U.S. Geological Survey Santa Rosa Plain Groundwater Study

Phase 1 - Hydrogeologic and Geochemical Characterization, July 2013

Background

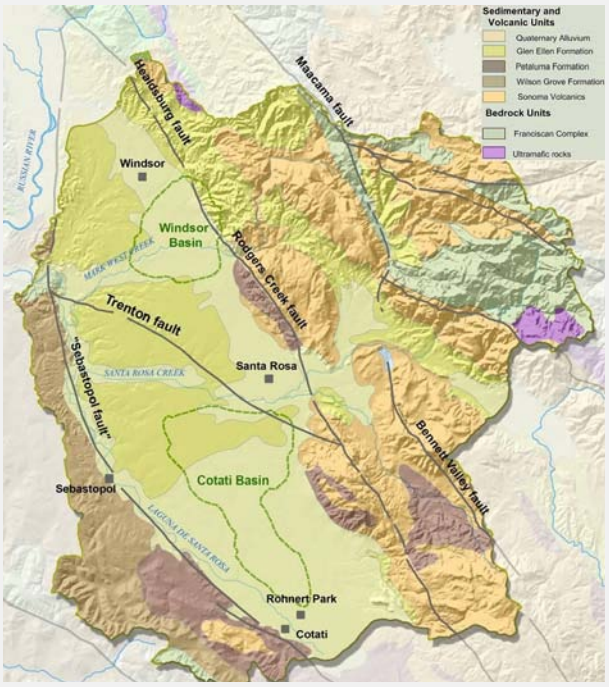
A significant study has been completed to characterize the surface water and groundwater resources of the Santa Rosa Plain Watershed. Groundwater in the Santa Rosa Plain is a critical resource for its residents, agriculture, businesses and ecosystems. The study provides a wealth of information and valuable tools for local stakeholders to use in protecting and managing the region's groundwater resources.

The seven-year study was conducted by U.S. Geological Survey (USGS) scientists as part of a cooperative program with the Sonoma County Water Agency to study the major groundwater basins of Sonoma County. Additional funding for the study was provided by the cities of Cotati, Rohnert Park, Santa Rosa, Sebastopol, town of Windsor, Cal-American Water Company, and County of Sonoma. The completion of the study by USGS scientists brings state-of-the-art tools and a rigorous scientific approach.

Santa Rosa Plain Setting and Geology

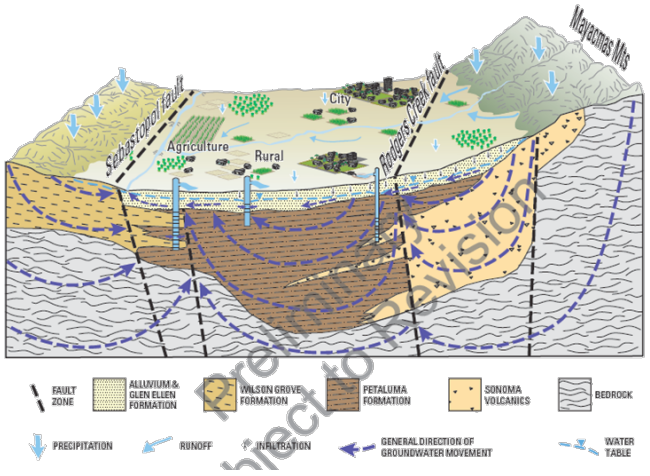
The Santa Rosa Plain Watershed study area covers about 167,000 acres, and is home to around half of the population of Sonoma County. The groundwater system beneath the Santa Rosa Plain provides water to residents and municipal systems, irrigation water for agriculture, and baseflow to streams, surface water bodies and associated ecosystems.

The Study reveals a large geologically complex groundwater basin, with multiple aquifers that exhibit wide variations in well yields and groundwater quality. In addition, the groundwater system is subdivided into several compartments that are separated by fault zones, including the Rodgers Creek Fault, the Sebastopol Fault, and the Trenton Fault. Groundwater flows through and is stored in sedimentary and volcanic formations, which include recent Alluvium/Glen Ellen, Wilson Grove, Petaluma, and the Sonoma Volcanics.



