EXPERIMENTAL RELEASES OF PHEASANTS IN WABASH COUNTY, ILLINOIS

WILLIAM L. ANDERSON
Illinois Natural History Survey, Urbana

ABSTRACT. — Four strains of the ring-necked pheasant (*Phasianus colchicus*) and one of the green pheasant (*P. versicolor*), totaling 1,155 birds, were experimentally released on an area near Bellmont in Wabash County, March 2-April 12, 1963 and March 18-19, 1964. Bellmont is located about 85 miles south of the established pheasant range in Illinois. Counts of territorial cocks during May indicated that the breeding population of cocks totaled 21, 31, 21, 10, and 5, respectively, in the 5 years 1963 through 1967. Sex ratios (cocks per hen) among birds observed during May through August were 0.47 and 0.65 in 1963 and 1964, respectively, but increased to 2.73 in 1965. The number of broods located on the area was 52 in 1963, 52 in 1964, and 11 in 1965. Thus, the population rapidly declined after the releases were discontinued and was practically nonexistent by 1967. Evidence indicated factors that caused the population to fail were concerned more with survival of the birds than with reproduction. Of an estimated 2,091 pheasants released and hatched on the area in 1963 and 1964, only two per cent survived to May 1965. Sex ratios among birds observed or captured by nightlighting during October and early November indicated that hens experienced higher rates of mortality than cocks. Mean weights of juvenile cocks and of juvenile hens captured at Bellmont were similar to those characteristic of juvenile pheasants in the established range in east-central Illinois.

The exotic ring-necked pheasant (*Phasianus colchicus*) has been established throughout the northeastern third of Illinois for more than 30 years (Greeley et al. 1962:13-16). A census conducted in April 1963 indicated that this pattern of distribution has not changed materially in recent years (Labisky and Anderson 1965:-132). Numerous attempts to establish pheasants in the southern half of the state, by releases of birds, have failed (Leopold 1931:106; Ellis and Anderson 1963:238). Because pheasants are important game birds and are able to tolerate intensive land-use practices characteristic of modern farming, repeated attempts have been made to extend the range of these birds in Illinois.

This paper discusses the fate of a population of pheasants created by experimental releases of four strains of *P. colchicus* and one of *P. versicolor* in 1963 and 1964 on an area near Bellmont in Wabash County. The releases were made to test the ability of crosses among various species, subspecies, and strains of *Phasianus* to produce self-maintaining populations south of the established range. It was theorized that, through the mechanics of population genetics, a pheasant that would survive and reproduce in agricultural areas unoccupied by pheasants might develop if several species, subspecies, and strains

were released simultaneously. Releases of pheasants in this manner would increase variation of genetic material in the resulting population. In theory, the greater the genetic variation within the population, the greater the chances for producing a bird that would survive and reproduce under the existing environmental conditions. The releases at Bellmont initiated the second *multiple-strain* — or *gene pool*—experiment in Illinois, the first one being on an area near Neoga, Cumberland County, where pheasants were released from 1960 through 1963 (Anderson 1964*a*, 1964*b*, and unpublished data).

Release Area

The Bellmont Area occupies about 15 square miles of level to moderately rolling farmland in southwestern Wabash County, approximately 85 miles south of the contiguous pheasant range in Illinois. Soils are relatively young and fertile, generally dark in color, tile drained, and slightly acid to neutral (Smith and Smith 1937:19-26).

Ninety per cent of the release area is considered agricultural land. Corn, soybeans, and wheat collectively occupy about 75 per cent of the total land area annually; 10 per cent of the area is devoted to pasture and hay. Woodlots comprise the bulk of the nonagricultural land.

The climate in the vicinity of Bellmont is warmer and wetter than within the contiguous pheasant range in Illinois. Annual precipitation at Mt. Carmel, located 8 miles east of Bellmont, averages 43 inches; temperatures average 33°F during January and 79°F during July (Page 1949:115, 117, 283). As a comparison, Roberts, located in Ford County — the heart of Illinois' better pheasant range — receives an average of 33 inches of precipitation annually, and temperatures during January and July average 27°F and 76°F, respectively (Page 1949:115, 117, 260).

