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CHAPTER 3 WESTERN MANAGEMENT AREA MONITORING NETWORK AND SUSTAINABLE MANAGEMENT CRITERIA

The Western Management Area Groundwater Sustainability Agency (WMA GSA) has defined the sustainability goal with consideration of the beneficial uses and users and in coordination with the entire Santa Ynez River Valley Groundwater Basin. This chapter of the GSP presents the sustainability goal for the WMA, including a description of how the sustainability goal was determined, how sustainability will be achieved and maintained, and how sustainability will be monitored and assessed through the 50-year planning and implementation horizon. Each component of the Sustainable Management Criteria is presented in a subsection of this Chapter as it applies to the specific conditions of the WMA, beginning with the sustainability goal (Section 3.1), followed by the undesirable results pertaining to the sustainability indicators (Section 3.2), minimum thresholds used as indicators of potentially undesirable conditions (Section 3.3), and, where appropriate, measurable objectives marking specific benchmarks on the way to achieving sustainability (Section 3.4)1. The monitoring network provides the quantifiable metrics on which the sustainable management criteria are based (Section 3.5). The monitoring network has been configured to assess groundwater conditions within the Basin and fill the data gaps needed to further evaluate the sustainability indicators. The sustainable management criteria defined in this GSP will be periodically re-evaluated through the SGMA-required annual reports and periodic updates and adjusted as needed to achieve and maintain sustainability in accordance with the Sustainability Goal.

3.1 Sustainability Goal

The sustainability goal for the Santa Ynez River Valley Groundwater Basin is to sustainably manage the groundwater resources in the Western, Central, and Eastern Management Areas for current and future beneficial users of groundwater. The absence of undesirable results, defined as significant and unreasonable effects of groundwater conditions, throughout the planning horizon will indicate that the sustainability goal has been achieved. Sustainable management will be defined as groundwater management that:

- [1] A sustainability indicator refers to “any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results” (Title 23 CCR Section 351(ah)).
- A minimum threshold means “a numeric value for each sustainability indicator used to define undesirable results” (Title 23 CCR Section 351(t)).
- A measurable objective means “specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin” (Title 23 CCR Section 351(s)).

(1) Maintains long-term groundwater elevation at levels adequate to support existing and anticipated beneficial uses,
(2) Maintains a sufficient volume of groundwater in storage to ensure groundwater availability during periods of drought and recovery during wet climate conditions,
(3) Maintains water quality conditions to support ongoing beneficial use of groundwater for agricultural, municipal, domestic, and industrial and environmental supply.

The groundwater resource will be managed through management actions and projects implemented by the respective Groundwater Sustainability Agencies. Management of the Basin will be supported by monitoring (where appropriate) groundwater levels, groundwater in storage, groundwater quality, land surface elevations, interconnected surface water, and seawater intrusion. If significant and unreasonable effects are identified resulting from groundwater pumping, management actions will be taken to mitigate the undesirable results within 20 years of the adoption date(s) for the three Groundwater Sustainability Plans submitted for the Basin. The GSAs will adaptively manage any projects and management actions to ensure the GSP is effective and undesirable results are avoided.

The sustainability goal for the WMA was developed using historical data, including groundwater elevations, groundwater quality, and satellite imagery. These data are discussed in detail in Chapter 2, Basin Setting.

3.1.1 The Santa Ynez River Alluvium Subarea

Alluvium upstream of the Lompoc Narrows is part of the subflow of the river, which is regulated by State Water Resources Control Board (SWRCB). Because subflow is considered surface water, the Santa Ynez River Alluvium would not be classified as a principal aquifer or managed by a GSP under SGMA. The Santa Ynez River Alluvium Subarea is regulated by water rights orders and environmental regulations. Water stored within the alluvium in the Subarea is treated as surface water (Stetson, 2021a). As such, the sustainability indicators within the Subarea are controlled by these State requirements and Cachuma Reservoir releases in accordance with applicable regulations. Although the Santa Ynez Alluvial Subarea is within the DWR defined Santa Ynez River Valley Groundwater Basin (DWR Basin No. 3-15), the WMA GSA has no authority to regulate conditions within the Subarea as they relate to the sustainability indicators. Therefore, sustainable management criteria for the Santa Ynez Alluvial Subarea have not been established in this GSP.

3.2 Undesirable Results

Under the Sustainable Groundwater Management Act (SGMA), undesirable results occur when groundwater conditions occurring throughout the WMA cause significant and unreasonable impacts to any of six sustainability indicators:

- Significant and Unreasonable Chronic Lowering of Groundwater Levels

- Significant and Unreasonable Reduction of Groundwater in Storage
- Significant and Unreasonable Seawater Intrusion
- Significant and Unreasonable Degradation of Water Quality Resulting from Groundwater Withdrawal
- Significant and Unreasonable Land Subsidence Resulting from Groundwater Withdrawal
- Significant and Unreasonable Reduction of Interconnected Surface Water and Groundwater Resulting from Groundwater Withdrawal

The WMA GSA is required to characterize undesirable results for each indicator unless "*undesirable results to one or more sustainability indicators are not present and are not likely to occur in the basin*," (23 CCR §354.26 (d)). Undesirable results associated with each of the six sustainability indicators are applicable to, but have not historically occurred within, the WMA (Sections 3.2.1 – 3.2.6). Because groundwater usage and conditions may lead to undesirable results, the WMA GSA has defined significant and unreasonable results for each sustainability indicator. Undesirable results associated with each sustainability indicator were defined using the data and processes compiled for this GSP and with consideration of the beneficial uses and users within the WMA.

The WMA is composed of five subareas characterized distinctly by their topography and interactions with surface water: (i) the Santa Ynez River Alluvium, (ii) the Lompoc Plain, (iii) Burton Mesa, (iv) the Lompoc Terrace, (v) the Lompoc Upland, and (vi) the Santa Rita Upland. The cause of undesirable results, corresponding groundwater conditions, and applicability of the six sustainability indicators to each subarea in the WMA are described in detail below. Undesirable results are not defined for the Santa Ynez River Alluvium because water stored in the alluvium of this subarea is considered surface water and not subject to SGMA. In addition, undesirable results are not defined for the Burton Mesa because groundwater in this subarea is primarily under the jurisdiction of the Vandenberg Space Force Base (formerly Vandenberg Air Force Base) and occurs under perched conditions with no hydrogeologic connection to the principal aquifers of the WMA (Chapter 2, Hydrogeologic Conceptual Model).

3.2.1 Chronic Lowering of Groundwater Levels – Undesirable Results

Chronic lowering of groundwater levels that indicate a depletion of supply (23 CCR §354.28(c)(1)) is an undesirable result applicable to the Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace subareas of the WMA.

Approximately 85% of all groundwater extractions within the WMA occur in the Lompoc Plain subarea (Section 2; Water Budget; Table 2-8). Within this subarea, groundwater in the upper aquifer has historically been encountered at elevations that range from 30 to 90 ft. NAVD88

(Section 2b; Groundwater Conditions; Figures 1-4F and 1-4G), with groundwater elevation lows corresponding to historical drought periods and groundwater elevation highs corresponding to periods of above normal and wet water years. In the Lower Aquifer, measured water levels in wells exhibit long-term declines that are not correlated to water year type or surface water availability (e.g. Section 2b; Groundwater Conditions; Figure 1-4H). Along the western boundary of the Lompoc Plain, groundwater elevations have remained stable at an average elevation of approximately 5 to 10 ft NAVD88 since the 1970s.

Approximately 10% and 5% of the total groundwater extractions from the WMA occurred within the lower aquifer in the Lompoc Upland and Santa Rita Upland, respectively. Since 1980, groundwater elevations have declined in the Lompoc Upland by 11 feet (Section 2; Groundwater Conditions; Figure 1-6B) and in the Santa Rita Upland by as much as 50 feet (Section 2; Groundwater Conditions; Figure 1-7B).

Groundwater extractions reported to the Santa Ynez River Water Conservation District indicate that approximately 320-340 groundwater wells actively extracted an average of 27,400 AFY from the WMA during the period from 2005 through 2018. This average annual groundwater extraction rate is approximately equal to the long-term historical average production rate (Section 2c-Water Budget). The similarity in production rates between 2005-2018, a period containing the drought of record and subsequent historical low water levels in the WMA, and the long-term historical record indicates that the historic low groundwater elevations have not resulted in significant and unreasonable impacts to beneficial users of groundwater. In addition to historical pumping data, historical well activity information (**Figure 3-2**) indicates that the number of inactive wells in the WMA has also been relatively steady from 2005 to the present. Based on these historical data, undesirable results associated with chronic lowering of groundwater levels have not been observed, and are not currently occurring, in the WMA.

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Chronic lowering of groundwater levels in the WMA may occur if groundwater extractions exceed the sustainable yield over a period that contains both wet and dry water year types. In addition, chronic lowering of groundwater elevations may be caused by reductions in surface water releases from the Cachuma Reservoir and reduced surface flows in the Santa Ynez River at the Lompoc Narrows, which provide approximately 45% of the average annual recharge to the WMA (Section 2c-Water Budget). Surface water releases through the Cachuma reservoir to the WMA are managed by the State Water Resources Control Board under Order WR 2019-0148.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Undesirable results associated with chronic lowering of groundwater levels will be defined in the WMA by collecting semi-annual (spring and fall) groundwater elevation measurements at 13 representative monitoring wells completed in the Upper Aquifer of the Lompoc Plain (Section 3.3.1, **Figure 3-1**) and 13 representative monitoring wells completed in the Lower Aquifer of the Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace (Section 3.3.1). Undesirable results associated with chronic declines in groundwater elevations will be characterized by comparing groundwater elevations at each well to established minimum threshold groundwater elevations. Spring groundwater elevations that drop below the established groundwater elevation minimum thresholds in more than 50% of the representative monitoring wells for 2 consecutive, non-drought[2] years would correspond to an undesirable result associated with chronic lowering of groundwater elevations. The criteria of 50% of the monitoring wells addresses the potential cumulative effects from pumping and GSA management on basin-scale water level conditions. Requiring two or more consecutive non-drought years of minimum threshold exceedances provides confirmation that the chronic lowering of groundwater elevations is not drought related, making it more likely attributed to groundwater pumping[3]. GSA management actions (Section 4) will be planned to accommodate drought periods and ensure short-term impacts can be offset by increases in groundwater levels or storage during normal or wet periods.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Chronic lowering of groundwater elevations may lead to an undesirable result in the WMA if groundwater elevations drop to a level that significantly and unreasonably reduces the total volume of groundwater in storage, eliminates or reduces the ability of production wells to economically access groundwater, causes the landward migration of saline water into the Lompoc Plain, or causes a disconnection from surface water that sustains habitat or groundwater dependent ecosystems (GDEs). Conditions that threaten long-term groundwater accessibility for agricultural, municipal, and domestic supply correspond to static water levels that stabilize within the perforated sections of a groundwater extraction well. Static groundwater elevations that reside within the perforated sections of an extraction well may lead to pump failure from entrained air or insufficient net positive suction head (Driscoll, 1968; Roscoe Moss, 1990). In addition, the

[2] 2 or more consecutive years that are classified as Dry or Critically Dry (Section 2) will be defined as drought years. All other year types and combination of year types will be defined as non-drought years for the purpose of defining undesirable results under a groundwater sustainability plan.

[3] CWC 10721(x): "Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods."

introduction of entrained air may increase well screen fouling from increased biological activity and geochemical reactions that lead to mineral precipitation (Driscoll, 1968; Schneiders, 2003), and interferes with the City of Lompoc's water treatment plant processes.

3.2.2 Reduction of Groundwater in Storage – Undesirable Results

Reduction of groundwater in storage is an undesirable result applicable to Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace subareas of the WMA. Reduction of groundwater in storage is also associated with undesirable results established for chronic lowering of groundwater levels and may be associated with undesirable results associated with land subsidence and seawater intrusion.

Groundwater is extracted from the WMA at an average annual rate of approximately 27,300 AFY (Section 2c-Water Budget; Table 2-8). Of this, approximately 85% of the average annual extractions occurred within the Lompoc Plain subarea, 10% occurred within the Lompoc Upland subarea, and the remaining 5% occurred within the Santa Rita Upland subarea. The average annual production rate from the WMA of approximately 27,300 AFY is approximately 1,000 AFY higher than the estimated perennial yield for the WMA (Section 2c-Water Budget; Table 2-8). Throughout the historical record, groundwater in storage in the Lompoc Plain, Lompoc Upland, and Santa Rita Upland subareas has declined at an average rate of approximately 640 AFY, 110 AFY, and 250 AFY, respectively.

The average annual reduction of groundwater in storage of 1,000 AFY in the WMA has not caused undesirable results associated with chronic lowering of groundwater levels and the beneficial use of groundwater for municipal, agricultural, and domestic supply (Section 3.2.1). In addition, historical rates of reduction in groundwater storage have not caused undesirable results associated with groundwater extraction-induced land subsidence (Section 3.2.5), degradation of water quality (Section 3.2.4), seawater intrusion (Section 3.2.3), or a depletion of interconnected surface water (Section 3.2.6). Based on this information, undesirable results associated with a reduction of groundwater in storage have not historically occurred, and are not currently occurring in, the WMA.

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Significant and unreasonable reduction of groundwater in storage may occur if groundwater production exceeds the sustainable yield of the WMA over a period containing both wet and dry water year types. In addition, chronic lowering of groundwater elevations may be caused by reductions in surface water releases from the Cachuma Reservoir and reduced surface flows in the Santa Ynez River at the Lompoc Narrows, which provide approximately 45% of the average annual recharge to the WMA (Section 2; Water Budget). Surface water releases through the

Cachuma reservoir to the WMA are managed under the State Water Resources Control Board under Order WR 2019-0148.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Undesirable results associated with a reduction of groundwater in storage will be defined in the WMA by collecting semi-annual (spring and fall) groundwater elevation measurements at 13 wells completed within the Upper Aquifer of the Lompoc Plain and 13 wells completed in the Lower Aquifer of the Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace. Undesirable results associated with reduction of groundwater in storage will be characterized by comparing groundwater elevations at each well to established minimum threshold groundwater elevations. Spring groundwater elevations that drop below the established groundwater elevation minimum thresholds in more than 50% of the representative monitoring wells for 2 consecutive non-drought years would be correspond to an undesirable result associated with a significant and unreasonable reduction of groundwater in storage.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Reduction of groundwater in storage can lead to an undesirable result in the WMA if the total volume in storage drops to levels that eliminates or reduces the ability of production wells to economically access or produce groundwater. Conditions that threaten long-term groundwater accessibility for agricultural, municipal, and domestic supply correspond to static water levels that stabilize within the perforated sections of a groundwater extraction well. Static groundwater elevations that reside within the perforated sections of an extraction well may lead to pump failure from entrained air or insufficient net positive suction head (Driscoll, 1968; Roscoe Moss, 1990). In addition, the introduction of entrained air may increase well screen fouling from increased biological activity and geochemical reactions that lead to mineral precipitation (Driscoll, 1968; Schneiders, 2003). Groundwater elevations that correspond to this reduction of groundwater in storage may also be associated with the landward migration of saline water into the Lompoc Plain or cause a disconnection from surface water that sustains habitat or groundwater dependent ecosystems (GDEs).

3.2.3 Seawater Intrusion – Undesirable Results

Seawater Intrusion is an undesirable result applicable to, but not occurring within, the WMA, including the Lompoc Terrace and Lompoc Plain subareas. Groundwater production from the Lompoc Terrace is minimal and under the jurisdiction of the Vandenberg Space Force Base; seawater intrusion into the Lompoc Terrace is not a concern in the WMA (Section 2-X; Groundwater Conditions).

Groundwater conditions within the western Lompoc Plain area are impacted by the Santa Ynez River Estuary, a dynamic mixing zone between seawater, Santa Ynez River water, and underlying groundwater. Interactions between the Pacific Ocean, Santa Ynez River Estuary, and groundwater have led to historical chloride concentrations within the estuary that exceed 650 mg/L (Section 2-X; Groundwater Conditions). Chloride concentrations measured at well 7N/35W-21G02, which is located approximately 2 miles east of the coast, have remained relatively stable since the mid-1990s; chloride concentrations in groundwater at 7N/35W-21G02 were most recently measured at a concentration of 490 mg/L (measured on 8/18/2020). These concentrations are reflective of natural estuarine conditions in the WMA and do not indicate historical groundwater extraction-induced seawater intrusion (GCTM, 2021a).

Historical impacts of elevated chloride concentrations near the coast in the Lompoc Plain were assessed using historical groundwater production data (Section 2c; Water budget – Figure 2-2) and well activity information (**Figure 3-2**). Rates of groundwater extraction within the WMA have not declined throughout the record of measurement, and the number of active wells in the WMA has slightly increased over time. This data indicates that seawater intrusion into the Lompoc Plain has not caused undesirable results in the WMA by impacting beneficial use of groundwater for municipal, agricultural, and domestic supply.

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Undesirable results associated with seawater intrusion may be caused by groundwater extractions that exceed the sustainable yield for a period containing both wet and dry water years. Groundwater production in excess of the sustainable yield may cause groundwater elevations within the Lompoc Plain to drop and remain below sea level, inducing a landward hydraulic gradient that causes saline water underlying the Santa Ynez River Estuary to migrate into the primary production zone of the Lompoc Plain.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Undesirable results associated with seawater intrusion will be quantified by collecting annual chloride concentrations measurements from four wells completed in the Upper Aquifer located in the Western Portion of the Lompoc Plain. Groundwater chloride concentrations measured in these wells will be contoured annually to track the potential landward migration of the chloride concentration isocontour into the Lompoc Plain. In order to differentiate between potential seawater intrusion and other potential increases from other sources of chloride, the chloride isocontours will be compared to time-series of chloride concentrations collected at wells 7N/35W-17K20, 7N/35W-21G2, 7N/35W-27F1, and 7N/35W-22A3 (**Figure 3-3**). The landward migration of the chloride isocontours, along with increasing groundwater chloride concentrations measured at 7N/35W-17K20 and 7N/35W-21G2, is indicative of potential undesirable results associated with seawater intrusion in the WMA.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Seawater intrusion may impact the beneficial use of groundwater for agricultural and domestic supplies in the Lompoc Plain. While native chloride concentrations in the western portion of the Lompoc Plain exceed tolerances for some locally-grown crops, historical agricultural usage in the WMA has not been significantly and unreasonably affected by chloride concentrations exceeding the 180 mg/L level. For general municipal and domestic beneficial uses, the secondary maximum contaminant level has a recommended upper limit standard of 500 mg/L. Chloride concentrations that exceed 500 mg/L in the western portion of the WMA would impact beneficial use of groundwater for domestic supplies.

3.2.4 Degradation of Water Quality – Undesirable Results

Degradation of water quality is an undesirable result applicable to the WMA. Groundwater quality in the WMA is currently in a state of, "adverse salt balance because of municipal and agricultural discharges" (Central Coastal Basin Plan, 2019). Primary salt and nutrients of concern in the WMA are TDS, Chloride, Sulfate, Boron, Sodium, and Nitrogen. Average 2015-2018 concentrations and Water Quality Objectives (WQOs) established in Central Coastal Basin Water Quality Control Plan (CCBWQCP) prepared by the California State Water Boards are summarized in **Table 3-1**.

Average 2015-2018 concentrations of TDS, sulfate, chloride, and nitrate exceed the established WQOs throughout much of the WMA (**Table 3-1**). During the 2015-2018 water quality sampling period, groundwater extractions and use within the WMA were similar to historical average groundwater extraction and usage rates (Section 2-c, Water Budget). The similarity in beneficial use volumes between water years 2015 and 2018 compared to historical usage indicates that salt and nutrient concentrations within the WMA remain suitable for agricultural, municipal, and domestic usage.

Table 3-1:
Median Groundwater Quality Objectives (mg/L) and average 2015-2018 salt and nutrient concentrations (mg/L) in the WMA

Basin/Subarea	Salinity as Total Dissolved Solids (TDS)		Chloride		Sulfate		Boron		Sodium		Nitrate as N	
	Objective (mg/L)	Avg 2015-2018	Objective (mg/L)	Avg 2015-2018	Objective (mg/L)	Avg 2015-2018	Objective (mg/L)	Avg 2015-2018	Objective (mg/L)	Avg 2015-2018	Objective (mg/L)	Avg 2015-2018
Lompoc Plain	1250	1600	250	285	500	518	0.5	0.7	250	190	2	9.9
Lompoc Upland	600	756	150	157	100	174	0.5	0.3	130	89	2	1.9
Lompoc Terrace	750	-	210	-	100	-	-	-	100	-	1	-
Santa Rita Upland	1500	583	150	95	700	149	0.5	0.2	100	68	1	1.5

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Adverse water quality conditions in the WMA are driven by the use and discharge of treated wastewater[4] within the Basin (Central Coastal Basin Plan, 2019), local agricultural practices, and Santa Ynez River water quality (Bright et al 1992). Historically, groundwater extractions from the Upper Aquifer in the Lompoc Plain have mobilized low-quality water from the Santa Ynez River Alluvium to the main production zone of the Upper Aquifer (Bright et al, 1992). However, more recent water quality assessments of the WMA indicate that water quality trends are variable (Haas et. al, 2019) and the current degree to which groundwater production in the WMA impacts water quality and the basin-wide salt balance is not well constrained. For example, during the last forty years pumping has been relatively constant in the WMA, but recent trends indicate increasing nitrate, arsenic and total dissolved solids in 22 to 36% of all wells in the Lompoc Plain (Haas et. al, 2019). Possible causes of these recent trends included wastewater treatment and agricultural and industrial sources (Haas et. al, 2019).

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Undesirable results associated with degradation of water quality will be quantified by collecting annual TDS, chloride, sulfate, boron, sodium, and nitrate concentration measurements from 19 wells completed in the Upper Aquifer of the Lompoc Plain and the Lower Aquifer of the Lompoc Plain, Lompoc Upland, and Santa Rita Upland (**Figure 3-4**). Salt and nutrient concentration measurements collected at each well will be compared to the established salt and nutrient concentration minimum thresholds (Section 3.3.4). Groundwater management decisions and pumping can influence local well water quality. Hence, minimum threshold exceedances for individual constituents in more than 50% of the monitoring wells for 2 or more consecutive years is considered an undesirable result associated with degradation of water quality in the WMA. The criteria of 50% of the monitoring wells addresses the potential cumulative effects from management decisions and pumping on basin-scale water quality conditions. Requiring two or more consecutive non-drought years of minimum threshold exceedances provides confirmation that the degraded water quality is not drought related, making it more likely attributed to groundwater pumping and/or management actions.

[4] Municipal suppliers responsible for wastewater operations are working closely with the Regional Water Quality Control Board to limit ongoing release of low-quality water into the Basin. The Central Coast Basin Plan identifies that following municipalities as point sources contributing to the degradation of water quality within the Basin: City of Lompoc, Mission Hills Community Services District, Vandenberg Space Force Base, United States Department of Justice, Bureau of Prison, Buellton Community Services District, City of Solvang, and Cachuma County Sanitation District.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Water quality degradation beyond current conditions in the WMA may impact municipal, domestic, and agricultural usage by exceeding salt and nutrient crop tolerances and drinking water standards and increase treatment costs by municipalities (GCTM, 2020a). Undesirable results associated with point sources of contamination is overseen by the State Water Resources Control Board (section 3.3 of Groundwater Conditions TM) and are not established as part of this Plan.

3.2.5 Land Subsidence – Undesirable Results

Inelastic land subsidence is an undesirable result not occurring or likely to occur in the future within the WMA. There is little to no evidence of land subsidence within the WMA that has disrupted infrastructure, land use, or beneficial use of groundwater (Section 5.2 of Groundwater Conditions TM). Areas where land-subsidence has been measured by remote sensing data are generally located in the upland areas, where there is little to no reported groundwater use (Section 5.3 of Groundwater Conditions TM).

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Groundwater production in excess of the sustainable yield may result in significant and unreasonable land subsidence if the subsidence, "*substantially interferes with surface land uses*" (California Water Code, Section 10721(x)(5)). Subsidence related to groundwater extraction can occur with groundwater elevations maintained below previous historical low water levels and in the presence of extensive fine-grained sediments.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Groundwater production is not expected to induce land subsidence within the WMA. Land surface elevations will be continuously monitored using InSAR data and continuous GPS monitoring data (**Figure 3-5**). Land subsidence associated with groundwater production that exceeds half a foot from 2015 conditions may impact infrastructure and land usage in the WMA.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Land subsidence from groundwater extraction is not expected to become an undesirable result within the WMA due to hydrogeologic conditions that are not conducive to land subsidence and because SMCs for other sustainability indicators will preclude the lowering of groundwater levels below the historical low elevation. Based on the potential for land subsidence resulting from groundwater withdrawal in the WMA, the undesirable result is defined as land subsidence resulting from groundwater extraction that causes half a foot of subsidence from 2015 conditions and interferes with land use or infrastructure.

3.2.6 Interconnected Surface and Groundwater – Undesirable Results

Depletion of interconnected surface water and groundwater is an undesirable result applicable to the WMA. The Santa Ynez River is the predominant interconnected surface water and groundwater system in the WMA and extends from the eastern edge of the WMA to the coast (**Figure 3-6**).

Underflow within the Santa Ynez River Alluvium Subarea (upstream of the Lompoc Narrows) is defined as surface water and regulated by the SWRCB. Because the Santa Ynez River Alluvium would not be classified as a principal aquifer or managed by a GSP under SGMA, interconnected surface and groundwater, and the GDEs within the Santa Ynez River Alluvium Subarea is not within the purview of the WMA GSA. Therefore, sustainable management criteria have not been set for interconnected surface water and groundwater in the Santa Ynez River Alluvium Subarea.

The portion of the Santa Ynez River that extends from the Lompoc Narrows to the Pacific Ocean is seasonally connected with groundwater (Section 6.1, Groundwater conditions TM). Within this stretch of the Santa Ynez River, the Natural Communities Commonly Associated with Groundwater Dataset mapped approximately Riparian Mixed Hardwood, Coast Live Oak, Willow, and seasonally flooded wetland. In addition to these habitats, surface water flows in this portion of the Santa Ynez River also sustain endangered steelhead trout (Section 6.3 Groundwater Conditions TM). Groundwater conditions along this reach of the Santa Ynez River are not considered vulnerable to groundwater production due to operations of the Cachuma Project that maintain these habitats (section 6.3 Groundwater Conditions TM). Based on this information, undesirable results associated with a depletion of interconnected surface water by groundwater pumping in the WMA has not historically occurred and is not currently occurring.

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Undesirable results associated with a depletion of interconnected surface water and groundwater in the WMA may be caused by groundwater production in excess of the sustainable yield over a period that contains wet and dry water years. Extended periods of groundwater production in excess of the sustainable yield may lead to groundwater elevations that drop below historical low water levels in the Upper Aquifer of the Lompoc Plain. . The lowering of groundwater elevations may also be caused by reductions in water rights or other releases from the Cachuma Reservoir and reduced surface flows in the Santa Ynez River at the Lompoc Narrows, which provide approximately 45% of the average annual recharge to the WMA (Section 2; Water Budget). Surface water releases through the Cachuma reservoir to the WMA are managed by the State Water

Resources Control Board under Order WR 2019-0148. The lowering of groundwater levels below historical lows in the Upper Aquifer potentially impacts habitat and ecosystem health along the Santa Ynez River.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Using groundwater levels adjacent to the Santa Ynez River in the Upper Aquifer, undesirable results associated with a depletion of interconnected surface water and groundwater will be quantified by measuring groundwater elevations semi-annually at three representative monitoring points located adjacent to the Santa Ynez River (**Figure 3-6**) and maintaining water levels above historical low groundwater levels. Significant and undesirable results are defined as groundwater elevations in the Upper Aquifer that drop to 10 feet below 2020 groundwater elevations in 2 out of the three representative monitoring wells for 2 consecutive non-drought[5] years (Section 3.3.6). Groundwater elevations measured at these wells will be compared to minimum threshold groundwater elevations (Section 3.3.6) to characterize whether groundwater production from the Lompoc Plain is causing significant and unreasonable depletion of interconnected surface water.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Undesirable results associated with a depletion of interconnected surface water would be groundwater elevations that impact habitat health and enhance surface water depletion rates along the Santa Ynez River. Groundwater conditions that may lead to this would be groundwater elevations in the Upper Aquifer that drop to the maximum of either 10 feet below 2020 groundwater elevations in 2 out of the three representative monitoring wells for 2 consecutive non-drought years (Section 3.3.6).

3.2.8 Defining Undesirable Results

Groundwater elevations and quality within the WMA are monitored by several local, state, and federal agencies (GCTM, 2021). Historical groundwater elevation and quality data provide a sufficient spatial and temporal record in the WMA to characterize the effects of historical groundwater usage on conditions in the management area. Groundwater elevation and quality monitoring programs currently implemented in the WMA, such as the water quality monitoring through Irrigated Lands Regulatory Program and groundwater elevation monitoring through the

[5] 2 or more consecutive years that are classified as Dry or Critically Dry (Section 2) will be defined as drought years. All other year types and combination of year types will be defined as non-drought years for the purpose of defining undesirable results under a groundwater sustainability plan.

United States Bureau of Reclamation, will continue throughout the planning and implementation horizon and will be used to characterize basin-wide groundwater conditions as part of the GSP implementation.

A subset of 39 wells from the broader monitoring program have been selected as representative monitoring wells (RMWs) to evaluate sustainable management criteria and the onset of undesirable results in the WMA. These wells were selected based on location, historical record, accessibility, and construction information to characterize future conditions in Upper Aquifer of the Lompoc Plain and Lower Aquifer in the Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace. Undesirable results related to chronic lowering of groundwater levels and significant and unreasonable loss of groundwater in storage will be quantified using groundwater elevation measurements collected at 26 wells out of the total 39 wells (**Table 3-2**). Undesirable results associated with degradation of water quality will be quantified using salt and nutrient concentration measurements at 19 wells out of the total 39 wells (**Table 3-2**). Undesirable results associated with depletion of interconnected surface water will be quantified using 3 wells (**Table 3-2**) and undesirable results associated with seawater intrusion will be quantified using four wells. Undesirable results associated with land subsidence will be quantified by comparing InSAR data and continuous GPS data to groundwater elevation trends measured at the 26 groundwater level RMWs.

3.3 Minimum Threshold

This section describes the minimum thresholds established for chronic lowering of groundwater levels, significant and unreasonable reduction of groundwater in storage, degraded water quality, disconnected surface and groundwater, seawater intrusion, and land subsidence related to groundwater withdrawals that substantially interferes with surface land uses. The minimum thresholds described below avoid undesirable results related to the beneficial uses within the WMA. **Table 3-3** summarizes the minimum thresholds established for each applicable sustainability indicator at the 39 RMWs. Because undesirable results are not currently occurring within the WMA, and interim milestones are not relevant to maintaining sustainability or avoiding undesirable results and therefore are not established.

Table 3-2 Representative Monitoring Wells in the WMA

RMW Name	Subarea	Principal Aquifer	Screen Interval [ft. bgs]	Well Completion Depth [ft. bgs]	Sustainability Indicator(s) Monitored
7N/34W-35K9	Lompoc Plain	UA	52-80; 112-124	124	GWL, GWS, Surface Water
Lompoc 11 (7N/34W-35)	Lompoc Plain	UA	Unknown	Unknown	Quality
7N/34W-26Q5	Lompoc Plain	UA	135-140	151	GWL, GWS
Lompoc 2 (7N/34W-34F6)	Lompoc Plain	UA	80-140	140	GWL, GWS
7N/34W-27F9	Lompoc Plain	UA	111.3-171.3	175	GWL, GWS
6N/34W-6C4	Lompoc Plain	UA	77-111	112	GWL, GWS
7N/34W-29N6	Lompoc Plain	UA	Unknown	160	GWL, GWS, Quality
7N/35W-26L01	Lompoc Plain	UA	Unknown	23	GWL, GWS, Quality
7N/35W-26L02	Lompoc Plain	UA	Unknown	82	GWL, GWS, Quality
7N/35W-24J4	Lompoc Plain	UA	165-170	171	GWL, GWS
7N/35W-21G2	Lompoc Plain	UA	Unknown	180	GWL, GWS, Quality, Seawater Intrusion, Surface Water
7N/35W-17M1	Lompoc Plain	UA	115-120	161	GWL, GWS
7N/34W-32H2	Lompoc Plain	UA	Unknown	220	GWL, GWS
7N/35W-23B2	Lompoc Plain	UA	Unknown	79	GWL, GWS
AGL020004874	Lompoc Plain	UA	90-390	400	Quality
Lompoc 6 (7N/34W-27K07)	Lompoc Plain	UA	Unknown	189	Quality
7N/34W-27K05	Lompoc Plain	UA	120-140	140	Quality
7N/34W-27K04	Lompoc Plain	UA	100-172	172	Quality
7N/35W-17K20	Lompoc Plain	UA	Unknown	123.9	Seawater Intrusion
7N/34W-29F02	Lompoc Plain	UA	Unknown	60.5	Surface Water
7N/35W-26L04	Lompoc Plain	LA	Unknown	299	GWL, GWS
7N/34W-29N7	Lompoc Plain	LA	Unknown	420	GWL, GWS, Quality

7N/34W-24N1	Lompoc Plain	LA	Unknown	159	GWL, GWS
7N/34W-22J6	Lompoc Plain	LA	Unknown	135	GWL, GWS
7N/33W-28D3	Santa Rita Upland	LA	Unknown	600	GWL, GWS
7N/33W-21G2	Santa Rita Upland	LA	Unknown	Unknown	GWL, GWS
7N/33W-27G1	Santa Rita Upland	LA	Unknown	735	GWL, GWS
AGL020021642	Santa Rita Upland	LA	Unknown	Unknown	Quality
AGL020035942	Santa Rita Upland	LA	610-650	655	Quality
Vista Hills MWC #4	Santa Rita Upland	LA	605-825	830	Quality
7N/35W-27P01	Lompoc Terrace	LA	Unknown	582	GWL, GWS
7N/34W-15D3	Lompoc Upland	LA	458-683	683	GWL, GWS
7N/34W-14F4	Lompoc Upland	LA	Unknown	540	GWL, GWS
7N/33W-17M1	Lompoc Upland	LA	Unknown	290	GWL, GWS
7N/33W-19D1	Lompoc Upland	LA	228-264; 300-552	552	GWL, GWS
7N/34W-12E1	Lompoc Upland	LA	Unknown	385	GWL, GWS
VVCSD 3B (7N/34W-15E3)	Lompoc Upland	LA	200-340; 420-520	530	Quality
MH CSD 7	Lompoc Upland	LA	305-585	585	Quality

GWL = Chronic Groundwater Level Declines, GWS = Reduction of Groundwater in Storage, Quality = Degradation of Water Quality, Surface Water = Depletion of Interconnected Surface Water

UA = Upper Aquifer, LA = Lower Aquifer

3.3.1 Chronic Lowering of Groundwater Levels – Minimum Thresholds

Minimum threshold groundwater elevations at the 26 RMWs (**Appendix A**) were established to: (i) protect municipal, agricultural, and domestic groundwater users and supply, (ii) prevent landward migration of brackish water from the Santa Ynez River Estuary into the main production area of the Lompoc Plain, and (iii) maintain surface water-groundwater connection along the Santa Ynez River. The rationale in choosing the minimum thresholds to prevent significant and unreasonable results in the WMA has two major components: 1) the minimum threshold water level will be set to limit the impact on existing groundwater well screen intervals; and 2) the minimum threshold should not be more than 20-feet below basin-wide historical low water levels. The more conservative minimum threshold shall be used as described below.

Groundwater elevation measurements collected from the WMA indicate that groundwater historically occurred at depths 40-feet below current conditions in the Upper Aquifer (Figure 3-7) and up to 20-feet below current conditions in the Lower Aquifer (Figure 3-8). Available groundwater production and well activity data indicates that beneficial use of groundwater for domestic, municipal, and agricultural supply has remained relatively stable since the 1980s, which implies that historical low groundwater conditions in the basin did not correspond to a significant and unreasonable depletion of supply (Section 3.2.1). In addition to this, historical time-series of chloride concentration measurements collected at 7N/35W-17K20 and 7N/35W-21G2 show that historical low water levels have not induced seawater intrusion into the WMA, and historical groundwater elevations in the Upper Aquifer of the WMA were sufficient to support habitat and ecosystem health along the Santa Ynez River (Jones and Stokes, 2000), and groundwater elevations along the Santa Ynez River have risen 25 feet since 2015 (Section 2b, Groundwater Conditions, Figure 2b-1-4g) .

To assess potential impacts of water level declines on municipal, agricultural, and domestic supply, a well impact analysis was performed to determine static groundwater elevations associated with the top of well screens. This analysis was performed for both the Upper Aquifer and Lower Aquifer in the WMA and characterized groundwater levels associated with top of well screens for municipal, domestic, and agricultural water supply wells (**Figures 3-9 and 3-10**). This analysis is based on well drillers logs filed with DWR and the Santa Barbara County Health Services. The category noted as “other” are wells in which the water use of the well is either monitoring or unknown. Domestic wells are typically the most vulnerable to water level decline below the top of well screen because they are often drilled shallower due to lower water use requirements (i.e. de minimis) and budget constraints. In the lower aquifer, results from the impact analysis indicate that 2020 static groundwater elevations are currently at, or below, the top of well screens in approximately 34% of domestic wells, 21% of municipal wells, and 25% of agricultural supply. In the Upper Aquifer, results from the impact analysis indicate that 2020 static groundwater

Table 3-3: Minimum Thresholds

RMW Name	Subarea	Principal Aquifer	Chronic Decline in Groundwater Levels and Groundwater In Storage (ft. NAVD88)	Depletion of Interconnected Surface Water (ft. NAVD88)	Water Quality MT (mg/L) (TDS/Cl-/SO42-/B/Na/NO3-)
7N/34W-35K09	Lompoc Plain	UA	67	67	-
Lompoc 11 (7N/34W-35)	Lompoc Plain	UA	-	-	1200/150/450/0.55/130/1
7N/34W-26Q5	Lompoc Plain	UA	44	-	-
Lompoc 2 7N/34W-34F06	Lompoc Plain	UA	34	-	-
7N/34W-27F09	Lompoc Plain	UA	37	-	-
6N/34W-6C4	Lompoc Plain	UA	22	-	-
7N/34W-29N6	Lompoc Plain	UA	26	-	3000/275/1250/1.1/275/
7N/35W-26L01	Lompoc Plain	UA	20	-	3000/550/1100/0.75/300/60
7N/35W-26L02	Lompoc Plain	UA	18	-	800/175/150/0.2/90/1
7N/35W-24J4	Lompoc Plain	UA	20	-	-
7N/35W-21G2	Lompoc Plain	UA	0	0	2000/500/500/0.5/300/1
7N/35W-17M1	Lompoc Plain	UA	0	-	-
7N/34W-32H2	Lompoc Plain	UA	28	-	-
7N/35W-23B2	Lompoc Plain	UA	0	-	-

AGL020004874	Lompoc Plain	UA	-	-	2400/300/600/0/150/3
Lompoc 6 (7N/34W-27K07)	Lompoc Plain	UA	-	-	1100/100/400/0.5/90/1
7N/34W-27K05	Lompoc Plain	UA	-	-	1180/125/450/0.5/100/ -
7N/34W-27K04	Lompoc Plain	UA	-	-	1100/100/400/0.45/90/2
7N/35W-17K20	Lompoc Plain	UA	-	-	-
7N/34W-29F02	Lompoc Plain	UA	-	31	-
7N/35W-26L04	Lompoc Plain	LA	6	-	1000/200/200/0.2/80/1
7N/34W-29N7	Lompoc Plain	LA	15	-	1200/175/350/0.65/130/1
7N/34W-24N1	Lompoc Plain	LA	29	-	-
7N/34W-22J6	Lompoc Plain	LA	28	-	-
7N/34W-27K06	Lompoc Plain	LA	-	-	1250/150/350/0.45/130/ -
7N/33W-28D3	Santa Rita Upland	LA	25	-	-
7N/33W-21G2	Santa Rita Upland	LA	46	-	-
7N/33W-27G1	Santa Rita Upland	LA	31	-	-
AGL020021642	Santa Rita Upland	LA	-	-	800/125/250/ - /100/ -
AGL020035942	Santa Rita Upland	LA	-	-	- /- /- /- /- / -
Vista Hills MWC #4	Santa Rita Upland	LA	-	-	550/75/150/0.35/60/3
7N/35W-27P01	Lompoc Terrace	LA	20	-	-

7N/34W-15D3	Lompoc Upland	LA	31	-	-
7N/34W-14F4	Lompoc Upland	LA	23	-	-
7N/33W-17M1	Lompoc Upland	LA	31	-	-
7N/33W-19D1	Lompoc Upland	LA	28	-	-
7N/34W-12E1	Lompoc Upland	LA	35	-	-
VVCSD 3B (7N/34W-15E3)	Lompoc Upland	LA	-	-	600/175/125/0.175/100/1
MH CSD 7	Lompoc Upland	LA	-	-	550/125/125/0.2/70/1

GWL = Chronic Groundwater Level Declines, GWS = Reduction of Groundwater in Storage, Quality = Degradation of Water Quality, Surface Water = Depletion of Interconnected Surface Water

UA = Upper Aquifer, LA = Lower Aquifer

elevations are currently at, or below, the top of well screens in approximately 10% of domestic wells, 15% of municipal supply wells, and 2% of the agricultural supply wells.

Based on the above considerations, the minimum threshold for chronic lowering of groundwater levels in the Lower Aquifer in the Santa Rita Upland, Lompoc Terrace, Lompoc Upland, and Lompoc Plain was chosen by the WMA GSA at 20 feet below 2020 groundwater levels (**Table 3-3**). Groundwater elevations 20 feet below 2020 levels corresponds to the top of well screens in approximately 22% of municipal supply wells, 39% of domestic supply wells, and 30% of agricultural supply wells completed in the Lower Aquifer. While there are currently no undesirable results associated with current groundwater levels and there is still groundwater storage available below the 20' level below 2020 groundwater levels[6], the WMA GSA chose 20' based on keeping impacts to domestic wells below 40% (**Figure 3-10**) and to maintain water levels close to historical water levels in order to avoid potential significant and unreasonable undesirable results for other sustainable management criteria including water quality, land subsidence, surface water depletions, and groundwater dependent ecosystems.

The minimum threshold groundwater elevations for the Upper Aquifer were established 10-feet below the 2020 groundwater elevation (**Table 3-3**). The WMA GSA chose this minimum threshold to be more conservative than the Lower Aquifer because municipal wells are more sensitive to water level decline in the Upper Aquifer (**Figure 3-10**). Groundwater elevations 10 feet below the 2020 levels correspond to the groundwater elevations at or below top of well screens in approximately 15% of municipal supply wells, 15% of domestic supply wells, and 10% of agricultural supply wells. In addition, groundwater elevations 10 feet below 2020 levels maintain groundwater elevations near the Santa Ynez River (at RMWs 7N/34W-29F02, 7N/34W-35K09, and 7N/35W-21G02) above historical low water levels, maintaining the historical range in depths to water near along the Santa Ynez River.

Groundwater elevations 10-feet below 2020 conditions at RMWs 7N/35W-17M1 and 7N/35W-21G2 would cause groundwater elevations to drop below mean sea level and potentially induce seawater intrusion into the WMA. To avoid undesirable results associated with seawater intrusion caused by chronic lowering of groundwater levels, minimum threshold groundwater elevations established at 7N/35W-17M1 and 7N/35W-21G2 were set equal to mean sea level (**Table 3-3**).

Chronic Lowering of Groundwater Levels Trigger Point

To allow adequate time for the implementation of projects and management actions to address declining water levels prior to the occurrence of minimum thresholds, an early warning "trigger point" has been established. The trigger point is activated with groundwater levels reaching 5 feet above the established water level minimum thresholds in half of the RMWs for a period of 1 year,

[6] Due to the Santa Rita Syncline, the Lower Aquifer thickness is up to 1000 feet (Section 2a, Hydrogeologic Conceptual Model).

(minimum thresholds are reported in **Table 3-3**). In addition, another early management trigger will be when the capacity of municipal water supplies are impacted by greater than 20%. For example, for the Upper Aquifer, this will occur when the City of Lompoc's municipal total well pumping capacity is reduced by 20% due to groundwater level decline. This will trigger early management actions such as requesting water rights releases from the Cachuma Reservoir (see Section 4 for more details and discussion).

3.3.2 Reduction in Groundwater Storage – Minimum Thresholds

There is a direct correlation between the volume of groundwater in storage and groundwater levels at the RMWs. Therefore, groundwater levels in the Upper Aquifer and Lower Aquifer will be used as a proxy for significant and unreasonable loss of groundwater in storage (**Table 3-3**). As with chronic lowering of groundwater levels, undesirable results associated with reduction of groundwater in storage will occur if spring groundwater elevations that drop below the minimum threshold water levels in more than 50% of the RMWs for two consecutive years.

Reduction in Groundwater in Storage Trigger Point

As with the undesirable result of the chronic lowering of groundwater levels, a trigger point for the reduction of groundwater in storage has been established. The trigger point is activated with groundwater levels reaching 5 feet above the established water level minimum thresholds in half of the RMWs for a period of 1 year (**Table 3-3**).

3.3.3 Seawater Intrusion – Minimum Thresholds

As part of the preparation of this GSP, chloride isocontours were delineated down to a concentration of 500 mg/L. The current location of the 500 mg/L isocontour is within the jurisdictional boundary of the Vandenberg Space Force Base (VSFB); groundwater underlying the VSFB is not subject to the SGMA. To protect beneficial uses of groundwater as a source of agricultural and domestic supply, the minimum threshold for seawater intrusion is the migration of the 500 mg/L chloride isocontour from a mile west of the Vandenberg Space Force Base boundary, to an eighth of a mile east of Vandenberg Space Force Base boundary and into the primary production zone of the Lompoc Plain (**Figure 3-3**).

The 500 mg/L chloride isocontour will be generated as part of the GSP implementation annually using groundwater chloride concentrations collected at wells 7N/35W-17M1, 7N/35W-21G2, 7N/35W-22A1, and 7N35W-22A3 (**Appendix D**). Because sources of chloride in the Lompoc Plain are variable, the 500 mg/L chloride isocontour location will be compared to time-series of concentration data from 7N/35W-17M1 and 7N/35W-21G2 to determine whether chloride concentrations in the Western Lompoc Plain are indicative of the landward migration of seawater into the WMA or the result localized sources.

3.3.4 Degraded Water Quality – Minimum Thresholds

Minimum threshold for salt and nutrient concentrations are based largely on the Groundwater Quality Objectives (WQOs) from the CCWQCP. Average 2015-2018 salt and nutrient concentrations in the Lompoc Terrace and Santa Rita Upland are currently lower than the WQOs established in the CCWQCP. With the exception of nitrate, the minimum threshold salt and nutrient concentrations for these subareas are established at the Median WQOs from the CCWQCP (**Table 3-3**).

Salt and Nutrient concentrations in the Lompoc Plain and Lompoc Upland currently exceed the WQOs in the CCWQCP. To support ongoing efforts by the RWQCB to improve groundwater quality within the WMA and provide operational flexibility for beneficial users of groundwater, the Minimum Threshold concentrations are established near current salt and nutrient concentrations (**Appendix B**). **Table 3-4** shows the average minimum threshold concentration for each salt and nutrient with an established WQO. The average minimum threshold concentrations for each subarea in the WMA are below the WQO's established in the CCWQCP.

Nitrate Minimum Threshold

The maximum contaminant level (MCL) for nitrate in drinking water is 10 mg/L for nitrate as nitrogen. Nitrate is considered to be undesirable for other uses, including watering of livestock and sensitive crop irrigation, at concentrations exceeding 100 mg/L and 5 to 30 mg/L, respectively (WMA Groundwater Conditions TM). The CCWQCP WQO is for nitrate and nitrite as nitrogen ranges from 1 to 2 mg/L across the WMA. Because the most sensitive use of groundwater within the WMA is potentially untreated groundwater served through domestic wells, the Minimum Threshold established for nitrate concentrations in groundwater is 10 mg/L (**Table 3-4**). The average nitrate concentration in the Lompoc Plain Subarea was 2 mg/L from 2015 to 2018, below the 10 mg/L threshold.

Table 3-4: Average Minimum Threshold Salt and Nutrient Concentrations (mg/L)

Subarea	TDS	CL	SO	B	Na	NO3
Lompoc Upland	1470	214	471	0.5167	145	7
Lompoc Plain	575	150	125	0.1875	85	10
Santa Rita Upland	675	100	200	0.3500	80	3

3.3.5 Land Subsidence – Minimum Thresholds

Minor changes in land surface elevations since the SGMA benchmark of 2015 likely result from forces unrelated to groundwater production because both land subsidence and rise have been noted and the subsurface materials do not include areas of thick, extensive clay that is typically prone to dewatering and compression. Localized lowering of land surface elevation may occur from causes other than land subsidence, including slope failure, hydrocompaction, excavation or grading for construction, and agricultural activities. In addition, the minimum threshold established for decline of water levels would preclude substantial land subsidence because thresholds are near historical low water elevations. The GSA proposes to monitor publicly available land subsidence satellite and continuous GPS data and report changes on an annual basis (Chapter 2, Section X). The land subsidence minimum threshold is a decline of six inches from the 2015 land surface elevation resulting from groundwater extractions and that interferes with land uses or infrastructure. Land use and infrastructure disruption will be determined by communication with relevant agencies and beneficial use representatives including the City of Lompoc, Santa Ynez River Water Conservation District, CalTrans, and the Central Coast Water Authority. Exceedances of the minimum threshold will be investigated to confirm changes in land surface elevation are not attributed to grading due to land development, routine agricultural practices, or plate tectonics.

3.3.6 Depletions of Interconnected Surface and Groundwater – Minimum Thresholds

Minimum thresholds for depletion of interconnected surface and groundwater were established to preserve historical ranges in connection between the Santa Ynez River and the Upper Aquifer of the Lompoc Plain (**Figure 3-6**). As noted in Section 3.2.6, surface water flows, and the connection between surface water and groundwater, along the Santa Ynez River sustains native GDEs and seasonal flows of endangered steelhead trout. Previous investigations of groundwater-surface water connection along the Santa Ynez River indicate that historical groundwater usage in the WMA has not threatened health of these ecosystems (Jones and Stokes, 2000).

To ensure that these conditions persist in the future, the minimum thresholds for depletion of interconnected surface water are groundwater elevations measured at 7N/34W-35K9, 7N/34W-29F2, and 7N/35W-21G2 that are 10 feet below the 2020 groundwater elevation (**Table 3-3** and **Appendix C**). Groundwater elevations 10-feet below spring 2020 levels would allow the water table to drop within historical conditions in the WMA (**Appendix C**), while maintaining water levels within the typical rooting depths of the GDEs that exist on the banks of the River. Groundwater elevations have historically rebounded in the Upper Aquifer from levels approximately equal to the established minimum thresholds to groundwater elevations equal to the Santa Ynez River channel thalweg. The established minimum threshold groundwater elevations maintain the hydraulic communication between the Santa Ynez River and the underlying groundwater aquifer.

3.3.7 Relationship between Minimum Thresholds for all Sustainability Indicators

Groundwater stored in the Upper Aquifer of the WMA provides a source of water supply for municipal, domestic, and agricultural users, as well as native phreatophytes that sustain habitats along the Santa Ynez River. In addition, surface water and groundwater interact dynamically within the WMA along the Santa Ynez River. Santa Ynez River flows are controlled by surface water releases under WR 2019-0148. Groundwater elevation minimum thresholds are established in this Plan to maintain historical conditions between groundwater and surface water.

As noted in Section 3.3.1, long-term accessibility and availability of groundwater supplies in the Upper Aquifer of the WMA are preserved by establishing minimum threshold groundwater elevations 10 feet below the 2020 groundwater level. These groundwater elevation minimum thresholds protect municipal, agricultural, and domestic groundwater users by preventing significant and unreasonable increases in the number of aerated well screens in the WMA (Section 3.3.1). In addition, groundwater elevation minimum threshold near the Santa Ynez River maintain water levels within the rooting zone of the vegetation that line the banks of the River, and keep groundwater elevations within historically observed ranges (Section 3.3.7). Lastly, groundwater elevation minimum thresholds ensure that groundwater elevations do not drop below mean sea level to protect against potential seawater intrusion that would impact water quality and beneficial users in the WMA.

The understanding of the relationship between groundwater elevations and groundwater quality in the WMA has evolved over time. As noted in Section 3.2.4, groundwater quality in the WMA was historically impacted by pumping that caused low-quality Santa Ynez River water to migrate into the primary production area of the Upper Aquifer (Bright et al, 1992). However, more recent evaluations of water quality trends in the WMA indicate that there may be limited correlation between groundwater elevations and groundwater quality in the Upper Aquifer (Haas et al, 2019). If undesirable results associated with degradation of water quality occur in the WMA, an examination of the relationship between groundwater elevations, groundwater quality, and the established minimum thresholds will be conducted through projects and management actions (Chapter 4, Projects and Management Actions).

3.4 Measurable Objectives

Measurable objectives are “quantifiable goals for the maintenance and improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin” (23 CCR §351. Definitions). Based on the sustainability goal (Section 3.1) and undesirable results (Section 3.2) for the WMA, measurable objectives were established for the relevant sustainability indicators.

3.4.1 Chronic lowering of groundwater levels – Measurable Objectives

The measurable objective established for chronic lowering of groundwater levels in both principal aquifers (Upper and Lower) is the spring 2011 groundwater elevation. Groundwater elevations in spring 2011 preceded recent drought conditions and followed a ten-year period of near normal climate (Chapter 2c, Water Budget). Measurable objectives are achieved when the 2011 groundwater elevation is reached in half of the RMWs.

In the Upper Aquifer of the Lompoc Plan, 2011 water levels are 5 to 10 feet lower than historical high groundwater elevations. Current groundwater elevations are at, or near, the 2011 measurable objective in 8 out of the 13 RMWs (or 62%) completed in the Upper Aquifer (**Figure 3-7**). In the Lower Aquifer of the Lompoc Plan, 2011 water levels generally do not correspond to historical high groundwater elevations (**Figure 3-8**). Current groundwater elevations are at, or near, the 2011 measurable objective in 1 out of the 13 RMWs (or 8%) completed in the Lower Aquifer. In the remaining RMWs, current groundwater elevations are 5-15 feet below the established measurable objectives.

Interim milestones are not established for groundwater elevations because the sustainability goal is currently being met within the WMA (Section 3.1) and the WMA is not experiencing undesirable results associated with any of the six sustainability indicators identified as part of SGMA.

3.4.3 Reduction of Groundwater in storage – Measurable Objectives

Groundwater elevation is used as a proxy for groundwater in storage. Undesirable results for reduction of groundwater in storage have not been documented within the WMA even during historical drought periods (Section 3.2.2). The measurable objective for groundwater in storage is the same as that for decline in groundwater levels, the 2011 groundwater level occurring in half of the RMWs (**Table 3-5**). Interim milestones for the reduction of groundwater in storage have not been established because the sustainability goal for the WMA is currently being met (Section 3.4.1).

Table 3-5: Measurable Objectives

RMW Name	Subarea	Principal Aquifer	Chronic Decline in Groundwater Levels and Groundwater In Storage (ft. NAVD88)	Depletion of Interconnected Surface Water (ft. NAVD88)	Water Quality (mg/L) (TDS/Cl-/SO42-/B/Na/NO3-)
7N/34W-35K09	Lompoc Plain	UA	80	67	-
Lompoc 11 (7N/34W-35)	Lompoc Plain	UA	-	-	1000/100/400/0.4/90/1
7N/34W-26Q5	Lompoc Plain	UA	68	-	-
7N/34W-34F6	Lompoc Plain	UA	57	-	-
7N/34W-27F9	Lompoc Plain	UA	56	-	-
6N/34W-6C4	Lompoc Plain	UA	42	-	-
7N/34W-29N6	Lompoc Plain	UA	41	-	1500/250/600/1/225/ -
7N/35W-26L01	Lompoc Plain	UA	30	-	1500/250/600/0.5/200/10
7N/35W-26L02	Lompoc Plain	UA	32	-	500/125/110/0.1/60/1
7N/35W-24J4	Lompoc Plain	UA	30	-	-
7N/35W-21G2	Lompoc Plain	UA	8	0	1500/450/400/0.4/225/1
7N/35W-17M1	Lompoc Plain	UA	5	-	-
7N/34W-32H2	Lompoc Plain	UA	45	-	-
7N/35W-23B2	Lompoc Plain	UA	8	-	-
AGL020004874	Lompoc Plain	UA	-	-	1500/200/500//100/2
Lompoc 6 (7N/34W-27K07)	Lompoc Plain	UA	-	-	1000/75/250/0.4/70/1
7N/34W-27K05	Lompoc Plain	UA	-	-	1000/80/250/0.4/75/ -
7N/34W-27K04	Lompoc Plain	UA	-	-	1000/90/250/0.4/80/1
7N/35W-17K20	Lompoc Plain	UA	-	-	-
7N/34W-29F02	Lompoc Plain	UA	-	31	-
7N/35W-26L04	Lompoc Plain	LA	28	-	500/150/150/0.125/70/1
7N/34W-29N7	Lompoc Plain	LA	43	-	1000/150/250/0.5/110/1
7N/34W-24N1	Lompoc Plain	LA	56	-	-
7N/34W-22J6	Lompoc Plain	LA	55	-	-
7N/35W-26L04	Lompoc Plain	LA	28	-	500/150/150/0.125/70/1

7N/34W-27K06	Lompoc Plain	LA	-	-	1000/125/250/0.4/110/
7N/33W-28D3	Santa Rita Upland	LA	42	-	-
7N/33W-21G2	Santa Rita Upland	LA	65	-	-
7N/33W-27G1	Santa Rita Upland	LA	56	-	-
AGL020021642	Santa Rita Upland	LA	-	-	500/75/100/ - /60/ -
AGL020035942	Santa Rita Upland	LA	-	-	- /- /- /- /- / -
Vista Hills MWC #4	Santa Rita Upland	LA	-	-	450/40/125/0.2/50/2
7N/35W-27P01	Lompoc Terrace	LA	43	-	-
7N/34W-15D3	Lompoc Upland	LA	58	-	-
7N/34W-14F4	Lompoc Upland	LA	50	-	-
7N/33W-17M1	Lompoc Upland	LA	62	-	-
7N/33W-19D1	Lompoc Upland	LA	56	-	-
7N/34W-12E1	Lompoc Upland	LA	62	-	-
VVCSD 3B (7N/34W-15E3)	Lompoc Upland	LA	-	-	500/150/100/0.1/90/1
MH CSD 7	Lompoc Upland	LA	-	-	500/100/100/0.1/50/1

GWL = Chronic Groundwater Level Declines, GWS = Reduction of Groundwater in Storage, Quality = Degradation of Water Quality, Surface Water = Depletion of Interconnected Surface Water

UA = Upper Aquifer, LA = Lower Aquifer

3.4.3 Seawater intrusion– Measurable Objectives

Chloride concentrations in wells adjacent to the estuary are reflective of natural conditions in the WMA (GCTM, 2021a) and have not caused significant and unreasonable impacts to the beneficial use of groundwater for municipal, agricultural, and domestic supply (Section 3.2.3) in the western Lompoc Plain. Because current chloride concentrations in the western portion of the WMA are suitable for agricultural, domestic, and municipal supply, the measurable objective for seawater intrusion is the current location of the 500 mg/L chloride isocontour (**Figure 3-3**).

3.4.4 Degraded Water Quality – Measurable Objectives

The measurable objectives for degradation of water quality are equal to the minimum of the secondary maximum contaminant level (where applicable) and the 2015 groundwater concentration (**Table 3-5**; **Appendix B**). Because groundwater quality in the WMA is currently suitable for agricultural, domestic, and municipal supply (Section 3.2.4), interim milestones are not established for water quality as part of this Plan.

3.4.5 Land Subsidence – Measurable Objective

Undesirable results related to land subsidence have not occurred historically and are not likely to occur within the CMA. Land subsidence monitoring will rely on publicly available InSAR and continuous GPS data (Section 3.2.6). The measurable objective is land subsidence of less than two inches as compared to 2015 InSAR data resulting from groundwater extraction.

3.4.6 Depletions of interconnected surface water and groundwater – Measurable Objectives

Measurable objectives for depletion of interconnected surface and groundwater were established to preserve long-term connection between the Santa Ynez River and the Upper Aquifer of the Lompoc Plain (**Appendix C**). As noted in Section 3.2.6, surface water flows, and the connection between surface water and groundwater, along the Santa Ynez River sustains native GDEs and seasonal flows of endangered steelhead trout. Previous investigations of groundwater-surface water connection along the Santa Ynez River indicate that historical groundwater usage in the WMA has not caused undesirable results to the GDEs (Jones and Stokes, 2000).

To ensure that these conditions persist in the future, the measurable objective established for depletion of interconnected surface water are groundwater elevations measured at wells 7N/35W-21G02, 7N/34W-29F02, and 7N/34W-35K09 equal to 5 feet below the channel thalweg of the

Santa Ynez River. Groundwater elevations 5 feet below the channel thalweg would ensure that the soil would be wet and be able to provide water for the GDEs along the riparian corridor.

3.5 Effects of Sustainable Management Criteria on Neighboring Basins

The WMA of the Santa River Valley Groundwater Basin is bounded to the north by the Purisima Hills and Purisima Anticline, which limits connectivity between the principal aquifers in the WMA and the San Antonio Creek Valley Basin to the north (Chapter 2, Hydrogeologic Conceptual Model). Along the southern and western boundary of the WMA, the Santa Ynez River Valley Groundwater Basin is bordered by the Pacific Ocean and White Hills (Chapter 2, Hydrogeologic Conceptual Model). There are no groundwater basins that border the WMA along the southern boundary of the Basin. The WMA has limited connectivity to the CMA along the eastern boundary of the Santa Rita Upland subarea and through the Santa Ynez River Alluvium subarea (Chapter 2, Hydrogeologic Conceptual Model). Interactions between the WMA and CMA through the Santa Ynez River Alluvium subarea is considered surface water interactions, and therefore is not within the jurisdiction of the WMA GSA (Section 3.1.1).

The WMA is downgradient from the CMA along the northeastern boundary of the Santa Rita Upland subarea. Because the WMA is downgradient of the CMA, and the established minimum thresholds maintain the direction of this gradient in the future, groundwater conditions in the Santa Rita Upland subarea will therefore not negatively impact that of the CMA.

