Big Valley Groundwater Basin

- Groundwater Basin Number: 5-15
- County: Lake
- Surface Area: 24,210 acres (38 square miles)

Basin Boundaries and Hydrology

The Big Valley Basin is located in the west-central portion of Lake County. The basin has been referred to as the Kelseyville Basin in previous versions of Bulletin 118. The basin name has been changed from Kelseyville Basin to the Big Valley Basin in this bulletin update to reflect past investigative work and to avoid any confusion with references to the Kelseyville Subbasin – an aquifer system within Big Valley. Plio-Pleistocene extrusive rocks of Mt. Konocti and Camelback Ridge border the basin to the east and southeast. The Jurassic-Cretaceous Franciscan Formation borders the basin to the west and south and constitutes the basement rock (SMFE 1967). The north side of the basin is open to Clear Lake. The basin shares a boundary with the Scott Valley Basin to the northwest and may be hydrologically contiguous. Precipitation in the basin ranges from 22- to 35-inches annually, decreasing to the northeast.

Previous work conducted in the valley identified eight subbasins based on geologic structure, geologic material, and aquifer conditions (perched or confined conditions) (SMFE 1967). For the purpose of this basin summary, the valley has been divided into five subbasins based on geologic conditions, groundwater boundaries, and topography. These areas are referred to as the Western Upland, the Adobe Creek-Manning Creek Subbasin, the Kelseyville Subbasin, the Central Upland and Upper Big Valley Subbasin, and the Cole Creek Upland.

The Western Upland is a one-half to one-mile wide topographic bench located along the western margin of the basin. The Adobe Creek - Manning Creek Subbasin is located east of the Western Upland, extends north to the Big Valley Fault, and is hydrologically connected to the Kelseyville Subbasin. The Kelseyville Subbasin is located north of the Big Valley Fault and extends north to Clear Lake. The Central Upland and Upper Big Valley Subbasin includes the eastern half of the basin south of the Big Valley Fault and is geologically similar to the Western Upland but is separated topographically by the Adobe Creek – Manning Creek Subbasin and separated structurally by the Adobe Creek Fault system. The Cole Creek Upland is located east of the Central Upland and Upper Big Valley system and is bounded to the north by the Mt. Konocti volcanics and to the south by Camel Back Ridge.

Hydrogeologic Information

The Big Valley Basin is comprised of extensive Quaternary to late Tertiary alluvial deposits, including fan deposits, lake bed and flood plain deposits, and terrace uplands.

Water-Bearing Formations

The primary water-bearing formations in the basin are Quaternary alluvium, lake, and terrace deposits and Upper Pliocene to Lower Pleistocene volcanic ash deposits.

Quaternary Alluvium. Surface distribution of younger alluvium is observed throughout the Adobe Creek – Manning Creek and Kelseyville aquifer systems. The younger alluvium generally extends to depths of 40- to 90-feet and consists of alternating strata of gravel, sand, silt, and clay. Alluvial fan deposits extend from the eastern boundary to the northeast-southwest trending Adobe Creek Fault Zone (DWR 1957).

Quaternary Terrace Deposits. Quaternary terrace deposits are observed south of the east-west trending Wight Way Fault system and along the western margin of the valley within the Western Upland. The deposits consist of red-brown, poorly stratified, sand, clay, and moderately well rounded gravels (DWR 1957). Permeability of the formation is generally low. Thickness of the deposits range from 50- to 100-feet (SMFE 1967).

Quaternary to Tertiary Lake Deposits. Plio-Pleistocene lake deposits underlie all terrace deposits and younger alluvium in most places. The deposit consists of blue clay with alternating strata of shale and limestone. Permeability of the formation is generally low; however, groundwater flow through sedimentary strata and volcanic deposits can be significant (DWR 1957). Thickness of the formation ranges up to 500 feet (SMFE 1967).

