Ten quail were trapped live and removed from the Area in the Fall of 1959, and two were removed the following Spring. Approximately four were frozen or otherwise killed in traps in addition to these.

Thirteen roosts were noted and recorded in the Fall of 1959, and seven were noted in the Spring of 1960, while ten were seen in the Spring of 1962. Others were seen during the course of other activities on the Management Area but were not recorded because of the possibility of duplication. No special emphasis was placed on discovery of roosts, and undergrowth in many instances made them difficult to find. No dead birds were found, and evidence of predators was almost nil.

Hunting is permitted on most of the adjoining lands, and birds from the Management Area have helped to provide a fairly good measure of the sport. As a result, hunting pressure on these lands has increased significantly during the past several years, taking a toll from marginal coveys. However, no measure of the hunting pressure or the kill on adjoining property is available at this time.

SUMMARY AND CONCLUSIONS

The quail population of the Kleber Wildlife Management Area encompassed eleven coveys in the Fall of 1959, compared with three coveys in 1954. It decreased to seven coveys in the Fall of 1960, probably due, in part, to severe snows, but increased to nine coveys in the Fall of 1961.

Six coveys were found in the Spring of 1960 and five in 1961, while seven coveys were found in the Spring of 1962, though the average number of birds was smaller. Increased hunting pressure on lands adjoining the Area has come about at least partly as a result of marginal quail from Kleber. This would tend to account for a decrease of 18 birds from the Spring of 1960 to the Spring of 1962, and is very possibly due to perennial plantings near the borders of the Area which help provide late winter food but do not tend to prevent egress of quail into adjoining lands.

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BREEDING CHARACTERISTICS OF SOUTHEASTERN MISSOURI COTTONTAILS *

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The purpose of this paper is to describe breeding characteristics of cottontails in southeastern Missouri during the 1962 season, with special reference to synchronous breeding. This phenomenon has previously been suggested by Schwartz (1942) for north-central Missouri cottontails, and fully documented by Conaway and Wight (1962) and Wight and Conaway (1962), also for cottontails of northern Missouri.

* Contribution from the Missouri Cooperative Wildlife Research Unit, University of Missouri, Columbia; and the Gaylord Memorial Wildlife Laboratory (University of Missouri and Missouri Conservation Commission, cooperating), Puxico, Missouri. Thanks are due the Conservation Department. Olin Mathieson Chemical Corporation, East Alton, Illinois, for special assistance; and to T. S. Baskett, C. H. Conaway, J. P. Rogers and N. R. Holler for advice and assistance in collecting.

Collections were made in the portion of Stoddard County, Missouri, that is bounded on the west by the Missouri Ozarks and on the east by the eastern edge of Crowley's Ridge. The soils of the area have low to medium fertility, but neither the poor soils of the Ozark uplands nor the most fertile soils of the Mississippi lowlands were included.

The total period of collection extended from December 1, 1961 through September 15, 1962; 455 rabbits of both sexes were collected. Intensive collection was begun on February 1, 1962 in order to determine the onset of breeding and time of first littering. Intensive collecting was continued through the remainder of the breeding season and terminated in September.

Conception dates were determined by measuring the embryos and back-dating in the manner described by Schwartz (1942). Conception dates for preimplantation pregnancies were included (Wight and Conaway, 1962).

RESULTS

Breeding began in early February and reached a peak around February 14 (Fig. 1). This was followed approximately 28 days later by a peak of similar magnitude and duration. For the next 3½ months there prevailed a similar pattern of breeding activity, indicated by peaks of conception dates separated by periods of 26-28 days. After July 1, no definite pattern could be discerned. The periods of 26-28 days separating the peaks evidently correspond to the gestation period for Missouri cottontails, based on direct observations by Marsden and Conaway (1963) and suggested by Schwartz and Schwartz (1959).

