# A FIVE-YEAR STATE-WIDE QUAIL POPULATION STUDY IN KENTUCKY

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Quail population surveys have been made in Kentucky since 1952. According to the post-season surveys in 1957, 3,645,000 quail were bagged. This was more than the indicated kill of any other single species. Even though this survey is not designed to compare the harvest of different species, it rather definitely indicates that the quail is an important game bird in Kentucky, and that Kentucky is an important quail state.

Frank Collins was leader of the quail study from 1952 to 1956. He did an excellent job of compiling data and refining methods of collecting and analyzing data.

## OBJECTIVES

Recording quail population trends was the primary objective of the study. Testing and development of techniques was naturally essential in realizing this objective. There was some thought of recommending seasons and bag limits according to quail abundance, but most biologists are skeptical of this type of management. Walter Rosene has recognized the value of locating areas of highest populations, and making that information available to hunters.

## METHODS

Developing a technique that will give an accurate state-wide index is a difficult task. The greatest problem is that there is no accurate yardstick to determine if a measurement or prediction was correct.

Six methods were used rather extensively. They were (1) farmer questionnaires, (2) brood reports, (3) weather, (4) kill data, (5) wing collections and (6) a post-season survey of hunters.

### QUESTIONNAIRES

An effort was made to obtain questionnaires returned from ten farmers in each county. These were mailed about September 1, and follow-up letters were mailed or visits made, as needed. Approximately 1,000 farmers reported each year.

Many farmers may misinterpret this questionnaire. A more careful selection of farmers probably would increase its dependability. Populations on small marginal quail farms probably would be more accurately known by the farmers. In 1952 and 1953, personal interviews were made.

### BROOD CARDS

Conservation Officers reported the number of chicks and approximate age for each brood of quail they flushed.

### BIOLOGISTS' KILL DATA

Biologists checked hunters to obtain data on kill per hour, number of adults, juveniles, males and females killed, cripples and dogs used.

Varying methods used by different biologists detracted from the value of these data. In the future, it seems desirable to check only hunters contacted at random in the field. Averages may be distorted by a tendency to also contact better hunters at home. A standard method is also needed for reporting rabbit hunting parties which kill quail incidentally.

### WING COLLECTIONS

Experienced quail hunters were given wing collection envelopes, and asked to return wings and hunting information to biologists. Average kill per hour from these hunters is not a reliable index, because different hunters contributed each year.

Adult-juvenile ratio and percent immature young were determined from the wings. Hatching dates could not be calculataed, because killing dates were not shown for most of the wings.

### Post-Season Hunting Survey

Each Conservation Officer interviews about 50 hunters after the close of each hunting season. Data are recorded on kinds of game hunted, number of hunts for each kind, and number of each kind killed. Because of the large sample, this should be the best index of past game populations in the state. Obviously, though, this census is affected by hunting conditions during the open season. It also fails to show hunting success by physiographic regions, because an unknown number of hunters hunt outside their home counties.

### Weather

There is general agreement that the excellent quail production of 1955 and 1956 was partly due to increased rainfall. It is difficult, however, to reduce this generalization to figures. Apparently it will be necessary to compute some averages not given by the Weather Bureau. Definite periods for computing rainfall have not been selected.

## RESULTS

Some rather definite correlations and trends were indicated by data collected during the past five years. But before these techniques can be trusted, they should be more thoroughly tested.

### Questionnaires

In tabulating questionnaires, the percent of farmers reporting a decrease in quail was subtracted from those reporting an increase. Percentages were figured on the entire number, including those who estimated that there had been no change.

Farmer questionnaires indicated an increase each year, in agreement with most other surveys, as shown in Table I. To this extent, they appear to have been accurate. But there seems to be little justification for assuming a degree of increase from the questionnaires. Certainly the increase is not cumulative. Questionnaires were not accurate when broken down by regions of the state, probably because the sample was too small.

