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Early Quail Hunting Season in Tennessee: Reasons and Results

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EARLY QUAIL HUNTING SEASON IN TENNESSEE: REASONS AND RESULTS

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Abstract:

Bobwhite quail (Colinus virginianus) wings were collected and aged from 1952 through 1970. The wing age data indicated that Tennessee's quail hunting season could begin 20 days earlier than the traditional Thanksgiving Day opening, providing a larger quail harvest. A study involving a season opening date of 5 November was conducted on Laurel Hill Wildlife Management Area resulting in an 18% increase in quail kill over previous years. Only 18% of the quail bagged on Laurel Hill were <12 weeks of age, indicating that birds were sufficiently developed to provide good sport. Based on these earlier studies, the Commission opened the statewide quail season on 6 November 1971. A total of 5,270 quail wings were collected and aged during the early season. An estimated 180,000 additional quail were harvested as a result of the earlier season. Approximately 18 to 19% of the quail were <12 weeks of age. Based on data resulting from a questionnaire, approximately 80% of the quail hunters furnished information favorable to the early season. Weather conditions during the early season were unseasonably warm, but 64% of the hunters indicated that warm weather was only a minor problem. Landowners (87%) indicated that unharvested crops were only a minor problem. Hunters (80%) indicated that young quail presented only minor problems. Sportsmen responding to the questionnaire averaged 8.1 hunting trips and bagged an average of 5.0 quail per trip in November.

The purpose of this study was to test the hypothesis that a hunting season on bobwhite quail (Colinus virginianus) in early November would allow sportsmen to harvest a segment of the population that generally is lost to natural mortality.

The Tennessee quail season traditionally opened on Thanksgiving Day prior to 1960. From 1960 to 1969, opening dates fluctuated from 3 to 10 days earlier, then returned to Thanksgiving Day in 1970. Biologists have contended that the season could be opened approximately 15 to 20 days earlier, resulting in a larger harvest of quail in which both sporting quality and size of birds were acceptable to hunters.

Persons opposing the earlier hunting date believed that quail would be too small, the weather too warm for hunting, and that farmer's crops would not yet be harvested and would suffer damage from hunters.

This paper attempts to explain the reasons for and results of the early quail hunting season in Tennessee.

Seasons prior to 1960 were based on tradition and other nonbiological factors. This is basically true in much of the quail range, and efforts to establish quail hunting seasons based on sound biological data have failed in many states.

Studies of quail population dynamics (8,12,13,18,21) have indicated that more quail should be available for hunting during an earlier season. The Game Management Division wanted to determine: (A) whether an earlier season would permit hunters to harvest additional birds, (B) the age structure of the quail population during early November, and (C) hunter response to an earlier opening date.

The assistance of the many people who contributed to this project is gratefully acknowledged. Without the quail wings contributed by thousands of Tennessee hunters for the past 21 years, the study could not have been made. The assistance of the sportsmen who answered the questionnaire is also appreciated. Special thanks go to the dedicated biologists who have assisted in collecting and aging the quail wings during the study; to the Game and Fish Officers who provided hunter names and collected hunter success data; and especially to Eugene Legler who was the Wildlife Investigations Project Leader for 15 years.

Materials and Methods

Twenty-Year Quail Wing Study

Tennessee quail wing collections were begun in 1951 when biologists collected wings in 6 southwestern counties. The collection was expanded to other counties in 1952. Beginning in 1953, names of quail hunters from all 95 counties were provided by Game and Fish Officers. Hunters were sent letters describing the quail program along with 5 self-addressed, postage-paid envelopes. Hunters were requested to cooperate by contributing 1 wing from each quail bagged. They were instructed to place the wings from 1 day's hunt in an envelope, write the date, county of hunt, and their name and address on the envelope, and mail them to the Game Division. Additional hunters were included during the 20-year period.

Wings received were aged according to techniques described in the literature (3,7,14,17,20). Basically, the aging technique was to evaluate the color of greater primary covert feather tips and measure the progress of molt of the primary wing feathers. Wings were aged to determine: (A) the adult-juvenile ratio, (B) the percentage of various age groups of juvenile quail in the fall population, and (C) hatching periods.

