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PRELIMINARY REPORT ON PHEASANT STOCKING IN SOUTHERN ILLINOIS[1]

W. D. KLIMSTRA AND DONALD HANKLA
Southern Illinois University, Carbondale

Pheasants, *Phasianus* spp., were first introduced into the United States late in the 18th Century. The first populations were not well established until late in the 19th Century when the first shooting was permitted in Oregon (McAtee, 1945). Virtually every state has attempted to encourage the development of harvestable populations, but only 18 states have thus far been successful.

The 37° parallel appears to be the approximate boundary of its southward distribution (Christisen, 1951). Many postulations have been offered as to the factors responsible for this limitation, but few of these have been carefully examined. Yeatter (1950), studying the effects of preincubation temperatures, suggested that probably air temperatures during egg laying were an important influence. He further suggested that two or more western populations, thriving considerably south of the distribution in the remainder of the United States, might be largely of a more southern Asiatic origin, being more tolerant of higher temperatures.

The objective of the present study was to make detailed observations of the survival and reproduction of released game-farm pheasants in southern Illinois. It was hoped that further insight into factors limiting their present distribution might be obtained.

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An opportunity to begin the investigation came in 1950 when the State Department of Conservation liberated pheasants in early April on two localities of the Crab Orchard National Wildlife Refuge. Six weeks later, observations were begun on about 100 acres where 300 birds had been stocked in ratios of five hens to one cock. The birds had dispersed widely and offered little opportunity for detailed observations.

To eliminate the dispersal factor and to facilitate careful observation of released birds, a study was undertaken in 1951 and continued in 1952 on an island in Crab Orchard Lake, located in the Crab Orchard National Wildlife Refuge. Birds were supplied by the Illinois Department of Conservation from the Mt. Vernon Game Farm. Some 22 and 27 birds were released in April, 1951, and February, 1952, respectively. Sex ratios were approximately one male to five females. Prior to liberation all birds were pinioned by removing the manus according to the Van den Akker (1947) method.

The release island, consisting of seven acres, contained an abandoned peach (*Prunus persica*) orchard of which one-fourth was undergrown to a relatively heavy stand of broomsedge, *Andropogon virginicus*. The remainder of the orchard contained isolated clumps of broom-sedge, scattered stands of Korean lespedeza,

Lespedeza stipulacea, blue grass, *Poa pratensis*, dewberries, *Rubus* sp., coralberry, *Symphoricarpos orbiculatus*, and several miscellaneous herbaceous plants in lesser abundances. The west and south edges of the island were covered with a dense stand of shingle oak, *Quercus imbricaria*, honey locust, *Gleditsia triacanthos*, and red elm, *Ulmus rubra*, thirty to fifty feet in height. A small pond surrounded by black willow, *Salix nigra*, was located in the center of the island. The mainland was approximately 100 yards from the island at the closest point. No predaceous mammals were resident on the island during the study and no sign occurred to indicate visits. During the summer fishermen and bathers occasionally used a small sandy beach.

To insure a constant food supply, shelled corn was scattered under fruit trees that were well distributed over the island. The birds ate the corn, native seeds, and succulent vegetation, as was shown by crop contents of dead birds.

Behavior

Behavior of the birds during the first few days following liberation paralleled that observed at the game farm. Little evidence was noted of fear reactions or of attempts to remain in cover. By the tenth to fifteenth day, however, they appeared to have become more wary, staying closer to cover, but failed to exhibit a great degree of wildness at any time.

In 1951, three males were noted to have established territories and "crowing areas" on three opposite corners of the island. Each used a site which included a canopy of trees and was relatively free of ground vegetation. Individual cocks could be identified by tracks in the loose soil, having been individually toe clipped for this purpose. Crowing was heard largely in early morning and on three occasions, hens were noted moving toward, or were with the cocks at this time. These observations reflected the findings of Baskett (1947) for northern Iowa.

Mortality

During the initial observations on the mass releases in 1950, 43 carcasses and ten living birds were found. The bulk of the dead birds were within 80 rods of the point of liberation. The condition of the remains indicated that mortality had occurred shortly following release. It was not possible to evaluate factors responsible for the losses.

In 1951, two hens were lost from pinioning immediately following the release on April 27. No further evidence of loss was noted until June 15 when three dead hens were found showing no apparent signs of predation. By July 15, a total of nine dead birds had been found; however, field evidence indicated that the loss was probably 12 to 14 birds. The last living birds were observed on September 10, and, by October 1, no further sign of them was in evidence.

One cock and one hen were lost from pinioning in 1952 immediately following their release on February 22. By March 10th, 11 had been lost and by April 1 the loss had reached 18 birds. Following June 10, no further sign of pheasant was found.

Factors responsible for the 1951 losses were largely undetermined, but predators (avian) were not believed important. Most birds showed no signs of injury, were in good flesh, and had food in the crops. The manager of the Mt. Vernon Game Farm reported mortality in the laying flock from an undetermined cause. Possibly the same factor may have produced losses among the experimental birds. Crows, *Corvus brachyrhynchos,* were secondary predators.

