3.1 Introduction

This section of the report describes the existing water resources in the San Juan Basin area with an emphasis on the surface and groundwater resources in the investigation area which includes the basin area bounded by the Ortega Highway on San Juan Creek, the confluence of Arroyo Trabuco and Oso Creek and the Pacific Ocean. What follows is an inventory of the surface and groundwater hydrology, geologic conditions and storage, water quality, water infrastructure and interpretation of groundwater modeling work conducted by the Municipal Water District of Orange County (MWDOC) in support of the South Orange County Ocean Desalter (SOCOD) project.

3.2 Surface Water Hydrology

This section of the report characterizes the surface water hydrology of the watershed tributary and overlying the groundwater resources of the investigation area.

3.2.1 Topographic and General Setting

The San Juan Creek watershed is located in Southern Orange County on the western flank of the Santa Ana Mountains, as shown in Figure 3-1. The headwaters originate in the Cleveland National Forest near the Orange/Riverside County border at an elevation of approximately 3,300 feet above sea level and flow about 29 miles south-southwest to the Pacific Ocean at Doheny State Beach in Dana Point. The total watershed drainage area covers approximately 175 square miles and consists of two major tributaries to San Juan Creek, known as the Arroyo Trabuco and Oso Creek. The upper third of the watershed is extremely rugged with steep slopes and deep cutting narrow canyons with minor tributaries from these areas flowing out from sharp canyons. The center third is dominated by rolling hills, and the downstream third is a highly developed floodplain. As the streams come out of the canyon mouth, they widen out into several alluvial floodplains (Pace 2008). These floodplains comprise the alluvial sediments from which groundwater is extracted. Land rises from sea level the where San Juan Creek discharges to the Pacific Ocean to 5,687 ft at the peak of Santiago Mountain. There are three principal streams that drain the watershed: Oso Creek, the Arroyo Trabuco and San Juan Creek. There are numerous other small streams that feed into the principal streams. Figure 3-2 shows the locations of the principal streams and some other tributaries in the lower part of the San Juan Basin where these streams traverse the underlying groundwater resources of interest in the groundwater management plan.

About 30 percent of the watershed is incorporated into 10 cities and unincorporated area. The larger cities and communities in the watershed include the Cities of Laguna Niguel, Laguna Hills, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano; and the unincorporated areas of Coto de Gaza, Dove Canyon and Trabuco Canyon.

The area has experienced continuous urban development since the 1970s. Some of this growth has been documented by SCAG in their periodic compilations of land use data. Since 1990, SCAG has developed GIS coverages of land use in its service area based on a four-level Anderson landuse coding system to characterize landuse. The latest land use coverage available from SCAG is from 2008. Residential landuse of all types has increased from about 9,400 acres in 1990 to about 13,500 acres in 2008, an increase of about 46 percent in 18 years; and relative to the watershed itself, the residential landuse has increased from about 8 percent of the watershed in 1990 to about 11 percent in 2008. Other urban land uses have also grown over time including institutional, commercial and industrial uses. Urban development significantly modifies the land surface and the hydrologic process in the watershed.

3.2.2 Precipitation

Table 3-1 lists major precipitation gauges in and around San Juan Basin. There are six active gauges with long history of records in or adjacent to the San Juan Creek Watershed the locations of which are shown in Figure 3-1. The annual average precipitation is about 12 to 13 inches per year at the coast (Laguna Beach, station number 100, period of record 1929 through 2010; Palisades Reservoir San Clemente, station number 186 period of record 1965 through 2010) and increases going inland with increasing elevation, to about 33 inches at Santiago Peak (Santiago Peak, station number 208, period of record 1949 through 2010).

Figure 3-3 shows the annual precipitation time history recorded at the Laguna Beach station for the period 1929 to 2010. The Laguna Beach station has the longest active precipitation history in the investigation area. Also shown in Figure 3-3 is the cumulative departure from mean (CDFM) precipitation. When the slope of the CDFM curve trends downward from left to right, the annual precipitation is less than the average precipitation: if the slope continues downward for more than one year then the CDFM is indicating a dry period. When the slope of the CDFM curve trends upward from left to right, the annual precipitation is greater than the average precipitation: if the slope continues upward for more than one year then the CDFM is indicating a wet period. The CDFM curve in Figure 3-3 suggests that the area experienced

- A long dry period from 1946 to 1977 that was punctuated with two very wet years in 1958 and 1969,
- a wet period from 1978 through 1983,
- a dry period from 1984 through 1992,
- a wet period from 1993 through 1998,
- a dry period from 1999 through 2010 punctuated with a very wet year in 2005

Figure 3-4 illustrates the monthly variation of precipitation at the Laguna Beach station, including the maximum, minimum , and median precipitation for the each month, and the 25th and 75th percentiles. Most of the precipitation occurs in the November through April period. The months of October through March have the greatest extremes as characterized by the maximum monthly precipitation relative to its median precipitation.

3.2.2.1 Doppler Radar Precipitation Estimates

As is evident in Figure 3-1, there are too few precipitation stations in the San Juan Creek watershed to accurately estimate areal variation in precipitation in the watershed. This situation has improved recently with newer spatially resolved datasets. In late 2001, the National Centers for Environmental Predictions (NCEP) began generating "Stage IV" radar-based precipitation estimates. These data are compiled from regional multi-sensor data (Stage III) produced by the 12 Regional Forecast Centers that cover the contiguous United States. In January 2002, archived spatial-temporal, high-resolution gridded precipitation estimates (Stage IV) became available for download from the National Center for Atmospheric Research (http://data.eol.ucar.edu/codiac/dss/id=21.093). Daily Radar Mean Areal Precipitation (RMAP) data for the San Juan watershed were downloaded and processed to obtain daily average precipitation estimates over the San Juan Creek watershed on approximately 2.5 by 2.5-mile grid. These daily precipitation estimates were aggregated to estimate annual precipitation for each year for the 2001 through 2009 period.

Figures 3-5 and 3-6 show radar-generated precipitation for 2007 (July 1, 2006 through June 30, 2007, a dry year) and 2005 (July 1, 2004 through June 30, 2005, a wet year), respectively. These maps show the spatial distribution of precipitation over the watershed and the annual total precipitation for precipitation stations in and around the watershed. This type of characterization is not possible with the data from the precipitation stations alone. The amount of precipitation falling in the watershed increases from the southwest on the coast to the northeast going inland following a classic orographic precipitation pattern – precipitation increases with altitude as moisture laden air from the sea flows up and over the Santa Ana Mountains. This effect can be observed in both the precipitation stations and the gridded precipitation estimates.

The difference between the annual precipitation estimates at the precipitation gauges and the annual value for each corresponding grid cell suggests there is significant spatial variability in the vicinity of the gauges. For example, the annual precipitation measured at the Santiago Peak station is substantially different than the precipitation estimate in the corresponding grid cell. In 2007 (Figure 3-5), the grid estimate is 2.69 inches and the station estimate is 8.04 inches. This suggests that the gauge estimate is not a good indicator of precipitation in the area of gauge and that highly localized intense precipitation occurs at the gauge due to its elevation and exposure. This same anomaly is observed for 2005, as shown in Figure 3-6. Another interesting observation is that during dry years the Doppler radar precipitation estimates suggest that the variability of precipitation across the watershed is substantially less than the variability in a wet year. For example, precipitation over the watershed in 2007 ranged from about1.9 inches near the coast to about 3.0 inches inland, an increase of about 2.1 inches, or 58 percent, relative to precipitation at the coast. In contrast, precipitation over the watershed in 2005, a wet year, ranged from about 23.1 inches near the coast to about 43.0 inches inland, an increase of about 19.9 inches, or 86 percent, relative to the precipitation at the coast. The implication of the areal variability of precipitation shown in Figures 3-5 and 3-6 are that the spatial variability increases with increasing precipitation, and that the use of an average value or a constant areal precipitation pattern computed from observed gauge estimates will likely not yield accurate estimates of watershed precipitation and runoff.

3.2.2.2 Climate Change

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by two United Nations Organizations, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to assess "the scientific, technical and socioeconomic information relevant for the understanding of the risk of human-induced climate change." IPCC produced a series of assessment reports on climate change in 1990 1995, 2001 and 2007. In 1992, the IPCC released its initial carbon dioxide emissions scenarios to be used for driving global circulation models (GCM's) to develop climate change scenarios, so-called IS92 scenarios. The IPCC revised the emissions scenarios in 1996 for its third assessment report. The emissions scenarios are based on four different narrative storylines, A1, A2, B1, and B2 that describe consistently the relationships between emission driving forces and their evolution and add context for the scenario quantification. Each storyline represents different demographic, social, economic, technological and environmental developments. For each storyline, several scenarios were developed using various modeling approaches to examine the range of outcomes that arise from the various models that use similar assumptions about driving forces. This resulted in a total of 40 special report emissions scenarios (SRES). After evaluating all SRES, the IPCC picked six scenarios to consider further: A1F1, A1T, A1B, A2, B1, and B2. A detailed discussion can be found in the third assessment report (IPCC, 2001) or in the summary report (IPCC, 2000).

3.2.2.2.1 Climate Change Approach Adopted by the California Department of Water Resources

The California Department of Water Resources (DWR) has incorporated climate change into its planning process[4]. DWR evaluated possible future impacts on California's water supply, and specifically the SWP, using its CalSIM II model and the results of climate changes models. DWR constructed four planning alternatives that were based on two IPCC greenhouse gas emission scenarios, A2 and B1, and two GCM's, the Geophysical Fluid Dynamic Lab Model (GFDL) and the Parallel Climate Model (PCM). These four planning alternatives were used in the 2007 State Water Project Delivery Reliability Report (DWR, 2008). This work was updated and reported in the 2009 State Water Project Delivery Reliability Report (DWR, 2009). In this update the DWR used its CALSIM II to evaluate the SWP delivery reliability with the precipitation, temperature estimates from the MPI-ECHAM5 for the A2 greenhouse gas emissions scenarios.

3.2.2.2.2 Projected Climate Change for the San Juan Basin

In order to conduct water resources impact analyses for climate change scenarios, the coarse spatial representation of global climate model data must be refined in a process called downscaling. Such data can be obtained from the World Climate Research Programme's (WCRP's) Coupled Model Intercomparison Project Phase 3 (CMIP3) multi-model dataset (Maurer et al, 2007)[5]. This data archive consists of bias-corrected and spatially downscaled climate projections derived from CMIP3 data. The data is available for 1/8th degree latitude/longitude resolution.

Figure 3-7 shows monthly average temperature predicted for the MPI-ECHAM5 A2 scenario for the 1950 through 2100 period. The 1950 through 2000 period was used to calibrate the models and the 2000 through 2100 period are model projections for the A2 scenario. The best-fit linear regression lines are also plotted in Figure 3-7 to emphasize the trend. In this

[4] This discussion is based on the 2009 SWP Delivery Reliability Report
http://www.water.ca.gov/news/.../2010/01262010reliabilitysummary.pdf

[5] http://gdo-dcp.ucllnl.org /downscaled_cmip3_projections/

scenario, the average temperature will rise about 3oC, or about 5oF, in winter months, and about 5oC, or about 9oF, in summer months, over the 150-year period. The significance of the historical and projected temperature increases is the corresponding increase in the evapotranspiration of vegetation.

Figure 3-8 shows the annual precipitation estimated under MPI-ECHAM5 A2 scenario for the 1950 through 2100 period. The chart shows the 50-year average precipitation for three sequential 50-year periods, 1950-1999, 2000-2049, and 2050-2099, and the 75-year average precipitation for two sequential 75-year periods, 1950-2024 and 2025-2988. The table below compares the basic statistics of the annual precipitation estimates for these periods.

Annual Precipitation Estimates

Period	Average	Standard Deviation	Coefficient of Variation	Minimum	Maximum
50-Year Interval					
1950-1999	13.66	4.67	34%	6.12	22.20
2000-2049	12.69	4.63	36%	4.95	24.92
2050-2099	13.72	6.14	45%	2.96	30.99
75-Year Interval					
1950-2024	13.13	4.57	35%	4.95	24.03
2025-2099	13.58	5.74	42%	2.96	30.99

Figure 3-8 and the above table suggests that the future will have: wetter wet years (a higher period maximum precipitation value), drier dry years (a lower period minimum precipitation value) and greater variability (greater standard deviations and coefficients of variation for the period). Interestingly, the mean precipitation is not significantly different among the periods. The projected increase in variability means that more storage for surface and groundwater than is currently used will be required to achieve the same native water supply utilized in the past.

Figure 3-9 shows the projected annual precipitation projection from the GCM for the area that includes the Laguna Beach precipitation station and the CDFM for that projection. Comparison of the annual measured precipitation at the Laguna Beach precipitation station and its associated CDFM shown in Figure 3-3 to the projection in Figure 3-9 for the overlapping record indicates that the GCM projection does not match the measured data very well (the wet periods and dry periods do not correlate well). The implication of this finding is that the reliability of the GCM precipitation projections for the San Juan Creek watershed is unknown.

3.2.3 Surface Water Hydrology

The USGS maintains several stream gauging stations that can be used to characterize the surface water hydrology in the San Juan Basin, the locations of which are shown in Figure 3-2. Table 3-2 lists these stations, their location and period of record. The most important gauging station is located on San Juan Creek at the Ortega Highway bridge crossing. The location of this gauging station has varied in the past and the record represents discharge time histories for slightly different drainage areas. The drainage area for the three gauges varies from 106 square miles to 117 square miles. Figure 3-10 shows the cumulative discharge curve (mass curve) of surface water discharge in San Juan Creek from the combined records of these three surface water discharge gaging stations for the 1928 to 2011 period. The average slope of the mass curve for the three distinct records shows the effect of the drainage area size on discharge. These slopes were used to normalize the historical record for the 11046500 and 11046550 gaging stations to be roughly equivalent to the record at the 11046530 gauging station. The result is the annual discharge record shown in Figure 3-11 and its associated CDFM annual discharge. The wet and dry periods suggested by the CDFM plot in Figure 3-11 are identical to the wet and dry periods observed for precipitation at the Laguna Beach precipitation station. That said, the variability in annual discharge is greater than the variability in precipitation.

Figure 3-12 illustrates the monthly variation of San Juan Creek discharge at the 11046530 gauging station including the maximum, minimum, and median precipitation for the each month, and the 25th and 75th percentiles. Most of the discharge occurs in the December through May period. The months of January through March have the greatest extremes as characterized by the maximum monthly discharge relative to its median discharge. This is a non-stationary time series due to urban development in watershed. The discharge record indicates that the discharge in San Juan Creek is highly variable and difficult to regulate for water development purposes without surface water storage.

3.3 Groundwater Hydrology

Four principal groundwater basins have been identified in the San Juan watershed: (1) Lower Basin, (2) Middle Basin, (3) Upper Basin, and (4) Arroyo Trabuco. These basins were first delineated by the DWR in 1972, based on water quality differences. These groundwater basins are shown in Figure 3-13. CDM (1987), NBS Lowery/PSOMAS (1994, annual reports), and others have modified the DWR delineations to suit the needs of their respective studies. Figure 3-13 shows the limits of the basins included this investigation. The Upper Basin was excluded because a majority of the land overlying the basin is privately owned, the groundwater resource is small and is managed by the RMV, and the RMV would not make their data available to the SJBA. The Arroyo Trabuco basin was divided into a lower and upper portion, with the Lower Arroyo Trabuco included in this investigation. The Lower Trabuco, Middle, and Lower Basins contain approximately 5.9 square miles of water bearing alluvium.

3.3.1 Geologic Setting

The San Juan Creek watershed is located on the western flank of the Santa Ana Mountains. The Santa Ana Mountains are part of a northwest-southeast trending fault block that has been tilted at a shallow angle in a westerly direction by the Elsinore fault system. The San Juan Creek watershed is underlain by plutonic, volcanic, metamorphic, and sedimentary rocks (Morton, 2004). The two major faults in the San Juan Creek watershed are the northwest/southeast trending Mission Viejo and Cristianitos Faults. The Cristianitos Fault displaces Tertiary sedimentary rocks and the Mission Viejo Fault bounds the Cretaceous sedimentary rocks on the west (Taylor, 2006).

3.3.2 Stratigraphy

In this report, the stratigraphy of the San Juan Creek watershed is divided into three divisions: (1) Mesozoic and older bedrock units, (2) Tertiary bedrock units, and (3) late Holocene to Early Pleistocene surficial deposits, as shown in Figure 3-13. The Mesozoic and older bedrock units are further differentiated as (a) Cretaceous Age Formations of Sedimentary Origin, (b) Pre-Cretaceous Metamorphic Formations of Sedimentary and Volcanic Origins, and (c) Granitic and other intrusive crystalline rocks. The tertiary bedrock units are further differentiated as (a) fine-grained formations and (b) coarse-grained formations. The Late Holocene to Early Pleistocene Surficial Deposits are further differentiated as (a) younger alluvial deposits, (b) landslide deposits, and (c) older alluvial deposits. The main water bearing unit in the watershed consists of the younger alluvial deposits. Below, these geologic formations are generally described in stratigraphic order, starting with the oldest formations first.

3.3.2.1 Mesozoic and Older Bedrock Units

The Mesozoic crystalline igneous rocks, the Pre-Cretaceous metasedimentary rocks of the Bedford Canyon Formation, and the metamorphic rocks of the Menifee Valley Formation are exposed in the northeastern portion of the San Juan Creek watershed and are considered non-water bearing. Overlying the igneous and metamorphic basement units are the Cretaceous sandstone and conglomerate sandstone of the Williams Formation and the non-marine conglomerate and sandstone of the Trabuco Formation.

3.3.2.2 Tertiary Bedrock Units

The tertiary bedrock units are divided into fine-grained and coarse-grained formations, as grouped in the California Geological Survey CGS Special Report 217. The fine-grained formations include the Capistrano and Monterey Formations and the coarse-grained formations include the Santiago, Sespe, and Niguel Formations.

3.3.2.2.1 Coarse-Grained Formations

The Santiago and Sespe Formations are bounded to the east by the Mission Viejo Fault and to the west by the Cristianitos Fault, as shown in Figure 3-13. The DWR (1971) identified both the Santiago and Sespe Formations as potential aquifers. The Santiago Formation is a chiefly marine conglomerate with interbedded very fine to coarse grained sandstones and is estimated to be about 3,000 feet thick (DWR, 1971). The Sespe Formation consists of non-marine conglomeratic sandstone, sandstone, and silty sandstone, and is estimated to be about 1,500 feet thick.

In Bulletin No. 104-7, the DWR reported that a test hole was drilled into the Santiago Formation and yielded groundwater at 48 gallons per minute (gpm) with a drawdown of 257 feet and a specific capacity of about 5 gpm/ft. In the same report, the DWR collected several outcrop samples from the Sespe Formation and determined the porosity to range between 20 and 25 percent.

The Pliocene Niguel Formation is younger than the Santiago and Sespe, but they are grouped together because the Pliocene Niguel Formation is coarse-grained. The Niguel Formation is about 350 feet thick and is comprised of sandstone interbedded with sandy siltstone that is exposed in the southwest portion of the watershed where it overlies the Capistrano and Monterey Formations (DWR, 1971).

3.3.2.2.2 Fine-Grained Formations

The Capistrano and Monterey Formations outcrop in the southeast portion of the watershed. The Capistrano Formation is about 2,400 feet thick and consists of white to pale gray, massive to crudely bedded siltstone and mudstone (DWR 1971). The Monterey Formation is a brown to yellow grey silty shale. Both the Capistrano and Monterey Formations are very prone to landslides in the surrounding hills.

The Capistrano Formation forms the bottom of the alluvial aquifer in the basins south of the Cristianitos Fault. The Capistrano Formation has been described in driller's logs as greenish black siltstone, grey siltstone, blue shale, and green shale. About sixty wells in the study area encountered the Capistrano Formation at depths ranging from about 30 feet to 160 feet below ground surface (ft-bgs). A more detailed discussion of the bottom of aquifer can be found in *Section 3.3.3 Geologic Cross Sections and Section 3.3.5 Effective Base of the Alluvial Aquifer*.

3.3.2.3 Late Holocene to Early Pleistocene Surficial Deposits

The late Holocene to Early Pleistocene deposits are divided into three groups: (1) older alluvial deposits, (2) landslide deposits, and (3) younger alluvial deposits.

3.3.2.3.1 Older Alluvial Deposits

The very old and older alluvial deposits are stream terraces ranging in age from the Early to Late Pleistocene. These terrace deposits are composed of clays, silts, sands, and gravels, and range in thickness from about 13 to 98 feet (Taylor, 2006). These terrace deposits are normally above the water table; however, they may overlie stream channel deposits (DWR, 1971).

3.3.2.3.2 Landslide Deposits

The landslides in the study area typically occur in the Capistrano and Monterey Formations. Like the stream terraces, they may overlie the water bearing stream channel deposits.

3.3.2.3.3 Younger Alluvial Deposits

The main water bearing sediments of the San Juan Creek watershed are the Younger Alluvial Deposits of the Late Pleistocene to the Holocene. The younger alluvium occupies streambeds, washes, floodplains, and other areas of recent sedimentation. The alluvial deposits' average thickness is about 90 feet throughout the study area, and they consist of a heterogeneous mixture of sand, silt, and gravel. The sediment is derived from the erosion of the more resistant bedrock formations that make up most of the watershed.

3.3.3 Geologic Cross Sections

Figure 3-14 shows the geology in greater detail in the management plan investigation area and the location of three cross sections developed for this investigation. These cross sections are shown in Figures 3-15 through 3-17. Plotted on these cross-sections are well and borehole data, including, where available, graphical borehole lithology, well casing perforations, geophysical data, and recent water levels.

Cross section A-A', which is orientated northeast-southwest and bisects the Middle and Lower Basins along San Juan Creek is shown in Figure 3-15. The northeast section terminates in terrace deposits that overly the coarse-grained Tertiary Capistrano Formation and the southeastern section terminates in the Pacific Ocean. A-A' traverses the two deepest portions of the San Juan Basin: (1) the CSJC desalter well field (CVWD-1) at about 160 ft-bgs and (2) Doheny State Beach where MWDOC MW-2 was drilled to 188 ft-bgs without penetrating the Capistrano Formation. The alluvial thickness through this section averages approximately 100 feet. The aquifer material is generally composed of coarse-grained materials (gravel and sand layers) with few interbedded silt and clay layers. A 5 to 10-foot thick basal gravel bed occurs in the wells that penetrate the Capistrano Formation. A 6 to 10-foot thick aquitard was observed in SCWD wells MW-1 and MW-4 (Geoscience, 2010). The average thickness-weighted specific yield of the wells on this cross section is about 16.5 percent.

Cross section B-B', which is oriented north-south and bisects the lower portion of Arroyo Trabuco, is shown in Figure 3-16. This cross section crosses the Arroyo Trabuco and San Juan Creek. The north section terminates in very old alluvial deposits that overlie the Capistrano Formation, and the southern end terminates in landslide deposits that also overly the Capistrano Formation. The aquifer is about 130 feet thick where the CSJC's northern production well field is located (North Open Space and Rosenbaum wells) and about 113 feet thick at the City's Dance Hall well. The aquifer material is generally composed of coarse-grained materials (gravel and sand layers) with few interbedded silt and clay layers. As in Cross section A-A', a 5 to 10-foot thick basal gravel bed occurs in the wells that penetrate the Capistrano Formation. The average thickness-weighted specific yield of the wells on this cross section is about 15 percent.

Cross section C-C', which is aligned east-west along the southern boundaries of both the Arroyo Trabuco and the Middle Basins, is shown in Figure 3-17. This cross section bisects Arroyo Trabuco, Horno, and San Juan Creeks. Both the east and west sides terminate into terrace deposits that overlie the Capistrano Formation. The aquifer thickness is about 130 feet in the vicinity the Hollywood 2A production well, thins in east to about 25 feet near Interstate 5 in the Arroyo Trabuco portion, and is about 80 feet thick near San Juan Creek. The aquifer material is generally composed of coarse-grained materials (gravel and sand layers) with few interbedded silt and clay layers. The basal gravel that overlies the Capistrano Formation is about 15 to 20 feet thick in the channel cut by Arroyo Trabuco. The average thickness weighted specific yield of the wells on this cross section is about 16 percent.

3.3.4 Groundwater Occurrence and Movement

Groundwater within the San Juan Creek watershed primarily occurs in the relatively thin alluvial deposits along the valley floors and within the major stream channels. The State Water Resources Control Board (SWRCB) has characterized this groundwater, from a water rights perspective, as flow of an underground stream. The physical nature of the San Juan Basin groundwater reservoir is described below with regard to basin boundaries, recharge, groundwater flow, and discharge.

3.3.4.1 San Juan Basin Boundaries

The physical boundaries of the San Juan Basin are shown in Figure 3-13 and include:

- Santa Ana Mountains. The Santa Ana Mountains are composed of impermeable granitic and metamorphic bedrock and form the northern boundary of the watershed.
- Sedimentary bedrock formations. Sedimentary bedrock formations form the sides of the water bearing canyons of the Upper Basin and Arroyo Trabuco (i.e. Cañada Chiquita, Cañada Gobernadora, and Bell Canyon).
- Pacific Ocean. The entire watershed drains south-southwest and into the Pacific Ocean, which forms the southern boundary of the basin.

3.3.4.2 Groundwater Recharge and Discharge

The predominant sources of recharge to the San Juan Basin include:

- Streambed infiltration in San Juan Creek, Horno Creek, Oso Creek, and the Arroyo Trabuco
- Subsurface boundary inflows at the head of these creeks on the upstream boundaries to the management plan investigation area and other minor subsurface inflows along the other boundaries
- Deep infiltration of precipitation and applied water
- Flow from fractures and springs

Groundwater discharge from the San Juan Basin occurs as:

- Groundwater production from wells
- Rising groundwater
- Evapotranspiration
- Subsurface outflow to the Pacific Ocean

In general, groundwater flow within the study area follows the surface topography: from areas of recharge in the surrounding highlands towards the central axis of the basin and then southwesterly along the axis of the basin before exiting into the Pacific Ocean. Figures 3-18 and 3-19 show groundwater elevation contours for the spring of 1987 and the fall of 2010, respectively. The direction of groundwater flow is perpendicular to the groundwater elevation contours. These maps show similar groundwater gradients and flow directions for the two time periods. A groundwater pumping depression, resulting from desalter production, is evident in the lower basin in the fall 2010 map.

3.3.5 Effective Base of the Freshwater Aquifer

Figure 3-20 depicts the effective base of the freshwater aquifer by equal depth contour lines. The geographic extent of the delineation of the effective base of the freshwater aquifer is the active storage management area with a slight extension above the active management area. Underlying this shallow alluvial aquifer system is what is commonly referred to in well completion reports as a green or blue clay/shale (believed to represent the Capistrano Formation), which likely acts as an aquitard preventing the downward movement of groundwater (Psomas, 2009). The effective base of the freshwater aquifer contours honored sixty borings that penetrated the alluvial aquifer with depths that range from 30 to 50 ft-bgs near the bedrock outcrops to about 150 to 160 ft-bgs near the confluence of Arroyo Trabuco and San Juan Creek.

3.3.6 Aquifer Storage Properties

Younger alluvial deposits comprise the aquifer material within the study area and consist of a heterogeneous mixture of sand, silts, and gravel.

Specific yield or effective porosity is a property of rocks that describes the ability of the rock to store water that can be recovered. A commonly used definition of specific yield is the quantity of water which a unit volume of aquifer, after being saturated, will yield by gravity, expressed either as a ratio or as a percentage of the volume of the aquifer. In other words, specific yield is a measure of the water available to wells. The specific yield of the aquifer-system sediments in the San Juan Basin study area was estimated through the analysis of lithologic descriptions from well driller's reports. WEI maintains a library of well driller's reports of all known boreholes that have been drilled in the San Juan Basin. The lithologic descriptions from the well driller's reports were input into a relational database along with corresponding estimates of specific yield by sediment description. A thickness-weighted, average specific yield was calculated at each borehole in the San Juan Basin, and these point values were imported to ArcGIS. Using a Kriging interpolation method within the Geostatistical Analyst extension of ArcGIS, a specific yield raster was created to interpolate specific yield of aquifer sediments between wells. Figure 3-21 shows the wells labeled by thickness-weighted, average specific yield. Specific yield values in the San Juan Basin average about 15 percent and range between 4 and 25 percent.

3.3.7 Historical Groundwater Level Monitoring

Groundwater level data has been collected from wells in the San Juan Basin since the late 1940s and early 1950s. These data have been collected by well owners, water district staff, and various consultants. In 2004, the SJBA installed nine monitoring wells with pressure transducers/data loggers that collect water level readings every 15 minutes. All of the groundwater level data collected in this investigation were carefully checked and uploaded into a relational database through WEI's HydroDaVESM system.

Figures 3-22 through 3-24 show groundwater level time histories at selected wells for the Lower and Middle San Juan Basins and for the lower portion of the Arroyo Trabuco Basin, respectively, for the 1979 through 2010 period. Figures 3-22 through 3-24 were constructed to compare groundwater level time histories to common drivers of groundwater level change: climate and production. The wells featured in the time-history plot are located on the map inset on the right hand side of each figure. On each chart, groundwater level time histories are plotted with the CDFM precipitation curve from the Laguna Beach precipitation station. Positive sloping lines on the CDFM curve indicate wet years or wet periods. Negatively sloping lines indicate dry years or dry periods. For example, the periods between 1978 to 1983, 1990 to 1998, and 2004 to 2005 are wet periods, and are represented as positively sloping lines. The periods 1983 through 1989 and 1998 through 2010 are drought periods and are represented as negatively sloping lines. Each chart also contains the time history of groundwater pumping in each basin as a stacked bar chart illustrating the magnitude of production by well in each basin. Thus, the groundwater level, climate and production time histories can be viewed together to explore how climate and production drive groundwater level changes.

Figure 3-22 illustrates the groundwater level time history for select wells in the Lower Basin. Groundwater levels in the Lower Basin ranged between 10 and 20 ft-bgs prior to the startup of the CSJC's desalter operations in 2005. After the commencement of desalter production, groundwater levels fluctuated between 20 and 40 ft-bgs. Groundwater levels at the two shallow screened monitoring wells MW-2 (perforated 14-74 ft) and MW-7 (perforated 10-90 ft) do not appear to respond to desalter production but fluctuate between 15 and 25 ft-bgs in response to climatic variations. During the wet period in the mid-1990s, groundwater levels at SJBA-2 reacted more like MW-2 and MW-7 and only fluctuated between 15 and 20 ft-bgs.

Figure 3-23 illustrates the groundwater level time history for select wells in the Middle Basin. Groundwater levels in the shallow SJBA monitoring wells (MW-4, MW-5, and MW-6) located along San Juan Creek fluctuate in response to climatic variations. As is shown in Figure 3-15, the groundwater-level and streambed of the San Juan Creek are essentially at the same elevation in this section of the study area. In other words, the Middle Basin was full of water in the spring of 2010.

Figure 3-24 illustrates the groundwater level time history for select wells in the lower Arroyo Trabuco Basin. Groundwater levels at several wells have declined from about 60 to 90 ft-bgs since the mid-1990s. Groundwater levels at MW-8 and Hollywood 2A have not undergone the same decline and fluctuate in response to climatic variations due to their close proximity to Arroyo Trabuco Creek. The lower Arroyo Trabuco Basin appears to be the only basin that may be suitable for artificial recharge due to the approximate 60 to 80 feet of unsaturated alluvium.

3.3.8 Groundwater Production Time Histories

Historical groundwater production data have been kept by private well owners and water agencies. Production data from 1978 through 2008 were compiled by MWDOC as part of their groundwater investigations for SOCOD, and the remaining data were collected from the CSJC and the SCWD. Table 3-3 shows production wells by owner and annual production for the 1978 to 2010 period. Figures 3-22 through 3-23 show the time series of annualized groundwater production at wells for the Lower, Middle, and the lower Arroyo Trabuco sub-basins, respectively. Prior to 2005, production was greatest in the lower Arroyo Trabuco Basin with average production at about 1,600 acre-ft/yr. On average, about 500 acre-ft/yr was pumped from the Middle Basin during the 1978-2010 period. Since the installation of the CSJC's desalter well field in 2005 and the SCWD's desalter in 2007, groundwater production has averaged about 3,500 acre-ft/yr.

3.3.9 Groundwater Storage Time History

The storage capacity of the alluvial areas in the San Juan Watershed was first calculated by DWR in 1972 (DWR, 1972). DWR simplified the storage calculation by dividing the alluvial aquifer into segments with similar hydrogeologic characteristics. Estimates of specific yield, area, and average alluvial thickness were made for each segment, which were, in turn, used to calculate the storage capacity of each segment. In the 1994 San Juan Basin Groundwater Management and Facility Plan, NBS Lowry calculated a combined storage capacity of about 41,600 acre-feet for the Lower San Juan, Middle San Juan and lower Arroyo from the ground surface to the base of the aquifer. In their Annual Integrated Environmental Monitoring Reports (Psomas, 2004 through 2010), Psomas created six polygons that approximately correspond to the alluvial aquifer segments delineated by the DWR in 1972 in order to make storage change calculations on an annual basis. The total storage capacity of the basins was calculated to be about 26,924 acre-ft by multiplying the area of each segment by the DWR's estimates of average thickness and specific yield. This is a difference of about 14,000 acre-ft, or 34 percent, from the DWR's estimate.

This study attempted to refine the estimates of storage capacity, groundwater currently in storage, and storage change within the study area. A GIS-based storage model was developed, and the following steps were taken: 1) develop a fine rectangular grid (i.e. GIS polygon layer) over the area, 2) compute the amount of groundwater storage in 2010, and 3) compute the total storage capacity in the each cell. These steps are described in more detail below.

1. *Develop a fine rectangular grid.* The grid cell size used in the calculation was 100x100 meters (see Figure 3-21). Where a grid cell is split by a storage segment, it is assigned parameters based on the apportionment of the grid cell in each segment (determined by area).
2. *Compute the volume of groundwater in storage in each grid cell based on the current condition.* Groundwater elevation contours for fall 2010 groundwater conditions (Figure 3-19), bottom of the aquifer elevation contours (Figure 3-20), and specific yield estimates (Figure 3-21) were used to calculate the total storage volume of each grid cell. The groundwater elevations and the bottom of aquifer elevations for each grid cell were estimated with an automated gridding program that interpolates between contours. The volume of groundwater in a grid cell for a single-layer aquifer is computed as:

$$V_i = A_i * (WL_i - B_i) * SY$$

Where V_i = volume of groundwater in the i^{th} grid cell

A_i = grid cell area (10,000 square meters for a square grid cell)

WL_i = average elevation of groundwater in the i^{th} grid cell (feet above mean sea level [ft-amsl])

B_i = average elevation of the effective base of aquifer in the i^{th} grid cell (ft-amsl)

SY = specific yield

3. *Compute the total storage capacity from the ground surface to the base of the aquifer.* The CSJC's 2-ft ground surface elevation contours, bottom of aquifer contours, and specific yield estimates were used to calculate the total storage capacity of the alluvium within the study area. The total storage capacity[6] in a grid cell for the alluvial aquifer is computed as:

$$SC_i = A_i * (GS_i - B_i) * SY$$

Where SC_i = storage capacity in the i^{th} grid cell (acre-ft)

A_i = grid cell area (10,000 square meters for a square grid cell)

GS_i = average streambed elevation in i^{th} grid cell (ft-amsl)

B_i = average elevation of the effective base of the aquifer in the i^{th} grid cell (ft-amsl)

SY = specific yield

The total storage capacity of the San Juan Basin was calculated to be about 26,500 acre-ft, and the amount of groundwater in storage in 2010 was calculated to be about 20,400 acre-ft. The amount of unused storage in the San Juan Basin is about 6,150 acre-ft. Table 3-4 compares the total storage capacity estimates made by DWR, Psomas, and WEI.

3.4 Water Rights

Several water rights permits and agreements exist to allocate groundwater production from the lower San Juan Basin.[7] A list of the existing water rights permits and pending water rights applications are shown in the table below.

---

[7] Note that the discussion of water rights contained herein is for illustrative purposes only and should not be construed as restricting, granting, or otherwise endorsing any particular claim of right. Rather, the discussion of water rights is for the purpose of explaining the amount of water rights that have been approved or applied for, and the agreements made by and amongst the parties to protect their existing or potential future rights. Any future projects proposed or implemented by the SJBA or other parties will need to address water rights, and the impacts the projects have on these rights, in more thorough detail.

Applicant	Application Number	Permit Number	Diversion Amount Eligible Under Current Permit and Agreements (acre-ft/yr)	Diversion Amount Potentially Eligible to be Permitted and Agreement (acre-ft/yr)	Purpose of Use
SCWD	A30337	21138	1,300	1,300	Municipal
SJBA	A30123	21074	8,026	10,702	Municipal
SMWD	A25557	17489	611 (Nov to Apr)	611 (Nov to Apr)	Irrigation
SMWD	A25733	17692	32 (Nov to Apr)	32 (Nov to Apr)	Irrigation
San Juan Hills Golf Course (SJHGC)	A30171	21142	450	450	Irrigation
CSJC	A30696[8]	N/A	3,325	3,325	Municipal
Totals			13,520	16,520	

Pursuant to SJHGC's current water rights permit, the State Board has only authorized the diversion of up to 450 acre-ft/yr. However, per the 1997 agreement between SJBA and SJHGC, the SJBA has agreed not to protest any increase to the SJHGC right up to a total right of 550 acre-ft/yr, subject to the terms of the agreement.

The key provisions of the SJBA and SCWD Water Rights Permits are:

- SJBA rights can be pumped out of the desalter project.
- SJBA right can be increased by 2,676 acre-ft/yr upon showing the availability of un-appropriated water and approval by the SWRCB Chief, Division of Water Rights.
- Allocation of water between SCWD and the SJBA is recognized as governed by agreements of Nov 21, 1995, Mar 1, 1998 and joint letter of Mar 13, 1998.
- Monitoring wells shall be used to measure groundwater levels on a minimum quarterly basis.
- The project shall not cause injury to the reasonable and beneficial uses of water recognized in the Basin Plan.

[8] The application remains pending, and CSJC is currently evaluating options for the future disposition of its application. In the meantime, all or most of the water pumped and treated under SJBA's Permit 20174 is beneficially used in the CSJC's service area.

- Downstream TDS and chloride concentration in groundwater shall be monitored when SJBA extractions exceed 4,800 acre-ft/yr (Phase 2). Extractions shall not cause Basin Plan Objectives to be exceeded or further degradation to occur.
- Mitigation monitoring of stresses to native vegetation is required when SJBA extractions exceed 4,800 acre-ft/yr), and if groundwater pumping has caused significant stresses to the vegetation then the SJBA will be required to cease pumping until the stress has been reduced to acceptable levels.
- Extractions by all pumpers shall not exceed the total recharge and the condition is satisfied as long as groundwater storage does not fall below 50 percent of the storage capacity of the basin.
- The SJBA pumping right is subject to the prior riparian right of San Juan Hills Golf Course (SJHGC) and shall not cause significant impact on water quality.

The groundwater rights and other conditions were agreed to by the parties in four agreements.

- Nov 1995 SJBA/CSJC Agreement.
  - By this Agreement, SJBA recognized and agreed that it would not challenge the CSJC extractions up to 3,325 acre-ft/yr
  - SJBA agreed to not operate its Groundwater Recovery Project in a manner that would infringe upon the City's extraction of water.
- 1997 SJBA/SJHGC Agreement
  - The SJHGC can continue to take up to 550 acre-ft/yr of water from the Basin under any water right (riparian or appropriative), and that water will be used for "irrigation and other proper riparian purposes only."
  - The SJHGC will request that the State Board include the riparian use limitation in the appropriative rights permit (as is show in the table above).
  - The SJBA will not oppose the SJHGC's application to appropriate water, and will not "interfere with" the SJHGC's take of 550 acre-ft/yr from the basin.
  - The SJBA will not take water from the Basin in a manner that causes significant injury to the quality of water necessary for use by the Golf Course or any other use recognized for the San Juan Creek watershed in the San Diego Basin Plan.
- Mar 1, 1998 SCWD/SJBA Settlement Agreement
  - SJBA to establish a Project Committee 10 "Basin Management Committee" which would serve as the "Basin Manager". The Basin Manager is responsible for determining on an annual basis the amounts of Available Safe Yield (ASY) which can be diverted by SCWD and SJBA from their water rights.

  - SCWD Base Allocation was set at 20 percent of the ASY up to a maximum of 1,300 acre-ft/yr.
  - SJBA Base Allocation was set at 80 percent of ASY, up to a maximum of 12,500 acre-ft/yr.
  - Either party can use the other parties unused allocation.
  - SCWD is responsible for artificial replenishment when necessary to achieve the SCWD's annual diversion but both parties agree to work to avoid diversions that will result in the need for artificial replenishment.
  - SCWD to become a member of SJBA.
  - SCWD agreed to not interfere with City water rights in total of 3,325 acre-ft/yr.
  - SCWD expressed that it had no interest in the SJBA water right or desalter project.
- Oct 2002 Project Implementation Agreement San Juan Basin Desalter Project
  - CSJC's allocated interest in the SJBA water rights were set at 5,800 acre-ft/yr from the desalter project.
  - SJBA has no obligation to provide make-up water to the CSJC as the allocation exceeds CSJC's base right of 3,325 acre-ft/yr.

The active management area of the SJBGFMP excludes the RMV whose lands and water use are upstream and not included in the SJBGFMP except through the recognition of the RMV upstream water uses and water rights. The management activities included in the SJBGFMP occur completely downstream of the RMV and they do not interfere with the water rights and management activities of the RMV.

3.5 Recent Results of MWDOC Groundwater Model Application to the San Juan Basin

The MWDOC and five agencies – Laguna Beach County Water District, MNWD, City of San Clemente, CSJC, and SCWD – have been investigating the feasibility of improving local water reliability in south Orange County through the development of SOCOD. This project would decrease the area's dependence upon imported drinking water supplies. Currently, South Orange County depends on water imported from northern California and the Colorado River to meet approximately 95 percent of its local demand[9].

The proposed ocean desalination facility would be located north of Doheny State Beach in Dana Point, adjacent to San Juan Creek on the inland side of Pacific Coast Highway. It would produce approximately 15 million gallons of drought-proof water per day (16,000 acre-ft/yr),

[9] http://www.mwdoc.com/pages.php?id_pge=68

which is approximately 25 percent of the area's potable water demand. This new, local water supply would also benefit the area during emergencies and outages of the regional imported water delivery system. The projected SOCOD project construction cost is estimated at about $182 million to $241 Million (estimated 2012 dollars, without and with Fe/Mn treatment, respectively), and the unit cost of water could range from about $1,500 to $1,700 per acre-ft[10] without incentives from MWDSC.

The project would divert seawater into the treatment plant through slant wells drilled into the near and offshore parts of the San Juan groundwater basin. These wells will induce seawater into the aquifer as well as draw groundwater from the landward side of the well field. The use of this forced seawater intrusion into the slant wells will greatly reduce the cost of pre filtration and eliminate the environmental challenges caused by direct intake of seawater.

Two phases of project feasibility testing have been conducted successfully at Doheny Beach since 2005. The project entered Phase 3: Extended Pumping & Pilot Plant Testing in early 2010 and was completed in May 2012. If pumping results are favorable, efforts would be initiated to move forward with development of a full-scale project description and environmental impact report (EIR). Successful adoption of the EIR and the receipt of all necessary permits from all appropriate regulatory agencies would be the next steps prior to project implementation and the initiation of construction. As planned, the project would be constructed and operational within two years, and water deliveries could begin as early as fall 2019..

The implementation of the SOCOD project will have significant impacts on the San Juan groundwater basin and include a reduction in the yield of the basin by diversion of groundwater from the landward side of the slant well intake system, and by the likely creation of a seawater intrusion barrier caused by the slant wells system. As to the latter, the regional groundwater level depression caused by the SOCOD intake could virtually eliminate future seawater intrusion regardless of how the San Juan groundwater basin is managed. Therefore if implemented, the natural yield of the San Juan groundwater basin would likely decline and the basin could be operated at lower levels during drought periods without the fear of seawater intrusion. These findings are preliminary and based on preliminary groundwater modeling conducted by MWDOC and its consultants. Additional surface and groundwater modeling and other investigations will be required to validate and refine these findings.

3.5.1 Summary Description of MWDOC's Groundwater Model of the San Juan Basin

Prior to the completion of this draft report, there was no written documentation of MWDOC's Groundwater Model other than pdf's of PowerPoint presentations located on MWDOC's website. Since the release of this report, the MWDOC model report was completed and is available for review at http://www.mwdoc.com/services/dohenydesal. Below is a summary of the model's limitations.

[10] MWDOC planning documents in early 2013 suggests that the unit cost could range between $1,800 and $2,000 per acre-ft in 2019 when the SOCOD project could become operational.

There are always limitations in the application of models. The specific limitations that were identified from the review of presentation materials and supplementary materials provided by MWDOC and the final report[11] include the following[12]:

- There is very little data that can be used to calibrate the model under high pumping stresses. This reduces confidence (or requires greater faith) in the models ability to predict future groundwater levels during dry periods and higher than historical production. This challenge can be addressed in the future through monitoring. Also, MWDOC should consider conducting sensitivity analysis to explore the how their model would predict groundwater level changes with alternative but plausible data sets.

- The subsurface boundary inflows are purported to average 2,700 acre-ft/yr, with this value being tied to other upstream surface modeling work. There is insufficient data to support the plausibility of this assumption given the limited size of the aquifers upstream of the model boundaries and the great variability in the hydrology upstream of these boundaries. As will be seen below, a constant subsurface inflow of 2,700 acre-ft/yr is a substantial part of the production yield of the basin during wet and dry periods. The implication to producers in the San Juan groundwater basin is that the model will likely over-estimate the ability to produce groundwater during dry periods.

- Seawater intrusion in the vicinity of the SCWD wells was estimated with a model that is not capable of simulating groundwater flow with variable density fluids. This may or may not be a limitation – presumably the appropriateness of the present model application will be demonstrated.

- The model projections do not include a provision in the water rights agreement limiting groundwater production when groundwater storage falls below half of the basin's storage capacity. The implication is that the model may project greater groundwater pumping during dry periods than may be allowed per the SWRCB permits. In fairness the permit is not clear on how production would be reduced when storage falls below half the basins storage capacity. This is explored in the section below.

3.5.2 MWDOC 2013 Groundwater Model Results for the SJBGFMP Baseline and Implications for the SJBGFMP

As mentioned above, the MWDOC model documentation is in preparation and was not available at the time this document was being prepared. WEI did request and obtain certain

[11] South Orange Coastal Ocean Desalination Project, Phase 3 Extended Pumping and Pilot Plant Testing, Volume 3 – San Juan Basin Regional Watershed and Groundwater Models, prepared by Geoscience Support Services, 2013.

[12] MWDOC's consultant provided WEI with supplementary information including certain water budget, model parameters and other hydrologic data and these comments are based on MWDOC power point presentations and supplementary information.

information to enable us to characterize the basin response to baseline stresses. This characterization is described herein.

Table 3-5 shows the baseline water budget for the San Juan basin model area for a constant 2014 groundwater production projection and the hydrologic period 1947 through 2010. The water budget shown in Table 3-5 represents how the basin would respond under 2014 production if that production were held constant for a long representative hydrologic period. The hydrologic period shown in Table 3-5 includes statistical summaries for a wet period (1978-1983), a dry period (1947-1976), the so called "average" period (1963-1992) and the entire simulation period. The simulation period 1947 through 2010 period contains very similar statistics to the average period and therefore the average period is not included in the subsequent discussion. Table 3-5 shows the hydrologic year, the recharge components, discharge components, the change in storage (sum of recharge components minus the sum of discharge components), end of period storage, deviation from minimum storage to maintain maximum production, and the unmet production demand.

The recharge components include underflow from upgradient groundwater resources in San Juan Creek, Horno Creek, Arroyo Trabuco and Oso Creek (column 1); streambed infiltration in the model area including natural flows and dry-weather flows (column 2); the deep infiltration of return flows (column 3); subsurface boundary inflows from adjacent non water bearing areas (column 4); and subsurface (underflow) from the ocean (column 5). The total inflow is shown in column 6 and ranges from low of about 4,300 acre-ft/yr to a high of about 24,000 acre-ft/yr, averages about 10,200 acre-ft/yr – about 1,000 acre-ft/yr less than the amount requested by all the groundwater producers in the basin, and the median is about 8,400 acre-ft/yr which is about 2,800 acre-ft/yr less than the amount requested by all the groundwater producers in the basin. The total recharge is dominated by the streambed infiltration that ranges from 1,400 to 19,100 acre-ft/yr, averages about 6,700 acre-ft/yr and has a median value of about 5,000 acre-ft/yr. The underflow from the ocean shown in column 5 is seawater intrusion and ranges from 0 in the first year to about 600 acre-ft/yr, averages about 300 acre-ft/yr and has a median value of 400 acre-ft/yr. This seawater intrusion is predicted to impact the SCWD desalter wells in the early 2020s. Both the SJBA and the SCWD diversion permits, contain language that prohibits water quality degradation due the exercise of rights conferred by the permits. Review of Table 3-5 indicates that the underflow from the ocean is essentially positive for all years meaning that seawater intrusion is projected to occur even for groundwater production levels less than the planned amounts. Seawater intrusion, if it occurs as suggested by the model, will degrade the basin water quality and thus the production allowed for within the permits will have to be reduced to the point that no seawater intrusion occurs[13].

The discharge components include groundwater production (column 7), evapotranspiration (column 8), rising groundwater discharge to streamflow (column 9), and underflow to the ocean (column 10). The total discharge is shown in column 11 and ranges from low of about 7,900 acre-ft/yr to a high of about 12,900 acre-ft/yr, averages about 10,300 acre-ft/yr, and the

[13] Model predictions of seawater intrusion are not conclusive. The SJBA is conducting groundwater monitoring to determine if and when seawater intrusion occurs and will take appropriate measures if and when seawater intrusion is detected.

median is also about 10,300 acre-ft/yr which is about 900 acre-ft/yr less than the planned groundwater production. The total discharge is dominated by the model-predicted groundwater production that ranges from 7,400 to 11,200 acre-ft/yr, averages about 9,600 acre-ft/yr and has a median value also of about 9,600 acre-ft/yr. The 2014 groundwater production was estimated initially by the SJBA TAC members and represents the potential maximum groundwater production for the basin for 2014. The SJBA TAC members supplied individual well production estimates and drawdown constraints that limit groundwater production at wells when the groundwater production falls below the drawdown constraint. The 2014 production was estimated as follows:

- 7,758 acre-ft/yr – CSJC desalter wells
- 1,023 acre-ft/yr – CSJC other wells
- 1,585 acre-ft/yr – SCWD desalter wells
- 850 acre-ft/yr – Other private wells
- 11,216 acre-ft/yr – Total "requested" production

In practice when the groundwater model predicts a groundwater level at or below water level constraint[14] at a well, the model ceased production at the well to try to maintain groundwater levels at or about the constraint. The annual production totals listed in Table 3-5 show that production was limited by groundwater levels falling below drawdown constraints in 56 of 63 years of the simulation period or about 90 percent of simulation period.

The other discharge components are relatively minor and in aggregate range from about 500 to 1,600 acre-ft/yr, average about 700 acre-ft/yr and have a median value of about 600 acre-ft/yr.

The end of period storage is equal to the storage at the beginning of the year (the end of period storage for the prior year, column 13) and the change in storage for the current year (column 12). For example the end of period storage for 1948 is equal to the end of period storage for 1947 (17,637 acre-ft) plus the change in storage for 1948 of -5,781 acre-ft and equals 11,857 acre-ft. The end of period storage ranges from 7,500 acre-ft to 43,900 acre-ft, average about 18,400 acre-ft and has a median value of about 17,200 acre-ft.

Figure 3-25 shows the relationship of end of period storage to model predicted groundwater production. The chart shows that requested or planned groundwater production is usually achievable if the end of period storage is greater than 27,000 acre-ft, and that the predicted production is highly variable and sometimes substantially less when the end of period storage is less than 27,000 acre-ft. The variability in predicted production is due to the variability in stream infiltration when the prior year end of period storage is less than 27,000 acre-ft.

Figure 3-26a shows the frequency of end of period storage based on the end of period time series shown in column 13 in Table 3-5. Review of Figure 3-26a indicates that the end of

[14] Production at a well is assumed to cease when the groundwater elevation at a well is projected to fall below an elevation corresponding to two feet above the top of screens

period storage will be less than half of the basin capacity at least 71 percent of the time, or seven out ten years.

