STANISLAUS & TUOLUMNE RIVERS GROUNDWATER BASIN ASSOCIATION AND COUNTY OF TUOLUMNE GROUNDWATER SUSTAINABILITY AGENCIES (GSAs)

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Modesto Subbasin Groundwater Sustainability Plan (GSP)

Fourth Annual Report

Water Year 2024

(October 2023 through September 2024)

March 13, 2025

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Acronyms

AF	Acre-feet
AFY	Acre-feet per year
BMP	Best Management Practices
Brown Act	Ralph M. Brown Act
CCR	California Code of Regulations
C2VSim	California Central Valley Groundwater-Surface Water Simulation Model
C2VSimTM	C2VSim-Turlock/Modesto; local model for Turlock and Modesto subbasins
CASGEM	California Statewide Groundwater Elevation Monitoring
CDEC	DWR California Data Exchange Center
cfs	Cubic Feet per Second
CGPS	Continuously Operating Global Positioning System
CIMIS	California Irrigation and Management Information System
COC	Constituent of Concern
DBCP	Dibromochloropropane
DMS	Data Management System
DNAPL	Dense Non-Aqueous Phase Liquid
DWR	Department of Water Resources, State of California
eWRIMS	SWRCB Electronic Water Rights Information Management System
ft	feet
GAMA	Groundwater Ambient Monitoring and Assessment Program, California
GIS	Geographic Information Services
GSA	Groundwater Sustainability Agency
GSE	Ground surface elevation
GPS	Global Positioning System
GRP	Groundwater Replenishment Project
GSP	Groundwater Sustainability Plan
IM	Interim Milestone
InSAR	Interferometric Synthetic Aperture Radar
IWFM	Integrated Water Flow Model
LID	Low-Impact Development
MA	Management Area
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
MID	Modesto Irrigation District
mm	Millimeters
MO	Measurable Objective
MRWTP	Modesto Regional Water Treatment Plant

msl	Mean Sea Level
MT	Minimum Threshold
NRCS	U.S. Natural Resources Conservation Service
OID	Oakdale Irrigation District
OSU	Oregon State University
PCE	Tetrachloroethylene
pCi/L	Picocuries per Liter
PRISM	Precipitation-Elevation Regressions on Independent Slopes Model
RMWs	Representative Monitoring Wells
SGMA	Sustainable Groundwater Management Act
STRGBA	Stanislaus and Tuolumne Rivers Groundwater Basin Association
STRGBA GSA	Stanislaus and Tuolumne Rivers Groundwater Basin Association Groundwater Sustainability Agency
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TCP	1,2,3-Trichloropropane
TDS	Total Dissolved Solids
Tuolumne GSA	The County of Tuolumne GSA
µg/L	Micrograms per liter
USGS	United States Geological Survey
VOC	Volatile Organic Compound
WY	Water Year (October 1 through September 30)

EXECUTIVE SUMMARY

The Stanislaus and Tuolumne Rivers Groundwater Basin Association Groundwater Sustainability Agency (STRGBA GSA) and the County of Tuolumne Groundwater Sustainability Agency (Tuolumne GSA) jointly prepared this Fourth Annual Report (Annual Report) for the Modesto Subbasin (5-22.02), addressing groundwater and surface water conditions during Water Year (WY) 2024 and summarizing implementation of the Groundwater Sustainability Plan (GSP), as revised in 2024. The 2024 Revised GSP was approved by the Department of Water Resources (DWR) on February 27, 2025.

This Annual Report is being submitted to the Department of Water Resources (DWR) by April 1, 2025, in accordance with regulatory requirements. The GSAs are submitting the DWR water use templates for groundwater extraction, groundwater extraction methods, surface water supply, and total water use for WY 2024 along with this Annual Report.

This Annual Report includes an update of the local C2VSimTM model for WY 2024. This updated model provides the best available method for developing estimates of changes in groundwater in storage, groundwater extractions and surface water-groundwater interaction. Data from WY 2024 were collected from the same public and private sources that provided historical data through WY 2022 for the GSP and three subsequent annual reports. Updated components of the model include precipitation, evapotranspiration, land use, population, surface water operations, canal and reservoir recharge, groundwater pumping, stream inflow, and boundary conditions.

Model results show that in WY 2024, the Modesto Subbasin experienced an increase in groundwater storage of 7,800 AFY. On average during WY 2024, deep percolation from rainfall and irrigation applied water (186,700 AFY) was the largest contributor of groundwater inflow to the Modesto Subbasin, while groundwater production (260,800 AFY) accounted for the largest outflow from the Modesto Subbasin.

Groundwater elevation data were compiled for this Annual Report from the GSP representative monitoring network wells (RMWs) in the three principal aquifers: Western Upper Principal Aquifer, Western Lower Principal Aquifer and Eastern Principal Aquifer. Groundwater level hydrographs were updated through WY 2024 (**Appendix B**) and groundwater elevation contour maps were developed to illustrate seasonal low (Fall 2023) and seasonal high (Spring 2024) groundwater elevations during the reporting period.

Precipitation in WY 2024 was characterized as “Above Normal” in the San Joaquin Valley. Groundwater monitoring in WY 2024 showed continued groundwater level recovery and stabilization across most of the Subbasin, building on WY 2023 wet conditions after declines during the critically dry WY 2021 and WY 2022. At most wells, water levels in Fall 2023 and Spring 2024 were higher than groundwater elevations than Fall 2022.

The hydrographs provided in **Appendix B** show available historical water levels from WY 1991 through the reporting period (WY 2024) for each RMW, along with the minimum thresholds (MTs) and measurable objectives (MOs), and in some cases the interim milestone (IM), established for each well. Groundwater levels at most wells in the Western Upper and Lower Principal Aquifers recovered to levels above their MT. Groundwater levels in the Eastern Principal Aquifer have exhibited long-term declines, but several wells experienced some recovery during WY 2024. Water level records in the eastern region of the Eastern Principal Aquifer indicate declining groundwater level trends since the mid-2000s, with significant declines continuing during WY 2024.

The Fall 2023 and Spring 2024 groundwater elevations were measured in 59 RMWs and compared to the GSP sustainable management criteria (MTs and IMs) for analysis in this Annual Report. Water levels in the Western Upper Principal Aquifer RMWs measured during the Fall 2023 monitoring event were above the MTs in all of the 17 wells. In the Western Lower Principal Aquifer, water levels were below the MTs in one of five wells (20%). For the Eastern Principal Aquifer, Fall 2023 levels were below the MT in 11 of 37 RMWs (30%) that were measured. The wells with MT exceedances are primarily east of Riverbank and Modesto, in the central and eastern regions of the aquifer. Groundwater levels for the interconnected surface water monitoring network were below the MTs in 3 of 19 wells measured in Fall 2023, a sharp contrast from Fall 2023, when groundwater levels were below the MT in 12 of 19 wells. These ISW MT exceedances occurred at two wells monitoring the Stanislaus River and at one well monitoring the Tuolumne River, all located in the Eastern Principal Aquifer.

Water levels were above the MTs in all Western Upper Principal Aquifer RMWs measured during the Spring 2024 monitoring event. In addition, Spring 2024 levels were above MTs in all Western Lower Principal Aquifer RMWs. For the Eastern Principal Aquifer, Spring 2024 levels were below the MT in 7 of 37 RMWs (19%) that were measured. The wells with MT exceedances are primarily in the eastern portions of the aquifer. Only one of the 19 ISW monitoring network wells had a groundwater level lower than the MT in Spring 2024. This well monitors the Stanislaus River and is in the Eastern Principal Aquifer.

DWR has established a Dry Well Reporting System for households not served by a public water system. Based on this system, no reports of dry wells were made during WY 2024. In contrast, four wells were reported as dry in WY 2023 and resolved. During the WY 2024 monitoring events, groundwater elevations were above the Interim Milestones (IMs) in all measured RMWs.

Groundwater elevation contour maps show similar groundwater flow patterns in Fall 2023 and Spring 2024 in the Western Upper Principal Aquifer and the Eastern Principal Aquifer. **Figure ES-1** illustrates groundwater elevation contours in the Western Upper and Eastern Principal Aquifer during Spring 2024. Groundwater highs are present in the easternmost Subbasin and groundwater flows west toward the central part of the Subbasin and then to

the west-southwest, with a southerly component toward the Tuolumne River in the central and eastern Subbasin. Localized groundwater depressions and mounds occur in the central and western Subbasin in the vicinity of the City of Modesto. From Fall 2023 to Spring 2024, groundwater elevations generally increased across the Subbasin. The largest increase was observed in the central Subbasin (+9 feet) with other notable increases along the extent of the Corcoran Clay. Slight decreases from Fall 2023 to Spring 2024 were observed at some wells in the central and southwestern portion of the Subbasin.

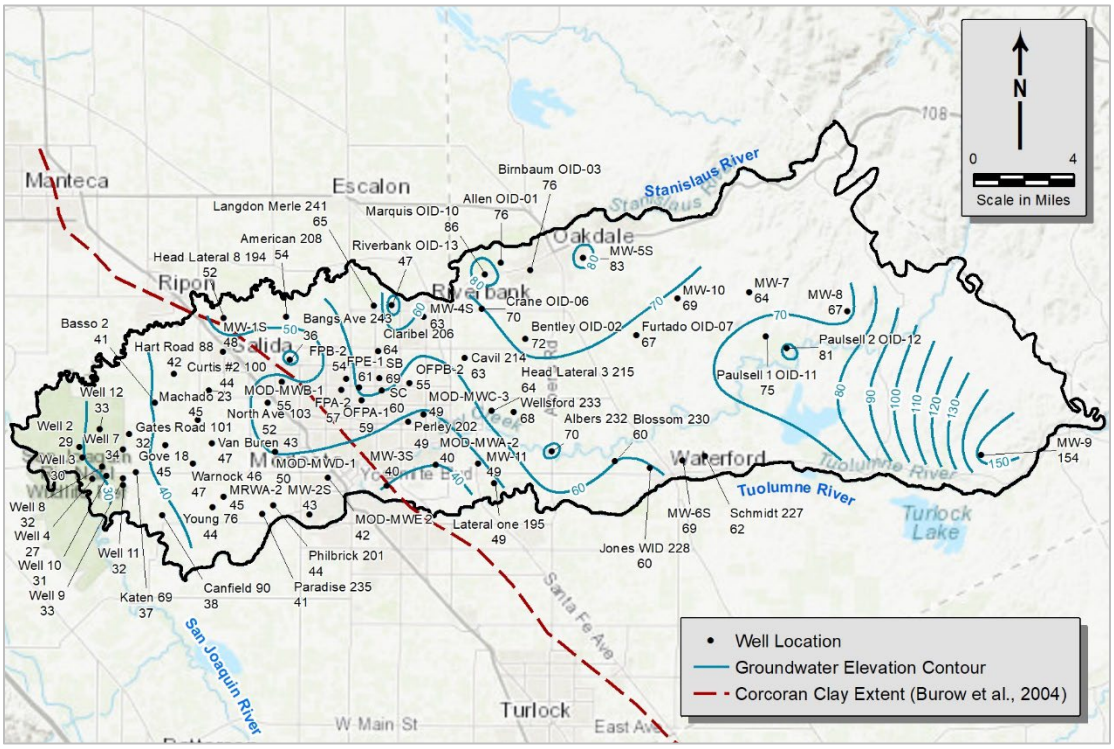

Figure ES-1 Groundwater Elevation Contours, Western Upper and Eastern Principal Aquifers, Spring 2024

Based on the limited groundwater elevation data in the Western Lower Principal Aquifer, groundwater elevation contour maps show similar groundwater flow patterns in Fall 2023 and Spring 2024 with groundwater flow toward the south-southwest and the Tuolumne River, and to the northwest and the Stanislaus River. From Fall 2023 to Spring 2024, groundwater elevations in the Western Lower Principal Aquifer increased.

Total groundwater extractions in the Modesto Subbasin during WY 2024 were estimated to be 260,800 AF. These estimates are based on directly measured groundwater extraction data collected by local water agencies and estimates for private pumping using the C2VSimTM model. During WY 2024, agricultural groundwater extraction accounts for 81% (210,400 AFY) of the total pumping in the Modesto Subbasin, while urban groundwater extraction accounts for the remaining 19% (50,400 AFY). Industrial water use is included in

the urban water use for WY 2024. No known groundwater extraction is used for maintaining managed wetlands, supplying managed recharge operations, or maintaining native vegetation in the Modesto Subbasin. **Figure ES-2** illustrates the distribution of groundwater extraction within the Modesto Subbasin during WY 2024, shown in feet, calculated by the volume of water extracted per area of each model element. The pumping distribution generally corresponds to irrigated areas where demand is not met by surface water supplies.

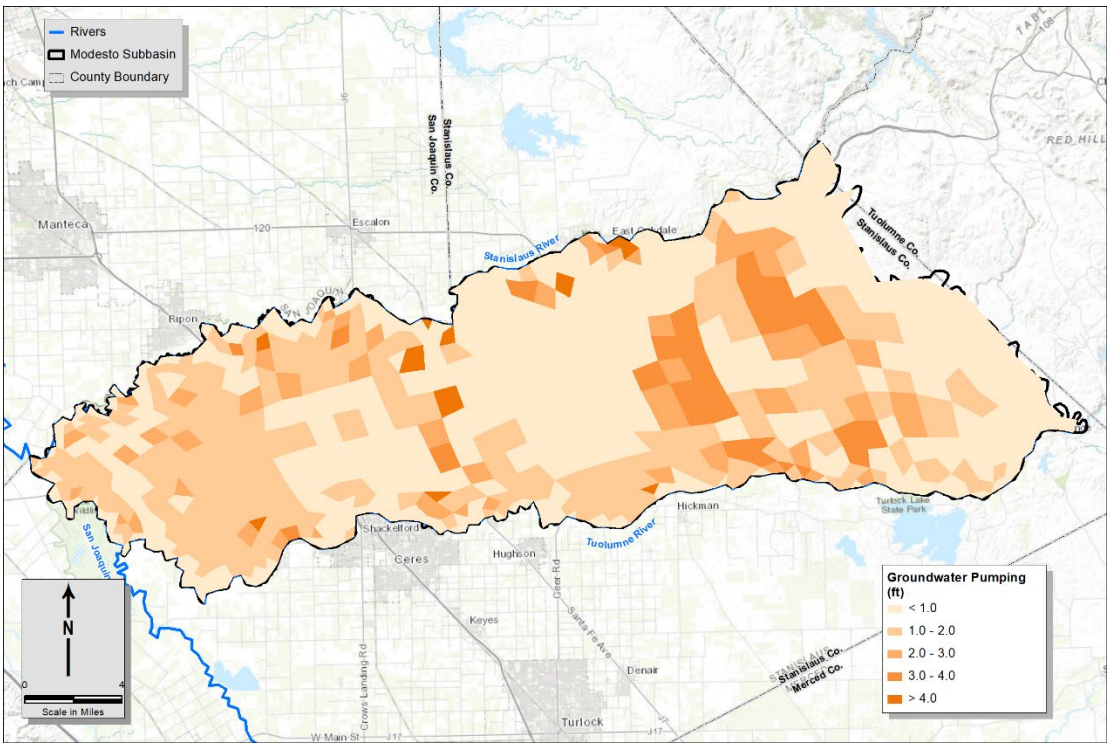

Figure ES-2 Groundwater Extraction, Modesto Subbasin WY 2024

Surface water supply in the Modesto Subbasin during WY 2024 was estimated to be 289,500 AF. This surface water supply includes Modesto Irrigation District (MID) and Oakdale Irrigation District (OID) deliveries and riparian deliveries. Direct measurements of surface water deliveries were provided by MID and OID, while riparian deliveries off the Stanislaus, Tuolumne and San Joaquin rivers are estimated by the State Water Resources Control Board (SWRCB) Electronic Water Rights Information Management System (eWRIMS) and the C2VSimTM model. **Figure ES-3** illustrates surface water delivery areas in the Modesto Subbasin.

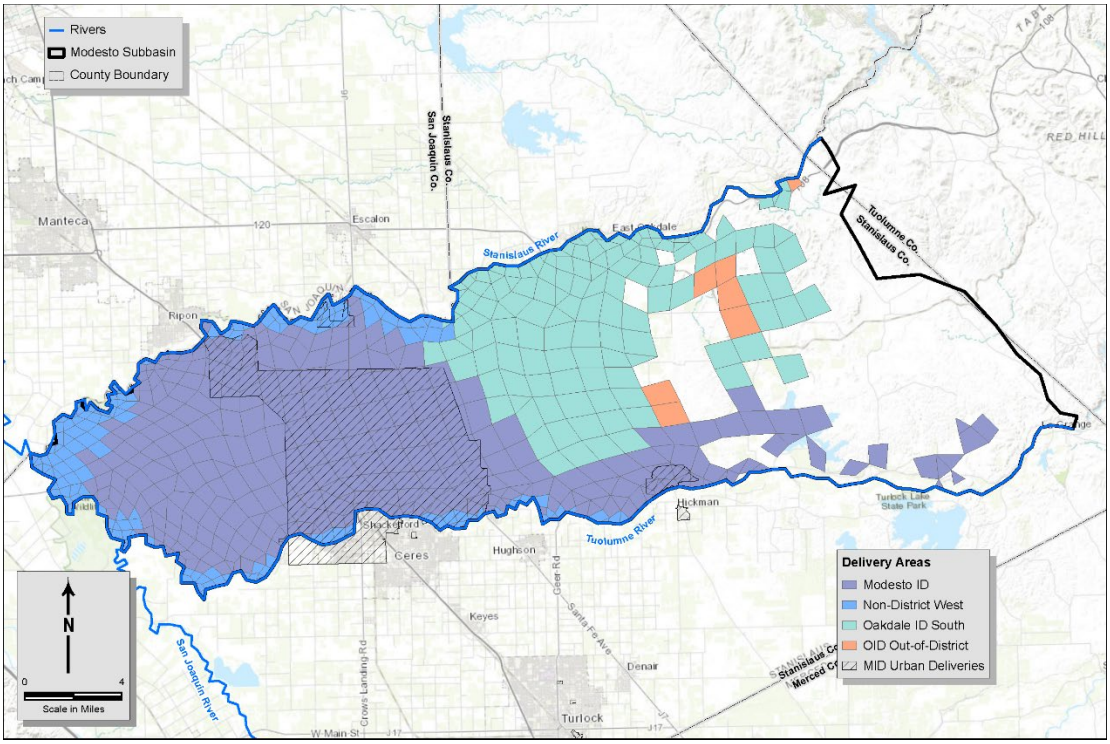

Figure ES-3 Surface Water Deliveries, Modesto Subbasin

During WY 2024, the total water use for the Modesto Subbasin was 550,300 AF. Groundwater extraction represents about 47% of the total supplies (260,800 AF), followed by surface water at 53% (289,500 AF). The total water supply for WY 2023 is summarized in **Table ES-1**.

Table ES-1: Total Water Use by Water Source for Water Year 2024 (in acre-feet)

	Groundwater[1]	Surface Water[2]	Other	Total Water Use
2024	260,800	289,500	0	550,300

1. *Includes "Agency" and "Private" pumping described in Section 4.*
2. *Includes "Measured" and "Estimated" surface water supplies described in Section 5.*

The total change in groundwater in storage during WY 2023 was estimated by the C2VSimTM model to be an increase of 7,800 AF. A change in groundwater in storage map for WY 2024 is provided as **Figure ES-4**. Storage is expressed in feet and represents that total volume of storage change per model element, divided by the model element area. In general, the Subbasin is gaining storage in the western part of the Subbasin and along the

Tuolumne River with higher rates of increase along the western (downstream) extent of the Tuolumne River. The Subbasin is losing storage in the Non-District East areas.

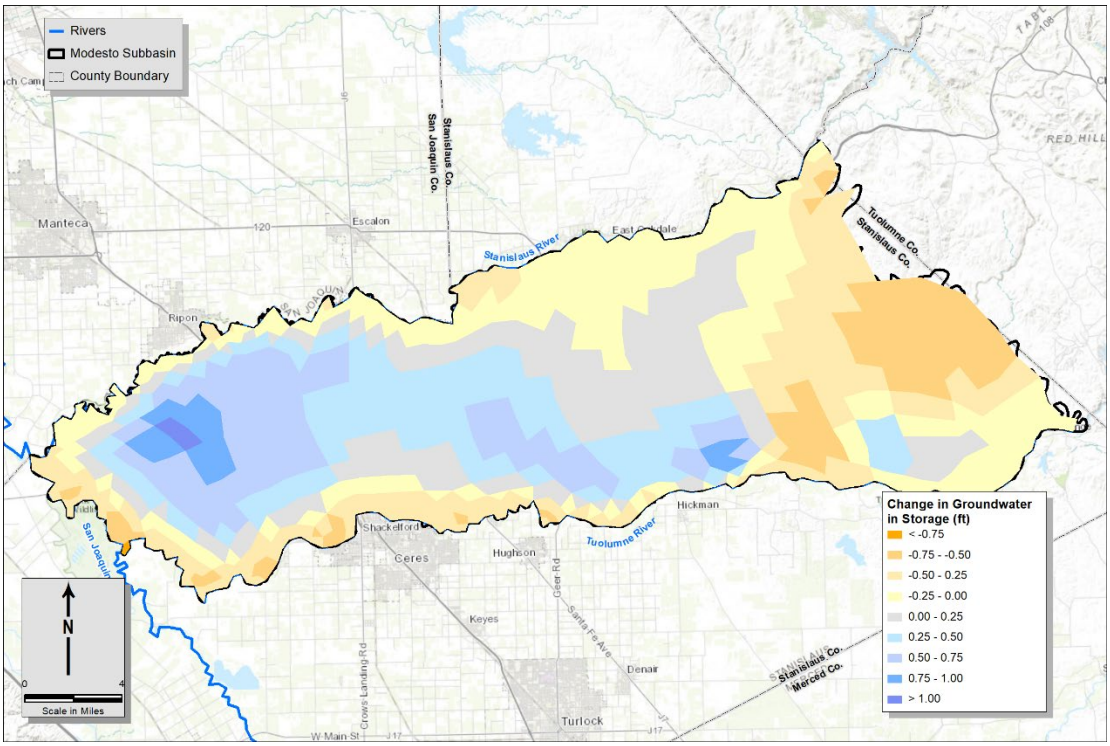

Figure ES-4 Change in Groundwater in Storage, Modesto Subbasin WY 2024

This Fourth Annual Report includes the third groundwater quality assessment following the baseline that was developed in the First Annual Report for WY 2021. The Modesto Subbasin GSP determined that an undesirable result for groundwater quality may be triggered when a Subbasin potable well in the monitoring network reports a new (first-time) exceedance of the MT (i.e., the primary or secondary California maximum contaminant level (MCL)), or a further exceedance of the MT, for any of the seven constituents of concern that result in increased operational costs and is caused by GSA management activities. The seven constituents of concern are arsenic, uranium, nitrate, 1,2,3-trichloropropane (TCP), dibromochloropropane (DBCP), tetrachloroethene (PCE), and total dissolved solids (TDS).

Data collected during WY 2024 for the seven COCs were downloaded from the State Groundwater Ambient Monitoring and Assessment Program (GAMA) Groundwater Information System through the State GeoTracker website. Water quality data collected during WY 2024 were compared to the baseline to determine if any new MCL exceedances, or further increases above the MCL, occurred. Such occurrences were detected for uranium (two wells), nitrate (six wells), and TCP (two wells). No MCL exceedances, or further increases above the MCL, were found for arsenic, DBCP, PCE, or TDS. Based on an analysis

of historical water quality trends and nearby water levels, it is concluded that MT exceedances were not caused by GSA management activities, and therefore did not meet the definition of undesirable results. **Figure ES-5** illustrates nitrate during WY 2024 in the Western Upper and Eastern Principal Aquifers.

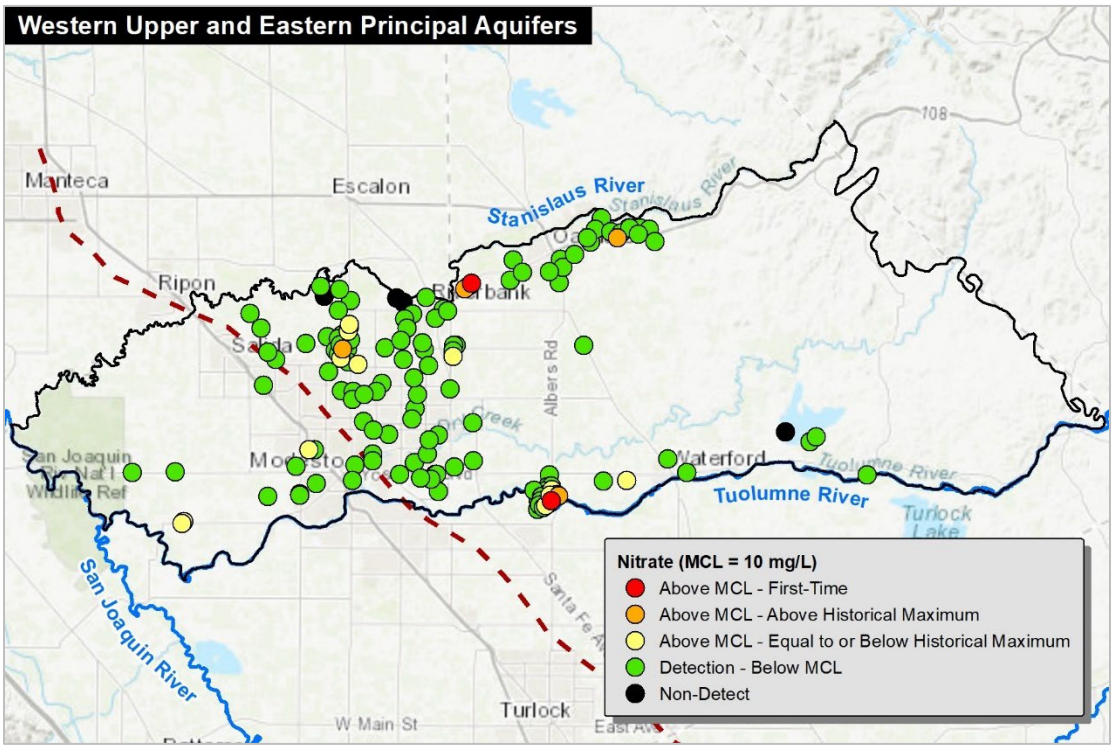

Figure ES-5 Nitrate in Groundwater, WY 2024

As described in the GSP, groundwater elevations are used as a proxy for a rate or extent of subsidence. Every aquifer had less than 33% of wells show groundwater levels below their MTs in WY 2024, so no aquifers met the criteria for undesirable results. The groundwater elevation monitoring was supplemented through review of vertical displacement data collected using Interferometric Synthetic Aperture Radar (InSAR) and local high-quality Global Positioning System (GPS) stations in the Subbasin. Review of InSAR data for WY 2024 showed that most of the Modesto Subbasin experienced a rise in ground surface elevation of up to 0.05 ft (0.6 inches). This is within the InSAR measurement error, and portions of the eastern Subbasin showed subsidence of up to 0.05 ft (-0.6 inches). Total vertical displacement based on InSAR data from June 2015 through September 2024 indicated localized areas with cumulative negative and cumulative positive vertical ground displacement. Areas in the eastern Subbasin with the highest rate of subsidence correspond to areas with water level declines.

Vertical displacement data also were reviewed from two GPS stations for 2006 through September 2024; one station on the easternmost boundary shows stable trends and the other station, near Modesto, indicates net vertical displacement of -0.07 feet (-0.81 inches) from 2006 to 2024.

The C2VSimTM model was used to evaluate interconnected surface water during WY 2024. Model results show that during WY 2024, the Stanislaus River and the Tuolumne River were net losing streams and the San Joaquin River was a net gaining stream. Streamflow loss, or the groundwater contribution from the stream, was 39,300 AFY along the Stanislaus River and 20,400 AFY along the Tuolumne River. These values are less than those in WY 2023, which represented high streamflow in response to a wet year. The San Joaquin River gained approximately 12,000 AFY from groundwater.

This annual report provides an update on GSP implementation progress. As evidenced by the reporting above, the GSAs conducted GSP monitoring events in Fall 2023 and Spring 2024, analyzed data with respect to sustainability indicators, and uploaded data to the SGMA portal as required. The GSAs have continued public outreach with regular monthly STRGBA GSA meetings.

The Modesto Subbasin GSP includes 13 Phase One GSP projects. Additional information on projects and management actions has been provided in the Revised GSP that was prepared and submitted in 2024, then approved by DWR in February 2025. Major accomplishments in WY 2024 and early 2025 are summarized below.

The Oakdale Irrigation District (OID) In-lieu and Direct Recharge Project is underway. This project consists of a 10-Year Out-of-District Water Sales Program in which over 5,000 irrigated acres in the Modesto Subbasin outside of OID's service area would purchase surplus surface water when available. OID has secured contracts with participants to commit to an annual purchase of a minimum of 1.5 AF per irrigated acre and has completed landowner turnouts so that all participants can connect their irrigation system. During the 2024 irrigation season, OID delivered approximately 2,500 AF of surplus surface water to Program lands in the Modesto Subbasin.

In September 2023, OID on behalf of the GSAs received a Round 2 Sustainable Groundwater Management SGMA Implementation Grant Award from DWR for over $14 million for the Paulsell Lateral Expansion project. In late 2024 and early 2025, OID completed two tunnel rehabilitations, and further design and bid documentation is underway.

In August 2023, the MID Board of Directors approved the Long-Term Groundwater Replenishment Program (GRP). The main objective of the Long-Term GRP program is to help reverse the trend of groundwater overdraft in the Modesto Subbasin and satisfy SGMA requirements. The Project's CEQA analysis was completed and adopted by the MID Board of Directors in January 2024, allowing implementation of the Long-Term GRP. The MID Long-Term GRP is a voluntary 20-year program open to all water users in the Modesto Subbasin.

The GRP was made available during the 2024 Irrigation Season; however, there were no participants in the program. In wet years when MID irrigators and the City of Modesto have received full uncapped allocations, MID will make surface water available to applicants.

The City of Modesto has progressed on projects to increase surface water use (in lieu groundwater recharge), to conserve water, and to recharge stormwater. The infrastructure for Phase II of the Modesto Regional Water Treatment Plant is in place, expanding the plant's capacity and helping meet growing urban demand with surface water. The City of Modesto has also completed approximately 29% of its storm drain cross connection removal project, which captures, treats, and recharges stormwater. The final phase I project the city aims to implement (i.e., smart meter implementation for improved water conservation) will ensue once the City has completed its upgrading of the current SCADA system, which will share infrastructure with the new smart meter technology, and reduce the overall cost of implementation to its customers.

1 INTRODUCTION

The Modesto Subbasin Groundwater Sustainability Plan (GSP or Plan) was submitted to California Department of Water Resources (DWR) for review on January 31, 2022. In January 2024, DWR determined the GSP to be incomplete (DWR, 2024). In 2024, the GSAs received an "Incomplete" determination from DWR. The primary issues involved quantification of potential effects of chronic lowering of groundwater and provision of additional information on projects and management actions. In July 2024 the GSAs submitted the Revised GSP, which addressed these issues with an analysis of impacts on wells of additional water level declines and with detailed documentation of implementation (described in Section 11). On February 27, 2025, DWR completed its review of the Revised GSP and released its approval of the GSP, finding that the sufficient action had been taken to correct deficiencies previously identified by DWR, such that the GSP satisfies the objectives of the Sustainable Groundwater Management Act (SGMA), and substantially complies with GSP Regulations.

This Revised GSP is not a GSP update, which will be submitted in January 2027. As documented in this Annual Report, the GSAs have continued to implement the GSP, in communication with DWR and responsive to DWR staff assessments and recommendations. An important part of ongoing GSP implementation is development of the GSP Annual Reports. The First, Second, and Third GSP Annual Reports were submitted to the DWR in 2022, 2023, and 2024, respectively. This Fourth GSP Annual Report (Annual Report) is being submitted to the DWR by April 1, 2025, in accordance with regulatory requirements.

The Stanislaus and Tuolumne Rivers Groundwater Basin Association (STRGBA) GSA covers more than 99 percent of the Plan area and is taking the lead for Annual Report preparation. The County of Tuolumne GSA (Tuolumne GSA) is participating in GSP-related activities, including preparation of Annual Reports, through a Cooperation Agreement with the County of Stanislaus. The Annual Report covers the entire Modesto Subbasin as defined by DWR (5-22.02) and addresses groundwater and surface water conditions during Water Year (WY) 2024. The Modesto Subbasin and GSA boundaries are shown on **Figure 1-1**.

1.1 PURPOSE AND TIMING OF THE FOURTH ANNUAL REPORT

Annual reporting, required by the GSP regulations, provides an opportunity to update DWR and stakeholders on the state of the Subbasin relative to sustainability, and to describe how the GSP is being implemented to achieve the Subbasin Sustainability Goal. This Annual Report is being prepared under the guidance of the Water Code Section 10728, Article 7 §356 GSP regulations, and generally follows the organization of said regulations to facilitate DWR review.

GSP regulations require an annual report to be submitted by April 1 of each year following GSP adoption (§356.2). Each report describes water conditions for the preceding water year (WY). This Fourth Annual Report (2024 Annual Report) covers the preceding water year (WY2024), extending from October 1, 2023, to September 30, 2024 (reporting period). In

addition, certain historical datasets are included to illustrate conditions prior to WY 2024. Specifically, regulations require groundwater elevation hydrographs and annual changes in groundwater in storage to be based on "historical data to the greatest extent available, including from January 1, 2015, to the current reporting year" (§356.2 (b)(1)(B) and §356.2 (b)(5)(B)).

Modesto Subbasin GSP implementation activities have been underway since the GSP was submitted. The STRGBA GSA and member agencies have made progress on GSP projects as summarized in **Section 11** of this report.

1.2 MANAGEMENT AREAS

The Modesto Subbasin Management Areas are referenced throughout the Annual Report. As explained in the GSP, four Management Areas have been established to facilitate GSP implementation. Management Area (MA) boundaries are based on areas of similar water supplies and ongoing water management activities. These four MAs are summarized in **Table 1-1** below and illustrated on **Figure 1-2**.

Table 1-1: Modesto Subbasin Management Areas

Management Area	Size (acres)[1]	Description
Modesto ID Management Area	101,914	Western and southwestern portions of the Subbasin; consistent with Modesto ID service area boundaries.
Oakdale ID Management Area	49,893	Northern and northeastern portions of the Subbasin; consistent with Oakdale ID service area boundaries.
Non-District East Management Area	77,218	Eastern Subbasin lands outside of Modesto ID and Oakdale ID boundaries.
Non-District West Management Area	15,777	Narrow rim of lands along the three river boundaries in the western Subbasin outside of irrigation district boundaries.

[1] *Management Area acres are based on GIS, and the total Subbasin acres are within one percent, but not identical, to the Subbasin total in previous DWR Bulletin 118 descriptions. Nonetheless, Management Areas cover the entire Subbasin, and approximate acres are shown here for relative comparisons.*

Surface water supplies are available to supplement groundwater use in the Modesto ID, Oakdale ID, and Non-District West MA, including the Tuolumne River, Stanislaus River, and riparian diversions along the western river boundaries, respectively. Only the Non-District East Management Area relies almost solely on groundwater without dedicated and consistent surface water supplies. Accordingly, groundwater levels in the Non-District East MA have experienced the most significant and ongoing water level declines. GSP projects and management actions have focused on the Non-District East MA to arrest overdraft conditions and water level declines.

1.3 APPROACH

The GSAs updated the local C2VSimTM model for WY 2024 for this Fourth Annual Report. This integrated water resources model was derived from the DWR regional C2VSim model and modified with local data from the Turlock and Modesto subbasins for application to GSPs in each subbasin. The updated model provides a useful tool to meet regulatory requirements for certain historical data in this report, and to support ongoing evaluations in the Subbasin. Additional information is provided in **Section 2**.

In addition to the model update, data from the various monitoring networks were compiled for the Annual Report. Groundwater elevation hydrographs were prepared for the representative monitoring wells (RMWs) and were compared to the sustainable management criteria.

Significant data compilation and analyses were conducted for this Fourth Annual Report as summarized below:

- compilation of water level, water quality, water use, land use, climate, and subsidence data sets from member agencies, state agencies, and other sources for WY 2024;
- update of C2VSimTM integrated water resources model for WY 2024;
- preparation of groundwater elevation hydrographs for RMWs from WY 1991 through WY 2024 and comparison to sustainable management criteria;
- development of groundwater elevation contour maps for the seasonal low (Fall 2023) and high (Spring 2024) groundwater levels in each principal aquifer;
- tabulation of groundwater extractions, surface water supply, and total water use data for WY 2024 using DWR water use templates;
- mapping of groundwater extractions illustrating volumes and general locations (using C2VSimTM results to prepare the required map);
- updated analysis of water budgets, including graphical representations of annual and cumulative changes in groundwater in storage from WY 1991 through WY 2024;
- map presentation of groundwater in storage for WY 2024;
- extended analysis (in addition to groundwater elevations) for three sustainability indicators including:
    - degraded water quality analysis for WY 2024;
    - land subsidence screening analysis of InSAR data for WY 2024;
    - interconnected surface water and streamflow depletion analysis using the updated C2VSimTM model for WY 2024;

- documentation of GSP implementation support activities and descriptions of early progress on projects and management actions.

1.3.1 Data Compilation

Data described in the previous section were compiled from numerous sources. Climate, water quality, land use, and remote sensing data were compiled primarily from state agencies, and other public resources. Much of the water level, surface water supply, groundwater extractions, and total water use information was provided by GSA member agencies, who cooperated to provide local data to support the Annual Reporting (see **Figure 1-3)**. Specific data compiled for each of the required elements and analyses are further described in each associated section in the Annual Report.

1.3.2 DWR Water Use Templates

DWR has provided Microsoft Excel© templates for agencies to report Subbasin-wide groundwater extraction data and measurement methods, surface water supplies, and total water use; GSAs are required to use these templates to support consistent statewide data reporting. A description of the data provided for these templates is included in the following sections:

- **Part A. Groundwater Extractions** – Description of groundwater extractions by water use sector data (23 CCR §356.2(b)(2)) is presented in **Section 4**.
- **Part B. Groundwater Extraction Methods** – Description of groundwater extraction measurement methods (23 CCR §356.2(b)(2)) is presented in **Section 4**.
- **Part C. Surface Water Supply** – Description of surface water supply by water source type (23 CCR §356.2(b)(3)) is presented in **Section 5.**
- **Part D. Total Water Use** – Description of total water supply and use (23 CCR §356.2(b)(4)) is presented in **Section 6**.

As part of the submission of this Annual Report, these data templates will be uploaded to the DWR SGMA Portal.

1.3.3 Progress on Plan Implementation

As required by the regulations, **Section 11** describes progress on GSP implementation. The section includes a summary of GSP implementation support activities, as well as activities regarding projects and management actions. As demonstrated by the descriptions, GSP implementation is underway.

1.4 Report Organization

This Annual Report is organized by the regulatory-required components presented in Article 7 of the GSP regulations. These components include groundwater elevations (**Section 3**), groundwater extractions (**Section 4**), surface water supply (**Section 5**), total water use

(**Section 6**), and change in groundwater in storage (**Section 7**). Additional monitoring for sustainable management criteria, and focused technical analyses are included for several of the sustainability indicators, including degraded water quality (**Section 8**), land subsidence (**Section 9**) and interconnected surface water (**Section 10**). As mentioned previously, **Section 11** provides a narrative description of progress on GSP implementation. The model update is documented in **Section 2**.

1.5 LIMITATIONS

This Fourth GSP Annual Report acknowledges some data limitations because the GSP was completed in 2022 (only three years ago) and, while most RMWs have a historical record, there are new monitoring wells installed during GSP preparation that have limited water level data. This limitation will be reduced with each new year of data. In addition, the GSP recognizes that the monitoring networks contain data gaps, which are being resolved during the GSP implementation period.

The Modesto Subbasin GSAs are collectively committed to successful GSP implementation and attainment of the Subbasin Sustainability Goals. Substantial compliance with the requirements of this Annual Report and the GSP is demonstrated throughout the document.

1.6 ANNUAL REPORT PREPARATION AND SUBMITTAL

As required in §353.4, this Fourth GSP Annual Report for the Modesto Subbasin is being submitted electronically to DWR through its online reporting system (SGMA Portal) at https://sgma.water.ca.gov/portal/, using forms and submittal instructions provided by DWR (§353.2).

This Annual Report has been prepared by Todd Groundwater and Woodard & Curran on behalf of STRGBA GSA and Tuolumne GSA, with oversight and submittal by Plan Manager Eric Thorburn. The GSAs Technical Advisory Committee (TAC) Planning Group – composed of a subset of TAC members – coordinated data requests and provided additional guidance on Annual Report preparation.

This Annual Report was reviewed for GSA member agencies, stakeholders, and the public in STRGBA GSA public meetings held on March 12 and March 26, 2024, prior to submittal to DWR by the April 1, 2025, deadline.

2 C2VSIMTM UPDATE (WATER YEAR 2024)

The C2VSimTM integrated surface water-groundwater model was developed as part of the Modesto Subbasin Groundwater Sustainability Plan, to simulate historical and projected hydrologic conditions for the surface, stream, and groundwater systems. The original model used to develop the GSP included water years 1991-2015 and has subsequently been updated each year during the Annual Report cycle. For the WY 2024 update, data were collected from federal, state, and local sources. As a result of the model update, an extended, historical, water budget was generated, including refined estimates for stream-aquifer interaction, pumping, and change in groundwater in storage.

The extension of the historical water budget is intended to verify and further evaluate the aquifer system under a variety of hydrologic and anthropogenic conditions. This update is important to the management of the aquifer system, as it reflects the conditions and operations of the Subbasin following GSP adoption and submittal. The annual groundwater budget for water years 1991-2024 is presented in **Section 7.**

Data Sources

Data were requested and received from the following entities within the Modesto Subbasin to complete the C2VSimTM update:

Local Water Agencies:

- Modesto Irrigation District;
- Oakdale Irrigation District;
- City of Modesto;
- City of Oakdale;
- City of Riverbank;
- City of Waterford.

Additionally, publicly available data were downloaded from the following sources to complete the C2VSimTM update:

- DWR SGMA Data Viewer;
- DWR California Data Exchange Center (CDEC);
- California Irrigation Management Information System (CIMIS);
- California State Water Resources Control Board (SWRCB);
- Oregon State University Climate Group (OSU);
- United States Natural Resources Conservation Service (NRCS);
- United States Geological Survey (USGS);
- United States Census Bureau.

It should be noted that the model was also updated to include data in the Turlock Subbasin as part of the Turlock Subbasin WY 2024 Annual Report. The details of the model update for the Turlock Subbasin are documented in their Annual Report.

2.1 UPDATED COMPONENTS

The sources summarized above provided the necessary data to update the historical model to reflect the most recent conditions. The following components of the model were updated for the 2024 Annual Report.

Precipitation: Monthly precipitation in the Subbasin and its watersheds was derived on a four-kilometer grid using the Precipitation-Elevation Regressions on Independent Slopes Model (PRISM) dataset, available online from Oregon State University through a partnership with the U.S. Natural Resources Conservation Service (NRCS), National Water and Climate Center.

Evapotranspiration: Crop evapotranspiration (ETc), or crop consumptive use, represents the volume of water that is lost to the atmosphere through both evaporation from the soil and transpiration from crop surfaces. Monthly ETc for each land use category was calculated based on the sum product of local crop coefficients (Kc) and monthly reference evapotranspiration (ETo). ET_O for the 2024 water year was calculated from the California Irrigation Management Information System (CIMIS) stations located in Modesto (#71) and Denair (#206).

Land Use: Each element within the C2VSimTM is composed of some fraction of 24 land use categories, including 20 agricultural crops, refuge, native vegetation, riparian vegetation, and urban. For the 2024 update, spatial land use data were downloaded from the DWR SGMA Data Viewer and incorporated into the Integrated Water Flow Model (IWFM).

Population: The population for each municipality was provided by that municipality for WY 2024. For the model development in the GSP, rural populations were extracted from census block data. However, at the time of data collection, these had not yet been updated by the US Census for 2024. For this model update, populations were projected based on historical trends and will be revised, if needed, when data become available.

Surface Water Operations: Monthly surface water flows were provided from October 2023 through September 2024 by Modesto Irrigation District (MID), and Oakdale Irrigation District (OID). These operational flows included diversions, deliveries, spills, seepage, and evaporative losses. Non-district water, including riparian diversions and recycled water supplies, were provided by the California State Water Resources Control Board (SWRCB) Electronic Water Rights Information Management System (eWRIMS), and the City of Modesto, respectively.

Groundwater Pumping: Pumping in the Modesto Subbasin is represented in the C2VSimTM model through a combination of distributed regional (elemental) and well-specific pumping. Well-specific pumping includes groundwater extractions by urban and agricultural agencies

and were reported on a monthly-timestep for the 2024 WY. Private groundwater production from agricultural wells was derived from an analysis of agricultural land use and climate data to assess crop water demand in excess of reported surface water deliveries provided by OID, MID, and riparian diverters. Groundwater pumping from private domestic wells was estimated as the product of population data from the US Census and historical unit water demand information from the C2VSimFG model published by DWR.

Streamflow: Monthly inflow to the Modesto Subbasin from the Tuolumne River was provided by MID, and was downloaded for the Stanislaus River and the San Joaquin River from CDEC. Streamflow associated with non-gauged tributaries within and adjacent to the Subbasin were estimated using a combination of the Integrated Water Flow Model (IWFM)rainfall-runoff and small-watershed package.

Boundary Conditions: Groundwater elevation contours were downloaded from DWR's SGMA Data Viewer for Fall 2023 and used to update the groundwater elevation boundary conditions in the model. As groundwater level contours are only available in semiannual intervals, intermediary months were estimated though linear interpolation.

2.2 MODELED RESULTS: WY 2024 GROUNDWATER BUDGET

Evaluation of the 2024 water year shows that the Modesto Subbasin experienced net 285,800 AF of inflows, and 278,000 AF of outflows. Deep percolation from rainfall and irrigation applied water (186,700 AF) is the largest contributor of groundwater inflow, followed by net inflow from the stream system (47,700 AF), net-recharge from the canal and reservoir system (46,600 AF), and inflow from the Sierra Nevada foothills (4,800 AF). Groundwater production (260,800 AF) accounts for the greatest outflow from the Modesto Subbasin, followed by net-subsurface flow (17,200 AF). In WY 2024, the Modesto Subbasin experienced an increase in groundwater in storage of 7,800 AF.

3 GROUNDWATER ELEVATIONS

Historical groundwater elevations for GSP monitoring wells in the Modesto Subbasin have been compiled for the 2024 Annual Report to provide the following:

- Water level data measured during WY 2024 (i.e., Fall 2023 and Spring 2024) is provided in **Appendix A**
- Water level hydrographs illustrate long-term trends and fluctuations and compare water levels to sustainable management criteria (**Appendix B**).
- Water level contour maps for Modesto Subbasin principal aquifers illustrate the seasonal high and seasonal low levels during the reporting period (i.e., Fall 2023 and Spring 2024).

3.1 GROUNDWATER ELEVATION MONITORING NETWORK

The Modesto Subbasin developed monitoring networks for the five sustainability indicators applicable to the Subbasin[1]. Four of the five sustainability indicators use groundwater elevations for the sustainable management criteria. In addition to the chronic lowering of water levels, groundwater elevations were demonstrated in the GSP to be an appropriate proxy for reduction of groundwater in storage, land subsidence, and interconnected surface water. Degraded water quality is the only applicable indicator that does not rely on groundwater elevations for minimum thresholds (MTs) and measurable objectives (MOs). This reliance on groundwater elevations emphasizes the importance of the GSP groundwater elevation monitoring network for GSP implementation.

Figures 3-1 through **3-4** illustrate the groundwater elevation monitoring networks and include the RMWs in each principal aquifer. The GSP defined three principal aquifers for the Modesto Subbasin as listed in **Table 3-1**. **Table 3-2** presents a summary of RMWs for each principal aquifer and for interconnected surface water.

Table 3-1: Local Principal Aquifers in the Modesto Subbasin

Principal Aquifer	Subbasin Area
Western Upper Principal Aquifer	Western Subbasin above the Corcoran Clay
Western Lower Principal Aquifer	Western Subbasin below the Corcoran Clay
Eastern Principal Aquifer	Central and eastern Subbasin outside of the Corcoran Clay extent

[1] Seawater intrusion was determined to not be present and not likely to occur in the inland Modesto Subbasin (as explained in the Modesto Subbasin GSP, Section 6.5).

Table 3-2: Summary of Representative Monitoring Wells

Well ID	Site Code	State Well Number	Station Code	Well Use / Status	Principal Aquifer	Latitude (NAD 83)	Longitude (NAD 83)	Well Depth (feet bgs)	Screen Interval Depths (feet bgs)	Ground Surface Elevation (feet)	Reference Point Elevation (feet)	Minimum Threshold (MT)	Measurable Objective (MO)	Interim Milestone (IM)	Changes [1]
Representative Monitoring Wells, Chronic Lowering of Groundwater Levels Monitoring Network															
Western Upper Principal Aquifer															
Canfield 90	376130N1211307W001	04S08E06L001M	26633	Active Irrigation	Western Upper	37.6131	-121.131	151	40-75	52	52.3	32	36		
Curtis #2 100	376852N1210974W001	03S08E09P001M	3303	Active Irrigation	Western Upper	37.6854	-121.097	124	79-100	63.6	63.6	34	41		
Gates Road 101	376596N1211549W001	03S07E24M001M	3146	Active Irrigation	Western Upper	37.6597	-121.155	64		44.2	44.2	24	33		
Hart Road 88	376946N1211227W001	03S08E08D001M	3301	Active Irrigation	Western Upper	37.6948	-121.123	130	73-85	54.9	55.2	35	40		
Katen 69	376377N1211496W001	03S07E25P001M	3147	Active Irrigation	Western Upper	37.6379	-121.150	160	13-148	45.1	45.1	27	33		
Machado 23	376680N1211049W001	03S08E17R001M	3864	Active Irrigation	Western Upper	37.6680	-121.105	80		59.1	59.3	31	40		
North Ave 103	376782N1210541W001	03S08E14B001M	3854	Active Irrigation	Western Upper	37.6784	-121.054	130	53-81	73.9	74.6	41	50		
Paradise 235	376141N1210577W001	04S08E02L001M	2151	Active Irrigation	Western Upper	37.6142	-121.058	258	96-132	73.7	73.9	34	41		
Philbrick 201	376191N1210499W001	04S08E02H001M	26591	Active Irrigation	Western Upper	37.6192	-121.050	88	58-74	73.1	73.5	34	41		
Van Buren 43	376543N1210946W001	03S08E21Q001M	3873	Active Irrigation	Western Upper	37.6546	-121.095	196	76-116	63.3	63.5	38	45		
Warnock 46	376427N1211085W001	03S08E29K001M	4015	Active Irrigation	Western Upper	37.6429	-121.109	240		55.1	55.1	35	42		
Young 76	376180N1210941W001	04S08E04G001M	38078	Active Irrigation	Western Upper	37.6181	-121.094	175	12-152	61.5	62.1	36	42		
MOD-MWB-1	376905N1210442W001		57377	Monitoring Well	Western Upper	37.6906	-121.044	177	152-172	78.795	78.8	40	49		
MOD-MWD-1	376499N1210486W001		57380	Monitoring Well	Western Upper	37.6500	-121.049	129	104-124	73.3	73.3	30	40		
MRWA-2	376241N1210861W001	03S08E33R002M	57384	Monitoring Well	Western Upper	37.6241	-121.086	183	174-179	64	64	36	43		
MW-1S	377076N1210871W001		57386	Monitoring Well	Western Upper	37.7076	-121.087	125	100-120	68.35	68	33	43		
MW-2S	376138N1210234W001		57388	Monitoring Well	Western Upper	37.6139	-121.023	135	110-130	71.1	70.7	34	41		
Western Lower Principal Aquifer															
MOD-MWB-2	376905N1210442W002		57378	Monitoring Well	Western Lower	37.6906	-121.044	250	225-245	78.7	78.7	26	34		
MOD-MWD-3	376499N1210486W002		57381	Monitoring Well	Western Lower	37.6500	-121.049	243	218-238	73.185	73.19	30	37		
MRWA-3	376241N1210861W002	03S08E33R001M	57385	Monitoring Well	Western Lower	37.6241	-121.086	280	269-274	64	64	28	36		
MW-1D	377076N1210871W002		57387	Monitoring Well	Western Lower	37.7076	-121.087	250	225-245	68.519	67.9	14	27		
MW-2D	376138N1210234W002		57389	Monitoring Well	Western Lower	37.6139	-121.023	281	256-276	71.2	71	35	40		
Eastern Principal Aquifer															
Albers 232	376507N1208474W001	03S10E26D001M	3559	Active Irrigation	Eastern	37.6510	-120.848	460	196-288	145.4	145.7	60	76		
Allen OID-01	377602N1208849W001	02S10E16M001M	4430	Active Irrigation	Eastern	37.7599	-120.885	415	0-120	145.62	145.72	72	81	61	
American 208	377280N1210413W001	02S08E25P001M	3723	Active Irrigation	Eastern	37.7281	-121.041	320	79-272	99.9	99.9	48	55		
Bangs Ave 243	377032N1210382W001	03S08E01K001M	3152	Active Irrigation	Eastern	37.7034	-121.038	346	141-251	90	90	32	46		
Bentley OID-02	377160N1208674W001	02S10E33J001M	4590	Active Irrigation	Eastern	37.7160	-120.867	500	120-175	171.94	172.09	71	85	56	
Birnbaum OID-03	377560N1208643W001	02S10E15N001M	4429	Active Irrigation	Eastern	37.7559	-120.864	293	55-293	149.39	149.84	72	86	61	
Blossom 230	376455N1208013W001	03S11E30K001M	3903	Active Irrigation	Eastern	37.6456	-120.802	412	179-283	154.8	155	61	78		
Cavil 214	377049N1209110W001	03S10E06G001M	27057	Active Irrigation	Eastern	37.7050	-120.911	480	107-275	135.6	135.6	53	73		
Claribel 206	377082N1209741W001	03S09E03D001M	2093	Active Irrigation	Eastern	37.7085	-120.974	650	96-550	114.1	114.5	49	62		
Crane OID-06	377335N1208999W001	02S10E29E001M	29444	Active Irrigation	Eastern	37.7334	-120.899	505	155-198	160.07	160.42	66	77	55	

Table 3-2: Summary of Representative Monitoring Wells

Well ID	Site Code	State Well Number	Station Code	Well Use / Status	Principal Aquifer	Latitude (NAD 83)	Longitude (NAD 83)	Well Depth (feet bgs)	Screen Interval Depths (feet bgs)	Ground Surface Elevation (feet)	Reference Point Elevation (feet)	Minimum Threshold (MT)	Measurable Objective (MO)	Interim Milestone (IM)	Changes [1]
Eastern Principal Aquifer (continued)															
Furtado OID-07	377182N1207857W001	02S11E32L001M	2529	Active Irrigation	Eastern	37.7184	-120.786	590	200-580	211.98	212.48	69	81	51	
Head Lateral 3 215	376743N1208913W001	03S10E17K001M	3552	Active Irrigation	Eastern	37.6744	-120.891	476	116-400	135.8	135.6	56	73		
Head Lateral 8 194	377271N1210868W001	02S08E27N001M	38870	Active Irrigation	Eastern	37.7272	-121.087	302	148-211	79.5	79.8	40	47		
Jones WID 228	376416N1207760W001	03S11E29J001M	38872	Active Irrigation	Eastern	37.6418	-120.776	324	188-280	166.4	166.4	55	75		
Langdon Merle 241	377346N1209774W001	02S09E28H001M	3876	Active Irrigation	Eastern	37.7349	-120.978	595	160-300	128.4	128.5	50	62		
Lateral one 195	376324N1208891W001	03S10E32G001M	3877	Active Irrigation	Eastern	37.6325	-120.889	260	141-210	126	126	42	52		
Marquis OID-10	377530N1208960W001	02S10E20C001M	29436	Active Irrigation	Eastern	37.7532	-120.897	125	27-125	138.39	138.84	85	91	78	
Paulsell 1 OID-11	377177N1206918W001	02S12E31K001M	26187	Active Irrigation	Eastern	37.7179	-120.692	815	195-410	195.94	197.54	88	117	53	
Paulsell 2 OID-12	377113N1206766W001	02S12E32P001M	38865	Active Irrigation	Eastern	37.7110	-120.677	815	132-815	193.85	195.6	94	123	58	
Perley 202	376677N1209518W001	03S09E14P001M	2109	Active Irrigation	Eastern	37.6677	-120.952	255	76-204	104.9	105.4	36	45		
Quesenberry 223	376596N1206896W001	03S12E19G001M	27424	Active Irrigation	Eastern	37.6598	-120.690	380	168-208	197	197	89	110	72	
Riverbank OID-13	377351N1209648W001	02S09E27G001M	49463	Active Irrigation	Eastern	37.7351	-120.965	560	200-550	132.32	134.16	42	54		
Schmidt 227	376485N1207360W001	03S11E27G003M	3897	Active Irrigation	Eastern	37.6487	-120.736	248	113-153	192.3	192.2	59	78		
Wellsford 233	376735N1208752W001	03S10E16K001M	3551	Active Irrigation	Eastern	37.6736	-120.875	468	158-358	141.9	142	62	77		
Wood 210	376674N1209121W001	03S10E18P001M	3553	Active Irrigation	Eastern	37.6675	-120.912	606	87-547	121.3	121.3	52	66		
MOD-MWA-2	376429N1209317W001		57376	Monitoring Well	Eastern	37.6430	-120.932	175	150-170	103.8	103.8	30	36		
MOD-MWC-3	376722N1209409W001		57379	Monitoring Well	Eastern	37.6722	-120.941	285	260-280	105.6	105.6	40	50		
FPA-2	376861N1210009W001	03S09E08K004M	57382	Monitoring Well	Eastern	37.6862	-121.001	122	115-120	91	91	38	48		
OFPB-2	376901N1209514W001	03S09E11F002M	57383	Monitoring Well	Eastern	37.6902	-120.951	175	166-171	104	104	35	53		
MW-3S	376307N1209676W001		57390	Monitoring Well	Eastern	37.6307	-120.968	161	136-156	95.8	95.6	25	31		
MW-3D	376307N1209676W002		57391	Monitoring Well	Eastern	37.6307	-120.968	283	258-278	95.7	95.3	25	31		
MW-4S	377285N1209415W001		57392	Monitoring Well	Eastern	37.7286	-120.942	165	140-160	136.569	136.3	56	67		
MW-5S	377631N1208253W001		57393	Monitoring Well	Eastern	37.7631	-120.825	175	150-170	191.9	191.6	69	89	68	
MW-6S	376461N1207525W001		57394	Monitoring Well	Eastern	37.6461	-120.753	179	154-174	171.3	170.9	65	83		
MW-7	377434N1207043W001		57395	Monitoring Well	Eastern	37.7434	-120.704	300	275-295	242.6	242.3	75	110	40	
MW-8	377323N1206328W001		57396	Monitoring Well	Eastern	37.7324	-120.633	290	265-285	292.9	292.3	75	110	49	
MW-9	376495N1205351W001		57397	Monitoring Well	Eastern	37.6495	-120.535	365	340-360	244.5	247.6	150	180	138	
MW-10	377396N1207564W001		57398	Monitoring Well	Eastern	37.7396	-120.756	265	240-260	265.1	264.7	72	101	63	
MW-11	376439N1209009W001		57399	Monitoring Well	Eastern	37.6440	-120.901	175	150-170	116.3	116.1	35	48		

Table 3-2: Summary of Representative Monitoring Wells

Well ID	Site Code	State Well Number	Station Code	Well Use / Status	Principal Aquifer	Latitude (NAD 83)	Longitude (NAD 83)	Well Depth (feet bgs)	Screen Interval Depths (feet bgs)	Ground Surface Elevation (feet)	Reference Point Elevation (feet)	Minimum Threshold (MT)	Measurable Objective (MO)	Interim Milestone (IM)	Changes [1]
Representative Monitoring Wells, Interconnect Surface Water Monitoring Network															
San Joaquin River															
Canfield 90	376130N1211307W001	04S08E06L001M	26633	Active Irrigation	Western Upper	37.6131	-121.131	151	40-75	52	52.3	33	37		
Katen 69	376377N1211496W001	03S07E25P001M	3147	Active Irrigation	Western Upper	37.6379	-121.150	160	13-148	45.1	45.1	27	33		
Stanislaus River															
Allen OID-01	377602N1208849W001	02S10E16M001M	4430	Active Irrigation	Eastern	37.7599	-120.885	415	0-120	145.62	145.72	75	83	61	
American 208	377280N1210413W001	02S08E25P001M	3723	Active Irrigation	Eastern	37.7281	-121.041	320	79-272	99.9	99.9	48	55		
Birnbaum OID-03	377560N1208643W001	02S10E15N001M	4429	Active Irrigation	Eastern	37.7559	-120.864	293	55-293	149.39	149.84	74	87	61	
Head Lateral 8 194	377271N1210868W001	02S08E27N001M	38870	Active Irrigation	Eastern	37.7272	-121.087	302	148-211	79.5	79.8	40	47		
Langdon Merle 241	377346N1209774W001	02S09E28H001M	3876	Active Irrigation	Eastern	37.7349	-120.978	595	160-300	128.4	128.5	50	62		
Marquis OID-10	377530N1208960W001	02S10E20C001M	29436	Active Irrigation	Eastern	37.7532	-120.897	125	27-125	138.39	138.84	86	92	78	
Riverbank OID-13	377351N1209648W001	02S09E27G001M	49463	Active Irrigation	Eastern	37.7351	-120.965	560	200-550	132.32	134.16	42	54		
MW-4S	377285N1209415W001		57392	Monitoring Well	Eastern	37.7286	-120.942	165	140-160	136.569	136.3	56	67		
Tuolumne River															
Jones WID 228	376416N1207760W001	03S11E29J001M	38872	Active Irrigation	Eastern	37.6418	-120.776	324	188-280	166.4	166.4	55	75		
Lateral one 195	376324N1208891W001	03S10E32G001M	3877	Active Irrigation	Eastern	37.6325	-120.889	260	140.5-210	126	126	42	52		
Paradise 235	376141N1210577W001	04S08E02L001M	2151	Active Irrigation	Western Upper	37.6142	-121.058	258	96-132	73.7	73.9	34	41		
Philbrick 201	376191N1210499W001	04S08E02H001M	26591	Active Irrigation	Western Upper	37.6192	-121.050	88	58-74	73.1	73.5	38	43		
Quesenberry 223	376596N1206896W001	03S12E19G001M	27424	Active Irrigation	Eastern	37.6598	-120.690	380	168-208	197	197	89	110	72	
Schmidt 227	376485N1207360W001	03S11E27G003M	3897	Active Irrigation	Eastern	37.6487	-120.736	248	113-153	192.3	192.2	59	78		
MW-2S	376138N1210234W001		57388	Monitoring Well	Western Upper	37.6139	-121.023	135	110-130	71.1	70.7	38	43		
MW-3S	376307N1209676W001		57390	Monitoring Well	Eastern	37.6307	-120.968	161	136-156	95.8	95.6	26	32		
MW-6S	376461N1207525W001		57394	Monitoring Well	Eastern	37.6461	-120.753	179	154-174	171.3	170.9	65	83		
MW-9	376495N1205351W001		57397	Monitoring Well	Eastern	37.6495	-120.535	365	340-360	244.5	247.6	150	180	138	

Notes:

1. No changes to the monitoring networks were made during WY 2024.

Figures 3-1 through **3-3** show the groundwater elevation monitoring networks for chronic lowering of water levels, which also serve as a proxy for the reduction of groundwater in storage, and land subsidence indicators. **Figure 3-4** provides the groundwater elevation monitoring network for interconnected surface water. Management Areas are included on the maps for reference.

Each RMW on the monitoring network maps (**Figures 3-1** through **3-4**) includes the MTs and MOs that have been assigned to each. Hydrographs for these wells are provided in **Appendix B**.

Groundwater elevations are collected by various member agencies of the GSAs, according to the adopted monitoring protocols documented in the Modesto Subbasin GSP. Monitoring protocols, as well as protocols from existing monitoring programs in the Subbasin such as CASGEM[2], the City of Modesto, and previous USGS monitoring efforts, are considered Best Management Practices (BMPs).

Monitoring protocols adopted as part of the GSP require that water levels be measured within the two time periods established, to capture the annual seasonal high and low water levels as follows:

- February 1st to April 15th, representing the seasonal high water levels.
- September 1st to November 30th, representing the seasonal low water levels.

These relatively long periods have been established to provide flexibility to the GSAs when attempting to capture the high and low water levels during years of varying hydrologic conditions. GSAs intend to coordinate sampling events within a relatively narrow window of time, within the aforementioned larger time periods, based on the conditions, anticipated irrigation schedules, and surface water deliveries. The timing of these activities can vary significantly from wet years to dry years and can affect the timing of seasonal high and low water levels within the Subbasin.

3.2 WATER YEAR TYPE

To provide context for the analysis of groundwater elevations throughout the historical Study Period (WY 1991 through WY 2015) and subsequent years (WY 2016 through WY 2024), the natural hydrologic conditions for the associated water years have been tabulated. DWR developed a hydrologic classification index based on a runoff analysis for the San Joaquin Valley by water year dating back to 1901. These indices provide a consistent methodology for comparing water year types to the groundwater elevation hydrographs from WY 1991 through WY 2024 for this Annual Report.

[2] California Statewide Groundwater Elevation Monitoring (CASGEM) program.

Figure 3-5 illustrates the water year type, as classified by the San Joaquin Valley Index, compared to the annual precipitation as measured in the western Modesto Subbasin at MID's weather station. Precipitation amounts from WY 1990 through WY 2024 are color-coded to indicate the respective water year type. Because the DWR-designated index is based on a runoff analysis from the San Joaquin River, the water year type does not correlate directly to the number of inches of precipitation in the Modesto Subbasin. However, the annual precipitation totals provide a reasonable match to water year types for most years. Water year types illustrated on **Figure 3-5** are summarized in **Table 3-3**.

Table 33: San Joaquin Valley Water Year Index

Water Year	Water Year Type San Joaquin Valley Water Year Index	Water Year	Water Year Type San Joaquin Valley Water Year Index
1990	Critically Dry	**2008**	Critically Dry
1991	Critically Dry	**2009**	Below Normal
1992	Critically Dry	**2010**	Above Normal
1993	Wet	**2011**	Wet
1994	Critically Dry	**2012**	Dry
1995	Wet	**2013**	Critically Dry
1996	Wet	**2014**	Critically Dry
1997	Wet	**2015**	Critically Dry
1998	Wet	**2016**	Dry
1999	Above Normal	**2017**	Wet
2000	Above Normal	**2018**	Below Normal
2001	Dry	**2019**	Wet
2002	Dry	**2020**	Dry
2003	Below Normal	**2021**	Critically Dry
2004	Dry	**2022**	Critically Dry
2005	Wet	**2023**	Wet
2006	Wet	**2024**	Above Normal
2007	Critically Dry		

As described in the GSP, the period WY 1991 through WY 2015 represents average hydrologic conditions and is characterized by a series of wet and dry years over a relatively long period of time. As indicated in **Table 3-3** and on **Figure 3-5**, that period begins and ends with a series of critically dry years indicating severe drought conditions. Since WY 2015, water year types indicate a series of intervening wet/dry years. WY 2021 and WY 2022 were critically dry years, WY 2023 was a very wet year and WY 2024 was an above normal year.

Because the period WY 2016 through WY 2024 follows a severe drought, groundwater levels were already at or near historical lows. With continued pumping, and without consecutive wet years since WY 2016, groundwater elevations have not fully recovered, and in some areas, continue to decline.

3.3 GROUNDWATER ELEVATIONS WY 1991 – WY 2024

Available water level data through WY 2024 from RMWs have been compiled in DWR water level templates and uploaded onto the SGMA portal. All monitoring data have been stored in the Modesto Subbasin Data Management System (DMS). Groundwater level data measured during WY 2024 are provided in **Appendix A.**

3.3.1 Hydrograph Development

Groundwater elevation data described above were used to generate water level hydrographs for RMWs where MTs and MOs have been established. GSP regulations require that hydrographs use "historical data to the greatest extent available, including from January 1, 2015, to current reporting year" (§356.2(b)(1)(B)). For this GSP Annual Report for the Modesto Subbasin, the time period from WY 1991 through WY 2024 (reporting period) was selected to meet GSP requirements and allow for consistent hydrograph development. As described previously, this 33-year period includes the historical GSP Study Period (WY 1991 – WY 2015) and subsequent years for C2VSimTM model updates.

Hydrographs for the RMWs are provided in **Appendix B** in two groups: 1) wells that are in the monitoring network for chronic lowering of groundwater levels, reduction of groundwater in storage, and land subsidence (total 61 RMWs), and 2) wells in the monitoring network for depletions of interconnected surface water (total 20 RMWs). Some Group 1 wells are repeated in Group 2, to illustrate all MTs associated with each monitoring network.

In compliance with GSP regulations Article 4, the hydrographs are submitted electronically and labeled with a unique site identification number (Site Code and Local Identifier/RMW#), monitoring agency, and the ground surface elevation (GSE). In addition, hydrographs have incorporated the same datum and scaling to the greatest extent practical (§352.4(e)). Some vertical scales are adjusted to allow the GSE, MT, and MO to be displayed (**Appendix B**).

The 2024 Annual Report includes 81 hydrographs for RMWs in the combined networks in **Appendix B**. For each hydrograph, a solid black horizontal line shows the GSE, the MT is represented by an orange line, the MO is represented by a green line, and, where applicable, the Interim Milestone (IM) is represented by a dashed blue line. Groundwater elevation data are shown in blue.

3.3.2 Water Level Trends Fluctuations

Example hydrographs were selected from **Appendix B** to illustrate long-term trends and seasonal fluctuations for the various principal aquifers and management areas. Selected RMW hydrographs are illustrated on **Figure 3-6**.

In general, water levels in the Western Upper and Western Lower Principal Aquifers increased during WY 2024. Water levels at most wells in the Eastern Principal Aquifer experienced some recovery in Spring 2024, but groundwater remained below pre-drought

(2012-2015) levels. Water level records in the eastern region of the Eastern Principal Aquifer indicate declining groundwater level trends since the mid-2000s, with significant declines continuing to present.

Since WY 2015, the end of the historical GSP Study Period, water levels in the Western Upper Principal Aquifer had slightly recovered by WY 2018. At several of the RMWs, dry conditions in WY 2021 and 2022 caused water levels to decline and Fall 2023 water levels were below elevations recorded in 2018. The wet conditions in 2023 enabled water levels to recover partially or fully to post-drought levels (as shown in the hydrographs for Canfield, Machado, and North Ave 103 in **Figure 3-6**). Most wells showed water level increases in both Fall 2023 and Spring 2024. In Canfield 90, Paradise 235, and Philbrick 201, water levels increase by several feet between Spring 2023 and Fall 2023, but then slightly declined between Fall 2023 and Spring 2024.

There are five RMWs in the Western Lower Principal Aquifer. Water levels measured in the five RMWs during WY 2024 exhibit seasonal pumping fluctuations (MW-1D, MW-2D, MOD-MWB-2, and MOD-MWD-3, MRWA-3, see well locations on **Figure 3-2** and hydrographs in **Appendix B**). In general, water levels rebounded in Spring 2024.

Water levels in the Eastern Principal Aquifer indicate some post-drought recovery but generally have declined since 2011. Most wells in the east showed groundwater elevations in Spring 2024 that were either below or have returned to water levels measured in Fall 2019 (see Bangs, Cavil, and Blossom hydrographs, **Figure 3-6**). The declining trend is more pronounced in the eastern extent of the Eastern Principal Aquifer. Water levels continued to decline through WY 2024, with minimal to no recovery (see Furtado and Paulsell-2 hydrographs, **Figure 3-6**).

3.3.3 Compliance with Sustainable Management Criteria

As explained above, hydrographs in **Appendix B** and on **Figure 3-6** show the MTs and MOs established for that RMW. The historical low water level was used to set the MTs for most RMWs in the monitoring networks. To provide context for these sustainable management criteria, **Table 3-4** summarizes how the MTs and MOs are defined for each applicable sustainability indicator in the GSP. The GSP provides the analysis and justification for the MTs and MOs, and how they are used to inform the definition of undesirable results for the Subbasin.

As mentioned previously, the WY 2024 reporting period for this Fourth Annual Report includes data from Fall 2023 and Spring 2024 GSP monitoring events. These were the fourth and fifth GSP monitoring events since GSP adoption and submittal in January 2022.

Table 3-4: Sustainable Management Criteria Summary

Sustainability Indicator	Minimum Thresholds (MTs)	Measurable Objectives (MOs)
Chronic Lowering of Groundwater Levels	Historic low groundwater elevation observed or estimated during WY 1991 – WY 2020 at each representative monitoring location, based on available data.	Midpoint between the historical high groundwater elevation and the MT at each representative monitoring location.
Reduction of Groundwater in Storage	Historic low groundwater elevation observed or estimated during WY 1991 – WY 2020 at each representative monitoring location, based on available data. (Chronic Lowering of Groundwater Levels as a proxy.)	Midpoint between the historical high groundwater elevation and the MT at each representative monitoring location. (Chronic Lowering of Groundwater Levels as a proxy.)
Degraded Water Quality	Minimum thresholds are set as the primary or secondary California maximum contaminant level (MCL) for each of seven (7) constituents of concern (COCs): • Nitrate (as N) - 10 mg/L • Arsenic - 10 ug/L • Uranium - 20 pCi/L • Total dissolved solids (TDS) - 500 mg/L • Dibromochloropropane (DBCP) - 0.2 ug/L • 1,2,3-Trichloropropane (TCP) - 0.005 ug/L • Tetrachloroethene (PCE) - 5 ug/L.	Historical maximum concentration of each constituent of concern (COC) at each representative monitoring location.
Inelastic Land Subsidence	Historic low groundwater elevation observed or estimated during WY 1991 – WY 2020 at each representative monitoring location, based on available data. (Chronic Lowering of Groundwater Levels as a proxy.)	Midpoint between the historical high groundwater elevation and the MT at each representative monitoring location. (Chronic Lowering of Groundwater Levels as a proxy.)
Interconnected Surface Water	Low groundwater elevation observed in Fall 2015 at each representative monitoring location.	Midpoint between the historical high groundwater elevation and the MT at each representative monitoring site.

An undesirable result related to the chronic lowering of groundwater levels is defined as occurring when at least 33% of representative monitoring wells exceed the MT for a principal aquifer in three consecutive Fall monitoring events. Undesirable results for interconnected surface water will occur on one of the rivers when 33% (Stanislaus and Tuolumne Rivers) to 50% (San Joaquin River) of the representative monitoring wells for that river exceed the MT in three consecutive Fall monitoring events.

A comparison of groundwater elevations in Fall 2023 and Spring 2024 to the sustainable management criteria is provided in **Table 3-5** on the following pages. **Table 3-6** summarizes the SMC criteria since Spring 2022. **Figures 3-7** through **3-14** are maps illustrating the MT comparison for the Fall 2023 and Spring 2024 monitoring events for the groundwater elevation monitoring network in each principal aquifer and for the interconnected surface water monitoring network.

Table 3-5: Comparison of Groundwater Elevations to Sustainable Management Criteria - Water Year 2024
Modesto Subbasin

			Fall 2023 Monitoring Event		Spring 2024 Monitoring Event	
Local Well Name	**Minimum Threshold (MT) (feet msl)**	**Interim Milestone (IM) (feet msl)**	**Groundwater Elevation Below MT? (yes/no)**	**Groundwater Elevation Below IM? (yes/no)**	**Groundwater Elevation Below MT? (yes/no)**	**Groundwater Elevation Below IM? (yes/no)**
Western Upper Principal Aquifer						
Canfield 90	32	---	No	---	No	---
Curtis #2 100	34	---	No	---	No	---
Gates Road 101	24	---	No	---	No	---
Hart Road 88	35	---	No	---	No	---
Katen 69	27	---	No	---	No	---
Machado 23	31	---	No	---	No	---
North Ave 103	41	---	No	---	No	---
Paradise 235	34	---	No	---	No	---
Philbrick 201	34	---	No	---	No	---
Van Buren 43	38	---	No	---	No	---
Warnock 46	35	---	No	---	No	---
Young 76	36	---	No	---	No	---
MOD-MWB-1	40	---	No	---	No	---
MOD-MWD-1	30	---	No	---	No	---
MRWA-2	36	---	No	---	No	---
MW-1S	33	---	No	---	No	---
MW-2S	34	---	No	---	No	---
Summary - Western Upper Principal Aquifer						
Above			17	--	17	--
Below			0	--	0	--
Not Measured			0	--	0	--
% Below (includes measured wells)			0%	--	0%	--
Western Lower Principal Aquifer						
MOD-MWB-2	26	---	No	---	No	---
MOD-MWD-3	30	---	No	---	No	---
MRWA-3	28	---	No	---	No	---
MW-1D	14	---	No	---	No	---
MW-2D	35	---	Yes	---	No	---
Summary - Western Lower Principal Aquifer						
Above			4	--	5	--
Below			1	--	0	--
Not Measured			0	--	0	--
% Below (includes measured wells)			20%	--	0%	--

Table 3-5: Comparison of Groundwater Elevations to Sustainable Management Criteria - Water Year 2024
Modesto Subbasin

			Fall 2023 Monitoring Event		Spring 2024 Monitoring Event	
Local Well Name	**Minimum Threshold (MT) (feet msl)**	**Interim Milestone (IM) (feet msl)**	**Groundwater Elevation Below MT? (yes/no)**	**Groundwater Elevation Below IM? (yes/no)**	**Groundwater Elevation Below MT? (yes/no)**	**Groundwater Elevation Below IM? (yes/no)**
Eastern Principal Aquifer						
Albers 232	60	---	No	---	No	---
Allen OID-01	72	61	No	No	No	No
American 208	48	---	No	---	No	---
Bangs Ave 243	32	---	Yes	---	No	---
Bentley OID-02	71	56	Yes	No	No	No
Birnbaum OID-03	72	61	Yes	No	No	No
Blossom 230	61	---	Yes	---	Yes	---
Cavil 214	53	---	No	---	No	---
Claribel 206	49	---	No	---	No	---
Crane OID-06	66	55	No	No	No	No
Furtado OID-07	69	51	Yes	No	Yes	No
Head Lateral 3 215	56	---	No	---	No	---
Head Lateral 8 194	40	---	No	---	No	---
Jones WID 228	55	---	No	---	No	---
Langdon Merle 241	50	---	No	---	No	---
Lateral one 195	42	---	No	---	No	---
Marquis OID-10	85	78	No	No	No	No
Paulsell 1 OID-11	88	53	Yes	No	Yes	No
Paulsell 2 OID-12	94	58	Yes	No	Yes	No
Perley 202	36	---	No	---	No	---
Quesenberry 223	89	72	NM	NM	NM	NM
Riverbank OID-13	42	---	No	---	No	---
Schmidt 227	59	---	No	---	No	---
Wellsford 233	62	---	No	---	No	---
Wood 210	52	---	NM	NM	NM	NM
MOD-MWA-2	30	---	No	---	No	---
MOD-MWC-3	40	---	No	---	No	---
FPA-2	38	---	No	---	No	---
OFPB-2	35	---	No	---	No	---
MW-3S	25	---	No	---	No	---
MW-3D	25	---	No	---	No	---
MW-4S	56	---	No	---	No	---
MW-5S	69	68	No	No	No	No
MW-6S	65	---	Yes	---	No	---
MW-7	75	40	Yes	No	Yes	No
MW-8	75	49	Yes	No	Yes	No
MW-9	150	138	No	No	No	No
MW-10	72	63	Yes	No	Yes	No
MW-11	35	---	No	---	No	---
Summary - Eastern Principal Aquifer						
		Above	26	13	30	13
		Below	11	0	7	0
		Not Measured	2	2	2	2
		% Below (includes measured wells)	30%	0%	19%	0%

Table 3-5: Comparison of Groundwater Elevations to Sustainable Management Criteria - Water Year 2024
Modesto Subbasin

			Fall 2023 Monitoring Event		Spring 2024 Monitoring Event	
Local Well Name	**Minimum Threshold (MT) (feet msl)**	**Interim Milestone (IM) (feet msl)**	**Groundwater Elevation Below MT? (yes/no)**	**Groundwater Elevation Below IM? (yes/no)**	**Groundwater Elevation Below MT? (yes/no)**	**Groundwater Elevation Below IM? (yes/no)**
Interconnected Surface Water						
San Joaquin River						
Canfield 90	33	---	No	---	No	---
Katen 69	27	---	No	---	No	---
Stanislaus River						
Allen OID-01	75	61	Yes	No	No	No
American 208	48	---	No	---	No	---
Birnbaum OID-03	74	61	Yes	No	No	No
Head Lateral 8 194	40	---	No	---	No	---
Langdon Merle 241	50	---	No	---	No	---
Marquis OID-10	86	78	No	No	Yes	No
Riverbank OID-13	42	---	No	---	No	---
MW-4S	56	---	No	---	No	---
Tuolumne River						
Jones WID 228	55	---	No	---	No	---
Lateral one 195	42	---	No	---	No	---
Paradise 235	34	---	No	---	No	---
Philbrick 201	38	---	No	---	No	---
Quesenberry 223	89	72	NM	NM	NM	NM
Schmidt 227	59	---	No	---	No	---
MW-2S	38	---	No	---	No	---
MW-3S	26	---	No	---	No	---
MW-6S	65	---	Yes	---	No	---
MW-9	150	138	No	No	No	No
Summary - Interconnected Surface Water						
San Joaquin River						
Above			2	--	2	--
Below			0	--	0	--
Not Measured			0	--	0	--
% Below (includes measured wells)			0%	--	0%	--
Stanislaus River						
Above			6	3	7	3
Below			2	0	1	0
Not Measured			0	0	0	0
% Below (includes measured wells)			25%	0%	13%	0%
Tuolumne River						
Above			8	1	9	1
Below			1	0	0	0
Not Measured			1	1	1	1
% Below (includes measured wells)			11%	0%	0%	0%

Notes:
highlight: groundwater elevation is below (exceeds) the MT or the IM
MT: Minimum Threshold
IM: Interim Milestone
NM: water level not measured

Table 3-6: Summary of GSP Monitoring Events
Modesto Subbasin

Undesirable Results Definition	Principal Aquifer/River	Percent of Measured RMWs Below MT				
		WY 2022	WY 2023		WY 2024	
		Spring 2022	Fall 2022	Spring 2023	Fall 2023	Spring 2024
Chronic Lowering of Groundwater Levels						
At least **33%** of RMWs exceed the MT for that Principal Aquifer in **three (3)** consecutive **Fall** monitoring events.	**Western Upper**	0%	**6%**	0%	**0%**	0%
	Western Lower	20%	**20%**	0%	**20%**	0%
	Eastern	28%	**57%**	32%	**30%**	19%
Interconnected Surface Waters						
At least **33%** (Stanislaus and Tuolumne) or **50%** (San Joaquin) of RMWs for a river exceed the MT in **three (3)** consecutive **Fall** monitoring events	**San Joaquin River**	0%	**50%**	0%	**0%**	0%
	Stanislaus River	25%	**75%**	25%	**25%**	13%
	Tuolumne River	11%	**56%**	22%	**11%**	0%

Fall GSP Monitoring Event - below threshold
Fall GSP Monitoring Event - above threshold

3.3.3.1 Fall 2023 Monitoring Event

As shown in **Table 3-5**, water levels in the monitoring network for the chronic lowering of groundwater levels indicator were measured in 61 RMWs between October and November 2023. During the Fall 2023 monitoring event, 2 RMWs were not measured due to casing obstructions (Wood 210 and Quesenberry 223).

As indicated on **Figure 3-6**, groundwater elevations have been declining over time in the Eastern Principal Aquifer (especially in the eastern Subbasin). MTs were selected in WY 2021 in recognition that these declines would continue until projects and management actions could be brought online. As such, short-term MT exceedances were expected, and Interim Milestones (IMs) were developed as guidelines for subsequent recovery. During the Fall 2023 monitoring event, groundwater elevations were not below the Interim Milestones (IMs) in any of the wells measured (**Table 3-5**). No principal aquifer monitoring networks had more than 33% of wells with water levels below their MTs.

3.3.3.1.1 Western Upper Principal Aquifer

Water levels were above the MTs in all Western Upper Principal Aquifer during the Fall 2023 monitoring event, as documented on **Figure 3-7** and in **Table 3-5**. No IMs are set for the Western Upper Principal Aquifer.

3.3.3.1.2 Western Lower Principal Aquifer

All RMWs in the Western Lower Principal Aquifer were measured in Fall 2023. As shown in **Figure 3-8** and **Table 3-5**, 1 out of 5 wells (20%) in the Western Lower Principal Aquifer (MW-2D) were below the MT. No IMs are set for the Western Lower Principal Aquifer.

3.3.3.1.3 Eastern Principal Aquifer

Water levels in 11 out of 37 wells (30%) measured in the Eastern Principal Aquifer were below the MTs in Fall 2023 (**Figure 3-9** and **Table 3-5**). Most wells with MT exceedances in the Eastern Principal Aquifer are east of Riverbank and Modesto, in the central and eastern regions of the aquifer. The rate of decline generally increases east of Furtado OID-07. RMWs Paulsell 1 OID-11 and Paulsell 2 OID-12 have declined consistently since 2008, and Wells MW-7, MW-8, and MW-10 show a similar trend since 2021. These wells are screened within the Mehrten Formation.

3.3.3.1.4 Interconnected Surface Water

Groundwater levels for the interconnected surface water monitoring network were below the MTs in 3 out of 19 wells measured (**Figure 3-10** and **Table 3-5**). The MT exceedances occurred in 2 out of 8 wells (25%) measured along the Stanislaus River (Allen OID-1 and Birnbaum OID-03). Along the Tuolumne River, 1 out of 9 wells (11%) measured (MW-6S) were below the respective MTs. One well along the Tuolumne River (Quesenberry 223) was not measured in Fall 2023 due to casing obstruction. The MT exceedances in the interconnected surface water monitoring network occurred primarily in the Eastern Principal Aquifer.

Spring 2024 Monitoring Event

Water levels in the monitoring network for the chronic lowering of groundwater levels indicator were measured in 59 RMWs in February and March 2024, prior to the start of irrigation season. RMWs Quesenberry 223 and Wood 210 were not measured due to casing obstructions. No principal aquifer monitoring networks had more than 33% of wells with water levels below their MTs.

3.3.3.1.5 Western Upper Principal Aquifer

Water levels were above the MTs in all Western Upper Principal Aquifer RMWs measured during the Spring 2024 monitoring event (**Figure 3-11** and **Table 3-5**). No RMWs have established IMs in the Western Upper Principal Aquifer.

3.3.3.1.6 Western Lower Principal Aquifer

As documented in **Figure 3-12** and **Table 3-5,** no RMWs were below their MTs in the Western Lower Principal Aquifer in Spring 2024. No IMs have been set for RMWs in the Western Lower Principal Aquifer.

3.3.3.1.7 Eastern Principal Aquifer

As shown in **Figure 3-13** and **Table 3-5**, water levels in the Eastern Principal Aquifer during the Spring 2024 monitoring event were below the MT in 7 of 37 RMWs (19%) that were measured. Between Fall 2023 and Spring 2024, water levels increased above the MT in 4 wells. The wells where MT exceedances remained below the MT in Spring 2024 occurred primarily east of the City of Modesto, in the interior portions of the Eastern Principal Aquifer, and along the Tuolumne River. In most of these wells, water levels remained at a similar level to Fall 2023 or increased by less than 2 ft. The lack of recovery during the rainy season suggests continued pumping stress on the Mehrten Aquifer, potentially for frost protection, or slower rates of recovery in this region.

3.3.3.1.8 Interconnected Surface Water

Groundwater levels for the interconnected surface water monitoring network were below the MTs in 1 of 19 wells measured (**Figure 3-14** and **Table 3-5**). The MT exceedance occurred in 1 of 8 wells (13%) measured along the Stanislaus River (Marquis OID-10). One well along the Tuolumne River was not measured in Spring 2024 (Quesenberry 223). The MT exceedances in the interconnected surface water monitoring network occurred in the Eastern Principal Aquifer. Water levels were not below the MTs in RMWs along the San Joaquin River.

3.3.4 Reported Dry Wells

DWR has a Dry Well Reporting System for households not served by a public water system. Based on data reported to this system, no dry wells were reported in the Subbasin during WY 2024 (**Figure 3-15**). In contrast, four dry wells were reported in the Subbasin in WY 2023. These reported dry wells occurred in vicinity of Riverbank and Oakdale and were resolved within WY 2023.

There are six reported dry wells occurring outside the Modesto boundary. Five of the wells appear along the north and northwest boundary, in San Joaquin County, and one well appears south of Turlock, Stanislaus County. According to the Dry Well Reporting System, the six cases remain as outages.

A Management Action framework to address potential impacts to domestic wells is being developed in the current year, in accordance with the Implementation Support Activity for development of a domestic well mitigation program identified in the GSP.

3.4 GROUNDWATER ELEVATION CONTOUR MAPS

Groundwater elevation data were used to develop water level contour maps for the principal aquifers in the Subbasin (see **Table 3-1** for a description of the Principal Aquifers in the Modesto Subbasin). The contour maps are based on groundwater elevation data from RMWs and supplemented by additional wells in the monitoring networks for the three principal aquifers. The contour maps also consider groundwater level data from outside the Subbasin to best represent water levels near the Subbasin boundaries. Data were compiled and contoured for both Fall 2023 and Spring 2024, as shown on **Figures 3-16** through **3-19**; maps are described in subsequent sections below.

3.4.1 Groundwater Elevations and Flow for Fall 2023

Groundwater elevations measured in Fall 2023 represent seasonal lows during WY 2024. Water levels were measured in late October and November, at the end of the irrigation season. Water level data collected from seven wells located on Mapes Ranch in the Western Upper Principal Aquifer were included in the Fall 2023 **(Figure 3-16)** and Spring 2024 **(Figure 3-18)** contour maps. Groundwater flow contour maps for the Western Lower Principal Aquifer show groundwater conditions in Fall 2023 (**Figure 3-17**) and Spring 2024 (**Figure 3-19**). These wells help to fill an existing data gap along the San Joaquin River and refine the understanding of groundwater levels in the westernmost part of the Subbasin.

3.4.1.1 Western Upper Principal Aquifer and Eastern Principal Aquifer

Groundwater elevation contours in Fall 2023 in the Western Upper Principal Aquifer and the Eastern Principal Aquifer are illustrated on **Figure 3-16**. The two principal aquifers are separated by the eastern extent of the Corcoran Clay, indicated on **Figure 3-16** by the dashed red line.

Groundwater elevation measurements range from 153 feet above mean sea level (msl) in the southeastern corner of the Subbasin near Modesto Reservoir (MW-9) to 26 feet msl in the western Subbasin near the San Joaquin River (Well 4 Older Fisherman's Club). The contours indicate that groundwater elevations are highest in the eastern Subbasin north of Modesto Reservoir and east of the City of Oakdale. From these highs, groundwater flows towards the central part of the basin, and then to the west-southwest into the western Subbasin. Groundwater flows south towards the Tuolumne River in portions of the central

and western Subbasin due to lower groundwater elevations south of the river. Hydraulic gradients are generally flatter in the central and western Subbasin.

Groundwater levels in the central eastern part of the Subbasin are relatively flat. Localized groundwater depressions (around Bangs Ave 243, Gates Road 101 and Riverbank OID-13) and groundwater mounds (see SB and Langdon Merle 241) occur in the central and western Subbasin. The localized depressions such as Bangs Ave 243, Gates Road 101 and Riverbank OID-13 are part of a broader trend, with groundwater elevations increasing in spring 2024, without the influence of recent pumping at or near the well. Wells used for contouring groundwater elevations in the Eastern Principal Aquifer are generally deeper and contain longer screen intervals than wells used for contouring groundwater elevations in the Western Upper Principal Aquifer. As a result, groundwater elevations in some of the wells near the edge of the Corcoran Clay may be correlated with elevations in the Western Lower Principal Aquifer, or a combination of the Western Upper and Western Lower Principal Aquifers. The extent and implications of this data gap will be investigated, as additional monitoring data are collected and analyzed.

3.4.1.2 Western Lower Principal Aquifer

Figure 3-17 shows groundwater elevations in the Western Lower Principal Aquifer in Fall 2023. During this time, groundwater elevation data were available in five monitoring wells. Four of the wells are in the eastern region of the aquifer, and one in the south-central part of the aquifer. Groundwater elevations in these wells are within nine feet of each other and range from 34 feet msl to 43 feet msl. The hydraulic gradient immediately west of the Corcoran Clay extent in the north and central part of the aquifer is flat at 42 feet msl. Along the Tuolumne River, the hydraulic gradient is to the south, toward lower groundwater elevations south of the river. Moving north, away from the Tuolumne River, the gradient is to the southwest.

3.4.2 Groundwater Elevations and Flow for Spring 2024

Groundwater elevations measured in Spring 2024 represent seasonal highs during WY 2024. Water levels in most of the wells were measured in February and early March, prior to irrigation season.

3.4.2.1 Western Upper Principal Aquifer and Eastern Principal Aquifer

Figure 3-18 presents groundwater elevation contours in Spring 2024 in the Western Upper Principal Aquifer and Eastern Principal Aquifer. During this time, groundwater elevation measurements ranged from 154 feet msl at MW-9 in the eastern Subbasin near the Tuolumne River, to 27 feet msl at Well 4 Older Fisherman's Club.

In general, groundwater elevations increased throughout the Subbasin from Fall 2023 to Spring 2024. For the 68 wells with measurements during both time periods, the average increase in groundwater elevation was 2.32 feet. The largest increase was observed in the central Subbasin (Claribel 206 and MW-5: +9 feet). Other notable increases occurred in

wells located along the Corcoran Clay extent (Head Lateral 8 194, Bangs Ave 243, FPB-2 and Head Lateral 3 215). The largest decrease occurred in the southwest subbasin, west of Shackelford, Philbrick 201, with the groundwater elevation falling by 2 feet.

Groundwater flow directions are similar to Fall 2023. Contours indicate that groundwater flow is predominantly northwest towards the central portion of the eastern Subbasin and then to the west and southwest. In Spring 2024, the groundwater mound in the City of Modesto extended northeast, towards Riverbank. Local groundwater depressions were still observed in Spring 2024, but their overall groundwater elevations were higher (Bangs Ave 243, for example).

Contours indicate steep gradients to the east of Modesto Reservoir based on the groundwater elevation at MW-9. In the central and southwestern region of the Subbasin, groundwater elevations at Cranfield 90, Head Lateral 3 215, Marquis OID-10, Paradise 235 and Philbrick 201 slightly decrease from Fall 2023 to Spring 2024.

3.4.2.2 Western Lower Principal Aquifer

Figure 3-19 shows groundwater elevations in the Western Lower Principal Aquifer for Spring 2024, when groundwater elevations were measured in 5 of 5 RMWs. Groundwater elevations in these wells are within eleven feet of each other, ranging from 37 to 46 feet msl. The addition of data for MRWA-3 indicates that there are three general groundwater flow directions. The maximum observed water elevation was at MOD-MWD-3 (46 ft msl). Along the Tuolumne River, groundwater flows south due to lower groundwater elevations south of the river. Groundwater flows southwest toward the San Joaquin River from the interior portion of the aquifer. In the north, water flows to the northwest.

From Fall 2023 to Spring 2024, groundwater elevations increased by 3 to 7 feet. The maximum increase of 7 feet was measured in MOD-MWB-2. Due to the confined nature of the Western Lower Principal Aquifer, water level fluctuations are expected to be greater than in the unconfined Western Upper Principal Aquifer for equivalent amounts of pumping.

4 GROUNDWATER EXTRACTIONS

The volume of groundwater extraction in the Modesto Subbasin is provided for the preceding water year (WY 2024) per SGMA Annual Report requirements in 23 CCR §356.2(b)(2). Data presented in this section follow DWR reporting requirements for groundwater extractions by water use sector and include the method of measurement and accuracy of measurements. A map of groundwater extractions (**Figure 4-1**) is provided to illustrate the general location and volume of groundwater extractions in the Modesto Subbasin.

4.1 GROUNDWATER EXTRACTION DATA METHODS

Total groundwater extractions for the Subbasin for the preceding water year (WY 2024) were compiled and are summarized in this section. The data was collected using the "best available measurement methods." For the Modesto Subbasin, the groundwater extraction data was compiled using two methods:

- Directly measured groundwater extraction data collected by local water agencies and irrigation districts.
- Estimated groundwater extractions using the C2VSimTM model, an application of the Integrated Water Flow Model (IWFM) developed by DWR (Dogrul, Kadir and Brush, 2017).

Directly measured groundwater extractions were collected using meters and other appropriate comparable measuring devices by local water agencies, in accordance with the monitoring protocols of the respective local agency. These data were compiled and provided to support this Annual Report by the local agency. Directly measured data were obtained using "high accuracy" measuring devices and methodologies (see **Section 4.4**).

Groundwater extractions from private irrigators and domestic wells are estimated by the California Central Valley Groundwater-Surface Water Simulation Model – Turlock/Modesto (C2VSimTM) for each model element based on factors including land use, evapotranspiration, surface water supply, population, and per-capita water use. Evapotranspiration of native vegetation is simulated in C2VSimTM, but the Modesto Subbasin does not extract nor apply surface or groundwater for the management of native vegetation.

Details about the C2VSimTM model can be found in the GSP, while recent updates to the model are described in **Section 2** of this Annual Report. A map illustrating the general location and volume of groundwater extractions as estimated by the C2VSimTM for water year 2024 can be found in **Figure 4-1**. These estimated data are expected to have a qualitative medium level of accuracy.

4.2 SUMMARY OF GROUNDWATER EXTRACTIONS WATER YEAR 2024

Using the methods described above, the total groundwater extractions in the Modesto Subbasin for WY 2024 were tabulated. **Table 4-1** summarizes the Modesto Subbasin groundwater extractions by water use type, and measurement method for WY 2024.

Table 4-1: Groundwater Extractions for Water Year 2024 (AF)

WY	Agricultural Production (Agency)[1]	Agricultural Production (Private)[2]	Urban Production (Agency)[1]	Urban Production (Private)[3]	Total
2024	9,500	200,900	33,700	16,700	260,800

1. *"Agency Pumping" indicates direct measurements of volumes of pumped groundwater reported by agricultural purveyors and urban water suppliers. Directly measured data are expected to have a qualitative high level of accuracy.*
2. *"Private Pumping" for the agricultural sector is estimated by C2VSimTM based on land use, evapotranspiration, and surface water data. See Section 2 – C2VSimTM Update (Water Year 2024). These estimated data are expected to have a qualitative medium level of accuracy.*
3. *"Private Pumping" for the urban sector (primarily from domestic wells in rural regions) is estimated by C2VSimTM based on census data for population multiplied by a volumetric water use factor averaged from the urban regions. See Section 2 – C2VSimTM Update (Water Year 2024). These estimated data are expected to have a qualitative medium level of accuracy.*

The data show that 260,800 AF of groundwater extractions occurred in WY 2024. Following the DWR templates, the groundwater extractions are presented by water use sector. For the Modesto Subbasin, the water use sectors are described as follows:

- **Agricultural** – groundwater extractions used to meet irrigation demands, and supplement surface water operations. Agency-reported data are provided by local agricultural water purveyors with metered data. Non-reported data are derived from a combination of land use, evapotranspiration, and surface water supply data through use of the C2VSimTM groundwater model. The total agricultural groundwater extraction in the Modesto Subbasin for WY 2024 is 210,400 AF which accounts for about 81% of the total pumping in the Modesto Subbasin.
- **Urban** – groundwater extractions for all urban uses including residential, commercial, municipal, industrial, landscaping, and other uses. Reported data are provided by urban water purveyors with metered data. Non-reported data are derived from a combination of land use, population, and per-capita water use within the C2VSimTM groundwater model. The total urban groundwater extraction in the Modesto Subbasin for WY 2024 is 50,400 AF which accounts for about 19% of the total pumping in the Modesto Subbasin.
- **Industrial** – current data do not allow for tabulation of groundwater extraction of industrial water use on a consistent basin-wide basis; therefore, industrial water use is included in the urban water use sector for WY 2024.

- **Managed Wetlands** – currently, no known groundwater extraction is used for maintaining managed wetlands in the Modesto Subbasin.
- **Managed Recharge** – currently, no known groundwater extractions are used to supply managed recharge operations in the Modesto Subbasin.
- **Native Vegetation** – currently, no groundwater extractions are used for maintaining native vegetation in the Modesto Subbasin.

In accordance with 23 CCR §356.2 (b)(2), the user must define the method of measurement (direct or indirect) and the accuracy of measurements. As shown on **Table 4-1**, the groundwater extractions are categorized into two of the methods listed by DWR. These include:

- **Measured (Metered)** – direct measurement of groundwater extraction collected by local water agencies using meters and other appropriate measurement devices. The total groundwater extraction from metered data in the Modesto Subbasin for WY 2024 is 43,200 AF which accounts for about 17% of the total pumping.
- **Estimated (Modeled)** – indirect estimate of groundwater extractions based on the simulation of urban and agricultural operations in the Modesto Subbasin using the C2VSimTM model, an application of the IWFM software package (Dogrul, Kadir and Brush, 2017). The C2VSimTM model estimates private groundwater production in addition to metered pumping based on a combination of land use, evapotranspiration, surface water supply, and urban water use factors. The total private groundwater extraction estimated by the C2VSimTM model for the Modesto Subbasin for WY 2024 is 217,600 AF which accounts for about 83% of the total pumping in the Subbasin.

Groundwater extractions presented here represent the current best estimate of groundwater pumping in the Modesto Subbasin. The use of C2VSimTM provides a consistent, basin-wide method for estimating the unmeasured pumping in accordance with the Modesto Subbasin Coordination Agreement.

4.3 GROUNDWATER EXTRACTIONS MAPPING

In accordance with 23 CCR §356.2 (b)(2), a map (**Figure 4-1**) illustrating the general location and volume of groundwater extractions has been developed for the Annual Report. Groundwater extractions are shown in units of feet, obtained from the volume of water extracted per area of each model element. For WY 2024, a total groundwater extractions map was derived from the C2VSimTM simulation results. The specified metered pumping is directly input into C2VSimTM, and the IWFM framework estimates the unmeasured portion of agricultural and urban pumping based on land use calculations (Maley and Brush, 2020).

Figure 4-1 shows the distribution of total groundwater extractions over the Modesto Subbasin. Because agricultural pumping accounts for 81% of the total groundwater extractions, the pumping distribution generally corresponds to irrigated areas, where demand is not met by surface water supplies.

4.4 PART A AND B DWR TEMPLATES

As part of the Annual Report submittal, DWR requires that a series of Excel spreadsheets be completed to summarize key water supply and use volumes for WY 2024 for the entire Subbasin. For groundwater extraction, DWR requires two spreadsheets to be submitted along with the Annual Report in accordance with 23 CCR §356.2 (b)(2):

- **Part A. Groundwater Extractions** - groundwater extractions for WY 2024 by water use sector (23 CCR §356.2(b)(2))
- **Part B. Groundwater Extraction Methods** - the volume of groundwater extractions for WY 2024 by different measurement methods (23 CCR §356.2(b)(2)).

Data summarized in **Table 4-1** follow the Part A and B DWR Template reporting requirements for groundwater extractions and were collected using the best available measurement methods. Accordingly, the data for WY 2024 on **Table 4-1** are submitted separately in the DWR templates.

The accuracy of measurement is required on the DWR templates. For the Modesto Subbasin, the groundwater extractions are based on either reported metered pumping data or from the C2VSimTM simulation results. These data were collected by experienced staff from agricultural and urban agencies in accordance with their monitoring protocols. The measuring devices used by these agencies are well maintained and consistently monitored; therefore, reported data meet high accuracy levels in compliance with AWWA (2006, 2012) and other relevant standards. In accordance with these standards, meter accuracy is considered high.

Estimated groundwater extractions are based on simulation results of the C2VSimTM model. The water balance information used in this analysis includes the data presented in **Section 2.1** and is based on historical cropping data, ET and climatic data from CIMIS, and surface water delivery from Modesto Irrigation District, Oakdale Irrigation District. The water balance accuracy of the groundwater model is considered medium. It is expected that the accuracy of this data can be improved as more information becomes available and the model is refined.

5 SURFACE WATER SUPPLY

The volume of surface water supplies delivered to the Modesto Subbasin is provided for WY 2024 per GSP Regulations (23 CCR §356.2(b)(3)). Data are summarized in a table that follows DWR reporting requirements for surface water supplies by water supply source and identifies the method used to determine the reported volume.

5.1 SURFACE WATER DATA METHODS

Surface water supplies for the Subbasin for WY 2024 were compiled from data collected using the "best available measurement methods." Data report total surface water farm gate deliveries as reported by the purveying agency. Direct measurements of local supplies were provided by MID and OID and are expected to have a qualitative high level of accuracy. Riparian deliveries in the Modesto Subbasin are not metered. Deliveries are estimated based on data from the SWRCB eWRIMS and demands simulated by the C2VSimTM model. It is anticipated that some of these data will be incorporated into future reports, as data become available due to increased compliance with Senate Bill 88 (2015).

5.2 SURFACE WATER BY SOURCE TYPE

Using the methods described above, the surface water supplies by source in the Modesto Subbasin for WY 2024 are summarized in **Table 5-1**. The water source types are defined in 23 CCR §351 (a-k). The user can identify a different water source type than those predefined by selecting 'other source type' in the template and providing a description of the source type with the data. A map showing the primary surface water delivery areas in the Modesto Subbasin is provided on **Figure 5-1**.

Table 5-1: Surface Water Supplies for Water Year 2024 (AF)

	Local Supply (Measured)[1]	Local Supply (Estimated)[2]	Other Supply (Estimated)	Total
2024	272,400	17,100	0	289,500

1. *Includes Modesto ID and Oakdale ID deliveries to their respective agricultural and urban water users.*
2. *Includes riparian deliveries off the Stanislaus, Tuolumne, and San Joaquin rivers as estimated by the SWRCB eWRIMS database and adjusted to meet agricultural demand simulated by the C2VSimTM model.*

- **Local Supplies**: surface water diversions from local surface water sources. The primary local supply is from the Stanislaus, Tuolumne, and San Joaquin rivers. In WY 2024, 289,500 AF of local surface water were delivered to the Modesto Subbasin, representing 100% of total surface water supplies.

- **Recycled Water:** wastewater and recovered stormwater that is treated and used for either agriculture or groundwater recharge. Currently, no recycled water supplies are available in the Modesto Subbasin.
- **Local Imported Supplies:** surface water from local sources imported from areas outside of the Modesto Subbasin. Currently, no locally imported supplies are available in the Modesto Subbasin.
- **Desalination Water:** poor-quality surface water or groundwater that is treated to levels where it can be used for irrigated agriculture, urban water supply or groundwater recharge. Currently, no desalination water is available in the Modesto Subbasin.
- **Other Water Source**: surface water obtained from sources other than those listed above or from unspecified sources. Currently, there are no other surface water supplies in the Modesto Subbasin.

The surface water supplies in the Modesto Subbasin can vary from year to year due to water year type, statewide water demand and operational considerations. WY 2024 is an above normal year according to the San Joaquin Valley Index.

5.3 PART C DWR TEMPLATE

As part of the Annual Report submittal, DWR requires that a series of Excel spreadsheets be completed to summarize key water supply and use volumes for WY 2024 for the Subbasin. The volume of surface water reported in the template is by water source type. For the surface water supply, DWR requires one spreadsheet be submitted along with the Annual Report in accordance with 23 CCR §356.2 (b)(3):

- **Part C. Surface Water Supply** – the surface water supply for WY 2024 based on quantitative data and listed by water source type (23 CCR §356.2(b)(3)).

Data summarized in **Table 5-1** follow the Part C DWR Template reporting requirements for surface water supply and were collected using the best available measurement methods.

