Water Level Declines in Smith and Mason Valleys During Recent Drought Periods

Abstract:

Smith Valley and Mason Valley, in the Walker River Region of western Nevada, are two of the most productive agricultural basins in the State of Nevada. Agricultural irrigation water in the basins is derived from surface water from the Walker River and from groundwater. Irrigation for agricultural accounts for over 80% of the total groundwater use in both basins. Groundwater use for irrigation is dominant during drought periods when less surface water is available. This reliance on groundwater, in combination with more frequent and intense drought periods, has led to a decades-long decline in groundwater levels in both basins.

The Nevada Division of Water Resources (NDWR) monitors groundwater levels semi-annually at approximately 40 and 67 sites in Smith and Mason Valleys, respectively. This poster compares the groundwater declines during the two most recent droughts (2020-2021 and 2012-2015) for each basin. Greater annual water level declines were recorded during the 2020-2021 than the 2012-2015 drought. Water levels measured at the end of the 2021 irrigation season are some of the lowest levels measured, and in Smith Valley, the largest year-over-year decline on record was observed (15.4 ft in Smith; 4.3 ft in Mason). Smith Valley experienced greater water-level declines during both recent droughts than Mason Valley, and exhibited smaller water-level recoveries than Mason Valley during the intervening wet period (2016-2019). The higher rates of water-level decline in Smith Valley during recent drought periods are likely a result of smaller recharge effect from the West Walker River through Smith Valley than from the East, West, and Main Walker Rivers through Mason Valley.

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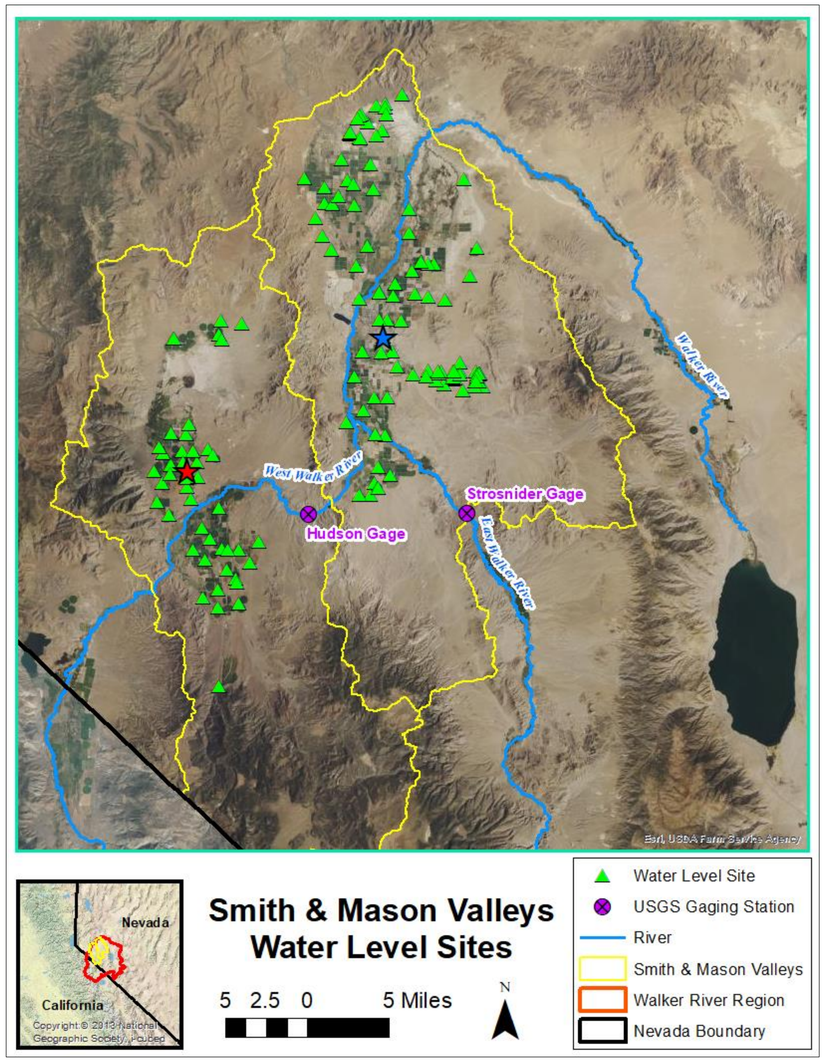
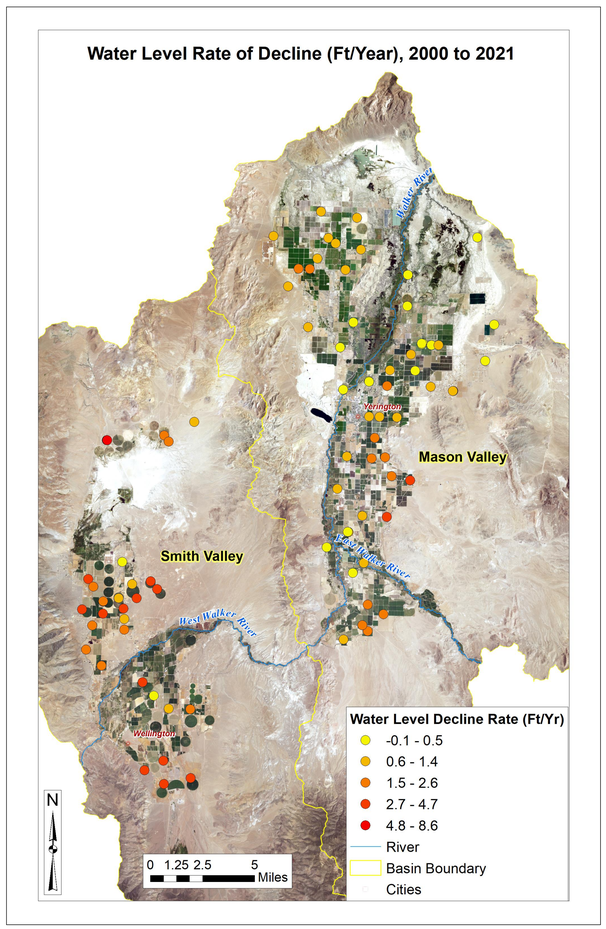