Methods

The following strains of pheasants were involved in the multiple-strain experiment at Bellmont:

Korean pheasant — Supposedly pure Korean ring-necked pheasants (*P. colchicus karpowi*, nomenclature by Delacour 1951:257), obtained from Korea by the Foreign Game Introduction Program sponsored by the U.S. Bureau of

Table 1.—Strains and Numbers of Pheasants Released at Bellmont, Illinois, in 1963 and 1964.

Strain	Year Hatched	Date Released	Number Released	
			Cocks	Hens
1963				
Wild-Illinois	Mixed[1]	March 2	14	0
	Mixed[1]	April 12	20	0
California	1962	March 22	0	54
	1962	April 3	0	300
Totals			34	354
1964				
Wild-Iowa	Mixed[1]	March 18	71	0
California	1963	March 19	0	500
Korean	1963	March 18	50	81
Green	1963	March 18	0	65
Totals			121	646

[1] Birds hatched the previous year and older birds.

Sport Fisheries and Wildlife, and propagated at Illinois state game farms.

California pheasant—Ring-necked pheasants (*P. colchicus*) originating from stock obtained from game farms located at Chico and Yountville, California (Ellis and Anderson 1963:226) and propagated at Illinois state game farms.

Wild-Illinois pheasant — Ring-necked pheasants (*P. colchicus*) captured from thriving wild populations in Ford and Champaign counties, east-central Illinois.

Wild-Iowa pheasant—Ring-necked pheasants (*P. colchicus*) captured from thriving wild populations in Union and Adair counties, southwestern Iowa.

Green pheasant—Supposedly pure northern green pheasants (*P. versicolor robustipes*, nomenclature by Delacour 1951:265), obtained from the island of Honshu, Japan, by the Foreign Game Introduction Program and propagated at Illinois state game farms.

Native pheasant — Birds hatched and reared on the release area, i.e., progeny of the introduced pheasants.

Pheasants released in 1963 were 34 wild-Illinois cocks and 354 California hens, resulting in a sex ratio of 0.10 cock per hen (Table 1). In 1964, birds of wild-Iowa, California, Korean, and green stock, totaling 121 cocks and 646 hens (0.19 cock per hen), were liberated.

The wild-Illinois and wild-Iowa birds had been captured by nightlighting (Labisky 1959). The wild-Iowa pheasants were held in large covered pens near Boone, Iowa, for about 3 months prior to their release at Bellmont. Wild-Illinois birds were retained in captivity for not more than 36 hours.

Wild-Illinois, wild-Iowa, and Korean birds were marked with numbered, plastic back tags (Labisky and Mann 1962) and aluminum, butt-end leg bands. Back tags were color coded according to origin of the birds and year of release. California and green pheasants, all hens, were marked only with leg bands. Because of their dark plumage, green hens were readily distinguishable from hens of other strains. All of the introduced pheasants were released onto the Bellmont Area directly from transporting crates. Most of the birds were in good physical condition.

Counts or estimates were periodically made of various cohorts of the population. During May, the number of territorial cocks on the area was determined by a combination of audio-censuses (Graham 1940:313) and visual observation. The sex ratio among adult pheasants observed from May through August was used as an index of the relative abundance of hens present during the nesting season.

The number of broods produced was determined by locating individual broods by direct observation and by keeping records of broods observed and reported by farmers. During June through August, all roads on the study area were driven during early morning and late afternoon to locate and observe broods and adults. The average number of chicks per brood was determined from observations for which the counts of chicks were considered to be complete. Chicks in broods were aged to the nearest week according to body size and development of plumage. Most of the pheasant nests examined were found and reported by farmers.

In 1963 and 1964, an index of the abundance of pheasants during the prehunt period (early November) was obtained by counting the number of birds flushed per truck-hour of nightlighting. Roosting cover (hayfields and wheat stubble) was systematically searched at night using a truck with a cluster of floodlights mounted on its top. Pheasants can be quickly found and, with the aid of a hooped net, captured with this technique (Labisky 1959:10).

In 1964, the prehunt population was estimated using the Lincoln Index; pheasants were captured by nightlighting during October and early November, marked with back tags and leg bands, and released in the fields where they had been captured. Subsequently, local farmers and sportsmen were asked to keep records of the numbers of marked and unmarked pheasants they saw while hunting on the area. This information provided three known values, from which the prehunt population was calculated using the simple ratio formula. The sex and age composition of the prehunt populations was determined from pheasants observed and captured during nightlighting. Captured birds were aged as juveniles (less than 1 year old) or adults by bursal examination.

