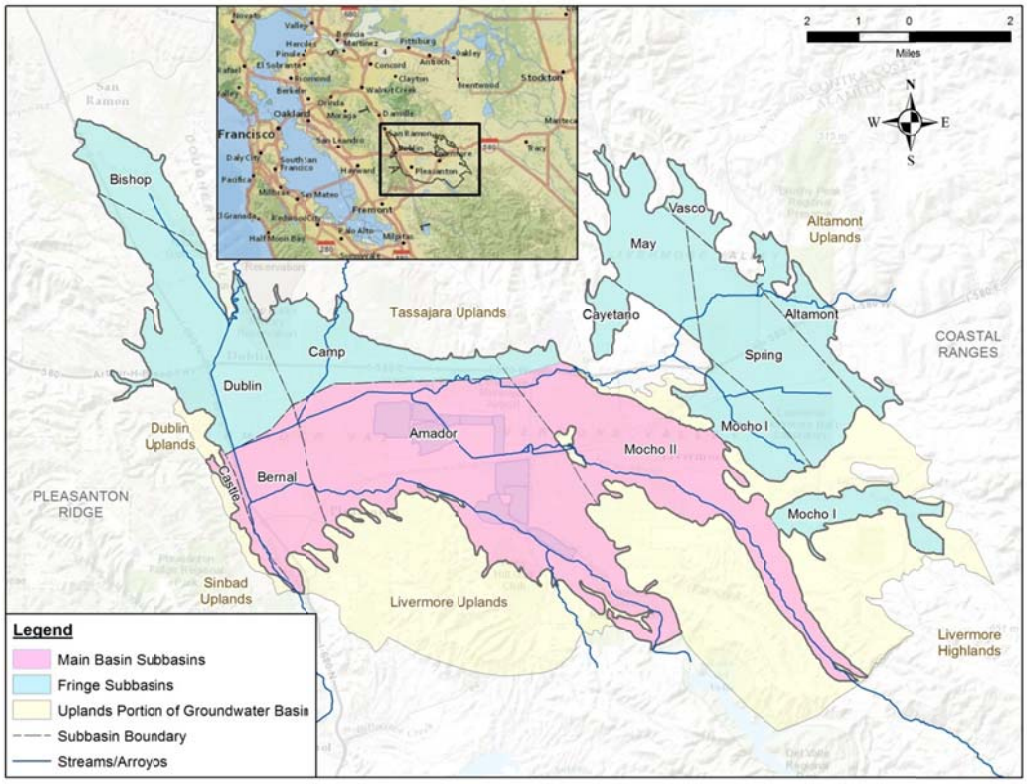
Executive Summary

Introduction

The Annual Report for the Groundwater Management Program for the 2015 Water Year (October 1, 2014 through September 30, 2015) summarizes this year's groundwater monitoring, evaluation, and management efforts in the Livermore Valley Groundwater Basin.

Figure ES-1: Livermore Valley Groundwater Basin



Results for each of the monitoring, evaluation, and management programs are summarized in this Executive Summary, while the details are provided in the sections that follow:

INTRODUCTION:

- Section 1: Background

WATER BUDGET AND WATER QUALITY MONITORING PROGRAMS:

- Section 2: Precipitation and Evaporation
- Section 3: Surface Water Contributions and Losses
- Section 4: Chain of Lakes and Quarry Operations Impacts
- Section 5: Groundwater Elevations
- Section 6: Groundwater Quality

- Section 7: Land Surface Elevation
- Section 8: Wastewater and Recycled Water
- Section 9: Land Use

WATER BUDGET

- Section 10: Water Budget

GROUNDWATER SUSTAINABILITY AND MANAGEMENT PROGRAMS:

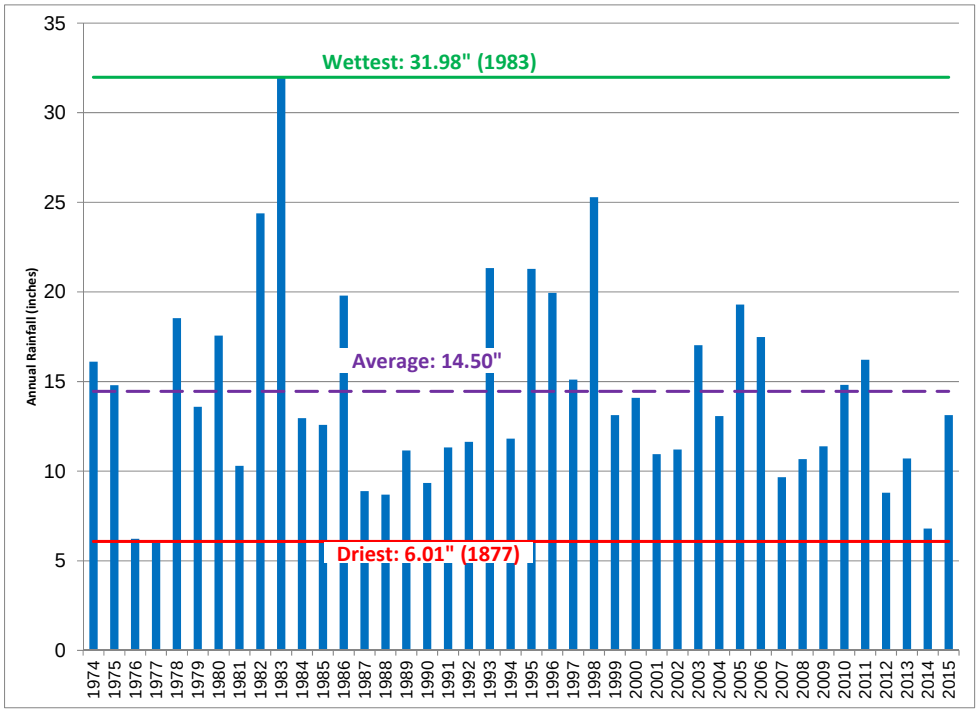
- Section 11: Groundwater Supply Sustainability
- Section 12 Water Quality Sustainability

