Eureka Plain Groundwater Basin

- Groundwater Basin Number: 1-9
- County: Humboldt
- Surface Area: 37,400 acres (58 square miles)

Basin Boundaries and Hydrology

The Eureka Plain Groundwater Basin is bounded by the Little Salmon Fault to the south, Humboldt Bay and Arcata Bay to the west and northwest, and by Wildcat series deposits to the east (Strand 1962). (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 northeast basin boundary, shared with the Mad River Basin, is the northwest trending Freshwater Fault (Clark 1990). It's unclear if the basin is hydrologically contiguous with the Mad River Basin. Humboldt Bay separates the primary basin deposits from dune sand deposits to the west. The faulted southern and northern basin boundaries may extend to the near surface and form hydrologic barriers in portions of dune sand deposits. Annual precipitation in the basin ranges from 39- to 47-inches, increasing to the southeast.

Hydrogeologic Information

The basin is composed of Quaternary alluvium and deposits of the Hookton Formation underlain by non-marine Wildcat series deposits. Surface exposures of the Carlotta Formation are also observed north of Elk River. The Carlotta Formation forms the uppermost formation of the Wildcat series (Evenson 1959).

Water-Bearing Formations

The primary water-bearing formations in the basin include the Pliocene Hookton Formation and, to a lesser extent, Holocene dune sand west of Humboldt Bay and alluvial deposits southeast of Arcata Bay and along the Elk River.

Holocene Dune Sand. Beach and dune sand deposits occur in an almost continuous strip along the coast. The dune sand is more than 100 feet thick and attains a maximum width of three-fourths of a mile along the North Spit between the entrance to Arcata Bay and the mouth of the Mad River. The dune sand is loose, subangular to subrounded, fairly well sorted, fine to coarse grained, and gray or brownish gray in color (Evenson 1959). The dune is developed as a source of water supply for shallow wells or well points that are driven into the sand far enough to penetrate the lens of freshwater overlying seawater. Recharge to the dune sand is almost wholly from local precipitation (Fuller 1975).

Holocene Alluvium. The Holocene alluvium consists of clay, sand, and gravel underlying alluvial plains of fluvial origin. In the Salmon Creek-Elk River Area alluvium yields only very small quantities of water to wells. Alluvium in the Jacoby Creek-Freshwater Creek Area may be up to 50 feet thick and yields small quantities of water to wells.

Pleistocene Hookton Formation. The Hookton Formation underlies the alluvium in the river floodplains and is exposed surfacially over approximately 70 percent of the basin. 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 (BOR 1960). The formation is primarily fluvial in origin. In the Salmon Creek-Elk River Area, confined aquifers of the Hookton Formation yield up 800 gpm from wells about 400 feet deep (DWR 1965). Sanding of wells is a problem.

Restrictive Structures

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

Recharge Areas

Recharge to the alluvium is from direct precipitation and seepage from Freshwater Creek, Elk River and the Eel River. Some groundwater also moves laterally from adjacent formations and also moves upward due to differences in hydraulic head between the alluvium and underlying formations.

Groundwater Level Trends

Groundwater occurs in unconfined portions of the alluvium at depths less than 10 feet. Groundwater level trends have not been evaluated.

Groundwater Storage

Groundwater Storage Capacity. Published information was not found addressing groundwater storage.

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 4,800 and 1,300 acre-feet respectively. Deep percolation from applied water is estimated to be 1,700 acre-feet.

Groundwater Quality

Characterization. Groundwater in the basin is characterized as calcium-magnesium type water. Total dissolved solids (TDS) range from 97- to 460-mg/L, averaging 177 mg/L (DWR unpublished data).