Groundwater elevations have historically occurred several hundred feet lower in the Santa Rita Upland compared to the Buellton Upland subarea of the CMA (e.g. 7N/33W-27G1 vs. 7N/33W-36J1; see Chapter 2, Groundwater Conditions). This difference in groundwater levels indicates a potential hydrogeologic barrier to groundwater movement between the Santa Rita Upland and Buellton Upland. The extent and nature of this barrier is a data gap, which is currently being assessed with the aerial geophysical survey performed in November 2020 (Skytem study). Because the groundwater elevation minimum threshold differences are within the observed groundwater elevation differences across the CMW-WMA boundary, future operations and management in the WMA will not impact the sustainability of the CMA.

3.6 Monitoring Network

This section of the GSP describes the existing monitoring networks within the WMA that are currently used to collect groundwater levels and water quality data, and the recommended WMA monitoring networks that will be used to monitor the six sustainability indicators in accordance with SGMA and the SMCs described above. The recommended WMA Monitoring Networks were developed to support GSA decision making to achieve groundwater sustainability goals and objectives outlined in Chapter 3.1.

Existing monitoring networks within the WMA for groundwater levels and water quality are described, and the wells from those existing networks that are part of the *California Statewide Groundwater Elevation Monitoring* (CASGEM) and the *Groundwater Ambient Monitoring and Assessment Program* (GAMA) are identified. Using the existing groundwater level and water quality monitoring networks within the WMA, recommended WMA monitoring networks were developed, and a subset of those wells were selected for representative monitoring.

Data gaps identified in Chapter 2 and discussed as part of the SMCs in Chapter 3.1, were considered during development of the recommended WMA monitoring networks. Those data gaps are described, followed by a brief description of how they will be addressed. Detailed approaches to address the identified data gaps are included in Chapter 4, Projects and Management Actions.

3.6.1 Monitoring Networks Objectives

The objectives of the WMA monitoring networks are to identify and select representative monitoring wells to collect data to support monitoring of groundwater conditions and detection of potential undesirable results, and to achieve sustainability goals. As stated in the SGMA[7], the monitoring networks will support:

- Demonstrate progress toward achieving measurable objectives described in the GSP;
- Monitor impacts to the beneficial uses or users of groundwater;
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds; and
- Quantify annual changes in water budget components.

The recommended monitoring network presented herein for the WMA GSA, is intended to monitor for the six sustainability indicators[8] and their associated undesirable results, listed below:

- Chronic lowering of groundwater levels;
- Reduction in groundwater storage;
- Degraded water quality;
- Seawater Intrusion;
- Land subsidence; and

[7] 23 CCR § 254.34(b)
[8] 23 CCR § 254.26

- Depletions of interconnected surface water.

3.6.2 WMA Basin Conditions

The WMA Basin Setting is described in detail in Chapter 2, **(**HCM, GC, and Water Budget) of this GSP. A summary of WMA conditions that were considered during the development of the monitoring networks are described below, including hydrogeologic conditions, land uses and historical groundwater conditions.

The WMA covers an area of 85,600 acres, subdivided into six distinct subareas as indicated below in **Table 3-6.** The Lompoc Plain is the most complex subarea and includes agriculture, the City of Lompoc, as well as the estuary of the Santa Ynez River. The Lompoc Upland and Santa Rita Upland have similar agricultural and domestic development. The Santa Ynez River Alluvium (SYRA) comprises the alluvium along the bedrock channel of the Santa Ynez River and is managed in accordance with the SWRCB Order WR 73-37. The Lompoc Terrace and Burton Mesa are almost entirely within the boundary of Vandenberg AFB, have been minimally developed in terms of groundwater use, and water that is observed in these areas is considered perched, as described in Chapter 2.

Table 3-6
Summary of WMA Subareas by size.

WMA Subarea	Acres [A]	Square Miles
Lompoc Plain	18,780	29.3
Lompoc Upland	21,170	33.1
Santa Rita Upland	7,090	11.1
Santa Ynez River Alluvium	4,940	7.7
Lompoc Terrace	10,560	16.5
Burton Mesa	23,060	36.0
Total	**85,600**	**133.7**

[A] Rounded to nearest 10 acres.

There are two principal aquifers within the WMA, the Upper Aquifer and the Lower Aquifer. The Lower Aquifer, as described in Chapter 2 **(**the 3D Geologic Model and HCM), is comprised of relatively coarse-grained sedimentary rocks identified as the Paso Robles Formation, and the Careaga Sandstone. Locally, these two geologic formations are present in a wide synclinal fold that extends from the Santa Rita Upland in the northeastern portion of the WMA, through the Lompoc Upland, central and eastern Lompoc Plain, and the Lompoc Terrace in the southwest portion of the WMA. Detailed cross sections of these formations that comprise the Lower Aquifer are included in (Section 2a, Hydrogeologic Conceptual Model, Appendix 3D Geologic Tech Memo**)**. The Lower Aquifer varies in vertical thickness within the WMA and hydraulic conductivity within the principal aquifer ranges from 15 to 40 feet per day, with a thickness of 0 to 1,500 feet.

The second principal aquifer is the Upper Aquifer, comprised of alluvial sediments primarily observed within the Lompoc Plain. Where present, the Upper Aquifer thickness ranges between 160-feet to 200-feet, and hydraulic conductivity within the principal aquifer ranges from 360 to 600 feet per day.

Water is also observed in the Santa Ynez River bedrock channel, alluvium, and adjacent terrace deposits (alluvium), herein referred to as the SYRA. These alluvial sediments are included in the SWRCB Order WR 73-37, and the water observed (in the SYRA) is considered Santa Ynez River streamflow or surface water. In accordance with the SWRCB Order WR 73-37 and the SGMA, the water observed in the SYRA is not considered a principal aquifer of the WMA. Although the SYRA is not considered a principal aquifer within the WMA, SYRA wells are considered in the WMA monitoring network to collect data to support sustainable groundwater management decision making by the WMA GSA, and to evaluate sustainable management criteria.

Groundwater may be found in perched conditions within the Burton Mesa and Lompoc Terrace, however as described in Chapter 2, the observed perched water is not considered a principal aquifer of the WMA.

The primary groundwater users within the WMA are agricultural (78% of the volume of groundwater pumped) and municipal and domestic use (22% of the volume of groundwater pumped).[9] The aerial extent of agricultural users within the WMA are shown on HCM Figure 5-1. Agricultural land uses comprise approximately 10,960 acres (13%) of the total WMA area as shown below in **Table 3-7**.

Table 3-7
Summary of WMA Land Use for Agriculture [A]

WMA Subarea	Agricultural Use	Agricultural Acres [B]
Lompoc Plain	36.4%	6,840
Santa Rita Upland	30.4%	1,500
Santa Ynez River Alluvium	8.6%	1,990
Lompoc Upland	2.9%	620
Burton Mesa	0.1%	10
Lompoc Terrace	0.0%	0
Total	78.4%	10,960

[A] Source of land use is from the 2016 LandIQ database.
[B] Rounded to nearest 10 acres.

[9] Five-year averages for Fiscal Year (FY) 2015-16 through FY2019-20 for Santa Ynez River Water Conservation District Zones B (Lompoc Plain, Lompoc Upland, and Lompoc Terrace) and F (Santa Rita Upland). Source is Stetson (2021) Forty-Third Annual Engineering and Survey Report on Water Supply Conditions of the Santa Ynez River Water Conservation District 2020-2021.

3.6.3 Existing Monitoring Networks

Groundwater level and water quality networks are actively monitored within the WMA and these data are used to evaluate changes in groundwater levels, calculate estimates of groundwater in storage, and assess changes in groundwater quality and to understand surface water conditions. The details of those existing monitoring networks are presented below. Additionally, the existing networks were evaluated and used to develop the recommended WMA monitoring networks to support GSA decision making to sustainably manage groundwater in accordance with established SMCs, within the WMA. The following subsections summarize the existing monitoring networks for the period of 2015-2021.

3.6.3.1 Groundwater Levels

The County of Santa Barbara (COSB)[10] , the United States Bureau of Reclamation (USBR), the City of Lompoc, the Mission Hills Community Services District and the Vandenberg Village Community Services District currently collect groundwater elevation data (groundwater levels) from their respective monitoring networks within the WMA. The monitored wells are shown in aerial view on **Figure 3-11** and summarized below in **Table 3-8**.

Table 3-8
Summary of Existing Groundwater Elevation Monitoring Network Wells
Spring 2015 through Spring 2021

Monitoring Network	Monitoring Frequency	Upper Aquifer	Lower Aquifer	SYRA Aquifer	Total
COSB (formerly USGS)[11]	Semi-annual / annual	63	25	4	92
USBR	Monthly	8	0	10	18
City of Lompoc	Monthly	9	1	0	10
VVCSD	Monthly	0	4	0	4
Duplicates[12]:		6	1	0	7
	Totals:	**74**	**29**	**14**	**117**

Of the wells monitored within the WMA for groundwater levels, as summarized above in **Table 3-8**, data collected from some of them are also submitted to the CASGEM program. The CASGEM wells are summarized below in **Table 3-9**, including the principal aquifer their data represent, their assigned State identification (ID) number, their USGS ID, CASGEM ID and CASGEM type (mandatory or voluntary monitoring).

[10] Groundwater levels are collected by the Santa Barbara County Water Agency which is one of five divisions of the Santa Barbara County Public Works Department, which in turn is one of several departments under the County of Santa Barbara.
[11] Prior to 2019, the COSB monitoring network data was collected by the United States Geological Survey (USGS).
[12] Wells in multiple monitoring networks during 2015-2021.

Table 3-9a
List of WMA CASGEM Wells,
Lompoc Plain Subarea (59 wells)
Spring 2015-Spring 2021

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
LA	7N/34W-20K04	49150	Voluntary	346710N1204820W001	344017120285502
LA	7N/34W-22J06	49155	Voluntary	346760N1204430W001	344033120263404
UA	7N/34W-22Q08	38451	Voluntary	346689N1204462W002	344008120263902
LA	7N/34W-24N01	49156	Voluntary	346690N1204210W001	344010120251601
UA	7N/34W-26H03	49154	Voluntary	346620N1204230W001	343943120252201
UA	7N/34W-27E04	23438	Voluntary	346608N1204570W001	343939120271801
UA	7N/34W-27F07	37470	Voluntary	346636N1204501W001	343949120265301
UA	7N/34W-27F08	23439	Voluntary	346636N1204498W001	343949120265201
UA	7N/34W-27G06	49152	Voluntary	346640N1204470W001	343949120264901
UA	7N/34W-27K04	37471	Voluntary	346605N1204467W001	343938120264101
UA	7N/34W-27K05	23441	Voluntary	346605N1204467W002	343938120264102
LA	7N/34W-27K06	37575	Voluntary	346605N1204464W001	343938120264001
UA	7N/34W-27N06	37576	Voluntary	346555N1204559W001	343920120271401
UA	7N/34W-27P06	36325	Voluntary	346553N1204542W001	343919120270801
UA	7N/34W-28B05	23533	Voluntary	346678N1204651W002	344004120274702
UA	7N/34W-28M01	36326	Voluntary	346605N1204753W001	343938120282401
UA	7N/34W-28M02	23534	Voluntary	346605N1204753W002	343938120282402
UA	7N/34W-28Q01	36327	Voluntary	346566N1204634W001	343924120274101
UA	7N/34W-29E04	49149	Voluntary	346630N1204890W001	343948120292002
UA	7N/34W-29F01	23536	Voluntary	346622N1204856W001	343944120290101
UA	7N/34W-29F02	36328	Voluntary	346622N1204856W002	343944120290102
UA	7N/34W-29H03	38163	Voluntary	346622N1204776W001	343944120283201
UA	7N/34W-29N06	49148	Voluntary	346570N1204920W001	343926120293001
LA	7N/34W-29N07	23538	Voluntary	346572N1204937W002	343926120293002
UA	7N/34W-30L10	23688	Voluntary	346614N1205023W004	343941120300106
UA	7N/34W-31R02	49147	Voluntary	346410N1204920W001	343828120293201
UA	7N/34W-32H02	49151	Voluntary	346500N1204780W001	343901120284201
UA	7N/34W-33E05	23690	Voluntary	346469N1204762W001	343849120282701
UA	7N/34W-34A04	39671	Voluntary	346503N1204414W001	343901120262202
UA	7N/34W-35K09	49153	Voluntary	346440N1204300W001	343840120254701
UA	7N/35W-15M01	49172	Voluntary	346900N1205510W001	344124120334401
UA	7N/35W-17K20	37900	Voluntary	346866N1205884W001	344112120351001
UA	7N/35W-17M01	25268	Voluntary	346872N1205953W001	344114120353501
UA	7N/35W-17Q06	49158	Voluntary	346860N1205870W001	344110120351201
UA	7N/35W-18J02	49157	Voluntary	346880N1206000W001	344118120355902

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
UA	7N/35W-21G02	25271	Voluntary	346780N1205720W001	344041120341101
UA	**7N/35W-22J01**	**37748**	**CASGEM**	**346725N1205467W001**	**344021120324101**
UA	7N/35W-22M01	49170	Voluntary	346740N1205590W001	344025120333401
UA	7N/35W-23B02	49171	Voluntary	346800N1205340W001	344048120320201
UA	7N/35W-23E05	37895	Voluntary	346786N1205420W005	344043120322405
UA	7N/35W-23E06	25322	Voluntary	346786N1205420W006	344043120322406
UA	7N/35W-23E07	37896	Voluntary	346786N1205420W007	344043120322407
UA	7N/35W-23E08	25323	Voluntary	346786N1205420W008	344043120322408
UA	7N/35W-23J05	49164	Voluntary	346740N1205270W001	344025120313701
UA	7N/35W-23Q02	25325	Voluntary	346691N1205364W002	344009120320402
UA	7N/35W-23Q03	49160	Voluntary	346690N1205340W001	344009120320403
UA	7N/35W-23Q04	25326	Voluntary	346689N1205378W001	344008120320901
UA	7N/35W-24J04	49146	Voluntary	346730N1205100W001	344021120303504
UA	7N/35W-24K05	38183	Voluntary	346747N1205195W005	344029120310305
UA	7N/35W-24N03	24442	Voluntary	346686N1205281W001	344046120321401
UA	7N/35W-25F06	49165	Voluntary	346630N1205190W001	343947120310703
UA	7N/35W-25F07	24445	Voluntary	346630N1205206W003	343947120310702
UA	**7N/35W-26F04**	**49161**	**CASGEM**	**346630N1205360W001**	**343948120320901**
UA	7N/35W-26L01	38297	Voluntary	346580N1205381W001	343929120321001
UA	7N/35W-26L02	49162	Voluntary	346580N1205360W001	343929120321002
LA	7N/35W-26L04	38298	Voluntary	346580N1205381W003	343929120321004
UA	7N/35W-27C01	49159	Voluntary	346670N1205540W001	344001120331401
UA	7N/35W-27F01	49169	Voluntary	346640N1205560W001	343952120332001
UA	7N/35W-35A03	49163	Voluntary	346500N1205280W001	343859120314003

Table 3-9b
List of WMA CASGEM Wells,
Lompoc Terrace Subarea (3 wells)
Spring 2015-Spring 2021

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
LA	7N/35W-27P1	49168	Voluntary	346560N1205570W001	343923120332501
UA	7N/35W-30G1	24672	Voluntary	346619N1206073W001	343944120361901
UA	7N/35W-31J2	24714	Voluntary	346441N1205992W001	343841120355202

Table 3-9c
List of WMA CASGEM Wells,
Lompoc Upland Subarea (10 wells)
Spring 2015-Spring 2021

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
LA	7N/33W-17M1	49144	Voluntary	346830N1203800W001	344100120224901
LA	7N/33W-17N2	23684	Voluntary	346808N1203823W001	344051120224901
LA	7N/33W-19D1	49143	Voluntary	346760N1204000W001	344035120235901
LA	7N/33W-20G1	49145	Voluntary	346740N1203710W001	344025120221601
LA	**7N/34W-12E1**	**49139**	**CASGEM**	**347050N1204180W001**	**344219120250601**
LA	7N/34W-14F4	49142	Voluntary	346910N1204310W001	344126120255201
LA	7N/34W-14L1	23897	Voluntary	346880N1204326W001	344117120255001
LA	7N/34W-15P2	49138	Voluntary	346830N1204510W001	344101120265901
LA	7N/34W-15D2	49140	Voluntary	-	344140120272302
LA	7N/34W-15E1	25659	Voluntary	346928N1204571W001	344134120272201

Table 3-9d
List of WMA CASGEM Wells,
Santa Rita Upland Subarea (5 wells)
Spring 2015-Spring 2021

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
LA	7N/33W-16G05	49131	Voluntary	346880N1203570W001	344115120212601
LA	7N/33W-21G02	23686	Voluntary	346736N1203562W001	344025120211501
LA	7N/33W-21N01	49130	Voluntary	346660N1203610W001	343956120214001
LA	7N/33W-27G01	49132	Voluntary	346570N1203360W001	343926120201001
LA	7N/33W-28D03	49129	Voluntary	346630N1203650W001	343946120215301

Table 3-9e
List of WMA CASGEM Wells,
Santa Ynez Alluvium Subarea[1] (4 wells)
Spring 2015-Spring 2021

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
SYRA	6N/34W-12C05	49135	Voluntary	346270N1204160W001	343735120245902
SYRA	6N/33W-09M01	25592	Voluntary	346131N1203638W001	343647120215001
SYRA	6N/33W-08R01	49136	Voluntary	346110N1203680W001	343640120220401
SYRA	6N/33W-08J03	38440	Voluntary	346124N1203674W001	343645120220301

[1]Bedrock channel and managed as surface water as Santa Ynez River sub flow.

Additional historical groundwater elevation data exists for wells not included in the existing groundwater monitoring network, i.e. for wells that may have been monitored in the past but are no longer part of the current monitoring network[13]. Available data from those wells have been incorporated into the Data Management System (DMS), as described in Chapter 2[14]. Additionally, detailed summaries and analysis of available historical groundwater elevation data are included in Chapter 2 discussions of CMA groundwater condition.

3.6.3.2 Groundwater Storage

The existing groundwater level monitoring network (described above) and the collected data are used to estimate annual changes to groundwater storage within the Santa Ynez River Water Conservation District (SYRWCD). The estimated changes to groundwater storage are included in the SYRWCD Annual Reports, which are available at the Lompoc Public Library and on the SYRWCD website for public access. Groundwater storage estimates utilize the data collected from the groundwater level monitoring network shown on **Figure 3-11** and summarized in **Table 3-8** and **Table 3-9.**

3.6.3.3 Groundwater Quality

Groundwater Quality refers to the measurement of naturally occurring and anthropogenically influenced chemical compounds in groundwater. These compounds have the potential to adversely affect groundwater quality. As described in Chapter 2, the groundwater quality in the Lower Aquifer is, with few exceptions, generally of better quality than the groundwater quality in the Upper Aquifer which is present at shallower depths (closer to the ground surface). SYRA aquifer water quality is measured and managed in accordance with the SWRCB Order WR 73-37 and is not subject to SGMA, however the collected data are publicly available and will be considered by the WMA GSA in their sustainable groundwater management decision-making.

Groundwater quality data is currently collected from wells within the WMA as part of three programs. USGS directed water quality monitoring funded by County of Santa Barbara and the Santa Ynez River Water Conservation District. Public water systems report water quality to the Division of Drinking Water[15] Safe Drinking Water Information System for all water sources as Public Water System Reporting. California Irrigated Lands Reporting Program (ILRP) which is for irrigated commercial lands. The SWRCB Groundwater Ambient Monitoring and Assessment (GAMA) website is one place where these data sets are made available. The WMA wells included in these programs and monitored for groundwater quality are shown on **Figure 3-12** and summarized below in **Table 3-10**.[16]

[13] Wells may be removed from monitoring programs over time due to land development, change in ownership or access, well destruction, well redundancy, lack of well completion or screen interval information, or other applicable criteria.

[14] The DMS and the associated Data Management Plan (DMP) describe available WMA data and resources considered.

[15] Division of Drinking Water is part of the California State Water Resources Control Board since July 1, 2014, previously part of California Department of Public Health.

[16] Sites are included if there were at least one or more Total Dissolved Solids measurements during the period 2015-2021. ILRP are grouped by reporting site.

Table 3-10
Summary of Existing WMA Groundwater Quality Monitoring Networks
Spring 2015 through Spring 2021

Monitoring Network	Monitoring Frequency	Upper Aquifer	Lower Aquifer	SYRA Aquifer	Total Participating Wells
USGS	Annual to Triennial	27	4	0	31
Public Water Systems Report	Monthly to Annual	11	12	0	23
Irrigated Lands Regulatory Program[17]	Annual or Biannual	65	44	22	131
Subtotal of Principal Aquifers:		**103**	**60**	**22**	**185**

Public water systems data includes the GSA member agencies of City of Lompoc, MHCSD and VVCSD, as well as other small municipal water companies. In the WMA, the Public Water System wells provide representative data for both the Lower Aquifer and the Upper Aquifer. Commercially irrigated agricultural lands are required to periodically submit groundwater quality data to the ILRP and within the WMA there are participating wells that provide data for both the Lower Aquifer and the Upper Aquifer, as listed above in **Table 3-10**.

3.6.3.4 Seawater Intrusion

Seawater intrusion is not observed nor is it expected in the WMA, as described in Chapter 2 **(**both the HCM and GC portions of the basin setting). Water quality at several WMA wells is monitored by the USGS on contract with local agencies. Chloride, Sodium, and Total Dissolved Solids at are reported in the Annual Report for the SYRWCD, for the two wells shown on Figure 2-5 (7N/35W-17K20 and 7N/35W-26F4).[18] As previously discussed in Chapter 2 and as shown on the GCTM Figure 4-3**,** the current monitoring of chloride identifies the chloride isocontour of 500 mg/L near the boundary the eastern boundary of the Santa Ynez River estuary, and complies with the SGMA requirements.[19]

3.6.3.5 Land Subsidence

Land subsidence monitoring has been conducted recently (since 2015) for the WMA using remote sensing Interferometric Synthetic Aperture Radar (InSAR) data which tracks vertical elevation changes to an accuracy of approximately 16-millimeters. These satellite data are collected by the European Space Agency (ESA) and processed by TRE ALTAMIRA Inc. under contract with the

[17] ILRP values here represent reporting groups.
[18] Stetson (2021) Forty-Third Annual Engineering and Survey Report on Water Supply Conditions of the Santa Ynez River Water Conservation District 2020-2021.
[19] 23 CCR § 254.34(c)(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.

DWR. Since June 2015, data has been collected and made publicly available monthly. These data are used to evaluate and estimate monthly and annual land surface elevation changes since data collection was initiated in 2015.

In addition to the available InSAR data, a USGS continuous global positioning system (CGPS) station (LOMP) was installed near Mission Hills and has been collecting vertical displacement data since May 15, 2015 as shown on **Figure 3-16**. Land subsidence has not been observed within the WMA by any of the GSA member agencies; nor has subsidence affected any of the existing water infrastructure within the WMA, as indicated in Chapter 2 **(**HCM and GCTM).

3.6.3.6 Surface Water Monitoring

Surface water monitoring within the Basin is conducted through stream gauges placed along the Santa Ynez River and confluences of key tributaries. Currently there are two active USGS stream gages within the WMA boundaries, and an additional active USGS stream gage located on an upstream tributary (**Figure 3-6**) which allow for estimation of streamflow or surface water conditions within the WMA. **Table 3-11** (below) summarizes the existing stream gauges that provide data that contribute to evaluation of WMA surface water conditions. Locations for USGS stream gages within the immediate vicinity of the WMA are shown in Chapter 2, GCTM Figure 6-1.

Table 3-11
USGS Stream Gages relevant to the WMA

Status	USGS Gage Name	Gage Number	Start Year	End Year	Upstream of or Within the WMA
Active	SALSIPUEDES C NR LOMPOC CA	11132500	1941	2020 (active)	Upstream
Active	SANTA YNEZ R A NARROWS NR LOMPOC CA	11133000	1952	2021 (active)	Within
Active	SANTA YNEZ R A H ST NR LOMPOC CA	11134000	1947	2021 (active)	Within

Additionally, as described in the WMA Basin Conditions section, SWRCB Order WR 73-37 has determined that water observed in the SYRA is surface water associated with the Santa Ynez River. Wells screened in the SYRA are considered surface water wells and are monitored by the USBR on a monthly basis. The data collected from the SYRA wells by the USBR are reported to the-SYRWCD and used to manage surface water flows in accordance with the SWRCB Order WR 73-37.

A variety of data sources are available for the WMA and they are used to estimate current surface water conditions within the WMA, and to assist with compliance with SWRCB Order WR 73-37. The available data sources and their uses are listed below.

- Upstream conditions of Lake Cachuma and Bradbury Dam operations, including imports from State Water Project water, are monitored by USBR on a daily basis.

- The Central Coast Water Authority (CCWA) which operates the pipeline which transports State Water Project water (HCM Figure 4-6) to the Basin, monitors the State Water Project deliveries to the watershed.

- Precipitation in the WMA is measured at the Lompoc City Hall and data for Water Year 1911-present (2021) and is published by the Santa Barbara County Flood Control & Water Conservation District.

3.6.4 WMA Monitoring Network

The recommended WMA Monitoring Network is discussed in the following subsections. The recommended monitoring network was developed to facilitate data collection to support early identification of groundwater changes that could potentially result in undesirable results, as well as to guide the WMA GSA toward their established groundwater sustainability goals over the implementation horizon. The recommended network, including the filling of identified data gaps, is intended to identify temporal trends in groundwater conditions. The data collected from the recommended monitoring networks will support the established SMCs and guide the WMA GSA in decision making on projects and management actions within the WMA, as warranted.

3.6.4.1 Groundwater Levels

As described above, the groundwater level monitoring network is focused on the Upper and Lower Aquifers within the WMA and not the Santa Ynez River Alluvium, in accordance with SWRCB Order WR 2019-0148. The existing wells monitored for groundwater levels by the various agencies will continue, and of those, a subset were selected as representative wells within the WMA, as discussed in Section 3.1.

3.6.4.1.1 Representative Wells Selection

Existing groundwater level monitoring wells located within the WMA were evaluated for selection as Representative Wells using the tiered approach outlined below. Each well was evaluated for each tier of criteria. If Tier 1 data was known or available for a well, the well would then be screened for Tier 2 criteria, and so on for Tiers 3 and 4. If Tier 1 and 2 criteria were met, the well was considered potentially suitable for inclusion in the monitoring networks for the WMA. If Tiers 1 through 4 criteria were met, the well was evaluated for potential suitability as a representative monitoring well for one of the established SMCs. Tier 4 evaluation was only conducted if a well was determined potentially suitable to monitor multiple SMCs.

The tiering criteria utilized to select WMA Representative Wells is shown below.

Tier 1

- part of an existing monitoring network
- access available for monitoring
- existing DWR databases (CASGEM, GAMA, SWIS, etc.)

Tier 2

- xyz well location data
- well boring log
- total boring depth
- well screen interval
- principal aquifer screened

Tier 3

- historical data
- spatial location and consideration of upgradient and downgradient conditions

Tier 4

- suitable to monitor multiple SMCs

The attached **Table 3-2** includes a list of the WMA Representative Monitoring Wells, and they are also shown on **Figure 3-1.**

3.6.4.1.2 Groundwater Levels Monitoring Improvements

Some alluvial canyons within the Lompoc Upland and Santa Rita Upland subareas of the WMA are not currently included in the existing Groundwater Level monitoring network, as shown by the polygons lacking well locations on **Figure 3-13**. Obtaining access to existing groundwater wells in these areas and adding them to the recommended WMA groundwater level monitoring program could potentially provide additional supplemental data in these areas. Efforts to determine whether wells exist in these areas, and if so, how public outreach would be conducted to gather well information is included in Chapter 4, Projects and Management Actions. Because the 26 representative monitoring wells already provide adequate spatial distribution, additional monitoring wells are identified as an improvement, not a data gap.

3.6.4.2 Groundwater Storage

The data collected from the Groundwater Level monitoring network will be used to evaluate changes in groundwater levels within the Upper and Lower Aquifers and to estimate changes in groundwater storage. Therefore, the Groundwater Level and Groundwater Storage monitoring networks are considered equivalent and the collected data will be used to evaluate both sustainability indicators for identification of potential undesirable results. If additional wells are added to the groundwater level network, the estimated groundwater in storage calculations will be modified to include those wells, as appropriate.

3.6.4.3 Groundwater Quality

It is recommended to continue to use the existing Groundwater Quality well network, monitored by the public water systems and by commercial irrigation within the WMA. The GSA will collect data from these programs annually to support evaluation of groundwater quality trends and tracking groundwater management progress to reach WMA sustainability goals. **Figure 3-14** shows the representative monitoring well network along with all of the wells in the current monitoring program. The distribution of existing wells across the principal aquifer indicates sufficient monitoring is feasible by utilizing the existing wells. Because the monitoring wells already provide adequate spatial distribution, additional monitoring wells are identified as an improvement, not a data gap.

3.6.4.4 Seawater Intrusion

Seawater intrusion is not currently observed within the WMA as presented and discussed in Chapter 2 (HCM and GCTM) and above in Section 3.1**.** However, current groundwater quality monitoring is conducted in the Santa Ynez River Estuary and the additional wells are recommended to be monitored for chloride, in accordance with the SGMA, to evaluate potential changes in groundwater quality and monitor for potential seawater intrusion. The existing wells monitored for chloride and the additional wells recommended for potential seawater intrusion monitoring are shown on the attached **Figure 3-15.**

3.6.4.5 Land Subsidence

As described in Chapter 2, Groundwater Conditions, land subsidence has not been historically observed in the WMA, existing water infrastructure have not been affected by land subsidence, and geologic properties of the aquifer indicate that land subsidence due to groundwater withdrawal in the WMA are unlikely. Based on these findings, a direct-measurement monitoring network for potential land subsidence is not recommended within the WMA. However, a remote-sensing option for land subsidence monitoring using InSAR data will be implemented. Available InSAR coverage for the WMA are deemed sufficient and will be evaluated for indications of ongoing or permanent land subsidence. InSAR uses radar returns to measure total vertical displacement of the land surface.

In addition to the available InSAR data, a USGS continuous global positioning system (CGPS) station (LOMP) was installed near Mission Hills Community Services District (MHCSD) and has been collecting vertical displacement data since May 15, 2015 as shown on **Figure 3-16**. Considering the vertical displacement observed in portions of the WMA as shown on **Figure 3-5**, additional areas within the WMA are identified for future potential CGPS stations as shown on

Figure 3-16 and identified as potential improvements for land subsidence monitoring, to determine whether the InSAR measurements are reflective of land subsidence or regional tectonic activity as described in Chapter 2 (3D hydrogeologic model tech memo)**.** Because of the existing InSAR data and CGPS site, additional monitoring CGPS sites are identified as an improvement, not a data gap.

3.6.4.6 Surface Water Depletions and Groundwater Dependent Ecosystems

The DWRs Emergency Regulations Section 354.28 (b) states that,

> *(6) Depletions of interconnected surface water. The minimum threshold for depletions of interconnected surface water shall be the volume of surface water depletions caused by groundwater use that has significant and unreasonable adverse impacts on beneficial uses of the surface water. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:*
>
> > *(A) The location, quantity, and timing of depletions of interconnected surface water.*
> >
> > *(B) A description of the groundwater-surface water model used to quantify surface water depletion.*

Item (6)(B) requires a numerical model to estimate the depletions of interconnected surface water, not the use of a monitoring network to measure depletions of interconnected surface water. Therefore, the Surface Water Depletion monitoring network will include two primary elements.

- Use of groundwater level monitoring as presented on **Figures 3-6** and **3-17** as a proxy to evaluate potential Surface Water Depletions, and
- Continued use of stream gauge data from within the WMA to support numerical modeling estimates.

Additionally, data from existing stream gauges located in the CMA and WMA will be utilized to assess potential surface water depletions and relationships to groundwater conditions changes. These monitoring data will be used to guide the WMA in groundwater management decisions to support the sustainability goals outlined in Section 3.1.

3.6.5 Monitoring Protocols

To fulfill the additional monitoring recommended below, monitoring protocols will be conducted in accordance with DWR's *Monitoring Networks and Identification of Data Gaps BMP,* which uses DWR's 2010 publication of *California Statewide Groundwater Elevation Monitoring (CASGEM) Program Procedures for Monitoring Entity Reporting* for the groundwater level sampling protocols. This publication includes protocols for equipment selection, setup, use, field evaluation, and sample collection techniques.

3.6.5.1 Identified WMA Data Gaps for Monitoring Network

Currently, data gaps exist on the well construction information for the representative monitoring wells. This data gap will be addressed in Chapter 4, Projects and Management Actions by performing video surveys in representative monitoring wells to confirm well construction.

No other data gaps within the WMA are identified for the monitoring network. Groundwater level and storage estimates would be improved by adding wells to the networks in the areas shown in **Figure 3-13**. The location of chloride iso-contours indicating influence of seawater would be improved by collecting water quality at the suggested wells shown on **Figure 3-15**. Land subsidence monitoring could also be improved by adding additional CGPS sits within the basin.

3.6.5.2 Plans to Fill Identified WMA Data Gaps in Monitoring Network

The first plan to fill data gaps in the WMA will be to perform video surveys in representative monitoring wells to confirm well construction (Chapter 4 Project and Management Actions).

In addition, throughout the implementation of the GSP, if the selected WMA monitoring networks and representative wells are deemed ineffective at providing the anticipated data needed for the GSA to evaluate current groundwater and future groundwater conditions, and support sustainable groundwater management decisions in alignment with the sustainability goals described in Section 3.1, they will be evaluated for replacement as described in detail in Chapter 4, Projects and Management Actions**,** and briefly described below.

Generally, the project would identify parcels within the WMA where additional data would be useful to fill the identified data gaps. The project will describe outreach efforts to engage the parcel owners to better understand whether groundwater wells exist, and their condition, in the target areas. If groundwater wells do exist, access to the well completion information will be requested from well owners, if available. If well construction information is available, the tiered approached described in Section 3.5.4.1 would be followed to determine whether the well was suitable for inclusion in the WMA monitoring networks. If the well records are unavailable and parcel owners agree, well inspection activities may be conducted to evaluate well construction details. If groundwater wells do not exist, or are not completed in a manner that would provide useful data, the GSA may consider the potential to install new groundwater wells in the target areas in an effort to close the identified data gaps.

Chapter 4 also includes identification of, and application for, grant funding from DWR for support projects that will address the identified WMA data gaps.

References Cited

Driscoll, F. G., 1986, Groundwater and Wells (Second Edition). Johnsons Screens, St. Paul, Minnesota, 198

Roscoe Moss 1990. Handbook of Groundwater Development. Editor(s): Roscoe moss Company. First published: 7 February 1990.

Schneiders, J. H., 2003, Chemical Cleaning, Disinfection and Decontamination of Water Wells. Johnsons Screens, St Paul, Minnesota, 2003

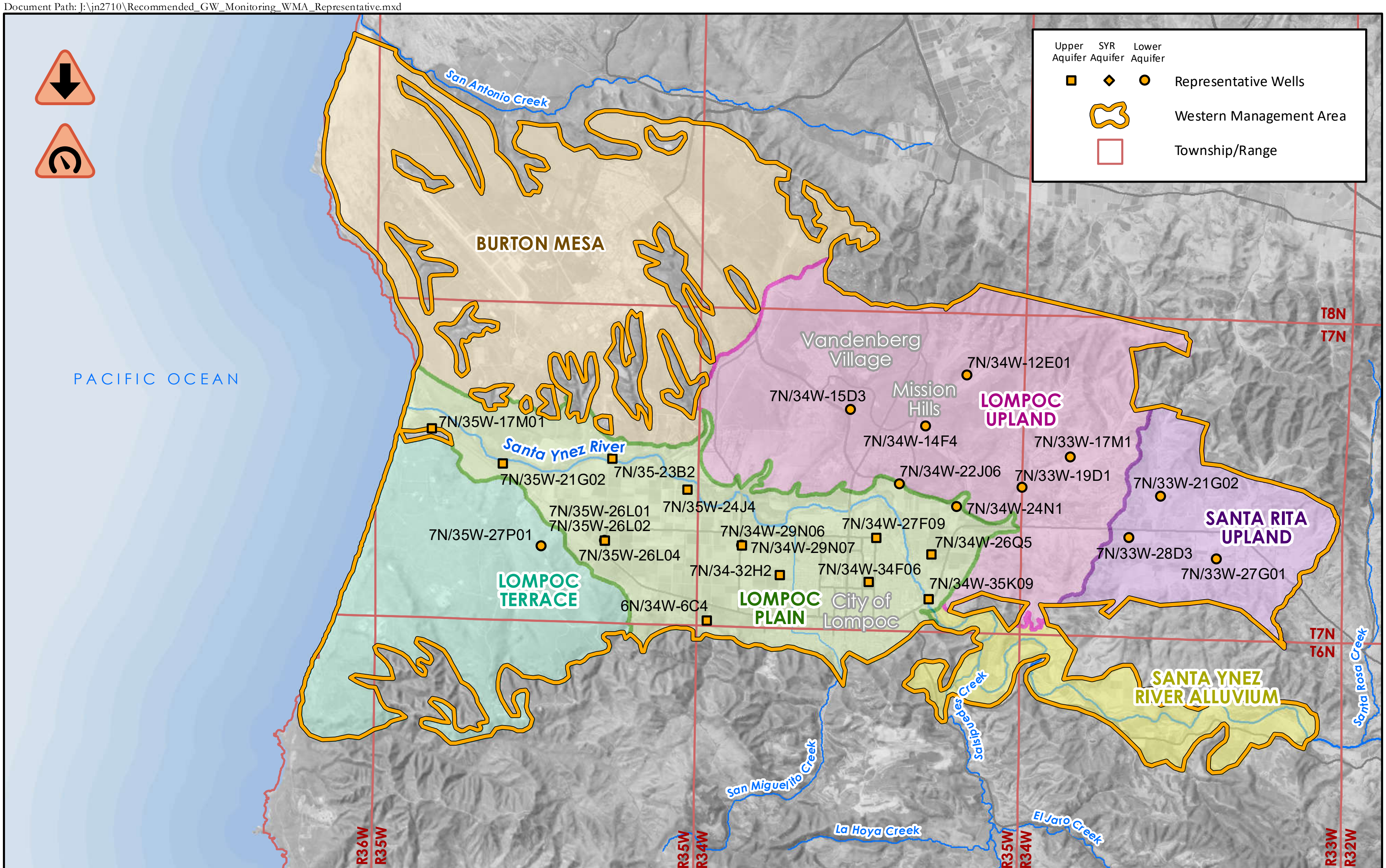
Central Coastal Regional Water Quality Control Board. 2019. *Water Quality Control Plan for the Central Coastal Basin,* June 2019 Edition. California Environmental Protection Agency.

Bright, D. J., C. L. Stamos, P. Martin, and D. B. Nash, 1992, *Groundwater Hydrology and quality in the Lompoc Area, Santa Barbara County, California, 1987-1988*. U.S. Geological Survey. Water Resources Investigations Report 91-4172

Haas, R., H. Kolb, and J. Bishop, *2019, Santa Barbara County Groundwater Characterization Project: Santa Ynez River Valley Groundwater Basin*. Prepared by Heal the Ocean and Central Coast Regional Water Quality Control Board.

Jones and Stokes. 2000. *Santa Ynez River Vegetation Monitoring Study: Final Phase I Report*. Prepared for the Santa Ynez River Vegetation Oversight Committee.

Document Path: J:\jn2710\Recommended_GW_Monitoring_WMA_Representative.mxd



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WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

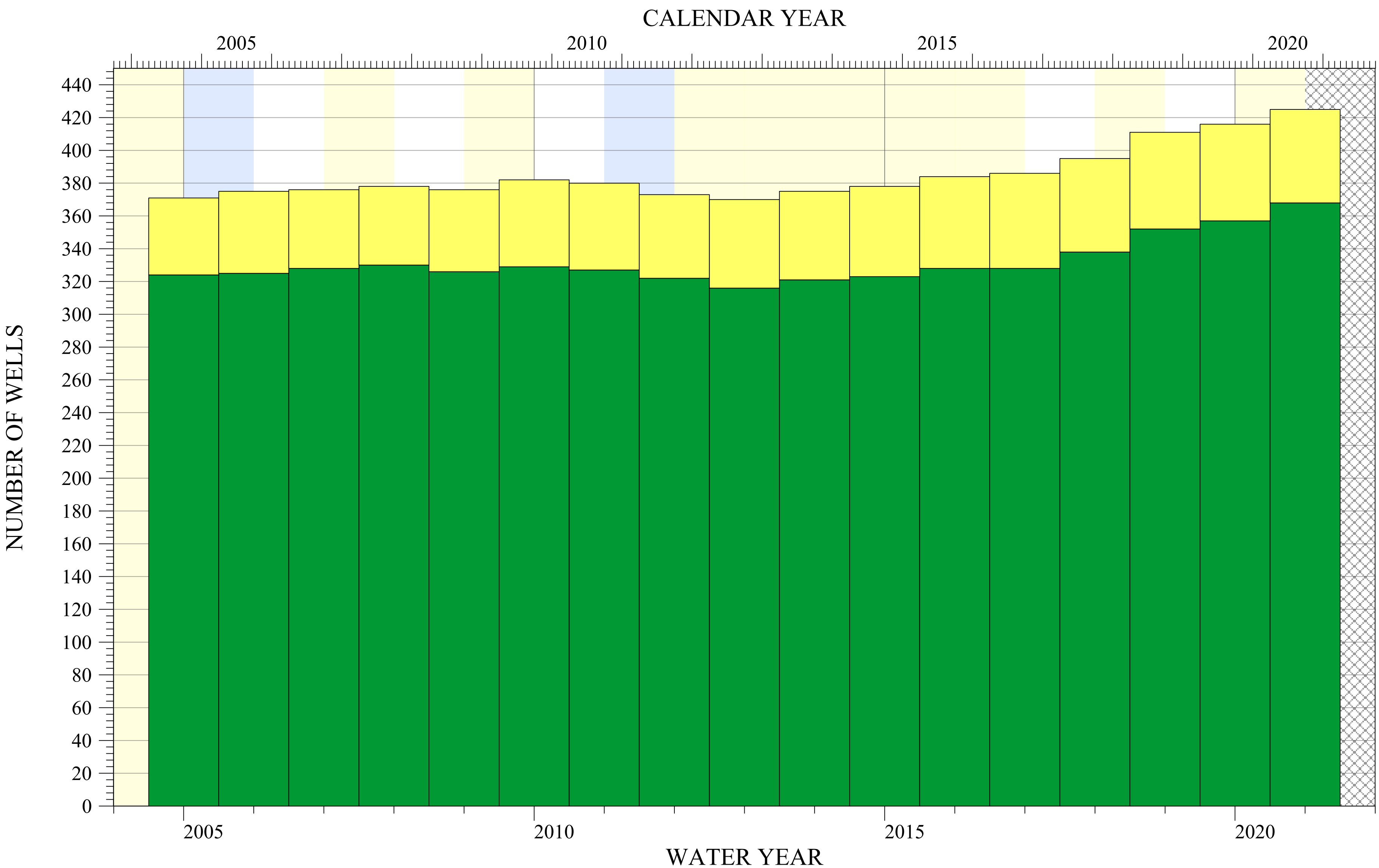
WMA REPRESENTATIVE MONITORING WELLS FOR GROUNDWATER LEVELS AND GROUNDWATER STORAGE

DRAFT

0 1 2 Miles

N

FIGURE 3-1



District Zone A, Santa Ynez River Alluvium, Excluded

Source: Santa Ynez River Water Conservation District (2005-2021)

I:\DATA\2710\Analyses\2021-04 Timeseries Active Inactive Wells\WMA SMC Fig 3-02 Wells Timeseries.grf 6/8/2021 M. McCammon

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WMA Santa Ynez River Valley Groundwater Basin Western Management Area Groundwater Sustainability Agency

REGISTERED
ACTIVE AND INACTIVE WELLS
DISTRICT ZONES B & F

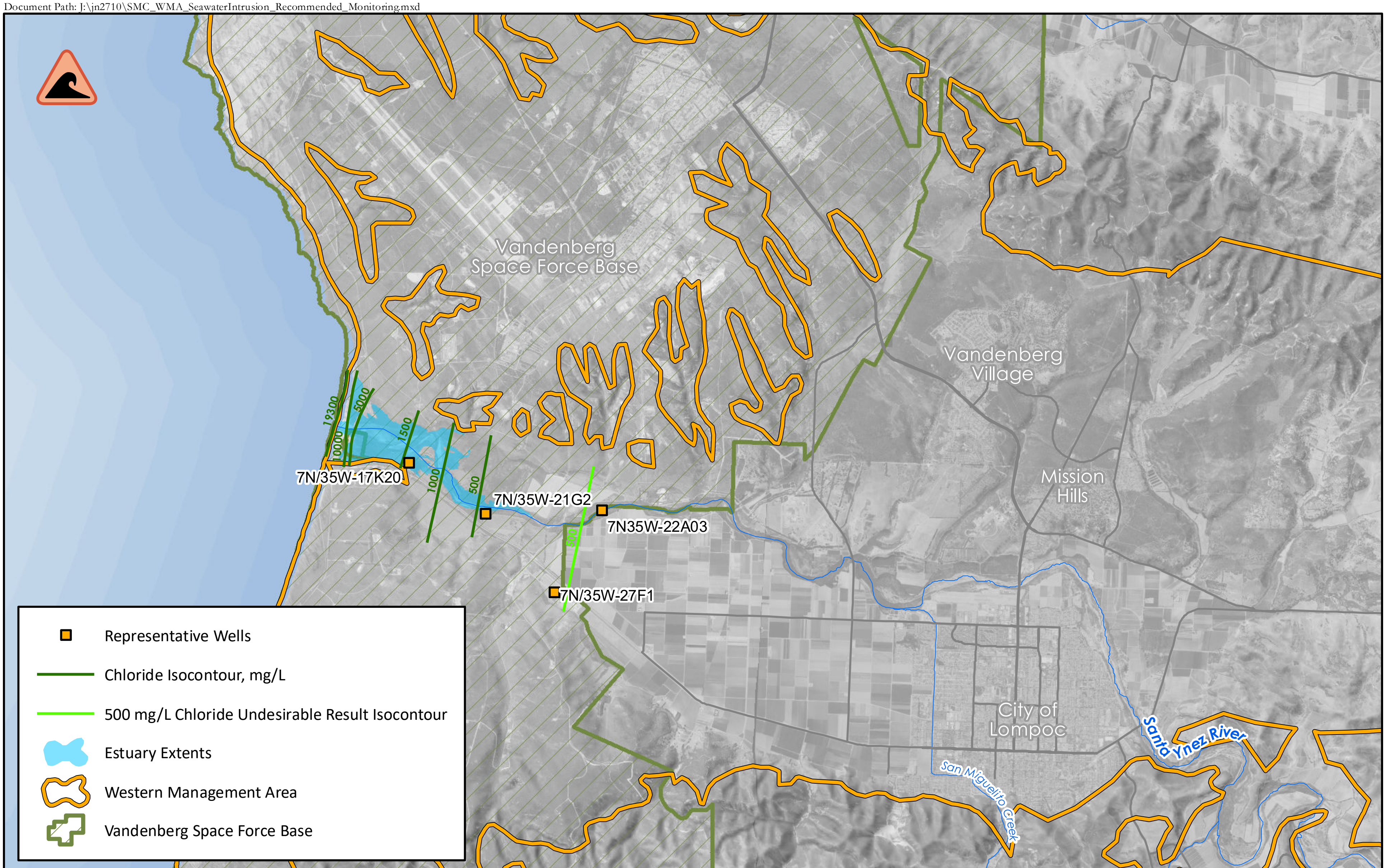
DRAFT
6/8/2021

Water Year Type (1942-2020)
Wet
No Data
Above/Below Normal
Dry / Critically Dry

Well Type
Active
Inactive

FIGURE 3-2

Document Path: J:\jn2710\SMC_WMA_SeawaterIntrusion_Recommended_Monitoring.mxd



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Western Management Area
Groundwater Sustainability Agency

WMA MONITORING NETWORK AND REPRESENTATIVE MONITORING WELLS FOR SEAWATER INTRUSION

DRAFT

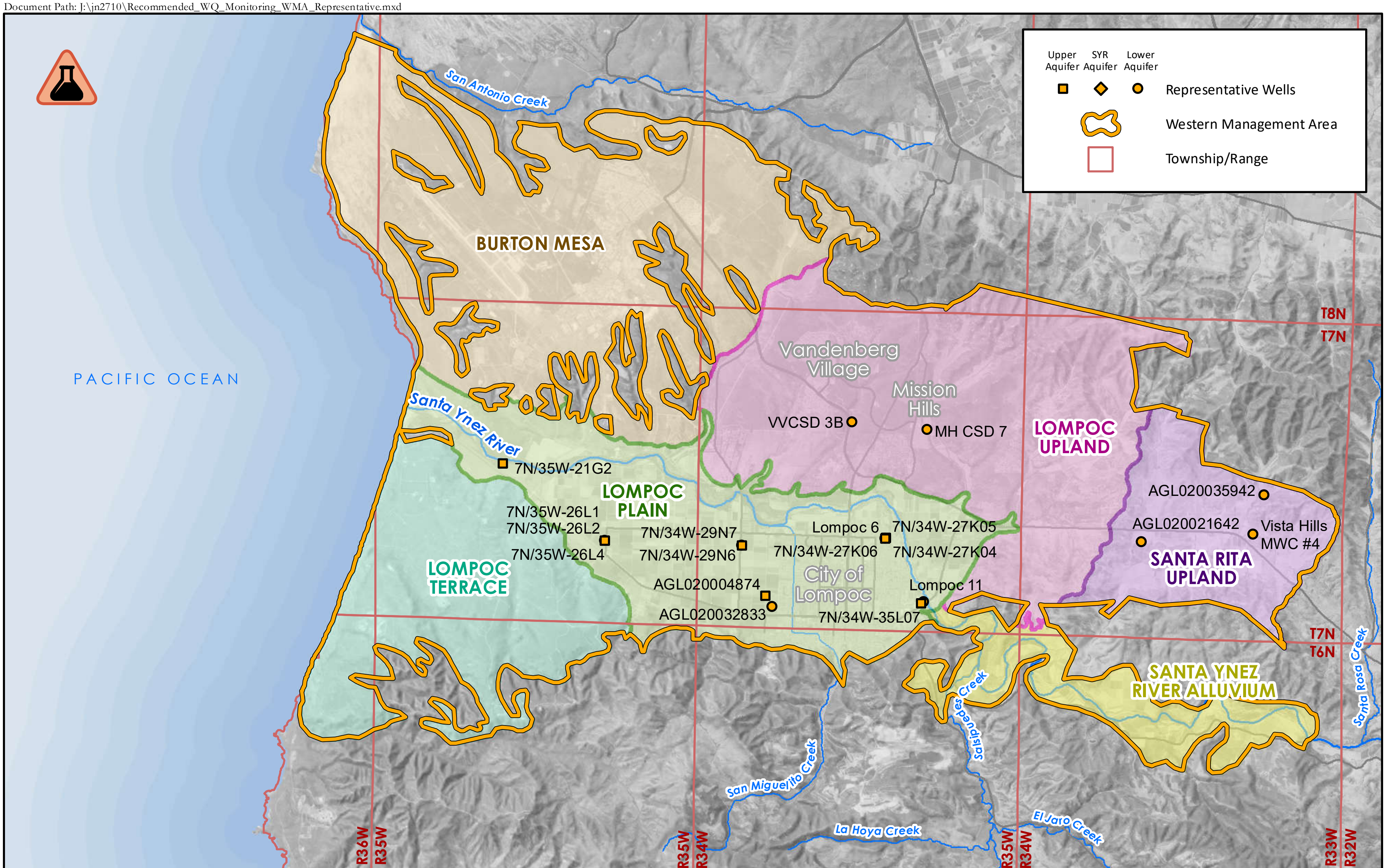
0 0.75 1.5 Miles

N

Sources:
Pacific States Marine Fisheries Commission (2018)
NAIP (2018)

FIGURE 3-3

Document Path: J:\jn2710\Recommended_WQ_Monitoring_WMA_Representative.mxd



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WMA REPRESENTATIVE MONITORING WELLS FOR WATER QUALITY

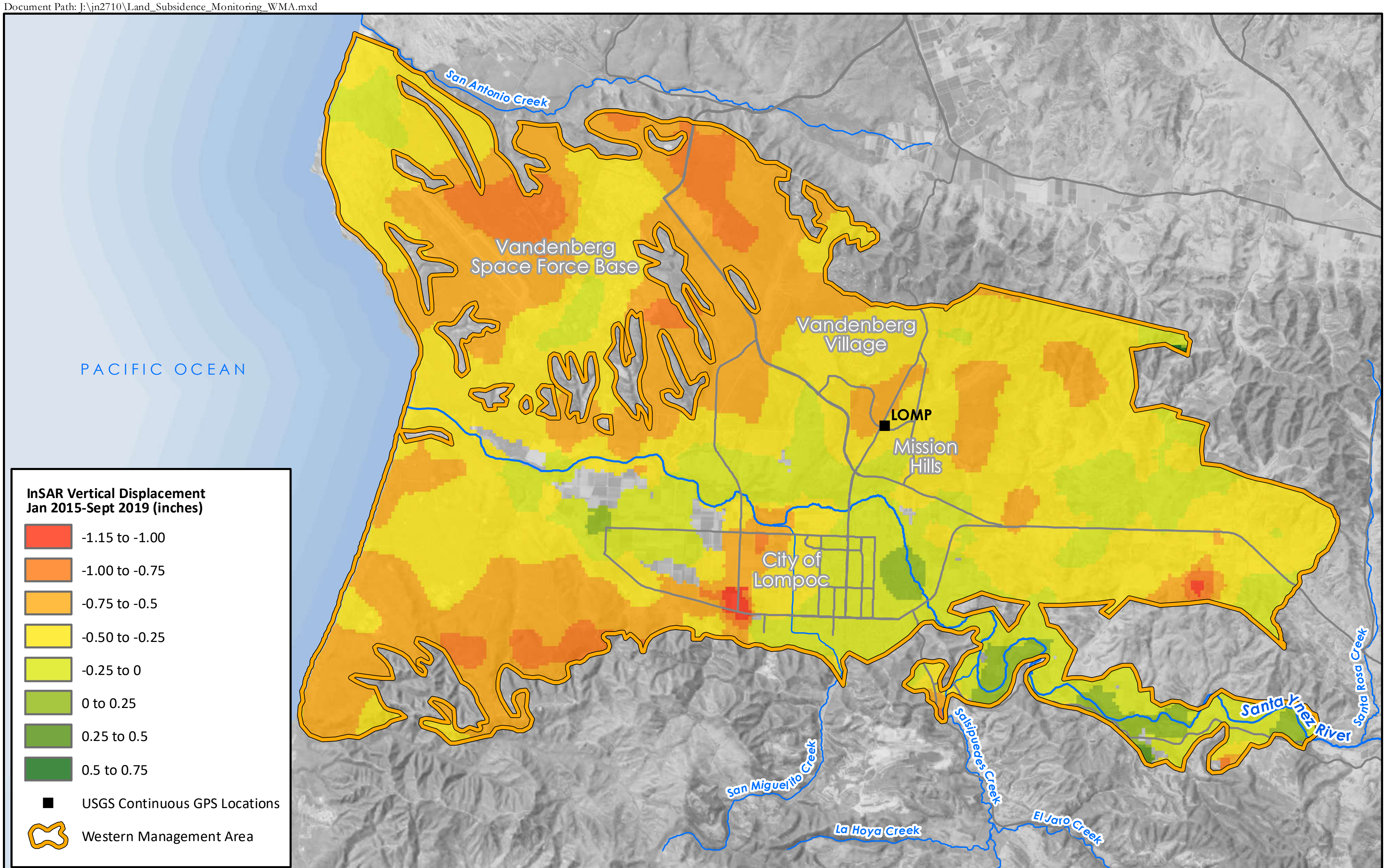
DRAFT

0 1 2 Miles

N

FIGURE 3-4

Document Path: J:\jn2710\Land_Subsidence_Monitoring_WMA.mxd



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DUDEK

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Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

LAND SUBSIDENCE MONITORING
WITHIN WESTERN MANAGEMENT AREA

DRAFT

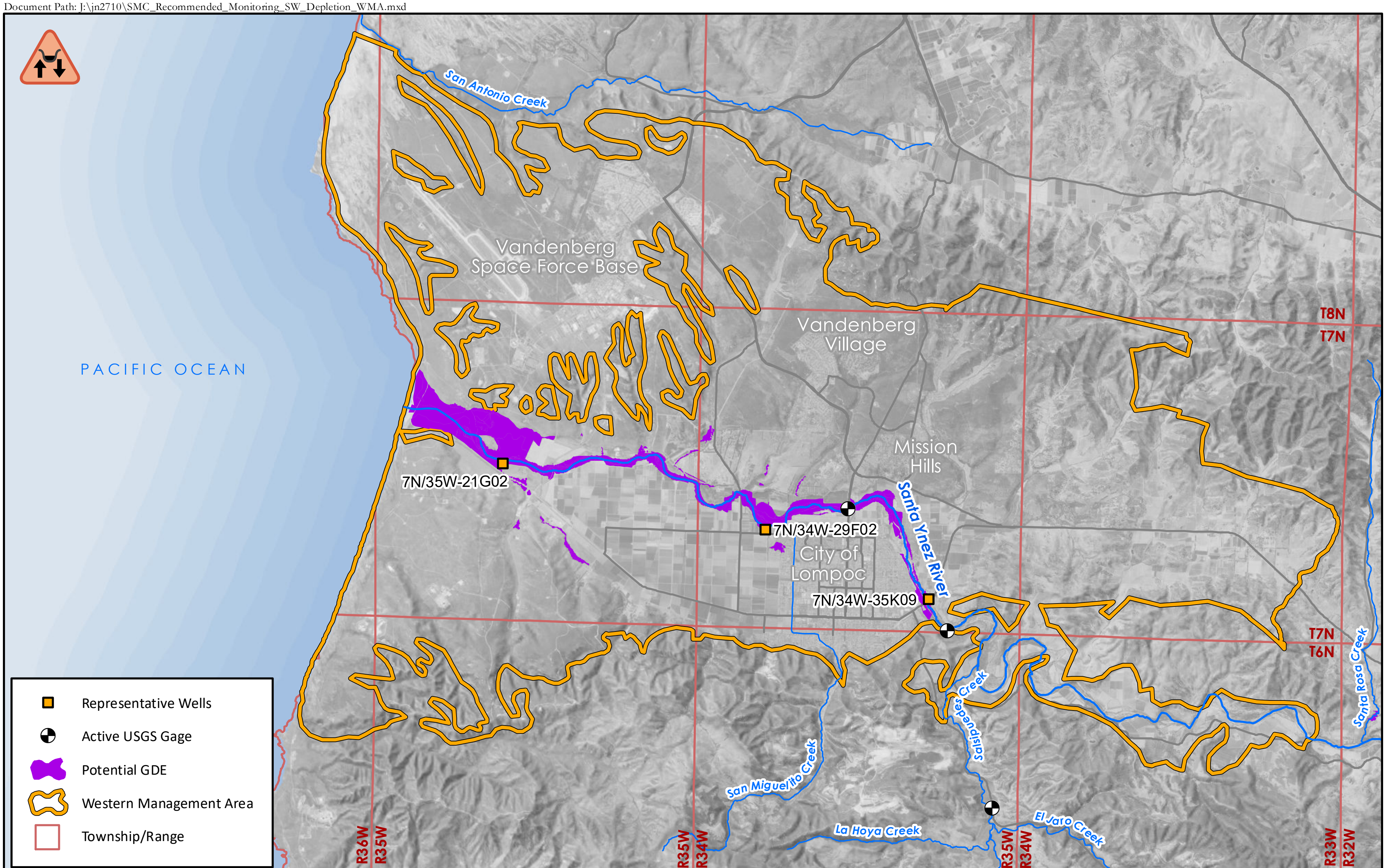
0 1 2 Miles

N

Sources:
USGS National Elevation Dataset, 2002
NAIP (2018)
Dudek (2020), DWR (2020)

FIGURE 3-5

Document Path: J:\jn2710\SMC_Recommended_Monitoring_SW_Depletion_WMA.mxd



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Western Management Area
Groundwater Sustainability Agency

