

STATUS AND DISTRIBUTION OF THE ELF OWL IN CALIFORNIA

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In California, the Elf Owl (*Micrathene whitneyi*) has been found only in riparian habitats and scattered stands of Saguaro (*Carnegiea gigantea*) along the lower Colorado River and at a few desert oases (Grinnell and Miller 1944). Although the species has never been numerous in California, there has apparently been a population decline. Surveys in 1978 and 1979 located 11 and 6 pairs of Elf Owls, respectively, at two locations along the lower Colorado River (Cardiff 1978, 1979). Cardiff's (1978) complete record of the 28 Elf Owl sightings made in California prior to 1978 identified eight locations where the species has been found. We gathered 10 additional records made since 1979 (Table 1). All recent records were for either Soto Ranch or near Water Wheel Camp. Since 1979, habitat destruction has continued, resulting in the loss of much of the remaining cottonwood-willow and mesquite bosques (C. Hunter and B. Anderson pers. comm.). This loss is due to the proliferation of tamarisk (*Tamarix chinensis*), agricultural clearing, bank stabilization projects, urbanization, and recent sustained flooding (Laymon and Halterman 1987). This loss and its potential effect on Elf Owls prompted this survey during the spring of 1987.

The objectives of this study were to (1) identify and survey areas where Elf Owls had been reported during and since the 1979 survey, (2) identify and survey other areas of potential Elf Owl habitat, (3) determine the size and distribution of the breeding population of Elf Owls in California, (4) describe the physiographic features and vegetation of the sites surveyed, (5) assess the condition of the sites, including potential threats, and (6) develop recommendations to halt and possibly reverse the decline of Elf Owls in California.

STUDY AREA AND METHODS

We selected the survey sites by using four sources of information: sites identified by Cardiff (1978, 1980), sites identified by the California Department of Fish and Game, sites identified by other field biologists, and sites identified by us during previous field work along the Colorado River. We identified potential Elf Owl habitat as patches of cottonwoods (*Populus fremontii*), Red Willow (*Salix gooddingii*), Honey Mesquite (*Prosopis juliflora*), Screwbean Mesquite (*Prosopis pubescens*), palo verde (*Cercidium floridum*), and Saguaro old enough to contain nest cavities and extensive enough to provide foraging areas. Also, the patches must experience only limited human disturbance, e.g., little or no use by off-road vehicles (ORV).

We conducted the field surveys between 6 April and 8 May 1987 in all areas with suitable habitat to which we had access. From historical records,

Table 1 Sightings of Elf Owls in California, 1903-1986

Date	Site	Number of individuals	Reference*
17 May 1903	Imperial Dam	2	Brown (1904)
23 April 1910	Imperial Dam	1	Grinnell (1914)
Apr 1915	Bard	2	Kimball (1922)
6 May 1946	Cottonwood Spring	2	Miller (1946)
Apr 1959	Cottonwood Spring	2	AFN 13:401
7 May 1959	Cottonwood Spring	2	AFN 13:401
Summer 1959	Cottonwood Spring	2	AFN 13:456
11 May 1962	Cottonwood Spring	2	G. McCaskie (pers. comm.)
27 Apr 1963	Cottonwood Spring	2	G. McCaskie (pers. comm.)
11 May 1963	Cottonwood Spring	2	G. McCaskie (pers. comm.)
8 Jun 1963	Cottonwood Spring	2	G. McCaskie (pers. comm.)
25 Apr 1964	Cottonwood Spring	2	G. McCaskie (pers. comm.)
Spring 1967	Cottonwood Spring	2	AFN 21:605
13 Apr 1969	Cottonwood Spring	1	AFN 23:626
31 May 1969	Soto Ranch	1	SBCM 4263
7 Apr 1970	Soto Ranch	4	AFN 24:625
18 Apr 1970	Cottonwood Spring	1	G. S. Suffel (pers. comm.)
18 Mar 1972	Corn Spring	1	AB 26:809
May 1972	Corn Spring	2	AB 26:809
23 Jun 1972	Soto Ranch	2	G. McCaskie (pers. comm.)
20 Apr 1973	Desert Center	2	Small (1974)
25 Apr 1975	Corn Spring	1	AB 29:909
10 Apr 1976	Soto Ranch	2 & juveniles	AB 30:892
23 Apr 1976	Corn Spring	1	AB 30:892
25 Apr 1976	Corn Spring	1	AB 30:892
6 Aug 1976	Wiley's Well	2	BLM unpubl. data
Aug 1976	Coon Hollow	2	R. McKernan (pers. comm.)
29 Apr-			
12 Jun 1977	Soto Ranch	6 & juveniles	AB 31:1190
Apr-Jun 1978	Soto Ranch	10 pairs	Cardiff (1978)
10 Jun 1978	Water Wheel Camp	1	Cardiff (1978)
May-Jun 1979	Soto Ranch	5 pairs	Cardiff (1979)
May-Jun 1979	Water Wheel Camp	1	Cardiff (1979)
12 Apr 1980	Soto Ranch	2	AB 34:897
26 Jun 1982	Soto Ranch	2 & juveniles	AB 36:1016
16 Apr 1983	Soto Ranch	6	AB 37:1028
21 Apr 1983	Water Wheel Camp	1	AB 37:1028
24 Apr 1984	Soto Ranch	1	AB 38:1062
Summer 1985	Soto Ranch	4-6	AB 39:962

