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JANUARY 2013

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Antelope Area Groundwater Sub-basin Information

Since the early 1990's attention to groundwater resources in Tehama County has increased. Emphasis has been on improving our overall understanding of the resource and improving upon our overall ability to manage and sustain groundwater resources over the long term. In 1992, a groundwater ordinance was adopted into County Code to protect against groundwater mining and to oversee groundwater exports. A county-wide groundwater management plan was also adopted in 1996 and is still being implemented today. Currently an update to the plan is in progress and should be in place in 2013. This Plan is founded on voluntary cooperation of various local water interests in the County and focuses on monitoring and education to understand the groundwater resources in Tehama County. As part of the monitoring, the valley floor of Tehama County has been divided into 12 different groundwater sub-basins based upon unique hydrology, geology, land uses, and population. This article has been prepared in a joint effort by the Tehama County Flood Control and Water Conservation District, the Tehama County AB 3030 Coordinated Groundwater Management Plan Technical Advisory Committee, the California Department of Water Resources, and the University of California Cooperative Extension. It summarizes information specific to the Antelope Area Groundwater Sub-basin. Similar articles may be developed and distributed for other groundwater sub-basins in Tehama County.

UNDERSTANDING YOUR WELL WATER SUPPLY AND DEMAND

Well owners and operators can take steps to be more informed about their individual water supply and anticipate the need to improve their individual well, and/or pump, for improved water supply reliability.

Important questions that private well owners need to consider:

1. What are the characteristics of my well?
2. What amount of water is available for use?
3. What is the current demand on the groundwater in my area?
4. Can the water use and improvements on my property affect adjacent property owners?
5. If I don't know, where do I find the information?

Start by knowing your well:

"Understanding how your well is constructed and how deep the pump is set inside it provides you with the knowledge needed to better manage and meet your individual, long term water needs."

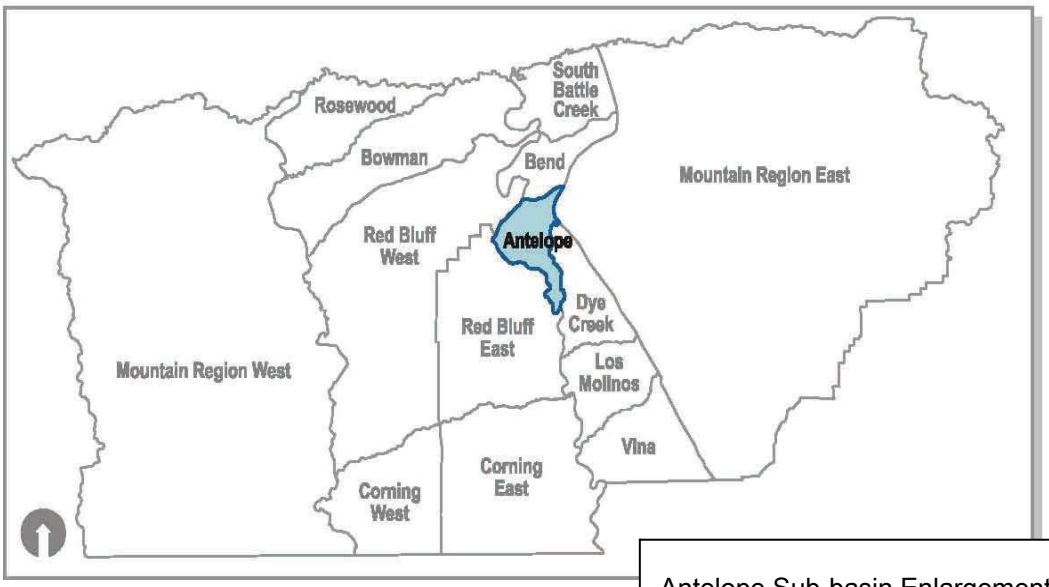
Recommended items that each well owner or prospective owner should know:

