2021 WATER YEAR ANNUAL REPORT

Wyandotte Creek Groundwater Subbasin

Final Report - March 2022

Prepared for the Wyandotte Creek Groundwater Sustainability Agency and submitted to the California Department of Water Resources to meet the requirements of the Sustainable Groundwater Management Act

Prepared by

Butte County Department of Water and Resource Conservation

With technical support provided by Davids Engineering, Inc. and Luhdorff & Scalmanini Consulting Engineers

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The Wyandotte Creek Subbasin (5-021.69) as defined by the Department of Water Resources' (DWR) Bulletin 118 subbasin boundaries, updated in 2018, is within Butte County as shown in Section 1, Figure 1. The Wyandotte Creek Subbasin lies in the eastern central portion of the Sacramento Valley Groundwater Basin (5-021). The subbasin is managed by the Wyandotte Creek Groundwater Sustainability Agency (GSA) to implement the Sustainable Groundwater Management Act (SGMA). The GSA is formed through a Joint Powers Agreement of three member agencies including Butte County, the City of Oroville, and Thermalito Water and Sewer District. The GSA worked cooperatively with stakeholders and interested parties to develop and submit a Groundwater Sustainability Plan (GSP) by the regulatory deadline of January 31, 2022.

The 2021 Water Year (2021 WY), defined as October 1, 2020 to September 30, 2021, started out with moderate precipitation in mid-November, leading to a very dry January, and moderate precipitation in the early spring. The 2021 WY ended as the second driest year on record based on statewide runoff. Overall, the 2021 WY had below average rainfall, snow pack, and runoff conditions. Water supply conditions led to a 5% allocation for State Water Project contractors statewide and curtailment of other local surface water supplies. This included about a 50% reduction in Feather River diversions by the Joint District Board (which includes Richvale Irrigation District, Butte Water District and Biggs-West Gridley Water District) and Western Canal Water District in the neighboring Butte Subbasin.

This annual report coincides with one of the most severe and extensive droughts that has ever impacted the western United States. In December 2021, as the final GSP was being assembled, drought conditions throughout most of California, including in this subbasin were classified as "exceptional," the most extreme classification defined by the U.S. Drought Monitor. Historically, observed impacts during exceptional drought generally include (among other potential impacts reported by the U.S. Drought Monitor):

- widespread water supply shortages,
- depleted surface water supplies,
- extremely low federal and state surface water deliveries,
- curtailment of water rights,
- extremely high surface water prices,
- increased groundwater pumping to satisfy agronomic water demands,
- dry groundwater wells,
- increased well drilling and deepening,
- increased pumping costs,
- wildfire,
- decreased recreational opportunities, and
- poor water quality.

All of these conditions were experienced to some degree across California in 2021 and, at least in part, within the subbasin.

Groundwater Conditions

Currently 13 wells are monitored as part of a Broad Network for groundwater levels in the Wyandotte Creek Subbasin and 9 are Representative Monitoring Site (RMS) wells with assigned Sustainable Management Criteria. These wells are measured at least in the spring and fall each year for SGMA compliance. Appendix A includes a map of the approximate locations of groundwater level RMS wells and each of their hydrographs showing measured groundwater levels for each well's period of record. Spring and fall 2021 levels were above the Measurable Objective. Appendix B provides an explanation of the terms making up the Sustainable Management Criteria defined in Section 3 of the GSP (e.g. Minimum Threshold, Measurable Objective). All measured groundwater levels remained within the subbasin's Margin of Operational Flexibility and well above the Minimum Threshold of each RMS well. Groundwater levels in many of the wells in 2021 were similar to levels measured in previous drought periods, however a couple of wells experienced new historical lows.

The contour maps (Section 2.1, Figure 3 and Figure 4) show groundwater elevations that are higher in the northern and eastern portions of the Wyandotte Creek Subbasin than in the south. This indicates groundwater flows from the north and from foothill recharge areas in the east toward the subbasin's southwestern corner. Because of the influence of Thermalito Afterbay and the Feather River, groundwater elevations in the north are generally stable between the spring and fall observation periods, while elevations in the south tend to be lower in the fall than the spring, a pattern typical of valley floor locations distant from major sources of recharge. Fall contours indicate declines of about ten feet relative to spring conditions throughout the subbasin.

The subbasin utilizes groundwater primarily for agricultural demands. In addition, rural residential demands rely on private domestic wells for their household water needs and the City of Oroville, served by three different water providers, is supplied in small part with groundwater. Total estimated groundwater extraction in water year 2021 was approximately 46,300 acre-feet (AF) (Table 2 in Section 2.2). This is just under the 2000-2018 average annual groundwater extraction of 47,100 AF reported in the GSP for the subbasin. About 96% of total extraction is used by the agricultural sector with the remaining 4% providing for municipal/industrial and household water needs.

Surface water provided about one-third of the agricultural water demand in the Wyandotte Creek Subbasin in 2021. Surface water is also a significant source of water supply (about 11,200 AF) for municipal/industrial uses in the City of Oroville (Table 3 in Section 2.2). Total surface water supplies in the subbasin are estimated to be 33,200 AF.

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. 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.

Groundwater extraction and reduced natural recharge due to dry climate conditions and decreased streamflows resulted in lower groundwater levels in most monitoring wells in the subbasin in spring 2021 compared to spring 2020. The moderate groundwater level declines amounted to an estimated reduction of groundwater in storage of about 380 AF for this time period. Figure ES-1 shows annual and cumulative change in groundwater storage over time, 2000-2021, relative to annual groundwater extraction and water year type. Change in groundwater storage was estimated based on change in measured spring to spring groundwater levels multiplied by the area of the Thiessen polygon associated with the RMS well and a representative storage coefficient of 0.1. Groundwater extraction for 2000-2018 are consistent with the GSP based on Butte Basin Groundwater Model results, 2019 and 2020 are estimated by matching to similar water year types, and 2020 extraction is estimated as described in Section 2.2. Values are reported in thousands of acre-feet (TAF).

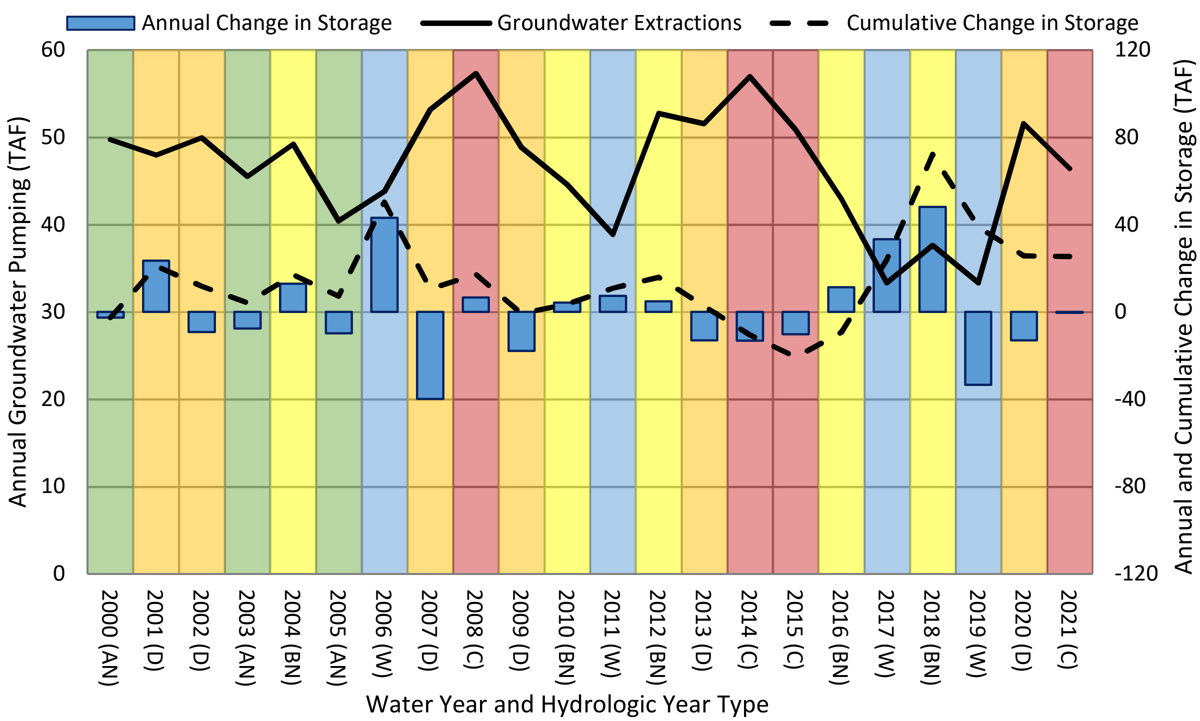

Figure ES-1. Change in Groundwater Storage (Cumulative and Annual Change) and Groundwater Extraction by Water Year Type.

Note: Values calculated spring to spring for each water year. Water year types are identified as wet (W, shaded blue), above normal (AN, shaded green), below normal (BN, shaded yellow), dry (D, shaded orange), or critical (C, shaded red). Groundwater extraction 2000-2018 values are consistent with the Wyandotte Creek GSP based on Butte Basin Groundwater Model results, 2019 and 2020 estimated by matching to similar water year types, and 2020 estimated as described in Section 2.2. Groundwater Change in Storage estimated based on change in measured spring to spring groundwater levels multiplied by the area of the Thiessen polygon associated with the monitoring well and the Storage Coefficient of 0.1.

Groundwater Sustainability Plan Implementation Progress

The GSP for the Wyandotte Creek Subbasin was adopted by the GSA in December 2021 and submitted to DWR in January 2022. This is the first annual report to be prepared since the GSP was submitted. The GSP implementation progress reported in this report covers ongoing work during GSP development since late 2021.

Progress has been made on the following projects and management actions:

- **Residential Water Conservation Project** - The municipal/industrial water providers in the subbasin are currently implementing water conservation practices in accordance with their 2020 Urban Water Management Plans.
- **Agricultural Irrigation Efficiency Project** - A survey of agricultural irrigators in the Vina Subbasin was conducted and the results were analyzed in December of 2021. A summary report is expected to be available in spring of 2022.
- **Palermo Clean Water Consolidation Project-** Multiple grant applications are under develop to seek funding to fully fund the project.
- **Oroville Wildlife Area Robinson's Riffle Project-** Sutter Butte Flood Control Agency has submitted a grant proposal to the Wildlife Conservation Board to fund this major restoration project for the Oroville Wildlife Area.
- **Thermalito Water and Sewer District Water Treatment Plant Capacity Upgrade Project-** Funding has been secured for the project and the process to select a contractor to conduct the work has begun.
- **Water Loss Monitoring Project-** South Feather Water and Power Agency (SFWPA) has made significant progress on this project including modifications to their policy to streamline the bulk filling permitting process. SFWPA's Board considered a suite of projects associated with their Water Loss Control Program along with submission of an application for Hydrant Theft Security Upgrades from the Urban and Multibenefit Drought Relief Funding in 2021.
- **General Plan Updates** - Suggested revisions to the Water Resources Element and applicable General Plan Goals, Policies, and Actions have been made by staff and the Butte County Water Commission as part of the County's General Plan Update process.
- **Expansion of Water Purveyors' Service Area-** The Palermo Clean Water Consolidation Project described above advances this management action.

The GSA is preparing to continue to engage stakeholders in the subbasin as they develop a workplan for 2022 and discuss implementation priorities.

In addition, Butte County funded and contracted with a consultant to conduct a Drought Impact Analysis Study (expected completion May 2022) to characterize the conditions and economic impacts of drought that occurred in 2021. It will also provide recommendations for County response and readiness in 2022 if dry conditions and drought impacts persist. The study is expected to provide information that may be useful to GSAs in the County as well.

Finally, ongoing activities include monitoring and reporting, updating and maintaining the subbasin's Data Management System, outreach to stakeholders, interbasin coordination, and coordination with other efforts to improve characterization of the subbasin (such as DWR's Airborne Electromagnetic Survey Program expected to collect data in the subbasin in May 2022).

Recent progress made on all of the above-mentioned activities (and described in detail in Section 3) since late 2021 demonstrates the commitment of the GSA to implement the GSP by allocating the necessary time and resources to achieve long-term sustainable management of the groundwater resources in the subbasin.

Wyandotte Creek Subbasin Annual Report

1. Plan Area and Background

The Wyandotte Creek Subbasin (5-021.69) as defined by the Department of Water Resources' (DWR) Bulletin 118 subbasin boundaries, updated in 2018, is within Butte County in the Sacramento Valley, as shown in Figure 1. The Wyandotte Creek Subbasin lies in the eastern central portion of the Sacramento Valley Groundwater Basin (5-021). It is bounded on the west by the Feather River and Thermalito Afterbay; in the south by the Butte-Yuba County line (except for Ramirez Water District which is fully within the North Yuba Subbasin); and on the north and east by the edge of the alluvial basin as defined by DWR Bulletin 118. It is surrounded by the Butte Subbasin to the west, the Vina Subbasin to the north, the North Yuba Subbasin to the south, and the foothills to the east.

The subbasin is managed by the Wyandotte Creek Groundwater Sustainability Agency (GSA). The GSA is formed through a Joint Powers Agreement of three member agencies including Butte County, City of Oroville, and Thermalito Water and Sewer District. The Wyandotte Creek GSA has assumed all authorities of the Sustainability Groundwater Management Act (SGMA) for developing and implementing a single Groundwater Sustainability Plan (GSP) for the Wyandotte Creek Subbasin. The GSA worked cooperatively with stakeholders and interested parties to develop and submit a GSP by the regulatory deadline of January 31, 2022.

Two management areas (MAs), Wyandotte Creek Oroville and Wyandotte Creek South, are defined in the subbasin. Although all stakeholders have a shared interest in sustainable management of groundwater in this predominantly groundwater dependent subbasin, the landscape of beneficial users varies between MAs. Wyandotte Creek Oroville is predominantly an urban area with Cal Water, Thermalito Water and Sewer District, and South Feather Water and Power Agency providing water 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. Wyandotte Creek South is dominated by irrigated agriculture dependent on groundwater and surface water diversions from the Feather River. Significant numbers of rural residents and ranchettes depend on groundwater typically from relatively shallow domestic wells interspersed with agricultural land uses. These established MAs facilitate successful development and long-term implementation of the GSP by effectively targeting the needs, vulnerabilities, and opportunities of local conditions in these areas.

The GSP outlines the need to maintain sustainable groundwater conditions and avoid undesirable results. The GSP identifies 15 projects for potential development that either replace groundwater use (offset) or supplement groundwater supplies (recharge) to meet current and future water demands. In addition, the GSP also identifies five management actions that can be implemented to improve resource management and avoid undesirable results. The sustainable yield (defined as the amount of groundwater that can be withdrawn without causing undesirable results) for the subbasin is estimated to be 46,100 acre-feet per year (AFY). This estimate is based on average annual historical groundwater pumping of 47,100 AFY and an annual historical decrease in storage of 1,000 AFY. As such, groundwater pumping offsets and/or recharge on the order of 1,000 AFY may be required to maintain and achieve sustainability. These numbers will continue to be refined as data gaps are filled and the GSP is implemented.

