

DISTRIBUTION AND STATUS OF BIRDS OF CONSERVATION INTEREST AND IDENTIFICATION OF IMPORTANT BIRD AREAS IN SONORA MEXICO

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INTRODUCTION

Ornithological studies in Sonora, Mexico began over a century ago and have continued to the present day (Stephens 1885, Moore 1938, van Rossem 1945, Marshall 1957, Short 1974, Russell and Monson 1998, Rojas Soto et al. 2002, Villaseñor 2006, Flesch 2008a). A. J. van Rossem (1945) provided the first statewide account of bird distribution in Sonora that he based primarily on museum specimens obtained between 1835 and the 1940s. J. Marshall Jr. (1957) provided detailed information on distribution, abundance, and habitat of birds in pine-oak woodlands in many of the higher mountains of northern Sonora. S. Russell and G. Monson (1998) synthesized information from these and other studies, and from museum specimens and field notes from throughout mainland Sonora that they supplemented with field work at hundreds of localities. Since these unprecedented efforts, several recent studies have contributed additional information. O. Rojas-Soto et al. (2002) summarized information for Tiburon Island, A. Flesch and L. Hahn (2005) described bird communities in several little-known mountain ranges west of the region visited by Marshall (1957), F. Villaseñor (2006) described communities of birds during winter in riparian areas throughout Sonora, and O. Hinojosa-Huerta et al. (2007) summarized status of species found in extreme northwestern Sonora [see Villaseñor (2006) for a historical account of avian studies in Sonora]. Most recently, Flesch (2008a) described the distribution and status of breeding landbirds throughout much of northern Sonora and summarized recent changes in status and distribution. Despite these efforts, many portions of Sonora have remained little studied, few sites visited during past efforts have been revisited, and many areas have yet to be visited (Phillips and Amadon 1952, Russell and Monson 1998, Flesch 2008a). Therefore, current information on the distribution and status of many species is lacking and few insights into changes in these parameters are possible.

Information on status, distribution, and habitat of birds can promote efficient conservation and management. Moreover, information on species richness and threats to birds at a range of spatial scales can help focus conservation priorities and efforts to manage bird populations and their habitats. To aid Sonoran Joint Venture and its partners in understanding the current distribution and

status of birds in Sonora, and to help focus ongoing efforts to manage and conserve birds, I summarized field observations that I obtained over eight years and compared my findings to those of previous efforts. I focused on 25 species that I selected subjectively on the basis of interest, notable observations, and quality and quantity of information available. To assess any evidence of changes in distribution or status, I compared my observations with those of Russell and Monson (1998) and other observers. To help focus conservation efforts on regions that support bird communities that are locally or regionally significant, I used information on species richness, status, and threats to recommend important bird areas throughout inland Sonora.

STUDY AREA

Sonora is the second largest state in Mexico and harbors a diversity of vegetation communities, physiographic regions, and biogeographic provinces. Vegetation in Sonora includes most of the major vegetation zones found in the Republic of Mexico (Leopold 1950, Rzedowski 1978) that occur across an elevation gradient from sea level to 2,635 m. Across Sonora quantity of summer rainfall and the presence, intensity, and duration of freezing temperatures contribute to marked transitions in vegetation that vary from open deserts to montane coniferous forests and tropical deciduous forests (Shreve 1951, Wiseman 1980, Brown 1982, Búrquez et al. 1992). These gradients and convergence of Sonoran, Sinaloan, Madrean, Chihuahuan, and Petran biogeographic provinces foster high regional diversity, result in the distributional limits of both Neotropical and Nearctic taxa (Halffter 1987, Howell and Webb 1995, Turner et al. 1995, Escalante et al. 2004), and support an avifauna estimated to include 548 species of 72 families, which is the fourth richest in Mexico (Villaseñor et al., *in press*)

Western Sonora is dominated by four of the six subdivisions of the Sonoran Desert and includes Lower Colorado River Valley, Central Gulf Coast, Plains of Sonora, and Arizona Upland desertscrub (Brown and Lowe 1980). Lower Colorado River Valley desertscrub in northwestern Sonora is the most arid subdivision and is dominated by shrubs and sub-shrubs with trees restricted primarily to drainages (Shreve 1951, Turner and Brown 1982). The Central Gulf Coast subdivision

occupies a 40-km band along the Gulf of California in west-central Sonora where succulents are often dominant. Arizona Upland desertscrub occupies a large portion of northern Sonora and is characterized by low woodland or scrubland of leguminous trees and large columnar cacti such as saguaros (*Carnegiea gigantea*). The Plains of Sonora on the central Coastal plain supports extensive areas of savannah and thornscrub and fewer cacti. Chihuahuan desertscrub is restricted to extreme northeast Sonora.

Semidesert grassland replaces desertscrub at higher elevations in north-central and eastern Sonora and plains grassland is largely restricted to higher elevations immediately south of Arizona in the Santa Cruz and San Pedro watersheds. Subtropical vegetation with Sinaloan affinities and montane vegetation with Madrean affinities replace desertscrub and grassland to the south and east. Madrean evergreen woodland dominated by oaks (*Quercus*) and pines (*Pinus*) occur at elevations generally above 1,200 m (Brown 1982) and transitions to Madrean montane conifer forest of pines and occasionally fir (*Pseudotsuga* and *Abies*) typically above 2,000 m. Foothill and coastal thornscrub occupies a large area on the southern Coastal plain and in the central and southern foothills below 950 m; dense, drought deciduous short trees, shrubs, and succulents dominate and forms a closed canopy 2 to 8 m tall (Brown 1982). Shrubs of the north transition to trees further south and form tropical deciduous forest predominately on slopes in southern and eastern Sonora between 300 and 1,100 m elevation (Gentry 1942, 1982). Although floristically similar to thornscrub, deciduous forest is distinguished by greater height, larger leaf area, and an increased proportion of tropical elements (Gentry 1982, Martin et al. 1998). Riparian vegetation associations vary widely across these major vegetation communities and include galleries of riparian evergreen forest with Sinaloan affinities and gallery forests and woodlands of broadleaf and microphyllous trees.

METHODS

SITE SELECTION

I collected information on birds between February 2000 and June 2007 and focused during the breeding season. Effort during 2000-2001 was nearly statewide and largely incidental to studies

of ferruginous pygmy-owls (*Glaucidium brasilianum*; Flesch 2003). Effort during 2002-2007 was focused in northern Sonora (Flesch 2008a, Flesch and Steidl 2006, 2007) but included extended field trips to portions of central, eastern, and southeastern Sonora (e.g., Flesch and Hahn 2005, O'Brien et al. 2006, Flesch 2008b). Over 7.5 years, I recorded observations during 452 different days. I also completed a total of approximately 50 additional days from July 2007 to July 2008 yet only selected records from this period were included.

I used three methods to select sites for surveys: (1) random placement of survey transects, (2) non-random placement of survey transects, and (3) incidental observations. Random sampling provided inference to large portions of Sonora whereas non-random sampling allowed the flexibility needed to efficiently locate and survey important environments that often had low landscape coverage and otherwise low probability of being sampled and opportunistic efforts in interesting or otherwise accessible areas.

To select survey sites I generated a random sample of coordinates at elevations $\leq 1,200$ m that I stratified by major vegetation community and allocated in proportion to the coverage of each community. Around each point, I established one transect along the closest drainage that was >2 m wide and within 1 km of a road in each of four possible topographic formations (valley bottoms, lower bajadas, upper bajadas, and mountain canyons) that occurred within 20 km of each point. Selection was constrained to low and moderate elevations because most transects were initially established for surveys of ferruginous pygmy-owls.

To expand coverage across a broader range of elevations, I selected another sample of transects non-randomly. I placed transects along drainages and occasionally on slopes or trails in riparian areas, canyons, montane and tropical forest, plains grassland, and focused in areas that were not adequately covered by random transects or where I suspected the occurrence of species with specialized habitat requirements. I selected locations for incidental observations opportunistically by noting observations while scouting, traveling between transects, in camp, and at times of day that were not efficient for transect surveys.

FIELD SURVEYS

I visited most transects only once and visited others >10 times depending on the timing of initial surveys, accessibility, interest, and the location of other efforts (e.g., Flesch and Steidl 2006, 2007). Each transect consisted of a linear search area approximately 1–6 km in length. To survey transects, I walked linear routes that typically followed drainages and temporarily walked in perpendicular directions to investigate bird activity or areas of interest. I recorded all species of birds that I detected during surveys, estimated numbers of individuals or pairs, noted any evidence of breeding, and walked at variable speeds depending on the amount of bird activity and complexity of the terrain. I often noted only presence and breeding behavior of common species so that I could focus on detecting and estimating abundance of less common species and traverse larger areas during morning. I surveyed during mornings but noted observations at other times of day or night. To rouse birds and augment visual and aural detection probabilities, I often mimicked or broadcast recorded territorial calls of pygmy-owls during surveys, which is similar to the method used by Marshall (1957). Along most transects that I selected randomly, I broadcast calls of pygmy-owl at 350–600 m intervals while simultaneously surveying for owls (Flesch 2003). Along transects that I selected non-randomly, I mimicked or broadcasted calls of pygmy-owls at less systematic intervals. At night, I broadcasted conspecific vocalizations to elicit responses from nocturnal species on an opportunistic basis. I focused incidental observations on species that were uncommon, rare or of interest, and recorded the number of individuals detected and any evidence of breeding.

ANALYSES

I used qualitative methods to describe distribution and status of selected species. To classify relative abundance, I divided the number of localities where a species was detected by the total number of transects visited during the breeding season. I used these estimates together with incidental observations to classify relative abundance as common (frequently encountered as individuals, pairs, or small groups), fairly common (a few individuals or pairs detected), uncommon (present but may not be found in a day or two of field observations), and rare (present but rarely

detected and often restricted to localized area), as defined by Russell and Monson (1998: 15). I presumed breeding was occurring if individuals were singing, paired, territorial, or exhibiting other circumstantial evidence of breeding and birds were in typical breeding habitat during the breeding season. For raptors, I presumed breeding was occurring if adults were present in typical breeding habitat during the breeding season. I used more rigorous standards for species that were in atypical breeding habitat by presuming breeding only if a territorial pair, courtship, or other behaviors indicative of breeding were observed. I did not presume breeding of migratory species unless observations occurred outside periods when populations typically migrate. To confirm breeding, I used criteria of the North American Ornithological Atlas Committee (1990). To define breeding habitat, distribution, and migration and wintering periods, I supplemented my observations with data from Sonora (van Rossem 1945, Marshall 1957, Russell and Monson 1998), adjacent portions of southern Arizona (Monson and Phillips 1981, Rosenberg and Witzeman 1998 and 1999, Rosenberg 2001, Corman and Wise-Gervais 2005), and other relevant literature (Poole 2005).

To assess potential changes in status and distribution, I compared my findings with information from published sources from throughout northwestern Mexico and the American Southwest and also considered reports from Christmas Bird Counts (available at: <http://www.audubon.org/bird/cbc/hr/index.html>). To compare my findings with those of Russell and Monson (1998), I used a database that included 40,869 records of 502 species that were obtained at 596 localities between 1929 and 1996. This database was provided by Stephen M. Russell to The Nature Conservancy of Arizona and was converted from D-Base to Microsoft Access format by Dale Turner. The database contained most but not all of the mapped records included in *The Birds of Sonora*; information denoting breeding and seasonal status of each observation was not interpretable but where possible I used maps from *The Birds of Sonora* to indicate localities where a species had not been presumed to breed. Evaluating changes in distribution and status is often hampered by lack of information on the timing and location of past efforts. Therefore, I compared the spatial location and arrangement and timing of my surveys with those of Russell and Monson (1998) to assess if and when a site had been surveyed previously.

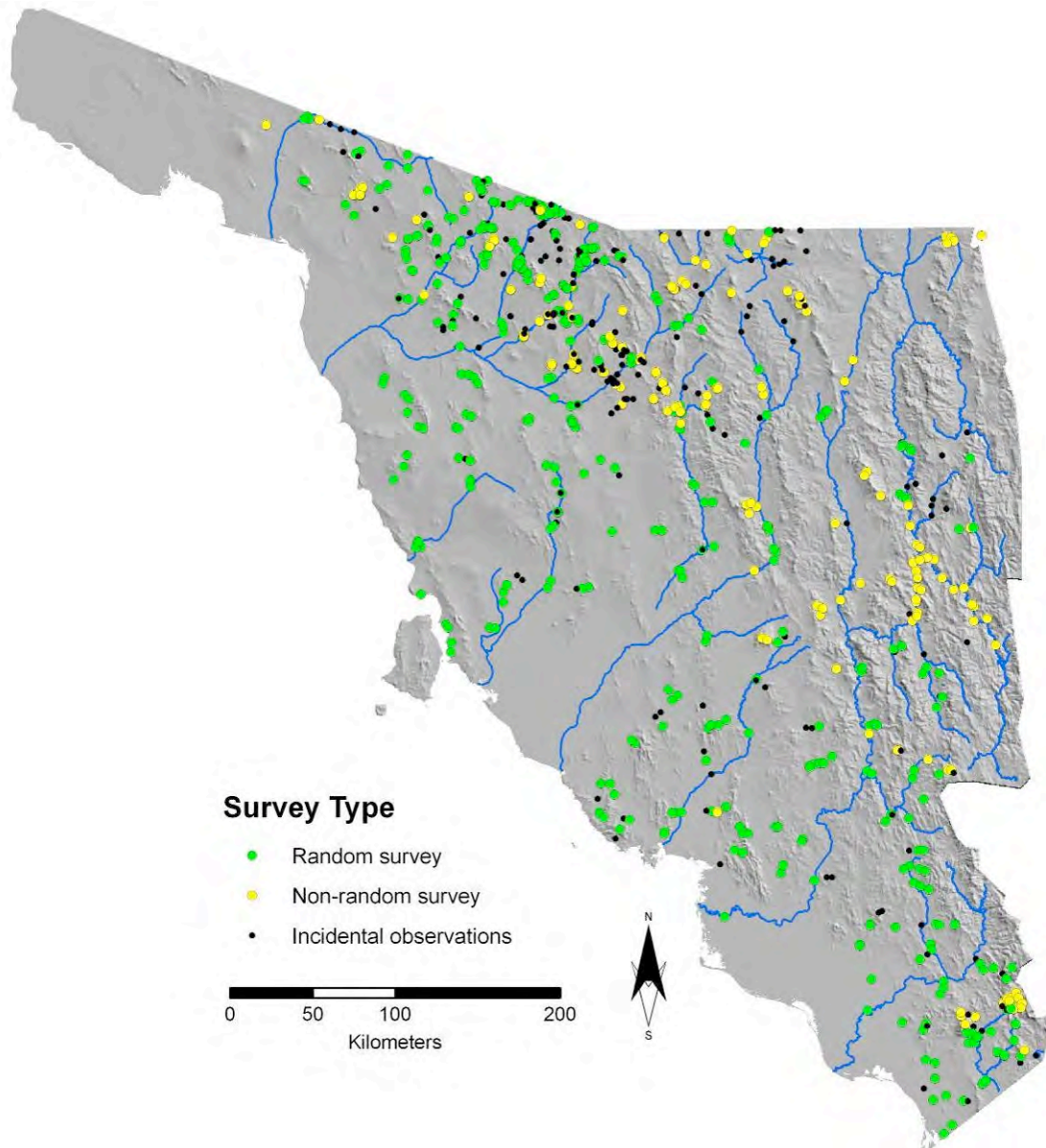
To help focus conservation efforts, I used information on species richness, distribution, status, vegetation, and threats to birds and habitat from throughout Sonora. I calculated species richness within 10 by 10 km blocks throughout Sonora that had at least one site which had been surveyed by combining my data with those of Russell and Monson (1998). I used these estimates together with information on vegetation structure and composition, land use, and threats collected during this and other efforts (Flesch 2003) to outline a series of areas that are important for conservation of bird communities in Sonora. I used the following criteria to suggest important bird areas: 1) areas with high species richness, 2) areas with species that are rare or threatened, 3) areas with populations or communities at or near their distributional limits, 4) areas with unique environments, and 5) areas with large populations of species in one or more of the previous criteria. Because of my focus on landbirds I did not consider coastal areas when suggesting important bird areas. Many of these areas however, have been considered by Arizmendi and Márquez Valdelamar (2000).

