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VINA SUBBASIN (5-021.57) GROUNDWATER SUSTAINABILITY PLAN ANNUAL REPORT – 2024

SUBMITTED BY

VINA AND ROCK CREEK RECLAMATION DISTRICT
GROUNDWATER SUSTAINABILITY AGENCIES

PREPARED UNDER CONTRACT WITH

BUTTE COUNTY DEPARTMENT OF
WATER AND RESOURCE CONSERVATION

PREPARED BY

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
µS/cm	micro siemens per centimeter
AEM	airborne electromagnetic
AF	acre-feet
AFY	acre-feet per year
AMSL	above mean sea level
BBGM	Butte Basin Groundwater Model
BCCER	Big Chico Creek Ecological Reserve
DMS	data management system
DWR	Department of Water Resources
DID	Durham Irrigation District
EC	electrical conductivity
eWRIMS	electronic water rights information management system
GPS	global positioning system
GSP	groundwater sustainability plan
GSA	groundwater sustainability agency
MA	management area
MO	measurable objective
MT	minimum /maximum threshold
PMAs	projects and management actions
RCRD	Rock Creek Reclamation District
RFP	request for proposal
RMS	representative monitoring site
SI	sustainability indicator
SGMA	Sustainable Groundwater Management Act
SMC	sustainable management criteria
Subbasin	Vina Subbasin
SWRCB	State Water Resources Control Board
WY	water year (October 1-September 30)

EXECUTIVE SUMMARY

The Vina Subbasin (Subbasin) (5-021.57) Annual Report was prepared on behalf of the Vina Groundwater Sustainability Agency (GSA) and the Rock Creek Reclamation District GSA to fulfill the statutory requirements set by the Sustainable Groundwater Management Act (SGMA) legislation (§10728) and the Groundwater Sustainability Plan (GSP) regulations (§354.40 and §356.2) developed by the California Department of Water Resources (DWR). The regulations mandate the submission of an annual report to DWR by April 1st after the reporting year, which spans the water year (WY) from October 1st to September 30th. This Annual Report includes information from the recent WY 2024 for the Vina Subbasin, located within Butte County, and shown in **Figure ES-1.**

Measured conditions in the Subbasin complied with all minimum/maximum thresholds (MTs) for all applicable sustainability indicators (SIs). A MT is the quantitative value that represents the groundwater conditions at a representative monitoring site that, when exceeded individually or in combination with MT at other monitoring sites, may cause an undesirable result(s) in the basin per DWR's definition. Whether the MT represents a minimum or maximum value is dependent on the SI. As an example of a minimum, if groundwater levels are lower than the value of the measurable objective (MO) for that site, they are moving in the direction of the MT. As an example of a maximum, for the groundwater quality sustainable management criteria (SMC), as the value of the electrical conductivity (EC) concentration increases from the MO established for that site, it is moving in the direction of the MT. The SIs and SMC, including MTs, are summarized in **Table ES-1.** Note that seawater intrusion is not an applicable SI in this Subbasin. Each SI is measured at Representative Monitoring Sites (RMS).

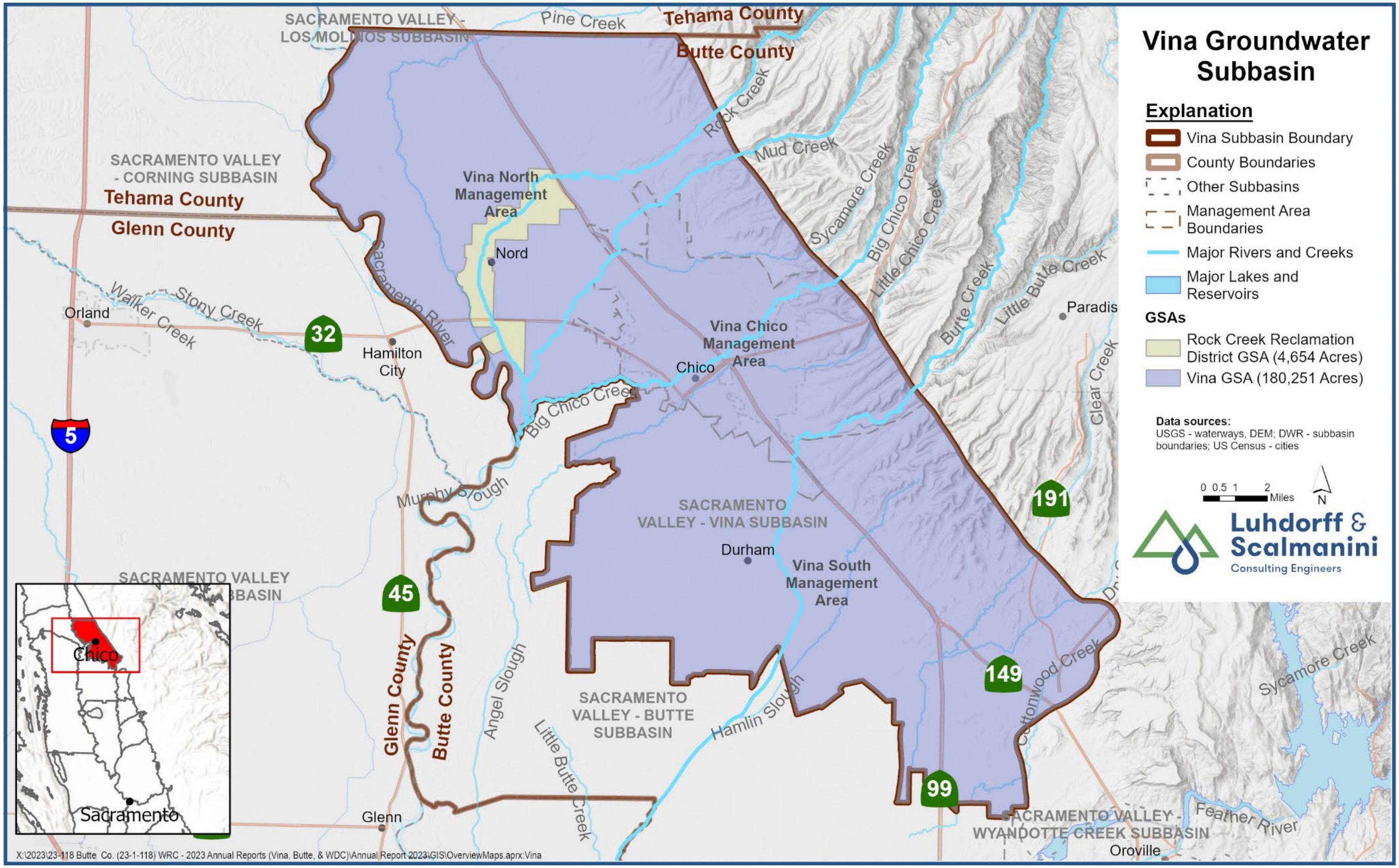

Figure ES-1. Vina Subbasin and Groundwater Sustainability Agency Boundaries

Table ES-1. Vina Subbasin Sustainability Indicator Summary			
2024 Status	**Undesirable Result Identification**	**Measurable Objective (MO) Definition**	**Minimum Threshold (MT) Definition**
Chronic Lowering of Groundwater Levels			
No indication of undesirable results There were no RMS wells with spring or fall 2024 groundwater level measurements below the MT.	When 2 RMS wells within a management area reach their MT for two consecutive non-dry year types.	The groundwater level is based on the groundwater trend line for the dry periods (over the period of record) of observed short-term climatic cycles extended to 2030 for each RMS well.	An elevation protective of sustainably constructed domestic wells (based on their well depths for wells drilled since 1980) within the polygon associated with the RMS well.
Reduction of Groundwater Storage			
No indication of undesirable results There were no RMS wells with spring or fall 2024 groundwater level measurements below the MT.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.
Degraded Water Quality			
No indication of undesirable results There were no RMS wells with electrical conductivity levels above their MTs in 2024.	When 2 RMS wells exceed their MT for two consecutive non-dry years.	Measured electrical conductivity is less than or equal to the recommended Secondary Maximum Contaminant Level (900 µS/cm) based on State Secondary Drinking Water Standards at each well.	The upper limit of the Secondary Maximum Contaminant Level for electrical conductivity (1,600 µS/cm) is based on the State Secondary Drinking Water Standards.
Land Subsidence			
No indication of undesirable results There were no RMS wells with spring or fall 2024 groundwater level measurements below the MT.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.

Table ES-1. Vina Subbasin Sustainability Indicator Summary			
2024 Status	**Undesirable Result Identification**	**Measurable Objective (MO) Definition**	**Minimum Threshold (MT) Definition**
Depletion of Interconnected Surface Water			
No indication of undesirable results There were no RMS wells with spring or fall 2024 groundwater level measurements below the MT.	Uses groundwater levels as a proxy. The GSP identifies data gaps and describes the "Interconnected Surface Water Sustainable Management Criteria Framework."	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.

Notes:

Salinity is the primary water quality constituent of concern, which is evaluated by measuring electrical conductivity (EC).

MO = Measurable Objective, MT = Minimum/Maximum Threshold, RMS = representative monitoring site, µS/cm = micro siemens per centimeter

Current Groundwater Level and Storage Conditions

The current groundwater conditions in the Subbasin are characterized by groundwater elevations that have remained consistently above the MO, have remained well above the corresponding MT, and remain within the Subbasin's established margin of operational flexibility for each RMS well. Importantly, none of the RMS wells experienced a decline below the MT for two consecutive non-dry years, hence avoiding undesirable results as defined in the GSP.

Generally, groundwater elevations were, on average, 68 feet above the MT throughout the Subbasin and, on average, 18 feet above the MOs in WY 2024. Elevations are mostly near or slightly higher than those observed in recent years. This positive trend is influenced by the above normal hydrologic conditions experienced in WY 2024, which resulted in increased natural recharge and reliable surface water supplies.

Fluctuations in groundwater levels and storage within the Subbasin are influenced by the balance between aquifer recharge and extraction. Groundwater levels are used as a proxy for estimating changes in groundwater storage, with observed patterns closely mirroring those in the broader Sacramento Valley. In years characterized by drought and low precipitation, increased agricultural irrigation demand and diminished surface water supplies lead to increased extraction and reduced recharge, causing a decline in groundwater storage.

In contrast, WY 2024, classified as an above normal WY (CDEC, 2024), marked an increase in groundwater storage of approximately 104,500 acre-feet (AF) in the subbasin (a 49% change from the previous WY). For context, in the past 24 years, the largest one-year decrease in groundwater storage is estimated to be -151,700 AF, and the greatest one-year increase was estimated to be 144,100 AF. **Figure ES-2** shows groundwater pumping, as well as an annual and cumulative change in groundwater storage from WY 2000 to WY 2024.

Water Use

Groundwater extraction was approximately 243,300 AF in WY 2024, about 1,300 AF greater than the 242,000 AF extracted in WY 2023. The annual volume of surface water delivered to the Subbasin from surface water features such as Butte Creek was about 28,300 AF in WY 2024, higher than the estimated 27,200 AF delivered in WY 2023.

Groundwater provided the majority (90%) of the water for agriculture in the Subbasin, and surface water was the source for the remainder. Groundwater also met the demand for municipal and rural residential users in WY 2024. The volume of groundwater and surface water used on an annual basis within the Subbasin is summarized directly from measured and reported groundwater pumping and surface water diversions when available; however, a water budget approach has been used to estimate the remaining unmeasured volume of groundwater extraction. Water use for the subbasin is reported in **Appendix D**. The water use analysis methodology is discussed in **Appendix E. Table ES-2** provides a summary of water use by the water sector. Numbers are rounded to the nearest 100.

