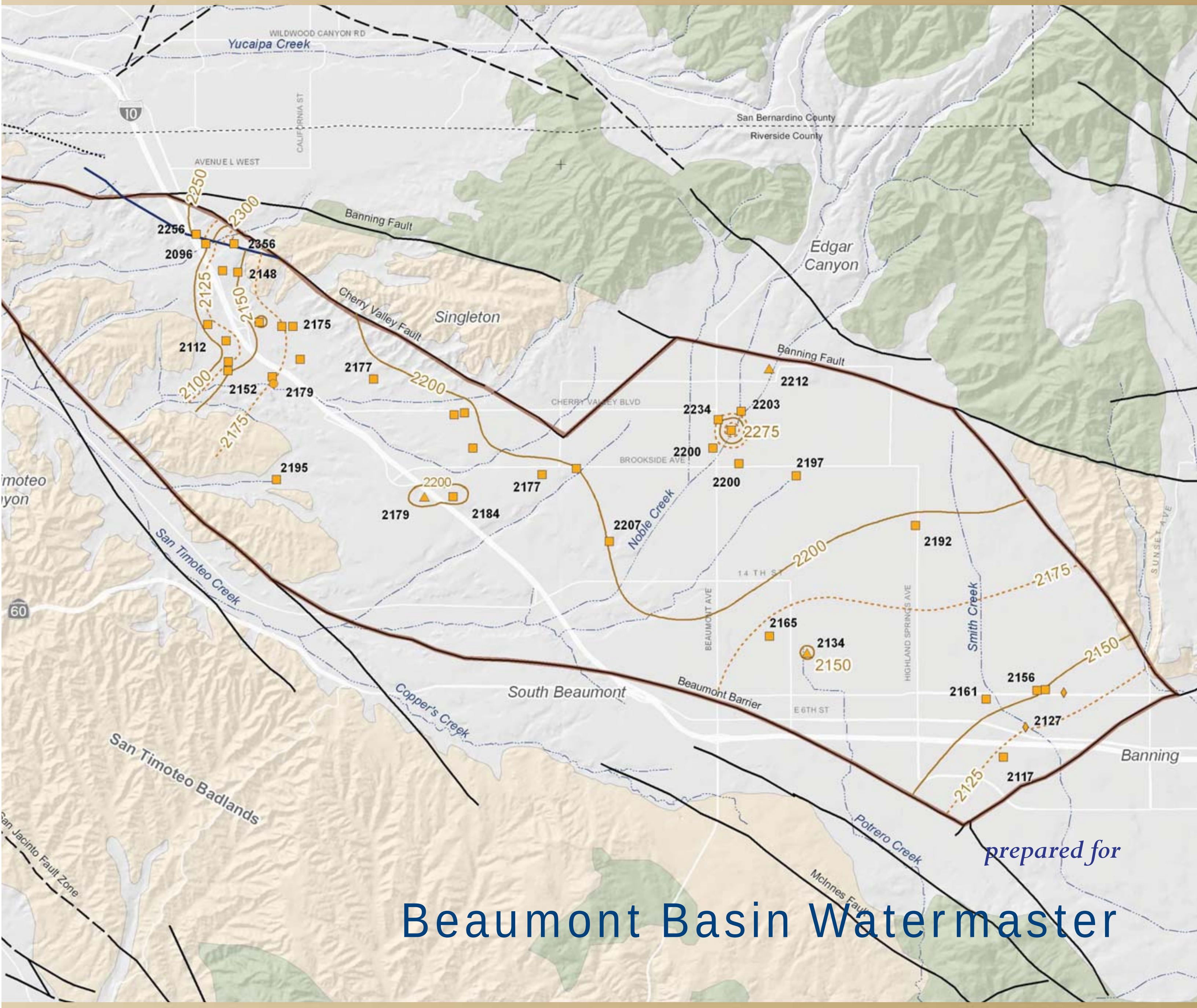
Beaumont Basin Watermaster Biennial Engineer's Report
July 2003 - June 2008



prepared for

Beaumont Basin Watermaster

June 2009
Revised February 2010

WILDERMUTH™
ENVIRONMENTAL INC.

February 16, 2010

Mr. George Jorritsma
Chairman, Beaumont Basin Watermaster
General Manager, South Mesa Water Company
391 West Ave. L
Calimesa, CA 92320

Subject: Transmittal of the Beaumont Basin Watermaster Biennial Engineer's Report

Dear Mr. Jorritsma:

Wildermuth Environmental is pleased to submit to you the *Beaumont Basin Watermaster Biennial Engineer's Report* for the July 2003 through June 2008 period. This report is in fulfillment of the Watermaster Rules and Regulations Section 2.13, which calls for the preparation of a basin condition report at least once every two years. This Biennial Engineer's Report summarizes changes in groundwater levels, storage, quality, and ground surface elevation for the five-year period from fiscal 2003/04 through 2007/08.

If you have any questions at all, please call myself or Mark Wildermuth at 949.420.3030.

Sincerely,

Wildermuth Environmental, Inc.

Samantha S. Adams
Senior Scientist

Mark J. Wildermuth, PE
Chairman

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Acronyms, Abbreviations, and Initialisms

acre-ft	acre-feet
acre-ft/yr	acre-feet per year
Amendment	Basin Plan Amendment
Banning	City of Banning
Basin	Beaumont Basin
Basin Plan	Water Quality Control Plan for the Santa Ana River Basin
BCVWD	Beaumont Cherry Valley Water District
Beaumont	City of Beaumont
BMZ	Beaumont Management Zone
CDFM	cumulative departure from mean precipitation
CVCOI	Cherry Valley Community of Interest
DifSAR	Differential Interferometric Synthetic Aperture Radar
DPH	California Department of Public Health
DWR	California Department of Water Resources
EPA	U.S. Environmental Protection Agency
IRWMP	Integrated Regional Water Management Program
MCL	maximum contaminant level
mg/L	milligrams per liter
NL	notification level
OSWDS	on-site waste disposal systems
PPCP	pharmaceutical and personal care products
Regional Board	Santa Ana Regional Water Quality Control Board
SGPWA	San Gorgonio Pass Water Agency
SMWC	South Mesa Water Company
STMZ	San Timoteo Management Zone
STWMA	San Timoteo Watershed Management Authority
STWMP	San Timoteo Watershed Management Program
TDS	total dissolved solids
µg/L	micrograms per liter
Watermaster	Beaumont Basin Watermaster
WCI	water character index
YVWD	Yucaipa Valley Water District

In January 2001, based on a common interest in the San Timoteo Watershed, the Beaumont Cherry Valley Water District (BCVWD), the City of Beaumont (Beaumont), the South Mesa Water Company (SMWC), and the Yucaipa Valley Water District (YVWD) formed the San Timoteo Watershed Management Authority (STWMA). Once formed, the STWMA began a watershed-wide, multi-phase effort to develop and implement a comprehensive San Timoteo Watershed Management Program (STWMP). Phase 1 of the STWMP included developing a description of the area's water resources, establishing goals to protect and enhance those resources, and affirming a management plan to accomplish those goals. This work is documented in *San Timoteo Watershed Management Program, Phase 1 Report* (Wildermuth Environmental, Inc., 2002) and its successor, the updated and re-titled *Integrated Regional Water Management Program for the San Timoteo Watershed* (IRWMP) (Wildermuth Environmental, Inc., 2005). The five goals established in Phase I include:

- Enhancing basin water supplies
- Protecting and enhancing water quality
- Optimizing the management of STWMA area groundwater basins
- Protecting riparian habitat in San Timoteo Creek and protecting/enhancing habitat in the STWMA area
- Equitably distributing the benefits and costs of developing the IRWMP for the San Timoteo Watershed

The Phase I report also identified the initiatives or program elements necessary to achieve these goals. Program Element 5 called for STWMA members to establish a groundwater management entity for the Beaumont Basin (Basin). The Basin is the most important groundwater basin in the Pass Area. The Basin is approximately 26 square miles in area and has a safe yield of approximately 8,650 acre-ft/yr, a total storage capacity of over a million acre-ft, and up to 200,000 acre-ft of unused storage capacity available for conjunctive use. Two groups, representing appropriator and overlying interests, began negotiations in May 2002 to implement this program element. In 2003 the STWMA initiated legal action against all the major pumpers in the Basin to adjudicate the pumping and storage rights in the Beaumont Basin.

A Stipulated Agreement was developed and submitted to the Court as a result of those negotiations. Honorable Judge Gary Tranbarger of the Superior Court of the State of California for the County of Riverside signed the Judgment titled "*San Timoteo Watershed Management Authority, vs. City of Banning, et al.*" (Case No. RIC 389197) on February 4, 2004. Pursuant to the Judgment, the Court appointed a five-member Watermaster committee, consisting of representatives from each of the Appropriator Parties: the City of Banning (Banning), Beaumont, the BCVWD, the SMWC, and the YVWD. The effective date of the Judgment, for accounting purposes, is July 1, 2003.

The Court gave the responsibility of managing the Basin to the Watermaster by approving the Stipulated Agreement but retained continuing jurisdiction should there be any future need to resolve questions among the Parties. The primary responsibilities of the Watermaster include:

- Administering the Beaumont Basin Judgment
- Approving producer activities
- Developing contracts for beneficial programs and services
- Maintaining and improving the water supply
- Maintaining and improving water quality
- Monitoring and understanding the basin
- Providing cooperative leadership

Part VI, Paragraph 5(A) of the Judgment calls for the establishment of Rules and Regulations for the conduct of Watermaster affairs. The Rules and Regulations of the Watermaster were adopted on June 8, 2004. This report is in fulfillment of Section 2.13 of the Rules and Regulations, which calls for the preparation of a basin condition report at least once every two years. This Biennial Engineer's Report summarizes changes in groundwater levels, storage, safe yield, quality, and ground elevation for the five-year period, fiscal 2003/04 through 2007/08.

Section 2 – Climate, Hydrology, and Hydrogeology

2.1 Climate

The Beaumont Basin is located in a semi-arid region with definitive wet and dry periods over the historical record. Precipitation in the region occurs as snow or rainfall in the San Bernardino Mountains and primarily as rainfall in the Basin. Figure 2-1 shows annual precipitation in the City of Beaumont from 1920 to 2008, as measured at the County of Riverside's Beaumont Station 013. The average annual precipitation for this period is 17.8 inches. Figure 2-1 also displays the cumulative departure from the mean (CDFM) precipitation. The CDFM plot is a useful way to characterize the occurrence and magnitude of wet and dry climatic periods: positive sloping segments (trending up to the right) indicate wet periods, and negative sloping segments (trending down to the right) indicate dry periods. Review of the CDFM plot indicates three prolonged dry period that include 1947 to 1977, 1984 to 1990, and 1999 to 2008. The 1947 to 1977 and the 1999 to 2008 dry periods were punctuated with only a few years of above average precipitation. The 1984 through 1990 dry period was seven years long and contained only years of below normal precipitation. Since the inception of the Watermaster, the Beaumont region experienced a short wet period (2003-2005) followed by three years of below average rainfall. Overall, the region is currently within a dry period that began in 1999 with the lowest annual precipitation recorded (6.4 inches) in the 89-year history of Beaumont Station 013. The base period in which the safe yield was determined is the five year period 1997 to 2001. Inspection of the CDFM plot indicates that this was a dry period.

2.2 Surface Water Hydrology

There are three significant drainage systems that overlie the Beaumont Basin: the San Timoteo Creek drainage, which is part of the Upper Santa Ana River watershed; the Potrero Creek drainage, which is part of the San Jacinto watershed; and the Smith Creek drainage, which is part of the White Water River watershed. The San Timoteo Creek drainage is largest of the three and is made up of Little San Gorgonio Creek, Noble Creek, and numerous sub-drainages. In this system, surface water flows originate in the San Bernardino Mountains. The streams and creeks in the Beaumont Basin are dry for most of the year with the exception of periodic discharge associated with rainfall events and urban runoff. There are no stream gages in the Basin or tributary to the Basin that can be used to characterize discharge into the Basin, recharge in the Basin, or discharge from the Basin.

2.3 Hydrogeology

2.3.1 Regional Geologic Context

The Beaumont Basin is located within an elevated alluvial plateau that is bounded by the San Andreas Fault and the San Bernardino Mountains to the north and the San Jacinto Fault and the San Timoteo Badlands to the south (Figure 2-2). The plateau, commonly referred to as the "Yucaipa-Beaumont Plain," generally slopes to the south and west from the San Bernardino

Mountains and the San Gorgonio Pass area. This plateau has been deeply incised by San Timoteo Creek and its tributaries. The plateau is divided into the Yucaipa area in the northwest and the Beaumont area in the southeast by the northwest trending Banning Fault. The following discussion focuses on the Beaumont area and, particularly, the Beaumont Basin.

The water-bearing sediments that serve as the major groundwater reservoirs of the Beaumont Basin consist of two general units of unconsolidated to semi-consolidated gravels, sands, silts, and clays. The older San Timoteo Formation outcrops in the southwest along San Timoteo Creek and in the Singleton and Banning Bench basins that bound the Beaumont Basin to the north. The younger overlying Quaternary Alluvium is relatively un-deformed and forms the ground surface of most of the Beaumont Basin. The non-water-bearing, consolidated bedrock that bounds, underlies, or outcrops within the Beaumont area consists primarily of Pre-Tertiary crystalline igneous and metamorphic rocks (Bloyd, 1971).

2.3.2 Faults and Barriers to Groundwater Flow

The boundaries of the Beaumont Basin are largely defined by structural features. Numerous faults, generally trending northeast and northwest, transect the Beaumont area, forming effective barriers to groundwater flow. Differential movements along these faults have created barriers to groundwater flow by (i) uplifting poorly permeable consolidated bedrock or (ii) deforming alluvial sediments along the fault plane to create a poorly permeable zone. In addition to fault and bedrock barriers, facies changes within the water-bearing sediments can affect groundwater flow. The texture and composition of the water-bearing sediments vary significantly, both vertically and laterally, which can retard groundwater flow along certain paths and encourage groundwater flow along other preferred paths. These faults and local facies changes have sub-divided the saturated sediments underlying the Beaumont area into a number of sub-basins, including the Calimesa, Singleton, Edgar Canyon, Banning Bench, Banning, Beaumont, South Beaumont, and San Timoteo Basins (see Figure 2-2).

The most prominent of the Beaumont Basin's fault boundaries are the Cherry Valley and Banning Faults, which create the Basin's northern boundaries. Differences in groundwater levels across these faults are large. The groundwater levels observed in the Beaumont Basin are typically much lower than the groundwater levels of the aquifers to the north of these faults; for example, 300 to 400-foot water level differences have been observed across the Banning and Cherry Valley Faults.

2.3.3 Groundwater Flow Systems

Of the Beaumont area sub-basins, the Beaumont Basin is the largest, and its relatively good hydraulic properties and great saturated thickness make it the most productive groundwater reservoir. Groundwater flow typically follows the surface drainage patterns from higher elevations in the northern forebay region to lower elevations in the south and southwest. From the Banning Fault, at the mouth of Edgar Canyon, groundwater within the Beaumont Basin flows southward under a relatively minor gradient toward the City of Beaumont where the groundwater flow divides. Groundwater east of this divide flows southeastward, discharging as underflow into the Banning sub-basin. Groundwater west of this divide flows westward, discharging as underflow into the San Timoteo Canyon sub-basin or as rising water at springs and seeps in the tributaries of San Timoteo Creek. Figure 2-2 displays equal elevation contours of groundwater levels for fall 2003, which depicts the general groundwater flow system.

2.3.4 Groundwater Recharge and Discharge

The sources of recharge to the Beaumont Basin include:

- Infiltration of flow within unlined streams
- Underflow from seepage across bounding faults, including the Banning and Cherry Valley Faults, and through modern riverbed deposits in front of mountain creeks, such as the Little San Gorgonio, Noble, Marshall, and Smith Creeks
- Deep percolation of precipitation and returns from use
- Septic tank discharge through the vadose zone in the Cherry Valley area

Groundwater discharges from the Beaumont Basin primarily occur via:

- Groundwater production
- Rising water in San Timoteo Creek
- Subsurface outflow to adjacent groundwater sub-basins (Banning and San Timoteo)
- Evapotranspiration

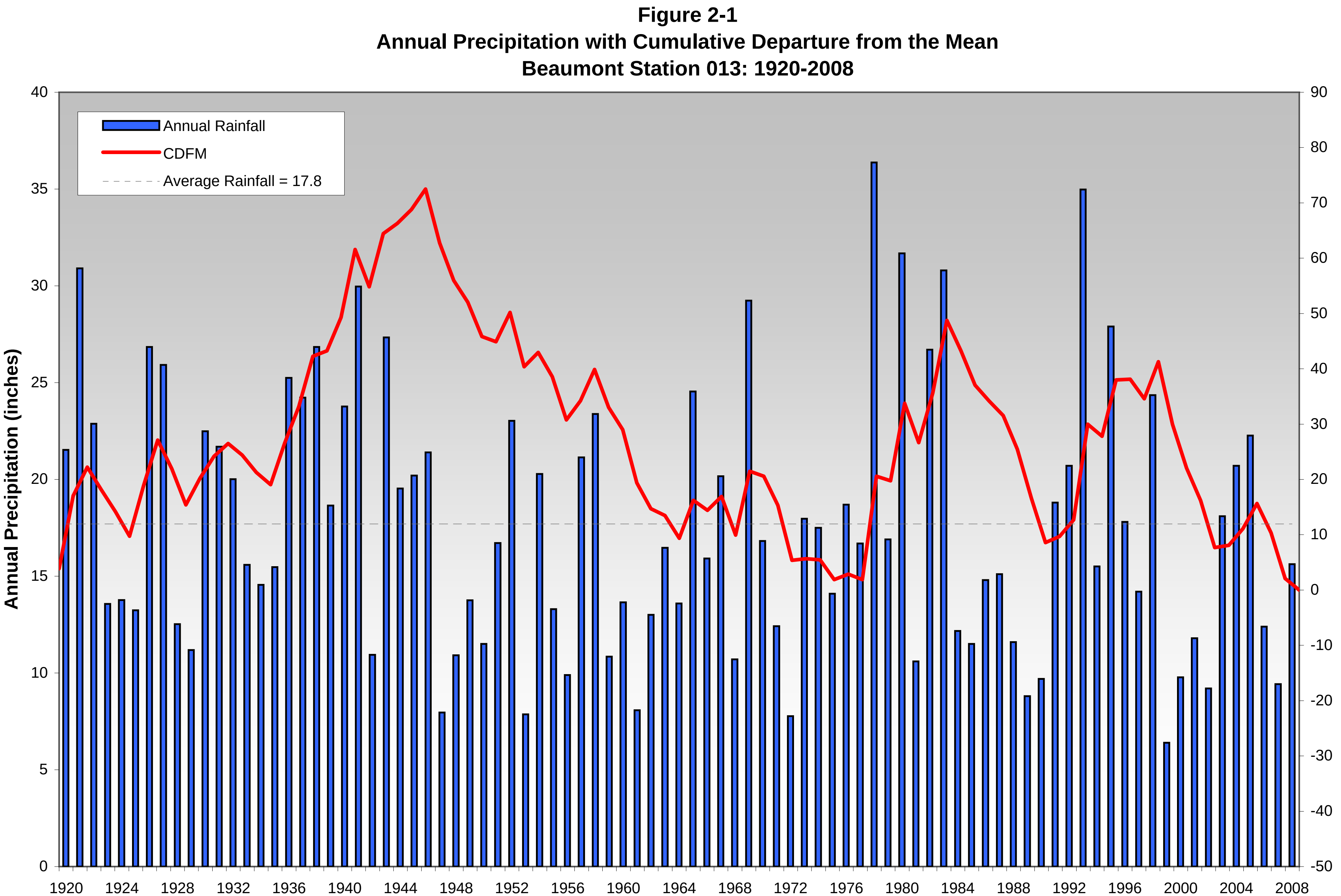
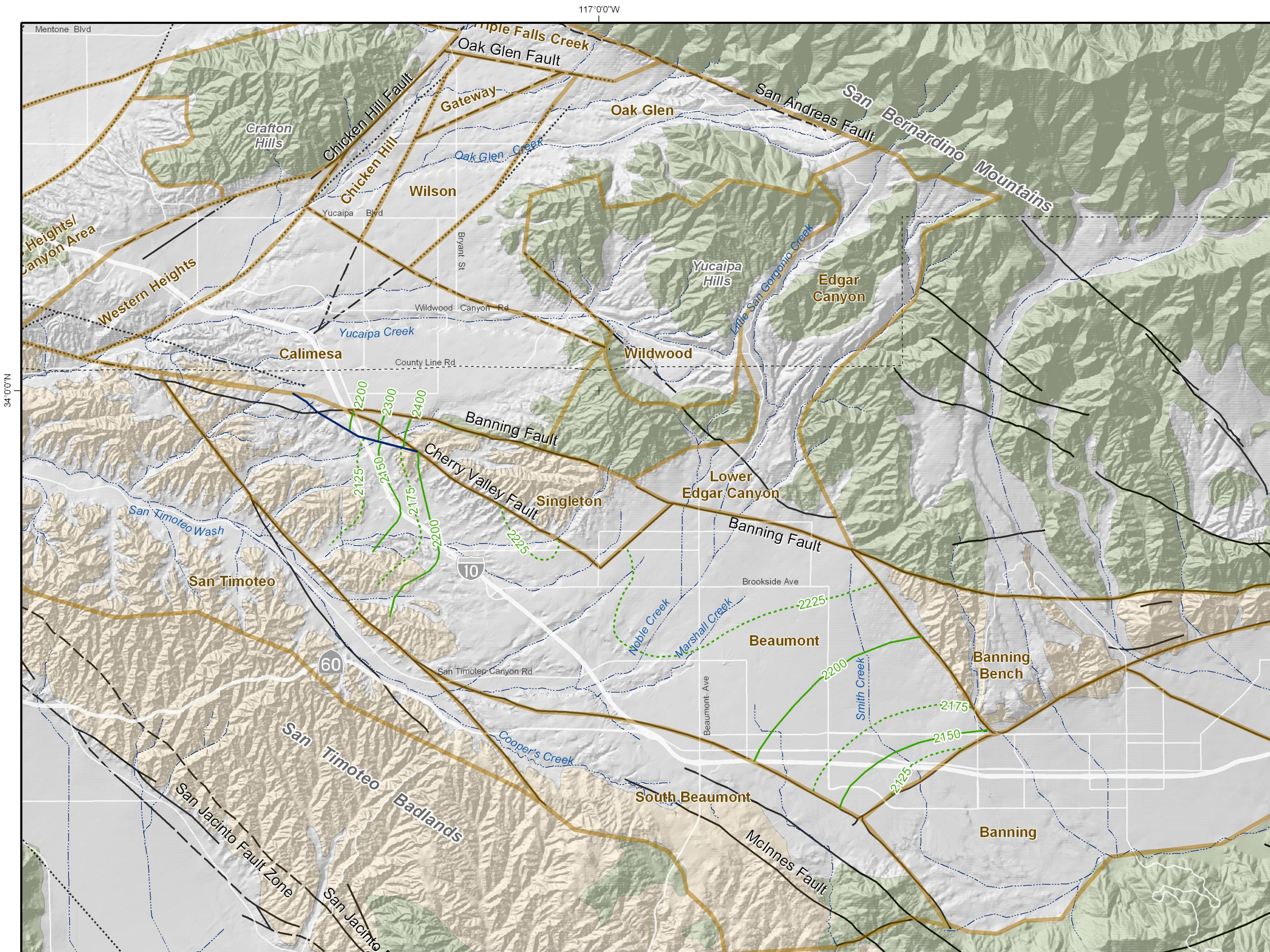


Figure 2-1 -- Precip_CDFM Chart



Geology

Water-Bearing Sediments

Unconsolidated to Semi-consolidated Quaternary Alluvium

Semi-consolidated San Timoteo Formation

Consolidated Bedrock

Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

Faults

Location Certain

Location Uncertain

Location Approximate

Location Concealed

Other Features

Groundwater Basins

Streams, Rivers, and Channels

Fall 2003 Water-Level Elevation Contour (ft-msl)

Inferred Groundwater Flow Barrier (based on significant differences in groundwater elevation at neighboring wells)

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Geology of the Beaumont Basin

Figure 2-2

Section 3 – Monitoring and Data Collection Programs

Part VI, Paragraph 5(G) of the Judgment gives the Watermaster the power to monitor groundwater levels, storage, ground levels, and water quality in the Basin. These data are needed to perform the requisite scientific and engineering analyses to ensure that the Watermaster's responsibilities of maintaining and improving the water supply, maintaining and improving water quality, and monitoring and understanding the basin are fulfilled. In addition to its own monitoring and data collection programs, the Watermaster relies on groundwater level and quality data collected by various agencies in the Basin to update and maintain a comprehensive groundwater database. Each monitoring and data collection program is discussed below.

