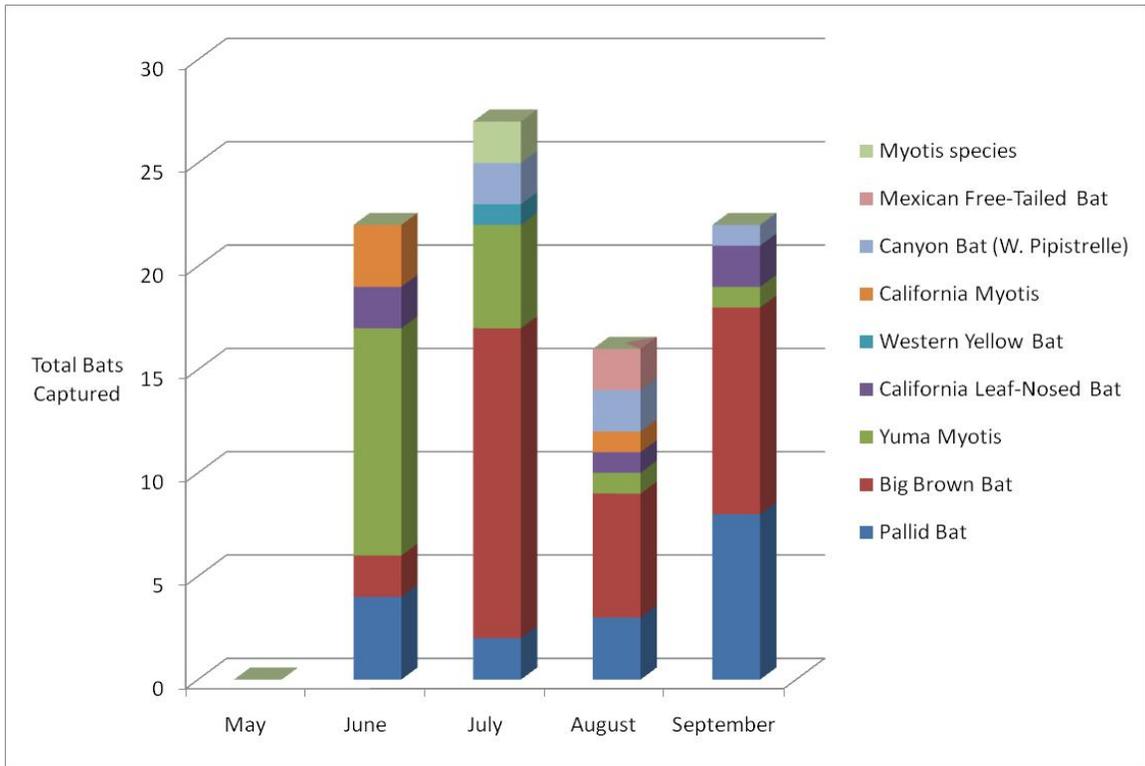


Table 7. All captures for all years at Pratt. MSCP species in bold

Species	2007 N=3	2008 N=5	2009 N=5	Total N=13
Big Brown Bat	33	8	33	74
Pallid Bat	5	20	17	42
Yuma Myotis	1	3	18	22
California Leaf-Nosed Bat	8	5	5	18
Canyon Bat	0	0	5	5
California Myotis	0	0	4	4
Western Yellow Bat	1	0	1	2
Mexican Free-Tailed Bat	0	0	2	2
<i>Myotis</i> species	0	0	2	2
Total	48	36	87	171

Summary of all sites for all years

A total of 526 bats of 12 species were captured between all four sites (Table 8). Cibola NWR had the highest number of captures and 'Ahakhav had the highest species richness (Figure 8). California leaf-nosed bats were captured at all four sites. Western yellow bats were captured at all sites except for Cibola NWR. Western red bats were only captured at 'Ahakhav and CVCA. The big brown bat was by far the most captured species, accounting for 52% of all captures in 2009.

A total of 754 bats of 12 species have been captured within the past three years from the four sites. 'Ahakhav had the highest number of captures and was tied with CVCA for the highest species richness. California leaf-nosed bats and western yellow bats have been captured at all four sites. Western red bats have only been captured at 'Ahakhav and CVCA, and 2009 was the first year they had been captured anywhere on the LCR. The big brown bat accounted for 45% of all captures across years. The canyon bat was the only new species captured in 2009; all other species have been captured at least once in a previous year.

