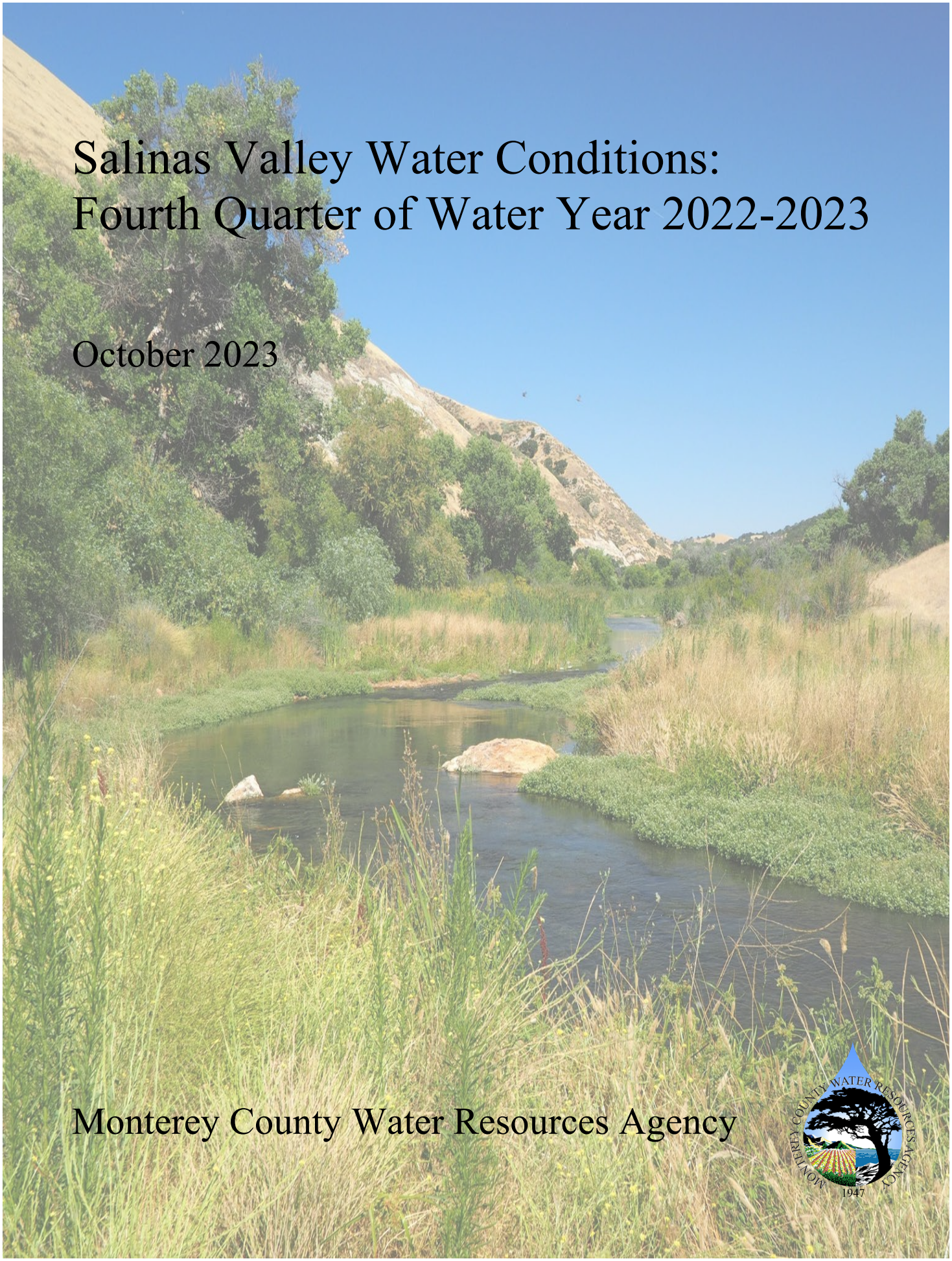

# Salinas Valley Water Conditions: Fourth Quarter of Water Year 2022-2023

October 2023

Monterey County Water Resources Agency

# MONTEREY COUNTY WATER RESOURCES AGENCY

Salinas Valley Water Conditions
Quarterly Update for Fourth Quarter of Water Year 2022-2023
October 2023

Prepared by Riley Clark, Guillermo Diaz-Moreno, and Tamara Voss

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# Introduction

This report covers the July through September 2023, which is the fourth quarter of Water Year 2022-2023 (WY23). It provides a brief overview and discussion of hydrologic conditions in the Salinas Valley including precipitation, reservoir storage, streamflow, and groundwater level trends (Figure 1).

Data for the fourth quarter of Water Year 2022-2023 indicate normal levels of precipitation and reservoir storage is higher than in September 2022 at both Nacimiento and San Antonio Reservoirs. Over the fourth quarter of WY23, groundwater elevations decreased across all monitored subareas and aquifers, however, groundwater elevations are higher in all monitored subareas and aquifers than they were one year ago.