WMA REPRESENTATIVE MONITORING FOR GROUNDWATER DEPENDENT ECOSYSTEMS

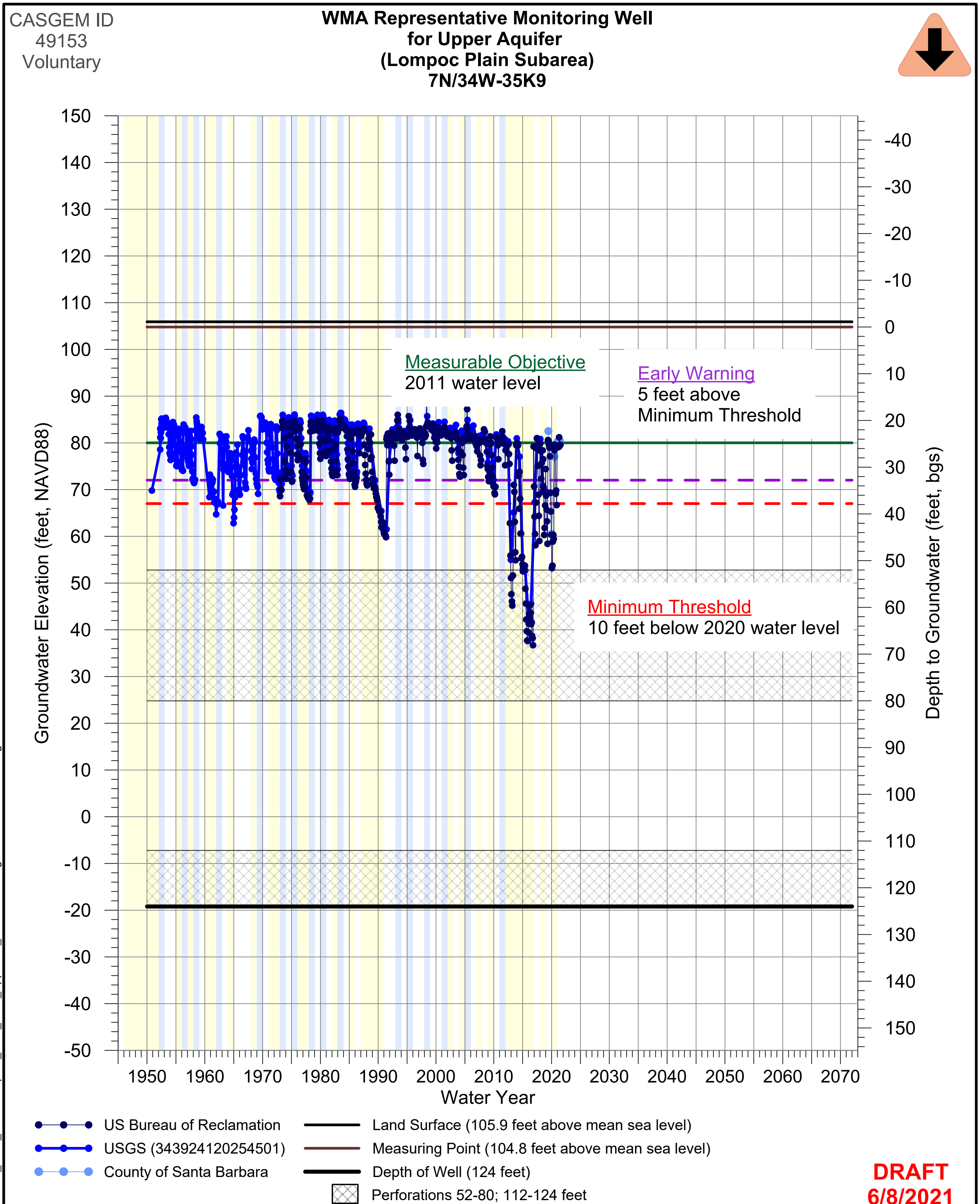
DRAFT

0 1 2 Miles

N

FIGURE 3-6

FIGURE 3-7



I:\DATA\2710\Monitoring\SMC\WMA_GWL_SMCs\Grapher_Files_SMC_Appendix_Order\WMA Fig A1-13 LP-U 32 35K9.grf 6/8/2021 M. McCammon

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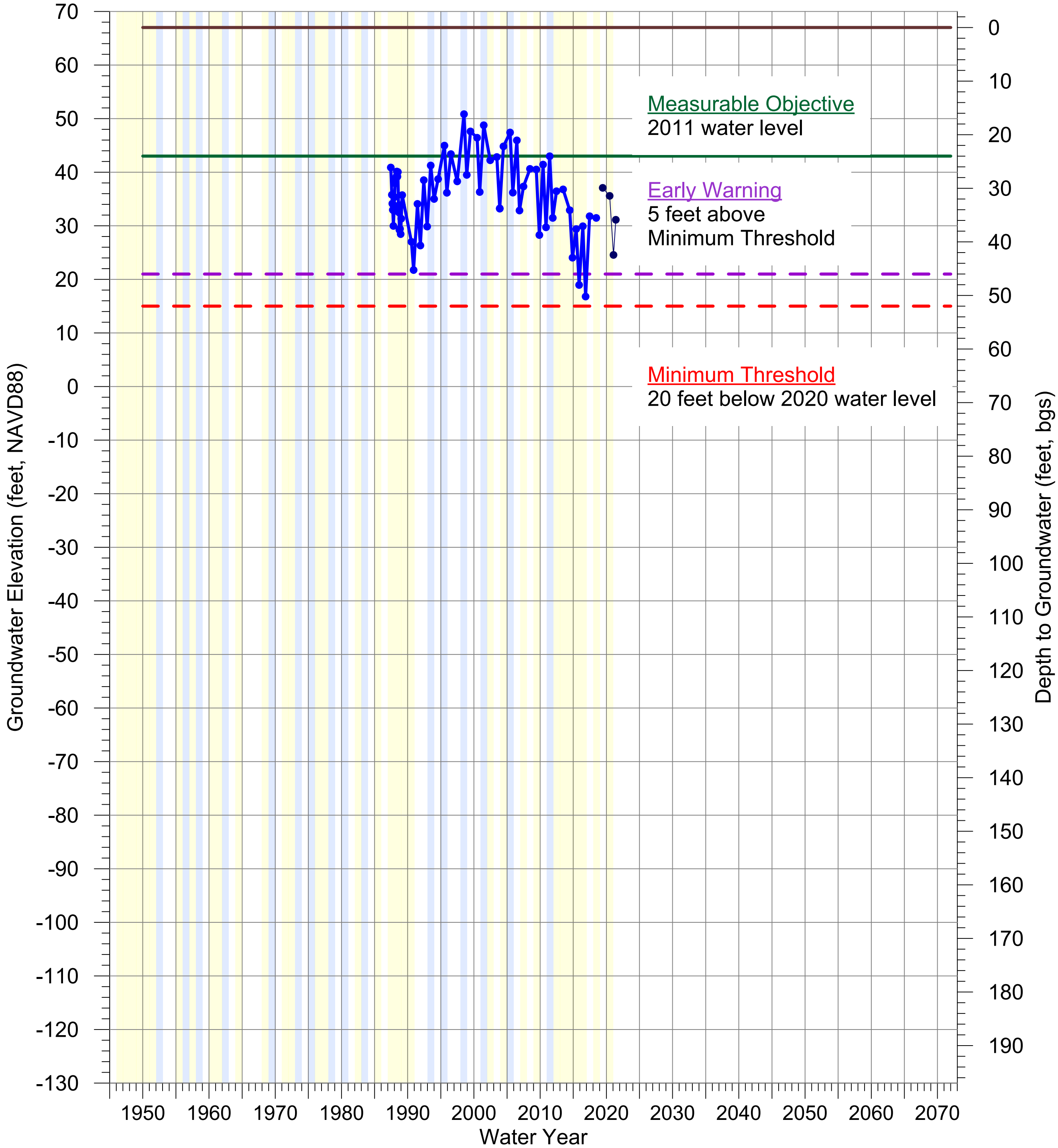
WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

CASGEM ID
23538
Voluntary

WMA Representative Monitoring Well for Lower Aquifer (Lompoc Plain Subarea) 7N/34W-29N7



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I:\DATA\2710\Monitoring\SMC\WMA_GWL_SMCs\Grapher_Files_SMC_Appendix_Order\WMA Fig A2-02 LP-L 28 29N7.grf 6/8/2021 M. McCammon

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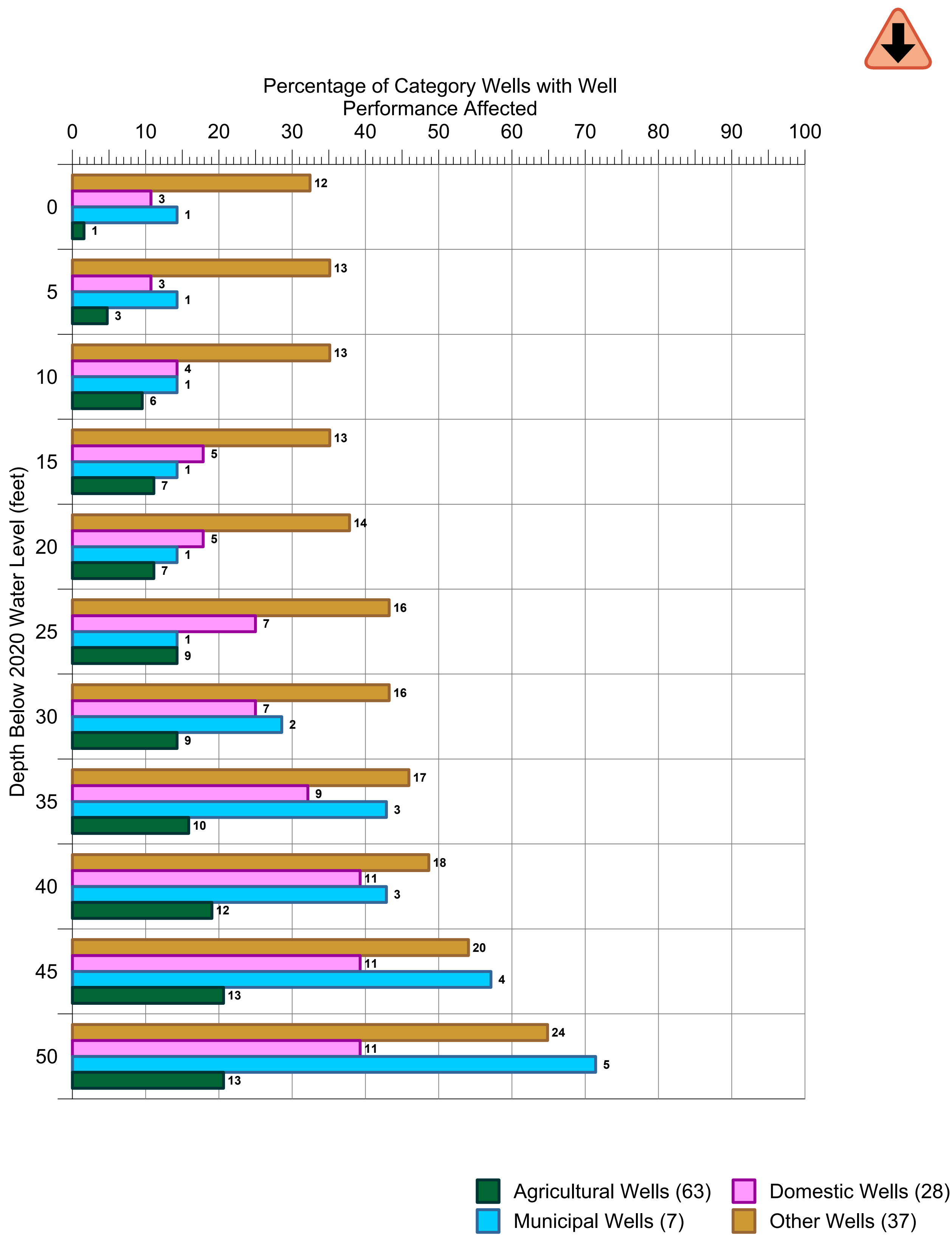
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Lower Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry



Other = Well use not recorded on well log or used for observation/ cathodic protection only.

DRAFT
5/19/2021

I:\DATA\2710\Analyses\2021-05 SMC GWL Decline\Data_Table\Fig 3-03 WMA_UA_Perforation_Top_Analysis_BAR.grf 5/19/2021 M. McCammon

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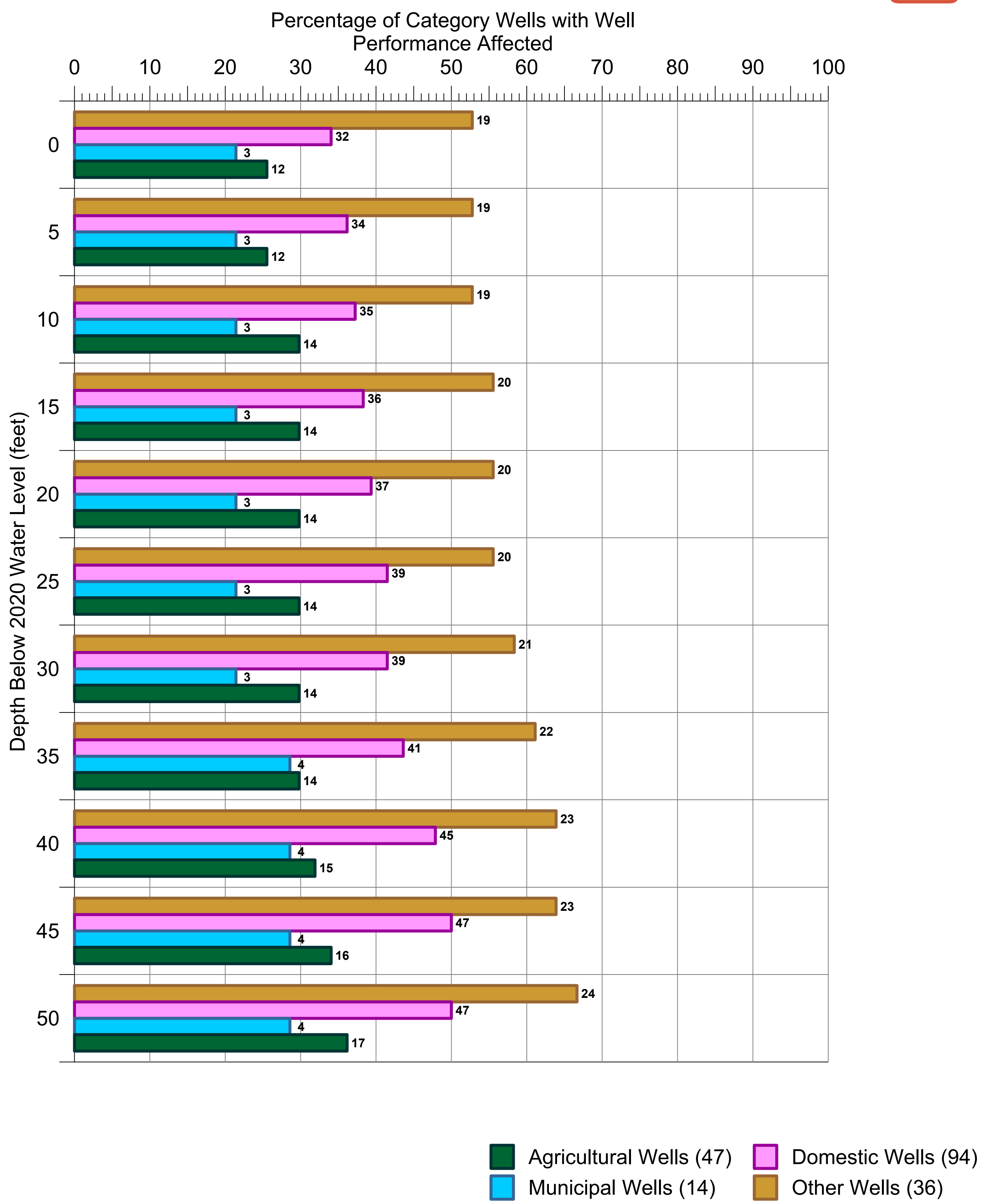
Western Management Area
Groundwater Sustainability Agency

WELL PERFORATIONS RELATIVE TO UPPER AQUIFER SPRING 2020 WATER DEPTH (TOP 50 FT)



Other = Well use not recorded on well log or used for observation/ cathodic protection only.

DRAFT
5/19/2021

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Santa Ynez River Valley Groundwater Basin
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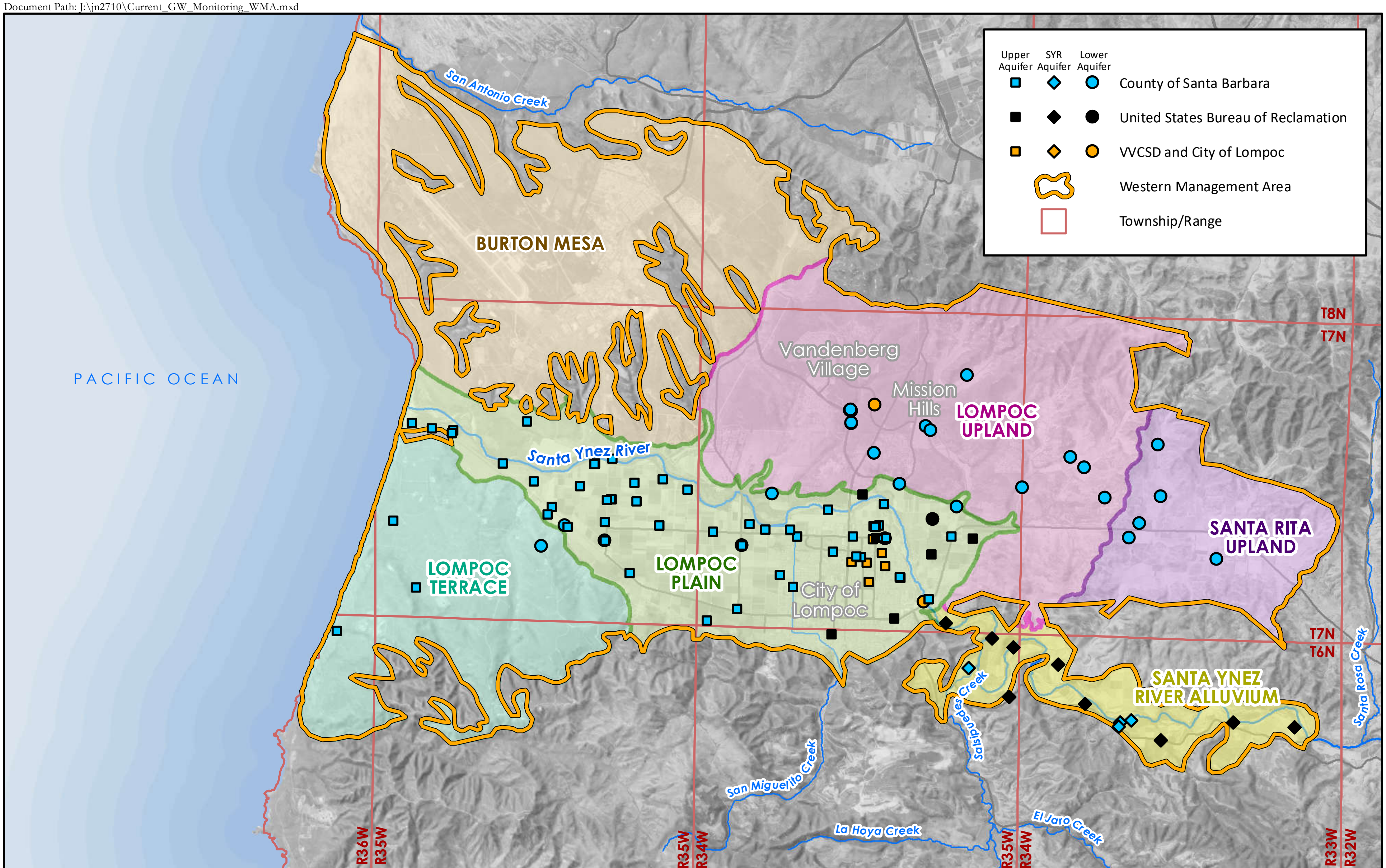
WELL PERFORATIONS RELATIVE TO LOWER AQUIFER SPRING 2020 WATER DEPTH (TOP 50 FT)

I:\DATA\2710\Analyses\2021-05 SMC GWL Decline\Data_Table\Fig 2-03 WMA_LA_Perforation_Top_Analysis_BAR.grf 5/19/2021 M. McCammon

Document Path: J:\jn2710\Current_GW_Monitoring_WMA.mxd



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Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

CURRENT GROUNDWATER LEVEL MONITORING PROGRAMS

DRAFT

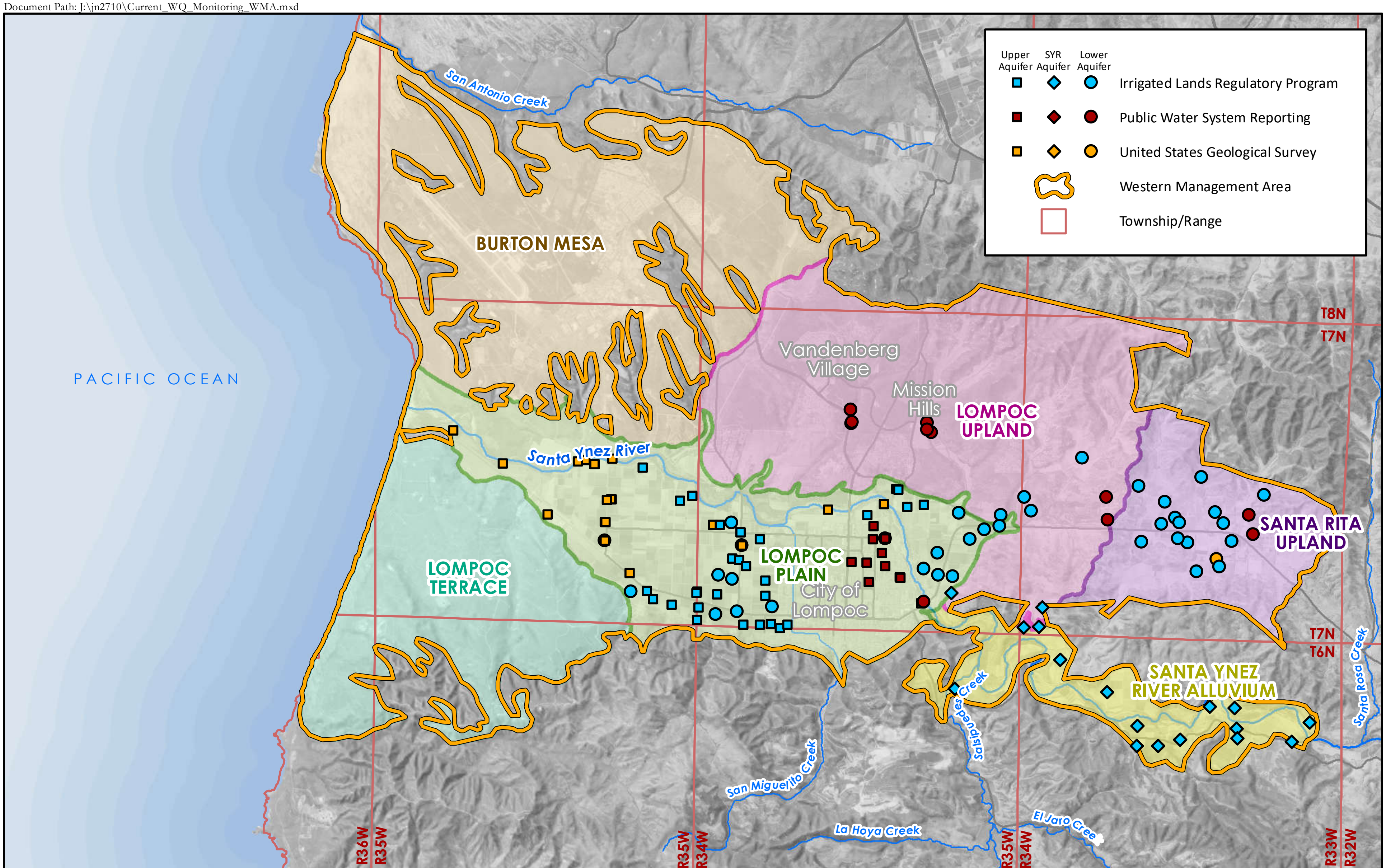
0 1 2 Miles

N

Note:
Wells shown were monitored 2015-2021.

FIGURE 3-11

Document Path: J:\jn2710\Current_WQ_Monitoring_WMA.mxd



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WMA

Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

CURRENT WATER QUALITY MONITORING PROGRAMS

DRAFT

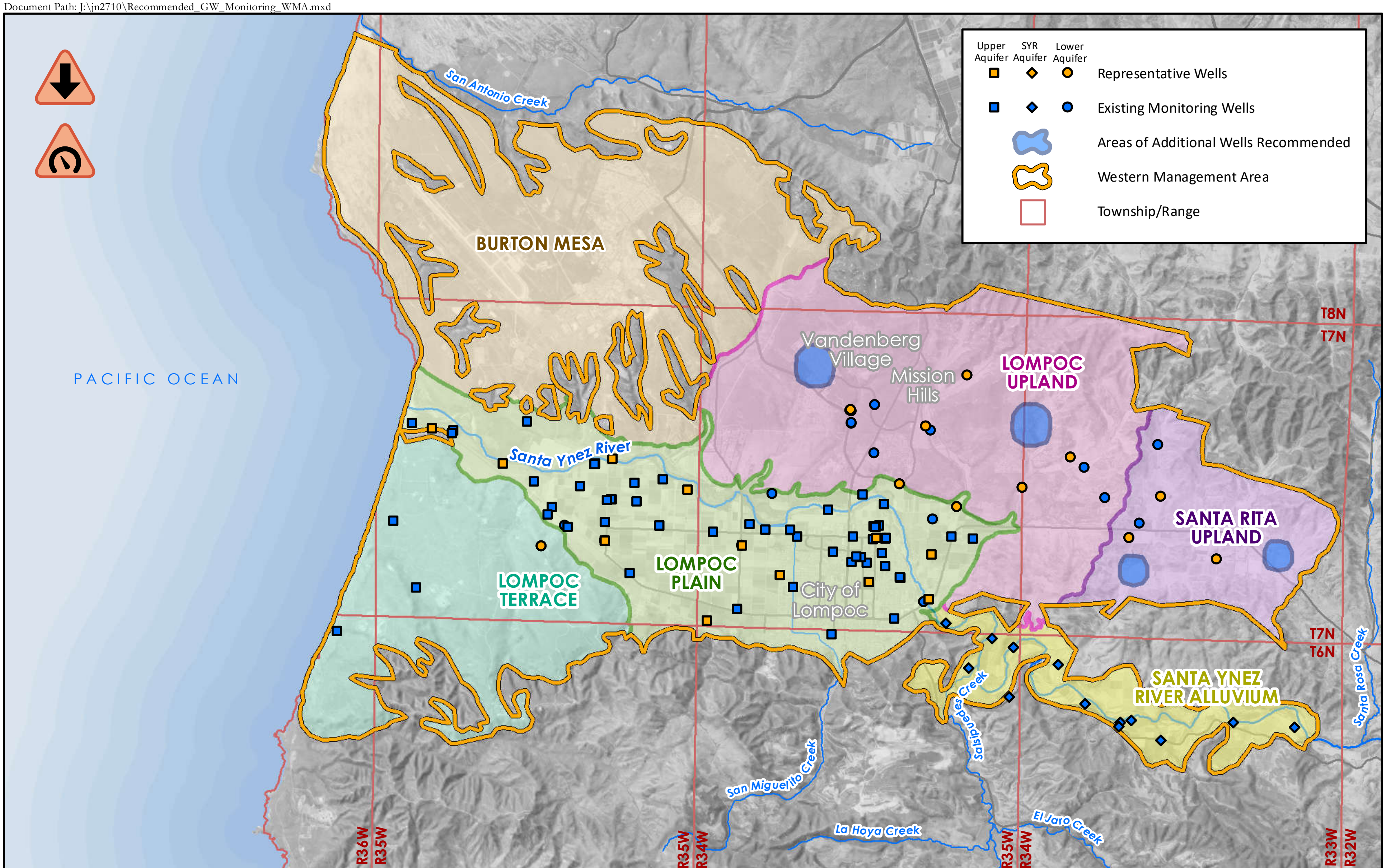
0 1 2 Miles

N

Note:
Wells shown were monitored 2015-2021.

FIGURE 3-12

Document Path: J:\jn2710\Recommended_GW_Monitoring_WMA.mxd



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WMA

Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

WMA MONITORING NETWORK AND REPRESENTATIVE MONITORING WELLS FOR GROUNDWATER LEVELS AND GROUNDWATER STORAGE

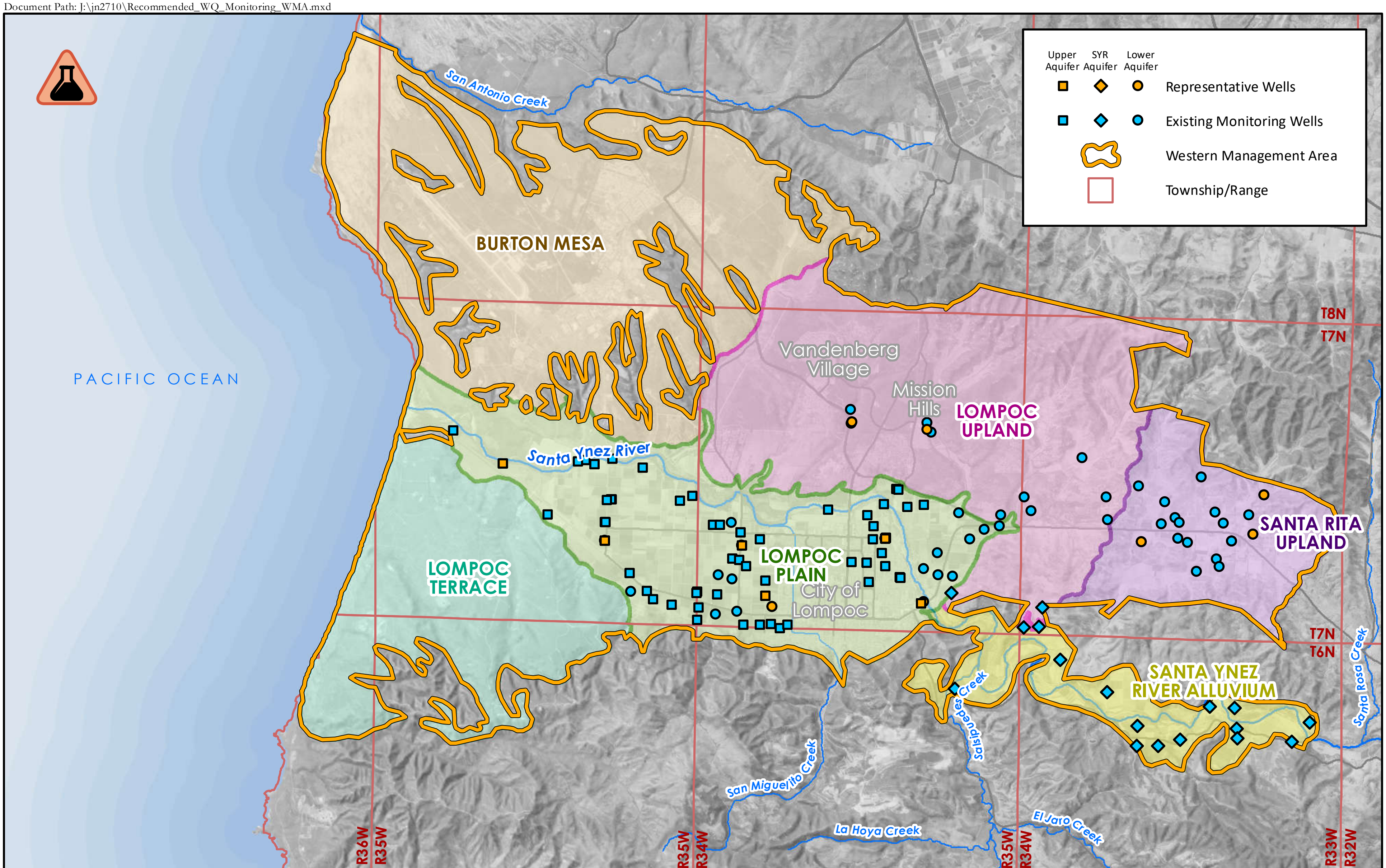
DRAFT

0 1 2 Miles

N

FIGURE 3-13

Document Path: J:\jn2710\Recommended_WQ_Monitoring_WMA.mxd



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WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

WMA MONITORING NETWORK AND REPRESENTATIVE MONITORING WELLS FOR WATER QUALITY

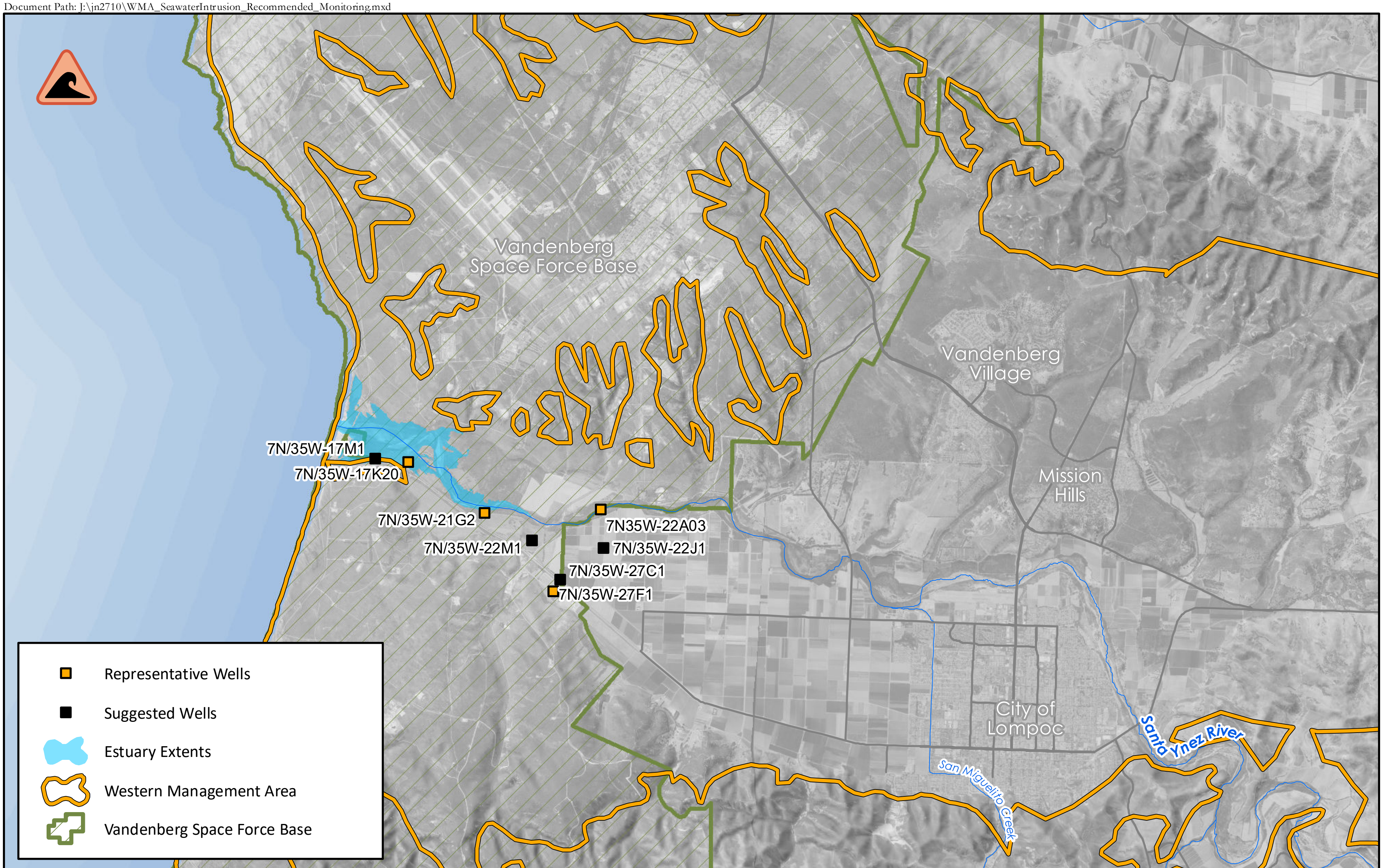
DRAFT

0 1 2 Miles

N

FIGURE 3-14

Document Path: J:\jn2710\WMA_SeawaterIntrusion_Recommended_Monitoring.mxd



STETSON
ENGINEERS INC.

WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

WMA MONITORING NETWORK AND REPRESENTATIVE MONITORING WELLS FOR SEAWATER INTRUSION

DRAFT

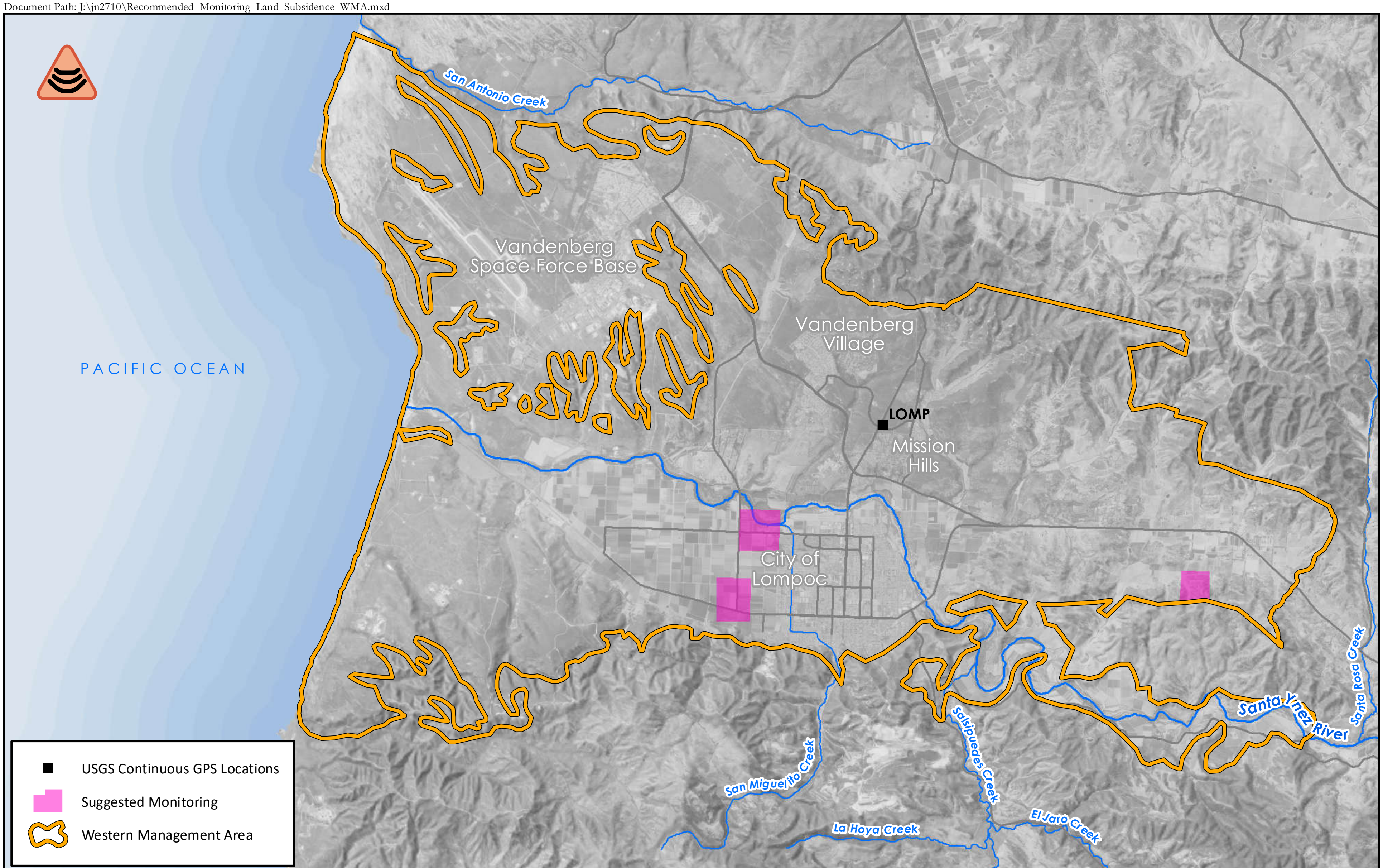
0 0.75 1.5 Miles

N

Sources:
Pacific States Marine Fisheries Commission (2018)
NAIP (2018)

FIGURE 3-15

Document Path: J:\jn2710\Recommended_Monitoring_Land_Subsidence_WMA.mxd



STETSON ENGINEERS INC.

WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

WMA SUPPLEMENTAL MONITORING NETWORK FOR LAND SUBSIDENCE

DRAFT

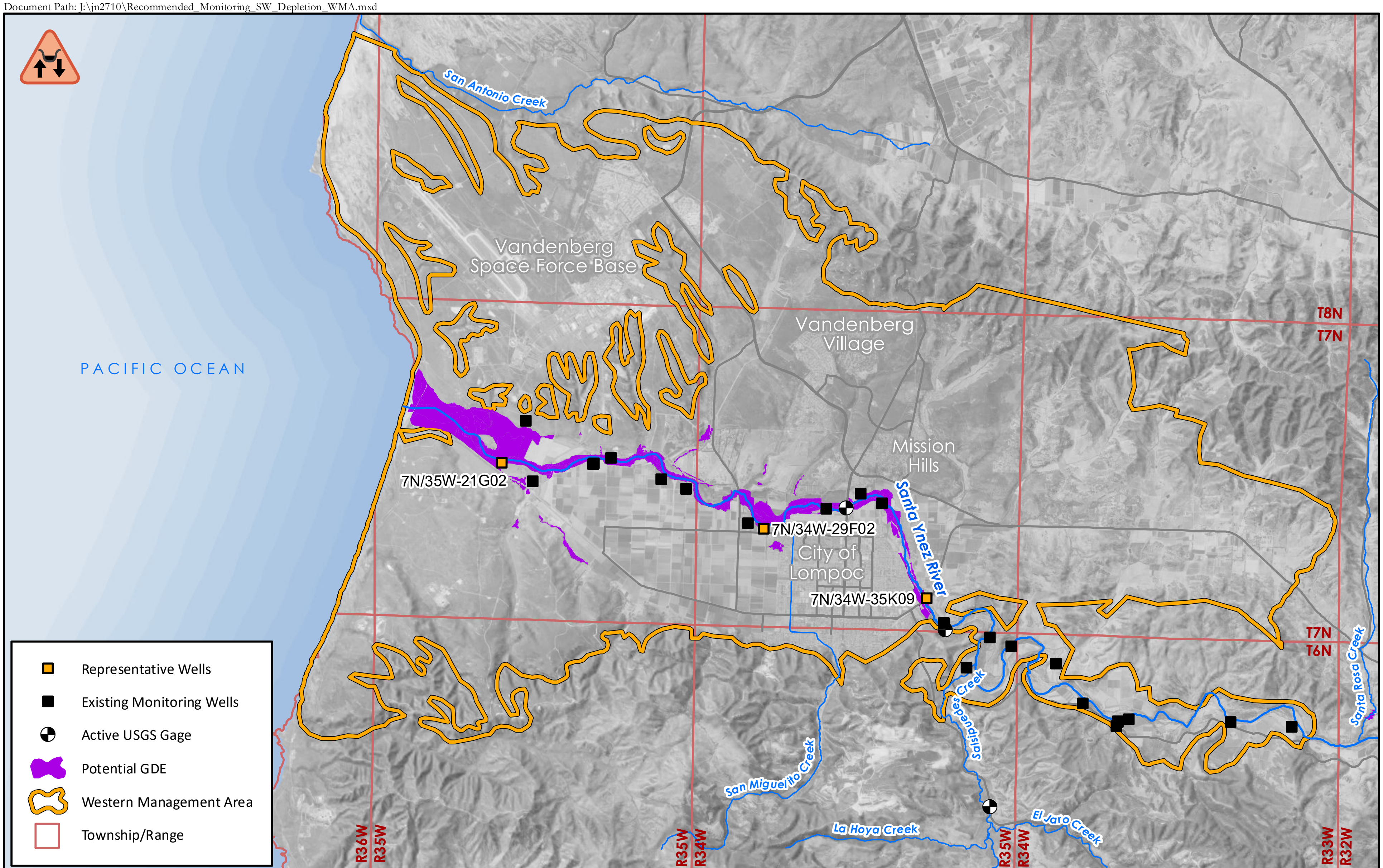
0 1 2 Miles

N

Note:
Primary land subsidence monitoring will be from remote sensing InSAR data.

FIGURE 3-16

Document Path: J:\jn2710\Recommended_Monitoring_SW_Depletion_WMA.mxd



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WMA

Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

WMA MONITORING NETWORK AND REPRESENTATIVE MONITORING FOR GROUNDWATER DEPENDENT ECOSYSTEMS

DRAFT

0 1 2 Miles

N

FIGURE 3-17

SUSTAINABLE MANAGEMENT CRITERIA
WESTERN MANAGEMENT AREA

APPENDIX A: CHRONIC DECLINE IN GROUNDWATER LEVELS
GROUNDWATER LEVEL HYDROGRAPHS

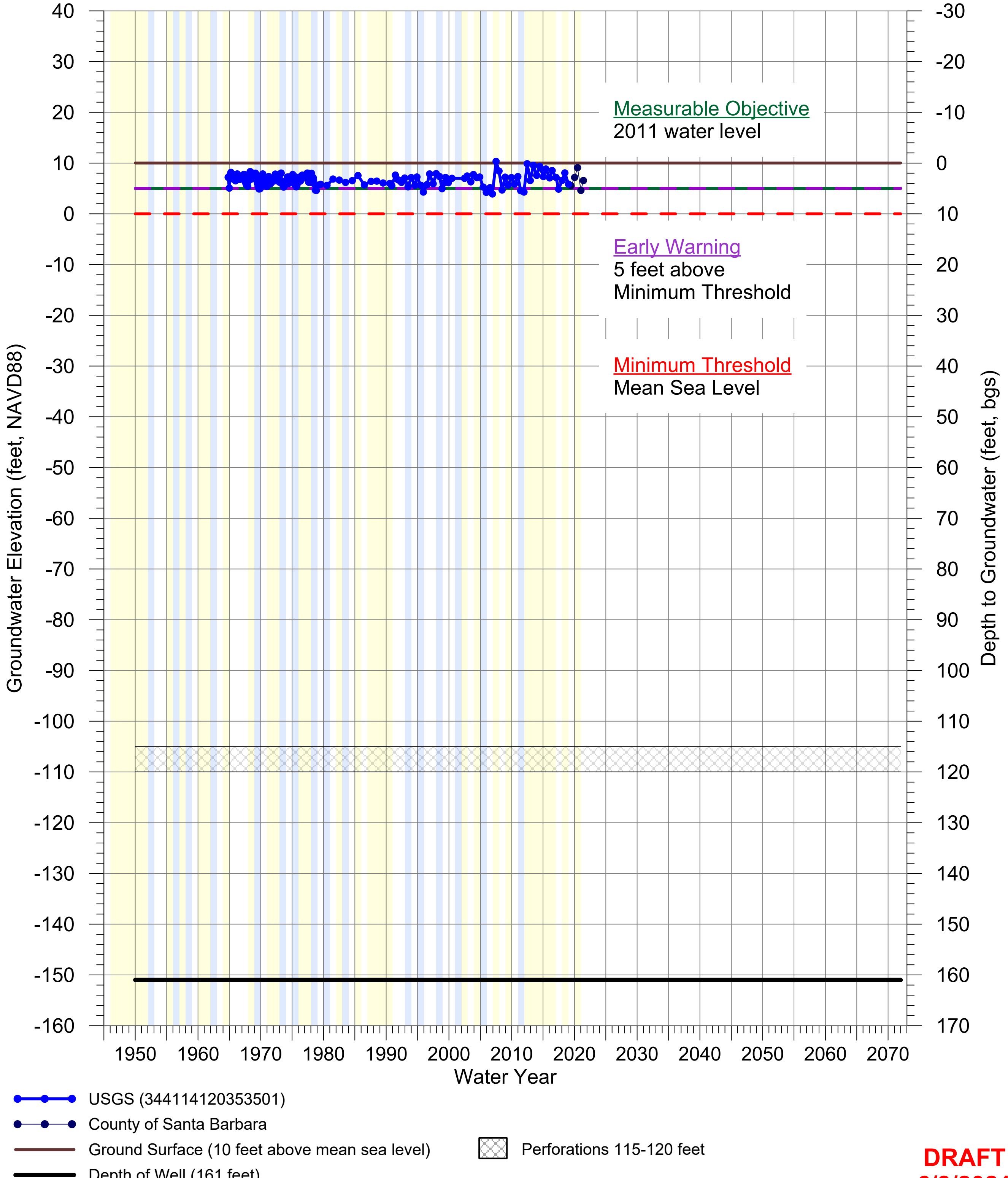
This appendix includes historical hydrographs of the representative wells for monitoring groundwater level decline, as well as the established sustainable management criteria of the measurable objective, early warning, and minimum threshold. The Appendix is organized into two sections: Upper Aquifer and Lower Aquifer.

LIST OF ACRONYMS AND ABBREVIATIONS

BGS	below ground surface
CASGEM	California Statewide Groundwater Elevation Monitoring
FT	feet
NAVD88	North American Vertical Datum of 1988
USBR	United States Bureau of Reclamation
USGS	United States Geologic Survey
WL	Water Level
WMA	Western Management Area

CASGEM ID
25268
Voluntary

WMA Representative Monitoring Well
for Upper Aquifer
(Lompoc Plain Subarea)
7N/35W-17M1



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STETSON ENGINEERS INC.

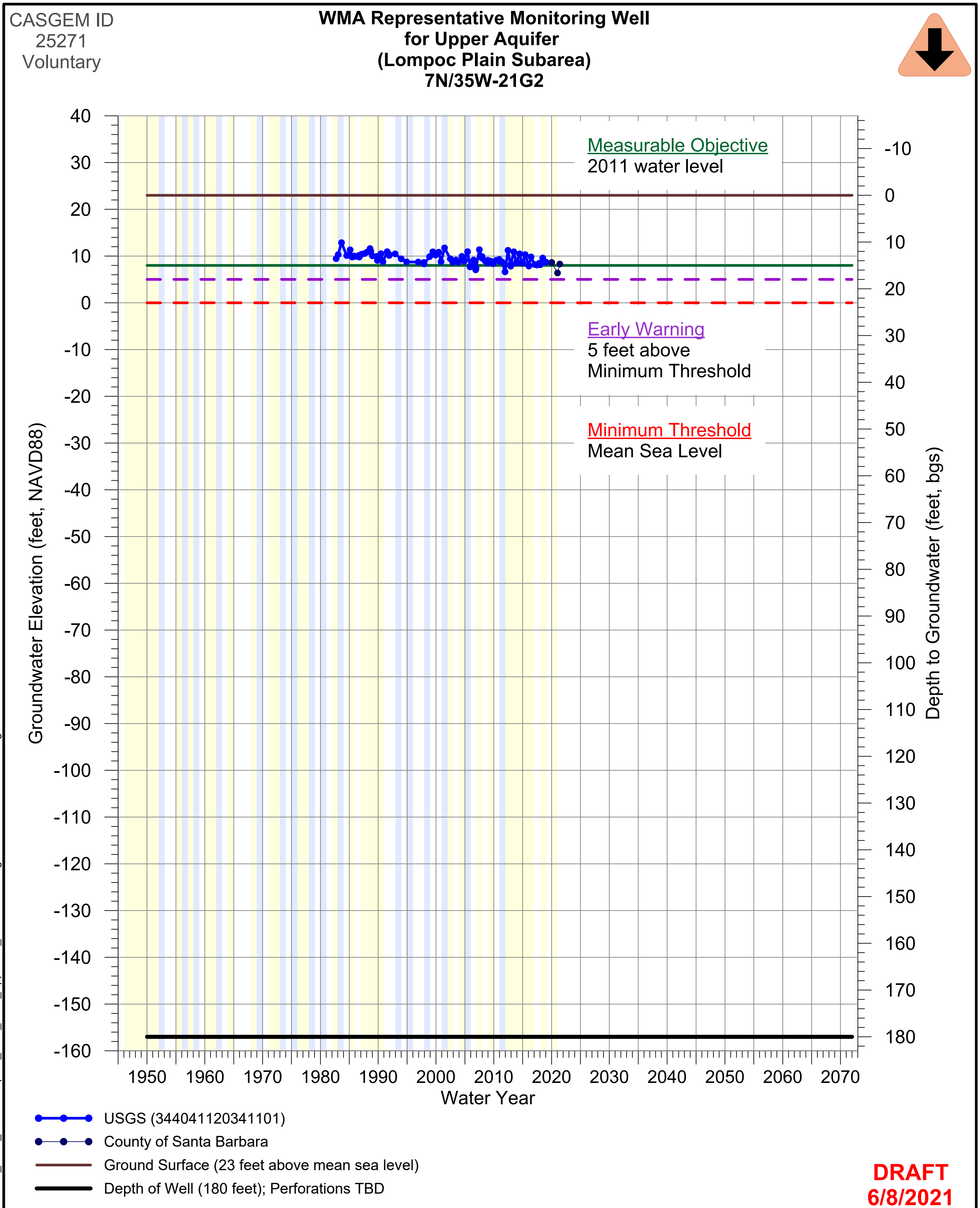
WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)

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

FIGURE A1-02



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Western Management Area
Groundwater Sustainability Agency

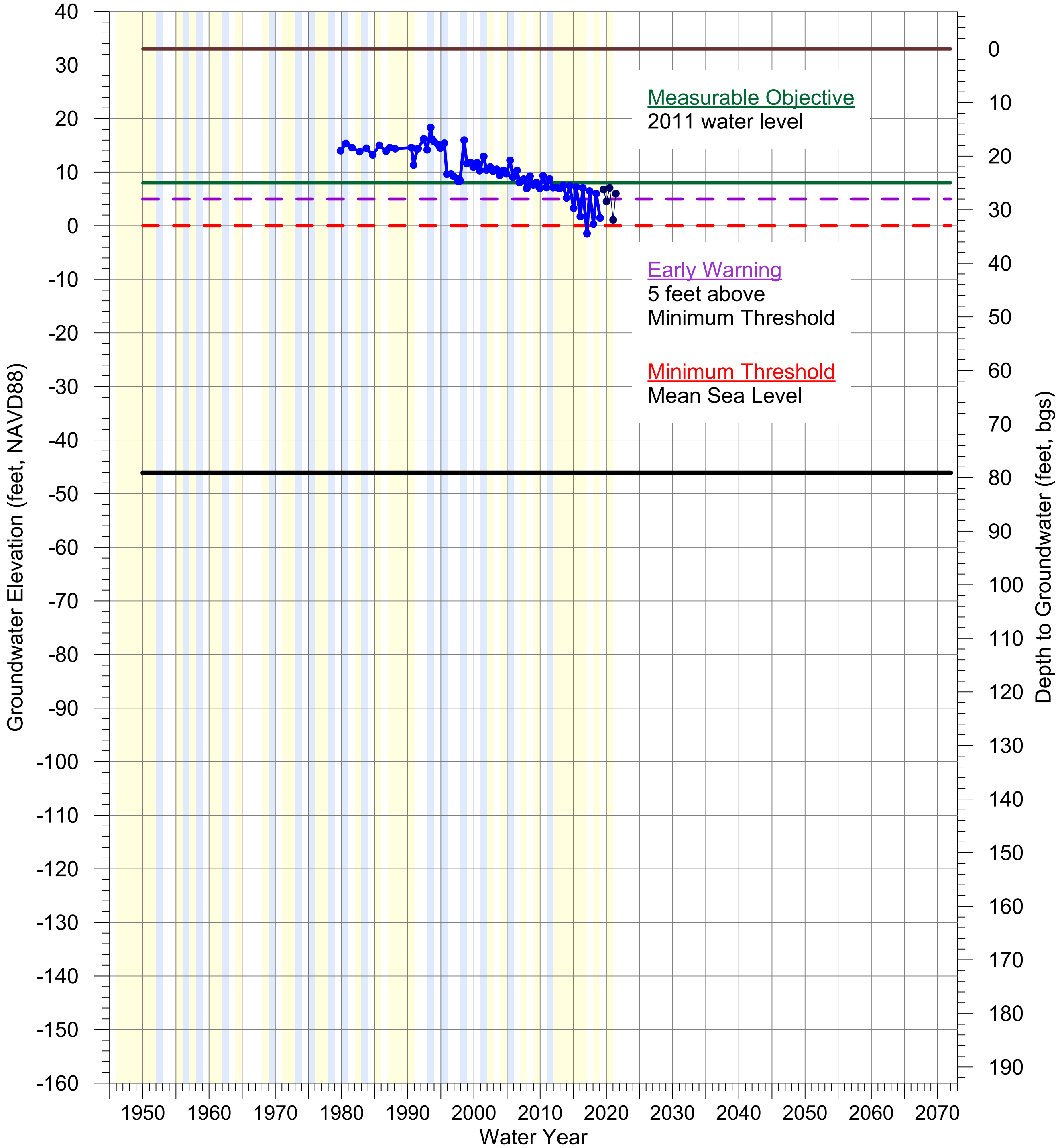
REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A1-03

CASGEM ID
49171
Voluntary

WMA Representative Monitoring Well for Upper Aquifer (Lompoc Plain Subarea) 7N/35W-23B2



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WMA
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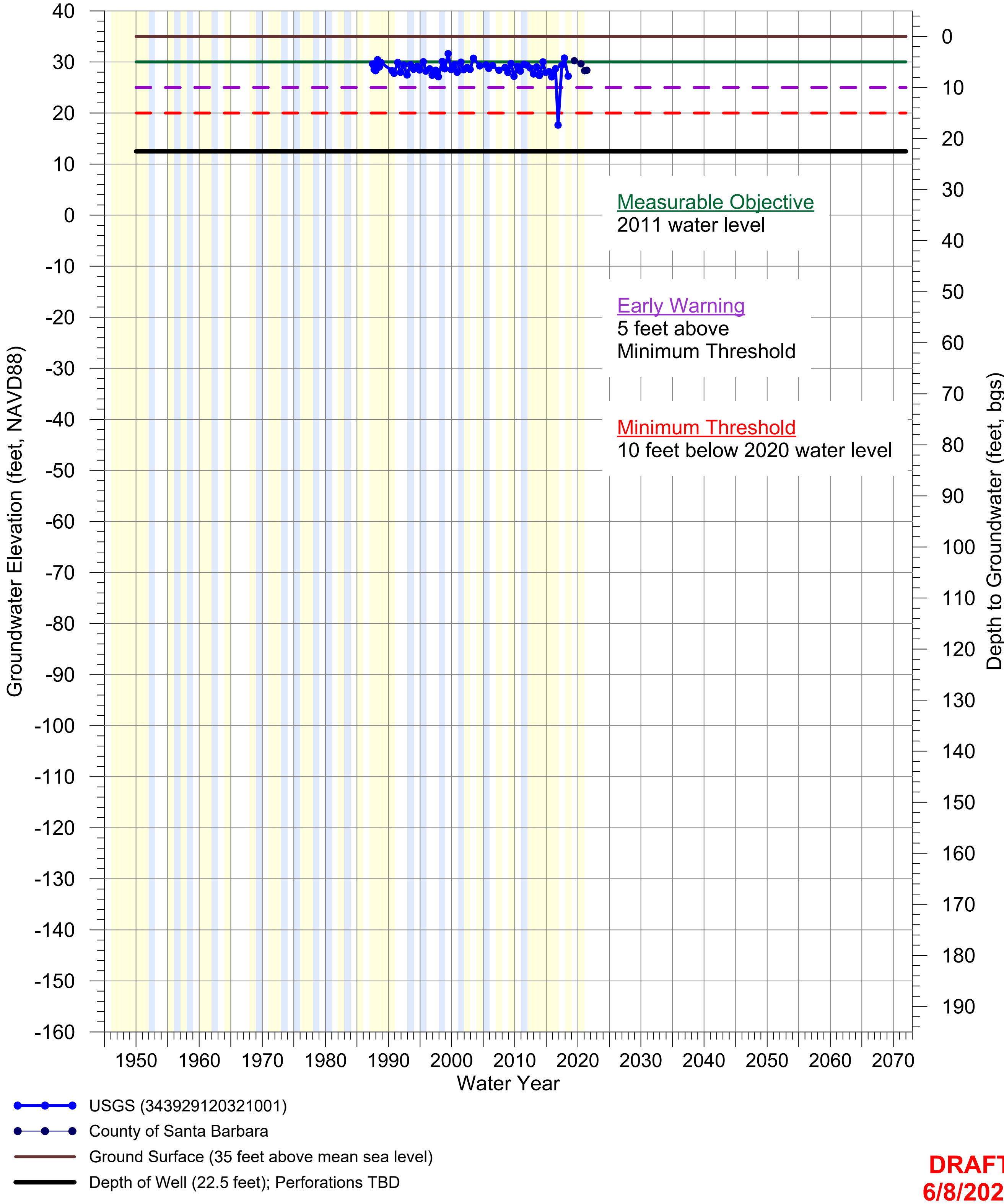
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

CASGEM ID
38297
Voluntary

WMA Representative Monitoring Well
for Upper Aquifer
(Lompoc Plain Subarea)
7N/35W-26L1



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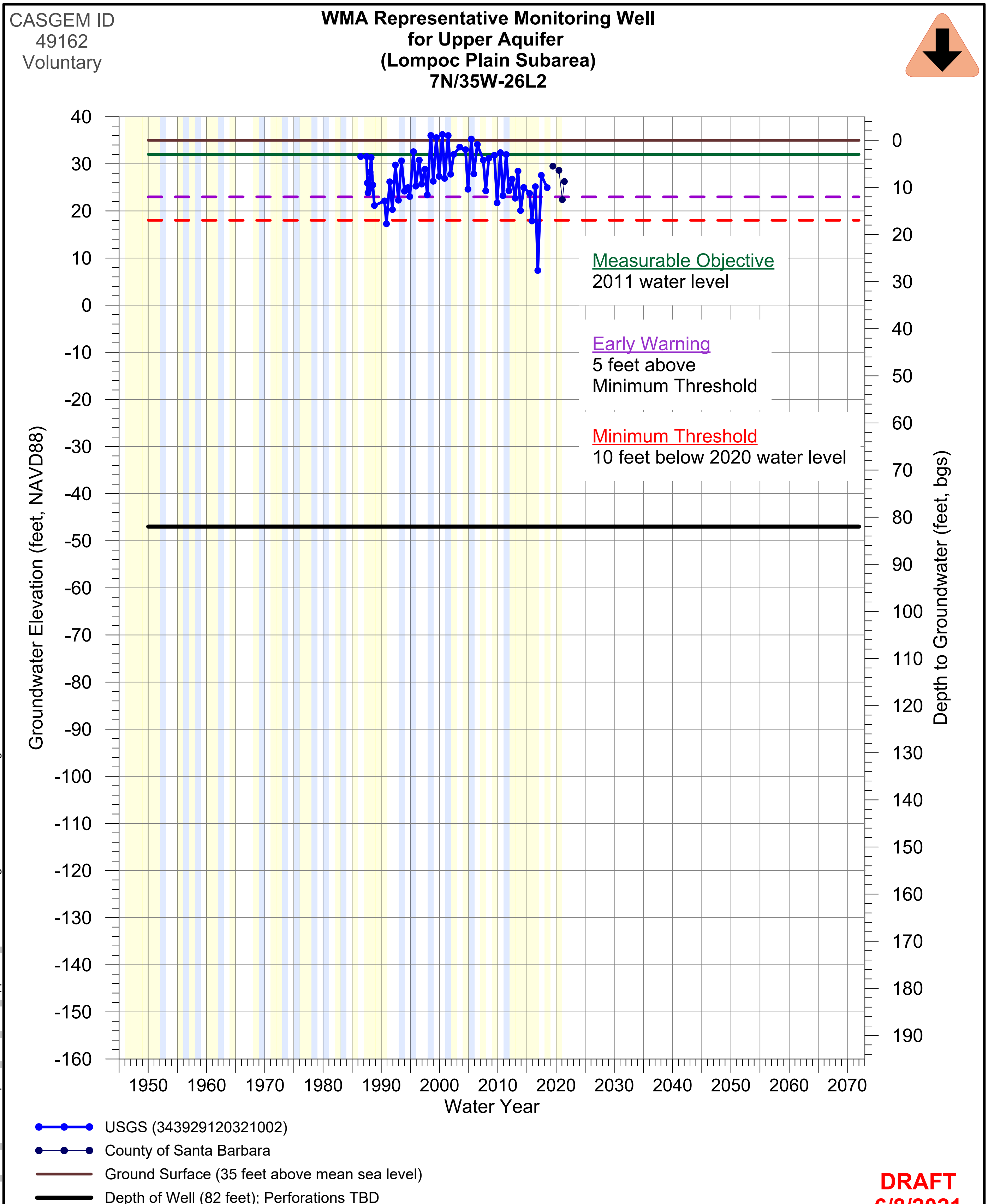
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A1-05