Table 8. Total captures for all sites for 2009. MSCP species in bold

Species	'Ahakhav	CVCA	Cibola NWR	Pratt	Totals
Big Brown Bat	35	86	121	33	275
Pallid Bat	52	9	8	17	86
Yuma Myotis	23	7	4	18	52
California Myotis	1	2	27	4	34
California Leaf-Nosed Bat	13	1	4	5	23
Arizona Myotis	12	0	0	0	12
Western Yellow Bat	6	5	0	1	12
Cave Myotis	5	4	0	0	9
Canyon Bat	0	1	0	5	6
Western Red Bat	2	3	0	0	5
Mexican Free-Tailed Bat	0	2	1	2	5
Hoary Bat	1	1	0	0	2
<i>Myotis</i> species	2	0	1	2	5
Totals	152	121	166	87	526

Figure 8. Comparison of species composition between all sites in 2009

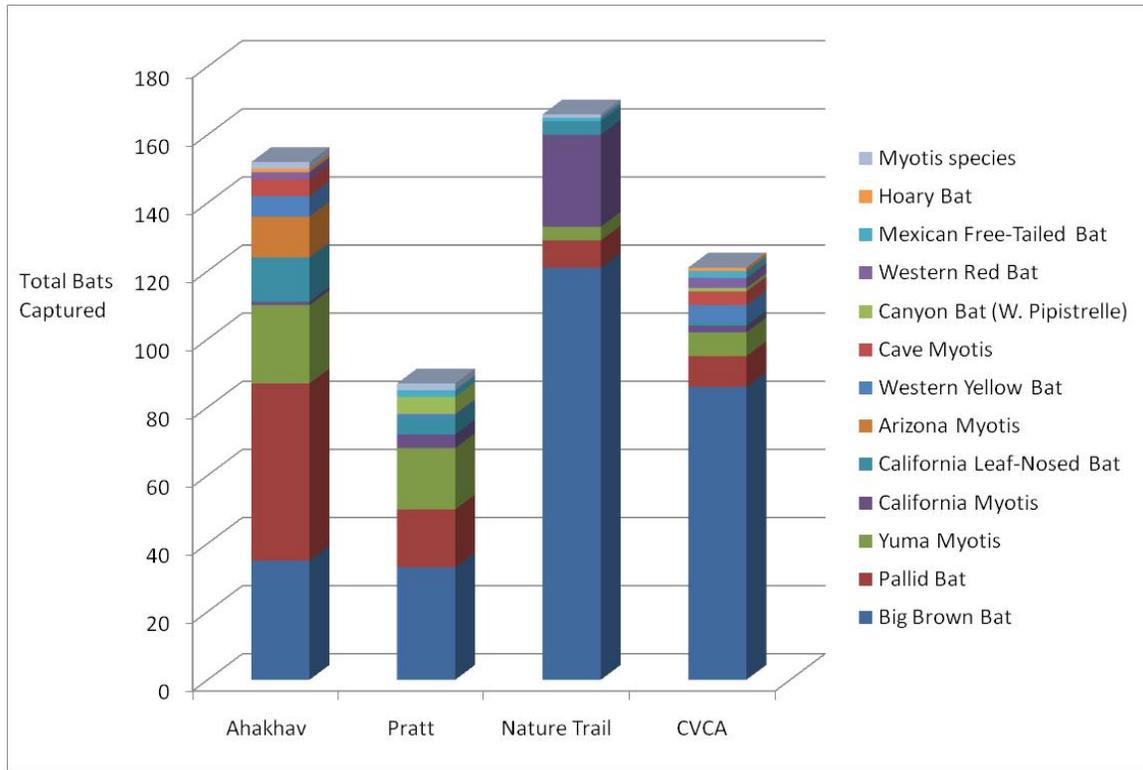


Table 9. Total captures for all sites for all years (2007-2009). MSCP species in bold

Species	Ahakhav N=13 ¹	CVCA N=5 ¹	Cibola NWR N=12 ¹	Pratt N=13 ¹	Totals N=43 ¹
Big Brown Bat	44	86	136	74	340
Pallid Bat	91	9	22	42	164
Yuma Myotis	39	7	5	22	73
California Leaf-Nosed Bat	18	1	22	15	56
California Myotis	3	2	30	4	39
Western Yellow Bat	14	5	2	2	23
Arizona Myotis	17	0	0	0	17
Cave Myotis	11	4	0	0	15
Canyon Bat	0	1	0	5	6
Mexican Free-Tailed Bat	1	2	1	2	6
Western Red Bat	2	3	0	0	5
Hoary Bat	1	1	3	0	5
Myotis species	2	0	1	2	5
Totals	243	121	222	168	754

¹N = number of survey sessions

Discussion

The capture of five western red bats was a major accomplishment of the 2009 surveys. The red bat captured in February helped to confirm what was thought to be red bat acoustic calls recorded in January. This bat was light tagged and reference calls were collected. It should also be noted that for about an hour, the bat made several passes over the road where our processing station was. The bat was flying fairly quickly 4.5-7.6 m (15-25 ft) off the ground near the edge of the trees. Due to the regularity of these passes, it appears that it was foraging along the same flight path multiple times. Based on acoustic files from January and capturing a bat two weeks later in February, this species may be using 'Ahakhav as a wintering area. A red bat was also captured during a survey on the Bill Williams River at Planet Ranch during the same time that the acoustic data was being collected (Vizcarra and Piest 2010). The only other western red bat to be captured near the LCR was also on the Bill Williams River in January of 2002 (Brown and Berry 2003). Western red bats have also been found wintering in coastal southern California, which further supports the probable winter residency of red bats within the LCR watershed (Dave Johnston, personal communication).