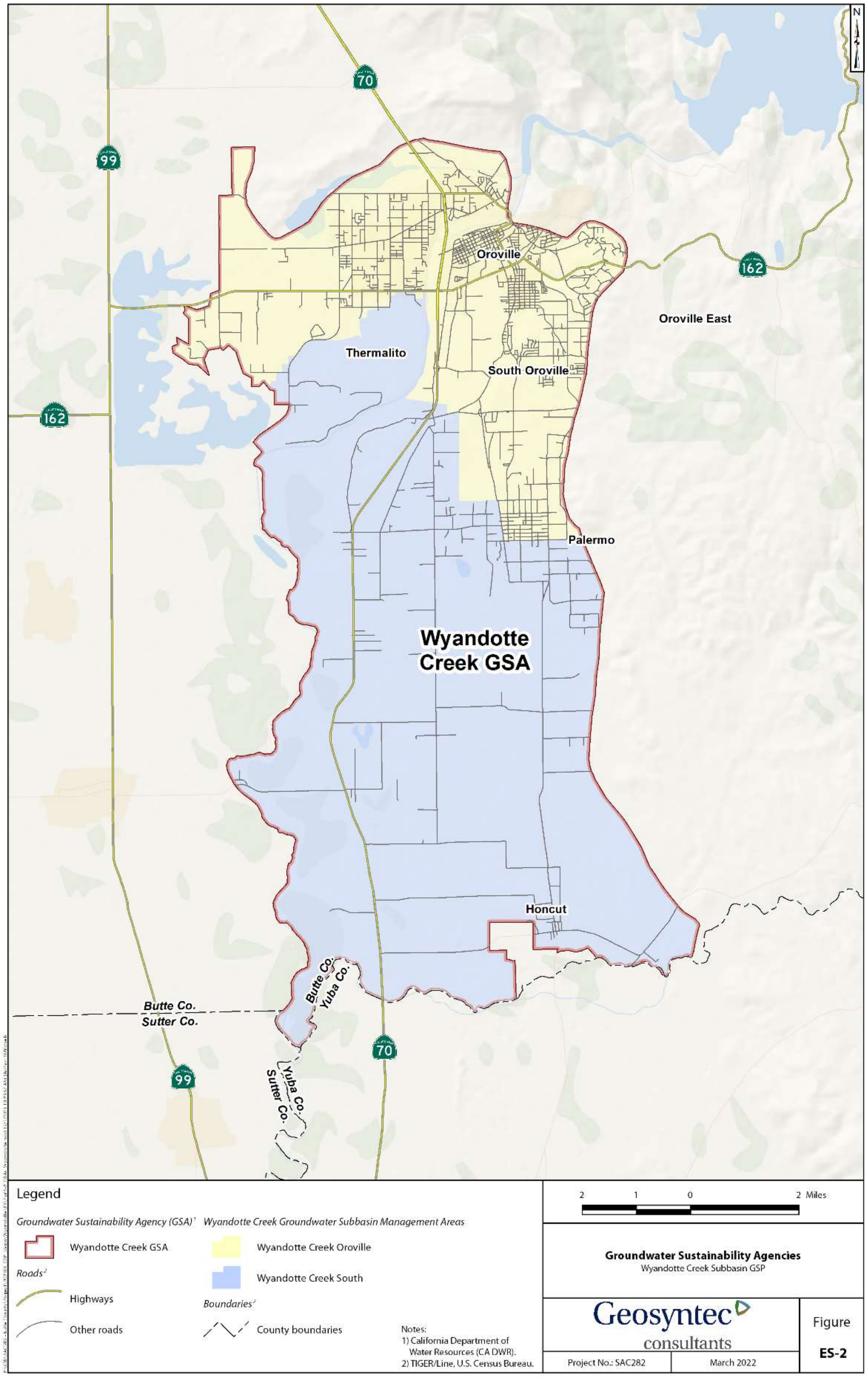

Figure 1. Wyandotte Creek Subbasin showing the Groundwater Sustainability Agency Boundaries and Defined Management Areas (Figure ES-2, Wyandotte Creek GSP)

1.1. 2021 Water Year Hydrologic Conditions

A number of data sources and indices are available to characterize and compare hydrologic conditions within or between particular years. The data sources typically report hydrologic data on a water year basis, or the 12-month period from October through September. The 2021 Water Year (2021 WY) began on October 1, 2020 and ended September 30, 2021. The 2021 WY was classified as a *Critical* year for the Sacramento Hydrologic Region. Water year types are based on the Sacramento Valley Water Year Index identified as wet, above normal, below normal, dry, or critical. At the end of the 2021 WY on September 30, 2021, statewide hydrologic conditions were as follows: precipitation was 49% of average; runoff was 33% of average; and reservoir storage, 58% of average. Sacramento River Region unimpaired runoff observed through September 30, 2021 was about 6.4 million acre-feet, which is about 36% of average.

The Northern Sierra 8-Station Precipitation Index (Figure 2) serves as a precipitation index for the Sacramento River hydrologic region by averaging measurements taken at the following precipitation stations: Blue Canyon, Brush Creek Ranger Station, Mineral, Mount Shasta City, Pacific House, Quincy Ranger Station, Shasta Dam, and Sierraville Ranger Station. This index provides a representative sample of the region's major watersheds: the Upper Sacramento, Feather, Yuba, and American Rivers, which produce inflow to some of California's largest reservoirs - the source of much of the state's surface water supplies. The graph also provides an indication of the timing of the precipitation over the course of the water year which has implications for impact to streamflows, snow pack, and water demands. The 2021 WY ended with 24.0 cumulative inches of precipitation, which is 45% of the long term (1991 - 2020) average of 53.2 inches.

The 2021 water year (2021 WY), defined as October 1, 2020 to September 30, 2021, started out with moderate precipitation in mid-November, leading to a very dry January, and moderate precipitation in the early spring. Total precipitation did not reach average hydrologic conditions in Northern California. The 2021 WY ended as the second driest year on record based on statewide runoff. Overall, the 2021 WY had below average rainfall, snow pack, and runoff conditions. Water supply conditions led to a 5% allocation for State Water Project contractors statewide and curtailment of other local surface water supplies. This included about a 50% reduction in Feather River diversions by Western Canal Water District and the Joint District Board in the neighboring Butte Subbasin.

This annual report coincides with one of the most severe and extensive droughts that has ever impacted the western United States. In December 2021, as the final GSP was being assembled, drought conditions throughout most of California, including in this subbasin were classified as "exceptional", the most extreme classification defined by the U.S. Drought Monitor. Historically, observed impacts during exceptional drought generally include: widespread water shortages, depleted surface water supplies, extremely low federal and state surface water deliveries, curtailment of water rights, extremely high surface water prices, increased groundwater pumping to satisfy water demands, dry groundwater wells, increased well drilling and deepening, increased pumping costs, wildfire, decreased recreational opportunities, and poor water quality, among other potential impacts reported by the U.S. Drought Monitor. All of these conditions were experienced to some degree across California in 2021 and, at least in part, within the subbasin.

Locally, drought impacts have been observed throughout the subbasin as well. The extent of the impacts and programs to help residents continues to be discussed by the Butte County Board of Supervisors, Water Commission and Drought Task Force. Since the summer of 2020, 45 reports were made to DWR's

Household Water Supply Shortage Reporting System in Butte County alone and another approximately 20 residents reported household dry well issues by calling the Butte County Department of Water and Resource Conservation Department. While a number of the reported dry wells are in the foothills outside of the subbasin, a portion of them lie within the Wyandotte Creek Subbasin. Most of the reported dry wells are used for domestic water supply. Of the reports in which the depth of the well was indicated, almost all of them were 200 feet deep or shallower. Counts of dry wells are likely to be low because some landowners choose not to report well problems. Butte and its surrounding counties have provided access to water for those residents experiencing water issues, while they work towards a long-term solution. Over the long-term as the GSP is implemented, the subbasin and surrounding region will be better positioned to manage and mitigate drought conditions and impacts may be less severe and/or costly.

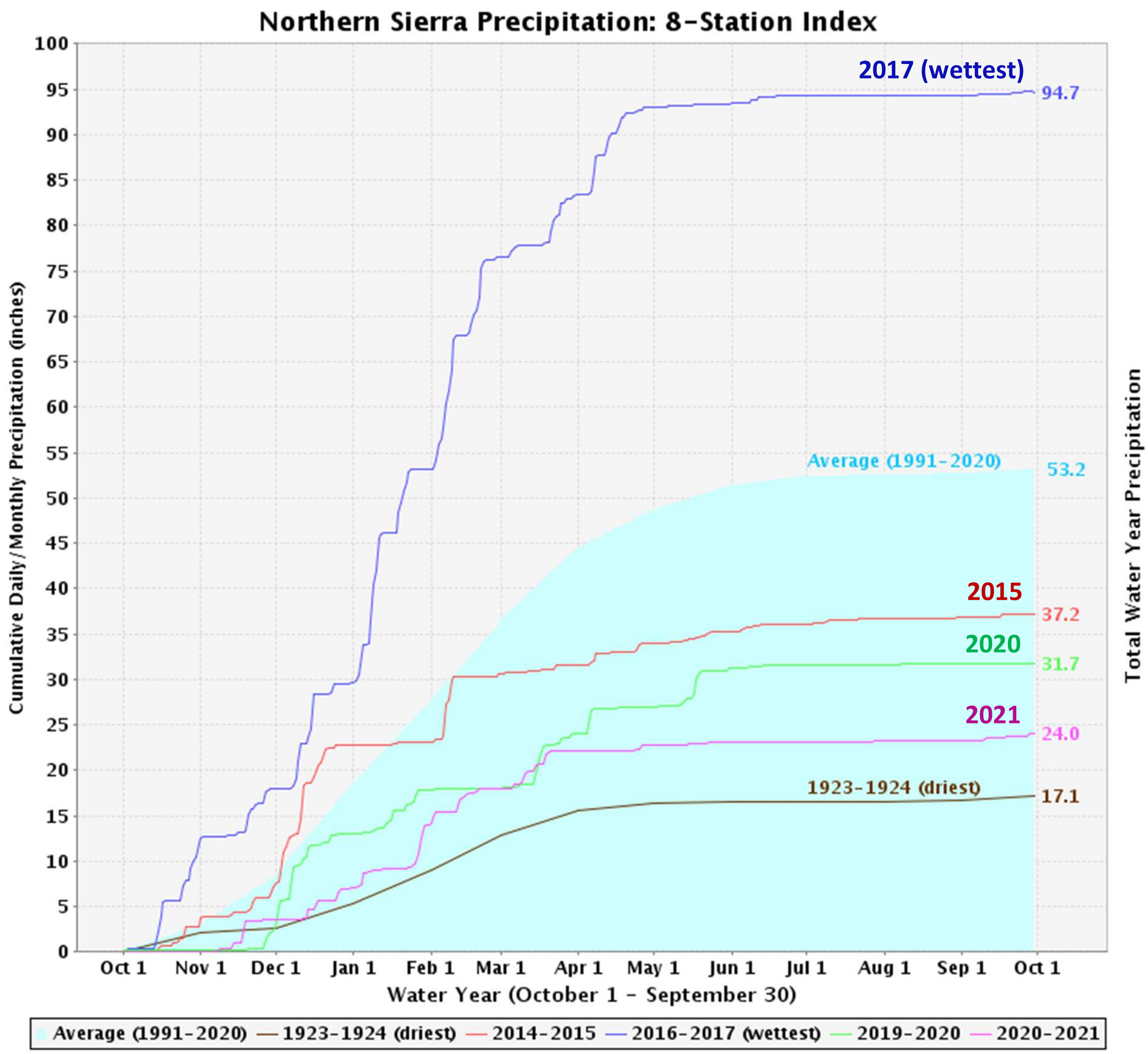

Figure 2. Northern Sierra Precipitation 8-Station Index for Selected Water Years

2. Groundwater Conditions

This section presents the change in groundwater conditions in the Wyandotte Creek Subbasin since the 2020 WY. Comparison of 2021 WY conditions to 2020 WY conditions characterizes the impact of the critically dry year on groundwater extraction, surface water availability, and groundwater conditions.

2.1. Groundwater Elevations

Groundwater levels typically fluctuate seasonally between and within water years. Seasonal fluctuation of groundwater levels occur in response to groundwater pumping and recovery, land and water use activities, recharge and natural discharge. Precipitation, applied irrigation water, and local creeks and rivers are all sources of recharge in the Wyandotte Creek Subbasin. 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 (usually measured in October) provide an indication of groundwater conditions after the primary irrigation season.

Data from groundwater level monitoring is available from DWR's online SGMA Data Viewer tool (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer). Summary data tables of groundwater surface elevations from spring and fall 2021 measurements for Representative Monitoring Site (RMS) wells are summarized in Table 1.

Currently 13 wells are monitored as part of a Broad Network for groundwater levels in the Wyandotte Creek Subbasin and nine of these are RMS wells with assigned Sustainable Management Criteria. These wells consist of a mixture of domestic and irrigation wells, along with one dedicated observation well and California Water Service Company municipal supply wells in Oroville. The Broad Network and RMS wells are typically measured by hand four times per-year, in March, July, August and October. From 2014 to 2016, groundwater levels were measured monthly from April through October due to severe drought conditions. Appendix A includes a map of the approximate locations of groundwater level RMS wells and each of their hydrographs showing measured groundwater levels for each well's period of record. The groundwater level monitoring methods are consistent with the protocols described in the Wyandotte Creek GSP. Groundwater elevations are typically measured using a steel tape, electric sounder or by pressure transducers. The accuracy of the groundwater level measurement range is either 0.01 feet or 0.1 feet depending on the equipment used.

2.1.1. Groundwater Elevation Hydrographs

Groundwater elevation hydrographs for each RMS well identified in the GSP are presented in Appendix A. Appendix B provides an explanation of the terms making up the *Sustainable Management Criteria* defined in Section 3 of the GSP (e.g. Minimum Threshold, Measurable Objective). The spring and fall 2021 water levels measured at each RMS well are presented in Table 1, which also provides a comparison of spring and fall water levels to: (i) 2020 WY conditions, (ii) the established Minimum Threshold groundwater elevations, (iii) the established Measurable Objective groundwater elevations, and (iv) the Interim Milestone for 2027.

Spring and fall 2021 levels were above the Measurable Objective. All measured groundwater levels remained within the subbasin's Margin of Operational Flexibility and well above the Minimum Threshold of each RMS well. Groundwater levels in many of the wells in 2021 were similar to levels measured in previous drought periods, however a couple of wells experienced new historical lows.

2.1.2. Groundwater Elevation Contour Maps

The contour maps (Figure 3 and Figure 4) show groundwater elevations that are higher in the northern and eastern portions of the Wyandotte Creek Subbasin than in the south. This indicates groundwater flows from the north and from foothill recharge areas in the east toward the subbasin's southwestern corner. Because of the influence of Thermalito Afterbay and the Feather River, groundwater elevations in the north are generally stable between the spring and fall observation periods, while elevations in the south tend to be lower in the fall than the spring, a pattern typical of valley floor locations distant from major sources of recharge. Fall contours indicate declines of about 10 feet relative to spring conditions throughout the subbasin. Lower fall levels is a pattern typical of valley floor locations due to irrigation season pumping.

The contour maps illustrate several general features of the groundwater flow system in the subbasin, including:

- Overall west-southwest flow consistent with recharge from the north and along the eastern foothills
- Convergence of flow toward the Feather River

The Wyandotte Creek Subbasin aquifer system is described in the GSP as a single principle aquifer and therefore the maps shown in Figure 3 and Figure 4 do not distinguish between completion intervals of the wells. Therefore the contours represent an aggregate of groundwater elevations across all zones of the primary aquifer system. 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 some additional minor adjustments to the contours were made based on expert judgement.

Table 1. Spring and Fall 2021 Groundwater Elevations in comparison to 2020 Groundwater Elevations and the Minimum Threshold and Measurable Objective (MO)

State Well Number	Spring Groundwater Conditions			Fall Groundwater Conditions			Minimum Threshold (ft MSL)	Measurable Objective (ft MSL)	Interim Milestone 2027
	2021 Groundwater Elevation (ft MSL)	Change from 2020 to 2021 (ft)	Difference relative to MO (ft)	2021 Groundwater Elevation (ft MSL)	Change from 2020 to 2021 (ft)	Difference relative to MO (ft)			
Wyandotte Creek Subbasin – Oroville Management Area									
19N03E16Q001M	138.3	-1.1	5.3	138.4	0.1	5.4	85	133	134
19N04E32P001M	130.5	-1.9	23.5	125.2	Not Available	18.2	78	107	108
CWS-03	166.0	0.0	33.0	Not Available	--	--	102	133	135
Wyandotte Creek Subbasin – South Management Area									
17N03E13B002M	*62.1*	QM	QM	52.6	-4.9	5.6	35	47	48
17N04E09N002M	74.8	QM	25.8	*47.2*	QM	QM	35	49	51
18N03E25N001M	59.1	-13.0	7.1	56.3	Not Available	4.3	37	52	53
18N04E08M001M	111.1	-1.8	25.1	106.2	-2.4	20.2	59	86	87
18N04E16C001M	111.5	-3.7	16.5	103.5	-3.5	8.5	71	95	96
19N04E31F001M	132.5	7.0	33.5	117.4	-4.3	18.4	76	99	101

Note- Mean Sea Level (MSL). Red/italicized numbers indicate questionable measurements (QM). "Not Available" indicates no measurement was taken.