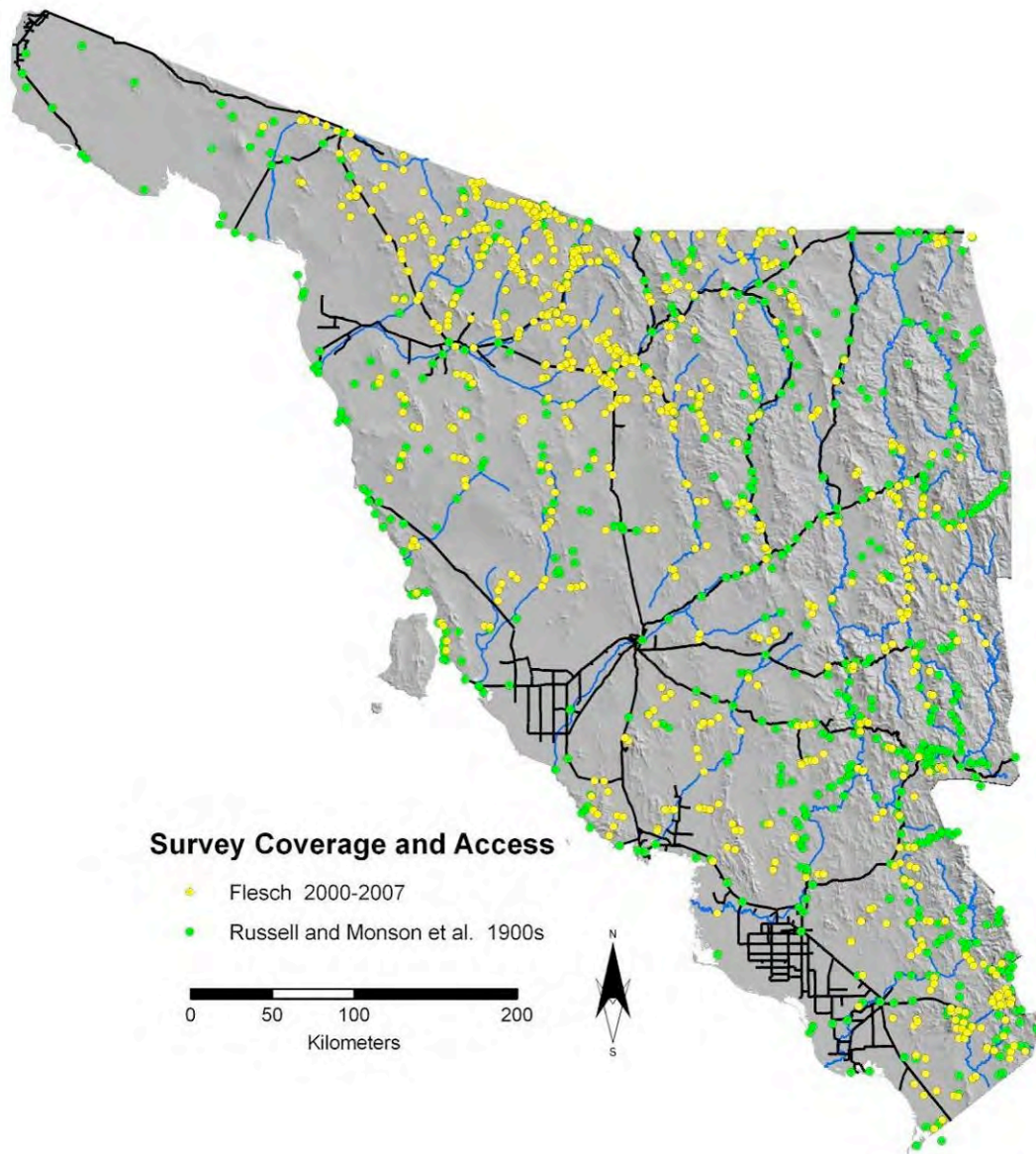
RESULTS

EFFORT

I completed 696 surveys along 455 transects, 74% of which I located randomly, and 243 incidental surveys at 198 localities. All effort combined yielded 939 site visits to 653 sites, 82% of which were from March through August and 44% were from May through July. Effort during the breeding season in southern Sonora was limited with most surveys between February and April. Effort was lowest in extreme northeastern Sonora, in the panhandle of extreme western Sonora, and on portions of the Coastal plain near the deltas of the Río Concepción, Sonora, and between the Ríos Yaqui and Mayo, where much of the landscape has been converted to commercial agriculture. Compared to the location of my efforts, Russell and Monson (1998) efforts were more focus along primary roadways, at higher elevation, and in northeast Sonora, and less focused in northern Sonora. I personally completed 70% of site visits and observers noted in the acknowledgements completed the remainder of surveys. Most locations noted in the text are listed in Russell and

Monson (1998) or are described in the text. All place names conform to those on standard INEGI 1:50,000 or 1:250,000 topographic maps.



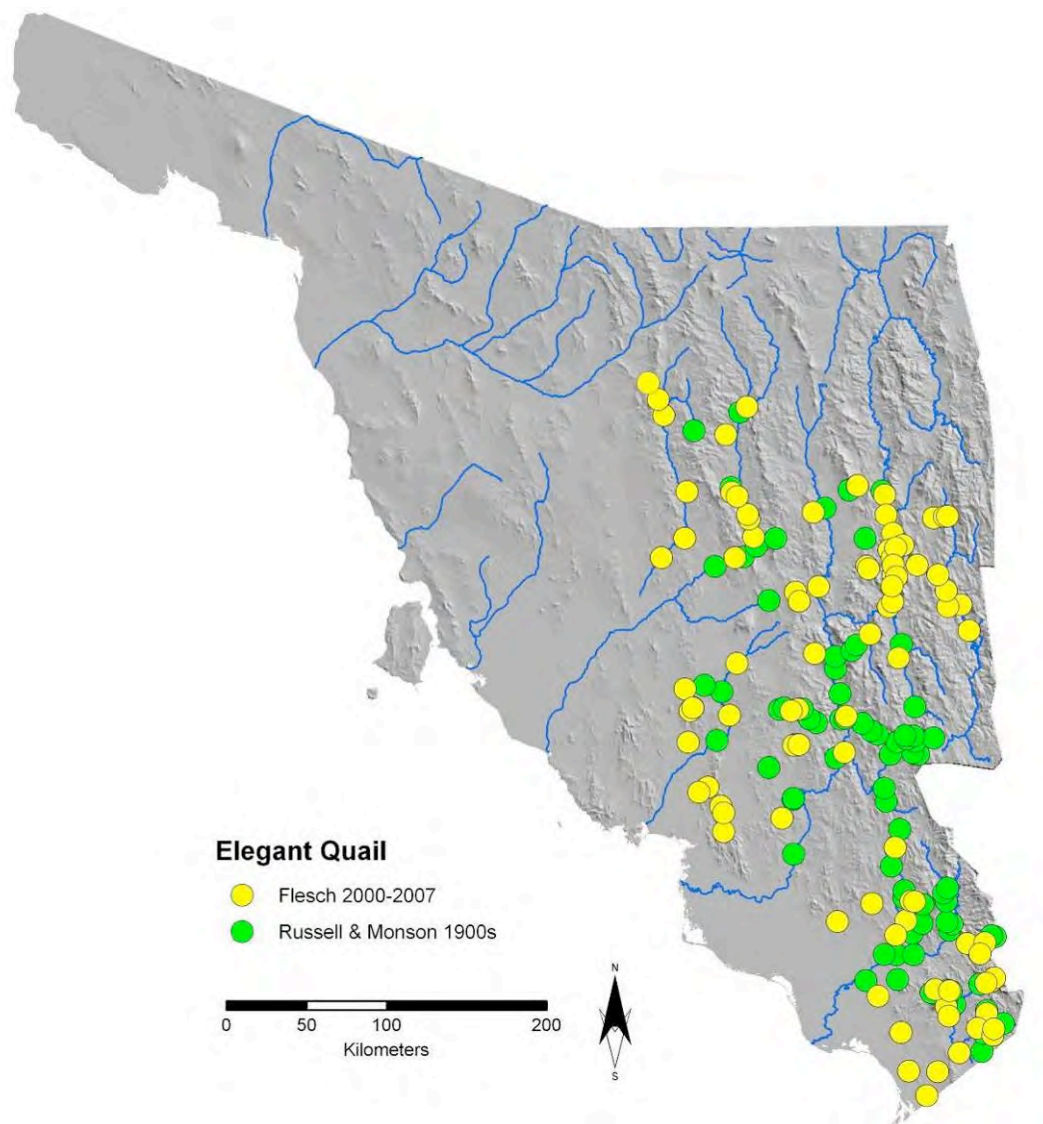


SPECIES ACCOUNTS

Elegant Quail (*Callipepla douglasii*)

These attractive quail are often revealed by loud booming calls that originate from areas of dense vegetation cover. I detected Elegant Quail in many regions of southern, central, and northern Sonora and in areas west and north of those mapped by Russell and Monson (1998). On the coastal plain of extreme southwestern Sonora these quail occur locally along large arroyos that support dense woodland. In central Sonora, Elegant Quail occur as far west as the west side of the

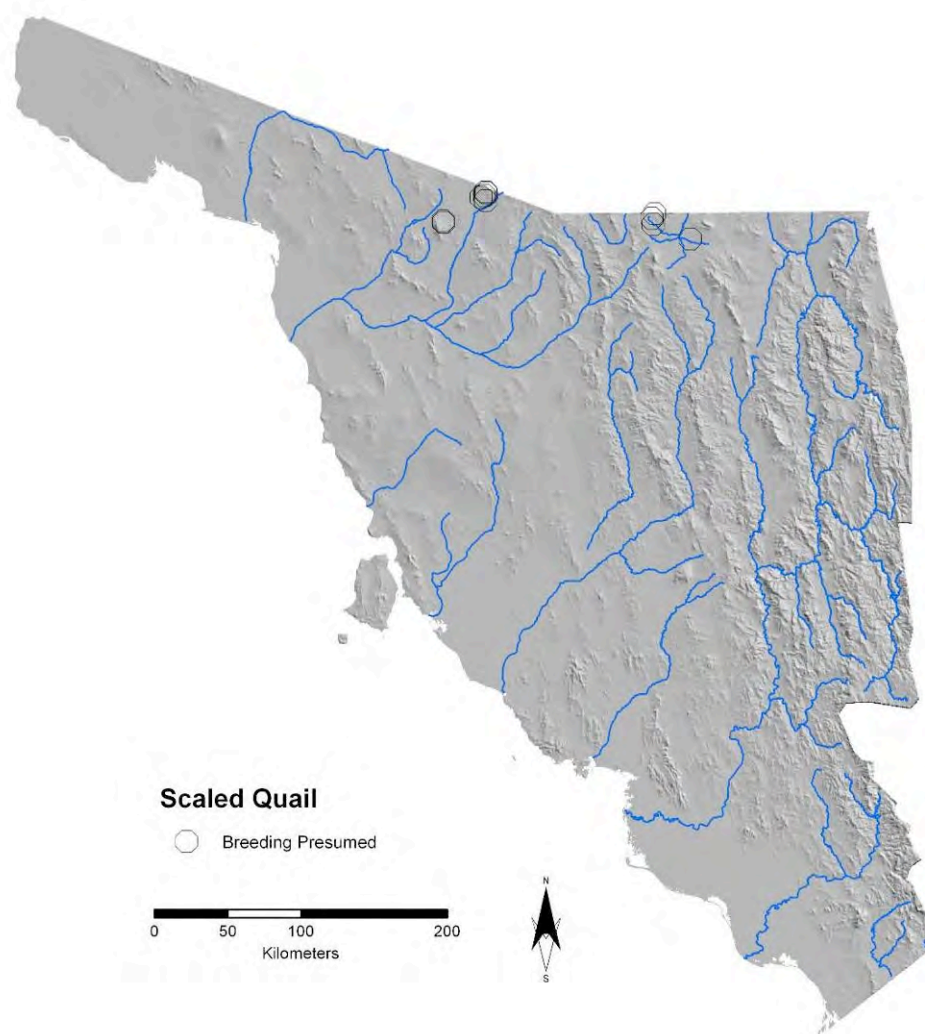
Sierra Bacatete and around the Sierra San Antonio between la Colorada and la Misa and become progressively more common to the east. To the north, Elegant Quail are distributed widely throughout much of the San Miguel River Valley north to near Cucurpe where I have found them in mesquite woodlands virtually every year since 2004. In the adjacent Río Sonora Valley I have detected them as far north as Arizpe and suspect they may occur as far north as Bacanuchi. On 29 May 2007, I detected a covey of six in a canyon bottom below the Magdalena Palm Grove. This is the northwestern-most locality and the only record in the Concepción Watershed. Elegant Quail may also occur in the Concepción Watershed on the west side of the Sierra Cucurpe.



Russell and Monson (1998) described only two breeding records and only one nest (with 10 eggs on 11 September). To this I add a nest with 15 eggs on 22 July north of the Sierra Agua Verde and a nest with 6 young on 3 September east of the Sierra Agua Verde. Like many species with affinity to tropical lowland environments, breeding activity in Elegant Quail is likely triggered by onset of the summer monsoon.

Scaled Quail (*Callipepla squamata*)

Scaled Quail are highly dependent on dense stands of open grasslands that are rare and local in Sonora. Russell and Monson (1998) considered them threatened by overgrazing and



degradation of grasslands, which is consistent with my observations throughout virtually all of their range in Sonora. I observed these quail in only three regions, west and southwest of Sasabe and throughout the upper San Pedro River Valley, where van Rossem (1945) also reported them, and on the northeast side of the Sierra el Humo where they had not been previously reported. Russell and Monson (1998) noted the westernmost population at 910 m in the Sierra el Cobre in June 1974. Good conditions for Scaled Quail still persist in the Sierra el Cobre where I suspect they still occur despite no detections during two days of field effort during the non-breeding season. In July 2006, I counted 13 calling birds during 26 five-minute point counts on Rancho los Fresnos in the upper San Pedro Valley; this area supports the highest densities of Scaled Quail I have observed in Sonora.

Sharp-shinned Hawk (*Accipiter striatus*)

Sharp-shinned Hawks are very local summer residents in the higher mountains of northern and eastern Sonora yet are fairly common in winter and during migration across a broad range of environments. In July 1953, J. Marshall collected an adult with a dependent juvenile on the west side of the Sierra los Ajos, which is the only confirmed breeding record in Sonora. Elsewhere, Russell and Monson (1998) presumed breeding at only five localities in the Sierra San Luis, Huachinera, Oscura, Calabasas (Russell's "north of Algodones"), and near Yecora. On 11 July 2006, I documented the first nest for the state at la Sal on the east side of the Sierra los Ajos. The nest was at 1,970 m, approximately 8 m above ground in a 10 m Arizona oak (*Quercus arizonica*), and contained three downy young. Other observations in potential breeding habitat at times outside typical migration dates are one below Mesa el Campanero west of Yecora on 1 September 2002, one in the Sierra la Madera on 10 September 2007, and one perched in the same area in the Sierra el Tigre on 30 April and 1 May 2008 (Sky Jacobs). J. Marshall (1950s) visited the Sierra el Tigre and both he and C. J. Cahoon (1887) visited the Sierra la Madera yet did not report Sharp-shinned Hawk. Russell and Monson (1998) observed the first fall migrant on 17 September and the last spring migrant on 12 April. I have detected migrants as early as 23 September along the Rio Yaqui



Sharp-shinned Hawk nest with three young in the Sierra los Ajos on 11 July 2006. This nest is the first for the state of Sonora. Photo was taken by Eduardo Hinajosa Robles of CONANP.

