

ES Executive Summary

This Annual Report for the Groundwater Management Program summarizes Zone 7's groundwater management and monitoring efforts in the Livermore Valley Groundwater Basin for the 2011 Water Year (October 2010 through September 2011). This report includes 2011 Water Year data sets, results, and interpretations for the monitoring, evaluation, and management programs outlined in the 2005 Groundwater Management Plan (GWMP). This report also includes revised quantities for various groundwater storage and salt loading components (e.g., rainfall recharge, applied recharge). The current and historical numbers in this report replace any generated for past reports.

ES 1 Overview

From October 2010 through September 2011 (2011 Water Year), groundwater supplies stored locally in the Main Basin increased by approximately 3,000 acre-feet. Above-normal rainfall that fell on the watershed and the Main Basin during the Water Year led to higher-than-average rainfall recharge and natural stream recharge components of the Basin's supply, and factored into lower-than-normal demands for municipal and agricultural groundwater pumping. However, the total demand for groundwater during the Water Year was about normal because of an offsetting increase in aggregate mining dewatering operations, which was likely associated with the deepening of the active mining pits and an increase of seepage into those pits from the above-average natural recharge.

With this modest increase to the local groundwater supply, the 2011 Water Year ended with an estimated 107,000 acre-feet of groundwater available for recovery above the "historic low" groundwater level constraint. This represents about 85% of the Main Basin's estimated operational storage capacity. Accordingly, groundwater elevations in the Main Basin's Key Wells were generally slightly higher (0 to 8 feet) than they were at the end of the 2010 Water Year (Figures ES-2 and ES-3). The exception was in the lower Amador East Subbasin Key Well, where the September 2011 Water Year level was approximately 14 feet lower than the September 2010 Water Year level. There were no indications that inelastic subsidence occurred anywhere in the valley during the water year due to groundwater pumping.

The greatest salt inflows to the Main Basin during the 2011 Water Year came from "applied water recharge" and "natural stream recharge," whereas the greatest salt removal (sinks) resulted from the salt exports associated with "municipal pumping" and "mining discharges." Zone 7's Mocho Groundwater Demineralization Plant (MGDP) was directly responsible for removing approximately 2,000 tons of salt while operating at about 1/3 of its capacity during the 2011 Water Year. After accounting for salt inflows and outflows from all sources and sinks, the net salt loading on the Main Basin was approximately neutral (40 tons) for the 2011 Water Year, as it was in the 2010 Water Year. Because of the diluting effect of the areal rainfall recharge (8,100 acre-feet in the 2011 Water Year), which adds practically no salt to the basin, the calculated basin-wide average TDS concentration decreased by about 14 mg/L.

Staff issued 140 well activity permits in 2011; ten more than in 2010. No new commercial septic tank use approval applications were received during the year. Staff carefully tracked the progress being made for the cleanup of 16 “high priority” toxic sites that have either impacted or are a threat to potable water supply wells within the valley. None of the local development project proposals received and reviewed by staff during the year, contained unmitigated “potentially significant impacts” for groundwater supply or quality.

ES 2 Monitoring Programs

Climatological – The 2011 Water Year rainfall in the valley was above average at 122% of normal (Figure ES-1 shows rainfall at Station 15E, which was 112% of normal). The evaporation for the Valley, represented by the Lake Del Valle Station, ended the year with 98% of normal evaporation.

The precipitation and evapotranspiration data collected from the California Irrigation Management System (CIMIS) station located at the Pleasanton Fairways Golf Course (CM-STA 191) was added to the climatological program in 2011.

Groundwater – In general, the 2011 Upper Main Basin groundwater levels mirrored the 2010 Upper groundwater levels throughout the water year (+/- 4 feet), and ended the year at approximately the same levels as they ended the 2010 Water Year (Figure ES-4). The Lower Main Basin groundwater levels rose five to eight feet from last year’s levels, except in the Amador East Subbasin where it ended the Water Year 14 feet below Water Year 2010’s year-end level (Figure ES-5).

In the central and western portion of the Main Basin, in the areas around Zone 7’s and City of Pleasanton’s wellfields, groundwater levels ended the water year at 40 to 95 feet above historical lows (Figure ES-6). Further to the southwest, in the central and southern portions of the Bernal Subbasin, water levels remain at greater than 100 feet above historical lows. Only SFPUC is using this part of the basin for municipal supply (for the Castlewood Development and Golf Course). In the eastern part of the Main Basin (Mocho II Subbasin), where California Water Service wells are located, the end of year groundwater levels were 80 to 160 feet above their respective historical lows.

Groundwater quality in the Upper Main Basin (Figure ES-7) and Lower Main Basin (Figure ES-8) aquifers remained relatively unchanged from the 2010 Water Year. However, individual municipal supply wells in the Mocho Wellfield experienced higher than average increases in hardness and salinity in the past few years. The poorer quality water seems to be coming from the upper aquifers as a result of a strong downward gradient induced by the pumping wells. Staff is continuing to investigate whether these localized increases are consequences of natural “leaky” aquitards between the upper aquifers (with poorer water quality) and the lower aquifers (which are being pumped) or are due to poorly constructed wells in the neighboring area serving as conduits.

Surface Water - During the 2011 Water Year, the watershed runoff total into Lake Del Valle was 28,634 acre-feet. Flood releases from Lake Del Valle totaled 2,559 acre-feet. The total volume of State Water Project (SWP) water released from the South Bay Aqueduct (SBA) to the Arroyo Valle totaled 3,905 acre-feet, releases from the SBA to the Arroyo Mocho totaled 4,113 acre-feet, and releases from the SBA to the Las Positas (via Altamont Creek) totaled 1,121 acre-feet.

Subsidence – There was no evidence of inelastic (permanent) subsidence due to groundwater pumping during the 2011 Water Year. Zone 7's survey benchmarks change in elevation from Fall 2010 to Fall 2011 varied from +0.020 to -0.024 ft. These changes in land surface elevation are within the range of elastic subsidence observed over the life of the monitoring program. Elevation changes from Spring to Fall 2011, which varied from -0.056 to -0.001 ft, were also within the range of elastic movement.