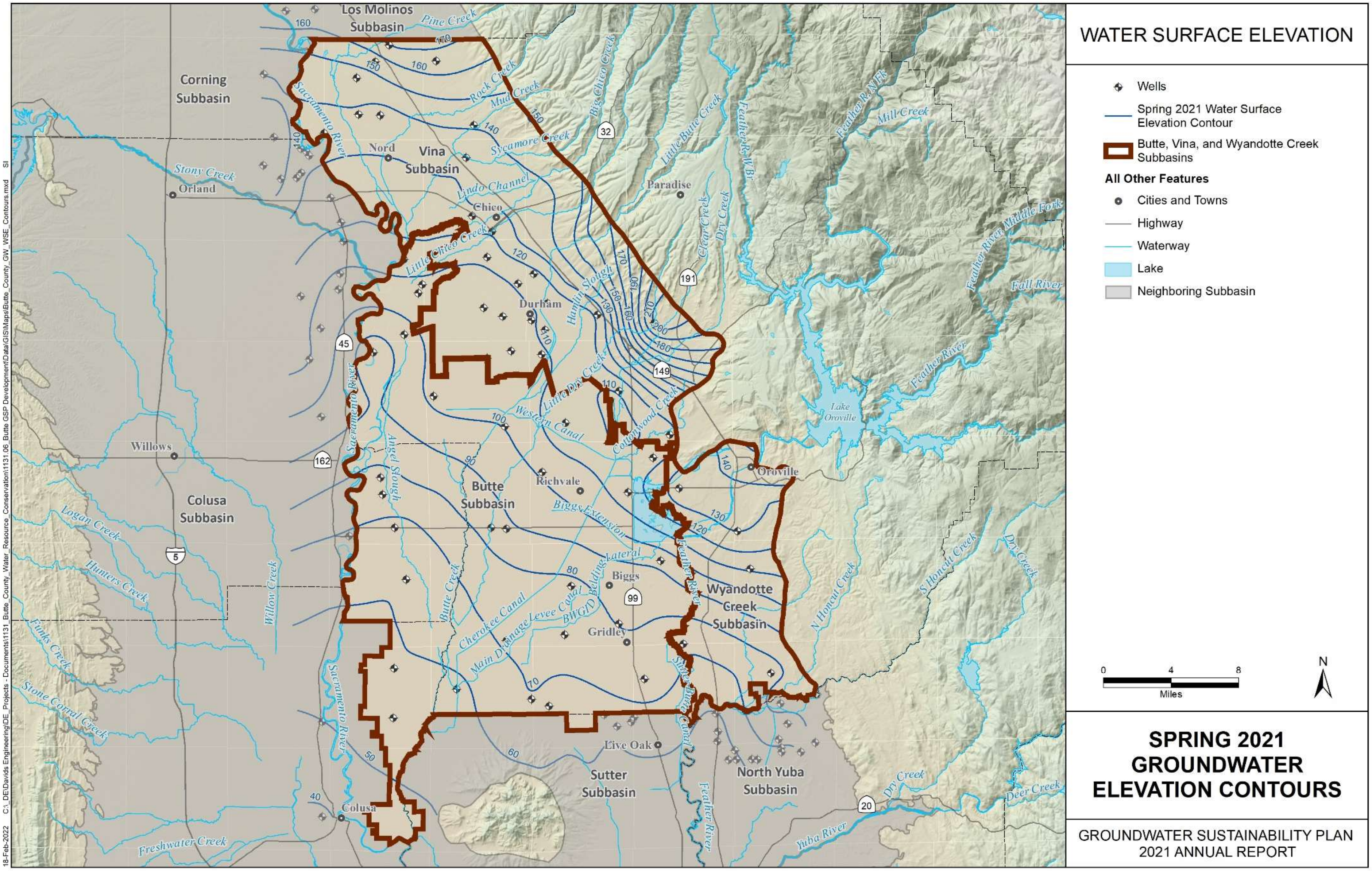

Figure 3. Spring 2021 Groundwater Elevation Contours

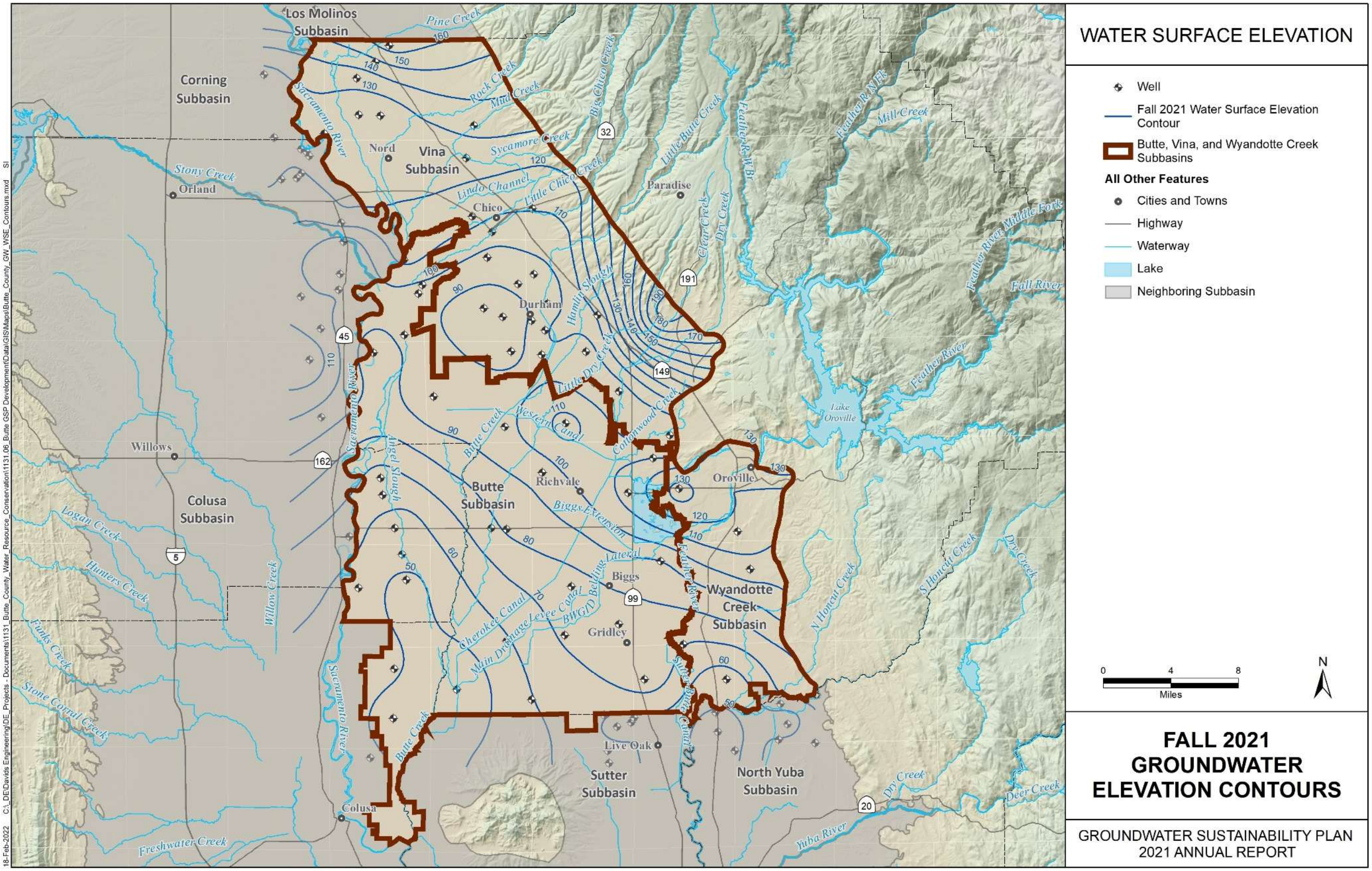

Figure 4. Fall 2021 Groundwater Elevation Contours

2.2. Water Use Estimates

The following section presents measured and estimated groundwater extraction and surface water used for the agricultural, municipal/industrial, and domestic sectors for the 2021 WY.

2.2.1. Groundwater Extraction

The subbasin utilizes groundwater primarily for agricultural demands. In addition, rural residential demands rely on private domestic wells for their household water needs and the City of Oroville, served by three different water providers, is supplied in small part with groundwater.

Total estimated groundwater extraction in the 2021 WY was approximately 46,300 AF (Table 2). This is just under the 2000-2018 average annual groundwater extraction of 47,100 AF reported in the GSP for the subbasin. About 96% of total extractions are used by the agricultural sector with the remaining 4% providing for municipal/industrial and household water needs. During dry and critically dry years, agricultural groundwater extraction often increases relative to long-term average demand due to less rainfall and therefore reduced soil moisture, and increased evapotranspiration associated with hotter, drier conditions. However, this is not evident in the 2021 estimated extraction for agricultural and managed wetlands demands.

Figure 5 shows a map of the general areas and pumping rates where extraction occurs. The subregions shown on the map are established in the Butte Basin Groundwater Model (BCDWRC, 2021).

Table 2. 2021 Water Year Groundwater Extraction by Water Use Sector

Sector	Extraction (AF)	Method
Agricultural and Managed Wetlands		
Wyandotte Creek Subbasin	44,600	Estimate
Municipal/Industrial		
Cal Water- Oroville	9	Measured
Thermalito Water and Sewer District	624	Measured
Subtotal	*633*	
Domestic		
Rural Residential	1,100	Estimate
Total	***46,333***	

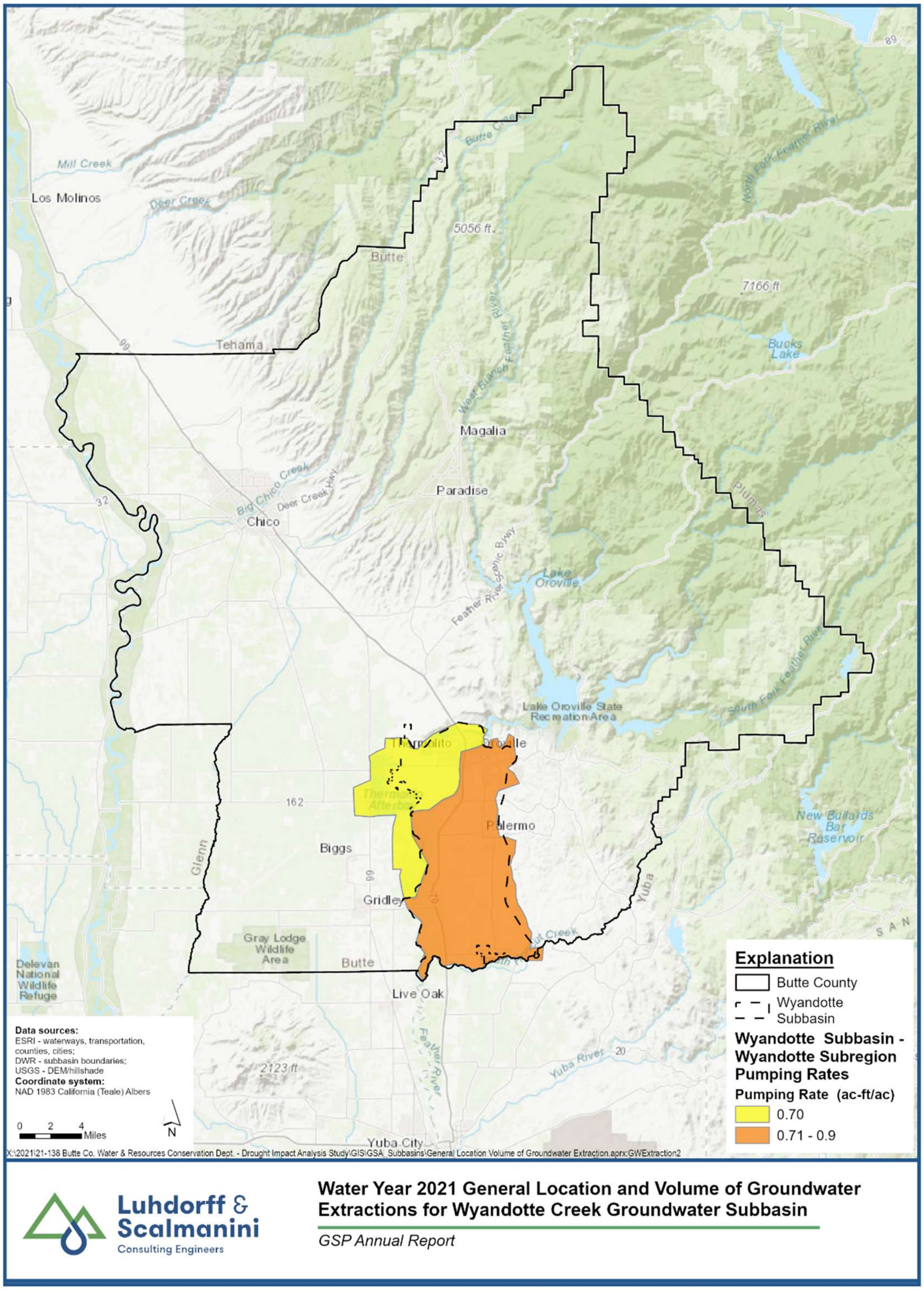

Figure 5. General Location (based on Butte Basin Groundwater Model subregions) and Volume of Groundwater Extraction shown as a Rate (acre-feet per acre) for 2021 WY

Agricultural groundwater extraction is estimated based on estimated agricultural water demand using 2021 land use (acreage for 17 different crops), climate conditions (i.e. precipitation and evapotranspiration), and crop coefficients consistent with those used in the Butte Basin Groundwater Model (used to develop water budgets for the GSP). This includes estimated groundwater extraction for irrigating managed wetlands. It should be noted that although the fundamental approach is similar to that used to estimate groundwater extraction in the GSP, the Butte Basin Groundwater Model was not updated with 2021 data and was not used to provide these estimates. Therefore, future updates and use of the Model may result in different estimates for 2021 groundwater extraction. The approach to estimate groundwater extraction herein is considered reasonable and cost effective for the purposes of the annual report. Coincident with the development of this annual report, Butte County is funding a Drought Impact Analysis Study to characterize conditions and economic impacts of the drought in 2021. Technical work for the Study provided water budget estimates for this annual report. The final report for the Study is expected to be released in May 2022.

Rural residential groundwater extraction is estimated based on the California Water Service Chico-Hamilton City District 2020 Urban Water Management Plan's 2020 usage of an average per capita water use of 184 gallons per capita per day. This is considered representative of per capita water use in the region. Population data from the 2020 census was coupled with parcel data to identify total population not serviced by municipal supplies. Municipal/industrial water supplies are measured and were provided by each utility/water agency.

2.2.2. Surface Water Supply

Surface water provided about one-third of the agricultural water demand in the Wyandotte Creek Subbasin in 2021. Surface water is also a significant source of water supply (about 11,200 AF) for municipal/industrial uses in the City of Oroville (Table 3). Local supplies as well at Butte County Table A supply surface water for agricultural and municipal/industrial uses. Diversions from the Feather River and Honcut Creek outside of district areas are estimated based on historic State Water Resources Control Board Electronic Water Rights Information Management System (eWRIMS) data for total diversions. For appropriative water rights in Wyandotte Creek Subbasin, the face value of the water right was taken and scaled by a local factor of 59% due to the critically dry water year. The local factor is based on an overview of measured deliveries in the region. This estimate was compared against past dry and critical year deliveries. Total surface water deliveries for the Wyandotte Creek Subbasin are estimated to be about 33,200 AF as shown in Table 3.