Pilot Study (1970)

A pilot study was conducted in 1970 on 1,200 acres of quail habitat on Laurel Hill Wildlife Management Area to study the effects of opening the quail season earlier. This public area normally has very heavy hunting pressure. An opening date was selected for the hunting season by using an average cumulative hatching curve (Fig. 1). An average date was determined by which time 84% of the juvenile quail were hatched. Twelve weeks (84 days) for maturing were added to that date. The season was thus set to begin on 5 November 1970. All persons hunting on the area were required to check in and out at checking stations so that biological data could be collected. Records were made of numbers of hunters and quail bagged. One wing was collected from each quail shot from 5 through 24 November. All wings were aged and the data recorded. Climatological data were collected in the study area to determine the effect of weather on

hunting activity and success during November. Hunters were questioned to determine their response to the early season. Locations from which hunters originated were also recorded.

State-wide Early Season (1971)

Based on results of the previous studies, the Commission established an early statewide quail season to begin on 6 November 1971. Quail wings were collected from 6 through 30 November as described above to assist in evaluating the early season. Quail hunters were checked in the field throughout the season by 130 Game and Fish Officers and Game Biologists to determine kill success.

State-wide climatological data were obtained from the U. S. Weather Bureau. This information was correlated with hunting activity and success.

Data obtained from the Tennessee Crop Reporting Service were reviewed to determine the percentage of agricultural crop acreage harvested by specific dates. This information was used to study the relationship of hunting to possible crop damage.

Quail Hunter Questionnaire

In February 1972, a questionnaire was sent to 282 quail-wing-survey cooperators. Questions concerning their hunting experiences and their feelings regarding various controversial aspects of the early season were asked. The questionnaire data were compiled and compared with other phases of the project.

Results

Twenty-Year Quail Wing Study

A total of 65,026 quail wings were contributed statewide by hunters from November 1951 through November 1970. Approximately 81% of these wings were from juvenile quail (<7 months of age) and 19% were from adult quail. The largest percentage of juvenile quail in the fall population was 84% in 1965 and the smallest percentage was 71% in 1952. An average of 3% of these quail were in the 4-to-10.5-week age class. Wing age data collected during the entire 20-year period are compiled in Table 1. A 20-year average cumulative hatching curve was developed based on the age data (Fig. 1). Quail wings collected during the first 2 weeks of each hunting season were used to develop age data in Fig. 1

Laurel Hill Study (1970)

The experimental season, restricted to Laurel Hill, began on 5 November 1970 and closed on 8 January 1971 with quail hunting permitted only on 24 days at regular intervals. Most of the sportsmen (390) hunted during the first 8 scheduled days and bagged 596 quail. Only 15 of the total 405 hunters utilized the area after the regular statewide season began on 26 November. No one hunted during 9 of the scheduled hunt dates. A total of 611 quail were bagged during the 15 days of actual hunting.

Overcrowded conditions on several hunt days caused some sportsmen to stop hunting soon after beginning, and for all practical purposes they did not hunt. Other persons utilized the area during the early portion of the season primarily to train dogs.

The 1970-71 quail-kill data are difficult to interpret due to the unexpectedly large number of hunters. The crowded situation resulted in hunter antagonism and caused poor hunting conditions. However, the number of quail bagged exceeds by approximately 18% the previous high of 503 quail bagged. There may be several possible causes for the increased harvest, but it is believed that at least a portion of it was because more birds were available earlier. Each year hunting pressure has been abnormally heavy on the 1,200 acres of quail habitat. Observations and quail population census attempts with bird dogs during October and February of each of the 3 years indicated only minor variations in the numbers of birds.

During the 1969-70 season 271 hunters bagged 490 quail. The season began on 22 November 1969 and closed on 17 January 1970 with 13 days of hunting permitted at regular intervals.

A total of 503 quail were bagged by 201 hunters during the 1968-69 season. This season began on 28 November 1968 and closed on 14 January 1969. Hunting was permitted on 11 days at regular intervals. Sportsmen utilized the area on all scheduled hunt days in 1968-69 and 1969-70.

Wings were removed and aged from 535 of the quail killed during the period of 5 through 24 November 1970 (Table 2). Approximately 18% of all quail bagged were <12 weeks of age. This percentage indicated that an average of 1 quail per each 8-bird bag limit could be recognized as a young bird by observing the primary covert feathers. The 18% was close to the predicted 16% based on an average-hatching curve.

Climatological data from 3 stations in the Laurel Hill vicinity indicated that weather conditions were favorable during November when 97% of the quail hunters used the area. Cool and drier-than-normal days prevailed during most of November. Only 2 warm days (28 and 30 Nov) were considered unfavorable for hunting. Dogs worked poorly and hunters were uncomfortable during these 2 days.

