

Lower Colorado River Multi-Species Conservation Program



Balancing Resource Use and Conservation

Post-Development Bat Monitoring 2009 Acoustic Surveys



May 2012

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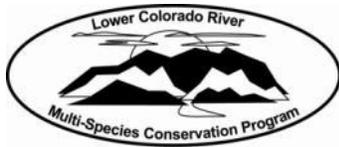
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Lower Colorado River Multi-Species Conservation Program

Post-Development Bat Monitoring 2009 Acoustic Surveys

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Multi-Species Conservation Program
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Abstract

Quarterly acoustic bat surveys were conducted by the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) at seven habitat creation sites along the lower Colorado River and adjacent riparian habitats. Surveys were conducted during October 2008 and February, April, and July 2009, for a total of 372 detector nights, recording 141,099 bat calls. A second permanent monitoring station was installed at the 'Ahakhav Preserve in 2009, in addition to the permanent station installed in 2008 at the Beal Lake Habitat Restoration Area. The primary focus of post-development bat monitoring is on the two covered bat species, western red bat (*Lasiurus blossevillii*) and western yellow bat (*Lasiurus xanthinus*), and the two evaluation species, pale Townsend's big-eared bat (*Corynorhinus townsendii*) and California leaf-nosed bat (*Macrotus californicus*). All four species were detected at the Beal Lake Habitat Restoration Area, 'Ahakhav Preserve, Palo Verde Ecological Reserve, Cibola Valley Conservation Area, and the Cibola NWR Conservation Unit #1. Three covered and evaluation species (all except the Townsend's big-eared bat) were detected at the Imperial Ponds Conservation Area and the Pratt Restoration Area. Large increases in bat activity were recorded for western red bat and western yellow bat at the 'Ahakhav Preserve compared to the previous year. Additionally, a large increase in bat activity for western red bat was observed at the Cibola Valley Conservation Area.

Introduction

Quarterly post-development bat monitoring was conducted utilizing Anabat bat detectors in seven LCR MSCP habitat creation areas including Beal Lake Habitat Restoration Project, 'Ahakhav Tribal Preserve, Palo Verde Ecological Reserve, Cibola Valley Wildlife and Conservation Area, Cibola NWR Unit #1 Conservation Area, Pratt Restoration Demonstration Site, and the Imperial Ponds Conservation Area. The principal goal of this monitoring is to assess seasonal use of the restoration sites by the two covered bat species, the western red bat (*Lasiurus blossevillii*), and the western yellow bat (*Lasiurus xanthinus*), and two evaluation species which includes the pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*) and the California leaf-nosed bat (*Macrotus californicus*).

Conservation measures for the covered bat species in the LCR MSCP Habitat Conservation Plan include conducting surveys and research to better identify habitat requirements and species distribution, as well as to monitor and adaptively manage covered and evaluation species habitats. Of the 7,260 acres of cottonwood-willow and honey mesquite to be created as covered species habitat, at least 765 acres will be designed and created to provide western red bat and western yellow bat roosting habitat. Conservation measures for the two evaluation bat species include conducting surveys to locate roost sites and to create covered species habitat near roost sites (BR 2004).

The acoustic sampling protocol established in early 2008 which increased the number of samples in each major habitat type to allow statistical comparisons of bat activity by habitat type was continued unchanged in 2009. Annual monitoring totaled 372 detector nights in 48 monitoring sites and 2 exploratory sites. A total of 141,099 bat call files were recorded and analyzed. The Beal Lake permanent bat monitoring station sampled for 365 nights, collecting a total of 67,186 call files. A permanent monitoring station installed at the 'Ahakhav Preserve (Fig.1) uses a different software than the original station installed at Beal Lake. It holds the promise of automatic identification of bat call files using the Sonobat software package. As of this writing, the software has not been adapted for Southwestern bat species. Data has been recorded for 2009, but has not been analyzed. However the station functioned quite well, losing only a few days during initial setup and troubleshooting. It is hoped that the software will be online in a timely manner for data analysis for the 2008 to 2010 monitoring period.



Figure 1. Permanent bat monitoring station installed at the 'Ahakhav Preserve.

This annual report presents an overview of the monitoring results collected for 2009. It focuses on results in restoration habitats—intermediate cottonwood, sapling cottonwood, and mesquite—and does not address results of monitoring in saltcedar and agriculture habitats. The 2010 report will address all habitat types for the three years of monitoring data collected from 2008 through 2010.

Study Areas

Quarterly post-development acoustic bat monitoring was conducted in seven LCR MSCP habitat creation areas during FY2009. These areas included Beal Lake Habitat Restoration Project, Colorado River Indian Tribe's Ahakhav Preserve, Palo Verde Ecological Reserve, Cibola Valley Conservation and Wildlife Area, Cibola NWR Unit 1, Imperial Ponds Conservation Area, and the Pratt Restoration Demonstration Site.

Beal Lake Habitat Restoration Project

The Beal Lake Restoration Project is located on Havasu National Wildlife Refuge in Needles, California, within the historic floodplain of the lower Colorado River. It consists of over 200 acres (81 hectares) of cottonwood (*Populus fremontii*), Goodding's willow (*Salix gooddingii*), coyote willow (*S. exigua*), honey mesquite (*Prosopis glandulosa*), and screwbean mesquite (*Prosopis pubescens*) in a series of plantings that began in 2001 and were completed in 2005 (BR 2005a). Table 1 and Fig. 2 show the study site characteristics and maps.

Table 1. Sample sites, habitat, and purpose for the Beal Lake Habitat Restoration Project.

Site Name	Habitat	Purpose
N	Mesquite	Monitoring
A	Mesquite	Monitoring
BB	Mesquite	Monitoring
K	Cottonwood - sapling	Monitoring
FF	Cottonwood - sapling	Monitoring
C	Cottonwood - sapling	Monitoring
NE SC	Saltcedar	Monitoring
NW SC	Saltcedar	Monitoring
SW SC	Saltcedar	Monitoring
PumpSta	Channel edge	Exploratory

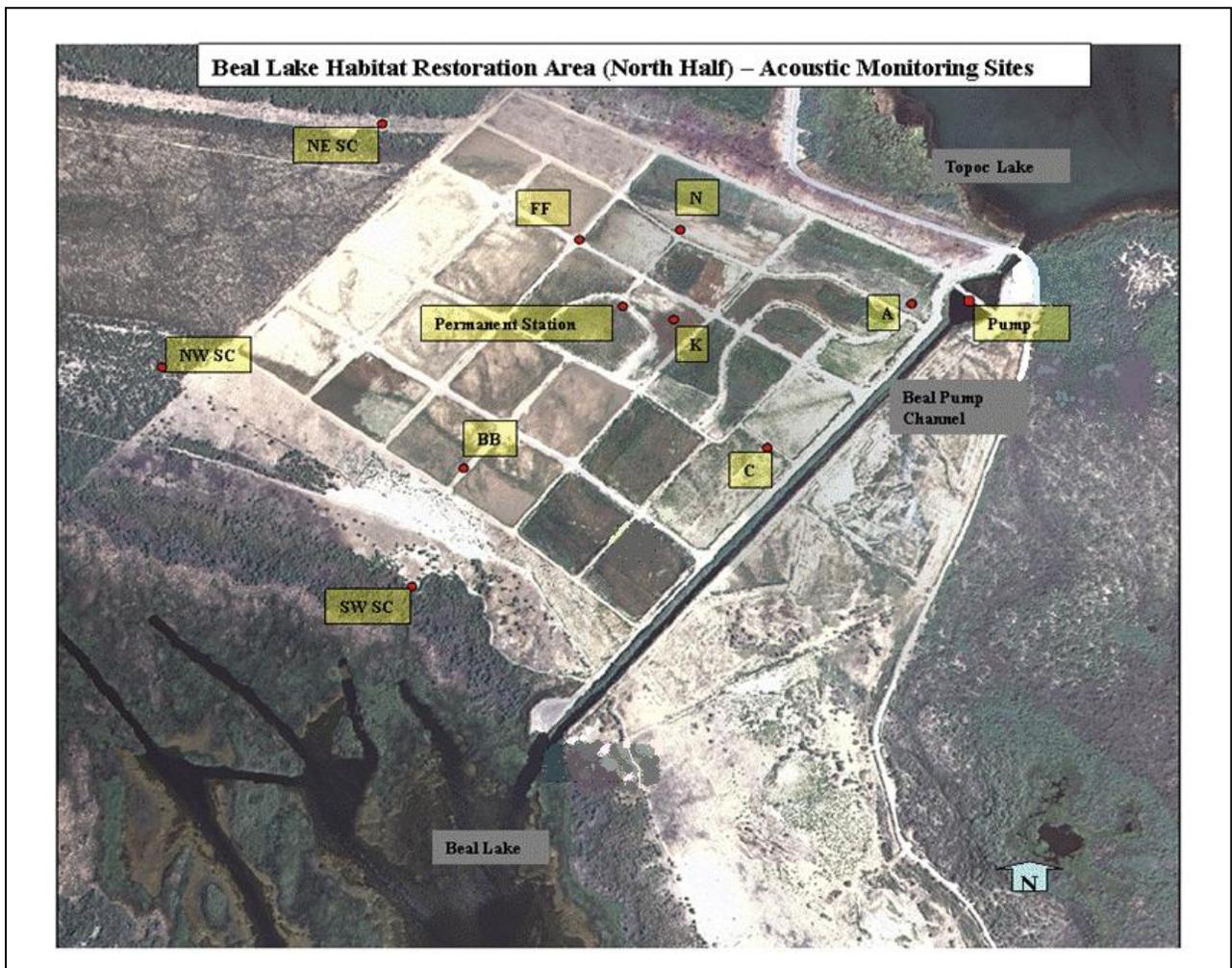


Figure 2. Beal Lake Habitat Restoration Project acoustic monitoring sites.

Colorado River Indian Tribes ‘Ahakhav Preserve

The ‘Ahakhav Preserve encompasses 154 acres (62 ha) of a mix of sapling and intermediate stage cottonwood and mesquite stands. Table 2 and Fig. 3 show the study site characteristics and map.

Table 2. Sample sites, habitat and purpose, Ahakhav Preserve.

Site Name	Habitat	Purpose
EHM	Mesquite (honey)	Monitoring
DHM	Mesquite (honey)	Monitoring
BSM	Mesquite (screwbean)	Monitoring
AMCW	Cottonwood - intermediate	Monitoring
CMCW	Cottonwood - intermediate	Monitoring
EMCW	Cottonwood - intermediate	Monitoring
FSYCW	Cottonwood – sapling	Monitoring
FNYCW	Cottonwood - sapling	Monitoring
GYCW	Cottonwood - sapling	Monitoring
Bat Station	Cottonwood - intermediate	Exploratory

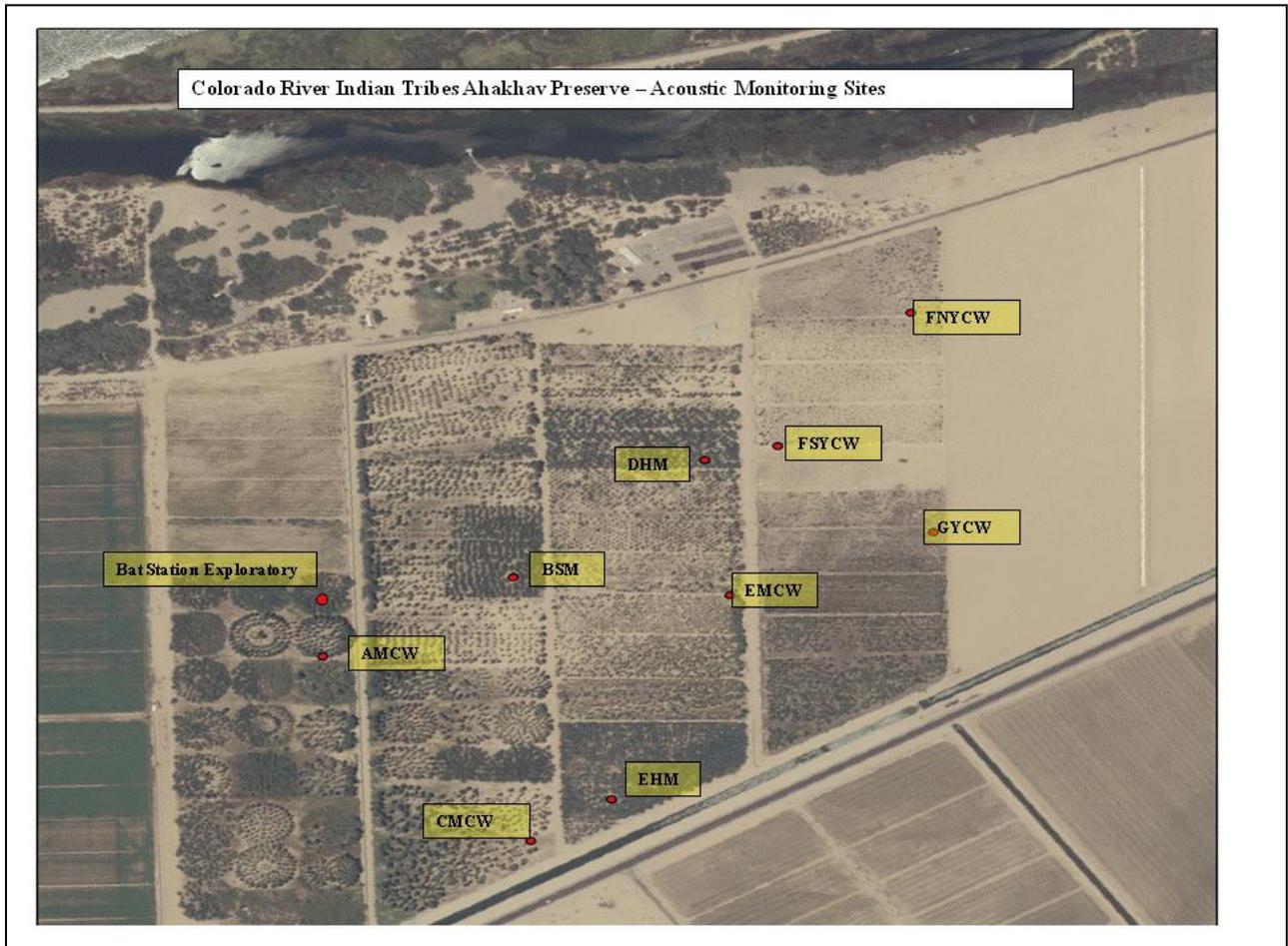


Figure 3. ‘Ahakhav Preserve acoustic monitoring sites.