3.1 Watermaster Programs

3.1.1 Groundwater Production and Recharge

Watermaster is responsible for the accounting of groundwater production by all Appropriator and Overlying Parties named in the Judgment. Producers who pump less than 10 acre-ft per year (acre-ft/yr), known as minimal producers, are exempt from the provisions of the Judgment unless otherwise ordered by the Court (Judgment Part III, Paragraph 4). Accordingly, Watermaster does not collect production information from minimal producers unless they participated in the Judgment. Figure 3-1 shows the locations of all wells that belong to the Appropriator and Overlying Parties of the Judgment.

Appropriator parties include Banning, the BCVWD, Beaumont, the SMWC, and the YVWD. Appropriators report the production volumes and groundwater levels for all of their wells in the Basin to the Watermaster on a monthly basis. Overlying Parties with metered wells report production volumes to the Watermaster on an annual basis. For Overlying Parties that do not meter their wells, an engineering estimate based on the water duty method, is used to estimate production for each fiscal year.

In addition to groundwater production data, the Watermaster collects data on the volume of supplemental water that is recharged to the Basin. Currently, there are two facilities in operation that recharge State Water Project water into the Basin: (1) the BCVWD's Noble Creek facility, located east of Beaumont Avenue between Brookside Avenue and Cherry Valley Boulevard; and (2) the Little San Gorgonio Spreading Ponds, operated by the San Gorgonio Pass Water Agency (SGPWA) and located on the northwest corner of Orchard Street and Avenida Miravilla. The locations of these facilities are shown in Figure 3-1. The SGPWA facility is upgradient and outside of the adjudicated Beaumont Basin. The hydrologic boundary[1] of the Basin in this area is north of the SGPWA facility and hence Watermaster considers supplemental water recharge by the SGPWA in their facility to recharge the Basin.

[1] Confirmed by 2008 geophysical investigation by the STWMA, the results of which are not published.

3.1.2 Groundwater Level Monitoring Program

In fiscal 2006/07, the Watermaster initiated a groundwater level monitoring program to determine the location of subsurface groundwater barriers and to collect consistent, long-term groundwater level information for its own use and for the use of Watermaster Parties. These data are used to create regional groundwater elevation contour maps for the periodic evaluation of groundwater storage and developed yield in the Basin and to supplement localized groundwater system investigations.

The Watermaster's groundwater monitoring program utilizes pressure transducers that measure and record groundwater levels at preset time intervals. To establish the monitoring network, 63 target wells within and just outside of the Basin were selected based on location, well status, and perforation intervals. The target wells were evaluated for transducer monitoring suitability, which included well accessibility, well owner permission, and physical transducer acceptance. 28 wells were deemed suitable for transducer monitoring. Of those, 10 wells were initially selected for transducer installation. Each well's historical water level record was used to determine appropriate transducer pressure ratings and installation depths. The transducers were installed and programmed to measure and record groundwater levels every 15 minutes.

Since the establishment of the monitoring network, wells have been added and/or removed from the program as needed to fulfill the program objectives and to respond to network maintenance logistics. Currently, 13 wells in the Basin are monitored with pressure transducers (Figure 3-2). Transducer data are downloaded quarterly.

3.1.3 Land Subsidence

The Subsidence Monitoring Program began in 2005 with the analysis of historic Basin ground-level data for the 1928 to 2000 period. In the summer and fall of 2006, 72 benchmark monuments were installed across the Basin and, in some places, in adjacent groundwater basins. The initial ground-level survey of the benchmark network was completed on November 30, 2006 to establish the initial elevations of all benchmarks. A subsequent ground-level survey of the benchmark network was completed on March 31, 2007.

Comparative analysis of the initial surveys indicated that little vertical change (i.e. subsidence) in the benchmark elevations has occurred. In addition, the subsidence appears to be evenly distributed across the basin with no obvious areas of differential subsidence that pose a concern for ground fissuring. Accordingly, the ground-level survey of the benchmark network will be executed on a triennial basis following the spring 2009 survey and analysis.

3.2 Cooperative Data Collection Efforts

The Watermaster relies on various agencies in the region to maintain its basin-wide groundwater level and quality database. All municipal supply entities are required to collect groundwater quality samples in order to comply with the California Department of Public Health's (DPH) requirements in the California Code of Regulations, Title 22. The appropriator parties provide this data to the Watermaster upon request. The other primary source of groundwater data for wells in the Basin is the Maximum Benefit Monitoring Program run by the STWMA and the City of Beaumont. All monitoring data and well construction information are stored in a relational database that is accessed through a state of the art interface. This interface is available to Appropriator Parties.

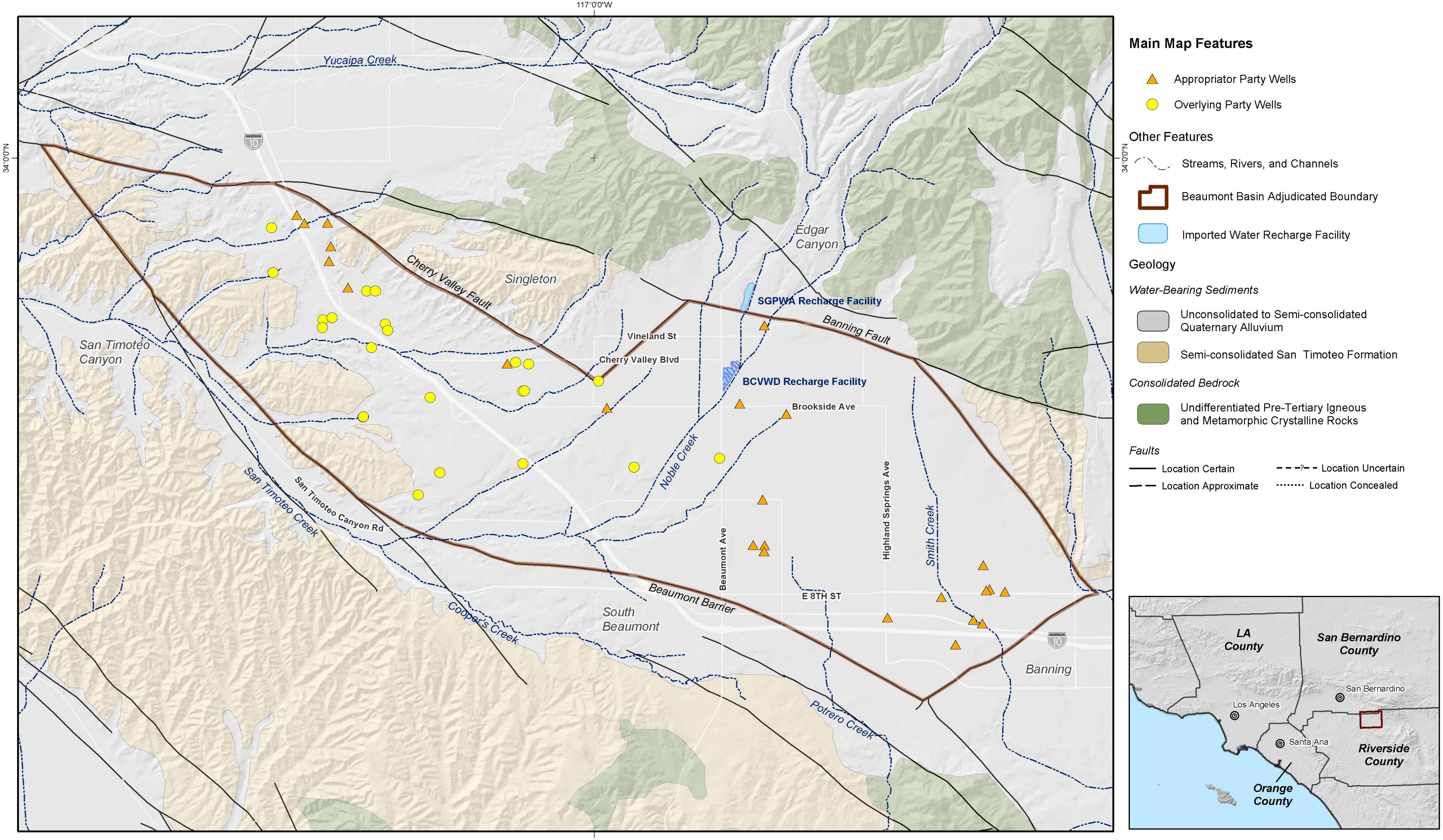
3.2.1 Maximum Benefit Monitoring Program

In January 2004, the Santa Ana Regional Water Quality Control Board (Regional Board) amended the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) to incorporate an updated total dissolved solids (TDS) and nitrogen management plan (Regional Board, 2004). The Basin Plan Amendment (Amendment) included revised groundwater sub-basin boundaries (now called management zones), revised TDS and nitrate-nitrogen groundwater quality objectives, revised TDS and nitrogen wasteload allocations, revised reach designations, and revised TDS and nitrogen objectives and beneficial uses for specific surface waters.

In addition to the updated antidegradation water quality objectives set forth by the Amendment, alternative maximum benefit objectives were specified for certain groundwater management zones, including the Beaumont Management Zone (BMZ) and San Timoteo Management Zone (STMZ). The boundary of the BMZ relative to the Basin is shown in Figure 3-2. The maximum benefit objectives for the BMZ and the STMZ were adopted by the Regional Board based on demonstrations made by the STWMA and Beaumont, which ensured that (i) the beneficial uses of ground and surface waters are being protected and (ii) water quality consistent with maximum benefit to the people of the State of California is being maintained.

In order to gain access to the maximum benefit objectives for TDS and nitrate-nitrogen, the STWMA and Beaumont are required to implement a specific program of projects and other commitments consistent with maximum benefit to the people of the state. One of these commitments includes a comprehensive groundwater monitoring program wherein groundwater level and quality data are collected from wells across the BMZ and STMZ.

In 2006, a well canvas effort was executed to update regional well information and to identify wells that could be used for water level and water quality monitoring. The results of the well canvass were used to create a Key Well Water Level Program and a Key Well Water Quality Program. Each program is made up of two components: 1) a cooperative data collection program wherein data are obtained for wells that are actively monitored by agencies in the region and 2) a field program wherein select private wells that were identified during the well canvass are monitored. Figure 3-2 shows the locations of wells included in the Key Well Programs. The Watermaster works cooperatively with the STWMA and Beaumont to update its groundwater level and quality database with data collected as part of the Maximum Benefit Monitoring Program.



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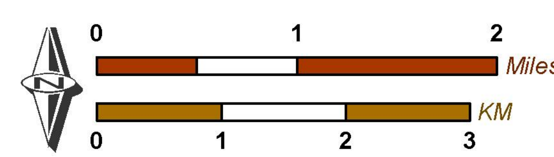

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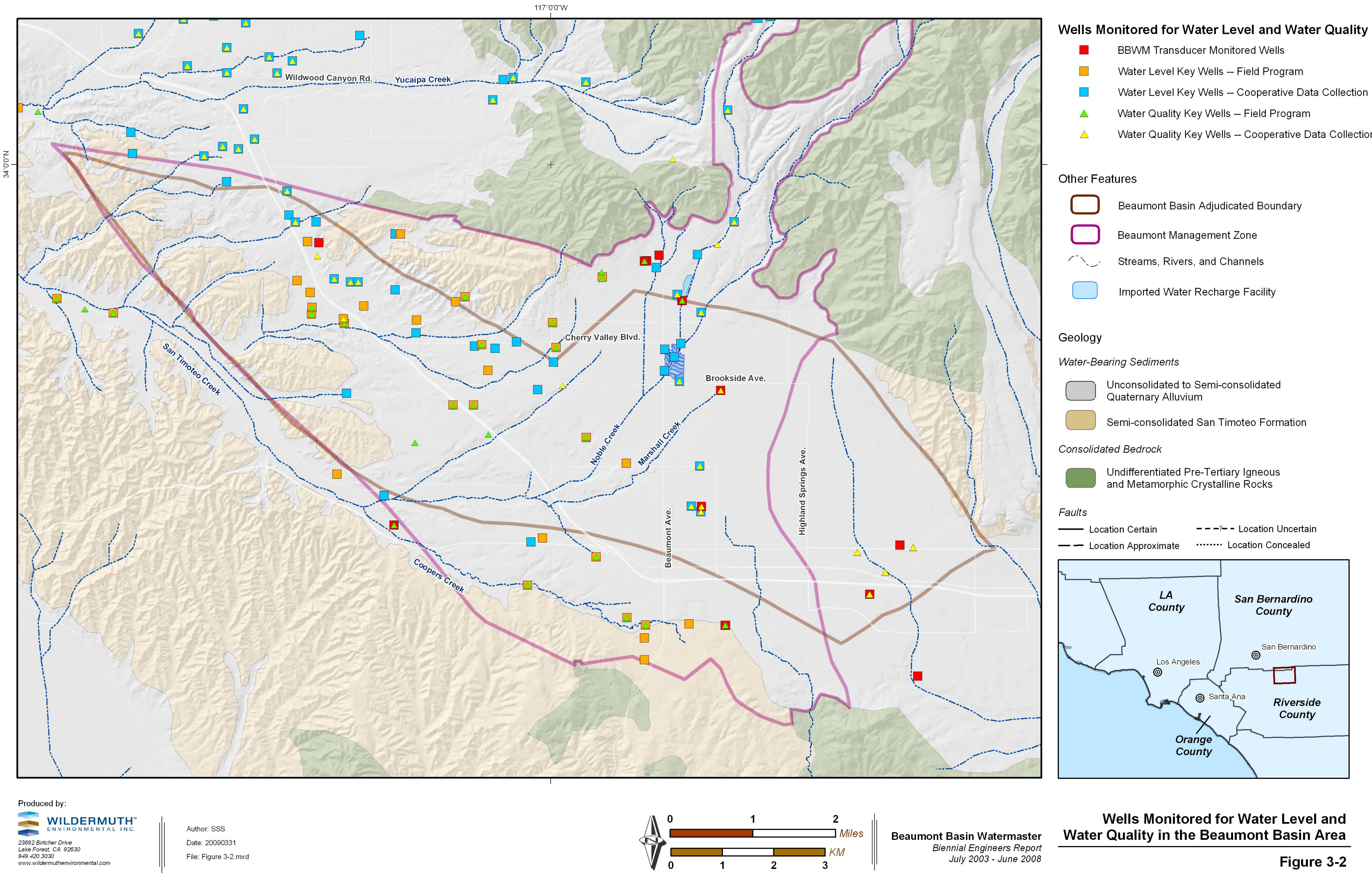
Appropriator and Overlyer Wells in the Beaumont Basin

Figure 3-1



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Wells Monitored for Water Level and Water Quality in the Beaumont Basin Area

Figure 3-2

Section 4 – Groundwater Pumping, Recharge, Elevation, and Storage

4.1 Groundwater Pumping

The safe yield of the Basin, as designated by the Judgment, is 8,650 acre-ft/yr. In addition, a temporary surplus was established, allowing 16,000 acre-ft/yr of additional pumping by the Appropriator Parties for the first ten years of Watermaster operations. The purpose of the temporary surplus is to establish a controlled drawdown of water levels in the basin, thus creating room for the safe storage of supplemental water and reducing outflow from the basin. With the temporary surplus, the annual operating yield of the basin is 24,650 acre-ft/yr through fiscal 2012/13. Thereafter Watermaster will re-determine the safe yield and the Basin will be managed to the updated safe yield.

Table 4-1 shows the annual production summary of each Party to the Judgment since the implementation of the Physical Solution. The largest producers in the Basin—those that pump more than 1,000 acre-ft/yr—are Banning, the BCVWD, the YVWD, and the East Valley Golf Club. Figure 4-1 shows the total annual production time-history. During the five years since the adjudication of the Basin, fiscal 2003/04 through 2007/08, a total of 84,159 acre-ft of water was produced. Of this, 66,863 acre-ft was pumped by Appropriator Parties, and 17,296 acre-ft was pumped by Overlying Parties. The minimum annual production during the five-year period was 14,064 acre-ft in fiscal 2004/05, and the maximum annual production was 19,405 acre-ft in fiscal 2007/08. The average across all five years is 16,832 acre-ft/yr. Annual production volumes have yet to reach the operating yield of the Basin. The groundwater production data for fiscal 2003/04 through 2007/08 is contained in an Access database included with this report as Appendix C.

4.2 Groundwater Recharge

Currently, there are two recharge facilities in operation in the Basin: (1) the Little San Gorgonio Creek Spreading Ponds, operated by the SGPWA and located on the northwest corner of Orchard Street and Avenida Miravilla; and (2) the BCVWD's Noble Creek facility, located east of Beaumont Avenue between Brookside Avenue and Cherry Valley Boulevard (see Figure 3-1). Both facilities are used to recharge imported State Water Project water to the Basin. The SGPWA began recharging SWP water in August 2003 and the BCVWD began recharging SWP water in September 2006. Table 4-2 shows the total annual recharge at each facility. During the study period, a total of 12,977 acre-ft of water was recharged into the Basin: 3,267 acre-ft at the SGPWA facility and 9,710 at the BCVWD facility. The water recharged by the SGPWA belongs to the SGPWA although the SGPWA does not have a storage account pursuant to the Judgment. The water recharged by the BCVWD was credited to the BCVWD storage account in the year that it was recharged. The groundwater recharge data for fiscal 2003/04 through 2007/08 is contained in an Access database included with this report as Appendix C.

4.3 Groundwater Elevation

Groundwater level time histories and elevation contour maps were used to examine changes in groundwater levels and flow patterns since the adjudication of the Basin. The procedure used to create groundwater elevation contour maps is as follows: 1) extract groundwater level time histories for all wells in the Beaumont Basin, 2) select wells with static water levels and choose one representative "static" groundwater level elevation data point per well for the fall period, 3) plot groundwater level elevation data on maps with geologic and hydrologic features, and 4) contour and digitize the groundwater elevation data. The groundwater level time histories and the locations of the wells used to create the 2008 groundwater elevation contours are provided in Appendix A.

Figure 4-2 shows the groundwater elevation contours for fall 2003 and represents the baseline condition of the Basin when Watermaster operations began. Figure 4-3 shows the groundwater elevation contours for fall 2008. The change in elevation between fall 2003 and fall 2008 is shown in Figure 4-4. These figures show that, in general, groundwater elevations have decreased across the basin. The southeast end of the Basin shows the greatest decrease in groundwater elevations with changes as great as 70 feet surrounding BCVWD Wells 1, 2, and 3. One notable area of an increase in groundwater elevations is the small mound created by the recharge of imported water at the BCVWD recharge facility along Noble Creek. The average decline across the Basin is about 20 feet.

The fall 2003 and fall 2008 contours show that groundwater flow patterns remain consistent. In general, groundwater flows from higher elevations in the north to lower elevations in the southeast and west. From the Banning Fault, at the mouth of Edgar Canyon, groundwater flows southward under a relatively minor gradient toward the City of Beaumont where the groundwater flow divides. Groundwater east of this divide flows southeastward and is either pumped by wells in this area or discharges as underflow into the Banning Basin. West of this divide, groundwater flows westward and either is pumped by wells in this area or discharges by evapotranspiration and underflow into the San Timoteo Basin. Pumping increases by the City of Banning in the southeast end of the Basin have begun to interrupt this general flow pattern. Flow patterns in this end of the Basin will continue to change as two new production wells that were recently constructed by the BCVWD go on-line and as Banning continues to increase its pumping.

