

## POPULATION FLUCTUATIONS OF THE HARRIS' HAWK (*PARABUTEO UNICINCTUS*) AND ITS REAPPEARANCE IN CALIFORNIA

MICHAEL A. PATTEN

*Department of Biology, University of California, Riverside, CA 92521 U.S.A.*

RICHARD A. ERICKSON

*LSA Associates, One Park Plaza, Suite 500, Irvine, CA 92714 U.S.A.*

**ABSTRACT.**—The Harris' Hawk (*Parabuteo unicinctus*) was considered extirpated from California in the mid-1960s. Most sightings in the past 30 years were, therefore, considered to be escaped or released birds. The species has recently staged an incursion into southern California and northern Baja California in the 1990s, involving nearly 50 individuals and local breeding. This incursion was apparently another in a long-term series of population fluctuations of the Harris' Hawk, each bringing large numbers to the north and west of its established range in Arizona and Baja California. Although first recorded at the state border in the 1850s, the Harris' Hawk was not recorded as a breeder until an incursion in the late 1910s and 1920s brought hundreds to the state, including the first known breeders. Numbers declined again in the 1940s, built up again in the 1950s, and thereafter drastically declined to the point of their absence by the mid-1960s. Therefore, the recent incursion was not anomalous but rather follows historical patterns of occurrence, indicating that California is on the fringe of the natural range of the Harris' Hawk, with emigration bringing birds into the state and subsequent population decreases leading again to "extirpation."

**KEY WORDS:** *Harris' Hawk; Parabuteo unicinctus; Baja California; California; population fluctuations.*

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### Fluctuaciones poblacionales de *Parabuteo unicinctus* y su reaparición en California

**RESUMEN.**—El gavilán de harris (*Parabuteo unicinctus*) fue considerado como extirpado de California a mediados de 1960. La mayoría de los avistamientos de los últimos 30 años fueron considerados como aves escapadas o liberadas. La especie ha incursionado en el sur de California y norte de Baja California en los años 90, incluyendo unos 50 individuos y algunos eventos de reproducción locales. Esta incursión es aparentemente una más de las ocurridas a largo plazo por esta especie. Cada una trayendo grandes números de individuos al norte y oeste de su rango establecido en Arizona y Baja California. Aunque por primera vez fue registrado en el borde del estado en 1850, el gavilán de harris no fue reportado en reproducción hasta su incursión en 1910 y 1920 con cientos de individuos incluyendo los primeros registros de reproducción. Los números de individuos declinaron otra vez en 1940, aumentaron en 1950, y declinaron drásticamente hasta considerarlos ausentes en 1960. Por lo tanto, la reciente incursión no es anómala, al contrario, sigue los patrones de ocurrencia indicando que California está en el límite del rango natural del gavilán de harris, con su emigración trayendo aves dentro del estado y la subsecuente declinación la cual conlleva a su extirpación.

[Traducción de César Márquez]

The Harris' Hawk (*Parabuteo unicinctus*) ranges from the southwestern United States southward through Central America to central Chile and central Argentina, with a geographically disjunct population on the Baja California peninsula. In the United States, it occurs from southern Arizona, southeastern New Mexico, and central Texas southward (Fig. 1; American Ornithologists' Union 1998). Its range in Arizona, New Mexico, and Tex-

as has been expanding northward in recent years (Bednarz et al. 1988, Bednarz 1995, Dawson 1998). In California, the Harris' Hawk was found formerly throughout the lower Colorado River Valley and in the Imperial Valley south of the Salton Sea (Grinnell and Miller 1944). By the mid-1950s, it was extirpated from California as a breeder (Remsen 1978, Walton et al. 1988), with the last definite wild bird recorded north of Blythe on 28 November

