J. Raptor Res. 27(4):203–209
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RECENT DISTRIBUTION AND STATUS OF NESTING BALD EAGLES IN BAJA CALIFORNIA, MEXICO

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ABSTRACT.—We studied Bald Eagles (*Haliaeetus leucocephalus*) nesting in Baja California, Mexico, and vicinity from 1983–1993. The range of nesting Bald Eagles in Baja California has been reduced from a scattering of pairs along both the Pacific and Gulf sides to a remnant population in Magdalena Bay where no more than three pairs were found annually. Low numbers and a restricted distribution make this disjunct population especially vulnerable to human disturbance. Additional protection of present nesting localities and a reintroduction program on remote islands in the Gulf of California, where eagles historically nested, are proposed. Limited data on nesting success indicate that the Magdalena Bay population is reproducing successfully with young probably dispersing north following fledging. The Bald Eagles found wintering along the Colorado River Delta in January apparently nest farther north in the United States or Canada.

Distribución reciente y status de nidificación de *Haliaeetus leucocephalus*, en Baja California, México

RESUMEN.—Estudiamos la nidificación de *Haliaeetus leucocephalus* en Baja California, México y en sus veciandades, desde 1983 a 1993. El rango de nidificación de *H. leucocephalus* en Baja California se ha redicido tanto en la vertiente Pacifico como en lado del Golfo a una población remanente en Bahía Magdalena, donde no se encuentran más de tres pares anualmente. Bajos números y una restringida distribución, hacen que esta población disyunta sea vulnerable a la perturbación humana. Proponemos programas adicionales de protección de las actuales localidades de nidificación y un programa de reintroducción en islas remotas del Golfo de California, donde históricamente han anidada las águilas. Datos limitados sobre nidificación exitosa indican que la población de Bahía Magdalena se reproduce exitosamente con juveniles que probablemente se dispersan al norte. *Haliaeetus leucocephalus* se encuentra invernando a lo largo del delta del Río Colorado en enero, aparentemente nidifica más al norte, en los Estados Unidos o Canada.

[Traducción de Ivan Lazo]

Henny et al. (1978) confirmed recent Bald Eagle (*Haliaeetus leucocephalus*) nesting in the Magdalena Bay region of Baja California in 1977 (Fig. 1). On 26 March 1977, a pair with two large young in a nest was noted near San Jorge (25°34′N, 112°6′W); hereafter abbreviated as (2534-11206), north of Santo Domingo (nest F); on 27 March, a pair with one large young in a nest was seen on Isla Creciente near Almejas Bay (nest A). They also summarized unpublished sight records from 1962, 1971, and 1972 that indicated a continued presence in Magdalena Bay and suspected continued nesting prior to their 1977 rediscovery. In this paper we: (1) describe the historical nesting population of Bald Eagles in Baja California and vicinity (Gulf of California), (2) evaluate the present nesting population (new data for 1983–1993) in relation to the historical population, (3) present recent productivity information, and (4) describe a wintering population in the vicinity of the Colorado River Delta.

METHODS

Three aerial survey types are reported in this paper.

(1) A survey was flown by Henny and Anderson (1979) between 23 March and 1 April 1977 of all of coastal Baja

