State of California
THE RESOURCES AGENCY
Department of Fish and Game

STATUS OF THE ELF OWL IN CALIFORNIA[1/]

by

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ABSTRACT

A survey to locate breeding populations of elf owls in California was conducted from April to July 1978. Ten pairs were found in an area along the Colorado River near the California-Nevada border NNW of Needles, San Bernardino County and a single individual was found along the Colorado River south of the San Bernardino-Riverside county line. None were found in other areas checked along the Lower Colorado River Valley and on the deserts of southern San Bernardino County, Riverside County, and eastern Imperial County. Past history of the species in California disclosed the elf owl was never abundant. Man-caused destruction of mature willow-cottonwood-mesquite habitat appears to have reduced the population of these owls, limiting their ability to continue to survive. The current population of elf owls in California probably does not exceed 20 pairs, and it is recommended this species be given endangered status under California law.

1/ Supported by Federal Aid in Wildlife Restoration, Project W-54-R-10, Wildlife Management Branch, Nongame Wildlife Investigations, Job III-1.0, Progress Report (July, 1978).

RECOMMENDATIONS

1. Give the elf owl in California the status of endangered and the protection of that status.

2. Undertake an intensive study to survey additional habitats not surveyed herein, to determine those habitat parameters necessary for delineation of presently occupied elf owl habitat, and to establish a plan to not only preserve present populations but to re-establish the species to a level at which it is not endangered.

3. Inform landowners of the presence of presently occupied or historical sites of elf owls, and work cooperatively with these landowners to eliminate habitat destruction by land clearing, fire, and recreational development of necessary habitat and to improve existing habitat so that it will become suitable for elf owl habitation.

4. Provide protection for any future elf owl population found on public land.

5. Initiate starling control in areas where elf owls are known to breed.

6. Prohibit the collecting, banding or handling of elf owls except under specific permit by the Department.

INTRODUCTION

The elf owl (Micathene whitneyi) reaches the western limit of its breeding range on the Colorado Desert of southeastern California (AOU 1957). Occurrence of the species within the state has always been rather sporadic and the small number of existing records come from a few widely scattered localities at isolated desert springs and along the Lower Colorado River Valley During the past ten years, field observers have noted population declines or complete disappearance of elf owls at all known breeding stations in California. These findings, along with a continuing rapid rate of habitat destruction in many areas of the Lower Colorado River Valley, prompted the California Department of Fish and Game to initiate this survey of the elf owl in California during the 1978 breeding season. Primary goals of this study were to 1) determine the present distribution by searching localities of known occurrence and other areas of the Colorado Desert with seemingly suitable habitat available, 2) review the past status and distribution of elf owls in California, 3) gain an understanding of the basic habitat requirements, 4) examine reasons for the decline of the species and make recommendations to alleviate problems which may be threatening the continued existence of elf owls in California.

HISTORY OF OCCURRENCE

Elf owls were first discovered in California by Herbert Brown (1904) on 17 May 1903 adjacent to the Colorado River near Imperial Dam, Imperial County (Table 1). He found two nesting females in a scattered stand of saguaro cactus (Carnegiea gigantea). Another female was found at or near the same site in 1910 (Grinnell 1914). Van Rossem apparently observed elf owls at this locality also (Miller 1946) but the date is not known. There have been no further records from the vicinity of Imperial Dam though. Kimball (1922) reported finding a pair of elf owls in an isolated cottonwood (Populus sp.) tree at Bard, Imperial County in 1915.

There were no further records of elf owls in California until 6 May 1946 when Miller (1946) discovered a pair at Cottonwood Spring in Joshua Tree National Monument, Riverside County. Additional observations of the species at Cottonwood Spring were made in 1959, 1962-1964, 1967, and 1969-1970 with successful nesting taking place during this period. There is also a 1970 record of an individual at nearby Cotton Spring. However, there have been no records from these spring areas since 1970.

An elf owl was located at Corn Spring, about 11.5 km SE of Desert Center, Riverside County, on 18 March 1972 with a pair present there later the same year. A pair returned and successfully nested in 1973. There were no reports of elf owls at Corn Spring during 1974 although at least one individual was present in 1975 and 1976. Elf owls have not been found at Corn Spring since 1976.