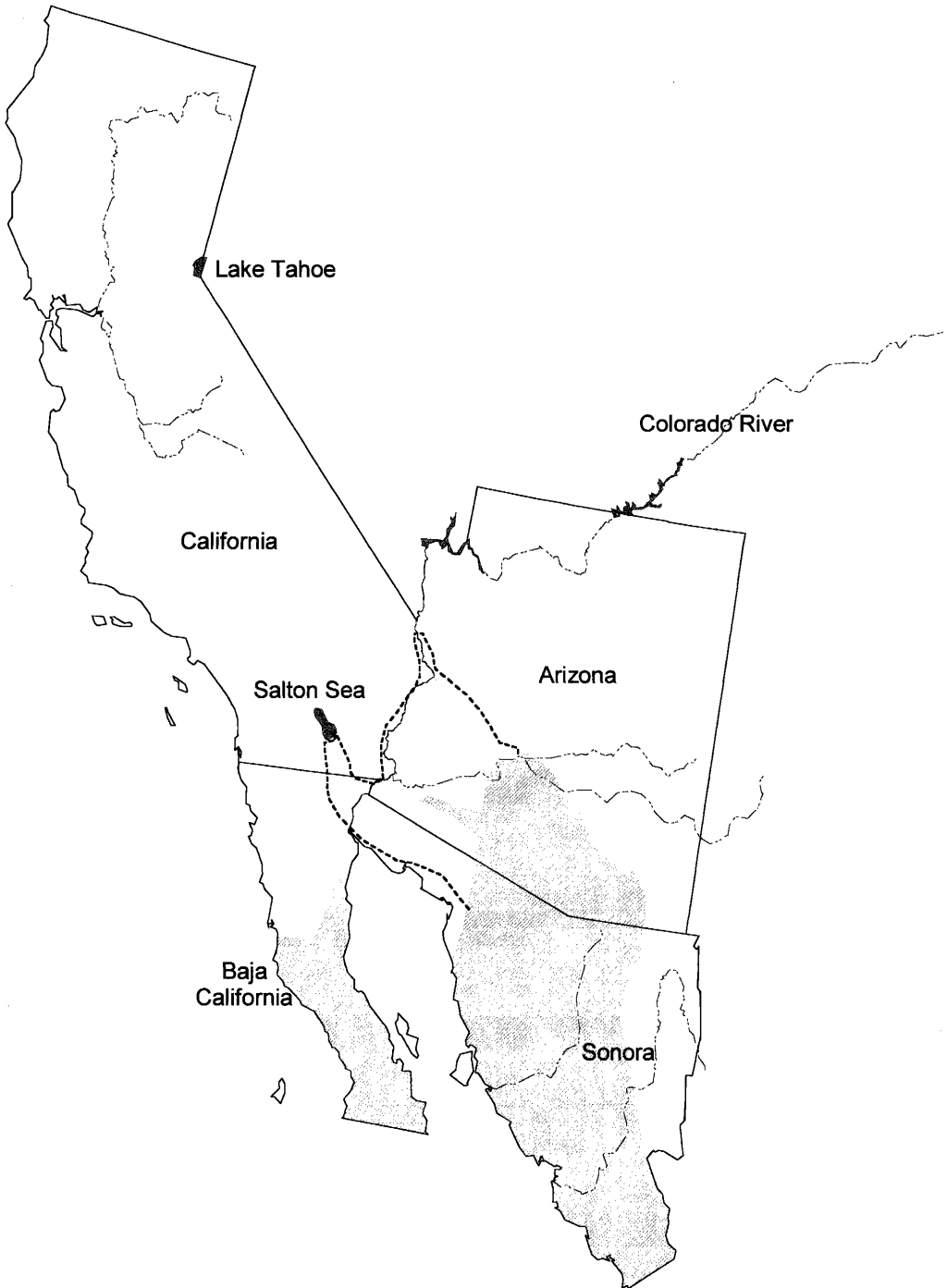


Figure 1. The northwestern portion of the current range (the shaded area) of the Harris' Hawk (*Parabuteo unicinctus*), modified from Bednarz (1995) and Dawson (1998). The dashed line signifies the former westerly limits of its range in southwestern Arizona and southeastern California.

1964 (Garrett and Dunn 1981, Rosenberg et al. 1991).

A reintroduction project for the Harris' Hawk was initiated in California in 1979 by various state, federal, and private groups (Stewart 1979, 1982, Walton et al. 1988). Eight birds were released that year and several more were released each year until 1989, for a total of 222 releases (Linthicum 1989, Linthicum pers. comm.). The first pair nested successfully in 1983, three pairs bred successfully in 1986 (Walton et al. 1988, Rosenberg et al. 1991), and five nested in 1989 (Linthicum 1989, Bednarz 1995). However, it is unlikely that this population is viable, as birds are now infrequently noted (Rosenberg et al. 1991, Patten pers. obs.).

