
WY 2023 Annual Report

Monterey Subbasin

Marina Coast Water District Groundwater Sustainability Agency

Salinas Valley Basin Groundwater Sustainability Agency

April 1, 2024

TABLE OF CONTENTS

1	Executive Summary.....	1
2	Introduction	7
	2.1 Purpose	7
	2.2 Monterey Subbasin Groundwater Sustainability Plan.....	7
	2.3 Organization of This Report.....	8
3	Subbasin Setting.....	9
	3.1 Principal Aquifers and Aquitards	9
	3.2 Natural Groundwater Recharge and Discharge.....	9
	3.3 Precipitation and Water Year Type.....	10
4	Subbasin Conditions.....	11
	4.1 Groundwater Elevations	11
	4.1.1 Groundwater Elevation Contours.....	11
	4.1.2 Long-Term Groundwater Elevation Trends	22
	4.2 Water Use and Supply	31
	4.2.1 Groundwater Extraction	31
	4.2.2 Total Water Use	32
	4.3 Groundwater Storage	33
	4.3.1 Marina-Ord Area WBZ	34
	4.3.2 Corral de Tierra WBZ.....	39
	4.4 Seawater Intrusion.....	42
	4.4.1 Salinity Concentrations.....	42
	4.4.2 Induction Logs.....	44
	4.5 Water Quality.....	45
	4.6 Land Subsidence	46
	4.7 Interconnected Surface Water	48
	4.7.1 Marina-Ord Area.....	48
	4.7.2 Corral de Tierra Area.....	48
5	Annual Progress Towards Implementation of the Monterey GSP	49
	5.1 Sustainable Management Criteria	49

Tables of Contents
WY 2023 Annual Report
Monterey Subbasin

5.1.1	Chronic Lowering of Groundwater Levels	50
5.1.2	Reduction in Groundwater Storage	54
5.1.3	Seawater Intrusion.....	54
5.1.4	Water Quality.....	54
5.1.5	Land Subsidence	56
5.1.6	Interconnected Surface Water	56
5.2	GSP Implementation Activities	56
5.2.1	General Administration.....	57
5.2.2	Coordination and Engagement.....	62
5.2.3	Data Expansion and SGMA Compliance	67
5.2.4	Projects and Management Actions.....	80
6	References	87

List of Tables

Table 3-1. Water Year Type

Table 4-1. Groundwater Extraction by Sector in WY 2022-23 in the Marina-Ord Area

Table 4-2. Groundwater Extraction by Sector in WY 2022 in the Corral de Tierra Area

Table 4-3. Total Water Use in WY 2023 in the Monterey Subbasin

Table 4-4. Estimate Change in Groundwater Storage in the Marina-Ord Area WBZ

Table 4-5. Estimated Change in Groundwater Storage in the Corral de Tierra WBZ

Table 4-6. Monterey Subbasin Seawater Intrusion Representative Monitoring Sites

Table 4-7. Water Quality in WY 2023

Table 4-8. Marina-Ord Area Interconnected Surface Water Representative Monitoring Sites

Table 5-1. Groundwater Elevations and Relevant Sustainable Management Criteria for Chronic Lowering of Groundwater Levels Sustainability Criteria

Table 5-2. Water Quality Exceedances in WY 2023

Table 5-3. Progress on General Administrative Tasks as of December 2023

Table 5-4. Progress on Interested Parties Coordination and Outreach as of December 2023

Table 5-5. Progress on Data Expansion and SGMA Compliance as of December 2023

Table 5-6. Status of Addressing Monterey Subbasin RCAs

Table 5-7. Progress on Projects and Management Actions as of December 2023

List of Figures

Figure 1-1. Monterey Subbasin

Figure 1-2. Management Areas

Figure 4-1. Groundwater Level Contours in the Marina-Ord Area – Fall 2022

Figure 4-2. Groundwater Level Contours in the Marina-Ord Area – Spring 2023

Figure 4-3. Groundwater Level Contours in the Marina-Ord Area – August 2023

Figure 4-4. Groundwater Level Contours in the Marina-Ord Area – Fall 2023

Figure 4-5. Groundwater Level Contours in the El Toro Primary Aquifer – August 2023

Figure 4-6. Groundwater Level Contours in the El Toro Primary Aquifer – Fall 2023

Figure 4-7. Representative Groundwater Elevation Hydrographs in the Dune Sand Aquifer

Figure 4-8. Representative Groundwater Elevation Hydrographs in the Upper 180-Foot Aquifer

Figure 4-9. Representative Groundwater Elevation Hydrographs in the Lower 180-Foot Aquifer

Figure 4-10. Representative Groundwater Elevation Hydrographs in the 400-Foot Aquifer

Figure 4-11. Representative Groundwater Elevation Hydrographs in the Deep Aquifers

Figure 4-12. Representative Groundwater Elevation Hydrographs in the El Toro Primary Aquifer (South)

Figure 4-13. Representative Groundwater Elevation Hydrographs in the El Toro Primary Aquifer (North)

Figure 4-14. Historic Groundwater Extraction in the Monterey Subbasin

Figure 4-15. Total Water Use in WY 2023 by Sector and Source

Figure 4-16. Cumulative and Annual Change in Storage in the Marina-Ord Area

Figure 4-17. Change in Groundwater Elevations in the Marina-Ord Area, Fall 2021 to Fall 2022

Figure 4-18. Change in Groundwater Elevations in the Marina-Ord Area, Fall 2022 to Fall 2023

Figure 4-19. Cumulative and Annual Change in Storage in the Corral de Tierra Area

Figure 4-20. Change in Groundwater Elevations in the El Toro Primary Aquifer System, Fall 2022 to Fall 2023

Figure 4-21. Estimated InSAR Subsidence

Figure 5-1. Monterey Subbasin Sustainability Strategy

Tables of Contents
WY 2023 Annual Report
Monterey Subbasin

Appendices

- Appendix A WY 2023 Hydrologic Condition and Water Management in the Salina Valley Basin
- Appendix B Reassessment of Water Quality Constituents of Concern for the Corral de Tierra Area
- Appendix C SVBGSA Work Plan to Address Recommended Corrective Actions on 2022 GSPs

List of Abbreviations

AC	Advisory Committee
AEM	airborne electromagnetic
AF	acre-foot
AFY	acre-feet per year
ASGSA	Arroyo Seco Groundwater Sustainability Agency
ASR	aquifer storage and recovery
BMP	best management practice
BOD	Board of Directors
CCP	Consensus and Collaboration Program
CCR	California Code of Regulations
CCRWQCB	Central Coast Regional Water Quality Control Board
CCWG	Central Coast Wetlands Group
COCs	constituents of concern
CSIP	Castroville Seawater Intrusion Project
DAC	disadvantaged community
DDW	Division of Drinking Water
DMS	data management system
DWR	California Department of Water Resources
EO	Executive Order
FO	Fort Ord
ft	foot
FY	fiscal year
GDE	Groundwater dependent ecosystem
GEMS	Groundwater Extraction Management System
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GTAC	Groundwater Technical Advisory Committee
GWE	groundwater elevation
HCM	Hydrogeologic Conceptual Model
ILRP	Irrigated Lands Regulatory Program
IM	interim milestone
IM5	first interim milestone
InSAR	Interferometric Synthetic Aperture Radar
IPR	indirect potable reuse
ISW	interconnected surface water
JPA	Joint Powers Authority
M&A	Mongomery & Associates
MBGWFM	Monterey Subbasin Groundwater Flow Model
MCL	Maximum Contaminant Level

Tables of Contents
WY 2023 Annual Report
Monterey Subbasin

MCWDGSA	Marina Coast Water District Groundwater Sustainability Agency
MCWRA	Monterey County Water Resources Agency
mg/L	milligram per liter
MO	measurable objective
MPWMD	Monterey Peninsula Water Management District
MT	minimum threshold
NAVD 88	North American Vertical Datum of 1988
P&MAs	Projects and Management Actions
PRISM	Parameter-elevation Regressions on Independent Slopes Model
PVWMA	Pajaro Valley Water Management Agency
QA/QC	quality control/quality assurance
RCA	Recommended Corrective Action
RCDMC	Resource Conservation District of Monterey County
RCDSC	Resource Conservation District of Santa Cruz County
RMS	Representative Monitoring Site
SGMA	Sustainable Groundwater Management Act
SMCL	Secondary Maximum Contaminant Level
SMCs	Sustainable Management Criteria
SRDF	Salinas River Diversion Facility
SVA	Salinas Valley Aquitard
SVBGSA	Salinas Valley Basin Groundwater Sustainability Agency
SVGB	Salinas Valley Groundwater Basin
SVIHM	Salinas Valley Integrated Hydrologic Model
SWI	seawater intrusion
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TCE	trichloroethene
TDS	total dissolved solids
UCCE	University of California Cooperative Extension
UG/L	microgram per liter
UMHOS/CM	micromhos per centimeter
UR	undesirable result
U.S.	United States
USGS	United States Geological Survey
WAC	Water Awareness Committee
WBZ	Water Budget Zone
WY	water year

1 EXECUTIVE SUMMARY

The Monterey Subbasin (referred to herein as “the Subbasin”), California Department of Water Resources (DWR) Basin No. 3-004.10, is classified as a medium priority basin (Figure 1-1; DWR, 2019). To address the long-term reliability of groundwater within the Subbasin, the Marina Coast Water District Groundwater Sustainability Agency (MCWDGSA) and the Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) co-authored a Groundwater Sustainability Plan¹ (Monterey GSP or GSP), which was adopted by both GSAs and submitted to DWR on January 31, 2022 (MCWDGSA and SVBGSA, 2022). The GSP was approved by DWR in April 2023 (DWR, 2024).

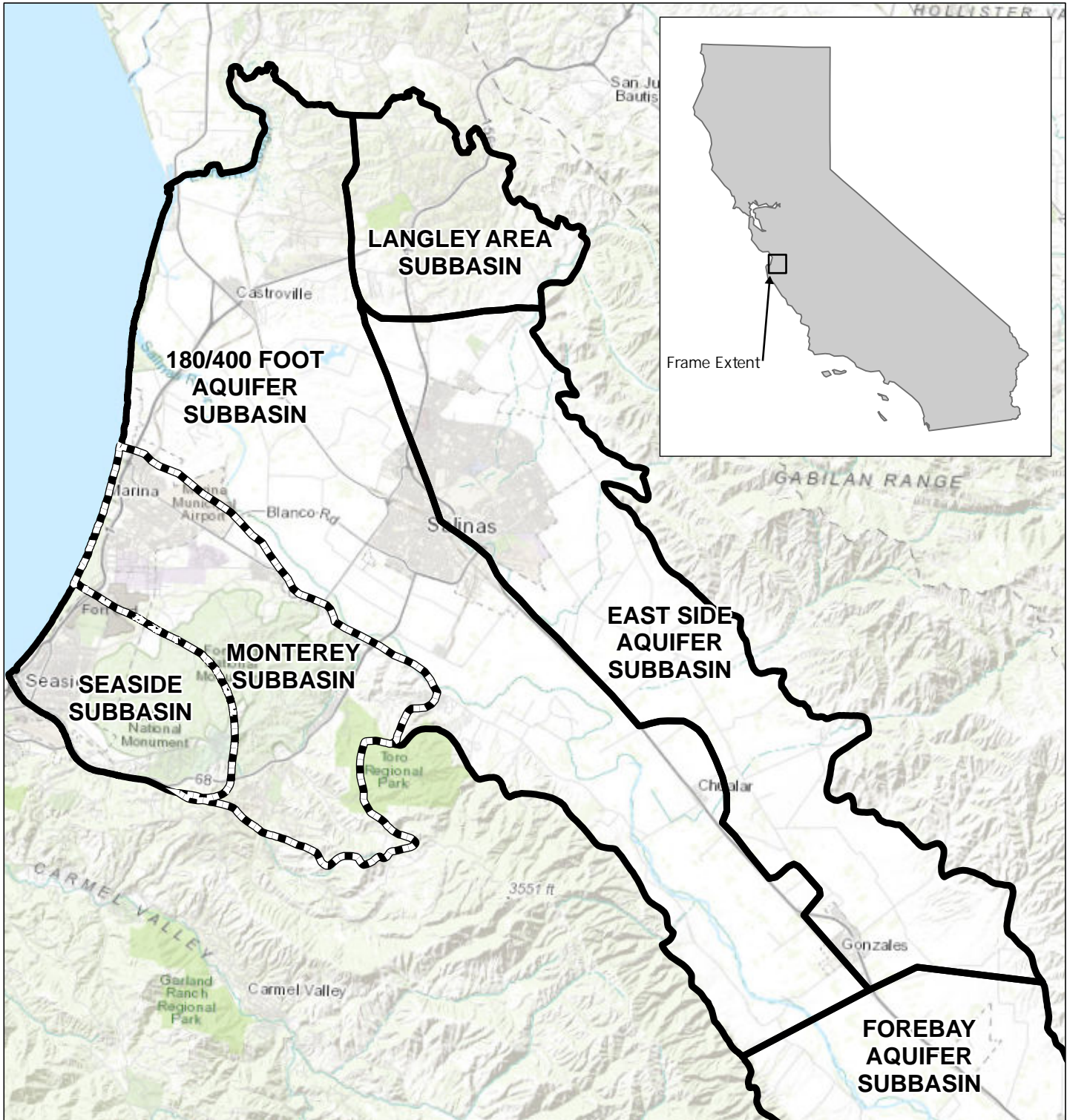
The GSP defined the sustainability goal of the Monterey Subbasin as follows:

“...to manage groundwater resources for long-term community, financial, and environmental benefits to the Subbasin’s residents and businesses. The goal of this GSP is to ensure long-term water supplies to local communities at a reasonable cost. In addition, because the Subbasin is hydrologically connected with other Salinas Valley Basin Subbasins, this GSP aims to develop a coordinated approach to groundwater management within this Subbasin and neighboring Subbasins. The Subbasin will achieve long-term sustainability through the implementation of inter- and intra- basin coordination as well as projects and management actions.”



The Monterey GSP establishes two Management Areas within the Subbasin. These Management Areas include the Marina-Ord Management Area (Marina-Ord Area) and the Corral de Tierra Management Area (Corral de Tierra Area) (Figure 1-2). The Marina-Ord Area consists of the lands within the City of Marina, the City of Seaside, and the former Fort Ord. The Corral de Tierra Area consists of the remainder of the Subbasin, which includes lands generally located south of State Route 68 and a few parcels along the northern subbasin boundary with the 180/400-Foot Aquifer Subbasin.

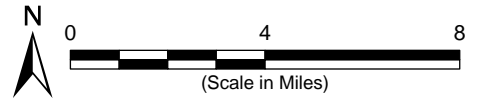
MCWDGSA has developed information for the Monterey GSP and ongoing Annual Reports for the Marina-Ord Area, and the SVBGSA has developed information for the Corral de Tierra Area. This Water Year (WY) 2023 Annual Report for the Subbasin has been prepared in compliance with the California Code of Regulations (CCR) 23 §356.2. WY 2023 includes the period from October 1, 2022, through September 30, 2023.

¹ The Monterey GSP can be downloaded via the SGMA Portal: <https://sgma.water.ca.gov/portal/gsp/preview/128>



Legend

-  Monterey Subbasin
-  Other Groundwater Subbasins within Salinas Valley Basin

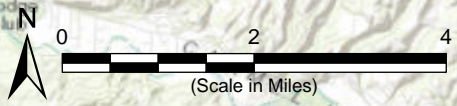
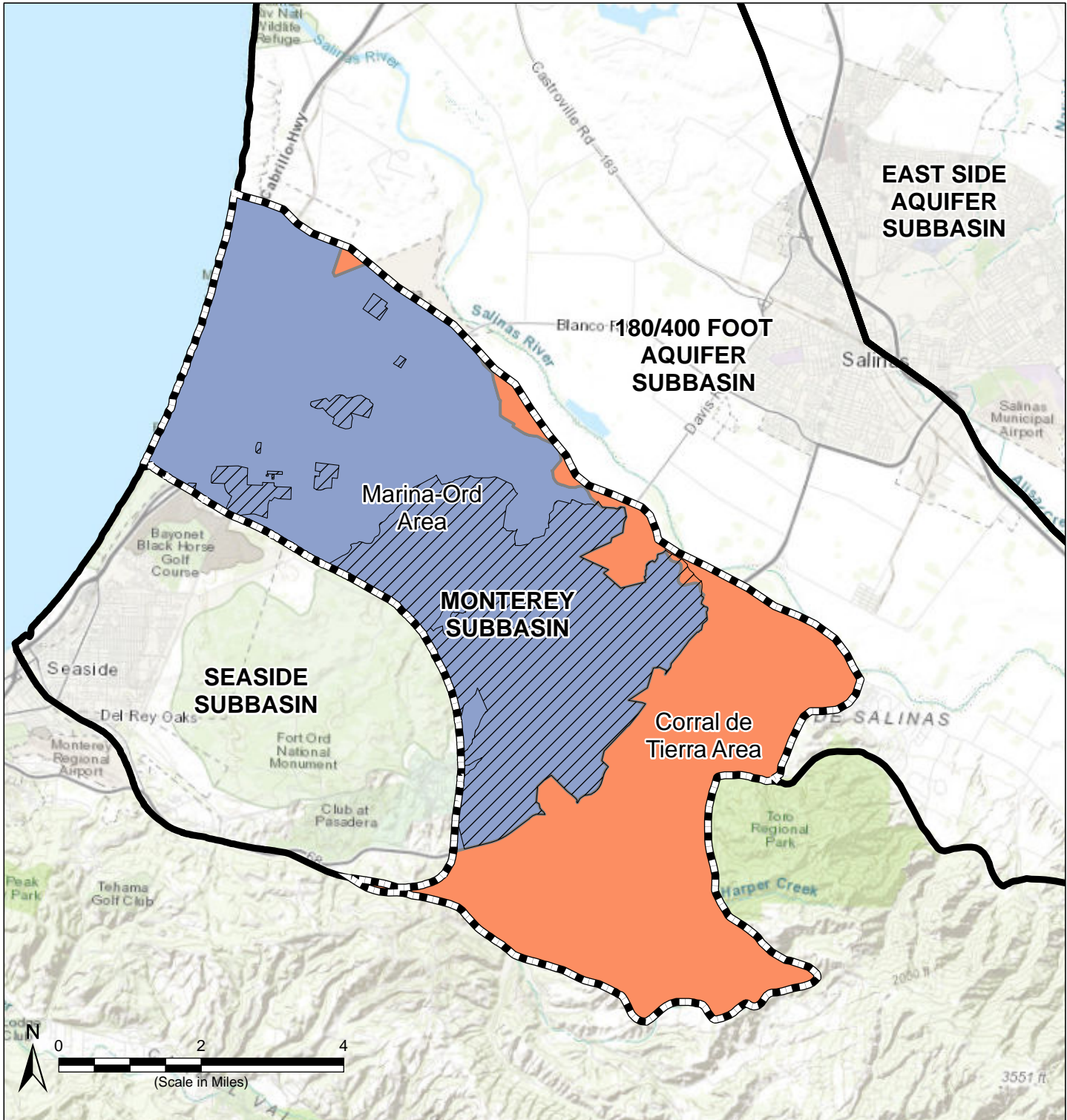


Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 25 January 2024.
2. DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2020 Update.

Monterey Subbasin

Monterey Subbasin
 WY 2023 Annual Report
 January 2024
Figure 1-1



Legend

- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley Basin
- Federal Lands
- Management Areas**
- Marina-Ord Area
- Corral de Tierra Area

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 25 January 2024.
2. DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2020 Update.

Management Areas

Monterey Subbasin
 WY 2023 Annual Report
 January 2024

Figure 1-2

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Executive Summary
WY 2023 Annual Report
Monterey Subbasin

Using the Water Year Type methodology developed by DWR (DWR, 2021), WY 2023 is classified as a wet year. In WY 2023, groundwater conditions remained similar to conditions in recent years, with slight changes related to specific Sustainability Indicators. Groundwater conditions monitoring data for the Marina-Ord Area and the Corral de Tierra Area during WY 2023 are summarized relative to their respective sustainable management criteria (SMCs) defined in the Monterey GSP below:

Marina-Ord Area

Increases of groundwater elevations in representative monitoring site (RMS) wells screened in the Dune Sand, 180-Foot, and the northern portion of the 400-Foot Aquifers were observed during WY 2023 due to increased precipitation in WY 2023 following two consecutive dry years. Groundwater elevations in these aquifers have been stable over the past thirty years with fluctuations that correlate to precipitation. Groundwater elevations continued to decline in two 400-Foot Aquifer RMS wells and four Deep Aquifer RMS wells located inland or near the Monterey-Seaside Subbasin boundary. Groundwater elevations in the southern 400-Foot Aquifer and Deep Aquifers have been declining since the 2000s.

- One well in the Dune Sand Aquifer, two wells in the lower 180-Foot and 400-Foot Aquifers, and seven wells in the Deep Aquifers exceeded their minimum thresholds (MTs) during the Fall 2023 monitoring event. MT exceedances in the lower 180-Foot and 400-Foot Aquifers and the Deep Aquifers constitute an undesirable result (UR) per the Monterey GSP.
- Groundwater extractions for WY 2023 in the Marina-Ord Area were approximately 3,338 acre-feet (AF). MCWD was the only agency that pumped groundwater water in the Marina-Ord Area. The groundwater production, measured by direct metering, was for urban water use only.
- The estimated change in groundwater storage in individual principal aquifers ranges from -1,060 AFY to +417 AFY between Fall 2022 and 2023 and within the range of changes observed historically.
- No data shows advancement of seawater intrusion in WY 2023.
- No wells sampled in WY 2023 had higher concentrations than groundwater quality regulatory standards (i.e., Title 22), so no MTs for the constituents of concern (COCs) were exceeded in water quality RMS wells in the Marina-Ord Area.
- Land subsidence measurements collected from Interferometric Synthetic-Aperture Radar (InSAR) data and provided by DWR showed no significant land subsidence occurred in the Subbasin during WY 2023.
- The groundwater elevation measured at the interconnected surface water (ISW) RMS well was higher than its MT and measurable objective (MO).

Corral de Tierra Area

- Groundwater elevations in the El Toro Primary Aquifer System showed fluctuations during WY 2023 with no specific spatial pattern. Based on groundwater elevations, an increase in groundwater storage was estimated between Fall 2022 and Fall 2023.
- Seven wells in the El Toro Primary Aquifer System exceeded their MTs during the Fall 2023 monitoring event. These MT exceedances in the El Toro Primary Aquifer System constitute an UR per the Monterey GSP.
- Groundwater extractions for reporting year 2022 (November 1, 2020, through October 31, 2021) were approximately 1,549 AF in the Corral de Tierra Area. Groundwater extraction reporting lags by a year because it is not available until after the Annual Report submittal.
- There is no seawater intrusion in the Corral de Tierra Area.
- Since completion of the last annual report, groundwater quality data available for the Subbasin has been reevaluated due to refinements made in the SWRCB's GAMA information system and the identified COCs has been revised for the Corral de Tierra Area. MTs for aluminum, arsenic, iron, manganese and radium in Divisions of Drinking Water wells were exceeded in WY 2023. For the ILRP on-farm domestic wells, the MT for specific conductance was also exceeded. However, these were not determined to be due to GSA groundwater management action or inaction.
- As mentioned above, no significant subsidence was detected in the Subbasin.
- There are no existing shallow monitoring wells in the Corral de Tierra Area that can be used to measure ISW. SVBGSA is working to fill this data gap and will install one new shallow monitoring well along El Toro Creek during GSP implementation.

During WY 2023, the Subbasin GSAs have taken numerous actions to implement the Monterey GSP. These include:

- **General Administration** – The Subbasin GSAs submitted a joint Sustainable Management Grant (SGM) Round 2 Implementation Grant application for the Monterey Subbasin, which was recommended for award. The grant includes efforts to support data expansion and SGMA compliance, regional project planning, and outreach and engagement activities. The MCWDGSA will administer the grant as the grantee and is finalizing the grant agreement with DWR. Additionally, in 2023, MCWD recruited and retained a Water Resources Analyst to support the District's and MCWDGSA's water management responsibilities. SVBGSA undertook administrative tasks including hiring a new General Manager, adding a second Deputy General Manager, and raising the regulatory fee for FY 2024, with plans for a comprehensive Regulatory Fee Study Update over the next two fiscal years.
- **Coordination and Engagement** – The Subbasin GSAs continued to coordinate regularly through staff and consultant meetings and strengthened collaboration with key agencies

Executive Summary
WY 2023 Annual Report
Monterey Subbasin

and partners. The Subbasin GSAs continued to regularly engage interested parties through their Boards of Directors, stakeholder workshops, and committees. MCWDGSA met with individual agencies to facilitate data sharing, expansion of the monitoring network, and project planning. SVBGSA continued robust collaboration with agency partners and held regular meetings of the Monterey Subbasin Implementation Committee. SVBGSA increased efforts to reach out to domestic well owners by initiating the Dry Well Notification Program and contributing to the Water Awareness Committee (WAC).

- **Data Expansion and SGMA Compliance** – In 2023, the Subbasin GSAs undertook extensive data expansion and SGMA compliance activities. The GSAs collectively focused on filling data gaps and groundwater modeling to establish a solid basis for planning projects and management actions. Joint efforts include:
 - Completing the administrative draft of the Deep Aquifers Study;
 - Convening and participating in the Groundwater Technical Advisory Committee;
 - Completing the initial development of the Seawater Intrusion Model to support the upcoming feasibility studies of regional projects and management actions; and
 - Developing an approach to address DWR’s Recommended Corrective Actions.

In addition, MCWDGSA focused on expanding its monitoring network and developing its seawater intrusion monitoring program. SVBGSA, in addition to leading the joint data expansion efforts, conducted workstreams including the Well Registration Program, GEMS expansion, GDE verification, and Deep Aquifers data collection.

- **Projects and Management Actions** – The SVBGSA led regional project planning efforts with the SGM Round 1 Implementation Grant for the 180/400-Foot Aquifer Subbasin and engaged the Monterey Subbasin Implementation Committee in a series of planning discussions for the Corral de Tierra Area. Within the Marina-Ord Area, the MCWDGSA proceeded with monitoring well planning and design with anticipated construction in WY 2024. The GSAs anticipate additional work efforts in WY 2024 to implement the SGM Round 2 Implementation Grant funding.

2 INTRODUCTION

2.1 Purpose

The 2014 California Sustainable Groundwater Management Act (SGMA) requires that, following the adoption of a GSP, GSAs annually report on the condition of the Subbasin and show that the Monterey GSP is being implemented in a manner that will likely achieve the sustainability goal for the Subbasin. This report fulfills that requirement for the Salinas Valley – Monterey Subbasin (Subbasin; DWR Basin 3-004.10).

This WY 2023 Annual Report for the Subbasin has been prepared in compliance with CCR 23 §356.2. WY 2023 includes the period from October 1, 2022, through September 30, 2023. This Annual Report also contains available and appropriate historical information back to calendar year 2015, the effective date of SGMA as required by CCR 23 §356.2 (b). This data provide an understanding of Subbasin conditions through the current reporting year. This Annual Report describes Subbasin conditions and includes hydrographs, groundwater elevation contour maps, estimates of changes in groundwater storage, and maps depicting the distribution of groundwater extraction across the Subbasin. It compares WY 2023 data to SMCs as a measure of where groundwater conditions within Subbasin are with respect to the Sustainability Goal that must be reached and maintained by the end of 2042.

2.2 Monterey Subbasin Groundwater Sustainability Plan

The Monterey GSP was co-authored by MCWDGSA and SVBGSA and submitted to DWR on January 30, 2022 (MCWDGSA and SVBGSA, 2022). The GSP was approved by DWR in April 2024 (DWR, 2024). The MCWDGSA is a single-agency GSA formed by the MCWD. The SVBGSA is a Joint Powers Authority (JPA) with membership comprising the County of Monterey, Monterey County Water Resources Agency (MCWRA), City of Salinas, City of Soledad, City of Gonzales, City of King, Castroville Community Services District, and Monterey One Water.

The GSAs developed the Monterey GSP in coordination with the five other Salinas Valley Subbasin GSPs: the Eastside Aquifer Subbasin (DWR subbasin 3-004.02), the Forebay Aquifer Subbasin (DWR subbasin 3-004.04), the Upper Valley Aquifer Subbasin (DWR subbasin 3-004.05), the Langley Area Subbasin (DWR subbasin 3-004.09) and the 180/400-Foot Aquifer Subbasin (DWR subbasin 3-004.01).

The Monterey GSP covers the entire Subbasin, which encompasses 30,850 acres (or 48.2 square miles) in the northwestern Salinas Valley Groundwater Basin (SVGB) in the Central Coast region of California (Figure 1-1. Monterey Subbasin). The Subbasin has been designated as medium priority by DWR. The Monterey GSP established two Management Areas within the Subbasin (Figure 1-2): the Marina-Ord Area and the Corral de Tierra Area.

2.3 Organization of This Report

This Annual Report has been developed pursuant to GSP Emergency Regulations §356.2 and DWR's guidelines for annual reports (DWR, 2023a). The Report outlines subbasin conditions, including groundwater elevations, groundwater extractions, surface water use, total water use, and changes in groundwater storage. The Report also reports on actions taken to implement the Monterey GSP and identifies any progress in reaching interim milestones (IMs).

3 SUBBASIN SETTING

The Subbasin is located at the northwestern end of the Salinas Valley Groundwater Basin, an approximately 90-mile-long alluvial basin underlying the elongated, intermountain valley of the Salinas River. The Subbasin includes the portions of the Monterey Bay coastal plain, south of the approximate location of the Reliz Fault, as well as upland areas to the southeast of the coastal plain. As further detailed in the Monterey GSP, the Subbasin has complex local hydrostratigraphy and represents a transition zone between the more defined, laterally continuous aquifer system along the central axis of the Salinas Valley and the less continuous aquifer systems towards the Sierra de Salinas.

3.1 Principal Aquifers and Aquitards

The Monterey GSP defined a series of principal aquifers and aquitards respectively for the Marina-Ord Area and the Corral de Tierra Area.

Hydrostratigraphy in the Marina-Ord Area consists of a series of laterally continuous aquifers consistent with the aquifers that form the distinguishing features of the northern Salinas Valley. The principal aquifers within the Marina-Ord Area include the unconfined Dune Sand Aquifer and the confined aquifers known as the 180-Foot Aquifer, the 400-Foot Aquifer, and the Deep Aquifers. In the coastal portion of the Marina-Ord Area, the 180-Foot Aquifer is subdivided into the upper 180-Foot Aquifer and the lower-180-Foot Aquifer, separated by the Intermediate 180-Foot Aquitard. Hydraulic conductivity of the aquifers underlying the Marina-Ord Area varies by aquifer and location. Groundwater production principally occurs from the 180-Foot, 400-Foot, and Deep Aquifers.

The Corral de Tierra Area has one principal aquifer, the El Toro Primary Aquifer System. The water-bearing units have historically been described by their geologic names, such as the Aromas Sand, Paso Robles Formation, and Santa Margarita Sandstone (Geosyntec, 2007; Yates 2005). Based on the best available information and many wells that span multiple formations, the GSP groups these geologic formations together into one principal aquifer.

3.2 Natural Groundwater Recharge and Discharge

Natural groundwater recharge occurs through the infiltration of precipitation, overlying surface water bodies, and excess applied irrigation water. Most of the Marina-Ord Area has good recharge potential (i.e., “A” and “B” hydrologic soil types) due to the high permeability of the Dune Sand Aquifer, which subsequently recharges the underlying 180-Foot and 400-Foot Aquifers. Most of the Corral de Tierra Area also has good recharge potential due to high permeability soils that recharge the underlying sandy, gravelly layers of the Aromas Sand and Paso Robles Formation; however, there is also high runoff during storm events.

Primary surface water bodies in the Subbasin include the Salinas River and Toro Creek. The Salinas River crosses into the Subbasin in two locations in the Corral de Tierra Area and may

Subbasin Setting
WY 2023 Annual Report
Monterey Subbasin

provide some recharge in areas that are not underlain by the Salinas Valley Aquitard (SVA) that generally exists in the 180/400-Foot Aquifer Subbasin. Toro Creek is generally perennial below the confluence with Watson Creek (Feikert, 2001). Recorded streamflows at USGS gage 11152540 from 1961 to 2001 indicate a mean annual streamflow of 1,590 acre-feet per year (AFY) for Toro Creek, however, not all years registered flow (GeoSyntec, 2007). Additionally, most flow occurs in the winter and spring months (GeoSyntec, 2007).

3.3 Precipitation and Water Year Type

Precipitation that falls within the Subbasin contributes to runoff and recharge components of the water budget. Precipitation rates within the Subbasin were estimated using the 4-kilometer gridded dataset from the Parameter-elevation Regressions on Independent Slopes Model (PRISM)², which reasonably reflects the spatial distribution of precipitation at a daily resolution over the entire extent of the Subbasin. The total precipitation in WY 2023 was estimated to be approximately 24.9 inches (in).

DWR’s methodology was used to assign a water year type of critical, dry, below normal, above normal, or wet based on precipitation that occurred in the Subbasin during the current year and prior years (DWR, 2021). Using DWR’s methodology, WY 2023 was classified as a wet year, ending the consecutive dry years of WY 2021 and 2022.

Table 3-1 identifies the assigned water year type for each water year since 2015.

Table 3-1. Water Year Type

WY	Precipitation (in)	Water Year Index	Water Year Type
2015	12.9	11.1	Dry
2016	19.4	16.8	Above Normal
2017	23.7	22.0	Wet
2018	11.6	16.5	Above Normal
2019	20.5	17.0	Above Normal
2020	14.6	17.0	Above Normal
2021	11.1	12.5	Dry
2022	12.7	12.0	Dry
2023	24.9	20.0	Wet

A summary of the water year context for water use and management in the larger Salinas Valley Basin is provided in Appendix A. Groundwater use, management, and conditions in the larger Salinas Valley Basin, particularly the adjacent 180/400 Foot Aquifer Subbasin, significantly affect outflows and the water budget in the Monterey Subbasin. As such, they provide context for interpreting water use fluctuations and trends in the Monterey and adjacent Subbasins.

² <https://prism.oregonstate.edu/recent/>

4 SUBBASIN CONDITIONS

This section details groundwater conditions within the Subbasin based on monitoring data collected during WY 2023. Where WY 2023 data are not available, groundwater conditions are evaluated based on the most recent data available as further described below.

4.1 Groundwater Elevations

Since last year’s annual report, MCWDGSA updated the list of representative monitoring sites (RMSs) in the Marina-Ord Area to remove and replace sites no longer maintained by the United States (U.S.) Army at Fort Ord. As detailed in Section 5.1.1, a total of four wells were replaced and SMCs were calculated for the replacement wells; one well was removed as no replacement candidate was available in its vicinity. The groundwater elevation monitoring network in the Subbasin currently consists of 46 RMS wells, including 34 RMS wells in the Marina-Ord Area and 12 RMS wells in the Corral de Tierra Area. The GSAs are working to fill data gaps with additional wells to include in the monitoring network. The locations of the current groundwater elevation RMS wells within the Marina-Ord Area and the Corral de Tierra Area are shown on the figures in Section 4.1.2.

The groundwater elevation monitoring network and RMS network for each Management Area are broken out by principal aquifer. However, as further discussed in Monterey GSP, the 180-Foot Aquifer is separated into an “upper” and a “lower” portion by a clay layer in the coastal areas of the Marina-Ord Area. In these areas, groundwater elevation and seawater intrusion conditions in the upper 180-Foot Aquifer are distinct from those in the lower 180-Foot Aquifer, while conditions in the lower 180-Foot Aquifer are generally more consistent with those observed in the 400-Foot Aquifer. Therefore, the monitoring network and RMS network are selected to additionally distinguish the upper 180-Foot Aquifer and the lower 180-Foot Aquifer.

This section presents groundwater elevation contours from WY 2023 and long-term hydrographs for selected wells in the Subbasin’s monitoring network.

4.1.1 Groundwater Elevation Contours

In the Marina-Ord Area, groundwater elevation contour maps during Fall 2022³, Spring 2023, August 2023, and Fall 2023 are represented on Figure 4-1, Figure 4-2, Figure 4-3, and Figure 4-4, respectively. Groundwater elevation contour maps for Spring 2023 and August 2023 respectively reflect seasonal high and seasonal low groundwater elevations in each principal aquifer during WY 2023. In addition, groundwater elevation contours were prepared for Fall 2022 and Fall 2023, which corresponds to the November and December monitoring timeframe upon which MTs and MOs for the Subbasin and neighboring subbasins within the greater Salinas Valley Basin have been established.

³ Although technically not within WY 2023, Fall 2023 conditions are presented in this report and compared to established MTs and MOs consistent with the other Salinas Valley subbasins managed by SVBGSA. Contours for the Marina-Ord Area during Fall 2022 are included as they were not available for inclusion in the WY 2022 Annual Report.

Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

In the Corral de Tierra Area, groundwater elevation contour maps are presented for August 2023, and Fall 2023 on Figure 4-5 and Figure 4-6, respectively. The August groundwater elevation contours represent the seasonal low conditions. The Fall contours show the conditions during November and December upon which MTs and MOs have been established. In addition, as only few wells are monitored in the spring season in the Corral de Tierra Area, the Fall contours are used to represent the seasonal high conditions, even though they are more reflective of neutral groundwater conditions that are generally not heavily influenced by either summer irrigation pumping or winter rainfall recharge.

Groundwater flow directions and groundwater levels observed during these periods in the Marina-Ord Area and Corral de Tierra Area are summarized below.

4.1.1.1 Marina-Ord Area

As mentioned in Section 3.1 above, principal aquifers in the Marina-Ord Area include the Dune Sand Aquifer, 180-Foot Aquifer, 400-Foot Aquifer, and Deep Aquifers.

Dune Sand Aquifer

As discussed in *Section 4* of the Monterey GSP, within the Monterey Subbasin, the Dune Sand Aquifer only exists in the Marina-Ord Area. Groundwater elevations and flow directions observed in the Dune Sand Aquifer during WY 2023 were generally consistent with those observed in the recent past. The groundwater elevations in the Dune Sand Aquifer are further described below.

- Groundwater elevations in the Dune Sand Aquifer are highest in the central portion of the Marina-Ord Area, where a groundwater divide exists (Figure 4-1 through Figure 4-4). At the top of this divide, groundwater elevations were approximately 96 feet North American Vertical Datum of 1988 (ft NAVD 88) during Fall 2023. Groundwater elevations were lowest at the coast at approximately 8 ft NAVD 88 where the Dune Sand Aquifer merges with the upper 180-Foot Aquifer west of the SVA. Groundwater level data for the Dune Sand Aquifer are limited in the southern portion of the Marina-Ord Area near the Monterey-Seaside Subbasin boundary and at the eastern extent of the Dune Sand Aquifer.
- West of the groundwater divide, groundwater in the Dune Sand Aquifer flows westward towards the Pacific Ocean and recharges the 180-Foot Aquifer where the SVA pinches out. Upon entering the 180-Foot Aquifer, groundwater abruptly reverses direction and flows eastward (i.e., inland). East of the groundwater divide, groundwater in the Dune Sand Aquifer flows to the northeast toward the 180/400-Foot Aquifer Subbasin and the Salinas River.
- Limited seasonal variations were observed in groundwater elevations within Dune Sand Aquifer during Spring 2023 and August 2023.

Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

180-Foot Aquifer

In the coastal portion of the Marina-Ord Area, the 180-Foot Aquifer is subdivided into the upper 180-Foot Aquifer and the lower-180-Foot Aquifer. Conditions in both portions of the 180-Foot Aquifer during WY 2023 were generally consistent with those observed in the recent past. The Groundwater elevations in the upper 180-Foot Aquifer are described below.

Upper 180-Foot Aquifer

- Groundwater elevations in the upper 180-Foot Aquifer are highest at the coastline and generally decrease inland to the east/northeast. Flow directions are generally to the northeast toward the 180/400-Foot Aquifer Subbasin.
- Groundwater elevations in the upper 180-Foot Aquifer were approximately 8 ft NAVD 88 at the coastline during Fall 2023 and generally decreased inland to the east/northeast, where groundwater elevations were approximately -10 ft NAVD 88. Groundwater elevations observed in Spring 2023 and Fall 2023 were generally higher than those observed in August 2023, but as discussed below in Section 4.1.2, seasonal variation in groundwater levels between these time periods is limited to a few feet (ft).
- Groundwater elevations are slightly higher than sea level at the coastline and are below sea level further inland. This inland gradient allows high salinity water to flow into the northwestern portion of the Subbasin. However, inflow from the Dune Sand Aquifer near the coastline protects the upper 180-Foot Aquifer from seawater intrusion in the remaining portions of the Marina-Ord Area.

Lower 180-Foot Aquifer

As discussed in *Section 4* of the Monterey GSP, the lower 180-Foot Aquifer is hydraulically connected to the 400-Foot Aquifer in the Marina-Ord Area due to the discontinuous nature of the 180/400-Foot Aquitard within this region. As such, groundwater elevations and gradients in the lower 180-Foot Aquifer are similar to those in the 400-Foot Aquifer in the Marina-Ord Area of the Subbasin, as further described below.

400-Foot Aquifer

Groundwater elevations and flow directions observed in the 400-Foot Aquifer during WY 2023 are generally consistent with those observed in the recent past but some declines within the historical range of fluctuations were observed at specific RMS wells as described in Section 4.1.2 below. Groundwater elevations in this aquifer have been plotted in combination with groundwater elevations observed within the Paso Robles Formation in the adjacent Seaside Subbasin. Available data indicate that these aquifers are potentially hydraulically connected; however, there is also a possible connection between the Paso Robles Formation in the Seaside Subbasin with the upper portion of the Deep Aquifers in the Subbasin.

- Groundwater elevations in the 400-Foot Aquifer were highest in the southern portion of the Subbasin and generally decreased to the north and east. Flow directions are generally toward the northeast and the 180/400-Foot Aquifer Subbasin. A flow divide occurs along

Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

the Monterey-Seaside Subbasin boundary. A local groundwater depression exists just north of the Monterey-Seaside Subbasin boundary. However, as discussed in *Section 5.1.3* of the Monterey GSP, there is no known extraction in the vicinity of these wells, and groundwater elevation trends observed in these wells are similar to those measured in the Deep Aquifers. These data suggest that (1) these wells are screened within sediments that connect directly to the Deep Aquifers; or (2) leakage is occurring from the 400-Foot Aquifer into the Deep Aquifers in the vicinity of these wells. This potential connectivity will be evaluated as part of the Deep Aquifers Study and MCWDGSA's plans to install additional monitoring wells in this area. The depression is not near supply wells or groundwater dependent ecosystems (GDEs) so beneficial users are not impacted. However, further declines in groundwater levels could lead to sea water intrusion within the southern portion of the Monterey Subbasin.

- During Fall 2023, groundwater elevations in the Marina-Ord Area ranged from 0 ft NAVD 88 near the coast to approximately -10 ft NAVD 88 at the Monterey-180/400-Foot Aquifer Subbasin boundary. Groundwater elevations were approximately -30 ft NAVD 88 at the local depression near the Monterey-Seaside Subbasin boundary. Groundwater elevations during Fall 2023 were similar to those observed during Spring 2023 in the Marina-Ord Area. Groundwater elevations during August 2023 were generally lower than those observed during the spring, but the variation in groundwater levels among these time periods was limited to less than 10 feet.
- Groundwater elevations are near sea level at the coastline and below sea level farther inland. As discussed in *Section 4* of the Monterey GSP, the geologic formations that make up this aquifer extend offshore and likely outcrop beneath a veneer of Pleistocene or Holocene marine sediments that is thin (i.e., less than 5 meters) across much of the offshore shelf but thicker (i.e., up to 32 meters) near the Salinas River Delta (Johnson et al., 2016). The combination of groundwater levels and Bay outcrops allow high salinity water to flow into this aquifer in the northern portion of the Subbasin.

Deep Aquifers

As discussed in *Section 4* of the Monterey GSP, the Deep Aquifers consist of multiple water-bearing zones and aquitards that appear to be somewhat hydraulically connected. Given the absence of data for the multiple layers that make up this aquifer, this assessment generally describes conditions in the Deep Aquifers as a whole. The Deep Aquifers Study funded by MCWDGSA, SVBGSA, and other cooperative funding partners is examining the extent of the Deep Aquifers and its connectivity to adjacent aquifers. For this annual report, groundwater elevation contours for the Deep Aquifers follow the extent included in the GSP, where groundwater elevations in the Deep Aquifers have been plotted with groundwater elevations within the Santa Margarita Sandstone in the Seaside Subbasin. Groundwater elevations and flow directions observed in the Deep Aquifers during WY 2023 are generally consistent with those observed in the recent past as further described below.

- Groundwater elevations in the Deep Aquifers are highest in the southeastern portion of

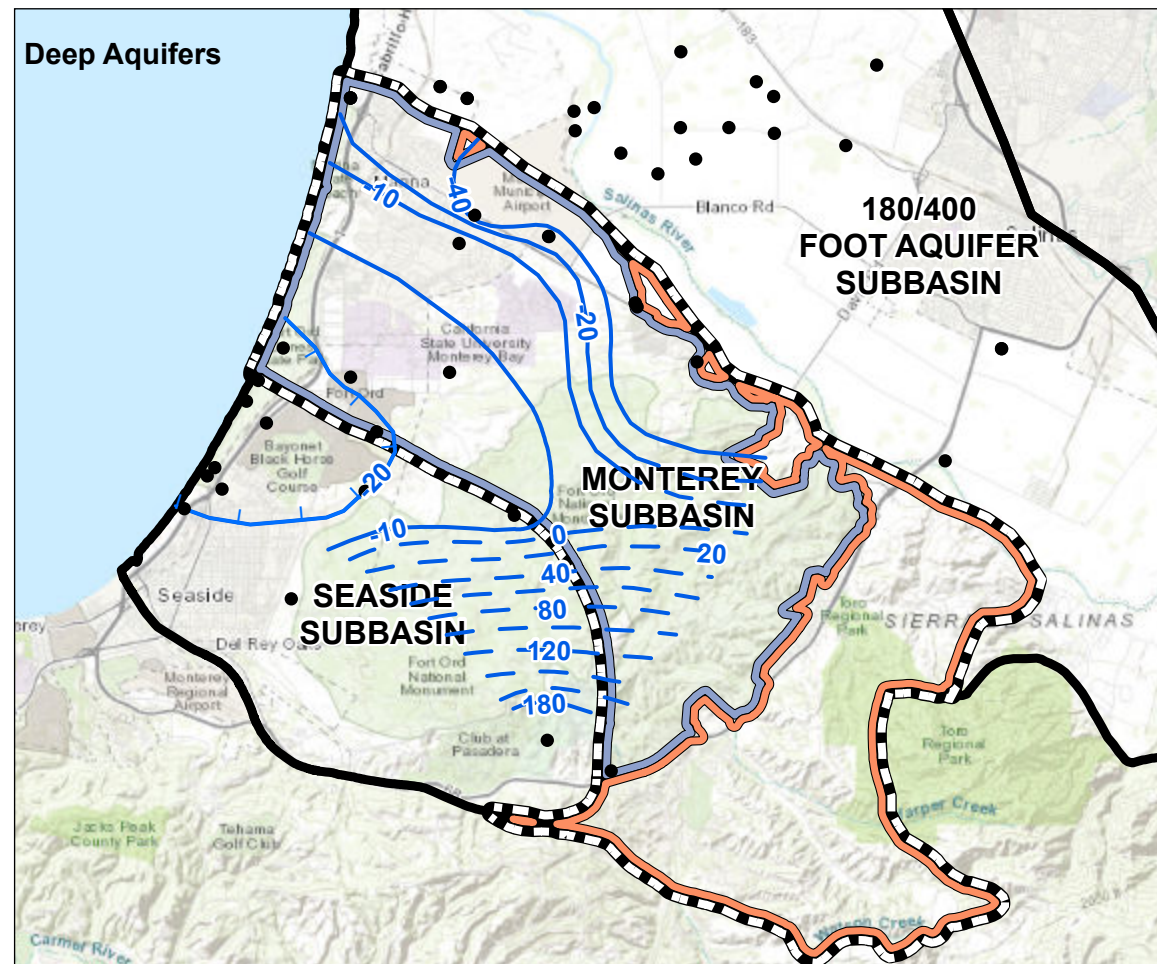
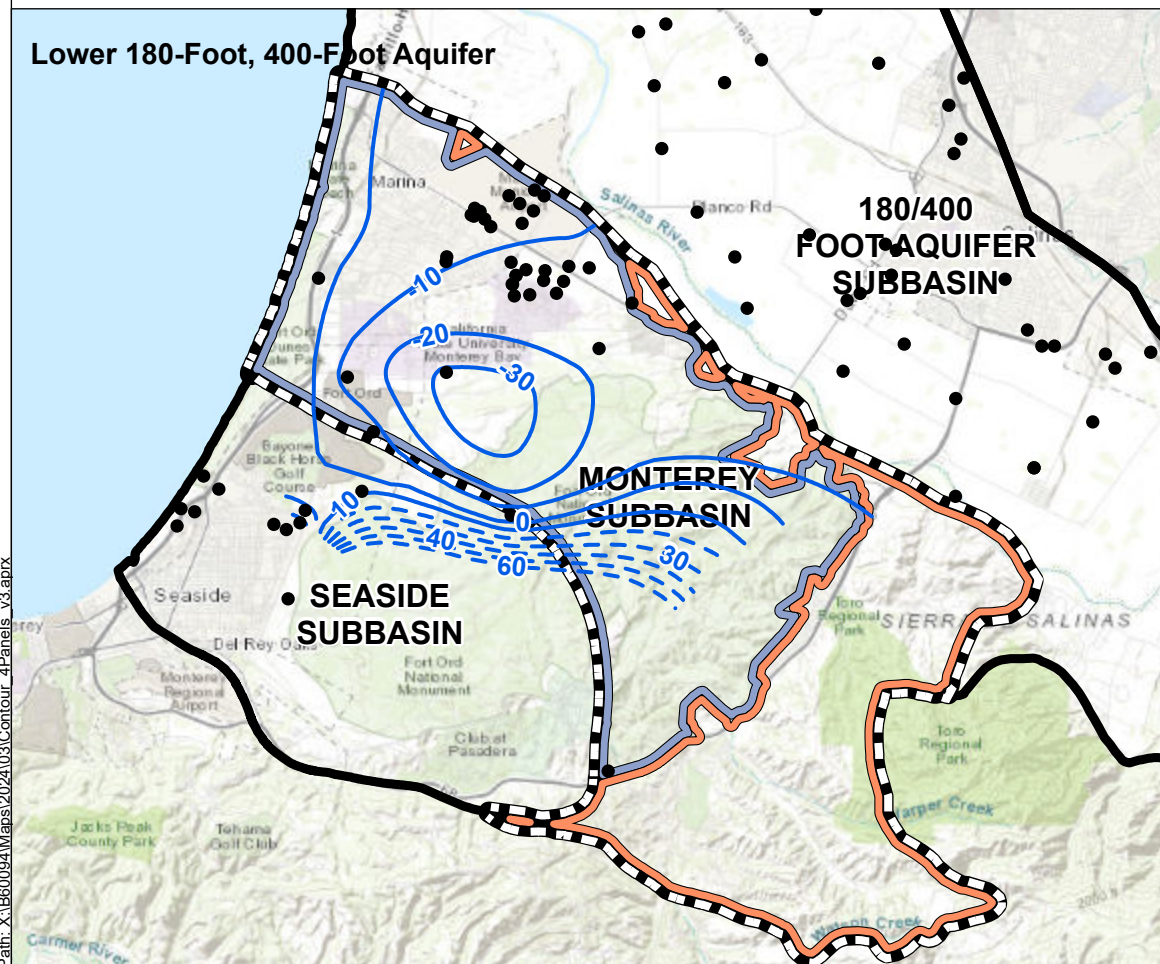
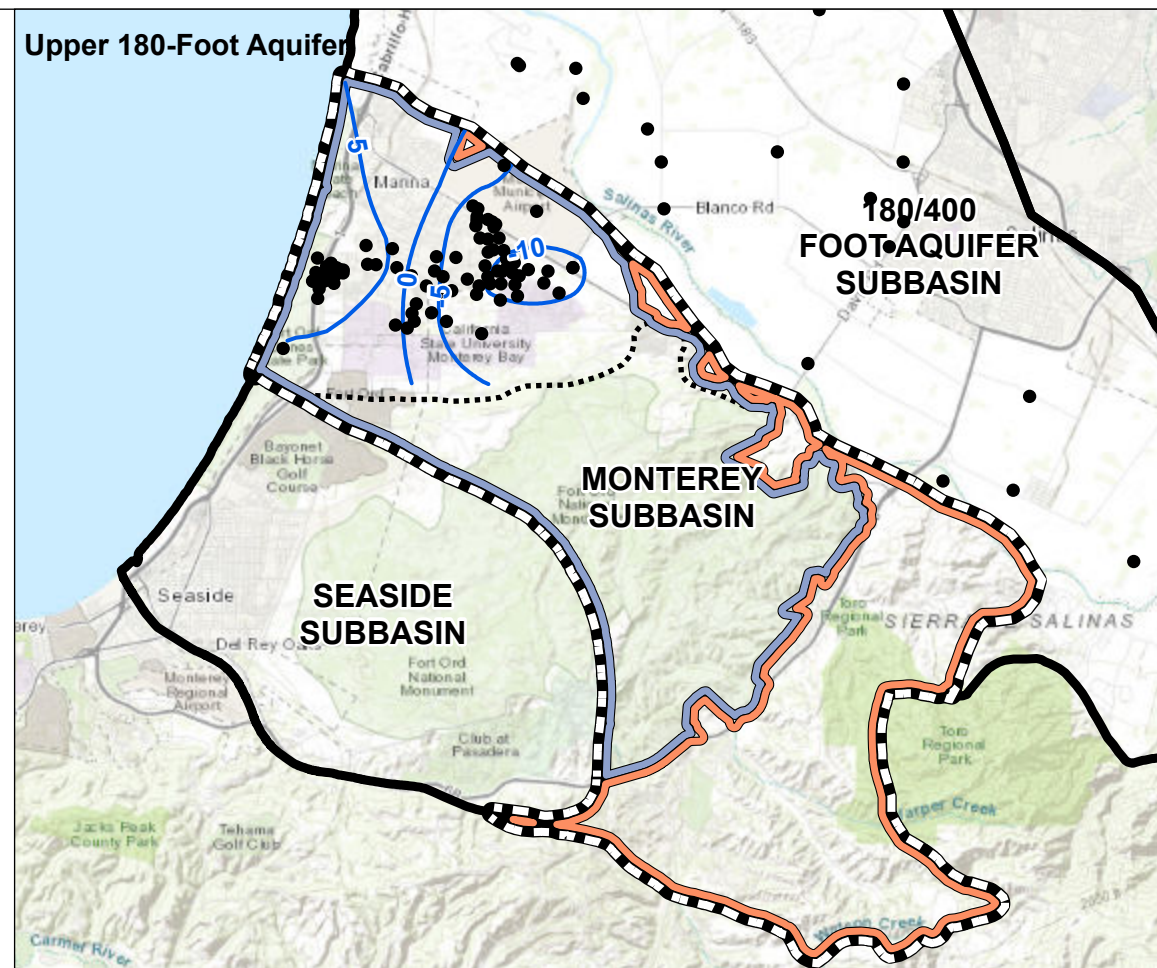
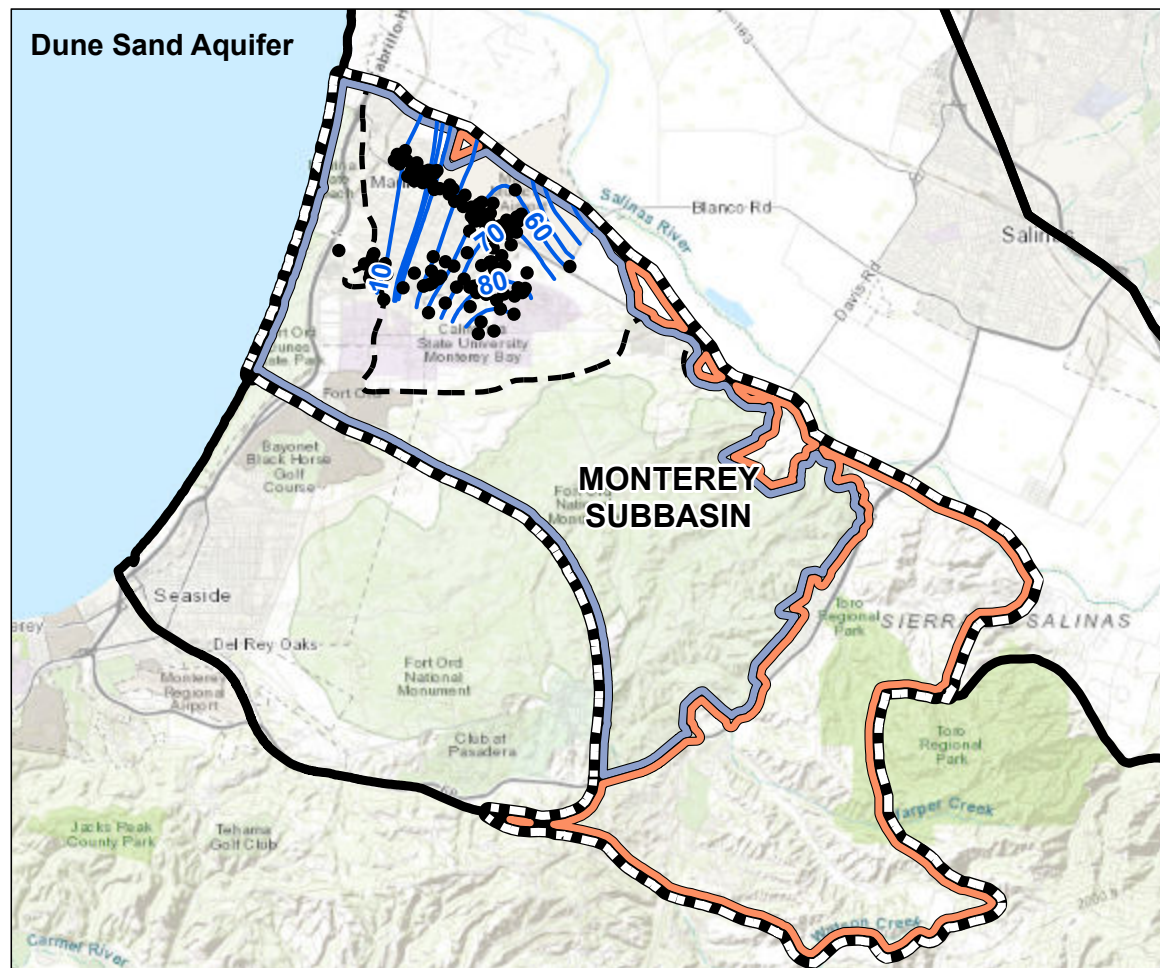
Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

the Marina-Ord Area and generally decrease toward the northwest. A groundwater divide exists in the central region of the Marina-Ord Area, running parallel to the boundary of the Monterey-Seaside Subbasins. To the south of this groundwater divide, the groundwater flows south toward the pumping depression in the Seaside subbasin, while to the north of the divide, groundwater flows northward toward a pumping trough located in the 180/400-Foot Aquifer Subbasin near West Blanco Road and Nashua Road.

- Groundwater elevations ranged from approximately 160 ft NAVD 88 near the southeastern Subbasin boundary with the Seaside Subbasin to -58 ft NAVD 88 in the north near the Monterey-180/400-Foot Aquifer Subbasin boundary during Fall 2023. Groundwater elevations were, for the most part, up to 20 feet lower in August 2023 than in Spring 2023 in the Marina-Ord Area. The Fall 2023 groundwater elevations were between the seasonal high (i.e., Spring 2023) and seasonal low (i.e., August 2023).

4.1.1.2 Corral de Tierra Area

Figure 4-5 shows the Fall 2023 groundwater elevation contours within the El Toro Primary Aquifer System in the Corral de Tierra Area, respectively. Groundwater in the El Toro Primary Aquifer System generally flows from the south toward the north, northwest, and northeast. A potential groundwater flow divide occurs near the Monterey-Seaside Subbasin boundary in the Laguna Seca area. There may be localized depressions around pumping centers, but there is insufficient data to show them in the groundwater elevation contours. Additionally, the top of the Monterey Formation, which is the defined bottom of the Subbasin, is uplifted in this area due to structural deformation, and may impact flow direction. In Fall 2023, the groundwater elevations in the El Toro Primary Aquifer System ranged from approximately 900 ft to -20 ft NAVD 88 from south to north. Groundwater elevations contours for August 2023 are provided in Figure 4-6 and show similar flow patterns to the Fall 2023 groundwater elevation contours.



Legend

- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley Basin
- Southern Extent of FO-SVA (Harding ESE, 2001)
- Dune Sand Groundwater Divide
- Southern Extent of Valley Fill Deposits (Harding ESE, 2001)
- Fall 2022 Groundwater Contours
- GWE Measurement Locations
- Pumping Depression

Management Areas

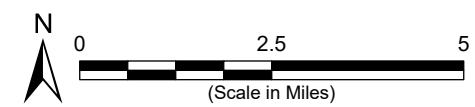
- Marina-Ord Area
- Corral de Tierra Area

Abbreviations

ft = foot
 NAVD 88 = North American Vertical Datum of 1988

- Notes**
1. All locations are approximate.
 2. Groundwater contours are in ft NAVD 88 and dashed where uncertain.
 3. The groundwater contours for the Deep Aquifers were prepared at 20-foot intervals, and the -10-foot NAVD 88 contours were included to inform the groundwater divide.
 4. MPWMD#FO-10S is known to be screened in the Paso Robles Aquifer, which is likely connected to the 400-Footer Aquifer. MPWMD#FO-10D and Sentinel MW#1 are screened in the Santa Margarita Aquifer, which is likely connected to the Deep Aquifers.
 5. Groundwater elevations in 400-Footer Aquifer have been plotted in combination with groundwater elevations observed within the Paso Robles Aquifer identified in the adjacent Seaside Subbasin. Groundwater elevations in the Deep Aquifers have been plotted with groundwater elevations within the Santa Margarita Aquifer in the Seaside Subbasin.

- Sources**
1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 28 March 2024.
 2. Groundwater contours are drawn with groundwater elevation measurements collected during Fall 2022. Only static water levels are plotted.

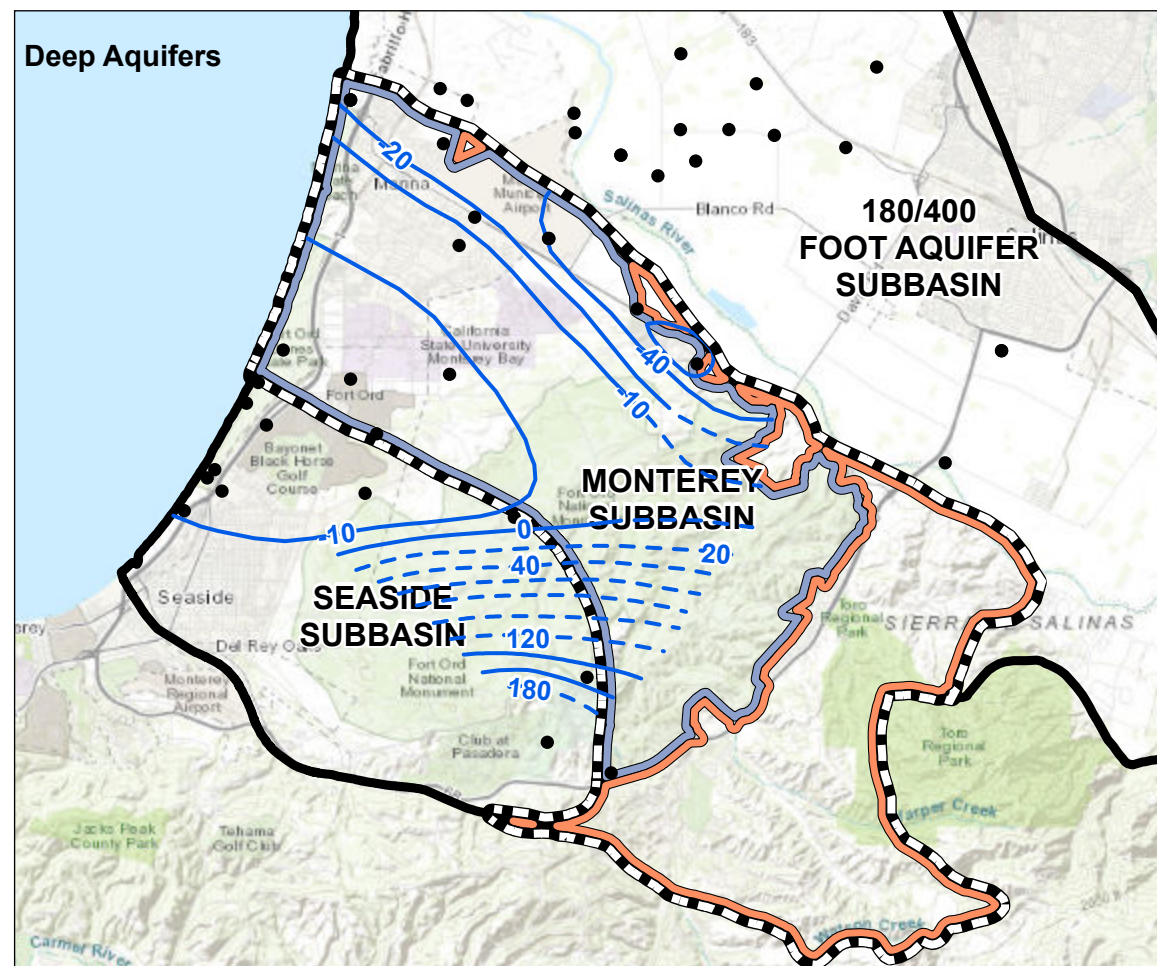
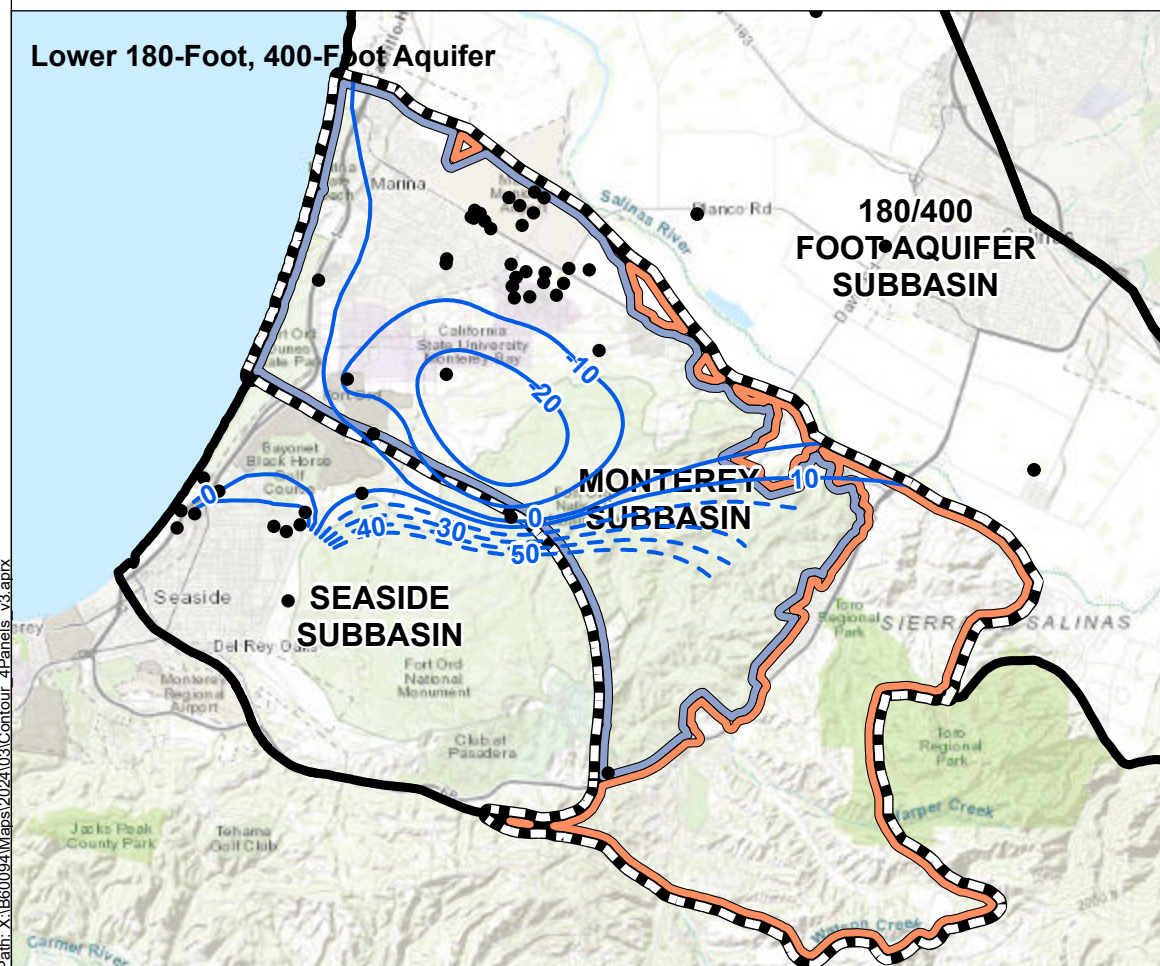
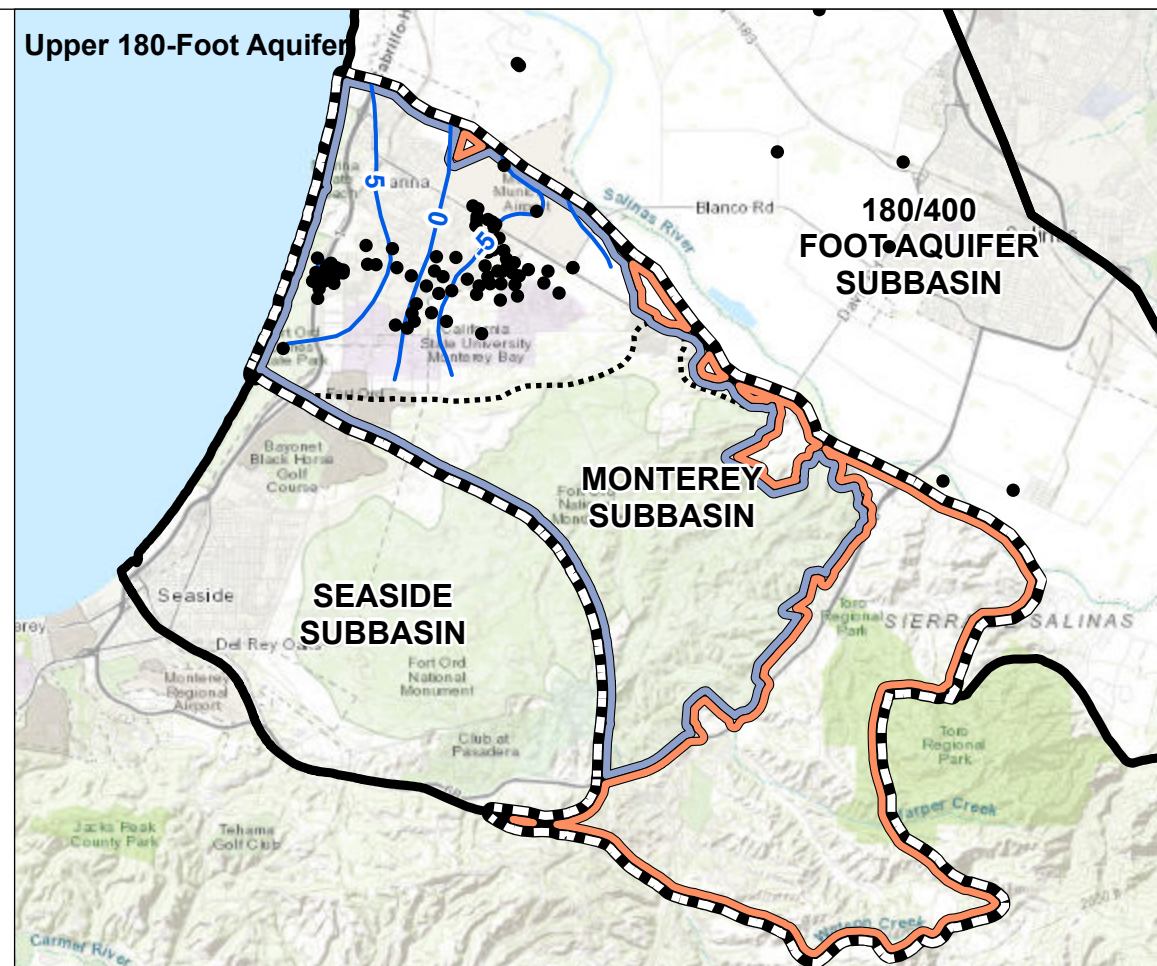
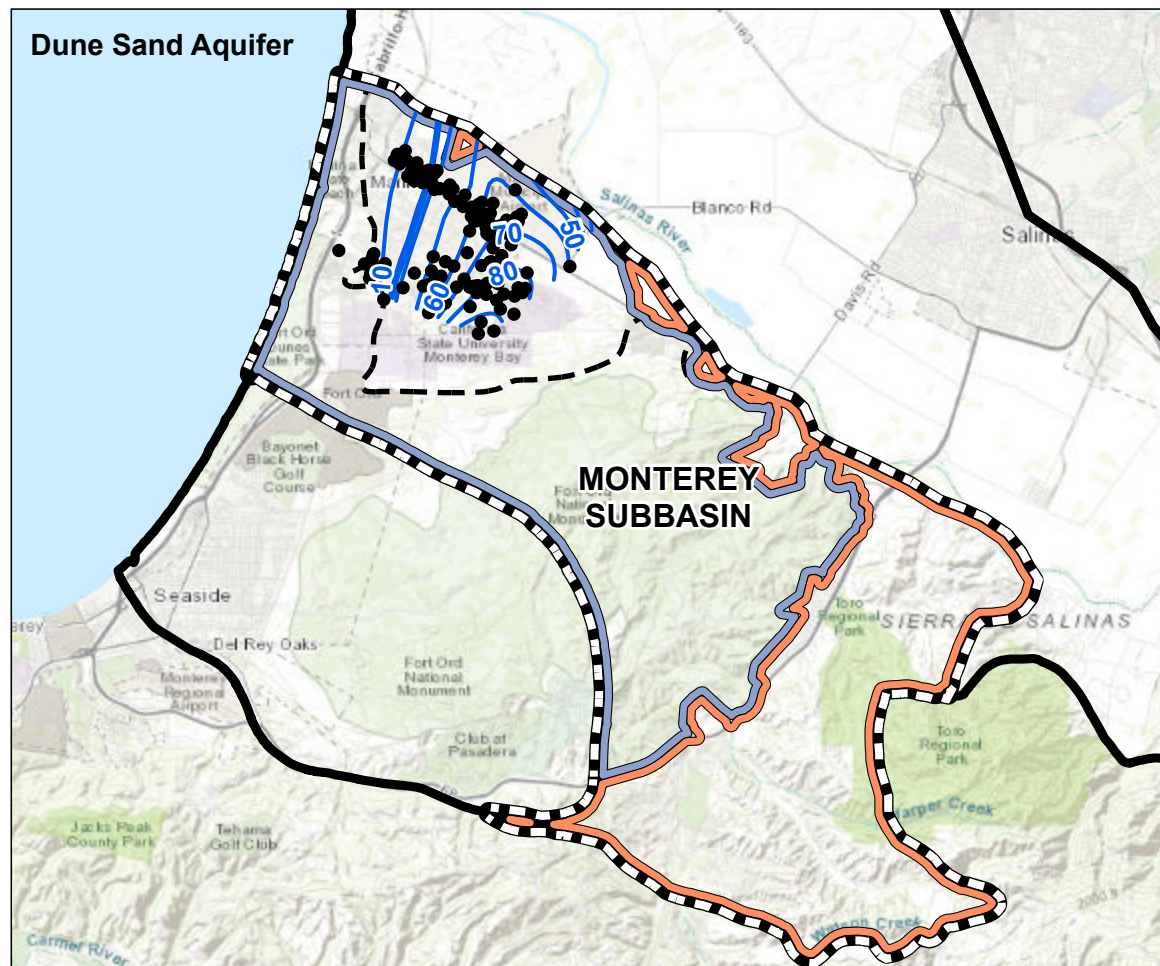


Groundwater Level Contours in the Marina-Ord Area - Fall 2022

Monterey Subbasin
 WY 2023 Annual Report
 March 2024

Figure 4-1

Path: X:\B60094\Maps\2024\03\Contour_4\Panels_v3.aprx



Legend

- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley Basin
- Southern Extent of FO-SVA (Harding ESE, 2001)
- Dune Sand Groundwater Divide
- Southern Extent of Valley Fill Deposits (Harding ESE, 2001)
- Spring 2023 Groundwater Contours
- GWE Measurement Locations
- Pumping Depression

Management Areas

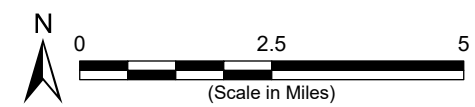
- Marina-Ord Area
- Corral de Tierra Area

Abbreviations

ft = foot
 NAVD 88 = North American Vertical Datum of 1988

- Notes**
1. All locations are approximate.
 2. Groundwater contours are in ft NAVD 88 and dashed where uncertain.
 3. The groundwater contours for the Deep Aquifers were prepared at 20-foot intervals, and the -10-foot NAVD 88 contours were included to inform the groundwater divide.
 4. MPWMD#FO-10S is known to be screened in the Paso Robles Aquifer, which is likely connected to the 400-Footer Aquifer. MPWMD#FO-10D and Sentinel MW#1 are screened in the Santa Margarita Aquifer, which is likely connected to the Deep Aquifers.
 5. Groundwater elevations in 400-Footer Aquifer have been plotted in combination with groundwater elevations observed within the Paso Robles Aquifer identified in the adjacent Seaside Subbasin. Groundwater elevations in the Deep Aquifers have been plotted with groundwater elevations within the Santa Margarita Aquifer in the Seaside Subbasin.

- Sources**
1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 28 March 2024.
 2. Groundwater contours are drawn with groundwater elevation measurements collected during Spring 2023. Only static water levels are plotted.