A single elf owl was found in a riparian thicket along the Colorado River 17.5 km NNW of Needles, San Bernardino County on 31 May 1969 and annual visits to the area by many observers thereafter revealed that a small population of 3-4 pairs successfully bred at this location. Elf owls continued

Table 1. Observations of elf owls in California prior to 1978.

Year	Date	Locality	No.	Reference
1903	17 May	Near Imperial Dam, Imperial Co.	2	Condor 6:45-47
1910	23 April	" " "	1	Grinnell 1914
1915	April	Bard, Imperial Co.	2	Condor 24:96
1946	6 May	Cottonwood Spring, Joshua Tree NM, Riverside Co.	2	Condor 48:284-285
1959	late April	" " "	2	Audubon Field Notes (AFN) 13:401
	7 May	" " "	2	AFN 13:401
	Summer	" " "	2	AFN 13:456
1962	11 May	" " "	2	G. McCaskie, pers. comm.
1963	27 April	" " "	2	" " " "
	11 May	" " "	2	" " " "
	8 June	" " "	2	" " " "
1964	25 April	" " "	2	" " " "
1967	Spring	" " "	2	AFN 21:605
1969	13 April	" " "	1	AFN 23:626
	31 May	17.5 km NNW Needles, San Bernardino Co.	1	Spec. #4263 SBCM
1970	7 April	" " "	4	AFN 24:625
	18 April	Cottonwood Spring, Joshua Tree NM, Riverside Co.	1	G. S. Suffel, pers. comm.
1972	18 March	Corn Spring, Riverside Co.	1	American Birds (AB) 26:809
	May	" " "	2	AB 26:809
	23 June	About 17 km NNW Needles, San Bernardino Co.	2	G. McCaskie, pers. comm.
1973	20 April	Corn Spring, Riverside Co.	2	West. Birds 5:106
1975	25 April	" " "	1	AB 29:909
1976	10 April	17 km NNW Needles, San Bernardino Co.	2 + yng.	AB 30:892
	23 April	Corn Spring, Riverside Co.	1	AB 30:892
	25 April	" " "	1	AB 30:892
	6 August	Wiley's Well, Riverside Co.	2	Bur. Land Mgmt., Riverside, unpub.
	early Aug.	Coon Hollow, Riverside Co.	2	B. McClernan, pers. comm.
1977	29 Apr-12 June	17 km NNW Needles, San Bernardino Co.	6 ad. + sev. yng.	AB 31:1190

to return to this area through 1977 even though a series of fires and agricultural clearing gradually reduced the size and quality of the habitat. Unfortunately, clearing of the area was completed during the winter of 1977-78, leaving only a small clump of 4 willow trees.

Two elf owls were heard at Wiley's Well Campground, about 31 km SW of Blythe, Riverside County on 6 August 1976 (Bureau of Land Management, unpubl.) and two more were heard at nearby Coon Hollow Campground on approximately the same date (B. McClernan, pers. comm.). These rather late records may be attributable to post-breeding or migrating individuals since breeding does not seem very likely at these particular localities. Miller (1946) reports finding an elf owl in "marginal shrubbery" at Blythe but gives no specific date. Specimens reportedly taken from Kern County in 1882 (Ridgeway 1902) and near San Bernardino, San Bernardino County in 1898 (Loomis 1902) are of questionable origin and can probably be safely disregarded as being in error (Stephens 1902).

Elf owls are a common breeding species in many areas of southeastern Arizona and northwestern Mexico where they occupy a wide variety of different habitats including saguaro desert, various forms of riparian woodland, and wooded canyons often extending into the lower reaches of the pine belt (Phillips et al. 1964). These regions represent the center of abundance for the species. Elf owls become less common and more locally distributed as one moves west into the drier, lower elevation areas between southeastern Arizona and the Lower Colorado River Valley and they become increasingly restricted to prime stands of saguaro and riparian for breeding habitat.

