Butte County Department of Water and Resource Conservation

Groundwater Status Report

2012 Water Year

February 2013

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Foreward

This report presents the status of groundwater conditions and land subsidence based on data collected by Butte County and the California Department of Water Resources (DWR) during the 2012 water year and from fall measurements taken in mid-October. The water year begins October 1 each year. The report gives general information regarding locations of wells and extensometers, statistics related to groundwater level trends, historical precipitation information and hydrographs depicting groundwater levels over time. This report was prepared by the Butte County Department of Water and Resource Conservation (Department) with assistance from DWR, Northern Region and complies with reporting requirements established in Chapter 33 and Chapter 33A of the Butte County Code.

In November 1996, the voters in Butte County approved "AN ORDINANCE TO PROTECT THE GROUNDWATER RESOURCES IN BUTTE COUNTY". One of the stated purposes of the ordinance was that "The groundwater underlying Butte County is a significant water resource which must be reasonably and beneficially used and conserved for the benefit of the overlying land by avoiding extractions which harm the Butte Basin aquifer, causing exceedance of the safe yield or a condition of overdraft." The ordinance is now codified as Chapter 33 of the Butte County Code relating to groundwater conservation. Section 3.01 – "Groundwater Planning Process" requires the preparation of a groundwater status report based upon the data gathered and analyzed pursuant to Section 3.02 – "Groundwater Monitoring". Until 2010, this reporting was completed by the Butte Basin Water Users Association (BBWUA).

In 2000, the Butte County Board of Supervisors amended Chapter 33, the Groundwater Conservation Ordinance, to require the Groundwater Status Report be delivered by February 21st of each year. In 2010, the Water Commission designated the Department of Water and Resource Conservation as the entity responsible for creating and submitting the annual report. Over the years, as responsibilities and water resource programs including advisory committees have shifted more and more to the County, the Butte Basin Water Users Association participation has declined. In 2012, its members voted to dissolve the organization, after twenty years of serving the region.

In February 2004, the Butte County Board of Supervisors adopted the Groundwater Management Ordinance which was codified as Chapter 33A of the Butte County Code. Chapter 33A calls for the establishment of a monitoring network and Basin Management Objectives (BMOs) to define acceptable groundwater levels, groundwater quality related to saline intrusion, and land subsidence. The BMO concept was incorporated into California Water Code §10750 et. seq., as a component of AB 3030 Groundwater Management Plans. On September 28, 2004, the Butte County Board of Supervisors formally approved Resolution 04-181 adopting the countywide AB 3030 Groundwater Management Plan (GMP) that includes the components of the BMO program. In 2011, Chapter 33A was amended and retitled to "Basin Management Objectives (BMO)" and now requires the BMO report be submitted in February of each year. The foregoing actions by the Board allow the reporting of groundwater conditions from Chapter

33 and 33A to be consolidated into a single report to be submitted by the Department on an annual basis in February.

Data from published reports prepared for the Butte County Department of Water and Resource Conservation are included throughout this document where relevant, and the referenced documents are listed in Appendices or as References, as well as being available on the Department's website at www.buttecounty.net/waterandresource. All past versions of the Groundwater Status Report and BMO documents are also available on the Butte County Department of Water and Resource Conservation website.

2012 Groundwater Status Summary

Water year 2012 was California's first dry year since the 2007-2009 drought. The 2012 water year began October 1, 2011 and ended September 30, 2012 (WY 2012). It followed the wet water year of 2011 which had helped to rebound groundwater levels some and improve statewide storage conditions. As a result, reservoir storage in the State Water Project's Lake Oroville began WY 2012 above average, was at or near capacity in May, but then due to minimal snowpack and lower runoff, reservoir storage ended the water year at 88% of average for the date (56% of capacity). The overall Below Normal conditions in the Sacramento Valley (based on precipitation and runoff in 2012) resulted in decreased groundwater levels in many monitored wells throughout Butte County. Of the last twelve water years, eight of them have been below normal, dry, or critical.

With below normal hydrologic conditions, groundwater levels in most monitored wells were lower than 2011 levels, for both spring and fall measurements. The spring 2012 groundwater level measurements showed that of the 111 wells measured, 28 wells did not meet their BMO and reached an Alert Stage (Table 6). Wells that reached an Alert Stage were in the Biggs-West Gridley, Cherokee, Esquon, Thermalito, North Yuba, Chico Urban Area, Durham/Dayton, Llano Seco, M&T and Vina sub-inventory units. In the fall of 2012, groundwater level data showed that 34 of 106 wells measured did not achieve their BMO. In comparison, 12 wells reached a BMO Alert Stage in fall 2011 and 24 wells reached a BMO Alert Stage in 2010 (Table 7). Fall Alert Stages in 2012 occurred in the Cherokee, Esquon, Richvale, Western Canal, Angel Slough, Chico Urban Area, Durham/Dayton, Llano Seco, M&T, and Vina sub-inventory units.

The Department conducted its eleventh year of groundwater quality trend monitoring for evidence of saline intrusion during the week of July 23 - 26, 2012. As required by Chapter 33, the parameters monitored were temperature, pH and electrical conductivity. These parameters encompass the basic water quality characteristics needed to evaluate a basin for evidence of saline intrusion. The groundwater quality trend monitoring program is designed to track single monitoring events throughout the county during the peak irrigation season on an annual basis. In 2012, all samples from the ten accessible wells fell within the acceptable range of water quality values as set forth by State and Federal agencies. Additionally, the results met BMOs for water quality parameters as specified in Chapter 33A.

Subsidence is monitored by periodic land surveys and by use of extensometers. These instruments are capable of detecting changes in land surface elevation to approximately 1/100th of an inch. DWR Northern Region has installed and operates eight extensometers in the northern Sacramento Valley: three in Butte County, three in Glenn County, and two in Colusa County. According to the BMO Ordinance, an Alert Stage is reached if the annual elastic subsidence exceeds the average annual elastic subsidence measured over the period of record of the extensometer. No land subsidence was detected in Butte County from an evaluation of the extensometer records in the Western Canal, Richvale, and Biggs-West Gridley sub-inventory units.

Hydrologic Conditions

There are a number of data sources and indices available to characterize hydrologic conditions. The data sources typically report hydrologic data on a water year basis, or the 12-month period from October through September. Water year 2012 is October 1, 2011 through September 30, 2012.

The Northern Sierra 8-Station Precipitation Index serves as a wetness index for the Sacramento River hydrologic region by averaging measurements taken at the following precipitation stations: Blue Canyon, Brush Creek Ranger Station, Mineral, Mount Shasta City, Pacific House, Quincy Ranger Station, Shasta Dam, and Sierraville Ranger Station.[1] This index provides a representative sample of the region's major watersheds: the upper Sacramento, Feather, Yuba, and American rivers, which produce inflow to some of California's largest reservoirs - the source of much of the state's water supply.

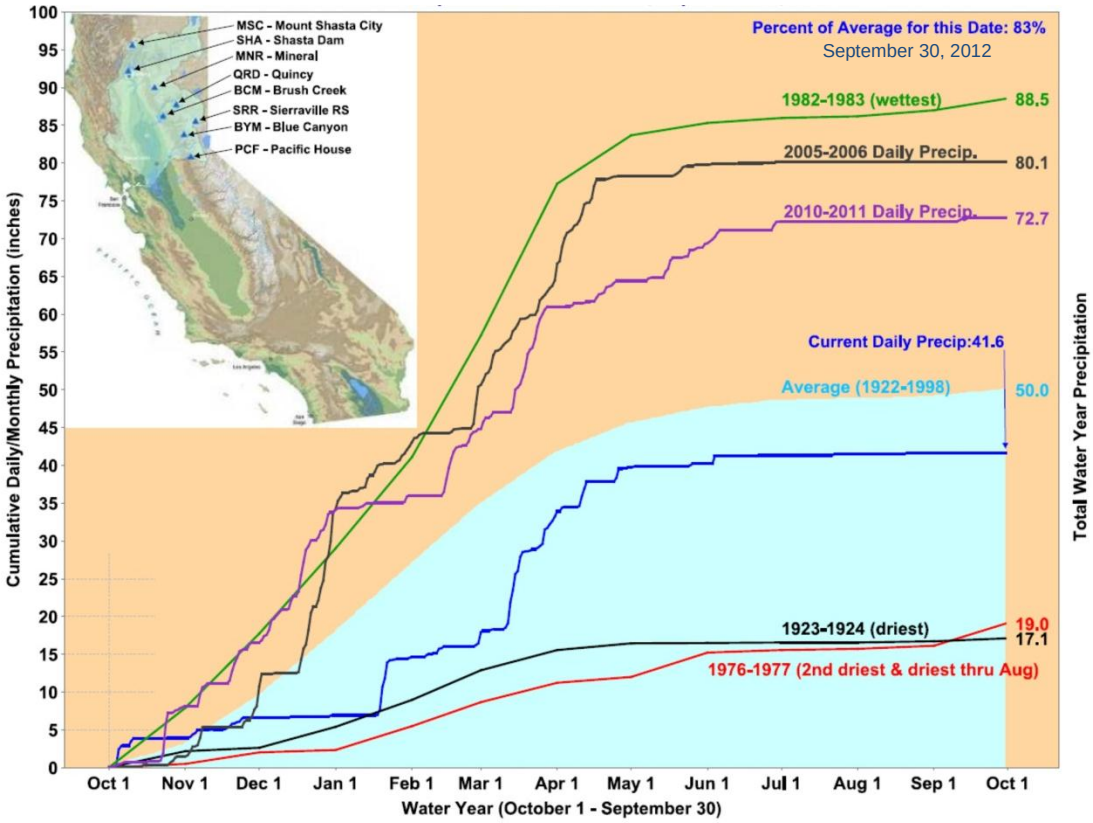


Figure 1. Northern Sierra Precipitation: 8 Station Index for 2012 Water Year (as of September 30, 2012)

At the end of the 2012 water year on September 30, 2012, *statewide* hydrologic conditions were as follows: precipitation was 75 percent of average to date; runoff was 60 percent of average to date; and reservoir storage, 95 percent of average for the date. Sacramento River Region unimpaired runoff observed through September 30, 2012 was about 11.8 million acre-

[1] http://cdec.water.ca.gov/cgi-progs/snow/PLOT_ESI

feet (MAF), which is about 65 percent of average. For comparison, the 2011 water year ended with 25.2 MAF (138 percent of average) and WY 2010 unimpaired runoff was about 16.0 MAF (88 percent of average).

Water year classification systems provide a means to assess the amount of water originating in a basin. Because water year classification systems are useful in water planning and management, they have been developed for several hydrologic basins in California. The Sacramento Valley 40-30-30 Index was developed by the State Water Resources Control Board (SWRCB) for the Sacramento hydrologic basins. This system defines one *"wet"* classification, two *"normal"* classifications (above and below normal), and two *"dry"* classifications (dry and critical), for a total of five water year types. The Sacramento Valley 40-30-30 Index is computed as a weighted average of the current water year's April-July unimpaired runoff forecast (40 percent), the current water year's October-March unimpaired runoff forecast (30 percent), and the previous water year's index (30 percent). A cap of 10 MAF is put on the previous year's index to account for required flood control reservoir releases during wet years. Unimpaired runoff (calculated in the 40-30-30 Index as the sum of Sacramento River flow above Bend Bridge near Red Bluff, Feather River inflow to Oroville, Yuba River flow at Smartville, and American River below Folsom Lake) is the river production unaltered by water diversions, storage, exports, or imports. Sacramento Valley Water Year Hydrologic Classification is:

Year Type	**Water Year Index**
Wet	Equal to or greater than 9.2
Above Normal	Greater than 7.8, and less than 9.2
Below Normal	Greater than 6.5 and equal to or less than 7.8
Dry	Greater than 5.4, and equal to or less than 6.5
Critical	Equal to or less than 5.4

The Sacramento Valley was classified as a below normal year in 2012 with an index value of 6.89.

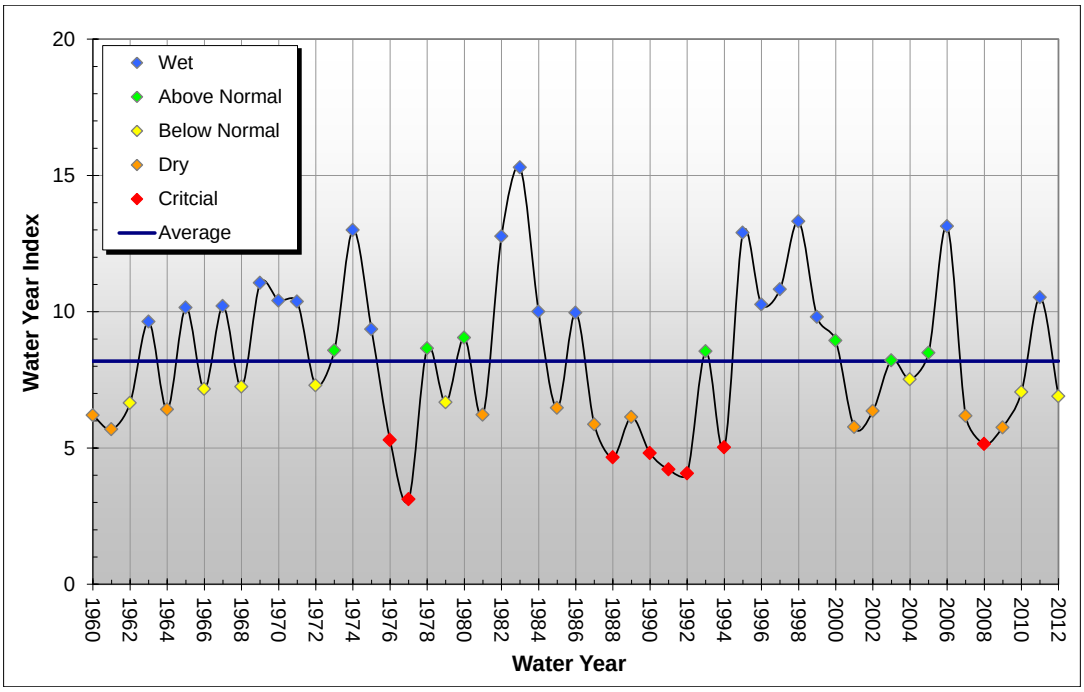


Figure 2. Sacramento Valley Water Year Type Index 40-30-30

Precipitation

Precipitation for the 2012 water year measured at the Western Canal Water District's Climatological Observation Station totaled 14.77 inches. This is over six inches below the 50-year average of 21.15 inches. Figure 3 shows the total annual precipitation at the Western Canal Station for the 52-year period, water years 1960 through 2012. Water year 2012 was the 13th driest year in the 52-year period.

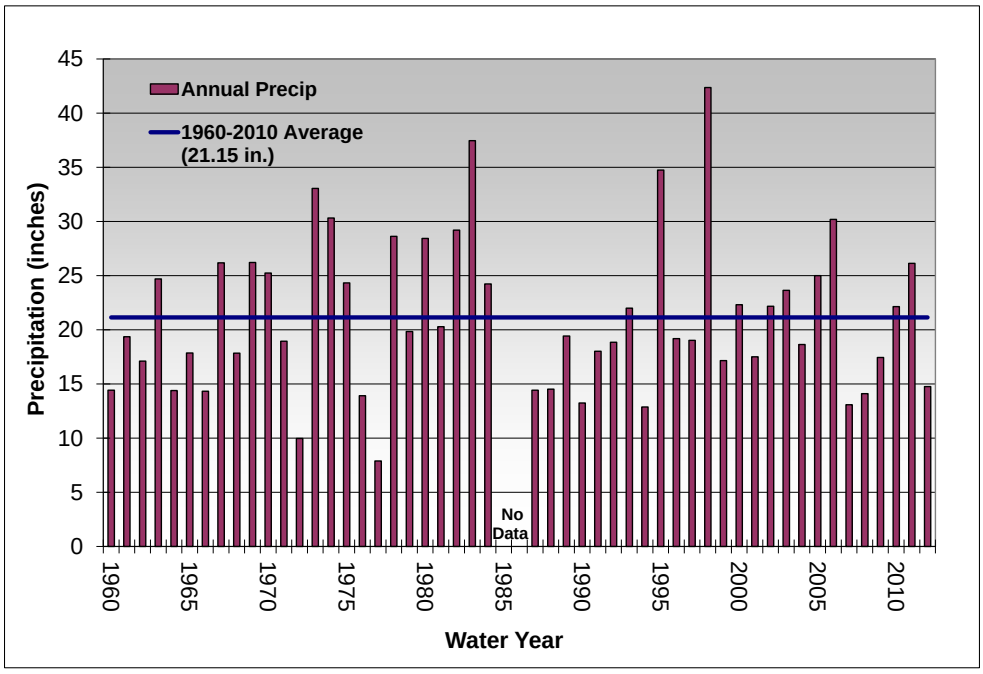


Figure 3. Annual precipitation for water years 1960-2012 from Western Canal climate station at Nelson compared to the 50 year average (1960-2010)

The timing of rainfall in the valley influences irrigation water use. Plotting daily precipitation November through June provides an indication of when and how much rainfall occurred and how that may affect the irrigation season. With late spring rains through April 2012 (Figure 4), irrigation was largely not necessary until May. If March and April had been dry months, then water deliveries and groundwater pumping would have begun earlier in the year and the irrigation season lengthened. This is included as a means of broadly gaging irrigation water demand for the 2012 season.

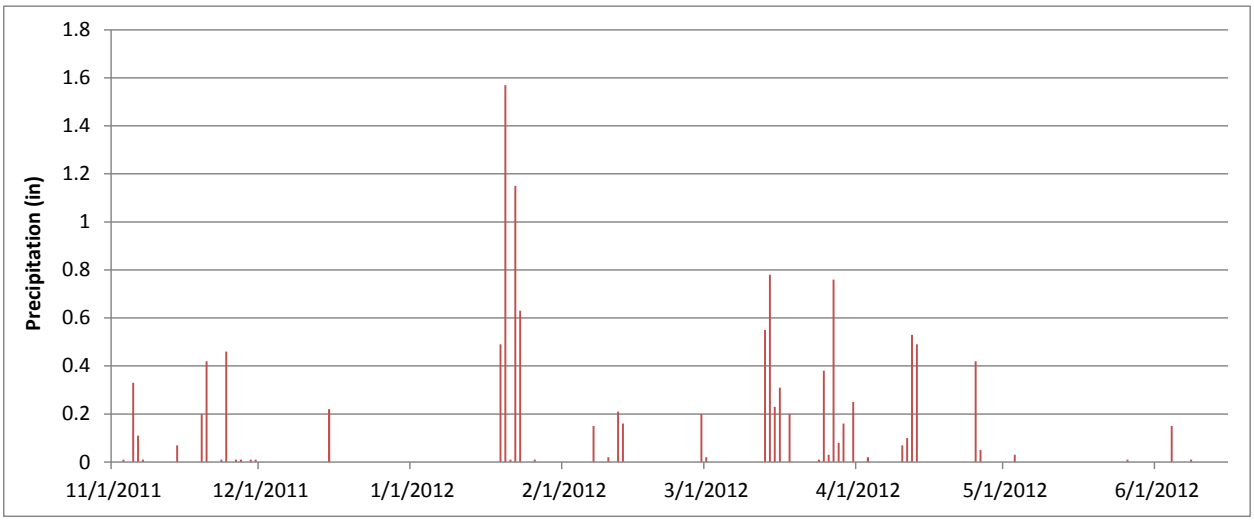


Figure 4. Daily Precipitation (inches) measured at the Durham CIMIS station

Frost Protection Water Use

Another driver of agricultural water use is frost protection practices during February through April when walnuts, almonds, and prunes are susceptible to damage from freezing temperatures. If temperatures below 30°F occur when the bloom or nut is vulnerable, growers will run their sprinkler systems to increase the air temperature in the orchard. This works because water gives off heat when it changes from a liquid to a solid (i.e. freezes). The plot below (Figure 5) shows the minimum air temperature for days that had a minimum air temperature below 30°F. Only one day in the 2012 season had these conditions and as a result, frost protection was likely not a significant use of water in 2012.

