

# Water Survey Gives Area Advance Notice on Water Supply

## Work of Surveyors In Flooded Streams Is Often Hazardous

### First Station Set Up At Gold Ray in 1905

Water to many of us is often taken for granted as a somewhat tasteless liquid which can be made a great deal more palatable by the inclusion of fresh coffee grounds, lemons and the like.

To others, especially farmers and orchardists, it is the lifeblood of their livelihoods when used for irrigation. Water is also good up to a certain concentration, then it becomes bad, when it strays from its well-worn course and results in floods.

It gives us electricity, fish, watermelons, grass, timber, and just about everything else except dryness. If then, it is so very important, somebody must be doing a lot of thinking about how it happens to be, where it comes from, how much is expected, its quality, etc.

**Three Branches**  
That "somebody" throughout the United States is the Water Resources division of the U. S. Geological survey, Department of Interior. In the Water Resources division, three principal functional branches: surface water, ground water and quality of water.

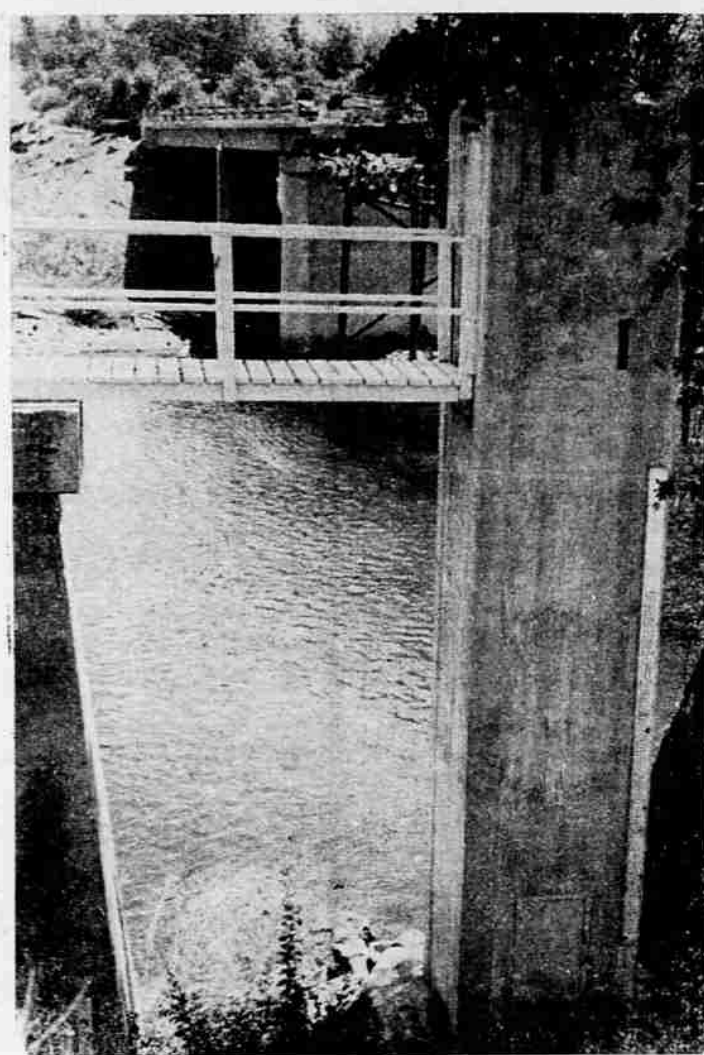
The latter branch conducts studies of the chemical and physical quality of surface and ground water. While ground water is investigated for occurrence, quantity and availability for use, surface water is studied for flow of streams, floods, droughts and utilization of resources. Both ground and surface studies, though separated for investigation, are necessarily concurrent in many instances where ground water seeps into springs, rills and larger streams.

The largest of the three divisions is the surface water branch which has maintained an office in Medford since 1946. The Medford office is a branch of the Portland district office with K. N. Phillips, district engineer, in charge. The local office is under his direction and investigations in southwestern Oregon are under the supervision of C. A. Young, hydraulic engineer, assisted by D. R. Hansen and D. H. Giles.

