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POPULATION DYNAMICS OF BOBWHITES ON AN INTENSIVELY MANAGED AREA IN SOUTHERN ILLINOIS

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Introduction

An intensive bobwhite quail management program was placed in operation on about 2,000 acres of The United Electric Coal Companies, Inc. properties near DuQuoin, Illinois in 1954 and was continued through 1959. Included were approximately 800 acres of strictly idle land, 600 acres of mixed idle and agriculture land, and 800 acres of intensive agricultural land. On idle lands, controlled burning, food strip plantings, fallow strips, and release cutting of trees in fencerows and field edges were carried out. Field size was reduced, fencerows widened, and food strips were established in the agricultural areas. In various years pen-reared quail were released, some in spring, some in summer, and some in fall in both areas. This paper describes the bobwhite population dynamics on these properties during 6 yr of management.

Methods

Population levels were determined by 3 censuses: 2 weeks before the hunting season (prehunting), immediately following the termination of hunting (posthunting, late December), and the third week in March (prenesting). Because of summer and early fall releases in 1954 and 1955, liberated quail were recorded as part of the fall population in those 2 yr. On the basis of percent return from harvesting it was estimated that these released birds represented 5 and 10% of the fall-censused populations for 1954 and 1955, respectively. Because of the apparent rate of mortality of liberated birds, it is estimated that they represented no more than 2 to 3% in any of the posthunting censuses and less than 1% in the prenesting censuses. Although some

quail from 2 of the fall releases and 1 of the spring releases survived until hunting seasons the following years, such releases were not considered as part of subsequent pre-hunting-censused populations. Admittedly, not all aspects of the effects of the various releases can be completely evaluated. However, their contribution to population levels on this study area are believed insignificant.

Results and Discussion

Three yr after the installation of management practices the quail population on these properties in the fall showed an increment of about 500% (Table 1); total numbers of quail increased from 136 to 667 birds and 13 to 52 coveys. The actual peak in population during the 6 yr occurred 1 yr later, in 1957, with 747 birds and 52 coveys. Following this peak there was a decline to 498 birds and 44 coveys in 1958 and to 486 birds and 38 coveys in 1959.

Prior to the management program, the quail populations on this area had shown a continuous decline over the previous 8-10 yr, reaching a level of 136 birds and 13 coveys in fall of 1953. This decline was related to the gradual deterioration of the quail habitat due to normal plant succession in the idle lands and increased intensity of intertilled cropping in the agricultural areas. According to reports, the highest populations for these areas occurred 8 to 10 yr previously. However, employees of the Company, who had been in charge of hunting for several years, stated that maximal fall population levels never approached more than 50% of that realized in 1957, following the intensive program of management.

It is acknowledged that quail populations in southern Illinois generally were increasing during the 1953-to-1956 period. An unmanaged area, under study since 1950 near Carbondale, 18 miles southeast of the managed area, was used as a reference. It showed a population increment of about 70% (237 to 392 birds) during this same period. It may be feasible to assume that a major portion of the 500% increase on the managed area at DuQuoin reflected the results of management efforts.

Because of the relationship of the idle and agricultural lands it was possible to establish, somewhat arbitrarily, 3 types of areas based upon use: strictly idle land, intermingled idle and agricultural, and strictly agricultural. The intermediate between the 2 extremes of land use revealed slightly denser quail populations in 5 of 6 years as based on number of acres per bird (Table 2); however, as reported, it likewise held the higher populations before management was installed. At peak population levels (1957) increase associated with land-use types was highest in the idle lands (605%), second highest in agricultural lands (474%), and third highest in the combination area (396%). This suggests that the greatest returns from management were realized for the 2 extremes in land use.

Hunter success per man-hour and total harvest were highest from the combination type of land use in contrast to the other 2. This was believed related to the behavior of the quail as the combination area

seemed to hold quail better, and to the fact that they were easier to hunt because of the distribution of cover. Idle areas had extensive heavy cover which afforded protection to quail when pursued by hunters; also, the heavy cover discouraged the novice hunter and made shooting more difficult. In agricultural areas, quail were more widely distributed, being less restricted by cover distribution; furthermore, in sparser cover they flushed more readily and worked less well for the dogs. There was some tendency to hunt the combination area more intensively because quail were easier to find and could be handled better by the dogs. Hence, there may have been a small disproportional hunter pressure in the 3 types of areas.

Of special interest was the hunting pressure experienced by this managed quail population. In 1954, when hunting was restricted, 22 parties averaged 1.8 days of hunting per week during a 30-day season. During the years 1955-59 the area was hunted an average of 4.5 days per week, totaling 90 hunting parties for the season. Such pressure is considered excessive and most undesirable by managers of quail plantations in southeastern United States (2) and results in poor hunting returns either in birds harvested or in covey finds. Because hunting activities were being conducted during morning and afternoon, and because the size of the area did not permit much change in places to hunt, the 90 hunting parties really meant as many as 180 individual hunting trips or an equivalent of 6 per day for the 30-day season. This then greatly magnifies the extent of the hunting pressure.

