

SHORT COMMUNICATIONS

IRIS COLORATION IN YOUNG BUSHTITS

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Bushtits (*Psaltriparus minimus*) exhibit sexual dimorphism in iris coloration; adult females have yellow, cream, or white irides, while males have dark-brown irides (van Rossem 1935; Phillips et al. 1964; Raitt 1967). Phillips (1958) noted the presence of gray-eyed juvenile females in an Arizona population. Early opinions conflicted as to the significance of iris color. Michener and Michener (1928) and Swarth (1929) believed the differences were determined by age rather than sex. Grinnell and Storer (1924) could not correlate iris color with age, sex, or season. In at least one instance, a discrepancy between plate and text occurred in the same volume (Baird 1870 colored copies only). As part of a larger study, I have obtained data on progressive changes in iris color of young Bushtits in the area of Santa Barbara, California. These data may clarify the reasons for the early confusion.

During the 1972 and 1973 breeding seasons, 118 nests were examined. Fifty-two nestlings were color-banded and their iris color noted. Attempts were

made to observe or recapture birds as soon as possible after fledging. Observations of iris color were made with 7 × 35 binoculars when distance and light conditions permitted.

RESULTS

Data on 16 individuals were obtained and are listed in table 1. All nestlings had dark-brown irides when banded; this agrees with Phillips et al. (1964). There is a progressive change in females from dark-brown irides in nestlings to gray and eventually yellow irides in adults. Males continue to have dark-brown irides. Colors are designated light or dark in table 1 due to difficulty in distinguishing between the progressive iris color changes in distant observations of females. The first date after fledging on which iris color was noted is listed in the table (Date Reobserved or Recaptured). Changes may have occurred before the dates listed; however, no major changes were subsequently observed.

In summary, females are readily distinguishable from males within a month of fledging and in some cases as early as 8 days. It may be possible to determine sex within 3 days of fledging if the young can be captured and examined.

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TABLE 1. History of eye color change in 16 Bushtits banded as nestlings.

Nest #	Nestling #	Hatch date	Last date examined before fledging	Iris color	Date reobserved or recaptured	Iris color	Age (days)	Days from fledging
004	0161	22 March 72 ^b	31 March 72	dark	13 April 72	dark	22 ^b	8
	0162	22 March 72 ^b	31 March 72	dark	13 April 72	light	22 ^b	8
	0163	22 March 72 ^b	31 March 72	dark	13 April 72	dark	22 ^b	8
052	1031	21 March 73	1 April 73	dark	2 May 73	light	42	23
057	1041	21 March 73	2 April 73	dark	22 May 73	light	62	43
	1042	21 March 73	2 April 73	dark	22 May 73	dark	62	43
	1043	21 March 73	2 April 73	dark	31 May 73 ^a	light	71	52
	1044	21 March 73	2 April 73	dark	31 May 73 ^a	dark	71	52
	1046	21 March 73	2 April 73	dark	22 May 73	dark	62	43
048	0348	15 March 73 ^b	27 March 73	dark	20 April 73	light	36 ^b	18
	0349	15 March 73 ^b	27 March 73	dark	20 April 73	light	36 ^b	18
	0351	15 March 73 ^b	27 March 73	dark	18 May 73	dark	64 ^b	46
	0352	15 March 73 ^b	27 March 73	dark	18 May 73	dark	64 ^b	46
098	0831	26 May 73 ^b	5 June 73	dark	16 June 73 ^a	light	21 ^b	3
	0834	26 May 73 ^b	5 June 73	dark	11 July 73	light	46 ^b	28
	0835	26 May 73 ^b	5 June 73	dark	11 July 73	light	46 ^b	28

^a Recaptured.

^b Exact hatch date not established.