* AB, *American Birds*; AFN, *Audubon Field Notes*; SBCM, San Bernardino County Museum; BLM, Bureau of Land Management.

we identified this period as the optimum survey time. We surveyed sites between sunset and midnight. During the day we visited the sites to describe and classify habitat quality and structure.

Information gathered for all sites included name, location, survey results, general comments, comments on health and vigor, extent (ha), dates surveyed, and habitat type. On the basis of this information and previously published data on the Elf Owl's habitat preferences (Cardiff 1978, 1979), we ranked sites into four categories of predicted habitat suitability: (1) excellent; (2) good; (3) marginal; and (4) poor (Table 2). We ranked the sites on the basis of habitat data collected on the sites before the Elf Owl surveys were conducted.

All areas except two were surveyed once, and most areas of good or excellent habitat were surveyed twice, as were several of the areas of marginal or poor habitat. We did not conduct nocturnal surveys at two areas of extremely poor habitat. Repeat surveys were conducted 2-3 weeks after the initial surveys.

We conducted surveys by automobile, foot, and boat. Nocturnal surveys consisted of stopping every 50-100 m at the sites and listening for Elf Owls. If few or no Elf Owls were heard, we played a tape of a male Elf Owl's territorial call to stimulate a response. The taped call was played 5-10 times with 1-minute pauses between calls at each station. We could hear the taped call 160 m away. We mapped the responses on U.S.G.S. 7½-minute topographic maps. At many sites two researchers "leap-frogged," working 100 m apart with one or both playing tape-recorded calls.

Fifty-two sites were surveyed during this study; 31 were checked twice. Sites were numbered sequentially from north to south (Figure 1).

RESULTS

We located 15 to 25 Elf Owls at 10 sites. The 42 sites at which Elf Owls were not found are listed in Appendix 1. The information on the individual sites is arranged by site name, location, survey results and discussion, habitat description, extent, dates surveyed, comments, and habitat quality rating.

(5) Soto Ranch, 12 km N of Needles, One to three Elf Owls at 2 locations on the first visit and 2-4 Elf Owls at 3 new locations on the second visit. This represents a total of 5-7 Elf Owls at 5 sites, resulting in an estimated population of 5 pairs. Mature mesquite bosque with a few cottonwood snags; 64 ha; 13 and 29 April 1987; excellent quality. This population has apparently remained stable since 1979. Soto Ranch contains the most extensive tract of mesquite bosque along the Colorado River in California. The removal in 1986 of 0.5 ha of bosque that included several large cottonwood snags indicates that the habitat is in danger as the landowner clears additional farmland.

(11) Head of Clear Bay, 7 km N of Havasu Landing. One Elf Owl possibly heard on the first visit. Mixed-age tamarisk-mesquite-palo verde; 2 ha; 16 April and 2 May 1987; light ORV use; good quality. This small patch of high-quality habitat is relatively undisturbed. It is probably too small to support more than one breeding pair, and the bird possibly heard there may have been a migrant.