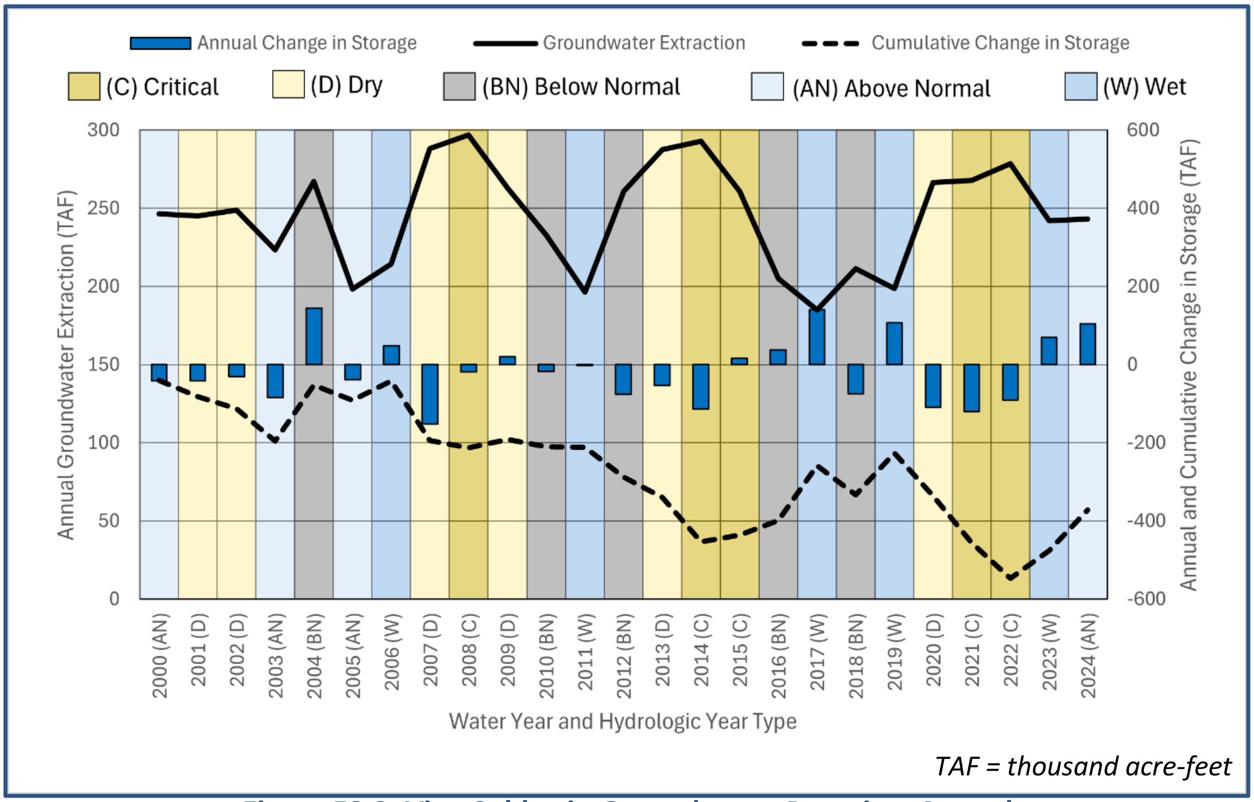

Figure ES-2. Vina Subbasin Groundwater Pumping, Annual and Cumulative Change in Storage from WY 2000 to WY 2024

Table ES-2. Vina Subbasin Total Water Use by Water Use Sector				
Sector	WY 2024 (AF)			
	Groundwater	Surface Water	Total	Total Sector Area (acres)
Agricultural	218,300	25,300	**243,600**	**75,500**
Municipal	22,000	0	**22,000**	**19,100**
Rural Residential	3,000	0	**3,000**	**n/a***
Total	**243,300**	**25,300**	**268,600**	**126,100**

Notes:
**Rural Residential water use is calculated based on population from census data, not area.*

GSP Implementation Progress

The main activities and updates from the previous Annual Report are as follows:

1. All sustainability indicators (SIs) are in compliance with their MTs (see summary **Table 5-1**).

2. The GSAs completed the WY 2023 Annual Report and other critical tasks, such as monitoring and recording groundwater levels and groundwater quality and maintaining and updating the data management system (DMS) with newly collected data.
3. The GSAs continued to participate in ongoing intra- and inter-basin coordination through the work of Butte County Water and Resource Conservation Department.
4. The Vina GSA adopted an initial uniform acreage-based property-related service fee to fund its operations, and the implementation costs required to comply with SGMA in the previous water year, with the intention of conducting a new fee study to explore funding options that reflect the diversity of groundwater users within its boundaries. The new fee study was initiated in early 2024.
5. DWR released a final awards list in September 2023 for the Sustainable Groundwater Management (SGM) Grant Program. Previously, the GSAs coordinated the submittal of a proposal seeking funding for a number of PMAs and other efforts to support the implementation of the GSP. In 2024, the GSAs began implementing projects, results are summarized below and in **Table 5-3**.
6. Progress has been made on 13 PMAs since the last annual report (**Tables 5-3 and 5-4**).

The GSP was approved in July of 2023, and DWR proposed six recommended corrective actions that will enhance the GSP:

1. Providing additional information on historical and current groundwater quality conditions in the Subbasin and refining the definition of sustainable management criteria through a number of actions further described in the letter,
2. Review the model inputs/outputs and provide consistent information regarding stream loss and gains, clarifying whether values represent the overall interaction between the surface water and groundwater system or the quantity of depletion due to groundwater pumping,
3. Providing more information regarding criteria used to identify significant and unreasonable conditions, undesirable results, and the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds through a number of actions further described in the letter,
4. Revising the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry periods will be managed as necessary to ensure that adverse water quality conditions are offset during other periods,
5. Providing more information about the criteria used to identify undesirable results and sustainable management criteria for land subsidence through a number of actions further described in the letter,
6. Use future DWR guidance regarding estimations of the location, quantity, and timing of depletions of interconnected surface water and establish specific sustainable management criteria to sustainably manage depletions of interconnected surface water through a number of actions.

In 2024, the GSAs began implementing projects to address recommended corrective actions, largely funded by the SGM Implementation Grant Program. The ongoing implementation of PMAs, described in **Section 5**, aims to address these corrective actions effectively through the Periodic Evaluation of the GSP, which is due in January 2027.

1 GENERAL INFORMATION §356.2(A)

The Annual Report for the Vina Subbasin (Subbasin) (5-021.57) was prepared on behalf of the Vina Groundwater Sustainability Agency (GSA) and the Rock Creek Reclamation District (RCRD) GSA to fulfill the statutory requirements of the Sustainable Groundwater Management Act (SGMA) legislation (§10728) and regulatory requirements developed by the California Department of Water Resources (DWR) included in the Groundwater Sustainability Plan (GSP) regulations (§354.40 and §356.2). The regulations require the GSAs to submit an Annual Report to DWR by April 1st following the reporting year, which spans the water year (WY) from October 1st to September 30th. This Annual Report is the fourth annual report submitted on behalf of the Subbasin and includes data for the most recent WY 2024 (October 1, 2023, to September 30, 2024). Members of the public seeking information on Vina Subbasin and GSP Implementation, Vina GSA meeting schedules and recordings, and other resources should visit the **Vina Sustainable Groundwater Agency website** (www.vinagsa.org).

1.1 Report Contents

This report is the fourth annual report prepared for the adopted Vina Subbasin GSP submitted in January 2022. The first annual report included data elements for the first reporting year, WY 2021, as well as a "bridge year," WY 2020. The second and third annual reports contain data only for the current reporting year, WY 2022 and WY 2023, respectively. Data elements presented in this report refer to WY 2024, the 12-month period spanning October 2023 through September 2024 unless otherwise noted. Pursuant to GSP regulations, the Annual Report includes:

- Groundwater Elevation Data
- Water Supply and Use
- Change in Groundwater Storage
- GSP Implementation Progress

1.2 Subbasin Setting

The Subbasin is a 289-square-mile (184,917 acres) area on the eastern side of the Sacramento Valley. The Subbasin is managed by the Vina and Rock Creek Reclamation District GSAs. The two GSAs have worked cooperatively to develop and submit a single GSP for the Subbasin and to submit Annual Reports every year.

The Subbasin is shown in **Figure 1-1** and **Figure 1-2**. The Subbasin lies in the eastern central portion of the Sacramento Groundwater Basin, **Figure 1-1**. The Subbasin's northern boundary is the Butte-Tehama County line, the western boundary is the Butte-Glenn County line, the southern boundary is a combination of property boundaries owned by the M&T Ranch, Reclamation District 2106 and Western Canal Water District, and the eastern boundary is the edge of the alluvium as defined by DWR Bulletin 118 (DWR, 2018), **Figure 1-2**. There are several surface water features located in the Subbasin, including Big Chico Creek, Butte Creek, Mud Creek, and Rock Creek. Generally, the streams traverse the Subbasin, moving northeast to southwest. Groundwater generally flows from north to southwest.

The GSP defines three management areas (MAs) in the Vina Subbasin: Vina North, Vina Chico, and Vina South. An MA refers to an area within a subbasin for which a GSP may identify different minimum thresholds (MTs), measurable objectives (MOs), monitoring, and projects and management actions (PMAs) based on unique local conditions or other circumstances as described in the GSP regulations. Although all stakeholders have a shared interest in the sustainable management of groundwater in this predominantly groundwater-dependent Subbasin, the landscape of beneficial users varies between MAs. Vina North is dominated by irrigated agriculture dependent on wells with sparsely distributed rural residential, domestic well users, and the small community of Nord. The Vina-Chico MA is predominantly an urban area with California Water Service, Chico (Cal Water-Chico), providing groundwater supplies for residential and municipal/industrial use. To a very limited extent, private domestic wells provide the primary source of water to households or, in some cases, provide a secondary supply for outdoor water use. The Vina South MA is dominated by irrigated agriculture dependent on groundwater and, to a lesser extent, surface water diversions (primarily from Butte Creek). In and around the community of Durham, significant numbers of rural residents and ranchettes depend on groundwater, typically from relatively shallow domestic wells interspersed with agricultural land uses. In addition, Durham Irrigation District serves household water needs using groundwater from district wells for a portion of the Durham community.

The Vina Subbasin GSP estimates the sustainable yield of the Subbasin to be 233,500 acre-feet per year (AFY) based on historical groundwater pumping averages of 243,500 AFY and an annual decrease in storage of 10,000 AFY (Geosyntec, 2021). Water use in the Subbasin is dominated (90%) by agricultural uses, including irrigation of nut and fruit trees, vineyards, row crops, grazing, and rice fields. Municipal and household water use accounts for the rest (10%) of water used. Groundwater constitutes the majority (91%) of the Subbasin’s water supplies, while surface water constitutes the remaining portion (9%).