Mining Area - Mining activities continued for Vulcan Materials (formerly Calmat) and Cemex (formerly RMC and Lonestar). Vulcan Materials continued their mining in R28 located south of Stanley Boulevard (future Lake D area) and increased dewatering from various ponds (e.g., R24 – future Lake E). Cemex continued mining in P42, located just north of Arroyo Valle (in the future Lake B area). As a result of these mining operations, about 4,277 acre-feet of the water discharged to the Arroyo Mocho flowed out of the Valley. Evaporation from the mining ponds accounted for another 1,905 acre-feet of groundwater loss. Total dissolved solids (TDS) concentrations (a surrogate for hardness readings) in the mining area pits ranged from about 250 mg/L to over 1,000 mg/L, with the better water quality 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 sealed ponds, where evaporation is likely concentrating the minerals in the water.

Land Use - For the 2011 Water Year, Main Basin land use remained relatively unchanged from the 2010 Water Year. Development continues to be slow due to the effect of the poor economy.

Groundwater Production - During the 2011 Water Year, about 13,523 acre-feet of groundwater was pumped from the Main Basin. Zone 7 produced approximately 6,200 acre-feet of the pumped groundwater. For the 2011 Water Year, Pleasanton pumped 3,435 AF and California Water Service pumped 2,673 AF. All other groundwater production (1,215 AF) was about normal for the basin.

Wastewater and Recycled Water – In 2011, approximately 21,092 acre-feet of wastewater flowed to the two publicly-owned treatment works (POTWs; Livermore Water Reclamation Plant (LWRP), and Dublin San Ramon Services District's (DSRSD) wastewater plant) as compared to 19,660 acre-feet in 2010. About 18% of the wastewater received by these two POTWs was recycled and used for irrigation projects; 1,421 acre-feet by City of Livermore and 2,462 acre-feet by DSRSD. About 68% (963 acre-feet) of the recycled water produced by LWRP was applied over the Main Basin; whereas all of DSRSD's recycled water was applied on areas outside of the Main Basin, primarily on fringe basin areas. Zone 7 staff continues to investigate the hydrogeologic relationship between the fringe and Main basins as part of updating its Salt Management Plan (SMP) to quantify the inflow of groundwater and salts from the fringe basins to the Main Basin.

The recycled water from both plants met the State Department of Public Health "Title 22" water quality standards for irrigation uses during the 2011 Water Year. TDS concentrations in the portion applied directly on the Main Basin ranged from 550 mg/L to 570 mg/L, while its Total Kjeldahl Nitrogen (TKN) content ranged from 39 mg/L to 44 mg/L. Less than 5% (542 tons) of the Main Basin's gross salt loading (12,830 tons) was attributed to recycled water use over the Main Basin during the 2011 Water Year.

ES 3 Basin Evaluation Programs

Recharge Calculations – For the 2011 Water Year, total natural recharge was about 20,507 acre-feet. This includes rainfall recharge of about 8,104 acre-feet, natural stream recharge of about 7,441 acre-feet, Arroyo Valle Prior Rights recharge of 1,768 acre-feet, applied water recharge at about 2,195 acre-feet and subsurface Basin inflow of about 1,000 acre-feet. Artificial stream recharge for the 2011 Water Year was limited to only about 4,806 acre-feet due to limited available recharge capacity during the period.

Groundwater Storage - At the end of the 2011 Water Year, the total groundwater in storage was estimated to be 235,000 acre-feet, and the total recoverable groundwater in storage was estimated to be about 107,000 acre-feet, which is about 85% of the basin's operational capacity of 126,000 acre-feet calculated as the difference in groundwater storage between the "low" established in early 1960's and the "high" in 1983. This is approximately a 4% increase from that estimated for the 2010 Water Year (Figure ES-10).

Salt Loading Calculations – Net salt loading to the Main Basin remained practically neutral for the second year in a row. This year's main salt contributors were "applied water recharge" (4,563 tons which includes 542 tons from recycled water), "natural stream recharge" (4,939 tons), "basin inflow" (2,024 tons), and "artificial stream recharge" (920 tons). The main de-salting components were "municipal pumping" (9,960 tons including 2,006 tons removed by the Mocho Groundwater Demineralization Plant) and "mining export" (2,756 tons).

For the second year in a row, the calculated basin-wide average TDS concentration decreased by 14 mg/L. This reversal in the basin-wide average TDS trend is attributed to the dilution from the above-average areal rainfall recharge that occurred in the 2010 and 2011 Water Years (6,800 acre-feet and 8,100 acre-feet, respectively), which adds water to the basin with almost no extra salt, and the additional salt mass removed by the Mocho Groundwater Demineralization Plant during the 2010 and 2011 Water Years (2,760 tons and 2,006 tons, respectively).

ES 4 Basin Management Programs

Most 2011 Basin Management Programs remained unchanged from 2010 except for:

Groundwater Demineralization – During the 2011 Water Year, approximately 3,140 acre-feet of groundwater produced from Mocho Wellfield wells was run through the Mocho Groundwater Demineralization Plant's (MGDP), which uses reverse osmosis technology to remove dissolved minerals/salts. As a result, 429 AF of brine containing 2,000 tons of salt was generated and exported from the basin via DSRSD. These results were attained while operating the MGDP at approximately one-third of its capacity during the 2011 Water Year.

Well Ordinance Program - Zone 7 issued 140 drilling permits in the 2011 Calendar Year, 10 more than were issued in 2010. Zone 7 permit compliance staff inspected approximately 50% of all permitted well work in 2011.

Septic Tank Management - No new commercial septic tank applications were received by Zone 7 during 2011. However, staff provided comments to Alameda County Environmental Health Agency (ACEH) on expansion or modification plans for three existing commercial systems and two special case residential systems with regard to Zone 7's Wastewater Management Plan policies. ACEH is the permitting agency for onsite wastewater treatment and disposal systems within Zone 7's service area.

Toxic Site Surveillance Program - In 2011, Zone 7 tracked the progress of 70 active sites where contamination has been detected or is threatening groundwater. Sixteen 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. Twelve of the high priority sites are fuel leak cases; the other four cases involve solvent contamination (tetrachloroethylene [PCE]). Two contamination cases were closed during 2011, after they were determined to no longer pose a threat to drinking water. Alameda County Environmental Health (ACEH) is the lead agency overseeing the cleanup of all of the fuel leak sites. Generally, the Regional Water Quality Control Board (RWQCB) oversees solvent contamination cases; however, two of the solvent cases have not been incorporated into the RWQCB's case load because the responsible parties have not yet been identified. For these two cases, Zone 7 staff is working with the RWQCB to identify the potential responsible parties so that they can begin pursuing investigation and cleanup.

