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An important phase of cottontail management is estimation of the populations. The accuracy of methods used to determine the numbers may be increased with greater knowledge of the effects of weather conditions on cottontail activity.

The effects of temperature on cottontail activity have been observed by several investigators. In Michigan, Allen (1939) found that females tended to use burrows at temperatures of 10° F. Linduska (1947) reported the use of dens by cottontails in southern Michigan to be three times as great at temperatures of –8° to +12° F. as when the temperature ranged from 12° to 32° F., and that females were more inclined to use dens than were males. In Wisconsin, Hanson (1944) found no correlation between temperature and the number of cottontails trapped per night, the correlation with barometric pressure not significant, and cloudiness, precipitation and wind direction showing no relationship to the number of rabbits trapped per night. Crunden (1954) reported more rabbits trapped during periods of rising or falling barometric pressure than during periods of constant barometric pressure.

During the winter of 1955-56 two areas on the Decatur County Quail Research Area in southern Iowa were selected for investigation of the behavior of Mearns cottontail (*Sylvilagus floridanus mearnsii*). The areas, each of about 60 acres and designated Areas A and B, were about five miles apart. Woody cover of gully borders and field edges with tall trees, shrubs, vines and herbs occupied about one-third of each area. Hand-picked corn, weedy oat stubble, Korean lespedeza and weeds of fallow ground composed the remainder of vegetative cover.

Readings of temperature, relative humidity, nebulosity, wind direction and velocity, and types and amounts of precipitation were made morning and evening and before each line count.

Live-trapping and walking line-count observations were used to measure cottontail activity. The live-trapping was done with 20 wooden box traps and five Number 2 Havahart metal box traps at

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each area. The traps were placed at runway or feeding sites and not moved during the investigation. Commercial rabbit pellets, which gave off a strong odor of alfalfa, served as bait. The traps were checked every morning. At the first capture a cottontail was weighed, sexed, aged if female, tagged in the left ear with a numbered washer type tag, tail-dyed with a saturated solution of picric acid and alcohol, and examined for general condition. Records included the assigned number of the trap site. Recaptured cottontails were weighed and examined for general condition.

At each area two line-count routes, each approximately 1.2 miles long, were laid out so that approximately three-fourths of a route was in woodland cover and one-fourth in cropland. The routes were walked daily and alternated so that a route was walked 2.5 hours after sunrise of one day and 2.5 hours before sunset the following day. The number of cottontails observed, the cover types in which they were seen, and the colors of the tails were recorded for each trip. Forms from which cottontails were flushed the first time were described, located by a conspicuous landmark, and observed at following trips for occupancy.

In all, 111 cottontails were trapped during 81 nights of trapping. Sixty-seven cottontails were trapped on Area A and 44 on Area B. The 111 cottontails were recaptured 131 times, ranging from 0 to 11 times an animal. The mean numbers of recaptures for males and females were 0.9 and 1.5 times, respectively. Fifty percent of the males and 63 percent of the females were recaptured at least once. On Area A 47 percent of the males and 70 percent of the females were recaptured. On Area B 54 percent of the males and 50 percent of the females were recaptured. The percentage of recaptures in the successive total weekly catches increased at each area, with less variation at A than at B. A comparison of the success of the wooden traps to that of the metal traps showed an average catch of 12.4 cottontails per wooden trap and 1.6 cottontails per metal trap for the entire period.

Forty-nine percent of the captured cottontails were males. Of 49 females aged, 67 percent were juveniles. The mean weights of males and females were 2.7 and 2.8 pounds, respectively.

The known distance an individual cottontail ranged was determined by measuring the distance between the trap sites farthest apart at which the animal was captured. The mean distance between sites of capture was less than 100 yards for both males and females, and males traveled greater distances than the females.

A total of 232 cottontails was observed during 118 line-count trips. Cottontails were observed during 95 percent of the trips on Area A and during 80 percent of the trips on Area B. The average number of cottontails observed per trip was 2.2 on Area A and 1.7 on Area B. Of the cottontails observed on Area A 42 percent were marked, 48 percent unmarked and 10 percent were unidentified. On Area B 59 percent of the cottontails were marked, 32 percent unmarked, and 9 percent unidentified.

Eighty-one percent of the cottontails observed on Area A and 98 percent of cottontails observed on Area B were observed first in woodland cover. On Area A 60 percent of the forms from which cottontails were started were in weeds, grass and woody understory in woodland cover. On Area A the cover generally used for forms was brushpiles, weeds and woody understudy in woodland cover type. On Area A six forms were reoccupied from one to 30 times and on Area B 10 forms were reoccupied from one to 10 times. Reoccupied forms were not always occupied on successive days, but were unoccupied sometimes for periods up to two weeks and then were reoccupied. Although it could not be determined whether the same cottontail reoccupied a form, from one form in woodland cover marked cottontails were started 28 times. Then the form was occupied twice by an unmarked cottontail. The reoccupied forms were usually in dense cover.