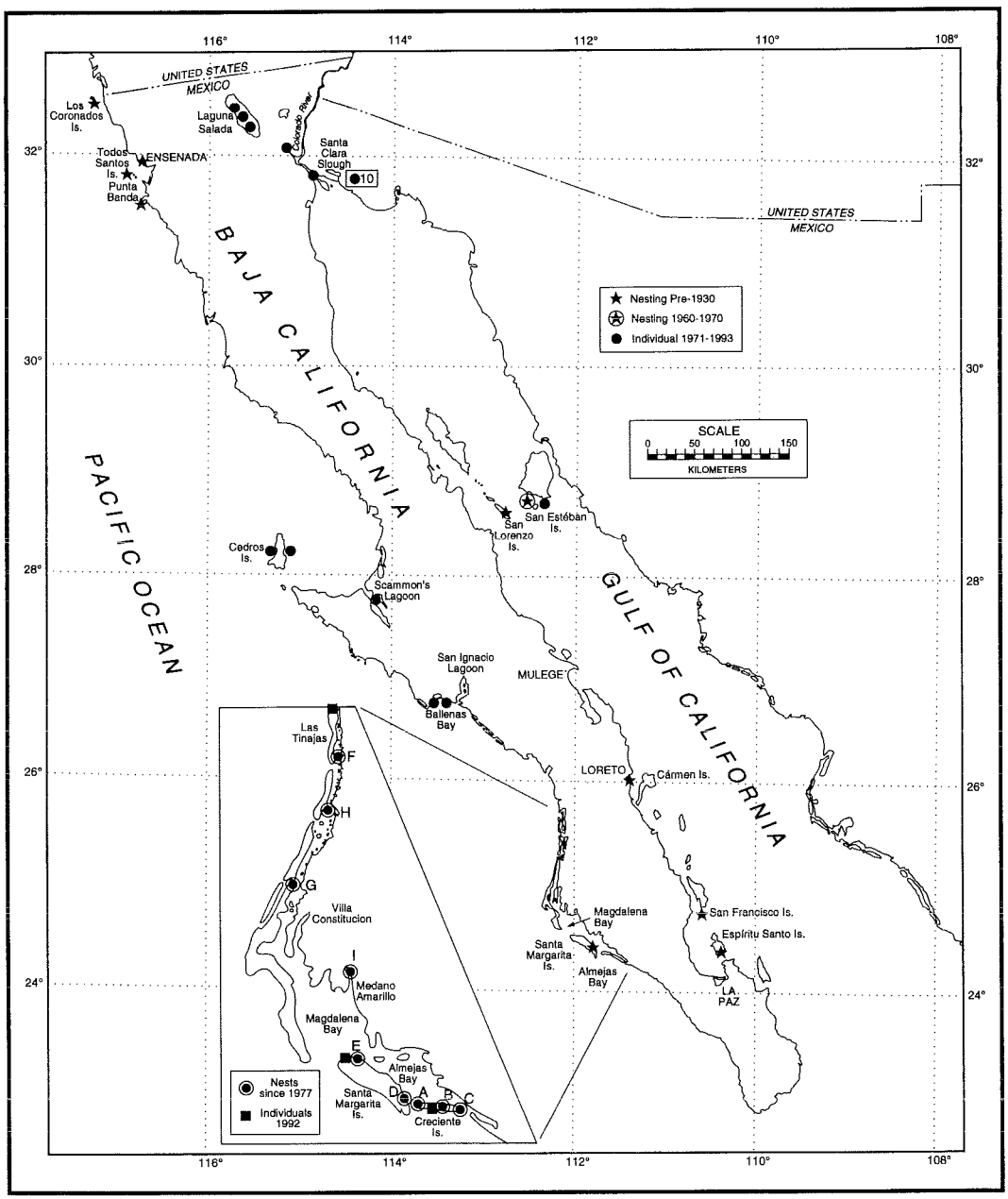

Figure 1. The locations of Bald Eagle nest sites since 1977 and individual observations in 1992 in the Magdalena Bay region (inset); and locations of all other nest records and observations of individuals in the remainder of Baja California and vicinity.

California plus the mainland coast of Mexico as far south as Mazatlan and adjacent islands. The survey was flown 60–100 m above the shorelines and inland up to 2 km. The survey was repeated in 1992–1993 with a twin engine Partenavia P68 and the same observers. Baja California was surveyed 24 March–2 April 1992 and coastal Sonora and Sinaloa 20–24 March 1993. Based on the 1977 observations (large young ready to fledge in late March), the

late March–early April surveys provided information on fledging rates at successful nests.

(2) Beginning in January 1983, the Magdalena Bay region (the only location where nesting Bald Eagles were found in 1977) was surveyed annually by air during the wintering waterfowl survey in coastal Mexico (Conant et al. 1984). This survey was not considered intensive for Bald Eagles, but included a detailed annual aerial check of the mangroves on Isla Creciente (1977 nest site). The mangroves to the north of Isla Creciente were checked opportunistically, and when a nest was located, the vicinity was checked annually thereafter. The mid-January survey occurred at the time when Bald Eagles were expected to be at nests with eggs or small young (active nests).

