

AVIFAUNAL CHANGES IN BIG BEND NATIONAL PARK, TEXAS

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Abstract. Population changes in the breeding avifauna of the Big Bend National Park from 1901 through 2006 were recorded for 24 species. They include recent arrivals, increasing, declining or extirpated, apparently stable species, and species of uncertain status. Recent arrivals include Black-crowned Night-Heron (*Nycticorax nycticorax*), Eurasian Collared-Dove (*Streptopelia decaocto*), Golden-fronted Woodpecker (*Melanerpes aurifrons*), Dusky-capped Flycatcher (*Myiarchus tuberculifer*), Cave Swallow (*Petrochelidon fulva*), Carolina Wren (*Thryothorus ludovicianus*), and Lucy's Warbler (*Vermivora luciae*). Increasing species include Mallard (*Anas platyrhynchos*), Green Heron (*Butorides virescens*), Gray Hawk (*Buteo nitida*), Common Black-Hawk (*Buteogallus anthracinus*), Lucifer Hummingbird (*Calopthorax lucifer*), Green Kingfisher (*Chloroceryle americana*), Painted Redstart (*Myioborus pictus*), Great-tailed Grackle (*Quiscalus mexicanus*), and Bronzed Cowbird (*Molothrus aeneus*). Declining or extirpated species include Gambel's Quail (*Callipepla gambelii*), Montezuma Quail (*Cyrtonyx montezumae*), Harris's Hawk (*Parabuteo unicinctus*), Golden Eagle (*Aquila chrysaetos*), Prairie Falcon (*Falco mexicanus*), Yellow Warbler (*Dendroica petechia*), and Hooded Oriole (*Icterus cucullatus*). Apparently stable species include Peregrine Falcon (*Falco peregrinus*), Loggerhead Shrike (*Lanius ludovicianus*), Bell's Vireo (*Vireo bellii*), Black-capped Vireo (*Vireo atricapilla*), and Colima Warbler (*Vermivora crissalis*). Uncertain status applies only to Aplomado Falcon (*Falco femoralis*).

Key words: avifaunal declines, avifaunal increases, Big Bend National Park, breeding avifauna, new arrivals, stable species, west Texas.

CAMBIOS A LA AVEFAUNA DEL PARQUE NACIONAL BIG BEND, TEXAS

Resumen. Desde 1901 hasta 2006 ha registrado cambios en la población de 24 especies de aves que anidan en el parque nacional Big Bend. Categorías para ellos incluyen recién llegado, aumentado, disminuido o extinguido, especies aparentemente en estado estable, y finalmente, en estado incierto. Especies recién llegados incluyen *Nycticorax nycticorax*, *Streptopelia decaocto*, *Melanerpes aurifrons*, *Myiarchus tuberculifer*, *Petrochelidon fulva*, *Thryothorus ludovicianus*, y *Vermivora luciae*. Especies con población aumentado incluyen pato de *Anas platyrhynchos*, *Butorides virescens*, *Buteo nitida*, *Buteogallus anthracinus*, *Calopthorax lucifer*, *Chloroceryle americana*, *Myioborus pictus*, *Quiscalus mexicanus*, y *Molothrus aeneus*. Especies disminuidos o extinguidos incluyen *Callipepla gambelii*, *Cyrtonyx montezumae*, *Parabuteo unicinctus*, *Aquila chrysaetos*, *Falco mexicanus*, *Dendroica petechia*, y *Icterus cucullatus*. Especies aparentemente en estado estable incluyen *Falco peregrinus*, *Lanius ludovicianus*, *Vireo bellii*, *Vireo atricapilla*, y *Vermivora crissalis*. La categoría de especies en estado incierto aplica únicamente al *Falco femoralis*.

The Big Bend region of western Texas includes a great variety of habitats, including desertscrub and grassland at lower elevations and woodlands dominated by oaks (*Quercus* spp.) and pines (*Pinus* spp.) at higher elevations. Emory Peak, the highest point, is 2,385 m above sea level. The region is best known for supporting the only US breeding population of Colima Warbler (*Vermivora crissalis*) but also contains a great variety of resident and migratory species, including many species characteristic of the US–Mexico border region (Wauer 1973, 1996; Lockwood and Freeman 2004). Much land is currently protected within Big Bend National Park, and the remainder is in private or public ownership.