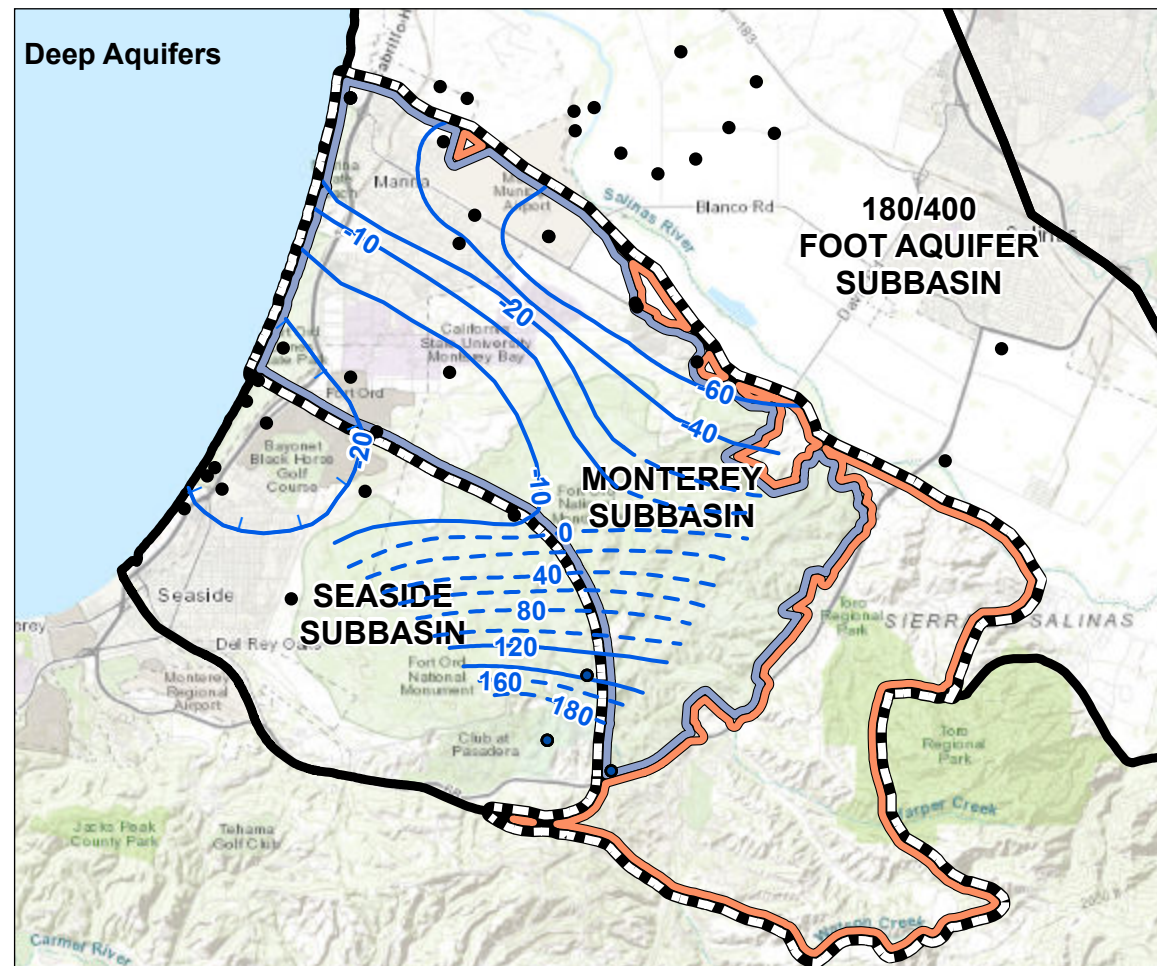
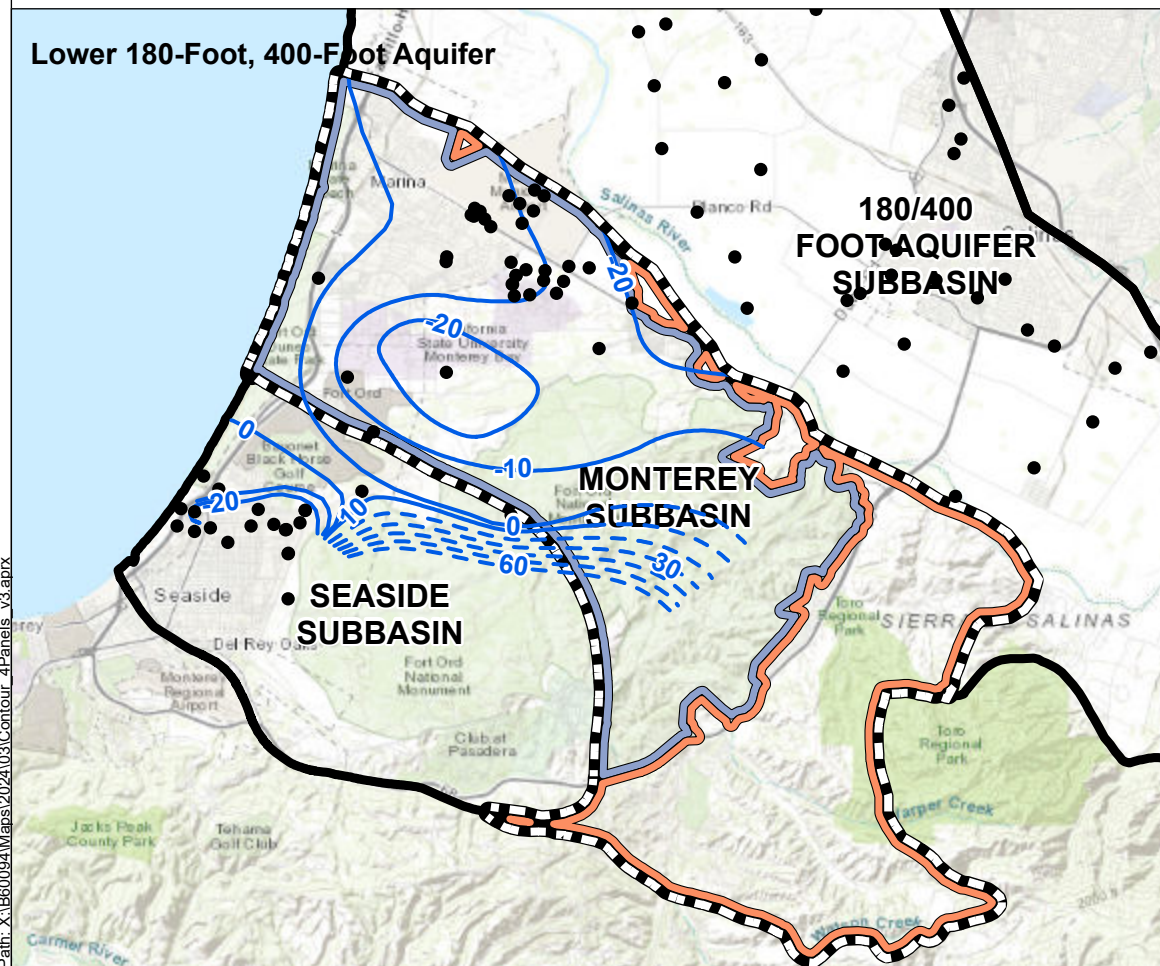
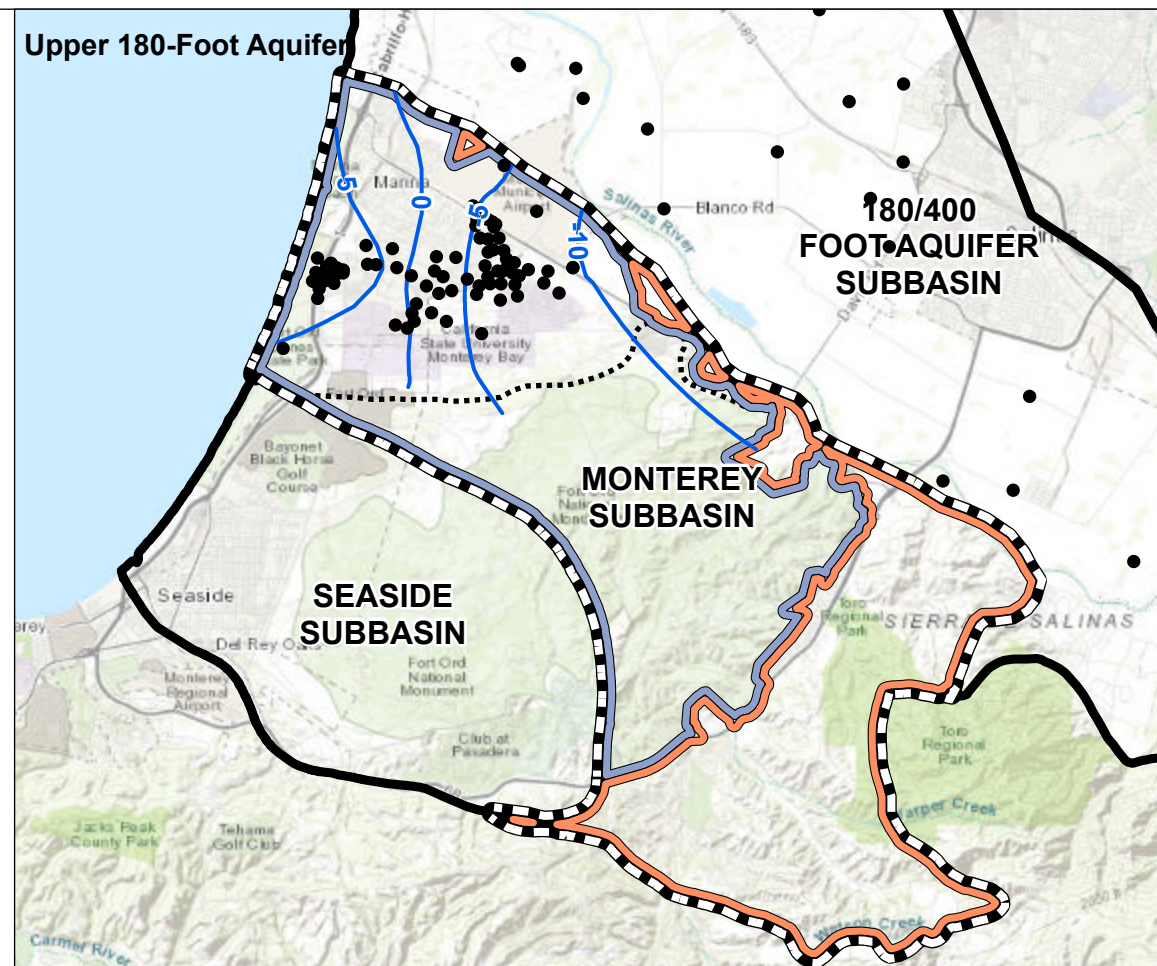
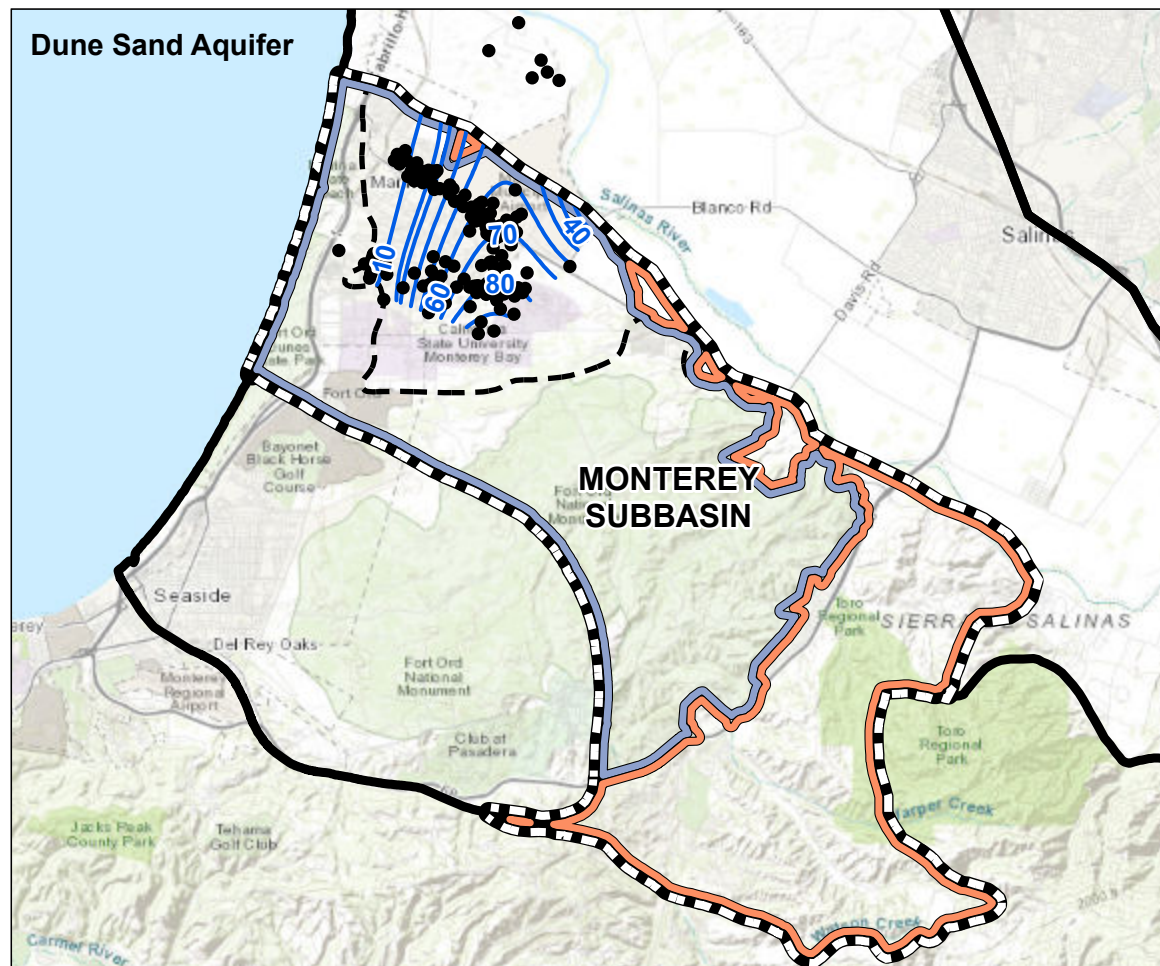


Groundwater Level Contours in the Marina-Ord Area - Spring 2023

Monterey Subbasin
 WY 2023 Annual Report
 March 2024

Figure 4-2

Path: X:\B60094\Maps\2024\03\Contour_4\Panels_v3.aprx



Legend

- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley Basin
- Southern Extent of FO-SVA (Harding ESE, 2001)
- Dune Sand Groundwater Divide
- Southern Extent of Valley Fill Deposits (Harding ESE, 2001)
- August 2023 Groundwater Contours
- GWE Measurement Locations
- Pumping Depression

Management Areas

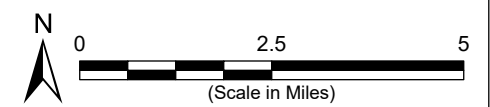
- Marina-Ord Area
- Corral de Tierra Area

Abbreviations

ft = foot
 NAVD 88 = North American Vertical Datum of 1988

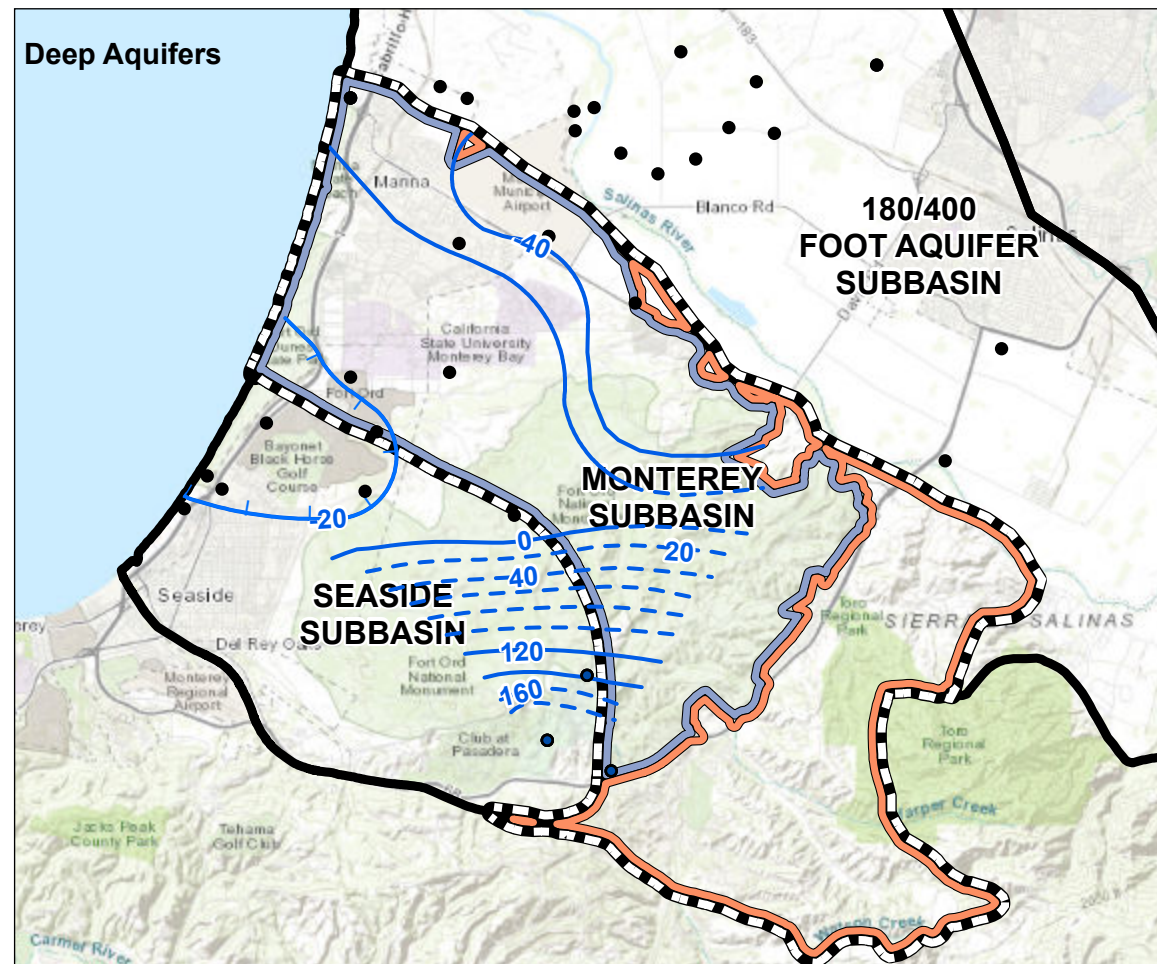
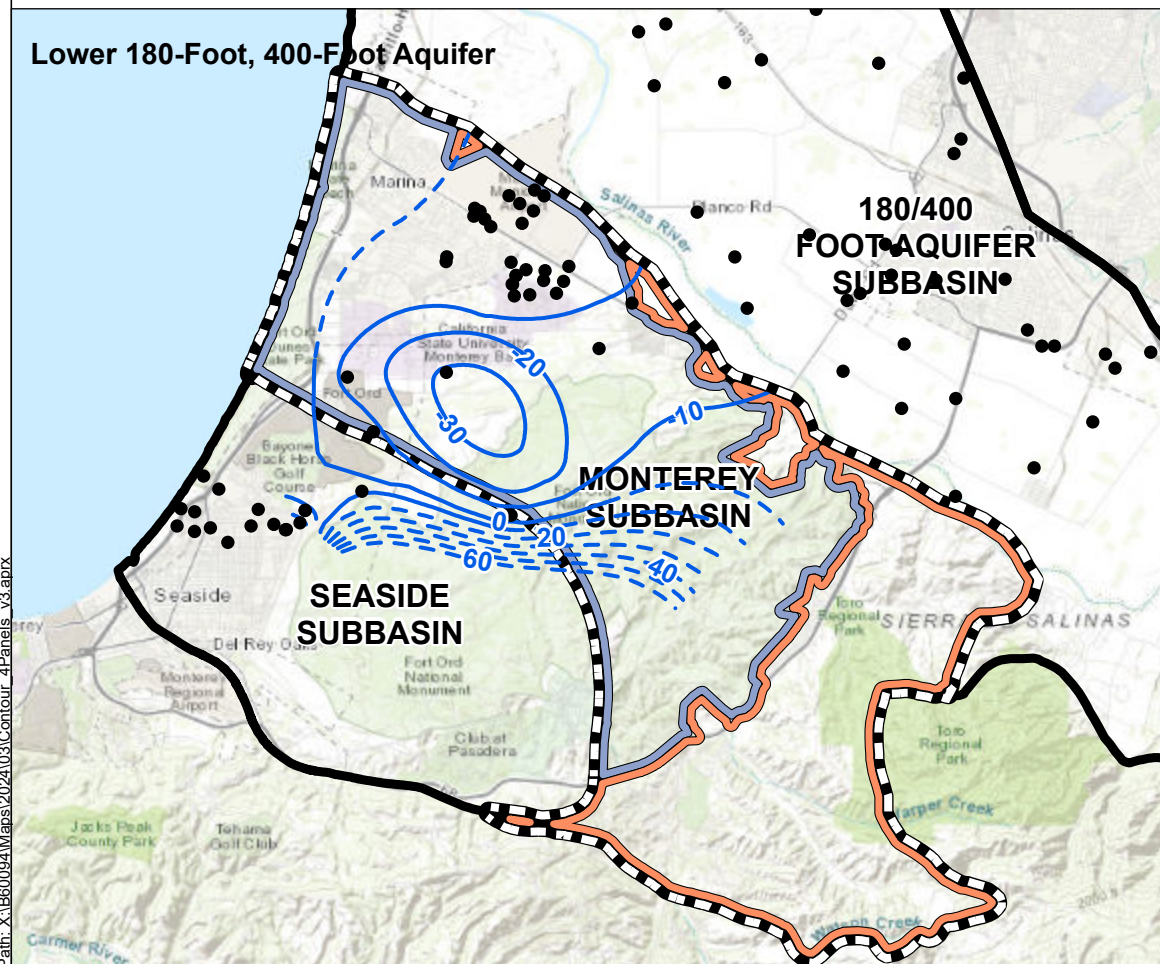
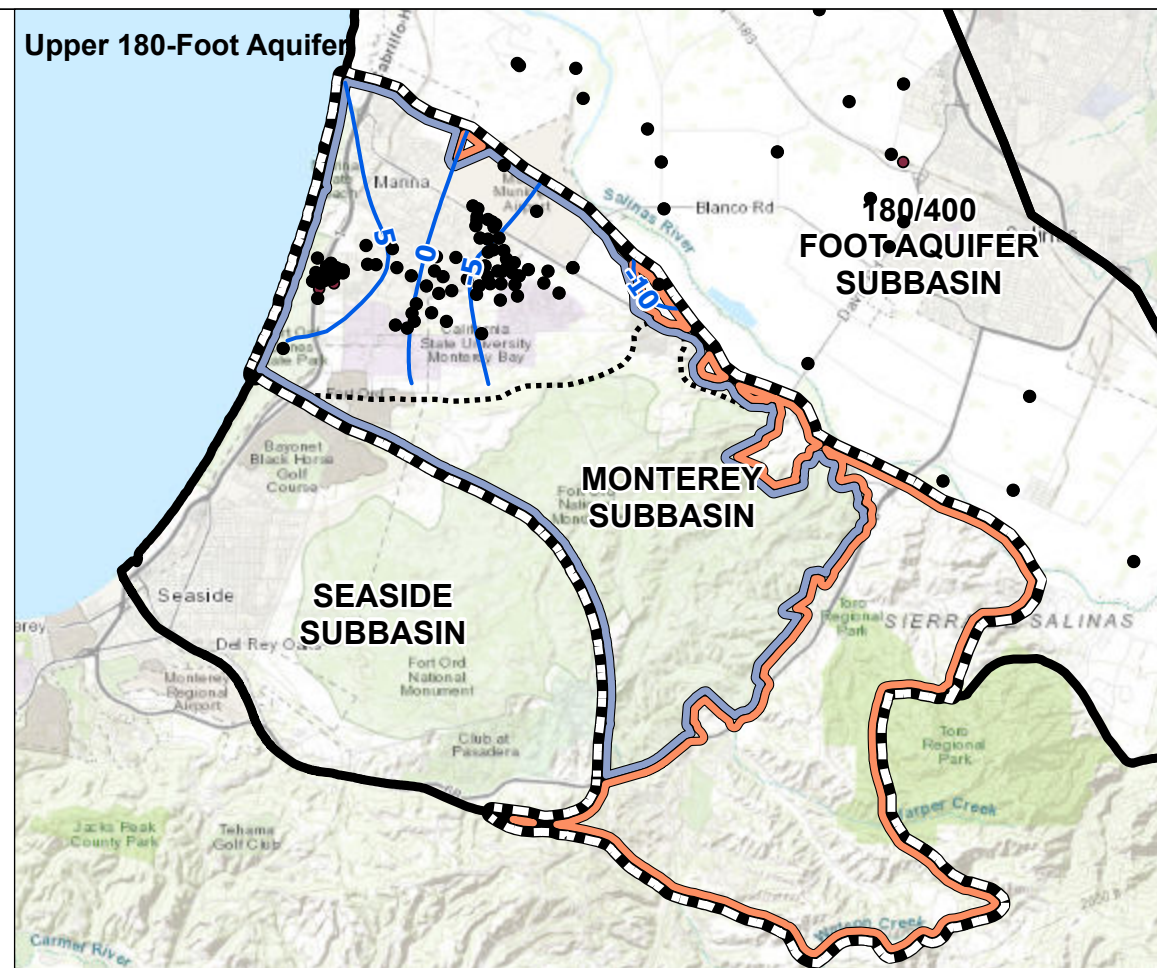
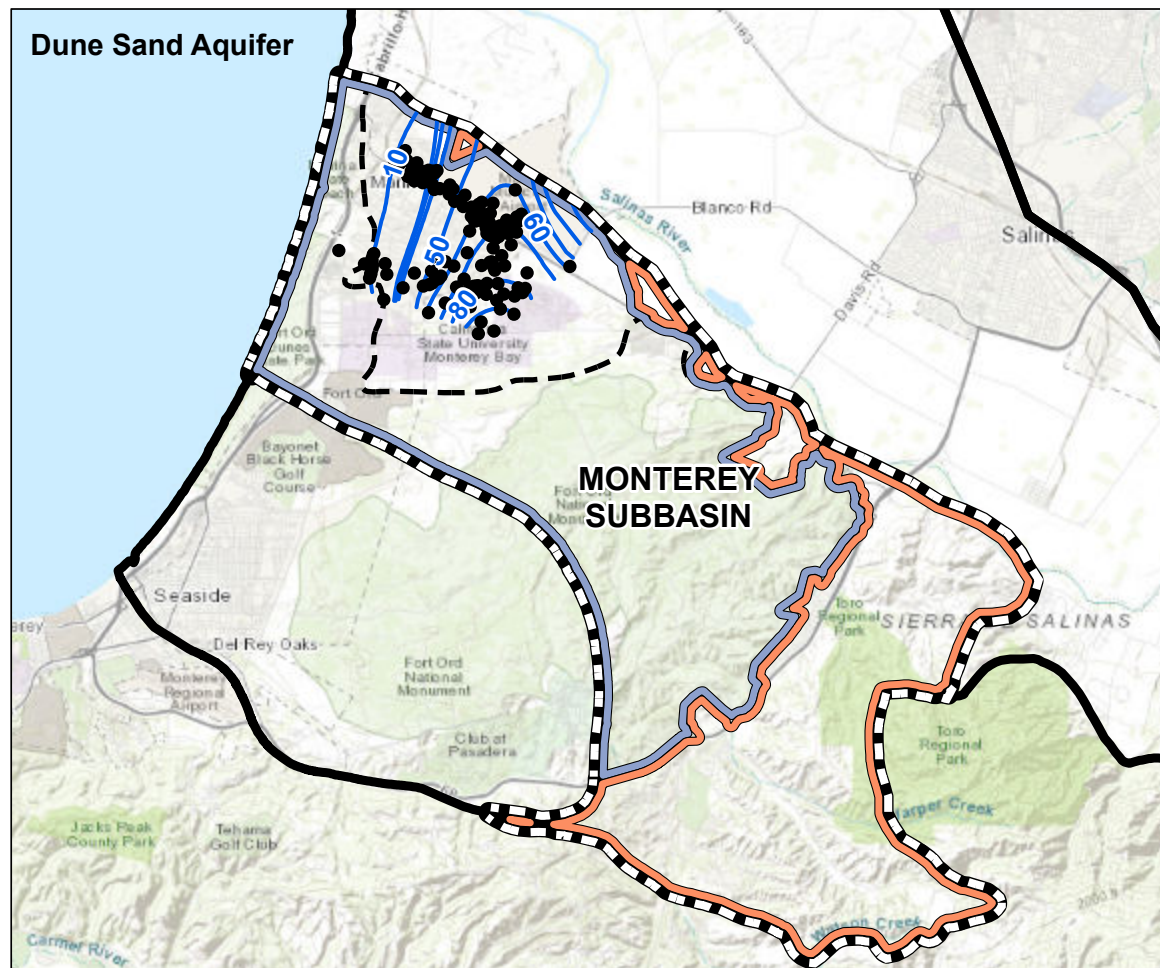
- Notes**
1. All locations are approximate.
 2. Groundwater contours are in ft NAVD 88 and dashed where uncertain.
 3. The groundwater contours for the Deep Aquifers were prepared at 20-foot intervals, and the -10-foot NAVD 88 contours were included to inform the groundwater divide.
 4. MPWMD#FO-10S is known to be screened in the Paso Robles Aquifer, which is likely connected to the 400-Footer Aquifer. MPWMD#FO-10D and Sentinel MW#1 are screened in the Santa Margarita Aquifer, which is likely connected to the Deep Aquifers.
 5. Groundwater elevations in 400-Footer Aquifer have been plotted in combination with groundwater elevations observed within the Paso Robles Aquifer identified in the adjacent Seaside Subbasin. Groundwater elevations in the Deep Aquifers have been plotted with groundwater elevations within the Santa Margarita Aquifer in the Seaside Subbasin.

- Sources**
1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 28 March 2024.
 2. Groundwater contours are drawn with groundwater elevation measurements collected during August 2023. Only static water levels are plotted.



Groundwater Level Contours in the Marina-Ord Area - August 2023

Path: X:\B60094\Maps\2024\03\Contour_4\Panels_v3.aprx



Legend

- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley Basin
- Southern Extent of FO-SVA (Harding ESE, 2001)
- Dune Sand Groundwater Divide
- Southern Extent of Valley Fill Deposits (Harding ESE, 2001)
- Fall 2023 Groundwater Contours
- GWE Measurement Locations
- Pumping Depression

Management Areas

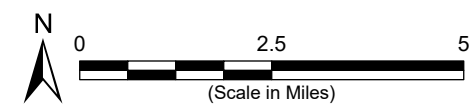
- Marina-Ord Area
- Corral de Tierra Area

Abbreviations

ft = foot
 NAVD 88 = North American Vertical Datum of 1988

- Notes**
- All locations are approximate.
 - Groundwater contours are in ft NAVD 88 and dashed where uncertain.
 - MPWMD#FO-10S is known to be screened in the Paso Robles Aquifer, which is likely connected to the 400-Foot Aquifer. MPWMD#FO-10D and Sentinel MW#1 are screened in the Santa Margarita Aquifer, which is likely connected to the Deep Aquifers.
 - Groundwater elevations in 400-Foot Aquifer have been plotted in combination with groundwater elevations observed within the Paso Robles Aquifer identified in the adjacent Seaside Subbasin. Groundwater elevations in the Deep Aquifers have been plotted with groundwater elevations within the Santa Margarita Aquifer in the Seaside Subbasin.

- Sources**
- Basemap is ESRI's ArcGIS Online world topographic map, obtained 28 March 2024.
 - Groundwater contours are drawn with groundwater elevation measurements collected during Fall 2023. Only static water levels are plotted.

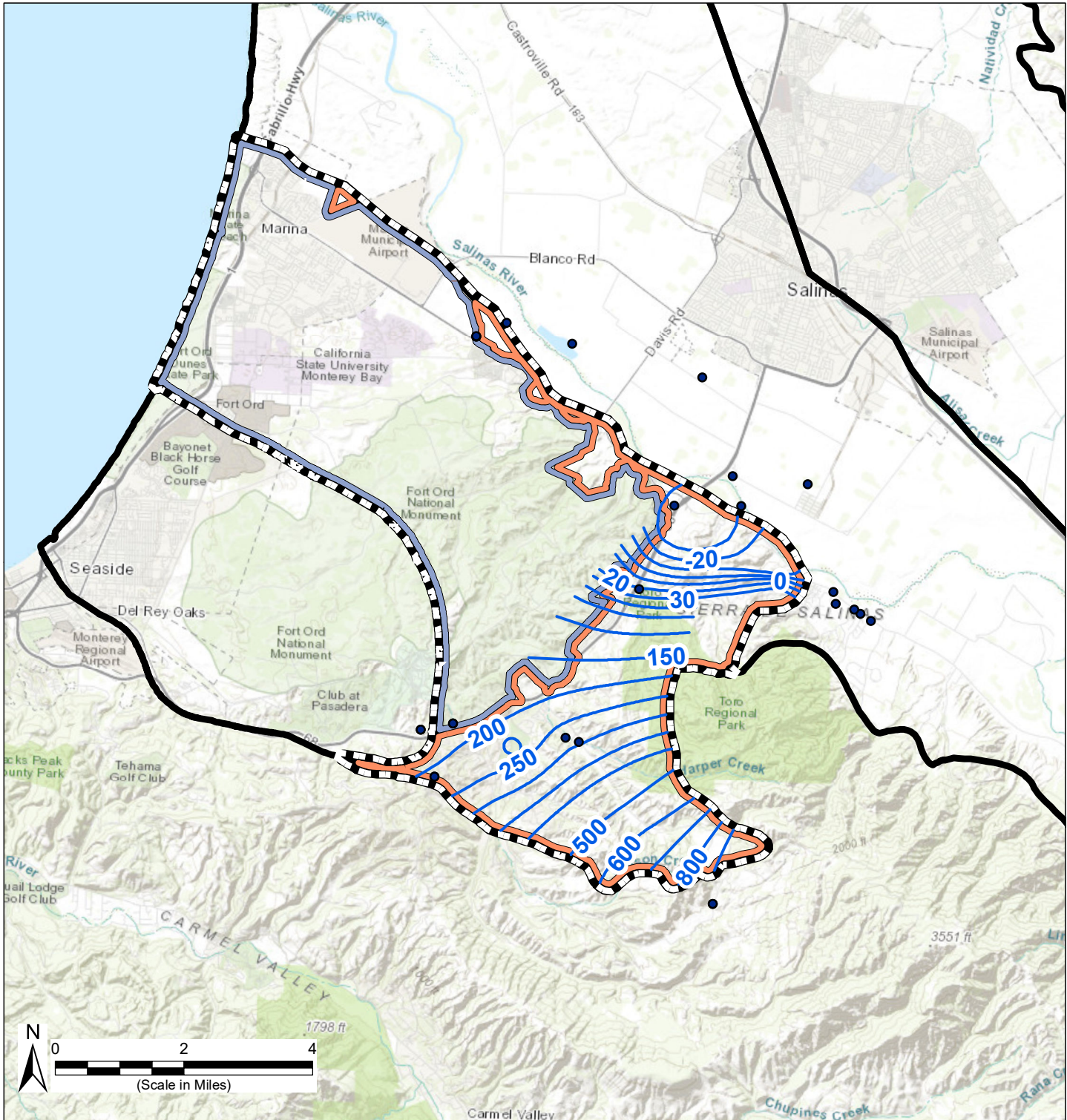


Groundwater Level Contours in the Marina-Ord Area - Fall 2023

Monterey Subbasin
 WY 2023 Annual Report
 March 2024







Figure 4-4

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Legend

-  Monterey Subbasin
-  August 2023 Groundwater Contours
-  Other Groundwater Subbasins within Salinas Valley Basin
-  GWE Measurement Locations
- Management Areas**
-  Marina-Ord Area
-  Corral de Tierra

Abbreviations

- ft = foot
- NAVD 88 = North American Vertical Datum of 1988

Notes

1. All locations are approximate.
2. Groundwater contours are in ft NAVD 88.

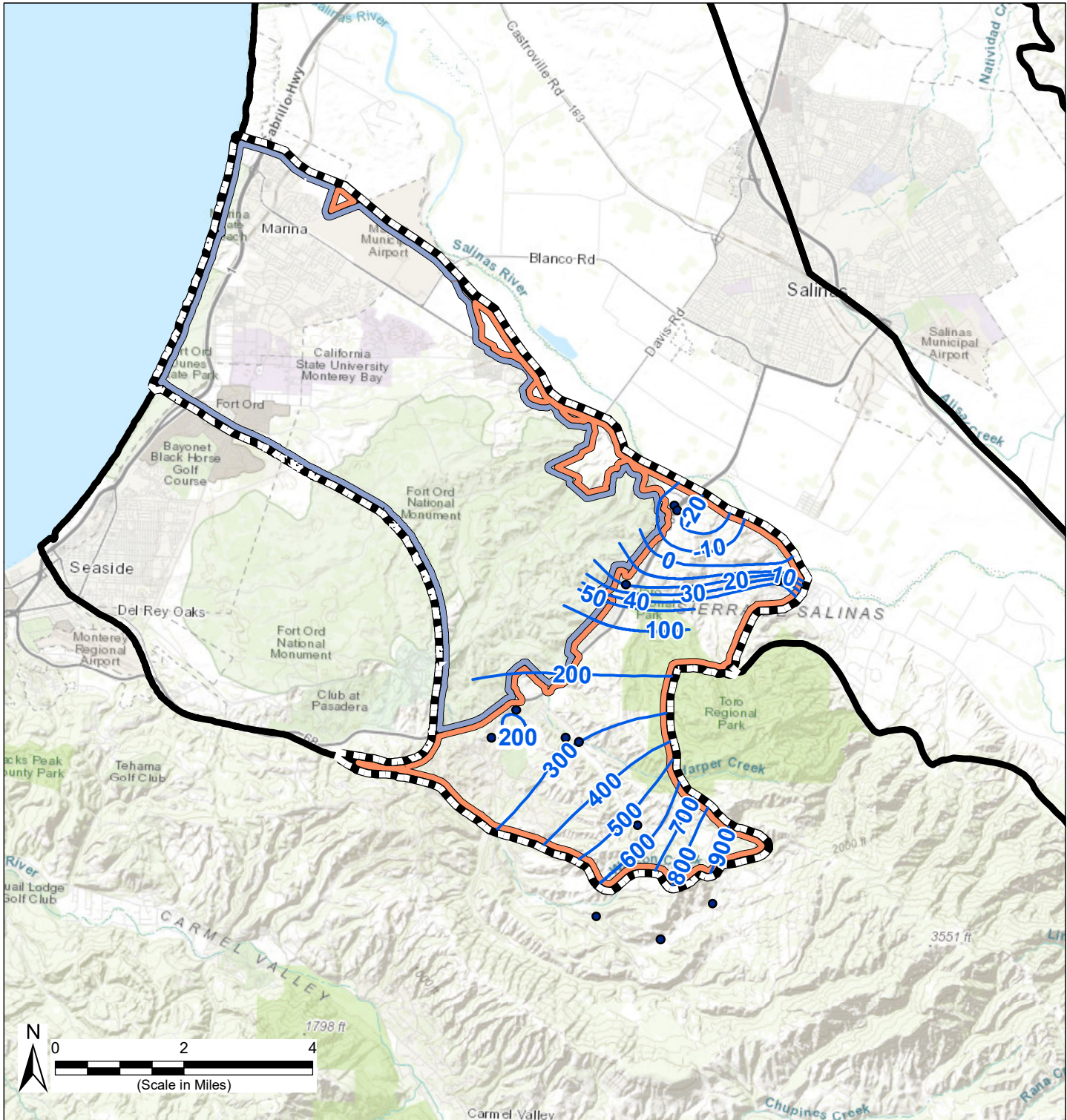
Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 15 March 2024.

