



# Lower Colorado River Multi-Species Conservation Program

---

*Balancing Resource Use and Conservation*

## System-wide Surveys of the Elf Owl (*Micrathene whitneyi*) Along the Lower Colorado River, 2008



November 2009

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

## **Federal Participant Group**

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

## **Arizona Participant Group**

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

## **Other Interested Parties Participant Group**

QuadState County Government Coalition  
Desert Wildlife Unlimited

## **California Participant Group**

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

## **Nevada Participant Group**

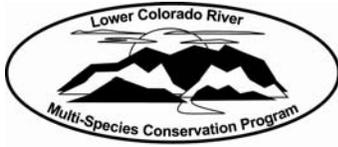
Colorado River Commission of Nevada  
Nevada Department of Wildlife  
Southern Nevada Water Authority  
Colorado River Commission Power Users  
Basic Water Company

## **Native American Participant Group**

Hualapai Tribe  
Colorado River Indian Tribes  
The Cocopah Indian Tribe

## **Conservation Participant Group**

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



# Lower Colorado River Multi-Species Conservation Program

## System-wide Surveys of the Elf Owl (*Micrathene whitneyi*) Along the Lower Colorado River, 2008

*Prepared by Beth Sabin, Wildlife Group*

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

November 2009

# Contents

|  |    |
|--|----|
| Abstract .....   | 1  |
| Introduction.....  | 2  |
| History of Occurrence and Survey Effort in the LCR Planning Area ..... | 2  |
| Methods.....   | 3  |
| Study Location .....   | 3  |
| Survey Methods .....   | 6  |
| Results.....   | 6  |
| Historical Habitat Assessment .....                                    | 6  |
| CW I, CW II, and HM III Previously not Surveyed in Reaches 3 to 5..... | 7  |
| Surveys.....   | 7  |
| Discussion.....  | 8  |
| Literature Cited .....   | 10 |
| Appendix 1 .....   | 13 |
| Appendix 2.....  | 14 |
| Appendix 3.....  | 15 |

## Figures and Tables

|   |   |
|---|---|
| Table 1. Sites surveyed for elf owls in 2008 during system-wide surveys along the LCR ..... | 2 |
| Table 2. Owls detected per site per survey period in 2008 .....                             | 5 |

# Abstract

Reclamation initiated system-wide surveys along the Lower Colorado River (LCR) for the elf owl (*Micrathene whitneyi*) in 2008. The objectives of this study were to 1) assess the current distribution of breeding elf owls along the LCR in Arizona, California, and Nevada; 2) assess the amount of CW (cottonwood-willow) I, CW II, and HM (honey mesquite) III habitat along the LCR for elf owls; and to 3) survey historic locations where elf owls were present during previous surveys and incidental sightings. The California side of the river has been previously surveyed, but there has been a lack of systematic surveys along the Arizona side. Study sites were selected using vegetation maps and aerial photography, historic locations, site reconnaissance, previous habitat creation projects, and previous incidental sightings. Survey protocol was taken from recommended methods by the Arizona Game and Fish Department (AGFD). Three surveys were conducted at each location between 25 March and 31 May 2008. Twenty-one sites and 45 single call stations were surveyed. No elf owls were detected. The following species of owls were detected during the 2008 surveys: barn owl (*Tyoto alba*), long-eared owl (*Asio otus*), western screech-owl (*Megascops kennicottii*), great horned owl (*Bubo virginianus*), and northern saw-whet owl (*Aegolius acadicus*). Much of the historic habitat has been lost or degraded due to development, fire, and invasive species.

# Introduction

## Background

The elf owl (*Micrathene whitneyi*) is the smallest owl in the world. It is migratory, wintering in Mexico and breeding in three areas of the United States: 1) the Lower Colorado River (LCR), from southern Nevada, eastern California, and western Arizona, east to the Rio Grande River in New Mexico; 2) the Big Bend region of Texas, east to Edwards Plateau; and 3) Dimmit County, Texas, southward, through the Rio Grande River, to Nuevo Leon, Mexico (LCR MSCP 2006). In most of the breeding range, the elf owl is associated with mature saguaro cactus (*Carnegiea gigantea*) (Brown 1903, Campbell 1934, Goad and Mannon 1987, Hardy et al. 1999, Hardy and Morrison 2001, Henry and Gehlbach 1999, Ligon 1968, Steidl 2001, Steidl 2002, Stephens 1903). Along the LCR, elf owls are associated with mesquite (*Prosopis* spp.) woodlands and Fremont cottonwood-willow (CW) (*Populus fremonti*, *Salix* spp.) riparian areas (Gilman 1909, Kimball 1922, Miller 1946, Halterman et al. 1987). The elf owl is a secondary cavity nester, relying on cavities excavated by other birds. Throughout the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) planning area, elf owls utilize cavities in cottonwood, willow, saguaro, and saltcedar (*Tamarix* spp.) trees, formerly occupied by Gila woodpeckers (*Melanerpes uropygialis*), gilded flickers (*Colaptes chrysoides*), and ladder-backed woodpeckers (*Picoides scalaris*) (Halterman et al. 1987). Habitat loss along the LCR has likely affected this species, although it is not known whether the species was ever abundant along the LCR, which is at the edge of the species range, or if populations were even continually present (Rosenberg et al. 1991). The elf owl is listed as endangered in the state of California (CDFG 2005). The elf owl is not federally listed or listed in the states of Arizona or Nevada.