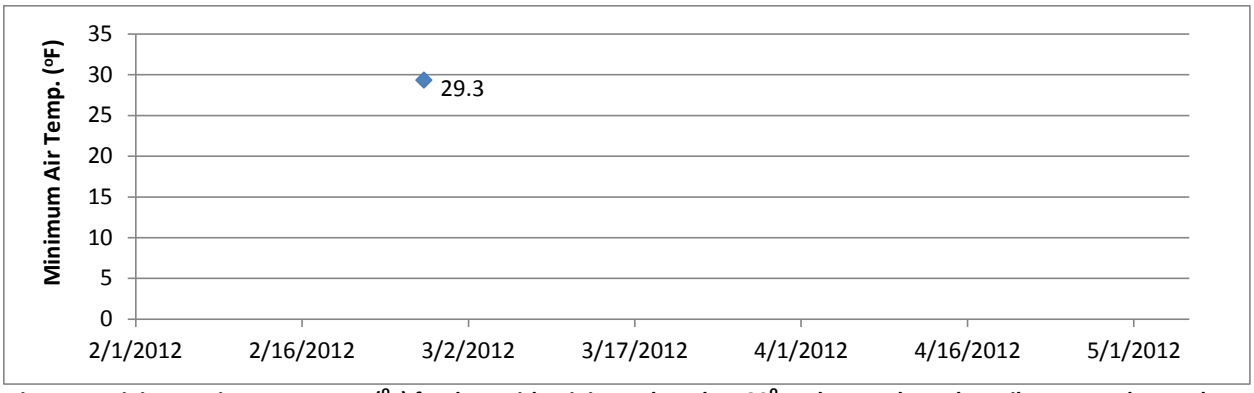


Figure 5. Minimum Air Temperature (°F) for days with minimum less than 30°F February through April, measured at Durham CIMIS station

Evapotranspiration

Evapotranspiration (ET) is the use of water by plants (transpiration) and evaporation from soil and other surfaces. It is an indication of how much water crops, landscaping and native vegetation need for healthy growth and productivity[2]. ET from a standardized grass surface is commonly denoted as ET_o. Daily and monthly ET_o are available from Durham CIMIS station data. From year to year, the total annual ET_o can vary by several inches with the overall range for the period of record being 44.6 inches (WY 1998) to 58.0 inches (WY 1988) (Figure 6). WY 2012 had a total annual ET_o of 47.3 inches.

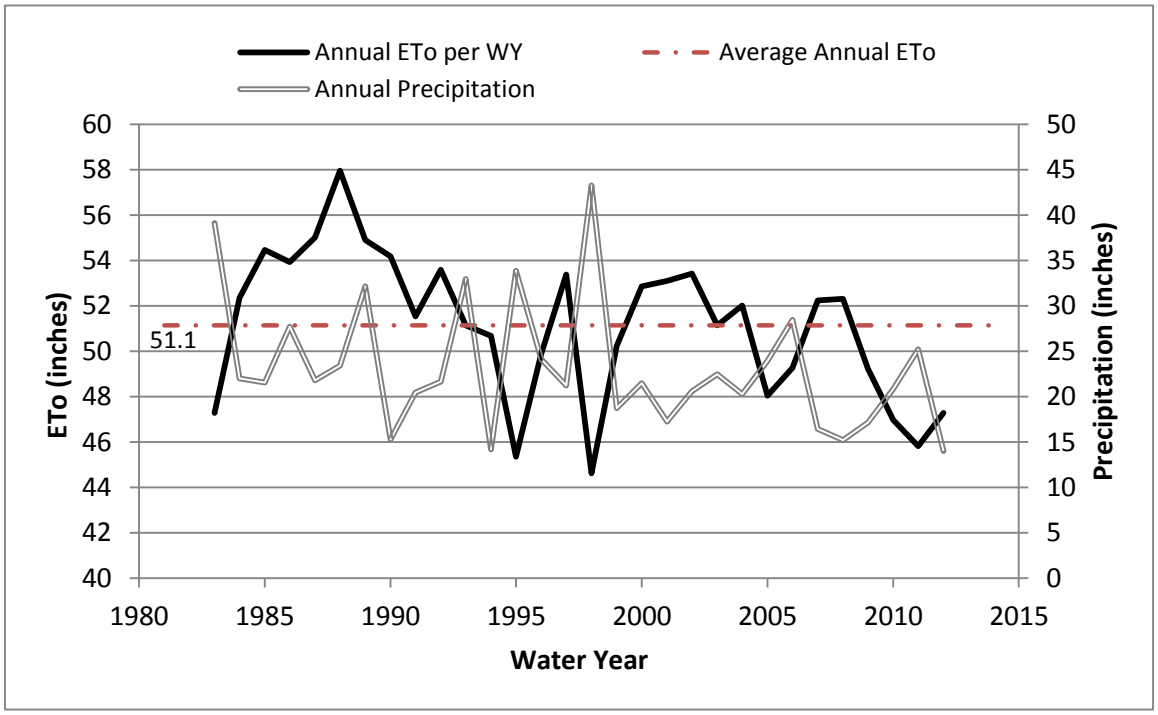


Figure 6. Total annual ETo (inches) and precipitation (inches) for water years 1983 - 2012 at Durham CIMIS station

Figure 6 shows both the annual ET_o per water year along with annual precipitation. They are generally inversely related meaning a higher ET_o year corresponds to a relatively lower precipitation year and vice versa.

Figure 7 shows the monthly ET_o and precipitation for WY 2012 compared to the average annual ET_o for the period of record, 1983-2012. This shows the variation throughout the year in comparison to the average monthly pattern. Driven largely by solar radiation, temperature and humidity, ET_o is greatest in June, July and August when days are long, hot and dry. Figure 7 also shows that the major storm events occurred in January and March and to a lesser degree in October, November, and April (see also Figure 4).

[2] http://wwwcimis.water.ca.gov/cimis/infoEtoOverview.jsp

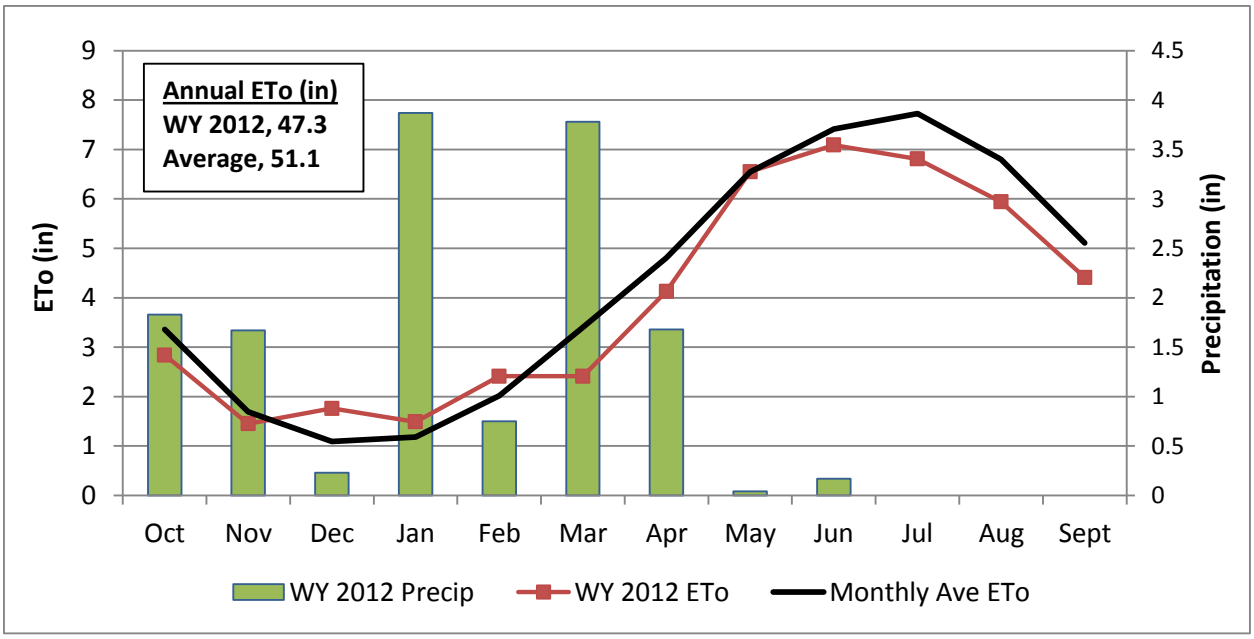


Figure 7. Monthly ET_o and precipitation (inches) from Durham CIMIS station for the current water year (2012) and average monthly ET_o 1983-2012

Surface Water Deliveries

Surface water is an important component of the water supply and has benefits to aquifer recharge in the Butte Basin. During the 2012 water year, 1,015,884 acre-feet (AF) of surface water was delivered to Western Canal Water District (WCWD) and the Joint Water District Board. The total 2012 water year deliveries were about 8,200 AF more than in water year 2011. The demand for surface water deliveries is affected by a number of factors. Although rice acreages remained high in Butte County, late rains in March and April resulted in very low water deliveries during April for WCWD. Summarized in Table 1 are the deliveries in acre-feet to Western Canal Water District and the Joint Water District Board for the water years 1991 to 2012.

Table 1. Surface water deliveries (acre-feet) for major water districts in Butte County

Water Year	Western Canal Water District	Joint Water District Board	TOTAL
2000	314,737	707,018	1,032,392
2001	302,784	718,489	1,021,562
2002	305,460	597,529	902,989
2003	271,867	682,403	954,270
2004	329,700	790,663	1,120,363
2005	284,188	750,128	1,034,316
2006	294,898	743,345	1,038,243
2007	318,159	824,286	1,142,445
2008	332,500	740,748	1,073,248
2009	327,184	711,693	1,038,877
2010	313,196	689,518	1,002,714
2011	288,912	718,771	1,007,683
2012	309,213	706,671	1,015,884

Groundwater Conditions

Monitoring Frequency and Period of Record

The monitoring well grid in Butte County is monitored four times per year as required by Chapter 33 and 33A of the Butte County Code. Sections 33-4 of the Butte County Code enacted in 1996 and 33A-8 of the Butte County Code enacted in 2004 state that groundwater level measurements shall be taken from all designated monitoring wells at least four (4) times per year, during the months of March, July, August, and October. The California Department of Water Resources (DWR) and the Butte County Department of Water and Resource Conservation (Department) share the monitoring duties. DWR conducts the spring and fall measurements while the Department does the July and August measurements. Water quality data are collected annually at the peak of the irrigation season. Monitoring frequency for land subsidence is conducted on a continuous basis by extensometers.

Groundwater Quality Trend Monitoring

The Butte County Groundwater Quality Trend Monitoring Program, in place since 2001, has annually recorded measurements for temperature, pH, and electrical conductivity (EC) from wells throughout the county. These three parameters are measured to evaluate for evidence of saline intrusion per Chapter 33. The Groundwater Quality Trend Monitoring Program is not designed to characterize specific groundwater contamination due to pollutants. The data is collected each July/August at the peak of irrigation season to establish baseline levels across the county to detect changes which may require further investigation. The network currently includes thirteen wells and ten of them were measured in 2012.

In Butte County, the primary freshwater bearing formations include the Tuscan formations, overlying alluvium deposits, basin deposits, and the Riverbank and Modesto Formations. A number of marine formations beneath the Tuscan formation make up the underlying saline aquifer system.[3] Increasing salinity in groundwater wells could indicate over utilization of groundwater resources. To ensure sustainable management of local groundwater resources, monitoring efforts need to provide baseline trends related to salinity.

The Department conducted its eleventh year of groundwater quality trend monitoring within the county during the week of July 23-26, 2012 (Appendix D). The 2012 data is comparable to data collected in the ten preceding years. All samples fell within the acceptable range of water quality values as set forth by State and Federal agencies. Additionally, groundwater quality measurements can trigger a BMO Alert Stage defined in Chapter 33A. If the temperature is more than five degrees outside of the historical range of measurements a BMO Alert Stage is reached. If the pH is below 6.5 or above 8.5, a BMO Alert Stage is reached. A BMO Alert Stage for electrical conductivity (EC) is reached if the measurements are greater than 900 uS for drinking water or greater than 700 uS for agricultural water use. None of the samples taken in 2012 triggered a BMO Alert Stage. Data tables and graphs can be viewed in Appendix D.

[3] Fulton, Allen. "Seeking an Understanding of he Groundwater Aquifer systems in the Northern Sacramento Valley: An Update". Article No. 1 – September 2005

To date, temperature has been relatively consistent in all wells. Temperature is a standard parameter measured when assessing water quality and is important because it affects chemical reactions that may occur in groundwater. Also, considerable changes in temperature could be an indication of other source waters migrating into the aquifer system such as stream seepage or flow from a different aquifer system." The 2012 measurements were all within 2.5 ^{o}C of the average temperature for each well and the 11 year temperature range for all wells is less than 5 ^{o}C. The lowest temperature reading was in the Thermalito well (17.8 ^{o}C) and the highest was in the Pentz well (21.9 ^{o}C). A map of well locations is included in Appendix D.

Measurements for pH remained stable and within the secondary water quality thresholds. The highest pH was found in the Thermalito well (8.00) and the lowest in Esquon (7.17). However, all measurements for pH were within the secondary water quality thresholds of 6.5-8.5 (see graphs in Appendix D).

Electrical conductivity (EC) measures the ability of a solution to conduct an electrical current. Observed readings for electrical conductivity can have a large range, up to 382 µS at a particular well (Western Canal-west), yet 2012 measurements were all well within the secondary water quality thresholds established by State and Federal regulatory agencies. Degraded water quality is a common effect of over-utilizing groundwater resources and can occur by saline intrusion from, among other sources, marine formations underlying freshwater aquifers.

Overall, the results of the water quality sampling indicate no significant changes in groundwater quality with respect to temperature, pH, or electrical conductivity and the basin appears to be free of saline intrusion. Water quality parameters have naturally occurring variability, so year to year changes are expected and nothing in this year's measurements give cause for further investigation or analysis. Further investigation would be advisable if values were to fall outside of the acceptable range. This data will help the Department continue to establish baseline levels for these parameters across the county so any future changes in water quality can be detected and further investigation and/or monitoring can be developed.

Land Subsidence

Land subsidence is a gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials caused by groundwater or oil extraction. The potential effects of land subsidence include differential changes in elevation and gradients of stream channels, drains, and water transport structures, failure of water well casings due to compressive stresses generated by compaction of aquifer systems, and compressional strain in engineering structures and houses.

Land subsidence in the Sacramento River, San Joaquin River, and Tulare Lake Basins is most likely to occur as a result of aquitard consolidation. An aquitard is a saturated geologic unit that is incapable of transmitting significant quantities of water. As the pressure created by the height of water (ie., head) declines in response to groundwater withdrawals, aquitards between production zones are exposed to increased vertical loads. These loads can cause materials in

aquitards to rearrange and consolidate leading to land subsidence. Factors that influence the rate and magnitude of consolidation in aquitards include mineral composition, the amount of prior consolidation, cementation, the degree of aquifer confinement, and aquitard thickness. Subsidence has elastic and inelastic deformation components. As the head lowers in the aquifer, the load that was supported by the hydrostatic pressure is transferred to the granular skeletal framework of the formation. As long as the increased load on the formation does not exceed the pre-consolidation pressure, the formation will remain elastic. Under elastic conditions, the formation will rebound to its original volume as hydrostatic pressure is restored. However, when the head of the formation is lowered to a point where the load exceeds pre-consolidation pressure, inelastic deformation may occur. Under inelastic consolidation, the formation will undergo a permanent volumetric reduction as water is expelled from aquitards[4].

Measurements of ground surface displacement providing evidence of subsidence are available in Butte County and the region. The locations of the three extensometers measuring land subsidence within Butte County are shown in Figure 8. These extensometers have a period of record beginning in 2005 and continuously monitor for subsidence. Records from these extensometers are available by contacting DWR Northern Region or from the Northern Region web page[5].

Figure 8. Extensometer locations in Butte County with continuous data available online (http://www.water.ca.gov/groundwater/data_and_monitoring/northern_region/LandSubsidence/available_data.cfm)

Downloaded data has been summarized in Table 2 which shows the annual minimum, maximum and average ground surface displacement in feet recorded at each of the three extensometers.

[4] http://water.usgs.gov/ogw/pubs/fs00165/

[5] http://www.water.ca.gov/groundwater/data_and_monitoring/northern_region/LandSubsidence/available_data.cfm

Table 2. Ground surface displacement (feet) measured by extensometers in Butte County sub-inventory units

	18N01E35L001M Biggs-West Gridley			19N01E35B002M Richvale			20N01E18L001M Western Canal		
Year	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
2005	0	0	0.000	0	0	0.000	0.02	0.02	0.02
2006	0	0	0.000	-0.03	0	-0.008	0.02	0.02	0.02
2007	0	0	0.000	-0.01	0	0.000	0.02	0.02	0.02
2008	0	0	0.000	0	0	0.000	0.02	0.02	0.02
2009	0	0.01	0.003	0	0.01	0.001	0.02	0.02	0.02
2010	0	0.01	0.006	0	0.01	0.002	0.02	0.02	0.02
2011	0	0.01	0.001	0	0.01	0.003	0.02	0.02	0.02
2012	0	0.01	0.003	0	0.01	0.005	0.02	0.02	0.02

*From daily data. Positive indicates land uplift, negative land subsidence

According to the BMO Ordinance, an Alert Stage is reached if the annual elastic subsidence exceeds the average annual elastic subsidence measured over the period of record of the extensometer. Chapter 33 is intended to prevent or limit inelastic subsidence. To date, no inelastic land subsidence has been recorded in Butte County.

Groundwater Level Monitoring

Groundwater levels typically fluctuate seasonally and from year to year. Seasonal fluctuation of groundwater levels occur in response to recharge and extraction or natural discharge. Precipitation, applied irrigation water, local creeks and rivers, and the Thermalito Afterbay all recharge groundwater in Butte County. Consequently, groundwater levels are usually highest in the spring and lowest during the irrigation season in the summer months.

Long-term fluctuations occur when there is an imbalance between the volume of water recharged into the aquifer and the volume of water removed from the aquifer, either by extraction or natural discharge to surface water bodies. If, over a period of years, the amount of water recharged to the aquifer exceeds the amount of water removed from the aquifer, then groundwater levels will increase. Conversely, if, over time, the amount of water removed from the aquifer exceeds the amount of water recharged then groundwater levels will decline. These long-term changes can be linked to various factors including increased or decreased groundwater extraction or variations in recharge associated with wet or dry hydrologic cycles.

Currently 110 wells are monitored for groundwater levels in Butte County as part of the BMO program. These wells consist of a mixture of domestic and irrigation wells, along with dedicated observation wells and ten Cal Water municipal supply wells. Approximately 44 of the 100 wells measured by DWR and the Department are equipped with data loggers which continuously monitor and record changes in groundwater levels. These and the remaining wells are measured by hand four times per-year, during March, July, August and October. The approximate locations of groundwater level wells monitored in Butte County are shown in Appendix B. The groundwater level monitoring methods are consistent with the procedures

described in the Department of Water Resources' Groundwater Elevation Monitoring Guidelines (December 2010)[6].

Groundwater elevations are taken by either the steel tape method or by transducers. The accuracy of the groundwater level measurement is approximately one tenth of a foot. In addition to the groundwater level monitoring conducted by Butte County and the DWR, California Water Service Company currently measures monthly groundwater levels in approximately sixty municipal groundwater supply wells in the Chico Urban and Oroville areas. As indicated, ten of these wells are included in the BMO program and assigned alert stages.