Figure 3-26b is a similar figure that shows the frequency of model-predicted annual production for the hydrologic period and existing cultural conditions. Combining Figures 3-25, 3-26a and 3-26b reveals that:

- The basin producers will produce less than the desired 11,200 acre-ft/yr 85 percent of the time or about nine out of ten years. Restated, the basin producers will be able to meet their desired production one out of ten years.

- The basin producers will produce less than 11,000 acre-ft/yr 71 percent of the time or about seven out of ten years; production of 11,000 acre-ft/yr corresponds to storage of about 22,900 acre-ft or close to half the estimated basin storage capacity of 43,900 acre-ft. Restated, the basin producers will be able to product more than 11,000 acre-ft/yr in three out of ten years when the groundwater in storage is greater than half of the basin storage capacity.

- The basin producers will be produce less than the average achievable production of 9,600 acre-ft/yr about 49 percent of the time or about five out of ten years; this will occur when the groundwater in storage is less than 16,000 acre-ft and is less than half full. Restated the basin producers will produce the average achievable production of 9,600 acre-ft/yr at least five out of ten years when the groundwater in storage is greater than 16,000 acre-ft.

The take-away from this baseline simulation is that planned production by the CSJC and SCWD along with private producers seems to exceed the production capabilities of the basin and will result in production levels less than planned and potentially seawater intrusion. The average production from the basin under the baseline plan appears to be about 9,600 acre-ft/yr and ranges from about 7,400 acre-ft/yr to about 11,200 acre-ft/yr. The firm yield of the basin appears to be less than 7,000 acre-ft/yr. The limiting factors on yield are storage and the ability to capture and recharge surface water during and after storms. The management plan moving forward will need to include increased recharge, decreased production or some combination of the two to meet the water needs of those dependent on the basin.

3.5.3 The Impacts of SOCOD on San Juan Basin Production

At the March 21, 2013 SOCOD Technical Advisory Committee meeting, MWDOC presented the results of its most recent model investigations of the projected impacts of the SOCOD project on producers in the San Juan Basin. The average decline in yield over the dry period of 1947 through 1976 is projected to be about 1,500 acre-ft/yr – no information was presented to characterize the SOCOD impacts on production during the driest years (no annual minimum). MWDOC estimated that implementation of the SOCOD project would result in an average decline of 1,800 acre-ft/yr of production among basin producers during the "average" climate period of 1963 through 1992.[15]

[15] Handouts from the March 21, 2013 SOCOD TAC meeting, Agenda item 2.

3.6 Yield Concepts for the SJBGFMP

3.6.1 Definition of Safe Yield

Water managers, civil engineers, hydrogeologist have wrestled with the term "safe yield" since the turn of the last century. The goal was to scientifically define and estimate a term for how much groundwater can extracted from a groundwater basin in a reliable manner.

Lee (1915) defined safe yield as the limit to the quantity of water which can be withdrawn regularly and permanently without dangerous depletion of the storage reserve. He noted that water permanently extracted from an underground reservoir reduces by an equal quantity the volume of water passing from the basin by way of natural channels, i.e., the natural discharge.

Theis (1940) recognized that all groundwater of economic importance is in constant movement through a porous rock stratum, from a place of recharge to a place of discharge. He reasoned that under pristine conditions, aquifers are in a state of approximate dynamic equilibrium. Discharge by pumping is a new discharge superimposed on a previously stable system; consequently, it must be balanced by: an increase in natural recharge; a decrease in natural discharge; a loss of storage in the aquifer; or a combination thereof. Significantly, Theis (1940) distinguished between natural recharge and available recharge.

The most common definition of safe yield is attributed to Todd (1959): the rate at which groundwater can be withdrawn perennially under specified operating conditions without producing an undesirable result. Most modern groundwater adjudications use some form of this definition. The definition also ties the safe yield to the cultural conditions of a specific year—presumably a near current year if cultural conditions are changing. Undesirable results commonly listed in literature include the depletion of groundwater reserves, intrusion of water of undesirable quality, contravention of existing water rights, excessive increases in production costs, stream flow depletion, and subsidence (Freeze & Cherry, 1979; Todd, 1959).

Safe yield is incorporated in the physical solution of adjudicated groundwater basins. Most of these physical solutions use different definitions of safe yield but they are all directed to enable a groundwater basin to be managed in a sustainable way.

3.6.2 Alternative Yield Concepts for the SJBGFMP

The concept of safe yield does not strictly apply to the San Juan Basin as the storage in the groundwater basin is small relative to recharge and production. The SWRCB has found that the San Juan basin is "flow of an underground stream" which means that they consider the groundwater in the basin a surface water.

A more appropriate yield term for the San Juan basin is "firm yield" a term used by the U.S. Bureau of Reclamation to describe the maximum quantity of water that can be guaranteed with some specified degree of confidence during a specific critical period. The critical period is that period in a sequential record that requires the largest volume from storage to provide a specified yield[16].

---

[16] www.usbr.gov/projects/glossary.jsp

More water can be produced from the basin most of time. What's needed is an articulation of how much can be produced given a specific amount of storage going into each production season and a statistical characterization of that production – an adaptive yield that's large enough to meet local demands with the potential to be augmented through various management schemes including artificial recharge. Given what has been learned in this investigation it appears that the minimum yield (firm yield) of the San Juan basin is slightly less than 7,000 acre-ft/yr; and that the basin could be managed to produce, with current production facilities and additional facilities that could constructed in the near term, between 7,000 and 11,000 acre-ft/yr. This would require intensive monitoring and facilities to protect the basin from seawater intrusion. The adaptive yield could also be augmented through aggressive means including the recharge of supplemental water.

The SJBA should consider adopting the term "adaptive yield" which in magnitude is bracketed by firm yield on the low end and a maximum yield consisting of natural and artificial recharge, and where the yield for a given year is established in the spring based on the groundwater levels in the spring and planned artificial recharge during the spring, summer and fall.

3.7 Water Quality

3.7.1 Data Sources

3.7.1.1 Surface Water Data Sources

All available surface water quality data in the San Juan Basin were collected for surface water sites along the San Juan Creek and its tributaries from a number of different data sources. Table 3-6 summarizes the different data sources and surface water stations from which water quality data were collected. The most continuous surface water quality monitoring program in the San Juan Basin is the County of Orange's storm water monitoring program. Grab and composite surface water quality samples for the County of Orange's Bioassesment and Mass Emissions storm water monitoring programs were collected for six sites in the study area with data from 2000 to 2009, and four sites with data from 1993 to 2009. Surface water quality data were collected from the San Diego Regional Water Quality Control Board, with data from 2002 to 2003 and 2009 to 2010 for their Surface Water Ambient Monitoring program. Surface water quality data were collected for the five SJBA monitoring sites along San Juan Creek, and for two SMWD monitoring sites at the Oso and Horno Creek Barriers. Additional surface water quality data were collected for project-specific monitoring programs for studies performed by Wildermuth Environmental (WEI, 1999) and CDM (1987). Figure 3-27 shows the locations of all the surface water quality monitoring sites in the San Juan Basin along the San Juan Creek and its tributaries.

3.7.1.2 Groundwater Data Sources

All available groundwater quality data for wells in the San Juan Basin were collected from a variety of resources for the period from 1952 to 2010. Table 3-7 summarizes the different sources from which water quality data were collected. Previous studies by DWR (1972), WEI (1999), CDM (1987), NBS Lowery (1994), and GeoTechnical Consultants, Inc. (GTC, 2001) provided sporadic historical groundwater quality data for various private and public wells the San Juan Basin. Groundwater quality data from production wells were extracted from the State of California Department of Public Health (CDPH) database for wells owned by the City, SCWD, RMV (Well 7), and SJBA. Additional production well data was provided by the City and SMWD. Monitoring well data from the California SWRQB GeoTracker website were collected for point-source contamination sites. Monitoring well water quality was provided by the SJBA for their nine San Juan Basin monitoring wells. Figure 3-28 shows the location of wells were water quality data were collected in the San Juan Basin.

3.7.1.3 Information Management

All groundwater and surface water quality data were uploaded into HydroDaVE. These data are readily accessed through the HydroDaVE Explorer interface where the user can perform spatial and temporal queries. All data collected for this project will be delivered in a HydroDaVE project file. Maintaining water resources data in HydroDaVE will make these data available for future projects and will save money.

3.7.2 Beneficial Uses

The Water Quality Control Plan for the San Diego Basin, or the Basin Plan, (SDRWQCB, 1995) identifies the beneficial uses for surface waters in the study area as AGR, REC1, REC2, WARM, COLD, and WILD. Surface waters in the San Juan Watershed have "been exempted by the Regional Board from the municipal use designation [MUN] under the terms and conditions of State Board Resolution No. 88-63, Sources of Drinking Water Policy." The Basin Plan identifies the beneficial uses for groundwater as MUN, AGR, and IND. Because of the interaction of surface water and groundwater in the watershed, this technical memorandum also compares surface water constituent concentrations with drinking water standards. The beneficial uses designations are defined as follows:

- Agricultural Supply (AGR) – Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
- Contact Water Recreation (REC1) – Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.
- Non-contact Water Recreation (REC2) – Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
- Warm Freshwater Habitat (WARM) – Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

- Cold Freshwater Habitat (COLD) – Includes uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
- Wildlife Habitat (WILD) – Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
- Municipal and Domestic Supply (MUN) – Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- Industrial Service Supply (IND) – Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

3.7.3 General Surface Water Quality Characterization

Figure 3-27 shows all surface water stations with water quality monitoring data. Constituents in surface water were compared with both water quality objectives in the Basin Plan and California water quality standards (primary and secondary maximum contamination levels (MCLs) and notification levels (NLs)) enforced by DPH. California drinking water MCLs were used because they are the same or more stringent than federal drinking water standards.

Basin Plan water quality objectives "must protect the most sensitive of the beneficial uses which have been designated for a water body. Water quality objectives may be numerical values for water quality constituents or narrative descriptions. Water quality objectives must be based upon sound scientific water quality criteria needed to protect the most sensitive of the beneficial uses which have been designated for a water body. Water quality objectives must be as stringent as or more stringent than water quality criteria [developed under the Clean Water Act]. " Tables 3-2 and 3-3 in the Basin Plan list water quality objectives for inland surface waters and for groundwater. Other constituents are prospectively incorporated by reference in the following tables in the Basin Plan:

- Table 3-4: Inorganic Chemicals
- Table 3-5: Organic Chemicals
- Table 3-6: Secondary MCLs for Consumer Acceptance Limits

The Basin Plan also includes narrative objectives, including the following calculation for percent sodium:

$$\%\,Na = \frac{100 \cdot Na}{(Na + Ca + Mg + K)}$$

where Na, Ca, Mg, and K are expressed as milliequivalents per liter (meq/L) concentrations. To the extent data were available, environmental concentrations were compared with these narrative objectives.

Drinking water quality standards are promulgated by federal and state agencies. Primary MCLs are enforceable criteria that are set due to health effects. They are developed by the USEPA from MCL Goals and by CDP from Public Health Goals or from one-in-a-million incremental cancer risk estimates for carcinogens and threshold toxicity levels for non-carcinogens. Secondary standards are related to the aesthetic qualities of the water, such as taste and odor. For some chemicals, there are "Notification Level" (NL) criteria that are set by the CDPH. These are health-based advisory levels established by CDPH for chemicals that lack MCLs. When notification levels are exceeded, the CDPH recommends that the utility inform its customers and consumers about the presence of the contaminant and any health concerns associated with exposure. The level at which the CDPH recommends the drinking water system remove the affected drinking water source from service is the "Response Level." These levels range from 10 to 100 times the notification level, depending on the chemical.

Table 3-8 in this report list all the constituents for which Primary or Secondary Drinking Water MCLs or State NLs were exceeded at surface water sites in the San Juan Basin. The first portion of the table lists the Primary and Secondary MCLs, and State NLs for those constituents, and is primarily California State MCLs unless otherwise noted. The remaining portion of the table shows statistics for the occurrence of an MCL or NL exceedance for two time periods; the last five years (2006 to 2010) and the historical record prior to the last five years (1987 to 2005). The two time periods are shown because data for the last five years is not representative of all of the surface water data collected in the San Juan Basin at the various sites, as shown in Table 3-8. The exceedance statistics summarize the count and percentage of sites and samples exceeding an MCL or NL, and the count and percentage of sites and samples not exceeding an MCL or NL. As an example, in the period 1987 through 2005, there were 19 surface water stations where TDS exceeded the secondary MCL of 500 milligrams per liter (mg/L) and 10 stations where the MCL was not exceeded. In this period, 192 samples (88 percent) were greater than the MCL and 27 samples (12 percent) were less than the MCL.

Table 3-9 in this report summarizes compliance with the Basin Plan surface water objectives for the constituents shown in Table 3-2 of the San Diego Basin Plan for all surface water monitoring sites on the San Juan Creek and its tributaries. The basin plan compliance metric requires that the concentration of these constituents shall not exceed its respective objective more than 10 percent of the time during any one-year period. Table 3-8 contains demonstrations as to whether or not measured surface water quality at each site has exceeded the Basin Plan objectives more than 10% of the time in any given year. In Table 3-9, the surface water sites are organized by surface water body from upstream to downstream, and the status of compliance with each objective is shown for the entire period of record where data are available. As an example, the surface water station San Juan Creek at La Novia (SJC @ La Novia in Table 3-9) has a discontinuous record for TDS concentration spanning 1987 through 2009, a period of 23 years. The TDS concentration was sampled in 5 of the 23 years. For the five years with TDS concentration data, the TDS concentration was above the objective more than 10 percent of the time.

3.7.4 General Groundwater Quality Characterization

Figure 3-28 shows all wells in the San Juan Basin for which groundwater quality data were available. Inorganic and organic constituents detected in groundwater samples from wells in the San Juan Basin through June 2010 were analyzed synoptically and temporally. This analysis included all available data from production and monitoring wells. Hence, the data do not represent a programmatic investigation of potential sources nor do they represent a randomized study that was designed to ascertain the water quality status of San Juan Basin. These data do, however, represent the most comprehensive information available to date. Monitoring wells targeted at potential sources tend to have greater concentrations than municipal or agricultural production wells. Wells with constituent concentrations greater than one-half of the MCL represent areas that warrant concern and inclusion in a long-term monitoring program. In addition, groundwater in the vicinity of wells with samples greater than the MCL may be impaired from a beneficial use standpoint, which for the study area are MUN, AGR, and IND.

Table 3-10 in this report list all the constituents for which Primary or Secondary Drinking Water MCLs or State NLs were exceeded at wells in the San Juan Groundwater Basin. The first portion of the table lists the Primary and Secondary MCLs, and State NLs for those constituents, and is primarily California State MCLs unless otherwise noted. The remaining portion of the table shows statistics for the occurrence of a MCL or NL exceedance for the last five years (2006 to 2010). The exceedance statistics summarize the count and percentage of sites and samples exceeding a MCL or NL, and the count and percentage of sites and samples not exceeding an MCL or NL. As an example, during 2006 to 2010 there were 22 wells where TDS exceeded the secondary MCL of 500 mg/L and no wells stations where the MCL was not exceeded. During this period, 424 samples (100 percent) were greater than the MCL and no samples (0%) were less than the MCL.

Table 3-11 in this report summarizes compliance determination of the San Diego RWQCB groundwater quality objectives for constituents shown in Table 3-3 of the Basin Plan for all wells in San Juan Groundwater Basin study area where groundwater quality data was collected. Table 3-11 shows the constituents with the corresponding groundwater quality objectives. As stated in the Basin Plan, the concentrations of these constituents are not to exceed the objective more than 10 percent of the time during any one year period. This table shows groundwater quality objective compliance by evaluating data per calendar year for the time period of 2006 to 2010. Wells are group by groundwater basin hydrologic Sub Area, and compliance of objectives for each well is summarized by the constituent, the number of years the constituent was sampled for during the five year period, and the number of years the concentration was above and below the objective based on the 10 percent metric.

3.7.5 Surface Water and Groundwater Quality Areal and Temporal Distribution

Figures were developed to depict the areal distribution of surface and groundwater quality in the study area. For each of the groundwater maps, time-history plots of constituent concentrations are also shown for four key wells: Rosenbaum Well 1, Hollywood Well 2A, San Juan Hills Golf Course Well, and SJBA #2. These wells were chosen because of their relatively long time history of water quality data. For each of the groundwater maps, the well symbols denote the maximum concentration of a given constituent for the last five years: 2006 through 2010. Because of the paucity of surface water quality data, the surface water maps depict the maximum concentration over the entire record of data.

Groundwater and surface water quality maps were prepared for following constituents where the MCL was exceeded at 10 percent or more of the groundwater sample during 2006 to 2010: total dissolved solids (TDS); manganese; iron; sulfate; and chloride. Groundwater quality maps only were prepared for methyl-tert-butyl-ether (MTBE), tert-butyl-alcohol (TBA), benezene, and arsenic where the MCL was exceeded in 10 percent or more of samples which were predominantly at wells associated with the known point source contamination monitoring; these maps are discussed in a later section. A nitrate as nitrogen (NO3-N) groundwater map was also prepared because nitrate is a constituent generally used to characterize the overall water quality of a basin and often used in compliance determination.

For the figures that depict water quality distributions in the San Juan Basin, the following convention is followed in setting class intervals in the legend (where WQS is the applicable water quality standard [see table below]).

Water Quality Class Interval Symbology

Symbol	Class Interval
	Not Detected
	<0.5x WQS, but detected
	0.5x WQS to WQS
	WQS to 2x WQS
	2x WQS to 4x WQS
	> 4x WQS

3.7.5.1 Total Dissolved Solids

TDS comprise inorganic salts dissolved in water; the major ions are sodium, potassium, calcium, magnesium, bicarbonates, chlorides, and sulfates Under Title 22, TDS is regulated as a secondary contaminant; high concentrations of TDS may be objectionable to consumers from an aesthetic standpoint. Secondary MCLs are established as guidelines to assist public water supply agencies in managing drinking water supplies for taste, odor, and color. The California secondary drinking water MCL for TDS is 500 mg/L. The following table lists the drinking water standard, and the surface water and groundwater objectives for TDS:

TDS Concentration Objectives in the Basin Plan

Drinking Water Standard	Hydrologic Area (HA) or Hydrologic Sub Area (HSA)	TDS Objective or MCL (mg/L)
California Secondary MCL		500
	Surface Water	
	Mission Viejo HA	500
	Groundwater	
	Oso HSA	1,200
	Upper Trabuco HSA	500
	Middle Trabuco HSA	750
	Gobernadora HSA	1,200
	Upper San Juan HSA	500
	Middle San Juan HSA	750
	Lower San Juan HSA	1,200
	Ortega HSA	1,100

Figure 3-29 shows the distribution of the maximum TDS concentrations in groundwater in the San Juan Basin from 2006 through 2010 as well as time history plots of the four key wells. All wells exceeded the secondary MCL for TDS, and several wells exceeded the Basin Plan objective for their respective sub areas. Note that there are numerous wells in the study area that do not have recent data (last five years).

Figure 3-30 shows the TDS concentrations in surface water in the San Juan Watershed. With the exception of the upper reaches of Arroyo Trabuco and San Juan Creek, TDS is generally greater than the MCL and the objective for the Mission Viejo HA. TDS is highest in the Oso and the Lower San Juan hydrologic sub areas (HSAs).

The relatively higher TDS in the lower portions of the basin can be attributed to irrigation return flows (agricultural and domestic landscape irrigation), fertilizer use, consumptive use, and the dissolution of ions from weathered rock surfaces and evaporate salts. As water percolates through soil, it dissolves ionic and non-ionic particles from mineral surfaces and exchange sites.

3.7.5.2 Nitrate Nitrogen

Nitrate can be naturally-occurring and it can also be associated with agriculture, septic systems, POTW discharges. Nitrate can be converted into nitrite, especially in the gastrointestinal system of infants; nitrite is a concern because it can interfere with the ability of red blood cells to transmit oxygen, potentially leading to a condition called methemoglobinemia, or "blue-baby syndrome."

The primary MCL for NO3-N in drinking water is 10 mg/L . The following table lists the drinking water standard, and the surface water and groundwater objectives for NO3-N:

Nitrate-Nitrogen Concentration Objectives in the Basin Plan

Drinking Water Standard	Hydrologic Area (HA) or Hydrologic Sub Area (HAS)	Objective or MCL (mg/L)
California Primary MCL		10
	Surface Water	
	Mission Viejo HA	footnote[17]
	Groundwater	
	Oso HSA	10
	Upper Trabuco HSA	10
	Middle Trabuco HSA	10
	Gobernadora HSA	10
	Upper San Juan HSA	10
	Middle San Juan HSA	10
	Lower San Juan HSA	10
	Ortega HSA	10

Figure 3-31 shows the distribution of the maximum nitrate-nitrogen concentrations in groundwater in the San Juan Basin from 2006 through 2010 as well as time history plots of the four key wells. Nitrate is typically below the MCL for wells in the study area with data. The only two wells that exceeded the MCL were the Stonehill well and MW-20A (associated with

[17] "Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth." *Ibid.* p. 3-14

Chevron Service Station #9-3417) in the Lower San Juan HSA. The MCL for nitrate was not exceeded at surface water stations in the study area based on the available data.

3.7.5.3 Sulfate

Sulfate is an inorganic compound dissolved in water. Under Title 22, sulfate is regulated as a secondary contaminant; high concentrations of sulfate may be objectionable to consumers from an aesthetic standpoint and may cause diarrhea. The California secondary drinking water MCL for sulfate is 250 mg/L. The following table lists the drinking water standard, and the surface water and groundwater objectives:

Sulfate Concentration Objectives in the Basin Plan

Drinking Water Standard	Hydrologic Area (HA) or Hydrologic Sub Area (HAS)	Objective or MCL (mg/L)
California Secondary MCL		250
	Surface Water	
	Mission Viejo HA	250
	Groundwater	
	Oso HSA	500
	Upper Trabuco HSA	250
	Middle Trabuco HSA	375
	Gobernadora HSA	500
	Upper San Juan HSA	250
	Middle San Juan HSA	375
	Lower San Juan HSA	500
	Ortega HSA	450

Figure 3-32 shows the distribution of the maximum sulfate concentrations in groundwater in the San Juan Basin from 2006 through 2010 as well as time history plots of the four key wells. Most of the wells exceeded the secondary MCL for TDS, and many wells exceeded the Basin Plan objective for their respective sub areas. Note that there are numerous wells in the study area that do not have recent data (last five years).

Figure 3-33 shows the sulfate concentrations in surface water in the San Juan Watershed. With the exception of the upper reaches of Arroyo Trabuco sulfate is generally greater than the MCL and the objective for the Mission Viejo HA. Sulfate is generally highest in the Oso and the Lower San Juan HSAs.

3.7.5.4 Chloride

Chloride is an inorganic constituent dissolved in water and is naturally occurring. Higher concentrations can be associated with consumptive use, marine sediments, and sea water intrusion. Under Title 22, chloride is regulated as a secondary contaminant; high concentrations of chloride may make drinking water taste salty (especially if sodium concentrations are high, there is less of an effect with calcium or magnesium). The California secondary drinking water MCL for sulfate is 250 mg/L. The following table lists the drinking water standard, and the surface water and groundwater objectives for chloride:

Chloride Concentration Objectives in the Basin Plan

Drinking Water Standard	Hydrologic Area (HA) or Hydrologic Sub Area (HAS)	Objective or MCL (mg/L)
California Secondary MCL		250
	Surface Water	
	Mission Viejo HA	250
	Groundwater	
	Oso HSA	400
	Upper Trabuco HSA	250
	Middle Trabuco HSA	375
	Gobernadora HSA	400
	Upper San Juan HSA	250
	Middle San Juan HSA	375
	Lower San Juan HSA	400
	Ortega HSA	375

Figure 3-34 shows the distribution of the maximum chloride concentrations in groundwater in the San Juan Basin from 2006 through 2010 as well as time history plots of the four key wells. Most of the wells exceeded the secondary MCL for TDS, and several wells exceeded the Basin Plan objective for their respective sub areas. Chloride is higher in the Lower San Juan HSA.

Figure 3-35 shows the chloride concentrations in surface water in the San Juan Watershed. Surface water stations along Arroyo Trabuco, Canada Chiquita, Canada Gobernadora, the middle to upper reaches of San Juan Creek all reported samples with chloride concentrations generally below the MCL and basin plan objective. Surface water stations along Oso Creek, Horno Creek, and the lower reaches of San Juan Creek all reported concentrations that were generally greater than the MCL and basin plan objective.

3.7.5.5 Manganese

Manganese is an inorganic constituent dissolved in water and is naturally occurring through the dissolution of manganese-bearing minerals. At low concentrations, manganese is an essential micronutrient. Higher concentrations can be associated with industrial effluent, acid-mine drainage, sewage and landfill leachate. Under Title 22, manganese is regulated as a secondary contaminant; high concentrations of manganese may give drinking water a bitter and metallic taste and may cause staining of clothes. The California secondary drinking water

MCL for manganese is 0.05 mg/L. The following table lists the drinking water standard, and the surface water and groundwater objectives:

Manganese Concentration Objectives in the Basin Plan

Drinking Water Standard	Hydrologic Area (HA) or Hydrologic Sub Area (HAS)	Objective or MCL (mg/L)
California Secondary MCL		0.05
	Surface Water	
	Mission Viejo HA	0.05
	Groundwater	
	Oso HSA	0.05
	Upper Trabuco HSA	0.05
	Middle Trabuco HSA	0.05
	Gobernadora HSA	0.05
	Upper San Juan HSA	0.05
	Middle San Juan HSA	0.05
	Lower San Juan HSA	0.05
	Ortega HSA	0.05

Figure 3-36 shows the distribution of the maximum manganese concentrations in groundwater in the San Juan Basin from 2006 through 2010 as well as time history plots of the four key wells. With the exception of two wells in the Oso and Lower Trabuco HSA, all of the wells exceeded the secondary MCL for manganese by as much as 40 times.

Figure 3-37 shows the manganese concentrations in surface water in the San Juan Watershed. With the exception of the upper reaches of Arroyo Trabuco, Bell Canyon, Canada Chiquita, Canada Gobernadora, and San Juan Creek, manganese is generally greater than the MCL and the objective for the Mission Viejo HA. The surface water station, SN-1A, in the upper reach of Arroyo Trabuco is on a mine adit from a former tin mine that discharges into Arroyo Trabuco.

3.7.5.6 Iron

Iron is an inorganic constituent dissolved in water and is naturally occurring through the dissolution of iron-bearing minerals. At low concentrations, iron is an essential micronutrient. Higher concentrations can be associated with industrial effluent, acid-mine drainage, sewage and landfill leachate. Under Title 22, iron is regulated as a secondary contaminant; high concentrations of iron may give drinking water a bitter and metallic taste and may cause staining of clothes. The California secondary drinking water MCL for iron is 0.3 mg/L. The following table lists the drinking water standard, and the surface water and groundwater objectives:

Iron Concentration Objectives in the Basin Plan

Drinking Water Standard	Hydrologic Area (HA) or Hydrologic Sub Area (HAS)	Objective or MCL (mg/L)
California Secondary MCL		0.3
	Surface Water	
	Mission Viejo HA	0.3
	Groundwater	
	Oso HSA	0.3
	Upper Trabuco HSA	0.3
	Middle Trabuco HSA	0.3
	Gobernadora HSA	0.3
	Upper San Juan HSA	0.3
	Middle San Juan HSA	0.3
	Lower San Juan HSA	0.3
	Ortega HSA	0.3

Figure 3-38 shows the distribution of the maximum iron concentrations in groundwater in the San Juan Basin from 2006 through 2010 as well as time history plots of the four key wells. With the exception of Rosenbaum Well 1 in the Oso HSA, all of the wells exceeded the secondary MCL for manganese by as much as 60 times.

Figure 3-39 shows the iron concentrations in surface water in the San Juan Watershed. With the exception of Arroyo Trabuco, and the upper reaches of San Juan Creek, iron is generally greater than the MCL and the objective for the Mission Viejo HA. The surface water station, SN-1A, in the upper reach of Arroyo Trabuco is on a mine adit from a former tin mine that discharges into Arroyo Trabuco.

3.7.6 Point Sources of Concern/Geo Tracker

The SWRCQ's GeoTracker database was queried interactively using the HydroDaVE Explorer interface to determine if there are any current open cases/sites in the study area. GeoTracker "is the Water Boards' data management system for managing sites that impact groundwater, especially those that require groundwater cleanup (Underground Storage Tanks [USTs], Department of Defense, Site Cleanup Program) as well as permitted facilities such as operating USTs and land disposal sites." Ten point-source contaminant sites were identified within the study area as potentially impacting the groundwater basin in the vicinity of active production wells (Figure 3-40).

3.7.6.1 Ultramar/San Juan Service (GeoTracker Global ID T0605902555)

The Ultramar/San Juan Service site is located at 26572 Junipero Serra Road in San Juan Capistrano. The site is on the southern side of Junipero Serra Road just east of the 5 Freeway. Junipero Serra High School is located south and west of the site. In 1998, five, single-walled USTs were removed, along with the associated fuel dispensers and product piping (Frey, 2005):

- Three 8000-gallon gasoline USTs
- One 12,000-gallon diesel UST
- One 280-galling waste oil UST

TPH, benzene, MTBE, and TBA have been detected in groundwater at concentrations up to 23,000 micrograms per liter (ug/L), 150 ug/L, 34,000 ug/L, and 62,000 ug/L, respectively. In the most recent sampling event reported (August 4, 2010), these constituents were still detected above their MCLs or NLs: 1,000 ug/L, 9.2 ug/L, 14 ug/L and 17,000 ug/L. Figures 3-41, 3-42, and 3-43 show the maximum concentrations of MTBE, TBA, and benzene, respectively, over the past 5 years (2006 to 2010) in the San Juan Basin study area.

3.7.6.2 Former Shell Station (GeoTracker Global ID T0605902592)

The former Shell Station site is located at 27101 Ortega Highway in San Juan Capistrano, CA. In May of 1986 a petroleum hydrocarbon leak was discovered. Several soil investigations occurred between 1987 and 2005. These investigations included installation and sampling of several monitoring wells and soil borings (OCHCA, 2006; MBE, 2006). Significant concentrations of MTBE and TBA were detected in the soils onsite, and in groundwater beneath the site and at offsite wells. Remedial activities at the site included excavation of USTs and surrounding soil, vapor extraction system, and a pump and treat program. TBA and MTBE concentrations decreased over this time. During 2004 and 2005 a mathematical model and HydroPunch groundwater samples collected on the downgradient side of the 5 Freeway concluded that plume would not move more than 450 feet offsite. A submittal for site closure was approved on March 6, 2006 (OCHCA, 2006).

The contaminant plume is characterized by elevated concentrations of MTBE, TBA, and benzene. Concentrations of ethylbenzene and naphthalene were detected above the California or Federal, Primary or Secondary MCLs for drinking water. Figures 3-41, 3-42, and 3-43 show maximum concentrations of MTBE, TBA, and benzene, respectively, over the past 5 years (2006 to 2010) in the San Juan Basin study area. The last groundwater quality monitoring event at the sites monitoring wells was conducted in January 2006. At the cessation of monitoring in 2006 MTBE concentrations ranged from non-detect (<0.5 ug/L) to 59 ug/L, TBA concentrations ranged from non-detect (2 ug/L) to 34,000 ug/L, and benzene concentrations ranged from non-detect (0.5 ug/L) to 1 ug/L.

3.7.6.3 76 Station 5425 (GeoTracker Global ID T0605902561)

The 76 Station 5425 site is located on the south side of the Ortega Highway, east of Interstate 5 in San Juan Capistrano, CA. In 1985, during a UST removal, hydrocarbons were detected in the soil surrounding the UST excavation. Between 1985 and 1994 soil removal and a vapor extraction system were used to remediate the soil and groundwater beneath the site. Several site investigations were conducted from 1986 to 1994. Data from borings drilled in late 1994 within the affected areas resulted in closure of the OCHCA case in late 1995 (TRC, 2006).

In 1998, during a product piping and dispenser island upgrade, hydrocarbons were detected in the soil surrounding the UST excavation. TPH as gasoline and MTBE were detected in the soil under three of the four dispenser sites (TRC, 2006). Between 1998 and 2008 contaminated soil was removed and several soil borings and monitoring wells were drilled to assess soil and groundwater contamination onsite and offsite (TRC, 2006; Delta Consultants, 2010). Groundwater quality monitoring is conducted quarterly at the monitoring wells

The contaminant plume is characterized by elevated concentrations of MTBE, and TBA. Concentrations of ethylbenzene, benzene, toluene, and total xylene were detected above the California or Federal, Primary or Secondary MCLs for drinking water. These constituents have been primarily non-detect since December 2004 with the exception of the sample from September 2009 when all of these constituents were detected in almost all monitoring wells, and one sample of total xylene in late 2005. Maximum concentrations of TPH were reached in 2004 (24,000 ug/L) and have been declining since to primarily non-detect. MTBE concentrations have decreased from a maximum of 8,600 ug/L at one well in 2000 to concentrations of less than 8 ug/L at all sites in late 2010. Figure 3-41 through Figure 3-43 show maximum concentrations of MTBE, TBA, and benzene over the past 5 years (2006 to 2010) in the San Juan Basin study area. MTBE concentrations have ranged from non-detect (<0.5 ug/L) to 1200 ug/L at the sites monitoring wells during 2006 to 2010. TBA concentrations have ranged from non-detect (<10 ug/L) to 6,900 ug/L at the sites monitoring wells during 2006 to 2010. Benzene concentrations have ranges from non-detect (<0.5 ug/L) to 20 ug/L in the sites monitoring wells during 2006 to 2010.

3.7.6.4 Chevron Service Station #9-8719 (GeoTracker Global ID T0605902510)

The Chevron Service Station #9-8719 site is located at 26988 Ortega Highway in San Juan Capistrano, CA. The station began operating in 1967, and is currently still in operation. During UST system upgrades in 1987, TPH as gasoline was detected in the soils beneath the site, resulting in the Orange County Local Oversight Program (OCLOP) opening of case #87UT233. During 1998 to 1993 contaminated soil was removed, and four monitoring wells were constructed and monitored for petroleum hydrocarbons, but not analyzed for MTBE or other oxygenates which were not of concern at the time (HFA, 2011b). The OCLOP case #87UT233 was closed in 1993. During additional facility upgrades in 1995, elevated concentrations of TPH and benezene were detected in soils resulting in the opening of OCLOP case # 95UT002, which was transfer to the San Diego RWQCB in 2009. Between 1995 and 2010, 43 soil borings, 18 groundwater monitoring wells, and 3 soil vapor wells were installed to assess the contamination on and off the site. Results of soil and groundwater sampling indicate that benzene, MTBE, and other constituents are present in soil below the site, and groundwater onsite and offsite to the south. Groundwater monitoring has been conducted quarterly since November 1995.

The contaminant plume is characterized by elevated concentrations of TPH as gasoline, MTBE, TBA, and benzene. Concentrations of 1,2-DCA, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, naphthalene, styrene, total xylenes, and toluene above the California or Federal, Primary or Secondary MCLs for drinking water. TPH as gasoline concentrations ranged from non-detect (<22 ug/L) to 25,000 ug/L between 2006 and 2010. MTBE concentrations have been declining since a maximum of 1660 ug/L was reached in 2001 at an onsite well. Figure 3-41 through Figure 3-44 show maximum concentration of MTBE, TBA, benezene, and 1,2-DCA for the past 5 years (2006 to 2010) in the San Juan Basin study area During 2006 to 2010, concentrations of MTBE ranged from non-detect (<0.5 ug/L) to 420 ug/L at the sites monitoring wells; During 2006 to 2010 TBA ranged from non-detect (<2 ug/L) and 4,500 ug/L at the sites monitoring wells. Benzene concentrations ranged from non-detect (<0.5 ug/L) to 1100 ug/L during 2006 to 2010 at the sites monitoring wells. 1,2-DCA concentrations ranged from non-detect (<0.5 ug/L) to 62 ug/L during 2006 to 2010 at the sites monitoring wells.

3.7.6.5 Chevron Service Station #9-3417 (GeoTracker Global ID T0605902379)

The Chevron Service Station #9-3417 site is located at 32001 Camino Capistrano, on the southwest corner of the intersection of Del Obispo Street and Camino Capistrano in San Juan Capistrano, CA. The station began operating in 1972, and is still in operation. Investigation of onsite contamination began in 1988 following a gasoline release from onsite underground storage tanks (USTs). Between 1988 and 1993, four UST were removed, several soil borings were drilled, and cone penetration tests (CPTs) were performed to assess the extent of contamination onsite. (Converse Environmental West, 1993). Between 1988 and 2010 over forty monitoring wells were drilled onsite and offsite to assess the extent of the groundwater contamination. Quarterly monitoring is performed at selected monitoring wells. From 1990 to 1996 soil excavations and soil vapor extractions were used to remove contamination from soils beneath the site. In 2010, an air sparging/soil vapor extraction system was used to remove constituents of concern from soil and groundwater in the source area (HFA, 2011a).

The contaminant plume is characterized by elevated concentrations of MTBE, TBA, benzene, and total petroleum hydrocarbon concentrations (TPH) including gasoline and diesel range organics. Concentrations of 1,2-dicloroethane (1,2-DCA), dibromo-3-chloropropane (DBCP), ethylbenzene, naphthalene, tetrachloroethane (PCE), toluene, and total xylenes were detected above the California or Federal, Primary or Secondary MCLs for drinking water. TPH ranged from 73,000 to 25,000 ug/L in 2010. At the sites monitoring wells MTBE concentrations have ranged from non-detect (<0.5 ug/L) to 370 ug/L, and TBA concentrations ranged from none-detect (<2 ug/L) to 170 ug/L during this time period. Benzene concentrations were as high as 6200 ug/L in 2003 and 2004, but have since declined, ranging from non-detect (<0.5 ug/L) to 890 ug/L between 2006 and 2010.

3.7.6.6 Mobil Station 18372 (GeoTracker Global ID T0605902502)

The Mobil Station 18372 site is located at 33571 Del Obispo Street in Dana Point, at the southwestern corner of Del Obispo Street and Stonehill Drive. There is one 15,000-gallon and one 20,000-gallon USTs, two dispenser islands and associated product piping. The site is located about 2100 feet northwest of SCWD's Stonehill well.

Thirty-two wells for monitoring, soil vapor extraction, air sparging, and nested fluid/vapor recovery. Light Nonaqueous Phase Liquids (LNAPLs) have been observed in on- and off-site monitoring wells from November 1991 through January 2004 (ERI, 2009).

TPH, benzene, MTBE, and TBA have been detected in groundwater at concentrations up to 170,000 ug/L, 4,100 ug/L, 50,000 ug/L, and 13,200 ug/L, respectively. In the most recent sampling event reported (December 14, 2009), these constituents were still detected at the following concentrations: 1,200 ug/L, <1.0 ug/L, 3.1 ug/L and 3.9J ug/L. Figures 3-41, 3-42, and 3-43 show the maximum concentrations of MTBE, TBA, and benzene, respectively, over the past 5 years (2006 to 2010) in the San Juan Basin study area.

3.7.6.7 Former Exxon Station 74816 (GeoTracker Global ID T0605902575)

The Former Exxon Station 74816 site is located at 34295 Doheny Park Road in Capistrano Beach, at the intersection of Las Vegas Avenue and Doheny Park Road. The site is now used as a U-Haul rental facility.

USTs and fuel dispensers from the Former Exxon Station were removed in 1972. Thirteen monitoring wells have been installed along with six triple nested extraction wells. Air sparging and soil vapor extraction to remove hydrocarbons has been conducted. LNAPLs were observed in a monitoring well (off-site monitoring well MW8) for the first time on November 22, 2010 (Cardno ERI, 2011a). Bailing of the NAPL has commenced since February 2011 (Cardno ERI, 2011b).

TPH, benzene, MTBE, and TBA have been detected in groundwater at concentrations up to 19,200 ug/L, 1,480 ug/L, 50,000 ug/L, and 2,000 ug/L, respectively. In the most recent sampling events reported (November 30, 2010), these constituents were still detected at the following concentrations: 3400 ug/L, 93 ug/L, 7.5 ug/L, and 470 ug/L. Figures 3-41, 3-42, and 3-43 show the maximum concentrations of MTBE, TBA, and benzene, respectively, over the past 5 years (2006 to 2010) in the San Juan Basin study area.

3.7.6.8 76 Station #255385 (GeoTracker Global ID T0605902362)

The 76 Station #255385 site is located at 34131 Doheny Park Road in Capistrano Beach, on the northwest corner of the intersection of Doheny Park Road and Victoria Boulevard. The site is currently an active gasoline station.

USTs and fuel dispensers from the 76 station were removed in 1990. Twenty-three monitoring wells have been installed. Soil vapor extraction to remove hydrocarbons was begun in July 1995, but ceased in August 1996 due to low influent concentrations. In 1998, an oxygen releasing compound (ORC) was injected around monitoring well MW-14 to promote bioremediation of petroleum compounds.

In the most recent sampling events reported (August 23, 2010 and November 22, 2010), TPH, benzene, MTBE, and TBA were detected at the following concentrations: 15,000 ug/L, 7.5 ug/L, and 25 ug/L (Antea Group, 2011). Figures 3-41, 3-42, and 3-43 show the maximum concentrations of MTBE, TBA, and benzene, respectively, over the past 5 years (2006 to 2010) in the San Juan Basin study area.

3.7.6.9 76 Station 7329 (GeoTracker Global ID T0605902573)

The 76 Station 7329 site is located at 34306 Pacific Coast Highway in Dana Point, at the northern corner of Del Obispo Street and Pacific Coast Highway. The site is an active service station with two 15,000-gallon gasoline USTs and one 12,000-gallon diesel UST, along with associated product piping and dispensing equipment.

Twenty-eight monitoring wells have been installed to date, along with five double nested sets of wells. Remedial activities have included dual phase extraction, oxygen and ozone injection pilot testing.

In 2009, OCHCA requested an Interim Remedial Action Plan because of the possibility of the dissolved-phase petroleum compounds impacting the desalinization pump test proposed by MWDOC. In May and June of 2010 URS installed 20 dual-nested ozone injection points to form a "reactive barrier" and to prevent dissolved-phase petroleum compounds from reaching the desalination well.

URS (2011) reports the current maximum concentrations of TPH, benzene, MTBE, and TBA to be: 29,000 ug/L, 1,600 ug/L, 4,400 ug/L, and 52,000 ug/L. Figures 3-41, 3-42, and 3-43 show the maximum concentrations of MTBE, TBA, and benzene, respectively, over the past 5 years (2006 to 2010) in the San Juan Basin study area.

3.7.6.10 ARCO Facility #0447 (GeoTracker Global ID T0605902526)

The ARCO Facility #0447 site is located at 34342 Pacific Coast Highway in Dana Point. The site is an active service station with three 12,000-gallon gasoline USTs (replacing the previous three 12,000-gallon singled-walled fiberglass USTs) along with associated product piping and dispensing equipment.

Twenty single completion monitoring wells have been installed to date, along with five double nested sets of wells. Remedial activities have included dual phase extraction, oxygen and ozone injection pilot testing.

In 2009, OCHCA requested an Interim Remedial Action Plan because of the possibility of the dissolved-phase petroleum compounds impacting the desalinization pump test proposed by MWDOC. In May and June of 2010 URS installed 20 dual-nested ozone injection points to form a "reactive barrier" and to prevent dissolved-phase petroleum compounds from reaching the desalination well.

Arcadis (2011) reports the current maximum concentrations of Gasoline Range Organics (GRO), benzene, MTBE, and TBA to be: < 50 ug/L, <0.5 ug/L, 4.8 ug/L, and <25 ug/L. Figures 3-41, 3-42, and 3-43 show the maximum concentrations of MTBE, TBA, and benzene, respectively, over the past 5 years (2006 to 2010) in the San Juan Basin study area.

3.8 Water Supply and Distribution

Due to limited groundwater supplies, the SJBA members obtain most of its water supply (about 92 percent of potable and 78 percent of total demands) from imported water sources. The table below lists the estimated total water demand for each agency and the amount of water supplied from imported, recycled and native sources for fiscal 2010 (Section 4 presents a more rigorous discussion of water demands and supplies for the recent past and for the future through 2035).

Water Demand and Supply within the SJBA Service Area in 2010[18]

Water Agency	Total Water Demand (acre-ft/yr)	Water Supply (acre-ft/yr)		
		Native Potable Water	Recycled/ Non-Potable Water	Imported Water
MNWD	36,593	-	6,858	29,735
CSJC	8,783	1,980	434	6,379
SMWD	34,169	65	6,027	28,077
SCWD	6,909	634	826	5,449
Total	86,454	2,679	14,145	69,640

3.8.1 Native Water Supply

The native groundwater supply in the SJBA service area is limited by availability and production capacity in the upper reaches of the basin, and by availability and water quality in the lower portions of the basin. SJBA member agencies produce potable native groundwater from two potable groundwater wells and two desalting facilities. Figure 3-45[19] shows the potable water infrastructure in the San Juan Basin Area. A summary of native water supply sources and their capacity is shown the table below.

Potable Native Groundwater Supply in the SJBA Service Area

Source	Water Agency	Production Capacity		Estimated Future Capacity	
		mgd	acre-ft/yr	mgd	acre-ft/yr
Potable Wells					
Rosenbaum No. 1	CSJC	0.58	650	0.58	650
North Open Space	CSJC	0.47	526	0.47	526
Desalters					
San Juan Basin Desalter	CSJC	5.1	5,713	5.1	5,713

[18] Sources include SJBA members agencies and MWDOC. See Section 4 and more specifically Table 4-1.

[19] Many of the maps contained in this planning document refer to the SJBA service area as the union of the SJBA member agencies service area. For clarity, the SJBGFMP contains management activities for surface and ground waters within the San Juan Creek watershed exclusively in the lower part of the watershed. The SJBGFMP management activities provide direct benefits to the SJBA member agencies. The service area boundaries of the SJBA member agencies extend beyond the boundaries of the watershed. This means that while the management activities of SJBGFMP occur within the San Juan Creek watershed (and exclusively in the lower part of the watershed), that the direct benefits of the management program can reach beyond the watershed, principally the service areas of the SJBA member agencies and the State.

Source	Water Agency	Production Capacity		Estimated Future Capacity	
		mgd	acre-ft/yr	mgd	acre-ft/yr
Capistrano Beach Desalter	SCWD	0.80	900	1.6	1,776
Total Capacity		6.95	7,789	7.75	8,665

3.8.1.1 Potable Groundwater Wells

The CSJC operates two potable groundwater wells, Rosenbaum Well No. 1 and the North Open Space Well. Several other groundwater wells were operated by CSJC in the past, but they have abandoned or converted to non-potable supply wells.

Rosenbaum Well No. 1. The Rosenbaum Well No. 1 was constructed in 1957 and is located in the upper reaches of the Lower Trabuco subbasin. It has a production capacity of 400 gpm (0.58 million gallons per day (mgd). The water is chlorinated at the wellhead and pumped directly into the distribution system.

North Open Space Well. The North Open Space Well was constructed in 2000 and is also located in the upper reaches of the Lower Trabuco subbasin. It has a maximum production capacity of 325 gpm (0.47 mgd) with actual capacity dependent on groundwater levels. The well is equipped with a variable frequency drive that allows the well to vary production based on the availability of groundwater. The water is chlorinated at the wellhead and pumped directly into the distribution system.

Additional Wells. The CSJC owns several other wells, as mentioned above, that have been abandoned or converted to non-potable wells due to declining production and water quality. These wells included Rosenbaum Well No. 2, Hollywood Well 2A, and the Mission Street Well.

3.8.1.2 Groundwater Desalting Facilities

A portion of the potable water delivered is produced from local desalters that were constructed and operated by the CSJC and SCWD.

San Juan Basin Groundwater Recovery Plant. The San Juan Basin Groundwater Recovery Plant was constructed in 2005 and is operated by CSJC. The facility is located in the Lower San Juan subbasin and is fed by several groundwater wells surrounding the plant. The plant consists of iron and manganese removal followed by two reverse osmosis (RO) trains capable of producing 5.1 mgd of potable water. The facility provides half of the CSJC water needs in the summer and almost all of the demand in the winter.

Capistrano Beach Groundwater Recovery Facility. The Ground Water Recovery Facility was constructed in 2007 and is operated by the SCWD. The treatment facility is fed by a single groundwater well and consists of RO treatment and Iron and Manganese Removal. A portion of the influent groundwater is sent to RO treatment process to remove dissolved solids.

Another portion bypasses the RO and is treated to remove iron and manganese. The RO permeate and bypass are recombined to produce 0.71 mgd of potable water.

3.8.2 Water Distribution

Each of the SJBA member agencies operate their own water distributions systems. The distributions systems consist of pipelines, pump stations, and reservoirs.

Moulton Niguel Water District. The MNWD operates and maintains over 700 miles of distribution piping, 28 potable water reservoirs with a total capacity of 69.7 MG, and 27 booster pump stations. These separate systems are interconnected and can be used to exchange water among the agencies.

City of San Juan Capistrano. The CSJC operates approximately 180 miles of pipelines, 10 reservoirs ranging in size from 0.21 million gallons to 10.11 million gallons, and twelve booster pump stations.

Santa Margarita Water District. The SMWD operates and maintains over 1,200 miles of water and sewer lines, 29 potable water reservoirs, and 20 booster pump stations.

South Coast Water District. The SCWD operates approximately 150 miles of watermains, 14 potable water reservoirs with a total capacity of 21.9 million gallons, and 9 booster pump stations

3.8.2.1 Bradt Reservoir

The Bradt Reservoir is a large regulating and terminal reservoir, located at the end of the JTM. The reservoir serves several water agencies, including SCWD, MNWD, and CSJC.

3.8.2.2 Upper Chiquita Reservoir

The Upper Chiquita Reservoir was recently constructed and came on line in 2012. The Upper Chiquita Reservoir has the capacity to store 244 million gallons (750 acre-ft) of domestic water. The reservoir is designed to supply drinking water in the event of an emergency or service disruption and will provide water to approximately 500,000 residents for one week.

3.9 Wastewater Collection, Treatment and Disposal

Each of the individual agencies operate their own wastewater collection systems, but many of the treatment facilities are jointly owned. There are a total of seven wastewater treatment facilities within the SJBA service area and four of them are managed and operated by SOCWA. A few of these facilities treat water to Title 22 standards for irrigation water. The water that is not recycled is discharged to the ocean through two ocean outfalls operated by the SOCWA.

3.9.1 Wastewater Collection

Each of the SJBA member agencies operate their own wastewater collection systems. The collection systems consist of gravity sewer, forcemains, and lift stations.

Moulton Niguel Water District. The MNWD maintains approximately 530 miles of sewers ranging in size from 8 inches to 33 inches and nineteen lift stations.

City of San Juan Capistrano. The CSJC maintains 120 miles of collection piping ranging up to 27 inches in diameter and two lift stations.

Santa Margarita Water District. The SMWD maintains over 1,200 miles of water and sewer lines and nineteen lift stations.

South Coast Water District. The SCWD maintains 140 miles of sewer ranging in size from 6 – 24 inches, three miles of force mains, and fourteen lift stations. The SCWD's lift station #2 is designed for a capacity of 2,200 gpm and is used to pump wastewater to the Coastal Treatment Plant.

3.9.2 Wastewater Treatment

There are seven wastewater treatment facilities within the SJBA service area. A summary of wastewater treatment plants and their liquid and solids capacities are shown in the table below, and their locations are shown on Figure 3-46[20].

Wastewater Treatment Facilities within the SJBA

Treatment Facility	Water Agency	Operated By	Capacity (mgd)	
			Liquid	Solid
Jay B. Latham Regional Treatment Plant	MNWD, CSJC, SMWD, SCWD	SOCWA	13	18.5
Joint Regional Treatment Plant	MNWD	SOCWA	12	24
Coastal Treatment Plant	MNWD, SCWD	SOCWA	6.7	-[21]
Plant 3A Water Reclamation Plant	MNWD, SMWD	SOCWA	8.0	8.0
Oso Creek Water Reclamation Plant	SMWD	SMWD	3.0	-[22]

[20] Many of the maps contained in this planning document refer to the SJBA service area as the union of the SJBA member agencies service area. For clarity, the SJBGFMP contains management activities for surface and ground waters within the San Juan Creek watershed exclusively in the lower part of the watershed. The SJBGFMP management activities provide direct benefits to the SJBA member agencies. The service area boundaries of the SJBA member agencies extend beyond the boundaries of the watershed. This means that while the management activities of SJBGFMP occur within the San Juan Creek watershed (and exclusively in the lower part of the watershed), that the direct benefits of the management program can reach beyond the watershed, principally the service areas of the SJBA member agencies and the State.

