TAHOE:
STATE
OF THE
LAKE
REPORT
2013

METEOROLOGY

UCDAVIS
TAHOE ENVIRONMENTAL
RESEARCH CENTER

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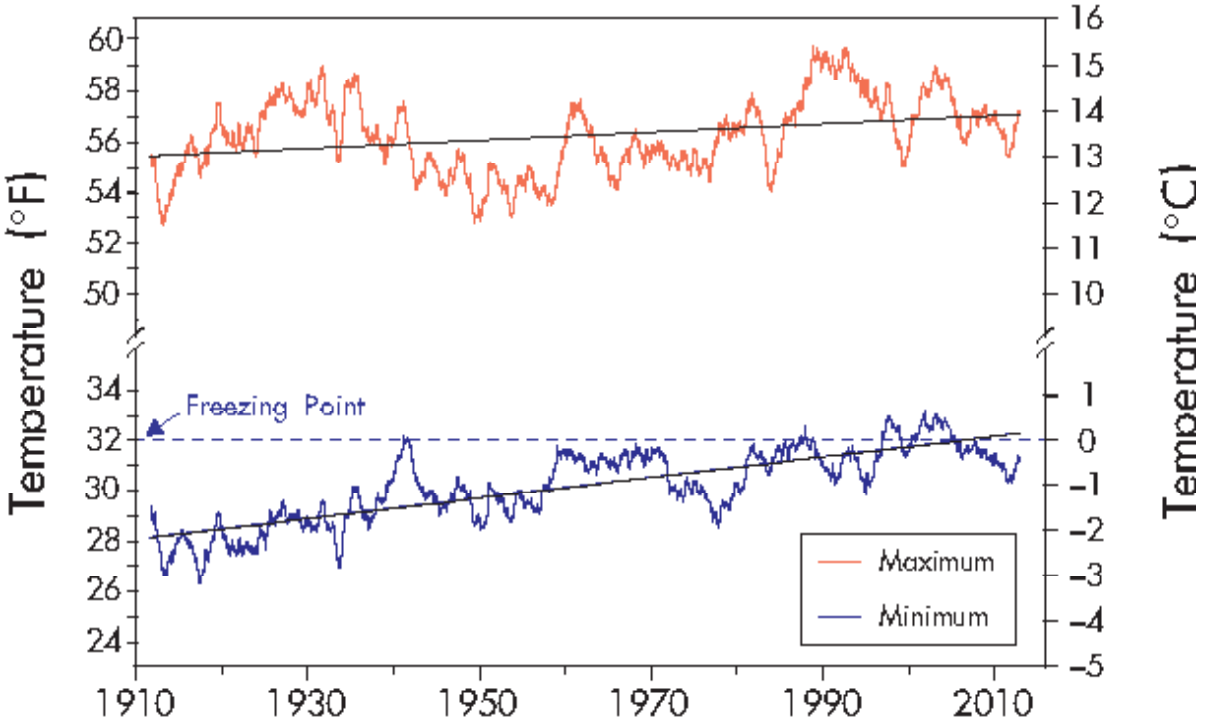
METEOROLOGY

Air temperature

Daily since 1911

Daily air temperatures have increased over the 100 years measured at Tahoe City. The long-term trend in daily minimum temperature has increased by more than 4 °F (2.2 °C), and the long-term trend in daily maximum temperature has risen by less than 2 °F (1.1 °C). The trend line for the minimum air temperature now exceeds the freezing temperature of water, which points to 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. 2012 was warmer than the previous year, which came at the end of a decade-long cooling trend.



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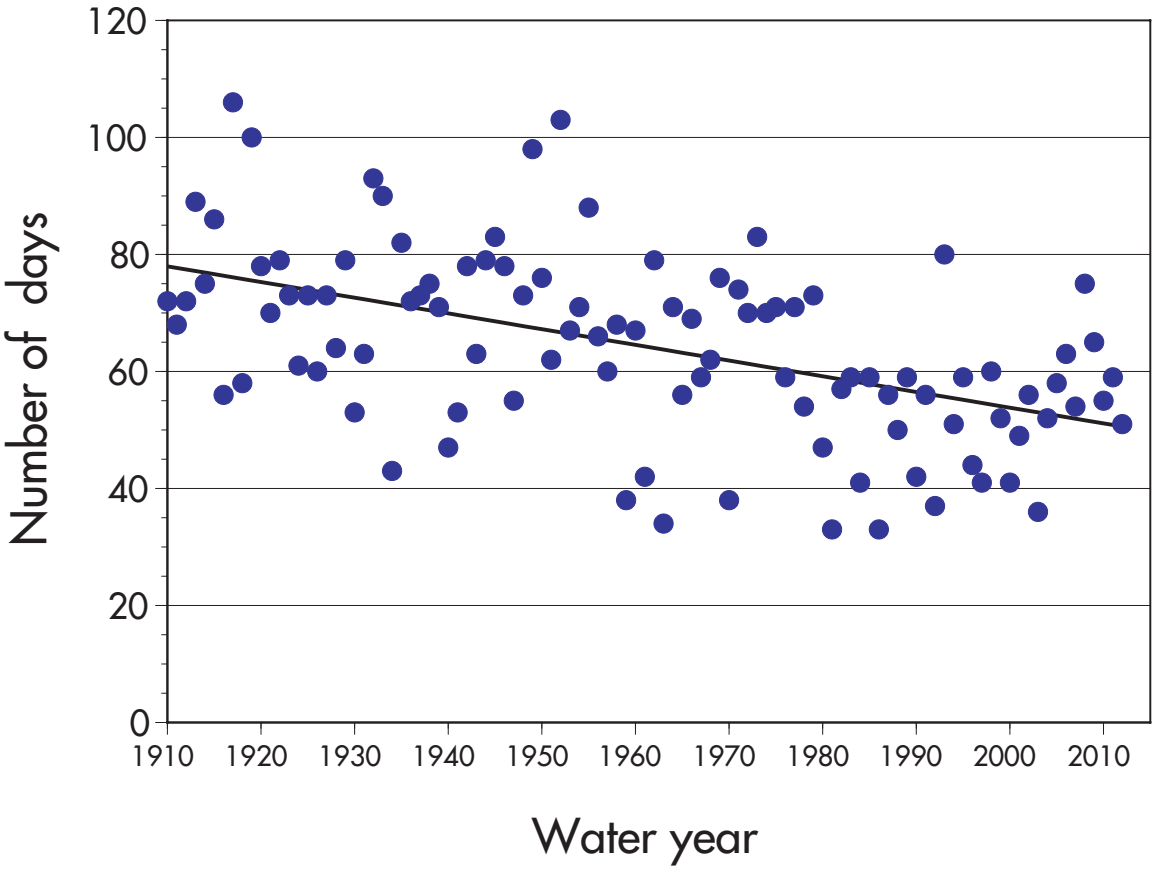
Below-freezing air temperatures

Yearly since 1910

The method used for this analysis sums the number of days with daily average temperatures below freezing between Dec 1 and March 31 for each Water Year. Although year-to-year variability is high, the number of days when air temperatures averaged below freezing has declined by about 25 days since 1911. In 2012, the number of freezing days fell directly on the long-term trendline.



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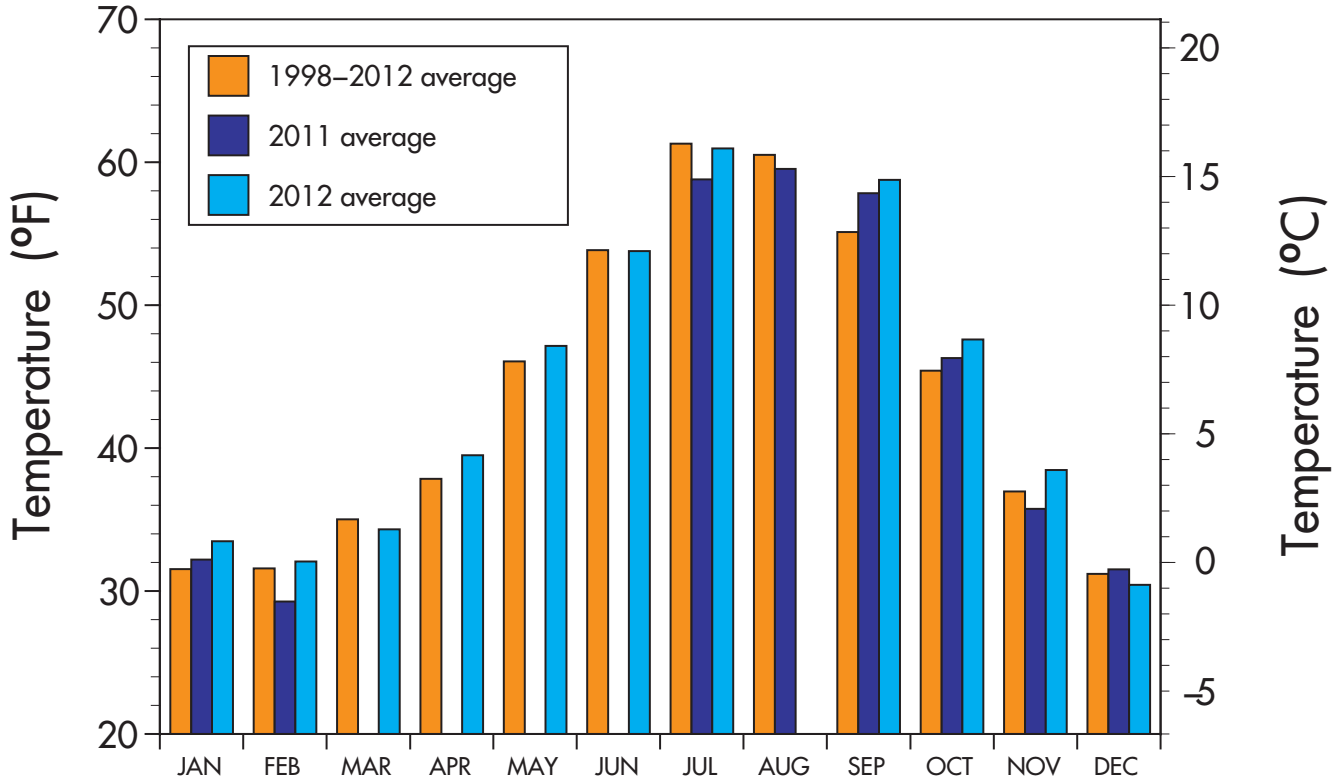
Monthly air temperature

Since 1998

In 2012, monthly air temperatures were generally similar to values in the previous year and to the long term average. A notable exception was that 2012 was warmer than the long term average in the fall months of September through November. Any month with more than 25 percent of the daily data missing was not plotted.



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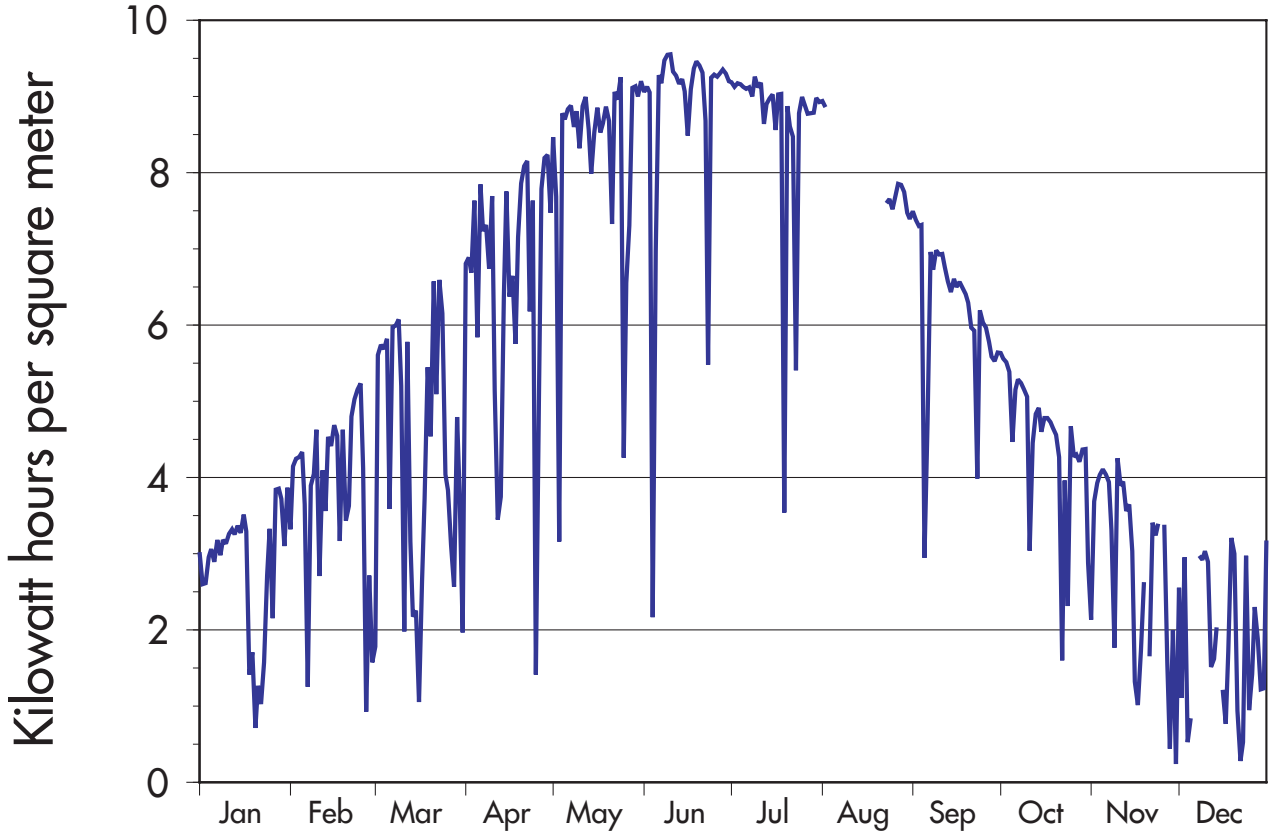
Daily solar radiation

Daily in 2012

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. Data for August are missing due to instrument calibration. The station where these data are collected is located on the U.S. Coast Guard dock at Tahoe City.



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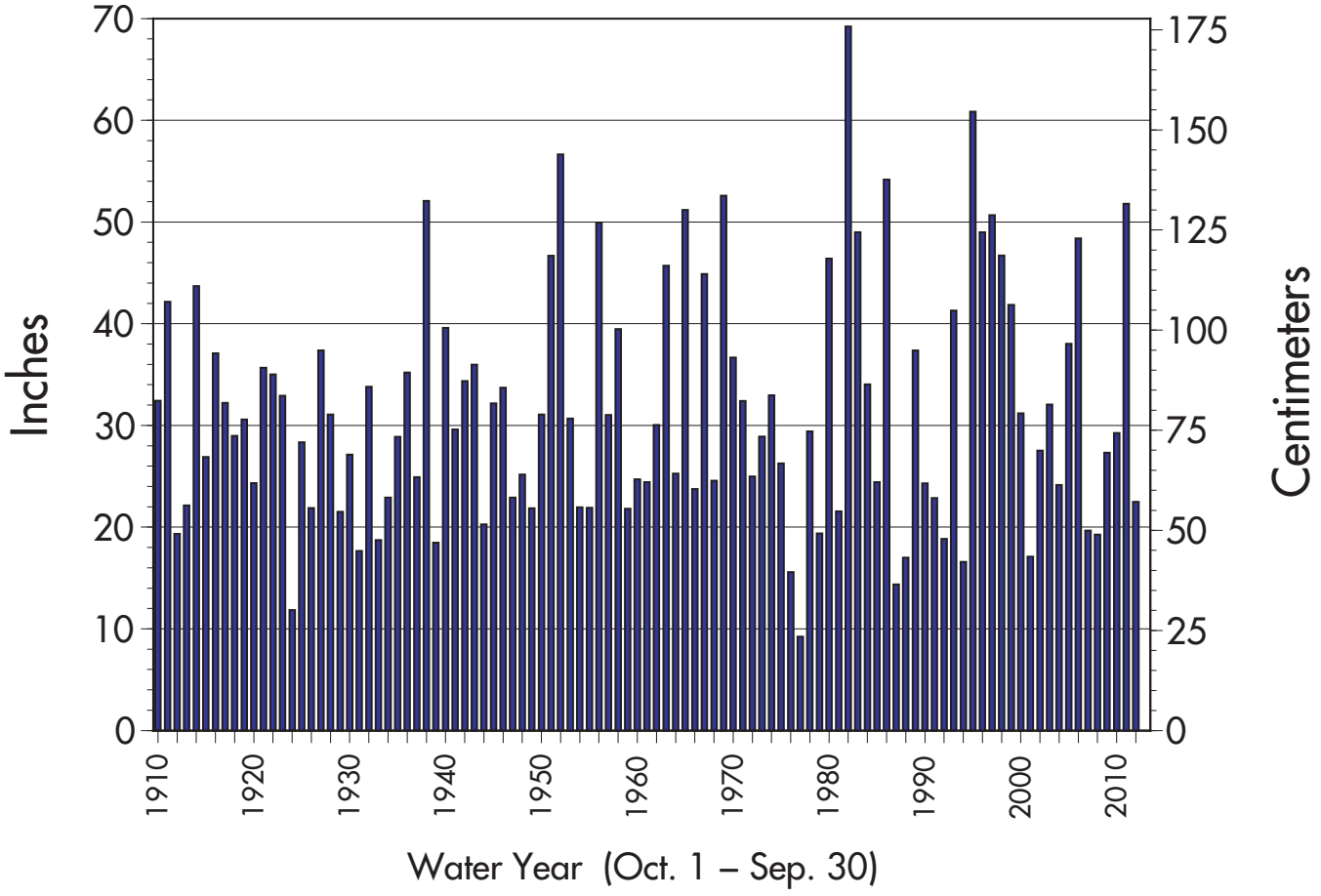
Annual precipitation

Yearly since 1910

From 1910 to 2011, average annual precipitation (water equivalent of rain and snow) at Tahoe City was 31.59 inches. The maximum was 69.2 inches in 1982. The minimum was 9.2 inches in 1977. 2012 was well below average, with 22.48 inches of precipitation. 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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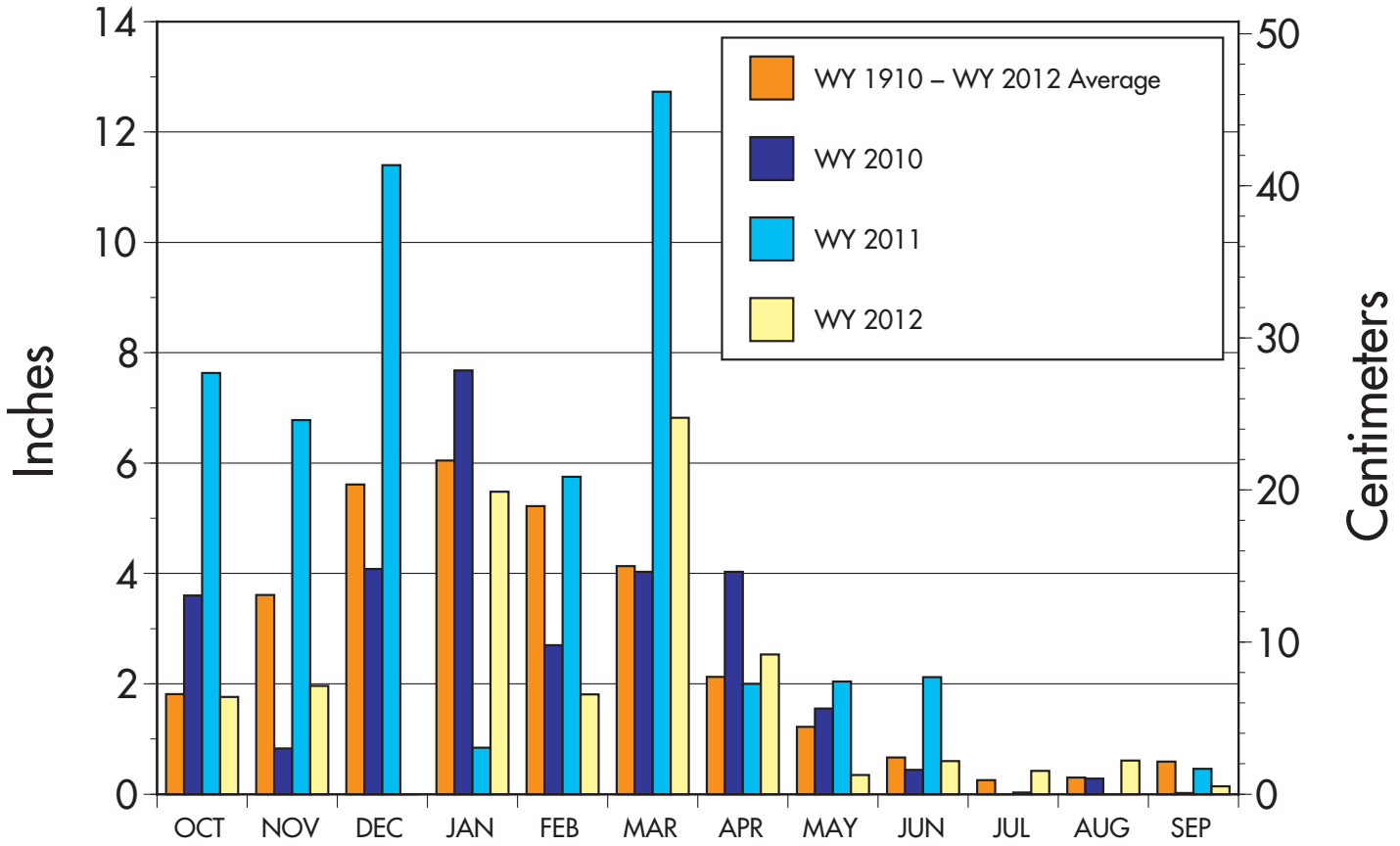
Monthly precipitation

2010, 2011, 2012 and 1910 to 2012 Average

2012 was well below average in total precipitation, and this is clearly evident in the comparison of the monthly precipitation with the previous two years and the long-term average. The monthly precipitation for Jul-2010, Aug-2011, and Dec-2011 was 0 inches. The 2012 Water Year extended from October 1, 2011, through September 30, 2012.



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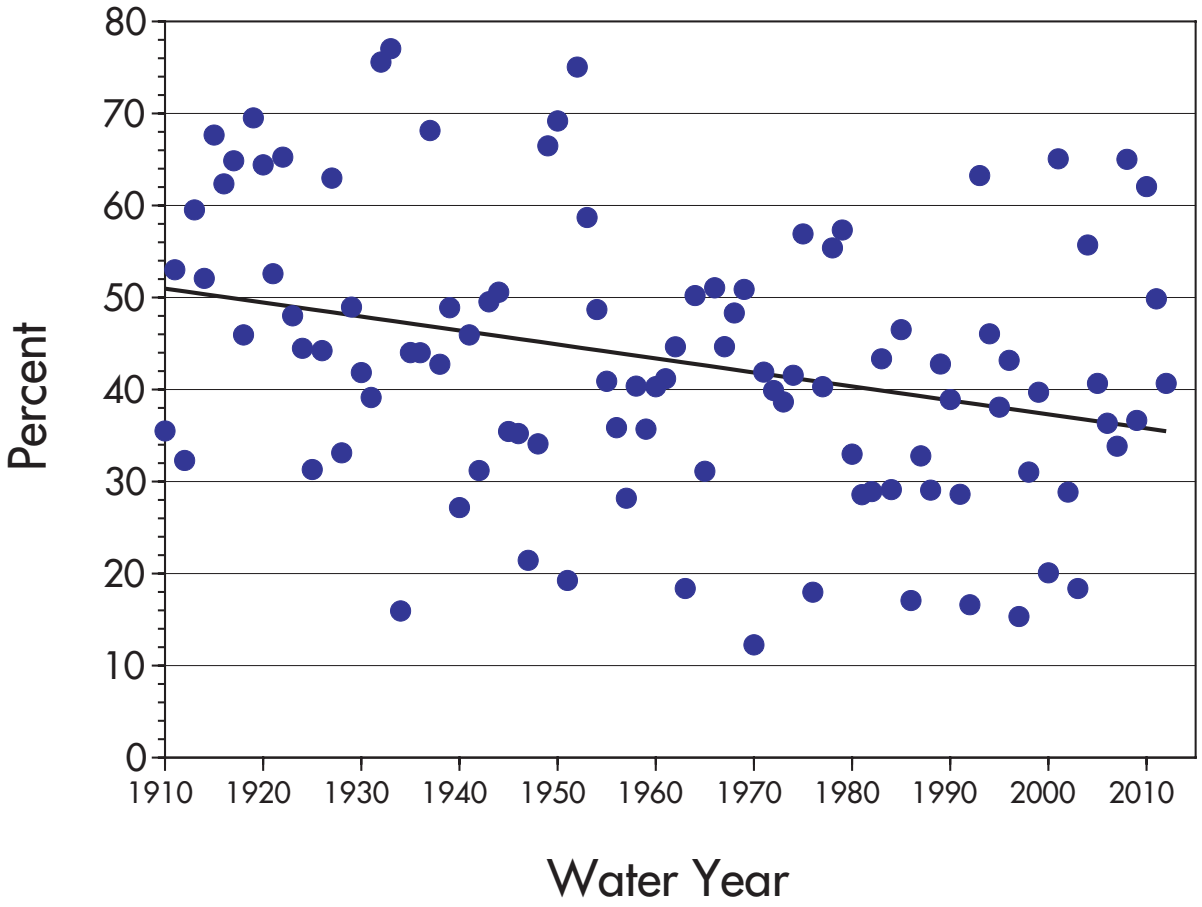
Snow as a fraction of annual precipitation

Yearly since 1910

Snow has declined as a fraction of total precipitation, from an average of 51 percent in 1910 to 36 percent in present times according to the line of best fit. In Tahoe City, snow represented 41 percent of the 2012 total precipitation, slightly above the long-term trend. These data are 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 2 weeks (16.3 days). This shift is statistically significant and is one effect of climate change on Lake Tahoe.

In 2012, peak discharge was one of the earliest recorded, occurring around May 4. 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 days. The data here are based on the average from the Upper Truckee River, Trout Creek, Blackwood Creek, Ward Creek, and Third Creek.