Conservation measures for the elf owl in the LCR MSCP Habitat Conservation Plan (HCP) are to create 1,784 ac (722 ha) of CW I and II and honey mesquite (HM) III (*Prosopis glandulosa*) land cover in reaches 3 to 5 and install elf owl nest boxes in created habitat (LCR MSCP 2004a). Reclamation initiated system-wide surveys along the LCR for the elf owl in 2008 using recordings to elicit response. The objectives of this study were to 1) assess the current distribution of breeding elf owls along the LCR in Arizona, California, and Nevada; 2) assess the amount of remaining CW I, CW II, and HM III habitat along the LCR for elf owls; and to 3) survey historic locations where elf owls were present during previous surveys and incidental sightings. Knowledge of the current distribution of elf owls will aid in the site selection of habitat creation projects targeted toward elf owls and interpreting results on habitat creation projects.

## History of Occurrence and Survey Effort in the LCR Planning Area

The majority of previous elf owl surveys have been conducted along the LCR on the California side. Steven W. Cardiff of the San Bernardino County Museum conducted surveys in California from the Colorado River to the San Jacinto Mountains in 1978 and 1979 at approximately 30 locations (Cardiff 1978, 1979). Eleven pairs of elf owls were detected in 1978 and six pairs were

detected in 1979 at two sites: 1) 9-12 mi (15-20 km) northwest of Needles, San Bernardino County, near the Soto Ranch, and 2) 22 mi (35 km) north of Blythe, Riverside County, near Water Wheel Resort (Cardiff 1978, 1979). Halterman et al. 1987 conducted surveys in California along the LCR from Nevada to the Mexican Border at 52 locations in 1987. Elf owls were detected at 10 sites: 1) Soto Ranch, 2) Wilson Road, 3) south end of Water Wheel Resort, 4) south end of Hall Island, 5) head of Clear Day, 6) Chemehuevi Wash, 7) Desilt Wash, 8) Headgate Rock Dam, 9) Goose Flats, and 10) Three Fingers Lake (Halterman et al. 1987). The California Department of Fish and Game (CDFG) conducted surveys at 51 sites along the LCR in California in 1998, 1999, and 2000; no elf owls were detected (CDFG 2005). The Bureau of Land Management (BLM) Lake Havasu field office conducted surveys in 1982, although exact locations are not known. Elf owls were detected in the Soto Ranch area and at the Bill Williams River National Wildlife Refuge (NWR)<sup>1</sup>. The BLM 1982 elf owl surveys were the only documented surveys that occurred on the Arizona side of the LCR and the extent and methodology of these surveys is not known.

Twenty-eight sightings of elf owls were recorded at eight sites in California prior to 1978 in Imperial, Riverside, and San Bernardino counties (Cardiff 1978). Ten additional sightings of elf owls were recorded in California from 1980 to 1986 at Soto Ranch and near Waterwheel Camp (Halterman et al. 1987). Incidental observations were recorded from 1996 to 2001 by the San Bernardino County Museum at six sites along the LCR on the California and Arizona side of the river and several locations along the Bill Williams River (McKernan 1997, McKernan and Braden 1998, 1999, 2001a, 2001b, 2002). Several observations of elf owls were recorded at the Bill Williams River NWR from 1986 to 2007, with the majority being in the Mosquito Flats area<sup>2</sup>. Brown reported observing elf owls near Yuma, Arizona (1903). Two elf owls were observed at the Yuma Proving Grounds in 1980 (Rosenburg et al. 1991). A call of an elf owl was heard near Needles, California in 2002 and two elf owls were observed near Soto Ranch in 2002 (CDFG 2005, LCR MSCP 2004b).

## Methods

### Study Location

Survey sites were selected in the LCR MSCP planning area using the 2004 vegetation maps and aerial photography, historic locations, site reconnaissance, previous habitat creation projects, and previous incidental sightings.

Cottonwood-willow I and CW II habitat, and HM III and HM IV habitat greater than 5 ac (2 ha) in patch size and located in reaches 3 to 5 were selected from the 2004 vegetation maps using ArcMap Geographic Info Systems (GIS). Habitat was selected in reaches 3 to 5 based on the LCR MSCP Habitat Conservation Plan (HCP) conservation measure of creating elf owl habitat in those reaches (LCR MSCP 2004a). Historical habitat where elf owls were detected was

---

<sup>1</sup> Bureau of Land Management, Lake Havasu Field Office, 2610 Sweetwater Avenue, Lake Havasu City, AZ 86406, 928-505-1200

<sup>2</sup> Kathleen Blair, Bill Williams National Wildlife Refuge, 60911 Hwy 95, Parker, AZ 85344, 928-667-4144

selected from previous elf owl surveys conducted on the California side of the LCR in 1978, 1979, and 1987 (Cardiff 1978, 1979, Halterman et al. 1987). Southwestern willow flycatcher sites where incidental observations of elf owls were made by the San Bernardino County Museum from 1996 to 2001 were selected to be surveyed (McKernan 1997, McKernan and Braden 1998, 1999, 2001a, 2001b, 2002). Two mature cottonwood/willow/mesquite habitat creation projects on the 'Ahakhav Preserve, which is part of the Colorado River Indian Tribes Reservation, were selected to be surveyed.