4.4 Change in Storage

Groundwater storage changes occur in response to Basin operations, such as increased pumping or the recharge of supplemental water. The change in storage can be calculated from changes in groundwater elevations over a known period of time and the specific yield of the aquifer. Specific yield is the quantity of water that a unit volume of an aquifer, after being saturated, will yield by gravity. The specific yield of the Basin was estimated using lithologic data and pump test data from well completion reports. These estimates were refined during the calibration of the BCVWD Beaumont Area Groundwater Flow Model (Wildermuth Environmental, Inc., 2009). During the calibration process, specific yield values were adjusted such that model simulated water level changes over the 1927 to 2005 period closely corresponded to the measured water level data for that period.

The procedure for estimating the change in storage of the Basin involves the following steps:

1. Create groundwater elevation contour maps of Beaumont Basin for fall 2003 and fall 2008,
2. Create a three-dimensional raster surface of the groundwater elevation contour maps,
3. Create a 400x400 meter grid of the Beaumont Basin,
4. Assign attributes to each grid cell (i.e. surface area, fall 2003 water level, fall 2008 water level, and specific yield of sediments), and
5. Export the attribute table of the 400x400 meter grid for the calculation of volumetric storage change.

Note that the far northwest edge of the Basin was not included in the storage change calculations due to the lack of lithologic and water level data needed to estimate specific yield and changes in groundwater elevations. For the fall 2003 to fall 2008 period, the calculated change in storage in the Basin is -19,700 acre-ft.

The planned change in storage for the first five years of operations was -80,000 acre-ft, assuming that each Party to the Judgment would pump their entire water right each year. By adding the total under-production and supplemental additions to storage, an expected change in storage can be estimated. This expected change can then be compared to the calculated change to see if the change in storage calculation is reasonable.

Planned Change in Storage	-80,000
Under Production by Appropriators	+13,000
Under Production by Overliers	+26,000
Recharge by BCVWD	+10,000
Recharge by SGPWA	+3,000
Expected Change in Storage	**-28,000**
Calculated Change in Storage	-20,000
Difference	+8,000

The expected change in storage is about 8,000 acre-ft greater than the calculated storage. This suggests that the safe yield of the Basin, as designated in the Judgment, may be underestimated by approximately 1,600 acre-ft/yr.

4.5 Developed Yield

Safe yield is a water management construct that describes the sustainable supply of a groundwater basin and is defined herein as the amount of water that can be withdrawn from a groundwater basin annually without producing an undesirable result. During the adjudication of the Basin, the safe yield was estimated to be 8,650 acre-ft/yr. Pursuant to Part VI, Paragraph 5(Y) of the Judgment, the safe yield of the Basin will be re-determined at least every 10 years.

The developed yield is the yield developed over a period of time and is calculated using the following equation:

$$Y = \frac{\Sigma P + \Delta S - \Sigma AR}{\Delta t}$$

Where Y is the developed yield, ΣP is the sum of pumping for the period, ΔS is the change in storage for the period, ΣAR is the sum of the artificial recharge for the period, and Δt is the length of the time period. The safe yield of the basin is equal to the developed yield if there are no undesirable results or effects. This equation is evaluated below for the period July 2003 through June 2008.

$$Y = \frac{84{,}159 \ \ acre \cdot ft + (-19{,}732 \ \ acre \cdot ft) - 12{,}977 \ acre \cdot ft}{5 \ \ yrs} = 10{,}290 \ \ acre \cdot ft / yr$$

From 2003 to 2008, the developed yield of the basin was about 10,290 acre-ft/yr. This exceeds the safe yield of the basin by about 1,640 acre-ft/yr. Watermaster currently plans to re-determine the safe yield after June 2013.

Table 4-1
Five-Year Production Summary for all Beaumont Basin Parties -- Fiscal Years 2003/04 through 2007/08
(acre-ft)

	Annual Production					Total Production
	2003/04	2004/05	2005/06	2006/07	2007/08	
Appropriator Parties						
Banning, City of	3,951.2	2,420.3	1,767.8	2,046.1	3,524.4	13,709.9
Beaumont Cherry Valley Water District	6,204.3	6,386.0	7,624.9	10,455.5	11,429.5	42,100.2
South Mesa Water Company	419.8	558.0	632.4	691.4	576.9	2,878.6
Yucaipa Valley Water District	2,005.1	1,284.5	1,529.7	2,308.7	1,046.6	8,174.5
Subtotal	**12,580.4**	**10,648.8**	**11,554.8**	**15,501.7**	**16,577.4**	**66,863.2**
Overlying Parties						
Beckman, Walter M.[1]	22.0	21.3	14.2	9.3	11.1	77.9
California Oak Valley Golf and Resort LLC	1,227.4	635.0	839.0	767.9	778.0	4,247.3
Merlin Properties[2]	1.6	1.6	1.6	1.6	1.6	8.0
Oak Valley Partners, LP	502.7	399.8	475.7	311.2	311.8	2,001.3
Plantation on the Lake LLC	321.4	312.7	326.8	372.2	332.3	1,665.4
Rancho Calimesa Mobile Home Park[2]	68.3	68.3	68.3	69.3	69.3	343.5
Roman Catholic Bishop of San Bernardino[2]	59.2	56.0	56.2	0.7	0.7	172.8
Sharondale Mesa Owners Association	169.1	162.8	185.8	194.8	171.0	883.6
So Calif Section of the Professional Golfer's Association of America	1,401.0	1,369.0	1,385.0	1,764.1	1,142.1	7,061.2
Stearns, Leonard M. and Dorothy D.[2]	1.1	1.1	1.1	1.1	1.1	5.5
Sunny-Cal Egg and Poultry Company[2]	405.0	387.6	2.5	2.7	2.7	800.5
Sunny-Cal North - Manheim, Manheim & Berman[2]	--	--	12.6	2.4	2.3	17.3
Nikodinov, Nick[2]	--	--	0.7	0.8	0.7	2.2
McAmis, Ronald L.[2]	--	--	0.5	0.6	0.6	1.7
Aldama, Nicolas and Amalia[2]	--	--	0.8	0.9	0.8	2.4
Gutierrez, Hector, Luis Gutierrez and Sebastian Monroy[2]	--	--	1.3	1.4	1.4	4.1
Darmont, Boris and Miriam[2]	--	--	0.4	0.4	0.4	1.1
Subtotal	**4,178.9**	**3,415.2**	**3,372.3**	**3,501.3**	**2,827.9**	**17,295.5**
Total	**16,759.3**	**14,064.0**	**14,927.2**	**19,002.9**	**19,405.3**	**84,158.7**

1 -- Production estimated in 03/04, 04/05, and part of 05/06.
2 -- Production estimated in all years.

Table 4-2
Annual Supplemental Recharge to the Beaumont Basin
2003/04 - 2007/08

Year	Artificial Recharge (acre-ft)	
	BCVWD	SGPWA
2003/04	0	557
2004/05	0	517
2005/06	0	1,074
2006/07	6,462	556
2007/08	3,248	562
Totals	**9,710**	**3,267**

Figure 4-1
Time History of Beaumont Basin Production
Fiscal 2003/04 through Fiscal 2007/08

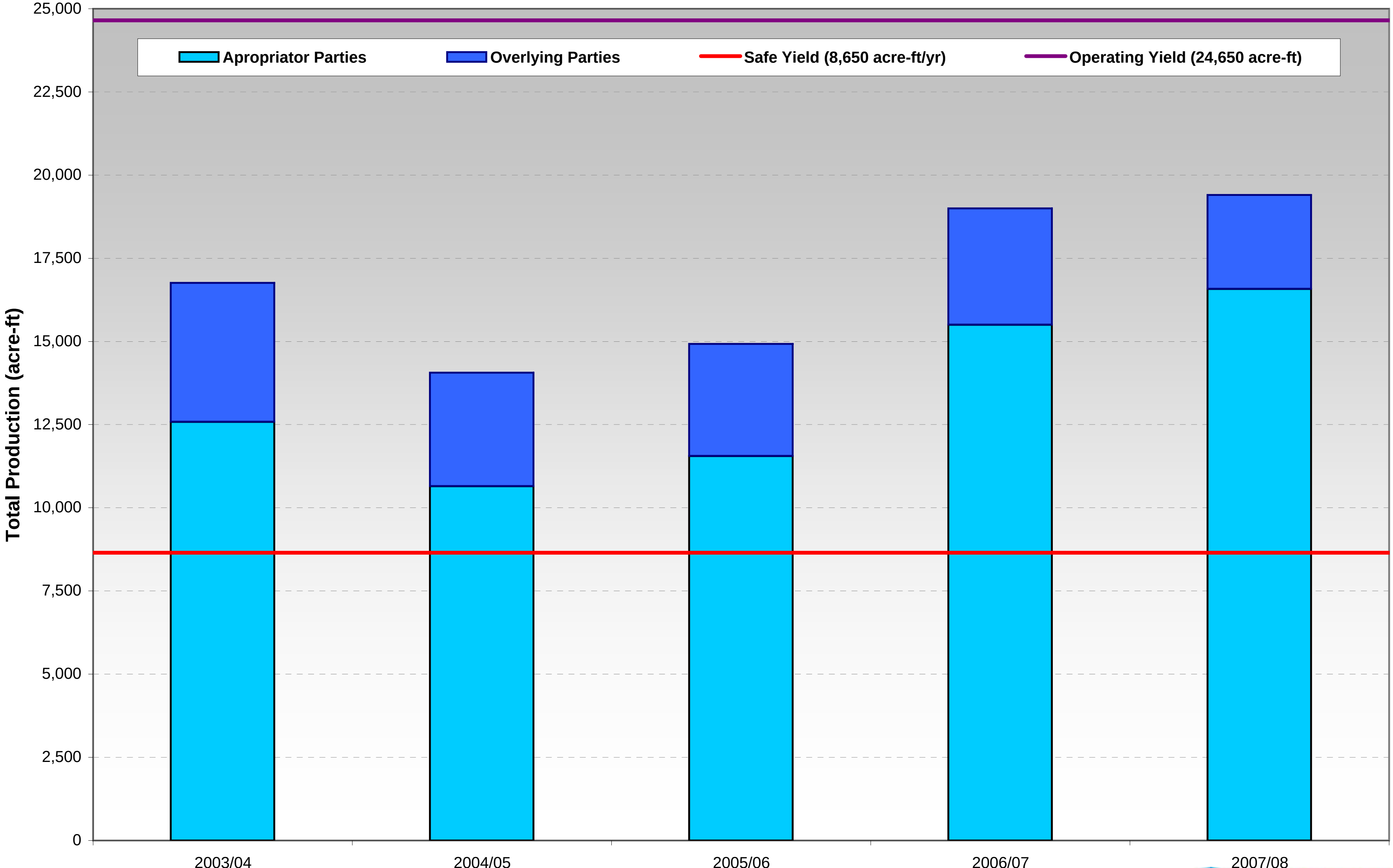
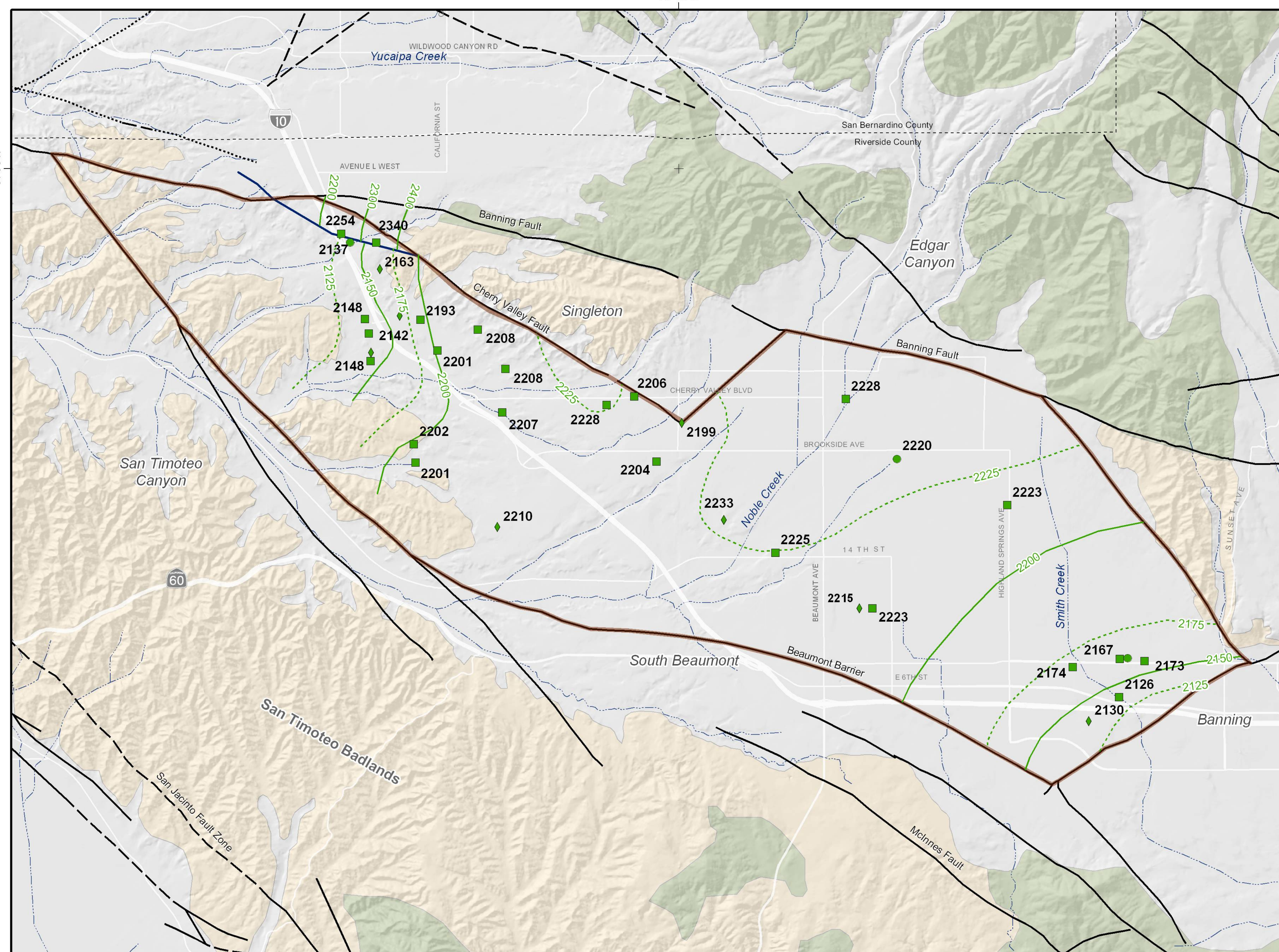


Figure 4-1 -- Production Time History

WILDERMUTH™ ENVIRONMENTAL INC.



Well Activity Qualification Symbol Code

- Static
- Recovering
- Estimated Static
- Dynamic
- Water-Level Elevation Contour (ft-msl)
- 2228 Fall 2003 Water Level Elevation (ft-msl)

Other Features

- Inferred Groundwater Flow Barrier (based on significant differences in groundwater elevation at neighboring wells)
- Beaumont Basin Adjudicated Boundary
- Streams, Rivers, and Channels

Geology

Water-Bearing Sediments

- Unconsolidated to Semi-consolidated Quaternary Alluvium
- Semi-consolidated San Timoteo Formation

Consolidated Bedrock

- Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

Faults

- Location Certain
- Location Uncertain
- Location Approximate
- Location Concealed

Produced by:

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Date: 20090428

File: Figure 4-2.mxd

0 1 2 Miles

0 1 2 KM

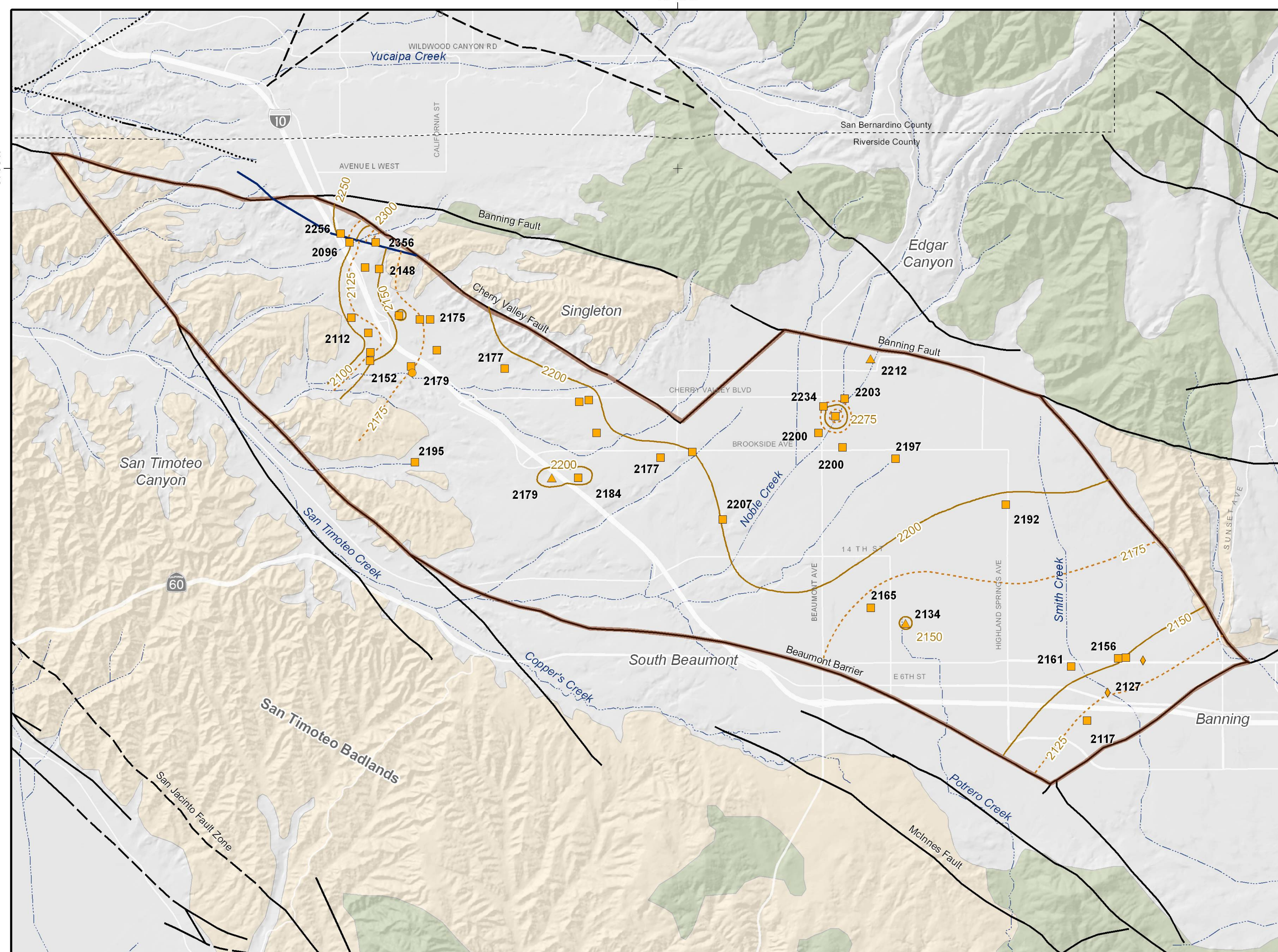
Beaumont Basin Watermaster

Biennial Engineers Report
July 2003 - June 2008

Groundwater Elevation Contours

Fall 2003

Figure 4-2



Well Activity Qualification Symbol Code

- Static
- Recovering
- Estimated Static
- Dynamic
- Water-Level Elevation Contour (ft-msl)
- 2228 Fall 2008 Water Level Elevation (ft-msl)

Other Features

- Inferred Groundwater Flow Barrier (based on significant differences in groundwater elevation at neighboring wells)
- Beaumont Basin Adjudicated Boundary
- Streams, Rivers, and Channels

Geology

Water-Bearing Sediments

- Unconsolidated to Semi-consolidated Quaternary Alluvium
- Semi-consolidated San Timoteo Formation

Consolidated Bedrock

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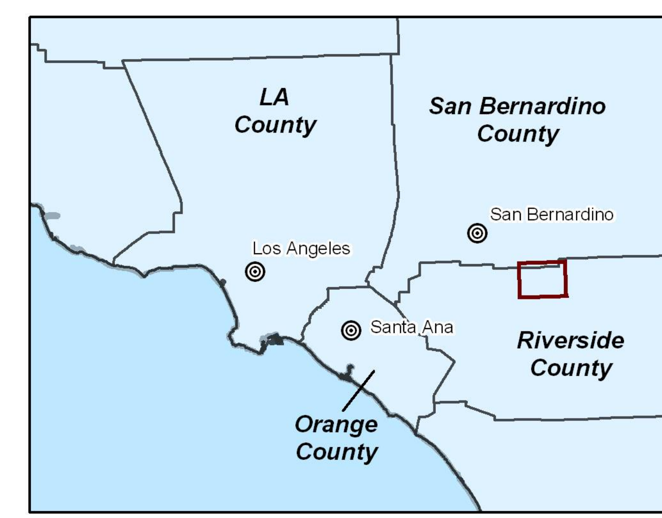
Faults

- Location Certain
- Location Approximate
- Location Uncertain
- Location Concealed