Groundwater Level Contours in the El Toro Primary Aquifer System - August 2023

Monterey Subbasin
 WY 2023 Annual Report
 March 2024

Figure 4-5



Legend

- Monterey Subbasin
- Fall 2023 Groundwater Contours
- Other Groundwater Subbasins within Salinas Valley Basin
- GWE Measurement Locations
- Management Areas**
- Marina-Ord Area
- Corral de Tierra Area

Abbreviations

- ft = foot
- NAVD 88 = North American Vertical Datum of 1988

Notes

1. All locations are approximate.
2. Groundwater contours are in ft NAVD 88.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 21 March 2024.

Groundwater Level Contours in the El Toro Primary Aquifer System - Fall 2023

Monterey Subbasin
 WY 2023 Annual Report
 March 2024

Figure 4-6

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4.1.2 Long-Term Groundwater Elevation Trends

Temporal trends in groundwater elevations can be assessed with hydrographs that plot changes in groundwater elevations over time. Hydrographs for selected monitoring wells within the Subbasin are shown on Figure 4-7 through Figure 4-13.

4.1.2.1 Marina-Ord Area

Dune Sand Aquifer

- Groundwater elevations in the Dune Sand Aquifer have been generally stable for over three decades and show long-term fluctuations corresponding to hydrologic conditions. Following the historic drought in 2014-15, groundwater elevations recovered slightly during a series of above normal and wet years between 2016 and 2020, declined during the consecutive dry years of 2021-22, and rebounded again during the wet year of WY 2023. Groundwater elevations in the Dune Sand Aquifer do not show significant seasonal variations.

180-Foot Aquifer

Upper 180-Foot Aquifer

- Groundwater elevations have been generally stable in the upper 180-Foot Aquifer for the past thirty years and show long-term trends similar to those observed in the Dune Sand Aquifer. Groundwater elevations increased during WY 2023 across the upper 180-Foot Aquifer. Seasonal variations are greater than those observed in the Dune Sand Aquifer and typically ranges between 3 to 7 feet. A larger seasonal variation is observed in wells located inland near the Monterey Subbasin and 180/400-Foot Aquifer Subbasin boundary (MW-BW-55-180 and MW-B-05-180) and is likely the result of recharge and seasonal agricultural pumping in the 180/400-Foot Aquifer Subbasin.

Lower 180-Foot Aquifer

- Groundwater elevations have been stable in the lower 180-Foot Aquifer for the past thirty years and show long-term trends similar to those observed in the upper 180-Foot Aquifer. Groundwater elevations increased during WY 2023 across the lower 180-Foot Aquifer. Seasonal variations in the lower 180-Foot Aquifer typically range between 5 to 10 feet.

400-Foot Aquifer

- In the northern Marina-Ord Area, groundwater elevations in the 400-Foot Aquifer are similar to those in the lower 180-Foot Aquifer and have been generally stable for the past thirty years. Groundwater elevations in the northern 400-Foot Aquifer show long-term fluctuations corresponding to hydrologic conditions and an increase during WY 2023 in response to the wet year. Seasonal variations in these wells are typically around 7 feet.
- However, in the southern Marina-Ord Area near wells MPWMD#FO-10S and MPWMD#FO-11S, groundwater elevations have been declining consistently since the 2000s. As discussed in Section 4.1.1.1, the cause of this local depression is not known as

Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

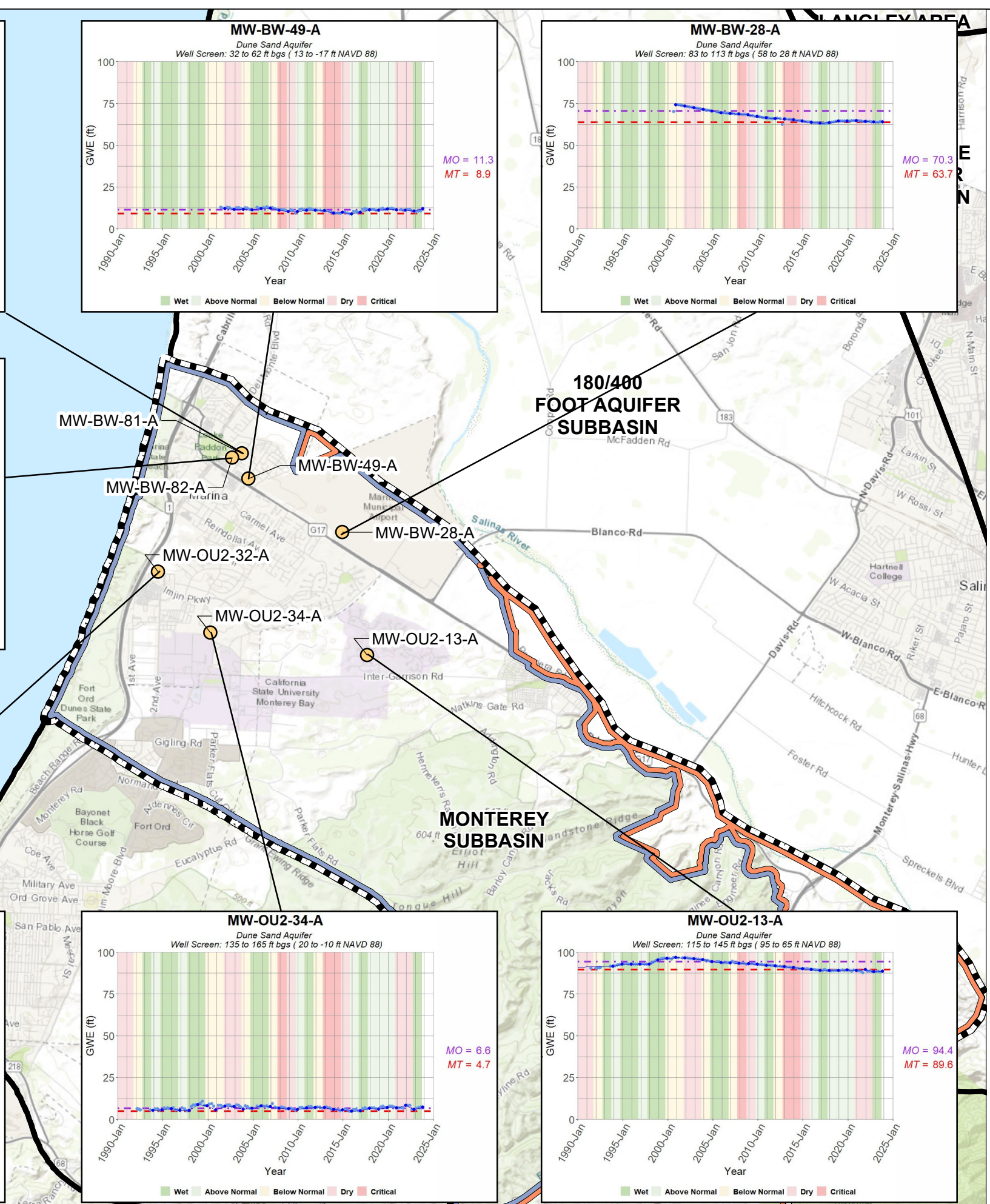
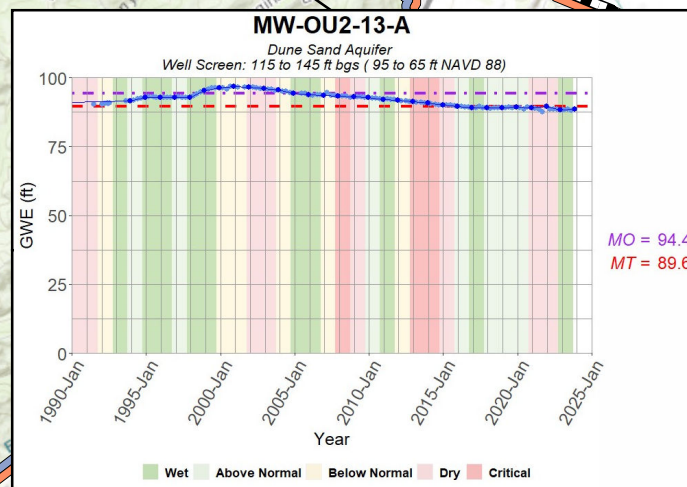
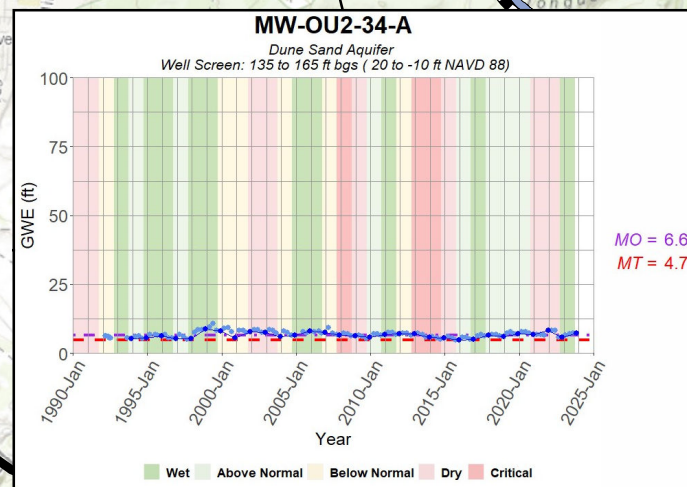
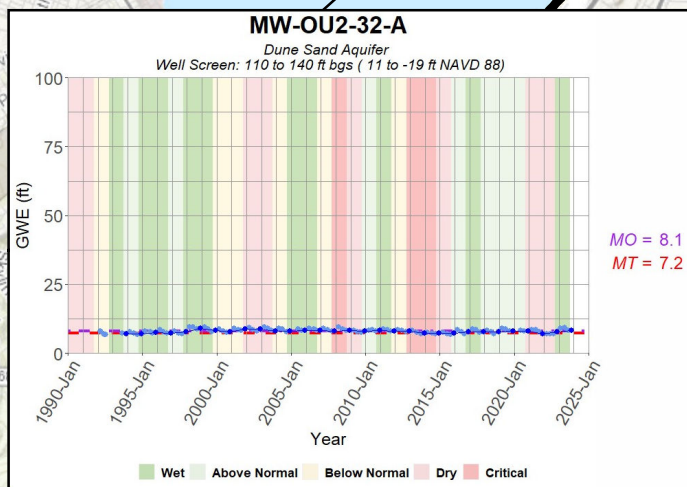
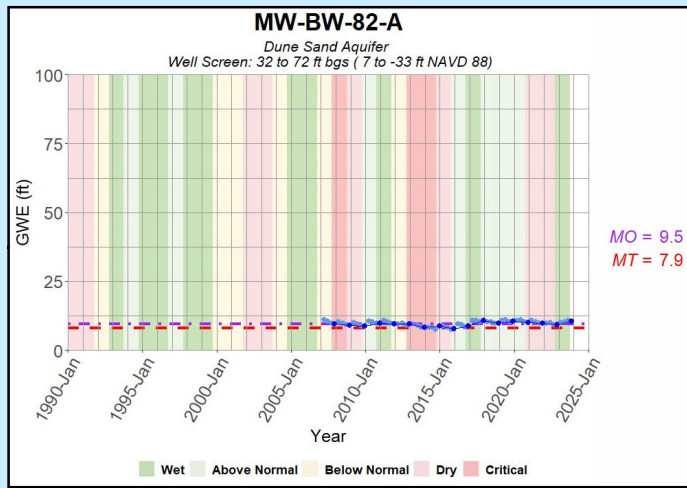
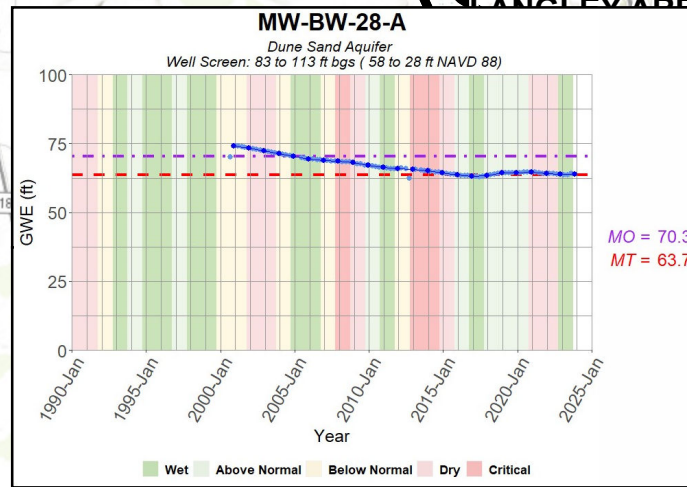
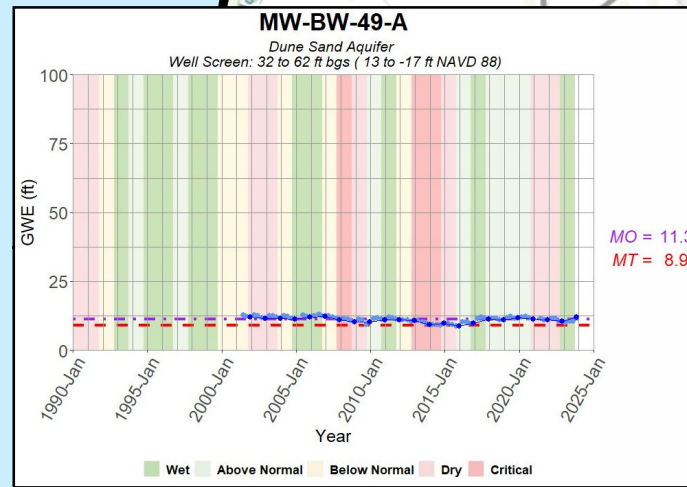
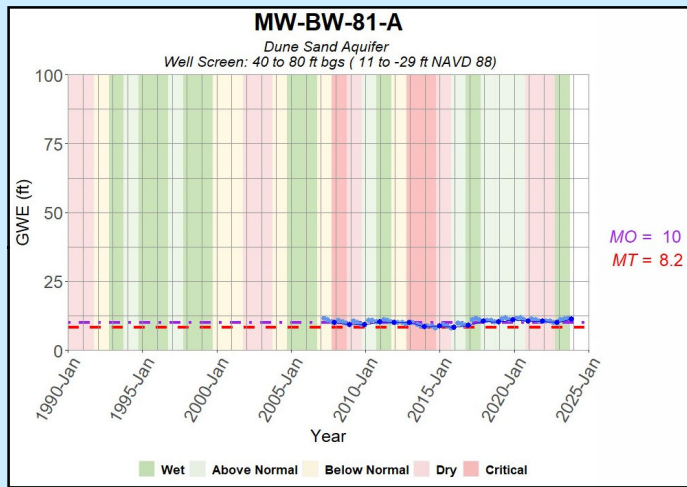
there is no known groundwater extraction in its vicinity. The depression is not near supply wells or GDEs so beneficial users are not impacted. Further information regarding groundwater conditions in this area can be obtained with MCWDGSA's construction of new monitoring wells, as described in Section 5.2.4. Seasonal variations in these wells are typically around 10 feet.

Deep Aquifers

- Groundwater elevations have been declining in the Deep Aquifers since the 2000s and the rate of decline was steepest following the historic drought of 2014-15. Over the past five years, groundwater elevations have been stable or increased slightly in the six RMSs located in the northern portion of the Marina-Ord Area and continued to decline in the four RMSs located farther inland near the border with 180/400 Foot Aquifer Subbasin and close to the Monterey-Seaside Subbasin boundary.

4.1.2.2 Corral de Tierra Area

Figure 4-12 and Figure 4-13 show example hydrographs for the RMS wells in the Corral de Tierra Area. Groundwater elevations in the Corral de Tierra Area have been declining on average since the 2000s. Between WY 2022 and WY 2023, groundwater elevations fluctuated in this area with no discernible prevalence of spatial patterns with the current RMS wells. SVBGSA is working to fill groundwater level monitoring data gaps to better understand groundwater elevation variation.



Legend

- Representative Monitoring Sites for Groundwater Elevations
- Monterey Subbasin
- Management Areas**
 - Marina-Ord Area
 - Corral de Tierra Area
 - Other Groundwater Subbasins within Salinas Valley Basin
- Representative Monitoring Sites**
 - Selected Fourth Quarter GWE Measurements
 - Other GWE Measurements
 - Measurable Objectives
 - Minimum Thresholds

Abbreviations

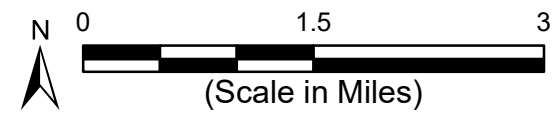
- DWR = California Department of Water Resources
- ft = foot
- GWE = groundwater elevation
- MO = Measurable Objectives
- MT = Minimum Thresholds
- NAVD 88 = North American Vertical Datum of 1988

Notes

- Selected fourth quarter measurements are measurements closest to December 1st of the year.
- Groundwater elevations are in ft NAVD 88.

Sources

- Basemap is ESRI's ArcGIS Online world topographic map, obtained 15 March 2024.
- DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2018 Update.

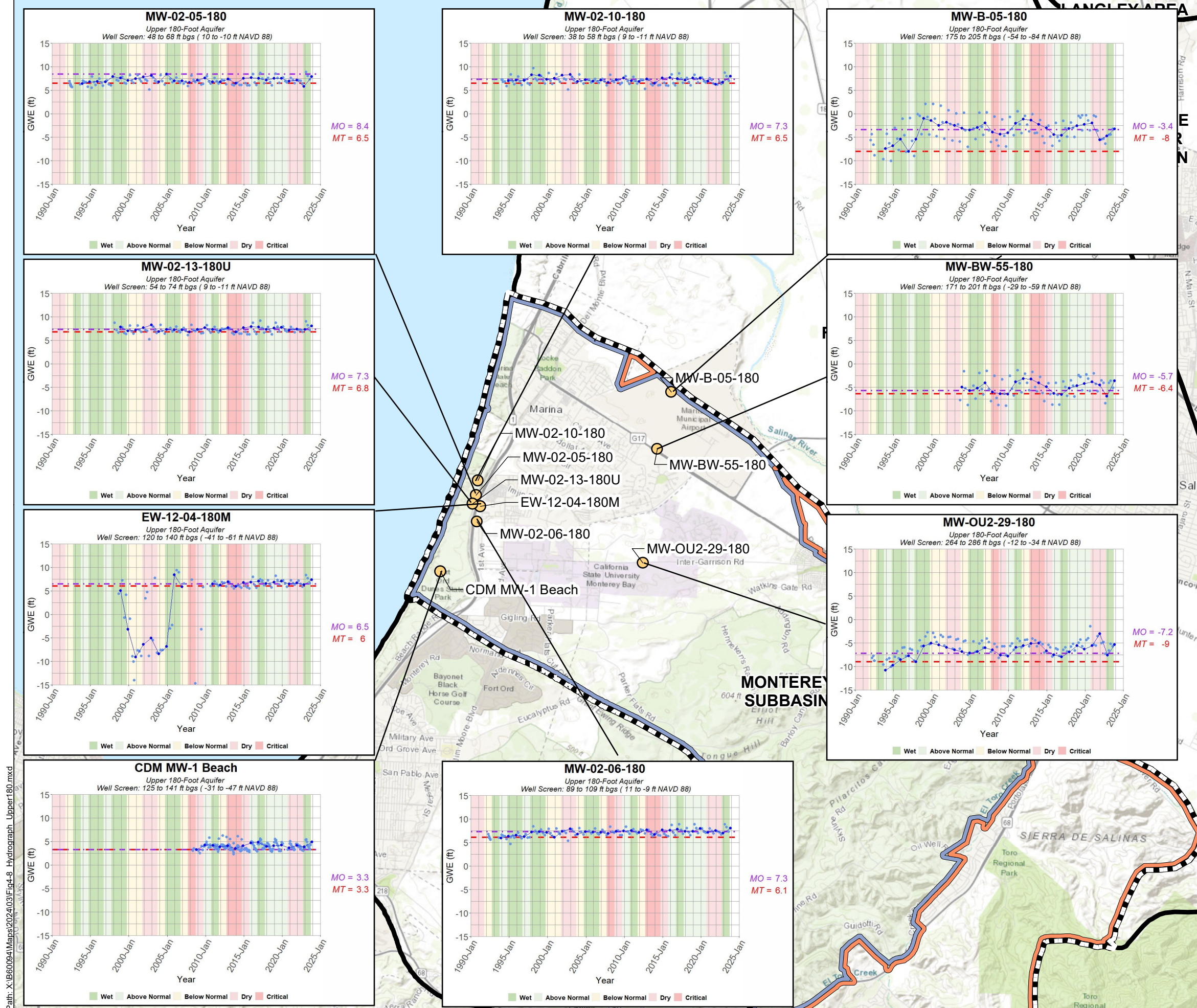


Representative Groundwater Elevation Hydrographs in the Dune Sand Aquifer

Monterey Subbasin
WY 2023 Annual Report
March 2024

Figure 4-7

Path: X:\B60094\Maps\2024\03\Fig4-7 Hydrograph_DuneSand.mxd



Legend

- Representative Monitoring Sites for Groundwater Elevations
- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley Basin

Management Areas

- Marina-Ord Area
- Corral de Tierra Area

Representative Monitoring Sites

- Selected Fourth Quarter GWE Measurements
- Other GWE Measurements
- MO
- MT

Abbreviations

- DWR = California Department of Water Resources
- ft = foot
- GWE = groundwater elevation
- MO = Measurable Objectives
- MT = Minimum Thresholds
- NAVD 88 = North American Vertical Datum of 1988

Notes

- Selected fourth quarter measurements are measurements closest to December 1st of the year.
- Groundwater elevations are in ft NAVD 88.
- EW-12-04-180M is a former extraction that stopped pumping in 2009.

Sources

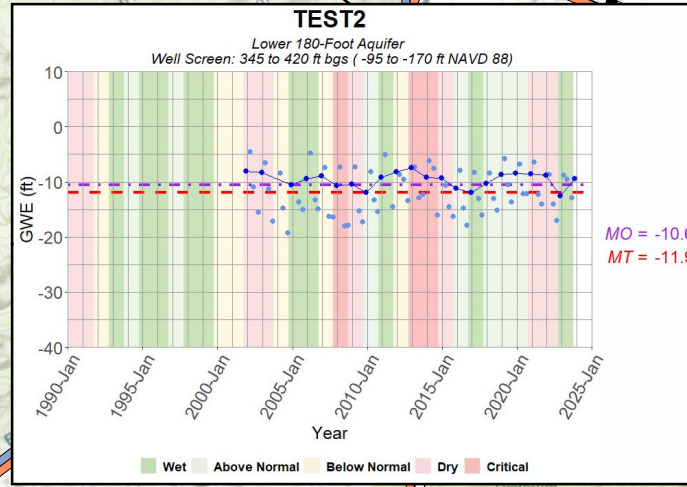
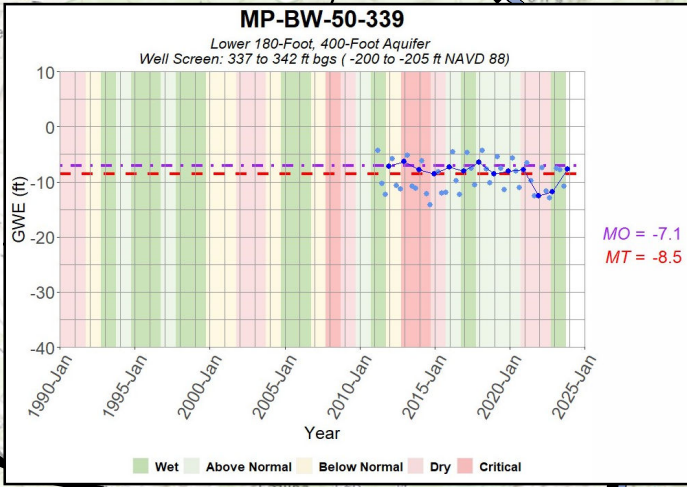
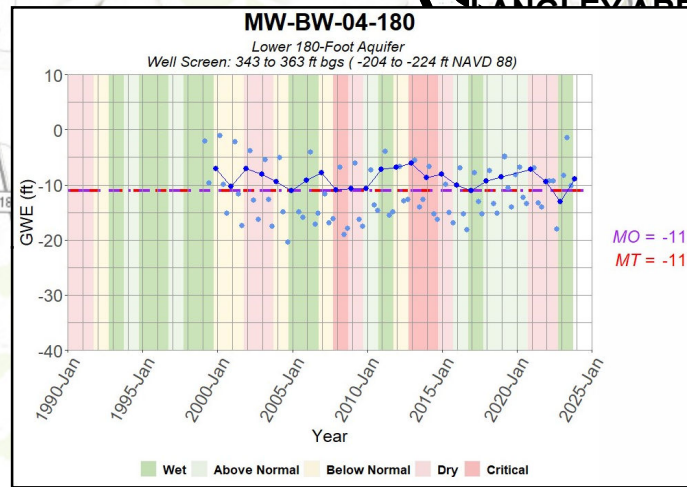
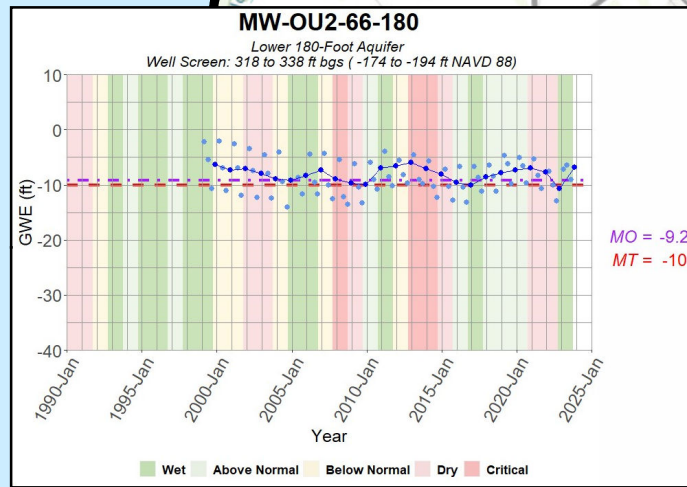
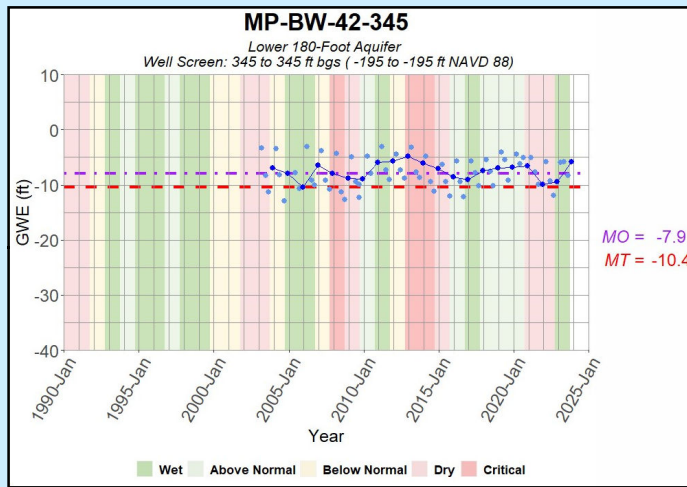
- Basemap is ESRI's ArcGIS Online world topographic map, obtained 21 March 2024.
- DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2018 Update.

(Scale in Miles)

Representative Groundwater Elevation Hydrographs in the Upper 180-Foot Aquifer

Monterey Subbasin
WY 2023 Annual Report
March 2024

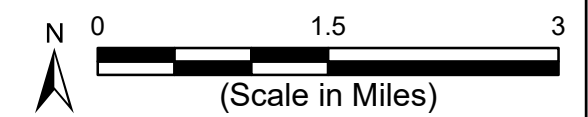
Figure 4-8



Legend

- Monterey Subbasin
- Management Areas
 - Marina-Ord Area
 - Corral de Tierra Area
 - Other Groundwater Subbasins within Salinas Valley Basin
- Representative Monitoring Sites for Groundwater Elevation
 - Lower 180-Foot Aquifer
 - Lower 180-Foot, 400-Foot Aquifer
- Representative Monitoring Sites
 - Selected Fourth Quarter GWE Measurements
 - Other GWE Measurements
 - MO
 - MT
- Abbreviations
 - DWR = California Department of Water Resources
 - ft = foot
 - GWE = groundwater elevation
 - MO = Measurable Objectives
 - MT = Minimum Thresholds
 - NAVD 88 = North American Vertical Datum of 1988

- Notes**
- Selected fourth quarter measurements are measurements closest to December 1st of the year.
 - Groundwater elevations are in ft NAVD 88.
- Sources**
- Basemap is ESRI's ArcGIS Online world topographic map, obtained 19 March 2024.
 - DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2018 Update.

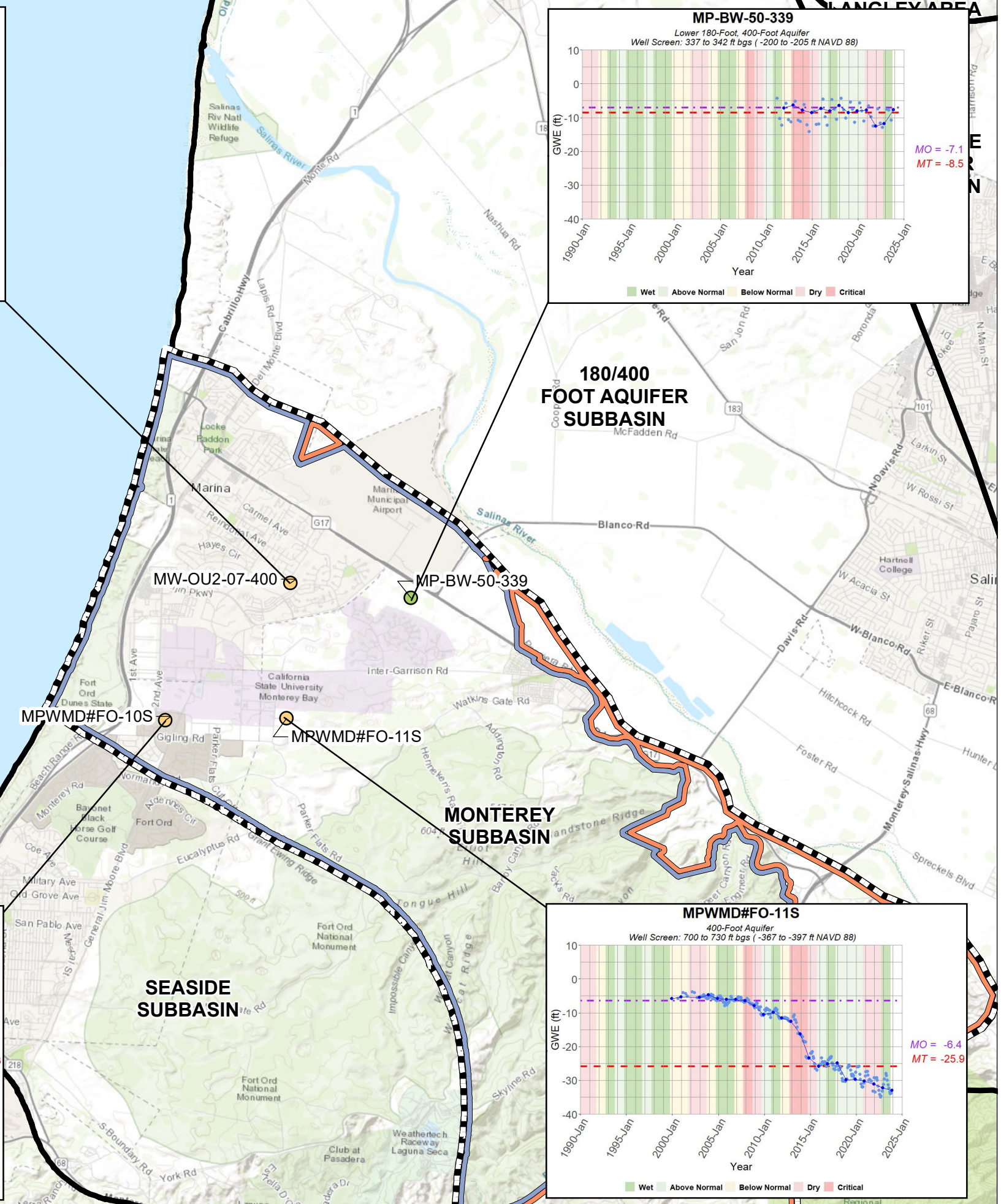
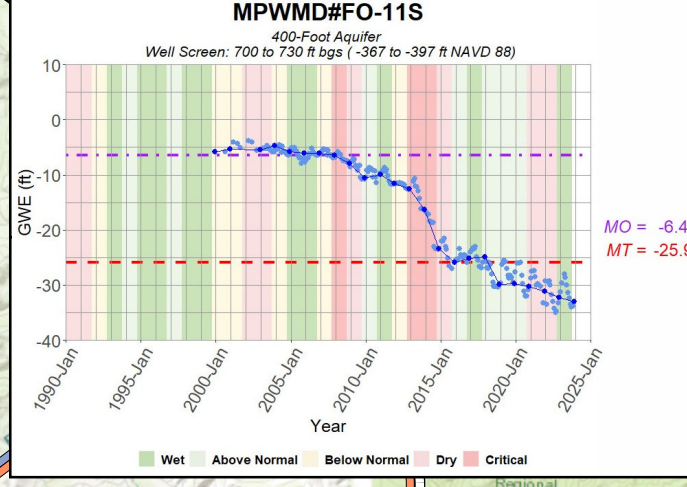
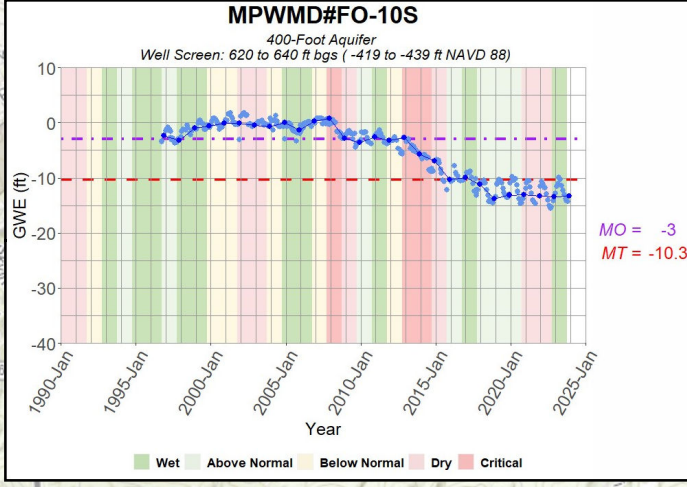
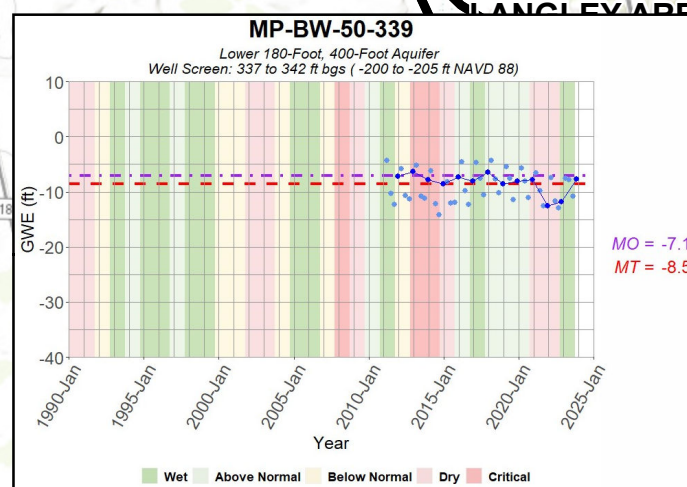
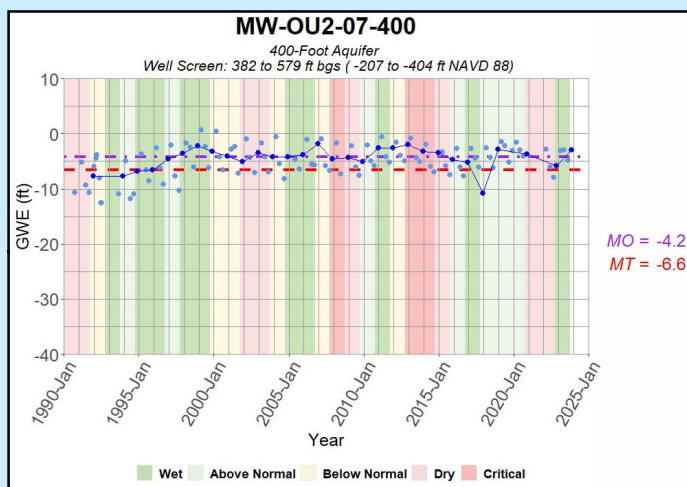


Representative Groundwater Elevation Hydrographs in the Lower 180-Foot Aquifer

Monterey Subbasin
WY 2023 Annual Report
March 2024

Figure 4-9

Path: X:\B60094\Maps\202403\Fig4-9_Hydrograph_Lower180.mxd



Legend

Representative Monitoring Sites for Groundwater Elevations

- 400-Foot Aquifer
- Lower 180-Foot, 400-Foot Aquifer
- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley Basin

Management Areas

- Marina-Ord Area
- Corral de Tierra

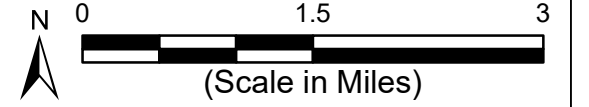
Representative Monitoring Sites

- Selected Fourth Quarter GWE Measurements
- Other GWE Measurements
- MO
- MT

Abbreviations

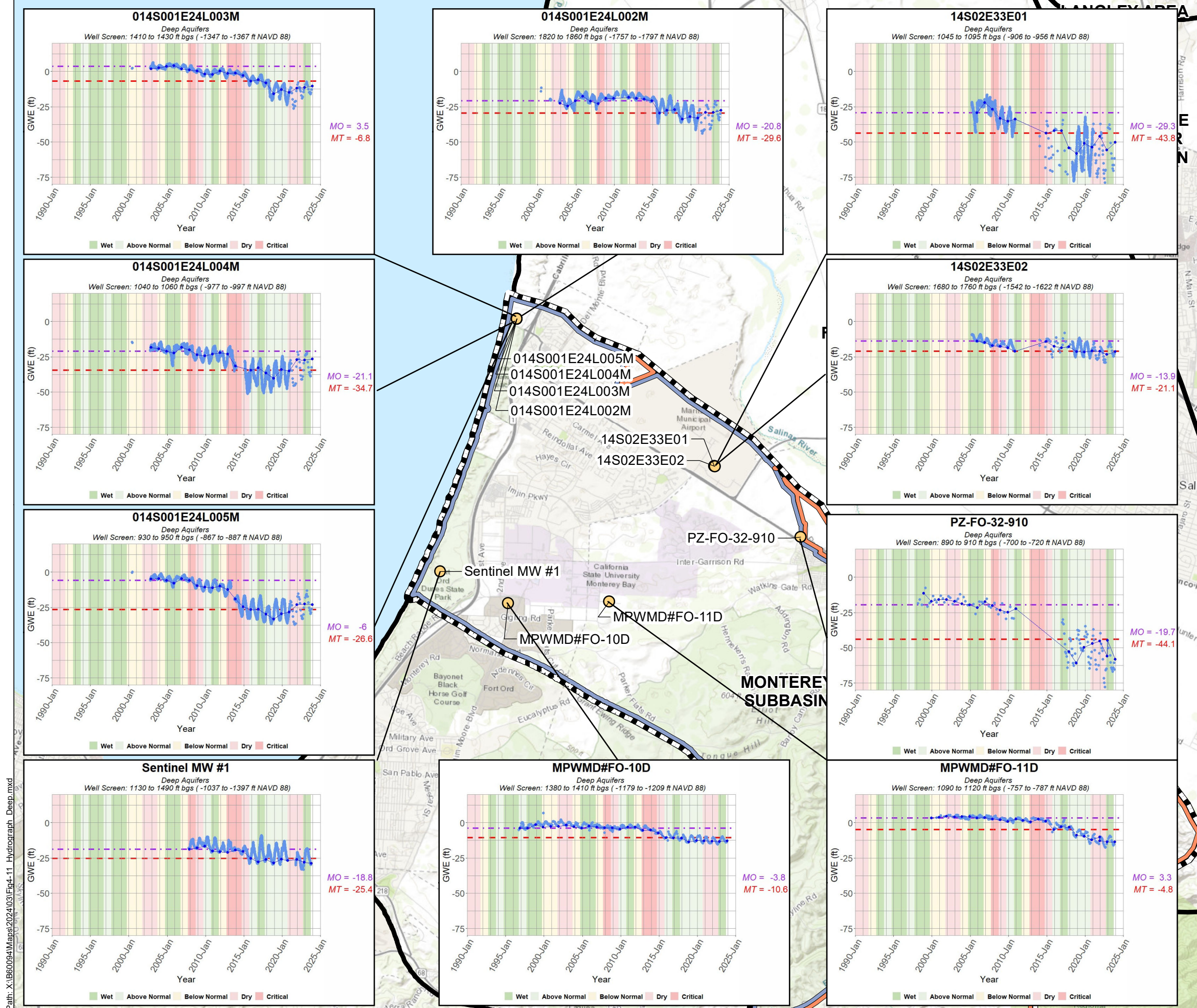
- DWR = California Department of Water Resources
- ft = foot
- GWE = groundwater elevation
- MO = Measurable Objectives
- MT = Minimum Thresholds
- NAVD 88 = North American Vertical Datum of 1988

- Notes**
- Selected fourth quarter measurements are measurements closest to December 1st of the year.
 - Groundwater elevations are in ft NAVD 88.
- Sources**
- Basemap is ESRI's ArcGIS Online world topographic map, obtained 15 March 2024.
 - DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2018 Update.