A site reconnaissance trip was made in March 2008 to determine whether selected sites were still suitable as possible elf owl habitat and to determine the Anderson and Ohmart (1976, 1984) vegetation type of each site. Of the 19 sites selected from the vegetation maps, 4 were excluded because they had burned and 1 was excluded because permits from the landowner could not be obtained. Of the 10 historical sites, 5 were excluded because they no longer meet habitat requirements and 2 were excluded because permits from the landowner could not be obtained. Of the 4 sites selected from incidental observations, 1 was excluded because it had burned and 1 was excluded because permits from the landowner could not be obtained.

Thirty-eight single call stations on Havasu NWR near sites 1 to 7 were selected by field reconnaissance. The Havasu NWR contains numerous smaller patches of large, mature Fremont cottonwood and Goodding's willow (*Salix gooddingii*) trees. Even though these patches are smaller than 5 ac (2 ha), they were selected for surveying because of their potential to contain cavities. Seven additional single call stations on Imperial NWR near site 23 and the Ducks Unlimited ponds were selected in old habitat creation projects smaller than 5 ac (2 ha).

In summary, 21 sites and 45 single call stations were selected to be surveyed in 2008 (Table 1, Appendices 1, 2, 3). The difference between single call stations and sites was that sites were over 5 ac and multiple calling stations were established at each site. The single call stations were placed in areas that were less than 5 ac (2 ha) and only one call station was needed to adequately cover the area. Single calling stations were chosen exclusively by field reconnaissance.

**Table 1. Sites surveyed for elf owls in 2008 during system-wide surveys along the LCR.**

| <b>Site Name and Type</b>                        | <b>Location</b>                                       | <b>Size</b>        | <b>Habitat Description</b>     |
|--|---|--------------------|--------------------------------|
| Site 1 (CW II veg map)                           | Havasu NWR (Pintail Slough)                           | 7.0 ac (2.8 ha)    | CW II                          |
| Site 2 (HM III veg map)                          | Havasu NWR (Pintail Slough)                           | 15.0 ac (6.1 ha)   | HM III                         |
| Site 3 (HM IV veg map)                           | South of Fort Mohave near Needles, CA                 | 16.0 ac (6.5 ha)   | HM IV                          |
| Site 4 (CW I veg map)                            | Havasu NWR (Pintail Slough)                           | 9.0 ac (3.6 ha)    | CW I                           |
| Site 5 (CW I veg map)                            | Havasu NWR (Glory Hole)                               | 14.0 ac (5.7 ha)   | CW I                           |
| Site 6 (CW I veg map)                            | Havasu NWR (Glory Hole)                               | 5.0 ac (2.0 ha)    | CW I                           |
| Site 7 (CW I veg map)                            | Havasu NWR (Bermuda Pasture)                          | 20.0 ac (8.1 ha)   | CW I                           |
| 3 single calling stations                        | Havasu NWR (New South Dike Road)                      |                    | CW I/II small isolated patches |
| 8 single calling stations                        | Havasu NWR (South Dike Road)                          |                    | CW I/II small isolated patches |
| 6 single calling stations                        | Havasu NWR (Levee Road)                               |                    | CW I/II small isolated patches |
| 11 single calling stations                       | Havasu NWR (Lower Levee Road)                         |                    | CW I/II small isolated patches |
| 8 single calling stations                        | Havasu NWR (Road to Pintail Slough)                   |                    | CW I/II small isolated patches |
| 2 single calling stations                        | Havasu NWR (Pintail Slough)                           |                    | CW I/II small isolated patches |
| Site 8 (CW I veg map)                            | Havasu NWR (Blankenship Bend)                         | 9.0 ac (3.6 ha)    | CW I                           |
| Clear Bay (Historic Site)                        | Havasu NWR (Clear Bay and adjacent cove)              | 8.0 ac (3.2 ha)    | Saltcedar/mesquite/Palo Verde  |
| Site 9 (CW I veg map)                            | Havasu NWR (Lake Havasu City near golf course)        | 7.0 ac (2.8 ha)    | CW I                           |
| Desilt Wash (Historic Site)                      | 1 mile Southwest of Parker Dam                        | 10.0 ac (4.0 ha)   | CW I                           |
| CRIT 8 (Habitat Creation Project)                | 'Akhav Preserve on CRIT land habitat creation project |                    | Mesquite/CW I and III          |
| CRIT 9 (Habitat Creation Project)                | 'Akhav Preserve on CRIT land habitat creation project | 134.0 ac (54.2 ha) | CW I, II, and III              |
| Ehrenberg (Incidental Sighting)                  | Arizona side of levee road downriver from Blythe, CA  | 11.6 ac (4.7 ha)   | CW III                         |
| Cibola 1 & 2 and Hart Mine (Incidental Sighting) | Cibola NWR levee road                                 | 147.6 ac (55.7 ha) | CW/saltcedar                   |
| Three Fingers Lake (Historic Site)               | Cibola NWR Three Fingers Lake                         | 160.0 ac (64.7 ha) | Mesquite/Palo Verde/saltcedar  |
| Site 19 (CW I veg map)                           | Walkers Camp Road South of campground                 | 6.0 ac (2.4 ha)    | CW I                           |
| Site 20 (CW I veg map)                           | Walkers Lake  | 5.0 ac (2.0 ha)    | CW I                           |
| Site 21 (CW I veg map)                           | South of Draper Lake                                  | 18.0 ac (7.3 ha)   | CW I                           |
| Site 22 (CW I veg map)                           | Adobe Lake  | 8.0 ac (3.2 ha)    | CW I                           |
| Site 23 (CW I veg map)                           | Imperial NWR headquarters/DU ponds/Nursery            | 13.0 ac (5.3 ha)   | CW I                           |
| 7 single calling stations                        | Imperial NWR headquarters/DU ponds                    |                    | CW I/II                        |