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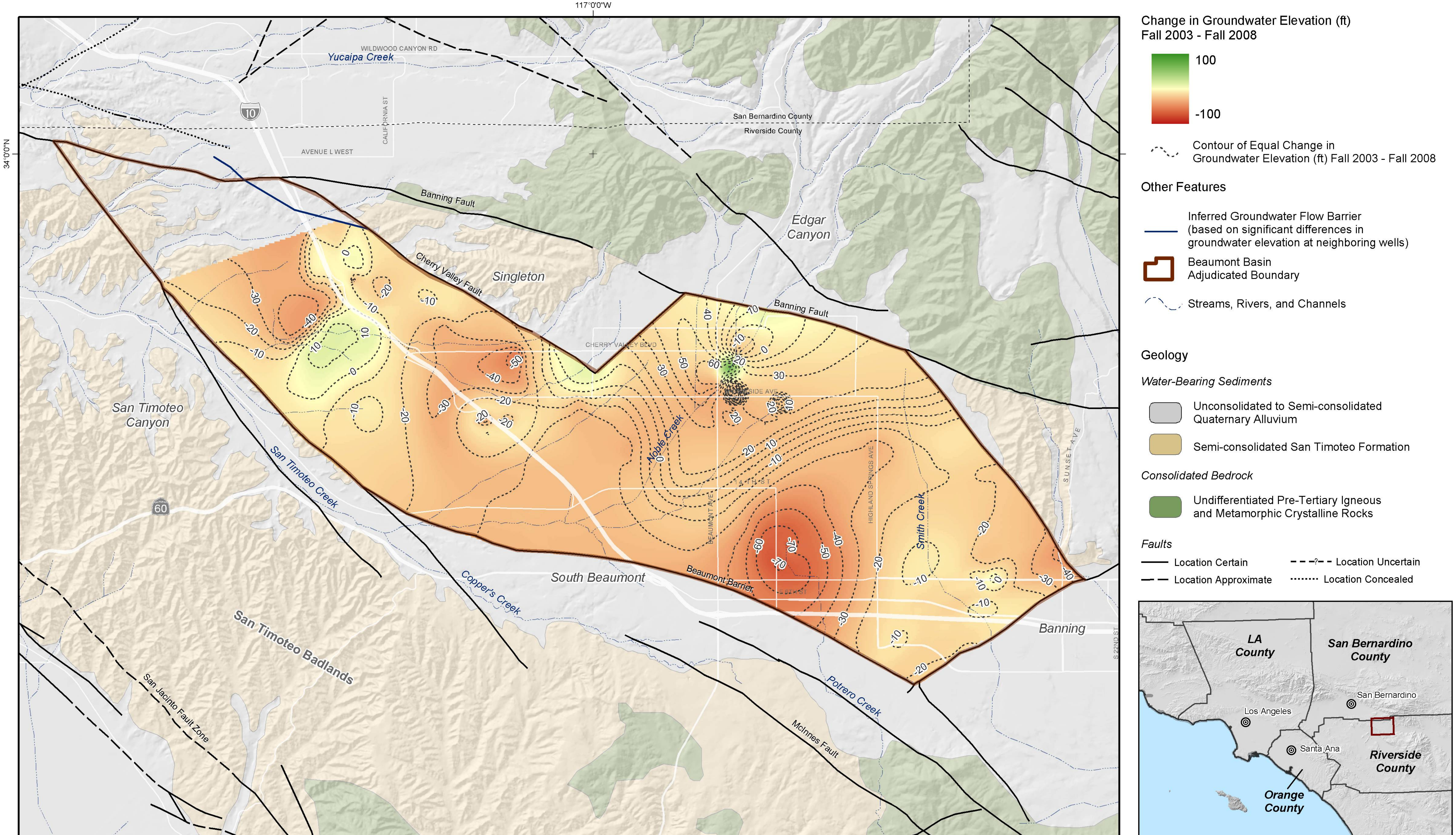
0 1 2 Miles
0 1 2 KM

Beaumont Basin Watermaster
Biennial Engineers Report
July 2003 - June 2008

Groundwater Elevation Contours
Fall 2008

Figure 4-3



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File: Figure 4-4.mxd

0 1 2 Miles
0 1 2 KM

Beaumont Basin Watermaster
Biennial Engineers Report
July 2003 - June 2008

Change in Groundwater Elevation
Fall 2003 - Fall 2008

Figure 4-4

As described in Section 3, the Watermaster collects water quality data for all monitored wells in the Basin. Figure 5-1 shows all of the wells that have groundwater quality data for the 2003-2008 period. Below, the general water character of the Basin is analyzed and the quality of Beaumont Basin water is compared to regulatory standards.

5.1 Water Character Index

Water character index (WCI) is a unit-less parameter that can be used to generally characterize water sources in terms of their ratios of major cations and anions. WCI is analogous to a trilinear or Piper diagram, which is a graphical means of displaying the ratios of the principal ionic constituents in water (Piper, 1944; Watson, & Burnett, 1995). Water character is defined by the following equation:

$$WCI = \left(\left\{ \frac{Ca + Mg}{Na + K} \right\} + \left\{ \frac{CO_3 + HCO_3}{Cl + SO_4} \right\} \right) \cdot 100$$

Where Ca, Mg, *et cetera* are expressed in terms of milliequivalents per liter rather than milligrams per liter (mg/L). The first term on the right hand side of the equation is the ratio of divalent to monovalent cations, and the second term is the ratio of carbonate character to chloride/sulfate character. The utility of the WCI method, compared to a Stiff or Piper/trilinear diagram, is that many data points can be plotted as a time series for a given well or other water source. The points can also be plotted on a map to show areal distributions of water character. Furthermore, the WCI method can be used to provide a semi-quantitative estimate of the mixing of source waters with differing WCIs as long as the WCIs of the source waters are consistent.

Figure 5-2 shows the average water character index of wells in the Basin for the 2003-2008 period. The lower the WCI value, the more the water character reflects a sodium-chloride-sulfate character (red and orange well symbols). Higher WCI values represent water that has more of a calcium-magnesium-bicarbonate character (black and blue well symbols). Native groundwater in the Basin typically has a calcium-magnesium-bicarbonate character, which reflects the influence of surface waters that originate in the San Bernardino Mountains. In general, higher WCI values are seen in wells that are in close proximity to surface water drainages, such as Little San Gorgonio Creek, Noble Creek, and Smith Creek. Several wells are clearly influenced by a water source that has more of a sodium-chloride-sulfate character and, thus, have lower WCI values. These lower WCI values may be due to the influence of on-site waste disposal system (OSWDS) discharges, agricultural practices, and/or return flows from irrigation. That the majority of wells in the Basin have relatively high WCI values suggests that the Basin is predominantly influenced by surface water.

5.2 Comparison with Management Zone Objectives

Two important groundwater quality constituents in the Basin are TDS and nitrate-nitrogen. Groundwater quality objectives have been established by the Regional Board for these constituents in the BMZ, which is overlain by the majority of the Beaumont Basin (see Figure

5-3). The BMZ has both "antidegradation" and "maximum benefit objectives" for these constituents. The antidegradation objectives are based on the historic ambient TDS and nitrate-nitrogen concentrations of 230 mg/L and 1.5 mg/L, respectively. The Regional Board uses the ambient concentration and the antidegradation objectives to write permits for discharges that they regulate pursuant to the Basin Plan. The high quality of BMZ groundwater led to promulgation of restrictive antidegradation objectives that would require mitigation for the implementation of certain groundwater management activities, such as the recharge of imported water and the reuse of recycled water. The maximum benefit based objectives were adopted by the Regional Board in 2004 at the request of the STWMA and Beaumont to allow for such activities. The maximum benefit objectives are set to 330 mg/L and 5.0 mg/L for TDS and nitrate-nitrogen, respectively (see Section 3.2.1). These objectives are still very low and are protective of the beneficial uses of the Basin groundwater. Once the ambient concentration of TDS and/or nitrate-nitrogen exceeds the BMZ maximum benefit objective(s), the STWMA and Beaumont will be required to implement salt mitigation plans to. For the 1987-2006 period, the ambient TDS and nitrate-nitrogen concentrations in the BMZ were 260 mg/L and 1.6 mg/L, respectively.

5.2.1 Total Dissolved Solids

Figure 5-3 shows the maximum TDS concentrations measured at Basin wells during the 2003-2008 period. The TDS concentrations are symbolized in intervals that correspond to regulatory objectives for groundwater quality in the BMZ. During this period, TDS concentrations ranged from 160 to 400 mg/L. Of the 34 wells sampled, 13 wells had a maximum concentration below the antidegradation objective, 17 wells had a maximum concentration between the antidegradation and maximum benefit objectives, and 4 wells had a maximum concentration in excess of the BMZ maximum benefit objective. None of the samples exceeded the secondary federal or state drinking water standard for TDS (500 mg/L).

Figure 5-4 is a time history of TDS concentrations at several wells across the Basin that have data dating back to the late 1960s. The locations of wells included in the time histories shown in Figure 5-4 are labeled in Figure 5-3. TDS concentrations have remained relatively stable with concentrations at individual wells increasing only slightly during this 40-year period.

5.2.2 Nitrate-Nitrogen

Figure 5-5 shows the maximum nitrate-nitrogen concentrations measured at Basin wells during the 2003-2008 period. The nitrate-nitrogen concentrations are symbolized in intervals that correspond to regulatory objectives for groundwater quality in the BMZ. During this period, nitrate-nitrogen concentrations ranged from 0.25 to 9.7 mg/L. Of the 32 wells sampled, 6 wells had a maximum concentration below the antidegradation objective, 19 wells had a maximum concentration between the antidegradation and maximum benefit objective, and 7 wells had a maximum concentration in excess of the BMZ maximum benefit objective. None of the samples exceeded the primary federal or state drinking water standards for nitrate-nitrogen (10 mg/L). BCVWD Well 16, located just south of the Banning Fault in the northeast end of the Basin, had the highest measured concentration of nitrate-nitrogen. Nitrate-nitrogen concentrations have exceeded 9.0 mg/L at this well seven times since 2005 (see Figure 5-6) which is indicative of high nitrate sources nearby and upgradient to this well.

Figure 5-6 is a time history of nitrate-nitrogen concentrations at several wells across the Basin that have data dating back to the late 1960s. The locations of wells included in the time histories shown in Figure 5-6 are labeled in Figure 5-5. Unlike the TDS concentrations, there has been a sharp rise in nitrate-nitrogen concentrations at several wells in recent years, including BCVWD Well 16, BCVWD Well 21, and YVWD Well 35. The increase in nitrate-nitrogen concentrations in the northeast region of the basin prompted the STWMA to launch an investigation in 2006 (Wildermuth Environmental, Inc., 2007d). This study is discussed in detail below.

5.2.2.1 Water Quality Impacts from On-Site Waste Disposal Systems in the Cherry Valley Community of Interest

In the Pass area the primary source of drinking water is groundwater, which is supplied by the City of Banning, the BCVWD, the SMWC and the YVWD. In 2005, rising nitrate levels were observed in a couple of groundwater production wells owned by the BCVWD as well as several other wells in the Cherry Valley Community of Interest (CVCOI). Two water companies in the CVCOI, the Bonita Vista Mutual Water Company and the Cherry Valley Water Company, requested to be annexed into the BCVWD's service area due to high nitrate concentrations in their wells.

On-site waste disposal systems (OSWDS) were identified as a possible source of nitrates in BMZ groundwater due to the density of households in the CVCOI and their up-gradient and adjacent proximity to water supply wells that have been impaired by nitrates. There is no sewer service in the CVCOI; thus, residents rely exclusively upon OSWDS—the overwhelming majority of which are conventional septic tank systems—for the treatment and disposal of wastewater.

STWMA Project Committee No. 1 retained Wildermuth Environmental, Inc. (WEI) in 2006 to conduct a study to assess current and future threats to groundwater quality in the BMZ from OSWDS in the CVCOI. The components of the study included a thorough review of scientific literature, a field study to estimate nitrogen concentrations in soil water below selected OSWDS, a nitrogen isotope and pharmaceutical and personal care products (PPCP) tracer study to confirm the presence of effluent from OSWDS in groundwater, an analysis of the locations and numbers of current and future OSWDS, an estimation of current and future discharge from OSWDS to groundwater, a planning-level evaluation of basin-wide nitrogen impacts in the BMZ using the groundwater flow and nitrate transport model for the Beaumont Basin region, and a review of the thresholds used in California to compel sewering when OSWDS contaminate or threaten to contaminate groundwater (WEI, 2007d).

The results of the investigation are summarized below.

- OSWDS are the most frequently reported cause of nitrate contamination in groundwater, and their density is the most important factor influencing groundwater contamination. Parcel data from the County of Riverside indicates that about 800 of the 1,900 developed lots with OSWDS in the CVCOI are on less than half-acre parcels, which violates the minimum half-acre parcel size requirement of the Regional Board (see Figure 5-7).

- The water produced from the high nitrate wells in this area has a nitrogen isotopic signature that is consistent with discharge from OSWDS (see Figure 5-8).
- The water produced from some of the high nitrate wells in this area contain PPCPs, which can only be explained by discharge from OSWDS (see Figure 5-8).
- The simultaneous occurrence of high nitrate concentrations, PPCPs, elevated levels of specific ions, and nitrogen isotopes associated with OSWDS discharge can only be explained by discharge from OSWDS.
- The average nitrate-nitrogen concentration in OSWDS discharge in the CVCOI was estimated to range from 22 to 33 mg/L. Presently, OSWDS discharge approximately 665 acre-ft/yr, which accounts for about five percent of total recharge to the BMZ.
- At build out, there will be about 4,900 to 8,800 OSWDS, depending on how the CVCOI is developed. This corresponds to between 1,700 and 3,100 acre-ft/yr of OSWDS discharge to groundwater, respectively, and represents 13 to 21 percent of total recharge to the BMZ.
- BCVWD Well 16 will require well-head treatment when the nitrate concentrations reach about 8 mg/L. The groundwater flow and nitrate transport model for the Beaumont Basin region shows that by 2030, the nitrate-nitrogen concentration at BCVWD Well 16 will exceed 20 mg/L if the CVCOI builds out to 8,800 lots (Figure 5-9).
- If the CVCOI builds out to 4,900 lots, OSWDS will significantly impact the local area, and well head treatment will be required in order to serve drinking water from the local production wells. If the CVCOI builds out to 8,800 lots, OSWDS will contribute enough nitrate to groundwater that in the fullness of time, the entire BMZ will be rendered non-potable.
- Left unmitigated, the magnitude of OSWDS discharge is sufficient to cause nitrate concentrations to exceed Basin Plan objectives in the BMZ.
- Based on a review of the law and case histories of prohibitions on OSWDS in California, there is sufficient evidence of groundwater contamination by OSWDS to warrant the Regional Board to issue a prohibition on new OSWDS in the CVCOI.

The results of the investigation clearly indicate that OSWDS are the source of nitrate contamination in the part of the BMZ overlain by the CVCOI. As a result of the study's findings, the County of Riverside issued a moratorium, followed by a permanent prohibition (Ordinance 871), on the installation of septic systems in Cherry Valley unless a system is designed to remove at least 50% of the wastewater nitrogen (County of Riverside, 2007). In July of 2009, the County enacted a new ordinance that has the effect of removing the prohibition on conventional OSWDS. The Regional Board initiated a process in August 2009 that may lead to a Basin Plan amendment prohibiting conventional OSWDS and may regulate such discharges to the antidegradation objectives.

5.3 Comparison with Federal and State Drinking Water Standards

There are numerous federal and state drinking water quality standards that apply to municipal potable water supplies. Federal standards are set by the U.S. Environmental Protection Agency (EPA) and state standards are set by the California DPH. Primary maximum contaminant levels (MCLs) at the federal and state level are enforceable criteria that have been set for the protection of public health. Secondary standards, or secondary MCLs, are related to the aesthetic qualities of water, such as taste, color, and odor. If the DPH has adopted a more stringent primary or secondary MCL than the EPA, the California MCL is applied. In addition, there are some chemicals for which the DPH has designated a "notification level" (NL) because the chemical may pose potential health concerns. NLs are not enforceable standards: they simply require municipal water suppliers to notify the public if the NL for a chemical has been exceeded.

Table 5-1 lists all wells in the Basin that have a measured exceedance of a state or federal water quality standard for the 2003-2008 period. The locations of these wells are shown in Figure 5-10. In general, the quality of the Basin groundwater is very good. Of the 32 wells sampled between 2003 and 2008, ten wells had water quality standard exceedances, only four of which were in exceedance of a primary, health-based standard. There are no exceedances for volatile organic compounds, synthetic organic contaminants, or radionuclides. A description of each chemical that exceeded a drinking water standard is provided below. Appendix B contains summary statistics of the analytical results for the 2003-2008 period for all chemicals that have a federal or state drinking water standard whether an exceedance occurred or not.

5.3.1 Trace Metals

The concentration of trace metals depends on mineral solubility, ion exchange reactions, surface complexations, and soluble ligands. These speciation and mineralization reactions, in turn, depend on pH, oxidation-reduction potential, and temperature. Trace metal exceedances of drinking water standards are often an artifact of sampling methodology: relatively high concentrations of trace metals are often the result of the dissolution of aluminosilicate particulate matter and colloids, which is caused by the acid preservative in unfiltered samples. In the Basin, the following trace metals were found in exceedance of a water quality standard:

Aluminum. The aluminum concentration exceeded the secondary state MCL at one well. Above the secondary MCL, aluminum can add color to water.

Arsenic. The US EPA implemented a new primary MCL for arsenic in 2006, changing it from 50 micrograms per liter (μg/L) to 10 μg/L. In November 2008, the primary CA MCL was also changed from 50 μg/L to 10 μg/L. One well exceeded the new primary MCL for arsenic. Arsenic can enter the drinking water supply from natural deposits in the earth or from agricultural and industrial practices.

Iron. Five wells exceeded the federal and state secondary MCLs for iron. At a concentration above the secondary MCL, iron can affect the color, odor, and taste of water. Iron can turn water a rusty color and produces a metallic taste. It can also cause reddish and orange staining of household fixtures, scaling, and sedimentation.

Lead. One well exceeded the federal and state primary MCLs for lead. At a concentration above the MCL, lead can cause a variety of adverse health effects. Lead is rarely found in source water, but commonly enters tap water through the corrosion of plumbing materials.

Manganese. One monitoring well exceeded the federal and state secondary MCLs for manganese. At a concentration above the secondary MCL, manganese can effect the color, odor, and taste of water. Manganese can turn water a black to brown color and produce a bitter metallic taste. It can also cause a blackish staining of household fixtures.

Total Chromium. _One well exceeded the state primary MCL for total chromium. The erosion of natural deposits can contribute chromium to groundwater.

Vanadium. Two wells exceeded the state NL for vanadium. The occurrence of vanadium in groundwater can result from mining and industrial activities or can be of natural occurrence. While elemental vanadium does not occur in nature, vanadium compounds are found in fossil fuels and exist in over 60 different mineral ores. Vanadium's primary industrial use is for strengthening steel.

5.3.2 pH

There are two secondary standards for pH, a lower limit of 6.5 and an upper limit of 8.5. Four wells in the Basin exceeded the upper limit for pH. Water with a pH above 8.5 can result in a soda taste, a slippery feel, and the formation of deposits.

5.3.3 Turbidity

One well exceeded the primary CA MCL and primary EPA MCL for turbidity. Turbidity is a measure of the cloudiness of water, and is used to indicate water quality and filtration effectiveness. Higher turbidity levels can be an indication of microorganisms, such as viruses, parasites, and some bacteria.