All of the data included in this report are conveyed based on the Water Year (WY, October 1 through September 30); however, due to other reporting obligations, some information in Section 11 regarding retailer pumping is also compiled and reported on a Calendar Year basis (CY, January 1 through December 31).

Precipitation and Evaporation (Section 2)

For the 2015 WY, rainfall in the Livermore-Amador Valley was 93% of average, after three water years in a row with well below-average rainfall. The total rainfall for Monitoring Station 15E in Livermore was 13.13 inches for the 2015 WY. This station had the fifth wettest December on record with 8.23 inches and that was followed by the first January with zero rainfall in the station's 144 year record. The aquifer replenishment from percolating rainfall was estimated to be 3,735 acre-feet (AF) which is about 87% of normal.

Figure ES-2: Sta. 15E Rainfall (inches), 1974-2015 Water Years



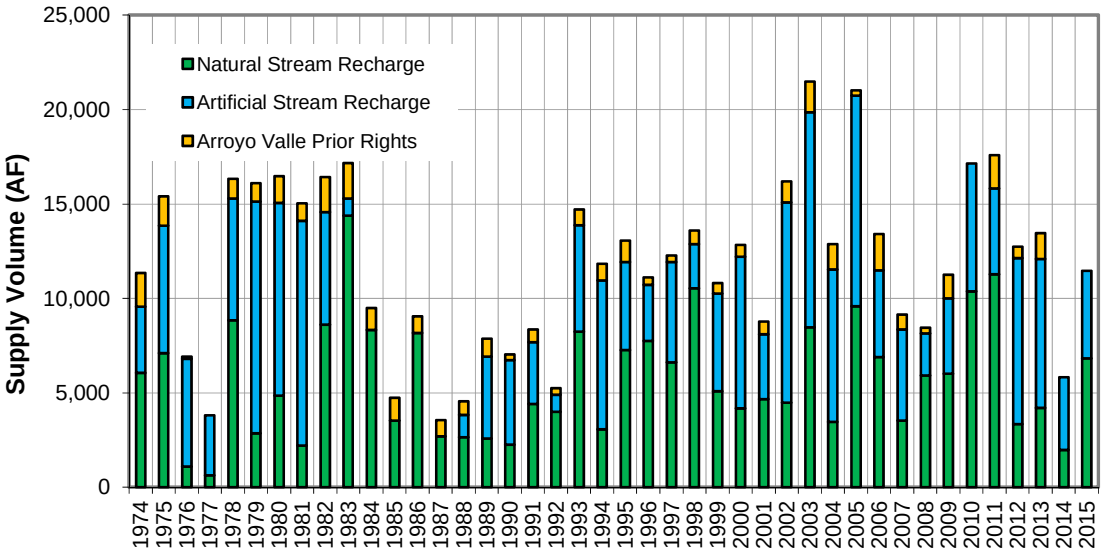
The Zone 7 network average evapotranspiration (ETo) was approximately 46.98 inches in the 2015 WY, which is about 101% of the historical network average.

Surface Water Contributions and Losses (Section 3)

Due to the continuing drought throughout Northern California during 2015 WY, natural and artificial streamflows in the Valley's arroyos were only a fraction of their normal. Releases of State Water Project (SWP) water to the Arroyo Mocho and Arroyo Del Valle for Zone 7's artificial aquifer recharge operations were not made between March 28, 2014 and December 29, 2015 due to the 5% allocation. For the 2015 calendar year, the SWP allocations were increased to 20% and releases resumed at an average of 9.8 cubic feet per second (cfs) for the remainder of the 2015 WY. Arroyo Mocho was dry at Arroyo Mocho Hageman (AMHAG) for 94% of the water year (up from only 77% in the 2014 WY), and due to the drought "live stream" conditions were not able to be maintained at Arroyo Del Valle Pleasanton (ADVP) for the entire 2015 WY. As a result, ADVP was dry for 116 days of the 2015 WY. The total stream recharge (natural and artificial) for the water year was 4,648 AF, which is 42% of average.

A total of 26,714 AF flowed past Arroyo De La Laguna at Verona (ADLLV) and out of the Valley in the 2015 WY. This is about 51% of the average outflow between 1970 and 2014.