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Western Management Area
Groundwater Sustainability Agency

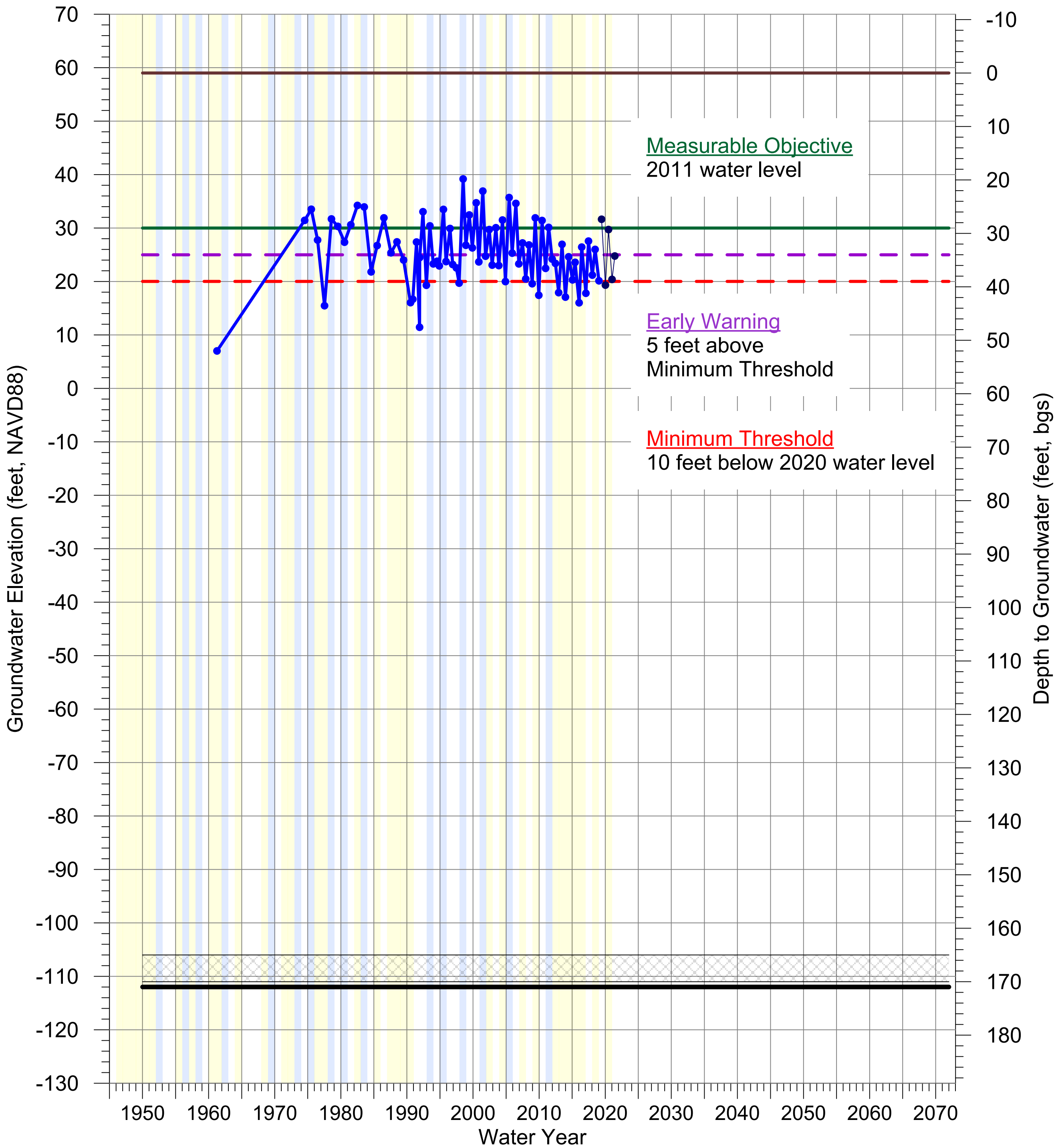
REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A1-06

CASGEM ID
49146
Voluntary

WMA Representative Monitoring Well
for Upper Aquifer
(Lompoc Plain Subarea)
7N/35W-24J4



USGS (344021120303504)
County of Santa Barbara
Ground Surface (59 feet above mean sea level)
Depth of Well (171 feet)
Perforations 165-170 feet

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WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

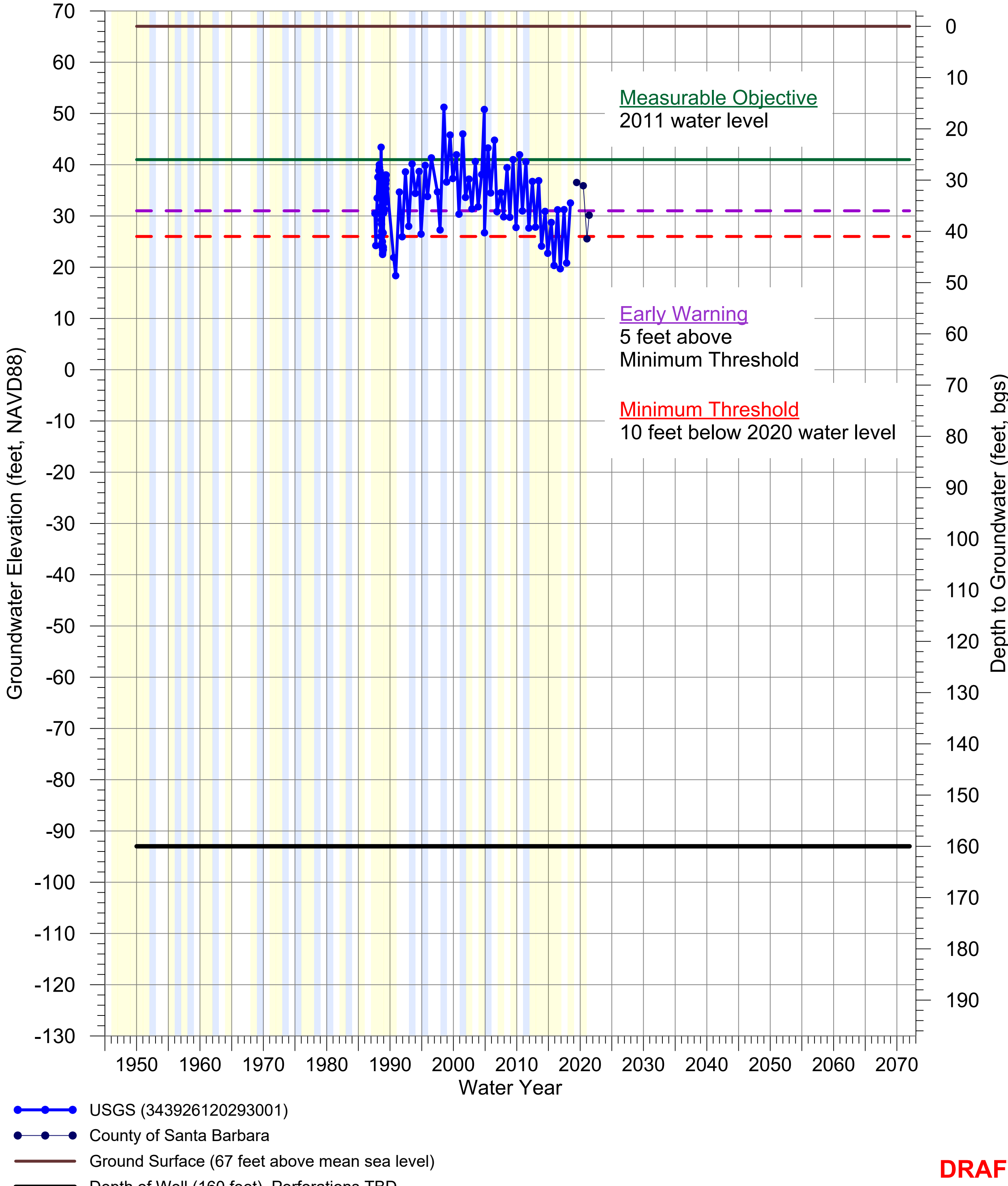
REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A1-07

CASGEM ID
49148
Voluntary

**WMA Representative Monitoring Well
for Upper Aquifer
(Lompoc Plain Subarea)
7N/34W-29N6**



I:\DATA\2710\Monitoring\SMC\WMA_GWL_SMCs\Grapher_Files_SMC_Appendix_Order\WMA Fig A1-07 LP-U 27 29N6.grf 6/11/2021 M. McCammon

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Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

**REPRESENTATIVE
MONITORING WELL
Upper Aquifer - Lompoc Plain**

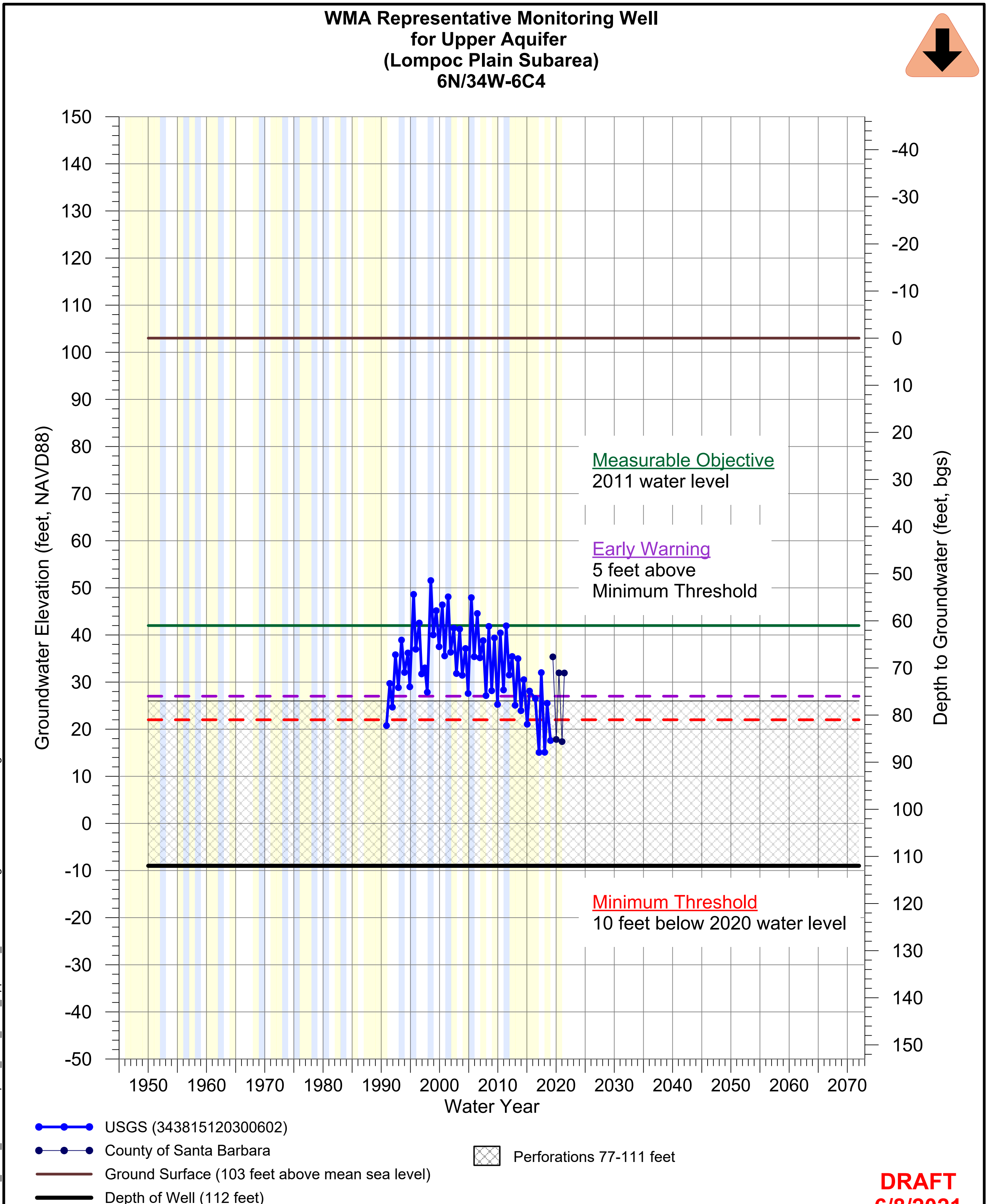
Water Year Type (1942-2020)

Wet

Above/Below Normal

Dry / Critically Dry

FIGURE A1-08



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WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

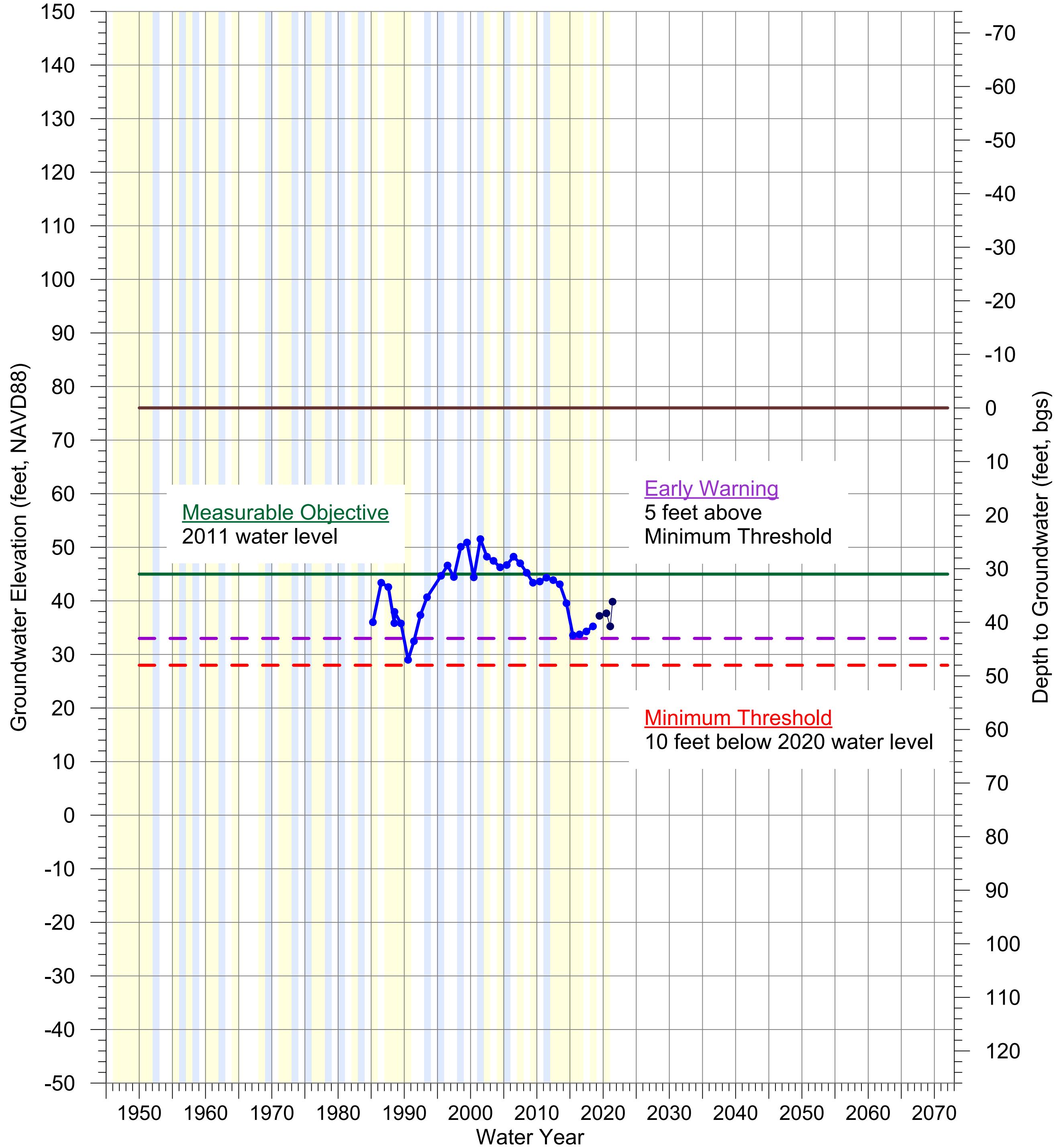
REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A1-09

CASGEM ID
49151
Voluntary

WMA Representative Monitoring Well
for Upper Aquifer
(Lompoc Plain Subarea)
7N/34W-32H2



USGS (343901120284201)
County of Santa Barbara
Ground Surface (76 feet above mean sea level)
Depth of Well (220 feet); Perforations TBD

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Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

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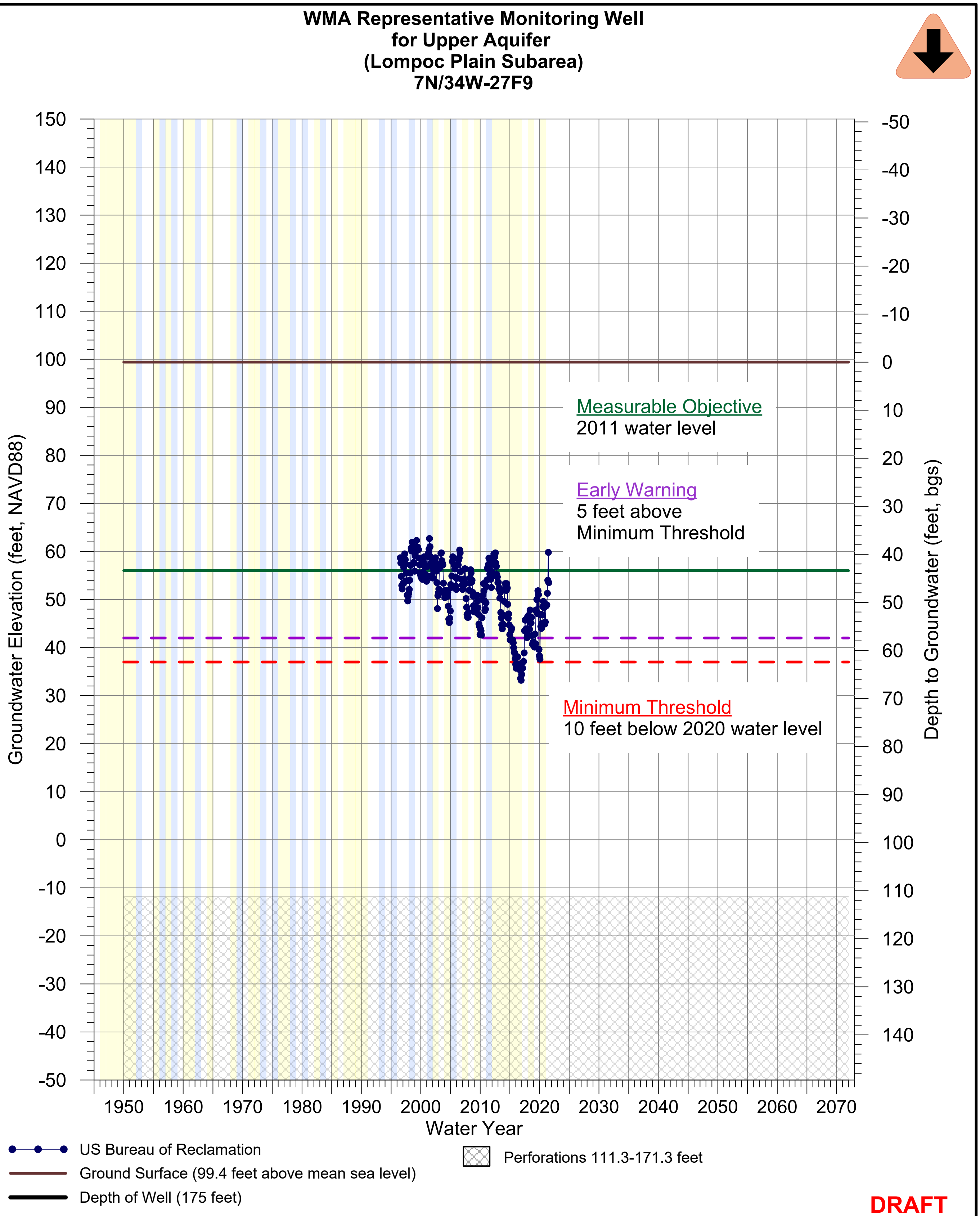
FIGURE A1-10



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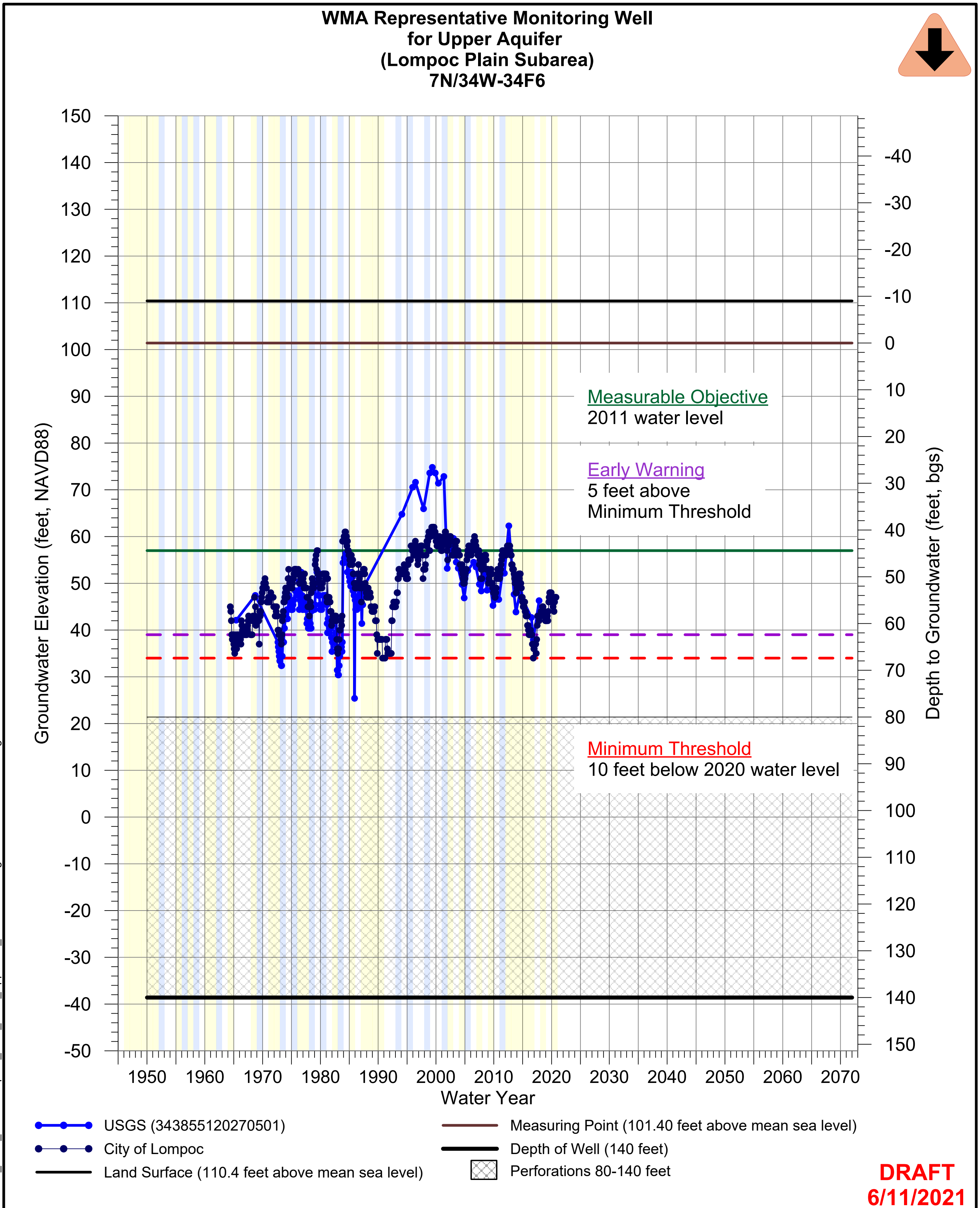
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)

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

FIGURE A1-11



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6/11/2021

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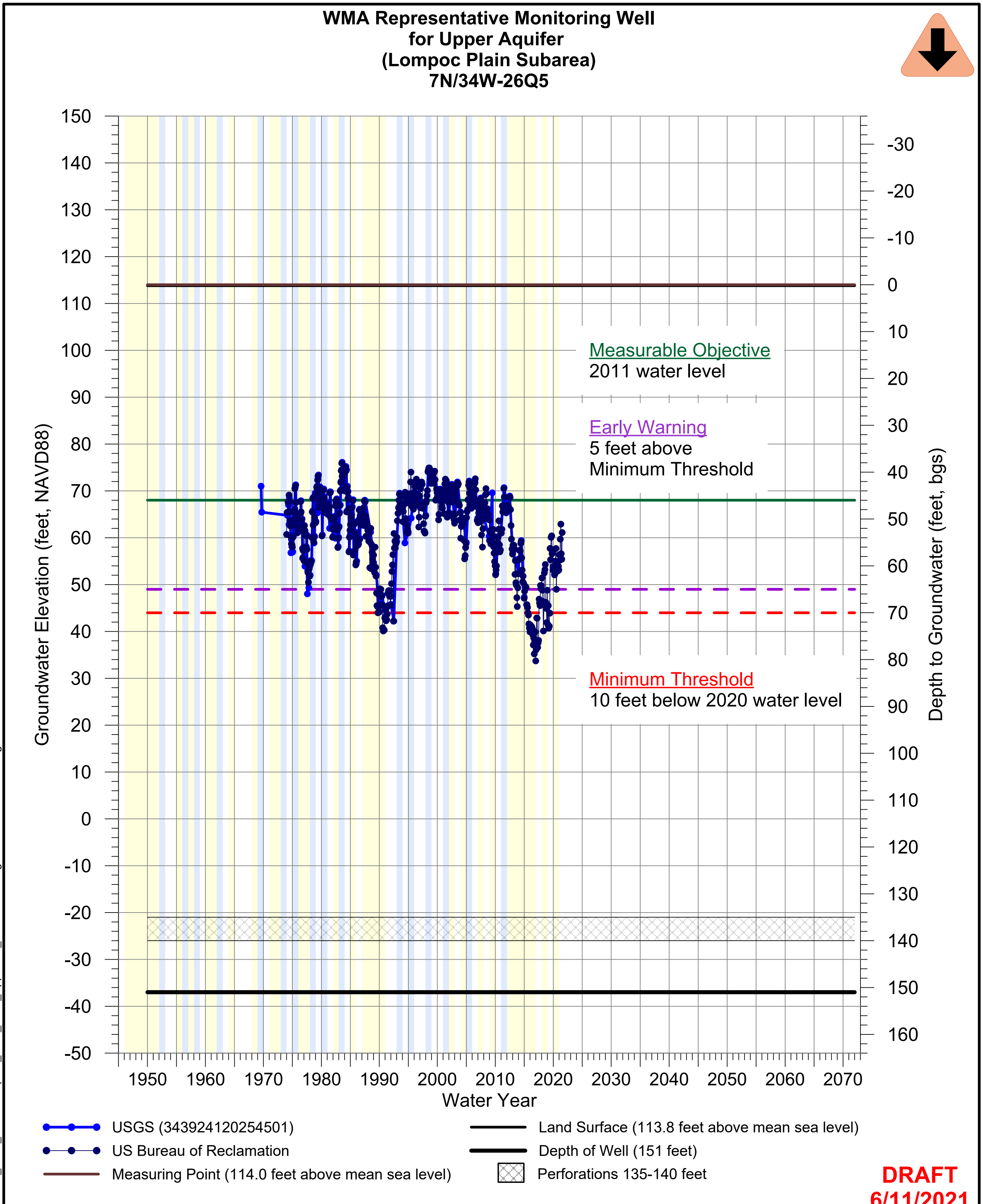
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A1-12



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Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Upper Aquifer - Lompoc Plain

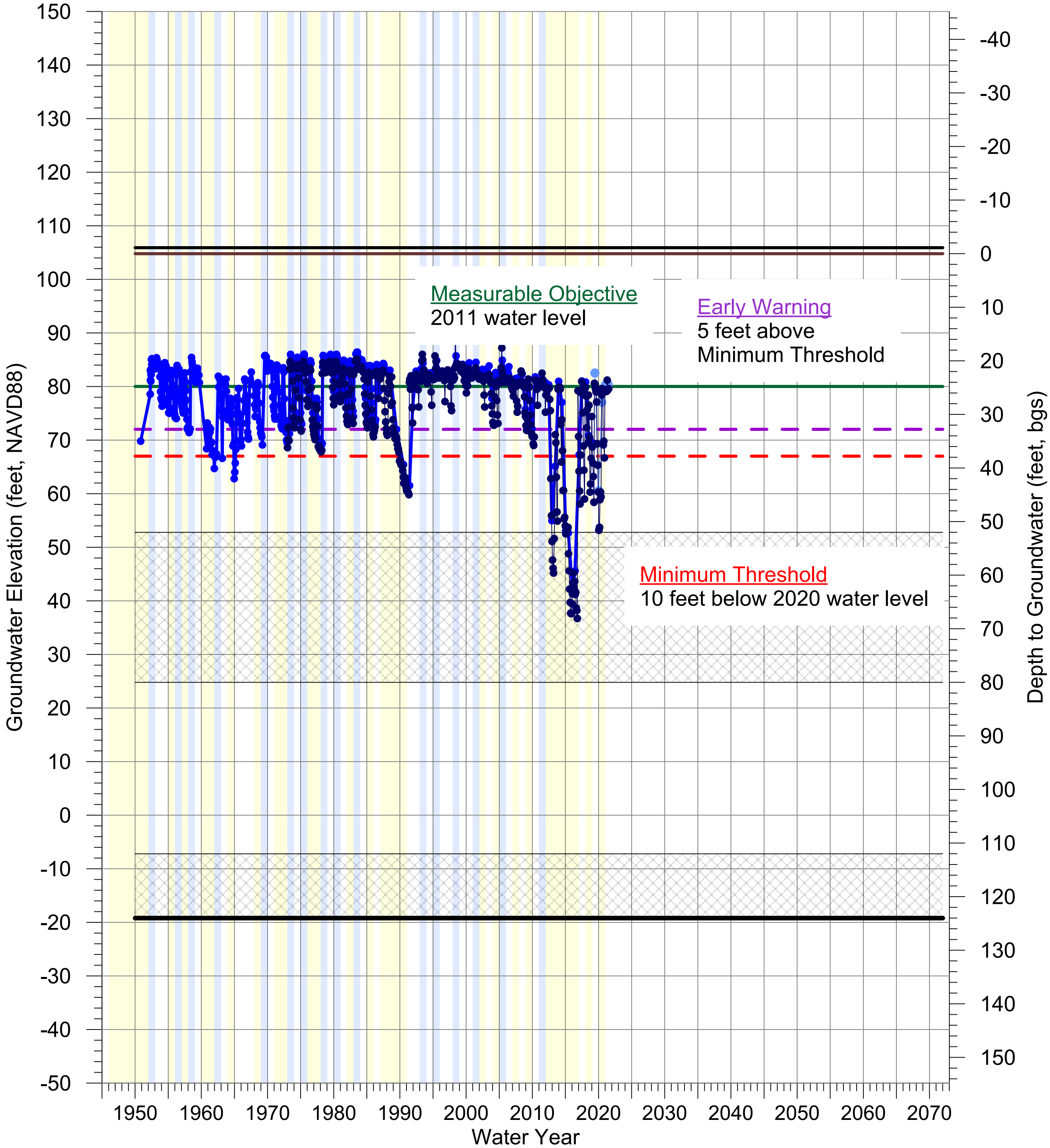
Water Year Type (1942-2020)

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

FIGURE A1-13

CASGEM ID
49153
Voluntary

**WMA Representative Monitoring Well
for Upper Aquifer
(Lompoc Plain Subarea)
7N/34W-35K9**



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Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

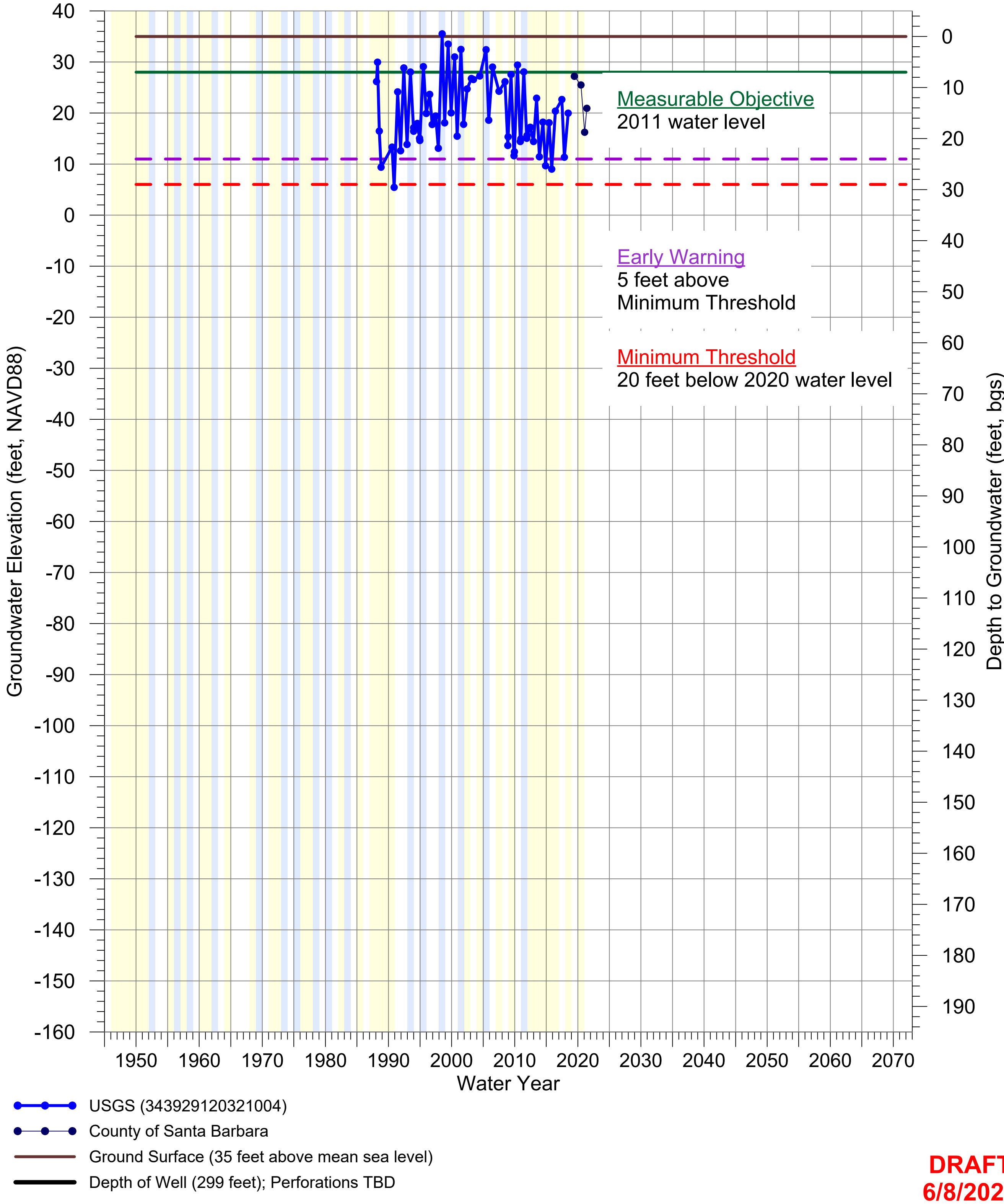
**REPRESENTATIVE
MONITORING WELL
Upper Aquifer - Lompoc Plain**

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A2-01

CASGEM ID
38298
Voluntary

WMA Representative Monitoring Well
for Lower Aquifer
(Lompoc Plain Subarea)
7N/35W-26L4



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WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

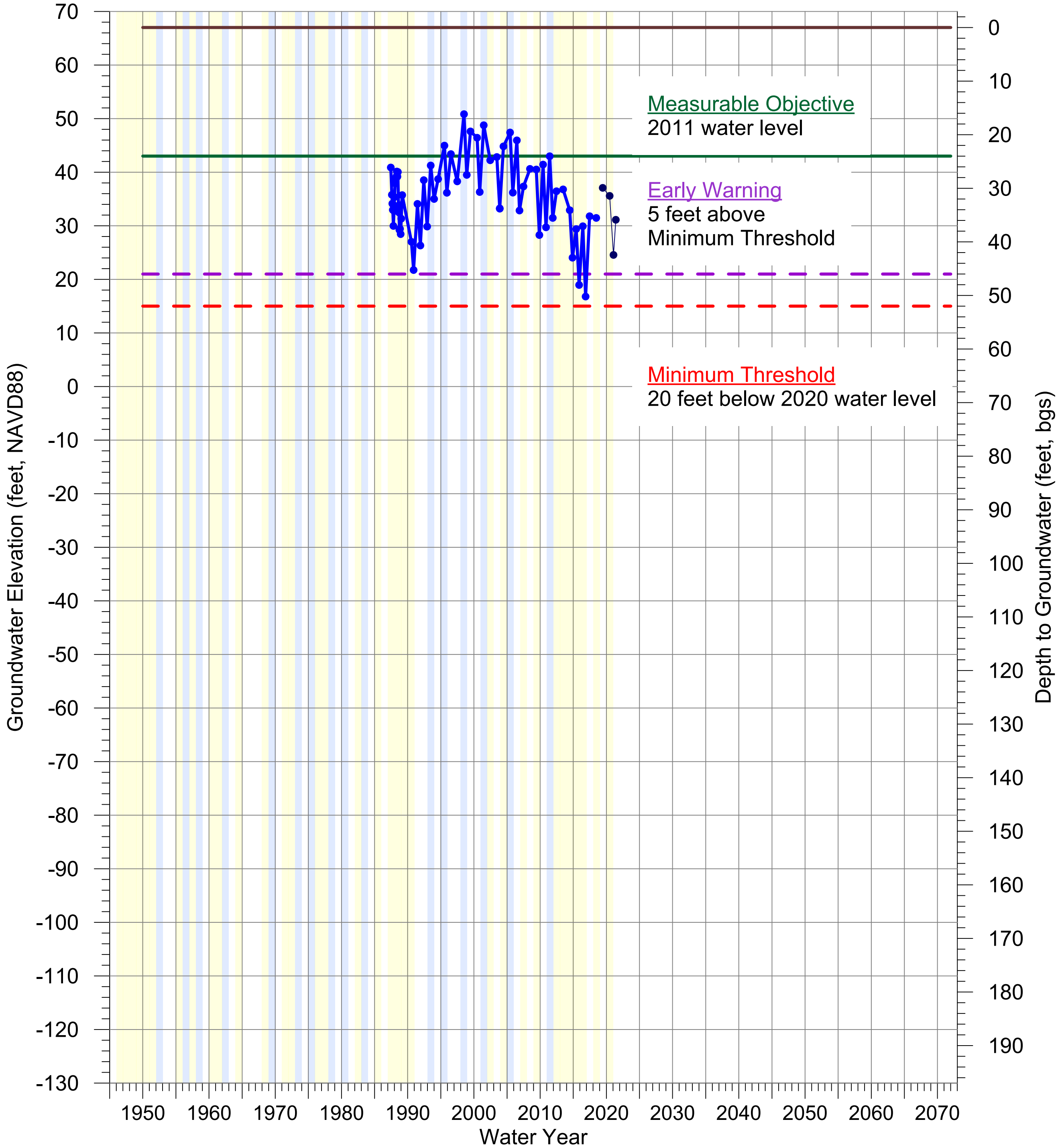
REPRESENTATIVE
MONITORING WELL
Lower Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A2-02

CASGEM ID 23538 Voluntary

WMA Representative Monitoring Well for Lower Aquifer (Lompoc Plain Subarea) 7N/34W-29N7



I:\DATA\2710\Monitoring\SMC\WMA_GWL_SMCs\Grapher_Files_SMC_Appendix_Order\WMA Fig A2-02 LP-L 28 29N7.grf 6/8/2021 M. McCammon

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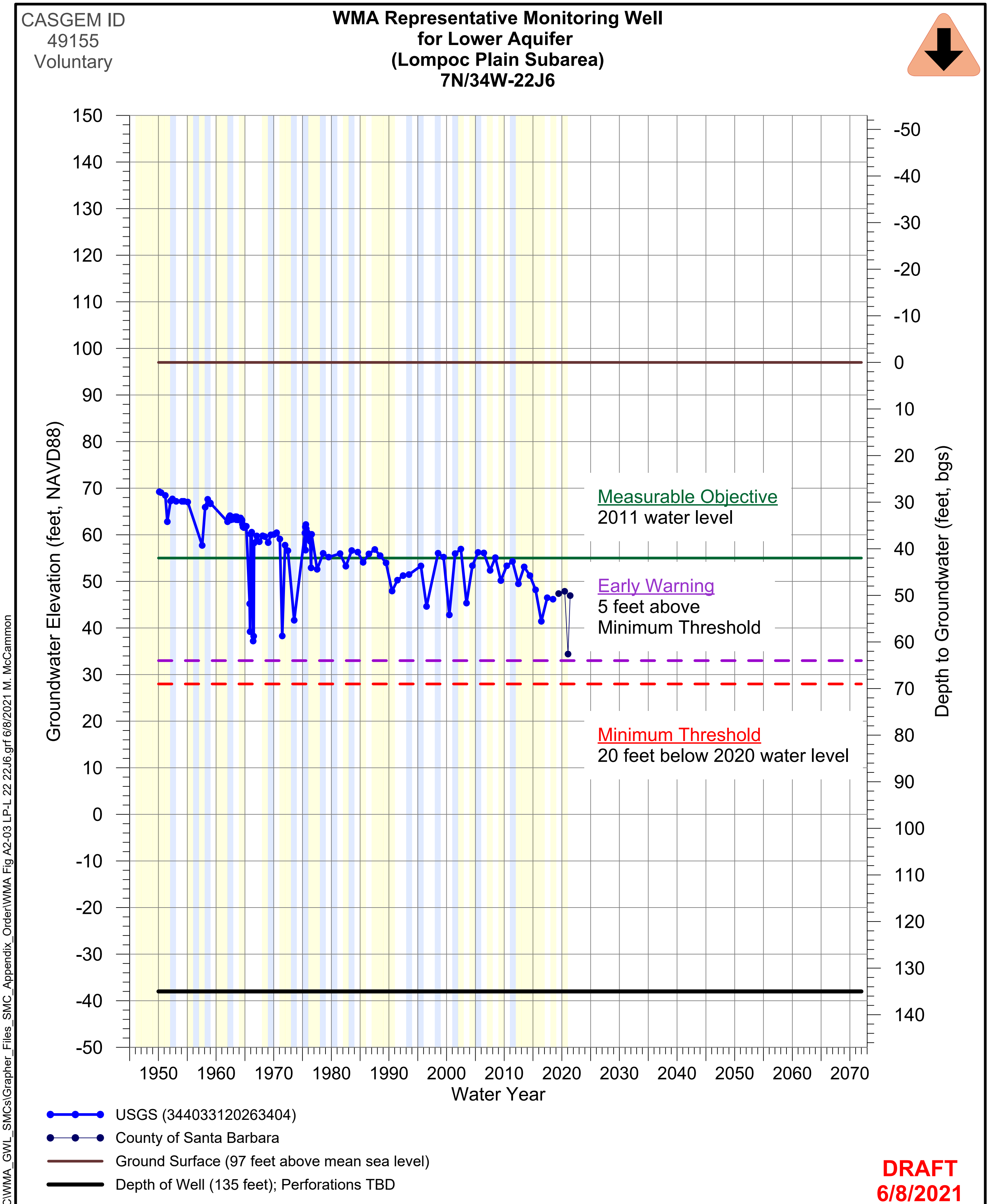
WMA Santa Ynez River Valley Groundwater Basin Western Management Area Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL Lower Aquifer - Lompoc Plain

Water Year Type (1942-2020)

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

FIGURE A2-03



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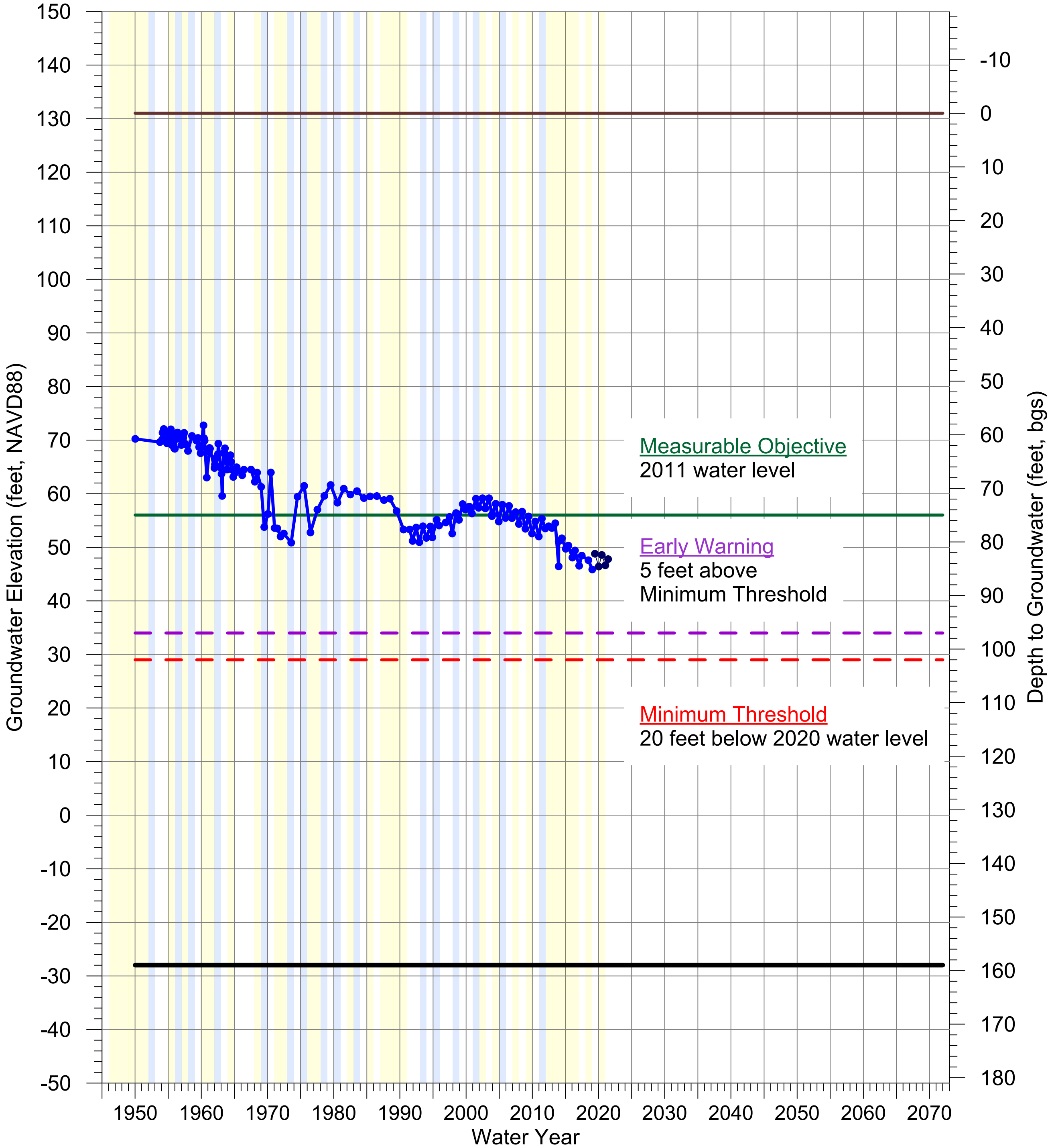
WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Lower Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

CASGEM ID
49156
Voluntary

WMA Representative Monitoring Well for Lower Aquifer (Lompoc Plain Subarea) 7N/34W-24N1



USGS (344010120251601)
County of Santa Barbara
Ground Surface (131 feet above mean sea level)
Depth of Well (159 feet); Perforations TBD

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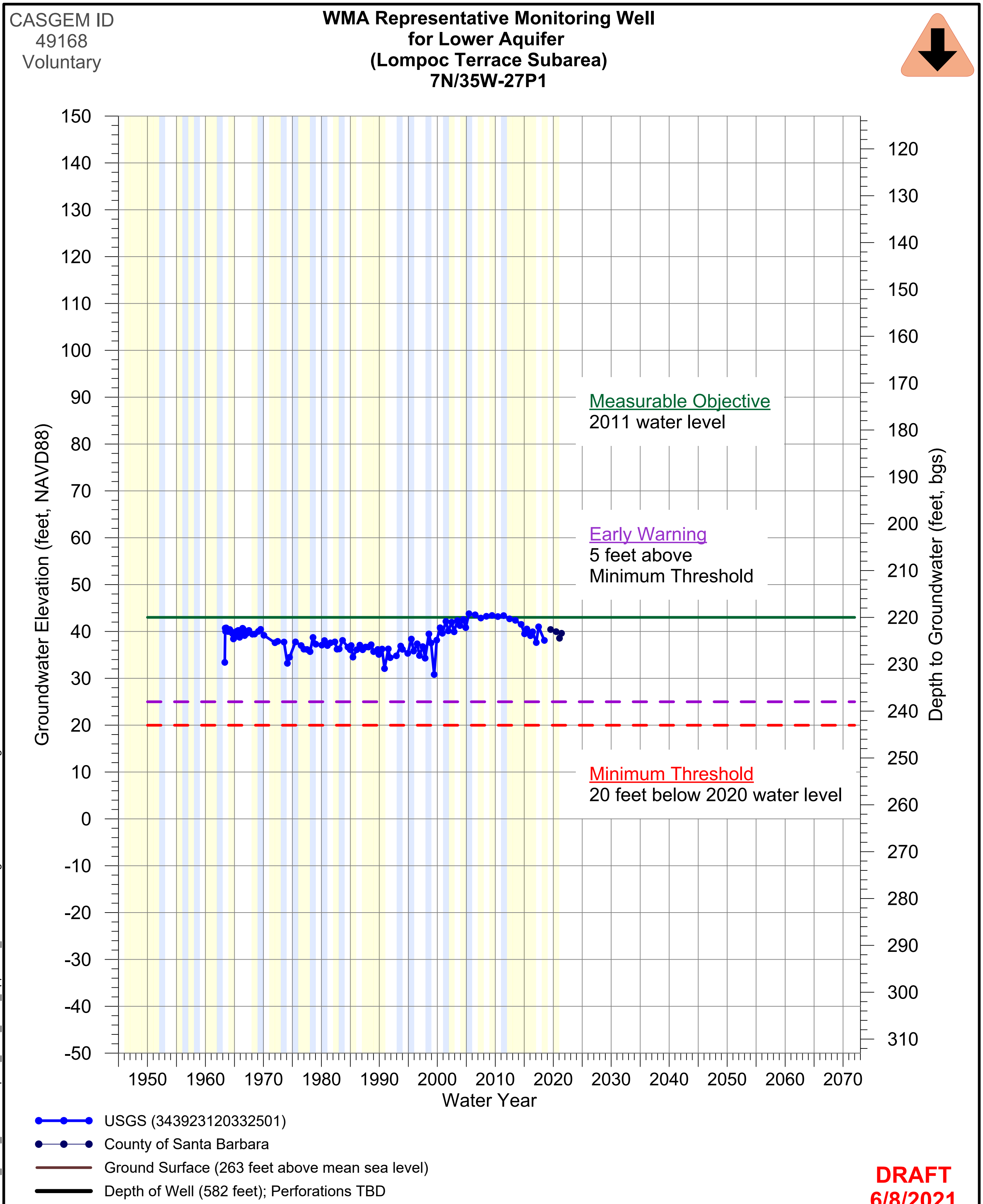
WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Lower Aquifer - Lompoc Plain

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A2-05



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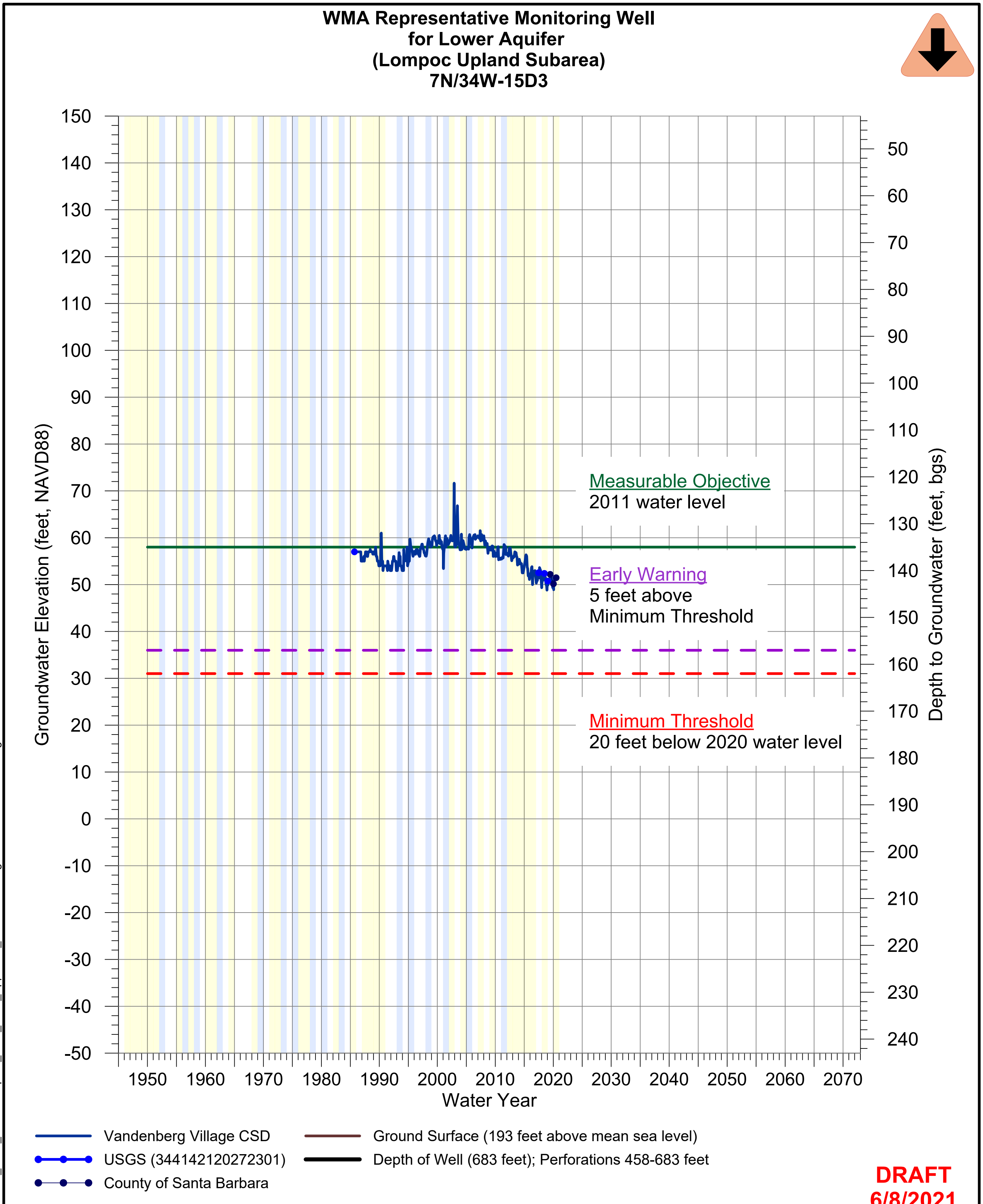
WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Lower Aquifer - Lompoc Terrace

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A2-06



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WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Lower Aquifer - Lompoc Upland

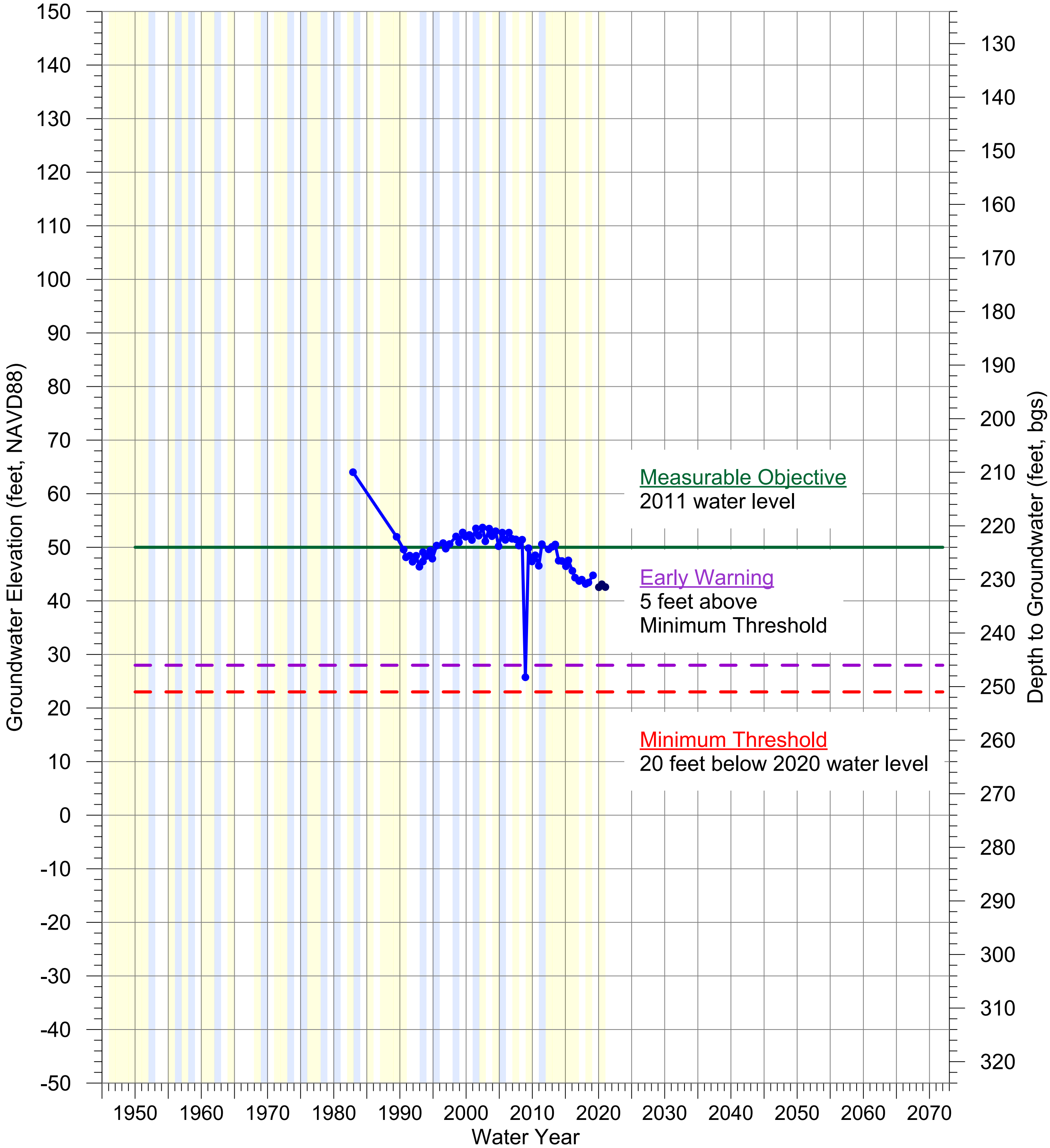
Water Year Type (1942-2020)

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

FIGURE A2-07

CASGEM ID
49142
Voluntary

WMA Representative Monitoring Well
for Lower Aquifer
(Lompoc Upland Subarea)
7N/34W-14F4



USGS (344126120255201)
County of Santa Barbara
Ground Surface (274 feet above mean sea level)
Depth of Well (540 feet); Perforations TBD

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WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

