Alexander Valley Groundwater Basin, Alexander Subbasin

- Groundwater Basin Number: 1-54.01
- County: Sonoma
- Surface Area: 24,500 acres (37 square miles)

Basin Boundaries and Hydrology

The Alexander area is a subbasin of the Alexander Valley Groundwater Basin. The Alexander Valley Groundwater Basin also includes the Cloverdale area subbasin to the north, and occupies a structural depression in the Coast Ranges north of the San Francisco Bay. The Alexander valley floor is locally bounded by low hills consisting of unconsolidated water-yielding sediments. The basin boundary extends from about 2 miles south of Asti in the north (the southern boundary of the Cloverdale area subbasin) to about 5 miles southeast of Jimtown. The northern boundary is noted by a reduced section of water-bearing materials between Alexander and Cloverdale valleys.

The Russian River flows south along the entire length of the basin. Precipitation in the Alexander Valley area ranges from approximately 36 to 44 inches.

Hydrogeologic Information

Water Bearing Formations

The Alexander Subbasin is comprised of Late Tertiary- to Quaternary-age volcanic rocks and continental sedimentary deposits. Primary water-bearing units include the Alluvium, Glen Ellen Formation, and the Sonoma Volcanics. The following description of hydrogeologic units is from an evaluation of groundwater resources in the area by DWR (1983).

Alluvium. Alluvium includes Pleistocene- and Holocene-age alluvial fan deposits, terraces, and stream-channel deposits. These deposits occur mainly along the margins of the basin and the floodplains and channels of active streams draining the basin. The alluvial fan and terrace deposits consist of poorly sorted, unconsolidated silt and silty clay with thin cross-bedded layers of sand and fine gravel. The deposits along the Russian River and Dry Creek consist of poorly sorted stream channel sands and gravels interbedded with clay and silt floodplain deposits. Maximum thickness is about 150 feet. The alluvium supplies most of the groundwater in the area, with wells yielding from about 50 to over 500 gpm. Higher yields are generally encountered near the Russian River (where river channel gravel is more common). Specific yields range between 8 to 20 percent.

Glen Ellen Formation. The Glen Ellen Formation is exposed in the southern portion of the valley, along the margins of the basin and within the low-lying hills in the vicinity of Jimtown. The formation consists of a thick

sequence of deformed continental deposits that overlie and interfinger with the Sonoma

Volcanics. It is composed of lenses of poorly sorted gravel, sand, silt, and clay deposited principally as piedmont and alluvial fans. Many beds grade laterally from coarse gravels into clay. The coarse materials are usually of andesitic composition. The unit is encountered in wells beneath the valley in the southern most end of the basin. Drillers' logs and discontinuous exposures in the south half of the valley suggest that the formation underlies the valley sediments at depths ranging from less than 10 feet to 60 feet below ground surface. The formations' subsurface extent is not well known in the northern half of the valley. The unit is Plio-Pleistocene in age and has an estimated thickness of about 1,500 feet east of the Russian River. The formation's potential to yield water is highly variable due to its heterogeneous nature. Specific capacities of wells are generally low, but high yields may be obtained from wells that penetrate thick sections of the formation. In the southern part of Alexander Valley, many wells are completed in this formation, with reported yields up to 120 gpm. Specific yields are generally low, in the 3 to 7 percent range.

Sonoma Volcanics. The Sonoma Volcanics are Pliocene in age. Exposures of the Sonoma Volcanics are limited to a few isolated outcrops along the margins of the valley. Because of their limited extent, they constitute a relatively minor portion of the total water-bearing deposits in the basin. However, they may be a locally important source of ground water. The Sonoma Volcanics consist of andesitic and basaltic lava flows and minor intrusive igneous rocks interbedded with tuff, welded tuff, and sedimentary deposits of volcanic origin. Thickness of the unit in the Alexander area is variable, probably measuring up to about 1,000 feet. The yield of wells completed in Sonoma Volcanics in the Alexander Subbasinis not known; however, to the south in Santa Rosa and adjacent valleys, successful wells completed in the volcanics generally yield from 10 to 50 gpm. Yields are highly variable and unpredictable, with the best yields reported from wells completed in beds of coarse tuff or volcanic ash. Specific yields vary from 0 to 15 percent.

Groundwater Level Trends

Hydrographs from eight wells in the study area between 1976 and 1999, indicate essentially no long-term change in water levels (DWR unpublished monitoring data).

Groundwater Storage

Groundwater Storage Capacity. The groundwater storage capacity for this basin was estimated at 762,000 af (DWR 1983). The calculation was made by dividing the area into a grid of 43 cells ranging from one-quarter mile to one mile in size. Specific yield values and aquifer thicknesses were assigned to each cell based on a review of lithologic descriptions from 600 well completion reports.

Groundwater in Storage. Based on groundwater elevation data from the fall of 1980, the volume of groundwater in storage was estimated to be approximately 547,000 af (DWR 1983).

Groundwater Budget (Type C)

There are not enough data available to provide an estimate of the basin water budget.

Water Quality

Characterization. Groundwater is generally characterized as moderately hard to hard, bicarbonate (DWR 1983). Based on data from 16 wells sampled between 1957 and 1980, TDS ranged from 130 to 444 mg/L and EC ranged from 178 to 672 µmhos/cm.

Impairments. Groundwater is generally suitable for all uses. Based on data available for 12 wells, 3 have had boron levels exceeding 0.5 mg/l. Boron values below this level are considered satisfactory for all crops; elevated levels may have detrimental effects on crop yields. In 1977, Sonoma County WA sent questionnaires to property owners within the County who were not served by a municipal or mutual water system, which requested information on taste, odor, and color of groundwater. The most common complaints were color and taste. Excessive iron and manganese can cause color in water; unpleasant taste can be caused by excessive hardness, salinity, sodium, iron and manganese, or sulfides; unpleasant odor can be caused by excessive iron and manganese or hydrogen sulfide (DWR 1983).

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	19	0
Radiological	9	0
Nitrates	21	0
Pesticides	16	0
VOCs and SVOCs	16	0
Inorganics – Secondary	19	6

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Characteristics

Well yields (gal/min)

Sonoma Volcanics: Highly variable; generally between 10 to 50 gpm
Glen Ellen: Highly variable; with reported yields up to 120 gpm
Alluvium: typical well yields from about 50 to over 500 gpm

Total depths (ft)

Domestic	Range: 18 - 722	Average: 241 (based on 156 wells)
Municipal/Irrigation	Range: 40 - 825	Average: 200 (based on 54 wells)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR	Groundwater levels	8 wells semi-annually
DWR:	Mineral, nutrient, & minor element.	5 wells every three years
Department of Health Services	Coliform, nitrates, mineral, organic chemicals, and radiological.	23 wells as required in Title 22, Calif. Code of Regulations

Basin Management

Groundwater management:	No groundwater management programs were identified.
Water agencies	
Public	Sonoma County Water Agency
Private	

References Cited

California Department of Water Resources. 1983. Evaluation of Ground Water Resources: Sonoma County. Bulletin 118-4, Volume 5: Alexander Valley and Healdsburg Area.

Additional References

California Department of Water Resources. 1975. Evaluation of Ground Water Resources: Sonoma County. Bulletin 118-4, Volume 1: Geologic and Hydrologic Data.

Cardwell, G.T. 1965. Geology and Ground Water in Russian River Valley Areas and in Round, Laytonville and Little Lake Valleys, Sonoma and Mendocino Counties, California. USGS Water Supply Paper 1548.

Errata

Changes made to the basin description will be noted here.