Figure ES-3: Stream Recharge Volumes (AF), 1974 to 2015 Water Years



Chain of Lakes and Quarry Operations Impacts (Section 4)

Aggregate mining activities continued by Vulcan Materials (formerly Calmat) and CEMEX (formerly RMC and Lonestar) in the central part of the groundwater basin in the 2015 WY. Vulcan Materials continued their mining in pit R24 (future Lake E). CEMEX continued mining in P42 (Lake B) and started preparations to move their processing plant location so that they can start mining the area east of Shadow Cliffs.

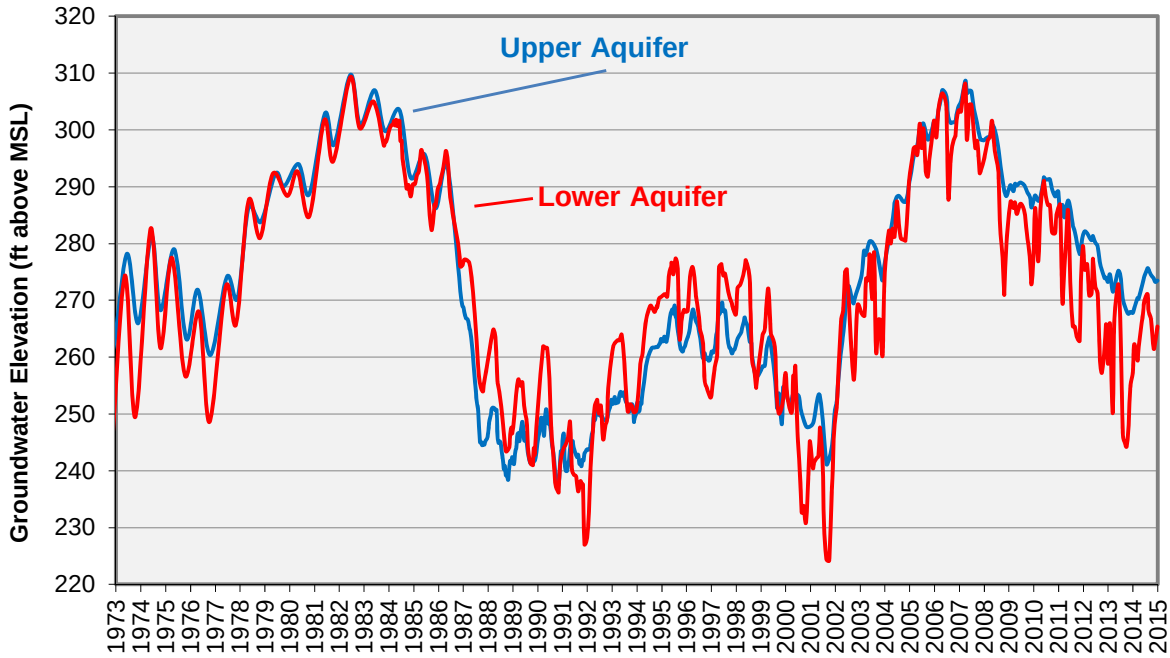
In the 2015 WY, 4,890 AF of Vulcan's de-silted mining water was captured in Cope Lake. Approximately 3,000 AF of the captured water was transferred through a pipelined from Cope Lake to Lake I for groundwater recharge. CEMEX did not discharge any groundwater to Arroyo Del Valle in the 2015 WY, however, evaporation from all the mining pits accounted for approximately 3,143 AF. Evaporation and exportation of moisture contained in the mined aggregate accounted for approximately an additional 700 AF of groundwater loss in the 2015 WY.

Total dissolved solids (TDS) concentrations in the mining area pits ranged from about 377 milligrams per liter (mg/L) to over 1,000 mg/L, with the better water quality (lower TDS concentrations) found in the ponds that are intercepting groundwater and artificially recharged surface water. The higher TDS concentrations are found, for the most part, in the clay-lined ponds, where evaporation is concentrating the minerals in the water.

Groundwater Elevations (Section 5)

As is usually the case, the 2015 WY groundwater levels varied with seasonal recharge and extraction. Generally the highest water levels are found in spring, at the end of the rainy season, and lowest at the end of the high demand summer/fall seasons. During the first half of the 2015 WY, groundwater elevations rose due to rainfall, artificial recharge, and subsequent reduced pumping. During the second half of the water year, water elevations leveled off and then dropped as rainfall decreased and water demand increased. For the 2015 WY, water levels generally ended 4 to 15 feet higher than they were at the end of the 2014 WY, in both the upper and lower aquifers.

