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P R O C E E D I N G S

HYDROLOGY SEMINAR

**Present Hydrologic Research
in Wyoming and Future Needs**

University of Wyoming

June 25-26, 1970

Abstract

A seminar for hydrologists practicing in Wyoming was held at the University of Wyoming, June 25 and 26, 1970. Individuals representing most of the Federal and State agencies discussed their ongoing research and the needs for the future. Copies of the papers presented are included.

Key Words: Hydrology/ Research/ Wyoming

The Hydrology of Sagebrush Lands and
the Management of Blowing Snow

by

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The Rocky Mountain Forest and Range Experiment Station is conducting hydrologic research in Wyoming on two related subjects: the hydrology of sagebrush lands, and the management of snow on windswept areas.

Sagebrush. Surprisingly little is known about the hydrologic peculiarities of the sagebrush type in relation to its importance as a major vegetative type in the western United States. The current popularity of sagebrush control programs to improve forage values on western rangelands adds additional incentive to better understand the hydrologic features of this important vegetative type.

The hydrology of sagebrush lands and the effects of sagebrush control on water yield are being studied on two different areas in the State. The Wayne's Creek Watersheds (elevation 9500 feet) near Dubois, Wyoming, have been studied since 1959 to determine how spraying big sagebrush (Artemisia tridentata N.) affects water yields and snow accumulation. Research at the Stratton Study Area near Saratoga, funded by the Bureau of Land Management, allows replication of studies at a lower elevation (7500 feet). At both of these areas, watersheds of 60 to 1600 acres are instrumented for streamflow, precipitation, snow storage, sediment yields, soil moisture, climatic data, and vegetative production and ground cover.

Plot studies are being used at both areas to supplement the results from the watersheds. Soil moisture use by sagebrush is being determined, as are the effects of sagebrush on snow accumulation, disappearance, and disposition of melt water. Another study relates

soil moisture withdrawal patterns around individual sagebrush plants to their root systems. The soil temperature regime under sagebrush stands is also being examined and related to net solar radiation differences between sprayed and unsprayed plots.

Blowing Snow. Blowing snow is an untapped resource that appears to have significant potential for water yield improvement in Wyoming. Snow fences hold promise as a means of increasing water yields, as a water diversion technique, and as a preliminary step in the management of snow for evaporation reduction or melt rate regulation.

The Rocky Mountain Forest and Range Experiment Station, in cooperation with the Medicine Bow National Forest, has been experimenting since 1961 with snow fences to increase snow accumulation on three small drainages on Pole Mountain, east of Laramie. A snow fence 12-1/2 feet tall and 1300 feet long was built on one of these watersheds during the summer of 1969 to trap a greater share of the snow that blows across the drainage. It is estimated that the fence will about double snow accumulation on the watershed. Effects of this treatment on snow accumulation, total annual streamflow, and seasonal distribution of flow will be studied over the next five years. The performance of the watershed fence is being related to characteristics of the concurrent snow flux across the watershed.

During calibration of the watersheds, field tests have been directed toward developing a realistic treatment prescription. A model has been developed for determining optimum spacing in a series of fences, and field data have been collected to test some of the

associated hypotheses. Data from a study to determine the effect of fence height on snow accumulation are being used to develop an empirical relation for predicting the amount of snow stored behind a fence as a function of cumulative precipitation and fence height.