Palo Verde Ecological Reserve

The Palo Verde Ecological Reserve (PVER) encompasses 1,352 acres (536 ha) of Colorado River historic floodplain near Blythe, California, of which 1,100 acres (445 ha) of active agricultural lands were identified for habitat restoration (BR 2006). There are three agriculture sites, three saltcedar sites, three intermediate cottonwood sites, and one exploratory site (Table 3 and Fig. 4).

Table 3. Sample sites, habitat and purpose for the Palo Verde Ecological Reserve.

Site Name	Habitat	Purpose
SCN	Saltcedar	Monitoring
SC Mid	Saltcedar	Monitoring
SCS	Saltcedar	Monitoring
AG7	Agriculture	Monitoring
AG 8	Agriculture	Monitoring
AG9	Agriculture	Monitoring
CW2NW	Cottonwood – sapling	Monitoring
CW2SE	Cottonwood - sapling	Monitoring
CWNur	Cottonwood - sapling	Monitoring
Nursery Canopy (adj to CW Nur)	Cottonwood – sampling - canopy	Exploratory

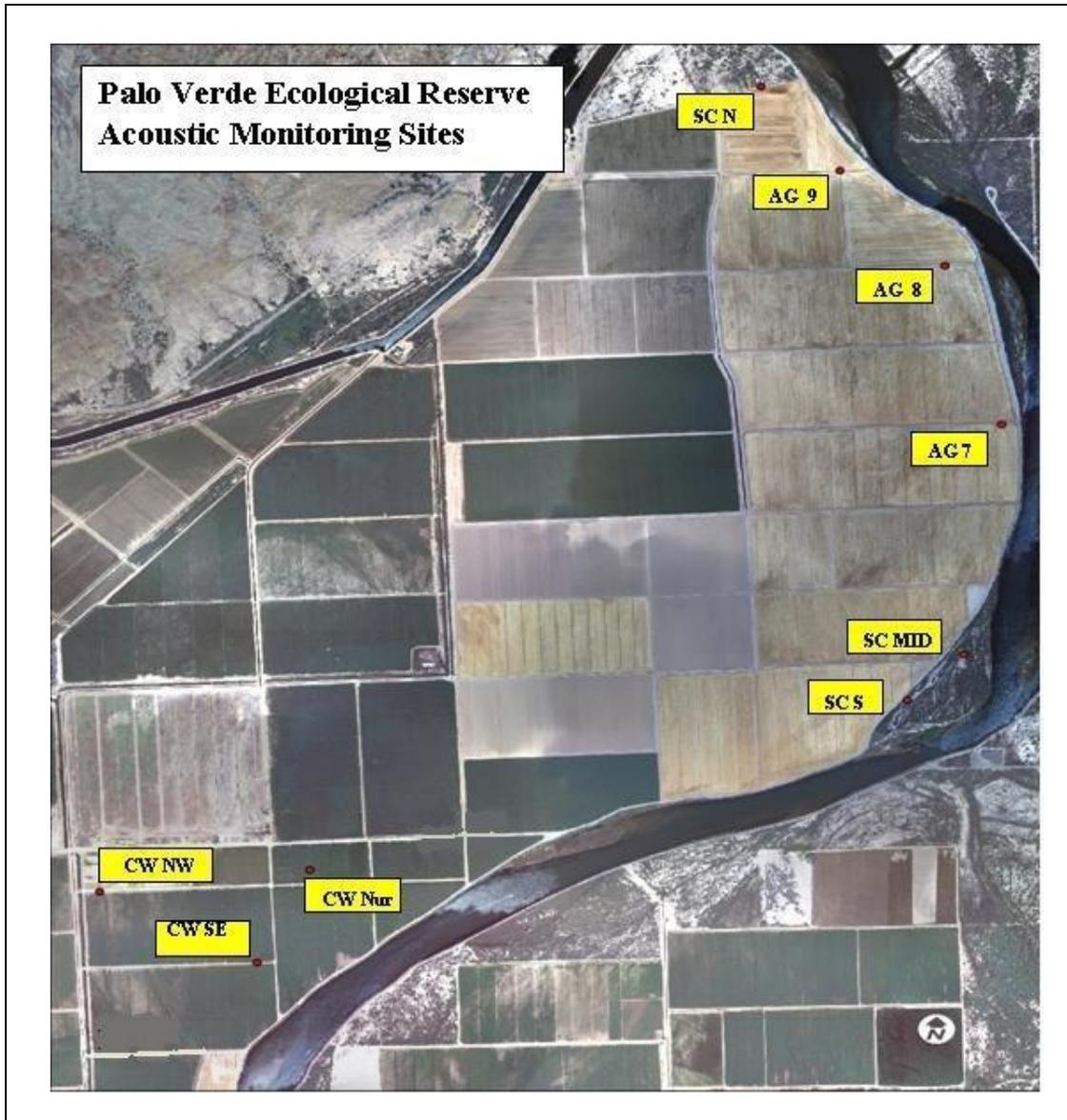


Figure 4. Palo Verde Ecological Reserve acoustic monitoring sites.

Cibola Valley Conservation and Wildlife Area

The Cibola Valley Conservation and Wildlife Area (CVCA) encompasses 1,019 acres (412.4 ha) of active agricultural lands. Phase I implemented in 2006 converted approximately 64 acres (25.9 ha) of active agricultural fields to cottonwood-willow habitat. Table 4 and Fig. 5 show the study site locations and characteristics (BR 2007a).

Table 4. Sample sites, habitat and purpose for the Cibola Valley Conservation and Wildlife Area.

Site Name	Habitat	Purpose
YCW A	Cottonwood - sapling	Monitoring
YCW D	Cottonwood - sapling	Monitoring
YCW 3	Cottonwood – sapling	Monitoring
Ag 1	Agriculture	Monitoring
Ag 2	Agriculture	Monitoring

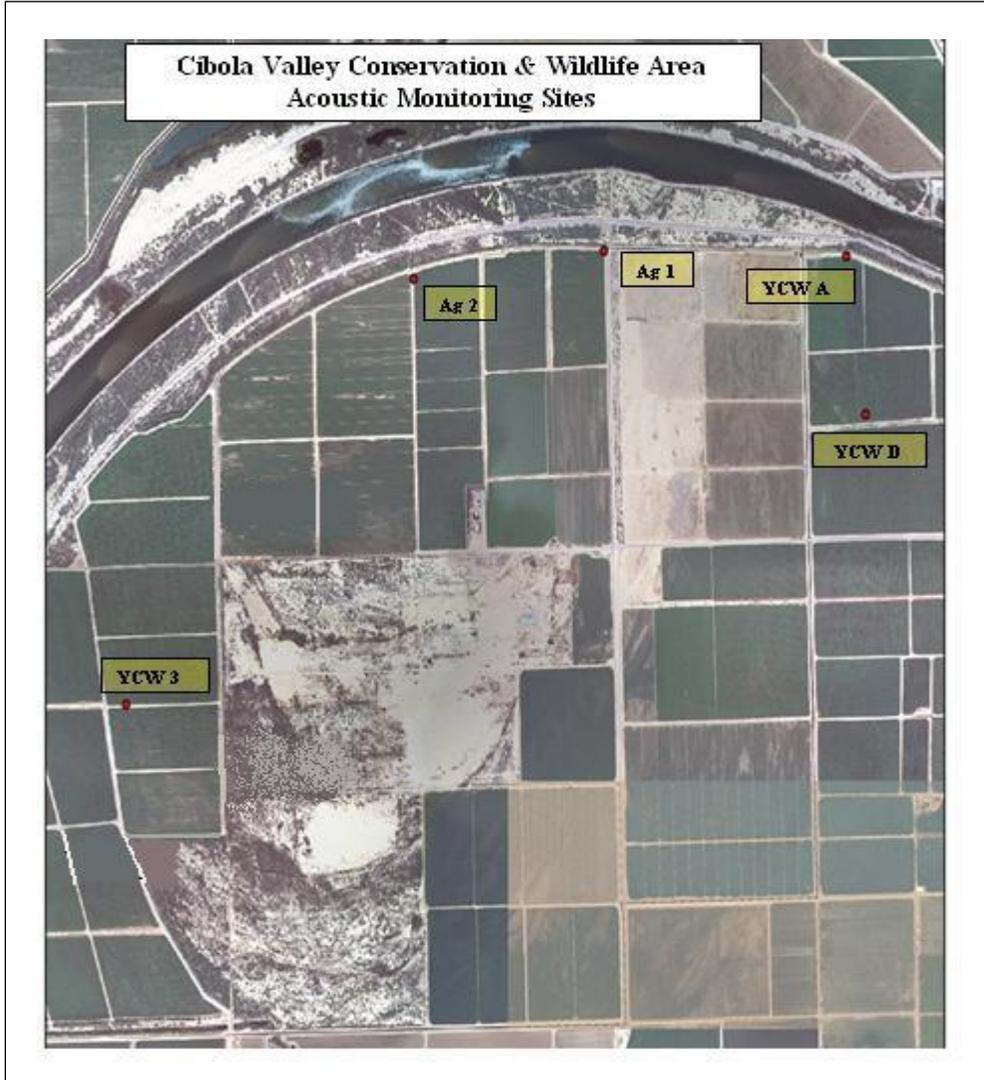


Figure 5. Cibola Valley Conservation and Wildlife Area acoustic monitoring sites.

Cibola NWR Conservation Unit #1

The Cibola National Wildlife Refuge consists of 16,600 acres (6,718 ha) along 12 miles (19.3 km) of the lower Colorado River. It is divided into six management units numbered from 1 to 6. Reclamation has several ongoing and planned projects in Unit #1 (CNWR #1) (Garnett and Calvert 2007). Table 5 and Fig. 6 show the study site locations and characteristics.

Table 5. Sample sites, habitat, purpose – Cibola NWR #1.

Site Name	Habitat	Purpose
MCW N	Cottonwood - intermediate	Monitoring
MCW Mid	Cottonwood - intermediate	Monitoring
MCW S	Cottonwood - intermediate	Monitoring
Mesq W	Mesquite	Monitoring
Mesquite Mid	Mesquite	Monitoring
Mesq E	Mesquite	Monitoring
Ag	Agriculture	Monitoring

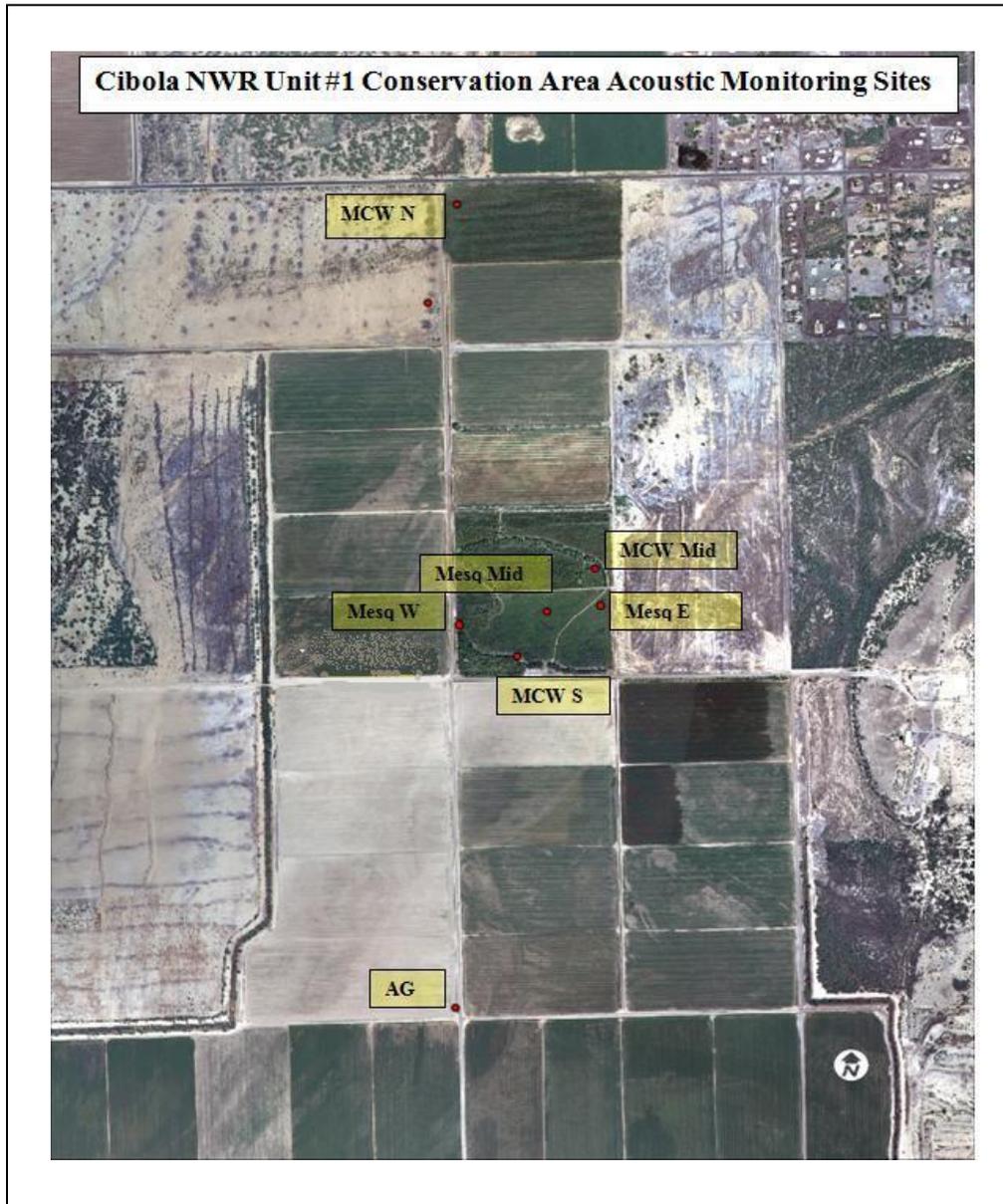


Figure 6. Cibola NWR Unit 1 Conservation Area - acoustic monitoring sites.

