

# DO REFUGES MEAN MORE QUAIL?

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The Kentucky Game and Fish Commission for several years has been vitally interested in this question, a refuge system having been initiated during the 1946 fiscal year as a prospective remedy for the generally low populations of bobwhites in Kentucky during the early 1940s. Pittman-Robertson Project 19-R was initiated December 1, 1947, for the purpose of evaluating the effects of refuges then existing and determining what factors were limiting their effectiveness.

The present author served as project leader from 1947 until March 31, 1949. Following a period of inactivity, Mr. Joe Bruna was assigned briefly as leader until October, 1949. At that time, Mr. Bromfield Ridley assumed the leadership of the project and he continued until its termination in March, 1951. Credit is due Mr. Ridley for all census data and field observations made on the project areas after March, 1949. From April, 1950, until the present time, the author has served as Superintendent of Game Management, which has afforded an opportunity to make further observations concerning administrative and public relations aspects of quail refuges. These observations will be combined with project data in the report.

## METHODS AND MATERIALS

Investigational procedures are described in detail in the Preliminary Project Report (Gale 1950). They will be mentioned here only briefly.

Seven refuges and six control or check areas of similar topography and land use were selected as study areas in the initial phase of the project. All areas were within 55 miles of Hodgenville in West Central Kentucky. The refuges were designated R-1, R-2 . . . R-7 and varied in size from 416 acres to 1150 acres with an average of 633 acres. Controls were designated C-1, C-2 . . . C-7 and averaged 677 acres, between the extremes of 500 acres and 970 acres.

The original work plan called for the periodic census of a one-half mile zone surrounding each refuge. Because of the time involved in making a census, the author modified this activity to include only a sufficient portion of the peripheral half-mile zone around four refuges to duplicate the area of those refuges. The zones were designated by the letter "Z" followed by the number of the corresponding refuge, e.g. Z-1.

Study areas were censused regularly before and after the hunting season. Bird dogs were used to locate the coveys and the leader attempted to make a total count of the bobwhites on each area. Further data were obtained from track counts during periods of snow, locations of roosting and feeding areas, and conversations with resident farmers.

In 1949 the total number of study areas and the acreage of some others were reduced to facilitate the collection of census data. Areas eliminated at that time included R-1, R-4, R-7, Z-1, C-1, and C-4. Control areas C-3 and C-6 were reduced in acreage to correspond more closely to the sizes of R-3 and R-6.

Complete half-mile zones around four of the refuges were substituted for the partial zones previously censused.

Descriptions of the study areas are included with the final report of Project 19-R (Ridley 1951). All areas consisted of farm lands under a general type of agriculture, with emphasis on livestock, particularly cattle. Much of the land is pastured, usually too closely. Other principal cover types are meadow, woodland, corn, small grain, and old fields grown to brush and weeds.

The general topography of the region is one of rolling hills. Except for a few localized small marshes and potholes, the land is sufficiently well drained to provide suitable quail habitat. Although believed unnecessary by most authorities (Stoddard 1931, Davison 1949) a constant supply of surface water is offered by streams and ponds.

The soils are mainly residual, mostly derived from limestone, but some from shale and sandstone. A small amount of alluvial soil is present along the streams.

In 1947, quail refuges in Kentucky were simply tracts of land which were posted against hunting and patrolled by the county conservation officers. There was no land management for the benefit of quail, although most refuges had been stocked at least once with pen reared bobwhites. At that time refuges were leased under the accompanying contract (Appendix 1). Stocking was suspended on the study areas for the duration of the project to limit the number of factors affecting bobwhite populations. It is evident that the refuges, as then administered, affected only the factor of shooting and harassment by hunters. Under these conditions it is believed that to be effective, a refuge should be situated where overshooting is important as a limiting factor to bobwhite populations.

The basic theory of a refuge is that its excess population will move out and restock the surrounding area (Leopold 1933). This presupposes that the refuge will contain a relatively high population of the desired game, with a surplus in excess of the necessary brood stock. In addition to population pressure within the refuge, other requirements are that the surrounding territory must be readily accessible, contain suitable habitat, and be underpopulated if the system is to function as expected.