Table 2 Variables for Ranking Habitats Surveyed for Elf Owls along the Lower Colorado River during 1987

Habitat variable	Habitat quality category			
	Excellent	Good	Marginal	Poor
Extent of habitat (ha)	>8	2-8	0.5-2	<0.5
Type of habitat	Mature cottonwood-willow-mesquite	Cottonwood-willow-willow-mesquite palo-verde	Young cottonwood-willow-mesquite	Small patches of trees
Extent of closed-canopy habitat (ha)	2	>1	None	None
Number of potential nest sites	>10	2-10	1-2	0-1
Extent of area free of human disturbance (ha)	>2 1-2	<1	Near 0	
Severity of human disturbance	Infrequent human presence	Intermittent human presence	Intermittent ORV use	Constant ORV use
Presence of tamarisk	<50%	<50-75%	>75%	Near 100%

ELF OWL IN CALIFORNIA

(13) Mouth of Chemehuevi Wash, 1 km S of Havasu Landing. One Elf Owl was possibly heard on the first visit; we were too far from the response to identify it positively. Scattered mature mesquite-tamarisk-palo verde; 8 ha; 16 April and 1 May 1987; heavy ORV use; good quality.

(15) Desilt Wash, 2 km SW of Parker Dam. One Elf Owl may have been heard on the second visit; noise from Desilt Creek made positive identifica-

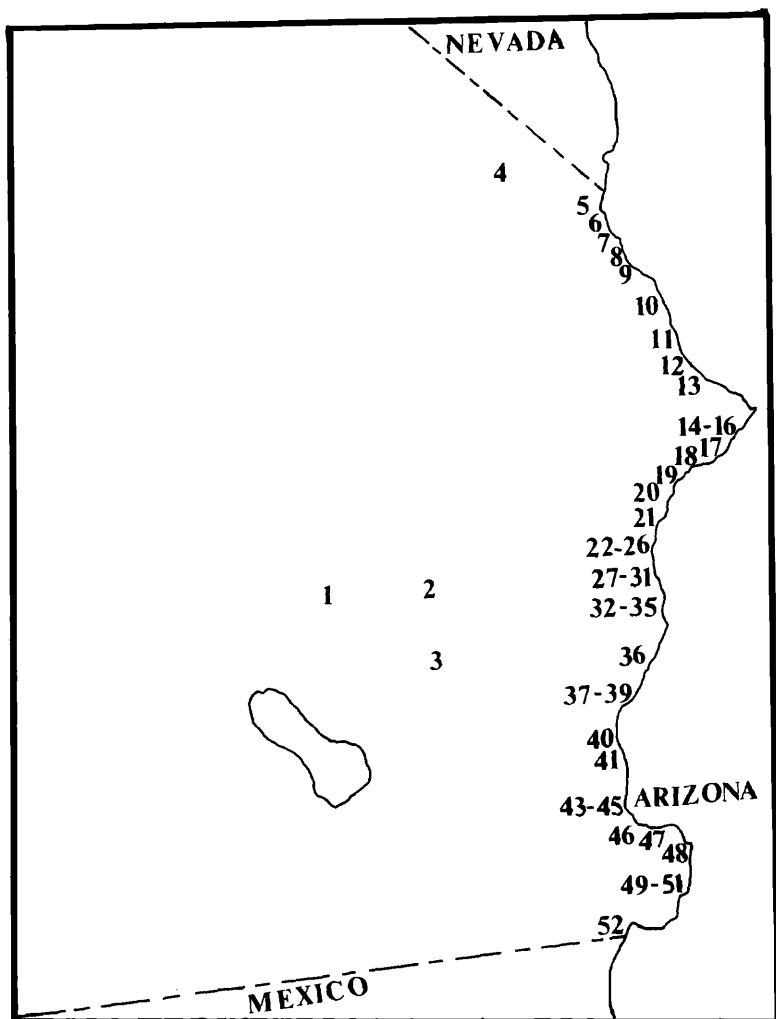


Figure 1. Lower Colorado River study area, showing sites surveyed for Elf Owls in 1987. Numbers correspond to those used in text and appendix.

tion difficult. This impressive but small stand of cottonwoods could be cleared; mature patches of cottonwood-willow; 2-4 ha; 12 and 28 April 1987; good quality.

(18) Headgate Rock Dam, 2.5 km ENE of Earp. Two Elf Owls seen and heard on the first visit. Patchy mature mesquite-tamarisk-cottonwood-willow; 3-4 ha; 12 and 28 April 1987; heavy human disturbance; good quality. There are several potential nest trees. While clearing is unlikely, use by man is inhibiting natural regeneration in the area. Much of this habitat is in scattered clumps and experiences heavy human disturbance. These birds may represent a nesting pair even though they did not respond on our second visit.

(20) Wilson Road, 2 km E of Highway 95. One Elf Owl was heard on the first visit, and two responded on the second visit. Scattered patches of mature mesquite-palo verde; 15 ha; 11 and 26 April 1987; good quality. There appears to be little to distinguish this site from many other similar areas where we did not detect Elf Owls. There is minimal human disturbance at this site, but there is a possibility that agriculture or ORV use may threaten the area.