Since the mid-1960s, virtually all recent records of the Harris' Hawk in California are of birds considered to have escaped from falconers (Garrett and Dunn 1981, Unitt 1984). In some cases, birds have been observed with jesses and clearly came from this source. In other cases, there appears to be some tendency for natural occurrence such as sightings of immatures along the Colorado River near Blythe in September (Roberson 1980) and December 1978 (Rosenberg et al. 1991) and at the south end of the Salton Sea on 25 June 1989 (McCaskie 1989). Nevertheless, records of individual birds are perhaps always suspect given that the species remains popular with falconers and rehabilitated birds are occasionally released, as were a few around the Salton Sea in the 1970s and 1980s (Walton et al. 1988). Herein, we document a major increase in sightings beginning in April 1994 that was apparently a natural influx involving nearly 50 individuals throughout southern California and northern Baja California. Further, we hypothesize that such incursions are the rule rather than the exception for the occurrence of this species in California.

#### METHODS

For the recent incursion, we gathered records and documentation from various field observers (see Acknowledgments) and from files of the California Bird Records Committee. All specific data gathered are on file at the Western Foundation of Vertebrate Zoology (WFVZ), Camarillo, California U.S.A. Recent and historical data were gathered from seasonal reports for the Southern Pacific Coast Region published in *Field Notes* (now *North American Birds*), Christmas Bird Counts and specimens at the San Diego Natural History Museum (SDNHM), San Diego, California U.S.A., National Museum of Natural History (USNM), Washington, D.C. U.S.A. and WFVZ. We tabulated and mapped these data to obtain an esti-

mate of the magnitude of the incursion and to examine its geographic extent.

#### THE 1994 INCURSION

Despite an annual "background" escape/release rate throughout California of >3 Harris' Hawks (Bloom pers. comm., Walton pers. comm.), a different phenomenon began 15 April 1994, when J. Rudley, P. Jorgensen, and M. Jorgensen observed three adults together in Borrego Valley. Between 1994–96, at least 34 individuals had been found in southern California (Table 1; McCaskie 1995). The largest groups of birds consisted of at least eight individuals in the Borrego Springs region of the Anza-Borrego Desert and up to five individuals both at the former George Air Force Base near Victorville and at Boulevard (Table 1). During this apparently natural incursion (Bednarz 1995, Massey 1997, Walton pers. comm.), Harris' Hawks were found north of their historical range as far as Victorville in the Mojave Desert, with scattered individuals reported around the Salton Sea and elsewhere (Fig. 2). Additional birds in cismontane valleys at Riverside and in central San Diego County may or may not have been naturally occurring, with individuals far west in coastal Orange County and in the Antelope Valley being particularly suspect given the apparent geographic extent of the influx (Fig. 2). Indeed, the Orange County bird showed signs of being in captivity (Bloom pers. comm., Daniels pers. comm.).

This influx into southern California was concomitant with at least 22 individuals well north of the species' normal range in northern Baja California (Table 2; Rademaker pers. comm., Wurster pers. comm.) and in adjacent northwestern Sonora (Russell and Monson 1998). During this period, Harris' Hawks bred in California at Borrego Springs (Massey 1997), Boulevard (Unitt pers. comm.) and Laguna Dam (McCaskie 1996, Massey 1997), and in northern Baja California at Valle San Telmo (Bloom pers. comm.). Small numbers have persisted in Borrego Valley as recently as 7 March 1999 (Jorgensen pers. comm.) and in Valle San Telmo on 31 January 1999 (Patten pers. obs.).

#### HISTORICAL TRENDS AND CURRENT STATUS

The historical distribution of the Harris' Hawk in California is not clear. The species was first recorded along the Colorado River on the Arizona side in February 1854 (Kennerly 1859, Swarth 1914), but Elliot Coues never recorded the species

Table 1. California records of the Harris' Hawk (*Parabuteo unicinctus*) from spring 1994 through winter 1996–97 (Fig. 2), arranged chronologically. Birds nested at Boulevard (1994) and Laguna Dam (1996), and exhibited nesting behavior (copulations, carrying sticks and food) at Borrego Valley (1994–95), with immatures observed in 1995. Data are on file with the CBRC.