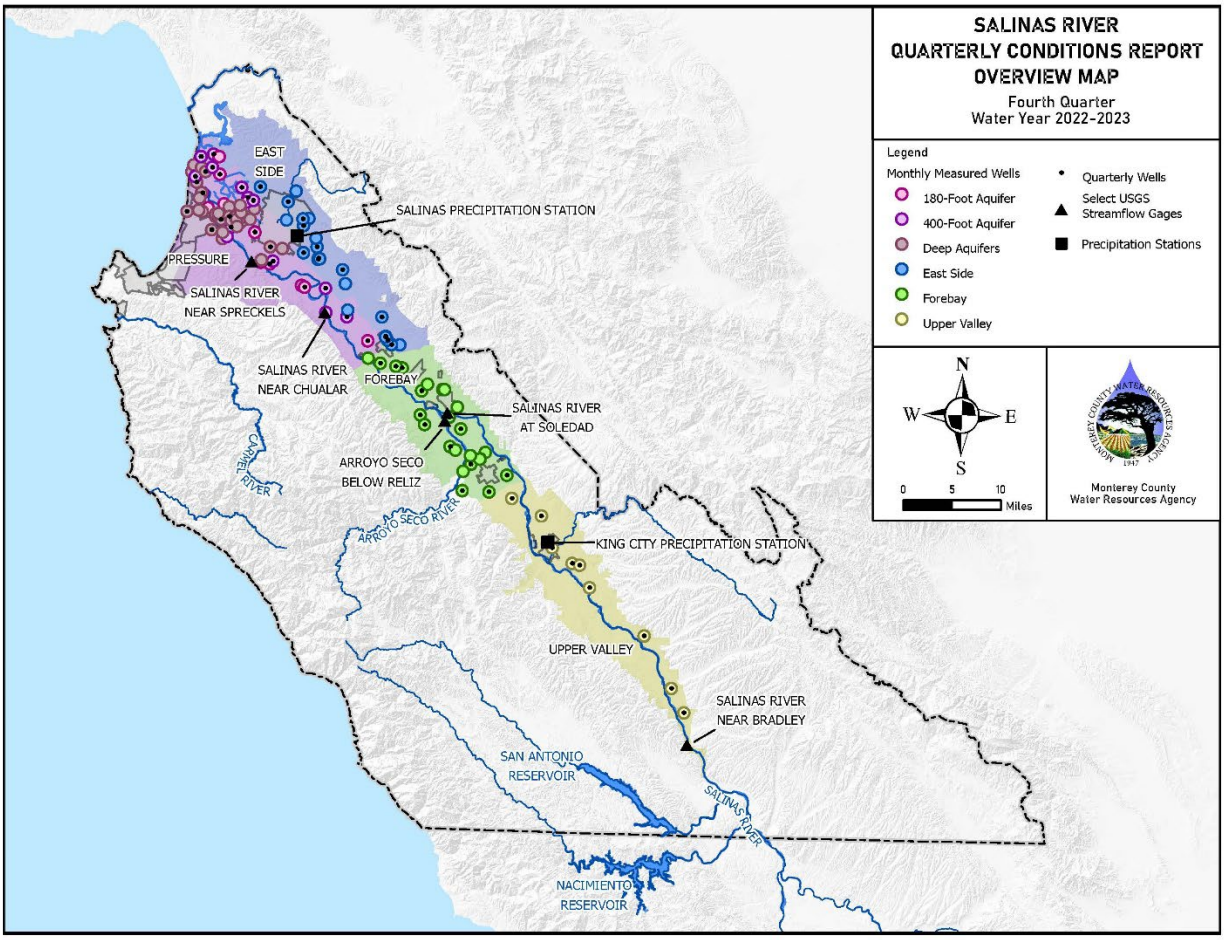
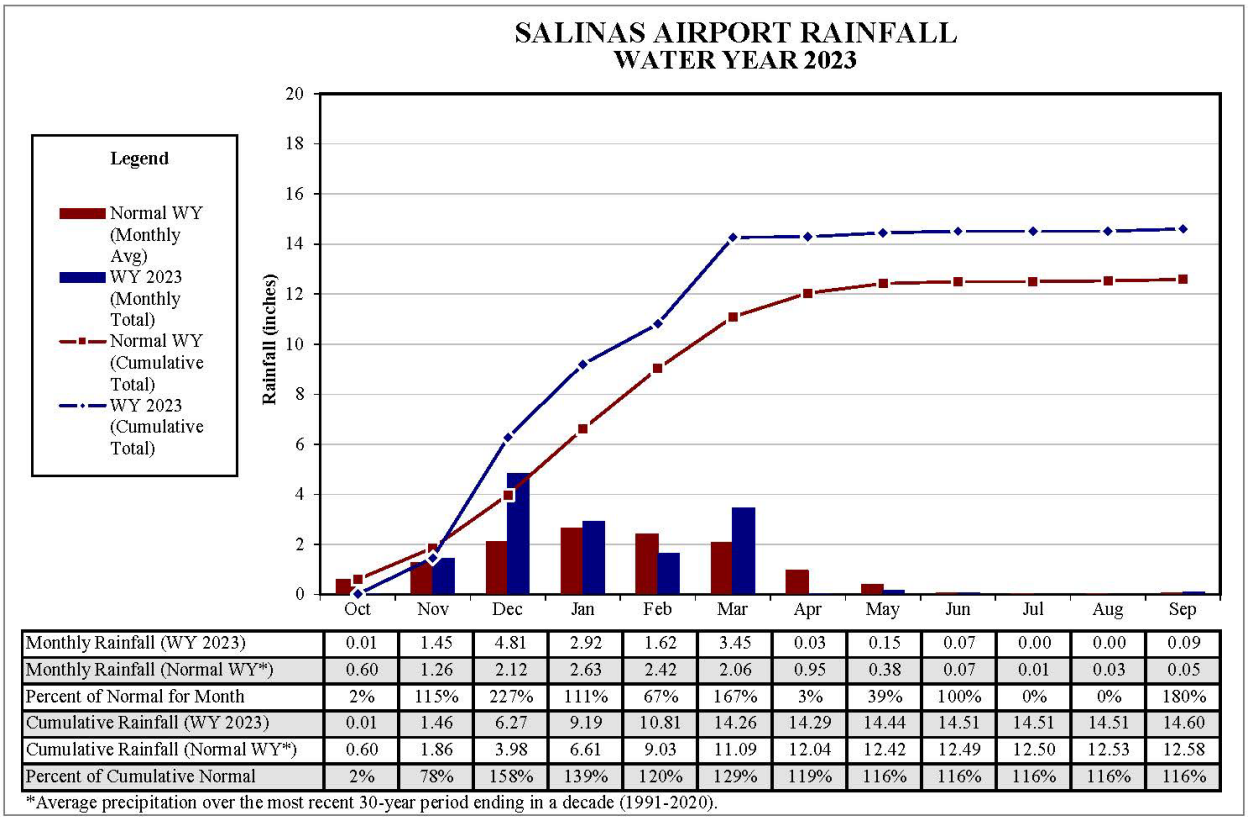



*Figure 1: Geographic extent of the area covered by this report and supporting data sources.*

## Precipitation

Preliminary National Weather Service rainfall data indicates that the fourth quarter of WY23 brought identical to normal rainfall to Salinas and below normal rainfall to King City. Totals for the quarter were 0.09 inches at the Salinas Airport (100% of normal rainfall of 0.09 inches for the quarter) and 0.02 inches in King City (25% of normal rainfall of 0.08 inches for the quarter).

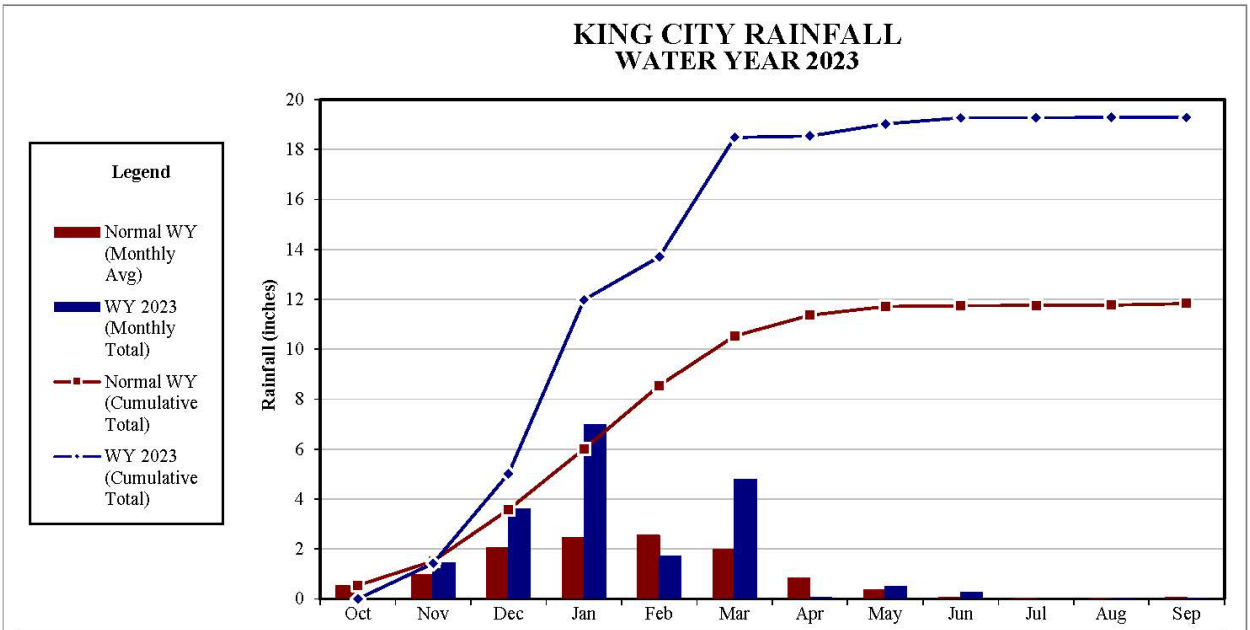
Figure 2 and Figure 3 show monthly and cumulative precipitation data for the current and a "normal" water year, based on long-term monthly precipitation averages, for the Salinas Airport and King City sites, respectively. Included below each graph is a table showing the numeric values for precipitation as well as percent of "normal" precipitation. For the purposes of these graphs, a "normal" water year is the average precipitation over the most recent 30-year period ending in a decade. Currently, the period from 1991 to 2020 is used for this calculation.




| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monthly Rainfall (WY 2023) | 0.01 | 1.45 | 4.81 | 2.92 | 1.62 | 3.45 | 0.03 | 0.15 | 0.07 | 0.00 | 0.00 | 0.09 |
| Monthly Rainfall (Normal WY*) | 0.60 | 1.26 | 2.12 | 2.63 | 2.42 | 2.06 | 0.95 | 0.38 | 0.07 | 0.01 | 0.03 | 0.05 |
| Percent of Normal for Month | 2% | 115% | 227% | 111% | 67% | 167% | 3% | 39% | 100% | 0% | 0% | 180% |
| Cumulative Rainfall (WY 2023) | 0.01 | 1.46 | 6.27 | 9.19 | 10.81 | 14.26 | 14.29 | 14.44 | 14.51 | 14.51 | 14.51 | 14.60 |
| Cumulative Rainfall (Normal WY*) | 0.60 | 1.86 | 3.98 | 6.61 | 9.03 | 11.09 | 12.04 | 12.42 | 12.49 | 12.50 | 12.53 | 12.58 |
| Percent of Cumulative Normal | 2% | 78% | 158% | 139% | 120% | 129% | 119% | 116% | 116% | 116% | 116% | 116% |

*Average precipitation over the most recent 30-year period ending in a decade (1991-2020).