Imperial Ponds Conservation Area

The Imperial Ponds, located on Imperial NWR, were originally constructed to provide a mixture of habitat types, including isolated backwater for native fish, marsh, and riparian land cover types. Those ponds were expanded to six ponds in 2007 creating an additional 80 acres of backwater habitat for native fish. Also present in the area is a mature cottonwood-willow stand planted in 1993 referred to as the “nursery” (BR 2005b). High soil salinity has impaired establishment of cottonwood, willow, and mesquite in this area. The soil removed from pond expansion was spread on adjacent fields. It was mostly bare dirt during bat monitoring in 2008, but in 2009 supports a grass cover crop. Thirty-four acres will be planted with cottonwood-willow adjacent to the nursery. Table 6 and Fig. 7 show the sample site locations and characteristics.

Table 6. Sample sites, habitat, purpose, Imperial Ponds Conservation Area.

Site Name	Habitat	Purpose
Saltcedar N	Saltcedar (not shown in Fig.7)	Monitoring
Saltcedar S	Saltcedar	Monitoring
Nursery Interior	Cottonwood – intermediate	Monitoring
29	Cottonwood – intermediate	Monitoring
1	Agriculture	Monitoring
24	Agriculture	Monitoring
Pond 1	Lakeshore	Exploratory

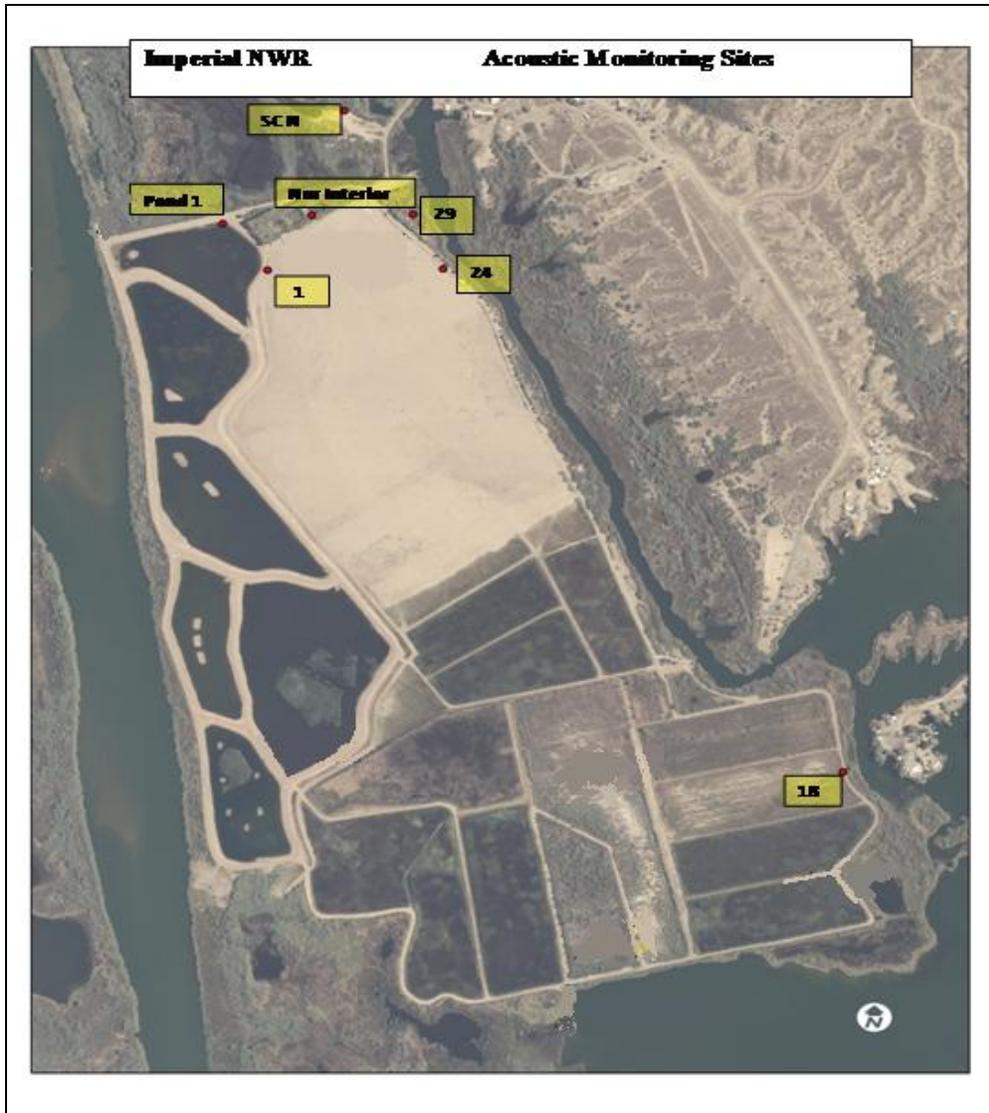


Figure 7. Imperial Ponds Conservation Area - Acoustic Monitoring Sites.

Pratt Restoration Demonstration Area

The 12-acre (4.9 ha) Pratt Restoration Demonstration Area was planted with cottonwood and willow in 1999 (BR 2003). At present this has matured into a healthy gallery forest. Some selective harvesting was conducted in 2005, 2006, and 2007 to create a mosaic of uneven aged, structurally diverse habitat. This site was selected for bat monitoring because it is a restoration site that contains mature cottonwood-willow habitat that is potentially suitable for the western red bat and western yellow bat. Table 7 and Fig. 8 show the sample site locations and characteristics.

Table 7. Sample sites, habitat and purpose – Pratt Restoration Demonstration Area.

Site Name	Habitat	Purpose
AG	Agricultural Field	Monitoring
MCW E	Cottonwood - intermediate	Monitoring
SC	Saltcedar	Monitoring

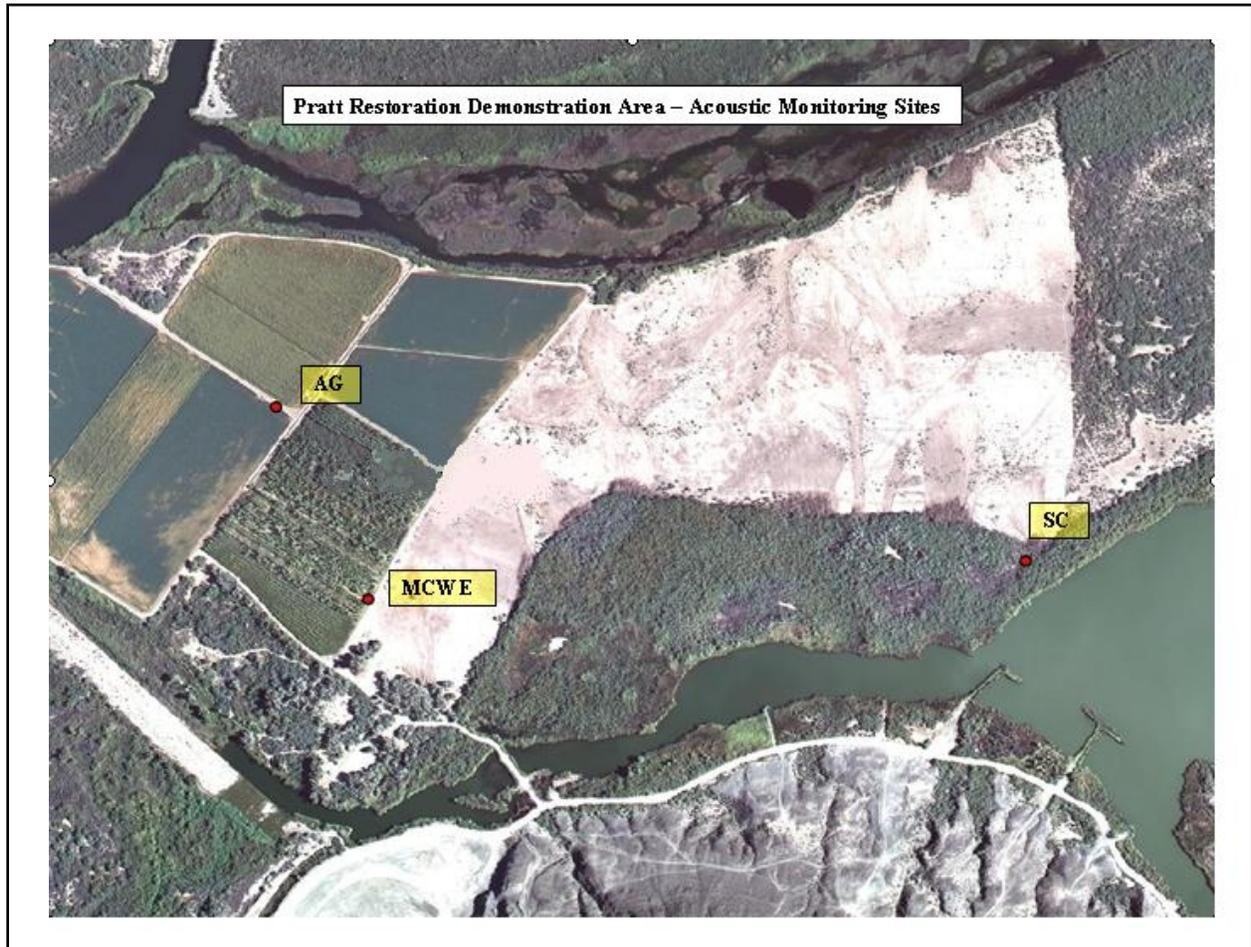


Figure 8. Pratt Restoration Demonstration Area - Acoustic Monitoring Sites.

Methods

Acoustic bat surveys were conducted using Anabat SD1 bat detectors as outlined by Brown (2006). Bat calls were recorded directly onto compact flash cards. Up to twelve units were deployed simultaneously in adjacent habitats and run continuously from dusk to dawn, recording all bat calls during an approximate ten hour period from dusk to dawn. Two nights were sampled in each restoration area either consecutively or within four days of the first sample night. Sampling was conducted quarterly during the dark phase of the moon October 2008, and February, April, July 2009. Sample sites were located non-randomly in representative habitats and monitored at the same location consistently. Detectors were placed on posts at approximately

1 m high at a 45° angle. In rapidly growing sites at several of the restoration areas, it was necessary to elevate the detector to the canopy level on extendable poles (Mr. Long Arm 3-section extension poles 8'-23' Model 6924). The detector was mounted on the top of the pole and positioned either vertically or at a 45° angle and faced away from taller vegetation edges. This was done for two reasons: first, to avoid excessive insect noise (which prevents the detector from recording bat calls); and second, to keep the detector in the flyways where bats are present. In many instances, the rapidly growing cottonwoods and willows were so dense that bats were unable to fly near the detectors and hence would not be recorded. Locating the bat detector on the extendable pole allowed sampling to be conducted, even during the peak of insect activity. Detectors are placed either along the edge of a habitat site or on a linear opening within the site that allows access to bat foraging (swoop zones).

Prior to deployment, each detector was calibrated manually using an Anabat chirper (Titley Scientific, Lawnton QLD) to achieve the optimum balance between enough sensitivity to record as many bat calls as possible without recording excessive extraneous noises from wind, tree branches, insects, etc. Depending on the unit, sensitivity may range from 4 to 7. The standard division ratio is set at 16. To protect detectors from rain and dust, each detector is placed in a tightly sealed plastic bag with the microphone exposed. During cloudy periods with storm activity likely, a rain guard is mounted on the detector (a flat thin metal shield placed on top of the detector extending slightly over the microphone). The shield protects the microphone from all but the most intense, windy storm events, yet allows good exposure of the microphone to bat calls. This setup allows the unit to be camouflaged to minimize exposure to theft or vandalism.

Sampling multiple nights provides an assessment of the level of temporal variation within and among habitats (Williams et al. 2006). Sampling all sites within a habitat creation area simultaneously also insures that any variation in conditions that affect bat activity is consistent among sampling sites.

The following assumptions are made for this monitoring study (Hayes 2000, Sherwin et al 2000): all habitats were equally accessible to all bats, all bats were randomly distributed vertically from just above the ground to the upper canopy layers; and any particular species was equally detectable from each habitat type. It is also assumed that all acoustic equipment has an equal ability of detecting bat echolocation calls. Another major assumption is that sampling simultaneously in a habitat creation area for a minimum of 2 nights per quarter is adequate to account for nightly variations in activity patterns of bats. The installation of permanent bat monitoring stations at Beal Lake Habitat Restoration and at the Ahakhav Preserve provides continuous year round nightly sampling. The non-random nature of bat detector location is done to select sites for optimum recording of bat calls either along habitat edges or in openings within habitats. All field studies have some degree of spatial autocorrelation risk and this study is no exception. Sample sites within a habitat restoration area are located as far apart as possible to reduce the risk that bats foraging in one area are not also recorded foraging in nearby areas. However with all acoustic bat studies this is difficult to assess. Data from this monitoring effort is intended to apply to the habitat restoration sites, rather than to the broader Colorado River ecosystem.