Measurement of surface water supplies for the Modesto Subbasin consists of a variety of measurement methods, but all are considered reliable and accurate. Water agencies typically measure surface water deliveries with a combination of weirs and meters that are read and reported by agency staff. Senate Bill x77 (SBx7-7) requires flow measurement devices to be maintained within an acceptable range of accuracy, which is defined as a volumetric flow measurement within +/- 12% (§597.3(a)(1))). Weirs and meters used in the Modesto Subbasin have been documented to conform to the SBx7-7 volumetric accounting standards (ITRC, 2012, USBR, 2001, AWWA 2006, 2012) in local water district agricultural water management plans. Procedures employed by water agencies have been standardized to further reduce potential sources of error to range between 1% to 10% depending on the measurement device. In the Part C template, an error range of 5% to 10% is listed as a conservative assumption for this Annual Report.

6 TOTAL WATER USE

The total water supply and use for the Modesto Subbasin is provided for WY 2024 per GSP Regulations 23 CCR §356.2(b)(4).

6.1 TOTAL WATER USE BY SOURCE

The total water supply uses the same data compiled for WY 2024 groundwater extractions, and surface water supply as presented in **Sections 4** and **5**. The data shows total water use for the Modesto Subbasin was 550,300 AF in WY 2024. The total water supply for WY 2024 is summarized in **Table 6-1.** The water supply types shown on **Table 6-1** are described as follows:

- **Groundwater** includes groundwater extractions for all uses. In WY 2024, the groundwater supply totaled 260,800 AF representing about 47% of total supplies in WY 2024.
- **Surface water** includes surface water deliveries for all uses. In WY 2024, the surface water supply totaled 289,500 AF representing about 53% of total water supplies in WY 2024.
- **Other Water Source Type** – Currently no other water source type is noted for the Modesto Subbasin.

Table 6-1: Total Water Use by Water Source for Water Year 2024 (AF)

	Groundwater[1]	Surface Water[2]	Other	Total Water Use
2024	260,800	289,500	0	550,300

1. *Includes "Agency" and "Private" pumping described in Section 4.*
2. *Includes "Measured" and "Estimated" surface water supplies described in Section 5.*

The total surface water supply from **Section 5** that is shown distributed by water source in **Table 5-1** is presented in **Table 6-1** distributed by water supply type.

6.2 TOTAL WATER USE BY WATER USE SECTOR

The data shows total water use for the Modesto Subbasin was 550,300 AF in WY 2024. The total water supply is summarized in **Table 6-2**and the water use sectors shown on **Table 6-2** are described as follows:

- **Agricultural** includes total water use for all agricultural water uses. In WY 2024, agricultural water use totaled 474,600 AF, representing about 86% of the total water use in the Modesto Subbasin.

- **Urban** includes total water use for all urban water uses including residential, commercial, municipal, industrial, landscaping, and other uses. In WY 2024, urban water uses totaled 75,700 AF, representing about 14% of the total water use in the Modesto Subbasin.
- **Industrial** includes total water use for industrial use. Current data does not allow for tabulation of industrial water use on a consistent basin-wide basis; therefore, industrial water use is included in the urban water use sector for WY 2024.
- **Managed Wetlands** would include groundwater extractions or surface water deliveries to manage local wetlands. In WY 2024, no known groundwater extractions or surface water deliveries were used to maintain managed wetlands in the Modesto Subbasin.
- **Managed Recharge** includes total water use for all managed recharge projects. In WY 2024, no known groundwater extractions or surface water deliveries were used for managed recharge operations in the Modesto Subbasin.
- **Native Vegetation** includes total water use for maintaining native vegetation. In WY 2024, no known groundwater extractions or surface water deliveries were used to maintain native vegetation in the Modesto Subbasin.
- **Other Water Use** includes total water use for uses other than those listed above or from unspecified uses. In WY 2024, no known groundwater extractions or surface water deliveries were used for other uses in the Modesto Subbasin.

Table 6-2: Total Water Use by Sector for Water Year 2024 (AF)

	Agricultural	Urban	Other	Total Water Use
2024	474,600	75,700	0	550,300

6.3 PART D DWR TEMPLATE

As part of the Annual Report submittal, DWR requires that a series of Excel spreadsheets be completed to summarize key water supply and use volumes for WY 2024 for the Subbasin. For the total water use, DWR requires one spreadsheet be submitted along with the Annual Report in accordance with 23 CCR §356.2 (b)(3):

- **Part D. Total Water Use** – the total water supply by water use type and total water uses by water use sector for the preceding water year (WY 2024) for the entire Modesto Subbasin (23 CCR §356.2(b)(4)).

Data summarized in **Table 6-1** and **Table 6-2** follow the Part D DWR Template reporting requirements for total water supply and use and were collected using the best available measurement methods.

7 CHANGE IN GROUNDWATER IN STORAGE

GSP regulation §356.2(b)(5) requires inclusion of the following maps and graphs in the Annual Report for the entire Modesto Subbasin:

(A) Change in groundwater in storage maps for each principal aquifer in the basin.

(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.

This section provides a description of the methodology used to develop the required annual change in groundwater in storage maps and graphs.

7.1 METHODOLOGY

For the Modesto Subbasin, the change in groundwater in storage maps and graphs are based on the updated C2VSimTM model results. Between the Modesto GSP and the first three Annual Reports, the C2VSimTM model was used to estimate changes in groundwater storage for water years 1991-2023. The most recent update extends the simulation period though WY 2024 to support quantification of storage change for this Annual Report.

The methodology and data used to update the C2VSimTM for 2024 are consistent with the historical water budget analysis presented in the GSP. A summary of C2VSimTM development is provided in **Section 2** and discussed in more detail in Appendix C of the Modesto Subbasin GSP.

7.2 GRAPHICAL REPRESENTATION OF CHANGE IN GROUNDWATER IN STORAGE

GSP Regulations require that the Annual Report include graphs of the changes in groundwater in storage for historical data, to the greatest extent available, including from January 1, 2015, to the current reporting year (§356.2(b)(5)(B)). For the 2024 Annual Report, the change in groundwater in storage is presented for the GSP historical Study Period (WY 1991 – WY 2015) and appended with updated changes in groundwater in storage from WY 2016 through WY 2024. Regulations also require the graphs to provide the following information:

- Water Year Type (Wet, Above Normal, Below Normal, Dry, Critically Dry)
- Groundwater Use
- Annual Change in groundwater in storage
- Cumulative change in groundwater in storage

7.2.1 Change in Groundwater in Storage Graph

Figure 7-1 shows the simulated annual and cumulative changes in groundwater in storage over the 34-year period from WY 1991 through WY 2024. The updated C2VSimTM results for change in groundwater in storage for the Modesto Subbasin are compared to the water year type based on the San Joaquin Valley Index (CDEC, 2024a, 2024b, see **Table 3-3**) as follows:

- WY 2024, an above normal year, had an **increase** of 7,800 AF.

7.2.2 Groundwater Use Graph

Figure 7-2 shows the simulated groundwater use based on C2VSimTM model results. The updated C2VSimTM simulation results for groundwater use in the Modesto Subbasin and the water year type based on the San Joaquin Valley Index (see **Table 3-3**, CDEC, 2024a, 2024b) are summarized as follows:

- WY 2024, an above normal year, had a total groundwater use of 260,800 AF, of which 81% was for agricultural use and 19% for urban use.

7.3 SUBBASIN MAP FOR CHANGE IN GROUNDWATER IN STORAGE

GSP regulation §356.2(b)(5)(A) requires an annual change in groundwater in storage map for the Modesto Subbasin to be included in the Annual Report.

7.3.1 Change in Groundwater in Storage Map

Figures 7-3 through **7-6** show the total change of groundwater in storage for WY 2024 for the entire Subbasin and by principal aquifer in a spatial format as estimated by the C2VSimTM model. The change in groundwater in storage is shown in units of feet, obtained from the change in volume per area of each model element. The figures show that, in general, the Subbasin is gaining storage in the western part of the Subbasin, while losing in the eastern part of the subbasin, near the foothills of the Sierra Nevada and the areas adjacent to the rivers (**Figure 7-3**). This trend is reflected in the Western Upper Principal Aquifer (**Figure 7-4**), where groundwater levels and aquifer storage show increases throughout the aquifer, with losses in areas adjacent to the rivers. The Western Lower Principal Aquifer (**Figure 7-5**) experienced a greater increase of groundwater in storage than the Western Upper Principal Aquifer, with increases in the central part of the aquifer. The Eastern Principal Aquifer (**Figure 7-6**) experienced a combination of storage increase in the southwest portion of the aquifer, and storage decline in the Non-District East and areas adjacent to the rivers.

7.3.2 Accuracy of Change in Groundwater in Storage Maps

Using WY 1991 to WY 2015 as the base period, C2VSimTM results show declining groundwater levels and long-term reduction of groundwater storage. During this period,

C2VSimTM results show an average-annual decline in groundwater storage of 43,900 AFY. The GSP estimated these data to have a qualitative medium level of accuracy. Based on similar methodology and data, it is anticipated that simulated results for WY 2024 maintain comparable levels of uncertainty. For additional information regarding calibration and uncertainty in the C2VSimTM model, please refer to Appendix C of the Modesto Subbasin GSP.

8 GROUNDWATER QUALITY MONITORING

The Modesto Subbasin GSP defined undesirable results for degraded groundwater quality as significant and unreasonable adverse impacts to groundwater quality caused by GSA projects, management actions, or other management of groundwater levels or extractions such that beneficial uses are affected, and well owners experience an increase in operational costs. Impacts that could lead to undesirable results might include groundwater level declines in areas where poor groundwater quality occurs at depth, pumping-induced migration of groundwater with poor quality into un-impacted areas, or groundwater quality degradation linked to recharge projects.

To ensure that GSA management is not causing degradation of groundwater quality, the GSP established a tracking and analysis process for inclusion in annual reports. The WY 2021 Annual Report provided a baseline for existing conditions in the Subbasin. This baseline provides a standard for comparison to water quality conditions documented in subsequent annual reports. This WY 2024 Annual Report marks the third groundwater quality monitoring assessment.

Groundwater quality monitoring in the Modesto Subbasin focuses on seven constituents of concern (COCs) that have been identified as having the highest potential to cause undesirable results. Four of the constituents of concern are anthropogenic: nitrate, tetrachloroethene (PCE), 1,2,3-trichloropropane (TCP), and dibromochloropropane (DBCP). Two are naturally occurring metals: arsenic and uranium. The remaining constituent, total dissolved solids (TDS), is naturally occurring, but human activities – such as wastewater disposal – can also contribute to groundwater concentrations. For protection of drinking water supplies, the MTs are set as the maximum contaminant levels (MCLs) for each constituent. Collectively, these constituents are used as indicator chemicals to analyze potential GSA impacts on groundwater quality.

As described in the Modesto GSP, potential indicators of groundwater quality degradation are wells with new exceedances of, or further degradation relative to, an established MT for each of the seven constituents of concern. Indicators of groundwater quality degradation are assessed in each Annual Report through a comparison with baseline values established in the WY 2021 Annual Report. In each annual report, any potable water supply well that is a potential indicator of groundwater degradation is individually examined to determine if its concentrations may be affected by GSA management.

The monitoring network makes best use of data from existing groundwater quality monitoring programs that are regulated by the State Water Resources Control Board (SWRCB). As stated in the GSP, the SWRCB and other agencies have the primary regulatory responsibility for water quality, and the GSAs do not intend to duplicate this authority. Rather, the analysis focuses on potential groundwater quality degradation in potable water supply wells caused by GSA management of groundwater in the Subbasin. Each year, the SWRCB-regulated data used in these analyses are obtained from the GAMA (Groundwater Ambient Monitoring and Assessment) portal.

As described in the Modesto Subbasin GSP, an undesirable result may occur if water quality degradation occurs in a potable well. The baseline monitoring network includes all available water quality data, including data collected from monitoring wells at regulated facilities. It is important to track all groundwater quality data in the Subbasin so that the GSAs are aware of groundwater quality conditions throughout the Subbasin.

8.1 APPROACH AND DATA COMPILATION

The Modesto Subbasin GSP defined undesirable results as a new (first-time) exceedance of, or a further exceedance from, the MT for each constituent of concern. The MTs are the primary or secondary California maximum contaminant level (MCL) for each of the seven COCs:

- Arsenic - 10 ug/L
- Uranium- 20 pCi/L
- Nitrate (as N)- 10 mg/L
- 1,2,3-Trichloropropane (TCP) - 0.005 ug/L
- Dibromochloropropane (DBCP) - 0.2 ug/L
- Tetrachloroethene (PCE) - 5 ug/L
- Total dissolved solids (TDS)- 500 mg/L

In each annual report, new exceedances of, or further degradation at wells with prior exceedances of the MTs, are evaluated in relation to GSA management of water levels and extractions, GSA projects, and GSA management actions to assess if the groundwater degradation is caused by GSA activities. Each annual report compares measurements of each COC to the baseline conditions in all three principal aquifers established in the First Annual Report.

To establish baseline conditions in the First Annual Report, a database was created by downloading data from the Statewide Groundwater Ambient Monitoring and Assessment Program (GAMA) Groundwater Information System, accessed through the State GeoTracker website for the seven constituents of concern from WY 1991 to WY 2021. This 31-year period began with the historical GSP study period (WY 1991 through WY 2015) and extended through WY 2021. The monitoring network for each constituent of concern is composed of the wells that were sampled for that constituent during WY 2021; those wells are the designated RMWs for water quality.

There are 361 RMWs for water quality. The RMWs include 177 public supply wells[3] monitored by water suppliers, and regulated by the Division of Drinking Water, 11 domestic wells monitored by the USGS under the GAMA program, 110 monitoring wells at regulated facilities overseen by the State Water Board, and 63 wells, mostly irrigation and domestic

[3] Water quality data from public supply wells are based on samples of untreated and unblended groundwater. See Consumer Confidence Reports for information about the quality of drinking water.

wells, associated with regulatory water quality coalitions (such as under the Irrigated Lands Regulatory Program), and monitored by Aglands. Of these wells, the 188 public supply wells and domestic wells are considered potable water supply wells that could potentially be indicators of groundwater quality degradation under the GSP.

All wells were classified by principal aquifer based on screen depth or well depth, depending upon data availability. Out of the 361 wells in the water quality monitoring network, 250 are in the Eastern Principal Aquifer, 66 are in the Western Upper Principal Aquifer, 22 are in the Western Lower Principal Aquifer, and 23 are in the western principal aquifers, a generic designation for western wells that either lack screen information or are screened in both aquifers. The baseline value established for each well is the maximum concentration of a given constituent of concern from WY 1991 to WY 2021. The maximum historical concentration is updated in each Annual Report to include COC concentration measurements collected in the previous water year. A table summarizing these RMWs and the maximum historical concentration (WY 1991 to WY 2024) for each COC is provided in **Appendix C**.

In this Annual Report, water quality conditions during WY 2024 are compared to the maximum historical concentrations, from WY 1991 to WY 2023. Data for WY 2024 was downloaded from GAMA for each COC. For each RMW, the maximum concentration for each COC during WY 2024 was compared to the MT. The maximum value during WY 2024 is listed in **Appendix C.**

A measurement in a potable water supply well is considered an indicator of groundwater degradation if it exceeds the MT for the first time at that well, or is larger than the maximum baseline concentration above the MT. If the baseline is greater than the MT, any new maximum values are considered groundwater quality degradation indicators. For those wells, historical water quality data are analyzed, along with changes in water quality or water levels in nearby wells, to determine whether degradation is attributable to GSA management, and is resulting in increased operational costs for well owners.

The Measurable Objective (MO) for water quality is defined by the historical maximum concentration of each constituent of concern at each representative monitoring location. The same monitoring data used to determine potential indicators of groundwater degradation will be used to calculate the MO. The percentages of RMWs below their MO, or their historical maximum concentrations, are reported for each constituent of concern.

8.2 GROUNDWATER QUALITY ANALYSIS

The groundwater quality monitoring network consists of publicly available data downloaded from GAMA through the State GeoTracker website. In WY 2024, 260 RMWs, out of the 361 RMWs in the baseline water quality network, had at least one measurement of a COC (**Figure 8-1**). The RMWs with WY 2024 data include 162 municipal wells, 1 domestic well monitored through Aglands, and 97 monitoring wells at regulated facilities. More than half of the WY 2024 RMWs are located in the Eastern Principal Aquifer. In total, 167 RMWs are in

the Eastern Subbasin Principal Aquifer, 62 are in the Western Upper Principal Aquifer, 19 are in the Western Lower Principal Aquifer, and 12 are designated in the western principal aquifers because their screen depths are unknown, or they are screened across both aquifers.

The maximum values for each COC during WY 2024 were compared to the MT (the MCL for each COC) and the maximum historical values listed in **Appendix C. Figures 8-2 through 8-8** show the status of WY 2024 water quality, compared with baseline conditions. Each figure is divided by principal aquifer and shows the RMWs that were monitored for that constituent in WY 2024. **Figures 8-2 through 8-8** show both potable water supply wells and monitoring wells at regulated facilities. The monitoring wells at regulated facilities often occurs in clusters. Some wells on the map may be obscured by the clusters due to the scale of the map.

In **Figures 8-2 through 8-8**, wells that reported a first-time exceedance of the MT (the MCL for each COC) in WY 2024 are shown as a red dot. Wells shown with an orange dot recorded a further exceedance of its MT in WY 2024. Potable water supply wells in these two categories (red and orange dots) are considered potential indicators of groundwater quality degradation in drinking water wells. Monitoring wells at regulated facilities with first-time MT exceedances, or value above their historical maximum, are not considered potential indicators of groundwater quality degradation that are the responsibility of the GSAs, given the non-potable nature of the wells, the ongoing remedial activities at the site, and regulation by state and local agencies with primary water quality authority.

Time-concentration plots for public supply wells with new (first-time) MCL exceedances or further exceedances of its MCL were developed and examined to see if concentrations began increasing prior to GSP implementation, or if WY 2024 COC concentrations were a departure from previous trends. These time-concentration plots are provided in **Appendix D,** shown in the order in which they are discussed in the text. Hydrographs from nearby wells were also examined to see how groundwater levels are changing near these wells.

Wells shown on **Figures 8-2 through 8-8** as yellow, green, or black dots do not indicate groundwater quality degradation. The wells marked as yellow dots had a maximum concentration in WY 2024 greater than the MT but less than the historical maximum concentrations (not a further exceedance of its MCL). Wells shown as green dots had concentrations that were less than the MT. Wells shown with a black dot had concentrations below the detection limit (non-detect).

8.2.1 Arsenic

Arsenic is a naturally occurring trace element in Central Valley groundwater. Its occurrence depends on local and regional geology, groundwater pH, and groundwater redox conditions (anoxic vs. oxic). Even though arsenic is naturally occurring, arsenic concentrations can be related to local industrial contamination at regulated facilities, or to groundwater management. Lateral and vertical gradients caused by pumping could cause arsenic migration (Jurgens et al., 2008). Increased arsenic concentrations in the Central Valley have

been linked to the compaction and dewatering of the Corcoran Clay (Smith et al., 2018). However, a 2021 study of arsenic trends in the San Joaquin Valley did not identify a relationship between arsenic concentrations and declining water levels. In general, a decreasing trend in arsenic concentrations was observed, particularly in areas with high production rates (Haugen et al., 2024). One explanation for this trend is that the migration of shallow oxic water could reduce arsenic mobility.

In WY 2024, 94 RMWs reported arsenic measurements. This is an increase from WY 2023, during which only 34 RMWs reported arsenic measurements. As shown in **Figure 8-2**, most of these were in the Eastern Principal Aquifer. Of the 94 wells monitored, 34 were potable water supply wells. Several of the RMWs occur in clusters, particularly monitoring wells near regulated facilities, and therefore overlap one another. No RMWs reported arsenic concentrations that were a first-time exceedance of the 10 ug/L MT, or a further exceedance of the MT. Of the 34 potable supply wells sampled, one well had concentrations above the MT but below the historical maximum concentration. In WY 2024, all RMWs that monitored arsenic reported concentrations below their MO, the historical maximum concentration.

8.2.2 Uranium

In the Modesto Subbasin, uranium is a naturally occurring groundwater contaminant that is derived from granitic rocks in the Sierra Nevada. In the eastern San Joaquin Valley, it typically occurs in shallow, oxic groundwater that is rich in calcium and bicarbonate (Jurgens et al., 2008; Lopez et al., 2021). Uranium concentrations can be related to management activities through several processes. Vertical gradients from pumping, or from wells screened at multiple intervals could cause shallow water with high uranium concentrations to migrate into deeper aquifer zones. Uranium can be mobilized by water infiltrating through saline soils, and it could be mobilized through irrigation return flow, or field flooding for managed aquifer recharge (Lopez et al., 2020).

Wells are monitored for uranium less frequently than other COCs, so the uranium monitoring network is small and tends to focus on wells where elevated uranium concentrations have previously been observed. The baseline RMWs for uranium comprise 26 wells, all municipal or domestic wells. In WY 2024, twelve of these wells were sampled for uranium (**Figure 8-3**). All twelve wells were potable supply wells, and eight wells were City of Modesto wells. Of these wells, two had uranium concentrations measured that were above the 20 pCi/L MCL and above the historical maximum (shown as orange dots in **Figure 8-3**).

Well 5010010-147 is City of Modesto's Well #301, located in southwest Modesto and screened in the Western Upper principal aquifer. As shown in **Appendix D**, its uranium concentration fluctuates throughout the year. Historically, fluctuations have been between approximately 14 pCi/L and 3 pCi/L, but 22 pCi/L of uranium was measured in 2017. In WY 2024, uranium levels were above 20 pCi/L twice, although most WY 2024 uranium measurements were between 10 and 15 pCi/L. Nearby, well 5010010-151 is City of Modesto's Well 236. Prior to 2012, its concentrations fluctuated from below 5 pCi/L to

above or near 20 pCi/L (**Appendix D**). Its WY 2024 measurement was the first uranium detection at the well since 2012, after years of samples below the detection limit. In both wells, uranium concentrations show wide fluctuations. The high levels may be linked to shallow water moving within the well column or samples collected shortly after the well was turned on.

The closest RMWs in the Western Upper Principal Aquifer (MW-2S, Philbrick 201, and Mod-MWD-1) have water levels that have remained above their MTs over the past 20 years (hydrographs in **Appendix B**). The water levels at these wells are stable and do not suggest that the elevated uranium concentrations observed at these two wells are due to groundwater management.

8.2.3 Nitrate

Most nitrate in Modesto Subbasin groundwater is from anthropogenic sources, such as nitrogen fertilizer, feedlot and dairy drainage, septic systems, or wastewater drainage, and concentrations tend to be relatively high in the vadose zone, or shallow saturated zones. Nitrate can reach deeper portions of the aquifers by hydraulic gradients created by municipal or agricultural pumping. Of all the COCs, nitrate by far has the most extensive water quality monitoring network in WY 2024.

Out of 282 RMWs in the monitoring network for nitrate, 189 were monitored in WY 2024 (**Figure 8-4**). Of these, 154 were municipal wells, and 1 was a domestic well monitored through Aglands. Only nitrate as N measurements were considered in this analysis; combined nitrate and nitrite as N concentrations were not included. Most of the wells sampled for nitrate in WY 2024 were in the Eastern Principal Aquifer. In WY 2024, 80 percent of RMWs sampled for nitrate reported maximum concentrations below their MO, or their maximum historical concentration.

Six potable water supply wells and one monitoring well reported concentrations above the 10 mg/L MT in WY 2024 that were greater than the historical maximum, and for three of these wells was a first-time MT exceedance. These are shown in **Figure 8-4** as four orange dots in the Eastern Principal Aquifer, two red dots in the Eastern Principal Aquifer, and one red dot in the Western Lower Principal Aquifer. Time-concentration plots for these wells are shown in **Appendix D.** The historical trends in nitrate concentrations and water levels at nearby wells are discussed below to assess if nitrate conditions could be linked to groundwater management.

From the northwest and moving clockwise, the first well identified as a potential indicator of groundwater quality degradation for nitrate is Well 5000335-001. This well, shown as the red dot slightly northwest of Modesto, is listed as being in the Western Lower Principal Aquifer. The time-concentration plot for this well in **Appendix D** shows that nitrate concentrations have remained below 5 mg/L, but have occasionally been higher, including a detection at 9.9 mg/L in 2018. In WY 2024, nitrate concentrations peaked at 12 mg/L, but other nitrate concentrations remained less than 5 mg/L. Nearby water level RMWs, MOD-MWD-2 and MW-1D show that water levels were well above their MT and MO in WY 2024.

The stable surrounding water levels suggest that the increase in nitrate was not due to GSA management activities.

Well 5000189-006 is shown as an orange dot north of Modesto in the western portion of the Eastern Principal Aquifer. In the WY 2022 and 2023 Annual Reports, 5000189-006 was identified as having a first-time MT exceedance and further exceedance of the MT, respectively. Nitrate concentrations in well 5000189-006 have been increasing since 2004, prior to GSP implementation and do not appear to be related to GSA management activities. The hydrograph of water levels at Claribel 206 shows that water levels have stayed above the MT (49 ft msl) since GSP implementation began. The increases in nitrate concentrations at this well do not appear to be caused by water level decline or GSA management.

Wells 5000048-002 and 5000048-003 are both public supply wells owned by a mobile home park near the Stanislaus River. The top of the screen for 5000048-002 is 184 ft deep and the top of the screen for 5000048-003 is 50 ft deep. 5000048-002 had a first-time exceedance in WY 2024 (shown as a red dot on **Figure 8-4**), and 5000048-003 had a further exceedance of the MCL (shown as an orange dot). At 500048-002, nitrate concentrations began increasing in 2022. At 5000048-003, nitrate as N concentrations were stable from about 7 mg/L until Fall 2023 and then increased to 13 mg/L and remained above the 10 mg/L MCL in WY 2024. The closest water level RMWs are Marquis OID-10 and Crane OID-06. Marquis OID-10 shows water levels declining until 2020 and then remaining near the 85 ft msl MT. Water levels were above the MT in WY 2024. At Crane OID-6, groundwater levels declined from 2006 to 2022 to below the 77-foot msl MT and then have slightly increased. The increase in nitrate in WY 2024 does not appear to correspond to a recent decrease in water levels below the MT and is likely not due to groundwater management by the GSAs.

In the Eastern Principal Aquifer east of Oakdale, Well 5000435-002 reported an MCL exceedance above its historical maximum. This well is shown as an orange dot (see the time-concentration plot in **Appendix D**). This well was identified as having a further exceedance of the MT in the WY 2022 and WY 2023 Annual Reports, when the maximum nitrate concentrations were 24 mg/L and 26 mg/L, respectively. In WY 2024, the maximum nitrate as N concentration was 28 mg/L. The nearby hydrograph for MW-5S shows stable groundwater levels since 2022. The other nearby well, Birnbaum OID-03, shows that water levels in this area have declined about 25 to 30 feet since 2005. In Fall 2023 the water levels were slightly below its MT (86 ft msl), and it was above the MT in Spring 2024 (hydrograph in **Appendix B**). Review of the time-concentration plot in **Appendix D** shows elevated concentrations since 2010 and a dramatic rise from about 10 mg/L in 2016 to more than 25 mg/L in 2024; this rapid and substantial increase suggests a local source such as a septic tank failure that occurred prior to GSP implementation.

To the south, along the Merced River, Well 5000090-002 had a further exceedance of the MCL. Nitrate concentrations at this well have been increasing since 2010 and do not appear to be related to GSA management activities (**Appendix D**). At the closest water level RMW Albers 232, water levels remained above the MT in WY 2024.

While not a potable water supply well, L10005824413-MW-11S is a monitoring well with a first time MCL exceedance for nitrate in WY 2024 and is shown on **Figure 8-4**. This well and other regulated facilities are being monitored under the requirements of state and local agencies with the primary responsibility to regulate groundwater quality.

In summary, nitrate concentrations in six potable water supply wells had a first-time MCL exceedance or further exceedance of the MCL above historical maxima. Of these, two wells had increasing nitrate concentration trends prior to GSP implementation, suggesting that the increasing nitrate levels are due to pre-existing conditions, such as the ongoing migration of nitrate from shallower portions of the aquifer. The other four wells have recent increases in nitrate, but they are located in areas where the water level RMWs do not show declining water levels below the MT in WY 2024. While there may be a relationship between nitrate concentrations and historical water level declines, increased nitrate concentrations at these wells do not appear to be related to GSA management activities because water levels have been relatively stable since GSP implementation began. Continued monitoring of both water quality and water levels in regions near these wells is recommended.

8.2.4 1,2,3-Trichloropropane (TCP)

1,2,3-Trichloropropane (TCP) is a chlorinated hydrocarbon with a high chemical stability that often occurs as an intermediate in chemical manufacturing. This anthropogenic contaminant is often associated with pesticide products (SWRCB, 2023), and it has been documented at industrial or hazardous waste sites. This chemical was banned from pesticides in the 1990s but has been widely detected in groundwater in agricultural areas of the Central Valley (Shelton et al., 2008). Like many agricultural constituents applied at the surface, upper portions of the aquifer are more vulnerable to TCP contamination. TCP can reach lower portions of the aquifer by vertical hydraulic gradients exacerbated by pumping.

The monitoring network for TCP contains 147 wells that were tested for TCP in WY 2021. Of these, 121 RMWs (43 potable water supply wells and 78 monitoring wells) were sampled in WY 2024 (**Figure 8-5**). In WY 2024, 97 percent of RMWs sampled for TCP reported maximum concentrations below their MO, or their maximum historical concentration.

A further exceedance of the 0.005 ug/L MT was observed at two municipal wells (orange dots on **Figure 8-5**) and a first-time exceedance of the MT was observed at a monitoring well (shown as a red dot). The time-concentration plot for these wells in **Appendix D** is shown with a logarithmic Y axis because the TCP concentrations varied by orders of magnitude. Non-detections are shown on the X axis as white dots.

Well 5010010-180 is a City of Modesto well, known as Well #291, located in the southwest boundary of Modesto. TCP concentrations at this well have generally been above the 0.005 ug/L MT since 2018, with occasional spikes at higher concentrations. The maximum concentration was 0.01 ug/L. The closest water level RMW is MOD-MWA-2. It shows that water levels have increased since Fall 2022 and have been above the 36-foot msl MO in WY 2024. The recent increase in TCP concentrations at this well does not appear to be linked to water levels or groundwater management by the GSAs.

Well 5010010-241, City of Modesto Well #231, is located northeast of Modesto. Most of its TCP measurements have been below the detection limit. In June 2024 TCP concentrations sharply rose to 0.015 ug/L (**Appendix D**). Water levels at the nearest water level RMW, Bangs Ave 243, declined from 2013 to Fall 2022. Water levels slightly increased during 2024 and rose above the MT in Spring 2024. The sudden spike in TCP concentrations does not correspond with water levels trends and does not appear to be caused by GSA management activities.

TCP has been detected at a regulated facility east of Modesto (SL205833043) and at L10005824413, along the Merced River in the Eastern Principal Aquifer. The wells are shown on **Figure 8-5**. These and other regulated facilities are monitored under the requirements of state and local agencies with the primary responsibility to regulate groundwater quality. Well L10005824413-MW-25D3 had a first-time exceedance of TCP in WY 2024, shown as a red dot on the map and in **Appendix D**.

8.2.5 Dibromochloropropane (DBCP)

DBCP was a widely used agricultural nematicide and soil fumigant that was banned in the 1970s. It was detected in groundwater in parts of the Central Valley in 1979 and has been monitored since. DBCP is relatively mobile when dissolved in water and may occur as a dense-non-aqueous phase liquid (DNAPL). Its occurrence can be affected by management activities if increased pumping exacerbates its transport to deeper portions of the aquifers.

In WY 2021, 117 baseline wells were monitored for DBCP. As shown on **Figure 8-6**, 87 of these wells were sampled during WY 2024 (48 municipal wells and 39 monitoring wells). There were no wells with first-time MT exceedances or further exceedances of the MT above the historical maximum. In WY 2024, all RMWs sampled for DBCP reported maximum concentrations beneath their MO, or their maximum historical concentration.

8.2.6 Tetrachloroethene (PCE)

PCE is a volatile organic compound (VOC), which is a point-source contaminant often sourced from dry cleaning operations, textile operations, and metal degreasing processes. PCE is a regulated chemical typically released at the surface but capable of migrating to deeper portions of aquifers by hydraulic gradients created by pumping.

In WY 2024, 96 out of the 142 baseline wells for PCE were sampled (**Figure 8-7**). Most of the wells sampled (66) were monitoring wells at regulated facilities, and 30 were municipal supply wells. There were no wells with first-time MT exceedances or further exceedances of the MT above the historical maximum. In WY 2024, 99% of all RMW sampled for PCE reported maximum concentrations lower than their MO. Most (86) of the wells had concentrations below laboratory detection limits (shown as black dots on **Figure 8-7**).

8.2.7 Total Dissolved Solids (TDS)

TDS is used as an indicator of overall salinity in groundwater. While high TDS concentrations can naturally occur (geogenic contaminant), it is also considered an anthropogenic contaminant because human processes have resulted in elevated concentrations of TDS in the Central Valley. Shallow groundwater is more vulnerable to salinization, and in the Modesto Subbasin, shallow groundwater generally has a higher TDS concentration than in lower portions of the principal aquifers. Elevated concentrations of TDS in shallow groundwater can occur from irrigation return flow percolating through sandy soil but can also be related to wastewater discharge or managed aquifer recharge using more saline water. It is recognized that TDS increases significantly at deeper depths and is used to define the bottom of the groundwater basin (i.e., base of fresh water). TDS concentrations at the groundwater basin bottom are naturally occurring and associated with older geologic formations that are not typically penetrated by Subbasin wells.

The baseline monitoring network for TDS contains 107 wells, consisting of 67 monitoring wells and 40 municipal wells. In WY 2024, 82 of these wells were sampled (**Figure 8-8**). Only 22 of the wells sampled were municipal wells, and 60 were monitoring wells at regulated facilities, shown in clusters in **Figure 8-8.** In WY 2024, 98% of RMWs sampled for TDS were below their MO, the maximum historical concentration.

8.3 LIMITATIONS

The water quality monitoring network contains several limitations, including the distribution of wells, and the disproportionate number of monitoring wells for particular constituents. Nonetheless, it makes best use of a wide variety of existing water quality data collected under a regulated program and approved protocols. The limitations are discussed below.

Not every well is sampled annually. Many municipal wells in the Subbasin may not monitor and report every COC each year, particularly for less common contaminants like DBCP or TCP. In contrast, many of the monitoring wells measure and report these constituents monthly, and in WY 2024 there were more monitoring wells reporting arsenic, PCE, and TDS concentrations than municipal wells. While regulated facilities can affect basin-wide water quality, measurements from monitoring wells are often more representative of local conditions. They are also often shallower than municipal, agricultural, and even domestic wells. However, the information from monitoring wells at regulated facilities provides valuable information to the GSAs with regard to the potential for spreading contaminants with groundwater extractions.

The wells in the monitoring network may be skewed towards areas with higher concentrations of the constituents of concern. Wells may be measured more frequently for a chemical if they have reported, or are at risk of, high concentrations of that contaminant. For example, wells at a regulated facility with PCE contamination will be regularly monitored for PCE, but these conditions are not reflective of the entire Modesto Subbasin. Wells with

higher arsenic concentrations may be monitored and reported for arsenic more frequently than wells that have never previously reported a high arsenic concentration.

Finally, WY 2024 represents only the third year when groundwater quality degradation has been evaluated. It is difficult to identify potential relationships between water quality and GSA management since GSP submittal in January 2022. It takes time for water levels to respond to management activities including projects and management actions. In addition, contaminant transport from shallow to deep groundwater can take years or even decades. Similarly, it could take years for any water quality changes to affect deep municipal wells.

Notwithstanding these limitations, the large number of monitoring sites allows for tracking trends in concentrations in the same wells (or nearby wells) over time and will provide valuable information about the potential for groundwater quality degradation in the Subbasin.

9 SUBSIDENCE MONITORING

As explained in the Modesto Subbasin GSP, groundwater elevations are used as a proxy for a rate or extent of subsidence. By managing water levels at or near the historical low levels, the Subbasin can be protected from potential future land subsidence that could impact land use or infrastructure. Given the lack of undesirable results related to land subsidence in the Modesto Subbasin to date, groundwater elevation monitoring represents the best available information to avoid undesirable results from potential land subsidence. Because the greatest risk for land subsidence in the Modesto Subbasin is likely associated with the dewatering or depressurization of the Corcoran Clay, MTs are set at historical low groundwater levels in order to minimize groundwater level declines.

The Modesto Subbasin GSP defines undesirable results as significant and unreasonable inelastic land subsidence, caused by groundwater extraction and associated water level declines, that adversely affects land use or reduces the viability of critical infrastructure. The GSP indicates that an undesirable result will occur when 33% of representative monitoring wells exceed the MT in three consecutive Fall monitoring events. Fall 2023 was the second fall monitoring event during GSP implementation.

To supplement groundwater elevation monitoring, remote sensing data provide measurements of vertical displacement across the entire Subbasin. Vertical displacement data collected using Interferometric Synthetic Aperture Radar (InSAR) is published and available each year on the SGMA Data Viewer. Finally, local high-quality Global Positioning System (GPS) stations in the Subbasin are monitored by others and provide additional data on ground surface displacement. Data from local GPS stations in the Modesto Subbasin are also tracked on an annual basis, as available, for supplemental information on ground surface conditions within the Subbasin. These land subsidence datasets for WY 2024 are described below.

9.1 GROUNDWATER ELEVATION MONITORING

The area within the Corcoran Clay extent is likely the most vulnerable to future land subsidence. As summarized in **Section 3.3.3.** and shown on **Table 3-5**, all water levels in the Western Upper Principal Aquifer were above their MT in Fall 2023. Only one well (MW-2D) in the Western Lower Principal Aquifer was below its MT in Fall 2023. The percentage of wells below their MT in the Western Principal Aquifer was 20%, below the 33% criteria for undesirable results.

In the Eastern Principal Aquifer during Fall 2023, water levels were below their MT at 30% of the RMWs. Most of the wells below their MT were located east of Modesto. Previously, the Fall 2022 monitoring event exceeded the 33% criteria for undesirable results in the Eastern Principal Aquifer. Undesirable results for land subsidence are triggered when the criteria are exceeded for three consecutive Fall monitoring events.

9.2 INSAR DATA

The GSP included a review of InSAR vertical displacement data for the Modesto Subbasin from June 2015 to October 2020, a period of approximately five years. Most of the Subbasin was indicated to have no negative vertical displacement (subsidence), with some indicated in the Eastern Principal Aquifer, in the northwest corner of the Subbasin, and in a thin strip along the lower Stanislaus River. Most of the eastern Subbasin was characterized by vertical displacement between 0 and -0.05 feet (0.6 inches), equivalent to a rate of approximately 0.12 inches per year over the five year period. The GSP concluded that a higher potential for subsidence exists in the western Modesto Subbasin if groundwater levels are lowered below the Corcoran Clay.

InSAR data for WY 2024 are presented on **Figure 9-1**. The figure illustrates that, throughout most of the Subbasin a slight rise in land surface was observed in WY 2024. Most of the basin experienced a rise between 0 and 0.05 feet (0.6 inches) (dark gray shading), which is below the documented accuracy for the instrument (see discussion below). Localized areas in the eastern and western margins of the Subbasin had a negative vertical displacement of 0 to -0.05 feet (-0.6 inches). In contrast, during WY 2023, vertical displacement in the Subbasin mostly ranged from -0.05 feet to 0 (-0.6 inches) and some localized areas with -0.1 feet to -0.05 feet (-1.2 to -0.6 inches) of displacement.

The total vertical displacement based on InSAR data from June 2015 through September 2024 is presented in **Figure 9-2.** Most of the Subbasin shows vertical ground surface displacement within the instruments documented margin of error (±0.05 feet). Localized areas in the western Subbasin along the Stanislaus River and in the eastern Subbasin, north of Modesto Reservoir, show a cumulative negative vertical ground displacement of -0.1 to -0.05 feet (-1.2 to -0.6 inches). The areas in the eastern Subbasin with the highest rate of subsidence correspond to areas with water level declines.

A study conducted by Towill, Inc. and TRE Altamira, Inc., under contract with DWR, showed that InSAR vertical displacement data is highly accurate in most areas. The study compared vertical displacement ground surface elevation data from InSAR to continuously operating global positioning system (CGPS) base stations (Towill, 2021). The study found that the two data sets had a high degree of correlation and concluded that InSAR data accurately measured vertical displacement in California's ground surface to within 18 mm (0.6 inches) between January 1, 2015, and October 1, 2020 (equivalent to about 0.12 inches per year).

9.3 GPS STATION DATA

The GSP documented four GPS stations in the Subbasin; two of these (P260 and P781) are no longer in operation so two GPS stations actively provide vertical displacement data in the Subbasin. As shown on **Figures 9-1**, one of these stations is in Modesto (Station ID: CMOD), and one is in the northeastern corner of the Subbasin (Station ID: P306). Historical ground surface elevation data from 2006 to 2024 at GPS Stations CMOD and P306 are shown on **Figures 9-3 and 9-4**. During WY 2024, the net vertical displacement (based on the 30 day

averages for September 2023 to September 2024) at Station CMOD was -0.008 feet (-0.1 inches) and at Station P306 was -0.002 feet (-0.02 inches), indicating slight decrease in ground surface elevation. From October 2006 through September 2024, CMOD recorded a net vertical displacement of -0.07 feet (-0.81 inches). Station P306 recorded a net positive vertical displacement of 0.03 feet (0.32 inches) from September 2006 to September 2024. These data suggest that from 2006 to 2024, ground surface elevations at both stations are relatively stable.

9.4 MAPES RANCH SUBSIDENCE DATA

Mapes Ranch, located in the westernmost region of the Subbasin next to the San Joaquin River, has a monitoring program that includes subsidence survey monitoring points. Mapes Ranch has been collecting elevations at these subsidence survey monitoring points since September 2015. The elevation changes from September 2015 to September 2024 range from -0.05 feet to 0.10 feet and average 0.01 feet. These data support the InSAR and CMOD measurements that show stable ground surface elevations in much of the western Subbasin.

10 INTERCONNECTED SURFACE WATER MONITORING

The C2VSimTM model, a surface water and groundwater flow model developed for the Modesto Subbasin GSP, has been updated for this Annual Report. The model provides a tool to analyze the linkages between groundwater extractions, reduction of groundwater in storage and interconnected surface water. Model results provided in the GSP showed that increased streamflow depletion along the Modesto Subbasin river boundaries is associated with groundwater level declines. This association allows water levels along the rivers to be used as a proxy to monitor streamflow depletions. Direct groundwater level monitoring is supplemented by ongoing analysis of streamflow depletions in the C2VSimTM model.

There are 20 RMWs in the monitoring network for interconnected surface water along the three river boundaries (**Figure 3-4**). These wells are relatively close to the rivers and screened in the unconfined aquifers that are connected to the rivers.

10.1 GROUNDWATER ELEVATION MONITORING

In **Section 3.3.3**, Fall 2023 and Spring 2024 groundwater elevations in the RMWs are compared to the sustainable management criteria for interconnected surface water (**Table 3-5, Figures 3-10 and 3-14**).

During Fall 2023 water levels at 3 out of 19 RMWs were below the MTs. Neither of the two wells near the San Joaquin River had water levels beneath their MTs. Two of the eight wells (Allen OID-01 and Birnbaum OID-03) near the Stanislaus River had water levels beneath their MTs (25% of wells for that river). One well (MW-6S) near the Tuolumne River was beneath its MT (11% of all wells for that river).

During Spring 2024, only one well had a water level below its MT. The water levels at Marquis OID-10, along the Stanislaus River, dipped below its MT.

The GSAs have recognized the need for improvements to this monitoring network and have planned for additional monitoring wells to support GSP implementation.

10.2 MODEL ESTIMATES FOR STREAMFLOW DEPLETION

For the GSP, the C2VSimTM model was applied to Subbasin water budgets covering the historical Study Period (WY 1991 – WY 2015) including an analysis of streamflow depletions. The First Annual Report included water budgets and streamflow depletion estimates for WY 2016 through WY 2021, and the subsequent Annual Reports included the same information for WYs 2022 and 2023. As explained in **Section 2**, the C2VSimTM water budget has been updated to WY 2024 for this Annual Report.

As reported in the Third Annual Report for WY 2023, streamflow depletions averaged approximately 45,300 AFY for the Stanislaus River and approximately 66,200 AFY for the Tuolumne River. During this time, the San Joaquin River gained approximately 3,100 AFY

from the Modesto Subbasin. WY 2023 had wet conditions, and the high stream flows reflect this. In contrast, in WY 2022, a critically dry year, streamflow depletion was 35,500 AFY at the Stanislaus River and 13,700 AFY at the Tuolumne River. WY 2022 baseflow in the San Joaquin River was 12,500 AFY.

Streamflow depletion estimates for WY 2024 are provided below in **Table 10-1**.

Table 10-1: Streamflow Depletion Estimates WY 2024

Water Year	Net Gain to Groundwater from Streamflow (AFY)		
	Stanislaus River	Tuolumne River	San Joaquin River
2024	39,300	20,400	-12,000

Notes:

1. Positive numbers represent water flowing from the stream to the groundwater system (i.e., net losing stream or recharge).
2. Negative numbers represent water flowing from the groundwater system to the stream (i.e., net gaining stream or baseflow).

As shown on **Table 10-1**, WY 2024, flows from the Stanislaus River (39,300 AFY) and the Tuolumne River (20,400 AFY) contributed to the groundwater system. As with last year, the San Joaquin River continues to gain from the Modesto Subbasin (12,000 AFY).

During WY 2024, streamflow depletion along the Stanislaus River is approximately 13 percent less than in WY 2023 (45,300 AFY). Streamflow depletion along the Tuolumne River during WY 2024 is approximately 69% less than in WY 2023 (66,200 AFY). The San Joaquin River gained about 290% more water than in WY 2023.

The combination of groundwater elevation monitoring and updates to the C2VSimTM model provide complementary tools for monitoring and quantifying interconnected surface water for future Annual Reports. Future model upgrades will consider recalibration to groundwater elevation monitoring data as the monitoring network is improved over time.

11 PROGRESS ON GSP IMPLEMENTATION

The GSAs are progressing with GSP implementation. In WY 2024 this included tracking of conditions relative to sustainable management criteria, maintenance of monitoring, regular reporting and outreach, and implementation of projects and management actions consistent with the 2024 Revised GSP.

11.1 COMPLIANCE WITH SUSTAINABLE MANAGEMENT CRITERIA

This Annual Report discusses the sustainable management criteria that are used to demonstrate how GSP implementation is progressing. This discussion is consistent with the topics specifically listed in the GSP regulations (§356.2(c)). Some of the information has already been addressed in **Section 3**, including a comparison of groundwater elevations to sustainable management criteria in **Table 3-5**, maps showing where MT exceedances occurred (**Figures 3-7** through **3-14**), and the hydrographs, which also show MTs and MOs, in **Appendix B**.

11.1.1 Implementation of GSP Monitoring Network

The GSP Monitoring Network is being maintained, and the semi-annual monitoring is being implemented as planned and consistent with GSP regulations. The second and third GSP monitoring events were conducted in Fall 2023 and Spring 2024. The GSP monitoring network includes 61 RMWs. Each of these RMWs is included in the monitoring networks for chronic lowering of groundwater levels, reduction of groundwater in storage, and land subsidence; 20 of these are in the monitoring network for interconnected surface water. These RMWs include CASGEM wells, City of Modesto monitoring wells, USGS monitoring wells and monitoring wells constructed in 2021 with Proposition 68 grant funding from DWR. The monitoring networks are illustrated on **Figures 3-1 through 3-4** and discussed in **Section 3**.

During both WY 2024 monitoring events, groundwater levels were measured in 59 of the 61 RMWs. Water levels were not measured in two RMWs during each monitoring event because of obstructions: Quesenberry 223 and Wood 210. The GSA is working to replace these wells in the monitoring network.

11.1.2 Progress in Achieving Interim Milestones

Interim Milestones (IMs) were developed for monitoring network wells in the OID and Non-District East Management Areas. The first IM occurs in 2027 with target values set below the MTs to provide a buffer to allow water levels to drop below the MT while projects and management actions are implemented. The GSP recognizes that water levels in these wells would likely continue to decline after the GSP is adopted and acknowledges that the aquifer response to projects and management actions will take time. 2027 IM values assume that water level declines will continue at similar rates between 2023 and 2027. Additional IMs

are at five-year increments: the 2032 IM is the MT, the 2037 IM is half-way between the MT and the MO, and the 2042 IM is the MO.

As summarized in **Table 3-5** and shown on the hydrographs in **Appendix B**, groundwater levels during WY 2024 monitoring events were above the IMs in all the RMWs.

11.1.3 Compliance with Additional Sustainable Management Criteria

Groundwater level monitoring networks were developed to track the chronic lowering of groundwater levels, reduction of groundwater in storage, potential for land subsidence, and depletions in interconnected surface water. As described in **Section 3.3.3**, water levels for most of the wells in the monitoring network are above their MTs.

Water levels during Fall 2023 were below the MTs in 12 out of 59 wells measured in the monitoring network for chronic lowering of groundwater levels. One of the MT exceedances is in the Western Lower Principal Aquifer and the remaining 11 are in the Eastern Principal Aquifer. As stated previously, water level measurements in two RMWs were not obtained because of obstructions. In Spring 2024, water level measurements were below the MTs in seven of 59 RMWs measured in the Eastern Principal Aquifer. Water levels in the Western Upper Principal Aquifer and Western Lower Principal Aquifer were above the MTs in all RMWs measured.

As explained in the GSP, the sustainable management criteria for chronic lowering of groundwater levels are used as a proxy for monitoring the reduction of groundwater in storage and the land subsidence sustainability indicators.

Groundwater levels in three out of 19 wells measured in the monitoring network for interconnected surface water were below the MTs in Fall 2023. The MT exceedances occurred at two RMWs along the Stanislaus River, and one along the Tuolumne River. During the Spring 2024 monitoring event, groundwater levels at one well out of 19 wells were below the MT. One well in this monitoring network along the Tuolumne River (Quesenberry 223) was not measured during WY 2024 because of an obstruction. As mentioned previously, the GSAs are looking for a well to replace Quesenberry 223 in the monitoring network.

Remote sensing data are used as a screening tool to evaluate land subsidence on a Subbasin-wide basis to complement the groundwater elevation monitoring network. During WY 2024, the InSAR vertical displacement data indicated a minor increase in ground surface elevation in the Modesto Subbasin. Data available at two GPS stations indicate that seasonal lows in ground surface at those locations were higher than in WY 2023. Elevation monitoring points on and around Mapes Ranch support these data.

This annual report provides an update on the degraded water quality sustainability indicator for WY 2024. As discussed in **Section 8**, a baseline monitoring network was established in the First Annual Report based on water quality data collected from WY 1991 through WY 2021. Water quality data collected from baseline monitoring network wells during WY 2024

for the seven constituents of concern were downloaded from the GAMA database through the State GeoTracker website. There were 260 wells in the baseline monitoring network that were sampled for one or more of the constituents of concern during WY 2024. Both new (first time) MCL exceedances and further exceedances of the MCL occurred and are discussed in **Section 8**. These new MCL exceedances and further exceedances of the MCL do not appear to be related to GSP activities including projects or management of groundwater levels since the GSP was submitted in January 2022.

11.2 IMPLEMENTATION PROGRESS

Implementation includes regular reporting to DWR and to local stakeholders. Consistent with DWR guidance, the GSAs and associated member agencies in the Subbasin conducted the fourth and fifth GSP monitoring events in Fall 2023 and Spring 2024 and uploaded the water level data from these monitoring events to DWR's SGMA Portal by the applicable deadlines (January 1, 2024, and July 1, 2024). The GSAs also collaborated and contributed to this Fourth GSP Annual Report. Regular monthly STRGBA GSA meetings, which are open to the public and subject to the Brown Act, are planned on an ongoing basis.

As noted in the Introduction, in 2024 the GSAs received an "Incomplete" determination from DWR. The primary issues involved provision of sufficient details to support the selection of SMC for the chronic lowering of groundwater and for projects and management actions. In July 2024 the GSAs submitted the Revised GSP, which addressed these issues with an analysis of impacts on wells of additional water level declines and with detailed planning for implementation of projects and management actions. In July 2024, the STRGBA GSA approved a resolution to adopt the revised GSP and commit to implementing demand management actions to arrest groundwater level declined by 2027 and raise groundwater levels after 2027. As noted before, the 2024 Revised GSP was approved by the Department of Water Resources (DWR) on February 28, 2025.

11.3 PROJECTS

11.3.1 Oakdale Irrigation District In-lieu and Direct Recharge Project

The Modesto Subbasin GSP includes 13 Phase One GSP projects. GSP Project number six, the Oakdale Irrigation District In-lieu and Direct Recharge Project, is underway. This project consists of a Ten-Year Out-of-District Water Sales Program (Program) in which over 5,000 irrigated acres in the Modesto Subbasin outside of OID's service area would purchase surplus surface water when available. OID has secured contracts with participants to commit to an annual purchase of a minimum of 1.5 AF per irrigated acre. During the 2024 irrigation season, OID delivered approximately 2,500 AF of surplus surface water to Program lands in the Modesto Subbasin. Over the winter during 2024 and early 2025, OID completed the remaining landowner turnouts such that all Program participants can connect their irrigation systems.

11.3.2 Paulsell Lateral Expansion

In September 2023, OID, on behalf of the GSAs, received a Round 2 Sustainable Groundwater Management SGMA Implementation Grant Award from DWR for over 14 million dollars for the Paulsell Lateral Expansion project. This project will expand OID's existing Paulsell Lateral to increase the capacity of approximately 10 miles of open ditch, tunnel and culverts to increase flow from 30 cubic feet per second (cfs) to 180 cfs to facilitate in-lieu groundwater recharge. In order to receive the most benefit from the awarded grant funds, engineering design will be completed for the entire Paulsell Lateral, and construction improvements will occur on approximately 5.5 miles of the facility. Two tunnel rehabilitations were completed during late 2024 and early 2025. Remaining design and bid document preparation is currently underway. OID anticipates that construction of five automated check structure installations, two siphon replacements, five culvert replacements, and at least 28,500 linear feet of canal restructuring will occur during late 2025 and early 2026. Project completion is anticipated by early spring of 2026.

11.3.3 Long-Term Groundwater Replenishment Program

In August 2023, the MID Board of Directors approved the Long-Term Groundwater Replenishment Program (GRP), with implementation of the program contingent upon completion of CEQA analysis. The CEQA analysis was completed and adopted by the MID Board of Directors in January 2024, allowing implementation of the Long-Term GRP. The MID Long-Term GRP is a voluntary 20-year program open to all water users in the Modesto Subbasin. In wet years when MID irrigators and the City of Modesto have received full uncapped allocations, MID will make surface water available to applicants.

The GRP includes two types of groundwater replenishment water, in-lieu water and conjunctive use water. In-lieu water is understood to mean the use of surface water "in-lieu of," or instead of, pumped groundwater for agricultural irrigation. Conjunctive Use Water, as defined, is intended for direct recharge of surface-applied water into the Subbasin. This usually is done by spreading water over the ground surface and allowing it to percolate into the aquifer over time. The main objective of the Long-Term GRP program is to help reverse the trend of groundwater overdraft in the Modesto Subbasin and satisfy SGMA requirements.

Both of these projects are in-lieu recharge projects that will increase delivery of surface water to the Non-District East MA, thereby reducing the demand for groundwater pumping. These projects focus on the Non-District East MA to address the most significant area of groundwater level declines in the Subbasin.

The GRP was made available during the 2024 Irrigation Season; however, there were no participants in the program. Availability of the program in subsequent irrigation seasons will be contingent upon hydrological conditions.

11.3.4 Urban Water Surface Water Capacity and Conservation Improvements

The City of Modesto has taken steps to increase the capacity and optimize water utilization and storage at the Modesto Regional Water Treatment Plant (MRWTP). This is a continuation of a water purchase agreement between MID and City of Modesto to meet growing urban water demands. Phase II is the expansion phase of this project. With the completion of the expansion, the project provides MRWTP with a total capacity of 60 mgd and a maximum annual supply of 67,200. The Phase II infrastructure is in place, but due to water conservation efforts, the Phase II capacity usage has not been necessary. With continued growth and development of The City, Phase II capacity will be critical to use, and will provide surface water in lieu of groundwater to meet growing urban demand.

The City of Modesto is in the process of upgrading 75,000 meters to AMI smart meters. This will increase conservation efforts by identifying potential leaks sooner and engaging customers in water conservation.

11.3.5 Storm Drain Cross Connection Removal Project

The City of Modesto has completed approximately 29% (18 of the 63 locations) of the Storm Drain Cross Connection Removal Project. This multi-benefit and multi-component project captures, treats, and recharges stormwater within the City of Modesto. The project components use low impact development (LID) techniques including bio-retention planters, infiltration trenches, and underground retention galleries/trenches within City parks for groundwater recharge. Additional benefits include the reduction of stormwater flows to the City of Modesto's wastewater treatment plant and sanitary sewer overflows, reduction of localized flooding, and improved water quality within Dry Creek and the Lower Tuolumne River.

11.3.6 Retention Systems Standards Specifications Update

The City of Modesto is currently retrofitting existing detention systems in order to increase retention and infiltration. The goal of this project is to change standards for storm drains so that the drains would not discharge straight to rivers, creeks, or canals but rather to these retention systems. Approximately 36 percent of the surface area in the City of Modesto drains to surface water, with approximately 64 percent draining and contributing to local recharge. The goals is for 100 percent of runoff from newly developed areas to reach a retention system.

11.4 MANAGEMENT ACTIONS

The Modesto Subbasin GSP includes seven management actions. The STRGBA GSA has been and will continue collaborating with stakeholders at workshops throughout 2025 to draft and implement Management Actions for the subbasin as required by DWR. The Management Actions include a Well Mitigation Program, which will be implemented by January 31, 2026. As discussed in the Revised GSP, the GSAs are committed to developing all Management Actions, such as groundwater allocations and reporting programs, by

January 31, 2026, and implementing them by January 31, 2027. Therefore, groundwater users will have a year to adjust their operations to the Management Actions. Management actions will be adaptive and can be escalated or deescalated as needed depending on current conditions of the subbasin.

By way of update, in WY 2024, the GSAs selected a consultant team to begin development of the Well Mitigation Program and Management Actions. The concepts of a Well Mitigation Plan were introduced to the public during a workshop in February 2025.

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FIGURES

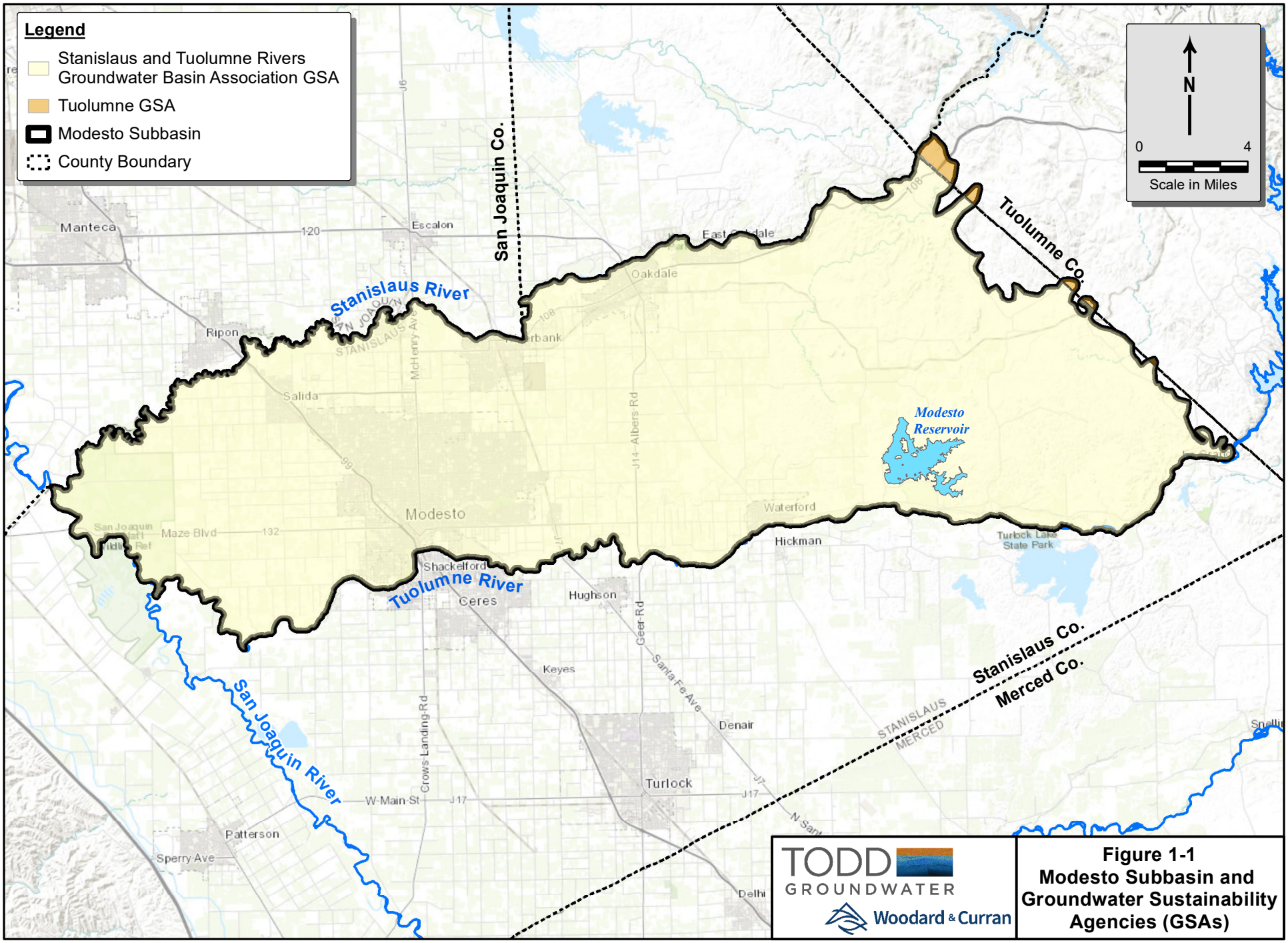


Figure 1-1
Modesto Subbasin and Groundwater Sustainability Agencies (GSAs)

Legend

- Corcoran Clay Extent

Management Area

- Modesto ID
- Oakdale ID
- Non-District West
- Non-District East

N

0 3

Miles

Oakdale ID Management Area

Non-District East Management Area

Modesto ID Management Area

Non-District West Management Area

Manteca

Escalon

Ripon

Salida

Modesto

Oakdale

Waterford

Hickman

Shackelford

Ceres

Hughson

Keyes

Denair

Turlock

Westley

Laird Park

Turlock Lake State Park

Turlock Lake

California State Univ Stanislaus

Woodward Reservoir

Modesto Reservoir

Lone Tree Creek

Littlejohns Creek

Martel's Creek

Escalon-Bellota Rd

Crows Landing Rd

Albers Rd

Santa Fe Ave

294 ft

614 ft

169 ft

STANISLAUS

TUOLUMNE

SAN JOAQUIN

CALAVERAS

STANISLAUS

MERCED

TODD GROUNDWATER

Woodard & Curran

Figure 1-2
Modesto Subbasin Management Areas

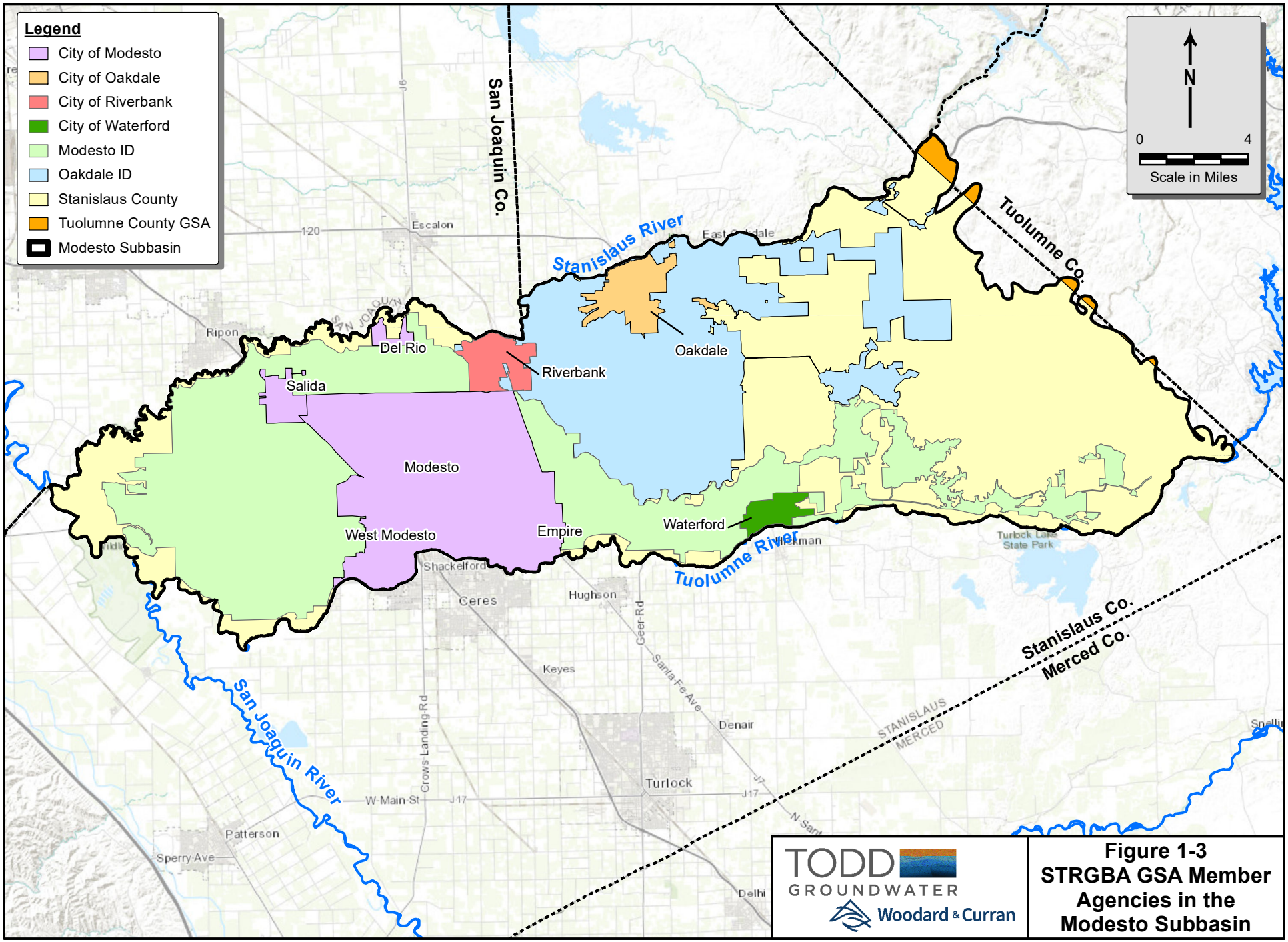


Figure 1-3
STRGBA GSA Member Agencies in the Modesto Subbasin

Legend

- CASGEM Well -- Western Upper (12)
- City of Modesto Monitoring Well (2)
- Prop 68 Monitoring Well (2)
- USGS Monitoring Well (1)
- Corcoran Clay Extent (Burow et al., 2004)

Management Area

- Modesto ID (17)
- Oakdale ID (0)
- Non-District West (0)
- Non-District East (0)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

MW-1S
(33 / 43)

Hart Road 88
(35 / 40)

MOD-MWB-1
(40 / 49)

Curtis #2 100
(34 / 41)

North Ave 103
(41 / 50)

Machado 23
(31 / 40)

Van Buren 43
(38 / 45)

Gates Road 101
(24 / 33)

Warnock 46
(35 / 42)

MOD-MWD-1
(30 / 40)

Katen 69
(27 / 33)

MRWA-2
(36 / 43)

Young 76
(36 / 42)

Canfield 90
(32 / 36)

MW-2S
(34 / 41)

Philbrick 201
(34 / 41)

Paradise 235
(34 / 41)

Ripon
Escalon
Oakdale
Modesto
Ceres
Hughson
Hickman
Waterford
Turlock
Denair
Keyes
Westley
Shackelford
Woodward Reservoir
Modesto Reservoir
Turlock Lake
Turlock Lake State Park
Lone Tree Creek
Littlejohns Creek
Martel's Creek
Rybberg Creek
Gallup Creek
Escalon-Bellota Rd
Albers Rd
Crows Landing Rd
Santa Fe Ave
California State Univ Stanislaus
Laird Park
294 ft
614 ft
169 ft

Note:
This monitoring network is used as a proxy for the reduction of groundwater in storage and land subsidence sustainability indicators.

TODD GROUNDWATER
Woodard & Curran

Figure 3-1
Groundwater Elevation Monitoring Network, Western Upper Principal Aquifer

Legend

- City of Modesto Monitoring Well (2)
- Prop 68 Monitoring Well (2)
- USGS Monitoring Well (1)
- Corcoran Clay Extent (Burow et al., 2004)

Management Area

- Modesto ID (5)
- Oakdale ID (0)
- Non-District West (0)
- Non-District East (0)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

MW-1D
(14 / 27)

MOD-MWB-2
(26 / 34)

MOD-MWD-3
(30 / 37)

MW-2D
(35 / 40)

MRWA-3
(28 / 36)

Note:
This monitoring network is used as a proxy for the reduction of groundwater in storage and land subsidence sustainability indicators.

TODD GROUNDWATER

Woodard & Curran

Figure 3-2
Groundwater Elevation Monitoring Network, Western Lower Principal Aquifer

Legend

- CASGEM Well -- Eastern (25)
- City of Modesto Monitoring Well (2)
- Prop 68 Monitoring Well (10)
- USGS Monitoring Well (2)
- Corcoran Clay Extent (Burow et al., 2004)

Management Area

- Modesto ID (24)
- Oakdale ID (7)
- Non-District West (1)
- Non-District East (7)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

Allen OID-01 (72 / 81)

Marquis OID-10 (85 / 91)

MW-5S (69 / 89)

Langdon Merle 241 (50 / 62)

American 208 (48 / 55)

Riverbank OID-13 (42 / 54)

Head Lateral 8 194 (40 / 47)

Birnbaum OID-03 (72 / 86)

MW-7 (75 / 110)

MW-10 (72 / 101)

MW-4S (56 / 67)

Crane OID-06 (66 / 77)

MW-8 (75 / 110)

Claribel 206 (49 / 62)

Furtado OID-07 (69 / 81)

Bangs Ave 243 (32 / 46)

Cavil 214 (53 / 73)

Bentley OID-02 (71 / 85)

Paulsell 1 OID-11 (88 / 117)

Paulsell 2 OID-12 (94 / 123)

FPA-2 (38 / 48)

OFPB-2 (35 / 53)

Wood 210 (52 / 66)

Wellsford 233 (62 / 77)

Blossom 230 (61 / 78)

Perley 202 (36 / 45)

Head Lateral 3 215 (56 / 73)

MW-6S (65 / 83)

MOD-MWC-3 (40 / 50)

MW-3D (25 / 31)

MW-11 (35 / 48)

Albers 232 (60 / 76)

MW-9 (150 / 180)

MOD-MWA-2 (30 / 36)

Jones WID 228 (55 / 75)

Quesenberry 223 (89 / 110)

MW-3S (25 / 31)

Schmidt 227 (59 / 78)

Lateral one 195 (42 / 52)

Note:
This monitoring network is used as a proxy for the reduction of groundwater in storage and land subsidence sustainability indicators.

TODD GROUNDWATER

Woodard & Curran

Figure 3-3
Groundwater Elevation Monitoring Network, Eastern Principal Aquifer

Legend

- CASGEM Well -- Western Upper (4)
- CASGEM Well -- Eastern (11)
- Prop 68 Monitoring Well (5)
- Corcoran Clay Extent (Burow et al., 2004)

Management Area

- Modesto ID (13)
- Oakdale ID (3)
- Non-District West (2)
- Non-District East (2)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

- Western Upper Principal Aquifer (5)
- Eastern Principal Aquifer (15)

N

0 3

Miles

Allen OID-01
(75 / 83)

Langdon Merle 241
(50 / 62)

Head Lateral 8 194
(40 / 47)

Marquis OID-10
(86 / 92)

Birnbaum OID-03
(74 / 87)

MW-4S
(56 / 67)

American 208
(48 / 55)

Riverbank OID-13
(42 / 54)

Katen 69
(27 / 33)

Canfield 90
(33 / 37)

Philbrick 201
(38 / 43)

Paradise 235
(34 / 41)

MW-2S
(38 / 43)

MW-3S
(26 / 32)

Lateral one 195
(42 / 52)

MW-6S
(65 / 83)

Jones WID 228
(55 / 75)

Schmidt 227
(59 / 78)

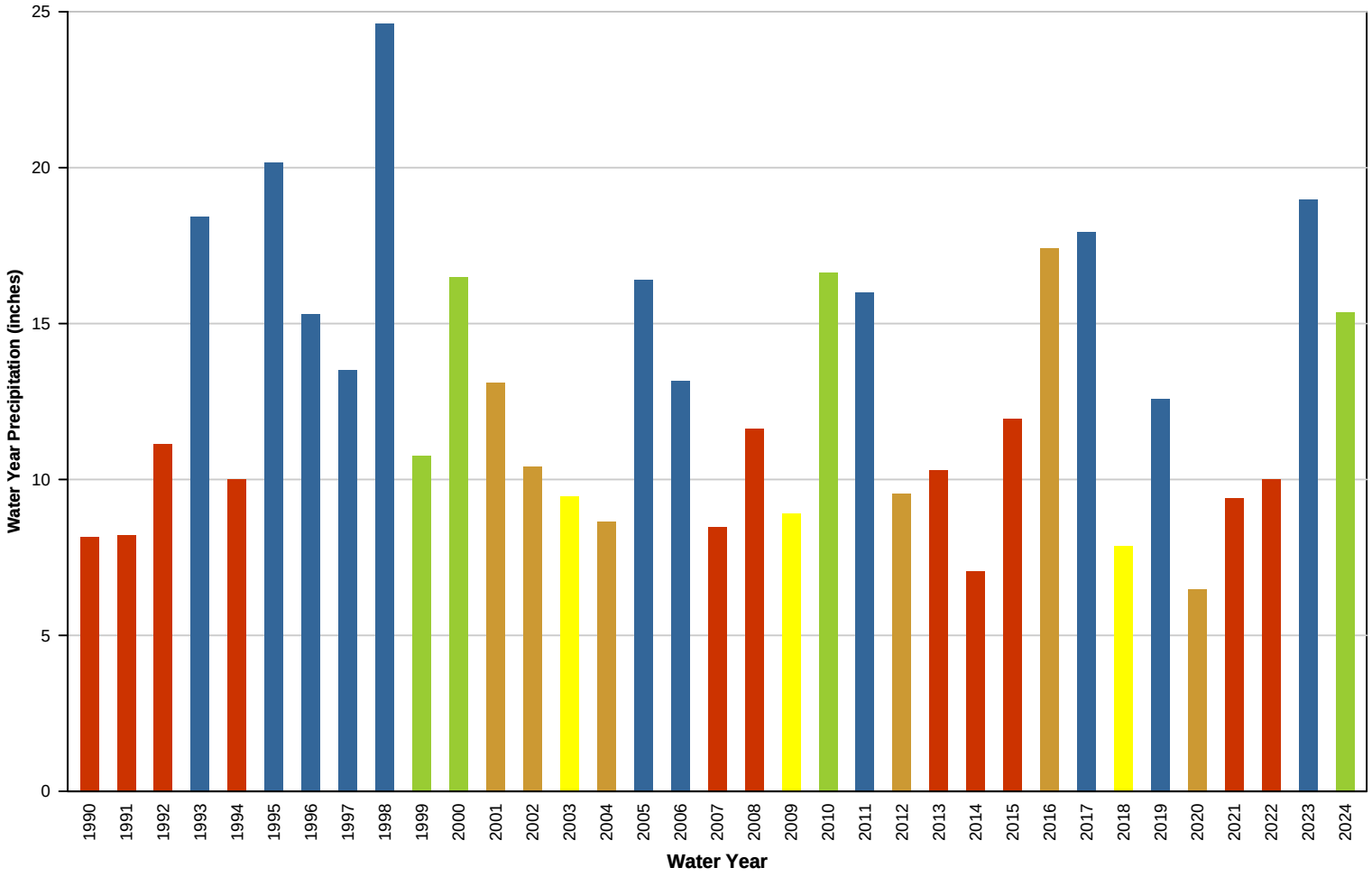
Quesenberry 223
(89 / 110)

MW-9
(150 / 180)

TODD GROUNDWATER

Woodard & Curran

Figure 3-4
Groundwater Elevation Monitoring Network for Interconnected Surface Water



Water Year Type

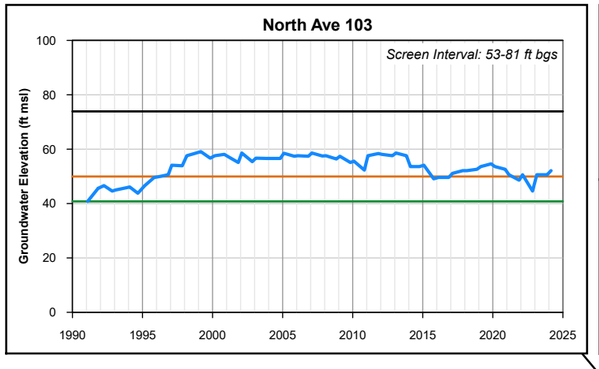
- Wet
- Above Normal
- Below Normal
- Dry
- Critically Dry

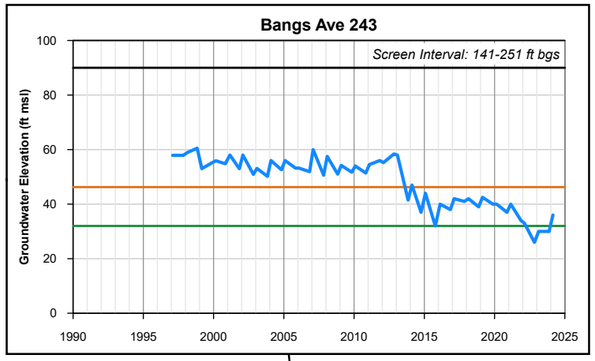
Notes:
Source - MID weather station (Modesto CA).
Water Year - October 1 through September 30.
Water year type is from the DWR San Joaquin Valley Index.

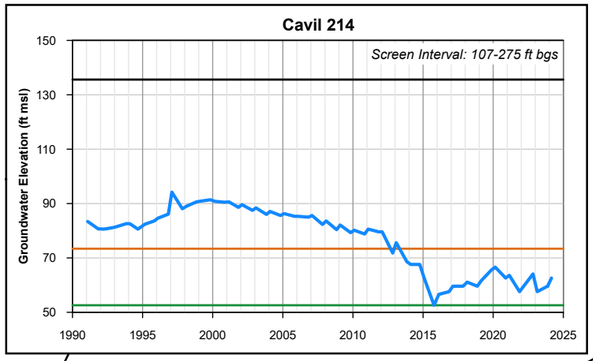
TODD GROUNDWATER
Woodard & Curran

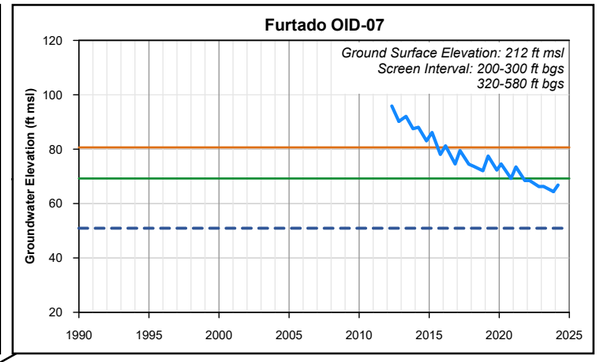
Figure 3-5
Annual Precipitation and Water Year Type
WY 1990-2024

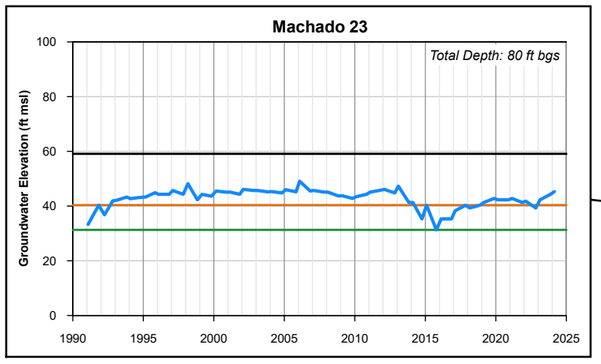
Path: \\todd-file\data\Projects\Modesto Implementation 743\2743\2-02 Modesto Annual Report WY 2024\GRAPHICS\Figure 3-5 Water Year Types San Joaquin Rivers Index WY 1990-2024.ppt

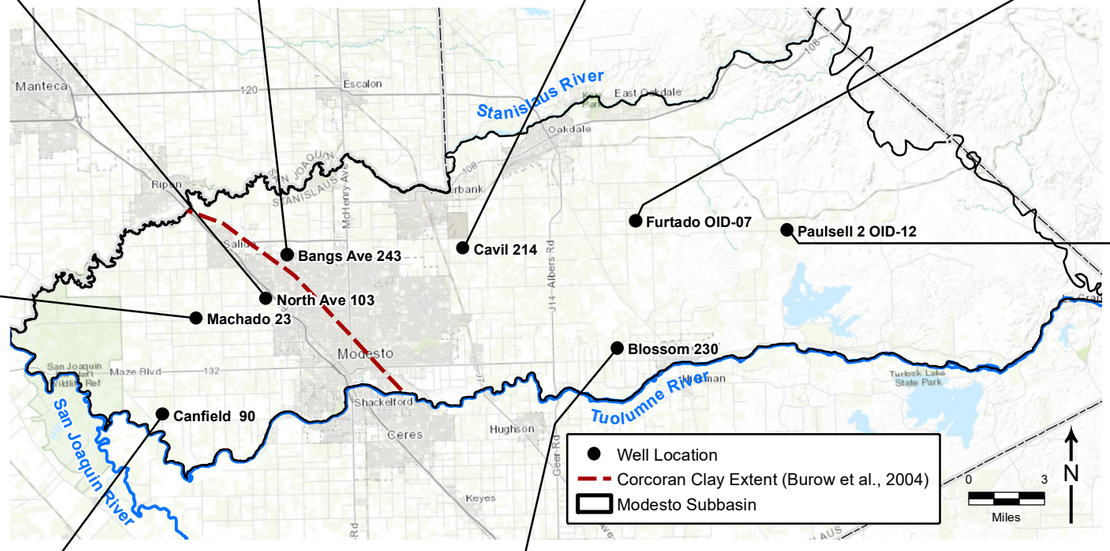


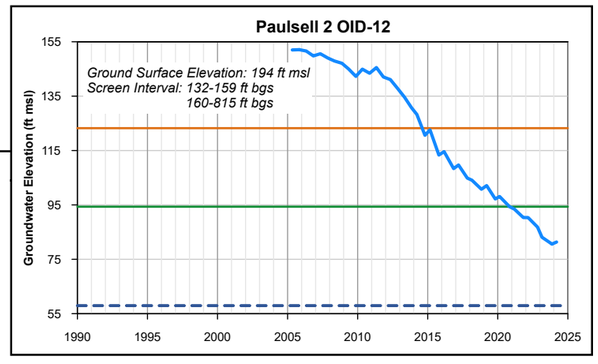


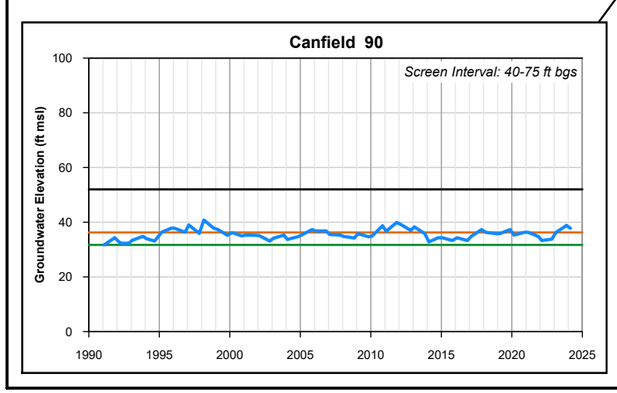


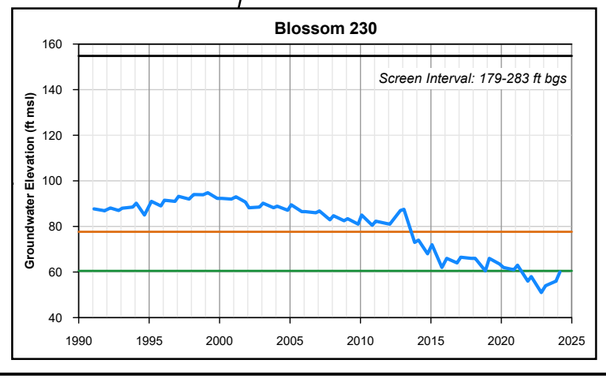












Ground Surface Elevation (ft msl)
Groundwater Elevation (ft msl)
Measurable Objective
Minimum Threshold
Interim Milestone

TODD GROUNDWATER
Woodard & Curran

Figure 3-6
Example Hydrographs Across Subbasin

Legend

- CASGEM Well -- Western Upper (12)
- City of Modesto Monitoring Well (2)
- Prop 68 Monitoring Well (2)
- USGS Monitoring Well (1)

MT Exceedance

- Above MT (17)
- Below MT (0)
- No Measurement (0)

Management Area

- Modesto ID (17)
- Oakdale ID (0)
- Non-District West (0)
- Non-District East (0)
- Corcoran Clay Extent (Burow et al., 2004)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

MW-1S (33 / 43)

Hart Road 88 (35 / 40)

MOD-MWB-1 (40 / 49)

Curtis #2 100 (34 / 41)

North Ave 103 (41 / 50)

Machado 23 (31 / 40)

Van Buren 43 (38 / 45)

Gates Road 101 (24 / 33)

Warnock 46 (35 / 42)

MOD-MWD-1 (30 / 40)

Katen 69 (27 / 33)

Young 76 (36 / 42)

MRWA-2 (36 / 43)

Canfield 90 (32 / 36)

MW-2S (34 / 41)

Philbrick 201 (34 / 41)

Paradise 235 (34 / 41)

Stanislaus River

Tuolumne River

San Joaquin River

Ripon

Modesto

Oakdale

Ceres

Hughson

Hickman

Waterford

Turlock

Keyes

Denair

Westley

Shackelford

Woodward Reservoir

Modesto Reservoir

Turlock Lake

Turlock Lake State Park

Martel's Creek

Littlejohns Creek

Lone Tree Creek

Rybberg Creek

Gallup Creek

California State Univ Stanislaus

Crows Landing Rd

Santa Fe Ave

Albers Rd

Note:
This monitoring network is used as a proxy for the reduction of groundwater in storage and land subsidence sustainability indicators.

TODD GROUNDWATER

Woodard & Curran

Figure 3-7
Fall 2023 Monitoring Event
MT Comparison
Western Upper Principal Aquifer

Legend

- City of Modesto Monitoring Well (2)
- Prop 68 Monitoring Well (2)
- USGS Monitoring Well (1)

MT Exceedance

- Above MT (4)
- Below MT (1)
- No Measurement (0)

Management Area

- Modesto ID (5)
- Oakdale ID (0)
- Non-District West (0)
- Non-District East (0)
- Corcoran Clay Extent (Burow et al., 2004)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

MW-1D
(14 / 27)

MOD-MWB-2
(26 / 34)

MOD-MWD-3
(30 / 37)

MW-2D
(35 / 40)

MRWA-3
(28 / 36)

Stanislaus River

Tuolumne River

San Joaquin River

Woodward Reservoir

Martel's Creek

Littlejohns Creek

Lone Tree Creek

Rydberg Creek

Gallup Creek

Modesto Reservoir

Turlock Lake State Park

Turlock Lake

Ripon

Oakdale

Modesto

Waterford

Hickman

Shackelford

Ceres

Hughson

Keyes

Denair

Turlock

Westley

Laird Park

California State Univ Stanislaus

Maze Blvd

Albers Rd

Crows Landing Rd

Santa Fe Ave

294 ft

614 ft

169 ft

Note:
This monitoring network is used as a proxy for the reduction of groundwater in storage and land subsidence sustainability indicators.

TODD GROUNDWATER

Woodard & Curran

Figure 3-8
Fall 2023 Monitoring Event
MT Comparison
Western Lower Principal Aquifer

Legend

- CASGEM Well -- Eastern (25)
- City of Modesto Monitoring Well (2)
- Prop 68 Monitoring Well (10)
- USGS Monitoring Well (2)

MT Exceedance

- Above MT (26)
- Below MT (11)
- No Measurement (2)

Management Area

- Modesto ID (24)
- Oakdale ID (7)
- Non-District West (1)
- Non-District East (7)
- Corcoran Clay Extent (Burow et al., 2004)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

Allen OID-01 (72 / 81)

Marquis OID-10 (85 / 91)

Langdon Merle 241 (50 / 62)

American 208 (48 / 55)

Head Lateral 8 194 (40 / 47)

Riverbank OID-13 (42 / 54)

MW-4S (56 / 67)

Claribel 206 (49 / 62)

Bangs Ave 243 (32 / 46)

FPA-2 (38 / 48)

OFPB-2 (35 / 53)

Wood 210 (52 / 66)

Perley 202 (36 / 45)

MOD-MWC-3 (40 / 50)

MW-3D (25 / 31)

MOD-MWA-2 (30 / 36)

MW-3S (25 / 31)

MW-11 (35 / 48)

Wellsford 233 (62 / 77)

Head Lateral 3 215 (56 / 73)

Albers 232 (60 / 76)

Lateral one 195 (42 / 52)

Crane OID-06 (66 / 77)

Cavil 214 (53 / 73)

Bentley OID-02 (71 / 85)

Birnbaum OID-03 (72 / 86)

MW-5S (69 / 89)

Furtado OID-07 (69 / 81)

Blossom 230 (61 / 78)

Jones WID 228 (55 / 75)

MW-10 (72 / 101)

MW-7 (75 / 110)

MW-8 (75 / 110)

Paulsell 1 OID-11 (88 / 117)

Paulsell 2 OID-12 (94 / 123)

MW-6S (65 / 83)

Quesenberry 223 (89 / 110)

Schmidt 227 (59 / 78)

MW-9 (150 / 180)

Stanislaus River

Tuolumne River

San Joaquin River

Ripon

Salida

Modesto

Ceres

Hughson

Keyes

Denair

Turlock

Westley

Oakdale

Hickman

Turlock Lake State Park

Turlock Lake

Woodward Reservoir

Modesto Reservoir

Martel's Creek

Littlejohns Creek

Lone Tree Creek

Rybberg Creek

Gallup Creek

Maze Blvd

Crows Landing Rd

Santa Fe Ave

California State Univ Stanislaus

Note:
This monitoring network is used as a proxy for the reduction of groundwater in storage and land subsidence sustainability indicators.

TODD GROUNDWATER

Woodard & Curran

Figure 3-9
Fall 2023 Monitoring Event
MT Comparison
Eastern Principal Aquifer

Legend

- CASGEM Well -- Western Upper (4)
- CASGEM Well -- Eastern (11)
- Prop 68 Monitoring Well (5)

MT Exceedance

- Above MT (16)
- Below MT (3)
- No Measurement (1)

Management Area

- Modesto ID (13)
- Oakdale ID (3)
- Non-District West (2)
- Non-District East (2)
- Corcoran Clay Extent (Burow et al., 2004)

Western Upper Principal Aquifer (5)

Eastern Principal Aquifer (15)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

Allen OID-01
(75 / 83)

Langdon Merle 241
(50 / 62)

Head Lateral 8 194
(40 / 47)

Marquis OID-10
(86 / 92)

Birnbaum OID-03
(74 / 87)

MW-4S
(56 / 67)

American 208
(48 / 55)

Riverbank OID-13
(42 / 54)

Katen 69
(27 / 33)

Canfield 90
(33 / 37)

Philbrick 201
(38 / 43)

Paradise 235
(34 / 41)

MW-2S
(38 / 43)

MW-3S
(26 / 32)

Lateral one 195
(42 / 52)

MW-6S
(65 / 83)

Jones WID 228
(55 / 75)

Schmidt 227
(59 / 78)

Quesenberry 223
(89 / 110)

MW-9
(150 / 180)

Stanislaus River

Tuolumne River

San Joaquin River

Woodward Reservoir

Modesto Reservoir

Turlock Lake

Ripon

Salida

Modesto

Shackelford

Hickman

Ceres

Hughson

Keyes

Denair

Turlock

Westley

Oakdale

Maze Blvd

Crows Landing Rd

Santa Fe Ave

Albers Rd

Martel's Creek

Littlejohns Creek

Lone Tree Creek

Rybolt Creek

Gallup Creek

TODD GROUNDWATER

Woodard & Curran

Figure 3-10
Fall 2023 Monitoring Event
MT Comparison
Interconnected Surface Water

Legend

- CASGEM Well -- Western Upper (12)
- City of Modesto Monitoring Well (2)
- Prop 68 Monitoring Well (2)
- USGS Monitoring Well (1)

MT Exceedance

- Above MT (17)
- Below MT (0)
- No Measurement (0)

Management Area

- Modesto ID (17)
- Oakdale ID (0)
- Non-District West (0)
- Non-District East (0)
- Corcoran Clay Extent (Burow et al., 2004)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

MW-1S
(33 / 43)

Hart Road 88
(35 / 40)

MOD-MWB-1
(40 / 49)

Curtis #2 100
(34 / 41)

North Ave 103
(41 / 50)

Machado 23
(31 / 40)

Van Buren 43
(38 / 45)

Gates Road 101
(24 / 33)

Warnock 46
(35 / 42)

MOD-MWD-1
(30 / 40)

Katen 69
(27 / 33)

Young 76
(36 / 42)

MRWA-2
(36 / 43)

Canfield 90
(32 / 36)

MW-2S
(34 / 41)

Philbrick 201
(34 / 41)

Paradise 235
(34 / 41)

Stanislaus River

Tuolumne River

San Joaquin River

Ripon

Oakdale

Modesto

Ceres

Hughson

Hickman

Waterford

Turlock

Keyes

Denair

Westley

Shackelford

Woodward Reservoir

Modesto Reservoir

Turlock Lake State Park

Turlock Lake

Martel's Creek

Littlejohns Creek

Lone Tree Creek

Rybberg Creek

Gallup Creek

Note:
This monitoring network is used as a proxy for the reduction of groundwater in storage and land subsidence sustainability indicators.

TODD GROUNDWATER

Woodard & Curran

Figure 3-11
Spring 2024 Monitoring Event
MT Comparison
Western Upper Principal Aquifer

Legend

- City of Modesto Monitoring Well (2)
- Prop 68 Monitoring Well (2)
- USGS Monitoring Well (1)

MT Exceedance

- Above MT (5)
- Below MT (0)
- No Measurement (0)

Management Area

- Modesto ID (5)
- Oakdale ID (0)
- Non-District West (0)
- Non-District East (0)
- Corcoran Clay Extent (Burow et al., 2004)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

MW-1D
(14 / 27)

MOD-MWB-2
(26 / 34)

MOD-MWD-3
(30 / 37)

MW-2D
(35 / 40)

MRWA-3
(28 / 36)

Stanislaus River

Tuolumne River

San Joaquin River

Ripon

Modesto

Oakdale

Ceres

Hughson

Hickman

Waterford

Turlock

Denair

Keyes

Westley

Shackelford

Woodward Reservoir

Modesto Reservoir

Turlock Lake

Turlock Lake State Park

California State Univ Stanislaus

Martel's Creek

Littlejohns Creek

Lone Tree Creek

Rybberg Creek

Gallup Creek

Albers Rd

Crows Landing Rd

Santa Fe Ave

Maze Blvd

294 ft

614 ft

169 ft

Note:
This monitoring network is used as a proxy for the reduction of groundwater in storage and land subsidence sustainability indicators.

TODD GROUNDWATER

Woodard & Curran

Figure 3-12
Spring 2024 Monitoring Event
MT Comparison
Western Lower Principal Aquifer

Legend

- CASGEM Well -- Eastern (25)
- City of Modesto Monitoring Well (2)
- Prop 68 Monitoring Well (10)
- USGS Monitoring Well (2)

MT Exceedance

- Above MT (30)
- Below MT (7)
- No Measurement (2)

Management Area

- Modesto ID (24)
- Oakdale ID (7)
- Non-District West (1)
- Non-District East (7)
- Corcoran Clay Extent (Burow et al., 2004)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

Allen OID-01 (72 / 81)

Marquis OID-10 (85 / 91)

Langdon Merle 241 (50 / 62)

American 208 (48 / 55)

Riverbank OID-13 (42 / 54)

Head Lateral 8 194 (40 / 47)

MW-5S (69 / 89)

Birnbaum OID-03 (72 / 86)

MW-7 (75 / 110)

MW-10 (72 / 101)

MW-8 (75 / 110)

MW-4S (56 / 67)

Crane OID-06 (66 / 77)

Claribel 206 (49 / 62)

Furtado OID-07 (69 / 81)

Bangs Ave 243 (32 / 46)

Cavil 214 (53 / 73)

Bentley OID-02 (71 / 85)

Paulsell 1 OID-11 (88 / 117)

Paulsell 2 OID-12 (94 / 123)

FPA-2 (38 / 48)

OFPB-2 (35 / 53)

Wood 210 (52 / 66)

Wellsford 233 (62 / 77)

Blossom 230 (61 / 78)

Perley 202 (36 / 45)

MOD-MWC-3 (40 / 50)

Head Lateral 3 215 (56 / 73)

MW-6S (65 / 83)

MW-3D (25 / 31)

MW-11 (35 / 48)

Albers 232 (60 / 76)

MW-9 (150 / 180)

MOD-MWA-2 (30 / 36)

Jones WID 228 (55 / 75)

Quesenberry 223 (89 / 110)

MW-3S (25 / 31)

Lateral one 195 (42 / 52)

Schmidt 227 (59 / 78)

Stanislaus River

Tuolumne River

San Joaquin River

Ripon

Salida

Modesto

Ceres

Hughson

Hickman

Keyes

Denair

Turlock

Westley

Oakdale

Woodward Reservoir

Modesto Reservoir

Turlock Lake

Turlock Lake State Park

Martel's Creek

Littlejohns Creek

Lone Tree Creek

Rybberg Creek

Gallup Creek

Maze Blvd

Crows Landing Rd

Santa Fe Ave

California State Univ Stanislaus

Laird Park

Note:
This monitoring network is used as a proxy for the reduction of groundwater in storage and land subsidence sustainability indicators.

TODD GROUNDWATER

Woodard & Curran

Figure 3-13
Spring 2024 Monitoring Event
MT Comparison
Eastern Principal Aquifer

Legend

- CASGEM Well -- Western Upper (4)
- CASGEM Well -- Eastern (11)
- Prop 68 Monitoring Well (5)

MT Exceedance

- Above MT (18)
- Below MT (1)
- No Measurement (1)

Management Area

- Modesto ID (13)
- Oakdale ID (3)
- Non-District West (2)
- Non-District East (2)
- Corcoran Clay Extent (Burow et al., 2004)

Western Upper Principal Aquifer (5)

Eastern Principal Aquifer (15)

(MT / MO) MT = minimum threshold, MO = measurable objective

Values in parentheses in legend represent number of wells

N

0 3

Miles

Allen OID-01
(75 / 83)

Langdon Merle 241
(50 / 62)

Head Lateral 8 194
(40 / 47)

Marquis OID-10
(86 / 92)

Birnbaum OID-03
(74 / 87)

MW-4S
(56 / 67)

American 208
(48 / 55)

Riverbank OID-13
(42 / 54)

Katen 69
(27 / 33)

Canfield 90
(33 / 37)

Philbrick 201
(38 / 43)

Paradise 235
(34 / 41)

MW-2S
(38 / 43)

MW-3S
(26 / 32)

Lateral one 195
(42 / 52)

Jones WID 228
(55 / 75)

MW-6S
(65 / 83)

Schmidt 227
(59 / 78)

Quesenberry 223
(89 / 110)

MW-9
(150 / 180)

Stanislaus River

Tuolumne River

San Joaquin River

Ripon

Salida

Modesto

Shackelford

Ceres

Hughson

Keyes

Denair

Turlock

Oakdale

Hickman

Turlock Lake

Westley

Woodward Reservoir

Modesto Reservoir

Turlock Lake State Park

California State Univ Stanislaus

Laird Park

Martel's Creek

Littlejohns Creek

Lone Tree Creek

Rybberg Creek

Gallup Creek

Maze Blvd

Albers Rd

Crows Landing Rd

Santa Fe Ave

294 ft

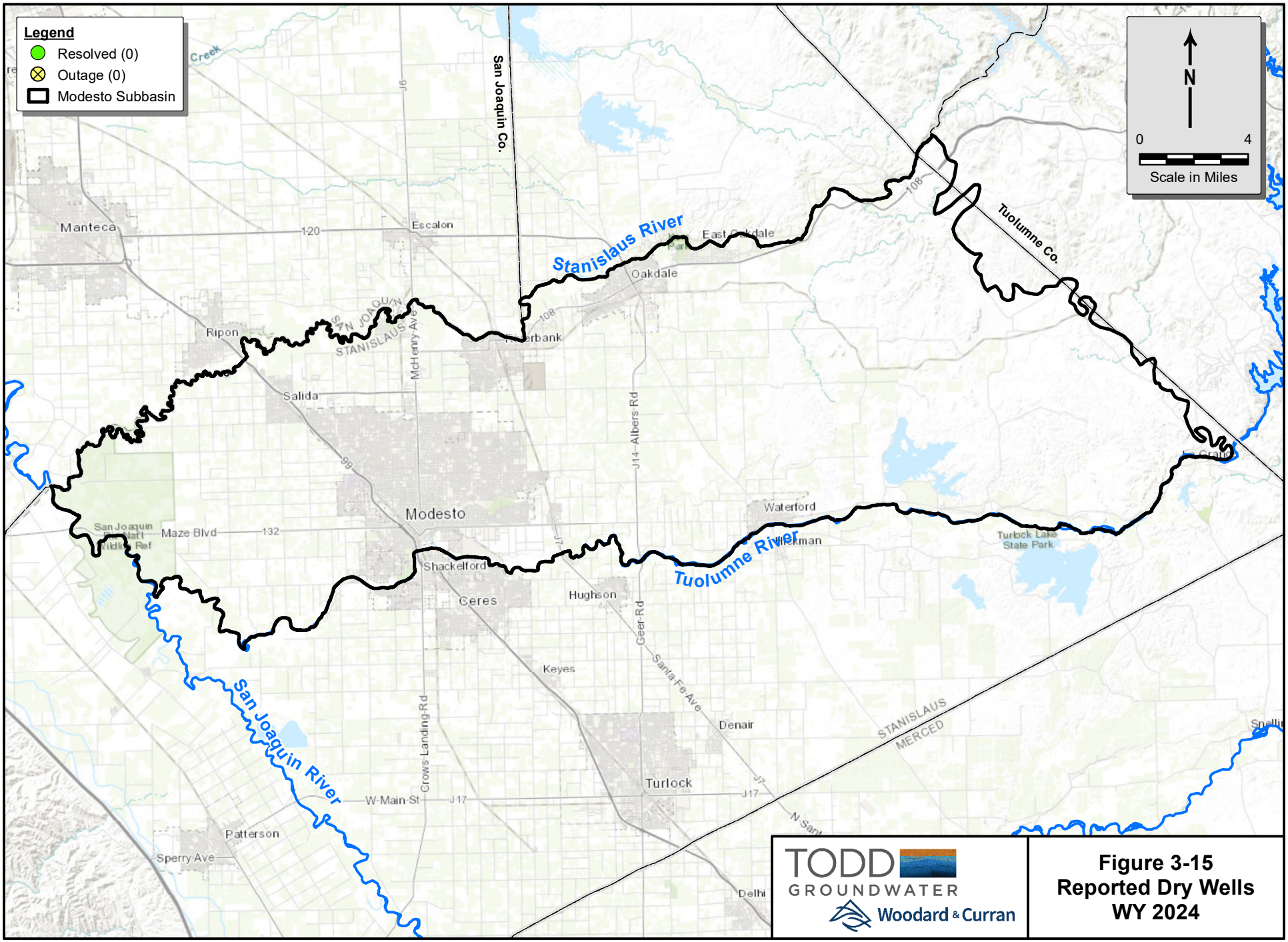
614 ft.