The earliest ornithological study in the Big Bend region occurred when the United States Biological Survey visited in 1901 (Wauer 1996). During May, June, and July of that year,

Harry C. Oberholser, Vernon Bailey, and Louis Agassiz Fuertes conducted extensive field work throughout the area. Oberholser (1902) summarized their more important findings, Fuertes (1903) published on the Montezuma Quail (*Cyrtonyx montezumae*), and Bailey (1905) reported on the expedition's overall findings.

This early period of activity was followed by one in which expeditions to this remote section of the United States were discouraged due to unrest along the border associated with the Mexican Revolution. In 1928, Josselyn Van Tyne, accompanied by F. M. and H. T. Gaige, surveyed the bird life from Alpine to the summit of Emory Peak between 8 June and 7 August. Significant findings of that expedition included the first specimen of Colima Warbler for the US and only the twelfth known specimen of this species. Van Tyne returned in 1932, and reported his successful search for nesting Colima Warblers

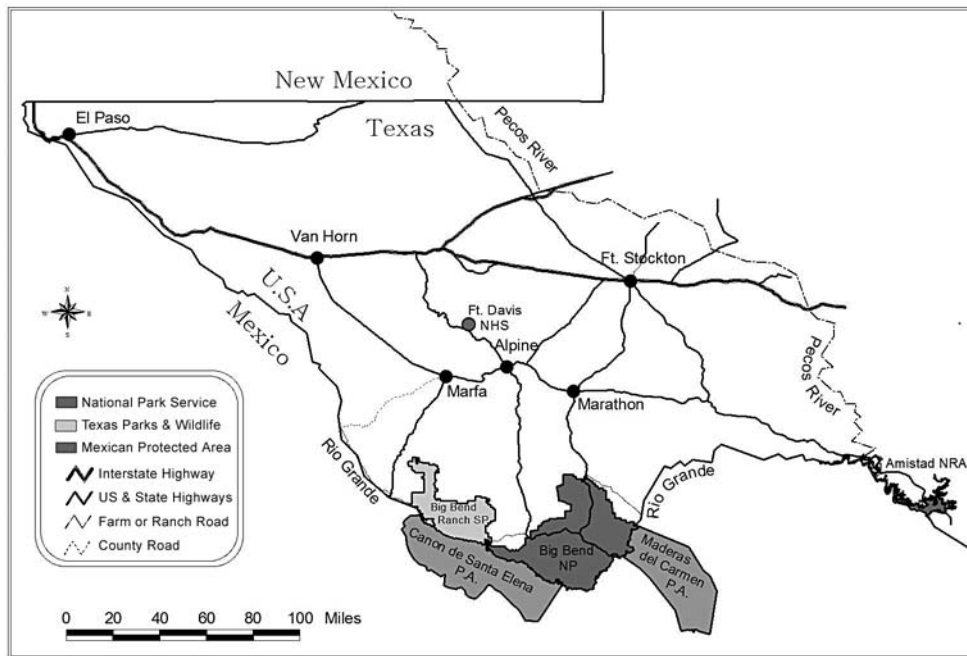


FIGURE 1. Map of Big Bend National Park, Texas, and the surrounding areas of the United States and Mexico.

(Van Tyne 1936). By this time, sufficient information on the bird life of the area was available to permit a comprehensive analysis of the avifauna (Van Tyne and Sutton 1937) in which a total of 215 species of birds was reported.

Big Bend National Park (BBNP) was established in southern Brewster County, Texas, in 1944 (Fig. 1), and National Park Service (NPS) employees began to record their bird observations. Harold Brodrick, the first park naturalist, maintained excellent bird records. Brodrick (1960) listed 236 species for BBNP. C. Phillip Allen and Anne LeSassier, who added several important records, revised Brodrick's checklist (Brodrick et al. 1966), increasing it to 241 species. Since then, revised park checklists have appeared every 5–10 yr; an upcoming edition currently features 409 confirmed species and 41 hypothetical species (R. H. Wauer and M. Flippo, unpubl. data).