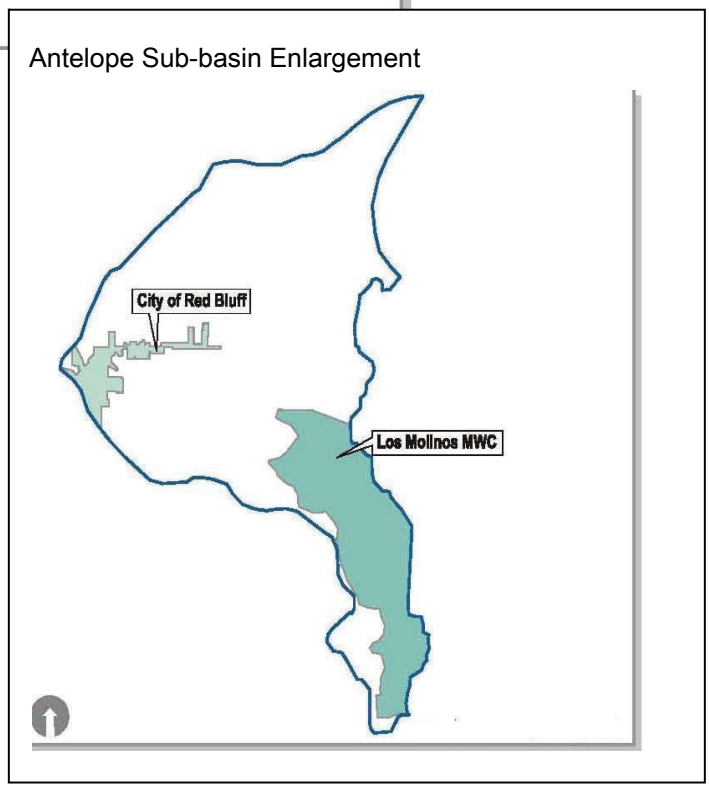
- How your water well was constructed and how it relates to the groundwater levels in your specific area.
    - ◊ A well log may be available from the well driller who constructed it. It should show how deep the well was drilled, describe the water bearing strata below ground, and indicate the depth and type of well screens installed to intercept groundwater.
    - ◊ As an alternative, request a copy of the well log from the California Department of Water Resources (DWR), Northern Region office located at 2440 N. Main Street in Red Bluff. Well logs are filed with DWR for most wells that have been constructed. Well logs are confidential and can only be requested by the well owner.
- How deep the pump is set in the well and how much deeper it could be set.
- Learn how to access public databases of local groundwater levels at http://www.water.ca.gov/waterdatalibrary/ or explore how and if it is feasible to measure groundwater levels in your own well. Use this knowledge to evaluate whether an existing well or new well, planned for construction, is deep enough.
- Give consideration to neighbors. When constructing a new well, especially larger capacity wells surrounded by shallow domestic wells, consider the feasibility of a well design that lessens competition for water from shallower groundwater bearing strata and reduces the area of influence while pumping. Be aware of Tehama County Health and Safety Code Section 9.40.040 which addresses groundwater aquifer protection.

Antelope Area Groundwater Sub-basin Information

Second, understand the water supply-demand situation on groundwater in your area:

The Antelope Groundwater Sub-basin lies on the valley floor within Tehama County and includes about 200,000 acres. It is bound on the north by volcanic (Tuscan) deposits from Mount Lassen, on the south and west by the Sacramento River, and on the east by Antelope Creek.





A portion of the City of Red Bluff lies within the westerly portion of the Antelope sub-basin. The majority of the sub-basin is primarily a rural agricultural area that includes the Community of Dairyville and a portion of the Los Molinos Mutual Water Company.

Water demand (use)

Historically, average annual water demand in the Antelope sub-basin is approximately 31,300 acre-feet (325,851 gallons of water equal an acre-foot of water). During abnormally hot and dry years, the annual water demand may be 10 to 15 percent higher. Irrigated agriculture accounts for the largest proportion of the annual water demand at 76 to 79 percent. Conveyance losses from agricultural canal systems account for another 13 to 16 percent of the annual demand. The losses generally percolate and/or recharge groundwater, or seep laterally and augment stream or river flows. Domestic, municipal, and industrial water demands in the Antelope sub-basin account for approximately 7 percent of the area's annual water demand.

Antelope Area Groundwater Sub-basin Information

Water supply

Both groundwater and surface water are used to meet the demand within the Antelope sub-basin. Approximately one-half, between 46 and 55 percent, of the annual water demand in the sub-basin is supplied by groundwater extraction depending on the annual weather patterns. The balance of the water demand is supplied by surface water diverted from Antelope Creek.