Table 3. Summary of 2021 Surface Water Deliveries by Source and Sector

Sector	Source	Surface Water (AF)	Method
Agriculture and Managed Wetlands			
Subbasin (outside districts)	Feather River & Honcut Creek	8,400	Estimate
South Feather Water & Power Agency	Feather River	13,624	Measured
Subtotal		*22,024*	
Municipal/Industrial			
Cal-Water Oroville	Feather River (PG&E)	2,961	Measured
Cal-Water Oroville	Butte County Table A	29	Measured
South Feather Water & Power Agency	Feather River	6,340	Measured
Thermalito Water & Sewer District	Concow Creek, Lake Oroville	1,848	Measured
Subtotal		*11,178*	
Total		***33,202***	

2.2.3. Total Water Available

Groundwater supplies about two-thirds of the agricultural water demand in the subbasin and provides about 58% of the total water supplies for all water demand sectors.

Total water available for use in the Wyandotte Creek Subbasin was tabulated from the groundwater extraction reported in Table 2 and the surface water supply reported in Table 3. Total water available is summarized in Table 4 for the 2021 WY. The results are either based on measured data or estimates as described in the previous two sections.

Table 4. 2021 Water Year Total Water Available by Water Use Sector and Water Source Type

Sector	Groundwater Extraction (AF)	Surface Water (AF)	Method	*Total (AF)*
Agricultural	44,600	22,024	**Estimate**	***66,624***
Municipal/Industrial	633	11,178	**Measured**	***11,811***
Domestic	1,100	Not Applicable	**Estimate**	***1,100***
Total	***46,333***	***33,202***		***79,535***

2.3. Change in 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. 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.

Groundwater extraction and reduced natural recharge due to dry climate conditions resulted in lower groundwater levels in most monitoring wells in the subbasin in spring 2021 compared to spring 2020. The moderate groundwater level declines amounted to an estimated reduction of groundwater in storage of about 380 AF for this time period. Figure 6 shows estimated change in storage using groundwater level conditions in RMS wells and a representative storage coefficient of 0.1, with Thiessen polygons defining a representative area for each RMS well. The representative storage coefficient was established by roughly calibrating estimated change in storage based on changes in observed water levels (i.e. calculated using water level data, representative area, and storage coefficient parameter) with estimated change in storage outputs from the Butte Basin Groundwater Model as reported in the GSP to aggregate characteristics across all zones of the principal aquifer system. A total of 20 pairs of concurrent annual storage changes from both of these methods (i.e., (1) groundwater level change method used in this report and (2) modeled storage changes from the GSP) from 1999 through 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. Spring measurements were computed as the average of all available groundwater level measurements from March and April of the respective year.

Figure 7 shows annual and cumulative change in groundwater storage over time in thousand acre-feet, 2000-2021, relative to annual groundwater extraction and water year type.

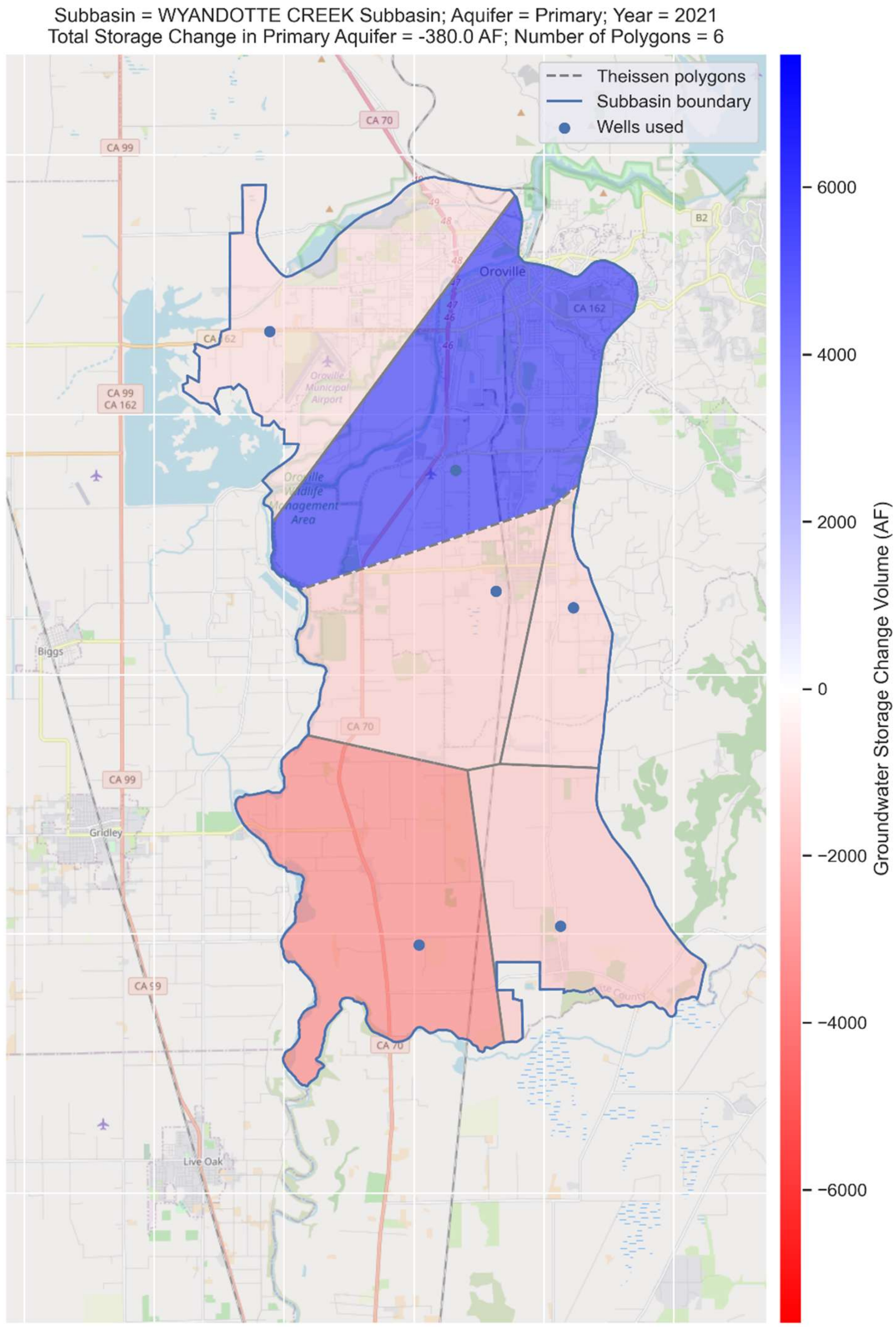

Figure 6. Change in Groundwater Storage from Spring 2020 to Spring 2021 using Groundwater Elevations from RMS Wells and Storage Coefficient of 0.1.

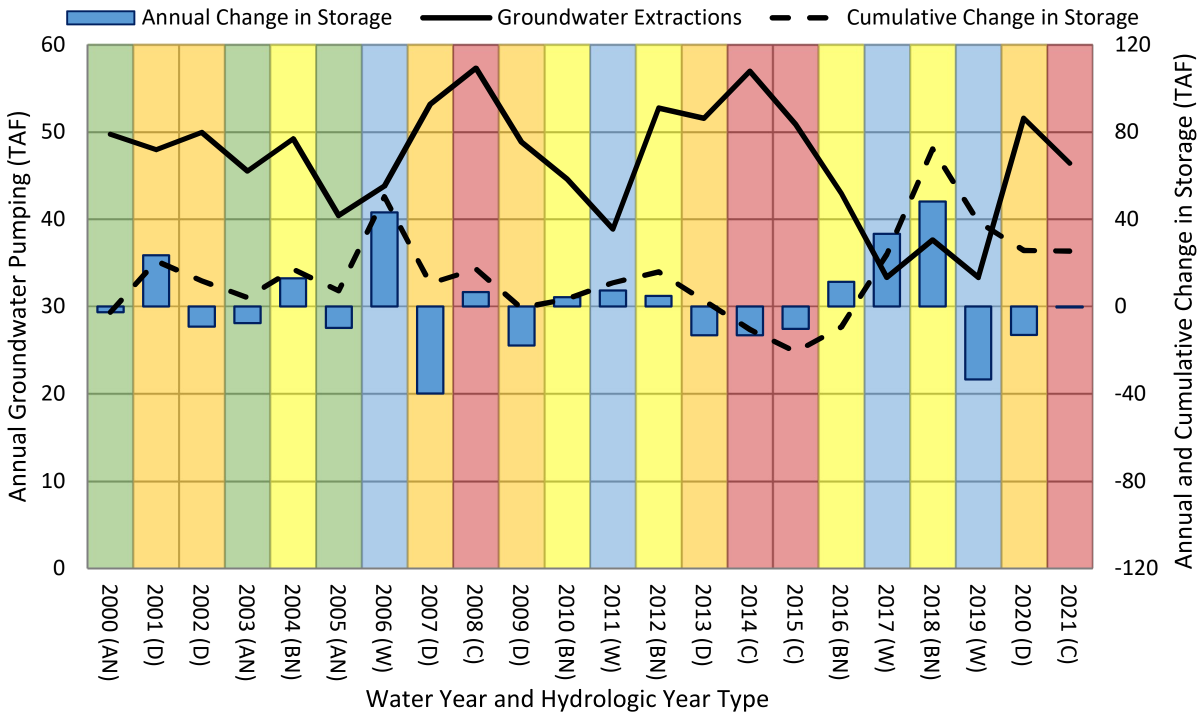

Figure 7. Change in Groundwater Storage (Cumulative and Annual Change) and Annual Groundwater Extraction by Water Year Type.

Note: Values calculated spring to spring for each water year. Water year types are identified as wet (W, shaded blue), above normal (AN, shaded green), below normal (BN, shaded yellow), dry (D, shaded orange), or critical (C, shaded red). Groundwater extraction 2000-2018 values are consistent with the Wyandotte Creek GSP based on Butte Basin Groundwater Model results, 2019 and 2020 estimated by matching to similar water year types, and 2020 estimated as described in Section 2.2. Groundwater Change in Storage estimated based on change in measured spring to spring groundwater levels multiplied by the area of the Thiessen polygon associated with the monitoring well and the Storage Coefficient of 0.1.

3. Groundwater Sustainability Plan Implementation Progress

The GSP for the Wyandotte Creek Subbasin was adopted by the GSA in December 2021 and submitted to DWR in January 2022. This is the first annual report to be prepared since the GSP was submitted. The GSP implementation progress reported in this report covers ongoing work during GSP development since late 2021.

3.1. Interim Milestone Achievement Progress

As shown in Table 1, the first 5-year 2027 interim milestones for the RMS wells in the subbasin are achieved by 2021 groundwater level conditions and all spring and fall groundwater levels are above the established Measurable Objective for each well.

Ongoing Stakeholder Engagement

Since completing the GSP, the Wyandotte Creek GSA continues to plan stakeholder meetings with the first scheduled for April of 2022. Upcoming meetings will involve review and discussion of a suite of projects and funding sources aimed at achieving sustainability in the subbasin by 2042. Additional projects beyond those identified in the GSP may be included. Upon additional evaluation, the stakeholder group may recommend that the GSA Board move a subset of the projects identified in the GSP ahead for further assessment, modeling or scoping. The GSA Board will continue to prioritize stakeholder feedback in the implementation phase of the GSP because of the vital role stakeholders play in identifying successful groundwater management approaches for the variety of beneficial uses and users of groundwater in the subbasin.

Monitoring Network Expansion Progress

During development of the GSP, the GSA identified a critical area in which aquifer specific groundwater elevations and water quality data were lacking. In response to the GSA's request, DWR installed a new nested monitoring well (with three individual wells screened at unique depths) through their Technical Support Services Program in 2021, per the GSA's technical specifications. These nested monitoring wells, 18N04E19D001M - 18N04E19D003M, near Lone Tree Road in the Wyandotte Creek South Management Area were installed specifically to address the spatial data gaps identified in the GSP. Groundwater data from these wells will be incorporated into future annual reports to help characterize groundwater conditions in the subbasin.

3.2. GSP Project Implementation Progress

Maintaining sustainability in the subbasin may require implementation of projects and management actions. The subbasin will achieve sustainability by both identifying and increasing alternative sources of supply and reducing groundwater demand when possible or necessary. Currently, no pumping restrictions have been proposed for the subbasin; however, the GSA maintains the flexibility to implement such demand-side management. The Wyandotte Creek GSA will evaluate implementation of the GSP and long-term funding strategies in upcoming meetings. The recent progress towards implementation of projects and management actions applicable to the subbasin demonstrates the GSA's commitment to allocating the necessary time and resources to achieve long-term sustainable management of the groundwater resources of the GSA. Progress made by the GSA or partners in the subbasin is described below.

Residential Water Conservation Project

Municipal/industrial water providers in the subbasin such as California Water Service Company, Thermalito Water and Sewer District (TWSD) and the South Feather Water and Power Agency (SFWPA), are currently implementing water conservation practices in accordance with their 2020 Urban Water Management Plans. Some of these conservation projects include the installation of low flow fixtures, toilet replacements, urinal valve and bowl replacements, clothes washer replacements, residential conservation kits, smart controllers, turf removal program, and high efficiency irrigation nozzles. Other projects include water waste prevention ordinances, household water audits, metering, conservation pricing, public education and outreach, programs to assess and manage distribution system real loss, water conservation program coordination and staffing support, and other demand management measures. The conservation projects from municipal/industrial water providers using groundwater as their supply source for the households they serve will directly affect groundwater levels and groundwater storage by reducing demand. The municipal/industrial water providers using surface water as their supply source for the households they serve will also affect groundwater levels and groundwater storage by reducing demand as many of the households served by surface water also have supplemental groundwater wells.

Agricultural Irrigation Efficiency Project

Butte County, the Agricultural Groundwater Users of Butte County, and the Butte County Farm Bureau collaborated to conduct a survey of agricultural irrigators in the Vina Subbasin, which will also be informative for efforts in the Wyandotte Creek Subbasin. The purpose of the survey was focused on evaluating current irrigation methods and practices, identifying opportunities and methods to improve irrigation efficiency, determining potential issues preventing the adoption of efficiency practices, and providing recommendations for increasing participation in these practices. The results of this survey were analyzed in December of 2021 and a summary report is expected to be available in spring of 2022. Recommendations from the survey will be made available to the local agricultural community and the public. Voluntary implementation of the recommended practices are expected to be initiated between 2024 and 2030 by local irrigators. The Wyandotte Creek GSA along with participating partners will pursue grant funds to help implement these practices. The Agricultural Irrigation Efficiency project addresses declining water levels and the declining volume of groundwater stored in the aquifer (and therefore potential land subsidence) by reducing groundwater demand. The main objective of the project is to improve groundwater levels and storage by modifying irrigation practices to reduce groundwater demand.

Palermo Clean Water Consolidation Project

The Palermo Clean Water Consolidation Project will provide clean and reliable potable water to 380 parcels (approximately 1,100 residents) in Palermo by connecting households to SFWPA's water supply. All elements of a Drinking Water State Revolving Fund application for the Project are under development. In June and November of 2021, community meetings were held at the Palermo Grange to provide an overview of the project and solicit community interest in the project. A Letter of Interest is currently being circulated to landowners located within the proposed service area to indicate their interest in connecting to the SFWPA water system. Over 100 letters of interest have been received to date. Multiple sources of funding may be necessary to fully fund the Project. In addition to the Drinking Water State Revolving Fund grant application, an application for the DWR Small Community Drought Relief Funding program will be submitted. This project will reduce groundwater demand by connecting households currently served by private wells to surface water supplies provided by SFWPA.