(3) Three special surveys included a 4.6 hr survey of the Magdalena Bay region by Knoder and Boeker (unpubl. data) on 12–13 March 1984 and our 6 hr survey of the entire Magdalena Bay Region on 29 March 1992. Also, the three active nests observed in mid-January 1993 were rechecked during a special flight on 24 March 1993 to determine the number of large young.

The annual nesting activity was scored on the basis of 1 (for an adult incubating or with eggs or young) and 0.5 (for each adult near a nest without eggs, young or an incubating bird). This approach was an attempt to reduce the nesting activity for each year to a single value for comparative purposes.

RESULTS

Nesting in Baja California before 1977. Published records of Bald Eagles nesting in Baja California from 1927–1977 were unknown to us in 1977 (Henny et al. 1978). Friedmann et al. (1950:61) described the distribution of nesting Bald Eagles in Baja California as "a scattering of pairs on both the Pacific and Gulf sides." Nesting Bald Eagles in Mexico were reported in the Magdalena Bay region by Bryant (1889) who found a pair on Isla Santa Margarita in that same year (2425-11150); he also saw a single adult north of Magdalena Bay (Fig .1). Wilbur (1987) reported an egg set collected by Ed N. Harrison from a nest in a large cardon cactus (*Pachycereus pringlei*) at Isla Santa Margarita on 28 January 1938. Nesting locations on the Pacific side summarized by Grinnell (1928) included Isla Todos Santos (1897, 1905, 1920), Isla Los Coronados, indirect report (1902), Guadalupe Canyon north of Ensenada (1926); localities on the Gulf side included Isla Espiritu Santo (1885?), the mainland opposite Isla Carmen (1887), and Isla San Francisco (1909).

Bancroft (1932:334) also reported "the only pair of Bald Eagles known still to exist on the Gulf" on Isla San Lorenzo (sometime between 1925 and 1930). He also mentioned nesting Bald Eagles (same time period) at Punta Banda (Bancroft 1932:44) and earlier nesting at Isla Los Coronados (presumably the 1902 record mentioned above).

Antero Diaz (Bahia de los Angeles) showed one of us (DWA) an abandoned Bald Eagle nest on Isla San Esteban (in Sonora), and said it was occupied in the late 1960s. The extremely large abandoned Bald Eagle nest was photographed by DWA several times during 1972–1978, but the nest has since deteriorated. In early January 1980 and early January 1984, T. Bowen and colleagues (San Jose State Univ. pers. comm.) observed and photographed a single adult Bald Eagle in a dense cardon cactus forest above the old site on Isla San Esteban, but no nest was ever seen.

Nesting in Baja California, 1977–1993. Nesting records in the Magdalena Bay region since 1977 can be divided into those on and near Isla Creciente and those from the remainder of the region (Table 1). Isla Creciente and southeastern Isla Santa Margarita were surveyed intensively and yielded comparable annual data. The two active sites (nests A and C) on Isla Creciente in January 1984 were later visited by Knoder and Boeker (unpubl. data) on 12 March 1984; nest C was still active (two eggs) and no eagles were at the other site. Nest D was first located by our survey in January 1986 (with 2 eggs; Table 1), but Boeker (pers. comm.) listed a possible Bald Eagle nest there on 12 March 1984 (unoccupied), and Amador-Silva and Guzman-Poo (in press) reported adult Bald Eagles in the area (apparently the nest was not located by them) as early as February 1985 (one adult), March 1985 (two adults), and April 1985 (three adults). Another (apparently temporary) inland nesting site in rocks at the northeast corner of Isla Santa Margarita (nest E) was not checked frequently enough in 1985 and 1986 to yield results (Amador-Silva and Guzman-Poo in press). They reported seeing Bald Eagles in the area but not perched at the nest, and we were not aware of the nest when we saw an adult in the same general vicinity on 28 March 1992. Although nest E is shown, all data referring to that nest were inconclusive and not included in our synthesis.

Both nesting effort and the number of Bald Eagles on Isla Creciente and southeast Isla Santa Margarita have progressively decreased. The nesting activity scores by 2-yr intervals for these islands were 3.0, 2.5, 3.0, 2.0, 2.5, 1.5. Also, the 2-yr intervals may be reviewed by known number of nesting attempts: 3, 2, 3, 1, 2, 1. The maximum number of pairs nesting there in any year was two and that occurred

Table 1. Occupancy of established nest sites by Bald Eagles in Magdalena Bay, Baja California Sur, Mexico, 1977–1993.