Impairments. Groundwater impairments include localized high boron, iron, manganese, 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	14	0
Radiological	8	0

Nitrates	20	0
Pesticides	8	0
VOCs and SVOCs	6	0
Inorganics – Secondary	14	4

[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)

The average well yield is estimated to be 400 gpm. The maximum yield is estimated to be 1200 gpm. (DWR 1975)

Total depths (ft)

Domestic	Range: 15 - 360	Average: 122 (162 Well Completion Reports)
Irrigation	Range: 75 - 305	Average: 159 (12 Well Completion Reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR	Groundwater levels	4 wells measured semi-annually.
DWR	Miscellaneous water quality	4 wells biennially
Department of Health Services and cooperators	Title 22 water quality	6

Basin Management

Groundwater management:	No known groundwater management plans, groundwater ordinances, or basin adjudications.
Water agencies	
Public	City of Eureka WSA; Humboldt CSD; Humboldt Bay MWD; Manila CSD
Private	

Selected References

California Department of Water Resources. 1965. North Coastal Hydrographic Area. Volume 1: Southern Portion. Bulletin 142-1.

California Department of Water Resources. 1973. Sea Water Intrusion and Ground Water Monitoring Programs in the Eureka Area. California Department of Water Resources, Northern District.

California Department of Water Resources. 1975. California's Ground Water. California Department of Water Resources. Bulletin 118.

Clark, Samuel H. Jr. 1990. Map Showing Geologic Structures of the Northern California Continental Margin. United States Geological Survey.

Evenson, R.E. 1959. Geology and Groundwater Features of Eureka Area, Humboldt County, California. USGS Water Supply Paper 1470.

Fuller, R.H. 1975. Water Quality in the Mad River Basin, Humboldt and Trinity Counties, California. USGS Water Resources Investigations 44-75.

Strand RG. 1962. Geologic Map of California, [Redding Sheet]. Scale 1:250,000. California Division of Mines and Geology.

Todd DK. 1992. Groundwater Reconnaissance of the Humboldt Bay Area (For Humboldt Bay Municipal Water District , Eureka, CA.). Consulting Engineers, Inc.

United States Bureau of Reclamation (BOR). January, 1960. Natural Resources of Northwestern California. Report Appendix – Plans of Water Development.

Bibliography

Bailey EH. 1966. Geology of Northern California. California Division of Mines and Geology. Bulletin 190.

California Department of Water Resources. 1958. Ground Water Conditions in Central and Northern California 1957-58. California Department of Water Resources. Bulletin 77-58.

California Department of Water Resources. 1964. Quality of Ground Water in California 1961-62, Part 1: Northern and Central California. California Department of Water Resources. Bulletin 66-62.

California Department of Water Resources. 1980. Ground Water Basins in California. California Department of Water Resources. Bulletin 118-80.

California Department of Water Resources. 1981. 1981 Monitoring Program Priority 1 Groundwater Basins, Report to State Water Resources Control Board, Division of Planning. California Department of Water Resources.

California Department of Water Resources. 1998. California Water Plan Update. California Department of Water Resources. Bulletin 160-98 Volumes 1 and 2.

Dickinson WR, Ingersoll RV, Grahm SA. 1979. Paleogene Sediment Dispersal and Paleotectonics in Northern California. Geological Society of America Bulletin 90:1458-1528.

Dupre WR, Morrison RB, Clifton HE, Lajoie KR, Ponti DJ. 1991. Quaternary Geology of the Pacific Margin. USGS.

Fraticelli LA, Albers JP, Irwin WP, Blake MC. 1987. Geologic Map of the Redding 1 x 2 Degree Quadrangle, Shasta, Tehama, Humboldt, and Trintity Counties, California. USGS. OF-87-257.

Johnson MJ. 1978. Ground-Water Conditions in the Eureka Area, Humboldt County, California, 1975. USGS. WRI 78-127.

Planert M, Williams JS. 1995. Ground Water Atlas of the United States, Segment 1, California, Nevada. USGS. HA-730-B.

Rantz SE. 1964. Surface-water Hydrology of Coastal Basins of Northern California. USGS. 1758.

Errata

Changes made to the basin description will be noted here.