169 ft

TODD GROUNDWATER

Woodard & Curran

Figure 3-14
Spring 2024 Monitoring Event
MT Comparison
Interconnected Surface Water


Legend
Resolved (0)
Outage (0)
Modesto Subbasin
N
0
4
Scale in Miles
Stanislaus River
Tuolumne River
San Joaquin River
San Joaquin Co.
Tuolumne Co.
Manteca
Escalon
Oakdale
Ripon
Salida
Modesto
Waterford
Shackelford
Ceres
Hughson
Keyes
Denair
Turlock
Patterson
Delhi
Maze Blvd
W Main St
Sperry Ave
Crows Landing Rd
Geer Rd
J14 Albers Rd
McHenry Ave
Santa Fe Ave
Turlock Lake State Park
STANISLAUS
MERCED
120
108
99
132
J17
J7
TODD GROUNDWATER
Woodard & Curran
Figure 3-15
Reported Dry Wells
WY 2024

Legend

- Well Location
- Groundwater Elevation Contour
- Corcoran Clay Extent (Burow et al., 2004)

N

0 3

Miles

Stanislaus River

Tuolumne River

San Joaquin River

Marquis OID-10 87

Allen OID-01 73

MW-5S 79

Birnbaum OID-03 72

American 208 53

Head Lateral 8 194 46

Riverbank OID-13 44

Langdon Merle 241 60

MW-4S 60

Crane OID-06 67

Bangs Ave 243 30

Claribel 206 55

SB 69

MW-1S 46

FPB-2 47

FPE-1 61

Cavil 214 60

Bentley OID-02 70

Furtado OID-07 64

MW-10 66

MW-7 63

MW-8 64

Paulsell 1 OID-11 74

Paulsell 2 OID-12 81

Hart Road 88 42

Curtis #2 100 43

MOD-MWB-1 51

OFPB-2 51

Basso 2 39

North Ave 103 51

FPA-2 55

SC 60

OFPA-1 59

Head Lateral 3 215 65

Wellsford 233 62

MOD-MWC-3 45

Perley 202 46

Albers 232 65

Schmidt 227 61

MW-9 153

Well 12 32

Gates Road 101 28

Machado 23 44

Van Buren 43 46

Well 2 27

Well 7 31

Gove 18 43

Well 3 28

Well 9 33

Warnock 46 46

MOD-MWD-1 49

MW-11 47

MOD-MWA-2 36

MW-3S 38

MOD-MWE 2 40

Katen 69 35

Blossom 230 56

Waterford

Hickman

MW-6S 60

Well 11 32

Young 76 43

MRWA-2 44

Philbrick 201 46

Well 8 32

Well 4 26

Well 10 31

MW-2S 41

Paradise 235 42

Canfield 90 39

Lateral one 195 47

Jones WID 228 59

Shackelford

Ceres

Hughson

Keyes

Westley

Turlock

Denair

Modesto Reservoir

Turlock Lake State Park

Turlock Lake

Woodward Reservoir

Manteca

Escalon

Ripon

Oakdale

Riverbank

Salida

Waterford

Hickman

Maze Blvd

Crows Landing Rd

Santa Fe Ave

Escalon-Bellota Rd

Lone Tree Creek

Littlejohns Creek

Martel's Creek

Rybberg Creek

Gallup Creek

Big Creek

Figure 3-16
Groundwater Elevation Contours
Western Upper and Eastern
Principal Aquifers, Fall 2023

TODD GROUNDWATER

Woodard & Curran

Legend

- Well Location
- Groundwater Elevation Contour
- Corcoran Clay Extent (Burow et al., 2004)

N

0 3

Miles

MW-1D
42

MOD-MWB-2
43

MOD-MWD-3
42

MRWA-3
38

MW-2D
34

Stanislaus River

Tuolumne River

San Joaquin River

Manteca

Escalon

Ripon

Riverbank

Oakdale

Modesto

Waterford

Hickman

Ceres

Hughson

Keyes

Denair

Turlock

Westley

Shackelford

Woodward Reservoir

Modesto Reservoir

Turlock Lake

Lone Tree Creek

Littlejohns Creek

Martel's Creek

Rybberg Creek

Gallup Creek

Maze Blvd

Escalon-Bellota Rd

Albers Rd

Crows Landing Rd

Santa Fe Ave

TODD GROUNDWATER

Woodard & Curran

Figure 3-17
Groundwater Elevation Contours, Western Lower Principal Aquifer, Fall 2023

Legend

- Well Location
- Groundwater Elevation Contour
- Corcoran Clay Extent (Burow et al., 2004)

N

0 3

Miles

Stanislaus River

Tuolumne River

San Joaquin River

Marquis OID-10 86

Allen OID-01 76

MW-5S 83

Birnbaum OID-03 76

Riverbank OID-13 47

American 208 54

Head Lateral 8 194 52

Langdon Merle 241 65

MW-4S 63

Crane OID-06 70

MW-10 69

MW-7 64

MW-8 67

Bentley OID-02 72

Furtado OID-07 67

Paulsell 2 OID-12 81

Paulsell 1 OID-11 75

MW-1S 48

Bangs Ave 243 36

Hart Road 88 42

Claribel 206 64

Cavil 214 63

FPB-2 54

SB 69

OFPB-2 55

SC 60

FPE-1 61

OFPA-1 59

FPA-2 57

MOD-MWB-1 55

Curtis #2 100 44

Gates Road 101 32

Basso 2 41

North Ave 103 52

Head Lateral 3 215 64

Wellsford 233 68

Perley 202 49

MOD-MWC-3 49

Machado 23 45

Well 12 33

Well 2 29

Well 8 32

Well 7 34

Gove 18 45

Van Buren 43 47

MOD-MWD-1 50

MOD-MWA-2 40

Albers 232 70

Blossom 230 60

MW-6S 69

MW-9 154

Well 3 30

Katen 69 37

Warnock 46 47

MOD-MWE 2 42

MW-3S 40

MW-11 49

Well 4 27

Well 11 32

Young 76 44

MRWA-2 45

Philbrick 201 44

Schmidt 227 62

Well 10 31

Well 9 33

Canfield 90 38

Paradise 235 41

MW-2S 43

Lateral one 195 49

Jones WID 228 60

Manteca

Escalon

Ripon

Oakdale

Modesto

Ceres

Hughson

Waterford

Turlock

Denair

Keyes

Westley

Shackelford

Woodward Reservoir

Modesto Reservoir

Turlock Lake

Turlock Lake State Park

Lone Tree Creek

Littlejohns Creek

Martel's Creek

Rybberg Creek

Callup Creek

Escalon-Bellota Rd

Albers Rd

Crows Landing Rd

Santa Fe Ave

TODD GROUNDWATER

Woodard & Curran

Figure 3-18
Groundwater Elevation Contours Western Upper and Eastern Principal Aquifers, Spring 2024

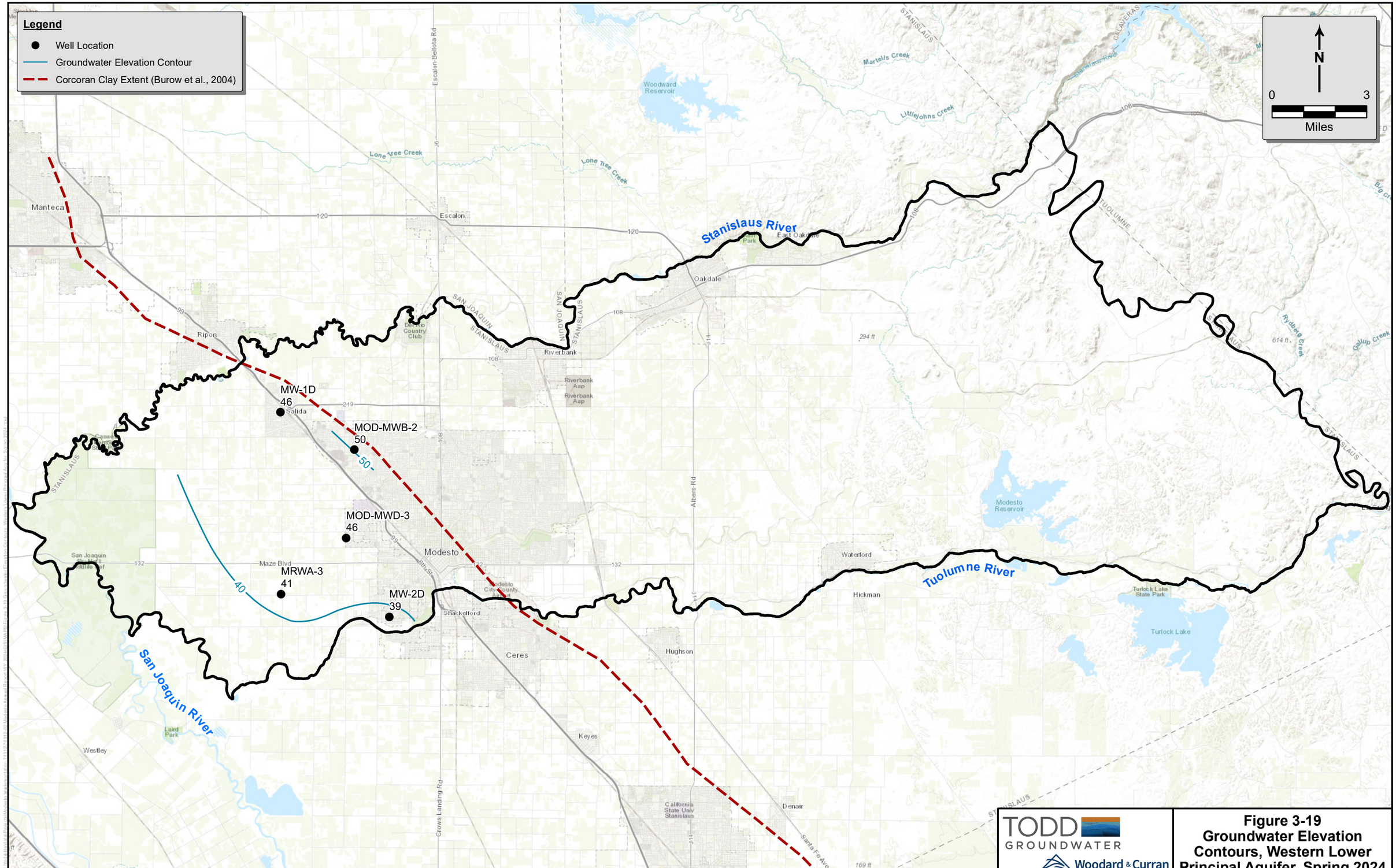
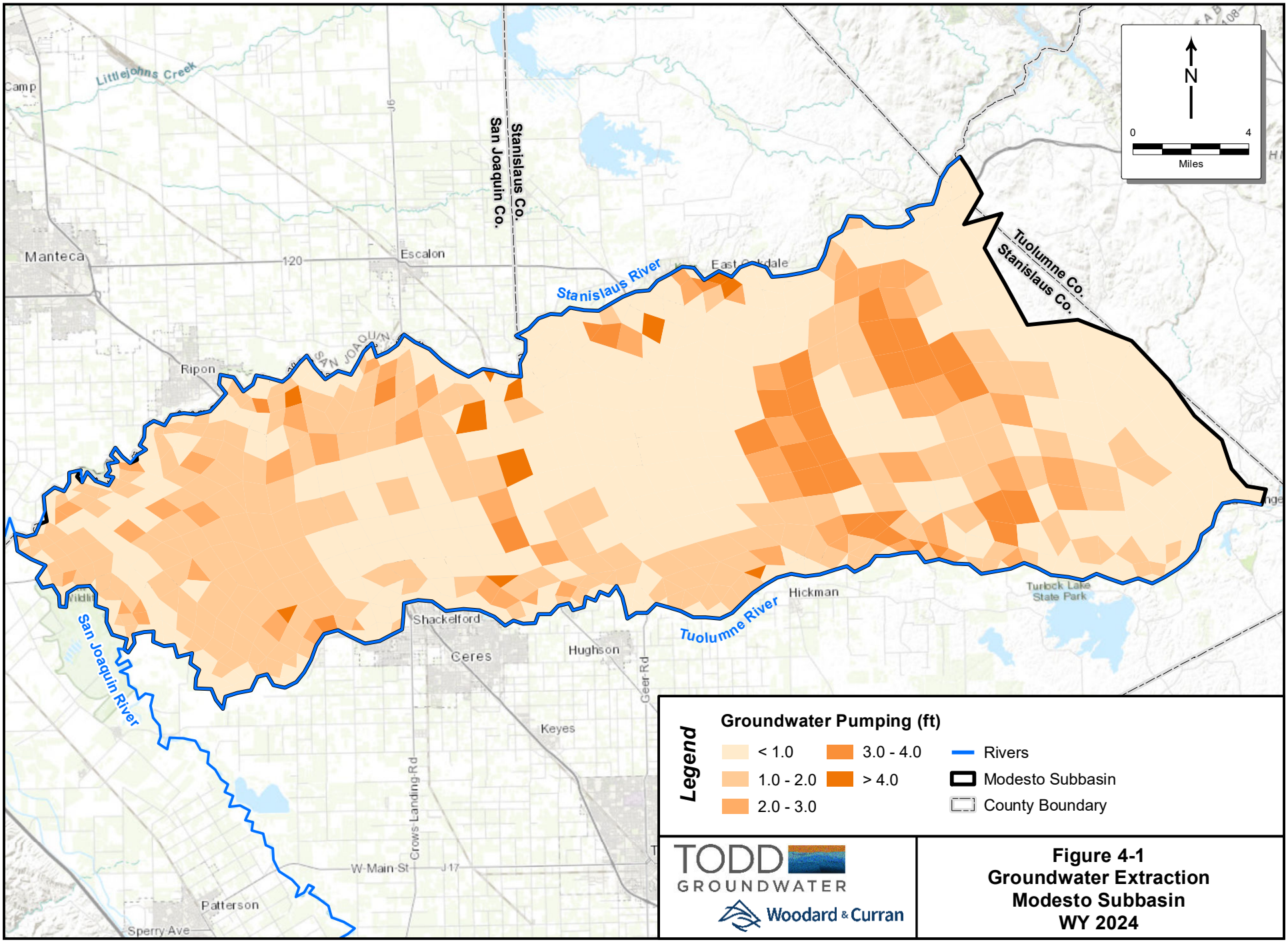
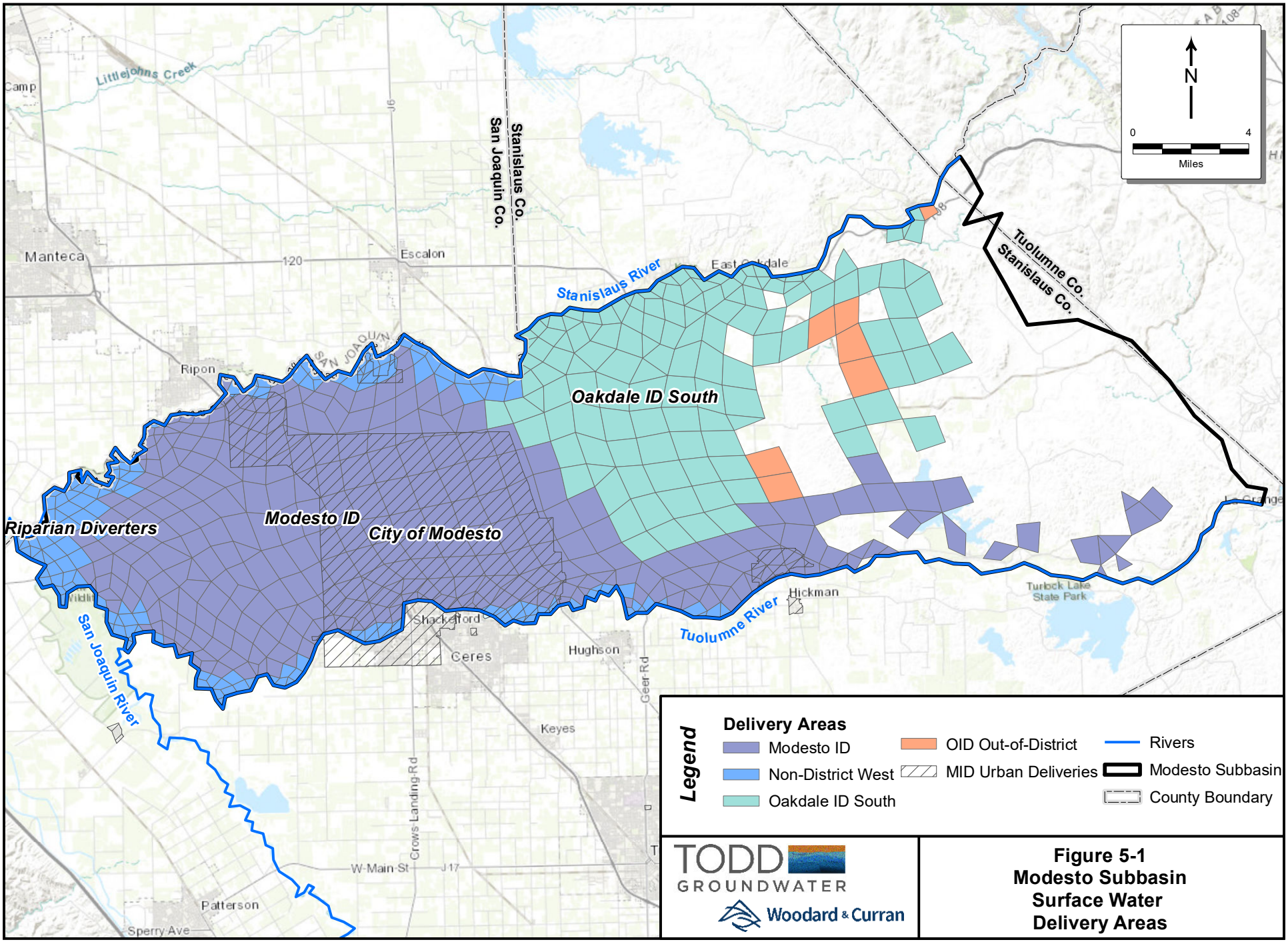
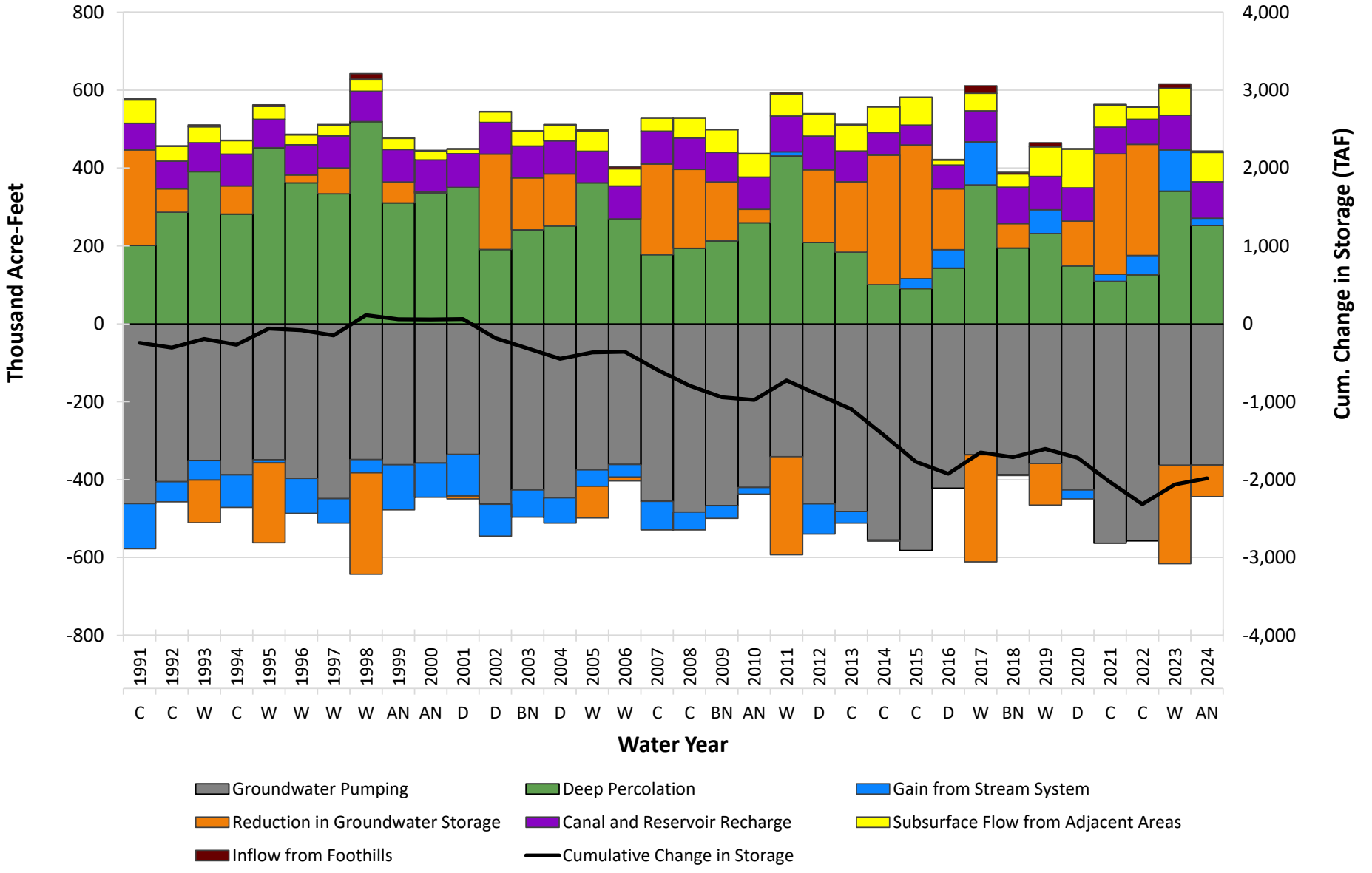


Figure 3-19
Groundwater Elevation Contours, Western Lower Principal Aquifer, Spring 2024

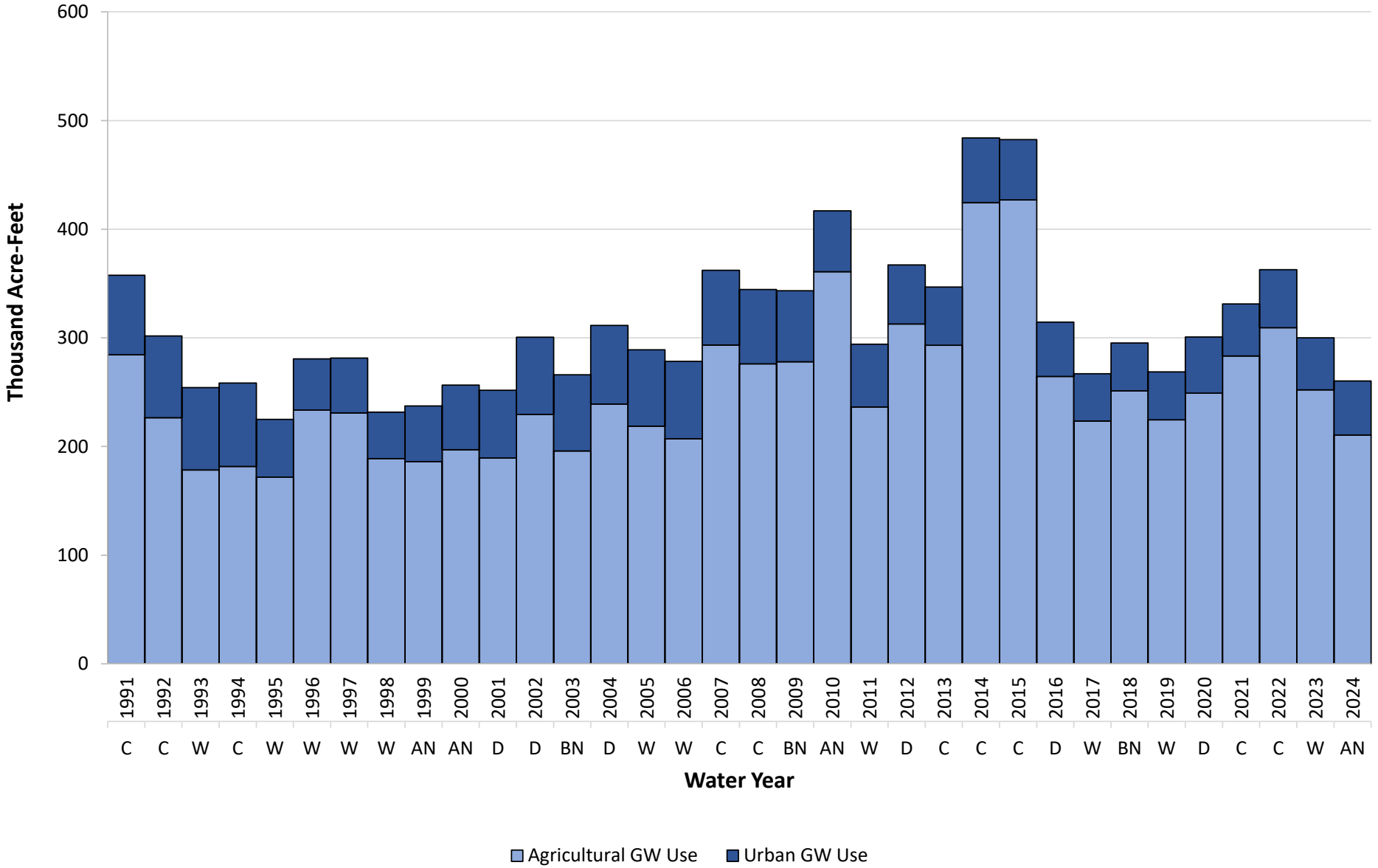

N
0
4
Miles
Littlejohns Creek
Stanislaus Co.
San Joaquin Co.
Tuolumne Co.
Stanislaus Co.
Manteca
120
Escalon
Stanislaus River
Ripon
SAN JOAQUIN
Hickman
Turlock Lake State Park
Tuolumne River
Shackelford
Ceres
Hughson
Geer Rd
San Joaquin River
Keyes
Crows Landing Rd
W Main St
J17
Patterson
Sperry Ave
Legend
Groundwater Pumping (ft)
< 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
> 4.0
Rivers
Modesto Subbasin
County Boundary
TODD GROUNDWATER
Woodard & Curran
Figure 4-1
Groundwater Extraction
Modesto Subbasin
WY 2024


Littlejohns Creek
Camp
Manteca
120
Escalon
Stanislaus River
San Joaquin Co.
Stanislaus Co.
Tuolumne Co.
Stanislaus Co.
East Oakdale
Ripon
Oakdale ID South
Riparian Diverters
Modesto ID
City of Modesto
Tuolumne River
Hickman
Turlock Lake State Park
Shackelford
Ceres
Hughson
Geer Rd
San Joaquin River
Keyes
Crows Landing Rd
W Main St
J17
Patterson
Sperry Ave
N
0
4
Miles
Legend
Delivery Areas
Modesto ID
Non-District West
Oakdale ID South
OID Out-of-District
MID Urban Deliveries
Rivers
Modesto Subbasin
County Boundary
TODD GROUNDWATER
Woodard & Curran
Figure 5-1
Modesto Subbasin
Surface Water
Delivery Areas



TODD GROUNDWATER
Woodard & Curran

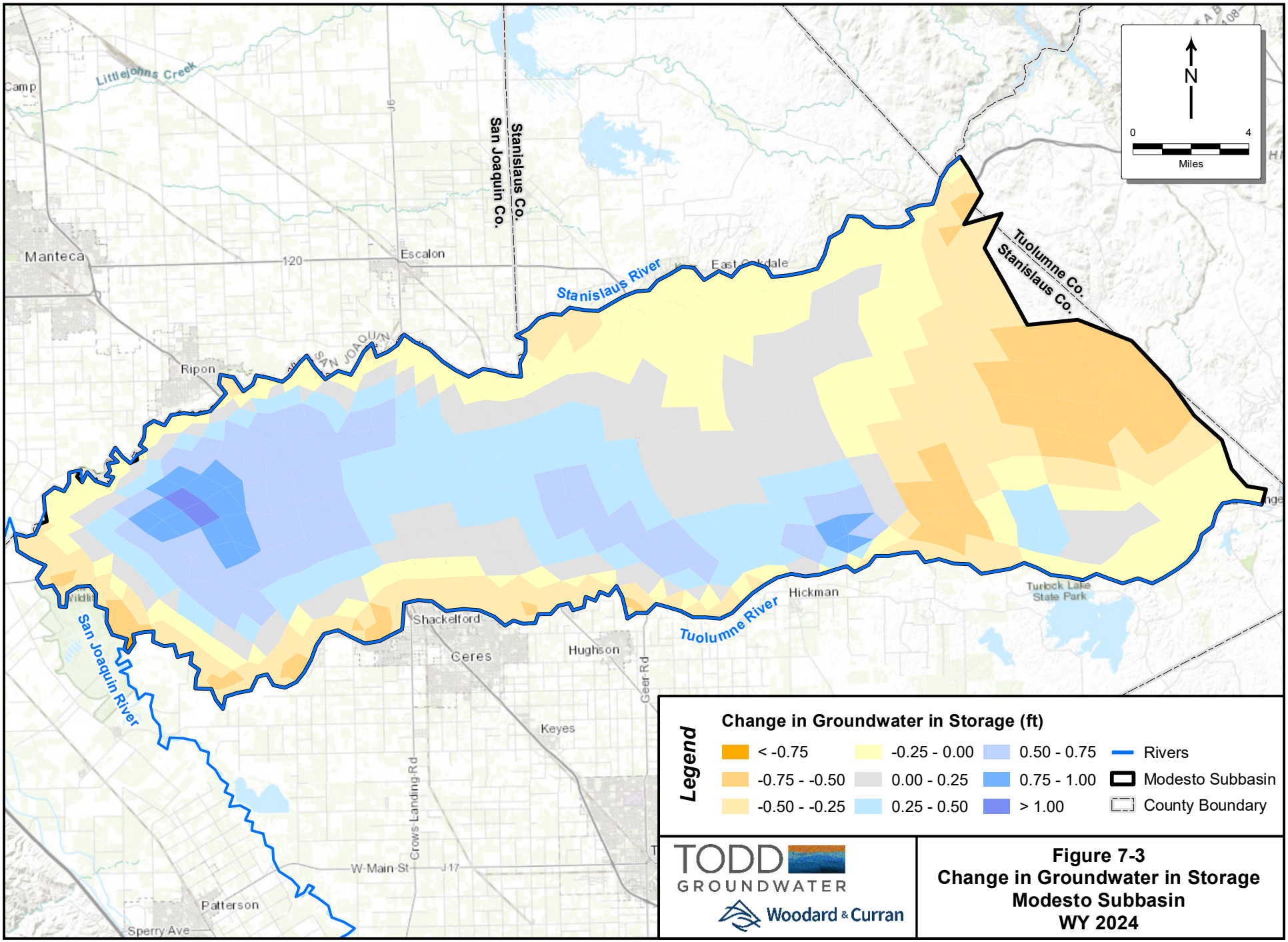
Figure 7-1
Groundwater Budget
Modesto Subbasin
WY 1991-2024

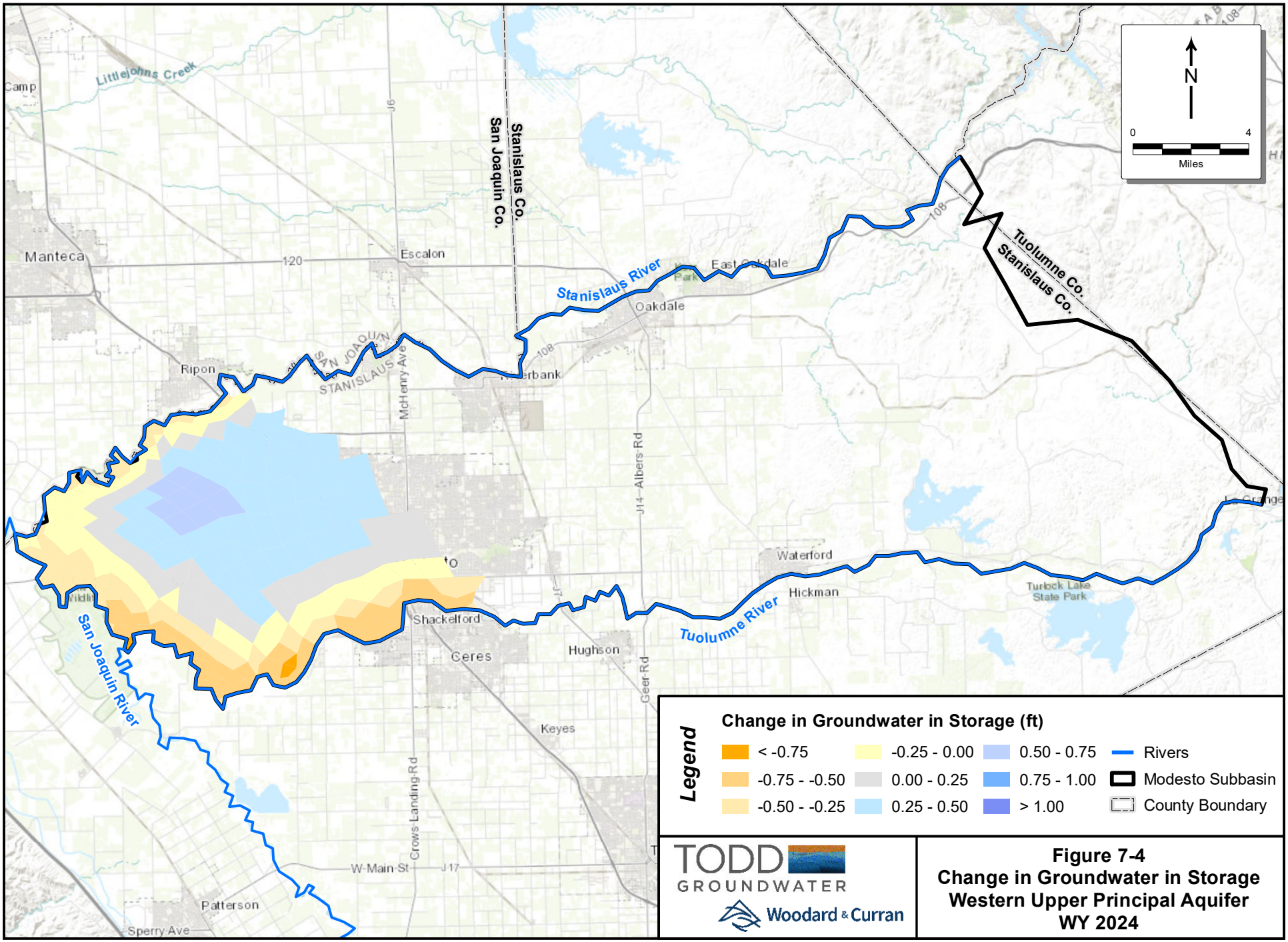


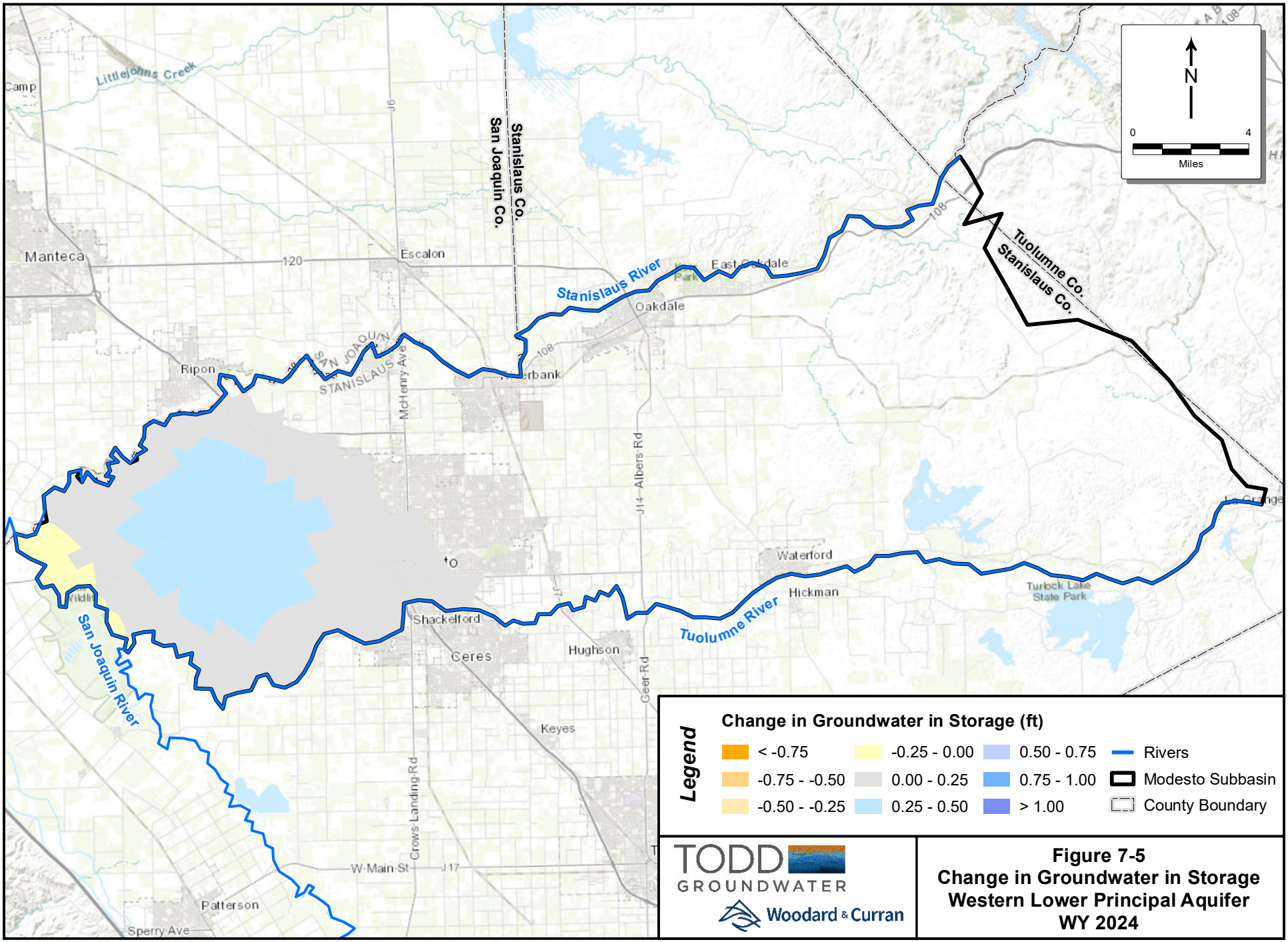
TODD GROUNDWATER

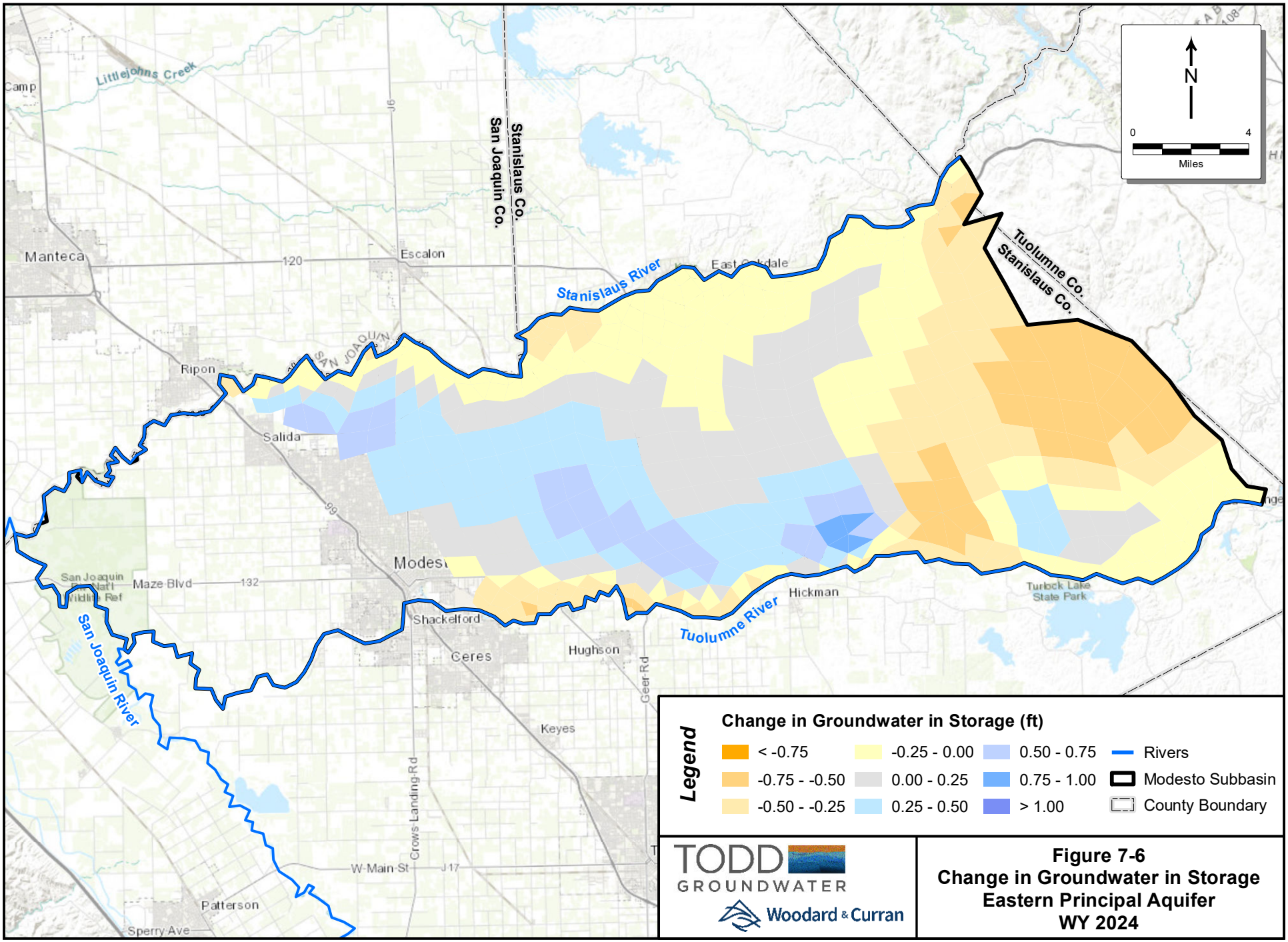
Woodard & Curran

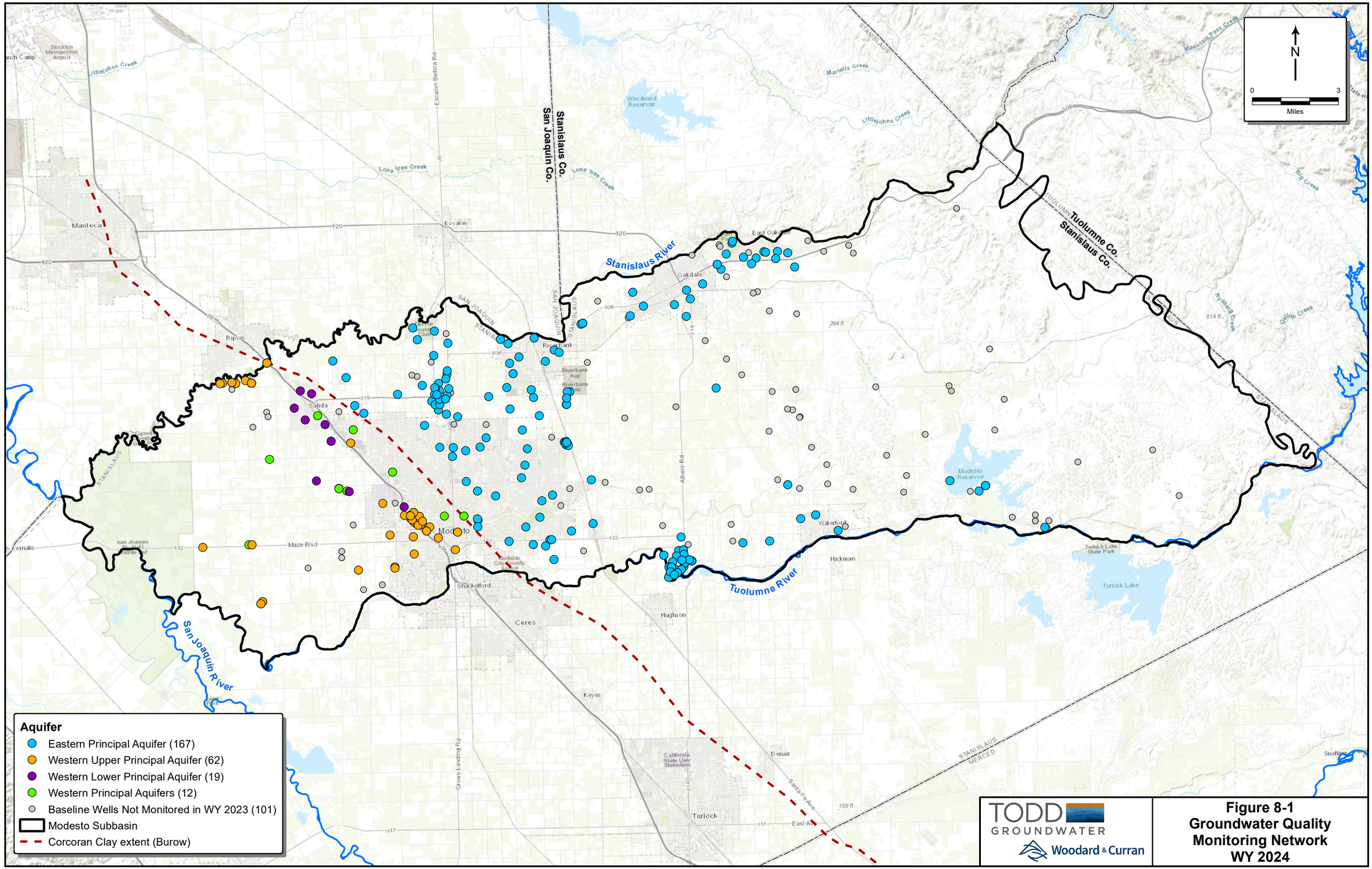
Figure 7-2
Groundwater Use
Modesto Subbasin
WY 1991-2024


Littlejohns Creek
Stanislaus Co.
San Joaquin Co.
Tuolumne Co.
Stanislaus Co.
Manteca
Escalon
120
Ripon
Stanislaus River
Tuolumne River
San Joaquin River
Shackelford
Ceres
Hughson
Hickman
Turlock Lake State Park
Keyes
Geer Rd
Crows Landing Rd
W Main St
J17
Patterson
Sperry Ave
N
0
4
Miles
Legend
Change in Groundwater in Storage (ft)
< -0.75
-0.75 - -0.50
-0.50 - -0.25
-0.25 - 0.00
0.00 - 0.25
0.25 - 0.50
0.50 - 0.75
0.75 - 1.00
> 1.00
Rivers
Modesto Subbasin
County Boundary
TODD GROUNDWATER
Woodard & Curran
Figure 7-3
Change in Groundwater in Storage
Modesto Subbasin
WY 2024

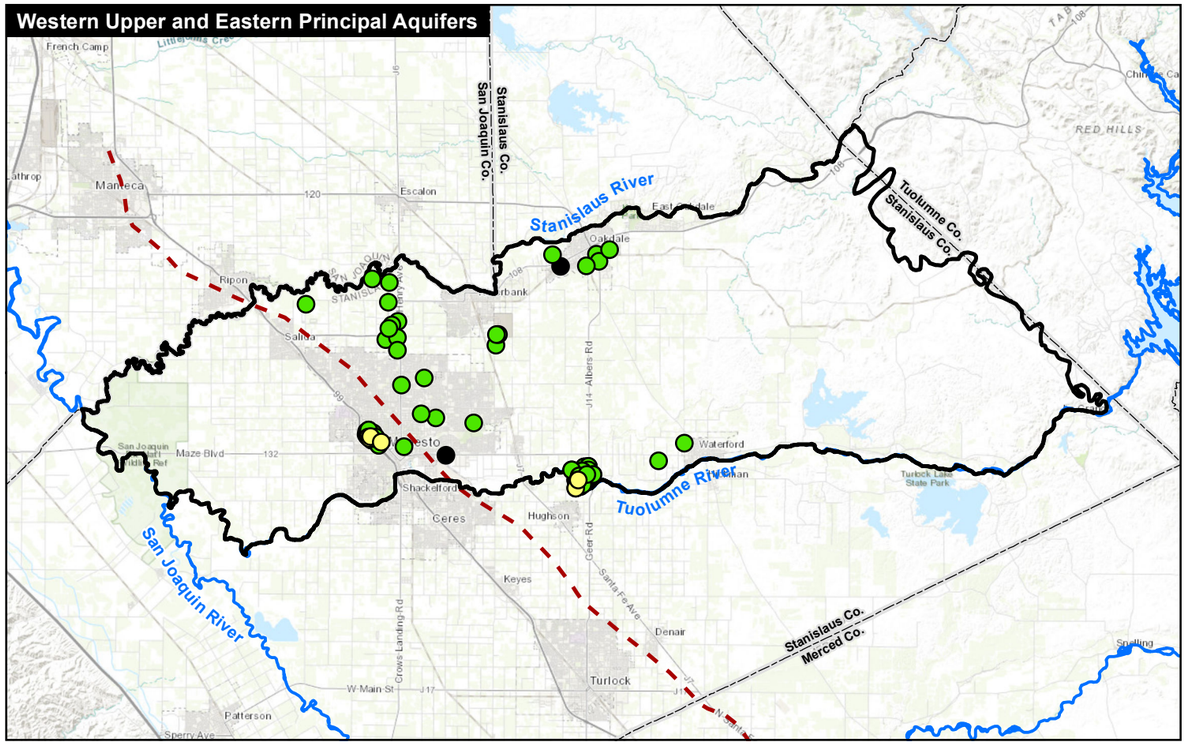

N
0
4
Miles
Littlejohns Creek
Stanislaus Co.
San Joaquin Co.
Tuolumne Co.
Stanislaus Co.
Manteca
Escalon
Oakdale
Ripon
Stanislaus River
Tuolumne River
San Joaquin River
Waterford
Hickman
Turlock Lake State Park
Shackelford
Ceres
Hughson
Keyes
Patterson
Sperry Ave
W Main St
McHenry Ave
J14 Albers Rd
Geer Rd
Crows Landing Rd
120
108
J6
J17
Legend
Change in Groundwater in Storage (ft)
< -0.75
-0.75 - -0.50
-0.50 - -0.25
-0.25 - 0.00
0.00 - 0.25
0.25 - 0.50
0.50 - 0.75
0.75 - 1.00
> 1.00
Rivers
Modesto Subbasin
County Boundary
TODD GROUNDWATER
Woodard & Curran
Figure 7-4
Change in Groundwater in Storage
Western Upper Principal Aquifer
WY 2024


N
0
4
Miles
Littlejohns Creek
Stanislaus Co.
San Joaquin Co.
Tuolumne Co.
Stanislaus Co.
Manteca
Escalon
Oakdale
Stanislaus River
Ripon
McHenry Ave
J14-Albers Rd
Waterford
Hickman
Turlock Lake State Park
Tuolumne River
Shackelford
Ceres
Hughson
Geer Rd
San Joaquin River
Keyes
Crows Landing Rd
W Main St
Patterson
Sperry Ave
Legend
Change in Groundwater in Storage (ft)
< -0.75
-0.75 - -0.50
-0.50 - -0.25
-0.25 - 0.00
0.00 - 0.25
0.25 - 0.50
0.50 - 0.75
0.75 - 1.00
> 1.00
Rivers
Modesto Subbasin
County Boundary
TODD GROUNDWATER
Woodard & Curran
Figure 7-5
Change in Groundwater in Storage
Western Lower Principal Aquifer
WY 2024

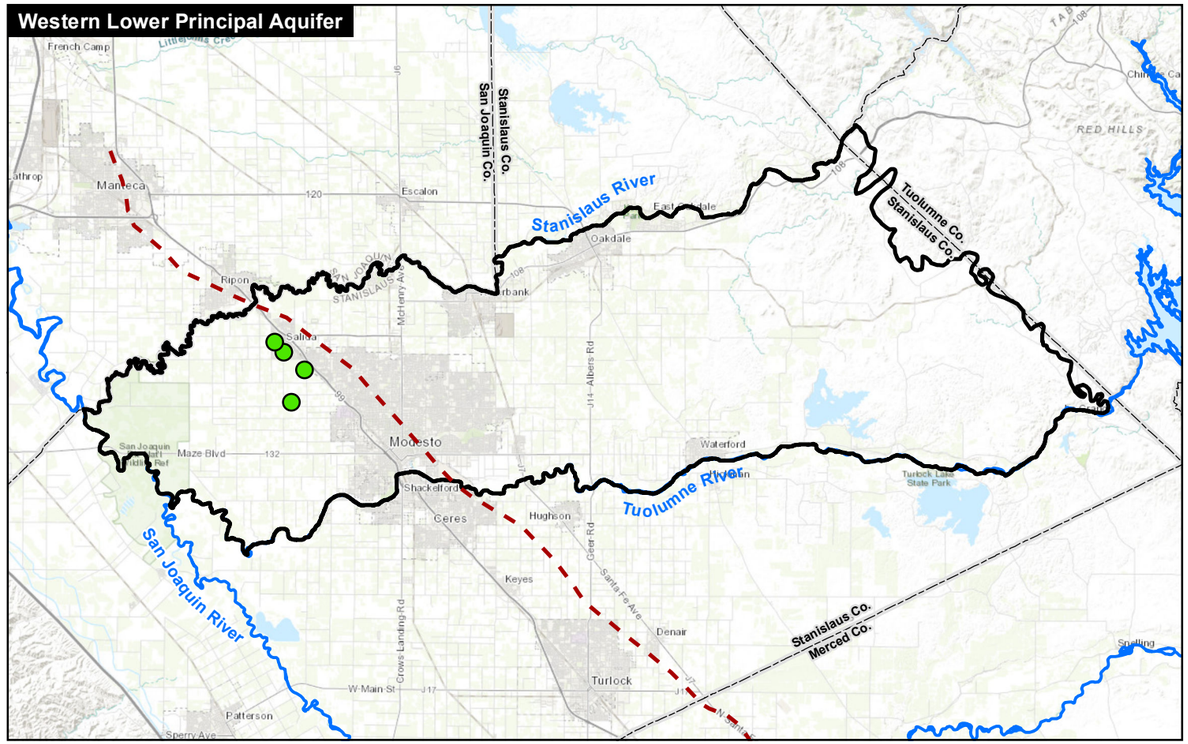

N
0
4
Miles
Littlejohns Creek
Stanislaus Co.
San Joaquin Co.
Tuolumne Co.
Stanislaus Co.
Manteca
Escalon
120
Stanislaus River
Ripon
Salida
Modesto
Maze Blvd
132
San Joaquin River
Shackelford
Ceres
Hughson
Hickman
Tuolumne River
Turlock Lake State Park
Geer Rd
Keyes
Crows Landing Rd
W Main St
J17
Patterson
Sperry Ave
Legend
Change in Groundwater in Storage (ft)
< -0.75
-0.75 - -0.50
-0.50 - -0.25
-0.25 - 0.00
0.00 - 0.25
0.25 - 0.50
0.50 - 0.75
0.75 - 1.00
> 1.00
Rivers
Modesto Subbasin
County Boundary
TODD GROUNDWATER
Woodard & Curran
Figure 7-6
Change in Groundwater in Storage
Eastern Principal Aquifer
WY 2024


N
0
3
Miles
Stanislaus River
Tuolumne River
San Joaquin River
Stanislaus Co.
San Joaquin Co.
Tuolumne Co.
Stanislaus Co.
Manteca
Escalon
Ripon
Salida
Riverbank
Oakdale
Modesto
Ceres
Hughson
Keyes
Turlock
Denair
Waterford
Hickman
Modesto Reservoir
Turlock Lake
Woodward Reservoir
Littlejohns Creek
Lone Tree Creek
Martells Creek
Mountain Pass Creek
Big Creek
Rydberg Creek
Gallup Creek
Maze Blvd
Shackelford
Crows Landing Rd
Albers Rd
Aquifer
Eastern Principal Aquifer (167)
Western Upper Principal Aquifer (62)
Western Lower Principal Aquifer (12)
Western Principal Aquifers (12)
Baseline Wells Not Monitored in WY 2023 (101)
Modesto Subbasin
Corcoran Clay extent (Burow)
TODD GROUNDWATER
Woodard & Curran
Figure 8-1
Groundwater Quality
Monitoring Network
WY 2024

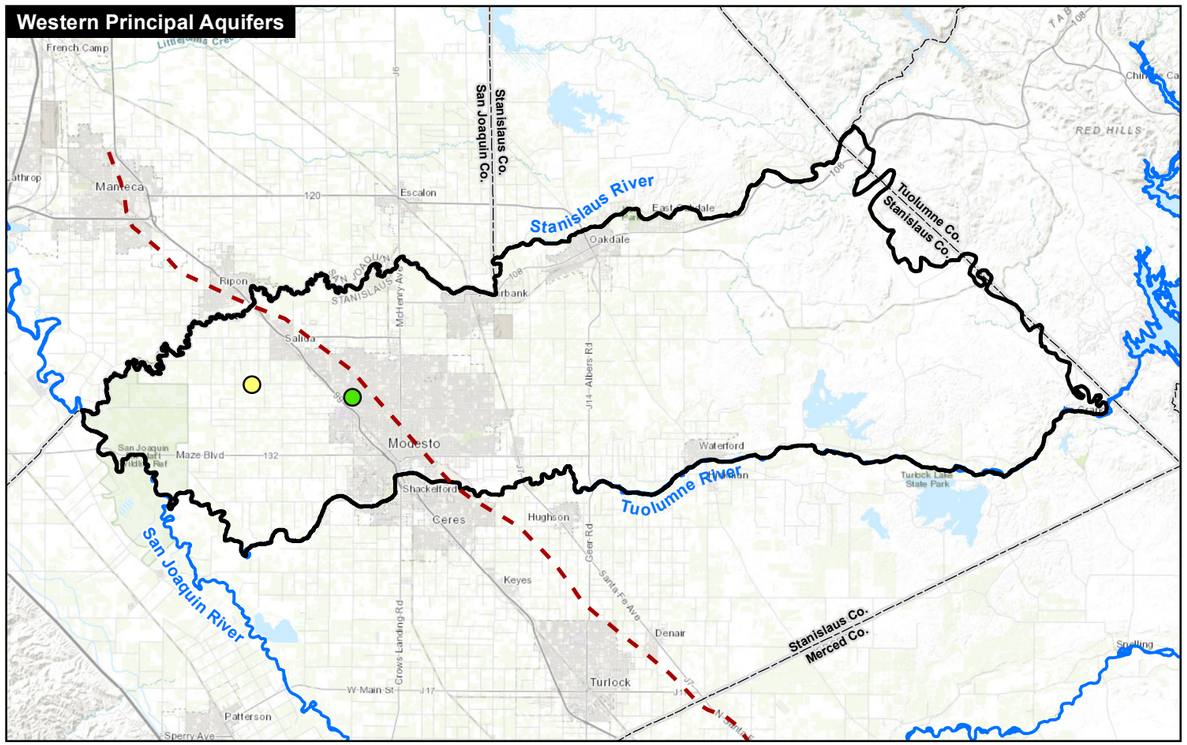
Western Upper and Eastern Principal Aquifers



Western Lower Principal Aquifer



Western Principal Aquifers



N

0 6

Miles

Arsenic (MCL = 10 mg/L)

- Above MCL - First-Time (0)
- Above MCL - Above Historical Maximum (0)
- Above MCL - Equal to or Below Historical Maximum (8)
- Detection - Equal to or Below MCL (68)
- Non-Detect (18)

TODD GROUNDWATER

Woodard & Curran

Figure 8-2
Arsenic in Groundwater
WY 2024

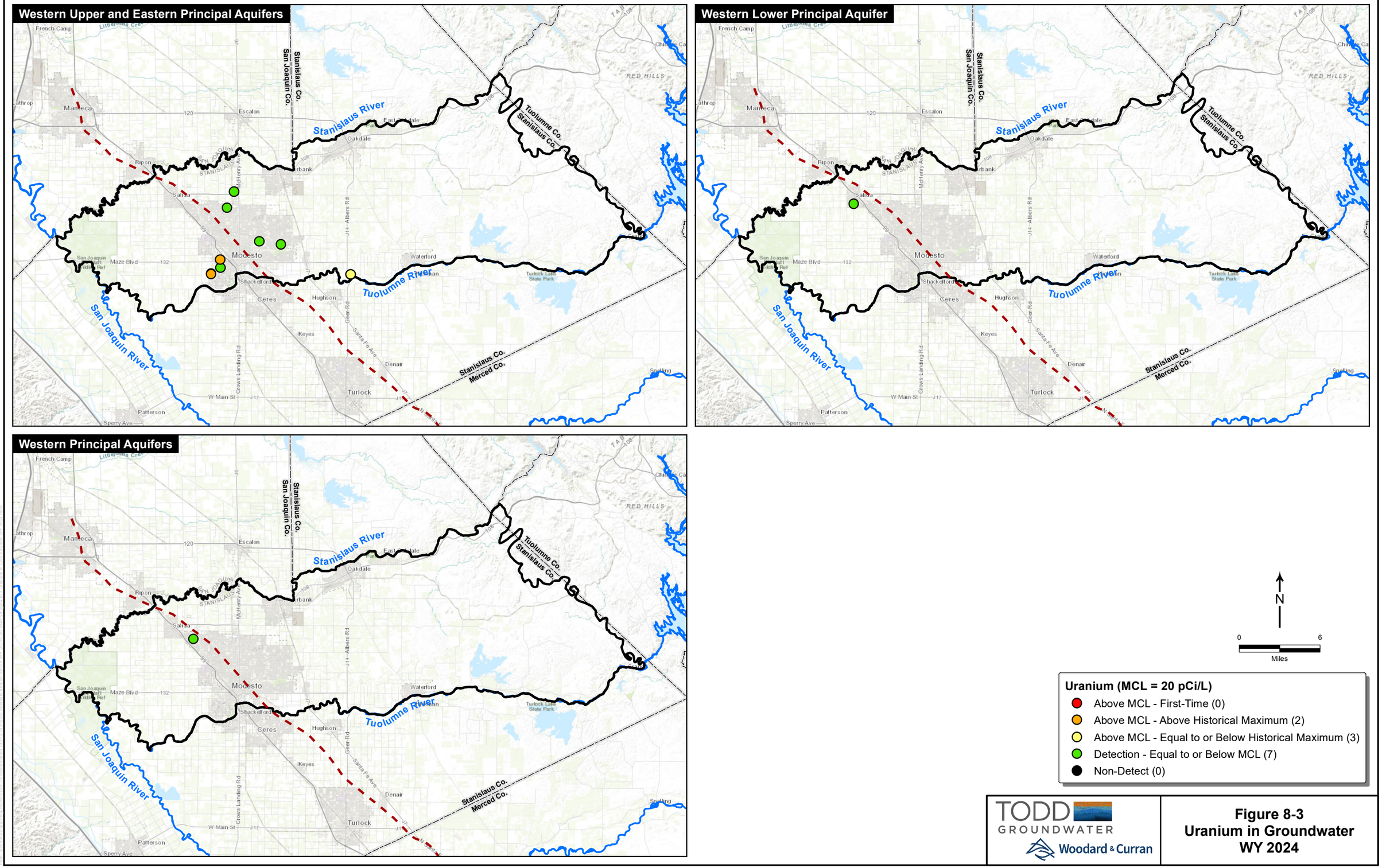
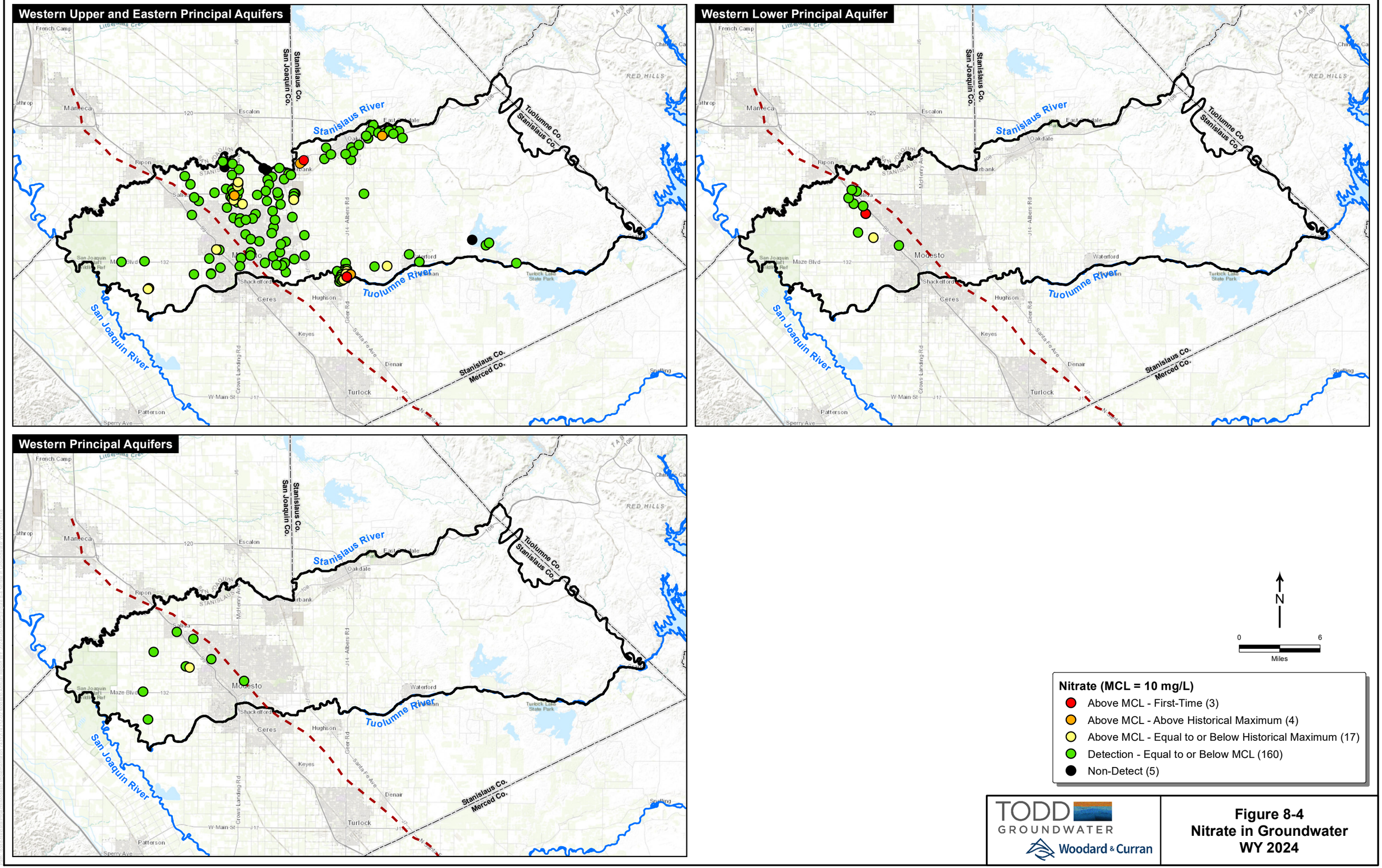


Figure 8-3
Uranium in Groundwater
WY 2024

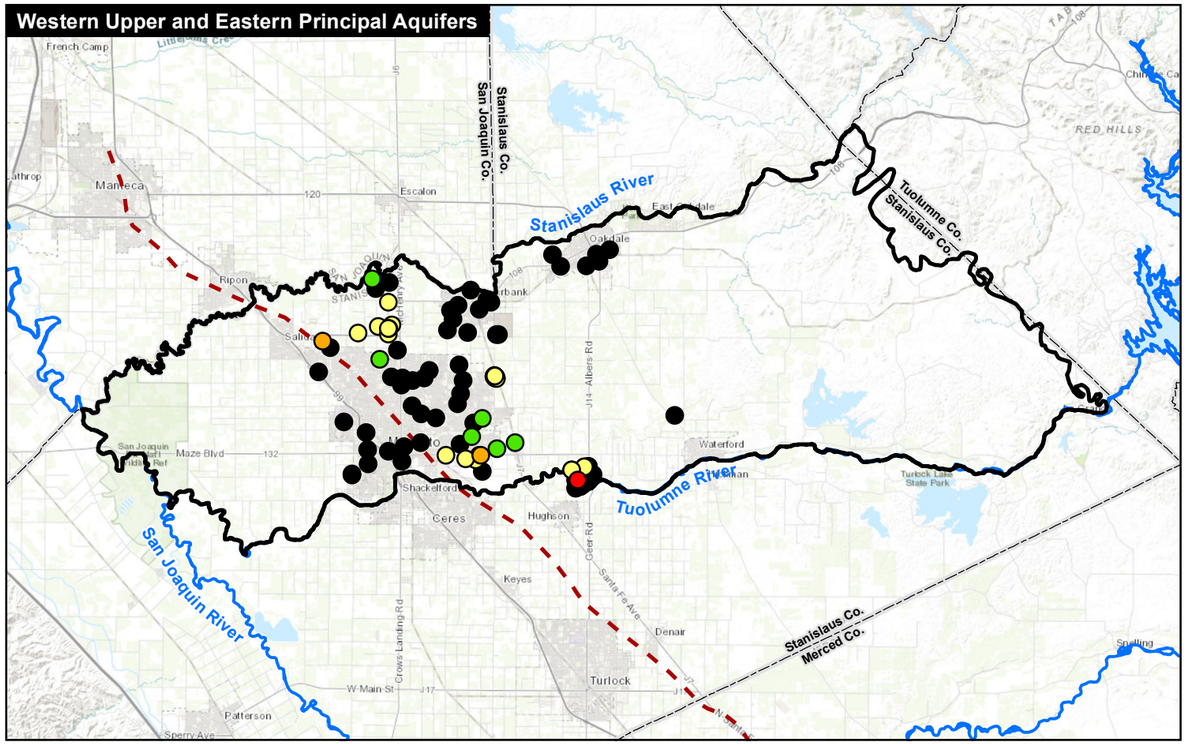


TODD GROUNDWATER

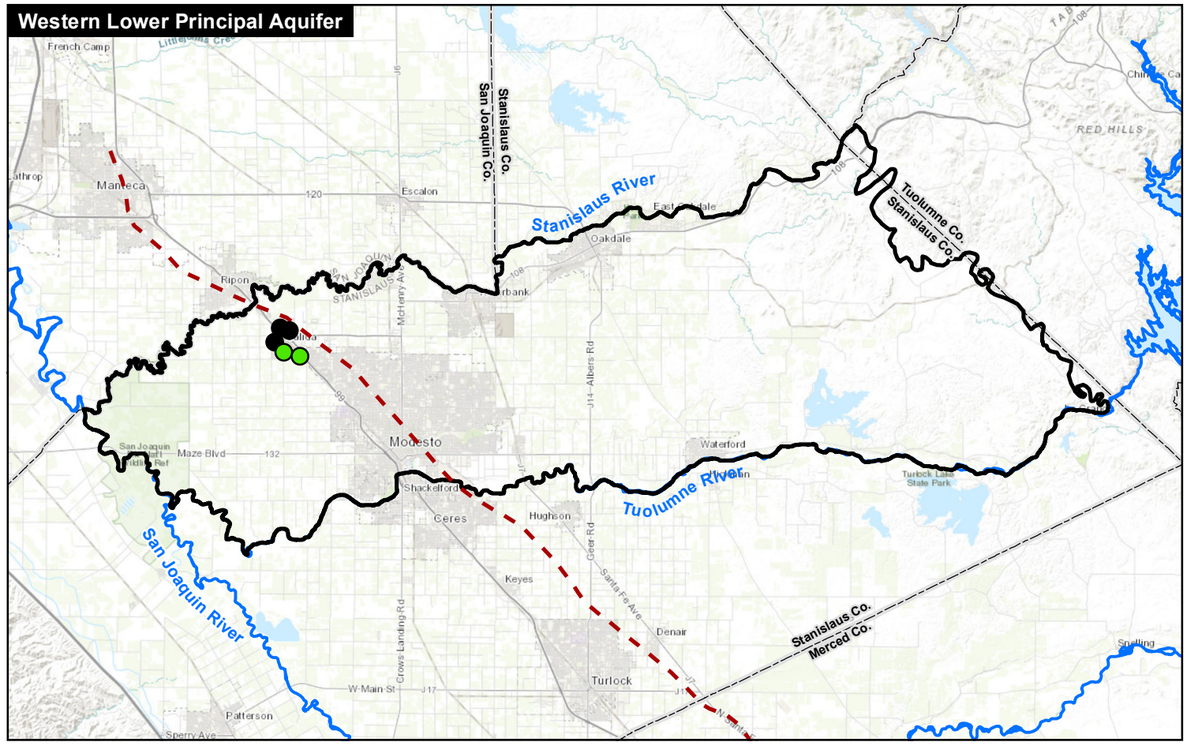
Woodard & Curran

Figure 8-4
Nitrate in Groundwater
WY 2024

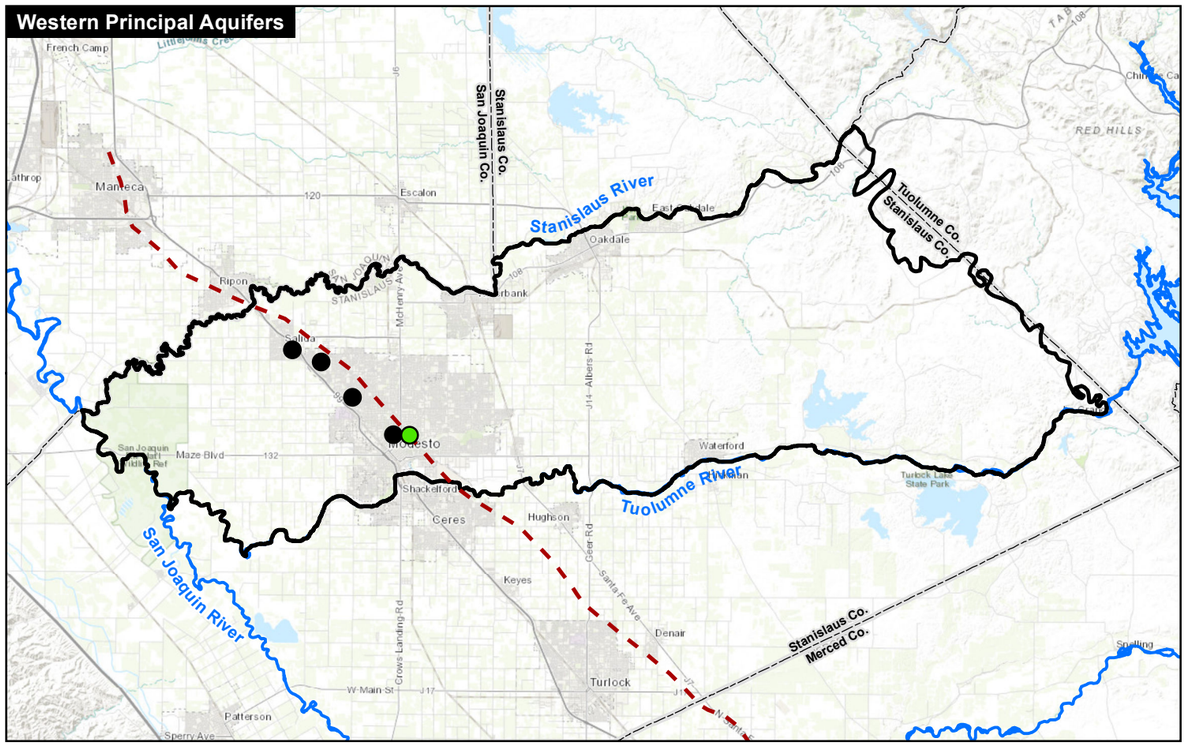
Western Upper and Eastern Principal Aquifers



Western Lower Principal Aquifer



Western Principal Aquifers



N

0 6
Miles

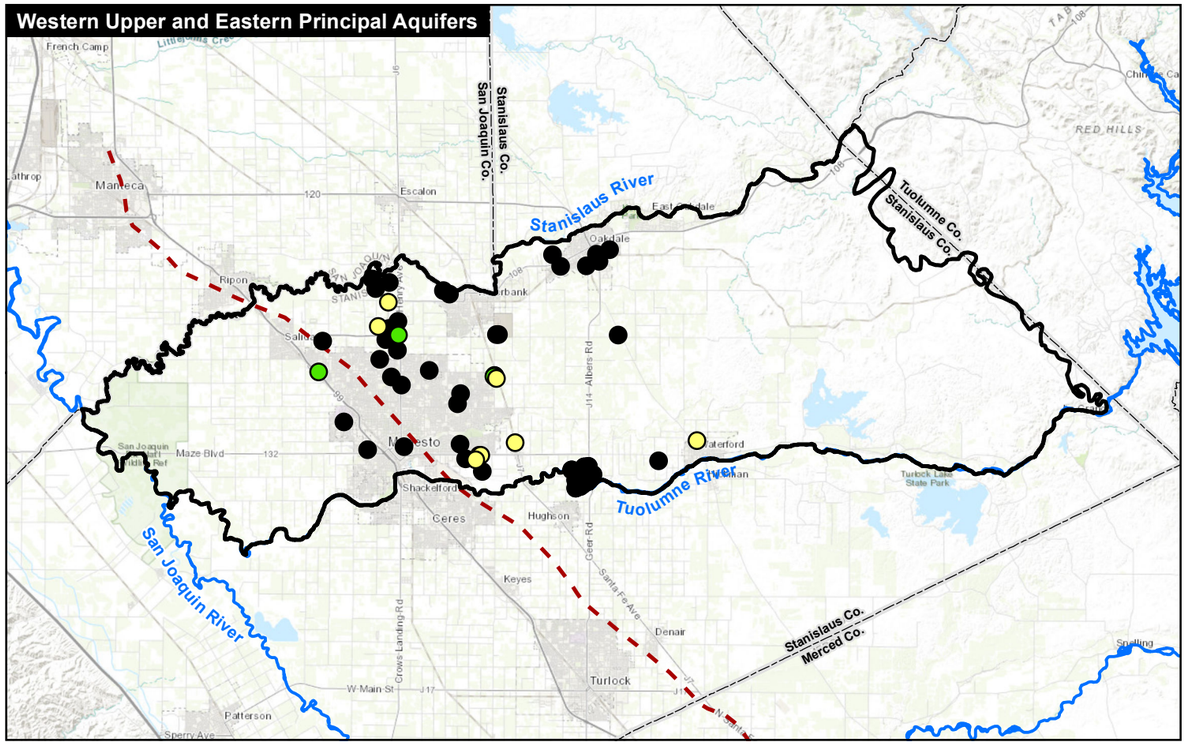
1,2,3-TCP (MCL = 0.005 ug/L)

- Above MCL - First-Time (1)
- Above MCL - Above Historical Maximum (2)
- Above MCL - Equal to or Below Historical Maximum (20)
- Detection - Equal to or Below MCL (10)
- Non-Detect (88)

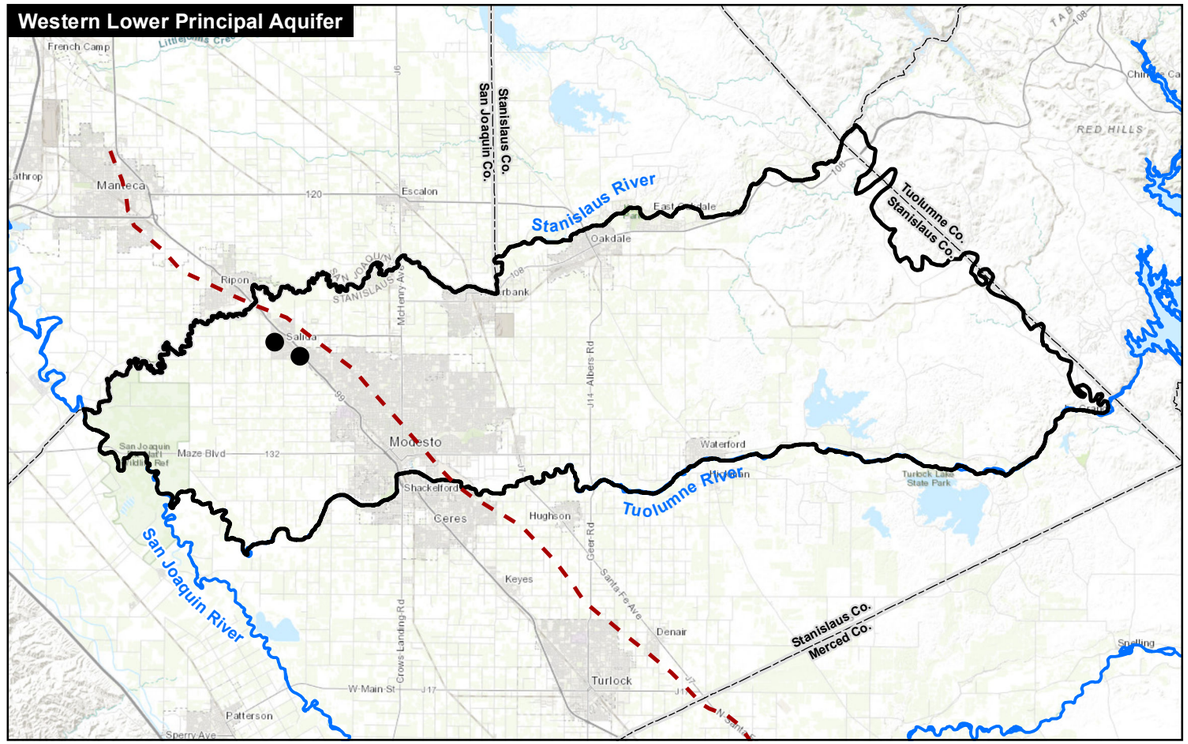
TODD GROUNDWATER
Woodard & Curran

Figure 8-5
TCP in Groundwater
WY 2024

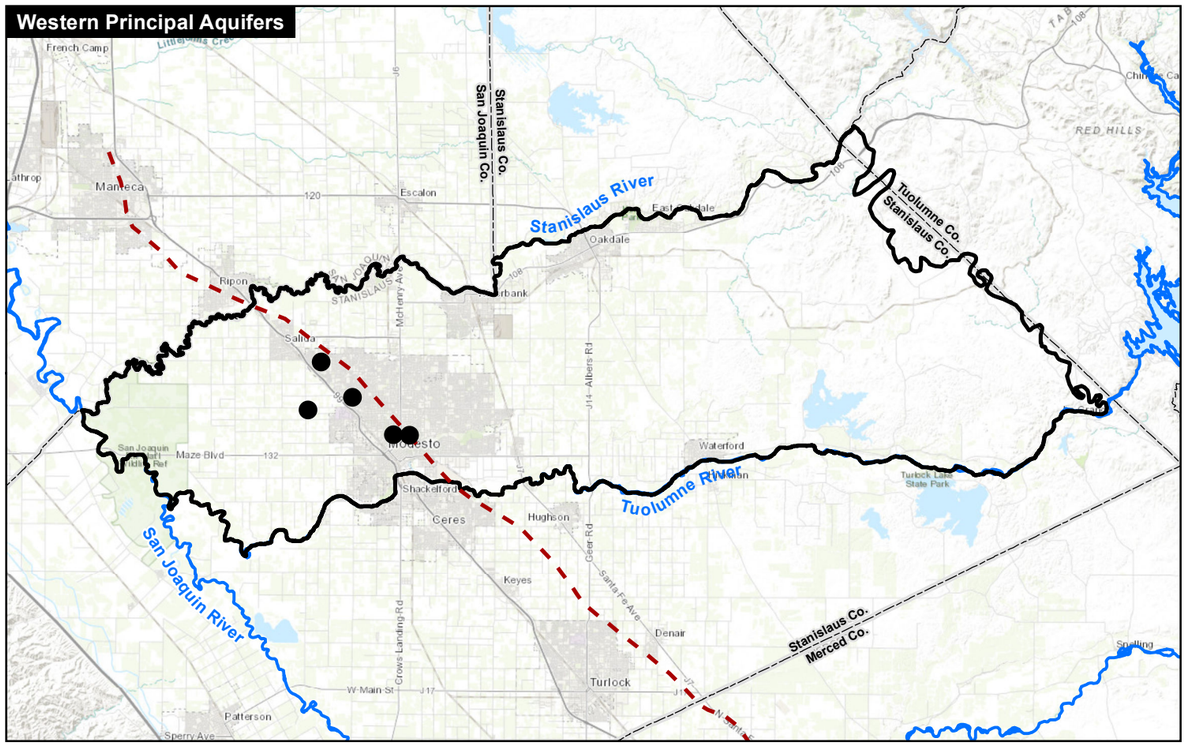
Western Upper and Eastern Principal Aquifers



Western Lower Principal Aquifer



Western Principal Aquifers



N

0 6

Miles

DBCP (MCL = 0.2 ug/L)

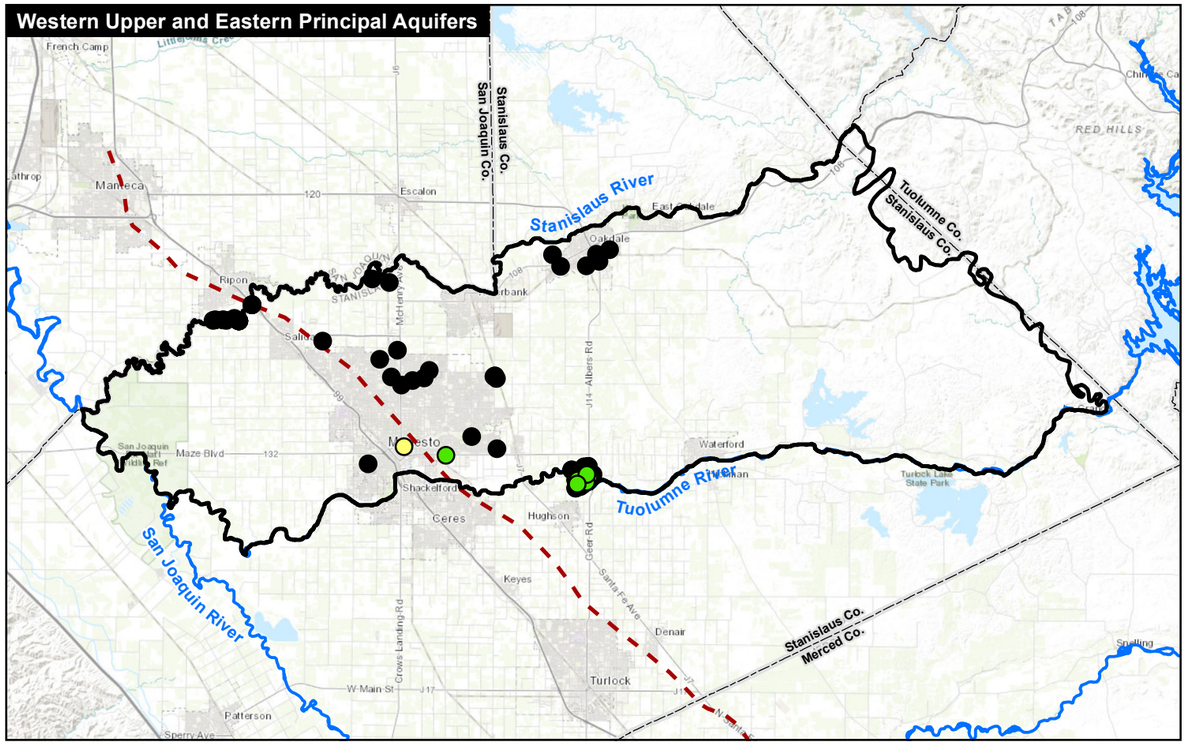
- Above MCL - First-Time (0)
- Above MCL - Above Historical Maximum (0)
- Above MCL - Equal to or Below Historical Maximum (8)
- Detection - Equal to or Below MCL (5)
- Non-Detect (74)

TODD GROUNDWATER

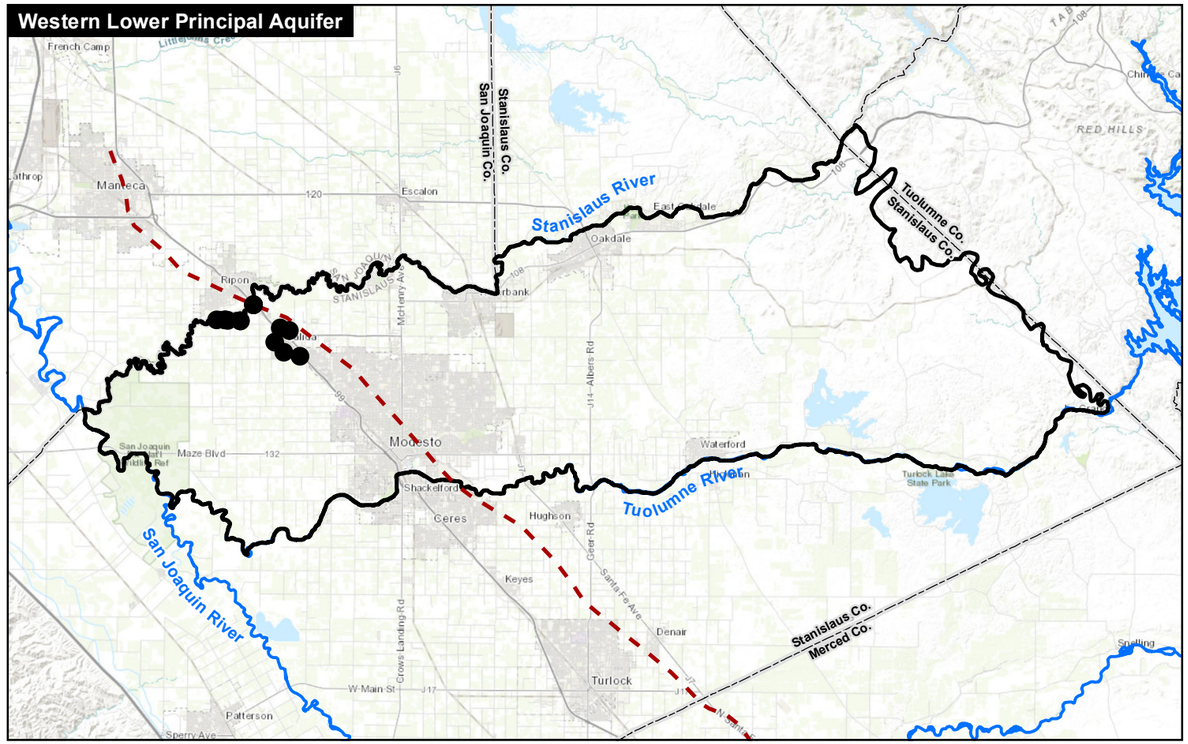
Woodard & Curran

Figure 8-6
DBCP in Groundwater
WY 2024

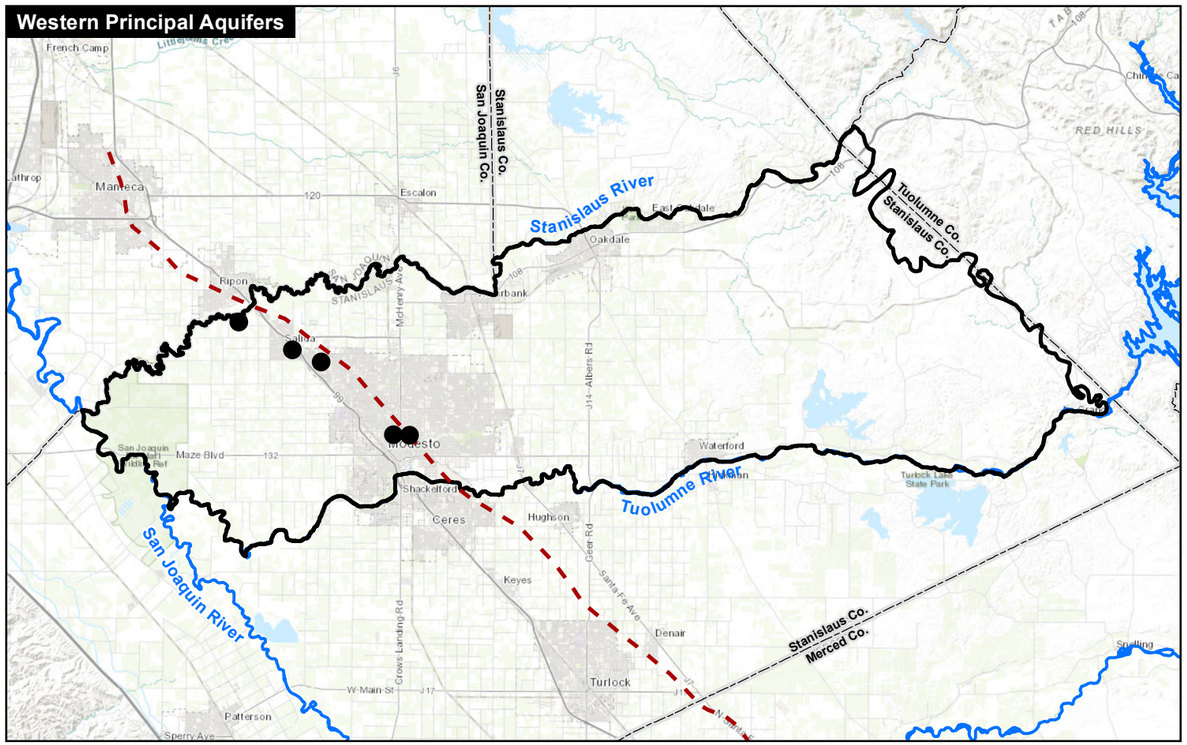
Western Upper and Eastern Principal Aquifers



Western Lower Principal Aquifer



Western Principal Aquifers



N

0 6

Miles

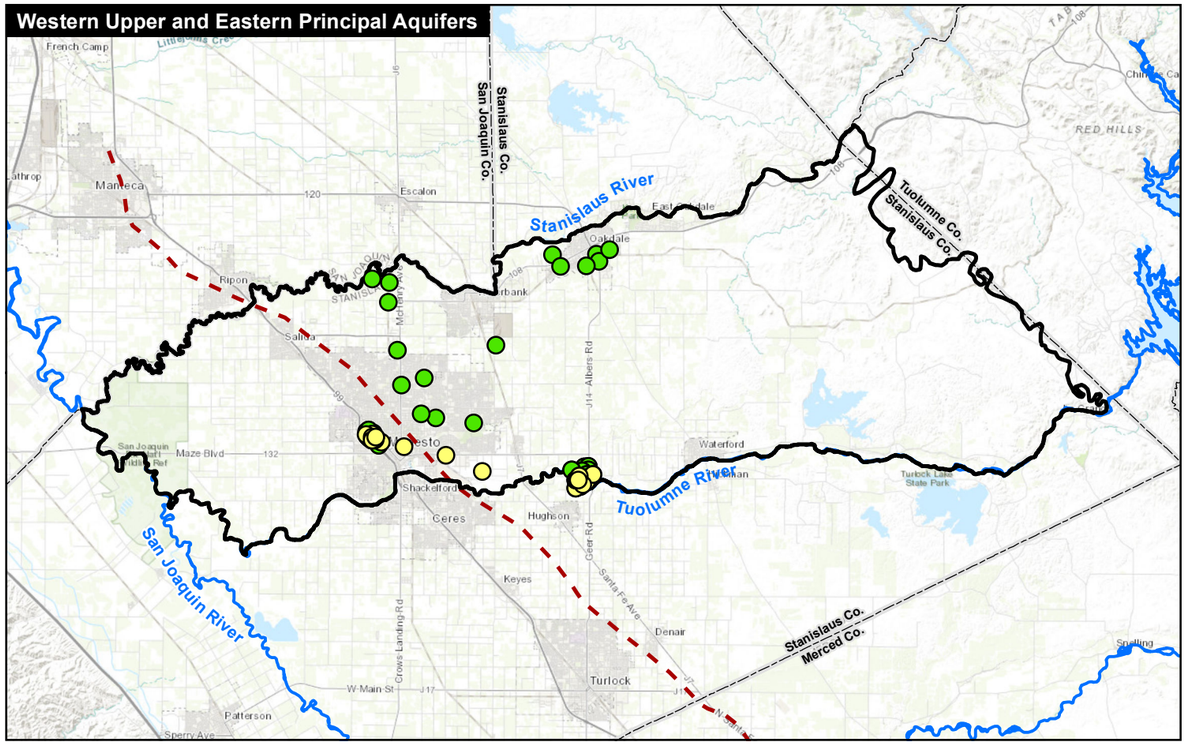
PCE (MCL = 5 ug/L)

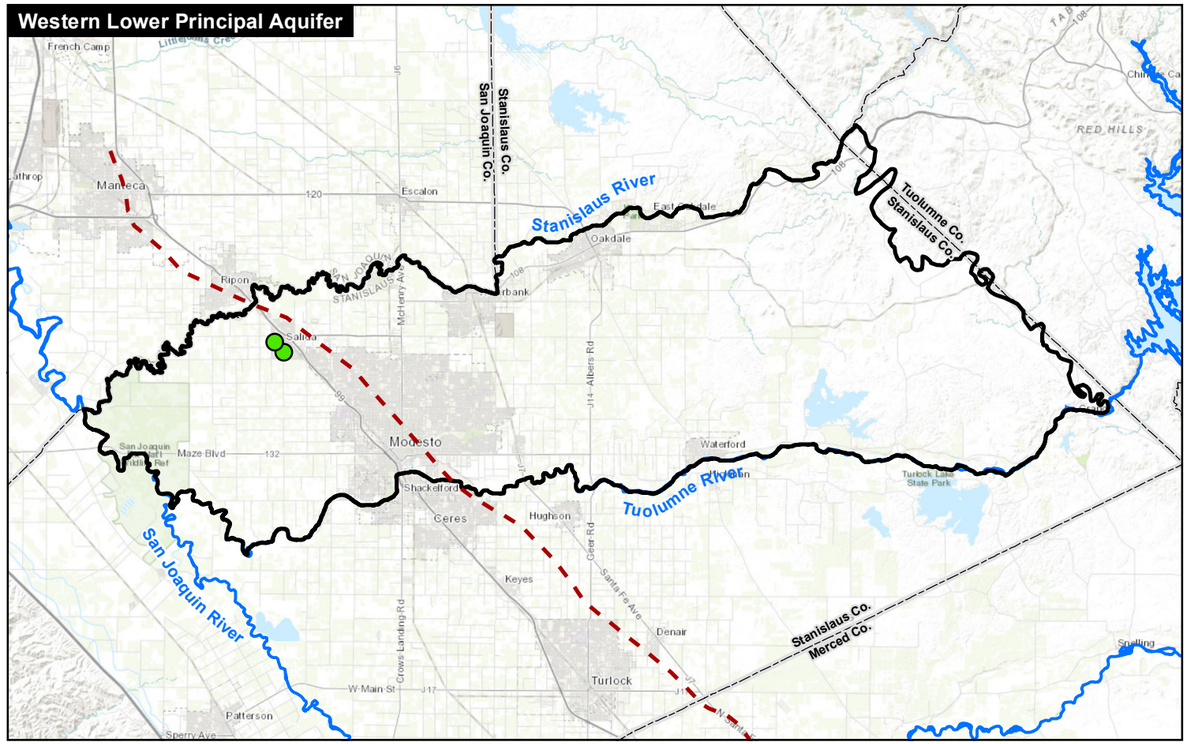
- Above MCL - First-Time (0)
- Above MCL - Above Historical Maximum (0)
- Above MCL - Equal to or Below Historical Maximum (1)
- Detection - Equal to or Below MCL (9)
- Non-Detect (86)

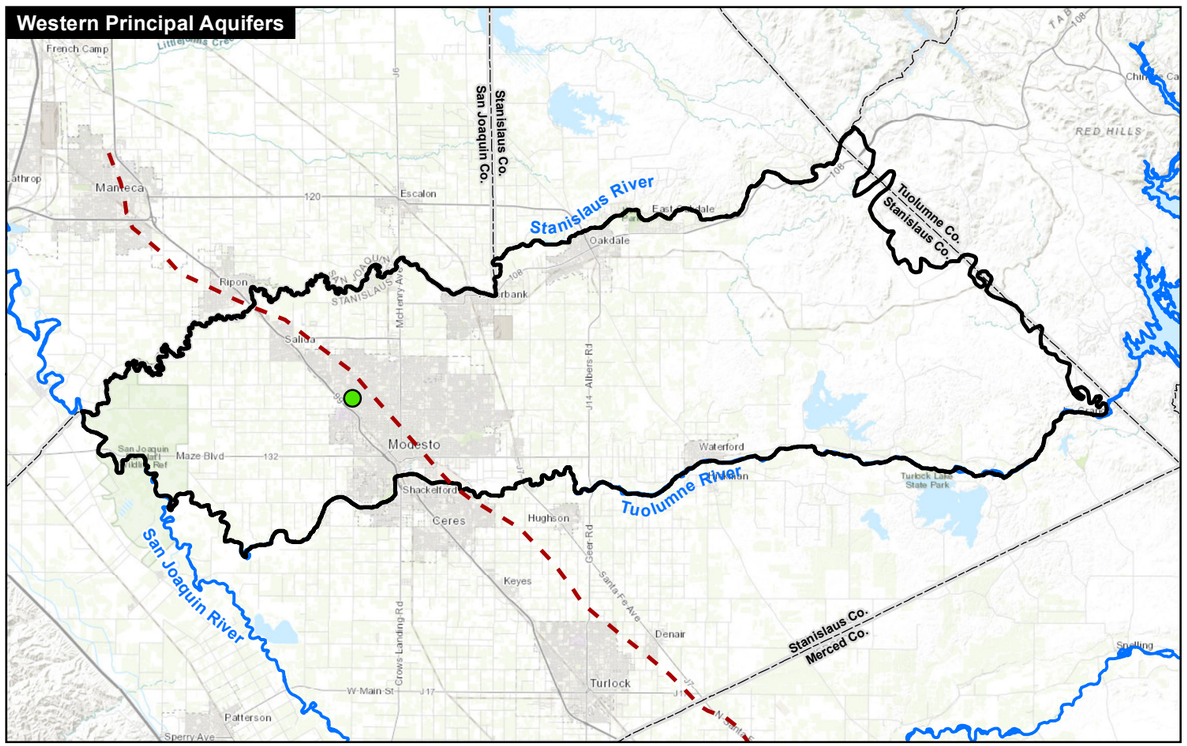
TODD GROUNDWATER

Woodard & Curran

Figure 8-7
PCE in Groundwater
WY 2024







N

0 6

Miles

TDS (MCL = 500 mg/L)

- Above MCL - First-Time (0)
- Above MCL - Above Historical Maximum (0)
- Above MCL - Equal to or Below Historical Maximum (31)
- Detection - Equal to or Below MCL (51)
- Non-Detect (0)

TODD GROUNDWATER

Woodard & Curran

Figure 8-8
TDS in Groundwater
WY 2024

Legend

Vertical Displacement (feet)

- < -0.35
- -0.35 to -0.3
- -0.3 to -0.25
- -0.25 to -0.2
- -0.2 to -0.15
- -0.15 to -0.1
- -0.1 to -0.05
- -0.05 to 0
- 0 to 0.05
- > 0.05
- No Data

GPS Station

- Vertical Displacement > 0 feet
- No vertical displacement data during WY 2024
- Basins Boundary
- County Line
- Extent of Corcoran Clay

N

0 1 2 3

Miles

P306

P260

P781

CMOD

Turlock Lake

Source: DWR SGMA Data Viewer, TRE Altamira InSAR Data (https://gis.water.ca.gov/arcgisimg/rest/services/SAR/Vertical_Displacement_TRE_ALTAMIRA_Annual_Rate_20231001_20241001/ImageServer)

TODD GROUNDWATER

Woodard & Curran

Figure 9-1
InSAR Vertical Displacement Data WY 2024

Path: T:\Projects\Modesto Implementation_743\2743\2.02 Modesto Annual Report WY 2024\GIS\MAPS\Figure 9-1 InSAR Vertical Displacement Data WY 2024.mxd

Legend

Vertical Displacement (feet)

- -0.35 to -0.3
- -0.3 to -0.25
- -0.25 to -0.2
- -0.2 to -0.15
- -0.15 to -0.1
- -0.1 to -0.05
- -0.05 to 0
- 0 to 0.05
- > 0.05

GPS Station

- Vertical Displacement > 0 feet
- No vertical displacement data during WY 2024
- Basins Boundary
- County Line
- Extent of Corcoran Clay

N

0 1 2 3

Miles

P306

P260

P781

CMOD

Turlock Lake

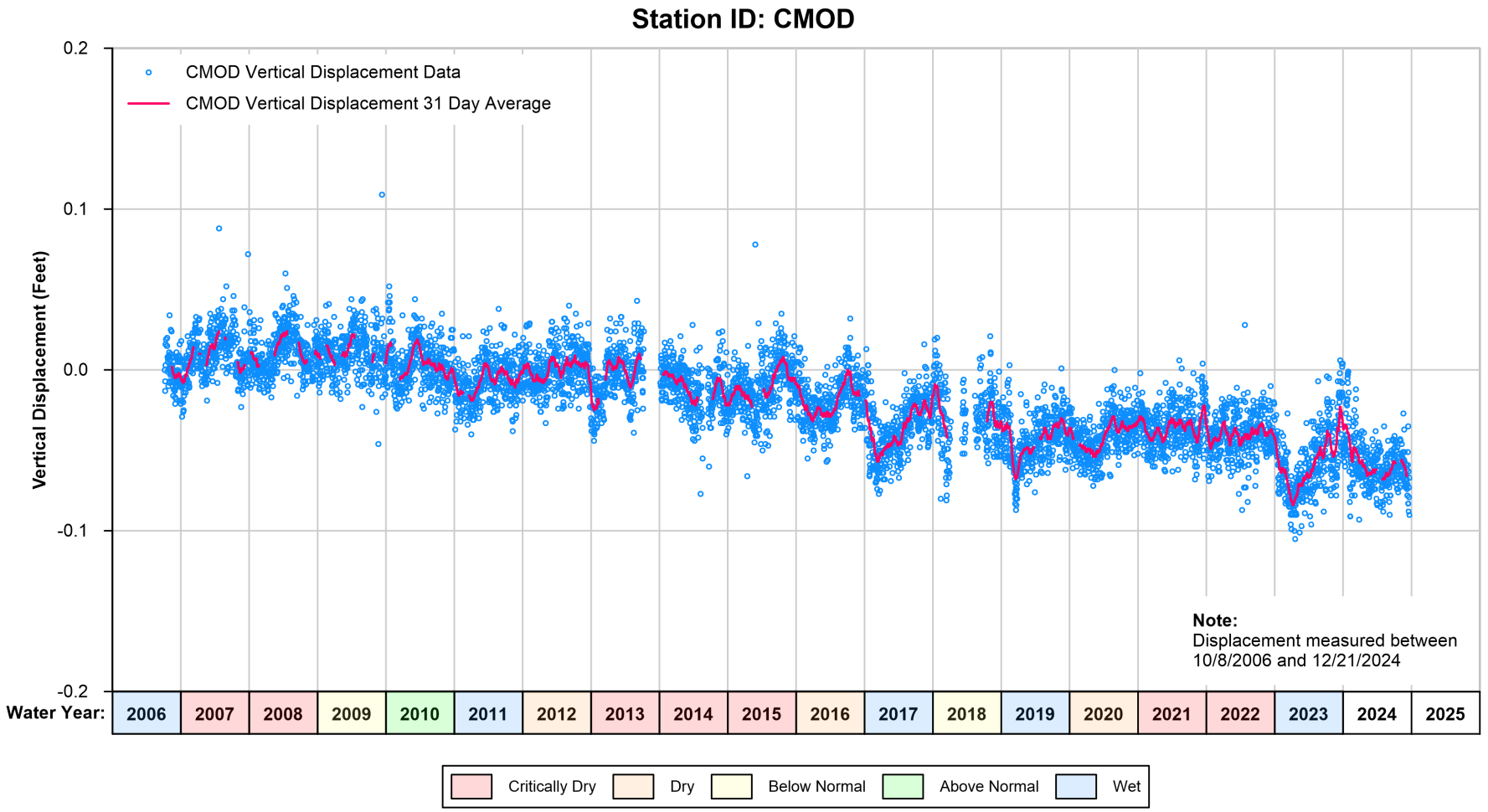
Source: DWR SGMA Data Viewer, TRE Altamira InSAR Data (https://gis.water.ca.gov/arcgisimg/rest/services/SAR/Vertical_Displacement_TRE_ALTAMIRA_Total_Since_20150613_20241001/ImageServer)

TODD GROUNDWATER

Woodard & Curran

Figure 9-2
InSAR Vertical Displacement Data
June 2015 to Sept. 2024

Path: T:\Projects\Modesto Implementation 743\2743\2743.02 Modesto Annual Report WY 2024\GIS\MAPS\Figure 9-2 InSAR Vertical Displacement Data June 2015 to Sept 2024.mxd

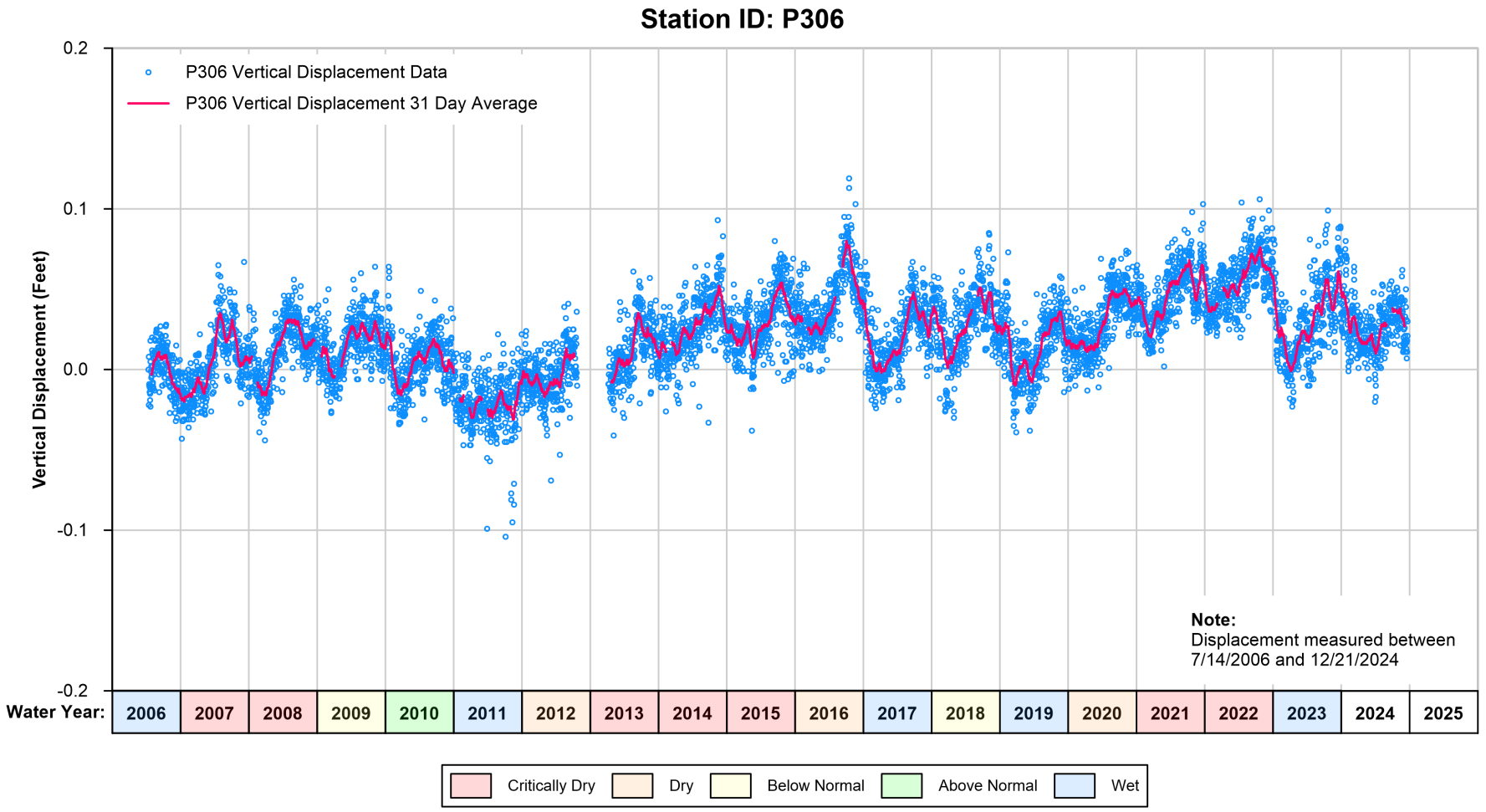


Source:
https://sgma.water.ca.gov/SGMAMapServices/report/gpsstation?station_id=CMOD