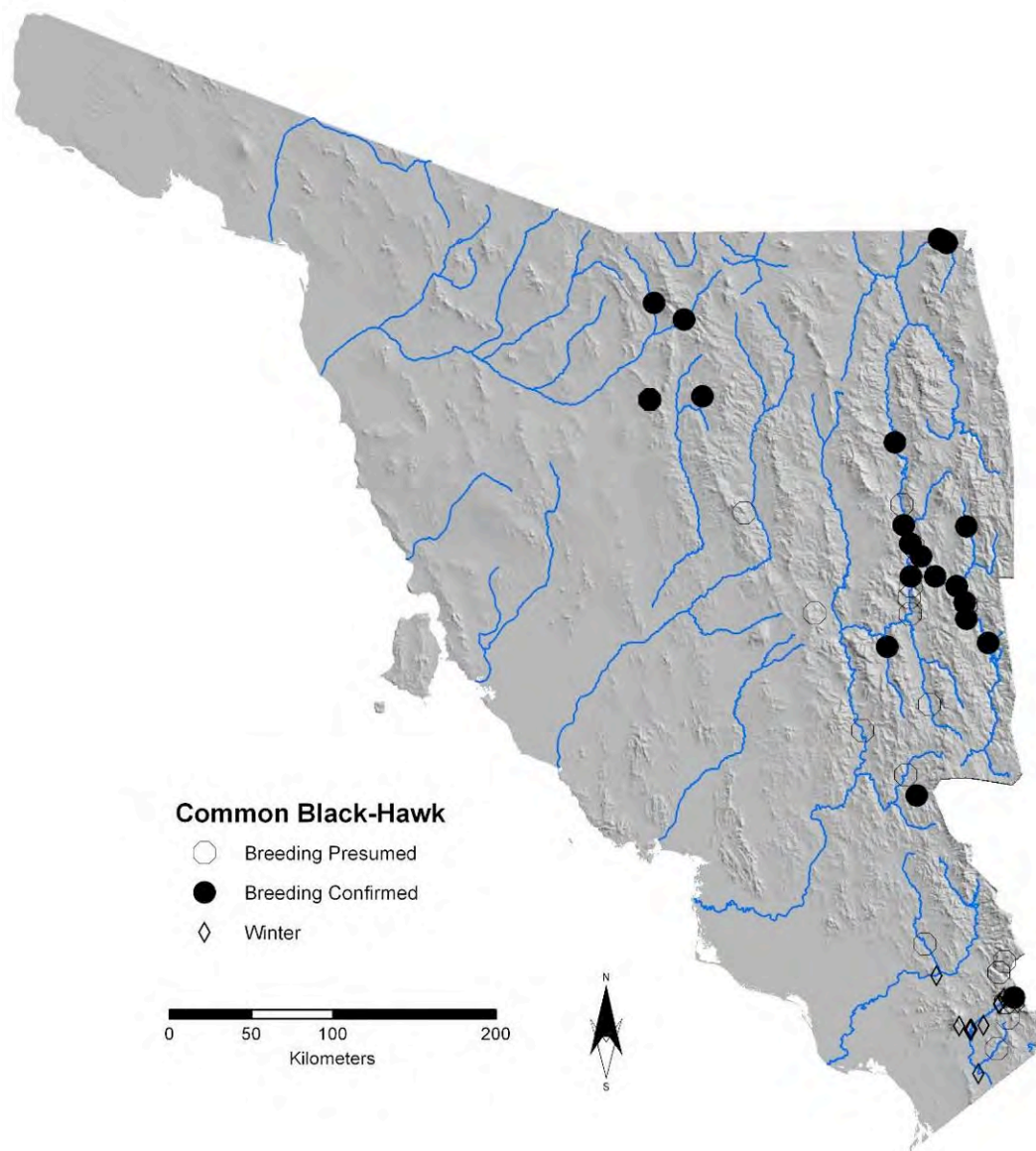
north of Sahuaripa and as late as 10-17 April (nine records) with extreme dates of 30 April (upper Río Plomo) and 2 May (upper Río Altar).

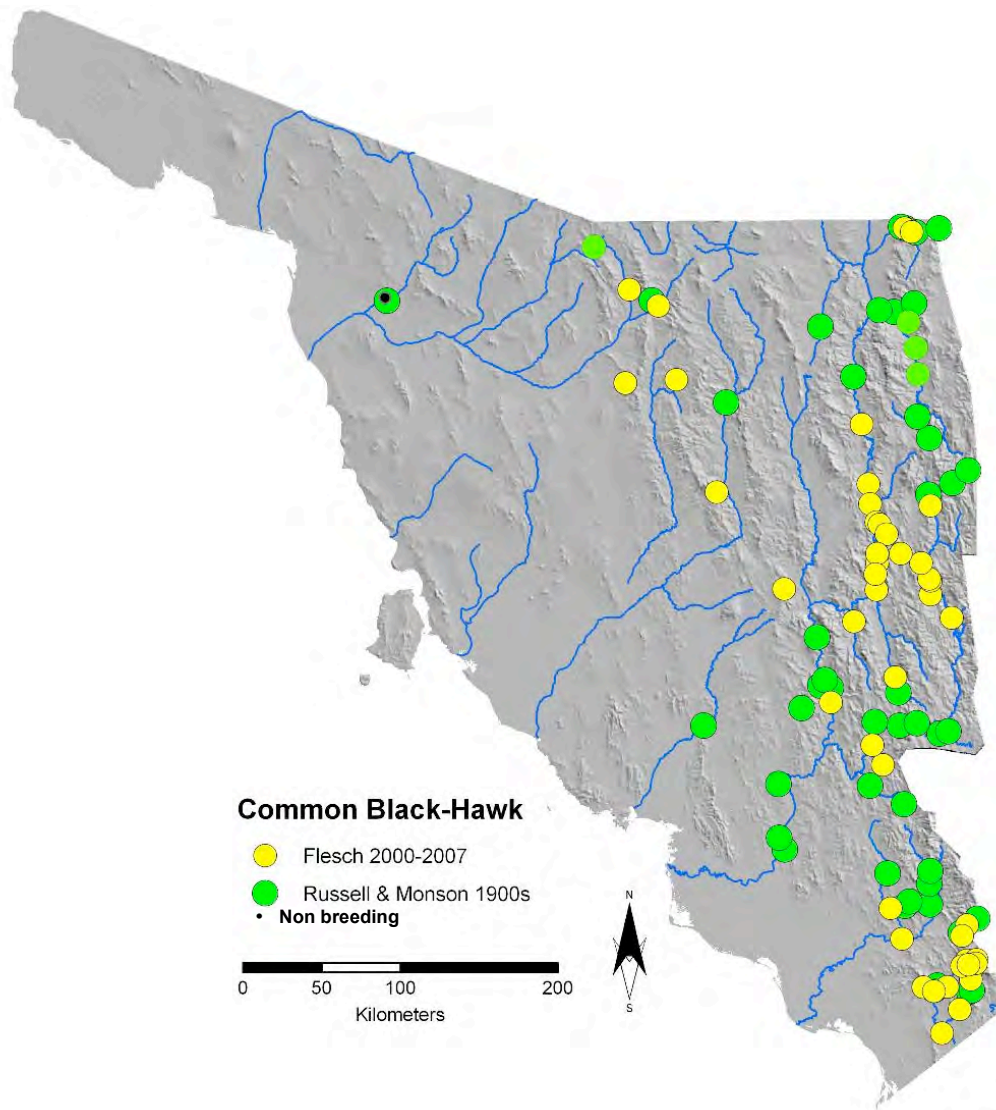
Crane Hawk (*Geranospiza caerulescens*)

This unusual raptor was described as a rare resident in southeastern Sonora based on records from only eight localities (Russell and Monson 1998). Despite considerable effort in southern Sonora, I have observed Crane Hawk only five times, further suggesting its rarity. Three observations were in the Alamos area in February or March 2001 (east side of the Sierra Alamos below Rancho las Sierritas, along the Río Cuchujaqui 5 km above Sabinito Sur, and below Cerro el Cajon) and a another was 1 km south of Cedros along the Río Cedros on 24 February 2001. This last locality is 5 km north of the northernmost observation reported by Russell and Monson (1998). On 27 and 28 July 2006, I observed an adult Crane Hawk along a perennial stretch of Canyon Bacatate in a tall gallery forest of evergreen figs (*Ficus* sp.). The bird perched in the tree tops, called multiple times, and was fairly approachable; this locality is on the west side of the Sierra Bacatate, is 115 km northwest of Cedros.

Common Black-Hawk (*Buteogallus anthracinus*)

Common Black-Hawks are obligated to wet riparian zones where they often hunt fish, amphibians, and reptiles from perches just above the water or while walking along shore. Given the rarity of these environments throughout many regions of Sonora and widespread degradation of riparian areas, distribution of Common Black-Hawks is highly clumped. Russell and Monson (1998) presumed breeding at only one locality on the coastal plain away from the lower Río Yaqui to which I can add only a single locality on west side of the Sierra Cucurpe. Common Black-Hawks are





common only along large drainages in southeast Sonora, along Arroyo Cajon Bonito in northeast Sonora, and along several reaches of the Río Yaqui, Bavispe, and especially the Río Aros. While floating an approximately 150 km stretch of the Río Aros below Natora in July and August 2005, I documented 37 sites occupied by Common Black-Hawks; at seven sites, dependent young were present and at nine pairs were present. In contrast, I observed only three pairs and two juveniles while floating approximately 45 km of the lower Río Bavispe below Granados in mid August 2004, which is before this species typically migrates. Rodríguez-Estrella and Brown (1990) suggested that densities are higher similar along the lower Río Bavispe below Presa la Angostura and Russell and Monson (1998) mapped numerous sites above Colonia Morelos.

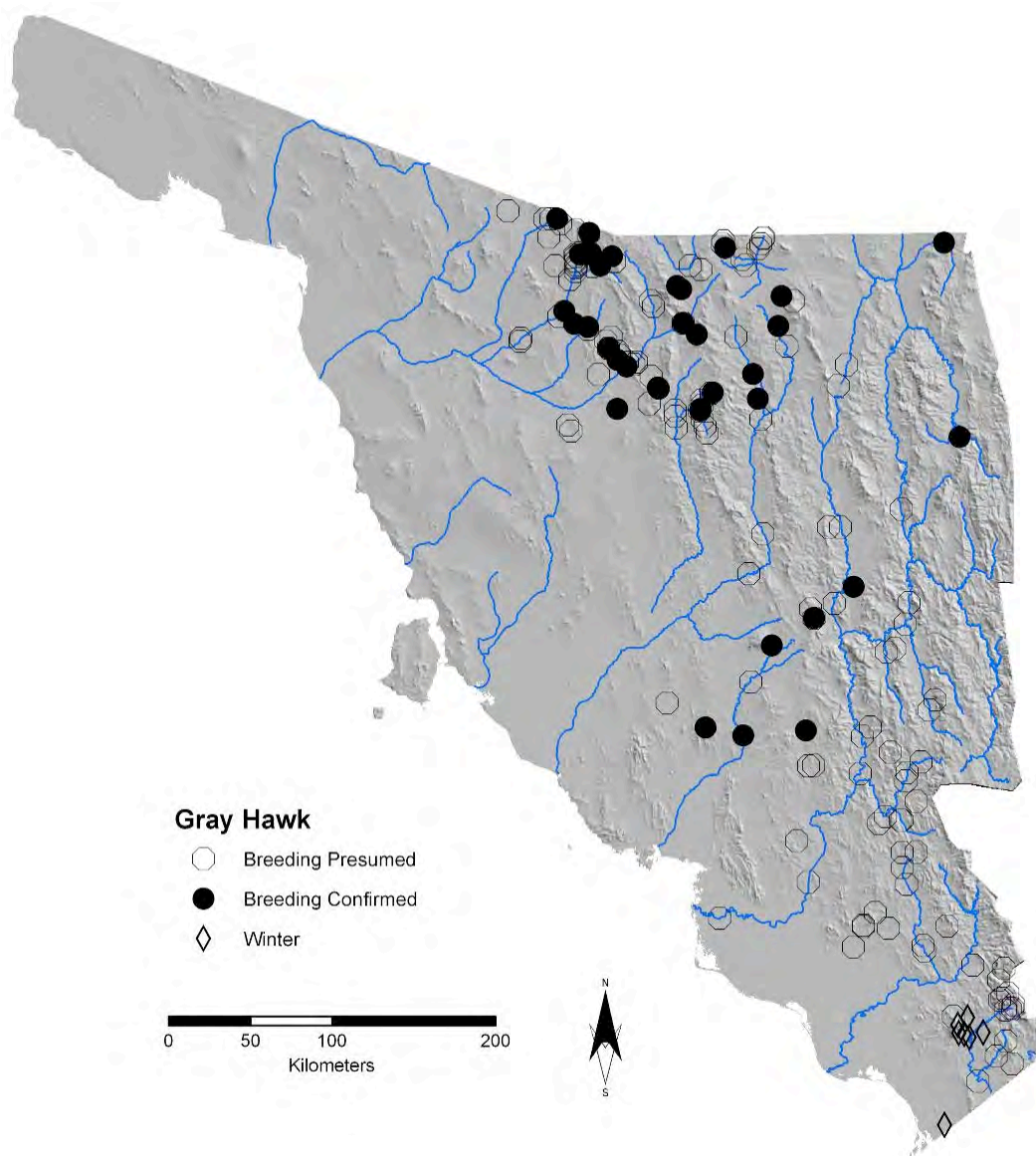
Data on nest spacing and nest timing are limited. Among pristine galleries of cottonwoods and sycamores along Arroyo Cajon Bonito, I observed three neighboring nests spaced 1.7 and 2.3 km apart in July 2006. Only five nest sites are known from north-central Sonora. A nest on the west side of the Sierra Cucurpe was occupied each year between 2005 and 2007, a nest along Arroyo Cocóspera below Aribabi was occupied in 2006 and 2007, and another nest along Arroyo Santa Domingo was occupied in 2005. An additional breeding record from northern Sonora is of a dependent young along a wet stretch of the Río Bambuto above Cibuta on 29 July 2006; all of these sites except the one along Arroyo Cocóspera were not reported by Russell and Monson (1998). Common Black-Hawks were not present in the Sierra las Avispas in 2007 due to lack of surface water yet this area has supported the westernmost breeding locality (Russell and Monson 1998). The earliest that I have observed incubation is 13 April at the source of the Río Cuchujaqui. Most young in Sonora fledge between 8 and 20 July.

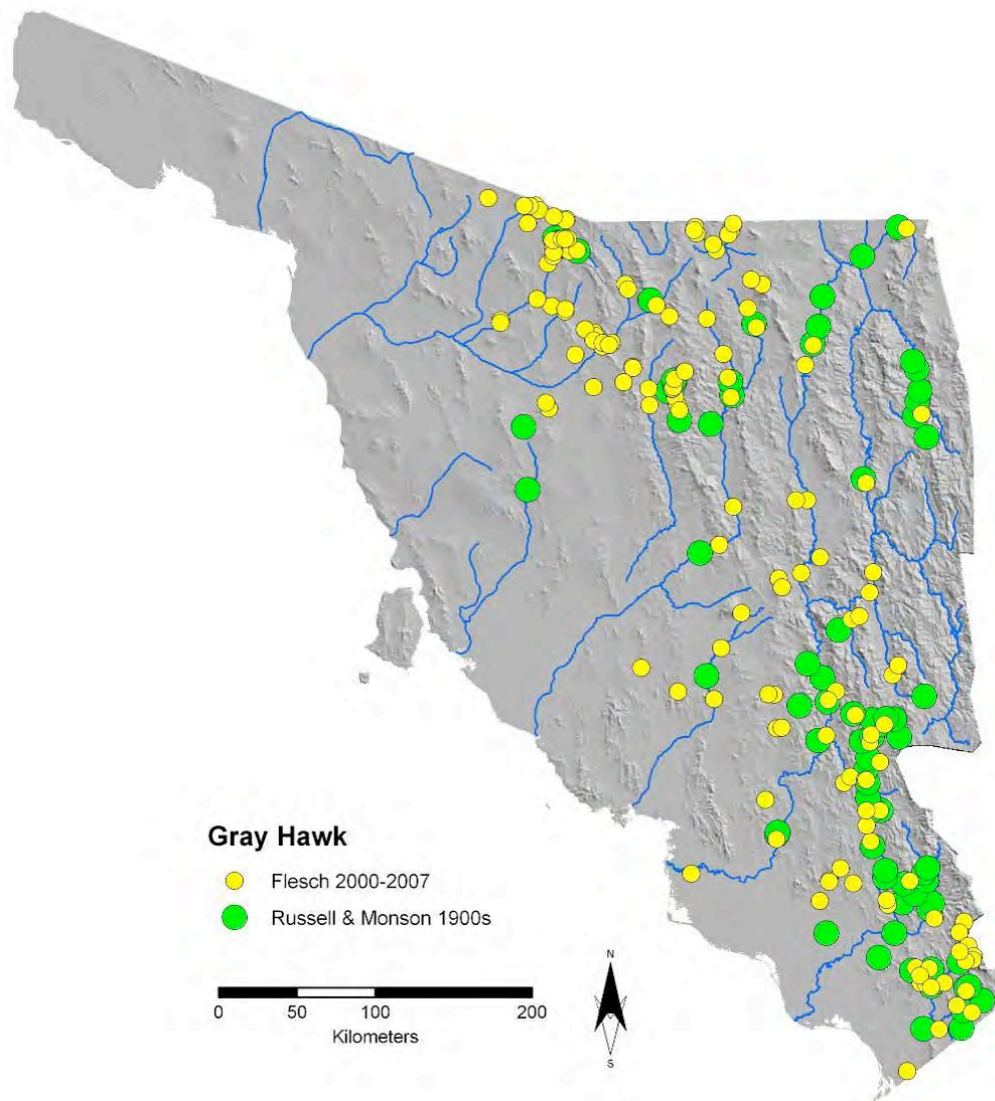
Gray Hawk (*Buteo nitidus*)

Gray Hawks are among the most common buteos in portions of southern and central Sonora where they occur in various associations of riparian woodland, tropical deciduous and semi-deciduous forest, and occasionally at lower elevations in oak or pine-oak woodland in the mountains. In northern Sonora they occur in woodland of mesquite and in galleries of chino (*Havardia mexicana*), cottonwood, willow, ash, or sycamore, and rarely in oak woodland. Russell and Monson (1998) grossly underestimated their distribution in northern Sonora by not noting presence in the San Pedro, Santa Cruz, Sasabe, Vamori, and Busani valleys and by noting few localities in the Altar and Magdalena watersheds, areas where they are rare to fairly common. In June 2008, I detected a immature individual in mesquite woodlands north of the Sierra el Humo, which is in the Arroyo Plomo watershed and is the westernmost locality in Sonora. Recent changes in status of Gray Hawks may be due to range expansion at the western edge of their range yet is more likely attributable to localized changes in vegetation structure and especially to increased survey effort (Flesch 2008a). In the north however, Gray Hawks now breed at elevations higher than those documented in

adjacent Arizona (Corman and Wise-Gervais 2005) or Sonora (Russell and Monson 1998) as evidenced by a nest with one young in the Sierra los Ajos at 1,620 m (13 July 2006) and an agitated territorial pair soaring above a riparian area at 1,810 m a day earlier.