# Survey Methods

The elf owl protocol used was adapted from Arizona Game and Fish recommended methods<sup>3</sup>. Surveys were conducted three times at each site or single call station between 25 March and 31 May 2008. The first survey period was from 24 March to 11 April 2008, the second survey period was from 21 April to 2 May 2008, and the third survey period was from 12 May to 23 May 2008. For each site or single calling station, one of the three surveys was conducted within 3 days of the full moon.

Multiple call stations were established every 492 ft (150 m) when feasible at the 21 sites that were greater than 5 ac (2 ha) in patch size. The single call stations were placed in habitat with small patch sizes. Surveys were conducted by walking, vehicle, kayak, and motor boat. A high quality elf owl call was broadcast with a Sony CD player connected to an external speaker at 80 dB from 3 ft (1 m) away. All surveys were conducted between 30 min after sunset and 0100 hours. Surveys were discontinued or did not occur in the event of rain or if wind exceeded 12 mph (19 kph).

At each station, 2 min of passive listening for elf owls occurred. After the 2 min, elf owl calls were broadcast for 30 sec followed by a 90-sec listening period. The 30-sec broadcast and 90-sec listening period occurred four times, for a total of 8 min. After the broadcast-listening period an additional 2 min of passive listening occurred. The total time spent at each station was 12 min.

The following data were recorded for each site: 1) general location of site, 2) site name, 3) Anderson and Ohmart habitat type (1976, 1984), 4) date site was surveyed, 5) name of surveyor(s), 6) start and end temperature (C°), wind speed (KPH), and cloud cover (%), 7) start and end time of survey, and 8) moon phase.

The following data were recorded for each calling station: 1) Universal Transverse Mercator (UTM), 2) start and end time, 3) number of elf owls detected, 4) number of other species of owls detected, 5) other species of wildlife detected, and 6) general comments.

## Results

### Historical Habitat Assessment

Five of the 10 sites where elf owls were detected historically were not surveyed due to habitat degradation (Cardiff 1978, 1979, Halterman et al. 1987<sup>1</sup>). These sites were Soto Ranch, Waterwheel Resort, Hall Island, Chemehuevi Wash, and Goose Flats.

---

<sup>3</sup> Michael Ingraldi (mingraldi@frontiernet.net) and Shawn Lowery, Arizona Game and Fish Department, 5000 West Carefree Highway, 602-942-3000

Soto Ranch and Waterwheel Resort represented the two sites where the largest breeding populations of elf owls had been detected historically (Cardiff 1978, 1979, Halterman et al. 1987). Halterman et al. (1987) rated Soto Ranch as excellent habitat and described it as 160 ac (64.7 ha) of mature mesquite bosques with a few cottonwood snags. In 2008 it appeared that the majority of habitat near Soto Ranch had burned and the habitat was mostly saltcedar with very little CW or mesquite habitat remaining. Halterman et al. (1987) rated Waterwheel Camp as good habitat and described it as 320 ac (129.5 ha) of saltcedar (60%)/mesquite V (40%) habitat. In 2008 it appeared that much of the habitat had been converted to agriculture. The majority of the remaining habitat was saltcedar. Halterman et al. (1987) rated Hall Island near Aha Quin trailer park as 20 ac (8.1 ha) of good habitat including CW III with a mesquite/saltcedar understory. In 2008 it appeared that some of the habitat had been converted to an airstrip and the majority of the remaining habitat was saltcedar. Chemehuevi Wash, which was rated as good habitat and described as 20.0 ac (8.1 ha) of mesquite/saltcedar/Palo Verde (*Cercidium microphyllum*) in Halterman et al. (1987), had burned and no live vegetation remained.

The five historical sites that appeared to be suitable elf owl habitat (Cardiff 1978, 1979, Halterman et al. 1987) included Desilt Wash, Headgate Rock Dam, Clear Bay, Three Fingers Lake, and Wilson Road. The habitat at Clear Bay appeared to have deteriorated since it was surveyed by Halterman et al. (1987).