TODD GROUNDWATER
Woodard & Curran

Figure 9-3
Historical Ground Surface Elevation from GPS Station CMOD

Path: T:\Projects\Modesto Implementation 7431274312-02 Modesto Annual Report WY 2024\GRAPHICS\Figure 9-3_9-4 Historical Ground Surface Elevation from GPS Station CMOD_P306.gpj



Source:
https://sgma.water.ca.gov/SGMAMapServices/report/gpsstation?station_id=P306

TODD GROUNDWATER
Woodard & Curran

Figure 9-4
Historical Ground Surface Elevation from GPS Station P306

Path: T:\Projects\Modesto Implementation 7431274312-02 Modesto Annual Report WY 2024\GRAPHICS\Figure 9-3_9-4 Historical Ground Surface Elevation from GPS Station CMCD_P306.gpj

APPENDIX A

WY 2024 Groundwater Elevation Data

Appendix A - WY 2024 Groundwater Elevation Data

Local Well Name	Measurement Date (mm/dd/yyyy)	Measurement Time (PST 24-Hour)	No Measurement Code	Questionable Measurement Code	Reading at Reference Point (feet)	Reading at Water Surface (feet)	Reference Point Elevation (feet)	Ground Surface Elevation (feet)	WSE	Measurement Method Code	Measurement Accuracy	Collecting / Co-op Agency	Water Level Measurement Comments
Albers 232	11/17/2023	0:00			81.0	0	145.7	145.4	64.7	ST	0.1 Ft	STRGBA GSA	
Albers 232	2/27/2024	0:00			76.0	0	145.7	145.4	69.7	ST	0.1 Ft	STRGBA GSA	
Allen OID-01	11/14/2023	0:00			72.8	0	145.7	145.6	72.9	ES	0.1 Ft	STRGBA GSA	
Allen OID-01	3/13/2024	0:00			69.8	0	145.7	145.6	76.0	ES	0.1 Ft	STRGBA GSA	
American 208	11/17/2023	0:00			47.0	0	99.9	99.9	52.9	ST	0.1 Ft	STRGBA GSA	
American 208	2/27/2024	0:00			45.5	0	99.9	99.9	54.4	ST	0.1 Ft	STRGBA GSA	
Bangs Ave 243	11/17/2023	0:00			60.0	0	90.0	90.0	30.0	ST	0.1 Ft	STRGBA GSA	
Bangs Ave 243	2/27/2024	0:00			54.0	0	90.0	90.0	36.0	ST	0.1 Ft	STRGBA GSA	
Bentley OID-02	11/14/2023	0:00			102.5	0	172.1	171.9	69.6	ES	0.1 Ft	STRGBA GSA	
Bentley OID-02	3/13/2024	0:00			100.0	0	172.1	171.9	72.1	ES	0.1 Ft	STRGBA GSA	
Birnbaum OID-03	11/14/2023	0:00			78.3	0	149.8	149.4	71.6	ES	0.1 Ft	STRGBA GSA	
Birnbaum OID-03	3/13/2024	0:00			74.2	0	149.8	149.4	75.7	ES	0.1 Ft	STRGBA GSA	
Blossom 230	11/17/2023	0:00			99.0	0	155.0	154.8	56.0	ST	0.1 Ft	STRGBA GSA	
Blossom 230	2/27/2024	0:00			95.0	0	155.0	154.8	60.0	ST	0.1 Ft	STRGBA GSA	
Canfield 90	11/17/2023	0:00			13.5	0	52.3	52.0	38.8	ST	0.1 Ft	STRGBA GSA	
Canfield 90	2/27/2024	0:00			14.5	0	52.3	52.0	37.8	ST	0.1 Ft	STRGBA GSA	
Cavil 214	11/17/2023	0:00			76.0	0	135.6	135.6	59.6	ST	0.1 Ft	STRGBA GSA	
Cavil 214	2/27/2024	0:00			73.0	0	135.6	135.6	62.6	ST	0.1 Ft	STRGBA GSA	
Claribel 206	11/17/2023	0:00			59.5	0	114.5	114.1	55.0	ST	0.1 Ft	STRGBA GSA	
Claribel 206	2/27/2024	0:00			51.0	0	114.5	114.1	63.5	ST	0.1 Ft	STRGBA GSA	
Crane OID-06	11/14/2023	0:00			93.5	0	160.4	160.1	66.9	ES	0.1 Ft	STRGBA GSA	
Crane OID-06	3/13/2024	0:00			90.8	0	160.4	160.1	69.6	ES	0.1 Ft	STRGBA GSA	
Curtis #2 100	11/17/2023	0:00			21.0	0	63.6	63.6	42.6	ST	0.1 Ft	STRGBA GSA	
Curtis #2 100	2/27/2024	0:00			19.5	0	63.6	63.6	44.1	ST	0.1 Ft	STRGBA GSA	
FPA-2	11/14/2023	0:00			36.1	0	91.0	91.0	54.9	ES	0.1 Ft	STRGBA GSA	
FPA-2	3/6/2024	0:00			33.7	0	91.0	91.0	57.3	ES	0.1 Ft	STRGBA GSA	
Furtado OID-07	11/14/2023	0:00			148.1	0	212.5	212.0	64.4	ES	0.1 Ft	STRGBA GSA	
Furtado OID-07	3/13/2024	0:00			145.7	0	212.5	212.0	66.8	ES	0.1 Ft	STRGBA GSA	
Gates Road 101	11/17/2023	0:00			16.0	0	44.2	44.2	28.2	ST	0.1 Ft	STRGBA GSA	
Gates Road 101	2/27/2024	0:00			12.5	0	44.2	44.2	31.7	ST	0.1 Ft	STRGBA GSA	
Hart Road 88	11/17/2023	0:00			13.0	0	55.2	54.9	42.2	ST	0.1 Ft	STRGBA GSA	
Hart Road 88	2/27/2024	0:00			13.0	0	55.2	54.9	42.2	ST	0.1 Ft	STRGBA GSA	
Head Lateral 3 215	11/17/2023	0:00			71.0	0	135.6	135.8	64.6	ST	0.1 Ft	STRGBA GSA	
Head Lateral 3 215	2/27/2024	0:00			72.0	0	135.6	135.8	63.6	ST	0.1 Ft	STRGBA GSA	
Head Lateral 8 194	11/17/2023	0:00			34.0	0	79.8	79.5	45.8	ST	0.1 Ft	STRGBA GSA	
Head Lateral 8 194	2/27/2024	0:00			27.5	0	79.8	79.5	52.3	ST	0.1 Ft	STRGBA GSA	
Jones WID 228	11/17/2023	0:00			107.0	0	166.4	166.4	59.4	ST	0.1 Ft	STRGBA GSA	
Jones WID 228	2/27/2024	0:00			106.0	0	166.4	166.4	60.4	ST	0.1 Ft	STRGBA GSA	
Katen 69	11/17/2023	0:00			10.5	0	45.1	45.1	34.6	ST	0.1 Ft	STRGBA GSA	
Katen 69	2/27/2024	0:00			8.0	0	45.1	45.1	37.1	ST	0.1 Ft	STRGBA GSA	
Langdon Merle 241	11/17/2023	0:00			69.0	0	128.5	128.4	59.5	ST	0.1 Ft	STRGBA GSA	
Langdon Merle 241	2/27/2024	0:00			64.0	0	128.5	128.4	64.5	ST	0.1 Ft	STRGBA GSA	
Lateral one 195	11/17/2023	0:00			79.5	0	126.0	126.0	46.5	ST	0.1 Ft	STRGBA GSA	
Lateral one 195	2/27/2024	0:00			77.5	0	126.0	126.0	48.5	ST	0.1 Ft	STRGBA GSA	
Machado 23	11/17/2023	0:00			15.0	0	59.3	59.1	44.3	ST	0.1 Ft	STRGBA GSA	
Machado 23	2/27/2024	0:00			14.0	0	59.3	59.1	45.3	ST	0.1 Ft	STRGBA GSA	
Marquis OID-10	11/14/2023	0:00			52.0	0	138.8	138.4	86.8	ES	0.1 Ft	STRGBA GSA	
Marquis OID-10	3/13/2024	0:00			53.0	0	138.8	138.4	85.8	ES	0.1 Ft	STRGBA GSA	
MOD-MWA-2	11/14/2023	0:00			67.4	0	103.8	103.8	36.4	ES	0.1 Ft	STRGBA GSA	
MOD-MWA-2	3/6/2024	0:00			64.3	0	103.8	103.8	39.5	ES	0.1 Ft	STRGBA GSA	
MOD-MWB-1	11/14/2023	0:00			27.5	0	78.8	78.8	51.3	ES	0.1 Ft	STRGBA GSA	
MOD-MWB-1	3/6/2024	0:00			23.6	0	78.8	78.8	55.2	ES	0.1 Ft	STRGBA GSA	
MOD-MWB-2	11/14/2023	0:00			35.4	0	78.7	78.7	43.3	ES	0.1 Ft	STRGBA GSA	
MOD-MWB-2	3/6/2024	0:00			28.3	0	78.7	78.7	50.4	ES	0.1 Ft	STRGBA GSA	
MOD-MWC-3	11/14/2023	0:00			60.5	0	105.6	105.6	45.1	ES	0.1 Ft	STRGBA GSA	
MOD-MWC-3	3/6/2024	0:00			56.6	0	105.6	105.6	49.0	ES	0.1 Ft	STRGBA GSA	
MOD-MWD-1	11/14/2023	0:00			24.5	0	73.3	73.3	48.8	ES	0.1 Ft	STRGBA GSA	
MOD-MWD-1	3/6/2024	0:00			23.0	0	73.3	73.3	50.3	ES	0.1 Ft	STRGBA GSA	
MOD-MWD-3	11/14/2023	0:00			30.7	0	73.2	73.2	42.5	ES	0.1 Ft	STRGBA GSA	
MOD-MWD-3	3/6/2024	0:00			26.8	0	73.2	73.2	46.4	ES	0.1 Ft	STRGBA GSA	
MRWA-2	11/15/2023	0:00			20.2	0	64.0	64.0	43.8	ES	0.01 Ft	STRGBA GSA	
MRWA-2	3/7/2024	0:00			19.3	0	64.0	64.0	44.7	ES	0.01 Ft	STRGBA GSA	
MRWA-3	11/15/2023	0:00			25.8	0	64.0	64.0	38.2	ES	0.01 Ft	STRGBA GSA	
MRWA-3	3/7/2024	0:00			22.7	0	64.0	64.0	41.4	ES	0.01 Ft	STRGBA GSA	
MW-10	11/14/2023	0:00			199.0	0	264.7	265.1	65.7	ES	0.1 Ft	STRGBA GSA	
MW-10	3/13/2024	0:00			195.5	0	264.7	265.1	69.2	ES	0.1 Ft	STRGBA GSA	
MW-11	11/14/2023	0:00			69.0	0	116.1	116.3	47.1	ES	0.1 Ft	STRGBA GSA	
MW-11	3/6/2024	0:00			67.5	0	116.1	116.3	48.6	ES	0.1 Ft	STRGBA GSA	
MW-1D	11/14/2023	0:00			25.7	0	67.9	68.5	42.2	ES	0.1 Ft	STRGBA GSA	
MW-1D	3/6/2024	0:00			21.9	0	67.9	68.5	46.0	ES	0.1 Ft	STRGBA GSA	
MW-1S	11/14/2023	0:00			21.8	0	68.0	68.4	46.2	ES	0.1 Ft	STRGBA GSA	
MW-1S	3/6/2024	0:00			20.0	0	68.0	68.4	48.0	ES	0.1 Ft	STRGBA GSA	
MW-2D	11/14/2023	0:00			37.0	0	71.0	71.2	34.0	ES	0.1 Ft	STRGBA GSA	

Appendix A - WY 2024 Groundwater Elevation Data

Local Well Name	Measurement Date (mm/dd/yyyy)	Measurement Time (PST 24-Hour)	No Measurement Code	Questionable Measurement Code	Reading at Reference Point (feet)	Reading at Water Surface (feet)	Reference Point Elevation (feet)	Ground Surface Elevation (feet)	WSE	Measurement Method Code	Measurement Accuracy	Collecting / Co-op Agency	Water Level Measurement Comments
MW-2D	3/6/2024	0:00			32.1	0	71.0	71.2	38.9	ES	0.1 Ft	STRGBA GSA	
MW-2S	11/14/2023	0:00			29.3	0	70.7	71.1	41.4	ES	0.1 Ft	STRGBA GSA	
MW-2S	3/6/2024	0:00			27.3	0	70.7	71.1	43.4	ES	0.1 Ft	STRGBA GSA	
MW-3D	11/14/2023	0:00			60.7	0	95.3	95.7	34.6	ES	0.1 Ft	STRGBA GSA	
MW-3D	3/6/2024	0:00			56.5	0	95.3	95.7	38.8	ES	0.1 Ft	STRGBA GSA	
MW-3S	11/14/2023	0:00			58.0	0	95.6	95.8	37.6	ES	0.1 Ft	STRGBA GSA	
MW-3S	3/6/2024	0:00			55.8	0	95.6	95.8	39.8	ES	0.1 Ft	STRGBA GSA	
MW-4S	11/14/2023	0:00			76.0	0	136.3	136.6	60.3	ES	0.1 Ft	STRGBA GSA	
MW-4S	3/13/2024	0:00			73.0	0	136.3	136.6	63.3	ES	0.1 Ft	STRGBA GSA	
MW-5S	11/14/2023	0:00			112.5	0	191.6	191.9	79.1	ES	0.1 Ft	STRGBA GSA	
MW-5S	3/13/2024	0:00			109.1	0	191.6	191.9	82.5	ES	0.1 Ft	STRGBA GSA	
MW-6S	12/7/2023	0:00			111.0	0	170.9	171.3	59.9	ES	0.1 Ft	STRGBA GSA	
MW-6S	3/8/2024	0:00			102.2	0	170.9	171.3	68.7	ES	0.1 Ft	STRGBA GSA	
MW-7	11/14/2023	0:00			179.5	0	242.3	242.6	62.8	ES	0.1 Ft	STRGBA GSA	
MW-7	3/13/2024	0:00			177.8	0	242.3	242.6	64.5	ES	0.1 Ft	STRGBA GSA	
MW-8	11/14/2023	0:00			228.0	0	292.3	292.9	64.3	ES	0.1 Ft	STRGBA GSA	
MW-8	3/13/2024	0:00			225.0	0	292.3	292.9	67.3	ES	0.1 Ft	STRGBA GSA	
MW-9	11/15/2023	0:00			94.2	0	247.6	244.5	153.4	ES	0.01 Ft	STRGBA GSA	
MW-9	3/7/2024	0:00			94.1	0	247.6	244.5	153.5	ES	0.01 Ft	STRGBA GSA	
North Ave 103	11/17/2023	0:00			24.0	0	74.6	73.9	50.6	ST	0.1 Ft	STRGBA GSA	
North Ave 103	2/27/2024	0:00			22.5	0	74.6	73.9	52.1	ST	0.1 Ft	STRGBA GSA	
OFPB-2	11/14/2023	0:00			53.0	0	104.0	104.0	51.0	ES	0.1 Ft	STRGBA GSA	
OFPB-2	3/6/2024	0:00			48.8	0	104.0	104.0	55.2	ES	0.1 Ft	STRGBA GSA	
Paradise 235	11/17/2023	0:00			31.5	0	73.9	73.7	42.4	ST	0.1 Ft	STRGBA GSA	
Paradise 235	2/27/2024	0:00			32.5	0	73.9	73.7	41.4	ST	0.1 Ft	STRGBA GSA	
Paulsell 1 OID-11	11/14/2023	0:00			123.8	0	197.5	195.9	73.8	ES	0.1 Ft	STRGBA GSA	
Paulsell 1 OID-11	3/13/2024	0:00			122.8	0	197.5	195.9	74.8	ES	0.1 Ft	STRGBA GSA	
Paulsell 2 OID-12	11/14/2023	0:00			115.0	0	195.6	193.9	80.6	ES	0.1 Ft	STRGBA GSA	
Paulsell 2 OID-12	3/13/2024	0:00			114.3	0	195.6	193.9	81.4	ES	0.1 Ft	STRGBA GSA	
Perley 202	11/17/2023	0:00			59.0	0	105.4	104.9	46.4	ST	0.1 Ft	STRGBA GSA	
Perley 202	2/27/2024	0:00			56.0	0	105.4	104.9	49.4	ST	0.1 Ft	STRGBA GSA	
Philbrick 201	11/17/2023	0:00			28.0	0	73.5	73.1	45.5	ST	0.1 Ft	STRGBA GSA	
Philbrick 201	2/27/2024	0:00			30.0	0	73.5	73.1	43.5	ST	0.1 Ft	STRGBA GSA	
Quesenberry 223	11/17/2023	0:00	3				197.0	197.0				STRGBA GSA	
Quesenberry 223	2/27/2024	0:00	3				197.0	197.0				STRGBA GSA	
Riverbank OID-13	11/14/2023	0:00			90.3	0	134.2	132.3	43.9	ES	0.1 Ft	STRGBA GSA	
Riverbank OID-13	3/26/2024	0:00			87.0	0	134.2	132.3	47.2	ES	0.1 Ft	STRGBA GSA	
Schmidt 227	11/17/2023	0:00			131.0	0	192.2	192.3	61.2	ST	0.1 Ft	STRGBA GSA	
Schmidt 227	2/27/2024	0:00			130.0	0	192.2	192.3	62.2	ST	0.1 Ft	STRGBA GSA	
Van Buren 43	11/17/2023	0:00			17.5	0	63.5	63.3	46.0	ST	0.1 Ft	STRGBA GSA	
Van Buren 43	2/27/2024	0:00			17.0	0	63.5	63.3	46.5	ST	0.1 Ft	STRGBA GSA	
Warnock 46	11/17/2023	0:00			9.0	0	55.1	55.1	46.1	ST	0.1 Ft	STRGBA GSA	
Warnock 46	2/27/2024	0:00			8.0	0	55.1	55.1	47.1	ST	0.1 Ft	STRGBA GSA	
Wellsford 233	11/17/2023	0:00			80.0	0	142.0	141.9	62.0	ST	0.1 Ft	STRGBA GSA	
Wellsford 233	2/27/2024	0:00			74.0	0	142.0	141.9	68.0	ST	0.1 Ft	STRGBA GSA	
Wood 210	11/17/2023	0:00	3				121.3	121.3				STRGBA GSA	
Wood 210	2/27/2024	0:00	3				121.3	121.3				STRGBA GSA	
Young 76	11/17/2023	0:00			19.0	0	62.1	61.5	43.1	ST	0.1 Ft	STRGBA GSA	
Young 76	2/27/2024	0:00			18.5	0	62.1	61.5	43.6	ST	0.1 Ft	STRGBA GSA	

No Measurement Code Glossary
0 - Measurement Discontinued
1 - Pumping
2 - Pump house locked
3 - Tape hung up
4 - Can't get tape in casing
5 - Unable to locate well
6 - Well has been destroyed
7 - Special/Other
8 - Casing leaking or wet
9 - Temporarily inaccessible
D - Dry well
F - Flowing artesian well

Questionable Measurement Code Glossary
0 - Caved or deepened
1 - Pumping
2 - Nearby pump operating
3 - Casing leaking or wet
4 - Pumped recently
5 - Air or pressure gauge measurement
6 - Other
7 - Recharge or surface water effects near well
8 - Oil or foreign substance in casing
9 - Acoustical sounder
E - Recently flowing
F - Flowing
G - Nearby flowing
H - Nearby recently flowing

Measurement Method Glossary
ES - Electric sounder measurement
ST - Steel tape measurement
AS - Acoustic or sonic sounder
PG - Airline measurement, pressure gage, or manometer
TR - Electronic pressure transducer
OTH - Other
UNK - Unknown

APPENDIX B

Hydrographs

Representative Monitoring Wells

GSP Groundwater Elevation Monitoring Network

Hydrographs for Wells

in the Monitoring Network for:

Chronic Lowering of Groundwater Levels

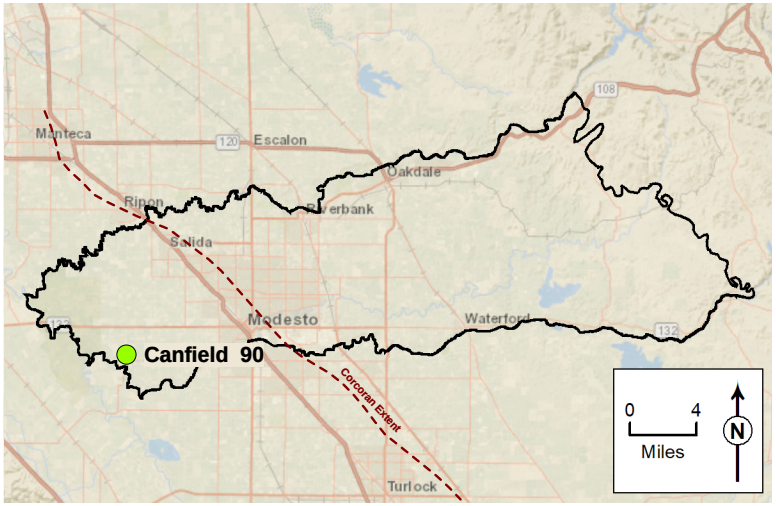
Reduction of Groundwater in Storage

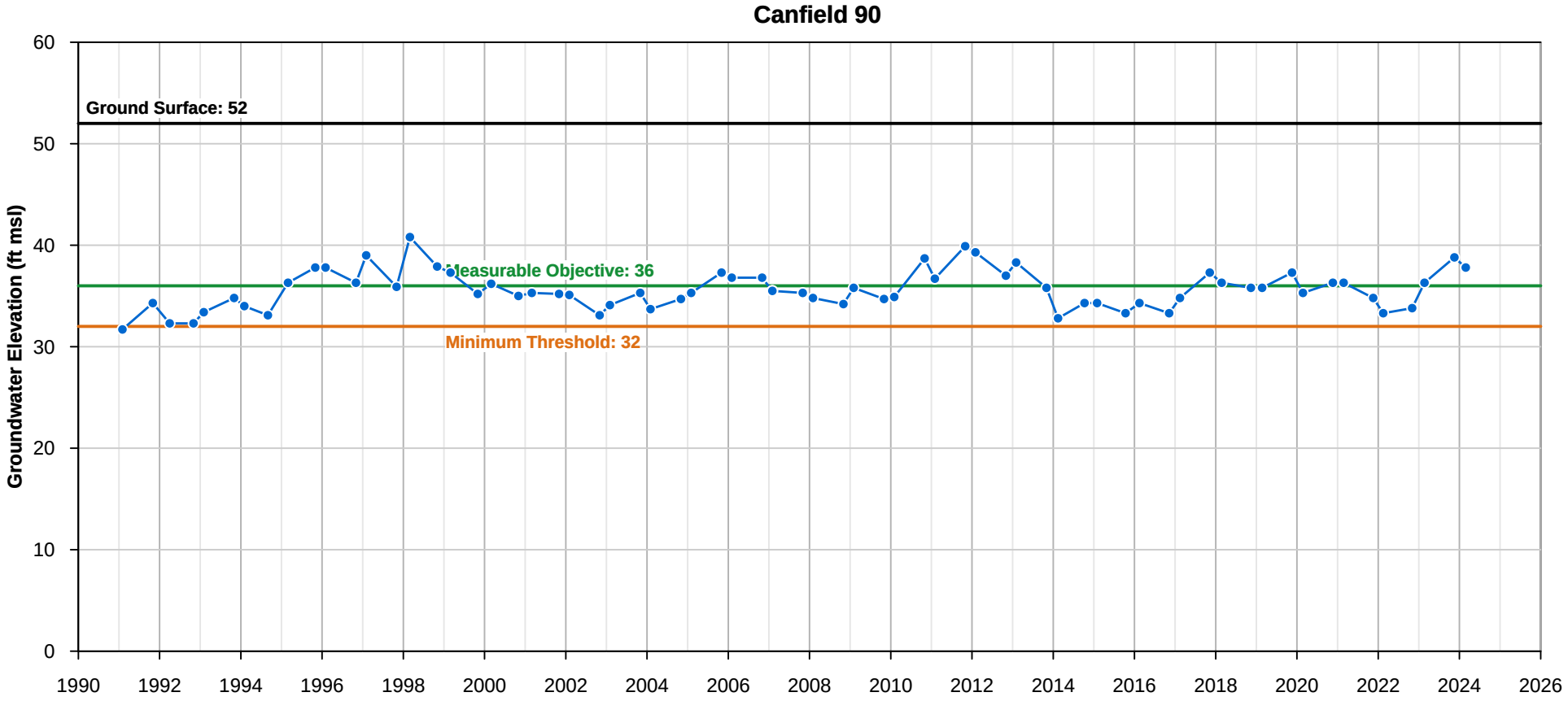
Land Subsidence

Western Upper Principal Aquifer

Well Information

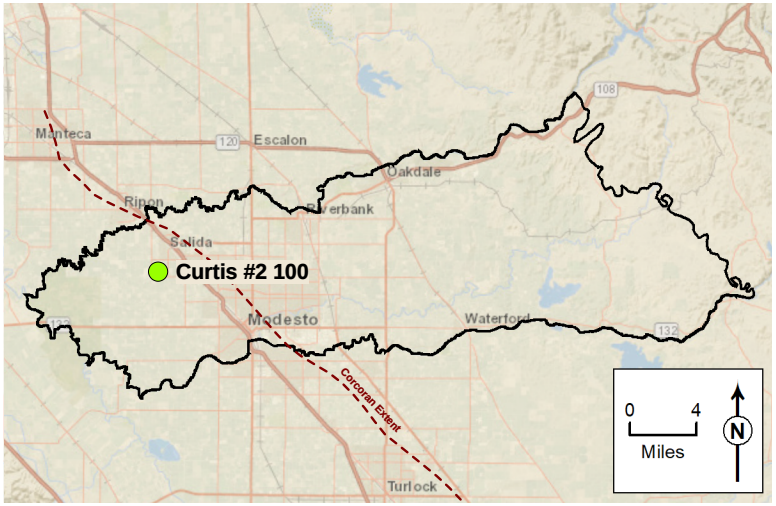
Site Code:	376130N1211307W001
Local Well Name:	Canfield 90
State Well Name:	04S08E06L001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	26633
Latitude:	37.6131
Longitude:	-121.131
Well Depth (feet bgs):	151
Top Perforation (feet bgs):	40
Bottom Perforation (feet bgs):	75
Ground Surface Elevation:	52
Reference Point Elevation:	52.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

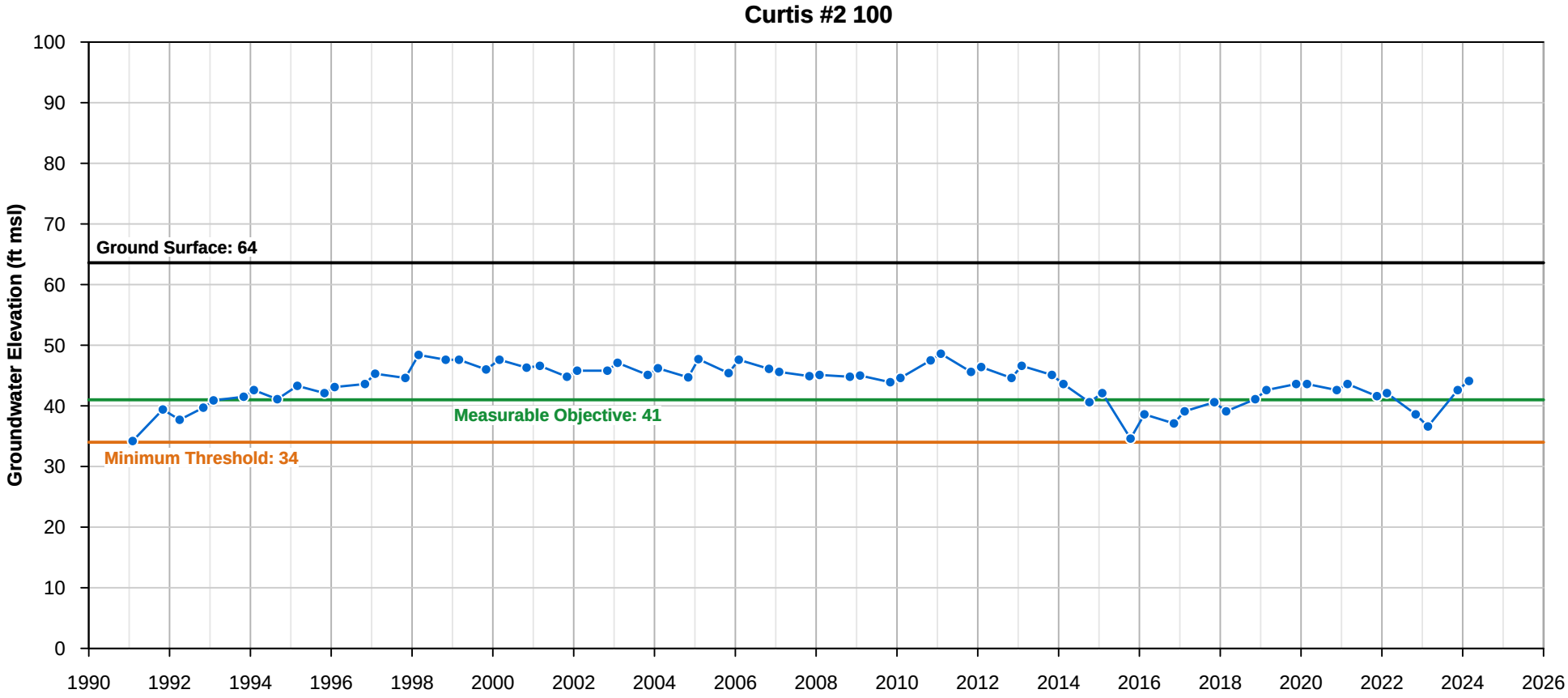




Well Information

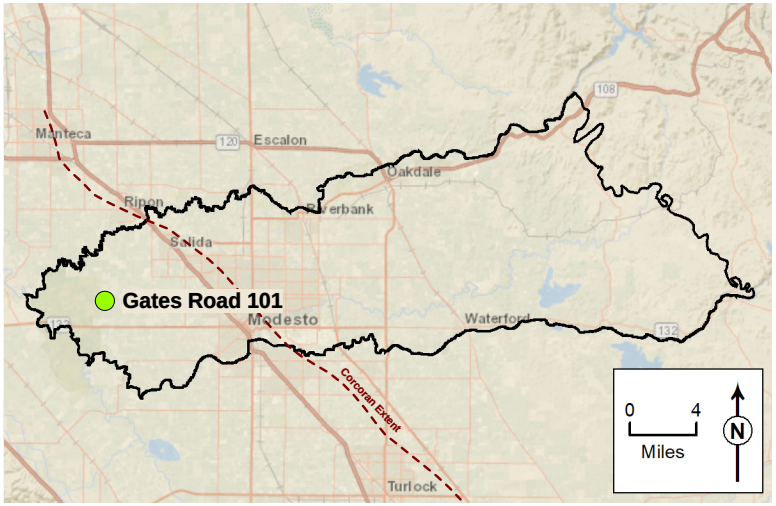
Site Code:	376852N1210974W001
Local Well Name:	Curtis #2 100
State Well Name:	03S08E09P001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	3303
Latitude:	37.6854
Longitude:	-121.097
Well Depth (feet bgs):	124
Top Perforation (feet bgs):	79
Bottom Perforation (feet bgs):	100
Ground Surface Elevation:	63.6
Reference Point Elevation:	63.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

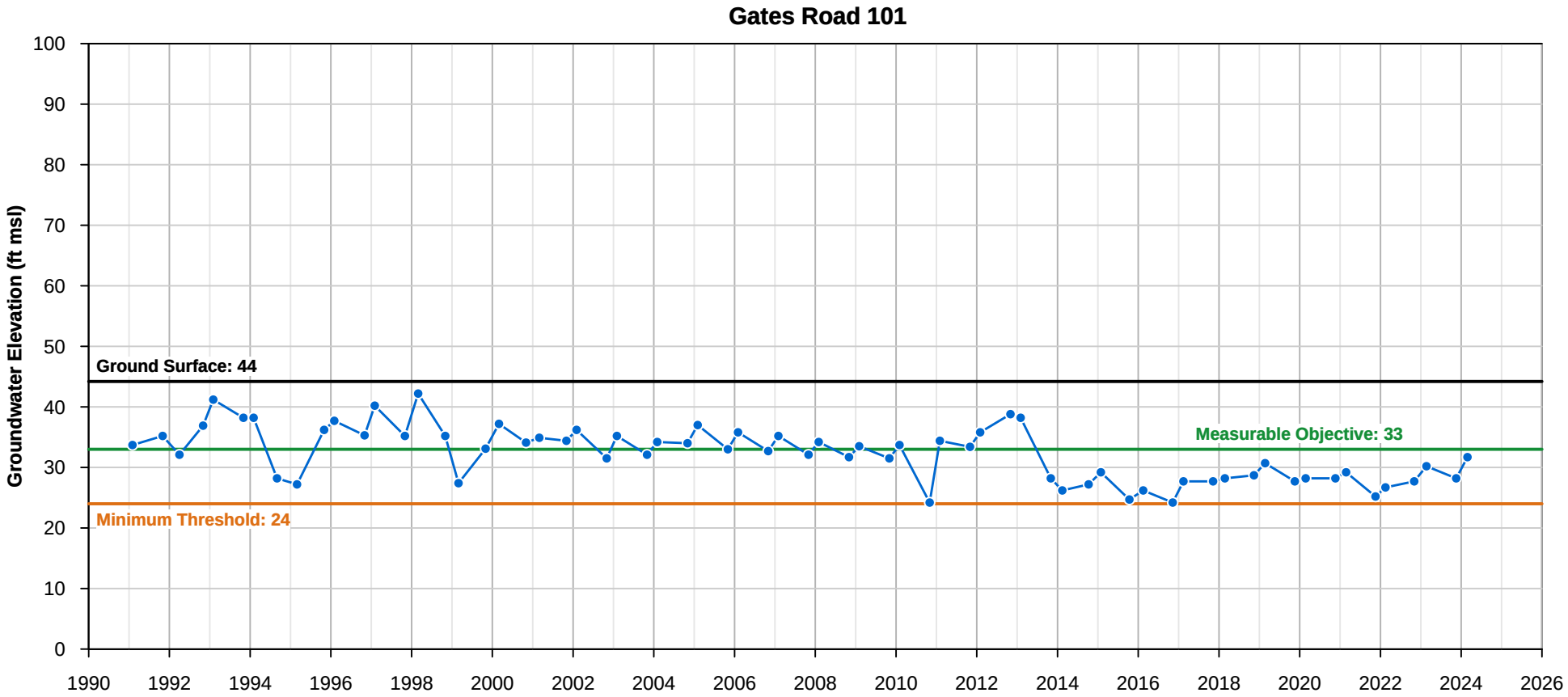




Well Information

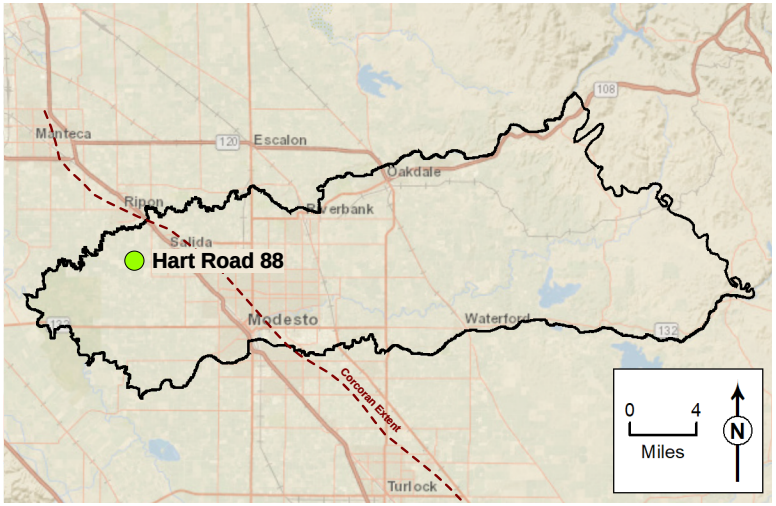
Site Code:	376596N1211549W001
Local Well Name:	Gates Road 101
State Well Name:	03S07E24M001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	3146
Latitude:	37.6597
Longitude:	-121.155
Well Depth (feet bgs):	64
Top Perforation (feet bgs):	0
Bottom Perforation (feet bgs):	0
Ground Surface Elevation:	44.2
Reference Point Elevation:	44.2
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

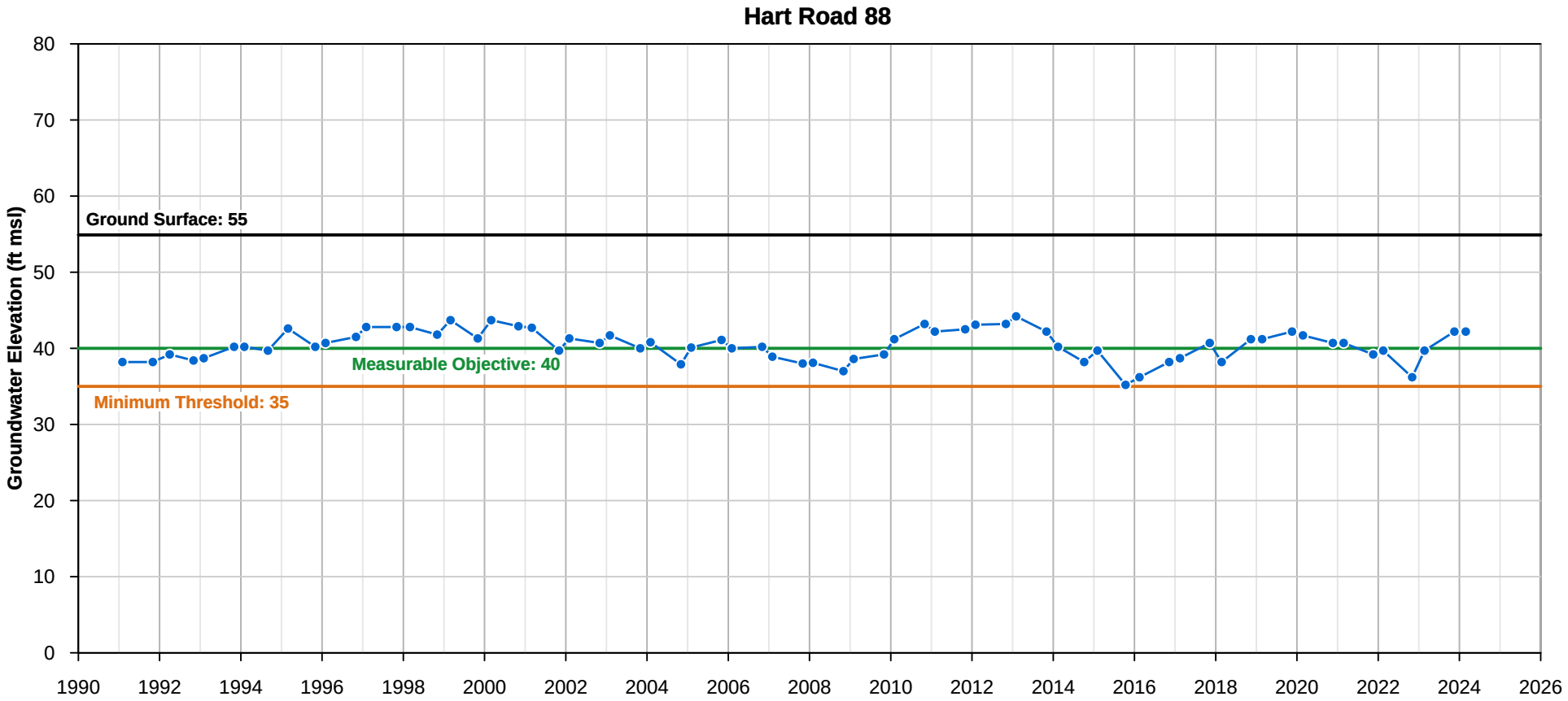




Well Information

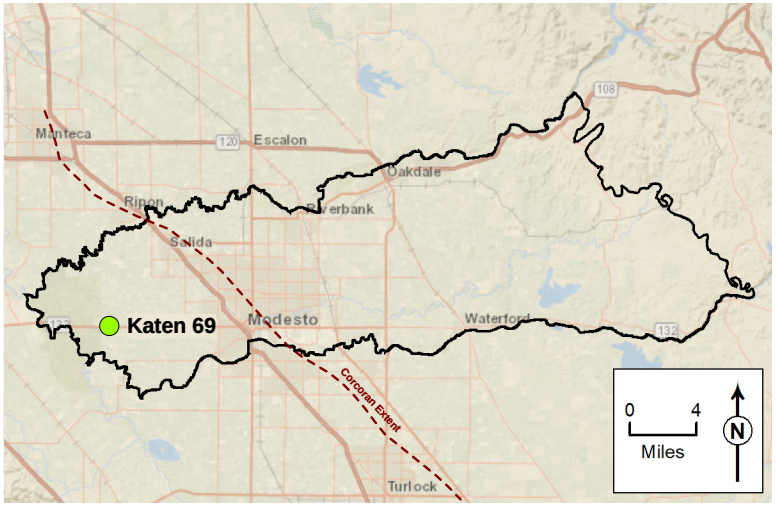
Site Code:	376946N1211227W001
Local Well Name:	Hart Road 88
State Well Name:	03S08E08D001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	3301
Latitude:	37.6948
Longitude:	-121.123
Well Depth (feet bgs):	130
Top Perforation (feet bgs):	73
Bottom Perforation (feet bgs):	85
Ground Surface Elevation:	54.9
Reference Point Elevation:	55.2
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

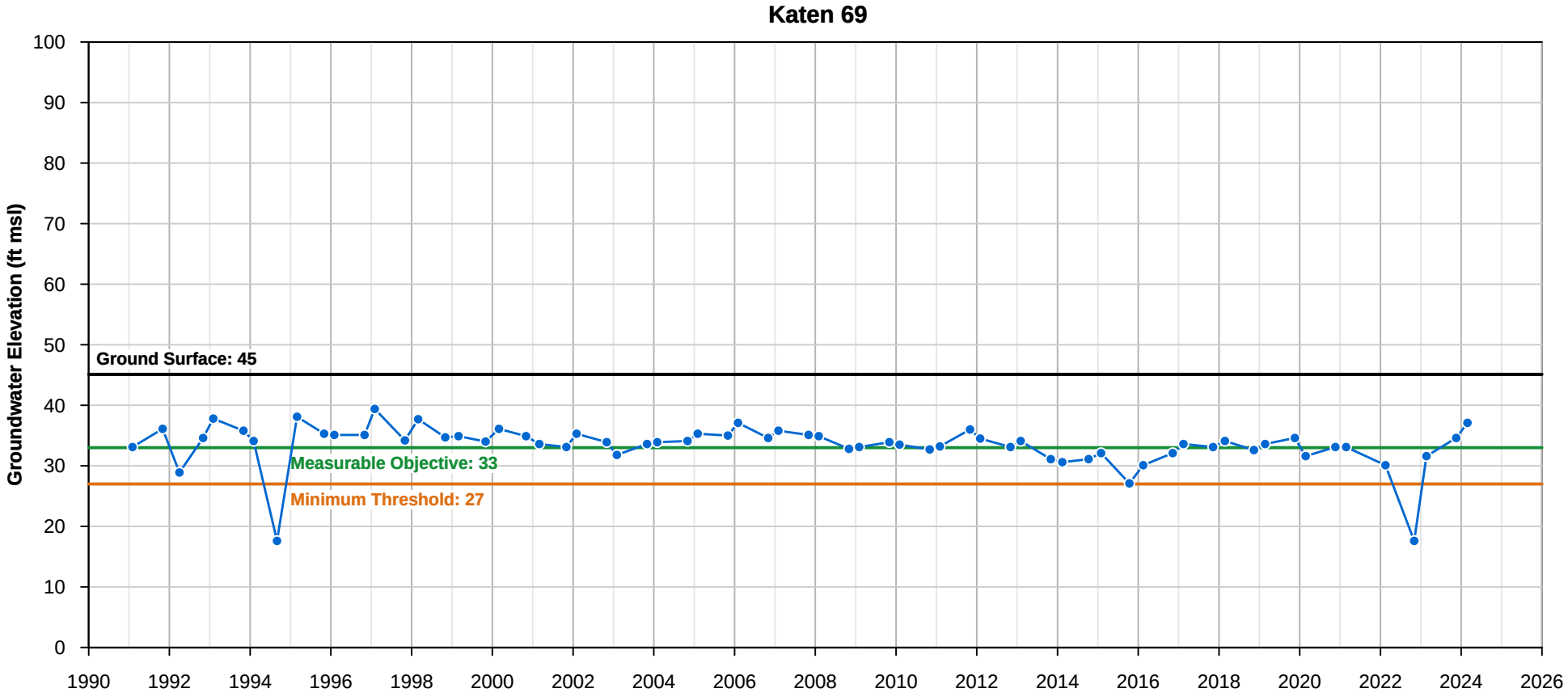




Well Information

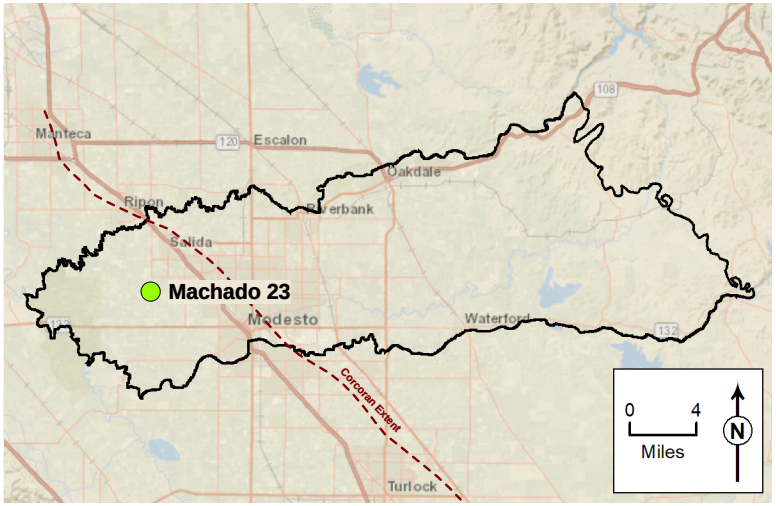
Site Code:	376377N1211496W001
Local Well Name:	Katen 69
State Well Name:	03S07E25P001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	3147
Latitude:	37.6379
Longitude:	-121.15
Well Depth (feet bgs):	160
Top Perforation (feet bgs):	13
Bottom Perforation (feet bgs):	148
Ground Surface Elevation:	45.1
Reference Point Elevation:	45.1
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

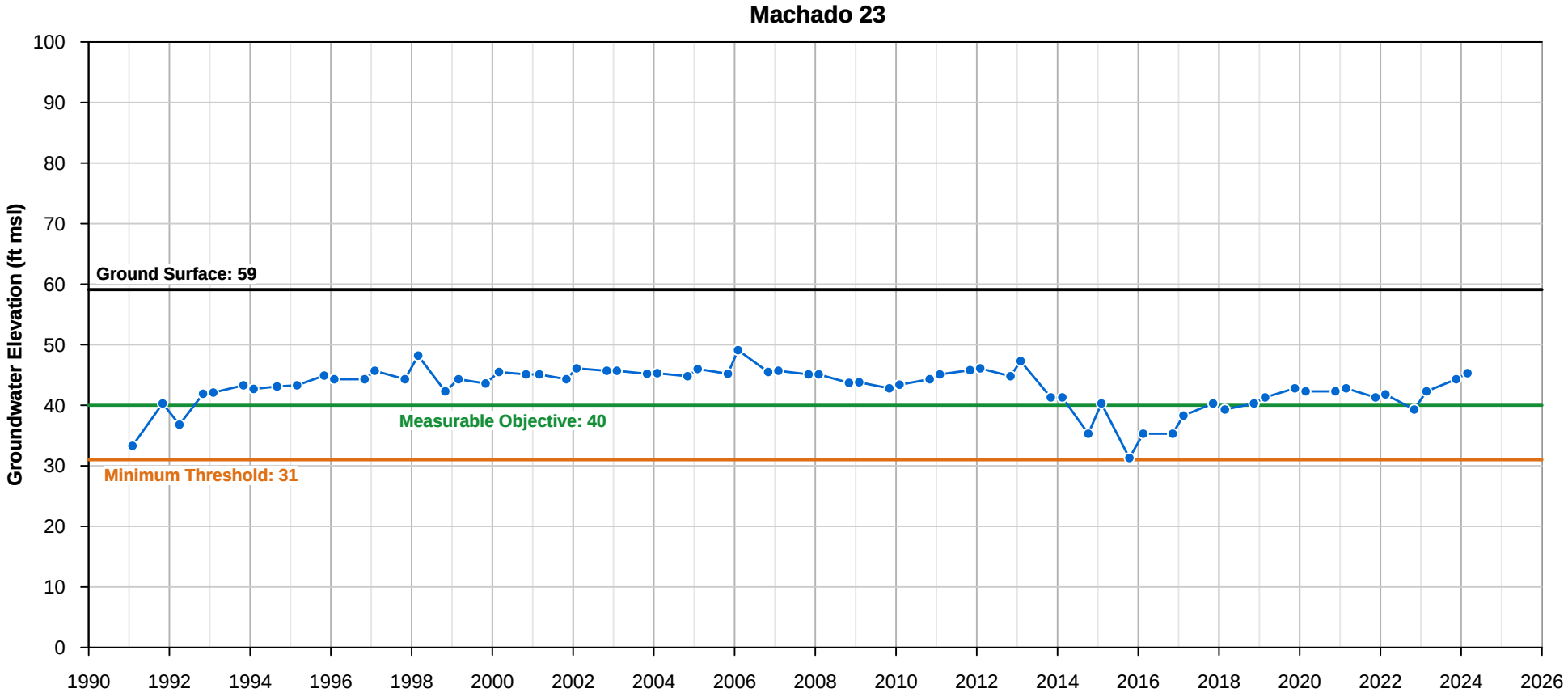




Well Information

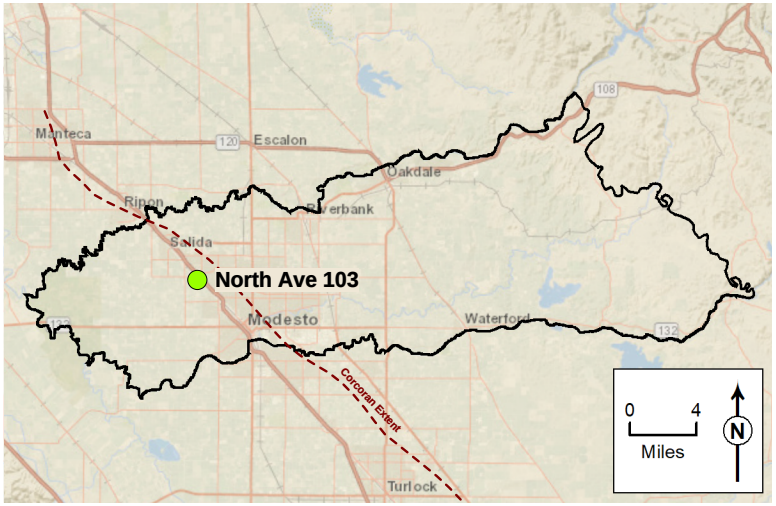
Site Code:	376680N1211049W001
Local Well Name:	Machado 23
State Well Name:	03S08E17R001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	3864
Latitude:	37.668
Longitude:	-121.105
Well Depth (feet bgs):	80
Top Perforation (feet bgs):	0
Bottom Perforation (feet bgs):	0
Ground Surface Elevation:	59.1
Reference Point Elevation:	59.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

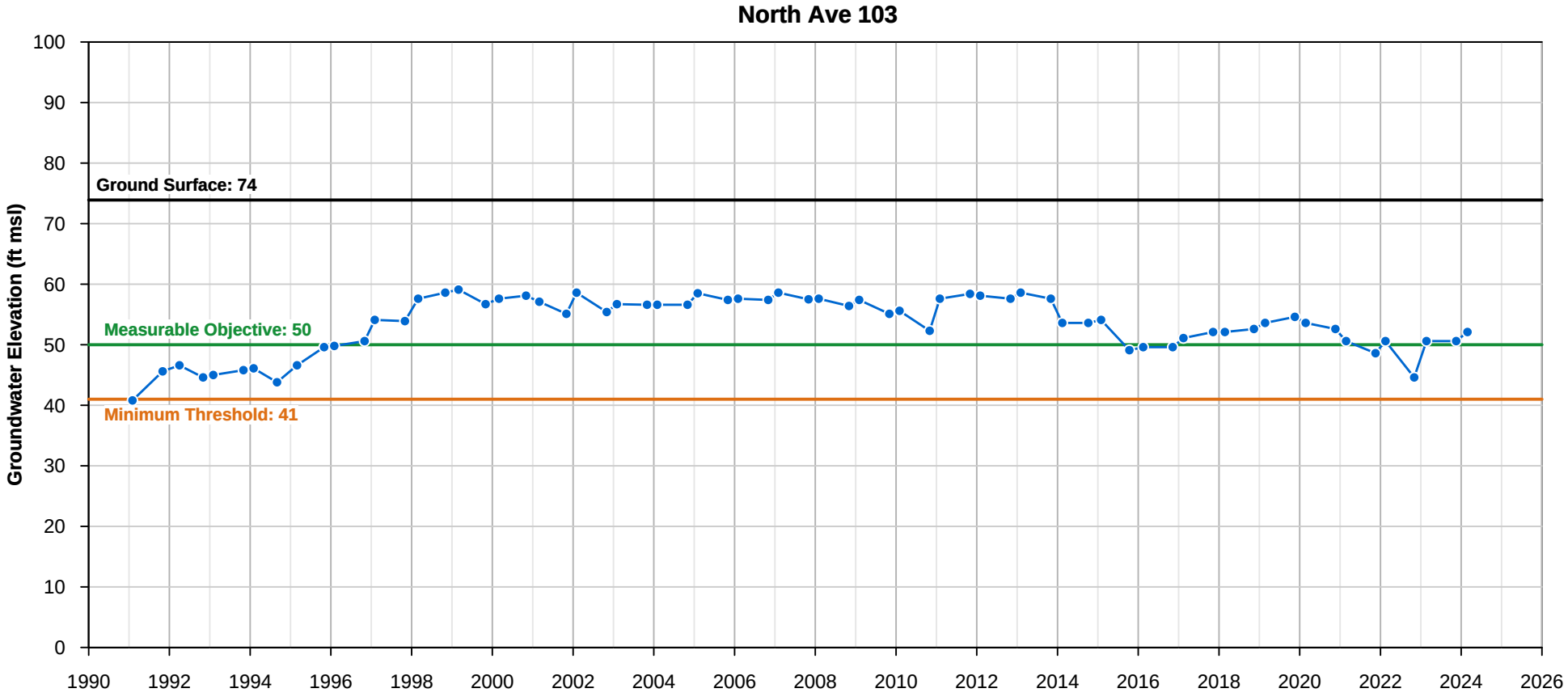




Well Information

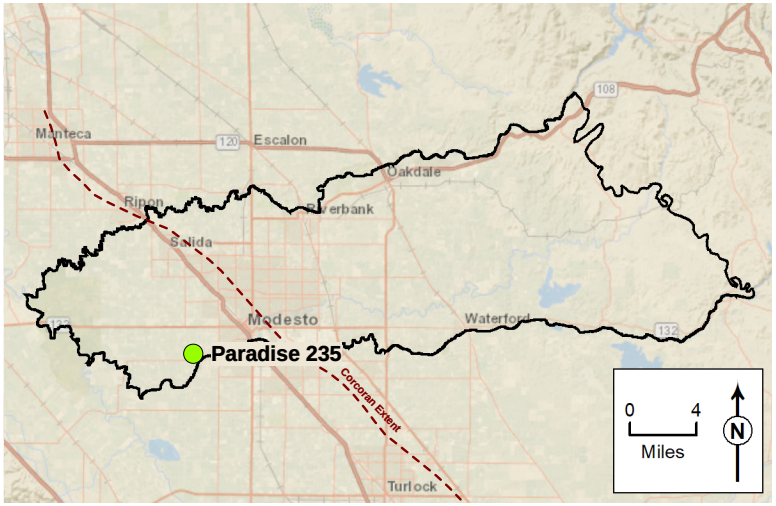
Site Code:	376782N1210541W001
Local Well Name:	North Ave 103
State Well Name:	03S08E14B001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	3854
Latitude:	37.6784
Longitude:	-121.054
Well Depth (feet bgs):	130
Top Perforation (feet bgs):	53
Bottom Perforation (feet bgs):	81
Ground Surface Elevation:	73.9
Reference Point Elevation:	74.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

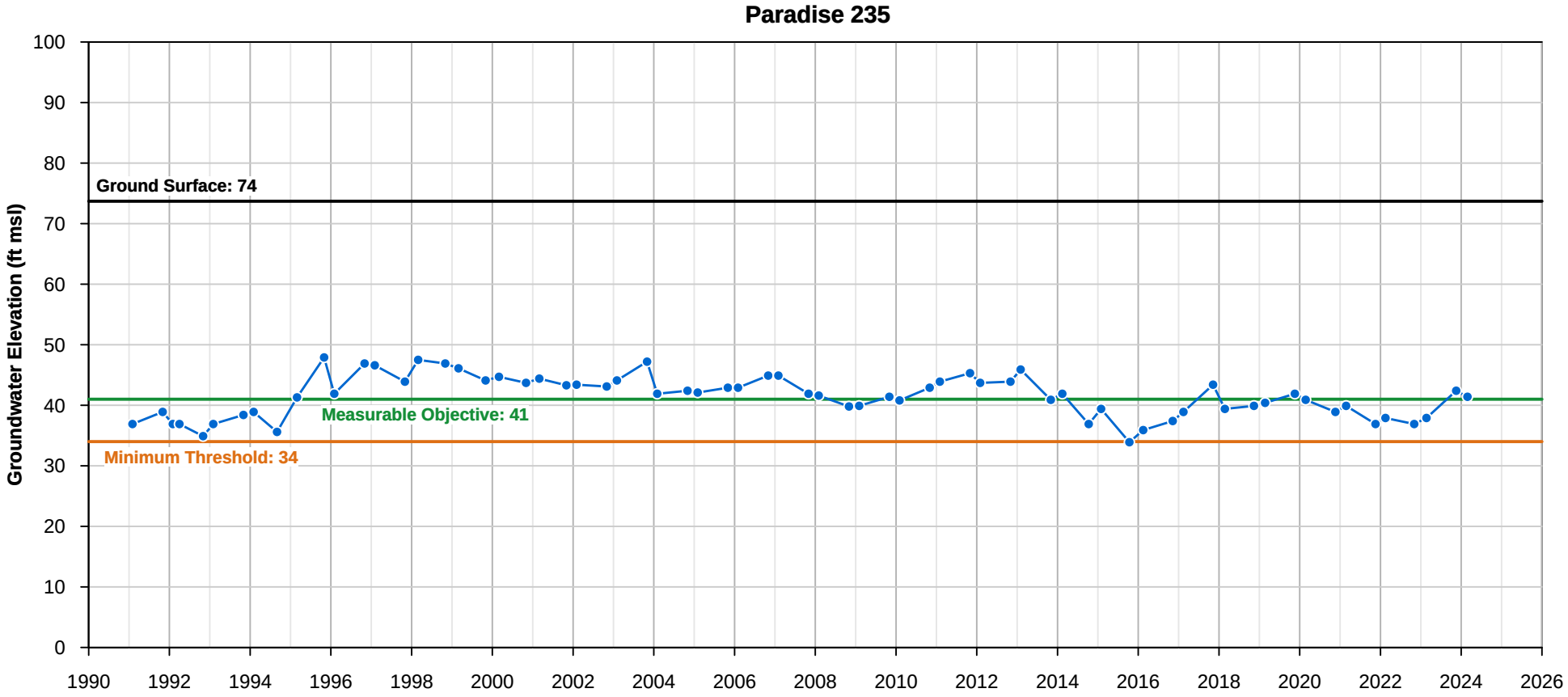




Well Information

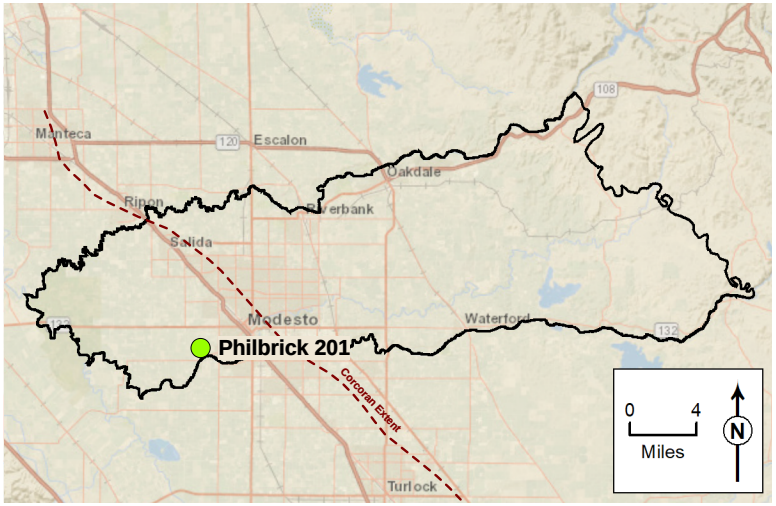
Site Code:	376141N1210577W001
Local Well Name:	Paradise 235
State Well Name:	04S08E02L001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	2151
Latitude:	37.6142
Longitude:	-121.058
Well Depth (feet bgs):	258
Top Perforation (feet bgs):	96
Bottom Perforation (feet bgs):	132
Ground Surface Elevation:	73.7
Reference Point Elevation:	73.9
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

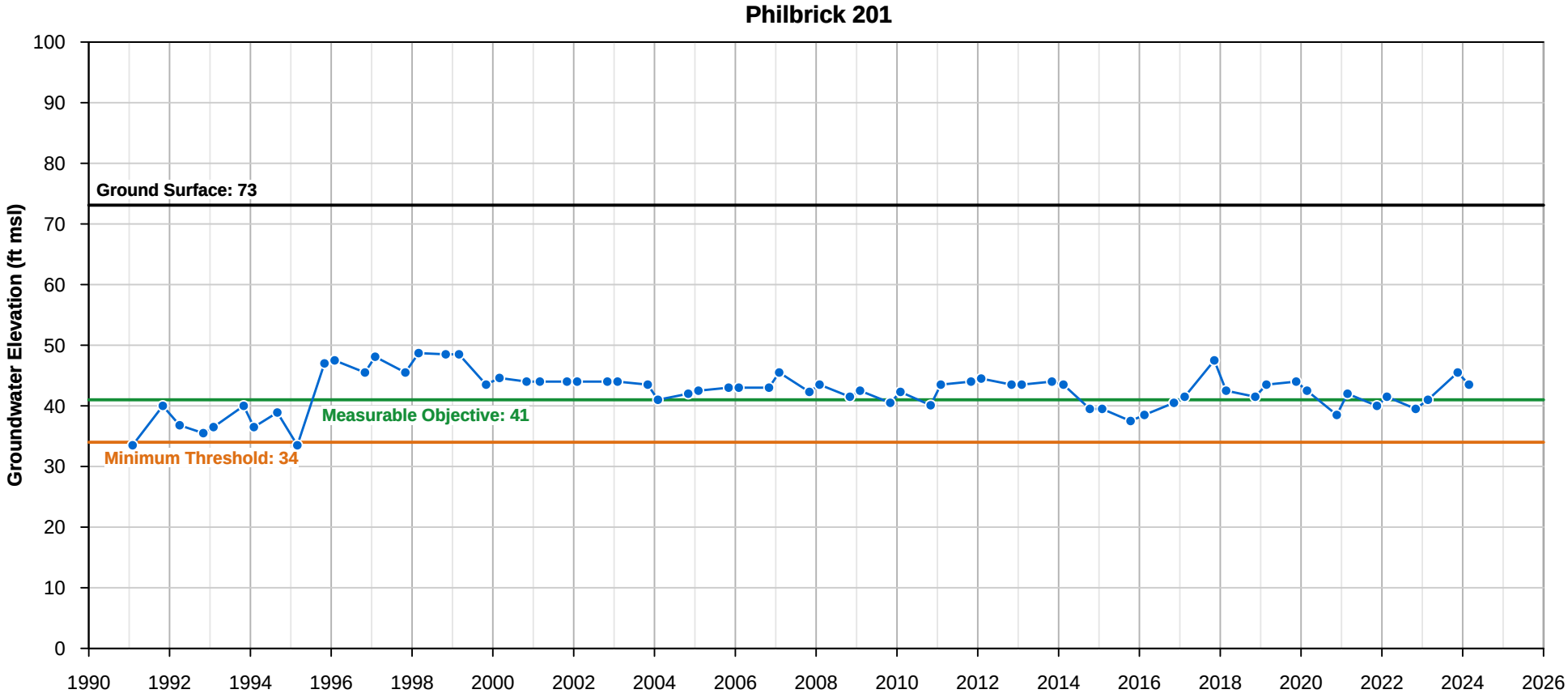




Well Information

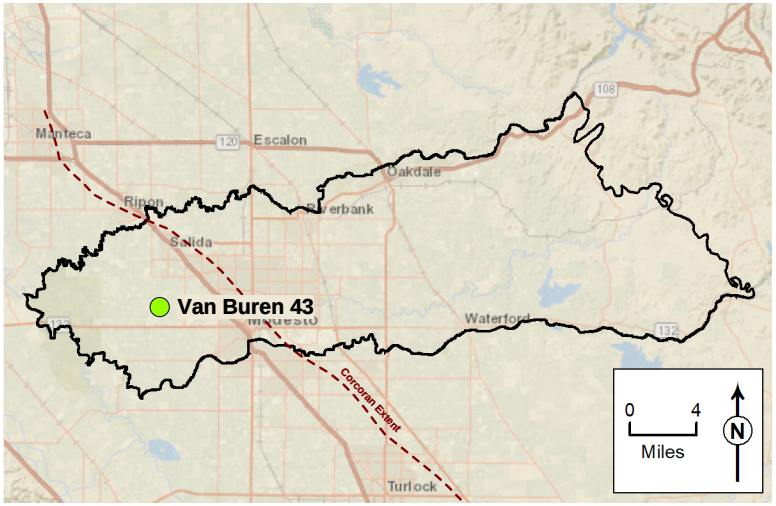
Site Code:	376191N1210499W001
Local Well Name:	Philbrick 201
State Well Name:	04S08E02H001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	26591
Latitude:	37.6192
Longitude:	-121.05
Well Depth (feet bgs):	88
Top Perforation (feet bgs):	58
Bottom Perforation (feet bgs):	74
Ground Surface Elevation:	73.1
Reference Point Elevation:	73.5
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

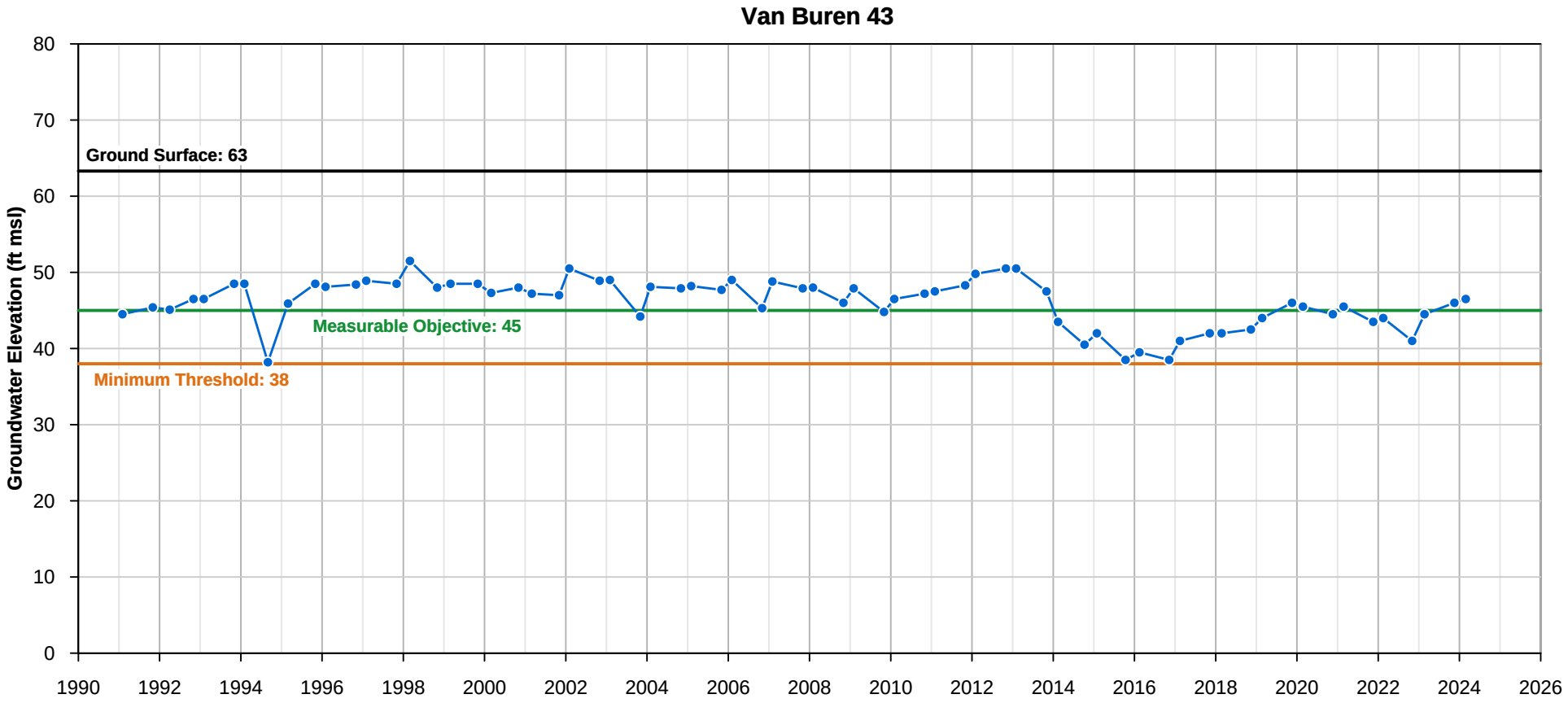




Well Information

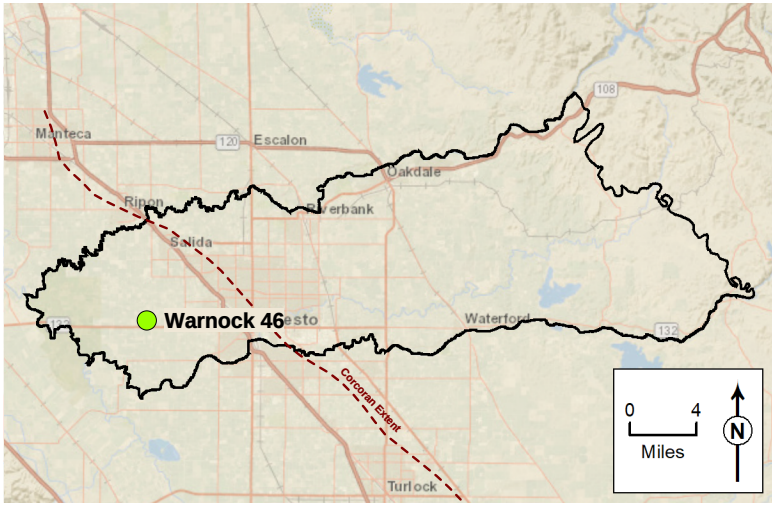
Site Code:	376543N1210946W001
Local Well Name:	Van Buren 43
State Well Name:	03S08E21Q001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	3873
Latitude:	37.6546
Longitude:	-121.095
Well Depth (feet bgs):	196
Top Perforation (feet bgs):	76
Bottom Perforation (feet bgs):	116
Ground Surface Elevation:	63.3
Reference Point Elevation:	63.5
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

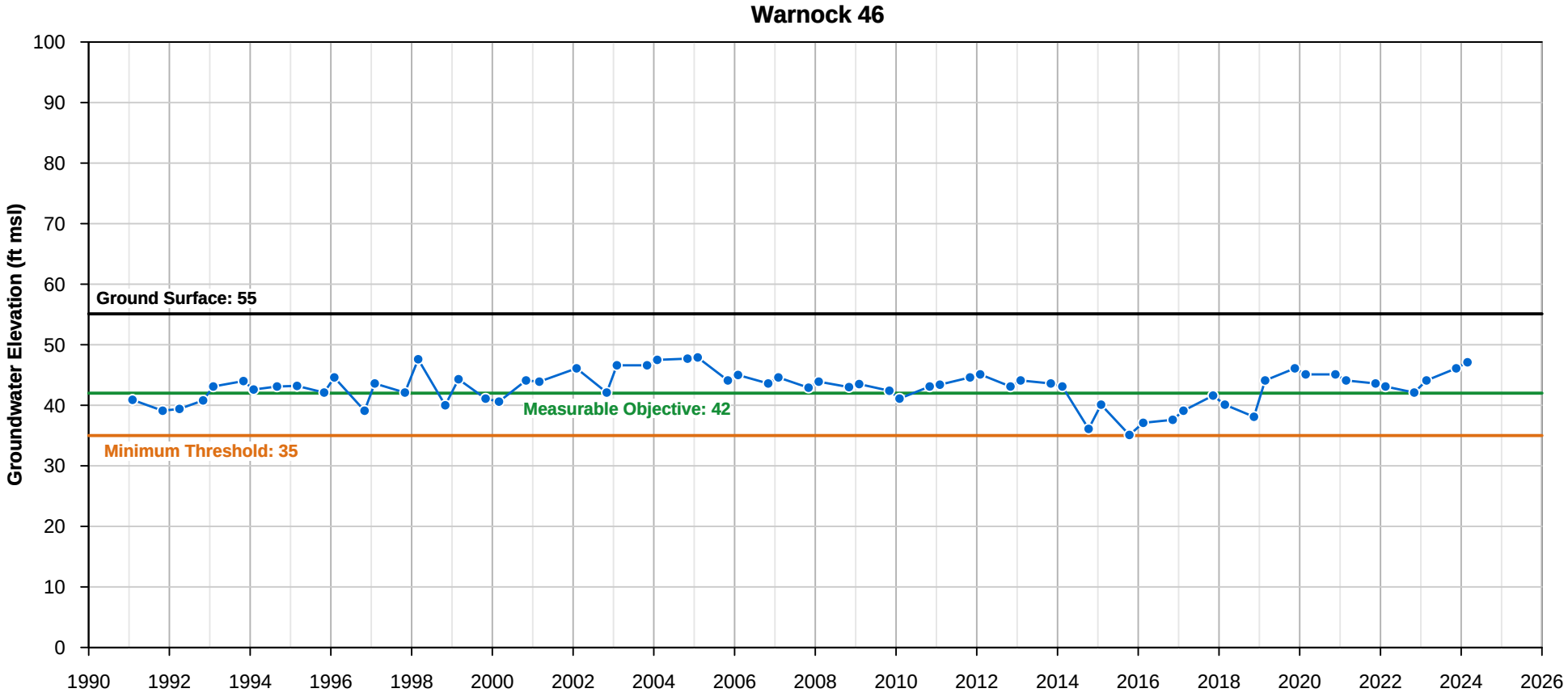




Well Information

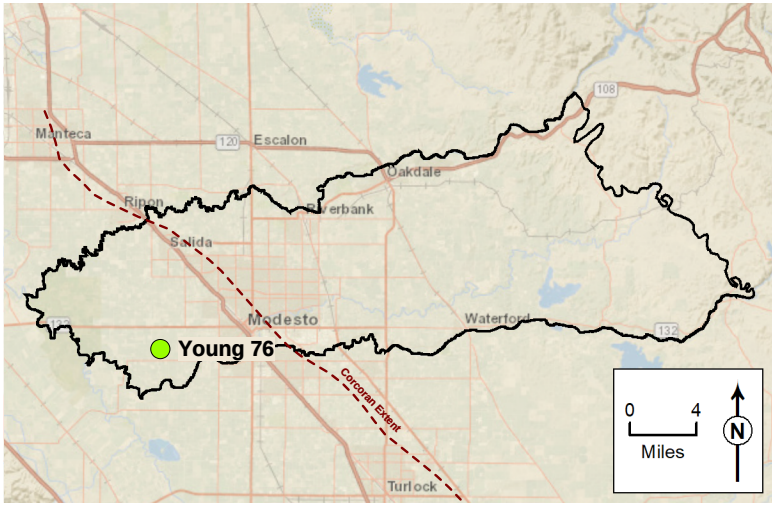
Site Code:	376427N1211085W001
Local Well Name:	Warnock 46
State Well Name:	03S08E29K001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	4015
Latitude:	37.6429
Longitude:	-121.109
Well Depth (feet bgs):	240
Top Perforation (feet bgs):	0
Bottom Perforation (feet bgs):	0
Ground Surface Elevation:	55.1
Reference Point Elevation:	55.1
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

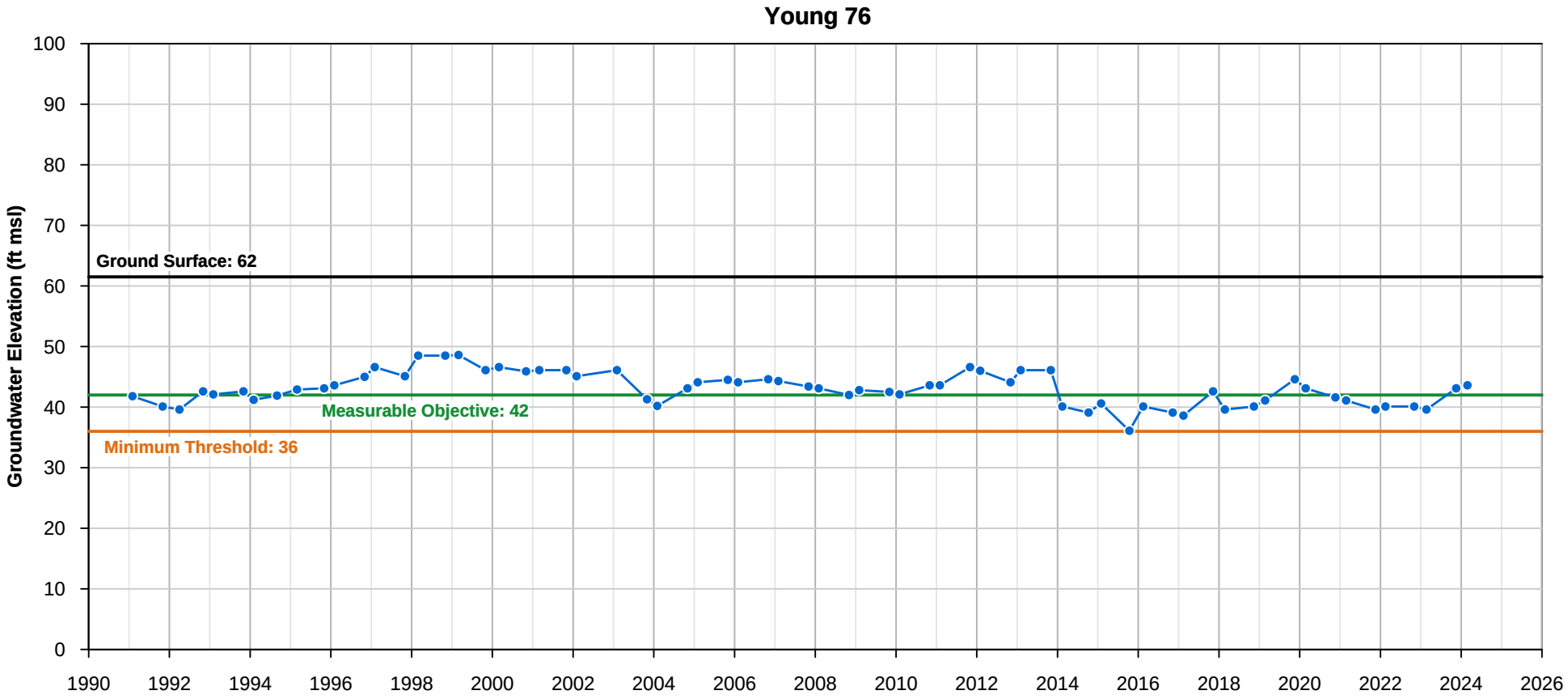




Well Information

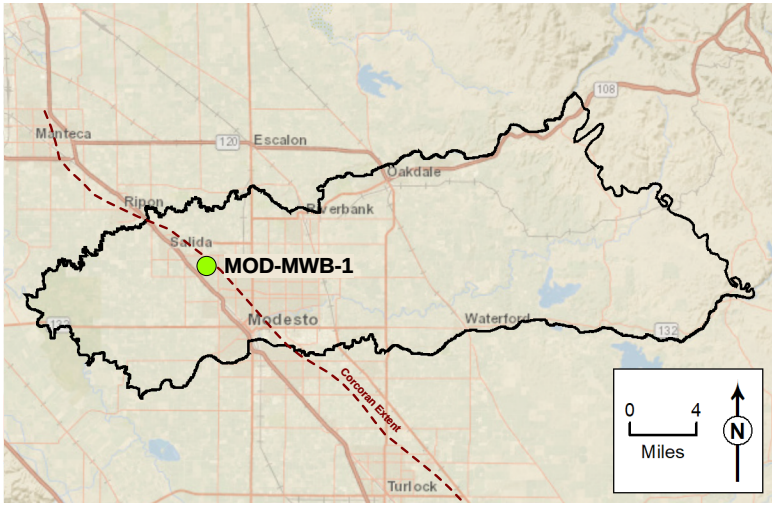
Site Code:	376180N1210941W001
Local Well Name:	Young 76
State Well Name:	04S08E04G001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	38078
Latitude:	37.6181
Longitude:	-121.094
Well Depth (feet bgs):	175
Top Perforation (feet bgs):	12
Bottom Perforation (feet bgs):	152
Ground Surface Elevation:	61.5
Reference Point Elevation:	62.1
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence





Well Information

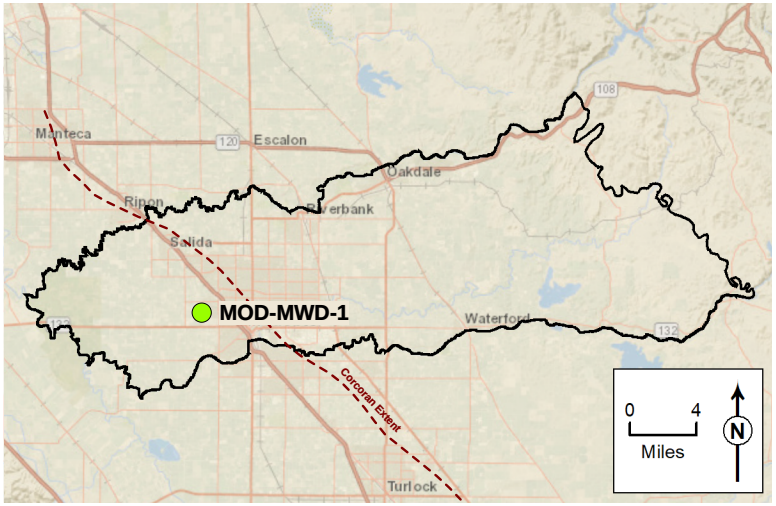
Site Code:	376905N1210442W001
Local Well Name:	MOD-MWB-1
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	57377
Latitude:	37.6906
Longitude:	-121.044
Well Depth (feet bgs):	177
Top Perforation (feet bgs):	152
Bottom Perforation (feet bgs):	172
Ground Surface Elevation:	78.795
Reference Point Elevation:	78.8
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

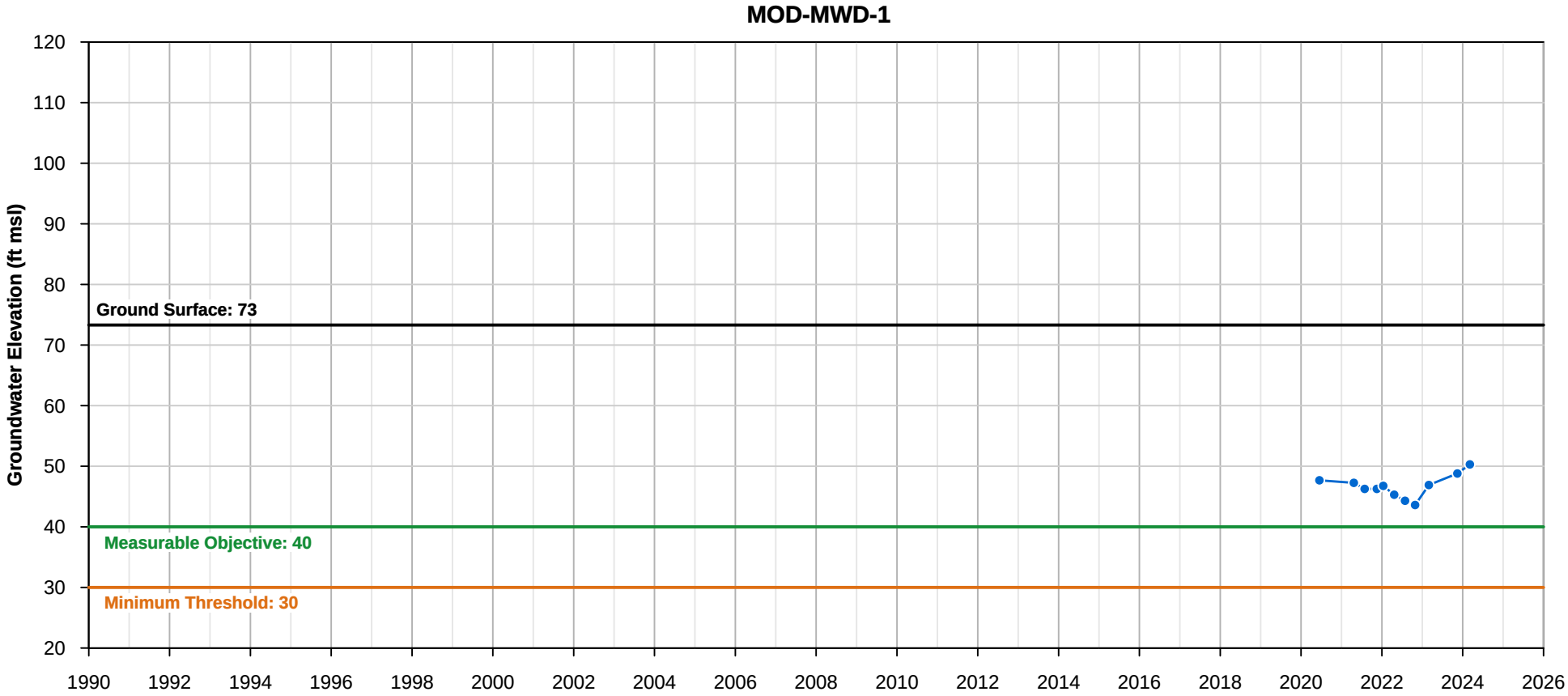




Well Information

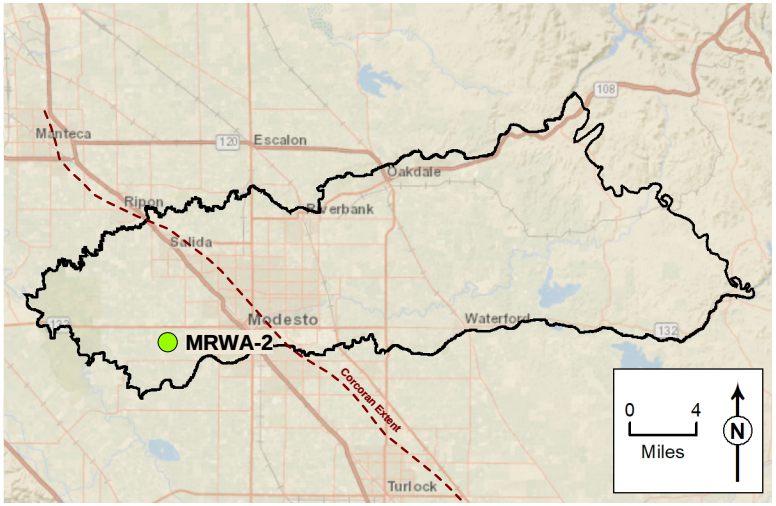
Site Code:	376499N1210486W001
Local Well Name:	MOD-MWD-1
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	57380
Latitude:	37.65
Longitude:	-121.049
Well Depth (feet bgs):	129
Top Perforation (feet bgs):	104
Bottom Perforation (feet bgs):	124
Ground Surface Elevation:	73.3
Reference Point Elevation:	73.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

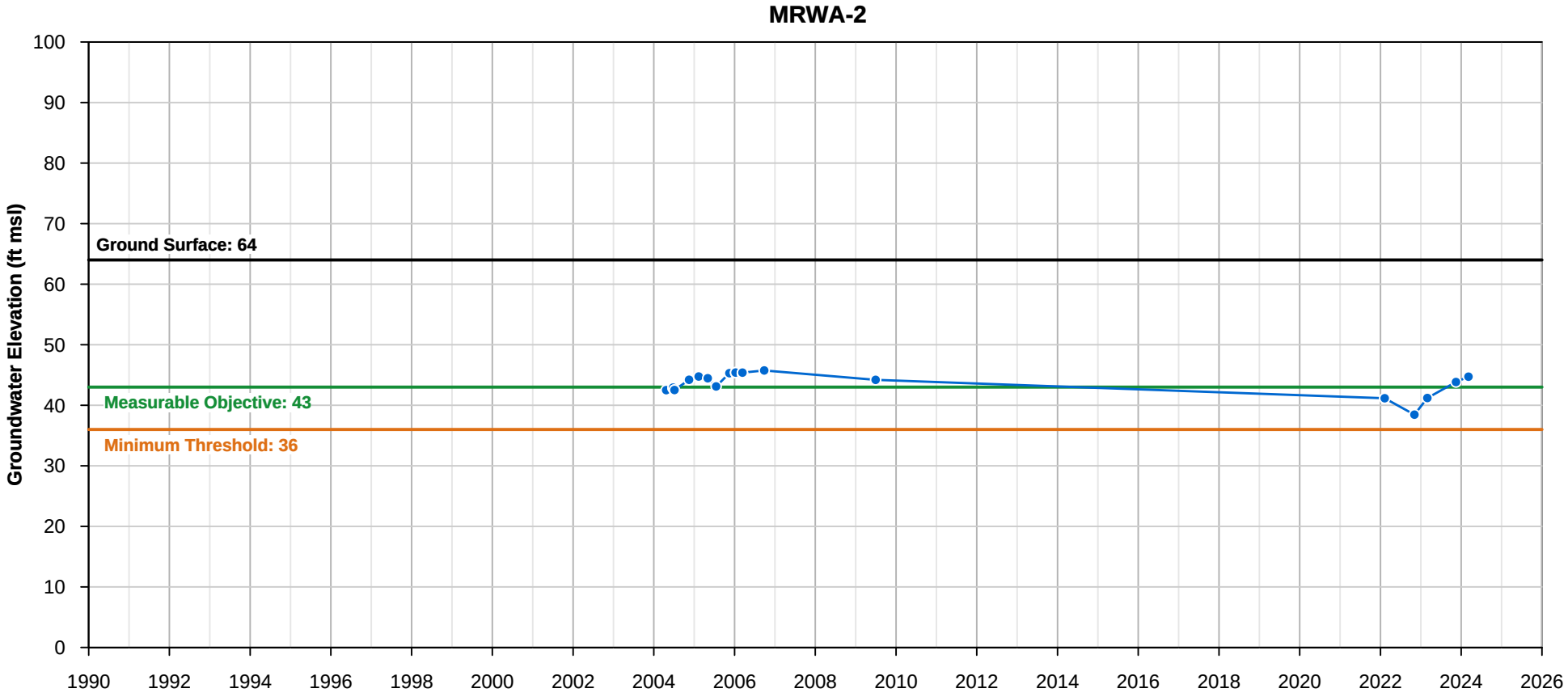




Well Information

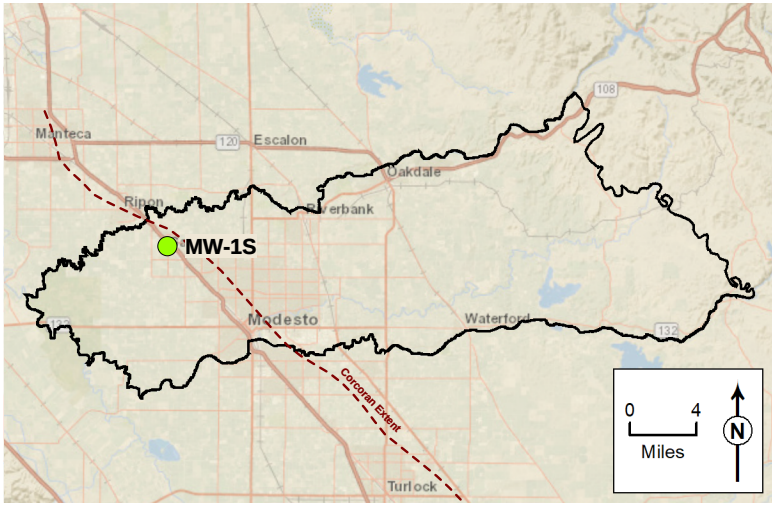
Site Code:	376241N1210861W001
Local Well Name:	MRWA-2
State Well Name:	03S08E33R002M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	57384
Latitude:	37.6241
Longitude:	-121.086
Well Depth (feet bgs):	183
Top Perforation (feet bgs):	174
Bottom Perforation (feet bgs):	179
Ground Surface Elevation:	64
Reference Point Elevation:	64
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

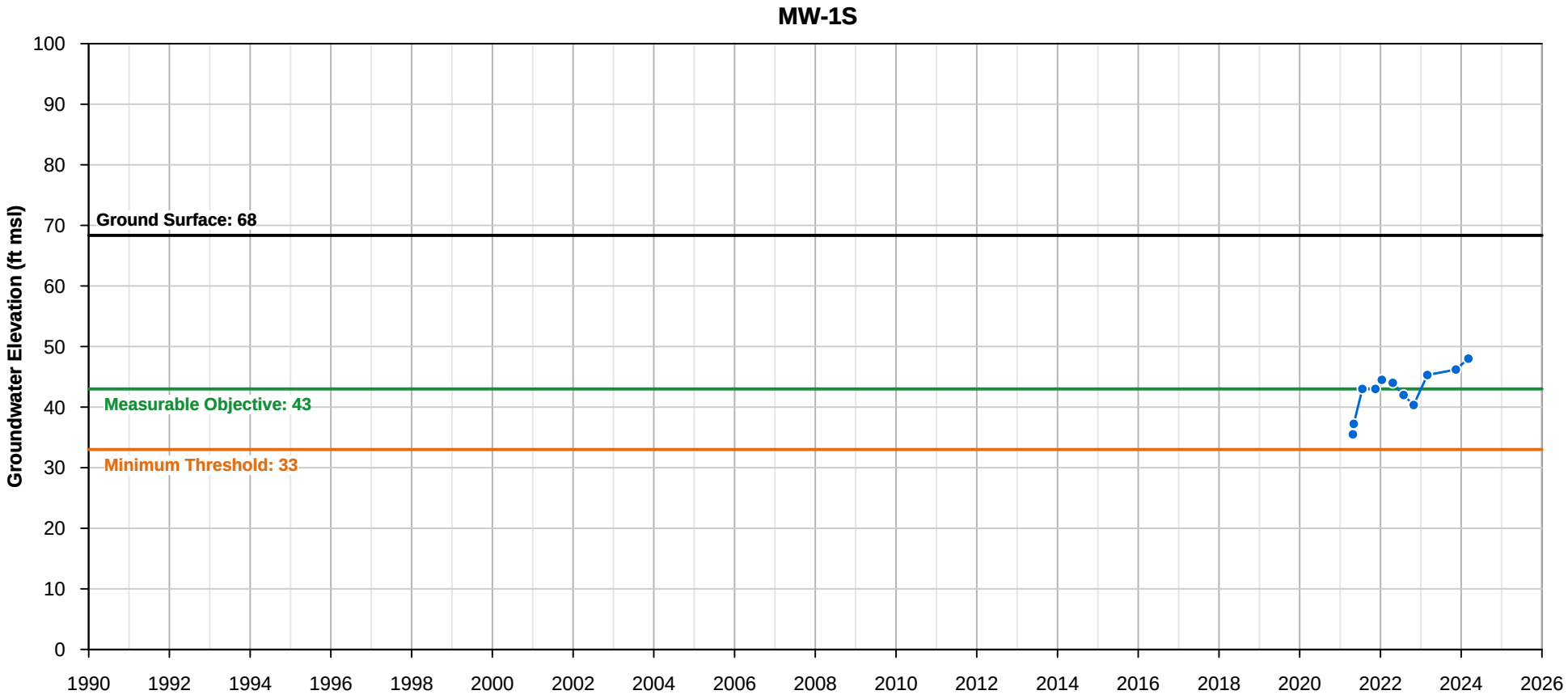




Well Information

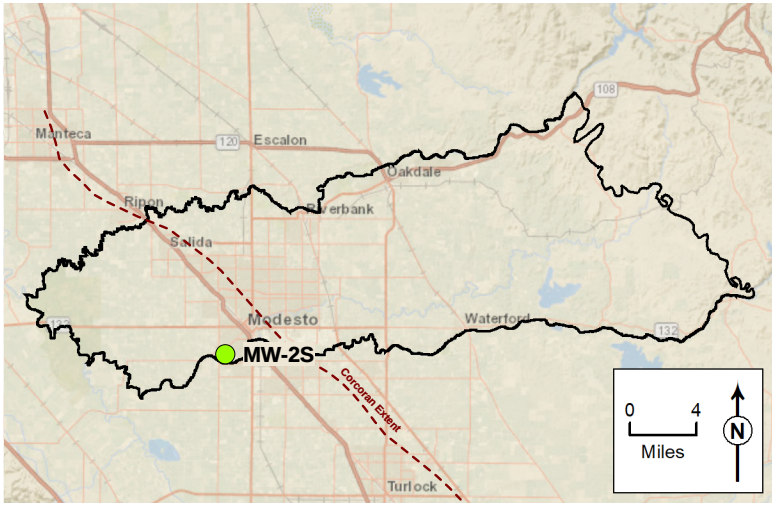
Site Code:	377076N1210871W001
Local Well Name:	MW-1S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	57386
Latitude:	37.7076
Longitude:	-121.087
Well Depth (feet bgs):	125
Top Perforation (feet bgs):	100
Bottom Perforation (feet bgs):	120
Ground Surface Elevation:	68.35
Reference Point Elevation:	68
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

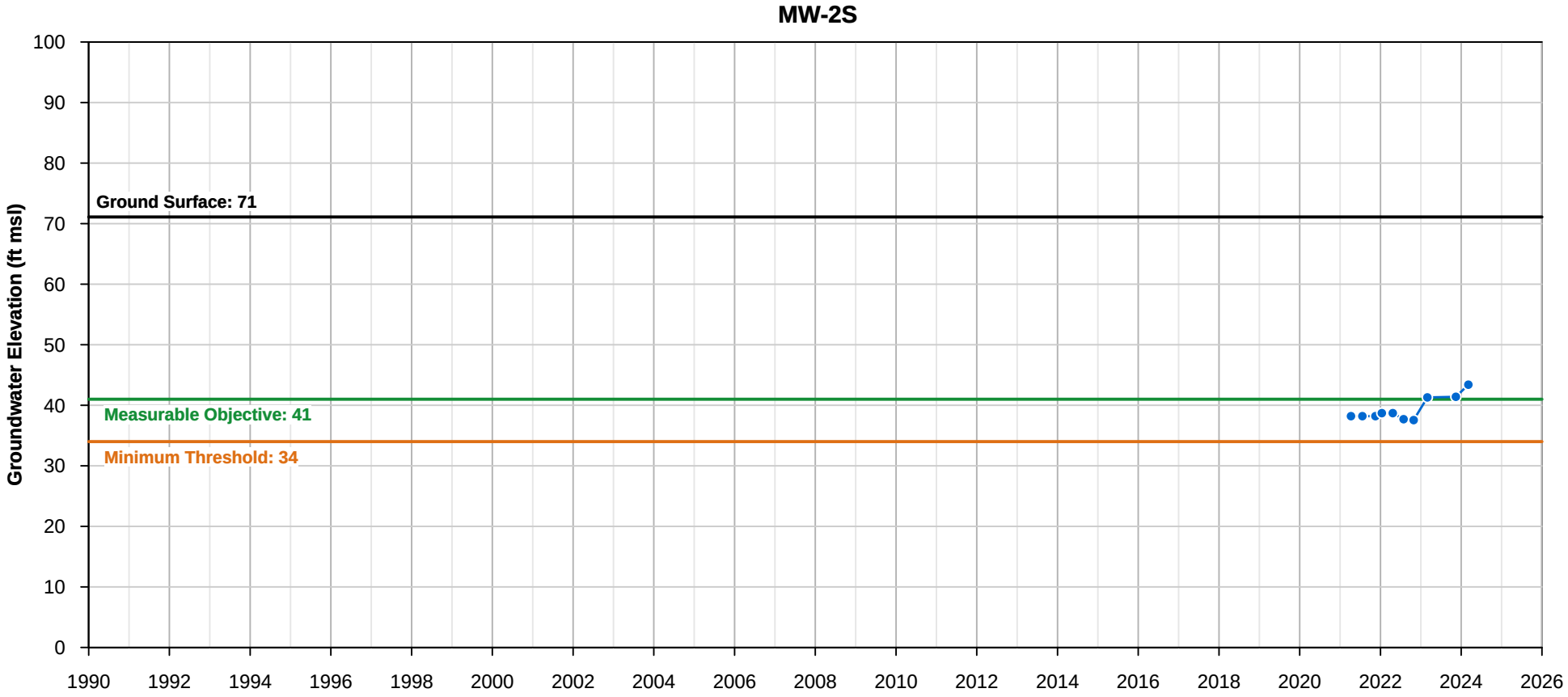




Well Information

Site Code:	376138N1210234W001
Local Well Name:	MW-2S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	57388
Latitude:	37.6139
Longitude:	-121.023
Well Depth (feet bgs):	135
Top Perforation (feet bgs):	110
Bottom Perforation (feet bgs):	130
Ground Surface Elevation:	71.1
Reference Point Elevation:	70.7
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

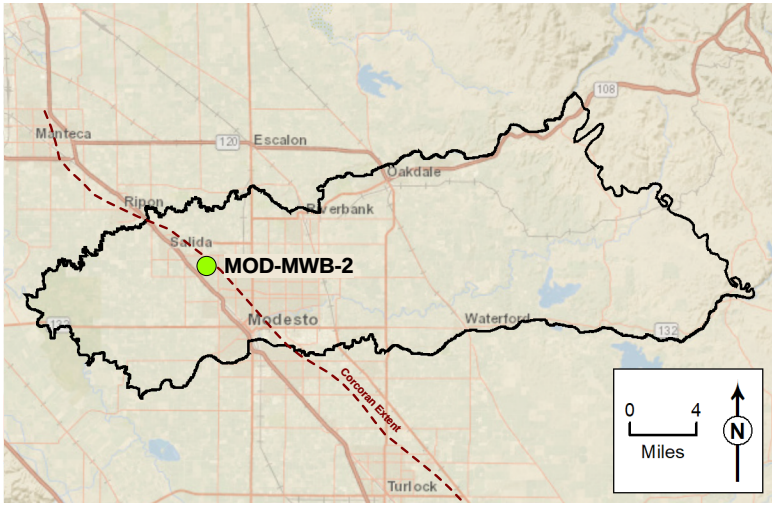


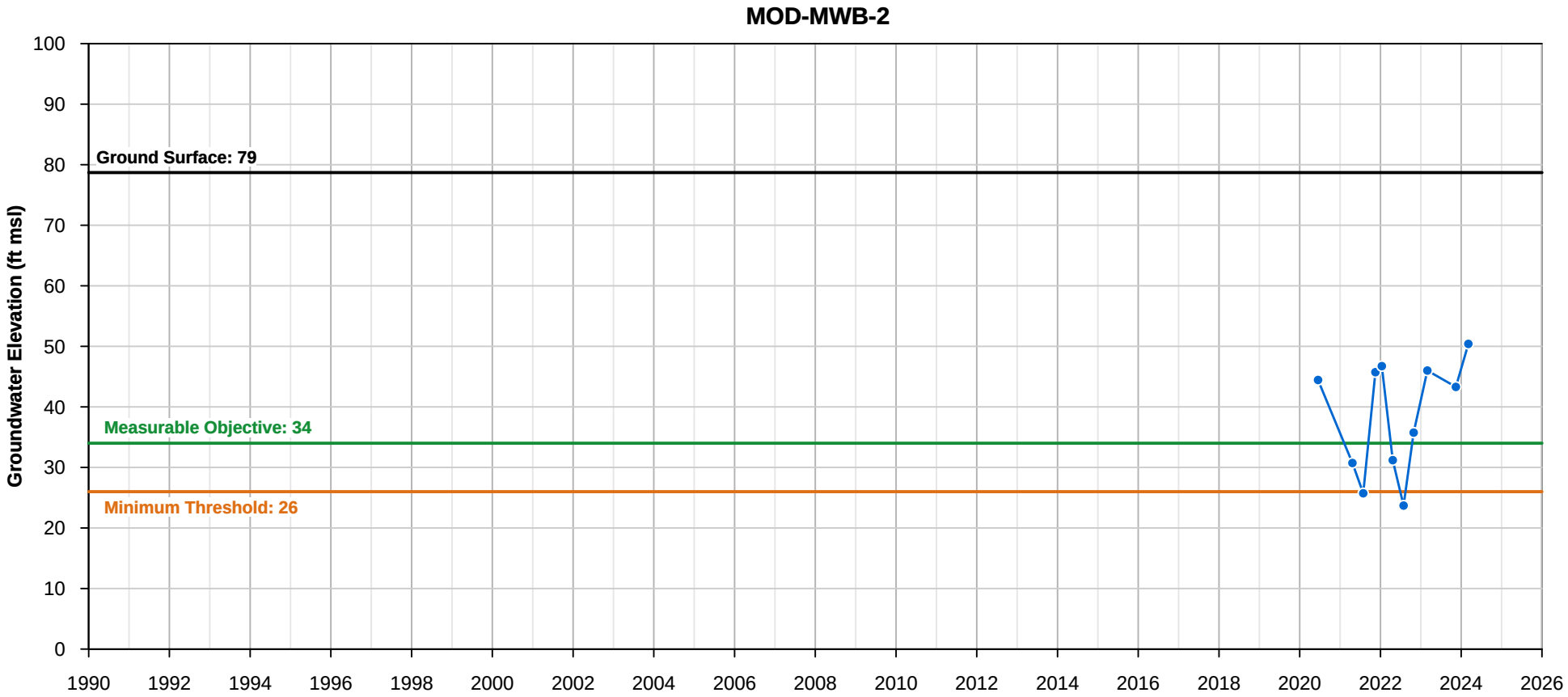


Western Lower Principal Aquifer

Well Information

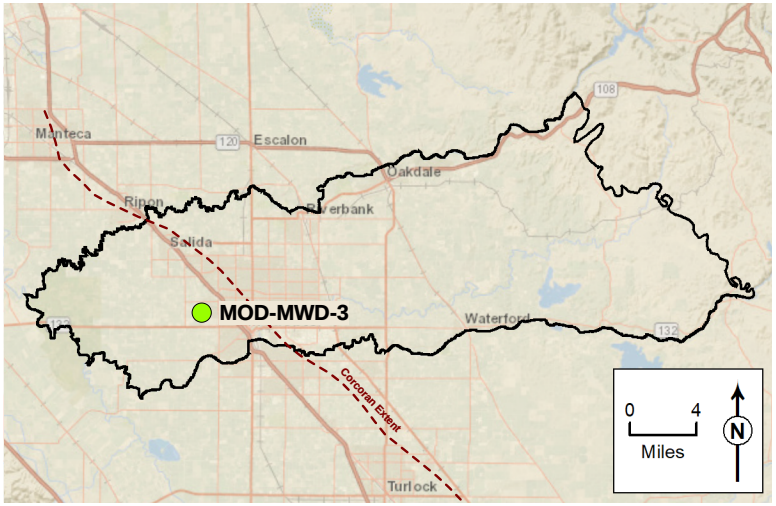
Site Code:	376905N1210442W002
Local Well Name:	MOD-MWB-2
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Lower
Station ID:	57378
Latitude:	37.6906
Longitude:	-121.044
Well Depth (feet bgs):	250
Top Perforation (feet bgs):	225
Bottom Perforation (feet bgs):	245
Ground Surface Elevation:	78.7
Reference Point Elevation:	78.7
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