The following list includes only breeding bird species whose status has changed, since records have been available. They are described as recent arrivals or as increasing, declining or extirpated species, and species of uncertain status. Our report is based upon data obtained from the historic and contemporary literature and field work by the authors. Unless otherwise cited, historic records are assumed to be from Wauer (1973, 1996), and new records summarized by

the authors from unpublished bird records submitted to Big Bend National Park.

RESULTS

MALLARD (*ANAS PLATYRHYNCHOS*)

Status: increasing. Although the Mallard has been considered to be only a winter resident in the Big Bend region, the subspecies known as Mexican Duck (*A. p. diazi*), is a fairly common year-round resident in aquatic habitats within and adjacent to BBNP and its abundance has increased in recent years. Intergrades between *A. p. platyrhynchos* and *A. p. diazi* are found occasionally.

GAMBEL'S QUAIL (*CALLIPEPLA GAMBELII*)

Status: declining. Wauer (1973) reported it to be an extremely rare resident in the Big Bend lowlands, with recent (since 1966) sightings at Maverick, the Old Ranch, Dugout Wells, and along the River Road. Oberholser (1974) considered it a fairly common resident along the Rio Grande from El Paso County south to upper Big Bend in Presidio County and rare to Big Bend National Park (nesting unconfirmed) and Terrell County (nesting doubtful). There have been no further reports for BBNP.

MONTEZUMA QUAIL (*CYRTONYX MONTEZUMAE*)

Status: declining with possible limited recovery. Van Tyne and Sutton (1937) reported that as early as 1933 this species seemed to be on the decline in BBNP. Local hunters and ranchers testified unanimously to the great decrease in the numbers of this quail in recent years in even remote areas. No adequate explanation of this decrease was offered but surely overgrazing, which now prevails in nearly every part of the country, must be an important contributing factor. Albers and Gehlbach (1990) found that Montezuma Quail in the Edwards Plateau disappeared when 40-50% of the tall grass was removed from an area. No BBNP records occurred for Montezuma Quail after the early 1940s. In January 1973, Wauer released 26 birds captured near Nogales, Arizona, into suitable habitat in the Pine Canyon area of the Chisos Mountains. In May 1973, five individuals were found there, along with two other birds in upper Boot Canyon. Since the 1973 release there were only scattered reports from the 1980s into the early 2000s.

In May 2003, Flippo and Dan Leavitt reported a probable calling male in upper Green Gulch. This report was followed by several other unconfirmed observations in 2004 and early 2005. On 28 May 2005, Sylvestre Sorola, David Holdermann, and Raymond Skiles confirmed the species' presence when they observed and video-taped two or three males on the South Rim of the Chisos (Holdermann et al. 2007). Subsequent visitor reports from the same area indicated that the quail remained through the summer of 2005.

The numerous reports of Montezuma Quail from 2003 through 2005, after so many years, raise the question of where they came from. Possible scenarios include: (1) the introduced birds and their progeny persisted in low density until detected, (2) surplus birds from a population in Mexico's Maderas del Carmen, approximately 80 km to the southeast, somehow found their way across the desert into adequate habitat in the Chisos Mountains, or (3) the quail have always been there but were overlooked because of their secretive nature and perhaps low density, in spite of the uncountable hours by birders and researchers in suitable habitat throughout the same areas.

Montezuma Quail is a rare and declining species in Texas (Shackelford and Lockwood 2000). Extant populations in the Davis Mountains, in intervening ranges with suitable habitat, and in the Maderas del Carmen range of Mexico are highly isolated and discontinuous.

GREEN HERON (*BUTORIDES VIRESCENS*)

Status: increasing. Nesting records anywhere along the Rio Grande corridor from El Paso downstream through the Big Bend region were reported only occasionally during the 1930s (Oberholser 1974). That status did not change, at least for BBNP (Wauer 1996), through the 1990s. However, the Green Heron is now a permanent resident in the park, and an uncommon nester at Rio Grande Village in southeastern BBNP. Efforts underway to restore permanent wetland areas near Rio Grande Village may enhance that population.