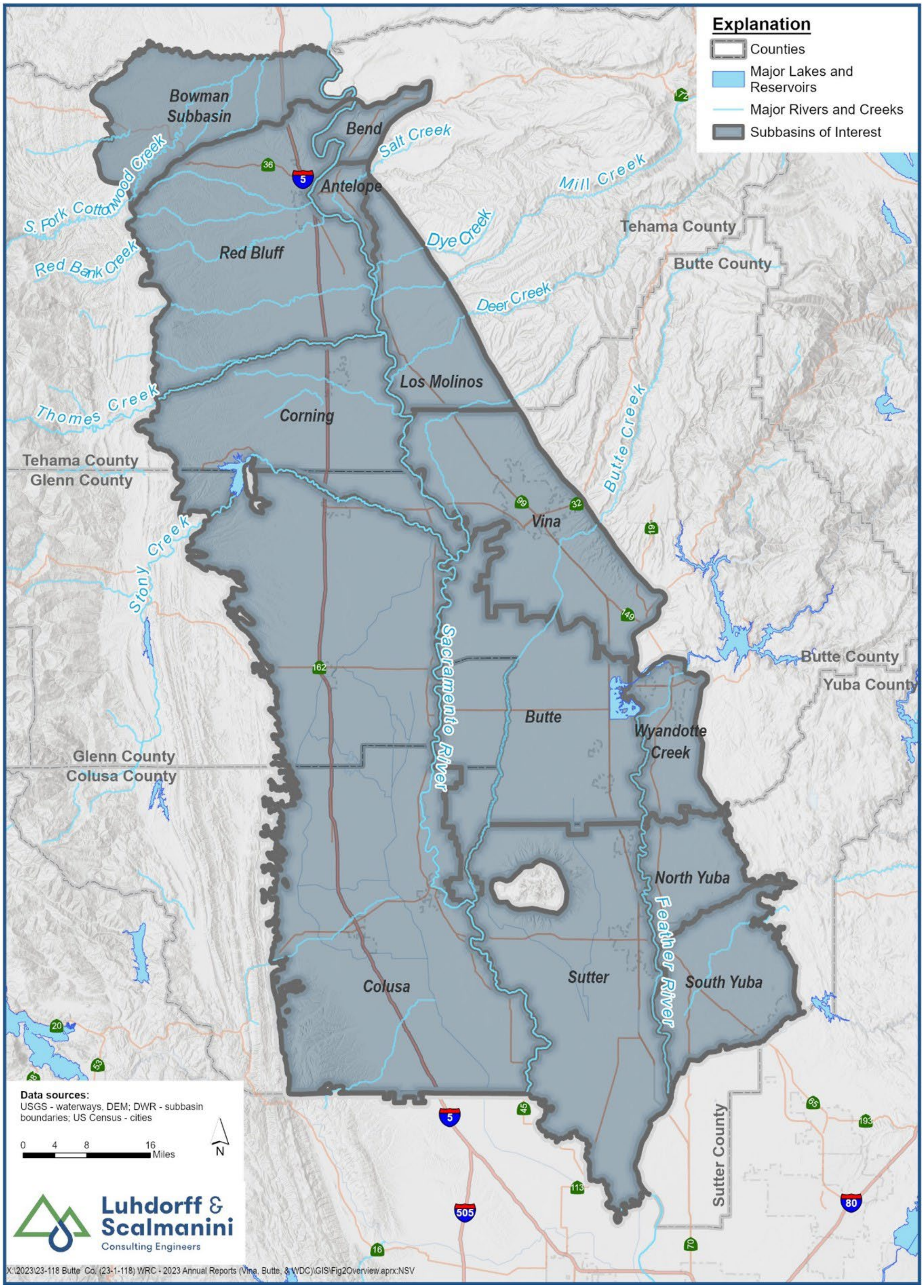

Figure 1-1. Subbasins in the Northern Sacramento Valley

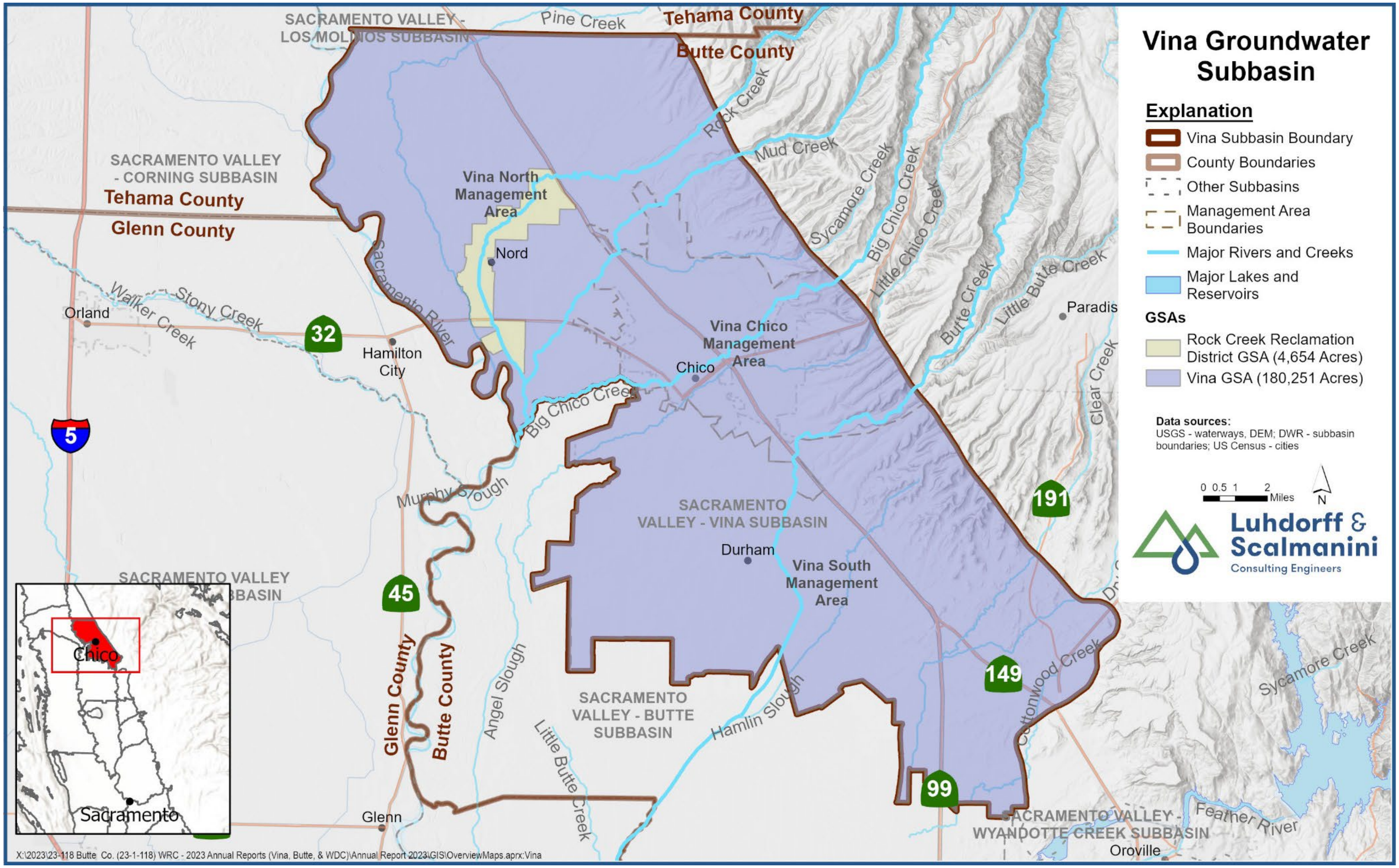

Figure 1-2. Vina Subbasin and Groundwater Sustainability Agency Boundaries

2 GROUNDWATER ELEVATIONS §356.2(b)(1)

Groundwater elevations in the Subbasin typically fluctuate seasonally between and within water years, particularly in groundwater-dependent areas or during drought years when groundwater is used to compensate for diminished surface water supplies. Seasonal fluctuations of groundwater levels occur in response to groundwater pumping and recovery, land and water use activities, recharge, and natural discharge. Sources of recharge into the groundwater system include precipitation, applied irrigation water, and seepage from local creeks and rivers.

Groundwater pumping for irrigation typically occurs from April to September, although depending on the timing of rainfall, it may shift earlier and/or later into the season. Consequently, groundwater levels are usually highest in the spring and lowest during the irrigation season in the summer months. Fall groundwater measurements (typically measured in October) indicate groundwater conditions after the primary irrigation season. Groundwater levels follow a variety of patterns in different areas of the Subbasin; in the WY of 2024 the depth to groundwater ranged from about 20 feet below ground surface to about 150 feet below ground surface.

Groundwater levels in the Subbasin are monitored in representative monitoring site (RMS) wells that were selected in the GSP to represent localized groundwater conditions for specified areas of the Subbasin. RMS wells include a mixture of domestic wells, irrigation wells, and dedicated observation wells. In total, 17 RMS wells are used to monitor conditions in the subbasin. **Appendix A** includes a map of the approximate locations of the RMS wells and hydrographs depicting groundwater elevations in the RMS wells. Sustainable management criteria (SMC), described in **Appendix B**, are assigned for groundwater levels at the RMS wells.

Certain RMS wells measured by DWR and Butte County are equipped with data loggers and pressure transducers, which continuously monitor and record hourly changes in groundwater levels. These and the remaining wells in the network are measured by hand at least twice (in spring and fall) but up to four times each year in March, July, August, and October. Data from groundwater level monitoring wells are available from DWR's online SGMA Data Viewer tool (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer).

Spring and fall 2024 groundwater elevation measurements from RMS wells in the subbasin system are summarized in **Table 5-2**. Groundwater elevation data in the Subbasin is collected by DWR and Butte County and is publicly available from DWR's online SGMA Data Viewer tool (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer). The groundwater level monitoring methods are consistent with the protocols described in the Vina Subbasin GSP. Depending on the well, groundwater elevations are measured using a steel tape, electric sounder, or pressure transducer. The accuracy of groundwater level measurements is typically either 0.01 feet or 0.1 feet, depending on the equipment used.

Groundwater elevations have remained on average 18 feet above their MOs over both seasons and well above their corresponding MTs and, therefore, remained within the Subbasin's margin of operational flexibility established for each RMS well. Therefore, none of the RMS wells fell below the MT for two consecutive non-dry years, hence avoiding undesirable results as defined in the GSP.

The following sections provide a summary of groundwater elevations and conditions during WY 2024 through the presentation and description of groundwater elevation contours (**Section 2.1**) and hydrographs of groundwater elevations (**Section 2.2; Appendix A**).

2.1 Groundwater Elevation Contour Maps – §356.2(b)(1)(A)

Groundwater elevation contour maps for spring and fall 2024 were prepared for the subbasin, as shown in **Figures 2-1** and **2-2**. Spring contours are intended to generally represent seasonal high groundwater elevations (shallower depth to water), while fall contours are intended to generally represent seasonal low groundwater elevations (a deeper depth to water). Groundwater elevation contours were developed by creating a continuous groundwater elevation surface based on available monitoring well data using the kriging interpolation method. Questionable groundwater elevation measurements were excluded, and minor adjustments to the contours were made based on professional judgment.

The contour maps of the subbasin (**Figures 2-1** and **2-2**) each show that groundwater elevations are generally higher in the northern and eastern areas of the Subbasin versus the southern and western areas, indicating a general gradient – and thus groundwater flow, from the northeast to the southwest. The contour maps illustrate several general features of the groundwater flow system in the Vina Subbasin, including:

- Overall, west-southwest groundwater flow is consistent with recharge from the north and along the eastern foothills.
- Convergence of groundwater flow toward pumping areas west of Butte Creek and near Durham in the Vina South MA.
- The higher concentration of contours in the southeast portion of the Subbasin indicates a steeper gradient and could suggest higher groundwater flow. However, given the characteristics of aquifer materials on the eastern portion of the Subbasin, the steep gradient is likely evidence of aquifer materials with lower transmissivity. Nonetheless, the contours are consistent with the current understanding of recharge coming from the lower foothills.
- . New sources of information and data may improve understanding of this area.

Elevations in fall 2024 tend to be nine feet lower than elevations in spring 2024 throughout the Subbasin. Groundwater levels are typically lower in the fall in valley floor locations due to irrigation season pumping. Maps showing the regional context of groundwater contours, including groundwater contours in the Vina, Butte, and Wyandotte Creek Subbasins, are included in **Appendix A**.

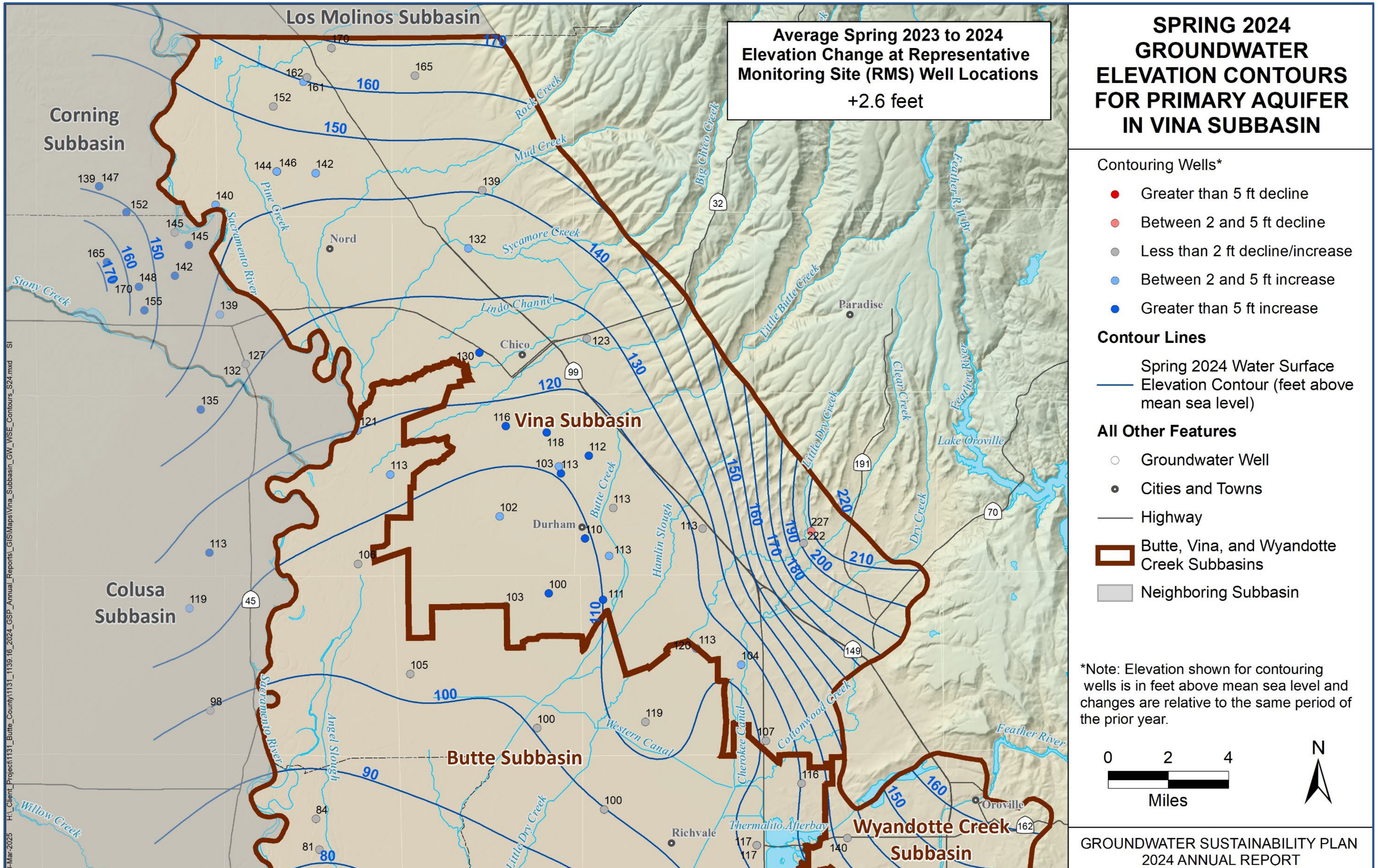

Figure 2-1. Vina Subbasin Contours of Equal Groundwater Elevation, Spring 2024 (Seasonal High)