## **CW I, CW II, and HM III Previously not Surveyed in Reaches 3 to 5**

Twelve sites of CW I habitat with a patch size greater than 5 ac (2 ha) comprising 120 ac (48.6 ha) were identified from the 2004 vegetation maps of the LCR. One site of CW II habitat 7 ac (2.8 ha) in size, one site of HM III habitat 15 ac (6.1 ha) in size, and one site of HM IV habitat 16 ac (6.5 ha) in size were identified from the 2004 vegetation maps of the LCR.

## **Surveys**

Twenty-one sites from historical locations, incidental locations, and CW I, CW II, HM III, and HM IV were selected to be surveyed (Table 1, Appendices 1, 2, 3). Forty-five additional single call stations were selected to be surveyed (Table 1, Appendices 1, 2, 3).

Sites and single calling stations were surveyed three times with the following exceptions: 1) site 21 and 22 were not surveyed at all, 2) site 9, Clear Bay, site 23, and the seven individual call stations at Imperial NWR were only surveyed twice, and 3) CRIT 8 was only surveyed once. Surveys were skipped because of high winds and lack of personnel.

No elf owls were detected during surveys in 2008. Twenty-two owls of other species were detected in survey period 1, 11 in survey period 2, and 4 in survey period 3 (Table 2). The following species of owls were detected: barn owl (*Tyoto alba*), long-eared owl (*Asio otus*), western screech-owl (*Megascops kennicottii*), great horned owl (*Bubo virginianus*), and northern saw-whet owl (*Aegolius acadicus*) (Table 2).

**Table 2. Owls detected per site per survey period in 2008.**

| Site   | Period | Species and number of owls detected                         |
|--|--------|---|
| Site 3   | 1      | 1 great horned owl  |
| 3 individual calling stations New South Dike Road    | 1      | 1 western screech-owl                                       |
| 8 individual calling stations South Dike Road        | 1      | 1 western screech-owl                                       |
| 6 individual calling stations Levee Road             | 1      | 3 western screech-owls                                      |
| 11 individual calling stations Lower Levee Road      | 1      | 2 northern saw-whet owls                                    |
| 11 individual calling stations Lower Levee Road      | 2      | 1 unknown owl   |
| 11 individual calling stations Lower Levee Road      | 3      | 1 western screech-owl                                       |
| 8 individual calling stations Road to Pintail Slough | 1      | 1 barn owl  |
| 8 individual calling stations Road to Pintail Slough | 2      | 1 great horned owl  |
| Site 7   | 1      | 1 great horned owl  |
| Site 8   | 1      | 1 western screech-owl                                       |
| Site 8   | 2      | 1 western screech-owl                                       |
| Site 8   | 3      | 2 western screech-owls                                      |
| Site 9   | 1      | 1 western screech-owl                                       |
| Desilt Wash (Historic Site)                          | 1      | 1 great horned owl  |
| CRIT 9   | 1      | 2 barn owls, 1 screech owl, 1 great horned owl              |
| Ehrenberg (Incidental Site)                          | 1      | 1 western screech-owl                                       |
| Cibola 1 & 2 and Hart Mine (Incidental Site)         | 2      | 1 great horned owl, 1 long-eared owl, 1 western screech-owl |
| Cibola 1 & 2 and Hart Mine (Incidental Site)         | 3      | 1 western screech-owl                                       |
| Three Fingers Lake (Historic Site)                   | 1      | 2 great-horned owls, 2 western screech-owls                 |
| Three Fingers Lake (Historic Site)                   | 2      | 2 long-eared owls, 3 unknown owls                           |

## Discussion

No elf owls were detected at the 21 sites surveyed in 2008. This was the first year of tape playback surveys at these locations except for the historical locations, which were last surveyed by CDFG in 1999 (CDFG 2005). No definitive conclusions can be made based on one year of data. Populations may fluctuate depending on rainfall, temperatures, and arthropod prey abundance (Rosenberg et al. 1991, CDFG 2005). These same 21 sites will be surveyed in 2009, to obtain two years of baseline data for these sites.

Fifty percent of the locations where elf owls had been historically located, including the two areas that supported the largest populations, had degraded due to invasive species, fire, and development. One hundred and fifty-eight acres (64 hectares) of CW I, CW II, and HM III with a patch size greater than 5 ac (2 ha) were still remaining along the LCR according to the 2004 aerial photographs and vegetation maps. Previous vegetation maps (1997) combined with field reconnaissance will be considered to identify additional CW I, CW II, and HM III habitat along the LCR.

Specific habitat requirements of elf owls in the riparian areas of the LCR are less studied than other areas in the species' range. Cardiff 1978 and 1979 noted a preference for mature mesquites, cottonwoods, and willows with adequate nesting cavities. Elf owl studies in saguaro habitat in

southern Arizona found that the number of suitable and available nest cavities is a factor in elf owl abundance (Hardy and Morrison 2001, Wise-Gervais 2005).

Habitat studies at known nest sites closer to the LCR, such as on the Bill Williams River NWR, would assist Reclamation in habitat creation projects targeted for the elf owl. CRIT 9, an LCR MSCP habitat creation project, contains large trees, but the habitat is not mature enough to contain sufficient nesting cavities. The placement and use of nest boxes at CRIT 9 and in other habitat creation projects in future years needs to be explored. The survey protocol should also be assessed to include a detectability and response rate of elf owls in riparian habitat. In 2009, the same 21 sites will be surveyed to collect additional baseline presence/absence data prior to initiating further studies.