*Figure 2: Salinas Airport Rainfall for Water Year 2023*




| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monthly Rainfall (WY 2023) | 0.00 | 1.42 | 3.59 | 6.97 | 1.72 | 4.79 | 0.05 | 0.49 | 0.24 | 0.00 | 0.01 | 0.01 |
| Monthly Rainfall (Normal WY*) | 0.54 | 0.98 | 2.05 | 2.44 | 2.54 | 1.98 | 0.83 | 0.35 | 0.04 | 0.01 | 0.01 | 0.06 |
| Percent of Normal for Month | 0% | 145% | 175% | 286% | 68% | 242% | 6% | 140% | 600% | 0% | 100% | 17% |
| Cumulative Rainfall (WY 2023) | 0.00 | 1.42 | 5.01 | 11.98 | 13.70 | 18.49 | 18.54 | 19.03 | 19.27 | 19.27 | 19.28 | 19.29 |
| Cumulative Rainfall (Normal WY*) | 0.54 | 1.52 | 3.57 | 6.01 | 8.55 | 10.53 | 11.36 | 11.71 | 11.75 | 11.76 | 11.77 | 11.83 |
| Percent of Cumulative Normal | 0% | 93% | 140% | 199% | 160% | 176% | 163% | 163% | 164% | 164% | 164% | 163% |

*Average precipitation over the most recent 30-year period ending in a decade (1991-2020).

*Figure 3: King City Rainfall for Water Year 2023*

## Reservoir Storage

At the end of the fourth quarter of Water Year 2023, storage at Nacimiento Reservoir was 236,200 acre-feet, which is 165,587 acre-feet higher than in September 2022. Storage in San Antonio Reservoir on September 30, 2023 was 219,500 acre-feet, which is 187,450 acre-feet higher than at the same time in September 2022.

| **Reservoir** | **September 30, 2023 (WY23) Storage in acre-feet** | **September 30, 2022 (WY22) Storage in acre-feet** | **Difference in acre-feet** |
|---|---|---|---|
| Nacimiento | 236,200 | 70,613 | 165,587 |
| San Antonio | 219,550 | 32,100 | 187,450 |

Graphs showing daily reservoir storage for the last five water years along with 30-year average daily storage for comparison are included as Figure 4 and Figure 5.

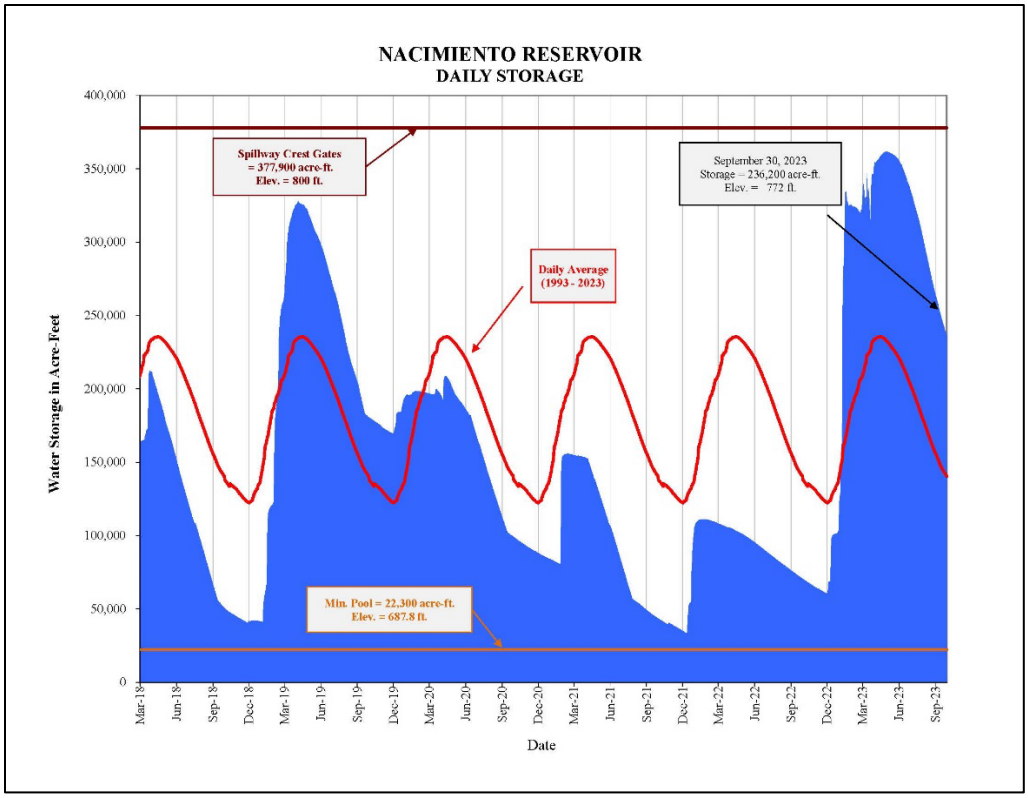



*Figure 4: Nacimiento Reservoir Storage*

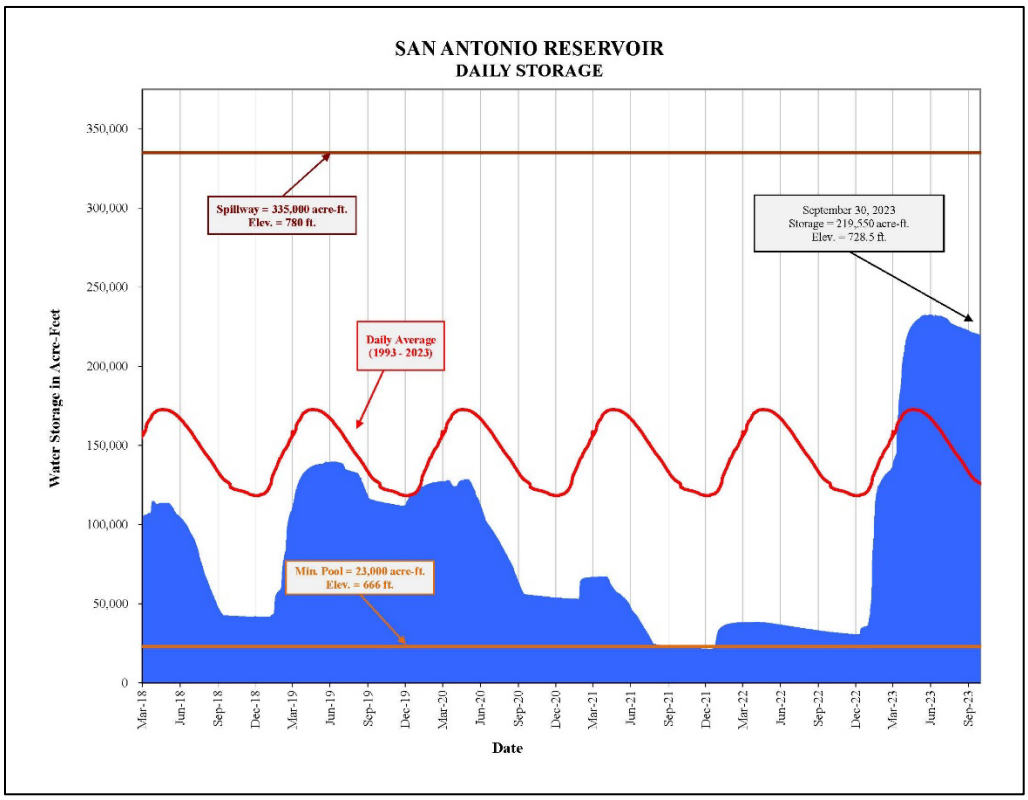



*Figure 5: San Antonio Reservoir Storage*

## Streamflow

The Salinas River is predominately a losing stream meaning streamflow moves from the streambed into the underlying aquifers. The U.S. Geological Survey maintains several streamflow gages throughout the Salinas River watershed that continuously measure discharge or flow in the river (Figure 1). Figure 6 shows mean daily flow, in cubic feet per second, from select gages on the Salinas River and Arroyo Seco for the last five years (WY 2019-2023) and the current water year (WY 2023).

Streamflow recorded during the fourth quarter of WY 2023 was predominantly the result of conservation releases being made from the reservoirs that started in June, as the natural flows from the wet January and March rain events have passed through the system.