Data from groundwater level monitoring can be obtained through DWR and the Department's websites. However, access to the data has become complicated due to the recent California Statewide Groundwater Elevation monitoring (CASGEM) program. Legislated and amended to the Water Code in 2009, SBx7-6 mandates statewide groundwater elevation monitoring to track seasonal and long-term trends in basins throughout the state. As a result of this legislation, DWR is developing a new website to house the database of past and future groundwater level data. Previously, the DWR Northern Region maintained an electronic database of groundwater level measurements for Northern California at the Water Data Library (WDL) (http://wdl.water.ca.gov/). That database contains over 100,000 individual groundwater level measurements, some dating back to the early 1930's. With the creation of the CASGEM website, the WDL is no longer being updated with current data. The CASGEM system is under development and currently has data for the well network beginning with fall 2011 measurements. Historical data remains housed and accessible from the WDL through fall 2011. It is important to note that 2012 data in the CASGEM system uses a different vertical datum than the WDL database. This datum establishes the basis for the ground surface elevation of each well and is used to calculate the groundwater surface elevation time series from depth to water field measurements. For the purposes of reporting groundwater elevations in this groundwater status update (summary spreadsheets and hydrographs in the Appendices), CASGEM 2012 data was adjusted to be based on the vertical datum of the WDL. This adjustment involves a range of increasing CASGEM data by up to 0.5 feet to decreasing values up to 2.8 feet. The magnitude of the adjustment is well specific. In the future, once the historical data has transitioned from WDL into the CASGEM database and been adjusted in that process, groundwater surface elevations will be based on the datum used by CASGEM. Summary data tables of groundwater surface elevations from spring, summer, and fall measurements are included in Appendix E and available from the Department's website.

With below normal hydrologic conditions in 2012, most wells had lower groundwater levels compared to 2011 measurements. Overall, spring water levels across the county continue to reflect the drier conditions characterizing four of the past six years. Of the 90 wells measured in 2011 and 2012, 16 of them had a higher 2012 spring level than their 2011 spring measurement. The average increase was 5 feet. Of the 2012 measurements that were lower than in 2011, they

[6] http://www.water.ca.gov/groundwater/casgem/documents.cfm

average a decrease of about 3 feet (Table 3). Most wells did not see a significant change in spring levels from 2011 to 2012, either up or down.

Table 3. Groundwater Elevation Change- Spring 2011 to 2012

		Change (ft)	SIU
Well Count	**Max Increase**	6	*Durham Dayton*
16	Average Increase	5	
	Max Decrease	-12	*Durham Dayton*
74	Average Decrease	-3	
	Average GWL Change	-2	
	Number of Wells	90	
	****Questionable Measurements not included**		

Like the spring levels, fall water levels decreased in some areas and increased in others compared to 2011 fall levels. Of the 87 wells measured in fall 2011 and 2012, 8 of them had a higher 2012 fall level than the corresponding 2011 fall measurement. The average increase was only about 2 feet. Of the 2012 measurements that were lower than in 2011, they average a decrease of about 5 feet. The overall average change in fall groundwater level from 2011 to 2012 was also a decrease of 5 feet (Table 4). Hydrographs in the individual BMO reports provide greater historical context for groundwater level trends.

Table 4. Groundwater Elevation Change- Fall 2011 to Fall 2012

		Change (ft)	SIU
Well Count	**Max Increase**	4	*Vina*
8	Average Increase	2	
	Max Decrease	-16	*Pentz*
79	Average Decrease	-5	
	Overall Average GWL Change	-5	
	Number of Wells	87	
	****Questionable Measurements not included**		

Summer measurements as required by Chapter 33A are conducted in July and August during peak pumping for irrigation. This results in more questionable measurements because measured or nearby wells are more likely to be pumping during the irrigation season than in the spring or fall. However, a number of the sub-inventory units (SIUs) have a BMO related to maintaining summer groundwater levels at a level that will assure an adequate and affordable irrigation groundwater supply. Therefore, even though the data is less consistent because of direct pumping effects on water elevations, it provides a baseline for summer groundwater conditions on a regional scale. For summer measurements, summer 2012 is compared to summer 2011 and compared to spring 2012 levels. Overall, the average decrease from spring

2012 to summer 2012 was about 12 feet. Compared to the previous year's summer levels (2011), 2012 groundwater levels were about 5 feet lower on average (Table 5).

Table 5. Groundwater Elevation Change- Summer 2011 to Summer 2012 and Spring 2012 to Average Summer 2012

Groundwater Elevation Change- Summer 2011 to Summer 2012				
		Change (ft)	**SIU**	**2010 to 2011 (ft)**
Well Count	**Max Increase**	9	*Vina*	16
8	Average Increase	3		
	Max Decrease	-20	*Esquon*	-7
80	Average Decrease	-6		
	Average GWL Change	-5		3
	Number of Wells	88		92
Groundwater Elevation Change- Spring 2012 to Average Summer 2012				
		Change (ft)	**SIU**	
8	**Max Increase**	3	*Richvale*	
	Average Increase	1		
	Max Decrease	-29	*Esquon*	
89	Average Decrease	-12		
	Number of Wells	97		
**DOES include Questionable Measurements because they are very common due to summer pumping				

Details on groundwater conditions can be found in the BMO reports prepared for the sixteen SIUs in Butte County. These SIUs are located in one of four sub-basins: North Yuba, East Butte, West Butte and Vina. The BMO reports include information on monitoring activities, current conditions, BMOs, hydrographs and recommendations from stakeholders. Additionally, the BMO reports include hydrographs on wells that are selected for the program's network but do not have a corresponding BMO. These wells were either key monitoring wells that were monitored prior to the BMO program or are wells recently added to the monitoring network. The recently added wells are typically dedicated monitoring wells and do not yet have enough data to establish a BMO Alert Stage.

BMOs are established for most of the wells in the monitoring network. BMOs are determined from historical data collected for the specific well. When a measurement fails to achieve the BMO for the well, a BMO Alert Stage is reached. When a BMO Alert Stage is reached, the Department increases outreach to stakeholders, seeks an evaluation by the Technical Advisory Committee and may conduct additional monitoring. Under the BMO program, stakeholders from the SIU participate in the evaluation and outreach of BMO data. The BMOs provide a standardized way to evaluate spring and fall changes in groundwater levels. Two methods are used to determine BMOs, as described in Chapter 33A.

The first method is called the historic range method. The historic range method has two procedures depending upon the period of record for the well. The first procedure is for wells

that have a period of record dating back to at least 1970. Measurements up through 2006 are used to set the BMO. The BMO is set by taking the historic low reading and adding 20% of the range of measurements, calculated from the first year on record through 2006. Measurements below the BMO and above the historic low would indicate an Alert Stage 1. Measurements at or below the historic low would indicated an Alert Stage 2. The measurements plotted after 2006 are for reference purposes only, and are not included in the calculation of the range.

The second procedure is for wells that have a period of record beginning after 1970. For these wells, the historic low measurement prior to 2006 indicates an Alert Stage 1. The historic low measurement minus the range of measurements indicates an Alert Stage 2. The measurements plotted after 2006 again are for reference purposes only, and are not included in the calculation of the range. All of the SIUs utilize the historic range method, except for Richvale and Western Canal which use the specific depth method.

The BMO Ordinance allows for a second method called the "specific depth method". For the specific depth method, the BMO is set based on the five feet below the average spring groundwater level established for the well. An Alert Stage 1 is reached if the spring measurement falls five feet below the average groundwater level (calculated from the first year on record through 2006). An Alert Stage 2 is reached if spring groundwater levels, for a second consecutive year, remain five feet below the average groundwater level established for the well. An Alert Stage 3 is reached if the spring groundwater levels fall ten feet below the average spring groundwater level established for the well.

A number of wells reached Alert Stages for both spring and fall BMOs in 2012. The number of wells at an Alert Stage for 2008-2012 spring and fall BMOs are shown in Table 6 and Table 7, respectively.

Table 6. Spring Alert Stages: Number of wells in Alert Stage 1 and 2

	2008	2009	2010	2011	2012
Alert 1	26	30	26	23	24
Alert 2	0	6	2	0	4

Table 7. Fall Alert Stages: Number of wells in Alert Stage 1 and 2

	2008	2009	2010	2011	2012
Alert 1	29	31	23	10	27
Alert 2	2	1	1	2	7

The 2012 BMO reports for each of the sixteen SIUs can be accessed from the Department's website under BMOs at: http://www.buttecounty.net/waterandresource/

Groundwater Status Report

Appendix A

Well Numbering System

APPENDIX A
WELL NUMBERING SYSTEMS

To develop the groundwater level BMOs, all existing monitoring wells were identified for each BMO sub-inventory unit. These wells are currently monitored either by public or private entities within a given sub-inventory unit, or they are monitored as part of the DWR, Northern District groundwater levels monitoring program. To distinguish and locate these monitored wells an alphanumeric name, or ID, is used. All BMO Key Wells identified for each sub-inventory unit are referenced by these unique ID's. Wells that are not part of the DWR monitoring network are typically assigned a local ID. Wells that are part of the DWR monitoring network are identified by the State Well Numbering System. This system is very useful in locating points on the ground, such as groundwater wells in areas with few identifying landmarks. Under this system, each well is assigned a unique number referred to as the State Well Number. This system is described further below.

State Well Numbering System

(Reference: Water Facts: Numbering Water Wells in California, No. 7, June 2000)

The State's well-numbering system is based on a rectangular system called the "United States System of Surveying in the Public Lands," commonly referred to as the "*Public Lands Survey*," established by the Continental Congress in 1784. The Public Lands Survey system has been employed by DWR, USGS, and other agencies for over 50 years. This system allows for a unique ID to be assigned to each well. These unique ID's are made up of several components, each of which is described below.

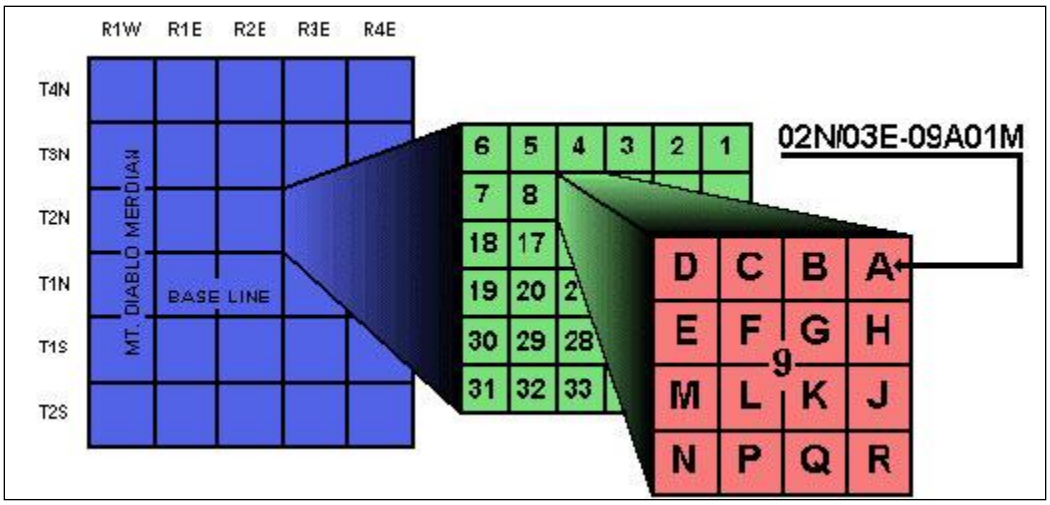
Initial Point and Corresponding Base & Meridian Pair. Under this system all tracts of land are referenced to an Initial Point. This Initial Point is defined by the intersection of a north-south line called the Meridian and an east-west line called the Base. In California there are three Initial Points each with a corresponding Base and Meridian Pair, and all of the BMO Key Wells are referenced to the Mt. Diablo Base and Meridian.

Range and Township Lines. Longitudinal lines are established at six-mile increments from the Initial Point and are east or west of the Meridian. These longitudinal lines are called Range Lines. Latitudinal lines also set at six-mile increments from the Initial Point are parallel to, and north or south of the Base. These latitudinal lines are known as Township Lines. This pattern of longitudinal and latitudinal lines defines a grid pattern consisting of 36-square-mile parcels of land. These 36-square-mile parcels are referred to as Townships. Each Township is referenced to an Initial Point by the number of 36-square-mile parcels and direction from that Initial Point.

Sections. Every Township is further divided in to 36 parts called Sections. A Section is a square parcel of land one-mile on a side, containing 640 acres.

Tract. Each Section is further divided into sixteen 40-acre parcels called Tracts. Each Tract is labeled with a letter. Once the well's location is established in the 40-acre Tract it is assigned a Sequence Number. These Sequence Numbers are assigned in chronological order (see Figure G).

State Well Number. The State Well Number is composed of the various components described above, including Township, Range, Section, Tract, Sequence Number, and Base & Meridian Pair.