The elf owl has essentially the same status in the Arizona portions of the Lower Colorado Valley as in the California portions. The type locality was at Fort Mohave, Arizona (Cooper 1870) which is only about 8 km N of the present elf owl population located NNW of Needles, California. Elf owls were never again found at Fort Mohave. Stephens (1903) thought he heard an elf owl on the Arizona side about 20 miles below Fort Mohave but could not confirm the record. Several individuals were heard at Willow Estates on the Arizona side about 10 km N of Needles during Spring 1978 (K. Rosenberg, pers. comm.). Up to 12 pairs of elf owls have been found in the extensive riparian areas of the lower Bill Williams River delta, near the lower end of Lake Havasu (K. Rosenberg, A. Higgins, pers. comm.). Grinnell (1914) found a single bird in saguaros on the Arizona side of the river near Imperial Dam during the same visit in which he found an individual on the California side of the river.

METHODS

A thorough literature search of ornithological journals was made to ascertain the extent of the historical distribution of elf owls. Additional contacts were made with field ornithologist recently working along the Colorado River and in the Colorado and Mohave deserts.

All field work was conducted between 22 April and 26 July 1978, a period during which elf owls remain on their breeding territories and are highly vocal. Survey sites were visited between one-half hour after sunset and midnight. One to several sites would be visited each survey night. In most survey areas an attempt was made to locate potential elf owl habitat during daylight hours or conduct surveys with a person who was familiar with the area and its habitats.

The census technique involved driving or walking along the edge or through potential habitat and playing a tape-recording of the elf owl calls taken from Kellogg et al. (1975) at regular intervals for 1 to 30 minutes. It was found

that when elf owls were present, they always responded to the tape within 2 minutes and usually within 30 seconds. The owls would usually approach the tape to defend their territory and often both members of a pair would respond to the tape simultaneously. Little attempt was made to actually sight the birds; the distinctive vocalizations were considered adequate evidence of an established breeding territory.

RESULTS

Present Distribution and Abundance

Eleven pairs of elf owls were found only in two areas, both along the Colorado River, during this study (Figure 1).

1. 15-20 km NNW of Needles, San Bernardino Co.--A single pair of elf owls continue to make their home in the remnants of the once extensive riparian habitat which was located adjacent to the Colorado River, 15-18 km NNW of Needles. The available habitat has been reduced to not more than 0.5 ha and consists of a clump of 4 willows (Salix sp.) about 30 m tall, a few mesquites (Prosopis pubescens) and scattered patches of arroweed (Pluchea sericea). This remaining habitat is about 17.5 km NNW of Needles and is situated in a narrow strip between the river and the levee road paralleling the river. A pair of elf owls, with a nest hole 9 m up in one of the willows, was discovered here on 22 April and were seen by numerous observers until 3 June. At least 2 young were fledged. By 4 June the birds had moved to the Arizona side of the river but still responded vigourously to a tape.

   Another calling elf owl was found on 22 April in an area where they were previously not known to exist, at the SE corner of a cluster of ranch buildings 3 km NW of the "willow clump" site. A more extensive search of areas to the N and W of the ranch buildings on 10-11 May resulted in the discovery of at least 8 more pairs of elf owls. The habitat consists of closely spaced, dense clumps of mesquite (Prosopis juliflora) 5-10 m tall with scattered dead cottonwood stumps, tamarisk (Tamarix sp.) clumps and patches of arroweed. Dead cottonwood logs and branches litter the ground in many areas. The southern part of the remaining habitat at this site is a rectangle .7 km E-W, 1.6 km N-S, with the ranch buildings located at the SE corner. Cultivated fields surround the native vegetation on the E, W, and S. North of this rectangle the available habitat is about 1.5 km wide and continues north to the Nevada border, a total N-S distance within California of about 5 km. Less than half of the available habitat of this area was surveyed and only includes the S and W edges of the rectangular section and the south central part of the wider northern section. The 9 pairs of elf owls located were evenly distributed at 0.3-0.4 km intervals along the edge of the surveyed areas. It is unknown how far the territories extended back from the edges of the habitat. Considering the area covered in the surveys and the number of individuals located this area may support about 20 pairs. Elf owls were heard in this area as late as 26 July, 6 weeks later than young were known to have fledged at the "willow clump" site nearby.