Other Projects – Zone 7 completed its study, "*Hydrostatic Investigation of the Aquifer Recharge Potential for Lakes C and D of the Chain of Lakes* (Zone 7, May 2011)" in 2011, for which Zone 7 received a Local Groundwater Assistance (LGA) Grant from the Department of Water Resources. The project investigated the connectivity between future Lakes C and D and the productive aquifers in the West Amador Subbasin. The results of the study suggest that the future Lakes C and D would be effective aquifer recharge facilities for replenishing the upper portions of the Lower Aquifer, from which several of Zone 7's and the City of Pleasanton's municipal supply wells pump groundwater. In 2011, the final report was generated and submitted to DWR for approval.

On another project, Zone 7 is continuing to make progress on a collaborative effort with Vulcan Materials Co. to capture the groundwater they pump from their quarry pits to de-water them for ease of gravel mining. For this project, Vulcan would pump the extracted groundwater into a Zone 7-owned lake within the future Chain of Lakes, where it could be used to replenish Main Basin aquifers instead of being discharged to the arroyos and lost as basin outflow.

FIGURE ES-1
ZONE 7 WATER AGENCY
Graph of Livermore Rainfall (Station 15E NOAA)

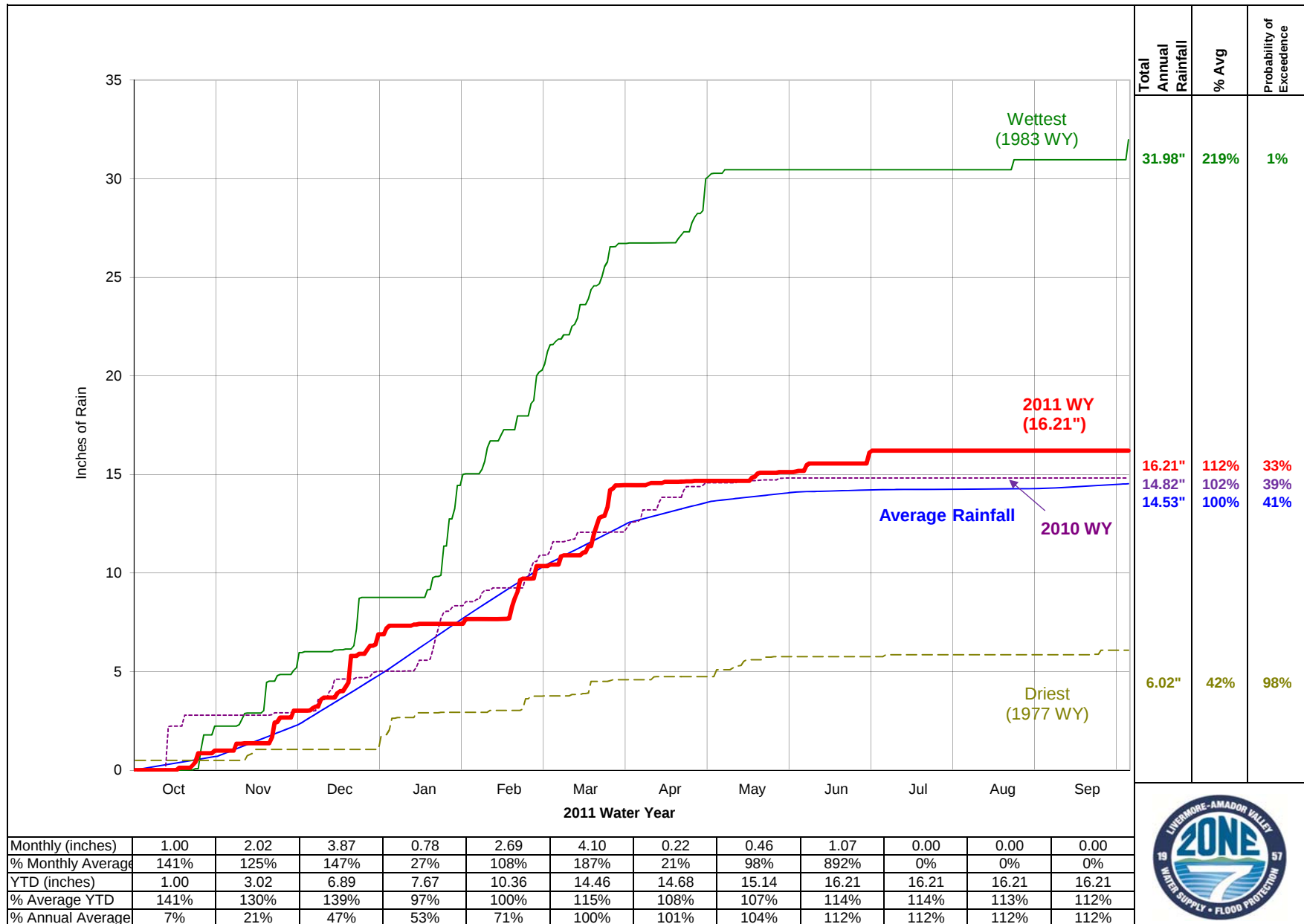


Figure ES-2
Zone 7 Water Agency
Key Well Hydrographs - Western Portion of Main Basin
2011 Water Year