Representative Groundwater Elevation Hydrographs in the 400-Foot Aquifer
 Monterey Subbasin
 WY 2023 Annual Report
 March 2024
Figure 4-10

Path: X:\B60094\Maps\202403\Fig4-11_Hydrograph_400-ft.mxd



Legend

- Representative Monitoring Sites for Groundwater Elevations
- ▭ Monterey Subbasin
- ▭ Other Groundwater Subbasins within Salinas Valley Basin

Management Areas

- ▭ Marina-Ord Area
- ▭ Corral de Tierra Area

Representative Monitoring Sites

- Selected Fourth Quarter GWE Measurements
- Other GWE Measurements
- MO
- MT

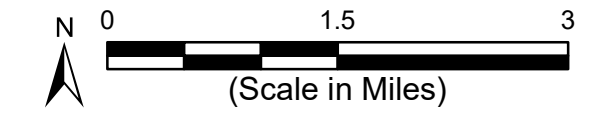
Abbreviations

- DWR = California Department of Water Resources
- ft = foot
- GWE = groundwater elevation
- MO = Measurable Objectives
- MT = Minimum Thresholds
- NAVD 88 = North American Vertical Datum of 1988

Notes

- Selected fourth quarter measurements are measurements closest to December 1st of the year.
- Groundwater elevations are in ft NAVD 88.

- ### Sources
- Basemap is ESRI's ArcGIS Online world topographic map, obtained 28 March 2024.
 - DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2018 Update.



Representative Groundwater Elevation Hydrographs in the Deep Aquifers
 Monterey Subbasin
 WY 2023 Annual Report
 March 2024
Figure 4-11

Path: X:\B60094\Maps\2024\03\Fig4-11_Hydrograph_Deep.mxd



Legend

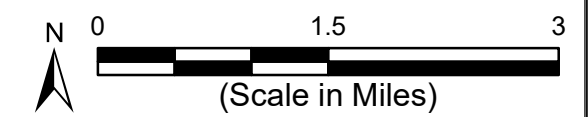
- Representative Monitoring Sites for Groundwater Elevations
- ▭ Monterey Subbasin
- Management Areas**
- ▭ Marina-Ord
- ▭ Corral de Tierra
- ▭ Other Groundwater Subbasins within Salinas Valley Basin
- Representative Monitoring Sites**
- Selected Fourth Quarter GWE Measurements
- Other GWE Measurements
- MO
- MT

Abbreviations

DWR = California Department of Water Resources
 ft = foot
 GWE = groundwater elevation
 MCWRA = Monterey County Water Resources Agency
 MO = Measurable Objectives
 MT = Minimum Thresholds
 NAVD 88 = North American Vertical Datum of 1988

- ### Notes
- Selected fourth quarter measurements are measurements closest to December 1st of the year.
 - Groundwater elevations are in ft NAVD 88.
 - Well 16S/02E-03H02 has withdrawn from MCWRA's water level monitoring programs and therefore could no longer be part of the RMS network.

- ### Sources
- Basemap is ESRI's ArcGIS Online world topographic map, obtained 15 March 2024.
 - DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2018 Update.

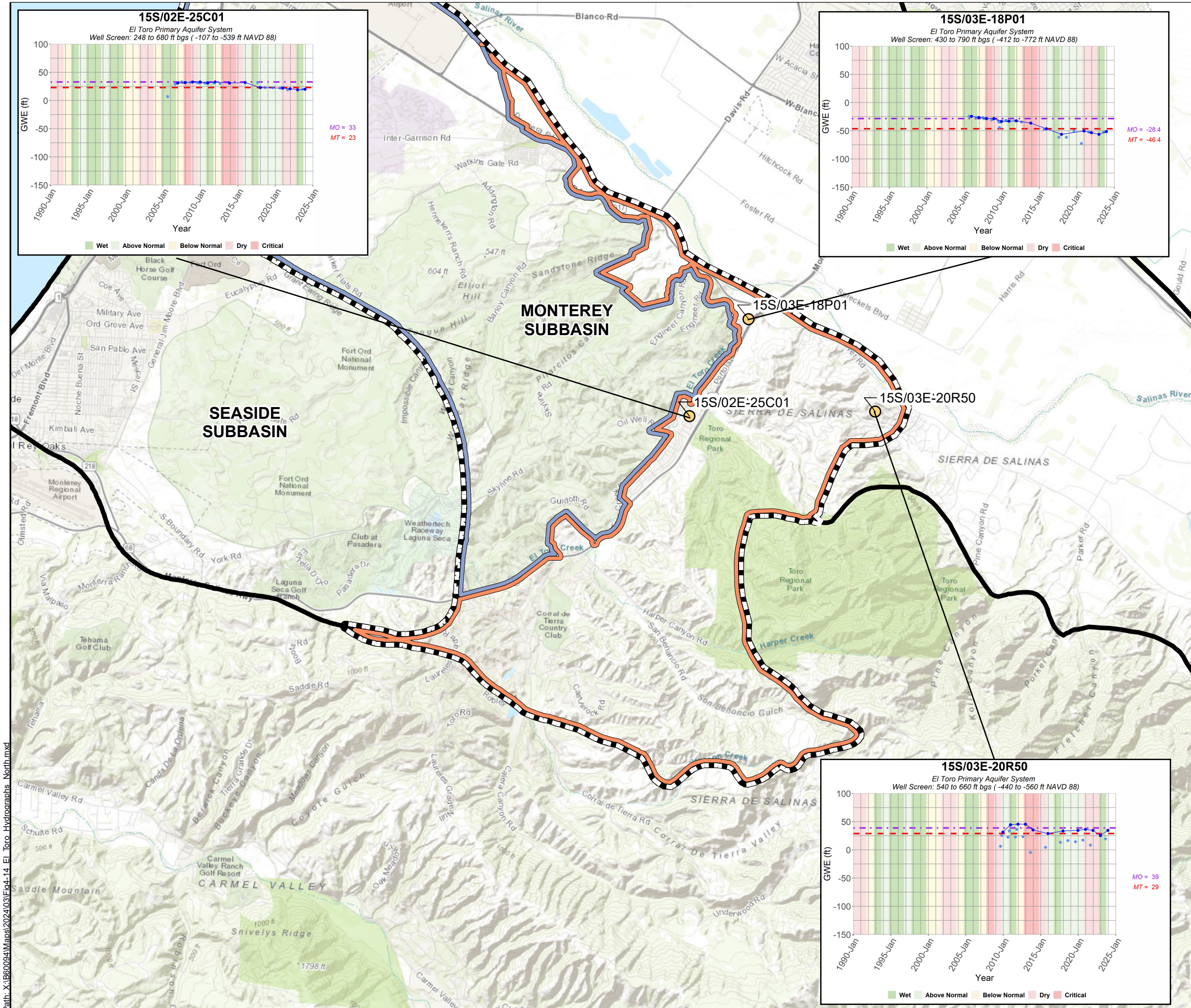


Representative Groundwater Elevation Hydrographs in the El Toro Primary Aquifer (South)

Monterey Subbasin
 WY 2023 Annual Report
 March 2024

Figure 4-12

Path: X:\1660094\Mapas\2024\03\Fig4-12_El_Toro_Hydrographs_South2.mxd



Legend

- Representative Monitoring Sites for Groundwater Elevations
- ▭ Monterey Subbasin
- ▭ Other Groundwater Subbasins within Salinas Valley Basin

Management Areas

- ▭ Marina-Ord Area
- ▭ Corral de Tierra Area

Representative Monitoring Sites

- Selected Fourth Quarter GWE Measurements
- Other GWE Measurements
- MO
- MT

Abbreviations

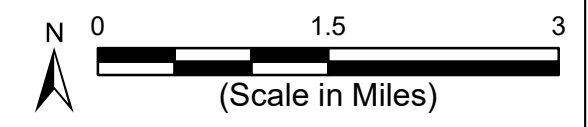
DWR = California Department of Water Resources
 ft = foot
 GWE = groundwater elevation
 MO = Measurable Objectives
 MT = Minimum Thresholds
 NAVD 88 = North American Vertical Datum of 1988

Notes

- Selected fourth quarter measurements are measurements closest to December 1st of the year.
- Groundwater elevations are in ft NAVD 88.

Sources

- Basemap is ESRI's ArcGIS Online world topographic map, obtained 15 March 2024.
- DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2018 Update.



Representative Groundwater Elevation Hydrographs in the El Toro Primary Aquifer (North)

Monterey Subbasin
 WY 2023 Annual Report
 March 2024

Figure 4-13

Path: X:\B60094\Maps\202403\Fig-14_El_Toro_Hydrographs_North.mxd

4.2 Water Use and Supply

Water use in the Subbasin primarily includes municipal, domestic, and agricultural uses. Groundwater is the only water source in the Subbasin except for a small recycled water supply to the Corral de Tierra Area as further described below.

4.2.1 Groundwater Extraction

Table 4-1 and Table 4-2 show groundwater extraction rates within each Management Area by sector.

Groundwater extraction within the Marina-Ord Area is primarily conducted by MCWD for municipal water use. A small volume of groundwater is extracted by the U.S. Army for remediation purposes at the former Fort Ord and is then returned to the groundwater basin. MCWD is the sole water purveyor within the Marina-Ord Area and collects groundwater extraction data by metering its production wells. As shown in Table 4-1, groundwater extraction rates within the Marina-Ord Area totaled approximately 3,338 acre-feet (AF) during WY 2023. Water use from WY 2022 is also shown in Table 4-1..

Water use sectors in the Corral de Tierra Area include municipal water use supplied by various small and large water systems and agricultural and rural domestic water use. Agricultural water use is derived from pumping reported as part of the MCWRA Groundwater Extraction Management System (GEMS). Urban water use in the Corral de Tierra Area is calculated based on extraction reported through GEMS and the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW). Table 4-2 shows the groundwater extraction for the Corral de Tierra Area. Data from WY 2022 are reported in this Annual Report because WY 2023 GEMS data were not available in time to include in this report. The reporting period and submittal deadlines for GEMS data are defined by MCWRA Ordinance No. 3717 and 3718, and do not align with the GSP Annual Report deadline; therefore, groundwater extraction reported in Annual Reports will lag by 1 year until the Ordinances are updated. The GSP identifies GEMS expansion and enhancement as a priority to make groundwater extraction data more complete, accurate, and accessible. SVBGSA and MCWRA have begun conversations on this effort. SWRCB pumping data will also lag by a year because the reporting period does not begin until March of the following year.

Table 4-1. Groundwater Extraction by Sector in WY 2022-23 in the Marina-Ord Area

Year	Water Use Sector	Groundwater Extraction (AF)	Method of Measurement	Accuracy of Measurement
WY 2022	Urban	3,491	Direct/Meter	Estimated to be +/- 5%.
WY 2023	Urban	3,338	Direct/Meter	Estimated to be +/- 5%.

Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

Table 4-2. Groundwater Extraction by Sector in WY 2022 in the Corral de Tierra Area

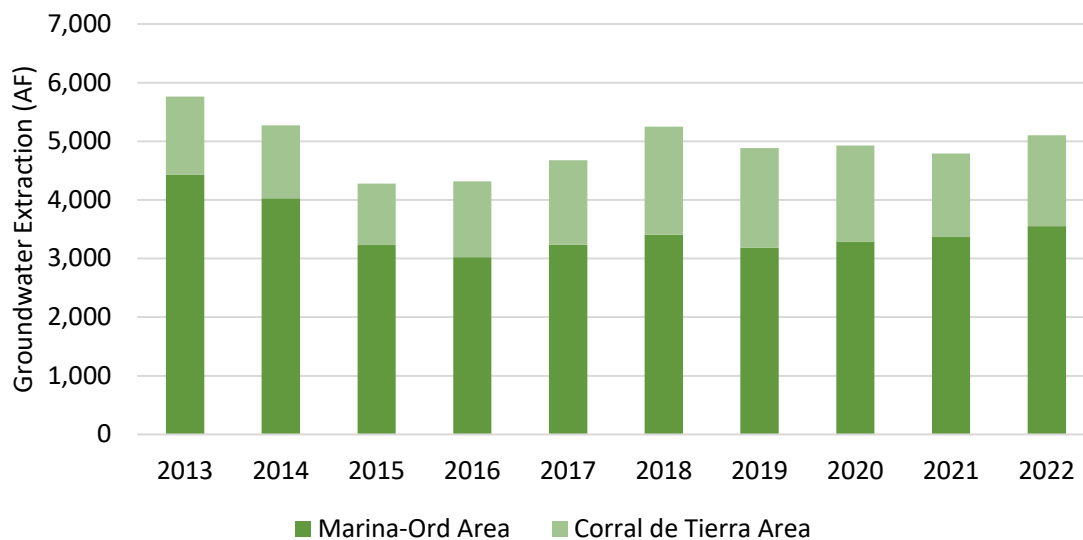
Water Use Sector	Groundwater Extraction (AF)	Method of Measurement	Accuracy of Measurement
Rural Domestic (b)	334	Estimated	N/A
Urban (c)	918	Direct, Estimated	Estimated to be +/- 5%.
Agricultural (c)	298	Direct	Estimated to be +/- 5%.
Total	1,549		--

Notes:

- (a) N/A = Not Applicable.
- (b) Estimated based on non-agricultural irrigation area and number of households outside of water systems. Includes parks and the golf course. Based on the estimation of water use in the Corral de Tierra Area (Wallace Group, 2021).
- (c) Agricultural pumping is reported on the MCWRA reporting year (November 1 to October 31), whereas urban is reported on a calendar-year basis.

Figure 4-14 shows historic groundwater extraction in the Monterey Subbasin over the past ten years. As shown on Figure 4-14, groundwater extraction in the Monterey Subbasin declined between 2014 and 2016 due to urban water conservation during the historic drought, rebounded between 2016 to 2018, and remained stable at approximately 5,000 AFY since 2018.

Figure 4-14. Historic Groundwater Extraction in the Monterey Subbasin



4.2.2 Total Water Use

Because WY 2023 water use data is not available for the Corral de Tierra Area, total water use for WY 2022 is summarized in Table 4-3 and illustrated by sector and by source on Figure 4-15. As shown on Figure 4-15, urban water use was the predominant water use sector and accounted for 88% of the water use in the basin. Domestic and agricultural uses each accounted for 6% of

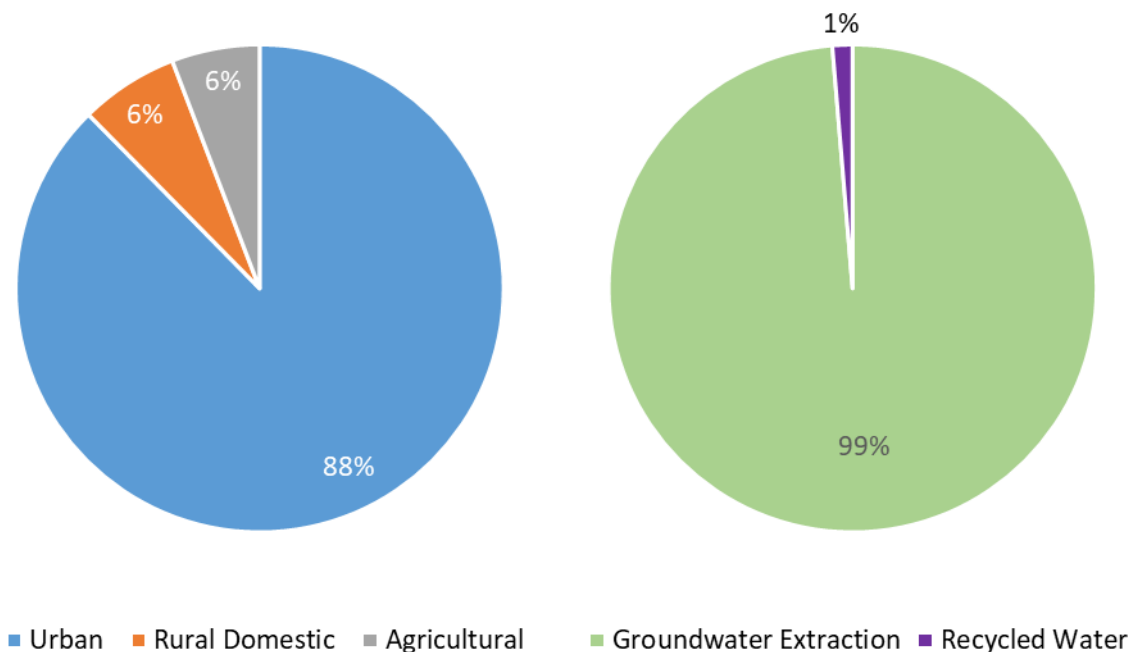
Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

the Subbasin’s total water use. Total water use is the sum of groundwater extraction and recycled water use. In addition to groundwater (99%), a small amount of wastewater is recycled (1%) and used to irrigate development lawns in Las Palmas residential area within the Corral de Tierra Area.

Table 4-3. Total Water Use in WY 2022 in the Monterey Subbasin

Management Area	Water Use Sector	Groundwater Extraction (AF)	Recycled Water (AF)	Total Use by Sector (AF)
Marina-Ord Area	Urban	3,491	0	3,491
Corral de Tierra Area	Rural Domestic	334	0	334
Corral de Tierra Area	Urban	918	76	994
Corral de Tierra Area	Agricultural	298	0	298
Total		5,041	76	5,117

Figure 4-15. Total Water Use in WY 2022 by Sector and Source



4.3 Groundwater Storage

The total change in groundwater storage within the Subbasin is equivalent to the change in storage due to groundwater elevation changes and the change in storage due to seawater

intrusion. The change in groundwater storage is calculated for the Marina-Ord Area Water Budget Zone (WBZ) and the Corral de Tierra Area WBZ, as presented below⁴.

4.3.1 Marina-Ord Area WBZ

The groundwater storage change in the Marina-Ord Area WBZ during WY 2023 was estimated by (a) comparing the estimated water level surface in Fall 2022 with the estimated water level surface in Fall 2023 for each principal aquifer and (b) calculating the change in storage based on the observed change in water levels and the estimated storage coefficient within the contoured portion of the Marina-Ord Area WBZ. The estimated storage coefficient defined spatially using parameters derived from the calibrated Monterey Subbasin Groundwater Flow Model (MBGWFM). As described in Section 4.4 and Section 5.2.3 below, available data shows no advancement of the seawater intrusion extent during WY 2023. Therefore, the change in groundwater storage estimated herein is based on the estimated change in storage due to groundwater elevation changes.

Specifically, geospatial (raster) surfaces of groundwater elevations were created from the Fall 2022 water level contours and Fall 2023 contours and associated with the MBGWFM grid. Average water levels within each grid cell were subsequently compared to the top and bottom elevations of each principal aquifer defined in the MBGWFM and were multiplied by their respective storage coefficients to determine the total unconfined and confined storage volume at the cell during each bookend date. Storage coefficients used in the MBGWFM are discussed in *Section 2.5.2, Appendix 6B* of the Monterey GSP. Cell-specific storage volumes were then summed for cells located within the contoured areas of the Marina-Ord WBZ to calculate the groundwater available in storage within each principal aquifer in Fall 2022 and Fall 2023. Total storage volumes were then compared to calculate the change in groundwater storage within each principal aquifer between Fall 2022 and Fall 2023. The calculation was only performed for cells outside the seawater intruded area.

In addition to the estimated storage change between Fall 2022 and Fall 2023, the estimated storage changes between Fall 2021 and Fall 2022 are presented herein because they were not available for inclusion in the WY 2022 Annual Report. The estimated change in groundwater storage for each principal aquifer in the Marina-Ord Area WBZ is shown in Table 4-4 and Figure 4-16. The estimated groundwater elevation changes in the Marina-Ord Area between Fall 2021 and Fall 2022 and between Fall 2022 and Fall 2023 are shown on Figure 4-17 and Figure 4-18, respectively.

- In the Dune Sand, 180-Foot, and 400-Foot Aquifers, there were observed decreases in storage between Fall 2021 and Fall 2022, followed by subsequent increases in storage between Fall 2022 and Fall 2023. These fluctuations fall within the historical range of

⁴ The Marina-Ord Area WBZ includes the Marina-Ord Area as well as the Reservation Road portion of the Corral de Tierra Area, as they share the same principal aquifers; The Corral de Tierra WBZ includes the main portion of the Corral de Tierra Area underlain by the El Toro Primary Aquifer System.

Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

changes and correlate with groundwater elevation trends, reflecting hydrologic conditions in WYs 2022 and 2023 (see Section 4.1.2).

- In the Deep Aquifers, an increase of +15 AFY was estimated between Fall 2021 and Fall 2022, consistent with the limited change in groundwater elevations during WY 2022. A decrease of -1,060 AFY was observed between Fall 2022 and Fall 2023, corresponding to a decline in groundwater elevations near the central Marina-Ord Area. These fluctuations fall within the historical range of changes and correlate with groundwater elevation trends during WYs 2022 and 2023.
- Due to data availability, groundwater elevation contours for the Deep Aquifers were based on a more sporadic distribution of wells, including data from production wells. As such, there is a higher level of uncertainty in the estimated change in storage in the Deep Aquifers compared to other principal aquifers. MCWDGSA is working on expanding its Deep Aquifers monitoring network with the construction of new monitoring wells, as outlined in Section 5.2.4.

Table 4-4. Estimate Change in Groundwater Storage in the Marina-Ord Area WBZ

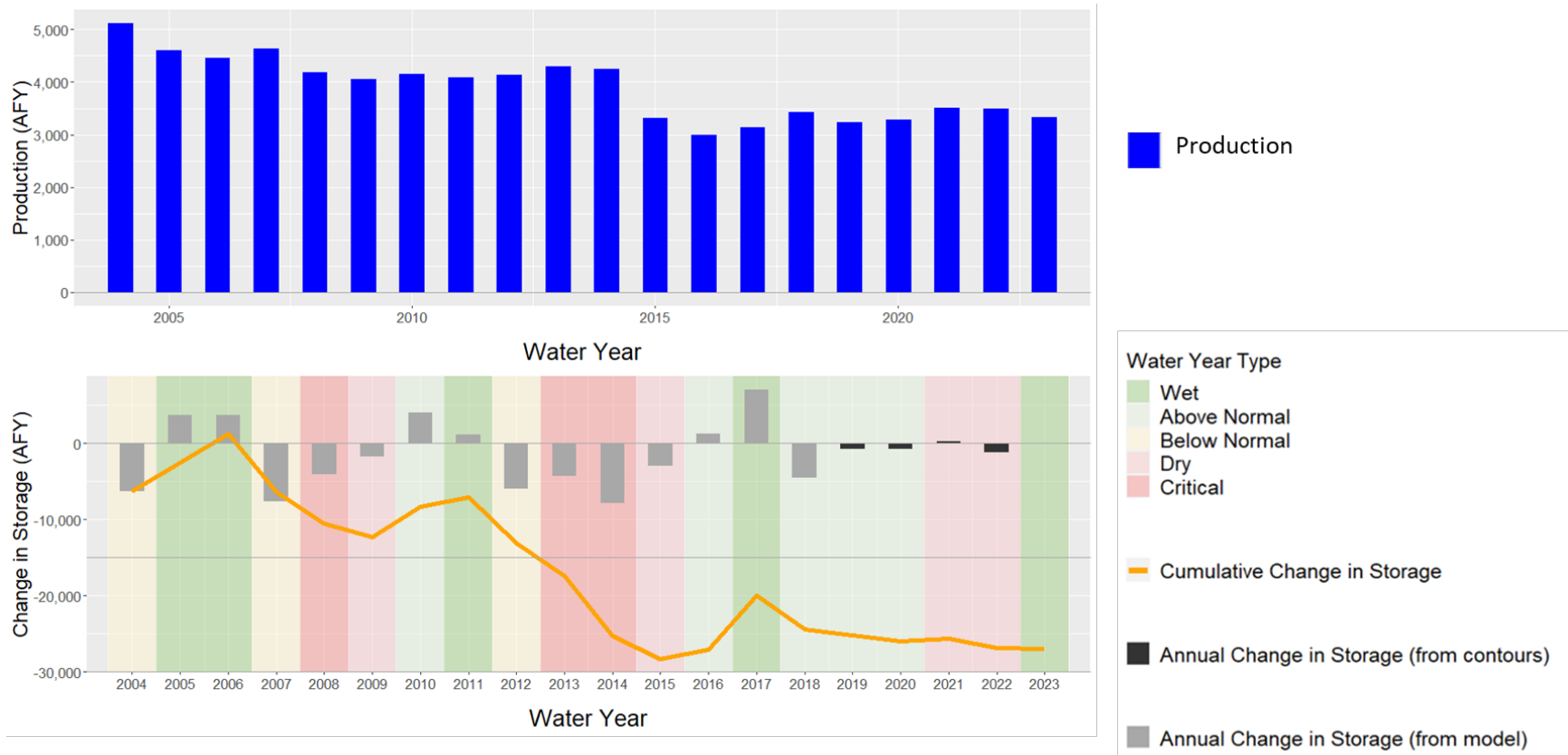
Aquifer	Change in Groundwater Storage, Fall 2021 to Fall 2022 (AF)	Change in Groundwater Storage, Fall 2022 to Fall 2023 (AF)
Dune Sand Aquifer	-130	127
180-Foot Aquifer	-456	417
400-Foot Aquifer	-590	397
Deep Aquifers	15	-1,060
Total Marina-Ord Area WBZ	-1,161	-119

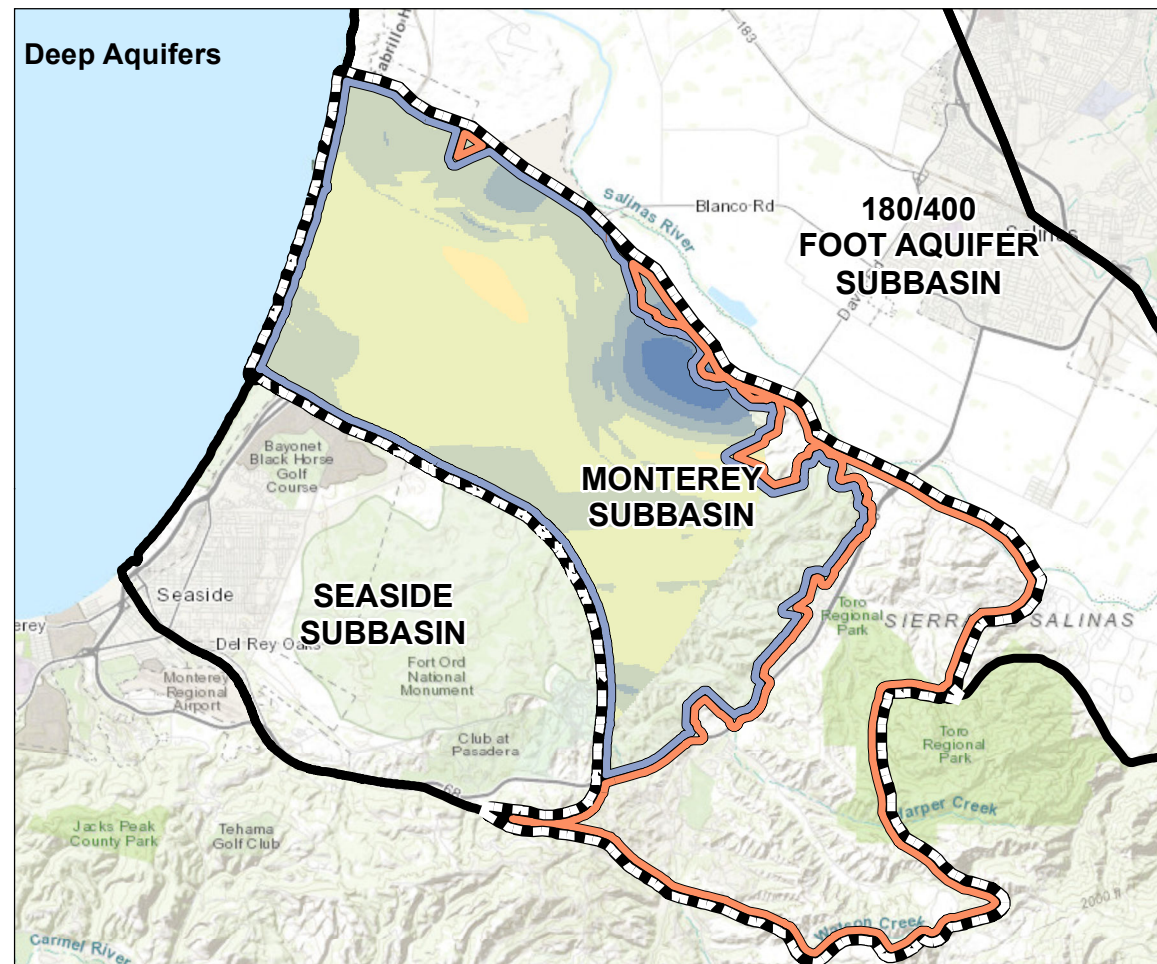
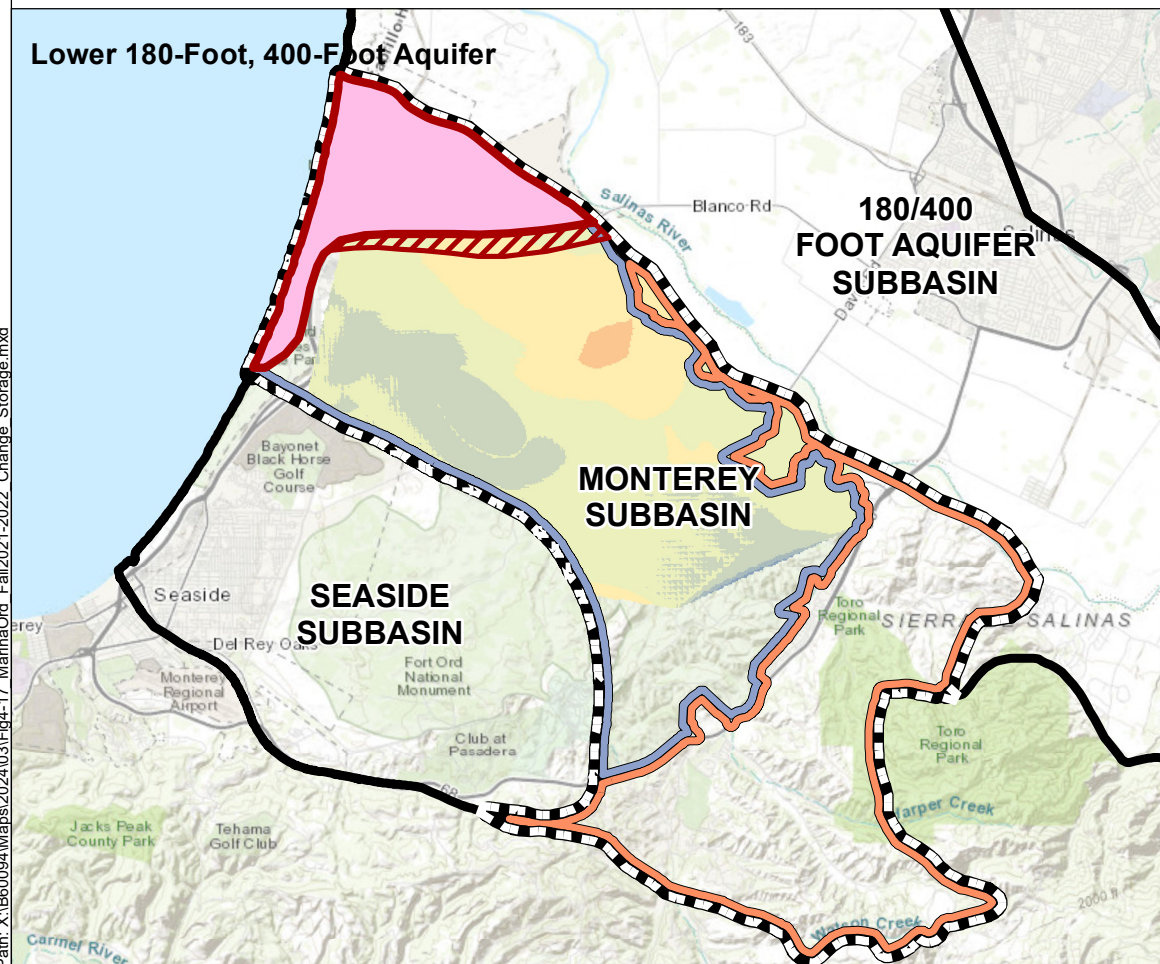
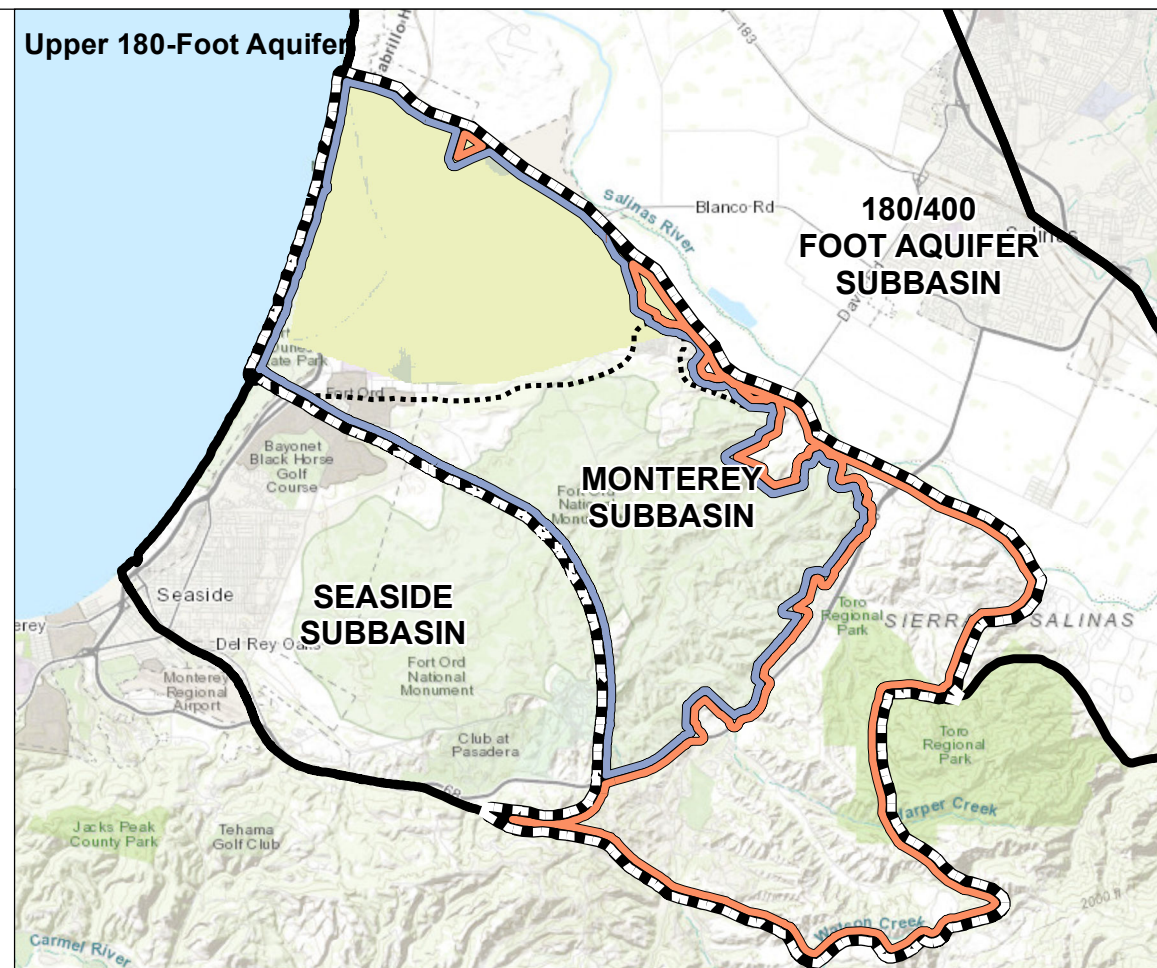
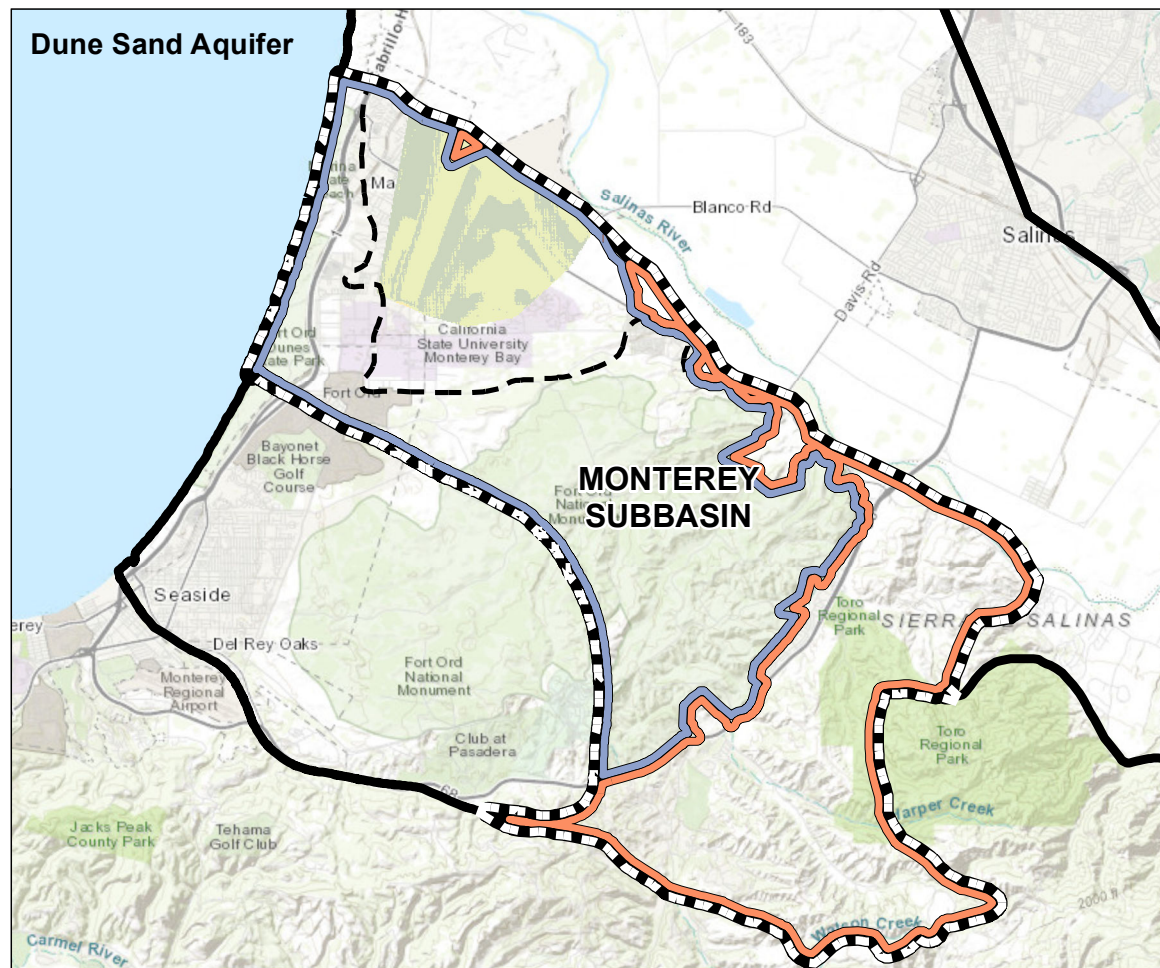
Notes:

Totals may not sum due to rounding.

