

SUMMARY

Wood ducks can be successfully trapped using any one of several methods and techniques. Bait trapping is the most universally used and accepted method because of its adaptability to a wide variety of situations. Roost trapping can result in a large number of ducks being trapped with a minimum of effort; however, its use is limited to the fall and winter seasons and to special roosting situations. Various State and Bureau personnel are making experimental use of methods which involve the capture of ducks with the aid of a retriever and with dip nets.

Success in trapping wood ducks hinges upon man's persistence and ingenuity. Trappers who have had success state that their secret is to "think like a duck" and try new methods if known procedures do not work. An outstanding example of this was at the Okefenokee National Wildlife Refuge, where little trapping success was realized until sliced white potatoes were used as bait.

REFERENCES

- Eadie, John R.—Wood Duck Bait Trapping Techniques, Region 4 Bureau Conference Paper 1963 (unpublished).
Nelson, Harvey K. and William E. Green—Wood Duck Banding—North Central Region, Technical Section, Mississippi Flyway Council, 1962.
Williamson, N. F.—Roost Trapping Wood Ducks, Region 4 Bureau Conference 1963 (unpublished).
Administrative Report No. 15—Roost Trapping of Wood Ducks, Migratory Bird Populations Station, Laurel, Maryland.

NOTES ON COTTONTAIL RABBIT STUDIES IN MISSISSIPPI

BY LOUIE P. HEARD

Mississippi Game and Fish Commission

Figures given me not too long ago by Mr. Harold Murphy, Secretary of the Pearl River Beagle Club of Jackson, Mississippi, speak for the popularity of the cottontail rabbit. He told me that, "From the field trial standpoint there were 497 organized beagle clubs in the United States at that time. Twelve of these clubs are in Mississippi with their membership owning an estimated 3,000 pedigreed beagles. Only five clubs existed in the state 10 years ago." This increased interest in the sport of beagling is also apparent from the requests we receive from hunters throughout the state about cottontail management. In order to give recommendations dealing with local conditions and to further promote the sport of rabbit hunting, the Mississippi Game and Fish Commission initiated the cottontail study upon which this report is based.

The study was begun in July 1959, and some phases are still in progress. Objectives were to determine as much as possible about the life history and needs of the cottontail with additional phases aimed at habitat improvement on small areas.

Location and Description of Area

The study area is located in Copiah County in the southwest portion of Mississippi. The forest type is shortleaf-loblolly and upland hardwoods while the typical ground cover is broomsedge grass (*Andropogon sp.*). Loessial clay of low fertility constitutes the soil type.

Methods

Data have been collected several ways. A 100-acre study area was established on the Copiah County Game Area. One hundred permanent trap sites were located on a grid system and the area was type-mapped in detail.

To supplement trapping data, collections on the game area were examined for litter sizes and internal and external parasites. Most

TABLE 1. PARASITIC INFECTION RATE OF COTTONTAIL RABBITS
IN SOUTHWEST MISSISSIPPI *

NAME OF PARASITE	RATE OF INDIVIDUAL RABBITS AFFECTED		RATE OF INFECTION BY INDIVIDUAL PARASITE		IMPORTANCE
	SUMMER	WINTER	SUMMER	WINTER	
<i>Haemophysalis leporis-palustris</i> Rabbit tick	High	Low	Medium	Low	Transmit tularemia
<i>Citotœnia ctenoides</i> Rabbit tapeworm	High	High	High	High	Rabbits apparently suffer no ill effects.
<i>Cuterebra cuniculi</i> Botfly larvae	Low	Low	Low	Low	Apparently lowers resistance of rabbits. Causes many hunters to discard good meat.
<i>Cysticercus pisiformis</i> Larval stage of dog tapeworm	Low	Low	Low	Low	No apparent effect on rabbit. Dogs may become infected when allowed to eat infected rabbit.
<i>Cedipsylla cuniculi</i> Rabbit flea	High	High	Low	Low	May transmit diseases
<i>Ceratophyllus multispinosus</i> Plague flea of rabbits	<i>cuniculi</i> and <i>multispinosus</i> not differentiated				
<i>Dirofilaria immitis</i> Filarial nematode of rabbits	Low	Low	Low	Low	Same as above
					Unknown

* Parasites were identified by Dr. James W. Ward, University of Mississippi Medical Center, Jackson.

collected rabbits were aged by the eye lens technique as described by Lord (1959). A few lenses were damaged during collecting and were not suitable for aging. No collections were made within approximately one-half mile of the trapping area until the winter of 1962-1963. The area was then control-hunted intensively with a pack of seven beagles. During this hunting, the run and point of kill of each rabbit jumped were plotted on a grid map of the area. Cover types were then superimposed on the grid map. Trap records were then compared with hunting records to study the use of certain cover types.