In March 2008 a new study design was developed to allow robust comparisons of bat use of three restored habitat types and two unrestored adjacent habitats. This study design was continued unchanged in 2009. Five habitat types are included in the monitoring. At least three of the five habitat types are monitored per study area. Three bat detectors are deployed in each habitat type so that at least nine detectors are being deployed on any given night. Acoustic surveys are conducted for two days every quarter at each study area so that all seasons are sampled each year. This study design is scalable, providing information on bat habitat use within individual restoration sites as well as information for the larger Lower Colorado River system. The primary focus is on habitat use of the four covered bat species using an index of bat activity. Bat activity levels will be compared between habitat types as well as evaluating how bat activity levels change through time as sites mature. Landscape features such as distance to pooled water, distance to roosts (known mine colonies), canopy height and tree density will be analyzed at the completion of surveys in 2010.

The first habitat type being monitored is the "intermediate" cottonwood-willow plantings where the average cottonwood dbh (diameter breast height) is greater than 8 cm (Fig. 10). Sites with this habitat type include: Ahakhav Preserve, CVCA, CNWR#1, Imperial, and Pratt.



Figure 9. Intermediate cottonwood –willow plantings with average cottonwood dbh >8cm.

The second habitat type is "sapling" cottonwood-willow plantings where the average dbh is less than 8 cm (Fig. 11). Sites being monitored include Beal, 'Ahakhav, PVER, and CVCA.



Figure 10. Sapling cottonwood-willow plantings with average dbh < 8 cm.

Mesquite plantings with an average canopy height of 3 m or more (Fig.12 is the third habitat being monitored. Sites include Beal, 'Ahakhav and CNWR #1.



Figure 11. Mesquite plantings (includes both screwbean and honey mesquite), with canopy height \geq 3m.

Monotypic *Tamarix* spp. (saltcedar) stands (Fig.13) are being monitored at Beal, PVER, Imperial and Pratt. The fifth habitat type being monitored for bat activity includes agricultural fields. These can range from bare dirt (fallow), to alfalfa, corn or millet (Fig.14).



Figure 12. Monotypic *Tamarix* spp stands.



Figure 13. Agricultural fields include alfalfa, corn, millet or bare dirt.

Bat calls were identified to species or species group by comparing the minimum frequency, duration and shape of each call sequence (bat pass) with reference calls from libraries of positively identified bats from throughout the western U.S. as well as reference calls recorded on the LCR following the method outlined in Thomas et al. (1987). A bat pass is defined as a call sequence of duration greater than 0.5 ms and consisting of more than two individual calls (Thomas 1988; O’Farell and Gannon 1999). Filters developed by Chris Corben and modified by the author were used to aid in species identification.

One of the most challenging aspects to bat call identification is the frequent overlap of call characteristics. Depending on the habitat the bat is flying over, wind, humidity, presence of ponded water, volume of the species' calls (shouters vs. whisperers¹) and presence of other bats of the same species or other species in the same airspace may all play a role in call identification. This has been well documented by many bat researchers and summarized by the Western Bat Working Group (2004). A detailed analysis of these overlaps and guidelines for determining species identity was developed for each of the four focal bat species and included in Appendix 1 through 4 of the 2008 Annual Report (Broderick 2009). These call guidelines serve as documentation for how each call was identified. Efforts to further refine the call guidelines was continued in 2009 as new positively identified reference calls were obtained from mist-netting efforts.

In cases where there are significant portions of the call envelope (all the characteristic calls of a species) that overlap with other bat species, a species group was assigned. Table 8 shows the species and species groups used for post development bat monitoring.

A total of 15 bat species are known to occur along the LCR (Snow 2007). An additional species, the Arizona myotis (*Myotis occultus*), was thought to have been extirpated, but has been confirmed from genetic analysis as being present at the ‘Ahakhav Preserve (Calvert 2009). This finding was supported by correlation of diagnostic acoustic calls with the genetics. Eleven bat species were identified based on the presence of characteristic, diagnostic calls in the recordings. In addition, species groups were created consisting of overlapping, similar call characteristics as done by Betts (1998); Rainey et al. (2003); and the Western Bat Working Group (2004). The 45-55 kHz species group includes California myotis (*Myotis californicus*), Yuma myotis (*Myotis yumanensis*) and some calls of the canyon bat (*Parastrellus hesperus*) and California leaf-nosed bat. The 35-40 kHz species group consists of overlapping calls of the cave myotis (*Myotis velifer*) and the Arizona myotis. The 25-30 kHz group includes big brown bat (*Eptesicus fuscus*), Mexican free-tailed bat (*Tadarida brasiliensis*) and the pallid bat (*Antrozous pallidus*). The 19-24 kHz species group includes overlapping calls of pocketed free-tailed bat (*Nyctinomops femorosaccus*), big free-tailed bat (*Nyctinomops macrotis*), hoary bat (*Lasiurus cinereus*) and some calls of the Mexican free-tailed bat.

¹ Bats can be characterized by their echolocation calls as shouting bats and whispering bats. Big brown bats and Mexican free-tailed bats are shouters, producing calls of 110 decibels which is similar to the loudness of a smoke alarm if we could hear them. Whispering bats such as the pallid bat produce sounds of 60 decibels or lower which is similar to normal conversation if we could hear them. Shouters forage in open spaces while whisperers glean insects from the foliage of trees and forage in the cluttered forest interiors.

There are four abundant “flagship” species: canyon bat, Mexican free-tailed bat, California myotis and Yuma myotis (Brown and Berry, personal communication). These flagship species (a term coined by Pat Brown, personal communication, which refers to their abundance along the Lower Colorado River) are widespread in a large array of habitats along the LCR and are considered to have stable or increasing populations. While they are important members of the mammalian community, the focus of habitat creation efforts is on restoring habitat for the two covered species, western red bat and western yellow bat, as well as for the two evaluation species, the California leaf-nosed bat and the pale Townsend’s big-eared bat. Calls of these abundant, common species were placed in species groups.

Call minutes is a relative activity index that eliminates the bias of over estimating bat relative abundance if multiple files of the same individual were recorded in a short period of time, or under-estimating bat abundance because of multiple individuals recorded within a single file (Kalcounis et al 1999, Brown 2006). A call minute indicates that a given species is present if it was recorded at least once within a 1-minute period regardless of the number of call sequences recorded within that minute. The highest rating a bat species can have is 60 in an hour, indicating that the species (but not necessarily the same individual) is recorded continuously during the hour (Brown 2006, Williams 2001 and Miller 2001).

Table 8. Bat species and species groups identified in the Lower Colorado River habitat creation areas.

Common Name	Scientific Name	Species Code
Individual Species		
Townsend’s big-eared bat	<i>Corynorhinus townsendii</i>	Coto
Western red bat	<i>Lasiurus blossevillii</i>	Labl
Yellow bat	<i>Lasiurus xanthinus</i>	Laxa
California leaf-nosed bat	<i>Macrotus californicus</i>	Maca
Mastiff bat	<i>Eumops perotis</i>	Eupe
Hoary bat	<i>Lasiurus cinereus</i>	Laci
Arizona myotis	<i>Myotis occultus</i>	Myoc
Cave myotis	<i>Myotis velifer</i>	Myve
Pocketed free-tailed bat	<i>Nyctinomops femorosaccus</i>	Nyfe
Big free-tailed bat	<i>Nyctinomops macrotis</i>	Nyma
Canyon bat	<i>Parastrellus hesperus</i>	Pahe
Phonic Groups:		
19-24 kHz	Overlapping calls of Nyfe, Nyma, Laci, Tabr	
25-30 kHz	All calls of Epfu, Tabr, Anpa	
30-35kHz	Overlapping calls of Epfu, Tabr, Anpa	
35-40 kHz	Overlapping calls of Myoc, Myve	
45-55 kHz	All calls of Myca, Myyu, and overlapping calls of Pahe	
Species included in the species groups listed above:		
Pallid bat	<i>Antrozous pallidus</i>	Anpa
Big brown bat	<i>Eptesicus fuscus</i>	Epfu
Mexican free-tailed bat	<i>Tadarida brasiliensis</i>	Tabr
California myotis	<i>Myotis californicus</i>	Myca
Yuma myotis	<i>Myotis yumanensis</i>	Myyu

Results

Tables 9 through 12 summarize the total number of bat minutes recorded for the four focal species at each of the seven habitat creation areas. Only calls recorded in restoration habitats (mesquite, intermediate and sapling cottonwood) are included in the summaries. Agriculture and saltcedar habitats are not included in this 2009 annual report, but will be included in the three-year analysis of data to be conducted in 2010.

Beal Lake Habitat Restoration Project

Table 9. Total number of call minutes recorded for the four focal species at the Beal Lake Habitat Restoration Project for FY07 through FY09 for restoration habitats only.

Species	FY07	FY08	FY09	All Years
Western Red Bat	3	1	3	7
Western Yellow Bat	9	2	1	12
California Leaf-Nosed Bat	7	3	7	17
Townsend's Big-Eared Bat	1	0	4	5
All other species	1618	2290	3780	7688
Total call minutes	1638	2296	3795	7729

A total of 76 detector nights were completed on nine monitoring sites and one exploratory site in the Beal Lake Habitat Restoration Project. A total of 15,616 call files were collected and edited, and valid call files identified to species or species groups. A total of 15 bat minutes were recorded for the four covered bat species. The quarterly summaries for the first and second sample periods included in Tables 1 and 2 in the Appendix.

Total Number of Bat Minutes for Covered and Evaluation Species. Three western red bat minutes were recorded at the Beal Lake Habitat Restoration Project 2009. This is similar to the bat activity recorded in 2007 (3 minutes) and 2008 (1 minute).

Only one western yellow bat minute was recorded at Beal. This is down from 2007 (9 minutes) and 2008 (2 minutes).

Four minutes of bat activity were recorded for Townsend's big-eared bats in 2009 at Beal. This compares with 0 minutes in 2008 and 1 minute in 2007. Since this is a whispering bat, these results are not unexpected since the bat has to be less than 15 ft (3 m) from the microphone in order to be recorded.

A total of 9 bat minutes were recorded for the California leaf-nosed bat in 2009 at Beal. This compares with 3 minutes recorded in 2008 and 7 recorded in 2007.

Permanent Bat Monitoring Station Results for the Four Focal Bat Species

The permanent bat station established at the Beal Lake Restoration Project in April 2008 continued to perform flawlessly throughout 2009, recording bat calls for 365 days. A fairly small

amount of data loss due to insect interference did occur. In one occasion, an Apache cicada (*Diceroprocta apache*) apparently landed near the microphone and called all night resulting in complete data loss for that night. The Anabat bat detectors cannot record bat calls when insects such as cicadas, crickets, and katydids are calling unless the bat flies and calls directly over the microphone. Most of the other data loss events occurred during the early evening hours principally in July and August, affecting Canyon bat calls the most as this species emerges to forage early in the evening. Overall, data loss due to insects was relatively minor.

Fig. 14 shows the daily monitoring results for the western red bat for FY2009. This year's results are much different than for FY2008 in which no western red bat minutes were recorded from April through September. On October 11, 2008 a small pulse of bat activity was recorded (5 minutes) followed by several nights with 1 minute of activity recorded sporadically through October and 1 minute in mid November. No activity was recorded during the cold winter weather. Red bat activity picked up again beginning in late March and continued sporadically throughout the spring and summer. A pulse of red bat activity occurred from September 15th through 30th, with the number of bat minutes ranging from 3 to 9. The total number of bat minutes for the comparable April through September period for 2008 was 0, but increased to 24 bat minutes in 2009 for the same time period. For all 12 months sampled in 2009, total bat minutes were 55.

Fig.15 shows the daily monitoring results for the western yellow bat for FY2009. This year's results shows an increase from 4 in 2008 recorded in August and September to 11 in 2009. Single minutes were recorded sporadically from late March through late September.

Fig.16 shows the daily monitoring results for the California leaf-nosed bat. As with red bats and yellow bats, 2009 shows a slight increase in bat activity for this species. Single minutes were recorded sporadically from late April through mid September. On July 28 a small spike of 6 bat minutes was recorded. A total of 14 minutes of activity was recorded for this species in 2009.

Fig. 17 shows the daily monitoring results for the pale Townsend's big-eared bat. Four minutes of bat activity were identified during May and early September in 2009. This compares to zero bat minutes recorded in 2008. This is a problematic species for acoustic monitoring as it is considered a whispering bat. It must be calling very near the microphone in order to be recorded. The fact that 4 minutes of bat activity were recorded does indicate that this species is using the area.

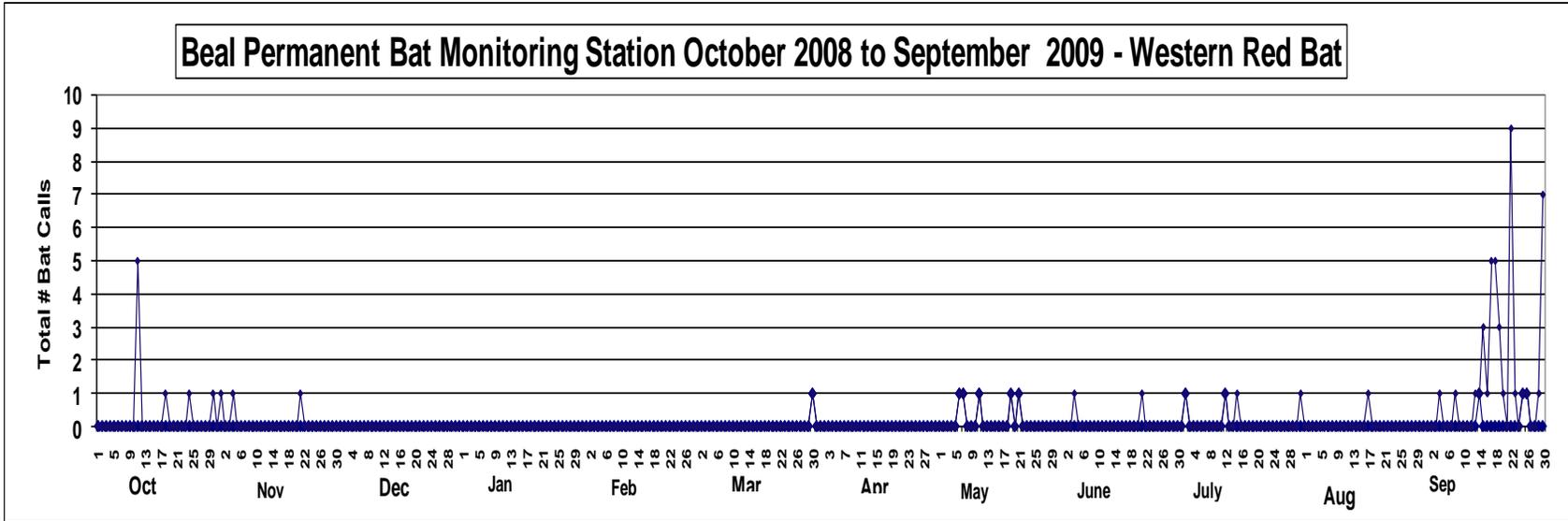


Figure 14. Total number bat calls for Western red bat from permanent monitoring station at Beal, October 2008 through September, 2009.

