TAHOE: STATE OF THE LAKE REPORT 2015

METEOROLOGY

UC DAVIS
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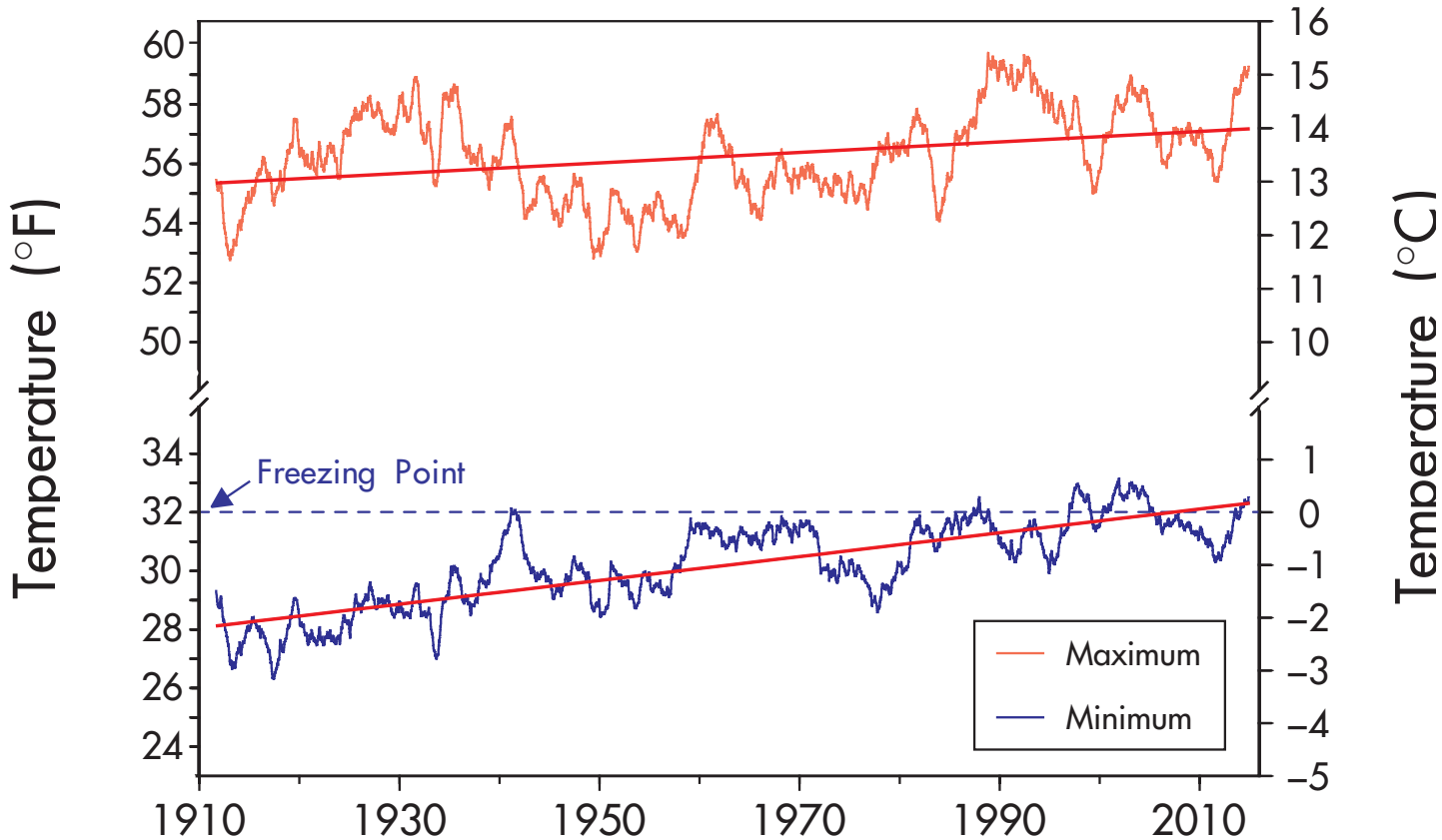
METEOROLOGY

Air temperature

Daily since 1911

Over the last 100 years, the daily air temperatures measured at Tahoe City have increased. The long-term trend in daily minimum temperature has increased by 4.2 °F (2.3 °C), and the long-term trend in daily maximum temperature has risen by 1.8 °F (1.0 °C). The trend line for the minimum air temperature exceeds the freezing temperature of water, which is strongly suggestive of more rain and less snow, as well as earlier snowmelt. These data have been smoothed by using a two-year running average to remove daily and seasonal fluctuations. In 2014 the average minimum temperature increased by 2.3 °F (1.3 °C) over 2013. The average maximum temperatureincreased 2.0 °F (1.1 °C) over 2013.



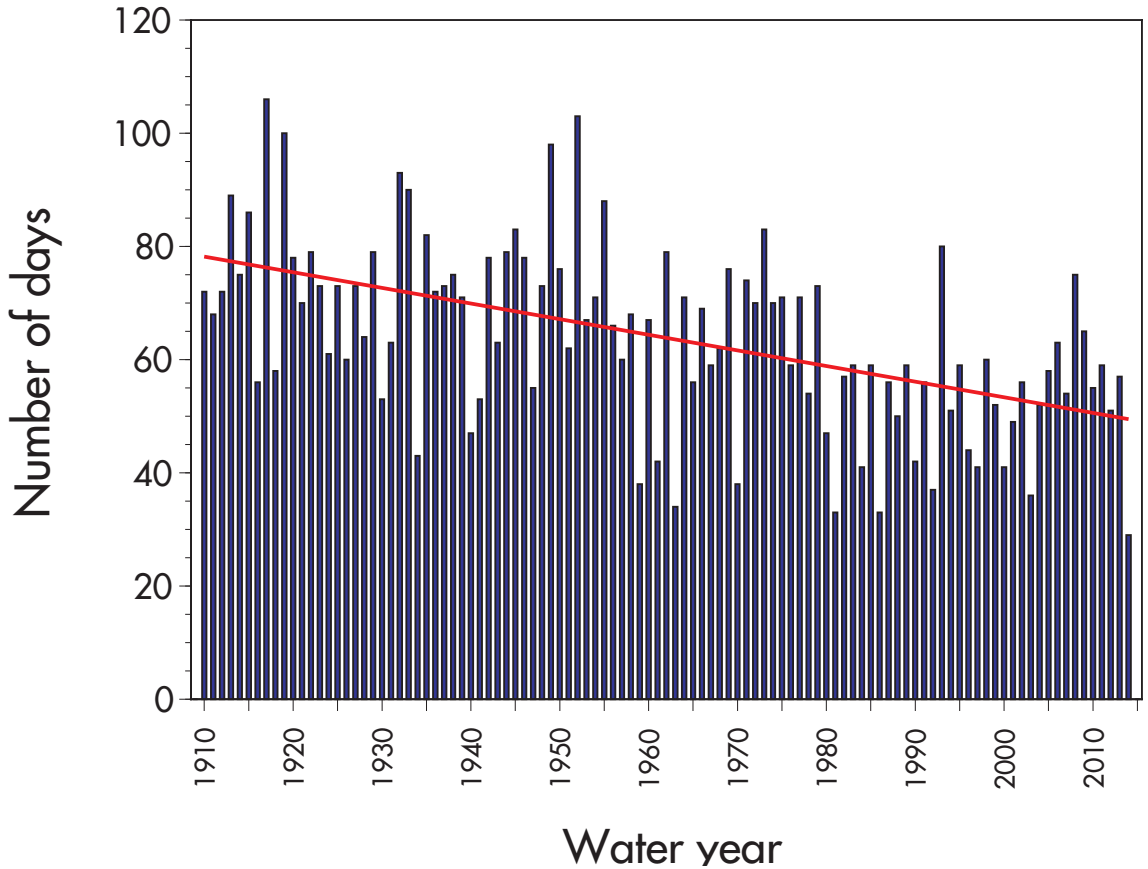
METEOROLOGY

Below-freezing air temperatures

Yearly since 1910

The method used for this analysis sums the number of days with daily average temperatures below freezing between December 1 and March 31 for each Water Year (WY). Although year-to-year variability is high, the number of days when air temperatures averaged below freezing has declined by about 29 days since 1911. In WY 2014, the number of freezing days was 29, the lowest ever recorded.

Note: The Water Year extends from October 1 through September 30.



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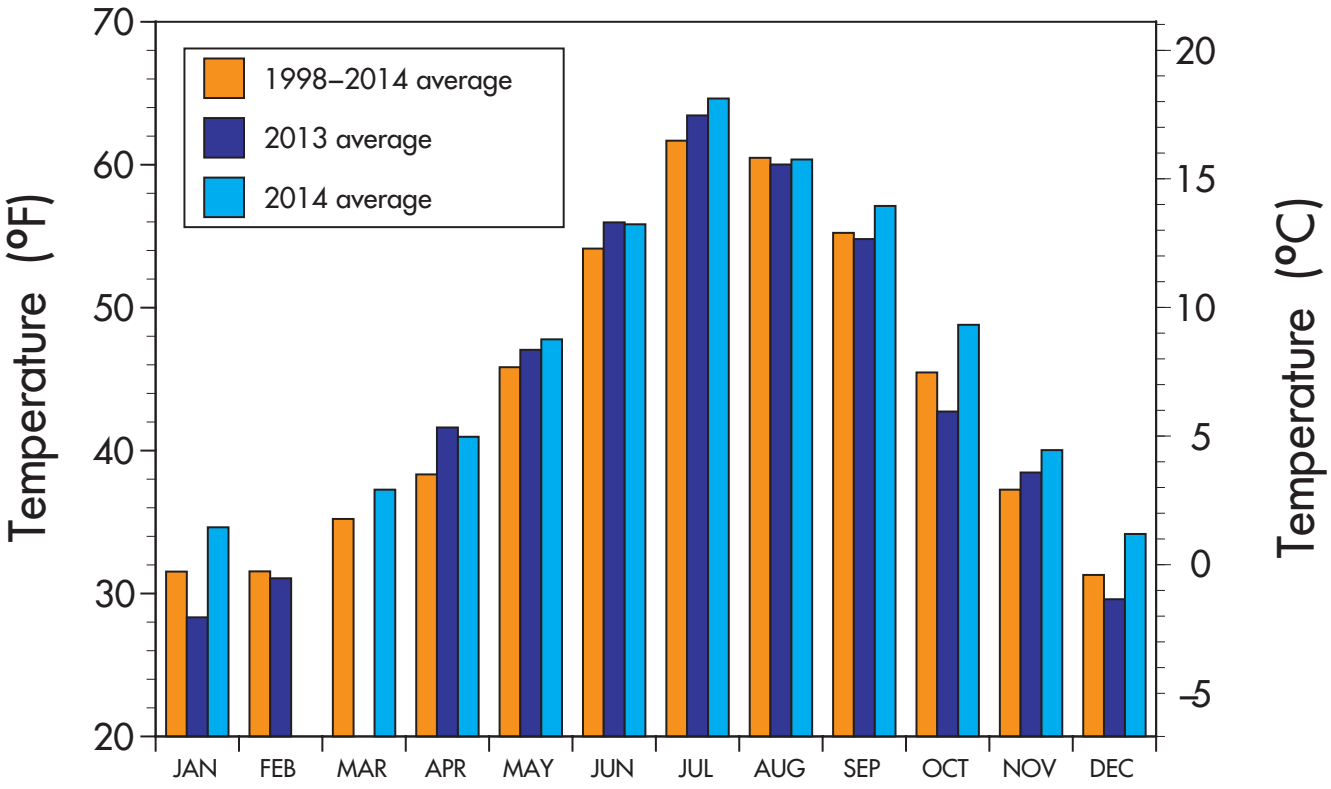
Monthly air temperature

Since 1998

In 2014 monthly air temperatures were distinguished by being colder that the long-term mean during the winter months and warmer than the long-term mean in the summer months. In January 2013, the air temperature was more than 3 degrees F cooler than the long-term mean and more than 5 degrees cooler than 2014. In 2014, April through July were all warmer months than the long-term average. These trends are all consistent with the drought conditions that were experienced in the basin.



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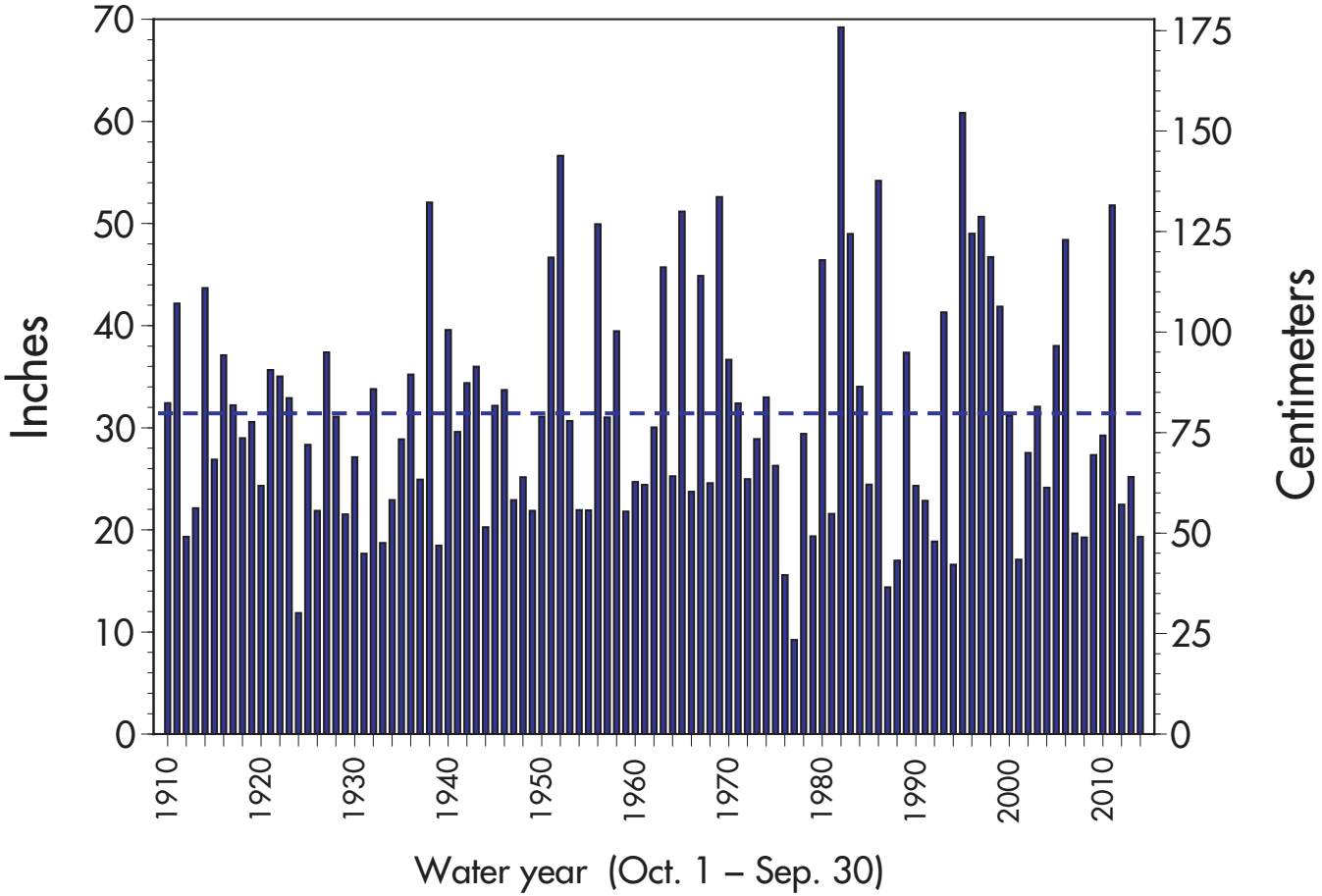
Annual precipitation

Yearly since 1910

From 1910 to 2014, average annual precipitation (water equivalent of rain and snow) at Tahoe City was 31.41 inches. The maximum was 69.2 inches in 1982. The minimum was 9.2 inches in 1977. 2014 was well below average, with 19.32 inches, following the previous dry year which had 25.19 inches of precipitation. The long-term mean of 31.53" is shown by the dashed line. Generally there is a gradient in precipitation from west to east across Lake Tahoe, with almost twice as much precipitation falling on the west side of the lake. (Precipitation is summed over the Water Year, which extends from October 1 through September 30.)



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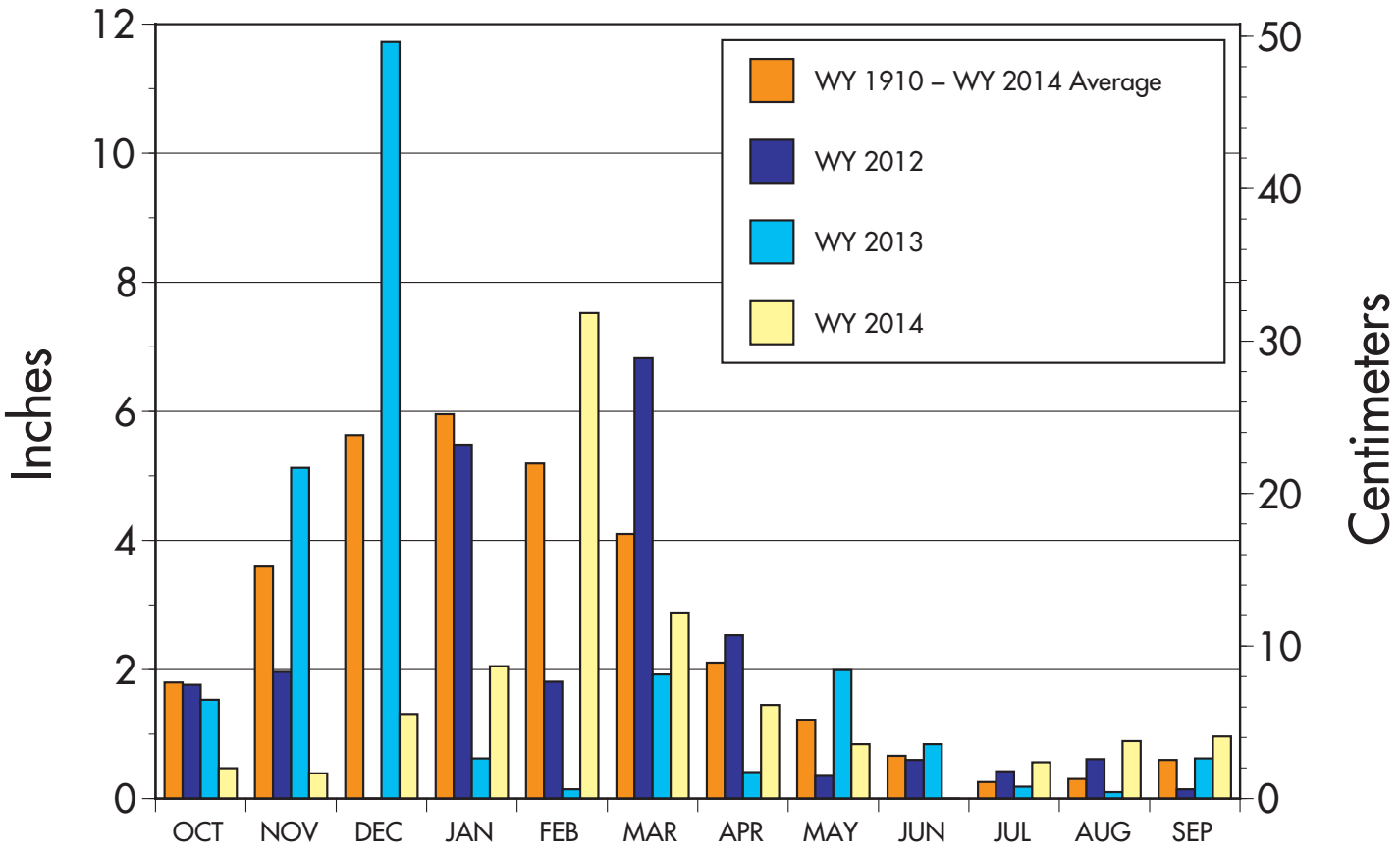
Monthly precipitation

2012, 2013, 2014 and 1910 to 2014

2014 was well below average in total precipitation. This is clearly evident in the comparison of the monthly precipitation with the previous two years and the long-term average. Monthly precipitation was particularly low from January through April. The monthly precipitation for Dec-2011 (WY 2012), and Jun-2014 (WY 2014) was 0 inches. The 2014 Water Year extended from October 1, 2013, through September 30, 2014.



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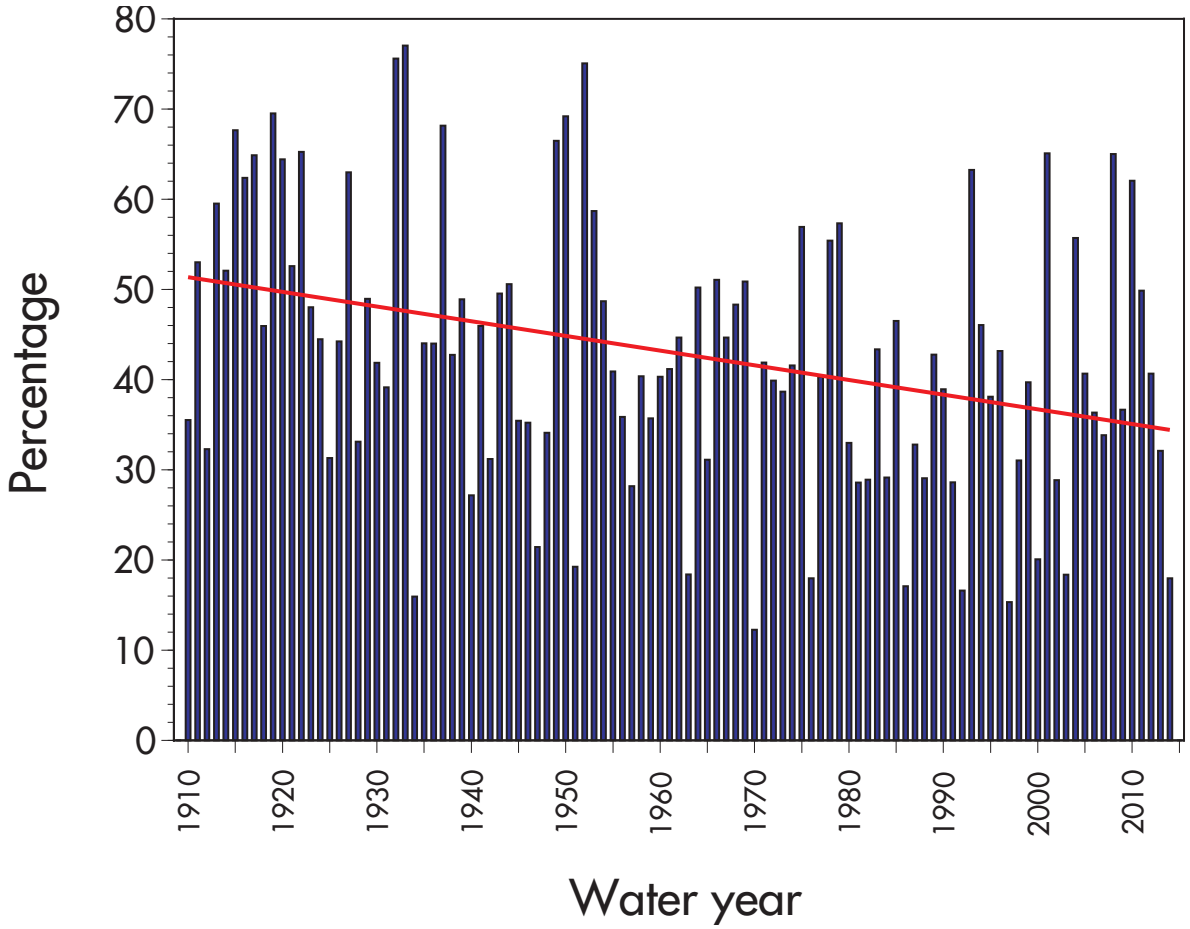
Snow as a fraction of annual precipitation

Yearly since 1910

Snow has declined as a fraction of total precipitation, from an average of 51 percent in 1910 to 34 percent in present times according to the line of best fit. In Tahoe City, snow represented 18 percent of the 2014 total precipitation, one of the lowest values on record. These data are calculated based on the assumption that precipitation falls as snow whenever the average daily temperature is below freezing. (Precipitation is summed over the Water Year, which extends from October 1 through September 30.)



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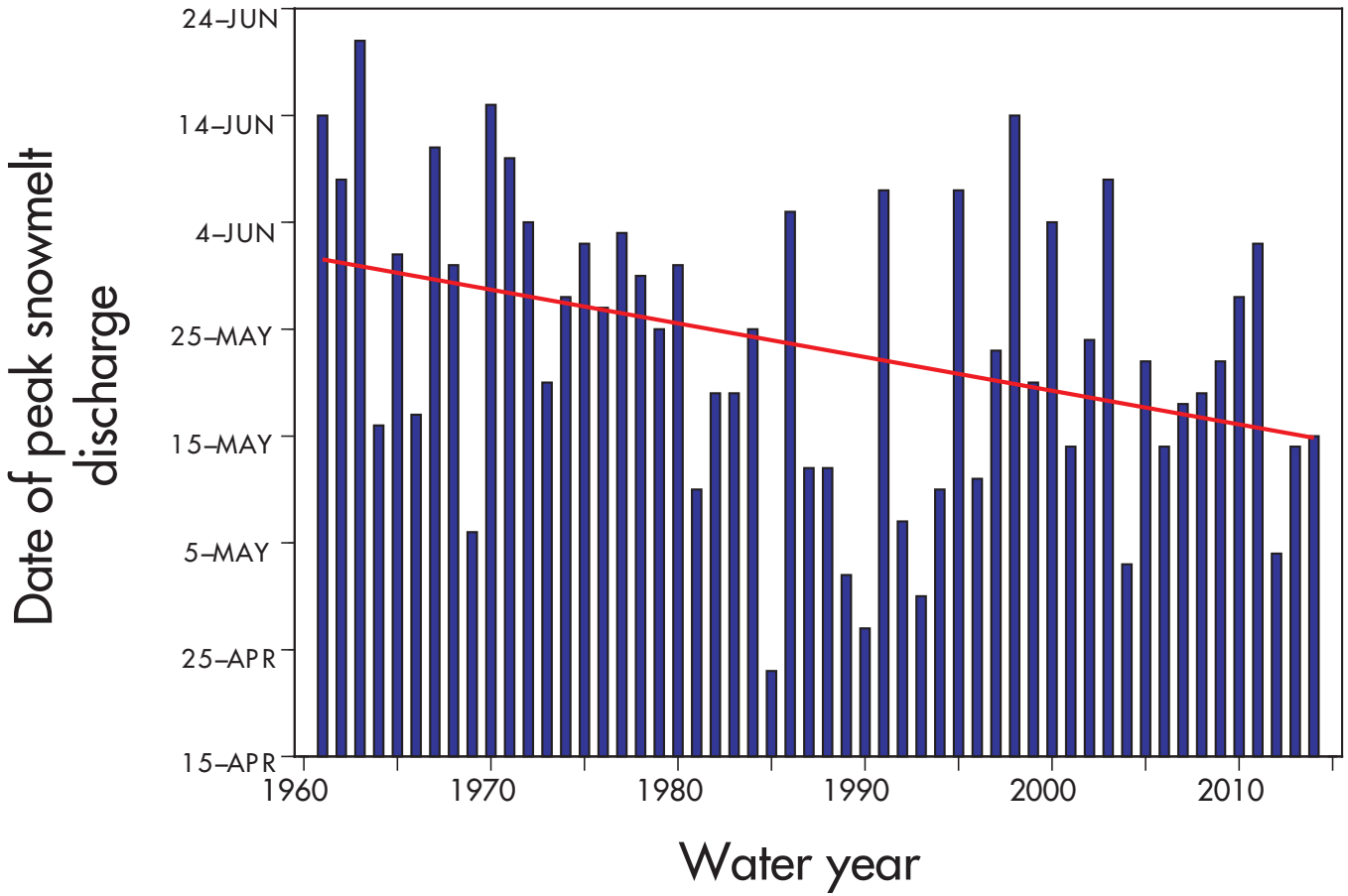
Shift in snowmelt timing

Yearly since 1961

Although the date on which peak snowmelt occurs varies from year to year, since 1961 it has shifted earlier an average of over 2 weeks (16.7 days). This shift is statistically significant and is one effect of climate change at Lake Tahoe.

Peak snowmelt is defined as the date when daily stream flows reach their yearly maximum. Daily stream flows increase throughout spring as the snow melts because of rising air temperatures, increasing solar radiation and longer hours of daylight. The data here are based on the average from the Upper Truckee River, Trout Creek, Blackwood Creek, Ward Creek, and Third Creek.



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Daily Solar Radiation

In 2014

Solar radiation showed the typical annual pattern of increasing then decreasing sunlight, peaking at the summer solstice on June 21 or 22. Dips in daily solar radiation are due primarily to clouds. Smoke and other atmospheric constituents play a smaller role. It is noteworthy that solar radiation on a clear day in mid-winter can exceed that of a cloudy day in mid-summer. The station where these data are collected is located on the U.S. Coast Guard dock at Tahoe City.