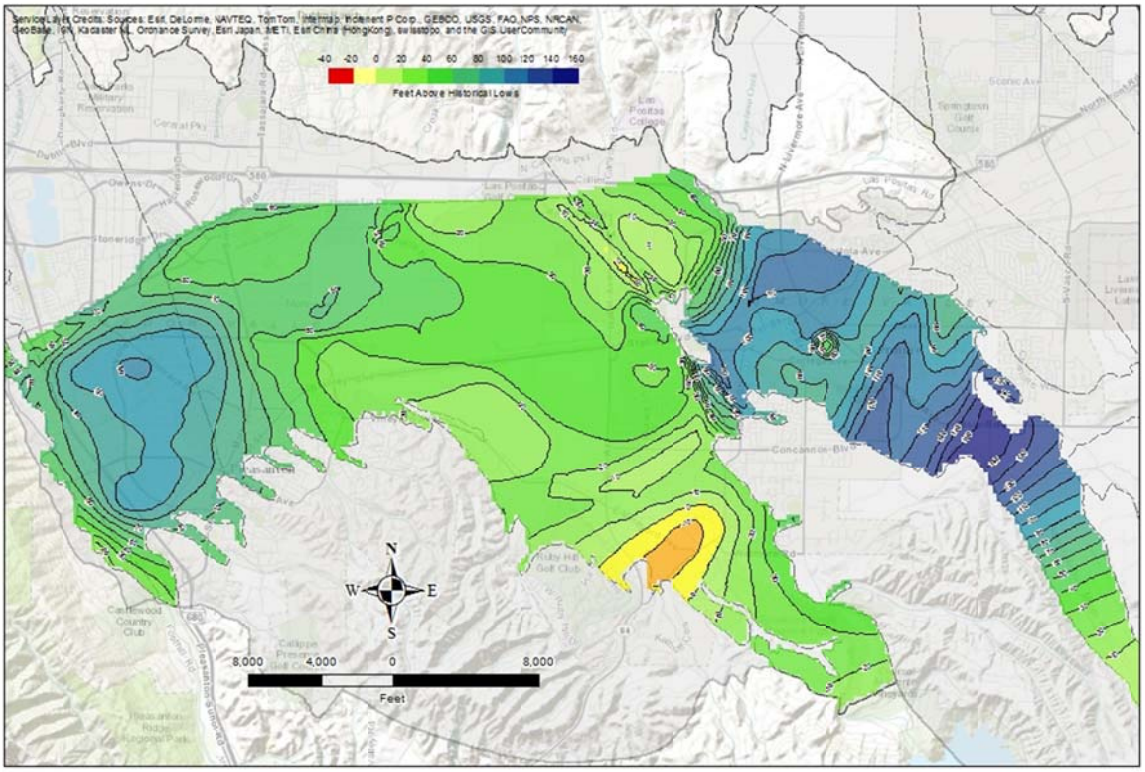
Figure ES-4: Key Well Water Levels in Amador West Subbasin (1973 to 2015)



At the end of the water year, groundwater levels in the lower aquifer in the vicinity of Zone 7's municipal wells were 24 to 95 ft above historical lows.

In the south-central portion of the Main Basin, in the vicinity of Pleasanton Well No 8, groundwater levels reached the theoretical historical low. This area of apparent historical low exceedance (shown in *Figure ES-5*), is the result of historical low elevations being approximately 10 feet higher and groundwater elevations being 20 feet lower than the surrounding areas.

Figure ES-5: Water Levels above Historical Lows (Fall 2015 Water Year)

