AN OUTPOST FOR DESERT BIRDS ON THE COASTAL SLOPE OF SOUTHERN CALIFORNIA

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ABSTRACT: Aguanga, California, is located on the Pacific slope of Riverside County and has no direct connection to the Colorado Desert. However, isolated populations of birds associated with the desert occur in the arid shrublands surrounding this small community. Even more unexpectedly, three of these desert species coexist with closely related counterparts on the coastal slope: Gambel's Quail (*Callipepla gambelii*) occurs with the California Quail (*C. californica*), the Ladder-backed Woodpecker (*Picoides scalaris*) occurs with Nuttall's Woodpecker (*P. nuttallii*), and the Black-tailed Gnatcatcher (*Polioptila melanura*) occurs with the California Gnatcatcher (*P. californica*). My observations near Aguanga document range extensions for a number of species in an area that has received little ornithological attention.

Aguanga is located in southwestern Riverside County 25 km east of Interstate 15 along Temecula Creek, which becomes the Santa Margarita River and drains into the Pacific Ocean. The nearest divide between the coastal and desert slopes lies 18 km to the east, and the nearest true desert habitat is 26 km to the east of Aguanga in Anza-Borrego Desert State Park (Figure 1). There are other locations where desert birds have established populations on the coastal slope, such as Miller Valley in San Diego County, San Jacinto and Cactus valleys in Riverside County, and Cuyama Valley in Santa Barbara and Ventura counties. None of these locations, however, hosts the variety of arid-land birds that I have noted at Aguanga.

Previous ornithological work near Aguanga has been limited. The U.S. Fish and Wildlife Service initiated the Oak Grove Breeding Bird Survey route, which passes through Aguanga. I recognized the uniqueness of this area while participating in three of these surveys, 1992–1994, with D. Rorick and G. Athens. The San Diego County Bird Atlas (Unitt 2004) covered areas near Aguanga immediately south of the Riverside County line from 1997 to 2002. I was the principal observer at these locations. The County of Riverside Transportation and Land Management Agency tracks locations of sensitive species through its Multiple Species Habitat Conservation Plan. These include several species characteristic of coastal sage scrub but no characteristically desert birds that occur on the coastal slope other than the Cactus Wren (*Campylorhynchus brunneicapillus*). The Santa Ana Watershed Association also maintains a data base of sensitive species in western Riverside County based on a variety of sources including environmental impact reports as well as incidental observations.

STUDY AREA AND METHODS

My observations were concentrated within 12 km of the Aguanga post office, located just west of the intersection of state highways 79 and 371 (Cahuilla Road). I focused my surveys on seven areas where native vegetation remains largely intact. Within each area, I established a survey route where I primarily, but not exclusively, observed the birdlife. Five of the study

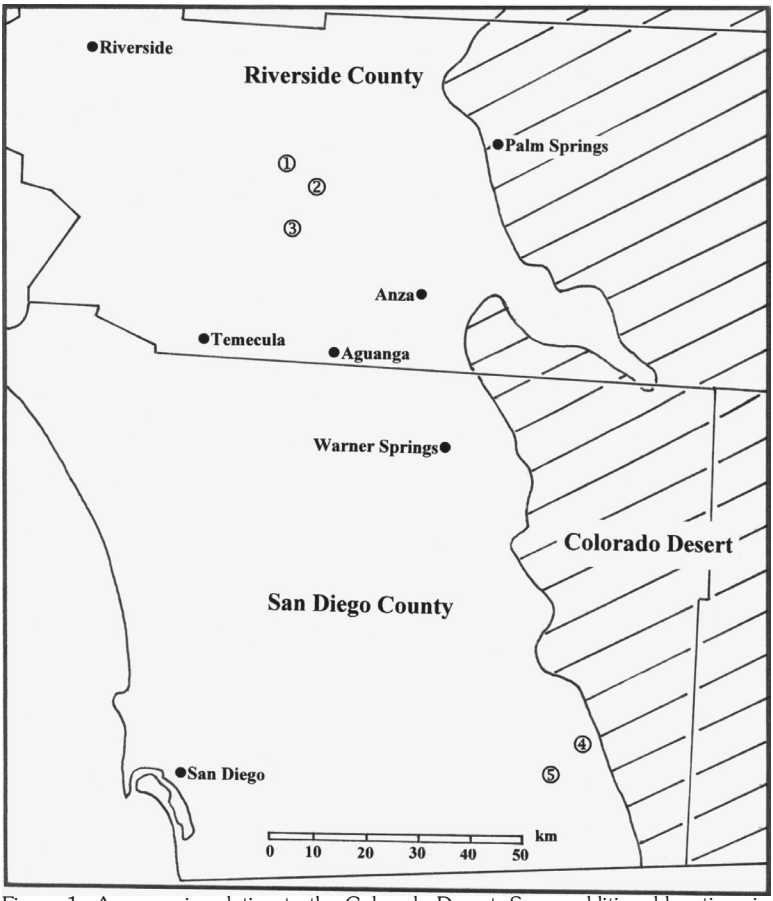

Figure 1. Aguanga in relation to the Colorado Desert. Some additional locations in Riverside and San Diego counties on and near the coastal slope and have hosted desert species include (1) San Jacinto Valley, (2) Valle Vista, (3) Cactus Valley, (4) McCain Valley, and (5) Miller Valley.

areas are located entirely in Riverside County, while two locations straddle the San Diego County line.

My surveys took place throughout the year from October 1995 to April 2010 with the greatest concentration of visits from 1995 to 1997 and from 2003 to 2005. I visited the survey routes and nearby areas a total of 126 days while logging more than 360 hours in the field. I completed 22 of these visits while participating in the San Diego County Bird Atlas project.

I determined breeding status by following criteria prescribed by Laughlin et al. (1982), while designations regarding abundance are derived from Garrett and Dunn (1981). I calculated the dominant vegetation along each

survey route by following techniques described by Braun-Blanquet (1932). Plant names follow Hickman (1993), while geological information follows Kennedy (2003, ftp://ftp.consrv.ca.gov/pub/dmg/rgmp/Prelim_geo_pdf/vail_lake_prelim.pdf) and Tan and Kennedy (2003, ftp://ftp.consrv.ca.gov/pub/dmg/rgmp/Prelim_geo_pdf/ Aguanga_prelim.pdf).