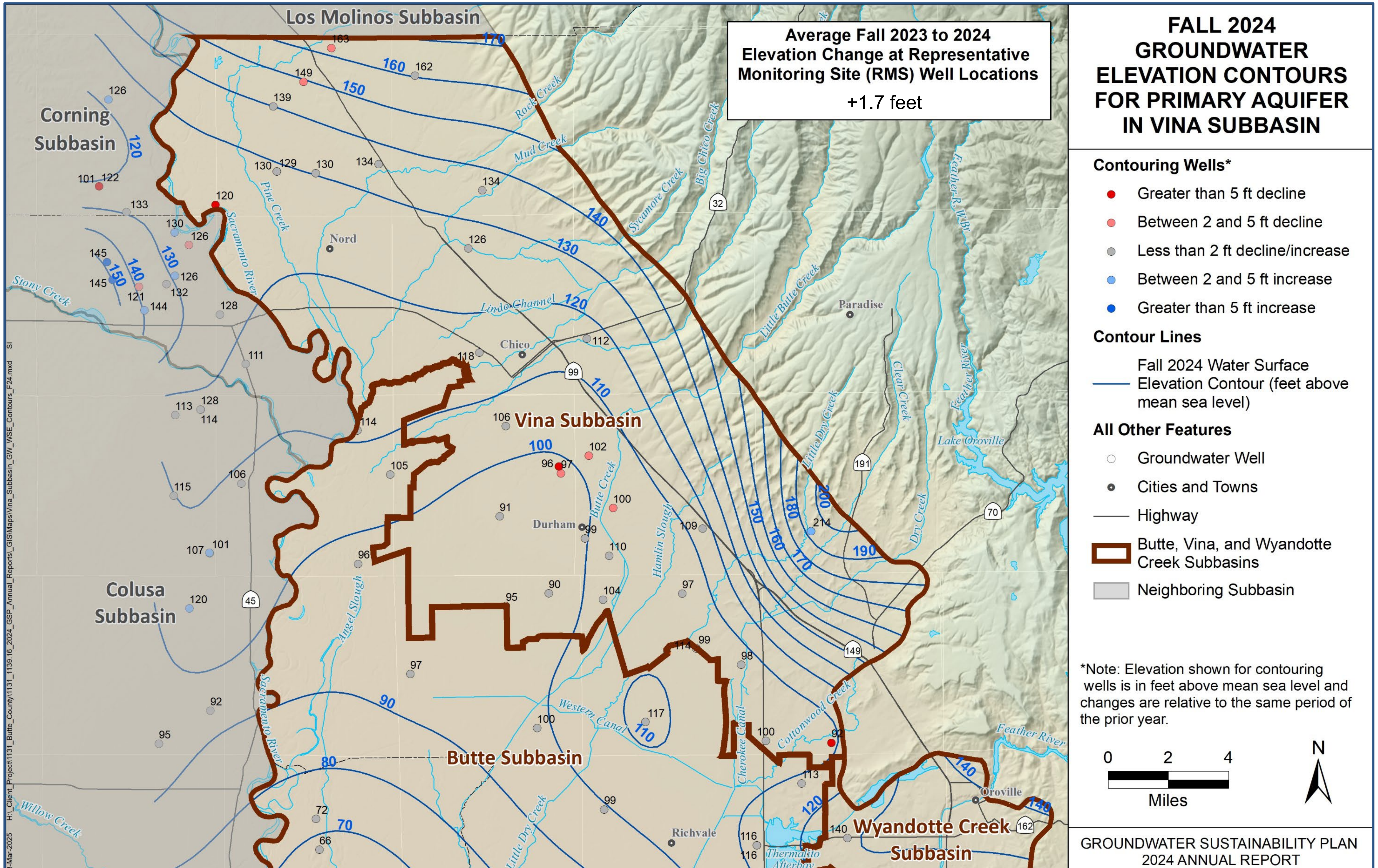

Figure 2-2. Vina Subbasin Contours of Equal Groundwater Elevation, Fall 2024 (Seasonal Low)

2.2 Hydrographs of Groundwater Elevations – §356.2(b)(1)(B)

Groundwater elevation hydrographs for each RMS well are presented in **Appendix A**. **Appendix B** provides an explanation of the SMC terminology defined in Section 3 of the GSP (e.g., MT, MO, interim milestone [IM]). **Table 5-1** summarizes the MOs, MTs, and identification of undesirable results for all applicable Sis for WY 2024, and **Table 5-2** contains a summary of the spring 2024 (seasonal high) and fall 2024 (seasonal low) groundwater elevations measured at each RMS well. **Table 5-2** also summarizes the MA each well is located within, established MO and MT for groundwater elevations, the IM for 2027, the changes in groundwater elevations from WY 2023 to WY 2024, and the differences between the 2024 groundwater elevations and the MO for each RMS well in the spring and fall.

Historically, groundwater levels have typically remained at or above their respective MOs in the Subbasin's RMS wells. The GSP also established IMs to provide numerical metrics for GSAs to track the Subbasin's conditions relative to the overall sustainability goal, ensuring that the groundwater management of the Subbasin remains sustainable.

Spring and fall 2024 groundwater elevations were generally near or slightly higher than seasonal groundwater elevations in previous years. In WY 2024, the average seasonal high was 131 feet above mean sea level (AMSL), and the average seasonal low was 120 feet AMSL. In WY 2023, the average seasonal high was 128 feet AMSL, and the average seasonal low was 118 feet AMSL. Rises in groundwater level elevations generally were expected to result from recharge resulting from a wet WY 2023 and above average hydrological conditions in WY 2024 for.

All wells remained above the MO during spring 2024 and fall 2024. All measured groundwater elevations also remained above the corresponding MT of that RMS well, avoiding undesirable results related to groundwater levels as defined in the GSP. Groundwater levels in RMS wells were, on average, about 18 feet higher than MO elevations and 68 feet higher than MT elevations over both the spring and fall of 2024. All WY 2024 measured groundwater levels remained within the Subbasin's margin of operational flexibility and above the MTs.

3 WATER SUPPLY AND USE

As required by §356.2, this section summarizes water supply and use in the Subbasin, categorized by groundwater supply, surface water supply, and total supply. The total water available for use in the Subbasin was tabulated from groundwater extraction volumes reported in **Table 3-1** and the surface water supply reported in **Table 3-2**. The total water available is summarized in **Table 3-3** for WY 2024. Groundwater extraction volumes are either based on measured data or are estimates from a water use analysis based on 2024 land use data and climate conditions. Water use for the subbasin is reported in **Appendix D**. The water use analysis methodology is discussed in **Appendix E**. Surface water use was estimated using EWRIMS data or historic diversions when records were not available. Groundwater use data was supplied by water districts/municipalities when available.

3.1 Groundwater Extraction – §356.2(b)(2)

Groundwater extraction in the Subbasin is summarized in **Table 3-1**. Groundwater extraction is reported from pumping records where available, while the remaining groundwater extraction is estimated through the water use analysis approach described in the previous section and in **Appendix E**.

The majority of the Subbasin uses groundwater supplies for agricultural irrigation, although portions of the Subbasin may rely on surface water for irrigation. Typically, in years characterized by drought and low precipitation, increased agricultural irrigation demand due to less rainfall (i.e. a dry winter or spring may require earlier or additional irrigation) and diminished surface water supplies lead to increased extraction and reduced recharge and can cause a decline in groundwater storage. In the Vina Subbasin, which does not rely heavily on surface water diversions, the decline in groundwater storage can be more directly attributed to diminished recharge.

Municipal water users extracted approximately 22,000 AF in the Subbasin in WY 2024.Municipal water supplies are measured and were provided by Cal Water, Chico, and Durham Irrigation District (DID). The record of municipal supplies does not distinguish between urban and industrial water uses.

Rural residential water users rely on private domestic wells to meet their household water needs and extracted approximately 3,000 AF in WY 2024. Rural residential groundwater extraction was quantified based on average per capita water use and estimated population. The average per capita water use reported in the California Water Service Chico-Hamilton City District 2020 Urban Water Management Plan 2020 (Cal Water-Chico, 2020) was 181 gallons per capita per day. This is considered representative of rural residential per capita water use in the region. Population estimates were based on average household sizes from the US census and aggregated to those living outside city water district boundaries. Population estimates were used to estimate residential groundwater pumping.

The total estimated groundwater extraction was approximately 243,300 AF in WY 2024, the majority of which was used to meet agricultural water demands (approximately 218,300 AF). The total groundwater extraction is about 1,700 AF less than the historical (2000 – 2023) groundwater pumping average (245,000 AFY; **Table 4-1**) while slightly higher than 228,000 AF, which was the average annual extraction of the last three above normal WYs on record (2000, 2003, 2005). **Figure 3-1** shows the general areas of pumping where extraction occurs. Roughly 90% of the total groundwater extraction was used by the agricultural sector, while the remaining 10% was used for municipal and rural residential water needs.

Table 3-1. Vina Subbasin Groundwater Use by Water Use Sector

Sector	WY 2024 (AF)
Agricultural	218,300
Municipal	22,000
Rural Residential	3,000
Total	**243,300**

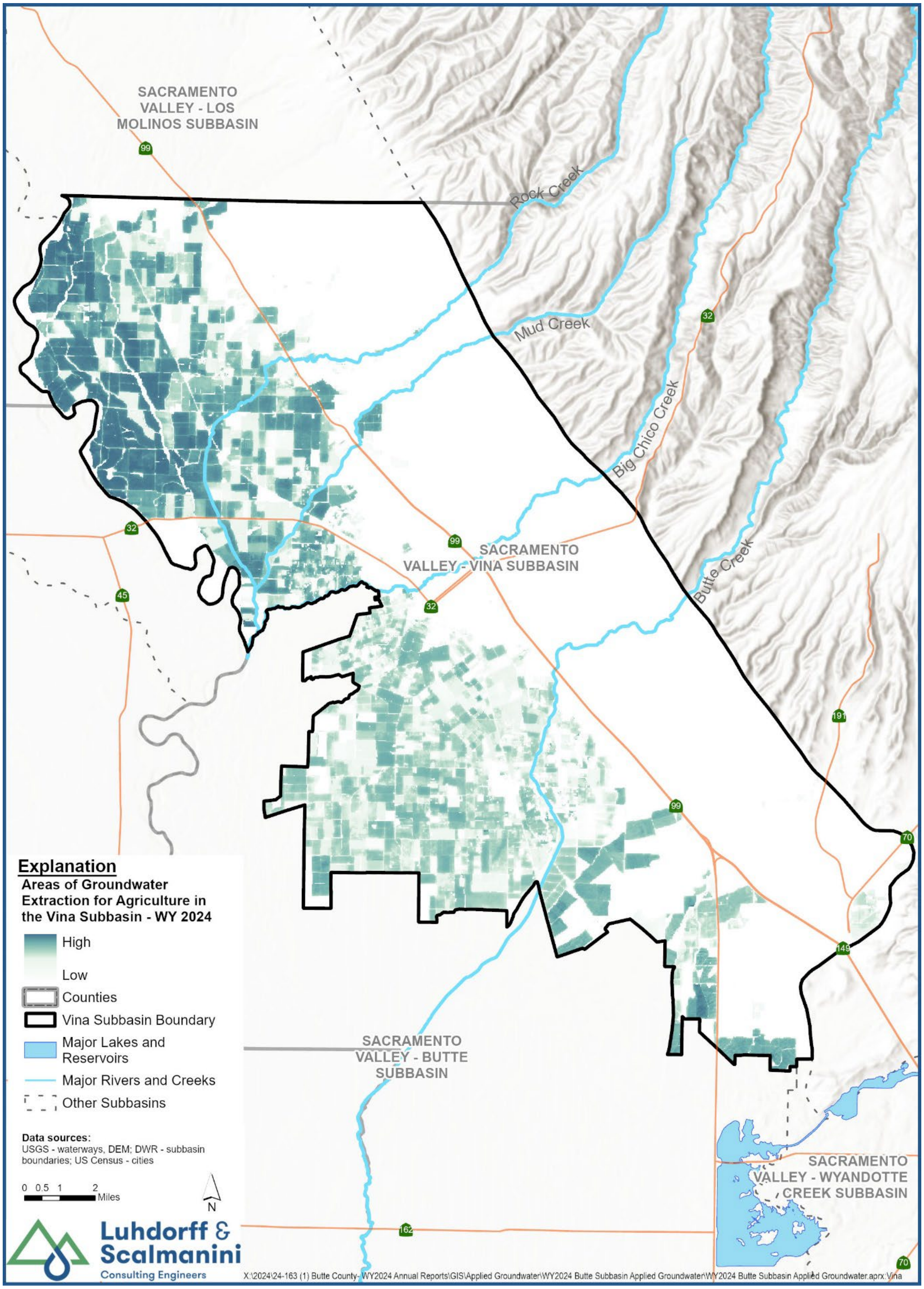

Figure 3-1. Vina Subbasin Areas of Groundwater Extraction for Agriculture – WY 2024

3.2 Surface Water Supply – §356.2(b)(3)

Surface water supplies used or available for use in the Subbasin are summarized in **Table 3-2.** Surface water supplies are reported directly from water supplier records or collected from publicly available sources (water rights diversion records, etc.) where available. Missing surface water supply data was estimated based on available historical diversions data in similar water years.