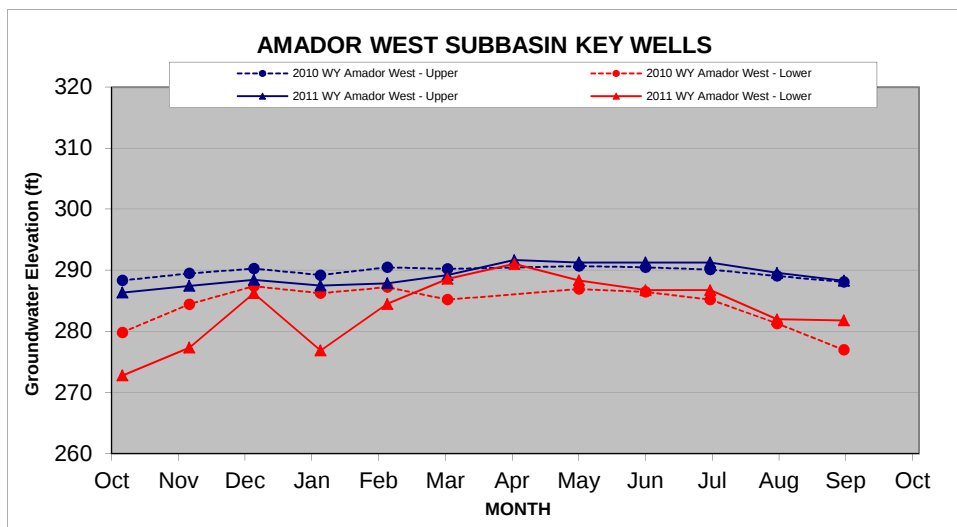
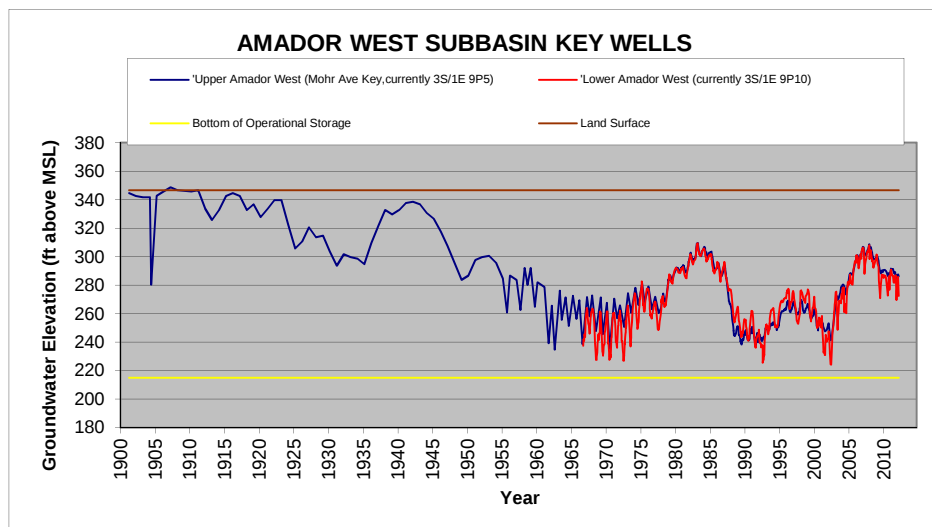
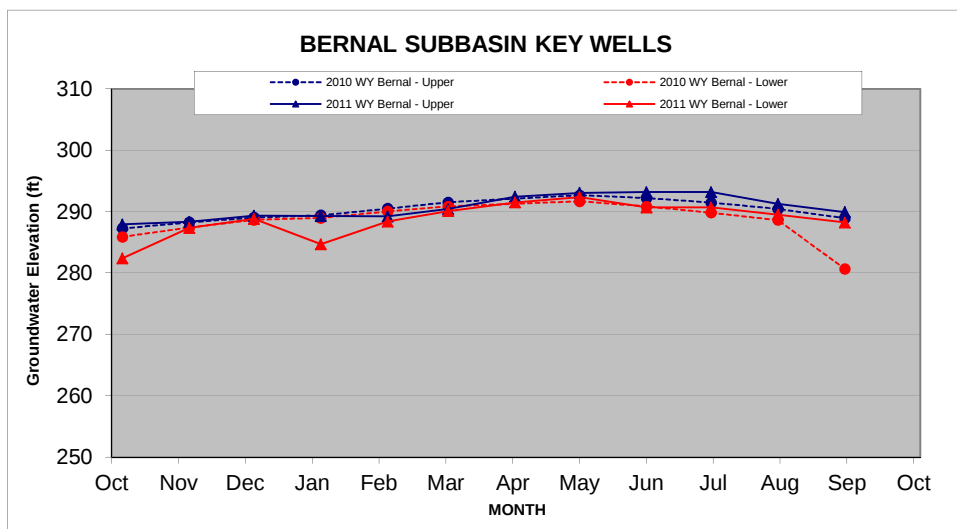