Results

Counts of territorial cocks during May suggested that the breeding population of cocks increased from 1963

TABLE 2.—Status of the Pheasant Population at Bellmont, Illinois, 1963 through 1967.

	Month	1963	1964	1965	1966	1967
Breeding Cocks	May	21	31	21	10	5
Observed Sex Ratio: Cocks per Hen	May-Aug.	0.47	0.65	2.73	2.00	.....[1]
Chicks Produced	June-Aug.	468	468	99	.....[1]	.....[1]
Prehunt Population	October	556	239	.....[1]	.....[1]	.....[1]

[1] No data available.

to 1964, then steadily decreased through 1967 (TABLE 2). Sex ratios among birds observed during May through August indicated that hens were more abundant than cocks during the years pheasants were released, 1963 and 1964, but became relatively more scarce during the following years (TABLE 2). As the number of cocks per hen among pheasants released was only 0.10 in 1963 and 0.19 in 1964, this finding was not surprising. When the observed sex ratios were evaluated in conjunction with the counts of territorial cocks, it was apparent that the number of hens on the area each spring decreased at a drastic rate after 1964 (TABLE 2). Observations of pheasants during the summer months indicated that wild-Illinois and wild-Iowa cocks were more successful than Korean cocks in surviving at Bellmont (TABLE 3). Similarly, California hens apparently enjoyed better survival than did hens of the Korean and green strains (TABLE 3). Hens of the latter two strains, released in 1964, were not observed during the June, July, or August following their release. California

TABLE 3.—Number of Adult Pheasants Observed, Including Repeat Observations of Individual Birds, during May through August, 1963 through 1966, Bellmont, Illinois. Percent of the number released the preceding March or April is given in parentheses.

Strain of Pheasant	Cocks				Hens			
	1963	1964	1965	1966	1963	1964	1965	1966
Wild-Illinois	20(59)	0	0	0				
California					43(14)	43(9+)	2	0
California or Native[1]						54		
Wild-Iowa	.....	41(58)	5	1				
Korean	.....	10(20)	0	0	.....	2(2)	0	0
Green					.....	7(11)	0	0
Native	.....	24	25	5	.....	9	9	3
Totals	20	75	30	6	43	115	11	3

[1] In 1964, it was frequently impossible to distinguish between native hens and California hens.

hens, liberated in 1963 and 1964, were observed on the area through August of both years.

Five pheasant nests were found at Bellmont in 1963, 13 in 1964, and one in 1965. Six of the 19 clutches had been incubated and seven had not; the status of the other six clutches was undetermined. Three of the clutches had hatched. All five nests found in 1963 had been established by hens from California stock, the only strain of hen pheasant present that year. In 1964, the hens that established six nests were identified as California or native birds (evidence was insufficient to distinguish between hens of these two strains). Origins of the hens that established the other seven nests found in 1964, plus the one located in 1965, was undetermined. Korean and green hens were never associated with any of the nests found on the area.

The six incubated clutches examined contained an average of 11.7 ± 2.2 eggs. An average of 9.0 ± 2.0 hatched eggs was found in the three successful clutches. These data compare favorably with similar information reported for several areas within the established pheasant range in North America (Stokes 1954:27, 33).

The number of broods located at Bellmont totaled 52 in 1963, 52 in 1964, and 11 in 1965. In 1963, the only hens present to produce broods were those from California stock. In 1964, the origins of the hens that accompanied, and presumably produced, 16 broods were determined; 15 were California and one was a Korean. Twenty-seven of the remaining 36 hens were known to be either California or native birds (progeny of California hens and wild-Illinois cocks), but their exact identity was not determined. The origin of only one brood-producing hen was determined in 1965; she was a native.

Although green hens were never observed with any of the broods located on the area, two territorial cocks observed during April 1965 appeared to be green-ringneck hybrids. These cocks had reduced neck-rings (completely absent on ventral) and prominent green coloration on the lower portion of the neck; their calls were more high pitched than those of typical ringneck cocks.

The number of chicks produced (TABLE 2) was estimated by multiplying the number of broods located by 9.0 hatched eggs per successful clutch. Although the average of 9.0 hatched eggs was based on only three successful clutches, all found in 1964, this average is similar to those obtained on a release area near Neoga in Cumberland County in 1960 and 1961 (Anderson 1964*a*:259) and to those within the range occupied by self-maintaining populations of pheasants (Stokes 1954:33).