The Kentucky quail refuge system, as it existed in 1947, was studied from the standpoint of the previously mentioned basic considerations. The answer to the title question is not entirely definite or final, as the conclusions of the study are necessarily qualified and limited by local conditions and by discontinuity of data during periods of project inactivity. Most of the basic information desired, however, has been obtained, and the results have been applied in a modification of the Kentucky refuge system.

## RESULTS

### Poaching

Unlawful hunting is a common problem on most refuges. It may be either difficult or simple to control, depending upon local sentiment and the diligence of the enforcement agency. In 1947 most of the study refuges had been hunted to some extent. Poaching rapidly decreased during the course of the project because of the frequent visits of the leader and for all practical purposes it remained at a minimum during the study.

Some trespassing results from honest mistakes concerning boundaries when refuge posters are not properly maintained, although such mistakes are infrequent. The usual poacher is a confirmed violator or a "boundary hunter" who cannot resist the urge to explore forbidden territory. These types of poachers can be curbed by proper posting and strict law enforcement.

Another kind of poaching results from alleged oral agreements between landowners and representatives of the Division of Game and Fish. In such cases the farmer usually states that he has been told that he may hunt some species other than quail. If such permission is delegated to others it soon will be abused, and this happened on one area. The solution is simply to make all commitments a part of the refuge contract.

### Overshooting

It as been mentioned that the main effect of a refuge is control of shooting. The effectiveness of an unmanaged refuge then depends largely upon the extent to which overshooting is limiting bobwhite populations. Overshooting may be said to occur when the population is so reduced by hunting that it cannot recover to a satisfactory level in the course of a normal breeding season. In this study, a pre-hunting season population was considered "satisfactory" if it equalled or exceeded that of the previous year, since data for the period before initiation of the project were not available.

Census data for the hunted control areas give the best available information concerning the effect of hunting in reducing bobwhite populations, although losses between the pre-hunting season census and the post-hunting season census include not only those due to hunting but also losses from other causes, such as egress and predation. Table 1 shows the population trends of four hunted areas. C-1 and C-4 have been omitted in order to obtain continuity of data.

Table 1. Bobwhite population trends on hunted areas.

| Dates           | Birds/100 AC |      |      |      | Average |
|-----------------|--------------|------|------|------|---------|
|                 | C-2          | C-3  | C-5  | C-6  |         |
| Postseason 1948 | 2.1          | 4.3  | 2.0  | 2.8  | 2.8     |
| Preseason 1948  | 5.1          | 3.8  | 3.1  | 17.9 | 7.5     |
| Postseason 1949 | 2.0          | 4.0  | 0.0  | 4.2  | 2.6     |
| Postseason 1950 | 2.1          | 4.2  | 0.0  | 3.8  | 2.5     |
| Preseason 1950  | 4.6          | 10.9 | 12.2 | 23.8 | 12.9    |

It is apparent that population levels for these areas are generally low, except on C-6. It is also apparent however, that the recovery of these hunted areas is consistently good, and there is no general downward trend in pre-hunting season populations. There remains a question as to whether overshooting may be responsible for the low population levels, even though the status quo is maintained. This is denied by census data from the refuges, as shown in Table 2.

Although the post-hunting season population densities of the refuges average three times as great as those of the controls, the average yearly increment of the refuges is much lower, percentage-wise, than the average increment of the controls.