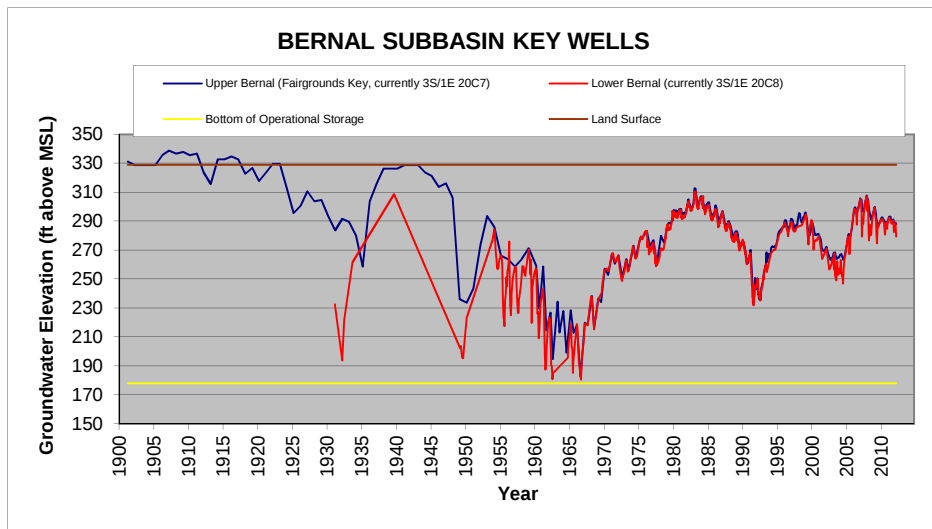
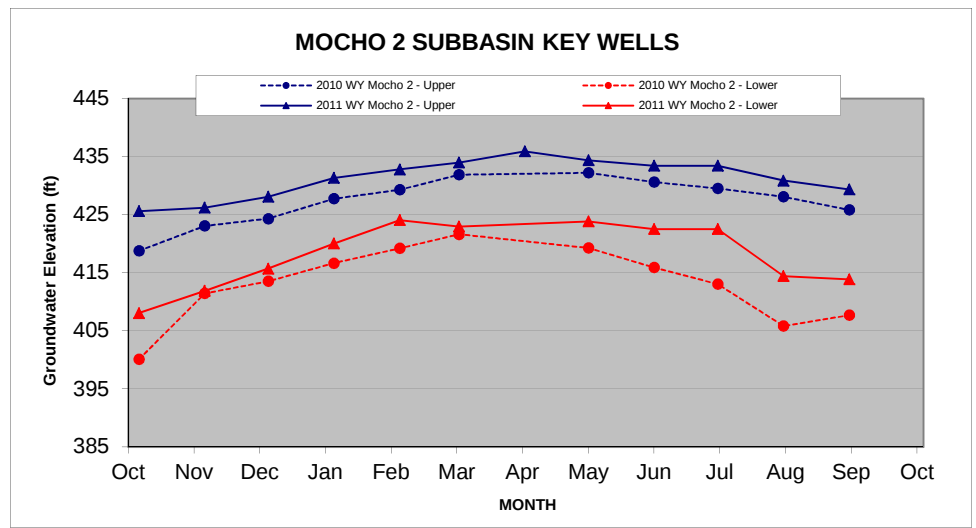
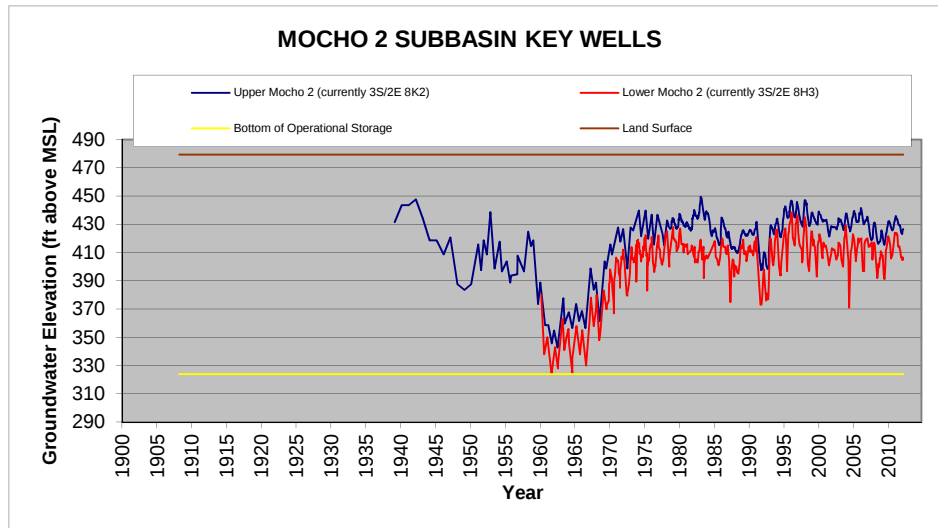
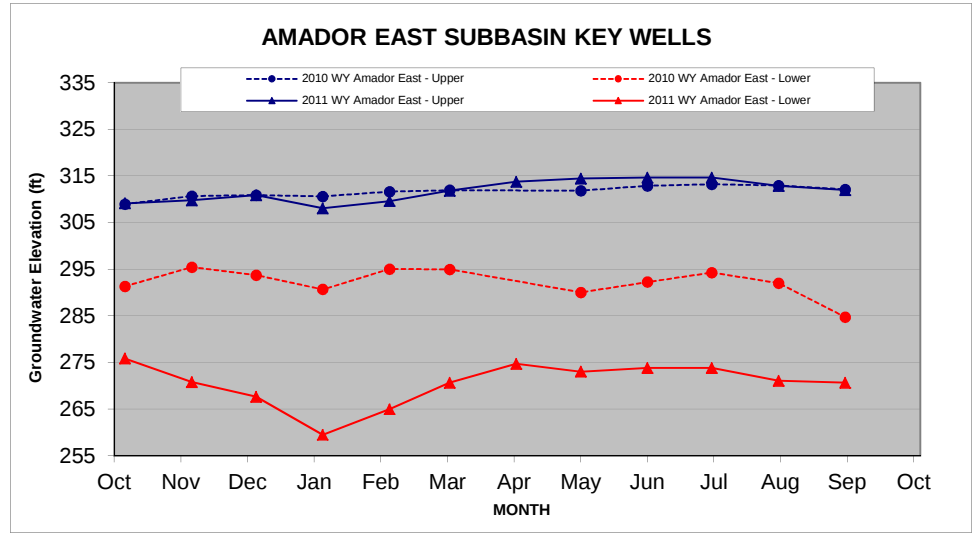