Oroville Wildlife Area Robinson's Riffle Project

The Robinson's Riffle Project is a major restoration project for the Oroville Wildlife Area, a 12,000-acre area located in Butte County and managed by DWR and the California Department of Fish and Wildlife (CDFW). Under this project, the Feather River will undergo major grading improvements that will lower the floodplain surface to a more naturalized condition by excavating tailing piles, reconnecting the overbank areas to the main channel, and creating new side-channel and floodplain habitat. This work would increase the overall area of riverine habitat, thereby improving the flow and quality of the water, removing invasive species along the banks, and increasing the surface available for recharge into the aquifer during flood events. This project will benefit groundwater levels, and storage, and therefore potential land subsidence, in the subbasin. Additionally, increasing the overall streamflow in the river will benefit several local species. The Sutter Butte Flood Control Agency (SBFCA) will obtain necessary permits in partnership with DWR and CDFW. SBFCA has conducted a series of workshops to engage with stakeholders and resource agencies and to obtain the necessary funding to move forward. Recently the SBFCA has submitted a grant proposal to the Wildlife Conservation Board to fund this work.

Thermalito Water and Sewer District Water Treatment Plant Capacity Upgrade Project

The TWSD provides domestic water services to the Thermalito community. The District's water supply is provided primarily from surface water rights. Surface water is eventually conveyed to its water treatment plant before distribution to customers. While TWSD primarily uses surface water as the main water supply, backup or supplementary groundwater supply is provided by four wells in the area. Both surface and groundwater sources tie into the central distribution system extending service throughout the urban areas of the District. The distribution network contains adequate surplus capacity to expand service to properties within the District's existing boundaries planned for future development. This project will increase the capacity of the water treatment plant serving the city of Oroville and surrounding area. By treating a greater volume of surface water for the area, there will be a reduced need for supplemental groundwater pumping which will benefit groundwater levels and storage, and therefore potential land subsidence in the subbasin. TWSD has secured funding for the project and is currently accepting proposals / designs for the work to begin with an anticipated completion of July 2023.

Water Loss Monitoring Project

Water providers in the Wyandotte Creek Subbasin recognize that water loss across their systems occurs due to unpermitted use. SFWPA provides service to cities such as Oroville and Palermo and recognized that fire hydrants, which are primarily used for fire suppression, are being used for other unmonitored purposes. The extended use of fire hydrants is negatively affecting the amount of available surface water in the service area. The hydrants do not have meters on them, making it difficult to monitor usage when used by those without portable meters. Under this project, water providers are evaluating and implementing procedures to track usage and water loss more accurately from their systems. This evaluation could include implementation of new practices to reduce unregulated use or installation of meters on hydrants. This project will increase the amount of surface water available for customers in the area and will reduce groundwater demand. Groundwater levels and storage (and therefore potential land subsidence) as well as surface water depletions in the subbasin will benefit from this project.

SFWPA has made significant progress on this project including modifications to their policy in order to streamline the bulk filling permitting process. Additionally, the SFWPA's Board has recently considered a suite of projects associated with their Water Loss Control Program along with a request to support a resolution to apply for the DWR Urban and Multibenefit Drought Relief Funding in late 2021 with one of the key items being Hydrant Theft Security Upgrades for targeted locations experiencing the highest unauthorized usage. SFWPA continues to explore funding options to implement solutions to minimize these unregulated uses through implementation of new practices to reduce unregulated use, including strategically installing hydrant security devices that will reduce this unregulated use. SFWPA also plans to continue to explore funding options to implement solutions to minimize these unregulated uses, including hydrant meters.

3.3. GSP Management Actions Implementation Progress

The recent progress on management actions demonstrates the GSA's commitment to allocating the necessary time and resources to achieve long-term sustainable management of the groundwater resources of the GSA. The GSA has made progress on the following management actions:

General Plan Updates

Butte County staff, who serve as members of the Wyandotte Creek GSA Management Committee, have been cooperating with the Butte County Department of Development Services in the 2040 General Plan Update. Specifically, staff along with the Water Commission has made suggested revisions to the Water Resources Element and applicable General Plan Goals, Policies, and Actions. These updates will ensure that important components of the GSP are supported by the General Plan.

Expansion of Water Purveyors' Service Area

Under this management action, water purveyors may expand their service areas and provide drinking water to residential areas that are currently using private domestic groundwater wells. Groundwater levels in the Wyandotte Creek Subbasin would benefit by the overall decrease in groundwater demand. This action may require approval from the Butte Local Agency Formation Commission and the California Public Utilities Commission. The Palermo Clean Water Consolidation Project described above is a project which meets this Management Action.

3.4. Other Relevant Efforts

Implementation Activities

Additionally, activities in the subbasin to implement SGMA and meet the commitments of the GSP include:

- Monitoring and recording groundwater levels
- Maintaining and updating the Data Management System with newly collected data
- Annual reporting of subbasin conditions and submission to DWR as required by SGMA
- Ongoing inter-basin coordination

Drought Impact Analysis Study

The Butte County Drought Preparedness and Mitigation Plan (Drought Plan) was adopted in 2004 and was developed to protect the County from the effects of a drought. The Drought Plan includes: an overview of Butte County's drought background; an institutional framework to approach drought; a monitoring plan; a response and mitigation plan; and a discussion of water transfers during a drought. The purpose of the Drought Plan is to provide an efficient and systematic process for Butte County that results in a short- and long-term reduction in drought impacts to the citizens, economy, and environment.

In preparation for potentially continued drought conditions, Butte County funded and contracted with a consultant to conduct a Drought Impact Analysis Study to characterize the conditions and economic impacts of drought that occurred in 2021. It will also provide recommendations for County response and readiness in 2022 if dry conditions and drought impacts persist. The study is expected to provide information that may be useful to GSAs in the County as well.

3.5. Conclusion

Recent progress made on all of the above-mentioned activities applicable to the GSA since late 2021 demonstrates the commitment of the GSA to implement the GSP by allocating the necessary time and resources to achieve long-term sustainable management of the groundwater resources in the subbasin.

4. References

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

Geosyntec Consultants, Inc. 2021. Wyandotte Creek Groundwater Sustainability Plan. Available at: https://sgma.water.ca.gov/portal/gsp/preview/99

Appendices

2021 Water Year Annual Report

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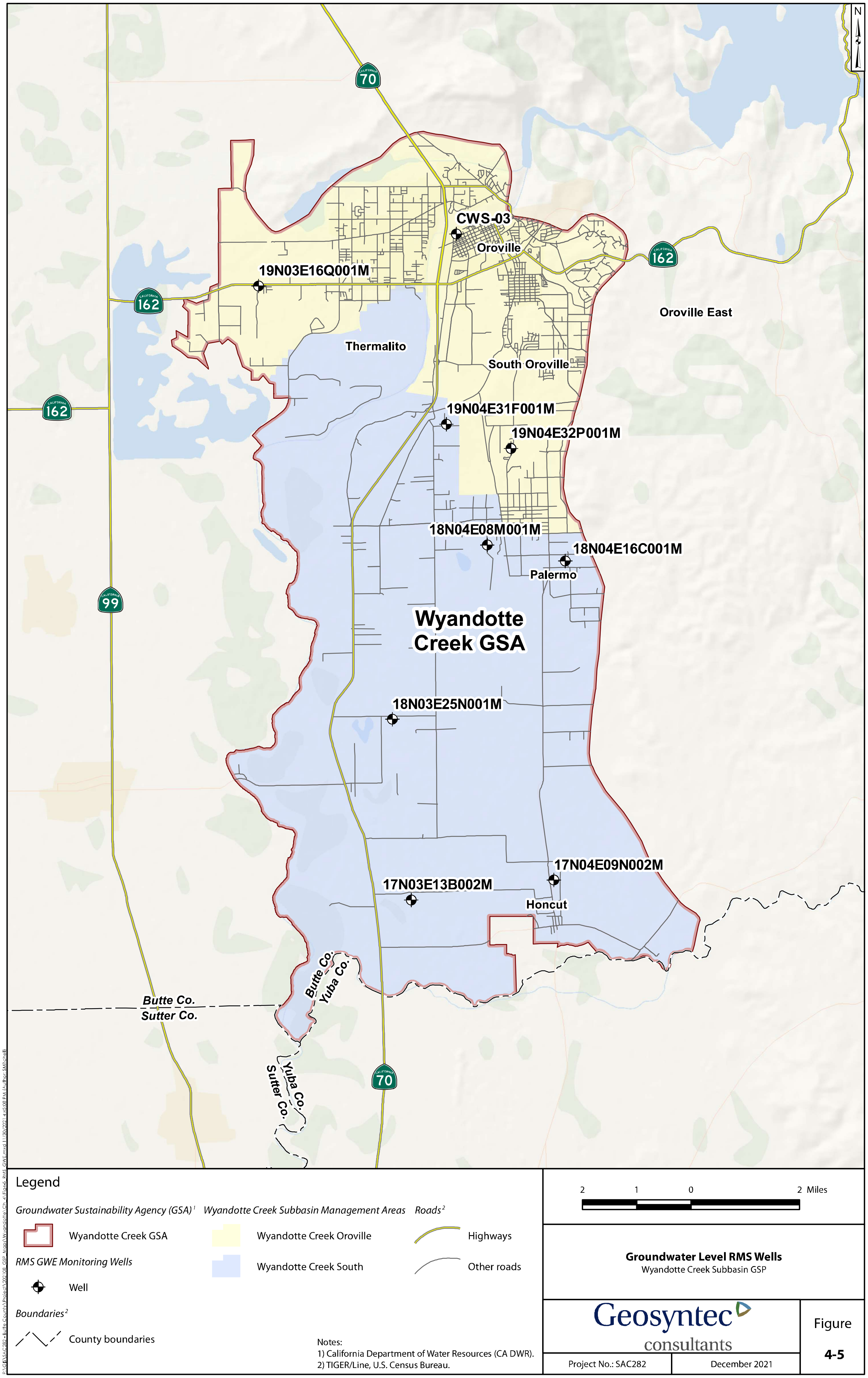
Appendix A

Characteristics and Hydrographs of Representative Monitoring Site (RMS) Wells



Notes:
1) California Department of Water Resources (CA DWR).
2) TIGER/Line, U.S. Census Bureau.

Groundwater Level RMS Wells
Wyandotte Creek Subbasin GSP

Geosyntec consultants

Project No.: SAC282 | December 2021

Figure 4-5

Table 4-5: Groundwater Levels Representative Monitoring Site Well Construction Details

RMS Well ID	State Well Number (Site Name)	Total Depth (feet bgs)	Screened Interval (feet bgs)	Reference Point Elevation[1] (feet)	Reference Point Description	Ground Surface Elevation[1] (feet)
Wyandotte Creek Subbasin – Oroville Management Area						
16Q001M	19N03E16Q001M	120	100-120	180.32	Top of casing	179.32
32P001M	19N04E32P001M	N/A	N/A	188	Between plate and casing on west side	187
CWS-03	CWS-03	<200	---	195	---	---
Wyandotte Creek Subbasin – South Management Area						
13B002M	17N03E13B002M	320	N/A	89.57	Top of casing	89.27
09N002M	17N04E09N002M	325	N/A	103.26	N/A	102.26
25N001M	18N03E25N001M	164	N/A	128.26	Top of casing	127.26
08M001M	18N04E08M001M	656	168-244	147.56	Between metal plate and top of casing	147.26
16C001M	18N04E16C001M	165	N/A	204.46	Top of casing	203.26
31F001M	19N04E31F001M	200	160-200	260.97	Top of casing	259.27

Note:

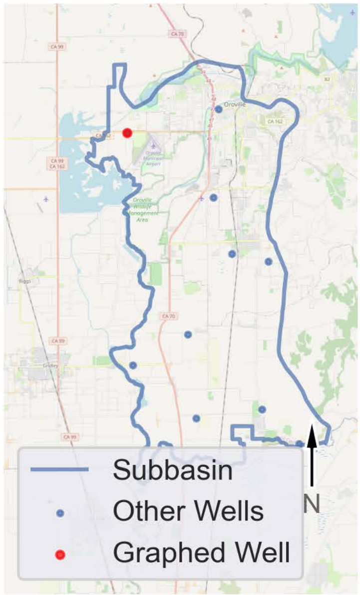
1 – North American Vertical Datum 1988.

N/A – Not available

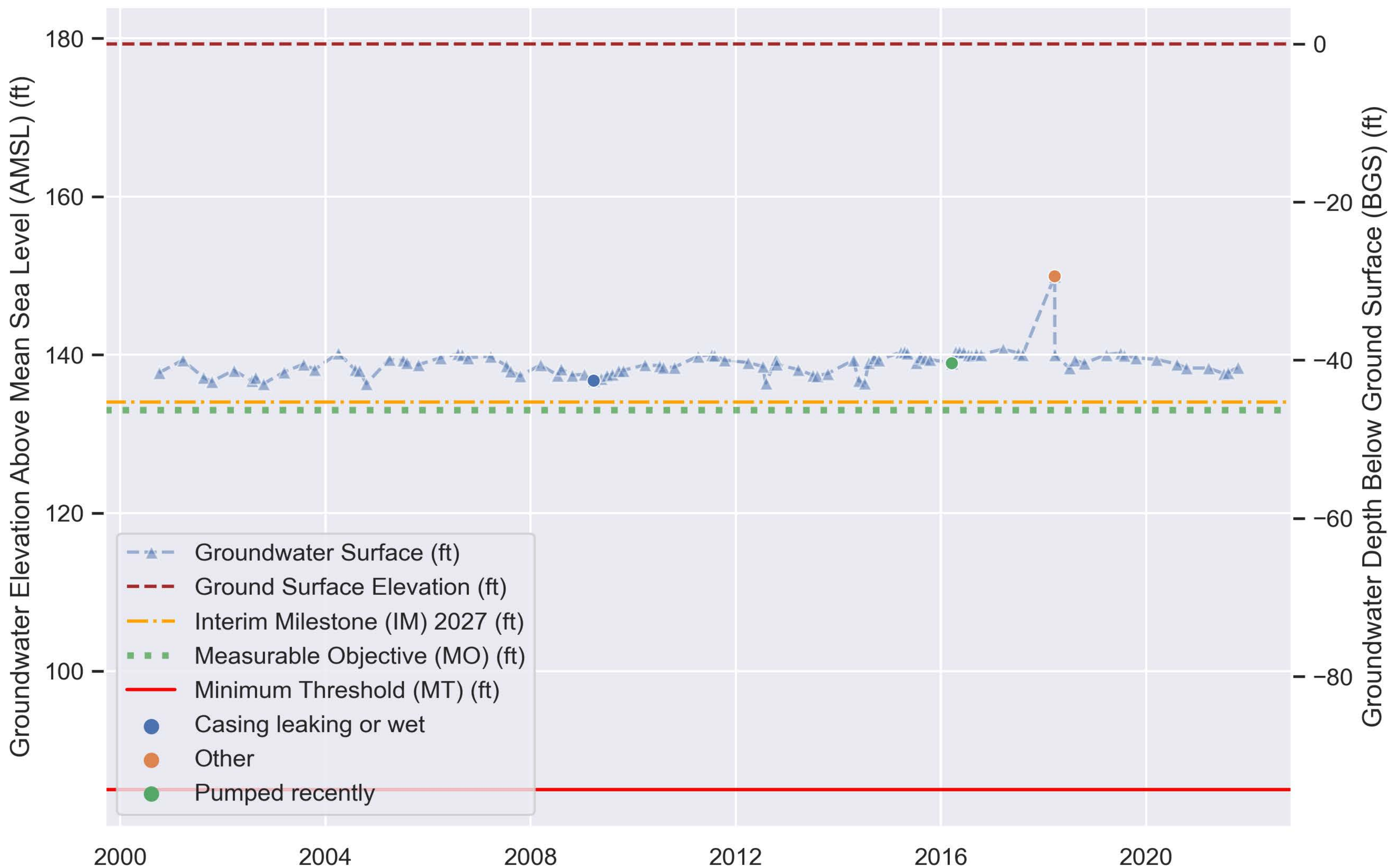
--- Details of public supply wells not disclosed