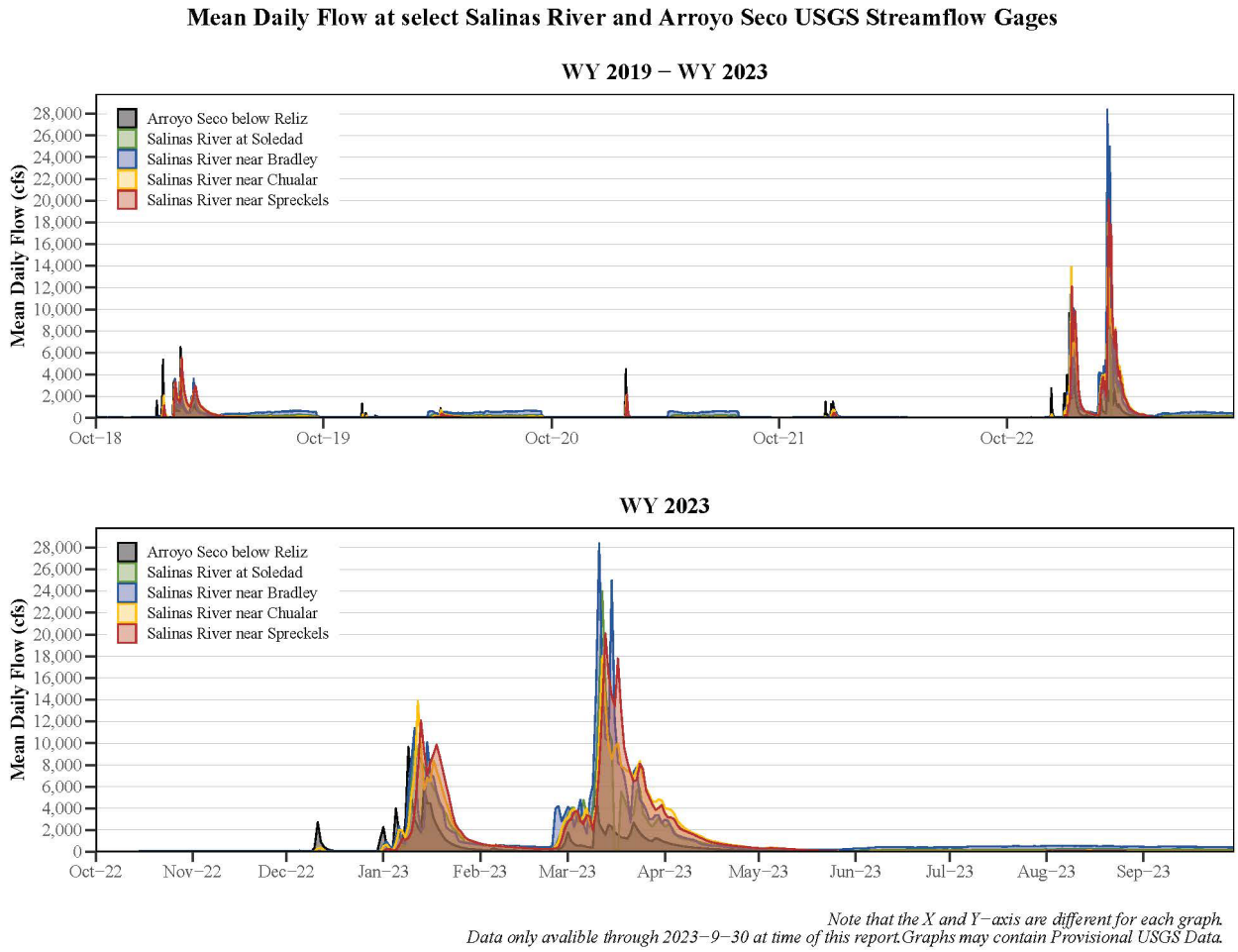



*Figure 6: Mean Daily Flow at Selected Stream Gages*

## Groundwater Elevations

Groundwater elevation data provides insight into how an aquifer or subarea responds to hydrologic conditions over time, such as changes in precipitation and reservoir releases. A one-year comparison can show the short-term effects of a single wet or dry year while a long-term comparison will help provide information on general trends in groundwater storage and demonstrate effects that occur on a longer time scale as surface hydrology interacts with the underlying geology. Subareas or aquifers will respond differently to these hydrologic conditions. For example, groundwater elevations in shallower aquifers may respond more quickly to a wet season while aquifers that are confined, deeper, or more depleted may take longer to show a response to hydrologic conditions.

More than 130 wells are measured monthly throughout the Salinas Valley to monitor seasonal groundwater elevation fluctuations. Data from approximately 50 of these wells are used in the preparation of this report (Figure 1). The measurements are grouped by hydrologic subarea, averaged, and a single value for the wells within each subarea is graphed to compare current groundwater elevations (WY23) with selected past conditions. Graphs for individual subareas, showing the current year's water level conditions, last year's conditions (WY22) and dry conditions (WY15) are found in the following sections.

For comparison to long term conditions, a curve showing monthly water levels averaged over the most recent 30 years (WY1993-WY2022) is included on each graph. The Deep Aquifers graph (Figure 9) does not include a 30-year average because there is not an adequate period of record to make that comparison. Table 1 provides a summary of the groundwater elevation trends for September 2023, with additional detail provided on Figures 7-12.

**Table 1: Groundwater Elevation Trends Summary for September 2023**

| Subarea/Aquifer | September 2023 Groundwater Elevation (ft-msl) | Change during Fourth Quarter | One Year Change | Difference from 30-Year Average Elevation |
|---|---|---|---|---|
| 180-Foot Aquifer | 3 feet | Down 4 feet | Up 11 feet | Up 2 feet |
| 400-Foot Aquifer | -8 feet | Down 1 foot | Up 15 feet | Up 6 feet |
| Deep Aquifers | -34 feet | Down 6 feet | Up 4 feet | Not applicable |
| East Side | -27 feet | Down 3 feet | Up 19 feet | Down 3 feet |
| Forebay | 161 feet | Down 4 feet | Up 17 feet | Up 6 feet |
| Upper Valley | 315 feet | Down 2 feet | Up 9 feet | Up 3 feet |

## 180-Foot Aquifer

Over the last quarter, groundwater elevation levels decreased four feet in the 180-Foot Aquifer (Figure 7). Groundwater elevations have increased eleven feet compared to September 2022 and are two feet above the 30-year average.