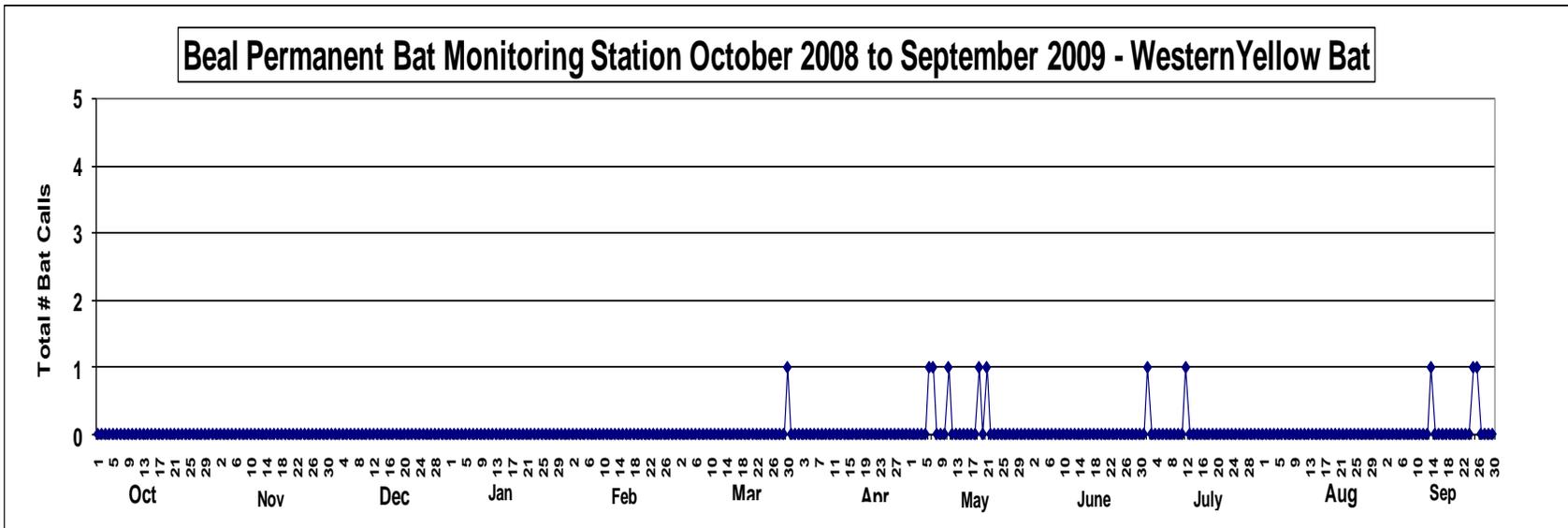


Figure 15. Total number bat calls for Western yellow bat from permanent monitoring station at Beal, October 2008 through September, 2009.

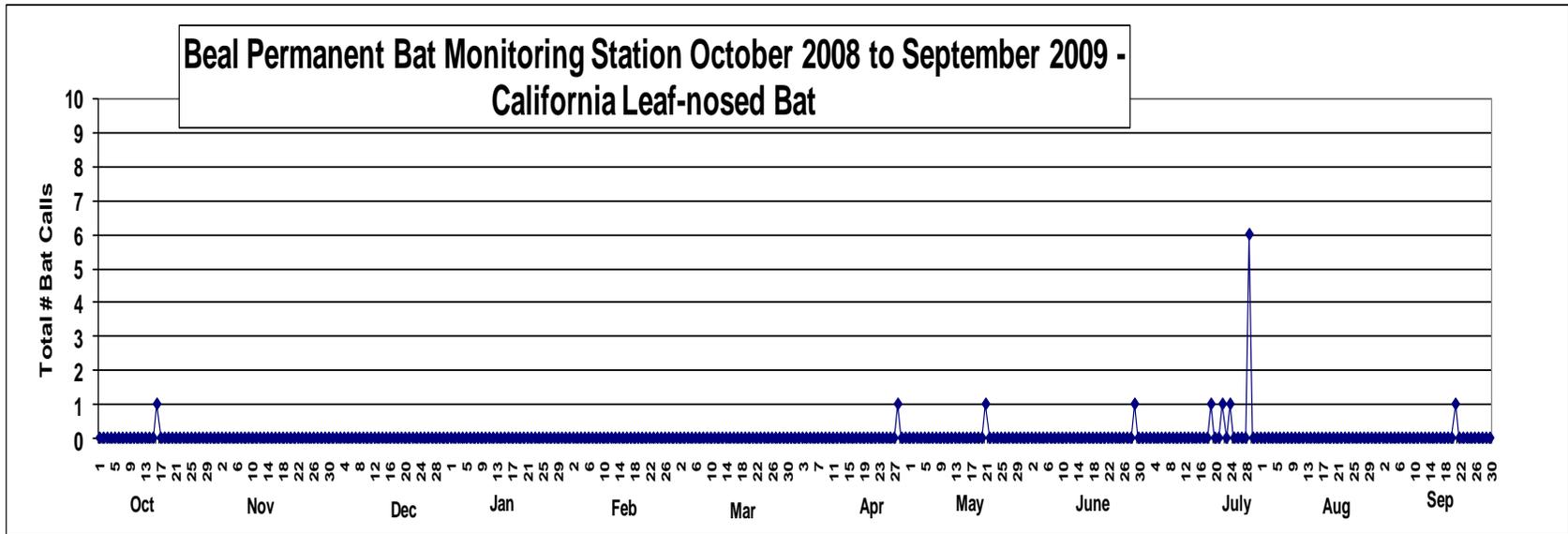


Figure 16. Total number bat calls for California leaf-nosed Bat from permanent monitoring station at Beal, October 2008 through September, 2009.

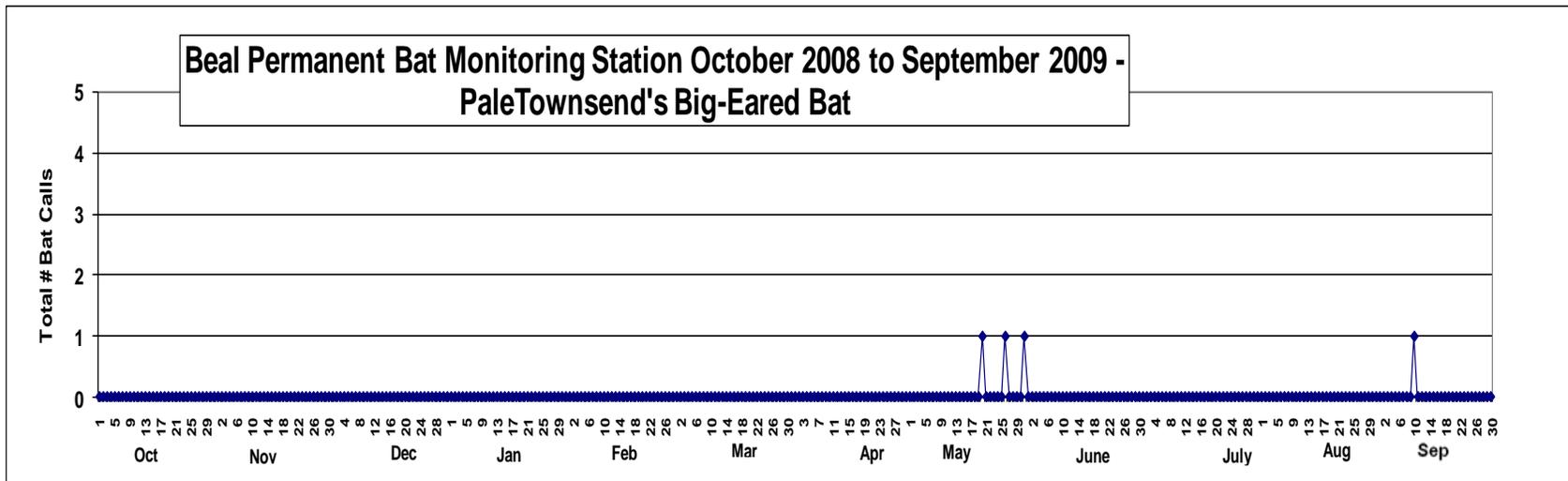


Figure 17. Total number bat calls for pale Townsend's big-eared bat from permanent monitoring station at Beal, October 2008 through September, 2009.

Colorado River Indian Tribes 'Ahakhav Preserve

Nine sites were monitored at the 'Ahakhav Preserve in 2009: three in sapling cottonwood (<8cm dbh); three in intermediate cottonwood (>8 cm dbh) and three in mesquite stands. Seventy-two detector nights were completed with a total of 17,482 call files being collected and edited, and valid call files identified to species or species groups. A total of 623 bat minutes were recorded for the four covered bat species, most of which were western yellow bats, followed by red bats. The quarterly summaries of bat minutes recorded for the first and second sample periods are included in Tables 3 and 4 in the Appendix.

Table 10. Total number of call minutes recorded for the four focal species at the 'Ahakhav Preserve for FY08 and FY09 for restoration habitats only.

Species	FY08	FY09	All Years
Western Red Bat	2	179	181
Western Yellow Bat	68	373	441
California Leaf-Nosed Bat	37	70	107
Townsend's Big-Eared Bat	1	1	2
All other species	7,130	12,163	19,293
Total call minutes	7,238	12,786	20,024

Total Number of Bat Minutes for Covered and Evaluation Species.

During 2009, 179 western red bat minutes were recorded at the 'Ahakhav Preserve, most of which were in the intermediate cottonwood during February.

A total of 373 western yellow bat minutes were recorded at the 'Ahakhav Preserve, most of which were in the intermediate cottonwood during July. This finding is similar to 2008 in that most of the calls last year were also recorded in intermediate cottonwood during July; however the activity in 2009 was much higher than recorded in 2008 (only 40 calls).

Seventy minutes of bat activity for the California leaf-nosed bat was recorded at the 'Ahakhav Preserve. Bat activity was spread across the seasons and habitats fairly equally.

There was 1 minute of bat activity for the pale Townsend's big-eared bat, recorded in April in mesquite habitat.

Palo Verde Ecological Reserve

Sixty-nine detector nights were completed on nine monitoring sites and one exploratory site in the Palo Verde Ecological Reserve. A total of 20,215 bat call files were collected and edited. Valid call files were identified to species or species groups and bat minutes were calculated. A total of 36 bat minutes were recorded for the four covered bat species in restoration habitats only, most of which were California leaf-nosed bats and red bats. The quarterly summaries of bat

minutes recorded for the first and second sample periods at PVER are included Tables 5 and 6 in the Appendix.

Table 11. Total number of call minutes recorded for the four focal species at the Palo Verde Ecological Reserve for FY07 through FY09 for restoration habitats only.

Species	FY07	FY08	FY09	All Years
Western Red Bat	6	1	11	18
Western Yellow Bat	0	0	1	1
California Leaf-Nosed Bat	22	3	23	48
Townsend's Big-Eared Bat	0	0	1	1
All other species	1352	1349	1942	4643
Total call minutes	1380	1353	1978	4711

Total Number of Bat Minutes for Covered and Evaluation Species. Eleven western red bat minutes were recorded at PVER in April in the cottonwood nursery site. One minute of bat activity was recorded for the western yellow bat in July in the cottonwood nursery. One minute of bat activity was recorded for the Townsend's Big-eared bat. A total of 23 minutes of bat activity was recorded for the California leaf-nosed bat, most of which occurred in February in the cottonwood nursery.

Cibola Valley Conservation and Wildlife Area

A total of 35 detector nights were completed in five monitoring sites in the CVCA. A total of 8,181 call files were collected and edited and valid call files identified to species or species groups. A total of 109 bat minutes were recorded for the four covered bat species. Quarterly summaries of bat minutes recorded for the first and second sample periods in five sites at PVER are included in Tables 7 and 9 in the Appendix.

Table 12. Total number of call minutes recorded for the four focal species at the Cibola Valley Conservation Area for FY07 through FY09.

Species	FY07	FY08	FY09	All Years
Western Red Bat	4	0	91	95
Western Yellow Bat	0	0	3	3
California Leaf-Nosed Bat	36	17	14	67
Townsend's Big-Eared Bat	1	0	1	2
All other species	758	629	1672	3059
Total call minutes	799	646	1781	3226

Total Number of Bat Minutes for Covered and Evaluation Species. A total of 91 minutes of bat activity was recorded in restoration habitats for the western red bat which was a large increase over the previous two years. Most of the minutes (67) were recorded in April, followed by 18 minutes in October and 6 minutes in July. Western yellow bat activity was recorded at CVCA for the first time since monitoring here began in 2007, with 3 minutes of activity. Fourteen minutes of bat activity was recorded for the California leaf-nosed bat and one minute was recorded for the pale Townsend’s big-eared bat.