WYANDOTTE CREEK Subbasin - State Well Number (SWN): 19N03E16Q001M

Well Location Map



Perforation 1: 100.0 - 120.0 ft BGS

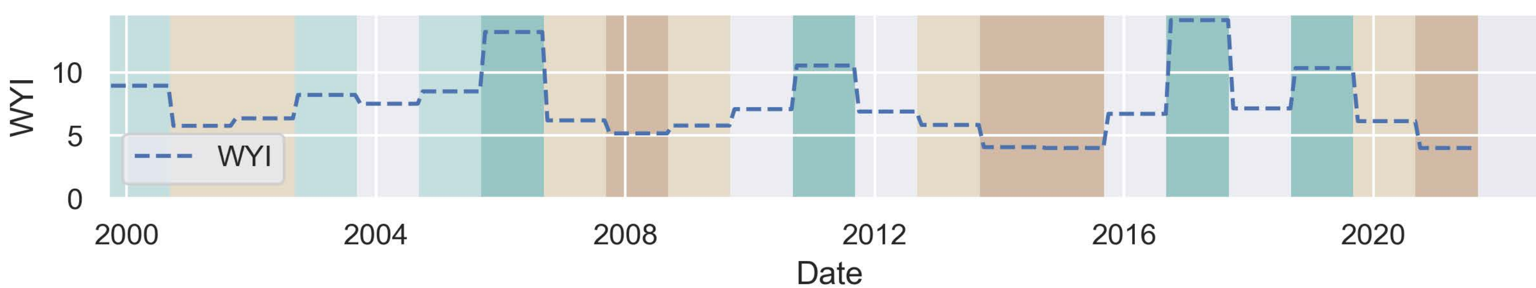


Sustainable Management Criteria:

IM (2027) = 134.0 ft AMSL
MO = 133.0 ft AMSL
MT = 85.0 ft AMSL

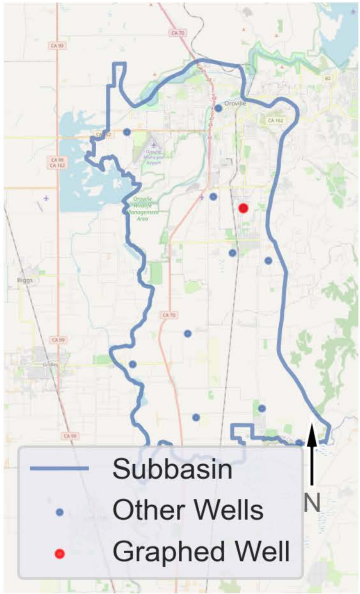
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

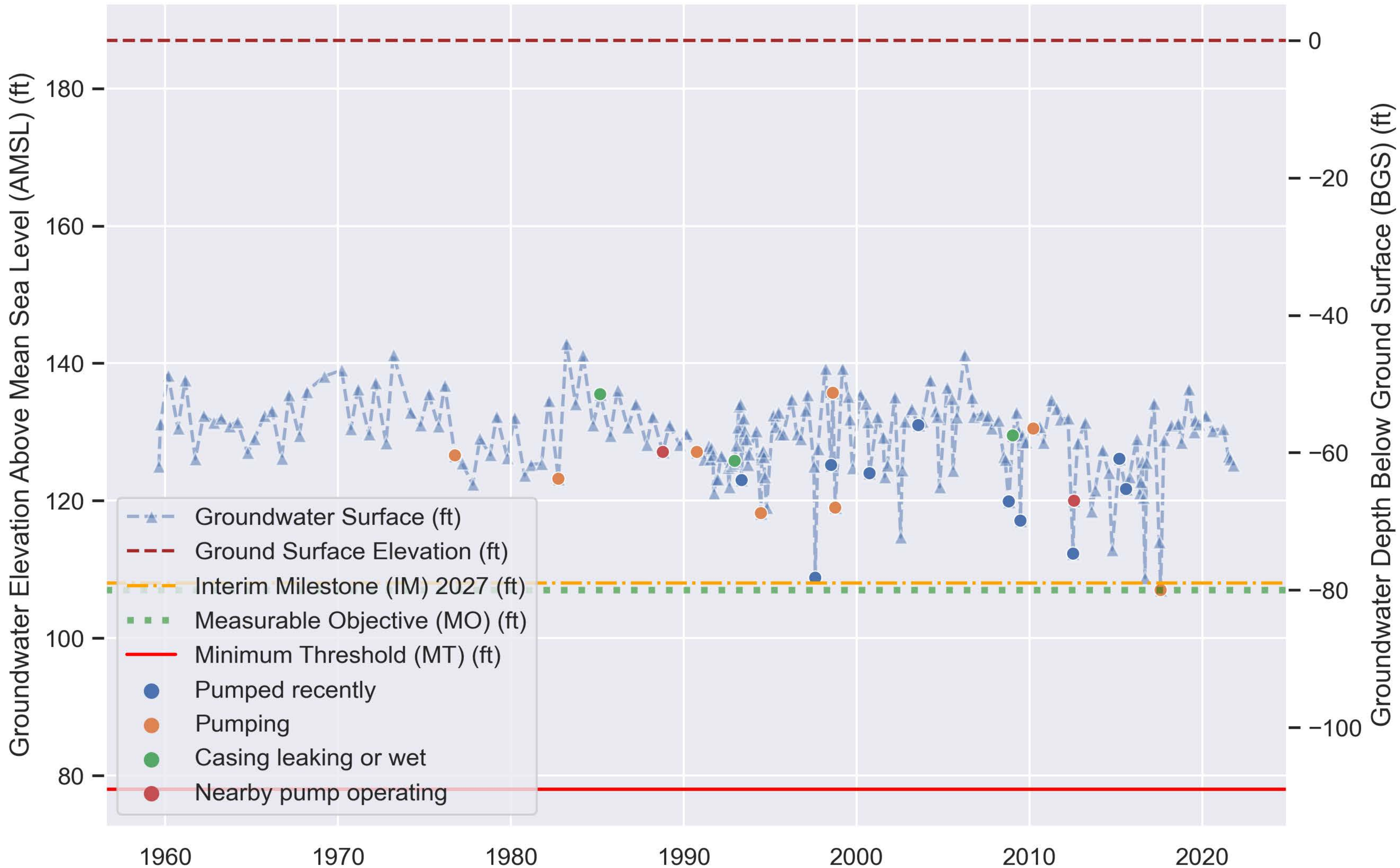


WYANDOTTE Subbasin - State Well Number (SWN): 19N04E32P001M

Well Location Map



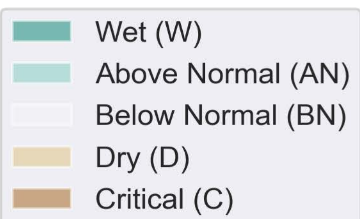
Perforation 1: Perforation data not available.

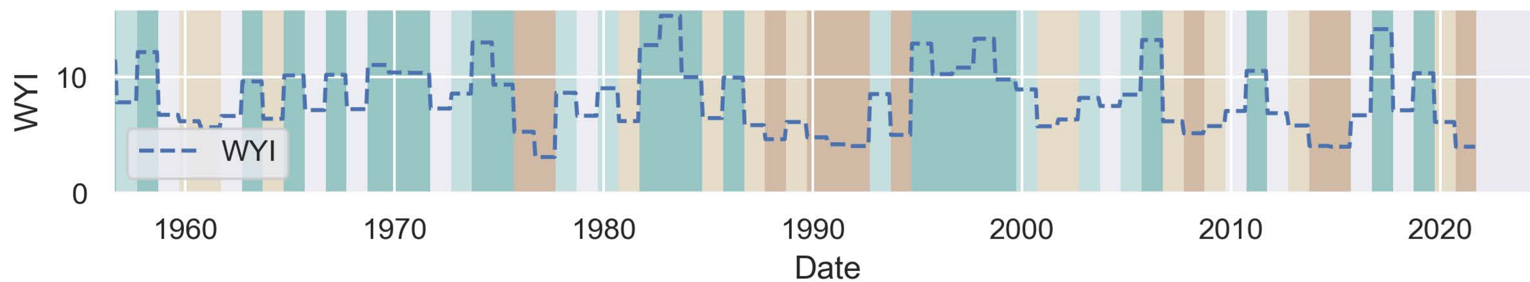


Sustainable Management Criteria:

IM (2027) = 108.0 ft AMSL
MO = 107.0 ft AMSL
MT = 78.0 ft AMSL

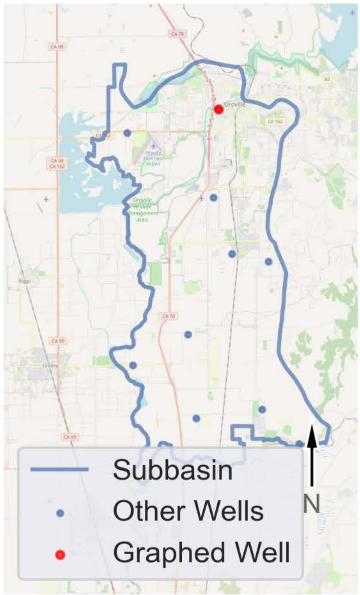
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.





WYANDOTTE CREEK Subbasin - State Well Number (SWN): CWS-03

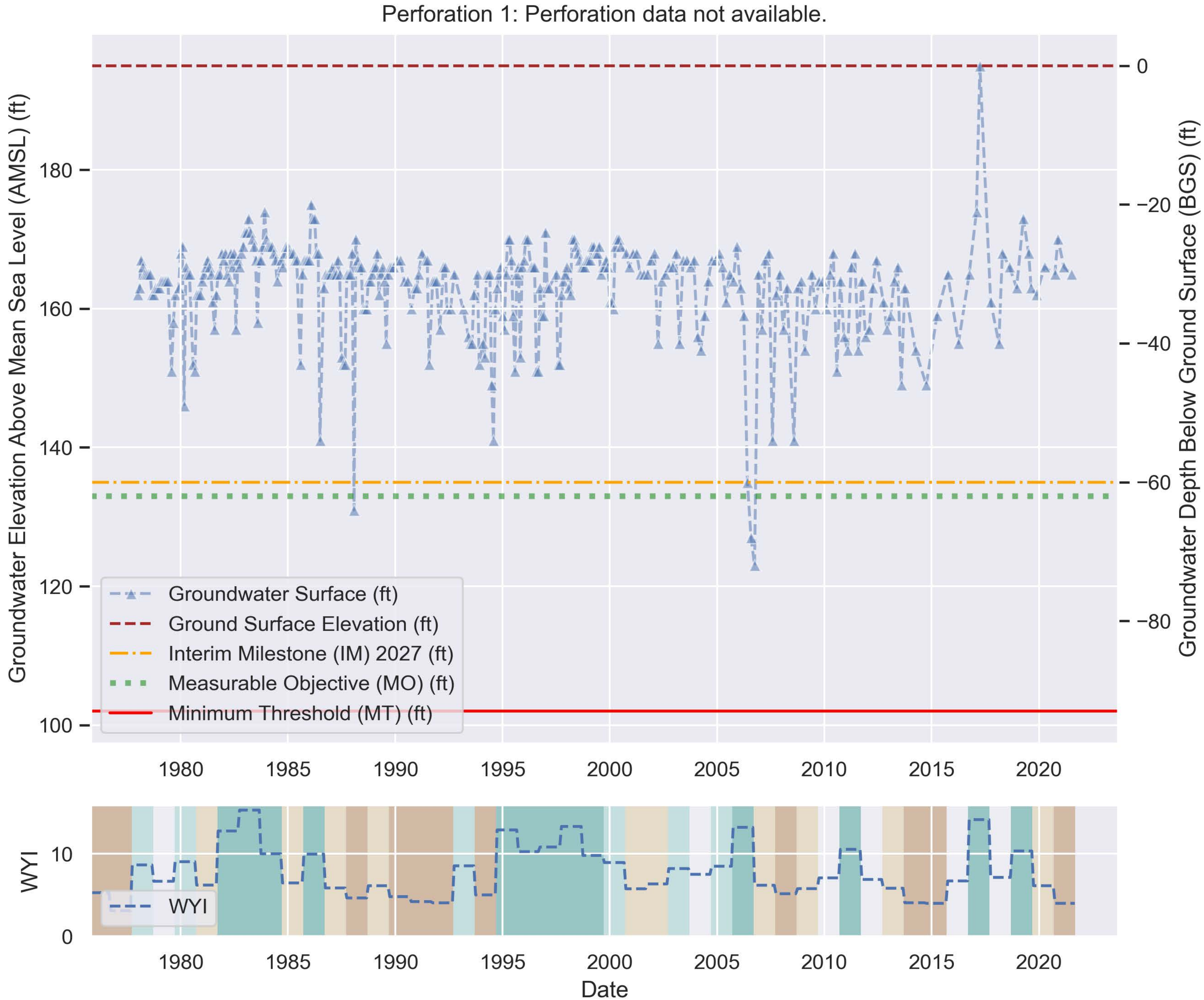
Well Location Map



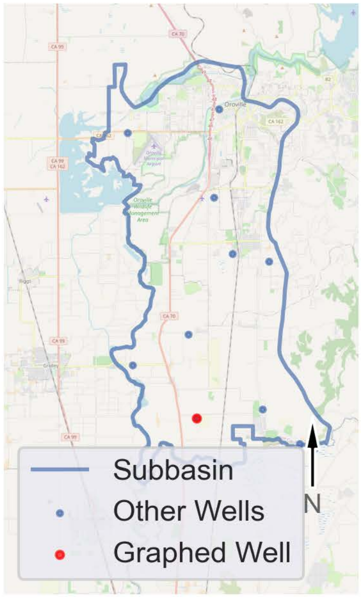
Sustainable Management Criteria:

IM (2027) = 135.0 ft AMSL
MO = 133.0 ft AMSL
MT = 102.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