The number of persons hunting on Laurel Hill in 1970-71 increased 33% over 1969-70, the previous high. Reasons for the early quail season were discussed with hunters at the checking stations and they were questioned concerning their attitudes. All hunters questioned stated that they would favor an early season if it were possible to harvest additional game. Two hunters, who killed 4-to-7-week-old birds, stated at first that they were against an early season. It was explained to them that late-hatched quail may suffer a high mortality rate. When they learned that the young birds they had killed had a high probability of dying during the first severe weather, they also decided in favor of an early season.

Persons hunting on Laurel Hill during the early season came from 26 counties in Tennessee and 6 counties in Alabama. Local (Lawrence

County) persons constituted only 19% of the hunters. It was reasonable to assume that these hunters would not object to an early season or they would not have traveled long distances to hunt on Laurel Hill.

Available data from hunts on Laurel Hill indicated that an earlier season was biologically sound and that more quail could be harvested.

Statewide Early Season (1971-72).

The 1971-72 quail hunting season (6 Nov through 12 Feb) began earlier than any previous year in Tennessee and earlier than any other statewide season in the Southeast. A total of 5,270 quail wings were contributed by 282 hunters during the early part of the season (6 through 30 Nov). This is the second largest number of wings contributed in 21 years of collections. Wings were returned from 89 of the 95 counties in Tennessee.

The quail-wing age data indicate that the 1971 production was excellent, based on the 82% proportion of juveniles in the bag compared to lower proportions of juveniles in other years of the 20-year study. The data also indicate that the 1971 hatch was slightly later than the 20-year average (Fig. 1). Approximately 18 to 19% of the quail bagged were <12 weeks of age (Table 3). This is roughly 3 or 4% more than is considered desirable.

A total of 2,232 quail hunters were checked in the field during November. They had hunted 5,659 hours and killed 4,920 quail. This indicates that statewide hunting success in terms of kill per hour was 0.87, which is the fourth highest kill per hour on record (19 years). The average 18-year kill-per-hour rate for November is 0.77. Hunters killed 0.83 quail per hour in December, 0.81 per hour in January, and 0.74 per hour in February. The 1971-72 season was rated excellent based on the data collected.

Data obtained from the U. S. Weather Bureau indicate that the mean date of the first fall temperature of 32 F or lower occurs prior to 30 October in all but 2 small locations in Tennessee (Fig. 2). The normal maximum daily temperatures were plotted for November from data furnished by the Weather Bureau (1). The data indicate that, normally, the warmest temperatures during daylight hours in November range between 53 and 68 F (based on 1931-1960 data). The coldest temperatures were not recorded because cold weather does not affect hunting conditions as much as warm weather does during November. During the Laurel Hill study, the weather approximated normal November weather and provided comfortable hunting conditions. During the early statewide season in November 1971, statewide daily maximum temperatures indicated that approximately 15 days had temperatures above and 15 days below the normal maximum (Fig. 3).

Quail Hunter Questionnaire

Approximately 76% (216) of the hunters returned the quail hunting questionnaire. Most persons answered all questions on the form, but some indicated that they could not remember certain facts and left these spaces blank. Based on the questionnaire, approximately 80% of the hunters furnished information favorable to the early season. A total of

193 hunters recorded making an average of 8.1 trips and bagging an average of 5.0 quail per trip during November. Two hundred and sixteen sportsmen gave ratings to the season (1971-72). Approximately 12% rated the season excellent, 41% gave ratings of good, 36% rated the season fair, and 11% gave the season a poor rating. When these 216 hunters compared this season (1971-72) with the quail season of a year ago (1970-71), 30% indicated that the 1971-72 season was better, 49% about the same, and 21% worse. Landowners with quail hunting opportunities on their farms composed 47% of the persons answering the questionnaire.

Quail hunters rated 4 controversial situations according to how the situations affected their hunting during November (Table 5). The 4 situations included warm weather, unharvested crops, age of quail, and landowner opposition.

Weather Effects:

Temperatures during most of the 1971-72 quail hunting season were unseasonably warm. This was favorable to the quail population, but some hunters complained of unpleasant hunting conditions. Even with the abnormally warm weather, approximately 64% of the hunters responding to the questionnaire indicated that warm weather during November was only a minor or no problem (Table 5).

Age of Quail:

The quail hatch was later than normal in 1971 and this probably caused a 3 or 4% increase in the number of young birds bagged. Nevertheless, only a few (1.5%) were less than 8 or 9 weeks old (Table 3). Approximately 80% of the quail hunters answering the questionnaire indicated that young quail were only a minor or no problem during the early season. Prior to the early season, most sportsmen believed that the vast majority of the quail would be too young for hunting when the season opened.