The effects of the heavy hunting pressure were believed evidenced by the covey finds per hunting party per 0.5 hunter-day. The first week of the season covey finds averaged 3.0 per 0.5 hunter-day; this declined to 0.4, a reduction of 2.6, by the last week of the season. The second and third week showed average covey finds of 2.0 and 0.9, respectively. Hunter success generally declined as the season progressed, and this relates directly to the decline in covey finds.

The progressive decline in covey finds seemed a direct reflection of hunting pressure, which remained relatively constant during the 30-day season. Seemingly, then, there was a progressive decline in the quail population as the season progressed. This was probably true only in part as it was clearly evident that coveys became increasingly hard to find as harrassment from hunters increased. However, field observations indicated that coveys not only changed their habits and utilized heavier cover but some actually moved off the study area.

Posthunting censuses reflected a significant population decline from the prehunting censuses. During the years of heavy hunting pressure (1955-1959), population losses ranged from 57 to 83% (Table 1). In contrast, the Carbondale Research Area, where hunting is more intense than the normal level on private lands, annual quail mortality due to hunting during 1955-1959 ranged from 42 to 67%. These are unusually high compared to an estimated annual harvest of 25% (1) for wild populations on a statewide basis.

Of special interest was the prenesting population on the United

Electric study area following the years of high hunter mortality. In the springs following the hunting seasons of 1955 and 1956, the pre-nesting populations showed increments of about 32 and 60%, respectively (Table 1). Prenesting populations in 1958 and 1959 revealed virtually no change from the posthunting numbers of the previous 2 years. In contrast, the 1955 prenesting population was about 27% less than the posthunting population of the previous year when hunting was limited. This represents a more normal pattern of decline for wild populations and is similar to that established for the Carbondale Research Area over a 15-year period.

An analysis of the population decline during the hunting seasons and of the quail harvested by hunters showed that actual harvest accounted for only 42 to 51% of the total losses recorded during years of heavy hunting pressure. This indicated that hunter mortality was not solely responsible for the decline in the quail population. Field observations indicated that a possible consequence of the heavy hunter pressure was movement of coveys of quail into surrounding lands not included in the study area. In 1956 a check of about 600 acres of spoilbanks adjacent to the study area on the south and west revealed 12 coveys in an environment considered appropriate for possibly 2 or 3 coveys. A similar situation was apparent for woodland and pasture areas along the south and east borders.

This was limited but good evidence that quail believed dislocated by heavy hunter pressure returned to the managed area within 2 weeks after the hunting season was terminated. This may account in part for the gain in populations or at least the little or no loss recorded during the winters of 1956-59 as evidenced by the prenesting censuses. Probably some additional birds, native to the surrounding areas, also moved on the managed acreage because of its superior habitat during winter. The extent of such movements was not known but 3 to 5 coveys may have been involved in any given year. This was possibly evidenced by the absence of population losses after the 1957 and 1958 hunting seasons when one might have expected at least small declines following hunter-caused mortalities of 62 and 57%, respectively (Table 1).

On the basis of prehunting populations, the peak of population increment occurred in 1956; however, highest fall populations occurred in 1957, 1 year later. This delayed peak reflects a possible carryover from the previous year. Although the percent summer gain clearly reflects inversivity when prenesting and prehunting populations are compared (Table 1), such inversivities are most strikingly demonstrated in 1958 and 1959 when overall populations were declining and when breeding populations were the highest.

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Table 1. Population Dynamics of Bobwhites on The United Electric Coal Companies, Inc., DuQuoin, Illinois, 1954-1959.

Year	Prenesting coveys of birds		Percent change from post hunting	Prehunting coveys of birds		Percent change from prenesting	Post hunting coveys of birds		Percent change from prehunting
1953				13	136				
1954	8	74		22	301	+306.7	18	169	-43.9
1955	17	123	-27.2	34	504	+309.8	10	108	-78.6
1956	16	143	+32.2	52	667	+366.4	12	114	-82.9
1957	20	182	+59.6	52	747	+310.4	30	284	-62.0
1958	24	269	-05.3	44	498	+ 85.1	23	214	-57.0
1959	25	215	+00.4	38	486	+126.0	23	205	-57.8

Table 2. Acres per bobwhite on different land use types, The United Electric Coal Companies, Inc., DuQuoin, Illinois.

Type of land use	Acres per bird					
	1954	1955	1956	1957	1958	1959
Idle area (800 ac.)	6.5	3.8	3.0	2.5	3.0	3.7
Idle and agriculture area (600 ac.)	6.2	3.4	2.0	1.9	4.0	3.5
Agriculture area (600 ac.)	8.4	7.5	4.4	4.2	6.0	6.0
Totals	6.6	4.0	3.0	2.7	4.0	4.1