Efforts were made to estimate the December population of the 100-acre study area by Lincoln's Index. Shortcomings of this method through loss of rabbits and an unfenced area are recognized. The probable rate of loss of the estimated population was determined by computing the decline in trapping success during December, January, and February, a period when trapability of rabbits should be at least consistent, if not increasing, because of food conditions.

Discussion of Results

Breeding. In other parts of the cottontails' range there is evidence that breeding and parturition occur in peaks throughout the season (Schwartz, 1942, and Wight and Conaway, 1962). Examination of 51 visible pregnancies and backdating of these embryos indicated synchronized breeding also in Mississippi cottontails. It was not determined how persistent these peaks were during the entire breeding season. The onset of breeding began in early February in 1962. During this study one of two females trapped in September was determined pregnant by palpating and the other female was lactating. This was the latest breeding activity noted.

An average litter size of 3.50 ± 1.02 was computed from 48 embryonic examinations and seven active nests. The largest potential litter observed was seven embryos of which two were being resorbed. Only one other case of resorption was found. The smallest potential litter encountered was two. This litter size data is in agreement with the findings of several other investigations listed by Barkalow (1962) as to reduced litter sizes in the southern portion of the cottontails' range. Whether this reduced litter size is nutritional, latitudinal, or a combination of factors, is not known.

Minimum home ranges of 12 males averaged 3.9 acres while six females' ranges averaged 2.9 acres as shown by trapping.

Parasites. Four ectoparasites and three endoparasites, other than the common chigger, were isolated. These parasites presented in Table 1 consisted of one species of ticks, the common rabbit tapeworm, and the botfly larvae. Other infestations included the larval stage of the dog tape worm, two species of fleas, and a filarial nematode of rabbits. This is the first reported instance of this nematode in wild rabbits in Mississippi, according to Dr. James W. Ward of the University of Mississippi Medical Center. Dr. Ward identified all parasites listed in this paper. Morgan and Hawkins (1960) stated that this nematode is located under the skin in the lumbar region, inside of the tarsus or in the subcutaneous tissues of the fore and hind legs. It has been found in wild rabbits from Oklahoma, Pennsylvania, Virginia, North Carolina, Minnesota, Washington, and Wisconsin. The degree of infestations by parasites found during this study appeared to have no adverse effects on the rabbits.

Population Turnover. Forty rabbits were tagged the first year of trapping. The second year trapping was inactive. Thirty-nine rabbits were tagged on the 100-acre study area the third year. One male rabbit was retrapped after a time lapse of two years. It was recorded as an adult when first trapped. The collection mentioned in *Methods* was made in the third year during the latter part of January, February, and the first week in March. Age ratios of 126 rabbits were as follows: Young of the year — 72 per cent, two-year olds — 20 per cent, and three years, or older — eight per cent (Figure 1).

greatest factor, however, may be in the continuous loss of rabbits as expressed by a reduction in trapping success. The average number of rabbits caught per 100 trap-nights during December, January, and February of two winters were:

	<i>December</i>	<i>January</i>	<i>February</i>
Rabbits	<u>58</u> = 3.3	<u>19</u> = 1.0	<u>11</u> = 0.8
	1750/100	1850/100	1300/100

If this decrease in trapping success of 79 per cent is indicative of a corresponding population decrease, 36 of the computed 46 in December would be lost by March 1, leaving a breeding stock of about 10, or one rabbit per 10 acres.

Rabbits jumped during trapping operations, records of predation, and trap records during the first and third years of the study indicated that there was little difference in the fall numbers of rabbits on the area. Intensive, controlled hunting of the area this past winter, 1962-1963, gave the opportunity to check on the 79 previously tagged rabbits and to also estimate the population by this method. Twenty-one hunts were staged on the 100-acre area from late November, 1962, through mid-February, 1963. There were 120 man-hours and 504 dog-hours spent during these hunts. Twenty-nine cottontails were taken by hunters and dogs and five were known to have been removed by other means for a total of 34 rabbits. Rabbits were not shot on the initial jump even though some could have been at that time. If a rabbit left the area at any point during the chase it was counted only as one-half rabbit using the area for the purpose of estimating harvested rabbits per acre. A reduction of six was made by this method leaving the total harvest at 23, or one rabbit per 4.3 acres. Of the 79 that had been tagged the first and third years, only one was killed that had apparently been tagged. This rabbit exhibited a neat hole in the area of the ear where tags were placed. A check of the epiphyseal groove of 27 of the harvested rabbits showed 19, or 70 per cent, to be juveniles. Shortly after hunting, firelanes were constructed and about 50 per cent of the area was burned in checker-board fashion (Plate 1). The remaining unburned blocks were "brushed out" by several "beaters" in a line. Eight rabbits were flushed. The number of rabbits known to have been using the area the fourth year (42) is comparable to the huntable number that was estimated the previous hunting season (46). This indicated that the population when not hunted was apparently reduced by other decimating factors, a basic concept of small game populations management. It also points out the futility of cottontail restocking.

