

COLONIZATION OF THE EASTERN BLUEBIRD ALONG THE RIO GRANDE IN NEW MEXICO

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ABSTRACT: During the 20th century the Eastern Bluebird (*Sialia sialis*) expanded its range westward, mainly as a result of anthropogenic alteration of habitats. Along the Rio Grande in New Mexico the species' numbers in winter have recently increased spectacularly, and from 1999 through 2004 four records of breeding were published. Here we report 30 further nestings in just 2005 and 2006. In all 30 cases, the birds nested in the cottonwood riparian forest along the river following fire, postfire habitat rehabilitation, or fuel reduction work, all leading to partial or complete removal of the understory vegetation. The Eastern Bluebirds' observed nesting season lasted from late March through the end of July. Most (17) nesting was in nest boxes, with an observed mean productivity of 1.43 fledglings per nest attempt in 2005 ($n = 7$) and 2.1 fledglings per nest attempt in 2006 ($n = 10$).

During the 20th century the Eastern Bluebird (*Sialia sialis*) slowly expanded its range west, mainly in response to anthropogenic alteration of habitats formerly unsuitable to the species (Bent 1949, Gowaty and Plissner 1998). It was first recorded in New Mexico in 1943, and by the late 1970s it had established itself in the eastern part of the state as a migrant and winter resident (Hubbard 1978). In the 1970s and 1980s it spread farther west into New Mexico, including the Rio Grande valley, where Hubbard (1978) and Hink and Ohmart (1984) described its occurrence as only irregular to occasional. In 1975, the Eastern Bluebird was for the first time recorded as breeding in New Mexico, at Rattlesnake Spring in the southeastern part of the state (Hubbard 1978).

Since about the turn of the new century, numbers of the Eastern Bluebird wintering in parts of the Rio Grande valley have increased spectacularly (Figure 1; Williams 2001, 2002, 2003, 2004a). Breeding was also documented along the Rio Grande at Socorro in 1999, at Mesilla in 2000, and in Albuquerque and near Radium Springs in 2004 (Williams 1999, 2000, 2004b). Here we report on an apparent surge in the number of breeding Eastern Bluebirds during 2005 and 2006 along a 90-km stretch of the Rio Grande in central New Mexico. We provide detailed information on local nesting habitat and chronology.

METHODS

Study Area

The middle Rio Grande lies in New Mexico, stretching over a distance of approximately 280 km from Cochiti Dam to Elephant Butte Reservoir

(Figure 2). Along the banks of the river is a riparian forest (hereafter "bosque") dominated by Rio Grande cottonwoods (*Populus deltoides* var. *wislizenii*). Largely because of dams, levees, and bank-stabilization projects, much of the bosque is no longer flooded, preventing the regeneration of cottonwoods and contributing to invasion by exotic shrubs, mainly the Russian olive (*Elaeagnus angustifolia*) and saltcedar (*Tamarix chinensis*). Until recently, most of the bosque consisted of stands of mature or senescent cottonwoods with thickets of Russian olive and saltcedar in the understory and a layer of organic debris (branches, logs, and leaf litter) on the forest floor. In response to a recent increase in the frequency of wildfire in the bosque, fuel-reduction and postfire rehabilitation projects have been undertaken on a large scale (especially in the Albuquerque area) since the winter of 2003–2004. Fuel reduction has involved mechanical removal of shrubs, snag cutting, grinding, mowing, tree planting, and/or grazing by goats. Postfire rehabilitation treatments have consisted of fire-residue grinding, weed mowing, and tree planting. In all cases, most or all of the understory vegetation was removed.

Survey and Monitoring Techniques

The information presented here is from several studies conducted by us and focusing mainly on avian response to fuel reduction and attempts to rehabilitate the habitat following the fires. Our datasets typically comprised information on bird nesting before and after vegetation treatment.

Research by Hawksworth and Finch consisted of point-count surveys and nest searches conducted annually since 2000, from the second week of May through at least the second week of July. Hawksworth and Finch began their work in 2000 at 12 sites and added three more in 2001, one more in 2002, and yet one more in 2005. The 17 study sites covered a total area of 340.5 ha along 19.5 km of river. Except for the site added in 2005 where work consisted only of nest searches, all sites were the focus of eight point-count surveys during the first year they were studied. Subsequently, point-count surveys were conducted at those sites at least four times every year, for a minimum total of 24 surveys at each site through 2006. Hawksworth and Finch searched for bird nests at each of the 17 sites for a minimum of 6 hours every week for a minimum total of 54 hours every year.