Landowner Attitudes:

Prior to the early season, some farmers complained about the early quail season because they feared crop damage by hunters. Their primary concern was loss of soybeans due to hunting activity. They contended that dogs running through fields of mature soybeans awaiting harvest would cause substantial damage. During the past few years new varieties of soybeans that are practically shatter resistant have been developed and widely used.

The majority of the state's soybeans are grown in west Tennessee and these landowners indicated more of a problem than those in other sections. Rains during September caused rank growth of soybeans. Maturation of the crop was later than normal, causing a late harvest. Data from the Tennessee Crop Reporting Service (11) indicate that 74% of the corn, 70% of the cotton, and 55% of the soybeans were harvested by 10 November 1971 (Table 4). Approximately 89% of hunters responding to a questionnaire indicated that unharvested crops were only a minor or no problem. Landowners with quail hunting opportunities on their farms also indicated few problems with unharvested crops (58% - no problem, 28% - minor problem, 14% - severe problem).

Discussions and Conclusions

Scientific data collected during the 20-year quail-wing study and the Laurel Hill study indicated that a portion of Tennessee's harvestable quail crop was being wasted each year. The data showed that, normally, 85% of the quail in the fall population were of sufficient age to be harvested in early November.

During the first week of the 1954 and 1955 statewide quail wing study, the percentage of juveniles in the bag was larger than the percentage when data for several weeks of these seasons were compiled.

This indicates 2 possibilities: (A) juvenile quail have a higher mortality rate than do adults as the season progresses and they are not available to hunters, or (B) juvenile quail are more susceptible to being killed and a larger percentage are killed at the beginning of hunting seasons. Marsden and Baskett (15) concluded that there was no significant change in the age ratio of an unhunted quail population from October through July, indicating that young in their first winter were dying at the same rate as were adults. Bennitt (2) found a drop in the percent of young amounting to 0.6% per week over the 8-week hunting season in Missouri (November-December). He concluded that the change was ". . . enough to show that young birds, even if fully grown, are slightly more vulnerable to shooting than older birds." In any case the first weeks of the 1954 and 1955 seasons and the Laurel Hill study demonstrated that the earlier the birds can be hunted the more quail the hunter can harvest.

Quail Mortality Statistics

Normally about 75 to 85% of the statewide bobwhite quail population succumbs annually to some mortality factor. This is established by the age data in Tables 1, 2 and 3 which show that approximately 75 to 85% of the birds bagged each year are juveniles. Data from studies in other states confirm this (2,5,9,15). The rate at which the approximate 80% mortality occurs varies from year to year. Natural causes of mortality such as weather, disease, parasites, predation, and food-and-cover deficiencies also vary in severity at different locations and seasons. These data indicate an average monthly mortality rate of approximately 6 to 7% or an instantaneous mortality rate of 11 to 15%.

Rosene (18) reported that his combined data indicated a loss of juveniles of slightly over 3% a week from hatching to 16 weeks of age. Rosene's data also showed that from 52 to 63% of adult birds were lost from 1 March to 20 November on several southern quail plantations. These plantations have high-quality habitat, and losses on them may be lower there than on statewide situations. Fatora, Provost, and Jenkins (4) reported a mortality of approximately 50% from hatching to 15 weeks of age, with a mortality rate of 3% per week after the initial high mortality immediately after hatching. Kabat and Thompson (12) reported mortality rates on their study area (Wisconsin) for several ecological periods. Based on 100% at the start of each period the rates were 50% from 15 November to 31 March, 17% from 1 April to 14 July, and 63% from 15 July to 14 November.

Management Considerations

The maximum quail population normally exists in August near the close of the hatching period. The maximum harvest by hunting could be achieved by opening the hunting season in August before other mortality factors acted, but this would be undesirable for several reasons. A large number of quail would be too small and the weather and vegetation would be undesirable for enjoyable hunting.

Size of Quail:

Realistically, the quail hunting season should begin when approximately 84% of the juvenile quail attain a weight of 141 to 170 g (5 to 6 oz). It is wasteful if hunting seasons are opened too early because many quail are too small for sport hunting or food. Because of high mortality rates in quail, it is also wasteful to delay opening the season until all young quail have gained fully mature weight. Herndon (10) found that Tennessee quail 10.5 weeks old compared favorably in weight to older birds. Birds 10.5 to 14.5 weeks old averaged 5.58 oz. Birds 14.5 weeks to adult age averaged 5.97 oz, and fully adult birds averaged 6.01 oz. Herndon emphasized that weights of individuals in any age classification may vary drastically. His data showed one adult weighing less than 5 oz and one 16.5 week-old female weighing 8 oz. In Missouri, Stanford (19) noted that quail 11 to 12 weeks of age were of adult size and that their sex could be easily determined. Stoddard (20) found that quail 88 days of age weigh 125 to 150 g (4.4 to 5.3 oz). Haugen and Speake (8) noted that bobwhite quail in Alabama over 90 days of age are indistinguishable from old birds insofar as estimated weight is concerned. Their conclusion was based on the assumptions that the average hunter in the field may be able to distinguish a bagged quail of 10% or more below adult weight as an immature bird, and that bobwhites weighing more than 156 g (5.5 oz) are, for hunting purposes, fully grown. Rosene (18) noted that average weights of juveniles 100 days old are practically the same as average weights of adults. Gore, Holt, and Barron (6) contended that Texas quail hunters consider unacceptable any quail weighing less than 150 g (5.3 oz). Kabat and Thompson (12) reasoned that an early opening date results in some sacrifice of size in quail, but reduces the number of birds that would be lost through natural mortality occuring between 15 October and 15 November. They contended that the presence of many small quail in the population (in Wisconsin) on 15 October is not a problem because hunters readily pass up the squealers (quail 3 to 7 weeks of age). Also they stated that shooting extremely immature birds does not materially reduce the population because these are late-hatched birds having a very high winter mortality.

Based on a combination of these considerations it was concluded that quail 12 weeks of age and above should be suitable in all respects as game birds. It was assumed that the average hunter, in his daily limit of 8 birds, would not be opposed to bagging an average of 1 quail (15.6%) that was slightly smaller than normal, especially if he felt he would have the opportunity to bag additional birds.

Potential Harvest

The quail population in Tennessee has been estimated to number 4,400,000 near the end of October (16). Based on mortality rates reported by several investigators (4,12,18), the potential losses in the quail population were computed for the period of 6 to 27 November. The 1971 quail wing data (Table 3) were used in these computations with an assumed quail population of approximately 4,272,000 birds on 6 November 1971. The potential weekly losses computed for the period of 6 through 27 November averaged 3% per week for juveniles less than 16 weeks of age and 2% per week for subadults and adult birds. It must be emphasized that mortality rates are not well-established, particularly for the early fall season. However, these estimated mortality percentages seem reasonable when the population turnover rate of 82% during 1971 is considered. This would indicate an average mortality rate of 1.6% or an instantaneous mortality rate of 3.2% per week. Based on the available data, estimates indicated a potential loss of approximately 310,000 juveniles and 49,000 adults, a total potential loss of 359,000 quail during the 22-day period. Assuming that 50% of these birds could be harvested, approximately 180,000 additional quail could have been bagged by hunters. It is believed that, with present habitat conditions, the statewide quail kill could be increased more by opening the season earlier than by any other means.

Related Factors:

The fears expressed by some sportsmen and landowners concerning the early quail season were proved to be unwarranted. Sportsmen imagined that they would encounter many young quail and that the weather would be too hot for hunting. Based on contacts with numerous hunters, these beliefs have been mostly dispelled. Few hunters reported observing small quail and few wings were contributed that came from extremely young birds.

Weather during 0.5 the days of the early season was unseasonably warm. This factor did cause some unpleasant hunting, but sportsmen learned that this did not spoil their sport. Many persons in Tennessee hunt on shooting preserves where the season opens on October 1 and they enjoy their hunts. Sportsmen in the Gulf Coast Regions, especially Florida, have been hunting in warm weather for many years. Florida's temperatures normally range from approximately 66 to 72 F in November, and hunters there harvested approximately 2,423,500 quail in the 1971-72 season (personal communications). While weather that is slightly warmer than normal may not be desirable to some Tennessee sportsmen, it certainly did not prevent them from hunting.

Farmers were also pleasantly surprised to observe that their crops were not ruined. Not a single case of crop damage was reported as a result of the early quail season. All information indicated that crop damage was not a legitimate concern. It is fully realized that most hunting takes place on private land, and the Commission would not advocate any program that would possibly damage property. Most hunters use discretion in these matters and avoid potentially damaging situations.

Summary

One of the responsibilities of the Game and Fish Commission is to provide more sport hunting. The hunter is allowed to harvest a maximum

number of game animals without endangering the populations. This was the goal when setting the quail season 20 days earlier than the traditional Thanksgiving opening date.