Table 5-1
Water Quality Exceedance Report
Sampling Period: 1/1/2003 to 12/31/2008

Owner Org	Well Name	Analyte	Date	Result	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
So. Calif. Professional Golf Association									
	A								
		Aluminum (mg/L)	**Date**	**Result**				0.2	
			1/5/2006	0.32					
		Chromium (ug/L)	**Date**	**Result**			50		
			1/16/2003	86					
		Iron (mg/L)	**Date**	**Result**		0.3		0.3	
			1/5/2006	0.93					
			12/3/2007	1.3					
		pH (pH)	**Date**	**Result**		8.5			
			1/16/2003	8.8					
			12/3/2007	8.9					
		Turbidity (NTU)	**Date**	**Result**	5			5	
			1/5/2006	8.5					
Oak Valley Partners									
	SINGLETON RANCH 5								
		Arsenic (mg/L)	**Date**	**Result**	0.01				
			9/21/2006	0.024					
		Vanadium (mg/L)	**Date**	**Result**					0.05
			9/21/2006	0.35					
	Singleton Ranch 7								
		Iron (mg/L)	**Date**	**Result**		0.3		0.3	
			9/21/2006	1.3					

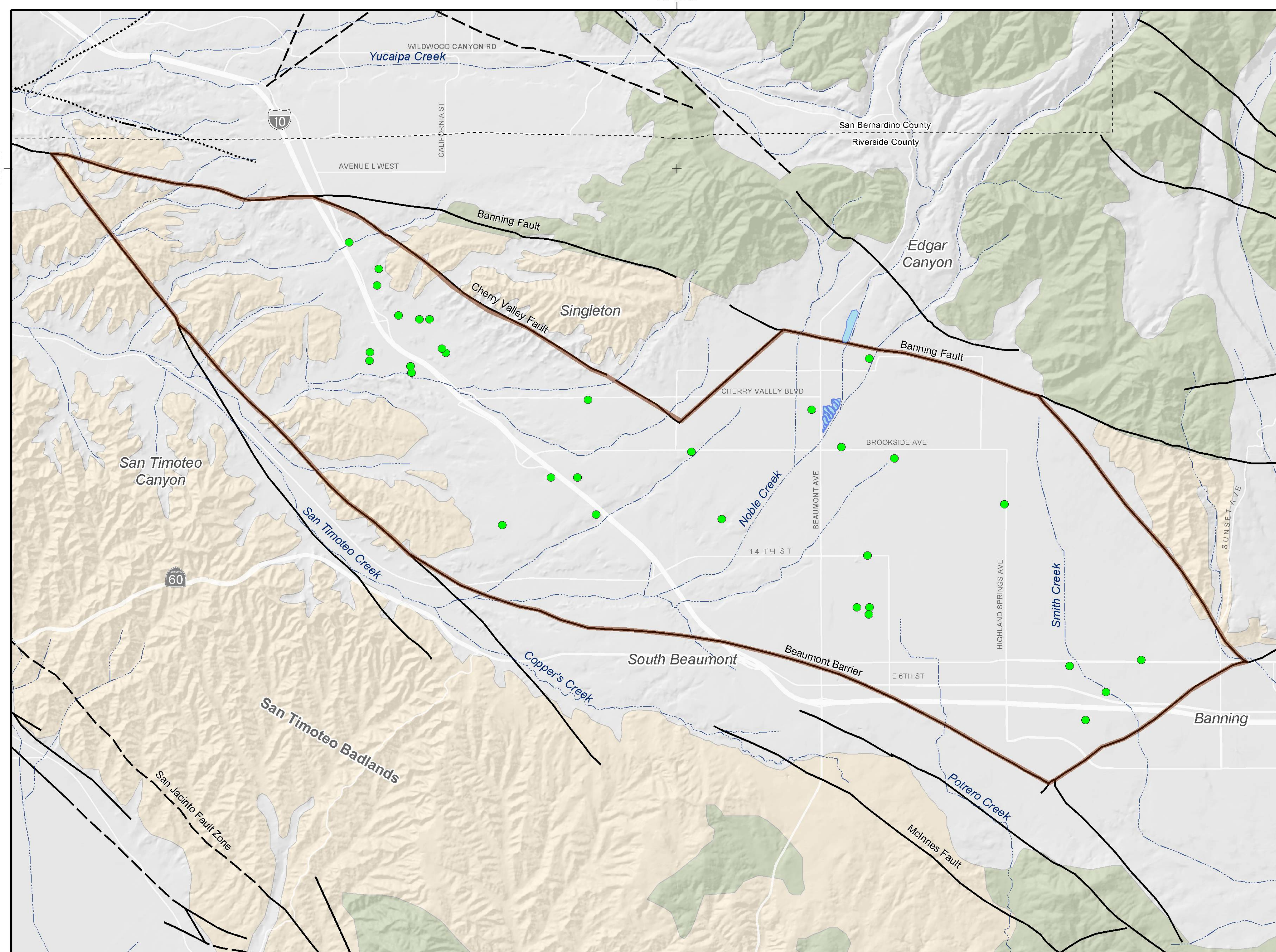
Table 5-1
Water Quality Exceedance Report
Sampling Period: 1/1/2003 to 12/31/2008

Owner Org	Well Name	Analyte	Date	Result	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Beaumont Cherry Valley Water District									
	BCVWD 24	**Iron (mg/L)**	**Date**	**Result**		0.3		0.3	
			9/23/2005	0.99					
	BCVWD 16	**Iron (mg/L)**	**Date**	**Result**		0.3		0.3	
			3/30/2007	2.6					
Sunny-cal Egg & Poultry Company									
	1	**Iron (mg/L)**	**Date**	**Result**		0.3		0.3	
			9/22/2006	1.1					
City of Banning									
	BAN M3	**Lead (mg/L)**	**Date**	**Result**	0.015		0.015		
			1/12/2006	0.026					
United States, Geological Survey									
	335714116565003	**Manganese (mg/L)**	**Date**	**Result**		0.05		0.05	
			6/11/2003	0.058					
		pH (pH)	**Date**	**Result**		8.5			
			2/12/2007	8.6					

Table 5-1
Water Quality Exceedance Report
Sampling Period: 1/1/2003 to 12/31/2008

Owner Org	Well Name	Analyte	Date	Result	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
United States, Geological Survey									
	335714116565002								
		pH (pH)	**Date**	**Result**		8.5			
			2/12/2007	8.6					
South Mesa Water Company									
	SMWC 04								
		pH (pH)	**Date**	**Result**		8.5			
			9/10/2003	9					
			3/31/2004	8.6					
			3/6/2007	8.8					
		Vanadium (mg/L)	**Date**	**Result**					0.05
			9/10/2003	0.107					
			3/31/2004	0.068					
			3/6/2007	0.11					

Primary EPA MCL	Primary EPA MCLs are federally enforceable limits for chemicals in drinking water and are set as close as feasible to the corresponding EPA MCLG.
Secondary EPA MCL	Secondary EPA MCLs apply to chemicals in drinking water that adversely affect its odor, taste, or appearance. Secondarey EPA MCLs are not based on direct health effects associated with the chemical. Secondary MCLs are considered desirable goals and are not federally enforceable.
Primary CA MCL	Primary CA MCLs are analogous to Primary EPA MCLs and are enfoceable at the state level. if the California DPH has adopted a more stringent primary CML than the EPA MCL, the primary CA MCL would be enforceable.
Secondary CA MCL	Secondary CA MCLs are analogous to Secondary EPA MCLs and are applicable at the state level. If the California DPH has adopted a more strngent secondary MCL than the EPA MCL, the secondary CA MCL would be applied.
CA NL	California Notification Levels are health-based criteria similar to US EPA Health Advisories. CA NLs are not enforceable, but are levels at which the California DPH strongly urges water purveyors to take corrective actions.



Main Map Features

Wells with Water Quality Data

Other Features

Streams, Rivers, and Channels

Beaumont Basin Adjudicated Boundary

Imported Water Recharge Facility

Geology

Water-Bearing Sediments

Unconsolidated to Semi-consolidated Quaternary Alluvium

Semi-consolidated San Timoteo Formation

Consolidated Bedrock

Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

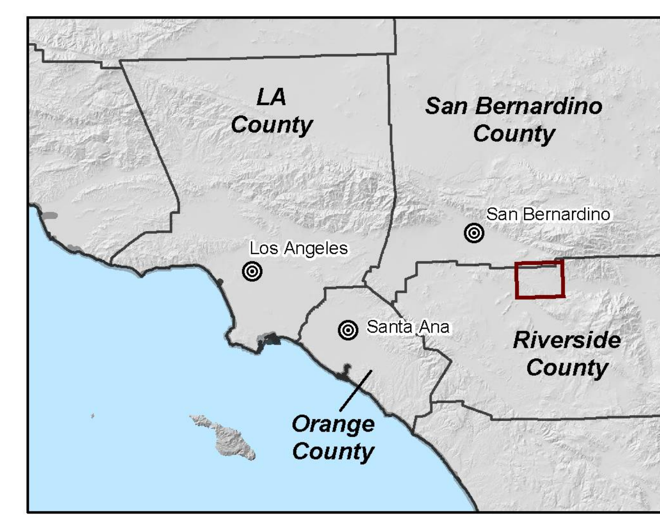
Faults

Location Certain

Location Approximate

Location Uncertain

Location Concealed



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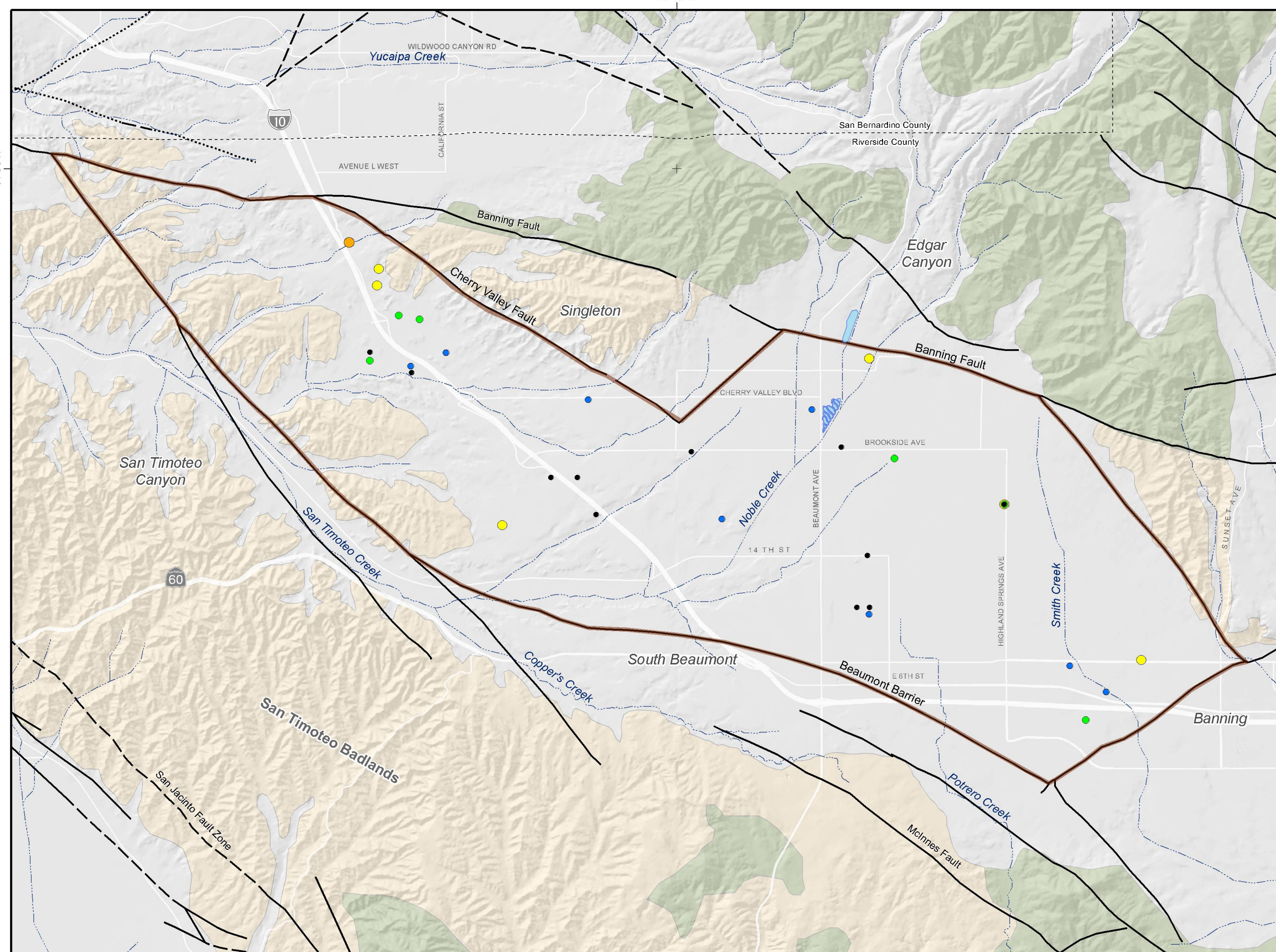
0 1 2 Miles

0 1 2 3 KM

Beaumont Basin Watermaster
Biennial Engineers Report
July 2003 - June 2008

Wells with Water Quality Data
2003-2008

Figure 5-1



Water Character Index

- < 200
- 200 - 400
- 400 - 600
- 600 - 800
- 800 - 1000
- > 1000

Other Features

- Streams, Rivers, and Channels
- Beaumont Basin Adjudicated Boundary
- Imported Water Recharge Facility

Geology

Water-Bearing Sediments

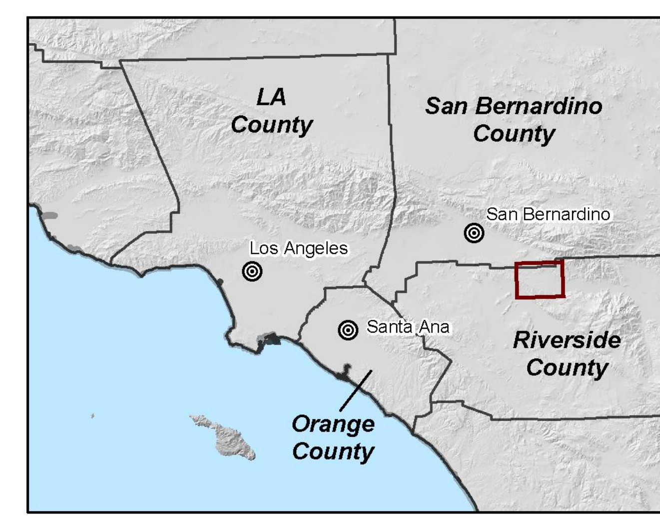
- Unconsolidated to Semi-consolidated Quaternary Alluvium
- Semi-consolidated San Timoteo Formation

Consolidated Bedrock

- Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

Faults

- Location Certain
- Location Approximate
- Location Uncertain
- Location Concealed



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0 1 2 Miles
0 1 2 3 KM

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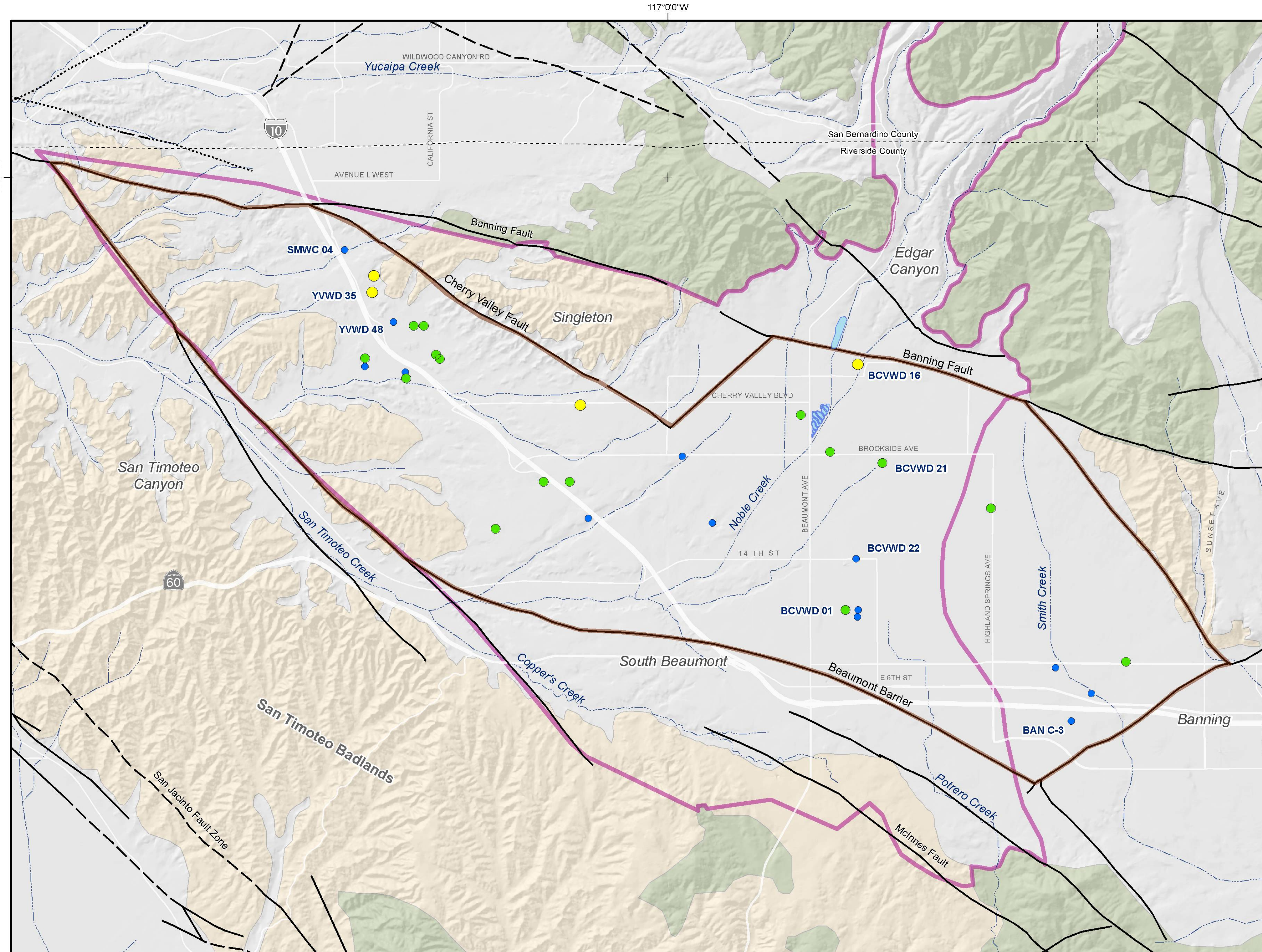
Water Character Index of Groundwater
Average Value 2003 to 2008

Figure 5-2



Total Dissolved Solids Concentration (mg/L)

- < 230
- 230 - 330
- 330 - 500
- > 500

Antidegradation Objective = 230 mg/L

Maximum Benefit Objective = 330 mg/L

Secondary EPA & CA MCL = 500 mg/L

Other Features

- Beaumont Basin Adjudicated Boundary
- Beaumont Management Zone (RWQCB Boundary)
- Streams, Rivers, and Channels
- Imported Water Recharge Facility

Geology

Water-Bearing Sediments

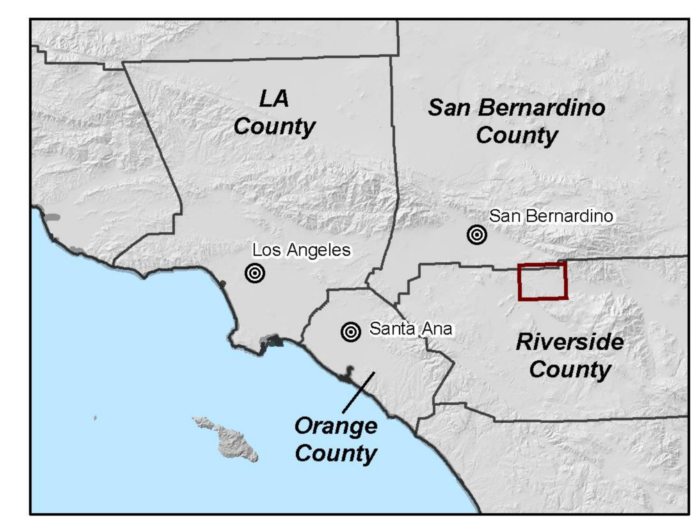
- Unconsolidated to Semi-consolidated Quaternary Alluvium
- Semi-consolidated San Timoteo Formation

Consolidated Bedrock

- Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

Faults

- Location Certain
- Location Approximate
- Location Uncertain
- Location Concealed



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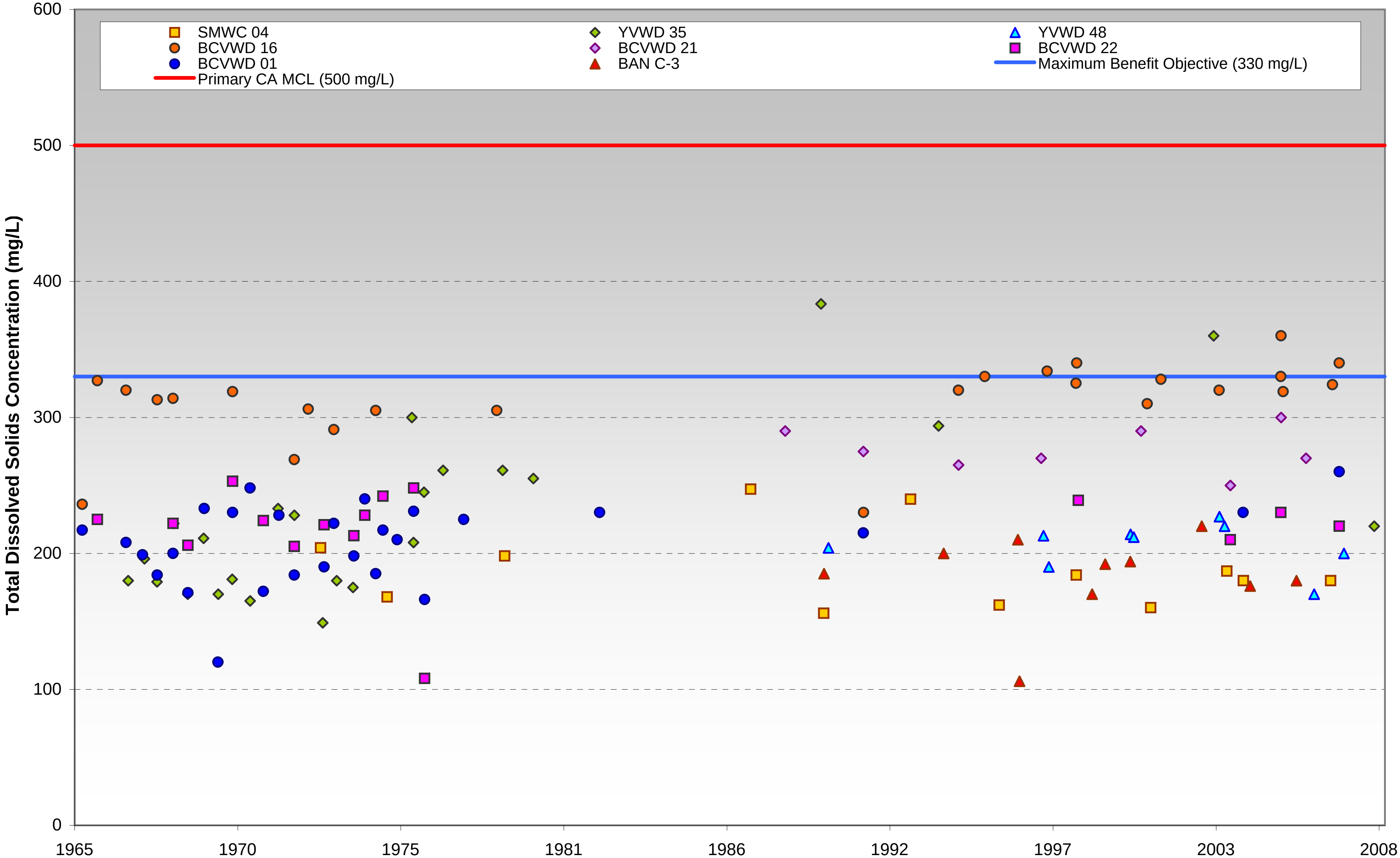
0 1 2 Miles
0 1 2 3 KM