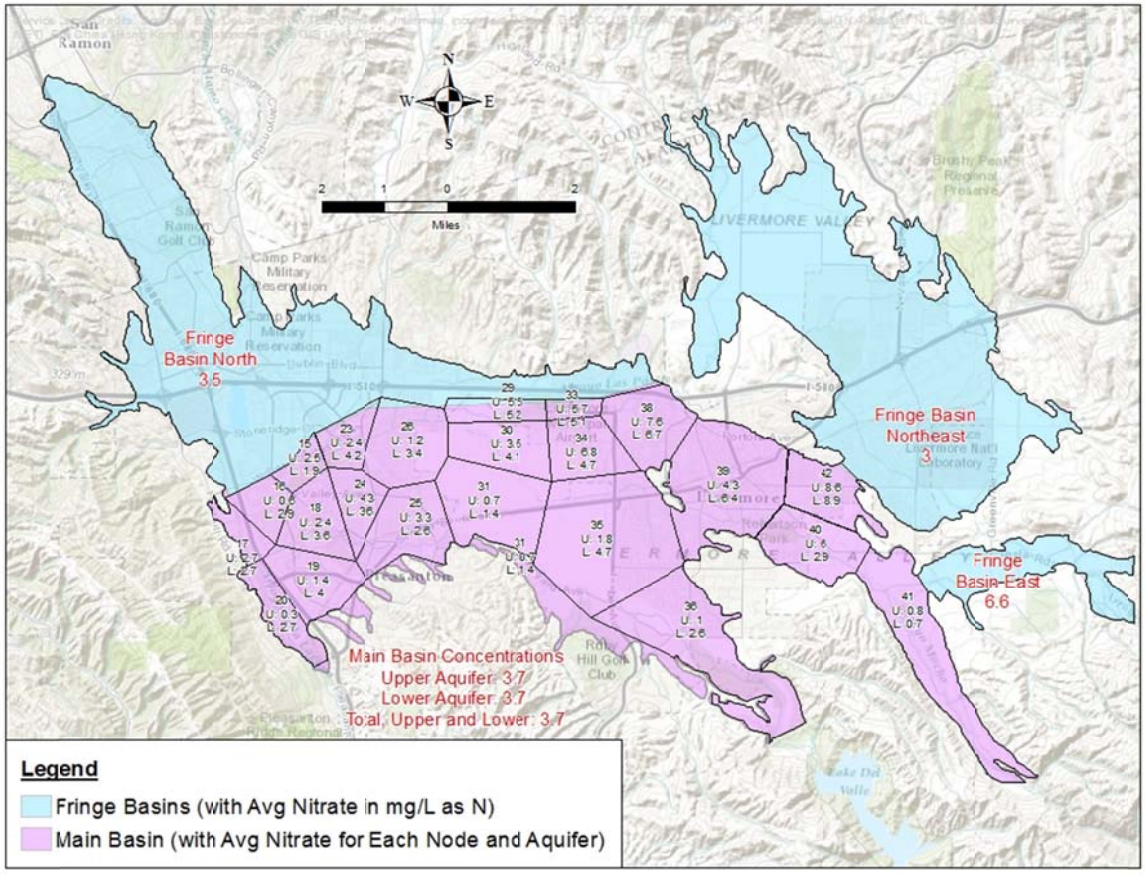


Groundwater Quality/Inorganics (Section 6)

Groundwater quality is generally good in the Main Basin. The main constituents of concern involved with meeting the Regional Water Quality Control Board's (RWQCB's) Basin Plan Objectives are salts (TDS) and nitrate.

The calculated basin-wide average TDS concentration at the end of the 2015 WY was approximately 588 mg/L, with the upper aquifer averaging 671 mg/L and the lower aquifer averaging 500 mg/L. The Basin Plan objective is 500 mg/L for the Main Basin. Zone 7's approved Salt Management Plan (SMP) provides a long-term plan for meeting this objective.

Figure ES-6: Average Nitrate Concentration by Subbasin (2015 Water Year)



There are plume-like nitrate "hot spots" distributed across the Main and fringe basins, however the aquifer weighted basin-wide average nitrate concentration is 3.7 mg/L (as N), well below the Basin Plan objective of 10 mg/L (*Figure ES-6*). For the 2015 WY, the average nitrate concentration was 3.7 mg/L in both the upper and lower aquifers.

Boron is a naturally occurring element typically found at very low concentrations in groundwater from the Livermore Groundwater Basin. While there is no maximum contaminant level (MCL) for boron, it is a problem for some irrigated crops when it exceeds 1 or 2 mg/L, depending on the crop's sensitivity. Boron concentrations in the lower aquifers of the Main Basin are generally below 2 mg/L throughout the lower aquifers, but exists at elevated concentrations (up to 34 mg/L) in the upper aquifers mainly in two areas of the groundwater basin: 1) in the eastern fringe basin area, and 2) along the boundary between the Main Basin and the Dublin and Camp fringe basins. The occurrences of boron in groundwater are depicted in *Figures 6-6 and 6-9* of the main report.

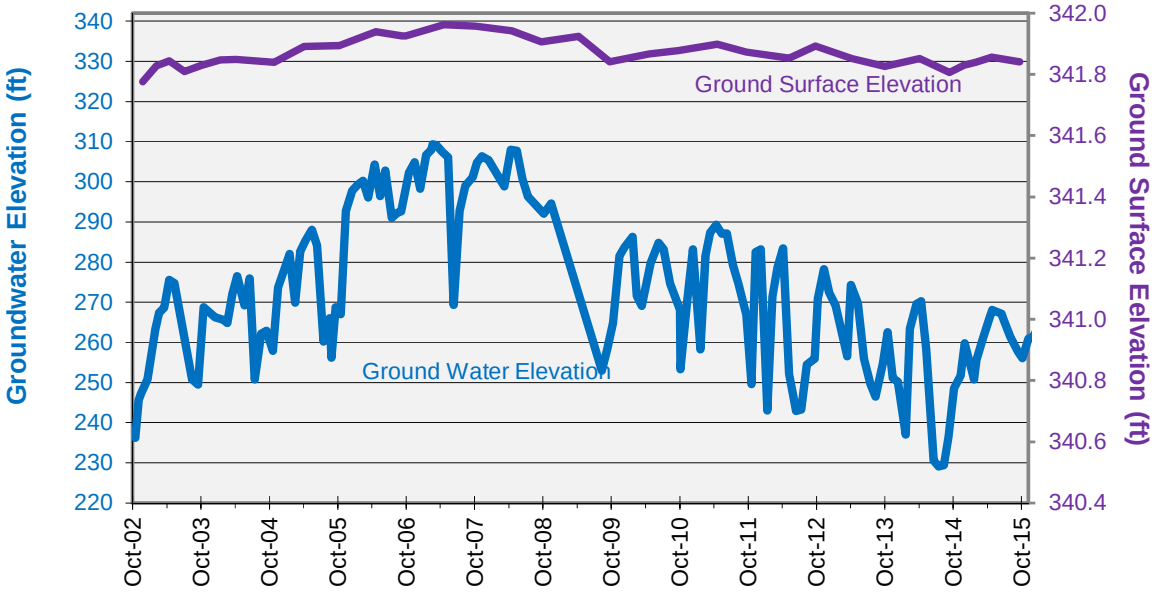
Chromium is also a naturally occurring element found in groundwater from the Livermore Groundwater Basin. While total chromium has always been included in the groundwater sampling program it is being looked at closer due to a new MCL of 0.01 mg/L for hexavalent

chromium (Cr VI) that was established in July 2014. To be conservative, the Groundwater Quality Program assumes that the total chromium concentration is made up of exclusively Cr VI. Chromium concentrations were detected above the new MCL in four areas of the upper aquifer at concentrations up to 0.122 mg/L and in three areas in the lower aquifer at concentrations up to 0.014 mg/L. The occurrences of chromium in groundwater are depicted in *Figure 6-7* and *Figure 6-11* of the main report.