Vegetation

Moisture from the Pacific Ocean is largely blocked from reaching Aguanga by the Santa Ana Mountains to the west and the Palomar Range to the south. Detailed weather data from the area are lacking. However, the lack of rainfall is very evident in the plant life, which includes a large component of species shared with the Colorado Desert. Botanical surveys that I completed with the help of my colleagues S. Yamaguchi and J. Dillane revealed that 42% of the native species (81 of 195 species) that we identified are characteristic of the desert. These include such plants as honey mesquite (*Prosopis glandulosa*), desert-willow (*Chilopsis linearis*), jojoba (*Simmondsia chinensis*), beavertail cactus (*Opuntia basilaris*), Acton's encelia (*Encelia actoni*), and desert needlegrass (*Achnatherum speciosum*). On the basis of our surveys, I also recognize three distinct types of vegetation: dry wash scrub, coastal sage scrub, and chaparral. These correspond most closely to the plant associations described by Sawyer and Keeler-Wolf (1995) as the scalebroom–four-wing saltbush association, the jojoba–cane cholla–California buckwheat association, and the redshank–chamise–cane cholla association, respectively.

Dry wash scrub occupies the smallest area. It is restricted to young alluvial floodplain deposits as found along sections of Tule and Temecula creeks, as well as smaller areas in Dameron Valley (Figures 2 and 3). At these locations 50–60% of native plant species are shared with the Colorado Desert. The tallest shrubs reach 3–6 m in height. Scalebroom (*Lepidospartum squamatum*) and four-wing saltbush (*Atriplex canescens*) are especially prominent. Waterjacket (*Lycium andersonii*) forms locally dense stands. All three of these species are widespread in the desert. The wash of Temecula Creek also supports desert-willow, while blue elderberry (*Sambucus mexicana*) is particularly abundant along washes in Dameron Valley. A few scattered trees typical of riparian woodland, such as western cottonwood (*Populus fremontii*) and red willow (*Salix laevigata*), also occur in the washes along Tule and Temecula creeks.

Coastal sage scrub (Figure 4) occurs in upland areas with a southern or western exposure. It is found on very old alluvial fan deposits and on soils underlain by sandstone. Coastal sage scrub also occupies low-lying locations immediately above seasonal water courses or washes where it grows on young alluvial floodplain deposits. The dominant sub-shrub is California buckwheat (*Eriogonum fasciculatum*), which reaches a height of about 1 m and also occurs in the desert. Jojoba and sugar bush (*Rhus ovata*) are the primary emergent shrubs, growing to 2.5 m in height. Cane cholla (*Cylindropuntia californica*) and Mojave yucca (*Yucca schidigera*) are frequently abundant. Additional succulent plants, such as a hedgehog cactus (*Echinocereus engelmannii*) and two species of prickly pear (*Opuntia basilaris* and *O. phaeacantha*), contribute to the desertlike appearance of locations dominated by coastal sage scrub. All plants listed above except the hedgehog cactus are also present in dry wash scrub.

Figure 2. Tule Creek Wash at Dry Ranch. Birds of desert origin are attracted to areas dominated by dry wash scrub.

Photo by K. L. Weaver

Chaparral (Figure 5) grows in upland areas on soils similar to those occupied by coastal sage scrub. It dominates north- and east-facing slopes as well as expanses of eroded "badlands." Redshank (*Adenostoma sparsifolium*) and chamise (*A. fasciculatum*) are the dominant shrubs. These plants are absent from the Colorado Desert. Redshank typically grows 3–4

Figure 3. Elderberry-lined draw in Dameron Valley. This area attracts a large diversity of birds during the summer fruiting season.

Photo by K. L. Weaver

Figure 4. Coastal sage scrub east of Sage Road. Areas dominated by coastal sage scrub and dry wash scrub share many plants with the high desert including cholla, prickly pear, and yucca.

Photo by K. L. Weaver

m in height, while chamise reaches 2–3 m. Because of nutrient-poor soils in many areas, chamise is frequently stunted, growing to a height of only about 1 m. Cane cholla and Mojave yucca are components of some stands of chaparral, generally occurring as scattered individuals.

Figure 5. Chaparral along High Point Road. Birds of desert origin avoid dense chaparral stands near Aguanga.

Photo by K. L. Weaver

Survey Routes

Each survey route that I established (Figure 6) largely traverses one major shrub association. All routes, however, include small areas of another association because of variations in slope, soil type, and fire history. Elevation ranges and lengths stated of survey routes are approximate. I defined the number of surveys per "season" by spring (March–May), summer (June–August), fall (September–November), and winter (December–February). It should be noted, though, that migration and breeding actually begin as early as February, and most winter residents are present October–April.

(1) The 4.7-km Sage Road route is dominated by coastal sage scrub with some stands of redshank and stunted chamise. Elevation range: 640–820 m. Surveys: spring, 12; summer, 8; fall, 4; winter, 2.

(2) The 1.8-km route below Cahuilla Road is dominated by coastal sage scrub, although scattered stands of redshank also occur. Elevation range: 760–920 m. Surveys: spring: 5; summer, 2; fall, 2; winter, 2.

(3) The 4.0-km loop through Dry Ranch includes a portion of the usually dry streambed of Tule Creek. Dry wash scrub is dominant with a fairly dense but varied cover of saltbush, scalebroom, sugarbush, blue elderberry, and waterjacket. Coastal sage scrub occupies the margins of the wash immediately above the floodplain. Redshank-dominated chaparral borders the coastal sage scrub as elevation increases to the south of the wash. Elevation range: 730–830 m. Surveys: spring, 9; summer, 8; fall, 9; winter, 3.

(4) The 2.0-km route through the hills above the Aguanga post office is dominated by coastal sage scrub with a few small stands of redshank. Several draws support thickets of honey mesquite. Elevation range: 640–690 m. Surveys: spring, 10; summer, 4; fall, 6; winter, 5.

(5) The 3.5-km loop through Aguanga Valley includes portions of the usually dry streambed of Temecula Creek. Dry wash scrub is dominant. Small areas of coastal sage scrub occupy terrain immediately above the creek bed, but development of a large campground limits its extent. Elevation range: 590–660 m. Surveys: spring, 4; summer, 3; fall, 8; winter, 5.

(6) The 3.1-km route along High Point Road (Forest Service Road 8S05) primarily features chaparral. Both redshank and chamise occur in extensive stands. Coastal sage scrub occupies the lower elevations. Burned areas at higher elevations feature California buckwheat and deerweed (*Lotus scoparius*). Elevation range: 660–1000 m. Surveys: spring, 9; summer, 2; fall, 2; winter, 5.

(7) The 2.0-km Dameron Valley route is dominated by coastal sage scrub. Blue elderberry lines a series of interconnected sandy draws that contain elements of dry wash scrub, such as saltbush and scalebroom. Elevation range: 830–920 m. Surveys: spring, 12; summer, 12; fall, 4; winter, 9.

RESULTS

Overview

I recorded 119 species of birds in the shrublands near Aguanga (see Appendix). Over 60 species occurred annually. I observed fledglings of all 37 species listed as confirmed, while nine additional species met the criteria for probable breeding (see Appendix).