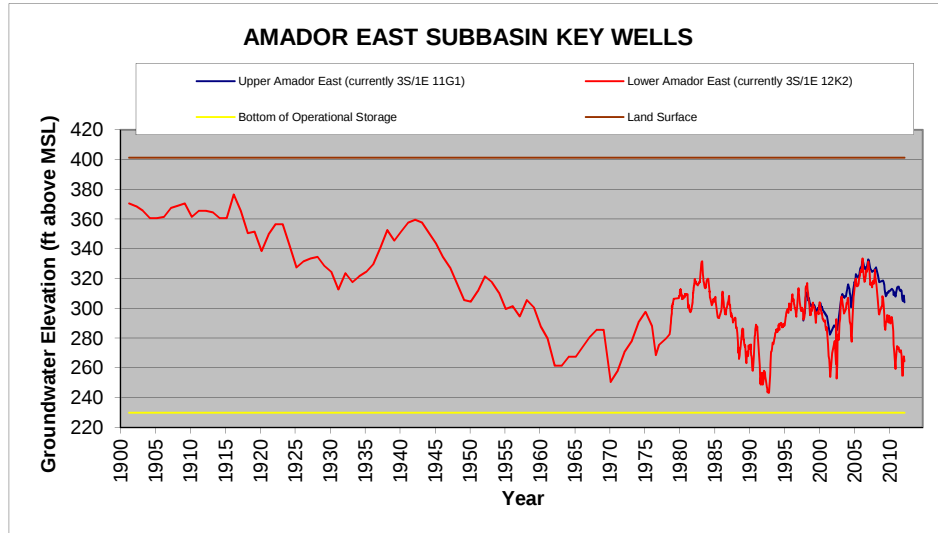
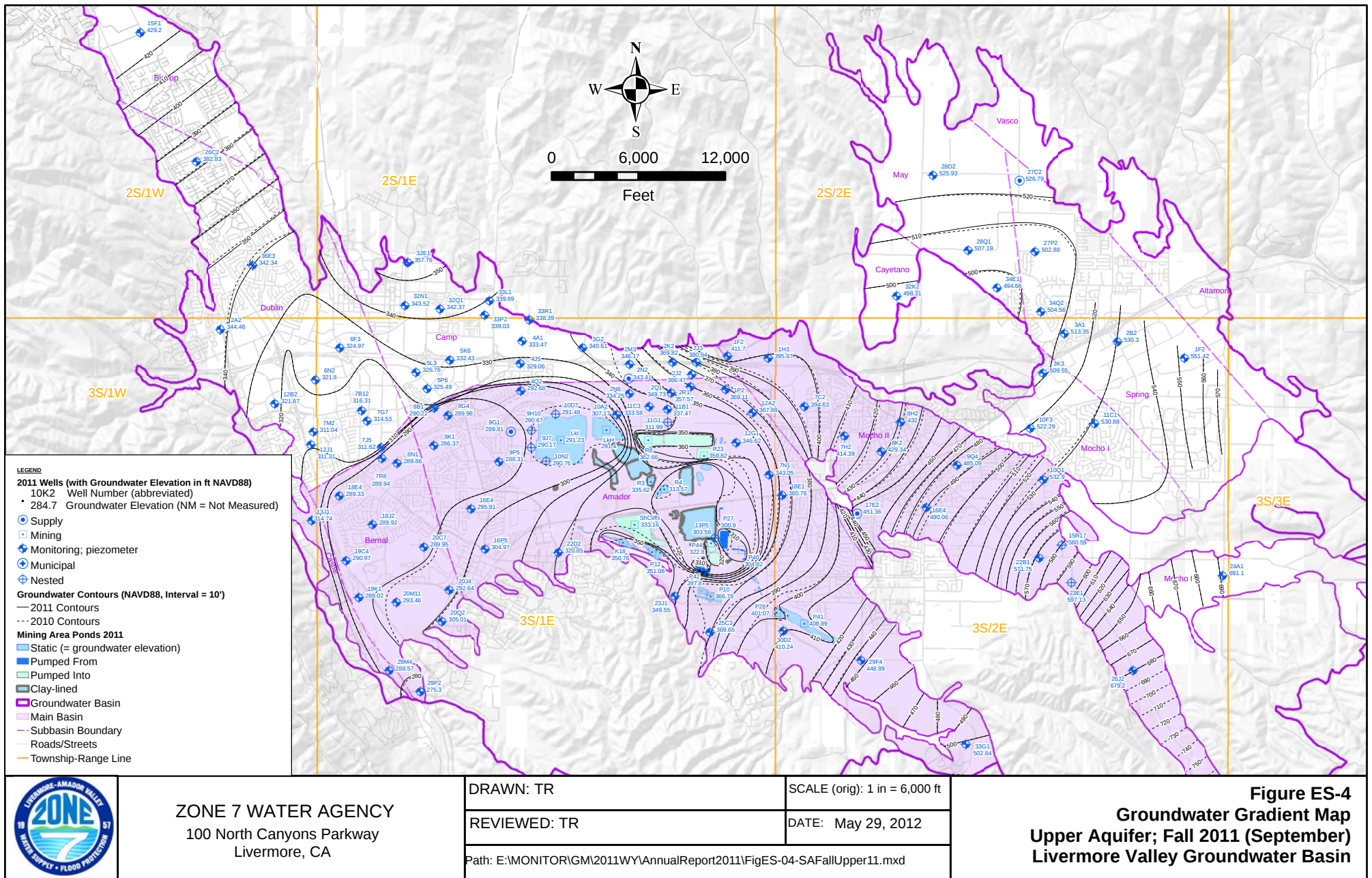
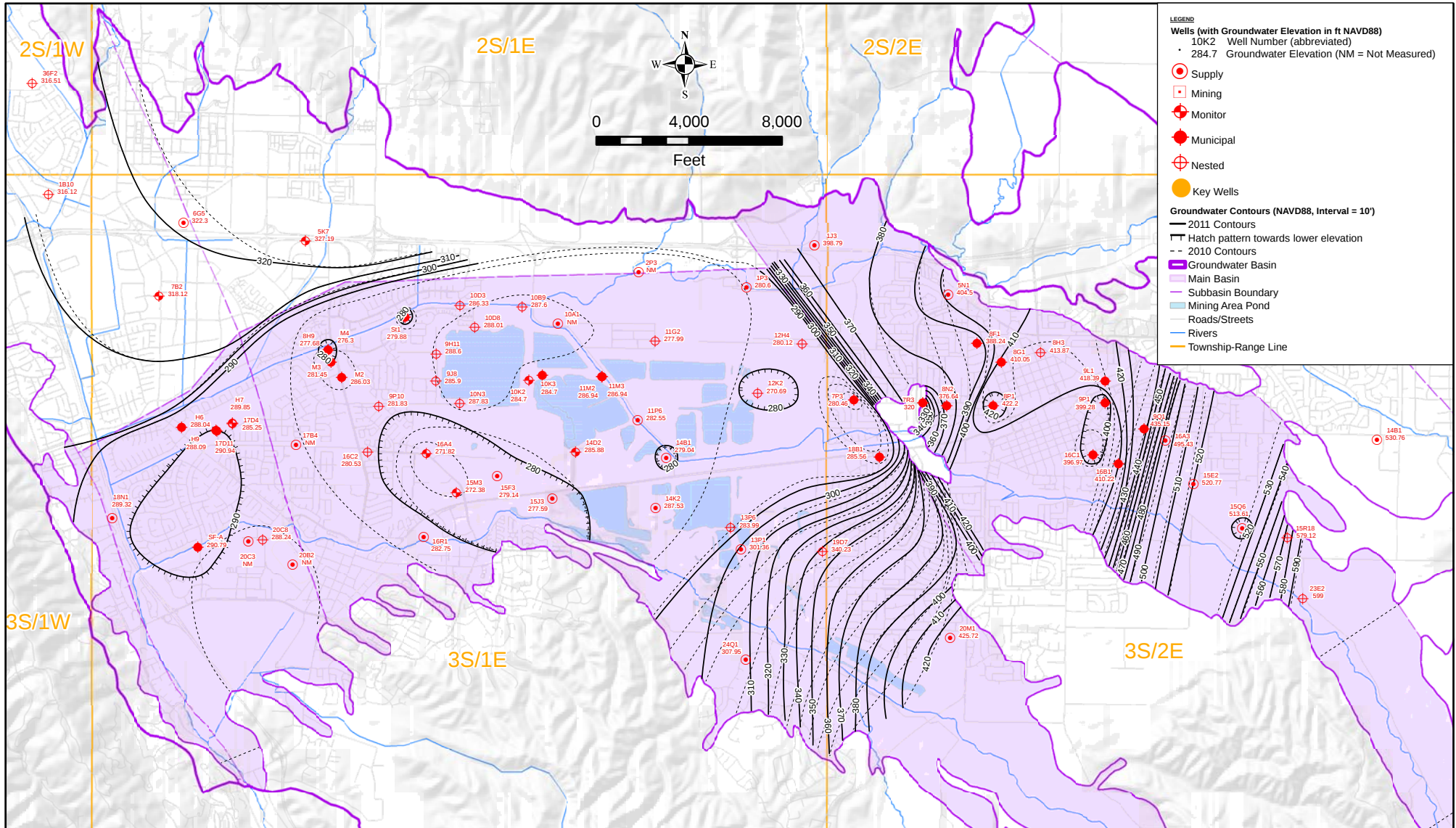