Ninety-two per cent (22 of 24), 56 per cent (22 of 39), and 25 per cent (1 of 4) of all adult hens observed between June 15 and August 31 in 1963, 1964, and 1965, respectively, were accompanied by broods. Considering the small sample sizes, these percentages are in the general range of those reported for established populations in Pennsylvania (Randall 1940:316), Ohio (Leedy and Hicks 1945:66), and Michigan (Shick 1952:22). The number of chicks per adult hen observed at Bellmont between June 15 and August 31 was 7.4 (177 chicks and 24 hens)

in 1963, 3.0 (118 chicks and 39 hens) in 1964, and 4.0 (16 chicks and 4 hens) in 1965. These findings suggest that surviving hens on the Bellmont Area were reasonably successful in producing chicks in 1963 and 1964. The data obtained in 1965 were too few to evaluate.

Averages of 7.5±0.3 chicks (average age 6.7 weeks), 5.9±0.2 chicks (average age 5.9 weeks), and 3.7±1.2 chicks (average age 6.0 weeks) were calculated for 21, 14, and 3 broods observed, respectively, in 1963, 1964, and 1965. One brood, containing six chicks 4 weeks old, was observed in 1966. On an area near Sibley in Ford County, near the center of abundance of pheasants in Illinois, averages of 5.2, 4.7, and 5.1 chicks were calculated for broods observed in 1963, 1964, and 1965, respectively (S. L. Etter, Illinois Natural History Survey, unpublished data). Therefore, it appears that, in general, the number of chicks produced per successful clutch and subsequent survival of chicks through at least their 6th week of life was not suppressed at Bellmont.

In 1963 and 1964, pheasants were observed and captured during the prehunt period (TABLE 4). The average numbers of birds flushed per truck-hour during nightlighting indicated that the abundance of pheasants on the area declined 43 per cent from early November 1963 to about the same period in 1964.

In 1964, the prehunt population was estimated to be 239 pheasants (46 birds marked during prehunt period × 83 birds observed by hunters ÷ 16 of the observed birds were marked = 239 pheasants). The sex ratio among all pheasants flushed and age ratios among cocks and hens captured (TABLE 4) indicated the 239 birds included 138 cocks (122 juveniles and 16 adults) and 101 hens (73 juveniles and 28 adults). This estimate of the sex and age composition of the prehunt population suggested that only 42 per cent (195

TABLE 4.—Population Data Obtained by Nightlighting Pheasants at Bellmont, Illinois, November 7-8, 1963 and October 19-November 5, 1964.

Type of Information	1963		1964	
Number of Pheasants Flushed				
Total	55		85	
Per Truck-hour	6.9		3.9	
Number of Pheasants Captured				
Total	38		51	
Per Truck-hour	4.8		2.3	
	Cocks	Hens	Cocks	Hens
Sex Composition of Pheasants Flushed	35	20	49	36
Age Composition of Pheasants Captured				
Juveniles	25	4	23	18
Adults	2	7	3	7

birds) of the 468 chicks estimated to have hatched on the area in 1964 survived to the following October. The estimate of 28 adult hens in the prehunt population indicated that less than 4 per cent of the 646 hens released in March 1964, survived to the following October. This exceedingly low survival of hens was unquestionably detrimental to the population.

The predominance of cocks among pheasants flushed by nightlighting (TABLE 4) was indicative of differential rates of mortality between the sexes during summer and early fall. Ratios of 1.75 and 1.36 cocks per hen occurred, respectively, among birds flushed in 1963 and 1964. The sex composition of juveniles captured was 6.25 cocks per hen in 1963 and 1.28 cocks per hen in 1964.

Age ratios, expressed as juveniles of both sexes per adult hen, were 4.1 and 5.9, respectively, among pheasants captured during the prehunt periods in 1963 and 1964 (TABLE 4). Such ratios are indicative of moderately high productivity.

Mean weights of juvenile hens captured in 1964 and of juvenile cocks captured in 1963 and in 1964 (TABLE 5) were similar to those characteristic of juvenile pheasants in established populations in Ford County (R. F. Labisky, Illinois Natural History Survey, unpublished data). Although the mean weight of juvenile hens captured in 1963 appeared to be subnormal, the small sample size seriously impaired validity of the data. No aberrancies were noted in the mean weights of adult hens, nearly all of which were of California stock (TABLE 5).

