Whether my plan for predicting California's rainfall several months in advance is sound I leave to your judgment; for myself I cannot help believe that the line of action I have pointed out will, if followed, lead to the accomplishment of practical results to the satisfaction of the vast economical interests that will thereby be benefited.

POSSIBLE GULF COAST-CALIFORNIA SEASONAL WEATHER SEQUENCE

May wind velocity at Galveston, Texas, I. R. Tannehill says, reached the highest average (15.3 mi/hr) on record there (57 years). April was also the windiest month of that name (14.5 mi/hr). Mr. Tannehill comments, "Undoubtedly this strong southerly circulation was connected with the heavy rainfall and unprecedented Mississippi Valley flood, as high southerly spring winds at Galveston are associated with a retreat of the rain area to the interior of the continent." He also calls attention to the rather close parallel, that has been maintained since 1916, between the May wind velocity at Galveston and the subsequent August-October sea temperature at La Jolla, California. Dr. McEwen has been using the latter for his trial forecasts of seasonal rainfall in southern California for the past 9 years (cf. October or November BULLETINS of the different years.) Unless this parallel is merely a chance one, we should expect warm water on the southern California coast this year: One might almost say that if the water there is not above normal in temperature after such a strong wind at Galveston there can be no important relation between the two.

SEASONAL SNOW SURVEY AND FORECAST OF STREAM FLOW, APRIL 1, 1927

Nevada Co-operative Snow Surveys

I. CENTRAL SIERRA QUADRANGLE

(Including the basins of the South Yuba to Tuolumne and Truckee to Walker. However, western outposts are still lacking for all western basins except the South Yuba).

SUMMARY

The snow cover this season is quite variable, especially at different altitudes because of winter melting.

The percentage of normal at the high altitude snow survey courses as of April 1, varied from 126.6 to 139.4, and it is probable that approximately similar percentages of normal would have resulted at lower altitudes had it not been for melting before the survey. As it was, the loss in low altitudes, as contrasted with the high, varied from 33.9% of normal in the Truckee basin to 45.7% of normal in the Walker basin.

Some of the premature melting occurred at the time of rains and abnormally high temperature late in December and early in January and

much of the March melting was because of high density in the lower strata of snow resulting from the December-January thaw.

The heavy snow storm occurring during the last few days of March and the first week of April, delayed most of the snow surveys until several days after April 1, so that the results had to be adjusted to make them applicable to April 1. This storm also added to the difficulty of making the surveys on account of the considerable depth of new snow. Due to a combination of circumstances, including accidents to apparatus and to one man usually depended on to help with courses west of Tahoe, several important courses were not surveyed at all this season.

The weighted seasonal percentages of normal in the various basins as of April 1, are as follows: South Yuba, 109.6; Truckee (exclusive of Tahoe), 93.4; Tahoe, 101.6; Mokelumne, 109.2; Carson, 116.5; West Walker, 128.6; East Walker, 125.6.

The heavy precipitation of the April 1 to 5 storm, assures practically the entire percentage of run-off indicated by the above weighted percentages of snow survey and probably about 12 per cent additional if normal precipitation is realized during the remainder of April-July.

Lake Tahoe should reach a maximum of 6226.84 early in July. This should satisfy the demands of irrigation and also for power this season unless an extremely dry fall and early winter follow the summer.

There will be ample water to fill Lahontan reservoir and probably considerable to waste.

The supply for the East and West Walker basins will be several times the capacities of the Bridgeport and Topaz reservoirs.

This season is in pleasant contrast with the last few preceding ones.

II. Humboldt Quadrangle

Summary

Owing to its length and diversity, the Humbolt Basin should be divided for forecast purposes into Upper Humboldt and Lower Humboldt Basins with division point at Palisade. Furthermore, because of its double source, the Upper Humboldt should be divided into Northern Feeders and Southern Feeders, but with estimate of combined flow into the Lower Humboldt.

The Little Humboldt, being practically isolated from the Main Humboldt, into which it rarely flows, is treated as a separate unit.

Stream flow in Nevada is dependent upon:

1. Snow cover at high elevations.
2. Snow cover at low elevations.
3. Relative dryness of the meadows and sloughs automatically fed by the streams.
4. Relative diversions along the stream; in the case of the Humboldt, particularly upon the relation of the flow at Oreana to that at Palisade, and the relation of the flow at Palisade

to the snow cover at the head of the Northern and Southern Feeders.

5. The summer precipitation during the melting of the snow cover, as from April through June.

Owing to the great length of the Humboldt Basin, the relative lowness of much of its watershed, the shallowness of its snow cover, and the tendency of the latter to melt out at the lower elevations during the winter, the forecasting of the run-off there is far more complex than in the Sierra Nevada, where the snow is deep and the streams relatively short. The problem is further complicated by the lack of adequate snow survey courses and stream gaging stations.

Consequently, detailed study must be made of the relative area at various elevations, with the usual snow cover at each, and more exact measurements must be kept of diversions along the stream before any reliable basis can be established for forecasting the run-off with even approximate precision, while the close accuracy now possible in the Sierra Nevada may never be attained owing to the more patent effects of the relatively heavier summer rains in the Humboldt Basin.

The present season, the snow cover, winter precipitation and amount of snow on the ground at the lower levels in March indicate an approximately normal run-off for April-July, especially along the upper stream near the source of supply and above diversions. In case of heavy summer rain the run-off may reach as high as 125 per cent, but lack of rain and the heavy draft on the Humboldt may cause a minimum run-off of approximately 75 per cent, at Palisade, as was experienced with nearly normal winter snow cover and summer precipitation in 1919-1920. Furthermore the dry stream bed resulting from the low water of last season must be re-primed, especially down stream below the effect of the winter snow and rain.

The run-off on the Lower Humboldt can be forecasted with far less accuracy than can the Upper Humboldt because of the increasing effect of diversions. Few data on run-off and storage are available. However, normal run-off of 233,278 A. F. at Palisade should furnish a correspondingly normal run-off of 121,197 A. F. at Oreana uncorrected for storage. The snow cover this season is 122.5 per cent and the winter run-off at Palisade 78.0 per cent or 61,520 A. F.

The Little Humboldt should flow 150 per cent the present season because of the deep snow cover and presence of snow at lower elevations. The normal run-off at the head of Paradise Valley has not yet been ascertained because of the shortness of the record and the apparent inaccuracy of the present normal for snow cover.

RAIN MAKES FREIGHT TONNAGE

When asked in the middle of January of this year for an appraisal of the 1927 business outlook, Vice-President Frank W. Robinson of the Union Pacific Railroad System said to a reporter for the Salt Lake *Tribune*: