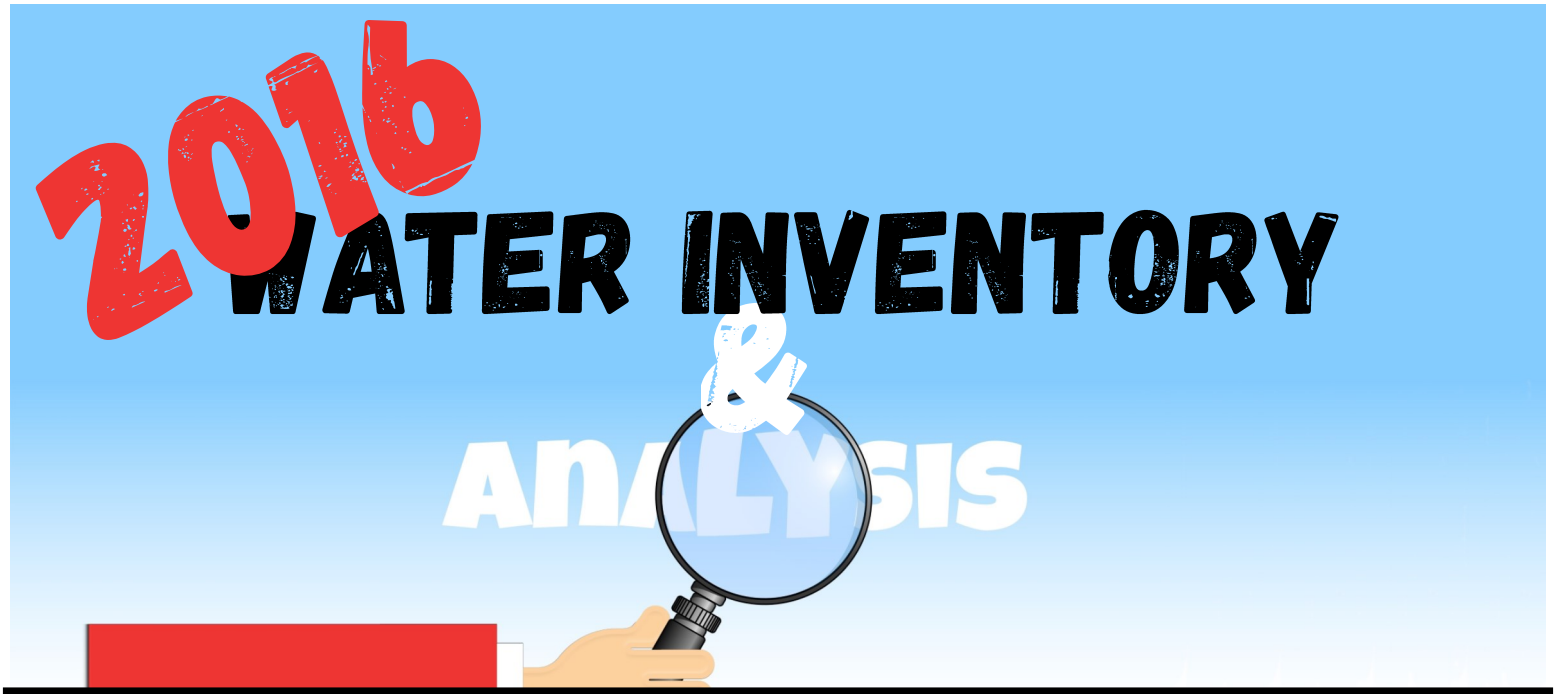

Highlights Part II: A View of the County through Differing Water Supplies

This continues part two of a three part series highlighting key content from the recently released 2016 Water Inventory and Analysis Report (WI&A report).

On average, the overall water supply (precipitation, surface water and groundwater) for the valley floor portion of Butte County is 2.040 million acre-feet. Precipitation provides the largest portion (914 thousand acre-feet) followed by applied surface water (715 thousand acre-feet) and groundwater pumping (411 thousand acre-feet). Different parts of the county use these varying water sources for urban and irrigation demands depending on their availability and accessibility. From the WI&A report, Figure 4.13 shows the dependency of Vina, portions of West Butte, and North Yuba on groundwater for irrigation supplies. In contrast, East Butte and portions of West Butte (corresponding largely to water district areas) generally use reliable surface water supplies for irrigation. These differences have a big influence on the water budgets for these different subbasins, which will be described in part III of this series. This article highlights content from Section 4 of the report which describes the County's hydrology and water sources.

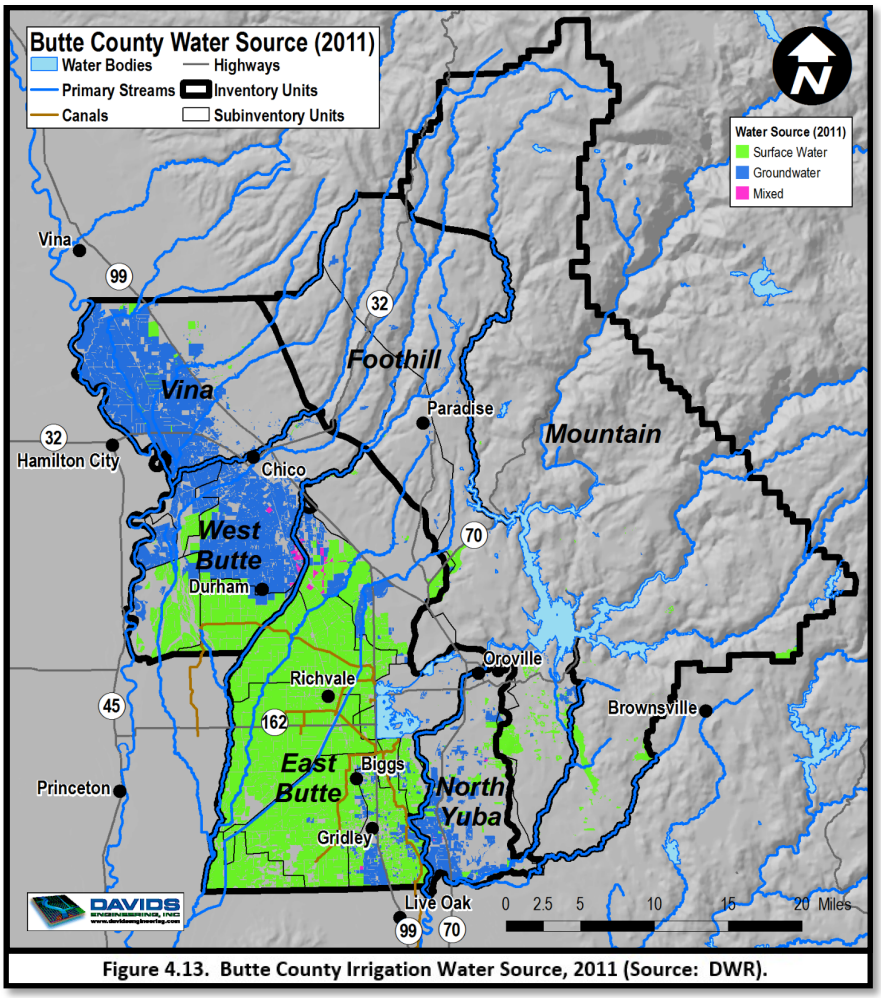

Figure 4.13. Butte County Irrigation Water Source, 2011 (Source: DWR).

Surface Water Supplies

Primary surface streams providing water supplies in Butte County include the Feather River and Butte Creek. Water is also diverted from the Sacramento River and other, minor sources including miscellaneous riparian diversions, diversions from the Feather River watershed other than the Feather River Settlement Contractors (e.g., South Feather Water and Power) and the Cherokee Canal.

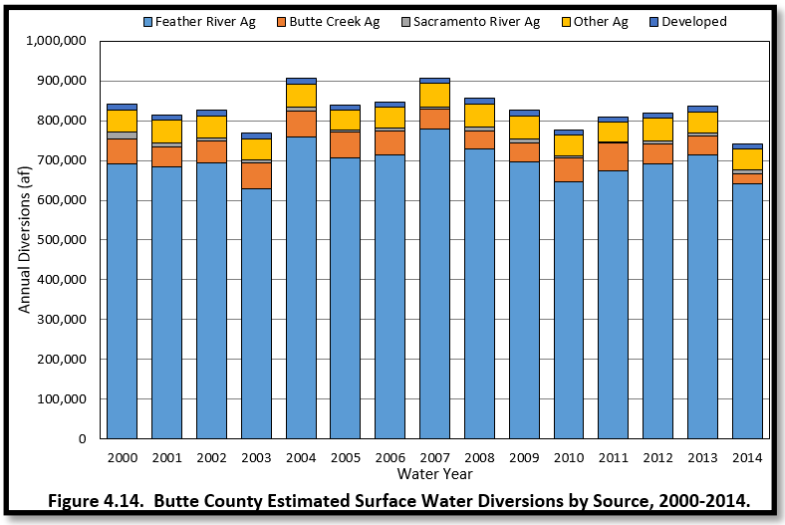

Figure 4.14. Butte County Estimated Surface Water Diversions by Source, 2000-2014.

Estimated annual diversions for water years 2000 to 2014 are shown in Figure 4.14. 'Feather River Ag' consists primarily of diversions by the Feather River Settlement Contractors (Western Canal Water District, Richvale Irrigation District, Biggs-West Gridley Water District, and Butte Water District) in East Butte and portions of West Butte. Total surface water diversions during this period ranged from 743 thousand acre-feet to 907 thousand acre-feet with an average of 828 thousand acre-feet. This variation largely occurs due to changes in demand driven by variations in irrigated acreage due to fallowing annual crops for various agronomic reasons or during water transfer years. In contrast, groundwater largely serves permanent crops (i.e. orchards) and thus variations in groundwater pumping from one year to the next largely responds to changes in water supply from variable precipitation or in some cases, available surface water (i.e. Butte Creek).

Vina surface water diversions are limited to minor riparian diversions for irrigation. There are no surface water diversions for domestic or municipal and industrial (M&I) use in Vina. Surface water diversions to meet demands within West Butte include diversions from the Feather River by Western Canal Water District; from Butte Creek by Dayton Mutual Water Company, Durham Mutual Water Company, Llano Seco Rancho, and M&T Chico Ranch; and from the Sacramento River by Llano Seco Rancho, M&T Chico Ranch, and riparian diverters in the Angel Slough subinventory unit. East Butte surface water supplies include diversions from the Feather River by Western Canal Water District, Richvale Irrigation District, Biggs-West Gridley Water District, and Butte Water District; from Butte Creek by Durham Mutual Water Company, Rancho Esquon, and Western Canal Water District; and other diversions in the Cherokee, Thermalito, and Butte Sink subinventory units. In addition to diversions for irrigation and wetlands, these other diversions include water diverted by Thermalito Water and Sewer District for domestic and M&I use. North Yuba surface water supplies include diversions by South Feather Water and Power Agency and CalWater Oroville. Diversions by South Feather are for irrigation, domestic and M&I use, while diversions by CalWater are exclusively for domestic and M&I use.

Groundwater Supplies

Groundwater provides a source of supply to meet irrigation, domestic, M&I, environmental, and stock water demands. Estimated pumping within the valley floor for water years 2000 to 2014 is presented in Figure 4.33. In the figure, symbols for each year are color-coded based on the Sacramento Valley Water Year Index (WYI), a key indicator of seasonal

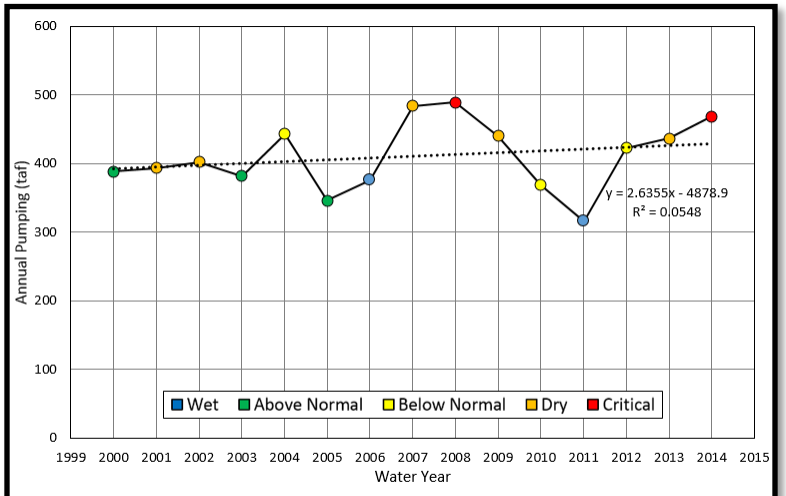

Figure 4.33. Butte County Valley Floor Estimated Groundwater Pumping and Water Year Type, 2000-2014.

variability in inter-annual hydrology. The WYI is used to classify individual water years as Wet (W), Above Normal (AN), Below Normal (BN), Dry (D), or Critical (C) with respect to surface water runoff in the Sacramento River Basin. Total estimated groundwater pumping during this period ranged from 316 thousand acre-feet in the wet year of 2011 to 489 thousand acre-feet in the critically dry year of 2008. Average pumping during this period is estimated to be 411 thousand acre-feet annually. Table 4.3 shows the break out of pumping for different uses: irrigated agriculture and wetlands, M&I, and rural residential pumping for each of the subbasins and the valley floor overall.

Table 4.3. Average Annual Groundwater Pumping (taf), 2000-2014.

Inventory Unit	Irrigated Agriculture and Wetlands	M&I	Rural Residential	Total
Vina	88.3	19.6	0.8	108.7
West Butte	115.8	8.9	1.2	125.9
East Butte	119.5	2.9	2.1	124.5
North Yuba	50.7	0.1	0.8	51.5
Valley Floor	374.3	31.4	4.8	410.6

Average pumping for water years 2000 to 2014 is estimated to be 109 thousand acre-feet annually in Vina for irrigated agriculture, wetlands, portions of the Chico urban area, and rural residential land use dependent on private domestic wells for indoor and outdoor water use. West Butte includes irrigated agriculture and wetlands, portions of the Chico urban area, Durham, and rural residential land use dependent on private domestic wells for indoor and outdoor water use. Average pumping, 2000 to 2014, is estimated to be 126 thousand acre-feet annually. East Butte includes irrigated agriculture and wetlands, the Oroville, Gridley and Biggs urban areas and rural residential land use dependent on private domestic wells for indoor and outdoor water use. Estimated average annual pumping is 124 thousand acre-feet. North Yuba includes irrigated agriculture and wetlands, and rural residential land use dependent on private domestic wells for indoor and outdoor water use. Average pumping is estimated to be 52 thousand acre-feet annually.

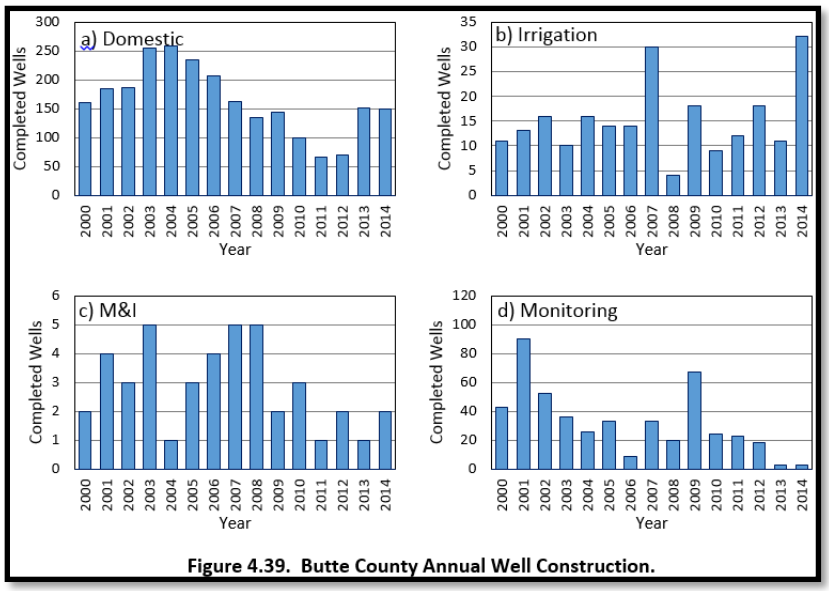

Figure 4.39. Butte County Annual Well Construction.

Groundwater Infrastructure: Well Development

Based on well completion reports on file with the Department of Water Resources Northern Region Office describing wells constructed between 1900 and August 2015, there are over 17,000 wells in Butte County. The wells are classified by type as domestic, irrigation, municipal and industrial (M&I), monitoring, and other.

Based on well completion data from DWR for the period 2000 to 2014, well construction has varied over time (Figure 4.39). Domestic well construction increased from 2000 to 2004 and then declined until 2013, when construction increased from approximately 70 to 150 wells per year (average of 164 wells per year between 2000 and 2014). Irrigation well construction has been relatively steady over time, averaging approximately 15 wells per year, with increases to 30 or more wells per year in 2007 and 2014, likely due to drought, anticipated surface water cutbacks, and long term water level declines in some areas. M&I well construction varied between 1 and 5 wells per year (average of 3 wells per year) during the 2000 to 2014 period, with monitoring well construction varying over time but averaging 32 wells per year.

A number of factors can contribute to additional wells being drilled. Declining groundwater levels can require wells to be deepened or a new well to be drilled to replace an older, shallower well. During the past couple of

severe drought years, some farmers in surface water irrigated areas put in new wells to compensate for anticipated cutbacks in surface water supplies. Recent increases in domestic well counts have been linked to marijuana growing activities in the foothills. Understanding the well infrastructure (both counts and depths) is important for tracking the vulnerability of current wells to reliably provide groundwater for irrigation and domestic needs. However, it's not a good indication of changing groundwater demand over time. This is better estimated using land use data (see Part I of this series for trends in County land use) and other factors captured by the Butte Basin Groundwater Model to develop water budgets and estimates of groundwater demand. Stay tuned for Part III of this series for results of the water budget analysis included in the WI&A report.

Check out the entire report

Complete results on the County's Climate and Hydrology can be found in Section 4 of the report (pages 4-1 to 4-48). This section also provides some background on the major creeks and streams in the county, a brief description of the hydrogeology, and an overview of groundwater conditions.

The entire report is available on our website (http://www.buttecounty.net/waterresourceconservation/WaterInventoryandAnalysis.) Results are generally broken down and presented for the Valley portion of Butte County (corresponding to the four groundwater subbasin area: Vina, East Butte, West Butte and North Yuba) and then individually for each of these areas.

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