### Kill Data

Kill data are shown with other population measurements in Table I for easy comparison.

*Hunter Success:* According to the post-season surveys, the quail population reached a low in 1953, with a slight increase in 1954. Kill data collected in the field indicated an almost imperceptible slump in 1954. Both the changes were so slight that they may have been mere sampling errors.

Both measurements indicated a significant increase in 1955, and the hunter check indicated another increase in 1956.

Some biologists think that quail could stand more hunting pressure. Data for the 1956-57 season indicated a decrease in kill per hour in January of about 25% for the average hunter and 12% for the expert (see Table II).

*Age Ratio:* Adult-juvenile ratio, often used as a barometer of populations, was the only indication of lower production in 1956. The ratio, according to wings submitted by hunters, was stable for the past three years. Biologists reported fluctuations, but when these two methods were compared by months, as shown in Table II, they agree more closely. Perhaps this discrepancy has been caused by collection of data during different months.

If the sample from which Table II was taken was representative, age ratios should be taken at comparable periods if they are to be used as an index from year to year and from region to region. Apparently juvenile kill per hour is a better indicator of production than is the adult-juvenile ratio.

TABLE I

QUAIL POPULATION INDICES

| | Questionnaires | Quail Per Hour | Juveniles Per Hour | Adult:Juveniles Wings | Adult:Juveniles Biologists | Rainfall Deviation | Percent Late Hatch | Quail Per Hunt | No. Hunts |
|---|---|---|---|---|---|---|---|---|---|
| 1950-51 | .. | .. | .. | . . . | . . . | .. | . . . | 2.9 | 6.2 |
| 1951-52 | .. | .. | .. | . . . | . . . | .. | . . . | 2.7 | 6.4 |
| 1952-53 | + 1% | .45 | .21 | 1:1.5 | 1:0.9 | .. | . . . | 2.7 | 6.9 |
| 1953-54 | +29% | .45 | .27 | 1:1.6 | 1:1.5 | +0.2" | . . . | 2.5 | 6.6 |
| 1954-55 | +14% | .43 | .32 | 1:4.1 | 1:3 | —3.3" | 14.8 | 2.6 | 7.4 |
| 1955-56 | +26% | .48 | .39 | 1:4.2 | 1:4.6 | +0.5" | 22.3 | 3.1 | 7.9 |
| 1956-57 | +26% | .61 | .45 | 1:4.2 | 1:2.8 | +1.0" | 31.6 | 3.2 | 8.2 |

TABLE II

CHANGE IN HUNTER SUCCESS AND AGE RATIO BY MONTHS

| | November | December | January |
|---|---|---|---|
| Average Kill Per Hour | .67 | .67 | .50 |
| Experts' Kill Per Hour | 1.04 | 1.07 | .92 |
| Adults:Juveniles—Biologists | 1:3.4* | 1:4.2* | 1:1* |
| Wings | 1:3.3 | 1:4.0 | 1:2 |

* Ratios in Table II were not computed from the entire sample used in Table I.

*Juvenile Kill Per Hour:* Juvenile kill per hour of hunting appears to be one of the most accurate indices of quail production. In the 1952-53 season, .21 juveniles were killed per hour. This figure increased uniformly each year, and by the 1956-57 season had doubled.

RAINFALL

Table I shows average state-wide deviation from normal rainfall during the important quail nesting months of April, May, June and July. In 1954, rainfall was 3.3" below normal during this period. It is interesting that there was also a slump in quail killed per hour and percentage of farmers reporting quail increases during that year. There was an increase in rainfall during 1955 and 1956. The percentage of late-hatched birds and the number of quail killed per hour also increased during each of these years.

Hatching peaks also seemed to be correlated with rainfall, as shown in Table III.

BROOD REPORTS

Table III shows some correlations between high rainfall and the number of broods hatched in the succeeding month. In the western area, May rainfall was 5.27" above normal. The number of June-hatched broods reported in that area was greater than any other in the state.