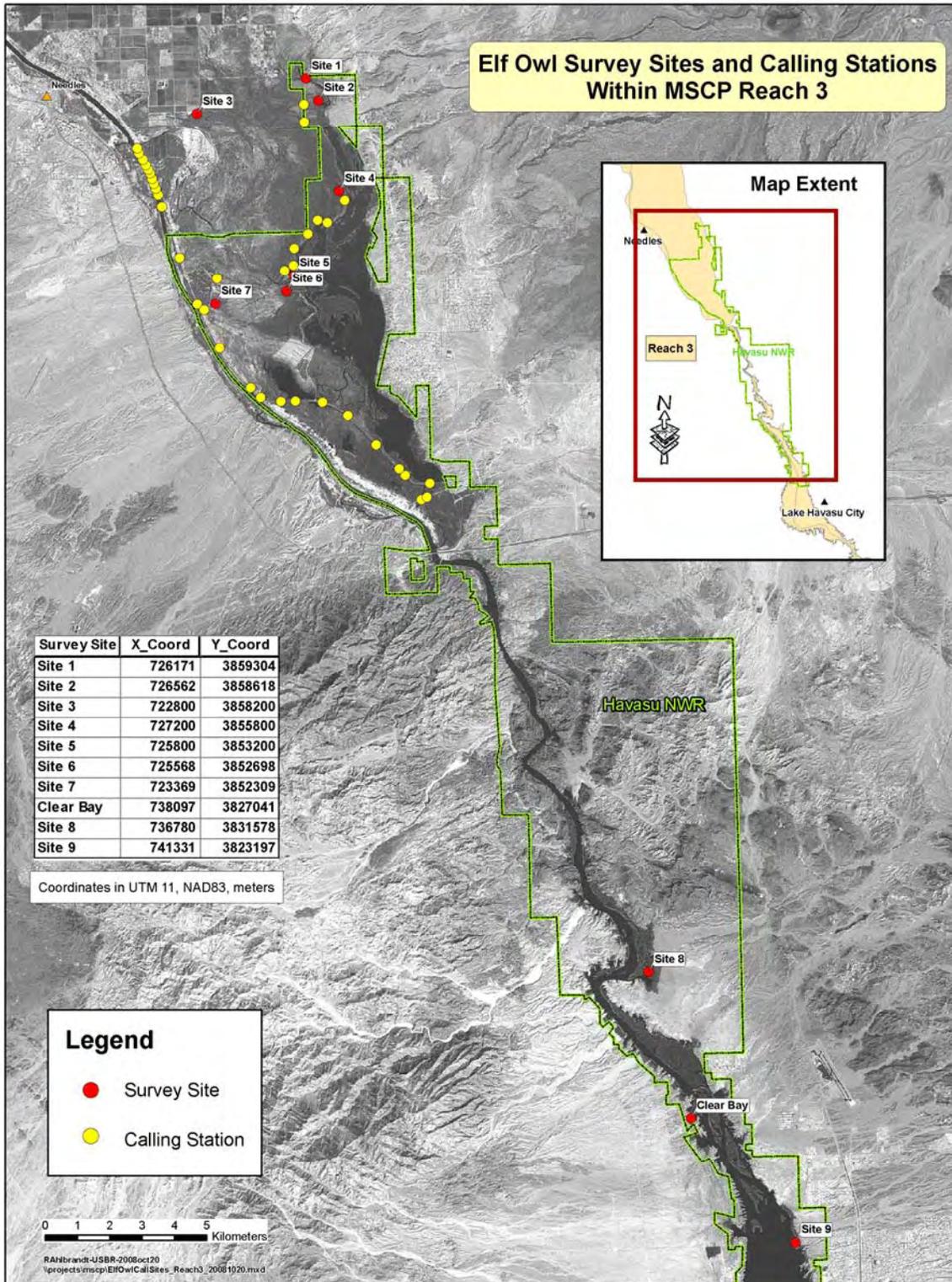
# Literature Cited

- Anderson, B.W., and R.D. Ohmart. 1976. Vegetation type maps of the lower Colorado River from Davis Dam to the southerly international boundary. Bureau of Reclamation, Contract No. 14-06-300-2531.
- Anderson, B.W., and R.D. Ohmart. 1984. Lower Colorado River riparian methods of quantifying vegetation communities to prepare type maps. Final report. Boulder City, NV: Bureau of Reclamation, Lower Colorado Region.
- Brown, H. 1903. Arizona bird notes. *The Auk* 20:43-50.
- California Department of Fish and Game 2005. The Status of Rare, Threatened and Endangered Animals of California, 2000-2004. State of California, Resources Agency, Department of Fish and Game, pp. 37-38.
- Campbell, B. 1934. Bird notes from southern Arizona. *The Condor* 36:201-203.
- Cardiff, S.W. 1978. Status of the Elf Owl in California. Progress Report to Nongame and Mammal Section, Wildlife Management Division, California Department of Fish and Game.
- Cardiff, S.W. 1979. Status of the Elf Owl in California. Final Report to Nongame and Mammal Section, Wildlife Management Division, California Department of Fish and Game.
- Gilman, M.R. 1909. Some owls along the Gila River in Arizona. *The Condor* 11:145-150.
- Goad, M.S., and R.W. Mannan. 1987. Nest-site selection by elf owls in Saguaro National Monument, Arizona. *The Condor* 89:659-662.
- Halterman, M.D., S.A. Laymon, and M.J. Whitfield. 1987. Population Assessment of the Elf Owl in California. Final Report to Nongame and Mammal Section, Wildlife Management Division, California Department of Fish and Game.
- Hardy, P.C., M.L. Morrison, and R.X. Barry. 1999. Abundance and habitat association of elf owls and western screech owls in the Sonoran Desert. *The Southwestern Naturalist* 44:311-323.
- Hardy, P.C., and M.L. Morrison. 2001. Nest site selection by elf owls in the Sonoran Desert. *The Wilson Bulletin* 113:23-32.
- Henry, S.G., and F.R. Gehlbach. 1999. Elf owl (*Micrathene whitneyi*). In A. Poole and F. Gill (editors), *The Birds of North America*, No. 413. The Birds of North America, Inc. Philadelphia, Pennsylvania.

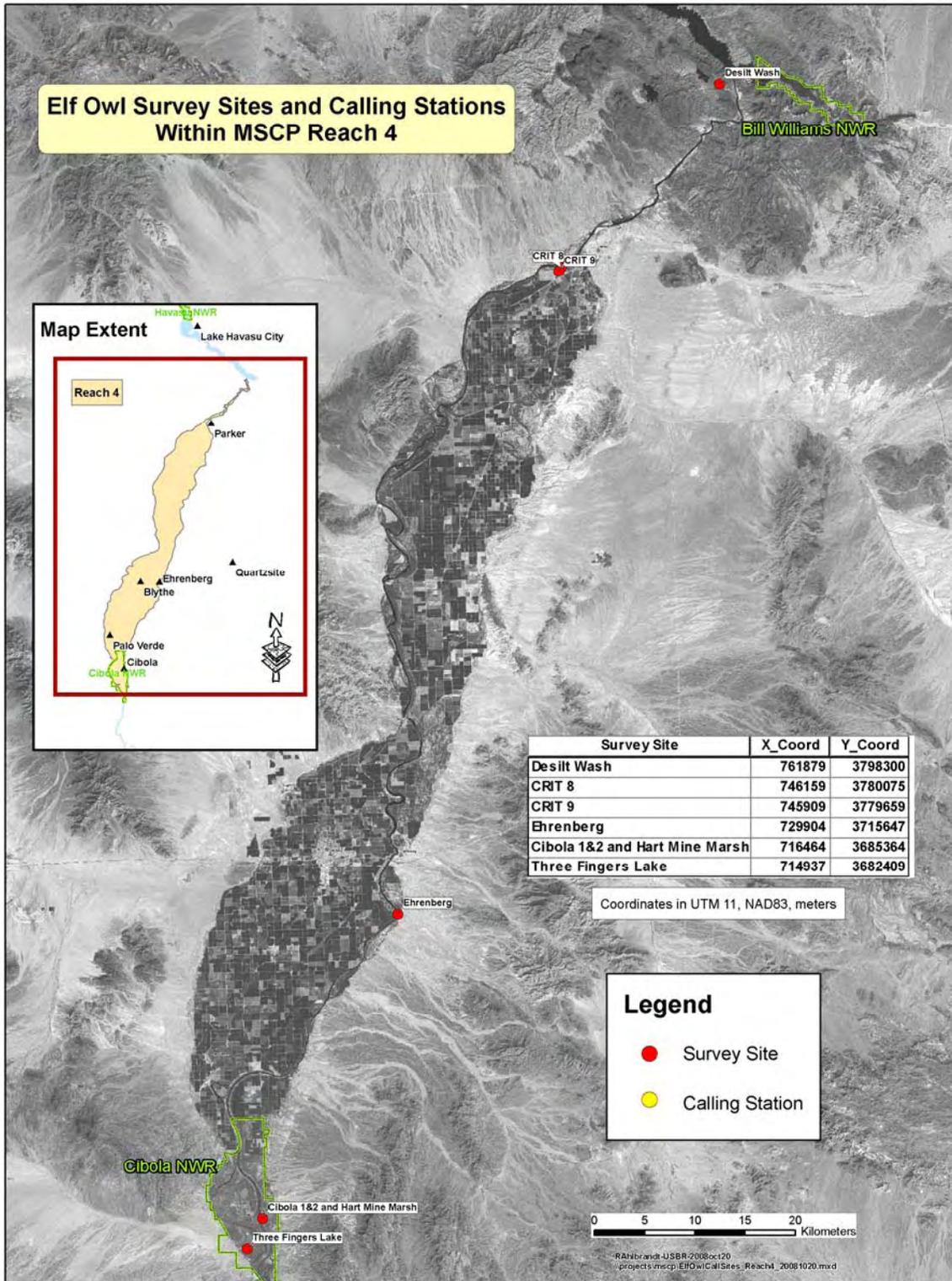
- Kimball, H.H. 1922. Bird records from California, Arizona, and Guadalupe Islands. *The Condor* 24:96-97.
- Ligon, J.D. 1968. The Biology of the Elf Owl, *Micrathene whitneyi*. University of Michigan Museum of Zoology, Miscellaneous Publication 136.