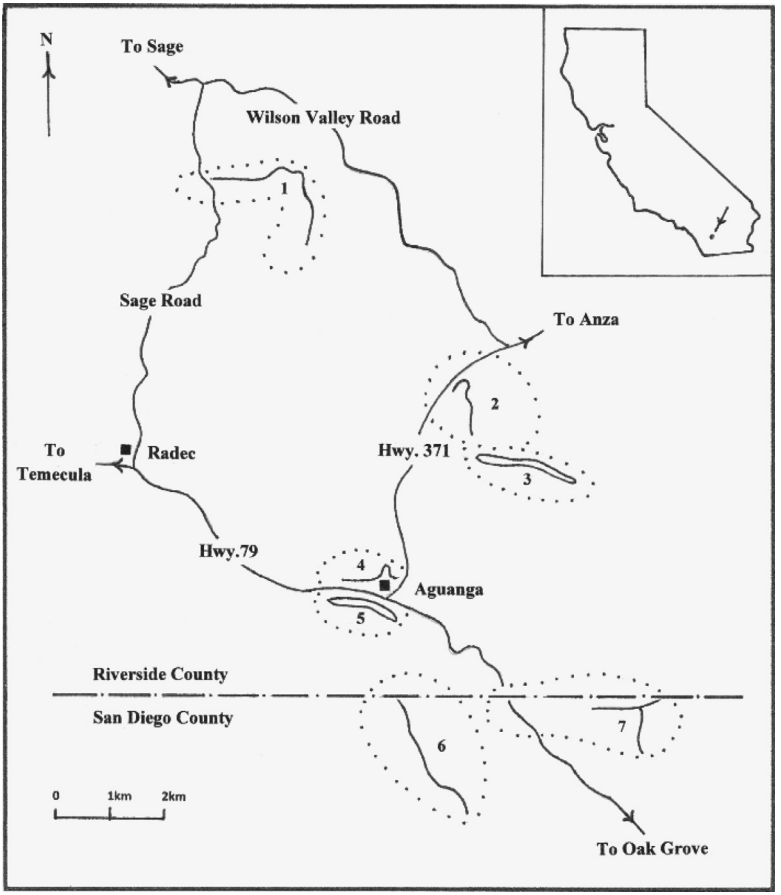

Figure 6. The Aguanga area. Study sites are delineated by dots. Survey routes include (1) Sage Road, SR, (2) Cahuilla Road, CR, (3) Dry Ranch, DR, (4) Aguanga Hills, AH, (5) Aguanga Valley, AV, (6) High Point Road, HP, and (7) Dameron Valley, DV.

Species diversity is greatest in the spring when winter and summer residents overlap in occurrence and transients are passing through. The number of species recorded per month ranged from a high of 71 in May to a low of 45 in January, July, and September. Transients are relatively sparse with observations largely confined to dry washes or patches of mesquite where cover is fairly dense. For birds, the major event of the year, in June and July, is the ripening of elderberries, which attracts a diversity of local birds as well as flocks of the mountain-dwelling Band-tailed Pigeon (*Patagioenas fasciata*). Many of the maximum counts of species I recorded are from Dameron Valley, where elderberries are particularly abundant.

Many of the birds recorded in shrublands near Aguanga are typical of chaparral and coastal sage scrub, as would be expected on a geographical basis. Seventeen of the recorded species (including certain subspecies) were listed by Miller (1951) as having a primary preference for "hard" or "soft" chaparral, the latter currently referred to as coastal sage scrub. These include such species as Wrentit (*Chamaea fasciata*), California Thrasher (*Toxostoma redivivum*), and Spotted Towhee (*Pipilo maculatus*).

The ubiquitous House Finch (*Carpodacus mexicanus*) aside, another 17 species that Miller listed as preferring desert lands occur at Aguanga**.** Eight of these, such as Costa's Hummingbird (*Calypte costae),* Northern Mockingbird (*Mimus polyglottos*), and Phainopepla (*Phainopepla nitens*), are also widespread west of the desert.

Nine species, though, are of local or unlikely occurrence on the coastal slope, according to their distribution as outlined by Grinnell and Miller (1944), Garrett and Dunn (1981), and Unitt (2004). D. Rorick, G. Athens, and I noted the Cactus Wren, Black-throated Sparrow (*Amphispiza bilineata*), and Scott's Oriole (*Icterus parisorum*) during the Breeding Bird Surveys. I observed six additional desert species during my individual surveys. I confirmed breeding by the three species listed above plus the Ladder-backed Woodpecker (*Picoides scalaris*) and Black-tailed Gnatcatcher (*Polioptila melanura*). I noted that two more species, the Verdin (*Auriparus flaviceps*) and Brewer's Sparrow (*Spizella breweri*), regularly winter in the area and may possibly breed. These observations document range extensions for these seven species beyond their previously known areas of occurrence. The status of two species, Harris's Hawk (*Parabuteo unicinctus*) and Gambel's Quail, remains to be determined. I discuss these nine species in greater detail below.

Drastic swings in populations are characteristic of the birds of the Aguanga area. Breeding success appears to be greater in years of abundant rainfall. Even arid-adapted species are affected by long-term drought. In 1996 I recorded eleven singing Cactus Wrens along the Cahuilla Road survey route. In 2003, following four years with very little precipitation, I found only one. In the exceptionally dry year of 2002, I observed no nests or fledglings of any species near Sage Road, the only site that I monitored that breeding season. The same year, in San Diego County, Bolger et al. (2005) also found nearly complete nesting failure of four coastal sage scrub species. The correlation between rainfall, abundance of species, and breeding success deserves further study.

Six species have appeared near Aguanga since 2004 with the establishment of recreational campgrounds: the Rock Pigeon (*Columba livia*), American Crow (*Corvus brachyrhynchos*), American Robin (*Turdus migratorius*), Brewer's Blackbird (*Euphagus cyanocephalus*), Great-tailed Grackle (*Quiscalus mexicanus*), and House Sparrow (*Passer domesticus*). Although these species are largely attracted to the lawns and man-made ponds of the campgrounds, they occasionally forage in shrublands along the wash of Temecula Creek in Aguanga Valley or nearby in the hills northwest of the intersection of State Highway 79 and Cahuilla Road.