DATE(S)	LOCATION	MAXIMUM
15 April 1994–January 1999+	San Diego County; Borrego Valley	8
1 June 1994–31 October 1995	San Diego County; Boulevard	5
26 November 1994–29 January 1995	San Diego County; Santee	2
? December 1994	Riverside County; Blythe	1
7–18 December 1994	Imperial County; Westmorland	2
10–12 December 1994	Orange County; Irvine	1
31 December 1994–29 January 1995	Riverside County; n. end Salton Sea	1
2–21 January 1995	San Bernardino County; Victorville	5
27 June–23 July 1995	Riverside County; Riverside	1
6–10 July 1995	San Diego County; Carrizo Canyon	2
3 April 1996	San Diego County; Escondido	1
5 April 1996	San Bernardino County; Vidal Wash	1
25 March–30 December 1996	Los Angeles County; Antelope Valley	1
29 March–April 1996	Imperial County; Laguna Dam	2
31 March 1996	San Diego County; Spring Valley	1

during his extensive surveys of the lower Colorado River Valley in the 1870s and 1880s. It apparently was not recorded at the Colorado River again until August (Stephens 1903) and December 1902 (Wilder 1916), when individuals were noted on both sides of the river. Two specimens collected in the Río Colorado delta of northeastern Baja California bracket these records, a male along the Río Alamo southwest of Pilot Knob on 7 April 1894 (USNM 133726) and a subadult along the Río Hardy on 16 April 1905 (USNM 197921). Thus, a few birds were in the area from the mid-1890s until the early 1900s; however, following the few noted in 1902, the species again went unrecorded in California for a decade. For example, Joseph Grinnell and party did not find the Harris' Hawk during their exhaustive survey of the length of the lower Colorado River Valley 14 February–15 May 1910 (Grinnell 1914). Given the paucity of records through this period, Grinnell (1915) considered the species to be only a "summer visitant" to the Colorado River, based solely on Stephens' (1903) records.

The Harris' Hawk was not documented as a breeder in southeastern California until the late 1910s, with the first evidence found on 25 July 1916 (Wiley 1917, Bancroft 1920); the first breeding evidence for northeastern Baja California was concomitant (WFVZ 83655). Thus, it is probable that the species had only recently expanded its range into the area. These breeding records were also the

first for the lower Colorado River Valley, as Cooper (1870) made no specific mention of encountering this species. By the mid-1940s, it was "locally common" in California (Grinnell and Miller 1944). There were occasional records of large numbers, although reports of 400–500 between Calexico and Heber, Imperial County, on 22 October 1920 (Chambers 1921) and 250 near Calexico on 28 August 1923 (Chambers 1924) are perhaps best considered tentative given that the species does not travel in large flocks (Bednarz pers. comm.).

The few records of the Harris' Hawk prior to the late 1910s may have involved occasional strays to the west of its established range given its apparent spread into western Arizona. This species "has a reputation for being somewhat nomadic" (Bednarz et al. 1988), with strays being recorded north to Ohio (Earl 1918) and Kansas (Bunker 1919, Snyder 1919), east to Louisiana (Coombs 1892), and west to Utah and Nevada (Palmer 1988). The species has bred opportunistically even at the fringes of its range, including occasional nesting in Kansas (Parmalee and Stephens 1964) and Louisiana (Bailey and Wright 1931). On a smaller scale, groups of Harris' Hawks have been documented to invade and subsequently nest in several regions in southern Arizona east of its normal range (Bednarz 1995). Furthermore, there are two historical records of the Harris' Hawk for coastal San Diego County, California: one collected at Mission Valley