BLACK-CROWNED NIGHT-HERON (*NYCTICORAX NYCTICORAX*)

Status: recent arrival. Previously, it had been considered only as a rare spring migrant; casual in summer, fall, and winter in the park (Wauer 1996). Increased sightings of birds year-round starting in the 1990s, included juveniles in late summer and early fall at Rio Grande Village, suggest breeding.

COMMON BLACK-HAWK (*BUTEOGALLUS ANTHRACINUS*)

Status: increasing. Although this species has nested in the Davis Mountains in the northern edge of the Big Bend Country at least since 1940, nesting was not recorded in the BBNP area until 1979 (Wauer 1996). Nesting has occurred almost every year since then, including a nest in Rio Grande Village, which has been utilized every summer by black-hawks for the past decade. Shackelford and Lockwood (2000) consider it a rare and declining bird in Texas, although there is also a small population along the Devil's River in central Val Verde County (Lockwood and Freeman 2004), and one-two pairs nest in the Concho Valley near San Angelo (M. W. Lockwood, pers. comm.). A pair nested at 1927 m in the Davis Mountains in 2000, indicating some expansion from lowland canyons into higher elevations (Bryan and Karges 2001), but no such upward expansion has been seen in BBNP.

HARRIS'S HAWK (*PARABUTEO UNICINCTUS*)

Status: declining or extirpated. Considered a rare summer and winter visitor and migrant, there have been no documented nesting records within BBNP since 1964 (Wauer 1996). It does occur to the northeast, especially east of Sanderson, Texas, and to the west of the park in central and northern Presidio County.

GRAY HAWK (*BUTEO NITIDA*)

Status: increasing. Prior to 1988, when nesting was discovered in BBNP (Wauer 1996), its US nesting range was thought to be the Lower Rio Grande Valley of Texas, southwestern New Mexico, and southeastern Arizona (Oberholser 1974, Phillips et al. 1964). Since 1988 one-two pairs have nested almost every year along the floodplain at Cottonwood Campground and Rio Grande Village. Beyond BBNP, Gray Hawks colonized the Davis Mountains in 1995 and now several pairs are known to nest in that area. Within BBNP it is considered uncommon in spring, summer, and fall and has overwintered once at Cottonwood Campground. In addition, a Gray Hawk paired with a Red-shouldered Hawk (*B. lineatus*) was found nesting near Cottonwood Campground in 1988; the one hatchling did not survive. Shackelford and Lockwood (2000) include Gray Hawk in their list of rare and declining Texas birds.

GOLDEN EAGLE (*AQUILA CHRYSAETOS*)

Status: declining or extirpated. Wauer (1996) reported that at least five pairs of Golden Eagles occurred in BBNP during the summer, and he listed several breeding records from the Chisos Mountains. It was then considered an uncommon summer resident. However, valid reports have become increasingly scarce over the past 5 yr or so. The last possible breeding pair in BBNP was seen in the Dead Horse Mountains on 28 May 1985 (Wauer 1996), but it was not known if the birds remained together or nested.

APLOMADO FALCON (*FALCO FEMORALIS*)

Status: uncertain. Although the species was once present on the yucca (*Yucca* spp.)-studded grasslands in the Marfa-Valentine-Sierra Blanca region, eastward to BBNP and the Pecos River valley, no verified records exist from the early 1950s to the early 1990s. In 1992, one individual was seen near Valentine, Jeff Davis County (Wauer 1996). Recent reintroduction efforts have been underway north of the park in the Marfa grasslands in northeastern Presidio County and in the Marathon Basin area of northern Brewster County (http://www.peregrinefund.org/press_full.asp?id=9&category=Aplomado%20Falcon). The Aplomado Falcon is listed as a rare and declining Texas bird by Shackelford and Lockwood (2000). On 28 March 2007, BBNP visitors John and Char Ester photographed a banded Aplomado Falcon on an ocotillo (*Fouquieria splendens*) approximately 11 km southeast of Panther Junction. Peregrine Fund

representatives with the West Texas restoration project identified the falcon as a female released in 2004 18 km east of Marathon, Texas. No further observations of this or other Aplomados have been documented in the park.