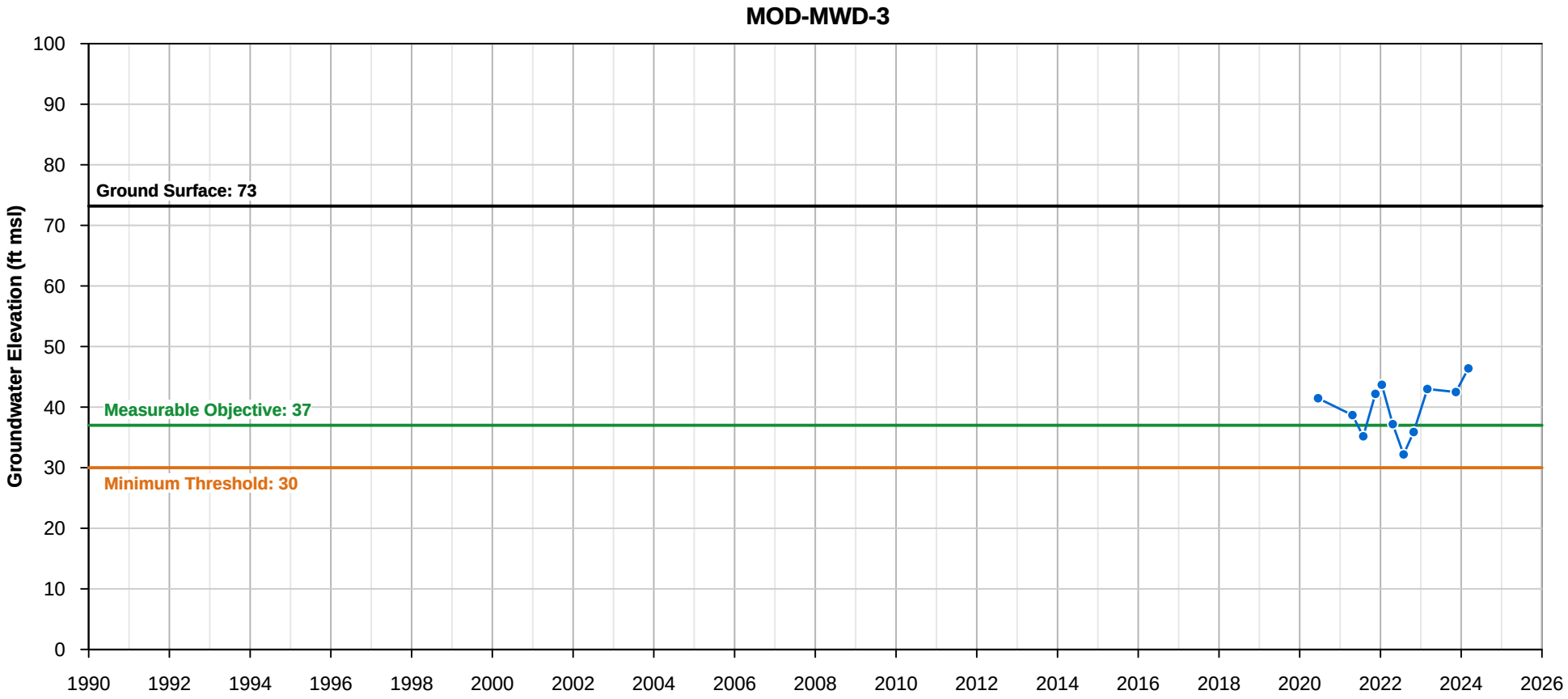




Well Information

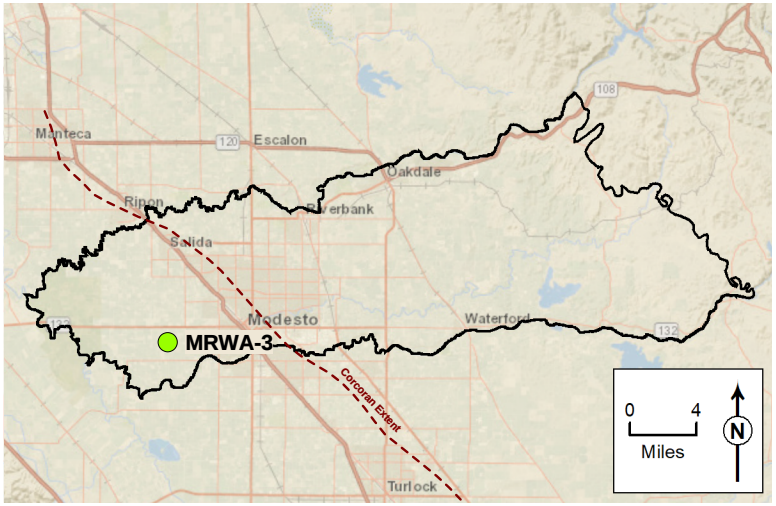
Site Code:	376499N1210486W002
Local Well Name:	MOD-MWD-3
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Lower
Station ID:	57381
Latitude:	37.65
Longitude:	-121.049
Well Depth (feet bgs):	243
Top Perforation (feet bgs):	218
Bottom Perforation (feet bgs):	238
Ground Surface Elevation:	73.185
Reference Point Elevation:	73.19
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

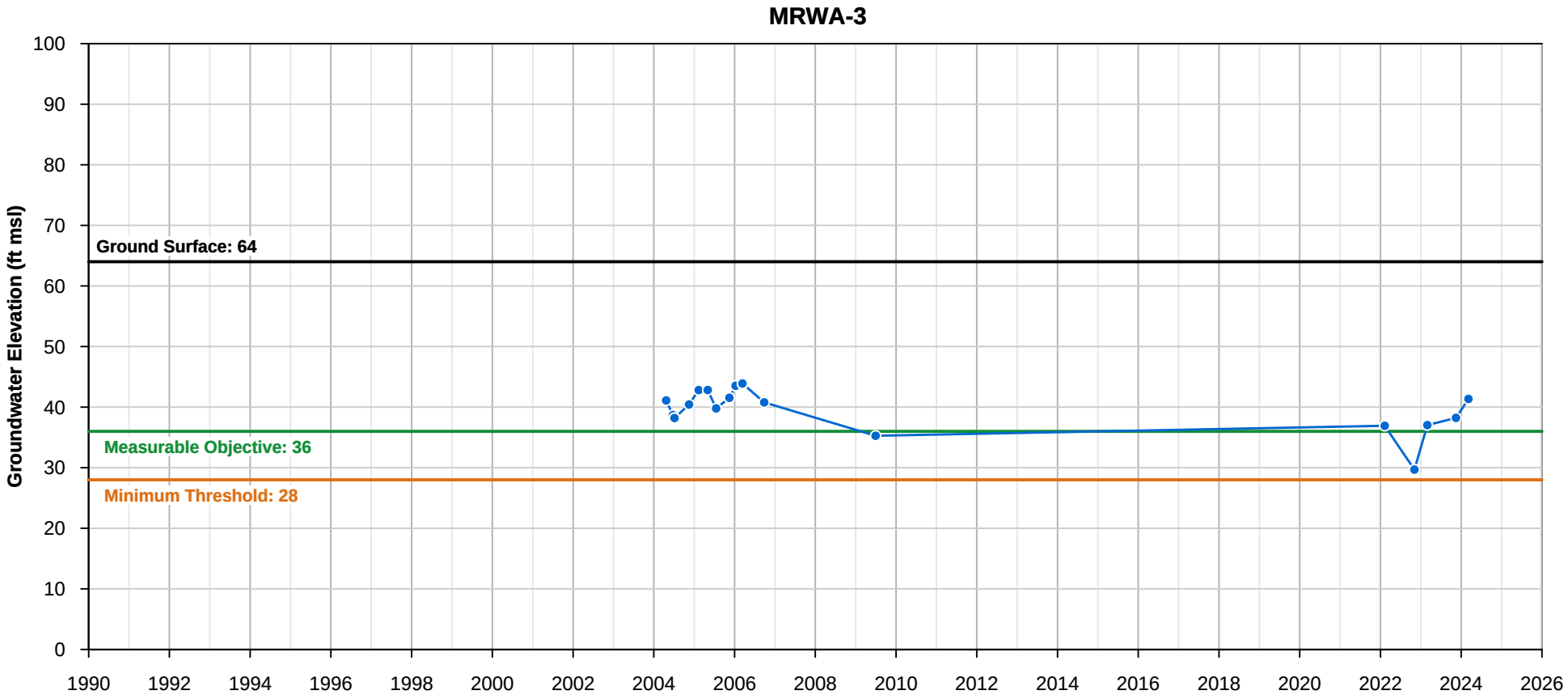




Well Information

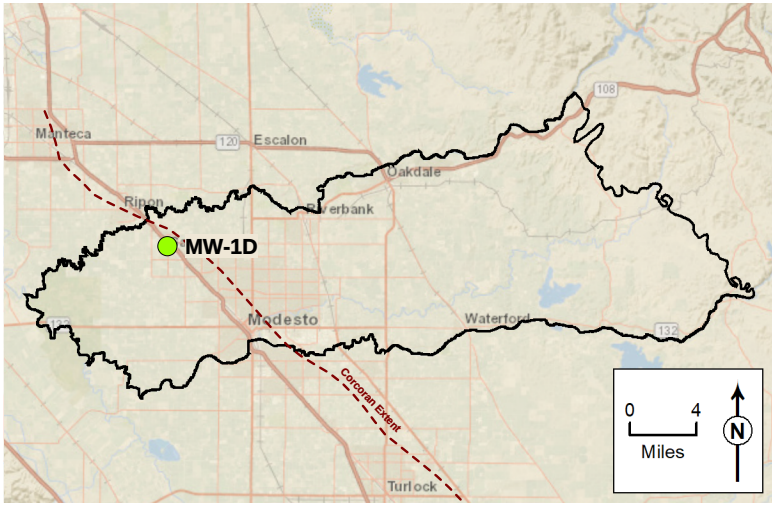
Site Code:	376241N1210861W002
Local Well Name:	MRWA-3
State Well Name:	03S08E33R001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Lower
Station ID:	57385
Latitude:	37.6241
Longitude:	-121.086
Well Depth (feet bgs):	280
Top Perforation (feet bgs):	269
Bottom Perforation (feet bgs):	274
Ground Surface Elevation:	64
Reference Point Elevation:	64
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

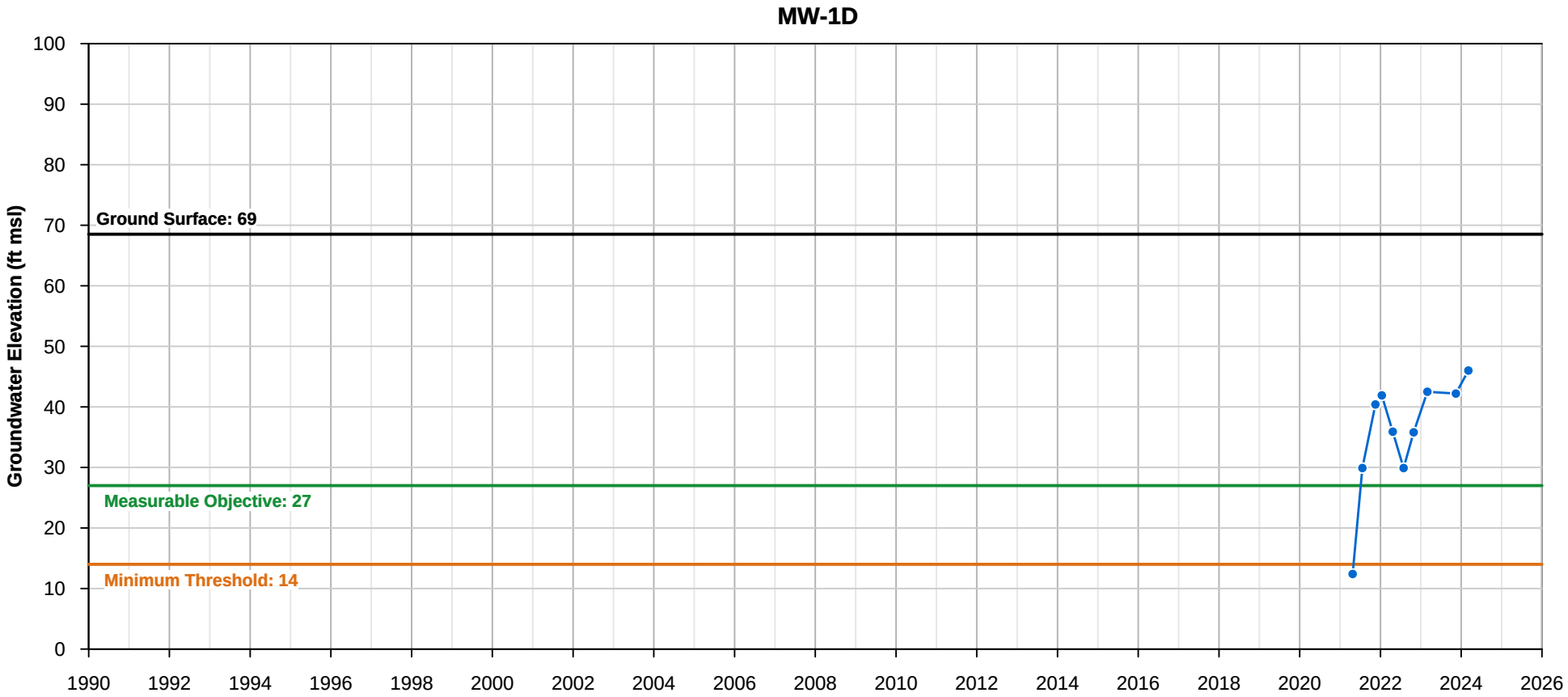




Well Information

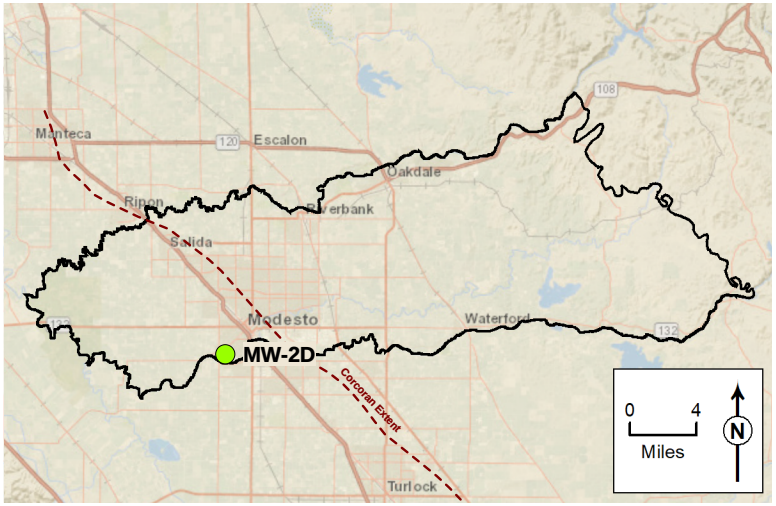
Site Code:	377076N1210871W002
Local Well Name:	MW-1D
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Lower
Station ID:	57387
Latitude:	37.7076
Longitude:	-121.087
Well Depth (feet bgs):	250
Top Perforation (feet bgs):	225
Bottom Perforation (feet bgs):	245
Ground Surface Elevation:	68.519
Reference Point Elevation:	67.9
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

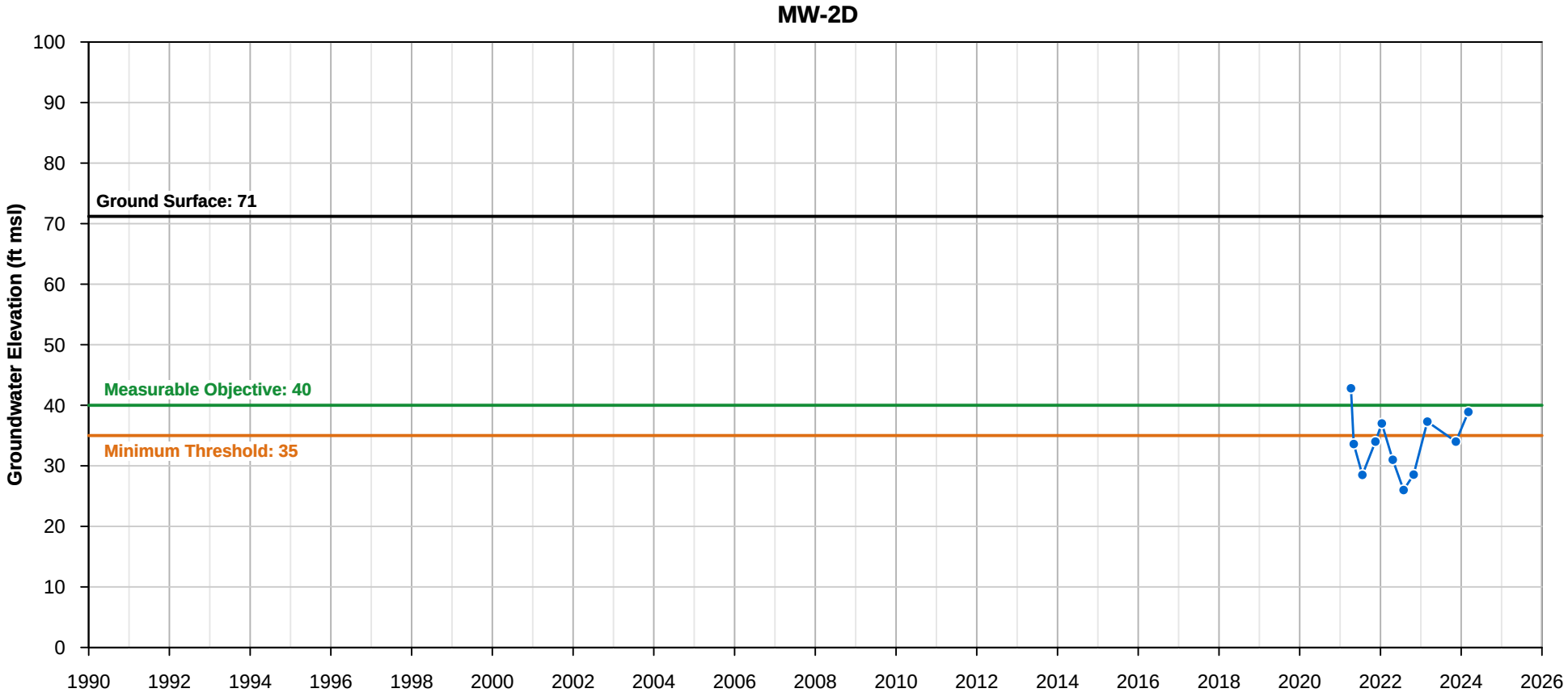




Well Information

Site Code:	376138N1210234W002
Local Well Name:	MW-2D
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Lower
Station ID:	57389
Latitude:	37.6139
Longitude:	-121.023
Well Depth (feet bgs):	281
Top Perforation (feet bgs):	256
Bottom Perforation (feet bgs):	276
Ground Surface Elevation:	71.2
Reference Point Elevation:	71
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

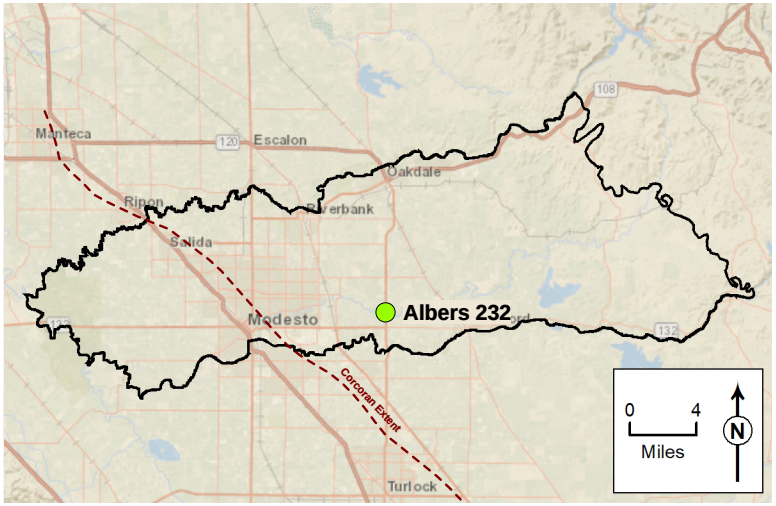


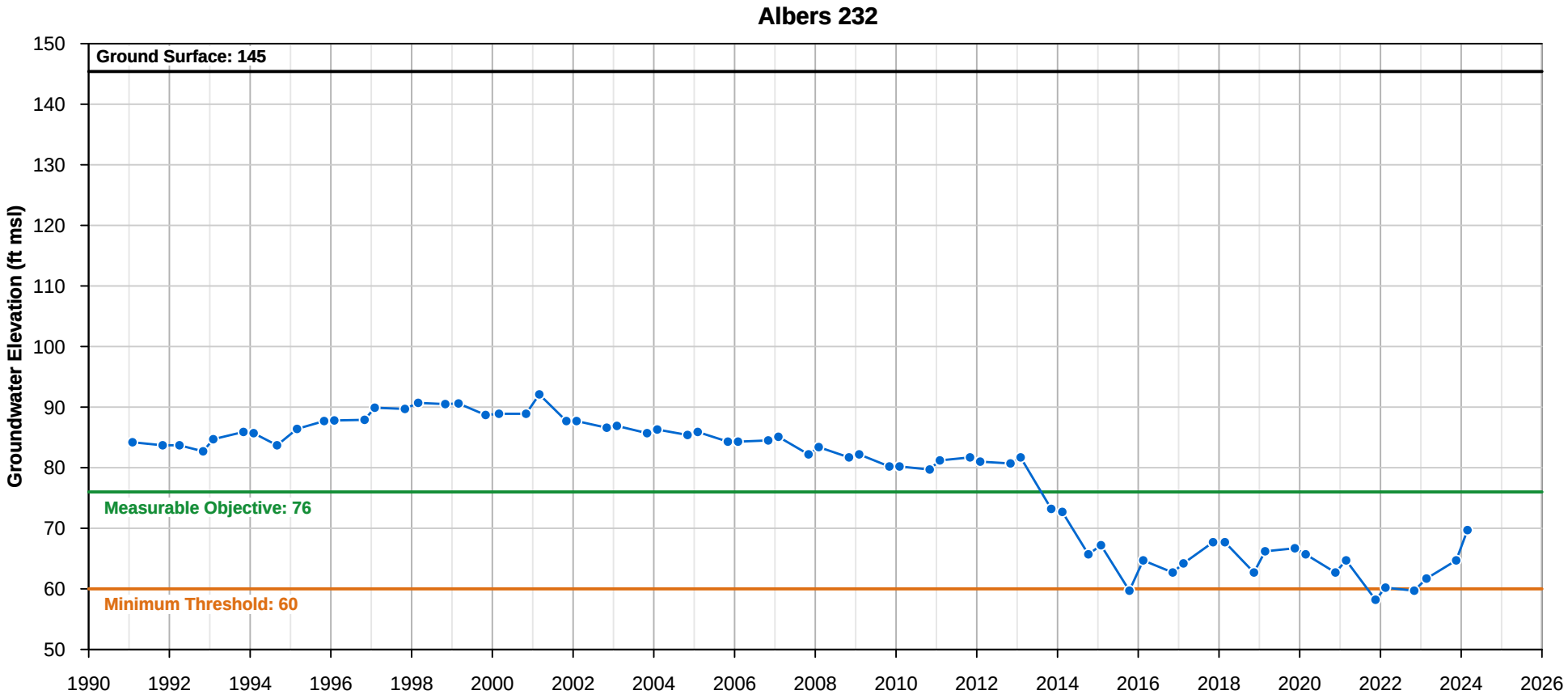


Eastern Principal Aquifer

Well Information

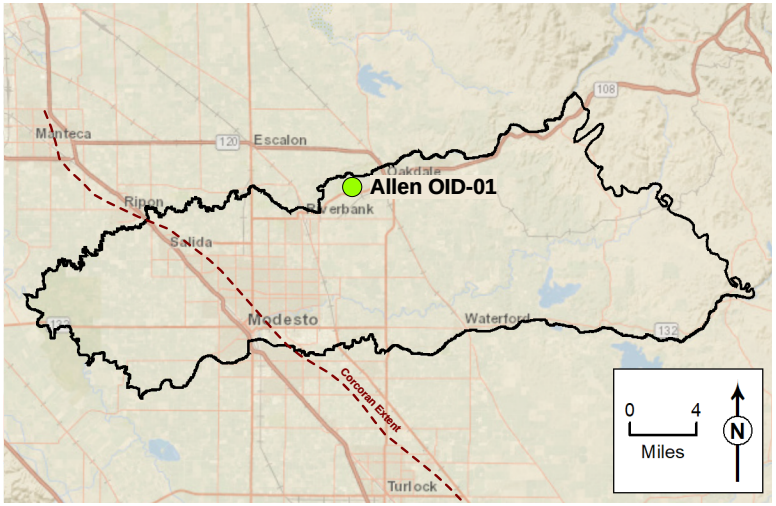
Site Code:	376507N1208474W001
Local Well Name:	Albers 232
State Well Name:	03S10E26D001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3559
Latitude:	37.651
Longitude:	-120.848
Well Depth (feet bgs):	460
Top Perforation (feet bgs):	196
Bottom Perforation (feet bgs):	288
Ground Surface Elevation:	145.4
Reference Point Elevation:	145.7
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

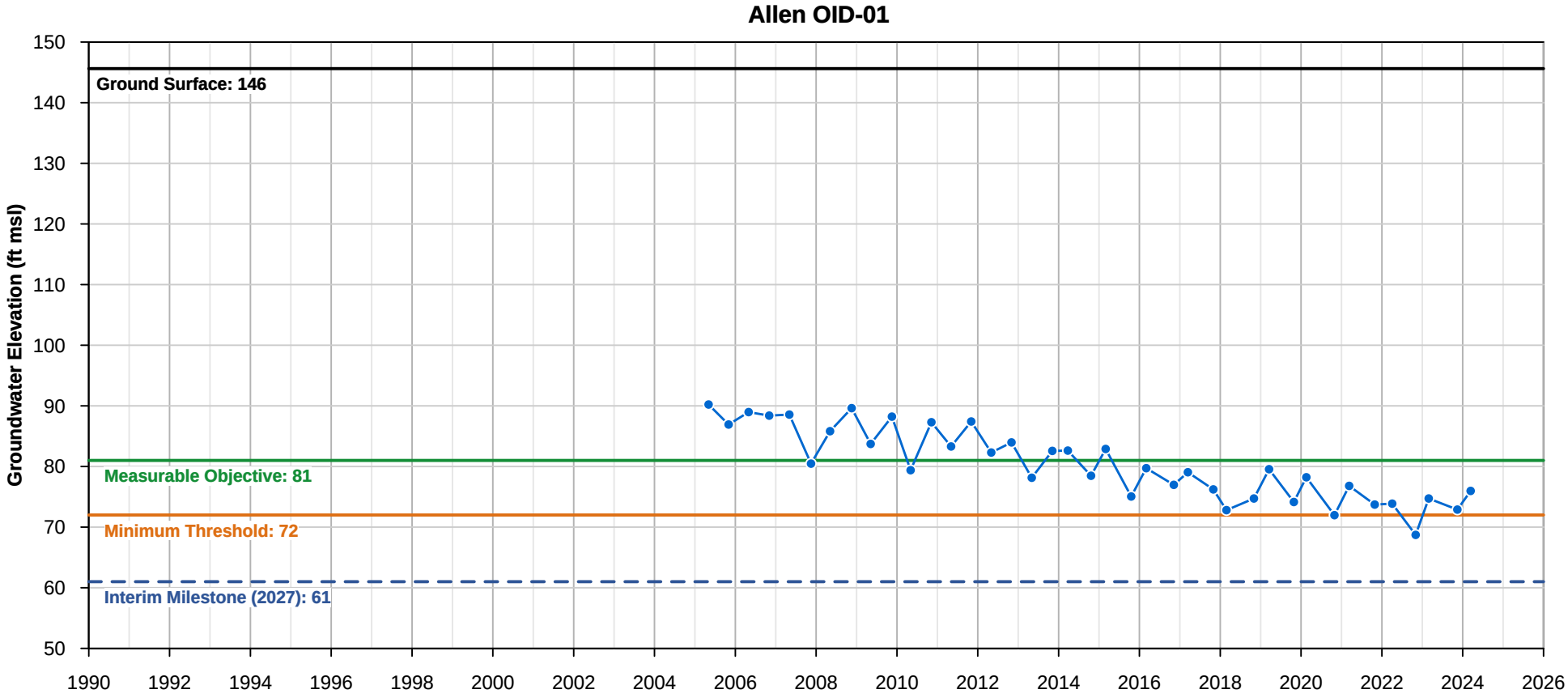




Well Information

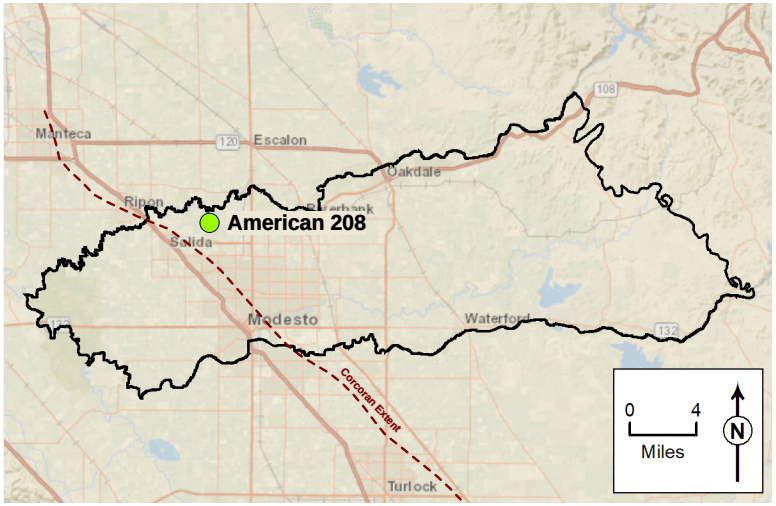
Site Code:	377602N1208849W001
Local Well Name:	Allen OID-01
State Well Name:	02S10E16M001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	4430
Latitude:	37.7599
Longitude:	-120.885
Well Depth (feet bgs):	415
Top Perforation (feet bgs):	0
Bottom Perforation (feet bgs):	120
Ground Surface Elevation:	145.62
Reference Point Elevation:	145.72
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

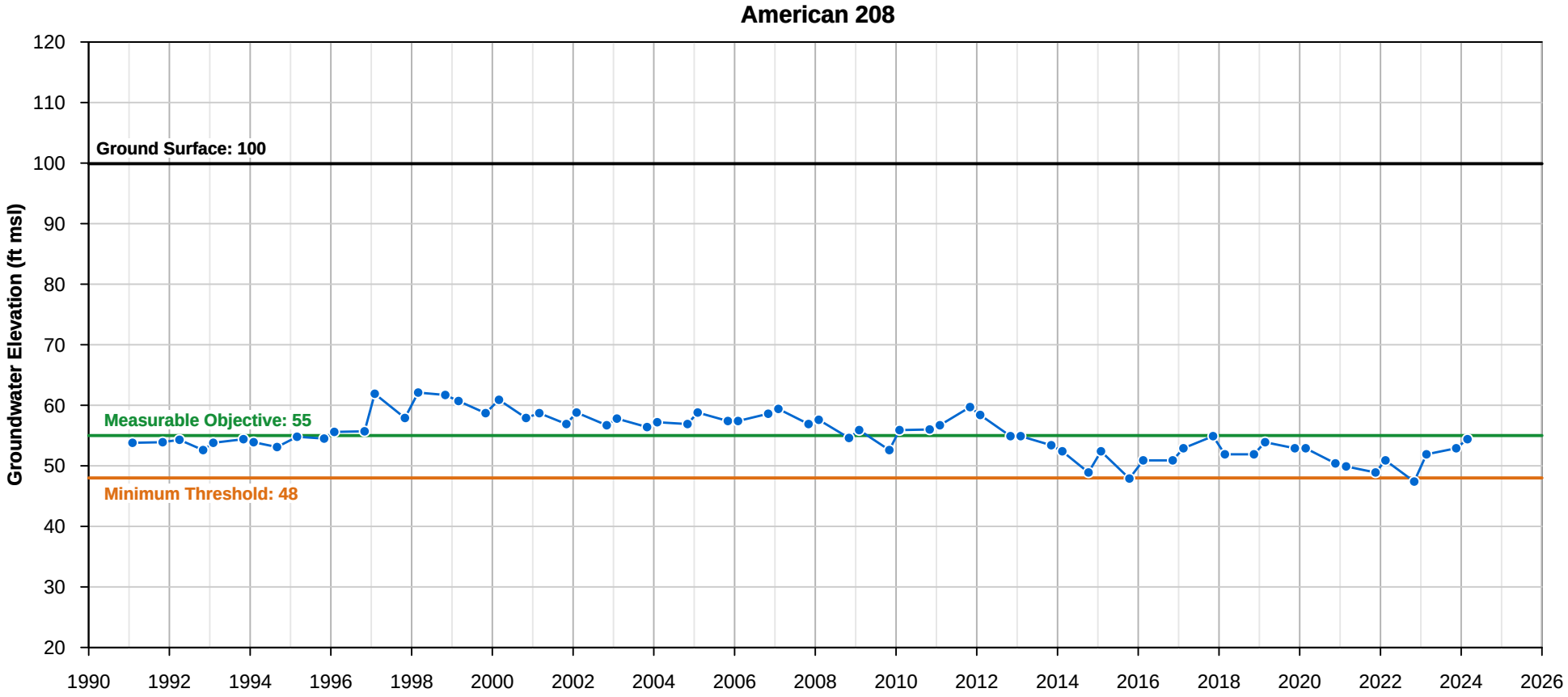




Well Information

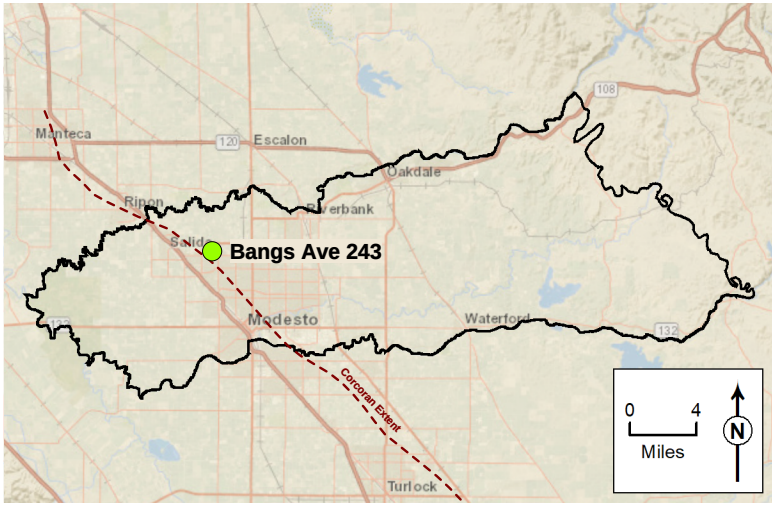
Site Code:	377280N1210413W001
Local Well Name:	American 208
State Well Name:	02S08E25P001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3723
Latitude:	37.7281
Longitude:	-121.041
Well Depth (feet bgs):	320
Top Perforation (feet bgs):	79
Bottom Perforation (feet bgs):	272
Ground Surface Elevation:	99.9
Reference Point Elevation:	99.9
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

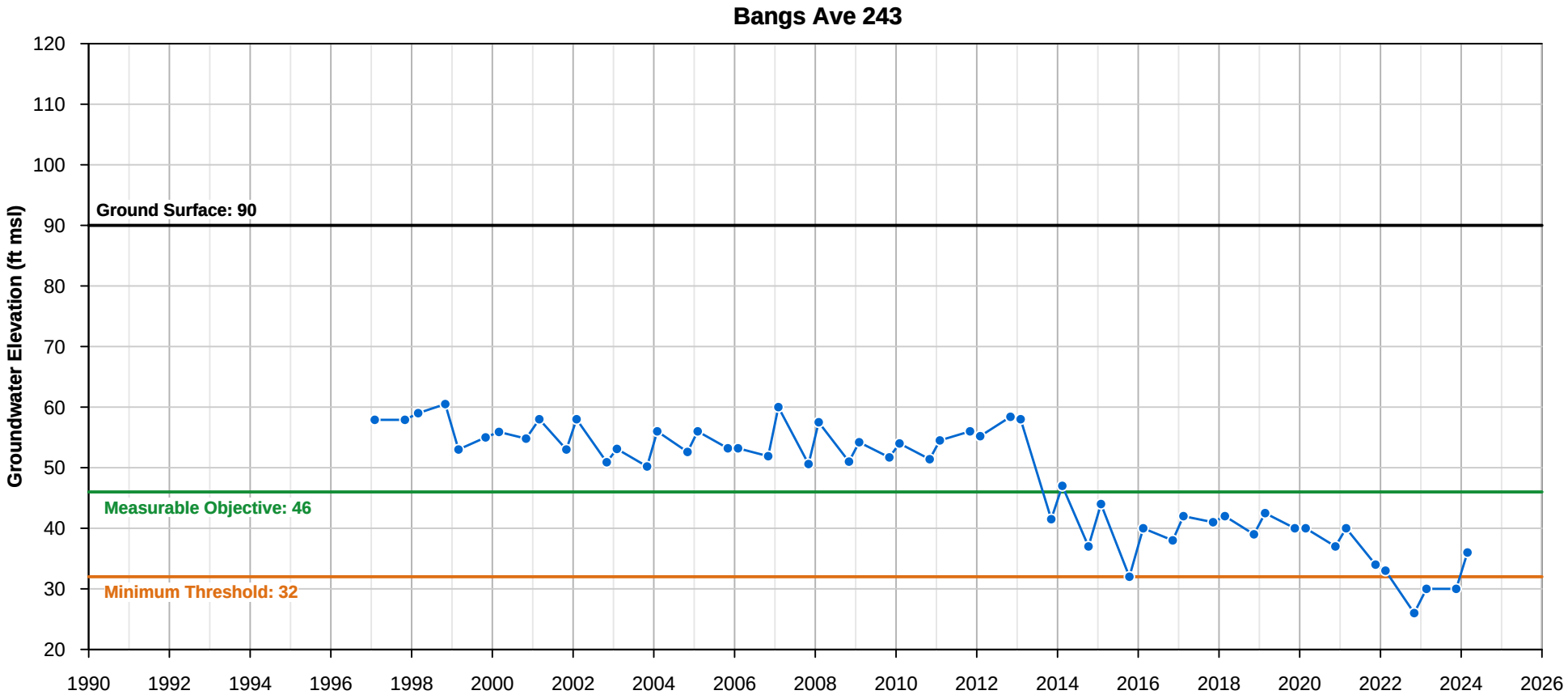




Well Information

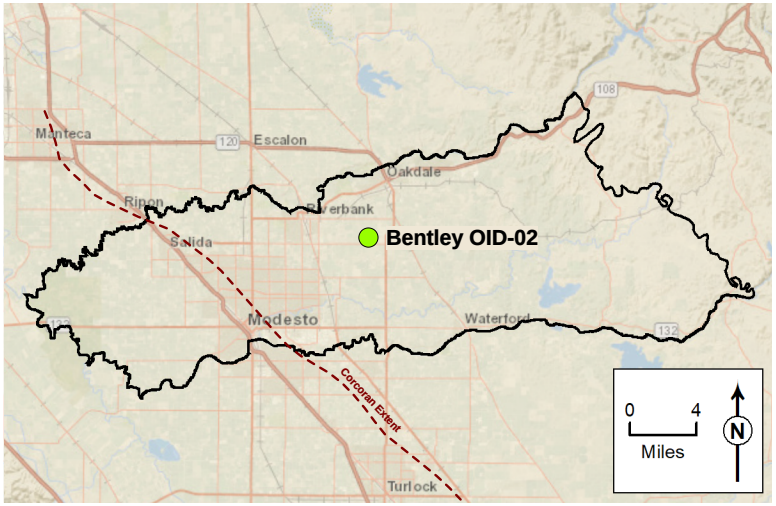
Site Code:	377032N1210382W001
Local Well Name:	Bangs Ave 243
State Well Name:	03S08E01K001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3152
Latitude:	37.7034
Longitude:	-121.038
Well Depth (feet bgs):	346
Top Perforation (feet bgs):	141
Bottom Perforation (feet bgs):	251
Ground Surface Elevation:	90
Reference Point Elevation:	90
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

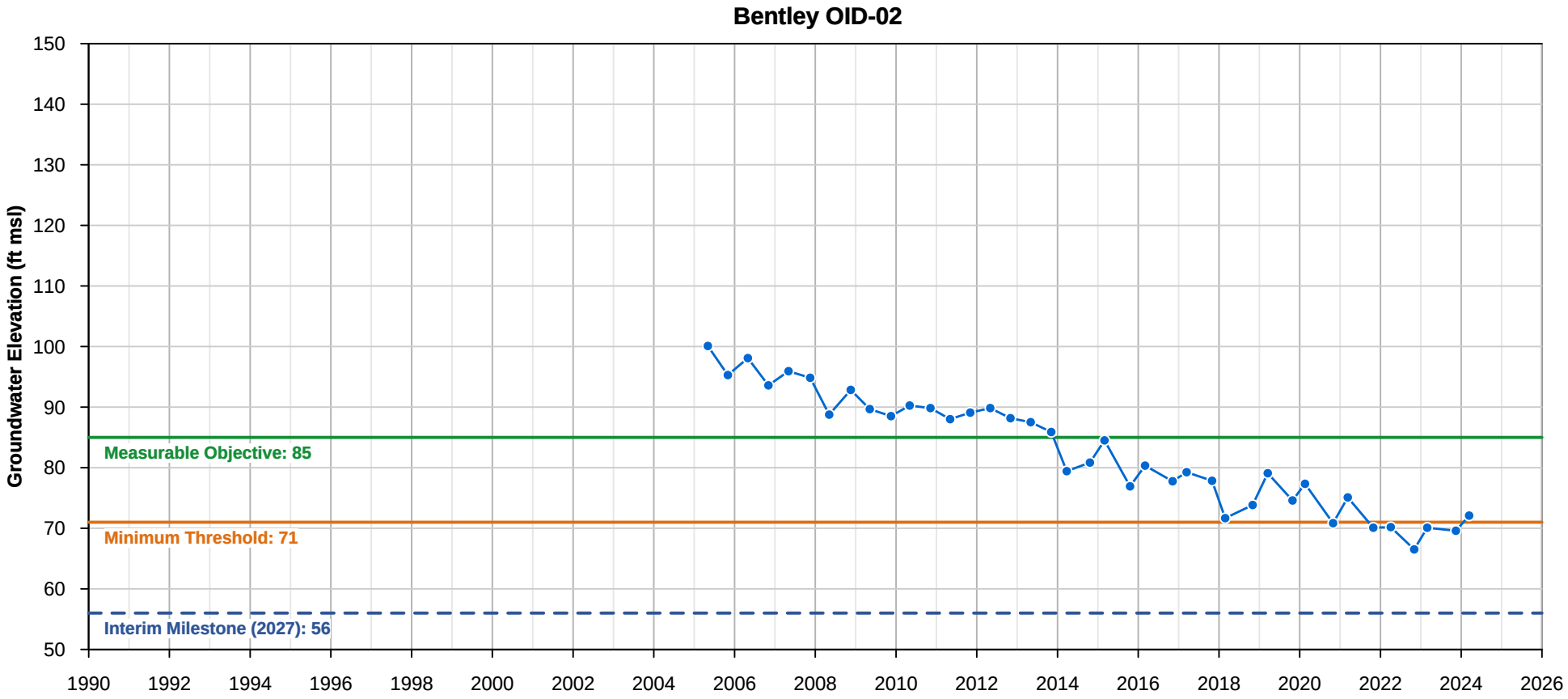




Well Information

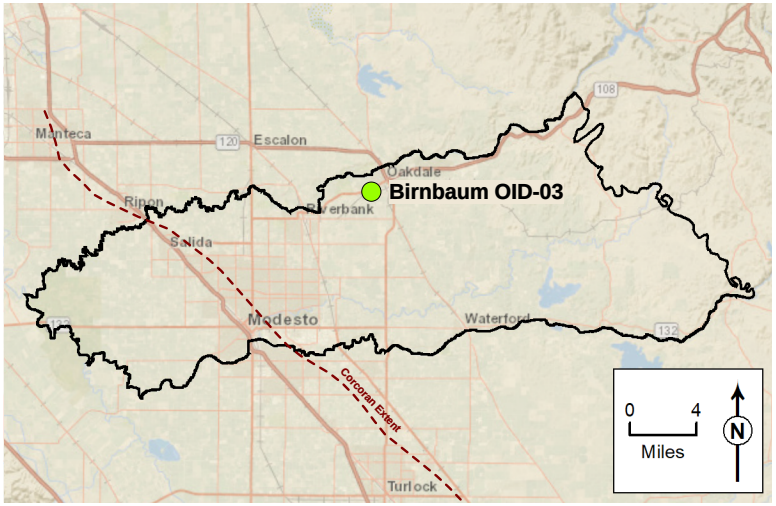
Site Code:	377160N1208674W001
Local Well Name:	Bentley OID-02
State Well Name:	02S10E33J001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	4590
Latitude:	37.716
Longitude:	-120.867
Well Depth (feet bgs):	500
Top Perforation (feet bgs):	120
Bottom Perforation (feet bgs):	175
Ground Surface Elevation:	171.94
Reference Point Elevation:	172.09
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

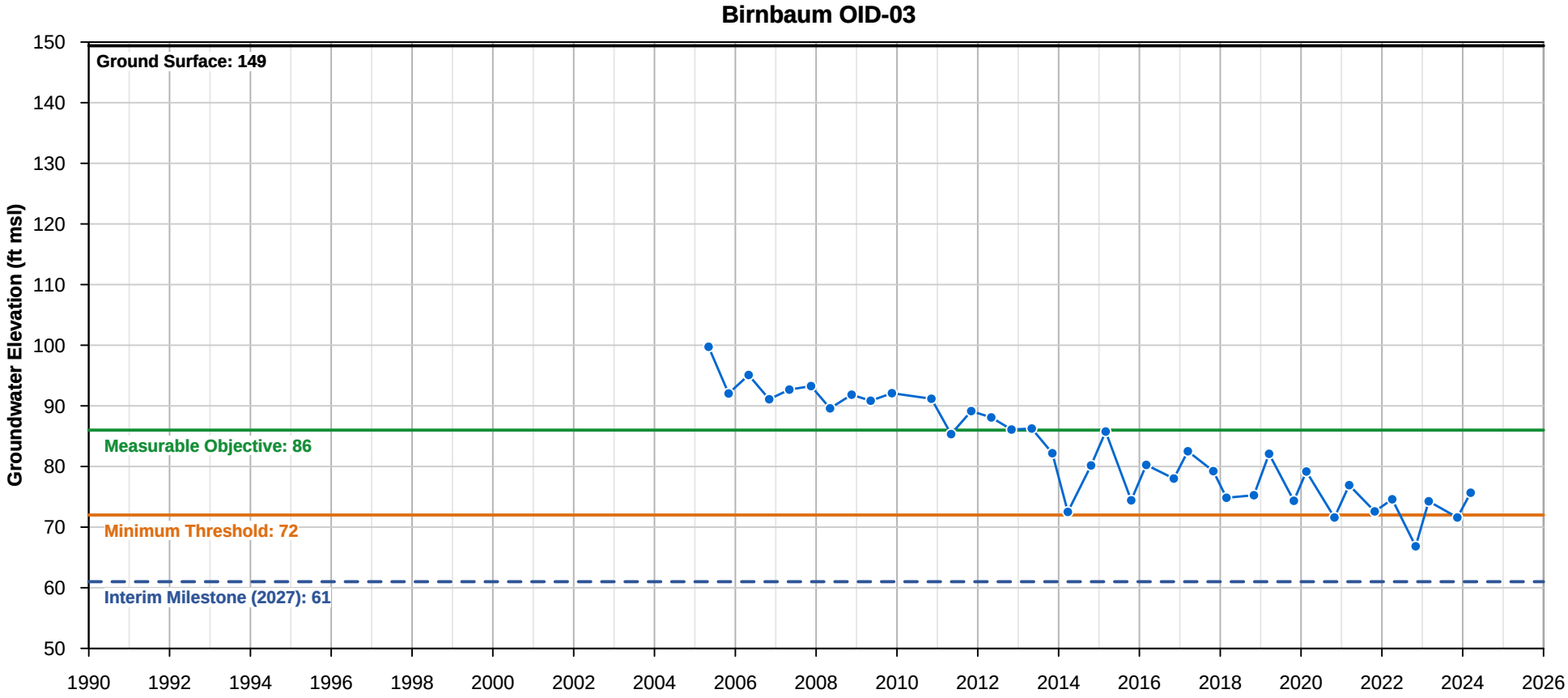




Well Information

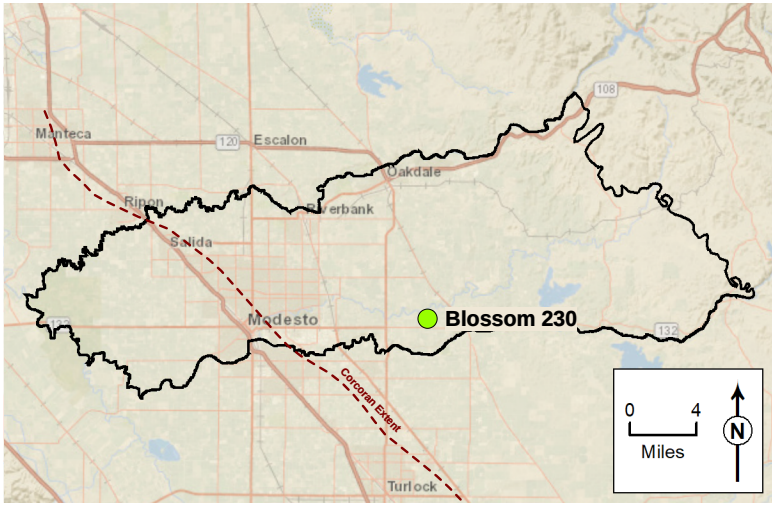
Site Code:	377560N1208643W001
Local Well Name:	Birnbaum OID-03
State Well Name:	02S10E15N001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	4429
Latitude:	37.7559
Longitude:	-120.864
Well Depth (feet bgs):	293
Top Perforation (feet bgs):	55
Bottom Perforation (feet bgs):	293
Ground Surface Elevation:	149.39
Reference Point Elevation:	149.84
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

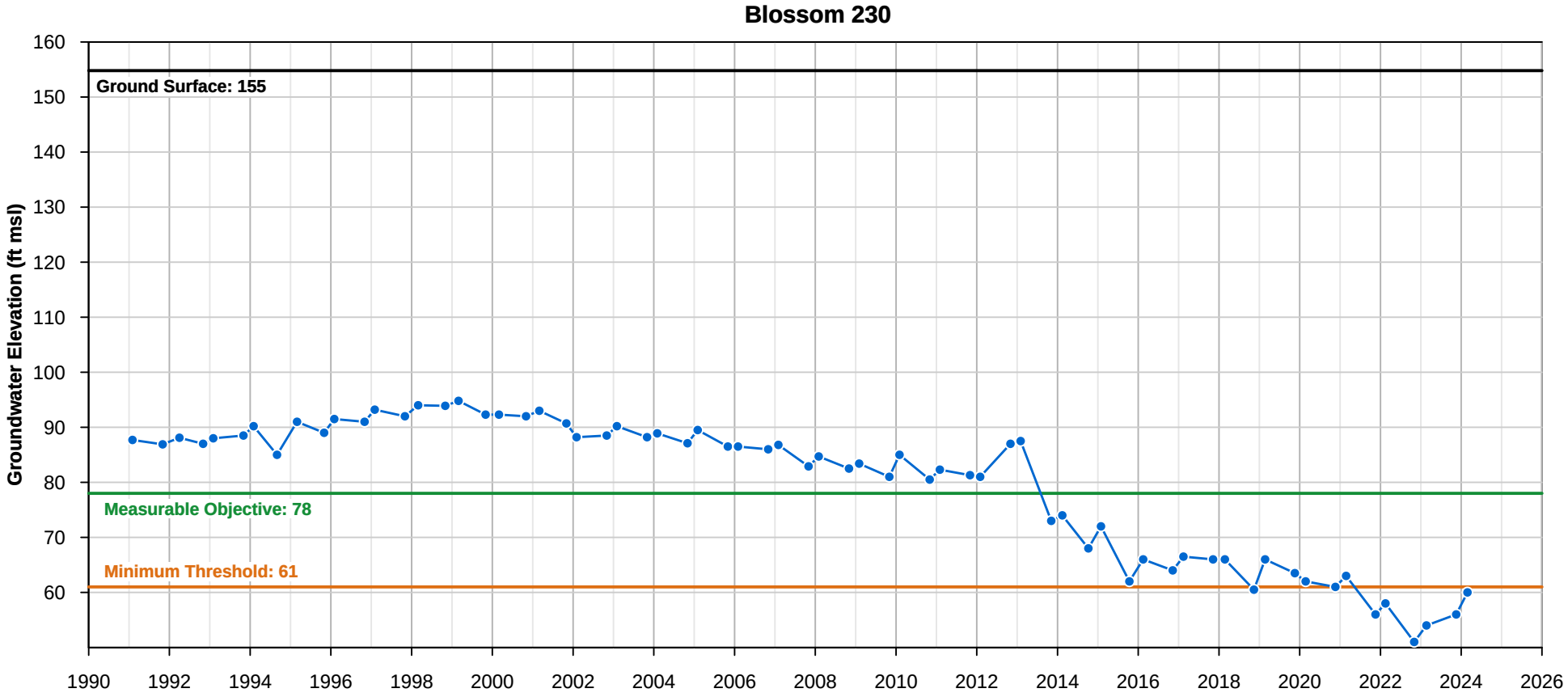




Well Information

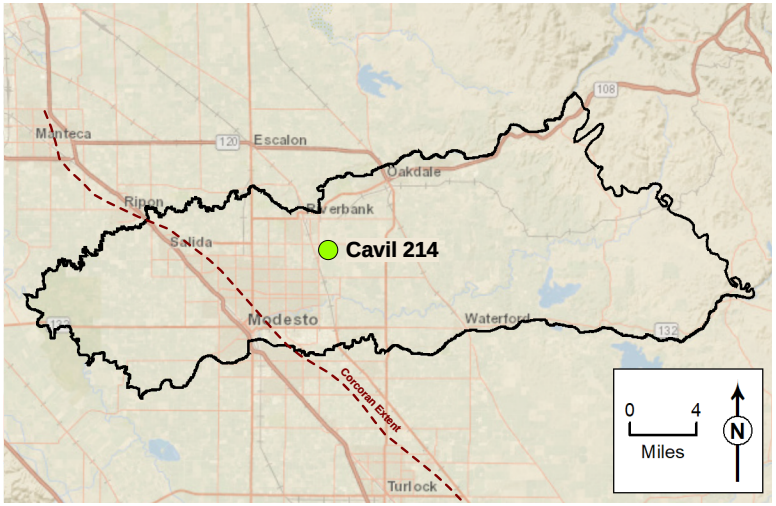
Site Code:	376455N1208013W001
Local Well Name:	Blossom 230
State Well Name:	03S11E30K001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3903
Latitude:	37.6456
Longitude:	-120.802
Well Depth (feet bgs):	412
Top Perforation (feet bgs):	179
Bottom Perforation (feet bgs):	283
Ground Surface Elevation:	154.8
Reference Point Elevation:	155
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

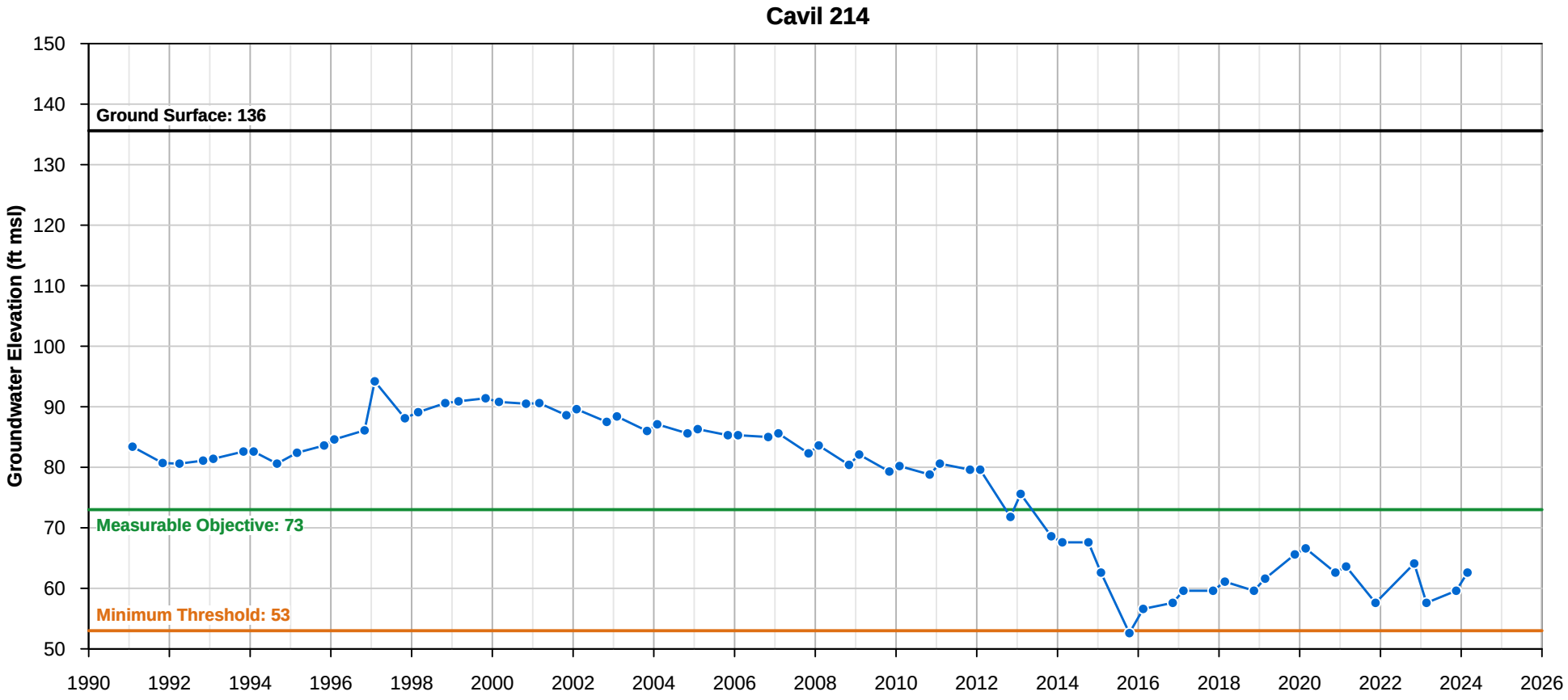




Well Information

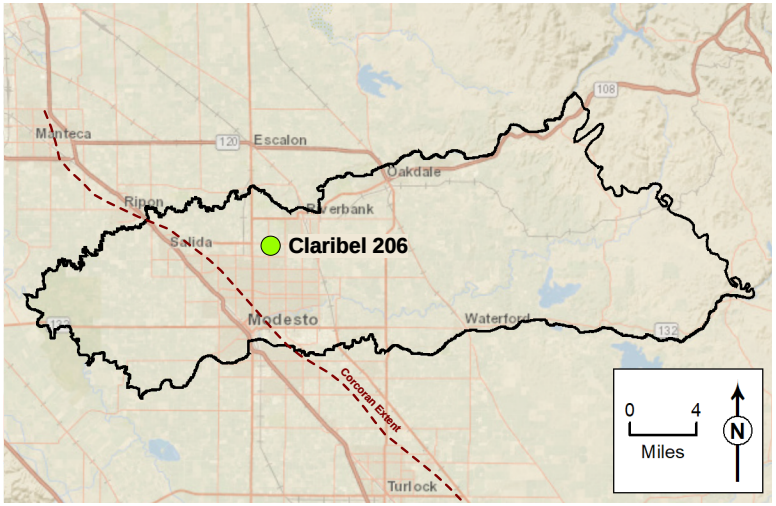
Site Code:	377049N1209110W001
Local Well Name:	Cavil 214
State Well Name:	03S10E06G001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	27057
Latitude:	37.705
Longitude:	-120.911
Well Depth (feet bgs):	480
Top Perforation (feet bgs):	107
Bottom Perforation (feet bgs):	275
Ground Surface Elevation:	135.6
Reference Point Elevation:	135.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

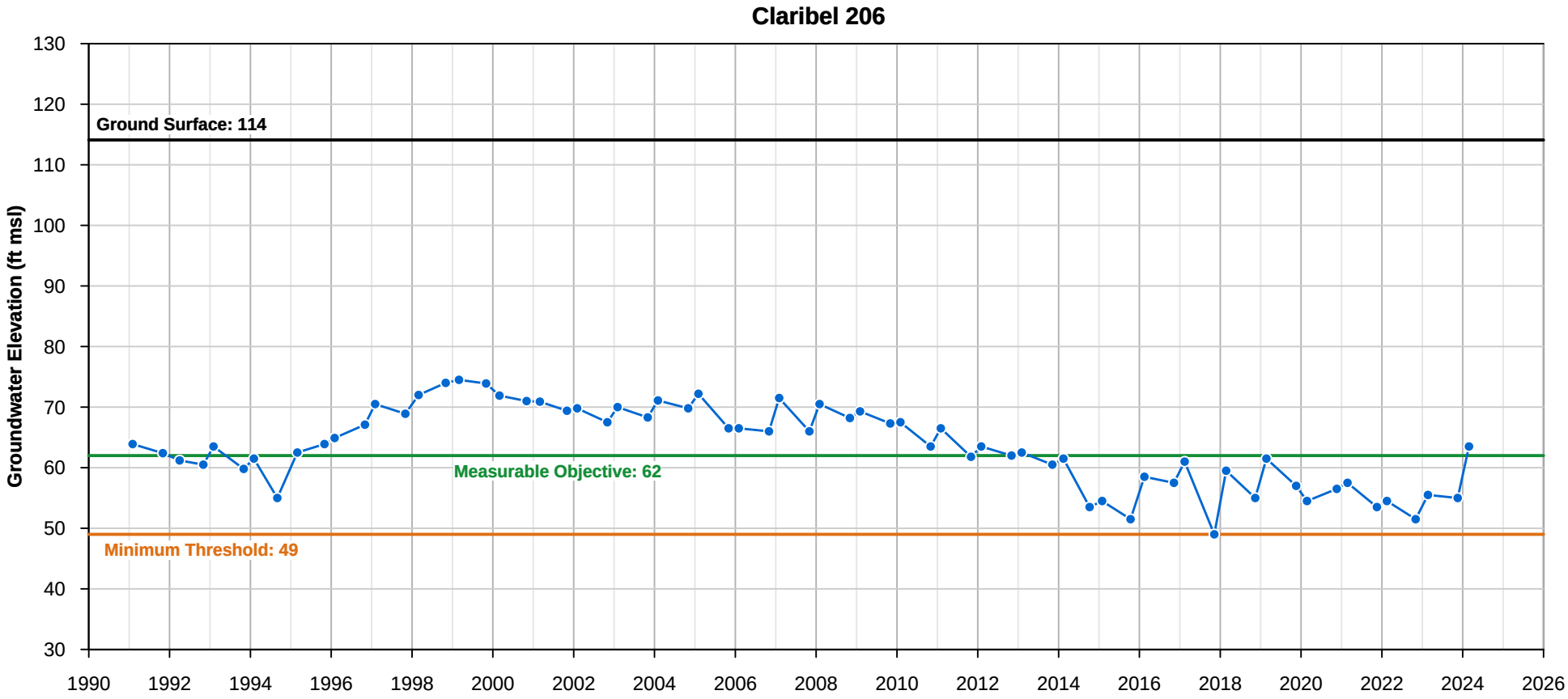




Well Information

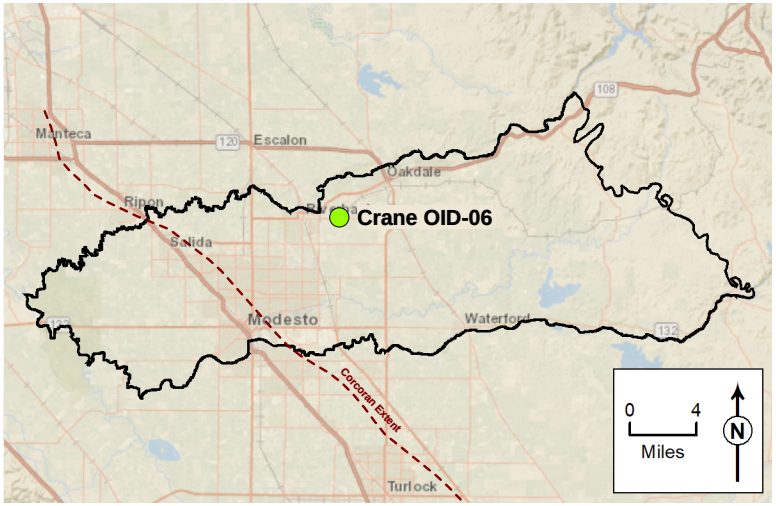
Site Code:	377082N1209741W001
Local Well Name:	Claribel 206
State Well Name:	03S09E03D001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	2093
Latitude:	37.7085
Longitude:	-120.974
Well Depth (feet bgs):	650
Top Perforation (feet bgs):	96
Bottom Perforation (feet bgs):	550
Ground Surface Elevation:	114.1
Reference Point Elevation:	114.5
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

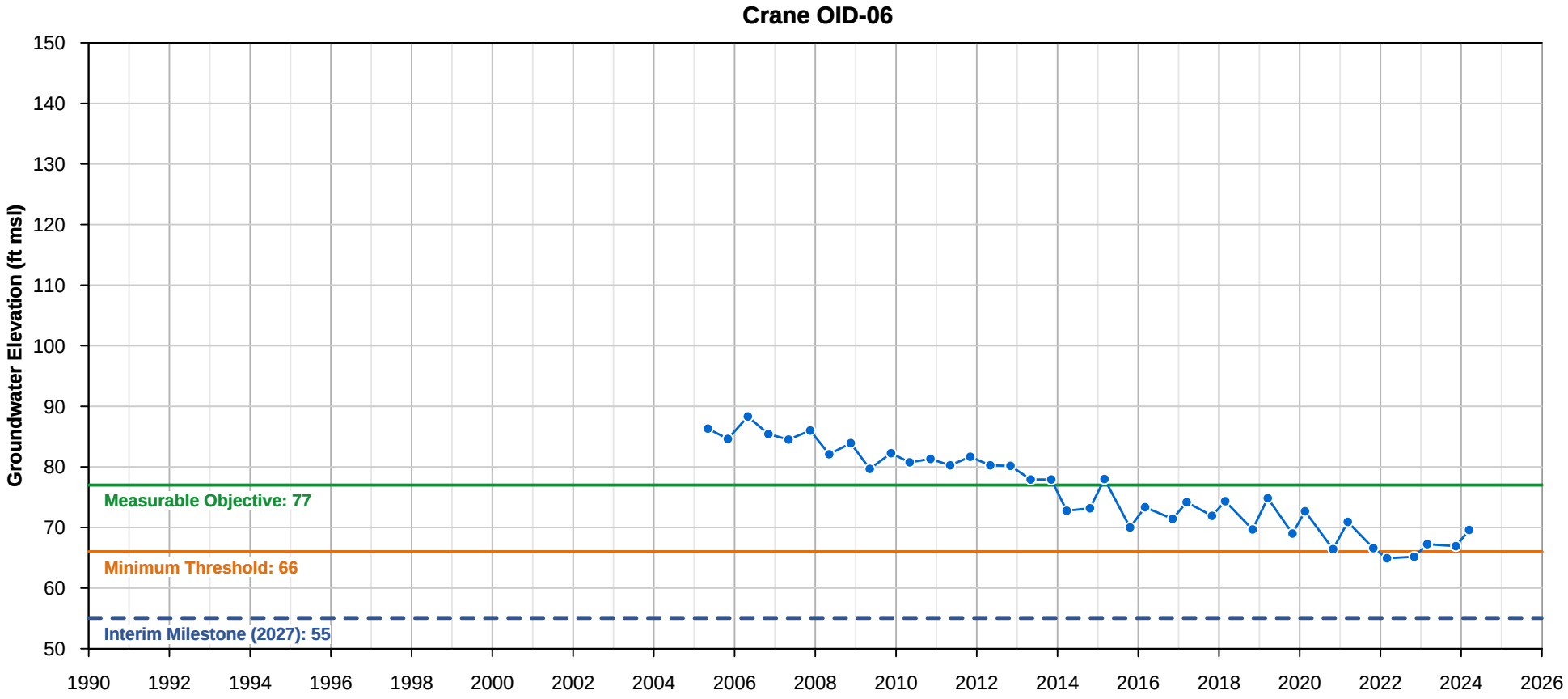




Well Information

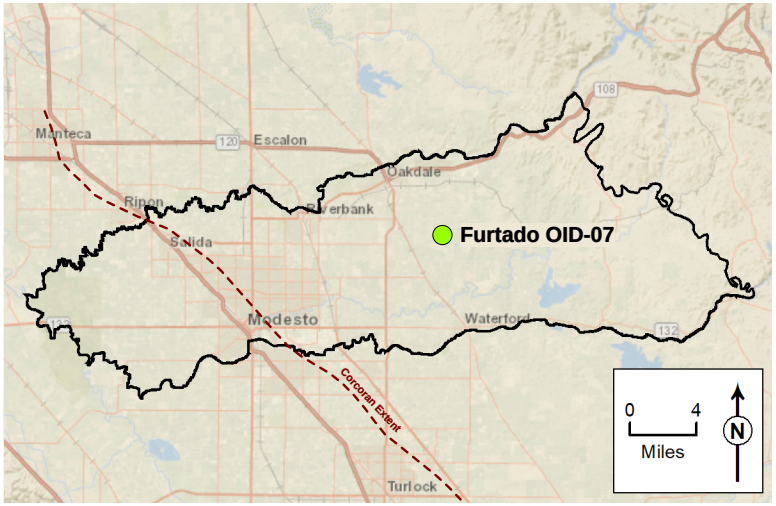
Site Code:	377335N1208999W001
Local Well Name:	Crane OID-06
State Well Name:	02S10E29E001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	29444
Latitude:	37.7334
Longitude:	-120.899
Well Depth (feet bgs):	505
Top Perforation (feet bgs):	155
Bottom Perforation (feet bgs):	198
Ground Surface Elevation:	160.07
Reference Point Elevation:	160.42
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

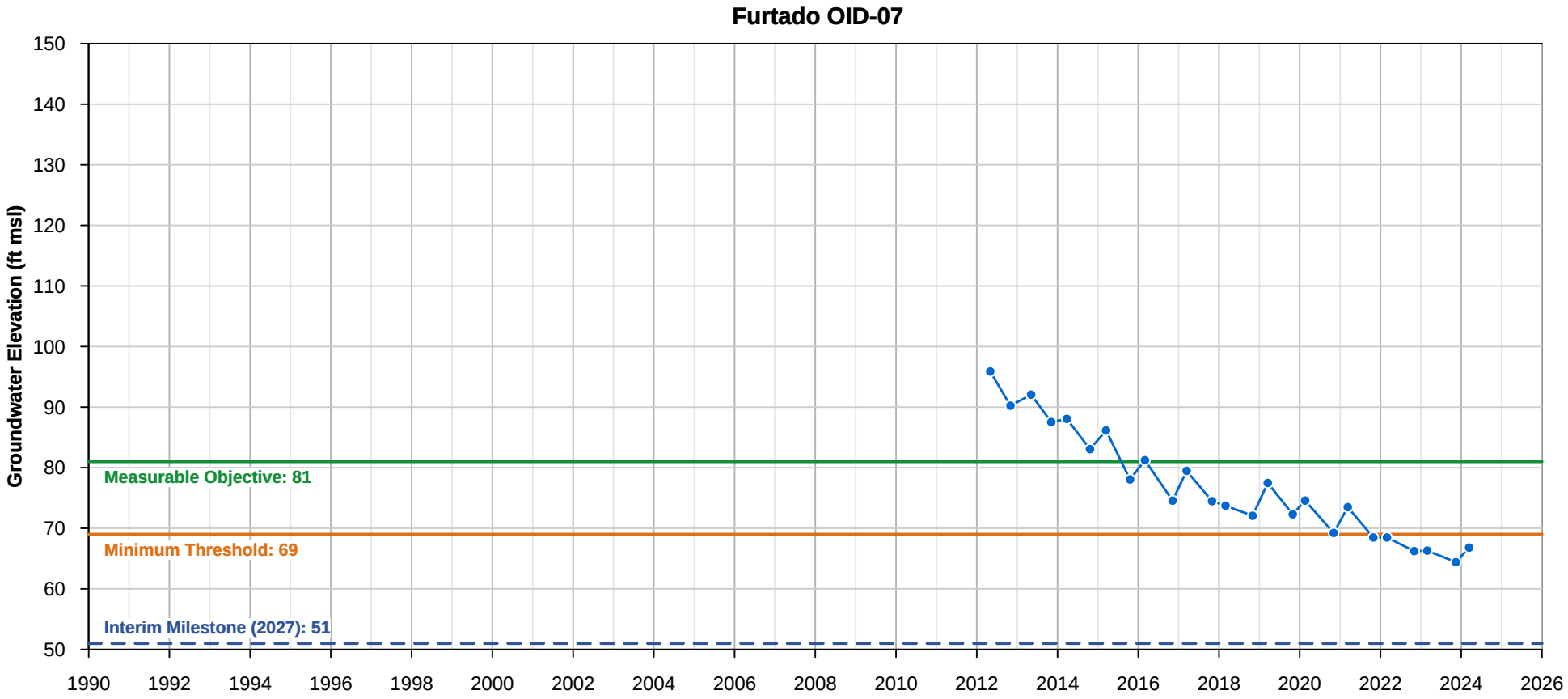




Well Information

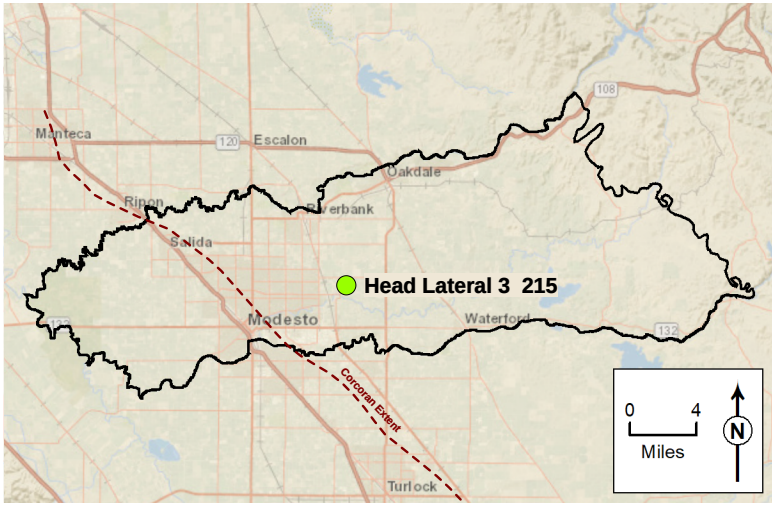
Site Code:	377182N1207857W001
Local Well Name:	Furtado OID-07
State Well Name:	02S11E32L001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	2529
Latitude:	37.7184
Longitude:	-120.786
Well Depth (feet bgs):	590
Top Perforation (feet bgs):	200
Bottom Perforation (feet bgs):	580
Ground Surface Elevation:	211.98
Reference Point Elevation:	212.48
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

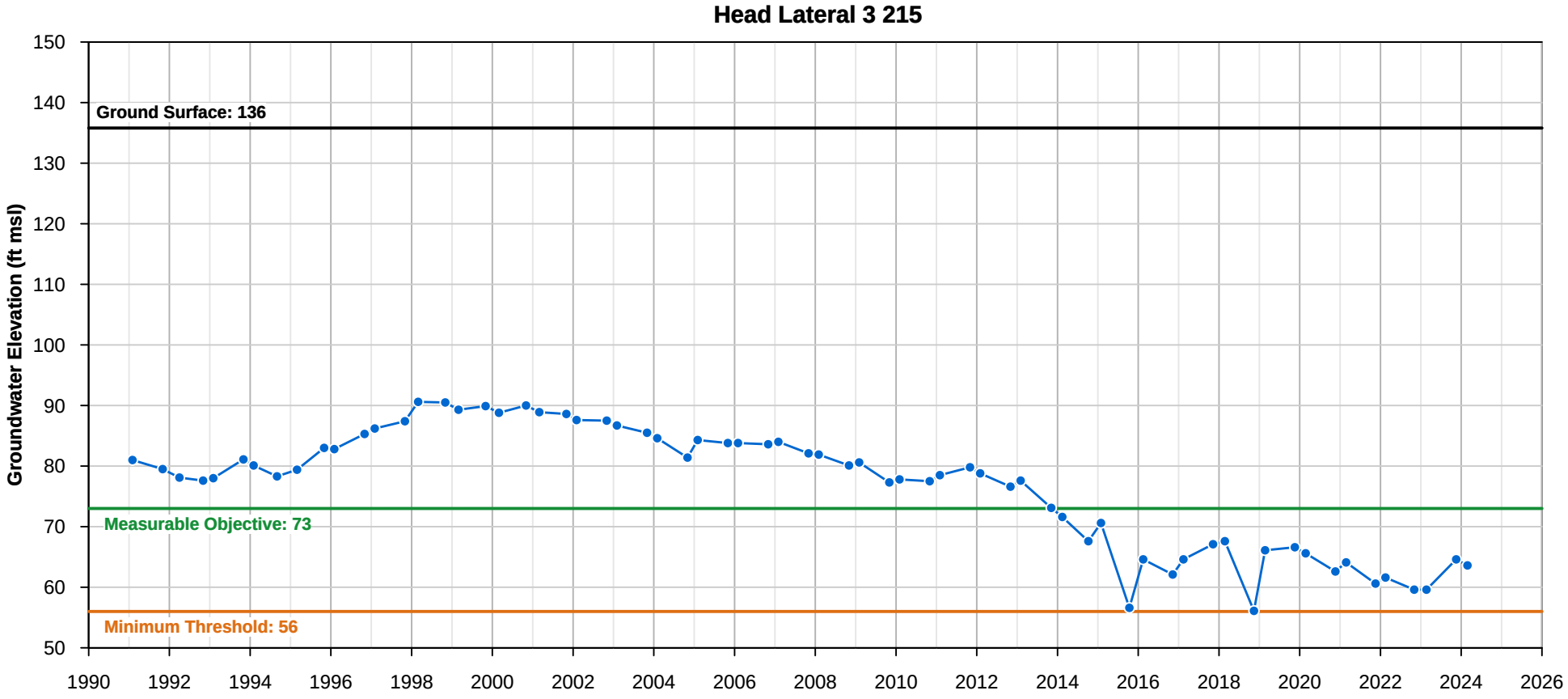




Well Information

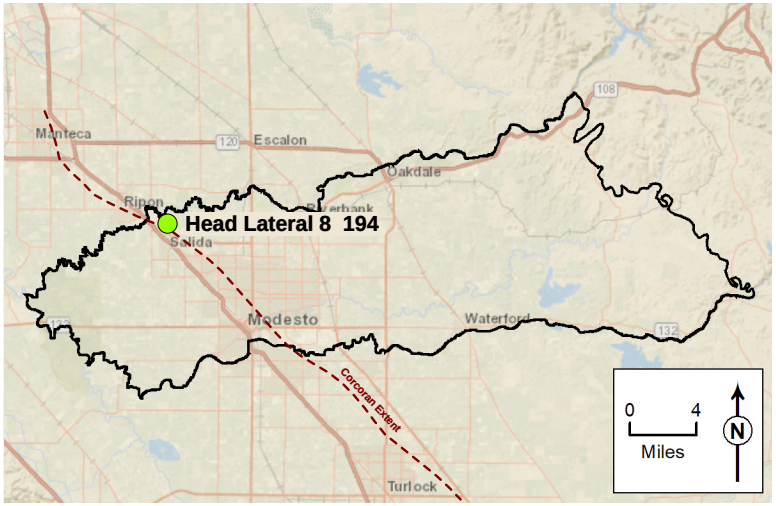
Site Code:	376743N1208913W001
Local Well Name:	Head Lateral 3 215
State Well Name:	03S10E17K001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3552
Latitude:	37.6744
Longitude:	-120.891
Well Depth (feet bgs):	476
Top Perforation (feet bgs):	116
Bottom Perforation (feet bgs):	400
Ground Surface Elevation:	135.8
Reference Point Elevation:	135.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

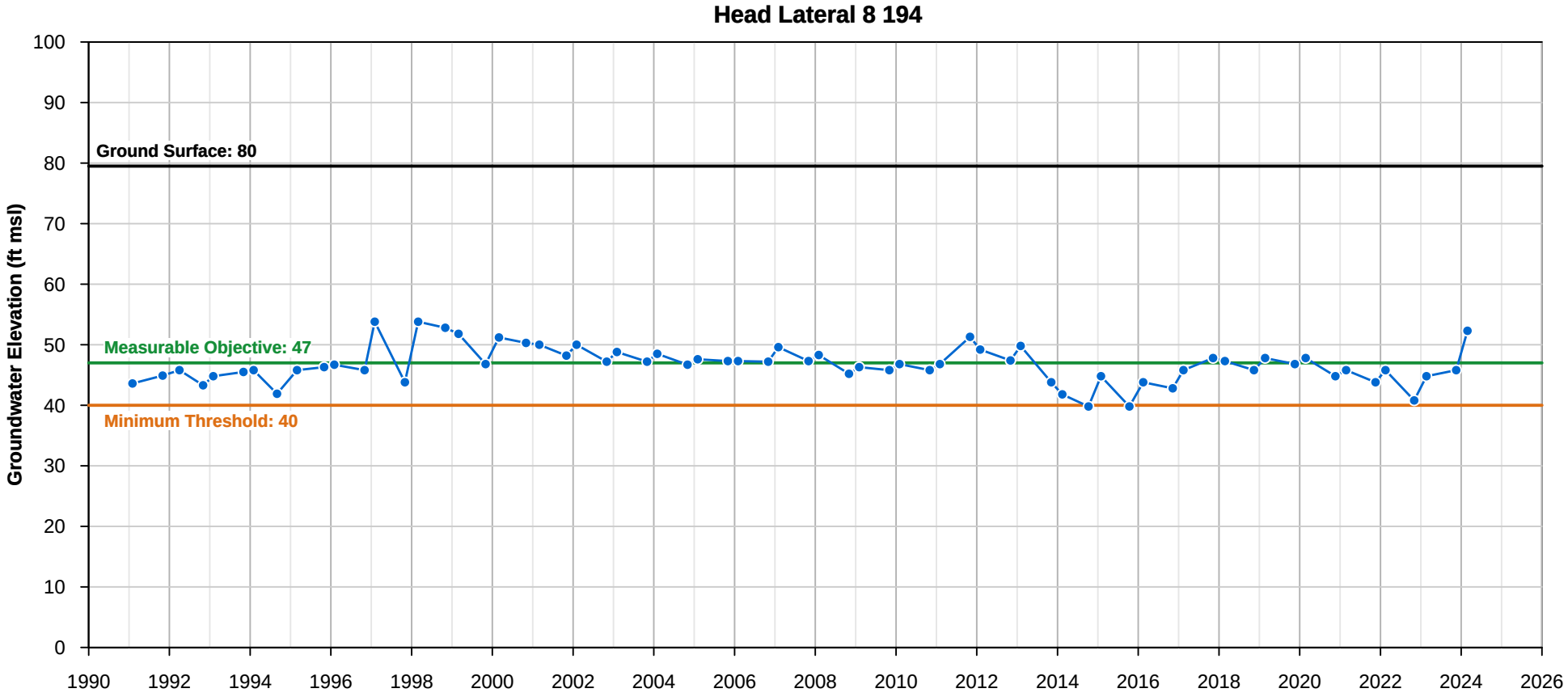




Well Information

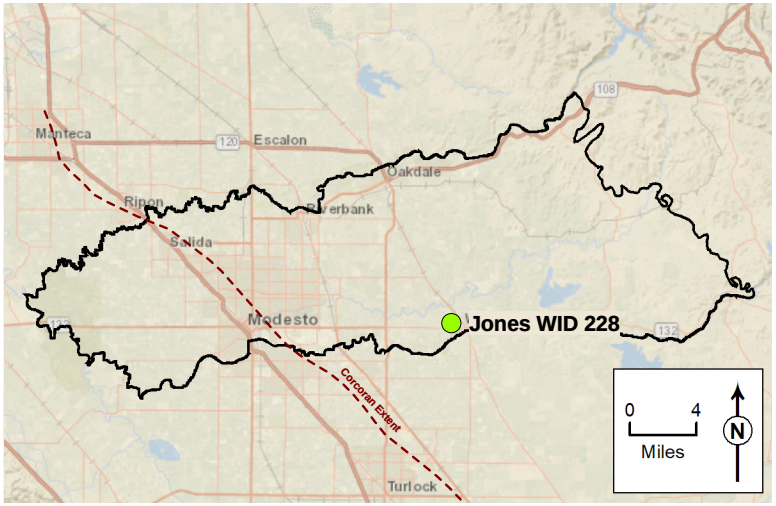
Site Code:	377271N1210868W001
Local Well Name:	Head Lateral 8 194
State Well Name:	02S08E27N001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	38870
Latitude:	37.7272
Longitude:	-121.087
Well Depth (feet bgs):	302
Top Perforation (feet bgs):	148
Bottom Perforation (feet bgs):	211
Ground Surface Elevation:	79.5
Reference Point Elevation:	79.8
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

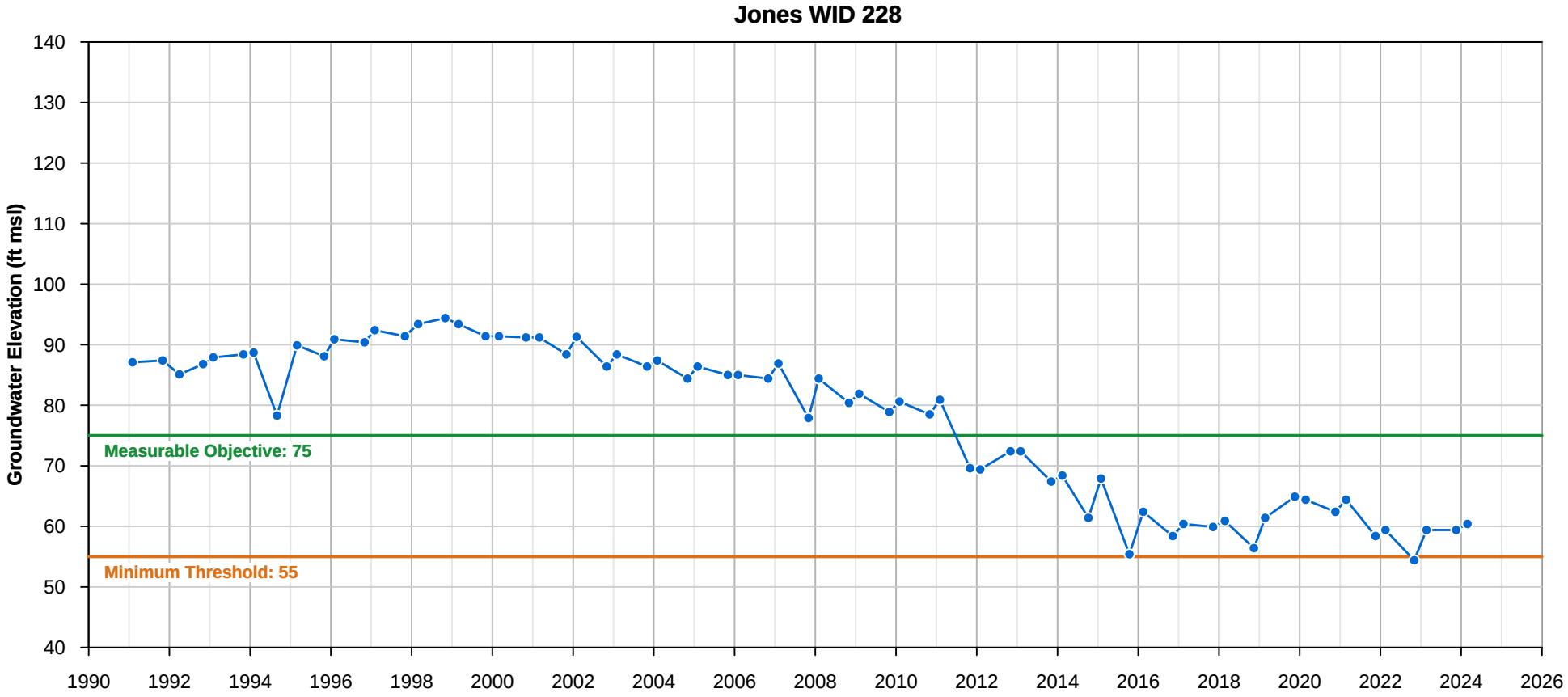




Well Information

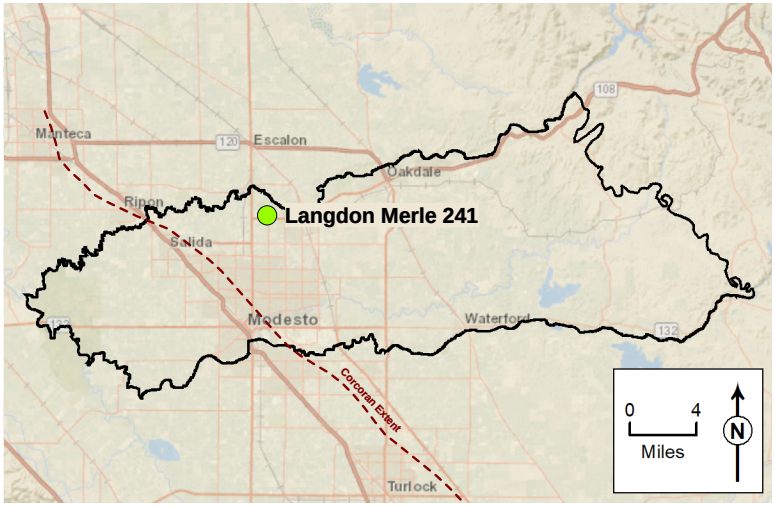
Site Code:	376416N1207760W001
Local Well Name:	Jones WID 228
State Well Name:	03S11E29J001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	38872
Latitude:	37.6418
Longitude:	-120.776
Well Depth (feet bgs):	324
Top Perforation (feet bgs):	188
Bottom Perforation (feet bgs):	280
Ground Surface Elevation:	166.4
Reference Point Elevation:	166.4
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

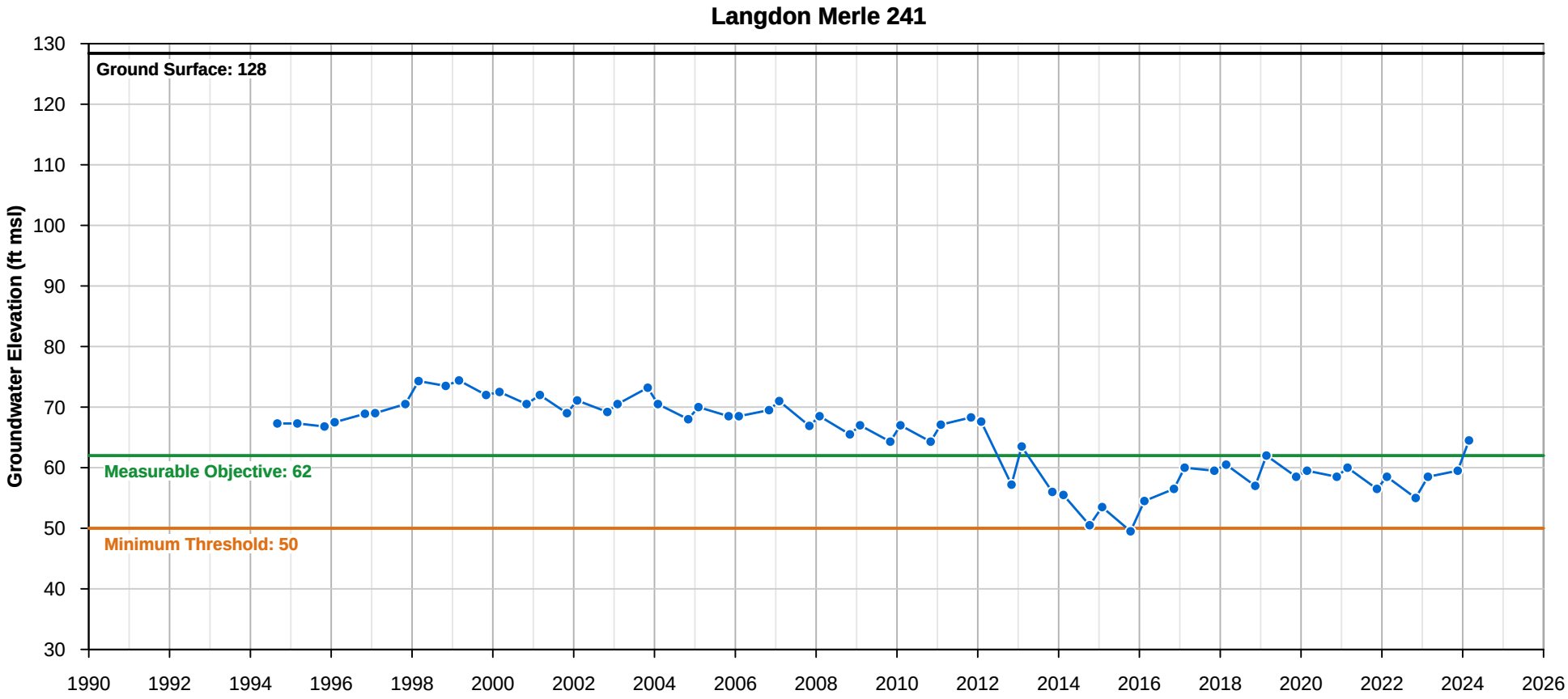




Well Information

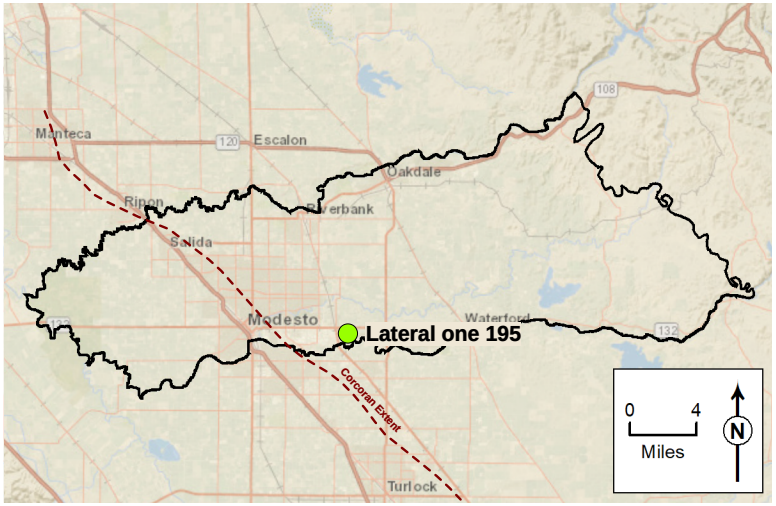
Site Code:	377346N1209774W001
Local Well Name:	Langdon Merle 241
State Well Name:	02S09E28H001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3876
Latitude:	37.7349
Longitude:	-120.978
Well Depth (feet bgs):	595
Top Perforation (feet bgs):	160
Bottom Perforation (feet bgs):	300
Ground Surface Elevation:	128.4
Reference Point Elevation:	128.5
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

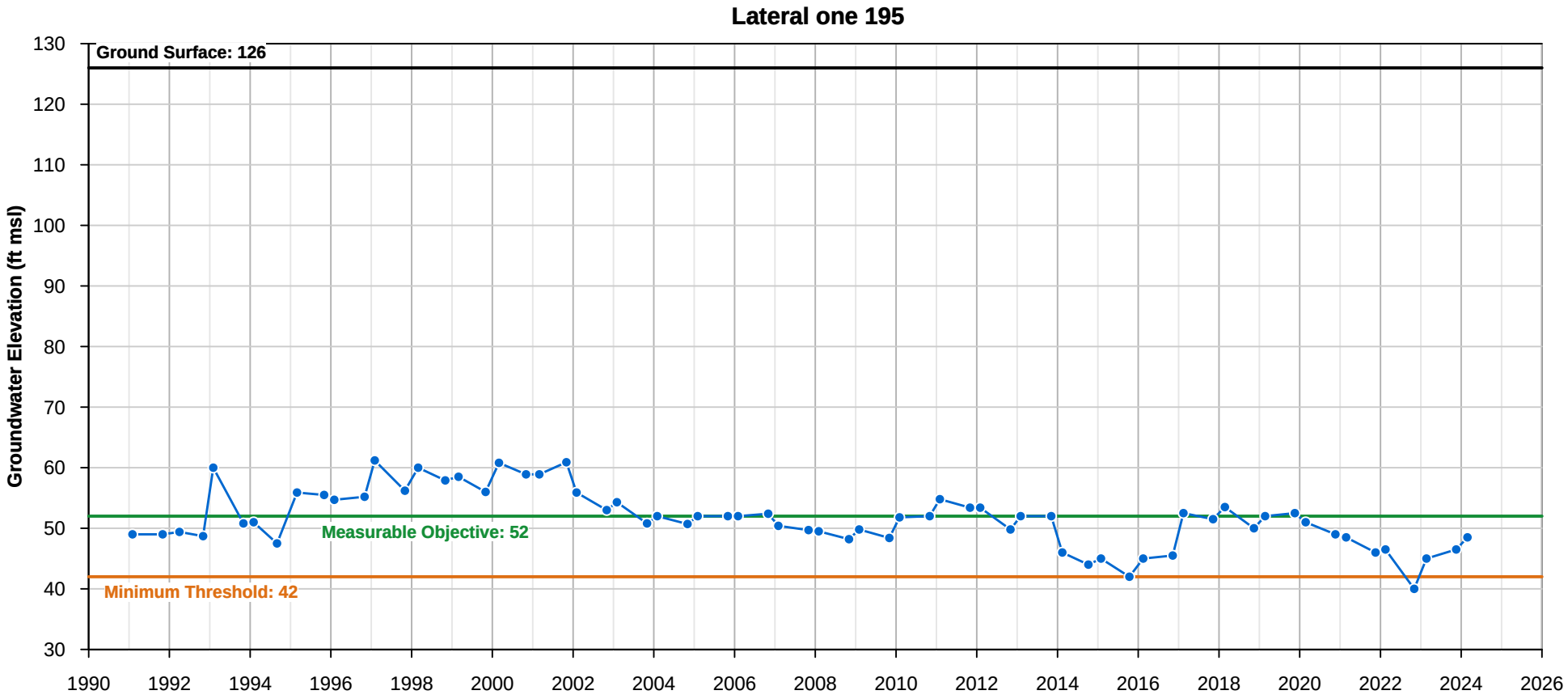




Well Information

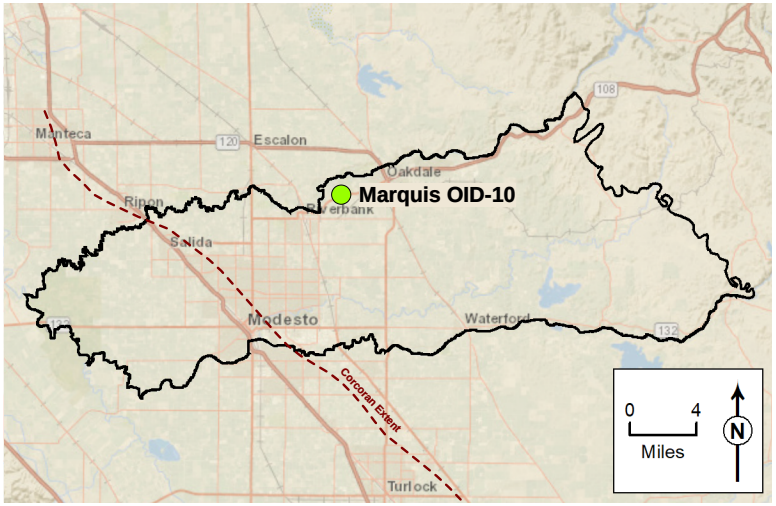
Site Code:	376324N1208891W001
Local Well Name:	Lateral one 195
State Well Name:	03S10E32G001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3877
Latitude:	37.6325
Longitude:	-120.889
Well Depth (feet bgs):	260
Top Perforation (feet bgs):	140.5
Bottom Perforation (feet bgs):	210
Ground Surface Elevation:	126
Reference Point Elevation:	126
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

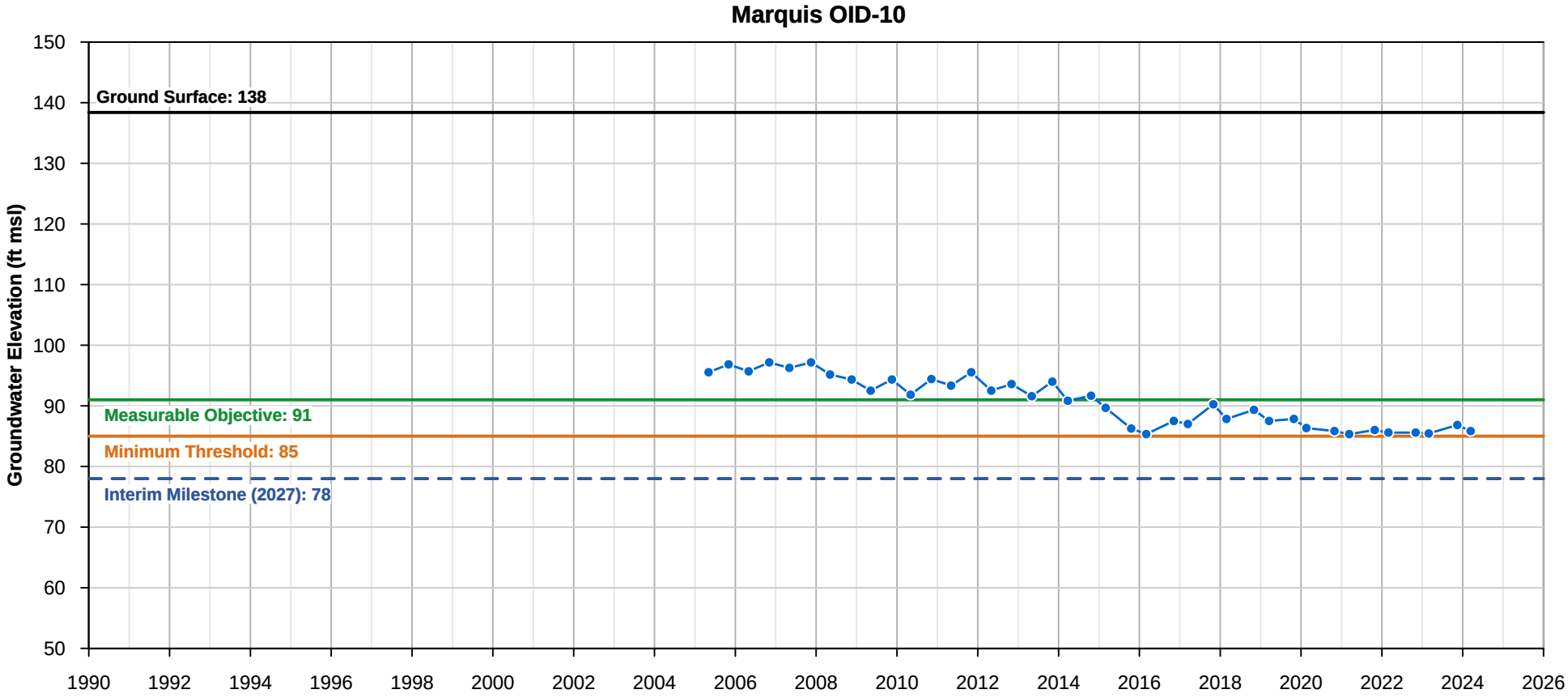




Well Information

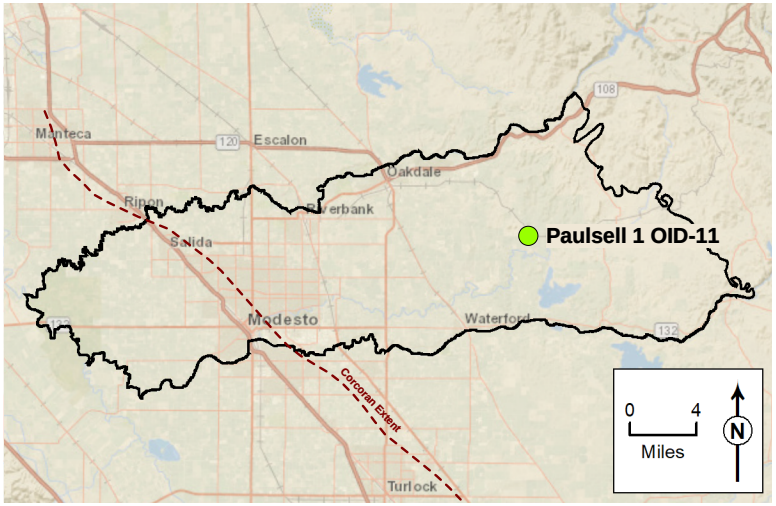
Site Code:	377530N1208960W001
Local Well Name:	Marquis OID-10
State Well Name:	02S10E20C001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	29436
Latitude:	37.7532
Longitude:	-120.897
Well Depth (feet bgs):	125
Top Perforation (feet bgs):	27
Bottom Perforation (feet bgs):	125
Ground Surface Elevation:	138.39
Reference Point Elevation:	138.84
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

