Alturas Groundwater Basin, Warm Springs Valley Subbasin

- Groundwater Basin Number: 5-2.02
- County: Modoc
- Surface Area: 68,000 acres (106 square miles)

Basin Boundaries and Hydrology

The Warm Springs Valley Groundwater Subbasin is bounded on the east by a low mesa of the Plio-Pleistocene Alturas Formation (separating Warm Springs Valley from South Fork Pit River Valley); to the north by the Pleistocene basalt of Devils Garden; to the south by Plio-Pleistocene Warm Springs tuff and basalt and to the west by Pleistocene basalt (Gay 1968).

The groundwater regime between Warm Springs Valley and South Fork Pit River Valley is continuous through a north-to-northwest trending highland, west and south of Alturas, that forms two distinct valleys with separate surface drainage. From the confluence of the North and South Forks of the Pit River, just to the east at Alturas, the Pit River flows westerly through Warm Springs Valley. The average annual precipitation in the basin ranges from 13- to 19-inches increasing toward the west.

Hydrogeologic Information

Water-Bearing Formations

The principal water-bearing formations are Holocene sedimentary deposits, Pleistocene lava flows, and Plio-Pleistocene Alturas Formation and basalts. The following summary of water-bearing formations is from DWR (1963).

Holocene Sedimentary Deposits. The Holocene sedimentary deposits include alluvial fan deposits, intermediate alluvium, and basin deposits - each up to a thickness of 75 feet. Alluvial fan deposits consist of unconsolidated to poorly consolidated, crudely stratified silt, sand and gravel with lenses of clay. These deposits generally have high permeability and are capable of yielding large amounts of water to wells. This unit may include confined as well as unconfined water.

Intermediate alluvium consists of unconsolidated poorly sorted silt and sand with some lenses of gravel. These deposits have moderate permeability and yield moderate amounts of water to shallow wells.

Basin deposits consist of unconsolidated, interstratified clay, silt and fine sand. These deposits have moderate to low permeability and yield small amounts of water to wells.

Pleistocene and Plio-Pleistocene Volcanic Rocks. The Pleistocene volcanic rocks consist of lava flows of layered, jointed basalt ranging in thickness from 50- to 250-feet. These basalt flows serve as recharge zones where exposed in the uplands surrounding the basin. Within the basin, where saturated, scoriaceous zones and joints in the basaltic flows can yield moderate amounts of water to wells. These flows occur interbedded with the upper member of the Alturas Formation in the valley areas.

Plio-Pleistocene Alturas Formation . The Plio-Pleistocene Alturas Formation consists of moderately consolidated, flat-lying beds of tuff, ashy sandstone and diatomite, and are widespread both at the surface and at depth. The upper and lower sedimentary members of the formation are each about 400 feet thick, and are separated by a basalt member and the Warm Springs tuff. The sediments of the formation are the principal water-yielding materials in the Warm Springs Valley Subbasin. These sediments have a moderate to high permeability and where saturated can yield large amounts of groundwater to wells. The formation contains both confined and unconfined groundwater.

Restrictive Structures

Exposures of Warm Springs tuff in Sections 10 and 15, Township 42 North, Range 11 East, act as a partial barrier to the westward movement of groundwater from South Fork Pit River Valley to Warm Springs Valley (DWR 1963).

Recharge Areas

Upland recharge areas consist of permeable lava flows of Plio-Pleistocene and Pleistocene age. Precipitation falling on these areas infiltrates the lava flows and moves toward the valley floor (DWR 1963).

Groundwater Level Trends

Water levels declined approximately 20 feet in the western part of the subbasin during the period between 1985 and the early 1990's and have recovered by approximately 15 feet by 1999.

Groundwater Storage

Groundwater Storage Capacity. The groundwater storage capacity to a depth of 800 feet is estimated to be approximately 7,500,000 acre-feet for the entire Alturas Groundwater Basin (including the South Fork Pit River Subbasin and the Warm Springs Valley Subbasin) (DWR 1963).

Groundwater Budget (Type B)

Estimates of groundwater extraction are based on a survey conducted by the California Department of Water Resources in 1997. The survey included land use and sources of water. Estimates of groundwater extraction for agricultural and municipal/industrial uses are 3,000, and 270 acre-feet respectively. Deep percolation from applied water is estimated to be 3,300 acre-feet.

Groundwater Quality

Characterization. Sodium bicarbonate and sodium-calcium bicarbonate type waters are the predominant water types in the Alturas Groundwater Basin. The concentration of total dissolved solids ranges between 180- to 800-mg/L, averaging 357 mg/L (DWR unpublished data).

Impairments. Kelly Hot Springs has water high in total dissolved solids, boron, and fluoride. Locally high conductivity, adjusted sodium absorption ratio, sulfate, iron, nitrate, calcium, manganese, and boron are found in the basin.

Well Characteristics

	Well yields (gal/min)	
Irrigation	Range: 100 – 400	Average: 314 (31 Well Completion Reports)
	Total depths (ft)	
Domestic	Range: 60 - 409	Average: 202 (116 Well Completion Reports)
Irrigation	Range: 32 - 850	Average: 477 (31 Well Completion Reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR	Groundwater levels	3 wells semi-annually
DWR	Miscellaneous Water Quality	8 wells biennially (including Subbasins 5-2.01 and 5-2.02)
Department of Health Services	Miscellaneous Water Quality	11

Basin Management

Groundwater management:	Modoc County adopted a groundwater management ordinance in 2000.
Water agencies	
Public	California Pines Community Service District, Hot Springs Valley Irrigation District.
Private	

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Errata

Changes made to the basin description will be noted here.