Surface water provided about 9% of the agricultural water demand in the Subbasin for WY 2024. Diversions from Butte Creek were accessed from the State Water Resource Control Board's (SWRCB) Electronic Water Rights Information Management System (eWRIMS; SWRCB, 2024) or direct request from diverters. Data from eWRIMS on surface water delivery indicated which water rights holders on Butte Creek had made diversions during WY 2024. There are currently no surface water supplies for municipal use in the Vina Subbasin. Total surface water diversions and deliveries for the Vina Subbasin are estimated to be about 28,300 AF and 25,300 AF, respectively. The difference between these two volumes represents estimated conveyance losses between points of diversion and application, such as seepage, evaporation, or spillage.

In contrast with reduced surface water supplies experienced in WY 2022 (20,500 AF), WY 2024 was an above normal WY with more substantial surface water supplies (similar to WY 2023). These, combined with above normal hydrological conditions, supported groundwater recharge and offset groundwater extraction volumes compared to WY 2022.

Table 3-2. Vina Subbasin Surface Water Use by Water Use Sector for WY2024

Sector	Diverted (AF)	Applied (AF)
Agricultural	28,300	25,300
Total	**28,300**	**25,300**

3.3 Total Water Use by Sector – §356.2(b)(4)

Total water demand in the subbasin for WY 2024 was divided between groundwater (91%) and surface water (9%). The total water available for use in the Subbasin was tabulated from groundwater extraction volumes reported in **Table 3-1** and the surface water supply reported in **Table 3-2**. The total water available is summarized in **Table 3-3** for WY 2024. The results are either based on measured data or estimates, as described in the previous two sections. **Table 3-3** also shows the total irrigated area in WY 2024 within the Subbasin.

Table 3-3. Vina Subbasin Total Water Use by Water Use Sector				
Sector	WY 2024 (AF)			
	Groundwater	Surface Water	Total	Total Sector Area (acres)
Agricultural	218,300	25,300	**243,600**	**75,500**
Municipal	22,000	0	**22,000**	**19,100**
Rural Residential	3,000	0	**3,000**	**n/a***
Total	**243,300**	**25,300**	**268,600**	**126,100**

Notes:
[*] Rural Residential water use is calculated based on population from census data, not area.

3.4 Uncertainties in Water Use Estimates

Estimated uncertainties in the water budget components are presented in **Table 3-4**. The uncertainty of these water budget components is based on typical accuracies given in technical literature and the cumulative estimated accuracy of all inputs used to calculate the components.

Table 3-4. Vina Subbasin Estimated Uncertainty in Water Use Estimates			
Water Budget Component	Data Source	Estimated Uncertainty (%)	Source
Groundwater			
Agricultural	Measurement	20%	Typical uncertainty from water balance calculation.
Municipal/Industrial	Measurement/ Estimate	5%	Typical accuracy of municipal water system reporting.
Rural Residential	Calculation	15%	Estimated from per capita water use and Census information.
Surface Water			
Agricultural	Calculation	10%[1]	Estimated from Senate Bill 88 measurement accuracy standards.

[1] *Higher uncertainty of 10%-20% is typical for estimated surface water inflows, including un-gaged inflows from small watersheds into creeks that enter the Subbasin.*

4 GROUNDWATER STORAGE

Long-term fluctuations in groundwater levels and groundwater in storage occur when there is an imbalance between the volume of water recharged into the aquifer and the volume of water removed from the aquifer, either by extraction or natural discharge to surface water bodies. If, over a period of years, the amount of water recharged to the aquifer exceeds the amount of water removed from the aquifer, then groundwater levels will increase and groundwater storage increases (i.e., positive change in storage). Conversely, if, over time, the amount of water removed from the aquifer exceeds the amount of water recharged, then groundwater levels decline, and groundwater storage decreases. These long-term changes can be linked to various factors, including increased or decreased groundwater extraction or variations in recharge associated with wet or dry hydrologic cycles.

A review of the RMS well hydrographs (**Appendix A**) indicates that groundwater elevations are either relatively stable or show a declining trend over time. Declines may be influenced by the significant percentage of water years since 2006 that have been dry (i.e., characterized as below normal, dry, or critical). Since groundwater storage is closely related to groundwater levels, measured changes in groundwater levels can serve as a proxy for and be utilized to estimate changes in groundwater storage. Changes in groundwater storage in the Subbasin follow a pattern typically seen in the majority of the Sacramento Valley. During normal to wet years, groundwater is withdrawn during the summer for irrigation and is replenished during the winter through recharge of precipitation and surface water inflows, allowing groundwater storage to potentially rebound by the following spring. During dry years and drought conditions, this pattern is disrupted when more groundwater may be pumped to meet irrigation demand, and less recharge may occur due to reduced precipitation, diminished or curtailed surface water supplies, and lower stream levels.

In WY 2024 (an above normal WY), groundwater storage increased by approximately 104,500 AF in the subbasin. Despite a slight increase in groundwater extraction relative to WY 2023, increased recharge due to above normal hydrological conditions contributed to this increase in storage.

The following sections present a summary of groundwater use and change in storage over time, along with a description of the uncertainty in storage change estimates.

4.1 Change in Groundwater Storage – §356.2(b)(5)(B)

Annual groundwater pumping, groundwater storage changes, and the cumulative change in storage over time are presented for WY 2000 through WY 2024 in **Table 4-1** and **Figure 4-1**. Substantial decline in groundwater storage occurred in the dry to critical WY 2020 through WY 2022 timeframe, significant recovery began in the wet WY 2023 and continued in the above normal WY 2024. Groundwater storage in the subbasin increased by 104,500 AF in WY 2024. For context, in the past 24 years, the largest one-year decrease in groundwater storage is estimated to be -151,700 AF, and the highest one-year increase was estimated to be 144,100 AF.

The historical record since 2000 includes multiple data sources. Groundwater extractions for WY 2000 through WY 2018 were obtained from the Butte Basin Groundwater Model (BBGM) (BCDWRC, 2021), and the water budgets were prepared as part of the Vina Subbasin GSP (Geosyntec, 2021). The WY 2019 and WY 2020 groundwater extraction values were calculated as the average based on the hydrologic year type from WY 2000 to WY 2018. The WY 2021 groundwater extraction estimates were based on a drought impact analysis conducted around the time of annual report development that year (LSCE, 2022). The WY 2022 and WY 2023 groundwater extraction values were obtained from prior annual reports and were developed using the same methods as WY 2024, as described in **Section 3** and **Appendix E**. Groundwater extractions for the entire period include pumping for agricultural, municipal, and rural residential purposes.

The annual and cumulative changes in groundwater storage are both calculated for the period from WY 2000 through WY 2024 based on the methodology described below in **Section 4.2**. This methodology differs from the change in groundwater storage estimates available through the BBGM. An evaluation of a total of 20 pairs of concurrent annual storage changes over the period from WY 1999 through WY 2018 was assembled from the BBGM, and the methodology described in **Section 4.2** was completed to evaluate the consistency of the new methodology with the BBGM results. Although groundwater storage changes differ in some cases, the general trends are similar, and there is agreement between the methodologies. It is anticipated that the methodology described in **Section 4.2** will be utilized for annual report updates until the BBGM model is updated from 2018 through the present (anticipated to be completed as part of the Periodic Evaluation of the GSP due in January 2027, if not sooner).

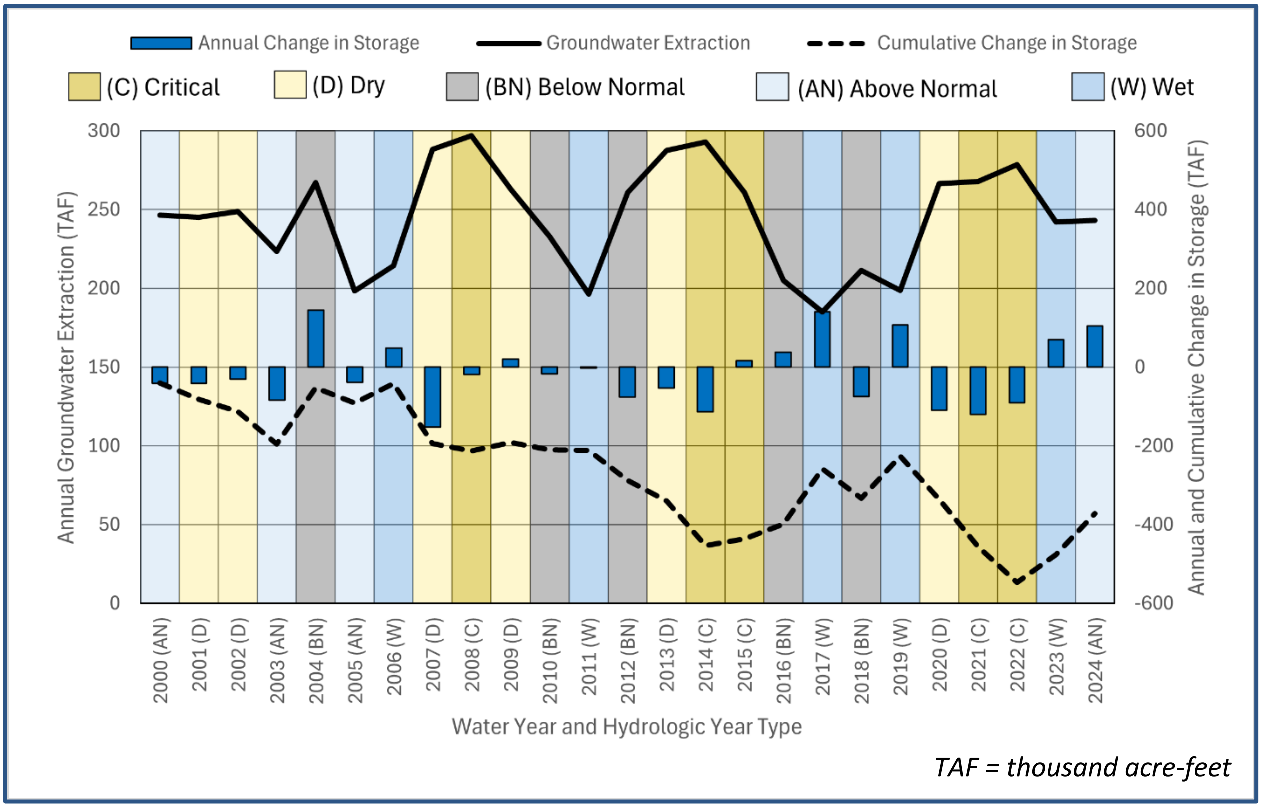

Figure 4-1. Vina Subbasin Groundwater Pumping and Annual and Cumulative Change in Storage from WY 2000 to WY 2024

Table 4-1. Vina Subbasin Groundwater Extraction, Annual Groundwater Storage Change, and Cumulative Change in Storage			
Water Year (Hydrologic Year Type)	Groundwater Extraction[1] (AF)	Annual Change in Storage (AF)	Cumulative Change in Storage (AF)
2000 (AN)	246,600	-41,000	-41,000
2001 (D)	245,200	-40,800	-81,800
2002 (D)	248,900	-30,300	-112,100
2003 (AN)	223,500	-83,900	-196,000
2004 (BN)	267,200	144,100	-51,900
2005 (AN)	198,400	-38,800	-90,700
2006 (W)	214,400	48,700	-42,000
2007 (D)	288,400	-151,700	-193,700
2008 (C)	297,100	-18,900	-212,600
2009 (D)	263,000	20,700	-191,900
2010 (BN)	232,700	-17,600	-209,500
2011 (W)	196,500	-2,100	-211,600
2012 (BN)	261,000	-75,700	-287,300
2013 (D)	287,600	-53,000	-340,300
2014 (C)	293,000	-112,600	-452,900
2015 (C)	260,900	16,800	-436,100
2016 (BN)	205,100	37,200	-398,900
2017 (W)	185,000	140,300	-258,600
2018 (BN)	211,400	-73,900	-332,500
2019 (W)	198,600	106,700	-225,800
2020 (D)	266,600	-109,400	-335,200
2021 (C)	267,980	-120,400	-455,600
2022 (C)	278,700	-90,700	-546,300
2023 (W)	242,000	70,200	-476,100
2024 (AN)	243,300	104,500	-371,600

Table 4-1. Vina Subbasin Groundwater Extraction, Annual Groundwater Storage Change, and Cumulative Change in Storage			
Water Year (Hydrologic Year Type)	**Groundwater Extraction[1] (AF)**	**Annual Change in Storage (AF)**	**Cumulative Change in Storage (AF)**
Historic Averages (2000 – 2023)			
2000-2023 (24 years)[2]	245,000	-19,800	
W (4 years)	207,300	72,800	
AN (4 years)	228,000	-14,800	
BN (5 years)	235,500	2,800	
D (6 years)	266,600	-60,800	
C (5 years)	279,500	-65,200	

Notes: *Table notes are included on the following page.*

Positive values indicate inflows to the groundwater system, and negative values indicate outflows from the groundwater system.