Desert Birds

Harris's Hawk (*Parabuteo unicinctus*). I first recorded this desert raptor just north of the Riverside–San Diego County line in Dameron Valley on 27 March 1997. J. Wells and S. Quartieri noted an individual "near Dripping Springs and Oak Grove," in both Riverside and San Diego counties, from 20 September 2006 to 14 February 2007 (Heindel and Garrett 2008). F. Baker (fide D. Aguillard) and I also noted presumably the same individual at several locations along State Highway 79 in 2006 and 2008, most frequently west of the intersection of Highway 79 and Cahuilla Road (Appendix). Multiple reports of a Harris' Hawk, presumably the same individual, from Aguanga southeast to Warner Springs as recently as 19 February 2010, have been accepted as representing a natural occurrence by the California Bird Records Committee. A pair of Harris' Hawks nested successfully west of the desert at McCain Valley in San Diego County from 2000 to 2002 (Unitt 2004). This species is popular with falconers, so many recent sightings in southern California are believed by the California Bird Records Committee to be of escapees.

Cactus Wren (*Campylorhynchus bruneicapillus*). I recorded this species on all seven survey routes as well as at other locations near State Highway 79, Cahuilla Road, and Wilson Valley Road. Although it is widespread, it adheres strictly to coastal sage scrub and dry wash scrub where an abundance of cane cholla provides nesting sites. In the field, the birds appear identical to the desert-dwelling Cactus Wren (*C. b. anthonyi*) rather than the geographically closer populations of *C. b. sandiegensis* inhabiting coastal San Diego County. The Aguanga population features a more distinct chest patch and smaller abdominal spotting than typical of *C. b. sandiegensis* (Rea and Weaver 1990). Both *C. b. anthonyi* and the Cactus Wrens of Aguanga sing a territorial song faster-paced than that of *C. b. sandiegensis*. Areas that have supported eight or more pairs include Sage Road, Cahuilla Road, Dry Ranch, and Dameron Valley. Most Cactus Wrens listed in the data base of the Santa Ana Watershed Association from the Aguanga area were recorded from 2005 to 2008 in the vicinity of Wilson Valley Road (M. Aimar pers. comm.). Although this species occurs very locally on the coastal slope in six southwestern California counties, I believe that its declining populations warrant highlighting it here.

Verdin (*Auriparus flaviceps*). I first recorded this species in the fall of 2003, when it appeared in the hills north of the Aguanga post office, in Aguanga Valley, and at Dry Ranch. It has since reappeared annually 2004–2009 at Dry Ranch in the fall, except I have no records for fall 2007 when I did not visit the area. My observations are most likely due to increased fall–winter coverage of these areas rather than a recent invasion. The Verdin is typically considered to be sedentary, but the fall–winter records of this species in the Tijuana River valley in coastal San Diego County from 1962 to 1975 (Unitt 2004) also indicate regular movement away from breeding sites at times. I noted individuals near the Aguanga post office and at Dry Ranch constructing this species' characteristic oval-shaped nests in mesquite and waterjacket and found two completed nests at the latter site. The Verdin, though, constructs nests for roosting as well as raising young. To date I have observed no definite indication of breeding and have no records of its presence June-August. Breeding, though, may be indicated by the observations of a single individual at Dry Ranch on 1 May 2004 and two recent nests at the same location on 16 and 24 June 2004.

Brewer's Sparrow (*Spizella breweri*). This species, which breeds primarily in the Mojave and Great Basin deserts, winters commonly in the Colorado Desert of southern California (Garrett and Dunn 1981), though numbers in the Anza-Borrego Desert vary greatly with rainfall (Unitt 2004). Brewer's Sparrow also winters near Aguanga, where I recorded it on all seven survey routes within coastal sage scrub and dry wash scrub. It is especially abundant most years at the Sage Road and Dameron Valley sites,

with flocks totaling 50 or more individuals at each. I observed no evidence of breeding near Aguanga, although several late dates of occurrence for wintering birds suggest the possibility: 11 individuals near Sage Road on 17 April 2010, 14 individuals near Cahuilla Road on 20 April 1996, 36 individuals near Sage Road on 24 April 2010, and a single individual north of the Aguanga post office on 1 May 2004. In 2001 Brewer's Sparrow bred in San Diego County on the desert slope in Montezuma Valley and McCain Valley (Unitt 2004). R. McKernan confirmed nesting on the coastal slope near Winchester, Riverside County, 36 km northwest of Aguanga, in May 1992 (McCaskie 1992). L. Hargrove and P. Unitt noted two individuals occupying territories on the coastal slope in Garner Valley, Riverside County, approximately 29 km north of Aguanga, in May 2010 (P. Unitt pers. comm.). Brewer's Sparrow bred formerly (1919 and before) on the coastal slope in San Fernando Valley in Los Angeles County, in Simi Valley in Ventura County, and in San Bernardino Valley in San Bernardino County (Willett 1933).

Black-throated Sparrow (*Amphispiza bilineata*). I observed this species on all survey routes. S. J. Montgomery (McCaskie 1994a) noted three territorial birds at Aguanga in May 1994 but did not confirm breeding. The Black-throated Sparrow is actually a common breeder in the area and is particularly numerous in stands of coastal sage scrub at Cahuilla and Sage roads, where 10 or more pairs typically occur at each site. Its distribution overlaps with the Sage Sparrow (*Amphispiza belli*) in coastal sage scrub, but the Sage Sparrow does not regularly occur in dry wash scrub as the Black-throated does. The Black-throated Sparrow has nested at other sites west of the desert including Cuyama Valley (Garrett and Dunn 1981).

Scott's Oriole (*Icterus parisorum*). In the Aguanga area, this species is closely associated with coastal sage scrub and dry wash scrub with an abundance of Mojave yucca, in which it nests. I recorded the oriole at all sites except Aguanga Valley and the hills above the Aguanga post office. It is most numerous at Dry Ranch and in Dameron Valley, both of which support up to a half dozen pairs each breeding season. It has also nested on the coastal slope in the Cuyama Valley, near Irvine in Orange County (McCaskie and Garrett 2006), and at a few scattered locations in arid chaparral in San Diego County such as Miller Valley (Garrett and Dunn 1981, Unitt 2004). This bird winters in small numbers in San Diego County (Unitt 2004, pers. obs.). I have no winter records from the study area, but R. Smith (McCaskie 1994b) observed this oriole to the west of Aguanga in Temecula on 12 December 1993.

Occurrence of Counterpart Species

Gambel's Quail (*Callipepla gambelii*) and California Quail (*C. californica*). I readily identified nearly all quail observed closely as California Quail, one of the most abundant birds of the shrublands. However, I noted three male Gambel's Quail near High Point Road on 3 February 2000 and a single male near Sage Road on 7 June 2003. On both occasions the birds were associating with California Quail. Coastal sage scrub dominates both locations. I am unaware that Gambel's Quail has been previously recorded on the coastal slope. As with the Harris's Hawk, there is a possibility that my observations are based on escapees, although Gambel's Quail could be easily overlooked in the large quail flocks that inhabit the Aguanga area.

