

EFFECTS OF ENVIRONMENTAL VARIABLES ON SOME PHYSIOLOGICAL
RESPONSES OF MICROTUS MONTANUS UNDER NATURAL
CONDITIONS.

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Objectives

Cyclic fluctuations in the population density of microtine rodents have been known since antiquity. However, factors responsible for this phenomenon are not known.

The objectives of this long term study are essentially fourfold. First, to characterize the environmental variables that might affect Microtus in different seasons of the year. Second, to record the growth, maturation and reproductive activity of Microtus montanus under natural conditions. Third, to determine the maturational as well as seasonal pelage changes of these rodents. Fourth, the data resulting from the execution of the first three objectives would be correlated in an attempt to determine the causes underlying the multiannual fluctuations in population density of these microtine rodents.

Methods

Microtus montanus were livetrapped and sacrificed as soon as possible after capture. Age estimation for all animals was based on weight, total length, and pelage characteristics. Reproductive organs, the spleen, and the adrenal glands were collected from the animals and preserved in Lillie's buffered neutral formalin for further histological study. Flat skins were prepared from all animals. All tissues are currently being processed at the Department of Biological Sciences, University of New Orleans.

In 1980 field observations in Grand Teton National Park were carried out over two study periods: spring (24-30 May) and summer (11 July - 13 August).

Results

In 1980 Microtus montanus began breeding on a population wide basis during the first and second weeks in May. All breeders were adult animals. There was no evidence of winter breeding, i.e., no juvenile animals were trapped, and all pregnant females carried their first litter of the year. Mean litter size was 5.3, a low average value for this time of year. For the first time since the study began a female carrying a single embryo was found. To date the lowest litter size recorded for an adult female had been three.

During the spring study period there was an unusual amount of precipitation; indeed, it was reported that this was the rainiest May in Teton County since 1931.

Abnormally high rainfall continued between the spring and summer study periods. As a result, at the onset of the summer study period all vegetation was uncommonly luxuriant. The mean litter size for adult females was 5.6 - higher than in 1979, and approximating the mean values for litter sizes in adult females for this time of the year. Inexplicably, the mean litter size (4.2) for subadult females was the lowest ever recorded for this age group in a summer study period.

Population density had declined below the 1979 levels. A ready explanation for this is not available. Unlike in the spring of 1979, in the spring of 1980 some of the trapped females had not yet begun reproductive activity. The females that were reproductively active at this time had small litters. Litter sizes remained small for subadult females (young of the year) as they began their reproductive career in 1980. Predation pressure could have contributed to the population decline: a total of eleven short tailed weasels (Mustela erminea) and three long tailed weasels (M. frenata) entered the unbaited Sherman traps that had been set for Microtus. This was the largest number of weasels recorded for the study area since 1970. A disconcertingly "tame" coyote hunted in the study area virtually daily.

Conclusions

A decline in the population density of Microtus montanus had taken place in 1980. The reasons for the decline are not apparent at this time. Unusually small litter sizes and a high population of weasels could be two contributory factors for this decline.

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