[21] Solids are sent to the Joint Regional Treatment Plant for Processing.

[22] Waste solids and filter backwash are sent to the Jay B. Latham Regional Treatment Plant for treatment.

Treatment Facility	Water Agency	Operated By	Capacity (mgd)	
			Liquid	Solid
Chiquita Water Reclamation Plant	SMWD	SMWD	9.0	9.0
Nichols Institute Water Reclamation Plant	SMWD	SMWD	0.086	-[23]
Total Capacity			51.8	59.5

3.9.2.1 Jay B. Latham Regional Treatment Plant

The Jay B. Latham Regional Treatment Plant is a conventional activated sludge secondary treatment facility managed by SOCWA. The plant has a liquid treatment capacity of 13 mgd and a solids handling capacity of 18.5 mgd. The treatment plant processes include screening, grit removal, primary clarification, and activated sludge secondary treatment. The plant also has chlorination facilities that are used to manage microbial growth. All four SJBA member agencies own capacity in the Jay B. Latham Regional Treatment Plant. Currently, all treated effluent is discharged to the ocean through the San Juan Creek Outfall.

3.9.2.2 Joint Regional Treatment Plant

The Joint Regional Treatment Plant (JRTP) is located in Laguna Niguel and is designed for a liquid treatment capacity of 12.0 mgd and a solids handling capacity of 24.0 mgd. MNWD owns 12.0 mgd of liquid capacity and 14 mgd of solids capacity. The JRTP is a conventional activated sludge secondary treatment plant that include screening, aerated grit removal, primary sedimentation, and activated sludge secondary treatment and is managed by SOCWA. A portion of the secondary effluent is sent to an advanced water treatment facility where it is treated to Title 22 standards for irrigation water. The treated secondary effluent not used for irrigation is discharged to the Aliso Creek Ocean Outfall.

3.9.2.3 Coastal Treatment Plant

The Coastal Treatment Plant is a conventional activated sludge secondary treatment facility managed by SOCWA. The plant has a liquid treatment capacity of 6.7 mgd and pumps its solids to the JRTP through a force main for processing. The treatment plant processes include screening, aerated grit removal, primary sedimentation, and activated sludge secondary treatment. Secondary effluent can be sent to an advanced water treatment plant to be treated to Title 22 standards for irrigation or discharged to the ocean through the Aliso Creek Ocean Outfall.

3.9.2.4 Plant 3A Water Reclamation Plant

The Plant 3A Water Reclamation Plant is a conventional activated sludge secondary treatment facility managed by SOCWA. The plant has a liquid treatment capacity of 8.0 mgd and a solids treatment capacity of 8.0 mgd. Capacity in this plant is owned by the MNWD and SMWD and

[23] Solids are trucked to the Chiquita Water Reclamation Plant for treatment and disposal.

is located in Mission Viejo. The treatment plant processes include screening, aerated grit removal, primary sedimentation, and activated sludge secondary treatment. Secondary effluent can be sent to an advanced water treatment plant to be treated to Title 22 standards for irrigation or discharged to the ocean through the San Juan Creek Ocean Outfall

3.9.2.5 Oso Creek Water Reclamation Plant

The Oso Creek Water Reclamation Plant is located in Mission Viejo and is an activated sludge treatment facility. The treatment plant processes include microscreening and activated sludge secondary treatment.. The plant is owned and operated by SMWD. Secondary effluent can be sent to an advanced water treatment plant to be treated to Title 22 standards or to the Jay B. Latham Regional Treatment Plant for further treatment and discharge to the ocean. Waste solids and filter backwash are discharged to the sewer and transported to the Jay B. Latham Regional Treatment Plant for treatment.

3.9.2.6 Chiquita Water Reclamation Plant

The Chiquita Water Reclamation Plant is located east of San Juan Capistrano and treats 7.5 million gallons per day. The plant is owned and operated by SMWD and has a liquid treatment capacity of 9.0 mgd and a solids handling capacity of 9.0 mgd. The treatment plant processes include screening, grit removal, primary sedimentation, and conventional activated sludge secondary treatment. Of the 7.5 mgd treated, 5.0 mgd is sent to an advanced water treatment plant to be treated to Title 22 standards for irrigation. The treated secondary effluent not used for irrigation is discharged to the ocean through the San Juan Creek Ocean Outfall.

3.9.2.7 Nichols Institute Water Reclamation Plant

The SMWD owns and operates the Water Reclamation Plant (WRP) at the Nichols Institute. The existing plant has a design capacity of 86,000 gpd. The treatment plant processes include conventional activated sludge secondary treatment, tertiary filtration, and disinfection. Waste activated sludge (WAS) is trucked to the Chiquita Water Reclamation Plant for digestion and disposal. Disinfected effluent is stored in a holding pond and used for irrigation.

3.9.3 Effluent Disposal

Treated secondary effluent from the treatment plants within the SJBA service area is disposed of through two ocean outfalls: the Aliso Creek Ocean Outfall and the San Juan Creek Ocean Outfall. Both outfalls are owned and operated by the SOCWA.

3.9.3.1 NPDES Permits

Treated secondary effluent from the treatment plants within the SJBA service area are regulated by two NPDES permits, one for each outfall. The effluent limitations for major constituents and properties of wastewater are shown in in the table below.

Effluent Limitations for Major Constituents of Wastewater

Outfall	NPDES Permit No.	CBOD (mg/L)[24]	TSS (mg/L)	Oil & Grease (mg/L)	Settleable Solids (ml/L)	Turbidity (ntu)	pH	Acute Toxicity (TUa)
		Weekly Average (7 day)						
		40	45	40	1.5	100	6.0-9.0	2.0
		Maximum at Any Time						
		45	50	75	3.0	225	6.0-9.0	2.5

3.9.3.2 San Juan Creek Ocean Outfall

San Juan Creek Ocean Outfall. The San Juan Creek Ocean Outfall discharges effluent from the Jay B. Latham Regional Treatment Plant, Chiquita Reclamation Plant, Oso Creek Water Reclamation Plant, and the Plant 3A Water Reclamation Plant. The outfall was constructed in 1978 and extends 10,550 feet southwesterly from Doheny State Beach. The first 216 feet of the diffuser are collinear with the outfall then the remaining 1,272 feet of diffuser extends northwesterly. The depth of the diffuser is approximately 100 ft. The San Juan Creek Outfall has a design capacity of 36.8 mgd.

3.10 Non-Potable Water Supplies and Demand

The member agencies of the SJBA have been developing recycled water and non-potable water infrastructure to provide irrigation water and reduce their dependence on imported water. Irrigation water comes from three different sources within the SJBA: wastewater, non-potable groundwater, and runoff. The non-potable groundwater and runoff are considered to be native sources of irrigation water, while the tertiary treated wastewater is considered to be a supplemental source.

3.10.1 Recycled Water Supplies

Six of the seven wastewater treatment plants have advanced water treatment (AWT) facilities that are capable of producing tertiary Title 22 effluent suitable for irrigation. A summary of the advanced water treatment plants and their Title 22 irrigation water capacities is shown in table below.

[24] For the JBLRTP the ratio of CBOD to BOD is approximately 0.6.

Advanced Water Treatment Facilities within the SJBA

Treatment Facility	Water Agency	Capacity	
		mgd	acre-ft/yr
Joint Regional Treatment Plant	MNWD	11.4	12,770
Coastal Treatment Plant	SCWD	2.6	2,912
Plant 3A Water Reclamation Plant	MNWD	2.4	2,688
Oso Creek Water Reclamation Plant	SMWD	3.0	3,360
Chiquita Water Reclamation Plant	SMWD	5.0	5,600
Nichols Institute Water Reclamation Plant	SMWD	0.086	96
Total Capacity		24.5	27,426

Title 22 irrigation water capacities within the San Juan Basin are about twice the current demand (14,145 acre-ft/yr) for non-potable demands. Some of this excess Title 22 capacity will be used to satisfy future increased non-potable demands and some could be used for indirect potable reuse thereby replacing imported water.

AWT Facility at the Joint Regional Treatment Plant. The AWT facility at the Joint Regional Treatment Plant is designed for a capacity of 11.4 mgd. The plant consists of chemical addition, coagulation, filtration, and chlorine disinfection and supplies Title 22 irrigation water to the MNWD service area.

AWT Facility at the Coastal Treatment Plant. The AWT facility at the Coastal Treatment Plant has a capacity of 2.6 mgd and supplies Title 22 irrigation water to the SCWD. The SCWD can also supply 1.4 mgd of reclaimed water to the MNWD from the AWT facility. The plant consists of chemical addition, coagulation, filtration, and chlorine disinfection.

AWT Facility at Plant 3A. The AWT facility at Plant 3A has a design capacity of 2.4 mgd and supplies Title 22 irrigation water to the MNWD. The plant consists of tertiary filtration and chlorine disinfection.

Oso Creek Water Reclamation Plant. The Oso Creek Water Reclamation Plant has the capacity to produce 3.0 mgd of Title 22 irrigation water for the SMWD. The plant consists of tertiary filtration and chlorine disinfection. The reclamation plant was designed to treat water needed for irrigation and does not have a direct connection to either of the ocean outfalls. Treated irrigation water is pumped to the Upper Oso Reservoir for storage and reuse.

Chiquita Water Reclamation Plant. The Chiquita Water Reclamation Plant currently treats 7.5 mgd of wastewater, of that, 5 mgd is treated to Title 22 standards for irrigation water and distributed throughout the SMWD. The plant consists of tertiary filtration and chlorine disinfection.

Nichols Institute Water Reclamation Plant. The Nichols Institute Water Reclamation Plant is a small plant designed to serve the Nichols Institute. All wastewater is treated to Title 22 standard for irrigation and pumped to a storage pond for use as irrigation water.

3.10.2 Native Irrigation Water Supplies

Within the SJBA, native irrigation water is delivered from non-potable groundwater wells and urban runoff barriers. A summary of native groundwater sources and their capacities is shown in the table below.

Native Irrigation Water Sources within the SJBA

Source	Water Agency	Capacity	
		mgd	acre-ft/yr
Non-Potable Wells			
Mission Street Well	CSJC	0.29[25]	325
Hollywood Well No. 2A	CSJC	0.43	482
Urban Runoff Barriers			
Oso Creek Barrier	SMWD	1.0	1,120
Dove Canyon Barrier	SMWD	0.18	200
Horno Creek Barrier	SMWD	0.29	322
Total		3.27	3,659

3.10.2.1 Non-Potable Wells

The CSJC operates three non-potable wells to supply irrigation water to fifteen customers: the Mission Street Well, Hollywood Well No. 2A, and Well 5. Currently, Well 5 is not used due to high iron and manganese levels.

3.10.2.2 Urban Runoff Barriers

There are currently three urban runoff barriers in operation and one under development within the SJBA service area. The barriers are designed to intercept and reuse urban runoff before entering and polluting sensitive environmental areas.

Oso Creek Barrier. The Oso Creek Barrier was constructed in the late 1970s and is designed to collect dry-weather urban-runoff within Oso Creek. The barrier consists of a water diversion structure, pump station, pressure discharge pipeline, and a gravity pipeline.

Dove Canyon Barrier. The Dove Canyon Barrier is designed to collect urban runoff from the Dove Canyon community before entering the environmentally sensitive Starr Ranch

[25] The Mission Street Well can only produce 50 gpm when operating at the same time as Hollywood Well No. 2A.

Sanctuary. The collected runoff is used for irrigation of nearby golf courses and parks. The Trabuco Canyon Water District (TCWD) owns and operates the barrier and the reclaimed water is shared by TCWD and SMWD.

Horno Creek Barrier. Horno Creek Barrier treats urban runoff from the Ladera Ranch community in a constructed wetland. The barrier provides reclaimed water to the SMWD.

3.10.3 Non-Potable Water Storage and Distribution

Each agency in the SJBA owns and maintains its own recycled water distribution system. The distribution systems consist of pipeline, pump stations, and reservoirs. Figure 3-47[26] shows the location of major storage reservoirs and back bone irrigation infrastructure.

Moulton Niguel Water District. The MNWD has constructed approximately 140 miles of recycled water distribution pipeline, 11 reservoirs with a total capacity of 18.7 million gallons, and 12 recycled water pump stations.

City of San Juan Capistrano. The CSJC maintains 54,000 ft of recycled water pipeline and one 500,000-gallon reservoir.

Santa Margarita Water District. The SMWD has over 2,500 irrigation water connections and operates 7 irrigation water reservoirs. The SMWD owns the Upper Oso Reservoir, which is one of the largest recycled water reservoirs in Orange County. The reservoir has the capacity to hold 1.3 billion gallons (4,000 acre-ft) of non-potable water and helps to conserve over a billion gallons (3,100 acre-ft) of drinking water each year.

South Coast Water District. The SCWD maintains fifteen miles of recycled water pipeline, three pump stations, and three recycled water reservoirs with a total capacity of 7.0 million gallons.

[26] Many of the maps contained in this planning document refer to the SJBA service area as the union of the SJBA member agencies service area. For clarity, the SJBGFMP contains management activities for surface and ground waters within the San Juan Creek watershed exclusively in the lower part of the watershed. The SJBGFMP management activities provide direct benefits to the SJBA member agencies. The service area boundaries of the SJBA member agencies extend beyond the boundaries of the watershed. This means that while the management activities of SJBGFMP occur within the San Juan Creek watershed (and exclusively in the lower part of the watershed), that the direct benefits of the management program can reach beyond the watershed, principally the service areas of the SJBA member agencies and the State.

Table 3-1 Precipitation Gauging Stations In and Around the San Juan Creek Basin

Station Number	Station Name	Location				Period of Record		Operator	Annual Precipitation		
		Latitude (dms)	Longitude (dms)	Elevation (feet)	San Juan Basin	Start Year	End Year		Minimum	Maximum	Average
									(inches/yr)		
Inactive Precipitation Stations											
50	El Toro - Moulton Ranch	33-36-26	117-42-08	375	Outside	1877	1972	Private Observer			
56	Irvine - Baudino Ranch	33-38-56	117-42-35	355	Outside	1911	1975	The Irvine Co.			
81	Trabuco Canyon - Robinson	33-39-12	117-34-14	1,150	Inside	1926	1967	Private Observer			
82	Bell Canyon - Hare and Starr Ranch	33-38-00	117-34-00	1,250	Inside	1930	1946	Private Observer			
86	San Juan Capistrano - Hankey	33-30-45	117-38-16	150	Inside	1905	1977	Private Observer			
92	San Juan Substation	33-30-44	117-39-56	160	Inside	1923	1976	Private Observer			
104	Trabuco Canyon - Refractory	33-40-24	117-34-48	1,500	Inside	1932	1941	Private Observer			
130	El Toro - Alios Ranch	33-39-50	117-40-05	640	Outside	1929	1977	Private Observer			
133	Trabuco Canyon (Trabuco Canyon)	33-39-26	117-36-00	970	Inside	1939		NWS/OCRDMD			
134	San Juan Guard Station	33-35-30	117-30-47	728	Inside	1939		NWS/OCRDMD			
151	Aliso Canyon - Cook's Corner	33-40-59	117-37-12	1,080	Outside	1945	1975	Private Observer			
164	Capistrano Beach	33-28-03	117-41-02	20	Inside	1955	1988	OCRDMD			
181	Modjeska Canyon - McArthur	33-42-28	117-37-39	1,300	Outside	1963	1993	Private Observer			
182	Hincky Canyon - Joplin Boys Ranch	33-40-43	117-34-23	1,720	Inside	1963	1974	Private Observer			
192	El Cariso Guard Station	33-39-00	117-24-43	2,660	Inside	1965	1997	NSFS/RCFCWCD			
201	Mission Viejo Cow Camp	33-31-21	117-35-31	300	Inside	1969	1989	Private Observer			
203	Moulton Niguel Water District	33-34-41	117-40-23	300	Inside	1969	1985	Water District Personnel			
207	Coto de Caza	33-35-14	117-35-05	970	Inside	1971	1988	Private Observer			
211	Laguna Niguel-South County Garage	33-31-29	117-42-58	350	Outside	1973	1988	O.C. Garage Personnel			
221	San Juan Capistrano - Lacouague	33-30-33	117-37-55	140	Inside	1979	1988	OCRDMD/Priv Observer			
Active Precipitation Stations											
100	Laguna Beach Treatment Plant (Laguna)	33-32-49	117-46-53	50	Outside	1928	Present	NWS/City of Laguna Beach	4.05	35.11	12.42
206	Trabuco Forestry (Trabuco Canyon)	33-39-15	117-35-34	970	Inside	1971	Present	O.C. Fire Authority	4.87	43.58	19.61
216	Sulphur Creek Dam (Laguna Niguel)	33-32-59	117-42-20	200	Outside	1974	Present	OCRDMD	3.54	35.32	14.21
176	El Toro (Lake Forest)	33-37-39	117-41-26	445	Outside	1964	Present	OCRDMD	2.58	38.58	14.79
208	Santiago Peak	33-42-06	117-32-01	5,638	Inside	1949	Present	OCPW	8.04	106.15	33.37
186	Palisades Reservoir (San Clemente)	33-27-46	117-39-02	360	Outside	1965	Present	Private Observer	4.13	28.70	12.99

Source: County of Orange, Resources and Development Management Department

Table 3-2 USGS Stream Flow Gauges in the San Juan Basin

Site Number	Site Name	Location					Record	
		Latitide (dms)	Longigude (dms)	Altitude (ft)	Dranage (sq mile)	San Juan Basin	Begin	End
11046400	SAN JUAN C A CASPER REG PRK NR SAN JUAN CAPISTRANO	33-34-25	117-32-29	515	42.1	Inside	10/6/00	9/25/01
11046500	SAN JUAN C NR SAN JUAN CAPISTRANO CA	33-31-08	117-37-30	150	106	Inside	10/1/28	9/30/69
11046501	SAN JUAN C AND CWC CANAL NR SAN JUAN CAPISTRANO CA	33-29-30	117-39-47		117	Inside	10/1/54	9/30/69
11046530	SAN JUAN C AT LA NOVIA ST BR AT SAN JUAN CAPIS CA	33-30-09	117-38-53		109	Inside	10/1/85	Present
11046550	SAN JUAN C AT SAN JUAN CAPISTRANO CA	33-29-30	117-39-47		117	Inside	10/1/69	9/30/85
11047000	ARROYO TRABUCO NR SAN JUAN CAPISTRANO CA	33-31-36	117-40-11	180	35.7	Inside	10/1/30	9/30/81
11047200	OSO C A CROWN VALLEY PKWY NR MISSION VIEJO CA	33-33-29	117-40-36		14	Inside	12/1/69	9/30/81
11047300	ARROYO TRABUCO A SAN JUAN CAPISTRANO CA	33-29-54	117-39-57	80	54.1	Inside	10/1/72	Present
11047350	SAN JUAN C A STONEHILL DRIVE NR DANA POINT CA	33-28-26	117-40-43	20	174	Inside	10/6/98	9/26/03
11047500	ALISO C A EL TORO CA	33-37-34	117-41-06	440	7.91	Outside	10/1/30	9/30/80
11047700	ALISO C A SOUTH LAGUNA CA	33-30-43	117-44-52		34.4	Outside	10/1/82	9/30/87
11046310	SAN MATEO C NR SAN ONOFRE CA	33-25-10	117-31-53		91.9	Outside	10/1/50	9/30/52
11046350	CRISTIANITOS C NR SAN CLEMENTE CA	33-26-57	117-34-16	165	29	Outside	10/1/50	9/30/67
11046358	S CH CRISTIANITOS C AB SAN MATEO C NR SN CLMNTE CA	33-25-35	117-34-13	90		Outside	10/1/93	2/6/98
11046359	N CH CRISTIANITOS C AB SAN MATEO C NR SN CLMNTE CA	33-25-35	117-34-13	90		Outside	10/1/93	2/24/98
11046360	CRISTIANITOS C AB SAN MATEO C NR SAN CLEMENTE CA	33-25-35	117-34-13	90	31.6	Outside	10/1/93	Present
11046370	SAN MATEO C A SAN ONOFRE CA	33-23-28	117-35-26	20	132	Outside	10/1/46	6/6/02

Table 3-3 Annual Groundwater Production within San Juan Basin Authority

Well Name	Kinoshita	Tirador	SJBA-4	SJBA-2	CVWD-1	Dance Hall	Stonehill	CVWD # 5	SJHGC-Small	SJHGC-Large	The Oaks	La Couague	Arroyo Trabucco Golf Course	Schuller	Sycamore Stables	Egan Tract-3	Rosenbaum 1	Rosenbaum 2	North Open Space(NOS)	Hollywood 2A	Mission Street	Total Groundwater Production [acre-ft]		
Basin	Lower Basin [acre-ft]							Middle Basin [acre-ft]					Arroyo Trabuco Basin [acre-ft]									Lower Basin	Middle Basin	Arroyo Trabuco Basin
1979	0	0	0	0	0	0	0	0	19	29	54	81	0	55	54	41	292	310	0	0	0	0	183	752
1980	0	0	0	0	0	0	0	0	78	116	81	122	0	83	81	62	506	660	0	0	0	0	397	1,393
1981	0	0	0	0	0	0	0	0	78	116	81	122	0	83	81	62	364	584	0	0	0	0	397	1,174
1982	0	0	0	0	0	0	0	0	80	121	81	122	0	83	81	62	550	550	0	0	0	0	404	1,325
1983	0	0	0	0	0	0	0	0	78	116	81	122	0	83	81	62	517	546	0	136	0	0	397	1,425
1984	0	0	0	0	0	0	0	0	80	121	81	122	0	83	81	62	377	549	0	377	0	0	404	1,528
1985	0	0	0	0	0	0	0	0	78	116	81	122	0	83	81	62	499	476	0	447	0	0	397	1,648
1986	0	0	0	0	0	0	0	0	79	118	81	122	0	83	81	62	637	699	0	418	0	0	400	1,980
1987	0	0	0	25	0	0	0	0	78	116	81	122	0	83	81	62	586	435	0	133	0	25	397	1,379
1988	0	0	0	163	0	0	0	0	122	184	81	122	0	83	81	62	583	384	0	657	0	163	509	1,850
1989	0	0	0	383	0	0	0	0	122	184	81	122	0	83	81	62	539	327	0	470	0	383	509	1,562
1990	0	0	0	292	0	0	0	0	122	184	81	122	0	83	81	62	501	339	0	429	0	292	509	1,495
1991	0	0	0	251	0	0	0	87	122	184	81	122	0	83	81	62	591	469	0	332	0	251	596	1,619
1992	0	0	0	144	0	0	0	159	122	184	81	122	0	83	81	62	593	633	0	312	0	144	668	1,763
1993	0	0	0	94	0	0	0	105	122	184	81	122	0	83	81	62	577	717	0	266	0	94	615	1,786
1994	0	0	0	70	0	0	0	76	122	184	81	122	0	83	81	62	588	312	0	324	0	70	585	1,449
1995	0	0	0	50	0	0	0	0	122	184	81	122	0	83	81	62	706	336	0	331	7	50	509	1,606
1996	0	0	0	55	0	0	0	0	122	184	81	122	0	83	81	62	697	27	0	379	236	55	509	1,566
1997	0	0	0	84	0	0	0	0	122	184	81	122	0	83	81	62	686	31	0	459	289	84	509	1,691
1998	0	0	0	12	0	0	0	0	122	184	81	122	0	83	81	62	375	226	0	88	118	12	509	1,033
1999	0	0	0	58	0	0	0	0	122	184	81	122	0	83	81	62	612	0	263	364	117	58	509	1,581
2000	0	0	0	58	0	0	0	0	122	184	81	122	0	83	81	62	612	0	263	364	117	58	509	1,581
2001	0	0	0	3	0	0	0	0	122	184	81	122	0	83	81	62	677	0	136	304	0	3	509	1,343
2002	0	0	0	4	0	0	0	0	122	184	81	122	405	83	81	62	223	0	0	342	0	4	509	790
2003	0	0	0	4	0	0	0	0	122	184	81	122	405	83	81	62	416	0	384	123	4	4	509	1,153
2004	12	17	66	6	62	3	0	0	122	182	81	122	405	83	81	62	1,323	0	978	1,263	0	166	507	3,789
2005	261	617	1,005	1,179	1,242	505	0	0	135	203	81	122	405	83	81	62	555	0	446	329	0	4,809	541	1,556
2006	81	796	924	1,082	1,102	860	0	0	142	113	81	122	405	83	81	62	417	0	323	260	0	4,846	458	1,227
2007	466	407	616	666	41	552	132	0	108	308	81	122	405	83	81	62	366	0	207	79	0	2,880	619	877
2008	57	71	479	424	390	29	822	0	79	268	68	102	338	69	68	52	377	0	344	291	0	2,271	516	1,199
2009	57	258	695	780	797	40	961	0	79	265							21	0	266	190	0	3,589	345	477
2010	1	24	748	717	261	1	854															2,606	0	0

Table 3-4
Comparison of Storage Capacity Estimates

Segment Number	Surface Area	Storage Capacity Estimates[a]					Groundwater in Storage Fall 2010	Unused Storage in Fall 2010
	Psomas[1]	DWR 1972[2]	PSOMAS		WEI		WEI	
	acres	acre-ft	Specific Yield (%)[3]	acre-ft[4]	Specific Yield (%)[5]	acre-ft[6]	acre-ft[7]	acre-ft[8]
San Juan Creek								
1	346.7	3,860	0.075	3,510	0.178	5,789	5,058	730
2	439.2	5,140	0.070	3,843	0.153	2,028	1,523	505
3	564	5,120	0.040	2,594	0.146	5,305	4,372	933
4	338	10,220	0.075	2,535	0.181	4,139	3,359	781
5	492	8,330	0.173	7,247	0.182	5,416	4,438	978
Arroyo Trabuco								
3[b]								
6	502	8,180	0.143	7,194	0.164	3,862	1,637	2,225
Total	2,682	40,850		26,924		26,539	20,387	6,152

a. Storage Capacity=Area x Aquifer Thickness x Specific Yield.

b. The lowermost 6,000 feet from the outlet of Arroyo Trabuco is included with segment 3 in San Juan Creek

(1) Psomas (2004) adopted the DWR (1972) methodology within the lower basins and created six polygons that represent the alluvial areas in each segment as shown in Figure 3-24.

(2) After Table 8 San Juan Groundwater Basin Storage Capacity in DWR Bulletin No. 104-7.

(3) DWR (1972) reported specific yield values for attitude segments in the basin. These values were assigned based on correlation to the average altitude for that segment. (PSOMAS, 2010)

(4) Calculated using the DWR (1972)/Psomas(Annual Reports) specific yield estimates and the average thickness of each segment from DWR (1972).

(5) Calculated using a thickness weighted specific yield value as shown in Figure 3-24.

(6) Calculated using a kriged surface from thickness weighted specific yield values, kriged bottom of aquifer surface and was adjusted by the average difference in elevation of the stream channel and the ground surface elevation wells adjacent to the creeks.

(7) Calculated using a kriged surface from thickness weighted specific yield values, kriged bottom of aquifer surface and a kriged water level surface from Fall 2010 groundwater elevation contours and points as shown in Figure 3-26.

(8) Calculated by subtracting the Groundwater in Storage Fall 2010 column from the WEI storage capacity estimate column.

Table 3-5

Annual Groundwater Water Budget for San Juan Basin Model Area with Analytics - Model Scenario 2h[1,2]

(acre-ft)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
						=[1]+[2]+[3]+[4]+[5]					=[7]+[8]+[9]+[10]	=[6]-[11]		=If(S_{min}>[13], S_{min}-[13],0), 0)	=P_{req}-[7]
	Recharge Components						Discharge Components								
Hydrologic Year	Underflow Inflow from Up-Gradient of San Juan, Horno, Trabuco and Oso Creeks	Streambed Infiltration Including Natural Water and Return Flow	Deep Infiltration of Return Flow	Areal Recharge and Mountain Front Runoff Recharge	Underflow Inflow from Ocean	Total Recharge	Groundwater Production	Evapotrans-piration	Rising Water Discharge to Streamflow	Underflow to Ocean	Total Discharge	Change in Groundwater Storage	End of Period Storage	Deviation from Minimum Storage to Maintain Production	Unmet Production Demand
	[acre-ft]	[acre-ft]	[acre-ft]	[acre-ft]	[acre-ft]	[acre-ft]	[acre-ft]	[acre-ft]	[acre-ft]	[acre-ft]	[acre-ft]	[acre-ft]	25,000	27,000	11,214
1947	2,700	1,436	134	7	0	4,277	10,919	520	38	163	11,640	-7,363	17,637	-9,363	295
1948	2,700	2,392	134	21	93	5,340	10,589	520	3	8	11,121	-5,781	11,857	-15,143	625
1949	2,700	3,908	134	65	266	7,074	9,237	520	17	2	9,777	-2,703	9,154	-17,846	1,977
1950	2,700	3,542	134	154	452	6,982	8,036	520	6	0	8,562	-1,580	7,574	-19,426	3,178
1951	2,700	4,325	134	149	527	7,836	7,355	520	16	0	7,891	-55	7,519	-19,481	3,859
1952	2,700	11,097	134	891	280	15,102	9,123	520	278	5	9,926	5,177	12,695	-14,305	2,091
1953	2,700	2,740	134	52	474	6,101	8,250	520	1	0	8,771	-2,671	10,025	-16,975	2,964
1954	2,700	5,021	134	233	484	8,572	7,988	520	33	0	8,541	31	10,056	-16,944	3,226
1955	2,700	3,461	134	83	511	6,889	7,724	520	7	0	8,252	-1,362	8,693	-18,307	3,490
1956	2,700	5,435	134	320	470	9,060	8,009	520	63	0	8,593	467	9,160	-17,840	3,205
1957	2,700	5,559	134	118	470	8,982	7,760	520	13	0	8,293	688	9,849	-17,151	3,454
1958	2,700	10,928	134	835	274	14,871	9,707	520	326	7	10,560	4,311	14,160	-12,840	1,507
1959	2,700	3,255	134	95	508	6,693	8,507	520	8	0	9,034	-2,341	11,819	-15,181	2,707
1960	2,700	3,896	134	54	489	7,273	8,000	520	10	0	8,530	-1,257	10,561	-16,439	3,214
1961	2,700	2,052	134	24	608	5,518	7,405	520	0	0	7,925	-2,407	8,155	-18,845	3,809
1962	2,700	8,033	134	479	399	11,744	8,561	520	222	2	9,306	2,439	10,593	-16,407	2,653
1963	2,700	3,996	134	140	498	7,468	7,809	520	1	0	8,330	-862	9,731	-17,269	3,405
1964	2,700	2,983	134	55	557	6,429	7,553	520	0	0	8,073	-1,645	8,086	-18,914	3,661
1965	2,700	9,435	134	735	456	13,460	7,775	520	210	2	8,506	4,954	13,040	-13,960	3,439
1966	2,700	7,435	134	284	362	10,915	8,851	520	160	3	9,534	1,381	14,421	-12,579	2,363
1967	2,700	7,347	134	383	280	10,843	10,078	520	79	3	10,681	163	14,583	-12,417	1,136
1968	2,700	2,977	134	49	496	6,356	8,605	520	0	0	9,125	-2,769	11,814	-15,186	2,609
1969	2,700	13,718	134	1,200	199	17,951	10,863	520	504	17	11,904	6,048	17,862	-9,138	351
1970	2,700	4,661	134	86	385	7,967	9,873	520	16	0	10,410	-2,443	15,419	-11,581	1,341
1971	2,700	3,312	134	49	508	6,703	8,544	520	7	0	9,070	-2,367	13,052	-13,948	2,670
1972	2,700	2,463	134	18	570	5,884	7,819	520	0	0	8,339	-2,454	10,597	-16,403	3,395
1973	2,700	4,508	134	138	472	7,952	8,046	520	32	0	8,599	-647	9,950	-17,050	3,168
1974	2,700	4,702	134	144	495	8,175	7,883	520	16	0	8,419	-244	9,707	-17,293	3,331
1975	2,700	5,346	134	164	455	8,799	8,068	520	53	1	8,642	157	9,864	-17,136	3,146
1976	2,700	4,640	134	104	487	8,065	7,862	520	8	0	8,390	-325	9,539	-17,461	3,352
1977	2,700	4,261	134	88	486	7,670	7,723	520	2	0	8,245	-575	8,963	-18,037	3,491
1978	2,700	16,862	134	1,121	158	20,975	10,308	520	592	19	11,438	9,536	18,500	-8,500	906
1979	2,700	10,897	134	523	150	14,405	10,969	520	347	22	11,858	2,547	21,047	-5,953	245
1980	2,700	14,742	134	1,279	98	18,954	11,228	520	643	48	12,439	6,514	27,561	0	-14
1981	2,700	3,763	134	103	263	6,962	11,056	520	12	1	11,590	-4,627	22,934	-4,066	158
1982	2,700	8,434	134	286	244	11,798	10,934	520	115	3	11,572	226	23,160	-3,840	280
1983	2,700	15,983	134	916	74	19,807	11,139	520	489	32	12,180	7,628	30,787	0	75
1984	2,700	4,495	134	102	257	7,689	11,008	520	55	3	11,587	-3,898	26,890	-110	206
1985	2,700	4,917	134	103	314	8,168	10,772	520	26	2	11,320	-3,151	23,738	-3,262	442
1986	2,700	6,866	134	221	331	10,252	10,496	520	88	2	11,106	-854	22,885	-4,115	718
1987	2,700	4,561	134	82	431	7,908	9,664	520	10	0	10,194	-2,285	20,599	-6,401	1,550
1988	2,700	5,034	134	165	480	8,512	9,072	520	25	0	9,617	-1,105	19,494	-7,506	2,142
1989	2,700	3,707	134	82	478	7,101	9,047	520	7	0	9,573	-2,472	17,022	-9,978	2,167
1990	2,700	3,684	134	85	512	7,115	8,631	520	14	0	9,165	-2,051	14,972	-12,028	2,583
1991	2,700	7,251	134	289	430	10,804	9,314	520	152	1	9,988	816	15,788	-11,212	1,900
1992	2,700	10,638	134	768	289	14,530	10,443	520	299	5	11,267	3,263	19,050	-7,950	771
1993	2,700	15,578	134	1,719	97	20,228	11,208	520	697	47	12,472	7,756	26,806	-194	6
1994	2,700	4,208	134	104	283	7,429	11,049	520	31	2	11,602	-4,173	22,634	-4,366	165
1995	2,700	15,353	134	1,143	93	19,423	11,214	520	578	42	12,354	7,070	29,703	0	0
1996	2,700	10,018	134	536	152	13,541	11,232	520	256	12	12,020	1,520	31,224	0	-18
1997	2,700	10,340	134	782	98	14,053	11,214	520	373	37	12,145	1,909	33,132	0	0
1998	2,700	19,130	134	1,617	2	23,584	11,214	520	922	188	12,845	10,739	43,871	0	0
1999	2,700	2,422	134	33	62	5,351	11,214	520	16	41	11,791	-6,440	37,431	0	0
2000	2,700	5,982	134	159	108	9,083	11,232	520	100	14	11,866	-2,783	34,648	0	-18
2001	2,700	6,793	134	167	137	9,932	11,214	520	112	12	11,858	-1,926	32,722	0	0
2002	2,700	2,462	134	29	340	5,665	11,084	520	0	0	11,605	-5,940	26,782	-218	130
2003	2,700	7,411	134	264	269	10,778	10,981	520	122	3	11,627	-849	25,933	-1,067	233
2004	2,700	7,648	134	237	305	11,025	10,657	520	102	2	11,281	-256	25,677	-1,323	557
2005	2,700	13,104	134	955	125	17,019	11,206	520	509	31	12,266	4,753	30,430	0	8
2006	2,700	3,989	134	123	277	7,223	11,010	520	29	1	11,560	-4,337	26,093	-907	204
2007	2,700	1,413	134	4	518	4,769	10,014	520	0	0	10,534	-5,765	20,328	-6,672	1,200
2008	2,700	5,251	134	244	507	8,835	9,304	520	36	0	9,860	-1,024	19,304	-7,696	1,910
2009	2,700	4,736	134	203	465	8,238	9,518	520	87	1	10,125	-1,887	17,417	-9,583	1,696
2010	2,700	12,002	134	1,007	341	16,184	10,247	520	341	3	11,112	5,072	22,489	-4,511	967
Entire Investigation Period (1947-2010)															
Average	2,700	6,696	134	354	339	10,223	9,585	520	146	12	10,263	-39	18,394	-9,568	1,629
Median	2,700	4,969	134	156	352	8,375	9,686	520	34	2	10,302	-851	17,220	-9,780	1,528
Standard Deviation	0	4,270	0	421	165	4,575	1,369	0	210	32	1,501	3,944	8,699	6,987	1,369
Coef of Variation	0%	64%	0%	119%	49%	45%	14%	0%	145%	262%	15%	-10054%	47%	-73%	84%
Max	2,700	19,130	134	1,719	608	23,584	11,232	520	922	188	12,845	10,739	43,871	0	3,859
Min	2,700	1,413	134	4	0	4,277	7,355	520	0	0	7,891	-7,363	7,519	-19,481	-18
Dry Period Hydrology (1947-1976)															
Average	2,700	5,153	134	238	417	8,643	8,560	520	71	7	9,158	-515	11,239	-15,761	2,654
Median	2,700	4,416	134	128	473	7,894	8,041	520	14	0	8,596	-611	10,040	-16,960	3,173
Standard Deviation	0	3,512	0	334	112	3,744	919	0	154	5	1,038	3,028	2,860	2,860	919
Coef of Variation	0%	68%	0%	141%	27%	43%	11%	0%	216%	64%	11%	-587%	25%	-18%	35%
Max	2,700	16,862	134	1,279	608	20,975	11,228	520	643	48	12,439	9,536	27,561	0	3,859
Min	2,700	2,052	134	18	98	5,518	7,405	520	0	0	7,925	-4,627	8,086	-18,914	-14
Average Period Hydrology (1963-1992)															
Average	2,700	6,787	134	325	374	10,321	9,381	520	132	5	10,039	282	16,702	-10,443	1,833
Median	2,700	4,975	134	154	407	8,344	9,489	520	43	1	10,091	-450	16,405	-10,595	1,725
Standard Deviation	0	4,298	0	449	145	4,605	1,283	0	216	14	1,421	3,865	6,159	5,885	1,283
Coef of Variation	0%	63%	0%	138%	39%	45%	14%	0%	163%	247%	14%	1371%	37%	-56%	70%
Max	2,700	16,862	134	1,719	570	20,975	11,232	520	697	48	12,472	9,536	31,224	0	3,491
Min	2,700	2,463	134	18	74	5,884	7,723	520	0	0	8,245	-4,627	8,963	-18,037	-18
Wet Period Hydrology (1978-1983)															
Average	2,700	11,780	134	705	164	15,484	10,939	520	366	21	11,846	3,637	23,998	-3,727	275
Median	2,700	12,820	134	720	154	16,679	11,013	520	418	21	11,724	4,531	23,047	-3,953	201
Standard Deviation	0	5,070	0	473	76	5,445	328	0	257	18	392	5,294	4,462	3,336	328
Coef of Variation	0%	43%	0%	67%	46%	35%	3%	0%	70%	86%	3%	146%	19%	-90%	119%
Max	2,700	16,862	134	1,279	263	20,975	11,228	520	643	48	12,439	9,536	30,787	0	906
Min	2,700	3,763	134	103	74	6,962	10,308	520	12	1	11,438	-4,627	18,500	-8,500	-14

Notes

[1] Water budget as shown in columns 1 through 12 based on unpublished modeling results provided MWDOC January 2013 representing 2014 requested pumping and 2014 landuse and water management conditions.

[2] Minimum storage (S_{min}) assumed to be 27,000 acre-ft; Pumping request in 2014 (P_{req}) is 11,216; Initial sotrage is 25,000 acre-ft.

Table 3-6
Surface Water Quality Sampling Sites in the San Juan Basin Watershed

Monitoring Entity	Surface Water Body	Station Name	Station Abbreviation	Station Alias	Monitoring Program	Sampling Time Period	Analytes
County	Bell Creek	Bell Creek	Bell Creek	REF-BC	Bioassessment Program	2003 - 2009	General Physical, Metals, Pesticides
County	San Juan Creek	San Juan Creek at Cold Spring	SJC @ Cold Spring	REF-CS	Bioassessment Program	2002 - 2009	General Physical, Metals, Pesticides
County	San Juan Creek	San Juan Creek at Ortega Highway	SJC @ Ortega	SJC-74	Bioassessment Program	2003 - 2009	General Physical, Metals, Pesticides
County	San Juan Creek	San Juan Creek at Caspers Park	SJC @ Caspers Park	SJOL01	Mass Emissions Monitoring Program	1993 - 2001	General Physical, Metals, Pesticides
County	San Juan Creek	San Juan Creek at Camino Capistrano	SJC @ Camino Capistrano	SJC-CC	Bioassessment Program	2002 - 2009	General Physical, Metals, Pesticides
County	Trabuco Creek	Trabuco Creek alder Spring	TC @ Alder Spring	REF-TCAS	Bioassessment Program	2003 - 2009	General Physical, Metals, Pesticides
County	Trabuco Creek	Trabuco Creek at Avery Parkway	TC @ Avery	TC-AP	Bioassessment Program	2002 - 2008	General Physical, Metals, Pesticides
County/CDM	Oso Creek	Oso Creek at Crown Valley Parkway	OC @ Crown Valley	OSOLO3/CDM-SW-9	Bioassessment Program	1986 - 1999	General Physical, Metals, Pesticides
County/CDM/RWQCB	San Juan Creek	San Juan Creek at La Novia	SJC @ La Novia	SJNL01/CDM-SW-4	Mass Emissions Monitoring Program	1987 - 2009	General Physical, Metals, Pesticides
County/CDM	Trabuco Creek	Trabuco Creek at Del Obispo	TC @ Del Obispo	TCOL02/CDM-SW-6	Mass Emissions Monitoring Program	1986 - 2009	General Physical, Metals, Pesticides
CDM	Oso Creek	CDM-SW-8	CDM-8	CDM-8	Monitoring Program	1986 - 1987	General Physical, Fe, Mn
CDM	San Juan Creek	San Juan Creek at Treatment Plant	SJC @ Treatment Plant	CDM-1	Monitoring Program	1986 - 1987	General Physical, Fe, Mn
CDM	San Juan Creek	CDM_SW-10 (Tributary to San Juan Creek)	CDM-10	CDM-10	Monitoring Program	1986 - 1987	General Physical, Fe, Mn
CDM	San Juan Creek	CDM_SW-11	CDM-11	CDM-11	Monitoring Program	1986 - 1987	General Physical, Fe, Mn
CDM	San Juan Creek	CDM_SW-11A (Tributary to San Juan Creek)	CDM-11A	CDM-11A	Monitoring Program	1986 - 1987	General Physical, Fe, Mn
CDM	San Juan Creek	CDM_SW-16	CDM-16	CDM-16	Monitoring Program	1986 - 1987	General Physical, Fe, Mn
CDM	San Juan Creek	San Juan Creek below Trabuco Creek	SJC below Trabuco	CDM-2	Monitoring Program	1986 - 1987	General Physical, Fe, Mn
CDM	San Juan Creek	San Juan Creek at Oda Nursery	CDM-5	CDM-5	Monitoring Program	1986 - 1987	General Physical, Fe, Mn
CDM	Trabuco Creek	Trabuco Creek At Camino Capistrano	CDM-7	TC @ Camino Cap	Monitoring Program	1986 - 1987	General Physical, Fe, Mn
RWCQB	San Juan Creek	San Juan Creek ~1mi above Lion Cyn. Cr.	SJC above Lion Cyn	901S00313	Ambient SW Monitoring Program	2009 - 2010	General Physical, Metals, Pesticides
RWCQB	San Juan Creek	San Juan Creek above Arroyo Trabuco	SJC above Trabuco	901S39498	Ambient SW Monitoring Program	2009 - 2010	General Physical, Metals, Pesticides
RWCQB	San Juan Creek	San Juan Creek ~0.3mi below Hwy 74	SJC below Ortega	901S45253	Ambient SW Monitoring Program	2009 - 2010	General Physical, Metals, Pesticides
RWCQB	Trabuco Creek	Trabuco Creek 2	TC -2	901SJATC2	Ambient SW Monitoring Program	2002 - 2003	General Physical, Metals, Pesticides
RWCQB	Trabuco Creek	Trabuco Creek 5	TC - 5	901SJATC5	Ambient SW Monitoring Program	2002 - 2003	General Physical, Metals, Pesticides
RWCQB	Bell Creek	Bell Canyon Creek 2	Bell Canyon Creek 2	901SJBEL2	Ambient SW Monitoring Program	2002 - 2003	General Physical, Metals, Pesticides
RWCQB	Oso Creek	Oso Creek 3	OC - 3	901SJOSO3	Ambient SW Monitoring Program	2002 - 2003	General Physical, Metals, Pesticides
RWCQB	San Juan Creek	San Juan Creek 5	SJC - 5	901SJSJC5	Ambient SW Monitoring Program	2002 - 2003	General Physical, Metals, Pesticides
RWCQB	San Juan Creek	San Juan Creek 9	SJC - 9	901SJSJC9	Ambient SW Monitoring Program	2002 - 2003	General Physical, Metals, Pesticides
SJBA	San Juan Creek	PMS-Control	PMS-Control	PMS-Control	Integrated Environmental Sampling	2009 - 2010	General Mineral, Physical, and Metals
SJBA	San Juan Creek	PMS-01	PMS-01	PMS-01	Integrated Environmental Sampling	2009 - 2010	General Mineral, Physical, and Metals
SJBA	San Juan Creek	PMS-02	PMS-02	PMS-02	Integrated Environmental Sampling	2009 - 2010	General Mineral, Physical, and Metals
SJBA	San Juan Creek	PMS-03	PMS-03	PMS-03	Integrated Environmental Sampling	2009 - 2010	General Mineral, Physical, and Metals
SJBA	San Juan Creek	PMS-04	PMS-04	PMS-04	Integrated Environmental Sampling	2009 - 2010	General Mineral, Physical, and Metals
SMWD	Oso Creek	Oso Creek at Oso Barrier	OC @ Barrier	Oso Barrier	Surface Water Diversion Monitoring	2009 - 2010	General Mineral, Physical, and Metals
SMWD	Horno Creek	Horno Creek at Horno Barrier	Horno Creek @ Barrier	Horno Barrier	Surface Water Diversion Monitoring	2009 - 2010	General Mineral, Physical, and Metals
WEI	Trabuco Creek	Trabuco Creek-8	TC - 8	TC-8	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Drainage Tributary from RSM Development	TC @ RSMD	D-SM	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Trabuco Creek at Rising Groundwater	TC @ Rising Groundwater	TC-RG	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Trabuco Creek-7	TC-7	TC-7	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Tin Mine Adit (SN-1A)	TC @ Mine Adit	SN-1A	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Trabuco Creek Below Tin Mine Adit (SN-1)	TC below Mine Adit	SN-1	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Holy Jim Creek-1	Holy Jim	HJC-1	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Trabuco Creek-2A	TC-2A	TC-2A	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Trabuco Creek at Oso Parkway	TC @ Oso	TC-OSO	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Trabuco Creek-3	TC-3	TC-3	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents
WEI	Trabuco Creek	Trabuco Creek at Crown Valley Parkway	TC @ Crown Valley	TC-CV	Arroyo Trabuco Study	1998	General Mineral, Physical, Metals, Trace Constituents

Table 3-7
Groundwater Quality Data Sources for Wells in the San Juan Basin

WQ Data Source	Time Period	# of Wells	Description
DWR, 1972	1952 - 1969	19	Private and Public Wells in San Juan Basin
NBS Lowry, 1994	1970 - 1992	10	Private and Public Wells in San Juan Basin
CDM, 1987	1986 - 1987	15	Private and Public Wells in San Juan Basin
CA DPH Database - RMV	1986 - 1999	1	Non Private RMV Wells (RMV 7)
GTC, 2001	1988 - 2001	15	Private and Public Wells in San Juan Basin
CA DPH Database - City of San Juan	1991 - 2010	10	City of San Juan Production Wells
CA State GeoTracker Website	2001 - 2010	272	Monitoring Wells for 10 Point Source Contamination Sites
SJBA	2003 - 2010	9	SJBA Monitoring Wells
City of San Juan Capistrano	2005 - 2008	6	City of San Juan Desalter Production Wells
CA DPH Database - SJBA	2005 - 2010	6	City of San Juan Desalter Production Wells
CA DPH Database - SCWD	2006 - 2010	1	Stonehill Well
Santa Margarita Water District	2006 - 2010	1	Nichols Well

Table 3-8
Surface Water Quality Data in Exceedance of Drinking Water Maximum Contaminant Levels

Analyte Group/ Constituent	Maximum Contaminant Levels[1]					1987 - 2005								Last Five Years (2006-2010)							
						Exceedance				Non-Exceedance				Exceedance				Non-Exceedance			
	Primary	Secondary	Notification Level	Units	Notes	# of Sites	% of Sites Exceeding MCLs	Count	% of Samples Exceeding MCLs	# of Sites	% of Sites Not Exceeding MCLs	Count	% of Samples Not Exceeding MCLs	# of Sites	% of Sites Exceeding MCLs	Count	% of Samples Exceeding MCLs	# of Sites	% of Sites Not Exceeding MCLs	Count	% of Samples Not Exceeding MCLs
Inorganic Constituents																					
Total Dissolved Solids		500		mg/L		19	66%	192	88%	10	34%	27	12%	10	91%	90	99%	1	9%	1	1%
Sulfate		250		mg/L		16	38%	143	62%	26	62%	88	38%	9	82%	89	98%	2	18%	2	2%
Chloride		250		mg/L		6	20%	115	53%	24	80%	102	47%	6	38%	57	66%	10	63%	30	34%
Manganese		0.05	0.5	mg/L		15	38%	67	44%	24	62%	87	56%	8	50%	40	62%	8	50%	25	38%
Iron		300		mg/L		10	31%	26	19%	22	69%	109	81%	7	41%	30	46%	10	59%	35	54%
Aluminum	1	0.2		mg/L	2	1	6%	1	2%	17	94%	51	98%	1	14%	1	2%	6	86%	46	98%
Arsenic	10			ug/L		0	0%	0	0%	17	100%	51	100%	2	25%	22	45%	6	75%	27	55%
Boron			1000	ug/L		0	0%	0	0%	12	100%	115	100%	1	33%	7	10%	2	67%	60	90%
Cadmium	5			ug/L		4	13%	26	5%	27	87%	537	95%	4	24%	12	5%	13	76%	233	95%
Lead	15			ug/L		4	20%	34	6%	16	80%	498	94%	3	19%	5	2%	13	81%	240	98%
Chromium	50			ug/L	3	2	7%	7	1%	27	93%	556	99%	2	13%	2	1%	13	87%	243	99%
Nickel	100			ug/L		3	10%	6	1%	26	90%	557	99%	1	8%	1	0%	11	92%	203	100%
Nitrate-N	10			mg/L		10	25%	32	16%	30	75%	165	84%	0	0%	0	0%	6	100%	60	100%
General Physical																					
Specific Conductance		900		umhos/cm		8	26%	86	19%	23	74%	367	81%	11	52%	68	49%	10	48%	71	51%
Turbidity	1			NTU		8	44%	262	66%	10	56%	138	35%	8	35%	60	39%	15	65%	92	61%
Color		15		Units		0	NA	0	NA	0	NA	0	NA	5	83%	13	81%	1	17%	3	19%
Odor		3		Threshold Units		0	NA	0	NA	0	NA	0	NA	5	50%	7	44%	5	50%	9	56%
pH		6.5<pH<8.5		Units		3	12%	13	3%	23	88%	442	97%	0	0%	0	0%	13	100%	111	100%

1 The California MCL was used for exceedance analysis unless otherwise noted.
2 The Primary California MCL is used for this analysis because the lower Secondary limit of 0.2 mg/L is the same as the US EPA Threshold 2 limit.
3 MCL is for total chromium.