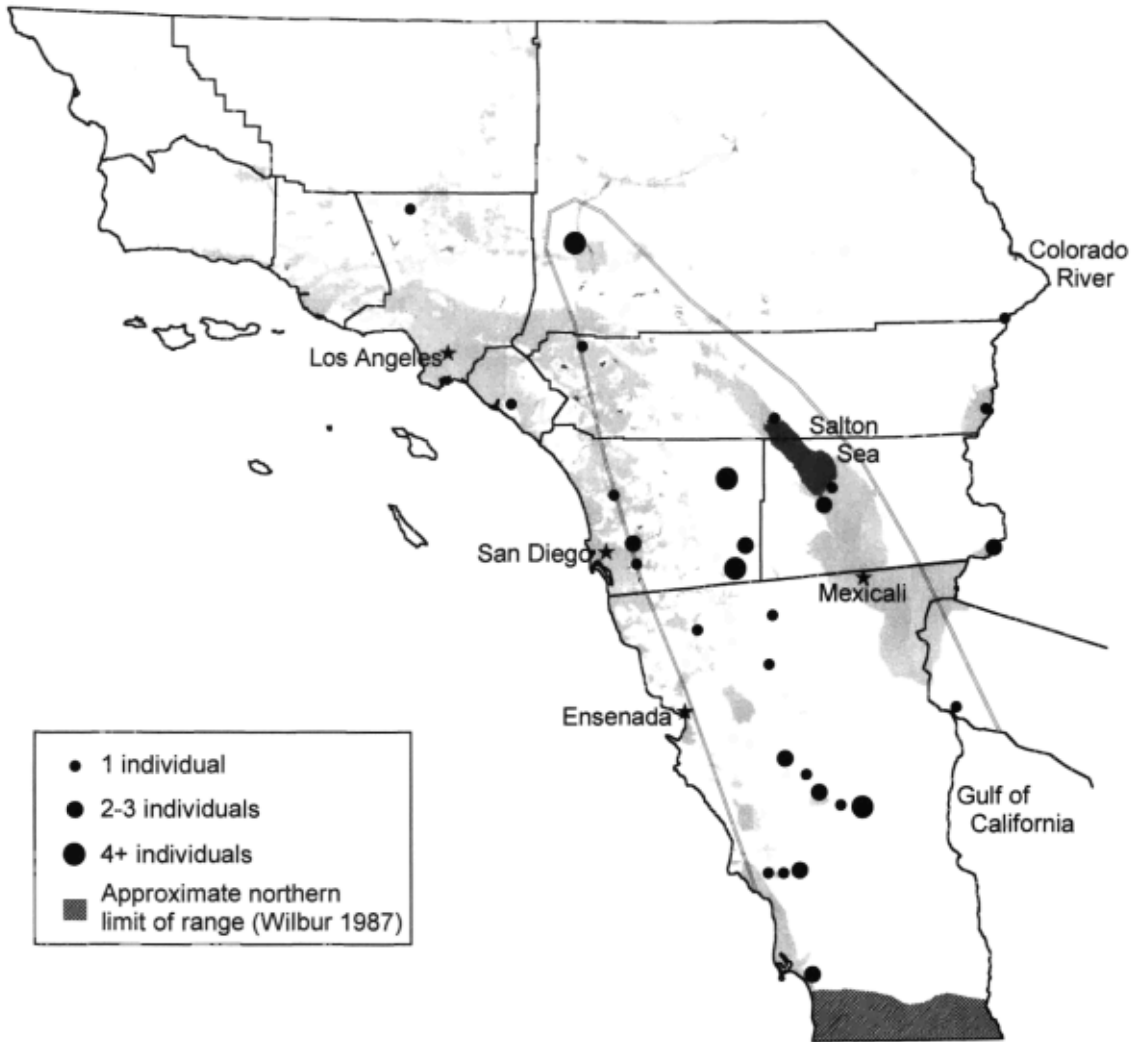


Figure 2. Records of the Harris' Hawk (*Parabuteo unicinctus*) in southern California and northern Baja California since April 1994. The double line identifies the apparent geographic limits of the 1994 incursion. Records within this line are best considered naturally occurring, records falling on the line are debatable, and records well to the west or east are problematic (see text). Shading represents urban/agricultural areas.

on 17 November 1912 (Grey 1913, SDNHM 1842; the second record for California) and one observed at Oceanside from 1–6 November 1942 (Kent 1944).