PEREGRINE FALCON (*FALCO PEREGRINUS*)

Status: apparently stable. On 25 August 1999, the Peregrine Falcon was officially removed from the US Endangered species list. Texas, however, still lists the Peregrine Falcon as Endangered. Of the fewer than 20 known breeding pairs in the state, most occur in the Big Bend Region. With delisting, federal funding for annual surveys of the Big Bend Peregrine population diminished, and for the last five years (2002–2007) the NPS has only conducted limited surveys at four known nesting sites. As far as is known, the population remains stable within BBNP.

PRAIRIE FALCON (*FALCO MEXICANUS*)

Status: declining or extirpated. Wauer (1996) listed a number of nesting sites within BBNP at least through 1995. There have been no recent nesting records for the park, although there was a nesting pair just west of BBNP on Hen Egg Mountain near Study Butte as recently as 2006.

EURASIAN COLLARED-DOVE (*STREPTOPELIA DECAOCTO*)

Status: recent arrival. The first verified reports of this rapidly expanding exotic species in BBNP occurred in April and May 2001 (Sexton 2001). Since spring 2004 they have been reported from numerous locations throughout the Big Bend region. Breeding populations have become established at Study Butte, Terlingua, Lajitas, Redford, Presidio, Marathon, and Alpine. M. W. Lockwood (pers. comm.) estimates the Alpine population at more than 5,000 individuals. Breeding was first confirmed in BBNP at Rio Grande Village in 2006.

LUCIFER HUMMINGBIRD (*CALOTHORAX LUCIFER*)

Status: increasing. The first record of this hummingbird for the US was in 1901 by the U.S. Biological Survey (Bailey 1905), and it was considered a vagrant until the first US nest was discovered near Terlingua in July 1962 (Pulich and Pulich 1963). Since then it has become fairly common in BBNP; P. Scott (pers. comm.) located 24 nests between Panther Junction and the Chisos Basin during May and June 1982. M. W. Lockwood (pers. comm.) has found male

and female Lucifers, but no nests, during the breeding season in both the Christmas (just north of BBNP) and Chinati Mountains (west of BBNP in Presidio County).

GREEN KINGFISHER (*CHLOROCERYLE AMERICANA*)

Status: increasing. In BBNP, no records existed until 1966, but it has been reported every year since then, primarily as a fall-winter visitor. No nesting has been recorded within the park, but a few records are known primarily from along the Rio Grande west of the park. East of BBNP, Green Kingfishers are common along the Devils River, Val Verde County, and Independence Creek, Terrill County, and they also occur along the lower Pecos River (J. Karges, pers. comm.), so future establishment of the species in BBNP is possible.

GOLDEN-FRONTED WOODPECKER (*MELANERPES AURIFRONS*)

Status: recent arrival. The status of this bird has changed dramatically since the mid-1970s, when it was considered a rare vagrant to BBNP (Wauer 1969). By the mid-1980s it had become a locally common year-round resident in cottonwood canopy habitat at Rio Grande Village and Cottonwood Campground. Wandering individuals occasionally appear at Panther Junction (grasslands) and Dugout Wells (desert oasis) in the spring. West of BBNP, Golden-fronted Woodpeckers are present along the Rio Grande upstream to Presidio, including wooded tributaries in Big Bend Ranch State Park. They also occur north of BBNP along Calamity Creek and at Post County Park, near Marathon, northern Brewster County

DUSKY-CAPPED FLYCATCHER (*MYIARCHUS TUBERCULIFER*)

Status: recent arrival. A very rare species in Texas, this small *Myiarchus* of the oak-pine woodlands has been a casual visitor to the park since 1937 (Van Tyne and Sutton 1937, Wauer 1996). In the spring of 2000, a pair nested on the lower Laguna Meadow Trail, approximately 3 km from the Chisos Basin (Lockwood 2002). On 9 May, the pair was photographed carrying nesting material to a cavity in a large oak. Later, on 23 June, two adults were photographed carrying insects into the nest. The next day at least two nestlings were heard calling from the cavity. Finally, an adult and two fledglings were seen on 27 June. This was the first confirmed nesting of this species in Texas. In subsequent years (2001, 2003, 2004, 2007) pairs of Dusky-

capped Flycatchers have been observed higher up in the Boot Canyon drainage where nesting was probable, but not confirmed. A pair was seen in the Davis Mountains in June 1991 (Peterson et al. 1991), and the species has since become a low-density but regular nester there (M. W. Lockwood, pers. comm.).