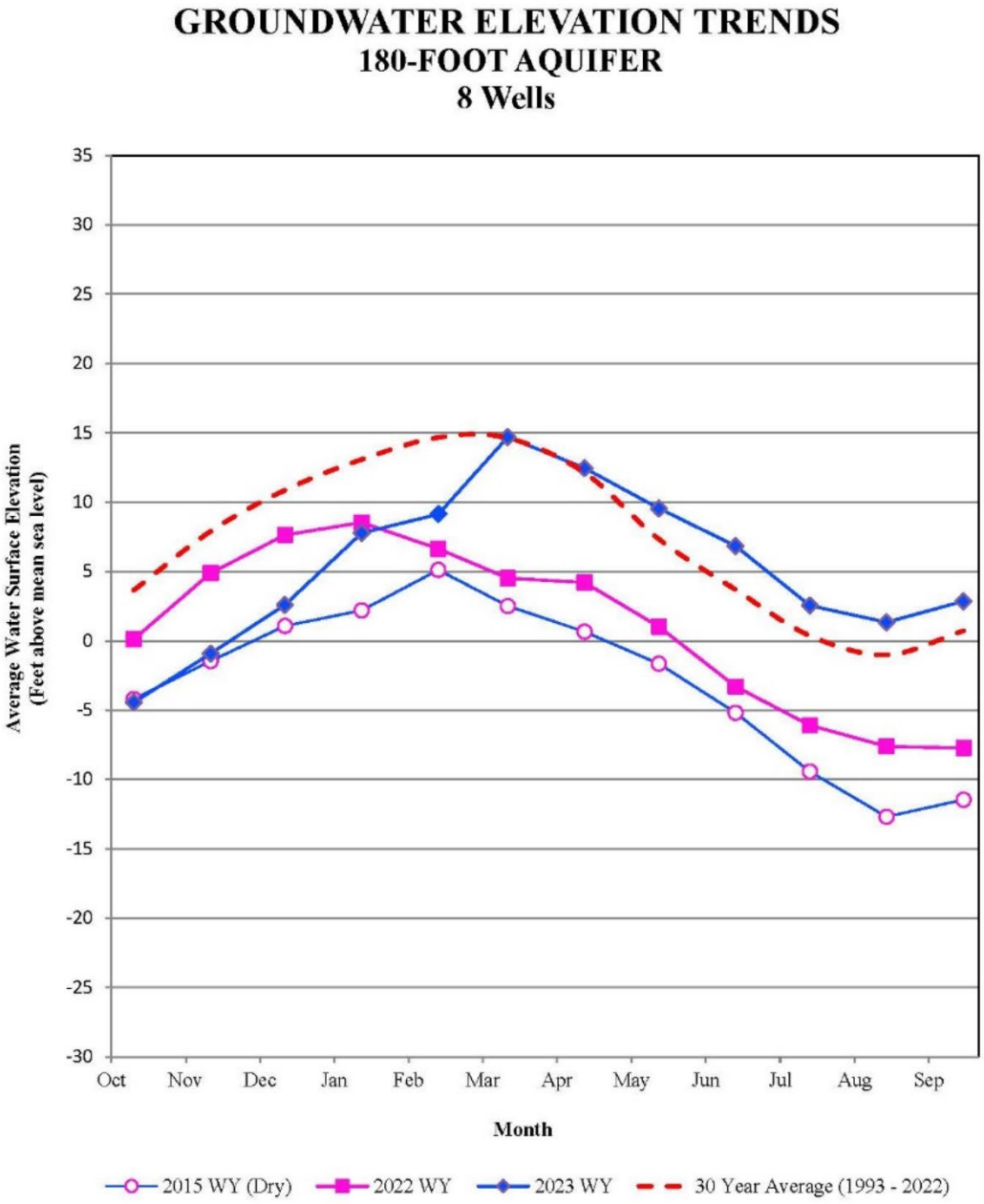



*Figure 7: Groundwater Elevation Trends for the 180-Foot Aquifer*

## 400-Foot Aquifer

Over the last quarter, groundwater elevation levels decreased one foot in the 400- Foot Aquifer (Figure 8). Groundwater levels are up fifteen feet compared to September 2022 and up six feet from the 30-year average.

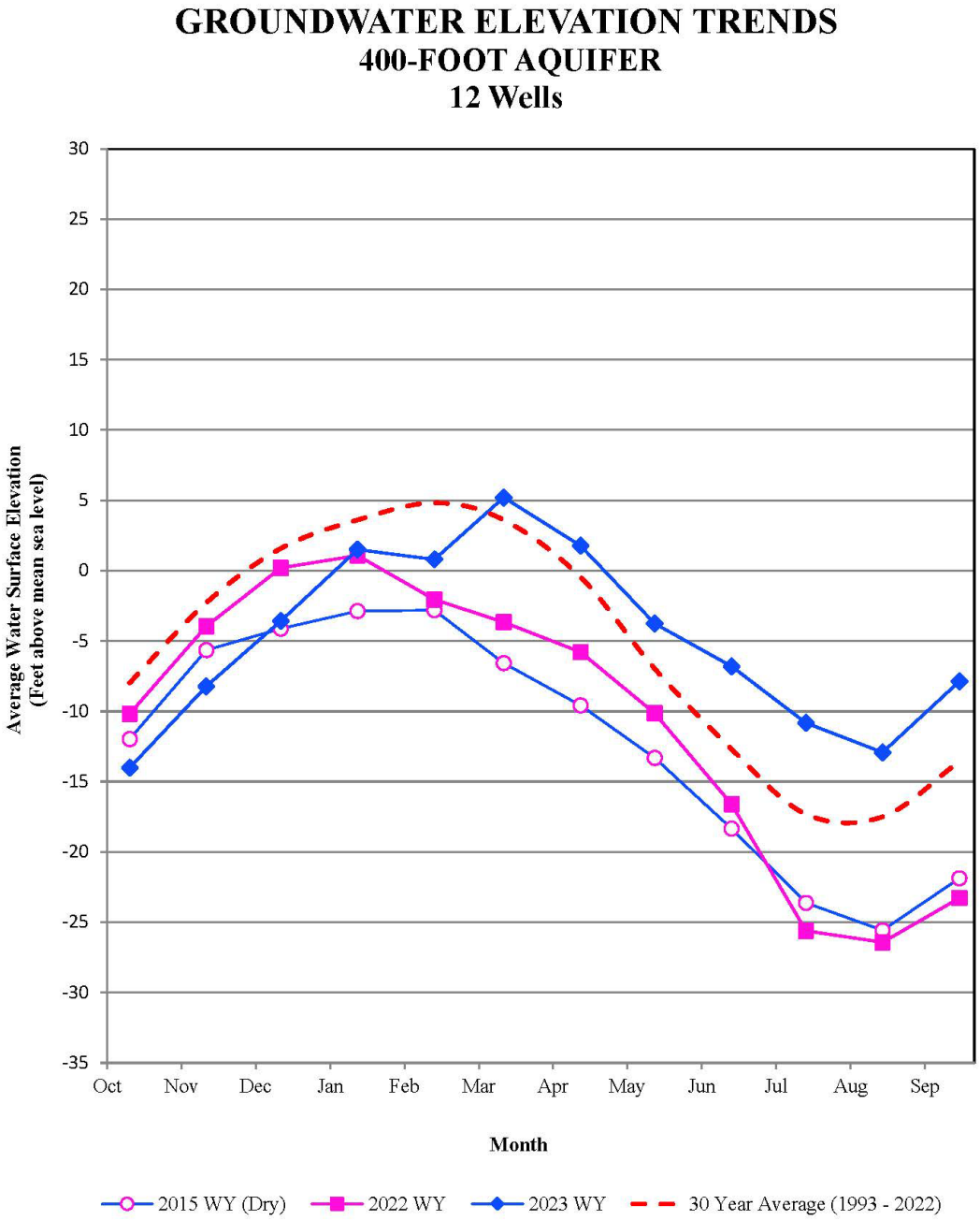



*Figure 8: Groundwater Elevation Trends in the 400-Foot Aquifer*

## Deep Aquifers

Over the last quarter, groundwater elevations decreased six feet in the Deep Aquifers (Figure 9). Groundwater elevation levels are up four feet compared to September 2022. Given the shorter period of record in the wells used for the Deep Aquifers, a 30-year average cannot be calculated. To represent the long-term trends in the Deep Aquifers, Figure 9 also includes a 30-year time series graph with groundwater elevation level data from the eleven wells to show the seasonal and long-term trends in these wells.