Beaumont Basin Watermaster
Biennial Engineers Report
June 2003 - July 2008

Total Dissolved Solids in Groundwater
Maximum Concentration 2003 to 2008

Figure 5-3

Figure 5-4
Total Dissolved Solids Time History in the Beaumont Basin



BBWM_TDS_NO3_timehistory -- Figure 5-4

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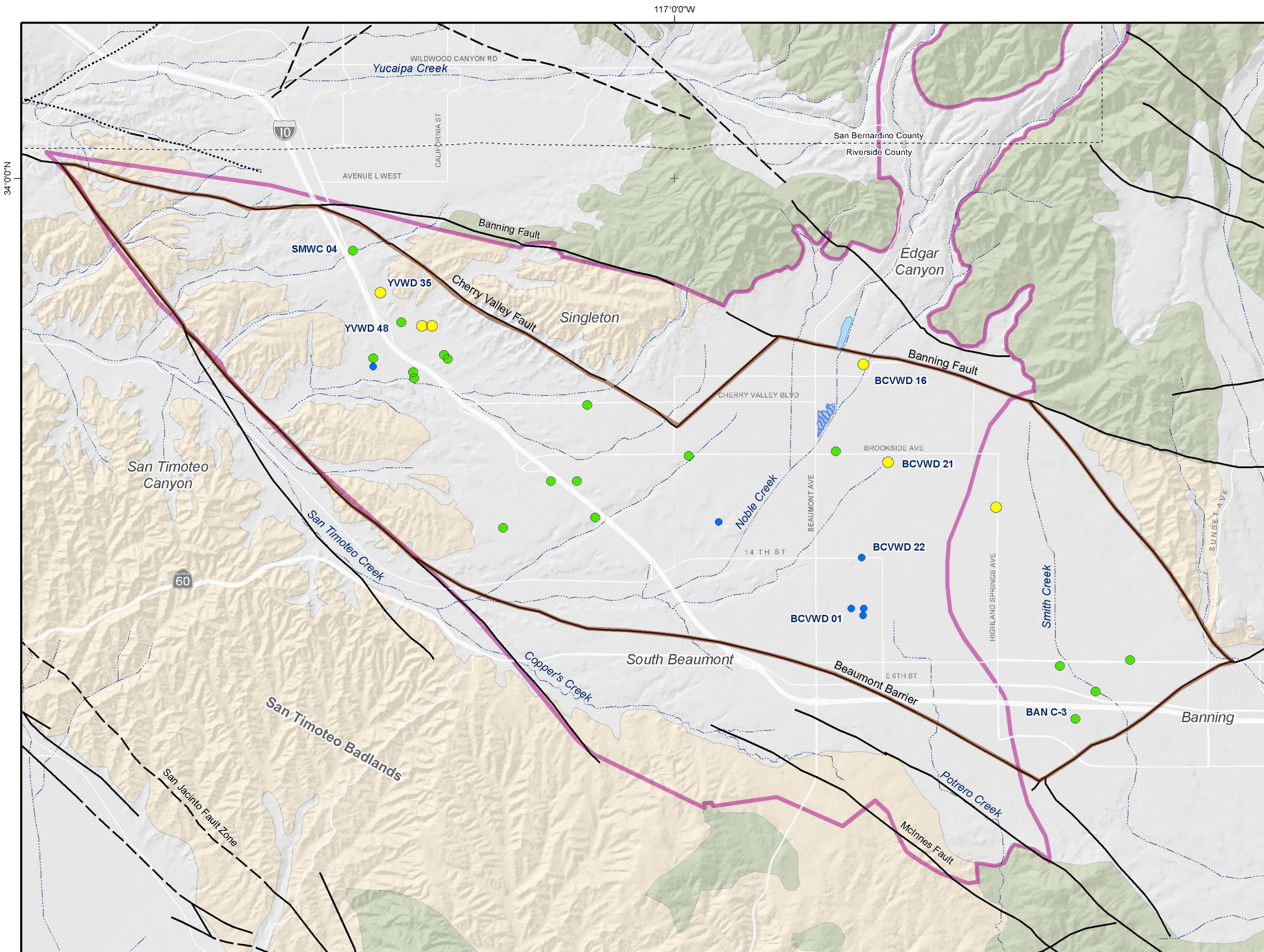

Nitrate-Nitrogen Concentration (mg/L)

- < 1.5
- 1.5 - 5.0
- 5.0 - 10
- > 10

Antidegradation Objective = 1.5 mg/L

Maximum Benefit Objective = 5.0 mg/L

Secondary EPA & CA MCL = 10 mg/L

Other Features

- Beaumont Basin Adjudicated Boundary
- Beaumont Management Zone (RWQCB Boundary)
- Streams, Rivers, and Channels
- Imported Water Recharge Facility

Geology

Water-Bearing Sediments

- Unconsolidated to Semi-consolidated Quaternary Alluvium
- Semi-consolidated San Timoteo Formation

Consolidated Bedrock

- Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

Faults

- Location Certain
- Location Approximate
- Location Uncertain
- Location Concealed

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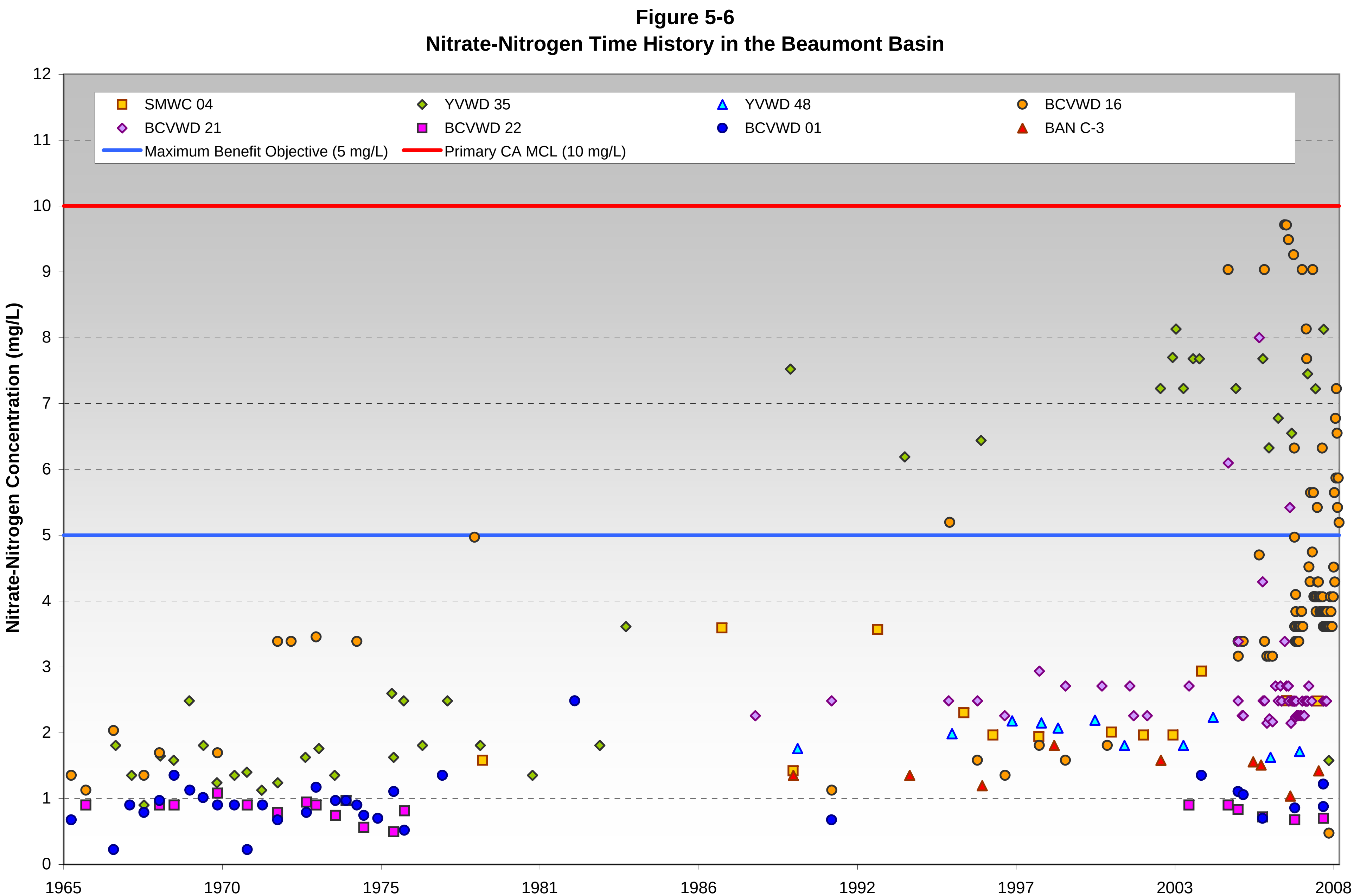
0 1 2 Miles
0 1 2 3 KM

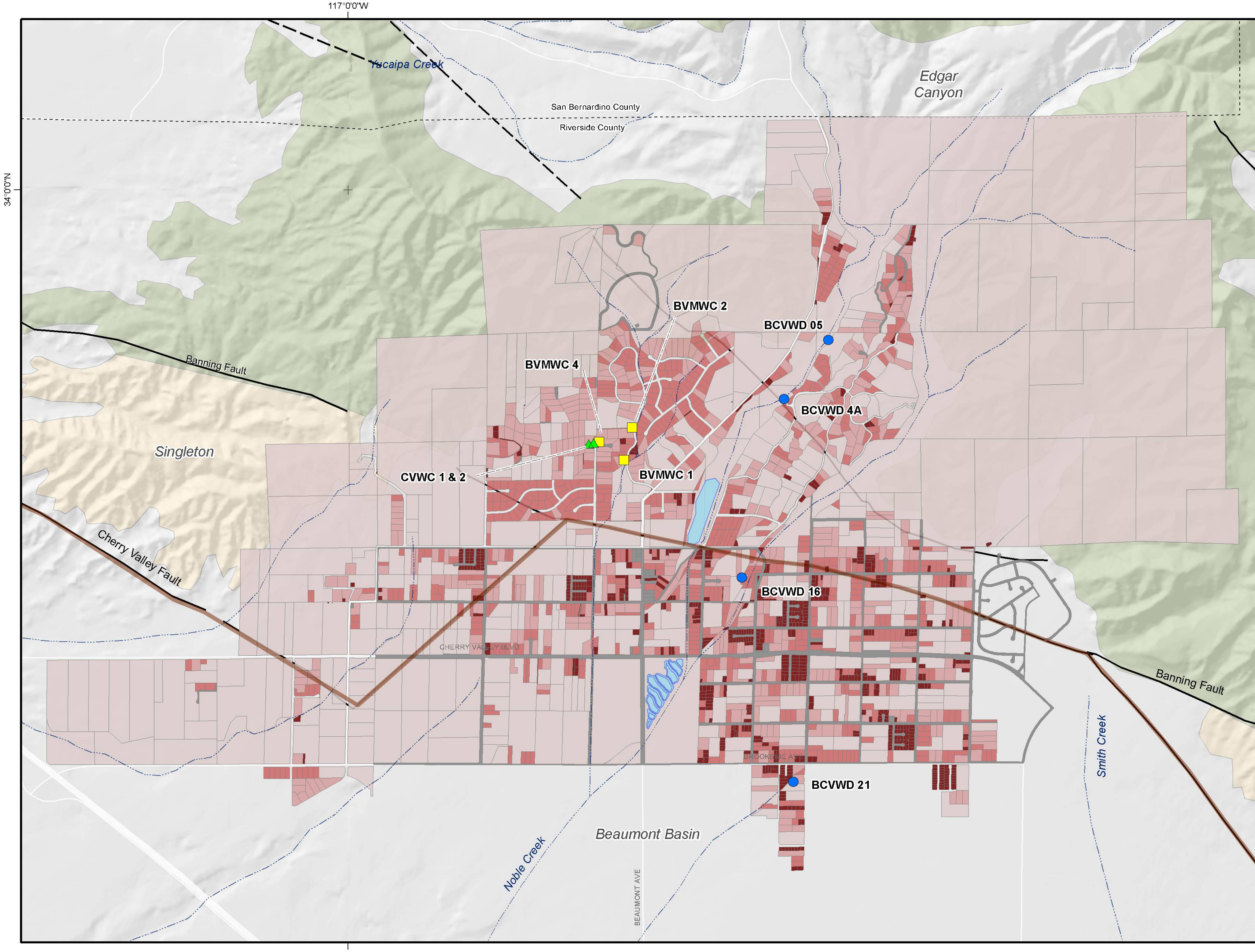
Beaumont Basin Watermaster
Biennial Engineers Report
July 2003 - June 2008

Nitrate as Nitrogen in Groundwater
Maximum Concentration 2003 to 2008

Figure 5-5



BBWM_TDS_NO3_timehistory -- Figure 5-6



Parcel Size Distribution in the CVCOI (acres)

- < 0.50
- 0.50 - 1.00
- 1.01 - 2.00
- > 2.0

Well Sampled for the OSWDS Tracer Study

- Beaumont Cherry Valley Water District Well
- Bonita Vista Mutual Water Company Well
- Cherry Valley Water Company Well

Other Features

- Beaumont Basin Adjudicated Boundary
- Streams, Rivers, and Channels
- Imported Water Recharge Facility

Geology

Water-Bearing Sediments

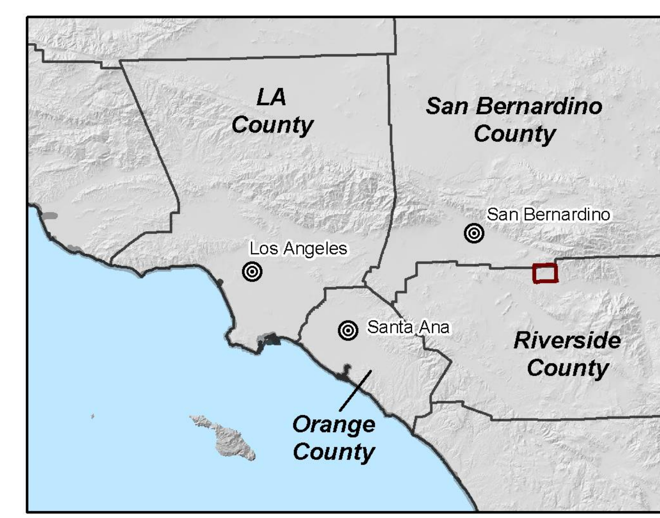
- Unconsolidated to Semi-consolidated Quaternary Alluvium
- Semi-consolidated San Timoteo Formation

Consolidated Bedrock

- Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

Faults

- Location Certain
- Location Approximate
- Location Uncertain
- Location Concealed



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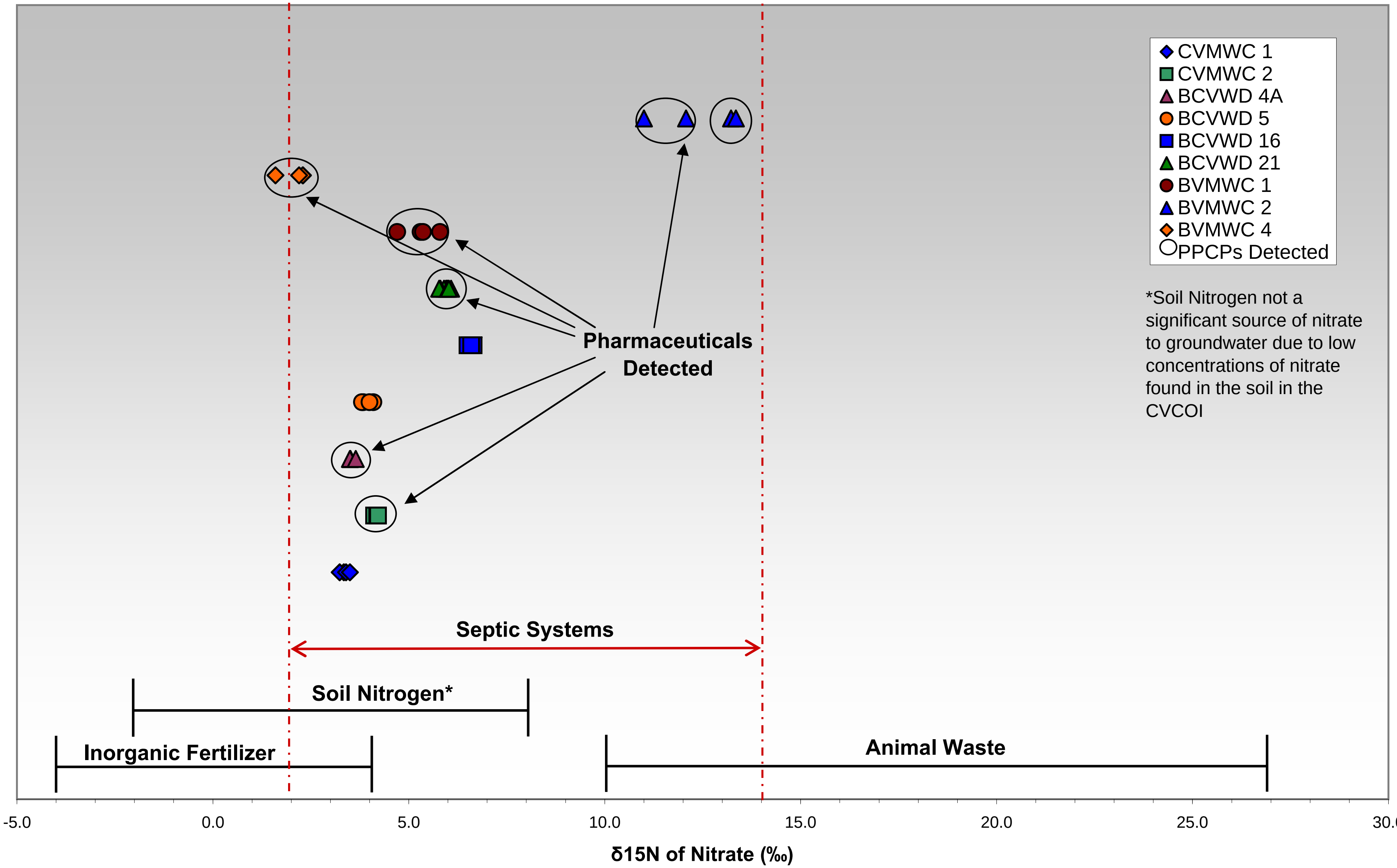
0 1 2 Miles
0 1 2 3 KM

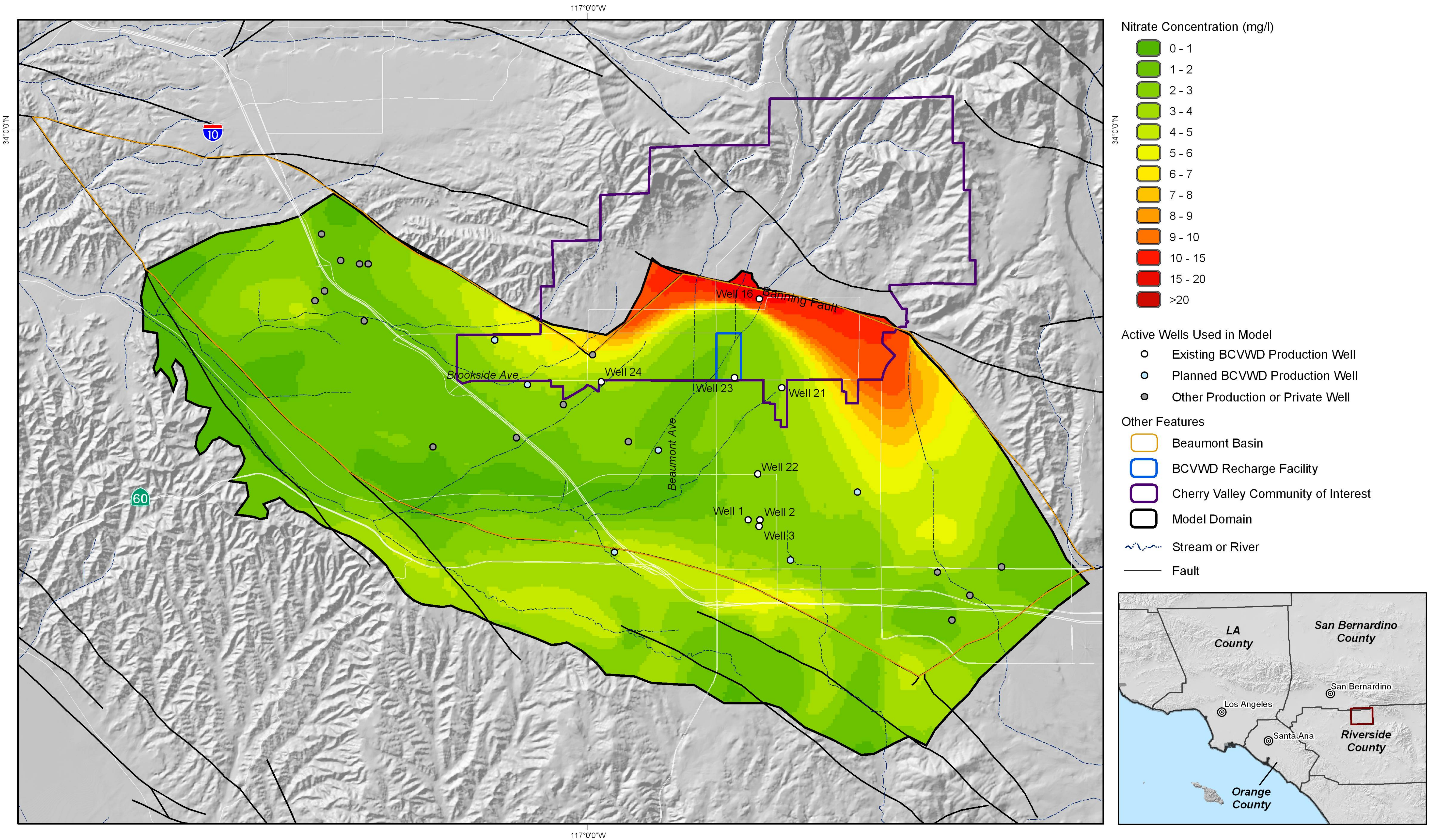
Beaumont Basin Watermaster
Biennial Engineers Report
June 2003 - July 2008

Cherry Valley Community of Interest
Parcel Size Distribution and Study Well Locations