- Lower Colorado River Multi-Species Conservation Program. 2004a. Lower Colorado River Multi-Species Conservation Program, Volume II: Habitat Conservation Plan. Final. December 17. (J&S 00450.00) Sacramento, CA.
- Lower Colorado River Multi-Species Conservation Program. 2004b. Lower Colorado River Multi-Species Conservation Program, Volume IV: Appendices to Volume I-III and V. Final. December 17. (J&S 00450.00) Sacramento, CA.
- Lower Colorado Multi-species Conservation Program. 2006. Combined Species Document for the LCR MSCP. Lower Colorado River Multi-Species Conservation Program, Boulder City, NV. 328 pp.
- Lower Colorado River Multi Species Conservation Program. 2008. Monitoring Protocols for Lower Colorado River Multi-Species Conservation Program, 2007. Lower Colorado River Multi-Species Conservation Program, Boulder City, NV. 81 pp.
- McKernan, R.L. 1997. Status, Distribution, and Habitat Affinities of the Southwestern Willow Flycatcher Along the Lower Colorado River, Year 1 – 1996. Submitted to the Bureau of Reclamation, Lower Colorado River Region, Boulder City, NV, and U.S. Fish and Wildlife Service, Carlsbad Field Office, Carlsbad, CA, by San Bernardino County Museum, Redlands, CA. 42 pp.
- McKernan, R.L., and G. Braden. 1998. Status, Distribution, and Habitat Affinities of the Southwestern Willow Flycatcher Along the Lower Colorado River, Year 2 – 1997. Submitted to the Bureau of Reclamation, Lower Colorado River Region, Boulder City, NV, and U.S. Fish and Wildlife Service, Carlsbad Field Office, Carlsbad, CA, by San Bernardino County Museum, Redlands, CA. 64 pp.
- McKernan, R.L., and G. Braden. 1999. Status, Distribution, and Habitat Affinities of the Southwestern Willow Flycatcher Along the Lower Colorado River, Year 3 – 1998. Submitted to the Bureau of Reclamation, Lower Colorado River Region, Boulder City, NV, and U.S. Fish and Wildlife Service, Carlsbad Field Office, Carlsbad, CA, by San Bernardino County Museum, Redlands, CA.
- McKernan, R.L., and G. Braden. 2001a. Status, Distribution, and Habitat Affinities of the Southwestern Willow Flycatcher Along the Lower Colorado River, Year 4 – 1999. Submitted to the Bureau of Reclamation, Lower Colorado River Region, Boulder City, NV, U.S. Fish and Wildlife Service, Carlsbad Field Office, Carlsbad, CA, and Reno, NV, and Bureau of Land Management, Caliente, NV, by San Bernardino County Museum, Redlands, CA. 83 pp.