Figure ES-3
Zone 7 Water Agency
Key Well Hydrographs - Eastern Portion of Main Basin
2011 Water Year







ZONE 7 WATER AGENCY
 100 North Canyons Parkway
 Livermore, CA

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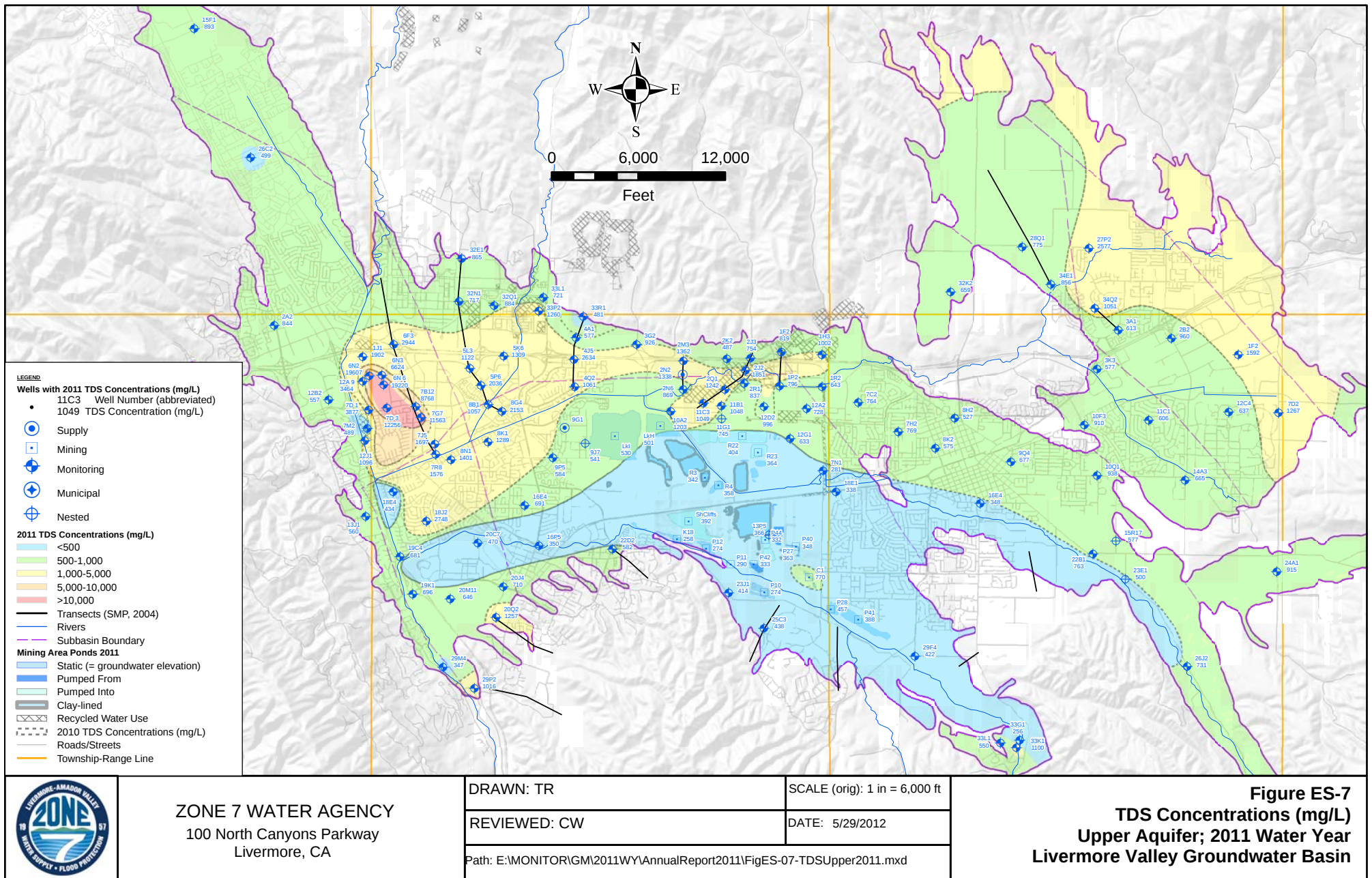
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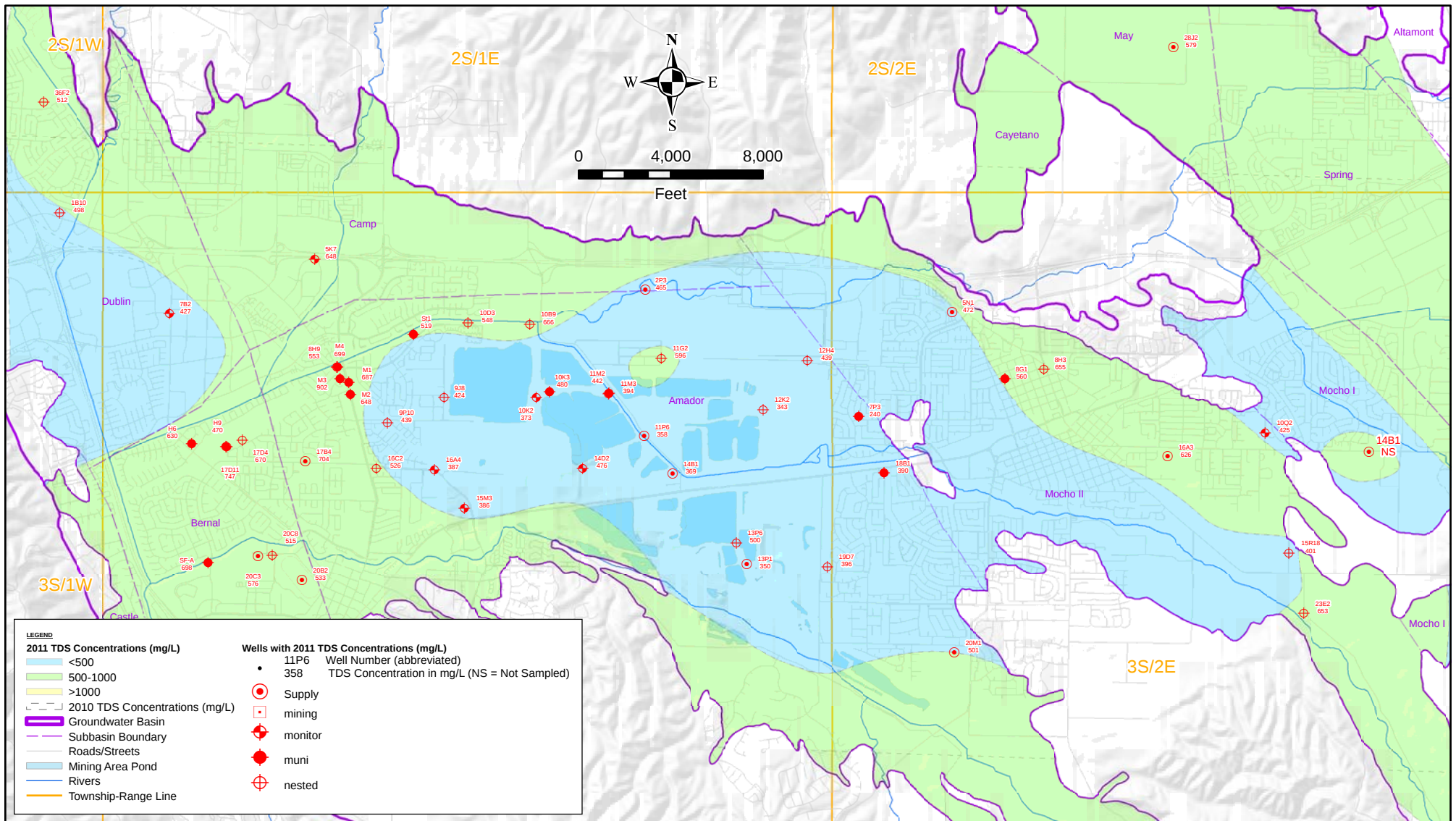
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Figure ES-5
Groundwater Gradient Map
Lower Aquifer; Fall 2011 (September)
Livermore Valley Groundwater Basin





