SAMPLING INTENSITY IN VEGETATION SURVEYS MADE BY THE SQUARE-FOOT DENSITY METHOD

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METHODS of making surveys of range land vegetation have been evolving slowly for a period of more than 30 years. Since the beginning, determination of density or spread of vegetation above the ground has been an integral part of survey procedure. Originally, density was estimated by the system common to the reconnaissance method of range surveying (3). More recently a method of determining density known as the square-foot density or point-observation-plot method has been developed by Stewart and Hutchings (4), and this method is now optional in standard range survey instructions (3). Questions and comments which have arisen as a result of the use of the optional square-foot density method in range surveys have emphasized a need for specific information on sampling intensity as reflected in number of plots required for an estimate within given limits of accuracy.

This paper, based on sample plot data recorded from all major range vegetation types in Colorado, Wyoming, and the Black Hills region of South Dakota, deals with sampling intensity in relation to reliability of mean densities and forage factors secured by the square-foot density method. It also presents the relationships between number of plots required for a reliable sample and (a) size of area sampled, (b) vegetation type, and (c) adequacy of sampling as determined by the purpose of the survey.

SOURCE AND NATURE OF THE DATA

A very considerable mass of data, obtained through the use of the square-foot density method of making range surveys, has been assembled by the Rocky Mountain Forest and Range Experiment Station. Observations on 4,620 plots were obtained in a general survey of range conditions throughout Colorado and Wyoming and in the Black Hills of South Dakota in October 1935. A forage inventory of Colorado and Wyoming, started in the spring of 1936, resulted in observations on 44,123 sample plots by November 1938. These data were supplemented by 24,476 sample plots which were established by various state and federal agencies under careful supervision and coordination during 1936 and 1937.

The basic data on all plots were recorded on Form 764b of the instructions for range surveys (3) or on similar forms. Species were listed by vegetation types and their densities were recorded directly in square feet or fractions thereof for each plot. Plot locations within any type area were determined by throwing a stone into the type to locate the first plot and by stripping or grid-ironing at a predetermined sampling interval until the necessary number of plots was established.

1Contribution from the Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. Received for publication July 10, 1939.
2Associate Forest Ecologist and Junior Agricultural Economist, respectively.
3Figures in parenthesis refer to “Literature Cited”, p. 810.
4The agencies participating in this cooperative project were the Forest Service, Resettlement Administration, Soil Conservation Service, of the U. S. Dept. of Agriculture; the Division of Grazing of the U. S. Dept. of Interior; Colorado State College of Agriculture and Mechanic Arts; and the University of Wyoming.