While both groundwater and surface water are essentially relied upon equally to supply the annual water demand in the Antelope sub-basin, groundwater extraction is more prevalent in the northern and western portions of the sub-basin, and surface water is relied upon more extensively in the eastern and southern portions of the sub-basin.

Net Groundwater Use in Antelope Sub-basin (acre-feet)[1]:

City of Red Bluff	600 - 800
Privately owned wells	13,700 – 18,500

Number of wells by type in Antelope Sub-basin[2]:

Irrigation:	112 wells
Domestic:	770 wells
Municipal and Industrial:	11 wells

[1] *Source: Tehama County Water Inventory and Analysis, 2003.*

[2] *Source: Department of Water Resources, Northern Region, 2010 Well Log Records.*

Annual groundwater extraction

Approximately, 900 water wells currently exist in the Antelope sub-basin to meet the irrigation, domestic, and municipal and industrial water demand. Most of the groundwater, on average 88 percent, is extracted for irrigation, even though there are fewer irrigation wells than domestic wells. New wells are constructed each year and may influence the annual amount of groundwater extracted. Historically, the number of new wells constructed typically increase 1 to 4 percent annually; equating to 9 to 36 new wells each year. Most are privately owned domestic wells. Economic conditions and periods of drought are two examples of variables that may influence the annual number of wells constructed. Land use changes can also influence annual groundwater extraction, depending upon whether the new land use has an increased demand for groundwater, and/or whether an adequate supply of groundwater to meet increasing demands already exist.

Groundwater levels in the Antelope Sub-basin

The Tehama County Flood Control and Water Conservation District, in cooperation with the State Department of Water Resources have been monitoring static (non-pumping) groundwater levels in five Key Wells in the Antelope Sub-basin for a number of years. Measurements are taken approximately twice each year (spring and fall) as part of the county-wide groundwater management plan effort. These key wells, combined with other wells in operation in the area, provide roughly a 10 to over 40 year history of groundwater that include past droughts, high water years, and changes in the landscape throughout the sub-basin. Static (non-pumping) groundwater levels measured in the spring and fall, before and after the most intensive summer pumping season, are better indicators of the groundwater conditions in the sub-basin.

Antelope Area Groundwater Sub-basin Information

Static levels versus actual pumping levels during the summer season, provide more accurate tracking data, because actual pumping levels are site-specific and can vary significantly depending upon how the well is constructed, whether water is pumped from it regularly, and whether other nearby wells are pumping at the same time.

Groundwater levels are generally deeper in the fall following the summer season of highest water demand. Levels recover each spring after the fall and winter season ends. The extent of spring recovery is dependent on rainfall and snowpack totals. Groundwater levels tend to be shallower in the eastern and southern areas of the Antelope sub-basin where surface water is used for irrigation and provides recharge. Groundwater levels are deeper in the northern and western areas of the sub-basin, where groundwater is the sole water supply.

Historic Groundwater Levels in the Antelope Sub-area[3]

General Location of Key Well	Range in Spring Groundwater Levels (feet below ground surface)	Range in Fall Groundwater Levels (feet below ground surface)
St. Mary and Trinity Ave	43 - 61	50 - 60
Roundup Ave	24 - 34	35 – 43
Hogsback Rd and Hwy 99E	12 - 30	12 - 39
Bray and Craig Ave	16 -31	22 - 38
LeClaire and Decker Ave	7 - 19	13 - 20

[3] *Source: Department of Water Resources Water Data Library. 2011.*

Existing water wells

The Tehama County Flood Control and Water Conservation District has analyzed the water well infrastructure surrounding the key wells in the Antelope sub-basin. The goal is to understand the trends in water well construction and how they relate to static water levels.