Research by Cartron included spot-mapping of bird nests in 16 ha of riparian forest along a 0–6 km stretch of the river in the south valley of Albuquerque. Most of the understory was removed mechanically in the fall of 2005. Field work took place at least twice every week from April through July in 2005 and 2006. Additionally, as part of general wildlife surveys primarily in the Albuquerque area, Cartron surveyed about 255 ha of treated and untreated riparian forest along a 10-km stretch of the Rio Grande at least once in the spring of both 2005 and 2006.

Research by Means included both general surveys and monitoring of nest boxes placed 1.2–1.7 m above ground at two locations in Albuquerque that burned in 2003 and 2004, respectively, before being rehabilitated. A combined total of 51 nest boxes was installed before the beginning of the nesting season in 2004 at the two locations representing collectively an area of 80 ha along 6 km of river. The total number of nest boxes increased to 53

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Figure 1. Male Eastern Bluebird in bosque along Rio Grande at Albuquerque, New Mexico, December 2006

Photo by Doug Brown

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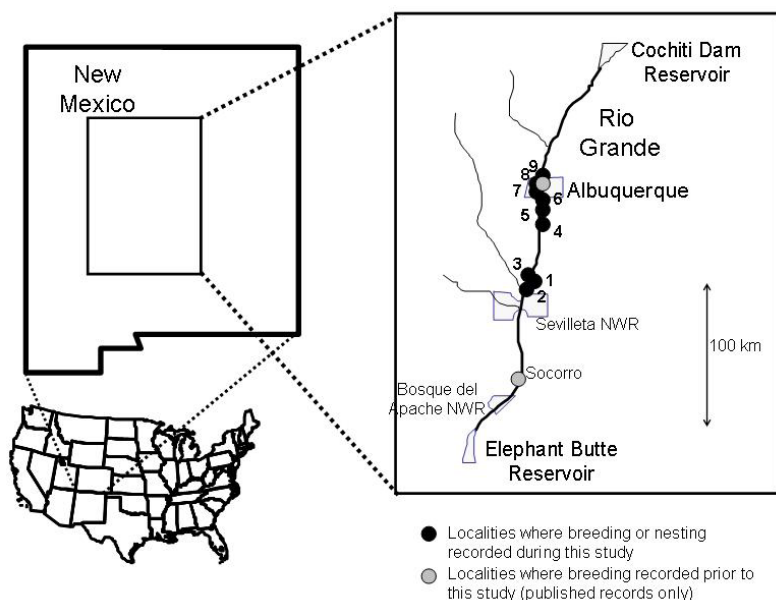


Figure 2. Middle Rio Grande, with locations of Eastern Bluebird nesting or breeding. 1–9: localities where breeding or nesting was recorded during this study. 1, approximately 1 mile NE of the village of Abeytas, Socorro County; 2, approximately 1 mile SSE of Abeytas; 3, approximately 1½ miles east of Bernardo, Socorro County; 4, Los Lunas, Valencia County; 5, Bosque Farms, Valencia County; 6, South Valley of Albuquerque, Bernalillo County; 7, Rio Grande Nature Center State Park and vicinity, Albuquerque, Bernalillo County; 8, Montañito Bridge and vicinity, Albuquerque, Bernalillo County; 9, La Orilla area, Albuquerque, Bernalillo County. The nest-box study took place at localities 8 and 9.

in 2005 and 54 in 2006. Two types of boxes were used during the study, one designed for Bewick's Wrens (*Thryomanes bewickii*), with 3.175-cm oval entrance holes (type 1), the other designed for bluebirds, with 3.81-cm round holes (type 2). The relative proportion of type-1 versus type-2 boxes was similar in all years. Nineteen type-1 boxes were used in 2004, 2005, and 2006. Thirty-two (63%) type-2 boxes were used in 2004, 34 (64%) were used in 2005, and 35 (65%) were used in 2006. At the onset of the study all type-1 boxes and most type-2 boxes were used rather than new. About 15% of all type-2 nest boxes were new but manufactured by Means from scrap wood. Monitoring of the nest boxes was continuous from late March through mid-July.

RESULTS

Altogether we documented a total of 30 nestings of the Eastern Bluebird along the middle Rio Grande, 9 in 2005 and 21 in 2006. Five records

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were from south of Albuquerque (Figure 2, localities 1–5); 25 were from the Albuquerque metropolitan area (Figure 2, localities 6–9), 23 of them along a stretch of the river measuring only about 4.5 km where the nest boxes had been installed.

Nest-Box Study

In 2004, nest boxes were used by both Ash-throated Flycatchers (*Myiarchus cinerascens*) and Bewick's Wrens but not by Eastern Bluebirds (Figure 3). In 2005, however, Eastern Bluebirds occupied six boxes, in 2006, nine. In contrast to the bluebird's pattern, there was no surge in the number of nest boxes occupied by Bewick's Wrens, while the increase in occupancy seen in 2005 for the Ash-throated Flycatcher did not continue in 2006 (Figure 3). Eastern Bluebirds used only type-2 nest boxes (v 4).