Although there are no long-term population census data, available data suggest that the Harris' Hawk has undergone four influxes into California during the 20<sup>th</sup> century (Fig. 3). The first major northwesterly expansion was around the turn of the century when “10–20 [were] in the air at a time” along the lower Colorado River between 1–

3 December 1902 (Wilder 1916). These numbers followed many decades of no records for the lower Colorado River Valley. Elliot Coues never recorded the species during many years of work at Yuma and the species was apparently absent again by 1910 (Grinnell 1914). This dearth was followed by an influx in the late 1910s and early 1920s that was apparently an order of magnitude larger than the incursions of 1902 or 1994, as evidenced by reports of large numbers in the Imperial Valley (Chambers 1921, 1924), a new westerly outpost for the species.

Table 2. Baja California records of the Harris' Hawk (*Parabuteo unicinctus*) north of its normal range from fall 1993 through fall 1995 (Fig. 2). Records are arranged chronologically. Breeding has been documented in the Valle San Telmo, where at least one was still present as of 31 January 1999 (Patten pers. obs.); in addition, an adult was still present at Leyes de Reforma on 7 November 1998 (Erickson pers. obs.). For the sake of completeness we also include one record from this timeframe for the Río Colorado in extreme northwestern Sonora (Russell and Monson 1998). See Methods for data sources (now on file at WFVZ).

DATE(S)	LOCATION	MAXIMUM
5 September 1993–fall 1995+	Valle San Telmo	2
20 February 1994	20 km s. of San Quintin	3
9 April 1994	El Doctor (Sonora)	1
10 April 1994	Valle las Palmas	1
23 April 1994	Laguna Hanson	1
21 May 1994	Campo Christiano	3
21 May 1994–5 March 1995	Valle San Matias	5
30 May 1994	Ejido Sinaloa	1
13 November 1994–fall 1995+	Leyes de Reforma	2
13 November 1994	Valle Trinidad	1
26 March 1995	La Rumorosa	1
10 November 1995	Héroes de la Independencia	1

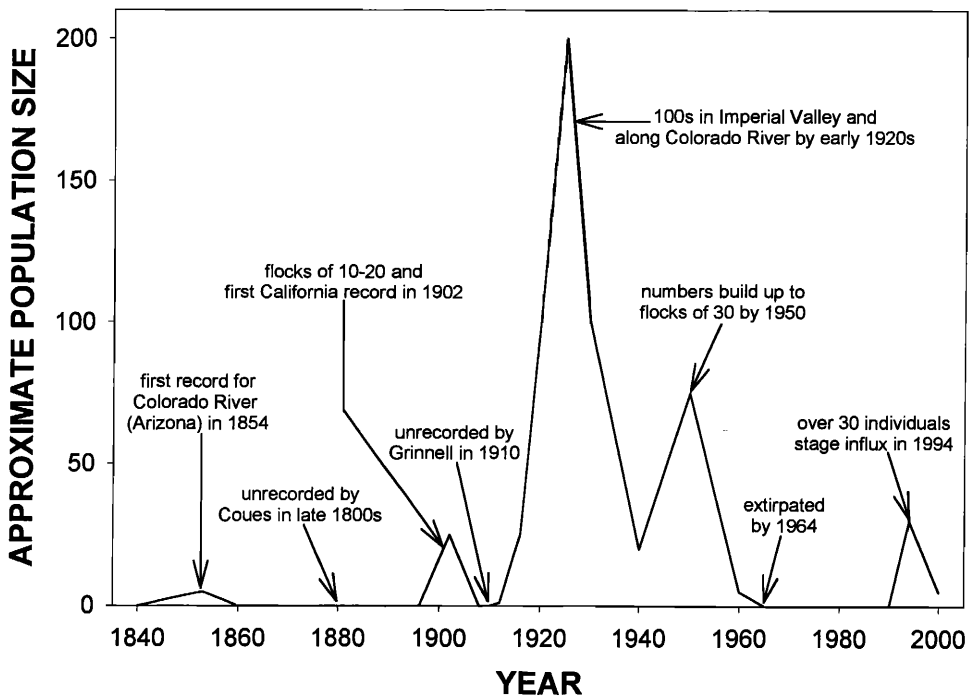


Figure 3. Timeline of the fluctuating occurrence of the Harris' Hawk (*Parabuteo unicinctus*) in California and the lower Colorado River Valley.