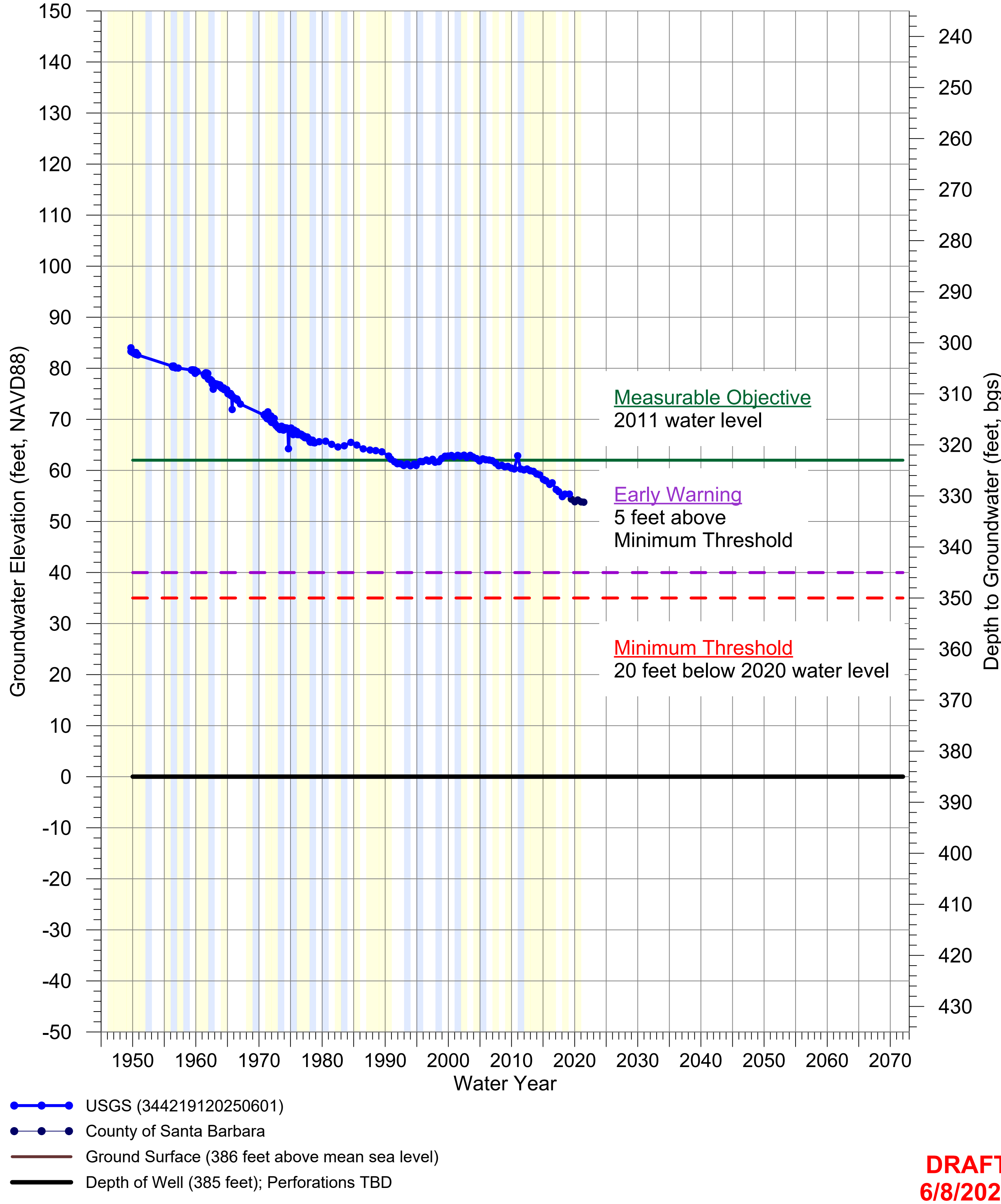
REPRESENTATIVE MONITORING WELL
Lower Aquifer - Lompoc Upland

Water Year Type (1942-2020)
Wet
Above/Below Normal
Dry / Critically Dry

FIGURE A2-08

CASGEM ID
49139
CASGEM

WMA Representative Monitoring Well
for Lower Aquifer
(Lompoc Upland Subarea)
7N/34W-12E1



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6/8/2021

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WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Lower Aquifer - Lompoc Upland

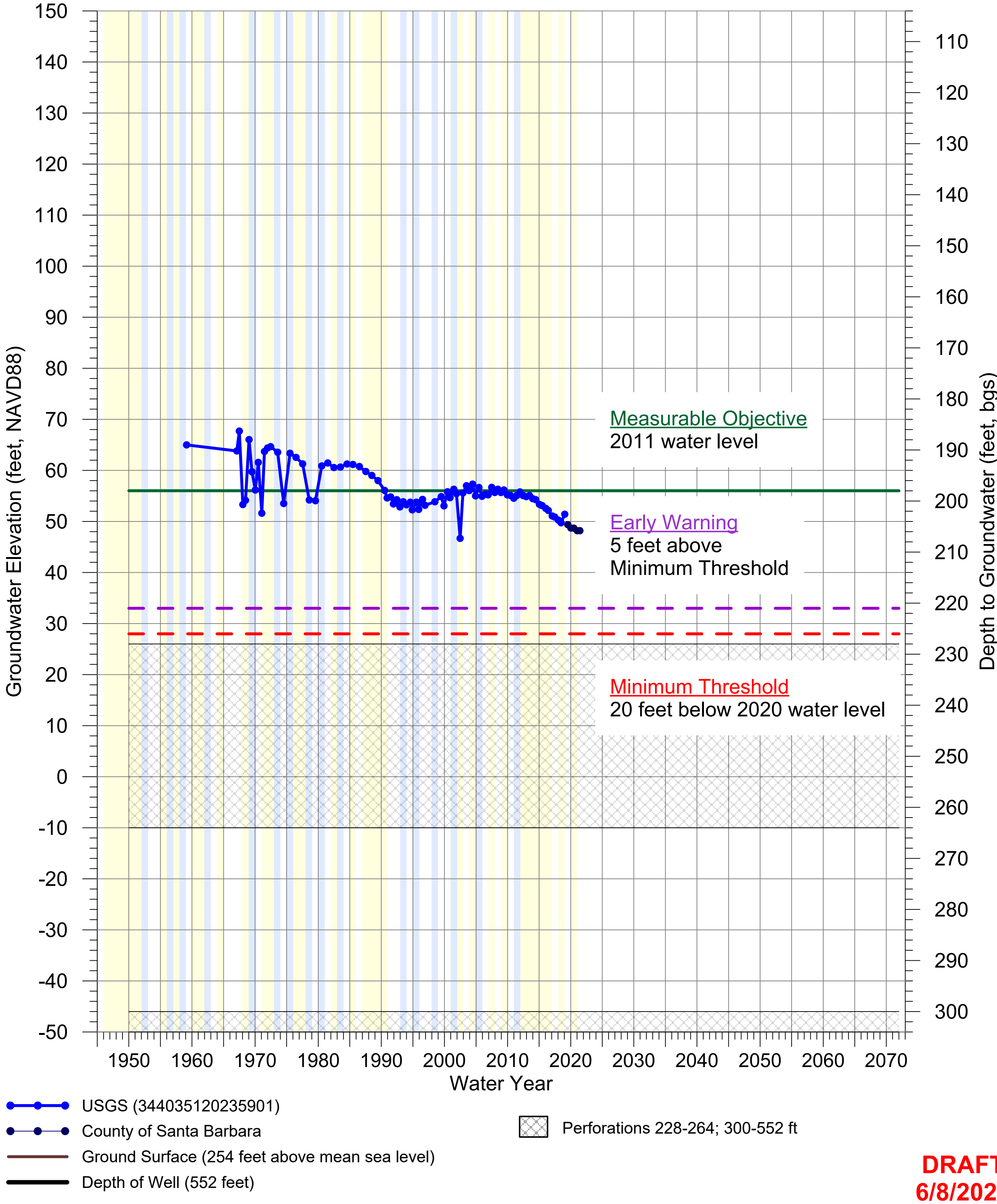
Water Year Type (1942-2020)

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

FIGURE A2-09

CASGEM ID
49143
Voluntary

WMA Representative Monitoring Well
for Lower Aquifer
(Lompoc Upland Subarea)
7N/33W-19D1



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6/8/2021

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WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

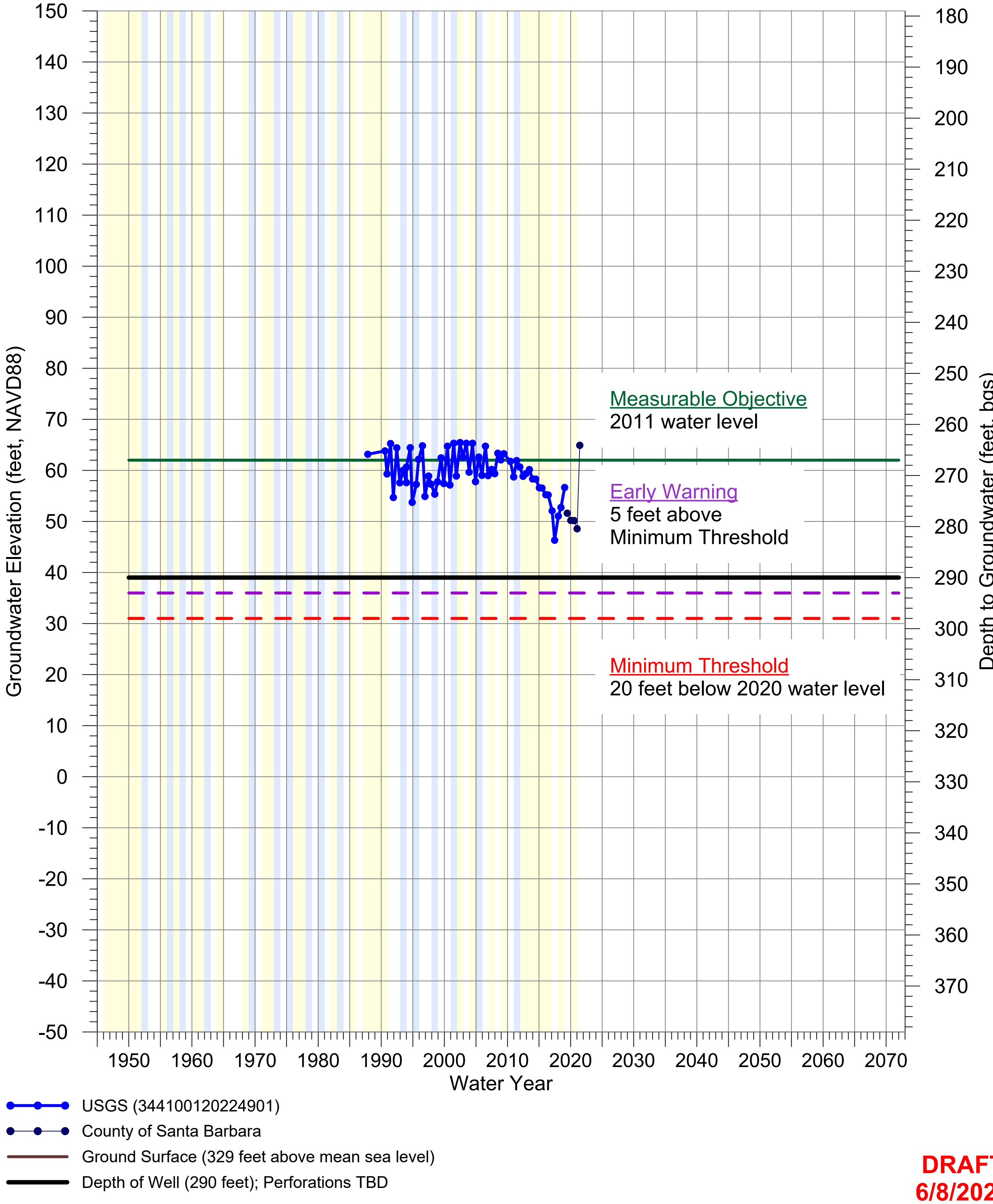
REPRESENTATIVE MONITORING WELL
Lower Aquifer - Lompoc Upland

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A2-10

CASGEM ID
49144
Voluntary

WMA Representative Monitoring Well
for Lower Aquifer
(Lompoc Upland Subarea)
7N/33W-17M1



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6/8/2021

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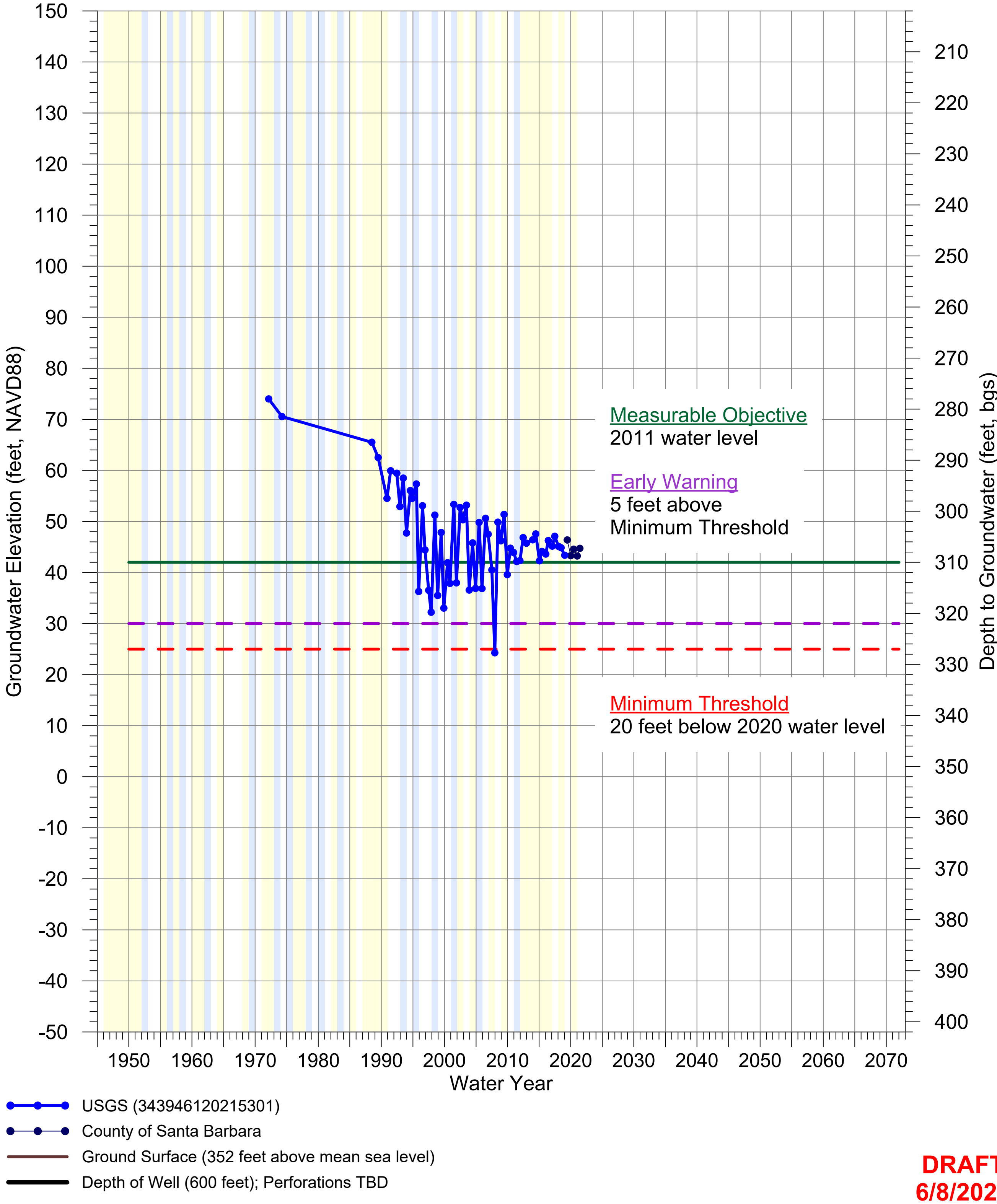
WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Lower Aquifer - Lompoc Upland

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

CASGEM ID
49129
Voluntary

WMA Representative Monitoring Well
for Lower Aquifer
(Santa Rita Upland Subarea)
7N/33W-28D3



I:\DATA\2710\Monitoring\SMC\WMA_GWL_SMCs\Grapher_Files_SMC_Appendix_Order\WMA Fig A2-11 SR-L 81 28D3.grf 6/8/2021 M. McCammon

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6/8/2021

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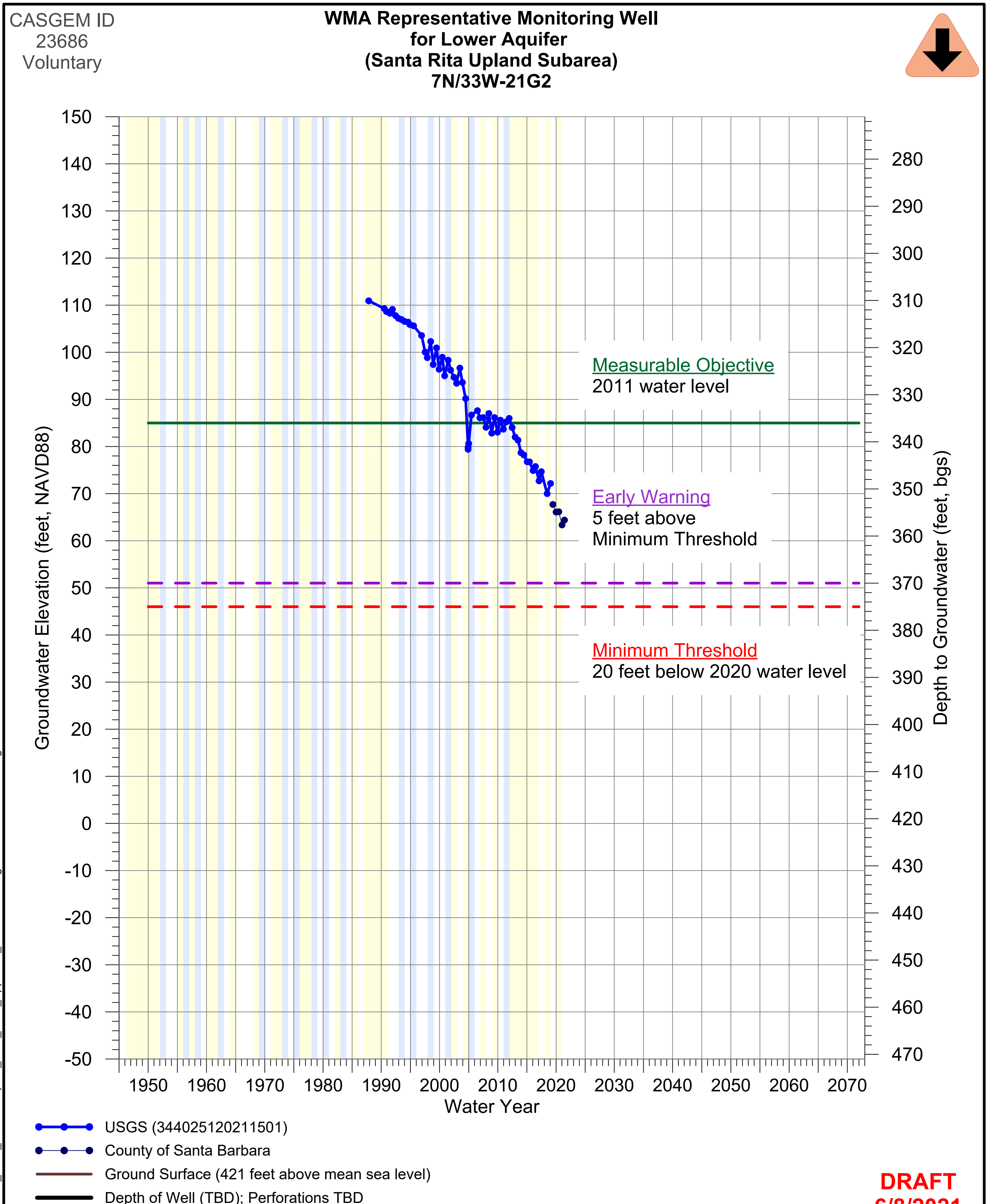
WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Lower Aquifer - Santa Rita Upland

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A2-12



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WMA
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Western Management Area
Groundwater Sustainability Agency

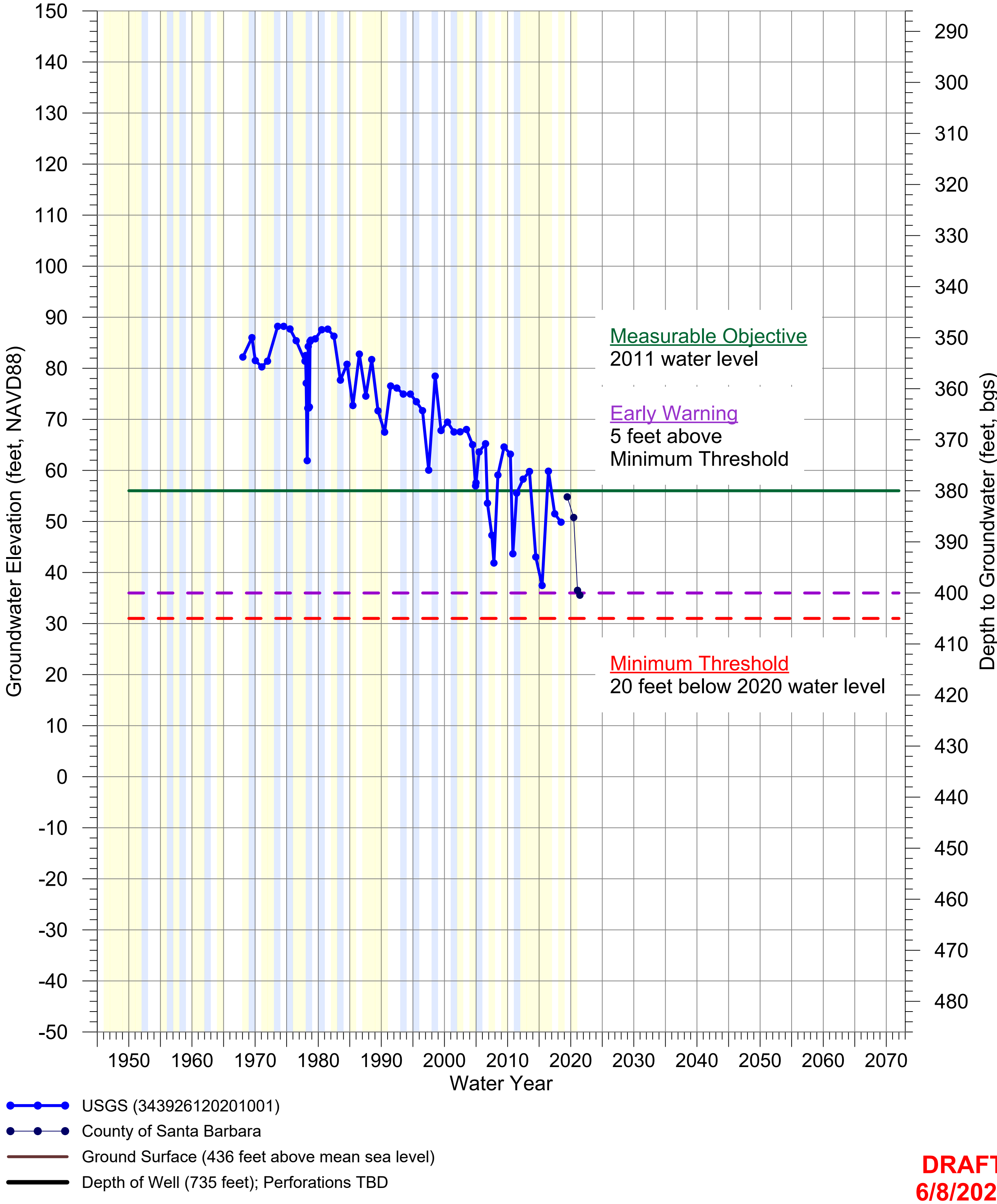
REPRESENTATIVE MONITORING WELL
Lower Aquifer - Santa Rita Upland

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

FIGURE A2-13

CASGEM ID
49132
Voluntary

WMA Representative Monitoring Well for Lower Aquifer (Santa Rita Upland Subarea) 7N/33W-27G1



I:\DATA\2710\Monitoring\SMC\WMA_GWL_SMCs\Grapher_Files_SMC_Appendix_Order\WMA Fig A2-13 SR-L 80 27G1.grf 6/8/2021 M. McCammon

DRAFT
6/8/2021

STETSON ENGINEERS INC.

WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL
Lower Aquifer - Santa Rita Upland

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

SUSTAINABLE MANAGEMENT CRITERIA
WESTERN MANAGEMENT AREA

APPENDIX B: DEGRADED GROUNDWATER QUALITY TIME SERIES GRAPHS

This appendix includes concentration time series graphs of groundwater quality for the representative wells in the monitoring network for degraded water quality as well as the established sustainable management criteria of the measurable objective, early warning, and minimum threshold. Organization is first by constituent, then by subarea, and then west to east within each subarea. The following constituents are included in this appendix:

- Salinity as Total Dissolved Solids (TDS)
- Chloride (Cl)
- Sulfate (SO_4)
- Boron (B)
- Sodium (Na)
- Nitrate as Nitrogen (NO_3 as N) with logarithmic scale

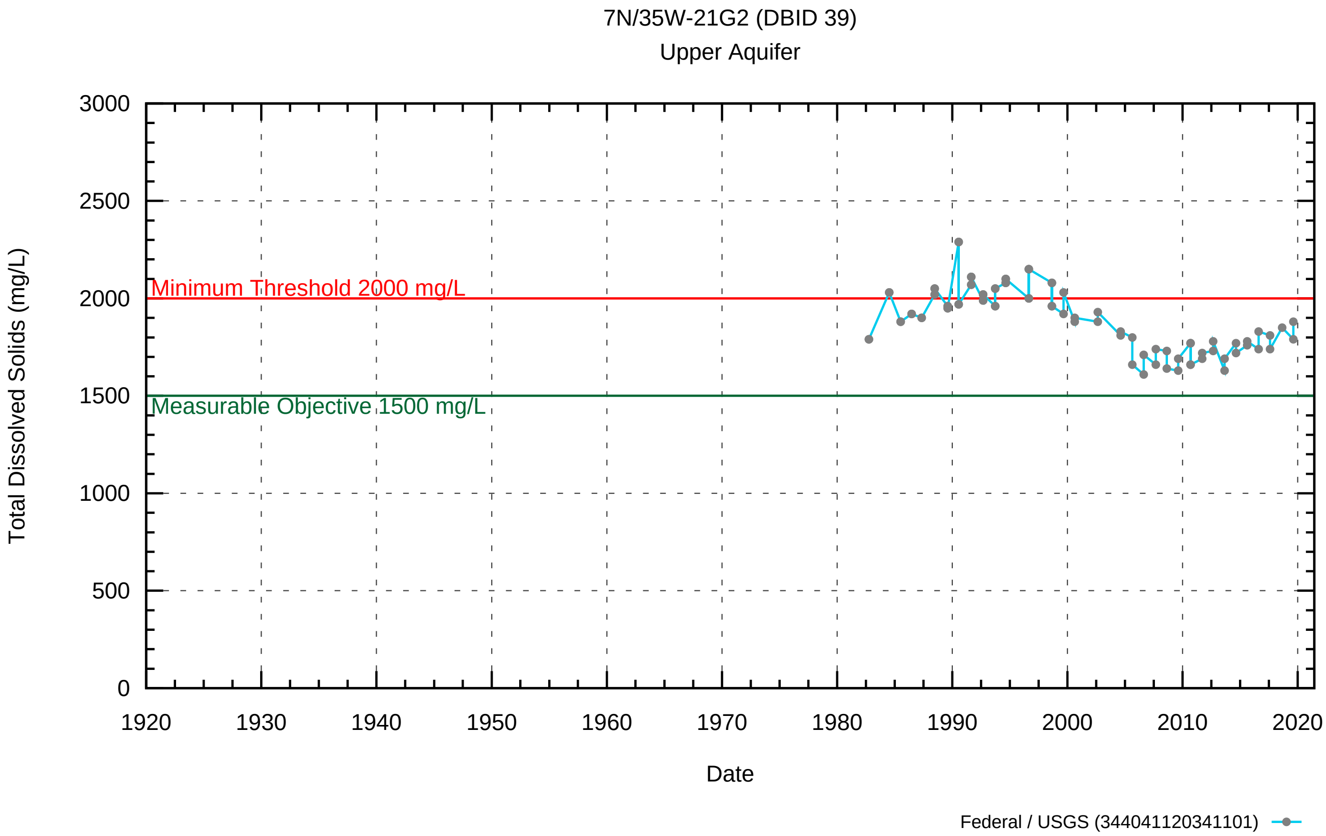
Null values are not plotted. Particular wells may not have historical measuments for all constituents.

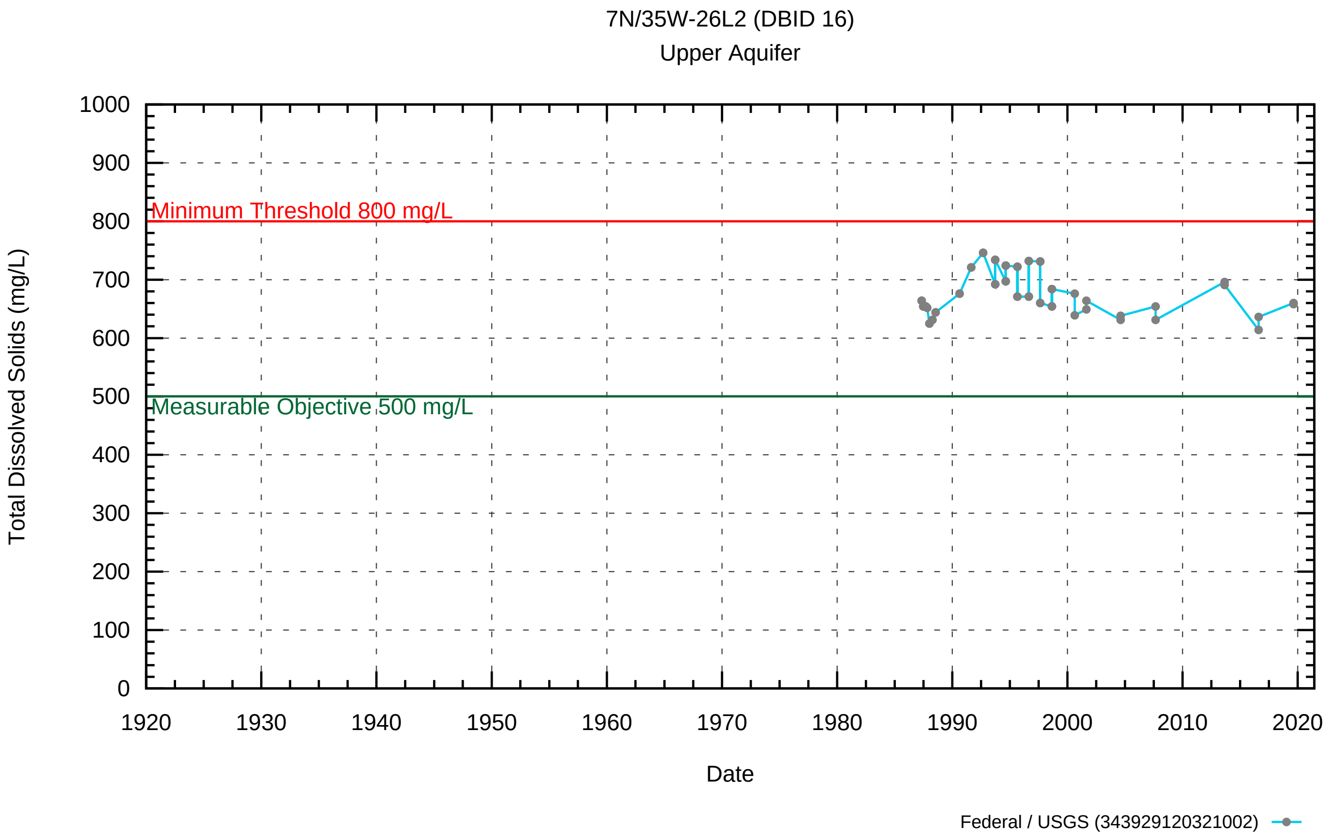
For Nitrate a logarithmic scale is used. Reporting source of value is shown. Values of Nitrate as Nitrate were converted to their Nitrogen composition. Values of Nitrate and Nitrite as Nitrogen (NO_3+NO_2 as N) are also included on graphs.

LIST OF ACRONYMS AND ABBREVIATIONS

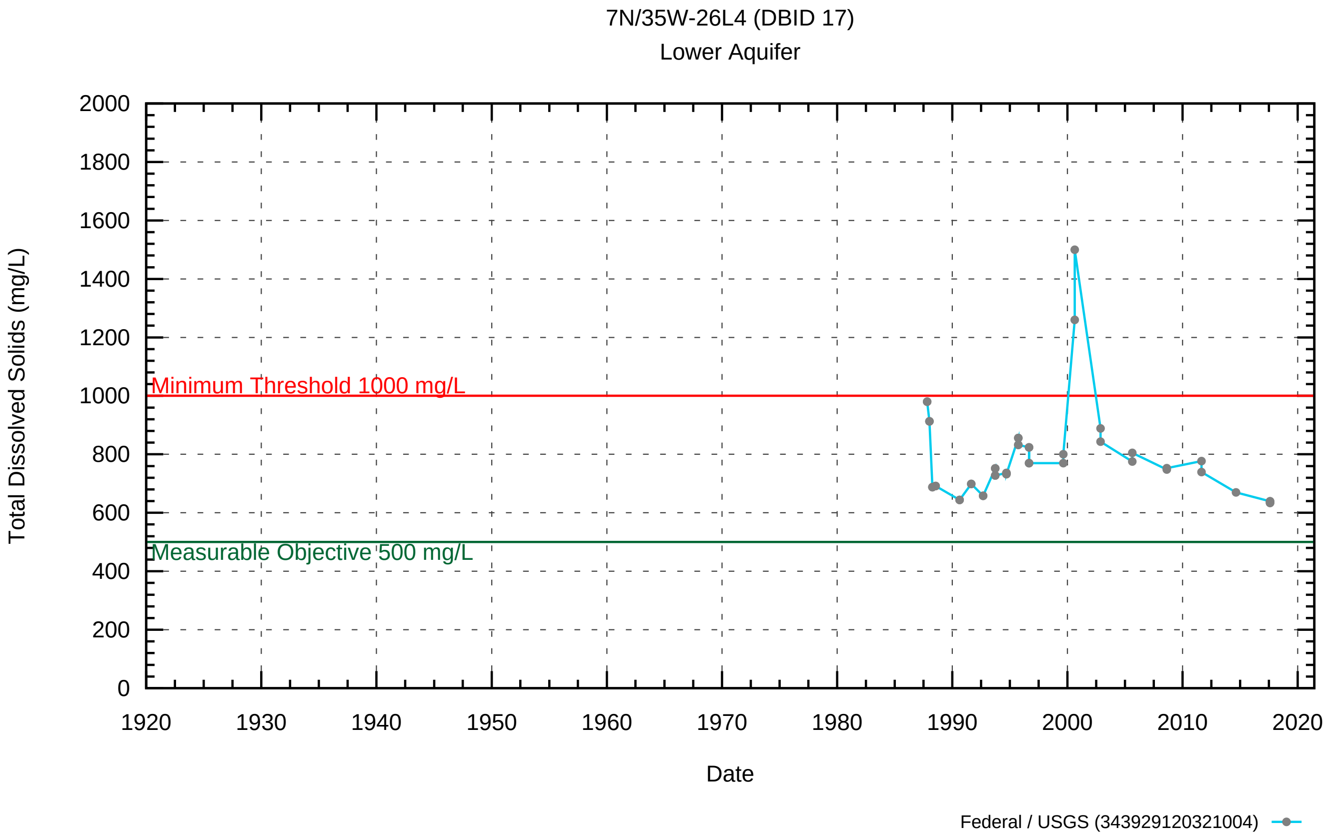
BGS	below ground surface
CASGEM	California Statewide Groundwater Elevation Monitoring
FT	feet
NAVD88	North American Vertical Datum of 1988
USBR	United States Bureau of Reclamation
USGS	United States Geologic Survey
WL	Water Level
WMA	Western Management Area

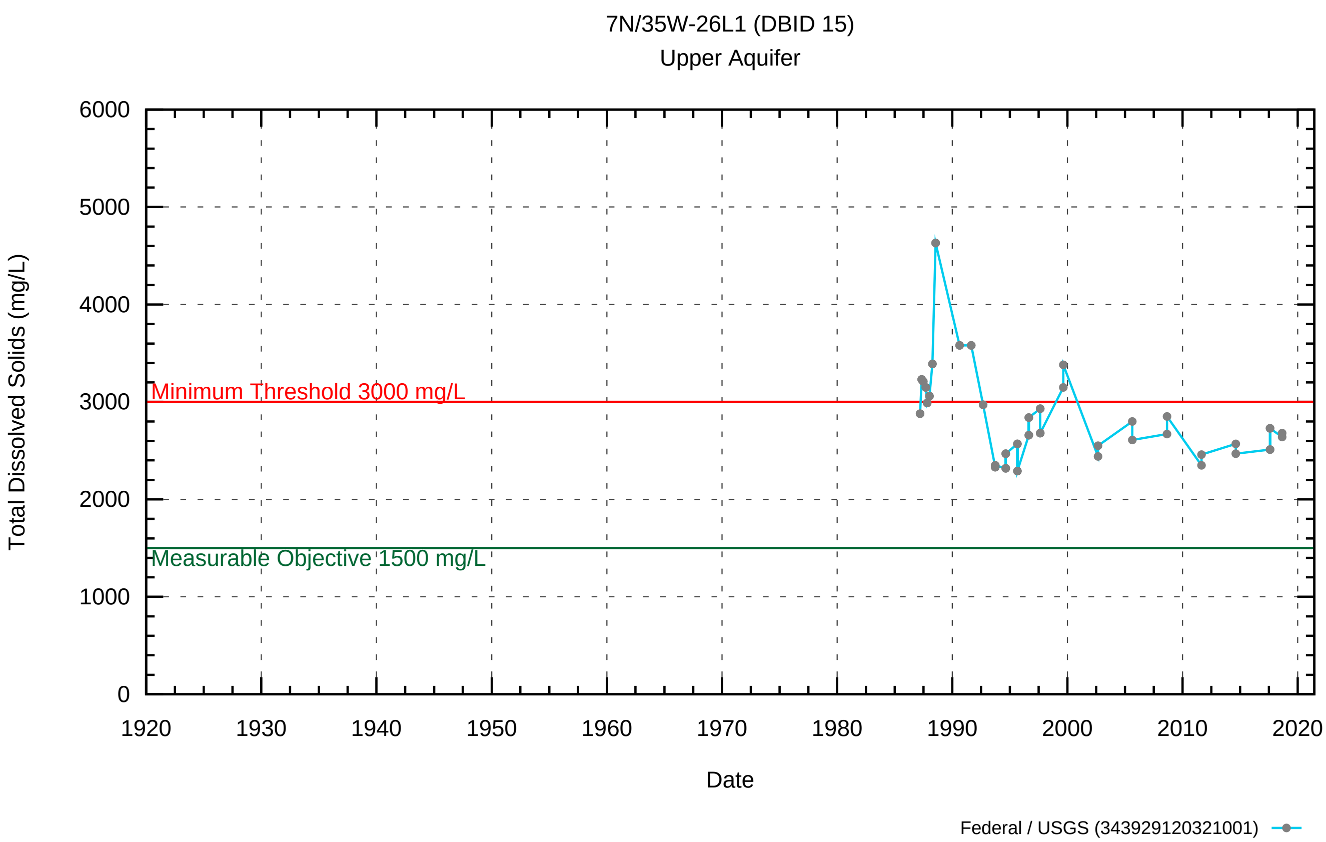
WMA: Lompoc Plain - Total Dissolved Solids



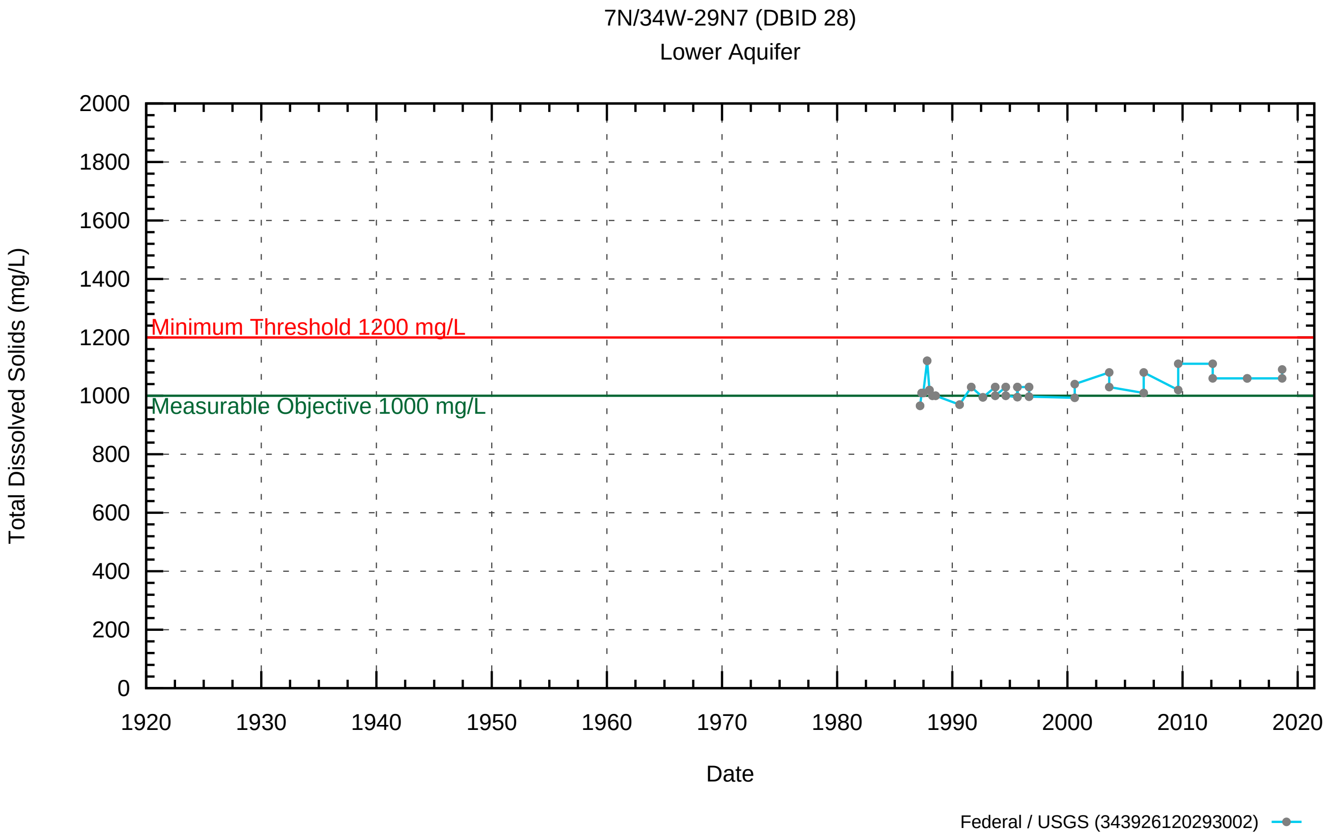


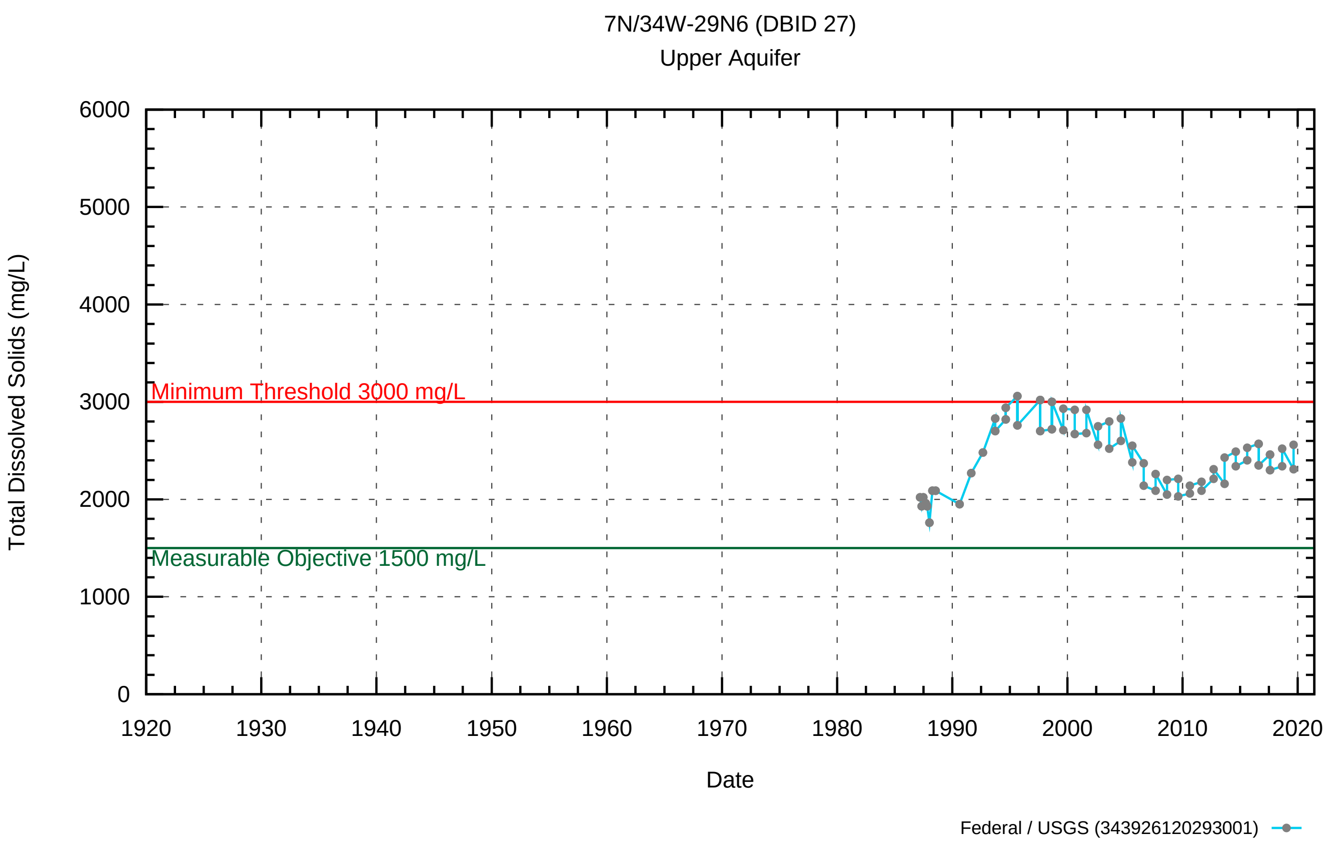
WMA: Lompoc Plain - Total Dissolved Solids





WMA: Lompoc Plain - Total Dissolved Solids





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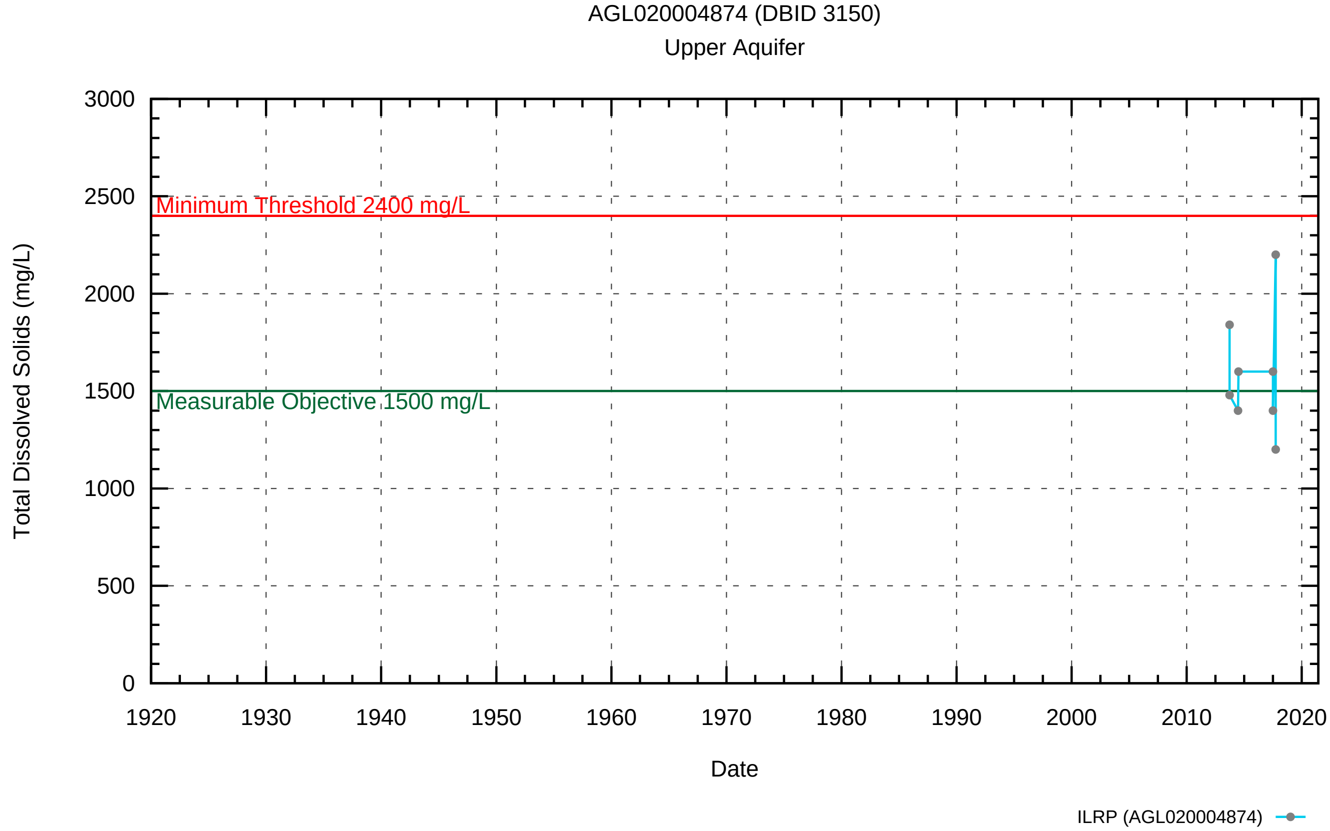

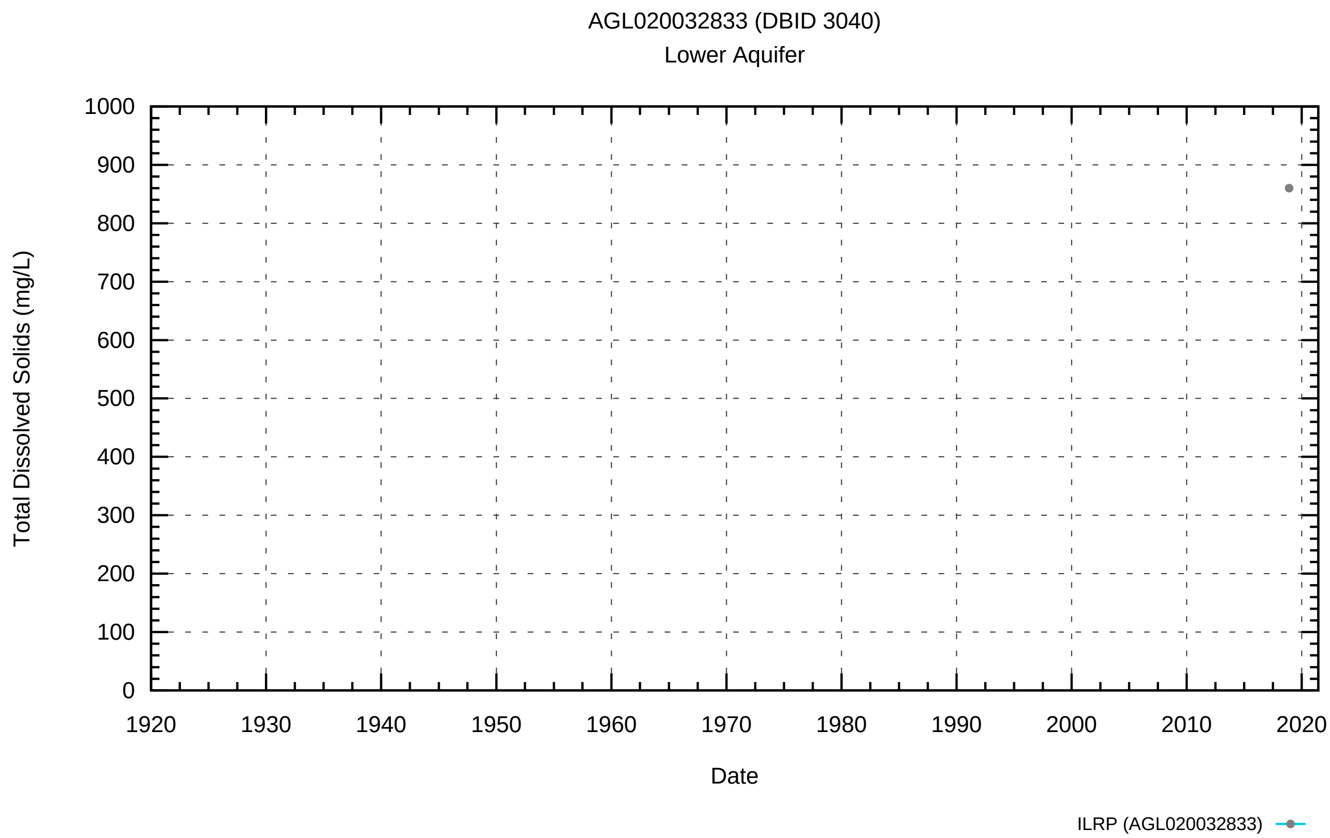

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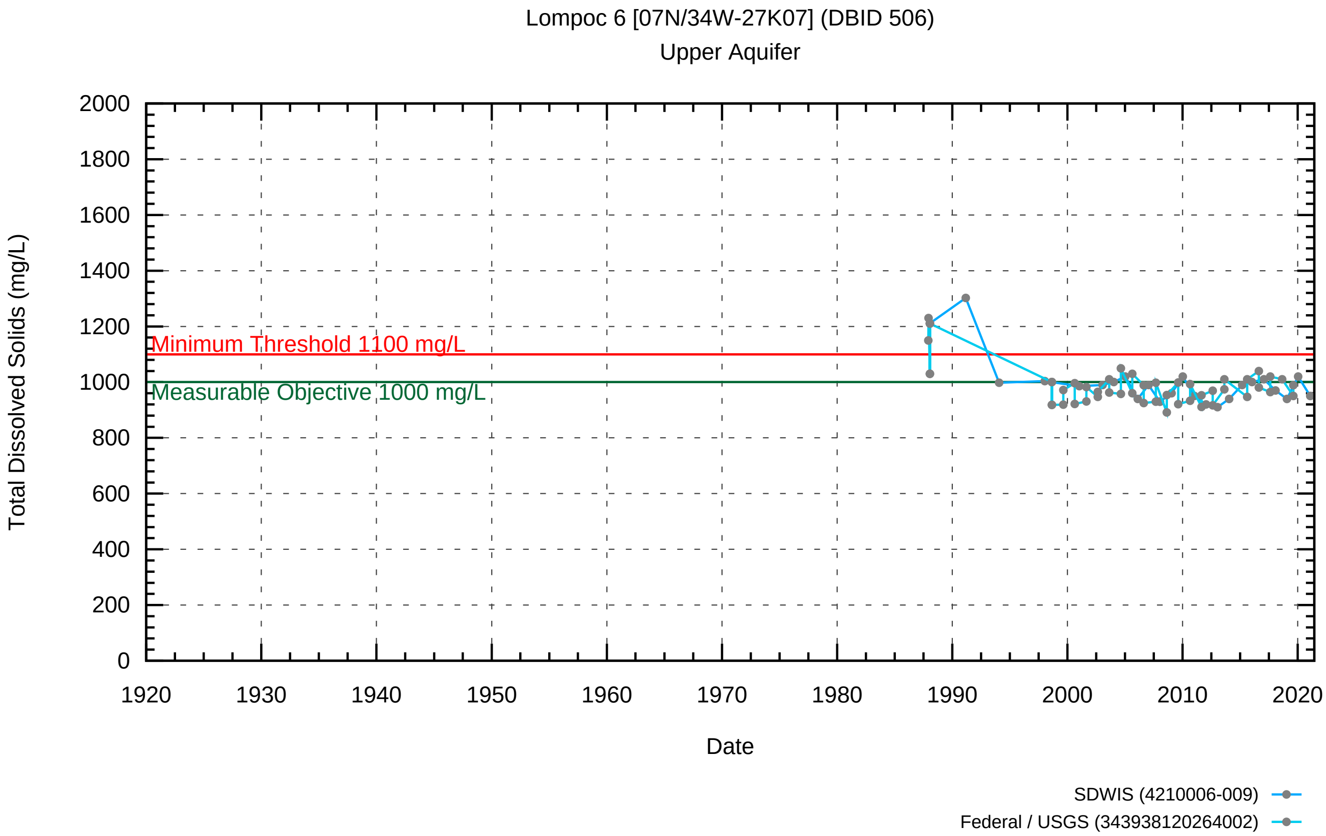

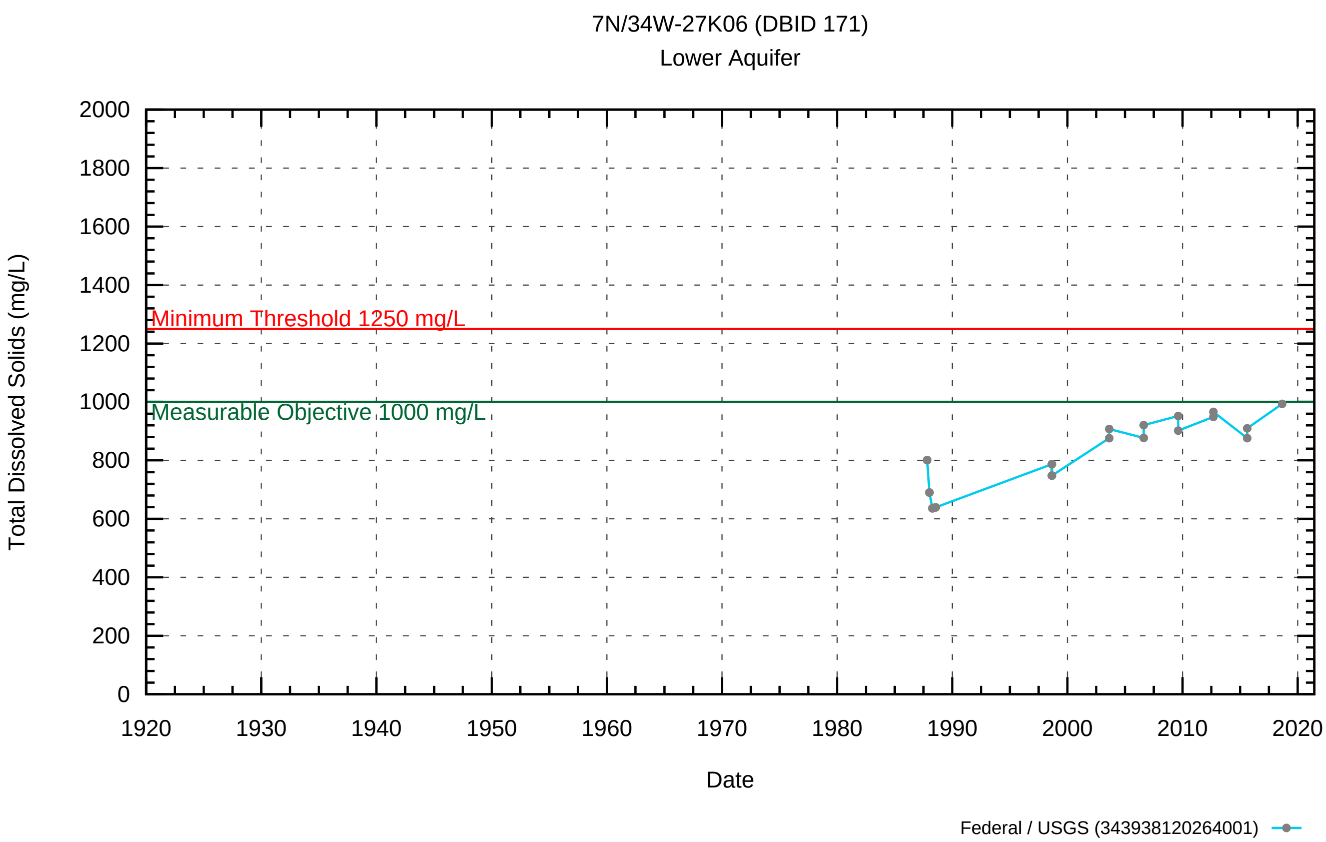

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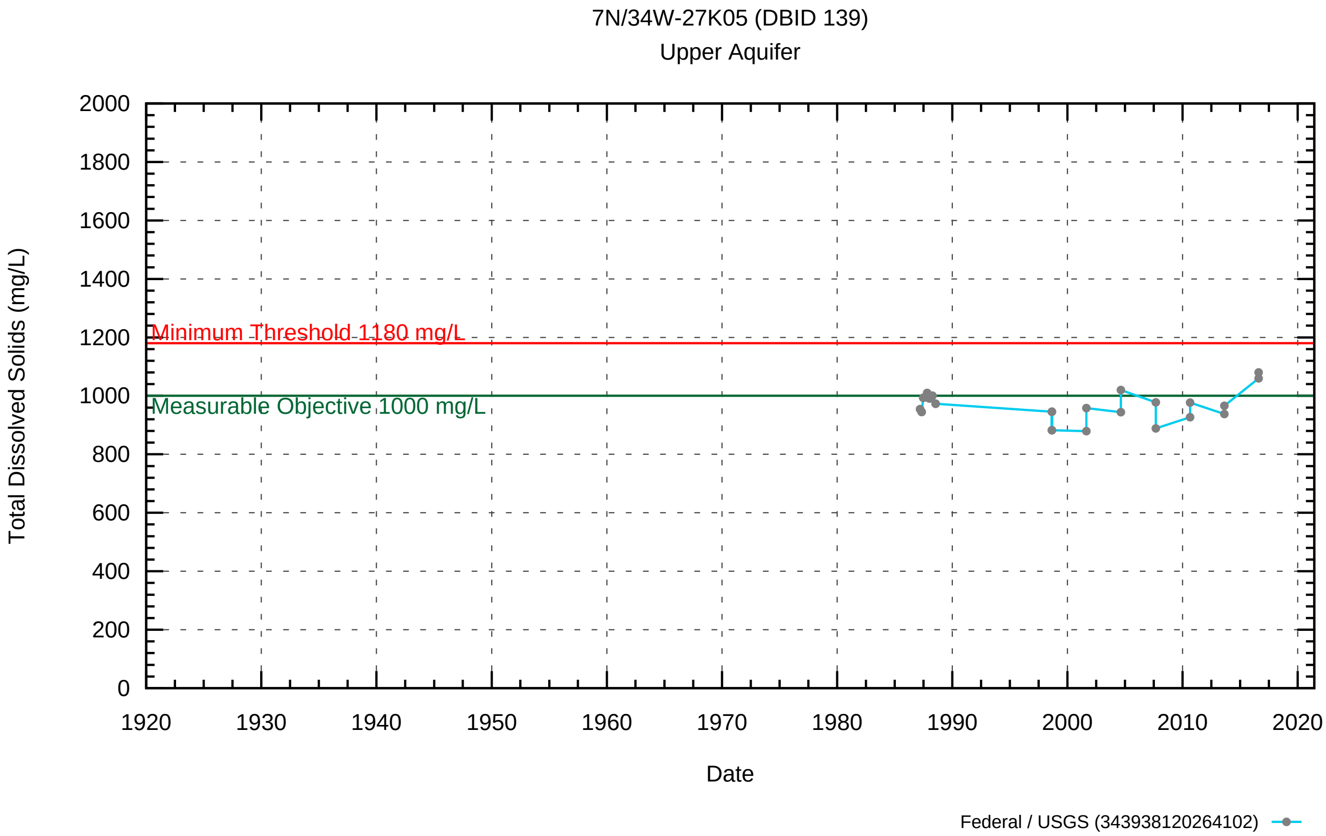