TROPICAL KINGBIRD (*TYRANNUS MELANCHOLICUS*)

Status: recent arrival. First documented in BBNP in June 1996 at Cottonwood Campground, a pair was subsequently found nest-building there. The nest failed after a late-summer thunderstorm. Since the initial discovery, 1-3 pairs of Tropical Kingbirds have nested every year at the same location. Nesting also has been confirmed once at Rio Grande Village (2002), and once (1999) at Post County Park (Lockwood and Freeman 2004). The species was removed from the Texas Ornithological Society review list in 1999 based on the establishment of a permanent population in the lower Rio Grande Valley, in southernmost Texas (Brush 2005).

LOGGERHEAD SHRIKE (*LANIUS LUDOVICIANUS*)

Status: apparently stable. Although declines have been noted elsewhere, particularly in the northeast and upper midwestern US, Loggerhead Shrike populations in the Big Bend Region seem to be stable, although its status is uncertain due to lack of targeted study. At BBNP it is a common to fairly common bird of the open desert during the winter and uncommon during the breeding season.

BELL'S VIREO (*VIREO BELLII*)

Status: apparently stable. Although this species is listed as a rare and declining species in Texas (Shackelford and Lockwood 2000), no appreciable change has been detected in its status in BBNP. It is an abundant summer resident on the Rio Grande floodplain and can also be found in smaller numbers nesting in dense brushy habitat from the Chisos Basin out into the lower desert along dry arroyos with suitable shrubby thickets.

BLACK-CAPPED VIREO (*VIREO ATRICAPILLA*)

Status: apparently stable. A US Endangered species, its status in BBNP has remained stable. It is at the western edge of its range and is considered an uncommon summer resident. Surveys have been conducted annually in May since 1986. From a high count of 36 individuals found in 1995, subsequent surveys

noted a decline in the population through the late 1990s to a low of only 10 individuals in 2001. Researchers have attributed this decline to extreme drought periods. The population rebounded by 2004 to a total of 28–31 individuals, 23–25 of which were adult birds (Maresh 2004). The most recent survey (2006) reported 25–27 individuals, 23–25 of which were adults (Troy 2006). This small population is scattered in and around the Chisos Mountains in areas of transitional deciduous shrubland (dominated by gray oak, [*Quercus grisea*], and evergreen sumac, [*Rhus virens*]) between lower desert scrub and higher pine-oak-juniper woodland. Core areas include Juniper Canyon, Green Gulch, Oak Creek Canyon, and the Upper Chisos Basin (Panther Pass to Chisos Basin campground).

CAVE SWALLOW (*PETROCHELIDON FULVA*)

Status: recent arrival. This species was not recorded in BBNP prior to 1969, when a nesting colony was discovered on Mariscal Mountain, in the southern section of BBNP (Wauer and Davis 1972). Since then they have been reported sporadically within the park, and the species has expanded its range throughout much of Texas (Lockwood and Freeman 2004).

CAROLINA WREN (*THRYOTHORUS LUDOVICIANUS*)

Status: recent arrival. This eastern wren first appeared at Rio Grande Village during the 1990s, and has since been recorded on numerous occasions along the floodplain near the eastern edge of the park as well as at a number of locations some distance from the river. Locations include higher elevations in the Chisos Mountains such as Boot Canyon. Although there are no known nesting records, there is little doubt that it is an established resident. There are also sightings west of BBNP, upstream to Lajitas.

COLIMA WARBLER (*VERMIVORA CRISSALIS*)

Status: apparently stable. This Mexican montane species reaches the northern edge of its breeding range in the Chisos Mountains, BBNP. Because it is found nowhere else in the US, surveys have been conducted about every 5 yr, from 1967 through 2006. The surveys provided sufficient evidence that the Big Bend population was remaining stable. In the Davis Mountains, several Colima Warblers, as well as individuals which were intermediate in appearance between Colima Warbler and Virginia's Warbler (*Vermivora virginiae*) in 2005 and 2006. This has prompted speculation of a hybrid

swarm (Lockwood et al. 2006; M.W. Lockwood, pers. comm.) but needs further study.