Use of Various Cover Types. It is not clearly understood just what part large expanses of broomsedge grass plays in cottontail habitat. This plant in almost pure stands makes up the ground cover on many idle acres in Mississippi. Trap records revealed that broomsedge grass was used sparingly for cover while a combination of weeds, various grasses, drainage areas of hardwood brush and briars were highly attractive to the cottontails (Table 2). Plotting of the jumps and runs of rabbits during hunts gave essentially the same results (Fig. 2).

TABLE 2. RABBITS TRAPPED BY TYPE DURING A
THREE-YEAR TRAPPING PERIOD THAT
INCLUDED OVER 10,000 TRAP-NIGHTS

TYPE	NUMBER TRAPS BY TYPE	NUMBER RABBITS BY TYPE	INDEX*
Old field (weeds and various grasses)	32	54	1.68
Drainage areas (hardwood brush and briars)	11	17	1.54
Scattered pine and broomsedge	57	48	0.84

* This figure represents rabbits trapped per acre by type and includes retraps.

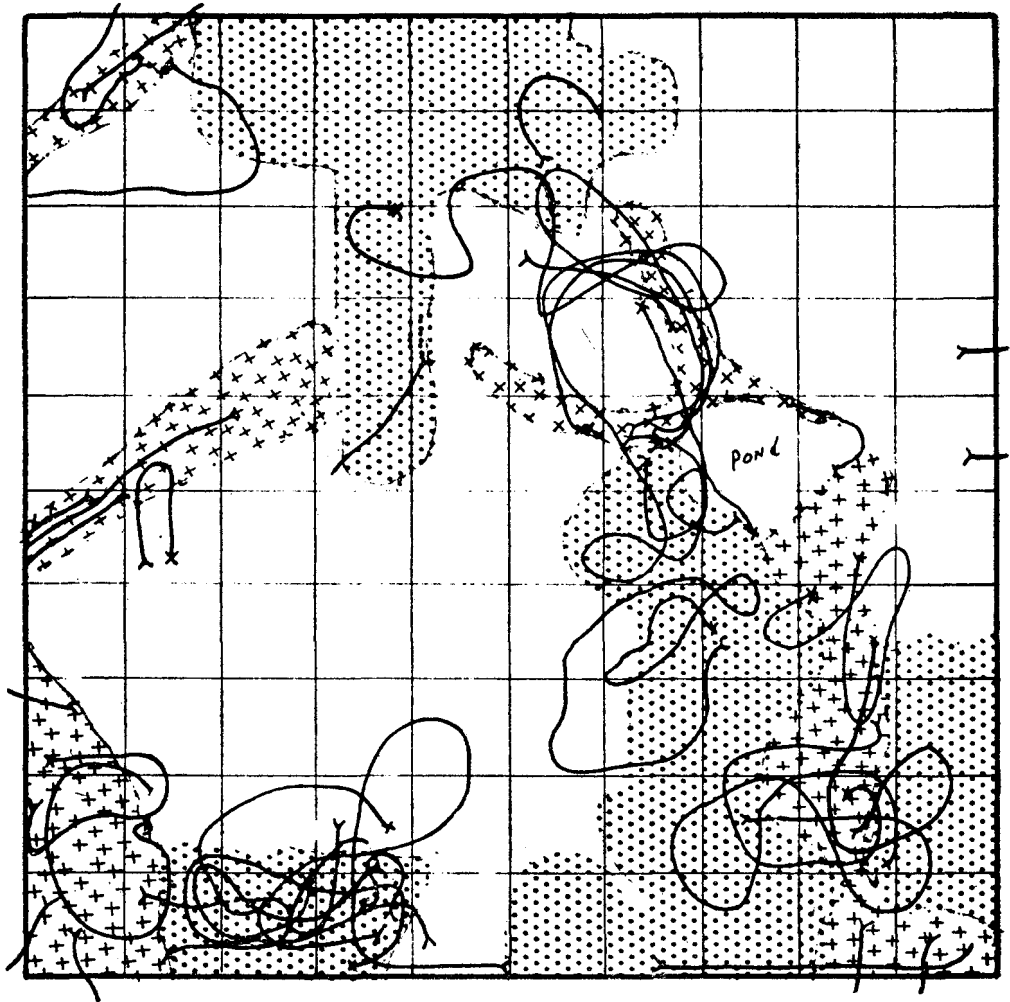


Figure 2.