There was apparently another influx of Harris' Hawks into California during the late 1940s and early 1950s (Bednarz 1995). During this period numbers again built to double digits (e.g., 30 at Havasu National Wildlife Refuge on 27 December 1950) following two decades of only a few individuals being regularly recorded (Rosenberg et al. 1991).

Two major factors have been implicated in causing the extirpation of this species in California. First, the sport of falconry had an upsurge in popularity in the 1950s, and the Harris' Hawk was and remains a favored bird (White 1988, 1989). Remsen (1978) suggested that nestlings were taken in California until the population was completely depleted, but there is no evidence that falconers ever harvested Harris' Hawks in California (Walton pers. comm.). Instead, birds were harvested in Arizona and Texas and most flown now are from captive breeding. Shooting was undoubtedly common and may also have contributed somewhat to its decline.

Second, habitat loss along the Colorado River from agricultural clearing and water diversion projects was extensive between 1930–60 (Whaley 1986) and similarly occurred during this time in the Imperial Valley (Steere 1952). In addition to direct clearing, erratic water levels led to periodic flooding and desiccation, killing most suitable nest trees. Throughout its range, the Harris' Hawk inhabits savannah-type habitats in arid and semiarid areas, including open woodland, open scrub, mesquite (*Prosopis* spp.) woodland, and riparian woodland bordering open spaces. Trees, especially cottonwoods (*Populus* spp.), or large cacti such as the saguaro (*Carnegiea gigantea*), are used for nesting; however, this species will use utility poles and other artificial structures. In recent years, this species has been steadily increasing its range in southeastern Arizona (Bednarz 1995, Dawson 1998) where it has become more tolerant of human settlements. Indeed, Dawson (1998) noted that "the willingness of Harris' Hawk to nest in urban areas offers some hope of mitigating habitat loss to development," although post-fledging survival of such birds is low (Bednarz pers. comm.).

Perhaps such tolerance for urban setting is a recent advent, for if it were always the case then the Harris' Hawk may have persisted in many areas where it formerly occurred. However, we feel that whereas this urban tolerance may play some small role in the recent incursion into southern Califor-

nia and northern Baja California, it explains neither the magnitude nor the rapidity of the 1994 event. Instead, our investigation supports the hypothesis that the species undergoes periodic population fluctuations that result in rapid range expansions followed by adventitious breeding and, typically, slow range contraction (Millsap 1981, Bednarz et al. 1988). Each expansion-retraction cycle differs in magnitude and may bring individuals into areas where they had not been recorded previously, such as the Mojave Desert. The breeding biology of the Harris' Hawk promotes rapid expansion in numbers when conditions allow. While most nest in spring (March–June), it is able to breed year-round in temperate-climate desert habitats in North America and may produce second and third clutches (Bednarz 1987, 1995). We believe that most birds observed during the 1994 event originated in northern Baja California, where rainfall totals at Ensenada were 140% of average during winter 1991–92 and 168% in 1992–93, but were 90% average in 1993–94 (Mellink pers. comm.). Perhaps two years of favorable conditions allowed for an increase in numbers sufficient to send birds far afield during less favorable conditions in 1993–94, although causes are likely more complex.

In summary, the available evidence suggests that the Harris' Hawk has always been on the fringe of its natural range in California, with occasional irruptive occurrences into the state every few decades. Many stay to breed or linger for significant periods, but eventually numbers decline as appeared to be happening already in the wake of the influx of 1994. As noted above for Louisiana and Kansas, this species is capable of adventitious breeding following a lengthy dispersal. Furthermore, the more general pattern of range expansion and contraction has been documented repeatedly in Arizona and New Mexico (Bednarz 1995, Dawson 1998), although it is perhaps more dramatic in California given that the species may not occur in the state for years at a time.

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WFVZ) were an invaluable resource for information about recent occurrences. R. Corado and J. Fisher (WFVZ), J.P. Dean and C. Ludwig (USNM), and P. Unitt (SDNHM) provided data about and/or allowed access to specimens in their care. We thank J.C. Bednarz, P.H. Bloom, B.J. Walton, and S.R. Wilbur for their careful reviews of the manuscript.

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