The four additional red bats captured in August and September are the first summer records on the LCR. Due to the late summer time frame, and the lack of captures earlier in the summer, these bats were most likely migrants. Habitat creation areas have already been shown to be used as migration stopover habitat for birds (Reclamation 2007). With the captures of both red bats and hoary bats (*Lasiurus cinereus*) at these sites, it is probable that these areas are also good stopover habitat for migrating bats. As these new large-scale habitat creation sites grow and mature, it is hoped that western red bats will become summer residents as well.

Western yellow bats have now been captured at all four sites being surveyed. The 'Ahakhav Tribal Preserve is the only site where summer residency is occurring. Because all five yellow bats captured at CVCA were on the same night, these bats were probably part of a migration pulse. Captures at Cibola NWR and Pratt were probably transient individuals that do not utilize the site on a regular basis. A telemetry study is planned for 2011 that will track both red and yellow bats to their roosts. This data should not only help determine whether each species has specific roosting preferences, but also what movement patterns they have during different times of the year.

The other important finding from the 2009 surveys was the confirmation of the Arizona myotis at the 'Ahakhav Tribal Preserve. This species was originally described on the LCR near Needles, California, but had not been observed or collected since 1945 and was thought to be extirpated (Hollister 1909 and Brown 2006). During Grinnell's survey of the LCR in 1910, this species seemed closely associated with cottonwood-willow habitat (Grinnell 1914). Most of the bats captured were either pregnant or lactating, indicating a maternity roost was in the area. The Arizona myotis is known to use abandoned buildings, bridges, and tree snags as roosts. Abandoned buildings are found throughout the Colorado River Indian Tribes reservation. On the Verde River, an Arizona myotis

maternity colony was found using an abandoned building on an Indian reservation (Hayward 1963). This may be true for the LCR population as well.

The California leaf-nosed bat was captured at all four sites, with 'Ahakhav having the most captures. Only one was captured at CVCA this year. The Cibola NWR site has generally had high capture success of leaf-nosed bats during all years of surveys, including this year. Because CVCA is only three miles from Cibola NWR, it was thought that leaf-nosed bats would be captured with more frequency at CVCA. Acoustic data has also shown that leaf-nosed bats use the site on a regular basis. Further surveys in 2010 should help to determine this disparity with captures at CVCA.

The Townsend's big-eared bat has yet to be captured at any LCR MSCP habitat creation areas. The only known maternity colony is about 19 km (12 mi) southwest of 'Ahakhav, which is probably too far away to be foraging habitat for this species. Some acoustic calls have been recorded at most sites. They may be too uncommon to be captured at this point. Townsend's big-eared bats are regularly captured on the Bill Williams River (Vizcarra and Piest 2010). It is hoped that as the MSCP continues to expand and create more habitat that this species will also benefit from the program.

With both the high numbers of captures of covered species as well as the rediscovery of the Arizona myotis, it appears that the 'Ahakhav Tribal Preserve is being used by more bats and species of bats than any of the other sites being monitored. CVCA had the same species richness as 'Ahakhav, but had lower capture rates. This site was only in its fourth growing season. As this site matures it may end up having habitat as good as that found on the tribal preserve. Due to the success at CVCA in 2009, the Palo Verde Ecological Reserve (PVER), which is similar in age and structure to CVCA, will be added for 2010. PVER is located just north of Blythe, California on the California side of the river. Like CVCA, PVER is being planted by phases each year. To accommodate the addition of PVER, the Pratt site will be dropped from monitoring. Pratt is not being managed as part of the MSCP and also had the lowest capture rates in 2009. Because the focus of these surveys is to monitor the success of the MSCP, it is logical that one of the large-scale sites be added as a capture survey site. This will also allow the comparison of two older re-vegetation areas ('Ahakhav and Cibola NWR) with these two newer areas that are much larger in scale, but lack the maturity of the older sites. The same protocol will be followed in 2010 and it is expected that the data gathered will aid future studies like the telemetry project, as well as aid the design of future sites by determining what sites have higher capture rates and species richness, and if the higher captures and richness relate to how trees were planted.

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Appendix 1. Common and scientific names of all species captured

Common Name	Scientific Name
California Leaf-Nosed Bat	<i>Macrotus californicus</i>
Pallid Bat	<i>Antrozous pallidus</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Yellow Bat	<i>Lasiurus xanthinus</i>
Western Red Bat	<i>Lasiurus blossevillii</i>
Canyon Bat*	<i>Parastrellus hesperus</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
California Myotis	<i>Myotis californicus</i>
Yuma Myotis	<i>Myotis yumanensis</i>
Cave Myotis	<i>Myotis velifer</i>
Arizona Myotis	<i>Myotis occultus</i>
Unknown Myotis	<i>Myotis</i> spp.
Mexican Free-Tailed Bat	<i>Tadarida brasiliensis mexicana</i>

**Parastrellus hesperus* is formerly known as *Pipistrellus hesperus*, the western pipistrelle