- | | |
|--|--------------------------------------|
| | Old field (weed and various grasses) |
| | Bottom areas |
| | Open pine and broomsedge |

A PLOTTING OF THE RUNS OF COTTONTAILS BEING PURSUED BY BEAGLES ON A 100-ACRE PLOT.



Plate 1. The area was checkerboard burned before censusing. Eight rabbits were flushed after intensive hunting, and other known factors removed 34 rabbits. (Photo by Bill Turcotte and St. Clair Tompson)

With the idea of establishing attractive cover in the broomsedge grass type, earthen mounds approximately 20 feet square and three feet high were constructed by bulldozing. It is believed that such mounds will form desirable cover patches instead of reverting to broomsedge within two to three years as on disked areas.

Three mounds in a pilot study last year received heavy utilization by rabbits as indicated by pellets and cutting of plant material. This spring, 1963, fifty (50) mounds were constructed. Twenty-five mounds were fertilized and check-plots for determining utilization were established. Construction cost was about one dollar apiece but would vary with spacing of mounds. Up to 15 different plant species are found on some mounds and a romping area is created for rabbits by construction while a well-drained nesting area is also provided. Rabbits might well be attracted to the change in elevation. If this be the case, then one could expect to flush it there more often than not. At this time results look promising for the use of such mounds on small areas managed intensively for cottontails.

SUMMARY AND CONCLUSION

This study was designed primarily to study the life history of the cottontail rabbit in Mississippi, with additional phases aimed at habitat improvement on small areas. Trapping and tagging on a 100-acre area was supplemented by collections. Breeding is known to occur from early February into September. The average litter size of 55 samples was 3.50 ± 1.02 and synchronized breeding was indicated. Minimum winter home ranges of 12 males averaged 3.9 acres while six females averaged 2.9 acres. Seventy-nine rabbits were tagged the first and third years of the study. Only one was killed during intensive hunting of the area the fourth year. Age ratios of 126 rabbits collected in late winter were: young of the year — 72 per cent, two years old — 20 per cent, and

three years or older — eight per cent. The harvested number of rabbits known to have been using the area the fourth year was comparable to previous fall populations indicating that before intensive hunting took place rabbits were removed by other decimating factors. The broomsedge grass type was used sparingly in relation to weeds, various grasses, bottom areas of briars, and hardwood brush. A study is now underway to determine the usage by rabbits and the feasibility of construction of earthen mounds for long-lasting desirable habitat.

ACKNOWLEDGMENTS

I wish to thank Mr. W. H. Turcotte for his suggestions during this study and for producing the slides. I am grateful to Mr. John H. Phares who supervised this study and assisted in ways too numerous to mention here. Appreciation is extended to other members of the staff who gave special aid in preparation of this paper.

LITERATURE CITED

- Barkalow, Frederick S., Jr., 1962. Latitude related to reproduction in the cottontail rabbit. *Jour. Wildl. Mgt.* 26 (1):32-37.
- Lord, Rexford D., 1959. The lens as an indicator of age in cottontail rabbits. *Jour. Wildl. Mgt.* 23 (3):358-360.
- Morgan, B. B., and Hawkins, P. A., 1960. *Veterinary Helminthology*. Minneapolis, Minn. Burgess Pub. Co. 400 pp.
- Schwartz, C. W., 1942. Breeding season of the cottontail in central Missouri. *Jour. Mamm.* 23 (1):1-16.
- Wight, Howard M., and Clinton H. Conaway, 1962. Determination of pregnancy rates of cottontail rabbits. *Jour. Wildl. Mgt.* 26 (1):93-95.
- Davis, D. E., 1960. Estimating the numbers of game population. Sec. (5) in *Manual of Game Investigational Techniques*. Ed. by Henry S. Mosly. The Wildlife Society.

UTILIZATION OF DOMESTIC FORAGE CROPS BY DEER AND WILD TURKEYS WITH NOTES ON INSECTS INHABITING THE CROPS

BY

LLOYD G. WEBB

*South Carolina Wildlife Resources Department
and
Clemson College*

INTRODUCTION

This study was initiated in 1959 to determine the availability and utilization of various domestic forage crops when planted in food plots for deer and wild turkeys. Included in the tests were plots of Ladino Clover, giant white Dutch Clover, Dixie reseeded Crimson Clover, Kentucky 31 fescue grass, Chapel Hill rescue grass, perennial rye grass, oats and wheat.

An additional study was initiated on the same plots upon realization that some older food plots were being utilized by wild turkeys during the summer months without any apparent sign of the crops being grazed. The objectives of this phase of study were to determine the numbers and kinds of insects available on each of the forage crops during the summer months when insects are so prevalent in the diet of young turkeys.

The study areas were located on lands belonging to Clemson College which, along with the South Carolina Wildlife Resources Department, is a joint sponsor of the Clemson Wildlife Management Research Project.