AF = acre-feet

Water Year Types Classified According to the Sacramento Valley Water Year Index:

W = wet, AN = above normal, BN = below normal, D = dry, C = critical

*[1] Groundwater extraction values from 2000 to 2018 were determined using BBGM (Geosyntec, 2021). Values for 2019-2020 are averages from that period. Estimates for 2021 were based on a drought impact analysis (LSCE, 2022), while estimates for 2022-2024 are based on a GEEEO process (**Appendix E**).*

[2]The historical average calculation covers the period from 2000 to 2023, excluding the current water year.

4.2 Groundwater Storage Maps – §356.2(b)(5)(A)

The spatial distribution of estimated changes in groundwater storage for the period from spring 2023 to spring 2024 are shown in **Figure 4-2** for the subbasin. Since groundwater storage is closely related to groundwater levels, measured changes in groundwater levels can serve as a proxy for and be utilized to estimate changes in groundwater storage. The change in groundwater storage was estimated based on the change in measured spring-to-spring groundwater levels at each RMS well, multiplied by the area of a Thiessen polygon surrounding that RMS well (defining a representative area for each RMS well) and a representative storage coefficient of 0.1 for the subbasin.

Spring measurements used to calculate the change in groundwater storage were computed as the average of all available groundwater level measurements from March and April of the respective year. The representative storage coefficient was established by roughly calibrating the estimated change in storage based on changes in observed groundwater levels (i.e., calculated using groundwater level data, representative area, and a storage coefficient parameter) with estimated change in storage outputs from the BBGM, as reported in the GSP to aggregate characteristics across all zones of the subbasin system. A total of 20 pairs of concurrent annual storage changes assembled from both methods over the period from WY 1999 through WY 2018 were used for calibration. Determination of a representative storage coefficient allows for estimating the change in volume of groundwater storage based on the measured change in groundwater levels and known representative area (i.e., Thiessen polygon) associated with each groundwater level measurement.

Negative changes in storage values indicate lowering groundwater levels and depletion of groundwater storage, whereas a positive change in storage values represents rising groundwater levels and accretion of groundwater in storage. As shown in **Figure 4-2**, the change in storage for each representative area (i.e., Thiessen polygon) in the subbasin over the previous year ranged from roughly zero to 10,000 AF. The representative areas around the northwestern and central portions of the Subbasin had a larger positive change in storage. Total groundwater storage change in the subbasin was estimated to be approximately 104,500 AF between spring 2023 and spring 2024.

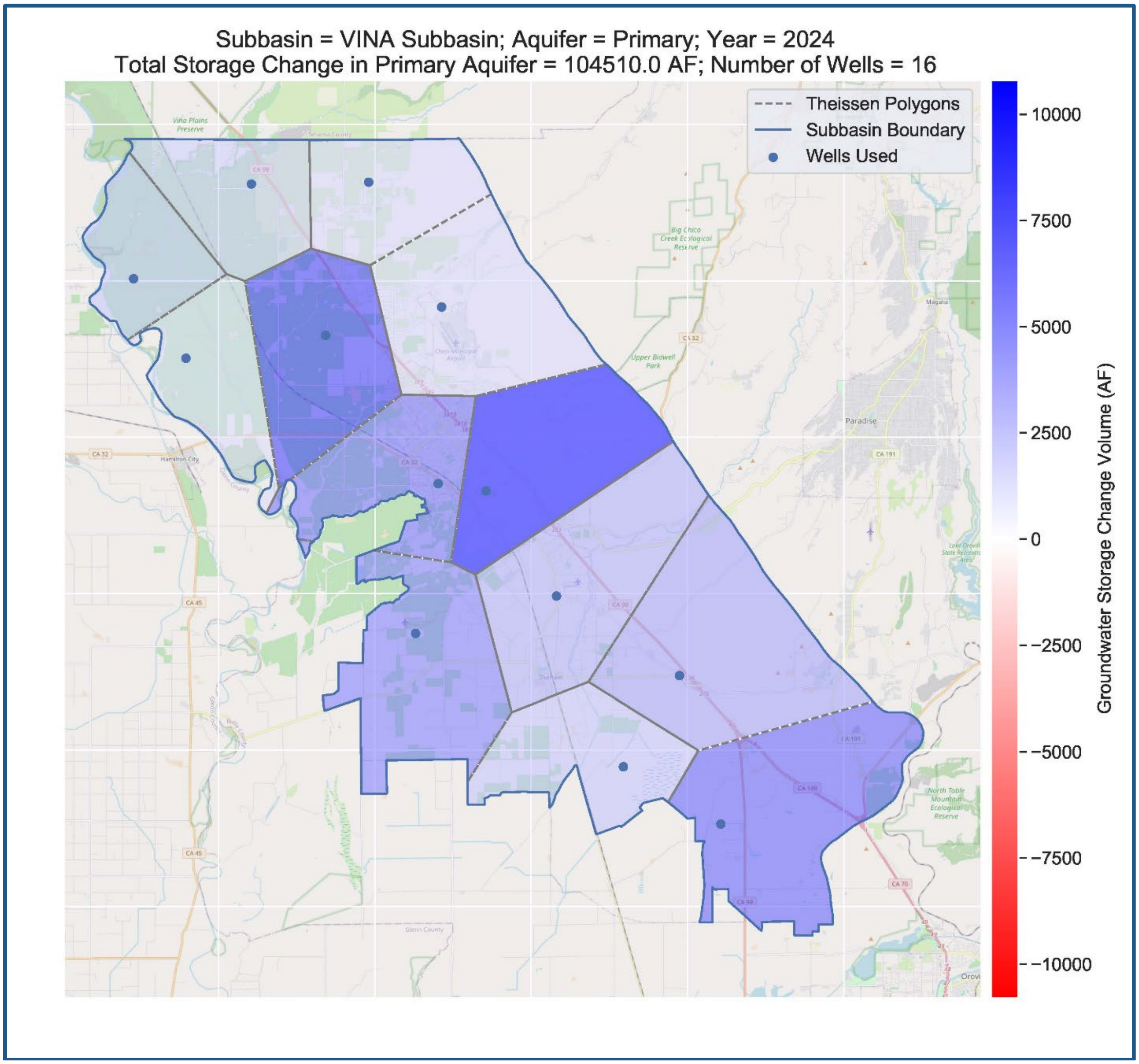

Figure 4-2. Vina Subbasin Change in Groundwater Storage from Spring 2023 to Spring 2024

4.3 Uncertainty in Groundwater Storage Estimates

The uncertainty associated with the change in groundwater storage estimates depends in part on the underlying uncertainty of the groundwater level data, the representative area (i.e., Thiessen polygon), and the calibrated storage coefficient parameter used to calculate the change in groundwater storage. As described in **Section 4.2**, a calibration process was conducted to roughly align the estimated change in groundwater storage based on observed groundwater levels to the estimated change in groundwater storage outputs from the BBGM. Thus, the uncertainty of the estimated change in groundwater storage reported in **Table 4-1** and **Figure 4-2** is estimated to be approximately equal to the uncertainty of the estimated change in groundwater storage outputs from the BBGM (typically 20-30% for integrated hydrologic models).

5 GSP IMPLEMENTATION PROGRESS – §356.2(B)(5)(C)

5.1 Main Activities of Water Year 2024

The main activities and updates from the previous Annual Report are as follows:

1. All sustainability indicators (SIs) are in compliance with their MTs (see summary **Table 5-1**).
2. The GSAs completed the WY 2023 Annual Report and other critical tasks, such as monitoring and recording groundwater levels and groundwater quality and maintaining and updating the data management system (DMS) with newly collected data.
3. The GSAs continued to participate in ongoing intra- and inter-basin coordination through the work of Butte County Water and Resource Conservation Department.
4. The Vina GSA adopted an initial uniform acreage-based property-related service fee to fund its operations, and the implementation costs required to comply with SGMA in the previous water year, with the intention of conducting a new fee study to explore funding options that reflect the diversity of groundwater users within its boundaries. The new fee study was initiated in early 2024.
5. DWR released a final awards list in September 2023 for the Sustainable Groundwater Management (SGM) Grant Program. The Vina GSA was awarded about $5.5 million to complete specific tasks ranging from filling data gaps, conducting feasibility analyses for two water supply projects, performing recharge feasibility and pilot projects, and designing and implementing pilot programs for demand reduction strategies. This portfolio approach funds various phases of projects listed in the GSP. More information is summarized below and in **Table 5-3**.
6. Progress has been made on 13 PMAs since the last annual report (**Tables 5-3 and 5-4**).

The GSP was approved in July of 2023, and DWR proposed six recommended corrective actions that will enhance the GSP:

1. Providing additional information on historical and current groundwater quality conditions in the Subbasin and refining the definition of sustainable management criteria through a number of actions further described in the letter,
2. Review the model inputs/outputs and provide consistent information regarding stream loss and gains, clarifying whether values represent the overall interaction between the surface water and groundwater system or the quantity of depletion due to groundwater pumping,
3. Providing more information regarding criteria used to identify significant and unreasonable conditions, undesirable results, and the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds through a number of actions further described in the letter,
4. Revising the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry periods will be managed as necessary to ensure that adverse water quality conditions are offset during other periods,

5. Providing more information about the criteria used to identify undesirable results and sustainable management criteria for land subsidence through a number of actions further described in the letter,
6. Use future DWR guidance regarding estimations of the location, quantity, and timing of depletions of interconnected surface water and establish specific sustainable management criteria to sustainably manage depletions of interconnected surface water through a number of actions.

In 2024, the GSAs began implementing projects to address recommended corrective actions, largely funded by the SGM Implementation Grant Program. The ongoing implementation of PMAs, described in **Section 5**, aims to address these corrective actions effectively through the Periodic Evaluation of the GSP, which is due in January 2027.

5.2 Progress Toward Achieving Interim Milestones

Observed conditions for all SIs are in compliance with their MTs (see summary **Table 5-1**). An MT is a quantitative value that represents the groundwater conditions at an RMS that, when exceeded individually or in combination with MTs at other monitoring sites, may cause an undesirable result in the basin per DWR's definition. Whether the MT represents a minimum or maximum value is dependent on the SI. As an example of a minimum, if groundwater levels are lower than the value of the MO for that site, they are moving in the direction of the MT. As an example of a maximum, for the groundwater quality SMC, as the value of the electrical conductivity concentration increases from the MO established for that site, it is moving in the direction of the MT. The SIs and SMC, including MTs, are summarized in **Table 5-2**. Seawater Intrusion is not an applicable SI in the Vina Subbasin.

Table 5-1. Vina Subbasin Sustainability Indicator Summary			
2024 Status	**Undesirable Result Identification**	**Measurable Objective (MO) Definition**	**Minimum Threshold (MT) Definition**
Chronic Lowering of Groundwater Levels			
No indication of undesirable results There were no RMS wells with spring or fall 2024 groundwater level measurements below the MT.	When 2 RMS wells within a management area reach their MT for two consecutive non-dry year types.	The groundwater level is based on the groundwater trend line for the dry periods (over the period of record) of observed short-term climatic cycles extended to 2030 for each RMS well.	An elevation protective of sustainably constructed domestic wells (based on their well depths for wells drilled since 1980) within the polygon associated with the RMS well
Reduction of Groundwater Storage			
No indication of undesirable results There were no RMS wells with spring or fall 2024 groundwater level measurements below the MT.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.
Degraded Water Quality			
No indication of undesirable results There were no RMS wells with electrical conductivity levels above their MTs in 2024.	When 2 RMS wells exceed their MT for two consecutive non-dry years.	Measured electrical conductivity less than or equal to the recommended Secondary Maximum Contaminant Level (900 µS/cm) based on State Secondary Drinking Water Standards at each well.	The upper limit of the Secondary Maximum Contaminant Level for electrical conductivity (1,600 µS/cm) is based on the State Secondary Drinking Water Standards.
Land Subsidence			
No indication of undesirable results There were no RMS wells with spring or fall 2024 groundwater level measurements below the MT.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.

