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On December 16, NASA and U.S. Geological Survey (USGS) scientists released separate studies reporting significant declines in groundwater in the Western U.S. NASA scientists announced that water levels in the Sacramento and San Joaquin River basins, which include the western slope of the Sierra Nevada and the northern half of the Central Valley, are 11 trillion gallons below normal levels. Scientists used data from NASA's Gravity Recovery and Climate Experiment (GRACE) satellites to measure surface and groundwater levels, finding that most of the water deficit is the result of groundwater extractions. Farmers have relied on these basins to irrigate crops during the past three years of drought conditions. Despite significant recent rainfall, hydrologists estimate that California would need 150 percent of its normal rainfall this winter to ease the drought and recharge the aquifer. The USGS report summarizes recent declines in the High Plains Aquifer, which underlies parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. Based on well measurements, the study compared current groundwater levels to measurements before significant extractions began in the 1950s. Measurements taken in 2011 showed an eight percent decline in aquifer levels, with an additional one percent depletion occurring between 2011 and 2013, which the report's lead author called "substantial" and attributed to increased groundwater pumping.

Sources: E&E News, NASA, U.S. Geological Survey
