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A STUDY OF BOBWHITE QUAIL NEST INITIATION DATES, CLUTCH SIZES, AND HATCH SIZES IN SOUTHWEST GEORGIA

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Abstract:

Nest initiation dates, size of clutches, and proportion of eggs hatching are presented for a high-density bobwhite quail (Colinus virginianus) population studied from 1967 through 1971 in southwest Georgia. Initiation dates were known for 680 nests that were active when found; of these, 379 nests (56%) were initiated before 16 June. Nesting success (percentage of all nests producing chicks) was low for these nests. Of 171 successful active nests with known initiation dates, only 38 (22%) were initiated before 16 June.

Mean monthly clutch size decreased from March (25.0) to August (9.4). The mean clutch size for all nests was 12.0. The number of eggs hatching per nest also decreased from March (20.0) to August (8.4) with a mean of 9.9 eggs hatching for all nests.

A search of literature on the life history of the bobwhite reveals scant information concerning the chronological distribution of nest initiation dates, clutch sizes, and hatch sizes. The majority of available information deals with generalities or extremes of occurrence. The purpose of this paper is to provide quantitative information on these aspects of the bobwhite's life history.

Special recognition is due to John M. Olin, owner of Nilo Plantation, for financial assistance, through the Georgia Game and Fish Commission, and for use of the study area, and to Gratten Parker, manager of Nilo Plantation, for his valuable assistance. Funds for the study were provided through Pittman-Robertson project W-41-R, Georgia Game and Fish Commission.

Study Area and Procedures

This study was conducted during the nesting seasons of 1967-1971 on Nilo Plantation in Dougherty and Baker counties, southwest Georgia. A detailed description of the study area and procedures for locating and studying nests are described elsewhere in these proceedings (6). All data pertaining to clutch size were based on nests known to have been incubated.

Results and Discussion

Nest Initiation Dates

Initiation dates were known for 680 nests that were active when found (Table 1). The earliest nest observed was initiated 22 March, 1969, and the latest on 26 August, 1971. Some nests were probably initiated later than is indicated because searches for nests were terminated on 31 August each year. The peak of nest initiation occurred during the periods 16-31 May and 1-15 June, with 113 nests (17%) and 110 nests (16%), respectively, initiated during these intervals. A slight decline occurred in nest building during 16-30 June, with 80 nests (12%) being initiated during this period. A second peak, although not as great as the first, was indicated for 1-15 July when 88 (13%) nests were initiated. The 16 May - 15 June peak occurred each year with one exception in 1970. The second peak, 1-15 July occurred in 3 of the 5 years (1967-69).

Few past studies of bobwhite nesting present detailed information concerning the chronology of nesting beyond describing the onset and cessation of nest building and hatching. Dinmick (2) reported on initiation dates of 127 nests found during 1967-71 on Ames Plantation, Tennessee. Peaks of nest initiation occurred during the periods of 1-15 June and 1-15 July. Earliest nests were started during 16-30 April and latest during 1-15 August. Lehmann (4) reported on the initiation dates of 64 nests found in southwestern Texas during 1943. The earliest nesting date was 11 April. Peak nest construction occurred about 13 June. The peaks of nest initiation indicated in Tennessee corresponded to those I found in Georgia. Also, the main initiation peak in Texas fell within the period having the largest number of nests

initiated on Nilo Plantation. The onset of nest construction was the same as was found in 4 of the 5 years in this study.

Of the 680 active nests, 171 (25%) were successful. The distribution of initiation dates of successful nests differed from that of all nests due to a high incidence of predation on the early season nests. Lowest nesting success occurred for nests initiated during the period 16-30 April and 1-15 May, when only 5% of the nests started during each period successfully hatched (Table 2). Highest nesting success (excluding the period of 16-31 March which involved only 1 nest) occurred in nests initiated during 1-15 July. Forty-five of 88 nests (51%) started during this period were successful. Nests initiated during 16-31 July were similarly successful, 31 of 62 nests (50%). It should be pointed out again that these estimates of nesting success are for nests that were active when found. Therefore, they may not accurately represent overall nesting success.

The peak of initiation for successful nests occurred during 1-15 July, when 45 nests (26%) were constructed. This period corresponds with the second peak of initiation based on data from all nests. Nests initiated during 16-31 May and 1-15 June, the first and highest peak of initiation for all nests, constituted only 6% and 11%, respectively, of successful nests. Nests initiated before 16 June made up 56% of all nests, yet constituted only 22% of successful nests. Nests initiated after 15 June constituted only 44% of all nests, but constituted 77% of successful nests.

Initiation dates were also estimated for 47 successful nests that had hatched shortly before being found. Combining data from these nests with those from nests active when found did not markedly alter the pattern of successful nest initiation described above (Table 3).

Clutch and Hatch Size

The mean size of 326 clutches that entered incubation was 12.0 eggs (range 5-33) (Table 4). Nest initiation dates were known for 296 of the clutches. Mean clutch size, in relation to month of initiation of the nest, decreased gradually during the nesting season from a high of 25.0 in March to 9.4 in August.

Of the 326 nests having known clutch size, 219 were successful (Table 4). Mean clutch size of successful nests was 11.2 eggs (range 5-30). The date of initiation was known for 211 of these nests. Mean clutch size declined from 25.0 in March to 9.5 in August.