Figure 5-7

Figure 5-8
Nitrogen Isotope Signature in Groundwater





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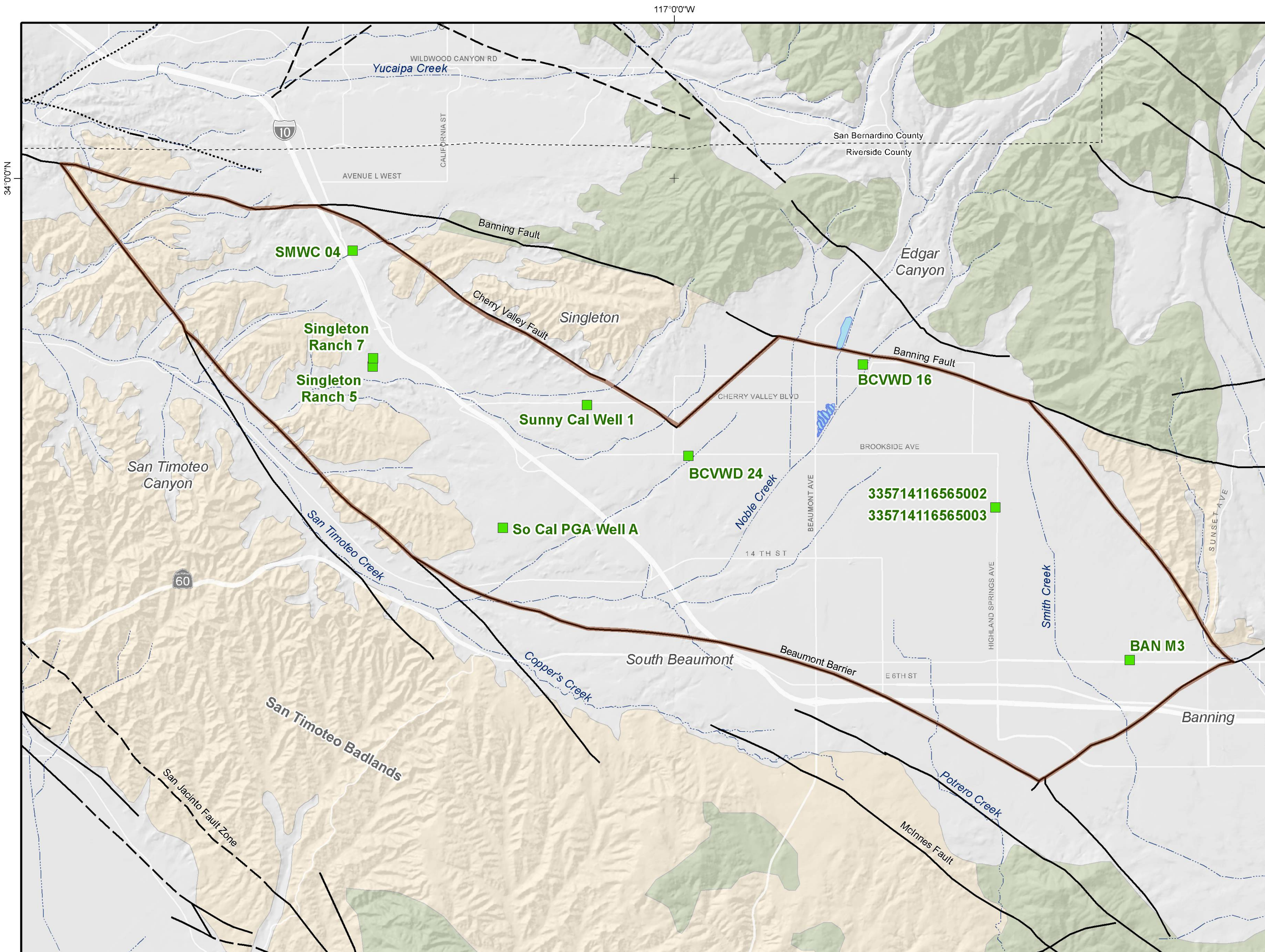
Beaumont Basin Watermaster
Biennial Engineers Report
July 2003 - June 2008

Nitrate-Nitrogen in Groundwater Model Simulation of 2030

Figure 5-9



Main Map Features

Wells with Exceedances

Other Features

Streams, Rivers, and Channels

Beaumont Basin Adjudicated Boundary

Imported Water Recharge Facility

Geology

Water-Bearing Sediments

Unconsolidated to Semi-consolidated Quaternary Alluvium

Semi-consolidated San Timoteo Formation

Consolidated Bedrock

Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

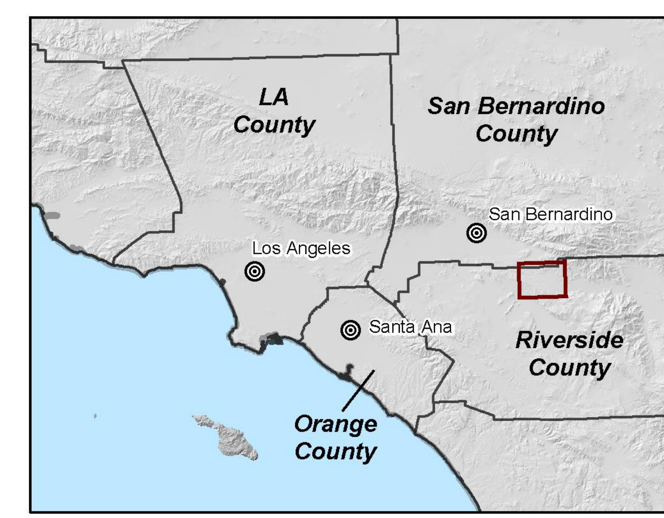
Faults

Location Certain

Location Approximate

Location Uncertain

Location Concealed



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0 1 2 Miles

0 1 2 3 KM

Beaumont Basin Watermaster

Biennial Engineers Report
July 2003 - June 2008

Wells with Exceedances of Federal or State Water Quality Standards

Figure 5-10

In the first ten years of operations under the Judgment, a temporary surplus was established that allows up to 160,000 acre-ft of overdraft within the Basin. The purpose of the temporary surplus is to create room for the safe storage of supplemental water and to reduce losses from the basin. A major concern is that overdraft of the groundwater basin may lead to the lowering of groundwater levels and, subsequently, to land subsidence and ground fissuring. To proactively address this concern, the STWMA and the Watermaster developed a monitoring program specifically to assess the occurrence of subsidence from past groundwater pumping and future pumping. To implement this program, the STWMA, on behalf of the Watermaster, applied for an AB303 Grant from the California Department of Water Resources (DWR). The application was successful, and the subsidence monitoring program was initiated during fiscal 2005/06. The results of the initial subsidence monitoring program were used by the Watermaster to design an on-going monitoring effort (see Section 3.1.3); the results of which can be used by the major producers in the Basin to adapt their pumping and recharge activities to minimize subsidence.

6.1 Initial Subsidence Monitoring Investigation

The initial subsidence monitoring investigation, funded in part by the AB303 grant from the DWR (Grant Agreement No. 4600004147), included an analysis of historical subsidence in the Basin (Task 1) and the initiation of an on-going monitoring program of land subsidence by conventional leveling surveys (Task 2). The results of these tasks are detailed in *Subsidence Monitoring Report for the Beaumont Basin, Final Report* (WEI, 2007c) and are summarized in the following sections.

6.1.1 Historical Subsidence

Task 1 focused on the historical drawdown of groundwater levels and any land subsidence that may have accompanied the drawdown. Historical subsidence was characterized through the analysis of differential leveling survey data and remote sensing data, known as Differential Interferometric Synthetic Aperture Radar (DifSAR). The methods used in the historical subsidence analyses are described in detail in *Land Subsidence Monitoring Program, Task 1 Report* (WEI, 2007a) and are summarized below.

6.1.1.1 Analysis of Differential Leveling Survey

The historic data spans the period of 1928-1993 and is well distributed along an east-west corridor through the southern and eastern portions of the Beaumont Basin (Figure 6-1). Benchmarks with historical data also extend into surrounding basins, including the Banning, South Beaumont, and San Timoteo Basins. Historical data was not available for the northern and western portions of Beaumont Basin. The maximum uplift that occurred at any one benchmark over any period of measurement was 0.020 m (0.066 ft) at benchmark K299. The maximum subsidence that occurred at any one benchmark over any period of measurement was -0.036 m (-0.118 ft) at benchmark L71 RESET.

6.1.1.2 Analysis of DifSAR

The historic DifSAR data used in this analysis spans the period of 1992-2000. Figure 6-1 shows cumulative DifSAR results for this period. The data are well distributed and coherent across most of the Basin as well as in all surrounding basins. The DifSAR results in Figure 6-1 indicate a very stable land surface over the period of record. Maximum uplift at any one location in the Beaumont Basin was about 0.022 m (0.072ft). Maximum subsidence at any one location in the Beaumont Basin was about -0.026 m (-0.085ft). The DifSAR results indicated only one area where differential subsidence could potentially be a concern if permanent subsidence were to occur in the future. This area is southwest of the intersection of Brookside Ave. and Beaumont Ave.

6.1.1.3 Conclusions and Recommendations

The analysis depicts a very stable land surface in Beaumont over the historical period of record, even in those locations that experienced significant groundwater level declines. No significant inelastic (permanent) subsidence occurred in the Basin from 1928-2000; however, it may occur in the future given sufficient lowering of groundwater levels. The results of the analysis were used to create a proposed benchmark network for an on-going subsidence monitoring program.

6.2 Initiation of the On-Going Subsidence Monitoring Program

In the summer and fall of 2006, 72 benchmark monuments were installed across the entire Basin and, in some places, in adjacent groundwater basins. The distribution of benchmarks provides a comprehensive depiction of subsidence within the Basin and relative to subsidence occurring within adjacent basins. Most of the benchmarks are located along major streets with approximately ½-mile spacing (Figure 6-2). Four closely spaced benchmarks were installed across the area of potential future differential subsidence, identified in the analysis of historical subsidence. Additional details on the benchmark network and the methods used to conduct and analyze differential surveys are contained in *Land Subsidence Monitoring Program, Task 2 Report* (WEI, 2007b). The results of the initial survey are summarized below.

6.2.1.1 Initial Ground-Level Surveys

The initial ground-level survey of the benchmark network was completed on November 30, 2006 to establish the initial ground elevation at all benchmarks. A subsequent ground-level survey of the benchmark network was completed on March 31, 2007. Figure 6-2 shows the comparative results of both surveys as the vertical change in benchmark elevations over the four months between the survey events. The results indicate that land surface subsidence occurred across the entire Beaumont Basin. The maximum subsidence at any one benchmark was 0.034 m (0.110 ft). The subsidence appears to be evenly distributed across the basin (average subsidence = 0.012 m [0.04 ft]) with no obvious areas of differential subsidence that pose a concern for ground fissuring. However, not enough data currently exists to characterize this recent land subsidence as a problem that requires immediate mitigation. Specifically, there are insufficient sets of paired groundwater level and ground-surface displacement observations to determine how much of the current land subsidence is elastic or inelastic (permanent).

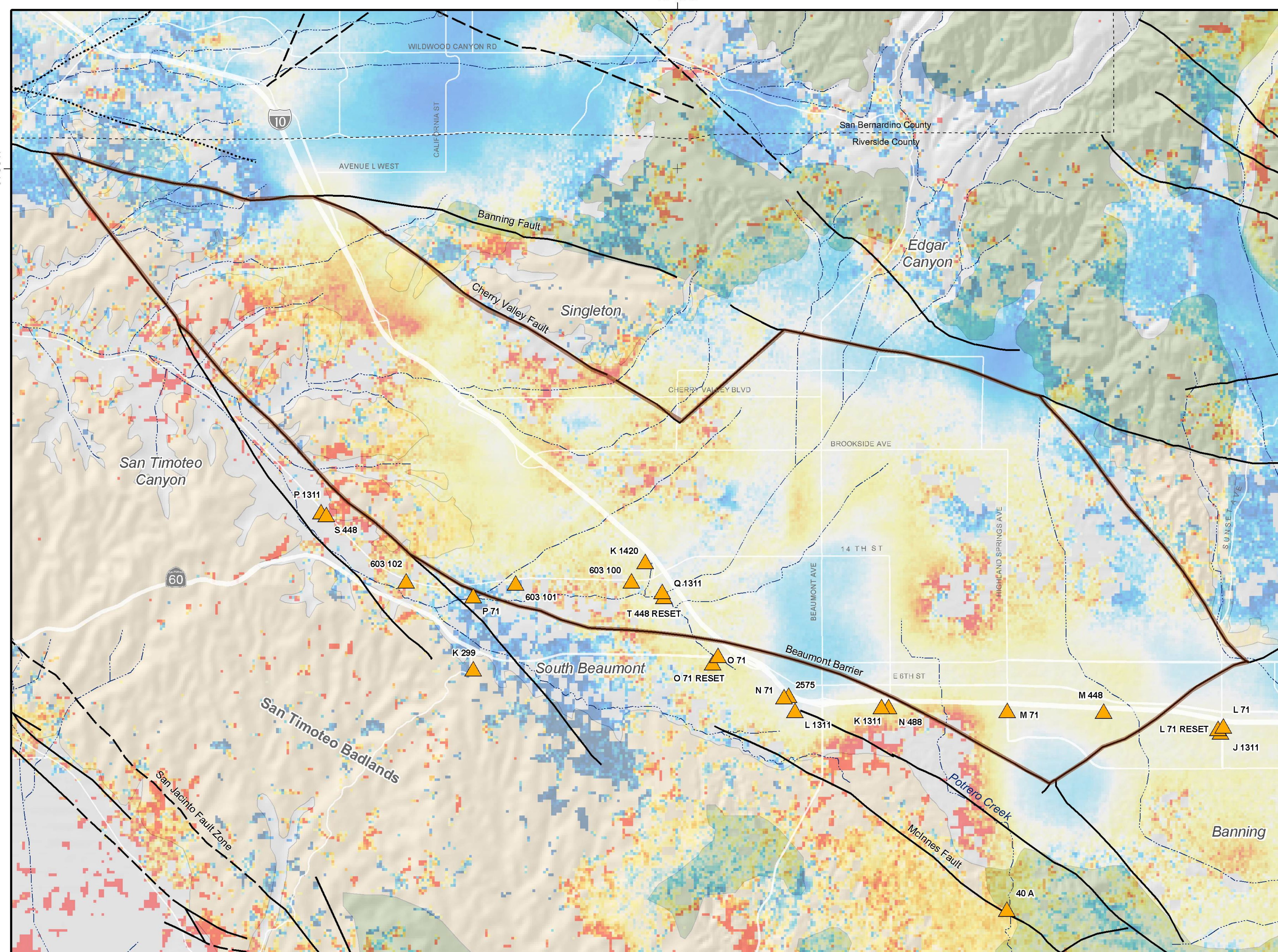
6.2.1.2 Recommendations

The Task 2 Report recommended a comprehensive data collection and monitoring program to collect recent and current groundwater-level and ground-surface displacement data within the Basin. These data would be used to by the Watermaster to:

1. Monitor the extent and rate of land subsidence as the temporary surplus is extracted from the groundwater basin.
2. Quantify how much of the current subsidence is elastic and how much is inelastic (permanent).
3. Identify any areas of differential subsidence that may be a precursor to ground fissuring.

6.3 Ongoing and Future Work

A ground-level survey of the benchmark network is scheduled for Spring 2009. The results of this survey will be analyzed and published in June 2009.



Main Features

- Historical Benchmark
- Beaumont Basin Adjudicated Boundary
- Streams, Rivers, and Channels

DifSAR Measurement of Subsidence

+ 3 cm
- 3 cm

Relative Ground Surface Displacement as Measured by DifSAR (1993-2000)

Geology

Water-Bearing Sediments

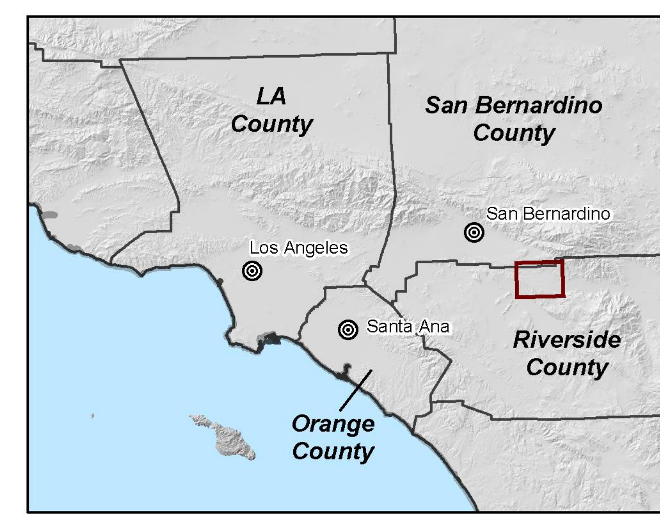
- Unconsolidated to Semi-consolidated Quaternary Alluvium
- Semi-consolidated San Timoteo Formation

Consolidated Bedrock

- Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

Faults

- Location Certain
- Location Approximate
- Location Uncertain
- Location Concealed



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0 1 2 Miles

0 1 2 KM

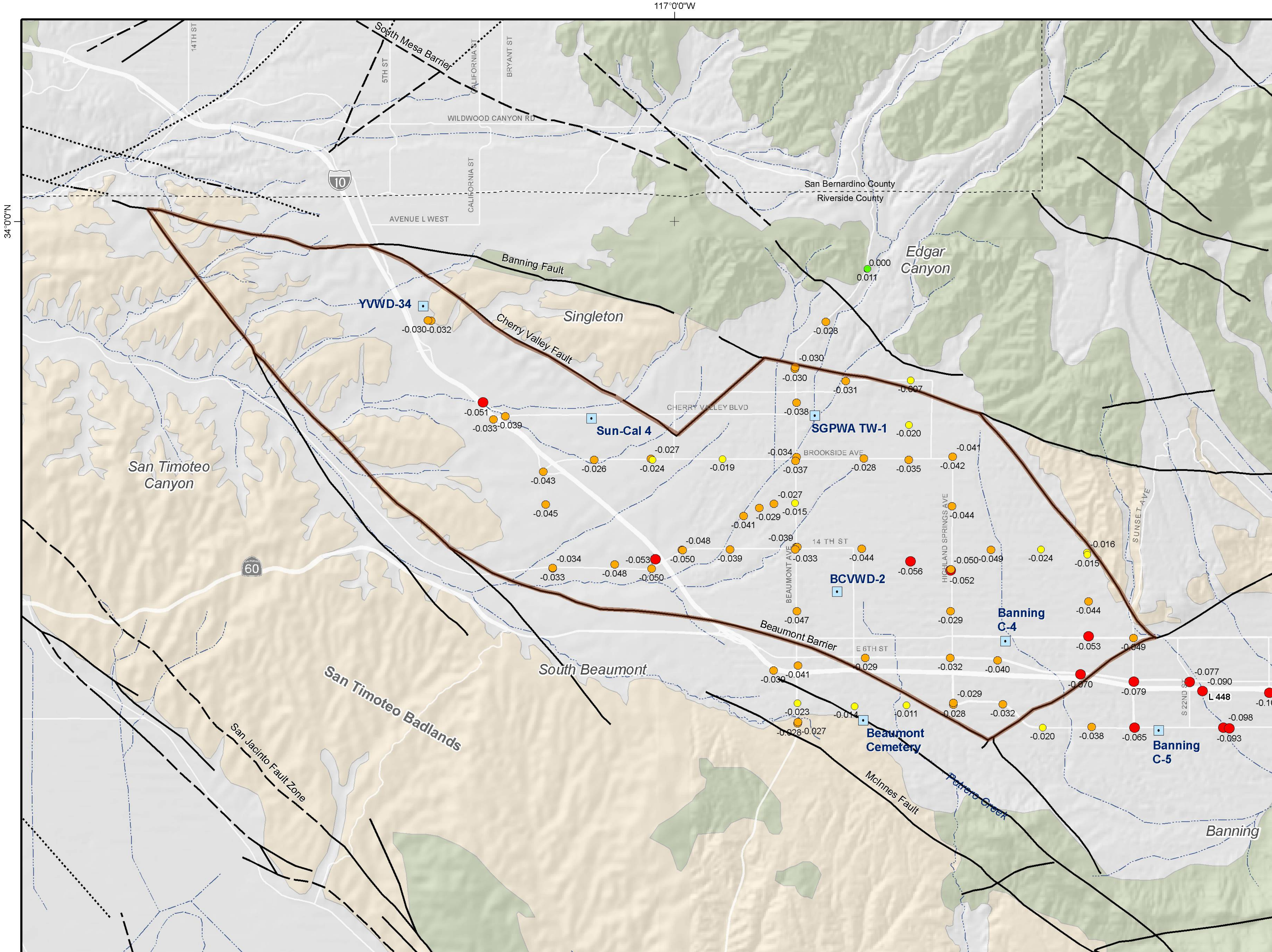
Beaumont Basin Watermaster

Biennial Engineers Report
July 2003 - June 2008

Historical Subsidence Map

Survey Benchmarks and DifSAR

Figure 6-1



Main Features

- + 0.051 to 0.1 feet
- + 0.025 to 0.05
- + 0.001 to 0.024
- 0.000
- -0.024 to -0.001
- -0.05 to -0.025
- -0.1 to -0.051 feet

Relative Change in Land Surface Altitude as Measured by Ground Level Surveys (Nov-2006 to Apr-2007)

- Wells in Groundwater-Level Monitoring Program

Other Features

- Beaumont Basin Adjudicated Boundary
- Streams, Rivers, and Channels

Geology

Water-Bearing Sediments

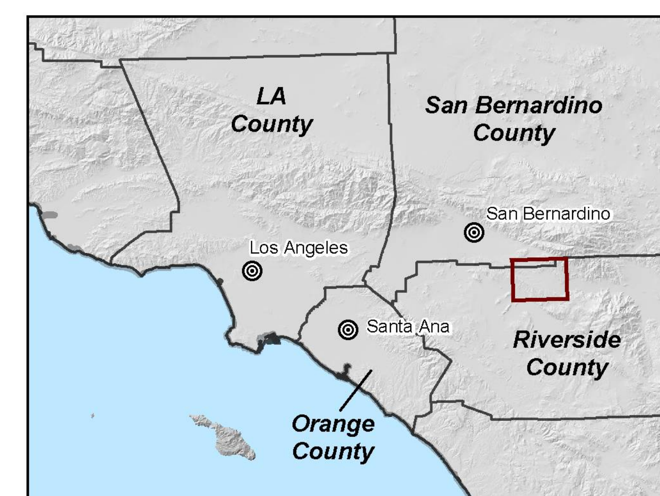
- Unconsolidated to Semi-consolidated Quaternary Alluvium
- Semi-consolidated San Timoteo Formation

