as much run-off from an early snow as from a late one, but in spite of this fact the early heavy snows this season will help out last year's deficiency in these watersheds to a great extent. It will require heavy snow later in the season to bring Lake Tahoe up to the desired level.

DAILY RANGES OF TEMPERATURE IN NEVADA.

By HARVEY S. COLE, Section Director.

In the Climatology of the United States, Prof. Henry says that the mean daily range of temperature is greatest in the Plateau region and least along the Pacific and Gulf coasts. Nevada, due to its geographic position, is an extreme type of country having a large range of temperature. It is situated east of a high mountain range and in addition has a considerable elevation. These facts account for the relatively high afternoon temperatures, and at the same time the rare and clear air permit rapid radiation at night with accompanying low temperatures.

The following instances of great ranges in temperature will emphasize this fact. A daily range of temperature of 75° occurred at Carlin August 24, 1910, and 72° on July 6 of the same year was reported at the same place. There is scarcely a season that a daily range of over 60° is not reported at that station. Quinn River Ranch scarcely ever fails to report a range of 55° or more during a season and has reported 60° on several different occasions. Ranges of 50° or more are expected over the eastern and nothern portions of the State. The highest temperature ever recorded in the State is 120° at Cobre, in August, 1893; the lowest —39° at Beowawe, January 8, 1890; an absolute range of 159° for the State.

For this study the mean daily ranges for the different months of the year were charted for 20 stations. The stations were not as well distributed as could be desired, as in some portions of the State no record for a number of years is available, but it is thought the ones chosen will answer very well. A chart of the average daily ranges for the year was also prepared.

The mean daily ranges for charts were obtained by subtracting the mean maximum temperature from the mean minimum temperature for each month in the year. The mean maximum and minimum temperatures used were for the different periods obtainable, varying in length, but none for less than five years.

These daily ranges were charted and lines drawn for each 5°. The lines are so irregular that the exposures of the instruments are evidently not uniform; but there is a general increase in range from Tonopah outward, the increase being decided to the northwest and to the northeast, east, southeast, and south, but small to the north and west.

The three Weather Bureau stations, Reno, Winnemucca, and Tonopah, show decidedly lower ranges than surrounding stations, the annual ranges being 28°, 28°, and 19°, respectively. This, of course, is because of the elevation of the instruments above the ground, in free air, where the effects of radiation and insulation are not so great as at the surface.

The record at Austin shows an average daily range for the year of 23°, much less than at surrounding stations, because the location is in a long narrow valley trending north and south, between high mountain ranges which cut off the amount of sunshine both morning and evening. Its elevation is 6,594 feet, which, other things equal, would give it a larger range.

Records at Lovelocks and Quinn River Ranch show a range of 34° each, considerably larger than the stations in the western portion of the State, which average 28°. The elevation at Lovelocks is 3,977 feet and at Quinn River Ranch it is 4,850 feet, somewhat lower than the other stations in the western portion. This increase in range is due to the great radiation over the Black Rock Desert, the air over the desert being so clear and dry that insolation and radiation are very effective.

The greatest average daily ranges for the year in the State are at Carlin and Geyser, which are 42° and 40°, respectively. Both stations are in the eastern portion of the State. Carlin has an elevation of 5,232 feet and Geyser 6,055 feet. The instruments at both stations are in shelters, over uncultivated ground, in a broad valley, the surface sloping gently to the southward. They are also in a portion of the State where the number of clear days is unusually large, allowing a great amount of insolation and radiation.

The annual variation of the daily range over the State is very noticeable, the average for February at Tonopah being 11° and increasing rapidly in each direction except to the north and west. In the northwestern and eastern portions of the State the midwinter average is 25° to 33°, the latter occurring at Geyser. These ranges increase gradually from midwinter to midsummer, when they exceed 40° in the northwestern portion and in the eastern half of the State. They exceed 44° at several stations in August, and reach 57° at Carlin. The large range at Carlin is due to the shelter being over uncultivated ground, the gentle slope to the south, the elevation leaving the denser portion of the air below, and to its location east of the Sierra, resulting in dry air and cloudless skies.

By the courtesy of Profs. Church and Ferguson I have obtained average daily ranges on Mount Rose for the midsummer and midwinter months, which are 9° and 22°, respectively. The station is on the highest point of the mountain, at an elevation of 10,800 feet. The midwinter range at Lewers Ranch, about 6 miles distant from Mount Rose and at an elevation of 5,200 feet, is 21°, and the midsummer range is 36°. The difference in range is accounted for by the fact that Mount Rose is a sharp peak projecting into the air, and the temperature readings are as near free-air readings as can be obtained except by kite observations.

The range retreats from midsummer to midwinter as consistently as it advanced. It is interesting to notice how consistently the lines of greater range appear on the outer edges of the State, and the lines of least range disappear at Tonopah as the season advances, month by month, from February to August, and how consistently the lines of least range appear at Tonopah and the lines of greatest range disappear on the outer edge from August to February.

The least difference between midsummer and midwinter ranges is 7° at Fernly and 28° at Carlin. This difference between summer and winter ranges is comparatively small in the western and southern portions of the State, while it is large in the northern portions.