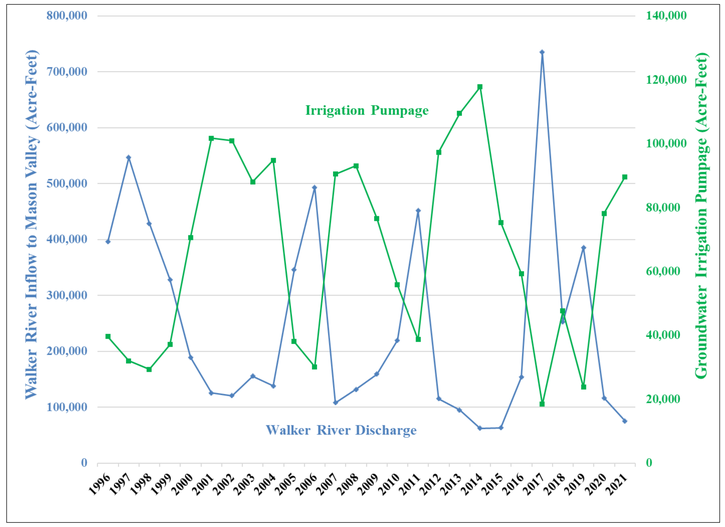


Average annual water level rates of decline for wells with 10 or more years of data between years 2000 and 2021.

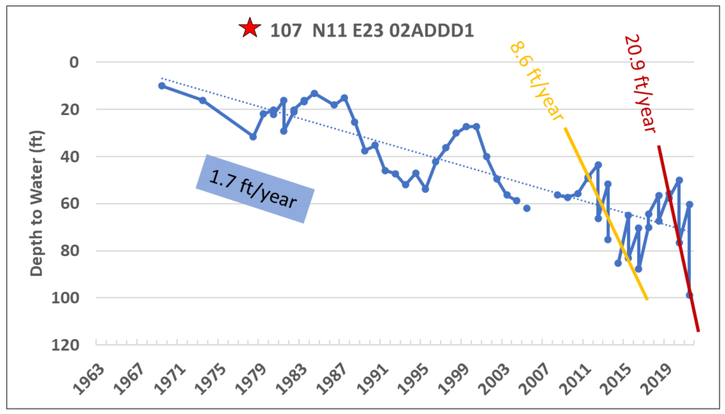
Mason Valley Water Level Declines (ft/yr)		
Drought	Average	Median
2012-15	4.3	4.0
2020-21	5.5	5.3

Smith Valley Water Level Declines (ft/yr)		
Drought	Average	Median
2012-15	5.7	7.7
2020-21	11.5	9.5

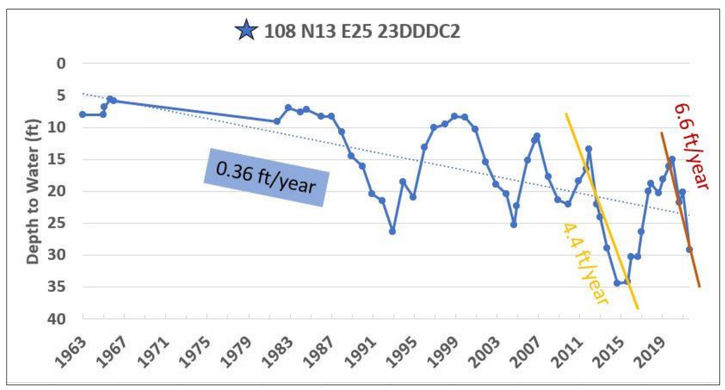
Mason Valley Groundwater Irrigation vs. Walker River Streamflow



More supplemental groundwater is used for irrigation when river discharge is low. Walker River streamflow is the sum of the average annual discharge at Hudson and Strosnider USGS Gages.



Typical Smith Valley hydrograph.



Typical Mason Valley hydrograph.

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