ZONE 7 WATER AGENCY
100 North Canyons Parkway
Livermore, CA

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DATE: May 29, 2012

Figure ES-8
TDS Concentrations (mg/L)
Lower Aquifer; 2011 Water Year
Livermore Valley Groundwater Basin

Figure ES-10
Graphs of Historical Main Basin Hydrologic Inventory
1974 to 2011 Water Years

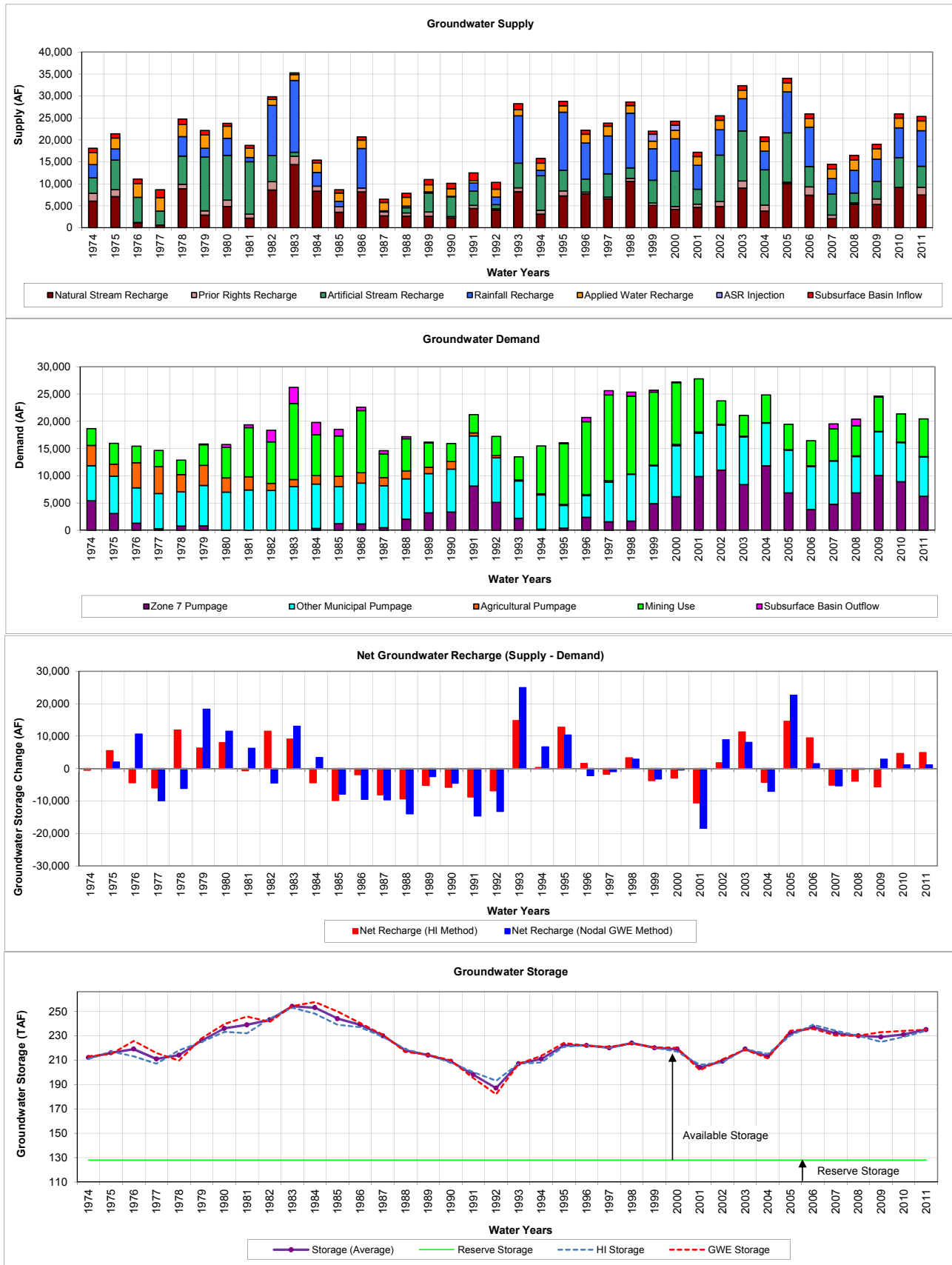


Figure ES-11
Graphs of Salt Loading and Salt Concentrations
1974-2011 Water Years