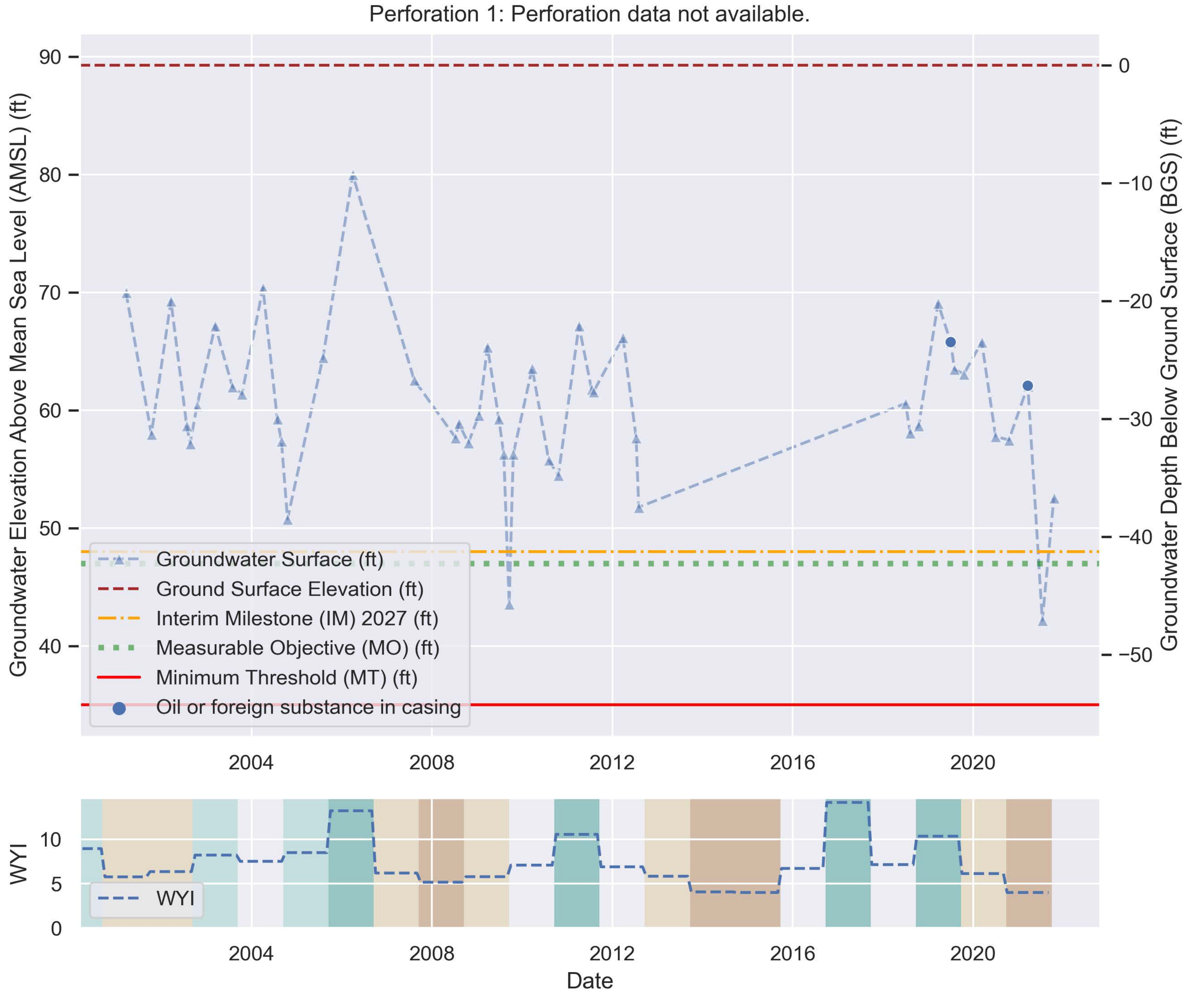
WYANDOTTE CREEK Subbasin - State Well Number (SWN): 17N03E13B002M



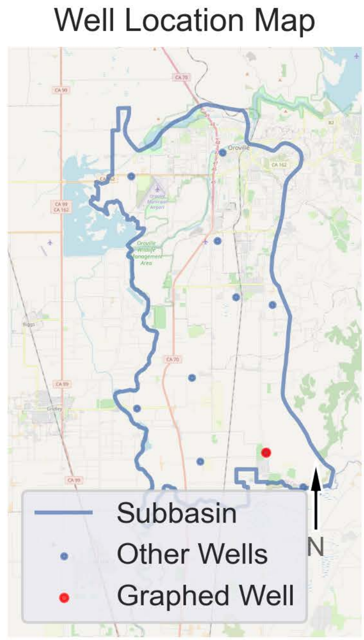
Sustainable Management Criteria:

IM (2027) = 48.0 ft AMSL
MO = 47.0 ft AMSL
MT = 35.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



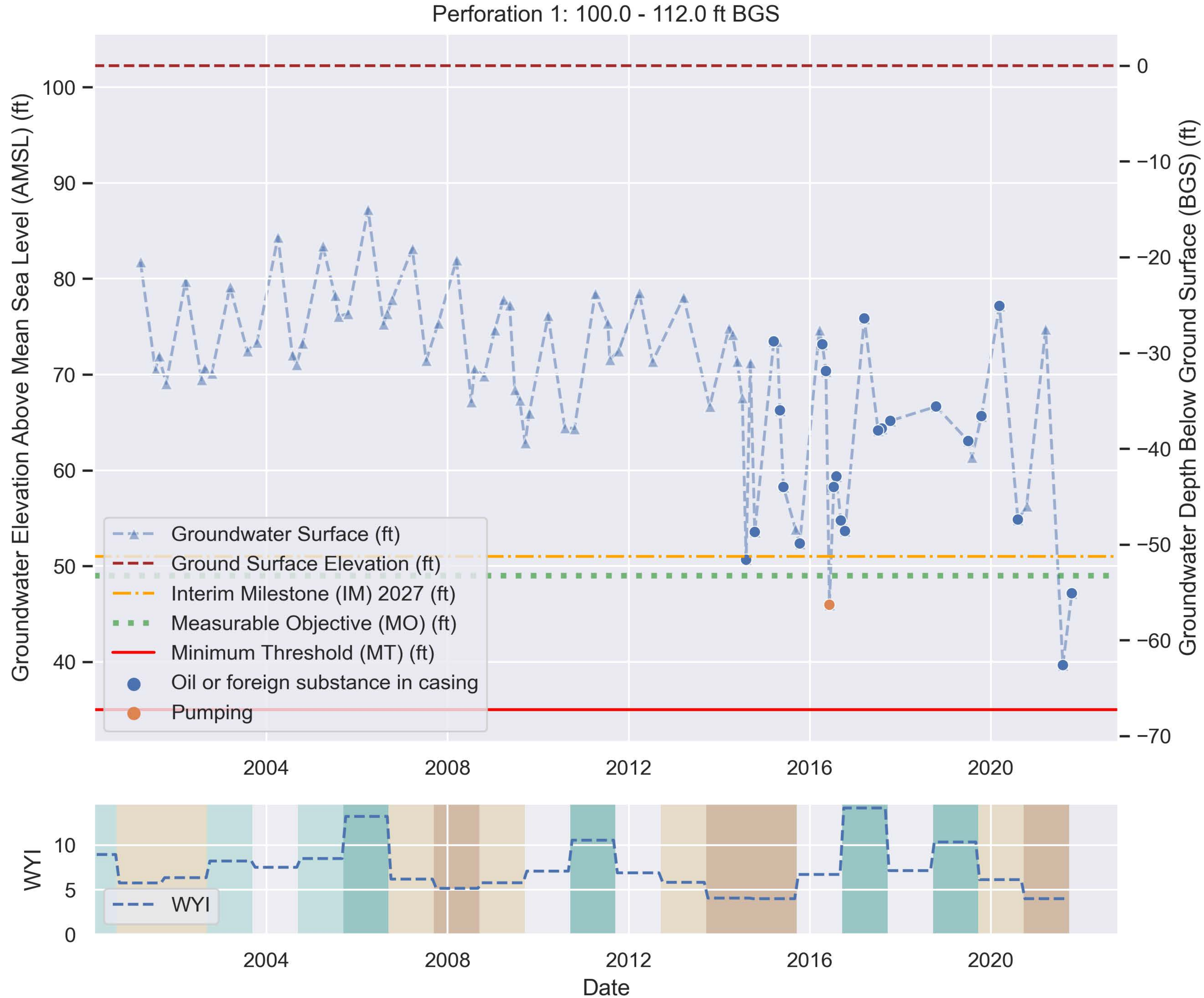
WYANDOTTE CREEK Subbasin - State Well Number (SWN): 17N04E09N002M



Sustainable Management Criteria:

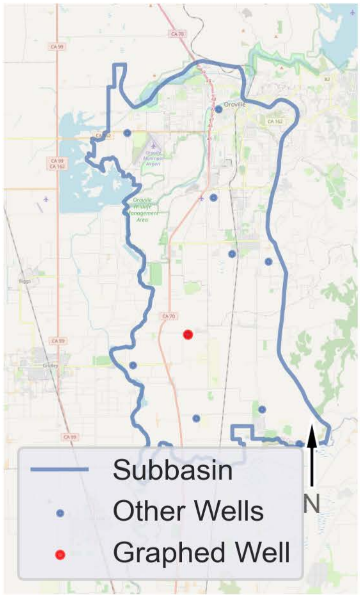
IM (2027) = 51.0 ft AMSL
MO = 49.0 ft AMSL
MT = 35.0 ft AMSL

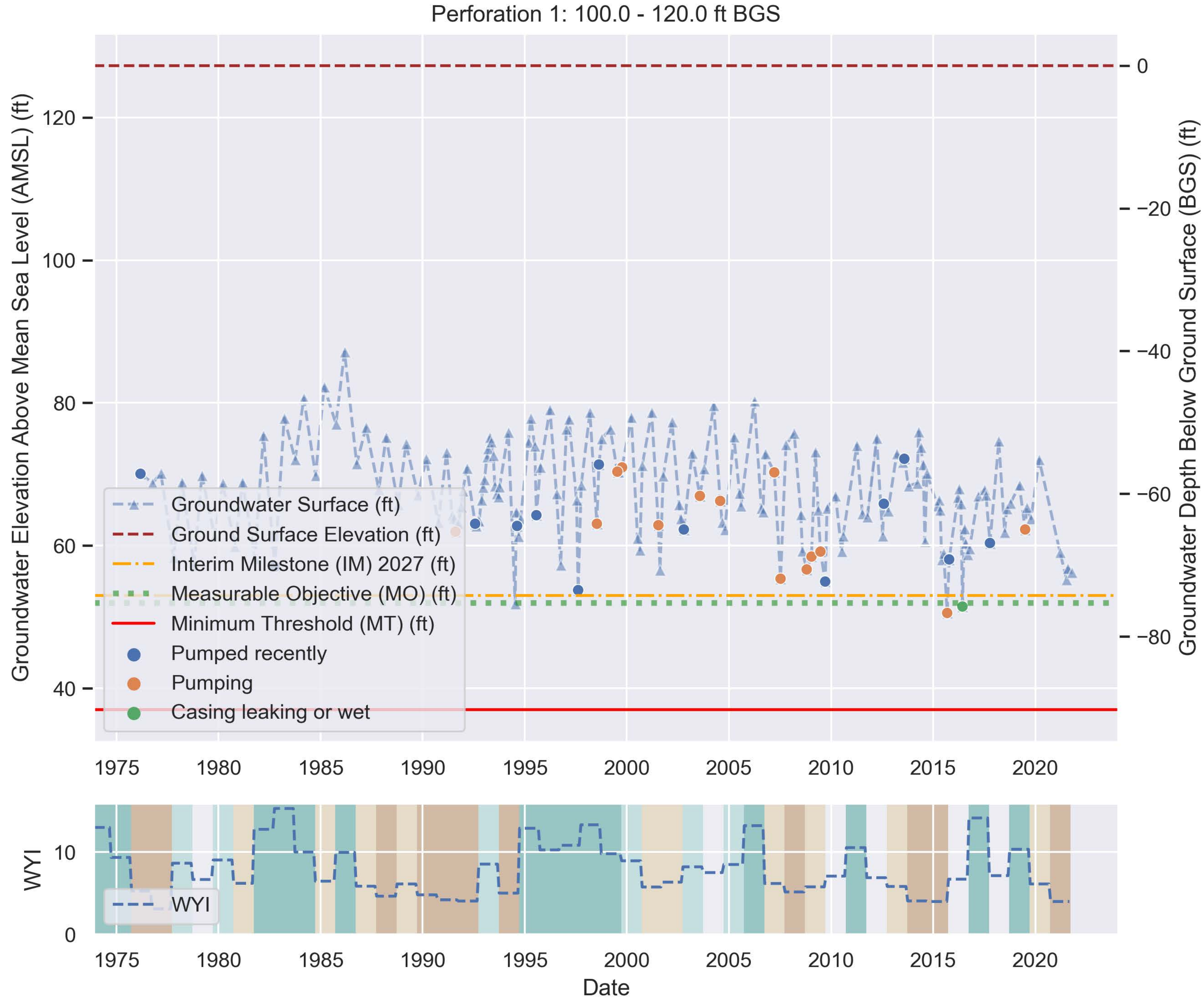
Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



WYANDOTTE CREEK Subbasin - State Well Number (SWN): 18N03E25N001M

Well Location Map





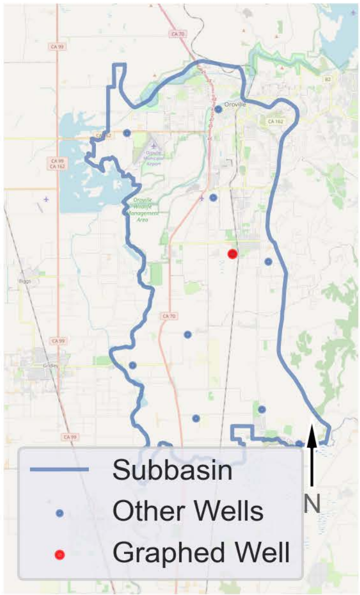
Sustainable Management Criteria:

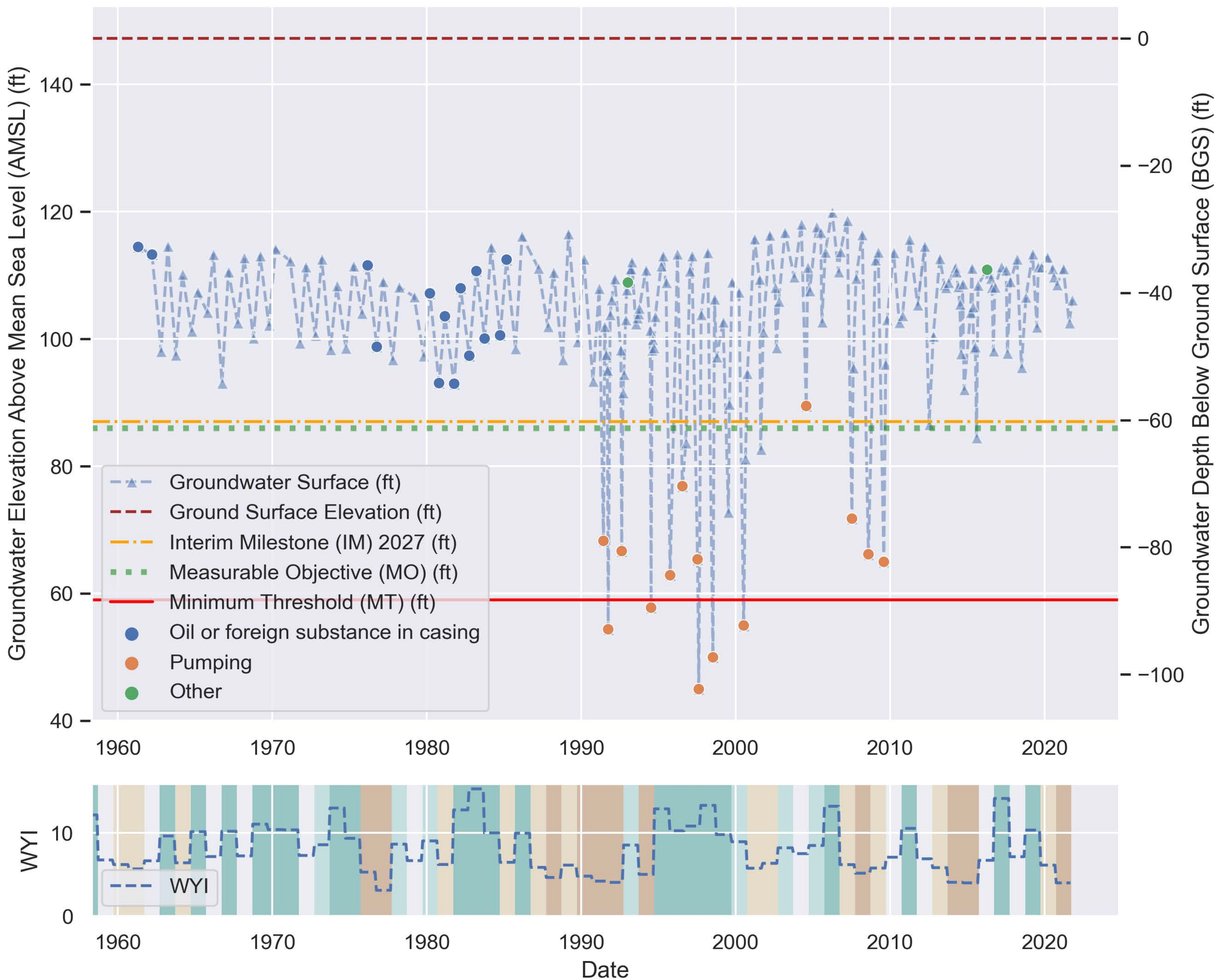
IM (2027) = 53.0 ft AMSL
MO = 52.0 ft AMSL
MT = 37.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