Maximum and minimum temperatures, precipitation and barometric pressure were the weather conditions analyzed to determine whether there was any relationship between them and the number of cottontails captured each night. Other weather conditions could not be checked as they were not recorded during the night.

In the preliminary analysis trap success, barometric pressure, precipitation, and maximum and minimum temperatures were graphed to determine relationships. There was no indication that maximum and minimum temperatuures or precipitation had any effect on trap success. However, there appeared to be a positive correlation between barometric pressure and trap success. Linear regression and correlation methods were applied to barometric pressure and the number of cottontails trapped per night to determine the significance of the relationship. The barometric pressure readings at midnight and the number of cottontails in the traps the following mornings were the data used for the analysis. In this method, the correlation coefficient, $r=0.2098$, was significant at the 10 percent confidence level. Although this analysis indicated that a higher trap success could be expected on nights of high barometric pressure, the level of the significance of the correlation was such that more investigation is desirable.

A method of coding barometric pressure was used to determine whether the trend of barometric pressure was correlated with trap success. The total barometric pressure change between 6 p.m. and

6 a.m. was given the values plus one, zero or minus one, corresponding to rising, steady or falling pressures. The values were coded, because it was believed that the amount of change was not to be related to numbers of cottontails trapped, but rather that the trend was more important. Linear regression and correlation methods did not detect any correlation between these coded values. The sensitivity of this method was probably affected by the frequent nightly total barometric change of plus or minus one, when, in fact, the pressure may have been slowly rising or falling for the greatest portion of the night, and then either fell or increased rapidly.

The number of cottontails observed while walking the line-count routes and the weather conditions recorded prior to walking the routes were plotted on graphs to determine relationships. From these graphs there appeared to be relationships between snow depth, barometric pressure, wind velocity and temperature and the number of cottontails observed. The method of multiple regression and correlation was utilized to measure the relationship of these four weather factors and the number of cottontails observed. For the calculations of multiple regression snow depth was coded, zero indicating the absence of snow, one indicating one inch of snow or less and two indicating more than one inch of snow. Temperature and wind velocity were recorded in degrees Fahrenheit and miles per hour. The barometric pressure during the trip was taken from the barograph and recorded to the nearest tenth of an inch. Separate calculations were made for the morning and afternoon trips to each area. The R^2 values for the four routes ranging from 0.09 to 0.20 indicated that from 9 to 20 percent of the variation in the number of cottontails observed was caused by weather factors. A large percent of the variation was not explained by the multiple regression methods. The R values, the coefficients of multiple correlation, were not significant for any of the routes.

There was a significant correlation between the number of cottontails observed and snow depth for the morning trips on Area A and for the afternoon trips on Area B, as determined by the simple correlation coefficient, x, which had values of 0.39 and 0.43. A value of 0.349 was necessary for significance at the 95 percent confidence level. This correlation indicates that there was an increase in the number of cottontails observed when snow was present.

The inconsistencies of the signs of the b' values, the partial regression coefficients, for temperature, wind velocity, and barometric pressure indicate that any correlation that may exist between these weather factors and the numbers of cottontails observed was not detected.

In summary, the analysis of the live-trapping data and weather conditions indicated that trap success was highest during or immediately following periods of rising barometric pressure. No correlation was found between precipitation, maximum and minimum temperatures and trap success. There was not a significant correlation between the total change in barometric pressure between 6 p.m. and 6 a.m. and trap success per night. Multiple regression and correlation methods were applied to the number of cottontails observed during the line-count routes, temperature, wind velocity, barometric pressure and snow depth. The coefficients of multiple correlation and regression were not significant for any of the routes. The simple correlation coefficients for snow and numbers of cottontails observed were significant at the 95 percent confidence level for the morning routes on Area A and the afternoon routes on Area B. The values for the other two routes were comparatively high but not significant. This relationship indicates that more cottontails were observed when snow was on the ground than when snow was absent.

Literature Cited

Allen, Durward L. 1939. Michigan cottontails in winter. Jour. Wildl. Mgmt. 3:307-322.

Crunden, Charles W. 1954. Techniques in the estimation of a Mearns cottontail population. M.S. thesis, Iowa St. Coll. Library, Ames, Iowa.

Hanson, Harold C. 1944. The cottontails and the weather. Trans. Wis. Acad. Sci., Arts and Letters 35:91-97.

Linduska, J. P. 1947. Winter den studies of the cottontail in southern Michigan. Ecology 28:448-454.

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