Santa Rosa Plain Groundwater Movement

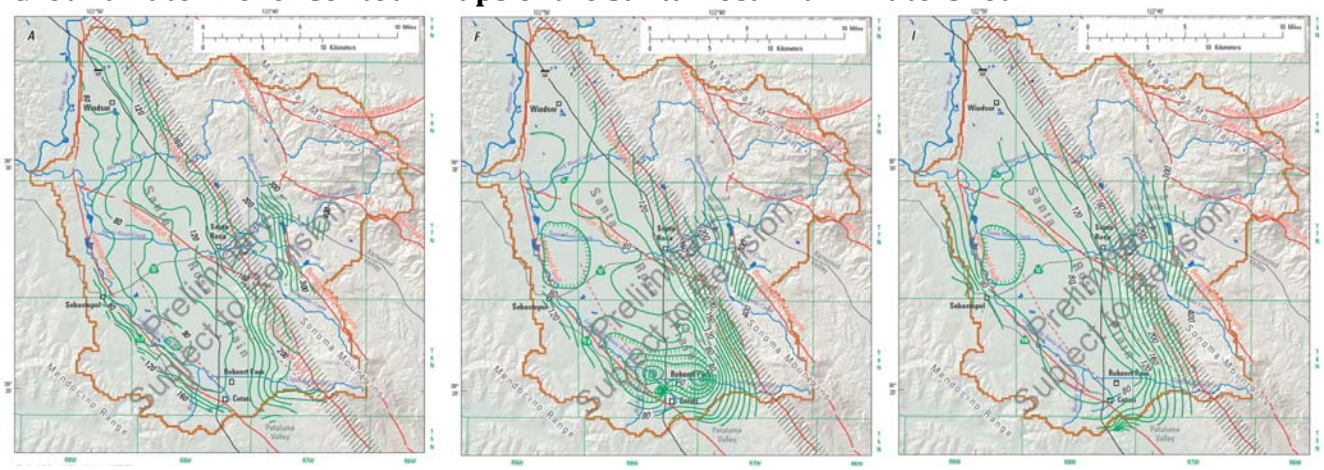
Groundwater is primarily recharged through the infiltration of precipitation and through seepage from streambeds. Groundwater leaves the basin through wells, springs, evapotranspiration from plants, and as both subsurface outflow and seasonal groundwater contribution to streamflows in some areas of the basin. Pumping is the largest cause of discharge from the basin, with the most significant proportion being agricultural and residential pumpage. Public supply pumpage represents around 15% of the total.



Santa Rosa Plain Groundwater Level Trends

In general, groundwater levels in shallow aquifers fluctuate seasonally with rainfall and are largely stable over time. The water in these aquifers is relatively young, often less than 50 years old. In contrast, groundwater within deeper aquifers commonly exceeds 4,000 years in age, with the oldest dated groundwater exceeding 30,000 years in age. Some deeper wells show overall stability, others show overall declining trends and still others show historical declining trends followed by recent increases in groundwater levels. Declining groundwater level trends within the deeper zone wells is likely related to large agricultural irrigation and public supply wells, as well as the greater amount of time these deeper zones require to recharge. A historical groundwater pumping depression that formed in the southern Santa Rosa Plain in the 1980's and 1990's has nearly fully recovered as imported surface water from the Russian River replaced groundwater use in this area over the past decade.

Groundwater-Level Contour Maps of the Santa Rosa Plain Watershed



The map on the left is a representation of 1951, and shows groundwater movement from the highlands towards the Laguna de Santa Rosa. The middle map (1990) shows two depressions in areas of high pumping, and the map on the right (2007) shows a reduction of these depressions.

Groundwater Quality

Groundwater quality throughout the study area is highly variable, but generally acceptable for potable use. Local groundwater quality issues exist, including naturally occurring constituents of concern such as iron, manganese, boron, and arsenic. Increases in chloride and specific conductance have occurred for reasons that remain unclear (although possible sources include groundwater inflow of older, more mineral-rich water, wastewater inputs through septic systems, and/or historical irrigation return flow).

Next Phase of Study

A second phase of the USGS study includes the development of a coupled surface water and groundwater flow model, with a comprehensive summary of the water budget for the study area. The model will be used by local stakeholders to assist in management and decision making for the region's groundwater resources in the future.

For more information visit www.sonomacountywater.org/srgroundwater/ or contact Project Manager Marcus Trotta at 707.547.1978 mtrotta@scwa.ca.gov.