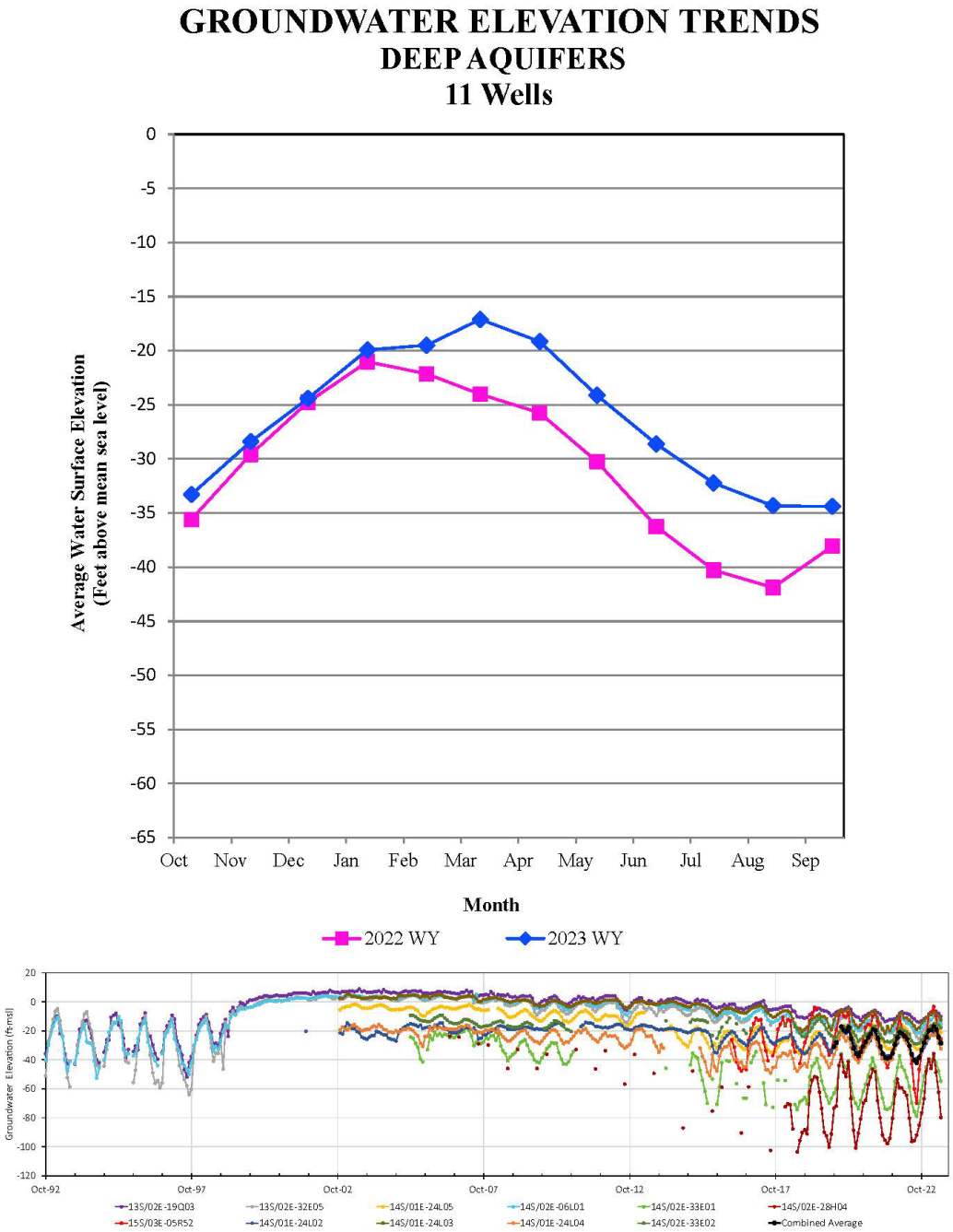



*Figure 9: Groundwater Elevation Trends in the Deep Aquifers*

## East Side Subarea

East Side groundwater elevation levels decreased two feet over the last quarter (Figure 10). Groundwater elevation levels are up nineteen feet from September 2022 levels and down three feet from the 30-year average.

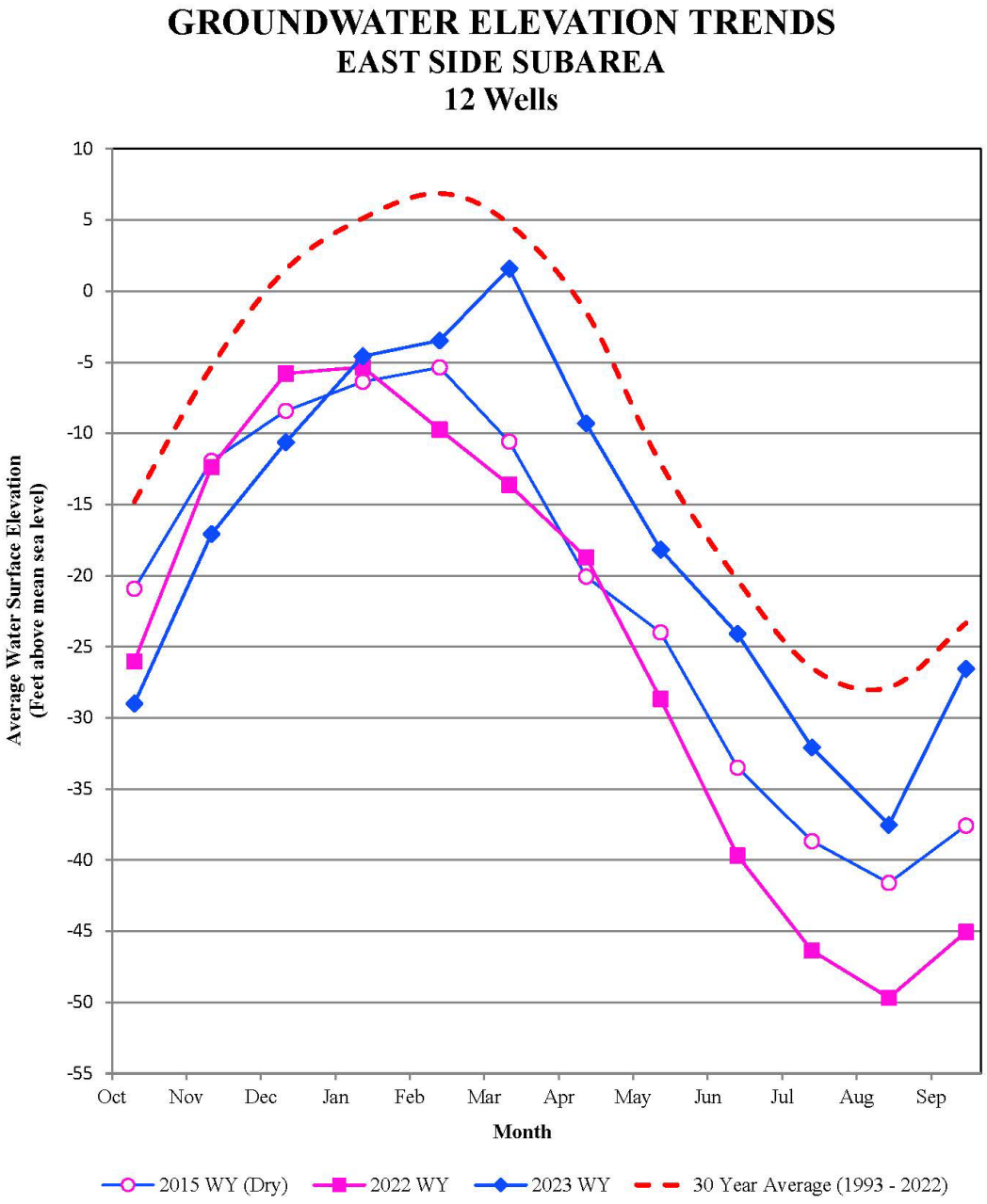



*Figure 10: Groundwater Elevation Trends in the East Side Subarea*

## Forebay Subarea

Over the last quarter, groundwater elevation levels have decreased four feet in the Forebay (Figure 11). Groundwater elevation levels are up seventeen feet from September 2022 levels and are up six feet from the 30-year average.