Cibola NWR Unit #1 Conservation Area

Fifty-six detector nights were completed for seven monitoring sites at Cibola NWR Unit #1 Conservation Area. These include three intermediate cottonwood sites, three mesquite sites, and one agriculture site. A total of 18,601 call files were obtained, edited and identified to species or species group. Bat minutes were calculated for each species and species group. There was a total of 24 minutes of bat activity for the four covered bat species in restoration habitats. Tables 9 and 10 in the Appendix show the quarterly summaries of bat minutes recorded in the seven sites at Cibola NWR Unit #1 Conservation Area.

Table 13. Total number of call minutes recorded for the four focal species at the Cibola NWR Unit#1 Conservation Area for FY07 through FY09 for restoration habitats only.

Species	FY07	FY08	FY09	All Years
Western Red Bat	0	0	2	2
Western Yellow Bat	0	0	4	4
California Leaf-Nosed Bat	12	67	11	90
Townsend’s Big-Eared Bat	0	0	7	7
All other species	433	2067	5702	8202
Total call minutes	445	2134	5726	8305

Total Number of Bat Minutes for Covered and Evaluation Species. Two western red bat minutes were recorded, one in intermediate cottonwood in February and one in mesquite in April. Four western yellow bat minutes were recorded in October and July. Eleven minutes of California leaf-nosed bat activity was recorded in July. Seven minutes of pale Townsend’s big-eared bat minutes were collected mostly in July.

Imperial Ponds Conservation Area

A total of 56 detector nights were completed for 6 monitoring sites and 2 exploratory sites. A total of 23,320 call files were obtained, edited and identified to species or species group. Bat minutes were calculated for each species and species group. A total of 31 bat minutes were recorded for the four covered bat species. Tables 11 and 12 in the Appendix show the quarterly summaries of bat minutes recorded in restoration and non restoration sites at Imperial Ponds Conservation Area.

Table 14. Total number of call minutes recorded for the four focal species at the Imperial Ponds Conservation Area for FY07 through FY09 for restoration habitats only.

Species	FY07	FY08	FY09	All Years
Western Red Bat	1	0	6	7
Western Yellow Bat	0	1	6	7
California Leaf-Nosed Bat	41	72	19	132
Townsend's Big-Eared Bat	4	0	0	4
All other species	2534	2224	3800	8558
Total call minutes	2580	2297	3831	8708

Total Number of Bat Minutes for Covered and Evaluation Species. Six western red bat minutes were recorded in the intermediate cottonwood habitat in April. Six western yellow bat minutes were recorded, 2 during February and 4 in July in intermediate cottonwood habitats.

No activity was recorded for the pale Townsend's big-eared bat. In 2007, 2 minutes were recorded for this species in spring and 2 minutes in summer in restoration sites.

A total of 19 minutes of bat activity were recorded for the California leaf-nosed bat, all in intermediate cottonwood habitat. Most of the activity was recorded in April.

Pratt Restoration Demonstration Site

Twenty-four detector nights were completed for three monitoring sites at Pratt. A total of 5,046 call files were obtained, edited, and identified to species or species group. Seven minutes of bat activity were recorded for the four focal bat species, most of which were the western yellow bat. Tables 13 and 14 in the Appendix show the quarterly summaries of bat minutes recorded in three sites at Pratt Restoration Demonstration Site.

Table 15. Total number of call minutes recorded for the four focal species at the Pratt Restoration Area for FY07 through FY09 for restoration habitats only.

Species	FY07	FY08	FY09	All Years
Western Red Bat	1	0	0	1
Western Yellow Bat	0	0	6	6
California Leaf-Nosed Bat	0	6	1	7
Townsend's Big-Eared Bat	0	0	0	0
All other species	1616	781	1261	3658
Total call minutes	1617	787	1268	3672

Total Number of Bat Minutes for Covered and Evaluation Species

No bat activity was recorded for the western red bat or pale Townsend's big-eared bat in restoration habitat at Pratt. Six minutes of bat activity was recorded for the western yellow bat. Activity was recorded in every monitoring period except February. One minute was recorded for California leaf-nosed during October.

Discussion

Beal Lake Habitat Restoration Project

2009 quarterly acoustic monitoring results for the Beal Lake Habitat Restoration Project for the four focal bat species is similar overall to results for 2008 and 2007. However the permanent monitoring station has successfully picked up a pulse of western red bat activity that occurred for several days in mid to late September and early October. Additionally, single calls were recorded sporadically in every month except December, January and February.

A total of 14 minutes of bat activity was recorded for the California leaf-nosed bat at the Beal permanent monitoring station. Some concern has been voiced over the apparent observation of California leaf-nosed bat at this location (Brown personal communication). In nearly three decades of bat monitoring and research on the Lower Colorado River, Pat Brown has not collected acoustically or through mist-netting any leaf-nosed bats from the Beal Lake area, nor are there any mines in the vicinity (less than 20 miles distant) with known populations of leaf-nosed bats.

Acoustic call characteristics for the California leaf-nosed bat do overlap in many instances with Yuma myotis and California myotis. However, the call characteristics used for identification of California leaf-nosed bat calls for this monitoring program are very rigorous and are restricted to only the most quintessential, characteristic calls of this species. The overall result is likely to be an under counting of bat activity for this species. While it is wise to bear in mind the possibility of call overlap, it is certainly worthwhile to consider that the range of the leaf-nosed bats may be increasing and that maternity colonies may exist in mines in the neighborhood (within a reasonable commuting distance) of Beal Lake that have yet to be discovered.. It is also possible that individuals of existing colonies are moving up and down the river that are now being captured acoustically because of the intense sampling effort underway.

Colorado River Indian Tribes 'Ahakhav Preserve

Two of the most dramatic acoustic monitoring results for 2009 occurred at the 'Ahakhav Preserve with the recording of 179 western red bat minutes and 373 western yellow bat minutes. These numbers are far higher than at any other habitat creation area. Particularly noteworthy is the fact that most of the western red bat activity was recorded in February and nearly all were recorded in Field A. This is a particularly well developed stand of intermediate cottonwood with a number of clear swoop zones.

Nearly all of the western yellow bat minutes were recorded in July, most of which occurred in the intermediate cottonwood habitats. The 373 minutes of activity recorded in 2009 was substantially higher than the 68 minutes recorded in 2008.

The presence of *Myotis occultus* (Arizona myotis) at the Preserve was confirmed in 2009 from genetic samples taken from individuals captured during mist-netting at the Preserve (Calvert

2010). Its numbers along the Lower Colorado River had decreased to the point it was no longer listed as present in this region. However there appears to be a stronghold at the 'Ahakhav Preserve. A total of 1,769 minutes of bat activity for this species was recorded in July 2009. Activity occurred in all three restoration habitats, but intermediate cottonwood showed the most bat activity.

Palo Verde Ecological Reserve

Eleven minutes of activity for the western red bat were recorded in April at the nursery. This is a rapidly maturing sapling cottonwood site that is developing a multi-layered canopy structure. A similar level of red bat activity was recorded in July 2007 in the Phase II cottonwood-willow habitat.

One minute of activity for the western yellow bat was recorded in July at the nursery site. This is the first time yellow bats have been recorded in restoration habitat at PVER.

Twenty-three minutes of activity for the California leaf-nosed bat was recorded in 2009. This is similar to 2007 results. Most of the leaf-nose activity was recorded during the February sample period.

Cibola Valley Conservation and Wildlife Area

Ninety-one minutes of activity were recorded for the western red bat at CVCA, most of which occurred in April in sapling cottonwood habitat. Some activity also was recorded in October, also in sapling cottonwood habitat. The total number of minutes for the western red bat is comparable only to the 'Ahakhav Preserve.

Three minutes of western yellow bat activity was recorded in 2009. This is the first time in three years that yellow bats were recorded in restoration habitats at CVCA. Activity was recorded in October and July in sapling cottonwood habitat.

There has been tremendous growth of the cottonwood-willow stands which has also been accompanied by intensive irrigation. As discussed in the 2008 report (Broderick 2009) these two conditions appear to have attracted abundant insects, in particular the Apache cicada. Experimental placement of the detectors on 23 ft. poles has proven successful in greatly reducing insect interference and allowing acoustic sampling to continue in habitats otherwise too dense and cluttered to sample using Anabat detectors.

Cibola NWR Unit #1

For the first time since acoustic monitoring began at this site, four western yellow bat minutes were recorded. These were recorded in July and October in mesquite and intermediate cottonwood habitats.

Similarly, two western red bat minutes were recorded for the first time in mesquite and intermediate cottonwood habitats in February and April.

Seven pale Townsend's big-eared bat minutes were recorded in mesquite and intermediate cottonwood habitats, mostly in July. Because this species is a whispering bat, requiring the bat to call very close to the detector microphone, it is more likely to be a random event rather than indicating increasing use of these habitats.

Imperial Ponds Conservation Area

The number of bat minutes recorded for both western red bat (6) and western yellow bat (6) in restoration habitat (intermediate cottonwood) represents an encouraging increase in activity since intensive monitoring began in 2007. Many of these calls were recorded in the small opening in the interior of the cottonwood nursery. This opening formerly had been occupied by Gooding's willows, but recently the willows have begun to die back, creating an interior opening in an otherwise dense stand of intermediate cottonwood. This points to the value of such openings in making the interior of stands accessible to foraging bats.

Pratt Restoration Demonstration Site

Six minutes of bat activity were recorded for the first time in intermediate cottonwood since sampling began in 2007. Yellow bats have been captured in mist netting efforts, however. The BLM has recently planted cottonwoods immediately west of the Pratt Restoration Demonstration Area. These cottonwoods have been growing rapidly providing some additional structure and increasing the overall patch size at Pratt.

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Appendix – Data Sheets For Quarterly Bat Monitoring

Table 1. Quarterly summary of bat minutes recorded simultaneously in 9 monitoring sites and 1 exploratory site at Beal Lake Habitat Restoration Area, first and second samples for October 2008 and February 2009.

Beal Lake Habitat Restoration Post Development Bat Monitoring FY 2009 Sample 1																						
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Myyu	Nyfe	Pahe	Tabr	Site Total	Status	
A		3				46									1			60		110		
N		3				51				1					1			58		114		
BB		4				34				2								37	1	78		
C		6		1		44								2				41	2	96		
K		10				57		2										50		119		
F		6				21												50		77		
SCNE																					0	no files
SCNW		4				21												35		60		
SCSW		8				45												68	1	122		
PumpSta		10		1		62								4				41	3	121		
Beal Lake Habitat Restoration Post Development Bat Monitoring FY 2009 Sample 2																						
A		7				31												18		56		
N		5				24									1			20	3	53		
BB		5				30							1					12		48		
C		7				41												16		64		
K		2				59												9		70		
F		6				46							1					12		65		
SCNE		1				11			1									6		19		
SCNW		2				19					1				1			11	4	38		
SCSW		7				65			1					1		1		18	1	94		
PumpSta		11				71					2		1					14	3	102		
Beal Lake Habitat Restoration Post Development Bat Monitoring FY 2009 Sample 1																						
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Myyu	Nyfe	Pahe	Tabr	Site Total	Status	
A	2	1																			3	
N																					0	ok
BB									1												1	
C		1							1												2	
K																					0	ok
FF		1																			1	
SCNE						1															1	
SCNW																					0	ok
SCSW	1	1																			2	
PumpSta		2				1															3	
Beal Lake Habitat Restoration Post Development Bat Monitoring FY 2009 Sample 2																						
A																					0	
N																					0	
BB									4												4	
C																					0	
K																					0	
FF																					0	
SCNE																					0	
SCNW																					0	
SCSW																					0	
PumpSta					5																5	

Legend: Mesquite Cottonwood Sapling Saltcedar Water

Table 2. Quarterly summary of bat minutes recorded simultaneously for April and July 2009 at Beal Lake Habitat Restoration Area, first and second samples.

April 2008	Beal Lake Habitat Restoration Post Development Bat Monitoring FY 2009 Sample 1																					
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Myyu	Nyfe	Pahe	Tabr	Site Total	Status	
A		25				22								2	1				47	5	102	
N	2	7		1		6					4								51	2	73	
BB																						no folders
C						8						1			1				30	2	42	
K	5	23				18			7		1			2	3				58	7	124	
FF	3	13				16					1				3			1	79	3	119	
II		5				14												1	37	2	59	
SCNE		5			1	6												1	48	3	64	
SCNW	1	6			1	13									1			1	62	5	90	
SCSW																						0
April 2008	Beal Lake Habitat Restoration Post Development Bat Monitoring FY 2009 Sample 2																					
A		20		1		26			2		1								67	4	121	
N	1	9		1		14									1			1	49	2	78	
BB		1				14													62		77	
C	1	18		1		22									2		1		51	1	97	
K	2	23				31			1	8					3			1	71	3	143	
II																						no folders
SCNE		8		2		7			1						2				63	1	84	
SCNW		14		1	1	25			1	1	1				4			2	78	2	130	
SCSW	1	18		3		35									4				80	2	143	
July 2008	Beal Lake Habitat Restoration Post Development Bat Monitoring FY 2009 Sample 1																					
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Myyu	Nyfe	Pahe	Tabr	Site Total	Status	
A		11	8			39													113		171	
C		56	25			54			1				1	1	5				143		286	
DD																						0 no folders
FF		18	3			18							1		3				38		81	
LL		58	12			32									4				96		202	
K		16	9			41								1					91		158	
CONNE		92	19			58			2						3				93		267	
CONNW		67	20			17			1						2				90		197	
CONSW		20	8			38													73		139	
July 2008	Beal Lake Habitat Restoration Post Development Bat Monitoring FY 2009 Sample 2																					
A		14	4			33													107		158	
C		44	48			19			1						3				103		218	
DD		29	7			16									1				69		122	
FF		14	6			34									1				63		118	
LL		15	15			11							1	1					65		108	
K		15	11			39									1				113		179	
CONNE		126	72			65								1					107		371	
CONNW		58	21			16			2						2				60		159	
CONSW		11	8			26									1				88		134	

Legend: Mesquite Cottonwood Sapling Saltcedar Water

Table 3. Quarterly summary of bat minutes recorded for 9 monitoring sites at the 'Ahakhav Preserve for October 2008 and February 2009, first and second samples.