Table 3-9
Surface Water Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Surface Water Quality Objectives

Station	Analyte	Unit	Objective	Time Period in which Data is Available	# of Years with Sample Results During Time Period	# of Years in which Compliance Metric is Violated	# of Years in which Compliance Metric is Not Violated
Bell Creek - Upstream to Downstream							
Bell Creek	Turbidity	NTU	20	2003-2009	7	0	7
Bell Canyon Creek 2	SO4	mg/L	250	2003-2003	1	0	1
Bell Canyon Creek 2	Mn	mg/L	0.05	2003-2003	1	0	1
San Juan Creek - Upstream to Downstream							
SJC above Lion Cyn.	TDS	mg/L	500	2009-2009	1	0	1
SJC above Lion Cyn.	SO4	mg/L	250	2009-2009	1	1	0
SJC above Lion Cyn.	Cl	mg/L	250	2009-2009	1	0	1
SJC above Lion Cyn.	Fe	mg/L	0.3	2009-2009	1	0	1
SJC above Lion Cyn.	Mn	mg/L	0.05	2009-2009	1	0	1
SJC above Lion Cyn.	%Na	%	60	2009-2009	0	0	0
SJC - 5	SO4	mg/L	250	2002-2003	2	0	2
SJC - 5	Mn	mg/L	0.05	2002-2003	2	0	2
SJC @ Cold Spring	Turbidity	NTU	20	2002-2009	8	1	7
SJC @ Caspers Park	Turbidity	NTU	20	1993-2001	9	4	5
CDM-16	TDS	mg/L	500	1987-1987	1	0	1
CDM-16	SO4	mg/L	250	1987-1987	1	0	1
CDM-16	Cl	mg/L	250	1987-1987	1	0	1
CDM-16	Fe	mg/L	0.3	1987-1987	1	0	1
CDM-16	Mn	mg/L	0.05	1987-1987	1	1	0
CDM-11A	TDS	mg/L	500	1987-1987	1	1	0
CDM-11A	SO4	mg/L	250	1987-1987	1	1	0
CDM-11A	Cl	mg/L	250	1987-1987	1	0	1
CDM-11A	Fe	mg/L	0.3	1987-1987	1	0	1
CDM-11A	Mn	mg/L	0.05	1987-1987	1	0	1
CDM-11	TDS	mg/L	500	1986-1987	2	2	0
CDM-11	SO4	mg/L	250	1986-1987	2	0	2
CDM-11	Cl	mg/L	250	1986-1987	2	0	2
CDM-11	Fe	mg/L	0.3	1986-1987	2	2	0
CDM-11	Mn	mg/L	0.05	1986-1987	2	1	1
CDM-10	TDS	mg/L	500	1986-1987	2	2	0
CDM-10	SO4	mg/L	250	1986-1987	2	0	2
CDM-10	Cl	mg/L	250	1986-1987	2	0	2
CDM-10	Fe	mg/L	0.3	1986-1987	2	1	1
CDM-10	Mn	mg/L	0.05	1986-1987	2	0	2
SJC @ Oda Nursery	TDS	mg/L	500	1986-1987	2	2	0
SJC @ Oda Nursery	SO4	mg/L	250	1986-1987	2	1	1
SJC @ Oda Nursery	Cl	mg/L	250	1986-1987	2	0	2
SJC @ Oda Nursery	Fe	mg/L	0.3	1986-1987	2	0	2
SJC @ Oda Nursery	Mn	mg/L	0.05	1986-1987	2	1	1
PMS-Control	TDS	mg/L	500	2009-2011	3	3	0
PMS-Control	SO4	mg/L	250	2009-2011	3	2	1
PMS-Control	Cl	mg/L	250	2009-2011	3	1	2
PMS-Control	Fe	mg/L	0.3	2009-2011	3	2	1
PMS-Control	Mn	mg/L	0.05	2009-2011	3	2	1
PMS-Control	Turbidity	NTU	20	2009-2011	3	0	3
PMS-Control	Color	units	20	2009-2011	3	0	3
PMS-Control	MBAS	mg/L	0.5	2009-2011	3	0	3
PMS-Control	%Na	%	60	2009-2011	3	0	3
SJC @ Ortega	Turbidity	NTU	20	2003-2009	7	1	6

Table 3-9

Surface Water Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Surface Water Quality Objectives

Station	Analyte	Unit	Objective	Time Period in which Data is Available	# of Years with Sample Results During Time Period	# of Years in which Compliance Metric is Violated	# of Years in which Compliance Metric is Not Violated
SJC Below Ortega	TDS	mg/L	500	2010-2010	1	1	0
SJC Below Ortega	SO4	mg/L	250	2010-2010	1	0	1
SJC Below Ortega	Cl	mg/L	250	2010-2010	1	0	1
SJC Below Ortega	Fe	mg/L	0.3	2010-2010	1	0	1
SJC Below Ortega	Mn	mg/L	0.05	2010-2010	1	0	1
SJC Below Ortega	%Na	%	60	2010-2010	0	0	0
PMS-04	TDS	mg/L	500	2010-2011	2	2	0
PMS-04	SO4	mg/L	250	2010-2011	2	1	1
PMS-04	Cl	mg/L	250	2010-2011	2	0	2
PMS-04	Fe	mg/L	0.3	2010-2011	2	0	2
PMS-04	Mn	mg/L	0.05	2010-2011	2	1	1
PMS-04	Turbidity	NTU	20	2010-2011	2	0	2
PMS-04	Color	units	20	2010-2011	2	1	1
PMS-04	MBAS	mg/L	0.5	2010-2011	2	0	2
PMS-04	%Na	%	60	2010-2011	2	0	2
PMS-03	TDS	mg/L	500	2010-2011	2	2	0
PMS-03	SO4	mg/L	250	2010-2011	2	1	1
PMS-03	Cl	mg/L	250	2010-2011	2	0	2
PMS-03	Fe	mg/L	0.3	2010-2011	2	0	2
PMS-03	Mn	mg/L	0.05	2010-2011	2	1	1
PMS-03	Turbidity	NTU	20	2010-2011	2	0	2
PMS-03	Color	units	20	2010-2011	2	0	2
PMS-03	MBAS	mg/L	0.5	2010-2011	2	0	2
PMS-03	%Na	%	60	2010-2011	2	0	2
SJC @ La Novia	TDS	mg/L	500	1987-2009	5	5	0
SJC @ La Novia	SO4	mg/L	250	1987-1992	4	4	0
SJC @ La Novia	Cl	mg/L	250	1987-2009	4	0	4
SJC @ La Novia	Fe	mg/L	0.3	1987-2009	5	2	3
SJC @ La Novia	Mn	mg/L	0.05	1987-2009	5	3	2
SJC @ La Novia	Turbidity	NTU	20	1992-2009	18	15	3
SJC @ La Novia	%Na	%	60	2009-2009	0	0	0
PMS-02	TDS	mg/L	500	2009-2011	3	3	0
PMS-02	SO4	mg/L	250	2009-2011	3	2	1
PMS-02	Cl	mg/L	250	2009-2011	3	2	1
PMS-02	Fe	mg/L	0.3	2009-2011	3	1	2
PMS-02	Mn	mg/L	0.05	2009-2011	3	1	2
PMS-02	Turbidity	NTU	20	2009-2011	3	0	3
PMS-02	Color	units	20	2009-2011	3	2	1
PMS-02	MBAS	mg/L	0.5	2009-2011	3	0	3
PMS-02	%Na	%	60	2009-2011	3	0	3
PMS-01	TDS	mg/L	500	2009-2011	3	3	0
PMS-01	SO4	mg/L	250	2009-2011	3	3	0
PMS-01	Cl	mg/L	250	2009-2011	3	2	1
PMS-01	Fe	mg/L	0.3	2009-2011	3	1	2
PMS-01	Mn	mg/L	0.05	2009-2011	3	2	1
PMS-01	Turbidity	NTU	20	2009-2011	3	1	2
PMS-01	Color	units	20	2009-2011	3	2	1
PMS-01	MBAS	mg/L	0.5	2009-2011	3	0	3
PMS-01	%Na	%	60	2009-2011	3	0	3

Table 3-9

Surface Water Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Surface Water Quality Objectives

Station	Analyte	Unit	Objective	Time Period in which Data is Available	# of Years with Sample Results During Time Period	# of Years in which Compliance Metric is Violated	# of Years in which Compliance Metric is Not Violated
SJC above Trabuco Creek	TDS	mg/L	500	2010-2010	1	1	0
SJC above Trabuco Creek	SO4	mg/L	250	2010-2010	1	0	1
SJC above Trabuco Creek	Cl	mg/L	250	2010-2010	1	1	0
SJC above Trabuco Creek	Fe	mg/L	0.3	2010-2010	1	1	0
SJC above Trabuco Creek	Mn	mg/L	0.05	2010-2010	1	0	1
SJC above Trabuco Creek	%Na	%	60	2010-2010	0	0	0
SJC below Trabuco Creek	TDS	mg/L	500	1986-1987	2	2	0
SJC below Trabuco Creek	SO4	mg/L	250	1986-1987	2	2	0
SJC below Trabuco Creek	Cl	mg/L	250	1986-1987	2	2	0
SJC below Trabuco Creek	Fe	mg/L	0.3	1986-1987	2	0	2
SJC below Trabuco Creek	Mn		0.05	1986-1987	2	2	0
SJC - 9	SO4	mg/L	250	2002-2008	3	3	0
SJC - 9	Mn	mg/L	0.05	2002-2003	2	1	1
SJC @ Treatment Plant	TDS	mg/L	500	1986-1987	2	2	0
SJC @ Treatment Plant	SO4	mg/L	250	1986-1987	2	2	0
SJC @ Treatment Plant	Cl	mg/L	250	1986-1987	2	2	0
SJC @ Treatment Plant	Fe	mg/L	0.3	1986-1987	2	1	1
SJC @ Treatment Plant	Mn	mg/L	0.05	1986-1987	2	2	0
SJC @ Camino Capistrano	Turbidity	NTU	20	2002-2009	7	1	6
Horno Creek - Upstream to Downstream							
Horno Creek @ Barrier	TDS	mg/L	500	1997-2010	14	14	0
Horno Creek @ Barrier	SO4	mg/L	250	1997-2010	14	14	0
Horno Creek @ Barrier	Cl	mg/L	250	1997-2010	14	14	0
Horno Creek @ Barrier	Fe	mg/L	0.3	2009-2010	2	2	0
Horno Creek @ Barrier	Mn	mg/L	0.05	2009-2010	2	1	1
Horno Creek @ Barrier	B	mg/L	0.75	1997-2010	14	0	14
Horno Creek @ Barrier	F	mg/L	1	1997-2010	14	1	13
Horno Creek @ Barrier	Turbidity	NTU	20	2009-2010	2	0	2
Horno Creek @ Barrier	MBAS	mg/L	0.5	2009-2010	2	0	2
Horno Creek @ Barrier	%Na	%	60	1997-2010	0	0	0
Trabuco Creek - Upstream to Downstream							
TC - 8	TDS	mg/L	500	1998-1998	1	0	1
TC - 8	SO4	mg/L	250	1998-1998	1	0	1
TC - 8	Cl	mg/L	250	1998-1998	1	0	1
TC - 8	Fe	mg/L	0.3	1998-1998	1	0	1
TC - 8	Mn	mg/L	0.05	1998-1998	1	0	1
TC - 8	B	mg/L	0.75	1998-1998	1	0	1
TC - 8	F	mg/L	1	1998-1998	1	0	1
TC - 8	%Na	%	60	1998-1998	1	0	1
Holy Jim	TDS	mg/L	500	1998-1998	1	0	1
Holy Jim	SO4	mg/L	250	1998-1998	1	0	1
Holy Jim	Cl	mg/L	250	1998-1998	1	0	1
Holy Jim	Fe	mg/L	0.3	1998-1998	1	0	1
Holy Jim	Mn	mg/L	0.05	1998-1998	1	0	1
Holy Jim	B	mg/L	0.75	1998-1998	1	0	1
Holy Jim	F	mg/L	1	1998-1998	1	0	1
Holy Jim	%Na	%	60	1998-1998	1	0	1

Table 3-9
Surface Water Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Surface Water Quality Objectives

Station	Analyte	Unit	Objective	Time Period in which Data is Available	# of Years with Sample Results During Time Period	# of Years in which Compliance Metric is Violated	# of Years in which Compliance Metric is Not Violated
TC - 7	TDS	mg/L	500	1998-1998	1	0	1
TC - 7	SO4	mg/L	250	1998-1998	1	0	1
TC - 7	Cl	mg/L	250	1998-1998	1	0	1
TC - 7	Fe	mg/L	0.3	1998-1998	1	0	1
TC - 7	Mn	mg/L	0.05	1998-1998	1	0	1
TC - 7	B	mg/L	0.75	1998-1998	1	0	1
TC - 7	F	mg/L	1	1998-1998	1	0	1
TC - 7	%Na	%	60	1998-1998	1	0	1
TC @ Mine Adit	TDS	mg/L	500	1998-1998	1	1	0
TC @ Mine Adit	SO4	mg/L	250	1998-1998	1	1	0
TC @ Mine Adit	Cl	mg/L	250	1998-1998	1	0	1
TC @ Mine Adit	Fe	mg/L	0.3	1998-1998	1	1	0
TC @ Mine Adit	Mn	mg/L	0.05	1998-1998	1	1	0
TC @ Mine Adit	B	mg/L	0.75	1998-1998	1	0	1
TC @ Mine Adit	F	mg/L	1	1998-1998	1	1	0
TC @ Mine Adit	%Na	%	60	1998-1998	1	0	1
TC Below Mine Adit	TDS	mg/L	500	1998-1998	1	0	1
TC Below Mine Adit	SO4	mg/L	250	1998-1998	1	0	1
TC Below Mine Adit	Cl	mg/L	250	1998-1998	1	0	1
TC Below Mine Adit	Fe	mg/L	0.3	1998-1998	1	0	1
TC Below Mine Adit	Mn	mg/L	0.05	1998-1998	1	0	1
TC Below Mine Adit	B	mg/L	0.75	1998-1998	1	0	1
TC Below Mine Adit	F	mg/L	1	1998-1998	1	0	1
TC Below Mine Adit	%Na	%	60	1998-1998	1	0	1
TC @ Alder Spring	Turbidity	NTU	20	2003-2009	7	0	7
TC - 2	SO4	mg/L	250	2003-2003	1	0	1
TC - 2	Mn	mg/L	0.05	2003-2003	1	0	1
TC @ RSMD	TDS	mg/L	500	1998-1998	1	1	0
TC @ RSMD	SO4	mg/L	250	1998-1998	1	1	0
TC @ RSMD	Cl	mg/L	250	1998-1998	1	0	1
TC @ RSMD	Fe	mg/L	0.3	1998-1998	1	0	1
TC @ RSMD	Mn	mg/L	0.05	1998-1998	1	1	0
TC @ RSMD	B	mg/L	0.75	1998-1998	1	0	1
TC @ RSMD	F	mg/L	1	1998-1998	1	0	1
TC @ RSMD	%Na	%	60	1998-1998	1	0	1
TC @ Rising Groundwater	TDS	mg/L	500	1998-1998	1	1	0
TC @ Rising Groundwater	SO4	mg/L	250	1998-1998	1	1	0
TC @ Rising Groundwater	Cl	mg/L	250	1998-1998	1	0	1
TC @ Rising Groundwater	Fe	mg/L	0.3	1998-1998	1	0	1
TC @ Rising Groundwater	Mn	mg/L	0.05	1998-1998	1	0	1
TC @ Rising Groundwater	B	mg/L	0.75	1998-1998	1	0	1
TC @ Rising Groundwater	F	mg/L	1	1998-1998	1	1	0
TC @ Rising Groundwater	%Na	%	60	1998-1998	1	0	1
TC - 3	TDS	mg/L	500	1998-1998	1	1	0
TC - 3	SO4	mg/L	250	1998-1998	1	1	0
TC - 3	Cl	mg/L	250	1998-1998	1	0	1
TC - 3	Fe	mg/L	0.3	1998-1998	1	0	1
TC - 3	Mn	mg/L	0.05	1998-1998	1	0	1
TC - 3	B	mg/L	0.75	1998-1998	1	0	1
TC - 3	F	mg/L	1	1998-1998	1	0	1
TC - 3	%Na	%	60	1998-1998	1	0	1

Table 3-9
Surface Water Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Surface Water Quality Objectives

Station	Analyte	Unit	Objective	Time Period in which Data is Available	# of Years with Sample Results During Time Period	# of Years in which Compliance Metric is Violated	# of Years in which Compliance Metric is Not Violated
TC @ Oso	TDS	mg/L	500	1998-1998	1	1	0
TC @ Oso	SO4	mg/L	250	1998-1998	1	0	1
TC @ Oso	Cl	mg/L	250	1998-1998	1	0	1
TC @ Oso	Fe	mg/L	0.3	1998-1998	1	0	1
TC @ Oso	Mn	mg/L	0.05	1998-1998	1	0	1
TC @ Oso	B	mg/L	0.75	1998-1998	1	0	1
TC @ Oso	F	mg/L	1	1998-1998	1	0	1
TC @ Oso	%Na	%	60	1998-1998	1	0	1
TC @ Crown Valley	TDS	mg/L	500	1998-1998	1	1	0
TC @ Crown Valley	SO4	mg/L	250	1998-1998	1	0	1
TC @ Crown Valley	Cl	mg/L	250	1998-1998	1	0	1
TC @ Crown Valley	Fe	mg/L	0.3	1998-1998	1	0	1
TC @ Crown Valley	Mn	mg/L	0.05	1998-1998	1	0	1
TC @ Crown Valley	B	mg/L	0.75	1998-1998	1	0	1
TC @ Crown Valley	F	mg/L	1	1998-1998	1	0	1
TC @ Crown Valley	%Na	%	60	1998-1998	1	0	1
TC @ Avery	Turbidity	NTU	20	2002-2008	7	0	7
TC - 2A	TDS	mg/L	500	1998-1998	1	1	0
TC - 2A	SO4	mg/L	250	1998-1998	1	0	1
TC - 2A	Cl	mg/L	250	1998-1998	1	0	1
TC - 2A	Fe	mg/L	0.3	1998-1998	1	0	1
TC - 2A	Mn	mg/L	0.05	1998-1998	1	1	0
TC - 2A	B	mg/L	0.75	1998-1998	1	0	1
TC - 2A	F	mg/L	1	1998-1998	1	0	1
TC - 2A	%Na	%	60	1998-1998	1	0	1
TC @ Camino Cap	TDS	mg/L	500	1986-1992	5	3	2
TC @ Camino Cap	SO4	mg/L	250	1986-1992	5	1	4
TC @ Camino Cap	Cl	mg/L	250	1986-1992	5	0	5
TC @ Camino Cap	Fe	mg/L	0.3	1986-1992	5	4	1
TC @ Camino Cap	Mn	mg/L	0.05	1986-1992	5	5	0
TC - 5	SO4	mg/L	250	2002-2003	2	0	2
TC - 5	Mn	mg/L	0.05	2002-2003	2	0	2
TC @ Del Obispo	TDS	mg/L	500	1986-1991	4	4	0
TC @ Del Obispo	SO4	mg/L	250	1986-1991	4	4	0
TC @ Del Obispo	Cl	mg/L	250	1986-1991	4	3	1
TC @ Del Obispo	Fe	mg/L	0.3	1986-1991	4	2	2
TC @ Del Obispo	Mn	mg/L	0.05	1986-1991	4	2	2
TC @ Del Obispo	Turbidity	NTU	20	1994-2009	11	10	1
Oso Creek - Upstream to Downstream							
OC @ Barrier	TDS	mg/L	500	1997-2010	14	14	0
OC @ Barrier	SO4	mg/L	250	1997-2010	14	14	0
OC @ Barrier	Cl	mg/L	250	1997-2010	14	14	0
OC @ Barrier	Fe	mg/L	0.3	2009-2010	2	2	0
OC @ Barrier	Mn	mg/L	0.05	2009-2010	2	2	0
OC @ Barrier	B	mg/L	0.75	1997-2010	14	0	14
OC @ Barrier	F	mg/L	1	1997-2010	14	1	13
OC @ Barrier	Turbidity	NTU	20	2009-2010	2	0	2
OC @ Barrier	MBAS	mg/L	0.5	2009-2010	2	0	2
OC @ Barrier	%Na	%	60	1997-2010	0	0	0

Table 3-9
Surface Water Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Surface Water Quality Objectives

Station	Analyte	Unit	Objective	Time Period in which Data is Available	# of Years with Sample Results During Time Period	# of Years in which Compliance Metric is Violated	# of Years in which Compliance Metric is Not Violated
OC @ Crown Valley	TDS	mg/L	500	1986-1987	2	2	0
OC @ Crown Valley	SO4	mg/L	250	1986-1987	2	2	0
OC @ Crown Valley	Cl	mg/L	250	1986-1987	2	2	0
OC @ Crown Valley	Fe	mg/L	0.3	1986-1987	2	1	1
OC @ Crown Valley	Mn	mg/L	0.05	1986-1987	2	2	0
OC @ Crown Valley	Turbidity	NTU	20	1991-1999	8	7	1
CDM-8	TDS	mg/L	500	1986-1992	5	5	0
CDM-8	SO4	mg/L	250	1986-1992	5	5	0
CDM-8	Cl	mg/L	250	1986-1992	5	5	0
CDM-8	Fe	mg/L	0.3	1986-1992	5	3	2
CDM-8	Mn	mg/L	0.05	1986-1992	5	4	1
OC - 3	SO4	mg/L	250	2002-2003	2	2	0
OC - 3	Mn	mg/L	0.05	2002-2003	2	2	0

Table 3-10
Groundwater Quality Data in Exceedance of Drinking Water Maximum Contaminant Levels
2006 to 2010

Analyte Group/Constituent	Maximum Contaminant Levels[1]					Exceedance				Non-Exceedance			
	Primary	Secondary	Notification Level	Units	Notes	# of Wells	% of Wells Exceeding MCL	Count	% of Samples Exceeding MCL	# of Wells	% of Wells Not Exceeding MCL	Count	% of Samples Not Exceeding MCL
Inorganic Constituents													
Total Dissolved Solids		500		mg/L		22	100%	424	100%	0	0%	0	0%
Manganese		0.05	0.5	mg/L		20	77%	422	95%	6	23%	21	5%
Iron		300		mg/L		28	51%	398	73%	27	49%	144	27%
Sulfate		250		mg/L		98	89%	375	88%	12	11%	52	12%
Chloride		250		mg/L		64	75%	162	55%	21	25%	132	45%
Arsenic	10			ug/L		35	40%	64	20%	52	60%	249	80%
Chromium	50			ug/L	2	8	13%	14	6%	54	87%	223	94%
Aluminum		0.05		mg/L	3,4	1	8%	1	2%	11	92%	48	98%
Nitrate-Nitrogen	10			mg/L		3	3%	5	1%	86	97%	439	99%
Lead	0.015			mg/L		2	10%	2	7%	19	90%	26	93%
Vanadium			0.05	mg/L		2	9%	2	8%	20	91%	24	92%
Barium	1			mg/L		1	4%	1	2%	26	96%	63	98%
Cadmium	5			ug/L		1	2%	1	1%	46	98%	167	99%
Copper	1.3	1		mg/L		1	2%	1	0%	55	98%	349	100%
Foaming Agents		0.5		mg/L		1	5%	1	1%	20	95%	183	99%
Mercury	0.002			mg/L		1	4%	1	2%	26	96%	63	98%
Nitrite-Nitrogen	1			mg/L		1	2%	1	1%	65	98%	82	99%
Silver		0.1		mg/L		1	1%	1	4%	72	99%	26	96%
Mercury	0.002			mg/L		1	4%	1	2%	26	96%	63	98%
Nickel	0.1			mg/L		1	2%	1	1%	45	98%	167	99%
Zinc		5		mg/L		1	2%	1	0.3%	55	98%	348	99.7%
General Physical													
Specific Conductance		900		umhos/cm		18	58%	344	87%	13	42%	52	13%
Turbidity		5		NTU		15	52%	145	59%	14	48%	100	41%
Color		15		Units		13	41%	73	29%	19	59%	178	71%
Odor		3		Threshold Units		11	35%	38	18%	20	65%	179	82%
pH		6.5<pH<8.5		Units		2	8%	2	1%	22	92%	342	99%
Chlorinated VOCs													
Methyl Tert-Butyl Ether	13	5		ug/L		106	29%	632	21%	260	71%	2349	79%
Tert-Butyl Alcohol			12	ug/L		111	30%	567	20%	256	70%	2263	80%
Benzene	1			ug/L		59	17%	386	13%	283	83%	2495	87%
Ethylbenzene	300			ug/L		15	5%	121	4.2%	290	95%	2760	96%
Naphthalene			17	ug/L		16	6%	96	6%	241	94%	1426	94%
1,2-Dichloroethane	0.5			ug/L		27	10%	85	6%	238	90%	1456	94%
Toluene	150			ug/L		12	4%	82	3%	292	96%	2798	97%
1,2,4-Trimethylbenzene	5			ug/L		12	5%	66	4%	245	95%	1465	96%
Total Xylene	1750			ug/L		12	4%	61	2%	267	96%	2573	98%
1,3,5-Trimethylbenzene			330	ug/L		9	4%	32	2%	247	96%	1499	98%
n-Propylbenzene			260	ug/L		6	2%	24	2%	247	98%	1507	98%

Table 3-10
Groundwater Quality Data in Exceedance of Drinking Water Maximum Contaminant Levels
2006 to 2010

Analyte Group/Constituent	Maximum Contaminant Levels[1]					Exceedance				Non-Exceedance			
	Primary	Secondary	Notification Level	Units	Notes	# of Wells	% of Wells Exceeding MCL	Count	% of Samples Exceeding MCL	# of Wells	% of Wells Not Exceeding MCL	Count	% of Samples Not Exceeding MCL
1,2-Dibromo-3-chloropropane	0.2			ug/L		16	6%	23	2%	246	94%	1488	98%
Chlorinated VOCs - continued													
Ethylene Dibromide	0.05			ug/L		13	5%	21	1%	246	95%	1491	99%
1,2,3-Trichloropropane			0.005	ug/L		13	5%	20	1%	248	95%	1508	99%
Dichloromethane	5			ug/L		13	5%	20	1%	248	95%	1520	99%
Tetrachloroethene	5			ug/L		6	2%	14	1%	247	98%	1522	99%
1,2-Dichloropropane	5			ug/L		4	2%	10	1%	248	98%	1530	99%
Methyl Isobutyl Ketone			120	ug/L		4	2%	10	1%	225	98%	1045	99%
Trichloroethene	5			ug/L		3	1%	10	1%	248	99%	1530	99%
1,1,2,2-Tetrachloroethane	1			ug/L		3	1%	6	0%	248	99%	1534	100%
1,1,2-Trichloroethane	5			ug/L		4	2%	6	0%	248	98%	1534	100%
Carbon Tetrachloride	0.5			ug/L		3	1%	6	0%	248	99%	1534	100%
Vinyl Chloride				ug/L		3	1%	6	0%	248	99%	1534	100%
1,1-Dichloroethane	5			ug/L		3	1%	5	0%	248	99%	1535	100%
1,1-Dichloroethene	6			ug/L		3	1%	5	0%	248	99%	1535	100%
1,2,4-Trichlorobenzene	5			ug/L		3	1%	5	0%	248	99%	1535	100%
1,4-Dichlorobenzene	5			ug/L		3	1%	5	0%	248	99%	1535	100%
Cis-1,2-Dichloroethene	6			ug/L		3	1%	5	0%	248	99%	1535	100%
Styrene	100			ug/L		3	1%	3	0%	248	99%	1537	100%
Trans-1,2-Dichloroethene	10			ug/L		2	1%	3	0%	248	99%	1537	100%
Trichlorofluoromethane	150			ug/L		2	1%	3	0%	248	99%	1537	100%
Chlorobenzene	70			ug/L		2	1%	2	0%	248	99%	1538	100%
n-Butylbenzene			260	ug/L		1	0%	1	0%	247	100%	1530	100%
Sec-Butylbenzene			260	ug/L		1	0%	1	0%	248	100%	1530	100%
Tert-Butylbenzene			260	ug/L		1	0%	1	0%	248	100%	1530	100%

1 The California MCL was used for exceedance analysis unless otherwise noted.
2 MCL is for total chromium
3 US EPA Secondary MCL Threshold 1
4 The US EPA Secondary MCL was used to compute counts and percentages of exceedances because it is a lower than the California MCL. The counts and percentages of exceedances were calculated for the US EPA Secondary MCL Threshold 2 (0.2 mg/L),California Secondary MCL (0.2 mg/L), and California Primary MCL (1 mg/L) and were determined to be zero.

Table 3-11

Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Lower San Juan Sub Area	TDS			Cl			SO4			%Na			NO3-N			Fe			Mn			MBAS			B			Turbidity			Color			F		
Objective:	1,200 mg/L			400 mg/L			500 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
08S08W01F001	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W01K003	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W01Q005	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W01Q01	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W12A001	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W12B002	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W12C002	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W14H003	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W14Q001 (Rancho SJ)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W23A007	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S08W23A05	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
AMW-01(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
Capistrano Beach CWD-4	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-7(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-7-1 (T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-7-1R(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-7-2(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-7-3(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-7-4(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-7-5(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-8(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-8-1(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-8-2(t0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-8-3(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-8-4(t0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-8-5(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-8-6(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-9(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-9-1(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-9-2(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-9-3(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-9-4(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-9-5(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-9-6(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-9-7	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMT-9-7(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CMW-09(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
CMW-11(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
Crean Well	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CVWD #2	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CVWD-1	1	4	0	2	0	3	2	3	0	2	0	3	1	0	4	1	1	3	1	4	0	3	0	2	3	0	2	1	0	4	1	0	4	2	0	3
Dance Hall	0	5	0	1	0	4	1	4	0	1	0	4	0	0	5	0	5	0	0	5	0	3	0	3	4	0	1	0	5	0	0	3	2	1	0	4
Hollywood 2A	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Kinoshita	0	5	0	1	0	4	1	3	1	1	0	4	0	0	5	0	5	0	0	5	0	3	0	2	4	0	1	1	4	0	1	2	2	1	0	4
Mission Street	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-01(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-02(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-02A(T0605902510)	5	0	0	4	0	1	4	0	1	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-02B(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-03(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1

Table 3-11
Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Lower San Juan Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	1,200 mg/L			400 mg/L			500 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
MW-03(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-03R(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-04(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-04(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-05(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-05(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-06(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW07 (T0605902573)	5	0	0	5	0	0	3	0	2	5	0	0	3	0	2	3	1	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-07(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW08 (T0605902573)	5	0	0	5	0	0	4	1	0	5	0	0	4	0	1	3	0	2	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-08(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-08A(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-08B(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW09 (T0605902573)	5	0	0	5	0	0	3	2	0	5	0	0	3	0	2	3	0	2	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-09A(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-09B(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW1 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605902524)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW10 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605902573)	5	0	0	5	0	0	3	0	2	5	0	0	4	0	1	3	0	2	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10A(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-10B(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW11 (T0605902573)	5	0	0	5	0	0	4	1	0	5	0	0	4	0	1	3	2	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-11(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-11(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-11A(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-11B(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-12(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-12A(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-12A(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	1	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-12B(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-12B(T0605902510)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-12C(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-12D(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-13(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-13A(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-13A(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-13B(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-13B(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-13C(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-14(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-14A(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-14A(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-14B(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-14B(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-14C(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1

Table 3-11
Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Lower San Juan Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	1,200 mg/L			400 mg/L			500 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
MW-15(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-15A(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-15A(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-15B(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-15B(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-15C(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-15D(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-16(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-16(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-16A(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-16B(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-16C(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-16D(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-17(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-18(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-19A(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-19B(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-19C(T0605902379)	5	0	0	4	0	1	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW2 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605902524)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-20A(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	1	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	1	0
MW-20B(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	1	0
MW-20C(T0605902379)	5	0	0	4	1	0	4	1	0	4	1	0	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	1	0
MW-20D(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	1	0
MW-21(T0605902379)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-21A(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-21B(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-22A(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-22B(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-23A(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-23B(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-24(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-24A(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-24B(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-25(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-25A(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-25B(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-26(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-27(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-28(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW3 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605902524)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-30(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-31(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-32(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-34(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-35(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-36(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

Table 3-11
Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Lower San Juan Sub Area	TDS			Cl			SO4			%Na			NO3-N			Fe			Mn			MBAS			B			Turbidity			Color			F		
Objective:	1,200 mg/L			400 mg/L			500 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
MW37(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW38(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW4 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902524)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW5 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902524)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW6 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902362)	5	0	0	5	0	0	4	1	0	5	0	0	5	0	0	5	0	0	4	1	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902524)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW7 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-7(T0605902362)	5	0	0	5	0	0	4	1	0	5	0	0	5	0	0	5	0	0	4	1	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-7(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-7A(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-7B(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW-7C(T0605902379)	5	0	0	4	1	0	4	1	0	4	0	1	4	0	1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1
MW8 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605902524)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW9 (T0605902575)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-12(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-13(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-14(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-15(T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-22/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-22/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-23/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-23/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-24/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-24/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-25/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-25/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-26/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-26/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-27/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-27/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-28/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-28/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-29/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-29/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

Table 3-11
Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Lower San Juan Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	1,200 mg/L			400 mg/L			500 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
OZ-30/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-30/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-31/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-31/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-32/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-32/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-33/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-33/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-34/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-34/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-35/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-35/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-36/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-36/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-37/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-37/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-38/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-38/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-39/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-39/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-40/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-40/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-41/A (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
OZ-41/B (T0605902573)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Rosan Ranch-1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Rosan Ranch-2	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
RP-1(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
RP-2(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
RP-3(T0605902526)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
RW-15(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
RW-16(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
RW-2(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
RW-3(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Schuller	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SJBA #1	5	0	0	5	0	0	5	0	0	5	0	2	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SJBA MW-01N	0	2	3	0	0	5	0	2	3	0	4	1	5	0	0	0	5	0	0	5	0	0	0	5	5	0	0	0	4	1	0	1	4	5	0	0
SJBA MW-01S	0	2	3	0	0	5	0	1	4	0	0	5	5	0	0	0	5	0	0	5	0	0	0	5	5	0	0	0	5	0	0	3	2	5	0	0
SJBA MW-02	0	5	0	0	0	5	0	5	0	0	0	5	5	0	0	0	5	0	0	5	0	0	1	4	5	0	0	0	5	0	0	3	2	5	0	0
SJBA MW-03	0	2	3	0	1	4	0	2	3	0	0	5	5	0	0	0	5	0	0	5	0	0	0	5	5	0	0	0	5	0	0	4	1	5	0	0
SJBA MW-07	0	5	0	0	0	5	0	5	0	0	0	5	5	0	0	0	5	0	0	5	0	0	0	5	5	0	0	0	5	0	0	3	2	5	0	0
SJBA MW-08	0	5	0	0	0	5	0	5	0	0	0	5	5	0	0	0	5	0	0	4	1	0	0	5	5	0	0	0	5	0	0	2	3	5	0	0
SJBA-2	0	5	0	1	0	4	1	4	0	1	0	4	0	0	5	0	5	0	0	5	0	3	0	2	4	0	1	0	0	5	0	0	5	1	0	4
SJBA-4	0	5	0	1	0	4	1	4	0	1	0	4	0	0	5	0	5	0	0	5	0	3	0	2	4	0	1	0	4	1	0	0	5	1	0	4
SP-1(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SP-2(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SP-3(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SP-4(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SP-5(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SP-6(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SP-7(T0605902362)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

WILDERMUTH ENVIRONMENTAL INC.

Table 3-11

Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Lower San Juan Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	1,200 mg/L			400 mg/L			500 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
Stonehill	1	4	0	2	3	0	2	3	0	2	0	3	1	3	1	1	4	0	1	4	0	2	0	3	3	0	2	4	1	0	2	3	0	4	0	1
SW-16A(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Sycamore Stables	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
TCW-1(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
TCW-2(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
TW-1 (SJC)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Vermulean Well	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-12(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-13(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-14(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-15(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-16(T0605902502)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VW-2(T0605902524)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VW-3(T0605902524)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

Middle San Juan Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	750 mg/L			375 mg/L			375 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
RMV 7	4	0	1	4	0	1	4	0	1	4	0	1	0	0	5	4	0	1	4	0	1	4	0	1	5	0	0	4	0	1	4	0	1	4	0	1

Middle Trabuco Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	750 mg/L			375 mg/L			375 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
07S08W25B004	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
07S08W25K002	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
07S08W25L001	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
07S08W36L01	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Christmas Tree Farm 1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Egan Tract-2	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
IW-1	0	5	0	5	0	0	0	0	5	5	0	0	0	0	5	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-01(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-02(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-04(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-05(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-06(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-07(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-08(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-09(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605902366)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW1(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW10(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW11(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-11(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

Table 3-11
Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Middle Trabuco Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	750 mg/L			375 mg/L			375 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
MW12(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-12(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW13(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW14(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-15(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605902366)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW2(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW2U(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605902366)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW3(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605933373)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW3U(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902366)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW4(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW4U(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902366)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW5(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW5U(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW6(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW7(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-7(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW8(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW9(T0605902555)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605952809)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
North Open Space(NOS)	2	3	0	2	0	3	2	2	1	2	0	3	2	0	3	2	0	3	2	0	3	2	0	3	4	0	1	2	1	2	2	0	3	2	0	3
P-6	0	5	0	5	0	0	0	0	5	5	0	0	0	0	5	5	0	0	5	0	0	5	0	0	5	0	0	4	0	1	5	0	0	5	0	0
Rosenbaum 2	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

Ortega Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	1,100 mg/L			375 mg/L			450 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
07S07W33B01	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S07W06K001	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S07W06K03	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S07W06P001	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
08S07W07C03	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Cerritos Ranch 3	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CVWD # 5	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CVWD #4	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
CVWD #5A	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
La Couague	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-03R(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

Table 3-11
Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Ortega Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	1,100 mg/L			375 mg/L			450 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
MW-1(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-11(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-12(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-13(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-14(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-15(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-16(T0605902510)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-16(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-7(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605902561)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Orange County Water Works #4	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SJBA MW-04	0	5	0	0	0	5	0	3	2	0	0	5	5	0	0	0	5	0	0	5	0	0	0	5	5	0	0	0	5	0	0	3	2	5	0	0
SJBA MW-05	0	5	0	0	0	5	0	5	0	0	0	5	5	0	0	0	5	0	0	4	1	0	0	5	5	0	0	0	5	0	0	3	2	5	0	0
SJBA MW-06	0	2	3	0	0	5	0	1	4	0	0	5	5	0	0	0	5	0	0	5	0	0	0	5	5	0	0	0	5	0	0	3	2	5	0	0
SJHGC-Large	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
SJHGC-Small	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
South Cooks	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
The Oaks	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Tirador	0	5	0	1	0	4	1	4	0	1	0	4	0	0	5	0	5	0	0	5	0	3	0	3	4	0	1	0	5	0	0	5	0	1	2	2
TW-2 (SJC)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
W-2(T0605902592)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

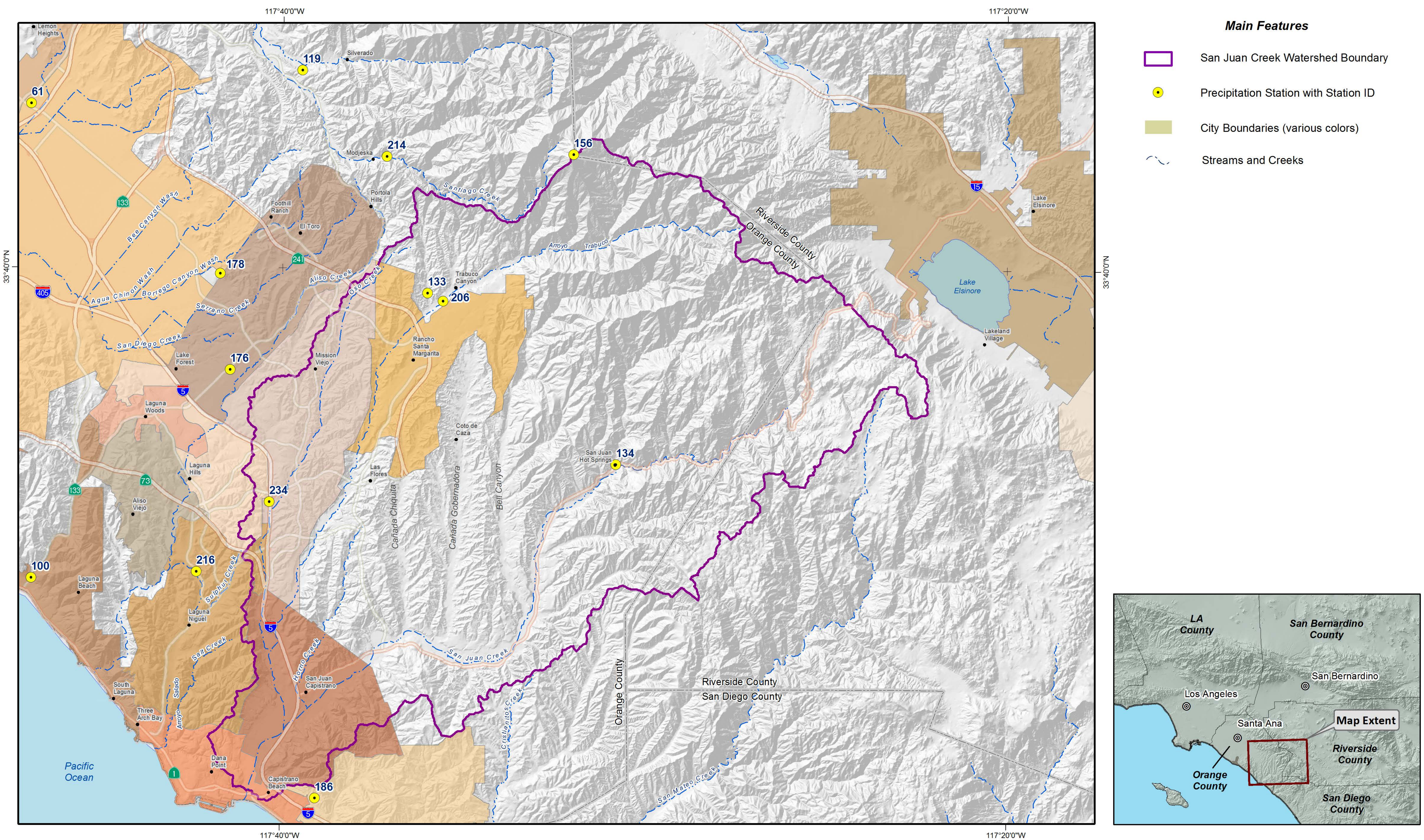
Oso Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	1,200 mg/L			400 mg/L			500 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
07S08W25L001	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	0	0	5	0	0	5	0	0	5
B-11(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-12(T0605902620)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-13(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-13(T0605902620)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-14(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	2	1	2	2	0	3	2	0	3
B-15(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-16(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-17(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

Table 3-11
Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Oso Sub Area	TDS			Cl			SO4			%Na			NO3-N			Fe			Mn			MBAS			B			Turbidity			Color			F		
Objective:	1,200 mg/L			400 mg/L			500 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
B-20(T0605902620)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-28(T0605902620)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-30(T0605902620)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-31(T0605902620)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-36(T0605902620)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
B-37(T0605902620)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Christmas Tree Farm 1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Christmas Tree Farm 2	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-1(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-11(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-13(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-14(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-16(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-17(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-18(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-19(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-20(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-21(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-22(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-4(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-5(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
E-7(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Egan Tract-1	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Egan Tract-3	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
GW-1(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605902475)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1(T0605940201)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW1(T0605991301)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605902568)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-10(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-11(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-11(T0605902568)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-12(T0605902568)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-1A(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW1C(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-2(T0605940201)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW2(T0605991301)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-24(T0605902454)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-25(T0605902454)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-26(T0605902454)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-27(T0605902454)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-28(T0605902454)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0

Table 3-11
Groundwater Quality Data in Exceedance of San Diego Regional Water Quality Control Board Basin Plan Groundwater Quality Objectives - 2006 to 2010

Oso Sub Area	**TDS**			**Cl**			**SO4**			**%Na**			**NO3-N**			**Fe**			**Mn**			**MBAS**			**B**			**Turbidity**			**Color**			**F**		
Objective:	1,200 mg/L			400 mg/L			500 mg/L			60%			10 mg/L			0.3 mg/L			0.05 mg/L			0.5 mg/L			0.75 mg/L			5 NTU			15 units			1 mg/L		
	# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years			# of Years		
Well Name	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below	Not Samp	Above	Below
MW-3(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-3(T0605940201)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW3(T0605991301)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-4(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-5(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-6(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-7(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-7(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-7(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW7A(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW7B(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-8(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW8A(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW8B(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605902381)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605902472)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605902568)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
MW-9(T0605902574)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
Rosenbaum 1	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	1	0	4	5	0	0	5	0	0	5	0	0	5	0	0
Shaw	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
TCW(T0605902580)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-1(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-2(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-3(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-4(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-5(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-6(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0
VEW-7(T0605902455)	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0



Produced by:

WILDERMUTH ENVIRONMENTAL INC.

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 4/11/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-1.mxd

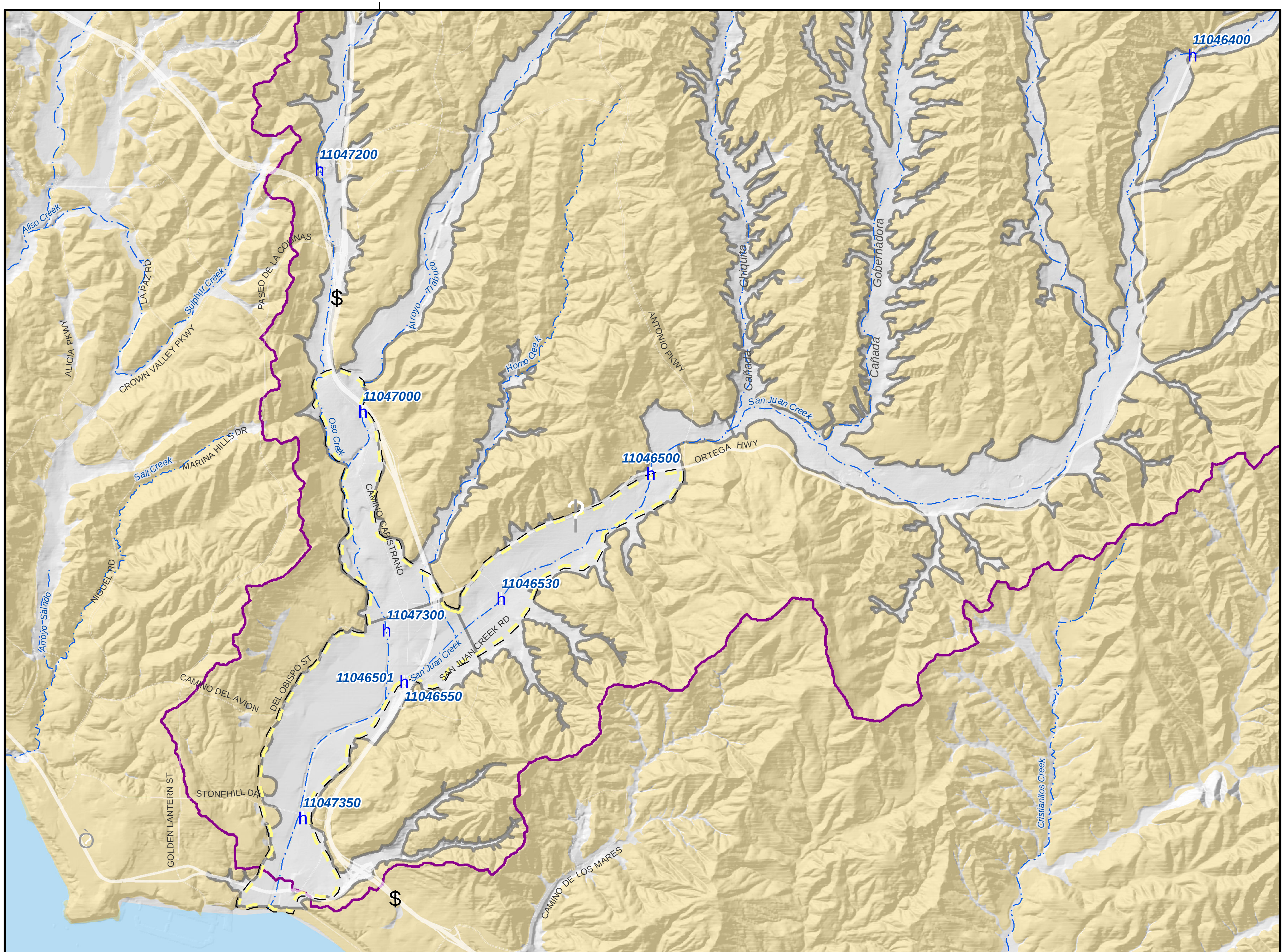
SAN JUAN BASIN AUTHORITY

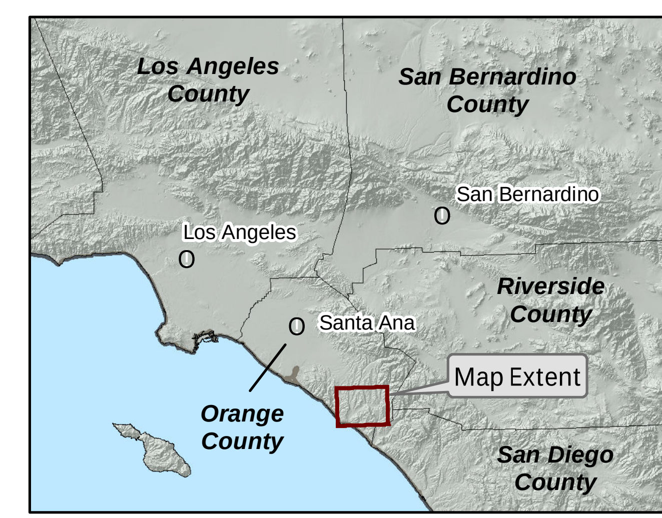
075-003
004

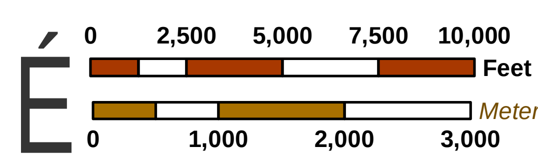
The San Juan Creek Watershed

City Boundaries and Precipitation Station Locations

Figure 3-1







Produced by:

WILDERMUTH ENVIRONMENTAL INC.