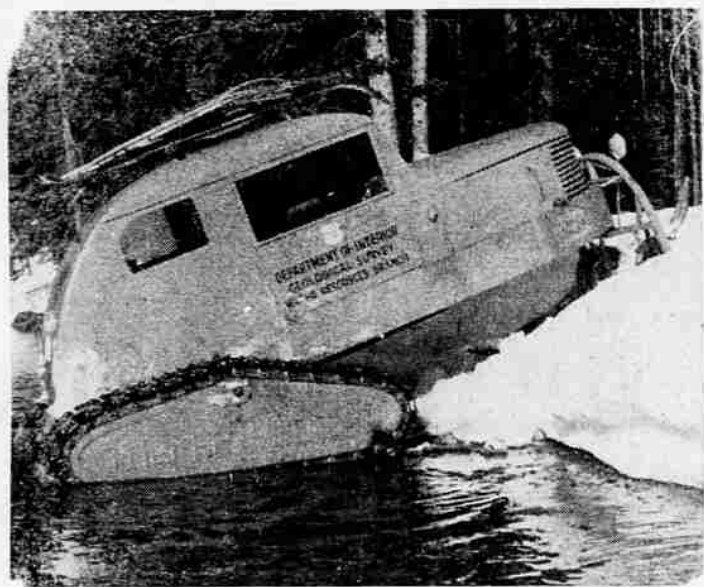
The local office maintains 55 river-measurement stations in the Rogue, Klamath, Umpqua and Coquille river basins as a part of the regular nationwide stream-gauging program for the investigation of the water resources of the nation. These stations are maintained by the Geological survey in cooperation with the state of Oregon, the cities of Coos Bay and North Bend, and other federal agencies.

Stream flow investigations are also being made by the Survey for the California Oregon Power company, a licensee of the Federal Power commission. Stream gauging under the Copco-FPC license exceeds that for all other FPC licenses in the state, according to Engineer Young, partly because this company has been the only private company to do any building of hydroelectric plants in Oregon in the last 20 years. The power company bears the maintenance and cost of operation of the stations where these investigations are made.

The engineer pointed out that



**CONSTANT RECORD**—Shown (right) is the concrete tower at Dodge bridge on Rogue river which houses a water-stage or height recorder which keeps a constant measurement of the river's height and when it occurs. The instrument is housed near the top of the structure which is connected with the river by pipes below the water surface which keep the water level of a well within the structure the same as the river. A float on the surface of the well regulates the pen on the recorder's graph paper through a system of lines and weights. The recorder is reached by the ladder and walk (left) which is anchored to a remaining portion of the old Dodge bridge superstructure.



**WINTER WORK**—Pictured is a Tucker Sno-Cat, used in long trips into the mountains during the winter to places where stream flow investigations are made by the U. S. Geological survey, water resources branch, and the depth of snow measured at regular snow courses. The picture was taken en route to the gauging station at Waldo lake in the Deschutes National forest, southwest of Bend. (Aubrey E. Perry Photo)

an extensive Copco power development is now in progress on the Upper North Umpqua river above and below Toketee falls which is necessary to keep up with the rapid growth of the industrial development of southwestern Oregon.

The survey has a stream flow record at one of the several gauging stations in the Toketee area which dates back to 1908. These records of discharge in the Upper North Umpqua basin were used by the company in the design of hydroelectric equipment to be used in that area.

a non-recording gauge or by a water-stage recorder which provides a continuous graph of the stage. The instrument used here is a Stevens recorder, manufactured in Portland, and widely used by various organizations over the nation.

The instrument is housed near the top of a wooden or concrete tower (see picture), located on the river bank. The elevated structure is connected with the river by pipes below the water surface which keep the water level of a well within the structure the same as the river.

A float on the surface of the well regulates the pen on the recorder's graph paper through a system of lines and weights and the pen thus draws a continuous line showing both river stage and time of the stage.

#### Discharge Measurements

Discharge measurements are made by use of a current meter (suspended below the cablecar in picture) held by the engineer while wading if the stage permits, or from a boat, cableway, or bridge. The meter, a series of cups which revolve (similar to wind velocity cups) from the speed of the water, measures the velocity by timing a series of clicks through the earphones of the operator. The results of the meter readings, plus the width and depth of the stream, give the discharge in cubic feet per second at any particular stage. A cubic foot per second represents 449 gallons a minute.

After these measurements are made at various low and high water stages, the stream is rated and a stage-discharge relation is obtained. With this information of discharge and stage, the daily flows and runoff figures are computed.