LUCY'S WARBLER (*VERMIVORA LUCIAE*)

Status: recent arrival. Although this southwestern warbler has long been a breeding bird along the floodplain below El Paso in extreme western Texas (Oberholser 1974), reports from farther east increased during the 1970s and 1980s. These included nesting near Candelaria, Presidio County, in 1979, and the first nest at Cottonwood Campground in 1986 (Wauer 1996). Nesting in mesquite bosques upstream from Cottonwood Campground to the mouth of Santa Elena Canyon, BBNP, has become an annual occurrence.

YELLOW WARBLER (*DENDROICA PETECHIA*)

Status: declining or extirpated. Although Van Tyne and Sutton (1937) found this species nesting along the floodplain in the eastern portion of BBNP during the 1930s, no known nesting has occurred since. It is likely that this species has been extirpated from the park and elsewhere along the Rio Grande in Texas.

PAINTED REDSTART (*MYIOBORUS PICTUS*)

Status: increasing. This species was first reported from the Chisos Mountains in 1928 (Van Tyne and Sutton (1937), and Brandt (1940) first recorded it nesting there in 1937. Since then it has been reported sporadically in spring. Since 2001, one–three pairs have nested annually in the Boot Canyon drainage.

GREAT-TAILED GRACKLE (*QUISCALUS MEXICANUS*)

Status: increasing. This species has greatly expanded its range in Texas during the last few decades, facilitated by urban and agricultural development. It was well established in the El Paso Valley by the 1930s and became established along the Pecos River by the 1950s (Oberholser 1974). Reports from BBNP, especially along the Rio Grande floodplain at Rio Grande Village and Cottonwood Campground, have increased. Although a sizable population exists in nearby Lajitas, we have no evidence of nesting in BBNP.

BRONZED COWBIRD (*MOLOTHRUS AENEUS*)

Status: increasing. Prior to the 1960s, when it was first recorded at BBNP (Wauer 1996), the Bronzed Cowbird's Texas range was limited to south Texas (Oberholser 1974). Since then it

has expanded its range significantly throughout much of Texas, including the Big Bend region (Robbins and Easterla 1981, Kostecke et al. 2004). Bronzed Cowbirds are now locally common along the riparian corridor of the Rio Grande, especially at Rio Grande Village and Cottonwood Campground, and occasionally are found away from the river at higher elevations (Panther Junction and Terlingua) in suburban settings.

HOODED ORIOLE (*ICTERUS CUCULLATUS*)

Status: declining. Prior to the arrival of Bronzed Cowbirds in BBNP, Hooded Orioles were a fairly common summer resident at Rio Grande Village and the adjacent floodplain (Wauer 1973). Populations declined during the ensuing 20 yr. By 1996, numerous reports of Bronzed Cowbird parasitism were noted, and the Hooded Oriole was listed as uncommon (Wauer 1996). A few breeding pairs persist at Rio Grande Village and Cottonwood Campground.

DISCUSSION

Over the last 100 yr, several notable changes have occurred in the breeding avifauna in the Big Bend region of Texas, encompassing BBNP. Using BBNP as the baseline, at least eight species have arrived and nested since the 1960s, nine other species have increased in number or frequency, and the population of at least five breeding species have either declined or disappeared from the park altogether.

Recent arrivals include Black-crowned Night-Heron, Eurasian Collared-Dove, Golden-fronted Woodpecker, Dusky-capped Flycatcher, Tropical Kingbird, Cave Swallow, Carolina Wren, and Lucy's Warbler. Of these, three—Golden-fronted Woodpecker, Tropical Kingbird, and Carolina Wren—are of eastern affinity, apparently having moved westward along the Rio Grande corridor. Two—Dusky-capped Flycatcher and Cave Swallow—are of southern affinity, and Lucy's Warbler is of western affinity. Climate change could be a factor causing expansion of species mentioned as being of southern or eastern affinity above (Brush 2005), although it is difficult to determine exclusive or even primary causes for changes in distribution. Although the Rio Grande pathway almost certainly has been important for Black-crowned Night-Heron, Eurasian Collared-Dove has evidently spread from city to city across Texas after their accidental introduction to the Bahamas.