Findings show that many wells are between 81 – 120 feet deep. The average depth of privately owned domestic wells in the vicinity of the key wells ranges from 87 – 113 feet in depth. Municipal and industrial wells averaged between 160 – 343 feet deep and irrigation wells averaged 123 – 305 feet deep. Generally, wells tend to be deeper in the northern and western portions of the sub-basin than in the eastern and

Existing Water Wells in the Antelope Sub-area[4]

General Location Of Key Well[5]	Number of Wells by Depth			
	40-80 feet	81-120 feet	121-160 feet	> 160 feet
St. Mary & Trinity Ave	85	335	118	69
Roundup Avenue	82	309	139	77
Hogsback Rd & Hwy 99E	57	137	46	32
Bray and Craig Ave	79	86	19	21
LeClaire & Decker Ave	82	76	21	11

[4] Source: Department of Water Resources, Northern Region, 2010 Well Log Records.

[5] The number of wells described in this table represents those within a nine square mile area surrounding each key well. Since the key wells at St. Mary and Roundup Avenues and Hogsback Road are relatively close, some wells may be counted twice.

southern areas, which is consistent with the variation in the groundwater levels noted for the sub-basin. A significant percentage 12 – 43 %, mostly domestic wells, are shallower at depths of 40 – 80 feet. These shallow wells may be more at risk of dewatering, especially in the northern and western areas of the sub-basin, where static groundwater levels are deeper.

Third, attention to water development activities in Tehama County

The Tehama County Flood Control and Water Conservation District is committed to sustaining long term, adequate and reliable supplies of groundwater for the citizens of Tehama County. The District recognizes that over 13,000 active wells extract groundwater throughout the County, and approximately 70 percent of the annual countywide water demand is supplied by groundwater. The District also recognizes the need to balance groundwater preservation with utilization in order to support a thriving rural economy. To assist in this effort the County implements policies that strive to maintain a viable groundwater system.

Examples of current policies that protect and manage groundwater include:

- Tehama County Code, Section 9.40 – Aquifer Protection prohibits mining of groundwater and requires a permit and annual reporting to extract groundwater and use it off-parcel.
- Tehama County Health and Safety Code Section 9.40.040 prohibits the radius of influence of a well from extending beyond the boundaries of the parcel of land upon which the well is located, or alternatively, beyond the boundaries of contiguous parcels of land under the same ownership as that parcel upon which the well is located. This provision does not apply to the extraction of water for the purposes of supplying a "public water system," a "community water system," a "noncommunity water system," or "state small water system" as defined by Division 5, Part 1, Chapter 7 of the California Health and Safety Code commencing with Section 4010, serving residents of the County of Tehama. Tehama County Health and Safety Code Section 9.40.045 further specifies that Code Section 9.40.040 is not applicable to any well constructed during the 1991 calendar year or any year prior.
- Adoption of the Tehama County Coordinated AB 3030 Groundwater Management Plan. The Plan emphasizes routine monitoring of groundwater conditions and collaboration among local water agencies and private interests to meet local water needs.
- For additional information visit: http://www.tehamacountypublicworks.ca.gov/Flood/.

Recommended Information Sources:

California Department of Water Resources Groundwater Information Center.
http://www.water.ca.gov/groundwater/

California Department of Water Resources, California Statewide Groundwater Elevation Monitoring (CASGEM) program.

http://www.water.ca.gov/groundwater/casgem/

Tehama County Code. Title 9: Health and Safety.
http://library.municode.com/index.aspx?clientID=16652&stateID=5&statename=California

Tehama County Flood Control and Water Conservation District.
http://www.tehamacountypublicworks.ca.gov/Flood/

- AB 3030 Coordinated Groundwater Management Plan, 1996 and Update 2013
- Technical Memorandums for defining groundwater elevation trigger levels and awareness actions, 2009
- Tehama County Water Inventory and Analysis, 2003

University of California Cooperative Extension, Groundwater Education Program.

http://cetehama.ucanr.edu Select the "Water/Irrigation Program" from the list on the left. A new list will then show on the left. From this list select "Groundwater Management".

Authorship

This informational pamphlet for the Antelope Area Groundwater sub-basin has been prepared through a joint effort by the:

- Tehama County Flood Control and Water Conservation District
- AB 3030 Coordinated Groundwater Management Plan Technical Advisory Committee
- California Department of Water Resources, Northern Region
- University of California Cooperative Extension, Tehama County

Cooperative Extension, University of California

Water & Land Resource Manager Newsletter

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Cooperative Extension Work in Agriculture and Home Economics, U.S. Department of Agriculture, University of California, and County of Tehama Cooperating.

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