

MENDOCINO WATER RESOURCES AND WATER CONSERVATION

MENDOCINO'S LIMITED GROUNDWATER SUPPLY

The Town of Mendocino is located on the Mendocino Headlands along the Pacific Coast in Mendocino County, California (Figure 1). The Mendocino Headlands form a broad peninsula bounded by sea cliffs that range in height from 40 to 100 feet. Elevations increase to 360 feet along the eastern margin. The land slopes westward with a broad gentle ridgeline roughly bisecting the peninsula. Hill slopes are generally steeper east of town.

The climate is maritime Mediterranean and is characterized by cool, foggy summers and cool, rainy winters. The average annual precipitation is 40.3 inches, but has historically ranged from 80 inches in 1983 to 16 inches in 1976. Rain mostly falls from November through March. Precipitation typically declines during the late season and becomes minimal during the summer.

The Mendocino Headlands are underlain by the Tertiary Franciscan Complex Coastal Belt bedrock. Overlying the bedrock are four marine terrace deposits that represent former beach deposits (Figure 2). The terraces form an essentially flat surface. Where the terraces have been eroded, the bedrock forms a rough and uneven surface.

Groundwater is the primary water supply for the Town of Mendocino. Groundwater production in Mendocino for both commercial and domestic water usage is primarily from individual privately-owned wells completed in marine terrace deposits and fractured bedrock. Well depths typically range between 40 to 200 feet, with most new wells in the range of 100 to 150 feet. Flow rates to wells are quite variable, but typically range from less than 1 gpm to over 25 gpm.

The terrace deposits act as a holding reservoir by storing water that recharges the underlying fractured bedrock. The distribution of the areas of saturated terrace deposits plays a key role in maintaining groundwater levels in the Mendocino Headlands aquifer.

The physical setting is a key factor that influences groundwater flow. Groundwater flows from the highland areas of Mendocino towards the sea cliffs that surround the town where it discharges to the Pacific Ocean via springs (Figure 2). Spring flow is also highly seasonal with the highest flow rates observed in the late winter and spring following significant rainfall. Unlike most California basins, the major portion of the annual inflow discharges out of the cliffs through springs rather than remaining in storage.

Mendocino's physical setting presents a challenge for maintaining the limited groundwater resource, since the Mendocino Headlands aquifer is an open system that is surrounded by cliffs. A major portion of the annual inflow discharges every year through springs located along these cliffs. Limited groundwater resources in the Mendocino Headlands have led to severe water shortages during the dry summer months for residents with marginal wells. In the past 25 years, several significant droughts have impacted the area.

Because of these low yields, most properties employ storage tanks, and throughout the community property owner's have implemented significant water conservation measures. Even so, some wells run dry in the late fall months, especially in drier than normal years, and water is trucked in to replenish storage tanks at several properties on a regular basis in the fall. This practice becomes more widespread during periods of drought.