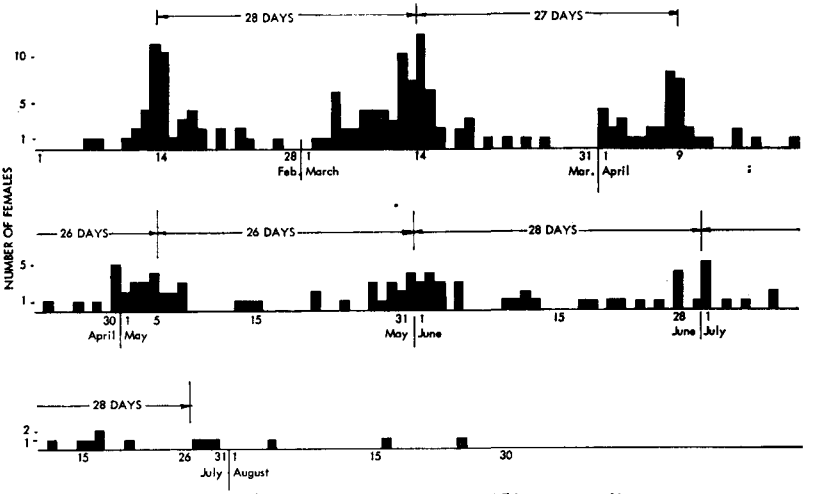

Fig. 1 Conception patterns for 253 cottontails.

The group of females comprising the peak of conceptions centering on February 14 consisted entirely of those bearing their first litters of the year. The next peak, 28 days later, was composed of another group of females bearing their first litters of the year, plus a group of females bearing their second litters. The remaining females (Fig. 1) were bearing litters subsequent to the second, except for two pregnant juvenile females collected late in the season.

The spacing of the peaks at intervals equal to the gestation period would suggest that the females of this cottontail population were experiencing a postpartum estrus such as suggested by Bruna (1952), and observed by Marsden and Conaway (1963) in a penned population of Missouri cottontails. Thus, it seems reasonable to suggest that six or even seven litters per year may be produced by a single female in southeastern Missouri. The evidence for a seventh litter is not conclusive since it is based on only five pregnant females.

That first conception dates of cottontails in northern Missouri do not show normal distribution has been well established by Conaway and Wight (1962: 280) who wrote, "Conception dates for the first pregnancy of many populations, however, do not show a normal distribution around a median date but are distributed discontinuously around two or even three dates." In the present study of southeastern Missouri cottontails, conceptions for the first pregnancies were distributed around two dates: February 14 and March 14.

The significance of these observations lies in establishing the fact that the synchronous breeding which Conaway and Wight (1962) demonstrated for northern Missouri is also well defined in a population in southeastern Missouri.

In both cases it appears quite evident that once breeding has begun, it proceeds in a rhythmic pattern determined by the length of gestation.

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EFFECTS OF COTTON PESTICIDES ON WILDLIFE: A PROGRESS REPORT *

By DENZEL E. FERGUSON, JIMMIE L. TISDALE, RAMON L. CALLAHAN and GWEN A. CATCHING

Pesticide use in modern agriculture has attained proportions difficult to comprehend. Rudd and Genelly (1956) estimated that 14,088.6 tons of the major pesticides were used in California alone in 1955, and the trend has been for increased use of agricultural chemicals. An excellent review of the problems produced by modern pesticide use has been prepared by the conservation committee of the Wilson Ornithological Society (Hickey, 1961). Few areas surpass the cotton growing region of the southern United States in duration of heavy pesticide utilization and annual consumption of these chemicals.

Many reports have appeared describing effects of control measures directed at a particular insect pest where operations, though extensive in area, are relatively short-term for a given locality. For example, many types of forest insect control have involved only a single annual application of 1 lb. of DDT per acre. However, most insecticides used are applied, not in these isolated control programs, but rather in systematic crop protection campaigns. Surprisingly little study has been devoted to the long term consequences of multiple insecticide applications, repeated year after year. The present report of progress made in an initial year of study deals with the latter problem. Objectives were: (1) to examine tissues of animals from cotton fields and cotton field borders for presence of insecticide and insecticide residues; (2) to relate these findings to animal behavior, reproduction or population fluctuations.

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