

BREEDING SEASONS OF HUMMINGBIRDS NEAR SANTA BARBARA, CALIFORNIA

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Western species of hummingbirds which overlap in their breeding distribution are more or less segregated into different habitats (Grinnell and Miller, Pacific Coast Avifauna No. 27, 1944:216-255), but they resemble each other in basic traits of behavior, particularly in mode of feeding and in territorial relations (Pitelka, Condor, 44, 1942:194-201) to the extent that some overlap in habitat distribution occurs. In the Berkeley Hills, on the east side of San Francisco Bay, a significant amount of interspecific strife affects population densities of the two breeding species, the Anna (*Calypte anna*) and Allen (*Selasphorus sasin*) hummingbirds (Pitelka, Ecol., 32, 1951: in press). An equally interesting situation, yet to be examined in detail, exists in the vicinity of Santa Barbara, California, where four species of hummingbirds breed. These are the Anna, Allen, Black-chinned (*Archilochus alexandri*), and Costa (*Calypte costae*). Data on breeding seasons in these species near Santa Barbara are presented here together with a brief, exploratory discussion of ecological overlap between them.

A total of 331 dates are available for nests under construction and eggs in nests. Each date represents a separate nesting. The seasonal distribution of the records for each of the four species is shown in figure 1. Most of the records were obtained from the files of the Santa Barbara Museum of Natural History where the oological collection of W. Leon Dawson is located. For the privilege of examining those files and using the data, I am indebted to Egmont Z. Rett. Additional data for Santa Barbara and Ventura counties were provided by Sidney B. Peyton and Lawrence C. Stevens from their oological collections and by Arthur E. Hutchinson from his field records. I acknowledge their generous cooperation. A few records were obtained from the egg collection of the California Academy of Sciences through the courtesy of R. T. Orr and M. L. Perry and from reports published in the Condor and the Oologist.

From the data in figure 1, the following points can be made: The permanently resident Anna Hummingbird has the longest breeding period, from late December to mid-June, and two broods (occasionally three?) are raised per season. Near Santa Barbara, this species begins to breed a full month to six weeks ahead of the Allen Hummingbird, and this difference also occurs between the same two species in the San Francisco Bay region (Pitelka, *op. cit.*). That nesting in the Anna Hummingbird may be well underway by the time Allen nesting begins is indicated in figure 1 not only by the records from the Santa Barbara area but also by 51 records from Santa Monica, Los Angeles County, for the years 1901 and 1902 (Chambers, Condor, 5, 1903:133). The distribution of dates for *anna* in figure 1 of course should not be taken to indicate relative amount of nesting activity in different parts of the breeding season; it probably indicates only that nests of *anna* are usually sought most frequently and found most easily in the first third of the season when *sasin* is only starting to nest and when the other two species have not yet appeared.

In the Anna Hummingbird, nest-building has been recorded as early as December 11 (1941), at Altadena, Los Angeles County (W. I. Allen, Condor, 44, 1942:129). An even earlier record, reported by Bowles (Condor, 12, 1910:125-127) and based on an observation of a female supposedly feeding a fledgling on January 3, seems doubtful because of the inadequacy of his evidence and the circumstantial nature of it.

The species other than *anna* are all summer residents. As is shown in figure 1, in the Allen Hummingbird two broods are usually raised. In the Black-chin and Costa, prob-

ably only one brood is raised per season. The Allen begins to nest in early February, the other two do not do so until mid- or late April. In the late nesting species, nests with eggs may be found in late June and even early July, whereas in the other two species, nests with eggs are generally not found after mid-June. Thus, real differences occur among the four species in length and timing of breeding periods. Taking the nestling period into account, overlap in nesting periods occurs from mid-April through June.

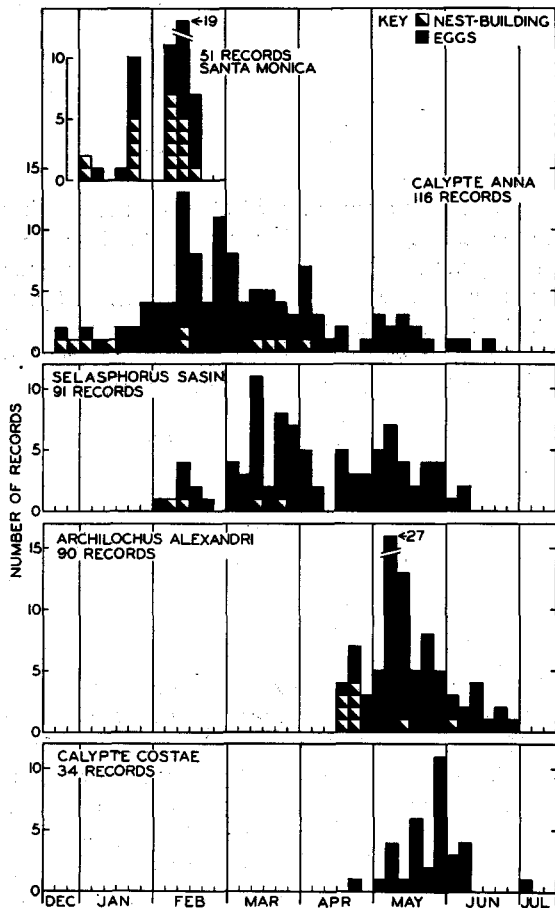


Fig. 1. Breeding seasons of four species of hummingbirds near Santa Barbara, California, showing frequency distribution of nesting dates in five-day intervals.