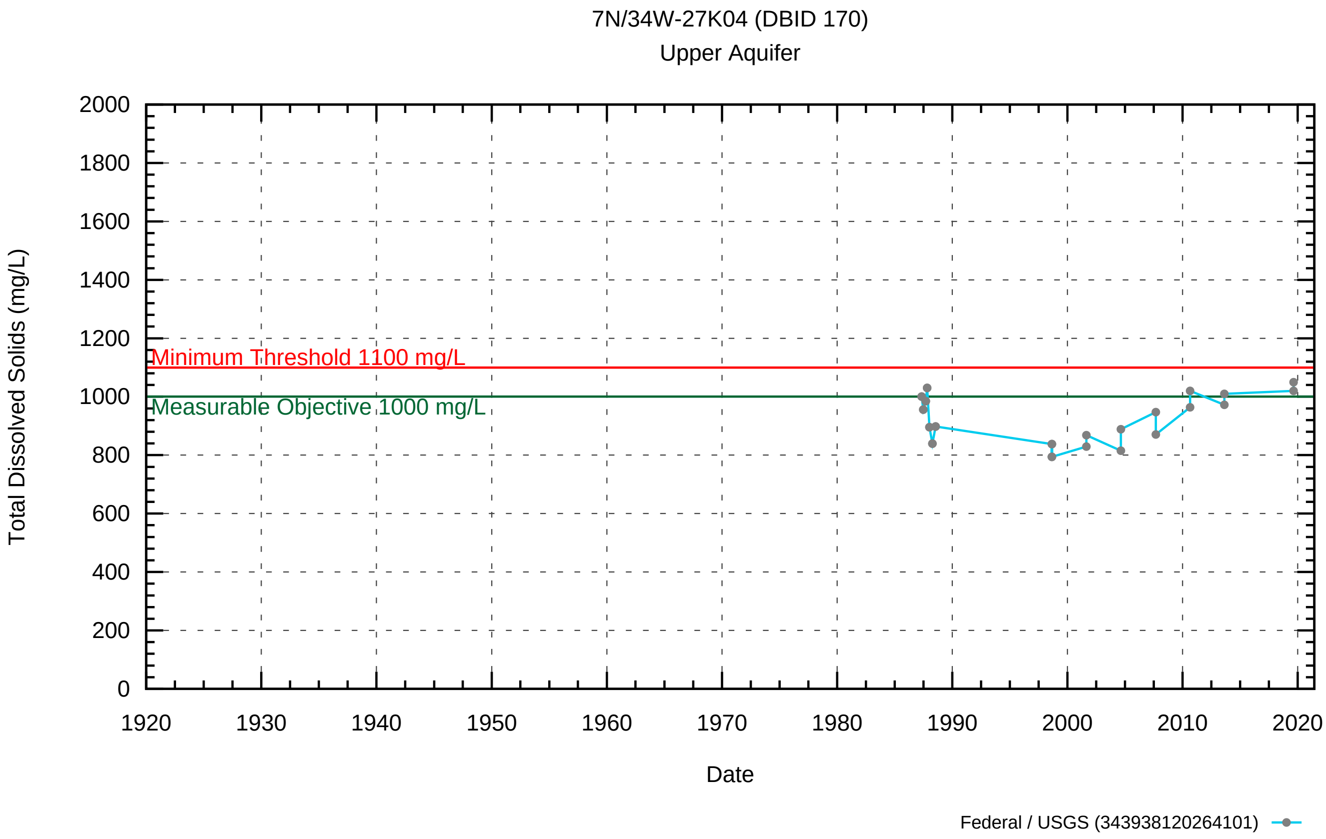

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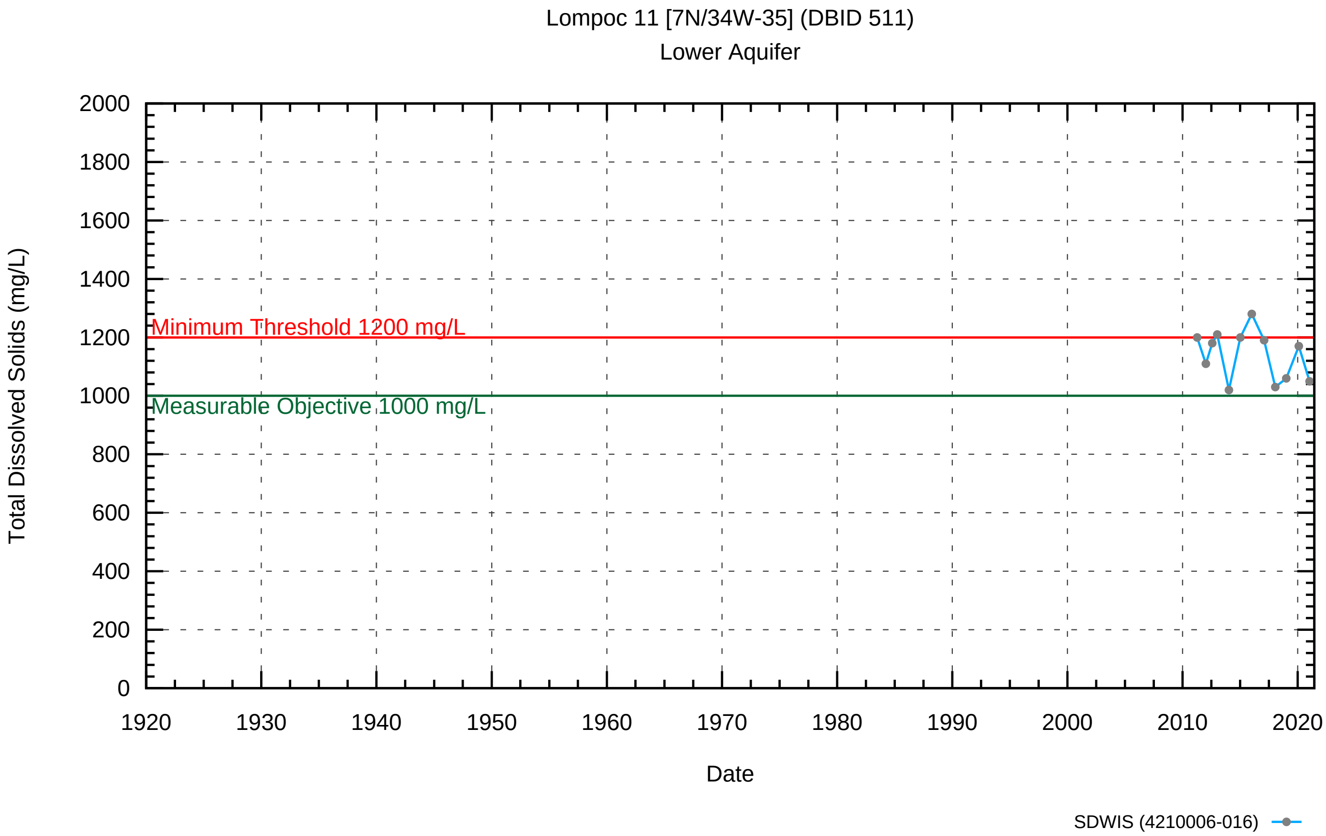

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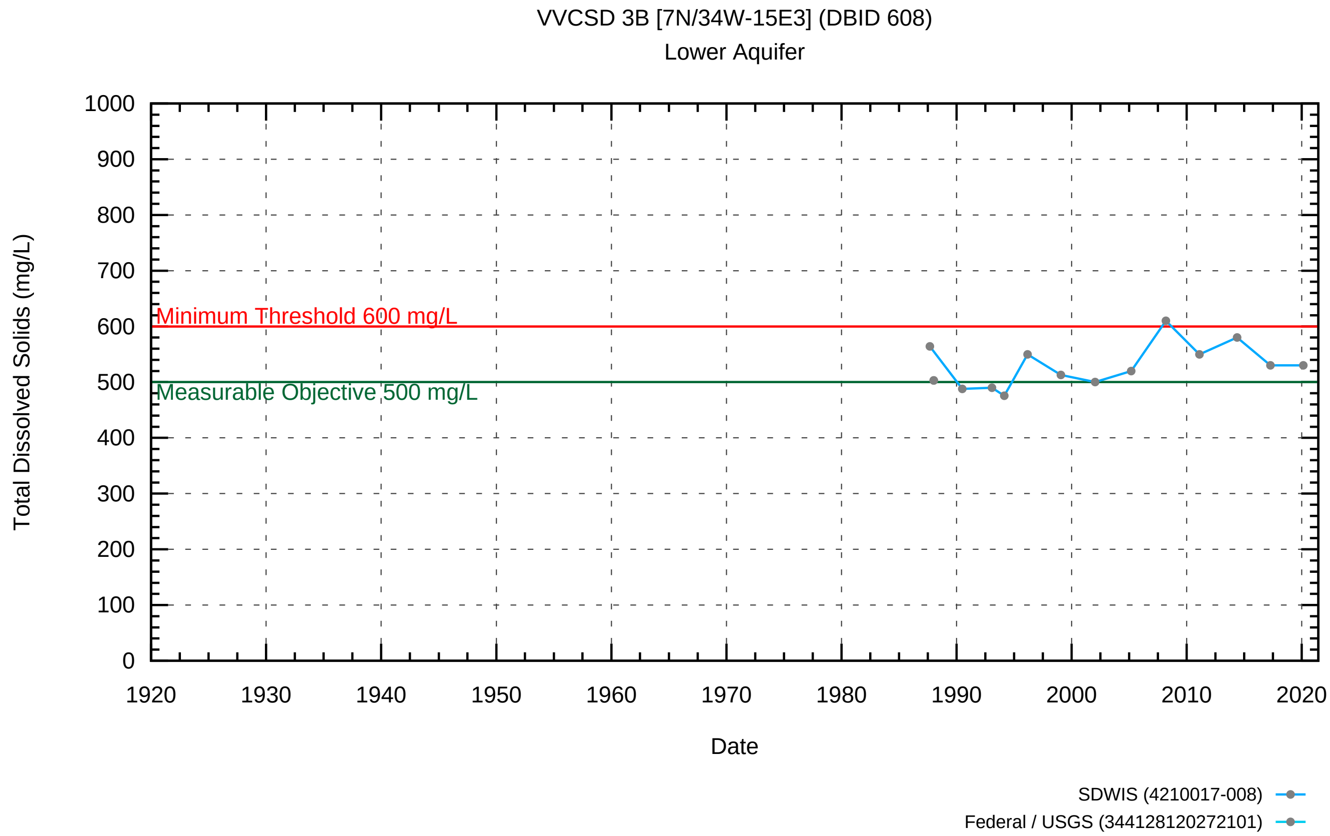
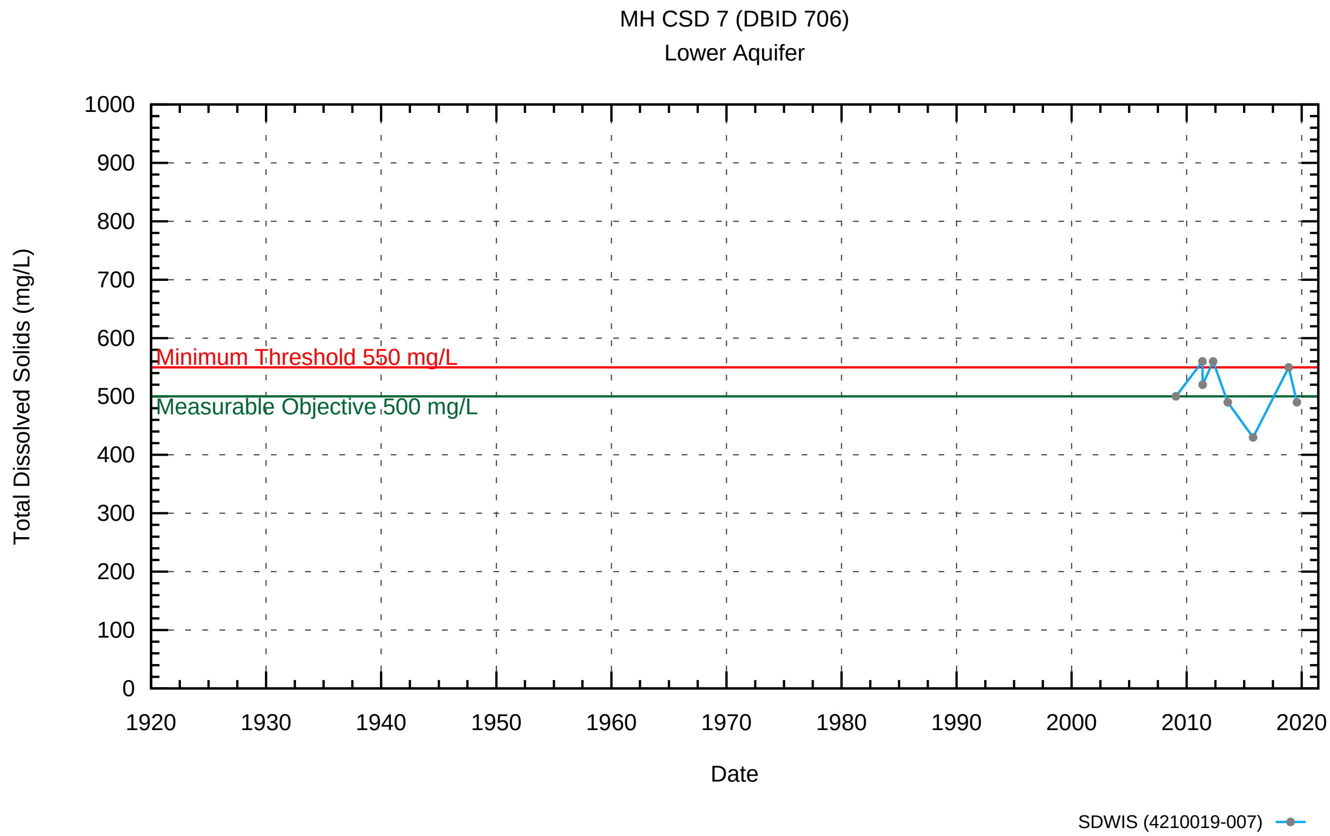
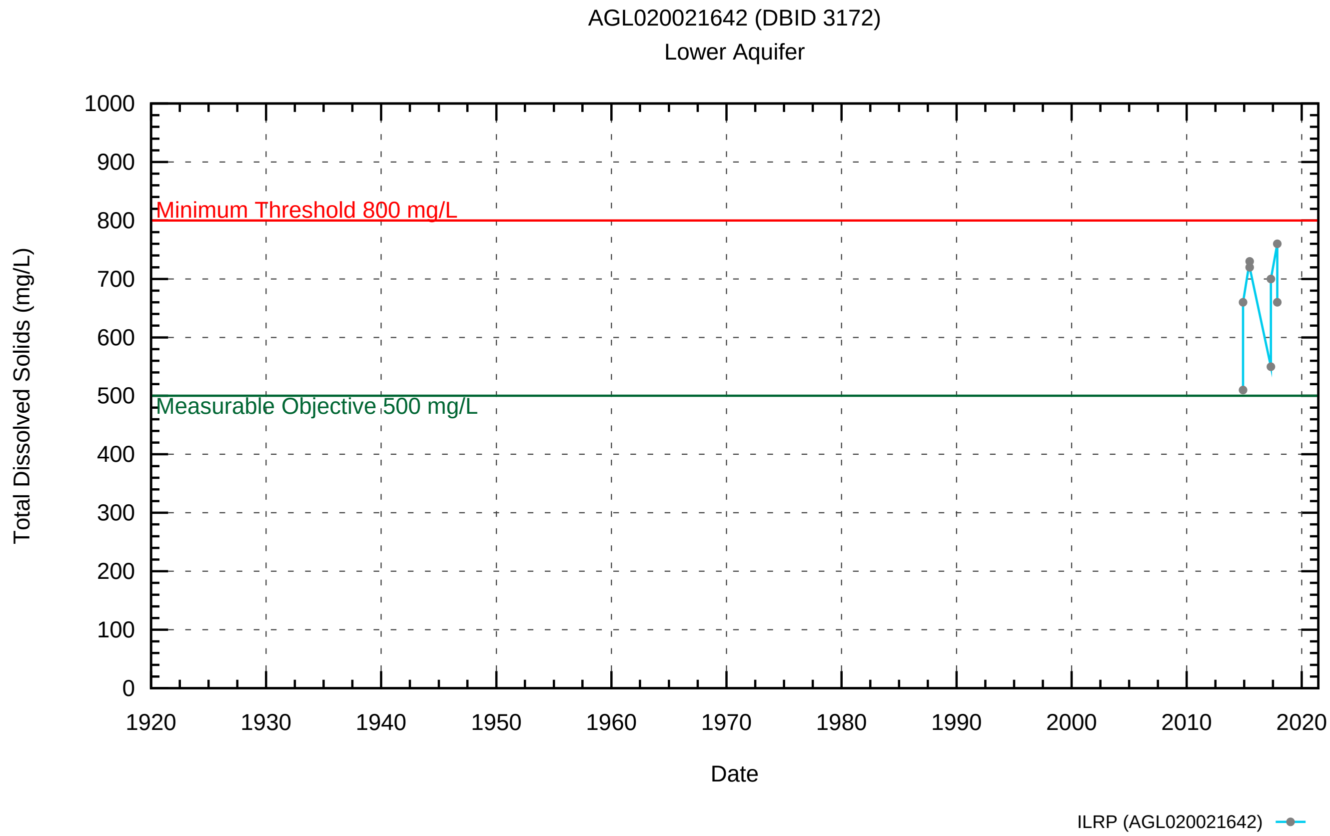
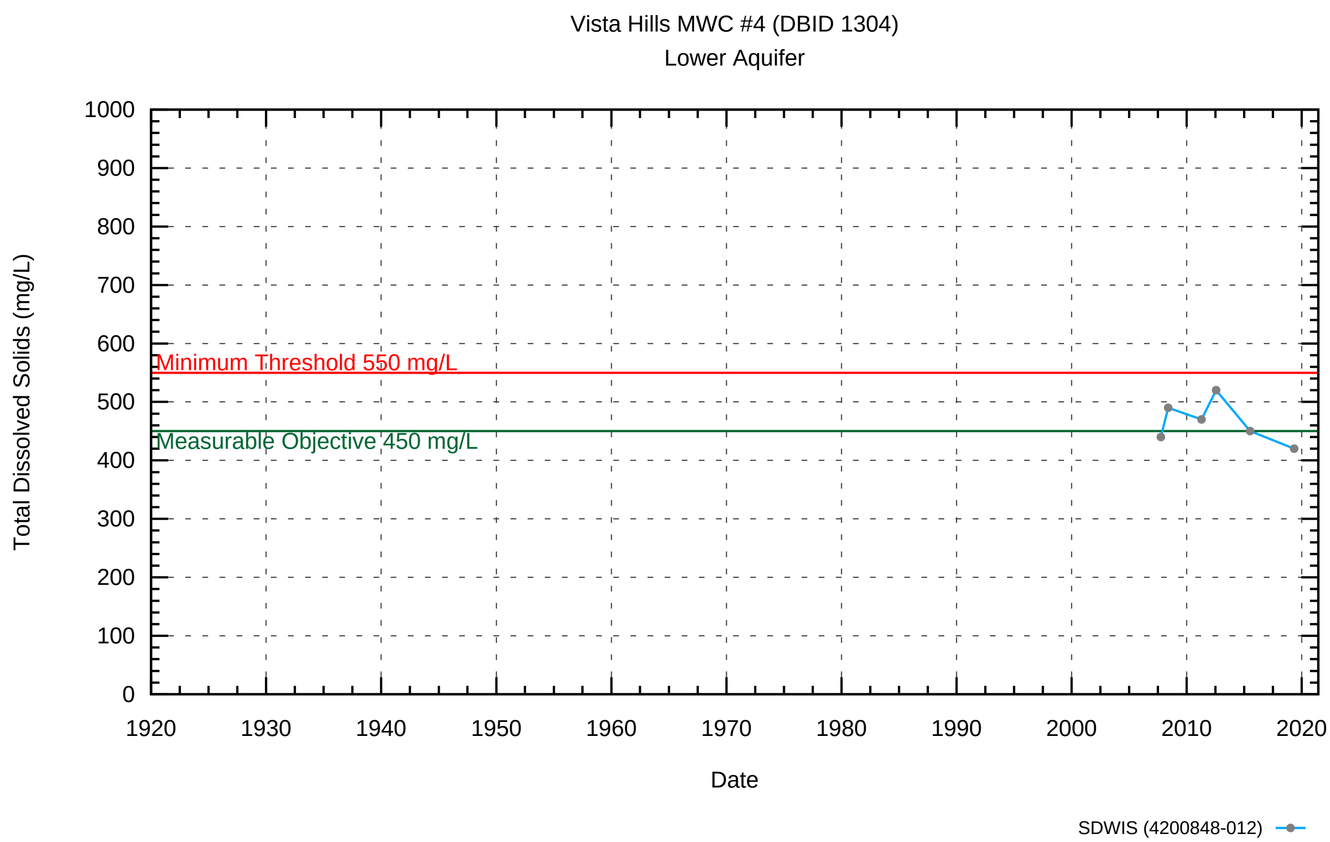


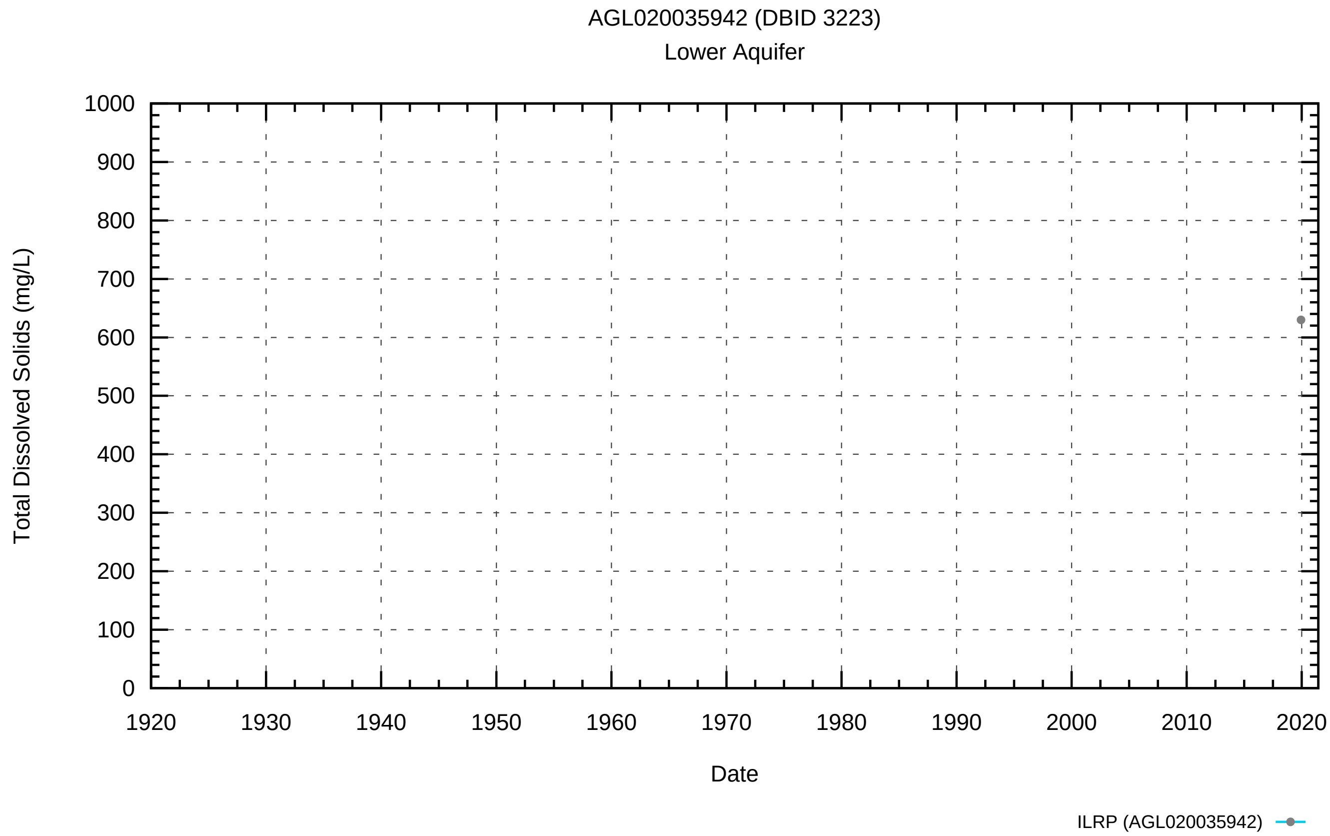


WMA: Santa Rita Uplands - Total Dissolved Solids





WMA: Santa Rita Uplands - Total Dissolved Solids



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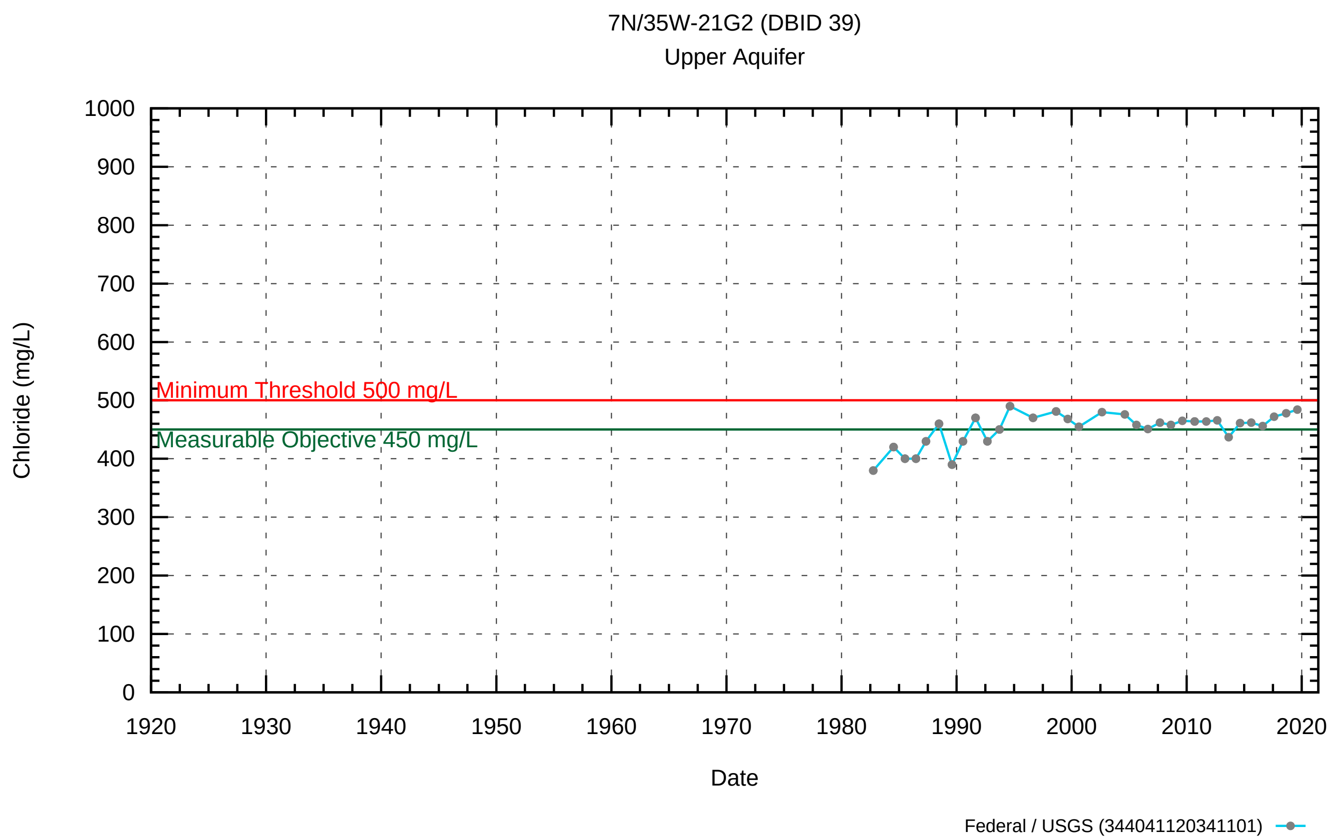

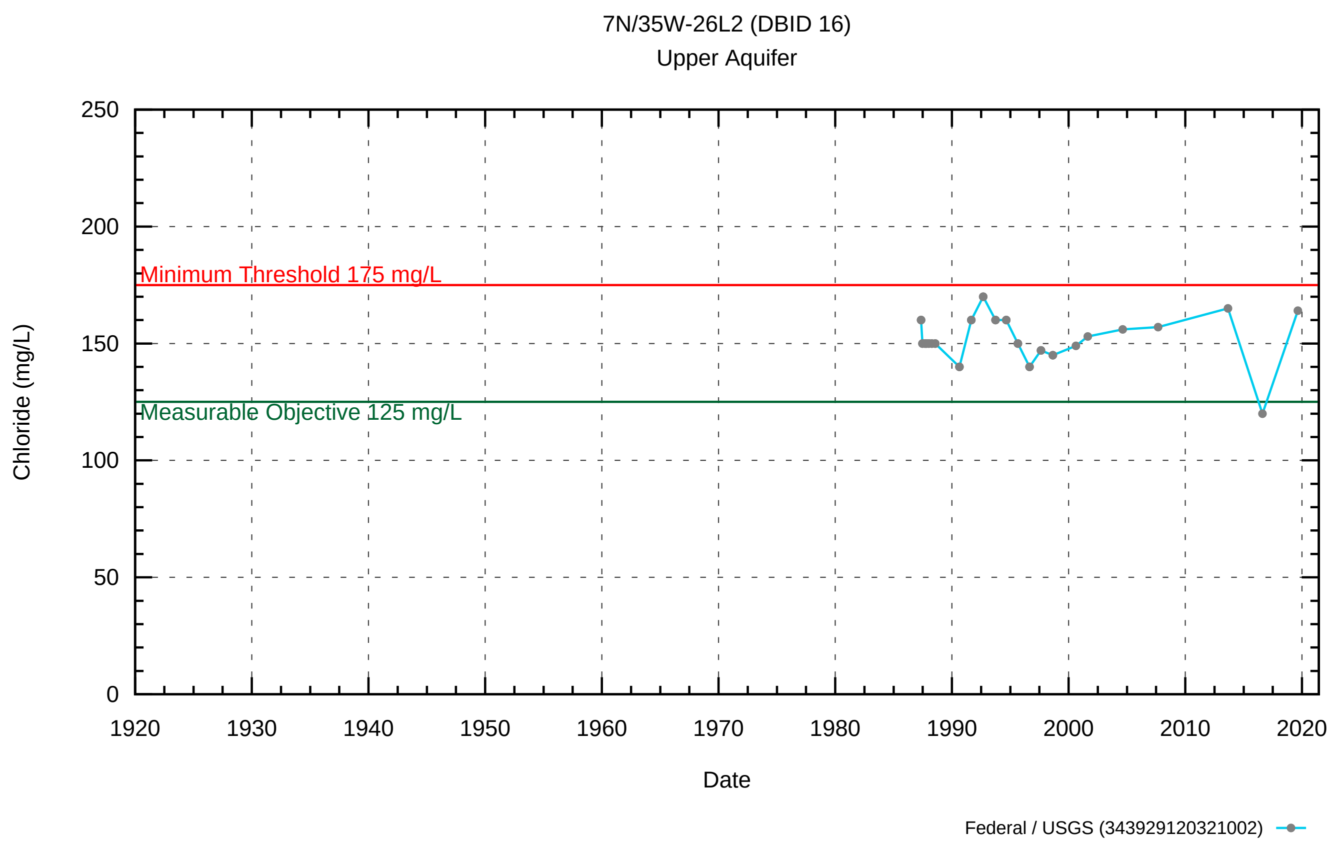

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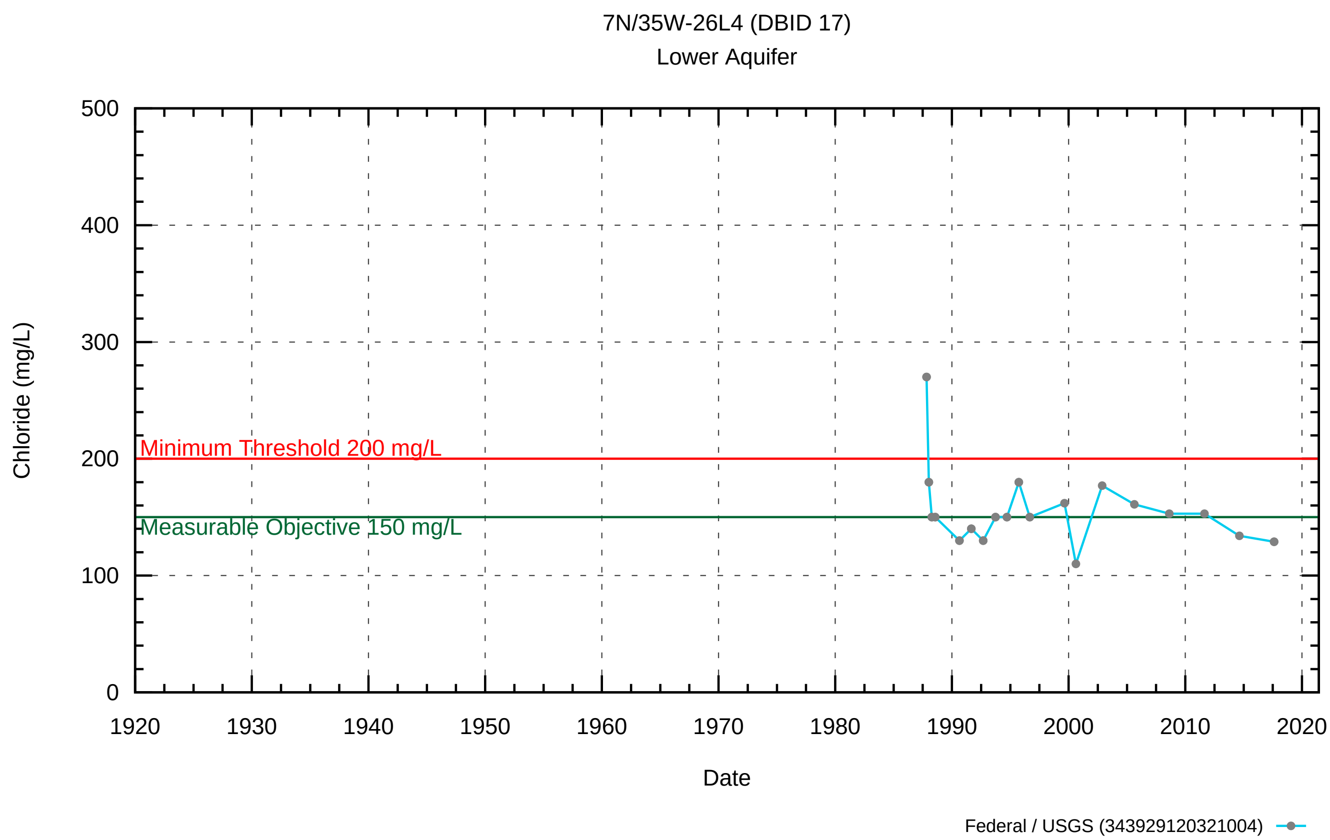

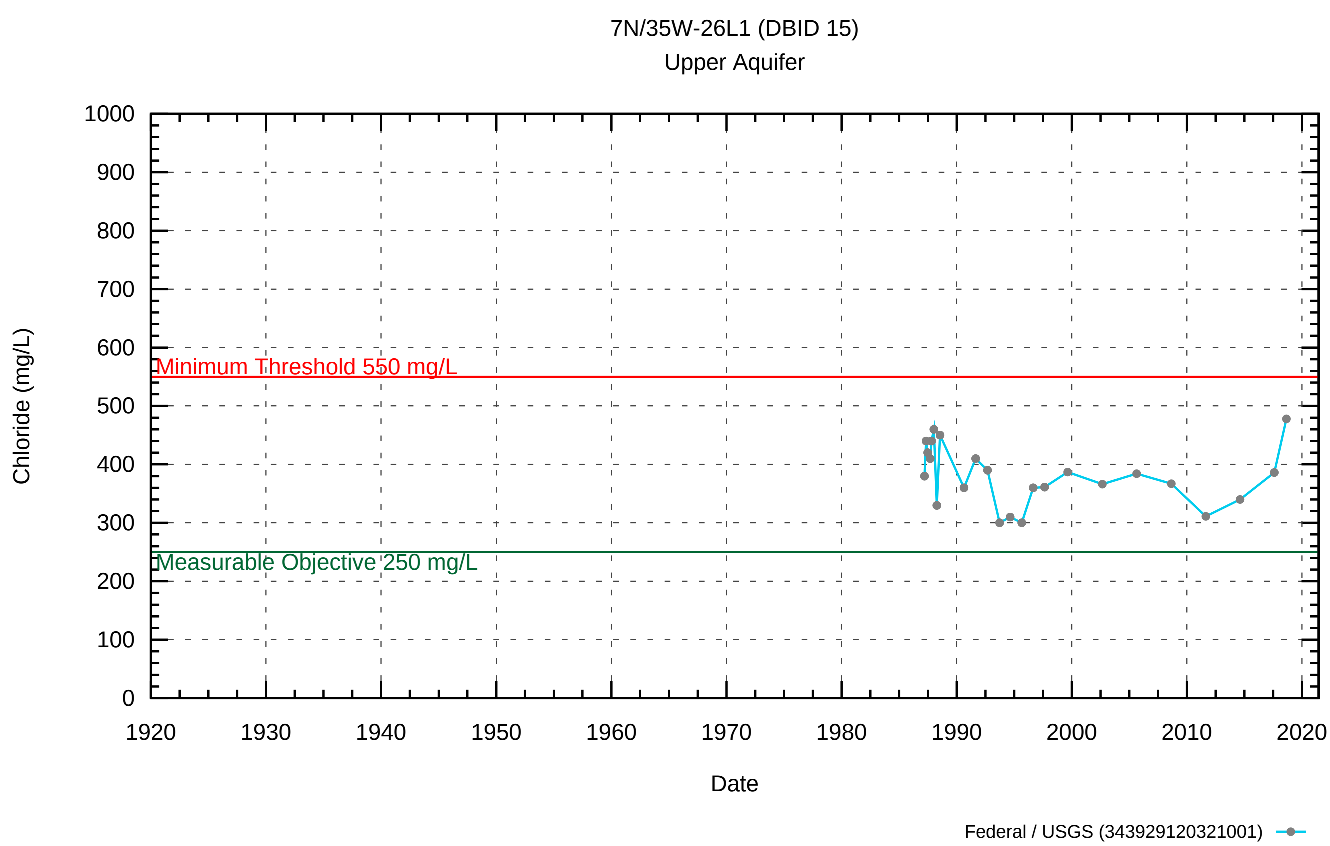

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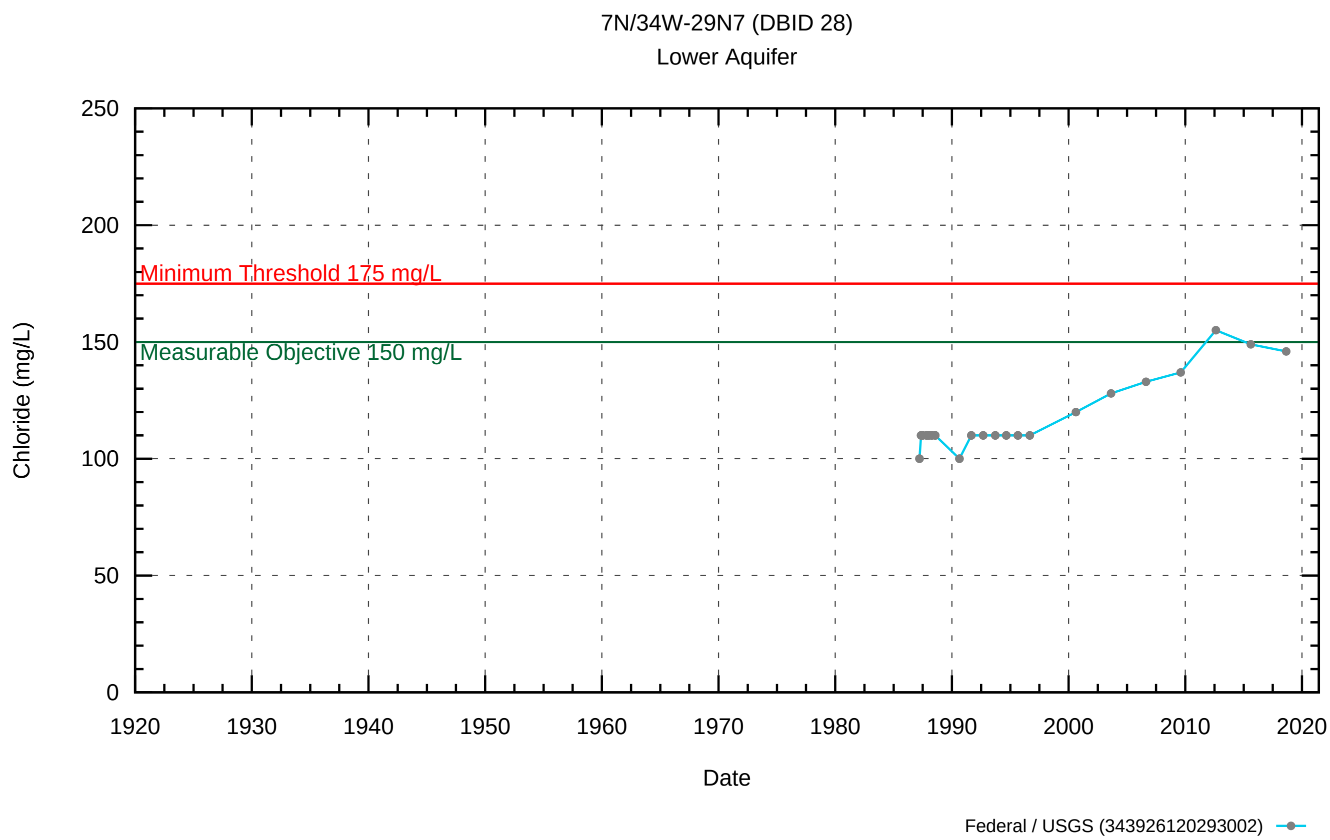

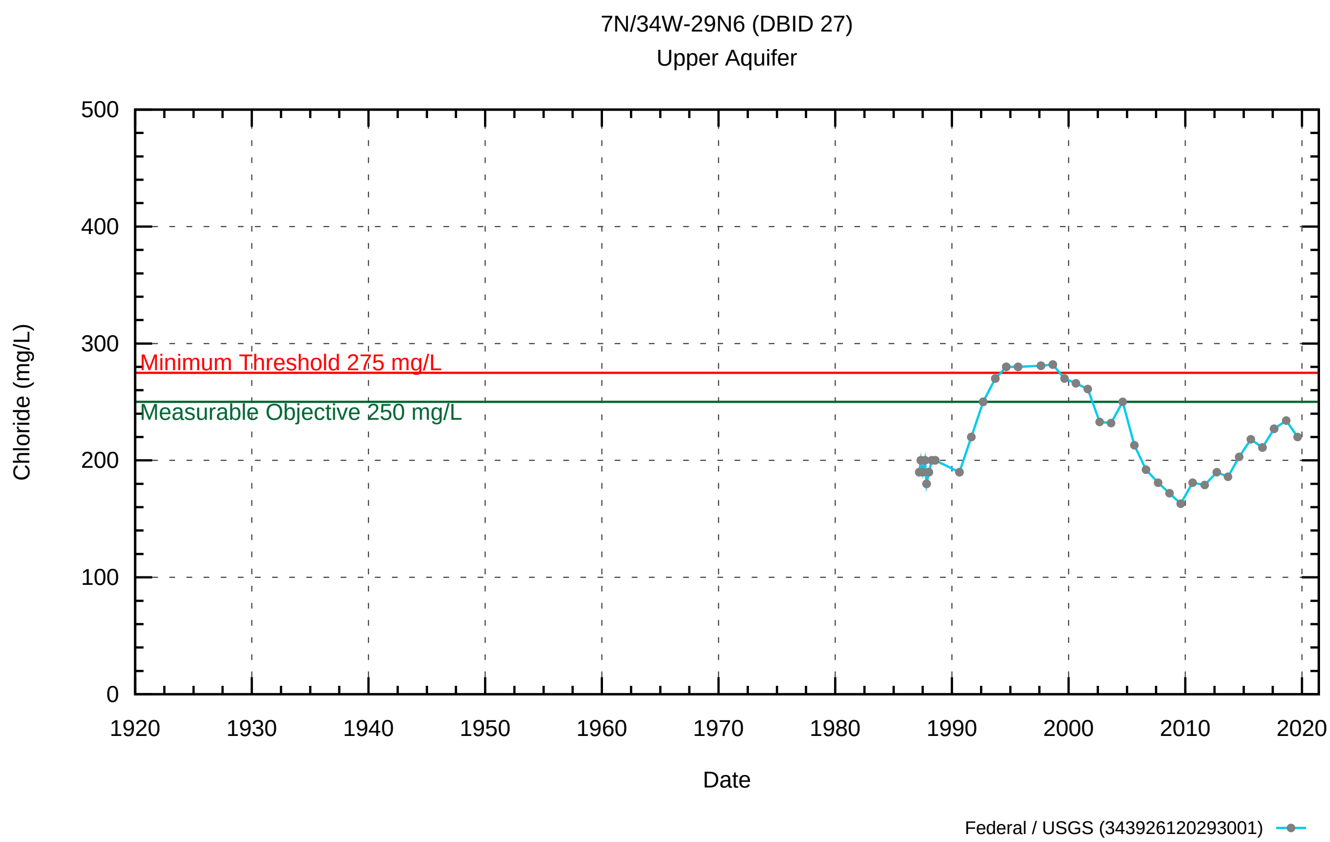

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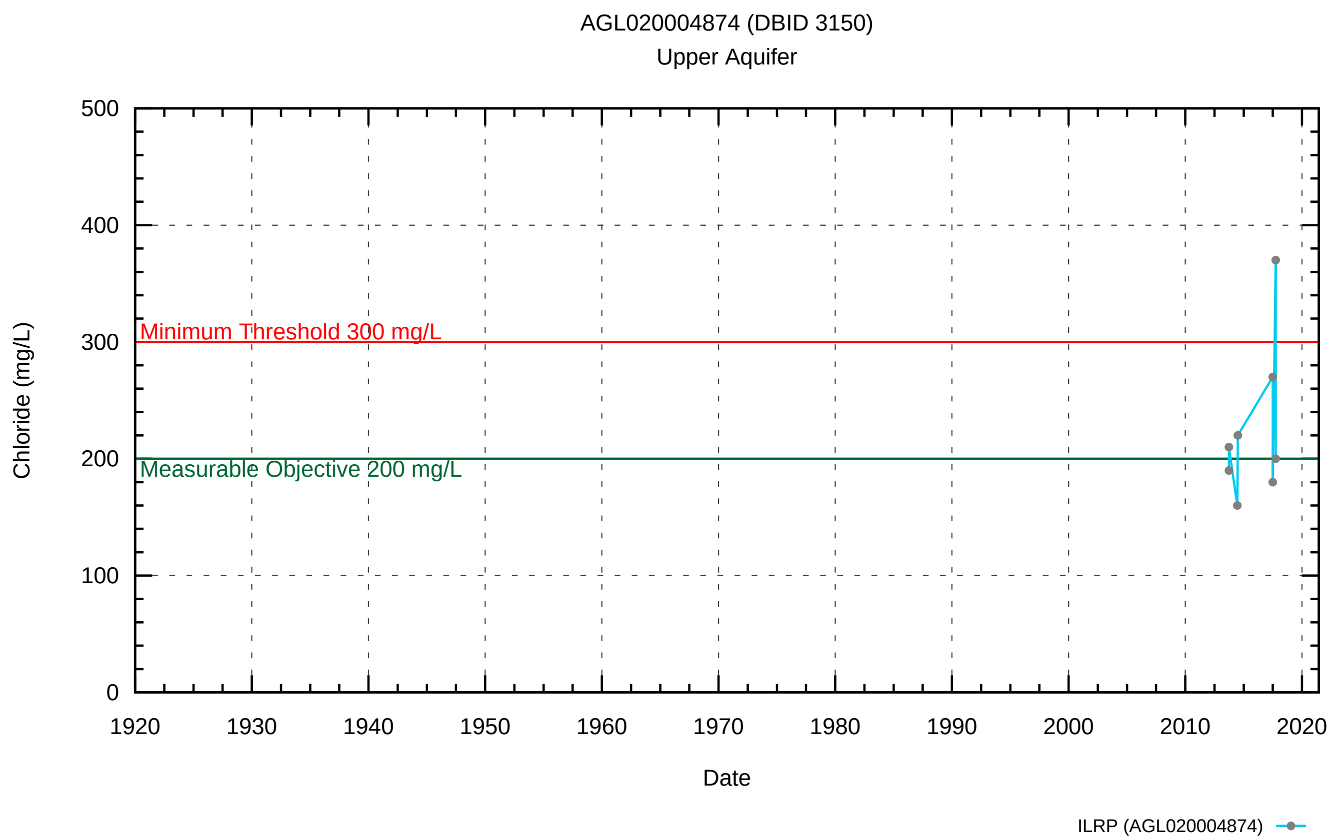

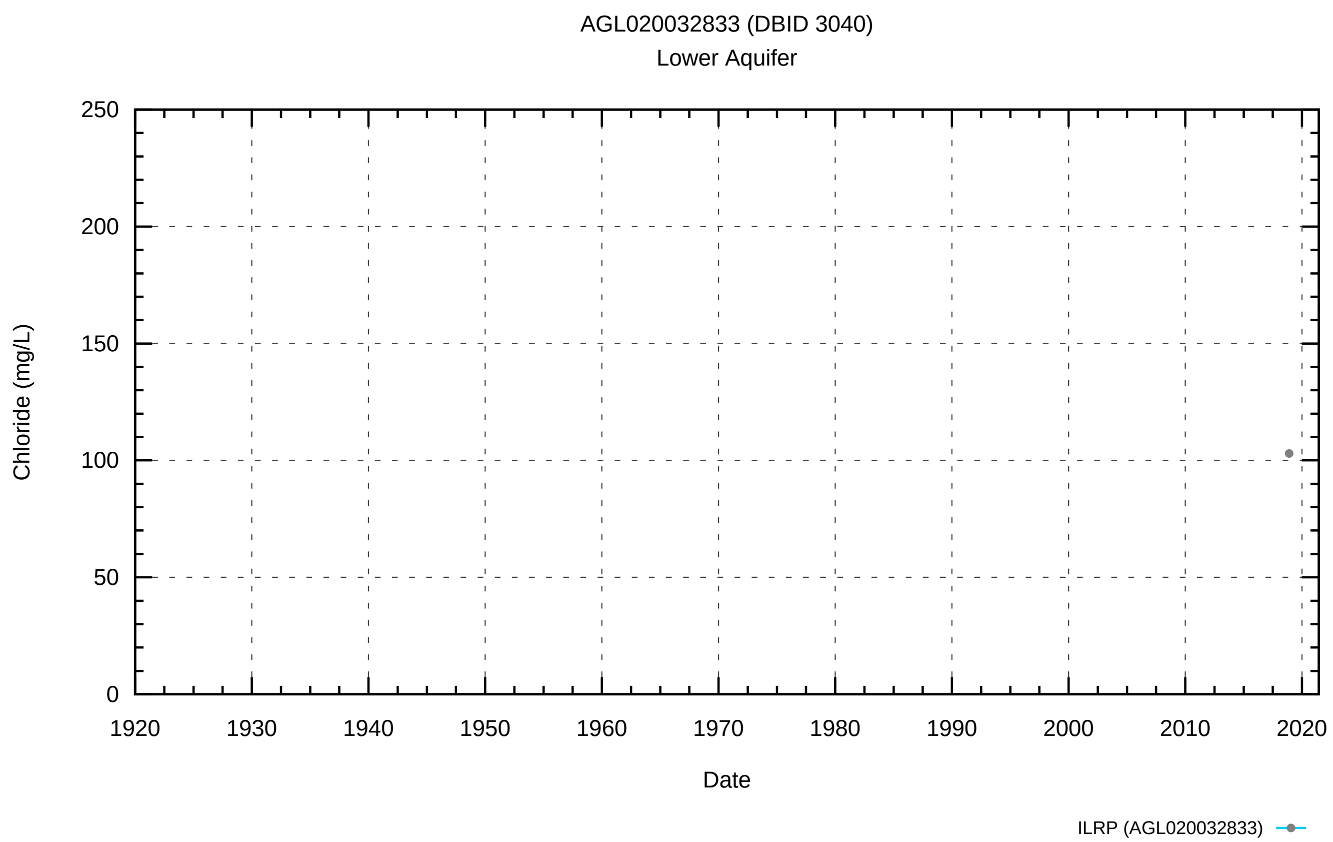

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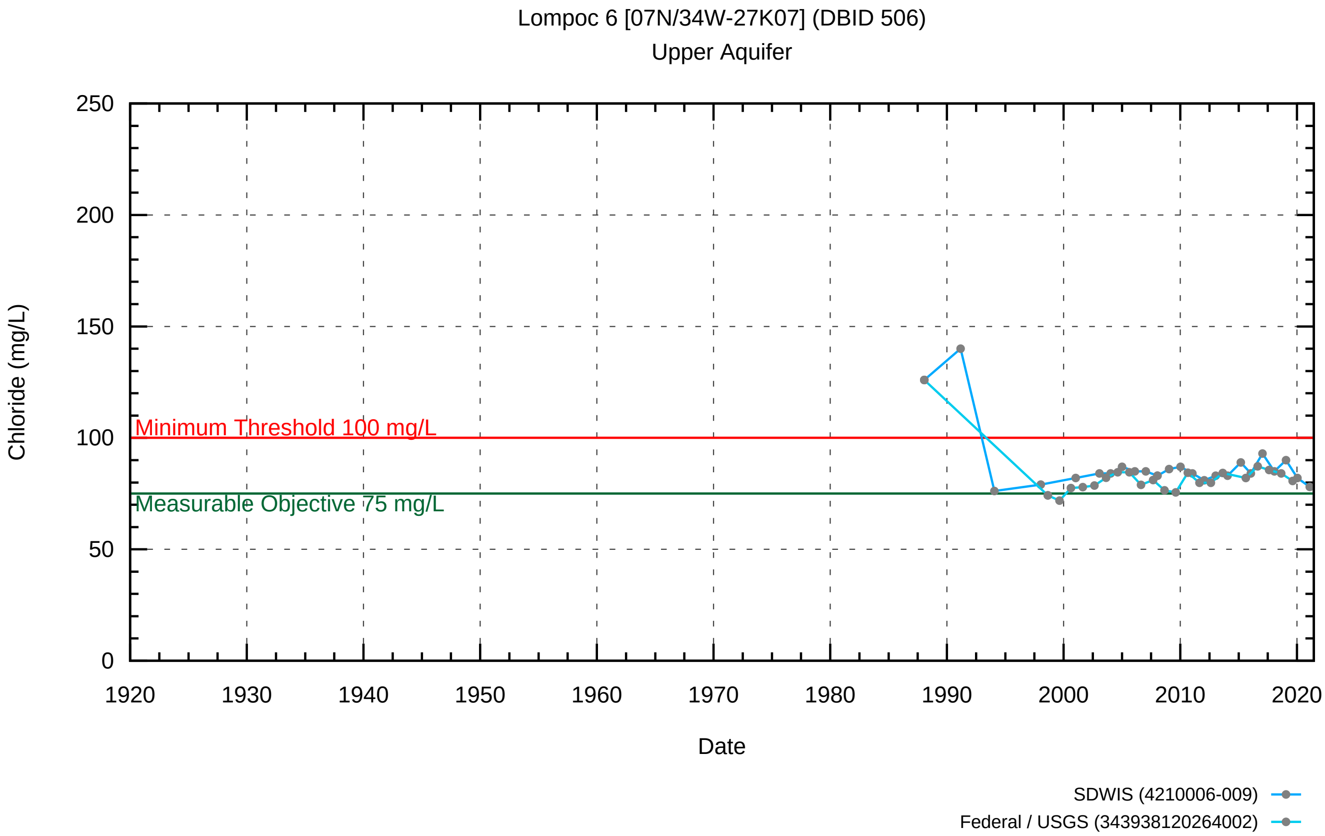

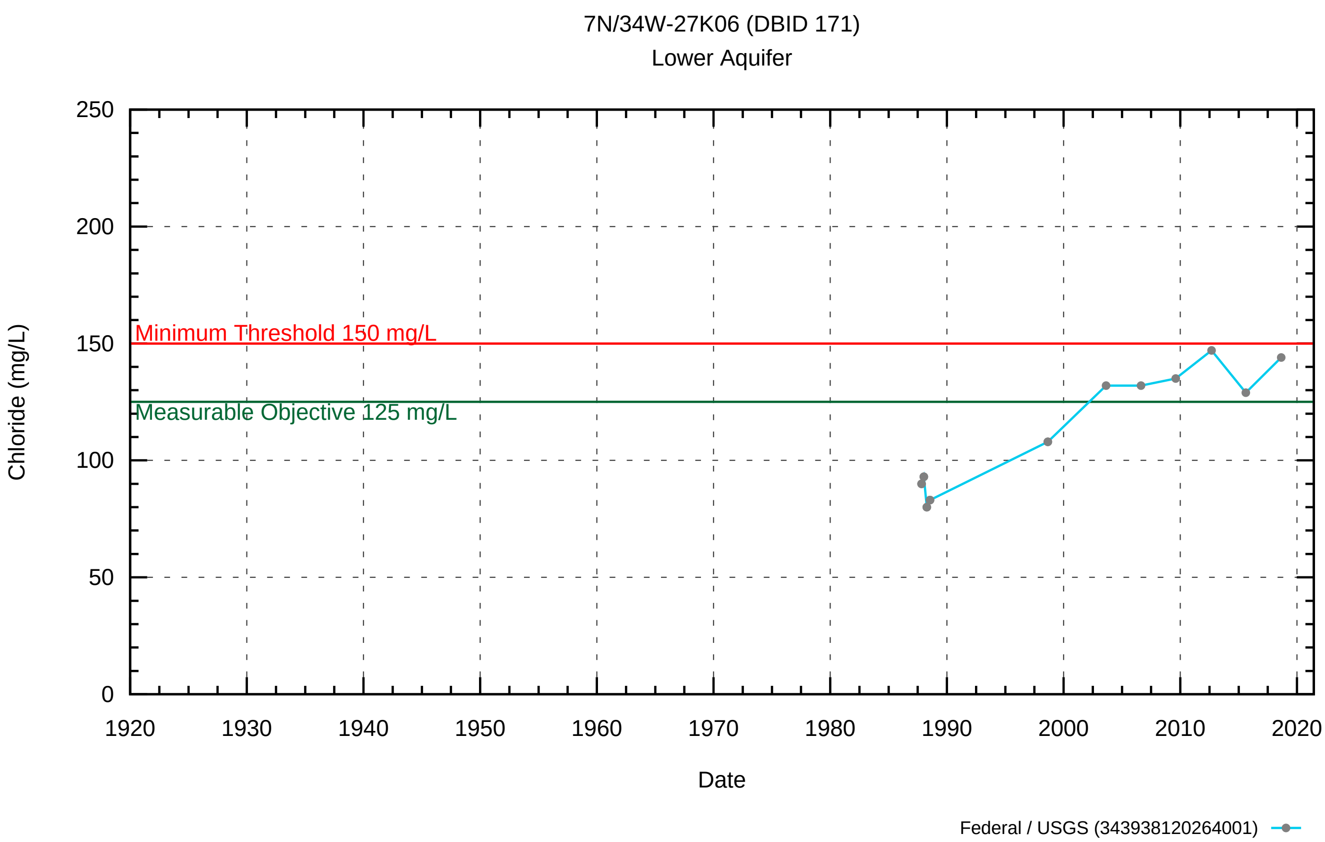

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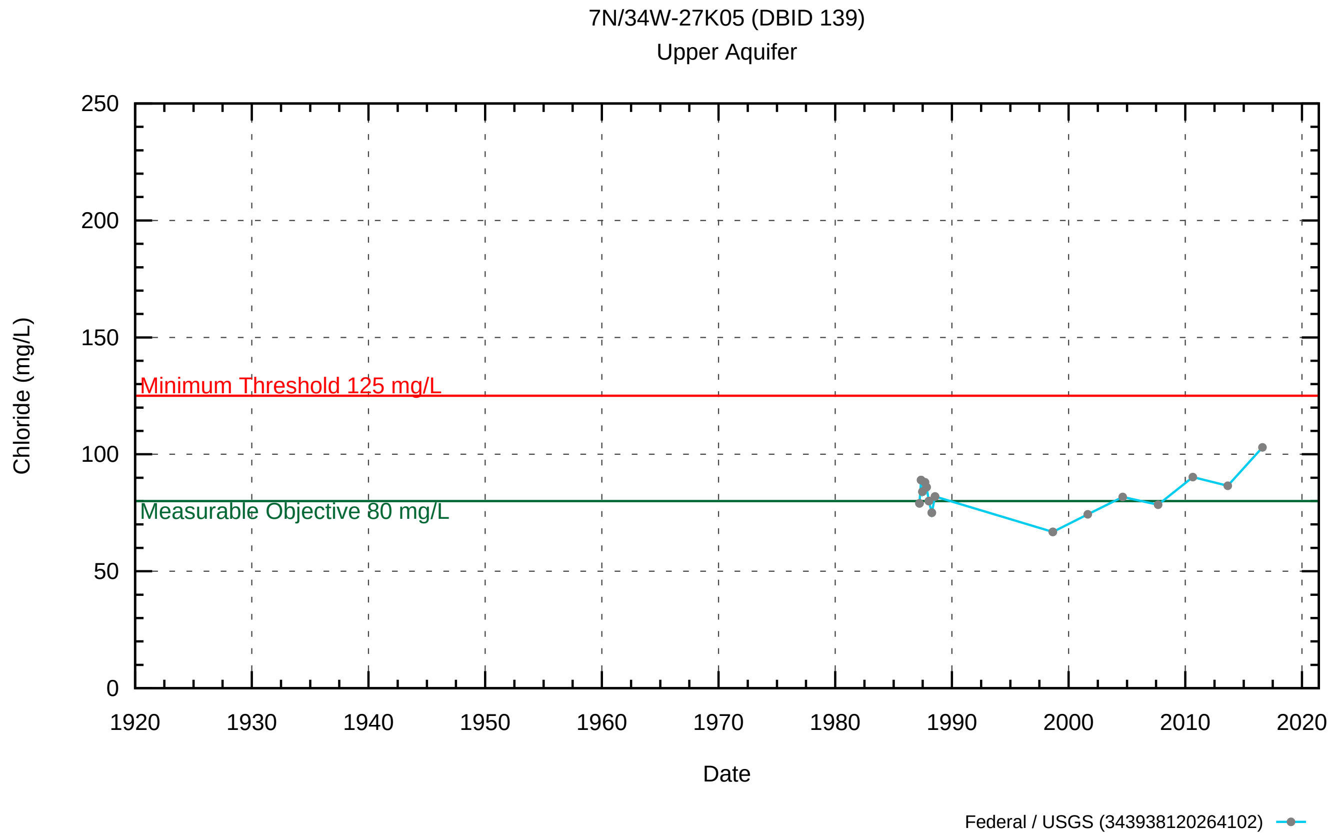

