Eel River Valley Groundwater Basin

- Groundwater Basin Number: 1-10
- County: Humboldt
- Surface Area: 73,700 acres (115 square miles)

Basin Boundaries and Hydrology

The Eel River Valley Groundwater Basin is one of the principal groundwater basins in the Eureka area of Humboldt County. The area includes the lower 8 miles of the Van Duzen River Valley and the Eel River Valley. The basin is bordered on the north by the Little Salmon Fault, on the south by the Plio-Pleistocene Carlotta Formation, and to the east by the Wildcat series; however, the actual extents of the eastern boundary is uncertain (Strand 1963, Clark 1990). The Wildcat series is a group of five formations ranging in age from Miocene to Pleistocene consisting of sandstone, marine siltstone, and claystone (Evenson 1959). The Carlotta Formation forms the uppermost formation of the Wildcat series. Surficial deposits of the Carlotta Formation are observed north and south of the Van Duzen River valley, located in the southeastern portion of the basin, and is an important water-bearing formation.

The basin includes the Eel River delta and channel gravels, floodplain clays and silts, and older terrace gravels of the Eel River and Van Duzen River. The basin also includes outcrops of the Hookton and Carlotta Formations in the northern and southern portions of the valley.

Annual precipitation in the basin ranges from 41 to 55 inches, increasing the southeast.

Hydrogeologic Information

The aquifer system of the Eel River Valley Basin is primarily composed of alluvium underlain by the Hookton and Carlotta Formations. Upland areas to the northeast are comprised of the Hookton Formation underlain by the Carlotta Formation. The Carlotta Formation is underlain by the remainder of the Pliocene Wildcat series. The Little Salmon Fault forms a hydrologic barrier to the north.

Water-Bearing Formations

Water-bearing formations include Quaternary river channel and floodplain deposits, the Carlotta Formation and, to a lesser extent, the Hookton Formation. The major aquifer in the basin is the alluvium that underlies the floodplain of the Eel River Valley (Evenson 1959).

Holocene Alluvium. The alluvial deposits underlying the Eel River delta consist of blue clay or sandy clay ranging in thickness from 1- to 75-feet. Between the Eel and Salt rivers, the alluvium consists of coarse sand and gravel from the surface to depths of 60 feet or more. Coarse gravel and sand containing minor amounts of silt and clay extend upstream along the Eel River to its confluence with the Van Duzen River.

The Eel River valley is underlain by poorly sorted sand and gravel, as much as 200 feet in thickness. Most of the groundwater used in this area is

obtained from wells tapping these beds. (Evenson 1959). Specific capacities range up to 600 gpm per foot of drawdown (DWR 1965).

Pleistocene Hookton Formation. The Hookton Formation underlies the alluvium in the river floodplain and is exposed in the northern 20 percent of the basin and also outcrops along the southern boundary. The formation consists of yellow to yellow-brown loosely consolidated clay, silt, sand, and gravel, interfingered with blue-gray marine clay and silt. Thickness of the formation ranges up to 100 feet (USBR 1960).

Plio-Pleistocene Carlotta Formation. The Carlotta Formation, a portion of the upper Wildcat group, is a poorly consolidated brown conglomerate and sandstone of continental origin with some marine blue-gray claystone and siltstone. Along the southern part of the Eel and Van Duzen River valleys, these sediments consist primarily of poorly sorted cobble conglomerate of nonmarine origin and fairly well sorted sandstone containing minor interfingering clay beds of marine origin. The formation may extend as far north as the Mad River. Well yields vary in the formation and are generally less that yields from alluvial deposits. West of Ferndale, wells drilled into the Carlotta Formation yield 1,200 gpm (DWR 1965). East of Ferndale, wells can yield 500 gpm (DWR 1965). Generally, specific capacities range from 15- to 20-gpm per foot of drawdown (Evenson 1959).

Restrictive Structures

The Little Salmon Fault is likely a hydrologic barrier to the north.

Recharge Areas

Recharge to the alluvium is from direct precipitation and seepage from the Eel and Van Duzen Rivers. Some groundwater also moves laterally from adjacent formations and also moves upward due to differences in hydraulic head between the alluvium and underlying formations. Direct recharge to the Carlotta Formation from streamflow likely occurs as the Van Duzen River transverses exposures of the formation in the eastern third of the basin.

Groundwater Level Trends

The depth to groundwater in the alluvium ranges from about 3 feet to 20 feet. Depth to groundwater for wells constructed in the Carlotta Formation is to within 35 feet of ground surface. North of Loleta, near Table Bluff, depth to which water is encountered is reported to be 300 feet. (DWR 1965)

Groundwater Storage

Groundwater Storage Capacity. Evenson (1959) estimates storage capacity for the basin to be 125,000 acre-feet based on a surface are of 19,400 acres and an average specific yield of 22 percent. The saturated thickness varied from 10- to 40-feet.

DWR (1975) estimates the storage capacity for the basin to be 136,000 acre-feet. Useable storage capacity is estimated to be 100,000 acre-feet.

Groundwater Budget (Type B)

Estimates of groundwater extraction are based on a survey conducted by the California Department of Water Resources in 1996. The survey included landuse and sources of water. Estimates of groundwater extraction for agricultural and municipal/industrial uses are 49,000 and 1,400 acre-feet respectively. Deep percolation from applied water is estimated to be 9,500 acre-feet.

Groundwater Quality

Characterization. Groundwater in the basin is characterized as magnesium-calcium bicarbonate and magnesium-sodium bicarbonate type waters. Total dissolved solids (TDS) range from 110- to 340-mg/L, averaging 237 mg/L (DWR unpublished data).

Impairments. Impairments to groundwater include high iron concentrations and locally high TDS, manganese, magnesium, calcium, boron, nitrite, and phosphorus.

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	24	0
Radiological	14	0
Nitrates	27	0
Pesticides	8	0
VOCs and SVOCs	12	0
Inorganics – Secondary	24	8

[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 Production characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range: up to 1,200	Average: 400 (DWR 1975)
	Total depths (ft)	
Domestic	Range: 13 - 415	Average: 108 (219 Well Completion Reports)
Municipal/Irrigation	Range: 20 - 572	Average: 133 (12 Well Completion Reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR	Groundwater levels	8 wells semi-annually
DWR	Miscellaneous water quality	11 wells biennial
Department of Health Services and cooperators	Miscellaneous water quality	29

Basin Management

Groundwater management:	No known groundwater management plans, groundwater ordinances, or basin adjudications.
Water agencies	
Public	Hydesville County WD
Private	

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Errata

Changes made to the basin description will be noted here.