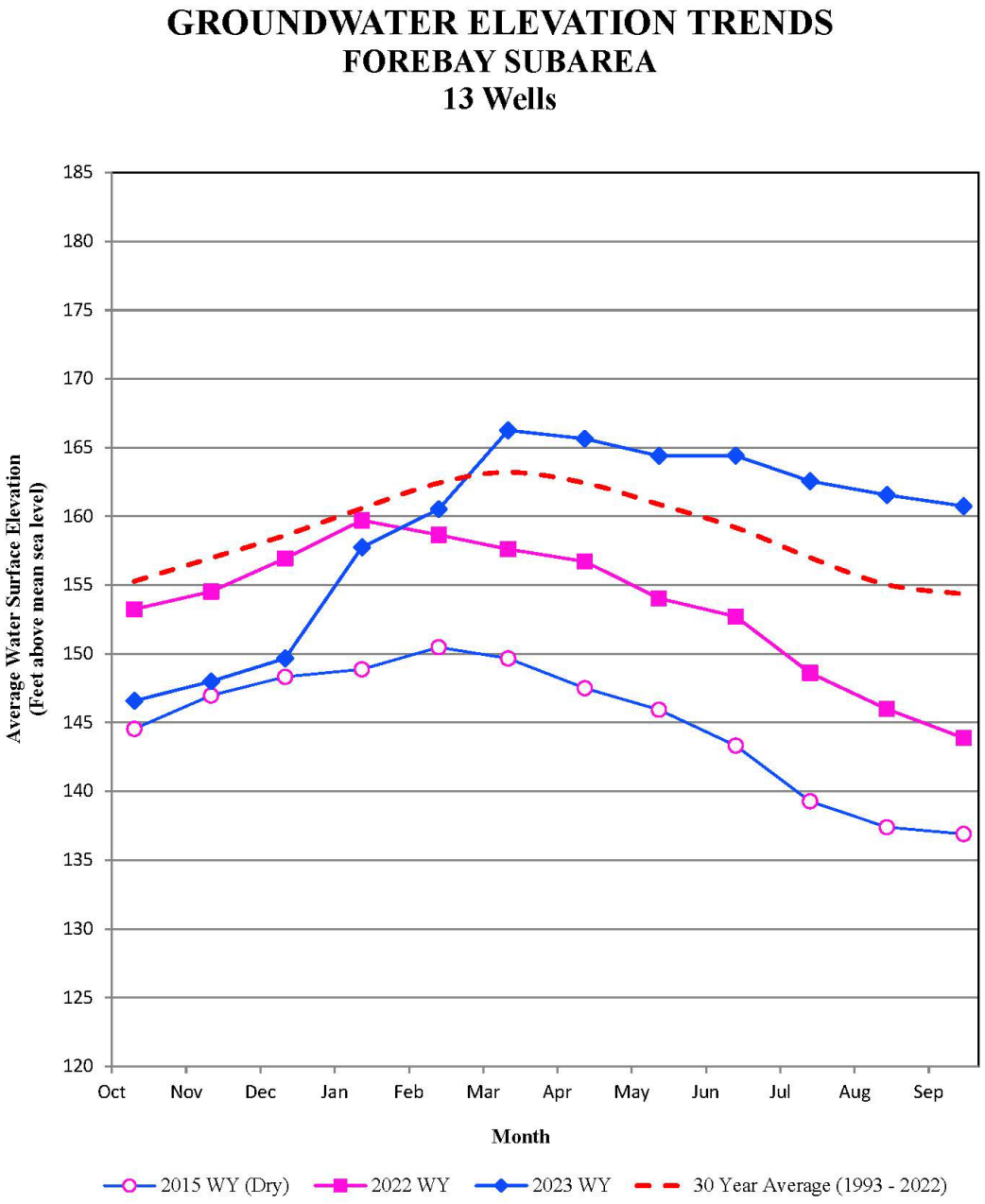



*Figure 11: Groundwater Elevation Trends in the Forebay Subarea*

## Upper Valley Subarea

Upper Valley groundwater elevation levels have decreased two feet over the last quarter (Figure 12). Groundwater elevation levels are up nine feet from September 2022 levels and up three feet from the 30-year average.

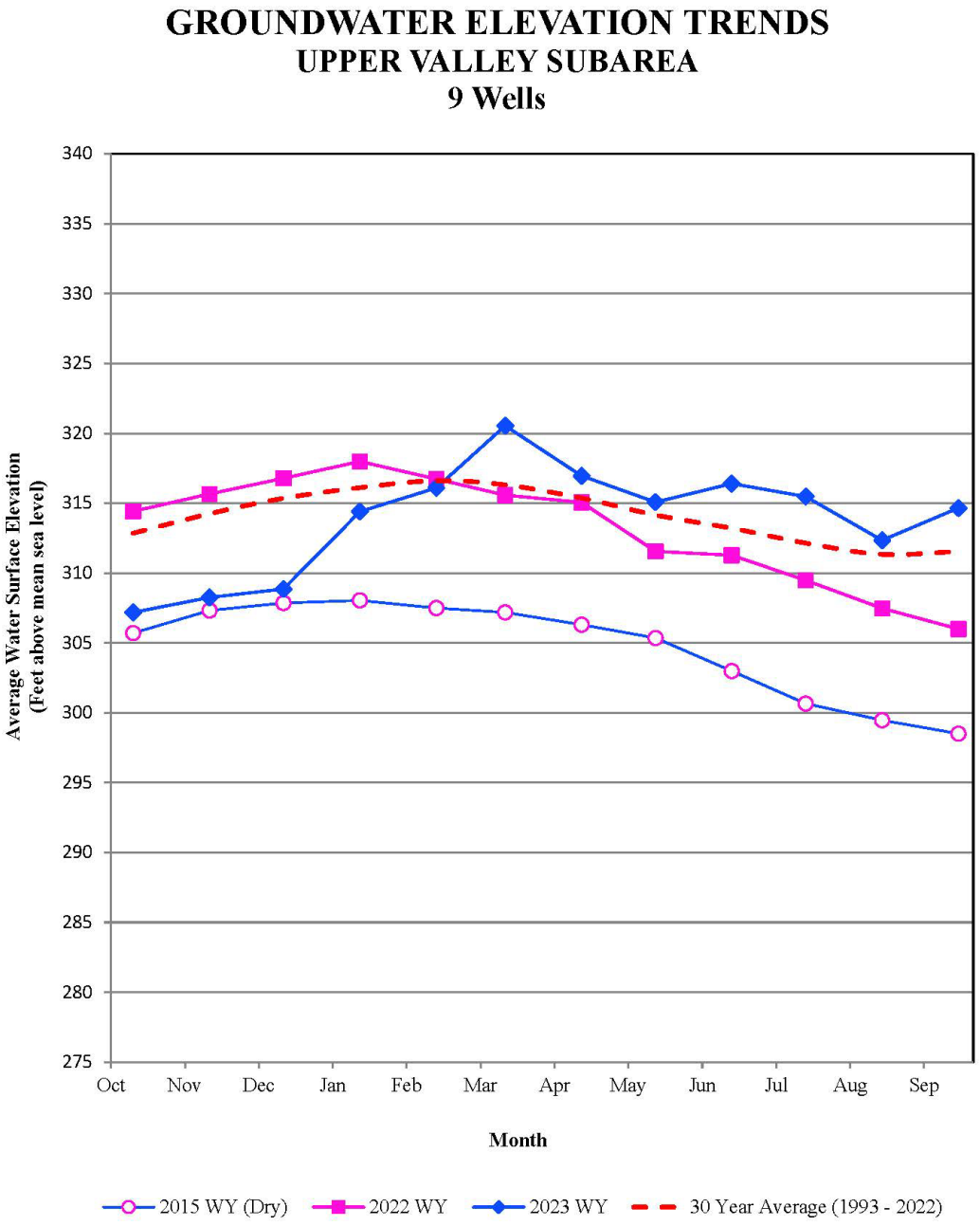



*Figure 12: Groundwater Elevation Trends in the Upper Valley Subarea*

Figure 13 shows the spatial distribution of changes in groundwater elevation levels from September 2022 to September 2023. Over the last Water Year, all hydrologic subareas experienced increasing groundwater elevations with the exception of the Deep Aquifers, which primarily experienced no significant change in groundwater elevations.