Subbasin Conditions
 WY 2023 Annual Report
 Monterey Subbasin

Figure 4-16. Cumulative and Annual Change in Storage in the Marina-Ord Area





Legend

- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley
- Southern Extent of FO-SVA (Harding ESE, 2001)
- Southern Extent of Valley Fill Deposits (Harding ESE, 2001)

Management Areas

- Marina-Ord Area
- Corral de Tierra Area

Estimated Seawater Intrusion in Monterey

- Area of Known Seawater
- Area of Potential Seawater

Change in Groundwater Elevations (ft)

-30 - -25	0.1 - 5
-24.9 - -20	5.1 - 10
-19.9 - -15	10.1 - 15
-14.9 - -10	15.1 - 20
-9.9 - -5	20.1 - 25
-4.9 - 0	

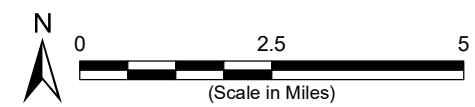
Abbreviations

ft = foot
NAVD 88 = North American Vertical Datum of 1988

- Notes**
- All locations are approximate.
 - The change in groundwater elevation reflects the changes from Fall 2021 to Fall 2022.
 - The areas of known seawater intrusion and potential seawater intrusion are discussed in Section 5.3.3 of the Monterey GSP. Area of potential seawater intrusion is located between the seawater intruded wells and the non-seawater intruded wells and lacks of sufficient data.

Sources

- Basemap is ESRI's ArcGIS Online world topographic map, obtained 28 March 2024.

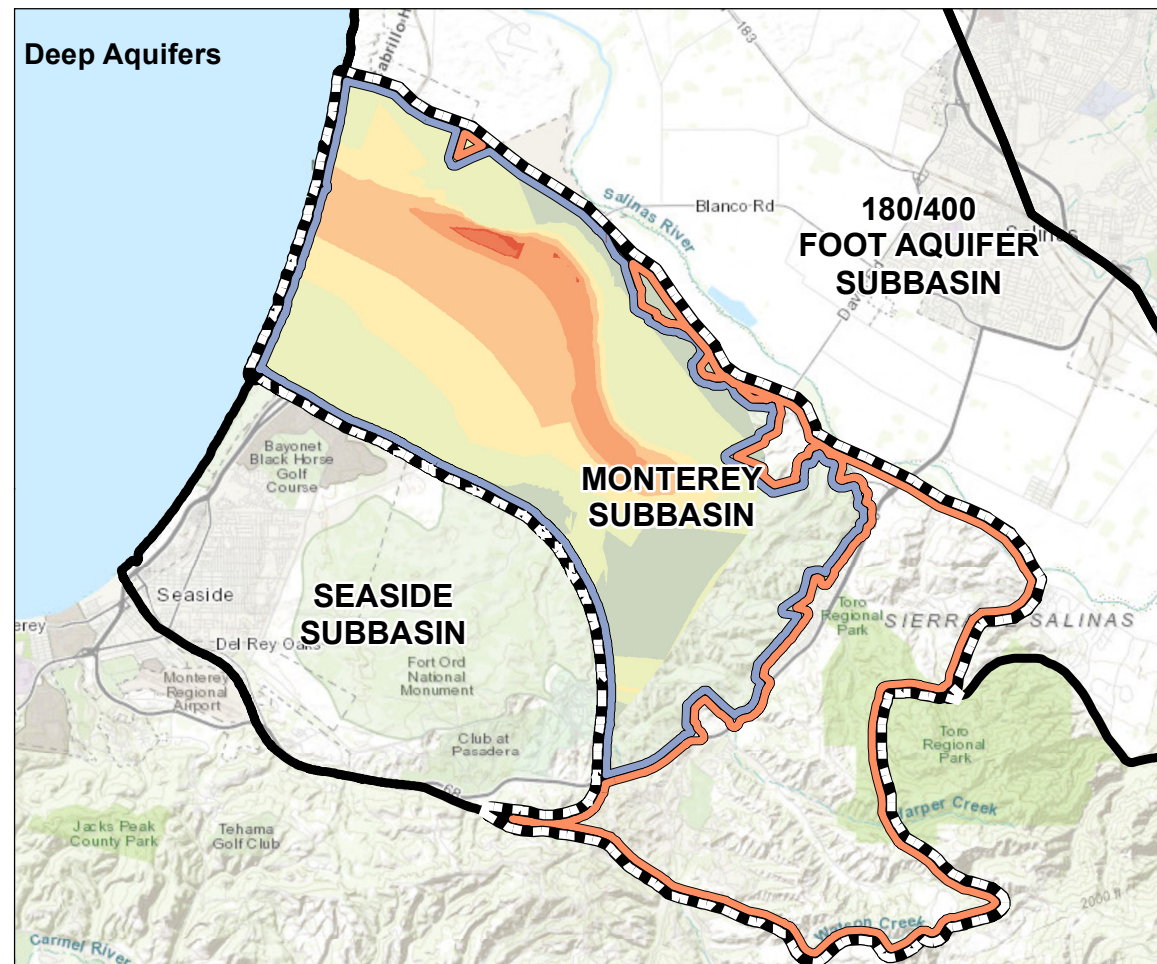
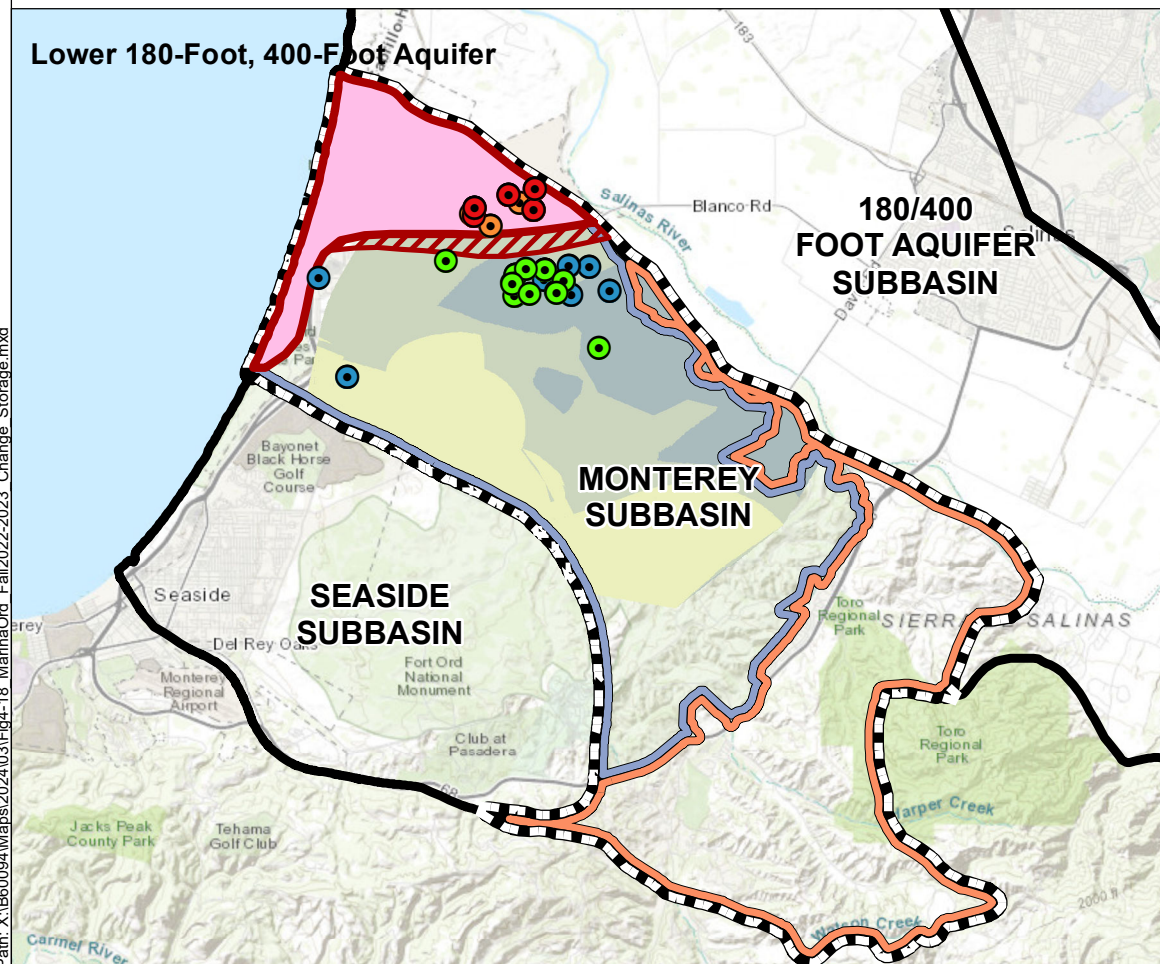
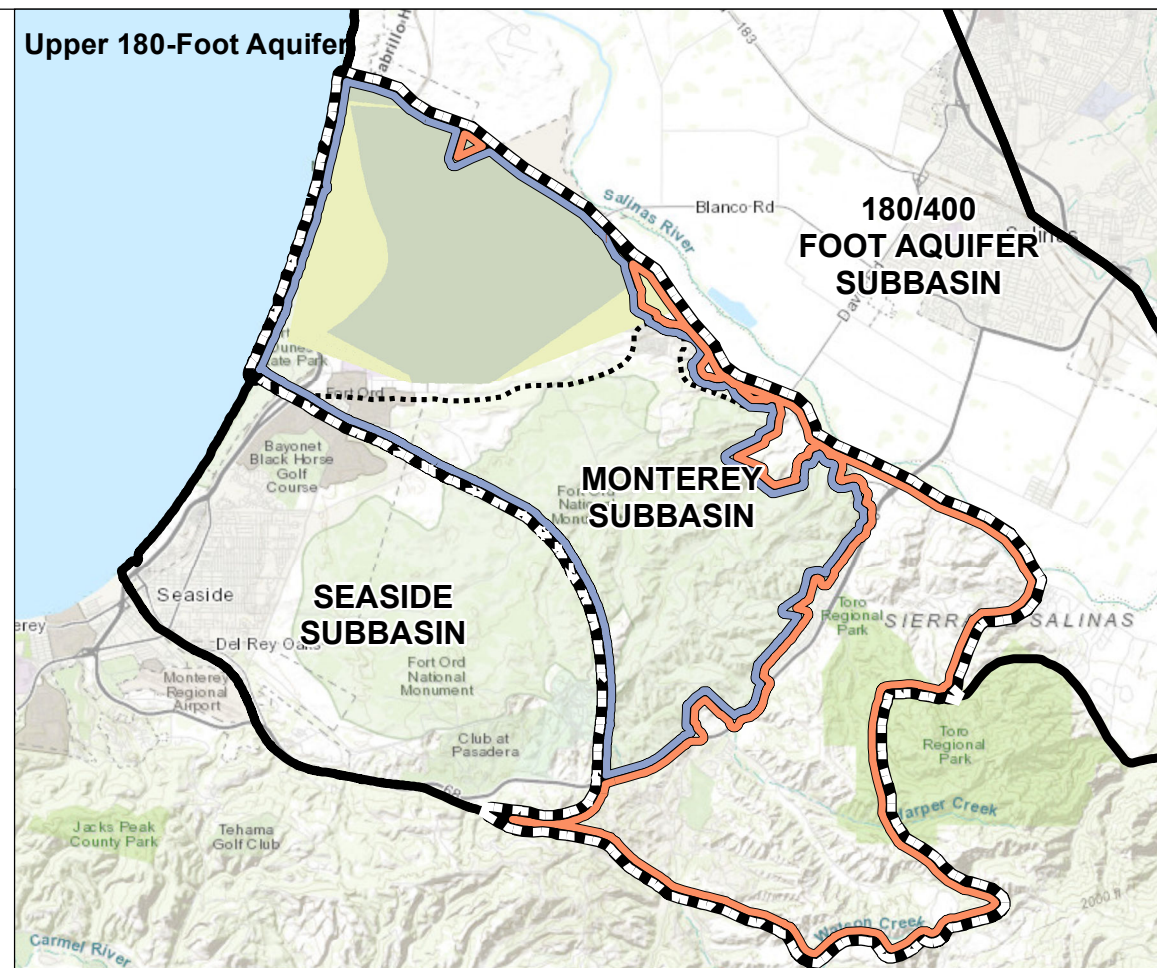
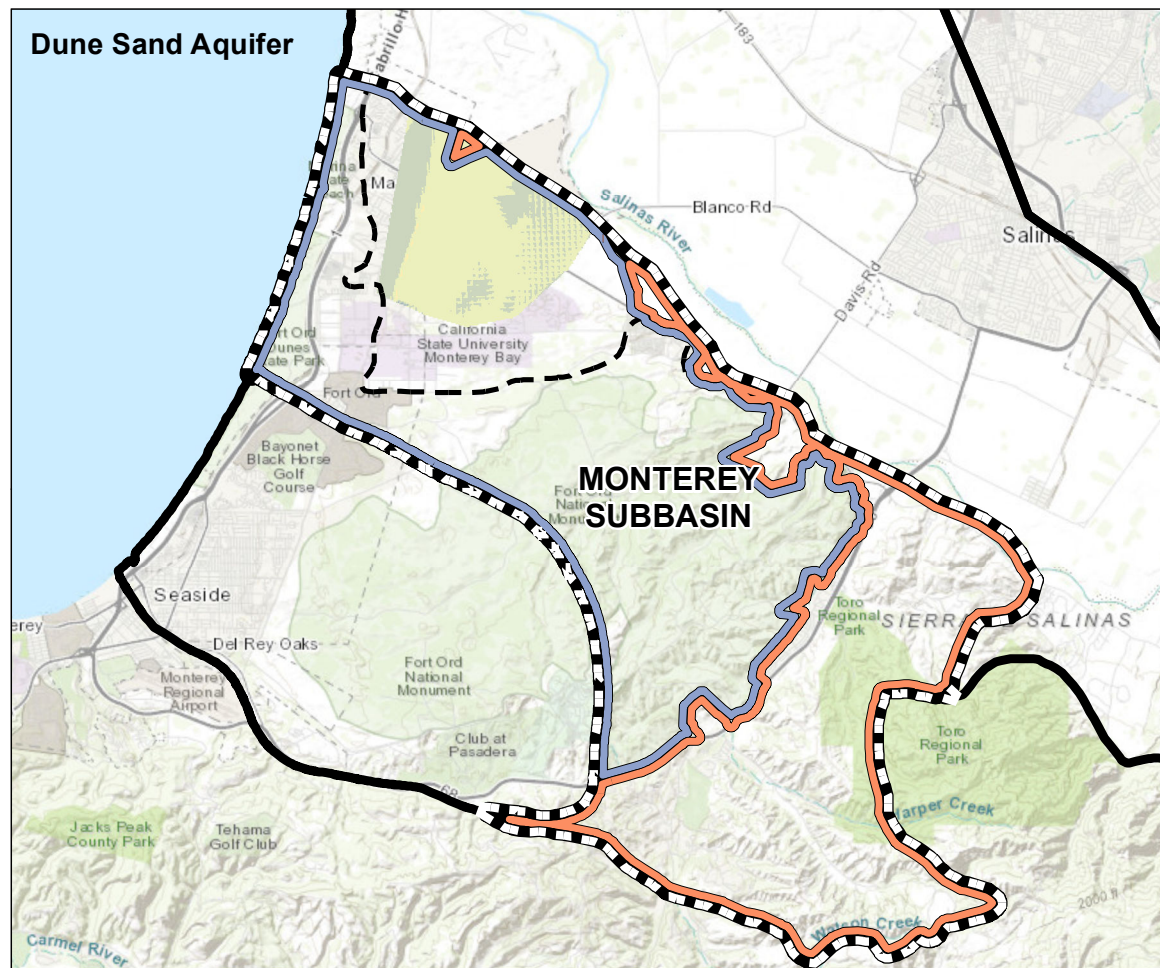


Change in Groundwater Elevations in the Marina-Ord Area, Fall 2021 to Fall 2022

Monterey Subbasin
WY 2023 Annual Report
March 2024

Figure 4-17

Path: X:\B60094\Maps\2024\03\Fig4-17_MarinaOrd_Fall2021-2022_Change_Storage.mxd



Legend

- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley
- Southern Extent of FO-SVA (Harding ESE, 2001)
- Southern Extent of Valley Fill Deposits (Harding ESE, 2001)

Management Areas

- Marina-Ord Area
- Corral de Tierra Area

Estimated Seawater Intrusion in Monterey

- Area of Known Seawater
- Area of Potential Seawater

Change in Groundwater Elevations (ft)

	-4.9 - 0		0.1 - 5
	-30 - -25		5.1 - 10
	-24.9 - -20		10.1 - 15
	-19.9 - -15		15.1 - 20
	-14.9 - -10		20.1 - 25
	-9.9 - -5		

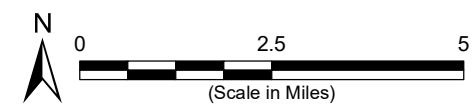
Abbreviations

ft = foot
NAVD 88 = North American Vertical Datum of 1988

- Notes**
- All locations are approximate.
 - The change in groundwater elevation reflects the changes from Fall 2022 to Fall 2023.
 - The areas of known seawater intrusion and potential seawater intrusion are discussed in Section 5.3.3 of the Monterey GSP. Area of potential seawater intrusion is located between the seawater intruded wells and the non-seawater intruded wells and lacks of sufficient data.

Sources

- Basemap is ESRI's ArcGIS Online world topographic map, obtained 28 March 2024.



Change in Groundwater Elevations in the Marina-Ord Area, Fall 2022 to Fall 2023

Monterey Subbasin
WY 2023 Annual Report
March 2024

Figure 4-18

Path: X:\B60094\Maps\2024\03\Fig4-18 MarinaOrd Fall2022-2023 Change Storage.mxd

4.3.2 Corral de Tierra WBZ

Groundwater storage change in the Corral de Tierra WBZ was estimated by comparing groundwater elevation data from one year to another from Fall 2022 to Fall 2023. The change in storage is calculated by multiplying a change in groundwater elevation by a storage coefficient and the land area of the contoured portion of the Corral de Tierra WBZ. The estimated groundwater elevation changes in the Corral de Tierra Area are shown on Figure 4-20. A storage coefficient of 0.1 is used to calculate the change in storage for the El Toro Primary Aquifer (GeoSyntec, 2007). The average change in groundwater elevation was calculated using the average change in groundwater elevations estimated based on the groundwater elevation contours. Since there are data gaps within the RMS network, the storage change was not calculated in the areas that were not contoured and not covered by the RMS network.

A summary of components used for estimating the change in groundwater storage due to groundwater elevation changes in the Corral de Tierra WBZ is shown in Table 4-5 and Figure 4-19. The estimated groundwater elevation changes in the Corral de Tierra Area are shown on Figure 4-20. Annual groundwater storage changes due to changes in groundwater elevation from Fall 2022 to Fall 2023 increased by 1,400 AF in the Corral de Tierra Area. The increase during this wet year does not change the overall trend of decreasing groundwater in storage, as shown by the orange cumulative change in groundwater storage line on Figure 4-19.

Table 4-5. Estimated Change in Groundwater Storage in the Corral de Tierra WBZ

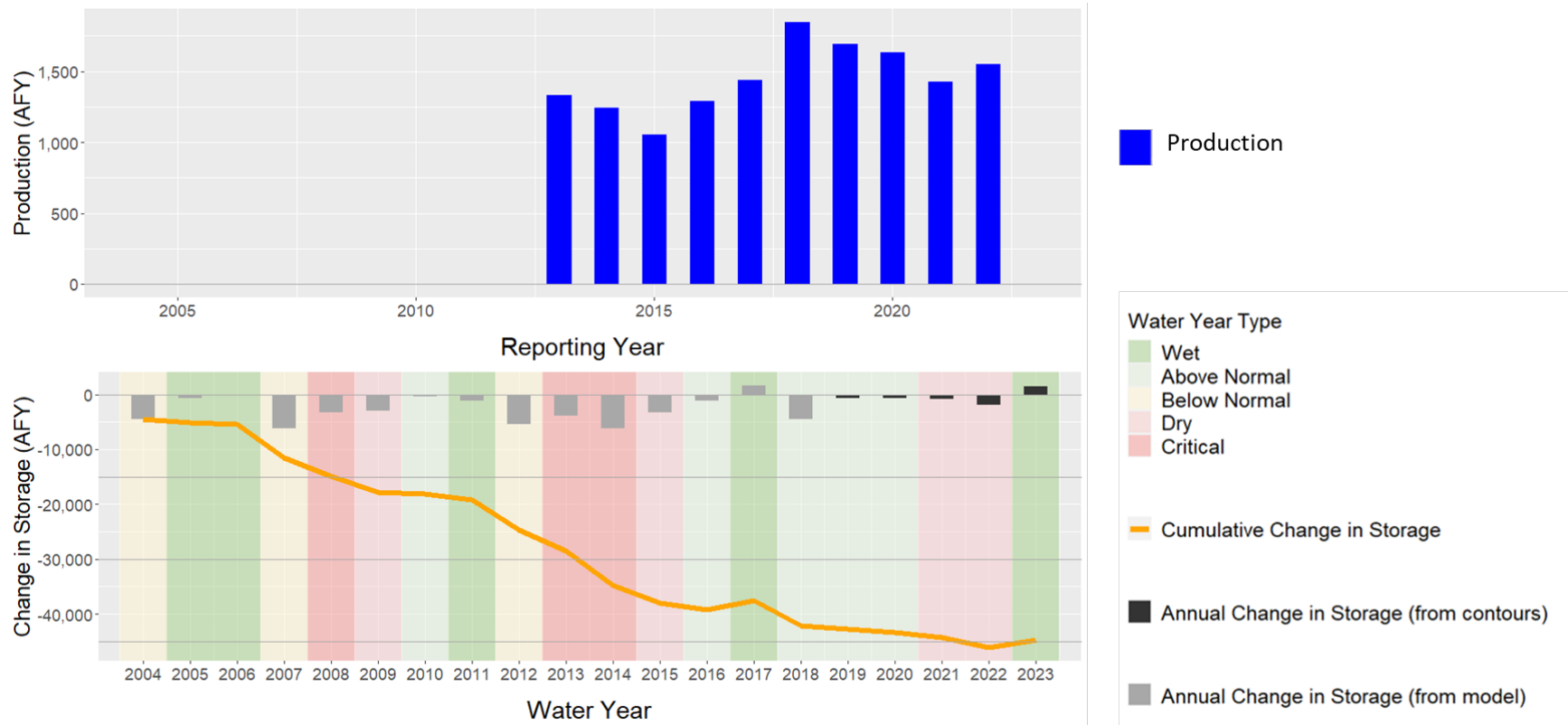
Component	Fall 2022 to Fall 2023
Area of contoured portion of Subbasin (acres)	9,675
Storage coefficient	0.1
Average change in groundwater elevation (feet)	1.40
Total annual change in groundwater storage (AF/year)	1,400

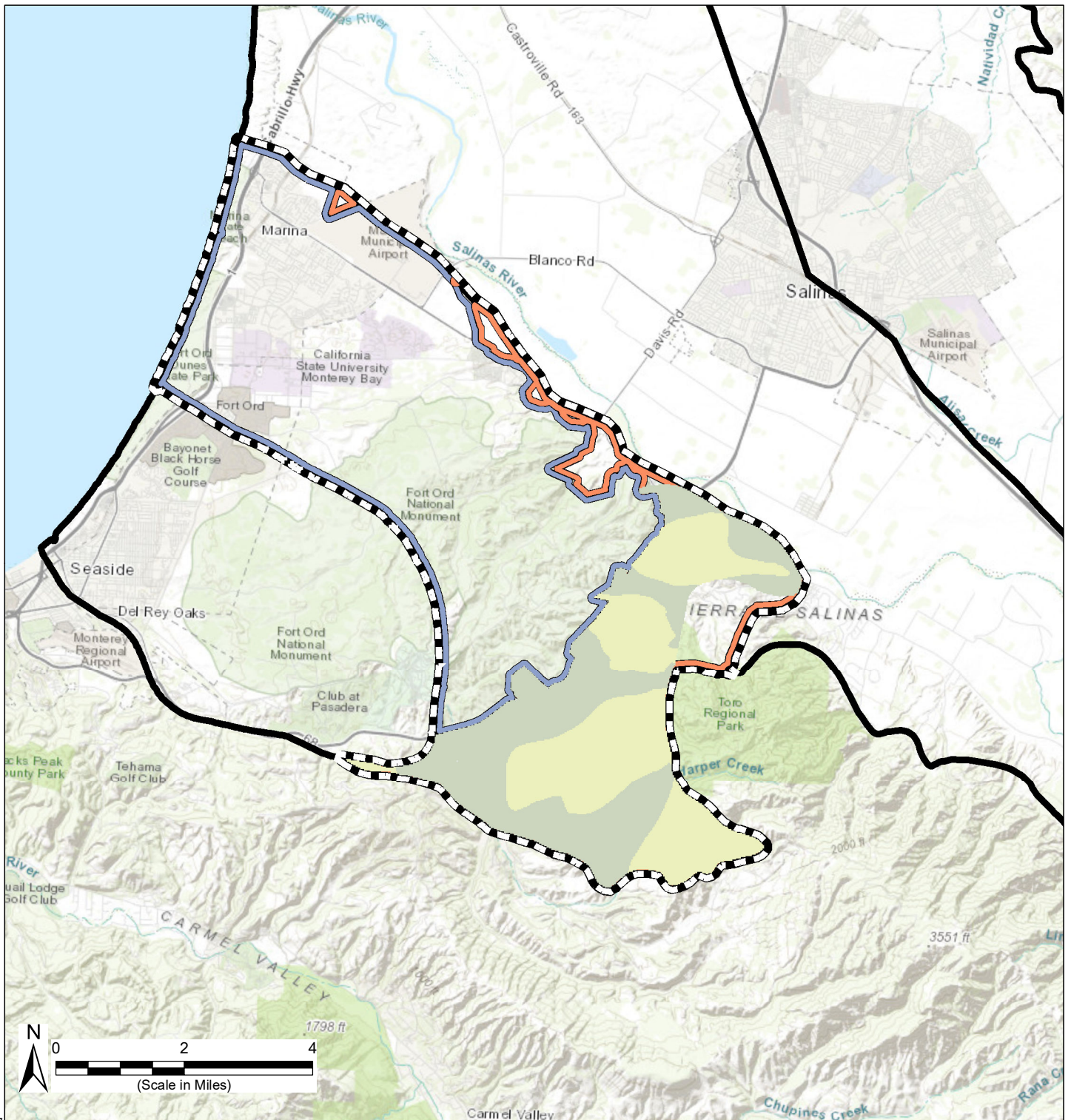
Notes:

Negative values indicate loss, positive values indicate gain.

Subbasin Conditions
 WY 2023 Annual Report
 Monterey Subbasin

Figure 4-19. Cumulative and Annual Change in Storage in the Corral de Tierra Area





Path: X:\B660094\Maps\2024\03\Fig4-20-Coral_ChangeInGWE.mxd

Legend

- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley Basin

Change in Groundwater Elevation in the El Toro Aquifer System (ft)

- 4.9 - 0
- 0.1 - 5

Management Areas

- Marina-Ord Area
- Corral de Tierra

Notes

1. All locations are approximate.
2. Groundwater contours are in ft NAVD 88.
3. The change in groundwater elevation reflects the changes from Fall 2022 to Fall 2023.

Abbreviations

- ft = feet
- NAVD 88 = North American Vertical Datum of 1988

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 27 March 2024.

Change in Groundwater Elevations in the El Toro Primary Aquifer System, Fall 2022 to Fall 2023

Monterey Subbasin
WY 2023 Annual Report
March 2024

Figure 4-20

4.4 Seawater Intrusion

4.4.1 Salinity Concentrations

Since completion of the WY 2022 annual report, the following changes were made to the seawater intrusion RMS network:

- MW-02-13-180M and MW-12-07-180 have been replaced by EW-12-04-180M and MW-02-06-180, respectively, because wells MW-02-13-180M and MW-12-07-180 have been decommissioned by the U.S. Army.
- MW-12-12-180L was decommissioned by the U.S. Army and removed from the monitoring network. It was not replaced due to a lack of monitoring wells in its vicinity.

As described in Section 5.2.3.2, during WY 2023, MCWDGSA focused on developing its seawater intrusion monitoring program, which included working with the Monterey Peninsula Water Management District (MPWMD), Seaside Watermaster, and the U.S. Army at the former Fort Ord to obtain access to wells of interest and contracting with partner agencies to perform the work. MCWDGSA will continue to work with partner agencies to initiate seawater intrusion monitoring in deep monitoring wells in WY 2024.

Table 4-6 below summarizes the most recent chloride (Cl) and total dissolved solids (TDS) concentrations from each of the seawater intrusion RMS wells, including data from a recent February 2024 sampling event. Among the seawater intrusion monitoring sites sampled recently, there are no exceedances of the MT defined for seawater intrusion in the Monterey GSP at 500 milligram per liter (mg/L) of chloride or 1,000 mg/L of TDS, which is used as a surrogate where chloride data are unavailable.

Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

Table 4-6. Monterey Subbasin Seawater Intrusion Representative Monitoring Sites

Site Name	Aquifer	Collection Agency	Latest Cl Concentration (mg//L) (e)	Latest TDS Concentration (mg//L) (e)
MW-BW-49-A	Dune Sand Aquifer	MCWDGSA	-	357 (2024) (c)
MW-BW-81-A	Dune Sand Aquifer	MCWDGSA	-	265 (2024) (c)
MW-BW-82-A	Dune Sand Aquifer	MCWDGSA	-	282 (2024) (c)
MW-OU2-32-A	Dune Sand Aquifer	MCWDGSA	-	562 (2024) (c)
MW-02-05-180	Upper 180-Foot Aquifer (a)	MCWDGSA	124 (2019)	451 (2024) (c)
MW-02-10-180	Upper 180-Foot Aquifer (a)	MCWDGSA	-	379 (2024) (c)
EW-12-04-180M	Upper 180-Foot Aquifer (a)	MCWDGSA	-	502 (2024) (c)
MW-02-13-180U	Upper 180-Foot Aquifer (a)	MCWDGSA	-	617 (2024) (c)
MW-02-06-180	Upper 180-Foot Aquifer (a)	MCWDGSA	-	326 (2019) (c)
MW-B-05-180	Upper 180-Foot Aquifer (a)	MCWDGSA	-	597 (2024) (c)
MW-BW-55-180	Upper 180-Foot Aquifer (a)	MCWDGSA	-	430 (2024) (c)
MCWD-31	Lower 180-Foot Aquifer (a)	MCWDGSA	86 (2023)	350 (2023)
MW-BW-04-180	Lower 180-Foot Aquifer (a)	MCWDGSA	-	422 (2024) (c)
MW-OU2-66-180	Lower 180-Foot Aquifer (a)	MCWDGSA	-	800 (2024) (c)
TEST2	Lower 180-Foot Aquifer (a)	MCWDGSA	-	749 (2024) (c)
MCWD-29	Lower 180-Foot, 400-Foot Aquifer (a)	MCWDGSA	94 (2023)	380 (2023)
MCWD-30	Lower 180-Foot, 400-Foot Aquifer (a)	MCWDGSA	130 (2023)	440 (2023)
MP-BW-50-289	Lower 180-Foot, 400-Foot Aquifer (a)	MCWDGSA	-	426 (2019)
MP-BW-50-309	Lower 180-Foot, 400-Foot Aquifer (a)	MCWDGSA	-	358 (2019)
MP-BW-50-339	Lower 180-Foot, 400-Foot Aquifer (a)	MCWDGSA	-	510 (2019)
MP-BW-50-359	Lower 180-Foot, 400-Foot Aquifer (a)	MCWDGSA	-	532 (2019)
MP-BW-50-384	Lower 180-Foot, 400-Foot Aquifer (a)	MCWDGSA	-	486 (2019)
MPWMD#FO-10S	400-Foot Aquifer (a) (b)	Seaside Basin Water Master	84 (2023)	284 (2023)
MW-OU2-07-400	400-Foot Aquifer (a)	MCWDGSA	-	480 (2024) (c)
MCWD-10	Deep Aquifers	MCWDGSA	60 (2023)	300 (2023)
MCWD-11	Deep Aquifers	MCWDGSA	79 (2023)	390 (2023)
MPWMD#FO-10D	Deep Aquifers (b)	Seaside Basin Water Master	52 (2023)	222 (2023)

Notes:

- (a) The RMS network is selected to distinguish the upper 180-Foot Aquifer and the lower 180-Foot Aquifer since conditions in the upper 180-Foot are distinct from those in the lower 180-Foot Aquifer, as described in *Section 5* of the Monterey GSP.
- (b) MPWMD#FO-10S is screened in the Paso Robles Formation, which is likely connected to the 400-Foot Aquifer; MPWMD#FO-10D is screened in the Santa Margarita Aquifer, which is likely connected to the Deep Aquifers.

Subbasin Conditions

WY 2023 Annual Report

Monterey Subbasin

- (c) Specific conductance to TDS conversion is based on a derived slope of 0.7025 mg/L PER $\mu\text{S}/\text{cm}$ from a linear regression model with existing data.
- (d) The year next to the concentration denotes the water year.

4.4.2 Induction Logs

Induction logging within a well measures the fluid conductivity within the adjacent formation. Although this method does not provide exact measurements of water quality, it can be used to monitor changes in conductivity (i.e., groundwater salinity) over time. In addition, because induction logging provides a continuous vertical profile, it is an effective way to identify signs of vertical migration of seawater intrusion from shallower to deeper aquifers.

This section describes current induction logging programs in the Subbasin and data collected in WY 2023. The monitoring wells mentioned herein are a subset of the 400-Foot and Deep Aquifer RMS wells shown on Figure 4-10 and Figure 4-11.

The Seaside Basin Watermaster constructed and maintains four Sentinel Wells along the coast in the Monterey and Seaside Subbasins to detect potential seawater intrusion. The northern-most well, SBMW-1, is located within the Monterey Subbasin. The Watermaster conducts semi-annual induction logging within these wells. During baseline monitoring of SBMW-1 in 2007, it has been documented that very high conductivities indicative of saline groundwater were observed in depths from 125 feet to approximately 350-400 feet (Feeney, 2007). Recent induction logs show small increases in conductivity in SBMW-1, 2, and 4 within the Paso Robles Formation. Within SBMW-1, the increased conductivity was observed between 500 to 540 feet below ground surface (Montgomery & Associates, 2023).

In 2021, the Seaside Watermaster performed induction logging at MPWMD well #FO-10S with the intent of evaluating recent elevated chloride detections from the well. However, an apparent section of metal pipe, likely lost down the well during drilling, was observed in the well and may have interfered with the induction logging, preventing the logging from providing accurate information (Montgomery & Associates, 2022). The Seaside Watermaster suspects that the well might also be allowing leakage to the deeper aquifers and is planning to destroy MPWMD#FO-10S. MCWDGSA is in discussions with the Watermaster regarding whether a replacement well should be constructed.

In November 2022, MCWRA performed induction logging at the USGS deep monitoring well (014S001E24L002M) and the Airport deep monitoring well (14S02E33E02). Concurrently, an attempt was made to induction log PZ-FO-32-910; however, MCWRA was unable to induction log the well due to its construction (MCWRA, 2022). These induction logs provide a baseline for comparison with future induction logs to qualitatively evaluate groundwater salinity changes near these wells.

Section 10.2.5 of the Monterey Subbasin GSP – Address Identified Data Gaps in the Basin Setting, calls for annual induction logging of Deep Aquifer monitoring well clusters to profile water quality changes and potential vertical migration of seawater intrusion into the Deep Aquifer. As

Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

discussed in Section 5.2, MCWDGSA plans to perform additional induction logging in the Subbasin’s existing and planned deep monitoring wells through implementation of the Subbasin’s Round 2 SGM Grant.