WYANDOTTE CREEK Subbasin - State Well Number (SWN): 18N04E08M001M

Well Location Map



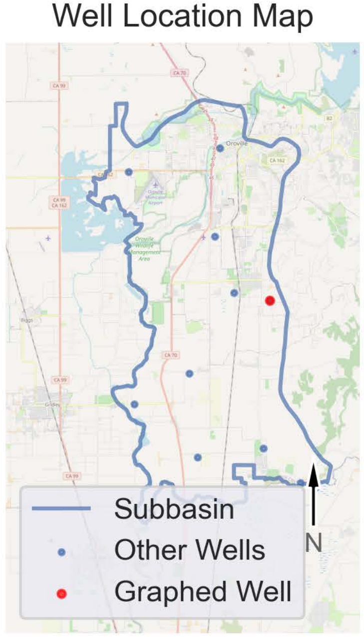


Sustainable Management Criteria:

IM (2027) = 87.0 ft AMSL
MO = 86.0 ft AMSL
MT = 59.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

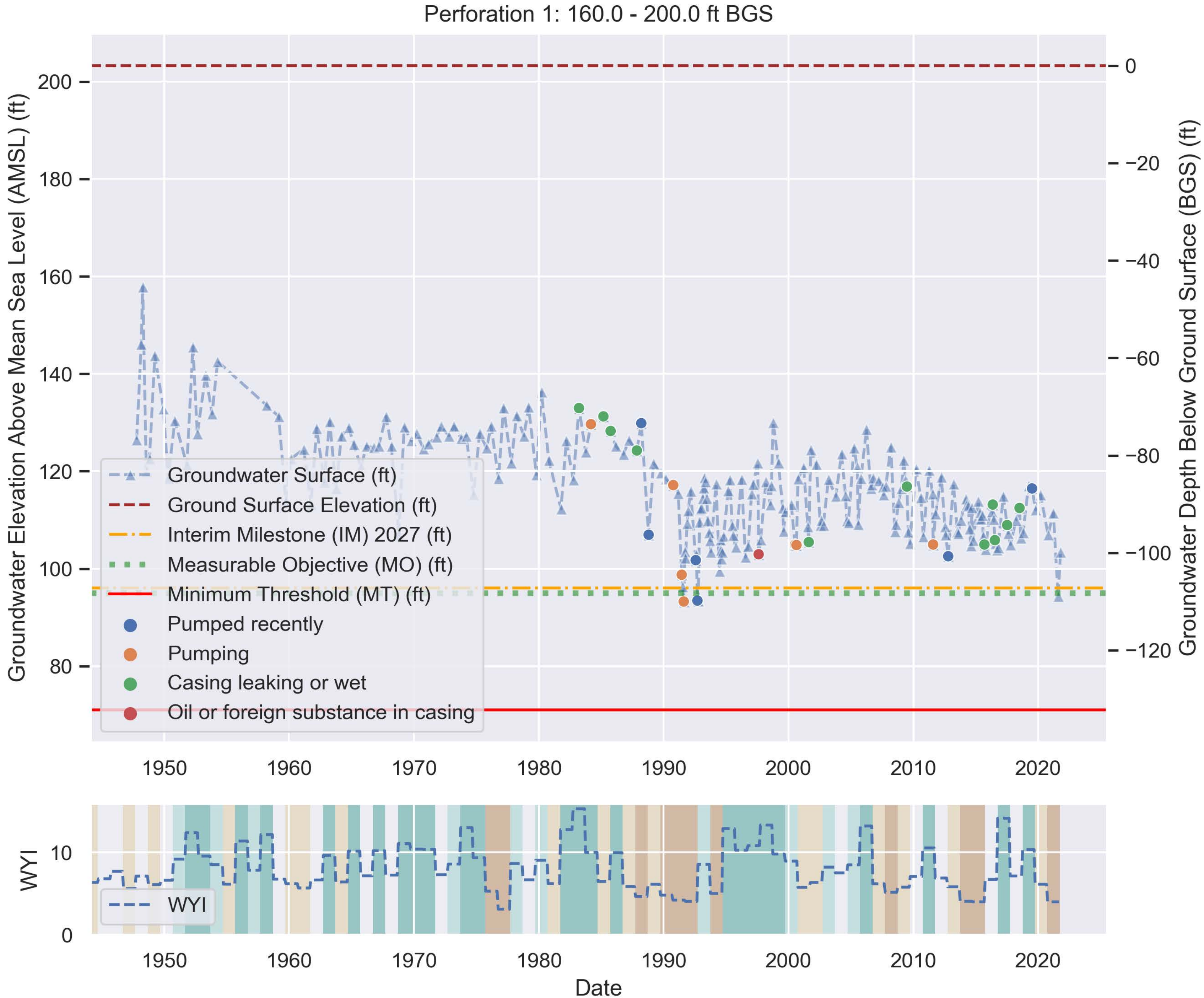
WYANDOTTE CREEK Subbasin - State Well Number (SWN): 18N04E16C001M



Sustainable Management Criteria:

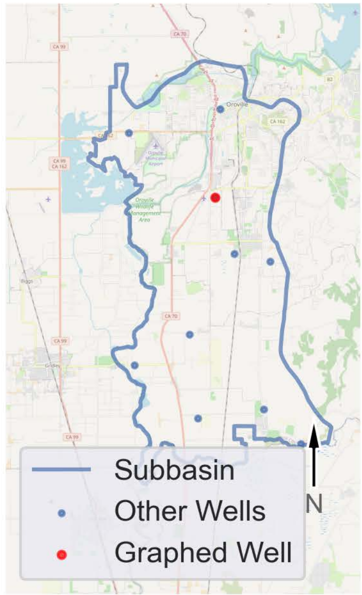
IM (2027) = 96.0 ft AMSL
MO = 95.0 ft AMSL
MT = 71.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



WYANDOTTE CREEK Subbasin - State Well Number (SWN): 19N04E31F001M

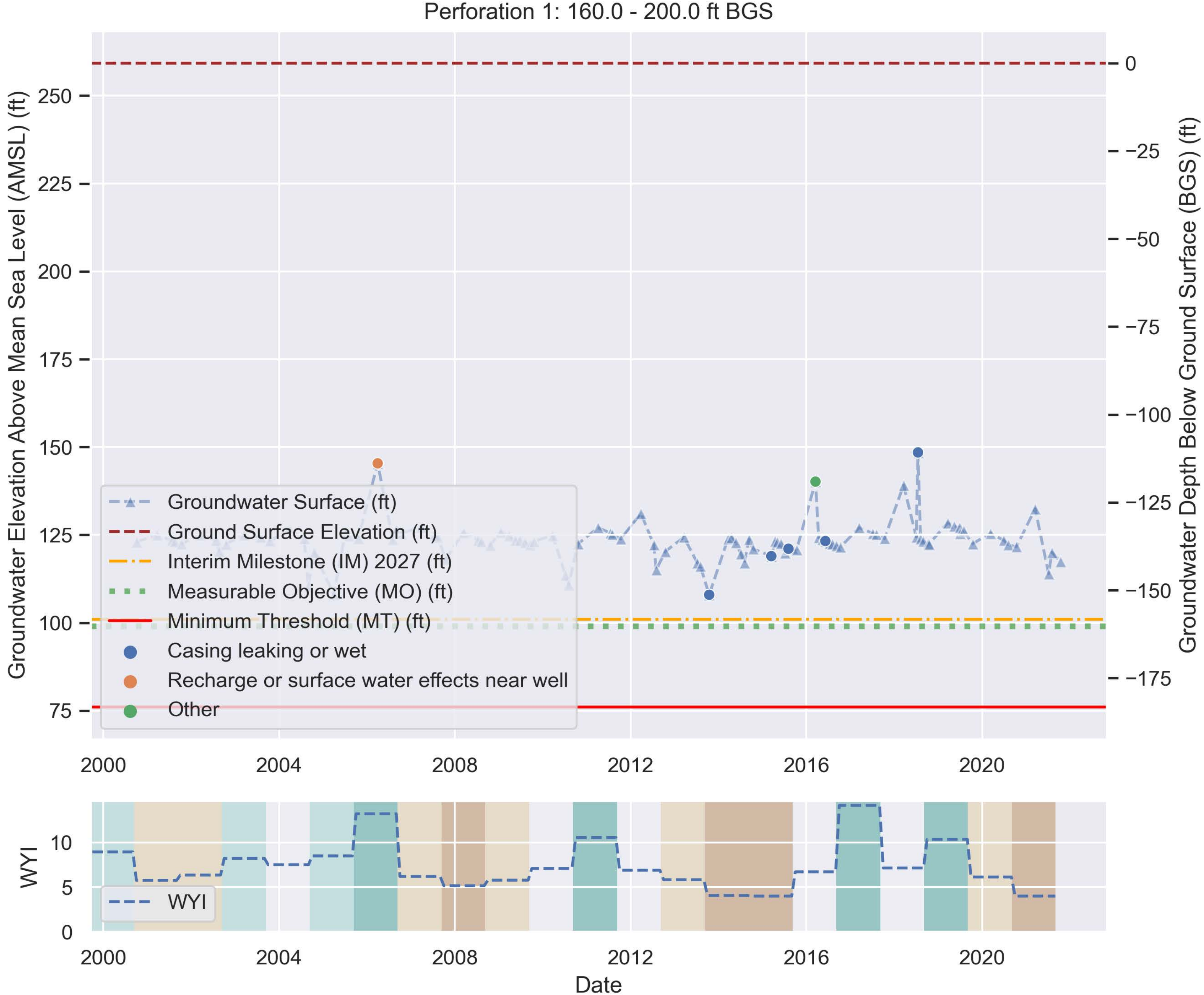
Well Location Map



Sustainable Management Criteria:

IM (2027) = 101.0 ft AMSL
MO = 99.0 ft AMSL
MT = 76.0 ft AMSL

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.



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Appendix B

Explanation of Sustainable Management Criteria

Appendix B: Explanation of Sustainable Management Criteria

The Sustainable Groundwater Management Act (SGMA) requires a Groundwater Sustainability Plan (GSP) to define Sustainable Management Criteria (SMC) for the groundwater subbasin. The SMC offer guideposts and guardrails for groundwater managers seeking to achieve sustainable groundwater management. SGMA defines sustainable groundwater management as "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results," where the planning and implementation horizon is 50 years with the first 20 years spent working toward achieving sustainable groundwater management and the following 30 years (and beyond) spent maintaining it (California Water Code §10721).

"Undesirable Results" are associated with up to six Sustainability Indicators (SI), including groundwater levels, groundwater storage, water quality, seawater intrusion, land subsidence, and interconnected surface water. SGMA defines undesirable results as those having significant and unreasonable negative impacts. Failure to avoid undesirable results on the part of the GSAs may lead to intervention by the State. Once the sustainability goal and undesirable results have been locally identified, projects and management actions are formulated to achieve the sustainability goal and avoid undesirable results.

SI and associated Undesirable Results, if significant and unreasonable

The terminology for describing the SMC is defined as follows:

Undesirable Results – Significant and unreasonable negative impacts associated with each SI.

Minimum Threshold (MT) – Quantitative threshold for each SI used to define the point at which undesirable results may begin to occur.

Measurable Objective (MO) – Quantitative target that establishes a point above the MT that allows for a range of active management to prevent undesirable results.

Margin of Operational Flexibility – The range of active management between the MT and the MO.

Interim Milestones (IMs) – Targets set in increments of five years over the implementation period of the GSP offering a path to sustainability.

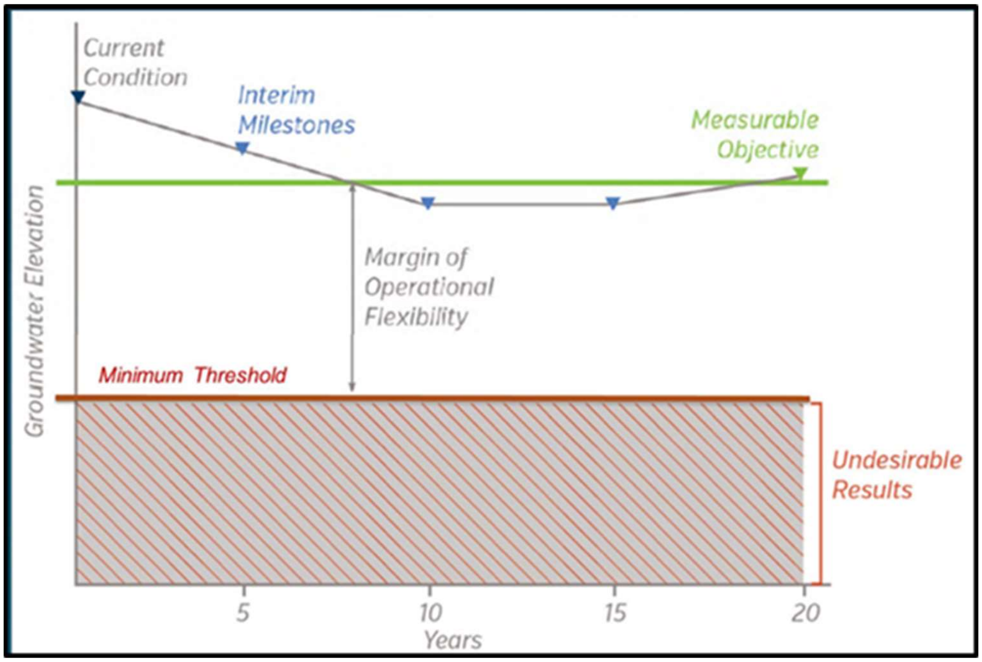

Illustration of Terms Used for Describing Sustainable Management Criteria Using the Groundwater Level SI

The figure above illustrates these terms for the groundwater level SI.

SI are intended to be measured and compared against quantifiable SMC throughout a monitoring framework of Representative Monitoring Site (RMS) wells. Ongoing monitoring of the SI can:

Determine compliance with the adopted GSP

Offer a means to evaluate the effectiveness of projects and management actions over time

Allow for course correction and adaptation in five-year updates

Facilitate understanding among diverse stakeholders

Support decision-making on the part of the GSA into the future

The SMC for the Wyandotte Creek Subbasin is fully explained and defined in Section 3 of the GSP available here:

https://sgma.water.ca.gov/portal/gsp/preview/99

2021 Water Year Annual Report

Appendix C

GSP Annual Reporting Elements Guide

Groundwater Sustainability Plan Annual Report Elements Guide

Basin Name	Wyandotte Creek Subbasin		
GSP Local ID			
California Code of Regulations - GSP Regulation Sections	***Groundwater Sustainability Plan Elements***	**Document *page number(s) that address the applicable GSP element.***	***Notes: Briefly describe the GSP element does not apply.***
Article 5	**Plan Contents**		
Subarticle 4	***Monitoring Networks***		
§ 354.40	**Reporting Monitoring Data to the Department**		
	Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.	14	Monitoring data submitted to the Monitoring Network Module.
	Note: Authority cited: Section 10733.2, Water Code. Reference: Sections 10728, 10728.2, 10733.2 and 10733.8, Water Code.		
Article 7	**Annual Reports and Periodic Evaluations by the Agency**		
§ 356.2	**Annual Reports**		
	Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:		
	(a) General information, including an executive summary and a location map depicting the basin covered by the report.	4:11	
	(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:		
	(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:		
	(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.	13, 15:16	
	(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.	12, 29:39	
	(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.	17:19	
	(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.	19:20	
	(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.	20	
	(5) Change in groundwater in storage shall include the following:		
	(A) Change in groundwater in storage maps for each principal aquifer in the basin.	20:22	
	(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.	23	
	(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.	23:27	