When all factors are considered, it is believed that the quail hunting season opening in early November (A) allowed hunters to harvest many additional birds that would have been lost to a variety of natural mortality factors, (B) provided 20 additional days of hunting opportunity per hunter, (C) demonstrated that the vast majority of the quail are suitable from the standpoint of age, size, and sporting quality, (D) will normally have weather conditions suitable for pleasant hunting, (E) will cause insignificant damage to agricultural crops, and (F) will not be opposed by most of the landowners. The sportsmen answering the questionnaire represent the "silent majority" and have spoken in favor of the early season. The Tennessee Conservation League (statewide affiliate of sportsmen's clubs) passed a resolution favoring the early quail season during their annual convention in April 1972.

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Table 1. Tennessee Bobwhite quail population age structure based on wings collected statewide from November 1951 through November 1970.

Wing Collection Dates	Juvenile quail age in weeks									Juveniles[1]		Adults		Total wings
	4-7	7-8	8-9	9-10½	10½-14½	14½-17	17-19	19-21½	Over 21½	Total	Percent	Total	Percent	
11/22/51-12/9/52		3	3	11	53	28	26	54	129	307	83.7	60	16.3	367
11/27/52-1/12/53		2		10	22	37	33	71	169	344	71.1	140	28.9	484
11/26/53-1/15/54			1	6	68	191	171	369	880	1,686	77.2	499	22.8	2,185
11/25/54-1/25/55			5	15	116	363	310	705	1,653	3,167	75.4	1,031	24.6	4,198
11/24/55-1/21/56			3	49	147	175	146	336	803	1,659	82.1	363	17.9	2,022
11/22-30/56		1	4	20	139	166	309	115	667	1,464[2]	81.1	342	18.9	1,806
11/28-12/08/57		1	2	12	106	274	272	329	1,083	2,116[3]	80.5	511	19.5	2,627
11/27-12/07/58		1	4	51	303	214	194	572	1,541	2,880	81.8	640	18.2	3,520
11/26-12/06/59		2	7	78	532	360	226	697	1,893	3,795	82.6	798	17.4	4,593
11/21-27/60	1	4	32	111	581	408	267	718	1,593	3,715	77.8	1,060	22.2	4,775
11/20-26/61		3	5	127	467	357	247	577	1,103	2,886	81.3	675	18.7	3,561
11/19-25/62		5	22	65	255	165	262	459	919	2,152	79.9	541	20.1	2,693
11/18-30-63		6	30	246	599	358	276	769	1,618	3,902	83.9	751	16.1	4,653
11/23-30/64	2	5	33	98	362	273	188	403	1,085	2,449	80.5	595	19.5	3,044
11/22-30/65	3	7	16	83	524	370	282	710	1,680	3,675	83.9	705	16.1	4,380
11/21-30/66		3	16	116	407	351	306	777	1,981	3,957	81.1	878	18.2	4,835
11/20-30/67		3	23	102	554	322	289	688	1,413	3,394	82.7	708	17.3	4,102
11/18-30/68			14	81	431	317	445	1,030	1,968	4,286	79.4	1,115	20.6	5,401
11/17-30-69	4	14	44	130	394	221	222	486	1,058	2,633[4]	80.9	619	19.1	3,252
11/26-30/70	1	2	4	73	300	211	172	361	970	2,094	82.8	434	17.2	2,528
Total	11	62	268	1484	6360	5161	4643	10,226	24,206	52,561	81.3	12,465	18.7	65,026
Percent	0.02	0.10	0.41	2.28	9.78	7.94	7.14	15.73	37.23		80.83		19.17	

[1]Unclassified juvenile wings were entered on this summary sheet, therefore column totals will not balance.
[2]Includes 43 unclassified juvenile wings.
[3]Includes 37 unclassified juvenile wings.
[4]Includes 60 unclassified juvenile wings.

Table 2. Laurel Hill Bobwhite quail population age structure based on wings collected from 5 through 24 November 1970.

	Juvenile quail age in weeks											Juveniles total	Adults total	Total wings
	4-5	6-7	7-8	8-9	9-10½	10½-12½	12½-14½	14½-17	17-19	19-21½	Over 21½			
Number wings	1	3	11	11	31	37	39	54	71	23	141	422	133	535
Percent of all quail bagged	0.19	0.56	2.06	2.06	5.79	6.92	7.29	10.09	13.27	4.30	26.36	78.88	21.12	

Table 3. Tennessee Bobwhite quail population age structure based on wings collected statewide during the early season - 6 through 30 November 1971.