4.5 Water Quality

The water quality monitoring network consists of existing water supply wells in the Subbasin. As described in *Section 8* of the Monterey GSP, separate MTs are set for the COCs for public water system supply wells, on-farm domestic wells, and irrigation supply wells. COCs for drinking water are assessed at public water supply wells and on-farm domestic wells, and COCs for crop health are assessed at agricultural supply wells. The municipal public water system supply wells included in the monitoring network were identified by reviewing data from the SWRCB DDW. All on-farm domestic wells and agricultural supply wells have been sampled through the Central Coast Regional Water Quality Control Board’s (CCRWQCB’s) Irrigated Lands Regulatory Program (ILRP).

Table 4-7 shows the number of wells in the identified water quality monitoring network that were sampled and those wells that had concentrations above regulatory standards in WY 2023. Since last year’s annual report, the groundwater quality data available for the Subbasin and the identified COCs has been reevaluated due to some location refinements made in the SWRCB’s GAMA information system. Appendix B includes the water quality data up to 2023 that were used in this Annual Report. It also includes a list of constituents that were removed and added to the list of COC for the Subbasin.

As shown on this table, no water supply wells sampled in the Marina-Ord Area had any COCs with concentrations above regulatory drinking water standards. In the Corral de Tierra, the COCs that had concentrations above the regulatory standard include arsenic, iron, manganese, and specific conductance. Ten wells in the Corral de Tierra Area had higher concentrations than the regulatory drinking water standard for arsenic. Four and five wells had higher concentrations than the regulatory drinking water standards for iron and manganese, respectively. One well had a higher concentration than the regulatory drinking water standard for specific conductance.

Subbasin Conditions
WY 2023 Annual Report
Monterey Subbasin

Table 4-7. Water Quality in WY 2023

Constituent of Concern (COC)	Regulatory Standard	Standard Units	Number of Wells Sampled for COC in WY 2023	Number of Wells Sampled in WY 2023 with COC Concentrations Above the Regulatory Standard
<i>Marina-Ord Area</i>				
<i>DDW Wells</i>				
Carbon Tetrachloride	0.5	UG/L	0	0
Trichloroethene (TCE)	5	UG/L	3	0
<i>Corral de Tierra Area</i>				
<i>DDW Wells</i>				
Aluminum	1000 (MCL) 200 (SMCL)	UG/L	1	0
Arsenic	10	UG/L	15	10
Chromium	50	UG/L	2	0
Foaming Agents (MBAS)	0	MG/L	0	0
Iron	300	UG/L	5	4
Manganese	50	UG/L	5	5
Radium 226 + Radium 228	5	pCi/L	1	0
Specific Conductance	1600	UMHOS/CM	6	1
Total Dissolved Solids	1000	MG/L	6	0
Zinc	5	MG/L	2	0
<i>ILRP On-Farm Domestic Wells</i>				
Specific Conductance	1600	UMHOS/CM	0	0
Total Dissolved Solids	1000	MG/L	0	0

Abbreviations:

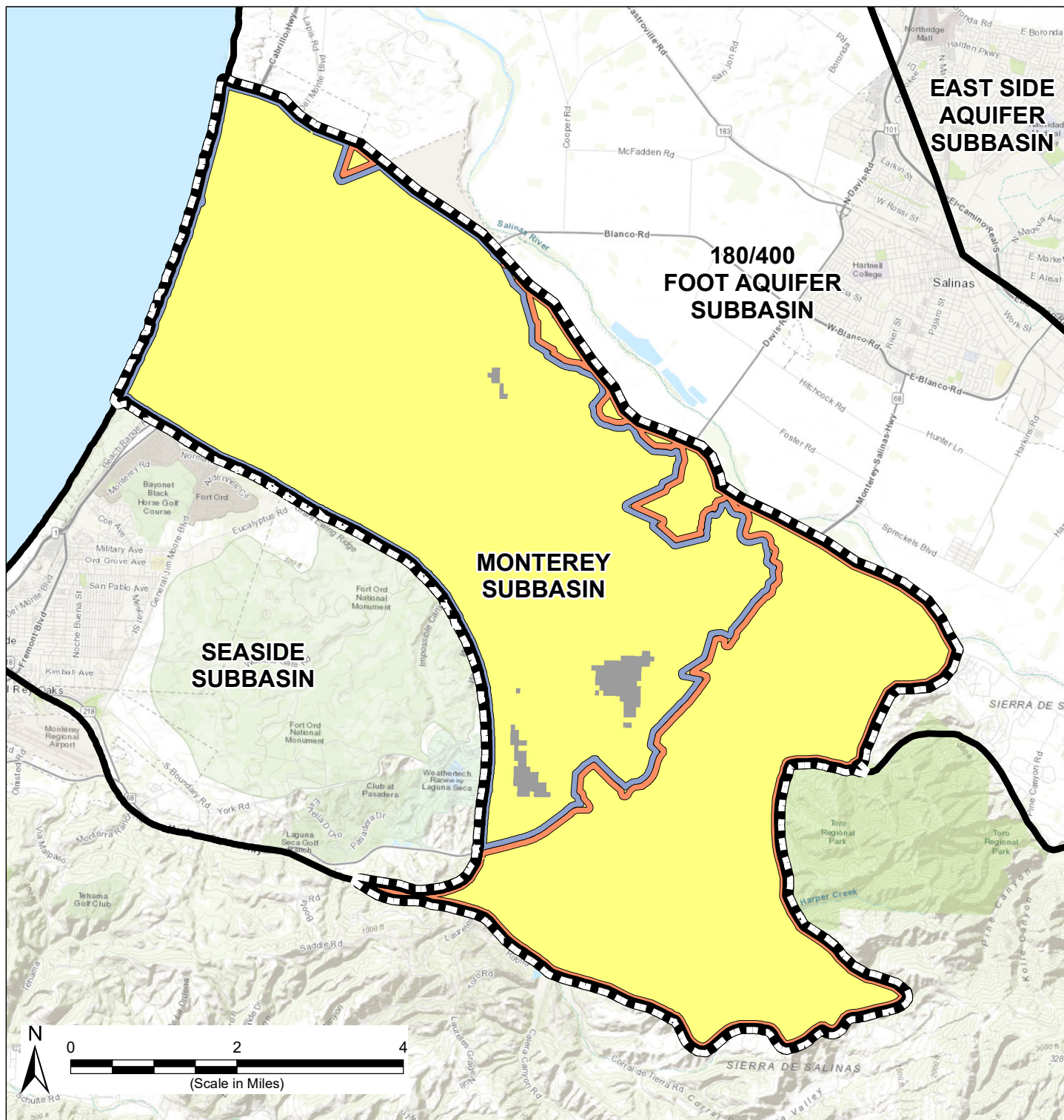
MG/L = milligram per liter

UG/L = microgram per liter

UMHOS/CM = micromhos per centimeter

4.6 Land Subsidence

Land subsidence is measured using InSAR data. This data is provided by DWR on the SGMA data viewer portal (DWR, 2023b). Figure 4-21. shows the annual subsidence for the Subbasin from October 2022 to October 2023. Data continue to show negligible subsidence. All land movement was within the estimated measurement error of +/- 0.1 foot.



Path: X:\B60094\Maps\2024\03\Fig4-21_InSARSubsidence.mxd

Legend

- Monterey Subbasin
- Other Groundwater Subbasins within Salinas Valley Basin
- Management Areas**
- Marina-Ord
- Corral de Tierra
- Rate of Land Subsidence**
- 0.1 to 0.1 ft/yr
- No Data

Abbreviations

ft/yr = foot per year

Notes

1. All locations are approximate.
2. This figure shows the annual land subsidence rate between October of 2022 and October of 2023.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 27 March 2024.
2. InSAR subsidence data, "SAR\ Vertical_Displacement_TRE_ALTAMIRA_Annual_Rate_20221001_20231001 (ImageServer)." Created by DWR and obtained from ArcGIS REST Services Directory.

**Estimated InSAR Subsidence
WY 2023**

Monterey Subbasin
WY 2023 Annual Report
March 2024
Figure 4-21

4.7 Interconnected Surface Water

4.7.1 Marina-Ord Area

As described in the Monterey GSP, the MT for the depletion of ISW due to pumping is set to the minimum shallow groundwater elevations historically observed between 1995 and 2015 near locations of ISW. As shown in Table 4-8, the groundwater elevation at the RMS during Fall 2023 and Spring 2023 remained higher than its representative MT and MO.

Table 4-8. Marina-Ord Area Interconnected Surface Water Representative Monitoring Sites

Site Name	Aquifer	Collection Agency	Fall 2023	Spring 2023	MT	MO
<i>Marina-Ord Area</i>						
MW-BW-82-A	Dune Sand Aquifer	Fort Ord	10.5	10.1	7.9	7.9

4.7.2 Corral de Tierra Area

SVBGSA is in the process of establishing a monitoring network for the depletion of ISW due to pumping in the Corral de Tierra Area and plans to install one new shallow well along El Toro Creek. Once the shallow monitoring well is installed, SVBGSA will use a historical groundwater level contour map to interpolate the MT, MO, and IMs.

5 ANNUAL PROGRESS TOWARDS IMPLEMENTATION OF THE MONTEREY GSP

5.1 Sustainable Management Criteria

The Monterey GSP includes descriptions of significant and unreasonable conditions, MTs, IMs, MOs, and URs for DWR's six sustainability indicators. The MCWDGSA and SVBGSA determined locally defined significant and unreasonable conditions based on public meetings and staff discussions. The quantitative SMCs were developed to reflect the significant and unreasonable conditions and the Subbasin's sustainability goal. The SMCs are individual criterion that will need to be met simultaneously for all Sustainability Indicators. A brief comparison of the data presented in Section 4 and the SMCs are included for each sustainability indicator in the following sections.

Significant and unreasonable conditions occur due to inadequate groundwater management and qualitatively describe groundwater conditions deemed insufficient by beneficial users of groundwater and stakeholders in the Subbasin. Minimum thresholds are quantitative indicators of the Subbasin's locally defined significant and unreasonable conditions. An undesirable result is a combination of minimum threshold exceedances that shows a significant and unreasonable condition across the Subbasin as a whole. Measurable objectives are the goals that reflect the Subbasin's desired groundwater conditions for each sustainability indicator and provide operational flexibility above the minimum thresholds. The GSP and annual reports must demonstrate that groundwater management will not only avoid undesirable results but can reach measurable objectives by 2042. DWR uses interim milestones every 5 years to review progress from current conditions to the measurable objectives.

Since the GSP addresses long-term groundwater sustainability, some of the metrics for the sustainability indicators may not be applicable in each individual future year. The GSP is developed to avoid undesirable results under future hydrogeologic conditions with long-term, deliberate management of groundwater. The Subbasin GSAs' best understanding of future conditions is based on historical precipitation, evapotranspiration, streamflow, and reasonably anticipated climate change and sea-level rise, which have been estimated based on the best available climate science (DWR, 2018). Groundwater conditions that are the result of extreme climatic conditions, which are worse than those anticipated based on the best available climate science, do not constitute an undesirable result. As such, SMCs may be modified in the future to reflect observed future climate conditions.

Pursuant to SGMA Regulations (California Water Code § 10721(w)(1)), "Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods." Therefore, groundwater levels may temporarily exceed minimum thresholds during prolonged droughts, which could be more extreme than those that have been

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

anticipated based on historical data and anticipated climate change conditions. Such temporary exceedances do not constitute an undesirable result.

5.1.1 Chronic Lowering of Groundwater Levels

Table 5-1 compares Fall 2023 groundwater elevations to MTs, MOs, and interim milestone in 5 years after GSP implementation (IM5s) set at RMS wells established for chronic lowering of groundwater levels in the Monterey GSP. For SGMA monitoring purposes, fall measurements are those collected during the fourth quarter (i.e., October, November, and December) and correspond to the measurements used to define the Subbasin’s SMCs.

The groundwater elevation monitoring network in the Monterey Subbasin GSP consists of 37 RMSs in the Marina-Ord Area and 13 RMSs in the Corral de Tierra Area. Since completion of the GSP, in the Marina-Ord Area, wells MW-02-13-180M, MW-12-07-180, MP-BW-42-295, MP-BW-50-289 have been replaced by EW-12-04-180M, MW-02-06-180, MP-BW-42-345, and MP-BW-50-339, respectively, because the wells are either decommissioned by the U.S. Army or no longer on the Army’s monitoring program. Well MW-12-180-180L has been removed due to the lack of replacement candidates in its vicinity. In the Corral de Tierra Area, one well (16S/02E-03H02) in the RMS network has been removed because the well was withdrawn from MCWRA’s water level monitoring programs. The old RMS well was not replaced because of the lack of existing monitoring wells in the Corral de Tierra Area. The groundwater elevation monitoring network currently consists of 36 RMSs in the Marina-Ord Area and 12 RMSs in the Corral de Tierra Area.

Fall groundwater elevation data are color-coded on Table 5-1: orange cells indicate the groundwater elevation is below the MT, yellow cells indicate the groundwater elevation is above the MT but below the MO, and green cells indicate the groundwater elevation is above the MO.

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

Table 5-1. Groundwater Elevations and Relevant Sustainable Management Criteria for Chronic Lowering of Groundwater Levels Sustainability Criteria

Site Name	Aquifer	Collection Agency	Fall 2023	MT	MO	IM5
<i>Marina-Ord Area</i>						
MW-BW-28-A	Dune Sand Aquifer	Fort Ord	63.8	63.7	70.3	70.3
MW-BW-49-A	Dune Sand Aquifer	Fort Ord	11.9	8.9	11.3	11.3
MW-BW-81-A	Dune Sand Aquifer	Fort Ord	11.2	8.2	10	10
MW-BW-82-A	Dune Sand Aquifer	Fort Ord	10.5	7.9	9.5	9.5
MW-OU2-13-A	Dune Sand Aquifer	Fort Ord	88.5	89.6	94.4	94.4
MW-OU2-32-A	Dune Sand Aquifer	Fort Ord	8.4	7.2	8.1	8.1
MW-OU2-34-A	Dune Sand Aquifer	Fort Ord	7.3	4.7	6.6	6.6
CDM MW-1 Beach	Upper 180-Foot Aquifer (a)	Seaside Basin Water Master	4.9	3.3	3.3	3.3
MW-02-05-180	Upper 180-Foot Aquifer (a)	Fort Ord	7.9	6.5	8.4	8.4
MW-02-10-180	Upper 180-Foot Aquifer (a)	Fort Ord	8.0	6.5	7.3	7.3
EW-12-04-180M	Upper 180-Foot Aquifer (a)	Fort Ord	7.3	6	6.5	6.5
MW-02-13-180U	Upper 180-Foot Aquifer (a)	Fort Ord	8.1	6.8	7.3	7.3
MW-02-06-180	Upper 180-Foot Aquifer (a)	Fort Ord	8.1	6.1	7.3	7.3
MW-B-05-180	Upper 180-Foot Aquifer (a)	Fort Ord	-3.2	-8	-3.4	-3.4
MW-BW-55-180	Upper 180-Foot Aquifer (a)	Fort Ord	-3.6	-6.4	-5.7	-5.7
MW-OU2-29-180	Upper 180-Foot Aquifer (a)	Fort Ord	-5.3	-9	-7.2	-7.2
MP-BW-42-345	Lower 180-Foot Aquifer (a)	Fort Ord	-5.9	-10.4	-7.9	-7.9
MW-BW-04-180	Lower 180-Foot Aquifer (a)	Fort Ord	-9.0	-11	-11	-11.0
MW-OU2-66-180	Lower 180-Foot Aquifer (a)	Fort Ord	-6.8	-10	-9.2	-9.2
TEST2	Lower 180-Foot Aquifer (a)	Fort Ord	-9.4	-11.9	-10.6	-10.6
MP-BW-50-339	Lower 180-Foot, 400-Foot Aquifer (a)	Fort Ord	-7.7	-8.5	-7.1	-7.1
MPWMD#FO-10S	400-Foot Aquifer (a) (b)	Seaside Basin Water Master	-13.3	-10.3	-3	-20.4
MPWMD#FO-11S	400-Foot Aquifer (a) (b)	Seaside Basin Water Master	-33.0	-25.9	-6.4	-44.4
MW-OU2-07-400	400-Foot Aquifer (a)	Fort Ord	-3.0	-6.6	-4.2	-4.2
014S001E24L002M	Deep Aquifers	USGS	-27.5	-29.6	-20.8	-34.9
014S001E24L003M	Deep Aquifers	USGS	-10.4	-6.8	3.5	-18.9
014S001E24L004M	Deep Aquifers	USGS	-26.6	-34.7	-21.1	-41.6
014S001E24L005M	Deep Aquifers	USGS	-23.1	-26.6	-6	-39.7
14S02E33E01	Deep Aquifers	MCWRA	-50.2	-43.8	-29.3	-69.9
14S02E33E02	Deep Aquifers	MCWRA	-21.4	-21.1	-13.9	-22.6

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Site Name	Aquifer	Collection Agency	Fall 2023	MT	MO	IM5
PZ-FO-32-910	Deep Aquifers	MCWRA	-58.3	-44.1	-19.7	-65.6
MPWMD#FO-10D	Deep Aquifers (b)	Seaside Basin Water Master	-12.9	-10.6	-3.8	-18.7
MPWMD#FO-11D	Deep Aquifers (b)	Seaside Basin Water Master	-13.6	-4.8	3.3	-15.7
Sentinel MW #1	Deep Aquifers (b)	Seaside Basin Water Master	-28.9	-25.4	-18.8	-37.8
Corral de Tierra Area						
15S/02E-25C01	El Toro Primary Aquifer System	MCWRA	20.0	23	33	21
15S/03E-18P01	El Toro Primary Aquifer System	MCWRA	-51.4	-46.4	-28.4	-53
15S/03E-20R50	El Toro Primary Aquifer System	MCWRA	34.5	29	39	37
16S/02E-01M01	El Toro Primary Aquifer System	MCWRA	308.3	291.5	301.5	295.3
16S/02E-02G01	El Toro Primary Aquifer System	MCWRA	290.9	294.9	304.9	299.2
16S/02E-02H01	El Toro Primary Aquifer System	MCWRA	300.7	278.9	288.9	282
16S/02E-03A01	El Toro Primary Aquifer System	MCWRA	208.6	227	232	188
16S/02E-03F50	El Toro Primary Aquifer System	MCWRA	227.0	220.7	225.7	211
16S/02E-03H01	El Toro Primary Aquifer System	MCWRA	193.0	210.1	220.1	213.6
16S/02E-03J50	El Toro Primary Aquifer System	MCWRA	221.6	193.3	210.1	210.1
Robley Deep (South)	El Toro Primary Aquifer System	MCWRA	164.9	169.8	183.5	160.5
Robley Shallow (North)	El Toro Primary Aquifer System	MCWRA	241.0	245.2	255.2	230.7

Notes:

- (a) The MPWMD#FO-10 wells, MPWMD#FO-11 wells, and Sentinel MW#1 in the Marina-Ord Area, and the Robley wells in the Corral de Tierra Area are monitored by MPWMD on behalf of the Seaside Watermaster. MPWMD#FO-10S and MPWMD#FO-11S are known to be screened in the Paso Robles Formation, which is likely connected to the 400-Foot Aquifer; MPWMD#FO-10D, MPWMD#FO-11D, and Sentinel MW#1 are screened in the Santa Margarita Aquifer, which is likely connected to the Deep Aquifers.
- (b) Orange cells indicate the groundwater elevation is below the MT, yellow cells indicate the groundwater elevation is above the MT but below the MO and green cells indicate the groundwater elevation is above the MO.

5.1.1.1 Minimum Thresholds

In the Marina-Ord Area, the MTs for chronic lowering of groundwater levels were set to minimum groundwater elevations historically observed between 1995 and 2015, and in the Corral de Tierra Area, groundwater elevations observed in 2015. In WY 2023, one well in the Dune Sand Aquifer, two wells in the lower 180-Foot and 400-Foot Aquifers, seven wells in the Deep Aquifers, and

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

seven wells in the El Toro Primary Aquifer System exceeded their MTs, as indicated by the orange cells.

5.1.1.2 Measurable Objectives and Interim Milestones

The MOs for chronic lowering of groundwater levels represent target groundwater elevations higher than the MTs. These MOs provide operational flexibility to ensure that the Subbasin can be managed sustainably over a reasonable range of hydrologic variability. Five RMS wells in the Dune Sand Aquifer, eight in the upper 180-Foot Aquifer, four in the lower 180-Foot and one in 400-Foot Aquifer, and four in the El Toro Primary Aquifer System had groundwater elevations higher than their MO in WY 2023, as represented by the green cells in Table 5-1. No RMS well in the Deep Aquifers had groundwater elevations higher than their MO.

To help reach MOs, the MCWDGSA and SVBGSA set IMs at 5-year intervals. The 2027 IM (IM5) for groundwater elevations are also shown in Table 5-1. The WY 2023 groundwater elevations in 28 wells are higher than the 2027 IMs⁵.

In the lower 180-Foot and 400-Foot Aquifers, the Deep Aquifers, and the El Toro Primary Aquifer System, the 2027 interim milestones continue the downward trend of groundwater elevations in most RMS wells before increasing toward the measurable objectives because of the time lag associated with seeing groundwater benefits from projects and management actions. This was done to set more realistic interim milestones where groundwater elevations have been declining historically; however, the goal is to raise groundwater levels as quickly as possible. It is acknowledged that these groundwater level declines may have additional impact to beneficial uses and users beyond those associated with the minimum threshold.

5.1.1.3 Undesirable Result

The chronic lowering of groundwater levels UR is a quantitative combination of groundwater elevation MT exceedances. For the Subbasin, the groundwater elevation UR is:

Over the course of any one year, exceedance of more than 20% of the groundwater level MTs in either:

- a) both the Dune Sand Aquifer and upper 180-Foot Aquifer, or
- b) both the lower 180-Foot and 400-Foot Aquifer, or
- c) the Deep Aquifers, or
- d) the El Toro Primary Aquifer System.

Marina-Ord Area

Dune Sand Aquifer and Upper 180-Foot Aquifer

⁵ The IMs at the Deep Aquifers were lower than MT since most P/MAs will not be implemented by 2027, and the water levels at the Deep Aquifers were assumed to decrease until 2032.

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

- One RMS well in the Dune Sand Aquifer, out of 16 RMS wells that screened the Dune Sand and upper 180-Foot Aquifers, exceeded its MT, which represents 6% of the total RMS wells in the Dune Sand and upper 180-Foot Aquifers.

Lower 180-Foot and 400-Foot Aquifer

- Two out of eight RMS wells, that screen the lower 180-Foot and 400-Foot Aquifers exceeded their MTs, which represents 25% of the total RMS wells in the lower 180- and 400-Foot aquifers.

Deep Aquifers

- Seven out of 10 RMS wells that screen the Deep Aquifers exceeded their MTs, which represents 70% of the total RMS wells in the Deep Aquifers.

Corral de Tierra Area

- Seven out of 12 RMS wells, or 58%, that screen the El Toro Primary Aquifer exceeded their MTs.

The WY 2023 conditions in the lower 180-Foot and 400-Foot Aquifer, the Deep Aquifers, and the El Toro Primary Aquifer, as described above, constitute an UR per the Monterey GSP. Due to the conditions in the Marina-Ord Area and Corral de Tierra Area, the Subbasin GSAs will work to implement P&MAs to improve groundwater conditions.

5.1.2 Reduction in Groundwater Storage

The SMCs for chronic lowering of groundwater levels and seawater intrusion are proxies for the reduction in groundwater storage SMC. As discussed in Section 5.2.1 above, groundwater levels that constitute an UR have been observed in WY 2023, and therefore, by definition, it constitutes an UR for reduction in groundwater storage.

5.1.3 Seawater Intrusion

No RMS wells sampled in 2023 and 2024 show advancement of the seawater intrusion isocontour, and therefore there has been no observed change in the seawater intrusion extent.

5.1.4 Water Quality

The MT values for each well within the groundwater quality monitoring network are provided in Table 5-2 and have been adjusted as discussed in Appendix B since last year's Annual Report. Table 5-2 also shows the wells sampled in WY 2023 that had higher concentrations than the regulatory standard, as previously discussed in Section 4.5, and the running total of wells above the 2019 baseline that have had higher concentrations than the regulatory standard, which is used to measure against the MTs. Only the latest sample for each COC at each well is used for the running total. The MTs are set at no additional wells with concentrations above the regulatory standard for each constituent, above those that existed in 2019. These conditions were

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

determined to be significant and unreasonable because groundwater quality with higher concentrations than these values may cause a financial burden on groundwater users. Public water systems with COC concentrations above the Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL) are required to add treatment to the drinking water supplies or drill new wells. Agricultural wells with COCs that significantly reduce crop production may reduce grower’s yields and profits.

In WY 2023, there were six exceedances of the MTs established for DDW public water system supply wells, one for the ILRP on-farm domestic, and none for the ILRP irrigation wells in the Corral de Tierra Area. There were no exceedances of the MTs in the Marina-Ord Area. The last column in Table 5-2 includes the number of wells above the MTs, with the COCs that exceeded the MT highlighted in orange. The negative numbers in the last column indicate the number of wells that now are above the regulatory limit is lower than those above the regulatory limit in 2019.

Table 5-2. Water Quality Exceedances in WY 2023

Constituent of Concern (COC)	Minimum Threshold/ Measurable Objective (Baseline number of wells with COC concentrations above the regulatory standard in 2019) (b)	Number of Wells Sampled in WY 2023 with COC Concentrations Above the Regulatory Standard	Total Number of Wells with COC Concentrations Above the Regulatory Standard in Most Recent Sample ¹	Number of Wells above the Minimum Threshold (negative if fewer than MT)
<i>Marina-Ord Area</i>				
<i>DDW Wells</i>				
Carbon Tetrachloride	0	0	0	0
Trichloroethane	0	0	0	0
<i>Corral de Tierra Area</i>				
<i>DDW Wells</i>				
Aluminum	0	0	1	1
Arsenic	10	10	14	4
Chromium	1	0	1	0
Foaming Agents (MBAS)	3	0	3	0
Iron	10	4	13	3
Manganese	11	5	12	1
Radium 226 + Radium 228	0	0	1	1
Specific Conductance	1	1	1	0
Total Dissolved Solids	1	0	0	-1
Zinc	1	0	0	-1
<i>ILRP On-Farm Domestic Wells</i>				
Specific Conductance	0	0	1	1
Total Dissolved Solids	1	0	1	0

Notes:

- (a) highlighted cells indicate the exceedance of MT.
- (b) The Monterey GSP did not include the baseline number of wells with COC concentrations above the regulatory standard for the Marina-Ord Area, because no RMS wells were detected above the MCL. Therefore, the baseline for these COC is 0.

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

5.1.5 Land Subsidence

Accounting for measurement errors in the InSAR data, the MT for land subsidence in the Monterey GSP is zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement to account for InSAR measurement errors. Because the MTs of zero net long-term subsidence are the best achievable outcome, the MOs and IMs are identical to the MTs. The land subsidence UR for the Subbasin is defined as zero exceedances of the MTs for subsidence in any one year.

Annual subsidence data from October 2022 to October 2023 demonstrated land subsidence of less than 0.1 feet/year, as shown on Figure 4-21.. Therefore, the land subsidence IM and MO are being met, and the Subbasin has not experienced a land subsidence UR.

5.1.6 Interconnected Surface Water

Groundwater elevation is used as a proxy in ISW RMS wells to monitor the potential depletion of ISW due to pumping and the health of GDEs located near the City of Marina. As shown in Section 4.7 and Table 4-6, groundwater elevation in Fall 2023 was above the MT and MO set at the ISW RMS monitoring well. Once SVBGSA installs the shallow monitoring well along Toro Creek, SVBGSA will use it to monitor ISW in the Corral de Tierra Area.

5.2 GSP Implementation Activities

This section details groundwater management activities that have occurred in WY 2023 associated with GSP implementation. These include the activities of MCWDGSA, SVBGSA, and partners that promote groundwater sustainability and are important for reaching the sustainability goal defined in the Monterey GSP. MCWDGSA and SVBGSA continued to strengthen their collaboration throughout WY 2023 with regular meetings on planning and implementing the Monterey GSP.

This section reports on activities conducted throughout WY 2023 to the end of calendar year 2023 (i.e., October 2022 to December 2023) with the entire period referred to as 2023. Sections are included for each of the following four categories of activities:

- General Administrative
- Interested Parties Coordination and Outreach
- Data Expansion and SGMA Compliance
- Projects and Management Actions

In addition, plan implementation activities for the upcoming water year are discussed with their specific work streams within each category. Progress on individual tasks and planned activities within each category are summarized in Table 5-3 through Table 5-7. The tasks carried out by SVBGSA align with the tasks identified in the SVBGSA Work Plan.

Annual Progress Towards Implementation of the Monterey GSP

WY 2023 Annual Report

Monterey Subbasin

In addition, the Subbasin GSAs' progress towards addressing DWR Recommended Corrective Actions on the Monterey Subbasin GSP is described in the Data Expansion and SGMA Compliance section (Section 5.2.3). Progress on DWR's Recommended Corrective Actions (RCAs) is summarized in Table 5-6.

5.2.1 General Administration

Progress on general administration tasks and planned activities are described below and summarized in Table 5-3.

5.2.1.1 MCWDGSA and SVBGSA Common Activities

In late 2022, MCWDGSA and SVBGSA developed a joint Sustainable Groundwater Management (SGM) Round 2 Implementation Grant application for GSP implementation activities in the Monterey Subbasin. The Subbasin GSAs developed detailed work plans for immediate GSP implementation tasks before 2026 and the funding needed to complete these tasks. In Fall 2023, DWR released the Round 2 Recommended Award List, which included \$6,447,910 for the Monterey Subbasin. The award included funding for

- **Data expansion and SGMA compliance:** installation of monitoring wells and data collection to address data gaps identified in the Monterey GSP; update of the HCM with the data collected in preparation of the 5-year GSP update; and refining representation of the Subbasin in the regional SVIHM and Seawater Intrusion Model.
- **Project Update Report:** development of Deep Aquifer management options building upon findings of the Deep Aquifers Study; further assessment of multi-regional project scenarios and impacts on the Monterey Subbasin, building upon the feasibility studies described in Section 5.2.4.
- **Corral de Tierra engagement of interested parties and domestic well owners:** interested party engagement and outreach to underrepresented communities and domestic well owners in the Corral de Tierra area; and coordination with the Water Quality Coordination Group, Land Use Jurisdiction Coordination Program, and other partner agencies.

The MCWDGSA, acting as the grantee, is working with DWR to finalize the grant agreement.

5.2.1.2 MCWDGSA Administration

The MCWDGSA continued general administrative tasks associated with the Board, the MCWDGSA/SVBGSA steering committee (described further in Section 5.2.2.1), communications, and collaboration with partner GSAs.

In 2023, MCWD recruited and retained a Water Resources Analyst to support water management responsibilities of the District and the GSA under the supervision of the Water Resources Manager. The addition of staff supports MCWD's water resources planning and MCWDGSA's

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

groundwater management efforts and meets the needs of the expanding SGMA monitoring program as described in Section 5.2.3.2.

5.2.1.3 SVBGSA Administration

At the start of 2023, SVBGSA began recruitment for a new General Manager to replace the retiring General Manager. With two well-qualified candidates with complementary strengths, the Agency hired a new General Manager and added a second Deputy General Manager, bringing the full-time Agency staff to 3. SVBGSA is administered by contract with Regional Government Services, which provides additional part-time administrative and financial support.

SVBGSA continued general administrative tasks associated with the Board, committees, communication, and collaboration with partner GSAs. As described below in Section 5.2.2.1, the MCWDGSA/SVBGSA Steering Committee reinitiated meetings in the spring of 2023.

After being unable to increase the regulatory fee for FY 2023, Committee and Board discussions in Spring 2023 focused on how to raise the regulatory fee for FY 2024. Discussions centered around the need for—and ways in which to implement—a fee structure tiered by subbasin and the need for the planned 5-year review of the fee. After gathering stakeholder input, the Board successfully raised the FY 2024 fee through separating the fee into a Tier 1 Groundwater Sustainability Fee, a regulatory fee for SVBGSA's jurisdiction, and Tier 2 Groundwater Sustainability Fee by Subbasin pursuant to the adopted Tiered Regulatory Fee Policy. They also planned the more comprehensive Regulatory Fee Study Update to be conducted over the next 2 fiscal years to conduct in-depth analyses on fee-related issues that stemmed from input by interested parties. The new General Manager organized all tasks into a work plan starting July 2023, which are reflected in the joint agency and SVBGSA tasks in Table 5-3 through Table 5-7.

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Table 5-3. Progress on General Administrative Tasks as of December 2023

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments (from October 2022 to December 2023)
<i>MCWDGSA and SVBGSA Common Activities</i>						
Grant Administration	SGM Round 2 Implementation Grant Application				x	Joint MCWDGSA/SVBGSA grant application submitted and recommended for award
Board and Committee Activities	MCWDGSA/SVBGSA Technical and Steering Committee			x		Regularly occurring Technical Committee and quarterly Steering Committee meetings; the Steering Committee met 3 times during the reporting period
<i>MCWDGSA Administrative Activities</i>						
Board and Committee Activities	Board of Directors			x		Ongoing; the MCWDGSA Board of Directors meets monthly
Staff Expansion	Hiring of a full-time Water Resources Analyst				x	
Grant Administration	SGM Round 2 Implementation Grant Administration		x			Serving as the grantee for the Monterey Subbasin in addition to administering grant-related work efforts in the Marina-Ord Area
<i>SVBGSA Administrative Activities</i>						
Organize and Conduct Agency Board and	Board of Directors, Executive Committee, Budget and Finance Committee			x		Ongoing; the SVBGSA Board of Directors (Board or BOD) meets monthly; the Board met 14 times, Executive Committee met 6 times,

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments (from October 2022 to December 2023)
Committee Activities						and the Budget and Finance Committee met 7 times
Regulatory Fee Study Update	Develop scope of work. timeline and process			x		Joint SVBGSA Advisory Committee and Board meeting to provide input for scope held in October 2023, survey conducted and shared with AC in December, BOD to make a final decision in January 2024
	Manage the process, outreach and implementation		x			Work anticipated to commence in February and finish in November 2024 with potential recommendations from the study to be implemented for FY 2026
Budget Preparation and Financial Reporting	Improve the format and process for financial reports				x	New budget and financial report format developed in October 2023. Bi-monthly financial reports produced going forward
	Prepare work plan and annual draft budget		x			Initial FY 2025 work plan and budget assumptions to be presented to Budget Finance Committee in February
Administrative Oversight	Review and update Agency policies			x		Three new administrative policies approved by BOD in September 2023. Revised Investment Policy for BOD approval in January 2024. Comprehensive Bylaws amendment underway, anticipated to be presented to BOD in Spring of 2024
	Assess and improve administrative processes			x		Ongoing

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments (from October 2022 to December 2023)
	Determine appropriate staffing support for administrative services			x		Staff to assess the appropriate level of support for FY 2025
Board Development	Engage Board and staff in Agency vision and values discussion		x			Initial discussions with Executive Committee in July 2023
	Assess structure, goals and purpose of all committees	x				
	Develop Board development strategy			x		Development of Board resource library underway. Planning for a governance training in Spring of 2024
Communications	Develop Agency communications strategy			x		Staff is working with Miller Maxfield to draft a communications strategy that supports SVBGSA's mission and aligns with the GSPs
	Develop work plan to support the communications strategy		x			Include in FY 2025 work plan
	Revamp and enhance Agency website			x		Ongoing

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

5.2.2 Coordination and Engagement

The Subbasin GSAs coordinated regularly through staff and consultant meetings during the reporting period. Additionally, they coordinated and engaged with stakeholders and agencies in their respective Management Areas described below. Progress on individual Interested Parties and Outreach tasks and planned activities are summarized in Table 5-4.

5.2.2.1 MCWDGSA and SVBGSA Coordination

The Subbasin GSAs' staff and consultants continued to meet regularly during 2023 through the Technical Committee to coordinate implementation activities including data management, monitoring, model development, funding and grant applications, and P&MA development. The MCWDGSA/SVBGSA Technical Committee was established in the 2018 Framework Agreement and includes staff and technical consultants from the two agencies.

The MCWDGSA/SVBGSA Steering Committee reinitiated meetings in the spring of 2023 and has established a quarterly meeting schedule. The MCWDGSA/SVBGSA Steering Committee was established in the 2018 Framework Agreement between the two agencies and consists of the General Managers and one board member from each agency. The Steering Committee met three times during 2023.

5.2.2.2 MCWDGSA Activities

The MCWDGSA practices stakeholder engagement through its GSA website (<http://mcwd.org/>) and public meetings. During the reporting period, MCWDGSA held Board of Director public meetings coincidentally with MCWD Board meetings on the third Monday of every month. The GSA will continue to meet regularly in WY 2024.

MCWDGSA participates in regular intra- and inter-basin coordination by being a member of the Seaside Watermaster Technical Advisory Committee, SVBGSA Advisory Committee, and the Monterey Subbasin Implementation Committee. Its consultant, EKI Environment & Water, serves on the SVBGSA Groundwater Technical Advisory Committee (GTAC).

Additionally, MCWDGSA held as-needed meetings with individual stakeholders and agencies to coordinate. During 2023, meetings were held with the Seaside Watermaster, MPWMD, MCWRA, and the U.S. Army regarding data sharing and groundwater monitoring coordination within the Monterey Subbasin and adjacent Subbasins.

5.2.2.3 SVBGSA Activities

The SVBGSA practices stakeholder engagement through its Board, Advisory Committee and Subbasin Implementation Committees, all held as public meetings, as well as through the SVBGSA website, newsletters and social media outreach. During the reporting period, SVBGSA held seven regular bi-monthly meetings of the Monterey Subbasin/Corral de Tierra Management Area Implementation Committee. Its consultant, Montgomery & Associates, facilitates the SVBGSA

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Groundwater Technical Advisory Committee (GTAC). The GSA will continue to hold regular meetings on the Monterey Subbasin with this committee in WY 2024.

During 2023, SVBGSA continued coordination with partner agencies, extensive engagement of stakeholders, and outreach on groundwater and GSA activities. SVBGSA held regular meetings with MCWRA staff and held other ongoing meetings with Monterey County Environmental Health Bureau, land use jurisdictions, and Preservation, Inc., who assists growers with Irrigated Lands Regulatory Program compliance.

Outreach on groundwater, SGMA, and SVBGSA remains a challenge given the multitude of small water systems, domestic well owners, disadvantaged communities (DACs), growers not currently involved, and other stakeholders. To address this challenge, SVBGSA increased efforts to reach out to domestic well owners by initiating the Dry Well Notification Program and contributing to the Water Awareness Committee (WAC) to disseminate information and resources about domestic water conservation.