	Isla Creciente and Southeast Isla Santa Margarita				Remainder					Nest Score[b]	
Year	Nest A 2422-1139	Nest B 2422-11137	Nest C 2422-11133	Nest D 2422-11143	Nest E 2430-11150	Nest F 2534-11206	Nest G 2503-11208	Nest H[a] 2515-11206	Nest I 2446-11157	A–E	F–I
1977	XX					XX				1.0	1.0
1983	XX		XX							2.0	[c]
1984	XX		XX			XX				2.0	1.0
1985	X			(X)	(X)					0.5	[c]
1986	XX			XX	(X)		XX			2.0	1.0
1987	XX						XX			1.0	1.0
1988	XX		X				XX			1.5	1.0
1989			X				XX			0.5	1.0
1990	XX						XX			1.0	1.0
1991		XX	X				XX			1.5	1.0
1992		X			(X)		X		XX	0.5	1.5
1993	XX						XX		XX	1.0	2.0

Note: XX = incubating pair, or young in nest; X = adult near nest without eggs, young, or an incubating bird; (X) = adult in general vicinity of nest site (no direct association with nest observed).

[a] Remnant nest discovered in 1986 that was soon destroyed.

[b] See text for scoring procedures.

[c] No search effort in portion of study area called "Remainder" in 1983 and 1985.

in three of the first five years. The assigned score of 0.5 for 1985 is probably low for reasons mentioned regarding nest D. We are unsure if nest E was ever occupied by Bald Eagles.

The Bald Eagle population in the remainder of the region appeared stable. Nest G was consistently occupied and successful from 1986 to 1993. An alternate nest within the same coordinate was found in 1992 with an adult nearby, but with no evidence of breeding. Knoder and Boeker (unpubl. data) located an active nest with two adults and one recently fledged young on 13 March 1984 near Las Tinajas, but the exact coordinates were not given. It may have been the same site (nest F) that Henny et al. (1978) located in 1977. Knoder and Boeker (unpubl. data) also saw a subadult in the same vicinity on 12 March 1984. The waterfowl crew did not locate this nest in January 1984 (area with limited search effort), but did see an adult in the vicinity. The nest discovered in a large cardon cactus on 29 March 1992 (nest I) was found as the result of intensive search effort throughout the Magdalena Bay region. The nest appeared old and was in an area not intensively checked in recent years, although Henny et al. (1978) reported Bald Eagle observations from the vicinity (Medano Amarillo) in both 1971 and 1972. The nesting activity scores by 2-yr periods, in the remainder of the region (initially pooling 1977 and 1984) were: 2.0, 2.0, 2.0, 2.0 and 3.5. The number of known nesting attempts showed the same pattern: 2, 2, 2, 2, and 3. The increase in the last 2-yr period was the result of increased search effort in 1992 which led to the discovery of nest I.

Recent Reproductive Success. The 20 January 1993 survey recorded three active nests (all with eagles incubating), but only one bird flushed from the nest revealing two eggs. Two months later (24 March) each nest contained two large young. The only other March data were obtained in 1977 (a nest with two large young and another with one large young) and 1984 (a nest with one large young) for nests not observed in January. Average brood size for successful nests observed in March was 1.67 large young for six nests.

Colorado River Delta Wintering Population. We observed an adult Bald Eagle on the delta of the Colorado River in January 1990, but more important were 10 Bald Eagles (nine adults and one subadult) at Santa Clara Slough near the mouth of the Colorado River Delta (in adjacent Sonora) on 15 January 1993 (Fig. 1). No Bald Eagles were at the slough two months later (20 March 1993). This large wetland area (about 12 500 ha) was created in 1973 by the discharge of saline drainwater from the Welton-Mohawk Irrigation District in the United States (E.P. Glenn, Univ. Arizona pers. comm.). The water flows through an 80 km concrete canal.

Other Individual Bald Eagle Observations. In January 1991, two subadult Bald Eagles were observed at Ballenas Bay, just west of San Ignacio Lagoon (Fig. 1). This location is 250 km northwest of nest G where incubating adults or nestlings were seen almost annually between 1986 and 1993. We saw no Bald Eagles outside the Magdalena Bay region in March of 1992 during the Osprey survey (67 hr of flying time) when all of coastal Baja and adjacent islands were surveyed.