2. 35 km N of Blythe, Riverside Co., near Water Wheel Resort--A single calling elf owl was heard on the floodplain of the Colorado River approximately 2 km S of Water Wheel Resort and 1 km W of the river on 10 June. The bird

was in tall mesquite (predominantly P. pubescens about 7 m high with scattered P. juliflora also present) bordering the south side of a cultivated field. The habitat here was much denser than that described NNW of Needles, having a rather thick and brushy understory of arroweed and tamarisk with a more open, uniform mesquite canopy extending above the brush. A few widely scattered live cottonwoods were also present. No other elf owls were located at this site although similar habitat extends for 1-2 km E and W and about 1.25 km to the south. This is the first record of an elf owl in this area.

Twenty-six other localities from the Colorado River to the San Jacinto Mountains were surveyed during the study and produced negative results. These sites included the historical sites near Imperial Dam and at Cottonwood and Corn springs. Descriptions of the other areas visited are provided in Appendix 1.

Basic Habitat Requirements

A comparison of habitats found at four historical and recent locations of elf owl in the Lower Colorado River Valley (Bard, Imperial Dam, Needles, Blythe) reveals several common characteristics. First, there are adequate nesting sites present in the form of natural cavities or old woodpecker holes in saguaro cactus, cottonwoods, willows, and probably mesquite. Excepting the Imperial Dam site, all of the areas are on the flat floodplain of the river. All sites are part of the original river ecosystem; they are areas of climax vegetation, whether mature stands of saguaro or cottonwood-willow-mesquite riparian, although some original characteristics have been altered somewhat by fires or timber removal. There is a low degree of human disturbance at all locations and all areas are larger than 1.3 km^2 (this is unknown for the Bard site). A very small area may be capable of supporting a pair of elf owls, as in the case of the willow clump NNW of Needles. But this probably occurs only when the owls are desperate and forced into such situation by habitat destruction in their original breeding territory. Except for the sites NNW of Needles and N of Blythe, every locality surveyed during this study in the Lower Colorado River Valley differed markedly from the above characteristics.

Habitat at Cottonwood and Corn springs is different from that found along the Colorado River. Cottonwood Spring originally consisted of a small grove of cottonwoods and a small grove of fan palms (Washingtonia filifera). Surface water is present. Nearby Cotton Spring consists of a small grove of cottonwoods with no palms or surface water. About 1966, the cottonwood grove at Cottonwood Spring was removed by National Park Service personnel and only 2 or 3 cottonwoods now remain with the fan palms.

Vegetation at Corn Spring consists of a large grove of tall fan palms and several mesquite (P. juliflora) thickets. Ironwood (Olneya tesota), palo verde (Cercidium floridum), and desert willow (Chilopsis linearis) grow in an adjacent wash. There are no cottonwoods or willows. The spring began producing large volumes of water again in 1976 after being virtually dry since the 1930's.

DISCUSSION

It is obvious from the results of this study and the historical records that elf owls are and have been very rare and locally distributed in California. Only six known or suspected breeding sites have been found in California and only two of these still had populations of elf owls in 1978. It appears that the only significant population concentration remaining within the state is the one located NNW of Needles. The single bird found N of Blythe during this study may indicate the existence of a second population but this will need to be confirmed by further field work. Early ornithologists failed to find elf owls in most areas despite extensive field work during the period when much of the habitat still remained in its original state (Stephens 1903, Grinnell 1914). There is the possibility that areas of habitat supporting populations of elf owls may have been destroyed even before early ornithologists were able to properly survey them. At least some of the early field work, including deliberate searches for elf owls, was conducted during winter months, before ornithologists realized that this species is migratory (Howell and Van Rossem 1915).