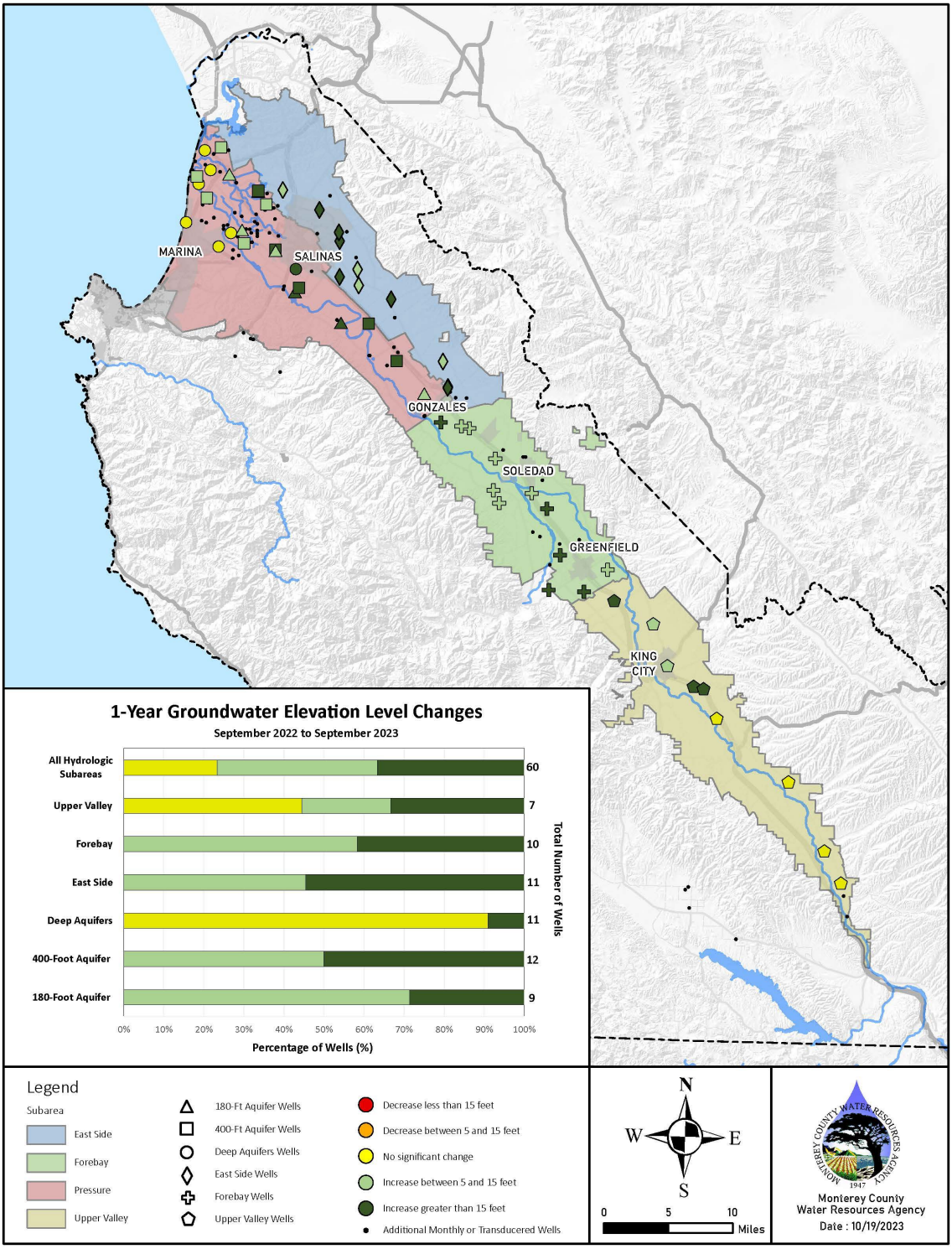



*Figure 13: One-Year Groundwater Elevation Changes*

## Depth to Groundwater vs Groundwater Elevation

Most of the figures in this report use groundwater elevation as a means of describing where groundwater was observed in a well. However, Figure 14 shows the monthly depth to groundwater measured in each well, which is an alternative approach to representing the same type of data.[1] The depth to groundwater is measured from a reference point that is unique to each well. Groundwater elevation is calculated from the measured depth to groundwater using the reference point elevation and ground surface elevation.

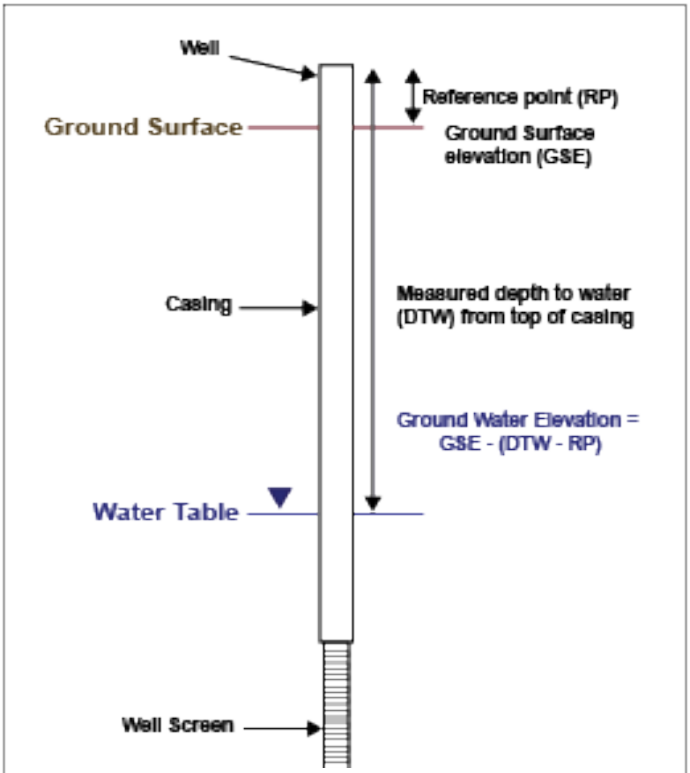



*Figure 14: Determining Depth to Groundwater*

Figure 15 shows the depth to groundwater that was measured in each of the wells, within a given subarea, that is used for developing this quarterly water conditions report. As shown on Figure 15, there is a range of depth to water values within each subarea with some, like the East Side Subarea, having a wider range of measured values than others, like the 180-Foot Aquifer. The black line on each of the subarea graphs in Figure 15 is the average depth to groundwater for each set of wells. This value is converted from "depth to groundwater" to "groundwater elevation" and graphed as the "2023 WY" line on each of the preceding subarea-specific graphs (Figures 7-12).

[1] Figure 14 is modified from the Idaho Department of Environmental Quality.

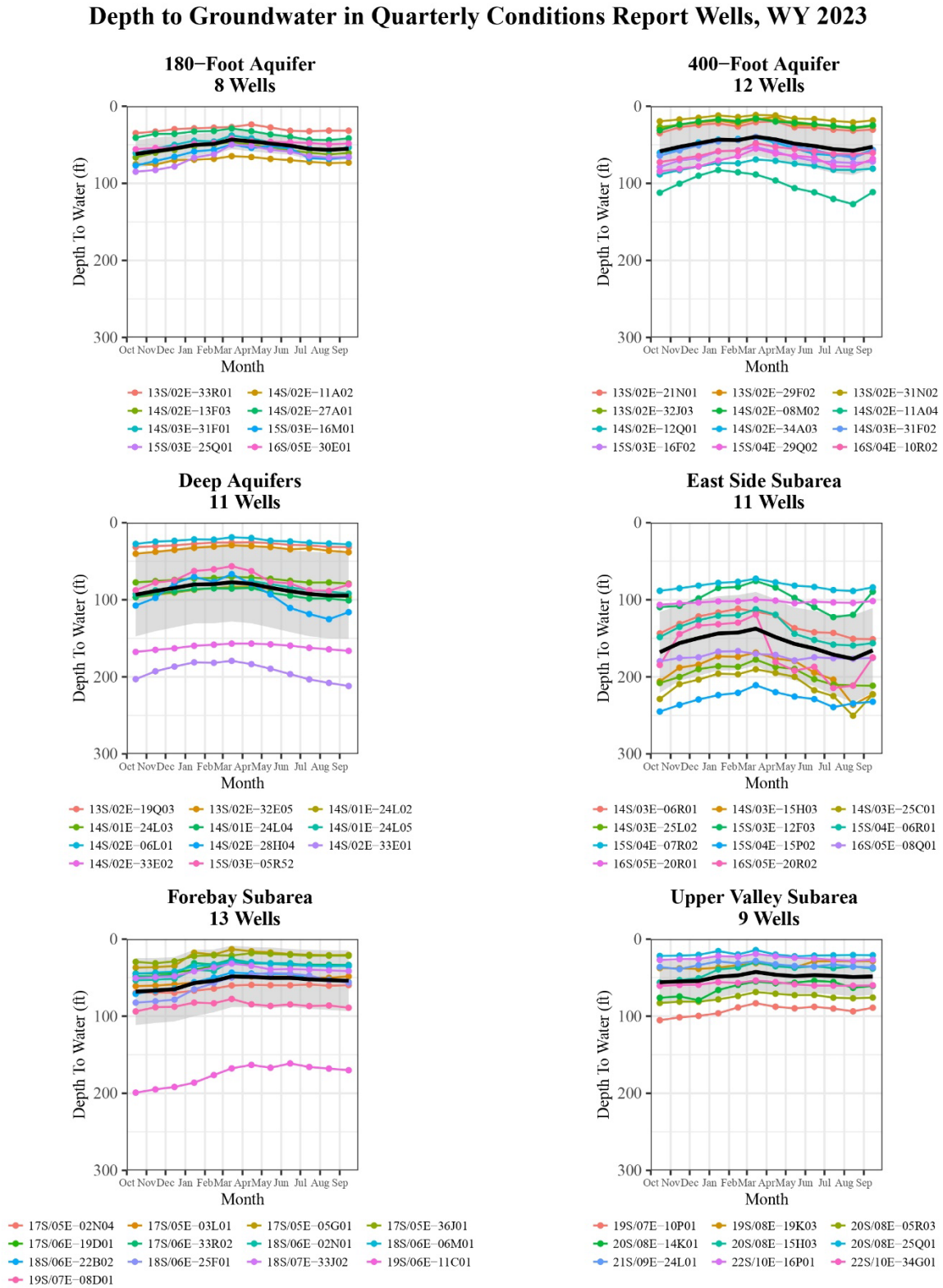



*Figure 15: Depth to Groundwater in Wells Used for Quarterly Conditions Report, WY 2023*