Increasing populations include those of Mallard (Mexican Duck subspecies), Green Heron, Montezuma Quail, Gray Hawk, Common

Black-Hawk, Lucifer Hummingbird, Green Kingfisher, Painted Redstart, and Great-tailed Grackle. Possible reasons for these increases in the last few decades are only conjecture. However, especially for those that use riparian habitat—Mexican Duck, Green Heron, Gray Hawk, Common Black-Hawk, and Green Kingfisher—that area within the well-protected park has remained stable over the years while riparian zones to the south in Mexico, as well as outside the park in south Texas, have been negatively affected, especially by grazing. Also, increased reports along the Rio Grande for such species as Green Heron may be due to increased observers, using the river for recreation.

Different species may be affected by various factors. It is possible that long-term drought conditions, that probably increase the spread of lechuguilla (*Agave lechuguilla*), on which Lucifer Hummingbirds nest, may have more of a positive effect than generally expected. The Painted Redstart is a common nesting species of the Maderas del Carmen montane forest (Wauer and Ligon 1977), and may have spread from there, without any apparent habitat- or climate-related cause. Montezuma Quail recovery was discussed above. Great-tailed Grackle numbers have increased dramatically throughout the Big Bend region, Texas, and northward into the Great Plains (Dinsmore and Dinsmore 1993), presumably due to its success in human-modified habitats.

Declining or extirpated species include Gambel's Quail, Harris's Hawk, Golden Eagle, Prairie Falcon, Yellow Warbler, and Hooded Oriole. In addition, the status of the Aplomado Falcon is uncertain because of unreliable early documentation. Three raptors—Harris's Hawk, Golden Eagle, and Prairie Falcon—have experienced a general decline throughout much of their range (Wauer 1996, Lockwood and Freeman 2004). Drought conditions that have created serious shortages of prey, including Gambel's Quail, are the most likely reason for raptor declines. For Yellow Warbler and Hooded Oriole, cowbird parasitism may be the principal cause of their decline or extirpation. Nesting Yellow Warblers may have been impacted by Brown-headed Cowbirds, although they may always have been peripheral in BBNP. Hooded Oriole declines were evident only after the Bronzed Cowbird moved into the Big Bend area in 1969 (Wauer 1969), and the species is known to be heavily parasitized by that species (Brush 2005, Ellison and Sealy 2007). Also, invasion by giant cane (*Arundo donax*) and tamarisk (*Tamarix* sp.) has substantially altered the woodland composition and structure of the riparian corridor.

Several species may nest in BBNP, but because they are known only from sporadic observations during the nesting season, cannot yet be considered as confirmed breeders. These are Cooper's Hawk (*Accipiter cooperii*), Swainson's Hawk (*Buteo swainsonii*), Cassin's Kingbird (*Tyrannus vociferans*), Scissor-tailed Flycatcher (*Tyrannus forficatus*), Warbling Vireo (*Vireo gilvus*), Chihuahuan Raven (*Corvus cryptoleucus*), and Rufous-capped Warbler (*Basileuterus rufifrons*).

Several species which merit comment because they seem to be declining or of conservation concern in other portions of their range but are apparently stable in BBNP and vicinity. These include Peregrine Falcon, Loggerhead Shrike, Bell's Vireo (*Vireo bellii*), Black-capped Vireo (*Vireo atricapilla*), and Colima Warbler. Although populations of some of these species, such as the endangered Black-capped Vireo and, to a lesser extent, peregrines and Colima

Warblers, have received some monitoring over the years, a distinct need exists to assess each of the species discussed above. All the avifauna within the national park is fully protected, and therefore constitutes an important baseline for long-term understanding of our changing environment.

ACKNOWLEDGMENTS

We thank the dozens of ornithologists and birders who, for more than 100 yr, have provided considerable data on the avifauna of the Texas Big Bend Region; the majority of their published materials are referenced in the section on ornithological history. In addition, Jim Paton and Mark Lockwood, and an anonymous reviewer read the manuscript and made several helpful suggestions. Any incorrect assumptions or other errors are the fault of the authors.