Table 5-1. Vina Subbasin Sustainability Indicator Summary			
2024 Status	**Undesirable Result Identification**	**Measurable Objective (MO) Definition**	**Minimum Threshold (MT) Definition**
Depletion of Interconnected Surface Water			
No indication of undesirable results There were no RMS wells with spring or fall 2024 groundwater level measurements below the MT.	Uses groundwater levels as a proxy. GSP identifies data gaps and describes "Interconnected Surface Water Sustainable Management Criteria Framework."	Groundwater levels are a proxy, per SGMA regulations.	Groundwater levels are a proxy, per SGMA regulations.

Notes:

Salinity is the primary water quality constituent of concern, which is evaluated by measuring electrical conductivity (EC).

MO = measurable objective, MT = minimum/maximum threshold, RMS = representative monitoring site, µS/cm = micro siemens per centimeter

5.2.1 Chronic Lowering of Groundwater Levels and Reduction in Groundwater Storage SMC

The reduction in groundwater storage SMC utilizes the chronic lowering of groundwater levels SMC as a proxy (**Table 5-1**). Thus, groundwater conditions related to storage and chronic lowering of groundwater levels are discussed together. Groundwater conditions in the Subbasin are on track to meet the first 5-year 2027 IMs and avoid undesirable results for groundwater levels at each of the RMS wells. In spring 2024, all groundwater elevations were above the established MOs and MTs (as indicated in **Table 5-2**) which shows measurements from WY 2024 for spring seasonal highs and fall seasonal lows, along with MOs and MTs. It also compares the WY 2024 measurements to those from WY 2023 and to the measurable objectives. Spring and fall 2024 groundwater elevations were all at or above the established MOs (DWR, 2024). Groundwater elevations are all above the MTs throughout the Subbasin, with elevations mostly near or slightly higher than those observed in recent years (**Appendix A**). Higher water level observed in spring 2024 compared to spring 2023 have bolstered groundwater storage in the Subbasin due to above normal hydrological conditions, and increased recharge despite a slight increase in groundwater extraction from the previous year.

Table 5-2. Vina Subbasin Measurable Objectives, Minimum Thresholds, and Seasonal Groundwater Elevations of Representative Monitoring Site Wells

State Well Number[1]	Groundwater Elevation (feet above mean sea level)				Spring 2024 vs. MO (ft)	Fall 2024 vs. MO (ft)	Spring 2024 vs. Spring 2023 (ft) (seasonal high)	Fall 2024 vs. Fall 2023 (ft) (seasonal low)
	2024 Measurements		MO	MT				
	Spring (seasonal high)	Fall (seasonal low)						
Vina North Management Area								
23N02W**25C001M**	143.8	131.6	130	50	13.8	1.6	3	-2.5
23N01W**10E001M**	160.7	--	136	80	24.7	--	2	--
23N01E**07H001M**	164.9	162.3	136	72	28.9	26.3	1.3	0.6
22N01W**05M001M**	139.7	121.1	115	31	24.7	6.1	1.6	--
23N01W**36P001M**	133	119.8	108	45	25	11.8	4	4.6
23N01E**33A001M**	138.8	133.9	125	72	13.8	8.9	1.0	0.3
Vina Chico Management Area								
CWSCH01b	121	107	106	85	15	1	4	-3
CWSCH02	128	120	105	85	23	15	10	9
CWSCH03	121	113	108	85	13	5	1	-2
CWSCH07	110	104	95	85	15	9	1	2
22N01E**28J003M**	134.2	123.3	111	85	23.2	12.3	5.8	0.96
Vina South Management Area								
21N01E**21C001M**	98	86.9	64	10	34	22.9	3.6	0
21N02E**18C003M**	167.1	163.6	130	65	37.1	33.6	-0.2	2.9
20N01E**10C002M**	--	--	92	20	--	--	--	--
20N02E**24C001M**	104.1	97.9	77	18	27.1	620.9	1.4	6.5
20N02E**09L001M**	114	105.7	91	30	23	14.7	2.3	-0.1
21N02E**26E005M**	111.5	108.5	95	36	16.5	13.5	0.4	4.1

[1] *The portion of the State Well Number shown in bold underlined text is the RMS ID.*

MO = measurable objective, MT = minimum/maximum threshold, -- = Indicates missing or questionable measurements.

5.2.2 Degraded Water Quality SMC

The degraded water quality MT and MO are summarized in **Table 5-1**. Salinity is the main constituent of concern in the Subbasin and is evaluated by EC. Salinity (i.e., EC) is measured at RMS wells throughout the Subbasin, and the County collected the data in WY 2024. There were no wells above the MT in 2024. A summary of groundwater quality monitoring data is available in **Appendix F**. Groundwater conditions are on track to avoid undesirable water quality results.

5.2.3 Land Subsidence SMC

Conditions indicate that there has not been any inelastic land subsidence historically or during the reporting period. The land subsidence SMC utilizes the chronic lowering of groundwater levels SMC as a proxy (**Table 5-1)**. Interferometric Synthetic Aperture Radar (InSAR) data provided by DWR (DWR, 2024) was analyzed from October 2023 to October 2024 to track annual changes. Groundwater conditions in the Subbasin are on track to meet the first 5-year 2027 IMs and avoid undesirable results for land subsidence.

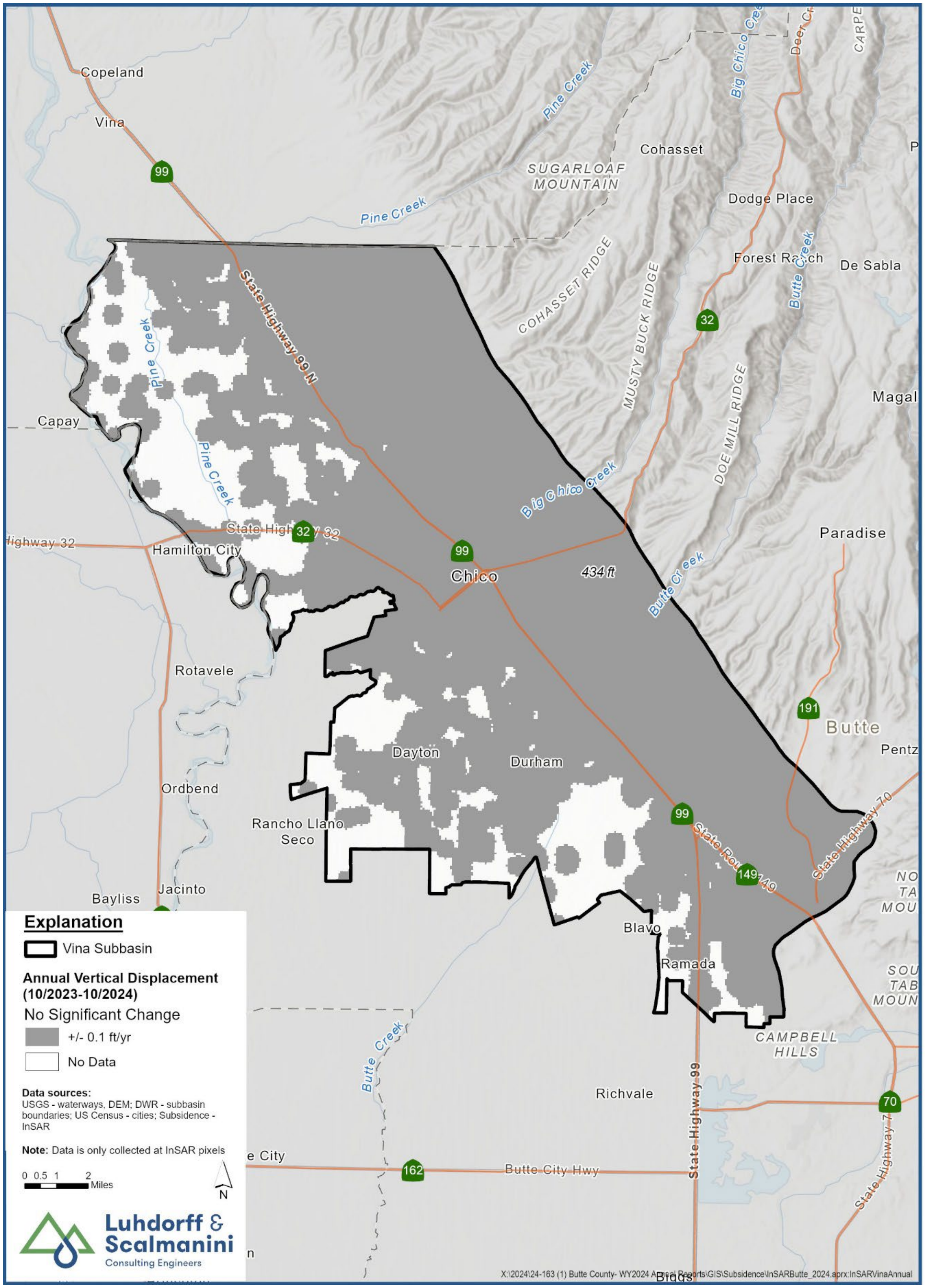

Figure 5-1. Vina Subbasin Vertical Displacement in Ground Surface from 10/2023 to 10/2024

5.2.4 Depletion of Interconnected Surface Water SMC

The depletion of interconnected surface water utilizes the chronic lowering of groundwater levels SMC as a proxy (**Table 5-1**). Groundwater conditions in the Subbasin are on track to meet the first 5-year 2027 IMs and to avoid undesirable results for groundwater levels at each of the RMS wells.

5.3 Progress Toward PMA Implementation

The following sections summarize the GSAs' progress in the 2024 WY towards implementing PMAs that were developed to manage groundwater conditions in the Subbasin and achieve the groundwater sustainability objectives described in the GSP. Projects as outlined in the GSP are provided below and summarized in **Table 5-3**. Updates on the status of management actions are described below and summarized in **Table 5-4**.

Table 5-3. Vina Subbasin Summary of Water Year 2024 Project Implementation Progress

GSP Section Reference	Project	Current Status	Notable Progress Since Last Annual Report
5.2.3.1	Agricultural Irrigation Efficiency	Funded, ongoing	Contracting, planning, ground-based inventory completed, analysis started and pilot project completion anticipated in 2026
5.2.3.2	Residential Water Conservation Project	Ongoing	Chico residents' participation in Cal Water conservation programs saved about 9 AF of water in WY 2024.
5.2.3.3	Scoping for Flood Managed Aquifer Recharge (FloodMAR)/Surface Water Supply and Recharge	Funded, ongoing	Contracting and planning completed, analysis and public outreach started, project completion anticipated in 2026
5.2.3.5	Fuels Management for Watershed Health	Ongoing	Assessment of fuels post-Park Fire conducted and is ongoing
5.2.4.3	Streamflow Augmentation Projects	Seeking funding	Additional grant proposals developed by the Friends of Butte Creek.
5.2.4.4	Community Monitoring Program	Funded, ongoing	Contracting, planning and a proposed monitoring network map completed, analysis and public outreach started, project completion anticipated in 2026
5.2.4.5	Recycled Water Feasibility Project	Funded, ongoing	Review of potential projects for the feasibility project started and ongoing by the City of Chico, project completion anticipated by the end of 2025

Table 5-3. Vina Subbasin Summary of Water Year 2024 Project Implementation Progress			
GSP Section Reference	Project	Current Status	Notable Progress Since Last Annual Report
5.2.4.6	Rangeland Management and Water Retention Project	Various	One late-season botanical survey completed before the Park Fire on the Big Chico Creek Ecological Reserve (BCCER). Sedimentation reduction projects planned, permitted and completed.
5.2.4.7	Removal of Invasive Species	Funded, ongoing	Grant funding received for invasive species management and installation of enclosure fencing for springs and blue oaks on the BCCER.
5.2.4.8	Surface Water Supply and Recharge Project	Various	The final Rock and Sand Creek Flood Mitigation Feasibility report was completed. Lindo Channel Surface Recharge Analysis, contracting, planning, and initial analyses completed, additional analysis started, project completion anticipated in 2025
5.2.5.1	Extend Orchard Replacement Program	Funded, ongoing	Contracting, planning, and initial analysis completed, analysis is ongoing, project completion anticipated in 2026

Table 5-4. Vina Subbasin Summary of Management Actions			
GSP Section Reference	Management Action	Current Status	Notable Progress Since Last Annual Report
5.3.2	Domestic Well Mitigation	Funded, ongoing	Funding secured for the County Drought Resilience and Outreach Program. Drinking water related resources provided to residents, applications accepted for well testing and well repair and/or replacement
5.3.3	Well Permitting Ordinance	Funded, ongoing	Funding secured, initial planning is ongoing

5.4 GSP Project Implementation Progress

5.4.1 Agricultural Irrigation Efficiency (GSP Section 5.2.3.1)

After the agricultural irrigation survey was completed, notable progress on this project since 2023 has included the project receiving funding through DWR's SGM Grant Program in 2024. The Precision Irrigation Program also referred to the Vina SGM Implementation grant for Tasks 2, 4, 6, and 7 of Component 3: Demand Reduction Strategies in the Vina Subbasin, was developed as the implementation effort for this project with the goal of enhancing irrigation efficiency, reducing non-beneficial consumptive water use and reducing groundwater pumping across thousands of acres of almond and walnut orchards. The Vina GSA entered into a sub-recipient agreement with the Agricultural Groundwater Users of Butte County to provide technical input on the project and manage the consultant team implementing the project. The Vina GSA also entered into contracts with Geosyntec, which has teamed with Land IQ to carry out the program design, implementation, and monitoring of a pilot program. Work started on performing a comprehensive field-scale ground-based inventory of irrigation methods, crops, and water sources in the Vina Subbasin. A review and selection of the most appropriate state-of-the-art precision irrigation technology was completed and work also began on the development of a precision irrigation pilot program for the Vina Subbasin, including a summary of the ground-based inventory. Work and analysis are underway, with the grant funded pilot project expected to be completed by March 2026.