I documented nests or dependent young at 31 localities in northern Sonora between 2000 and 2007 in a region where Russell and Monson (1998) noted only two breeding localities. Although I detected occupied nests as early as 4 April and nests with young as late as 29 July, most young





seem to fledge in the second or third week of July. Nest spacing varies widely in Sonora. The closest nests I observed were only 330 m apart along Arroyo San Domingo northeast of Cucurpe. Both nests contained two young approximately one week from fledging on 10 July and the upper nest was only 1.18 km from another neighbor with three young of similar age. The only nests that have been observed closer were 305 m apart along the San Pedro River in Arizona (Brent Bibles, pers. comm.).

Short-tailed Hawk (*Buteo brachyurus*)

Russell and Monson (1998) reported this small buteo at 11 localities between 1982 and 1995 in areas ranging from tropical deciduous forest to pine-oak woodland. Only two of these records however, were north of 29° N. latitude, two were near Yecora, and others were in southeast Sonora. Since these observations, single individuals have been detected on the Christmas Bird Counts around Alamos in 1999, 2004, and 2005 and Yecora in 2000 (two records) and 2005.

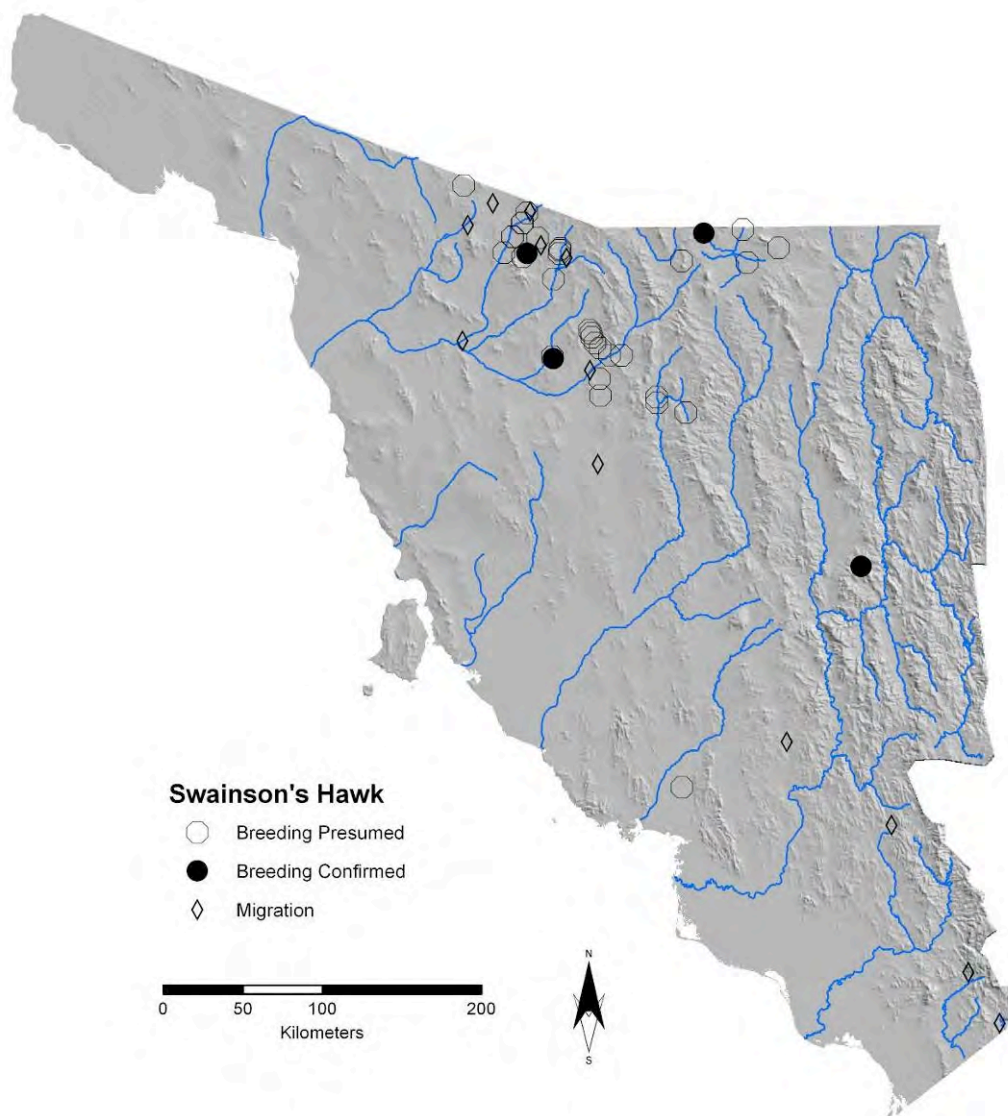
Short-tailed Hawks are still rare in Sonora and occur locally in pine forest and pine-oak woodland in the Sky Islands. My observations of Short-tailed Hawks are limited to only four localities, in pine forests in the Sierra Elenita (west of Cananea; 10 July 2006 at 2000 m), Sierra los Ajos (12 July 2006 at 2230 m), and Sierra la Madera (10 September 2007 at 2000 m), and in tropical thornforest at the base of the Sierra Zetasora north of Sahuaripa (11 July 2008 at 760 m). All my observations are of single light morph adults except in the Sierra la Madera where I repeatedly observed a pair soaring with a juvenile during the morning. The juvenile intermittently perched in tall pines on the ridge while one or both adults continued to kite and soar nearby. This is the only observation in Sonora that suggests recent breeding. Short-tailed Hawks have recently expanded their range throughout much of northwestern mainland Mexico and have recently bred in the Chiricahua Mountains in extreme southeastern Arizona (Williams et al. 2007).

Swainson's Hawk (*Buteo swainsoni*)

Swainson's Hawk are uncommon summer residents in grassland, open savannah, and along valley bottoms with extensive agricultural development throughout much of northern Sonora where they are more widely distributed than suggested by Russell and Monson (1998). In the north, Swainson's Hawks occur in savannahs throughout portions of the upper Sasabe watershed, in agricultural areas and adjacent open country along the upper Río Altar, in the Busani Valley (between El Ocuca and La Sangre), east and south of Magdalena de Kino, in the San Miguel Valley near Cucurpe, and throughout most of the San Pedro Valley and in portions of the adjacent Santa Cruz and Fronteras valleys. The westernmost presumed breeding locality is east of the Sierra el

Cobre where on 10 May 2006 I observed and adult near the westernmost extent of semidesert grasslands in Sonora. Although this individual could have been a late migrant, my observations and those of Russell and Monson (1998) suggest spring migrants pass through northern Sonora in April, after which no observations occurred away from typical breeding habitat until late August or in some years early September. The greatest numbers of individuals I have observed simultaneously was five adults feeding over wheat fields that were being reaped in the lower Busani Valley on 9 June 2006.

Russell and Monson (1998) and Neff (1947) reported several localities including two nests on the plains east and south of Felix Gomez (Bacoachi Valley) yet my surveys in this region were

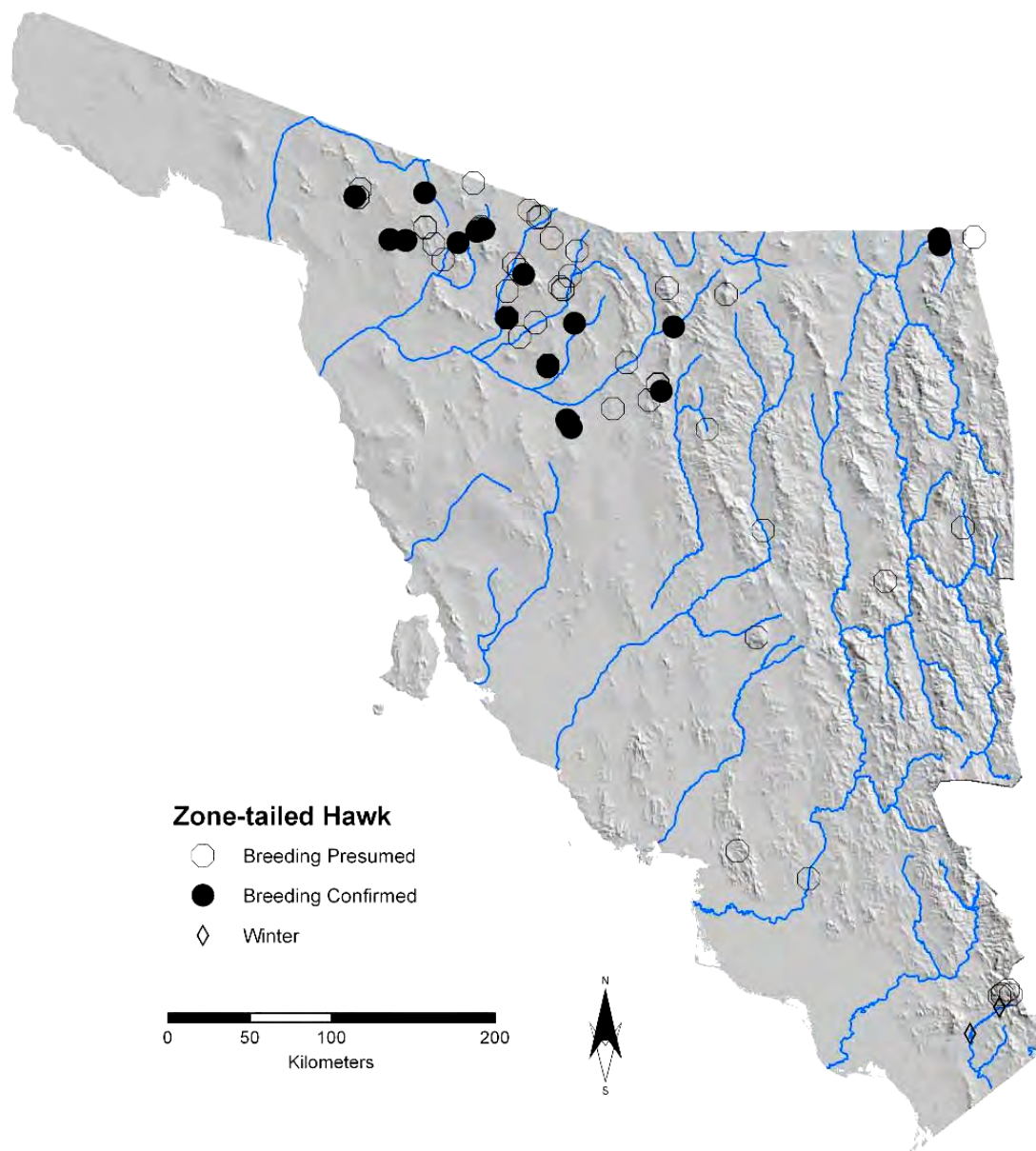


before their arrival on the breeding grounds. Elsewhere, I detected an adult on 26 July 2006 near extensive agricultural fields in the lower Matapé Valley where I suspect they may breed. Notably, I observed a fledgling within 100 m of a used nest in an oak that was being guarded by an adult on 7 July 2001 southeast of Tepache at 1,600 m in the Sierra Lampazos. The nest was in oak woodland on a slope above grassy rolling hills interspersed with shrubs and oaks in atypical breeding habitat. I documented three nests in the north: a nest with three eggs in a mesquite was 500 m east of agricultural fields along the Busani Valley on 8 June 2005, a nest with two young approximately 1-1.5 weeks from fledging was in a cottonwood on Rancho Los Fresnos in the upper San Pedro Valley on 5 July 2006, and a nest with two eggs in a western soapberry (*Sapindus saponideria*) was 5 km north of the Sierra San Juan south of Sasabe on 7 June 2007. Earliest arrival in spring was on 10 March 2002 along the Río Fuerte in extreme southeastern Sonora, which was 10 days earlier than noted by Russell and Monson (1998). Habitat of Swainson's Hawks is threatened by shrub encroachment in grasslands and by loss of tall stands of trees near agricultural areas.

Zone-tailed Hawk (*Buteo albonotatus*)

Like Gray Hawks, these dark buteos are distributed much more widely than suggested by Russell and Monson (1998), especially in the Arizona Upland subdivision of the Sonoran Desert. In this region, Zone-tailed Hawks are uncommon or occasionally fairly common summer residents and nest in tall trees in xeroriparian woodlands along large arroyos as low as 370 m west of Quitovac. Several of the 24 nests I have recorded in northern Sonora have been occupied repeatedly for as many as five years. Clutch and brood sizes range from one to two in northern Sonora and only two nests were in saguaros with others in Mexican ebony, mesquite, paloverde, catclaw acacia, oak, willow, sycamore, and cottonwood. Although I found Zone-tailed Hawks to be much more common and widespread in western Sonora than had been described previously, presence in western Arizona since at least 1939 (Phillips et al. 1964) and northwestern Sonora since 1942 (Neff 1947) suggests distribution has been largely static in northern Sonora despite recent expansion to the north (Johnson 1994, Corman and Wise-Gervais 2005). I have found Zone-tailed Hawks to be most

common along large arroyos with tall galleries of Mexican ebony where as many as four nesting pairs occurred along approximately 8 km of arroyo bottom northwest of Benjamin Hill and where nests were spaced as close as 1.7 km apart. Like many other raptors, Zone-tailed Hawks are threatened locally by loss of tall trees especially Mexican ebony. Zone tails have detected in winter only in extreme southern Sonora aside from a couple records from the Baviacora and Yecora Christmas Bird Counts.



Golden Eagle (*Aquila chrysaetos*)

This large eagle is rarely detected away from mountain ranges in northern Sonora despite suggestions that it is common throughout Sonora (Rodríguez Estrella 2002). I detected Golden Eagles in two areas where they have been reported previously (Sierra los Ajos, S. el Pinito, and in the valley southeast of the S. San Jose) and in many other localities in north-central and northwest Sonora where they had not been reported (Sierra San Francisco, el Durazno, el Cobre, el Humo, Pozo Verde, Cienegita, el Chivato). At one of these new localities an active nest and pair were present, at another I observed a used nest that was described as active in prior years (Enrique Zepeda, pers. comm.), and at a third a pair was present. To the west, David Ellis (pers. comm.) reported a used nest in the Sierra Pinacate. On 8 April 2000 I observed a Golden Eagle near the coast on the west side of Sierra Tinaja del Carmen approximately 20 km northwest of Guaymas; this is the southernmost coastal record in mainland Mexico. One reported on the Alamos Christmas Bird Count in 2000 is the only record in southeast Sonora. Golden Eagles have also been reported on the Yecora Christmas Bird Count in 1997, 2000, and 2001. All observations to date suggest that Golden Eagles occur throughout northern Sonora in and around mountain ranges that possess large cliff faces and extensive areas of grasslands or desert scrub in adjacent valleys. Few observations in central Sonora however, suggest they are exceedingly rare or absent. Current status in the Sierra Madre, near Yecora, and in mountains of southern and central Sonora is unknown.