Figure 1 Town of Mendocino

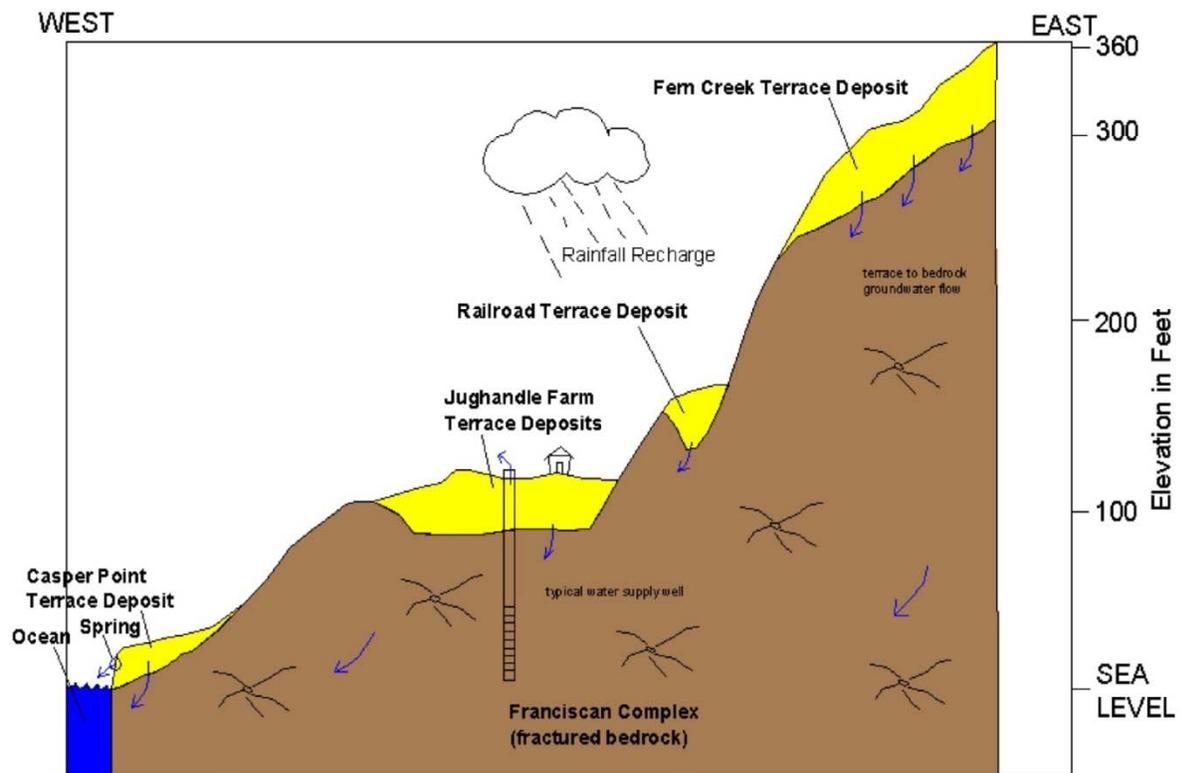


Figure 2 Mendocino's Hydrologic Balance

MCCSD GROUNDWATER MANAGEMENT

The Mendocino City Community Services District (MCCSD) has had groundwater management authority in Mendocino since 1990, and MCCSD has adopted a Groundwater Management Plan with a groundwater withdrawal program (Groundwater Extraction Permit Ordinance 07-1), which limits groundwater extraction. The Groundwater Extraction Permit (GWEP) ordinance allows local government to mandate the amount of naturally occurring groundwater that can be withdrawn from the Town's aquifer on a sustained basis to help prevent depletion of the Town's groundwater by not exceeding the aquifer's perennial or safe yield, which is the amount of water that can be pumped regularly and permanently without dangerous depletion of the storage reserve.

The District's current groundwater management policies are, to collect and analyze current groundwater and rainfall data within the District's boundary to assist the Board of Director's with their groundwater management decision-making responsibilities, to increase the use of reclaimed water to reduce groundwater extraction, and to promote water conservation measures.

WATER CONSERVATION PROGRAM

Conservation, or appropriate water use, forms the capstone of the District's groundwater management efforts. Mendocino residents are acutely aware of the need for water conservation. The Department of Water Resources (DWR-85) noted that Mendocino is already extremely conservative in its water use as compared with other north coast towns (an estimated 70 gpd per capita on average, 76-45% of use in towns similarly situated). Conservative water use in Mendocino has helped extend existing Town water supplies as far as possible.

The following recommendations (updated in part) were made by DWR (DWR-82) and hold continued relevance to any discussion of water conservation. DWR states that the first two recommendations could reduce water consumption by 50%, while the next four are designed to maximize groundwater recharge while minimizing run-off.

1. All new development should incorporate proven water conservation technology in planning and construction of the project (E.g., low-flush toilets, low-flow shower heads, single faucets with aerators, water-efficient clothes washer and dishwashers, hot-water pipe insulation, water reclamation, water storage, and drought-tolerant landscaping).
2. The installation of efficient irrigation systems, such as drip irrigation, soil moisture sensors, and automatic timers, which minimize runoff and evaporation and maximize the amount of water reaching the plant's roots, is recommended to all citizens.
3. Where feasible, all new development should endeavor to retain rainwater for groundwater recharge. At minimum, the development and construction of a project should be designed to reduce, retard, and disperse runoff. (E.g., mulched or terraced slopes reduce erosion and retain rainfall; porous drain swales and paving materials allow infiltration of rainwater; out sloped roads spread runoff evenly down a slope; landscaping with drought-resistant ground cover will protect the soil, facilitate infiltration, and reduce runoff.)
4. Cluster development should be encouraged wherever appropriate.
5. The preservation of existing natural drainage areas and incorporation of natural drainage in new developments aids groundwater recharge.
6. Flood plains and aquifer recharge areas, which are the best sites for groundwater recharge, should be preserved as open space.

In addition, all new street and off-street parking development should utilize permeable materials to aid groundwater recharge. Water that might otherwise recharge the aquifer is presently lost to run-off from the use of non-permeable paving materials.

The MCCSD adopted its Water Conservation Program on February 25, 1991. The District promotes water conservation by both voluntary water conservation education program and a mandatory water conservation requirement in the GWEP ordinance.

Voluntary Water Conservation Education Program: MCCSD uses an ongoing public awareness campaign to promote water conservation in Mendocino. Water conservation information is mailed to District property owners. Conservation information is available at the District office. The District Board commissioned a local artist to design a water conservation placard, which is distributed to all visitor serving facilities and restaurants. Press releases are published in the Mendocino Beacon, which inform the public of drought conditions and the need for conservation. Special meetings are held annually by the District to inform the public about current groundwater conditions.

Mandatory Water Conservation: MCCSD has adopted a Groundwater Extraction Permit ordinance. Section 5 of this ordinance requires that water conservation devices be installed for all new development as a condition of permit approval. Water use standards have been included in the ordinance to limit the quantity of water that can be extracted for new development, changes of use, or expansion of an existing use.

District Recommendations: Gardeners should be encouraged to cultivate drought tolerant plants. Visitors must be exhaustively reminded that in Mendocino we must conserve even on vacation.

Water conservation requirements and recommendations are intended to encourage habits of appropriate water use by residents and visitors. Water conservation will forestall the drying of wells located in the District, and can help prevent depletion of the local aquifer.

REFERENCES

- California Department of Water Resources (DWR), 1985, Town of Mendocino Ground Water Study, California Department of Water Resources, June 1985, 53 pp.
- California Department of Water Resources (DWR), 1982, Mendocino County Coastal Ground Water Study, California Department of Water Resources, June 1982, 15 pp.
- Kennedy/Jenks Consultants, 2006, Mendocino Drought Scenarios, technical memorandum to Mike Kelley, Mendocino City Community Services District, November 16, 2006.
- Kennedy/Jenks Consultants, 2007, Groundwater Model Update, technical memorandum to Mike Kelley, Mendocino City Community Services District, January 17, 2008.
- Kennedy/Jenks Consultants, 2008, Groundwater Model Update, technical memorandum to Mike Kelley, Mendocino City Community Services District, May 1, 2009.
- Questa Engineering, 2006, Drought Contingency Plan, technical report to Mendocino City Community Services District.
- Questa Engineering and ETIC Engineering, Inc, 2004, Groundwater Modeling Study of the Mendocino Headlands, Mendocino, California, Final Report, May 2004, technical report to Mendocino City Community Services District.
- Questa, 1988, Mendocino County Coastal Groundwater Development Guidelines.