In the Santa Barbara area, three of these species (*anna*, *sasin*, and *alexandri*) overlap in habitat distribution of nesting females. Competition for space or food or both may thus be expected to occur. For their bearing upon these matters, the differences in breeding periods must be examined in the light of other pertinent information. Such differences can relieve or intensify competition. Some information on this situation is provided by data accumulated by Mr. and Mrs. Arthur E. Hutchinson of Santa Barbara and generously given to me for study.

The fact that the Anna, Allen and Black-chinned hummingbirds overlap locally in breeding distribution is shown by results of breeding-bird censuses published by the Hutchinsons (Audubon Mag., supplements, 1944-1947). They studied a 17-acre stand of mature live oaks (*Quercus agrifolia*) traversed by a canyon creek along which three species of deciduous, riparian trees (*Platanus*, *Populus*, and *Salix*) were more or less mixed with the oaks. The hummingbird nests recorded in four successive years are as follows:

	Anna	Allen	Black-chin
1944	10	7	9
1945	10	4	5
1946	10	10	21
1947	1	7	5
	—	—	—
	31	28	40

These results indicate that within a general habitat type such as oak woods along a canyon stream, the three species may breed in fair numbers. This applies specifically to the females and their nesting activity, since the males do not participate in nesting and usually maintain territories in different habitats (Grinnell and Miller, *op. cit.*).

Those nests on which Mr. Hutchinson had adequate information have been tabulated according to site, distance from ground, and distance to nearest active nest of another hummingbird. With respect to site, the following results were obtained.

	Anna	Allen	Black-chin
Live-oak	29 nests	21 nests	26 nests
Sycamore	1	2	11
Poplar			1
Vine		2	1
Fern		1	
	—	—	—
	30	26	39

With respect to height from ground, nests were classified into frequency classes of five-foot intervals. Twenty-seven nests of *anna* ranged from 5 to 30 feet; the modal class was 11-15, with 12 nests. Twenty-two nests of *sasin* ranged from 2 to 25 feet; two equal modal classes, 6-10 and 11-15, included 12 nests. Thirty-seven nests of *alexandri* ranged from 3 to 30 feet; the modal class was 6-10, with 16 nests. These figures must be regarded as merely approximate, as in the original census work, full details were not recorded concerning nest location. Nevertheless, we have a fair sampling of nests from a 17-acre area, and the data suggest a significant amount of overlap in both heights at which nests are usually placed and sites usually used. Thus, either this description of the nest sites is too gross to pin down important ecological differences, or some interspecific adjustments in the numbers and local distribution of nesting hummingbirds occur, or both.

The data on distances between active nests disclose additional interesting points. In the following tabulation, numbers of neighboring nests are given together with extremes of distances in yards between them.

	Anna	Allen	Black-chin
Anna	20 nests (20-50)	4 nests (15-25)	3 nests (20-25)
Allen	6 (18-40)	10 (28-50)	8 (18-40)
Black-chin	3 (20-42)	4 (18-37)	23 (15-75)

In the Anna Hummingbird, for example, among 29 nests, the nearest neighbor with an active nest was another Anna Hummingbird in 20 instances, an Allen in 6 instances, and a Black-chin in 3 instances. The results suggest that in a given species the nearest neighbors will more likely be the same species than either of the other two species. This at once suggests that some segregational factors are operating in addition to the partial separation resulting from seasonal differences in nesting. About this and other aspects of hummingbird distribution near Santa Barbara, we should like to know more. It is up to some interested observer to capitalize on the excellent opportunity which this general problem affords.

There is some question concerning identification of nests of the Costa Hummingbird in the Santa Barbara area. The Costa Hummingbird is a species characteristic of deserts and dry, broken chaparral; it is not to be expected in woodland and riparian habitats where, near Santa Barbara, the Anna, Allen, and Black-chinned hummingbirds occur. Yet Dawson (*Birds of California*, 2, 1924:951), referring to that area, states that "the Costa Hummers join their fellows of three other species in seeking sites close to running water." He speaks of nests in "oaks, alders, sycamores, or bays, and sometimes within two feet of the water." This occurrence is to be doubted on ecological grounds. Females of the Costa and Black-chinned hummingbirds are exceedingly difficult to distinguish in the field, and as Dawson believed that dependable species distinctions could be made on the basis of nest structure, he probably misidentified nests if they deviated from the nest structure he regarded as typical of the species. Variation in nest structure within a species may of course be such as to invalidate the diagnostic value of nest ornamentation thought to be characteristic. If Dawson's identification of females of the Costa Hummingbirds nesting in the situations mentioned above is correct, this must be proven with collected breeding specimens. Referring again to figure 1 and the 34 nestings of the Costa Hummingbird graphed there, only seven of them are from Dawson's records; and although a few of Dawson's records may be based on misidentifications, the distribution of records shown there is probably an adequate approximation of the nesting season of that species near Santa Barbara.

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