(26) South end of Water Wheel Camp, 21 km N of Blythe. Two to five Elf Owls on the first visit representing 2-3 pairs. Large, dense, and undisturbed patches of mature tamarisk-mesquite, 60% tamarisk; 130 ha; 11 and 25 April 1987; good quality. Several roads run through the area and they are probably used by ORVs and dove hunters. This area is surrounded by agriculture and could be cleared for that purpose.

(29) Aha Quin trailer park, S end of Hall Island, 18 km N of Blythe. Two Elf Owls, representing 1-2 pairs, responded to the tape on the second visit; there are numerous nest sites. Scattered patches of dense, mature cottonwood-willow with tamarisk-willow-mesquite understory; 8 ha; 10 and 24 April 1987; good quality. Approximately 4 ha in the middle has been cleared for an airstrip, and new ORV trails are being bulldozed. This patch of habitat is in need of protection through either a management agreement or purchase.

(36) Goose Flats, backwater 3 km downstream from I-10 freeway bridge. One Elf Owl heard on the first visit was probably a migrant; there are large cottonwoods in this area, but they are widely scattered and separated by much open ground. Patchy cottonwood-willow; 96 ha; 70% tamarisk, 3% cottonwood, 2% willow; 8 and 22 April 1987; marginal quality. Most of the trees were killed by fires and floods in the early 1980s. We feel that the openness of the habitat made it inadequate for breeding.

(41) Walter's Camp, 0.5 km S of Three-finger Lake. Three Elf Owls were heard on the first visit. Mature mesquite-tamarisk-palo verde; 65 ha; 9 and 21 April 1987; heavy ORV use; good quality. This area has large tracts of mesquite interspersed with more open areas of palo verde. More habitat could be cleared for expansion of nearby trailer parks. There are many potential nest trees. We believe that the site is adequate for breeding.

We estimated a total population of 10-17 pairs from the results of the survey. Elf Owls were probably breeding at five locations and may have been breeding at four additional locations. Three of the probable and four of the possible breeding sites were at locations where Elf Owls had not previously

been found. A few more pairs may breed at some of the good or better sites where we surveyed and did not find Elf Owls.

Only one of the 42 sites where we did not detect Elf Owls was in the excellent habitat suitability category. This site, number 43, at the mouth of Julian Wash, consisted of 65 ha of mesquite, tamarisk, ironwood, and palo verde closed to ORVs. There appeared to be sufficient nest sites to accommodate several pairs of Elf Owls. Unfortunately, because of difficult access we were only able to survey this site once, which may explain why no Elf Owls were detected.

Seventeen sites where we did not detect Elf Owls were in the good habitat suitability category. Many of these sites were not extensive enough or were too patchy to be considered excellent.

The marginal habitats are mostly small remnants of higher-grade habitats. Many of these areas have been degraded through habitat loss from flooding, clearing for agriculture, and the establishment of tamarisk.

We found no Elf Owls in poor habitats. These usually consisted of tamarisk patches or areas with only a few cottonwoods in trailer parks.

The proportion of sites at which Elf Owls were found declined with habitat quality. Elf Owls were found at 50% of the excellent sites, 32% of the good sites, 8% of the marginal sites, and none of the poor sites (Table 3).

DISCUSSION

Why did we not find Elf Owls in many areas of good to excellent habitat? Possibly our criteria for habitat ranking are incorrect or oversimplified. Factors that we did not recognize or measure may have been important in determining occupancy. Factors other than habitat suitability may be limiting the population: the population of Elf Owls in California is so low and most sites are so small that stochastic events may prevent the owls from occupying all suitable sites every year. This could be tested by multi-year studies to determine occupancy of sites over a series of years. Elf Owls may ingest persistent pesticides, such as DDT, on their wintering grounds, resulting in eggshell thinning and reduced reproduction and keeping the population below the carrying capacity of the habitat. Collection and measurement of eggshell fragments could help answer this question.

Table 3 Site Habitat Quality and Elf Owl Occupancy along the Lower Colorado River in 1987

Habitat quality	Occupied by Elf Owls	No Elf Owls found
Excellent	1	1
Good	8	17
Marginal	1	11
Poor	0	11
Total	10	40*

* Two additional sites of poor quality were not surveyed at night because of poor access.