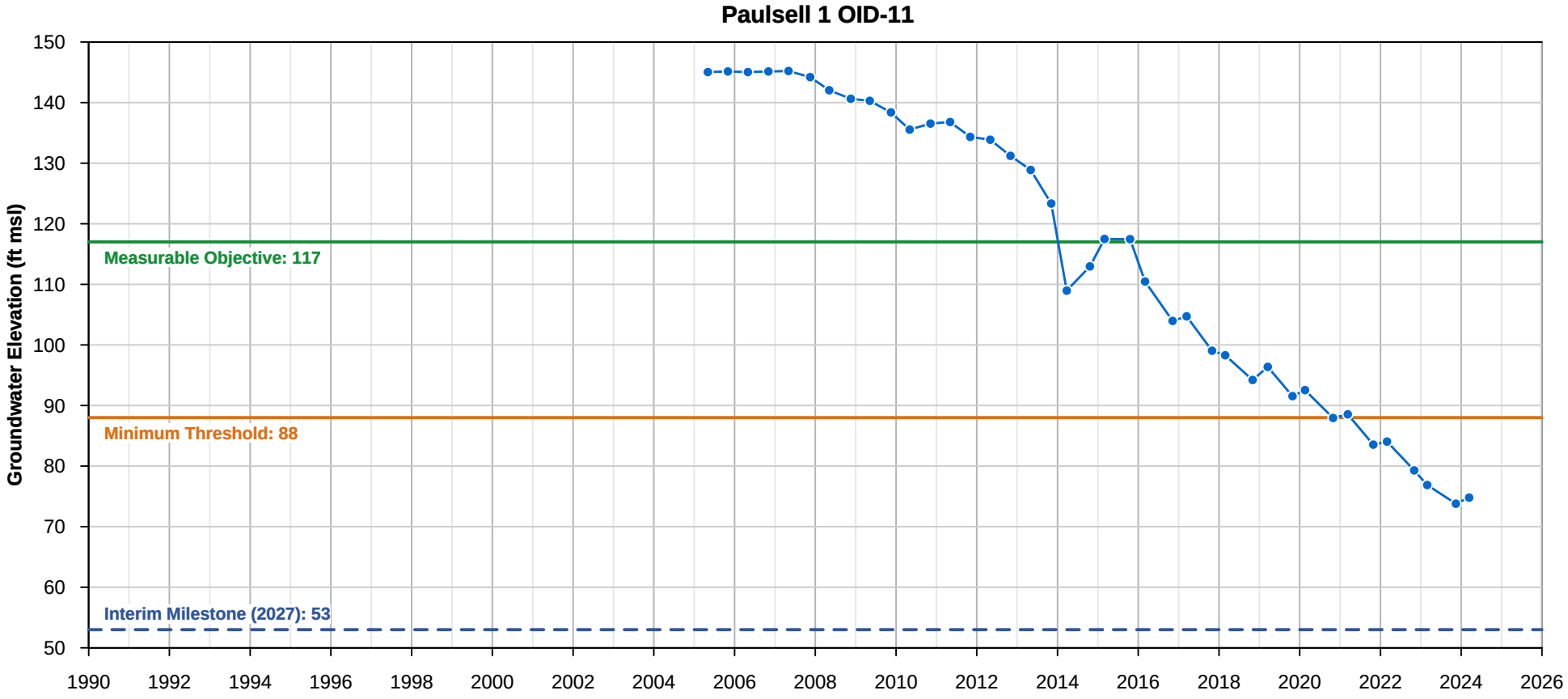




Well Information

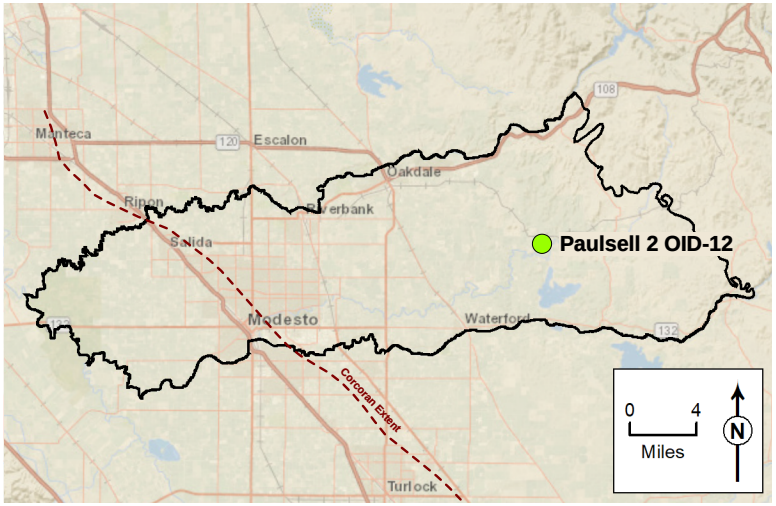
Site Code:	377177N1206918W001
Local Well Name:	Paulsell 1 OID-11
State Well Name:	02S12E31K001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	26187
Latitude:	37.7179
Longitude:	-120.692
Well Depth (feet bgs):	815
Top Perforation (feet bgs):	195
Bottom Perforation (feet bgs):	410
Ground Surface Elevation:	195.94
Reference Point Elevation:	197.54
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

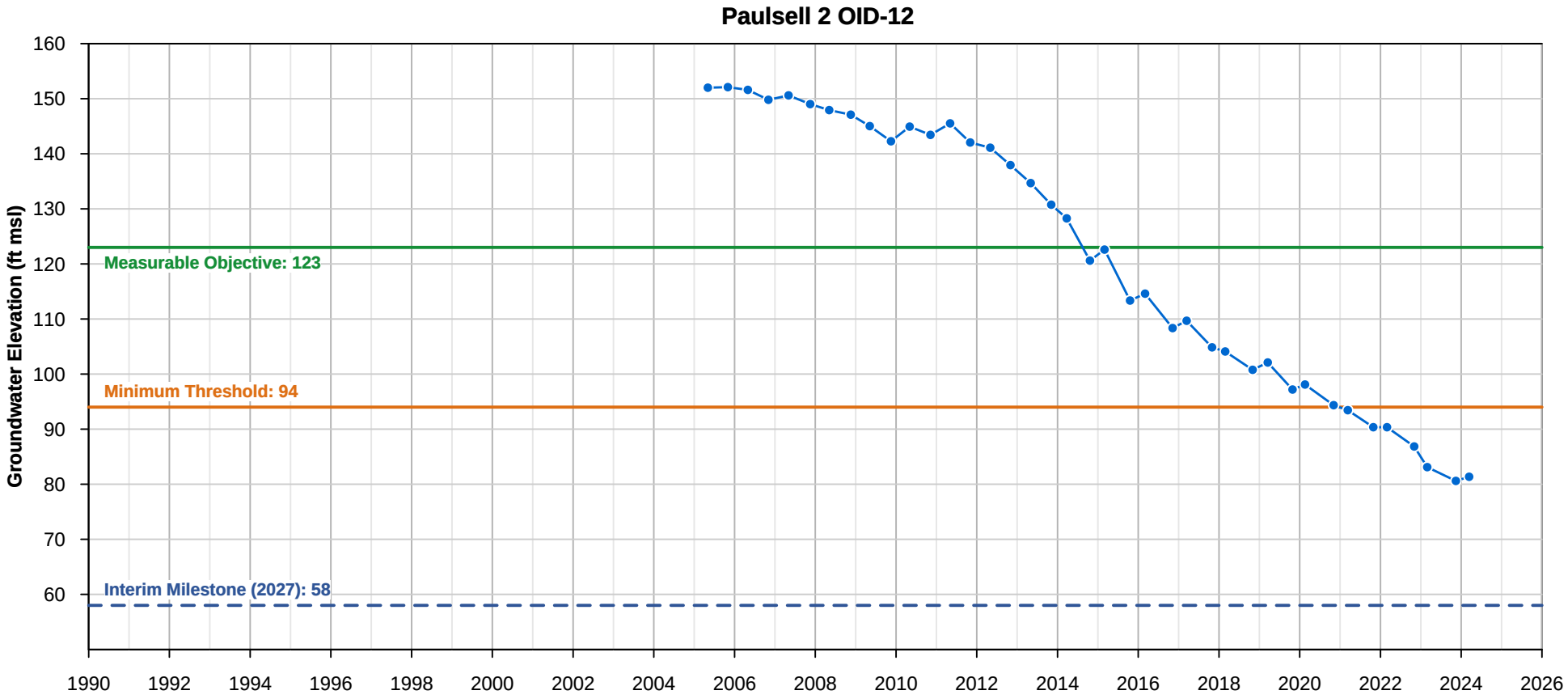




Well Information

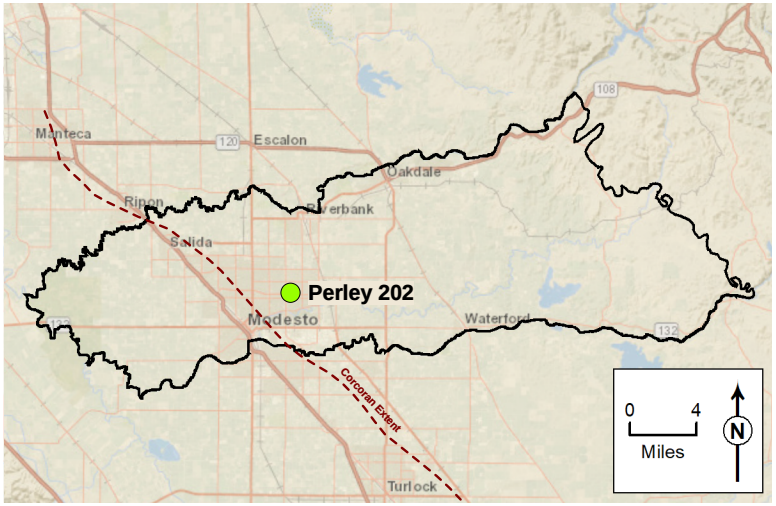
Site Code:	377113N1206766W001
Local Well Name:	Paulsell 2 OID-12
State Well Name:	02S12E32P001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	38865
Latitude:	37.711
Longitude:	-120.677
Well Depth (feet bgs):	815
Top Perforation (feet bgs):	132
Bottom Perforation (feet bgs):	815
Ground Surface Elevation:	193.85
Reference Point Elevation:	195.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

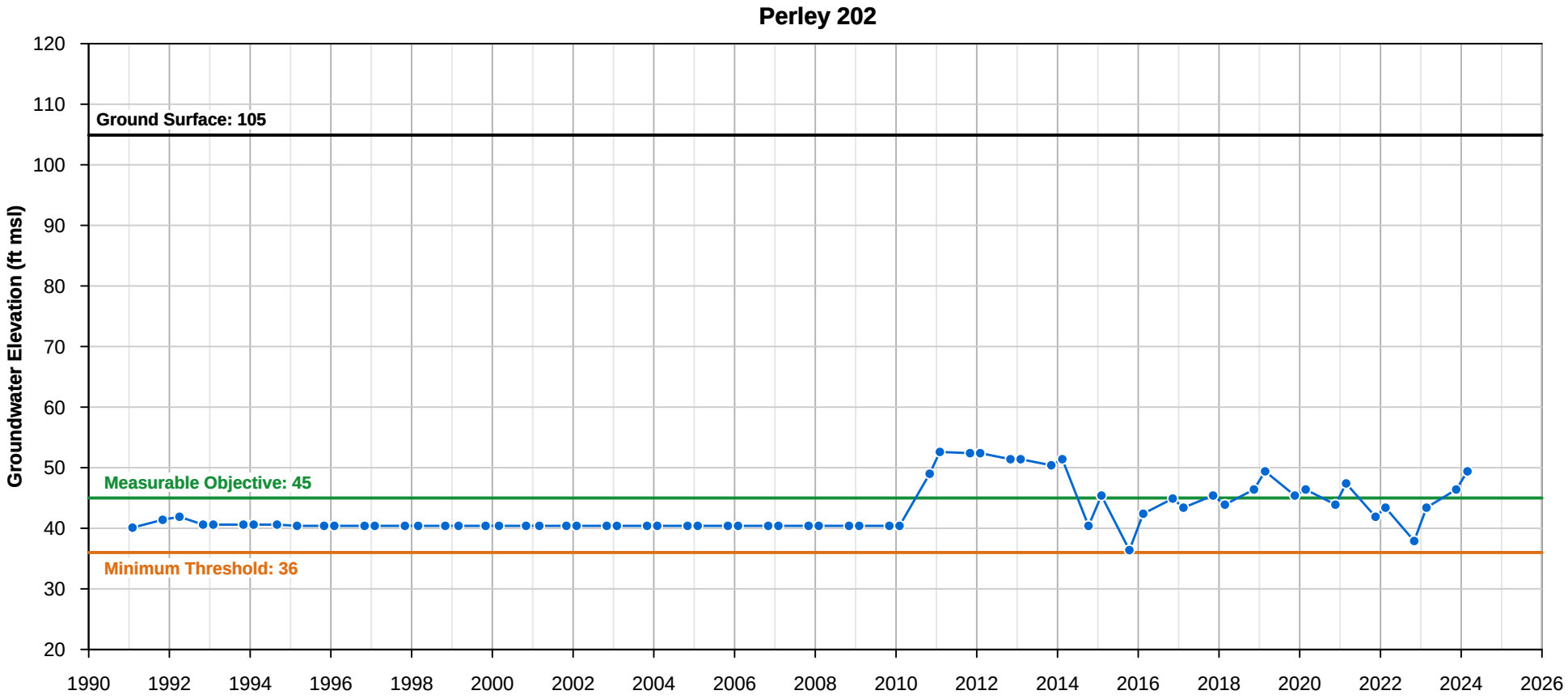




Well Information

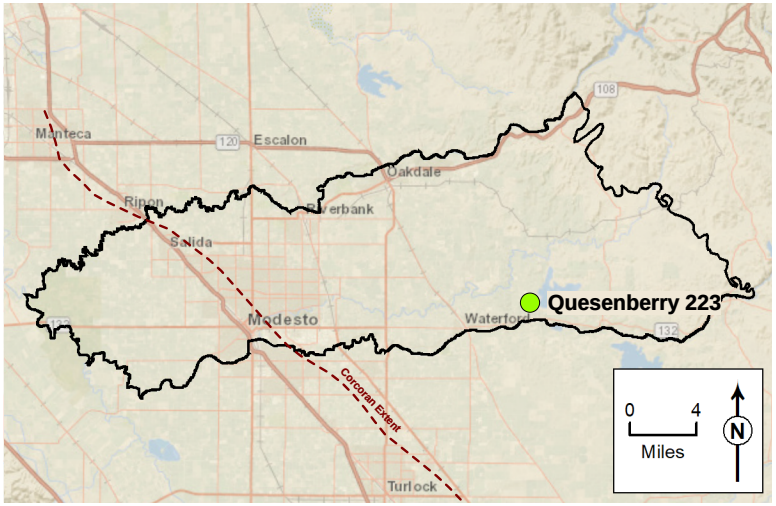
Site Code:	376677N1209518W001
Local Well Name:	Perley 202
State Well Name:	03S09E14P001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	2109
Latitude:	37.6677
Longitude:	-120.952
Well Depth (feet bgs):	255
Top Perforation (feet bgs):	76
Bottom Perforation (feet bgs):	204
Ground Surface Elevation:	104.9
Reference Point Elevation:	105.4
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

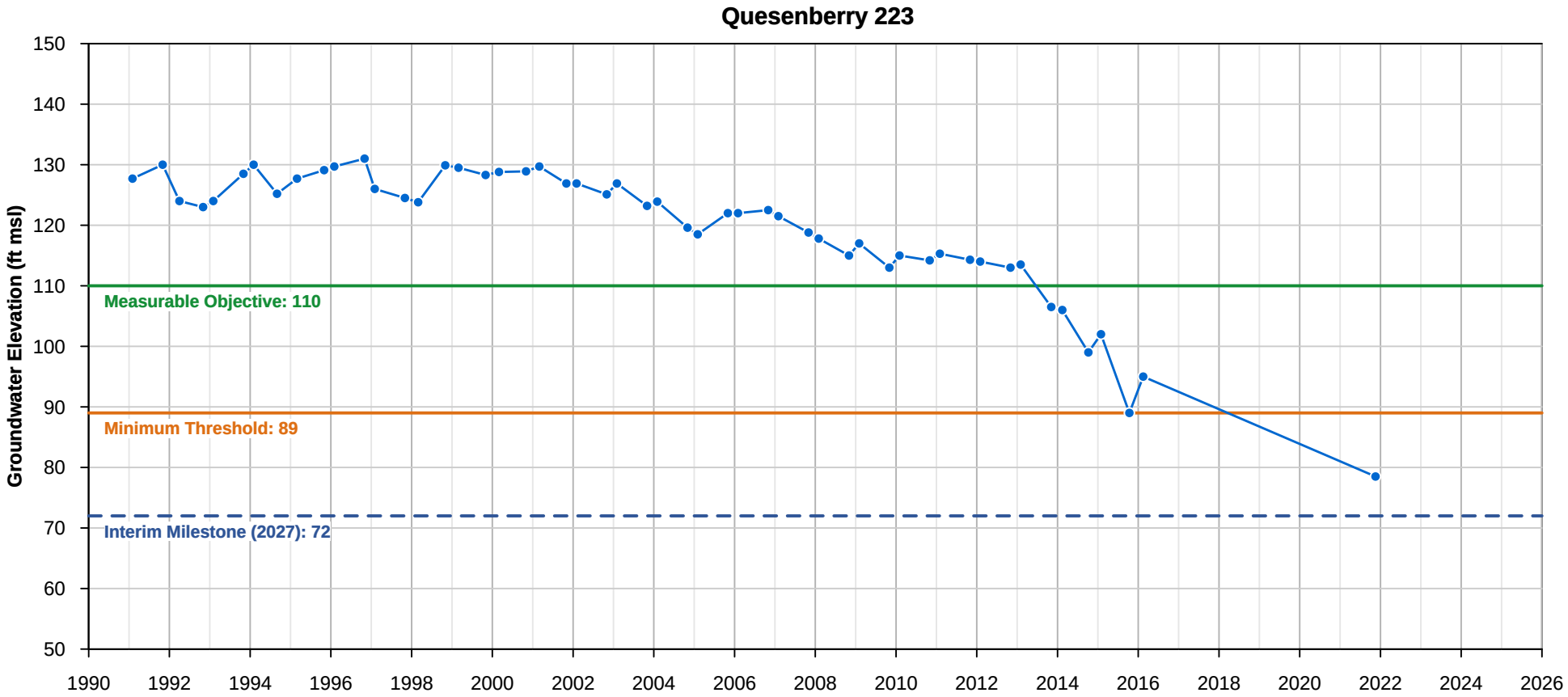




Well Information

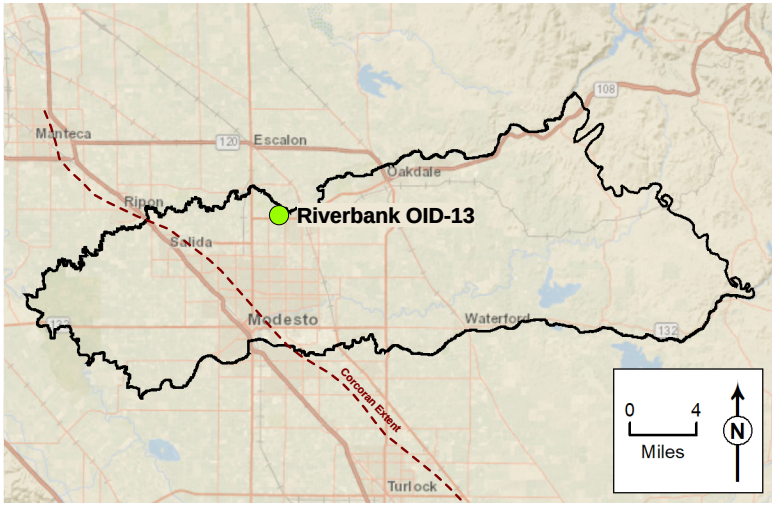
Site Code:	376596N1206896W001
Local Well Name:	Quesenberry 223
State Well Name:	03S12E19G001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	27424
Latitude:	37.6598
Longitude:	-120.69
Well Depth (feet bgs):	380
Top Perforation (feet bgs):	168
Bottom Perforation (feet bgs):	208
Ground Surface Elevation:	197
Reference Point Elevation:	197
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

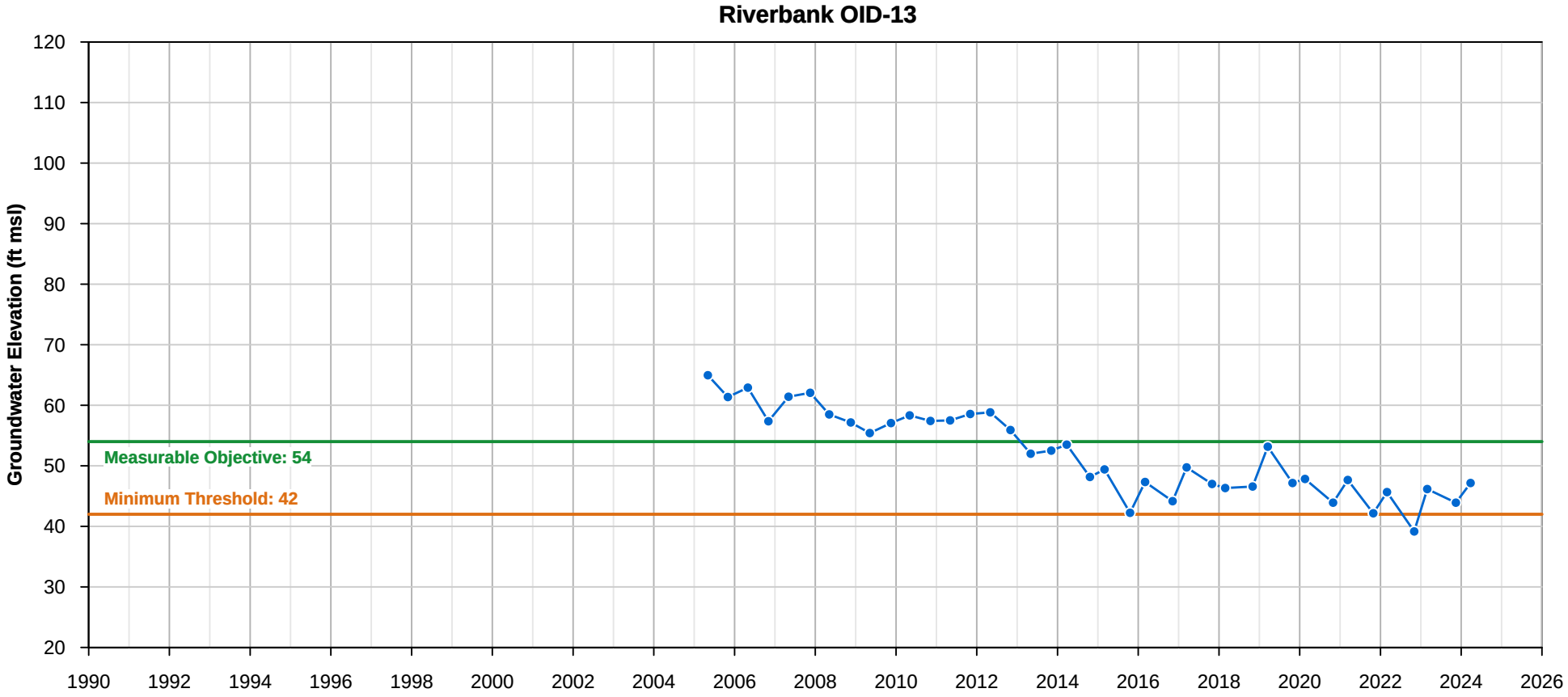




Well Information

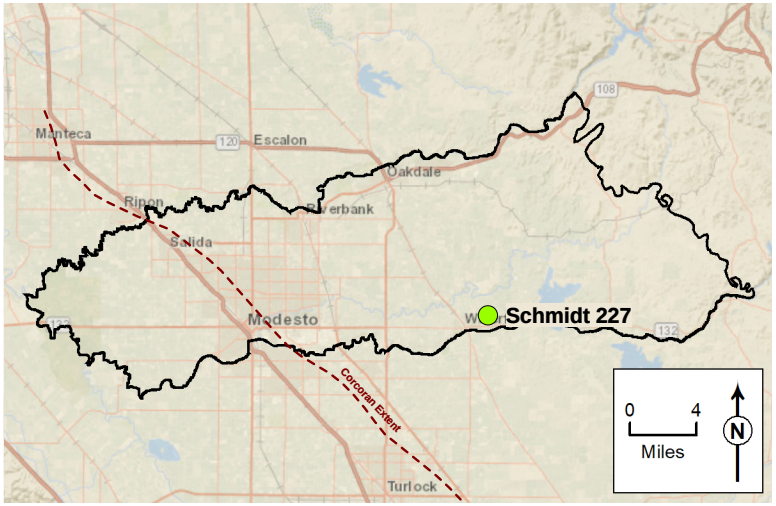
Site Code:	377351N1209648W001
Local Well Name:	Riverbank OID-13
State Well Name:	02S09E27G001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	49463
Latitude:	37.7351
Longitude:	-120.965
Well Depth (feet bgs):	560
Top Perforation (feet bgs):	200
Bottom Perforation (feet bgs):	550
Ground Surface Elevation:	132.32
Reference Point Elevation:	134.16
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

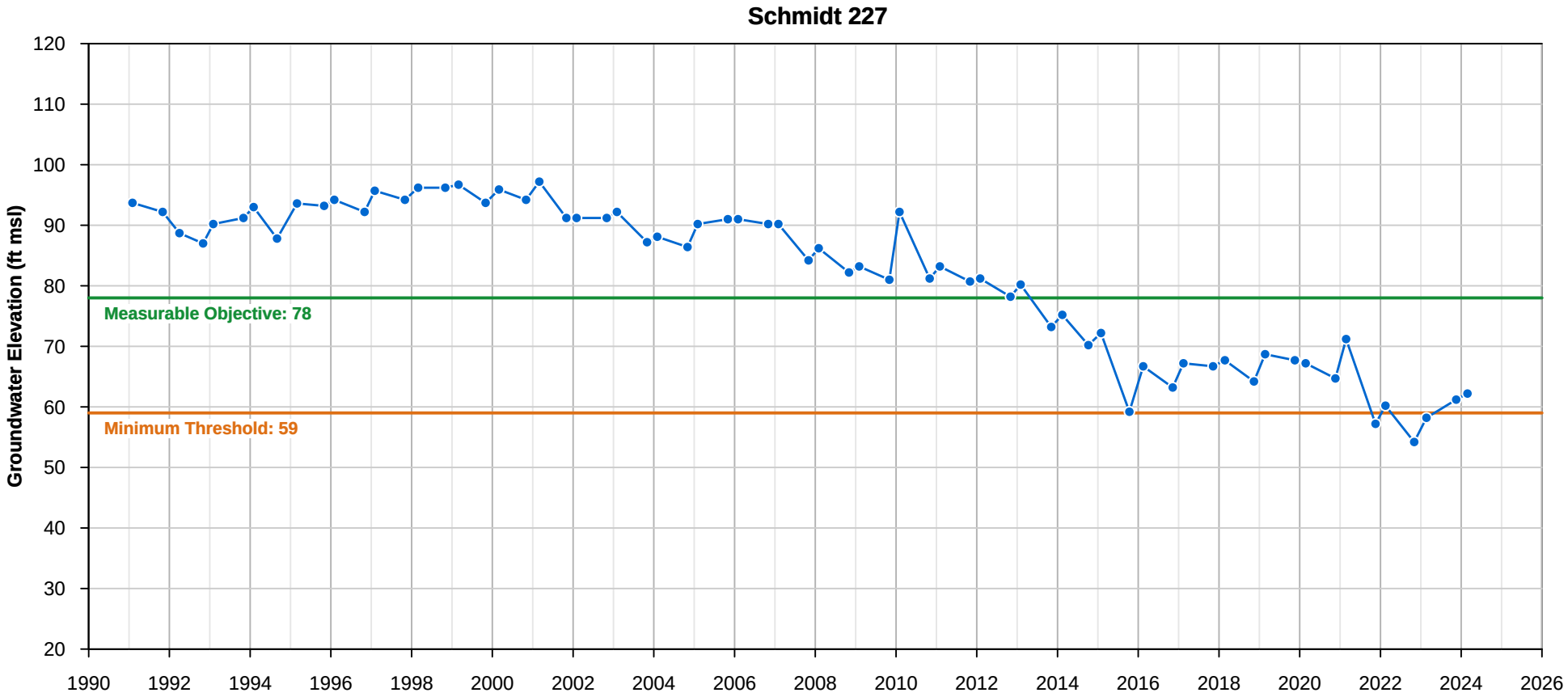




Well Information

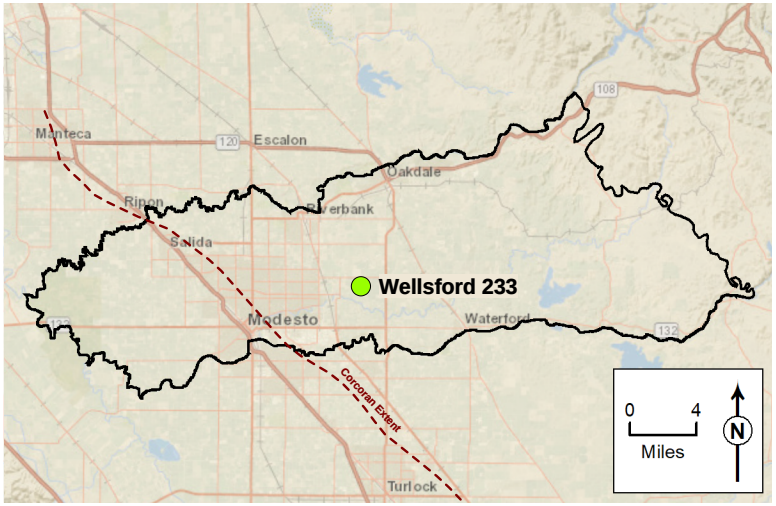
Site Code:	376485N1207360W001
Local Well Name:	Schmidt 227
State Well Name:	03S11E27G003M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3897
Latitude:	37.6487
Longitude:	-120.736
Well Depth (feet bgs):	248
Top Perforation (feet bgs):	113
Bottom Perforation (feet bgs):	153
Ground Surface Elevation:	192.3
Reference Point Elevation:	192.2
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

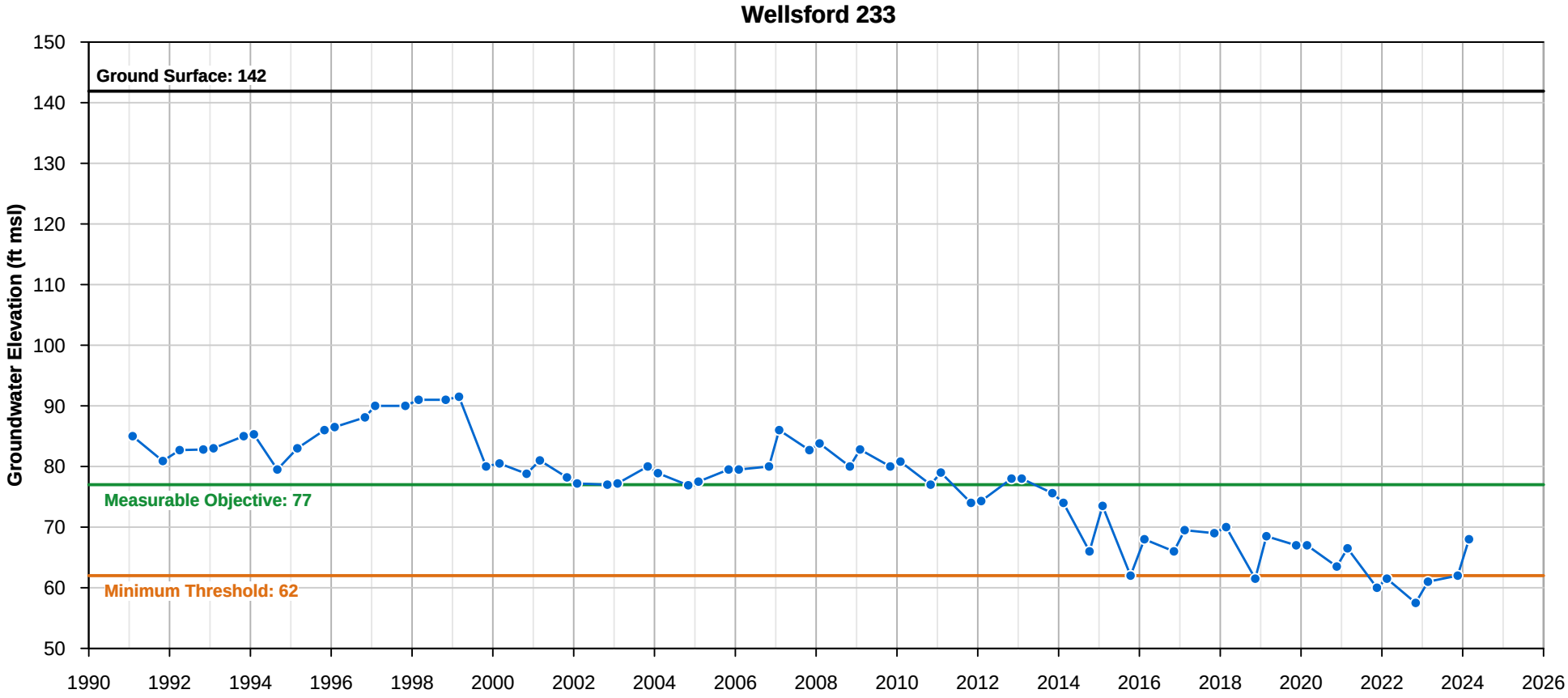




Well Information

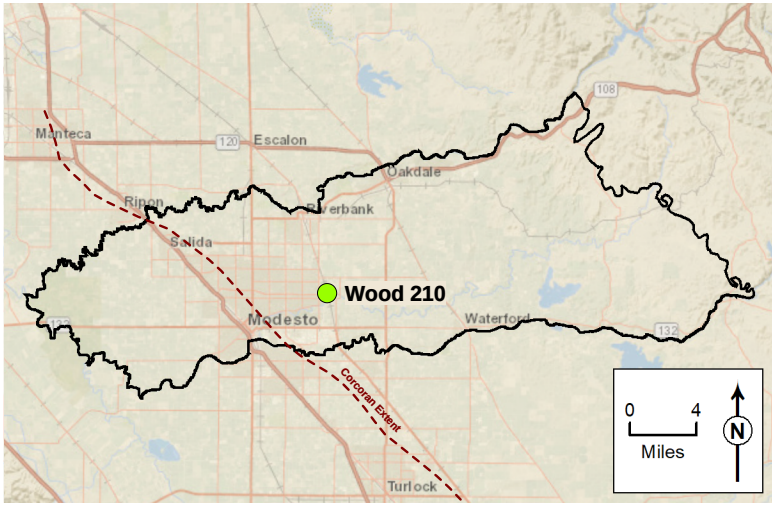
Site Code:	376735N1208752W001
Local Well Name:	Wellsford 233
State Well Name:	03S10E16K001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3551
Latitude:	37.6736
Longitude:	-120.875
Well Depth (feet bgs):	468
Top Perforation (feet bgs):	158
Bottom Perforation (feet bgs):	358
Ground Surface Elevation:	141.9
Reference Point Elevation:	142
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

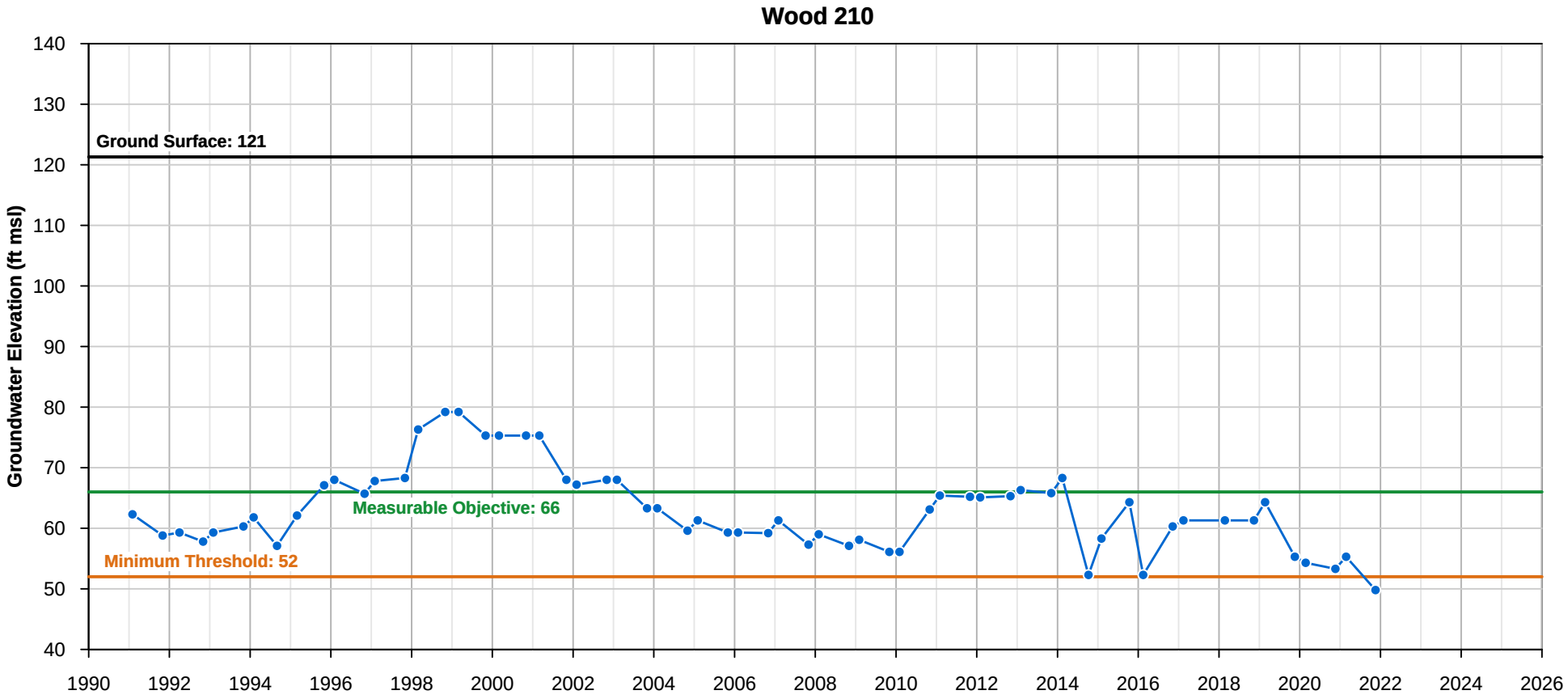




Well Information

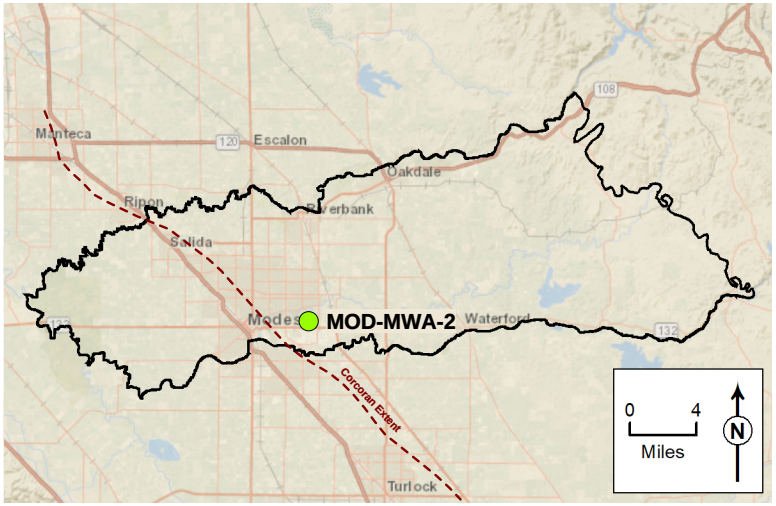
Site Code:	376674N1209121W001
Local Well Name:	Wood 210
State Well Name:	03S10E18P001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3553
Latitude:	37.6675
Longitude:	-120.912
Well Depth (feet bgs):	606
Top Perforation (feet bgs):	87
Bottom Perforation (feet bgs):	547
Ground Surface Elevation:	121.3
Reference Point Elevation:	121.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

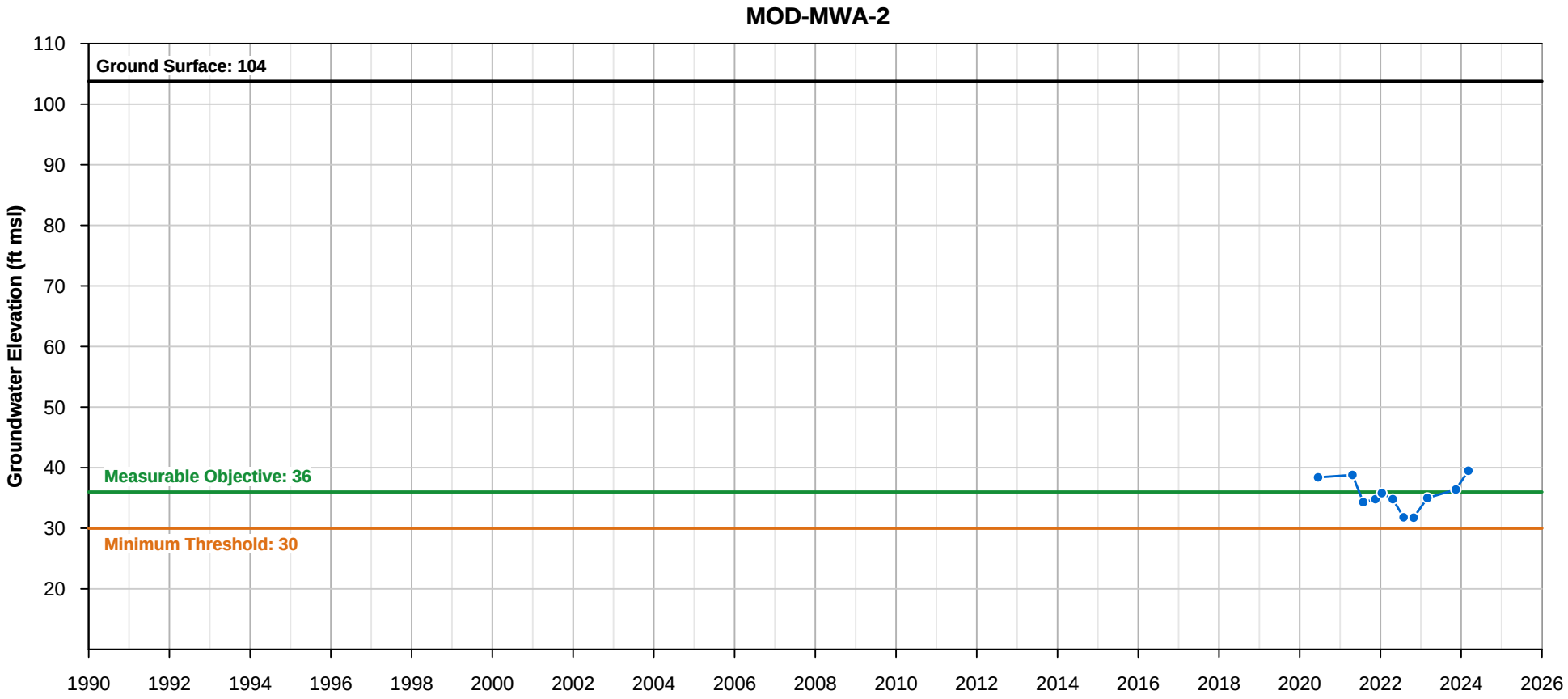




Well Information

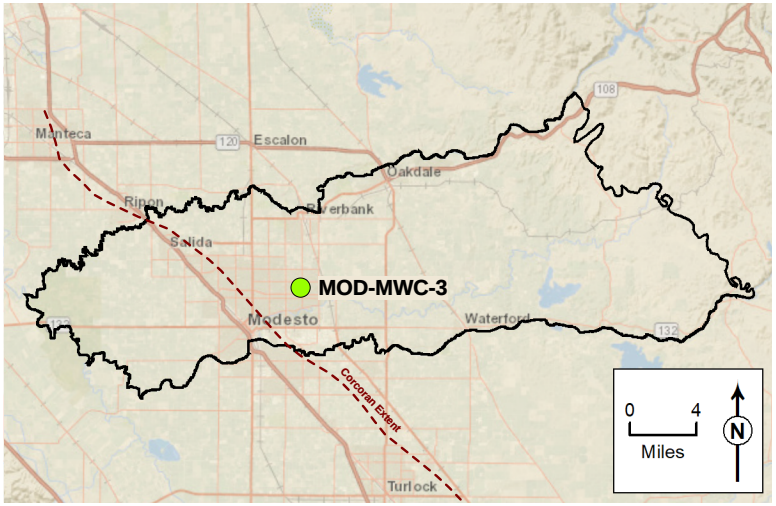
Site Code:	376429N1209317W001
Local Well Name:	MOD-MWA-2
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57376
Latitude:	37.643
Longitude:	-120.932
Well Depth (feet bgs):	175
Top Perforation (feet bgs):	150
Bottom Perforation (feet bgs):	170
Ground Surface Elevation:	103.8
Reference Point Elevation:	103.8
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

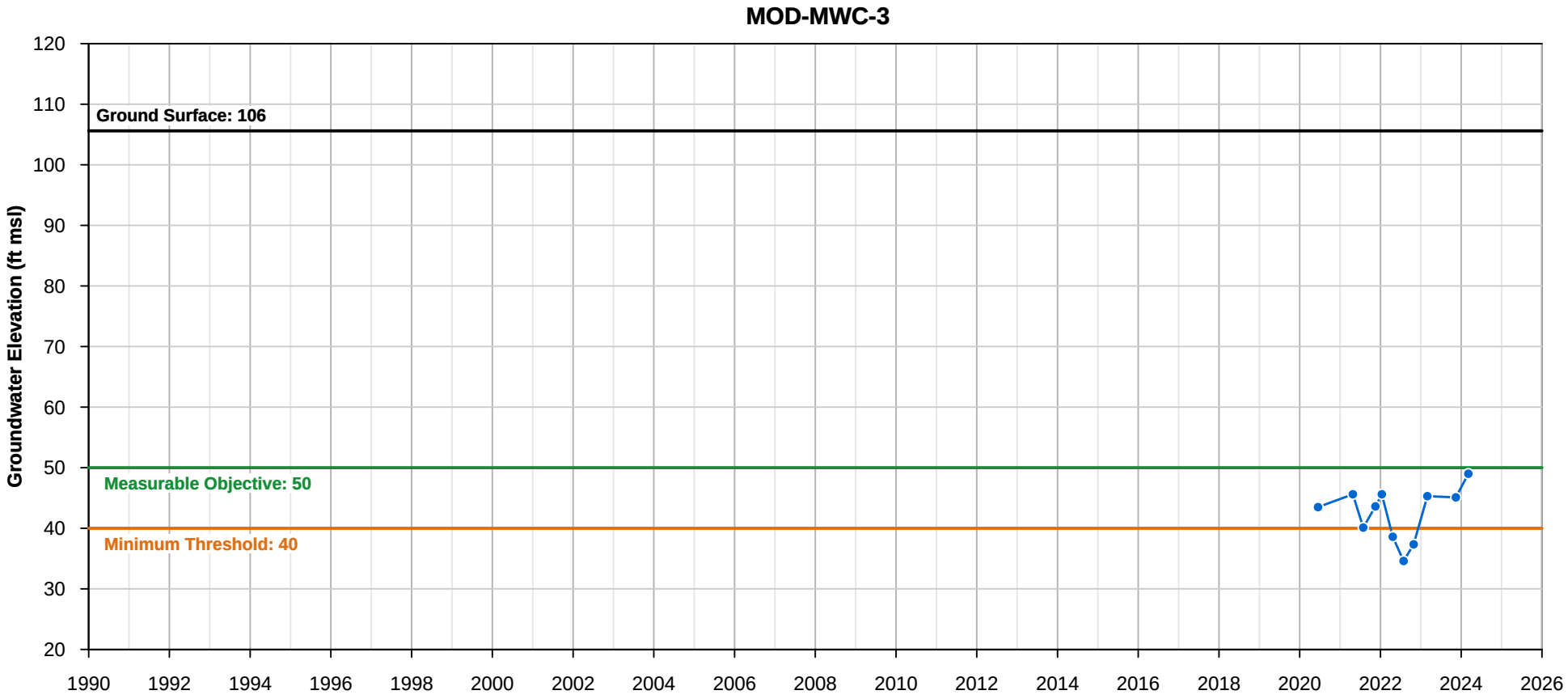




Well Information

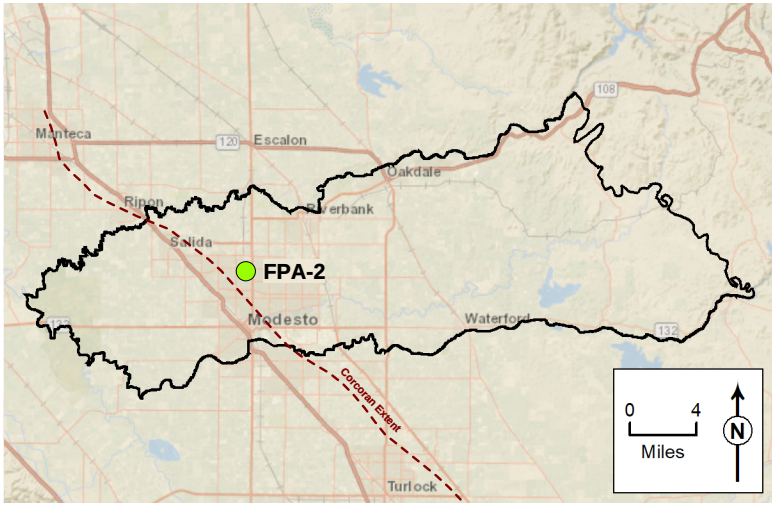
Site Code:	376722N1209409W001
Local Well Name:	MOD-MWC-3
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57379
Latitude:	37.6722
Longitude:	-120.941
Well Depth (feet bgs):	285
Top Perforation (feet bgs):	260
Bottom Perforation (feet bgs):	280
Ground Surface Elevation:	105.6
Reference Point Elevation:	105.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

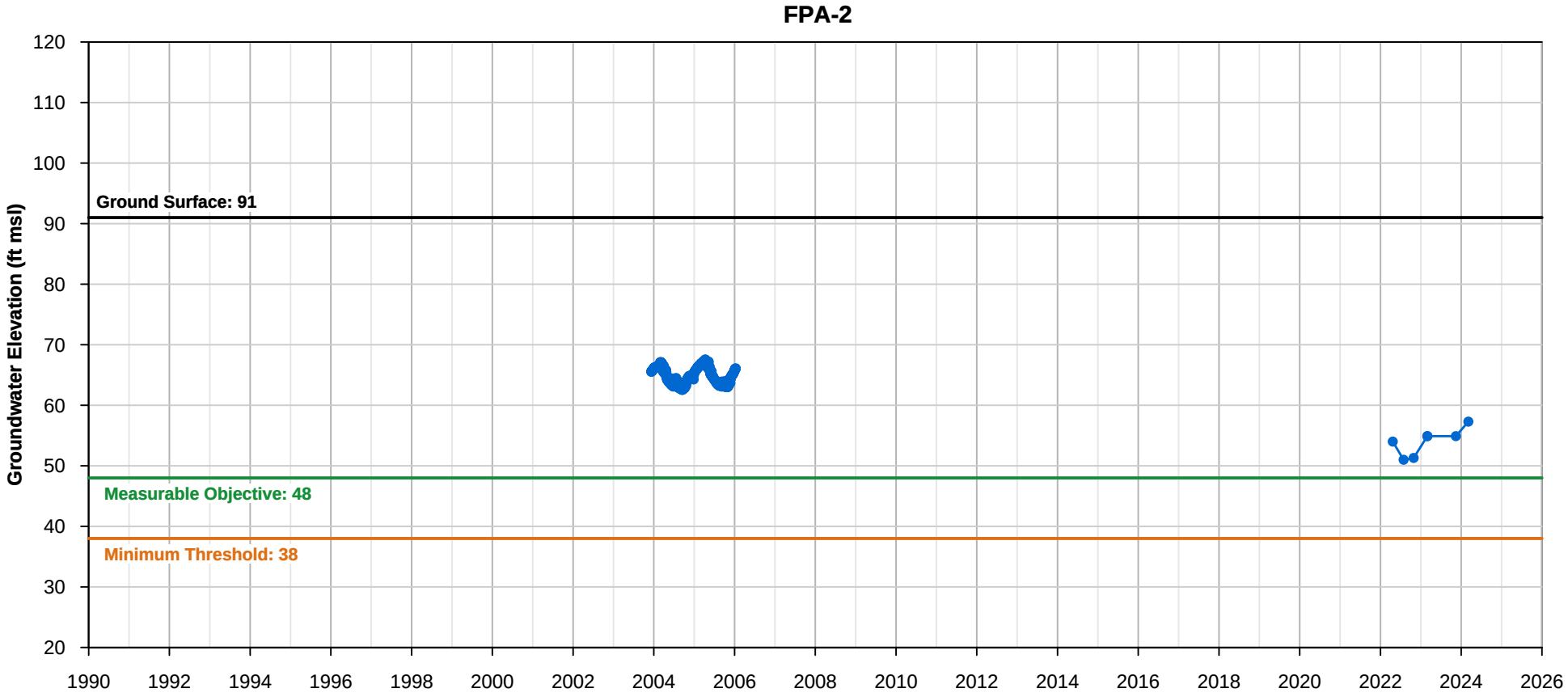




Well Information

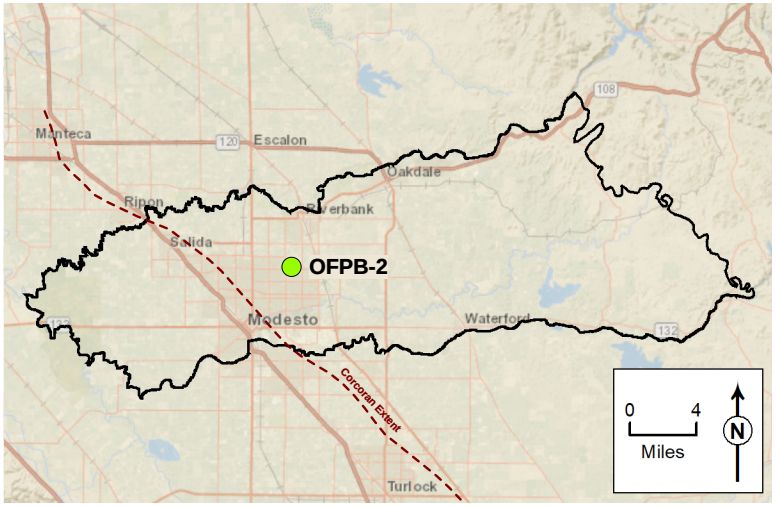
Site Code:	376861N1210009W001
Local Well Name:	FPA-2
State Well Name:	03S09E08K004M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57382
Latitude:	37.6862
Longitude:	-121.001
Well Depth (feet bgs):	122
Top Perforation (feet bgs):	115
Bottom Perforation (feet bgs):	120
Ground Surface Elevation:	91
Reference Point Elevation:	91
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

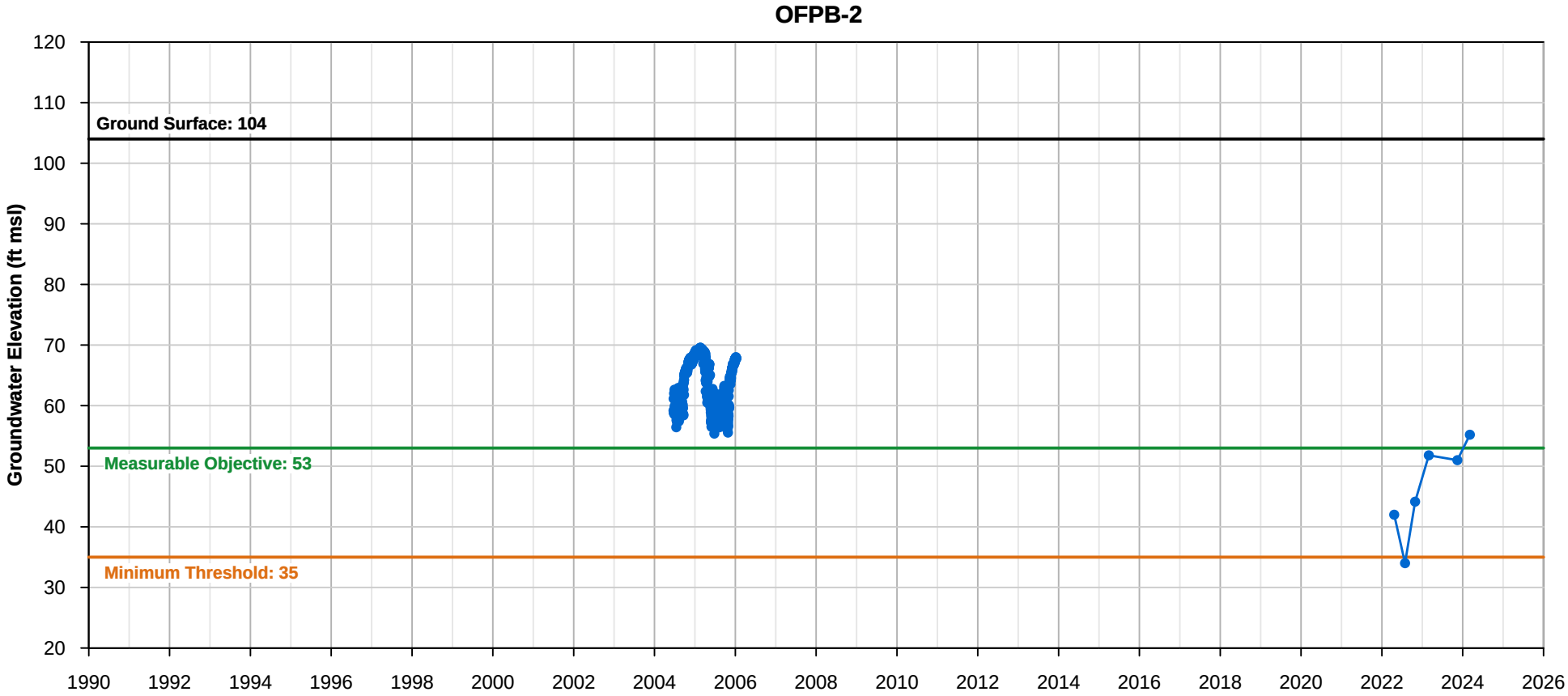




Well Information

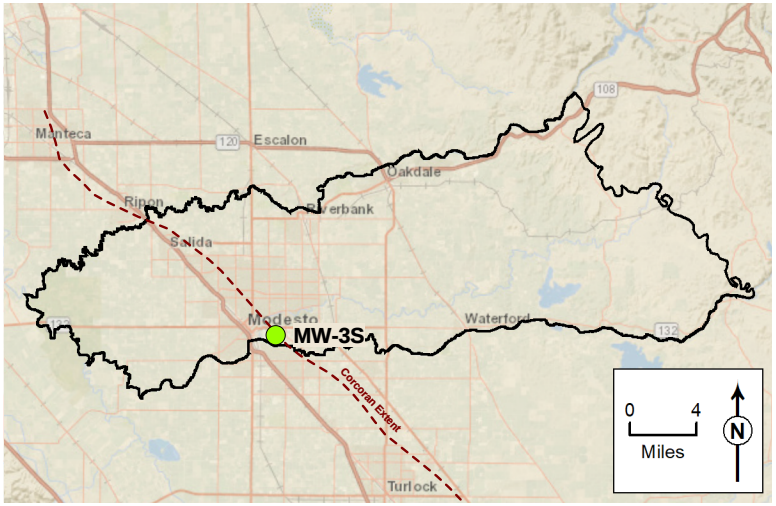
Site Code:	376901N1209514W001
Local Well Name:	OFPB-2
State Well Name:	03S09E11F002M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57383
Latitude:	37.6902
Longitude:	-120.951
Well Depth (feet bgs):	175
Top Perforation (feet bgs):	166
Bottom Perforation (feet bgs):	171
Ground Surface Elevation:	104
Reference Point Elevation:	104
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

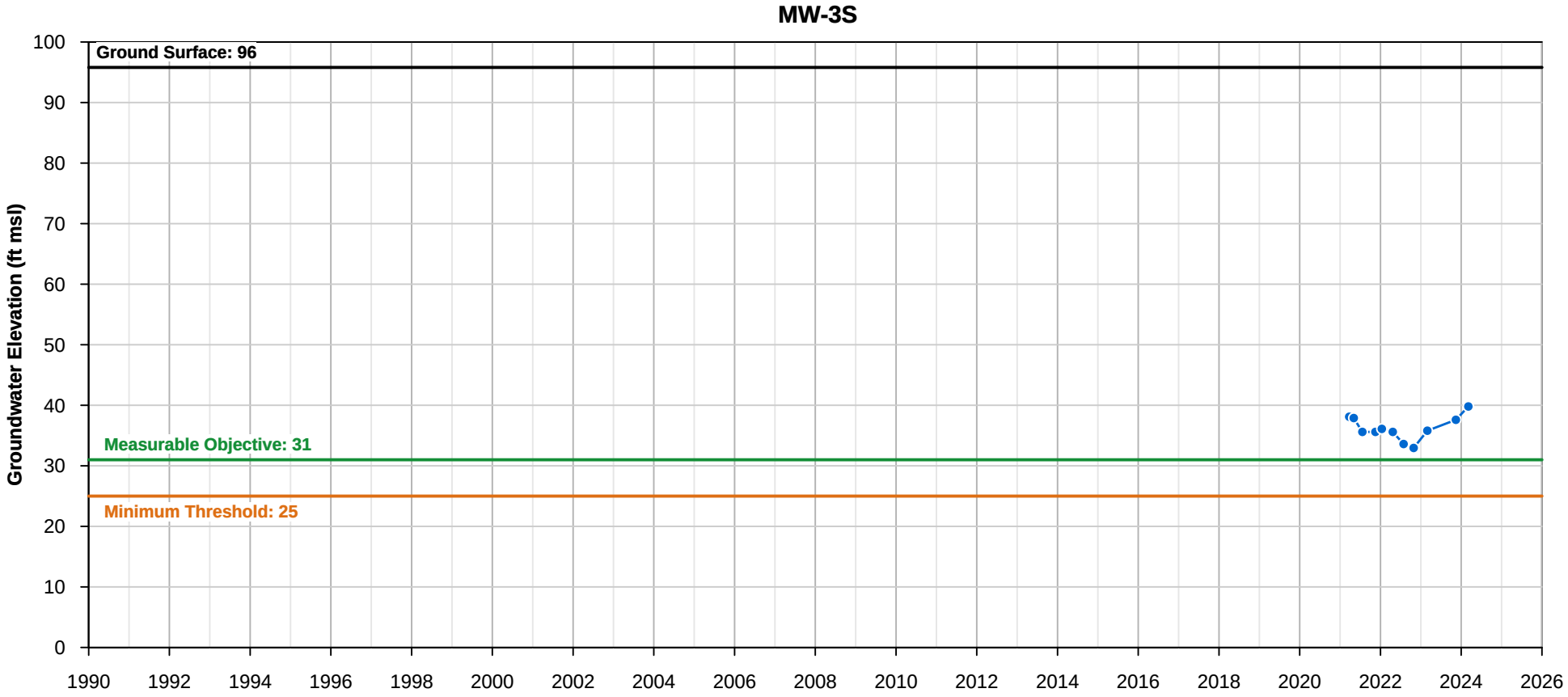




Well Information

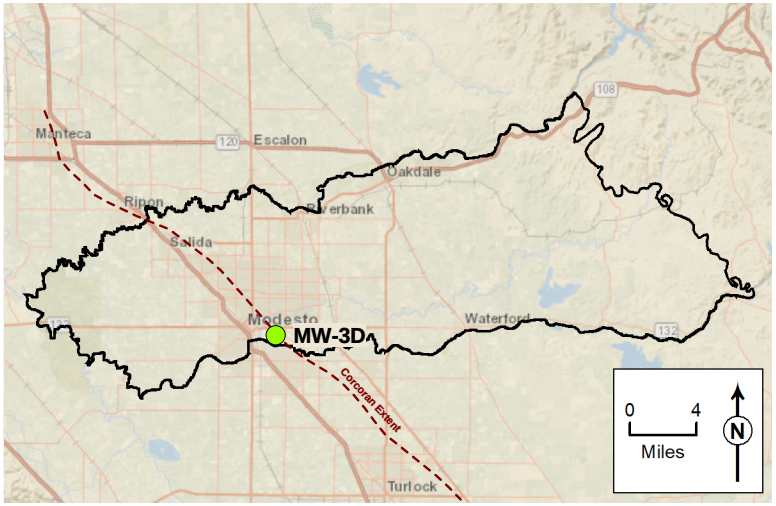
Site Code:	376307N1209676W001
Local Well Name:	MW-3S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57390
Latitude:	37.6307
Longitude:	-120.968
Well Depth (feet bgs):	161
Top Perforation (feet bgs):	136
Bottom Perforation (feet bgs):	156
Ground Surface Elevation:	95.8
Reference Point Elevation:	95.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

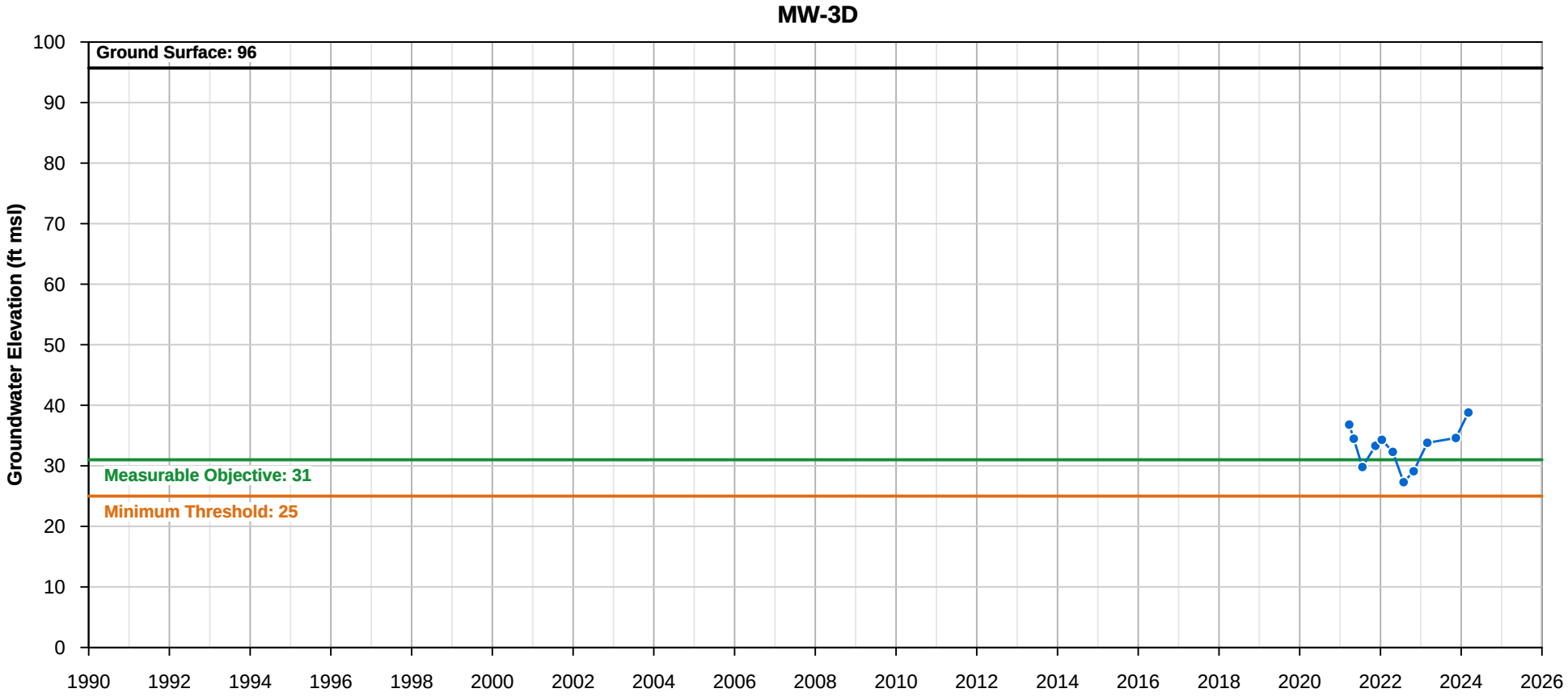




Well Information

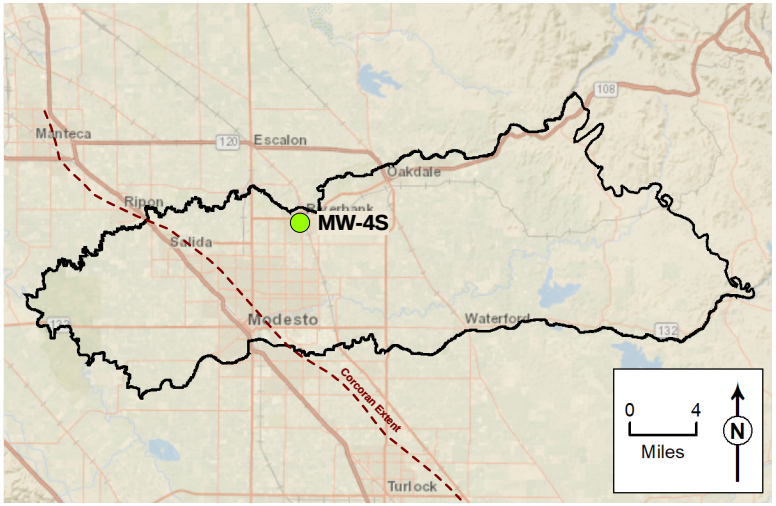
Site Code:	376307N1209676W002
Local Well Name:	MW-3D
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57391
Latitude:	37.6307
Longitude:	-120.968
Well Depth (feet bgs):	283
Top Perforation (feet bgs):	258
Bottom Perforation (feet bgs):	278
Ground Surface Elevation:	95.7
Reference Point Elevation:	95.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

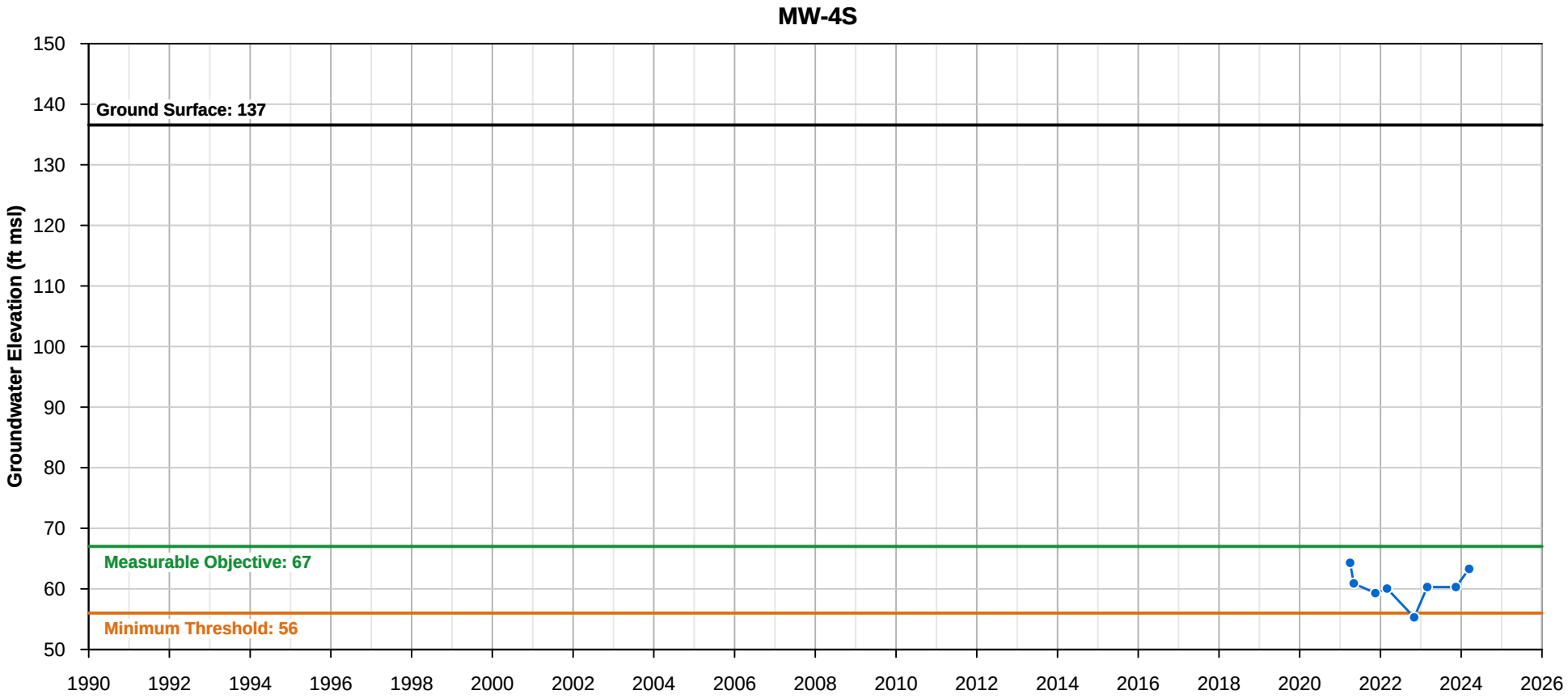




Well Information

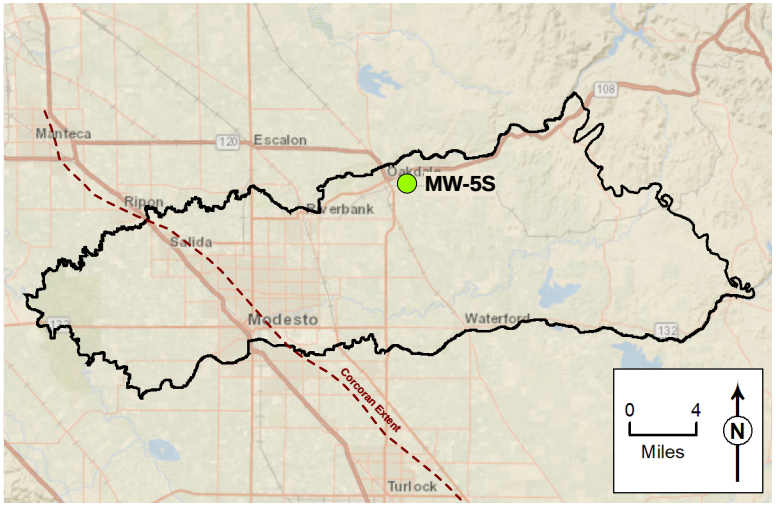
Site Code:	377285N1209415W001
Local Well Name:	MW-4S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57392
Latitude:	37.7286
Longitude:	-120.942
Well Depth (feet bgs):	165
Top Perforation (feet bgs):	140
Bottom Perforation (feet bgs):	160
Ground Surface Elevation:	136.569
Reference Point Elevation:	136.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

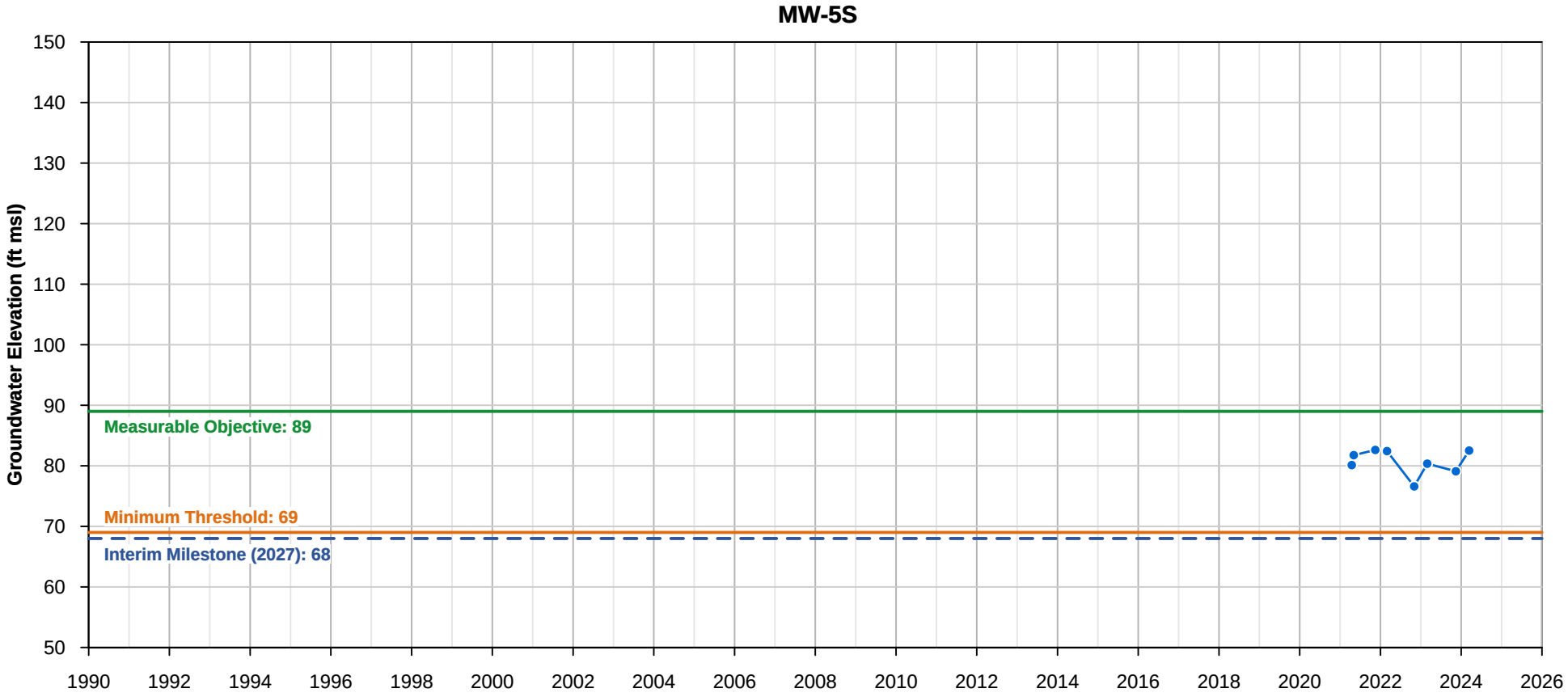




Well Information

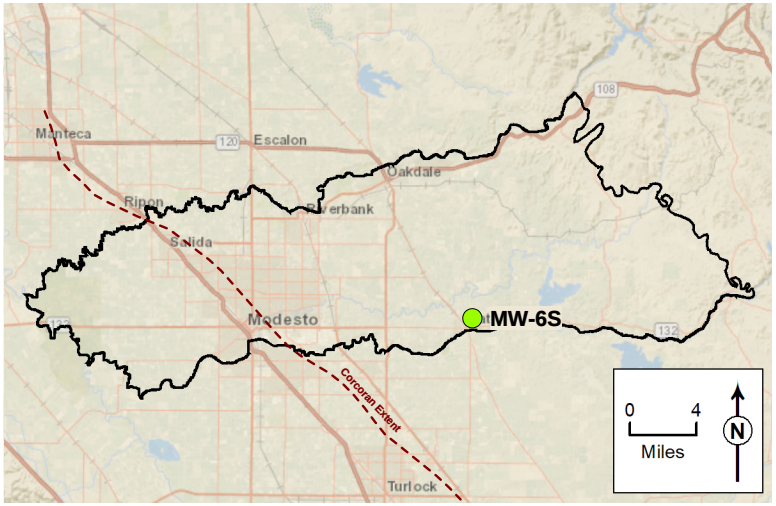
Site Code:	377631N1208253W001
Local Well Name:	MW-5S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57393
Latitude:	37.7631
Longitude:	-120.825
Well Depth (feet bgs):	175
Top Perforation (feet bgs):	150
Bottom Perforation (feet bgs):	170
Ground Surface Elevation:	191.9
Reference Point Elevation:	191.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

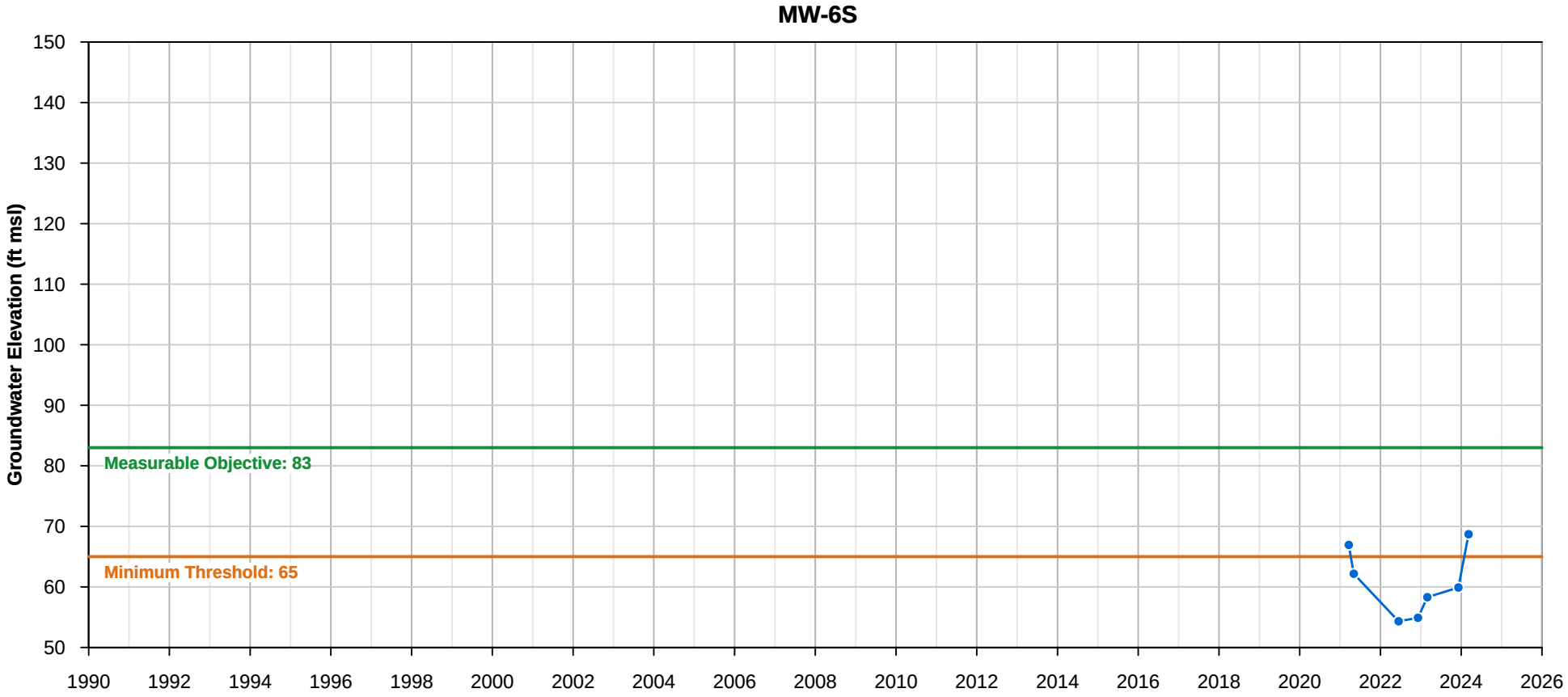




Well Information

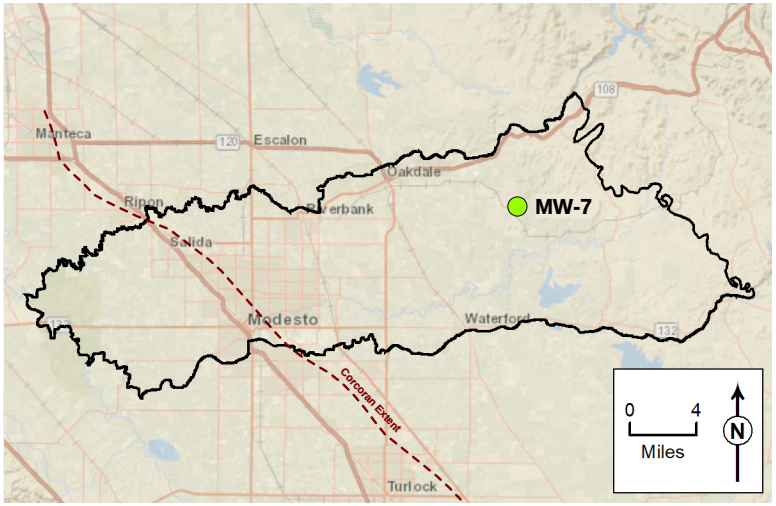
Site Code:	376461N1207525W001
Local Well Name:	MW-6S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57394
Latitude:	37.6461
Longitude:	-120.753
Well Depth (feet bgs):	179
Top Perforation (feet bgs):	154
Bottom Perforation (feet bgs):	174
Ground Surface Elevation:	171.3
Reference Point Elevation:	170.9
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

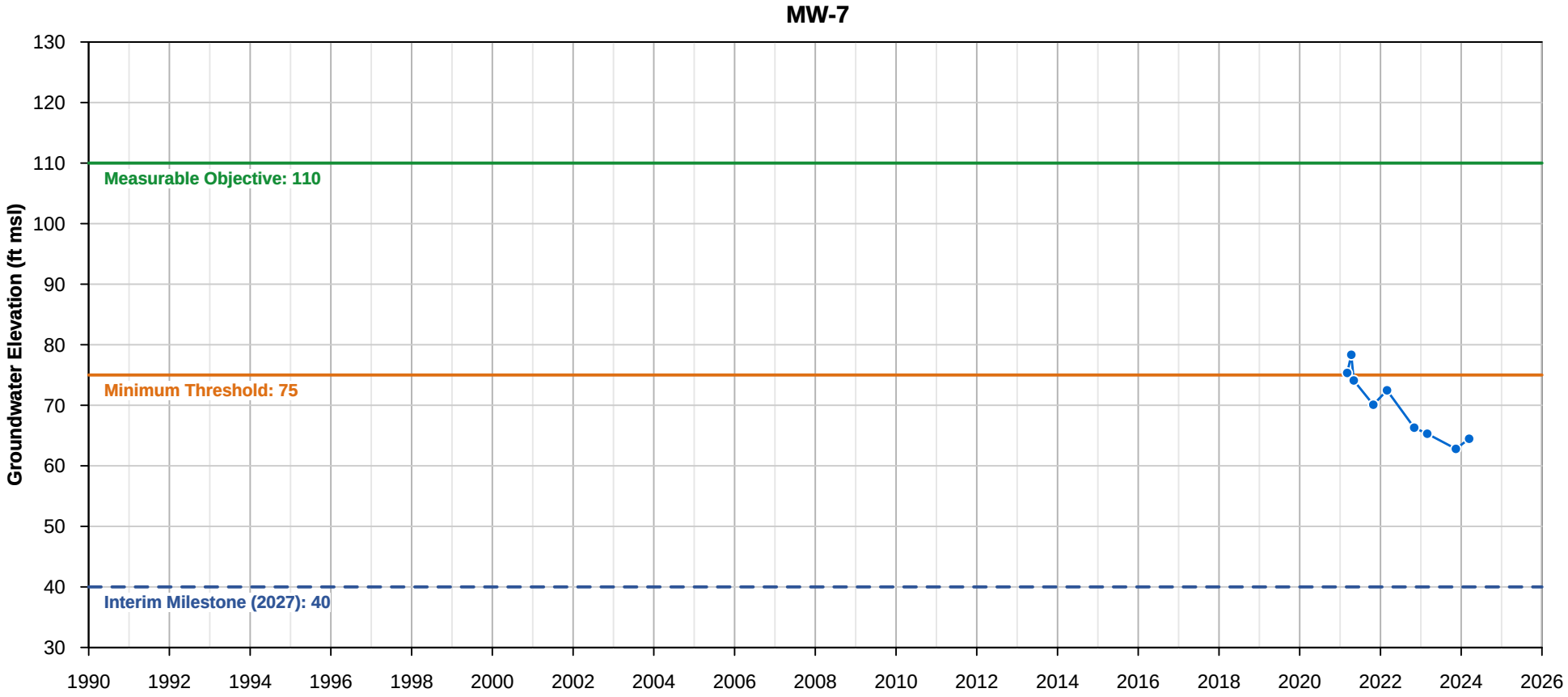




Well Information

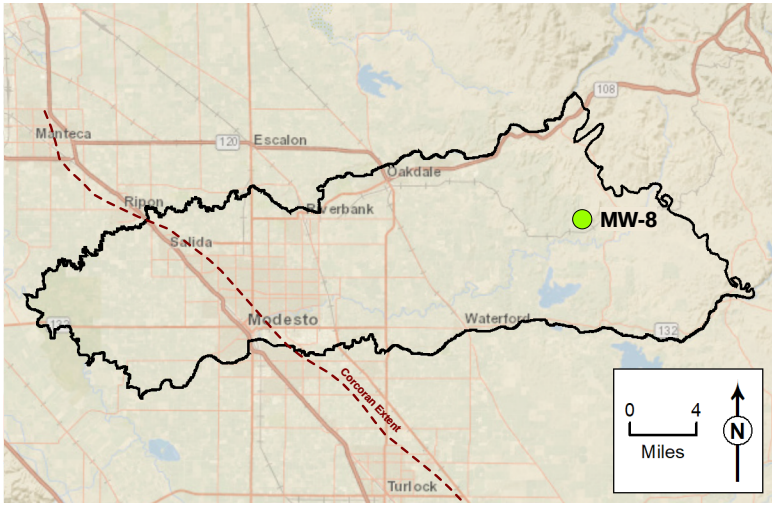
Site Code:	377434N1207043W001
Local Well Name:	MW-7
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57395
Latitude:	37.7434
Longitude:	-120.704
Well Depth (feet bgs):	300
Top Perforation (feet bgs):	275
Bottom Perforation (feet bgs):	295
Ground Surface Elevation:	242.6
Reference Point Elevation:	242.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

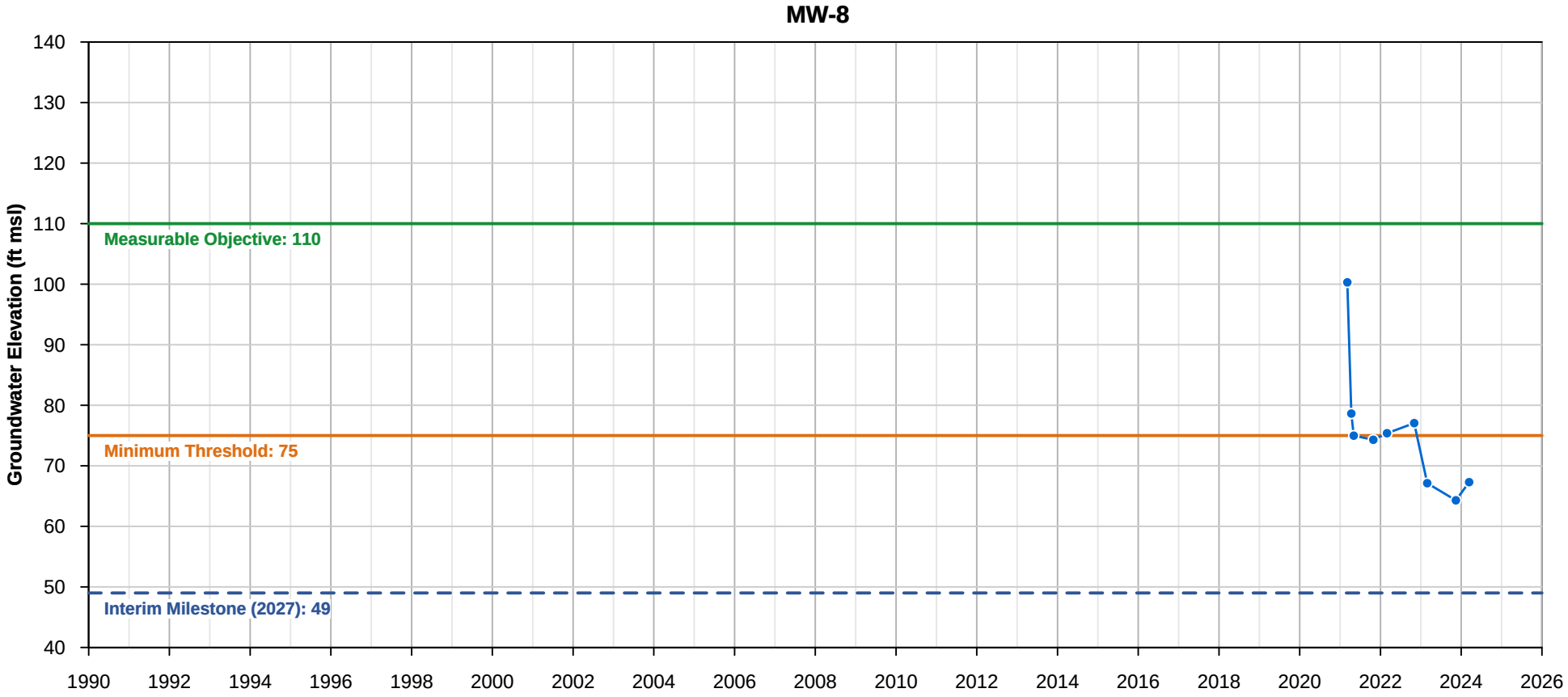




Well Information

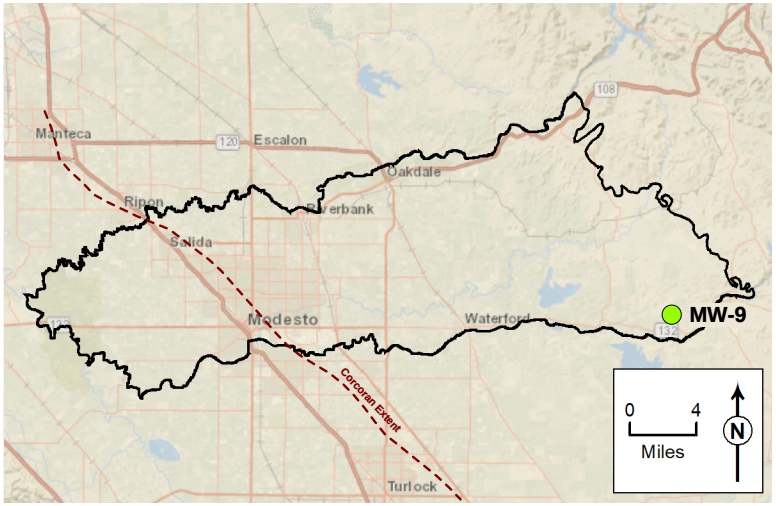
Site Code:	377323N1206328W001
Local Well Name:	MW-8
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57396
Latitude:	37.7324
Longitude:	-120.633
Well Depth (feet bgs):	290
Top Perforation (feet bgs):	265
Bottom Perforation (feet bgs):	285
Ground Surface Elevation:	292.9
Reference Point Elevation:	292.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

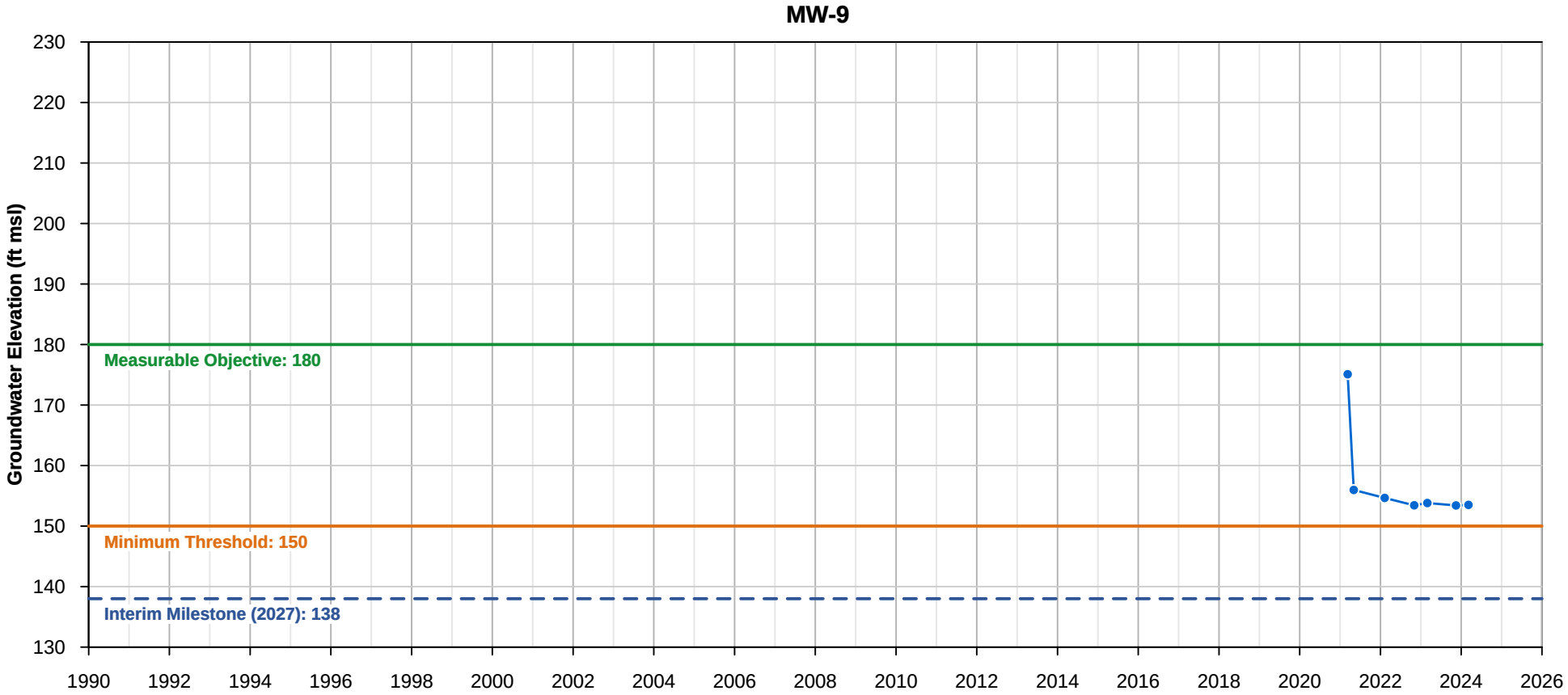




Well Information

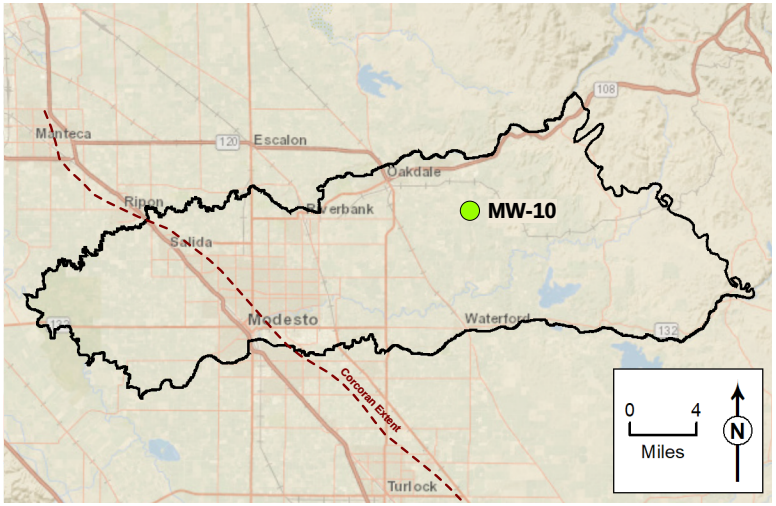
Site Code:	376495N1205351W001
Local Well Name:	MW-9
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57397
Latitude:	37.6495
Longitude:	-120.535
Well Depth (feet bgs):	365
Top Perforation (feet bgs):	340
Bottom Perforation (feet bgs):	360
Ground Surface Elevation:	244.5
Reference Point Elevation:	247.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

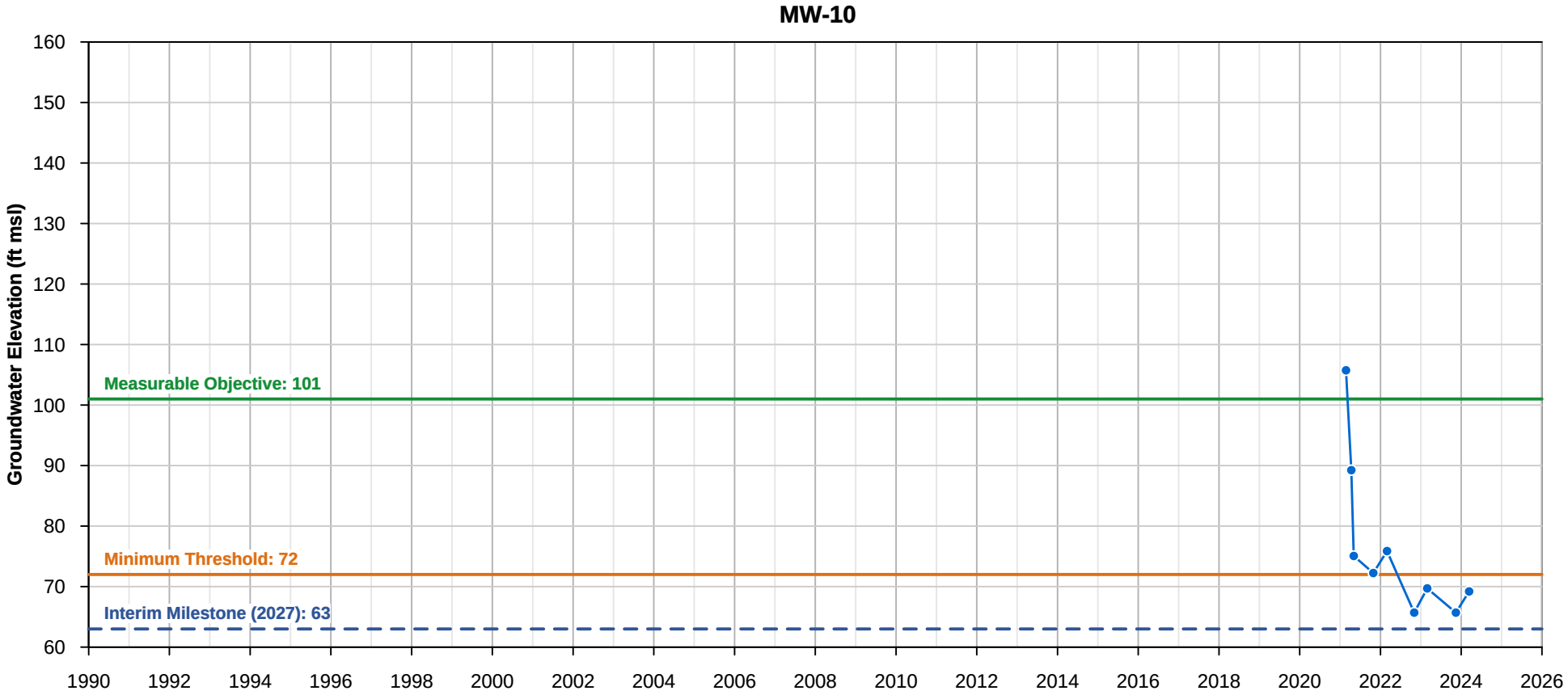




Well Information

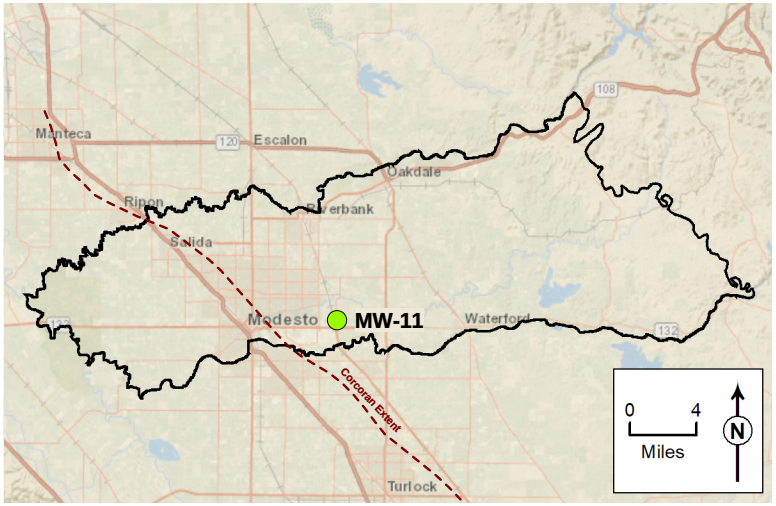
Site Code:	377396N1207564W001
Local Well Name:	MW-10
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57398
Latitude:	37.7396
Longitude:	-120.756
Well Depth (feet bgs):	265
Top Perforation (feet bgs):	240
Bottom Perforation (feet bgs):	260
Ground Surface Elevation:	265.1
Reference Point Elevation:	264.7
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

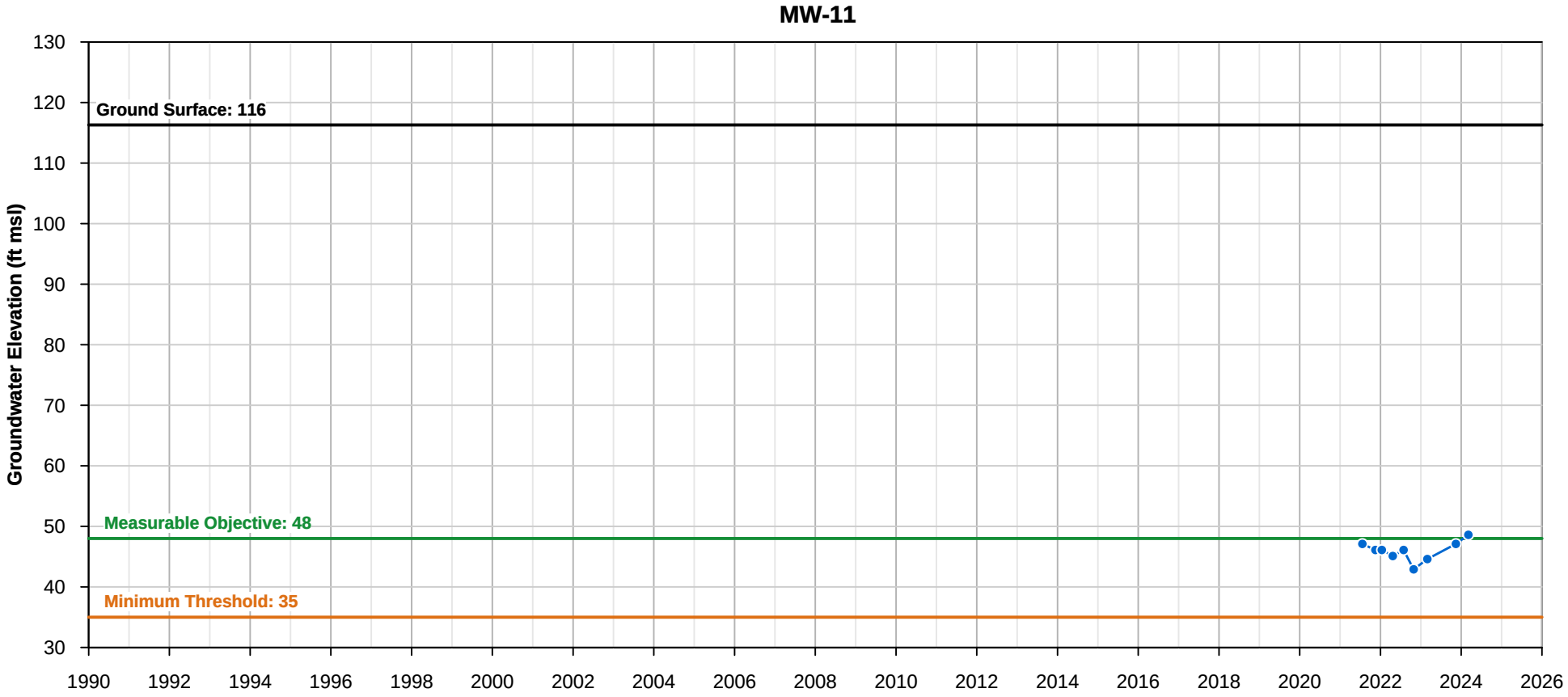




Well Information

Site Code:	376439N1209009W001
Local Well Name:	MW-11
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57399
Latitude:	37.644
Longitude:	-120.901
Well Depth (feet bgs):	175
Top Perforation (feet bgs):	150
Bottom Perforation (feet bgs):	170
Ground Surface Elevation:	116.3
Reference Point Elevation:	116.1
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Land Subsidence