October 2008		COLORADO RIVER INDIAN TRIBE 'AHAKHAVPRESERVE 2009 SAMPLE 1																						
Location	15-19kHz	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Social	Nyfe	Nyma	Pahe	Tabr	Site Total	Status	
AMCW			1				2				1				3						5		12	
CMCW			1				45							1	1				1		41	1	91	
EMCW			3				12							1							6		22	
BSM			1				9							1							33		44	
DHM			1	1	1		6														24		33	
EHM			1				25				1								2		16		45	
FNYCW				2		1	10				1						61				45	1	121	
FSYCW							17				4			2	1					1	41	3	69	
GYCW							15					1							1		31		48	
October 2008		COLORADO RIVER INDIAN TRIBE 'AHAKHAVPRESERVE 2009 SAMPLE 2																						
AMCW							32						1	1	1				1		20		56	
CMCW			1		1		39							1							15		57	
EMCW			1	1			12												3		9		26	
BSM			1	2			16								1				1	22			43	
DHM				1			7														15		23	
EHM			1	1			12												3		9		26	
FNYCW					3		9							1			38		2		10	1	64	
FSYCW			1	1			33			1				1						6	40		83	
GYCW							12			1		1		1	1				4		36	1	57	
February 2009		COLORADO RIVER INDIAN TRIBE 'AHAKHAVPRESERVE 2009 SAMPLE 1																						
AMCW			2				16			6	110			1						3	8	4	150	
CMCW							16				4								1		1	5	27	
EMCW							24			13				10					8			1	56	
BSM			3				2			7				1					1			2	16	
DHM			1				2			2				1					4			3	13	
EHM			3				3			7									7			4	24	
FNYCW						1	22			7									6		1	1	38	
FSYCW			1				3													1		1	6	
GYCW			1				3												1			1	6	
February 2009		COLORADO RIVER INDIAN TRIBE 'AHAKHAVPRESERVE 2009 SAMPLE 2																						
AMCW							35			8	54			2					10		1	4	114	
CMCW							7			2		1		1					14		1	3	29	
EMCW							10			5				1					6			2	24	
BSM										6									8			2	16	
DHM										6									10			1	17	
EHM										4									18			4	26	
FNYCW							3			5									7			6	21	
FSYCW							2							1					3	1			7	

Legend: Intermediate Cottonwood Mesquite Sapling Cottonwood

Table 4. Quarterly summary of bat minutes recorded for 9 monitoring and 1 exploratory sites at the 'Ahakhav Preserve April and July 2009, first and second samples.

April 2009																							
COLORADO RIVER INDIAN TRIBE 'AHAKHAVPRESERVE 2009 SAMPLE 1																							
Location	15-19kHz	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Social	Nyfe	Nyma	Pahe	Tabr	Site Total	Status
AMCW							3				5								7			6	21
AX			45	8	1		28					10	4	4	3				2		12	6	123
CMCW			4	2			33							1	4	2				7	3	56	
EMCW			1				4							1	1	1				3	3	14	
BSM			1				28		1			1	1		1						12	6	51
DHM			3				15								1						1	1	21
EHM			1			1	5														2		9
FNYCW			8	2			17			1					4	1			4		13	6	56
FSYCW				5			9										1		1		11	5	32
GYCW			1	7	1		25								3				7		31	7	82
April 2009																							
COLORADO RIVER INDIAN TRIBE 'AHAKHAVPRESERVE 2009 SAMPLE 2																							
AMCW			45	8	1		28					10	4	4	3				2		12	6	123
AX			41	42	2		18							5	19	1			2		2	2	134
CMCW			11	3			46							4					2		9	1	76
EMCW			2	1			4								1	2					1		11
BSM			6	1			72						1	2	1				2		7	3	95
DHM				1			26							1	1	1			2		2		34
EHM			3	2			29						1			1			3		7	2	48
FNYCW			5				17									3			8		10	3	46
FSYCW				5			16								3	2			1		9		36
GYCW			6	3			28								3				5	1	15	1	62
July 2009																							
COLORADO RIVER INDIAN TRIBE 'AHAKHAV PRESERVE 2009 SAMPLE 1																							
Location	15-19kHz	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Social	Nyfe	Nyma	Pahe	Tabr	Site Total	Status
AMCW	1	2	100	162	90	7	122				3	1	85		181	117			79	1	134	1	1086
AX		4	174	166	40	3	91				4		3	73	5	133	46		41	1	36		820
CMCW		3	35	117	43	6	80				2		15		107	131			62		68		669
EMCW				3			16							1	15	58			1				94
BSM		7	11	15		1	79			39			5	2	44	27			69		89	1	389
DHM		1	6	20	2		125				3		1	3	19	16			38		63		297
EHM		4	10	12	6	2	60				8	1	2	1	52	76			46		61	2	343
FNYCW		1	31	51	2		71				5	1	1		78	28			49		135		453
FSYCW		5	36	68	1		72				9		1		85	49			95	1	122		544
GYCW		2	48	49	4	1	68				2		9	1	82	37			87		130	1	521
July 2009																							
COLORADO RIVER INDIAN TRIBE 'AHAKHAV PRESERVE 2009 SAMPLE 2																							
AMCW		7	184	165	27	1	83				3		35	1	112	78			37		28		761
AX	1	2	92	245	36	10	132				3		1	93	1	282	169		53		99		1219
CMCW		16	40	154	20	6	95						18	1	137	224			62		66	1	840
EMCW				3			16							1	15	58			1				94
BSM		28	31	32	2	2	189			10	1		5		67	51			83		85		586
DHM		21	14	16	6		143				3		1		27	20			31		81	4	367
EHM	1	5	18	16	2	2	58				3		1		54	124			17		45	1	347
FNYCW		13	57	58	3	1	64				2	1	6	2	110	54			59		96		526
FSYCW		13	39	49	4	1	63				4		3	1	80	41			101		101	3	503
GYCW		15	65	92	9		65				2		7	6	89	42			72		105	1	570

Legend: Intermediate Cottonwood Mesquite Sapling Cottonwood

Table 5. Quarterly summary of bat minutes recorded simultaneously in 9 monitoring sites at the Palo Verde Ecological Reserve, October 2008 and February 2009 , first and second samples.

October 2008		Palo Verde Ecological Reserve Post Development Bat Monitoring Sample Period 1																					
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyma	Nyfe	Pahe	Tabr	Social	Site Total	Status	
2NW		1		2		5			1									1	25			35	
2SE						36			1									1	49			88	
NUR2																						0	No files
7						406									3			2	48			459	
8		2				543			1					6	2			1	78	2	2	635	
9		39		1		58			1									11	79	8		197	
SCN			13			56													41	3		113	
SCM			14	1	2	21			1		1							3	1	53		97	
SCS																						0	No files
October 2008		Palo Verde Ecological Reserve Post Development Bat Monitoring Sample Period 2																					
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45-kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyma	Nyfe	Pahe	Tabr	Social	Site Total	Status	
2NW	1	8	1	1		22			1					1	1	4			10			50	
2SE		9				21										1			3			34	
Nursery Canopy		1				9								1	3				12			26	
NUR		5	1			11			3					1					11			32	
7		5				342												3	54			404	
8	1	5		1		589			5							1		6	61	1		670	
9	2	9	3	1		53			1									34	78	1		182	
SCN	2	10	1	1		72			1							1		13	52			153	
SCM		20		2		26						1						12	35			96	
SCS		21	4	1		31									1				37			95	
February 2009		Palo Verde Ecological Reserve Post Development Bat Monitoring Sample Period 1																					
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45-kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyma	Nyfe	Pahe	Tabr	Social	Site Total	Status	
2NW																		1				1	
2SE		1																				1	
NUR						24								9					1			34	
7		3				6													1			10	
8		1				1								3						1		6	
9		1				1																2	
SCN			3			2													1			6	
SCM																						0	
SCS						2													1			3	
February 2009		Palo Verde Ecological Reserve Post Development Bat Monitoring Sample Period 2																					
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45-kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyma	Nyfe	Pahe	Tabr	Social	Site Total	Status	
2NW																		5	1	1		7	
2SE						3												8	1			12	
NUR						61								9				2				72	
7						4								1				2	3	1		11	
8																				20		20	
9						1			1									3				5	
SCN						4												3	2			9	
SCM						1												6				7	
SCS						2													2			4	

Legend: Cottonwood Sapling Ag Saltcedar

Table 6. Quarterly summary of bat minutes recorded simultaneously at 9 monitoring sites at Palo Verde Ecological Reserve, first and second samples, April and July 2009.

April 2009																							
Palo Verde Ecological Reserve Post Development Bat Monitoring Sample Period 1																							
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45-kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyma	Nyfe	Pahe	Tabr	Social	Site Total	Status	
2NW		4		1		7												2	15			29	
2SE		2	1			4			3									1	4	1		16	
NUR		2	3			15				7								1	12	1		41	
7		3	1			71									2			2	50			129	
8		3				40													40			83	
9		2	1	1		48													50			102	
SCM		2	1			7												3	24			37	
SCN		1	4	2		41										2			62			112	
SCS		2	1	1		21									6			2	5			38	
April 2009																							
Palo Verde Ecological Reserve Post Development Bat Monitoring Sample Period 2																							
2NW			1	1		12				4								3	1			22	
2SE		5				6			5						4			5	5			30	
NUR		5	2			14			1	4								3	1			30	
7		6	2			13			2									1	26			50	
8		1		1		17												2	21			42	
9		1	1			10			4							1		2	5			24	
SCM		9	2			5									3				8			27	
SCN		2	1	1		21										6			7			38	
SCS		9	7	2	1	4					1				1			1	9	2		37	
July 2009																							
Palo Verde Ecological Reserve Post Development Bat Monitoring Sample Period 1																							
Location	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45-kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyma	Nyfe	Pahe	Tabr	Social	Site Total	Status	
2NW		6																	4			10	Insect Noise
2SE		3	6		2	9									12				76			108	
NUR		69	47			45									1	26			163			351	
7		55	14			52										7			116			244	
8		15	41	7	3	1	205		4						2	5		7	181			471	
9		32	6	2	4	125							6					22	158			357	
SCM	1	51	20	1		8									2	14			164			261	
SCN		39	4	1		12			1							11	1		190	1		260	
SCS	3	241	73	3		53						28	1	1	54			26	274			757	
July 2009																							
Palo Verde Ecological Reserve Post Development Bat Monitoring Sample Period 2																							
2NW		45	50	1	2	14			1					2	1	8			75			199	
2SE		31	31	4	2	22									3	36			114			243	
NUR		5	38	11	1	1	243					1				2		4	195	6		507	
PV3			7	9	1	4									2	2			38			63	Insect Noise
6			41	184	6	5	42		1		1				8	67	1		65			421	
7			32	14		187			1			1			3	7			157			402	
8		1	15	6		41										2			163			229	
9			29	10		215							1	2	5			1	81			344	
SC4	1	77	64	1		6				1		2		1	8			1	180			342	
SCM	1	84	19	2	1	6						2		3	8				244	1		371	
SCN	2	32	3	1		30				1		2		2	12			5	164	3		257	
SCS	5	314	50			28			2	2		6			33			5	300			745	

Legend: Cottonwood Sapling Ag Saltcedar

Table 7. Quarterly summary of bat minutes recorded simultaneously at 5 monitoring sites at Cibola Valley Conservation Area, sample 1.

Cibola Valley Conservation Area Post Development Bat Monitoring FY 2009 Sample 1																							
	15-19kHz	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyfe	Nyma	Pahe	Tabr	Social	65kHz	Site Total	Status
October 2008																							
3F4		1	1	3			131												3				139
A			21	50	3		103		3	6		1	1	8	4	1					1		202
D		1	6	16	1		48		4	2			2	1		2		1					84
Wat 1			5	2			31						1					1					40
Wat 2			17	5			36		3							3		1	2				67
Species Subtotal		2	50	76	4	0	349	0	10	8	0	1	4	9	4	6		6	2	0	1		532
February 2009																							
3F4																1				1			2
A																							0 No folders
D							13		1										1				0
Wat1																							0
Wat 2																							0
Species Subtotal		0	0	0	0	0	13	0	1	0	0	0	0	0	0	1		0	2	0	0		17
April 2009																							
3F4			1	1			3			4							2		8				19
A																							0 No folders
D			3	2			23			6									5				39
Wat 1																							0 No folders
Wat 2		1	4	4			12			1						1		20	1	6			50
Species Subtotal		1	8	7	0	0	38	0	0	11	0	0	0	0	0	3		33	1	6	0		108
July 2009																							
3F4			7	43	17		54				1			1	8				61				192
A			6	37	1	1	30	1	1		1			2	6				57				143
D			52	102	9	2	97		1	5			3	24	3				30				328
Wat 1			107	37	1	2	106			3				1	3				263				523
Wat 2			108	47			56				1								277				489
Species Subtotal		0	280	266	28	5	343	1	2	8	2	1	3	28	20	0		688	0	0	0		1675
Species Total		3	338	349	32	5	743	1	13	27	2	2	7	37	24	10		727	5	6	1		2332

Legend: Sapling Cottonwood Agriculture

Table 8. Quarterly summary of bat minutes recorded for 5 monitoring sites at the Cibola Valley Conservation Area, Sample 2.