Land Surface Elevation (Section 7)

Overall, ground surface elevations rose 0.02 ft to 0.04 ft in most of the monitored area during the 2015 WY, either due to the rise in water levels or the re-wetting of expansive soils present in the area as the rainfall total returned to normal. *Figure ES-7* shows the variation in land surface elevations observed near the Mocho Wellfield from 2002 through the 2015 WY. Based on the data collected for the Surface Elevation Monitoring Program, there was no indication that inelastic subsidence occurred anywhere in the valley during the water year due to groundwater pumping.

Figure ES-7: Surface Elevation and Groundwater Levels at Mocho Wellfield



Wastewater and Recycled Water (Section 8)

Approximately 5,600 AF of the 17,736 AF of the wastewater produced in the Valley (about 32%) was recycled and used for landscape irrigation in the 2015 WY. The City of Livermore (LWRP) produced and applied about 2,401 AF of the recycled water while Dublin San Ramon Services District (DSRSD) generated and used about 3,186 AF. About 71% (1,698 AF) of the recycled water produced by LWRP was applied over the Main Basin; whereas the remainder was applied on areas outside of the Main Basin; primarily on fringe basin and upland areas north of the Main Basin. All of DSRSD's recycled water was applied on areas north of the Main Basin. The recycled water from both wastewater plants met the State Division of Drinking Water "Title

22" water quality standards for irrigation uses during the 2015 WY.

It is estimated that less than 2% of the Main Basin's groundwater inflow component (i.e., recharging waters) in the 2015 WY was the result of applied recycled water percolating beyond the root zones. More important, however, the use of recycled water to irrigate urban landscape conserved up to 5,587 AF of groundwater storage, assuming that the irrigation demand would have been met with groundwater supplies in the 2015 WY.

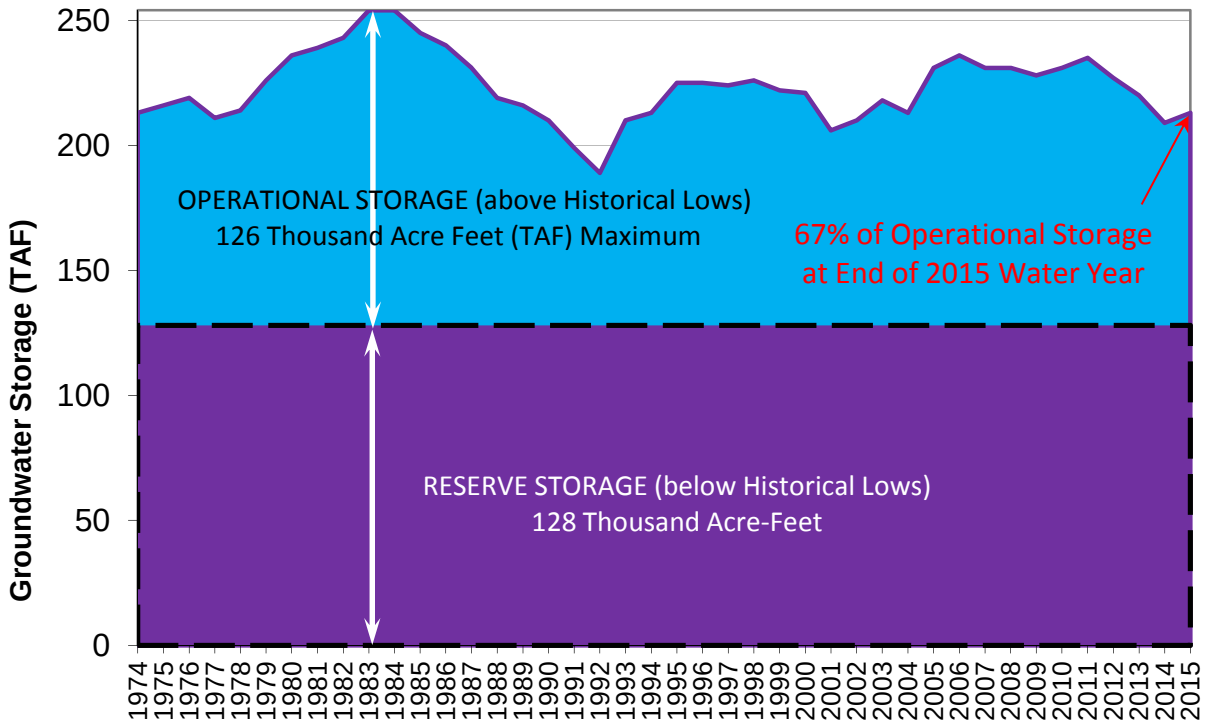
Land Use (Section 9)

The biggest change in land use over the last two years was the commercial and residential development along El Charro Road and Fallon Road (both, north and south of Interstate 580), and the addition of some irrigated vineyards in South Livermore. Otherwise land use remained similar to the 2014 WY.

