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SEASONAL HOME RANGE OF A COLONY OF COLUMBIAN GROUND SQUIRRELS IN THE IDAHO PRIMITIVE AREA

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ABSTRACT--Mean seasonal home range for a colony of columbian ground squirrels was 1532.7 square meters. Density was 13 adult squirrels per hectare.

The columbian ground squirrel *(Spermophilus columbianus)* is an endemic sciurid in the northwestern mountain states (Manville 1959). Although much is known regarding the columbian ground squirrel's behavior (Betts 1976) and life history (Steiner 1970a, b) little has been published concerning its home range requirements.

The concept of home range has been criticized by Hayne (1949) who noted it is important to recognize that when trapping data are interpreted in terms of home range, the assumption is implicit, but not always valid, that the animal will be trapped over all of the 'ecologically significant' area of its home range. In a discussion concerning the activity of the California ground squirrel *(Spermophilus beecheyi),* Linsdale (1946) criticized the interpretation of activity in terms of area. He noted that the activities of an animal are almost never within two-dimensional space, yet we calculate the animal's activity on a single plane in order to assess its movements. He further stated that a boundary drawn upon a map detailing activity sites is our own abstraction and of no meaning to the animal itself. Stickel (1954) cautioned that boundaries of a home range must be considered diffuse and general rather than sharply or definitely outlined. It is therefore necessary to interpret home range data cautiously, bearing in mind the many criticisms concerning the concept of home range. Home range is often considered to represent the living area of an animal; its size being related to the animal's living requirements (Stickel 1954). Home range data are often essential for population estimations; it was for this reason that the data reported here were collected.

The study was conducted at Cold Meadows, an 87 ha meadow (elev. 2010 m) located in the northeastern portion of the Big Creek Ranger District, Idaho Primitive Area. A description of the Big Creek area has appeared elsewhere (Wing 1969, Hornocker 1970). Ground squirrels were trapped for three summers, from 12-19 June, 17-24 July and 14-21 August, 1976-1978. Data reported here concern the 1977 and 1978 field seasons. A 90 m X 90 m grid with 36 trapping stations 15 m apart was established on the central portion of the meadow. One live trap (15 X 15 X

Table 1. Mean (+SD) individual estimations of home range for columbian ground squirrels, Cold Meadows, Idaho Primitive Area, 1977-1978.

Sq.#	Sex	Observed range length (m)	Adjusted range length (m)	Minimum area (m^2)	Inclusive boundary strip (m^2)	Exclusive boundary strip (m^2)
7	F	40.5±27	55.5±27	319.7±293	1332.0±770	1181.2±715
30	F	52.5±10	67.5±10	572.7±332	2027.0±809	1729.5±695
12	M	49.5±6	64.5±6	956.2±238	2020.5±642	1687.5±795
MEAN		47.5±6	62.5±14	616.2±364	1739.1±678	1532.7±632

48 cm) was placed at each trapping station. Traps were baited with carrot and checked every hour. Captured squirrels were marked using the toe clipping sequence of Melchior and Iwen (1965). Each recaptured squirrel was identified and the trap location plotted to determine individual seasonal home range. The term 'seasonal' home range is used because adult male columbian ground squirrels are known to be territorial during the breeding season (Murie and Harris 1978) but the data reported here represent trapping results for the entire summer period (pre- and post-breeding time).

Analysis of the trapping data showed three adult squirrels had been captured five times or more each summer. Following Hayne's (1949) method the 'center of activity' was determined for the three repetitively captured squirrels. The centers of activity were found to coincide for each squirrel for both seasons. The center of activity is equivalent to the geographic center of all points of capture (Hayne 1949). It was assumed that if the centers of activity remained constant for each year the data gathered would reflect the mean seasonal home range.

A problem in utilizing home range data reported in the literature is the variation in techniques used for determining home range. These differences in methodology make it difficult to compare data obtained from other geographic locations (Mohr 1947). Table 1 lists the mean estimations of home range determined for individual columbian ground squirrels at Cold Meadows. Home ranges were determined using the methods indicated in Table 1, calculation procedures for each method are described in Hayne (1949) or Stickel (1954). Means obtained for each range determination technique were compared between individual squirrels using unpaired t-tests ($P=0.01$). No significance differences were noted, suggesting that the mean home range reported for a particular home range determination method was the same for both sexes.

Stickel (1954), using an artificial population, reviewed various techniques and reported that the boundary strip method of calculating home range gave results closest to the true value. Calculations using the exclusive boundary strip method were reported the most accurate. Using the mean home range derived by calculating the exclusive boundary strip (Table 1) the density of columbian ground squirrels at Cold Meadows was 0.15 adult squirrels per hectare or 13 resident adult squirrels.

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