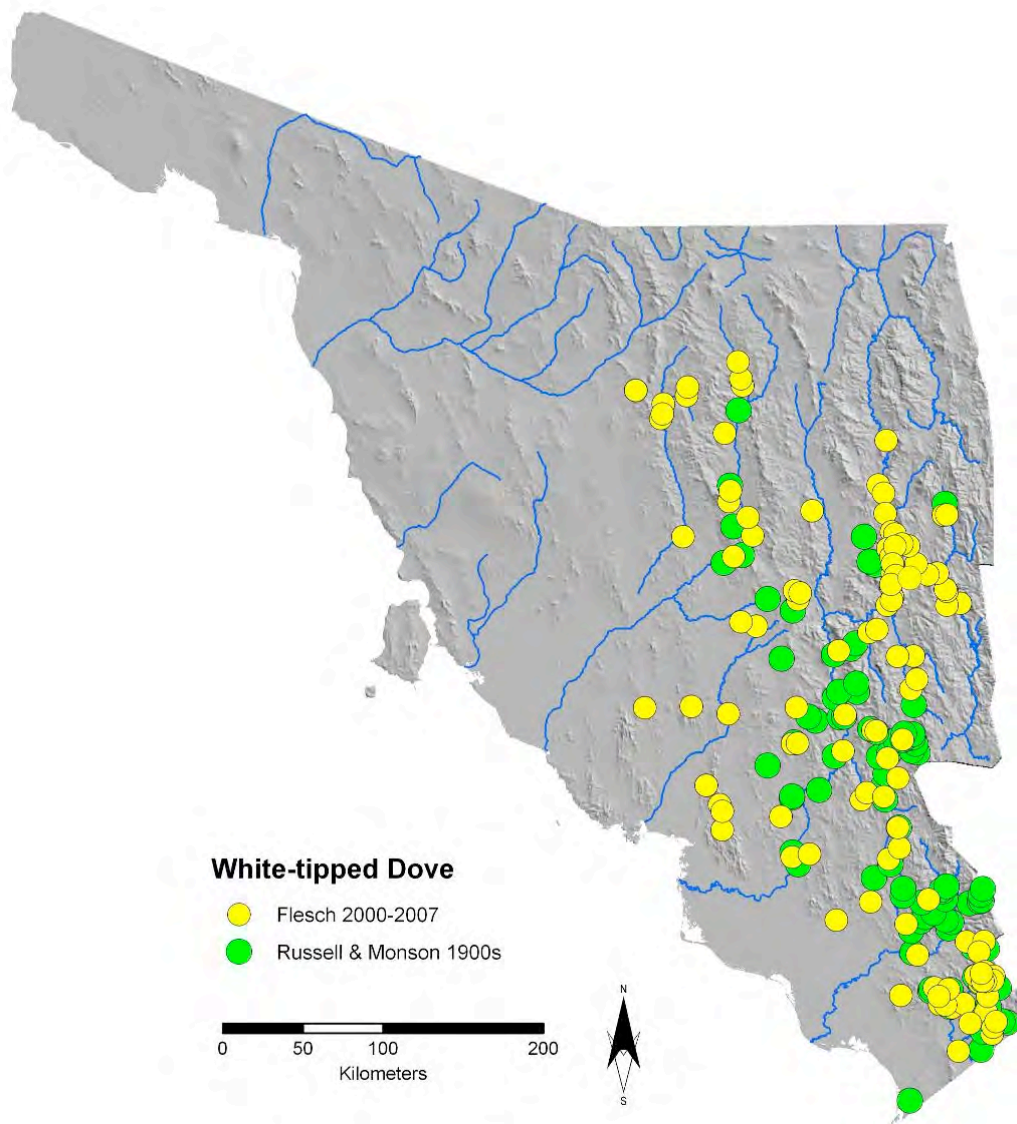
Laughing Falcon (*Herpetotheres cachinnans*)

This unique black and white raptor had not been reported in Sonora since 1949 until one was reported on the Alamos Christmas Bird Count in 1990. In February 2001, I observed an adult calling along the upper Río Cuchujaqui near el Llano de San Pedro, which is approximately 25 km east of Alamos. The Alvarez family who owns this land informed me that a pair had been present in the area since 1998. During a second visit on 15 April 2006, I again observed a single individual in this same area yet failed to detect them elsewhere in the surrounding region during an extensive eight-

day horse-pack expedition to the north and east. Landowners in the region however, reported recent sightings of “Huaco” to the east and west of el Llano de San Pedro. Vegetation where this species was observed included a mosaic of tropical forest on low hills, open cattle pastures, grassy savannah, and gallery forest of Mexican baldcypress (*Taxodium mucronatum*). Further south these raptors frequently occur in landscapes with moderate to high levels of clearing similar to areas that now dominate much of the Güirocoba region where Laughing Falcons were observed in the 1930s and 1940s (Sheffler and van Rossem 1944, van Rossem 1945). Survey results around Güirocoba, Choquincahui, and in the region around the Sierra las Tablas during February 2001 and March 2002 were all negative. Few ornithologists have visited these regions in recent years and so the current status of Laughing Falcon in southeastern Sonora is still largely unknown. There are no reports from the Alamos Christmas Bird Count since 1990.

White-tipped Dove

Like several other Neotropical species that are associated with low dense vegetation cover, White-tipped Doves seem to have expanded their range north and west in recent decades. Russell and Monson (1998) failed to detect them in the Cucurpe region as late as the mid 1980s yet they now occur along the Río San Miguel below Cucurpe and along Arroyo Santa Domingo where three were calling in mesquite woodland on 10 and 11 July 2005. At their northwestern-most locality on the west side of the Sierra Cucurpe, I detected as many as 10 on 9 June 2006; two birds at this same site on 14 January 2006 suggests they are resident even at the northern end of the range. Russell and Monson observed White-tipped Dove as far north as Canyon Toro Muerto near Arizpe in January 1992 and in April and May 1994. In the Río Sonora Watershed, I have found them approximately 50 km to the north near Bacanuchi where five were calling along the Río Bacanuchi on 7 July 2006. White tipped Dove are rare and local on the central coastal plain where they occur in well-developed thornscrub in canyons in the Sierra Libre, Bacatete, and San Antonio (north of la Misa), and in mesquite woodland along the Río Matape. In east-central Sonora they are fairly



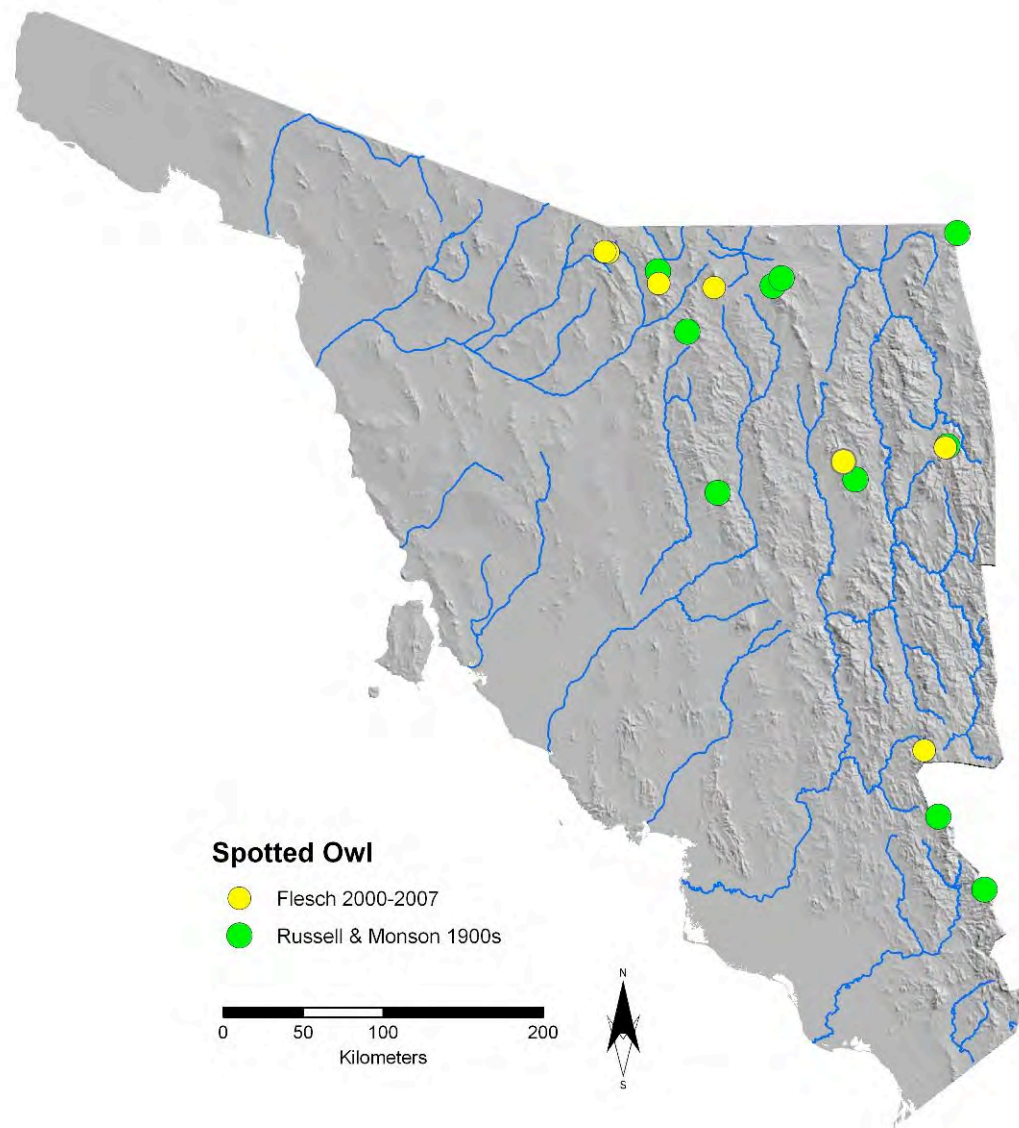
common along the Río Bavispe below Granados, upper Río Yaqui, and especially along the Río Aros.

Spotted Owl (*Strix occidentalis*)

Spotted Owls are rare in Sonora and have been reported at nine localities all in pine-oak woodland or mixed-conifer forest in high mountains. C. J. Cahoon collected one in the Sierra la Madera (Oposera) in 1887 and J. Marshall noted six localities (Sierra San Luis, el Pinito, Azul, los Ajos, Aconchi, and Huachinera). Russell and Monson (1998) added an additional two localities in

the Sierra Oscura and Calabasas and mapped a tenth locality near Mesa Tres Ríos that was not substantiated in the text or in their database (Russell and Monson 1998: 143-144). M. Cirett estimated a population size of 14 pairs in the Sierra los Ajos in the mid 1990s according to Lammertink et al. (1996).

I detected Spotted Owls at three additional localities, in the Sierra Elenita, las Avispas, and west of Mesa el Campanero. Additionally, I also observed Spotted Owls in the Sierra Huachinera and el Pinito where they had not been detected since 1954 and in the Sierra la Madera where they had not been detected since 1887. On the night of 13 June 2007 an individual made several contact calls in a riparian forest of sycamore and oak in the Sierra las Avispas at only 1,120 m; this site is at the western edge of their known range in Sonora. The following day, Sky Jacobs and I observed an adult perched in similar vegetation at a habitual roost in a canyon bottom below a large rock wall at 1,250 m. Habitat at these sites was similar to areas occupied by nesting Spotted Owls in the Atascosa Mountains in adjacent south-central Arizona (Corman and Wise-Gervais 2005). I detected pairs in the Sierra Elenita, Huachinera, and near Mesa el Campanero. In the S. Elenita two additional individuals made begging-type calls from nearby hillsides on 10 July 2006, suggesting they were dependent young. Excellent descriptions of vocalizations made by Spotted Owls are provided by Forsman et al. (1984). Marshall's failure to observe Spotted Owls in the Sierra Cananea (Elenita and Mariquita) in the 1950's was likely due to logging that occurred shortly before his surveys whereas in the Sierra la Madera it was likely to due to poor conditions of his survey site (Marshall 1957). Spotted Owls likely occur in several other mountain ranges in northern and eastern Sonora that support mature forests of pine. Limited accessibility of these areas has greatly limited our knowledge of the distribution and status of Spotted Owls and many other species dependent on high-elevation forests (Flesch 2008a).

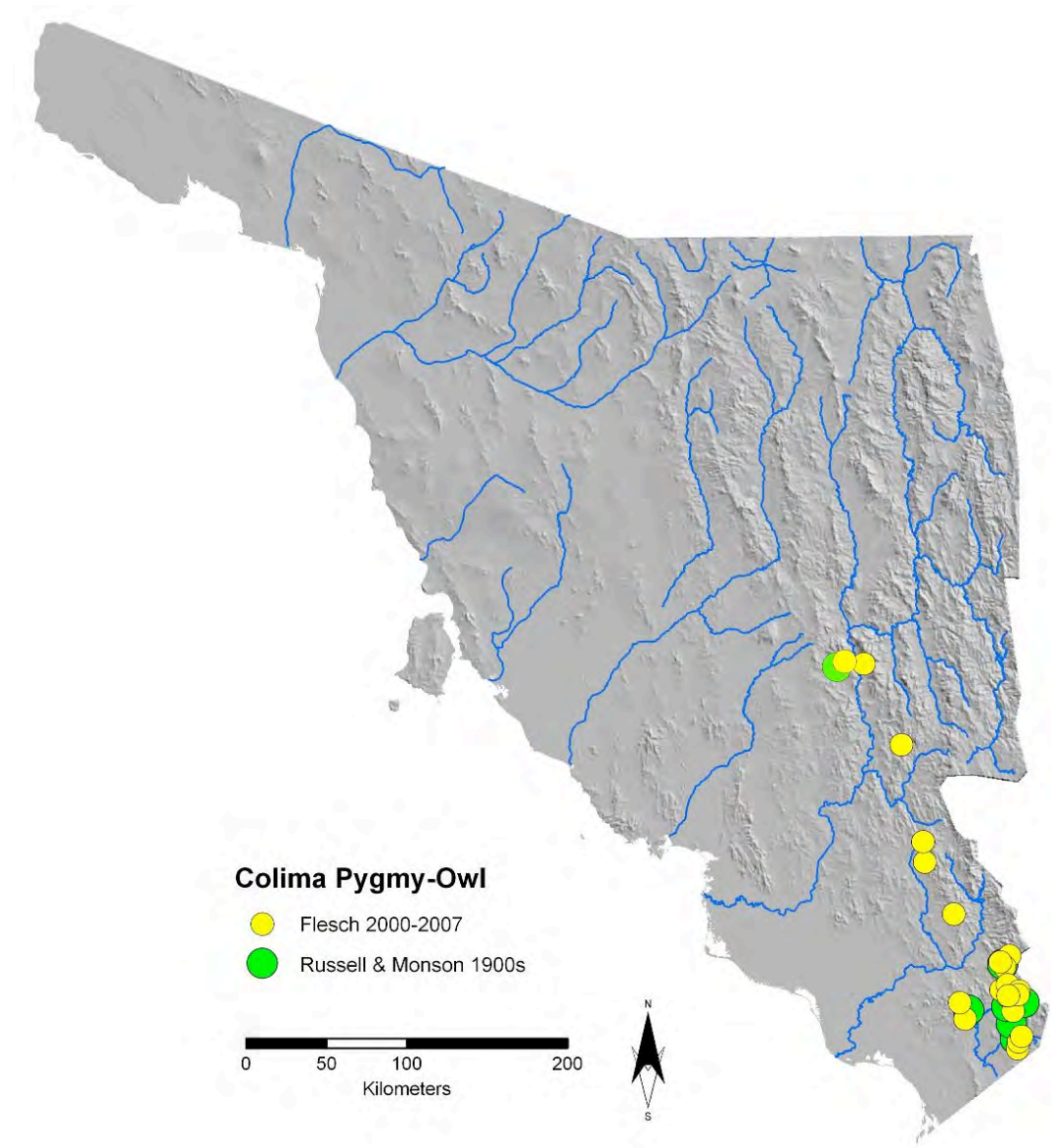


Colima Pygmy-Owl (*Glaucidium palmarum*)

This small diurnal owl is little known in Sonora. I detected from one to eight individuals or pairs at 22 localities in southeast and east-central Sonora between 2000 and 2007. My observations were from January through April and in June and September suggesting that like other *Glaucidium* they are resident. The highest density that I have observed was in Canyon Santa Barbara (25 km east of Alamos) where eight territorial adults were recorded along a 2.6 km transect and as many as three individuals were heard simultaneously. In southeast Sonora, Colima Pygmy-Owls typically

occupy the tallest best-developed tropical forests typically on steep slopes where palo joso (*Conzattia multiflora*) is often present. Colima Pygmy-Owls also occur in canyons with associations of oak, palm, and tepaguaje (*Lysiloma watsonii*) and in tropical thornscrub and forest especially those in steep canyons adjacent to galleries of Mexican baldcypress. At Rancho Santa Barbara, two were calling vigorously on 10 April 2006 in pine-oak woodland at 1,250 m in an area where I had detected Northern Pygmy-Owl the previous December. During that same April however, Northern Pygmy-Owls were not detected below 1,615 m and occurred only in higher-elevation associations of pines and oaks. These observations suggest both species may make short-range elevational movements between seasons. The two northernmost records east and west of La Estrella near Presa Novillo were obtained on 15 and 16 March 2001 and are close to a locality reported by Howell and Robbins (1995) in June 1991. Survey efforts in the nearby Sierra Agua Verde and elsewhere were negative although I suspect Colima Pygmy-Owls may occur slightly north of their mapped range in mountains northeast of Presa Novillo.