Annual Progress Towards Implementation of the Monterey GSP
 WY 2023 Annual Report
 Monterey Subbasin

Table 5-4. Progress on Interested Parties Coordination and Outreach as of December 2023

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments (includes meetings from October 2022 to December 2023)
<i>MCWDGSA and SVBGSA Coordination Activities</i>						
Inter-basin Coordination	Technical Committee			x		Regularly occurring Technical Committee meetings between staff and consultants and as-needed communications
	Steering Committee			x		Quarterly Steering Committee meetings; the Steering Committee met 3 times
<i>MCWDGSA Coordination and Outreach Activities</i>						
Agency Committees and Meetings	Seaside Watermaster Technical Advisory Committee (TAC)			x		Participates in the Seaside Watermaster TAC and TAC meetings
	SVBGSA Advisory Committee (AC)			x		Participates in the SVBGSA AC and AC meetings
	Subbasin Implementation Committees: Monterey (Corral de Tierra Management Area)			x		Participates in Monterey Subbasin Implementation Committee meetings
	Groundwater Technical Advisory Committee			x		EKI participates in GTAC meetings to review and provide input on Deep Aquifer Study and Seawater Intrusion Model
Individual Stakeholder Coordination	Seaside Watermaster, MPWMD, MCWRA, M1W, and the U.S. Army			x		Staff and consultants held as-needed meetings with individual stakeholders and agencies to coordinate specific work efforts

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments (includes meetings from October 2022 to December 2023)
<i>SVBGSA Coordination and Outreach Activities</i>						
Manage and Support Agency Meetings	Advisory Committee (AC)			x		SVBGSA AC meets bi-monthly or as needed to provide community input to the BOD; held 7 AC meetings
	Subbasin Implementation Committees: Monterey (Corral de Tierra Management Area)			x		Held 7 Monterey Subbasin Implementation Committee meetings
	Groundwater Technical Advisory Committee			x		Held 4 GTAC meetings to review and provide input on Deep Aquifer Study and Seawater Intrusion Model
	Partner Agencies: MCWRA, M1W, MCWD, ASGSA, Water Quality Coordination Group, Land Use Coordination Group			x		Staff meets with partner agency staff regularly for general coordination and on specific work streams
Engage with Underrepresented and Disadvantaged Communities	Review 2020 DAC engagement strategy and develop implementation plan through 2027		x			Included in SGM Round 2 Implementation Grant
	Form AC DAC Working Group		x			Included in SGM Round 2 Implementation Grant
	Initiate communications with representatives, community leaders, and potential partners (non-profits) working in DACs			x		

**Annual Progress Towards Implementation of the Monterey GSP
 WY 2023 Annual Report
 Monterey Subbasin**

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments (includes meetings from October 2022 to December 2023)
	Implement DAC Outreach and Engagement (ongoing)			x		
Enhance Partnerships with Domestic Well Owners	Dry Well Notification Program			x		Information about the Dry Well Notification Program distributed to interested parties and shared via social media channels
	Water Awareness Committee/ Conservation Communication			x		Staff participates and contributes to the WAC and disseminates information about domestic water conservation workshops and resources

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

5.2.3 Data Expansion and SGMA Compliance

As described below, the Subbasin GSAs focused heavily on filling data gaps and groundwater modeling during 2023 to establish a solid basis for planning projects and management actions. In addition, each GSA undertook efforts to expand groundwater monitoring and reporting within their respective Management Areas. Progress on individual Data Expansion and SGMA Compliance tasks and planned activities are summarized in Table 5-5.

5.2.3.1 MCWDGSA and SVBGSA Common Activities

The Subbasin GSAs and partner agencies carried out data expansion and groundwater modeling Implementation Actions identified in the Monterey Subbasin GSP, including the Deep Aquifers Study (I2), the Groundwater Technical Advisory Committee (I5), and modeling of seawater intrusion and regional projects (I6).

- **I2 – Deep Aquifers Investigation:** The Salinas Valley Deep Aquifers Study focuses on describing the geology, hydrogeology, and extent of the Deep Aquifers, the water budget, and guidance for management and is led by the SVBGSA. In October 2021, the following agencies and entities entered into an Agreement for Contribution to Funding the Deep Aquifers Study: SVBGSA; Monterey County; MCWRA; Castroville Community Services District; MCWD; City of Salinas; Alco Water; and California Water Service.

During 2023, SVBGSA’s consultant, Montgomery & Associates (M&A), continued to carry out the study to better understand the extent, groundwater conditions, and water budget of the Deep Aquifers of the Salinas Valley and finalized the Administrative Draft in January 2024. Once the Study is made public in spring 2024 after undergoing a GTAC review process, SVBGSA will engage partner agencies and stakeholders in discussion and implementation of Study guidance.

The MCWDGSA is actively supporting the Deep Aquifers Study by being a funding partner and collaborating on technical input. During 2023, MCWDGSA received information on the Deep Aquifers Study through the GTAC and provided technical input regarding topics such as isotopic sampling, groundwater conditions, and modeling of the Deep Aquifers water budget. In WY 2024, the MCWDGSA anticipates continued engagement in the Deep Aquifers Study through review and technical input on draft reports.

- **I5 – Groundwater Technical Advisory Committee, formerly the Seawater Intrusion Working Group (SWIG):** The GTAC was formed in late 2022 by the SVBGSA and is an ad hoc committee comprised of third-party experts that represent stakeholders within the Salinas Valley Groundwater Basin. These experts have expertise in hydrology, hydrogeology, hydrological modeling, civil engineering, or related fields. The GTAC continues the responsibilities of the former SWIG TAC and is convened to provide technical input on multi-subbasin groundwater management strategies including management of seawater intrusion and the Deep Aquifers. SVBGSA held 4 GTAC meetings between October 2022 and December 2023. Through these meetings, the Subbasin GSAs

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

continued to work through technical review and feedback on the SWI Model development and calibration, as well as on the various components of the Deep Aquifers Study.

- I6 – Future Modeling of Seawater Intrusion and Projects: One challenge with modeling of regional conditions has been the continued delay in the completion of the final Valley-wide Salinas Valley Integrated Hydrologic Model (SVIHM) under development by USGS. Public release of the Valley-wide model is not anticipated until summer 2024. However, SVBGSA finished the initial development of the Salinas Valley Seawater Intrusion Model (SWI Model). This work included completing revisions to and responding to selected comments from the GTAC. The SWI Model provide a preliminary, publicly available tool to estimate the effects of projects and management actions on seawater intrusion, and is being used for the feasibility studies of the seawater intrusion extraction barrier/regional supply project (R2) and seasonal reservoir releases with aquifer storage and recovery (R1) that were initiated in 2023 (see Section 5.2.4).

In addition, SVBGSA and MCWDGSA are working on updating the model to improve its performance in the Monterey Subbasin. The updates should improve model performance and consistency between the existing MBGWFM and the SWI model. These modifications are being spearheaded by MCWDGSA’s technical consultant in close coordination with SVBGSA’s technical consultant. They include:

- Improving the consistency in aquifer/aquitard layering, geometry and parametrization with the MBGWFM;
- Incorporation of additional data and information collected from the City of Marina and Fort Ord to refine SWI model recharge assumptions within the Marina/Ord Management Area; and
- Further evaluation/refinement of coastal boundary conditions (e.g., constant head cell assumptions) to improve SWI model performance relative to observed water level and chloride/TDS monitoring data collected from wells within the coastal portions of the Monterey Subbasin.

The Subbasin GSAs intend to make further refinements to the SWI Model in WY 2024 based on the results of the Deep Aquifers Study.

The Subbasin GSAs conducted SGMA compliance activities including preparation of annual reports and addressing the recommended corrective actions of the 2022 Monterey Subbasin GSP. DWR approved the 2022 Monterey Subbasin GSP in April 2023, with five RCAs to be addressed before the 5-year Periodic Evaluation and GSP update. Progress towards addressing the RCAs is summarized in Table 5-6. SVBGSA’s work plan to address RCAs across the Salinas Valley Basin 2022 GSPs is provided in Appendix C.

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

5.2.3.2 MCWDGSA Activities

In addition to actively supporting the collaborative activities described above, MCWDGSA focused on improving its monitoring network, addressing data gaps, and expanding data collection during WY 2023.

- **Monitoring Collaboration within the Seaside Subbasin:** Groundwater monitoring conducted in the adjacent Subbasins provides critical information in understanding hydraulic connectivity between Subbasins and early warnings of seawater intrusion. MCWDGSA provided cost-sharing to the Seaside Watermaster for the destruction and replacement of monitoring well MPWMD#FO-09 Shallow in the Seaside Subbasin. The original well was destroyed in 2021; construction of the replacement well was completed in December 2023.
- **Groundwater Elevation and Seawater Intrusion Monitoring Networks Expansion:** MCWDGSA and its technical consultants conducted planning and scoping efforts for (a) new monitoring wells in the 400-Foot and Deep Aquifers in the Marina-Ord Area (see Section 5.2.4), and (b) repurposing inactive production well MCWD-09 as a long-term monitoring well. Design and construction of the new monitoring wells and field work to repurpose MCWD-09 are anticipated in WY 2024. The expansion of the monitoring network addresses data gaps identified in Section 7 of the Monterey Subbasin GSP.
- **Seawater Intrusion Monitoring Program:** The Monterey Subbasin GSP identified wells that are owned by the MPWMD, the U.S. Army, and the MCWRA for inclusion in its seawater intrusion monitoring network. Most of these wells are on a regular groundwater elevation monitoring program but are not monitored for water quality. During WY 2023, MCWDGSA worked with partner agencies to develop a seawater intrusion monitoring program, obtained access to wells of interest, and/or contracted with partner agencies to perform the work. Salinity data including conductivity and TDS concentrations will be collected from Fort Ord monitoring wells on an annual basis beginning in February 2024.

One of the challenges in collecting water quality data from Deep Aquifers monitoring wells is the difficulty in extending salinity probes and/or collecting water samples from small diameter monitoring wells with screens over 1,000 ft below ground surface. During WY 2023, the MCWDGSA evaluated options for monitoring salinity in deep wells with the support of its technical consultants. As part of its efforts to expand its monitoring capabilities, MCWDGSA purchased a custom-made temperature-level-electric conductivity (TLC) meter for salinity profiling in deep wells and obtained training for staff to use the equipment consistent with GSP monitoring requirements.

- MCWDGSA continued to evaluate potential seawater intrusion impacts of the proposed Monterey Peninsula Water Supply Project, located within 1.5 miles of the Subbasin.

Additional MCWDGSA SGMA compliance activities during 2023 included updating the Agency's Data Management System (DMS) and submitting monitoring data to DWR.

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

5.2.3.3 SVBGSA Activities

In addition to leading the multi-agency data expansion and modeling efforts described above, SVBGSA conducted the following major data gaps filling workstreams:

- **Well Registration Program:** MCWRA began the desktop data collection to better understand the locations and depths of domestic wells.
- **GEMS Expansion:** SVBGSA and MCWRA also collaborated on the development of a regulatory framework to expand groundwater extraction monitoring and potentially modify the GEMS program to align with SVBGSA’s reporting needs and timelines.
- **GDE Verification:** The Advisory Committee established a GDE Working Group that met 4 times during the reporting period. The purpose of the working group is to provide input to SVBGSA and Central Coast Wetlands Group (CCWG) on designing and planning for field verification of groundwater-dependent ecosystems (GDEs). Subject matter experts also provided input and guidance on the GDE identification process and monitoring recommendations.
- **Deep Aquifers Data:** As part of the Deep Aquifers Study and SGM Round 1 Implementation Grant, SVBGSA collected an additional 300 km of airborne electromagnetic (AEM) data across the 180/400-Foot Aquifer and adjacent subbasins.
- **I12 - Arsenic Implementation Action:** SVBGSA initiated coordination with Monterey County Environmental Health Bureau to gather information on small water systems with arsenic issues and opportunities for consolidation of systems with treatment capacity. Further coordination and data analysis will continue as part of the water quality coordination and outreach planned under the SGM R2 Implementation Grant.

Additional SGMA compliance activities during 2023 included updating the Agency’s DMS and web map and submitting monitoring data to DWR.

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Table 5-5. Progress on Data Expansion and SGMA Compliance as of December 2023

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments
<i>MCWDGSA and SVBGSA Common Activities</i>						
I2 - Conduct Deep Aquifer Study	Complete administrative draft of Deep Aquifers Study				x	SVBGSA’s consultant, M&A, completed an administrative draft of the full study in December 2023 in collaboration with MCWDGSA and its consultants through the GTAC
	Conduct GTAC review and finalize Deep Aquifers Study			x		After a review process by the GTAC in early 2024, the final study will be presented to the SVBGSA BOD and other funding agency partner’s Boards, including MCWD
Assess Deep Aquifer Study Management Options	Evaluate policy approaches and determine management options	x				Pending release of study
I6 - Assess and Refine Seawater Intrusion Model (SWI Model)	Develop SWI Model				x	SWI Model completed and revised in response to selected GTAC comments
	Additional SWI Model Updates			x		Included in SGM Round 2 Implementation Grant for Monterey Subbasin
Prepare Annual Reports	Gather input from implementation committee (Corral de Tierra Management Area)			x		WY 2023 Annual Report process and narrative on conditions presented to the subbasin implementation committees for their review and input
	Prepare, submit and present annual reports			x		EKI and M&A are working on preparing WY 2023 Annual Reports due to DWR by April 1

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments
	Provide options and recommendations for Annual Report process to SVBGSA BOD				x	SVBGSA informed BOD on the role of subbasin implementation committees in the preparation of annual reports
Semi-Annual Data Upload	Semi-annual groundwater elevation submittals to DWR pursuant to 23 CCR § 354.34(c)(1)(B) and § 354.40			x		
Address RCAs of 2022 GSPs	Review RCAs and develop strategies for addressing them			x		RCA's and proposed strategies for addressing them were presented to the subbasin implementation committees for their review and input. Respective activities will be included in the FY 2025 and beyond work plans
<i>MCWDGSA Data Expansion and SGMA Compliance Activities</i>						
Expand Groundwater Level and Seawater Intrusion Monitoring Network	New Monitoring Wells		x			See M4 under P&MAs
	Instrument Well 9 as monitoring well		x			
	Salinity sampling from deep wells			x		Evaluated sampling options, purchased custom-made equipment, and obtained training for staff

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments
Develop Seawater Intrusion Sampling Program	Coordinate salinity sampling from Fort Ord wells			x		First sampling event planned for February 2024 with annual sampling anticipated starting WY 2024
	Induction logging	x				MCWDGSA will review historical induction logging data to inform future induction logging from Deep Aquifer wells. Included in SGM Round 2 Implementation Grant for Monterey Subbasin
Host and Manage Data Management System (DMS)	Manage and update DMS concurrent with annual report preparation			x		Facilitate data transfers from partner agencies: Seaside Watermaster, MPWMD, MCWRA, and the U.S. Army. Upload of new water year data into DMS in progress.
<i>SVBGSA Data Expansion and SGMA Compliance Activities</i>						
Develop Well Registration Program	Desktop data collection		x			MCWRA developing a "well library" starting with the 180/400, and will expand to other subbasins afterwards
	Policy development	x				
	Outreach activities and data solicitation	x				
	Field verification of wells	x				
	Data management options evaluation	x				

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments
Expand Groundwater Extraction Monitoring	Development and adoption of regulatory framework in collaboration with MCWRA			x		MCWRA and SVBGSA collaborating to determine the best approach for expanding GEMS. Anticipate a new ordinance to be adopted in Summer 2024
	Feasibility study for extraction data collection			x		The first feasibility study has begun with a kick-off meeting for interested grower participants scheduled for January 2024
Expand Groundwater Level Monitoring Network	Well design, bid assist, construction management, equip & monitor		x			Included in SGM Round 2 Implementation Grant for Monterey Subbasin
	Well construction		x			Included in SGM Round 2 Implementation Grant for Monterey Subbasin
	Add existing wells to the monitoring network		x			Included in SGM Round 2 Implementation Grant for Monterey Subbasin
Test Aquifer Properties	Fill aquifer properties data gap(s) in the Corral de Tierra Management Area			x		Included in SGM Round 2 Implementation Grant for Monterey Subbasin
Verify Groundwater Dependent Ecosystems (GDEs)	Develop methodology with CCWG			x		GDE Working Group formed and convened 4 times to provide CCWG and SVBGSA input. Additional subject matter experts have been consulted for input on the methodology
	Field reconnaissance to verify presence in Corral de Tierra Management Area		x			Once a methodology has been determined, field reconnaissance will begin. Included in SGM Round 2 Implementation Grant for Monterey Subbasin

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments
Maintain, Enhance and Update Groundwater Models	Conduct USGS model oversight and groundwater model maintenance			x		Update new versions of SVIHM as they are available and adjust as needed
	USGS Tech Services Agreement			x		SVBGSA fiscal contribution. No-cost contract extension between SVBGSA, MCWRA and USGS executed to complete project deliverables no later than 12/31/24
	Plan and implement groundwater model		x			Upon completion of the model updates, new versions will be used to evaluate PMAs. Included in SGM Round 2 Implementation Grants for Monterey Subbasin and Salinas Valley. Model updates for the Monterey Subbasin will be conducted in partnership with MCWDGSA.
Host and Manage Data Management System (DMS)	Manage and update DMS concurrent with annual report preparation			x		Upload of new water year data into DMS in progress
Modeling Preparation for 5-year updates	Refine Hydrogeologic Conceptual Model (HCM)		x			SVBGSA plans to update the Monterey Subbasin HCM with a focus in the Corral de Tierra Area during the first half of 2024, prior to completing modeling updates. Included in SGM Round 2 Implementation Grant for Monterey Subbasin
Review Well Permits (as needed)	Review Well Permits (as needed)			x		Review well permits in compliance with EO N-7-23

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

Table 5-6. Status of Addressing Monterey Subbasin RCAs

No.	RCA	Action to Address	Status
1	Investigate the connectivity of the upper saturated zone to the principal aquifer to determine if a continuous upper saturated zone connects to the principal aquifer.	Corral de Tierra Management Area: <ul style="list-style-type: none"> SVBGSA will use the shallow wells installed for ISW and GDEs to assess connections between shallow groundwater and primary aquifers. 	Corral de Tierra Management Area: <ul style="list-style-type: none"> To be completed by 2027 Periodic Evaluation.
		Marina-Ord Management Area: <ul style="list-style-type: none"> Groundwater elevation near the vernal ponds GDEs aligns with those in the Dune Sand Aquifer, which is defined as a principal aquifer in the Marina-Ord Area 	Marina-Ord Management Area: <ul style="list-style-type: none"> No further action
2	Conduct necessary field reconnaissance for GDE identification. Update future iterations of the GSP with the results of the field studies to identify GDEs in the Subbasin.	Corral de Tierra Management Area: <ul style="list-style-type: none"> SVBGSA will work with Central Coast Wetlands Group to map potential GDEs and conduct field reconnaissance in the Corral de Tierra Management Area. 	Corral de Tierra Management Area: <ul style="list-style-type: none"> SVBGSA is developing an approach and methods in other subbasins, and will expand this work to the Corral de Tierra Management Area with SGM Round 2 Implementation Grant.
		Marina-Ord Management Area: <ul style="list-style-type: none"> Field studies of the Marina vernal pond GDEs were completed in 2020 and summarized in the GSP; MCWDGSA staff is participating in the Central Coast Wetlands Group. 	Marina-Ord Management Area: <ul style="list-style-type: none"> MCWDGSA will assess whether further field reconnaissance is needed in the Marina-Ord Area through the approach developed by the Central Coast Wetlands Group.
3	Provide more information about how the proposed minimum thresholds for the chronic lowering	Corral de Tierra Management Area: <ul style="list-style-type: none"> SVBGSA will provide more information to 	Corral de Tierra Management Area: <ul style="list-style-type: none"> Underway and will increase with SGM

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

No.	RCA	Action to Address	Status
	groundwater levels may impact beneficial uses and users. Specifically, work to obtain additional well information and perform further analysis to identify and analyze the impact of the selected minimum threshold levels on supply wells. The analysis should identify the degree/extent of potential impact including the percentage, number and location of potentially impacted wells at the proposed minimum thresholds for chronic lowering of groundwater levels.	<p>beneficial uses and users, with an initial focus on outreach to domestic well owners.</p> <ul style="list-style-type: none"> SVBGSA is developing a Valley-wide well registration database that will include the Monterey Subbasin. SVBGSA will re-assess impacts in the Corral de Tierra after the database is complete. <p>Marina-Ord Management Area:</p> <ul style="list-style-type: none"> Construction of domestic wells is prohibited in the urban areas of the Marina-Ord Area; the only supply wells in the Marina-Ord Area are MCWD production wells. 	<p>Round 2 Implementation Grant.</p> <ul style="list-style-type: none"> Underway with MCWRA. To be completed when well registration database complete, no later than 2027. <p>Marina-Ord Management Area:</p> <ul style="list-style-type: none"> MCWD production wells to be included in the Valley-wide analysis above.
4	Revise the definition of undesirable results so that exceedances of minimum thresholds caused by groundwater extraction, whether the GSA has implemented pumping regulations or not, are considered in the assessment of undesirable results in the Subbasin.	<ul style="list-style-type: none"> SVBGSA will review conditions in the Corral de Tierra Management Area and provide explanations of when exceedances occur. MCWDGSA and SVBGSA will revise the Water Quality undesirable result in next amendment to include pumping impacts regardless of GSA action. MCWDGSA and SVBGSA will provide a more thorough analysis in 2027 Periodic Evaluation. 	<ul style="list-style-type: none"> Underway with this Annual Report. Planned for 2027 Periodic Evaluation. Planned for 2027 Periodic Evaluation.
5	Provide the rationale for using 2019 concentration data instead of 2015 concentration data as the baseline for setting minimum thresholds for degraded water quality.	<ul style="list-style-type: none"> MCWDGSA and SVBGSA will evaluate if using 2015 leads to a different SMC, and based on results the GSAs may reconsider SMC if needed or provide rationale. 	<ul style="list-style-type: none"> Planned for Fall 2025.

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

No.	RCA	Action to Address	Status
6	<p>Department staff understand that estimating the location, quantity, and timing of stream depletion due to ongoing, Subbasin-wide pumping is a complex task and that developing suitable tools may take additional time; however, it is critical for the Department’s ongoing and future evaluations of whether GSP implementation is on track to achieve sustainable groundwater management. The Department plans to provide guidance on methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water and support for establishing specific sustainable management criteria in the near future. This guidance is intended to assist GSAs to sustainably manage depletions of interconnected surface water.</p> <p>In addition, the GSA should work to address the following items by the first periodic update:</p> <ol style="list-style-type: none"> a. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions. b. Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing. c. Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite 	<ul style="list-style-type: none"> • MCWDGSA and SVBGSA will review forthcoming DWR guidance and refine SMC based on it, as appropriate for the Subbasin. 	<ul style="list-style-type: none"> • Awaiting DWR guidance on ISW.

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

No.	RCA	Action to Address	Status
	of beneficial uses and users that may be impacted by pumping-induced surface water depletion within the GSA’s jurisdictional area.		
7	Establish a sufficient monitoring network capable of collecting the required information to quantify depletions of interconnected surface water.	<p>Corral de Tierra Management Area:</p> <ul style="list-style-type: none"> • SVBGSA will install 1 shallow well along El Toro Creek to monitor ISW. • SVBGSA will reassess locations of ISW as part of the HCM update and may consider additional wells if findings warrant it. <p>Marina-Ord Management Area:</p> <ul style="list-style-type: none"> • One shallow monitoring well is included in the ISW monitoring network near the Marina vernal ponds. No additional data gaps were identified. 	<p>Corral de Tierra Management Area:</p> <ul style="list-style-type: none"> • Planned for 2024 with SGM Round 2 Implementation Grant. <p>Marina-Ord Management Area:</p> <ul style="list-style-type: none"> • No further action

5.2.4 Projects and Management Actions

Section 9 of the Monterey GSP identified P&MAs that collectively will allow the Subbasin to meet and maintain its sustainability goal within the 20-year SGMA implementation period (i.e., by 2042), which are being further developed and prioritized during the first years of GSP implementation.

The Monterey GSP highlighted the hydraulic connection between the Subbasin and the adjacent subbasins, and therefore, the Subbasin GSAs have developed an implementation approach that includes both basin-specific projects and regional coordination actions, and participation in multi-subbasin projects. Many of the P&MAs included in the Monterey GSP are part of a larger set of integrated projects and actions for the entire Salinas Valley Basin.

Building on the Monterey GSP, MCWDGSA and SVBGSA have developed a sustainability strategy for the Monterey Subbasin as shown on Figure 5-1. The Monterey Sustainability Strategy organizes the main workstreams that are currently being pursued to reach sustainability, which include Marina-Ord Area local P&MAs, Corral de Tierra Area local P&MAs, as well as multi-subbasin projects and management actions.

The following is a brief overview of the progress made towards implementing the P&MAs during 2023. The SVBGSA led regional project planning efforts with the SGM Round 1 Implementation Grant for the 180/400-Foot Aquifer Subbasin and engaged the Monterey Subbasin Implementation Committee in a series of planning discussions for the Corral de Tierra Area. Within the Marina-Ord Area, the MCWDGSA proceeded with monitoring well planning and design with anticipated construction in WY 2024. With the anticipated SGM Round 2 Implementation Grant funding, MCWDGSA and SVBGSA will get additional workstreams underway. Progress towards implementing the P&MAs during 2023 and planned activities are also summarized in Table 5-7.

Monterey Subbasin Projects and Management Actions

- M3 – Recycled Water Reuse Through Landscape Irrigation and Indirect Potable Reuse: The project consists of recycled water reuse through landscape irrigation and/or indirect potable reuse (IPR) within MCWD’s service area. The MCWDGSA included the recommended project of its 2022 IPR Feasibility Study in its Round 2 Implementation Grant work plan; however, the project was not included in the funding award. The MCWDGSA will continue to develop a funding plan for the project in WY 2024.
- M4 – Drill and Construct Monitoring Wells: This project consists of constructing new monitoring wells and expanding the groundwater elevation and seawater intrusion monitoring networks in the Marina-Ord Area. Particularly, the Monterey Subbasin GSP identified data gaps near the central coastline and the Fort Ord hills area in the 400-Foot and Deep Aquifers. The MCWDGSA included planning and construction of monitoring wells in the Round 2 Implementation Grant work plan. The grant application was successful, and funding was awarded for this project. As of the end of 2023, MCWDGSA

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

has worked with its technical consultants to evaluate potential locations for monitoring well construction, conducted field reconnaissance, and identified locations near its Ord Office and F Tank for further well design and construction in WY 2024.

- C1 - Reducing Demand (Pumping Allocations and Controls in GSP): A variety of strategies can reduce groundwater demand. In 2023, SVBGSA conducted a Valley-wide demand management stakeholder assessment, and in 2024 will implement educational workshops to increase awareness of the breadth of potential demand management actions, prior to subbasin-specific discussions.

In the Corral de Tierra, SVBGSA anticipates ramping up activities to move project planning forward with the SGM Round 2 Implementation Grant. This includes continuing feasibility work on regional projects as discussed below, as well as activities specific to the management area such as beginning a domestic user outreach program that supports residential actions to reduce extraction and explores opportunities to increase efficiency via automated data collection strategies and planning for demand management in the Monterey Subbasin.

Regional Projections and Management Actions

- R1 through R3 Multi-Subbasin Projects: The Monterey GSP identified 3 multi-subbasin projects that address groundwater conditions in the Monterey Subbasin and adjacent subbasins. SVBGSA initiated development of feasibility studies for 3 approaches to mitigate seawater intrusion: an extraction barrier coupled with a desalting plant to provide a new regional water supply, seasonal reservoir releases with aquifer storage and recovery, and demand management. These feasibility studies will inform how the Agency proceeds with the selection of projects to address seawater intrusion. The feasibility studies will culminate in a Project Update Report that will enable the Agency to compare study results and options, solicit feedback from interested parties, and consider project combinations.
- R1 – Seasonal Reservoir Releases with Aquifer Storage and Recovery: This study is to look at using the existing Salinas River Diversion Facility (SRDF) facilities to divert, treat and inject water into the 180/400-Foot Aquifer Subbasin and augment groundwater supplies serving the Castroville Seawater Intrusion Project (CSIP) system in the vicinity of the CSIP supplemental wells. During the reporting period, SVBGSA initiated this feasibility study with M&A and MCWRA to assess operations and constraints related to reservoir operations, water rights, and permits associated with the SRDF. The feasibility analysis will consider whether this project could maintain groundwater elevations, improve water quality, and mitigate seawater intrusion. Next steps include a review of existing water quality and potential treatment requirements, refining the project concept and scenarios, and modeling its effectiveness.
- R2 – Seawater Intrusion Extraction Barrier/Regional Water Supply: During the reporting period, SVBGSA selected Carollo Engineers to prepare this feasibility study and began work on the study in June 2023. In coordination with M&A, initial scenarios were

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

developed for extraction barrier well alignments and pumping offsets from delivery of treated water to end users. M&A used the Salinas Valley Seawater Intrusion Model to run several initial scenarios to assess the effects of different project configurations on seawater intrusion compared with a no project baseline scenario. Next steps with this study include evaluating these scenarios with the updated model, identifying treatment requirements for groundwater desalting, refining potential facility locations and developing facility descriptions, and estimating capital and operating costs.

- R3 – Multi-benefit Stream Channel Improvements: Working with the Resource Conservation District of Monterey County, SVBGSA executed an agreement with FlowWest to assess groundwater benefits of the Salinas River Stream Maintenance Program to assess the potential groundwater benefit from vegetation removal and sediment management. This will help guide SVBGSA’s involvement in this Program in the future.

In addition, with SVBGSA’s \$7.6 million SGM Round 1 Implementation Grant for the adjacent 180/400-Foot Aquifer Subbasin, SVBGSA also began a Valley-wide workstream on demand management:

- Demand Management: During 2023, SVBGSA worked with California State University Sacramento Consensus and Collaboration Program (CCP) to complete a Situation Assessment (Assessment) of demand management as the initial step in demand management feasibility. The Assessment was intended to gauge understanding and readiness for demand management policy or program development. Recommendations from the Assessment included conducting a series of educational sessions as part of a Valley-wide demand management dialogue process, which is now planned to occur in the spring of 2024, prior to subbasin-specific discussions. SVBGSA is also proceeding with supporting existing agricultural extension efforts for efficient agricultural irrigation as a way to support and develop a broader program to incentivize voluntary actions that will result in reduced demand.

Annual Progress Towards Implementation of the Monterey GSP

WY 2023 Annual Report

Monterey Subbasin

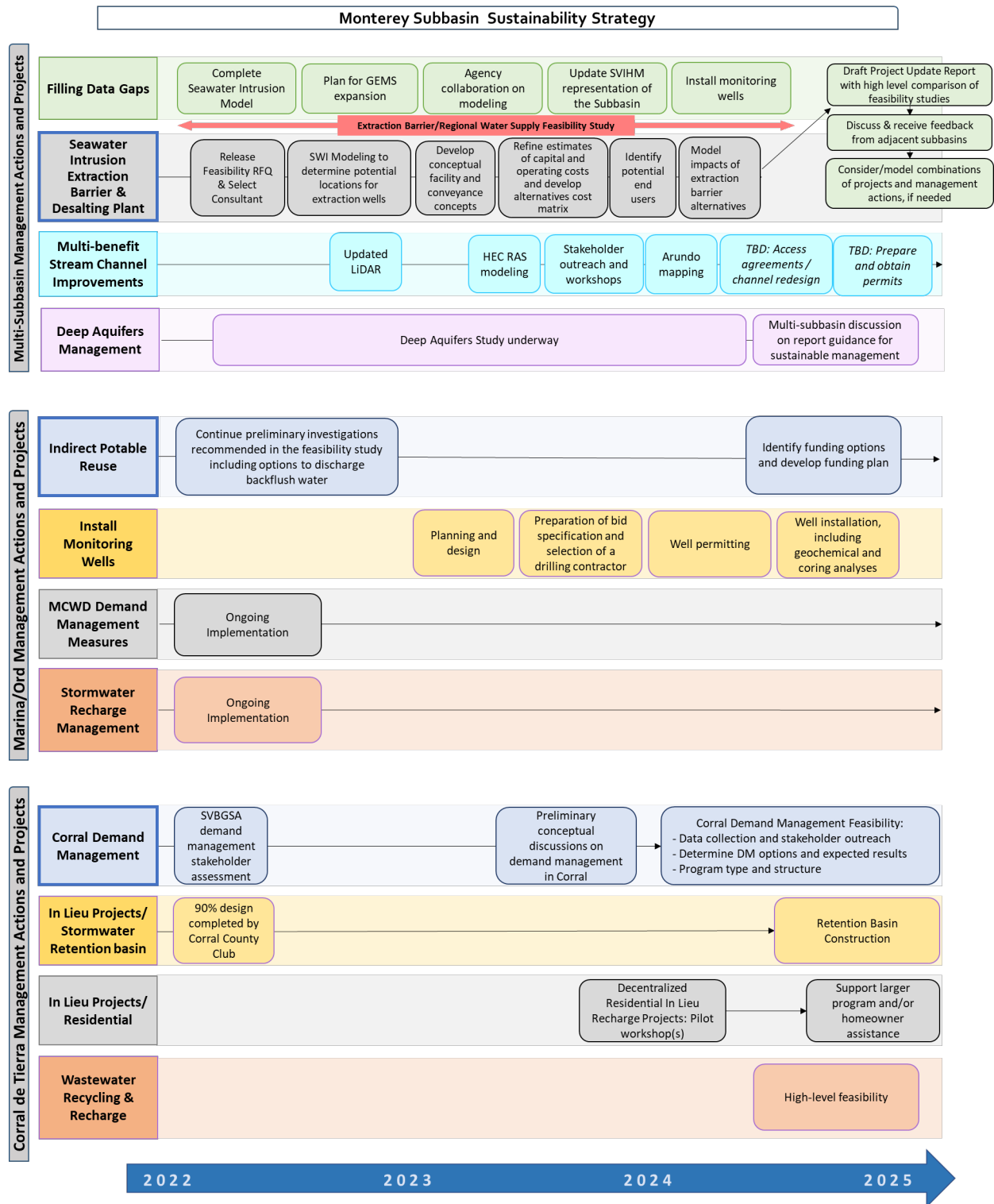


Figure 5-1. Monterey Subbasin Sustainability Strategy

Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin

Table 5-7. Progress on Projects and Management Actions as of December 2023

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments
<i>Monterey Subbasin Projects and Management Actions</i>						
M3 – IPR with Injection of Recycled Water	Develop funding plan	x				
M4 – New Monitoring Wells	Well design, bid assist, construction management, equip & monitor			x		Included in SGM Round 2 Implementation Grant for Monterey Subbasin; identified candidate well sites and screened aquifers; proceeding with well design
	Well construction		x			Included in SGM Round 2 Implementation Grant for Monterey Subbasin; planned for WY 2024
C1 - Assess and Develop Demand Management	Conduct Demand Management Assessment				x	CCP completed a Situation Assessment to gage understanding and readiness for demand management policy or program development
	Conduct Demand Management dialogue process			x		Kick-off meeting with Advisory Committee took place in December 2023 - based on input received CSUS, staff and communications consultant Miller Maxfield are working on designing the community workshops, to be held in Spring of 2024

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments
<i>Regional Projects and Management Actions</i>						
Develop and Support Website for Central Coast Ag Water Best Management Practices (BMPs)	Engage and plan with partner agencies			x		Resource Conservation District of Monterey County (RCDMC), Resource Conservation District of Santa Cruz (RCDSC), Pajaro Valley Water Management Agency (PVWMA), SVBGSA and University of California Cooperative Extension (UCCE) are collaborating on website development and content
	Work with website developer to create website		x			Received a proposal from TreeTop Web Design
R3 - Assess Groundwater Benefits of Salinas River Stream Maintenance Programs	Model the Program impact to recharge and conduct stakeholder outreach*			x		Executed agreement with FlowWest and initiated coordination meetings with RCDMC, MCWRA and M&A
R1 - Conduct Aquifer Storage and Recovery (ASR) Feasibility Study*	Assessment of Project Constraints*		x			Staff-level meetings with MCWRA and others planned through Summer of 2024
	Modeling of ability to address SWI and GW elevations*		x			Planned for Summer of 2024
	Initial WQ Analysis*		x			Planned for Spring of 2024
	Distribution System Modeling*	x				Planned for Summer of 2024

**Annual Progress Towards Implementation of the Monterey GSP
WY 2023 Annual Report
Monterey Subbasin**

Activities	Tasks	Not yet started	Scoping/ Planning	In progress	Complete	Comments
R2 - Conduct Seawater Extraction Barrier Feasibility Study*	Project Management and Meetings*			x		Ongoing
	Presentations to Board and Committees*			x		Periodic updates presented at various committee meetings
	Effectiveness Evaluation*			x		Initial seawater intrusion modeling under development
	Alternatives Analysis*			x		Alternatives being identified concurrent with modeling scenarios
	Siting and Implementation*					
	Final Feasibility Study Report*					
	Optional Tasks*					Requested cost estimate from Carollo optional task for USBS Feasibility Study for federal funding eligibility
Prepare 180/400 PMA Feasibility Update Report	Prepare 180/400 PMA Summary Feasibility Report*	x				A summary of the 3 project feasibility studies to address seawater intrusion; to be prepared for inclusion in the 180/400-Foot Aquifer Subbasin 5-year periodic evaluation due January 2025

6 REFERENCES

- DWR, 2018. Guidance Document for the Sustainable Management of Groundwater – Guidance for Climate Change Data Use During Groundwater Sustainability Plan Development, July 2018.
- DWR, 2019, Sustainable Groundwater Management Act 2019, Basin Prioritization Process and Results. April 2019, 64 pp.
- DWR, 2021. Sustainable Groundwater Management Act, Water Year Type Dataset Development Report, January 2021.
- DWR, 2023a. Groundwater Sustainability Plan Implementation: A Guide to Annual Reports, Periodic Evaluations, and Plan Amendments, October 2023
- DWR, 2023b. InSAR subsidence data, "SAR/Vertical_Displacement_TRE_ALTAMIRA_Annual_Rate_20221001_20231001 (ImageServer)." Created by DWR and obtained from ArcGIS REST Services Directory. Accessed in February 2024.
https://gis.water.ca.gov/arcgisimg/rest/services/SAR/Vertical_Displacement_TRE_ALTAMIRA_Annual_Rate_20221001_20231001/ImageServer
- DWR, 2024. Approved Determination of the 2022 Groundwater Sustainability Plan Submitted for the Salinas Valley Basin – Monterey Subbasin, dated April 27, 2023.
- Feikert, 2001. How Land-Use Affects Sediment Yields and Surface Runoff in a Small Semi-arid Watersheds, A Case Study of the El Toro Watershed, dated May 22, 2001.
http://science.csUMB.edu/~ccows/ccows/pubs/capstones/BFeikert_FinalThesis.pdf
- Feeney, 2007. Seaside Groundwater Basin Watermaster Seawater Sentinel Wells Project, October 2007.
- Geosyntec Consultants, 2007. El Toro Groundwater Study, July 2007.
- Johnson et al., 2016. Local (Offshore of Monterey Map Area) and Regional (Offshore from Pigeon Point to Southern Monterey Bay) Shallow-Subsurface Geology and Structure, California, U.S. Geological Survey Open-File Report 2016-1110, p. 9.
- MCWDGSA and SVBGSA, 2022. Groundwater Sustainability Plan, Monterey Subbasin, dated January 7, 2022.
- MCWRA, 2022. *Staff communication*, November 30, 2022.
- Montgomery & Associates, 2022. Seaside Groundwater Basin 2022 Seawater Intrusion Analysis Report, prepared for the Seaside Groundwater Basin Watermaster, dated November 23, 2022.
- Montgomery & Associates, 2023. Seaside Groundwater Basin 2023 Seawater Intrusion Analysis Report, prepared for the Seaside Groundwater Basin Watermaster, dated December 14, 2023.

References
WY 2023 Annual Report
Monterey Subbasin

Yates, 2005. Seaside Groundwater Basin: Update on Water Resource Conditions, dated April 14, 2005.