DISCUSSION

The findings suggest that pheasants were relatively abundant on the Bellmont Area in 1963 and 1964, the years of the releases, and relatively scarce thereafter (TABLE 2). Counts of territorial cocks indicated the population was, for practical purposes, nonexistent by 1967. Thus, the pheasants involved in the multiple-strain releases at Bellmont did not

TABLE 5.—Mean Weights, In Grams, of Pheasants Captured by Nightlighting during November 7-8, 1963 and October 19-November 5, 1964, Bellmont, Illinois. Sample sizes are in parentheses.

Sex and age	1963	1964	Both Years
Cocks			
Juveniles[1]	1,243±16 (25)	1,246±15 (18)	1,244±13 (43)
Adults	1,319±43 (2)	1,385±4 (3)	1,358±22 (5)
Hens			
Juveniles[1]	800±44 (4)	879±13 (9)	855±18 (13)
Adults	909±20 (7)[2]	929±18 (6)[3]	918±13 (13)

[1] All juveniles weighed were at least 15 weeks old as determined by progression of molt of the primary flight feathers.
[2] All were California hens.
[3] Five were California hens, and one was a native that weighed 935 g.

develop a bird during the relatively short period, 1963 to 1967, which was adapted to the environmental conditions that prevail in Wabash County.

Experimental releases, involving birds of California stock only, on this same area in 1957 and on another area, located near Neoga in Cumberland County, in 1956 had previously failed to establish pheasants in the southern half of the state (Ellis and Anderson 1963:238). The populations created by these releases declined to a relatively few birds within 3 years. However, releases at Neoga during the winters of 1959-60 through 1962-63, involving several different strains of pheasants, resulted in a small population that persisted at least to 1967 (W. L. Anderson, unpublished data). Thus, the multiple-strain experiment at Bellmont experienced a fate similar to those of the earlier experiments involving California birds only. In other words, the simultaneous release of five strains of pheasants on this area did not materially delay expiration of the resulting population.

The reasons that the multiple-strain experiment at Bellmont was less "successful" than the one at Neoga are obscure. However, the releases at Neoga were made during 4 consecutive years and involved 2,662 pheasants, as compared with 1,155 birds released during 2 consecutive years at Bellmont. It is possible these differences contributed to the differences noted in the fates of the two multiple-strain experiments. It is also possible that the factors preventing establishment of pheasants in southern Illinois are more severe at Bellmont, which is located 85 miles south of the established range, than at Neoga, which is only 20 miles south of self-maintaining populations. Finally, the releases at Neoga coincided with a period of increase in pheasant abundance throughout much of the established range of this species in Illinois, particularly in the east-central counties, whereas releases at Bellmont coincided with years of decline throughout much of the occupied range in the state.

Earlier studies (Ellis and Anderson 1963:238; Anderson 1964*a*: 263) indicated that the factors deterring the southward extension of self-maintaining populations of pheasants in Illinois are concerned more with survival of the birds than with reproduction. Findings of the present study tend to support this conclusion. Indices of reproductive success indicated that hens surviving at Bellmont were reasonably successful in hatching and rearing chicks to 6 weeks of age in 1963 and 1964.

The catastrophic rate of mortality that apparently occurred among pheasants at Bellmont was illustrated by the rapid deterioration of the population in 1965, the year after releases were discontinued (TABLE 2). Although 21 territorial cocks were located in 1965, the observed sex ratio (2.73 cocks per hen) indicated the number of hens was drastically reduced that year; it was believed the actual sex ratio was no less than one cock per hen in 1965. If this assumption is reasonably correct, only about two per cent of the 2,091 pheasants (1,155 birds released and 936 hatched) on the area in 1963 and 1964 survived to May 1965.

Sex ratios among pheasants flushed or captured by nightlighting during

the prehunt periods of 1963 and 1964 (TABLE 4) suggested that hens experienced higher rates of mortality than cocks. With the possible exception of juvenile hens weighed in 1963, no peculiarities were noted among mean weights of hens captured on the area (TABLE 5). However, body weight is by no means an absolute indicator of physical condition. Detailed physiological studies of pheasants subsisting on areas in southern Illinois could be highly rewarding in disclosing factors preventing the southward extension of pheasants in the state.

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