Water Budget (Section 10)

During the 2015 WY, groundwater supplies stored locally in the Main Basin increased by approximately 4,000 AF. As a result, the 2015 WY ended with an estimated 213,000 AF of groundwater in total storage and 85,000 in operational (available above historical lows) storage. This represents about 67% of the Main Basin's operational storage capacity.

Figure ES-8: Groundwater Storage (1974 to 2015 Water Years)



Groundwater Supply Sustainability (Section 11)

Zone 7 has been sustainably managing the Livermore Valley's groundwater storage and use for over 40 years. Zone 7 adaptively manages its groundwater supply with regard for current hydrologic conditions, water demands, water quality conditions, and future water supply/demand forecasts. Groundwater supply sustainability is evaluated as two main components:

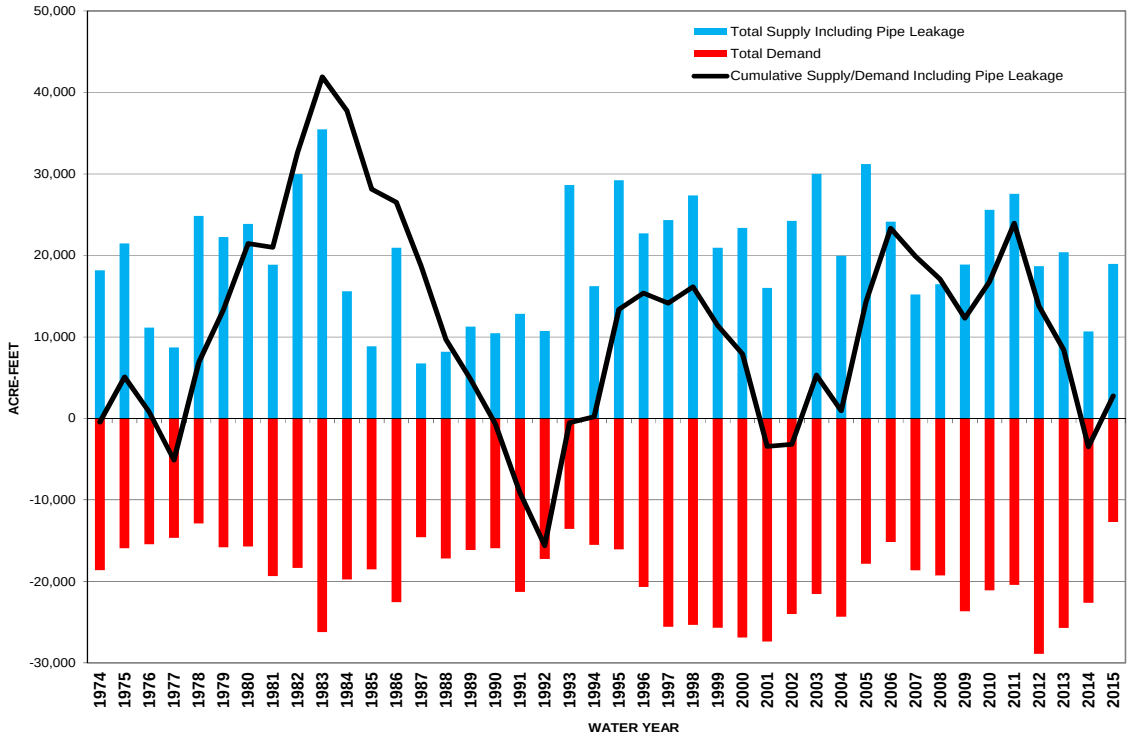
- Natural Sustainable Yield Supply and Demand
- Zone 7 Supply and Demand

The Natural Sustainable Yield Supply components include the aquifer recharge derived from natural stream flows, rainfall, irrigation percolation, and subsurface inflow. The demand components assigned to the Natural Sustainable Yield include all groundwater pumping except Zone 7 pumping. The Zone 7 Supply and Demand components refer to the artificial recharge (supply) and municipal pumping (demand) that Zone 7 achieves each water year.

In the 2015 WY, the total Natural Sustainable Yield demand was 10,797 AF, while the total Natural Sustainable Yield supply was 13,186 AF. For the Zone 7 components, 2,600 AF was pumped from the Main Basin compared to 4,600 AF that Zone 7 artificially recharged in the 2015 WY.

On average, the Natural Sustainable Yield Demands have outpaced the Natural Sustainable Yield Supply components since 1974; however, because the Zone 7 Supply has outpaced the Zone 7 Demands during the same period, the net result demonstrates sustainability of the current conjunctive use of the groundwater basin (see *Figure ES-9* below).

