

## **Goose Lake Valley Groundwater Basin, Fandango Valley Subbasin**

- Groundwater Basin Number: 5-1.02
- County: Modoc
- Surface Area: 18,500 acres (27 square miles)

### **Basin Boundaries and Hydrology**

The Fandango Valley Groundwater Subbasin is part of the Goose Lake Valley Groundwater Basin which extends north into Lake County, Oregon. The whole of Goose Lake Valley is approximately 47 miles long and 12 miles wide. The basin is a downfaulted block with numerous bounding faults on the west and east side of the valley.

The Fandango Valley Subbasin is an irregularly shaped groundwater basin which includes Fandango Valley and the area previously identified as the Willow Ranch Subbasin (DWR 1963).

The Willow Ranch area is bounded on the west by Goose Lake, on the east by Pliocene and Tertiary basalt and intrusive rocks of the Warner Mountains, and to the south by Pliocene basalt. The surface area of Goose Lake is variable given that the lake is an intermittent lake and has been completely dry several times since the early 1900's (DWR 1963). Several tributary streams flow into the subbasin from the Warner Mountains. Annual precipitation ranges from 17- to 19-inches in the Willow Ranch area and from 19- to 23-inches in Fandango Valley.

### **Hydrogeologic Information**

#### ***Water-Bearing Formations***

The primary water-bearing formations are Holocene sedimentary deposits (which include lake deposits, intermediate alluvium, and alluvial fan deposits) and Pleistocene near-shore deposits and lava flows. The following summary of water-bearing formations is from DWR (1963).

**Holocene Sedimentary Deposits.** The lake deposits consist of unconsolidated interstratified clay and silty clay limited in extents to the Willow Ranch area. Water produced from these sediments may be of poor quality depending on the degree of alkalinity.

The intermediate alluvium consists of unconsolidated, poorly sorted silt and sand with lenses of gravel up to a thickness of 100 feet. The thickness of the deposits is considerably less for Fandango Valley. These zones are moderately permeable.

The alluvial fan deposits consist of unconsolidated to poorly consolidated, partially stratified sand, gravel, and silt with lenses of clay. These deposits are generally the most permeable of the valley sedimentary deposits. The eastside alluvial fans range up to 300 feet in thickness and are considered the most important groundwater source. The upper fan areas are moderately to highly permeable and, where saturated, can yield large amounts of water to

wells. The mid- to lower fans are generally less permeable but contain confined zones yielding moderate amounts of water to wells. The alluvial fan deposits in Fandango Valley are considerably less in thickness due to their limited areal extent.

**Pleistocene Near-Shore Deposits.** Near-shore deposits occur at the south end of the subbasin. The deposits are moderately to highly permeable and may yield large quantities of water to wells.

**Pleistocene Volcanic Rocks.** The Pleistocene volcanic rocks consist of highly jointed flat lying basalt flows ranging from 50 to 200 feet in thickness with interbedded scoriaceous zones and pyroclastic rocks. These rocks serve as a recharge zone and interfinger with valley sediments. In general these rocks are highly permeable and can yield large amounts of water to wells.

### ***Recharge Areas***

Upland recharge areas consist of the permeable basalt flows of Pliocene to Pleistocene age. Precipitation and surface runoff infiltrates the basalt flows and percolates towards the valley, and along Willow Creek, recharging valley sediments. Most of the recharge to deeper aquifers along the east side of the California portion of Goose Lake Valley is derived from infiltration of surface water, generally along the foothill portions of stream channels (DWR 1963).

### ***Groundwater Level Trends***

Analysis incomplete.

### ***Groundwater Storage***

Groundwater storage for the Goose Lake Valley Basin is estimated to be 1,000,000 acre-feet to a depth of 500 feet. The percentage of the estimated groundwater storage located within Fandango Valley Subbasin is unknown. DWR (1963) notes that the amount of water that is useable is unknown.

### ***Groundwater Budget (Type B)***

Estimates of groundwater extraction for the Goose Lake Basin (including Lower Goose Lake Valley Subbasin and the Fandango Valley Subbasin) are based on a survey conducted by the California Department of Water Resources during 1997. The survey included land use and sources of water. Estimates of groundwater extraction for agricultural and municipal /industrial uses are 10,000 and 25 acre-feet respectively. Deep percolation from applied water is estimated to be 1,600 acre-feet.

### ***Groundwater Quality***

**Characterization.** Calcium bicarbonate type waters occur throughout the basin. Sodium bicarbonate waters are found below 200 feet in a three square mile area east of Goose Lake and south of New Pine Creek. The concentration of total dissolved solids averages 183 mg/L and ranges between 66- to 528-mg/L (DWR unpublished data).

**Impairments.** Thermal waters containing high concentrations of total dissolved solids, sodium, fluoride, and boron are associated with fault zones east of Goose Lake and south of New Pine Creek.

## Well Characteristics

Well yields (gal/min)		
Irrigation	400	1 Well Completion Report
Total depths (ft)		
Domestic	Range: 45 – 400	Average: 142 (51 Well Completion Reports)
Irrigation	Range: 150 – 600	Average: 450 (8 Well Completion Reports)

## Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR	Groundwater levels	3 wells semi-annually
Department of Health Services	Miscellaneous Water Quality	1

## Basin Management

Groundwater management:	Modoc County adopted a groundwater management ordinance in 2000.
Water agencies	
Public	
Private	

## Selected References

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## Errata

Changes made to the basin description will be noted here.