- McKernan, R.L., and G. Braden. 2001b. Status, Distribution, and Habitat Affinities of the Southwestern Willow Flycatcher Along the Lower Colorado River, Year 5 – 2000. Submitted to the Bureau of Reclamation, Lower Colorado River Region, Boulder City, NV, U.S. Fish and Wildlife Service, Carlsbad Field Office, Carlsbad, CA, and Reno, NV, and Bureau of Land Management, Caliente, NV, by San Bernardino County Museum, Redlands, CA. 86 pp.
- McKernan, R.L., and G. Braden. 2002. Status, Distribution, and Habitat Affinities of the Southwestern Willow Flycatcher Along the Lower Colorado River, Year 6– 2001. Submitted to the Bureau of Reclamation, Lower Colorado River Region, Boulder City, NV, U.S. Fish and Wildlife Service, Carlsbad Field Office, Carlsbad, CA, and Reno, NV, and Bureau of Land Management, Caliente, NV, by San Bernardino County Museum, Redlands, CA. 58 pp.
- Miller, L. 1946. The elf owl moves west. *The Condor* 48:284-285.
- Rosenberg, K.V., R.D. Ohmart, W.C. Hunter, and B.W. Anderson. 1991. *Birds of the lower Colorado River Valley*. Univ. Arizona Press, Tucson. 416 p.
- Steidl, R.J. 2001. Summary Report: Monitoring Elf Owls in and Near Saguaro National Park, 2000-2001. University of Arizona. Tucson, AZ.
- Steidl, R.J. 2002. Summary Report: Monitoring Elf Owls in and Near Saguaro National Park, 2000-2002. University of Arizona. Tucson, AZ.
- Stephens, F. 1903. Bird notes from eastern California and western Arizona (concluded). *The Condor* 5:100-105.
- Wise-Gervais, C. 2005. Elf Owl. Pp. 220-221 *In* T.E. Corman and C. Wise-Gervais (editors), *Arizona Breeding Bird Atlas*. University of New Mexico Press, Albuquerque.

# Appendix 1



# Appendix 2



# Appendix 3