Figure ES-9: Main Basin Sustainability

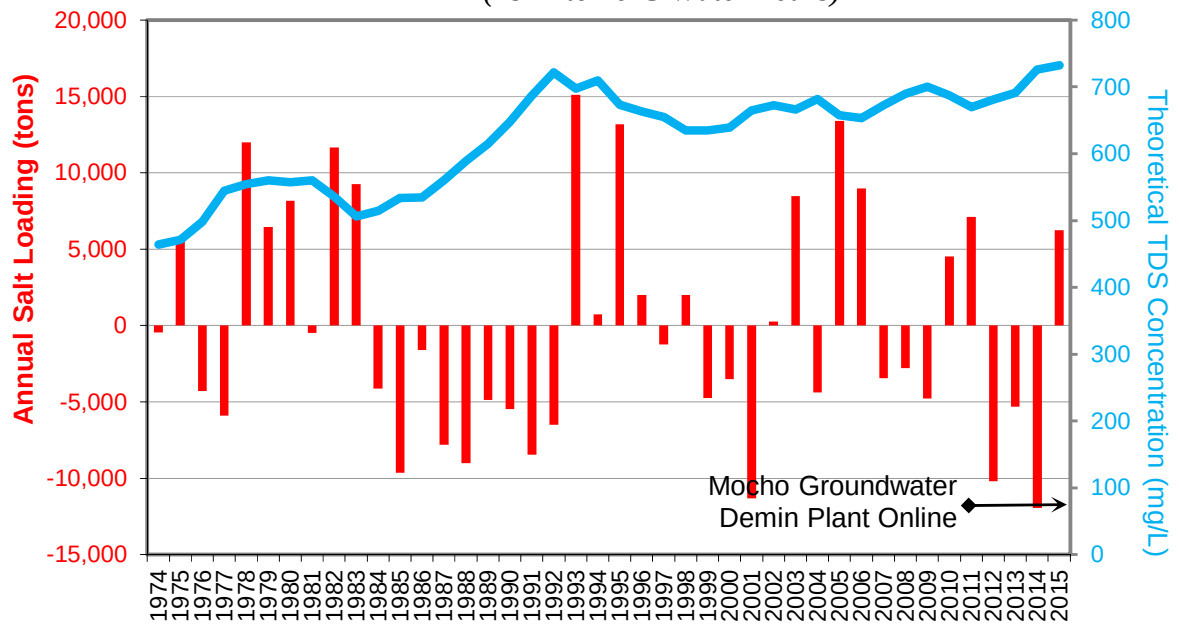


Water Quality Sustainability (Section 12)

The net Main Basin salt loading for the 2015 WY was calculated to be 8,204 tons of salt, which resulted in a 6 mg/L increase in the theoretical average TDS concentration of the entire groundwater basin. This was the first year of positive net salt loading in seven years because of the relatively low volume of groundwater pumped this year and higher-than-normal TDS concentrations of imported water due to drought-induced impacts to Bay-Delta water quality. Also as a result of the ongoing drought, Zone 7's Mocho Groundwater Demineralization Plant (MGDP) operations were minimal this year, so only 76 tons of salt were exported from the Valley, compared to 1,047 in 2014 WY.

In addition to calculating the average TDS concentration in the upper and lower aquifers from the monitoring well samples (see Groundwater Quality Section above), Zone 7 tracks a running theoretical basin-wide average TDS concentration by dividing the inventoried salt load at the end of each water year by the year-end inventoried groundwater storage (*Figure ES-10*).

Figure ES-10: Main Basin Salt Loading and Theoretical TDS Concentration (1974 to 2015 Water Years)



Zone 7 also tracks nutrient concentrations in groundwater, primarily nitrate and phosphate. In general, there is not a nutrient loading problem in the groundwater basin; however, there are a few areas with high nitrate concentrations that are believed to have been caused mainly by historical agricultural and municipal wastewater practices that are no longer being employed over the groundwater basin. During the 2015 WY, Zone 7 completed its Nutrient Management Plan (NMP) that assesses the current and projected future nutrient loading to the groundwater basin, including loading from planned recycled water use. The NMP also addresses the few high nitrate areas-of-concern that exist in localized areas. The NMP concluded that although overall basin groundwater quality is not expected to degrade significantly, there is still a need to further monitor, assess, reduce, and/or manage future nutrient loading. The NMP was adopted by the Zone 7 Board of Directors in June 2015, and by resolution the RWQCB concurred with the findings and measures of the NMP in March 2016.

Zone 7 manages three other groundwater protection programs for the purpose of groundwater quality sustainability, namely:

- Onsite Wastewater Treatment System (OWTS) Management;
- Well Ordinance/Well Permitting, and
- Toxic Site Surveillance

On the recommendation of staff, the Zone 7 Board approved three new commercial OWTS uses and one for an existing commercial use in the 2015 WY.

In the 2015 WY, Zone 7 issued 166 drilling permits, 15 less than were issued in the 2014 WY. Zone 7 permit compliance staff inspected approximately 30% of all permitted well work in the 2015 WY. The remainder were allowed to self-monitor with required reporting. In June 2015, Alameda County and Zone 7 entered into a memorandum of understanding (MOU) that delegates the administration and issuing of water well permits to Zone 7 for all wells within Zone 7's service area. The implementation of the County fee program for permits will start in the 2016 WY.

Zone 7's Toxic Site Surveillance program tracked the progress of 45 active contamination cases where contamination has been detected in groundwater or is threatening groundwater. Nine of the sites are designated as "High Priority" because they have impacted or are an immediate threat to potable water supply wells or surface water. Six of the high priority sites are fuel leak cases; the other three cases involve solvent contamination (tetrachloroethylene [PCE]). Eleven contamination cases were closed during the 2015 WY after they were determined to no longer pose a threat to drinking water. At the end of the water year, six other toxic site cases were being considered for closure. One new case was added to the program.