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CLUTCH SIZE OF THE SPRUCE GROUSE, *CANACHITES CANADENSIS FRANKLINII*, IN SOUTHWEST ALBERTA

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There has been very little documentation of clutch size of Spruce Grouse (*Canachites canadensis*). Rand (1947) summarized the early clutch size information for *Canachites*; however, some of the data presented were of questionable value. Johnsgard (1973) recently reviewed clutch-size data and the paucity of information is apparent. The report by Tufts (1961) for 39 nests of *C. c. canace* located during 1922-40 is the most extensive set of data for a single locality. Information for *C. c. franklinii* has been particularly lacking; I know of four published accounts for a total of only five nests (Dawson 1897; Bent 1932; Reed 1965; McCourt et al. 1973).

This note reports on clutch size of *C. c. franklinii* from nests located during a population study in 1970-73. All nests were found in predominantly lodgepole pine (*Pinus contorta*) forest within an 8 km radius of the R. B. Miller Biological Station (50° 39' N, 114° 39' W), approximately 27 km W of Turner Valley, Alberta. Most nests were found by trained English pointer dogs.

Clutch size for 21 nests is presented in table 1. These nests were considered complete because the number of eggs remained constant between two or more counts (18 nests) or because clocker droppings (enlarged fecal droppings that result from infrequent defecation by an incubating hen) were present in the vicinity of the nest (three nests). Counts of eggs in the above 18 nests were made at least 3 days apart for 15 nests; for the remaining three nests the counts were only 1-2 days apart, but the female exhibited a very strong behavioral attachment to the nest. For all nests the count of egg shells after hatch or nest destruction did not exceed the number earlier recorded for complete clutch. The range in clutch size (table 1) was two to six eggs, with a mean of 4.9 for adults and yearlings combined. A clutch of five was found most frequently. Data of all years have been pooled to compare clutch size of adults (2 or more years old) and yearlings (1 year old). Clutches averaged 5.0 and 4.6 eggs for adults and yearlings, respectively, and this difference was not statistically significant ($P > 0.05$). The number of clutches was not sufficient to test for differences between years.

An additional nine nests provided clutch-size data. The number of eggs recorded for these nests was not, however, used to represent full clutch for a variety

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of reasons, principally because of the known, earlier destruction of at least one egg and insufficient counts of eggs. Caution was needed in recording a clutch as complete because females have been observed to continue incubating after their clutch was partially destroyed. Field evidence suggested that all nine nests were beyond the early stages of laying when found, and the range of clutch size, four to six with a mean of 4.8, was within the range for completed clutches (table 1).

Clutches from renestings are included in table 1. The two-egg clutch of an adult was possibly a renest; this female was known to have laid five eggs the previous year. Two adults laid clutches of four eggs, and I believe one was the result of renesting because of the very late hatch date (25 July). The other four-egg clutch by an adult was a known renest. The original nest of this female, with one egg, was located on 6 June 1972; on 9 June the nest was found to be destroyed. Her new nest was located on 10 June with one egg, and four eggs were eventually laid. The short time span within which the two nests were initiated indicates that any sample of nests may include some clutches of reneests. A clutch may result from renesting yet fit within the normal distribution of hatch dates.

Rand (1947) suggested that brood size should give a minimal estimate of clutch size. More than 100 different broods were sighted during this study, and of these there were five broods in which seven or more chicks were seen in a single sighting. However, mixing of chicks between broods is known to occur in *C. c. franklinii* (Keppie, unpubl. data), and such mixing accounted for the large chick counts in three of the above broods and the possibility exists for the other two. Juveniles that changed broods were at least 11 days of age, and perhaps counts of younger chicks would be free of this bias. Movements between broods may be infrequent, but such changes may alter the accuracy of estimates of clutch size from brood size and these estimates should be used with caution.

Although the maximum clutch recorded in this study was six eggs, there is other evidence that larger

TABLE 1. Clutch size of *C. c. franklinii* in southwest Alberta, 1970-73. Clutches recorded were known to be complete.

Age of female	Clutch size					N	Mean	Standard deviation
	2	3	4	5	6			
Adult	1	0	2	4	5	12	5.0	1.20
Yearling	0	1	2	4	1	8	4.6	0.93
Age unknown	0	0	0	1	0	1	5.0	—
Total	1	1	4	9	6	21	4.9	1.06

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