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

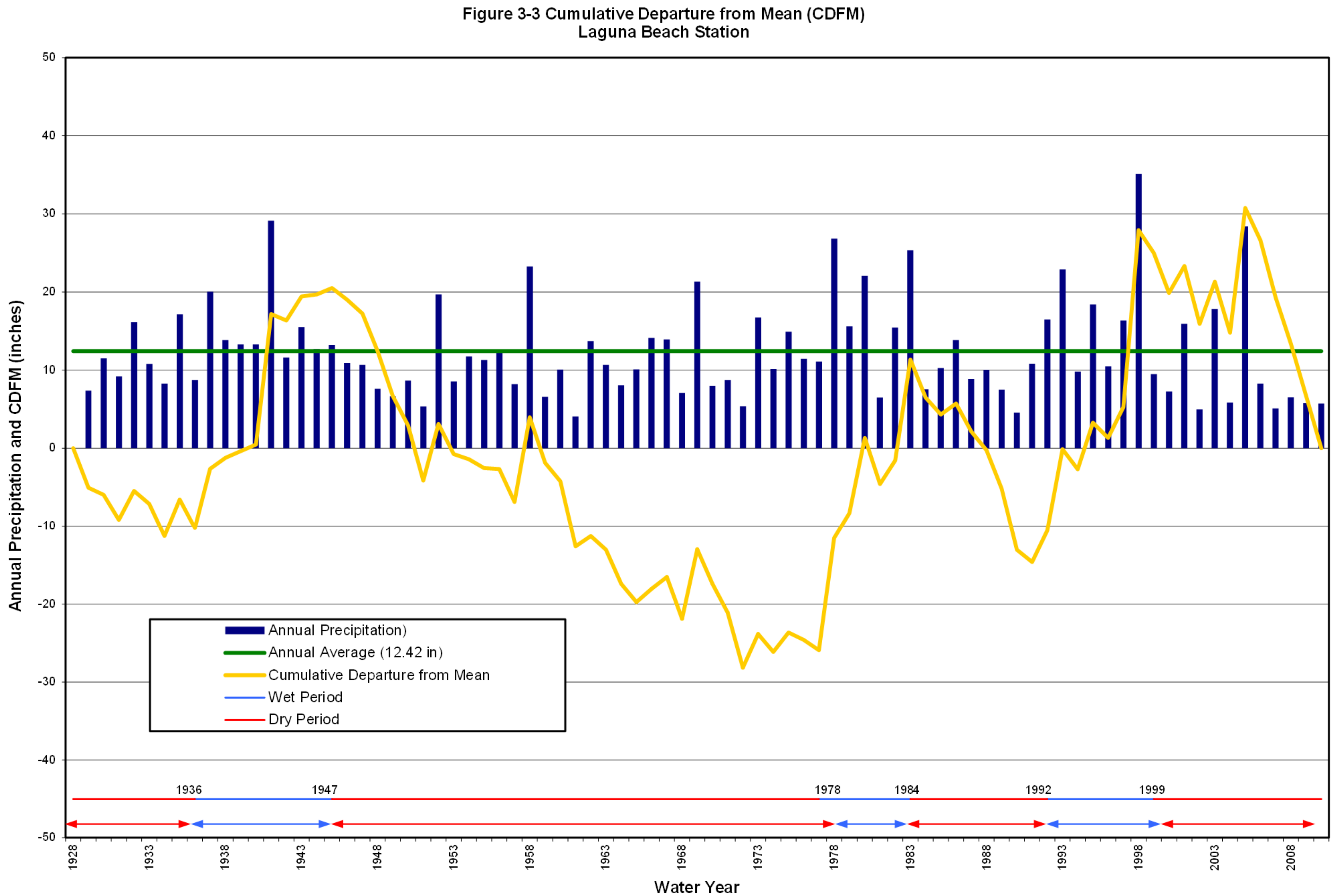
Author: lboehm
Date: 11/6/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-2.mxd

SAN JUAN BASIN AUTHORITY

075-003
004

Location of USGS Stream Gauging Stations

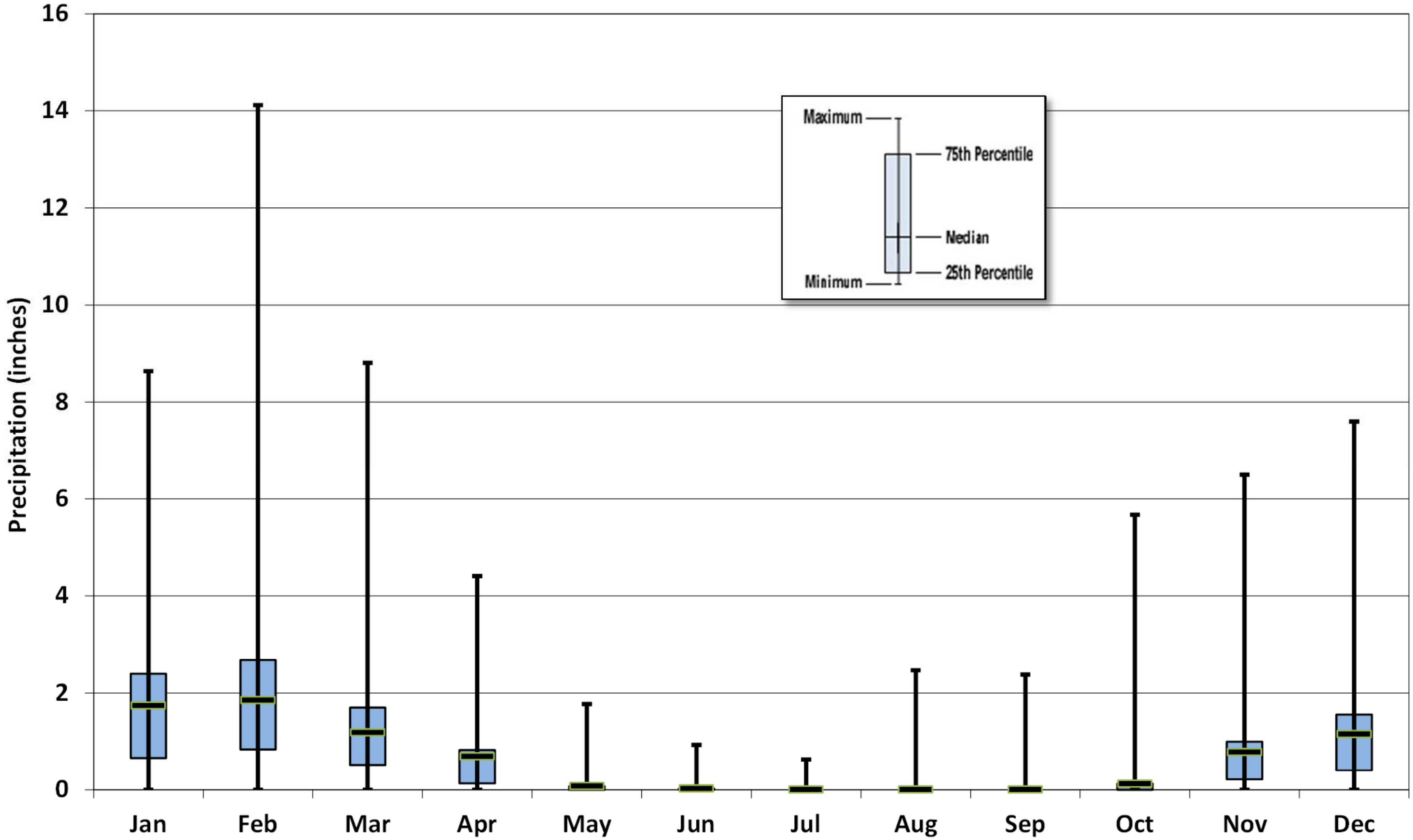
Figure 3-2



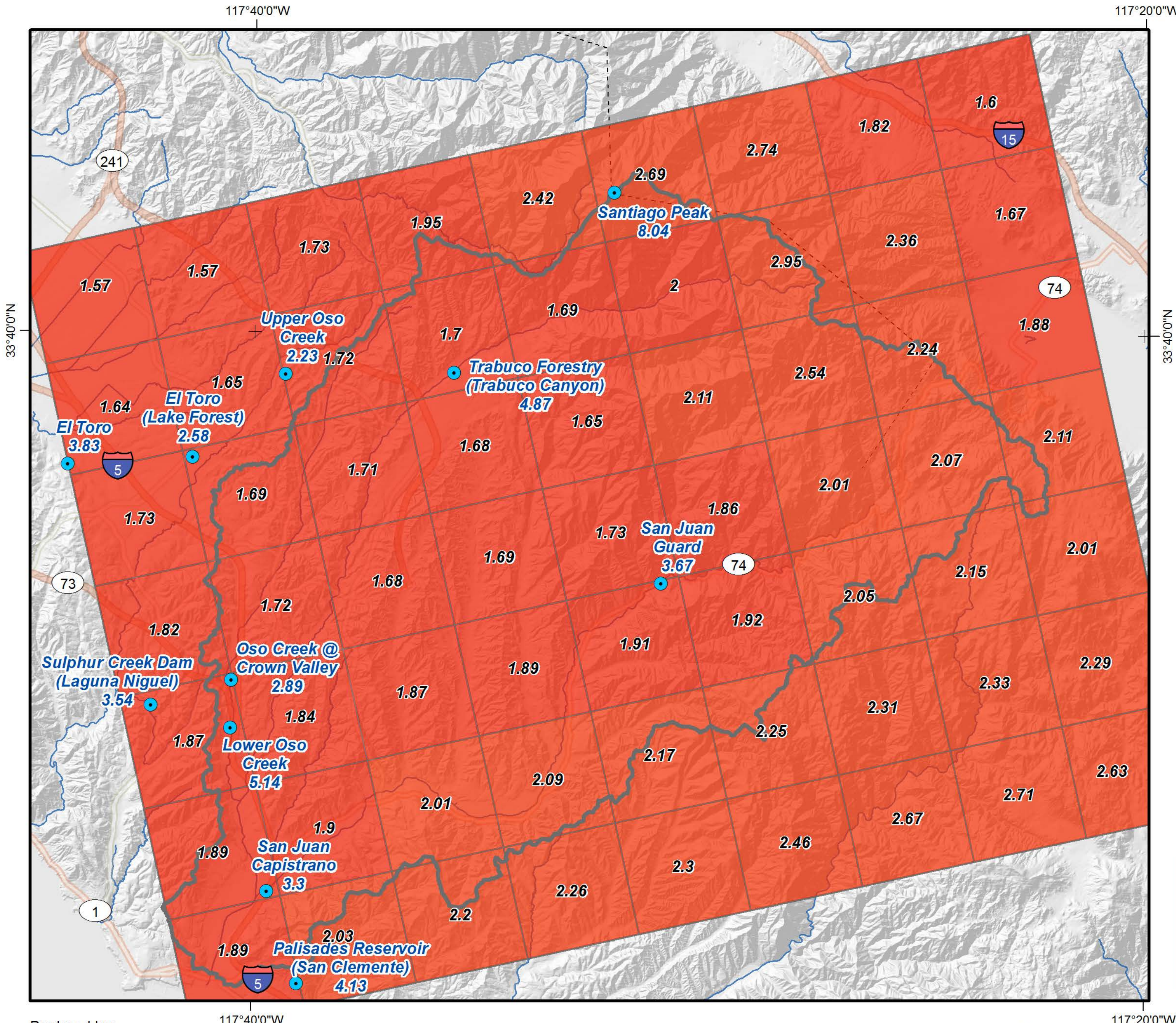
S:\Clients\San Juan Basin Authority\Groundwater Management Plan\Report\2013 Report Compilation\Figures\Figure 3-3 CumDepMean -- Fig 3-3

WILDERMUTH ENVIRONMENTAL INC.

Figure 3-4 Monthly Precipitation Variability in Laguna Beach Station from 1928 to 2010



WILDERMUTH ENVIRONMENTAL INC.



Annual Rainfall (inches)

50

25

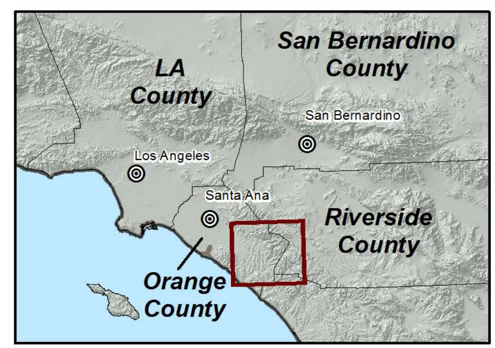
0

Data collected from the National Center for Atmospheric Research

Annual Precipitation at Precipitation Station

Watershed Boundary

Streams and Creeks



Produced by:

WILDERMUTH ENVIRONMENTAL INC.

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm

Date: 4/15/2013

Path: N:\...SJBA\2011 GWMP\Figure 3-6.mxd

0 2 Miles

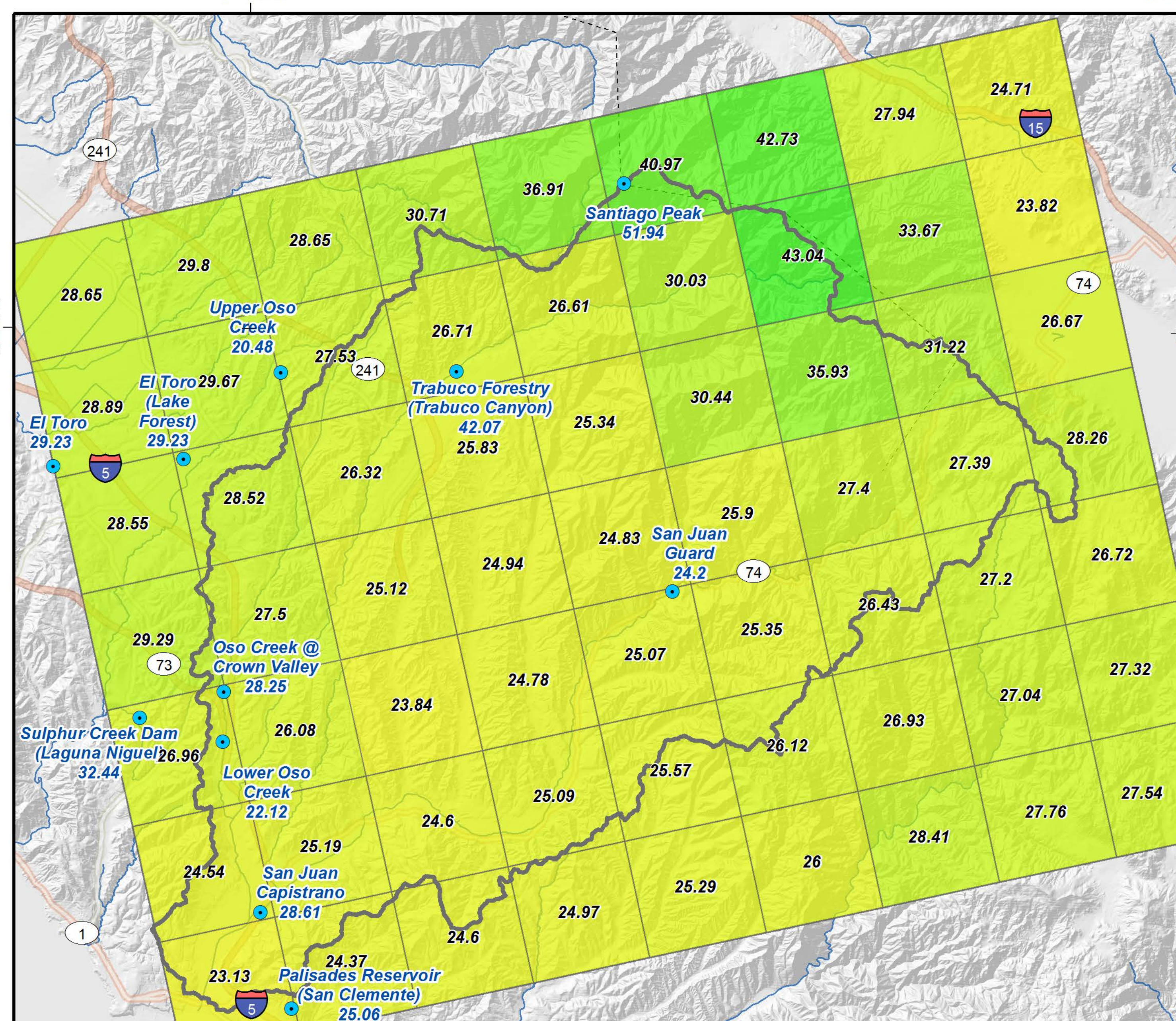
0 2 4 6 Kilometers

SAN JUAN BASIN AUTHORITY

075-003
004

Annual Precipitation on San Juan Basin in Fiscal Year 2007

Figure 3-5



Annual Rainfall (inches)

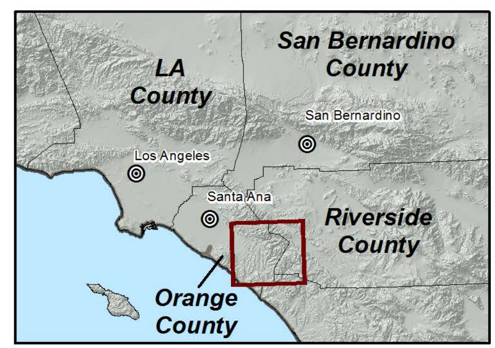
50
25
0

Data collected from the National Center for Atmospheric Research

Annual Precipitation at Precipitation Station

Watershed Boundary

Streams and Creeks



Produced by:

WILDERMUTH ENVIRONMENTAL INC.

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm

Date: 4/15/2013

Path: N:\...SJBA\2011 GWMP\Figure 3-6.mxd

0 2 Miles

0 2 4 6 Kilometers

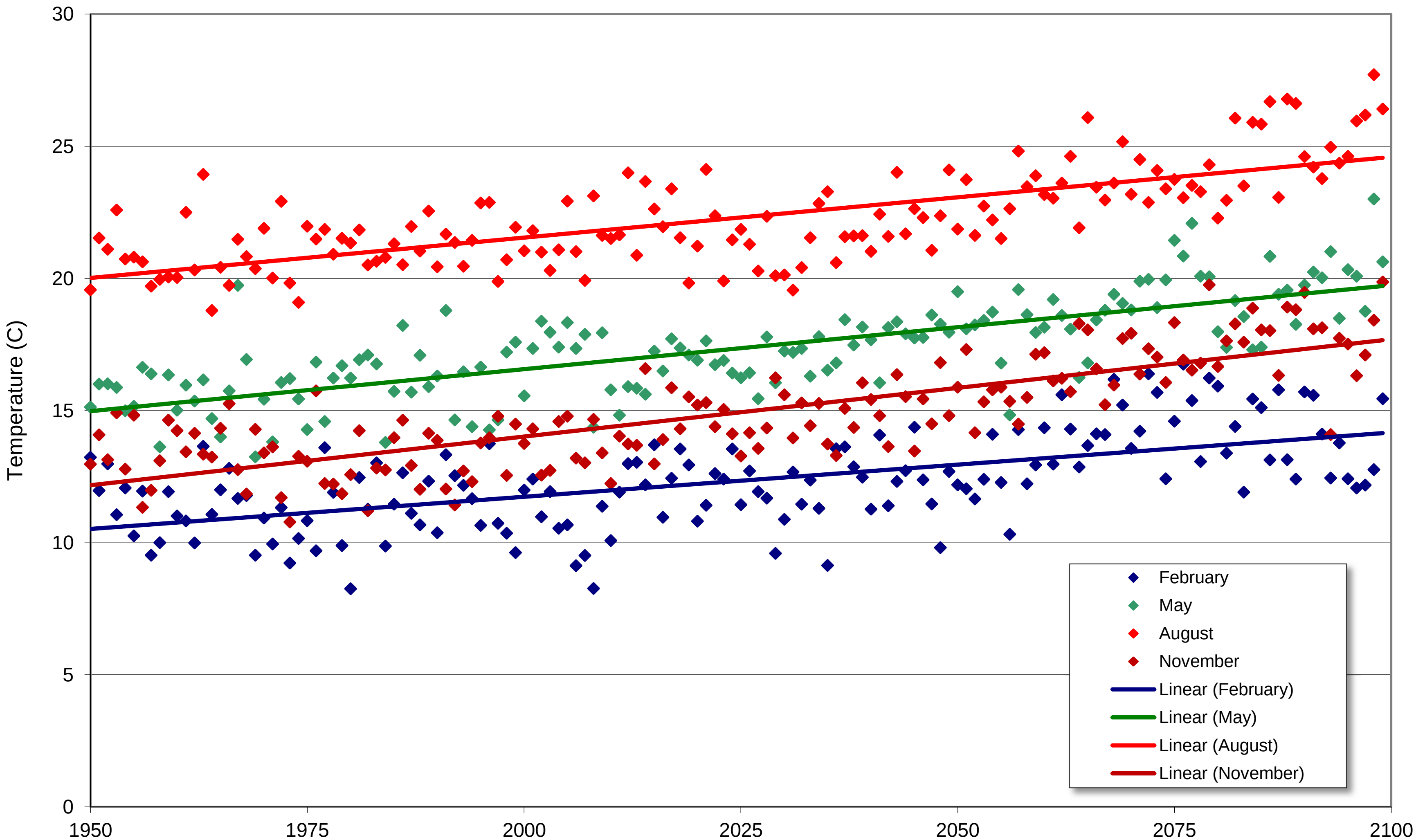
SAN JUAN BASIN AUTHORITY

075-003
004

Annual Precipitation on San Juan Basin in Fiscal Year 2005

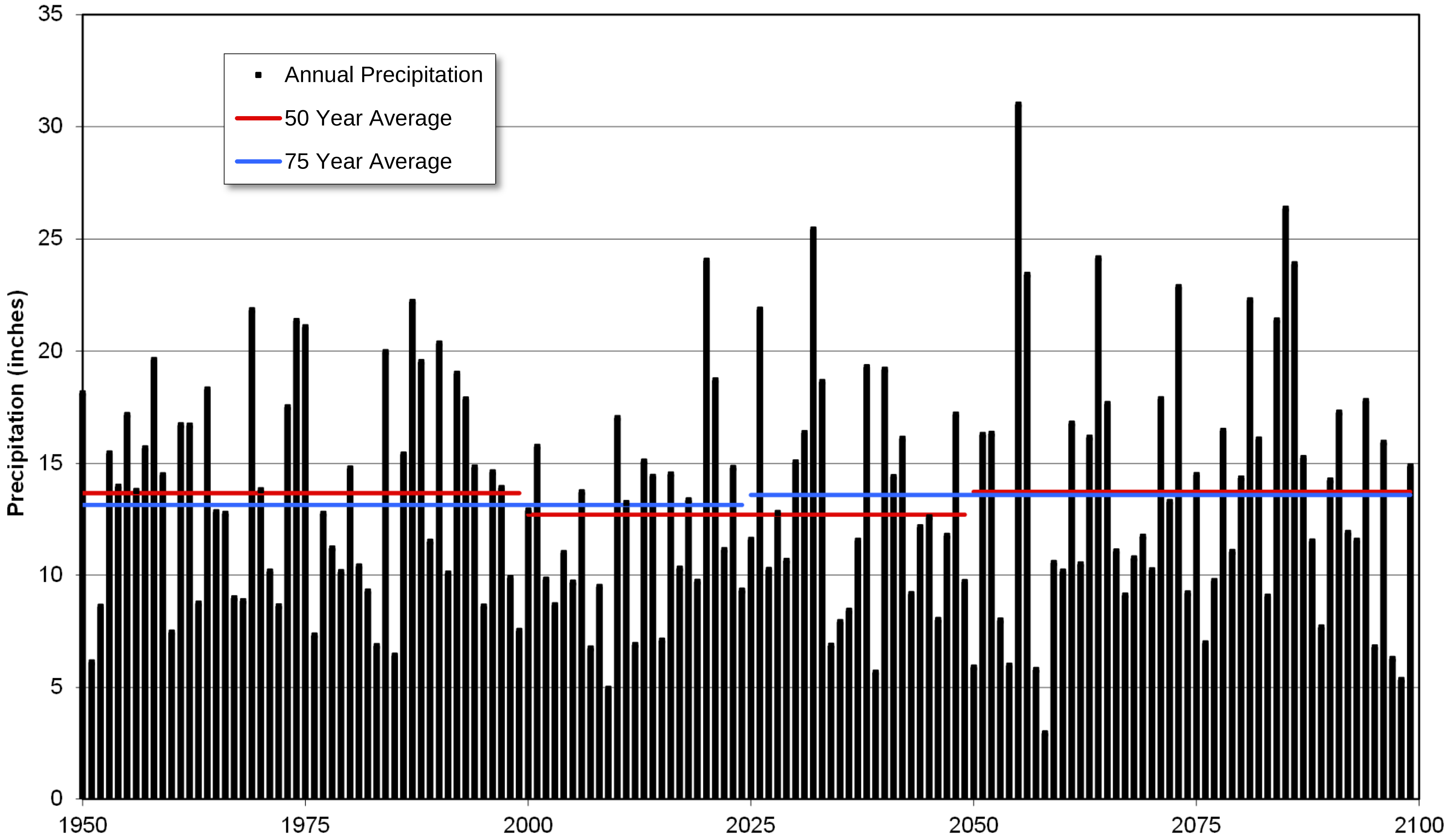
Figure 3-6

Figure 3-7 Projected Average Monthly Temperature for the San Juan Creek Watershed
Based on the IPCC A2 Emission Scenario and the MPI-ECHAM5 Model



WILDERMUTH ENVIRONMENTAL INC.

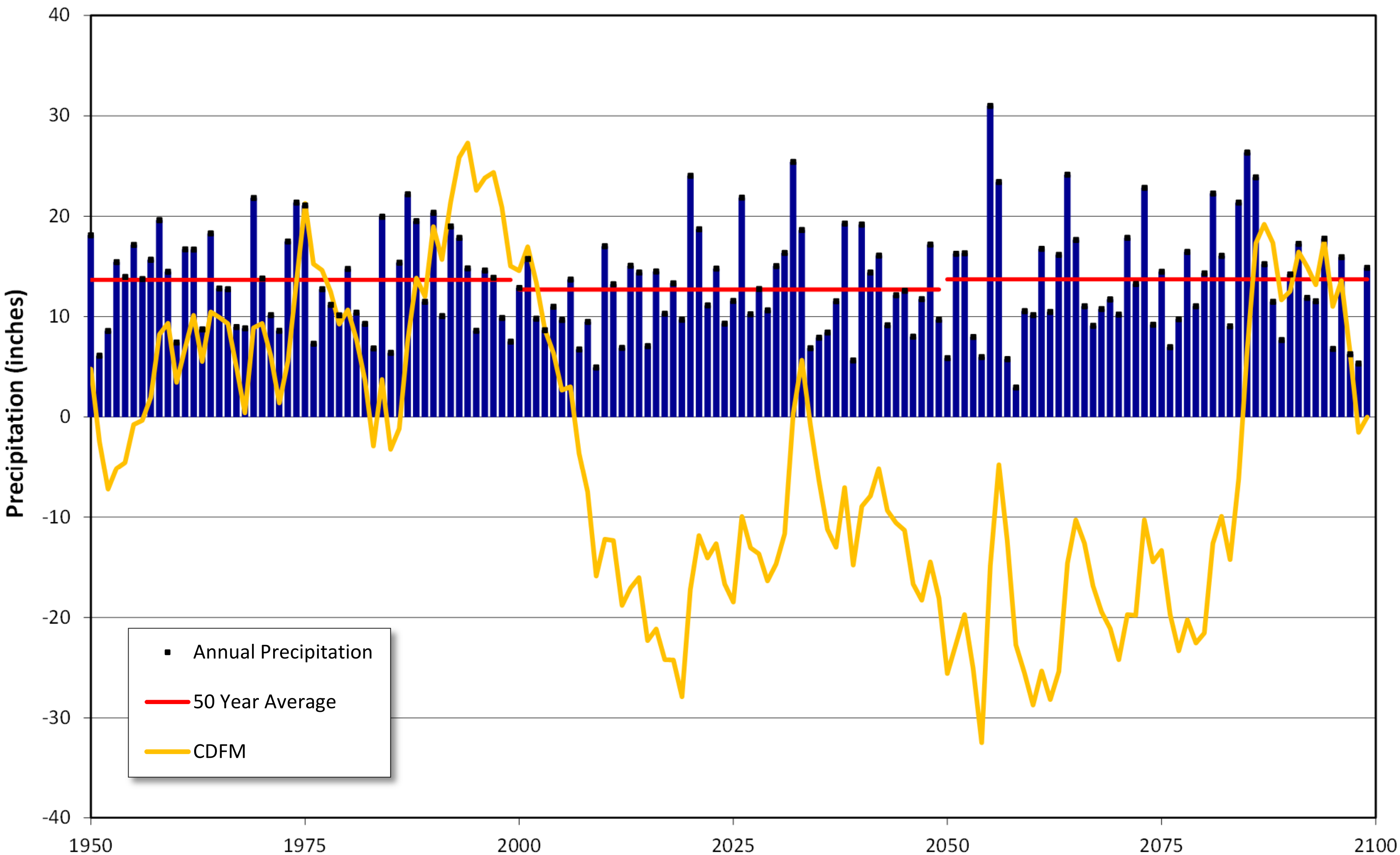
Figure 3-8 Projected Precipitation on the San Juan Creek Watershed
MPI-ECHAM 5.1 Model - A2 Emissions Scenario



S:\Clients\San Juan Basin Authority\Groundwater Management Plan\Report\2013 Report Compilation\Figures\Figure 3-8 -- Figure 3-8

WILDERMUTH ENVIRONMENTAL INC.

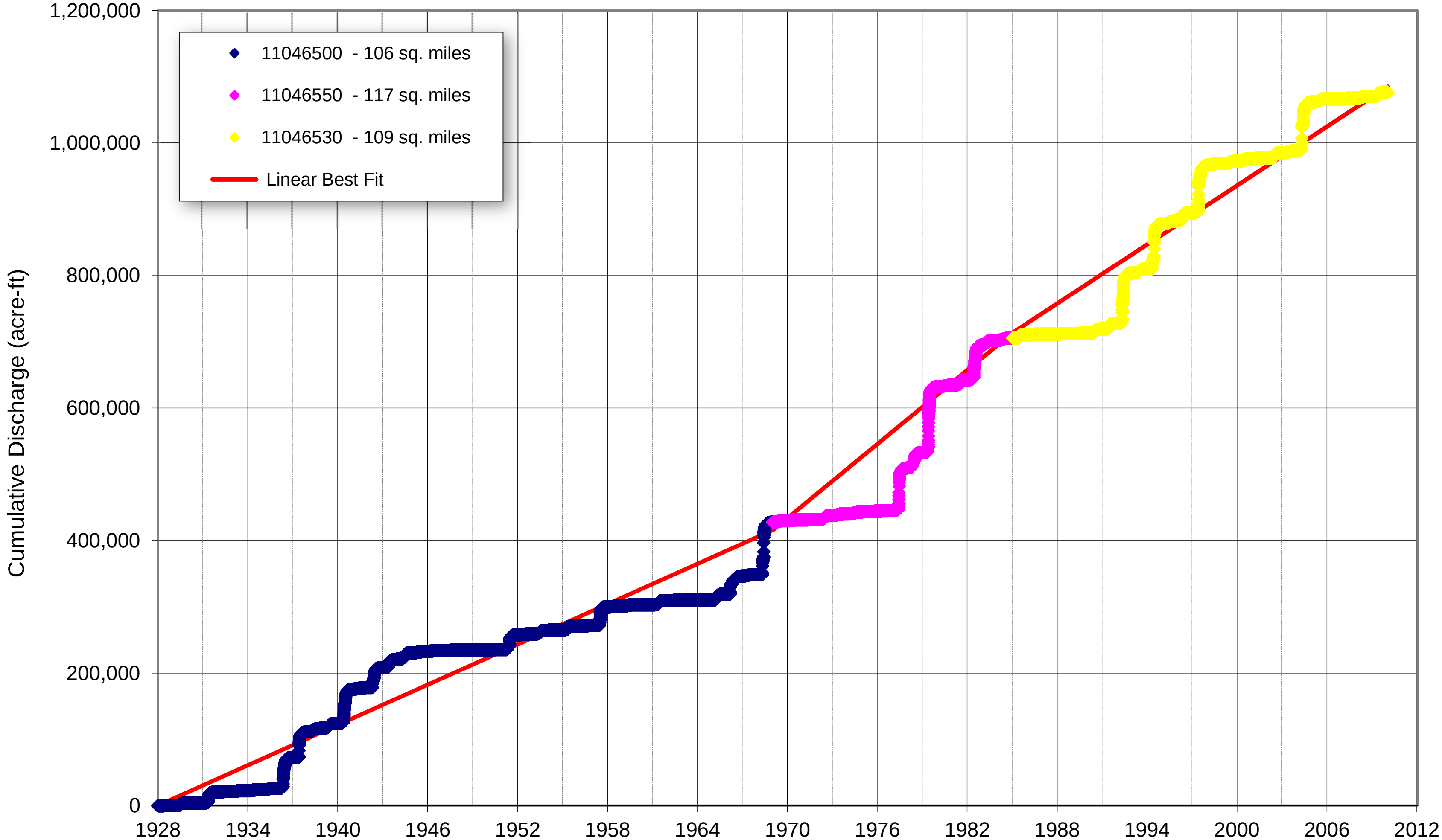
Figure 3-9 Projected Annual Precipitation on the San Juan Watershed 1950 through 2100
Based on the IPCC A2 Emission Scenario and the MPI-ECHAM5 Model



S:\Clients\San Juan Basin Authority\Groundwater Management Plan\Report\2013 Report Compilation\Figures\Figures 3-7 3-9 -- Figure 3-9

WILDERMUTH ENVIRONMENTAL INC.

Figure 3-10 Mass Curve of Stream Flow
San Juan Creek (1928 - 2010)



WILDERMUTH ENVIRONMENTAL INC.

Figure 3-11 Annual Stream Discharge with CDFM
San Juan Creek Composite Gage

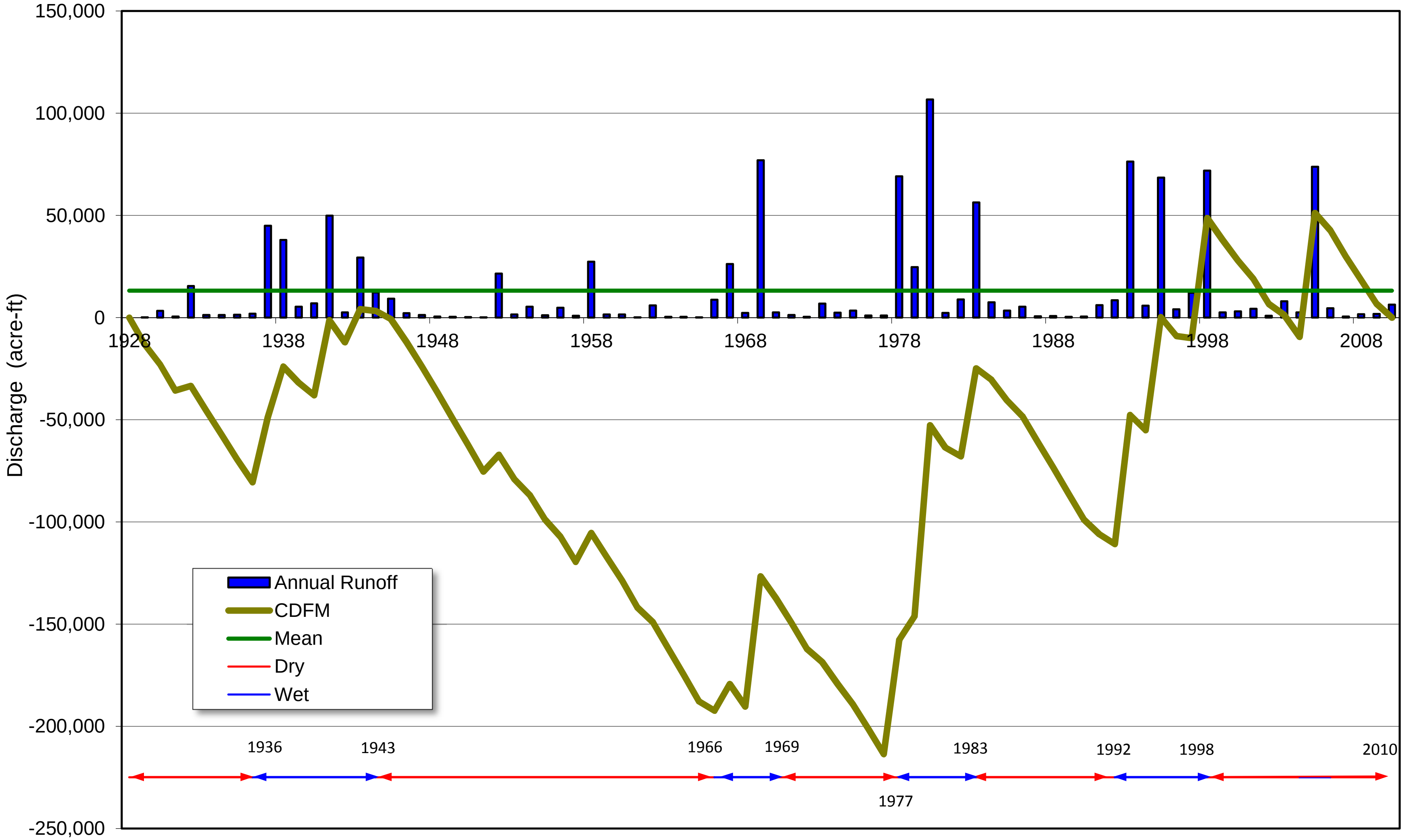
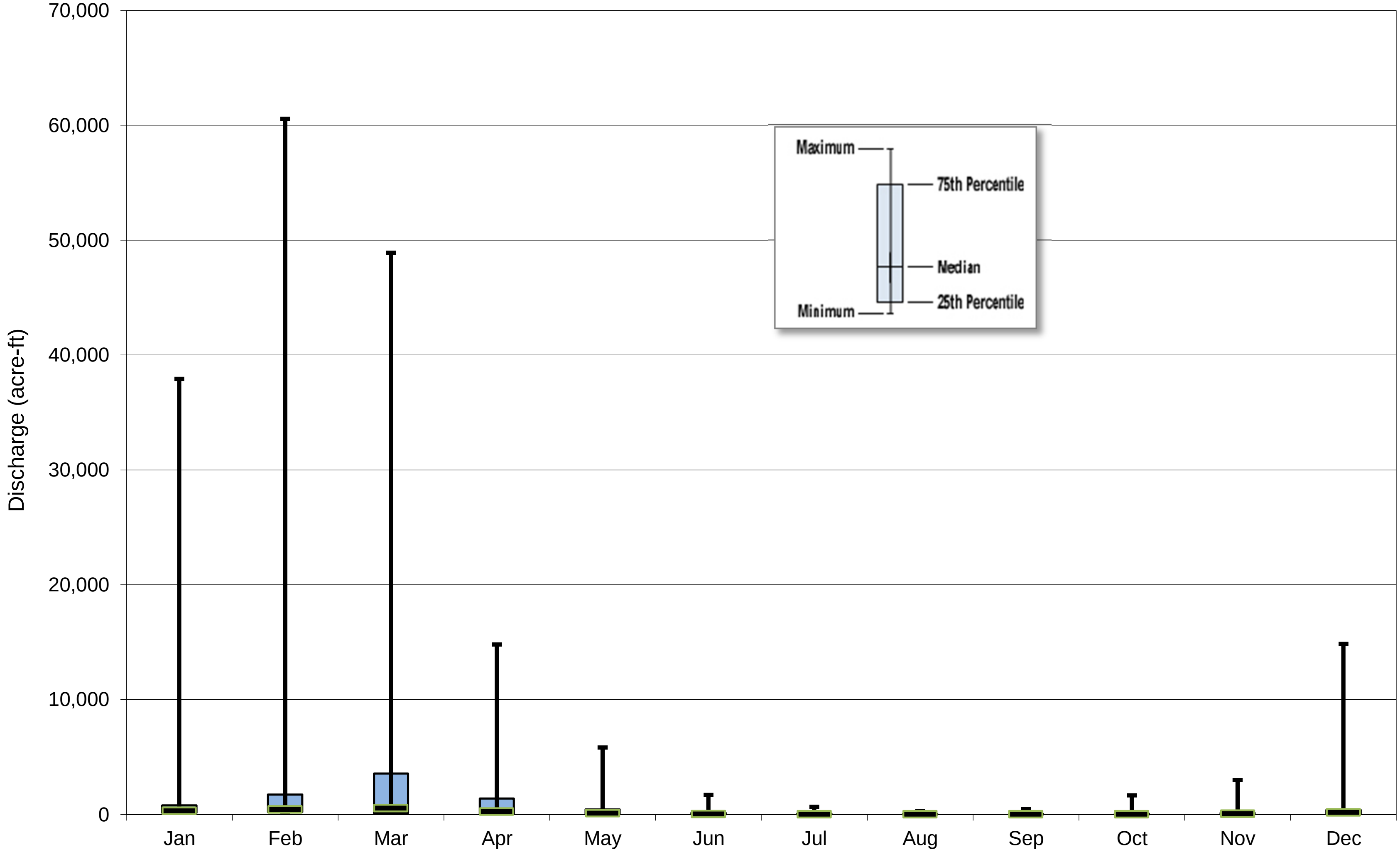


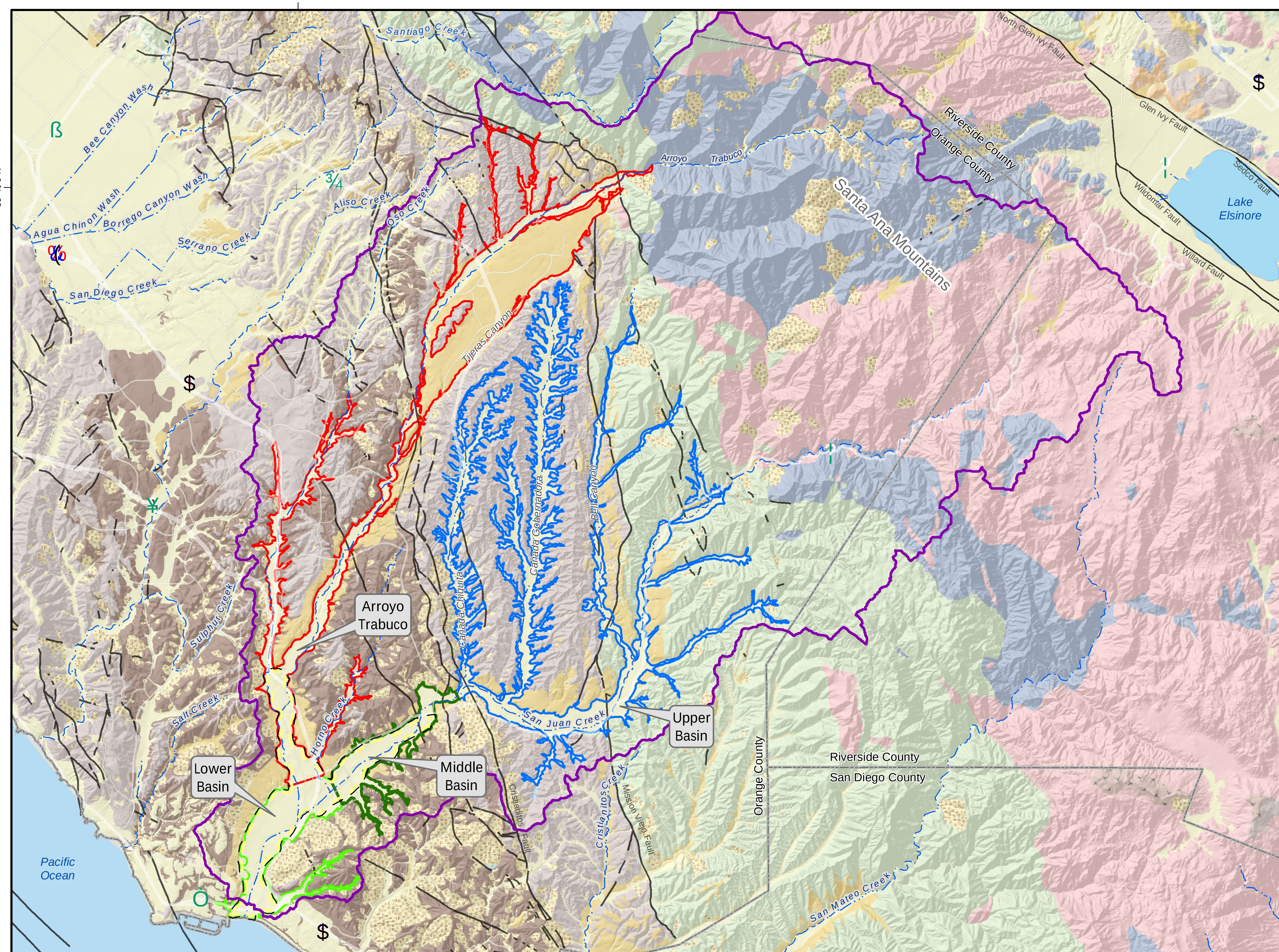
Fig 3-10 3-11 and 3-12-- Fig 3-11

WILDERMUTH ENVIRONMENTAL INC.

Figure 3-12 Monthly Discharge Variability Plot
San Juan Creek, from 1930 to 2010



WILDERMUTH ENVIRONMENTAL INC.



Hydrologic Features

- San Juan Creek Watershed Boundary

San Juan Sub-Basins

- Arroyo Trabuco
- Lower Basin
- Middle Basin
- Upper Basin
- Active Managment Area

Geologic Features

Late Holocene to Early Pleistocene Surficial Deposits

- Younger Alluvial Deposits
- Landslide Deposits
- Older Alluvial Deposits

Tertiary Bedrock Units

- Fine-grained Formations (Capistrano and Monterey Formations)
- Coarse-grained Formations (Santiago,Sespe, and Niguel Formations)

Mesozoic and Older Bedrock Units

- Cretaceous Age Formations of Sedimentary Origin (Williams and Trabuco Formations)
- Pre-Cretaceous Metamorphic Formations of Sedimentary and Volcanic Origins (Menifee Valley and Bedford Canyon Formations)
- Granitic and other intrusive crystalline rocks

Source: CGS Special Report 217.

Faults

- Location Certain
- Location Approximate

Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 11/6/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-13.mxd

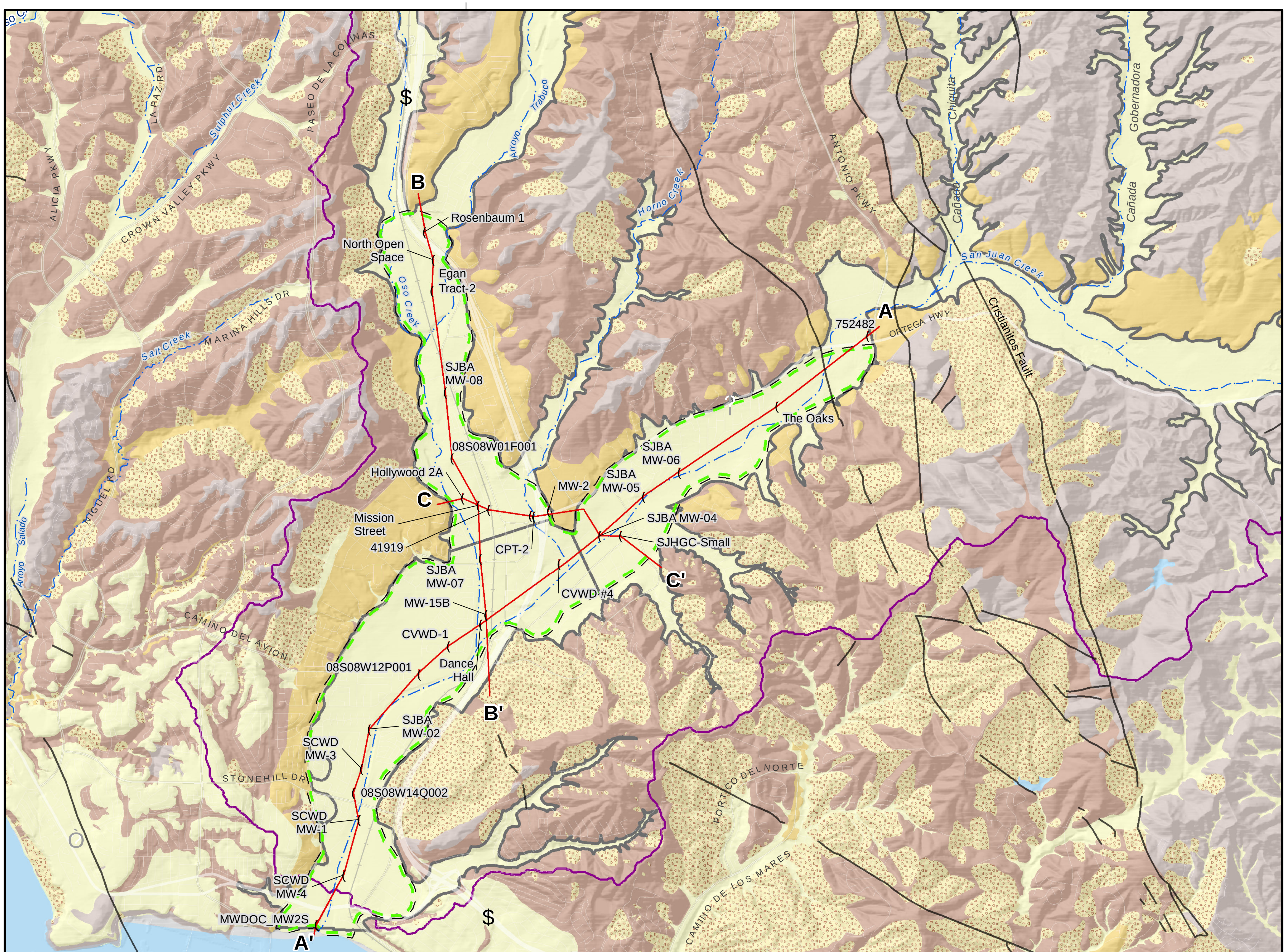
0 1 2 3 4 Miles
0 2 4 6 KM

SAN JUAN BASIN AUTHORITY

075-003
004

Generalized Geology and Locations of Groundwater Sub-Basins

Figure 3-13



Main Features

Line of Geologic Cross Section
(shown in Figures 3-15 thru 3-17)

Well Used in Cross Section

Hydrologic Features

Groundwater Sub-basin

San Juan Creek Watershed Boundary

Active Managment Area

Geologic Features

Late Holocene to Early Pleistocene Surficial Deposits

Younger Alluvial Deposits

Landslide Deposits

Older Alluvial Deposits

Tertiary Bedrock Units

Fine-grained Formations
(Capistrano and Monterey Formations)

Coarse-grained Formations
(Santiago,Sespe, and Niguel Formations)

Source: CGS Special Report 217.