	Juvenile quail age in weeks										Juveniles		Adults		Total
	3½-5	6-7	7-8	8-9	9-10½	10½-14½	14½-17	17-19	19-21½	Over 21½	Total	Percent	Total	Percent	wings
Nov. 6-11															
East		3	13	23	56	111	29	37	84	100	456	83.98	87	16.02	543
Plateau			1	3	19	19	6	9	23	34	114	83.82	22	16.18	136
Middle	1	7	27	53	137	187	56	61	170	228	927	83.44	184	16.56	1,111
West		3	7	25	56	95	35	41	87	122	471	83.07	96	16.93	567
Total State	1	13	48	104	268	412	126	148	364	484	1,968	83.49	389	16.51	2,357
% of all Quail	0.04	0.55	2.03	4.41	11.37	17.48	5.35	6.28	15.44	20.53		83.49		16.51	
Nov. 12-17															
East			3	4	9	37	25	19	43	70	210	80.15	52	19.85	262
Plateau				8	8	10	13	7	19	28	93	83.04	19	16.96	112
Middle			3	7	27	63	21	22	38	99	280	78.21	78	21.79	358
West			3	9	15	38	25	21	39	58	208	78.49	57	21.51	265
Total State			9	28	59	148	84	69	139	255	791	79.34	206	20.66	997
% of all Quail			0.90	2.81	5.92	14.84	8.43	6.92	13.94	25.58		79.34		20.66	
Nov. 18-23															
East				3	6	24	12	9	21	51	126	86.90	19	13.10	145
Plateau				1	2	3	7	3	5	16	37	77.08	11	22.92	48
Middle			2	7	20	36	18	21	53	117	274	85.89	45	14.11	319
West			2	12	28	44	30	27	41	101	285	83.58	56	16.42	341
Total State			4	23	56	107	67	60	120	285	722	84.52	131	15.48	853
% of all Quail			0.47	2.69	6.56	12.54	7.85	7.03	14.07	33.41		84.52		15.48	
Nov. 24-30															
East			1	5	5	26	13	11	37	86	184	83.64	36	16.36	220
Plateau						1	1	4	4	9	19	79.17	5	20.83	24
Middle			1	5	8	46	23	28	61	161	333	80.43	81	19.57	414
West			1	6	5	40	32	18	67	147	316	78.02	89	21.98	405
Total State			3	16	18	113	69	61	169	403	852	80.15	211	19.85	1,063
% of all Quail			0.28	1.50	1.69	10.63	6.49	5.74	15.90	37.91					
Grand Total	1	13	64	171	401	780	346	338	792	1,427	4,333	82.22	937	17.78	5,270
% of All Quail	0.02	0.25	1.21	3.21	7.63	14.80	6.57	6.41	15.03	27.08		82.22		17.78	

Table 4. Percentage of crop acreage harvested by specific dates in Tennessee, 1969-1971.

Crop and year	September						October						November					
	5	10	15	20	25	30	5	10	15	20	25	30	5	10	15	20	25	30
Cotton									Percent									
1969	1	3	5	9	16	27	36	40	45	53	62	66	74	81	88	92	98	
1970		1	2	3	7	11	19	26	27	30	33	38	45	54	61	67	72	
1971				2	4	5	10	17	25	35	44	52	63	70	77	82	91	
Corn									Percent									
1969		7	10	15	20	26	31	35	44	53	61	66	72	79	87	90	94	97
1970		10	14	18	23	31	39	46	50	55	60	65	70	74	79	85	86	87
1971		4	7	10	13	18	23	29	38	46	54	60	69	74	80	87	91	95
Soybeans[1]									Percent									
1969							4	9	14	23	34	55	62	70	80	86	92	95
1970							4	6	9	13	15	18	28	38	47	56	66	75
1971							1	4	7	13	18	25	36	55	69	80	87	93

[1] Most soybeans are grown in West Tennessee

Table 5. Summary of question six of the questionnaire.

Question 6. Think carefully about your quail hunts during November and rate the following situations according to how they affected your quail hunting.

Situation	Rating (Check (x) one rating for each situation)						
	No problem		Minor problem		Severe problem		Total hunters responding
	Number	Percent	Number	Percent	Number	Percent	
Warm weather	23	10.7	116	53.7	77	35.7	216
Crops not harvested	112	55.5	67	33.2	23	11.4	202
Quail too young	100	48.3	66	31.9	41	19.8	207
Landowner opposition	129	62.9	47	22.9	29	14.2	205
Total all situations	364	43.8	296	35.7	170	20.5	830