Upper Pliocene to Lower Pleistocene Volcanic Ash Deposit. An unconsolidated coarse ash deposit ranging in depth from 70- to 240-feet has been encountered in a number of wells (DWR 1957). The volcanic ash is a thin bed of lithic tuff confined within older semiconsolidated sediments and occupies the Western Upland, Adobe Creek-Manning Creek, and most of the Central Upland and Upper Big Valley aquifer system situated south of the Big Valley Fault. The ash layer is offset by the northeast/southwest trending Adobe fault system. Groundwater contained within the deposit is confined with pressure heads ranging between 100- to 150-feet. Thickness of the deposit averages 2 feet (SMFE 1967).

Recharge Areas

Recharge in the northern portion of the Big Valley Basin is primarily infiltration from Kelsey Creek and by underflow from the Adobe Creek-Manning Creek Subbasin. Underflow occurs mainly from more permeable zones at depths of 25- to 45-feet and 70- to 90-feet. A limited amount of underflow probably enters the basin from the Central Upland system and from Mt. Konocti. Some recharge by infiltration of rain, applied water, and creek water occurs in areas other than the Kelsey Creek flood plain; however, direct surface recharge is inhibited by clayey soil and the near surface clay layer (SMFE 1967).

Recharge within the Adobe Creek-Manning Creek Subbasin is from percolation from the channels of Highland and Adobe Creeks and from underflow from the Western Upland and Central Upland areas.

Groundwater Level Trends

Evaluation of the groundwater level data shows an average seasonal fluctuation ranging from 5- to 15-feet for normal and dry years with some wells located in the center of the subbasin varying from 15- to 30-feet. A review of the hydrographs for long-term comparison of spring-spring groundwater levels indicates a decline in groundwater levels of 5- to 10-feet associated with the 1976-77 and 1987-94 droughts, followed by a recovery in levels to pre-drought conditions of early 1970's and 1980's. Overall there does not appear to be any increasing or decreasing trend in the groundwater levels.

Groundwater Storage

Groundwater Storage Capacity. DWR (1960) estimates storage capacity to be 105,000 acre-feet for a saturated depth interval of 10 to 100-feet. Useable storage is estimated to be 60,000 acre-feet.

Groundwater Budget (Type B)

Estimates of groundwater extraction for the Big Valley Basin are based on a survey conducted by the California Department of Water Resources in 1995. The survey included land use and sources of water. Estimates of groundwater extraction for agricultural and municipal/industrial uses are 24,000 and 410 acre-feet respectively. Deep percolation from applied water is estimated to be 5,600 acre-feet.

Groundwater Quality

Characterization. Magnesium bicarbonate is the predominant groundwater type in the basin. Total dissolved solids range from 270- to 790-mg/L, averaging 535 mg/L (DWR unpublished data).

Impairments. Boron is present in groundwater at concentrations that may be injurious to crops (SMFE 1967).

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	8	0
Radiological	6	0
Nitrates	8	0
Pesticides	6	0
VOCs and SVOCs	5	0
Inorganics – Secondary	8	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)	
Municipal/Irrigation	Range: 30 – 1470	Average: 475 (32 Well Completion Reports)
	Total depths (ft)	
Domestic	Range: 20 – 660	Average: 103 (414 Well Completion Reports)
Municipal/Irrigation	Range: 48 – 524	Average: 162 (285 Well Completion Reports)

Active Monitoring Data

Agency	**Parameter**	**Number of wells /measurement frequency**
DWR	Groundwater levels	16 wells semi-annually
Lake County	Groundwater Levels	49 wells monthly
DWR	Miscellaneous water quality	11 wells biennially
Department of Health Services and cooperators	Title 22 water quality	7

Basin Management

Groundwater management:	Lake County adopted a groundwater management ordinance in 1999. An AB3030 groundwater management plan was adopted in 1999.
Water agencies	
Public	County of Lake
Private	

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Errata

Changes made to the basin description will be noted here.