Observations in 1952 indicated that the predatory marsh hawk, *Circus cyaneus hudsonius,* was responsible for a high rate of mortality. On three occasions, these predators were observed attacking pheasants. They dove at the birds, slashed them across the back or head with their talons, but made no attempt to feed on them. Such injured or dead birds were found under vegetation where it appeared that they had attempted to hide after being injured. These hawks were daily in evidence over and around the island in numbers of one to four. Eighteen losses were attributed to their activity. The fact that the 1952 releases were made during hawk migration may have attracted and held the marsh hawks to this limited area. The later liberation in 1951 possibly avoided this concentration.

Nesting

Eighteen pheasant nests were found on the 100-acre area in 1950, but only one of these indicated a successful hatch. Six of the remainder contained undisturbed eggs and the others showed evidences of predation. The deserted clutches had an average of 7.9 eggs. Examination of these showed an advance stage of desiccation so that field determination could not be made regarding embryo development. It was not possible to determine the nature of the predation, or whether it was a primary or secondary factor. A brood of six was observed in this area the first week in July. Observations in October indicated that possibly eight to twelve birds were in the area.

In 1951, because of the delay in starting the project, egg laying had already started when the birds were released. As a result, first evidences of laying were "dropped eggs." The earliest nest was believed established three or four days following the release. The last nest found was started around July 16.

Most nests were well constructed, having a lined bowl. Few nests had a canopy but were well concealed from all sides. Eighty per cent of the nests were in broom-sedge, situated between clumps of the vegetation, where natural depressions and nest lining materials were found. Heavy stands of this grass were used only at the edges or where thinnings were in evidence. The remaining nests were in miscellaneous weedy vegetation. Ninety-two per cent (18) of the nests of pheasants released on the unrestricted area of the Refuge in 1950 were located in thin to moderately heavy stands of broom-sedge.

Eleven completed clutches of the island birds ranged in size from six to 18 eggs, showing an average of 9.7 eggs. The first four clutches, however, had an average of 15.5 eggs, indicating that these nests were possibly the efforts of more than

one bird although initial clutches may occasionally be that size.

Of the nests in 1951, 87.5 percent (14) were unsuccessful. Ten of the 14 deserted nests were believed to have resulted from crow and turtle predation. Turtle droppings examined during May 20 to June 25 revealed a 63 percent occurrence of pheasant egg shells. On two occasions these reptiles were observed in the nest, destroying the eggs. Crows were thought directly responsible for the loss of four nests and were secondary factors in at least three others. Desertion of the remaining four nests was attributed to the fact that they were compound clutches with no single hen as the sole incubator. In one instance, two different hens were identified attempting to incubate a single clutch at separate intervals. The two successful clutches produced a total of nine young from 17 eggs. In 1952 only one clutch of six eggs was found and it was believed deserted because of the hen's death. No attempt was made to evaluate renesting, but some such attempts probably occurred in 1951.

In 1951, 43 eggs, representing deserted clutches, unhatched eggs in successful clutches, and "dropped eggs," were examined for fertility and embryo development. Of these, 19 were classified as fertile, 6 infertile, and 18 were beyond field identification. The six eggs from the deserted clutch of 1952 were fertile. When examined, all fertile eggs contained dead embryos of a very early stage. It was entirely possible that several or all of the 18 undetermined did likewise. Temperature may have been a factor, as reported by Yeatter (1950). The infertile eggs were all found in a single nest, established on July 3, at a time when only one cock was known to be left on the island, which may account for the infertility of the eggs.

The results of the present study were doubtless influenced by the concentration of birds in a limited area, by the game-farm origin of the birds released, and by clipped wings. Increased predation, compound clutches, and intra-specific strife could well be associated with a high density. Predation on both adults and eggs must be viewed as somewhat extraordinary. Findings of Scott (1947) in Iowa indicated that fox predation was proportionately greater in marginal habitats with low pheasant populations than in good habitats with high populations. Game-farm birds would be less suited to survive than wild birds because of necessary adjustments required of them when liberated. However, so limited a study reveals the severity of the limiting factors that are imposed on a species when so far outside its established range, even when given partial protection from environmental limitations. It further indicates that not single factors, but probably a combination of several are important in evaluating the limitations imposed on stocked birds, particularly when planted beyond the fringe of their established range. When limitations are exerted on the reproductive potential of a species, they are extremely effective. The evidence of dead embryos and the loss of breeding stock suggests that these at present had the greatest influence on success.

Although the present data do not

support it, it seems reasonable that a selective breeding program might develop birds suited to conditions in southern Illinois. Such a program would logically begin with birds already adapted to more southern areas, such as those in southern California or from southern extremes in their Asiatic home. Large isolated enclosures containing natural conditions would be necessary. Rigid protection would be required to insure existence of selected birds for breeding. The practicality of such an expensive program might be questionable.

In connection with the development of a pheasant adapted to southern conditions, the compatability of pheasants and quail, *Colinus virginianus,* needs to be evaluated. It would be unwise to establish a game bird which would compete with another desirable species. Errington's (1945) studies in Iowa suggested that in winter, particularly, pheasants were present at expense of the bob-whites.

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