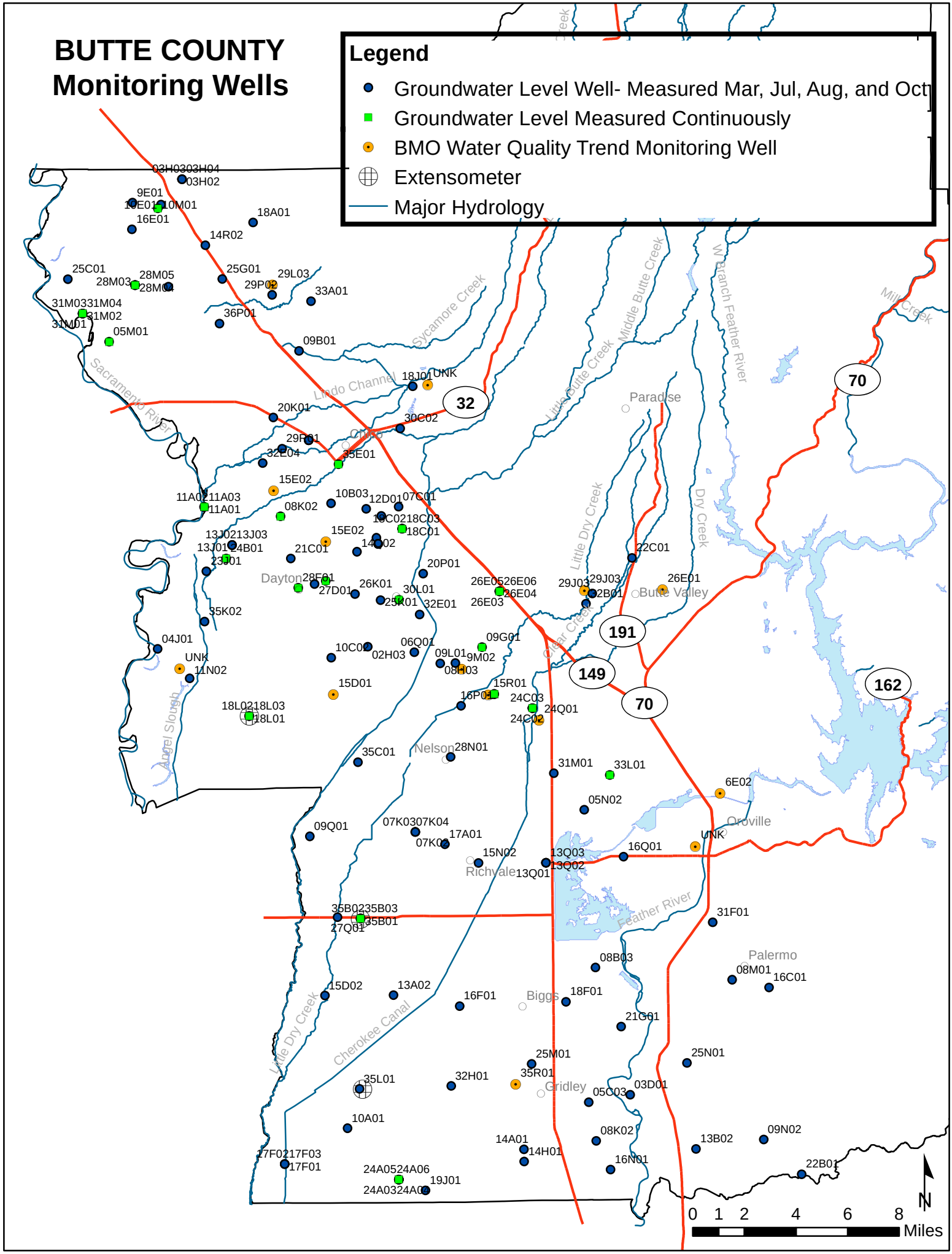


Groundwater Status Report

Appendix B

Butte County Monitoring Network

BUTTE COUNTY Monitoring Wells

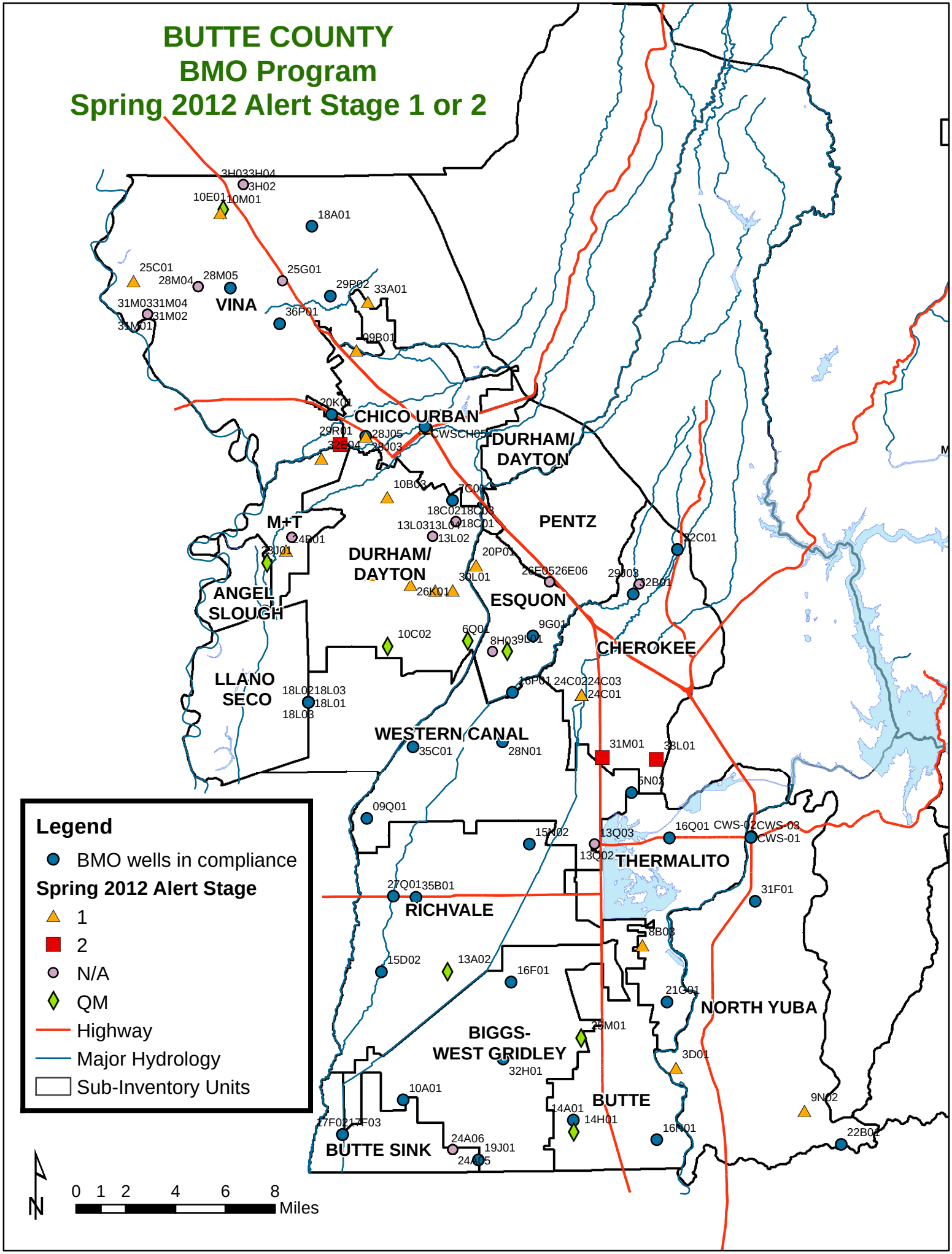


Groundwater Status Report

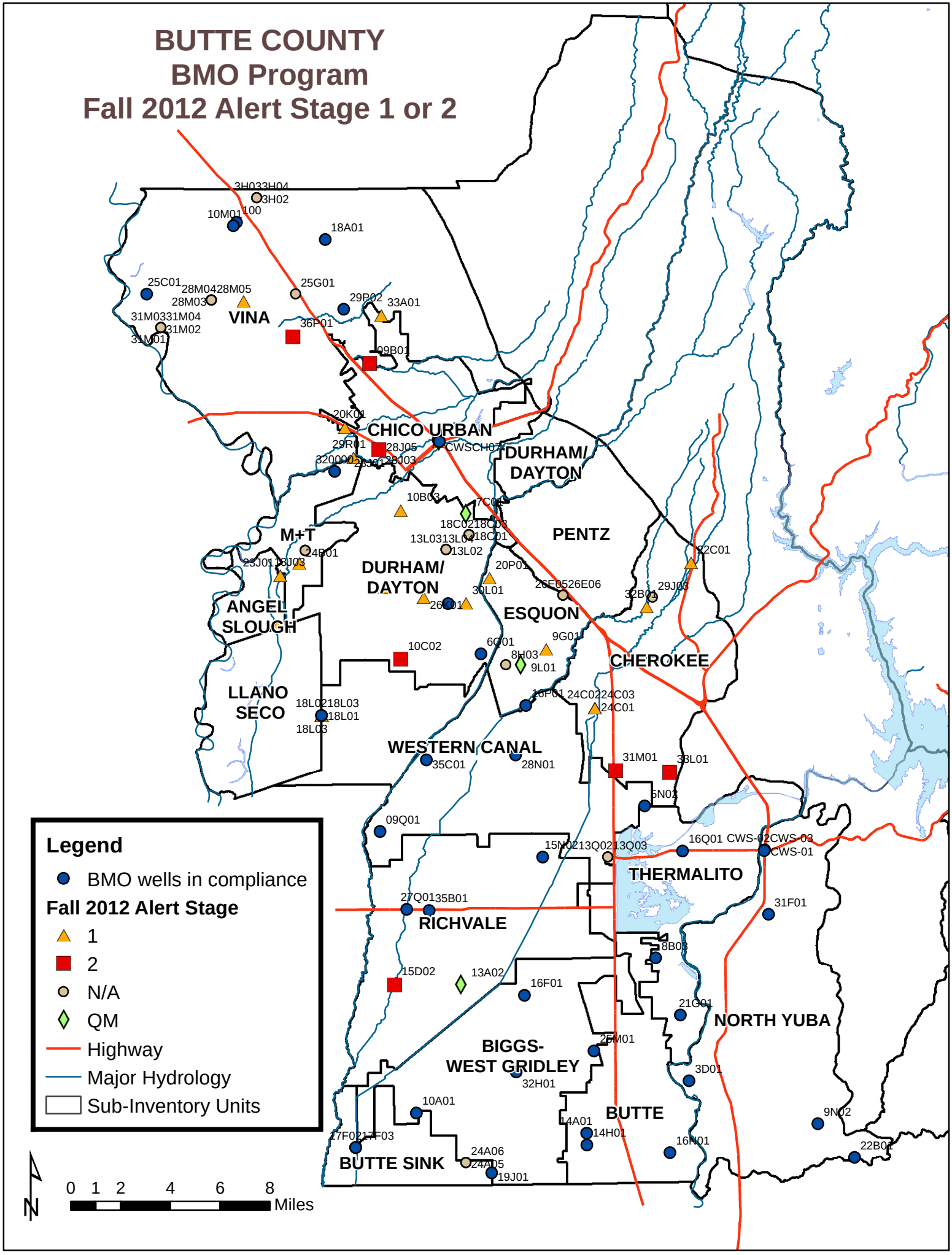
Appendix C

Groundwater Level Alert Stage Maps

BUTTE COUNTY
BMO Program
Spring 2012 Alert Stage 1 or 2



BUTTE COUNTY
BMO Program
Fall 2012 Alert Stage 1 or 2



Groundwater Status Report

Appendix D

2012 Water Quality Trend Monitoring Report

Butte County Water and Resource Conservation

INTERDEPARTMENTAL MEMORANDUM

TO: Butte County Water Commission Technical Advisory Committee

FROM: Christina Buck, Water Resources Scientist
Water and Resource Conservation

SUBJECT: 2012 Cumulative Groundwater Quality Trend Monitoring Update

DATE: August 17, 2012

INTRODUCTION and BACKGROUND

The Butte County Department of Water and Resource Conservation (DW&RC) conducted its eleventh year of groundwater quality trend monitoring within the county during the week of July 23 - 26, 2012. As required by Chapter 33A, the parameters monitored were temperature, pH, and Electrical Conductivity (EC). These parameters are the basic water quality characteristics needed to evaluate a basin for evidence of saline intrusion. The groundwater quality trend monitoring serves to establish baseline levels for these parameters throughout the county so that any future changes can be identified and further investigation and/or monitoring can subsequently be developed. This year, all samples fell within the acceptable range of water quality values set forth by State and Federal agencies and alert stages defined in Chapter 33A.

METHODOLOGY and RESULTS

The DW&RC owns a Hach sensION multi-parameter meter, which is used to do the groundwater quality testing. Glenn County has the same meter and conducts similar water quality monitoring during July or August. Collaboration with Glenn County helps to ensure we are collecting, analyzing, and reporting data in a similar manner, which will allow for greater confidence in comparing data across county lines.

The sites visited in Butte County were on private land and many of the wells are used for agricultural purposes (irrigating orchards, rice, or pasture). However, the two Thermalito wells, Chico Urban Area well, Vina well, and the Llano Seco well provide for domestic use. The sampling grid spans from north of the Chico Urban Area (Vina sub-inventory unit), west towards the Sacramento River (M & T sub-inventory unit), east towards the foothills (Pentz sub-inventory unit), and south towards Gridley (Biggs-West Gridley sub-inventory unit). Figure 1 shows the approximate locations (township, range, and section) of the water quality wells in relation to wells monitored four times per year for groundwater level.

As in previous years, we are fortunate to have support and permission from local property owners who allow access to their wells. We have provided them with the preliminary results from this year's monitoring for their general knowledge. Due to extenuating circumstances, water quality sampling was not completed at one of the Thermalito wells (domestic), the Durham Dayton well, or at the Western Canal (east) well. Future water quality reports will incorporate these wells once again.

This summer's measurements are well within acceptable ranges defined in Chapter 33A and established by State and Federal agencies (Table 1). Meter readings are recorded when the temperature, pH and EC from the well stabilizes. Temperature is a standard parameter measured when assessing water quality, mostly to indicate that water being sampled is representative of aquifer water and not water standing in the well itself.

The US Environmental Protection Agency (US EPA) establishes drinking water quality standards using two categories, Primary Standards and Secondary Standards[1]. Primary Standards are based on health considerations and Secondary Standards are based on taste, odor, color, corrosivity, foaming, and staining properties of water. Secondary water quality thresholds for pH and EC compared to the range of 2012 values are presented in Table 1.

Table 1. US EPA Secondary Standards for measured parameters

Parameter	Secondary Standard or Secondary WQ Threshold	Range of 2012 Values	Notes re: Butte County Study
pH	6.5 to 8.5	7.17-8.00	Within range of secondary water quality thresholds.
Electrical Conductivity (EC)	< 900 µS – drinking water < 700 µS – ag water	174-630	Within range of secondary water quality thresholds

Water quality data for specific wells is presented in tables on the attached pages.

Temperature is an important parameter because it affects chemical reactions that may occur in groundwater. Also, considerable changes in temperature could be an indication of other source waters migrating into the aquifer system such as stream seepage or flow from a different aquifer system. To date, temperature has been relatively consistent in all wells. Chapter 33A states that "the BMO Alert Stage for temperature will be reached when the measurement is more than five (5) degrees outside of the historic range of measurements." The 2012 measurements were all within 2.5 ^{o}C of the average temperature for each well. The 11 year temperature range for all wells is less than 5 ^{o}C (Table 3). The lowest temperature reading was in the Thermalito well (17.8 ^{o}C) and the high was, like last year, in the Pentz well (21.9 ^{o}C).

Measurements for pH remained relatively stable compared to previous years (see attached graphs). The highest pH was found in the Thermalito well (8.00) and the lowest in Esquon (7.17). All measurements for pH were well within the secondary water quality thresholds of 6.5-8.5 (Table 1, Table 4, and included graphs).

Electrical conductivity (EC) measures the ability of a solution to conduct an electrical current due to the presence of ions. Observed readings for electrical conductivity can have a large range, up to 382 µS at a particular well (Western Canal-west), yet 2012 measurements were all well within the secondary water quality thresholds established by State and Federal regulatory agencies (Table 1, Table 6 and included graphs).

CONCLUSIONS

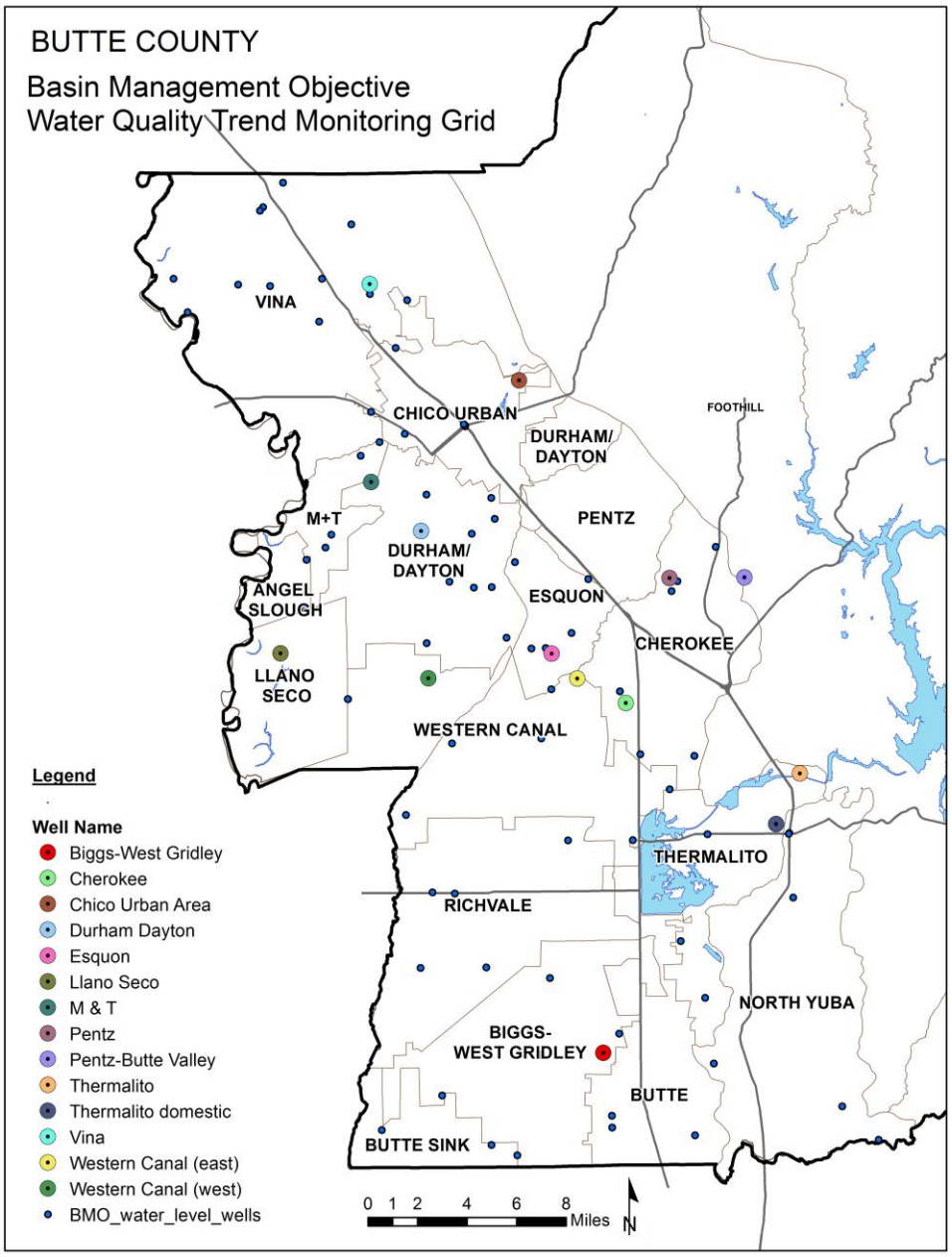
This was the eleventh season the DW&RC collected groundwater quality information. Overall, the results of the water quality sampling indicate no significant changes in groundwater quality with respect to temperature, pH, or electrical conductivity and the basin appears to be free of saline intrusion. Water quality parameters have naturally occurring variability, so year to year changes are expected and nothing in this year's measurements give cause for further investigation or analysis. Further investigation would be advisable if values were to fall outside of the acceptable range. This data will help the DW&RC continue to establish baseline levels for these parameters across

[1] http://www.epa.gov/safewater/consumer/2ndstandards.html

the county so that any future changes in water quality can be detected and further investigation and/or monitoring can be developed.

Further information on water quality standards for different constituents can be found at www.swrcb.ca.gov or in the *Compilation of Water Quality Goals*, published by the State Water Resources Control Board. Additionally, in 2010 the State Water Resources Control Board published the *Groundwater Quality Protection Strategy for the Central Valley Region, a Roadmap*[2]. Work plans for high priority actions identified in the Roadmap document have subsequently been developed.

Figure 1. Approximate well locations for water quality wells in relation to wells monitored annually (four times) for water level.



[2] http://www.swrcb.ca.gov/rwqcb5/water_issues/groundwater_quality/index.shtml

DATA TABLES and GRAPHS

Table 2. Annual groundwater temperature (°C)

Sub-Inventory Unit	State Well Number	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Biggs-West Gridley	18N02E35R01M	18.5	18.5	18.1	20.5	18.2	18.3	18.7	19.0	19.2	20.1	18.0
Cherokee	20N02E24Q01M	22.4	21.9	21.2	21.4	21.1	20.7	21.0	20.9	21.9	21.8	21.8
Chico Urban Area	22N02E17						18.4	20.1	18.2	18.8	19.5	21.6
Durham Dayton	21N01E15E02M	18.8	19.9	21.8	20.4	17.4	NM	19.3	NM	18.9	18.0	NM
Esquon	20N02E09M02M	19.7	18.9	19.6	20.1	20.7	19.0	19.6	19.0	19.1	20.0	21.4
Llano Seco								20.8	20.6	20.7	20.6	21.7
M & T	22N01E15D02M	17.6	18.2	17.8	19.2	18.6	18.0	17.7	18.6	17.8	NM	18.3
Pentz	21N03E29J03M						22.2	21.5	21.3	21.5	23.9	21.9
*Pentz-Butte Valley	21N03E26E01M	27.0	26.4	26.7	23.2							
Thermalito	19N04E06E02M	18.3	17.9	17.1	17.1	18.4	17.7	18.9	17.6	NM	NM	17.8
Thermalito domestic								19.4	19.4	19.4	NM	NM
Vina	23N01E29L03M	19.6	20.3	19.2	19.2	19.6	18.9	19.6	18.9	18.8	22.8	18.8
Western Canal (east)	20N02E15R01M	18.4	18.2	19.9	20.5	18.8	18.6	19.1	19.0	18.8	19.0	NM
Western Canal (west)	20N01E15D01M	19.0	18.1	19.8	20.8	18.5	20.6	21.8	18.5	19.1	20.5	20.1

*Pentz-Butte Valley discontinued

Table 3. Groundwater temperature average and range over 11 year sampling period (°C)

Sub-Inventory Unit	Average	Range
Biggs-West Gridley	18.8	2.5
Cherokee	21.5	1.7
Chico Urban Area	19.4	3.4
Durham Dayton	19.3	4.4
Esquon	19.7	2.5
Llano Seco	20.9	1.1
M & T	18.2	1.6
Pentz	22.1	2.6
*Pentz-Butte Valley	25.8	3.8
Thermalito	17.9	1.8
Thermalito domestic	19.4	0.0
Vina	19.6	4.0
Western Canal (east)	19.0	2.3
Western Canal (west)	19.7	3.7

Table 4. Annual groundwater pH

Sub-Inventory Unit	State Well Number	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Biggs-West Gridley	18N02E35R01M	7.60	7.50	7.50	7.04	7.60	7.64	7.72	7.88	7.86	7.22	7.91
Cherokee	20N02E24Q01M	7.50	7.50	7.10	7.40	7.40	7.30	7.30	7.30	7.23	7.58	7.30
Chico Urban Area	22N02E17						6.88	6.94	6.90	6.99	7.53	7.29
Durham Dayton	21N01E15E02M	7.70	7.20	7.60	7.60	7.50	NM	7.54	NM	7.41	7.70	NM
Esquon	20N02E09M02M	7.30	7.50	7.10	7.40	7.50	7.43	7.24	7.42	7.38	7.55	7.17
Llano Seco								7.90	8.07	8.15	8.05	7.92
M & T	22N01E15D02M	7.20	7.50	6.90	7.80	7.90	7.62	7.68	7.62	7.62	NM	7.24
Pentz	21N03E29J03M						7.58	7.40	7.53	7.44	7.27	7.75
*Pentz-Butte Valley	21N03E26E01M	7.10	6.90	7.29	6.24							
Thermalito	19N04E06E02M	7.00	6.50	7.10	7.10	7.90	7.40	7.42	7.44	NM	NM	8.00
Thermalito domestic								7.73	7.84	7.71	NM	NM
Vina	23N01E29L03M	7.50	7.60	6.90	6.20	7.70	7.54	7.51	7.39	7.57	7.95	7.33
Western Canal (east)	20N02E15R01M	7.00	6.60	6.80	6.90	7.30	6.92	6.96	7.00	7.10	6.95	NM
Western Canal (west)	20N01E15D01M	7.80	8.10	7.10	6.90	7.90	7.88	7.81	6.59	7.75	7.50	7.70

Table 5. Groundwater pH average and range over 11 year sampling period

Sub-Inventory Unit	Average	Range
Biggs-West Gridley	7.59	0.87
Cherokee	7.36	0.48
Chico Urban Area	7.09	0.65
Durham Dayton	7.53	0.50
Esquon	7.36	0.45
Llano Seco	8.02	0.25
M & T	7.51	1.00
Pentz	7.50	0.48
*Pentz-Butte Valley	6.88	1.05
Thermalito	7.32	1.50
Thermalito domestic	7.76	0.13
Vina	7.38	1.75
Western Canal (east)	6.95	0.70
Western Canal (west)	7.55	1.51

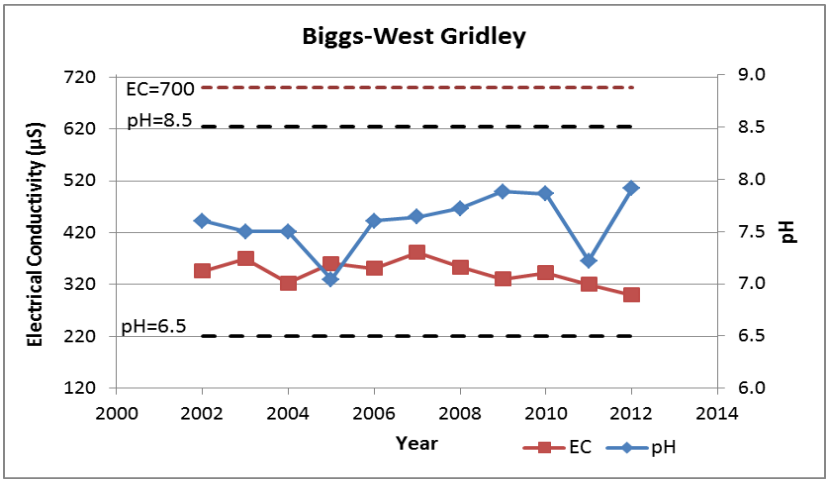
Table 6. Annual groundwater electrical conductivity (µS)

