Sacramento Valley Groundwater Basin, North Yuba Subbasin

- Groundwater Basin Number: 5-21.60
- County: Butte, Yuba
- Surface Area: 103,151 acres (161 square miles)

Basin Boundaries and Hydrology

The North Yuba subbasin lies in the eastern central portion of the Sacramento Groundwater Basin. It is bounded on the north and West by the Feather River, on the south by the Yuba River, and on the east by the Sierra Nevada. Based on an analysis of hydrographs the Yuba River and Feather Rivers create a groundwater divide, which act as flow barriers in the shallow subsurface. Precipitation is nearly 20 inches in the southwest too greater than 32 inches in the northeast.

Hydrogeologic Information

The following geologic discussion is generally from Bookman-Edmonston Engineering, Inc. (1992), except where noted.

Water Bearing Formations

The North Yuba subbasin aquifer system is comprised of continental deposits of Quaternary to Late Tertiary (Pliocene) age. The cumulative thickness of these deposits increases from a few hundred feet near the Sierra Nevada foothills on the east to over 1,000 feet along the western margin of the basin.

Recent Valley Sedimentary Deposits. Dredger tailing deposits occur along the Feather River in the northwest and the Yuba River in the southeast of North Yuba Groundwater. The coarse gravels and cobbles can be up to 125 feet thick and are highly permeable. Stream channel and floodplain materials occur as coarse sand and gravels along present stream channels of the Yuba River, Feather River, and Honcut Creek. Coarser grained materials occur near streams with thickness up to 110 feet. Both grain size and thickness decrease with increased distance from streams. These deposits are highly permeable and provide for large amounts of groundwater recharge within the subbasin. Well yields are reported in the range of 2,000 to 4,000 gpm.

Pleistocence Victor Formation. The Victor Formation lies unconformably above the Laguna Formation. The majority of the formation occurs as alluvium throughout the North Yuba Groundwater subbasin, but floodplain deposits are present along stream channels above the alluvium.

Pleistocene Floodplain Deposits. These deposits occur as gravelly sand, silt, and clay from flood events along the Feather River and its tributaries. This unit overlies the Older Alluvium, underlies Quaternary Deposits, and ranges in thickness from 5 to 15 feet. These deposits provide a good medium for groundwater recharge, provided the groundwater can pass the lower contact with the Older Alluvium.

Pleistocene Alluvium. This unit occurs at over 50 percent of the basin surface and at least 60 percent of its irrigated agricultural lands. Its thickness

is highly variable due to its lower contact with the Laguna Formation. The Older Alluvium is comprised of Sierran alluvial fan deposits of loosely compacted silt, sand, and gravel with lesser amounts of clay deposits. The deposits occur as lenticular beds with decreasing thickness and grain size with increasing distance from the Yuba River and the foothills. Hardpan and claypan soils have developed to form an impermeable surface, but below this the Older Alluvium is moderately permeable and provides for most of the groundwater from domestic and shallow irrigation wells. Wells in the older alluvium have yields up to 1,000 gpm.

Pliocene Laguna Formation. The Laguna Formation is the most extensive water-bearing unit within the North Yuba Groundwater subbasin. The formation is comprised of reddish to yellowish or brown silt to sandy silt with abundant clay and minor lenticular gravel beds. It overlies the Mehrten Formation and occurs at the surface intermittently at the east end of the basin (Olmsted and Davis 1961). The continental deposits of the Laguna dip to the west beneath the Victor Formation and range in thickness from 400 feet near the Yuba River up to 1,000 feet in the southwest portion of the county. Although the occurrence of thin sand and gravel zones is common, many of them have reduced permeability due to cementation. This, coupled with its fine-grained character, leads to an overall low permeability for the Laguna Formation. Most of the groundwater produced from wells in the Laguna comes from overlying units.

