Bodega Bay Area Groundwater Basin

- Groundwater Basin Number: 1-57
- County: Sonoma
- Surface Area: 2,680 acres

Basin Boundaries and Hydrology

Bodega Bay lies along the Sonoma County coastline about 55 miles north of San Francisco. The Bodega Bay Area extends approximately 4 miles along the mainland from the area of Salmon Creek to the north to below Cheney Gulch on the south. This area extends inland up to about 1 mile from Bodega Harbor. The area is comprised of the mainland on the east side, Bodega Harbor and Doran Beach, Bodega Head, and the Bodega Tombolo (a sand bar/dune area which connects Bodega Head with the mainland). The Bodega Bay Area Groundwater Basin is defined by the areal extent of Quaternary alluvium, sand dunes, and terrace deposits, but also contains some Cretaceous granitic rocks exposed on Bodega Head. On the mainland side, the groundwater basin is bounded by bedrock of the Franciscan Complex. This basin is bounded on the north by the Fort Ross Terrace Area Groundwater Basin near Salmon Creek. The San Andreas Fault Rift Zone trends northwest through the area of Bodega Bay and Bodega Harbor (Wagner 1982).

No major rivers transect the basin; however, Salmon Creek bounds the basin on the north and Cheney Gulch discharges into Bodega Harbor on the south. Annual precipitation in the Bodega Bay Area ranges from approximately 28 inches at Bodega Head to 36 inches on the eastern (inland) side of the basin.

Hydrogeologic Information

Water Bearing Formations

The water-bearing units of primary significance in the Bodega Bay Area include Recent Alluvium in Salmon Creek, Sand Dune Deposits of the Bodega tombolo, and marine terrace deposits. The Franciscan Complex and granitic rocks exposed at the surface and underlying the area are generally considered non-water bearing except where significant fracture porosity exists. Information on water-bearing formations and groundwater conditions was taken from DWR (1982) and other unpublished DWR documents.

Recent Alluvium. The Recent Alluvium in Salmon Creek is the only deposit in the Bodega Bay Area that contains groundwater in usable quantities. The alluvium consists of clay to gravel-sized material. Based on well logs from two water supply wells along Salmon Creek, the alluvium extends to at least 63 feet below the ground surface. Yields from these two supply wells ranged from 100 to 150 gpm. No specific yield data for this unit was found.

Sand Dunes. The dunes form the Bodega tombolo south from Salmon Creek to Bodega Head with an average thickness of 161 feet and maximum width of 5,800 feet. The dune sand is loose, subangular to subrounded, fairly well sorted, fine to coarse-grained, and gray to brownish gray. No well yield data for wells in the sand dunes are available. Groundwater most likely occurs under unconfined conditions within the sand dunes. No specific yield data for this unit was found.

Terrace Deposits. Marine terrace deposits of Pleistocene age overlie wave-cut bedrock surfaces along the northern California coastline. They occur as a series of benches or steps, uplifted above sea level over the last half-million years. Up to five terrace levels have been identified. The marine terrace deposits are predominantly massive, semiconsolidated clay, silt, sand, and gravel, and range from 1 to about 80 feet in thickness with an average of about 23 feet. The deposits range from being clean sand, well-sorted, fine to coarse sand, to poorly sorted, fine to coarse sand with a silty matrix. Fine to medium gravel occurs as lag gravel layers and in lenses of conglomerate. Terrace composition varies and reflects the lithologies of the parent bedrock.

DWR (1982) reported that wells installed into similar terrace deposits located north of Bodega Bay yield water from 2 to 75 gpm with an average yield of about 27 gpm. Since the terrace deposits cap the bedrock, the aquifer is generally unconfined. Estimated specific yield for an equivalent unit along the Mendocino County coastline ranged from 5 to 22 percent with an average of 11.5 percent.

Groundwater Level Trends

No hydrographs are available in order to evaluate long-term water level trends. However, for the Mendocino County coastal area to the north, hydrographs indicate that the marine terrace deposits reach maximum storage by mid-January of each year under normal rainfall conditions (DWR 1982).

Groundwater Storage

Groundwater Storage Capacity. No data was found.

Groundwater in Storage. No estimates of the amount of groundwater in storage were found. However, it was concluded that under normal rainfall conditions, the similar terrace deposits in Mendocino County reach maximum storage by mid-January of each year (DWR 1982).

Groundwater Budget (Type A)

DWR has compiled groundwater extraction data reported by Bodega Bay PUD for the years 1994 through 1999. Annual extraction during this period ranged from a low of 384 af (1999) to a high of 439 af (1996). Bodega Bay PUD is the only water supplier in the area.

Groundwater Quality

Characterization. There was no published groundwater quality data found for this basin. Based on analyses of two water supply wells in the Bodega Bay Area Groundwater Basin, TDS ranges from 290 to 480 mg/L.

Impairments. Since this groundwater basin lies along the coastline, seawater intrusion may be a problem if water levels are lowered below sea level.

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	4	0
Radiological	3	0
Nitrates	4	1
Pesticides	3	0
VOCs and SVOCs	2	0
Inorganics – Secondary	4	2

[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)

Two alluvial wells in Salmon Creek are reported to yield 100 gpm with 2.5 feet of drawdown after 12 hours and 150 gpm with 3 feet of drawdown after 2 hours.
Terrace deposit wells yield water at rates ranging from approximately 2 to 75 gpm. Average yield are about 27 gpm. Mean specific capacity is reported to be 1.46 gpm/ft (DWR 1982).

Total depths (ft)

Domestic	Range: 30 – 230	Average: 124 (Based on 4 well completion reports)
Municipal/Irrigation	Range: 66 – 264	Average: 183 (Based on 3 well completion reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
Bodega Bay PUD	Groundwater levels	None.
DWR and cooperators	Miscellaneous water quality	None.
Department of Health Services and cooperators	Title 22 water quality	6 wells / annually

Basin Management

Groundwater management:	No groundwater management plans identified.
Water agencies	
Public	Sonoma County Water Agency, Bodega Bay Public Utility District
Private	

References Cited

California Department of Water Resources (DWR) 1982. Mendocino County Coastal Ground Water Study. Northern District.

Wagner, D.L., 1982. Geologic Map of the Santa Rosa Quadrangle. Regional Geologic Map Series No. 2A (Geology). Scale 1:250,000. California Department of Conservation, Division of Mines and Geology.

Additional References

California Department of Water Resources (DWR) 1975. California's Ground Water. Bulletin 118-75. September.

Errata

Changes made to the basin description will be noted here.