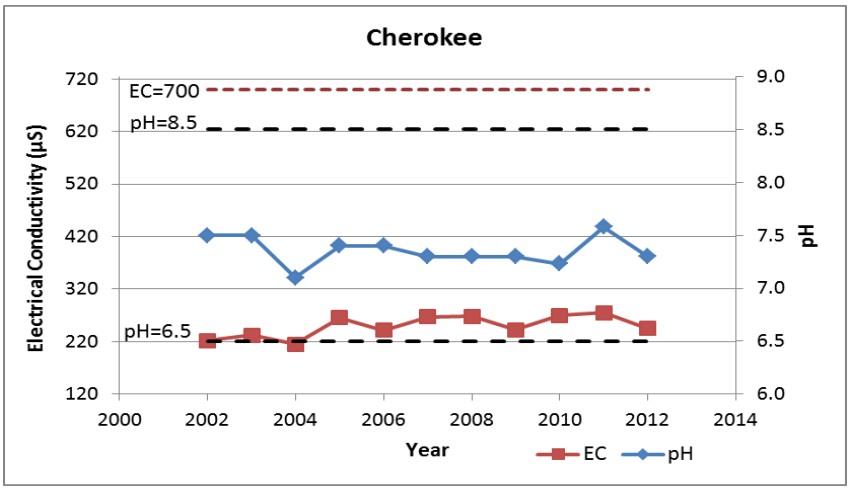
Sub-Inventory Unit	State Well Number	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Biggs-West Gridley	18N02E35R01M	346	370	323	361	351	382	354	331	343	320	300
Cherokee	20N02E24Q01M	222	232	215	266	242	267	268	243	270	275	245
Chico Urban Area	22N02E17						280	291	260	249	250	248
Durham Dayton	21N01E15E02M	315	348	259	340	322	NM	327	NM	307	315	NM
Esquon	20N02E09M02M	388	526	470	557	507	480	439	419	427	415	408
Llano Seco								204	195	196	198	192
M & T	22N01E15D02M	418	551	678	504	465	451	667	445	592	NM	427
Pentz	21N03E29J03M						218	229	227	225	224	204
*Pentz-Butte Valley	21N03E26E01M	195	186	211	240							
Thermalito	19N04E06E02M	132	164	149	150	152	242	205	158	NM	NM	292
Thermalito domestic								374	350	354	NM	NM
Vina	23N01E29L03M	197	225	180	216	192	224	203	200	199	194	174
Western Canal (east)	20N02E15R01M	447	344	400	524	492	471	482	488	465	459	NM
Western Canal (west)	20N01E15D01M	464	248	407	501	309	477	469	462	455	460	630

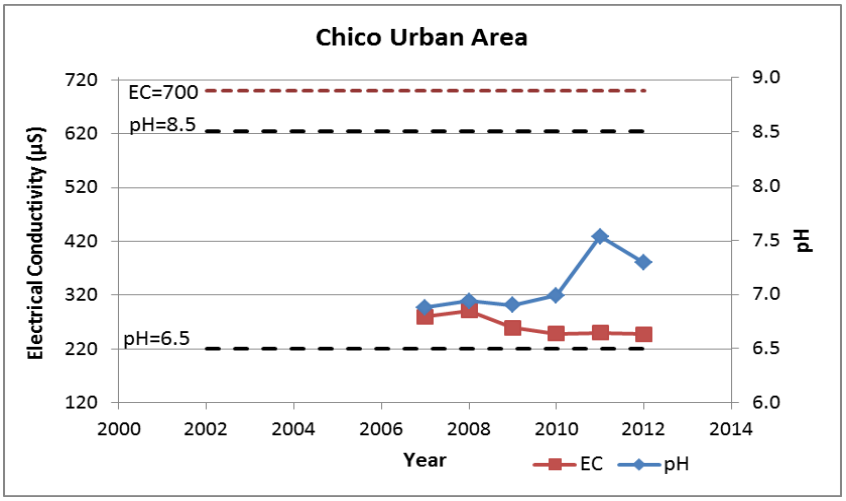
Table 7. Groundwater EC (µS) average and range over 11 year sampling period

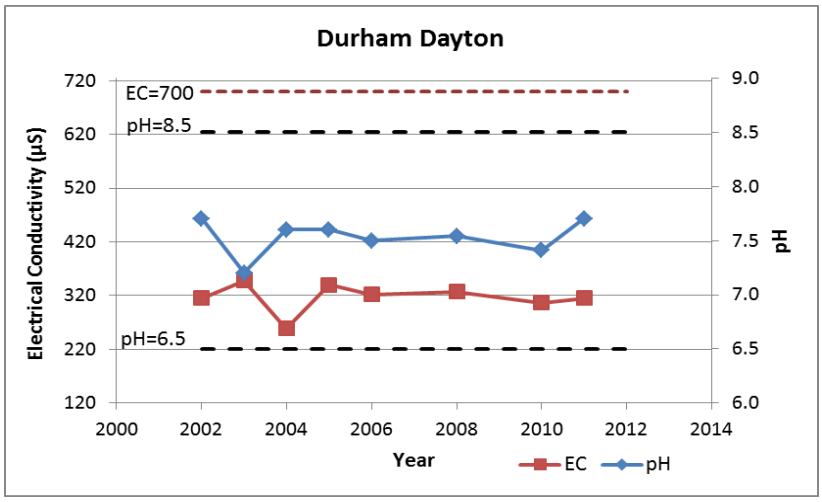
Sub-Inventory Unit	Average	Range
Biggs-West Gridley	344	82
Cherokee	250	60
Chico Urban Area	263	43
Durham Dayton	317	89
Esquon	458	169
Llano Seco	197	13
M & T	520	260
Pentz	221	25
*Pentz-Butte Valley	208	54
Thermalito	183	160
Thermalito domestic	359	24
Vina	200	51
Western Canal (east)	457	180
Western Canal (west)	444	382

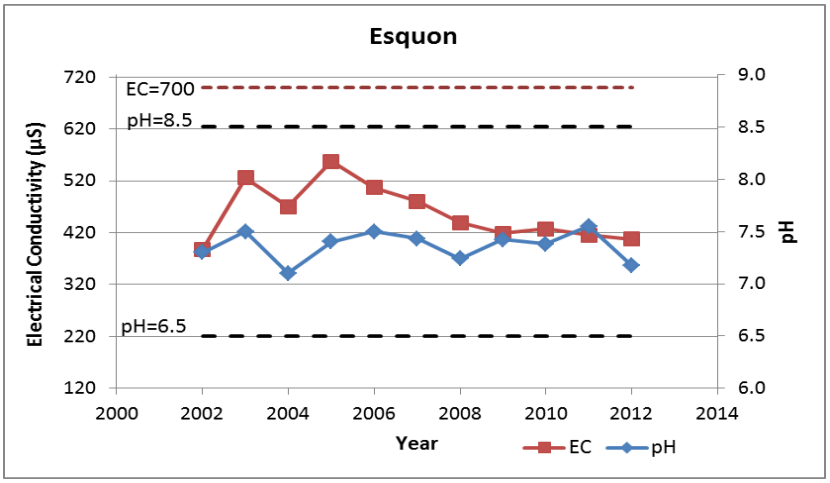
Annual electrical conductivity (µS) and pH for each water quality sampling well. The red dashed line indicates the preferred maximum level for EC and the black dashed lines bound the acceptable pH range, 6.5-8.5. Therefore, when the red plot of EC values is below the red dashed line (as it always is), then measured EC is within the secondary standard for agricultural water (<700), which is more restrictive than for drinking water (<900). To be within the acceptable pH range, the blue line should be within the black dashed lines.

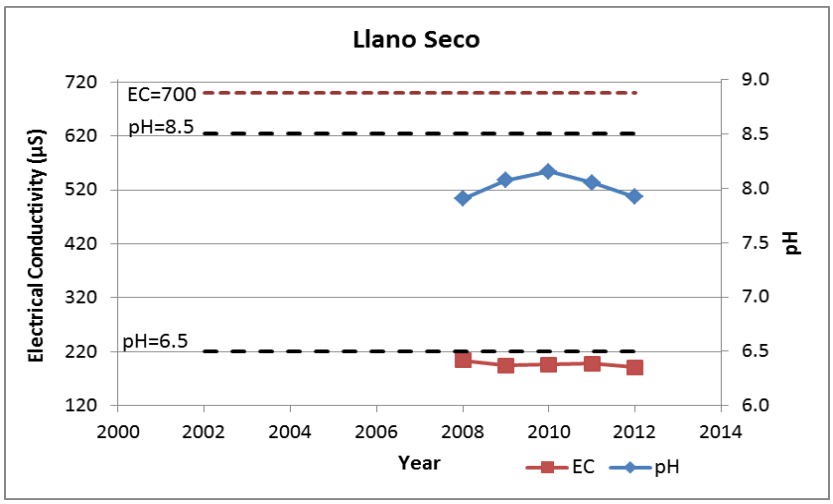




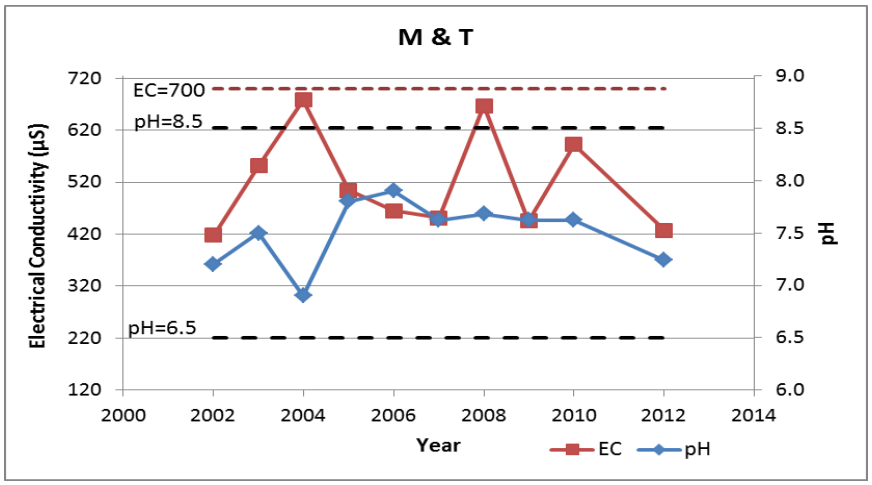


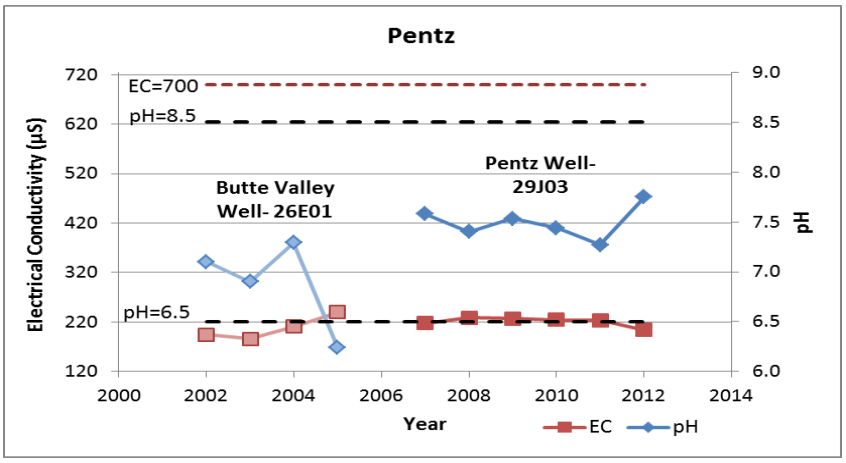


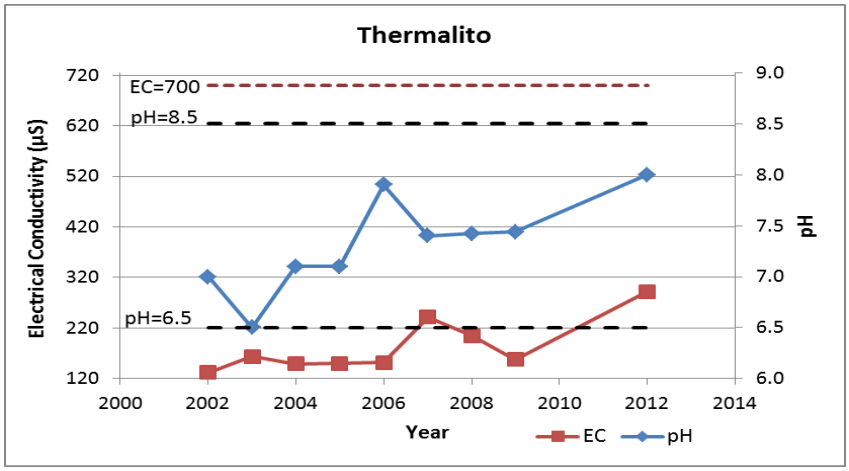




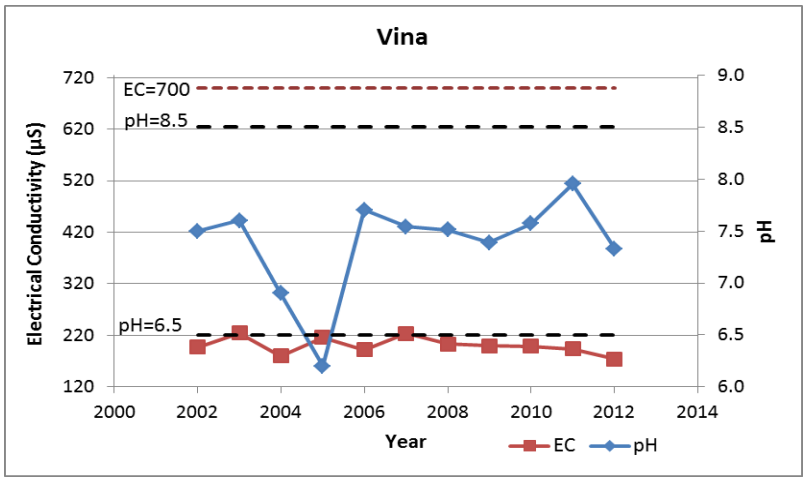
NOTE: The red dashed line indicates the preferred maximum level for EC and the black dashed lines bound the acceptable pH range, 6.5-8.5. Therefore, when the red plot of EC values is below the red dashed line (as it always is), then measured EC is within the secondary standard for agricultural water (<700), which is more restrictive than for drinking water (<900). To be within the acceptable pH range, the blue line should be within the black dashed lines.

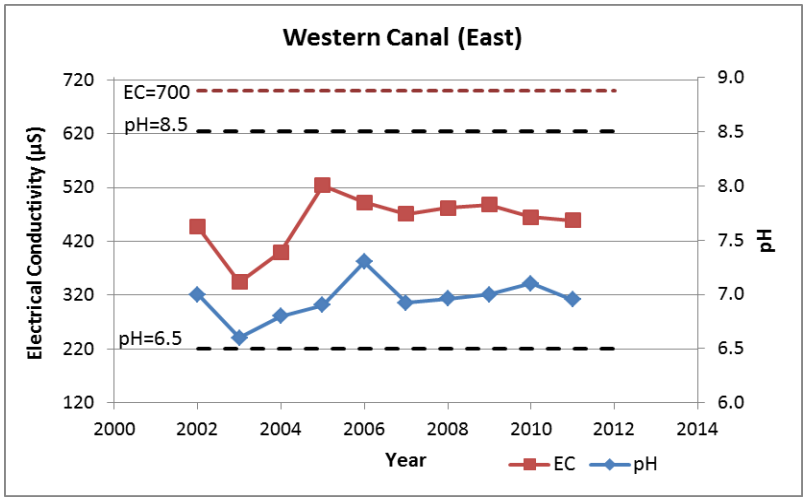


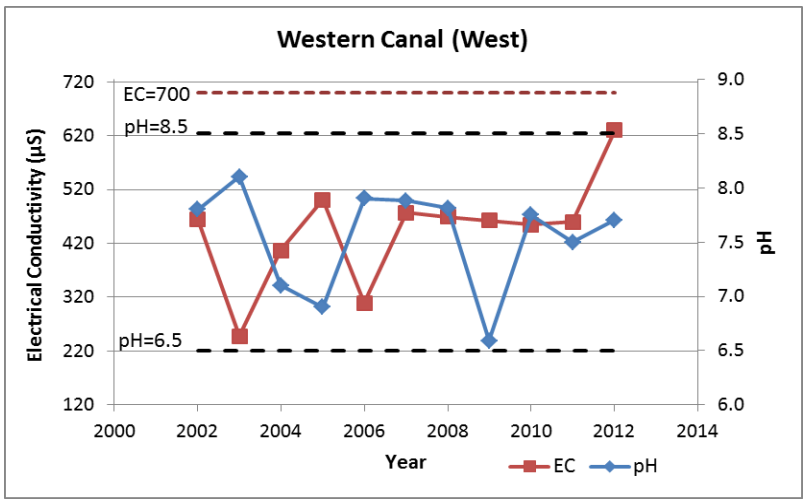




NOTE: The red dashed line indicates the preferred maximum level for EC and the black dashed lines bound the acceptable pH range, 6.5-8.5. Therefore, when the red plot of EC values is below the red dashed line (as it always is), then measured EC is within the secondary standard for agricultural water (<700), which is more restrictive than for drinking water (<900). To be within the acceptable pH range, the blue line should be within the black dashed lines.







NOTE: The red dashed line indicates the preferred maximum level for EC and the black dashed lines bound the acceptable pH range, 6.5-8.5. Therefore, when the red plot of EC values is below the red dashed line (as it always is), then measured EC is within the secondary standard for agricultural water (<700), which is more restrictive than for drinking water (<900). To be within the acceptable pH range, the blue line should be within the black dashed lines.