Faults

Location Certain

Location Approximate

Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 11/6/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-14.mxd

0 2,500 5,000 7,500 10,000 Feet

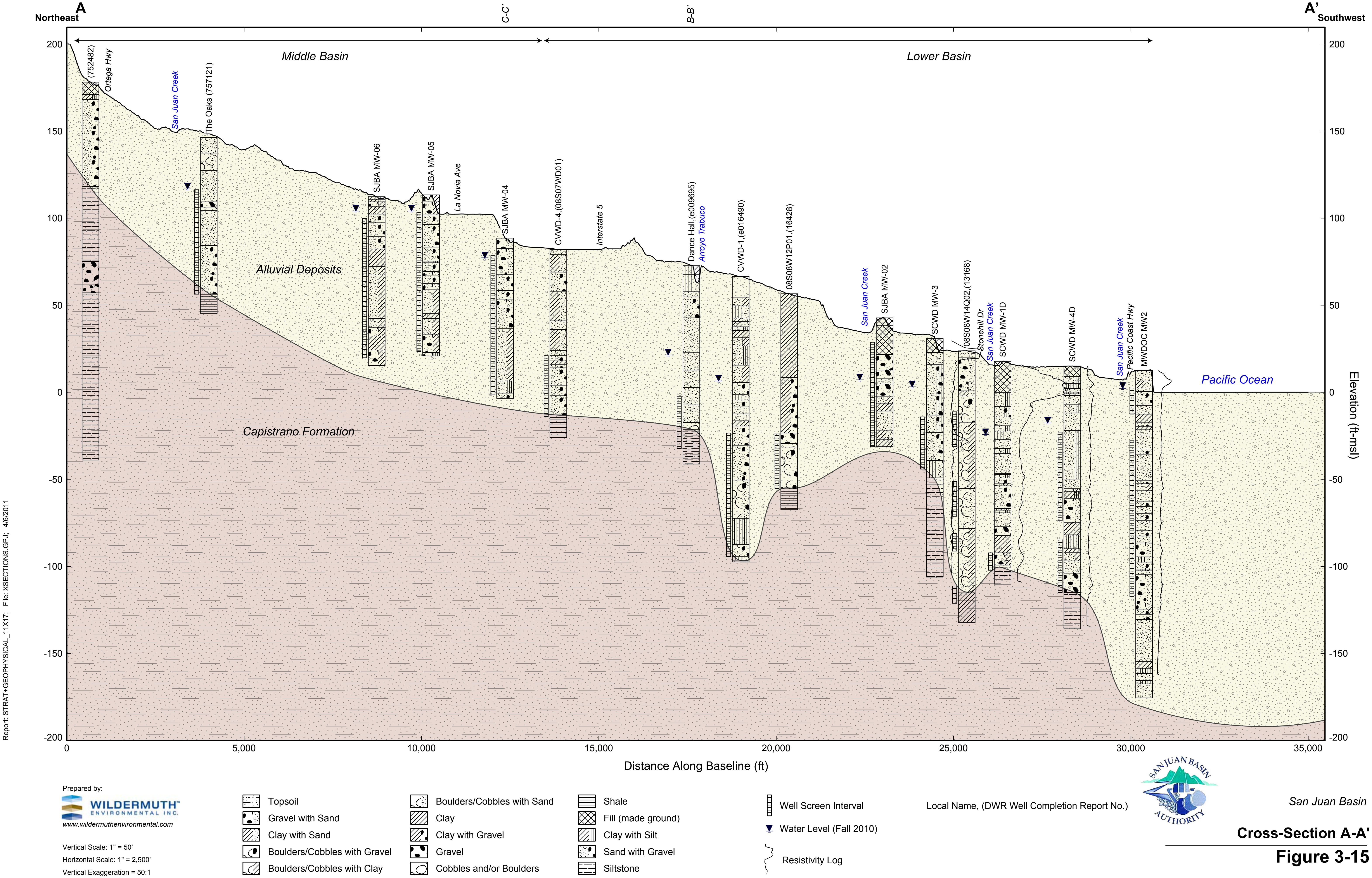
0 1,000 2,000 3,000 *Meters*

SAN JUAN BASIN AUTHORITY

075-003
004

Plan View of Geologic Cross Sections

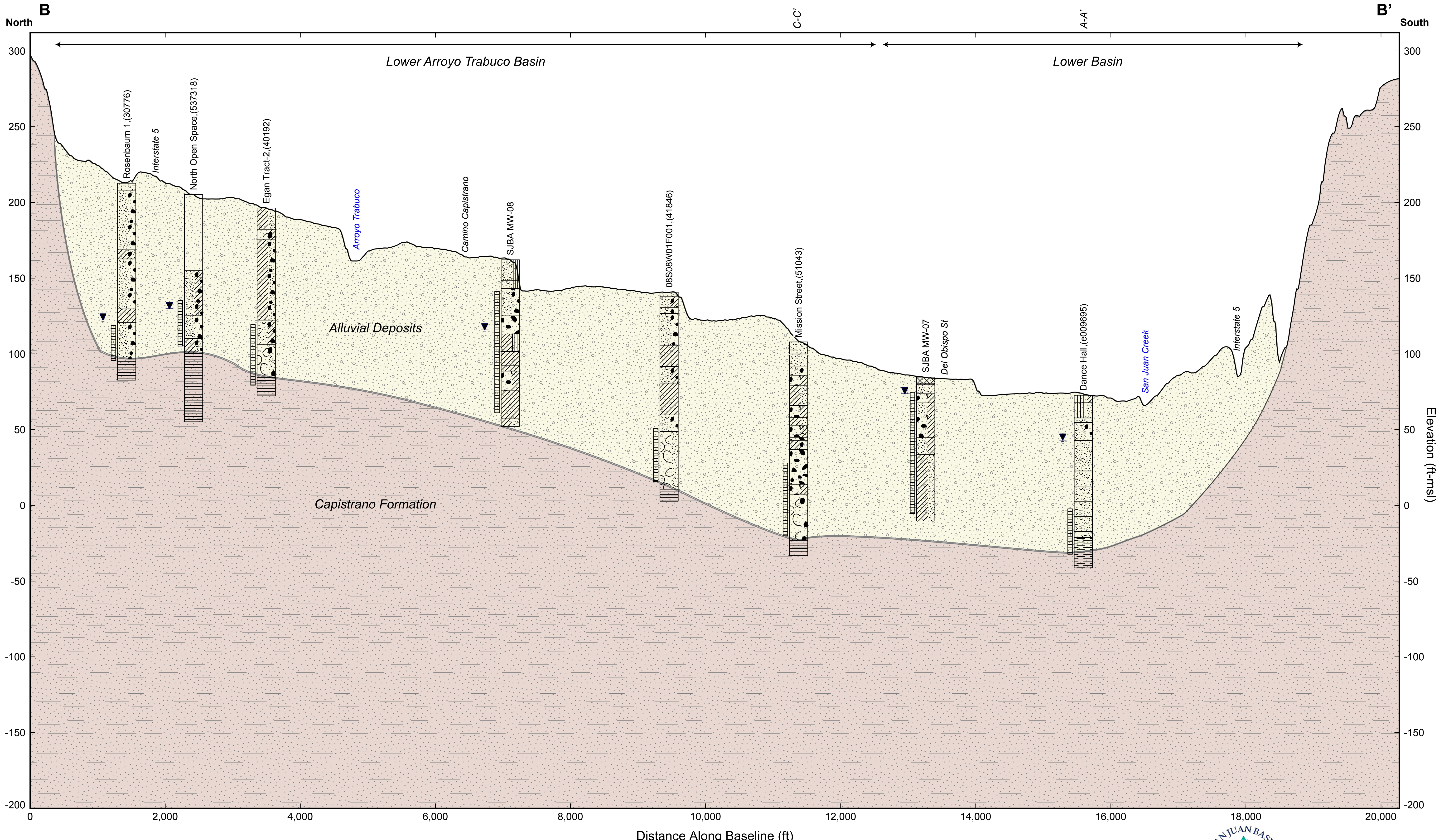
Figure 3-14



San Juan Basin

Cross-Section A-A'

Figure 3-15



Prepared by:

WILDERMUTH ENVIRONMENTAL INC.
www.wildermuthenvironmental.com

Vertical Scale: 1" = 27'
Horizontal Scale: 1" = 1,350'
Vertical Exaggeration = 50:1

- Topsoil
- Sand with Gravel
- Clay with Gravel and Sand
- Clay
- Shale
- Clay with Sand
- Boulders/Cobbles with Gravel and Clay
- Sand with Gravel and Clay
- Boulders/Cobbles with Gravel and Sand
- Boulders/Cobbles with Sand
- Sand
- Gravel with Clay
- Gravel with Sand and Clay
- Gravel
- Clay with Gravel
- Well Screen Interval
- Water Level (Fall 2010)

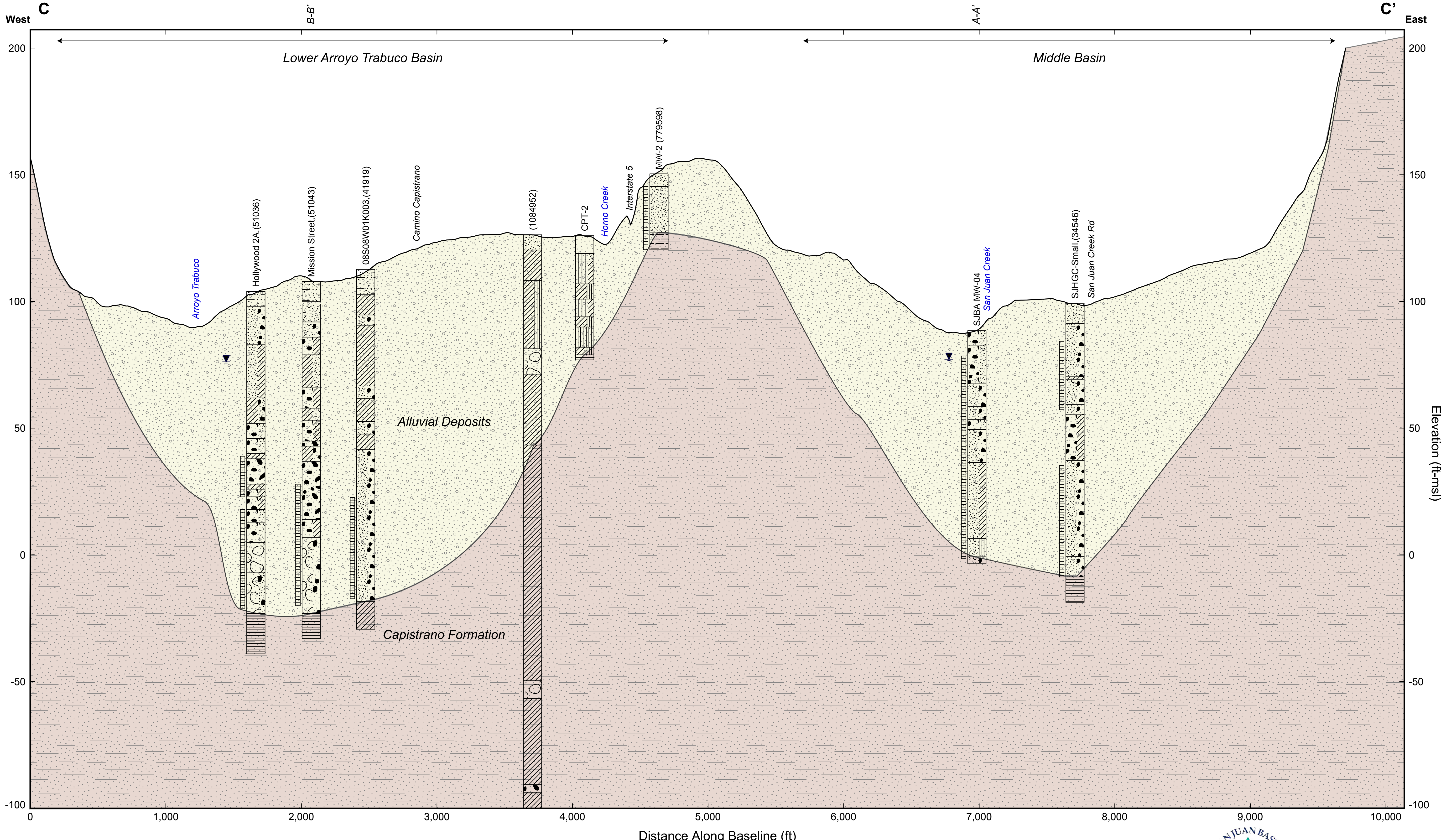
Local Name, (DWR Well Completion Report No.)

San Juan Basin

Cross-Section B-B'

Figure 3-16

Report: STRAT+GEOPHYSICAL_11X17; File: XSECTIONS.GPJ; 4/6/2011



Report: STRAT+GEOPHYSICAL_11X17; File: XSECTIONS.GPJ; 4/7/2011

Prepared by:

WILDERMUTH ENVIRONMENTAL INC.
www.wildermuthenvironmental.com

Vertical Scale: 1" = 27'
Horizontal Scale: 1" = 680'
Vertical Exaggeration = 25:1

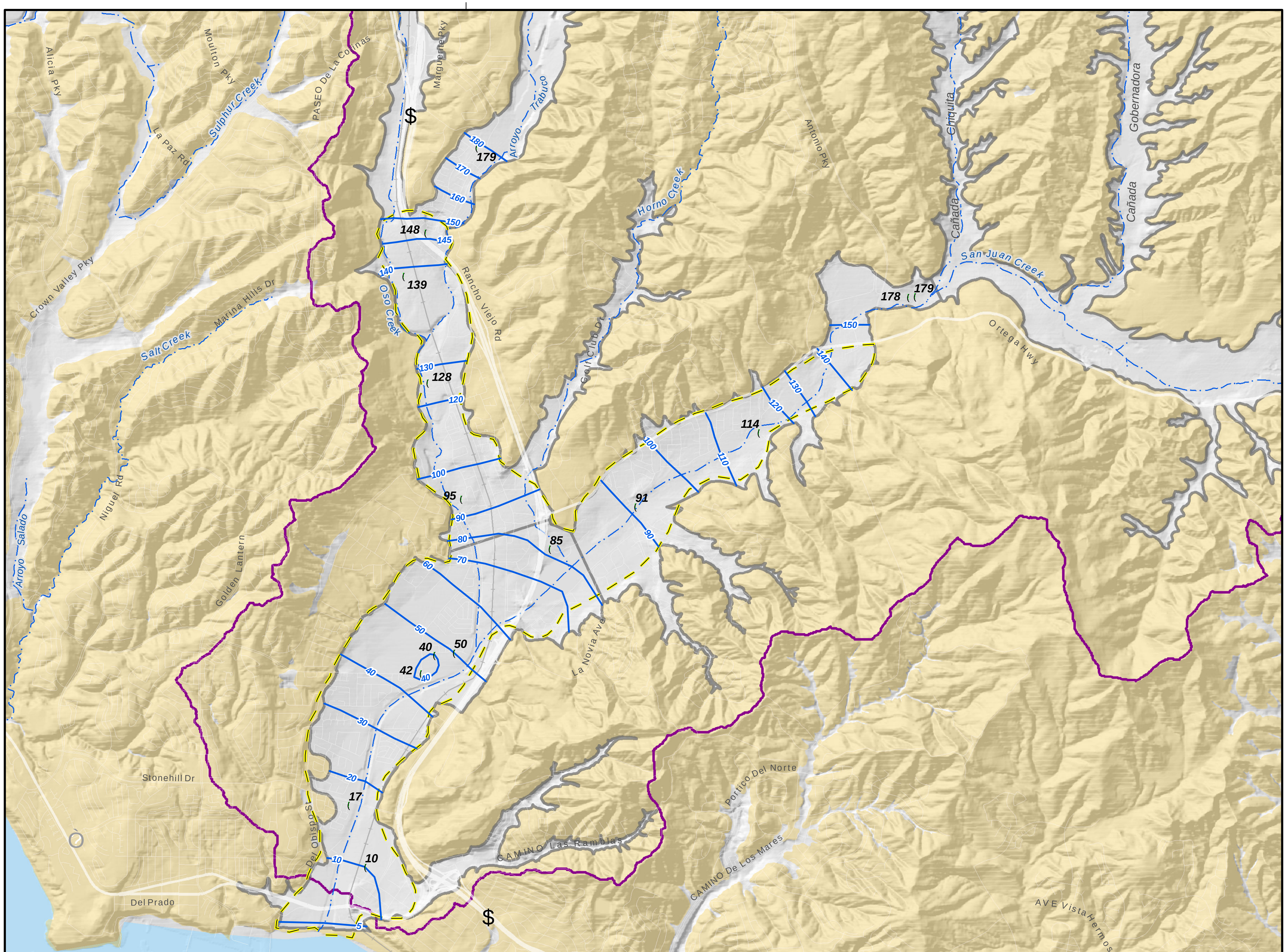
Topsoil
Sand with Gravel
Clay with Gravel
Clay with Sand
Gravel with Sand and Clay
Clay
Gravel with Sand
Sand
Gravel with Clay
Shale
Gravel
Boulders/Cobbles with Gravel and Clay
Sand with Clay
Clay with Gravel and Sand
Cobbles and/or Boulders
Well Screen Interval
Water Level (Fall 2010)
Local Name, (DWR Well Completion Report No.)

San Juan Basin Authority

San Juan Basin

Cross-Section C-C'

Figure 3-17



Main Features

Groundwater Elevation Contours (ft-amsl)

Groundwater Elevation at Well (ft-amsl)

Active Management Area

San Juan Creek Watershed Boundary

San Juan Basin

Streams and Creeks

Geologic Features

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.

Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 11/6/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-18.mxd

0 2,500 5,000 7,500 10,000 Feet

0 1,000 2,000 3,000 Meters

SAN JUAN BASIN AUTHORITY

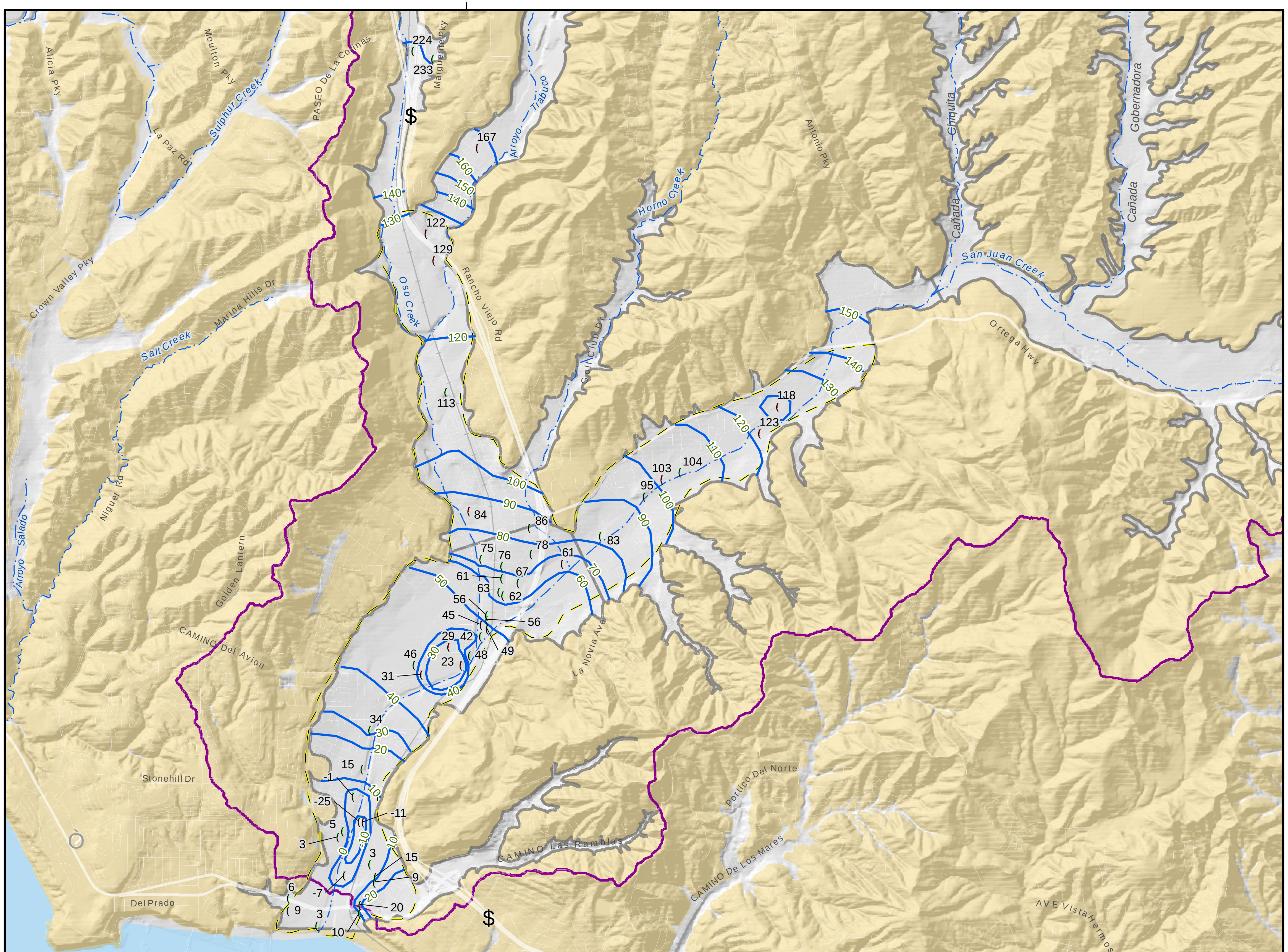
075-003
004

Groundwater Level Elevation

Spring 1987

Figure 3-18

117°40'0"W



117°40'0"W

Main Features

- Groundwater Elevation Contours (ft-above msl)
- Monitoring Well with Groundwater Elevation (ft amsl)
- Production Well with Groundwater Elevation (ft amsl)
- Active Management Area
- San Juan Creek Watershed Boundary
- San Juan Basin
- Streams and Creeks

Geologic Features

- Younger Alluvial Deposits
- Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.

Produced by:
WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 11/6/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-19.mxd

0 2,500 5,000 7,500 10,000 Feet

0 1,000 2,000 3,000 Meters

SAN JUAN BASIN AUTHORITY

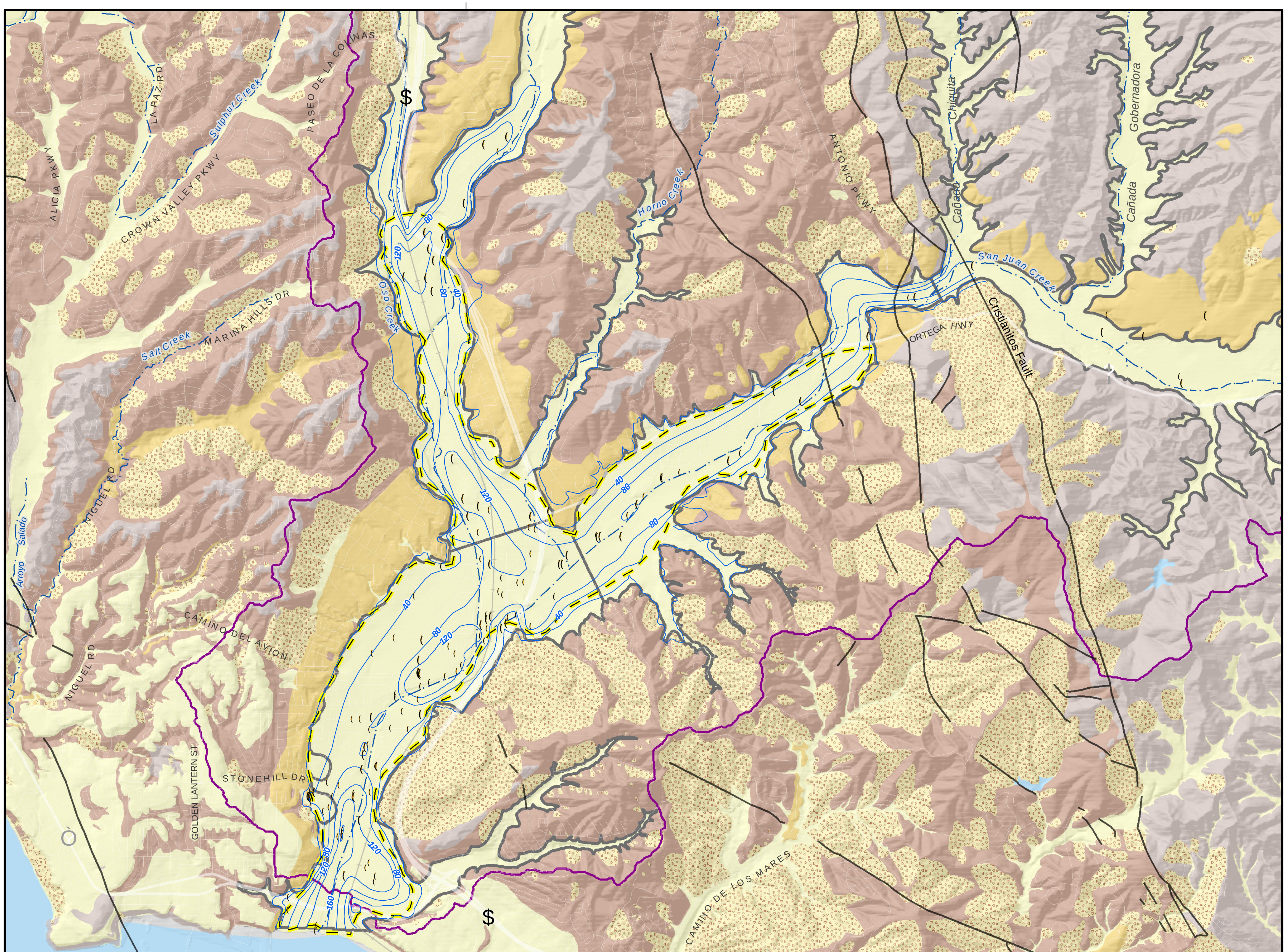
075-003
004

Groundwater Level Elevation

Fall 2010

Figure 3-19

117°40'0"W



117°40'0"W

Hydrologic Features

- Contour of Depth to Effective Base of the Alluvial Aquifer (feet-amsl) (100)
- Well/Boring which fully penetrated the alluvial aquifer
- Well/Boring with lithology information
- Groundwater Sub-basin
- Active Management Area
- San Juan Creek Watershed Boundary

Geologic Features

Late Holocene to Early Pleistocene Surficial Deposits

- Younger Alluvial Deposits
- Landslide Deposits
- Older Alluvial Deposits

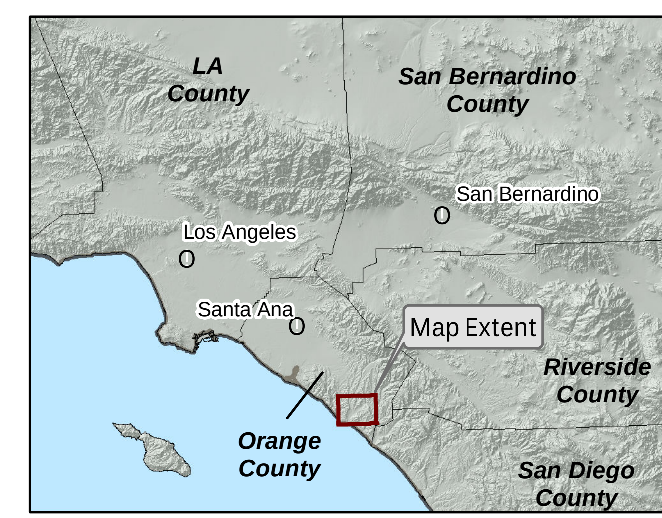
Tertiary Bedrock Units

- Fine-grained Formations (Capistrano and Monterey Formations)
- Coarse-grained Formations (Santiago, Sespe, and Niguel Formations)

Source: CGS Special Report 217.

Faults

- Location Certain
- Location Approximate



Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 11/6/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-20.mxd

0 2,500 5,000 7,500 10,000 Feet
0 1,000 2,000 3,000 Meters

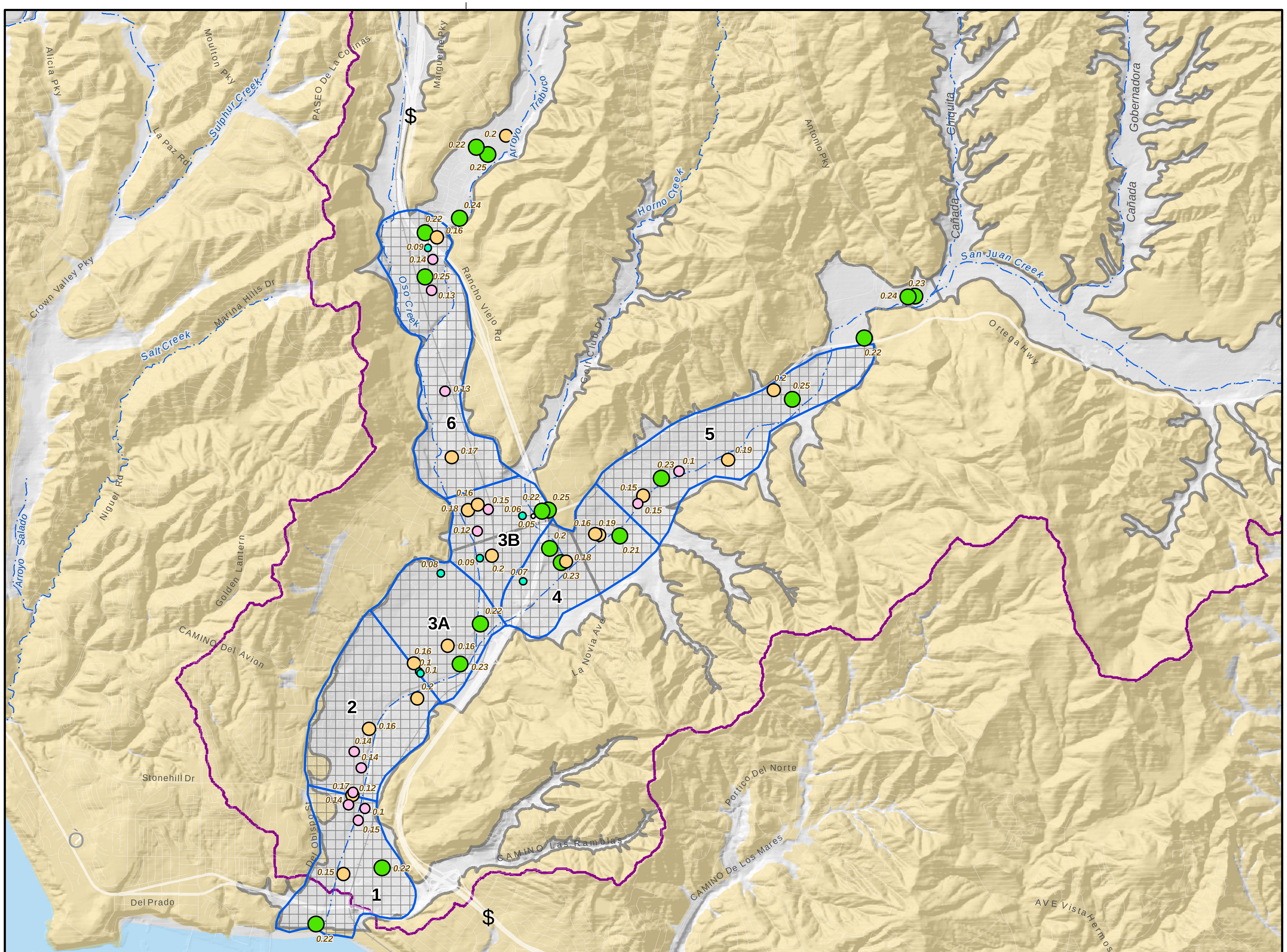
SAN JUAN BASIN AUTHORITY

075-003
004

Effective Base of Alluvial Aquifer

Figure 3-20

117°40'0"W



117°40'0"W

Main Features

Specific Yield at Well Sites (percentage)

- 0 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.2
- 0.2 - 0.25

Storage Grid (100 m x 100 m)

Active Managment Area Segments

San Juan Creek Watershed Boundary

San Juan Basin

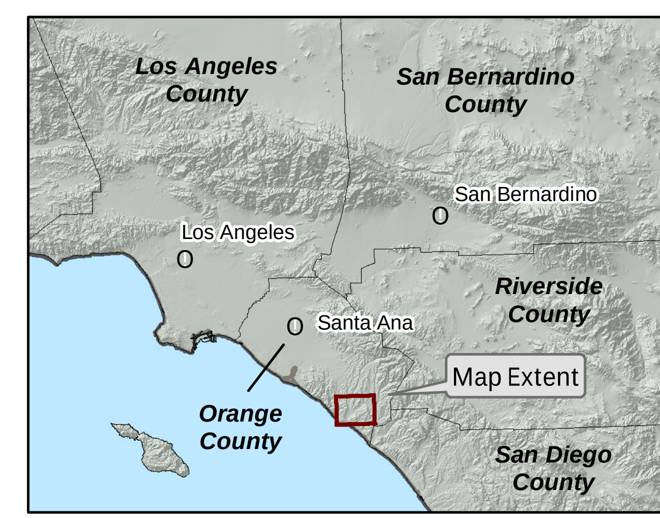
Streams and Creeks

Geologic Features

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.



Produced by:

WILDERMUTH ENVIRONMENTAL INC.

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm

Date: 11/6/2013

Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-21.mxd

0 2,500 5,000 7,500 10,000 Feet

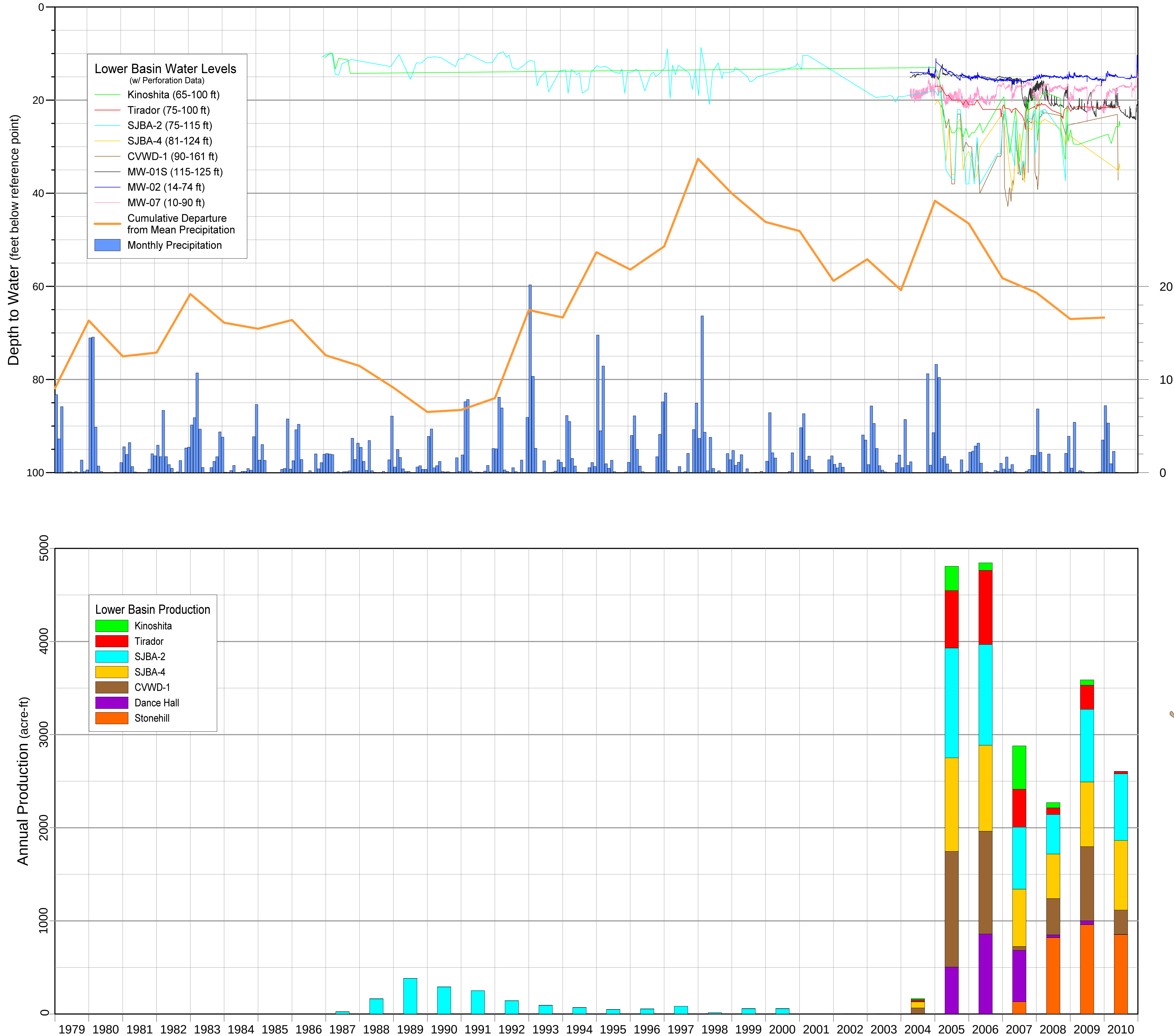
0 1,000 2,000 3,000 Meters

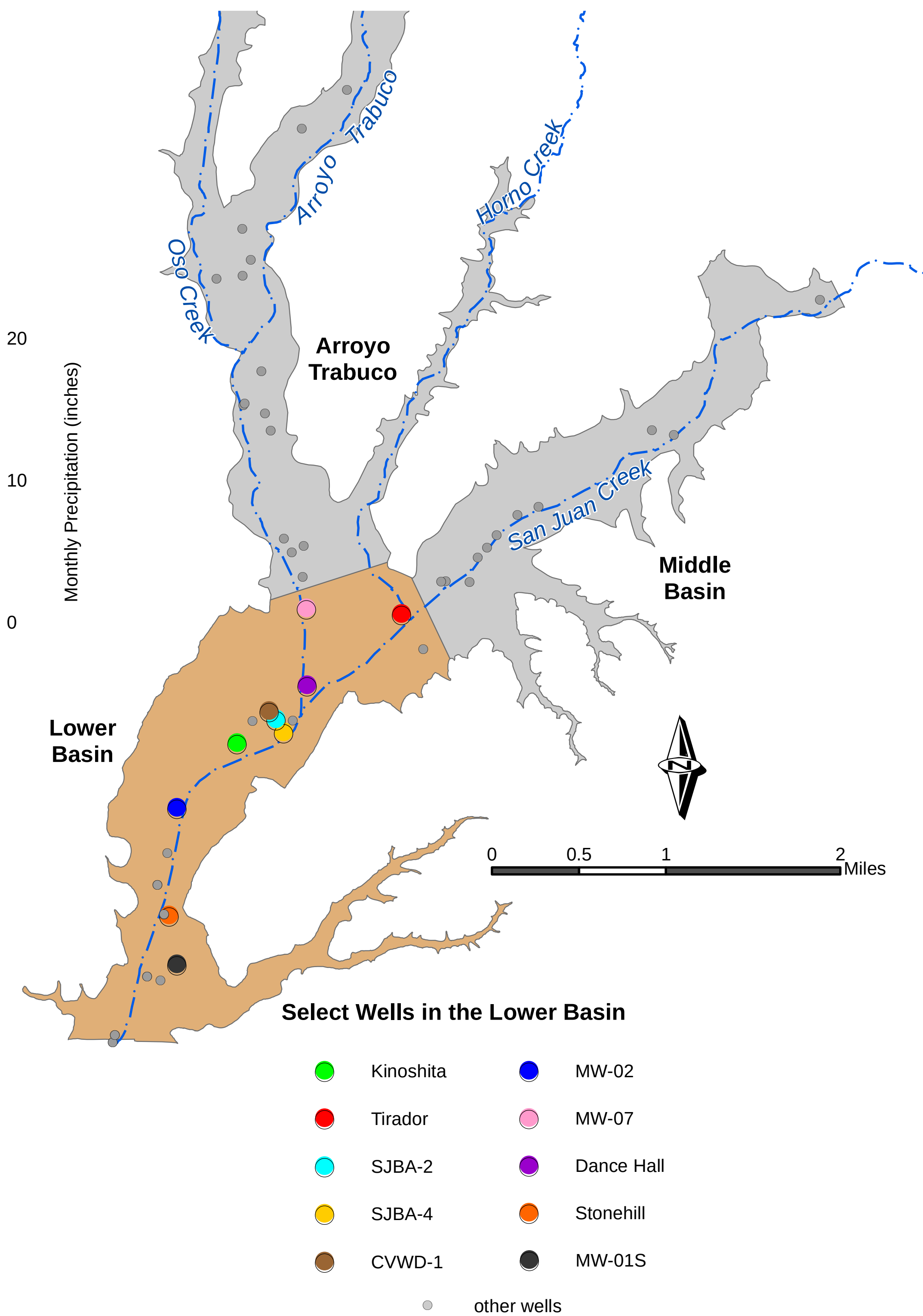
SAN JUAN BASIN AUTHORITY

075-003
004

Storage Capacity Grid and Estimated Specific Yield

Figure 3-21

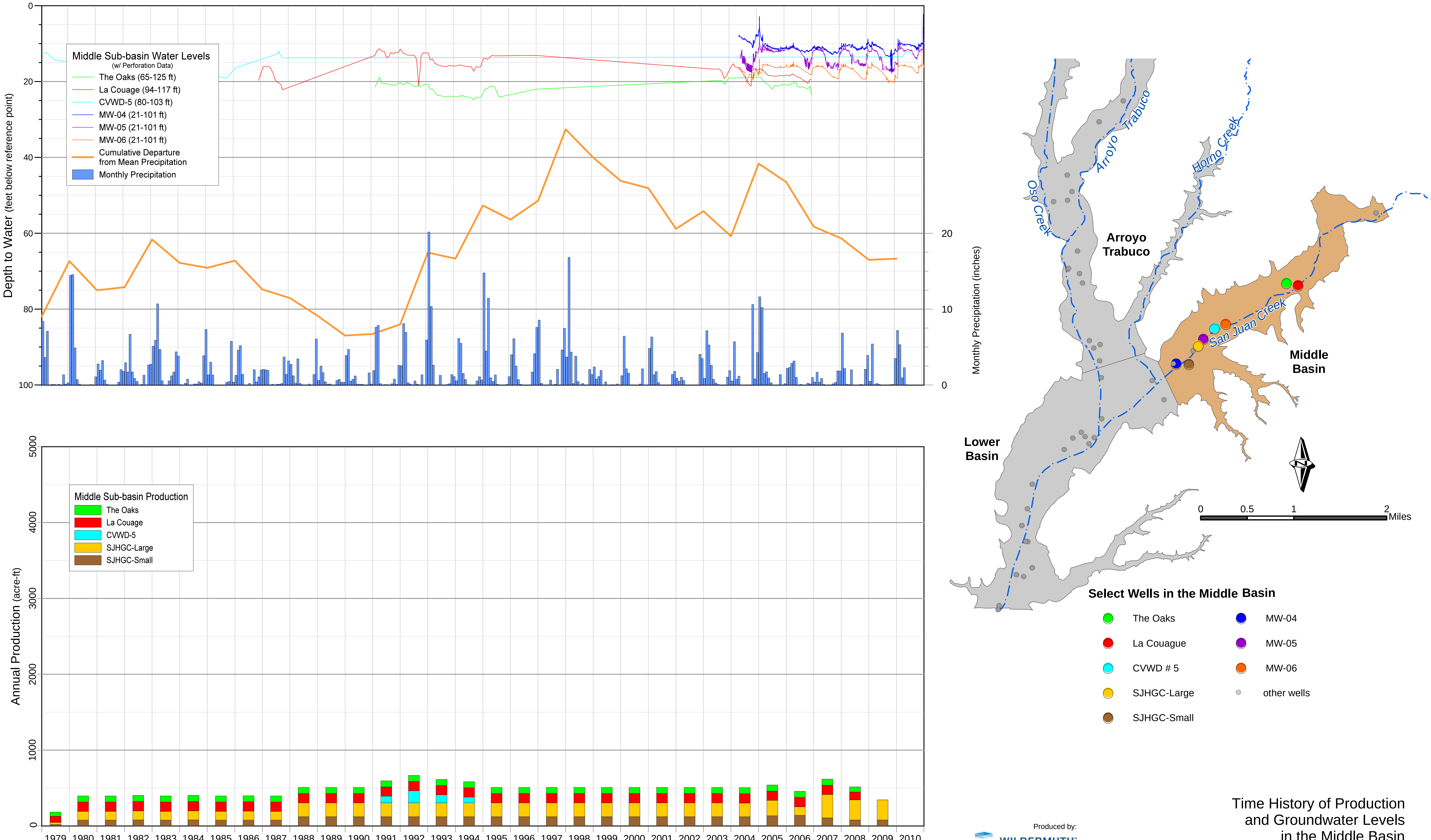




Produced by:
WILDERMUTH ENVIRONMENTAL INC.
www.wildermuthenvironmental.com
Date: 20110218
Filename: Figure_3.grf

Time History of Production and Groundwater Levels in the Lower Basin

Figure 3-22



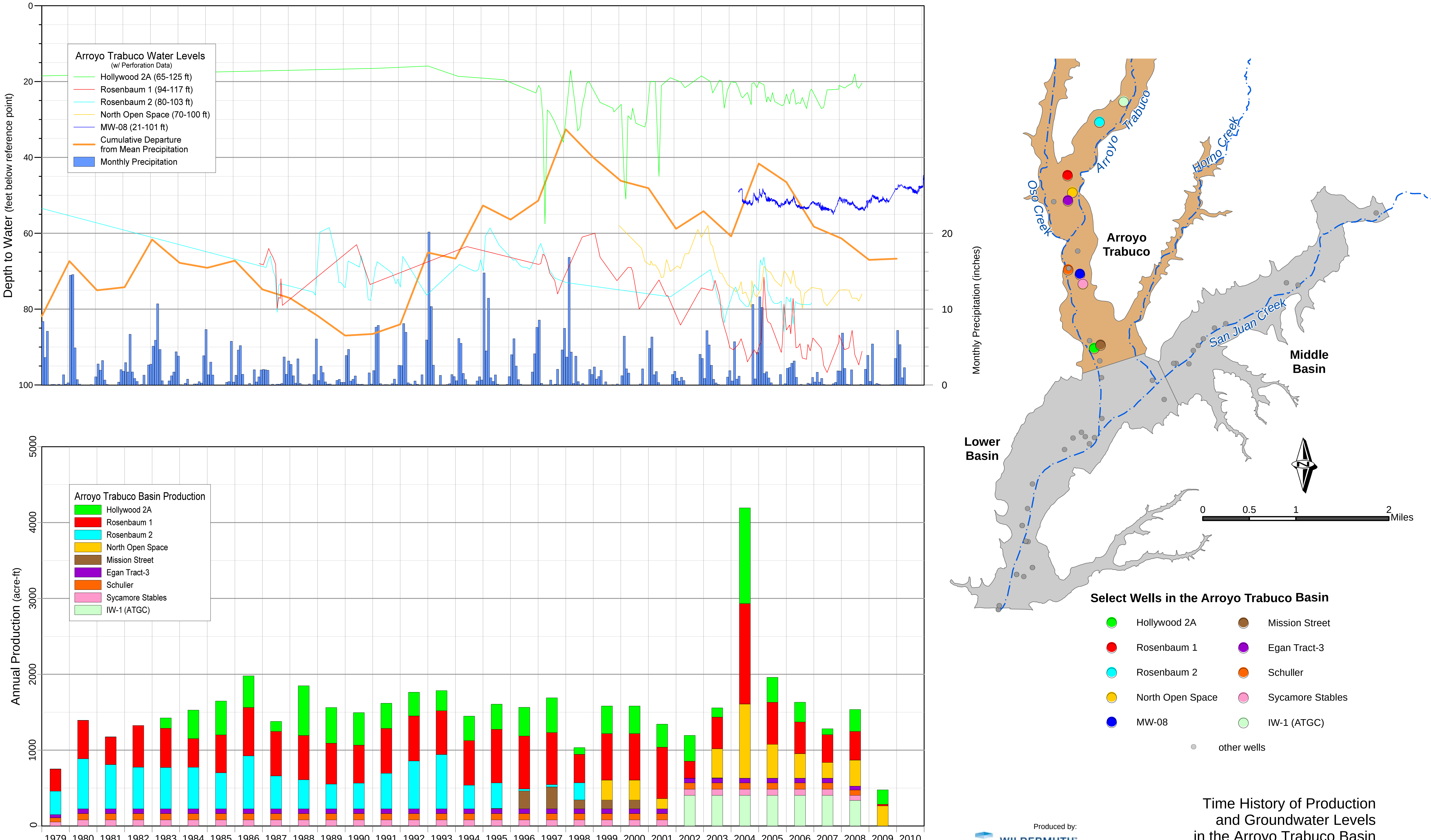
Produced by:

WILDERMUTH ENVIRONMENTAL INC.

www.wildermuthenvironmental.com
Date: 20110218
Filename: Figure_3.grf

Time History of Production and Groundwater Levels in the Middle Basin

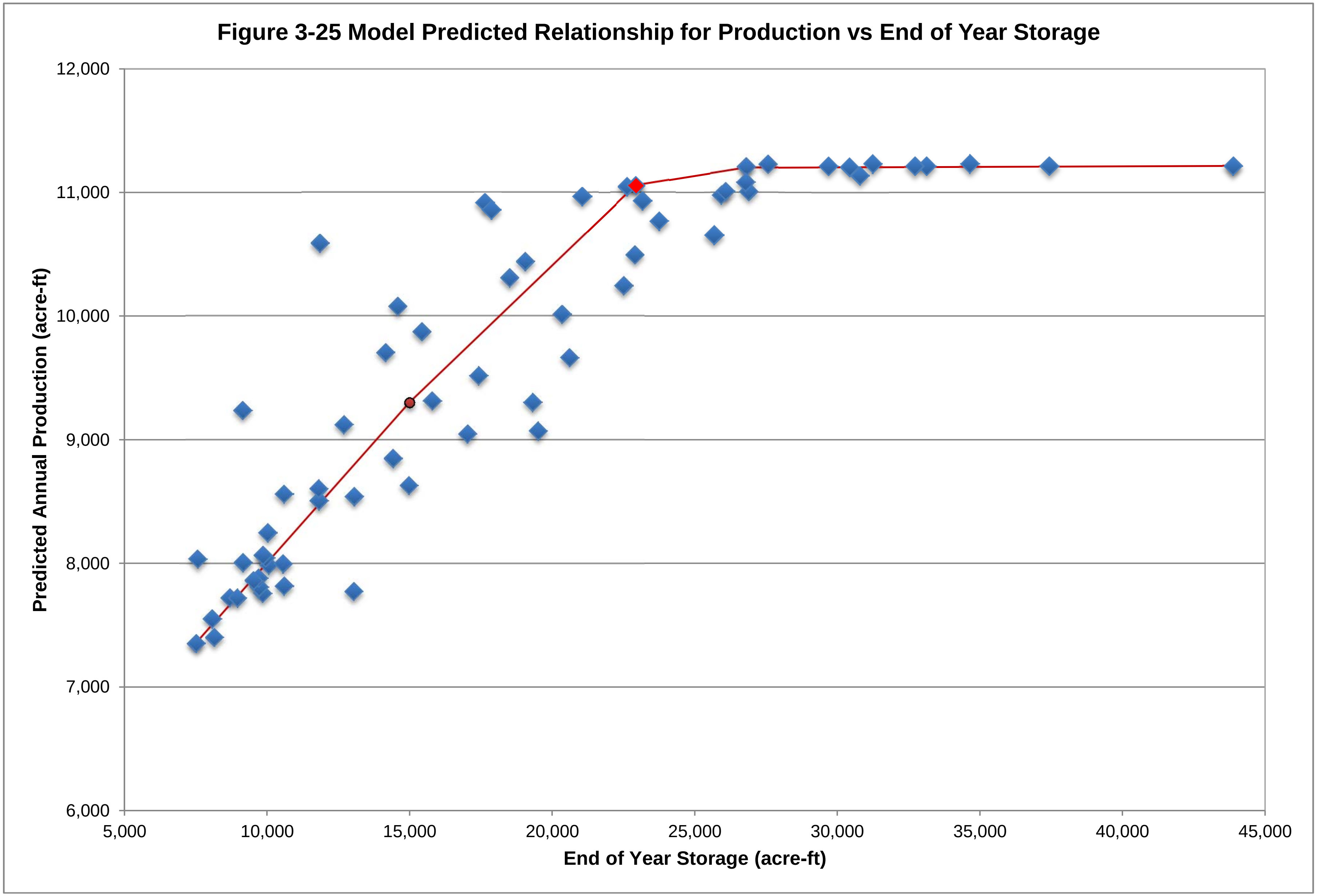
Figure 3-23



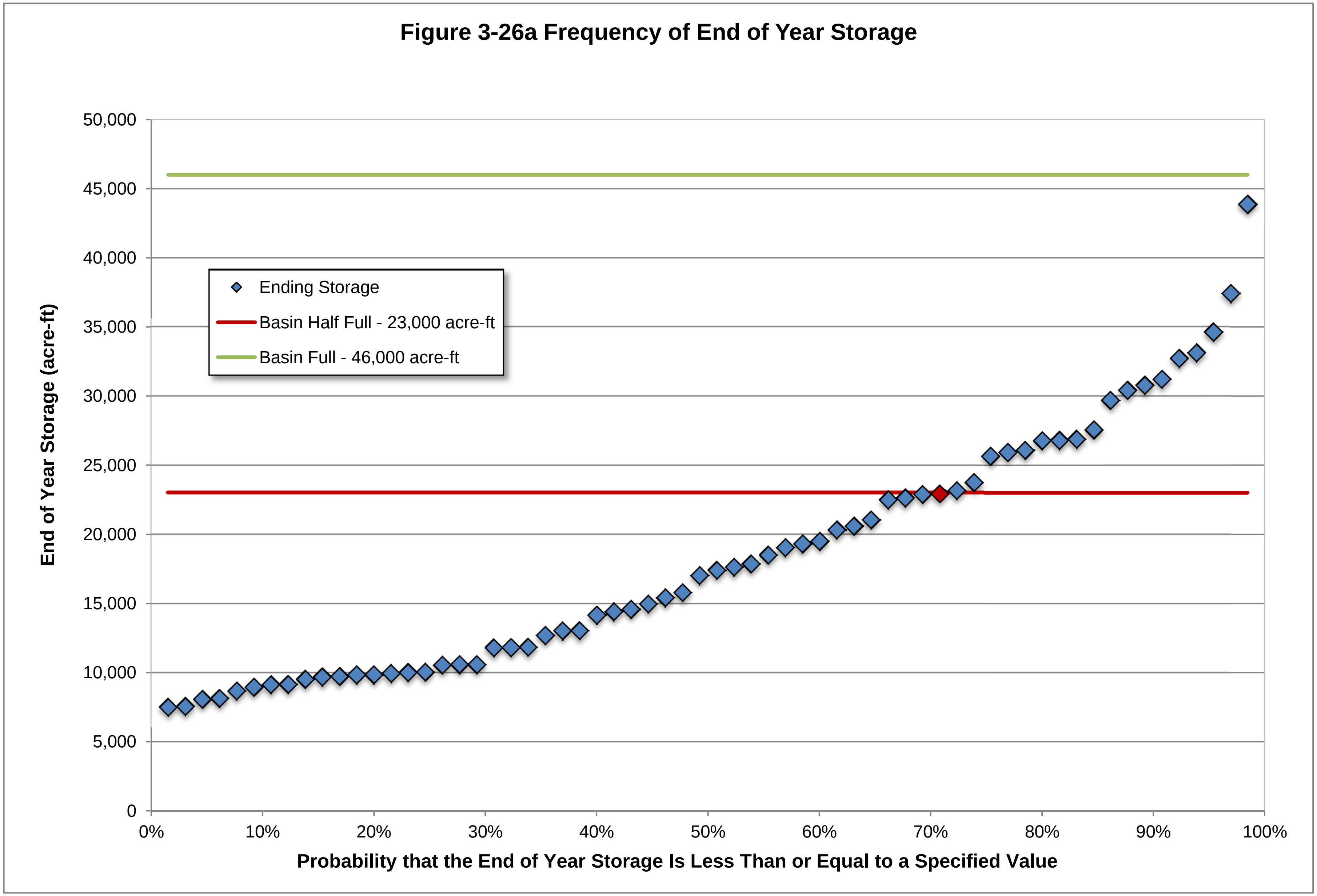
Produced by:
WILDERMUTH ENVIRONMENTAL INC.
www.wildermuthenvironmental.com
Date: 20110218
Filename: Figure_3.grf

Time History of Production and Groundwater Levels in the Arroyo Trabuco Basin

Figure 3-24



S:\Clients\San Juan Basin Authority\Groundwater Management Plan\Report\FINAL_GWPM_20130810\Figures\Figures 3-25_ 26a_26b.xlsx_figure 3-25



S:\Clients\San Juan Basin Authority\Groundwater Management Plan\Report\FINAL_GWPM_20130810\Figures\Figures 3-25_ 26a_26b.xlsx_figure 3-26a

WILDERMUTH™ ENVIRONMENTAL INC.