In both years, the bluebirds began building nests in late March or the first week of April. We observed nest building directly during that time at nine nest boxes (three in 2005, six in 2006), and nest building could be backdated to late March at two additional nest boxes in 2005. Nest building was also recorded during the second half of May and in June. Five pairs were with eggs by the end of the first week of April (two in 2005, three in 2006), while the latest a pair was observed with eggs was 25 June. Hatchlings were recorded as early as the third week of April and as late as the last week of

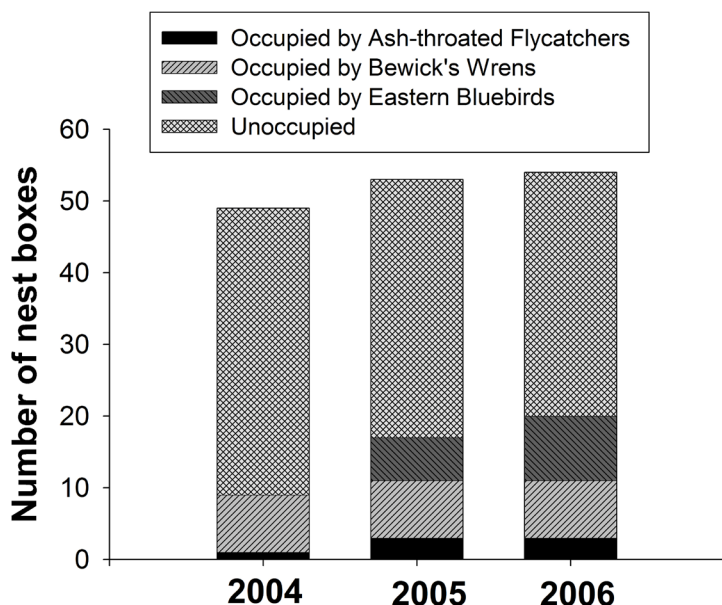


Figure 3. Number of nest boxes used for nesting by the Eastern Bluebird, Ash-throated Flycatcher, and Bewick's Wrens in 2004, 2005, and 2006 in Albuquerque study areas.

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June. Fledging was observed as early as 1 May. Three pairs fledged young in mid-July, two in 2005, the other in 2006.

In 2005 one of the six Eastern Bluebird nest boxes in 2005 was used twice, for a total of seven nesting attempts in nest boxes that year. In 2006, one of the nine Eastern Bluebird nest boxes was again the site of two nesting attempts. In 2005, three (43%) of the seven nesting attempts were successful, for a total of ten fledglings produced (mean productivity 1.43 per nesting attempt). In 2006, six (60%) of the ten nesting attempts were successful, for a total of 21 fledglings (mean productivity 2.1 per nesting attempt). Two nest boxes, one each in 2005 and 2006, produced five fledglings.

Other Observations of Nesting or Breeding

In 2005, we noted two nestings not in boxes. One was in Socorro County approximately 1 mile northeast of the village of Abeytas (Figure 2, locality 1) in a natural cavity 4.5 m above the ground in a dead cottonwood. The adults were adding nesting material on 10 May but possibly already had eggs, as the female was inside the cavity for long periods of time. The area had burned in June 2004; it had only dead cottonwoods and 95% bare ground in May 2005. It was not on any of our study sites and was not monitored. Interestingly, there were three other pairs and two single males in the area as well. The males were acting territorial. The second observation was of a fledgling foraging away from the boxes in the bosque in Albuquerque on 13 July.

In 2006 our records not involving nest boxes included observations of 11 pairs nesting or with fledglings. Seven of those pairs were in Albuquerque, but the other four were scattered over about 90 km south to the vicinity of Bernardo in northern Socorro County (Figure 2, localities 2–5). In six cases, the nest was found. One was a natural cavity 4.4 m high in the trunk of a live cottonwood where a branch had broken off (Figure 2, locality 2). The nest had nestlings when found on 16 May and fledged two young (seen 24 May). The other five nests were in woodpecker holes all in live or dead cottonwoods at heights of 5.5, 5.8, 6, 10, and 15 m. One nest was in one of two closely spaced woodpecker holes in an ascending dead branch, the other hole having been occupied in 2005 by a pair of Ash-throated Flycatchers. That last Eastern Bluebird nest cavity was occupied until late July but did not fledge young, the nest failure coinciding with the occupied part of the branch breaking off.