Table 2. Bobwhite population trends on Refuges.

| Dates           | Birds/100 AC |      |      |      | Average |
|-----------------|--------------|------|------|------|---------|
|                 | R-2          | R-3  | R-5  | R-6  |         |
| Postseason 1948 | 6.2          | 9.7  | 8.9  | 9.6  | 8.6     |
| Preseason 1948  | 3.1          | 14.4 | 7.9  | 13.9 | 9.8     |
| Postseason 1949 | 2.0          | 9.0  | 9.6  | 10.6 | 7.8     |
| Preseason 1949  |              |      |      |      |         |
| Postseason 1950 | 6.5          | 9.9  | 9.8  | 4.3  | 7.6     |
| Preseason 1950  | 6.0          | 18.8 | 13.6 | 11.5 | 12.5    |

The average preseason density of the refuges was higher in 1948 but that of the controls was higher in 1950. Unfortunately, no census was made in 1949. The great variation between the preseason population densities of different areas in the same year (C-2 and C-6, R-2 and R-3) and on the same area in different years (C-5, R-2, R-5) shows that some factor other than shooting is seriously affecting bobwhite populations. This factor is the quality of the habitat, which depends largely upon the land use in practice.

Such overshooting as may occur must be on land which is marginal for bobwhite production. C-2 is the best example. Although hunting pressure is tremendous on C-6, the habitat conditions are such that it produced and/or attracted large numbers of bobwhite each year. The pre-hunting season population of C-6 was consistently higher than that of any other study area, including the refuges. It is concluded that overshooting occurs only in marginal or submarginal habitat.

#### Population Pressures

It has been stated that in order to function properly a refuge must have a surplus, creating population pressures. Table 2 does not reveal any refuge as having a significant surplus, possibly excepting R-3. Even R-3, however, has a population density considerably less than that of C-6, a hunting area. The population of R-2 and R-5 actually decreased during the 1948 breeding season. The losses were attributed to an increase in grazing intensity and a prolonged drought which reduced the quality of vegetative cover from marginal to submarginal early in the Fall.

It is clear that the establishment of a refuge does not guarantee that the land will support a high population of quail or even that there will be an increase. Habitat is a more important limiting factor than hunting in West Central Kentucky.

Considering the apparent equilibrium between the yearly increment and seasonal losses on the study refuges there could not be significant population pressures within most of them. Even if the maximum possible surplus were utilized by hunters it could not affect the county-wide quail population to any great extent.

#### Effects on Surrounding Territory

Although it has been shown that the study refuges produced a very small numerical surplus of bobwhites for hunting, it might be contended that the surplus

moved off the refuges during the breeding season. No census is made after the coveys break up and the extent of movement is difficult to demonstrate, although there certainly is some egress from those refuges which are good wintering areas but poor nesting territory. The populations of the peripheral zones normally should be quite high, if the refuges are keeping them supplied with brood stock. Census data from the zones are presented in Table 3.

**Table 3. Bobwhite population on peripheral zones.**

| Dates                        | Birds/100 AC |     |     |     | Average |
|------------------------------|--------------|-----|-----|-----|---------|
|                              | Z-2          | Z-3 | Z-5 | Z-6 |         |
| Preseason 1948               |              | 8.0 | 9.0 | 9.5 | 8.8     |
| Postseason 1949              |              | 7.1 | 2.4 | 6.0 | 5.2     |
| Postseason 1950 <sup>a</sup> | 0.6          | 2.8 | 1.0 | 1.8 | 1.5     |
| Preseason 1950 <sup>a</sup>  | 3.5          | 9.7 | 3.7 | 5.4 | 5.6     |

<sup>a</sup> Acreage increased to include entire periphera.

The increases in acreage of the zones has been discussed under Changes in Methods and Materials. Except on Z-3, the addition of territory brought about a decrease in population densities. This would be expected, since the original partial zones were selected as that portion of the periphera containing the best bobwhite habitat. In most cases, the additional zonal area included large blocks of unproductive habitat types such as heavily wooded areas or intensively grazed pastures.

A comparison of Tables 1 and 3 reveals that, on the average, the bobwhite population densities were greater on the refuges zones than on the control areas during the preseason census of 1948 and the postseason census of 1949. During the postseason and preseason censuses of 1950 the situation was reversed, with the controls having a higher average population level. Although the zone census data are incomplete, it is evident that if the zones are being populated by surplus brood stock from the refuges, the stocking is not resulting in quail populations significantly higher than those on hunted areas more distant from the refuges. It must be concluded that either the control areas are not overshot; or the refuges are not having a particularly beneficial effect on the surrounding zones.