5.4.2 Residential Water Conservation Project (GSP Section 5.2.3.2)

Notable progress on this project since 2023 has included continued implementation of water conservation practices by municipal/industrial water providers such as the California Water Service Company in Chico (Cal Water-Chico), which is reliant on groundwater. Over the WY 2024, conservation practices of Chico residents resulted in a savings / reduction in groundwater use of approximately 9.31 AF, yielding a benefit to the Subbasin.

5.4.3 Scoping for Flood Managed Aquifer Recharge (FloodMAR)/Surface Water Supply and Recharge (GSP Section 5.2.3.3)

Notable progress on this project since 2023 has included the project receiving funding through DWR's SGM Grant Program in 2024. These scoping projects are also referred to in the Vina SGM Implementation grant as Tasks 1, 2, 3, and 5 of Component 5: Surface Water Supply and Recharge Feasibility Study in the Vina Subbasin. The project includes a Surface Water Supplies Feasibility Analysis, focusing on assessing the feasibility of potential water sources and required infrastructure to expand the use of surface water for irrigation in the Vina Subbasin. It also consists of the performance of a feasibility analysis to design and implement a phased groundwater recharge plan that considers previous studies and efforts to determine the most efficient and effective path forward to increase recharge in the Vina Subbasin. A Request for Proposals process was successfully conducted, leading to the selection of consultants. Butte County, through a subrecipient agreement with the Vina GSA is managing and implementing the project. Butte County entered into contracts with Geosyntec which teamed with Water and Land Solutions to carry out the feasibility analyses and recharge pilot. These consultants have engaged with the public and relevant agencies to explore potential surface water supply projects. They have also reviewed the GSP, and other background materials related to the Subbasin. Additionally, the consultants have analyzed Airborne Electromagnetic (AEM) and geologic data to identify potential recharge opportunities within the Subbasin, and this analysis is still ongoing. Project completion is planned for March 2026.

5.4.4 Fuels Management for Watershed Health (GSP Section 5.2.3.5)

Notable progress on this project since 2023 has included an assessment of fuels management in the Big Chico Creek Ecological Reserve post-Park Fire. Approximately 95% of the 7,885 acres on the Reserve were burned during the Park Fire in July 2024, resulting in significant fuel reduction.

5.4.5 Streamflow Augmentation Project (GSP Section 5.2.4.3)

Notable progress on this project since 2023 has included the development of additional grant proposals by the Friends of Butte Creek after the submittal last year was not funded.

5.4.6 Community Monitoring Program (GSP Section 5.2.4.4)

Notable progress on this project since 2023 has included the project receiving funding through DWR's SGM Grant Program in 2024. This project is also referred to in the Vina SGM Implementation grant as Tasks 8, 9, and 10 of Component 2: GSP Updates, Data Gaps, and Outreach. A Request for Proposals (RFP) process was successfully conducted, leading to the selection of Larry Walker Associates as the project consultant. The Vina GSA entered into a contract with the firm, and the consultant reviewed the GSP and other relevant background materials to identify data gaps. A proposed monitoring network map was drafted, including a community-specific monitoring network, and was presented to the Stakeholder Advisory Committee and other stakeholders. Additionally, the initial iteration of the domestic well surveys and analysis are currently underway, with project completion planned for March 2026.

5.4.7 Recycled Water Feasibility Project (GSP Section 5.2.4.5)

Notable progress on this project since 2023 has included the City of Chico reviewing the feasibility of utilizing treated wastewater for a variety of applications, including non-potable reuse, indirect potable reuse, and potable reuse. The feasibility study will include the creation of a long list of potential projects, which will then be analyzed in an alternatives analysis to determine feasible projects. The outcome of the feasibility study will include a short list (2-3 projects) of feasible projects, planning level cost estimates, maps and diagrams, and next steps for potential implementation. Project completion is planned for December 2025.

5.4.8 Rangeland Management and Water Retention Project (GSP Section 5.2.4.6)

Notable progress on this project since 2023 has included the Big Chico Creek Ecological Reserve securing grant funds through the Wildlife Conservation Board to gather baseline information and develop a long-term master management plan for all 7,835 acres of the Reserve's properties. This includes baseline surveys and biological and cultural resource surveys to inform management recommendations and provide data for long-term comparative analysis of land management actions. It also includes management planning on BCCER property and associated California Environmental Quality Act (CEQA) compliance.

5.4.9 Removal of Invasive Species (GSP Section 5.2.4.7)

Notable progress on this project since 2023 has included BCCER securing grant funds for invasive species management and installation of wildlife-friendly enclosure fencing for two springs on 10 acres and invasive species management and blue oak restoration on 20 acres on the BCCER through a grant awarded to Point Blue.

5.4.10 Surface Water Supply and Recharge Project (GSP Section 5.2.4.8)

Since 2023, notable progress on this project has included the analysis of four initiatives aimed at enhancing the surface water supply to the Subbasin. These initiatives focus on the direct application of surface water to crops, the application of surface water and/or floodwater to land surfaces (such as existing orchards for recharge purposes), and the use of surface water and/or floodwater in recharge basins, ponds, or similar facilities.

First, the Rock and Sand Creek Flood Mitigation Project funding was secured by the Rock Creek Reclamation District through the Integrated Regional Water Management Program Proposition 1 program to consider solutions to flooding, public safety, and recharge of the aquifer, focusing on potential floodwater detentions on Sand Creek. The final feasibility study report was released in October 2023.

Three other projects have also had notable progress since 2023 and have received funding through DWR's SGM Grant Program in 2024; the Lindo Channel Surface Water Recharge Feasibility Study (also referred to as Tasks 1, 2 and 3 in Component 4: Lindo Channel Surface Water Recharge Implementation of the SGM Grant project), the Agricultural Surface Water Supplies Feasibility Analysis project (also referred to as Tasks 1 and 5 in Component 5: Surface Water Supply and Recharge Feasibility Study of the SGM Grant project), and the Groundwater Recharge Feasibility Analysis and Site Evaluation project (also referred to as Tasks 2, 3 and 5 in Component 5: Surface Water Supply and Recharge Feasibility Study of the SGM Grant project).

Notable progress on the Lindo Channel Surface Water Recharge Feasibility Study includes the completion of a Request for Proposals process and the selection of a consultant team. The Vina GSA contracted with Geosyntec and West Yost to lead the project. The consultants have conducted hydrologic analyses to assess flow patterns, initiated an environmental flow analysis, and reviewed AEM data, boring logs, and geological data to evaluate recharge potential. This analysis is ongoing and expected to be completed in 2025.

5.4.11 Extend Orchard Replacement Program (GSP Section 5.2.5.1)

Notable progress on this project since 2023 has included this project receiving funding through DWR's SGM Grant Program in 2024 (also referred to as Tasks 1, 3, 5, and 7 of Component 3: Demand Reduction Strategies in the Vina Subbasin of the SGM Grant). The Vina GSA has made significant progress, including entering into a subrecipient agreement with the Agricultural Groundwater Users of Butte County to provide technical input and oversight of the implementing consultant team. The Vina GSA also contracted with Geosyntec, teamed with Land IQ, and ERA Economics to support key project tasks and develop the program. Tasks involve measuring water savings and planning a long-term economic analysis to evaluate the project's benefits over the next 25–30 years. Program efforts have already begun to analyze historical water savings from fallowing practices, including the impact of extended fallowing periods. This analysis is underway, with an expected completion date in March 2026.

5.5 GSP Management Action Implementation Progress

Below are Management Action Updates and their progress in implementation since the last Annual Report.

5.5.1 Domestic Well Mitigation (GSP Section 5.3.2)

Notable progress on this project since 2023 has included the Butte County Office of Emergency Management receiving funding through the State Water Resource Control Board for a new project called the Drought Resilience and Outreach Program. This project will allow the County to provide short- and long-term solutions to ensure Butte County property owners impacted by dry wells have access to water. Short-term solutions include water hauling, bottled water, a water tank program, and water filling. These services were provided to residents in the Subbasin. Long-term solutions include well testing and well repair and/or replacement. Applications for the long-term solutions were developed, accepted and screened. It is anticipated that well repair or replacement may begin in 2025.

5.5.2 Well Permitting Ordinance (GSP Section 5.3.3)

Notable progress on this project since 2023 has included the Butte County Public Health (PH) Department securing funding for updates to Butte County's well ordinance. The final agreement is planned to be signed within the next water year, which will lead to a comprehensive review of the ordinance after a process to select a consultant to support these efforts, as well as work done on all appropriate environmental reviews. Public hearings will also be forthcoming where stakeholders, such as GSAs, will be able to participate and provide comments.

6 Conclusions

The Vina Subbasin GSAs adopted and submitted the GSP to DWR in January 2022 and continue to actively work on sustainable groundwater management in the Subbasin directly and with partners. As presented in **Section 5** of this report, recent progress made on activities applicable to the GSAs demonstrates the commitment of the GSAs to implement the GSP by allocating the necessary time and resources to achieve long-term sustainable management of the groundwater resources in the Vina Subbasin.

7 References

Butte County Department of Water and Resource Conservation (BCDWRC). 2021. Model Documentation v 1.0. Butte Basin Groundwater Model (BBGM). November 30. Available at: https://www.buttecounty.net/1117/Water-Resource-Conservation.

Butte County. 2022. Vina Subbasin Annual Report WY 2021. Available at: https://sgma.water.ca.gov/portal/gspar/preview/91. Prepared by Luhdorff & Scalmanini Consulting Engineers and Davids Engineering.

Butte County. 2023. Vina Subbasin Annual Report WY 2022. Available at: https://sgma.water.ca.gov/portal/gspar/preview/245. Prepared by Luhdorff & Scalmanini Consulting Engineers and Davids Engineering.

Butte County. 2024. Vina Subbasin Annual Report WY 2023. Available at: https://sgma.water.ca.gov/portal/gspar/preview/289. Prepared by Luhdorff & Scalmanini Consulting Engineers and Davids Engineering.

California Data Exchange Center (CDEC). 2024. Water Year Type. Retrieved at: https://data.ca.gov/dataset/cdec-water-year-type-dataset/resource/301aaef5-940d-4915-8ed6-baada4e101f5.

California Department of Water Resources (DWR). 2018. 5-021.70 Sacramento Valley-Butte Basin Boundaries Description. Available at: https://data.cnra.ca.gov/dataset/ca-gw-basin-boundary-descriptions/resource/2385b4bd-4858-4902-b98d-19936ee3f21e.

California Department of Water Resources (DWR). 2024. Periodic Groundwater Level Measurements - Datasets - California Natural Resources Agency Open Data. Downloaded November 2024. Available at: https://data.cnra.ca.gov/dataset/periodic-groundwater-level-measurements.

California State Water Resources Control Board (SWRCB). 2024. Electronic Water Rights Information Management System (eWRIMS). Accessed January 21, 2025. Available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/ewrims/.

California Water Service Company (Cal Water-Chico). 2020. 2020 Urban Water Management Plan's (UWMP) 2020 Chico-Hamilton City District. Available at: https://www.calwater.com/docs/uwmp2020/CH_2020_UWMP_FINAL.pdf.

Geosyntec Consultants, Inc. 2021. Vina Groundwater Sustainability Plan. Available at: https://sgma.water.ca.gov/portal/gsp/preview/86.

Luhdorff Scalmanini Consulting Engineers (LSCE). 2022. Drought Impact Analysis Study. Prepared for the County of Butte Water and Resource Conversation Department. Available at https://www.buttecounty.net/1240/Drought-Impact-Analysis-Study