NOTES

NESTING ANNA'S HUMMINGBIRDS IN URBAN TUCSON, ARIZONA

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Anna's Hummingbird (*Calypte anna*), formerly regarded as a California species (Ridgway 1890), has extended its range in recent years. In Arizona, the species was thought to be a fall and winter resident only, with no positive breeding records prior to the mid-1960s (Phillips et al. 1964). Spring occurrences were not documented until after 1964, and only rarely prior to the 1970s were the birds noted in summer (Zimmerman 1973). The species first nested near Tucson in 1972; young fledged 14 March (Calder 1974). In Arizona, Anna's Hummingbird's breeding is confined mainly to cities (Zimmerman 1973).

We followed the nesting of six (unmarked) female Anna's Hummingbirds in Tucson during 1993 and 1994. We provide information concerning nest-site characteristics, interactions of females, and parental care of fledglings. We confirmed double brooding (see Legg and Pitelka 1956) by two females.

Our study took place at the Western Archeological and Conservation Center on 1.19 ha of landscaped space in 4.2 ha of buildings and paved areas. Plants at this site include nonnative ornamentals and native species. Tree species are the Sweet Acacia (*Acacia smallii*), Honey Mesquite (*Prosopis glutinosa*), Blue Paloverde (*Cercidium floridum*), and Mexican Paloverde (*Parkinsonia aculeata*). We observed nesting hummingbirds from February through July 1993 and November 1993 through early July 1994. Nest height and straight-line distances between nests and from nests to identified sources of paint flakes (used in nest construction) were measured. All trees were mapped and identified, and female hummingbirds were named A through F. We associated hummingbird nests with females (i.e., A–1 refers to the first nest of female A, A–2 to the second of female A, etc.).

In 1993, females A and B nested simultaneously, each fledging young from two broods (Appendix). The first pair of nests (A–1 and B–1) were separated by approximately 70 m; the second pair (A–2 and B–2) were approximately 135 m apart. A building separated the nests of female A from those of female B. Each female communicated with a chip note when flying over the nest of the other (see Stiles 1982), but we did not observe these females contesting the vicinity of their nests. As the young of B–2 were about to fledge, female C began to build her nest (C–1) around the corner of a building, approximately 37 m from B–2. After the failure of C–1, female D (recognizable by distinctive markings) arrived on the study site and successfully nested (D–1) approximately 9 m from the site of C–1.

We observed females E and F on the southeast part of the study site as early as November 1993. There were no visual barriers, such as man-made structures, subdividing the area, and we observed many confrontations between the two birds. Female E built her nest (E–1) first. Female F often disturbed her at this nest by approaching the nest and even perching on the side of it while female E occupied it. Female E abandoned the nest four days after laying one egg and before laying a second egg, although she did begin to incubate. Female E constructed a second nest (E–2) in the same vicinity, with similar, persistent disturbance by female F; a predator ultimately took the two nestlings. Female F began to construct her nest (F–1) while

female E was feeding nestlings (E–2). Nests E–2 and F–1 were located approximately 19 m apart with no intervening vegetation or other objects to obstruct view from one nest to the other.

Three of the females (A, E, and F) frequently used prominent perches near their nests, from which each chased intruding Anna's Hummingbirds (and other bird species) from the vicinity of their nests. Female A chased a male and female Anna's traveling together, and often chased Verdins (*Auriparus flaviceps*), Northern Mockingbirds (*Mimus polyglottos*), Curve-billed Thrashers (*Toxostoma curvirostre*), House Sparrows (*Passer domesticus*), and House Finches (*Carpodacus mexicanus*). While building her nests and during incubation, female E chased female F on each occasion they were observed together. After both nesting attempts of female E failed and female F had begun her own nest, the role of aggressor reversed: female F began chasing female E from her nest area.

Ambient temperatures increased during the advancing nesting seasons in 1993 and 1994. Later nests were built at greater heights (Appendix), with the exception of the last nest of 1993 (D–1), which was shaded early in the afternoon by a building.

Hummingbirds added paint flakes of various colors to the outside of their nests with the exception of female D, which added plant parts to the outside of D–1. Paint flakes were collected from an adjacent building, a stationary trailer, and from buildings in the neighboring area. Female A used only a few paint flakes, from a variety of sources, on nest A–1, but covered A–2 profusely with flakes from a single source, about 100 m northeast of her nest. We recorded paint-flake sources at distances ranging from approximately 4 m to approximately 180 m from nests. We observed a female feeding on flowers adjacent to the most distant paint-flake site.

