PACIFIC SOUTHWEST
FOREST & RANGE EXPERIMENT STATION
Berkeley, California

U. S. FOREST SERVICE
RESEARCH NOTE PSW- 62

1965

An Economical Storage Precipitation Gage

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ABSTRACT: Describes how to make an economical "can-cone"-type storage precipitation gage, based on one originally designed by the California Department of Water Resources. The cone was modified by including an inner skirt to prevent loss of water between the cone and can. Periodic records of precipitation are obtained by stick measurement. Five complete cones cost $120.

The amount of seasonal precipitation is an important variable in studies of vegetation and cattle responses in bunchgrass ranges. An economical and efficient method of measuring precipitation is necessary in these investigations.

We have developed an improved "can-cone"-type storage gage by modifying the original design of Russell F. Franson, of the California Department of Water Resources. We changed the cone by adding a special catch ring and inner skirt.

Five of these gages have been used for a year. And we have encountered no problems with them. Each cone assembly cost only $24. The wooden tower on which the gage is mounted cost $25, including labor and materials.

HOW TO BUILD THE GAGE

The gage consists of two parts: a 15-gallon oil drum and a sheet-metal cone assembly. The oil drum serves as the storage can. It is often available at gasoline service stations. In selecting the oil drum, make sure it is in good condition. Check for leaks and dents. Water freezing in the drum will cause its bottom to be pushed out and become bowl-shaped.

The cone assembly has three parts (fig. 1). All joints are soldered water tight. The cone and inner skirt are cut from 24-gage, and the catch ring from 22-gage galvanized sheet metal. Thicker metal is used in the 8-inch diameter catch ring to assure maintenance of its circular shape. The top of the catch ring is beveled from the outside to form a cutting edge. The inner skirt prevents loss of precipitation between the cone and can. It slips down inside the can. Two 1/4-inch stove bolts, 180 degrees apart, fasten the cone assembly to the can.

The complete gage is mounted on a tower (fig. 2). The tower is made to keep the top of the gage well above maximum snow depth and to withstand rubbing by cattle.

The U. S. Weather Bureau[1] recommends a small sheltered opening in timber as the most suitable site for a precipitation gage. Tree tops around the opening should make an angle of 30 to 40 degrees with the top of the gage.

CHARGING THE GAGE

If freezing weather is expected, antifreeze must be added to prevent the can from bulging at the bottom. A 3-gallon charge of antifreeze will protect 20 inches of precipitation to -12° F. One quart of 10-weight motor oil covers the top of the liquid sufficiently to prevent measurable evaporation. The gage then has a capacity of 53 inches of precipitation. For its gages the California Department of Water Resources uses an insulating oil. For accurate operation of the gage, the specific gravity of the antifreeze and oil must be nearly that of water.

MEASURING PRECIPITATION

If a single yearly measurement of precipitation is wanted, weighing the charge and contents of the gage provides the most accurate record. The amount of precipitation is the difference between the weight of the charge and the weight of the contents at the end of the precipitation year. Special scales which give the weight in inches of precipitation are available for this purpose. The California Department of Water Resources uses this method.

Periodic records of precipitation during the year can be obtained by measuring the depth of liquid in the gage. In this gage, a depth increase of 1 inch equals 3.092 inches of precipitation. After the gage is charged, the depth of the liquid is measured to the nearest one-tenth of an inch (fig. 2) and recorded. All measurements are taken by holding the measuring stick vertically in the center of the gage. As each successive reading is made, the amount of precipitation since the previous reading is determined by the following formula:

(Present reading - previous reading) 3.092 = inches of precipitation.

If small amounts of precipitation must be measured, the ribs of the "can" may create a problem. However, the error is negligible for depth measurements to the nearest one-tenth of an inch.

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[1] Operation and maintenance of storage precipitation gages, p. 6. U.S. Department of Commerce, Weather Bureau. 1951.

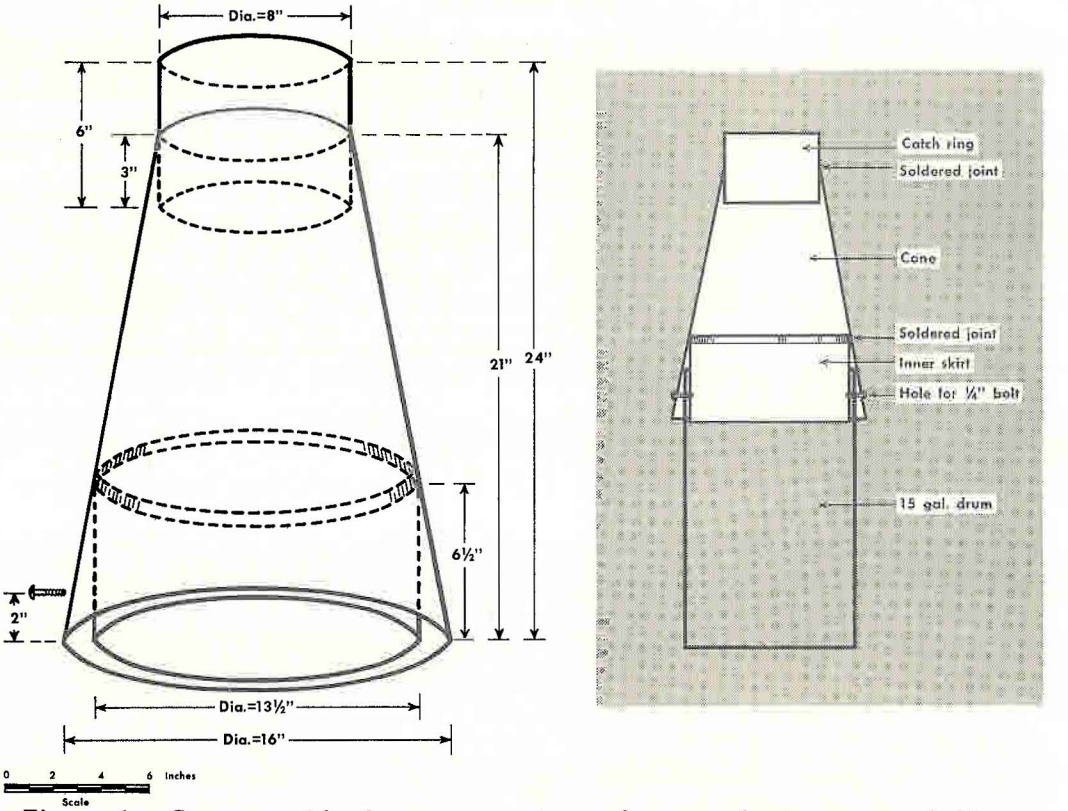

Figure 1.--Cone assembly for can-cone type of seasonal storage precipitation gages.

Figure 2.--Stick measurements of the gage contents give periodic records of accumulated precipitation.

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