When Colima and Ferruginous Pygmy-Owls were detected simultaneously, Colimas were always on steeper slopes and in denser vegetation and Ferruginous were in more open vegetation typically on flat terrain or on shallow slopes. The two species can apparently hybridize. On 23 February 2001, I studied an individual at close range that had plumage and vocal characteristics of both species. The forehead had fine off-white linear streaks and the sides and top of the head had large diffuse spots. The tail had five off-white bars that were broken in the center and wider toward the edges. The bird initially vocalized like a Colima Pygmy-Owl until reaching a steady series of higher loopier notes typical of Ferruginous Pygmy-Owl. Notably, a Ferruginous Pygmy-Owl was calling immediately below this individual in the canyon mouth and a Colima Pygmy-Owl was calling simultaneously on steeper slopes above. Although not seen, another individual with intermediate vocal attributes was detected in Canyon el Jacalón east of Rosario on 25 February 2001. Vocalizations of Colima Pygmy-Owls typically begin with a short introductory chatter followed by a single flat whistled *whooo*. This single note is then repeated a second, then third time with notes of



equal length and spacing. Following this series of three notes, 4-5 more closely spaced notes that increase in speed are given and the series is repeated and often becomes more rapid.

Long-eared Owl (*Asio otus*)

Long-eared Owls were described as casual winter visitors in Sonora on the basis of four records (Russell and Monson 1998). Although I suspect they may nest sporadically in northern Sonora, as they do in neighboring Arizona (Corman and Wise-Gervais 2005), no records are from

summer. I detected Long-eared Owls only twice. On 13 February 2000, I flushed a group of eight individuals from a mesquite along the lower Río Sasabe north of Altar at 480 m and on 9 April 2000 I observed a single individual along Aguaje de Robinson Canyon in the Sierra el Aguaje north of Guaymas at 180 m.

Short-eared Owl (*Asio flammeus*)

Short-eared Owls are rare winter visitors in Sonora and had not been reported in the grasslands southeast of Nogales since 1892 (Russell and Monson 1998). On the evening of 23 February 2007, I watched two individuals flying low over grassland in the upper San Pedro Valley on Rancho los Fresnos. Both birds landed together for several seconds, clutched talons, and exchanged vocalizations then took to the air and continued to fly near the ground. On 1 March 2008, Glenn Johnson and John Yerger observed a single bird on Rancho los Fresnos within 4 km of where I observed them the prior year.

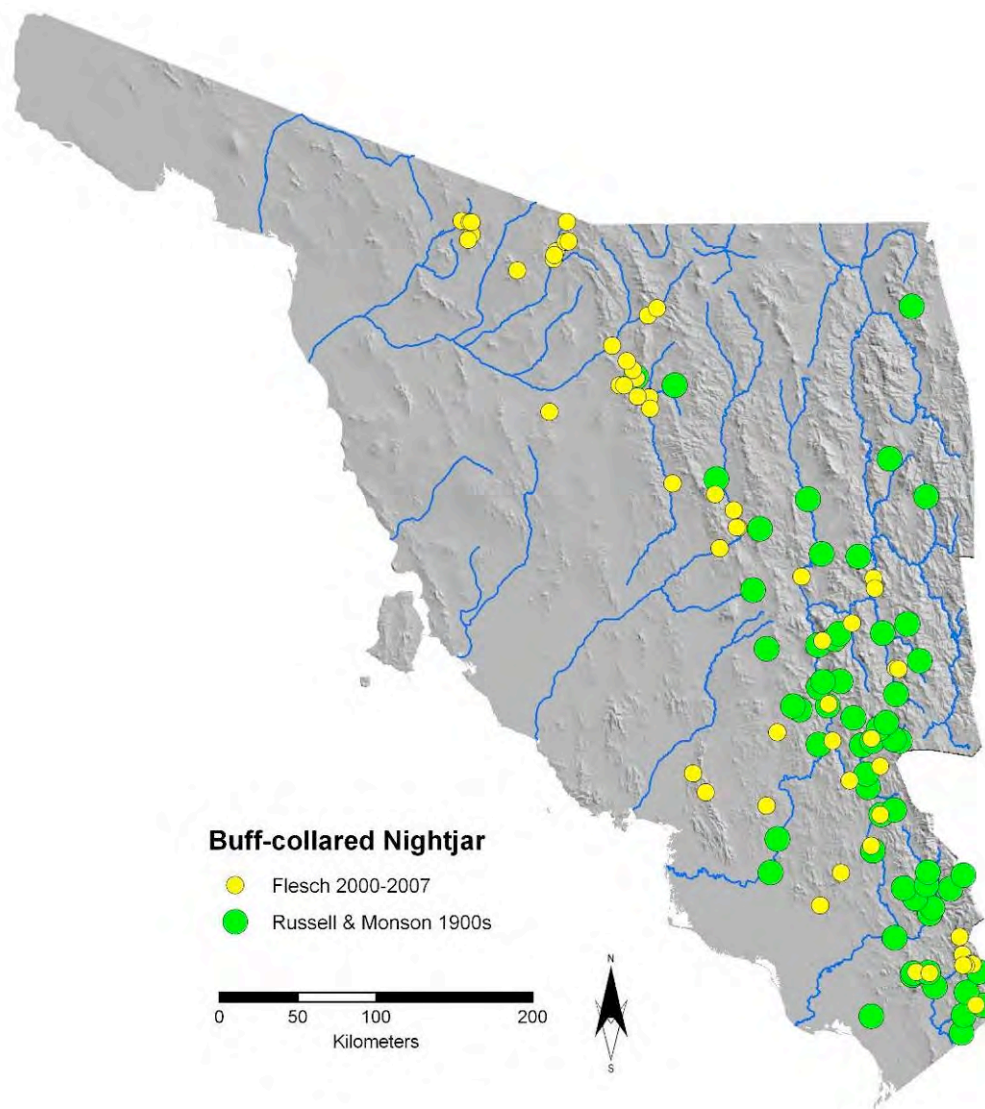
Eared Poorwill (*Nyctiphynus mcleodii*)

This west-Mexican endemic has been detected in Sonora only seven times; four collections are from the 1940s (W. Sheffler) east of Alamos and two sight records are from the late 1980s (Monson) from Yecora and below Sahuarivo northeast of Alamos. On 14 April 2006, Mac Hudson led me to an individual that he had detected hours earlier along the upper Río Cuchujaqui approximately 5 km west-southwest of Tecorahui Chihuahua. The bird was perched on the ground at 600 m below a large guamuchil (*Pithecellobium dulce*) and its conspicuous ear tufts were erect. Vegetation in the vicinity included dense patches of arid thornforest, open cleared flats, and semi-open oak woodland on slopes similar to vegetation described by Schaldach and Phillips (1961).

Buff-collared Nightjar (*Caprimulgus ridgwayi*)

This conspicuous sounding nightjar has recently expanded its range into several regions of northern Sonora where it was not previously reported. Russell and Monson (1998) reported these

nightjars in northern Sonora at only four localities none of which were west of Magdalena de Kino: near the Magdalena Palm Canyon and north of Saracachi in 1981, at 1,100 m in the Sierra Pulpito in 1977, and near the upper Rio Bavispe above Colonia Morelos (date unknown). Today, Buff-collared Nighthjars are local summer residents in several portions of the Concepción watershed west to tributaries of the Arroyo Plomo at elevations from 650 to 1,260 m. Since 2001, I have detected them each year at one or more localities in or around the Sierra el Humo. Since 2000, I have found them to be uncommon summer residents in mesquite woodlands and scrub in several portions the upper



Río Altar Valley north of Saric. The westernmost record is of a calling bird on 2 June 2008 in mesquite-paloverde woodland along Arroyo el Tren south of Rancho el Sonic. Patterns of range expansion in northern Sonora correspond to recent changes in status in southern Arizona where the species was first detected in 1960 and expanded its range considerably in the 1980s and 1990s (Bowers and Dunning 1997). The earliest spring record in northern Sonora is 17 March 2006 on the west side of the Sierra Cucurpe. Numerous winter records in southern Sonora cited by Russell and Monson (1998), my observation of a calling bird on 15 January 2005 near Alamos, a perched bird on 24 February 2001 near Cedros, and observations from multiple Alamos Christmas Bird Counts suggest some proportion of the population resides in winter.

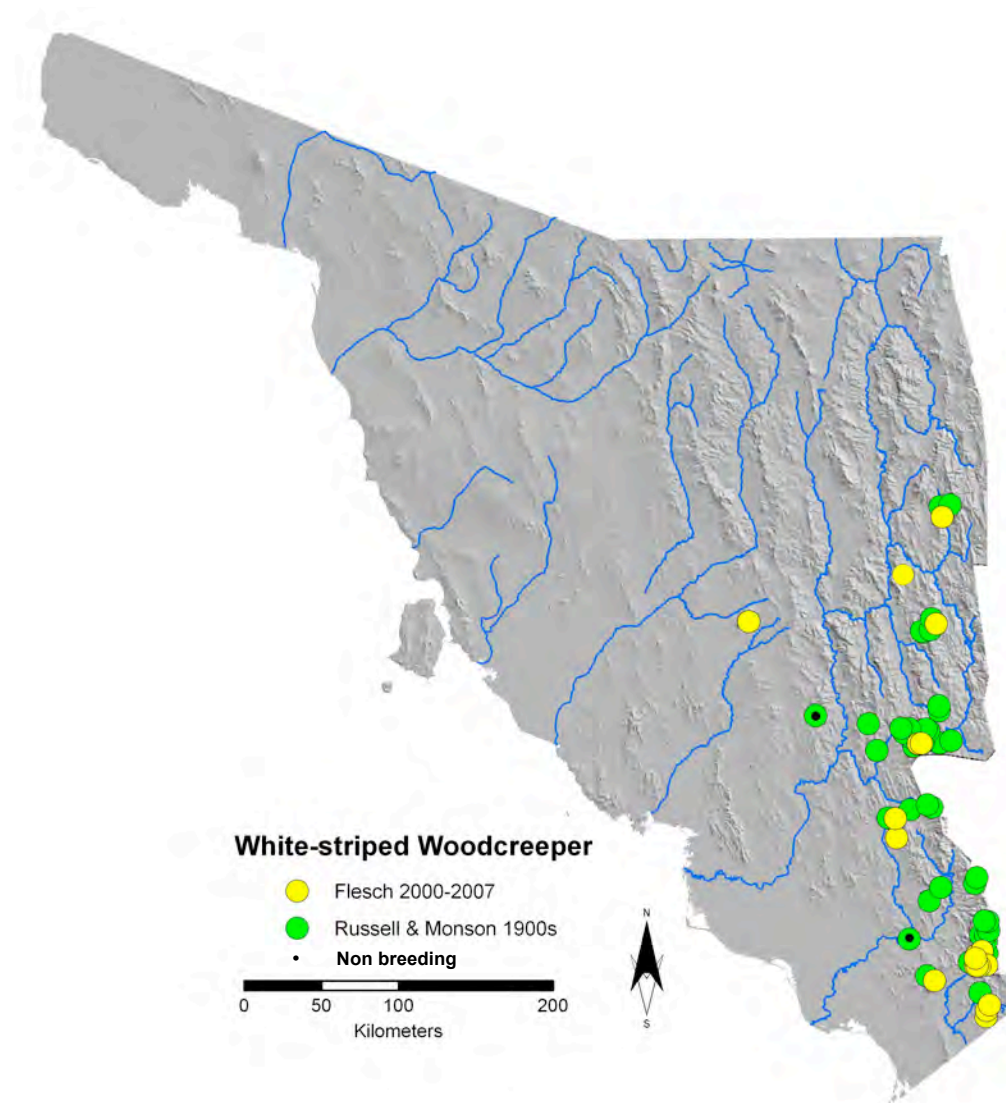
Pale-billed Woodpecker (*Campephilus guatemalensis*)

This large woodpecker has not been reported in Sonora since 1950 when four specimens were taken near Güirocoba (Russell and Monson 1998). Prior to 1950, Pale-billed Woodpeckers were collected near Alamos, near the Sinaloa border in Cañon San Francisco, and near Güirocoba (van Rossem 1934, 1945). In 2001, my associates and I observed four individuals in southeast Sonora. Two were along Arroyo Mentidero on 14 February; a female foraged in a large amapa (*Tabebuia impetiginosa*) at the base of the Sierra Alamos approximately 2.5 km above the road to Masiaca and a male was observed in tall tropical forest near the confluence of Cañon Ottotal in the heart of the Sierra Alamos later that day. On 16 February, Greg Greene watched an adult female foraging in tropical forest along Arroyo Alcaparrosa above Rancho Paradones in the southeast portion of the Sierra Alamos. On 19 February, Elliott Swarthout observed a male foraging in a large grove of mesquite (*Prosopis* sp.) along Arroyo Güirocoba below Portrero de Alcantar, which is approximately 12 km southwest of Güirocoba. There are no reports from the Alamos Christmas Birds Count. I am aware of only one report of Pale-billed Woodpeckers since 2001; Rick Wright (pers. comm.) reported one in tropical deciduous forest in the foothills northwest of the Sierra Alamos on 20 October 2004. Collectively, these observations suggest a small population persists in the Sierra Alamos. Lack of recent observations from near Güirocoba is likely due to extensive

clearing of tropical forest in the region, low density of these woodpeckers, and extremely limited field effort away from accessible areas near Alamos. More focused study is needed to guide conservation and management of this rare woodpecker.

White-striped Woodcreeper (*Lepidocolaptes leucogaster*)

Russell and Monson (1998) described these bark-gleaning insectivores as common summer residents in pine-oak and mixed-conifer forest and uncommon in tropical deciduous forest in the southern two-thirds of Sonora. My observations indicate they also occur in stands of oak woodland



with large oaks, in riparian areas with palm, sycamore, and oak, and in galleries of Mexican baldcypress to elevations near 400 m. Marshall's observation on 8 June 1960 along Arroyo el Riito northeast of Nacori Chico is the northernmost and only 5 km above where I observed one on 5 August 2006. Fifty kilometers to the southwest on the east side of the Sierra Zetasora, White-striped Woodcreepers occur in two canyons dominated by oak or sycamores. The only presumed breeding locality on the coastal plain is just below the summit of the Sierra Mazatán at 1,460 m where I observed a pair and another calling bird nearby in tall woodland of willow-leaf (*Q. vimenea*) and Mexican blue oak (*Q. oblongifolia*) on 10 April 2004 (Flesch and Hahn 2005). Russell and Monson (1998) noted them at two lowland localities where they did not presume breeding; I have not detected them away from areas where I suspect they could breed. One individual was foraging alongside an Ivory-billed Woodcreeper (*Xiphorhynchus flavigaster*) in upper Canyon el Jacalón east of Rosario on 25 February 2001.

Military Macaw (*Ara militaris*)

To visitors from the north the raucous calls and resplendent plumage of these large parrots are invigorating reminders of having arrived in the Neotropics. Military Macaws are resident in southern and central Sonora during spring and summer north to the Río Aros and west to the Sierra Bacatate. They are often found around tall cliffs or while flying high above presumably in route to their foraging grounds. Despite numerous records, there are little data on distribution, abundance, habitat requirements, and breeding status of macaws in Sonora. Russell and Monson (1998) did not presume breeding for any of the records they mapped and included only four confirmed breeding records all in the south from 1947 to 1967. In contrast, I presumed that pairs in or around tall cliffs were in areas where they breed at 11 localities in southern and central Sonora. J. Marshall detected the northernmost macaws on 8 June 1953 and 10 June 1960 around cliffs east of Huasabas where they have not been observed since. To the north, I observed two pairs perching in on a cliff above a tall gallery forest of evergreen figs on 21 July 2001 in the Sierra Agua Verde west of San Jose de Batuc, three at this same site on 3 September 2002, and a pair flying high above the highway to

Matape the following day. A small population also occurs south and east of the confluence of the Ríos Aros and Yaqui where I detected as many as six individuals simultaneously around large limestone cliff above the Aros. Vocalizations by two individuals at this site that were each following a separate pair suggested they were juveniles (Gerardo Carreon, pers. comm.). At the western edge the range, Elliott Swarthout detected two pairs in tall cliffs in the Sierra Bacatete on 31 March 2001



at a site where I detected three pairs on 28 July 2006; three birds were also flying south over Arroyo Guapari 15 km to the southwest a day before and may have in route to forage on the nearby Yaqui Delta. The largest group of macaws I observed was 26 counted by Mac Hudson and I in a barranca south of Rancho Santa Barbara on 16 April. Russell and Monson (1998) reported the earliest spring arrival on 12 March yet my observations of a pair on 23 February east of Quiriego suggest some arrive considerably earlier. A recent federal law banning the trapping and export of all species of parrots was enacted in 2008.