The mean number of eggs hatched was 9.9 (range 2-24) for 211 of the 219 successful nests (Table 4). Initiation dates were also known for 206 of these nests. As would be expected, the number of eggs hatching per nest decreased in relation to the reduction in clutch size. Mean hatch size ranged from 20.0 in March to 8.4 in August.

Stoddard (7) reported an average clutch size of 14.4 eggs for bobwhites in the Tallahassee, Florida-Thomasville, Georgia area. In 1926, the first 25 clutches averaged 15.0 and the last 25 clutches

averaged 13.9. In 1927, the first 50 clutches averaged 16.3 and the last 50 clutches averaged 12.8. Using Stoddard's data, I calculated the mean size of successful clutches to be 13.6 with an average of 11.7 eggs hatching. Lehmann (4) reported clutch sizes of bobwhites in southwest Texas as follows: 14.8 eggs in early spring clutches, 11.5 in midsummer clutches, and 10.5 in late summer clutches. From Lehmann's data, the mean hatch was calculated to be 9.9. Parmalee (5) reported a mean clutch size of 12.9 eggs for successful nests and a mean hatch of 11.9 in east-central Texas. Dimmick (1) reported mean clutch sizes of 11.4 in 1967 and 11.5 in 1968 for bobwhites in Tennessee. In a study by Klimstra (3) in Illinois, the average clutch size was 13.2 eggs and the average hatch was 11.7 chicks.

The mean clutch size and number of eggs hatching per nest found in this study were somewhat smaller than those reported for bobwhites in most of the studies cited. This difference was due mainly to the low success of the early nests and the resulting higher proportion of late nesting attempts with smaller clutches.

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Table 1. The chronological distribution of nest initiation on the Nilo Plantation, Georgia, during the nesting seasons of 1967-1971.

Initiation period	Number of nests					Total
	1967	1968	1969	1970	1971	
March 16-31	--	--	1	--	--	1 (0.1%)
April 1-15	--	--	5	--	1	6 (0.9%)
" 16-30	5	14	21	20	6	66 (9.7%)
May 1-15	6	28	15	27	7	83 (12.2%)
" 16-31	21	31	20	15	26	113 (16.6%)
June 1-15	17	28	19	21	25	110 (16.2%)
" 16-30	13	15	13	20	19	80 (11.8%)
July 1-15	16	30	16	13	13	88 (12.9%)
" 16-31	5	28	8	12	9	62 (9.1%)
August 1-15	8	17	11	8	7	51 (7.5%)
" 16-31	3	4	3	6	4	20 (2.9%)
Total	94	195	132	142	117	680 (99.9%)

Table 2. The relationship of initiation date to proportion of nests hatching on Nilo Plantation, Georgia, 1967-1971.

Initiation period	Total nests		Successful nests		Percent of nests successful
	No.	%	No.	%	
March 16-31	1	0.1	1	0.6	100.0
April 1-15	6	0.9	1	0.6	16.7
" 16-30	66	9.7	3	1.8	4.5
May 1-15	83	12.2	4	2.3	4.8
" 16-31	113	16.6	10	5.8	8.8
June 1-15	110	16.2	19	11.1	17.3
" 16-30	80	11.8	25	14.6	31.3
July 1-15	88	12.9	45	26.3	51.1
" 16-31	62	9.1	31	18.1	50.0
August 1-15	51	7.5	24	14.0	47.1
" 16-31	20	2.9	8	4.7	40.0
Total or average	680	99.9	171	99.9	25.1

Table 3. The dates of initiation for all successful nests during 1967-1971 on Nilo Plantation, Georgia.

Initiation period	Number of nests		Total
	Active	Hatched when found	
March 16-31	1	1	2 (0.9%)
April 1-15	1	2	3 (1.4%)
" 16-30	3	1	4 (1.8%)
May 1-15	4	4	8 (3.7%)
" 16-31	10	4	14 (6.4%)
June 1-15	19	5	24 (11.0%)
" 16-30	25	17	42 (19.2%)
July 1-15	45	8	53 (24.2%)
" 16-31	31	4	35 (16.0%)
August 1-15	24	1	25 (11.4%)
" 16-31	8	1	9 (4.1%)
Total	171	48	219 (100.1%)

Table 4. Mean number of eggs per clutch and chicks per successful nest during each month of the nesting season on Nilo Plantation, 1967-1971. Numbers in parenthesis are the number of eggs and number of nests.

Month of Initiation	Clutch size		Hatch size
	All nests	Successful nests	
March	25.0 (50/2)	25.0 (50/2)	20.0 (40/2)
April	16.0 (353/22)	16.2 (81/5)	13.4 (67/5)
May	13.9 (707/51)	14.2 (327/23)	12.4 (286/23)
June	11.6 (926/80)	11.4 (660/58)	9.8 (569/58)
July	10.2 (991/97)	10.3 (904/88)	9.3 (794/85)
August	9.4 (415/44)	9.5 (331/35)	8.4 (276/33)
Total ¹	11.6 (3441/296)	11.2 (2353/211)	9.9 (2032/206)
Total ²	12.0 (3896/326)	11.2 (2445/219)	9.9 (2085/211)

¹Total for nests with known initiation dates.²Total for all nests with complete clutches.