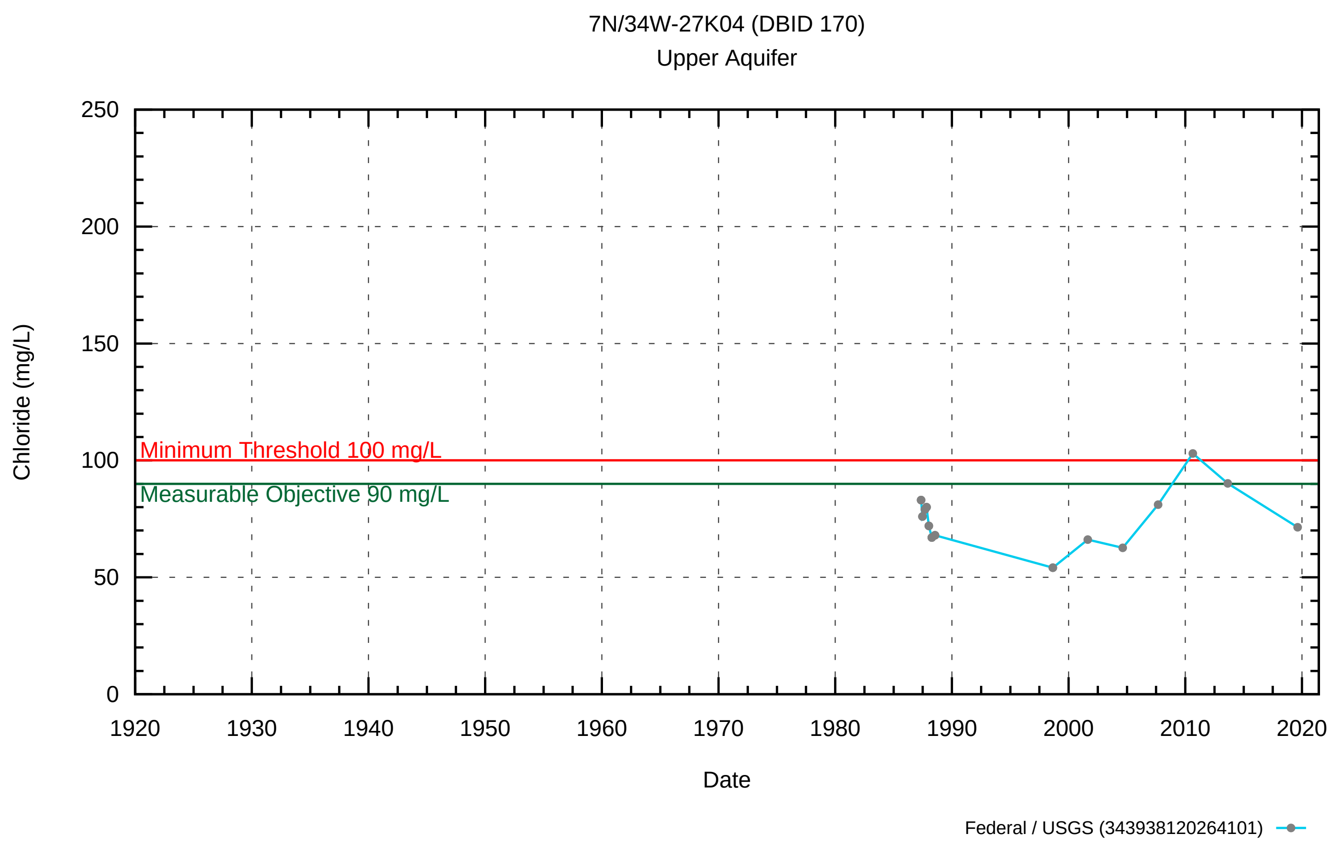

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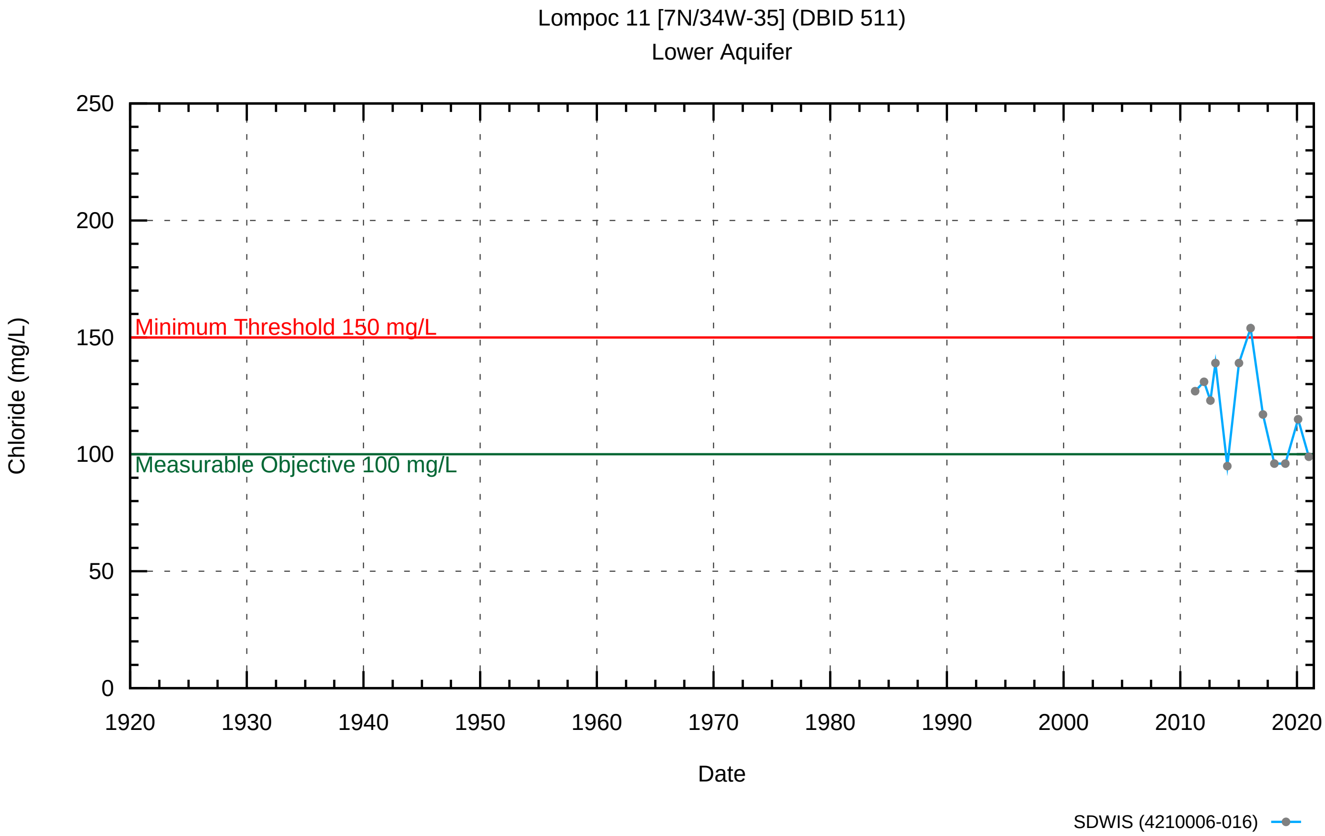

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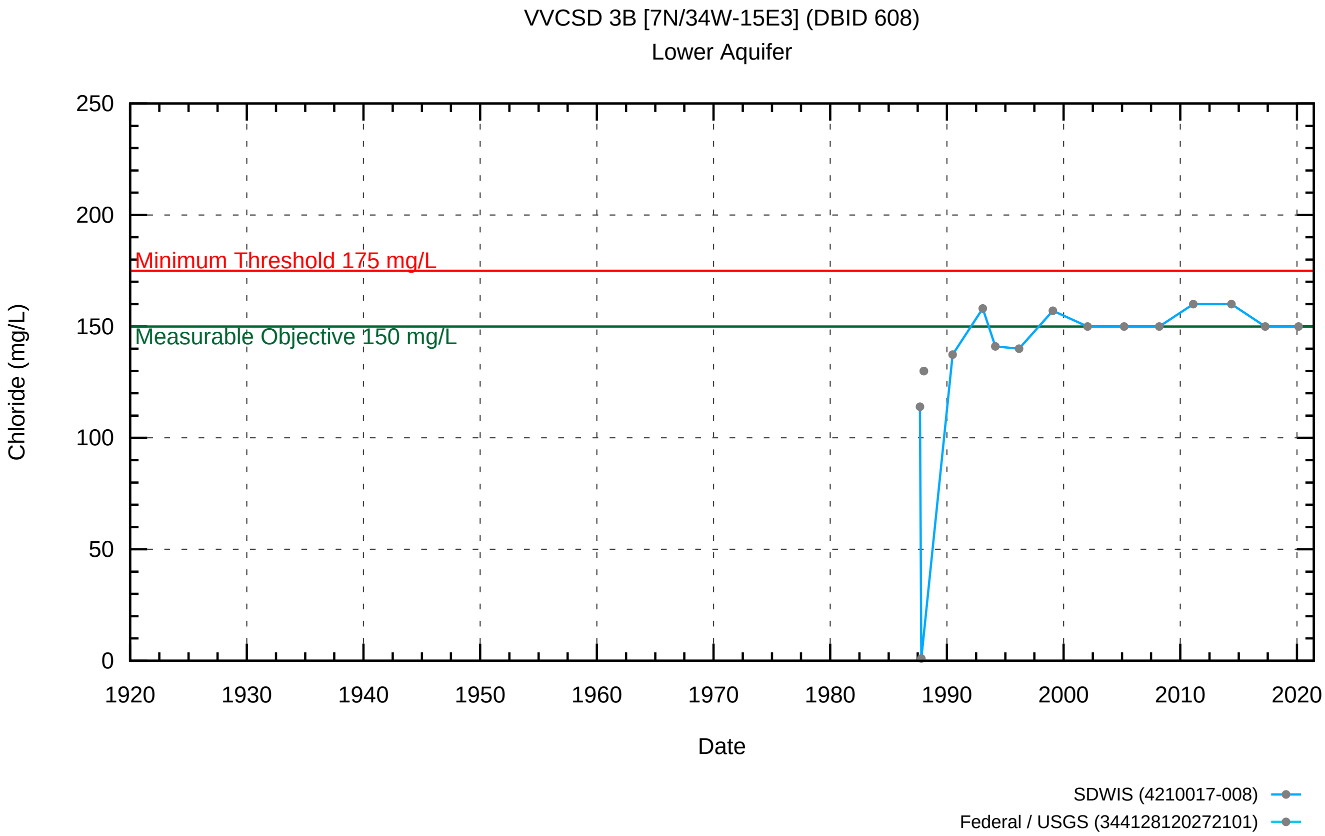

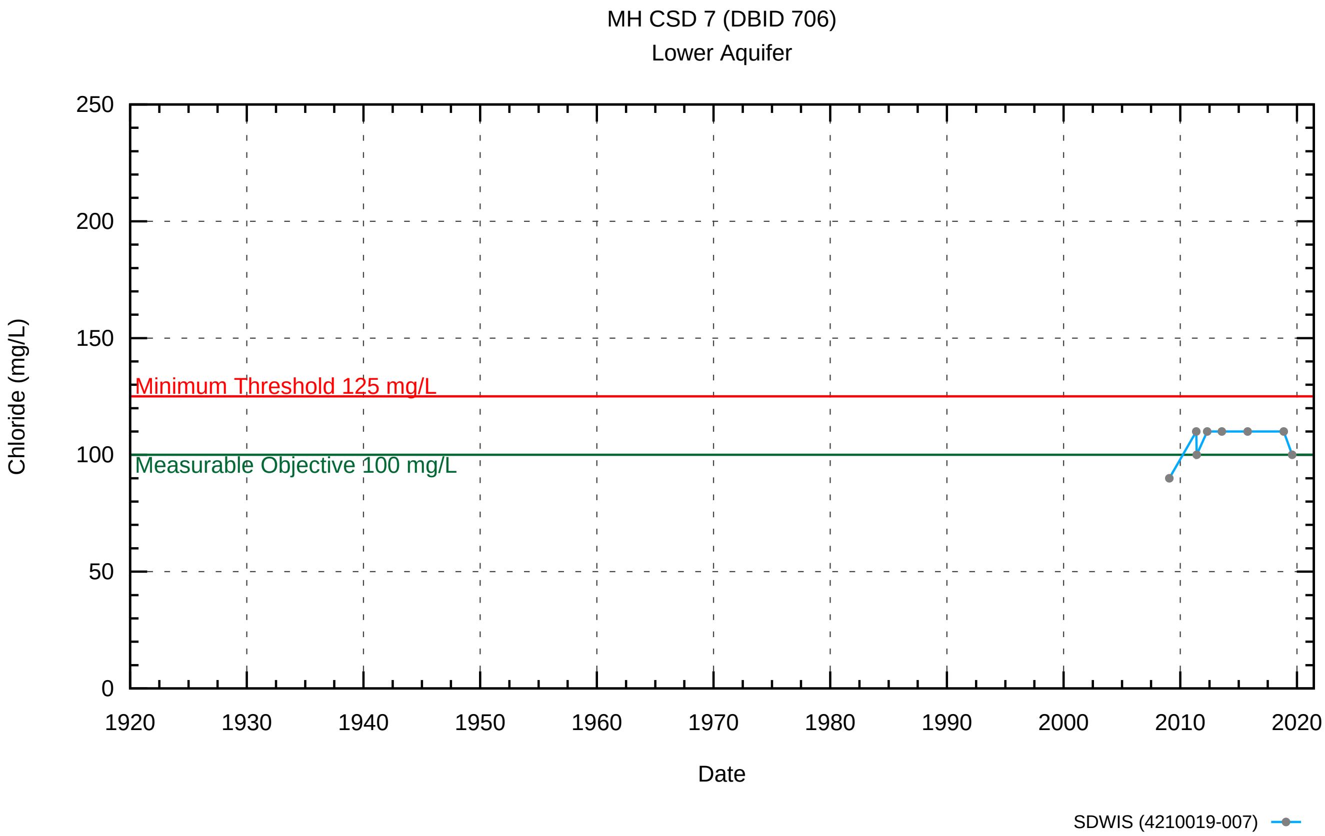

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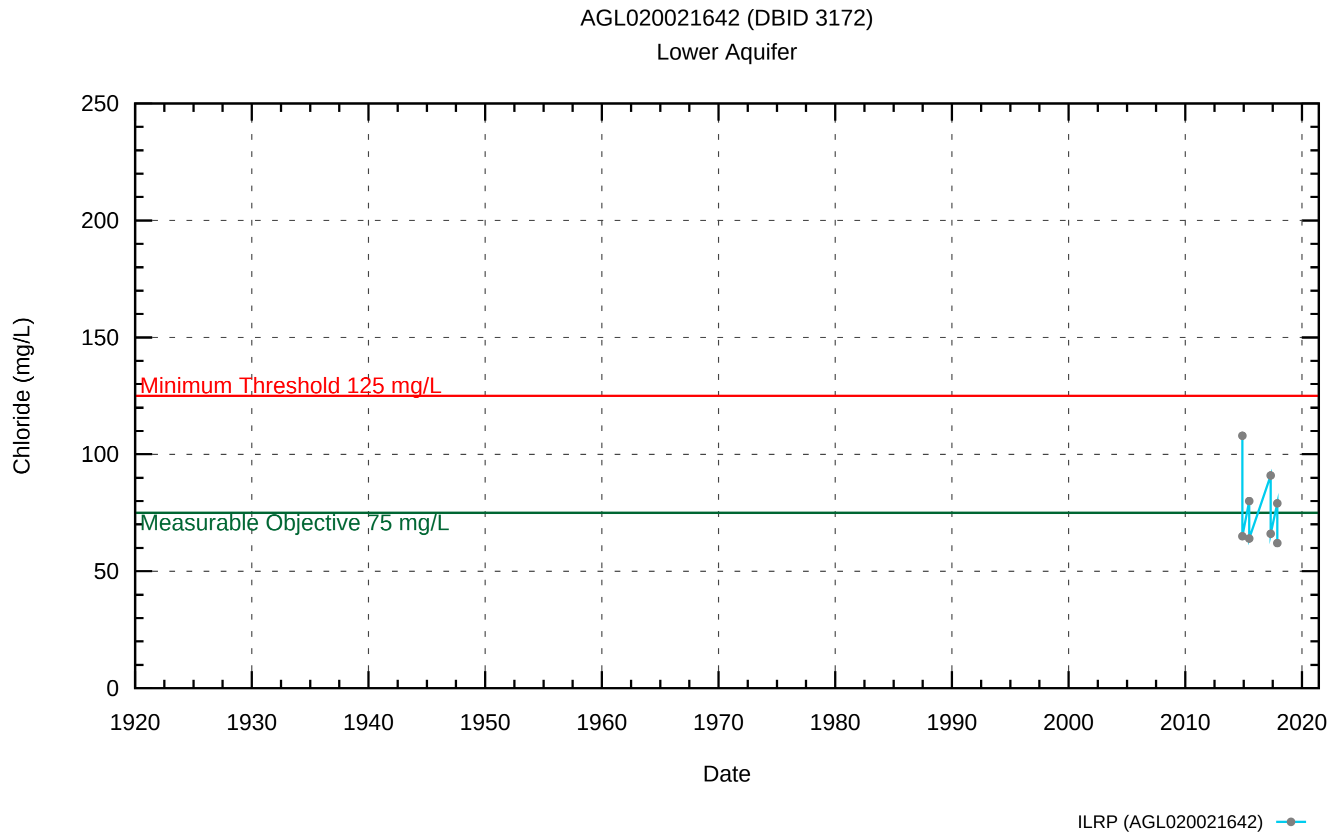

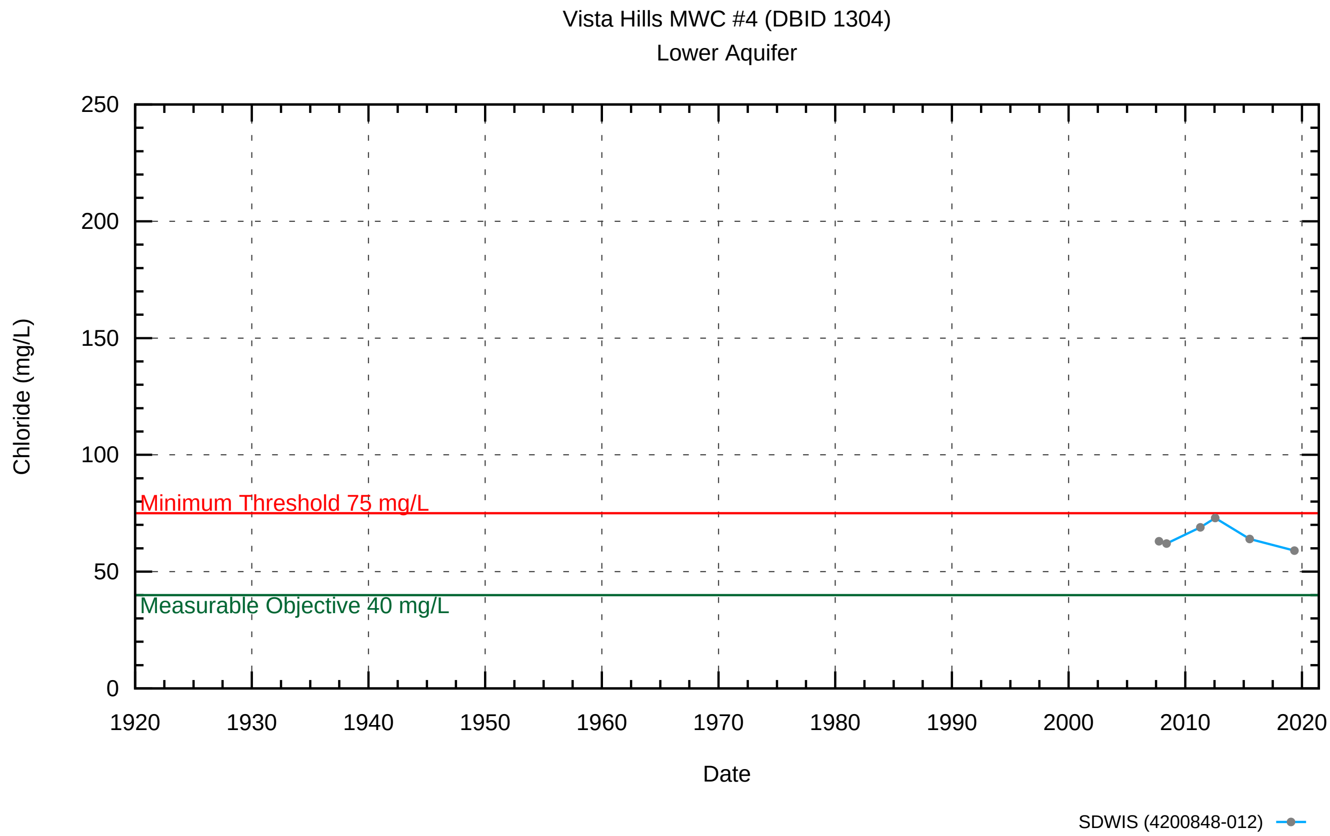

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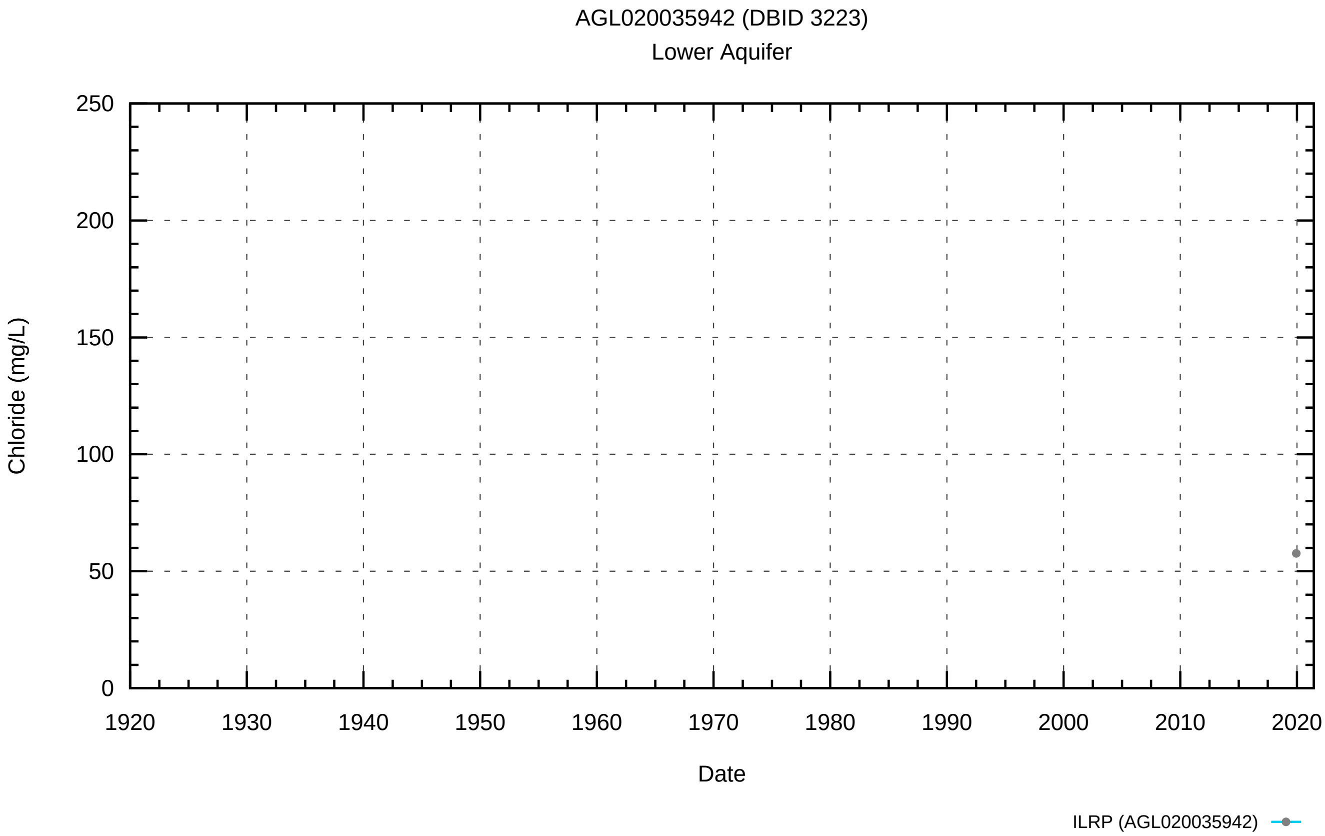

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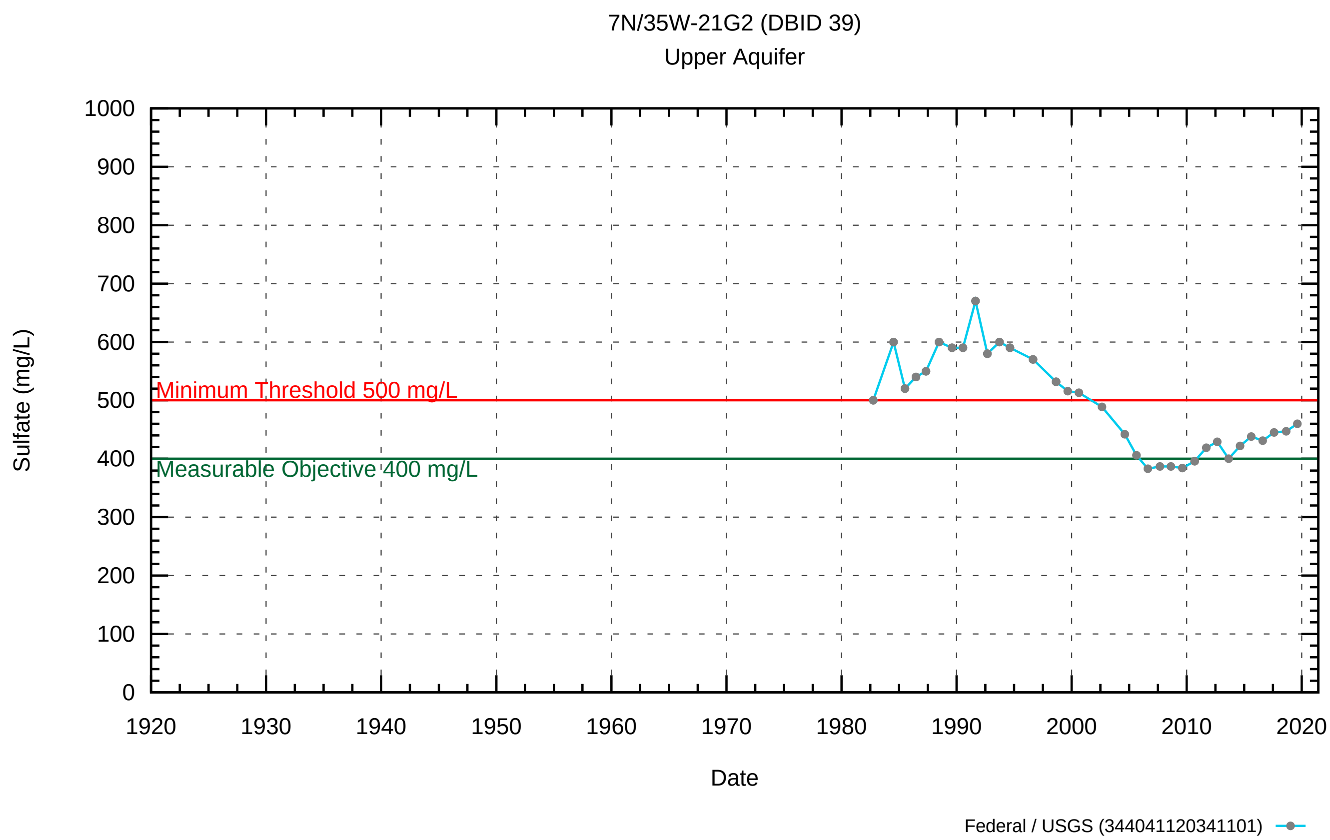

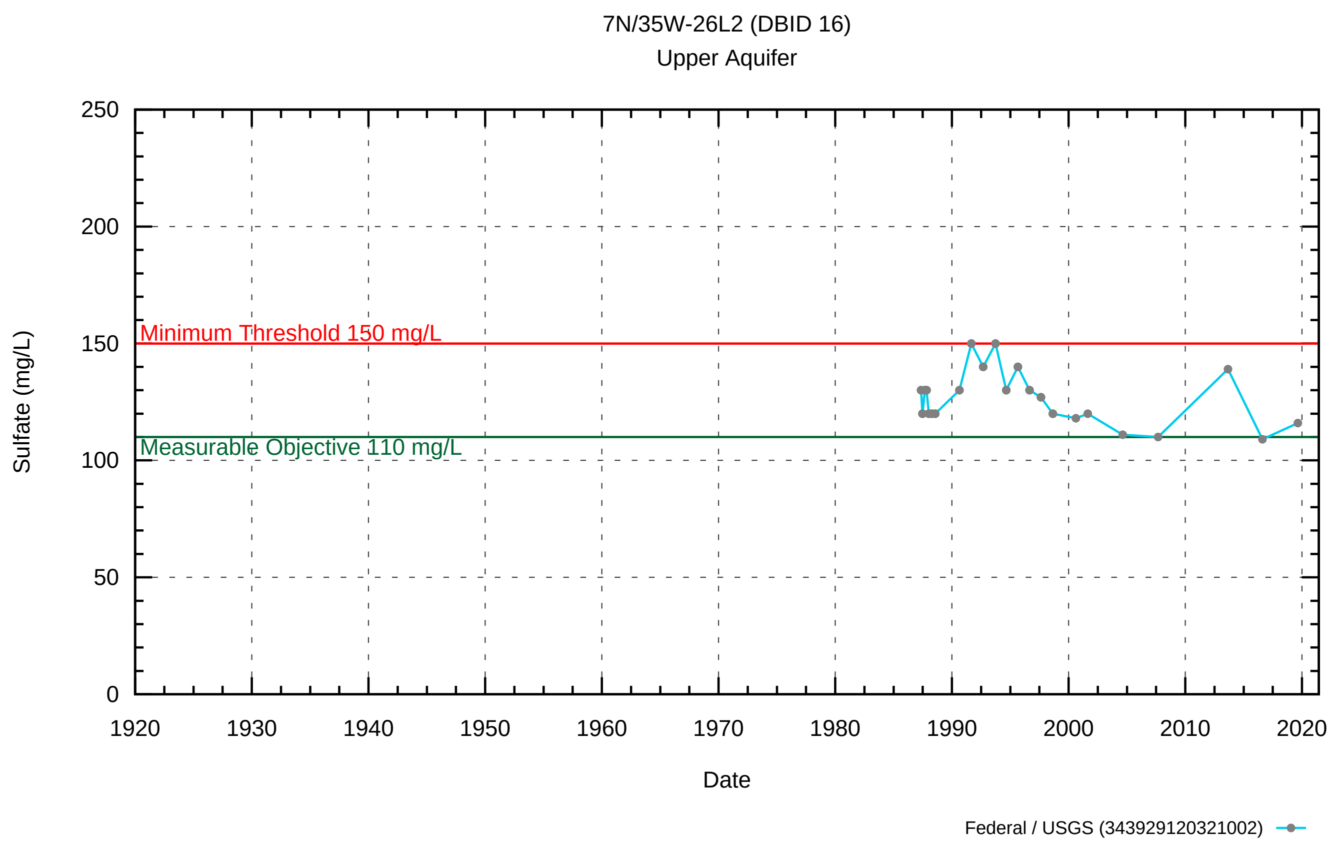

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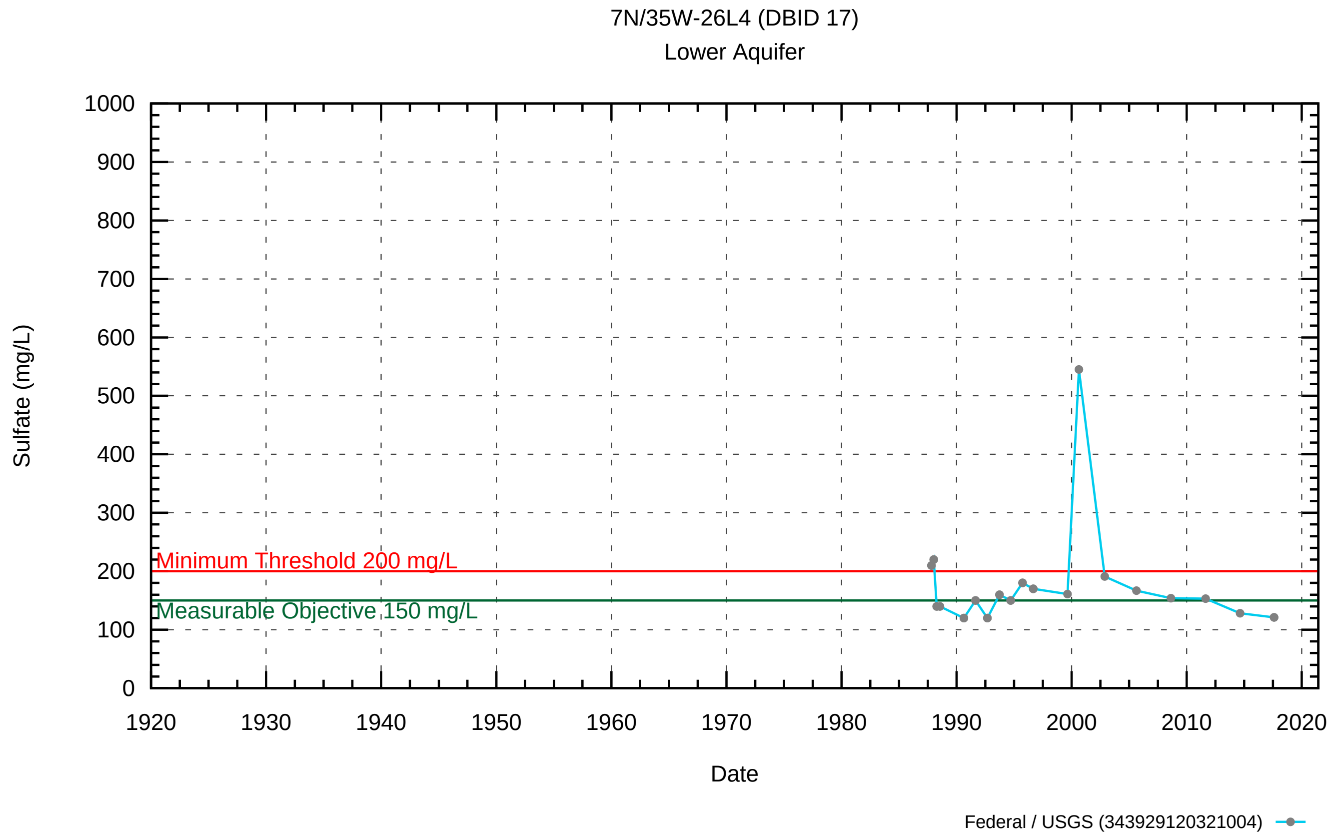

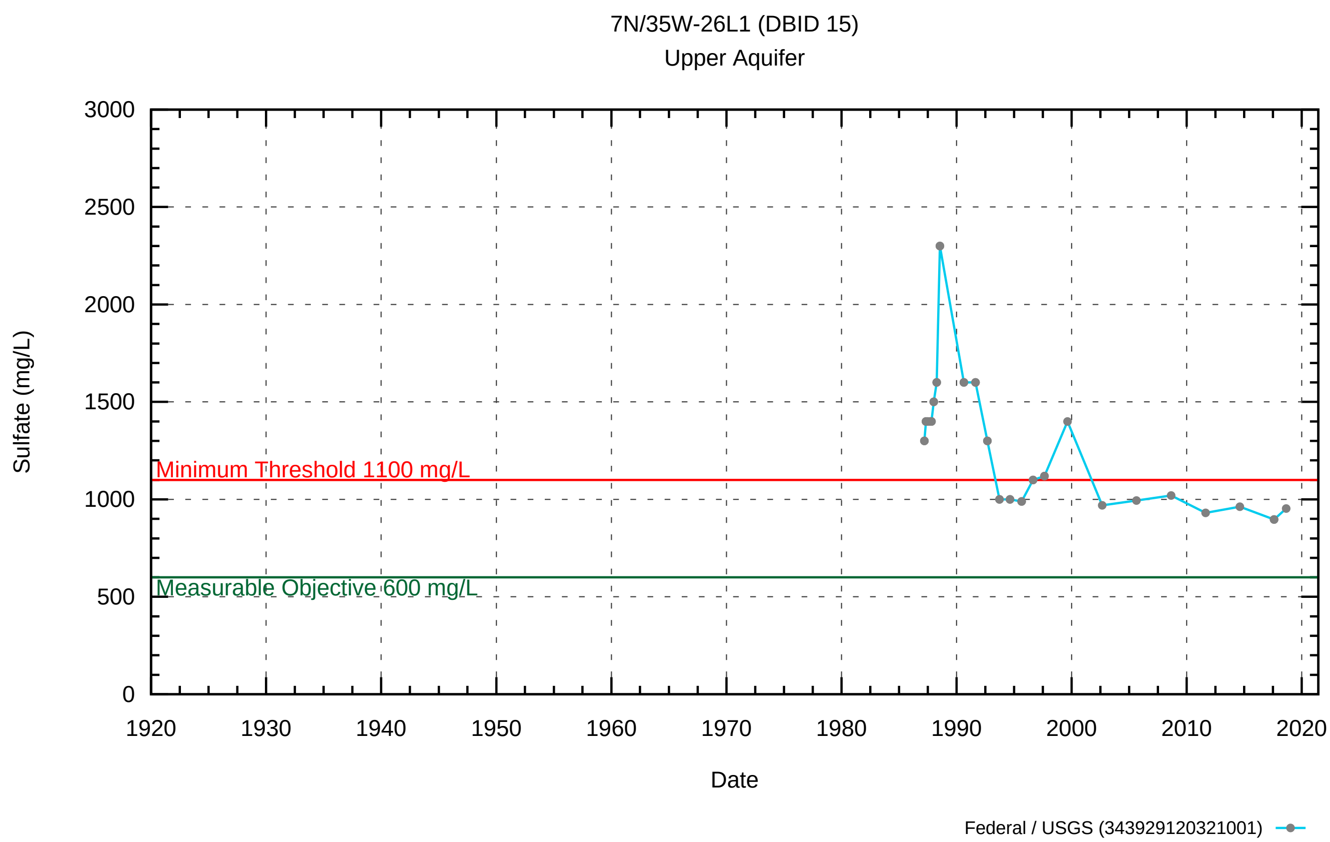

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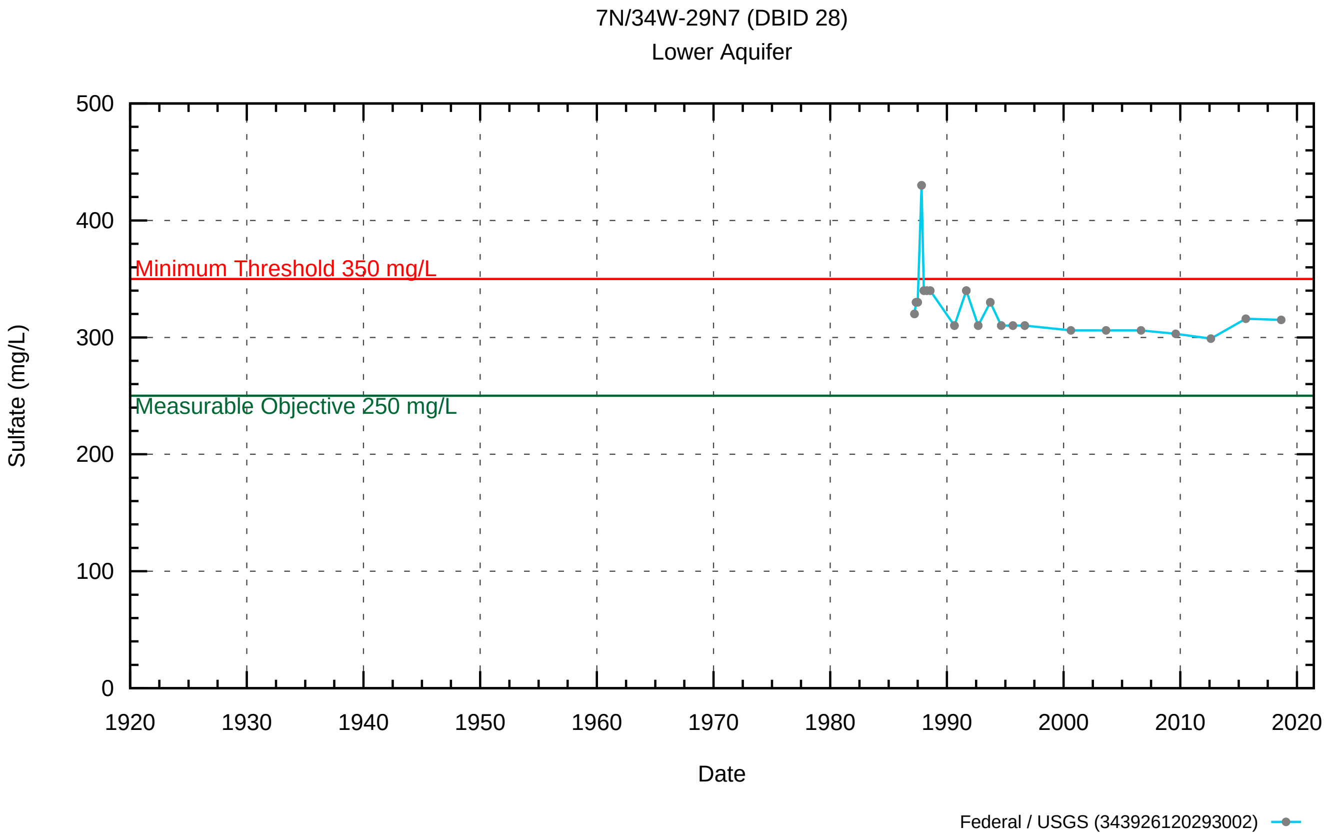

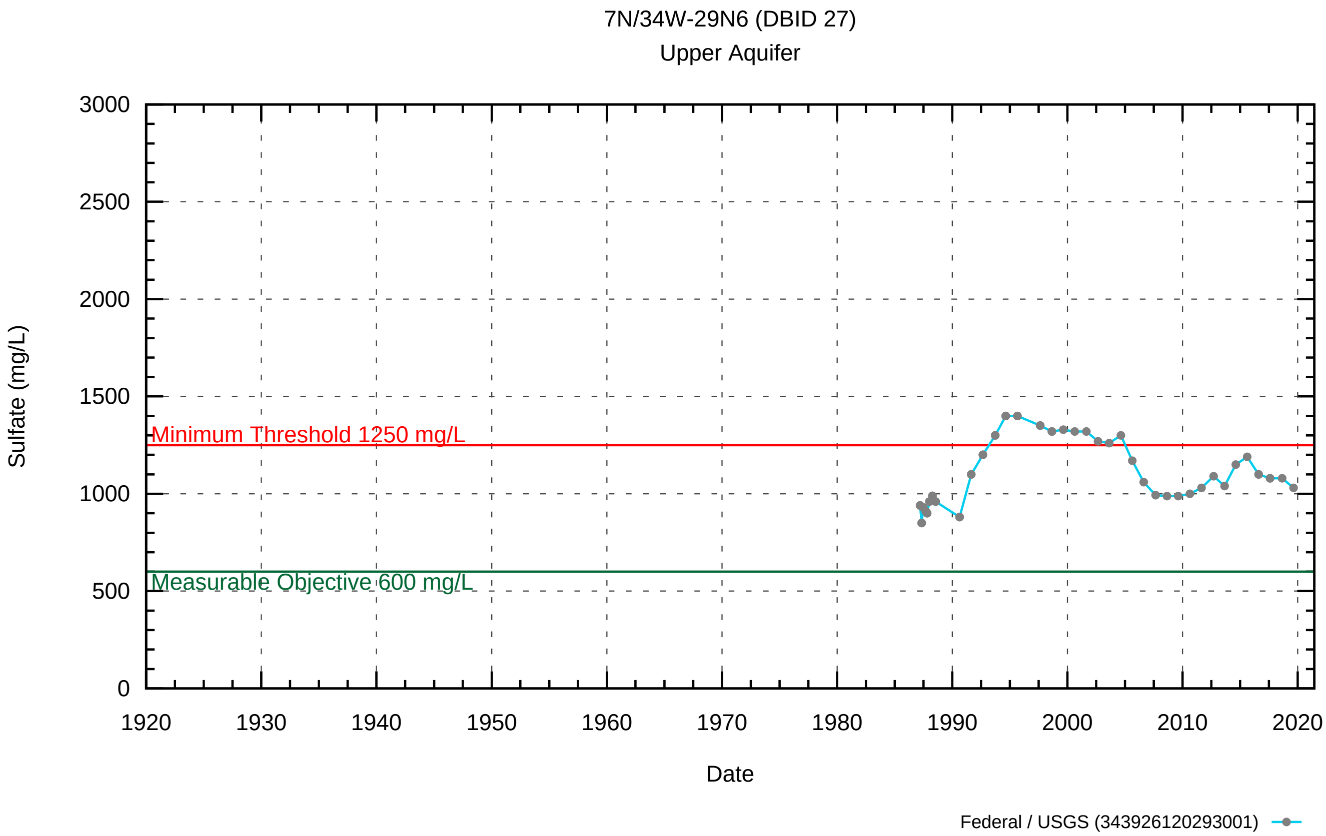

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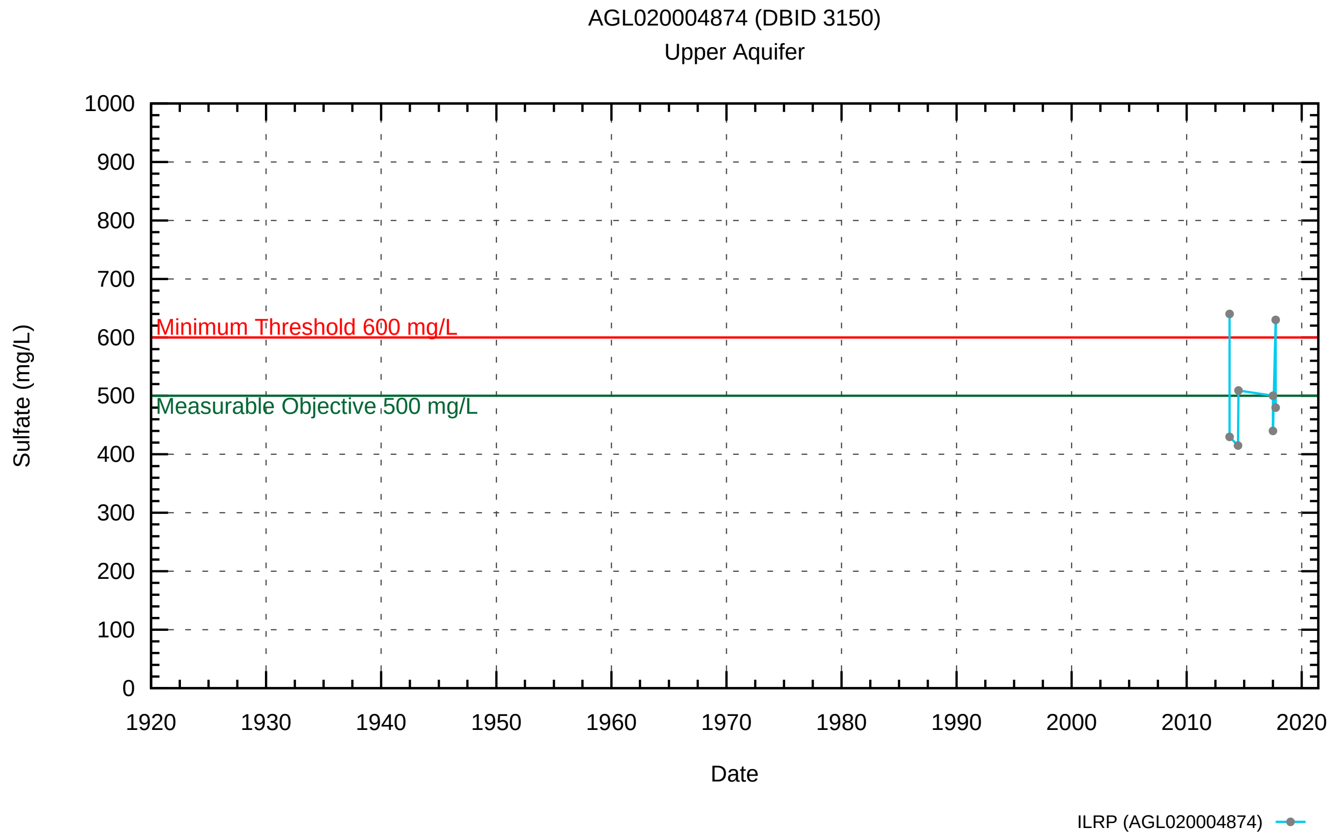

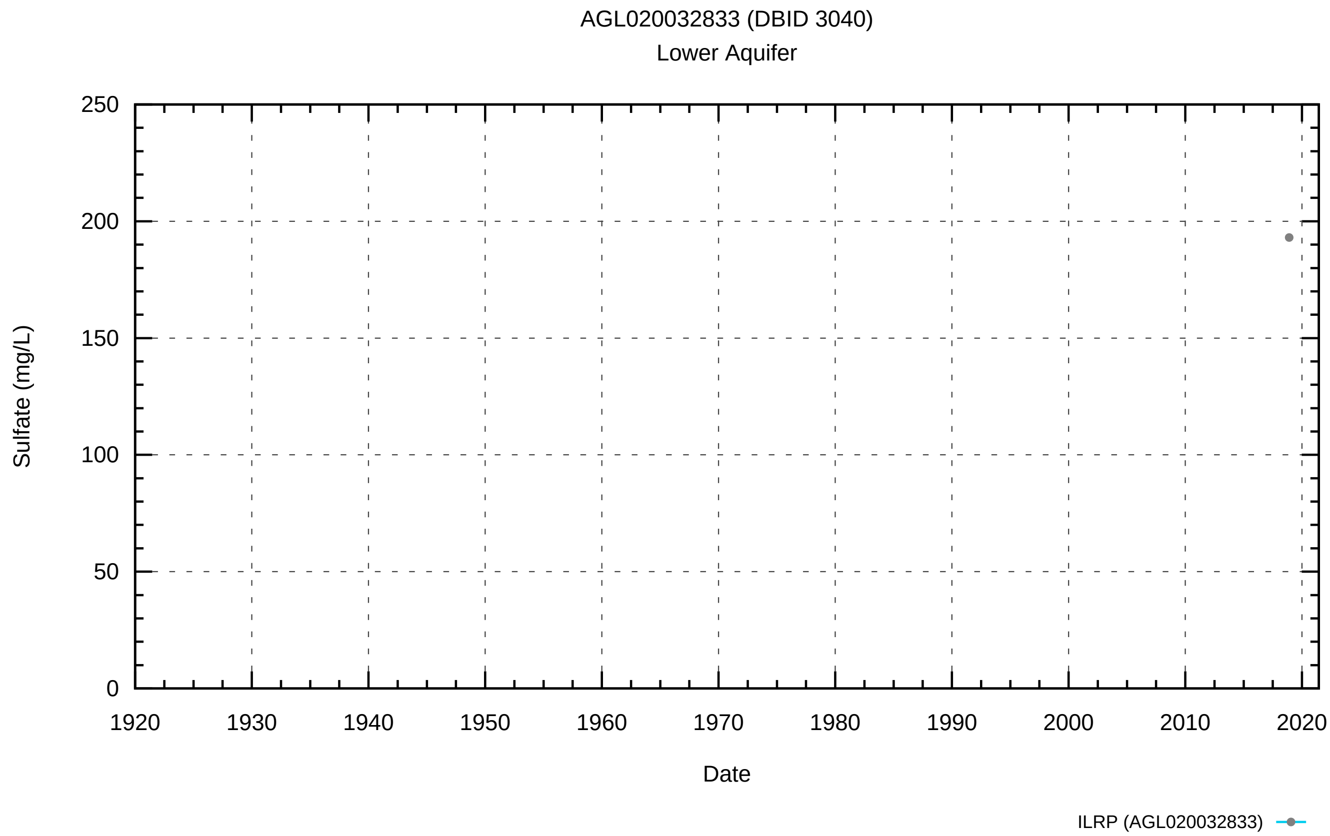

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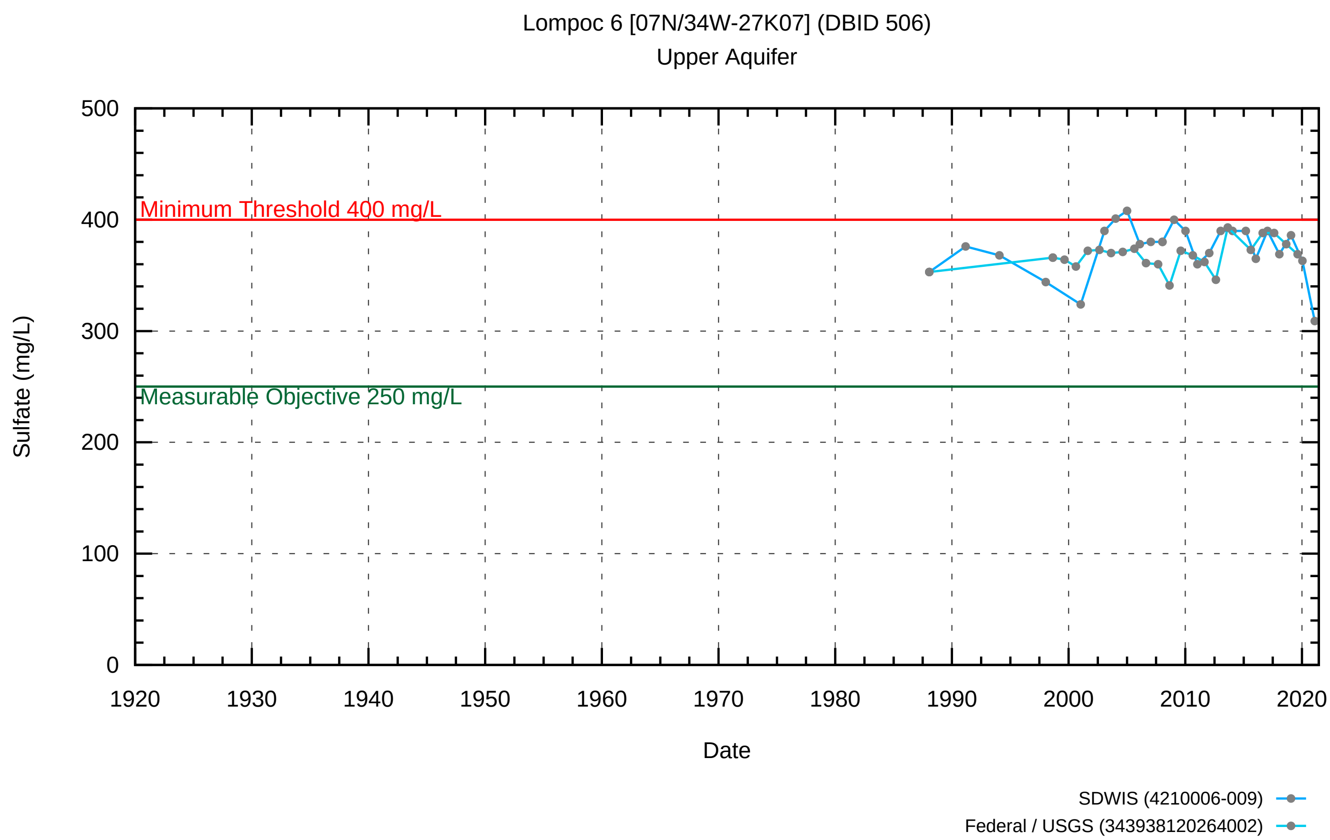

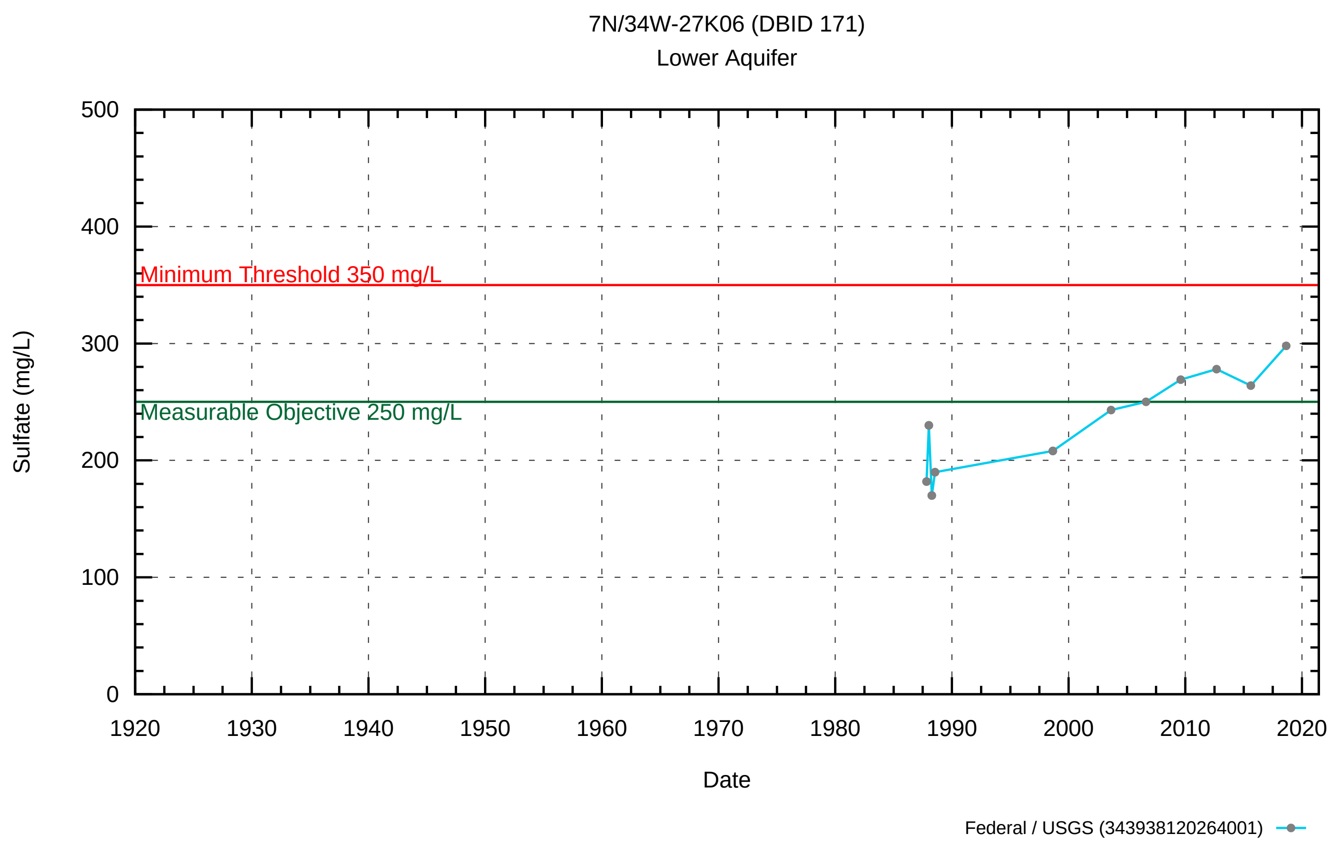

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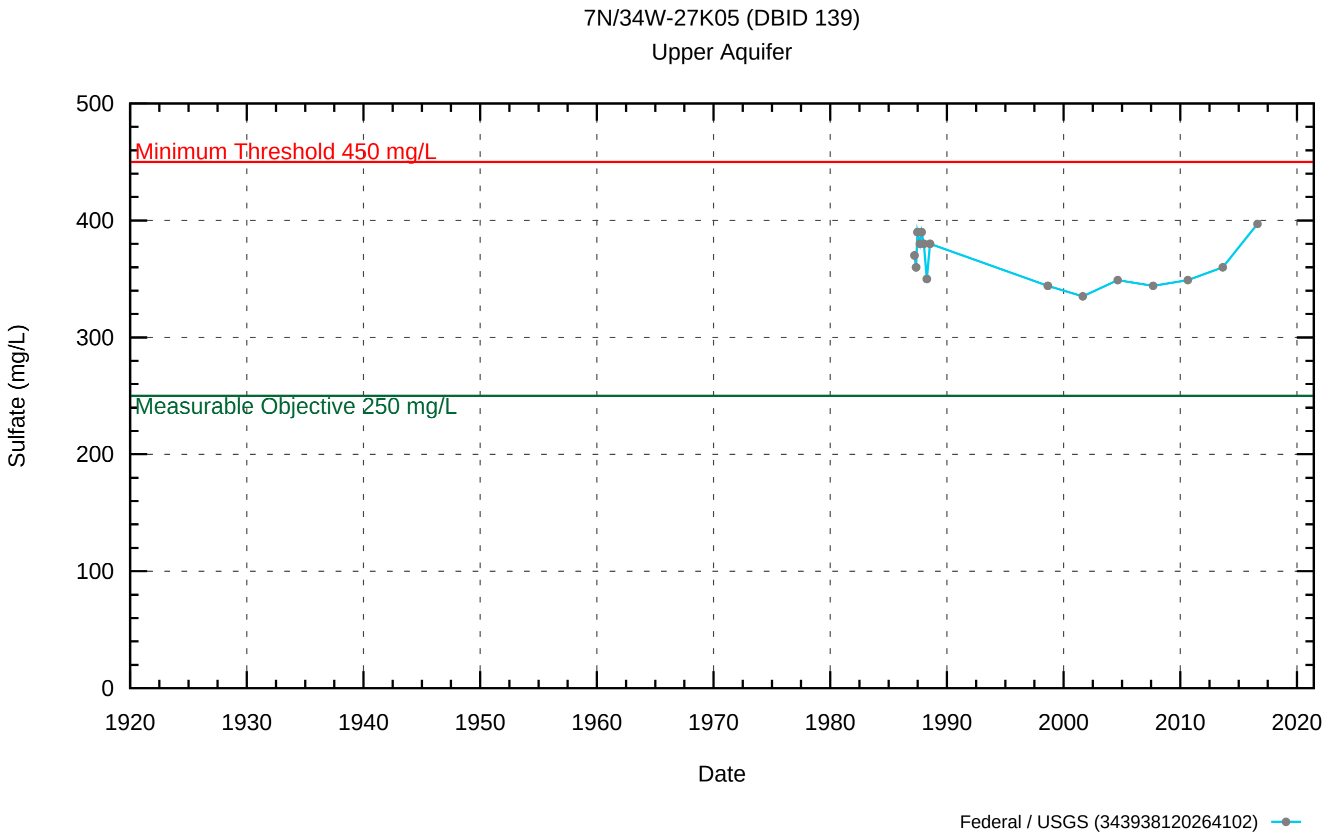