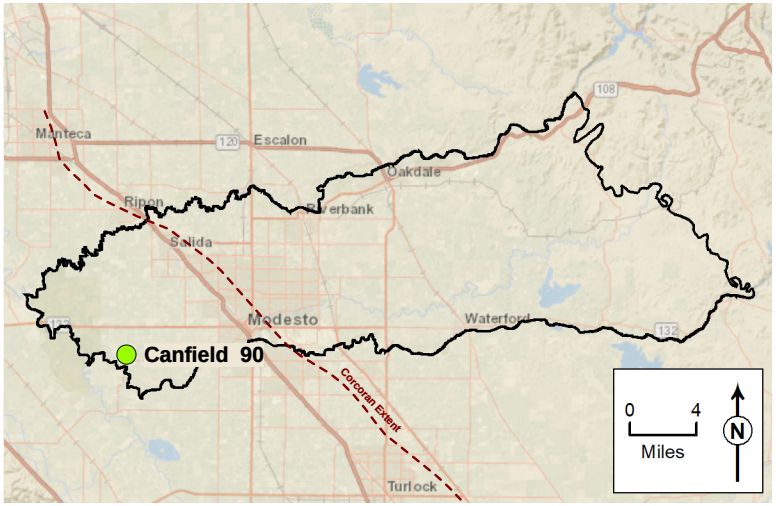


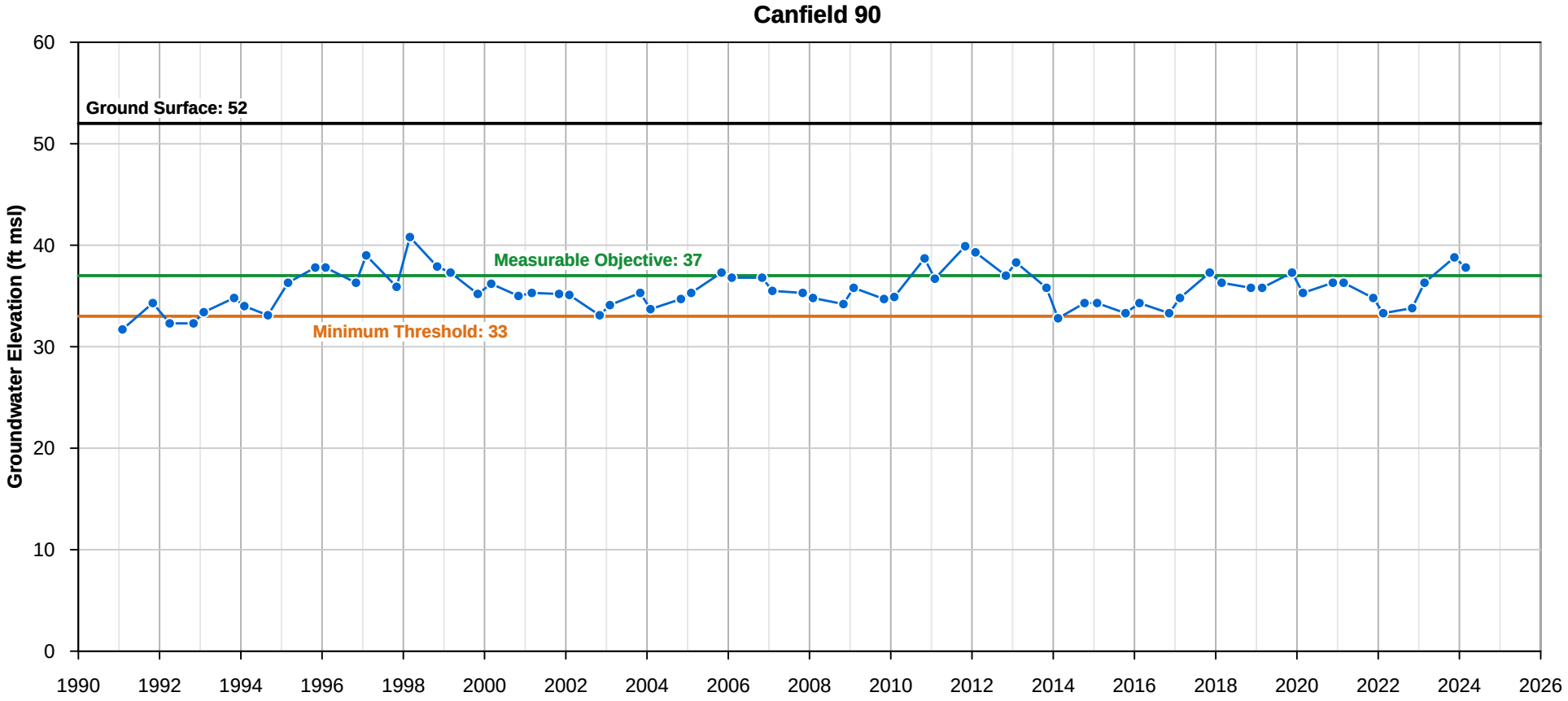


Hydrographs for Wells in the Monitoring Network for Depletions of Interconnected Surface Water

Well Information

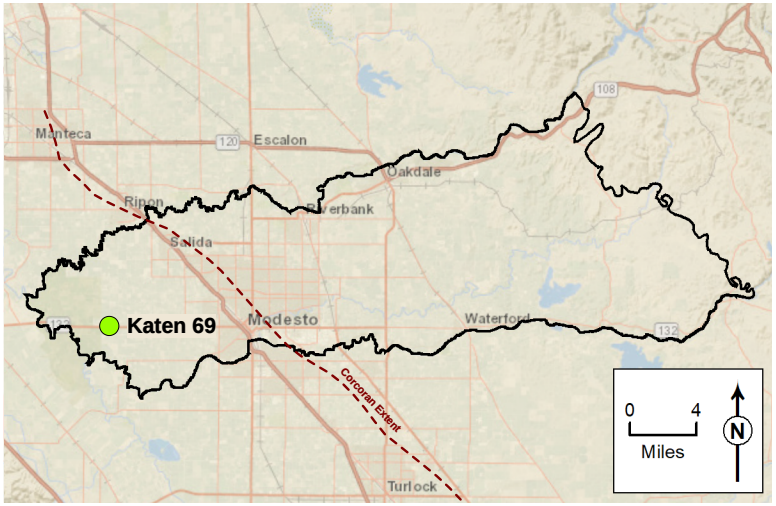
Site Code:	376130N1211307W001
Local Well Name:	Canfield 90
State Well Name:	04S08E06L001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	26633
Latitude:	37.6131
Longitude:	-121.131
Well Depth (feet bgs):	151
Top Perforation (feet bgs):	40
Bottom Perforation (feet bgs):	75
Ground Surface Elevation:	52
Reference Point Elevation:	52.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

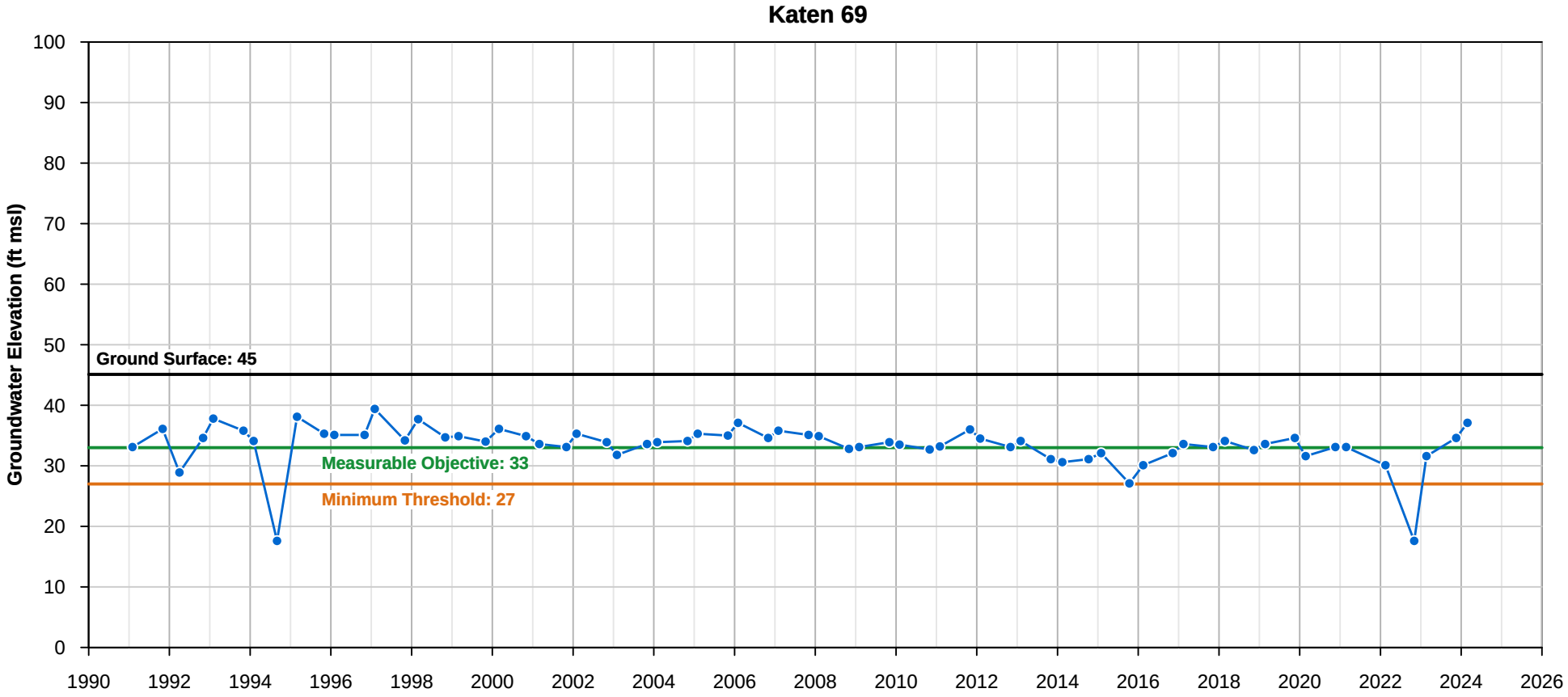




Well Information

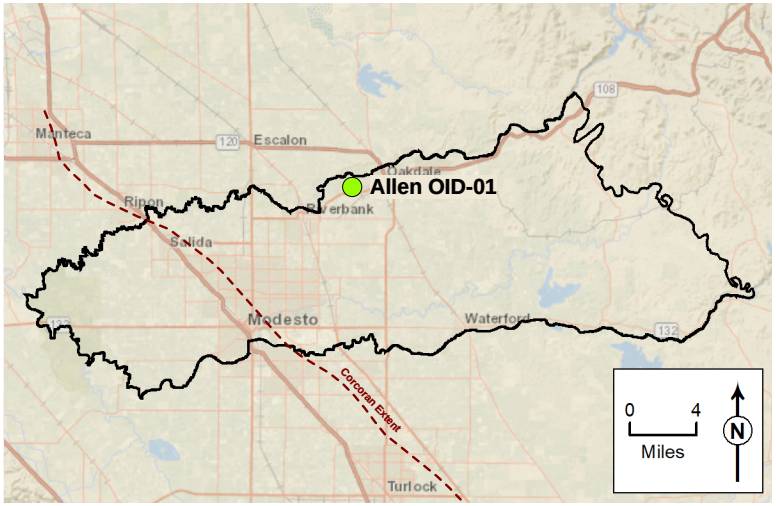
Site Code:	376377N1211496W001
Local Well Name:	Katen 69
State Well Name:	03S07E25P001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	3147
Latitude:	37.6379
Longitude:	-121.15
Well Depth (feet bgs):	160
Top Perforation (feet bgs):	13
Bottom Perforation (feet bgs):	148
Ground Surface Elevation:	45.1
Reference Point Elevation:	45.1
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

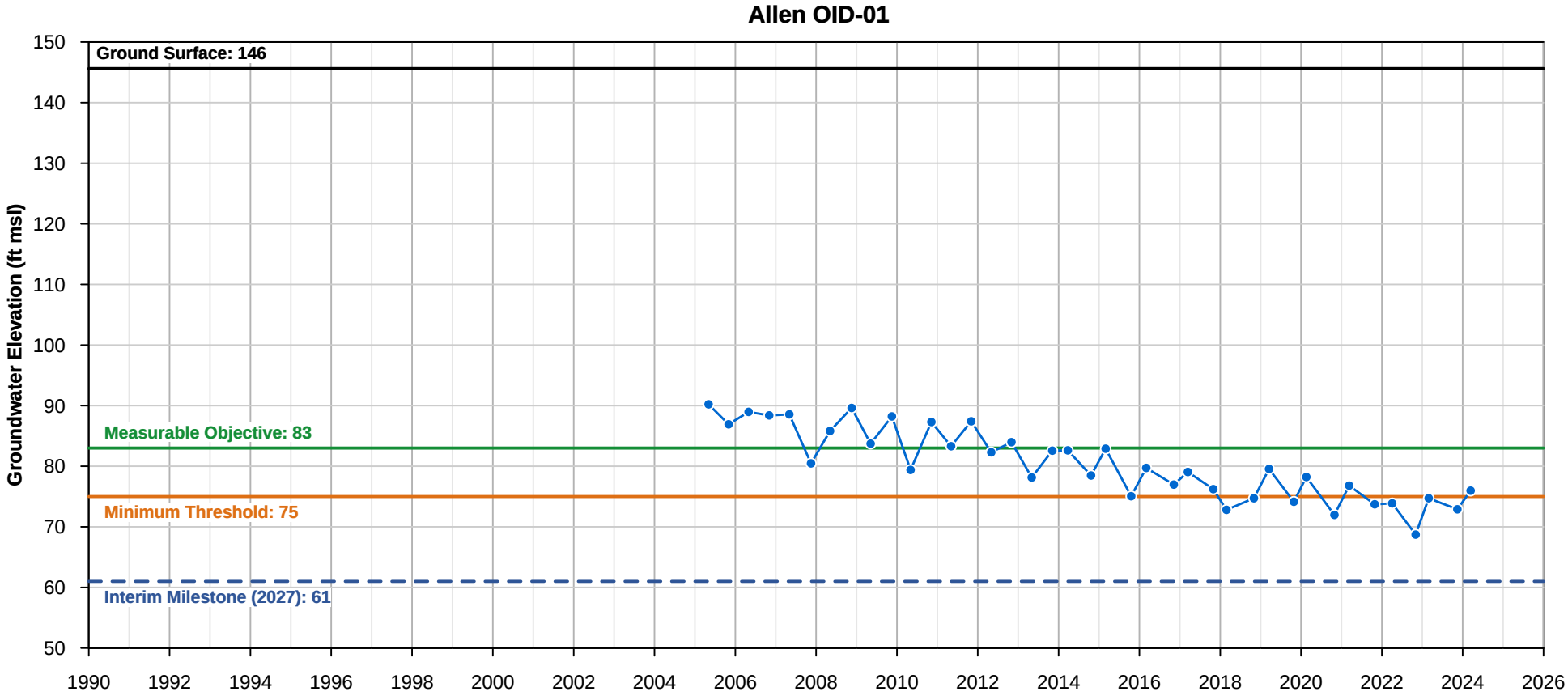




Well Information

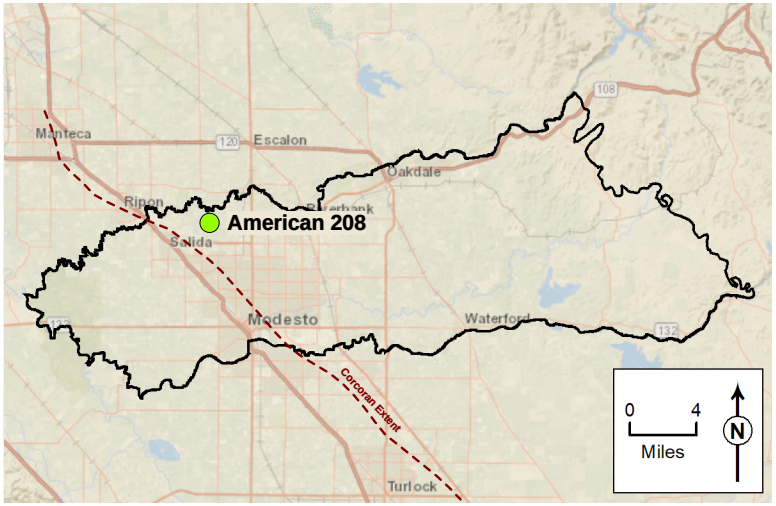
Site Code:	377602N1208849W001
Local Well Name:	Allen OID-01
State Well Name:	02S10E16M001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	4430
Latitude:	37.7599
Longitude:	-120.885
Well Depth (feet bgs):	415
Top Perforation (feet bgs):	0
Bottom Perforation (feet bgs):	120
Ground Surface Elevation:	145.62
Reference Point Elevation:	145.72
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

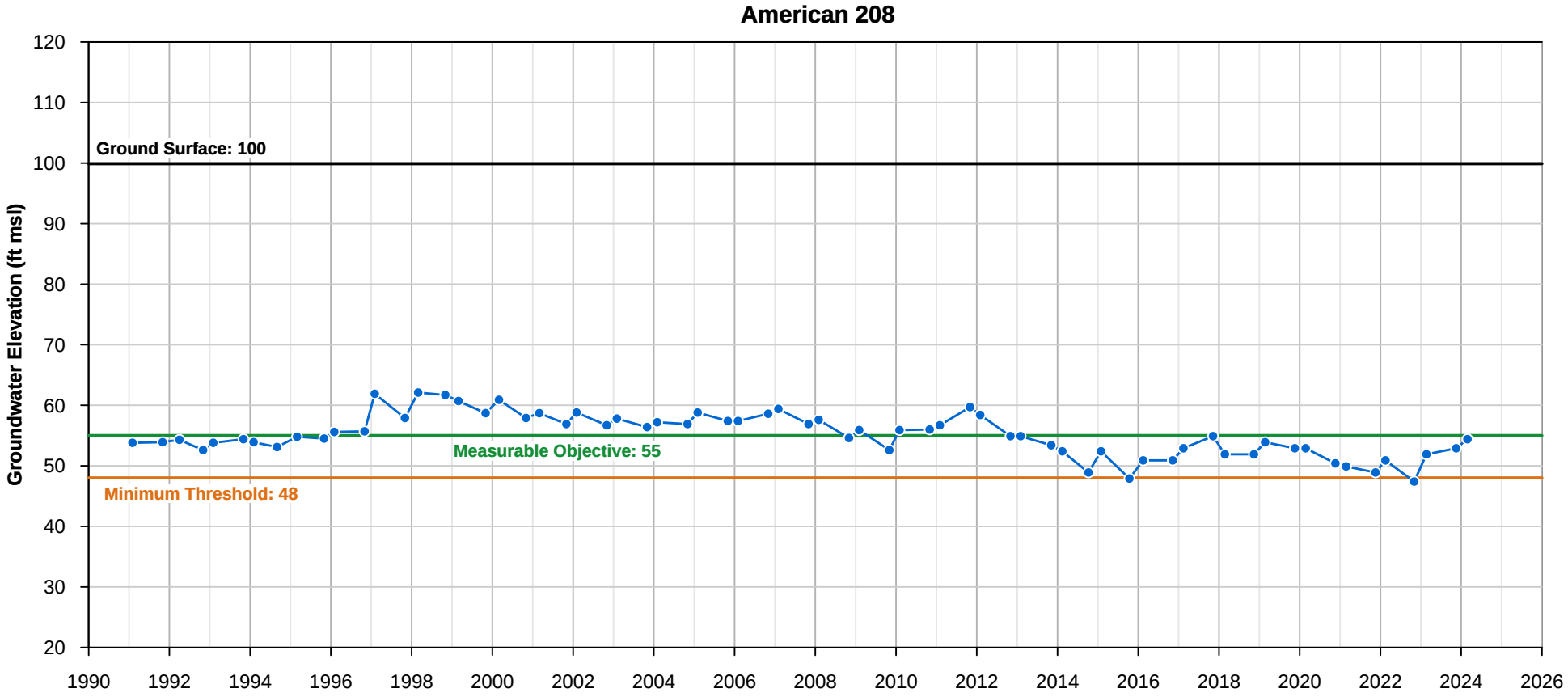




Well Information

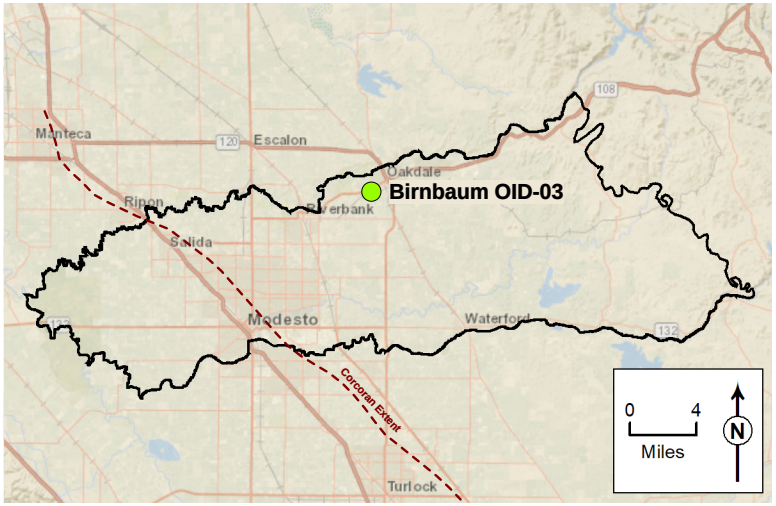
Site Code:	377280N1210413W001
Local Well Name:	American 208
State Well Name:	02S08E25P001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3723
Latitude:	37.7281
Longitude:	-121.041
Well Depth (feet bgs):	320
Top Perforation (feet bgs):	79
Bottom Perforation (feet bgs):	272
Ground Surface Elevation:	99.9
Reference Point Elevation:	99.9
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

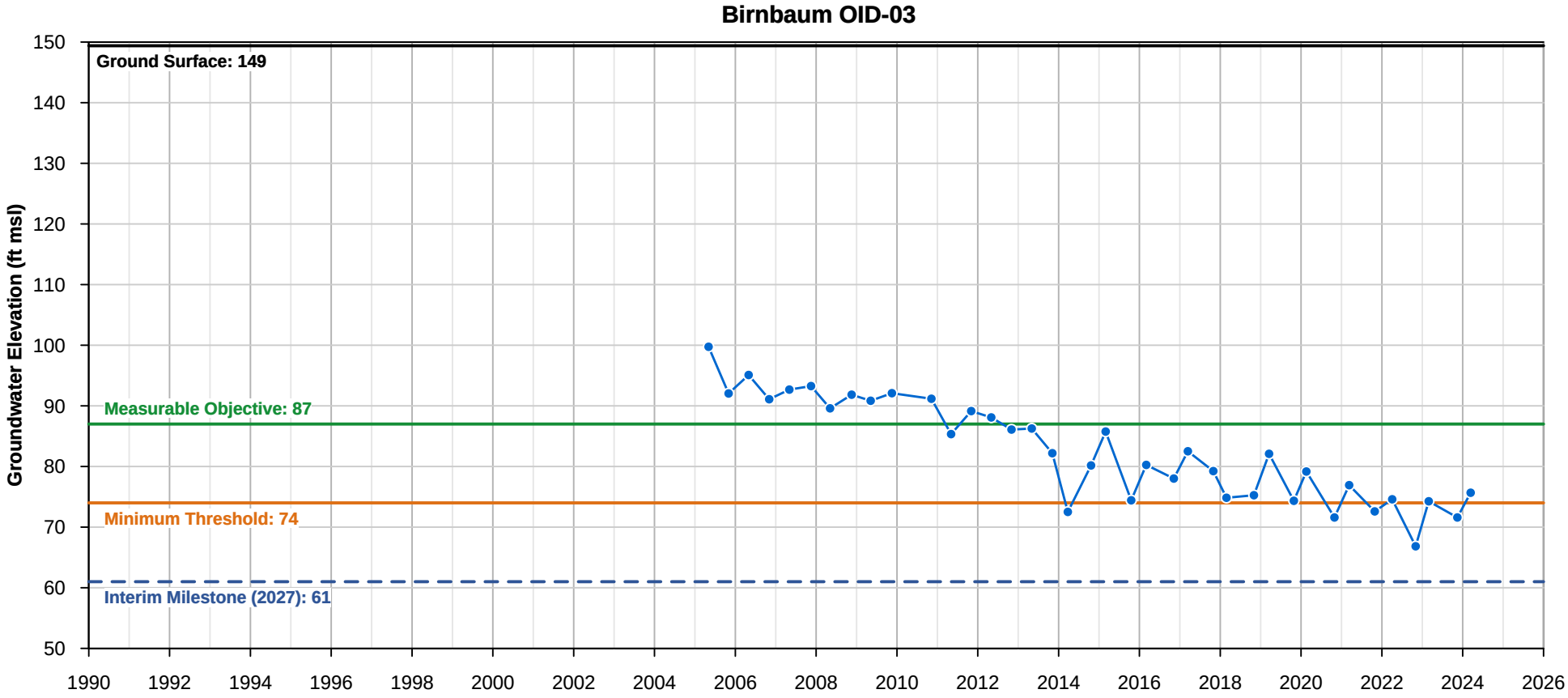




Well Information

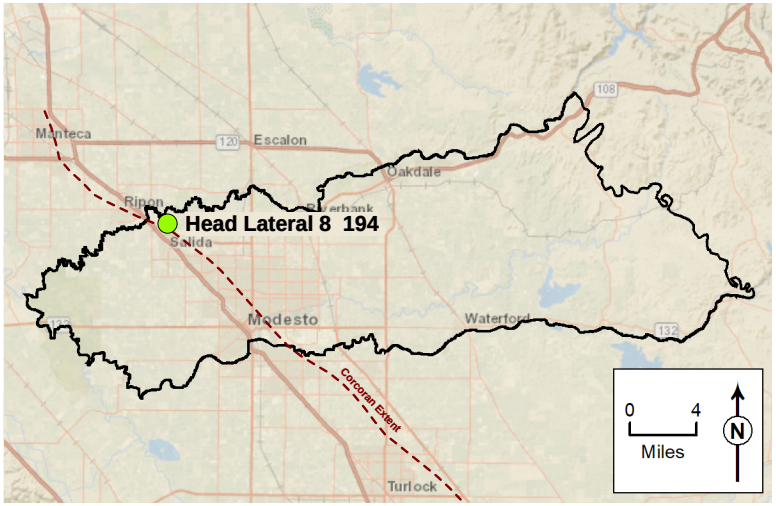
Site Code:	377560N1208643W001
Local Well Name:	Birnbaum OID-03
State Well Name:	02S10E15N001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	4429
Latitude:	37.7559
Longitude:	-120.864
Well Depth (feet bgs):	293
Top Perforation (feet bgs):	55
Bottom Perforation (feet bgs):	293
Ground Surface Elevation:	149.39
Reference Point Elevation:	149.84
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

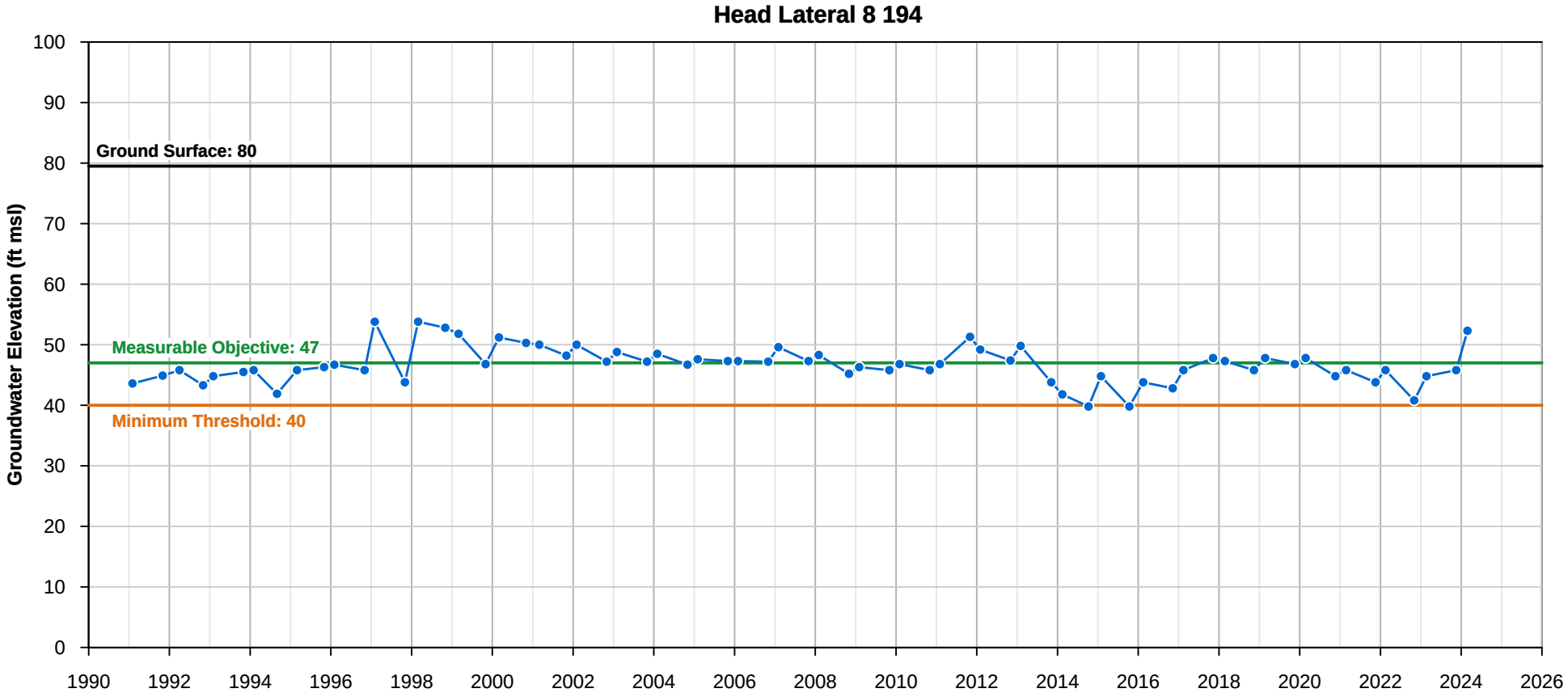




Well Information

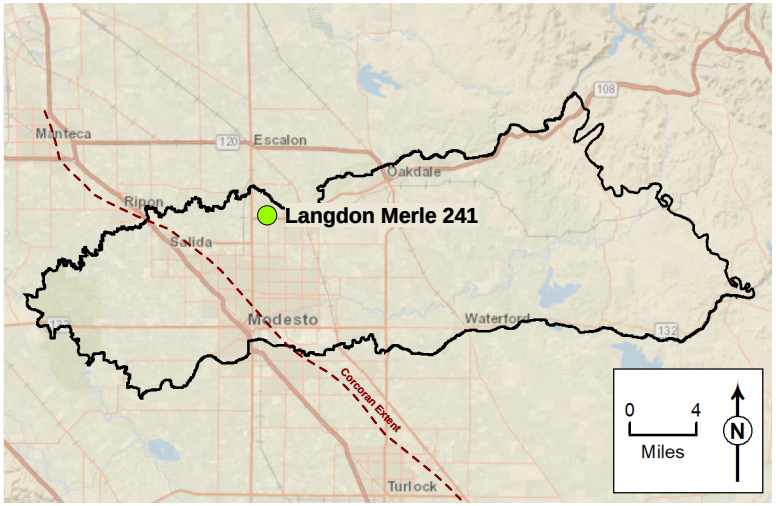
Site Code:	377271N1210868W001
Local Well Name:	Head Lateral 8 194
State Well Name:	02S08E27N001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	38870
Latitude:	37.7272
Longitude:	-121.087
Well Depth (feet bgs):	302
Top Perforation (feet bgs):	148
Bottom Perforation (feet bgs):	211
Ground Surface Elevation:	79.5
Reference Point Elevation:	79.8
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

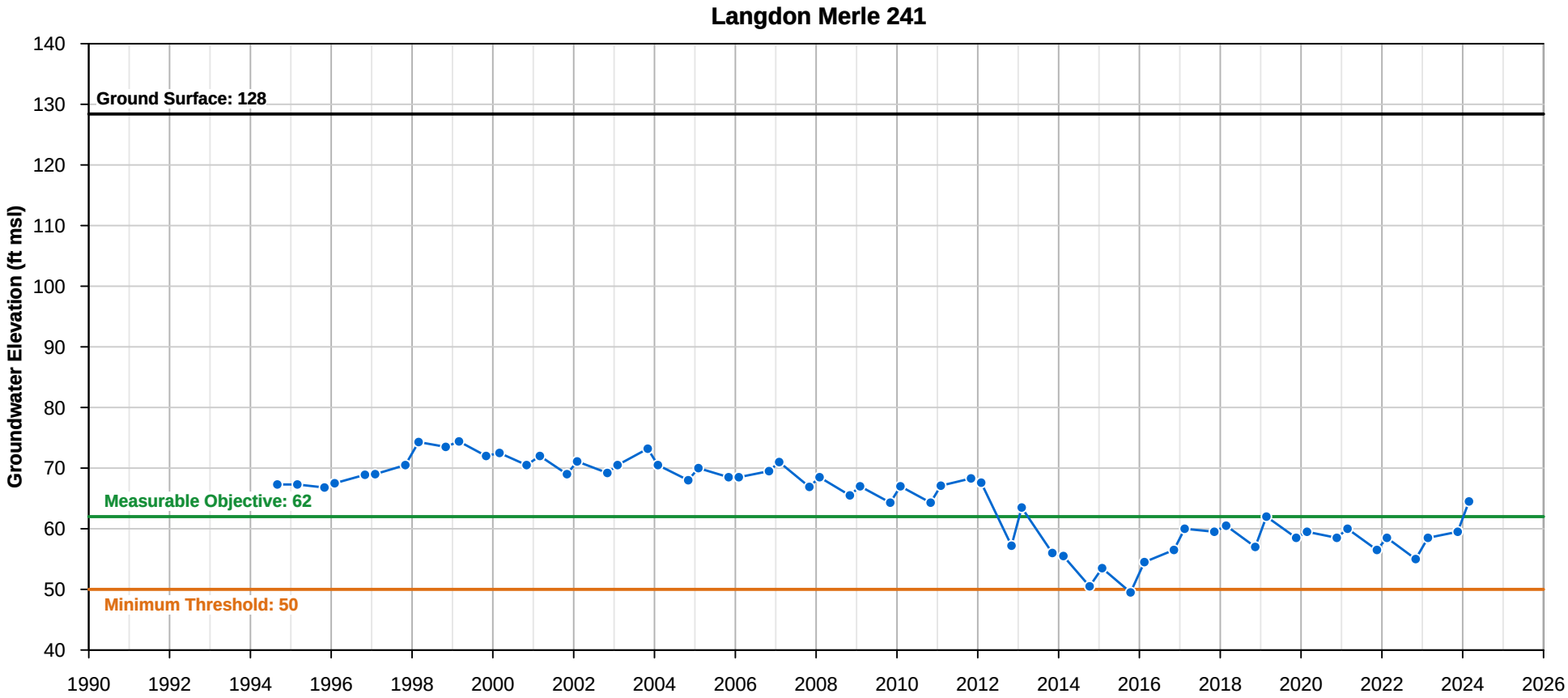




Well Information

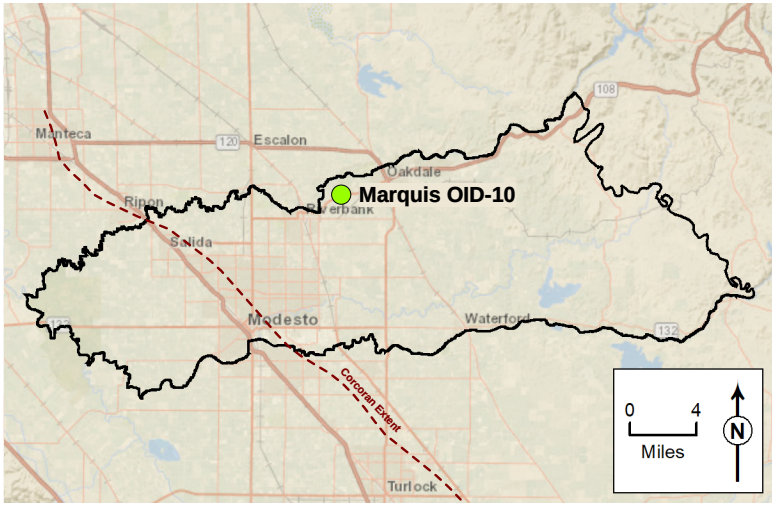
Site Code:	377346N1209774W001
Local Well Name:	Langdon Merle 241
State Well Name:	02S09E28H001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3876
Latitude:	37.7349
Longitude:	-120.978
Well Depth (feet bgs):	595
Top Perforation (feet bgs):	160
Bottom Perforation (feet bgs):	300
Ground Surface Elevation:	128.4
Reference Point Elevation:	128.5
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

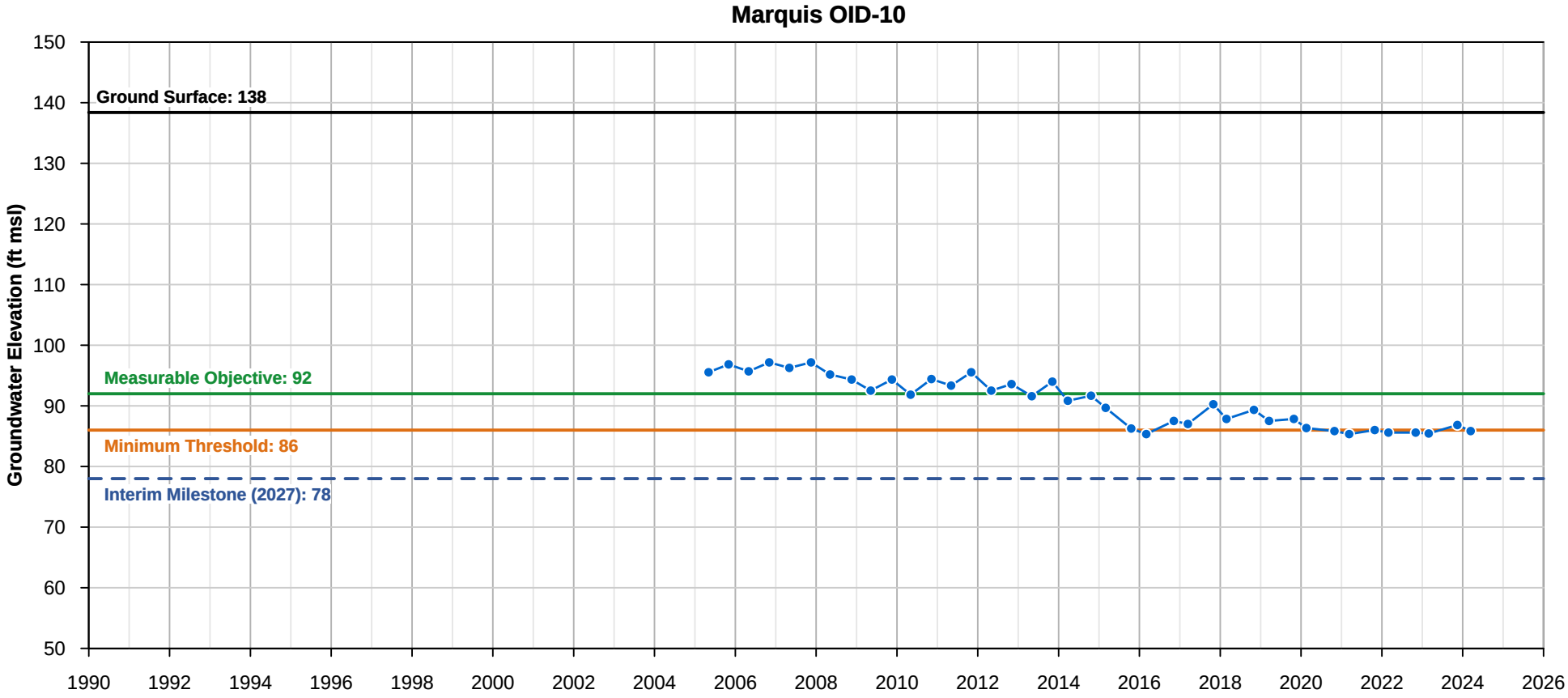




Well Information

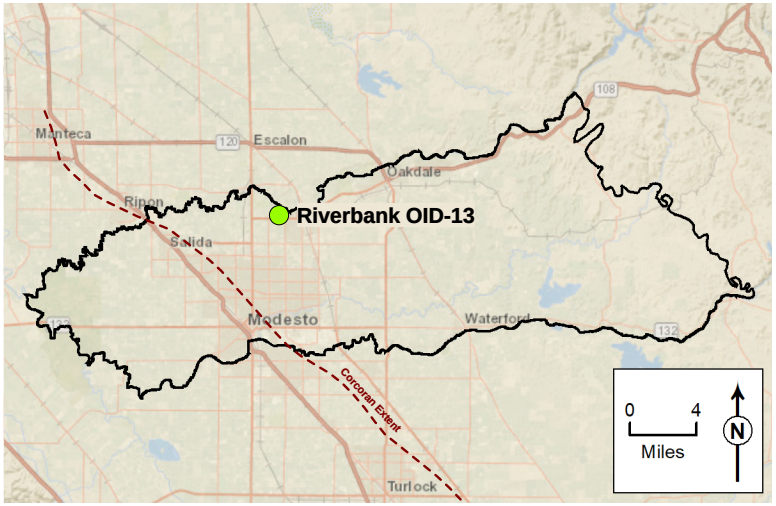
Site Code:	377530N1208960W001
Local Well Name:	Marquis OID-10
State Well Name:	02S10E20C001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	29436
Latitude:	37.7532
Longitude:	-120.897
Well Depth (feet bgs):	125
Top Perforation (feet bgs):	27
Bottom Perforation (feet bgs):	125
Ground Surface Elevation:	138.39
Reference Point Elevation:	138.84
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

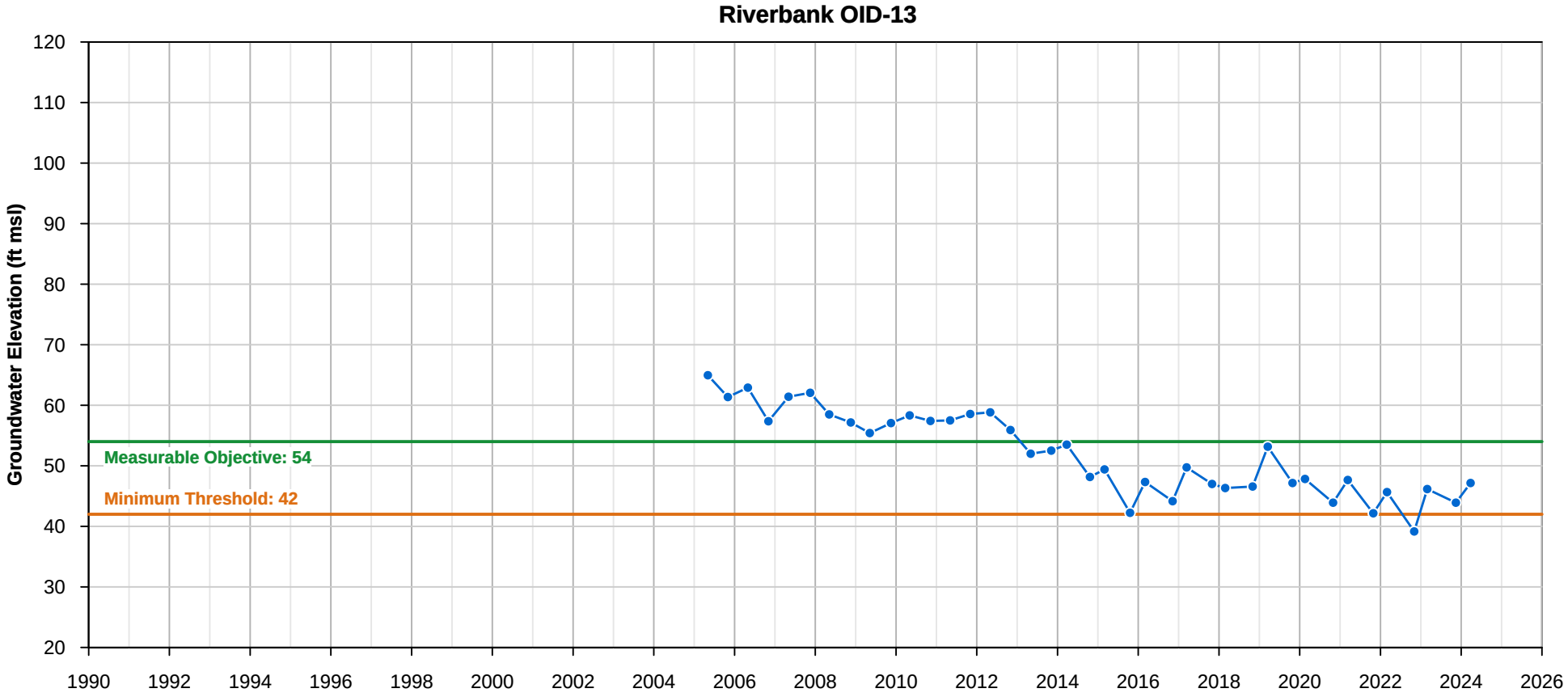




Well Information

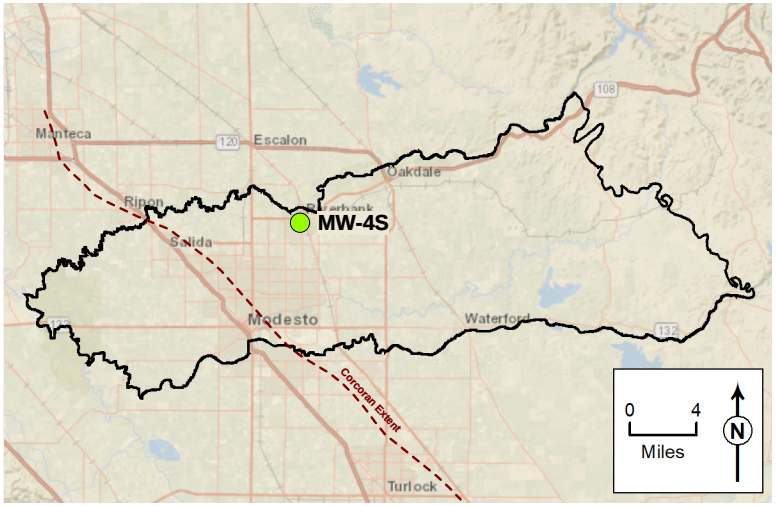
Site Code:	377351N1209648W001
Local Well Name:	Riverbank OID-13
State Well Name:	02S09E27G001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	49463
Latitude:	37.7351
Longitude:	-120.965
Well Depth (feet bgs):	560
Top Perforation (feet bgs):	200
Bottom Perforation (feet bgs):	550
Ground Surface Elevation:	132.32
Reference Point Elevation:	134.16
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

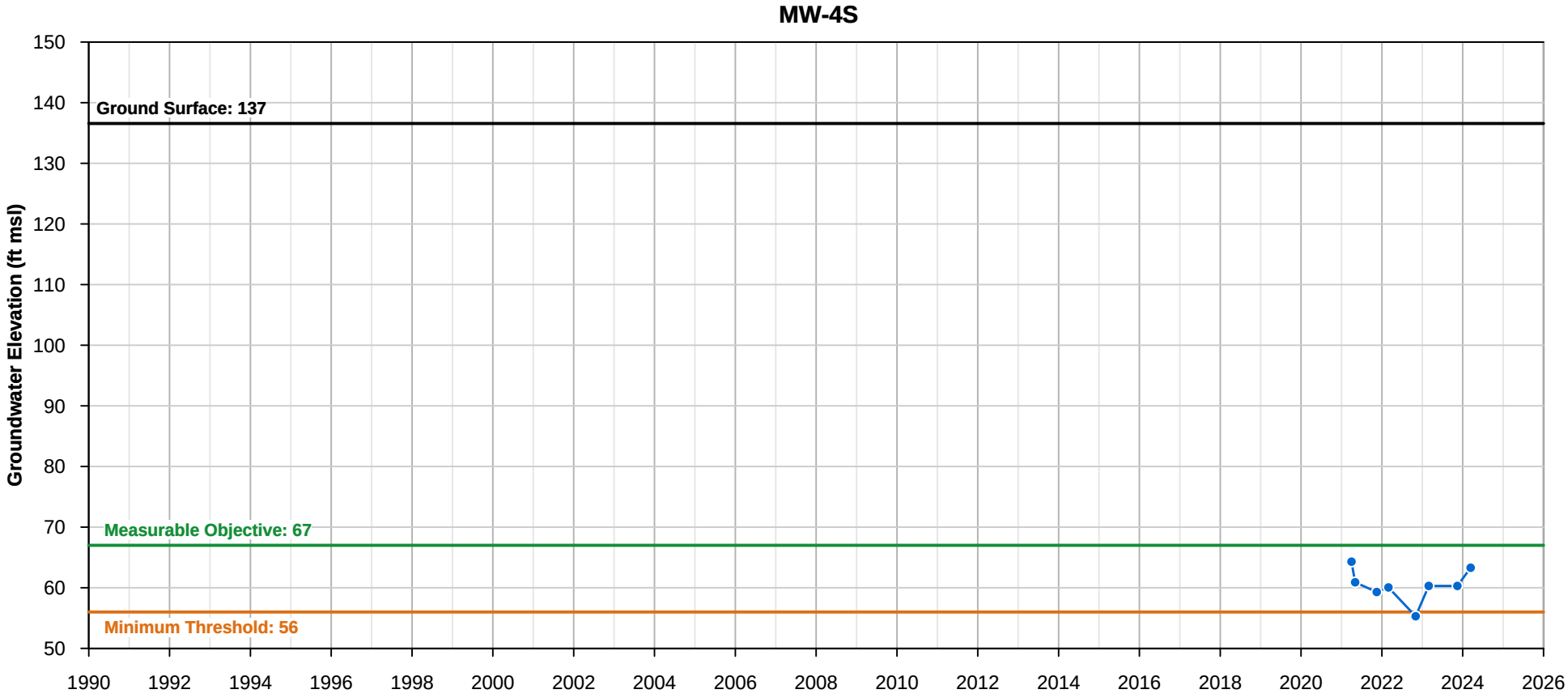




Well Information

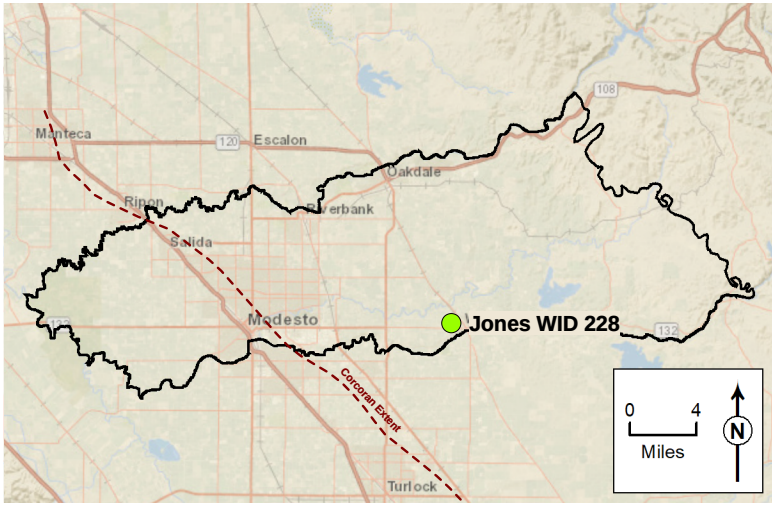
Site Code:	377285N1209415W001
Local Well Name:	MW-4S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57392
Latitude:	37.7286
Longitude:	-120.942
Well Depth (feet bgs):	165
Top Perforation (feet bgs):	140
Bottom Perforation (feet bgs):	160
Ground Surface Elevation:	136.569
Reference Point Elevation:	136.3
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

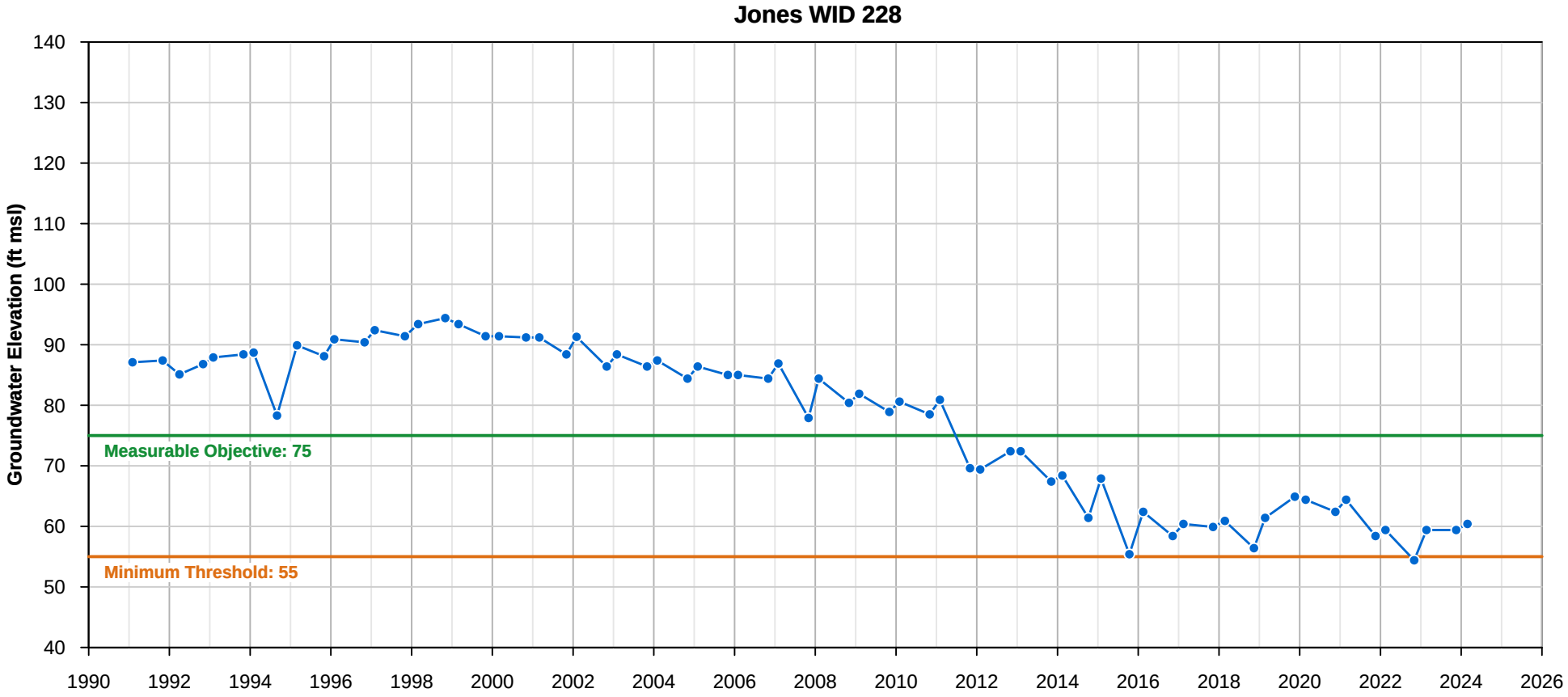




Well Information

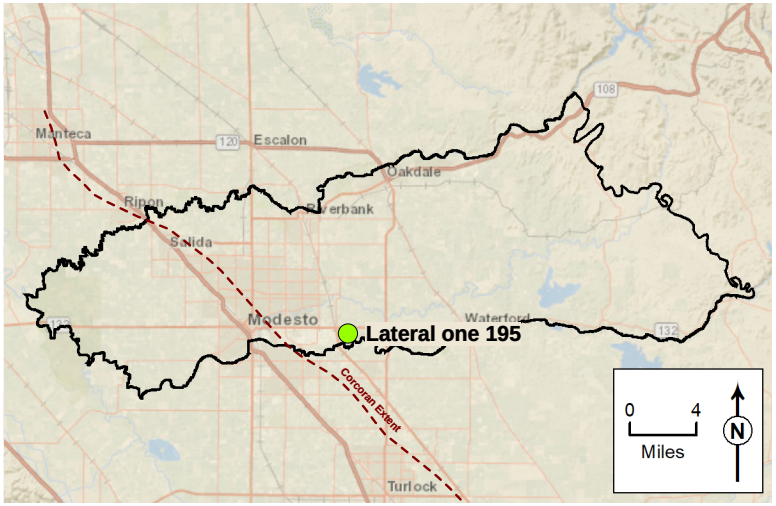
Site Code:	376416N1207760W001
Local Well Name:	Jones WID 228
State Well Name:	03S11E29J001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	38872
Latitude:	37.6418
Longitude:	-120.776
Well Depth (feet bgs):	324
Top Perforation (feet bgs):	188
Bottom Perforation (feet bgs):	280
Ground Surface Elevation:	166.4
Reference Point Elevation:	166.4
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

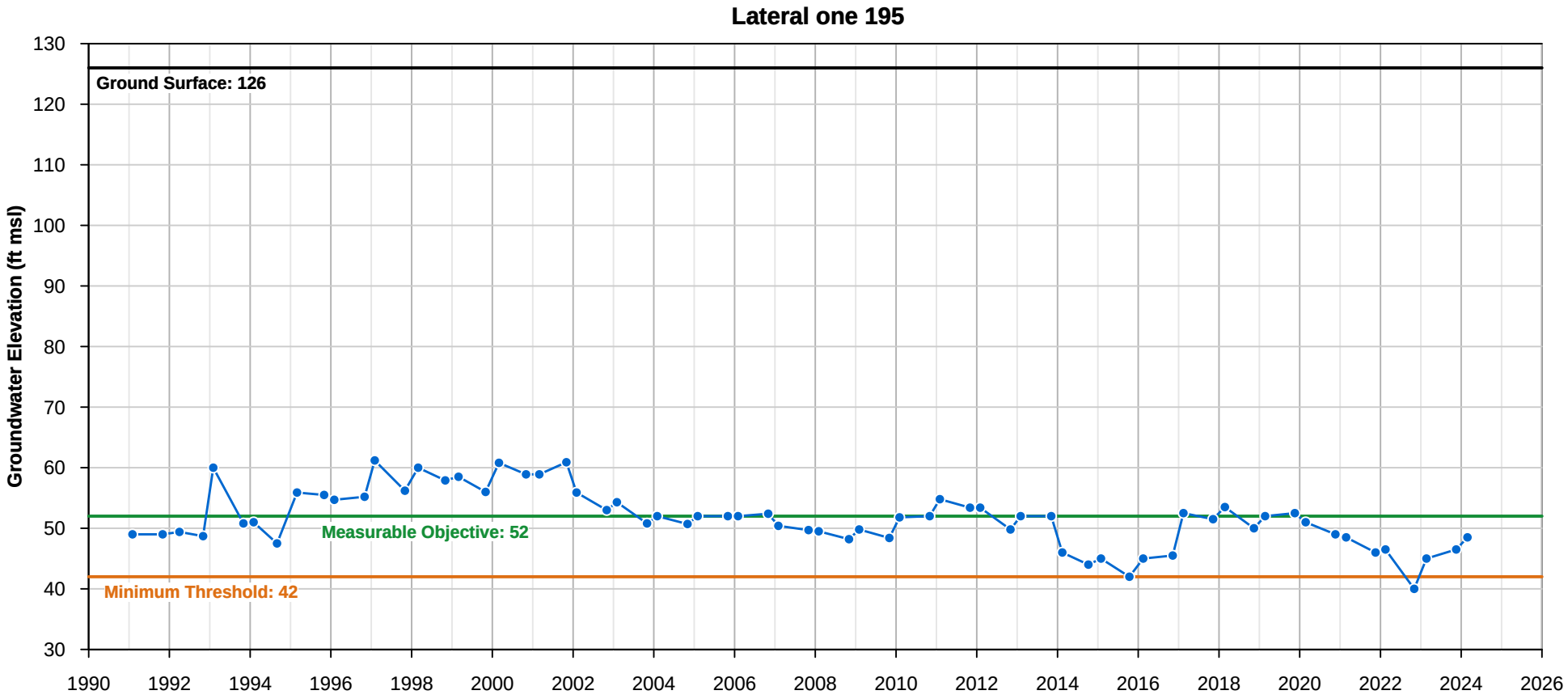




Well Information

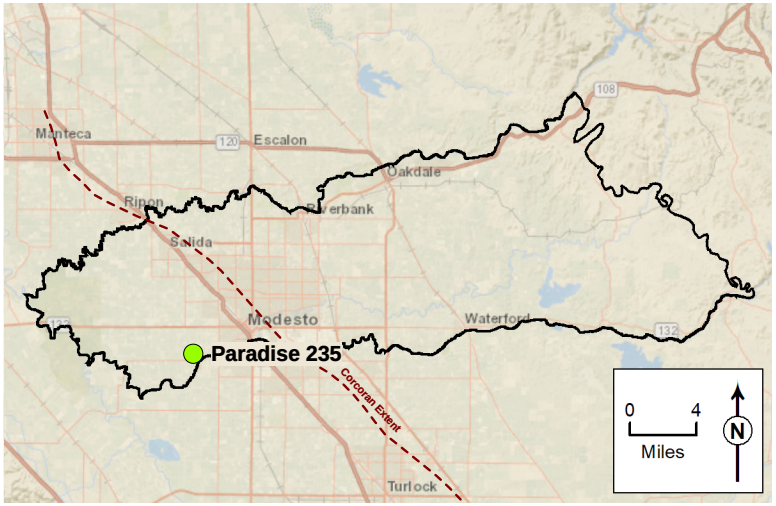
Site Code:	376324N1208891W001
Local Well Name:	Lateral one 195
State Well Name:	03S10E32G001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3877
Latitude:	37.6325
Longitude:	-120.889
Well Depth (feet bgs):	260
Top Perforation (feet bgs):	140.5
Bottom Perforation (feet bgs):	210
Ground Surface Elevation:	126
Reference Point Elevation:	126
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

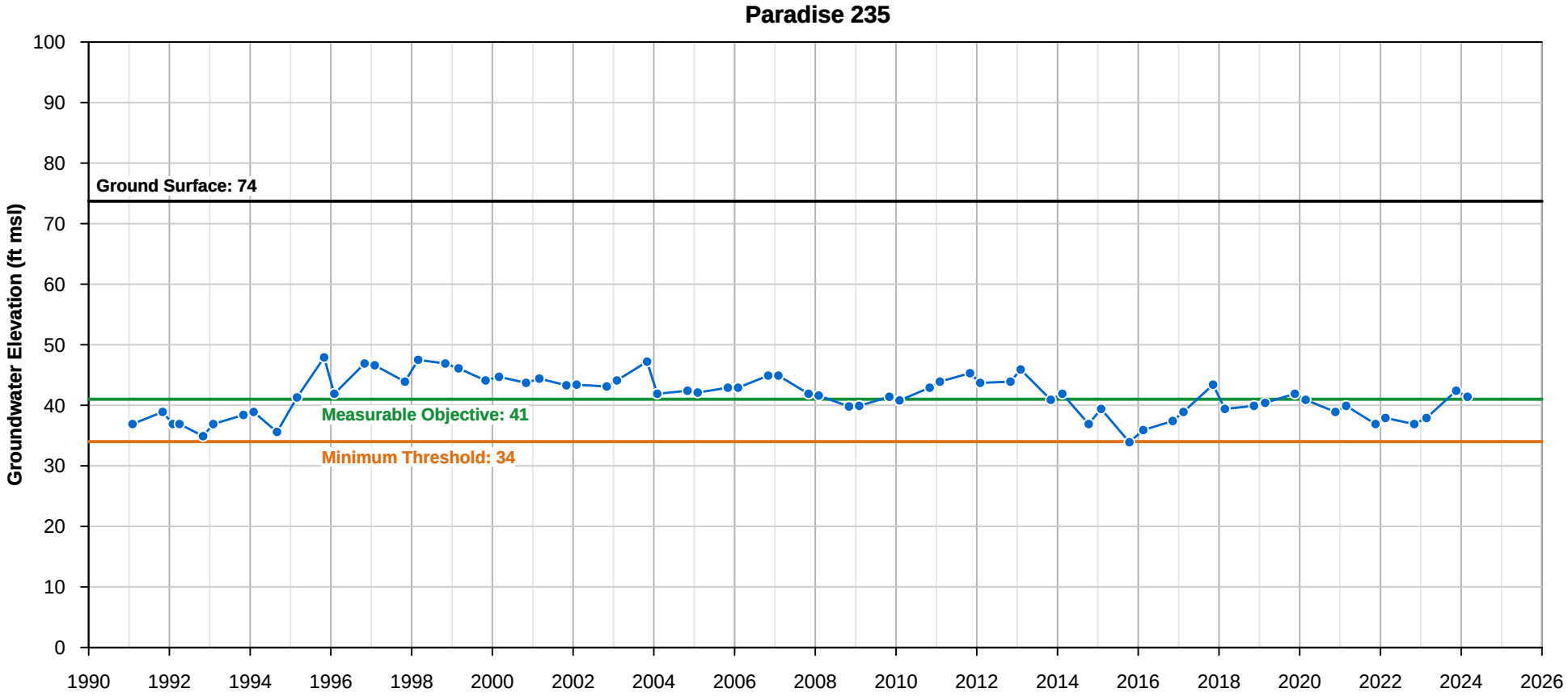




Well Information

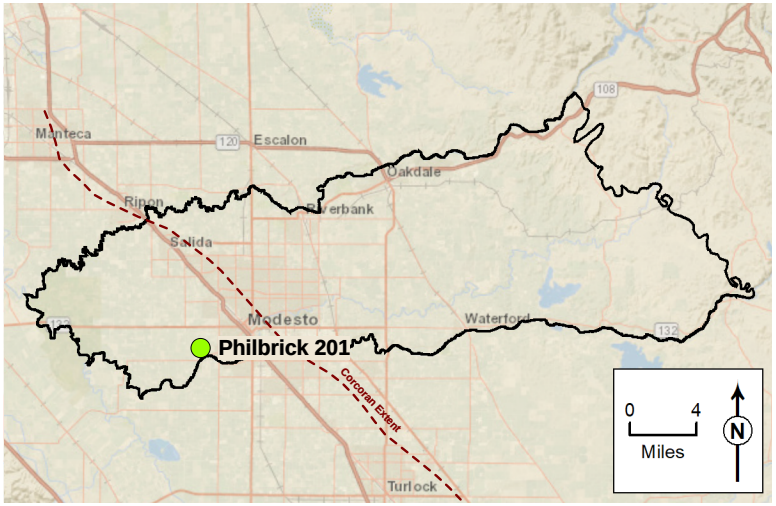
Site Code:	376141N1210577W001
Local Well Name:	Paradise 235
State Well Name:	04S08E02L001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	2151
Latitude:	37.6142
Longitude:	-121.058
Well Depth (feet bgs):	258
Top Perforation (feet bgs):	96
Bottom Perforation (feet bgs):	132
Ground Surface Elevation:	73.7
Reference Point Elevation:	73.9
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

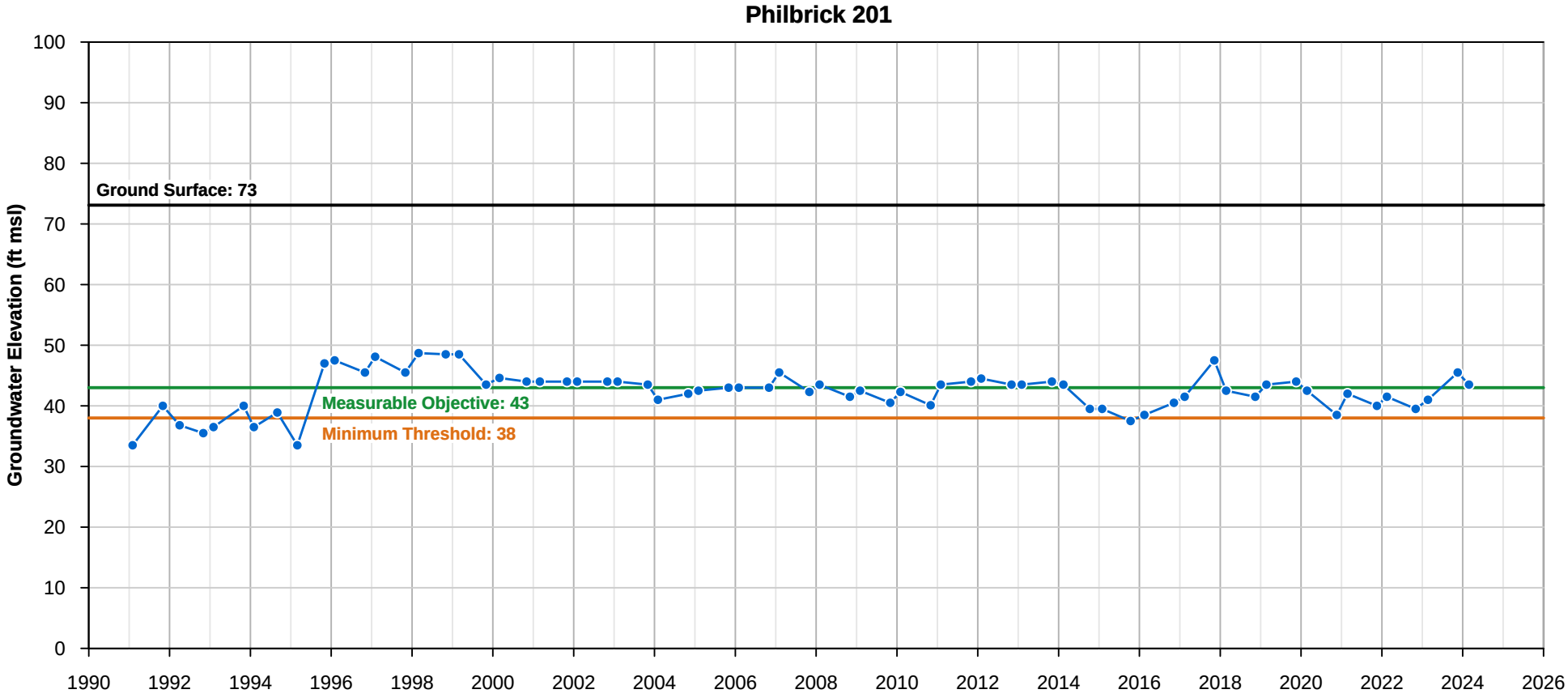




Well Information

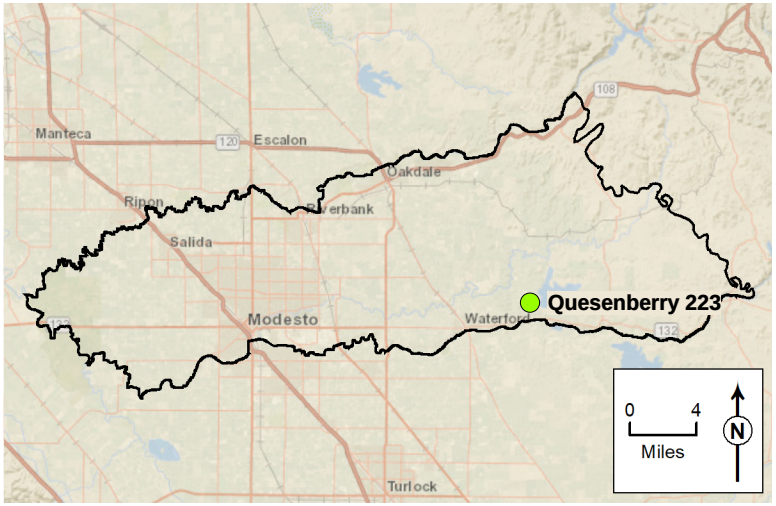
Site Code:	376191N1210499W001
Local Well Name:	Philbrick 201
State Well Name:	04S08E02H001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	26591
Latitude:	37.6192
Longitude:	-121.05
Well Depth (feet bgs):	88
Top Perforation (feet bgs):	58
Bottom Perforation (feet bgs):	74
Ground Surface Elevation:	73.1
Reference Point Elevation:	73.5
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

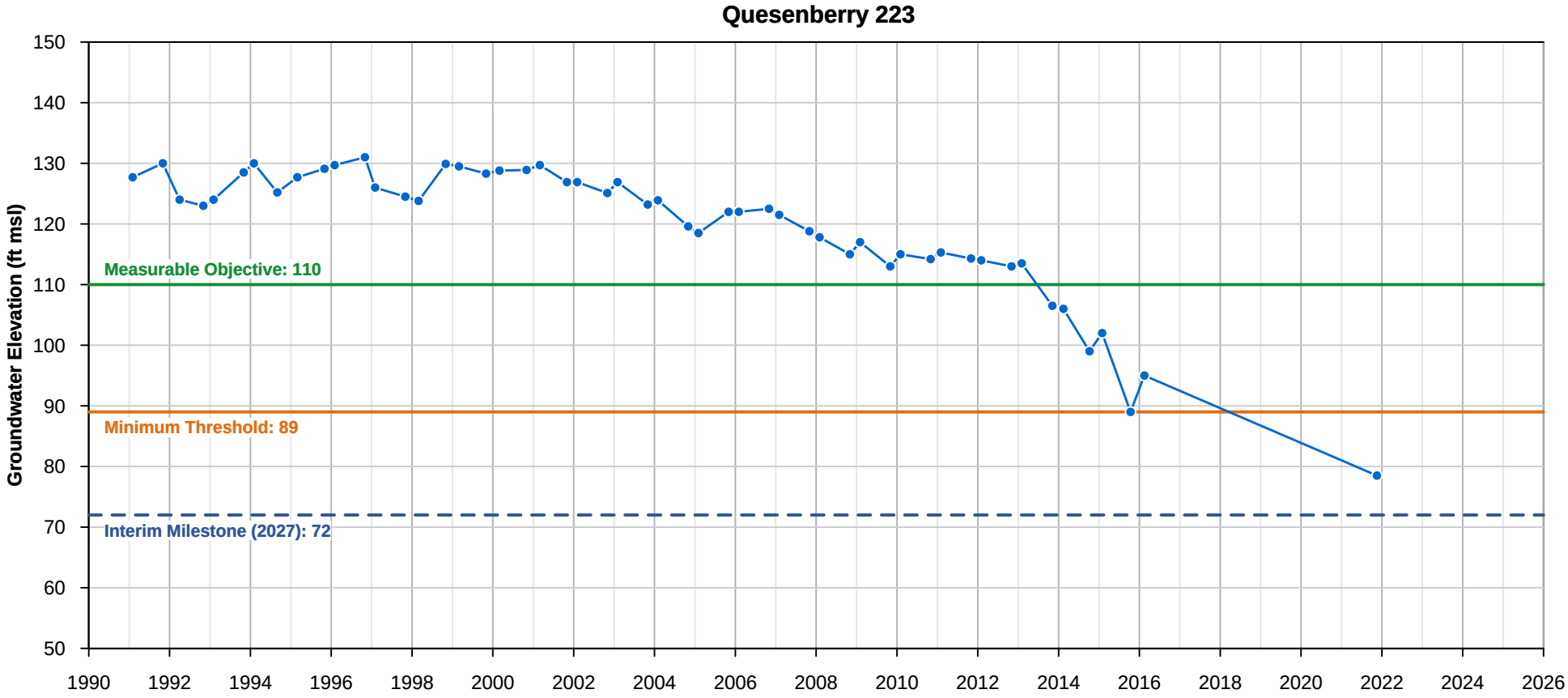




Well Information

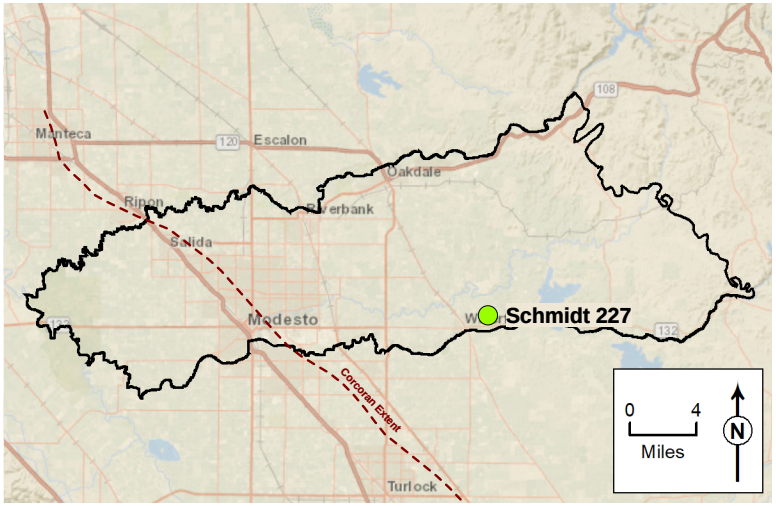
Site Code:	376596N1206896W001
Local Well Name:	Quesenberry 223
State Well Name:	03S12E19G001M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	27424
Latitude:	37.6598
Longitude:	-120.69
Well Depth (feet bgs):	380
Top Perforation (feet bgs):	168
Bottom Perforation (feet bgs):	208
Ground Surface Elevation:	197
Reference Point Elevation:	197
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

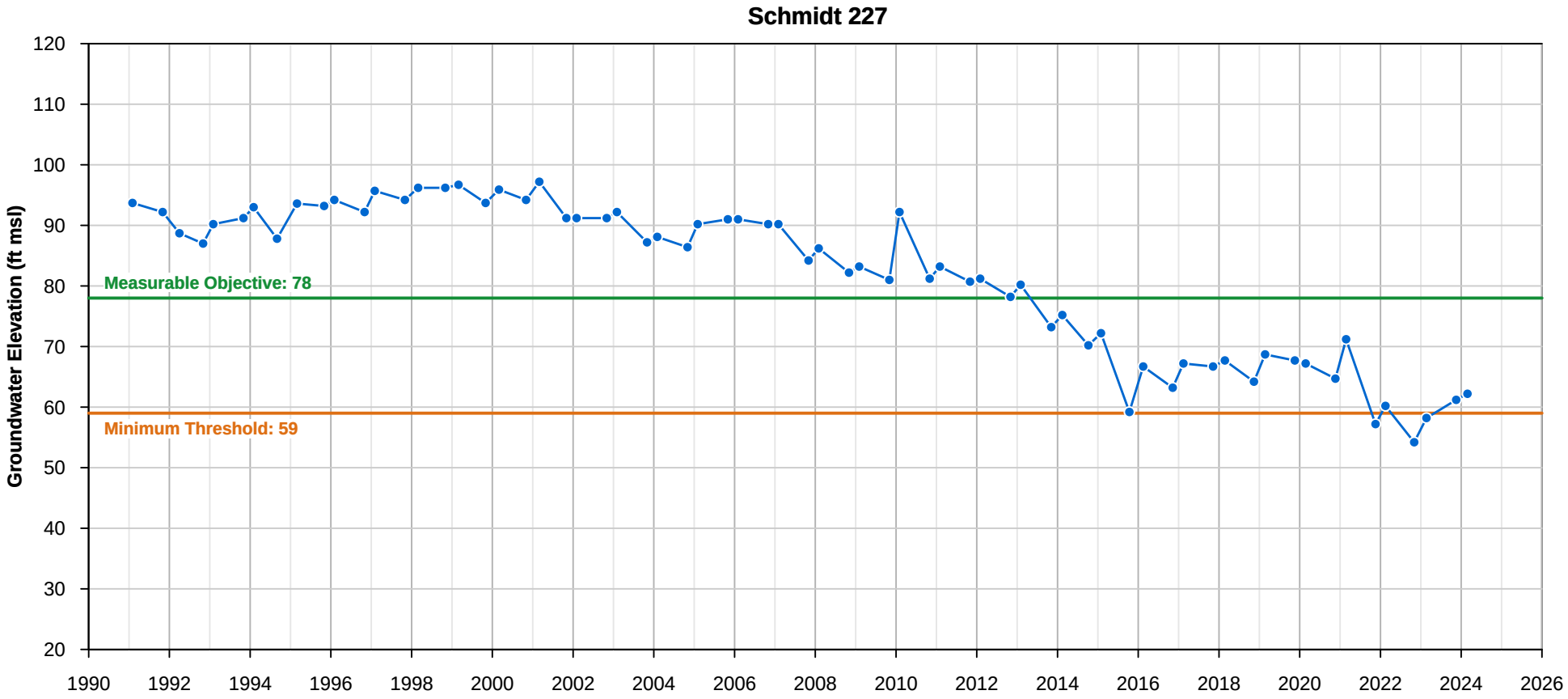




Well Information

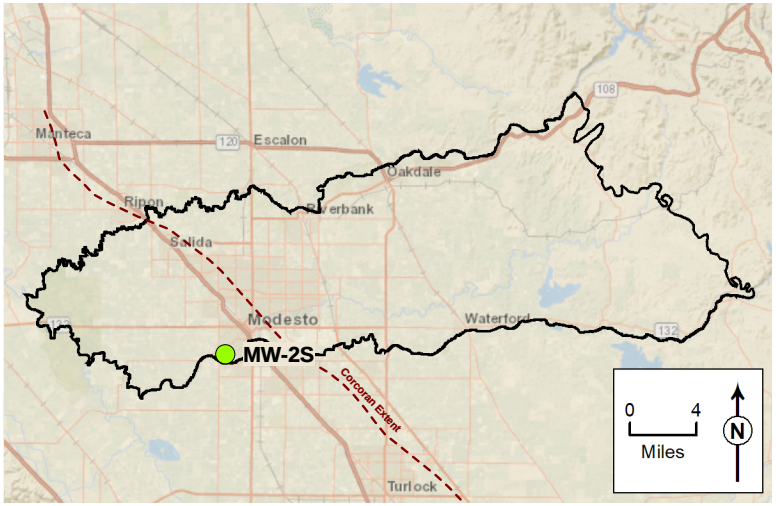
Site Code:	376485N1207360W001
Local Well Name:	Schmidt 227
State Well Name:	03S11E27G003M
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	3897
Latitude:	37.6487
Longitude:	-120.736
Well Depth (feet bgs):	248
Top Perforation (feet bgs):	113
Bottom Perforation (feet bgs):	153
Ground Surface Elevation:	192.3
Reference Point Elevation:	192.2
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

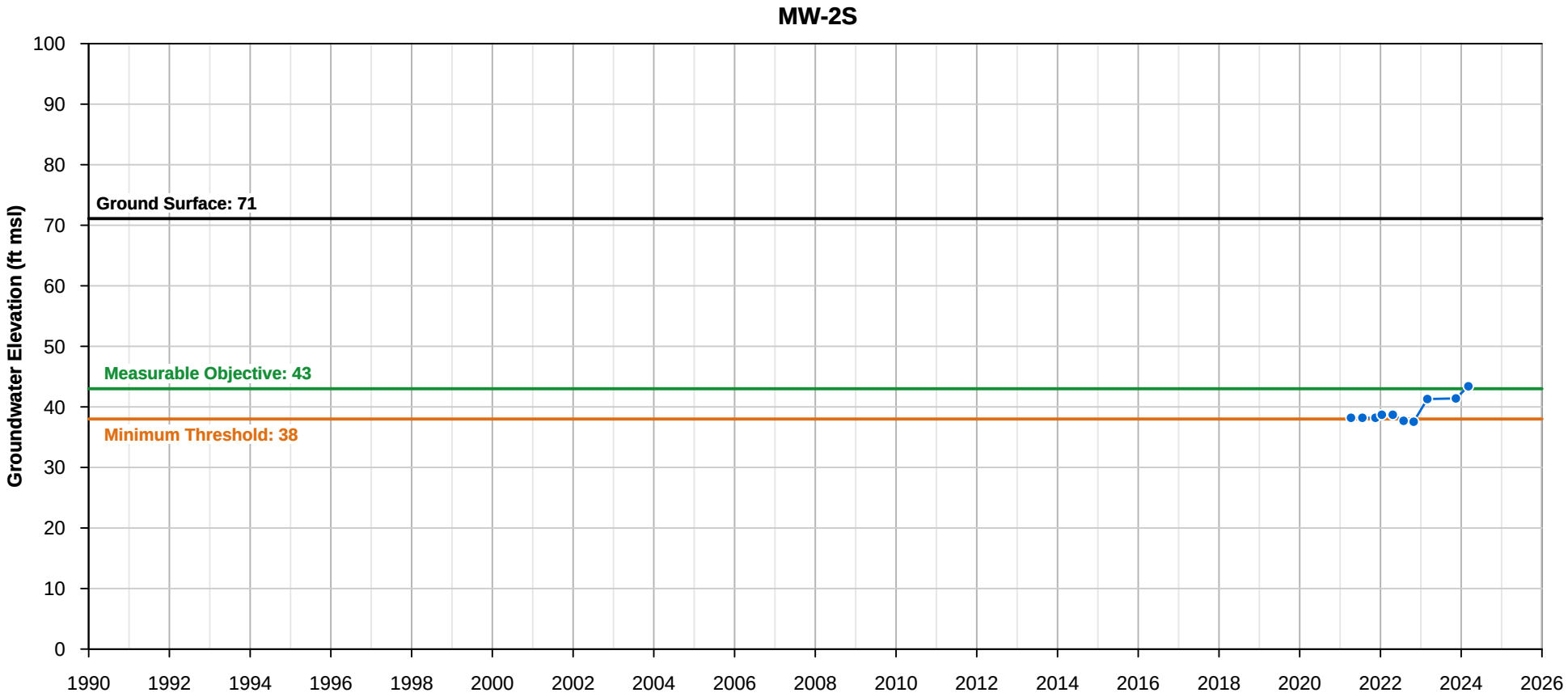




Well Information

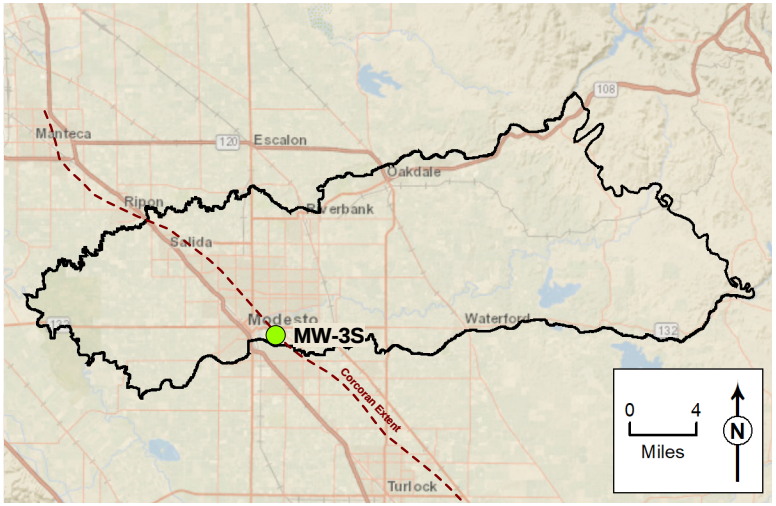
Site Code:	376138N1210234W001
Local Well Name:	MW-2S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Western Upper
Station ID:	57388
Latitude:	37.6139
Longitude:	-121.023
Well Depth (feet bgs):	135
Top Perforation (feet bgs):	110
Bottom Perforation (feet bgs):	130
Ground Surface Elevation:	71.1
Reference Point Elevation:	70.7
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

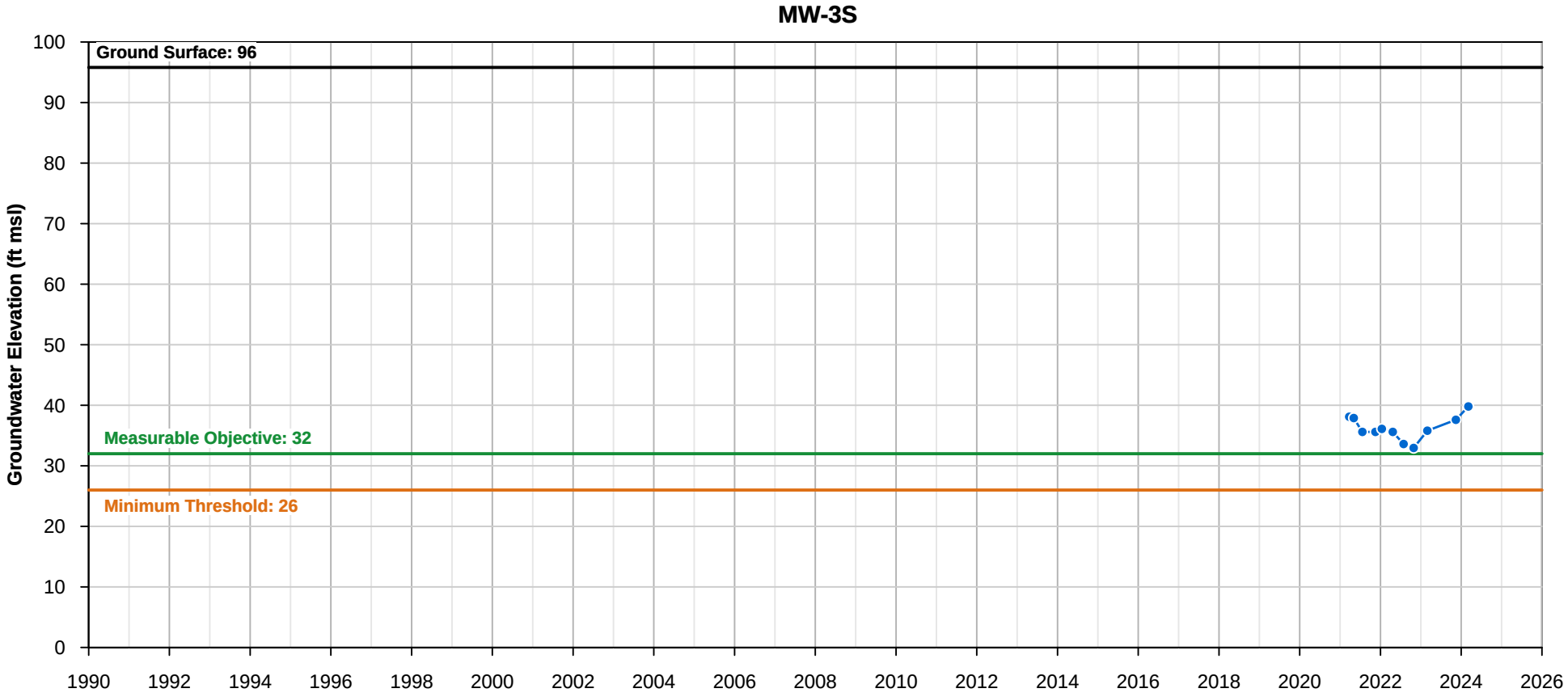




Well Information

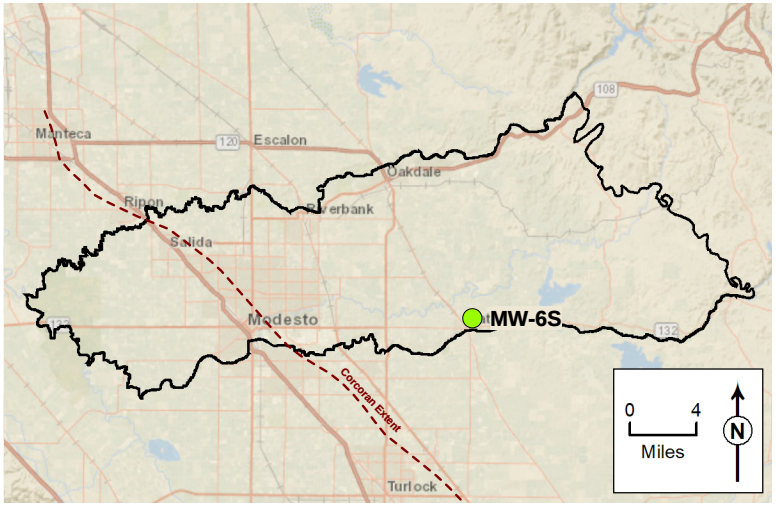
Site Code:	376307N1209676W001
Local Well Name:	MW-3S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57390
Latitude:	37.6307
Longitude:	-120.968
Well Depth (feet bgs):	161
Top Perforation (feet bgs):	136
Bottom Perforation (feet bgs):	156
Ground Surface Elevation:	95.8
Reference Point Elevation:	95.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

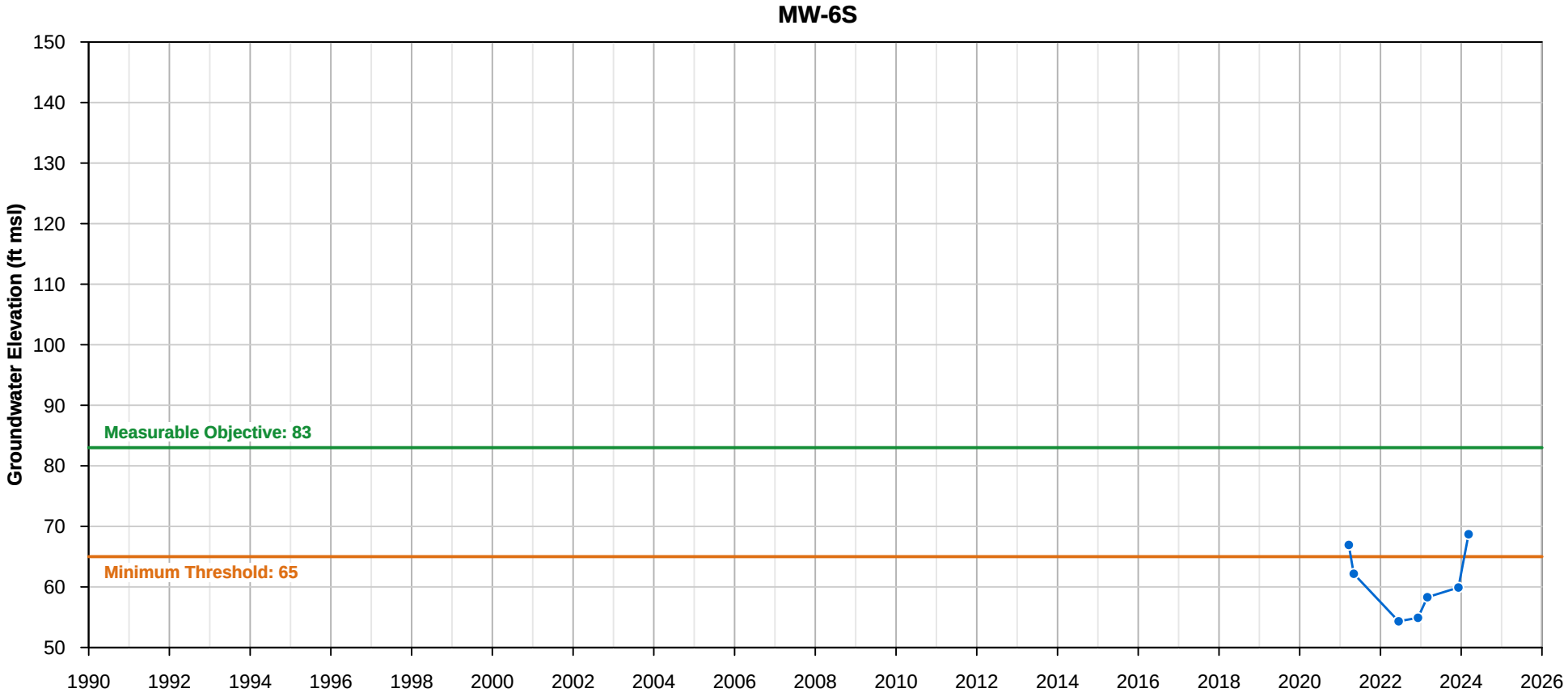




Well Information

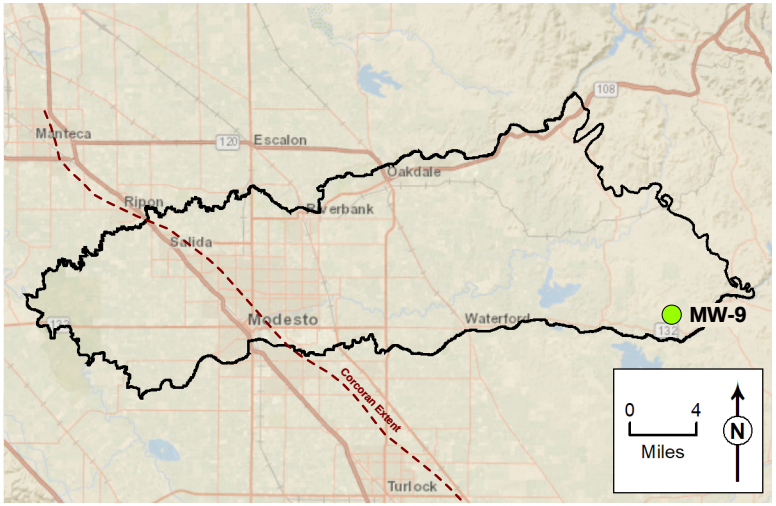
Site Code:	376461N1207525W001
Local Well Name:	MW-6S
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57394
Latitude:	37.6461
Longitude:	-120.753
Well Depth (feet bgs):	179
Top Perforation (feet bgs):	154
Bottom Perforation (feet bgs):	174
Ground Surface Elevation:	171.3
Reference Point Elevation:	170.9
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence

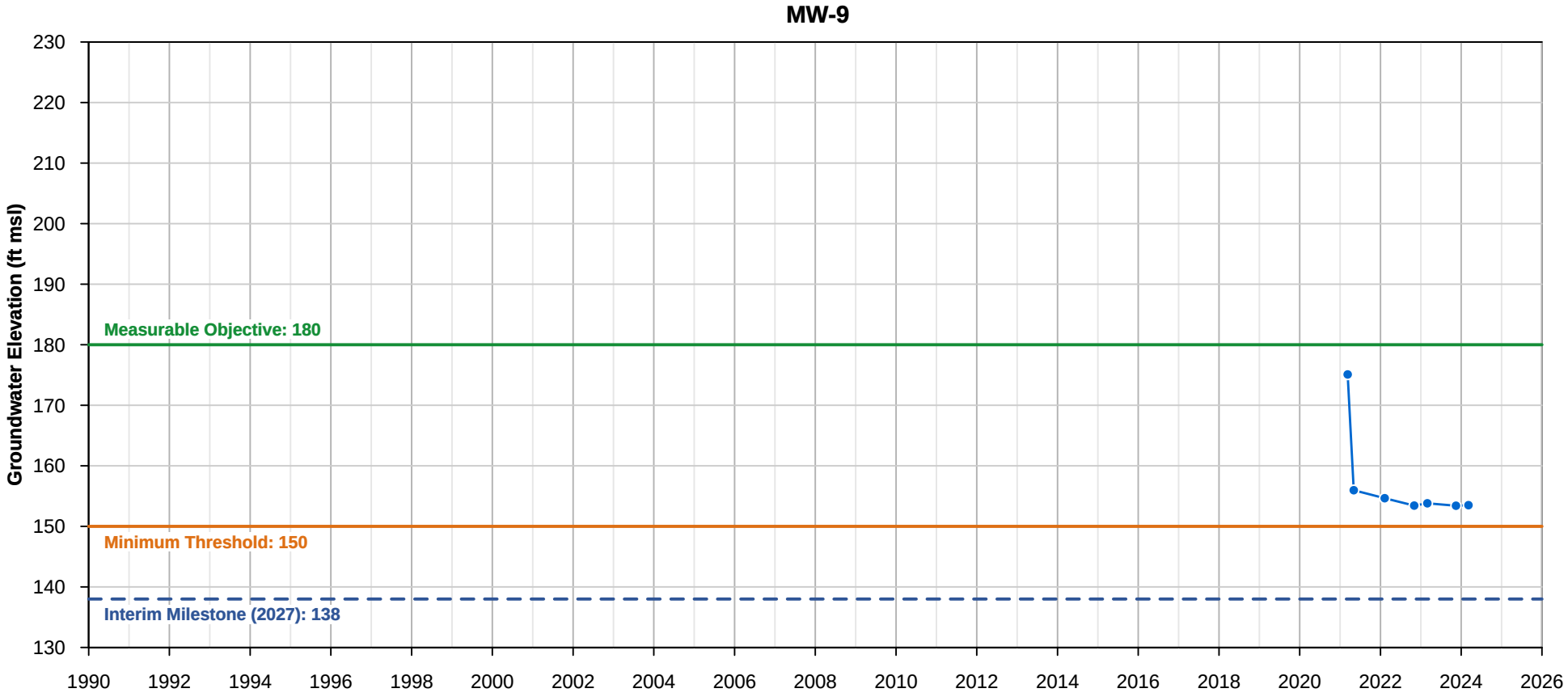




Well Information

Site Code:	376495N1205351W001
Local Well Name:	MW-9
State Well Name:	
Montoring Network Type:	SGMA Representative
Principal Aquifer:	Eastern
Station ID:	57397
Latitude:	37.6495
Longitude:	-120.535
Well Depth (feet bgs):	365
Top Perforation (feet bgs):	340
Bottom Perforation (feet bgs):	360
Ground Surface Elevation:	244.5
Reference Point Elevation:	247.6
Sustainability Indicators:	Groundwater Levels, Groundwater Storage, Interconnected Surface Waters, Land Subsidence