Groundwater Status Report

Appendix E

Spring, Summer, Fall BMO Summary Tables

BMO Data Summary
Spring 2008-2012 Groundwater Elevations

Sub Basin	Sub-Inventory Unit	Monitoring Wells	Well Type	First Record	Groundwater Elevations							Analysis		
					Spring 2008 Water Surface Elevation (WSE) (Elev. ft)	Spring 2009 Water Surface Elevation (WSE) (Elev. ft)	Spring 2010 Water Surface Elevation (WSE) (Elev. ft)	Spring 2011 Water Surface Elevation (WSE) (Elev. ft)	Spring 2012 Water Surface Elevation** (WSE) (Elev. Ft)	Spring 2012 BMO Stage 1 Alert Level (Elev. ft)	Spring 2012 BMO Stage 2 Alert Level (Elev. ft)	Elevation Above (+) or Below (-) Alert Level (ft)	% change between Alert Level and Spring WSE	Change Spring 2011 to Spring 2012 (ft)
EAST BUTTE	Biggs/West Gridley	17N01E10A001M	D	1953	57.3	56.9	57.4	58.2	61.4	50.6	48.9	10.8	21%	3.2
		18N02E16F001M	I	1947	74.4	74.1	74.3	74.9	74.2	73.0	72.3	1.2	2%	-0.7
		18N02E25M001M	I	1959	81.1	81.1	80.6	82.3	80.1	80.4	79.6	-0.3	%	
		18N02E32H001M	D	2001	69.6	69.4	NM	70.6	69.1	68.5	65.9	0.6	1%	-1.5
	Butte	17N02E14A001M	I	1947	79.2	79.2	79.0	78.9	77.6	75.7	74.2	1.9	3%	-1.3
		17N02E14H001M	D	2000	77.5	77.7	77.5	79.9	77.2	76.7	73.9	0.5	1%	
		17N03E16N001M	D	1953	75.0	75.1	75.3	77.3	73.6	72.0	69.9	1.6	2%	-3.7
	Butte Sink	17N01E17F001M	M	1992	54.8	54.7	54.8	56.0	55.3	54.1	51.3	1.2	2%	-0.7
		17N01E17F002M	M	1992	57.2	57.1	57.0	58.0	57.2	56.9	54.9	0.3	%	-0.8
		17N01E17F003M	M	1992	58.4	57.9	58.1	58.7	57.6	57.5	55.0	0.1	%	-1.1
		17N02E19J001M	I	2000	61.8	63.9	64.6	64.9	64.4	63.7	60.5	0.7	1%	-0.5
		17N01E24A003M	M	2007	75.2	74.7	74.4	74.8	74.6	a				-0.2
		17N01E24A004M	M	2007	65.8	65.4	66.0	67.2	65.4					-1.8
		17N01E24A005M	M	2007	65.8	65.4	65.9	67.1	65.4					-1.7
		17N01E24A006M	M	2007	68.1	68.1	68.2	69.2	68.5					-0.8
	Cherokee	20N02E24C001M	M	1999	***121.0***	***119.6***	***118.9***	***121.2***	***119.6***	123.1	117.9	-3.5	-3%	-1.6
		20N02E24C002M	M	1999	***121.0***	***119.5***	***118.9***	***121.2***	***119.7***	123.1	118.0	-3.4	-3%	-1.5
		20N02E24C003M	M	1999	***121.0***	***119.6***	***118.9***	***121.2***	***119.7***	122.8	117.3	-3.1	-3%	-1.5
		20N03E31M001M	M	2001	***118.6***	***118.2***	***117.6***	***118.3***	***115.0***	120.1	117.1	-2.1	-4%	-3.3
		20N03E33L001M	I	1999	***121.7***	***120.0***	***118.6***	***121.3***	***116.8***	122.2	118.3	-1.5	-4%	-4.5
		21N03E22C001M	D	2001	378.6	379.3	380.3	379.4	378.8	369.7	358.3	9.1	2%	-0.6
		21N03E32B001M	I	1999	***222.9***	***222.4***	***221.6***	***222.8***	223.6	223.4	222.1	0.2	%	0.8
		21N03E29J003M	D	2007	222.0	228.0	228.1	NM	NM	b				
	Esquon	20N02E09G001M	M	2001	124.4	121.7	121.9	124.7	120.6	114.7	100.0	5.9	5%	-4.1
		20N02E09L001M	I	1953	***121.5***	121.2	***120.6***	123.0	120.1	123.2	120.4	-0.3	-3%	
		21N02E20P001M	I	1995	***120.5***	***116.2***	***118.7***	110.0	***116.7***	127.3	113.0	-10.6	-8%	
		20N02E08H003M	D	2008	121.0	119.2	120.3	120.5	118.4	c				-2.1
	Pentz	21N02E26E003M	M	2007	124.3	121.4	121.0	122.9	123.3	d				0.4
		21N02E26E004M	M	2007	123.5	120.4	120.3	122.0	122.8					0.8
		21N02E26E005M	M	2007	122.6	119.4	119.2	120.8	121.7					0.9
		21N02E26E006M	M	2007	116.3	113.1	112.1	113.9	116.4					2.5
	Richvale	18N01E13A002M	I	2002	73.4	73.0	73.3	73.3	72.8	68.4	63.4	4.4	6%	
		18N01E15D002M	D	1976	68.4	68.0	68.2	68.4	65.8	62.9	57.9	2.9	5%	-2.6
		19N01E27Q001M	M	1978	82.3	81.6	82.1	82.8	81.7	77.3	72.3	4.4	6%	-1.1
		19N01E35B001M	M	2002	82.7	82.4	82.7	83.5	83.2	78.0	73.0	5.2	7%	-0.3
		19N02E15N002M	I	2000	100.6	100.2	100.5	101.0	100.1	95.9	90.9	4.2	4%	-0.9
		19N02E13Q002M	M	2006	114.3	113.1	113.4	114.3	113.8	e				-0.5
		19N02E13Q003M	M	2006	114.8	113.4	113.8	114.7	114.1					-0.6

D-Domestic
I-Irrigation
M-Monitoring
M/I-Municipal and Industrial

Sub Basin	Sub-Inventory Unit	Monitoring Wells	Well Type	First Record	Groundwater Elevations							Analysis		
					Spring 2008 Water Surface Elevation (WSE) (Elev. ft)	Spring 2009 Water Surface Elevation (WSE) (Elev. ft)	Spring 2010 Water Surface Elevation (WSE) (Elev. ft)	Spring 2011 Water Surface Elevation (WSE) (Elev. ft)	Spring 2012 Water Surface Elevation** (WSE) (Elev. Ft)	Spring 2012 BMO Stage 1 Alert Level (Elev. ft)	Spring 2012 BMO Stage 2 Alert Level (Elev. ft)	Elevation Above (+) or Below (-) Alert Level (ft)	% change between Alert Level and Spring WSE	Change Spring 2011 to Spring 2012 (ft)
EAST BUTTE	Thermalito	18N03E08B003M	I	2001	98.7	93.5	98.4	100.0	97.6	98.0	94.1	-0.4	%	-2.4
		18N03E21G001M	I	1953	84.5	82.4	84.7	86.9	85.3	84.4	81.8	0.9	1%	-1.6
		19N03E05N002M	D	1967	119.3	118.3	119.6	119.8	117.3	112.1	94.2	5.2	5%	-2.5
		19N03E16Q001M	D	2000	136.4	134.4	136.4	137.5	136.7	135.5	133.1	1.2	1%	-0.8
	Western Canal	19N01E09Q001M	I	1991	87.1	86.4	85.9	87.0	86.4	82.1	77.1	4.3	5%	-0.6
		20N01E18L001M	M	2000	106.3	104.3	105.2	106.6	103.7	103.3	98.3	0.4	%	-2.9
		20N01E18L002M	M	2001	103.0	102.4	102.6	104.3	101.8	99.1	94.1	2.7	3%	-2.5
		20N01E18L003M	M	2001	104.2	103.6	104.0	104.7	103.1	99.4	94.4	3.7	4%	-1.6
		20N01E35C001M	D	1947	97.0	96.1	96.0	97.5	NM	91.9	86.9			
		20N02E16P001M	I	1990	120.7	119.9	NM	121.0	120.0	117.5	112.5	2.5	2%	-1.0
		20N02E28N001M	D	1947	116.2	116.3	116.3	116.8	119.9	111.4	106.4	8.5	8%	3.1
NORTH YUBA	North Yuba	CWS-01	M&I	1980	103.0	124.0	129.0	128.0	122.0	119.0	99.0	3.0	3%	-6.0
		CWS-02	M&I	1980	152.0	144.0	144.0	148.0	142.0	135.0	111.0	7.0	5%	-6.0
		CWS-03	M&I	1980	163.0	151.0	165.0	159.0	163.0	154.0	135.0	9.0	6%	4.0
		17N03E03D001M	I	1947	70.4	69.2	70.2	73.7	67.9	70.5	67.5	-2.6	-4%	-5.8
		17N04E09N002M	I	2001	NM	75.6	73.9	76.2	76.3	76.9	68.8	-0.6	-1%	0.1
		17N04E22B001M	D	1976	NM	101.0	99.0	103.8	101.3	96.3	93.8	5.0	5%	-2.5
		19N04E31F001M	D	2001	123.5	122.5	122.6	124.8	128.9	105.8	68.5	23.1	22%	4.1
WEST BUTTE	Angel Slough	21N01W23J001M	I	1941	110.3	110.6	110.0	114.7	109.6	108.3	105.8	1.3	1%	
		21N01W35K002M	I	1994	100.0	99.9	100.6	105.1	98.6	92.5	78.5	6.1	7%	-6.6
	Chico Urban Area	CWSCH01	M&I	1988	134.0	122.0	131.0	134.0	132.0	125.0	100.0	7.0	6%	-2.0
		CWSCH02	M&I	1988	138.0	136.0	138.0	141.0	136.0	123.0	91.0	13.0	11%	-5.0
		CWSCH03	M&I	1988	123.0	128.0	129.0	123.0	126.0	128.0	81.0	-2.0	-2%	3.0
		CWSCH04	M&I	1988	118.0	117.0	QM	123.0	119.0	126.0	106.0	-7.0	-6%	-4.0
		CWSCH05	M&I	1988	122.0	118.0	124.0	125.0	122.0	119.0	95.0	3.0	3%	-3.0
		CWSCH06	M&I	1988	118.0	115.0	126.0	115.0	117.0	116.0	93.0	1.0	1%	2.0
		CWSCH07	M&I	1988	115.0	115.0	118.0	117.0	123.0	115.0	95.0	8.0	7%	6.0
		22N01E28J001M	M	1958	139.3	131.9	136.5	141.7	137.8	140.5	135.7	-2.7	-2%	-3.9
		22N01E28J003M	M	1958	143.8	138.9	140.7	145.2	141.4	135.9	129.9	5.5	4%	-3.8
		22N01E28J005M	M	1958	136.6	131.3	133.0	135.9	133.8	135.2	130.9	-1.4	-1%	-2.1
	Durham/Dayton	20N01E10C002M	I	1947	108.5	101.6	106.1	108.3	106.2	107.9	103.7	-1.7	-2%	
		20N02E06Q001M	I	1947	117.5	114.8	115.5	117.8	114.7	117.8	114.3	-3.1	-3%	
		21N01E10B003M	I	1995	124.3	119.5	121.0	123.7	122.6	125.9	108.3	-3.3	-3%	-1.1
		21N01E13L002M	M	2012					113.4	f				
		21N01E13L003M	M	2012					109.5					
		21N01E13L004M	M	2012					106.0					
		21N01E25K001M	D	1993	111.4	106.0	108.3	111.3	109.9	116.2	98.1	-6.3	-5%	-1.4
		21N01E26K001M	I	1993	108.9	102.0	98.8	104.4	100.6	113.1	94.6	-12.5	-11%	-3.8
		21N01E27D001M	D	1946	107.4	101.6	104.3	108.1	105.8	108.7	103.4	-2.9	-3%	-2.3
		21N02E07C001M	I	1967	126.5	119.3	132.4	121.8	132.4	126.5	120.6	5.9	5%	
		21N02E18C001M	M	2010				120.2	121.4	f				1.2
		21N02E18C002M	M	2010				117.7	121.8					4.1
		21N02E18C003M	M	2010				160.8	149.0					-11.8
		21N02E30L001M	D	1995	118.4	113.5	115.7	117.6	116.4	124.0	107.5	-7.6	-6%	-1.2

D-Domestic
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Sub Basin	Sub-Inventory Unit	Monitoring Wells	Well Type	First Record	Groundwater Elevations							Analysis		
					Spring 2008 Water Surface Elevation (WSE) (Elev. ft)	Spring 2009 Water Surface Elevation (WSE) (Elev. ft)	Spring 2010 Water Surface Elevation (WSE) (Elev. ft)	Spring 2011 Water Surface Elevation (WSE) (Elev. ft)	Spring 2012 Water Surface Elevation** (WSE) (Elev. Ft)	Spring 2012 BMO Stage 1 Alert Level (Elev. ft)	Spring 2012 BMO Stage 2 Alert Level (Elev. ft)	Elevation Above (+) or Below (-) Alert Level (ft)	% change between Alert Level and Spring WSE	Change Spring 2011 to Spring 2012 (ft)
WEST BUTTE	Llano Seco	20N01E18L001M	M	2000	***106.3***	***104.3***	***105.2***	***106.6***	***103.7***	107.7	105.2	-1.5	-4%	-2.9
		20N01E18L002M	M	2001	103.0	***102.4***	***102.6***	104.3	***101.8***	102.9	100.2	-1.1	-1%	-2.5
		20N01E18L003M	M	2001	104.2	103.6	104.0	104.7	***103.1***	103.6	101.5	-0.5	-1%	-1.6
		21N01W35K002M	I	1994	100.0	99.9	100.6	105.1	98.6	92.5	78.5	6.1	7%	-6.6
	M & T	21N01W13J001M	M	2012					115.7	**g**				
		21N01W13J002M	M	2012					115.8					
		21N01W13J003M	M	2012					116.0					
		21N01W24B001M	M	1995	***113.3***	***110.6***	***112.0***	***115.4***	***111.0***	115.7	106.4	-4.7	-4%	-4.4
		22N01E29R001M	I	1947	***135.9***	***136.0***	***130.1***	***135.2***	***131.0***	137.9	133.9	-2.9	-5%	-4.2
		22N01E32E004M	D	1992	***124.8***	***123.2***	***122.3***	***124.2***	***124.8***	129.0	115.9	-4.2	-3%	0.6
VINA	Vina	22N01E09B001M	D	2001	***142.6***	***138.4***	***138.7***	***142.7***	***140.3***	143.7	135.9	-3.4	-2%	-2.4
		22N01E20K001M	D	1961	130.5	***126.7***	131.8	135.9	132.8	130.5	125.4	2.3	2%	-3.1
		23N01E18A001M	D	1976	173.0	169.3	169.1	169.9	NM	159.8	138.6			
		23N01E29P002M	D	1990	153.8	150.0	150.2	153.6	150.3	146.1	129.6	4.2	3%	-3.3
		23N01E33A001M	I	2001	152.3	***149.1***	***148.2***	***150.3***	***149.2***	153.0	141.8	-3.8	-2%	-1.1
		23N01W10E001M	I	2001	***163.4***	***160.8***	***162.3***	***164.2***	161.2	164.4	158.5	-3.2	-1.9%	
		23N01W10M001M	M	2001	***163.1***	***162.1***	***162.9***	***165.4***	***160.9***	166.0	160.2	-5.1	-3%	-4.5
		23N01W27L001M	D	1976	142.8	140.0	142.9	NM	140.3	134.7	112.4	5.6	4%	
		23N01W36P001M	D	1959	139.7	136.1	137.2	141.1	134.5	132.0	125.5	2.5	2%	-6.6
		23N02W25C001M	I	1967	136.7	136.9	138.1	141.8	***133.7***	133.9	130.6	-0.2	%	-8.1
		23N01W25G001M	I	2007	146.0	147.6	148.3	132.1	147.4	**h**				
		23N01W03H002M	M	2012					179.0					
		23N01W03H003M	M	2012					179.4					
		23N01W03H004M	M	2012					182.9					
		23N01W28M002M	M	2008		145.2	148.9	148.1	147.8					-0.3
		23N01W28M003M	M	2008		145.6	148.6	147.1	146.7					-0.4
		23N01W28M004M	M	2008		147.9	146.5	152.2	143.5					-8.7
		23N01W28M005M	M	2008		148.2	146.5	152.6	142.8					-9.8
		23N01W31M001M	M	2008		138.1	141.2	143.6	139.7					-3.9
		23N01W31M002M	M	2008		144.2	144.9	148.1	142.0					-6.1
		23N01W31M003M	M	2008		141.2	142.2	146.6	140.6					-6.0
		23N01W31M004M	M	2008		138.8	139.2	142.3	138.6					-3.8

Note: Red font indicates Questionable Measurement (QM), Orange highlight is Alert Stage 1, Red higlight is Alert Stage 2
**2012 WSE adjusted from CASGEM data to vertical datum of Water Data Library

a 17N01E24A03-6 multi-completion well installed in 2007. Not yet enough data to establish alert levels
b 21N03E29J03 added to DWR monitoring network in 2007
c 20N02E08H03 added to DWR monitoring network in 2008
d 21N02E26E03-6 multi-completion monitoring well installed 2007
e 19N02E13Q02-3 first measurement on Water Data Library Spring 2006
f 21N01E13L02-04 installed in 2012 and 21N02E18C01-03 in 2010
g 21N01W13J01-03 installed 2012
h 23N01W25G01 added to DWR monitoring network in 2007, 23N01W28M02-5 and 23N01W31M01-4 multi-completion monitoring wells installed 2008, and 23N01W03H02-4 installed 2012

Alert Stage Count

	2008	2009	2010	2011	2012
Alert 1	26	30	26	23	24
Alert 2	0	6	2	0	4

D-Domestic
I-Irrigation
M-Monitoring
M/I-Municipal and Industrial

BMO Data Summary
Summer 2011 & 2012 Groundwater Elevations

Sub Basin	Sub-Inventory Unit	Monitoring Wells	Well Type	First Record	Groundwater Elevations: Summer 2011 Average WSE (ft)	Groundwater Elevations: Spring 2012 Water Surface Elevation** (ft)	Groundwater Elevations: July 2012 Water Surface Elevation** (ft)	Groundwater Elevations: August 2012 Water Surface Elevation** (ft)	Analysis: 2012 Average Summer WSE (ft)	Analysis: Change Ave Summer WSE 2011 to 2012 (ft)	Analysis: Change Spring to Ave. Summer 2012 (ft)	Note: 2012 Questionable Measurement: July Measurement	Note: 2012 Questionable Measurement: August Measurement
EAST BUTTE	Biggs/West Gridley	17N01E10A001M	D	1953	55.9	61.4	51.9	NM	51.9	-4.0	-9.5		9 - Temporarily in
		18N02E16F001M	I	1947	76.0	74.2	74.8	75.5	75.2	-0.8	1.0		
		18N02E25M001M	I	1959	79.7	80.1	NM	NM	NM	NM	NM		1 - Pumping
		18N02E32H001M	D	2001	73.1	69.1	70.8	72.2	71.5	-1.6	2.4	4 - Pumped recentl	
	Butte	17N02E14A001M	I	1947	75.6	77.6	73.6	74.8	74.2	-1.4	-3.4		
		17N02E14H001M	D	2000	71.0	77.2	60.8	61.0	60.9	-10.1	-16.3	2 - Nearby pump o	4 - Pumped recen
		17N03E16N001M	D	1953	70.0	73.6	69.3	58.7	64.0	-6.0	-9.6		
	Butte Sink	17N01E17F001M	M	1992	52.3	55.3	52.5	51.8	52.2	-0.1	-3.2		
		17N01E17F002M	M	1992	53.5	57.2	53.5	52.3	52.9	-0.6	-4.3		
		17N01E17F003M	M	1992	54.2	57.6	54.1	52.5	53.3	-0.9	-4.3		
		17N02E19J001M	I	2000	62.0	64.4	59.3	58.9	59.1	-2.9	-5.3		
		17N01E24A003M	M	2007	74.6	74.6	73.1	72.5	72.8	-1.8	-1.9		
		17N01E24A004M	M	2007	51.6	65.4	52.1	53.8	52.9	1.4	-12.5		
		17N01E24A005M	M	2007	51.6	65.4	52.2	53.8	53.0	1.4	-12.4		
		17N01E24A006M	M	2007	66.4	68.5	66.8	67.0	66.9	0.5	-1.6		
	Cherokee	20N02E24C001M	M	1999	104.7	***119.6***	104.5	103.5	104.0	-0.7	-15.6		
		20N02E24C002M	M	1999	104.6	***119.7***	104.5	103.5	104.0	-0.6	-15.7		
		20N02E24C003M	M	1999	107.6	***119.7***	103.6	103.5	103.6	-4.0	-16.1		
		20N03E31M001M	M	2001	101.6	***115.0***	98.3	99.0	98.6	-2.9	-16.4		
		20N03E33L001M	I	1999	94.9	***116.8***	93.0	91.7	92.3	-2.6	-24.5		
		21N03E22C001M	D	2001	364.9	378.8	365.4	360.7	363.1	-1.9	-15.8		4 - Pumped recen
		21N03E32B001M	I	1999	221.7	223.6	219.3	NM	219.3	-2.3	-4.3		9 - Temporarily in
		21N03E29J003M	D	2007	NM	NM	NM	NM	NM	NM	NM		
	Esquon	20N02E09G001M	M	2001	114.8	120.6	97.6	96.9	97.3	-17.5	-23.3		
		20N02E09L001M	I	1953	108.1	120.1	94.5	NM	94.5	-13.6	-25.6	8 - Oil or foreign su	1 - Pumping
		21N02E20P001M	I	1995	101.1	***116.7***	90.3	84.3	87.3	-13.8	-29.4		
		20N02E08H003M	D	2008	117.4	118.4	107.8	110.0	108.9	-8.5	-9.5	4 - Pumped recentl	
	Pentz	21N02E26E003M	M	2007	112.0	123.3	103.6	101.4	102.5	-9.5	-20.8		
		21N02E26E004M	M	2007	109.1	122.8	101.6	99.4	100.5	-8.5	-22.3		
		21N02E26E005M	M	2007	106.3	121.7	98.9	96.8	97.9	-8.4	-23.8		
		21N02E26E006M	M	2007	114.1	116.4	111.8	109.0	110.4	-3.6	-6.0		
	Richvale	18N01E13A002M	I	2002	74.9	72.8	74.1	74.3	74.2	-0.7	1.4	8 - Oil or foreign su	8 - Oil or foreign s
		18N01E15D002M	D	1976	67.6	65.8	68.3	68.4	68.3	0.7	2.5		
		19N01E27Q001M	M	1978	81.6	81.7	80.1	81.2	80.7	-0.9	-1.1		
		19N01E35B001M	M	2002	84.0	83.2	NM	84.1	84.1	0.1	0.9		
		19N02E15N002M	I	2000	100.8	100.1	NM	99.6	99.6	-1.2	-0.5	9 - Temporarily ina	
		19N02E13Q002M	M	2006	112.4	113.8	111.4	NM	111.4	-1.0	-2.4		9 - Temporarily in
		19N02E13Q003M	M	2006	112.7	114.1	111.8	NM	111.8	-1.0	-2.4		9 - Temporarily in