One effect on quail in the peripheral zone is that under hunting pressure they may immigrate to the refuge and be saved from further harassment. This effect was observed when two coveys under hunting pressure moved from Z-5 to R-5 during the 1948 - 49 hunting season. These coveys remained on the refuge until after the hunting season. The author and Ridley (1949) both observed similar occurrences among marginal coveys which normally ranged across refuge boundaries.

### Other Considerations

In addition to the potential effects of refuges on bobwhite populations there are certain other aspects to be considered. One is public relations. Most Kentucky sportsmen believe that quail refuges are beneficial, and many clubs have "adopted" one or more refuges as club projects. The development of a refuge is a good activity for both junior and senior sportsmen and demonstrates to them, in a way

that words never can, the techniques involved in successful game production. A cooperative refuge development project also helps establish better relationships among sportsmen, farmers, and the Division of Game and Fish.

Another potential value of a refuge is its use as a demonstration area. A State posted area is certain to be noticed and it offers an opportunity to show the benefits of a game management program.

Both of these advantages are somewhat offset by the inherent reduction of potential hunting territory. Privately posted land is one of the foremost problems in many states, including Kentucky (Gale 1950). It should be explained to all concerned that the management and cooperation demonstrated on a refuge can and should be extended to hunting territory.

## SUMMARY

A three-year study of the Kentucky quail refuge system, as it existed from 1947 to 1950, resulted in the following conclusions:

1. Poaching occurs on most refuges to some extent, although it was not an important factor on the study areas during the course of this investigation.
2. Overshooting of bobwhite quail occurs only in marginal or submarginal habitat, where heavy cover is deficient. The quality of the habitat is much more important in limiting bobwhite quail populations than is hunting pressure.
3. Unmanaged refuges in West Central Kentucky seldom have a surplus of quail large enough to create significant population pressures.
4. The territory immediately adjacent to an unmanaged refuge usually will have about the same density of quail as an area of similar habitat conditions more distant from the refuge.
5. Refuges occasionally preserve coveys which under hunting pressure immigrate from the adjacent zone to a refuge.
6. Refuges have certain public relations values, particularly as sportsmen's club projects and as game management demonstration areas. These values are partially offset by the reduction in huntable territory.

## RECOMMENDATIONS

During the latter phase of Project 19-R and since its termination, the author has had the opportunity, seldom afforded a research biologist, to apply the results of the research. The Director and the Game and Fish Commission have been most cooperative in accepting recommendations concerning changes in the refuge system.

First, a game technician was hired to assist in administration of the refuge system. No area is leased as a refuge until it has been approved as suitable quail habitat by a technician. This prevents waste of effort and funds.

All commitments are a part of the written contract. The landowner agrees in writing to follow a game management program, including the planting of food and cover recommended by the Game Management Section. Refuges will be managed to obtain the maximum production of quail consistent with good land use.

Refuges are established only where most of the surrounding territory is not posted against hunting.

Sportsmen and Junior Conservation Club members are encouraged to assist the farmers in refuge development.

A new contract has been drawn up (Appendix 2) which contains specific reasons for which the State can terminate a refuge prior to the date of expiration of the contract. Under the old contract there was no such provision. The new contract is for only five years instead of ten. If results are not apparent in five years, the contract will be terminated permanently.

The general quality of refuges has improved tremendously in the past two years and development has been done on many of them. The goal for the 1952 planting season is at least one plot of *Lespedeza bicolor* on each refuge.

Facts determined by Project 19-R have been of great benefit in the conversion of the Kentucky quail refuge system from a number of mere posted tracts to a series of game management demonstration areas.