It is also obvious that California now maintains precariously only a few remnants of a declining population. Though the original population was small and widely scattered, the loss of populations near Imperial Dam and Bard, and at Cottonwood and Corn springs and the lack of extralimital records or colonization of new areas are indicative of declining population.

The factors leading to the disappearance of populations of this species and various forms of habitat alteration effecting its present habitat cause the elf owl to be truly endangered in California. Channelization and damming of the Colorado River and the resultant disruption of the normal pattern of flooding and silt deposition which maintained and rejuvenated floodplain vegetation has been a major form of habitat alteration. Control of the river allowed agriculture to invade fertile floodplains and a high percentage of original habitat has been replaced by cultivated fields, orchards, irrigation systems, and human habitations. Considerable acreages of habitat have been drowned under reservoirs created by damming the river. Most of the remaining tracts of habitat have been subjected to burning, timber removal, and invasion by introduced tamarisk. Most if not all of the saguaros once located near Imperial Dam have been removed or destroyed by vandals and I saw none during my recent visits there. Much of the habitat now found along the Colorado River is second growth and is not capable of supporting elf owls due to lack of nesting sites.

There are some good sized tracts of willow riparian along the edges of many reservoirs and backwaters created by the dams but these areas have developed only recently and therefore were not part of the original habitat available to elf owls. This habitat is probably not mature enough to provide adequate nest sites. Even if nest sites eventually become available, these areas will never develop the basic "floodplain riparian" characteristics necessary for the success of elf owls due to stabilization of the river and disruption of the natural flooding cycle. Although there are many isolated clumps of possibly adequate habitat scattered up and down the river, the majority of them either serve as shade for a house or are located along highways or immediately next to the river where car and boat traffic creates intolerable disturbances and noise levels.

There may be several factors involved in the disappearance of elf owls from the Cottonwood Spring area and Corn Spring. Although elf owls were still present after removal of most of the cottonwoods at Cottonwood Spring, this certainly did not help the situation at that locality and probably discouraged the owls to some degree by destroying many of the available nest holes. The presence of a campground at Corn Spring (with associate lights, noise, etc.) could be equally repellent to the owls.

Elf owls were found nesting in cottonwoods at Cottonwood Spring and at Corn Spring in 1973 they were using a hole in a desert willow. There are no records of elf owls nesting in the palms at either spring, which may explain their absence from the many palm oases on the eastern deserts where there is little substantial vegetation besides the palms themselves. The absence of elf owls from areas similar to Cottonwood and Corn Springs on the southern and eastern Mohave Desert and on the more westerly portions of the Colorado Desert is hard to understand and an explanation is not attempted here.

Nest site competition with the European starling or even native hole-nesting species such as screech owl (Otus asio), American kestrel (Falco sparverius), Wied's crested flycatcher (Myiarchus tyrannulus), and various woodpeckers may also be important in determining elf owl breeding presence, especially in areas where nest holes are in short supply.

Excessive scientific collecting may have caused extirpation of the elf owl population near Imperial Dam. Here nearly every adult and clutch of eggs found by early ornithologists were taken as a specimen. The stand of saguaros where these birds were found probably never supported more than two or three pairs of elf owls and such a small population was probably unable to survive such pressure. Even nest holes themselves were often destroyed by collectors who gained access to the holes by chopping them open (Brown 1904, Grinnell 1914). Collecting does not seem to have been a problem at Cottonwood or Corn springs and although the first pair of elf owls discovered at Cottonwood Spring was collected (Miller 1946), other individuals replaced them during subsequent years and no further specimens were taken. However, there are reports of bird banders leaving mist nets set up and untended overnight at both locations and of elf owls becoming trapped in the nets. This could easily lead to nest failure if not injury or death for the trapped bird. The specimen taken NNW of Needles in 1969 did not appear to have any ill effects on that population and no further specimens were taken.

Records of two elf owls at Wiley's Well campground and two more at nearby Coon Hollow campground in early August of 1976 probably represent post-breeding or migrating individuals, and it may be possible that the sightings represent a single pair of birds. Elf owls were not found at either place during this study. The possibility of breeding does exist, but it can be argued that if nesting occurs here then nesting should be equally likely throughout the extensive network of similar palo verde-ironwood washes found over much of the Colorado Desert. Such has not proved to be the case.