D-Domestic
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M-Monitoring
M/I- Municipal and Industrial

Sub Basin	Sub-Inventory Unit	Monitoring Wells	Well Type	First Record	Groundwater Elevations: Summer 2011 Average WSE (ft)	Groundwater Elevations: Spring 2012 Water Surface Elevation** (ft)	Groundwater Elevations: July 2012 Water Surface Elevation** (ft)	Groundwater Elevations: August 2012 Water Surface Elevation** (ft)	Analysis: 2012 Average Summer WSE (ft)	Analysis: Change Ave Summer WSE 2011 to 2012 (ft)	Analysis: Change Spring to Ave. Summer 2012 (ft)	Note: 2012 Questionable Measurement: July Measurement	Note: 2012 Questionable Measurement: August Measurement
EAST BUTTE	Thermalito	18N03E08B003M	I	2001	88.9	***97.6***	85.0	85.2	85.1	-3.8	-12.5		
		18N03E21G001M	I	1953	85.8	85.3	82.7	82.8	82.8	-3.1	-2.6		
		19N03E05N002M	D	1967	115.6	117.3	108.2	108.1	108.2	-7.4	-9.1	1 - Pumping	
		19N03E16Q001M	D	2000	137.7	136.7	136.2	134.1	135.2	-2.5	-1.6		
	Western Canal	19N01E09Q001M	I	1991	87.4	86.4	NM	86.6	86.6	-0.8	0.2	9 - Temporarily ina	
		20N01E18L001M	M	2000	101.2	103.7	NM	96.1	96.1	-5.1	-7.7		
		20N01E18L002M	M	2001	100.8	101.8	NM	97.6	97.6	-3.2	-4.2		
		20N01E18L003M	M	2001	103.3	103.1	NM	100.6	100.6	-2.7	-2.4		
		20N01E35C001M	D	1947	98.4	NM	NM	NM	NM	NM	NM	1 - Pumping	1 - Pumping
		20N02E16P001M	I	1990	114.8	120.0	NM	NM	NM	NM	NM	9 - Temporarily ina	9 - Temporarily in
		20N02E28N001M	D	1947	115.1	119.9	114.1	114.0	114.1	-1.1	-5.8		
NORTH YUBA	North Yuba	CWS-01	M&I	1980	NA	122.0			NA	NA	NA		
		CWS-02	M&I	1980	NA	142.0			NA	NA	NA		
		CWS-03	M&I	1980	NA	163.0			NA	NA	NA		
		17N03E03D001M	I	1947	70.7	***67.9***	69.1	68.3	68.7	-2.0	0.8		
		17N04E09N002M	I	2001	71.2	***76.3***	69.1	NM	69.1	-2.1	-7.2		9 - Temporarily in
		17N04E22B001M	D	1976	96.8	101.3	93.5	95.2	94.4	-2.4	-7.0		
		19N04E31F001M	D	2001	123.1	128.9	120.0	112.8	116.4	-6.7	-12.5		
WEST BUTTE	Angel Slough	21N01W23J001M	I	1941	105.2	109.6	105.2	104.9	105.1	-0.1	-4.5		
		21N01W35K002M	I	1994	96.6	98.6	94.8	94.5	94.6	-1.9	-3.9		2 - Nearby pump
	Chico Urban Area	CWSCH01	M&I	1988	NA	132.0			NA	NA	NA		
		CWSCH02	M&I	1988	NA	136.0			NA	NA	NA		
		CWSCH03	M&I	1988	NA	***126.0***			NA	NA	NA		
		CWSCH04	M&I	1988	NA	***119.0***			NA	NA	NA		
		CWSCH05	M&I	1988	NA	122.0			NA	NA	NA		
		CWSCH06	M&I	1988	NA	117.0			NA	NA	NA		
		CWSCH07	M&I	1988	NA	123.0			NA	NA	NA		
		22N01E28J001M	M	1958	126.2	***137.8***	119.8	116.6	118.2	-8.0	-19.6		
		22N01E28J003M	M	1958	132.6	141.4	126.8	124.4	125.6	-7.0	-15.9		
		22N01E28J005M	M	1958	126.9	***133.8***	120.5	117.6	119.1	-7.8	-14.8		
	Durham/Dayton	20N01E10C002M	I	1947	0.0	106.2	NM	NM	NM	NM	NM	9 - Temporarily ina	9 - Temporarily in
		20N02E06Q001M	I	1947	110.4	114.7	98.8	98.8	98.8	-11.6	-15.9	8 - Oil or foreign su	8 - Oil or foreign s
		21N01E10B003M	I	1995	107.9	***122.6***	99.0	95.2	97.1	-10.8	-25.5		
		21N01E13L002M	M	2012	NW	113.4	NM	90.9	90.9	NW	-22.5	9 - Temporarily ina	
		21N01E13L003M	M	2012	NW	109.5	NM	89.8	89.8	NW	-19.7	9 - Temporarily ina	
		21N01E13L004M	M	2012	NW	106.0	NM	92.6	92.6	NW	-13.4	9 - Temporarily ina	
		21N01E25K001M	D	1993	101.8	***109.9***	NM	NM	NM	NM	NM	7 - Special/Other	2 - Pump house lo
		21N01E26K001M	I	1993	95.3	***100.6***	89.9	NM	89.9	-5.4	-10.7	4 - Pumped recentl	1 - Pumping
		21N01E27D001M	D	1946	99.7	***105.8***	90.5	87.7	89.1	-10.6	-16.7		
		21N02E07C001M	I	1967	129.3	132.4	113.1	112.6	112.9	-16.5	-19.6	3 - Casing leaking	3 - Casing leaking
		21N02E18C001M	M	2010	104.4	121.4	97.8	93.3	95.6	-8.8	-25.9		
		21N02E18C002M	M	2010	105.1	121.8	98.5	92.6	95.5	-9.6	-26.3		
		21N02E18C003M	M	2010	154.4	149.0	145.4	145.4	145.4	-9.0	-3.6		
		21N02E30L001M	D	1995	107.8	***116.4***	98.4	94.3	96.3	-11.5	-20.1		

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Sub Basin	Sub-Inventory Unit	Monitoring Wells	Well Type	First Record	Groundwater Elevations: Summer 2011 Average WSE (ft)	Spring 2012 Water Surface Elevation** (ft)	July 2012 Water Surface Elevation** (ft)	August 2012 Water Surface Elevation** (ft)	Analysis: 2012 Average Summer WSE (ft)	Change Ave Summer WSE 2011 to 2012 (ft)	Change Spring to Ave. Summer 2012 (ft)	Note: 2012 Questionable Measurement: July Measurement	August Measurement
WEST BUTTE	Llano Seco	20N01E18L001M	M	2000	101.2	***103.7***	NM	96.1	96.1	-5.1	-7.7		
		20N01E18L002M	M	2001	100.8	***101.8***	NM	97.6	97.6	-3.2	-4.2		
		20N01E18L003M	M	2001	103.3	***103.1***	NM	100.6	100.6	-2.7	-2.4		
		21N01W35K002M	I	1994	96.6	98.6	94.8	94.5	94.6	-1.9	-3.9		2 - Nearby pump
	M & T	21N01W13J001M	M	2012	NW	115.7	101.9	101.0	101.5	NW	-14.2		
		21N01W13J002M	M	2012	NW	115.8	103.7	102.5	103.1	NW	-12.7		
		21N01W13J003M	M	2012	NW	116.0	105.5	104.4	104.9	NW	-11.1		
		21N01W24B001M	M	1995	101.0	***111.0***	NM	96.8	96.8	-4.2	-14.1		
		22N01E29R001M	I	1947	124.2	***131.0***	118.5	NM	118.5	-5.8	-12.6	2 - Nearby pump o	8 - Casing leaking
		22N01E32E004M	D	1992	117.4	***124.8***	109.7	109.0	109.3	-8.1	-15.5		
VINA	Vina	22N01E09B001M	D	2001	139.4	***140.3***	127.4	127.2	127.3	-12.1	-13.0	1 - Pumping	
		22N01E20K001M	D	1961	128.1	132.8	120.1	119.8	120.0	-8.1	-12.9	4 - Pumped recent	4 - Pumped recen
		23N01E18A001M	D	1976	166.9	NM	NM	NM	NM	NM	NM	9 - Temporarily ina	9 - Temporarily in
		23N01E29P002M	D	1990	143.3	150.3	137.2	136.9	137.1	-6.3	-13.3		
		23N01E33A001M	I	2001	145.5	***149.2***	142.4	141.1	141.8	-3.8	-7.4		
		23N01W10E001M	I	2001	153.9	161.2	161.0	NM	161.0	7.2	-0.2	8 - Oil or foreign su	1 - Pumping
		23N01W10M001M	M	2001	156.2	***160.9***	146.7	146.1	146.4	-9.8	-14.6		
		23N01W27L001M	D	1976	134.9	140.3	126.3	NM	126.3	-8.6	-14.0		8 - Casing leaking
		23N01W36P001M	D	1959	129.2	134.5	110.1	109.1	109.6	-19.6	-24.9		
		23N02W25C001M	I	1967	134.4	***133.7***	134.9	NM	134.9	0.5	1.2		7 - Special/Other
		23N01W25G001M	I	2007	123.2	147.4	131.6	131.9	131.8	8.6	-15.7		
		23N01W03H002M	M	2012	NW	179.0	162.1	170.6	166.3	NW	-12.7		
		23N01W03H003M	M	2012	NW	179.4	166.3	170.3	168.3	NW	-11.1		
		23N01W03H004M	M	2012	NW	182.9	178.5	178.0	178.3	NW	-4.7		
		23N01W28M002M	M	2008	141.1	147.8	136.5	134.1	135.3	-5.8	-12.5		
		23N01W28M003M	M	2008	137.9	146.7	132.8	130.6	131.7	-6.3	-15.1		
		23N01W28M004M	M	2008	137.2	143.5	128.2	127.2	127.7	-9.5	-15.9		
		23N01W28M005M	M	2008	138.2	142.8	131.8	129.7	130.7	-7.4	-12.1		
		23N01W31M001M	M	2008	133.4	139.7	130.7	125.1	127.9	-5.5	-11.8		
		23N01W31M002M	M	2008	129.0	142.0	123.4	120.9	122.2	-6.8	-19.8		
		23N01W31M003M	M	2008	123.1	140.6	120.7	119.7	120.2	-2.9	-20.4		
		23N01W31M004M	M	2008	136.5	138.6	134.5	133.9	134.2	-2.3	-4.4		

Note: Red font indicates Questionable Measurement (QM)
NA- Not available, NM- No measurement, NW- New well
**2012 WSE adjusted from CASGEM data to vertical datum of Water Data Library

Groundwater Elevation Change- Summer 2011 to Summer 2012

		Change (ft)	SIU	2010 to 2011 (ft)
Well Count	**Max Increase**	9	*Vina*	16
8	Average Increase	3		
	Max Decrease	-20	*Esquon*	-7
80	Average Decrease	-6		
	Average GWL Change	-5		3
	Number of Wells	88		92

Groundwater Elevation Change- Spring 2012 to Average Summer 2012

		Change (ft)	SIU
8	**Max Increase**	3	*Richvale*
	Average Increase	1	
	Max Decrease	-29	*Esquon*
89	Average Decrease	-12	
	Number of Wells	97	

**DOES include Questionable Measurements because they are very common due to summer pumping

D-Domestic
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BMO Data Summary
Fall 2008-2012 Groundwater Elevations

Sub Basin	Sub-Inventory Unit	Monitoring Wells	Well Type	First Record	Groundwater Elevations: Fall 2008 Water Surface Elevation (WSE) (Elev. ft)	Fall 2009 Water Surface Elevation (WSE) (Elev. ft)	Fall 2010 Water Surface Elevation (WSE) (Elev. ft)	Fall 2011 Water Surface Elevation (WSE) (Elev. ft)	Fall 2012 Water Surface Elevation** (WSE) (Elev. ft)	Fall BMO Stage 1 Alert Level (Elev. ft)	Fall BMO Stage 2 Alert Level (Elev. ft)	Analysis: Elevation Above or Below Assigned Alert Level (ft)	% Differnce Between Alert Level 1 and Fall WSE	Change Fall 2011 to Fall 2012 (ft)
EAST BUTTE	Biggs/West Gridley	17N01E10A001M	D	1953	53.0	50.6	52.9	54.7	NM	31.7	25.8			
		18N02E16F001M	I	1947	73.6	73.6	73.4	74.2	75.5	72.5	71.9	3.0	4%	1.3
		18N02E25M001M	I	1959	79.4	78.4	78.5	79.8	78.6	65.6	61.7	13.0	20%	
		18N02E32H001M	D	2001	NM	NM	NM	71.4	69.5	67.8	65.7	1.7	3%	-1.9
	Butte	17N02E14A001M	I	1947	75.8	78.3	75.5	76.1	75.1	70.1	67.5	5.0	7%	-1.0
		17N02E14H001M	D	2000	73.0	73.5	73.1	74.6	72.6	63.7	52.0	8.9	14%	-2.0
		17N03E16N001M	D	1953	72.5	71.8	72.2	73.4	72.1	71.7	70.9	0.4	1%	-1.3
	Butte Sink	17N01E17F001M	M	1992	51.9	52.3	***50.8***	51.3	52.1	50.9	47.5	1.2	2%	0.8
		17N01E17F002M	M	1992	***50.6***	***51.0***	***48.9***	***49.8***	52.1	51.1	47.4	1.0	2%	2.3
		17N01E17F003M	M	1992	***50.0***	***50.0***	***47.6***	***48.8***	51.3	51.0	47.0	0.3	1%	2.5
		17N02E19J001M	I	2000	NM	NM	63.8	64.9	NM	60.5	53.4			
		17N01E24A003M	M	2007	70.7	67.4	68.6	72.5	71.3	a				-1.2
		17N01E24A004M	M	2007	28.2	22.9	27.2	51.7	41.9					-9.8
		17N01E24A005M	M	2007	28.5	23.1	27.4	51.7	42.0					-9.7
		17N01E24A006M	M	2007	68.4	68.3	67.3	67.1	69.3					2.2
	Cherokee	20N02E24C001M	M	1999	***112.3***	***111.6***	***110.8***	114.9	***110.1***	113.9	109.1	-3.8	-3%	-4.8
		20N02E24C002M	M	1999	***112.1***	***111.6***	***112.1***	114.9	***110.2***	113.7	108.1	-3.5	-3%	-4.8
		20N02E24C003M	M	1999	***112.1***	***111.5***	***110.9***	114.9	***110.2***	113.8	108.2	-3.6	-3%	-4.8
		20N03E31M001M	M	2001	***109.2***	***108.1***	105.7	***105.6***	***106.0***	111.4	106.5	-0.5	-5%	0.3
		20N03E33L001M	I	1999	114.5	***113.1***	***112.9***	***112.5***	***110.3***	114.4	111.0	-0.8	-4%	-2.3
		21N03E22C001M	D	2001	359.1	363.6	364.7	363.2	***351.9***	355.5	345.5	-3.6	-1%	-11.3
		21N03E32B001M	I	1999	216.5	***215.8***	***216.0***	219.8	***215.9***	216.2	212.9	-0.3	%	-3.9
		21N03E29J003M	D	2007	NM	214.2	209.9	NM	NM	b				
	Esquon	20N02E09G001M	M	2001	***105.7***	NM	***108.8***	113.6	***100.8***	108.9	97.5	-8.1	-7%	-12.8
		20N02E09L001M	I	1953	***107.4***	***106.3***	108.6	110.2	107.4	109.8	104.5	-2.4	-2%	
		21N02E20P001M	I	1995	109.6	109.3	***104.1***	111.8	***104.3***	106.6	85.6	-2.3	-2%	-7.5
		20N02E08H003M	D	2008	114.1	114.2	115.4	115.6	98.1	c				
	Pentz	21N02E26E003M	I	2007	107.9	109.4	107.0	119.1	105.5	d				-13.6
		21N02E26E004M	I	2007	94.4	106.9	104.7	118.3	103.6					-14.7
		21N02E26E005M	I	2007	98.8	104.2	101.7	117.0	100.8					-16.2
		21N02E26E006M	I	2007	108.9	108.0	107.6	113.5	107.1					-6.4
	Richvale	18N01E13A002M	I	2002	73.3	72.9	72.0	72.4	72.0	68.1	63.1	3.9	6%	
		18N01E15D002M	D	1976	66.4	***60.5***	38.1	38.9	***50.4***	61.0	56.0	-5.6	-17%	
		19N01E27Q001M	M	1978	80.7	80.2	79.8	83.1	78.8	75.1	70.1	3.7	5%	-4.2
		19N01E35B001M	M	2002	83.6	83.4	81.7	82.3	82.0	77.6	72.6	4.4	6%	-0.3
		19N02E15N002M	I	2000	98.9	98.6	98.8	100.6	98.7	94.6	89.6	4.1	4%	-1.9
		19N02E13Q002M	M	2006	111.0	111.0	111.8	113.7	112.6	e				-1.1
		19N02E13Q003M	M	2006	111.5	111.5	112.2	114.0	113.0					-1.1