#### LITERATURE CITED

- Davison, Verne E. 1949. Bobwhites on the rise. Charles Scribner's Sons, New York, 150 pp.
- Gale, Larry R. 1950. Effects of quail refuges in Kentucky. Pittman-Robertson Project 19-R, Preliminary Report, Division of Game and Fish, Frankfort, Kentucky.
- Gale, Larry R. 1950. Handwriting on the fences! Kentucky Happy Hunting Ground, March, 1950, Division of Game and Fish, Frankfort, Kentucky.
- Leopold, Aldo, 1933. Game management. Charles Scribner's Sons, New York, 481 pp.
- Ridley, Bromfield. 1949. Evaluation of the effects of quail refuges as a quail restoration technique. Pittman-Robertson Project 19-R, Quarterly Progress Report, December 31, 1949, Division of Game and Fish, Frankfort, Kentucky.
- Ridley, Bromfield. 1951. Effects of unmanaged quail refuges as a restoration technique. Pittman-Robertson Project 19-R, Final Report, Unpublished, Division of Game and Fish, Frankfort, Kentucky.
- Stoddard, Herbert L. 1931. The bobwhite quail. Charles Scribner's Sons, New York, 559 pp.

#### APPENDICES

##### Appendix 1. Refuge lease contract.

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#### Refuge Lease Contract

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COMMONWEALTH OF KENTUCKY  
DIVISION OF GAME AND FISH  
FRANKFORT, KENTUCKY

1946

This agreement is entered into this \_\_\_\_ day of \_\_\_\_\_,  
194\_\_\_\_ by and between \_\_\_\_\_ of  
\_\_\_\_\_ and \_\_\_\_\_  
of \_\_\_\_\_ hereinafter referred to as party or  
parties of the first part, and the Division of Game and Fish of Frankfort, Kentucky  
through its Director, hereinafter referred to as party of the second part.

Appendix 1. Continued

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WITNESSETH: That the party or parties for the first part, for and in consideration of valuable services rendered by party of the second part and in accordance to 150.240 Kentucky Revised Statues, an act to contract for Game Refuge in this State, the said party or parties of the first part assign to the Division of Game and Fish certain lands described as follows:

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to be used by the said Division as a Game Refuge for a period of 10 years, during which time no wild birds or wild animals, except excessive populations of predatory birds or animals, as may be determined by party of the second part, are to be disurbed, molested, or killed thereon by any persons, including party or parties of the first part, their heirs or resident lessees. It is further understood that all hunting with fire arms or pursuing with dogs any wild birds or wild animals on the above described lands is prohibited.

The party of the second part has the right and privilege at any and all times during the term of this lease to enter said tract of land for the purpose of protecting, re-stocking, caring for, inspecting, carrying on research or study, or in any way caring for any and all wild game, birds, fowls, or animals, which are now on said tract of land or which shall populate said land during the term of this lease either by re-stocking, migrating or increase by resident seed stock and the party or parties of the first part shall in no wise interfere with the right of the party of the second part to enter by any duly appointed agent, conservation officer or representative of the Division of Game and Fish.

The party of the second part agrees to post said lands against hunting or chasing with 12 × 24 signs placed not less than twelve to each and every mile. The party of the second part shall not be responsible in any way for any damage done to any crops belonging to party or parties of the first part, by wild birds or wild animals on said tract of land.

The party or parties of the first part shall not at any time shoot, hunt, trap, chase or in any way hinder or molest wild birds or animals or give permission to shoot, hunt, trap, chase or in any way hinder or molest wild birds or animals on said tract of land.

Party or parties of the first part shall retain all other rights pertaining to the above described said tract of land, such as farming, grazing, timber harvest or any other operations necessary to uses which said tract might be put.

Party of the second part agrees to cancel this lease contract whenever its existence might interfere with the sale of said tract by party or parties of the first part to a prospective buyer not willing to assume the obligations of this contract.

The purpose of this lease is to establish a refuge or haven for wild life, where wild birds and animals may be unmolested at all times and remain undisturbed by trespassers or hunters. Any other contemplated improvements may become a part of this contract upon agreement and can be attached as a part of this contract.