Until the factors controlling the California Elf Owl population are understood, the first step toward protecting the species must be habitat protection. All nine sites where Elf Owls were located and may breed are in some danger of destruction from flooding, clearing for agriculture or development, or disturbance by ORVs. Almost all of these sites could be protected by management agreements, conservation easements, or fee title purchase by state or federal agencies or conservation organizations. Preservation of the fragments of existing habitat probably will not be enough to prevent the extirpation of the species from California; ultimately there must be efforts to restore suitable habitats by removing tamarisk, reforesting with mesquite, cottonwoods, and willows, and excluding disturbing activities. Many other endangered species of this devastated river system will also benefit from these measures. Only by such means will the numbers of Elf Owls currently in California increase. Without this management it seems unlikely that the Elf Owl, and many other species dependent on the Colorado River ecosystem, will be able to maintain their tenuous foothold in California.

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APPENDIX 1. Survey sites where Elf Owls were not detected along the Colorado River during 1987. Numbers refer to localities numbered in Figure 1.

(1) Cottonwood and Cotton Springs, Joshua Tree National Monument; approximately 10 mature cottonwoods; 0.2 ha; 5 April and 8 May 1987; poor quality.

(2) Ironwood-palo verde area 5 km N of Desert Center; scattered, mature ironwood-palo verde; 120 ha; 8 May 1987; poor quality.

(3) Corn Springs, 12 km SW of Desert Center; palm oasis, approximately 100 fan palms (*Washington filifera*); 0.2 ha; BLM has placed nest boxes; 6 April 1987; poor quality.

(4) Fort Piute Wash-Piute Spring; scattered mature cottonwood-willow; 2 ha; a riparian strip 15-50 m wide and 2.5 km long; 14 April 1987; good quality.

(6) Fort Mojave Indian Reservation; a narrow strip of habitat along the Colorado River approximately 9 km N of Needles; scattered mixed-age tamarisk-mesquite; 24 ha; 13 April 1987; poor quality.

(7) Mouth of Piute Wash, 7 km N of Needles; scattered uneven-aged mesquite-tamarisk-palo verde; 24 ha; snags present; 13 and 30 April 1987; good quality.

(8) Needles sewage disposal site; scattered young willow-tamarisk with some mesquite; 16 ha; 15 and 30 April 1987; marginal quality.

(9) Beal Lake in Topock Marsh; mixed, occasionally dense, tamarisk-willow-mesquite; 64 ha; 15 and 30 April 1987; good quality.

(10) Topock Gorge; uneven-aged tamarisk-mesquite-palo verde; 8 ha at 10 sites; 90% tamarisk; 1 May 1987; not surveyed because of poor access; marginal quality.

(12) Catfish Bay, 3 km N of Havasu Landing; scattered uneven-aged tamarisk-mesquite-palo verde; 1.5 ha; 1 May 1987; marginal quality.

(14) Saguaro in the Whipple Mountains, 7 km WNW of Parker Dam; 20 mature Saguaro along 5 km of road, with one 2-ha clump of 8 Saguaro; 28 April 1987; some Saguaro have been damaged; poor quality.

(16) Copper Basin Wash; mature patchy mesquite-palo verde-tamarisk; 3 ha; 12 and 28 April 1987; moderate ORV use; marginal quality.

(17) Mouth of Bennett Wash, along Parker strip; scattered mesquite-tamarisk; 1 ha; 12 and 27 April 1987; marginal quality.

(19) Vidal Wash, 12 km S of Parker; dense, mixed-age mesquite-tamarisk; 6 ha; there are a few cottonwoods and willows; 11 and 26 April 1987; good quality.

(21) Mesquite area N of Lost Lake Trailer Park; dense, mixed-age mesquite-tamarisk; 16 ha; several roads bisect site; 6 May 1987; good quality.

(22) Lost Lake Resort, 20 km S of Parker; trailer park with many planted cottonwoods; 8 ha; 11 and 26 April 1987; marginal quality.

(23) Burned area 2 km S of Lost Lake Resort, E of Highway 95; extensive tamarisk with mesquite and tamarisk snags; 125 ha; 11 and 26 April 1987; area burned in 1985 in preparation for agricultural clearing; poor quality.

(24) North end of Water Wheel Camp, 22 km N of Blythe; 4 small clumps of mature cottonwoods surrounded by agricultural fields; minimal understory; 11 and 25 April 1987; poor quality.

(25) Cottonwoods at south end of Water Wheel Camp; 10 large cottonwoods; 6 May 1987; marginal quality.