Consolidated Bedrock

- Undifferentiated Pre-Tertiary Igneous and Metamorphic Crystalline Rocks

Faults

- Location Certain
- Location Approximate
- Location Uncertain
- Location Concealed



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0 1 2 Miles
0 1 2 KM

Beaumont Basin Watermaster
Biennial Engineers Report
July 2003 - June 2008

Ground-Level Survey Results
November 2006 - March 2007

Figure 6-2

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Appendix A

Compact Disc: Groundwater Level Time Histories at Wells in the Beaumont Basin

Appendix B

Water Quality Standards Exceedance Report

Water Quality Exceedance Report

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Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
1,1,1-Trichloroethane	**ug/L**	**200**	**n/a**	**200**	**n/a**	**n/a**
1,1,2,2-Tetrachloroethane	**ug/L**	**n/a**	**n/a**	**1**	**n/a**	**n/a**
1,1,2-Trichloro-1,2,2-trifluoroethane	**ug/L**	**n/a**	**n/a**	**1200**	**n/a**	**n/a**
1,1,2-Trichloroethane	**ug/L**	**5**	**n/a**	**5**	**n/a**	**n/a**
1,1-Dichloroethane	**ug/L**	**n/a**	**n/a**	**5**	**n/a**	**n/a**
1,1-Dichloroethene	**ug/L**	**7**	**n/a**	**6**	**n/a**	**n/a**
1,2,3-Trichloropropane	**ug/L**	**n/a**	**n/a**	**n/a**	**n/a**	**0.005**
1,2,4-Trichlorobenzene	**ug/L**	**70**	**n/a**	**5**	**n/a**	**n/a**
1,2,4-Trimethylbenzene	**ug/L**	**n/a**	**n/a**	**n/a**	**n/a**	**330**
1,2-Dibromo-3-chloropropane	**ug/L**	**0.2**	**n/a**	**0.2**	**n/a**	**n/a**

Chemical	*Min*	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
1,1,1-Trichloroethane							28	20	0	0
1,1,2,2-Tetrachloroethane							29	20	0	0
1,1,2-Trichloro-1,2,2-trifluoroethane							28	20	0	0
1,1,2-Trichloroethane							28	20	0	0
1,1-Dichloroethane							28	20	0	0
1,1-Dichloroethene							29	20	0	0
1,2,3-Trichloropropane							8	8	0	0
1,2,4-Trichlorobenzene							29	20	0	0
1,2,4-Trimethylbenzene							19	11	0	0
1,2-Dibromo-3-chloropropane							27	19	0	0

Water Quality Exceedance Report

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL			
1,2-Dichlorobenzene	**ug/L**	**600**	**n/a**	**600**	**n/a**	**n/a**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						29	20	0	0
1,2-Dichloroethane	**ug/L**	**5**	**n/a**	**0.5**	**n/a**	**n/a**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						31	20	0	0
1,2-Dichloropropane	**ug/L**	**5**	**n/a**	**5**	**n/a**	**n/a**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						29	20	0	0
1,3,5-Trimethylbenzene	**ug/L**	**n/a**	**n/a**	**n/a**	**n/a**	**330**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						19	11	0	0
1,3-Dichloropropene	**ug/L**	**n/a**	**n/a**	**0.5**	**n/a**	**n/a**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						20	16	0	0
1,4-Dichlorobenzene	**ug/L**	**75**	**n/a**	**5**	**n/a**	**n/a**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.1	0.1	0.1		0.1	0.1	30	20	1	0
1,4-Dioxane	**ug/L**	**n/a**	**n/a**	**n/a**	**n/a**	**3**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						7	6	0	0
2,3,7,8-Tetrachlorodibenzo-p-dioxin	**ug/L**	**3E-05**	**n/a**	**3E-05**	**n/a**	**n/a**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						10	9	0	0
2,4-Dichlorophenoxyacetic acid	**ug/L**	**70**	**n/a**	**70**	**n/a**	**n/a**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
2-Chlorotoluene	**ug/L**	**n/a**	**n/a**	**n/a**	**n/a**	**140**			
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						19	11	0	0

Water Quality Exceedance Report

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL	Min	1st Quartile	Median	3rd Quartile	Maximum	Average	# of Samples	# of Wells Sampled	# of Wells with Detects	# of Wells with Exceedances
4-Chlorotoluene	ug/L	n/a	n/a	n/a	n/a	140							19	11	0	0
Alachlor	ug/L	2	n/a	2	n/a	n/a							23	18	0	0
Aluminum	mg/L	n/a	2	1	0.2	n/a	0.001	0.003	0.005	0.034	0.32	0.042	57	31	13	1
Antimony	ug/L	6	n/a	6	n/a	n/a							36	26	0	0
Arsenic	mg/L	0.01	n/a	0.05	n/a	n/a	0	0	0.001	0.003	0.024	0.003	57	30	11	1
Asbestos	MFL	7	n/a	7	n/a	n/a	0.2	0.2	0.2		0.2	0.2	2	2	1	0
Atrazine	ug/L	3	n/a	1	n/a	n/a							21	13	0	0
Barium	mg/L	2	n/a	1	n/a	n/a	0.001	0.011	0.018	0.027	0.055	0.02	58	31	20	0
Bentazon	ug/L	n/a	n/a	18	n/a	n/a							12	12	0	0
Benzene	ug/L	5	n/a	1	n/a	n/a							29	20	0	0

Water Quality Exceedance Report

WILDERMUTH ENVIRONMENTAL INC.

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical			Unit	Primary EPA MCL		Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Benzo(a)pyrene			**ug/L**	**0.2**		**n/a**	**0.2**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	11	0	0
Beryllium			**mg/L**	**0.004**		**n/a**	**0.004**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						36	26	0	0
Boron			**mg/L**	**n/a**		**n/a**	**n/a**	**n/a**	**1**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.011	0.013	0.016	0.023	0.026	0.018	32	20	12	0
Cadmium			**mg/L**	**0.005**		**n/a**	**0.005**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						36	26	0	0
Carbofuran			**ug/L**	**40**		**n/a**	**18**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						9	9	0	0
Carbon Tetrachloride			**ug/L**	**5**		**n/a**	**0.5**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						29	20	0	0
Chlordane			**ug/L**	**2**		**n/a**	**0.1**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Chloride			**mg/L**	**n/a**		**250**	**n/a**	**250**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
5.1	9.2	13	15	72	13.82	116	33	33	0
Chlorobenzene			**ug/L**	**100**		**n/a**	**70**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						29	20	0	0
Chromium			**ug/L**	**100**		**n/a**	**50**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
1.7	4.9	6.9	10	86	10.293	44	29	27	1

Water Quality Exceedance Report

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical			Unit	Primary EPA MCL		Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Cis-1,2-Dichloroethene			**ug/L**	**70**		**n/a**	**6**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						29	20	0	0
Color			**Assessment**	**n/a**		**15**	**n/a**	**15**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
3	3	3	3	3	3	39	26	7	0
Copper			**mg/L**	**1.3**		**1**	**1.3**	**1**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0	0.009	0.033	0.088	0.19	0.059	41	26	7	0
Cyanide			**ug/L**	**200**		**n/a**	**150**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						30	24	0	0
Dalapon			**ug/L**	**200**		**n/a**	**200**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Di(2-ethylhexyl)adipate			**ug/L**	**400**		**n/a**	**400**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Di(2-ethylhexyl)phthalate			**ug/L**	**6**		**n/a**	**4**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
3.2	3.2	3.2		3.2	3.2	12	12	1	0
Dichlorodifluoromethane			**ug/L**	**n/a**		**n/a**	**n/a**	**n/a**	**1000**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						28	20	0	0
Dichloromethane			**ug/L**	**5**		**n/a**	**5**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						29	20	0	0
Dinoseb			**ug/L**	**7**		**n/a**	**7**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0

Water Quality Exceedance Report

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical			Unit	Primary EPA MCL		Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Diquat			**ug/L**	**20**		**n/a**	**20**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						10	9	0	0
Endothall			**ug/L**	**100**		**n/a**	**100**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Endrin			**ug/L**	**2**		**n/a**	**2**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Ethylbenzene			**ug/L**	**700**		**n/a**	**300**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						29	20	0	0
Ethylene Dibromide			**ug/L**	**0.05**		**n/a**	**0.05**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						27	19	0	0
Fluoride			**mg/L**	**4**		**2**	**2**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.24	0.4	0.43	0.6	0.99	0.524	68	33	33	0
Foaming Agents			**mg/L**	**n/a**		**0.5**	**n/a**	**0.5**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.05	0.05	0.05	0.08	0.18	0.071	40	26	8	0
Glyphosate			**ug/L**	**700**		**n/a**	**700**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						10	10	0	0
Gross Alpha			**pci/L**	**15**		**n/a**	**15**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.011	0.97	1.16	1.41	3.66	1.407	41	22	18	0
Heptachlor			**ug/L**	**0.4**		**n/a**	**0.01**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0

Water Quality Exceedance Report

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical			Unit	Primary EPA MCL		Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Heptachlor Epoxide			**ug/L**	**0.2**		**n/a**	**0.01**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Hexachlorobenzene			**ug/L**	**1**		**n/a**	**1**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Hexachlorocyclopentadiene			**ug/L**	**50**		**n/a**	**50**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Iron			**mg/L**	**n/a**		**0.3**	**n/a**	**0.3**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.004	0.049	0.14	0.99	2.6	0.575	67	31	12	5
Isopropylbenzene			**ug/L**	**n/a**		**n/a**	**n/a**	**n/a**	**770**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						20	11	0	0
Lead			**mg/L**	**0.015**		**n/a**	**0.015**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.001	0.002	0.007	0.009	0.026	0.009	38	26	6	1
Lindane			**ug/L**	**0.2**		**n/a**	**0.2**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Manganese			**mg/L**	**n/a**		**0.05**	**n/a**	**0.05**	**0.5**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0	0.001	0.013	0.032	0.058	0.019	58	31	8	1
Mercury			**mg/L**	**0.002**		**n/a**	**0.002**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						35	26	0	0
Methoxychlor			**ug/L**	**40**		**n/a**	**30**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0

Water Quality Exceedance Report

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical			Unit	Primary EPA MCL		Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Methyl Isobutyl Ketone			**ug/L**	**n/a**		**n/a**	**n/a**	**n/a**	**120**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						19	11	0	0
Methyl Tert-Butyl Ether			**ug/L**	**n/a**		**n/a**	**13**	**5**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						39	21	0	0
Molinate			**ug/L**	**n/a**		**n/a**	**20**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						33	20	0	0
n-Butylbenzene			**ug/L**	**n/a**		**n/a**	**n/a**	**n/a**	**260**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						19	11	0	0
n-Propylbenzene			**ug/L**	**n/a**		**n/a**	**n/a**	**n/a**	**260**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						19	11	0	0
Naphthalene			**ug/L**	**n/a**		**n/a**	**n/a**	**n/a**	**17**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						20	11	0	0
Nickel			**mg/L**	**n/a**		**n/a**	**0.1**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						36	26	0	0
Nitrate-Nitrogen			**mg/L**	**10**		**n/a**	**10**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.248	1.626	2.937	4.065	9.714	3.347	255	32	32	0
Nitrite-Nitrogen			**mg/L**	**1**		**n/a**	**1**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.001	0.001	0.01	0.065	0.065	0.035	109	31	3	0
Odor			**TON**	**n/a**		**3**	**n/a**	**3**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
1	1	1	1	1	1	39	26	6	0

Water Quality Exceedance Report

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical			Unit	Primary EPA MCL		Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Oxamyl			**ug/L**	**200**		**n/a**	**50**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						9	9	0	0
Pentachlorophenol			**ug/L**	**1**		**n/a**	**1**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						13	12	0	0
Perchlorate			**ug/L**	**n/a**		**n/a**	**6**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
3.9	3.9	3.9		3.9	3.9	40	23	1	0
pH			**pH**	**n/a**		**8.5**	**n/a**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
7.3	7.8	7.8	8	9	7.935	72	32	32	4
Picloram			**ug/L**	**500**		**n/a**	**500**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0
Polychlorinated Biphenyls			**ug/L**	**0.5**		**n/a**	**0.5**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						3	3	0	0
Propachlor			**ug/L**	**n/a**		**n/a**	**n/a**	**n/a**	**90**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						5	4	0	0
Sec-Butylbenzene			**ug/L**	**n/a**		**n/a**	**n/a**	**n/a**	**260**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						19	11	0	0
Selenium			**mg/L**	**0.05**		**n/a**	**0.05**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						36	26	0	0
Silver			**mg/L**	**n/a**		**0.1**	**n/a**	**0.1**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						36	26	0	0

Water Quality Exceedance Report

WILDERMUTH™ ENVIRONMENTAL INC.

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Silvex	**ug/L**	**50**	**n/a**	**50**	**n/a**	**n/a**
Simazine	**ug/L**	**4**	**n/a**	**4**	**n/a**	**n/a**
Specific Conductance (lab)	**umhos/cm**	**n/a**	**n/a**	**n/a**	**900**	**n/a**
Styrene	**ug/L**	**100**	**n/a**	**100**	**n/a**	**n/a**
Sulfate	**mg/L**	**n/a**	**250**	**n/a**	**250**	**n/a**
TDS	**mg/L**	**n/a**	**500**	**n/a**	**500**	**n/a**
Tert-Butyl Alcohol	**ug/L**	**n/a**	**n/a**	**n/a**	**n/a**	**12**
Tert-Butylbenzene	**ug/L**	**n/a**	**n/a**	**n/a**	**n/a**	**260**
Tetrachloroethene	**ug/L**	**5**	**n/a**	**5**	**n/a**	**n/a**
Thallium	**ug/L**	**2**	**n/a**	**2**	**n/a**	**n/a**

Chemical	*Min*	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
Silvex							12	12	0	0
Simazine							21	13	0	0
Specific Conductance (lab)	250	352	390	450	620	407.147	75	33	33	0
Styrene							29	20	0	0
Sulfate	2.7	10	17	45.8	58	26.69	117	33	33	0
TDS	160	200	230	270	400	243.693	75	34	34	0
Tert-Butyl Alcohol	2.1	3.5	3.6	5.6	7	4.317	28	20	6	0
Tert-Butylbenzene							19	11	0	0
Tetrachloroethene							29	20	0	0
Thallium							36	26	0	0

Water Quality Exceedance Report

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Thiobencarb	**ug/L**	**n/a**	**n/a**	**70**	**1**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						23	18	0	0

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Toluene	**ug/L**	**1000**	**n/a**	**150**	**n/a**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
98.7	98.7	98.7	99.5	99.5	99.1	31	20	2	0

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Total Xylene	**ug/L**	**10000**	**n/a**	**1750**	**n/a**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						28	20	0	0

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Toxaphene	**ug/L**	**3**	**n/a**	**3**	**n/a**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						12	12	0	0

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Trans-1,2-Dichloroethene	**ug/L**	**100**	**n/a**	**10**	**n/a**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						29	20	0	0

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Trichloroethene	**ug/L**	**5**	**n/a**	**5**	**n/a**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						28	20	0	0

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Trichlorofluoromethane	**ug/L**	**n/a**	**n/a**	**150**	**n/a**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						28	20	0	0

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Trihalomethanes	**ug/L**	**80**	**n/a**	**80**	**n/a**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
1.4	1.4	1.4		1.4	1.4	12	12	1	0

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Tritium	**pci/L**	**n/a**	**n/a**	**20000**	**n/a**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
-0.1	0.1	0.3	3.8	6	1.783	6	6	6	0

Chemical	Unit	Primary EPA MCL	Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Turbidity	**NTU**	**5**	**n/a**	**n/a**	**5**	**n/a**

Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.1	0.24	0.43	1	8.5	1.029	43	26	19	1

Water Quality Exceedance Report

WILDERMUTH ENVIRONMENTAL INC.

Sampling Period: 1/1/2003 **to** 12/31/2008

Chemical			Unit	Primary EPA MCL		Secondary EPA MCL	Primary CA MCL	Secondary CA MCL	CA NL
Uranium			**pci/L**	**n/a**		**n/a**	**20**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.11	0.52	0.85	1.27	2.23	0.884	47	16	16	0
Vanadium			**mg/L**	**n/a**		**n/a**	**n/a**	**n/a**	**0.05**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.004	0.005	0.009	0.014	0.35	0.029	30	19	19	2
Vinyl Chloride			**ug/L**	**2**		**n/a**	**0.5**	**n/a**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
						28	20	0	0
Zinc			**mg/L**	**n/a**		**5**	**n/a**	**5**	**n/a**
Min	*1st Quartile*	*Median*	*3rd Quartile*	*Maximum*	*Average*	*# of Samples*	*# of Wells Sampled*	*# of Wells with Detects*	*# of Wells with Exceedances*
0.033	0.033	0.045	0.065	0.45	0.115	42	27	6	0

Primary EPA MCLs are federally enforceable limits for chemicals in drinking water and are set as close as feasible to the corresponding EPA MCLG.

Secondary EPA MCLs apply to chemicals in drinking water that adversely affect its odor, taste, or appearance. Secondary EPA MCLs are not based on direct health effects the chemical. Secondary MCLs are considered desirable goals and are not federally enforceable.

Primary CA MCLs are analogous to Primary EPA MCLs and are enforceable at the state level. If the California DHS has adopted a more stringent primary MCL than the EPA MCL, the primary CA MCL would be applied.

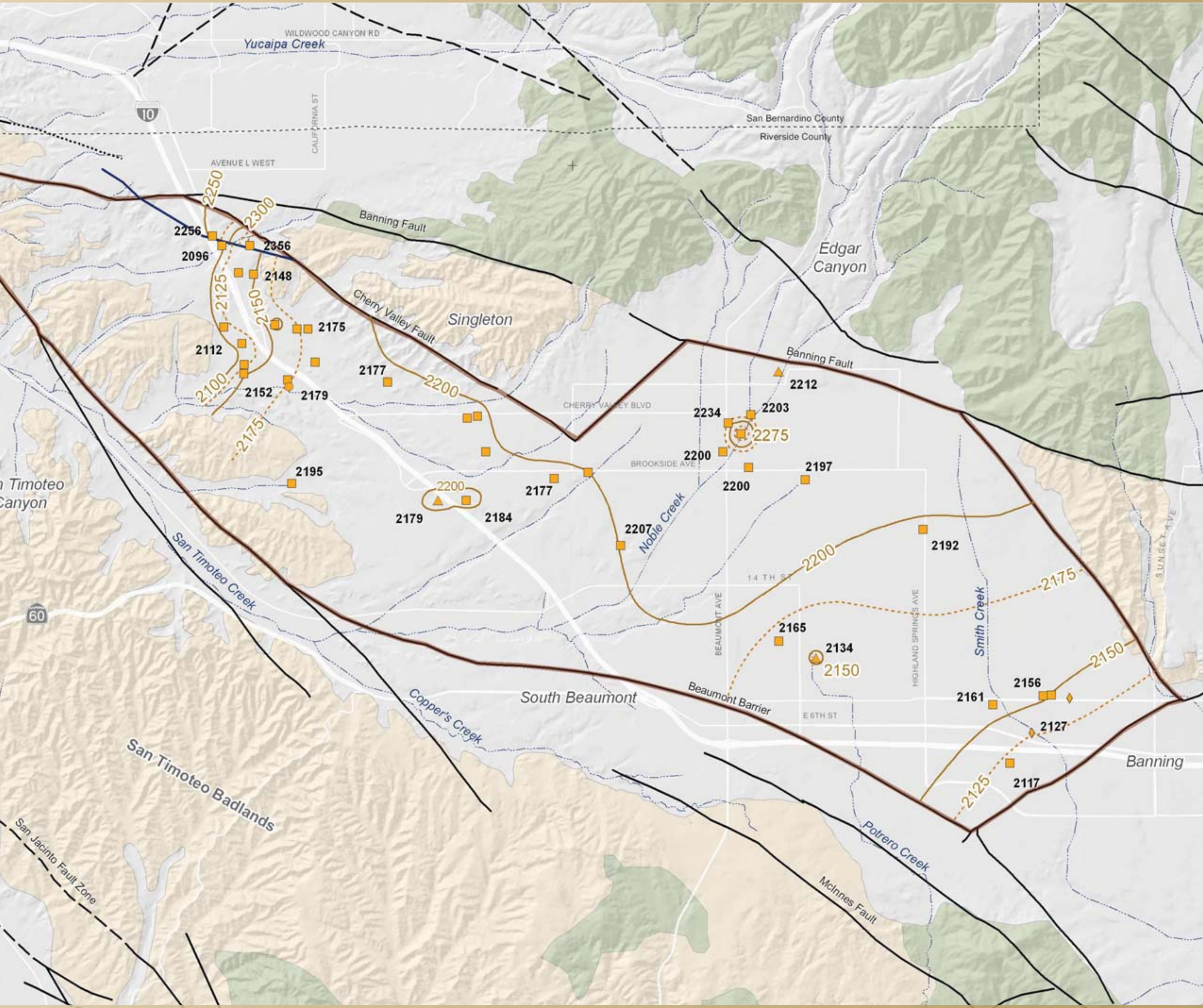
Secondary CA MCLs are analogous to Secondary EPA MCLs and are applicable at the state level. If the California DHS has adopted a more stringent secondary MCL than the EPA MCL, the secondary CA MCL would be applied.

California Notification Levels are health-based criteria similar to US EPA Health Advisories. CA NLs are not enforceable, but are levels at which the California Department of Health Services strongly urges water purveyors to take corrective actions.

Appendix C

Compact Disc: Groundwater Production and Recharge Database

WILDERMUTH™ ENVIRONMENTAL INC.



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