DISCUSSION

The small disjunct Bald Eagle nesting population in the Magdalena Bay region continues to exist, but it is vulnerable to human disturbance and appears to be declining in its former stronghold (Isla Creciente and southeast Isla Santa Margarita). The maximum number of pairs found nesting in the Magdalena Bay region was 3 in 1984, 1986 and 1993. The intensive effort in 1992 resulted in the location of five adult Bald Eagles (including the new pair); we doubt that many more than three pairs now live in the region. The excellent production in 1993 provides some cause for optimism; however, we urge that the Mexican government immediately afford the unique habitat in Magdalena Bay special protected status and more detailed monitoring and protection of individual nesting territories. Bald Eagle protection criteria for nesting territories, from experiences in the United States and Canada, are well-tested and established (e.g., Montana Bald Eagle Working Group 1986).

Nests with complete information on reproductive success were limited because, in most years, only one survey (January) was conducted. The three nests with incubating adults in January 1993 each contained two large young nearly ready to fledge in late March which was considered excellent production (see Sprunt et al. 1973). The average brood size of 1.67 large young for six successful nests observed in March was also considered excellent, but again the sample size was small.

The 10 Bald Eagles we observed on Santa Clara Slough near the mouth of the Colorado River Delta in January 1993, and the single one we observed on

the delta in January 1990 supplement other January observations in the region. Sada (1987) reported three Bald Eagles (one adult and two subadults) at Salada Lagoon south of Mexicali on 7–8 January 1987. Patten et al. (1993) reported a subadult along the Rio Hardy on 14 January 1989. Potential contamination of wildlife at Santa Clara Slough, including eagles, by drainwater pollutants needs to be investigated. This wintering concentration is closer to the nesting population on the Rio Yaqui drainage in Sonora, Mexico (Brown 1988, Brown et al. 1987), or perhaps the central Arizona nesting population (Haywood and Ohmart 1986), and we know Baja California pairs are already on eggs in mid-January. Also, the nesting cycle is too early in Arizona (Ohmart and Sell 1980) and Sonora (Brown 1988) for the adults to be from those populations. Therefore, the wintering adult eagles on the Colorado River Delta and at Santa Clara Slough must nest later and farther north in the United States or Canada.

We observed two subadult Bald Eagles at Ballenas Bay in Baja California and Wilbur (1987) reported two subadults on Isla Cedros (17 February 1982), and one subadult at Scammon's Lagoon (20 January 1971). The sightings were all north of Magdalena Bay. The source of these five subadults observed in Baja California is uncertain, but young Florida (similar latitude) and California Bald Eagles are known to migrate north following fledging (Broley 1947, Hunt et al. 1992). Therefore, they may be eagles from Magdalena Bay.

The last confirmed nesting in the Gulf of California occurred on Isla San Lorenzo and Isla San Esteban which are remote and may provide an opportune place for successful Bald Eagle reintroductions into the Gulf of California. No adults or old nests were seen on either island during the 1992 and 1993 surveys. However, these remote islands in the Gulf (which are in various Biosphere Preserves) could provide a second focus for nesting in the region.

ACKNOWLEDGMENTS

The west coast winter waterfowl surveys and the special resurvey of nesting Ospreys in 1992 and 1993 were conducted by the U.S. Fish and Wildlife Service in cooperation with the Dirección General de Aprovechamiento Ecológico de los Recursos Naturales (SEDESOL) of Mexico as part of the U.S.-Mexico Joint Agreement. CJH and DWA especially thank our pilot John Winship for taking us safely into remote and potentially dangerous places. E. Almador-Silva kindly provided us his recently completed report. Raymond J. Quigley, Ed N. Harrison, and Lloyd F. Kiff provided historical information from the Western Foundation of Vertebrate Zoology. We thank the North American Waterfowl and Wetland Office, U.S. Fish & Wildlife Service, which provided partial funding to conduct the 1992 and 1993 surveys. An earlier draft of the manuscript was improved by the comments of David H. Ellis, Sanford R. Wilbur, Nimish Vyas, and several anonymous reviewers.

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Received 24 June 1993; accepted 30 August 1993