Ladder-backed Woodpecker (*Picoides scalaris*) and Nuttall's Woodpecker (*P. nuttallii*). The Ladder-backed Woodpecker is widely distributed near Aguanga in coastal sage scrub and dry wash scrub. Dry Ranch, Sage Road, and Dameron Valley typically support three or four pairs each, while one or two pairs occur at the other four sites surveyed for this study. Unitt (2004) considered the availability of agaves and yuccas to be the key factor in the occurrence of this bird in the deserts of San Diego County. Its nesting requirements are more flexible near Aguanga, where I

observed its nest cavities in mesquite, elderberry, scrub oak (*Quercus* sp.), a dead willow, and telephone poles. Nuttall's Woodpecker typically inhabits oak and riparian groves. However, I observed it on a number of occasions within shrublands, often at a fair distance from any woodland habitat. Most individuals are readily identified as to species. However, I noted two individuals with the width of facial markings and the extent of black on the back intermediate, which may indicate hybridization. There are records of the Ladder-backed Woodpecker from other locations on the coastal slope. Grinnell and Swarth (1913) obtained specimens of the Ladder-backed Woodpecker from Valle Vista in Riverside County in early September 1908. House et al. (2010) reported several occurrences, including an observation of nesting, near Redlands and Devore in San Bernardino County. The species was also recorded nesting in Miller Valley on the coastal slope of southeastern San Diego County on 22 June 2000 (L. Hargrove Unitt 2004).

Black-tailed Gnatcatcher (*Polioptila melanura*) and California Gnatcatcher (*P. californica*). These counterpart species reach their western and eastern range limits, respectively, in Riverside County near Aguanga. I previously reported the occurrence of these two species at Aguanga (Weaver 1998), although I have now found both species at additional locations. Both species inhabit dry wash scrub and coastal sage scrub. They occur together at four locations within the study area: Sage Road, Cahuilla Road, Dry Ranch, and Aguanga Hills. I recorded the Black-tailed Gnatcatcher in Dameron Valley also. The most frequent sightings of the Black-tailed Gnatcatcher are from Dry Ranch. I have never observed more than a single family group of this species during a survey. The California Gnatcatcher is most numerous at the Sage Road site, where I have recorded as many as eight pairs. In January 2006, I noted these two species plus the Blue-gray Gnatcatcher (*Polioptila caerulea*) in the same feeding flock at Dry Ranch. The San Diego County Bird Atlas project (Unitt 2004) produced two records of the Black-tailed Gnatcatcher during the breeding season west of the desert near Warner Springs.

DISCUSSION

The wide distribution of arid-land birds throughout the Aguanga area is evidence of long-term occupancy by desert life. This is reinforced by the presence of more than 80 species of plants shared with the desert as well as populations of the White-tailed Antelope Ground Squirrel (*Ammospermophilus leucurus*), Long-nosed Leopard Lizard (*Gambelia wislizenii*), and Zebra-tailed Lizard (*Callisaurus draconoides*), all typical sedentary desert dwellers (C. Mahrdt pers. comm., pers. obs.).

The possible origin of Aguanga's contingent of desert-adapted species deserves consideration. The closest true desert lands lie approximately 26 km east of Dameron Valley in Alder and Coyote canyons in Anza Borrego State Park and have six of the desert species that occur at Aguanga: the Ladder-backed Woodpecker, Verdin, Cactus Wren, Black-tailed Gnatcatcher, Brewer's Sparrow, and Black-throated Sparrow (Unitt 2004). Weathers (1983) and Grinnell and Miller (1944) recorded small numbers of five desert species (Gambel's Quail, Ladder-backed Woodpecker, Brewer's Sparrow, Black-throated Sparrow, and Scott's Oriole) ranging into the Pinyon Flats area southwest of Palm Desert, 38 km northeast of the closest of the Aguanga study areas. These locations may serve as possible dispersal routes. However, they are separated from Aguanga by grassland and extensive stands of chaparral. San Diego County Atlas observers thoroughly covered

Pacific slope locations between Aguanga and the desert country directly to the east. They only reported a few sightings of two desert species, the Black-tailed Gnatcatcher and Scott's Oriole, from this portion of the county (Unitt 2004). My observations also reflect a lack of any desert species near the town of Anza, which is located midway between Pinyon Flats and Aguanga as well as midway between the Coyote Canyon section of Anza-Borrego Desert State Park and Aguanga. To judge by the paucity of records of desert birds from intervening areas, it appears that chaparral and grassland may serve as partial barriers to the spread of arid-adapted species.

Another less obvious route actually shows more potential. A band of semi-desert vegetation, now fragmented in occurrence and degraded in composition, extends around the northern and western bases of Mount San Jacinto. This band connects, more or less, with the true desert associations of the Coachella Valley. Chamise generally dominates ridges, while California buckwheat dominates lower slopes between Aguanga and the San Jacinto Valley located west of Mount San Jacinto. Emergent shrubs and succulents are generally sparse in this region, indicating elimination by fire and grazing. However, there have been observations of some of the desert birds that occur near Aguanga in remnant patches of this vegetation. Archives of the San Jacinto Lake Christmas bird count (http://www.audubon.org/bird/cbc/hr/index.html) conducted in the San Jacinto Valley of Riverside County over the past 28 years include observations of several species noted near Aguanga that are characteristic of the desert. These include fairly frequent sightings of the Black-throated Sparrow (11 records), Cactus Wren (10 records), and Brewer's Sparrow (10 records), while Scott's Oriole (2 records) and Verdin (1 record) have also been noted. The center of this count circle is located 43 km north of the nearest of my survey sites at Sage Road. Grinnell and Swarth (1913) reported the Ladder-backed Woodpecker, Black-throated Sparrow, and Brewer's Sparrow at a now-developed collecting site at Valle Vista 26 km north of the Sage Road site. In September 2008 I noted the Black-throated Sparrow and Brewer's Sparrow in Cactus Valley, only 17 km distant. While conducting breeding bird surveys, G. Athens (pers. comm.) observed Scott's Oriole near Red Mountain Road 11 km to the north of the Sage Road site. The Ladder-backed Woodpecker and Black-throated Sparrow were also recorded by participants in the San Diego County Bird Atlas project at Oak Grove Valley, 3 km to the east of Dameron Valley (Unitt 2004). Prior to the initiation of the atlas surveys, I encouraged participants to watch for these birds, as the plant life is an eastern extension of the vegetation found near Aguanga.

These records suggest that in the past the Aguanga area functioned as the southern terminus of a region once hosting a wider variety of arid-land birds. The continuing presence of desert birds at Aguanga is likely due to the relatively intact condition of the native vegetation compared with the largely disturbed lands to the north.