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APPENDIX A

Locations and Descriptions of Areas Surveyed for Elf Owls,
Spring and Summer 1978

1. Colorado River

Mexican Border to Senator Wash Reservoir, Imperial Co.

This area was surveyed on 19-20 May. Areas covered included those near Andrade, Winterhaven, Bard and the Bard Valley, Laguna Dam, and Imperial Dam. No elf owls were found in this area. Appropriate habitat is very scarce on the California side. There is virtually none to be found downriver from Laguna Dam, there being only scattered cottonwoods and willows and a few mesquite thickets below this point. The entire Bard Valley has been developed for agriculture. There are some promising willow and mesquite thickets between Laguna Dam and Imperial Dam but all of them are either occupied by "squatter" colonies or lie adjacent to busy roads and noise levels are rather high. A search for saguaro cactus in the vicinity of Imperial Dam and Senator Wash Reservoir produced negative results and if any saguaro do still exist here, they are probably too few in number to support elf owls. Scientific collecting may have eliminated elf owls from this spot, but destruction of the habitat assures that this is so.

Ferguson Lake and Picacho State Recreation Area, Imperial Co.

The Ferguson Lake area was surveyed on 20 May and Picacho SRA was surveyed on 22 June. No elf owls were found at these sites. Habitat in these areas consists of dense salt cedar, arroweed and mesquite, with occasional patches of willows, growing immediately adjacent to the water. The vegetation is usually very dense with especially heavy growth occurring at the mouths of large washes. These types of areas are of relatively recent origin, created when Imperial Dam caused water levels to rise. Such areas are probably unsuitable for elf owls in that they probably have not matured enough to provide the proper requirements for nesting and feeding.

Palo Verde and Blythe, Imperial-Riverside Co.

Areas south of Blythe and in the vicinity of Palo Verde were surveyed on 24 May. No elf owls were found. Habitat in these areas is basically similar to that found in the Bard-Winterhaven area, with scattered isolated cottonwoods and willows in the floodplain areas and along the river and backwaters. There are also large areas of dense salt cedar, arroweed and mesquite which are unsuitable. Most of the floodplain has been developed.

Blythe to the Riverside-San Bernardino Co. line.

These areas were surveyed on 4 and 10 June. A single elf owl was found near Water Wheel Resort, on the floodplain at the western edge of the Parker Valley. No other elf owls were found although a part of this general area seems to have the best possibilities for producing new elf owl breeding locations in California. Along much of this stretch, the Colorado River runs at the extreme western edge of the floodplain and consequently there is relatively little

floodplain vegetation on the California side of the river. The floodplain areas immediately north of Blythe have been completely converted to agriculture, with only scattered isolated clumps of cottonwoods and willows and a few patches of second growth mesquite. Between the Palo Verde Diversion Dam and the San Bernardino Co. line there are numerous clumps of cottonwood and willow bordering the river. Most habitat is too sparse to support elf owls or is adjacent to houses or trailer parks. The floodplain areas at Hall Island, near Water Wheel Camp, near Lost Lake Resort, and near Wilson Road have habitat that may be marginally suitable for elf owls. However, these areas are generally lacking in nest sites (mature cottonwoods, dead stumps, etc.) or have become choked with salt cedar and arroweed.

Earp to Parker Dam, San Bernardino Co.

This area was surveyed on 2 July. There is little habitat available to elf owls along this stretch of the river. Most habitat lies in a narrow strip between the highway and the river and the heavy car and boat traffic and a high level of development in this area creates a high level of disturbance. Most of the cottonwoods and willows are restricted to yards and trailer parks.

Lake Havasu, San Bernardino Co.

This area was not visited after dark. Some habitat was examined on 26 July and it was found that this area closely resembles the Picacho and Ferguson Lake area. The only substantial vegetation occurs along the margins of the lake, usually at the mouths of large washes. Elf owls are probably absent here for the same reasons they are absent at Picacho and Ferguson Lake.