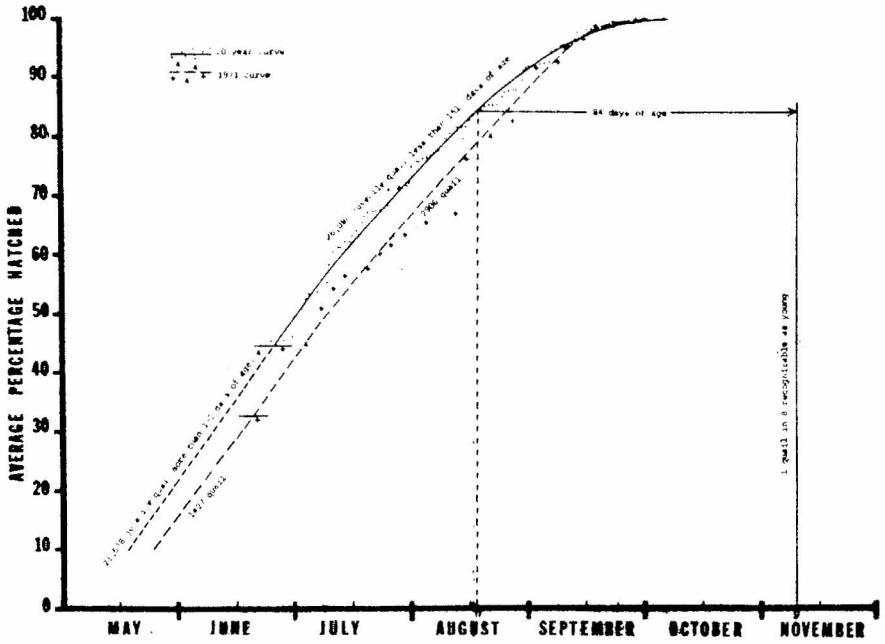

Figure 1. Twenty year (1951-1970) Bobwhite quail average cumulative hatching curve for Tennessee showing relationship of average hatching date to possible opening date for hunting season. (80% juvenile quail ratio is assumed). The 1971 quail hatching curve is plotted which shows the hatch was later than average.

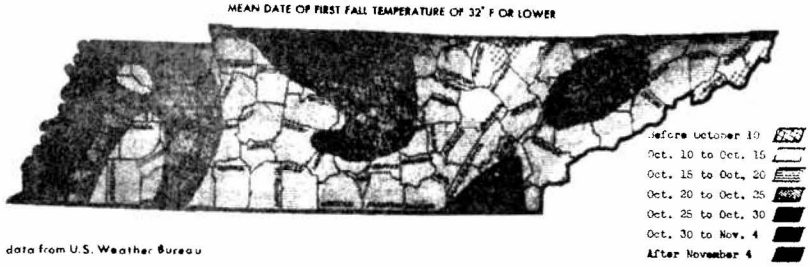

Figure 2. Map of Tennessee showing mean date of first fall temperature of 32 F or Lower.

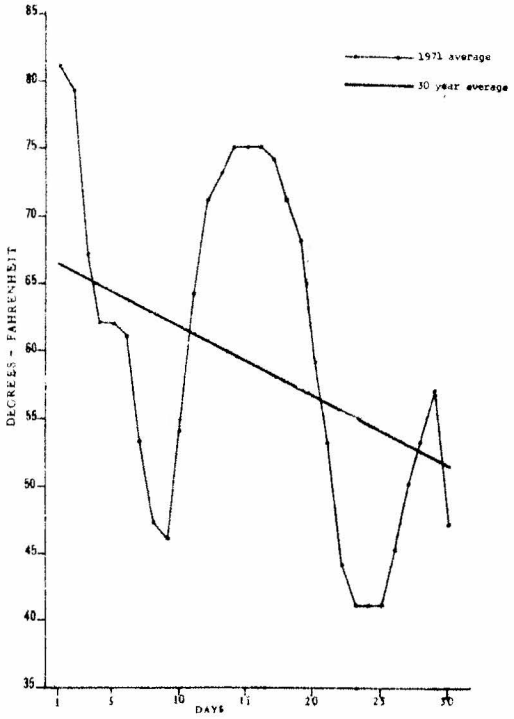

Figure 3. Average maximum daytime temperature for November 1971 and 30 year average (1941-1970) for Tennessee.

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BOBWHITE QUAIL POPULATION DYNAMICS: RELATIONSHIPS OF WEATHER, NESTING, PRODUCTION PATTERNS, FALL POPULATION CHARACTERISTICS, AND HARVEST IN MISSOURI QUAIL

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Abstract:

For 25 years Missouri has investigated bobwhite quail (Colinus virginianus) behavior, production, and population response to 4 major types of weather. Ten population parameters are examined annually to compare effects of Normal, Wet-Deluge, Snow-Cold and Drought weather years on quail populations.