Five of our 2006 records were based on observations of adults with fledglings, at five locations where no nests were found, on 17 May, 2 June, 20 June, 17 July, and 18 July. The maximum number of fledglings observed was three, on 2 June. The bosque around the site of the 17 May observation had been thinned in winter 2003–2004 and burned in mid-June 2006. The family of Eastern Bluebirds, however, was still present and foraging in the burned area after the fire.

DISCUSSION

The number of nestings and fledglings we report here strongly suggests the recent establishment of a sizeable population of the Eastern Bluebird along

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Figure 4. Female Eastern Bluebird incubating in a nest box at Albuquerque, New Mexico.

Photo by Michael D. Means



Figure 5. Example of Eastern Bluebird nesting habitat in bosque along the middle Rio Grande. Although this nesting habitat is quite variable, it is always characterized by the absence of an understory of shrubs.

Photo by Jean-Luc E. Cartron

the middle Rio Grande. Whether that breeding population is distributed fairly evenly along the entire length of the middle Rio Grande is unknown. As many as eight of our 2005 records and 15 of our 2006 records were from along a 4.5-km stretch of the river in Albuquerque where nest boxes had been installed. Thus it is possible that the concentration of records in that area was due largely to nest boxes serving as tools to enhance detection. We did not search for nests along the northern segment of the middle Rio Grande, while to the south our coverage was less extensive than near Albuquerque. Observations of additional pairs and territorial males in 2005 at locality 1, however, suggest fairly high densities of breeding Eastern Bluebirds outside the Albuquerque area as well.

As described elsewhere, typical Eastern Bluebird habitat consists of open woodland or savanna with little or no understory, including recently burned areas, clearcuts, and edges of forests (e.g., Howell 1965, Gowaty and Plissner 1998; Figure 5). Despite our monitoring of several sites within the bosque of the Rio Grande since 2000, we found no Eastern Bluebirds nesting anywhere prior to thinning or fire, when habitat in the bosque was most likely unsuitable because of its extensive understory thickets. Neither did we detect nesting of Eastern Bluebirds in 2005 or 2006 in areas of the bosque still characterized by a dense understory.

In addition to large-scale vegetation thinning and fires, the nest boxes used in our research likely played a role locally, as Eastern Bluebirds are notorious for their propensity to use them (Gowaty and Plissner 1998). In 2003 and 2004, however, Smith et al. (2007) installed and monitored nest boxes at four burned and four unburned sites along the middle Rio Grande in Socorro and Valencia counties, south of the Albuquerque nest box sites monitored by Means. Boxes numbered from 0 to 14 per site, depending on location and year, totaling 53 in 2003 and 97 in 2004. Over the two years, 0 or 33% of the boxes at burned sites were occupied in a year, while at unburned sites 10 or 57% were occupied. Those boxes were used by two species, the Ash-throated Flycatcher and Bewick's Wren, with no Eastern Bluebirds, in contrast to the situation at the burned sites in Albuquerque. All nest boxes put up by Smith et al. (2007) were bluebird-type nest boxes (D. M. Smith pers. comm.). No postfire rehabilitation had been attempted at the sites studied by Smith et al. (2007) sites, in contrast to some—but not all—of the burned sites where we detected Eastern Bluebirds.

The absence of Eastern Bluebirds from the nest boxes studied by Smith et al. (2007) might be related to the time since the fire and subsequent succession and habitat composition. At the time when Smith et al. (2007) put up their boxes their sites had burned one, two, four, and eight years earlier than had the burned sites around Albuquerque monitored by Means. Saltcedar and other woody plants had resprouted or returned in varying densities to older burned sites (Finch pers. obs.), possibly discouraging bluebirds from using boxes. In addition, the understory of the bosque south of Albuquerque is more likely to be dominated by saltcedar, whereas in Albuquerque it tends to have more Russian olive than saltcedar (Finch unpubl. data). Competition with the Ash-throated Flycatcher, which prefers open sites (Smith et al. 2007) similar to those used by the bluebird, may also have played a role, though direct evidence of exclusion is lacking.

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On the basis of our data, a more likely explanation is that although suitable nesting habitat existed in 2004, or in some cases even 2003, there were far fewer Eastern Bluebirds in the middle Rio Grande valley prior to 2005 to breed in that habitat. As stated above, five of our 2006 records of Eastern Bluebird nesting were from areas we had monitored intensely for at least three years. In four of those five cases our detection of nesting Eastern Bluebirds lagged the fire or vegetation treatment by one or two years. One of the two nest-box study areas in Albuquerque had burned in 2003, yet no bluebirds occupied the boxes in 2004. The time lag was not related to succession, as Eastern Bluebirds also nested in 2006 following vegetation thinning in the fall of 2005. Nesting and breeding records from our research thus presumably reflect a surge in Eastern Bluebird numbers along the western edge of the species' range in New Mexico, as part of further expansion to the west.

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