Needles area, San Bernardino Co.

This area was surveyed on 22 April, 9-10 May, and 26 July. A population of elf owls was found north of Needles near the Nevada border. There is no significant floodplain between Topock and 10 km N of Needles and little suitable habitat for elf owls along this stretch. Occasional clumps of cottonwoods and willows border the river but these are usually in yards or trailer parks. Two patches of willow riparian SE of the Needles Golf Course look suitable for elf owls and were surveyed on 26 July with negative results. But, this date may have been too late and elf owls which might use the area may have left or become silent. These two willow thickets should be checked again earlier in the season to verify the presence or absence of elf owls.

Other areas of the Colorado River not checked.

The riparian habitat between Picacho State Recreation Area and Davis Lake-Mitchell's Camp was not surveyed. However, this area is probably very similar to the habitat found at Ferguson Lake and Picacho SRA where most of the vegetation is of recent origin and is restricted to a narrow strip along the water's edge and thus unsuitable for elf owls. These conditions are probably applicable to Lake Havasu and Topock Gorge areas also and these areas were not surveyed.

2. Desert Areas of Southeastern California

Cottonwood Spring, Joshua Tree National Monument, Riverside Co.

This area was visited on 27 April and 9 June. Cottonwood Spring proper was checked on both dates and nearby Cotton Spring was also checked on the latter date. No elf owls were found at either site. The vegetation at Cottonwood Spring presently consists of tall fan palms and a single tall cottonwood with a few clumps of mesquite and one or two smaller cottonwoods close to the main clump of trees. There did not appear to be any nest holes at this site. Cotton Spring consists of a small clump of tall cottonwoods and a few introduced Eucalyptus trees. A number of holes are available in the dead cottonwood snags at Cotton Spring. I have not been able to verify rumors that one or more additional springs are located in this area and that elf owls have been observed at these sites in the past.

Corn Spring, Riverside Co.

This area was visited on 28 April and 18 May. The first visit was on a Friday night and a moderate wind and constant loud noise from the numerous campers using the BLM campground made surveying difficult. The second visit, on a Thursday night, was much more pleasant but no elf owls were found on either visit. The vegetation here consists of a tall grove of fan palms, a few large introduced tamarisk trees, several large patches of dense mesquite (P. juliflora), brush of various species (Atriplex, Suaeda, etc.), and some patches of cattail (Typha). Enough surface water is present to form a small stream about 200 meters in length. A large sandy wash passes close to the spring and the vegetation here consists of ironwood, palo verde, and associated shrubs. Nest holes appeared to be very scarce and this may be one of the major factors limiting the presence of elf owls at this site.

Areas West of Cottonwood and Corn Springs.

Areas were surveyed in the Coachella Valley and Joshua Tree National Monument areas to determine if the westward extension of the elf owl's range continued further than Cottonwood Spring. Locations visited included Twentynine Palms Oasis (27 April), Yucca Valley Golf Course (27 April), Big Morongo Regional Park in Morongo Valley (several visits during the spring by myself and other observers), areas near Mecca and Thermal (23 April), and near Palm Springs and Palm Desert (31 May). Habitat at most of these areas included various numbers of mature cottonwoods in various combinations with willows, fan palms, and mesquite. No elf owls were located at any of these sites.

Wiley's Well and Coon Hollow, Eastern Riverside Co.

These two sites, which lie very close together, were visited on 9 June. Elf owls have been reported in early August from the large wash vegetated with palo verde and ironwood which dominates the vicinity of each of the two BLM campgrounds in the area. No elf owls were found here during this visit and therefore, the possibility of breeding appears extremely unlikely.

Other Desert Areas Not Surveyed.

There are numerous sites in the Imperial Valley, in the vicinity of Anza-Borrego Desert State Park, and in the central and eastern Mohave Desert which

might possibly be able to support elf owls. None of these areas were surveyed during this study but the possibility that elf owls are present in any of these places seems highly unlikely for the simple reason that there have never been any verified reports of elf owls from any of these regions despite the recent reasonably good coverage by amateur and professional ornithologists.