Females A and B each raised a second brood after fledging of their first brood. They nested simultaneously from mid-January through April 1993. Both females began construction of second nests while still feeding fledglings from their first broods; female A began to build her second nest the day after young from her first nest fledged. Female A built nest A–2 38 m west of A–1, and female B built nest B–2 20 m north of B–1. We observed each female fly alternately to her new nest site and her fledglings (for three days at start of A–2 and six days at B–2). Fledglings from the first broods remained in the vicinity of their home nests until their mothers laid eggs and began incubation. We observed female A feed her young from A–2 three days after it fledged; female B was still feeding the second young to fledge from B–2 (distinguishable from her other fledgling by size) seven days after it fledged.

We observed female D, distinguishable by a crook in her bill, with her single young 24 to 27 days after it fledged. The young bird fledged between 9 and 12 July, and was regularly seen being fed by its mother through 16 July. On 4 and 5 August, we saw female D perched within a meter of presumably the same young bird.

We observed six nests built by four females in 1993 and three nests by two females in 1994 (Appendix). In 1993, 91% of the eggs laid hatched and 73% of the eggs fledged. One nest (C–1) failed because of predation of nestlings; young fledged from the other five nests. In 1994, only two of five eggs hatched and no nests were successful.

There were few aggressive interactions in 1993 between nesting females. Birds A and B acknowledged each other's flights by vocal chips but did not chase; their nests were visually separated by a building. Nesting of female C overlapped the second nesting of females A and B; nesting of female D did not overlap other females' nesting.

The insistent claim to the same area by females E and F in 1994, coupled with their intolerance of each other in a shared area, may have contributed to nest failure for both females. We do not know what caused E and F to select sites so close together (19 m), but since 1994 was very dry and many food sources available in 1993 were not in 1994, perhaps this area was critical.

Our observations of female D and her young suggest that parental care of offspring may be extended if the mother does not attempt additional broods. Female B was still feeding one of her young from B–2 seven days after it fledged, the last day we saw female B and her young on the site.

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LITERATURE CITED

Calder, W. A., Jr. 1974. The thermal and radiant environment of a winter hummingbird nest. Condor 76:268–273.

Legg, K., and Pitelka, F. A. 1956. Ecologic overlap of Allen and Anna hummingbirds nesting at Santa Cruz, California. Condor 58:393–405.

Phillips, A. R., Marshall, Jr., J. T., and Monson, G. 1964. The Birds of Arizona. Univ. Ariz. Press, Tucson.

Ridgway, R. 1890. The Hummingbirds. Rep. U.S. Nat. Mus. 1889–1890, p. 336.

Stiles, F. G. 1982. Aggressive and courtship displays of the male Anna's Hummingbird. Condor 84:208–225.

Zimmerman, D. A. 1973. Range expansion of Anna's Hummingbird. Am. Birds 27:827–835.

Appendix. Data on Six Anna's Hummingbird Nests in Tucson, Arizona, 1993 and 1994.

Female A. Nest 1: In *Acacia smallii*, height 189 cm; 2 eggs laid before 4 Feb 1993; one hatched before 10 Feb, other hatching on 10 Feb; both young fledged when inadvertently flushed from nest 4 Mar. Nest 2: In *A. smallii*, height 218 cm; 2 eggs laid 10 and 15 Mar; one hatched between 25 and 30 Mar; single young fledged 19 or 20 Apr.

Female B. Nest 1: In *Cercidium floridum*, height 205 cm; 2 eggs laid before 4 Feb 1993; first hatched on 4 or 5 Feb, second hatched between 5 and 8 Feb; both fledged 2 Mar. Nest 2: In *C. floridum*, height 251.6 cm; 2 eggs laid between 5 and 8 Mar; first fledged when flushed from nest 12 Apr, second on 15 or 16 Apr.

Female C: In *Prosopis glandulosa*, height 292.1 cm; 2 eggs laid before 27 Apr 1993; both hatched between 30 Apr and 3 May; nest and young destroyed, presumably by predator, on 11 or 12 May.

Female D: In *Prosopis glandulosa*, height 175 cm; before 22 Jun 1993; hatched before 22 Jun; fledged between 9 and 12 Jul.

Female E. Nest 1: In *Cercidium floridum*, height 166 cm; 1 egg laid 28 or 29 Jan 1994; nest abandoned before 2 Feb. Nest 2: In *C. floridum*, height 190 cm; 2 eggs, one laid on 18 or 19 Feb, second between 19 and 21 Feb; first egg hatched on 7 or 8 Mar, second on 8 or 9 Mar; young destroyed, presumably by predator, between 17 and 19 Mar.

Female F: In *Cercidium floridum*, height 269 cm; 2 eggs, one laid on 23 or 24 Mar 1994, second on 25 or 26 Mar; eggs destroyed, presumably by predator, on 3 or 4 Apr.

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