APPENDIX C

Water Quality Monitoring Network

Water Year 2024

Appendix C Groundwater Quality Monitoring Network

								Arsenic			DBCP			Nitrate as N			PCE			TCP			TDS			Uranium		
Well ID	Latitude	Longitude	Principal Aquifer	Well Type	Dataset Name[1]	Alternative Well ID	Alternative Well ID 2	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (pCi/L)	Date
5000013-001	37.78530	-120.81297	Eastern	Municipal	DHS	5000013-001	WELL 01	0			0			2.7	3.80	3/8/2019	0						220					
5000013-002	37.78609	-120.81264	Eastern	Municipal	DHS	5000013-002	WELL 02- 2709 OAKHURST	2.8			0			1.6	1.60	3/25/2020							150					
5000014-001	37.78058	-120.79294	Eastern	Municipal	DHS	5000014-001	WELL#1	0			0			6.5	8.00	2/14/2017							280					
5000014-002	37.74884	-120.88009	Eastern	Municipal	DHS	5000014-002	WELL#2	0			0				3.00	3/8/2019							140					
5000015-002	37.77225	-120.82033	Eastern	Municipal	DHS	5000015-002	WELL #1 - SOUTH	0			0			2	5.67	5/3/2010	0						160					
5000016-001	37.74986	-120.87875	Eastern	Municipal	DHS	5000016-001	WELL#2	0			0			4.7	5.76	11/1/2010				0			280					
5000017-001	37.73708	-120.95675	Eastern	Municipal	DHS	5000017-001	ARROWOOD (EAST) WELL		3.30	8/8/2022	0	0.00	3/10/2021	0	7.03	5/16/2002		0.00	3/10/2021					609.00	12/16/2014			
5000017-002	37.73936	-120.96136	Eastern	Municipal	DHS	5000017-002	PARK RIDGE WEST	2.8			0	0.00	3/10/2021	0	9.35	10/29/2010							290					
5000041-001	37.63766	-121.15292	Western Upper	Municipal	DHS	5000041-001	EAST WELL NEW #02							3.4	7.6	44166												
5000048-002	37.74658	-120.90888	Eastern	Municipal	DHS	5000048-002	NORTH EAST WELL #1							10.4	9.00	7/6/2017												
5000048-003	37.74622	-120.91000	Eastern	Municipal	DHS	5000048-003	WEST #02							12.8	10.90	11/5/2009												
5000049-001	37.77481	-120.82256	Eastern	Municipal	DHS	5000049-001	NORTH WELL							5.9	6.70	6/13/2017												
5000049-002	37.77475	-120.82256	Eastern	Municipal	DHS	5000049-002	SOUTH WELL							7.1	9.70	4/8/2019												
5000054-002	37.71066	-120.96966	Eastern	Municipal	DHS	5000054-002	SOUTH WELL							2.3	8.40	7/11/2017												
5000055-002	37.70583	-120.92042	Eastern	Municipal	DHS	5000055-002	WEST FIELD	3	3.20	1/28/2002				11	11.10	11/5/2021							390	340.00	8/6/2014			
5000055-003	37.70586	-120.92032	Eastern	Municipal	DHS	5000055-003	EAST FIELD							7.7	9.50	11/14/2019												
5000058-002	37.74658	-120.90888	Eastern	Municipal	DHS	5000058-002	WEST- MHP WELL							5.8	9.70	1/15/2021												
5000066-001	37.69706	-120.99203	Eastern	Municipal	DHS	5000066-001	WELL)		5.30	5/29/2012					6.82	10/14/2014		0.00	12/2/2020					186.00	5/7/2009			
5000067-001	37.71702	-121.01164	Eastern	Municipal	DHS	5000067-001	WELL 03				0.22	0.60	6/17/2004	6.1	6.80	6/18/2015				0.14	1.20	9/13/2021						
5000090-002	37.62556	-120.84303	Eastern	Municipal	DHS	5000090-002	SOUTH WELL					0.05	5/13/2002	16.5	10.10	2/12/2014		0.00	4/5/2021							24.9	26.00	11/19/2019
5000090-013	37.62557	-120.84319	Eastern	Municipal	DHS	5000090-013	SOUTH WEST NEW WELL					0.02	4/19/2010	9.4	9.00	7/10/2017		0.00	4/5/2021							21.5	31.20	11/19/2019
5000091-001	37.77980	-120.81679	Eastern	Municipal	DHS	5000091-001	SOUTH WELL							5.2	4.00	11/12/2019												
5000110-001	37.64850	-120.97817	Eastern	Municipal	DHS	5000110-001	SOUTH/ MAIN WELL							8.6	9.17	10/15/2008												
5000110-002	37.64922	-120.97849	Eastern	Municipal	DHS	5000110-002	NORTH/BACK UP WELL							8.7	9.70	10/27/2021												
5000117-001	37.77475	-120.82256	Eastern	Municipal	DHS	5000117-001	DOMESTIC WELL							5.3	9.10	6/8/2015												
5000133-003	37.66597	-121.06601	Western Unknown	Municipal	DHS	5000133-003	2011 WELL	8			0	0.00	7/8/2021	0.98	1.90	4/28/2016		0.00	7/8/2021									
5000141-004	37.70900	-121.00577	Eastern	Municipal	DHS	5000141-004	WELL #3 (COLD STORAGE)	5.7	4.50	3/30/2012	0	0.02	3/13/2018	7.8	8.20	10/5/2021		0.00	3/10/2021					374.00	3/17/2015			
5000154-002	37.63783	-120.84967	Eastern	Municipal	DHS	5000154-002	WELL 02 OLD EASTERN							4.9	9.30	6/1/2010					0.00	1/6/2021					3.70	7/6/2020
5000155-001	37.63823	-120.61884	Eastern	Municipal	DHS	5000155-001	WELL 01		3.70	3/27/2018		0.00	3/15/2021	1.8	2.00	12/1/2017		0.00	3/15/2021		0.00	3/15/2021		170.00	3/15/2021			
5000164-001	37.65733	-120.66006	Eastern	Municipal	DHS	5000164-001	WELL #1							0.6	0.00	4/26/2021												
5000164-002	37.66297	-120.67831	Eastern	Municipal	DHS	5000164-002	WELL #2							0	0.00	4/26/2021												
5000164-003	37.65726	-120.66549	Eastern	Municipal	DHS	5000164-003	WELL #3								0.00	4/26/2021												
5000164-004	37.66001	-120.65574	Eastern	Municipal	DHS	5000164-004	WELL #4							0	0.00	4/26/2021												
5000179-003	37.74886	-120.84306	Eastern	Municipal	DHS	5000179-003	#3 WELL SOUTH		3.00	9/24/2008				2.7	3.20	10/4/2020												
5000179-004	37.66001	-120.65574	Eastern	Municipal	DHS	5000179-004	#4 WELL NORTH WEST		3.30	11/4/2014		0.00	10/1/2020	1.9	2.50	5/10/2011												
5000189-003	37.70452	-121.00170	Eastern	Municipal	DHS	5000189-003	S. WELL #1 (BY 4500 N. STAR)							10.2	11.00	6/8/2022												
5000189-004	37.70716	-121.00371	Eastern	Municipal	DHS	5000189-004	WAY)							7.3	11.00	3/13/2023												
5000189-005	37.70721	-121.00081	Eastern	Municipal	DHS	5000189-005	E.WELL, #4 622 GALAXY WAY							5.8	5.80	1/7/2019												
5000189-006	37.70981	-121.00082	Eastern	Municipal	DHS	5000189-006	N.WELL, #5, 4825 STRATOS				0			12.1	11.00	6/8/2022												
5000211-003	37.71228	-120.91821	Eastern	Municipal	DHS	5000211-003	WELL NO. 06	3.4	3.00	2/19/2009	0	0.00	5/12/2021	5.7	7.20	5/13/2020		0.00	5/12/2021	0	0.00	5/12/2021						
5000211-004	37.71232	-120.91980	Eastern	Municipal	DHS	5000211-004	WELL NO. 05	3.2	3.30	11/13/2008	0	0.00	5/12/2021	5.6	7.00	5/13/2020		0.00	5/12/2021	0	0.00	5/12/2021						
5000213-001	37.66593	-121.06596	Western Unknown	Municipal	DHS	5000213-001	LPA REPORTED PRIMARY SOURCE							8.3	14.00	9/11/2015												
5000249-004	37.71283	-121.02746	Eastern	Municipal	DHS	5000249-004	WELL 02 RAW							2.3	1.70	6/24/2021				0.047	0.06	8/4/2022						
5000261-003	37.72249	-120.99584	Eastern	Municipal	DHS	5000261-003	2007 WELL							4.8	4.80	4/7/2020												
5000263-002	37.71179	-120.99603	Eastern	Municipal	DHS	5000263-002	NEW 2006				0.09	0.11	10/14/2020							0								
5000274-001	37.62464	-121.05458	Western Upper	Municipal	DHS	5000274-001	NEW WELL							1.3	8	37302												
5000284-001	37.60964	-121.11564	Western Upper	Municipal	DHS	5000284-001	WELL 01							5	9.83	39569												
5000290-001	37.63844	-121.12181	Western Upper	Municipal	DHS	5000290-001	LPA REPORTED PRIMARY SOURCE							9.2	10.1	41984												
5000295-001	37.60964	-121.11564	Western Upper	Municipal	DHS	5000295-001	WELL 01							17	17.4	43836												
5000316-001	37.62464	-121.05458	Western Upper	Municipal	DHS	5000316-001	WELL 01		16.10	8/5/2002					7	37690												
5000317-001	37.68982	-121.07024	Western Lower	Municipal	DHS	5000317-001	WELL#1	0			0			4	4.02	2/7/2011				0			190					
5000317-002	37.78055	-120.78424	Eastern	Municipal	DHS	5000317-002	WELL#2	0			0			7.6	4.80	3/25/2020							240					
5000335-001	37.68982	-121.07024	Western Lower	Municipal	DHS	5000335-001	WELL, PUBLIC/SOUTH	9.6	14.00	8/16/2007				12	9.90	7/5/2021												
5000372-001	37.66433	-121.05939	Western Lower	Municipal	DHS	5000372-001	WELL 01		12.00	8/17/2010		0.00	2/1/2021	16	20.00	5/4/2020		0.00	2/1/2021									
5000372-003	37.66461	-121.06086	Western Unknown	Municipal	DHS	5000372-003	SW NEW WELL		11.00	8/17/2010		0.00	2/1/2021	16	15.00	2/1/2021		0.00	2/1/2021									
5000384-003	37.65604	-121.02473	Western Lower	Municipal	DHS	5000384-003	NEW LONE PALM				0			0.73	4.50	3/28/2003												
5000388-001	37.65169	-121.02475	Western Upper	Municipal	DHS	5000388-001	WELL 01							14	15.4	43411												
5000401-001	37.60867	-121.11690	Western Unknown	Municipal	DHS	5000401-001	LPA REPORTED PRIMARY SOURCE							2.5	3.89	7/28/2009												
5000404-002	37.67000	-121.08000	Western Lower	Municipal	DHS	5000404-002	02 NEW SCHOOL	9.2	8.40	8/4/2020				3.2	9.00	3/22/2016												
5000409-001	37.60867	-121.11690	Western Upper	Municipal	DHS	5000409-001	LPA REPORTED PRIMARY SOURCE							12	17	44662												
5000411-001	37.72012	-120.99655	Eastern	Municipal	DHS	5000411-001	WELL 4 EAST MAIN WELL	3.5	4.20	11/5/2008	0	0.84	11/14/2003	13	11.50	2/12/2019		0.00	7/19/2021									
5000411-003	37.71786	-121.00124	Eastern	Municipal	DHS	5000411-003	WELL #3 WEST PARK	2.4	3.30	11/25/2020				7.3	9.80	11/28/2016				0.052	0.07	8/8/2022						
5000426-001	37.70085	-120.98959	Eastern	Municipal	DHS	5000426-001	WELL 01							14	14.80	2/6/2018												
5000433-002	37.77809	-120.80597	Eastern	Municipal	DHS	5000433-002	NO. 02							3	6.14	3/24/2003							180					
5000433-003	37.77747	-120.79795	Eastern	Municipal	DHS	5000433-003	NO. 01							5.3	6.20	3/25/2020							270					
5000433-004	37.78037	-120.80252	Eastern	Municipal	DHS	5000433-004	NO. 01								3.30	3/25/2020												
5000433-005	37.78032	-120.79170	Eastern	Municipal	DHS	5000433-005	NO. 01	0			0			6.7	5.70	3/25/2020	0.89			0			250					
5000433-006	37.77968	-120.77772	Eastern	Municipal	DHS	5000433-006	01	0			0			9.4	8.18	8/4/2015	0			0			240					
5000433-007	37.77693	-120.78556	Eastern	Municipal	DHS	5000433-007	01							7.3	8.00	2/14/2017							250					
5000435-002	37.77464	-120.80089	Eastern	Municipal	DHS	5000435-002	NEW WELL 01							28	23.90	4/15/2020												
5000457-002	37.72415	-120.99566	Eastern	Municipal	DHS	5000457-002	WELL 01							12	13.00	7/7/2022												
5000462-001	37.68692	-120.92228	Eastern	Municipal	DHS	5000462-001	MOTEL WELL								33.00	5/1/2020												
5000467-001	37.68692	-120.92228	Eastern	Municipal	DHS	5000467-001	LPA REPORTED PRIMARY SOURCE							9.8	9.70	2/27/2018												
5000481-002	37.66285	-120.78124	Eastern	Municipal	DHS	5000481-002	OLD WELL (WESTERN BY PLANT)													0	0.00	6/7/2021						
5000486-001	37.70914	-120.92019	Eastern	Municipal	DHS	5000486-001	LPA REPORTED PRIMARY SOURCE							2.06	2.80	5/15/2018												
5000493-002	37.70913	-120.92022	Eastern	Municipal	DHS	5000493-002	2016 WELL							5	4.60	12/4/2019												

Appendix C Groundwater Quality Monitoring Network

								Arsenic			DBCP			Nitrate as N			PCE			TCP			TDS			Uranium		
Well ID	Latitude	Longitude	Principal Aquifer	Well Type	Dataset Name[1]	Alternative Well ID	Alternative Well ID 2	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (pCi/L)	Date
5000013-001	37.78530	-120.81297	Eastern	Municipal	DHS	5000013-001	WELL 01	0			0			2.7	3.80	3/8/2019	0						220					
5000499-004	37.68138	-121.10948	Western Unknown	Municipal	DHS	5000499-004	2018 WELL	11	13.00	4/11/2022				9.6	7.70	10/5/2021												
5000506-001	37.69836	-120.88367	Eastern	Municipal	DHS	5000506-001	WELL 01								4.83	1/13/2005												
5000509-001	37.77256	-120.77358	Eastern	Municipal	DHS	5000509-001	MAIN 2/96 WELL OLD OFFICE							1.5	2.62	8/12/2003												
5000516-001	37.70967	-120.94115	Eastern	Municipal	DHS	5000516-001	WELL							2.9	2.37	5/29/2015												
5000517-001	37.71001	-120.99702	Eastern	Municipal	DHS	5000517-001	WELL	6.2	7.00	3/11/2015				3.6	3.50	3/15/2017		0.00	6/22/2021									
5000529-001	37.70417	-120.95640	Eastern	Municipal	DHS	5000529-001	WELL							4.5	4.10	10/26/2021												
5000530-004	37.63466	-120.79356	Eastern	Municipal	DHS	5000530-004	2011 WELL	2.7	5.60	3/23/2012	0	0.00	6/1/2021	17	14.00	3/1/2021		0.00	6/1/2021									
5000535-001	37.71417	-121.00101	Eastern	Municipal	DHS	5000535-001	2003 WELL 01							6.9	6.70	2/4/2020										13.4	15.00	5/5/2021
5000538-001	37.66759	-120.90568	Eastern	Municipal	DHS	5000538-001	2003 WELL							8.3	8.20	8/11/2020												
5000551-001	37.70059	-120.93784	Eastern	Municipal	DHS	5000551-001	WELL							6.7	10.00	3/11/2020												
5000552-001	37.71237	-121.00386	Eastern	Municipal	DHS	5000552-001	WELL							4.9						0.023	0.08	5/16/2019	230					
5000561-001	37.71313	-120.99368	Eastern	Municipal	DHS	5000561-001	2005 DOMESTIC WATER WELL								9.90	12/4/2018												
5000562-002	37.71516	-120.99481	Eastern	Municipal	DHS	5000562-002	NEW 2006 WELL							8	8.00	2/7/2019												
5000563-001	37.71561	-121.00339	Eastern	Municipal	DHS	5000563-001	WELL	3.3	4.70	4/6/2021	0	0.00	5/5/2021	5.9	6.80	5/5/2020		0.00	5/5/2021	0.038	0.05	1/31/2018						
5000565-001	37.71575	-121.00392	Eastern	Municipal	DHS	5000565-001	NEW WELL							6.1	5.70	4/13/2021				0.06	0.09	8/14/2018	260					
5000568-001	37.72180	-121.05999	Eastern	Municipal	DHS	5000568-001	WELL #1 2007					0.00	4/19/2021	1.1	0.90	4/17/2018					0.00	4/19/2021						
5000573-002	37.71230	-121.00251	Eastern	Municipal	DHS	5000573-002	SCS 2007 WELL							4	4.31	1/28/2011												
5000580-001	37.73025	-121.06814	Eastern	Municipal	DHS	5000580-001	WELL	6.7	7.00	11/14/2017				8.5	3.10	11/3/2020												
5000584-001	37.73803	-120.99481	Eastern	Municipal	DHS	5000584-001	NEW WELL 2009							2.2	2.80	11/7/2016												
5000585-001	37.63855	-121.12369	Western Unknown	Municipal	DHS	5000585-001	1999 DOMESTIC WELL							6.4	4.80	2/1/2022												
5000588-001	37.65809	-121.03037	Western Unknown	Municipal	DHS	5000588-001	WELL 01					0.00	6/9/2021	4.1														
5000592-001	37.71245	-120.82519	Eastern	Municipal	DHS	5000592-001	2014 WELL		0.00	4/20/2021	0	0.00	4/20/2021	10	12.00	1/3/2018		0.00	4/20/2021									
5010005-001	37.70083	-121.08642	Western Lower	Municipal	DHS	5010005-001	WELL 250 - SALIDA GAS	9.9	12.00	6/12/2000				5.5	7.10	6/1/2022	0	0.00	5/5/2021	0.0016	0.00	2/3/2021	230	210.00	3/10/1997	1.7	2.50	2/3/2021
5010005-005	37.70691	-121.09319	Western Lower	Municipal	DHS	5010005-005	WELL 288 - SUNNYBROOK	9.6	13.00	9/23/1997	0	0.00	5/5/2021	3.7	4.10	11/3/1999	0	0.00	5/5/2021	0	0.00	5/5/2021	180	290.00	11/3/1999			
5010005-006	37.71402	-121.08200	Western Lower	Municipal	DHS	5010005-006	WELL 290 - CLARENDON							6	7.84	9/4/2018	0	0.00	5/5/2021	0	0.00	2/3/2021						
5010005-007	37.69834	-121.07377	Western Lower	Municipal	DHS	5010005-007	WELL 297				0	0.00	5/5/2021	5	11.10	7/5/2013	0	0.00	5/5/2021	0.0012	0.00	2/3/2021						
5010005-008	37.71553	-121.08905	Western Lower	Municipal	DHS	5010005-008	WELL 298							4.3	5.72	3/17/2009	0	0.00	5/5/2021	0	0.00	5/5/2021						
5010005-017	37.70294	-121.07842	Western Unknown	Municipal	DHS	5010005-017	WELL 313 - RAW							8.5	8.62	9/6/2017	0	0.00	5/5/2021	0	0.00	2/3/2021						
5010006-003	37.64117	-120.74547	Eastern	Municipal	DHS	5010006-003	WELL NO. 245		7.00	3/3/1997																		
5010006-004	37.64558	-120.77354	Eastern	Municipal	DHS	5010006-004	WELL NO. 286	2.86	4.00	1/13/2005				5.3			0						260					
5010006-006	37.64727	-120.76391	Eastern	Municipal	DHS	5010006-006	WELL NO. 303 - RAW TO GAC				0.14	0.50	7/17/2003	4.41	7.48	5/2/2006	0											
5010010-003	37.64277	-120.99117	Western Upper	Municipal	DHS	5010010-003	WELL 001	2.5	5.00	1/10/2001	0	0	44328	4.2	5.85	38601	7	8.7	44356	0	0.0082	44230	510	560.00	6/28/2006	20		
5010010-005	37.64003	-121.00358	Western Upper	Municipal	DHS	5010010-005	WELL 003							8.9			0			0	0	44328				22		
5010010-008	37.65071	-120.98702	Western Unknown	Municipal	DHS	5010010-008	WELL 006				0	0.00	7/14/2021	6.6	7.05	7/11/2007	0	0.00	7/14/2021	0.0047	0.01	8/22/2018						
5010010-009	37.65093	-120.99944	Western Unknown	Municipal	DHS	5010010-009	WELL 007				0	0.00	7/14/2021				0	0.00	7/14/2021	0	0.00	7/14/2021						
5010010-027	37.68571	-121.00140	Eastern	Municipal	DHS	5010010-027	WELL 025				0	0.00	5/5/2021	5.4	9.63	4/21/1999	0	0.00	5/5/2021	0	0.00	5/5/2021						
5010010-035	37.67377	-121.03156	Western Unknown	Municipal	DHS	5010010-035	WELL 033	8.5	9.90	1/4/1994	0	0.00	2/3/2021	5.9	6.96	7/5/2017				0	0.00	5/5/2021	310	340.00	6/1/2021			
5010010-041	37.69001	-120.97187	Eastern	Municipal	DHS	5010010-041	WELL 039				0	0.00	5/12/2021	6.5	6.80	11/15/2012	0	0.00	5/12/2021	0	0.00	5/12/2021						
5010010-042	37.64458	-120.94783	Eastern	Municipal	DHS	5010010-042	WELL 040				0	0.33	1/11/1995	9.2	9.96	7/20/2016				0	0.01	8/22/2018						
5010010-043	37.66040	-120.93046	Eastern	Municipal	DHS	5010010-043	WELL 041							6.2	7.08	3/8/1995				0.0015	0.00	5/19/2021						
5010010-044	37.68880	-121.05788	Western Upper	Municipal	DHS	5010010-044	WELL 042				0.035	0.087	37746	9.7	9.20	4/7/2021				0	0.00086	44321						
5010010-047	37.66340	-120.91952	Eastern	Municipal	DHS	5010010-047	WELL 045					0.00	5/19/2021		6.40	7/17/2019					0.00	5/19/2021						
5010010-048	37.67571	-120.94764	Eastern	Municipal	DHS	5010010-048	WELL 046				0	0.01	4/14/2009	4.4	4.20	2/16/2022				0	0.00	5/19/2021						
5010010-049	37.64931	-120.93879	Eastern	Municipal	DHS	5010010-049	WELL 047							0.6	6.14	7/21/2009	0	0.00	7/21/2021	0.0025	0.01	8/22/2018						
5010010-050	37.70231	-120.99673	Eastern	Municipal	DHS	5010010-050	WELL 048	6.1	8.00	1/4/1996	0	0.00	5/5/2021	2.6	2.69	2/19/2008	0	0.00	5/5/2021	0	0.00	5/5/2021	130	190.00	5/2/2018			
5010010-052	37.69679	-121.01066	Eastern	Municipal	DHS	5010010-052	WELL 050				0	0.09	7/3/1995	5.9	9.50	5/16/2005	0	0.00	7/6/2021	0.00075	0.00	5/5/2021				5.2	13.12	5/16/2002
5010010-053	37.70363	-121.04910	Eastern	Municipal	DHS	5010010-053	WELL 051							4	9.93	1/4/1994		0.00	7/6/2021	0	0.00	7/6/2021						
5010010-061	37.65147	-121.02083	Western Upper	Municipal	DHS	5010010-061	WELL 056							0.73	2.90	1/4/1993		0.54	37175	0	0.00	2/10/2021						
5010010-062	37.68394	-120.94584	Eastern	Municipal	DHS	5010010-062	WELL 052							4.1	3.90	2/16/2021				0	0.00	5/19/2021						
5010010-068	37.69341	-120.94873	Eastern	Municipal	DHS	5010010-068	WELL 054					0.00	5/19/2021	1.8	2.70	2/16/2022				0	0.00	5/19/2021						
5010010-070	37.63391	-120.99295	Western Upper	Municipal	DHS	5010010-070	WELL 057							5.8	6.5	44776				0	0.00078	44237						
5010010-097	37.66944	-120.95000	Eastern	Municipal	DHS	5010010-097	WELL 65 - RAW				0	0.00	5/19/2021	3.1	5.20	10/6/2004				0	0.00	2/16/2021						
5010010-124	37.65796	-121.03818	Western Upper	Municipal	DHS	5010010-124	WELL 241 - HAMMET		12.00	6/13/2000	0	0	44383		5.12	42893				0	0	44383		220.00	7/9/1993			
5010010-127	37.65759	-120.93726	Eastern	Municipal	DHS	5010010-127	WELL 265 - LINCOLN ESTATES	2.7	3.00	1/20/2005	0			5.4	6.77	10/10/2001				0	0.00	5/19/2021	300	370.00	5/16/2018	5.4	8.00	9/15/1992
5010010-129	37.68533	-120.97581	Eastern	Municipal	DHS	5010010-129	WELL 259 - COFFEE VILLAGE 01	8.9	5.10	5/9/2018	0			5.2	5.60	2/12/2014	0	0.00	5/12/2021	0	0.00	5/12/2021	330	390.00	5/9/2018			
5010010-130	37.68534	-120.99272	Eastern	Municipal	DHS	5010010-130	WELL 264 - SHERWOOD FOREST							0.83	2.18	10/9/2013				0	0.00	5/12/2021						
5010010-131	37.68089	-120.99341	Eastern	Municipal	DHS	5010010-131	WELL 262 - HART WELL 02	6.7	7.30	2/11/2015	0	0.00	5/12/2021	2	5.82	2/14/2018	0	0.00	5/12/2021	0	0.00	5/12/2021	210	210.00	7/6/2005			
5010010-146	37.62581	-121.03147	Western Upper	Municipal	DHS	5010010-146	WELL 304							7.4	7.84	42375				0	0.0017	44230				23	28	44713
5010010-147	37.62531	-121.03148	Western Upper	Municipal	DHS	5010010-147	WELL 301							9.1	21	43740				0	0	44321				26	22	43012
5010010-148	37.63222	-121.01908	Western Upper	Municipal	DHS	5010010-148	WELL 283 - ANWAR MANOR							5.5	9.3	34101	0	0	44348	0	0.0016	44230				10	27	33863
5010010-149	37.64199	-121.03415	Western Upper	Municipal	DHS	5010010-149	WELL 237 - ELM							9.9	8.99	42375		0	44321		0	44321						
5010010-151	37.64091	-121.01933	Western Upper	Municipal	DHS	5010010-151	WELL 236 - EMERALD				0	1.5	42375							0	0.0022	44230				25	21	33850
5010010-170	37.62793	-120.93048	Eastern	Municipal	DHS	5010010-170	WELL 308				0	0.06	10/10/2006	1.5	6.35	11/9/1998				0	0.00	5/19/2021	1100	1200.00	11/20/2018			
5010010-172	37.66808	-120.98508	Eastern	Municipal	DHS	5010010-172	WELL 300							0.91	3.66	3/28/2001				0	0.00	5/12/2021						
5010010-178	37.63784	-120.93285	Eastern	Municipal	DHS	5010010-178	WELL 292 - MARIPOSA WEST				0.19	2.00	1/20/2005	6.9	9.42	6/2/2009	0			0.014	0.02	12/13/2016						
5010010-180	37.63785	-120.93172	Eastern	Municipal	DHS	5010010-180	WELL 291 - MARIPOSA EAST				0.082	1.02	10/11/1990	5.3	10.10	5/14/2007				0.011	0.01	9/1/2021						
5010010-184	37.63483	-120.93568	Eastern	Municipal	DHS	5010010-184	WELL 279 - FARRAR (OLD 06)				0.14	1.00	9/5/2000	6.2	9.85	9/26/2007				0.015	0.04	7/18/2018						
5010010-186	37.63194	-120.91164	Eastern	Municipal	DHS	5010010-186	WELL 277 - NORTH CODONI								9.74	10/19/2016												
5010010-187	37.66055	-120.96670	Eastern	Municipal	DHS	5010010-187	WELL 269 - ROSE AVENUE	2.5	4.00	7/14/2021				6.3	10.70	6/25/1993				0	0.00	5/12/2021	350	490.00	8/10/1993	3.4	32.00	9/23/1992
5010010-189	37.66316	-120.97808	Eastern	Municipal	DHS	5010010-189	WELL 267 - ORANGEBURG	9.3	9.00	6/7/2000				6	10.60	10/15/2016				0	0.00	5/12/2021	350	490.00	3/11/2015			
5010010-191	37.64560	-120.90525	Eastern	Municipal	DHS	5010010-191	WELL 247 - NORTH EMPIRE				0.03	0.49	8/7/1995	7.5	10.60	10/19/2016				0.0023	0.01	8/22/2018						
5010010-192	37.63757	-120.95876	Eastern	Municipal	DHS	5010010-192	WELL 225 - BUDGET PACK	0	4.00	9/1/2005				8	9.06	10/12/2016	4.9	32.00	6/1/2011	0.0098	0.02	10/13/2021	580	1300.00	12/7/1995			
5010010-194	37.63565	-120.94334	Eastern	Municipal	DHS	5010010-194	WELL 212 - BEARD AVENUE				0	0.44	7/5/2006	7.6	10.10	7/9/2007				0.011	0.01	8/24/2016						
5010010-196	37.64526	-120.97845	Eastern	Municipal	DHS	5010010-196	WELL 211 - THOUSAND OAKS							7.1	8.50	1/15/2020				0	0.50	3/10/1994						
5010010-221	37.68369	-120.98493	Eastern	Municipal	DHS	5010010-221	WELL 058	5.7						1	2.30	3/2/2011	0	0.00	5/12/2021	0	0.00	5/12/2021	300			0		

Appendix C Groundwater Quality Monitoring Network

								Arsenic			DBCP			Nitrate as N			PCE			TCP			TDS			Uranium		
Well ID	Latitude	Longitude	Principal Aquifer	Well Type	Dataset Name[1]	Alternative Well ID	Alternative Well ID 2	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (pCi/L)	Date
5000013-001	37.78530	-120.81297	Eastern	Municipal	DHS	5000013-001	WELL 01	0			0			2.7	3.80	3/8/2019	0						220					
5010010-226	37.64198	-120.91903	Eastern	Municipal	DHS	5010010-226	WELL 059							6.4	8.90	2/2/2011	0	0.00	3/17/2021	0.0028	0.01	6/13/2018						
5010010-241	37.70767	-121.05488	Eastern	Municipal	DHS	5010010-241	WELL 61				0	0.00	3/3/2021	3.6	2.70	12/7/2006	0	0.00	3/3/2021	0.015	0.01	8/24/2016						
5010010-243	37.69540	-121.05603	Western Unknown	Municipal	DHS	5010010-243	WELL 63				0	0.00	5/5/2021	1.6	2.30	12/2/2015	0	0.00	5/5/2021	0	0.00	5/5/2021				1.7	1.70	2/1/2012
5010010-245	37.68948	-120.93022	Eastern	Municipal	DHS	5010010-245	WELL NO. 67														0.00	2/16/2021						
5010014-005	37.77968	-120.83856	Eastern	Municipal	DHS	5010014-005	WELL 03 - ON THE HILL		2.30	7/14/2021		0.02	1/13/1992		4.10	7/17/2013		0.00	7/14/2021		0.01	7/6/2020		244.00	7/14/2004			
5010014-008	37.76212	-120.84250	Eastern	Municipal	DHS	5010014-008	WELL 05-A - SIERRA & J	3.5	3.30	7/14/2021	0	0.00	7/14/2021	2.9	4.70	8/6/2003	0	0.00	7/14/2021	0	0.00	7/14/2021	150	170.00	7/22/2015			
5010014-009	37.75773	-120.84036	Eastern	Municipal	DHS	5010014-009	WELL 06	3.1	3.30	7/14/2004	0	0.00	7/14/2021	2.4	4.61	7/19/1995	0	0.00	7/14/2021	0	0.00	7/14/2021	180	240.00	11/18/1998			
5010014-010	37.76164	-120.87669	Eastern	Municipal	DHS	5010014-010	WELL 07	2	3.00	1/18/2010	0	0.00	7/14/2021	0.89	3.60	1/18/2010	0	0.00	7/14/2021	0	0.00	7/14/2021	130	240.00	7/12/2018			
5010014-011	37.76502	-120.83228	Eastern	Municipal	DHS	5010014-011	WELL 08	3.2	2.40	7/14/2021	0	0.00	7/14/2021	3.9	6.80	8/22/2012	0	2.20	4/15/2011	0	0.00	7/14/2021	180	227.00	1/27/1993			
5010014-012	37.75455	-120.87014	Eastern	Municipal	DHS	5010014-012	WELL 09	0	2.50	7/14/2021	0	0.00	7/14/2021	1.7	8.25	4/26/2012	0	0.00	7/14/2021	0	0.00	7/14/2021	160	270.00	12/18/2019			
5010014-013	37.75502	-120.85043	Eastern	Municipal	DHS	5010014-013	WELL 10	3.5	2.50	7/15/2019	0	0.00	7/14/2021	3.1	4.00	7/12/2018	0	0.00	7/14/2021	0	0.00	7/14/2021	220	240.00	7/14/2021			
5010018-002	37.73336	-120.92734	Eastern	Municipal	DHS	5010018-002	WELL 02							3.7	3.80	11/12/2015				0	0.00	7/7/2021						
5010018-003	37.73033	-120.94992	Eastern	Municipal	DHS	5010018-003	WELL 03							3.2	6.57	8/21/2008				0	0.00	7/7/2021						
5010018-004	37.73973	-120.93995	Eastern	Municipal	DHS	5010018-004	WELL 04							1.8	5.40	6/9/2009				0	0.01	10/31/2002						
5010018-006	37.72784	-120.93318	Eastern	Municipal	DHS	5010018-006	WELL 06							4.4	4.90	12/14/2017				0	0.00	7/7/2021						
5010018-007	37.72726	-120.95580	Eastern	Municipal	DHS	5010018-007	WELL 07							9.3	9.60	10/14/2020				0	0.00	7/7/2021						
5010018-008	37.72194	-120.95380	Eastern	Municipal	DHS	5010018-008	WELL 08							7.2	7.40	10/11/2018				0	0.00	7/7/2021						
5010018-009	37.71361	-120.94250	Eastern	Municipal	DHS	5010018-009	WELL 09							4.6	8.00	10/10/2016				0	0.00	7/7/2021						
5010018-010	37.71508	-120.95810	Eastern	Municipal	DHS	5010018-010	WELL 10							6.7	21.00	11/10/2021				0	0.00	7/7/2021						
5010018-012	37.73216	-120.92441	Eastern	Municipal	DHS	5010018-012	WELL NO. 12							1.6	2.50	12/14/2017				0	0.00	7/7/2021						
5010029-001	37.74016	-121.01405	Eastern	Municipal	DHS	5010029-001	WELL 271 - HILLCREST ESTATES				0	1.00	3/19/1992	0	4.30	3/19/1992				0	0.00	5/5/2021						
5010029-002	37.74611	-121.01690	Eastern	Municipal	DHS	5010029-002	WELL 282 - DEL RIO	7.5	7.00	7/1/2020	0	0.06	9/13/2005	7.5	9.41	10/16/2017	0	0.00	5/5/2021	0.0046	0.01	6/29/2022	150	300.00	5/5/2021			
5010029-004	37.74423	-121.00330	Eastern	Municipal	DHS	5010029-004	WELL 289 - KRISTINA	6.4	5.70	5/5/2021	0	0.25	10/2/1990	4.1	3.90	1/6/2021	0	0.00	3/3/2021	0	0.00	6/29/2022	140	180.00	6/27/2006			
5010029-008	37.74290	-120.99578	Eastern	Municipal	DHS	5010029-008	WELL NO. 70		4.80	12/27/2018		0.47	4/21/2021		5.10	4/21/2021		0.00	4/21/2021		0.00	4/21/2021		180.00	4/21/2021		0.00	4/21/2021
5010029-010	37.73200	-121.00397	Eastern	Municipal	DHS	5010029-010	WELL NO. 68	7.3	6.90	5/4/2021	0.42	0.87	5/13/2020	5.3	4.50	2/2/2022		0.00	7/6/2021	0.014	0.01	12/2/2020	120	170.00	5/13/2020		0.12	5/14/2018
5010042-002	37.63917	-120.75000	Eastern	Municipal	DHS	5010042-002	FE&MN				0			1.49	2.98	7/12/2017	0			0			190					
AGW080010534-HOME	37.66204	-120.87511	Eastern	Domestic	AGLAND	HOME	HOME								5.18	3/1/2019												
AGW080010535-HOME	37.67591	-120.54922	Eastern	Domestic	AGLAND	HOME	HOME								1.49	6/30/2021												
AGW080010562-8400	37.76046	-120.79739	Eastern	Domestic	AGLAND	8400	8400								0.63	11/9/2021												
AVE	37.64751	-121.05726	Western Unknown	Domestic	AGLAND	KANSAS AVE	KANSAS AVE								8.87	4/19/2021												
WELL	37.64162	-120.62486	Eastern	Domestic	AGLAND	FARM WELL	FARM WELL								0.94	6/25/2019												
HOUSE	37.64162	-120.62486	Eastern	Domestic	AGLAND	WEST HOUSE	WEST HOUSE								2.44	6/25/2019												
HOUSE	37.64158	-120.62486	Eastern	Domestic	AGLAND	EAST HOUSE	EAST HOUSE								2.13	6/25/2019												
AGW080010964-HOME	37.64454	-120.62481	Eastern	Domestic	AGLAND	HOME	HOME								0.46	11/29/2021												
AGW080010965-HOUSE	37.70330	-120.64263	Eastern	Domestic	AGLAND	HOUSE	HOUSE								4.18	5/7/2019												
AGW080010967-HOUSE	37.69013	-120.79227	Eastern	Domestic	AGLAND	HOUSE	HOUSE								3.46	5/7/2019												
AGW080010971-HQ	37.69691	-120.77239	Eastern	Domestic	AGLAND	HQ	HQ								3.19	5/7/2019												
AGW080010972-HOUSE F	37.69667	-120.77267	Eastern	Domestic	AGLAND	HOUSE F	HOUSE F								3.10	5/7/2019												
AGW080010973-HUDSON	37.71083	-120.77460	Eastern	Domestic	AGLAND	HUDSON	HUDSON								2.89	5/7/2019												
AGW080010974-HULLER	37.68141	-120.76551	Eastern	Domestic	AGLAND	HULLER	HULLER								2.01	6/24/2020												
SOUTH	37.70816	-120.67605	Eastern	Domestic	AGLAND	JKSN SOUTH	JKSN SOUTH								1.05	6/30/2021												
CLABL	37.71079	-120.67741	Eastern	Domestic	AGLAND	JKSN CLABL	JKSN CLABL								0.97	6/24/2020												
ALMONDS	37.68781	-120.64916	Eastern	Domestic	AGLAND	ALMONDS	ALMONDS								1.75	5/7/2019												
AGW080010989-FRONT 40	37.66288	-120.75587	Eastern	Domestic	AGLAND	FRONT 40	FRONT 40								2.33	8/19/2019												
AGW080010990-BACK 40	37.67261	-120.75605	Eastern	Domestic	AGLAND	BACK 40	BACK 40								3.05	8/19/2019												
AGW080011023-DW2	37.70045	-120.77700	Eastern	Domestic	AGLAND	DW2	DW2								2.89	5/15/2019												
AGW080011024-DW1	37.70099	-120.78019	Eastern	Domestic	AGLAND	DW1	DW1								3.68	5/15/2019												
AGW080011029-GIL1	37.74882	-120.77300	Eastern	Domestic	AGLAND	GIL1	GIL1								3.18	5/14/2021												
AGW080011032-SHR	37.67078	-120.59682	Eastern	Domestic	AGLAND	SHR	SHR								3.57	4/29/2019												
AGW080011033-GIL2	37.75067	-120.79034	Eastern	Domestic	AGLAND	GIL2	GIL2								6.23	8/25/2020												
AGW080011065-6437	37.70516	-121.11071	Western Unknown	Domestic	AGLAND	6437	6437								0.55	5/30/2019												
AGW080011066-HOME	37.65984	-120.73983	Eastern	Domestic	AGLAND	HOME	HOME								2.72	5/21/2021												
AGW080011224-1131	37.62612	-121.08638	Western Unknown	Domestic	AGLAND	1131	1131								7.84	12/2/2021												
AGW080011346-WALI	37.71875	-120.80881	Eastern	Domestic	AGLAND	WALI	WALI								4.71	6/8/2021												
AGW080011487-6813	37.66217	-120.86911	Eastern	Domestic	AGLAND	6813	6813								2.02	7/10/2020												
AGW080011757-WVD1	37.72876	-120.65104	Eastern	Domestic	AGLAND	WVD1	WVD1								4.79	11/27/2019												
AGW080011758-ARD1	37.72693	-120.81828	Eastern	Domestic	AGLAND	ARD1	ARD1								8.13	11/24/2020												
AGW080011759-LRD1	37.75982	-120.80018	Eastern	Domestic	AGLAND	LRD1	LRD1								4.38	11/27/2019												
AGW080011760-OWD1	37.73642	-120.83138	Eastern	Domestic	AGLAND	OWD1	OWD1								4.76	11/27/2019												
AGW080011786-HOME	37.70469	-121.06488	Western Unknown	Domestic	AGLAND	HOME	HOME								7.65	12/2/2019												
AGW080011823-1081	37.65770	-120.70782	Eastern	Domestic	AGLAND	1081	1081								4.98	11/18/2021												
AGW080011852-6106	37.72682	-120.90655	Eastern	Domestic	AGLAND	6106	6106								7.75	11/1/2021												
AGW080011855-1772	37.61476	-121.05149	Western Unknown	Domestic	AGLAND	1772	1772								9.90	7/19/2021												
AGW080011876-530	37.63100	-121.06498	Western Unknown	Domestic	AGLAND	530	530								5.76	12/8/2020												
AGW080011877-431	37.63428	-121.06490	Western Unknown	Domestic	AGLAND	431	431								3.12	10/28/2019												
AGW080012103-HOUSE	37.78000	-120.75480	Eastern	Domestic	AGLAND	HOUSE	HOUSE								7.01	12/18/2019												
AGW080012136-SDW	37.77879	-120.73608	Eastern	Domestic	AGLAND	SDW	SDW								1.35	11/18/2021												
AGW080012137-NDW	37.78267	-120.73881	Eastern	Domestic	AGLAND	NDW	NDW								1.05	11/18/2021												
AGW080012192-848	37.72874	-121.00560	Eastern	Domestic	AGLAND	848	848								3.27	12/12/2019												
AGW080012240-W#1	37.65495	-120.92531	Eastern	Domestic	AGLAND	W#1	W#1								9.37	11/24/2020												
AGW080012327-HOME	37.71006	-120.78962	Eastern	Domestic	AGLAND	HOME	HOME								7.77	1/26/2021												
AGW080012405-5261	37.75763	-120.89916	Eastern	Domestic	AGLAND	5261	5261								6.04	6/15/2020												
CRABTREE	37.63413	-120.81047	Eastern	Domestic	AGLAND	CRABTREE	CRABTREE								8.98	12/9/2019												
AGW080012448-MCEWEN	37.63413	-120.81047	Eastern	Domestic	AGLAND	MCEWEN	MCEWEN							7.6	8.20	10/30/2020												
AGW080012666-1649	37.61698	-121.03971	Western Unknown	Domestic	AGLAND	1649	1649								4.83	12/9/2019												

Appendix C Groundwater Quality Monitoring Network

								Arsenic			DBCP			Nitrate as N			PCE			TCP			TDS			Uranium		
Well ID	Latitude	Longitude	Principal Aquifer	Well Type	Dataset Name[1]	Alternative Well ID	Alternative Well ID 2	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (pCi/L)	Date
5000013-001	37.78530	-120.81297	Eastern	Municipal	DHS	5000013-001	WELL 01	0			0			2.7	3.80	3/8/2019	0						220					
AGW080012671-HAZL	37.64383	-120.86108	Eastern	Domestic	AGLAND	HAZL	HAZL								8.06	12/23/2019												
AGW080012678-WELL	37.63396	-120.84524	Eastern	Domestic	AGLAND	WELL	WELL								6.20	11/15/2021												
AGW080012806-BARN	37.66602	-120.70584	Eastern	Domestic	AGLAND	BARN	BARN								1.50	11/5/2020												
AGW080012860-HOME	37.67647	-120.71800	Eastern	Domestic	AGLAND	HOME	HOME								3.25	12/31/2019												
AGW080012938-1934	37.64380	-120.63930	Eastern	Domestic	AGLAND	1934	1934								2.60	10/28/2021												
AGW080012942-DW1	37.65250	-120.53320	Eastern	Domestic	AGLAND	DW1	DW1								3.60	10/28/2021												
AGW080013770-6725	37.69784	-121.11962	Western Unknown	Domestic	AGLAND	6725	6725								1.93	4/9/2020												
AGW080013782-454	37.64352	-120.81778	Eastern	Domestic	AGLAND	454	454								6.88	4/28/2020												
AGW080013900-237	37.63519	-120.81686	Eastern	Domestic	AGLAND	237	237								4.72	4/12/2021												
AGW080014842-HOME	37.66093	-120.77381	Eastern	Domestic	AGLAND	HOME	HOME								6.88	10/19/2021												
AGW080016092-106	37.63797	-120.61747	Eastern	Domestic	AGLAND	106	106								2.82	12/15/2020												
AGW080016185-HOME	37.70345	-120.85107	Eastern	Domestic	AGLAND	HOME	HOME								2.42	12/10/2020												
AGW080016580-3536	37.68651	-120.69332	Eastern	Domestic	AGLAND	3536	3536								1.91	10/4/2021												
AGW080018565-DW1	37.72151	-121.01482	Eastern	Domestic	AGLAND	DW1	DW1								1.69	4/16/2021												
L10005824413-MW-10S	37.62024	-120.85017	Eastern	Monitoring	EDF	MW-10S	MW-10S		4.40	6/7/2008		0.00	5/13/2021		19.00	11/18/2020		0.57	5/14/2014		0.00	5/13/2021		740.00	5/28/2020			
L10005824413-MW-11S	37.62294	-120.84817	Eastern	Monitoring	EDF	MW-11S	MW-11S	0	6.70	12/3/2021	0	0.00	5/12/2021	13	9.30	11/29/2006	1.6	1.60	6/4/2009	0	0.00	5/12/2021	600	620.00	11/5/2014			
L10005824413-MW-12S	37.62429	-120.84759	Eastern	Monitoring	EDF	MW-12S	MW-12S		1.80	6/7/2008		0.00	5/12/2021		25.00	6/7/2008		40.00	11/30/2006		0.00	5/12/2021		720.00	5/12/2015			
L10005824413-MW-13S	37.62747	-120.84811	Eastern	Monitoring	EDF	MW-13S	MW-13S		4.20	11/9/2011		0.00	5/12/2021		25.00	6/7/2008		1.40	5/4/2012		0.00	5/12/2021		610.00	11/13/2007			
L10005824413-MW-14SR	37.62154	-120.85382	Eastern	Monitoring	EDF	MW-14SR	MW-14SR	2	6.10	8/20/2015	0	0.00	5/14/2021	2.2	6.90	2/10/2017	3.5	16.00	7/20/2012	0	0.00	5/14/2021	630	720.00	5/24/2013			
L10005824413-MW-15D	37.61766	-120.85800	Eastern	Monitoring	EDF	MW-15D	MW-15D	12	11.00	5/13/2021	0	0.00	5/13/2021	0.81	0.98	11/18/2020	0	0.75	5/14/2014	0	0.02	12/2/2021	170	530.00	11/17/2010			
L10005824413-MW-15S	37.61763	-120.85804	Eastern	Monitoring	EDF	MW-15S	MW-15S	2.8	7.00	11/4/2014	0	0.00	5/13/2021	4.7	18.00	11/18/2020	0	0.49	11/10/2011	0	0.00	5/13/2021	1200	1600.00	5/15/2018			
L10005824413-MW-16S	37.62618	-120.84678	Eastern	Monitoring	EDF	MW-16S	MW-16S		2.00	5/2/2012		0.00	5/11/2021		30.00	11/8/2011		0.66	5/12/2014		0.00	5/11/2021		860.00	11/13/2007			
L10005824413-MW-17D	37.63090	-120.85130	Eastern	Monitoring	EDF	MW-17D	MW-17D	3.4	4.60	11/18/2010	0	0.00	5/12/2021	5.7	11.00	6/2/2009	0	1.30	6/2/2009	0.023	0.03	6/16/2022	330	500.00	6/2/2009			
L10005824413-MW-17S	37.63090	-120.85130	Eastern	Monitoring	EDF	MW-17S	MW-17S	2.1	3.60	6/5/2008	0	0.00	5/12/2021	3.8	12.00	11/10/2011	0	2.80	5/14/2014	0	0.00	5/12/2021	420	660.00	5/12/2021			
L10005824413-MW-18D	37.63122	-120.84827	Eastern	Monitoring	EDF	MW-18D	MW-18D	4.8	5.00	12/1/2006	0	0.00	5/12/2021	1.7	9.50	12/1/2006	0	0.70	6/5/2008	0	0.00	5/12/2021	200	460.00	12/1/2006			
L10005824413-MW-18S	37.63122	-120.84827	Eastern	Monitoring	EDF	MW-18S	MW-18S	0	4.40	12/1/2006	0	0.00	5/12/2021	0.54	11.00	12/1/2006	0	1.00	5/9/2007	0	0.00	5/12/2021	120	440.00	12/1/2006			
L10005824413-MW-19D	37.62471	-120.84766	Eastern	Monitoring	EDF	MW-19D	MW-19D	0	4.30	6/7/2008	0	0.00	5/12/2021	0.57	8.50	11/19/2007	0	5.20	11/19/2007	0	0.00	5/12/2021	310	530.00	11/19/2007			
L10005824413-MW-19S	37.62471	-120.84767	Eastern	Monitoring	EDF	MW-19S	MW-19S	0	4.50	6/7/2008	0	0.00	5/12/2021	19	28.00	11/17/2020	4.2	6.30	5/12/2015	0	0.00	5/12/2021	690	790.00	6/14/2022			
L10005824413-MW-1D	37.62137	-120.84984	Eastern	Monitoring	EDF	MW-1D	MW-1D	0	2.90	8/20/2014	0	0.00	5/13/2021	0.29	9.30	6/7/2008	0	5.70	7/19/2012	0	0.00	5/13/2021	680	1700.00	11/19/2008			
L10005824413-MW-1S	37.62139	-120.84983	Eastern	Monitoring	EDF	MW-1S	MW-1S	0	3.10	11/18/2020	0	0.00	5/13/2021	9.8	27.00	5/18/2017	1.5	2.80	11/16/2007	0	0.00	5/13/2021	940	1800.00	5/28/2020			
L10005824413-MW-21D	37.63065	-120.84806	Eastern	Monitoring	EDF	MW-21D	MW-21D		5.10	5/16/2018		0.00	5/12/2021		7.30	11/30/2006		0.29	11/20/2008		0.00	5/12/2021		530.00	11/16/2010			
L10005824413-MW-21S	37.63065	-120.84806	Eastern	Monitoring	EDF	MW-21S	MW-21S		4.90	6/5/2008		0.00	5/12/2021		7.00	11/16/2007		0.63	5/13/2014		0.00	5/12/2021		490.00	11/16/2007			
L10005824413-MW-22D	37.62909	-120.84804	Eastern	Monitoring	EDF	MW-22D	MW-22D	4.9	4.70	6/5/2008	0	0.00	5/12/2021	1.5	9.60	11/19/2007	0	6.80	11/19/2007	0	0.00	5/12/2021	180	580.00	11/19/2007			
L10005824413-MW-22S	37.62909	-120.84804	Eastern	Monitoring	EDF	MW-22S	MW-22S	0	4.20	5/13/2014	0	0.00	5/12/2021	12	17.00	5/16/2018	0	23.00	11/19/2007	0	0.00	5/12/2021	410	730.00	11/19/2007			
L10005824413-MW-23D	37.62281	-120.85772	Eastern	Monitoring	EDF	MW-23D	MW-23D	2.5	22.00	5/15/2018	0	0.00	5/13/2021	3.6	3.10	6/15/2022	2.6	1.40	8/9/2017	0	0.00	5/13/2021	530	760.00	8/3/2011			
L10005824413-MW-23S	37.62277	-120.85776	Eastern	Monitoring	EDF	MW-23S	MW-23S	3.6	34.00	5/15/2018	0	0.00	5/13/2021	6.9	10.00	11/20/2019	0	0.51	10/9/2012	0	0.00	5/13/2021	560	1400.00	5/27/2020			
L10005824413-MW-24D	37.62620	-120.84469	Eastern	Monitoring	EDF	MW-24D	MW-24D	5.1	4.60	11/18/2019	0	0.00	5/11/2021	3.5	22.00	11/9/2011	0	1.30	5/12/2014	0	0.00	5/11/2021	230	590.00	5/10/2016			
L10005824413-MW-24S	37.62620	-120.84461	Eastern	Monitoring	EDF	MW-24S	MW-24S	0	4.10	5/10/2016	0	0.00	5/11/2021	23	25.00	8/18/2014	0	0.14	2/17/2015	0	0.00	5/11/2021	630	690.00	5/14/2018			
L10005824413-MW-25D2	37.62269	-120.85618	Eastern	Monitoring	EDF	MW-25D2	MW-25D2	3.8	33.00	5/15/2018	0	0.00	5/13/2021	3	2.70	12/3/2021	0	1.20	5/15/2014	0	0.00	5/13/2021	520	630.00	2/19/2014			
L10005824413-MW-25D3	37.62267	-120.85618	Eastern	Monitoring	EDF	MW-25D3	MW-25D3	6.6	18.00	5/15/2018	0	0.00	5/13/2021	0.17	0.44	11/12/2018	0	0.39	8/20/2015	0.013	0.00	5/13/2021	520	530.00	5/22/2019			
L10005824413-MW-26D	37.62830	-120.85280	Eastern	Monitoring	EDF	MW-26D	MW-26D	4.2	4.30	11/14/2018	0	0.00	5/13/2021	3.2	6.80	11/20/2019	0	1.10	11/14/2017	0	0.00	5/13/2021	330	440.00	8/29/2019			
L10005824413-MW-26S	37.62829	-120.85277	Eastern	Monitoring	EDF	MW-26S	MW-26S	3.5	4.30	8/17/2012	0	0.00	5/13/2021	2.6	13.00	12/2/2021	0	1.70	11/19/2015	0	0.00	5/13/2021	260	400.00	5/13/2021			
L10005824413-MW-27D	37.62883	-120.86088	Eastern	Monitoring	EDF	MW-27D	MW-27D	3.3	3.50	8/13/2013	0	0.00	5/13/2021	6.1	6.50	6/15/2022	0	0.00	5/13/2021	0.021	0.00	5/13/2021	360	390.00	8/13/2013			
L10005824413-MW-27S	37.62885	-120.86090	Eastern	Monitoring	EDF	MW-27S	MW-27S	0	4.40	2/17/2015	0	0.00	5/13/2021	0.33	5.40	2/20/2018	0	1.20	11/13/2018	0	0.00	5/13/2021	300	340.00	10/4/2012			
L10005824413-MW-2D	37.61980	-120.85249	Eastern	Monitoring	EDF	MW-2D	MW-2D	2.4	50.00	6/16/2022	0	0.00	5/13/2021	15	24.00	8/14/2013	0	4.60	11/15/2007	0	0.00	5/13/2021	360	610.00	8/4/2011			
L10005824413-MW-2S	37.61982	-120.85246	Eastern	Monitoring	EDF	MW-2S	MW-2S	0	4.00	12/10/2009	0	0.00	5/13/2021	32	50.00	11/15/2018	0	5.20	11/29/2006	0	0.00	5/13/2021	1100	1800.00	5/28/2020			
L10005824413-MW-3D	37.62532	-120.85532	Eastern	Monitoring	EDF	MW-3D	MW-3D	3.4	4.80	6/7/2008	0	0.00	5/14/2021	0.39	3.70	7/19/2012	0	1.40	2/10/2016	0	0.00	5/14/2021	430	960.00	7/19/2012			
L10005824413-MW-3S	37.62534	-120.85531	Eastern	Monitoring	EDF	MW-3S	MW-3S	2.2	11.00	5/18/2017	0	0.00	5/14/2021	0.36	64.00	11/15/2017	0	2.10	11/19/2015	0	0.00	5/14/2021	820	3000.00	8/10/2017			
L10005824413-MW-4D	37.62277	-120.85618	Eastern	Monitoring	EDF	MW-4D	MW-4D	3.3	48.00	11/28/2006	0	0.00	5/13/2021	3.5	3.30	11/21/2019	1.4	2.30	11/21/2019	0	0.00	5/13/2021	430	680.00	8/4/2011			
L10005824413-MW-4S	37.62283	-120.85614	Eastern	Monitoring	EDF	MW-4S	MW-4S	44	110.00	2/28/2019	0	0.00	5/13/2021	0.28	11.00	11/15/2017	0	1.90	6/7/2008	0	0.00	5/13/2021	800	980.00	2/21/2018			
L10005824413-MW-5S	37.61952	-120.85203	Eastern	Monitoring	EDF	MW-5S	MW-5S		2.70	2/9/2017		0.00	5/13/2021		24.00	11/18/2020		1.70	8/29/2019		0.00	5/13/2021		1200.00	5/28/2020			
L10005824413-MW-7D	37.62611	-120.84943	Eastern	Monitoring	EDF	MW-7D	MW-7D	7.8	8.00	5/17/2018	0	0.00	5/11/2021	1.4	13.00	11/16/2007	0	5.80	11/14/2017	0	0.00	5/11/2021	270	2800.00	4/30/2012			
L10005824413-MW-7S	37.62610	-120.84943	Eastern	Monitoring	EDF	MW-7S	MW-7S	0	5.60	6/4/2009	0	0.00	5/12/2021	19	21.00	11/19/2020	3.8	7.10	5/28/2010	0	0.00	5/12/2021	450	680.00	6/4/2009			
L10005824413-MW-8S	37.62040	-120.85687	Eastern	Monitoring	EDF	MW-8S	MW-8S	0	4.70	11/19/2015	0	0.00	5/13/2021	2	8.30	5/23/2019	0.81	5.30	11/29/2006	0	0.00	5/13/2021	350	640.00	2/28/2019			
L10005824413-MW-9S	37.61878	-120.85437	Eastern	Monitoring	EDF	MW-9S	MW-9S	0	2.40	6/7/2008	0	0.00	5/13/2021	4.4	14.00	11/14/2017	0	0.92	7/18/2012	0	0.00	5/13/2021	360	2600.00	8/2/2011			
S12-MO05	37.69658	-120.97175	Eastern	Municipal	USGS	S12-MO05	S12-MO05		8.90	10/19/2020		0.00	10/19/2020		4.98	10/19/2020		0.00	10/19/2020		0.00	10/19/2020		411.00	10/19/2020	10.50	10/19/2020	
S12-MO06	37.70285	-121.10984	Western Unknown	Municipal	USGS	S12-MO06	S12-MO06		8.00	10/19/2020		0.00	10/19/2020		15.80	10/19/2020		0.01	10/19/2020		0.00	10/19/2020		507.00	10/19/2020	52.50	10/19/2020	
S12-MO07	37.66553	-120.78761	Eastern	Municipal	USGS	S12-MO07	S12-MO07		2.70	10/21/2020		0.00	10/21/2020		3.69	10/21/2020		0.00	10/21/2020		0.00	10/21/2020		356.00	10/21/2020	2.66	10/21/2020	
S12-MO08	37.72242	-121.01800	Eastern	Municipal	USGS	S12-MO08	S12-MO08		8.50	11/3/2020		0.21	11/3/2020		2.92	11/3/2020		0.00	11/3/2020		0.03	11/3/2020		145.00	11/3/2020	0.21	11/3/2020	
S12-MO09-U	37.71117	-120.72383	Eastern	Municipal	USGS	S12-MO09-U	S12-MO09-U		4.30	12/3/2020		0.00	12/3/2020		2.93	12/3/2020		0.00	12/3/2020		0.00	12/3/2020		188.00	12/3/2020	0.09	12/3/2020	
S12-MO10	37.78458	-120.82131	Eastern	Municipal	USGS	S12-MO10	S12-MO10		0.80	12/15/2020		0.00	12/15/2020		2.39	12/15/2020		0.00	12/15/2020		0.00	12/15/2020		183.00	12/15/2020	0.55	12/15/2020	
S12-MO11	37.66614	-120.89696	Eastern	Municipal	USGS	S12-MO11	S12-MO11		3.00	1/28/2021		0.00	1/28/2021		5.99	1/28/2021		0.00	1/28/2021		0.00	1/28/2021		287.00	1/28/2021	6.89	1/28/2021	
S12-MO12-U	37.78371	-120.82063	Eastern	Municipal	USGS	S12-MO12-U	S12-MO12-U		1.00	2/25/2021		0.00	2/25/2021		2.13	2/25/2021		0.00	2/25/2021		0.00	2/25/2021		162.00	2/25/2021	0.48	2/25/2021	
S12-MO13-U	37.76847	-120.81689	Eastern	Municipal	USGS	S12-MO13-U	S12-MO13-U		2.20	2/25/2021		0.00	2/25/2021		4.00	2/25/2021		0.00	2/25/2021		0.00	2/25/2021		145.00	2/25/2021	0.36	2/25/2021	
S12-UP03	37.78561	-120.76481	Eastern	Municipal	USGS	S12-UP03	S12-UP03		0.87	10/20/2020		0.00	10/20/2020		5.50	10/20/2020		0.00	10/20/2020		0.00	10/20/2020		169.00	10/20/2020	0.33	10/20/2020	
S12-UP04	37.80007	-120.66974	Eastern	Municipal	USGS	S12-UP04	S12-UP04		9.90	11/4/2020		0.00	11/4/2020		2.36	11/4/2020		0.00	11/4/2020		0.00	11/4/2020		200.00	11/4/2020	0.29	11/4/2020	
SL185742938-M-101	37.64664	-121.01610	Western Upper	Monitoring	EDF	M-101	M-101	7.1	7.30	1/29/2006													760	1500.00	1/29/2006			
SL185742938-M-102	37.64854	-121.01611	Western Upper	Monitoring	EDF	M-102	M-102	6.4	12.00	7/12/2022													940	4800.00	7/12/2006			
SL185742938-M-103	37.65059	-121.01623	Western Upper	Monitoring	EDF	M-103	M-103	0	30.00	7/7/2006													780	1800.00	7/12/2010			
SL185742938-M-104	37.64899	-121.01712	Western Upper	Monitoring	EDF	M-104	M-104	16	52.00	1/10/2007													2100	3600.00	1/20/2009			
SL185742938-M-105	37.65301	-121.01874	Western Upper	Monitoring	EDF	M-105	M-105	5.7	7.80	1/17/2013													460	620.00	1/16/2020			
SL185742938-M-106	37.64871	-121.01911	Western Upper	Monitoring	EDF	M-106	M-106	44	78.00	1/18/2012													2500	3800.00	1/20/2009			
SL185742938-M-107	37.65057	-121.01623	Western Upper	Monitoring	EDF	M-107	M-107	6.3	8.20	1/6/2011													350	960.00	1/8/2019			
SL185742938-M-108	37.65060	-121.01623	Western Upper	Monitoring	EDF	M-108	M-108	5.9	9.20	7/13/2010													470	970.00	1/10/2007			
SL185742938-M-109	37.64763	-121.01610	Western Upper	Monitoring	EDF	M-109	M-109	80	170.00	1/27/2014													3000	3300.00	1/20/2020			

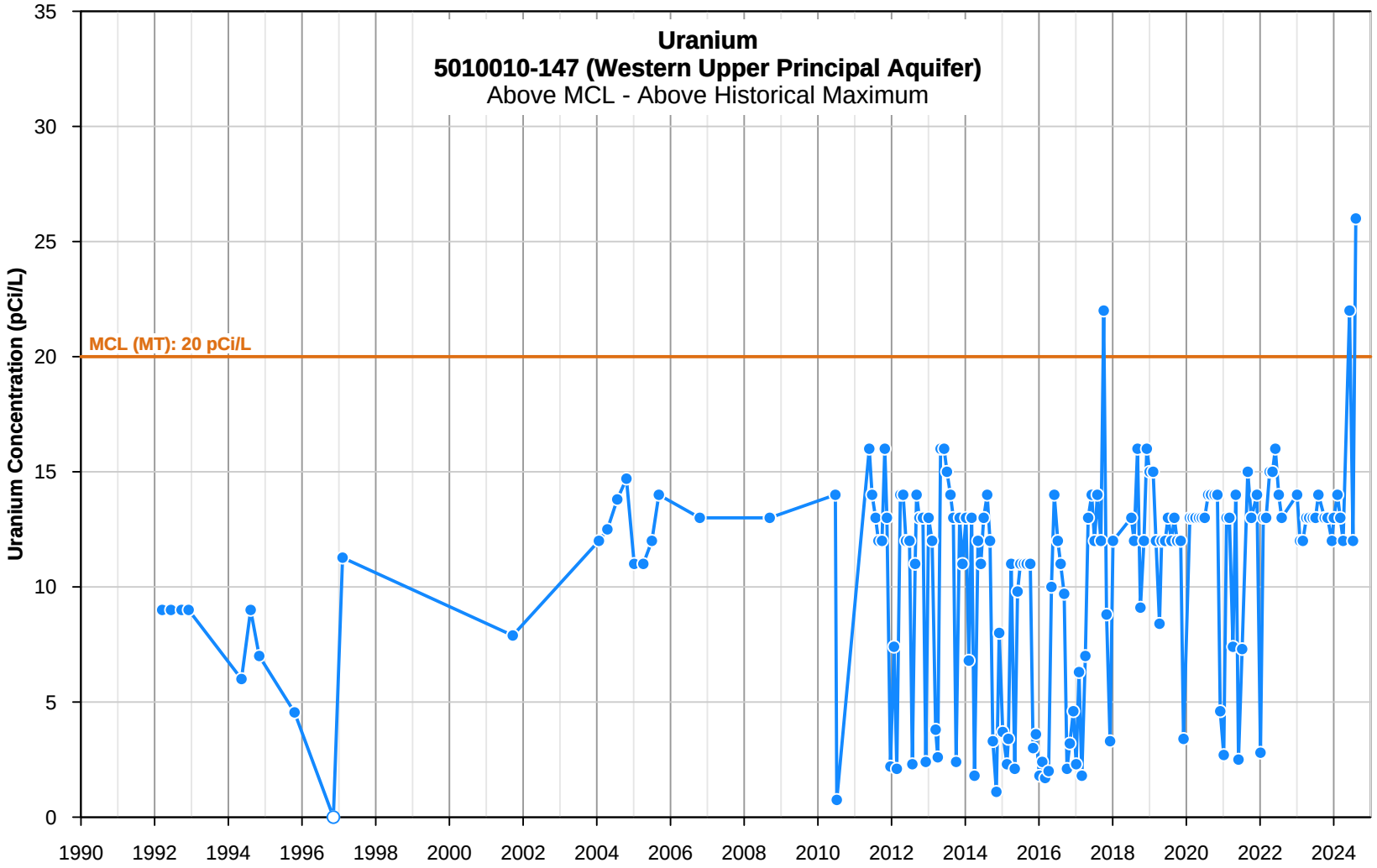
Appendix C Groundwater Quality Monitoring Network

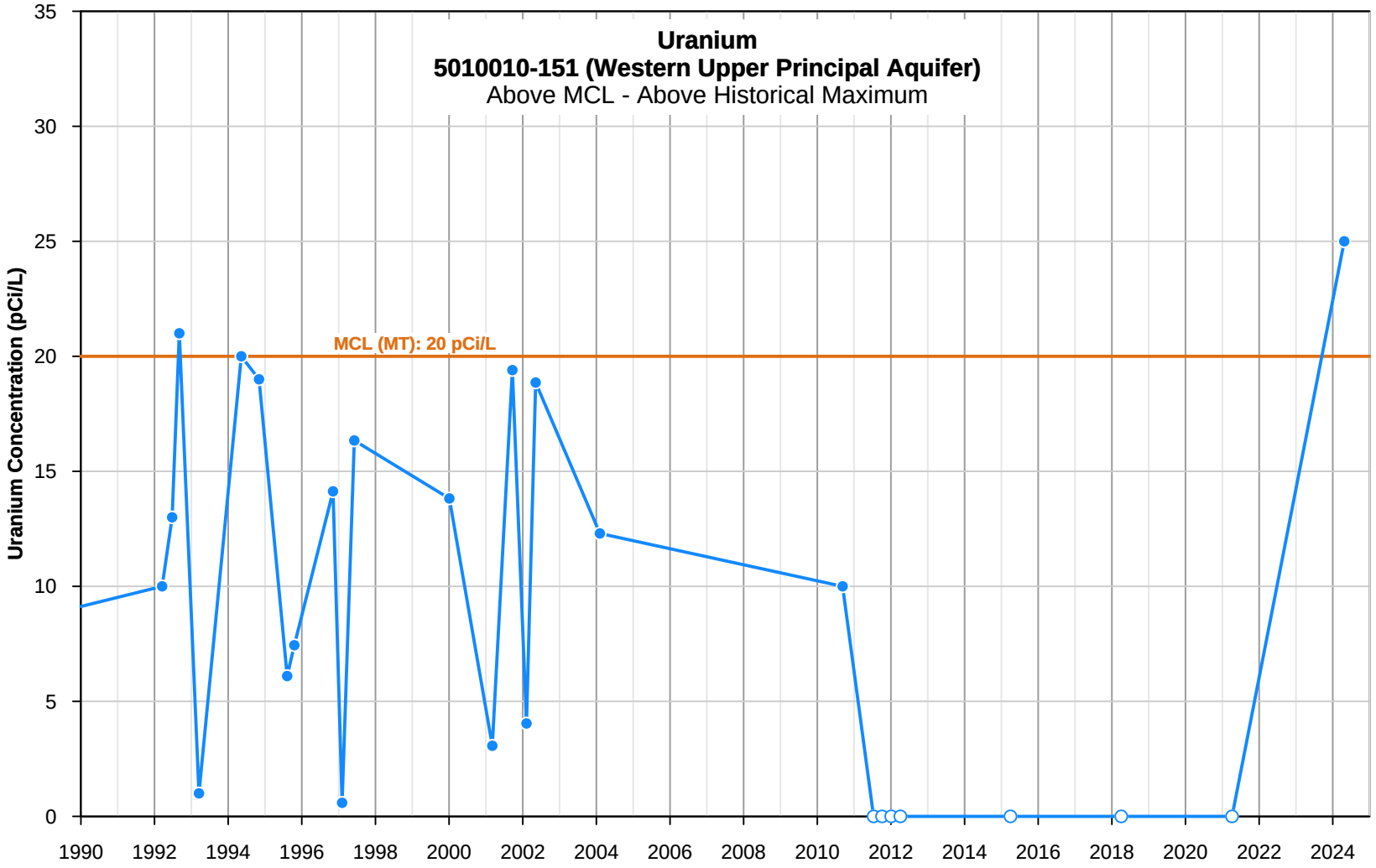
								Arsenic			DBCP			Nitrate as N			PCE			TCP			TDS			Uranium		
Well ID	Latitude	Longitude	Principal Aquifer	Well Type	Dataset Name[1]	Alternative Well ID	Alternative Well ID 2	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (ug/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (mg/L)	Date	WY 2024 Max	Historical Max Conc (WY 1991-2023) (pCi/L)	Date
5000013-001	37.78530	-120.81297	Eastern	Municipal	DHS	5000013-001	WELL 01	0			0			2.7	3.80	3/8/2019	0						220					
SL185742938-M-111	37.64751	-121.01610	Western Upper	Monitoring	EDF	M-111	M-111	0	38.00	1/29/2006													2800	3500.00	1/20/2020			
SL185742938-M-112	37.64369	-121.01082	Western Upper	Monitoring	EDF	M-112	M-112	5.3	7.2	40185													430	4800	40008			
SL185742938-M-113	37.64365	-121.01084	Western Upper	Monitoring	EDF	M-113	M-113	2.4	6.2	39289													360	800	38917			
SL185742938-M-118	37.65303	-121.01877	Western Upper	Monitoring	EDF	M-118	M-118	8.5	9.5	40731													270	340	40203			
SL185742938-M-119	37.65112	-121.01527	Western Upper	Monitoring	EDF	M-119	M-119	0	22	43846													230	20000	39478			
SL185742938-M-120	37.65110	-121.01524	Western Upper	Monitoring	EDF	M-120	M-120	6.8	8	40197													360	380	43846			
SL185742938-M-121	37.64566	-121.00876	Western Upper	Monitoring	EDF	M-121	M-121	16	40	40197													620	3000	39100			
SL185742938-M-150	37.64871	-121.01612	Western Upper	Monitoring	EDF	M-150	M-150	7.2	9.1	43850													410	1320	41113			
SL185742938-M-151	37.64856	-121.01341	Western Upper	Monitoring	EDF	M-151	M-151	6.4	19	40736													520	1300	38743			
SL185742938-M-152	37.64703	-121.01359	Western Upper	Monitoring	EDF	M-152	M-152	4.2	9.1	41295													910	1100	40373			
SL185742938-M-160	37.64939	-121.01989	Western Upper	Monitoring	EDF	M-160	M-160	6.6	8.1	39640													500	840	39093			
SL185742938-M-161	37.64677	-121.01631	Western Upper	Monitoring	EDF	M-161	M-161	4.9	9.7	42759													440	530	39093			
SL185742938-M-162	37.64693	-121.01441	Western Upper	Monitoring	EDF	M-162	M-162	6.4	7.8	38917													720	1100	42570			
SL185742938-M-163	37.64860	-121.01338	Western Upper	Monitoring	EDF	M-163	M-163	6.5	7.3	44951													530	1400	38742			
SL185742938-M-2R	37.65010	-121.02073	Western Upper	Monitoring	EDF	M-2R	M-2R	3.6	12	40381													1500	2300	39833			
SL185742938-M-6R	37.64782	-121.01803	Western Upper	Monitoring	EDF	M-6R	M-6R	23	73	44754													2100	3200	42564			
SL185742938-M-9R	37.65204	-121.02030	Western Upper	Monitoring	EDF	M-9R	M-9R	7.8	42	39280													320	950	39100			
SL205012989-M-19C1	37.73000	-121.11000	Western Upper	Monitoring	EDF	M-19C1	M-19C1											0.00	4/15/2021									
SL205012989-M-20C1	37.72000	-121.12000	Western Upper	Monitoring	EDF	M-20C1	M-20C1				0						0	0.00	4/14/2021	0								
SL205012989-M-20D	37.72000	-121.12000	Western Lower	Monitoring	EDF	M-20D	M-20D				0						0	0.00	10/7/2021	0								
SL205012989-M-21C1	37.72000	-121.13000	Western Upper	Monitoring	EDF	M-21C1	M-21C1				0						0	0.00	10/7/2021	0								
SL205012989-M-21D	37.72000	-121.13000	Western Lower	Monitoring	EDF	M-21D	M-21D				0						0	0.00	10/7/2021	0								
SL205012989-M-23A	37.72000	-121.12000	Western Upper	Monitoring	EDF	M-23A	M-23A				0						0	0.00	4/14/2021	0								
SL205012989-M-23C1	37.72000	-121.12000	Western Upper	Monitoring	EDF	M-23C1	M-23C1											0.00	4/14/2021									
SL205012989-M-23D	37.72000	-121.12000	Western Lower	Monitoring	EDF	M-23D	M-23D				0						0	0.00	4/14/2021	0								
SL205012989-M-26C2	37.73000	-121.11000	Western Lower	Monitoring	EDF	M-26C2	M-26C2				0						0	0.00	10/8/2021	0								
SL205012989-M-30C1	37.72000	-121.12000	Western Upper	Monitoring	EDF	M-30C1	M-30C1				0						0	0.00	10/8/2021	0								
SL205012989-M-30C2	37.72000	-121.12000	Western Upper	Monitoring	EDF	M-30C2	M-30C2				0						0	0.00	10/8/2021	0								
SL205012989-M-31C1	37.72000	-121.12000	Western Upper	Monitoring	EDF	M-31C1	M-31C1				0						0	0.00	10/7/2021	0								
SL205012989-M-31C2D	37.72000	-121.12000	Western Unknown	Monitoring	EDF	M-31C2D	M-31C2D				0						0	0.00	4/15/2021	0								
SL205012989-M-32D	37.72050	-121.13170	Western Lower	Monitoring	EDF	M-32D	M-32D				0						0	0.00	10/8/2021	0								
SL205012989-M-34A	37.72050	-121.13240	Western Upper	Monitoring	EDF	M-34A	M-34A				0						0	0.00	4/9/2021	0								
SL205012989-M-34C	37.72050	-121.13240	Western Upper	Monitoring	EDF	M-34C	M-34C				0						0	0.00	10/8/2021	0								
SL205012989-M-34D	37.72050	-121.13240	Western Lower	Monitoring	EDF	M-34D	M-34D				0						0	0.00	10/8/2021	0								
SL205012989-M-34D1	37.72050	-121.13240	Western Lower	Monitoring	EDF	M-34D1	M-34D1											0.00	4/9/2021									
SL205012989-M-35A	37.72030	-121.13850	Western Upper	Monitoring	EDF	M-35A	M-35A				0						0	0.00	10/8/2021	0								
SL205012989-M-35B	37.72030	-121.13850	Western Upper	Monitoring	EDF	M-35B	M-35B				0						0	0.00	4/9/2021	0								
SL205012989-M-35D	37.72030	-121.13850	Western Lower	Monitoring	EDF	M-35D	M-35D				0						0	0.00	4/9/2021	0								
SL205012989-M-36C	37.72130	-121.12380	Western Upper	Monitoring	EDF	M-36C	M-36C				0						0	0.00	10/8/2021	0								
SL205012989-M-36D	37.72130	-121.12380	Western Lower	Monitoring	EDF	M-36D	M-36D											0.00	4/9/2021									
SL205012989-M-37D	37.71700	-121.13250	Western Lower	Monitoring	EDF	M-37D	M-37D											0.00	4/9/2021									
SL205012989-M-5A	37.73000	-121.11000	Western Upper	Monitoring	EDF	M-5A	M-5A				0						0	0.00	10/8/2021	0								
SL205012989-M-5B	37.73000	-121.11000	Western Upper	Monitoring	EDF	M-5B	M-5B											0.00	4/14/2021									
SL205012989-M-5C1	37.73000	-121.11000	Western Upper	Monitoring	EDF	M-5C1	M-5C1				0						0	0.00	10/8/2021	0								
SL205012989-M-5C2	37.73000	-121.11000	Western Lower	Monitoring	EDF	M-5C2	M-5C2				0						0	0.00	10/8/2021	0								
SL205012989-M-7A	37.73000	-121.11000	Western Upper	Monitoring	EDF	M-7A	M-7A				0						0	0.00	4/15/2021	0								
SL205012989-MW-11	37.72000	-121.14000	Western Upper	Monitoring	EDF	MW-11	MW-11				0						0	0.00	10/7/2021	0								
SL205012989-MW-7	37.73000	-121.11000	Western Upper	Monitoring	EDF	MW-7	MW-7										0	0.00	10/7/2021									
SL205012989-TH-1	37.73000	-121.11000	Western Lower	Monitoring	EDF	TH-1	TH-1				0						0	0.00	4/15/2021	0								
SL205012989-TH-10	37.72000	-121.12000	Western Upper	Monitoring	EDF	TH-10	TH-10				0						0	0.00	10/7/2021	0								
SL205012989-TH-9	37.72000	-121.12000	Western Upper	Monitoring	EDF	TH-9	TH-9				0						0	0.00	10/7/2021	0								
SL205833043-MMW-01A	37.68713	-120.92128	Eastern	Monitoring	EDF	MMW-01A	MMW-01A				0.011	0.20	8/17/2018							0.021	0.04	8/17/2018						
SL205833043-MMW-02A	37.68549	-120.92007	Eastern	Monitoring	EDF	MMW-02A	MMW-02A													0.0062	0.01	2/19/2016						
SL205833043-MMW-14A	37.68550	-120.92110	Eastern	Monitoring	EDF	MMW-14A	MMW-14A													0.0047	0.01	8/18/2016						
SL205833043-MMW-18A	37.68647	-120.92049	Eastern	Monitoring	EDF	MMW-18A	MMW-18A													0.012	0.02	8/19/2016						
SL205833043-MMW-21A	37.68613	-120.92034	Eastern	Monitoring	EDF	MMW-21A	MMW-21A													0	0.00	3/22/2021						
SL205833043-MMW-24A	37.68665	-120.92103	Eastern	Monitoring	EDF	MMW-24A	MMW-24A				0.0044	0.06	2/19/2016				0	0.00	3/23/2021	0.37	1.90	5/27/2022	824					
SL205833043-MMW-27A	37.68517	-120.91972	Eastern	Monitoring	EDF	MMW-27A	MMW-27A				0.041	0.21	12/19/2015				0	0.00	3/23/2021	0.033	0.06	1/25/2019	3730					
SL205833043-MMW-28A	37.68629	-120.92163	Eastern	Monitoring	EDF	MMW-28A	MMW-28A				0.02	0.07	8/16/2018				0	0.00	3/22/2021	0.23	0.90	3/22/2021	854					
SL205833043-MMW-29A	37.68677	-120.92084	Eastern	Monitoring	EDF	MMW-29A	MMW-29A				0	0.00	3/23/2021				0	0.00	3/23/2021	0.33	2.10	3/23/2021	660					

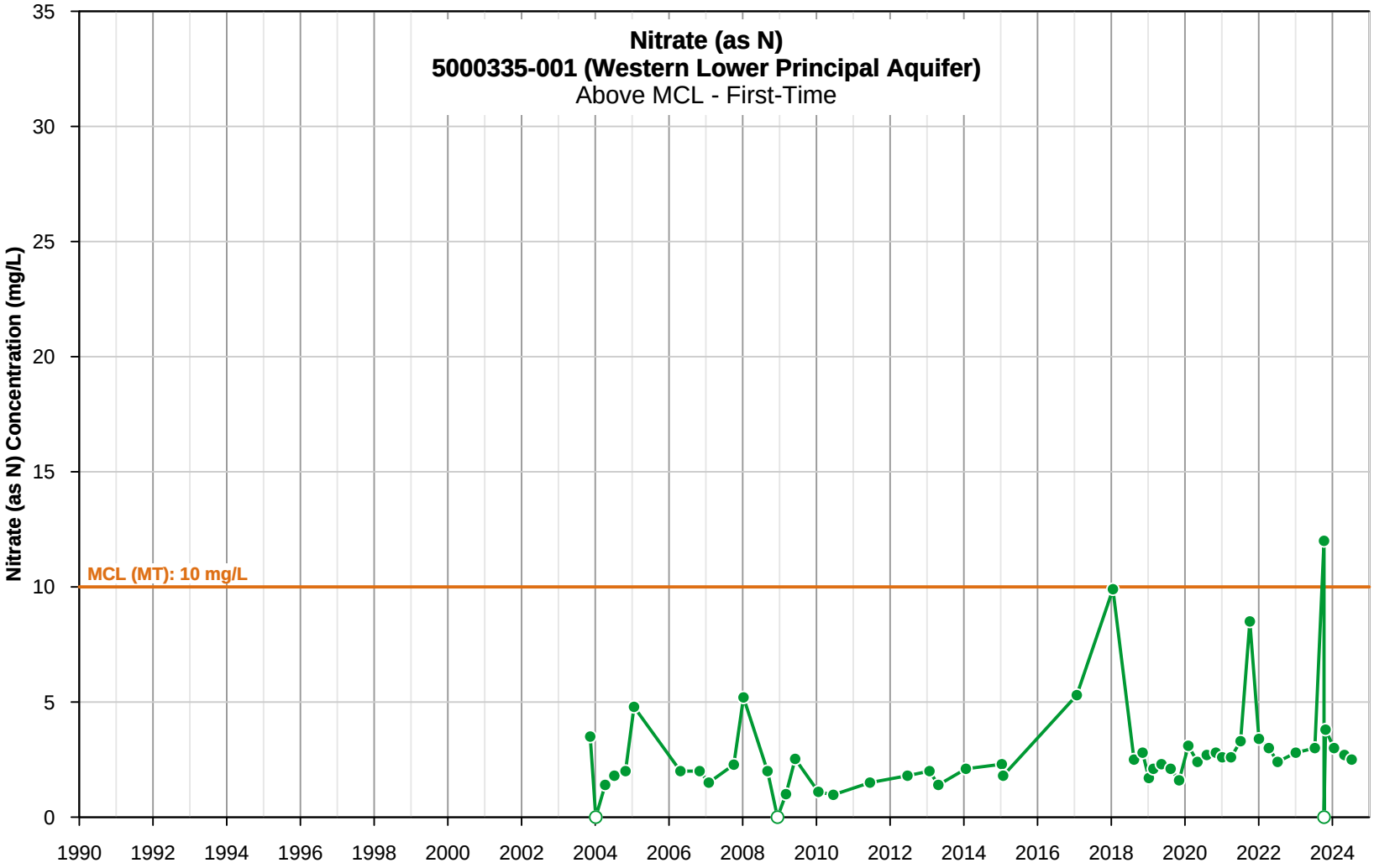
1. Dataset Descriptions:
AGLAND- Domestic wells monitored by the SWRCB Irrigated Lands Regulatory Program
DHS- Untreated and unblended groundwater sampled from public supply wells and reported to the Division of Drinking Water, formerly Department of Health Services
EDF- Monitoring wells at regulated facilities reported by State Water Resources Control Board, submitted in Electronic Deliverable Format
USGS- Wells monitored by United States Geological Survey Groundwater Ambient Monitoring and Assessment (USGS-GAMA) program

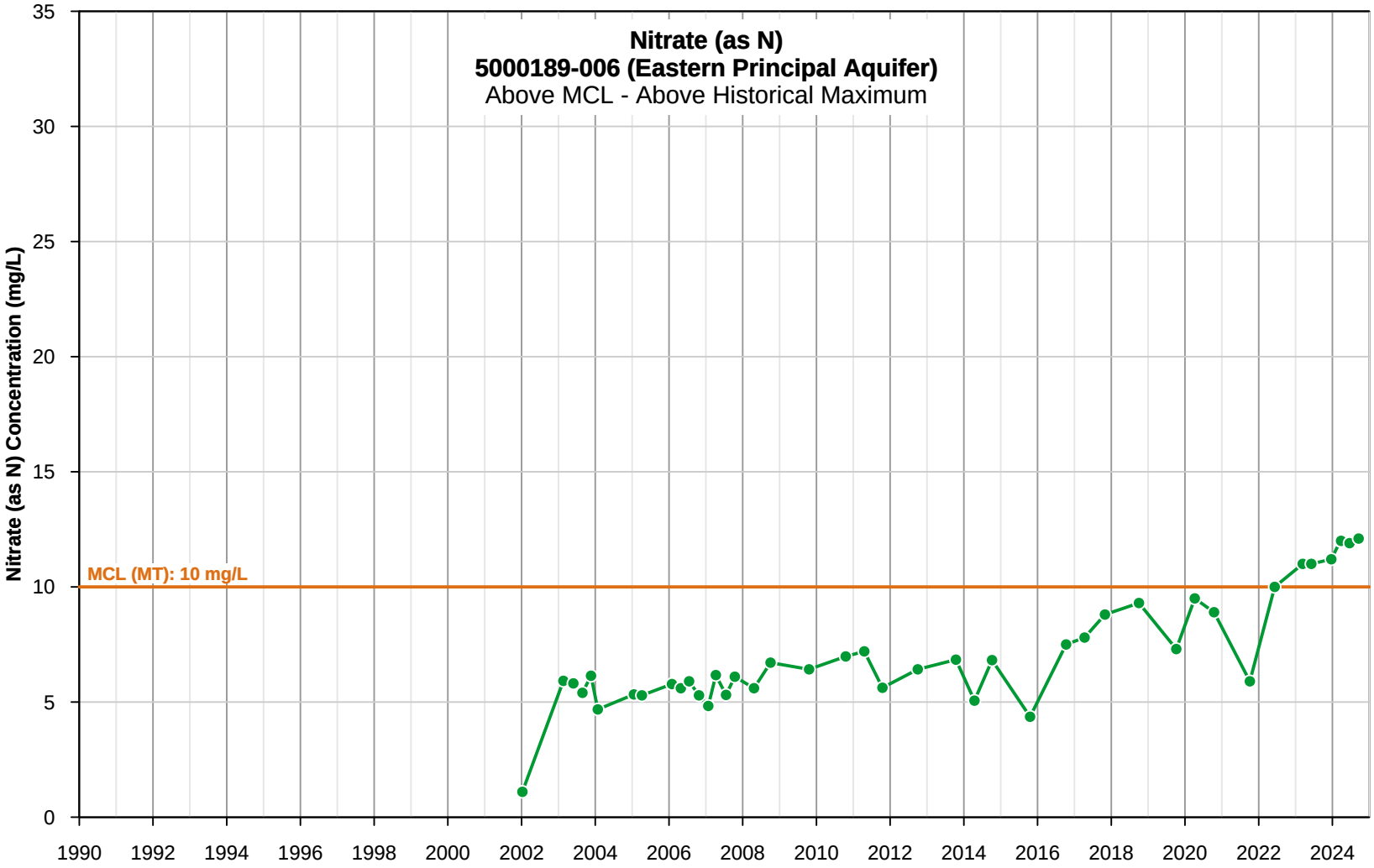
APPENDIX D

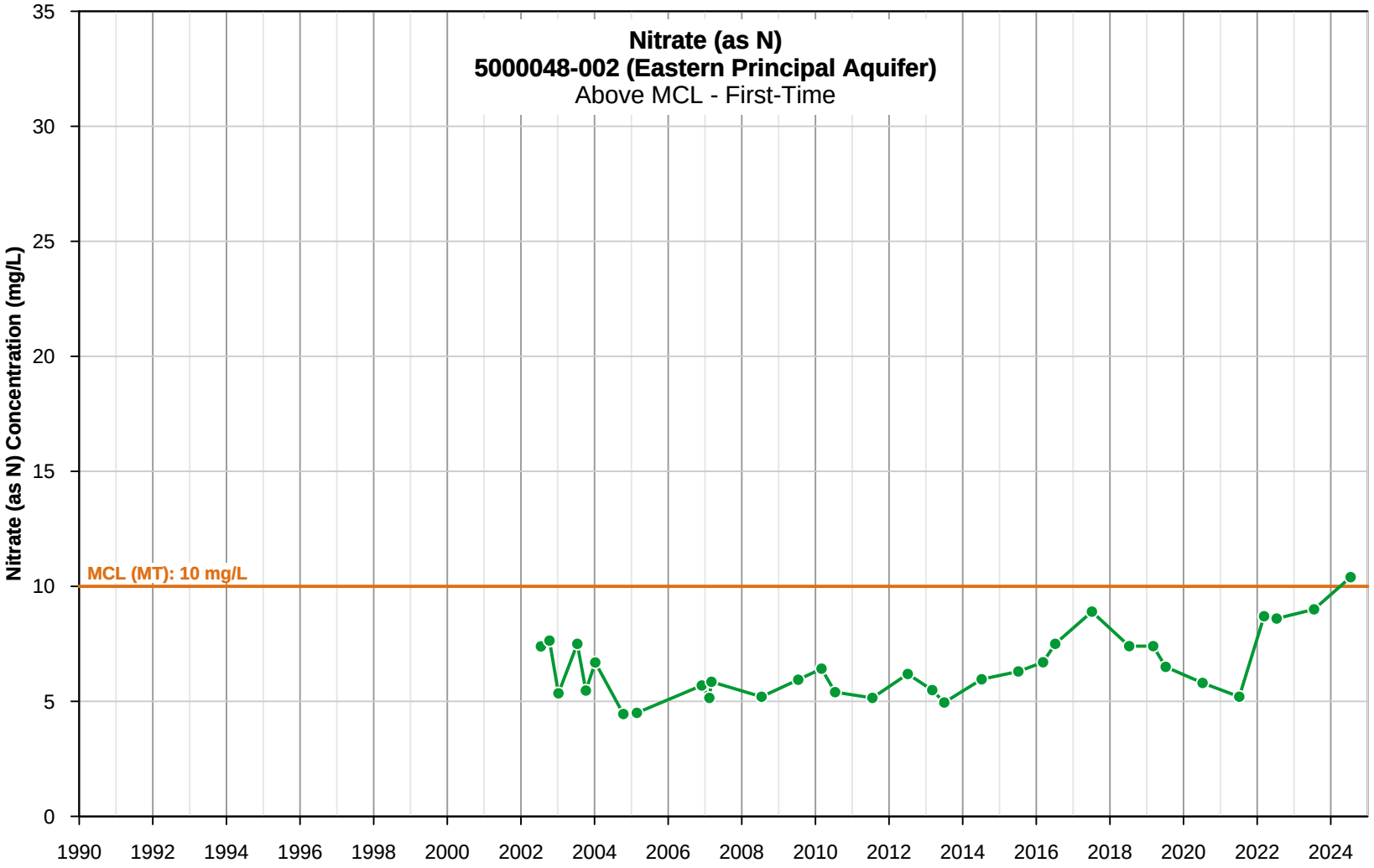
Water Quality Time-Concentration Plots

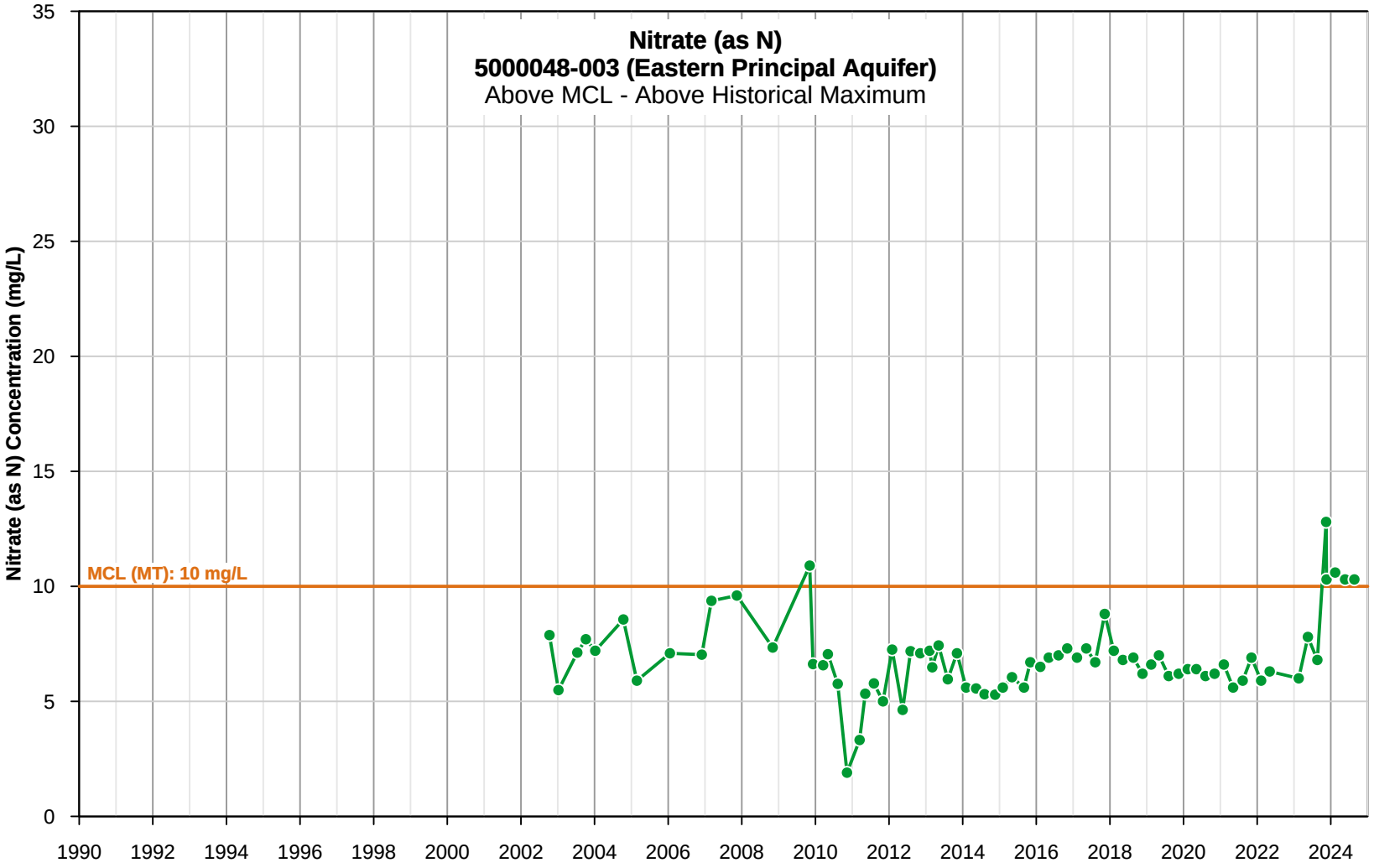

Uranium
5010010-147 (Western Upper Principal Aquifer)
Above MCL - Above Historical Maximum
Uranium Concentration (pCi/L)
MCL (MT): 20 pCi/L
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024

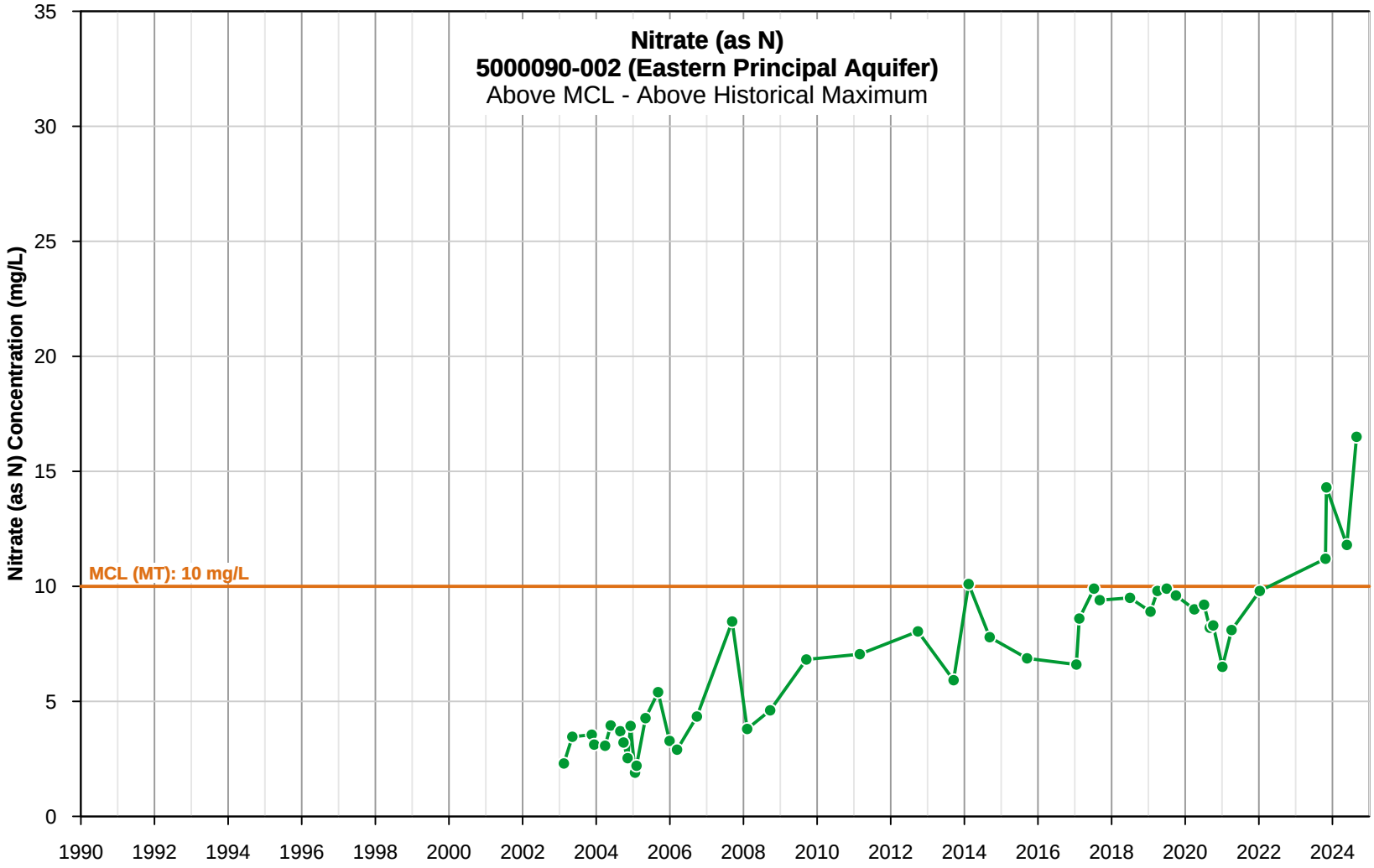

Uranium
5010010-151 (Western Upper Principal Aquifer)
Above MCL - Above Historical Maximum
Uranium Concentration (pCi/L)
MCL (MT): 20 pCi/L
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024

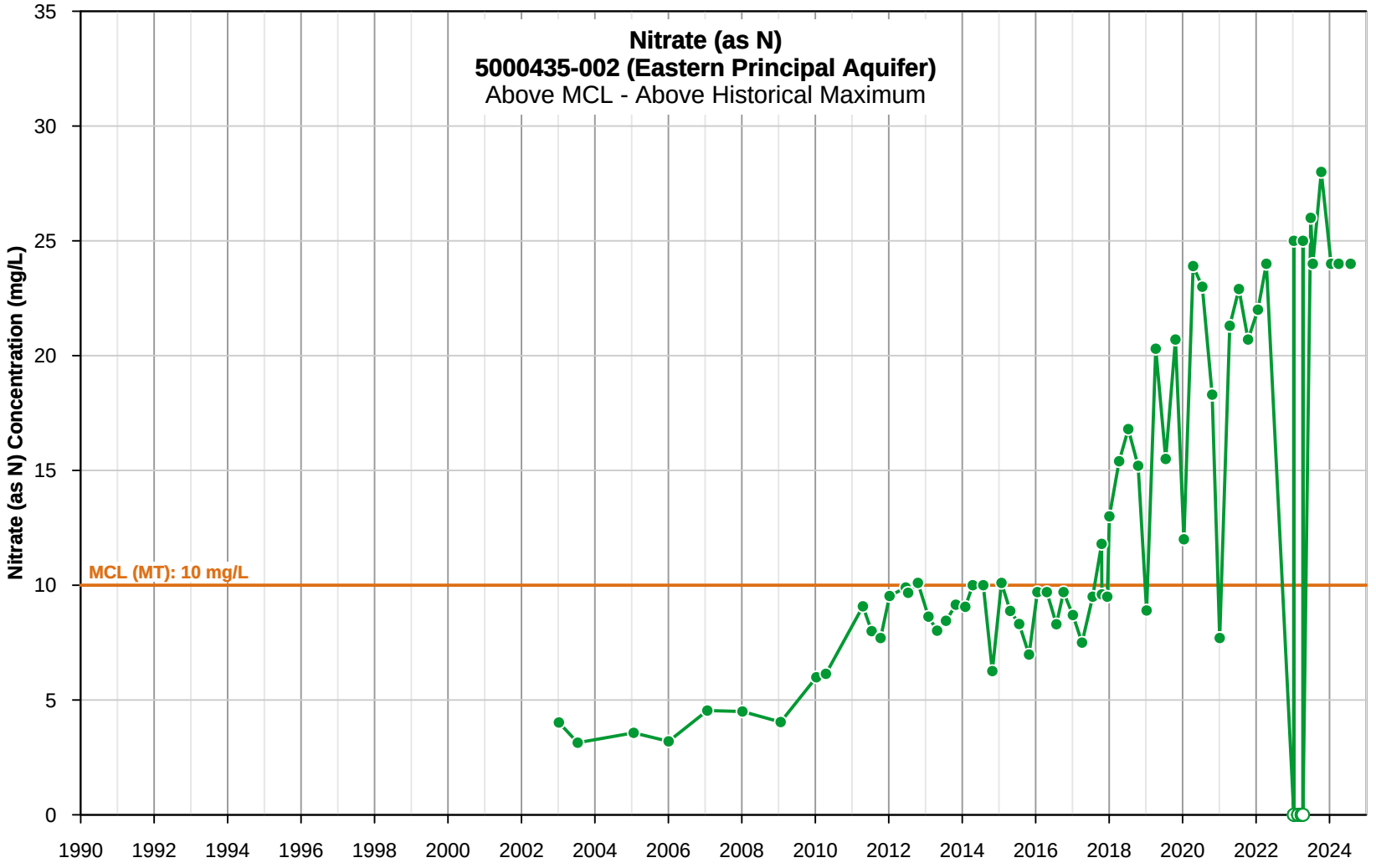

Nitrate (as N)
5000335-001 (Western Lower Principal Aquifer)
Above MCL - First-Time
Nitrate (as N) Concentration (mg/L)
MCL (MT): 10 mg/L
0
5
10
15
20
25
30
35
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024

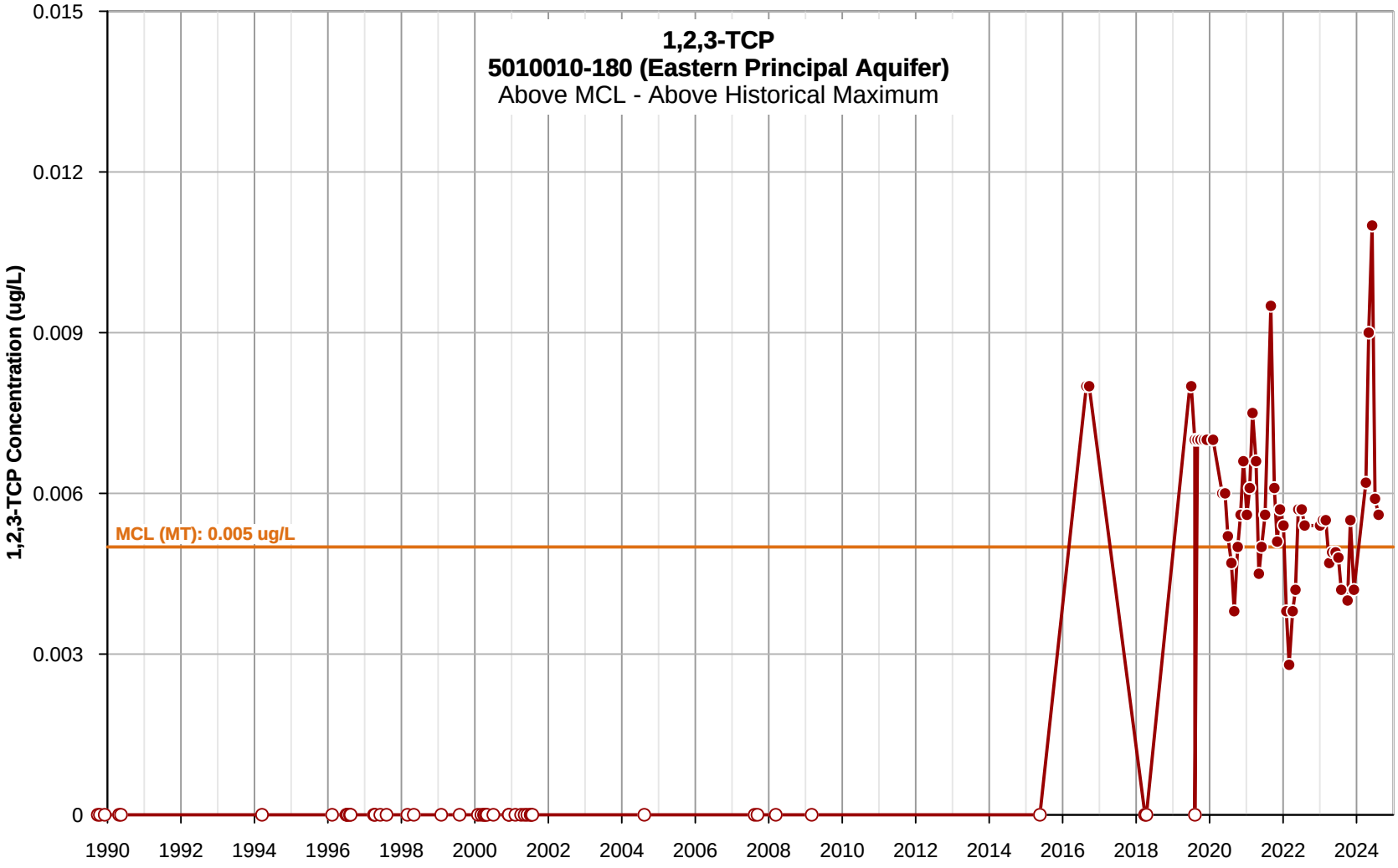

Nitrate (as N)
5000189-006 (Eastern Principal Aquifer)
Above MCL - Above Historical Maximum
Nitrate (as N) Concentration (mg/L)
MCL (MT): 10 mg/L
0
5
10
15
20
25
30
35
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024

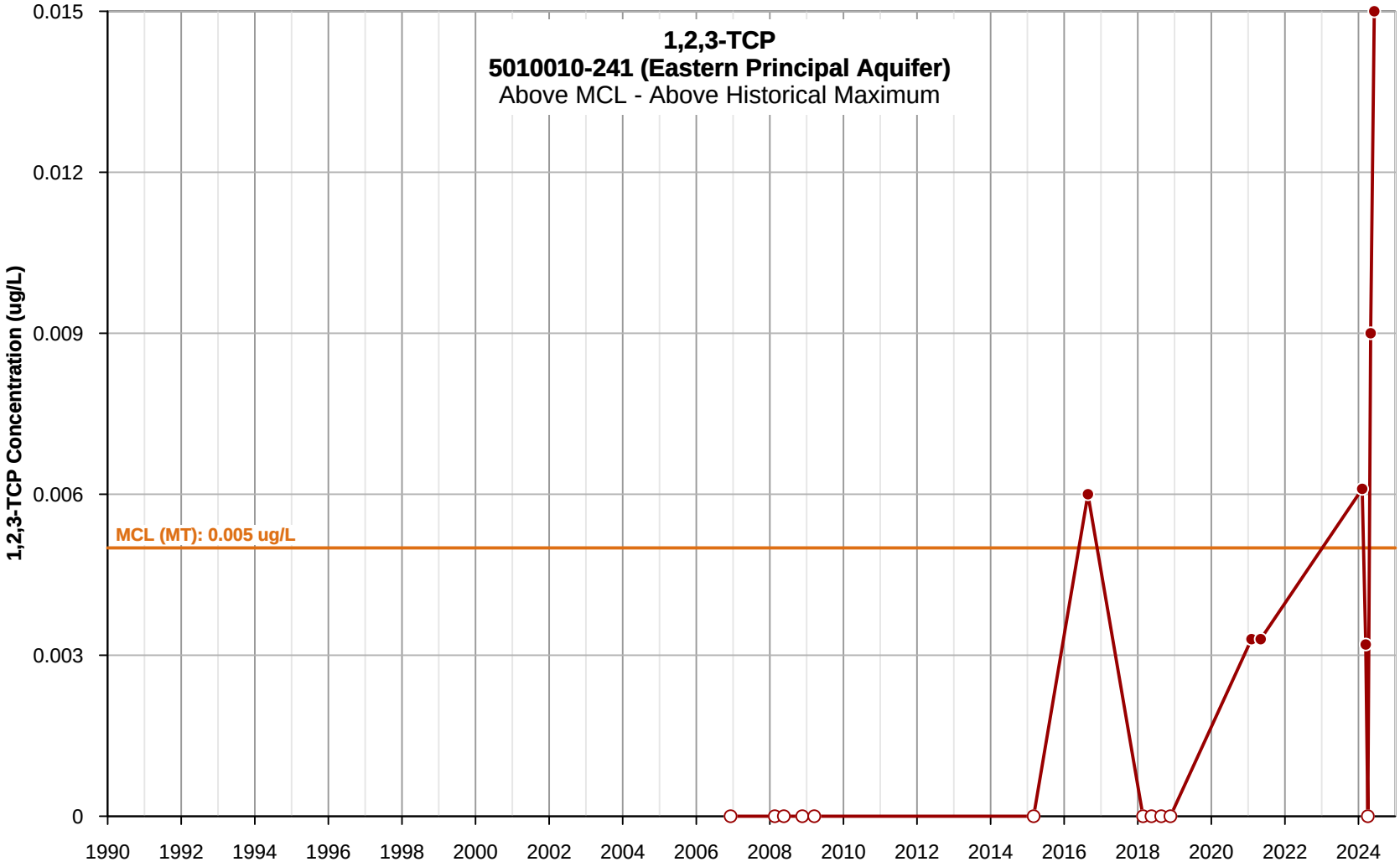

Nitrate (as N)
5000048-002 (Eastern Principal Aquifer)
Above MCL - First-Time
Nitrate (as N) Concentration (mg/L)
MCL (MT): 10 mg/L
0
5
10
15
20
25
30
35
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024


Nitrate (as N)
5000048-003 (Eastern Principal Aquifer)
Above MCL - Above Historical Maximum
Nitrate (as N) Concentration (mg/L)
MCL (MT): 10 mg/L
0
5
10
15
20
25
30
35
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024


Nitrate (as N)
5000090-002 (Eastern Principal Aquifer)
Above MCL - Above Historical Maximum
Nitrate (as N) Concentration (mg/L)
MCL (MT): 10 mg/L
0
5
10
15
20
25
30
35
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024


Nitrate (as N)
5000435-002 (Eastern Principal Aquifer)
Above MCL - Above Historical Maximum
Nitrate (as N) Concentration (mg/L)
MCL (MT): 10 mg/L
0
5
10
15
20
25
30
35
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024


1,2,3-TCP
5010010-180 (Eastern Principal Aquifer)
Above MCL - Above Historical Maximum
1,2,3-TCP Concentration (ug/L)
0.015
0.012
0.009
0.006
0.003
0
MCL (MT): 0.005 ug/L
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024


1,2,3-TCP
5010010-241 (Eastern Principal Aquifer)
Above MCL - Above Historical Maximum
1,2,3-TCP Concentration (ug/L)
0.015
0.012
0.009
0.006
0.003
0
MCL (MT): 0.005 ug/L
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024