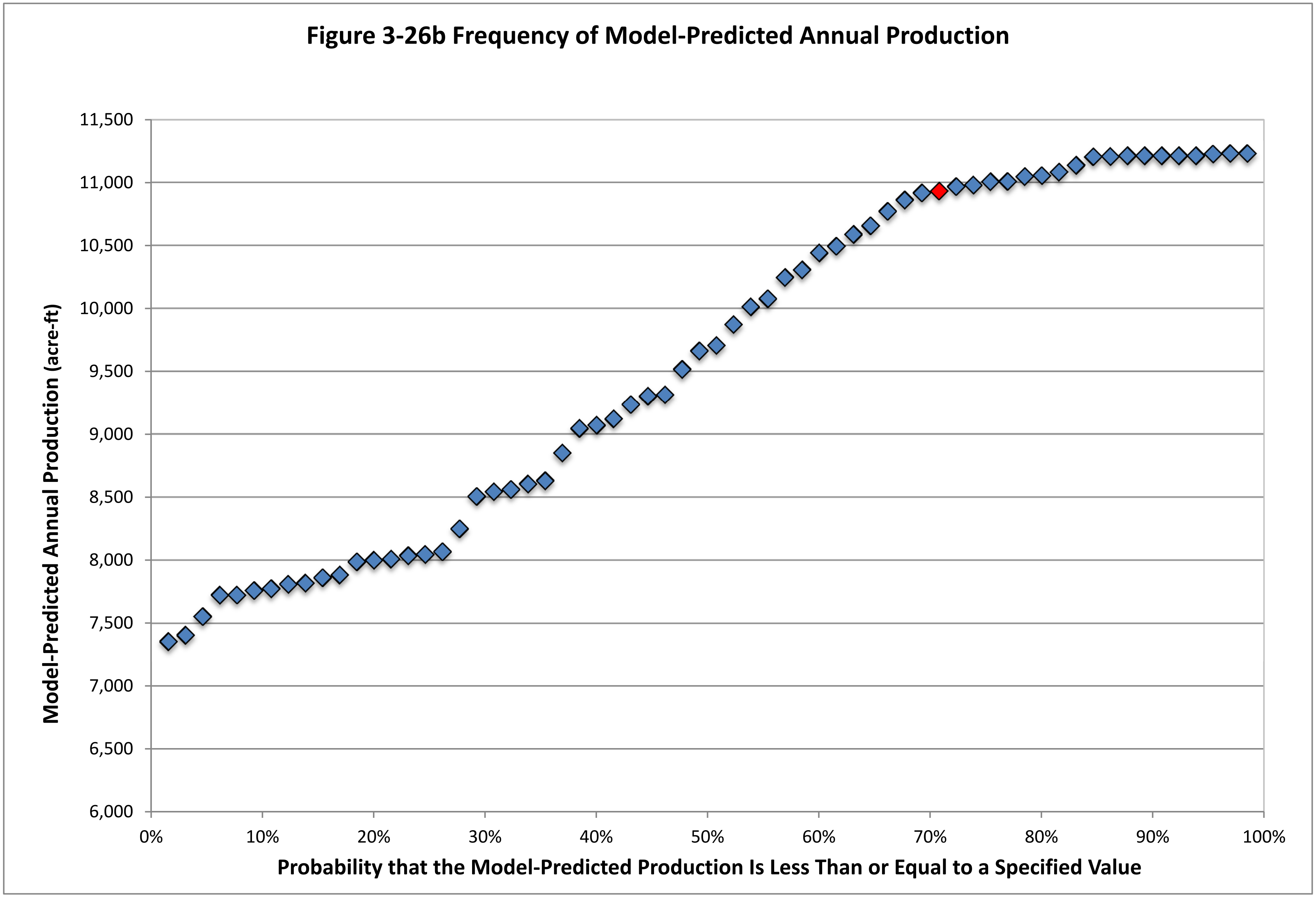
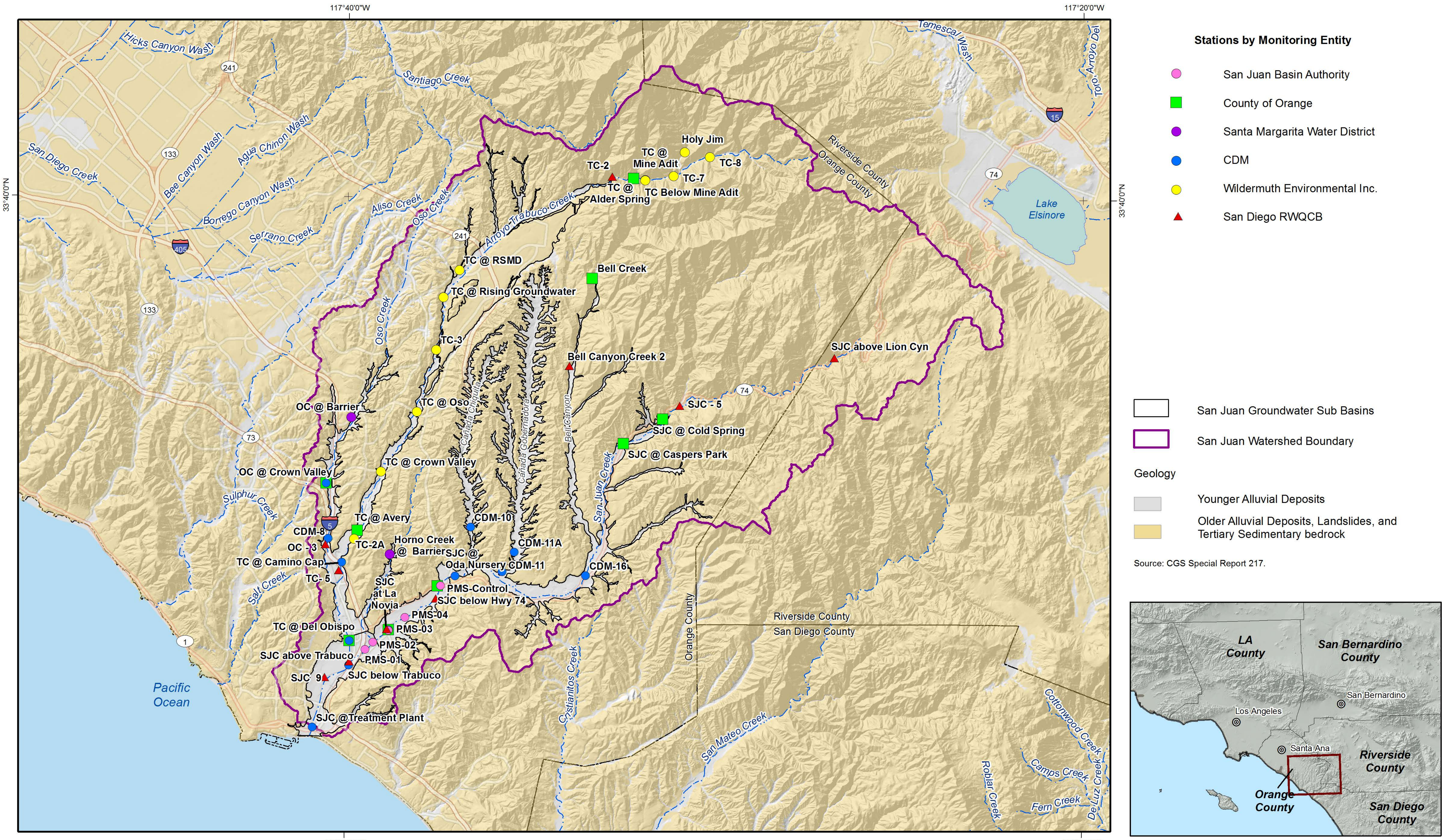


Figure 3-26b Frequency of Model-Predicted Annual Production
Model-Predicted Annual Production (acre-ft)
11,500
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
6,000
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Probability that the Model-Predicted Production Is Less Than or Equal to a Specified Value



Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 20110505
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-27.mxd

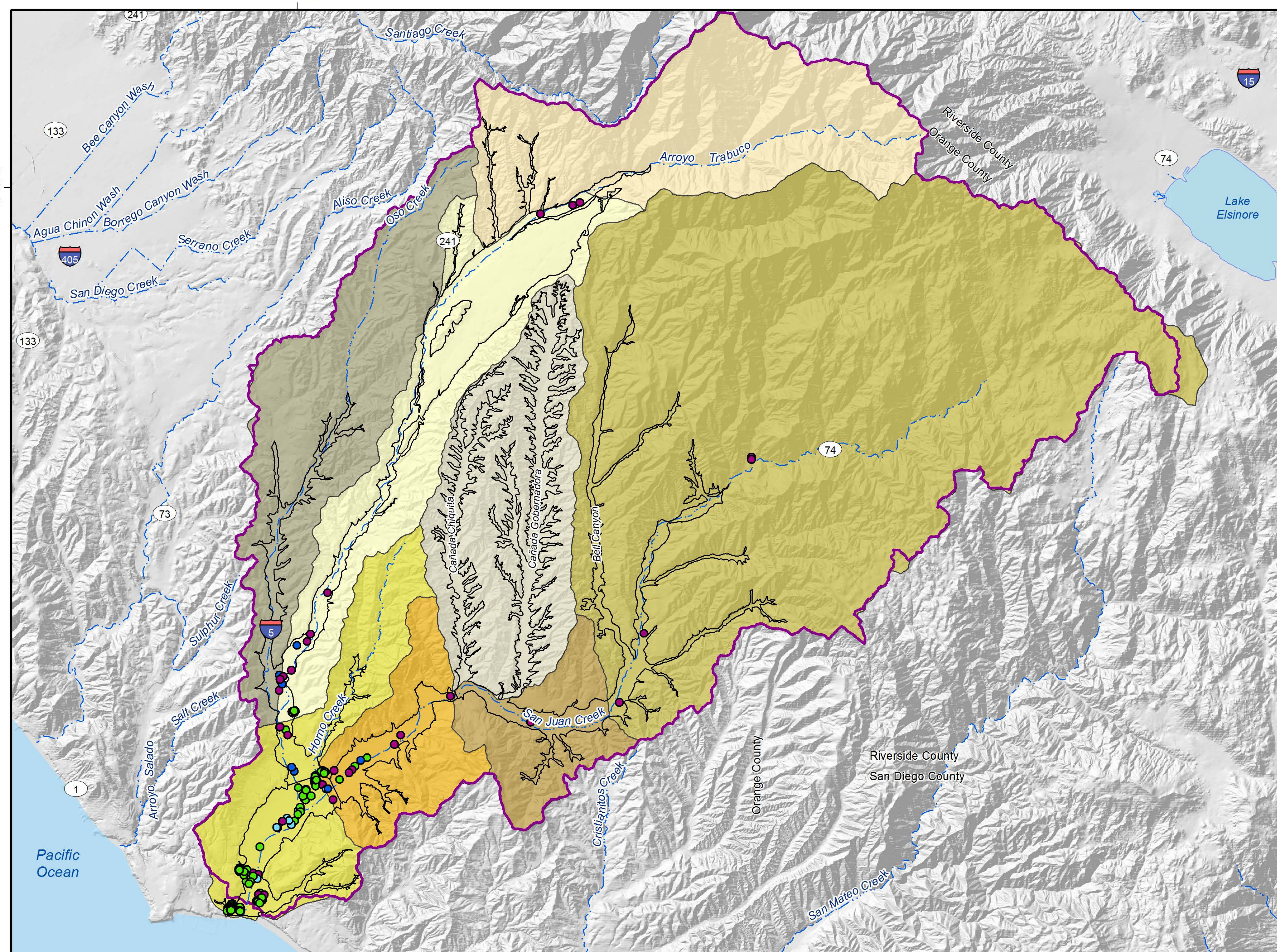
0 1 2 3 4 Miles
0 2 4 6 KM

SAN JUAN BASIN AUTHORITY

075-003
004

San Juan Watershed
Surface Water Quality Monitoring Stations

Figure 3-27



Well Type

- Monitoring
- Municipal - Desalter
- Municipal - Non Potable
- Private

Hydrologic Sub Areas

- Upper Trabuco
- Upper San Juan
- Oso
- Middle Trabuco
- Gobernadora
- Middle San Juan
- Ortega
- Lower San Juan

- San Juan Groundwater Sub Basins
- San Juan Watershed Boundary

Produced by:

WILDERMUTH ENVIRONMENTAL INC.

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 20110505
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-28.mxd

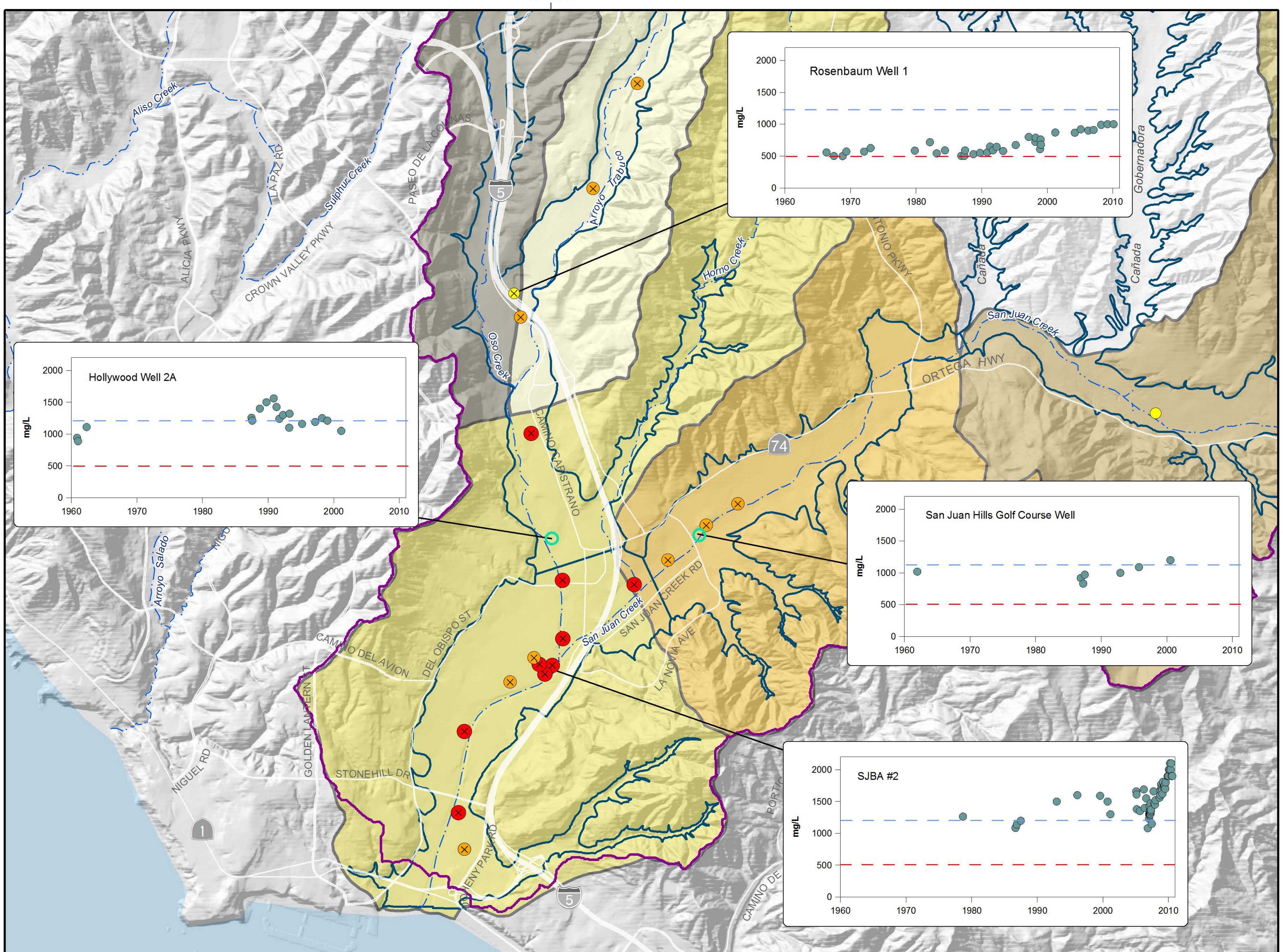
0 1 2 3 4 Miles
0 2 4 6 KM

SAN JUAN BASIN AUTHORITY

075-003
004

San Juan Watershed
Wells with Water Quality Data

Figure 3-28



Total Dissolved Solids (TDS)

mg/L — Year

Basin Plan Objective Specific to Sub Area

US EPA Secondary MCL = 500 mg/L

Maximum TDS (mg/L) 2006 - 2010

- < 125
- 125 - 250
- 250 - 500
- 500 - 1,000
- 1,000 - 2,000
- > 2,000

Secondary US EPA MCL = 500 mg/L

Hydrologic Sub Area and Basin Plan Objective for TDS

- Lower San Juan - 1200 mg/L
- Ortega - 1100 mg/L
- Middle San Juan - 750 mg/L
- Middle Trabuco - 750 mg/L
- Oso - 1200 mg/L

- Maximum Concentration of TDS for 2006 to 2010 Exceeds the Basin Plan Objective
- Well with Data Plotted in Graph but no Current Data for 2006 to 2010
- San Juan Watershed Boundary
- San Juan Groundwater Sub Basins

Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-29.mxd

0 2,500 5,000 7,500 10,000 Feet
0 1,000 2,000 3,000 Meters

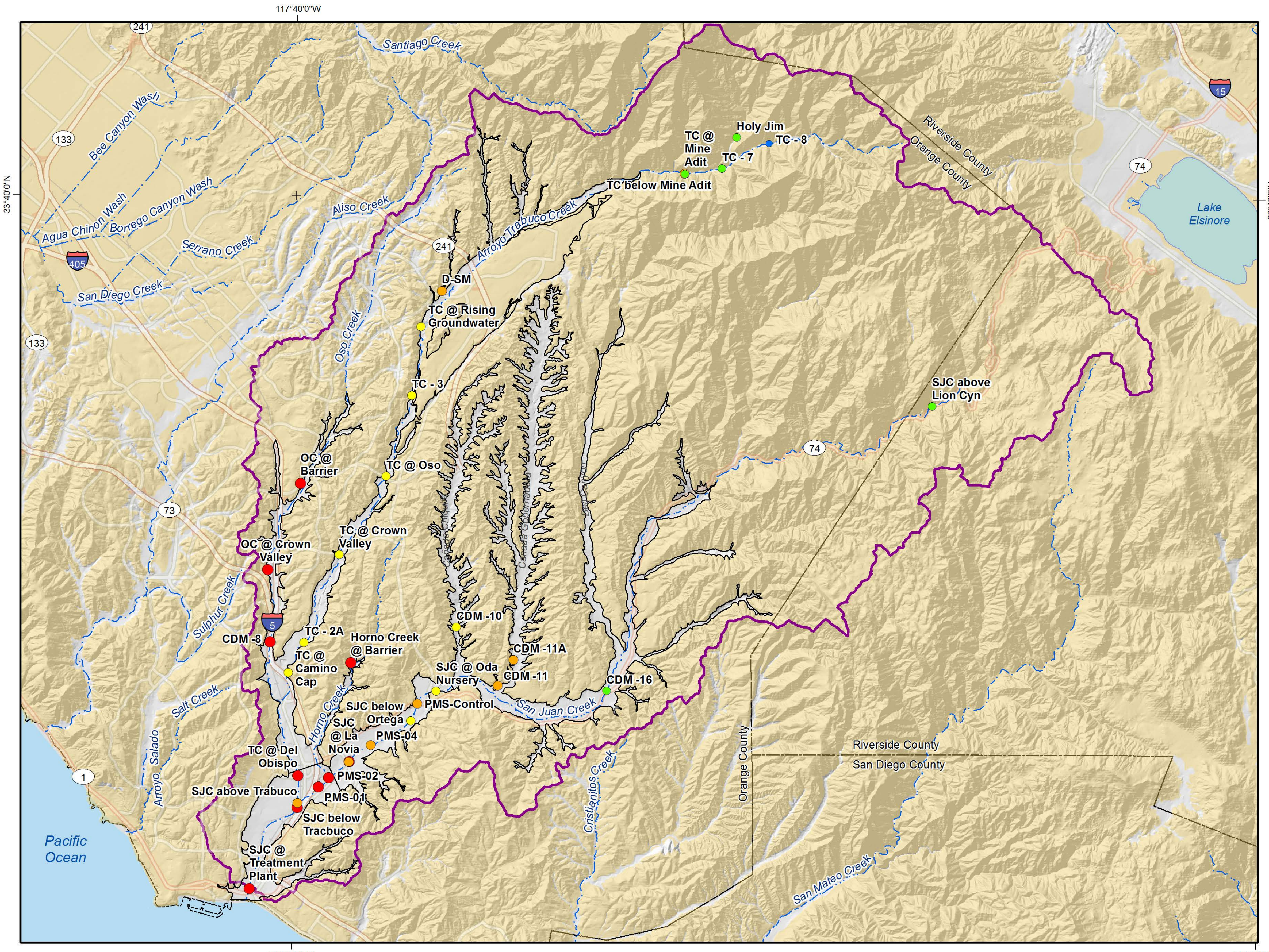
SAN JUAN BASIN AUTHORITY

075-003
004

Total Dissolved Solids in Groundwater

Maximum Concentration 2006 - 2010 and Historical Trends

Figure 3-29



Maximum TDS (mg/L)

- < 125
- 125 - 250
- 250 - 500
- 500 - 1,000
- 1,000 - 2,000
- > 2,000

Secondary US EPA MCL = 500 mg/L

Basin Plan Surface Water Objective = 500 mg/L

** Maximum concentration is based on all available data from the historical record. All surface water sites are monitored at different time periods and for different analytes. Refer to Table 3-5 in this report for a summary of the monitoring at the surface water stations.*

San Juan Groundwater Sub Basins

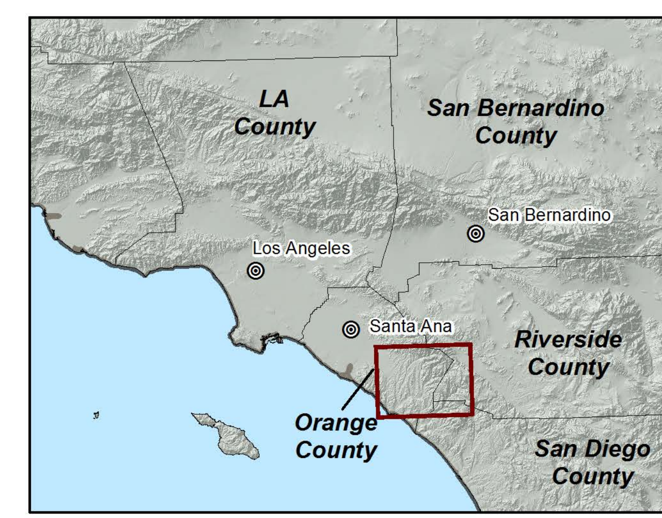
San Juan Watershed Boundary

Geology

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.



Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 20110505
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-30.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

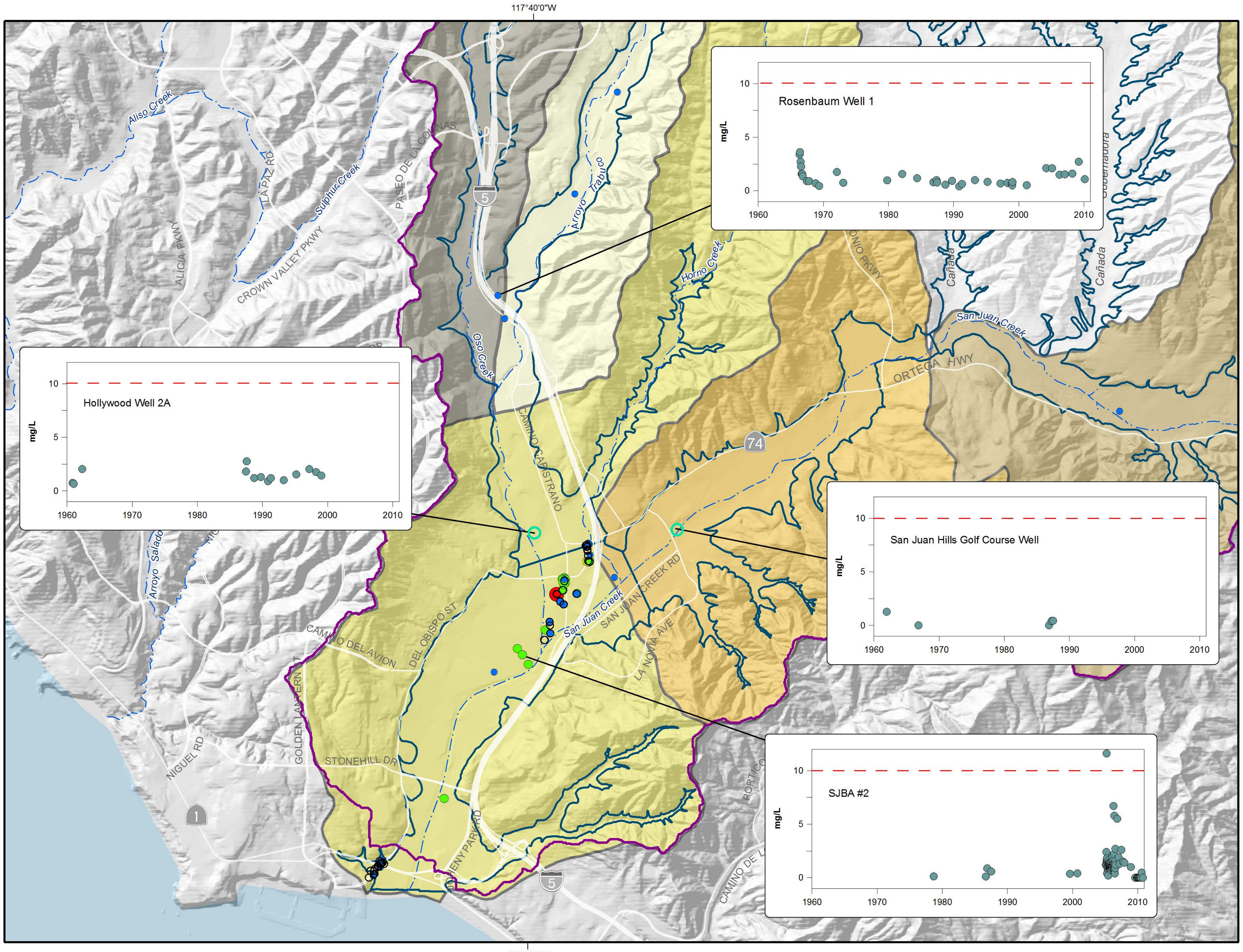
SAN JUAN BASIN AUTHORITY

075-003
004

Total Dissolved Solids in Surface Water

Maximum Concentration for Historical Record

Figure 3-30



Nitrate as Nitrogen (NO3-N)

Basin Plan Objective = 10 mg/L

Primary US EPA & CA MCL = 10 mg/L

mg/L

Year

Maximum NO3-N (mg/L) 2006 - 2010

- ND
- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

Primary US EPA MCL = 10 mg/L
Primary CA MCL = 10 mg/L

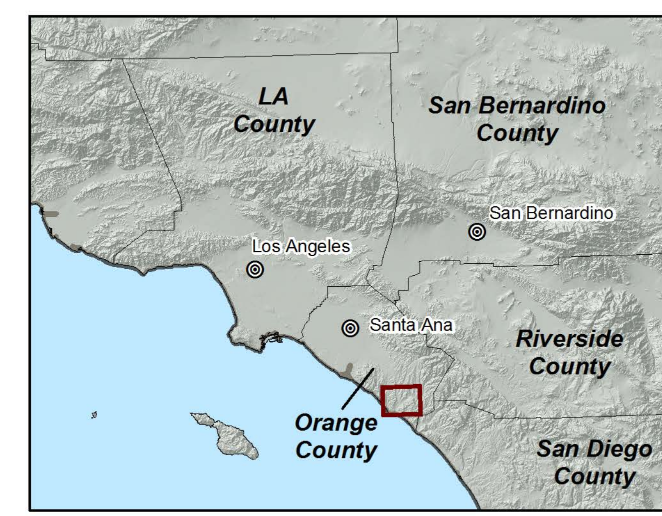
Hydrologic Sub Area and Basin Plan Objective for NO3-N

- Lower San Juan - 10 mg/L
- Ortega - 10 mg/L
- Middle San Juan - 10 mg/L
- Middle Trabuco - 10 mg/L
- Oso - 10 mg/L

Well with Data Plotted in Graph but no Current Data for 2006 to 2010

San Juan Watershed Boundary

San Juan Groundwater Sub Basins



Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-31.mxd

0 2,500 5,000 7,500 10,000 Feet

0 1,000 2,000 3,000 Meters

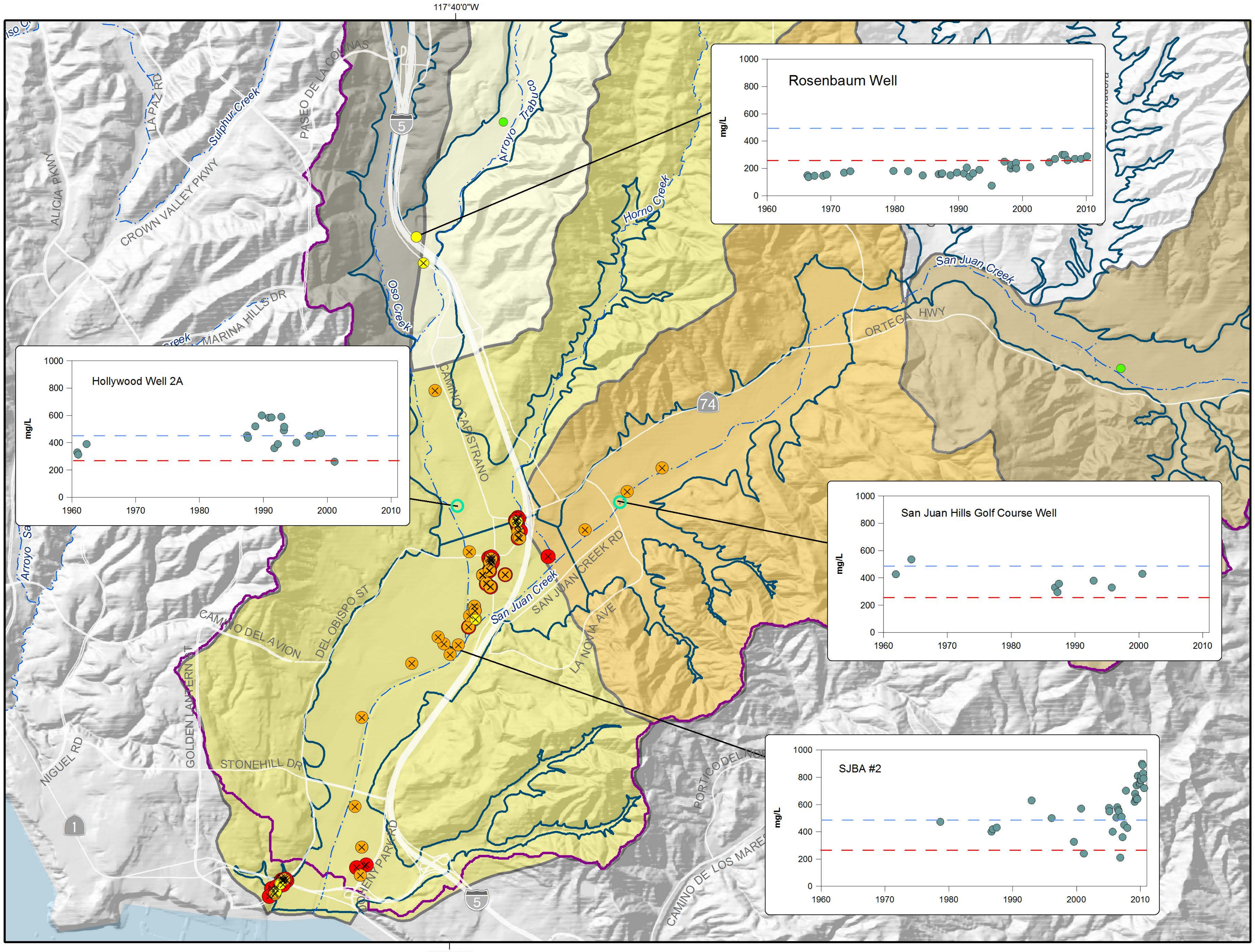
SAN JUAN BASIN AUTHORITY

075-003
004

Nitrate as Nitrogen in Groundwater

Maximum Concentration 2006 - 2010 and Historical Trends

Figure 3-31



Sulfate

Basin Plan Objective Specific to Sub Area

US EPA & CA Secondary MCL = 250 mg/L

mg/L

Year

Maximum Sulfate (mg/L) 2006 - 2010

- ND
- < 125
- 125 - 250
- 250 - 500
- 500 - 1,000
- > 1,000

Secondary US EPA MCL = 250 mg/L
Secondary CA MCL = 250 mg/L

Hydrologic Sub Area and Basin Plan Objective for Sulfate

- Lower San Juan - 500 mg/L
- Ortega - 450 mg/L
- Middle San Juan - 375 mg/L
- Middle Trabuco - 375 mg/L
- Oso - 500 mg/L

- Maxmium Concentration of Sulfate for 2006 to 2010 Exceeds the Basin Plan Objective
- Well with Data Plotted in Graph but no Current Data for 2006 to 2010
- San Juan Watershed Boundary
- San Juan Groundwater Sub Basins

Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-32.mxd

0 2,500 5,000 7,500 10,000 Feet
0 1,000 2,000 3,000 Meters

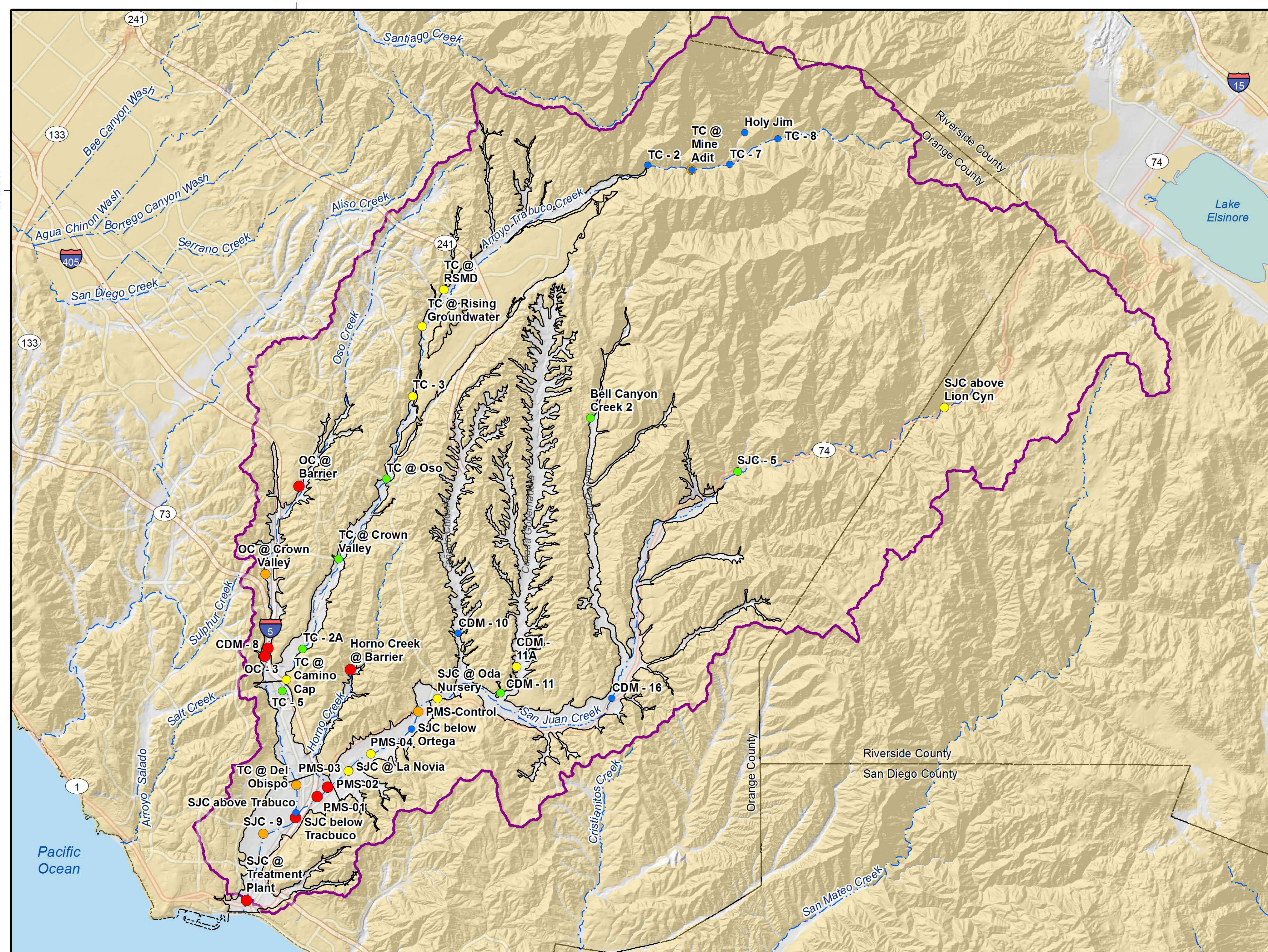
SAN JUAN BASIN AUTHORITY

075-003
004

Sulfate in Groundwater

Maximum Concentration 2006 - 2010 and Historical Trends

Figure 3-32



Maximum Sulfate (mg/L)

- ND
- < 125
- 125 - 250
- 250 - 500
- 500 - 1,000
- > 1,000

Secondary US EPA MCL = 250 mg/L
Secondary CA MCL = 250 mg/L

Basin Plan Basin Plan Surface Water Objective = 250 mg/L

** Maximum concentration is based on all available data from the historical record. All surface water sites are monitored at different time periods and for different analytes. Refer to Table 3-5 in this report for a summary of the monitoring at the surface water stations.*

San Juan Groundwater Sub Basins

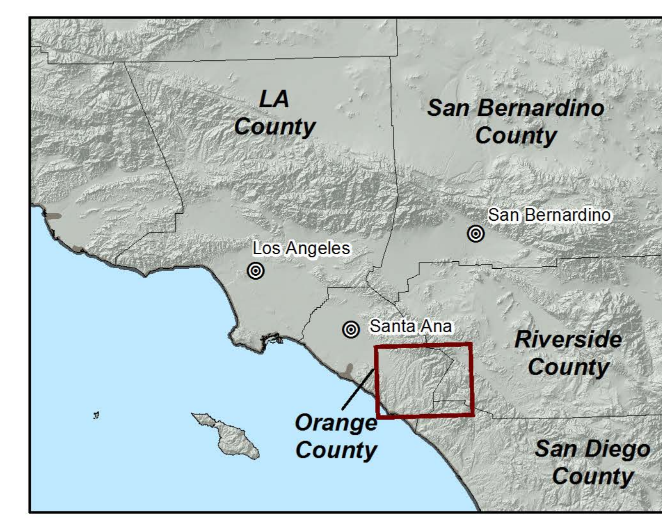
San Juan Watershed Boundary

Geology

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.



Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 20110505
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-33.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

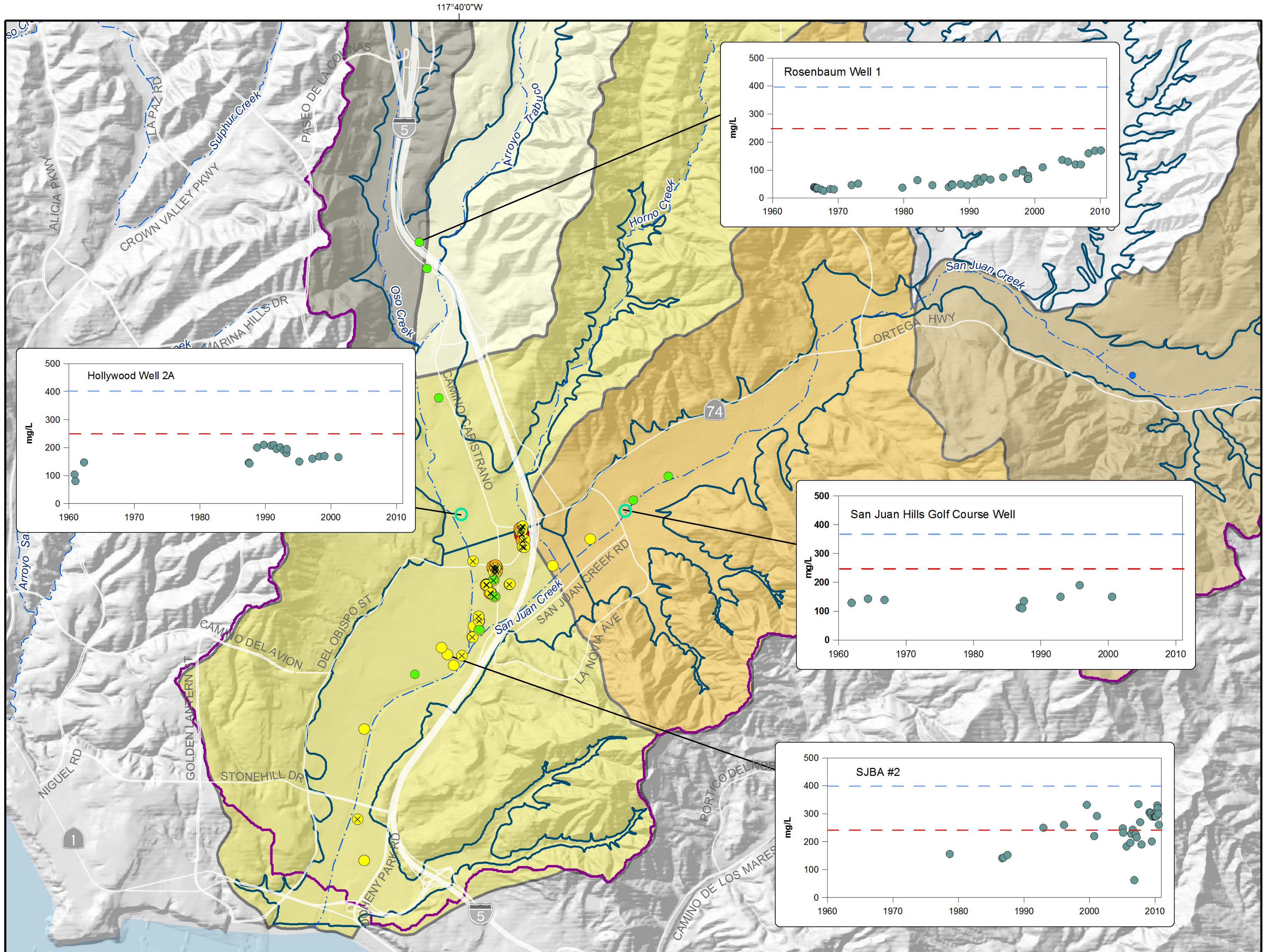
SAN JUAN BASIN AUTHORITY

075-003
004

Sulfate in Surface Water

Maximum Concentration for Historical Record

Figure 3-33



Chloride

mg/L

Basin Plan Objective Specific to Sub Area

US EPA & CA Secondary MCL = 250 mg/L

Year

Maximum Chloride (mg/L) 2006 - 2010

- ND
- < 125
- 125 - 250
- 250 - 500
- 500 - 1,000
- > 1,000

Secondary US EPA MCL = 250 mg/L
Secondary CA MCL = 250 mg/L

Hydrologic Sub Area and Basin Plan Objective for Chloride

- Lower San Juan - 400 mg/L
- Ortega - 375 mg/L
- Middle San Juan - 375 mg/L
- Middle Trabuco - 375 mg/L
- Oso - 400 mg/L

- Maximum Concentration of Chloride for 2006 to 2010 Exceeds the Basin Plan Objective
- Well with Data Plotted in Graph but no Current Data for 2006 to 2010
- San Juan Watershed Boundary
- San Juan Groundwater Sub Basins

Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-34.mxd

0 2,500 5,000 7,500 10,000 Feet
0 1,000 2,000 3,000 Meters

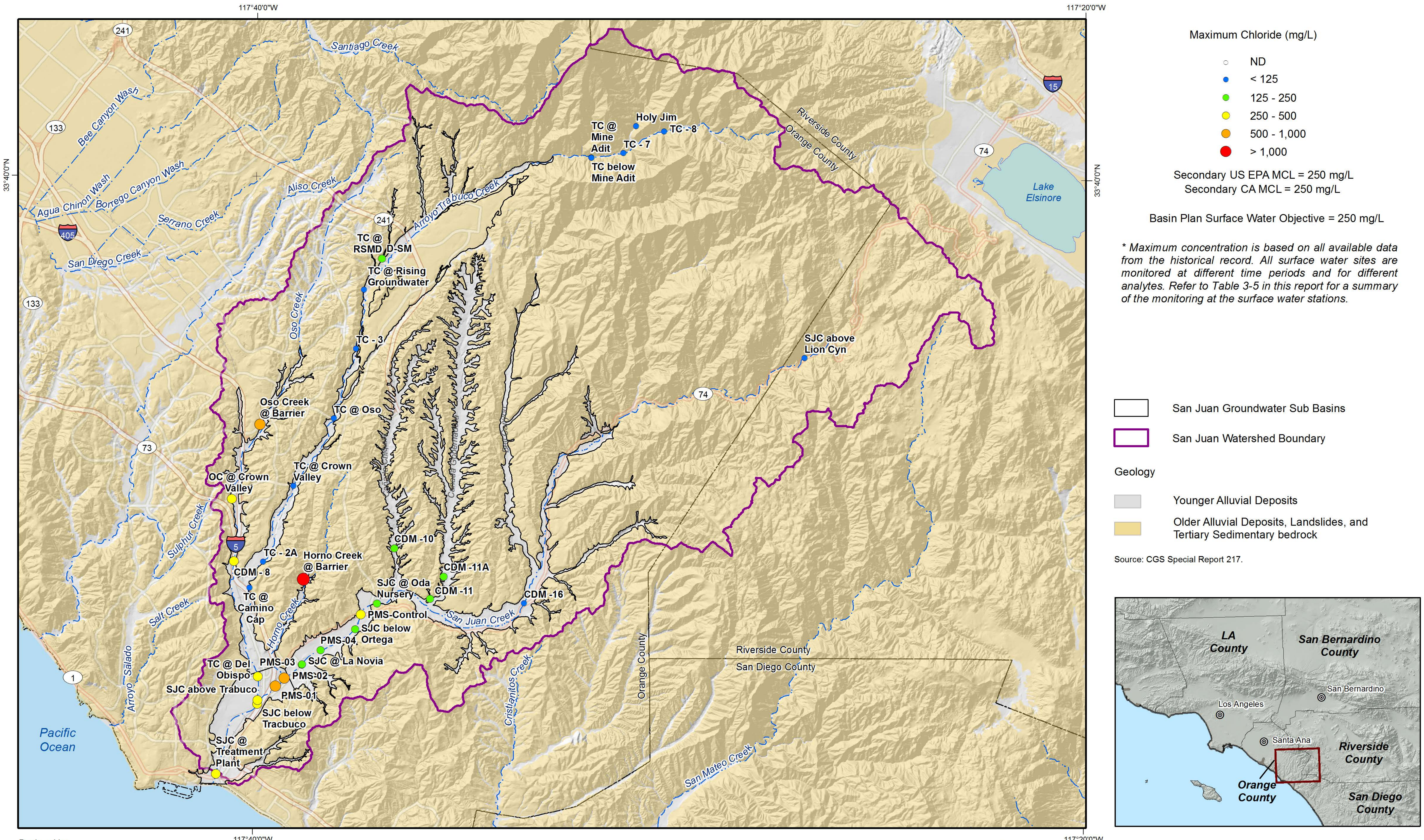
SAN JUAN BASIN AUTHORITY

075-003
004

Chloride in Groundwater

Maximum Concentration 2006 - 2010 and Historical Trends

Figure 3-34



Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 20110505
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-35.mxd

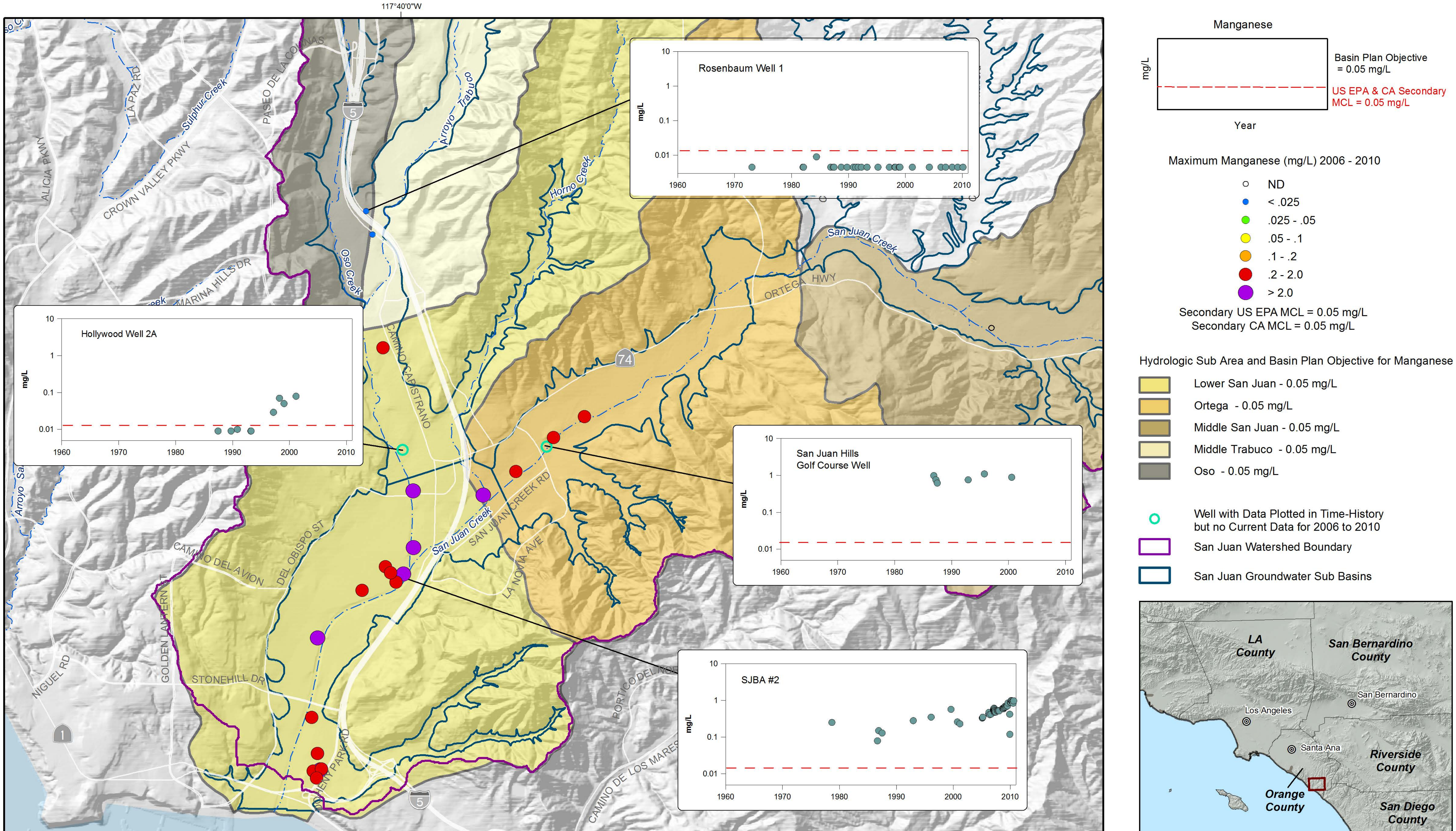
SAN JUAN BASIN AUTHORITY

075-003
004

Chloride in Surface Water

Maximum Concentration for Historical Record

Figure 3-35



117°40'0"W

Produced by:

WILDERMUTH ENVIRONMENTAL INC.