Appendix 1. Continued

Given under our hands and seals this \_\_\_\_ day of \_\_\_\_\_  
194\_\_\_\_.

Witnesses \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Division of Game & Fish, Frankfort, Ky.

Appendix 2. Refuge lease contract.

Refuge Lease Contract

COMMONWEALTH OF KENTUCKY  
DIVISION OF GAME AND FISH  
FRANKFORT, KENTUCKY

Revised 8/1/51

This agreement is entered into this the \_\_\_\_ day of \_\_\_\_\_  
195\_\_\_\_, by and between \_\_\_\_\_ of  
\_\_\_\_\_ hereinafter referred to as party  
(Post Office) (County)

of the first part, and the Division of Game and Fish of Frankfort, Kentucky,  
through its Director, hereinafter referred to as party of the second part.

WITNESSETH: That the party of the first part, for and in consideration of  
valuable services rendered by party of the second part and in accordance with  
150.240 Kentucky Revised Statues, an act to contract for Game Refuges in the  
State, assigns to the Division of Game and Fish certain lands described as follows:

\_\_\_\_\_ acres, more or less, located in \_\_\_\_\_  
County \_\_\_\_\_ miles \_\_\_\_\_  
Bounded by \_\_\_\_\_  
\_\_\_\_\_

to be used by the said Division as a Game Refuge for a period of 5 (Five) years,  
with option to renew for an additional five years if such renewal is deemed  
advantageous to the Division of Game and Fish. During this time no wild birds or  
wild animals, except excessive populations of predatory birds or animals, as may  
be determined by party of the second part, are to be disturbed, molested, or killed  
thereon by any persons, including party of the first part, their heirs, and resident  
lessees. The hunting with firearms or pursuing with dogs of any wild birds or wild  
animals on the above described lands is prohibited.

The party of the second part has the right and privilege at any and all times  
during the term of this lease to enter said tract of land for the purpose of  
protecting, restocking, inspecting, carrying on research or study, or in any way  
caring for the wild game, birds or animals, which are now on said tract of land or  
which shall populate said land during the term of this lease either by restocking,  
migrating, or increase from resident seed stock, and the party of the first part shall  
in no wise interfere with the right of the party of the second part to enter by any  
duly appointed agent, conservation officer, or representative of the Division of  
Game and Fish.

Appendix 2. Continued

The party of the second part agrees to post said lands against hunting with official signs placed not less than twelve to each and every mile. The party of the second part shall not be responsible in any way for any destruction or crops by wild birds or wild animals on said tract of land.

The party of the first part shall not at any time shoot, hunt, trap, chase, or in any way hinder or molest wild birds or animals or give permission to shoot, hunt, trap, chase, or in any way hinder or molest wild birds or animals on said tract of land.

The party of the first part agrees to cooperate with the party of the second part in a game management program. This includes the planting of food and cover, the planting materials to be furnished by the party of the second part at no cost to the party of the first part.

Party of the first part shall retain all other rights pertaining to the above described tract of land, such as farming, grazing, timber harvest, or other operations to which said tract might be put.

Be it understood that this lease contract becomes null and void and is automatically cancelled whenever the ownership of said tract of land is changed.

Party of the second part reserves the right to cancel this lease contract whenever the wildlife habitat conditions of said tract of land are changed as a result of farming practices so that, in the opinion of the party of the second part, the tract is no longer suitable as a wildlife refuge.

The party of the second part reserves the right to cancel this lease contract whenever the party of the first part shows a lack of good faith toward the original and fundamental purpose of the provisions of the above lease contract.

The purpose of this lease is to establish a refuge for the propagation of wildlife, where wild birds and animals may be unmolested at all times. Any further provisions may become a part of this contract upon agreement by the contracting parties and can be attached as a part of this contract.

Given under our hands and seals this \_\_\_\_ day of \_\_\_\_\_ 195\_\_\_\_.

Witnesses (2)

Lessee

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\_\_\_\_\_  
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Director, Division of Game and Fish