The future of this area, most of which is in private ownership, is very much in doubt.

Shrublands were once nearly continuous in the area, separated by narrow bands of riparian vegetation along portions of Tule, Temecula, Cottonwood, and Wilson creeks. Present and future threats center on the rapidly increasing human population. Since the 1980s, development for housing and agricul-

ture has greatly fragmented the native vegetation (D. Rorick pers. comm., G. Athens pers. comm.). Typically, one of the first acts of new residents is to clear most or all natural vegetation from their property, as I have personally observed. Such rapid habitat fragmentation creates an uncertain future for shrub-preferring birds, as many species of both coastal and desert regions require substantial tracts of native vegetation (Soulé et al. 1988, Bolger et al. 1997, Latta et al. 1999). The Ladder-backed Woodpecker, Cactus Wren, Verdin, Black-tailed Gnatcatcher, and Black-throated Sparrow are among the desert species that are likely to be affected. Additional threats, because of their potential as fire hazards, include target shooting and off-road vehicle driving. In my experience, both are prevalent activities among the human population of the area. Some areas, most notably along Wilson Valley Road and Highway 79, have burned several times since I initiated this study.

Coastal sage scrub along portions of Happy Valley Road east of Cahuilla Road as well as west of Cahuilla Road and south of Wilson Valley Road is currently protected as conservation land by the county of Riverside (www.wrc-rca.org/RCA_Prev_Acquisitions.html). The Bureau of Land Management (BLM) protects coastal sage scrub in isolated parcels located east and west of Sage Road, along the lower section of High Point Road, north of the Aguanga post office, and east of Cahuilla Road. The BLM lands, however, have been slated for sale in the past, and their future is uncertain. The Center for Natural Lands Management, a nongovernmental conservation organization, also protects stands of coastal sage scrub in two mitigation banks north and south of Wilson Valley Road (www.cnlm.org/cms/index.php?option=com_content&task=view&id=19&Itemid=175). A small area of dry wash scrub is protected by the County of Riverside along Temecula Creek. Otherwise this plant association is subject to future destruction. From the current rate of development, I believe that natural habitats outside of the locations mentioned above are facing elimination within the coming decade, if not sooner. Key locations that urgently need protection include the Dry Ranch area with its extensive dry wash scrub, the elderberry-lined draws of Dameron Valley, the eastern and central sections of Aguanga Valley, and the south-facing slopes below Cahuilla Road south of its intersection with Wilson Valley Road.

ACKNOWLEDGMENTS

I thank Gregory Athens and the late David Rorick for introducing me to the area and sharing their time and knowledge of local birdlife as I accompanied them on breeding bird surveys. I thank James Dillane and the late Shogo Yamaguchi for sharing their botanical expertise with me in the field. I thank Clark Mahrdt for sharing his knowledge of Cactus Wrens and reptiles found locally. I thank Philip Unitt for his helpful comments and for allowing use of data originally collected for the San Diego County Bird Atlas. I thank Kimball Garrett, Lori Hargrove, Paul Lehman, and Kathy Molina for their helpful comments.

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Accepted 1 November 2010

APPENDIX. Birds Recorded in the Aguanga Shrub Lands

Notation: * breeding confirmed; + breeding probable; visitor, no trend in records, no indication of breeding; max, maximum number of individuals recorded on a single date. The following abundance notations refer to the proper season and the proper habitat: abundant, almost always encountered in large numbers; common, almost always encountered in moderate numbers; fairly common, usually encountered in

small numbers; uncommon, missed more often than encountered, but occurs annually; rare, missed more often than encountered, does not occur annually. Locations: AH, Aguanga Hills; AV, Aguanga Valley; CR, Cahuilla Road; DR, Dry Ranch; DV, Dameron Valley; HP, High Point Road; SR, Sage Road.

Mallard (*Anas platyrhynchos*). Rare visitor, max 2, AV, 9 Aug 2008.

+Mountain Quail (*Oreortyx pictus*). Uncommon resident, max 4, HP, 12 Apr 1997.

*California Quail (*Callipepla californica*). Common to abundant resident, max 192, DV, 22 Oct 2005.

Gambel's Quail (*Callipepla gambelii*). Uncertain status, max 3, HP, 3 Feb 2000.

Turkey Vulture (*Cathartes aura*). Uncommon visitor, max 2, DR, 26 Apr 2005.

Golden Eagle (*Aquila chrysaetos*). Rare visitor, max 2, AV, 3 May 2005.

Northern Harrier (*Circus cyaneus*). Rare winter resident (Nov–early Apr), 1, CR, 9 Dec 1995; 1, DV, 4 Apr 1998; 1, SR, 30 Nov 1998; 1, DR, 11 Nov 2006; 1, SR, 26 Jan 2007. One sighting in spring, 1, AH, 18 May 1999.

Cooper's Hawk (*Accipiter cooperii*). Fairly common visitor, max 2, DV, 6 Aug 2005.

Harris's Hawk (*Parabuteo unicinctus*). Rare visitor, 1, DV, 27 Mar 1997; 2 km west of Dripping Springs Campground, 10 Dec 2006; 1 Hwy. 79 1.5 km west of Hwy. R6, 4 Jul and 2 Aug 2008.

White-tailed Kite (*Elanus leucurus*). Rare visitor, 1, SR, 13 Aug 2005; 1, HP, 26 Nov 2005; 1 DR, 11 Nov 2006.

Red-shouldered Hawk (*Buteo lineatus*). Single record, 1, 1.0 km north of Radec, 26 Jan 2007.

*Red-tailed Hawk (*Buteo jamaicensis*). Fairly common resident, max 3, DR, 25 Apr 2005.

Ferruginous Hawk (*Buteo regalis*). Rare winter resident, 1, DV, 13 Dec 1997; 1, DV, 12 Dec 1998.

Rough-legged Hawk (*Buteo lagopus*). Single record, 1, DV, 6 Feb 1999.

American Kestrel (*Falco sparverius*). Rare visitor, max 2, DV, 2 Aug 2008.

Merlin (*Falco columbarius*). Single record, 1, SR, 26 Jan 2007.

Prairie Falcon (*Falco mexicanus*). Single record, 1, DV, 27 Mar 1997.

Rock Pigeon *(Columba livia).* Single record, 2, AV, 8 Aug 2008.

Band-tailed Pigeon, (*Patagioenas fasciata*). Fairly common to abundant summer visitor (Jun–Aug), max 110, DV, 23 Jun 2001.

*Mourning Dove (*Zenaida macroura*). Fairly common to common resident, max 22, AV, 26 Jan 2007.