#### Indirect Methods

At times when stations cannot be reached during floods in the daytime, or when they occur at night, current meter measurements cannot be made. Selected sites are then picked and the discharge is determined by indirect methods, using a hydraulic formula jointly with the data from the field survey.

Young pointed out that the work during floods is sometimes hazardous, owing to the nature of the measurements and weathering conditions. Discharge measuring during flood stages is "usually in the worst kind of weather," he added, "and stations in the remote areas are only reached after a hard and hazardous trip."

He noted that the survey lost an engineer by drowning a few years ago when his boat capsized on the lower McKenzie river, and that investigating engineers risk their life during floods when they sound from bridges which may collapse at any minute, and from cablecars where the sounding line can become snagged by a log.

Danger is not always in flood stages, Young continued. Last winter one of the local engineers was making a routine wading measurement near Butte Falls and "inadvertently stepped into a hole which filled his waders with water. The swift current made it extremely difficult to reach shore and he had a hard time making it without drowning. The equipment was found later after the winter tragedy."

During the winter, measurements are often accomplished in blizzard conditions.

#### Areas Vary

The gauging stations in this area are located at points that measure the flow draining from areas ranging from 8.6 square miles (Powell creek near Williams, Ore.) to 2,420 square miles on the Rogue river at the Grants Pass station. Many of the stations are reached by automobile over the main highways, while others are reached by forest service roads. A few are so isolated that they can only be reached in the winter by snow vehicles or skis.

The survey uses a Tucker Sno-Cat (see picture), manufactured at Medford for its long trips into the Cascade mountains where stream flow investigations are made and the depth of snow is measured at regular snow courses. The snow trips are usually made under adverse weather conditions and occasionally a storm will force the engineers to hasten to previously stocked cabins until the weather moderates.

#### Winter Trips

Winter trips are made into a Klamath drainage gauging station on Beaver creek, near Lake O' Woods, by skis from the snow line on the Dead Indian road. Information from this trip is gathered to show the yield of this creek, now important to the Bureau of Reclamation which is surveying it at the present time.

for a dam site to provide supplemental irrigation water for Jackson county. The station is 14 miles from the snow line and in winter can only be reached under ideal weather conditions.

One of the longest continuously operated stations in the state is the one situated on the Rogue river at Gold Ray dam between Bybee bridge and Gold Hill. The station was established in 1905 with the records providing a "good picture of the behavior of the Rogue river for the past 46 years," according to the engineer.

The maximum instantaneous discharge for the period of record at this station was 91,500 cubic feet per second on Feb. 21, 1927. The minimum daily discharge occurred on Sept. 6, 1931, when the river flowed at the daily rate of 616 cubic feet a second.

**Wagon Trip**  
The next oldest station on the Rogue river is still in operation near Prospect. It was established in 1907. A district engineer in one of the southwestern districts of the United States told Young that at one time prior to 1910 he visited this station by a horse-drawn wagon.

Other stream flow stations on the main stem of the Rogue river

## Robertson Delegate To Elks Conference

Harvey W. Robertson, 1955 Gregory road, left here Friday

located above Bybee creek near Union creek, at Laurelhurst below the South Fork of the Rogue, Dodge bridge (pictured), and Grants Pass. Reconnaissance will be made later this summer for the establishment of a station in the vicinity of Galice, Ore., near the mouth of Grave creek.

Numerous gauges are in operation on tributaries of the Rogue and some of these streams have more than one station.

for Salt Lake City, where he is to attend a regional conference of the district deputies of the Elks lodge of 11 western states. Robertson recently was appointed district deputy, Grand Exalted Ruler of Oregon South for the lodge.

Robertson has served in all of the offices of the local Elks lodge and was exalted ruler for 1946-47. He served three years as a trustee and has been on numerous committees. Robertson has also been active in Oregon State Elks association work.

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**CABLEWAY METHOD**—Shown above is D. H. Giles, employed in the Medford office of the surface water branch, Water Resources division, U. S. Geological survey, suspended from a cableway at Gold Ray dam on the Rogue river with a current meter (cups and fin above bomb-like sounding weight). The meter is let down into the water and revolves from the speed of the water, measuring the velocity by timing a series of clicks through the earphones on the operator. Meter reading results, plus the width and depth of the stream, gives the discharge in cubic feet per second. Other methods used in current meter tests are by wading, from a boat and from a bridge.