In June, rainfall was greatest in the central area. This was the only area in which the hatching peak apparently was July instead of June.

In July, rainfall was above normal only in the western area. Seven broods hatched in August were reported there, while none of the other areas had more than two.

June appeared to be the normal hatching peak, unless it was affected by abnormal rainfall.

TABLE III

RAINFALL AND REPORTED BROODS HATCHED BY MONTHS IN 1957

| Area | April | May | June | July | August |
|---|---|---|---|---|---|
| Western Broods | 0 | 13 | 50 | 34 | 7 |
| Rainfall Deviation | 1.52" | 5.27" | 1.55" | 1.08" | |
| Central Broods | 1 | 3 | 16 | 20 | 2 |
| Rainfall Deviation | 1.48" | 1.61" | 2.20" | –1.32" | |
| Bluegrass Broods | 1 | 7 | 22 | 7 | 0 |
| Rainfall Deviation | 2.60" | .89" | .53" | –1.40" | |
| Eastern Broods | 0 | 9 | 29 | 14 | 1 |
| Rainfall Deviation | .86" | .89" | .50" | –2.13" | |

## CONCLUSIONS

1. At present there is no way to detect small changes in state-wide quail populations. Therefore, the accuracy of a measurement technique or prediction cannot be determined.

2. Farmer questionnaires appear to give a fairly accurate estimate of quail production. Small marginal quail farms probably are best for this survey.

3. Juvenile kill per hour of hunting appears to be a better index of quail production than the adult-juvenile ratio.

4. Adult-juvenile ratios in bagged quail apparently vary from month to month.

5. Above-normal rainfall in April, May or June seemed to increase the number of quail broods hatched during the succeeding month.

# RUFFED GROUSE MANAGEMENT IN NORTH CAROLINA

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## INTRODUCTION

While range, numbers, and other factors will be touched on in this paper, the central theme is the harvest of existing populations. Past investigations have indicated that a relatively large grouse population and light hunting pressure do not require attempts to increase the number of birds by habitat improvement. While supplementary plantings and clearings have undoubtedly had a beneficial effect on the population, their greatest value is in concentrating the birds so that they are more available to the hunters.

## HISTORY

Although little is recorded of the history of the ruffed grouse in North Carolina, they apparently occurred as far east as Person County in the middle Piedmont. Information received during a recent investigation stated that the last one was killed there in 1888. This is approximately 50 miles east of their present easternmost range. Grouse were undoubtedly present in many Piedmont counties but probably in very limited numbers. Lumbering and agriculture destroyed the Piedmont grouse habitat soon after the War Between the States. Intensive cultivation of the valleys and foothills of the mountains soon limited grouse to the higher mountains. Clearing and lumbering operations in the mountains improved the extensive forests as grouse habitat, and old time hunters speak of flushing 100 to 150 grouse a day.

## PRESENT STATUS

The "mountain pheasant" as grouse are called in the southern Appalachians, is present today in one-fourth of the counties of the state. It is common to abundant in many of these counties. The grouse population in the better habitat in North Carolina compares favorably with populations found in central Pennsylvania. Table I gives a comparison of populations of the Barrens Study Area near Pennsylvania State College and the Flat Top Area in western North Carolina. The King Census Method was used on both areas.

## FOOD AND COVER

In North Carolina there are two forest cover types where grouse are most numerous. The commonest is a cove type of black and yellow birch, beech, maple, tulip poplar, and hemlock making up most of the overstory. Rhododendron and mountain laurel are the principal understory plants. The other type is found at elevations of 4,000′ to 6,500′. It contains black and yellow birch, beech, fire cherry, spruce, and balsam and the understory is blackberry and rhododendron. They are found in many other forest formations and associations but the above mentioned types constitute the best range.

North Carolina is geographically on the extreme southern edge of the range of the ruffed grouse. The large population is undoubtedly due to the elevations