+Greater Roadrunner (*Geococcyx californianus*). Uncommon resident, max 3, DV, 6 Feb 2003.

+Barn Owl (*Tyto alba*). Fairly common resident, max 5, along Hwy 79 and 371, 8 Jul 2006.

+Great Horned Owl (*Bubo virginianus*). Fairly common resident, max 2, HP, 26 May 2005.

+Lesser Nighthawk (*Chordeiles acutipennis*). Fairly common summer resident (May–Jul), max 5, SR, 31 May 2003.

+Common Poorwill (*Phalaenoptilus nuttallii*). Fairly common resident, max 12, HP, 26 May 2005.

White-throated Swift (*Aeronautes saxatalis*). Single record, 3, HP, 10 Jul 1998.

Vaux's Swift (*Chaetura vauxi*). Single record, 1, Wilson Valley Road, 20 Apr 1996.

+Anna's Hummingbird (*Calypte anna*). Fairly common resident, max 16, AH/AV, 25 Oct 1997.

*Costa's Hummingbird (*Calypte costae*). Fairly common to common summer resident, rare winter resident, max 22, DV, 27 Jun 1998.

Belted Kingfisher (*Megaceryle alcyon*). Single record, 1, SR, 30 Nov 1998.

Lewis's Woodpecker (*Melanerpes lewis*). Single record, 1, DR, 12 Mar 2003.
*Ladder-backed Woodpecker (*Picoides scalaris*). Fairly common resident, max 8, DV, 6 Aug 2005.
Nuttall's Woodpecker (*Picoides nuttallii*). Uncommon visitor, max 2, SR, 7 Jun 2003; 2, AV, 7 Aug 2008.
Northern Flicker (*Colaptes auratus*). Uncommon visitor, max 1, HP, 16 Apr 1996; AV, 28 Sep 1996; HP, 29 Mar 1998; DV, 12 Dec 1998; DV, 10 Apr 1999; CR, 15 Jun 2003; DV, 22 Oct 2005.
Gray Flycatcher (*Empidonax wrightii*). Rare winter resident (Jan–Mar), 1, DR, 20 Jan 2006; 1, DR, 30 Mar 2006.
Pacific-slope Flycatcher (*Empidonax difficilis*). Single record, 1, DR, 27 Apr 2006.
Empidonax Flycatcher (*Empidonax* sp.). Single record, 1, DR, 16 Aug 2003.
Black Phoebe (*Sayornis nigricans*). Uncommon visitor, max 2, AV, 4 Nov 2005; AV, 7 Aug 2008.
*Say's Phoebe (*Sayornis saya*). Uncommon summer resident, fairly common winter resident, max 5, AV/DR, 18 Oct 2003; AH, 6 May 2005.
Olive-sided Flycatcher (*Contopus cooperi*). Single record, 1, DR, 17 May 2003.
*Ash-throated Flycatcher (*Myiarchus cinerascens*). Fairly common summer resident (Apr–Jul), max 13, HP, 14 Jun 1997.
Western Wood-Pewee (*Contopus sordidulus*). Single record, 1, AH, 5 Aug 1996.
*Western Kingbird (*Tyrannus verticalis*). Uncommon summer resident (Apr–Aug), max 4, AV, 7 Aug 2008.
Cassin's Kingbird (*Tyrannus vociferans*). Uncommon visitor, max 3, HP, 14 Jun 1997.
*Loggerhead Shrike (*Lanius ludovicianus*). Uncommon resident, max 5, AV, 3 May 2005.
Warbling Vireo (*Vireo gilvus*). Single record, 1, CR, 4 May 1996.
*Western Scrub-Jay (*Aphelocoma californica*). Common resident, max 36, DV, 6 Aug 2005.
American Crow (*Corvus brachyrhynchos*). Uncommon visitor, max 12, AV, 26 Jan 2007.
*Common Raven (*Corvus corax*). Fairly common resident, max 8, DV, 10 Apr 1999; SR, 7 Jun 2003.
*Horned Lark (*Eremophila alpestris*). Uncommon to fairly common resident, max 5, SR, 8 Jun 2005.
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*). Uncommon summer visitor (Mar–Aug), max 3, CR, 20 Apr 1996.
Tree Swallow (*Tachycineta bicolor*). Uncommon transient (Apr), max 5, Wilson Valley Road, 20 Apr 1996
Violet-green Swallow (*Tachycineta thalassina*). Single record, 1, HP, 14 Jun 1997.
Cliff Swallow (*Petrochelidon pyrrhonota*). Fairly common summer visitor (Apr–Sep), max 70, SR, 7 Jun 2003.
Barn Swallow (*Hirundo rustica*). Uncommon transient (Mar, Sept–Oct) max 19, AV, 28 Sep 1996.
*Oak Titmouse (*Baeolophus inornatus*). Fairly common resident, max 4, DV, 2 May 1998; DV, 12 Jan 2002.
*Bushtit (*Psaltriparus minimus*). Fairly common to common resident, max 36, DV, 22 Oct 2005.
Verdin (*Auriparus flaviceps*). Uncommon winter resident (Sep–May), max 4, DR, 27 Sep 2003; DR, 6 Sep 2004.
*Cactus Wren (*Campylorhynchus bruneicapillus*). Fairly common resident, max 19, DV/CR, 1 Jun 1996.
*Rock Wren (*Salpinctes obsoletus*). Uncommon resident, max 4, SR, 7 Jun 2003; SR, 4 May 1996.

