
SONOMA VALLEY GROUNDWATER CONDITIONS

Groundwater resources have long played a significant role in the development, growth and sustainability of Sonoma Valley, with more than half the water demand in a given year met by local groundwater resources. These groundwater resources are relied upon by rural and urban residents, vineyards and wineries, dairies, and other businesses and also support the rich ecosystems present in Sonoma Valley. Assuring sustainable groundwater supplies in the Sonoma Valley is critical to the environmental health and economic vitality of the Basin. In recognition of the importance of local groundwater resources, local agencies and stakeholders have funded and supported technical studies and voluntary groundwater management programs that provide a strong technical and institutional foundation to build upon under SGMA. The USGS completed studies and modeling of the basin in 2006, and basin stakeholders engaged in a voluntary Groundwater Management Program between 2007 and 2017. Key information, tools and outcomes from these previous groundwater management planning activities include:

- Technical information on the Basin hydrology, hydrogeologic framework, water chemistry and source, surface water and groundwater interaction monitoring, and records of groundwater levels, including historical trends and documentation of two depressions in southern Sonoma Valley.
- Development of a MODFLOW groundwater flow model of surface water and groundwater systems in the Basin and contributing watershed area. The model has been used to simulate the water budget for the Basin and run preliminary future scenarios that will be needed for the GSP.
- Engagement of local stakeholders in local groundwater planning and management.

Sonoma Valley Groundwater Conditions and Management

Watershed and Climate

The Sonoma Valley watershed is located within the North Coast Ranges of northern California, which has a Mediterranean climate, with moderate temperatures and distinct wet and dry seasons. About 90 percent of the annual precipitation typically occurs during the months of November through April, and nearly half of the precipitation is due to atmospheric rivers, which concentrate rainfall and runoff along narrow bands.

Mean annual precipitation at Sonoma has been variable and averaged 28.8 inches during the 63-year period from 1953 through 2016, with 12 of the last 15 years seeing below average rainfall at 25.2 inches per year, including 8 years of a state-defined drought. Stream discharge patterns typically mirror rainfall, with peak flows occurring in response to precipitation. Significant for Sonoma Valley is that late spring rains provide soil moisture to crops, thereby reducing spring and early summer groundwater demands. Hydrologic models of potential climate change scenarios predict that precipitation could be subject to increased variability resulting in reduced water supply reliability and increased water demands due to increased evapotranspiration rates during warmer and extended summers.

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Hydrogeology

The Sonoma Valley is located within the geologically complex North Coast Ranges of California, dominated by northwest trending valleys with faults that may act as barriers to groundwater flow, or conduits to deeper saline water intrusion. A mixture of younger volcanic, sedimentary rocks and unconsolidated sediments form the complex aquifer system, which overlies older basement rocks that are fractured. The aquifer system consists of a shallow zone, approximately 200 feet depth or less, that appears relatively continuous and largely associated with alluvial and fluvial sedimentary deposits and some volcanics, and a deeper hydraulically isolated zone. The shallow aquifer zone is locally connected to Sonoma Creek, with most recharge occurring largely through streambed sediments along water courses throughout the valley, and also direct infiltration of precipitation on the valley floor and along the margins of the valley areas (mountain front recharge). In general, groundwater flows from recharge areas in the mountains and uplands surrounding the Sonoma Valley toward the valley axis, and in a generally southern direction towards San Pablo Bay.

Surface water-groundwater interaction within the entire watershed continues to be an important component of the groundwater system in Sonoma Valley. Data from the GMP monitoring program provides information on seasonally and annually variable groundwater discharge from the shallow aquifer to maintain and enhance flows in the Sonoma Creek and many of its tributaries, and the important role streams play in recharging groundwater in some areas.

Groundwater Levels and Movement

Monitoring of groundwater levels over time indicates declines continue to persist within deep zone aquifers primarily southeast of the City and in the El Verano/Fowler Creek subareas. The areas of decline have persisted for the last decade or more and may be expanding. While the magnitude of the declining rate may be influenced in part by the lower than average rainfall in recent years, many of the wells with declining groundwater levels exhibit persistent declines that do not recover during relatively wetter years. These chronic declines indicate that groundwater withdrawals are occurring at a rate exceeding the rate of recharge (or replenishment) within the deeper aquifer zones of southern Sonoma Valley.

Water Quality

Groundwater quality within the Sonoma Valley is generally good for all beneficial uses, with the exception that some wells contain elevated levels of arsenic, boron, manganese or iron. Brackish groundwater present beneath the southernmost Sonoma Valley represents a future threat to groundwater resources should groundwater declines continue to persist.

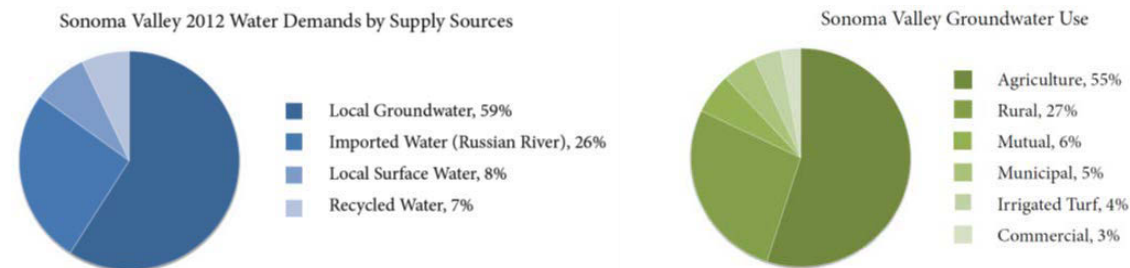
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Water Demands

Water demands in Sonoma Valley are met by four primary sources of supply comprised of local groundwater, imported surface water, local surface water and recycled water. The total estimated water demands from these four sources of supply for the entire Sonoma Valley watershed in Water Year 2012 were approximately 17,900 acre-feet (Figure B-1 shows percentage of each):

- 10,500 AF - Local groundwater pumped from wells located within Sonoma Valley
- 4,700 AF - Imported surface water from the Russian River Watershed delivered by the City of Sonoma and Valley of the Moon Water District
- 1,500 AF - Local surface water diverted from Sonoma Creek and its' tributaries
- 1,200 AF - Recycled water produced at Sonoma Valley Wastewater Treatment Plant and delivered for irrigation use within Sonoma Valley

The above estimates reflect the following percentage-sourcing of water-supply valley-wide in Water Year 2012: groundwater 59%, imported water 26%, diverted surface water 8%, and recycled water 7%.



Water Budget

The water budgets derived from computer models of the basin simulate average annual losses of groundwater in storage ranging from approximately 660 to 1,400 AFY, with estimates of approximately 850 AFY for the most recent decade (based on the most recent update of the MODFLOW model). While the certainty of these model simulations is constrained by the limitations of data and inherent assumptions, the groundwater storage declines estimated by the model are corroborated by the measured groundwater level declines in southern Sonoma Valley, where two pumping depressions have existed for several decades and appear to be expanding.