(27) Shaggy Tree trailer park, 19 km N of Blythe; several large cottonwoods and mesquites; 11 April 1987; poor quality.

(28) Red Rooster trailer park, 19 km N of Blythe; 20 mature cottonwoods; unsuitable for owls because of human disturbance; 11 April 1987; poor quality.

(30) Twin Palms Camp, 14 km N of Blythe; 20 mature cottonwoods, 5 mature willows; 10 April 1987; poor quality.

(31) 3 km N of Blythe Boat Club; young cottonwood-willow; 8 ha; and scattered patches of tamarisk-mesquite-willow; 26 ha; 10 and 24 April 1987; the habitat could be cleared; good quality.

ELF OWL IN CALIFORNIA

(32) Mayflower County Park, 9 km N of Blythe; mature Honey Mesquite; 6 ha; no understory (campground), all dead branches removed; 11 and 23 April 1987; marginal quality.

(33) 200 m S of 6th Avenue Trailer Park; young, dense tamarisk-mesquite, 75% mesquite; 4 ha; 7 and 23 April, 1987; marginal quality.

(34) 2 km W of 6th Avenue Trailer Park; dense, old Honey Mesquite-*Baccharis*; 16 ha; 7 and 23 April, 1987; good quality.

(35) Big Hole, 5 km NE of Blythe; scattered, mature cottonwood-willow-mesquite, 40 ha; cottonwoods in narrow strips; young cottonwood-mesquite; 40 ha; marshy; 7 and 23 April, 1987; marginal quality.

(37) 1 km N of McIntire County Park; mature cottonwood-willow; 60 cottonwoods in a 1-km strip; 8 and 22 April, 1987; marginal quality.

(38) H. Miller County Park, 18 km S of Blythe; scattered tamarisk-cottonwood-willow; 0.5 ha; 9 April, 1987; poor quality.

(39) Arizona State University revegetation site, 11 km S of Palo Verde; planted in 1979, park-like cottonwood-willow; 16 ha; 9 and 21 April, 1987; good quality.

(40) 2 km W of Walter's Camp, Cibola National Wildlife Refuge; scattered palo verde-mesquite-smoke tree; 190 ha; 21 April, 1987; good quality.

(42) Across from Lighthouse Rock; dense, patchy tamarisk-mesquite-palo verde; 4 ha; 5 May 1987; not surveyed at night because of poor access; poor quality.

(43) Mouth of Julian Wash; open ironwood-palo verde; 65 ha; mature, scattered mesquite-tamarisk; 65 ha; 5 May 1987; area closed to ORV use; excellent quality.

(44) Unnamed washes between Julian and Para Washes; scattered mesquite-tamarisk-palo verde; 8 ha; scattered palo verde-ironwood; 8 ha; 5 May 1987; good quality.

(45) Mouth of Para Wash, 5 km N of Picacho State Recreation Area; scattered dense clumps mesquite-tamarisk-palo verde; 8 ha; open ironwood-palo verde-mesquite; 4 ha; 19 April and 3 May 1987; good quality.

(46) Taylor Lake and White Wash and Picacho State Recreation Area; dense tamarisk-palo verde-mesquite; 4 ha; 19 April and 3 May 1987; good quality.

(47) Main campground, Picacho State Recreation Area; open with clumps of palo verde-mesquite-tamarisk; 4 ha; 19 April and 3 May 1987; good quality.

(48) Between Imperial and Laguna dams; occasionally dense tamarisk-mesquite-palo verde; 230 ha; mostly tamarisk, there is also one 2-ha patch of mature willow-cottonwood-tamarisk; 18 April and 2 May 1987; good quality.

(49) Along the All-American Canal; 11 km NE of Yuma; patchy tamarisk-mesquite-palo verde; 24 ha; interspersed with roads and agricultural patches; 17 April and 4 May 1987; good quality.

(50) Along the All-American Canal; 12 km NE of Yuma; mature cottonwood-willow-tamarisk; 2 ha; 17 April, 2 and 4 May 1987; good quality.

(51) Along the All-American Canal, 2 km N of Picacho State Recreation Area turn-off; occasionally dense palo verde-mesquite-tamarisk; 64 ha; tamarisk-palo verde-mesquite; 64 ha; 20 April 1987; area not revisited; good quality.

(52) Araz Wash, 5 km W of Winterhaven; young palo verde-mesquite-tamarisk; 2 ha; dense mesquite-palo verde; 1 ha; 20 April, 1987; marginal quality.