+Canyon Wren (*Catherpes mexicanus*). Uncommon resident, max 2, HP, 10 Jul 1998.
*Bewick's Wren (*Thyromanes bewickii*). Common resident, max 24, DV, 22 Oct 2005.
House Wren (*Troglodytes aedon*). Uncommon visitor, max 2, DV, 22 Oct 2005.
*Blue-gray Gnatcatcher (*Polioptila caerulea*). Uncommon summer resident, fairly common winter resident, max 4, DV, 4 Apr 1998.
*California Gnatcatcher (*Polioptila californica*). Fairly common resident, max 16, SR, 13 Aug 2005.
*Black-tailed Gnatcatcher (*Polioptila melanura*). Uncommon resident, max 3, AH, 11 May 1996.
Ruby-crowned Kinglet (*Regulus calendula*). Fairly common winter resident (Oct–Apr), max 5, HP, 26 Nov 2005.
*Wrentit (*Chamaea fasciata*). Fairly common to common resident, max 22, HP/DV, 12 Apr 1997.
Western Bluebird (*Sialia mexicana*). Fairly common winter resident (Oct–Apr), max 15, AH/AV, 25 Oct 1997.
Hermit Thrush (*Catharus guttatus*). Fairly common winter resident, (Nov–Apr), max 6, HP, 27 Mar 1998; DR, 10 Apr 1999.
American Robin (*Turdus migratorius*). Uncommon winter resident (Feb), max 7, AV, 22 Feb 1997.
*Northern Mockingbird (*Mimus polyglottos*). Fairly common resident, max 10, DR, 17 May 2003.
*California Thrasher (*Toxostoma redivivum*). Common resident, max 29, DV, 23 Jun 2001.
Sage Thrasher (*Oreoscoptes montanus*). Rare transient, max 1, DV, 1 Mar 1997; SR, 12 Mar 2002.
European Starling (*Sturnus vulgaris*). Uncommon visitor, max 12, AV, 25 Oct 1997.
American Pipit (*Anthus rubescens*). Uncommon winter resident (Dec–Feb), max 2, AV, 22 Feb 1997.
Phainopepla (*Phainopepla nitens*). Common to abundant summer resident, rare winter resident, max 71, DV, 6 Aug 2005.
Orange-crowned Warbler (*Oreothlypis celata*). Uncommon transient (Mar–Apr), max 4, HP, 27 Mar 1998; DR, 26 Apr 2003.
Yellow Warbler (*Dendroica petechia*). Rare transient (May), max 2, DR, 17 May 2003.
Yellow-rumped Warbler (*Dendroica coronata*). Uncommon to common winter resident (Oct–Apr), max 29, AV, 4 Nov 2005.
MacGillivray's Warber (*Oporornis tolmiei*). Single record, 1, DR, 26 Apr 2005.
Common Yellowthroat (*Geothylpis trichas*). Status uncertain, max 3, AV, 28 Sep 1996.
Wilson's Warbler (*Wilsonia pusilla*). Uncommon transient (May), max 2, DR, 17 May 2003.
*Spotted Towhee (*Pipilo maculatus*). Common resident, max 22, DV, 23 Jun 2001.
*Rufous-crowned Sparrow (*Aimophila ruficeps*). Fairly common to common resident, max 13, HP, 26 May 2005.
*California Towhee (*Melozone crissalis*). Abundant resident, max 80, SR, 7 Jun 2003.
Chipping Sparrow (*Spizella passerina*). Single record, 2, DV, 6 Feb 1999.
Brewer's Sparrow (*Spizella breweri*). Fairly common to abundant winter resident (Sep–May), max 107, SR, 25 Mar 2009.
+Black-chinned Sparrow (*Spizella atrogularis*). Fairly common transient, uncommon summer resident, max 12, CR, 20 Apr 1996. Rare winter resident (2, DR, 20 Jan 2006; 2, DR, 30 Mar 2006).

Vesper Sparrow (*Pooecetes gramineus*). Rare winter resident, max 10, DV, 6 Feb 1999.

*Lark Sparrow (*Chondestes grammacus*). Fairly common summer resident, common winter resident, max 40, DV, 6 Feb 1999.

*Black-throated Sparrow (*Amphispiza bilineata*). Common resident, max 22, SR, 13 Aug 2005.

*Sage Sparrow (*Amphispiza belli*). Common resident, max 29, SR, 7 Jun 2003.

Savannah Sparrow (*Passerculus sandwichensis*). Uncommon winter resident (Sep–Feb), max 2, AV, 28 Sep 1996; DV, 6 Feb 1999.

Fox Sparrow (*Passerella iliaca*). Uncommon winter resident (Nov–Feb), max 4, HP, 26 Nov 2005.

+Song Sparrow (*Melospiza melodia*). Rare resident, max 3, DR, 1 Jun 1996.

Lincoln's Sparrow (*Melospiza lincolnii*). Rare winter resident (Sep–Apr), max 2, DV, 6 Feb 1999.

Harris's Sparrow (*Zonotrichia querula*). Single record, 1, DV, 6 Feb 1999.

White-crowned Sparrow (*Zonotrichia leucophrys*). Abundant winter resident (Sep–May), max 156 DR/AH, 31 Jan 2004.

Golden-crowned Sparrow (*Zonotrichia atricapilla*). Uncommon winter resident (Nov–Apr), max 6 DR, 30 Mar 2006.

Dark-eyed Junco (*Junco hyemalis*). Uncommon winter resident (Nov–Feb), max 3, AV, 4 Nov 2005.

Western Tanager (*Piranga ludoviciana*). Single record, 2, DV, 6 Aug 2005.

*Black-headed Grosbeak (*Pheucticus melanocephalus*). Fairly common to common summer resident (Apr–Aug), max 29, DV, 16 Jul 2005.

Blue Grosbeak (*Passerina caerulea*). Single record, 1, SR, 4 May 1996.

*Lazuli Bunting (*Passerina amoena*). Erratic summer resident (Apr–Jun), max 7, DV, 16 May 1998.

Tricolored Blackbird (*Agelaius tricolor*). Erratic visitor, max 200, DV, 2 May 1998. Colonies previously existed 1.7 km south of Aguanga, 0.5 km east of Oak Grove, and 3.5 km west of Oak Grove.

*Western Meadowlark (*Sturnella neglecta*). Uncommon to fairly common resident, max 26, SR, 12 Mar 2002.

Brewer's Blackbird (*Euphagus cyanocephalus*). Uncommon visitor, max 11, AV, 3 May 2005.

*Brown-headed Cowbird (*Molothrus ater*). Uncommon summer resident (Apr–Jul), max 3, DR, 1 Jun 1996; DR, 17 May 2003.

Great-tailed Grackle (*Quiscalus mexicanus*). Uncommon visitor, max 24, AV, 7 Aug 2008.

Hooded Oriole (*Icterus cucullatus*). Uncommon transient (May), max 2, SR, 4 May 2003.

Bullock's Oriole (*Icterus bullockii*). Uncommon summer visitor (May–Aug), max 4, DV, 6 Aug 2005.

*Scott's Oriole (*Icterus parisorum*). Fairly common summer resident (Mar–Aug), max 7, DR, 18 May 1996; DR, 21 Mar 2009. One sighting in fall, 1, DR, 29 Oct 2005.

*House Finch (*Carpodacus mexicanus*). Common to abundant resident, max 240, AV, 26 Jan 2007.

Cassin's Finch (*Carpodacus cassinii*). Single record, 6, AV, 22 Feb 1996.

Lesser Goldfinch (*Spinus psaltria*). Fairly common to common visitor, max 20, AV, 14 Jan 1996.

Lawrence's Goldfinch (*Spinus lawrencei*). Uncommon visitor, max 4, DR, 27 Apr 2006.

American Goldfinch (*Spinus tristis*). Uncommon visitor, max 4, HP, 26 Nov 2005.

House Sparrow (*Passer domesticus*). Uncommon visitor, max 3, AV, 3 May 2005.