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-36.mxd

0 2,500 5,000 7,500 10,000 Feet

0 1,000 2,000 3,000 Meters

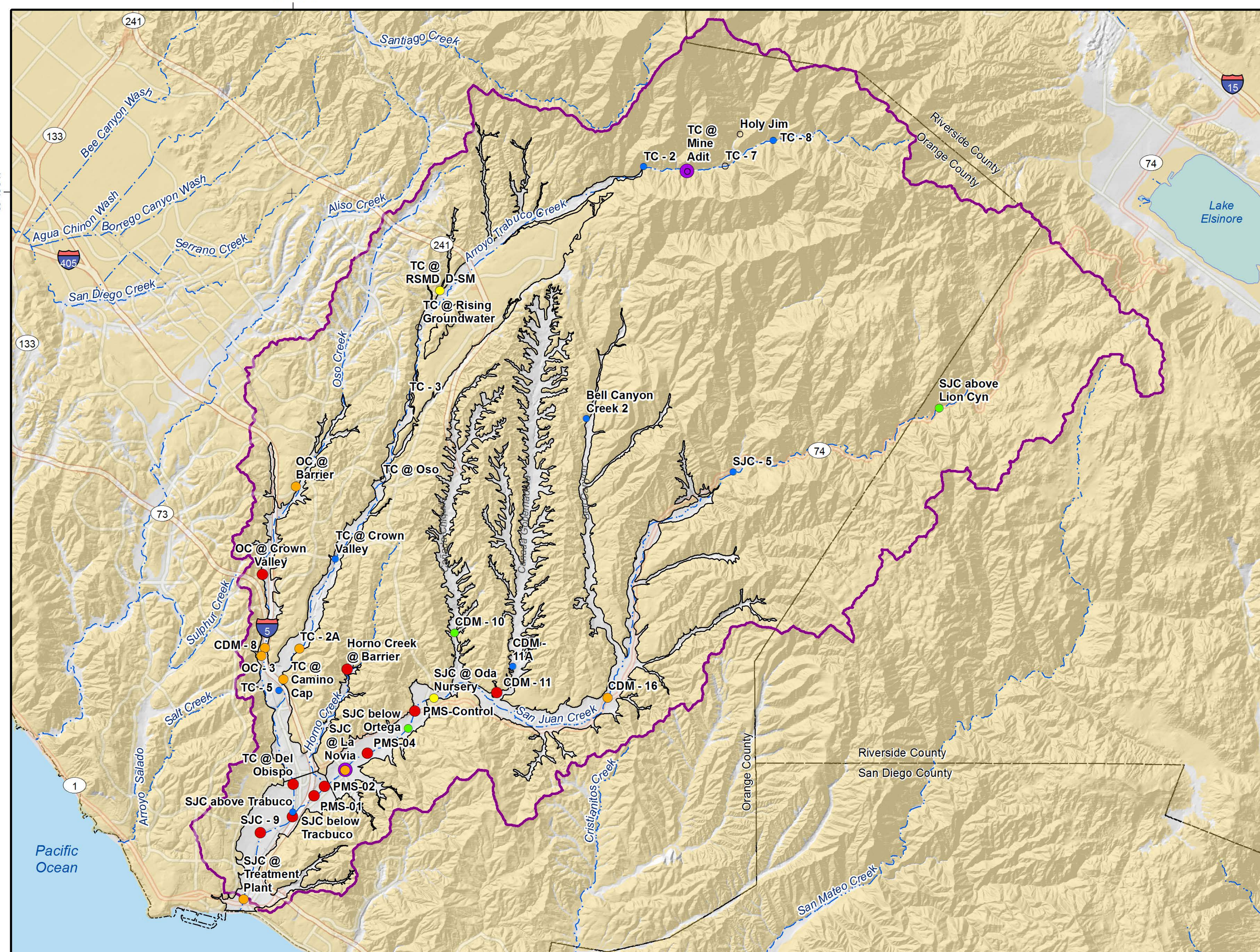
SAN JUAN BASIN AUTHORITY

075-003
004

Manganese in Groundwater

Maximum Concentration 2006 - 2010 and Historical Trends

Figure 3-36



Maximum Manganese (mg/L)

- ND
- < .025
- .025 - .05
- .05 - .1
- .1 - .2
- .2 - 2.0
- > 2.0

Secondary US EPA MCL = 0.05 mg/L
Secondary CA MCL = 0.05 mg/L

Basin Plan Surface Water Objective = 0.05 mg/L

** Maximum concentration is based on all available data from the historical record. All surface water sites are monitored at different time periods and for different analytes. Refer to Table 3-5 in this report for a summary of the monitoring at the surface water stations.*

San Juan Groundwater Sub Basins

San Juan Watershed Boundary

Geology

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.

Produced by:
WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 20110505
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-37.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

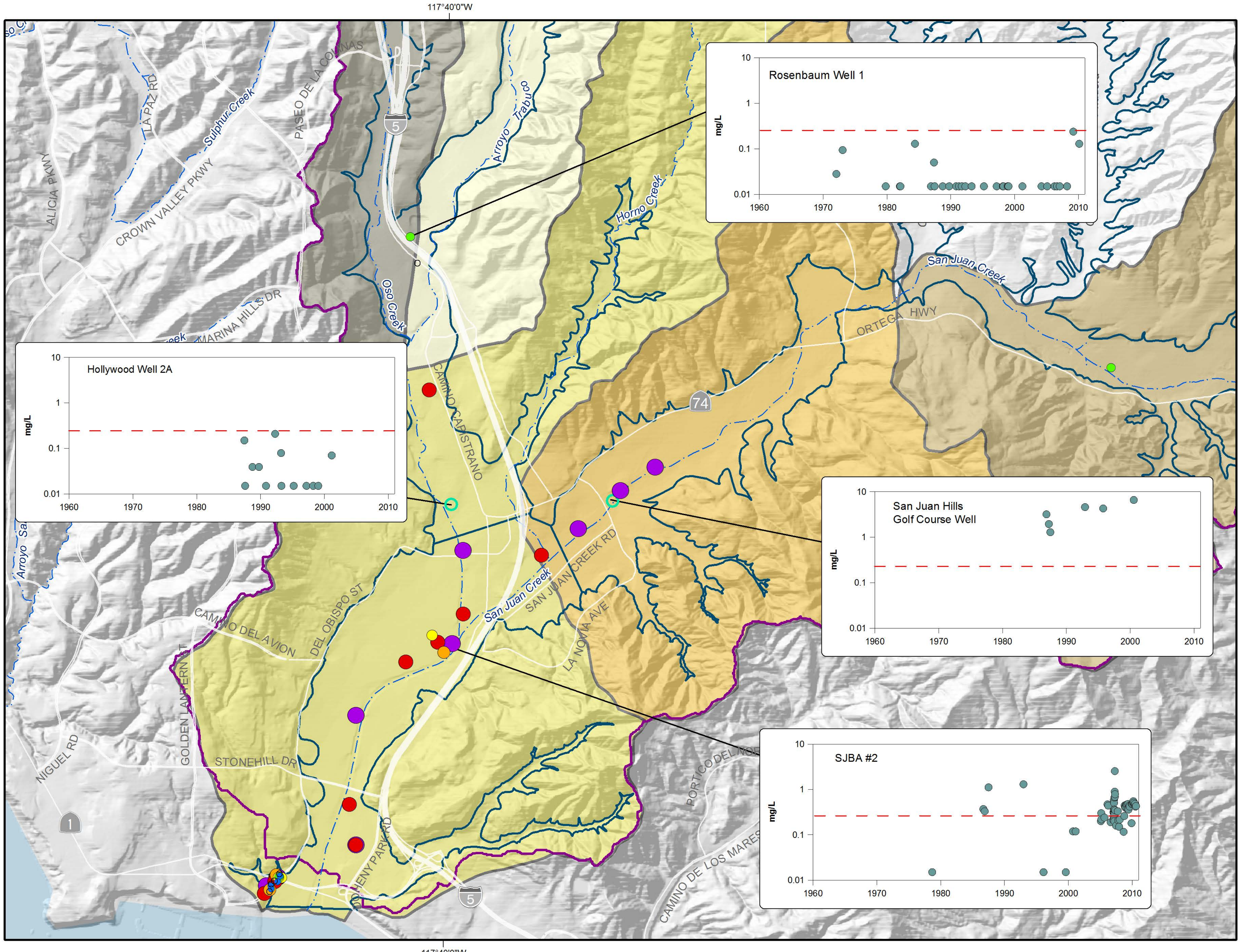
SAN JUAN BASIN AUTHORITY

075-003
004

Manganese in Surface Water

Maximum Concentration for Historical Record

Figure 3-37



Iron

mg/L

Year

Basin Plan Objective = 0.3 mg/L

US EPA & CA Secondary MCL = 0.3 mg/L

Maximum Iron (mg/L) 2006 - 2010

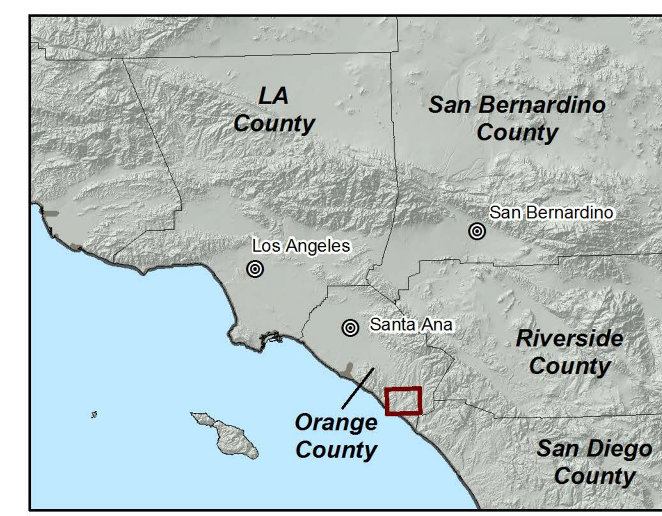
- ND
- < .15
- .15 - .3
- .3 - .6
- .6 - 1.2
- 1.2 - 20
- > 20

Secondary US EPA MCL = 0.3 mg/L
Secondary CA MCL = 0.3 mg/L

Hydrologic Sub Area and Basin Plan Objective for Iron

- Lower San Juan - 0.3 mg/L
- Ortega - 0.3 mg/L
- Middle San Juan - 0.3 mg/L
- Middle Trabuco - 0.3 mg/L
- Oso - 0.3 mg/L

- Well with Data Plotted in Graph but no Current Data for 2006 to 2010
- San Juan Watershed Boundary
- San Juan Groundwater Sub Basins



Produced by:

WILDERMUTH ENVIRONMENTAL INC.

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-38.mxd

0 2,500 5,000 7,500 10,000 Feet

0 1,000 2,000 3,000 Meters

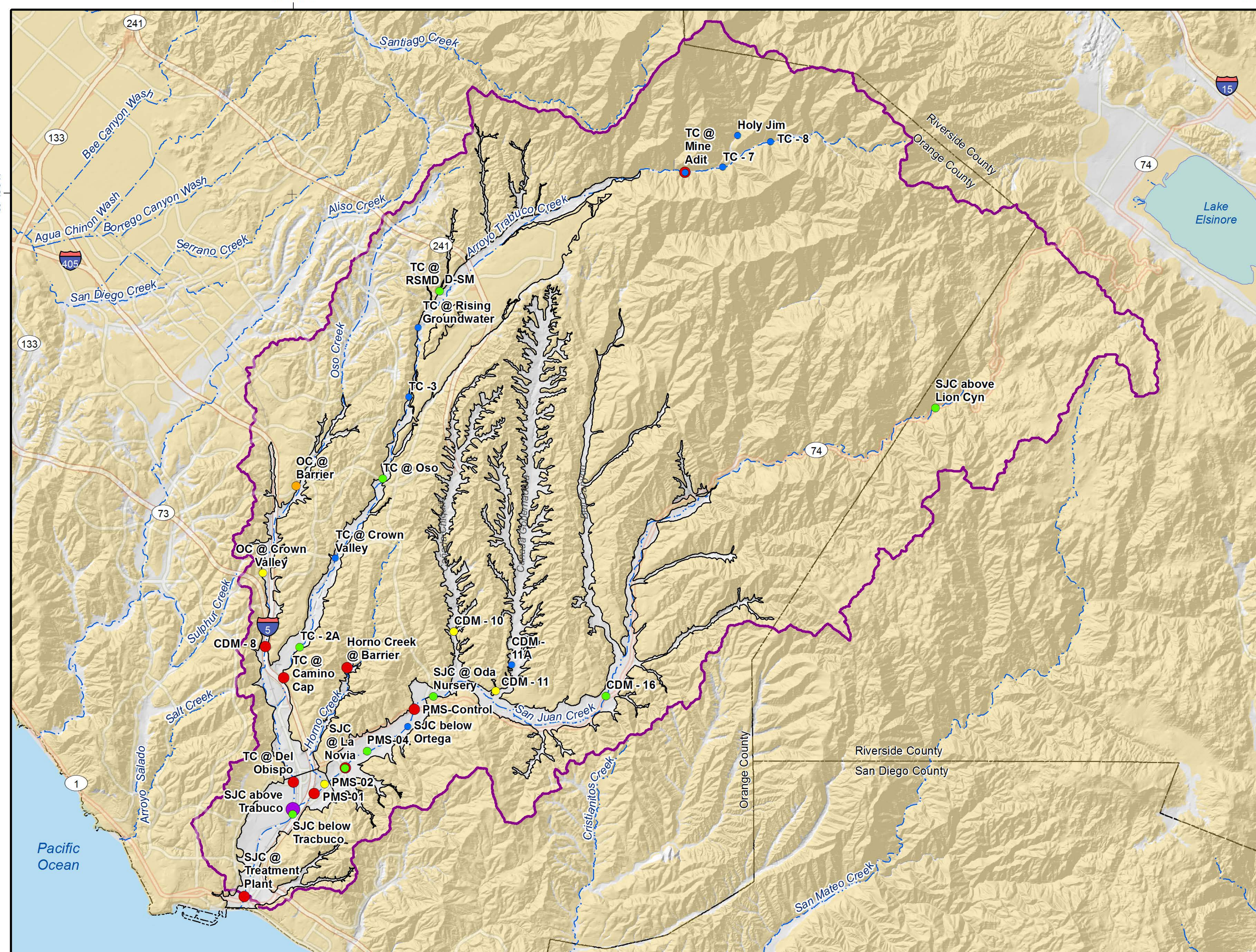
SAN JUAN BASIN AUTHORITY

075-003
004

Iron in Groundwater

Maximum Concentration 2006 - 2010 and Historical Trends

Figure 3-38



117°40'0"W 117°20'0"W

Maximum Iron (mg/L)

- ND
- < .15
- .15 - .3
- .3 - .6
- .6 - 1.2
- 1.2 - 20
- > 20

Secondary US EPA MCL = 0.3 mg/L
Secondary CA MCL = 0.3 mg/L

Basin Plan Surface Water Objective = 0.3 mg/L

** Maximum concentration is based on all available data from the historical record. All surface water sites are monitored at different time periods and for different analytes. Refer to Table 3-5 in this report for a summary of the monitoring at the surface water stations.*

San Juan Groundwater Sub Basins

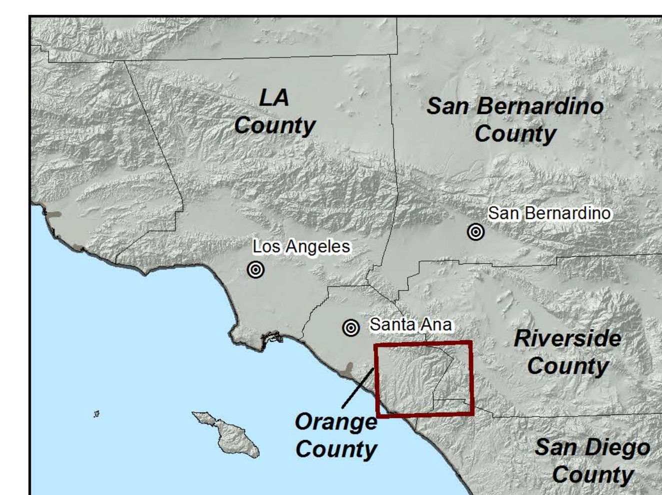
San Juan Watershed Boundary

Geology

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.



Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: VMW
Date: 20110505
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-39.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

SAN JUAN BASIN AUTHORITY

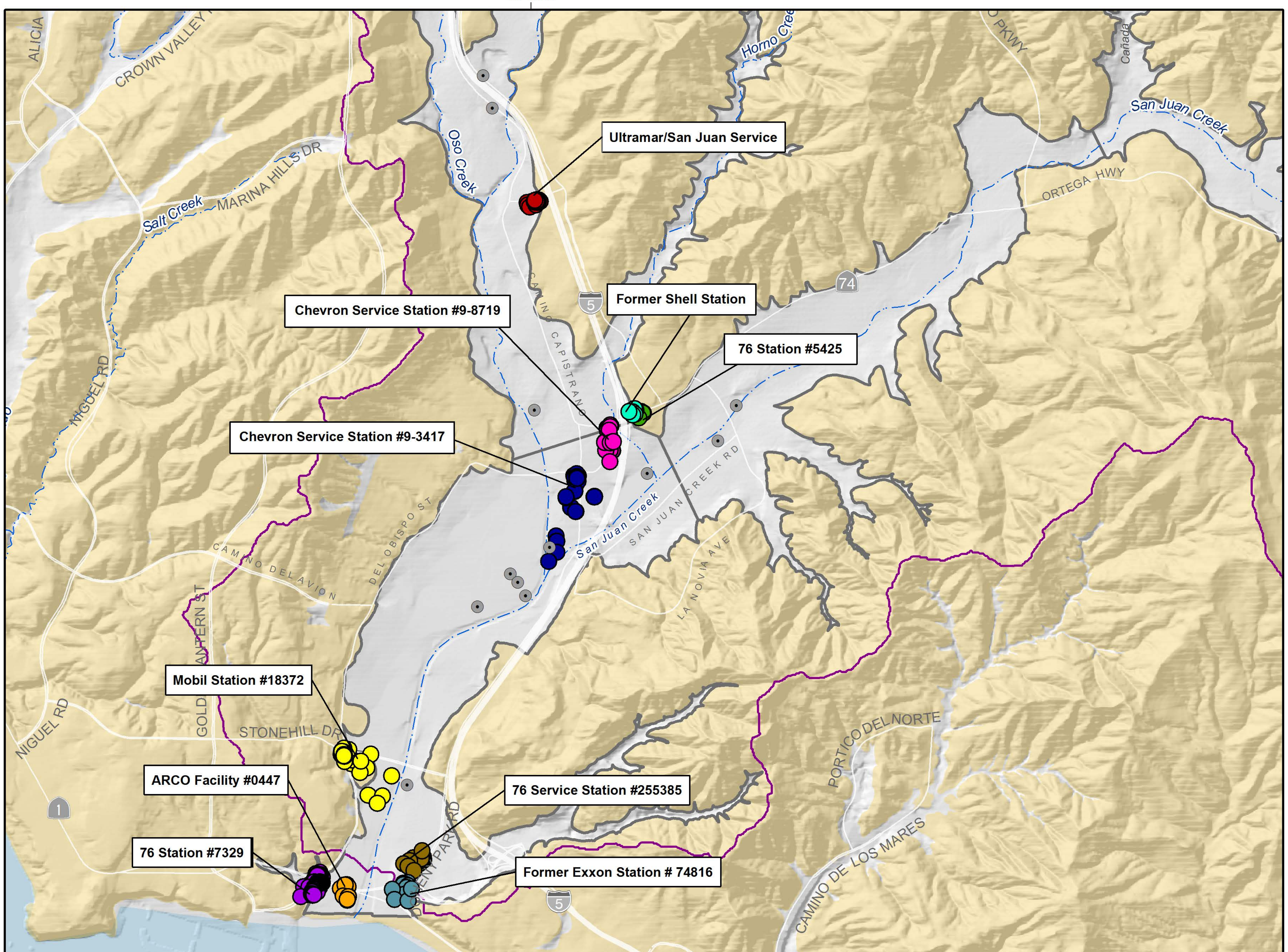
075-003
004

Iron in Surface Water

Maximum Concentration for Historical Record

Figure 3-39

117°40'0"W



117°40'0"W

Cleanup Site Monitoring Wells

- Ultramar/San Juan Sevice (ID # T0605902555)
- Former Shell Station -Closed (ID # T0605902592)
- 76 Station #5425 (ID # T0605902561)
- Chevron Service Station #9-8719 (ID # T0605902510)
- Chevron Service Station #9-3417 (ID # T0605902379)
- Mobil Station # 18372 (ID # T0605902502)
- 76 Service Station # 255385 (ID # T0605902362)
- Former Exxon Station 74816 (ID # T0605902575)
- ARCO Facility # 0447 (ID # T0605902526)
- 76 Station #7329 (ID # T0605902573)

** The ID # listed above is the Global ID # assigned for the State of California Water Resources Control Board*

- Active Production Wells
- San Juan Watershed Boundary
- San Juan Groundwater Sub Basins

Geology

- Younger Alluvial Deposits
- Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217

Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-40.mxd

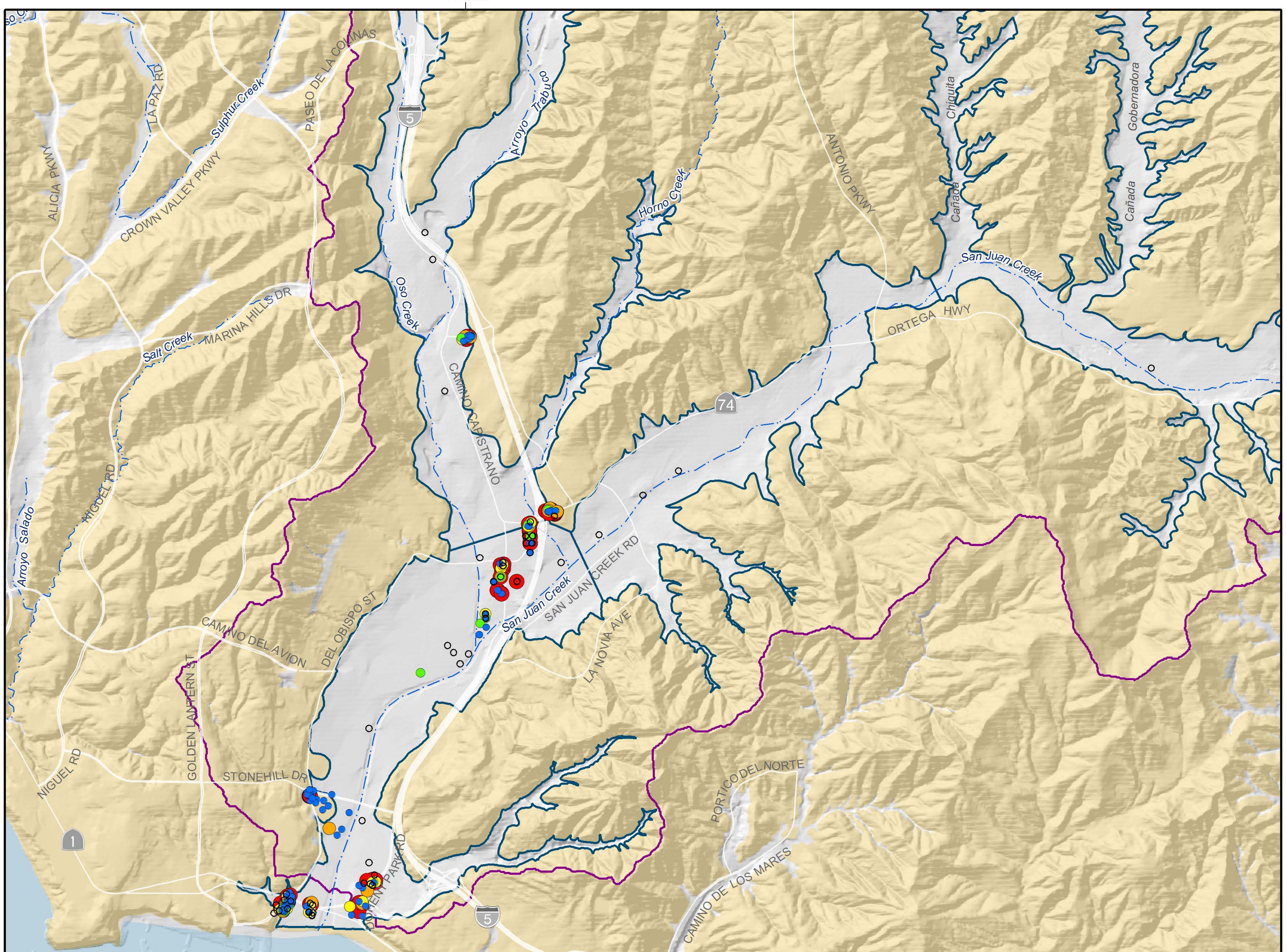
0 2,500 5,000 7,500 10,000 Feet
0 1,000 2,000 3,000 Meters

SAN JUAN BASIN AUTHORITY

075-003
004

San Juan Basin Point Source Contamination Cleanup Sites and Monitoring Wells

Figure 3-40



Maximum MTBE (ug/L) 2006 - 2010

- ND
- < 2.5
- 2.5 - 5
- 5 - 10
- 10 - 20
- > 20

Primary CA MCL = 13 ug/L
Secondary CA MCL = 5 ug/L

San Juan Watershed Boundary

San Juan Groundwater Sub Basins

Geology

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.

Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-41.mxd

0 2,500 5,000 7,500 10,000 Feet

0 1,000 2,000 3,000 Meters

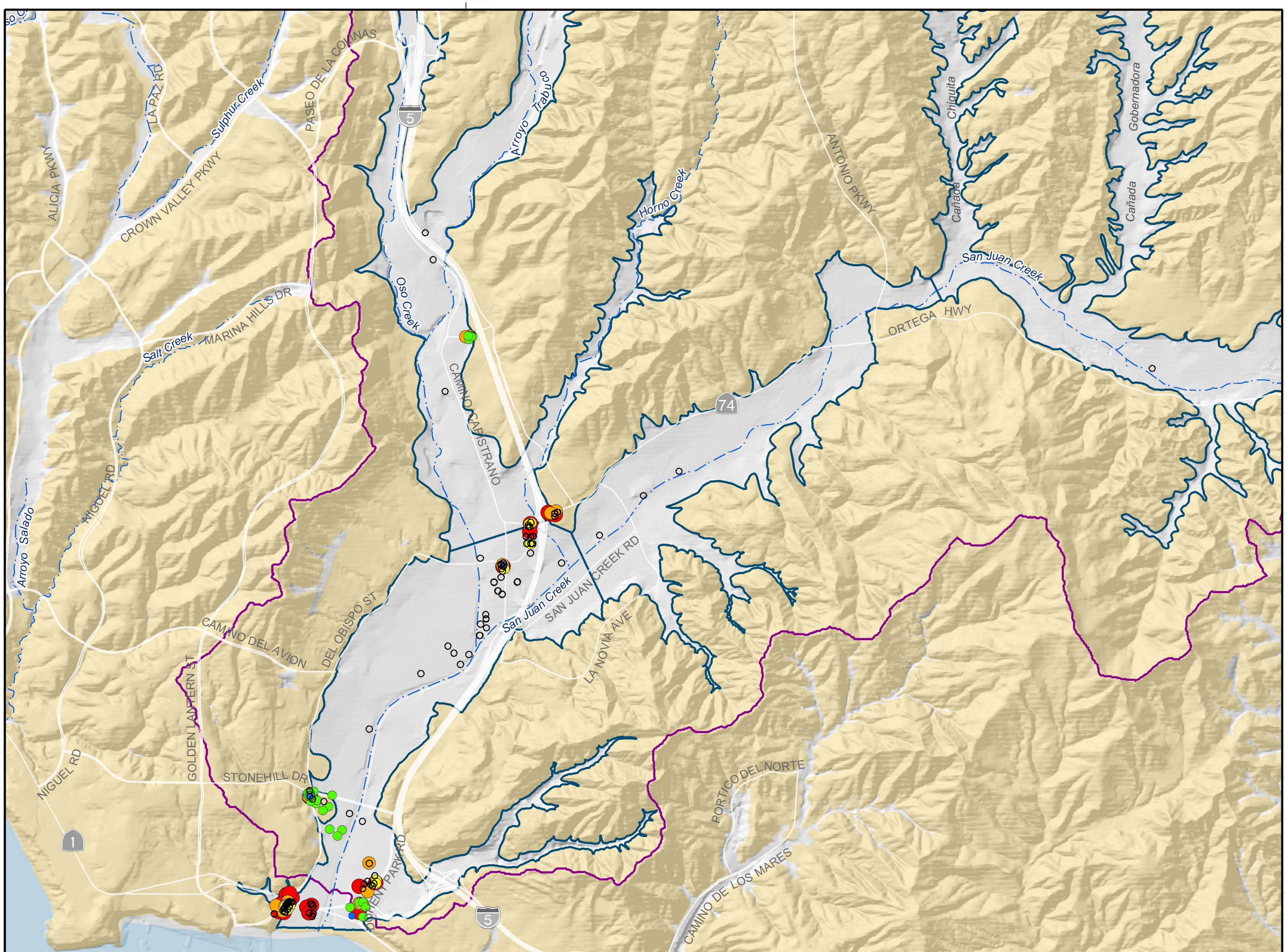
SAN JUAN BASIN AUTHORITY

075-003
004

Methyl Tert-Butyl Ether in Groundwater

Maximum Concentration 2006 to 2010

Figure 3-41



Maximum TBA (ug/L) 2006 - 2010

- ND
- < 6
- 6 - 12
- 12 - 24
- 24 - 48
- > 48

CA Notification Level = 12 ug/L

San Juan Watershed Boundary

San Juan Groundwater Sub Basins

Geology

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.

Produced by:
WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-42.mxd

0 2,500 5,000 7,500 10,000 Feet

0 1,000 2,000 3,000 Meters

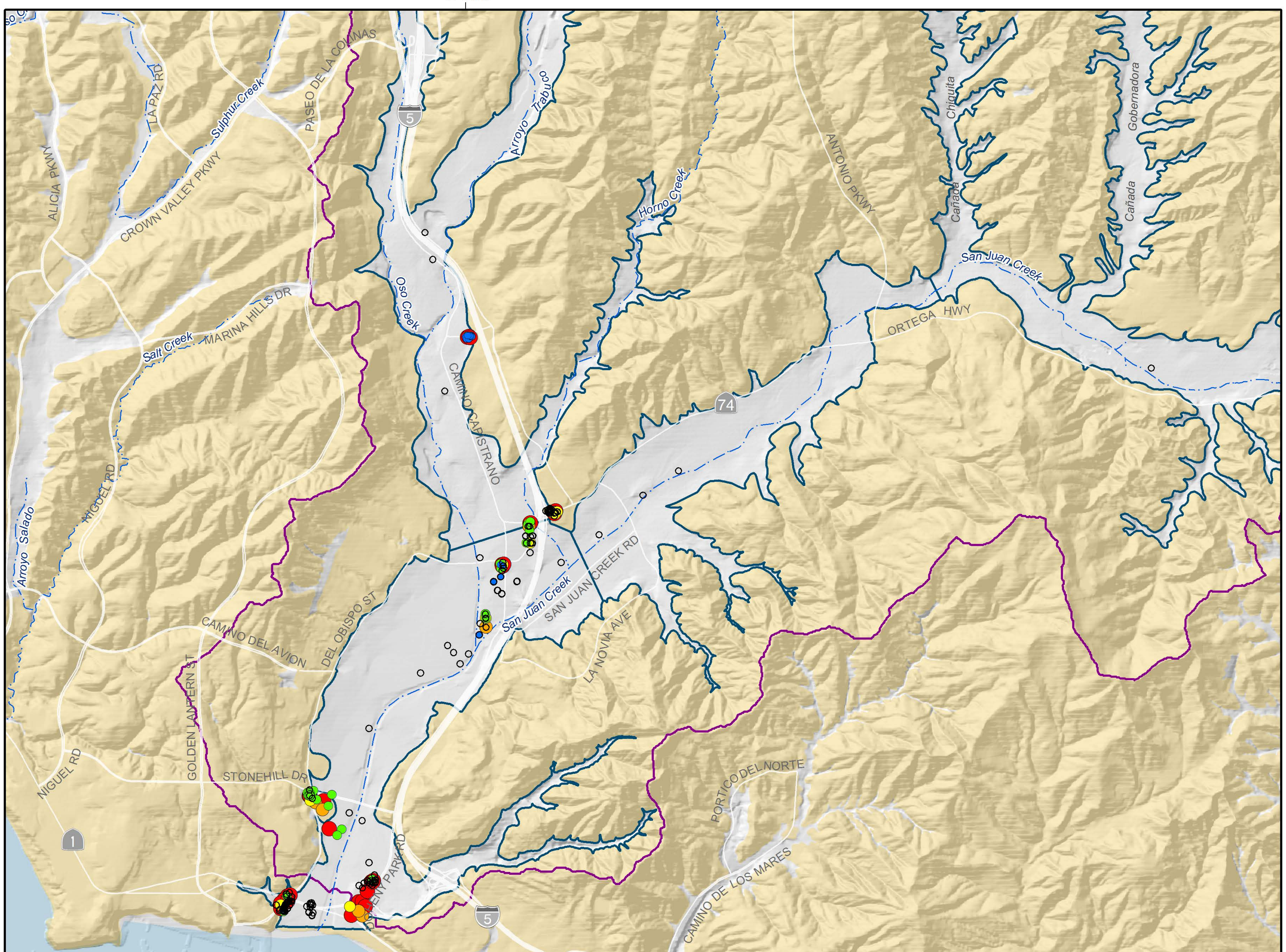
SAN JUAN BASIN AUTHORITY

075-003
004

Tert-Butyl Alcohol in Groundwater

Maximum Concentration 2006 to 2010

Figure 3-42



Maximum Benzene (ug/L) 2006 - 2010

- ND
- < 0.5
- 0.5 - 1
- 1 - 2
- 2 - 4
- > 4

Primary EPA MCL = 5 ug/L
Primary CA MCL = 1 ug/L

San Juan Watershed Boundary

San Juan Groundwater Sub Basins

Geology

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.

Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-43.mxd

0 2,500 5,000 7,500 10,000 Feet
0 1,000 2,000 3,000 Meters

SAN JUAN BASIN AUTHORITY

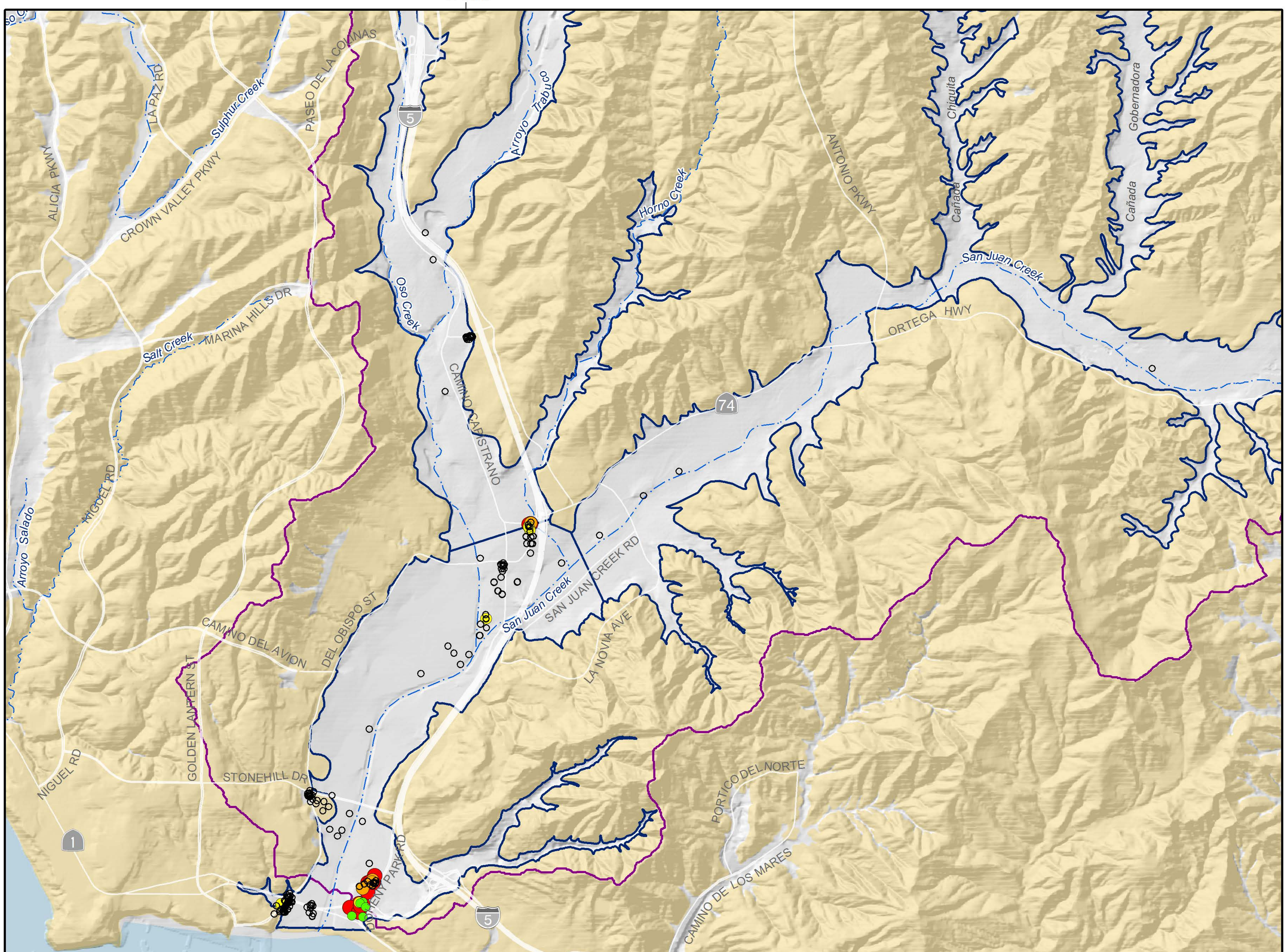
075-003
004

Benzene in Groundwater

Maximum Concentration 2006 to 2010

Figure 3-43

117°40'0"W



Maximum 1,2 DCA (ug/L) 2006 -2010

- ND
- < 0.25
- 0.25 - 0.5
- 0.5 - 1
- 1 - 2
- > 2

Primary EPA MCL = 5 ug/L
Primary CA MCL = 0.5 ug/L

San Juan Watershed Boundary

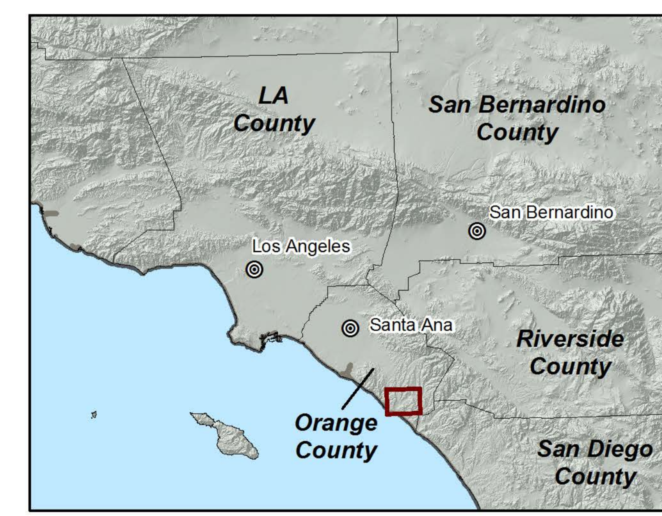
San Juan Groundwater Sub Basins

Geology

Younger Alluvial Deposits

Older Alluvial Deposits, Landslides, and Tertiary Sedimentary bedrock

Source: CGS Special Report 217.



Produced by:

WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: lboehm
Date: 4/15/2013
Path: N:\MapDocs\Clients\SJBA\2011 GWMP\Figure 3-44.mxd

0 2,500 5,000 7,500 10,000 Feet

0 1,000 2,000 3,000 Meters

SAN JUAN BASIN AUTHORITY

075-003
004

1,2 - Dichloroethane in Groundwater

Maximum Concentration 2006 to 2010

Figure 3-44

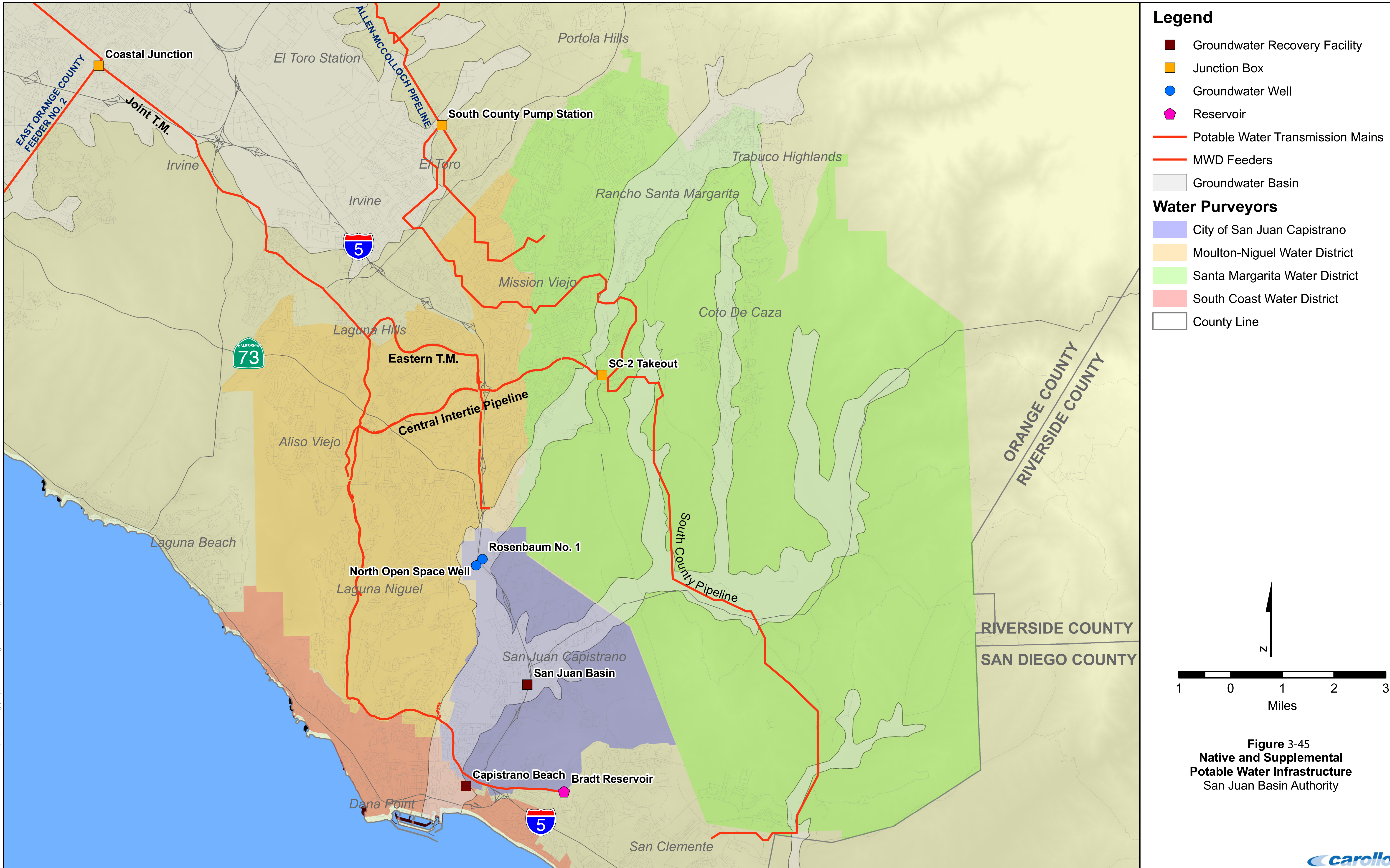


Figure 3-45
Native and Supplemental Potable Water Infrastructure
San Juan Basin Authority

FILENAME: c:\pw_working\projectwise\wang\d0127168\Figure_2_SJBA.mxd
DATE: 2/9/2011

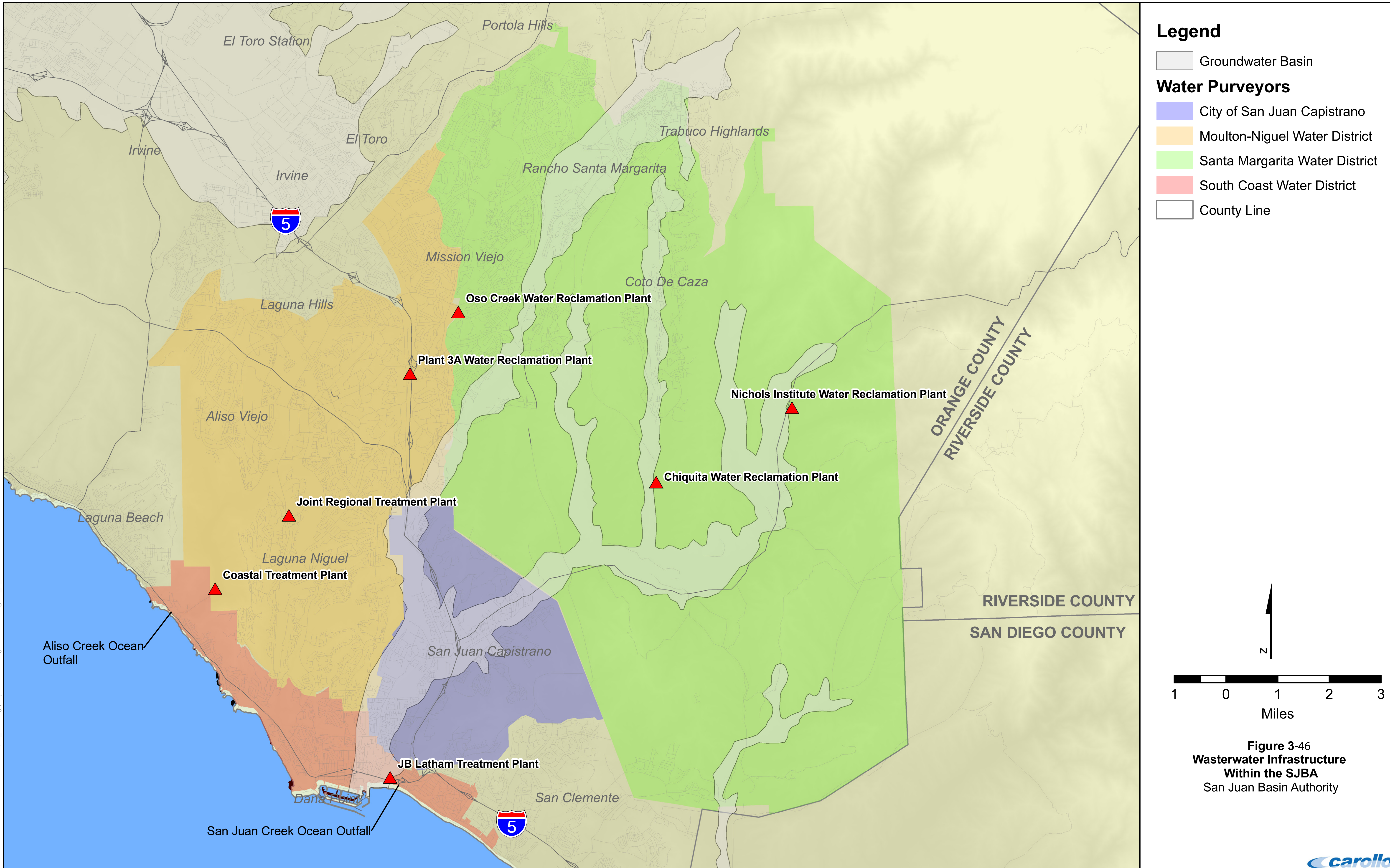


Figure 3-46
Wasterwater Infrastructure Within the SJBA
San Juan Basin Authority

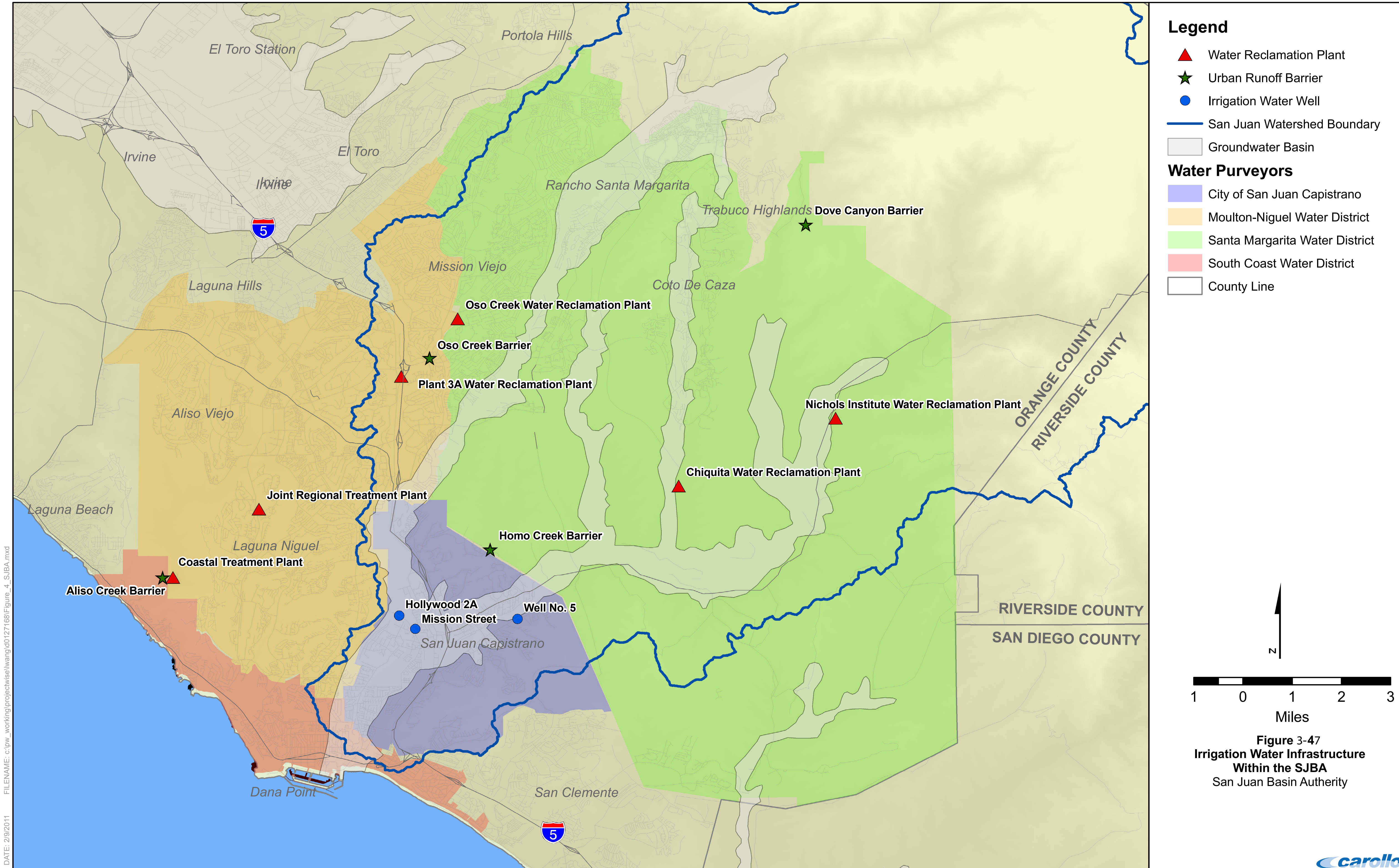


Figure 3-47
Irrigation Water Infrastructure Within the SJBA
San Juan Basin Authority