Cibola Valley Conservation Area Post Development Bat Monitoring FY 2009 Sample 2																					
	15-19kHz	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Coto	Eupe	Labi	Laci	Laxa	Maca	Myoc	Myve	Nyfe	Nyma	Pahe	Tabr	Social	Site Total
October 2008																					
3F4			2				18			1			1			1			1		24
A																					0 no folders
D			4	7			54			9			2			2		17			95
Wat 1			5				15						1		3		14				38
Wat 2			5	1			20				1				6		5	1			39
Species Subtotal			16	8	0	0	107	0	0	10	0	1	3	1	0	12	36	2	0	0	196
February 2009																					
3F4																					0
A																					0
D							24									2			1		27
Wat 1																					0
Wat 2																					0
Species Subtotal			0	0	0	0	24	0	0	0	0	0	0	0	0	2	0	1	0	0	27
April 2009																					
3F4			2	2			16			1						1		18			40
A			6	3	1		53		1	19								18			101
D			1				28			37			3	2	1			14			86
Wat 1																					0 No folders
Wat 2			2				5											30			37
Species Subtotal			0	11	5	1	102	0	1	57	0	0	3	2	1	1		80	0	0	264
July 2009																					
3F4																					0
A			1	7	1		10					1						1			21
D			73	58	4		81		1	1		1	2	11	5			2			239
Wat 1			68	5	1		29		1						3			35			142
Wat 2			62	16			59		1			2						77			217
Species Subtotal			0	204	86	6	179	0	3	1	0	2	4	11	8	0		115	0	0	619
Species Total			0	231	99	7	412	0	4	68	0	3	10	14	9	15		231	3	0	1106

Legend: Sapling Cottonwood Agriculture

Table 9. Quarterly summary of bat minutes recorded at Cibola NWR Conservation Unit #1, first sample.

Cibola NWR Conservation Unit #1 Post Development Bat Monitoring FY 2009 Sample 1																							
	15-19kHz	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyfe	Nyma	Pahe	Tabr	Social	Site Total	Status
October 2008																							
Ag			31	10			133						3						14			191	
MQ2			8	2			6			1									1			18	
MQ4			4	11			225		2				1						8	1		252	
MQ3			1				24															25	
CWN			20	4			75												3			102	
CWMid			5	11			12						1								1	30	
CWS				2			314															316	
Species Subtotal	0		69	40	0	0	789	0	2	1	0	0	5	0	0	0	0	0	26	1	1	934	
February 2009																							
Ag			1				20			2								6				29	
MQCtr							2			2		1									9	14	
MQE			2				12											1				15	
MQW																						0	no folders
CWN			2															1				3	
CWMid							1			1								1				3	
CWS																						0	
Species Subtotal	0	0	5	0	0	0	35	0	0	5	0	1	0	0	0	0	0	9	0	0	0	9	64
April 2009																							
Ag																						0	ok
MQCtr			21	1			15												3			40	
MQE			1	13	2		25			1		1							16	3		62	
MQW			1	54	5		60			13									20	2		155	
CWN				2			23												3			28	
CWMid				5	1		14												10			30	
CWS				80			97												10			187	
Species Subtotal	0	2	175	9	0	0	234	0	0	14	0	1	0	0	0	0	0	0	62	5	0	502	
July 2009																							
Ag			48	33			67												123			271	
MQCtr			8	27			29									1			87			152	
MQE			13	95	4	2	63			1					10	2			26			216	
MQW				121	4	1	166							2	36	6			60	1		397	
CWN				267	4	2	137			1				1	116	13			14			555	
CWMid				88	7		8							1	75	1						180	
CWS				234	7		101					3	1		89	2						437	
Species Subtotal	0		69	865	26	5	571	0	1	1	0	3	1	4	327	24	0		310	1	0	2208	2208
Legend:	Intermediate Cottonwood			Mesquite			Agriculture																

Table 10. Quarterly summary of bat minutes recorded for 7 monitoring sites at Cibola NWR Conservation Unit #1, second sample.

Cibola NWR Conservation Unit #1 Post Development Bat Monitoring FY 2009 Sample 2																								
October 2008	15-19kHz	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyfe	Nyma	Pahe	Tabr	Social	Site Total	Status	
Ag			7	3			14										2		34	2		62		
MQ3			1				20														4	25		
MQ2			2	1			28										4		5			40		
MQ4			5	2			138										2		17			164		
CWN				1			6												1			8		
CWMid				8	1		31											2		10		52		
CWS																						0		
Species Subtotal	0	0	23	8	0	0	237	0	0	0	0	0	0	0	0	0	10	0	67	2	4	351		
February 2009																								
Ag							7										4	1				12		
MesqMid			3				1		2		2							4				9	21	
MesqE							5										3					8		
MesqW			1				6				1						1					9		
CWN									3		2						4				5	14		
CWMid			1				5				1						3					10		
CWS							12										1					13		
Species Subtotal	0	0	5	0	0	0	36	0	0	5	1	5	0	0	0	0	20	1	0	0	14	87		
April 2009																								
Ag																						0	ok	
MesqMid	1		33	4			28				2								3			71		
MesqE		1	28	3			17		2	1	3						1		11			67		
MesqW		3	61	23			50		18								1		10			166		
CWN			3				10												3			16		
CWMid	1		33	4			28				2								3			71		
CWS			200	6			121												24			351		
Species Subtotal	2	4	358	40	0	0	254	0	0	20	1	7	0	0	0	0	2	0	54	0	0	742		
July 2009																								
Ag			39	11			62		2									1	55			170		
MesqMid			1	17			15												5			38		
MesqW				39	4		84							15	1	1	1	1	1			146		
MesqE	1		4	37	2		94								3							141		
CWN				55			86	2						1	8							152		
CWMid		2	66	289	2	12	219	1						6	21	40						658		
CWS				132	6	2	72	1			1			64	3							281		
Species Subtotal	1	2	110	580	14	14	632	0	4	2	0	0	1	7	111	44	1	2	61	0	0	1586		
Species Totals	3	6	496	628	14	14	1159	0	4	27	2	12	1	7	111	44	33	3	182	2	18	2766	2766	

Legend: Intermediate Cottonwood Mesquite Agriculture

Table 11. Quarterly summary of bat minutes recorded in 6 monitoring sites and 2 exploratory sites at Imperial Ponds Conservation Area, first sample.

Imperial Ponds Conservation Area Post Development Bat Monitoring 2009 Sample 1																							
	15-19kHz	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyfe	Nyma	Pahe	Tabr	Social	Site Total	Status
October 2008																							
F1																						0	no folders
F24			1				86										2		6			95	
Impen1			1				71							1								73	
F29			2	1			53			1							1		8			66	
F18			7				34			1				1			3		7	5	9	67	
SCDock		1	2				44										2	1	1	1		51	
SCN							39			2							7		4			52	
Pond1A																						0	no folders
SppSubtotal	0	1	13	1	0	0	327	0	0	4	0	0	0	2	0	0	15	0	26	6	9	404	404
February 2009																							
F1			20				101										5		42	217		385	
F24		5	37	13		1	12							1			1		30	323		423	
F18							14										2		14	178		208	
F29		2	6	1			47										1		13	398		468	
Impen1		3	68				29						1	1					15	150		267	
SCDock		45	268	37			40				2		3		1		3	1	24	252		676	
SCN		1	12	1			57										6		37	110		224	
Pond1A			17	13			122			1	1			1			8	1	35	341		540	
Subtotal	0	56	428	65	0	1	422	0	0	1	3	0	4	3	1	0	26	2	210	1969		3191	3191
April 2009																							
F1b			3				46												31	1		81	
F24			6				120		1	2							1			40		170	
F29			25	2		2	399			13	1			9					64			515	
Impen1																						0	no folders
SCDock		1	7	1			189			4									43	1		246	
SCN			6	1		1	118			46				1			2		49	3		227	
Subtotal	0	1	47	4	0	3	872	0	1	65	1	0	0	10	0	0	3	0	187	45	0	1239	1239
July 2009																							
F1b			10	1			49												35			95	
F24			31	9		2	100			17							4		56	5		224	
F29			4	33	20	3	106			5					3		2		96	2		276	
Impen1	1		6	41	41	1	115			8		1			7		1	1	1	6		230	
SCDock				56	8		139			8							3		113	5		333	
SCN			1	38	16		67			16			1		1		3		88	16		248	
Subtotal	1	11	209	95	4	6	576	0	0	54	0	1	1	0	11	0	13	1	389	34		1406	1406
Total	1	69	697	165	4	10	2197	0	1	124	4	1	5	15	12	0	57	3	812	2054		6240	

Legend: Agriculture Intermediate Cottonwood Saltcedar

Table 12. Quarterly summary of bat minutes recorded simultaneously in 6 monitoring sites & 2 exploratory sites at Imperial Ponds, second sample.

Imperial Ponds Conservation Area Post Development Bat Monitoring 2009 Sample 2																						
	15-19kHz	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Anpa	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyfe	Nyma	Pahe	Tabr	Social	Site Totals
October 2008																						
F1			10	1			49												35			95
F24			31	9		2	100			17							4		56	5		224
Impen1			4				53							1			1					59
F29			5				54							1			17		60	4		141
F18		1	23		1		73			2							14		61	20	12	207
SCDock			3		1		63			1		1		1			18		45	2		135
SCN		1	1				29										18		47			96
Pond1A		4	97	2			251					1		7			4		86	68		520
Subtotal	0	6	174	12	2	2	672	0	0	20	0	2	0	10	0	0	76	0	390	99	12	1477
February 2009																						
F1			3				112							2					27	40		184
F24																						0
F18							15							1					7	68		91
F29			1				49												19	104		173
Impen1		4	14				24						1						23	25		91
SCDock							32										1		20	218		271
SCN		1					94							1			3		12	51		162
Pond1A			2				132												15	121		270
Subtotal	0	5	20	0	0	0	458	0	0	0	0	0	1	4	0	0	4	0	123	627		1242
April 2009																						
F1b			5				96			1							1		46	1		150
F24		1	16	1			134			4				1			3		81	3		244
F29			13	3		1	157			7	5			3			15		76	4		284
Impen1			9	11			111			3				2			5		33	2		176
SCDock			10	2			162			7	1			1			17		73	5		278
SCN	1		14	1	1		94			34				2			24		70	4		245
Subtotal	1	1	67	18	1	1	754	0	0	56	6	0	0	9	0	0	65	0	379	19		1377
July 2009																						
F1b			4	1			65			1									60			131
F24			17	15		1	159			11							1		87	1		292
F29		1	84	40	6		160			49			2	1	5		8		157	7		520
Impen1	2	1	98	100		1	239			13			2		16		5	3	10	2		492
SCDock			43	25	2		198			5			1		3	1	11	2	132	13		436
SCN		1	38	51		1	129		1	24				2	1		5		111	10		374
Subtotal	2	3	284	232	8	3	950	0	1	103	0	0	5	3	25	1	30	5	557	33		2245
Total		15	545	262	11	6	2834	0	1	179	6	2	6	26	25	1	175	5	1449	778		6341

Legend: Agriculture Intermediate Cottonwood Saltcedar

Table 13. Quarterly summary of bat minutes recorded simultaneously in 3 monitoring sites at the Pratt Restoration Area, first and second samples.

Pratt Restoration Post Development Bat Monitoring FY 2009 Sample 1																				
October 2008	19-24kHz	25-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Social	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyfe	Pahe	Tabr	Site Total	Status
AG		66	2	1	11												2	7	89	
E		52	8	3	28							1					3	6	101	
SC		10			10												8	1	29	
Species Subtotal	0	128	10	4	0	49	0	0	0	0	0	1	0	0	0	0	13	14	219	219
February 2009																				
AG		46	5			2													10	63
E		50	5			3											3	3	9	73
SC	3	262	107	15		4					4	5			1	1	6	17	425	
Species Subtotal	3	358	117	15	0	9	0	0	0	0	4	5	0	0	1	4	9	36	561	561
April 2009																				
AG	2	16	2			42			1			1			1		43	1	109	
E	4	19	16			107						1			1		37	2	187	
SC	2	12	1			47					1						7	1	71	
Species Subtotal	8	47	19	0	0	196	0	0	1	0	1	2	0	0	2	0	87	4	367	367
July 2009																				
AG		48	6		2	163			1		1						2	27	14	264
E	1	105	62	1	1	121			1					11			10	2	315	
SC		24	3			66			1			1					14	21	13	143
Species Subtotal	1	177	71	1	3	350	0	0	3	0	1	1	0	11	0	16	58	29	722	722
Species Totals	12	710	217	20	3	604	0	0	4	0	6	9	0	11	3	20	167	83	1869	1869

Pratt Restoration Post Development Bat Monitoring FY 2009 Sample 2																				
October 2008	19-24kHz	24-30kHz	30-35kHz	35-40kHz	40-45kHz	45-55kHz	Social	Coto	Eupe	Labl	Laci	Laxa	Maca	Myoc	Myve	Nyfe	Pahe	Tabr	Site Total	Status
AG		32		1		19	25		2				1			3	20	9	112	
E		10	2			13						1	1		1		4	4	36	
SC	1	8				25						1					19	8	62	
Species Subtotal	0	42	2	1	0	32	25	0	2	0	0	1	2	0	1	3	24	13	148	
February 2009																				
AG		5				1											10	11	27	
E	1	5				1											6	4	17	
SC	1	12				2											1	3	22	
Species Subtotal	2	22	0	0	0	4	0	0	0	0	0	0	0	0	0	1	19	18	66	
April 2009																				
AG		6	5			28											18	1	58	
E		15	1			44			16								1	10	12	99
SC	1	29	21			63						2					35	1	152	
Species Subtotal	1	50	27	0	0	135	0	0	16	0	0	2	0	0	0	1	63	14	309	
July 2009																				
AG		78																	78	
E		139	67		1	166						3		1		2	12	2	393	
SC		25	13			69			4							27	14	22	174	
Species Subtotal	0	242	80	0	1	235	0	0	4	0	0	3	0	1	0	29	26	24	645	
Species Totals	3	356	109	1	1	406	25	0	22	0	0	6	2	1	1	34	132	69	1168	1168

Legend: Agriculture Intermediate Cottonwood Saltcedar