

hours. Near Mount Whitney, on its eastern slope, 2 inches fell, September 5 and 6, above 12,000 feet. On the 28th also 2 inches fell.

SUNSHINE.

The following table gives the total hours of sunshine and percentages of the possible:

Stations.	Hours.	Percent- age of possible.	Stations.	Hours.	Percent- age of possible
Eureka.....	112	30	Sacramento.....	330	89
Fresno.....	348	93	San Diego.....	278	75
Los Angeles.....	287	71	San Francisco.....	243	65
Mount Tamalpais.....	271	73	San Jose.....	293	79
Red Bluff.....	313	84	San Luis Obispo....	276	74

NOTES ON THE RIVERS OF THE SACRAMENTO AND LOWER SAN JOAQUIN WATERSHEDS DURING SEPTEMBER, 1912.

By N. R. TAYLOR, Local Forecaster.

Sacramento watershed.—All streams in this watershed averaged slightly above the stages that obtained during the preceding month. They were, however, abnormally low, especially the Sacramento River between Walnut Grove and the mouth of the Feather, which was lower than for any previous September of which there is a record.

General rains throughout the drainage basin of the Sacramento Valley during the first decade of the month resulted in rapid rises in the main rivers and freshets in some of the smaller watercourses. The greatest 24-hour rise in the Sacramento was at Colusa, where it rose 6.7 feet and culminated in a stage of 11.2 feet on the 8th. The crest of this rise reached Sacramento city on the 9th. After this date the river fell steadily.

In the watershed of the Feather-Yuba River there was a substantial rise during the three days ending on the 9th, but after this date both streams fell rapidly, and by the end of the month they had reached the extreme low-water stages that prevailed prior to the rains.

In the American River watershed the rainfall was lighter than in any other section of the valley, and as a result there was little change in the run-off of this stream.

There was a marked improvement in the navigability of the Sacramento River as a result of the rise, which swept away many of the sand bars that had formed at various points in this stream.

San Joaquin watershed.—The rivers of this watershed averaged about 0.5 of a foot above their height during the preceding month, due to the rains that were more or less general in the first decade of the month. The rises, however, were slight, the greatest being 1 foot in the Tuolumne River at Jacksonville during the 24 hours ending at 7 a. m. of the 8th.

NOTES ON STREAMS AND WEATHER OF THE UPPER SAN JOAQUIN WATERSHED.

By W. E. BONNETT, Local Forecaster.

Although low, the mean stages of the streams of this district for September were higher than the stages for that month in several other years of the last six and in some cases higher even than the September average for that period.

At Merced Falls the mean stage was 0.3 foot, equalling the 1911 stage and exceeding the September stages in the years 1907 to 1910, inclusive. Daily gage heights were very uniform throughout the month, with a range of but 0.2 foot. In the San Joaquin the average monthly stage

at Firebaugh was -0.5 foot, or slightly lower than the 6-year mean, and higher than the stages in 1908, 1909, and 1910.

On the whole, weather conditions were favorable. A fall of 0.10 inch of rain occurred on the 3d, making the third date in 26 years on which there has been measurable rainfall between August 1 and September 3. The temperature was about one degree below normal. The first decade was so cool that the high temperature during the remainder of the month did not overcome the negative departure.

EXCESSIVE RAINS IN CALIFORNIA.

By A. G. McADIE.

In an article in the Monthly Weather Review, July, 1912, page 1062, Mr. Edward D. Coberly gives an extensive tabulation of all monthly rainfalls of 10 inches or more and of all amounts of 4 inches or more in 24 hours that have occurred in the State of Louisiana. It has occurred to the writer that a somewhat similar table for California would be of value not only for engineers and others interested in power questions, but also for students of climatology who may be interested in studies of heavy rainfall in various parts of the United States.

It is evident from the figures that follow that certain portions of California may well be considered as lying within the zone of maximum intensity of rainfall in the United States. It may also be noted that the records are of comparatively recent date and have been made with standard 8-inch gages properly exposed.

The following table shows the heaviest recorded rainfall in California during the past 10 years: The greatest annual amount is 153.54 inches (3,900 mm.) at Monumental, Del Norte County, exact elevation not determined. This occurred in 1909. This is not given in the list compiled by Mr. Coberly, although in excess of any of the rainfalls quoted for places in the United States, except Glenora, Oreg., record of 1896, when 167.29 inches (4,250 mm.) fell, and the same place in 1897, 156.50 inches (3,969 mm.) fell.

Rainfalls exceeding 100 inches (2,540 mm.) have occurred at many points in California. From an inspection of long period records made at several stations in California, we are justified in concluding that the year 1909 in California was the year of heaviest rainfall. The years 1871, 1879, 1880, 1882, 1884, 1893, 1896, 1899, 1904, 1907, and 1911 were all years of heavy rainfall; but it is doubtful if the total amount at any one station was in excess of that which fell during 1909.

Excessive annual rainfalls in California.

Stations.	Elevation.	1911.	1910.	1909.	1908.	1907.	1906.	1905.	1904.	1903.	1902.
	Feet.										
Monumental.....				153.54	88.59	139.20	116.13	69.30			
Magalia.....	2,321	77.62	49.32	150.62	44.96	96.32	125.01	43.16	94.40		
La Porte.....	5,000		60.22	141.40	58.08	113.94	124.46			77.04	89.09
Helen Mine.....	2,750	73.81	50.76	136.86	53.90	103.13	129.69	68.03	114.72	67.37	137.58
Inskip.....	4,975	78.49	58.08	134.18	56.42						
Branscomb.....	2,000	65.17	56.49	130.14	59.06	108.42	99.08	55.03	115.07	91.06	120.35
Woodleaf.....	3,250			125.28		103.18	125.41				
Fordyce Dam.....	6,500	71.03	47.41	125.28	41.88	86.14	120.64	43.16	75.69	63.31	65.59
Bear Valley (Nevada Co.).....	4,600	72.75	49.44	119.39	45.47	94.47	110.85	46.93	103.59	67.44	
Pilot Creek.....	4,000	79.94	44.01	113.98	41.96	87.15	110.61	42.56	93.99	68.66	60.70
Blue Canon.....	4,695	67.27	42.13	110.72	40.97	100.17	104.21	46.65	93.48	64.18	64.99
Stirling City.....	3,525	66.20	35.75	108.63	33.56	111.20	125.08	44.02			
Brush Creek.....	2,140	66.53	37.62	104.65	48.57	86.64	106.25	50.63	91.98		
Nimshew.....	2,500	65.70	40.36	103.26	44.82	82.21	104.00	43.11			
Crescent City.....	50				53.35	91.46	70.27	50.91	107.61	80.76	103.12
Upper Mattole.....	244	64.13	62.81	121.79	61.93	99.84	85.70	70.04	126.53	94.88	123.26
Bowmans Dam.....	5,500			113.85	47.27	86.55	97.45	64.49	135.70	88.70	70.92