Eared Quetzal (*Euptilotus neoxenus*)

This magnificent trogon is little known in Sonora. A specimen was obtained near Mesa Tres Ríos during C. Lumholtz's expedition in 1890 and Marshall observed a pair near the same location in June 1953 (Russell and Monson 1998). On 1 June three years later, Marshall observed another pair in the nearby Sierra Huachinera in an area where I failed to detect them in early August 2006.

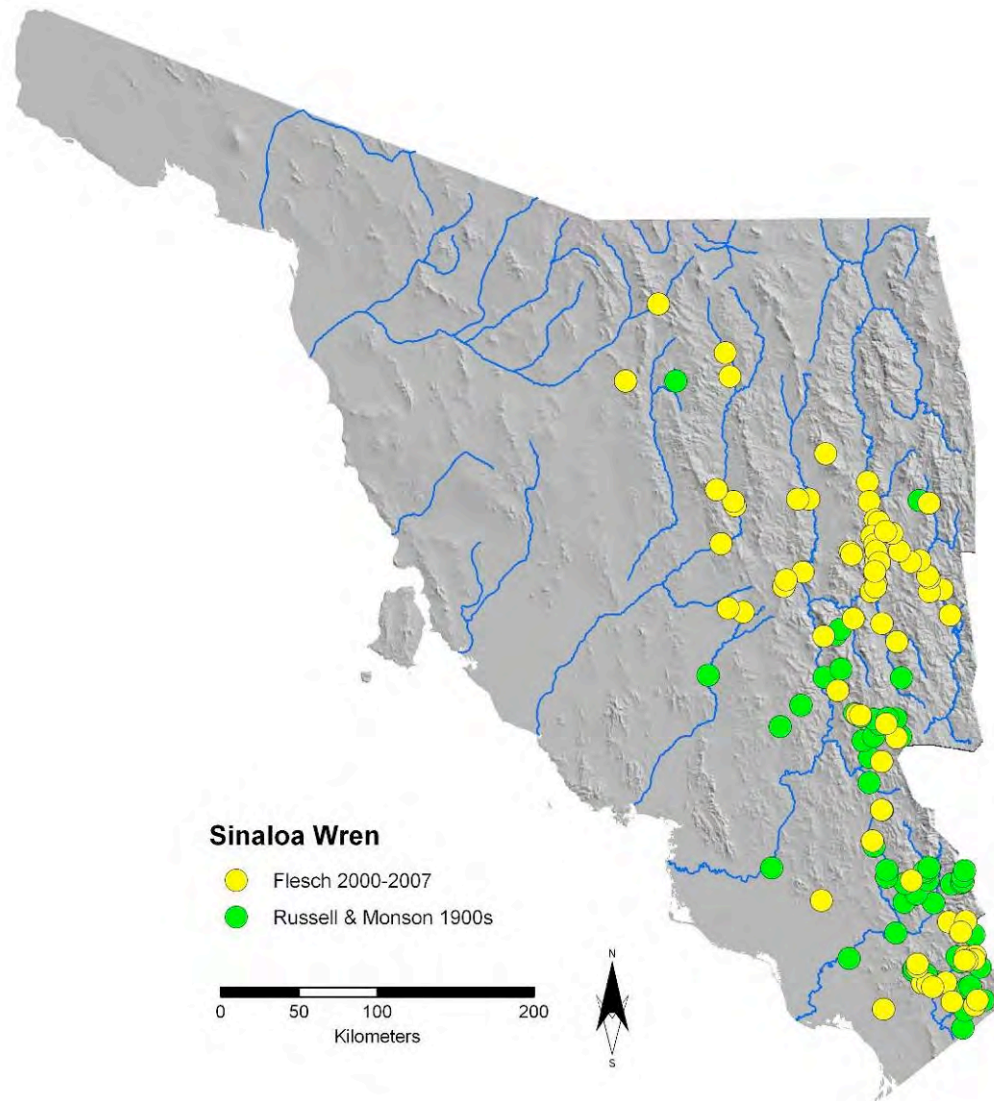
Eared Quetzals were not reported in Sonora for 40 years until M. Lammertink et al. (1996) described a calling bird on 14 and 15 July 1995 at 1,850 m near el Macho, which is approximately 10 km west of Mesa Tres Ríos. Vegetation at this site was selectively-cut pine-oak woodland with large oaks. Notably in early August of that same year, Lammertink et al. (1996) reported three sites occupied by Eared Quetzals and a nest between 2,340 and 2,490 m on the Mesa Las Guacamayas in western Chihuahua only a few km east of the Sonora border. One was also reported on the Yecora Christmas Bird Count in 2000.

On 16 April 2006 in Arroyo Verde, a deep lush side canyon of Canyon Santa Barbara east of Alamos, I observed no fewer than 16 adult Eared Quetzals in tall tropical evergreen forest along a 1.2 km stretch of canyon bottom. From an elevated perch above the canyon bottom, I observed six individuals simultaneously and overall quetzals were outnumbered by Elegant Trogons (*Trogon elegans*) by about two to one. Both species were feeding on an abundance of figs and wild avocados (*Persea podadenia*). These quetzals may have been in route to their breeding grounds in the mountains of adjacent Chihuahua; none were detected during two earlier visits to this canyon (21

January 2005, 11 February 2001) suggesting they may not typically winter. Arroyo Verde supports some of the tallest, most diverse tropical forest known in Sonora and a marvelous abundance of wild fruit trees frequented by trogons, parrots, robins, and tanagers.

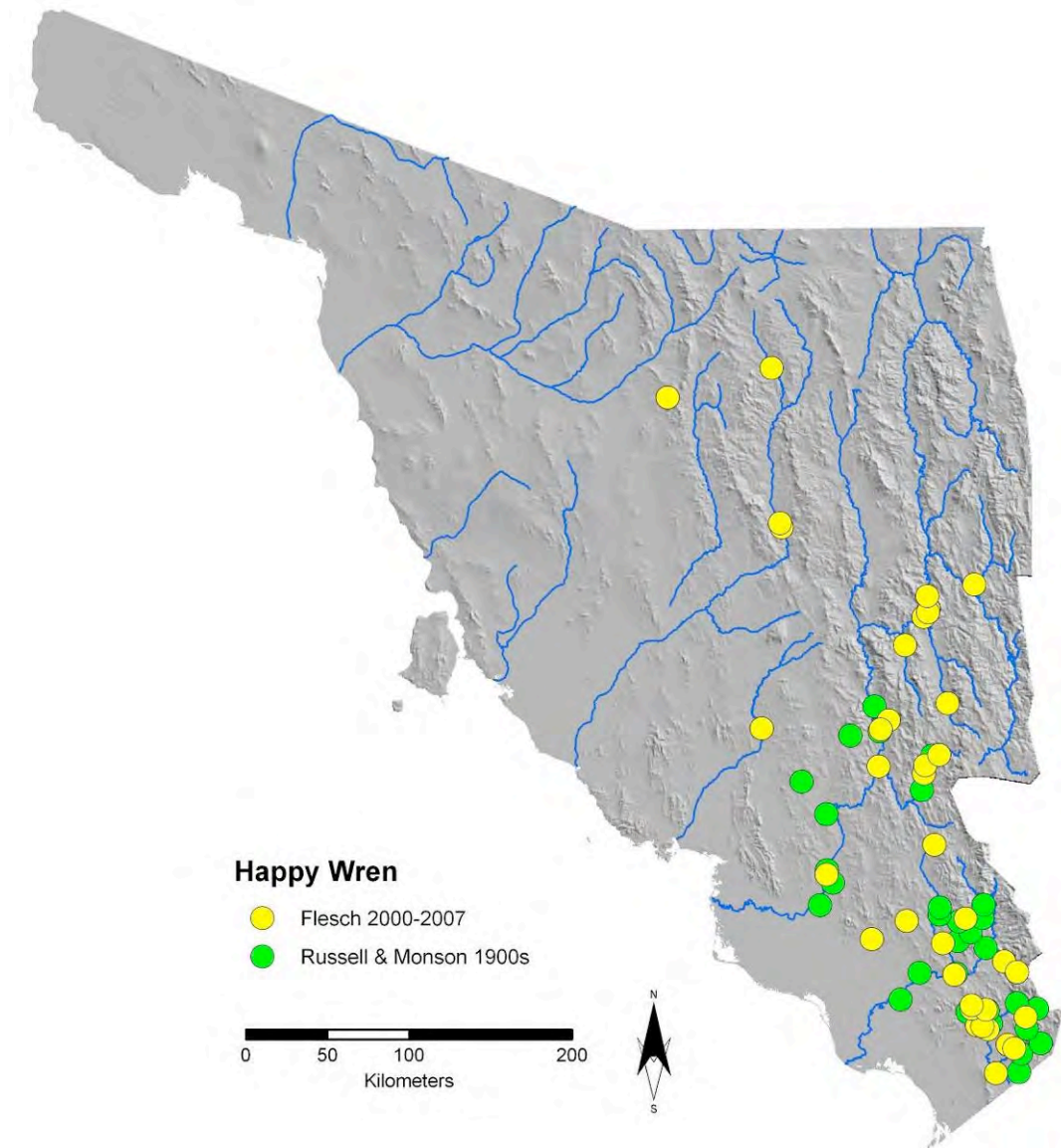
Sinaloa Wren (*Thryothorus sinaloa*)

Distribution of Sinaloa Wren has likely changed markedly in recent decades. Russell and Monson (1998) suggested they may be expanding northward based on observations of a pair east of Cucurpe in 1986 yet mapped only three localities north of 29° N. latitude. My observations indicate that Sinaloa Wrens are distributed across a much wider area of northern and especially central Sonora than previously described, as suggested by their recent arrival in southern Arizona in summer 2008. Sinaloa Wrens are common along the Río Aros below Natora and along the Río Bavispe in dense thornscrub and adjacent streamside thickets and woodlands. They are uncommon along the Río Sonora, in foothills of the Sierra Aconchi, in and around the Sierra Mazatán, and near Moctezuma. In northern Sonora, they are locally common along the Río Bacanuchi below Bacanuchi where I detected five singing males in 2.5 km of river bottom on 7 July 2006. On the west side of the Sierra Cucurpe I detected as many as four singing males in September and 10 total individuals in October along only 1.2 km of canyon bottom. On 8 July 2006 in humid stand of mesquite and willow along the Arroyo Cocóspera northeast of Imuris, Mac Hudson and I found a nest with young. Adults delivered small insects to the brood nine times during 15 minutes of observation. On 31 March 2007 Sky Jacobs detected two singing males in this same area, which is the northernmost locality in Sonora and only 55 km from Arizona. Like Happy Wrens, this species uses dense low vegetation throughout its range in northern Sonora. Although I have found pairs around nests to elevations of 1,430 m in oak-sycamore woodland in the Sierra la Madera, most observations are from elevations below 1000 m. Sinaloa Wrens are likely year-round residents even in northern Sonora although some individuals may move south during the winter. On 15 January 2006, I detected four on the west side of the Sierra Cucurpe.



Happy Wren (*Thryothorus feliz*)

Happy Wrens have recently expanded their range into portions of northern Sonora where they are rare and extremely local in humid thickets of low dense vegetation along wet drainages. The first records of Happy Wren north of 28° 30' N. latitude were of single birds during the Baviacora Christmas Bird Count in 1997-1999. Shortly thereafter on 19 May 2000, I detected two singing males along a perennial stretch of the Río Sonora near Baviacora and a year later in July I detected three singing males in 800 m of river bottom in this same area. North of areas noted by Russell and Monson (1998) these wrens now occur locally along the upper Río Yaqui near Batui

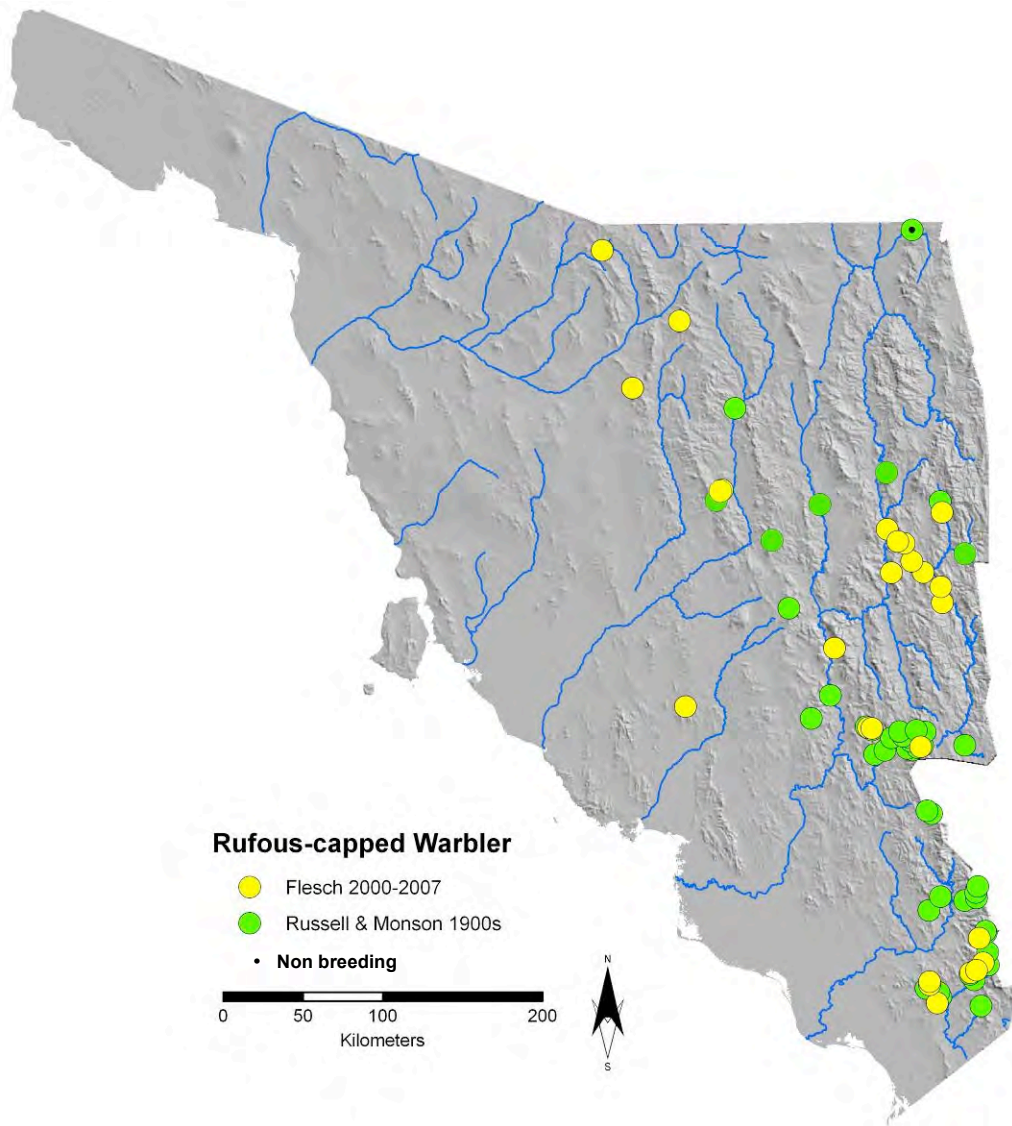


(summer 2003, 2004, and 2005), Río Aros at the mouth of Arroyo Bonito (summer 2005), Río Matape below Rancho Estacada (May 2000), Río Bacanora below Bacanora (March 2001), and according to Eduardo Gomez Limon (pers. comm.), near San Jose de Pimas. The two northernmost localities are on the west side of the Sierra Cucurpe where I observed a pair in August 2005 and a singing male in July 2006, and along the Río Bacanuchi where I observed a singing male in July 2006. I have not detected Happy Wren during winter in northern Sonora yet Russell and Monson (1998) considered them residents in Sonora; they have been found during winter on the Baviacora

and Yecora Christmas Bird Counts. During winter Happy Wrens are typically silent and occupy extremely dense thickets where detection probability is low. Russell and Monson (1998) described their habitat as dense moist thickets along streamsides in vegetation denser than that occupied by Sinaloa Wrens, which is very similar to my observations. In northern and central Sonora these localities are virtually always in dense stands of seepwillow (*Baccharis* sp.) along wet riparian areas and occasionally in tangles of shrubs, *Vitis*, and *Rhynchosia* in canyons. Happy Wrens may one day occur locally in southern Arizona if low humid conditions associated with an intensifying monsoon prevail.

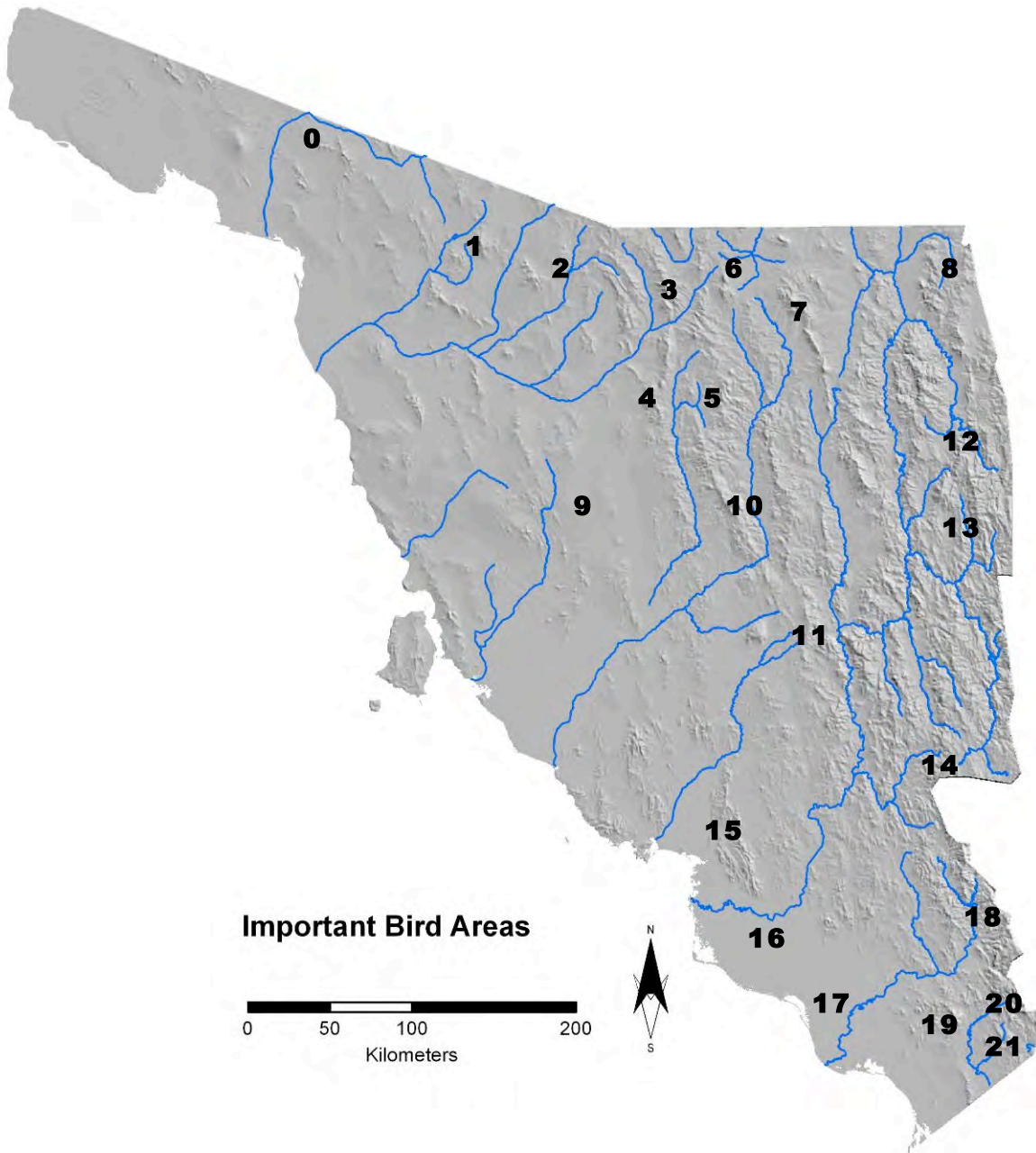
Rufous-capped Warbler (*Brasileuterus rufifrons*)

Rufous-capped Warblers are fairly common throughout much of southern Sonora where they occur in a wide range of vegetation associations to elevations near 2000 m. To the north they become increasingly rare and local and typically occur in riparian areas of oaks and sycamores and on adjacent slopes with a mosaic scattered dense shrubs and rocky outcrops. At the northern edge of their range, Russell and Monson (1998) found singing birds along Arroyo Cajon Bonito in 1975 and 1976 where they did not presume breeding and in Canyon Toro Muerto near Arizpe in 1994 where they did presume breeding. I did not detect them in either area but observed one on the east side of the Sierra Aconchi in 1999 and 2005 where they had not been detected since 1957 (Marshall) and along Arroyo el Riito where they had not been detected since 1960 (Marshall). I detected Rufous-capped Warblers at three localities in north-central Sonora; one was singing vigorously at 1,250 in the Sierra las Avispas on 14 June 2007, another sang at 1,190 m along a large canyon on the north side of the Sierra Azul on 9 July 2006, and as many as three singing birds were singing on the west side of the Sierra Cucurpe in 2006. The only record on the coastal plain is of one detected by Robert Hunt in Cajon de Uvalama in the Sierra San Antonio north of la Misa. These attractive Neotropical warblers seem to have expanded their range northward in recent decades as suggested by these and other observations from southern Arizona (Monson and Phillips 1981, Corman and Wise-Gervais 2005).



IMPORTANT BIRD AREAS

I described 22 important bird areas (IBA) in Sonora. These areas covered virtually all major vegetation communities in Sonora and ranged from western deserts to tropical deciduous forests and from lowland plains to the summits of the highest peaks. Overall I selected nine IBA in the north, seven in central Sonora, and six in the south. Because data are not available for all areas of Sonora, my designation of IBA likely excludes many significant regions. The spatial extent of each IBA is typically at the landscape scales and includes a sierra, adjacent bajadas, and one or more valley bottoms as well as more homogenous areas on river deltas. Although coastal areas are profoundly important to birds in Sonora (Russell and Monson 1998, Arizmendi and Márquez Valdelamar 2000) none were selected due to my focus on landbirds. Table 1 outlines details on the location, environment, important bird communities and populations, threats, and ongoing management of these areas.



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Table 1. Description of 22 important bird areas in Sonora Mexico. Map numbers reference are on the map above.

Region Name	Map no.	Environmental attributes	Important communities and species	Threats and management
Northern				
Rio Sonoyta - Quitovac - Arroyo Guadalupe	0	Riparian woodland, desertscrub, perennial flows and spring	large populations of desert woodland species at the western range margins, high densities of desertscrub species, raptors (ZTHa, GiWo, VGSw, BCFI, BeVi, CaWr, LuWa)	Loss of surface water, tamarisk invasion, woodcutting of desert trees, salinization
Sierra el Humo - upper Arroyo Plomo	1	westernmost oak woodlands surrounded by grasslands, very lush Arizona upland desertscrub, mesquite - xeroriparian woodlands	western range margins for some oak woodland and grassland species, large populations of desert woodland and scrub birds (GoEa, ScQu, FePO, BCNi, ArWo, BCFI, DCFI, MeJa, BrTi, BeVi, LuWa, VaBu, RWSp)	Climate change, overgrazing in lowlands. Highlands currently have no grazing
Upper Rio Altar Valley Sierra San Juan	2	Perennial watercourse with broadleaf gallery forests, lush Arizona upland desertscrub, and oak woodlands	western extent of oak woodland and all cottonwood-willow riparian species; large populations of desert woodland and scrub birds, raptors (GrHa, GaQu, GrKi, YBCu, FePO, WhSO, RTBe, CaWr, BeWr, BeVi, LuWa, YeWa, YBCh, SuTa, SBOr)	High levels of ground water pumping for crops, agricultural development in valley bottom, limited regeneration of cottonwoods and willows, overgrazing
Sierra el Pinito - Rio Bambuto and Cocospera	3	Pine-oak woodland surrounded by grasslands and large perennial watercourses with broadleaf gallery forests	western range margins of pine-forest species, large populations of broadleaf riparian species, raptors (CBHa, GoEa, SpOw, EITr, WPWi, SBFI, StJa, HuVi, PIVi, SiWr, OIWa, GrWa, BTGW, YeWa, PaRe, HeTa, SuTa)	Ground water pumping, limited regeneration of cottonwoods and willows, overgrazing. No sign of recent logging in pine forests
Sierra Cucurpe - upper Rio San Miguel	4	Northernmost Sinaloan thornscrub, oak woodlands, and broadleaf gallery forests with perennial water	Local isolated populations of thornscrub species at their northernmost localities, oak woodland birds, mesquite woodlands (CBHa, GrHa, CrCa, ElQu, WTD0, YBCu, EITr, NuFI, SiWr, HaWr, RCWa, SuTa, FSSp)	Ground water pumping and limited regeneration of cottonwoods and willows. Few threats exist in highlands
Saracachi - Arroyo Santa Domingo	5	Cienega, broadleaf gallery forests, grassland, eastern saguaros	Oak woodland, grassland, broadleaf riparian species, marsh birds (CBHa, GrHa, YBCu, EITr, YeWa, CoYe, YBCh, SuTa, SoSp, BuOr)	Overgrazing, excessive groundwater pumping. Seems well managed
Sierra los Ajos	6	Extensive pine and mixed conifer forest and montane broadleaf gallery forests	High-elevation birds and specialties from the north (Gosh, SSHa, GoEa, SpOw, NoPO, FIOw?, WPWi, CoFI, BBFI, GrPe, HeTh, GrWa, PaRe, HeTa, WeTa, SpTo)	Climate-change induced stress to white fir forests may already be weakening them and resulting in mortality, local logging, is a federal reserve
San Pedro Valley	7	Lush high-elevation grasslands and broadleaf gallery forests	Grassland and cottonwood obligates (GrHa, SwHa, SEOW, ScQu, YBCu, BCFI, YeWa, YBCh, SuTa, AbTo, CaSp, BoSp, GrSp, LaSp, EaMe)	Groundwater loss and limited regeneration of cottonwoods and willows, overgazing in grasslands , shrub invasion

Cajon Bonito - Sierra San Luis	8	Broadleaf gallery forests and highlands of oak and pine	Large populations of riparian species and some pine forest and perhaps mixed-conifer species in highlands, hummingbirds, raptors (Gosh, CBHa, ZTHa, GoEa, EITr, BTHu, BCHu, LuHu, YeWa, YBCh, SuTa)	Limited data. Waterflow seems stable
Central				
Central grassland - upper Rio Bacoachi	9	Grasslands and riparian woodland on the central coastal plain and foothills	Grassland obligates, mesquite woodland and local broadleaf riparian species, desert savannahs (SwHa, NoBo, FePO, EITr, BeVi, LuWa, CaSp, FSSp)	Buffelgrass plantations, fire-induced mortality to saguaros, overgrazing, loss of groundwater.
Sierra Aconchi - middle Rio Sonora	10	Extensive oak woodland, Sinaloa thornscrub, and broadleaf gallery forests	Isolated populations of oak woodland and thornforest species, extensive broadleaf bottomlands (GrHa, MoQu, SpOw?, EITr, VCHu, ArWo, HaWr, SiWr, YeWa, YBCh, SuTa, HeTa)	Climate change in highlands, clearing of riparian forest, limited cottonwood regeneration
Sierra Agua Verde - La Estrella	11	Northwestern-most fig galleries and tropical deciduous forest, oak savannah, and thornscrub	Isolated populations of thornforest and tropical forest species, humid oak woodlands (GrHa, MiMa, EITr, NuFI, SBFI, RBRo, SiWr, YGVi, TrPa, RCWa, FTWa, YBCh, SuTa, HeTa)	None observed, local land use included low-intensity grazing and bacanora production
Sierra Huachinera - upper Rio Bavispe	12	Extensive pine-oak woodland and montane riparian forests	Species of mesic montane slopes and canyons (SpOw, WEHu, BTHu, MaHu, HaWo, GrPe, MeCh, BBSO, AzTh, OIWa, RFWa, HeTa)	Few threats, no current logging seen, mostly roadless federal reserve
El Riito - Sierra Nacori	13	Northern extent of tall Sinaloa thornscrub, humid pine-oak woodland, and montane riparian forests	Diverse communities in mesic montane riparian and high mountain forests with high affinity to the Sierra Madre (Gosh, CBHa, SpOw, TBP a?, EaQu, EITr, BTHu, MaHu, WSWo, BBSO?, HuVi, GrWa, RCWa, HeTa)	Logging
Yecora - Mesa el Campanero - Arroyo el Reparo	14	Humid Madrean pine-oak woodland and montane forests and deep canyon with montane riparian down to foothill thornscrub	Birds of humid pine-oak and sycamore forests (Gosh, SpOw, WiTu, MoTr, WEHu, BTHu, MaHu, GCWo, PiFI, GCBe, SpWr, GSFI, CCWa, FTWa, FCTa?, RuSp)	Logging, overgrazing
Sierra Bacatete	15	Isolated Sierra with tall thornscrub, fig galleries, tall cliffs, and well-developed low elevation desertscrub with woodlands	Isolated populations of thornforest and fig forest species and large populations of desertscrub birds (CrHa, PeFa, MiMa, WFPa, PCSt, NuFI, SBFI, YBCh, VaBu)	Overgrazing
Southern				
Rio Yaqui Delta	16	Remnant stands of bottomland cottonwood forests	Remnant cottonwood forests and wetland species (GBHa?, CBHa, FePO, RBPI, WFPa, GrKi, YBCu, TrKi, GrKi, SoFI, HaWr, YBCh, SuTa)	Virtually eliminated by agricultural development and river diversion. Total lack of cottonwood regeneration in most areas, among the richest yet most threatened ecosystems in northwest Mexico

Rio Majo Delta	17	Remnant stands of bottomland cottonwood forests	Remnant cottonwood forests and wetland species (GBHa?, CBHa, FePO, RBPi, WFPa, GrKi, YBCu, TrKi, GrKi, SoFl, HaWr, YBCh, SuTa)	Similar to Yaqui Delta
Rio Mayo Canyons - Sierra Oscura	18	Deep barrancas with tropical evergreen forest, tall tropical deciduous forest, humid pine-oak and riparian woodland	Potentially the northernmost breeding localities for lowland tropical birds obligated to semi deciduous riparian forests and humid pine oak (Gosh, SoEa?, SpOw, EaPo, BRAt, AzTh, other unknown species)	Limited data, logging in highlands likely a major threat
Sierra Alamos - middle Rio Cuchujaqui	19	Isolated pine-oak woodlands, tall tropical forests, and lowland tropical evergreen forests	Lowland sabino and birds of tall tropical forests and thornforest (CBHa, CrHa, CoPO, MiMa, LCPa, MePa, EITr, PCSt, RCMo, PBWo, PBJa,	Loss of surface water, forest clearing for agriculture and buffelgrass, human-caused fires, overgrazing and lack of sabino regeneration
Santa Barbara - upper Rio Cuchujaqui	20	Pine-oak woodland surrounded by deep barrancas with tropical evergreen forest, and tall tropical deciduous forest	Lowland sabino, tall tropical forests, semi deciduous and evergreen riparian forests, and humid pine oak (CBHa, SoEa?, LaFa, CoPO, MiMa, LCPa, EaQu, BeHu, EaPo, LiWo, IBWo, MaTi, GCBe, BRAt, SpWr, YGVi, TrPa, EIEu, BHSi)	Forest clearing for agriculture and buffelgrass, human-caused fires, overgrazing.
Sierra las Tablas - Guirocoba	21	Tall diverse low-elevation tropical deciduous forests on shallow slopes and riparian woodlands	Large populations of lowland tropical forest species (LaFa?, CoPO, MiMa, LCPa, LiWo, PBWo, BRAt, YGVi, FCTa)	Large-scale clearing of tropical forests and overgrazing in bottomlands