D-Domestic
I-Irrigation
M-Monitoring
M/I-Municipal and Industrial

Sub Basin	Sub-Inventory Unit	Monitoring Wells	Well Type	First Record	Groundwater Elevations							Analysis		
					Fall 2008 Water Surface Elevation (WSE) (Elev. ft)	Fall 2009 Water Surface Elevation (WSE) (Elev. ft)	Fall 2010 Water Surface Elevation (WSE) (Elev. ft)	Fall 2011 Water Surface Elevation (WSE) (Elev. ft)	Fall 2012 Water Surface Elevation** (WSE) (Elev. ft)	Fall BMO Stage 1 Alert Level (Elev. ft)	Fall BMO Stage 2 Alert Level (Elev. ft)	Elevation Above or Below Assigned Alert Level (ft)	% Differnce Between Alert Level 1 and Fall WSE	Change Fall 2011 to Fall 2012 (ft)
EAST BUTTE	Thermalito	18N03E08B003M	I	2001	92.9	NM	87.3	96.7	95.0	89.4	81.5	5.6	6%	-1.7
		18N03E21G001M	I	1953	79.9	81.6	82.8	84.7	83.0	81.2	78.9	1.8	2%	-1.7
		19N03E05N002M	D	1967	117.4	114.7	112.8	117.5	115.6	106.9	90.1	8.7	8%	-1.9
		19N03E16Q001M	D	2000	135.1	135.7	136.1	137.0	136.5	134.0	130.7	2.5	2%	-0.5
	Western Canal	19N01E09Q001M	I	1991	86.2	86.7	83.8	84.4	84.1	78.8	73.8	5.3	7%	-0.3
		20N01E18L001M	M	2000	99.4	99.3	100.7	101.0	96.8	96.8	91.8	0.0	%	-4.2
		20N01E18L002M	M	2001	99.0	99.5	99.8	100.4	97.5	95.3	90.3	2.2	2%	-2.8
		20N01E18L003M	M	2001	101.3	102.0	102.4	102.9	100.4	97.1	92.1	3.3	3%	-2.5
		20N01E35C001M	D	1947	96.9	97.3	95.7	96.6	95.4	91.1	86.1	4.3	5%	-1.2
		20N02E16P001M	I	1990	105.9	105.2	NM	106.9	110.9	110.0	105.0	0.9	1%	4.0
		20N02E28N001M	D	1947	112.1	112.9	115.6	116.2	115.1	110.2	105.2	4.9	4%	-1.1
NORTH YUBA	North Yuba	CWS-01	M&I	1980	101.0	132.0	131.0	131.0	124.0	82.0	31.0	42.0	51%	-7.0
		CWS-02	M&I	1980	146.0	143.0	146.0	148.0	146.0	98.0	43.0	48.0	49%	-2.0
		CWS-03	M&I	1980	163.0	165.0	164.0	164.0	161.0	123.0	78.0	38.0	31%	-3.0
		17N03E03D001M	I	1947	69.2	68.2	70.0	70.9	70.3	66.1	64.6	4.2	6%	-0.6
		17N04E09N002M	I	2001	67.6	63.7	62.1	70.2	NM	66.8	58.0			
		17N04E22B001M	D	1976	86.1	83.1	92.9	98.1	95.9	79.0	74.0	16.9	21%	-2.2
		19N04E31F001M	D	2001	119.8	120.9	120.2	121.6	118.0	117.7	112.3	0.3	%	-3.6
WEST BUTTE	Angel Slough	21N01W23J001M	I	1941	105.3	104.8	104.8	105.7	103.6	106.1	103.0	-2.5	-2%	-2.1
		21N01W35K002M	I	1994	95.2	95.3	95.4	96.5	94.3	95.1	93.1	-0.8	-1%	-2.2
	Chico Urban Area	CWSCH01	M&I	1988	117.0	117.0	120.0	119.0	115.0	119.0	101.0	-4.0	-3%	-4.0
		CWSCH02	M&I	1988	117.0	123.0	130.0	132.0	87.0	103.0	63.0	-16.0	-16%	
		CWSCH03	M&I	1988	121.0	120.0	116.0	120.0	118.0	116.0	100.0	2.0	2%	-2.0
		CWSCH04	M&I	1988	107.0	91.0	NM	110.0	109.0	103.0	66.0	6.0	6%	-1.0
		CWSCH05	M&I	1988	111.0	115.0	113.0	118.0	111.0	98.0	61.0	13.0	13%	-7.0
		CWSCH06	M&I	1988	116.0	113.0	109.0	113.0	102.0	115.0	61.0	-13.0	-11%	-11.0
		CWSCH07	M&I	1988	111.0	106.0	110.0	114.0	106.0	103.0	80.0	3.0	3%	-8.0
		22N01E28J001M	M	1958	122.6	123.8	125.5	130.5	121.5	126.8	120.9	-5.3	-4%	-9.0
		22N01E28J003M	M	1958	126.5	128.0	129.7	135.0	126.4	128.8	123.4	-2.4	-2%	-8.6
		22N01E28J005M	M	1958	120.5	121.5	122.2	127.4	116.5	122.4	117.4	-0.9	-5%	-10.9
	Durham/Dayton	20N01E10C002M	I	1947	98.2	98.7	98.5	NM	93.6	99.1	95.2	-1.6	-6%	
		20N02E06Q001M	I	1947	107.2	106.0	105.8	111.6	104.2	103.6	98.6	0.6	1%	
		21N01E10B003M	I	1995	108.3	109.5	110.1	116.8	104.8	112.4	90.9	-7.6	-7%	-12.0
		21N01E13L002M	M	2012					102.2	f				
		21N01E13L003M	M	2012					102.1					
		21N01E13L004M	M	2012					102.4					
		21N01E25K001M	D	1993	96.2	94.6	96.5	101.6	NM	97.3	72.2			
		21N01E26K001M	I	1993	90.6	83.3	95.9	90.5	85.3	93.1	69.5	-7.8	-8%	-5.2
		21N01E27D001M	D	1946	92.6	91.9	92.6	97.7	89.1	94.8	88.6	-5.7	-6%	-8.6
		21N02E07C001M	I	1967	111.9	130.8	132.5	131.4	125.7	106.7	98.1	19.0	18%	
		21N02E18C001M	M	2010			107.5	115.7	103.2	f				-12.5
		21N02E18C002M	M	2010			108.0	115.8	102.8					-13.1
		21N02E18C003M	M	2010			151.2	154.1	144.6					-9.5
		21N02E30L001M	D	1995	104.5	103.3	104.0	110.3	99.5	108.2	92.8	-8.8	-8%	-10.9

D-Domestic
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Sub Basin	Sub-Inventory Unit	Monitoring Wells	Well Type	First Record	Groundwater Elevations							Analysis		
					Fall 2008 Water Surface Elevation (WSE) (Elev. ft)	Fall 2009 Water Surface Elevation (WSE) (Elev. ft)	Fall 2010 Water Surface Elevation (WSE) (Elev. ft)	Fall 2011 Water Surface Elevation (WSE) (Elev. ft)	Fall 2012 Water Surface Elevation** (WSE) (Elev. ft)	Fall BMO Stage 1 Alert Level (Elev. ft)	Fall BMO Stage 2 Alert Level (Elev. ft)	Elevation Above or Below Assigned Alert Level (ft)	% Differnce Between Alert Level 1 and Fall WSE	Change Fall 2011 to Fall 2012 (ft)
WEST BUTTE	Llano Seco	20N01E18L001M	M	2000	99.4	99.3	100.7	101.0	96.8	99.4	94.1	-2.6	-3%	-4.2
		20N01E18L002M	M	2001	99.0	99.5	99.8	100.4	97.5	99.3	96.3	-1.8	-2%	-2.8
		20N01E18L003M	M	2001	101.3	102.0	102.4	102.9	100.4	101.2	98.5	-0.8	-1%	-2.5
		21N01W35K002M	I	1994	95.2	95.3	95.4	96.5	94.3	95.1	93.1	-0.8	-1%	-2.2
	M & T	21N01W13J001M	M	2012					105.9	g				
		21N01W13J002M	M	2012					107.0					
		21N01W13J003M	M	2012					107.7					
		21N01W24B001M	M	1995	103.7	103.4	104.8	104.5	101.6	107.0	98.2	-5.4	-5%	-2.9
		22N01E29R001M	I	1947	115.8	117.0	120.7	125.1	115.6	115.9	106.7	-0.3	%	-9.5
		22N01E32E004M	D	1992	111.1	112.2	115.7	119.2	111.7	109.6	88.2	2.1	2%	-7.5
VINA	Vina	22N01E09B001M	D	2001	129.4	128.7	129.7	133.8	127.2	141.2	134.0	-6.8	-10%	-6.6
		22N01E20K001M	D	1961	119.2	118.7	122.3	126.8	118.9	123.1	118.2	-4.2	-3%	-7.9
		23N01E18A001M	D	1976	NM	161.9	166.2	165.6	NM	162.9	145.7			
		23N01E29P002M	D	1990	141.5	136.2	139.6	141.9	138.3	127.5	98.5	10.8	8%	-3.6
		23N01E33A001M	I	2001	144.4	143.1	143.0	145.2	141.2	147.0	134.0	-5.8	-4%	-4.0
		23N01W10E001M	I	2001	146.9	153.9	154.8	157.5	NM	150.2	141.8			
		23N01W10M001M	M	2001	151.2	153.2	154.8	157.5	NM	151.9	143.1			
		23N01W27L001M	D	1976	130.2	131.0	132.9	135.0	128.3	129.2	113.6	-0.9	-1%	-6.7
		23N01W36P001M	D	1959	120.4	122.4	123.5	127.4	117.9	126.1	121.3	-3.4	-7%	-9.5
		23N02W25C001M	I	1967	129.7	131.5	132.0	133.4	128.2	126.4	121.3	1.8	1%	-5.2
		23N01W25G001M	I	2007	137.9	137.4	132.1	126.7	132.0	h				
		23N01W03H002M	M	2012					172.6					
		23N01W03H003M	M	2012					173.2					
		23N01W03H004M	M	2012					175.8					
		23N01W28M002M	M	2008		136.9	134.4	138.2	136.6					-1.6
		23N01W28M003M	M	2008		136.8	135.4	138.8	137.1					-1.7
		23N01W28M004M	M	2008		133.9	139.3	137.1	131.7					-5.4
		23N01W28M005M	M	2008		133.4	141.4	136.6	131.3					-5.2
		23N01W31M001M	M	2008	131.1	126.8	134.0	126.0	129.7					3.8
		23N01W31M002M	M	2008	132.5	131.6	133.0	132.4	129.4					-2.9
		23N01W31M003M	M	2008	133.1	135.1	133.8	137.2	132.0					-5.1
		23N01W31M004M	M	2008	134.0	134.1	134.5	135.7	133.6					-2.1

Note: Red font indicates Questionable Measurement (QM), Orange highlight is Alert Stage 1, Red higlight is Alert Stage 2

**2012 WSE adjusted from CASGEM data to vertical datum of Water Data Library

a 17N01E24A03-6 multi-completion well installed in 2007. Not yet enough data to establish alert levels
b 21N03E29J03 added to DWR monitoring network in 2007, has since been discontinued.
c 20N02E08H03 added to DWR monitoring network in 2008
d 21N02E26E03-6 multi-completion monitoring well installed 2007
e 19N02E13Q02-3 first measurement on Water Data Library Spring 2006
f 21N01E13L02-04 installed in 2012 and 21N02E18C01-03 in 2010
g 21N01W13J01-03 installed 2012
h 23N01W25G01 added to DWR monitoring network in 2007, 23N01W28M02-5 and 23N01W31M01-4 multi-completion monitoring wells installed 2008, and 23N01W03H02-4 installed 2012

Alert Stage Count

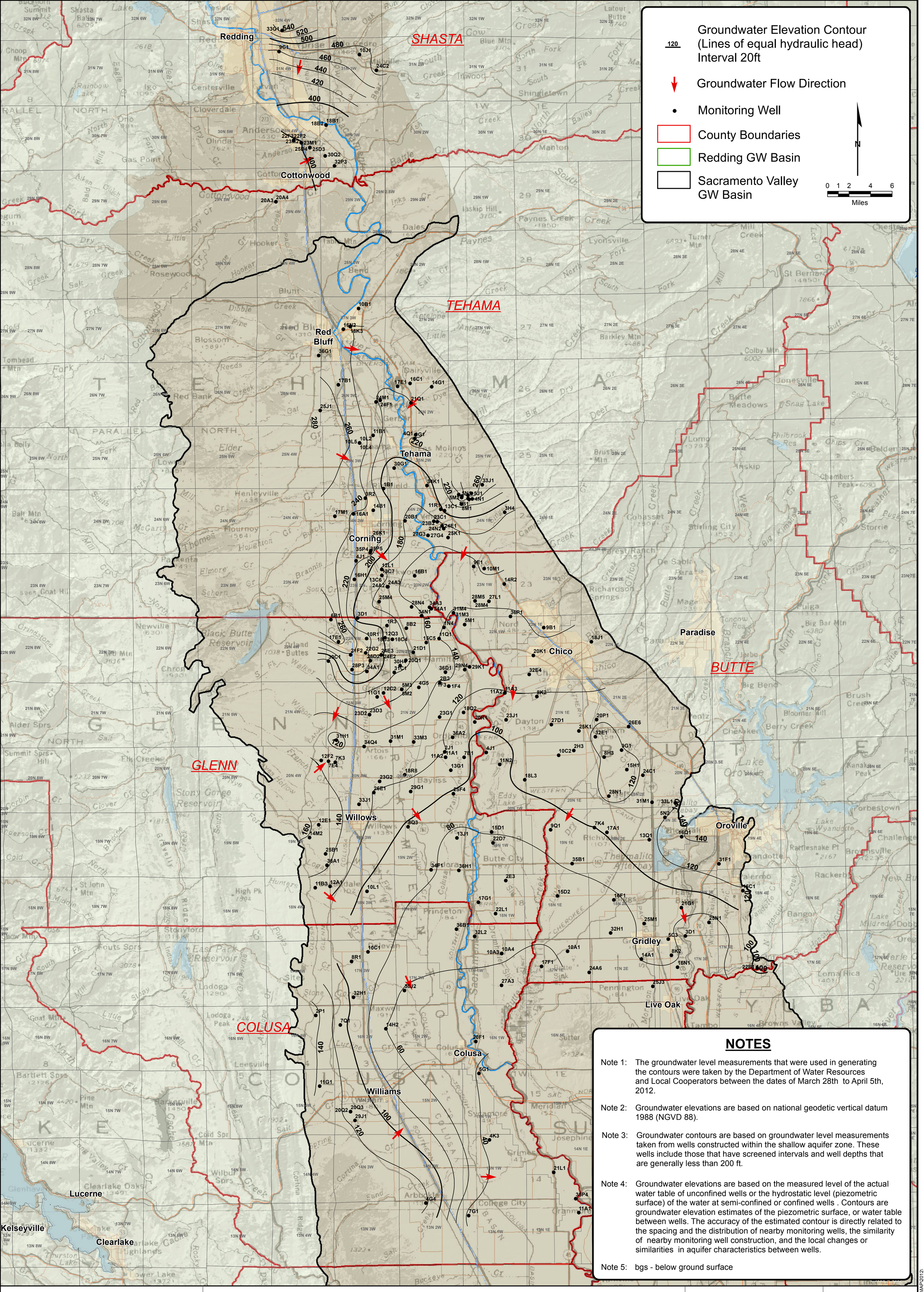
	2008	2009	2010	2011	2012
Alert 1	29	31	23	10	27
Alert 2	2	1	1	2	7

D-Domestic
I-Irrigation
M-Monitoring
M/I-Municipal and Industrial

Groundwater Status Report

Appendix F

DWR Contour Maps



NOTES

Note 1: The groundwater level measurements that were used in generating the contours were taken by the Department of Water Resources and Local Cooperators between the dates of March 28th to April 5th, 2012.

Note 2: Groundwater elevations are based on national geodetic vertical datum 1988 (NGVD 88).

Note 3: Groundwater contours are based on groundwater level measurements taken from wells constructed within the shallow aquifer zone. These wells include those that have screened intervals and well depths that are generally less than 200 ft.

Note 4: Groundwater elevations are based on the measured level of the actual water table of unconfined wells or the hydrostatic level (piezometric surface) of the water at semi-confined or confined wells . Contours are groundwater elevation estimates of the piezometric surface, or water table between wells. The accuracy of the estimated contour is directly related to the spacing and the distribution of nearby monitoring wells, the similarity of nearby monitoring well construction, and the local changes or similarities in aquifer characteristics between wells.

Note 5: bgs - below ground surface

STATE OF CALIFORNIA
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NORTHERN SACRAMENTO VALLEY GROUNDWATER ELEVATION MAP SPRING 2012

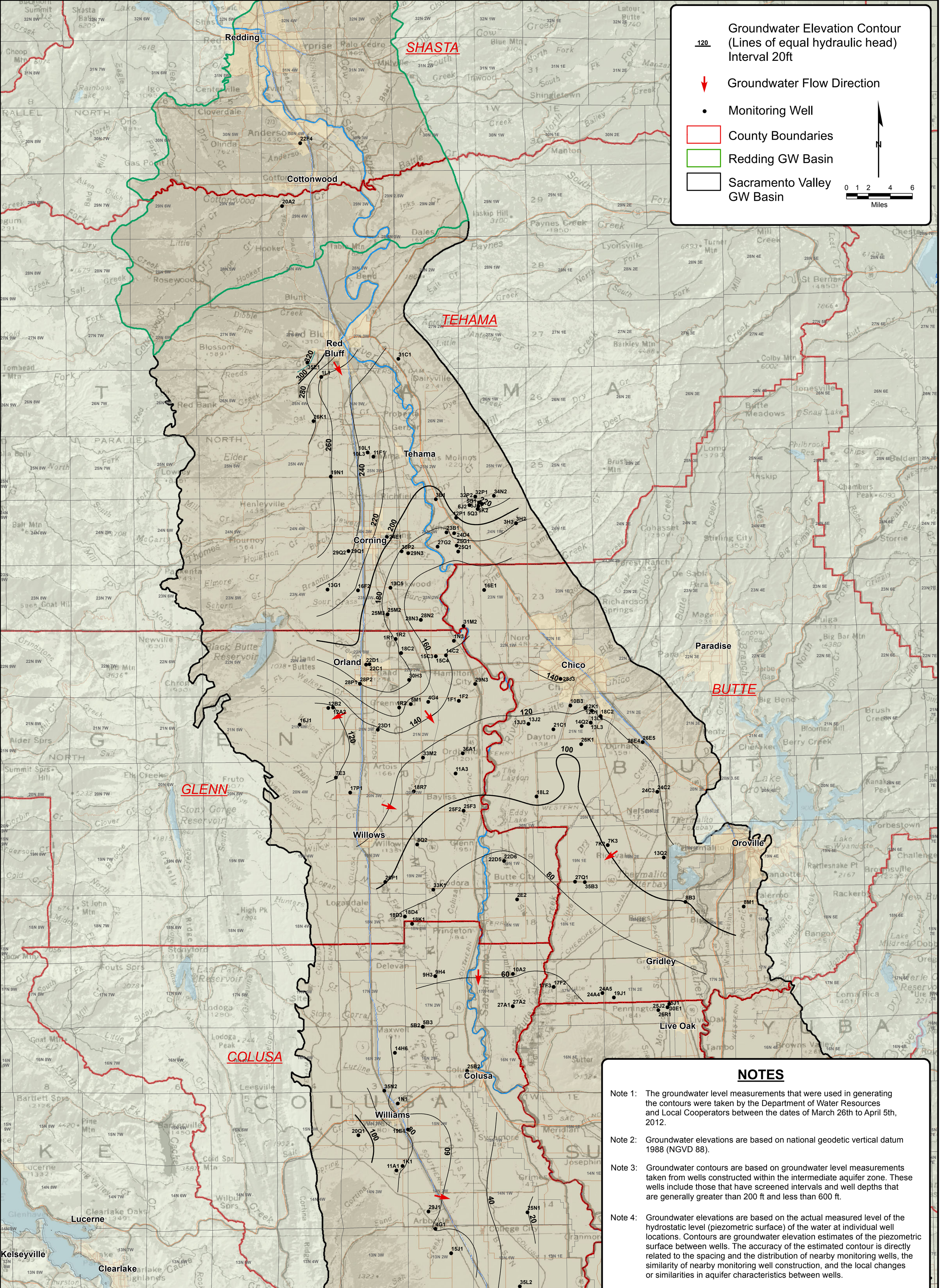
SHALLOW AQUIFER ZONE

(Wells generally less than 200 ft bgs)

PLATE 1S

Date: October 2012

BY: G. Gordon



NOTES

Note 1: The groundwater level measurements that were used in generating the contours were taken by the Department of Water Resources and Local Cooperators between the dates of March 26th to April 5th, 2012.

Note 2: Groundwater elevations are based on national geodetic vertical datum 1988 (NGVD 88).

Note 3: Groundwater contours are based on groundwater level measurements taken from wells constructed within the intermediate aquifer zone. These wells include those that have screened intervals and well depths that are generally greater than 200 ft and less than 600 ft.

Note 4: Groundwater elevations are based on the actual measured level of the hydrostatic level (piezometric surface) of the water at individual well locations. Contours are groundwater elevation estimates of the piezometric surface between wells. The accuracy of the estimated contour is directly related to the spacing and the distribution of nearby monitoring wells, the similarity of nearby monitoring well construction, and the local changes or similarities in aquifer characteristics between wells.

Note 5: bgs - below ground surface

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NORTHERN SACRAMENTO VALLEY GROUNDWATER ELEVATION MAP SPRING 2012

INTERMEDIATE AQUIFER ZONE

(Wells generally greater than 200 ft and less than 600 ft bgs)

PLATE 1I

Date: October 2012

BY: G. Gordon

Groundwater Status Report

Appendix G

2013 Basin Management Objective Reports

Available at http://www.buttecounty.net/waterandresource/
under Groundwater Reports -> 2012 Groundwater Status Report
-> Appendix G