Miocene-Pliocene Mehrten Formation. The Mehrten Formation is a sequence of volcanic rocks of late Miocene through middle Pliocene age. Surficial exposures are limited to a few square miles in the northeast corner of the basin (Olmsted and Davis 1961) and thickness varies from 200 feet near the eastern margin of the basin to 500 feet near the Feather River. The Merhten Formation is composed of two distinct units. One unit occurs as intervals of gray to black, well-sorted fluvial andesitic sand (up to 20 feet thick), with andesitic stream gravel lenses and brown to blue clay and silt beds. These sand intervals are highly permeable and wells completed in them can produce high yields. The second unit is an andesitic tuff-breccia that acts as a confining layer between sand intervals. A more detailed description of the Mehrten Formation can be found in described in Bulletin 118-6 (DWR 1978).

Recharge Areas

Stream channel and floodplain deposits present along the Yuba River, Feather River, and Honcut Creek are highly permeable and provide for large amounts of groundwater recharge within the subbasin. The potential for artificial recharge of groundwater in the basin is limited since areas which have available storage space typically have overlying soils with very low infiltration rates that would restrict recharge potential. Bookman-Edmonston Engineering, Inc. (1992)

Groundwater Level Trends

From 1950 through 1990, average basin groundwater levels remained relatively constant. Bookman-Edmonston Engineering, Inc. (1992)

Groundwater Storage

Groundwater Storage Capacity. An unpublished study by Bookman-Edmonston Engineering, Inc. (1992) estimated groundwater storage in the North Yuba basin. The estimated storage capacity for the North Yuba basin is 620,000 acre-feet. This estimate was based on an area of 49,800 acres, which closely corresponds to boundaries used by DWR. The Bookman-Edmonston Engineering, Inc. calculated an average specific yield of 6.9 percent and an assumed thickness of 200 feet.

Groundwater in Storage. There are no published reports, which discuss groundwater in storage.

Groundwater Budget (Type C)

Previous DWR unpublished studies have estimated natural and applied recharge. DWR has also estimated urban and agriculture extractions and subsurface outflow. Inflows include natural recharge of 51,100 af and applied recharge of 13,900 af. Outflows include urban extraction of 9,000 af, agricultural extraction of 65,800 af, and subsurface outflow of 21,800 af.

Groundwater Quality

Characterization. The generally good water quality characteristics are apparent in the overall salinity of ground water in the study area. In general, total dissolved solids (TDS) concentrations in the study area are below 500 milligrams per liter (mg/l) throughout the entire basin. Bookman-Edmonston Engineering, Inc. (1992). DWR maintains data for 35 water quality wells in the North Yuba Subbasin. Data collected from these wells indicate a TDS range of 149 to 655 mg/l and a median of 277 mg/l. The primary water chemistry in the area, mapped by Bertoldi, 1991 indicates calcium magnesium bicarbonate or magnesium calcium bicarbonate groundwater. Some magnesium bicarbonate can be found in the northwest portion of the basin.

Impairments. There are no documented impairments to groundwater quality in the subbasin.

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	27	0
Radiological	23	1
Nitrates	35	1
Pesticides	23	0
VOCs and SVOCs	24	2
Inorganics – Secondary	27	7

[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: 500-4,000	Average: 1,400 (47 well completion reports)
	Total depths (ft)	
Domestic	Range: 37-550	Average: 130 (247 well completion reports)
Municipal/Irrigation	Range: 75-550 feet	Average: 244 (58 well completion reports)

Active Monitoring Data

Agency	**Parameter**	**Number of wells /measurement frequency**
DWR YCWA	Groundwater levels	7 wells semi-annually 2 monthly 13 wells semi-annually,
DWR YCWA	Mineral, nutrient, & minor element.	7 wells biennially,
Department of Health Services	Coliform, nitrates, mineral, organic chemicals, and radiological.	32 wells as required in Title 22, Calif. Code of Regulations

Basin Management

Groundwater management:	Cordua Irrigation District-AB3030 plan, Yuba County Water Agency- AB3030 plan
Water agencies	
Public	Yuba County Water Agency, Ramirez Water District, Cordua Irrigation District
Private	Hallwood Irrigation District, Browns Valley Irrigation District

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Errata

Updated groundwater management information and added hotlinks to applicable websites. (1/20/06)