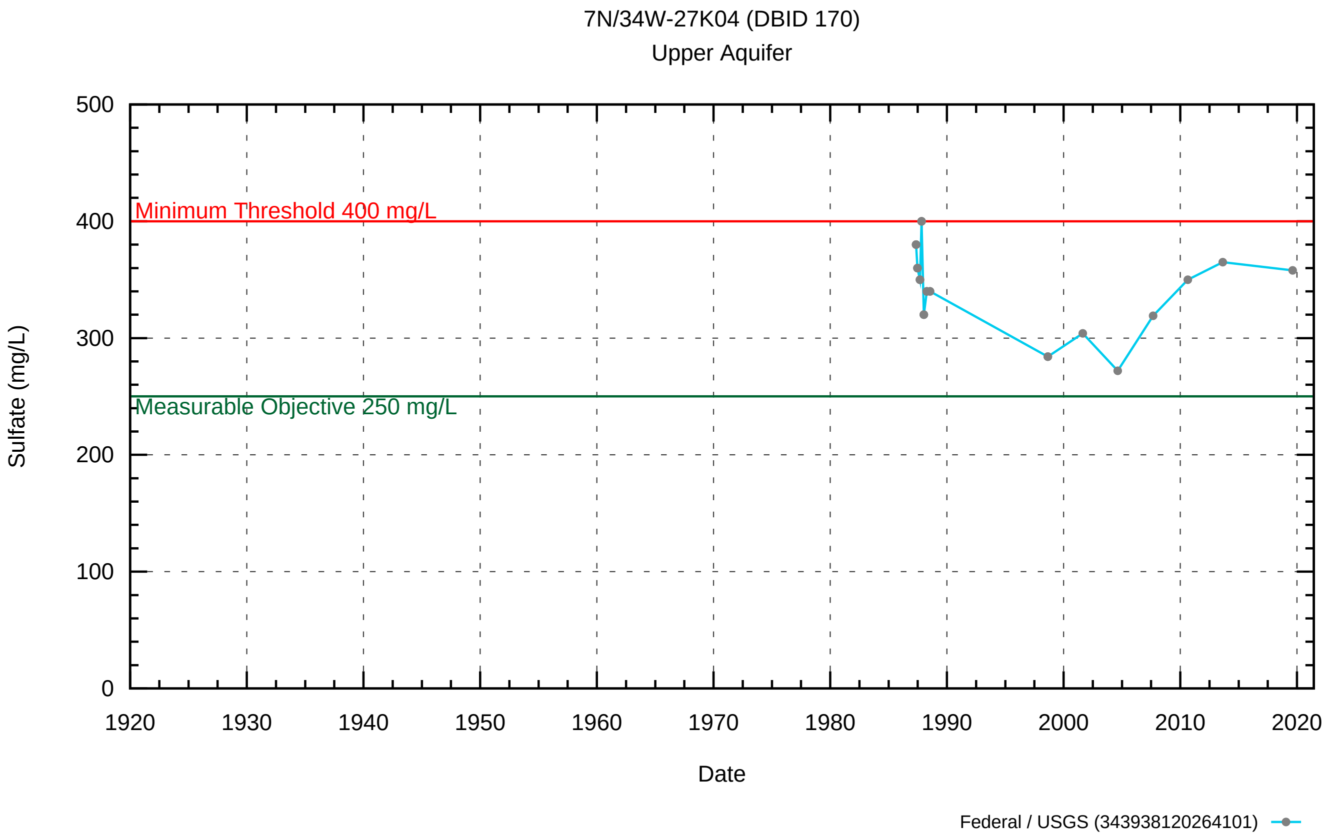

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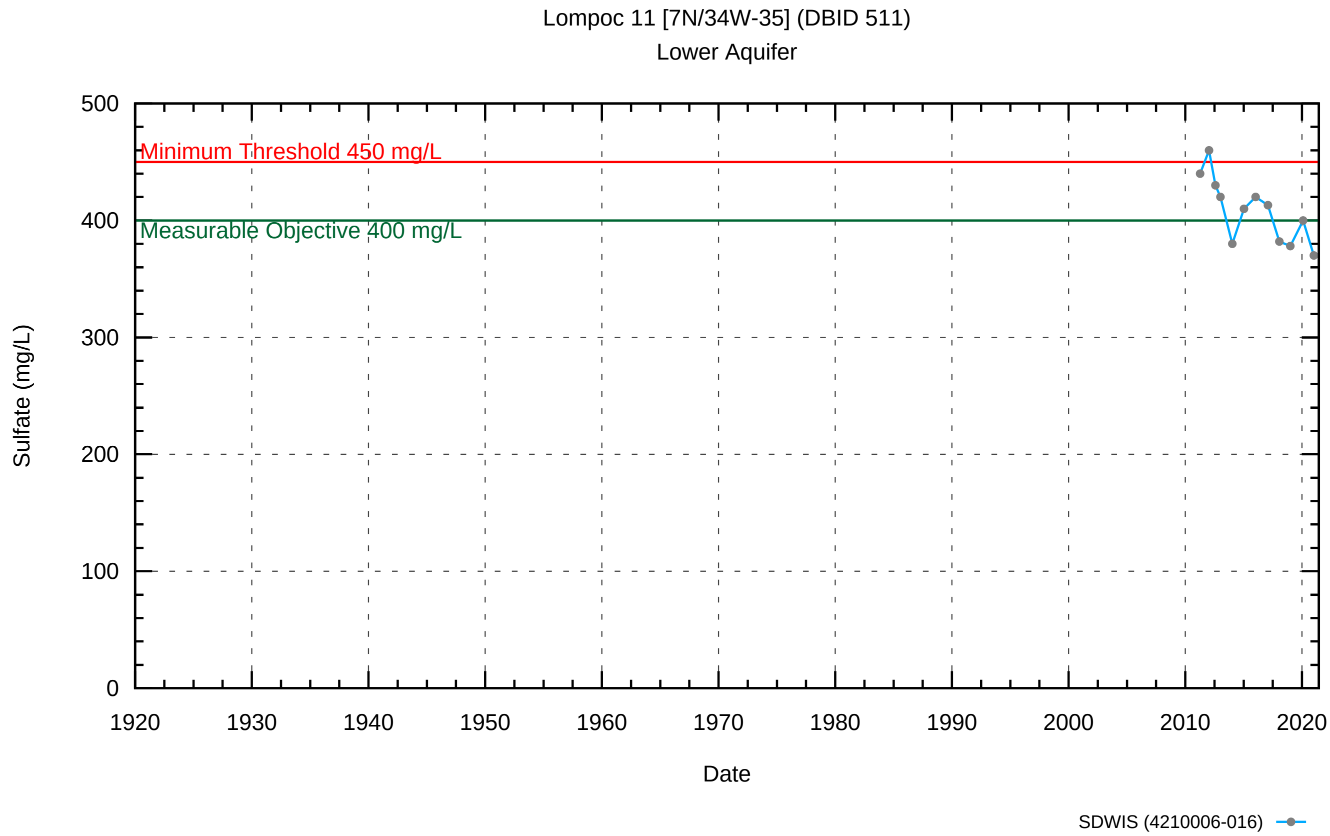

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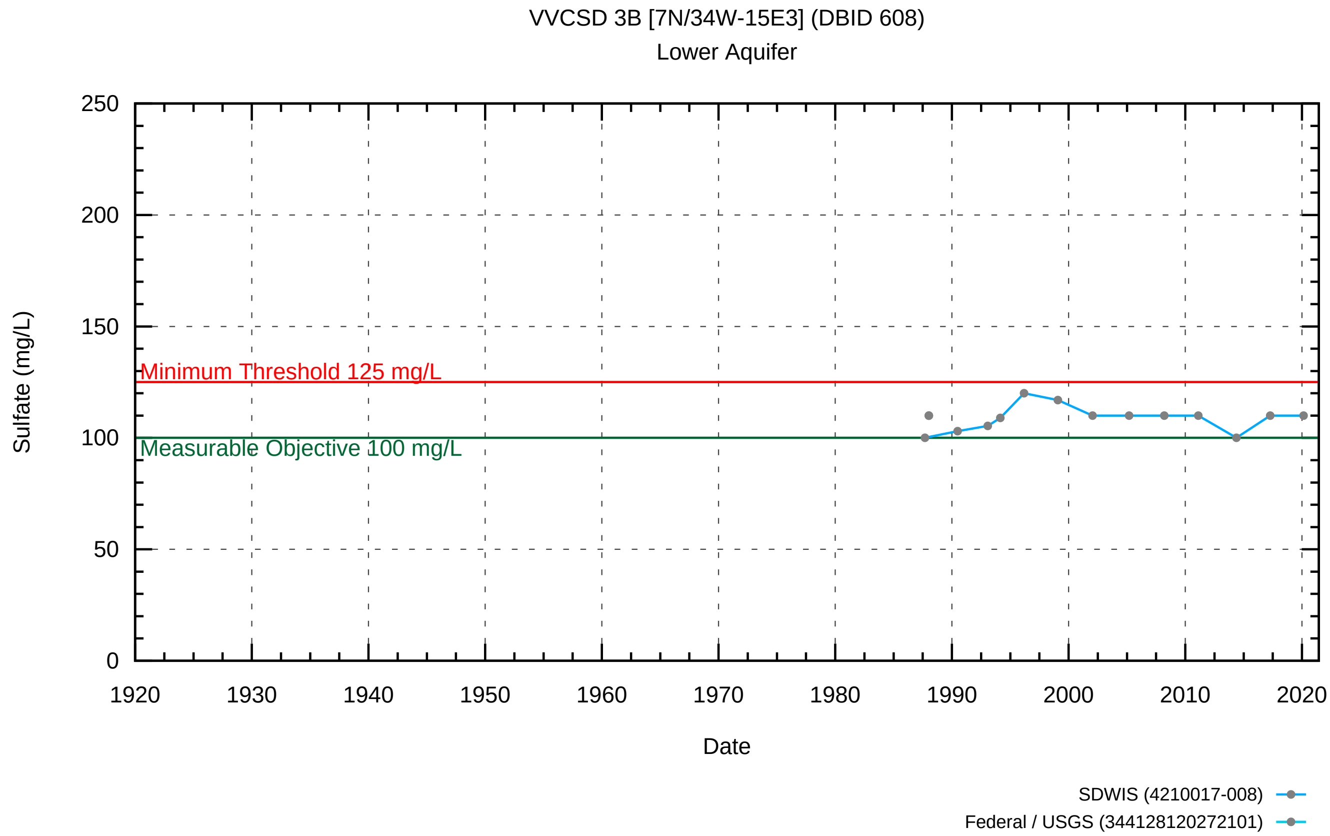

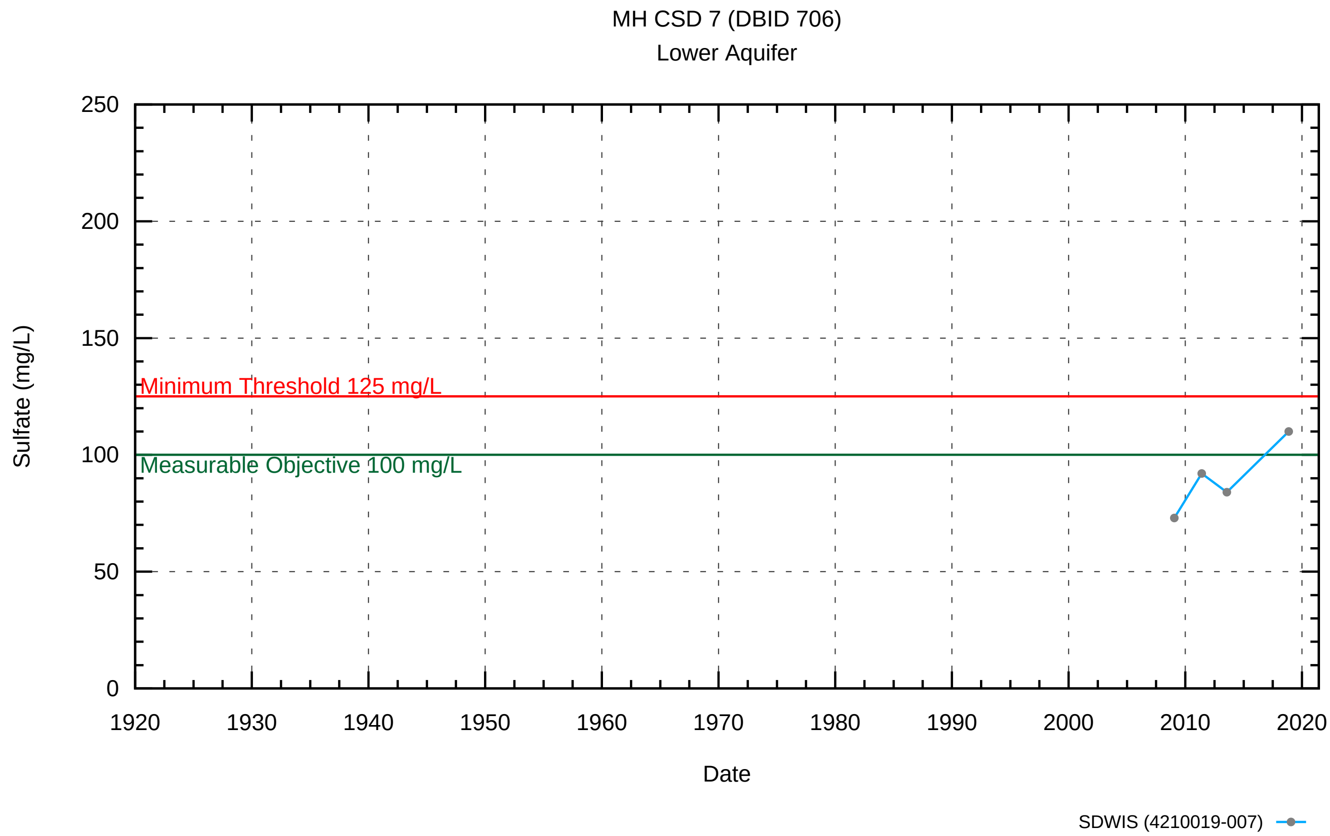

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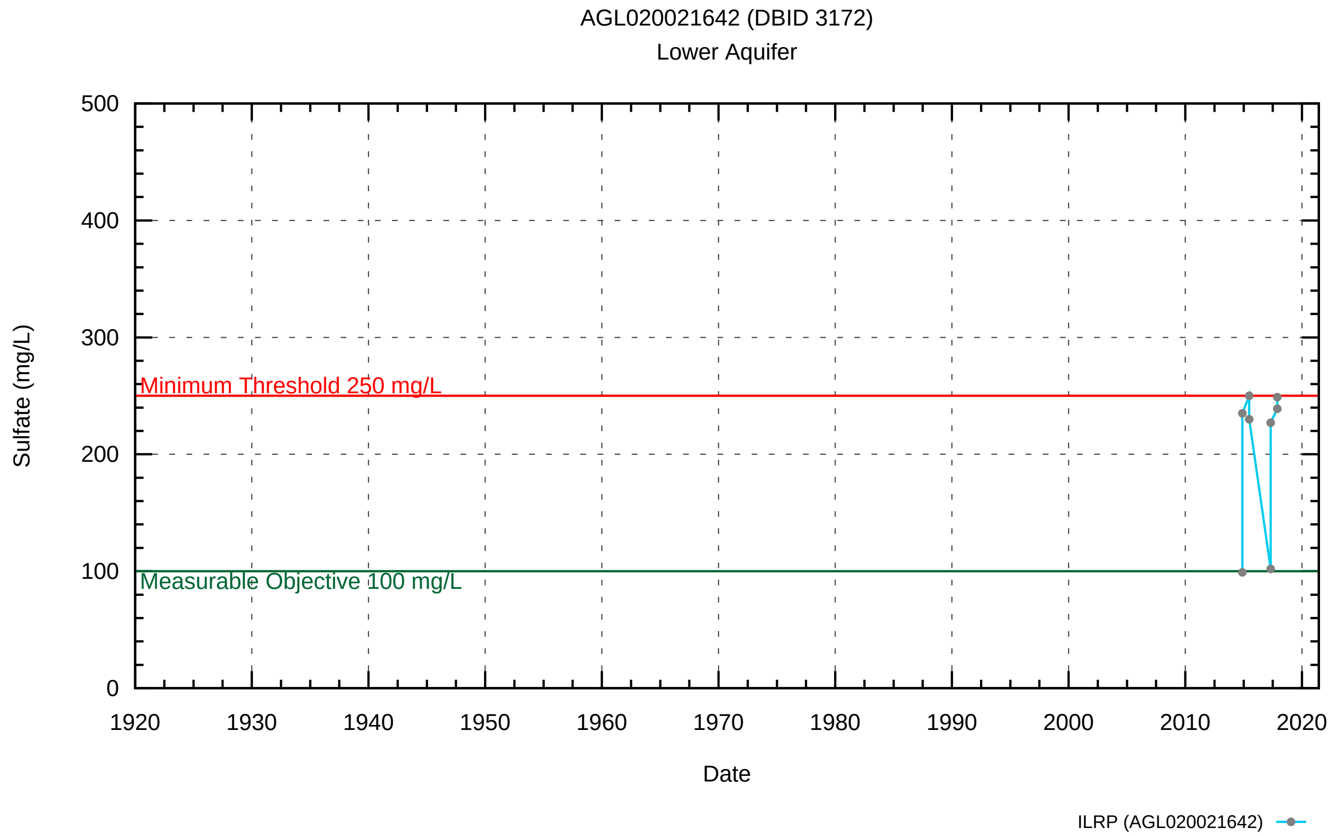

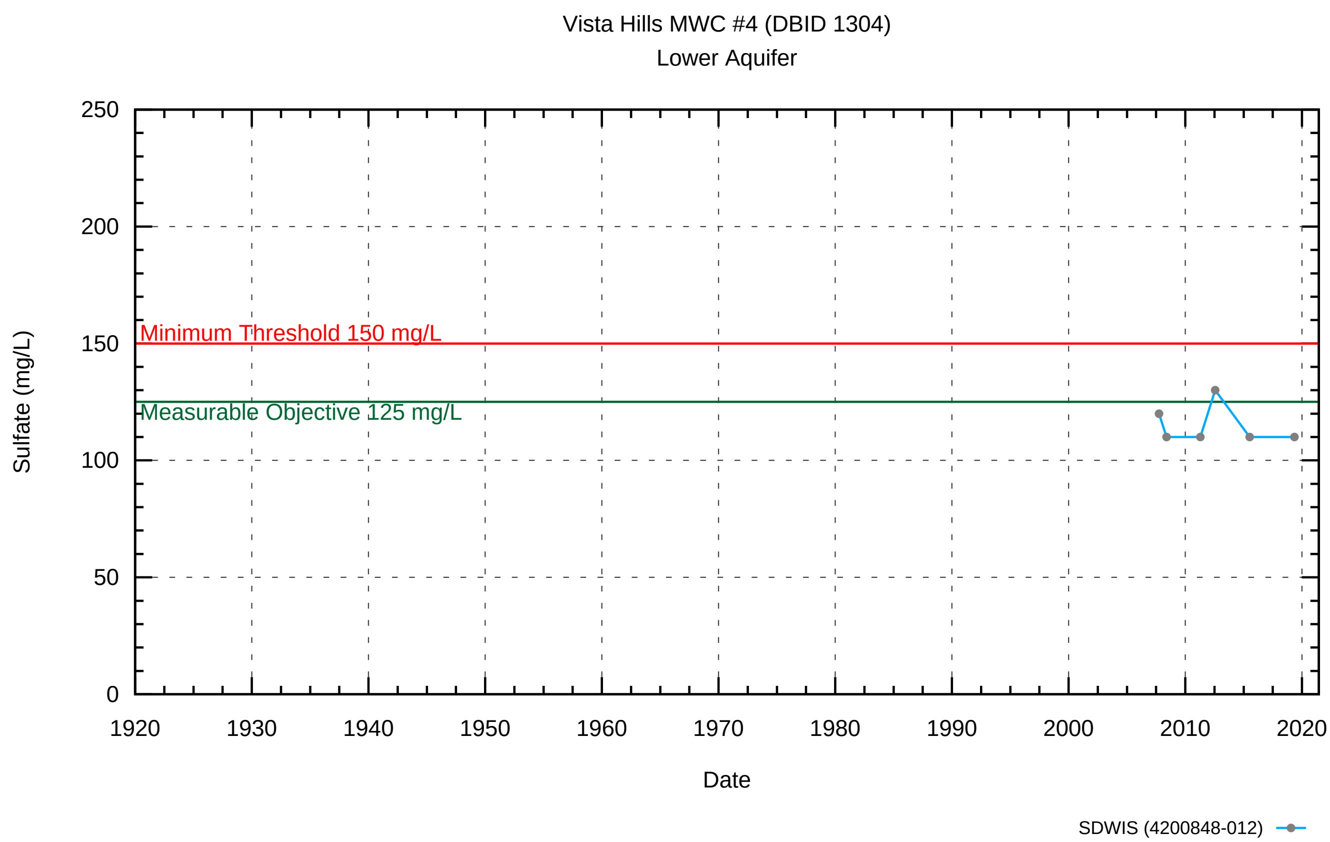

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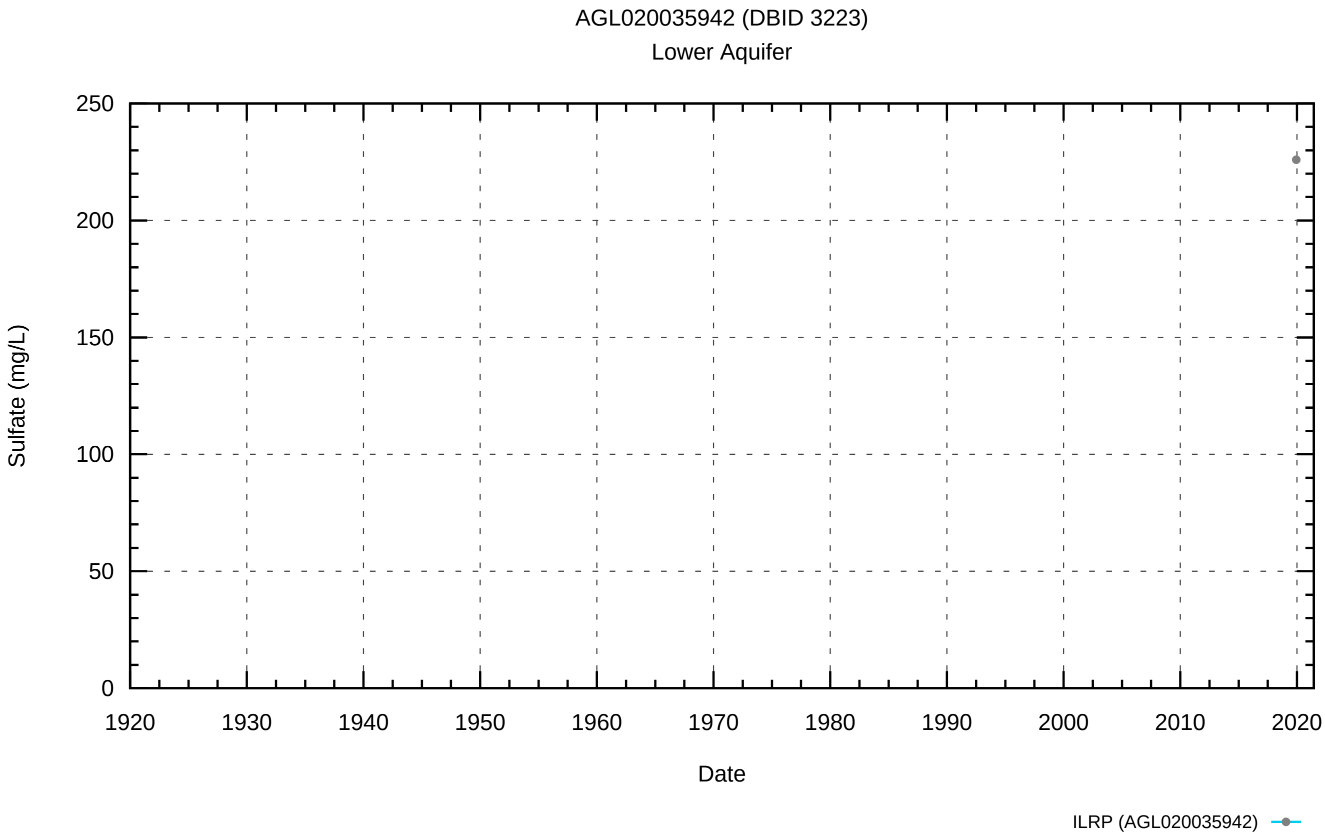

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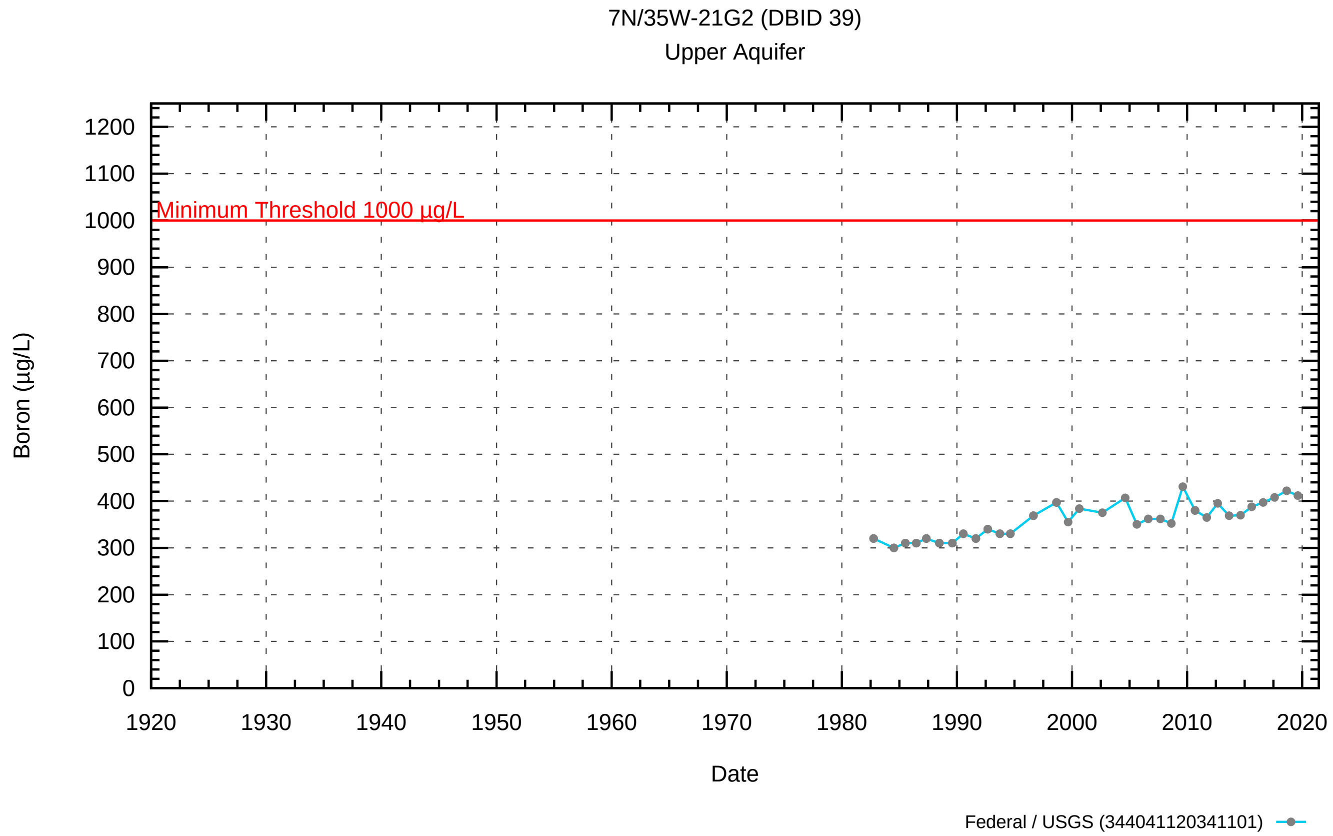

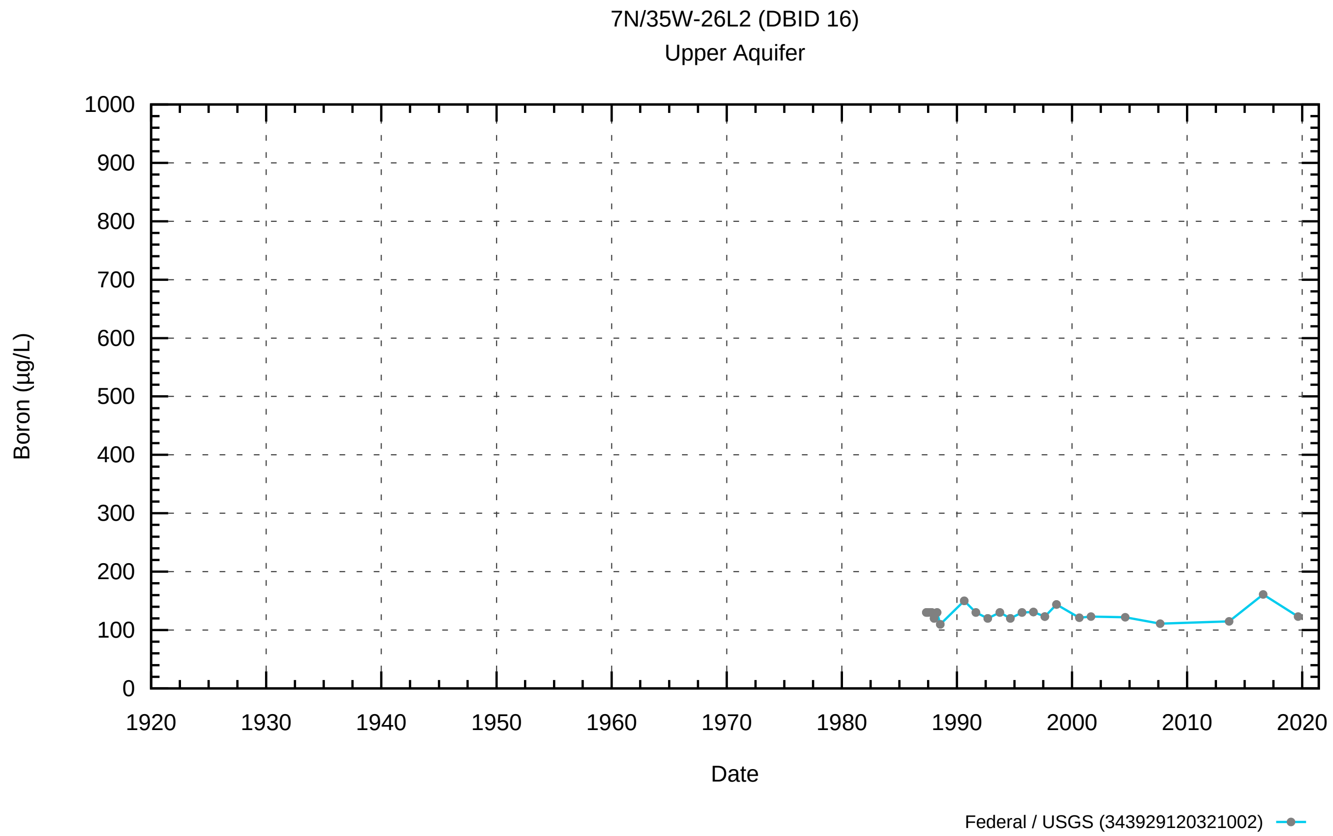

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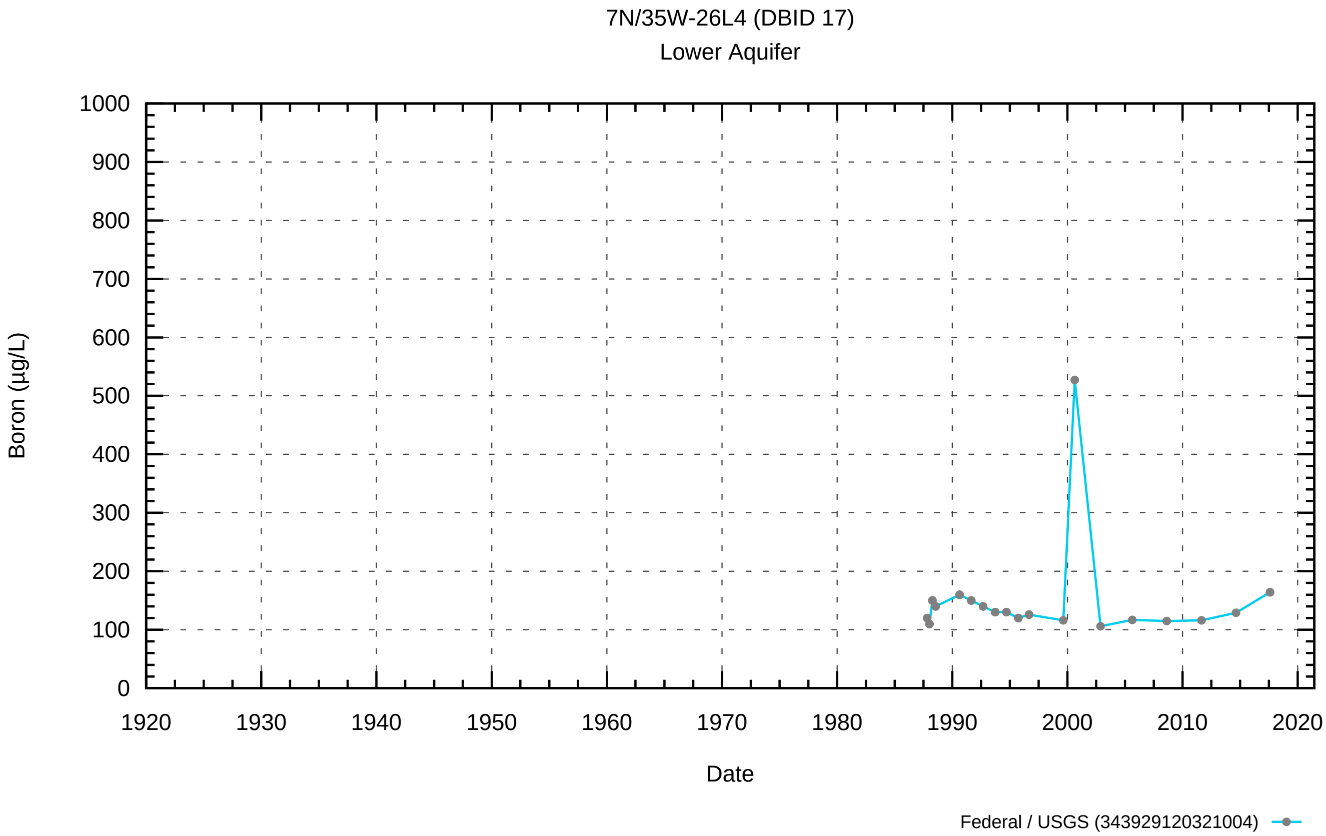

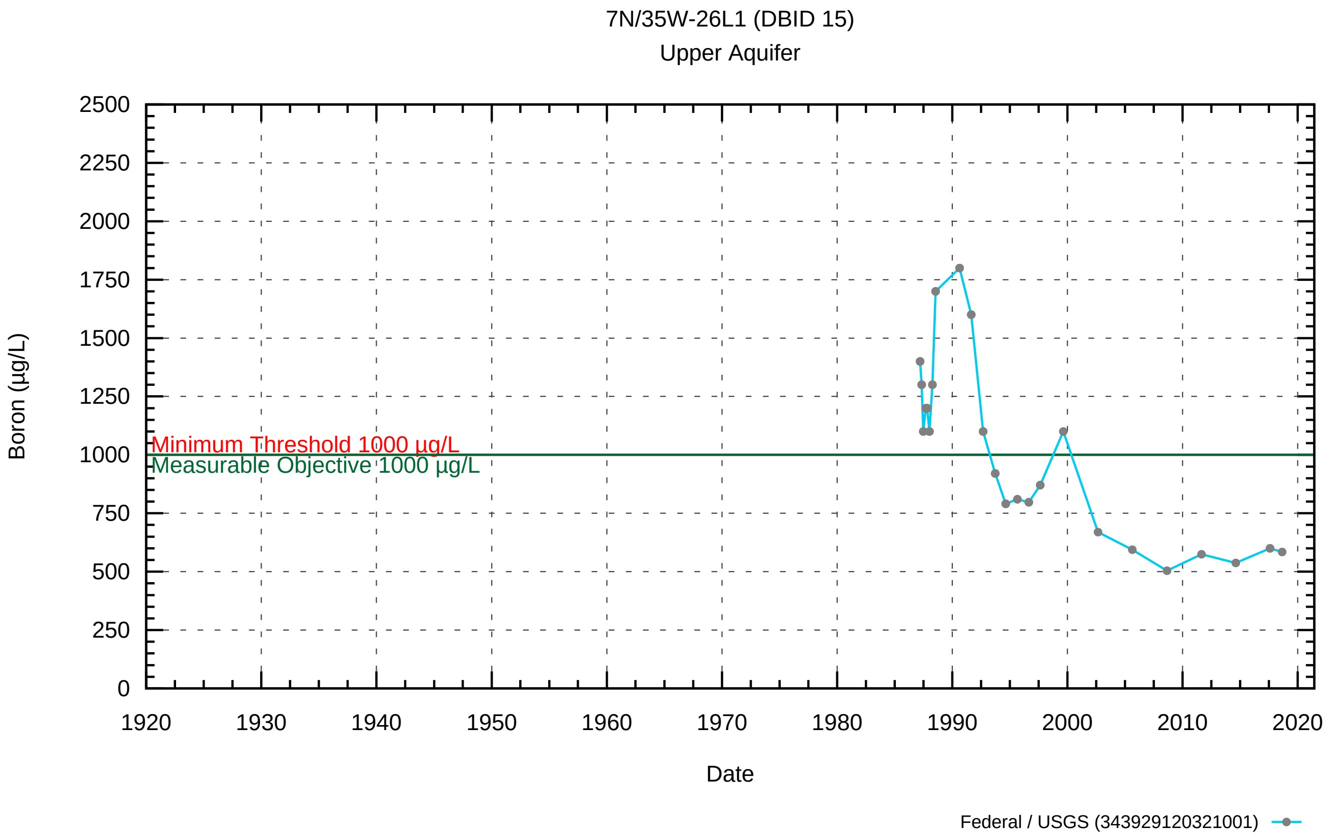

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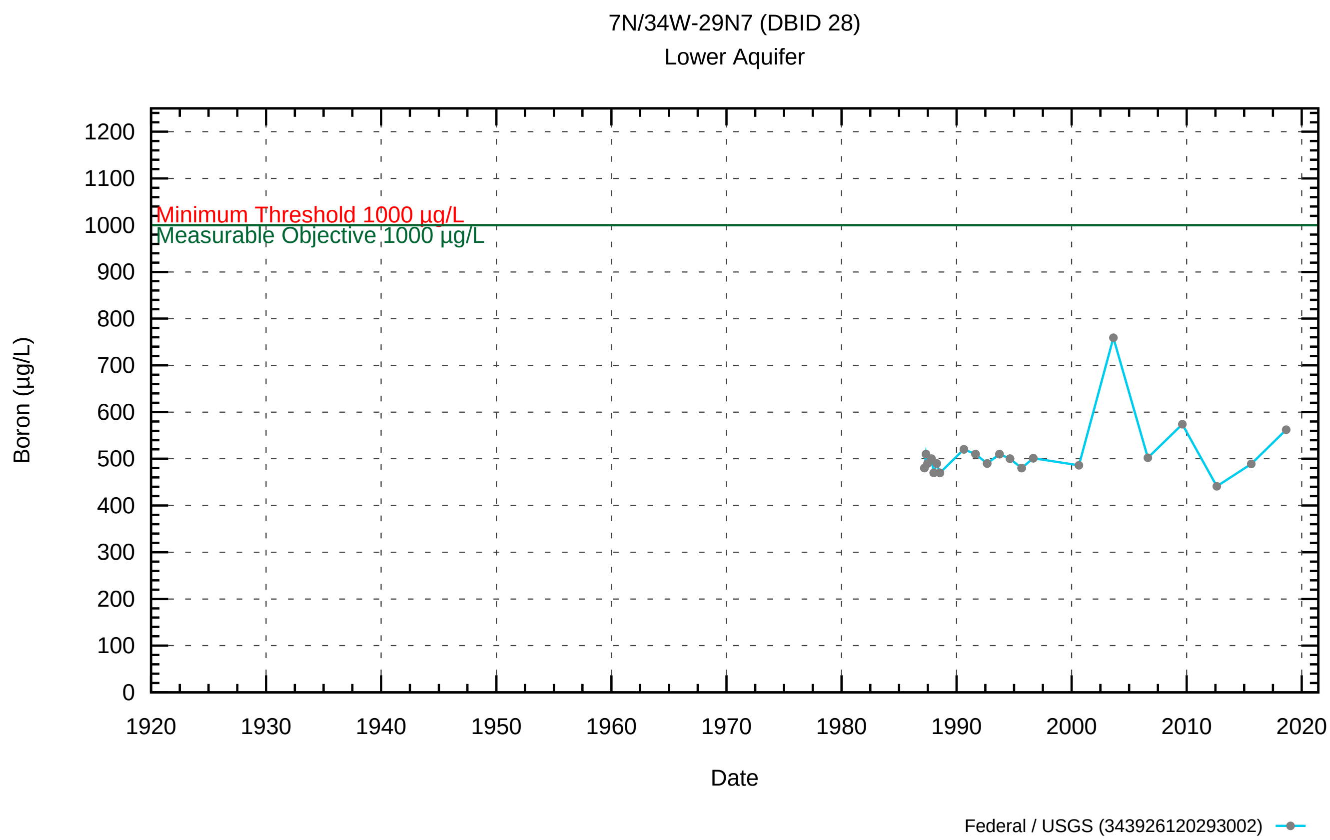

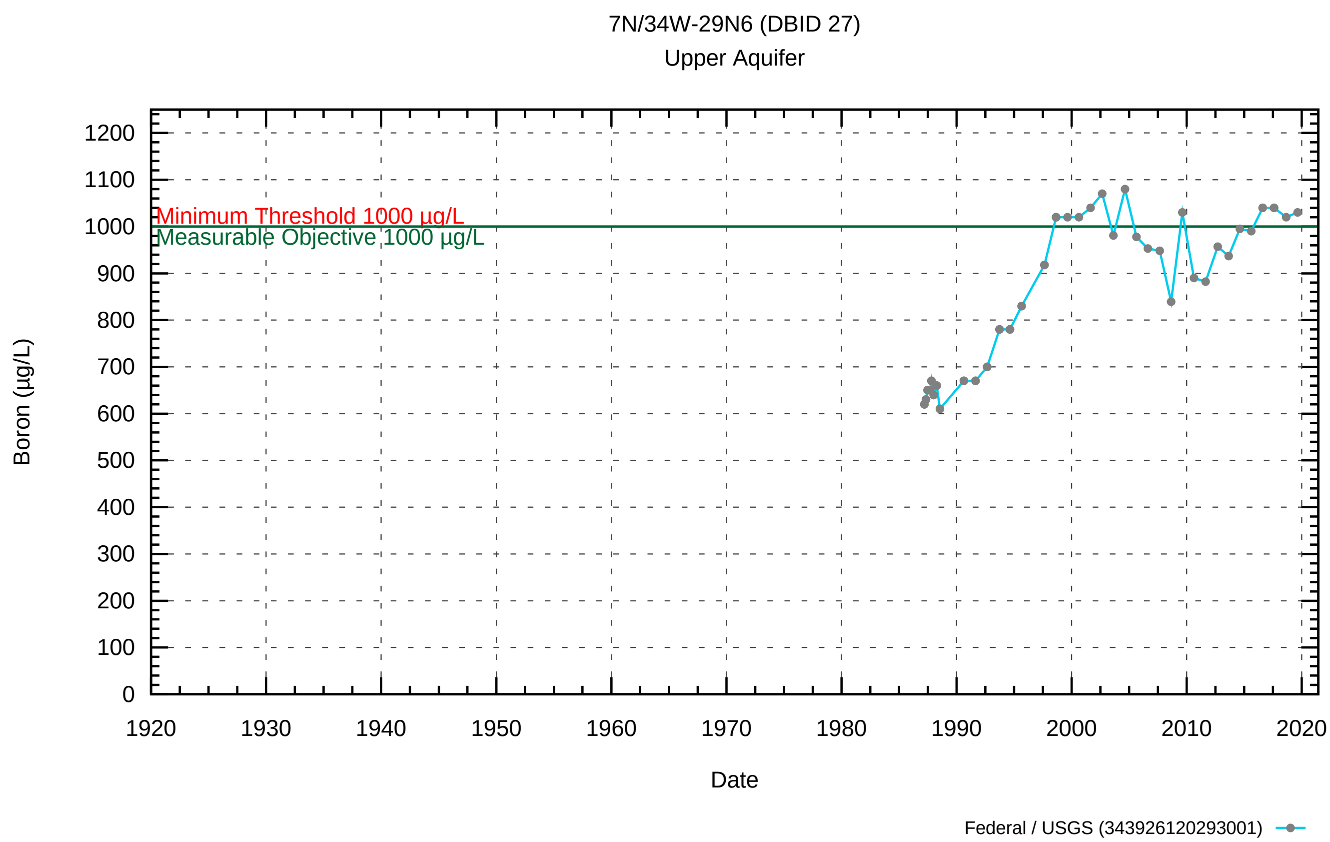

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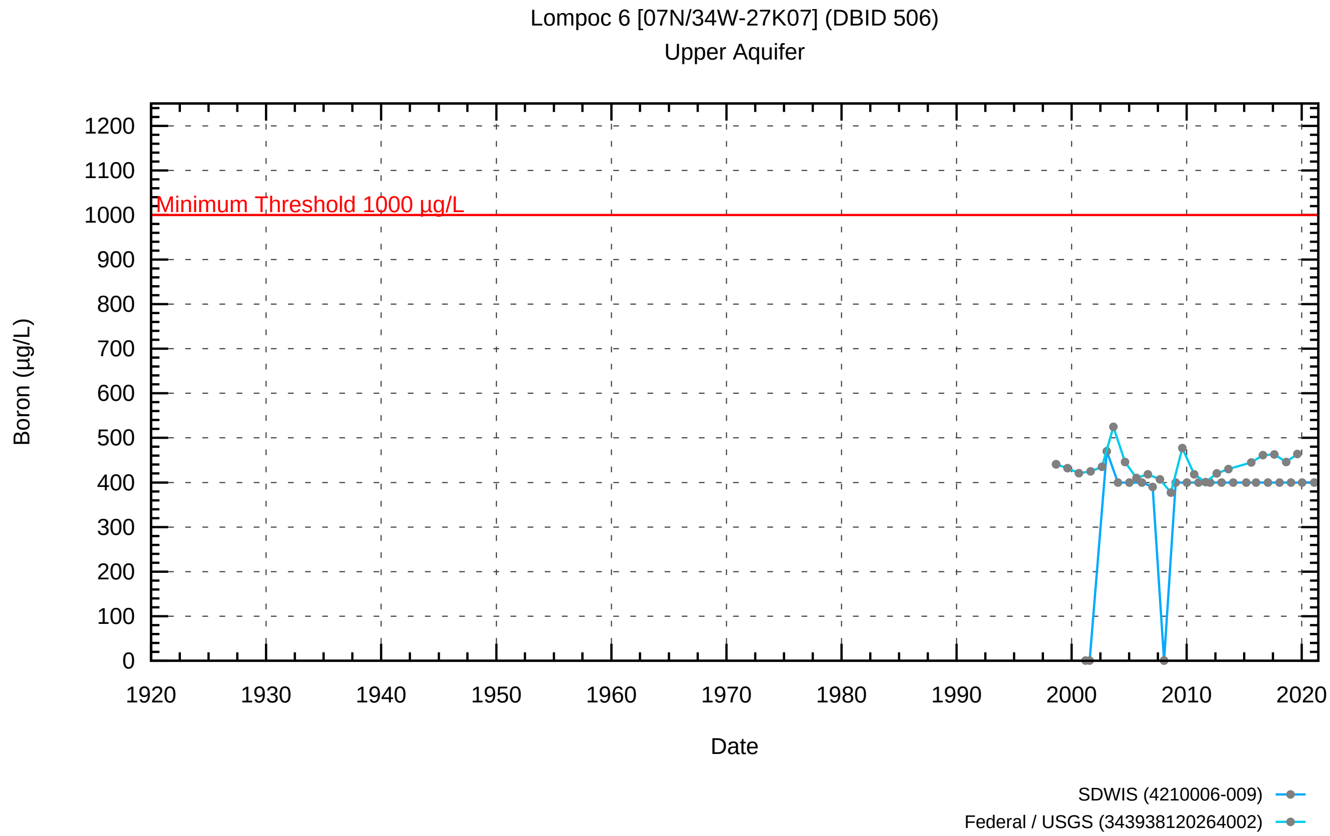
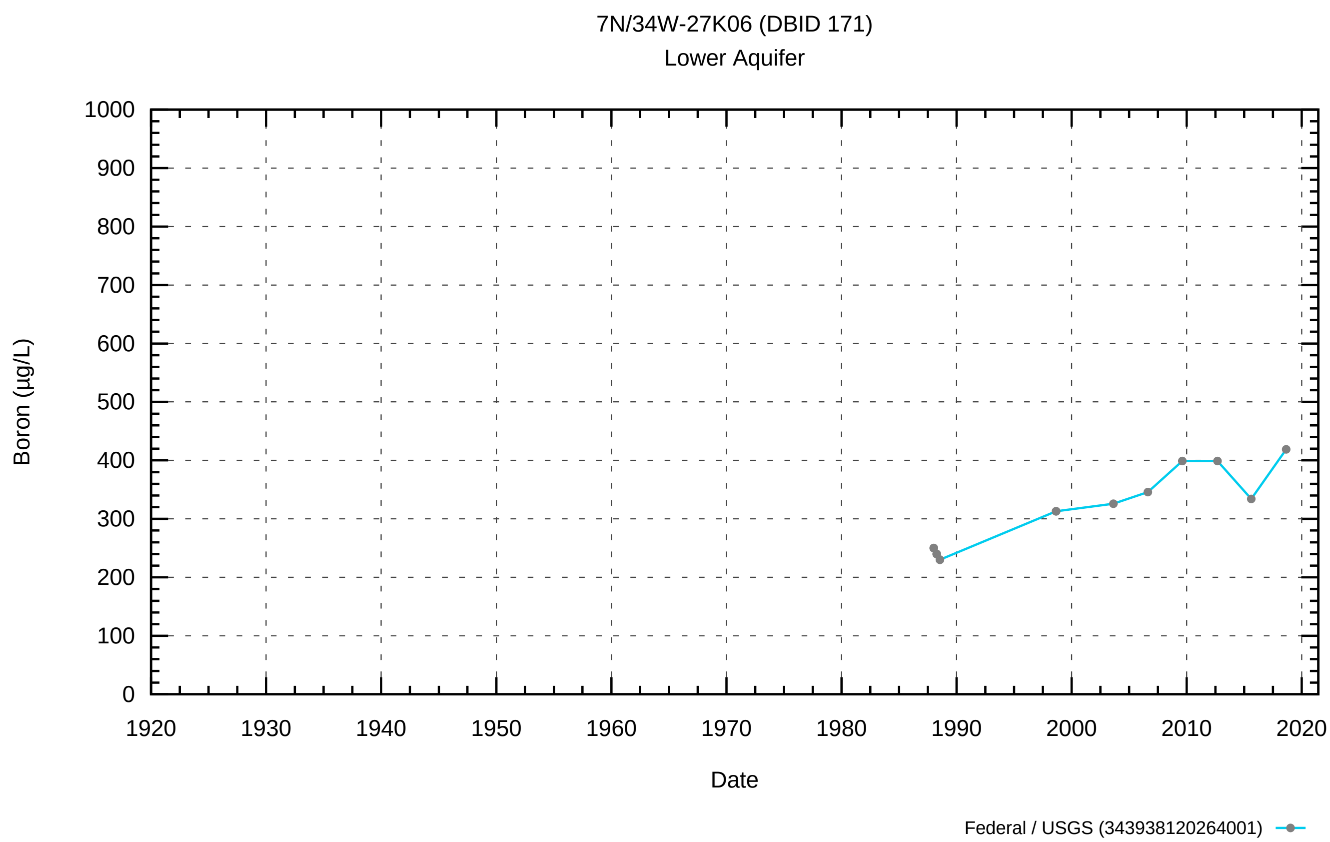
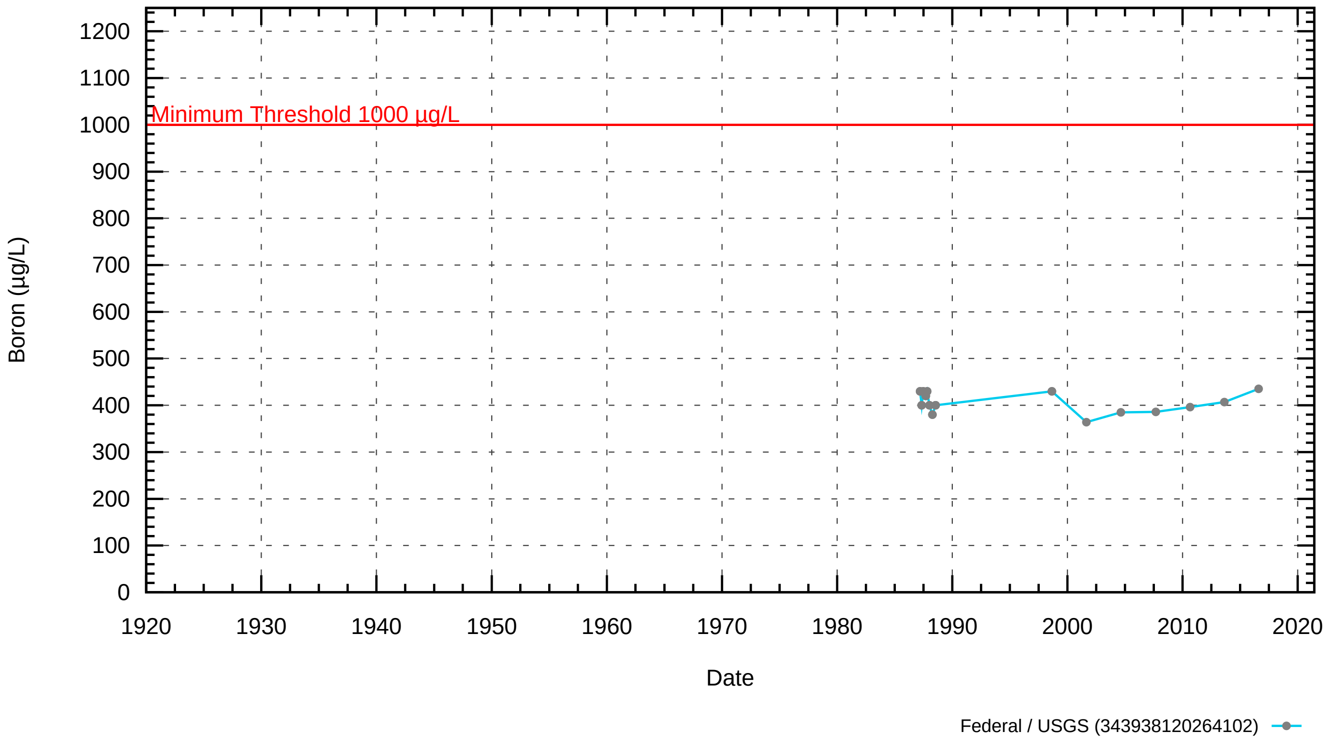




WMA: Lompoc Plain - Boron

7N/34W-27K05 (DBID 139)
Upper Aquifer



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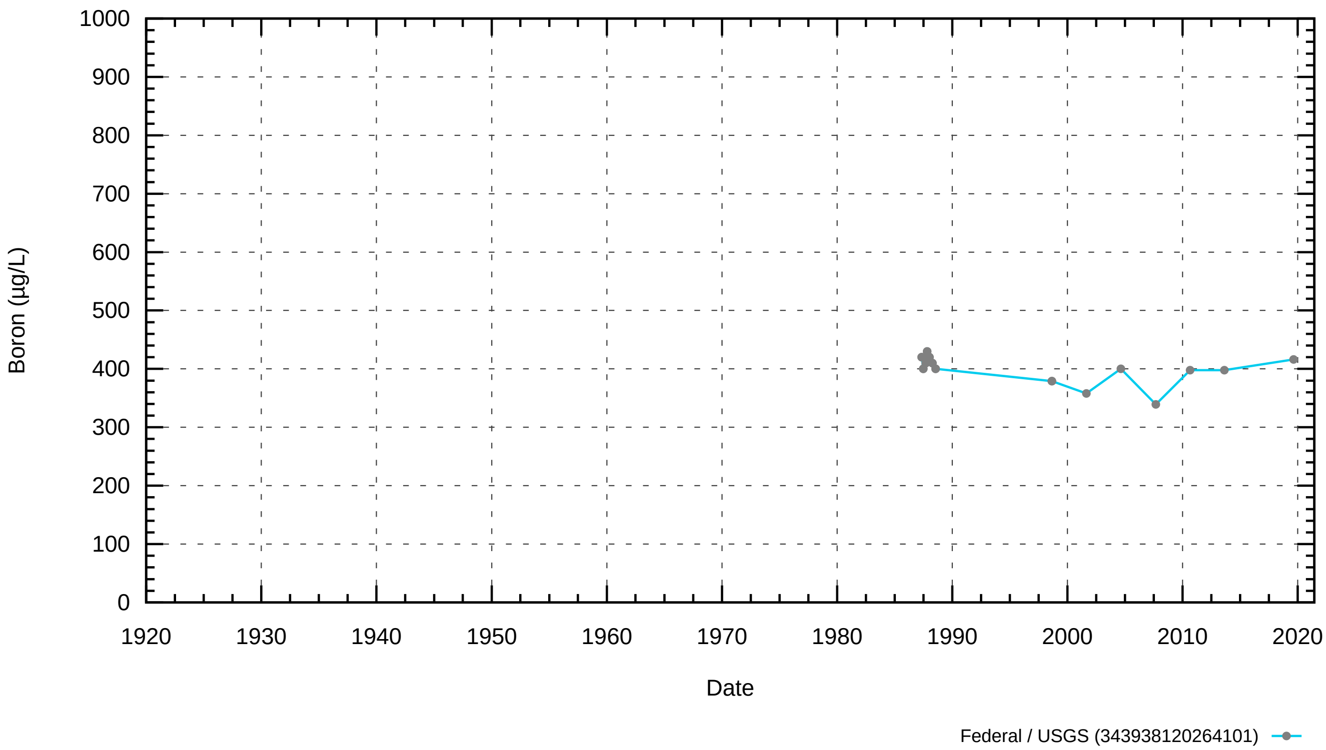
Upper Aquifer



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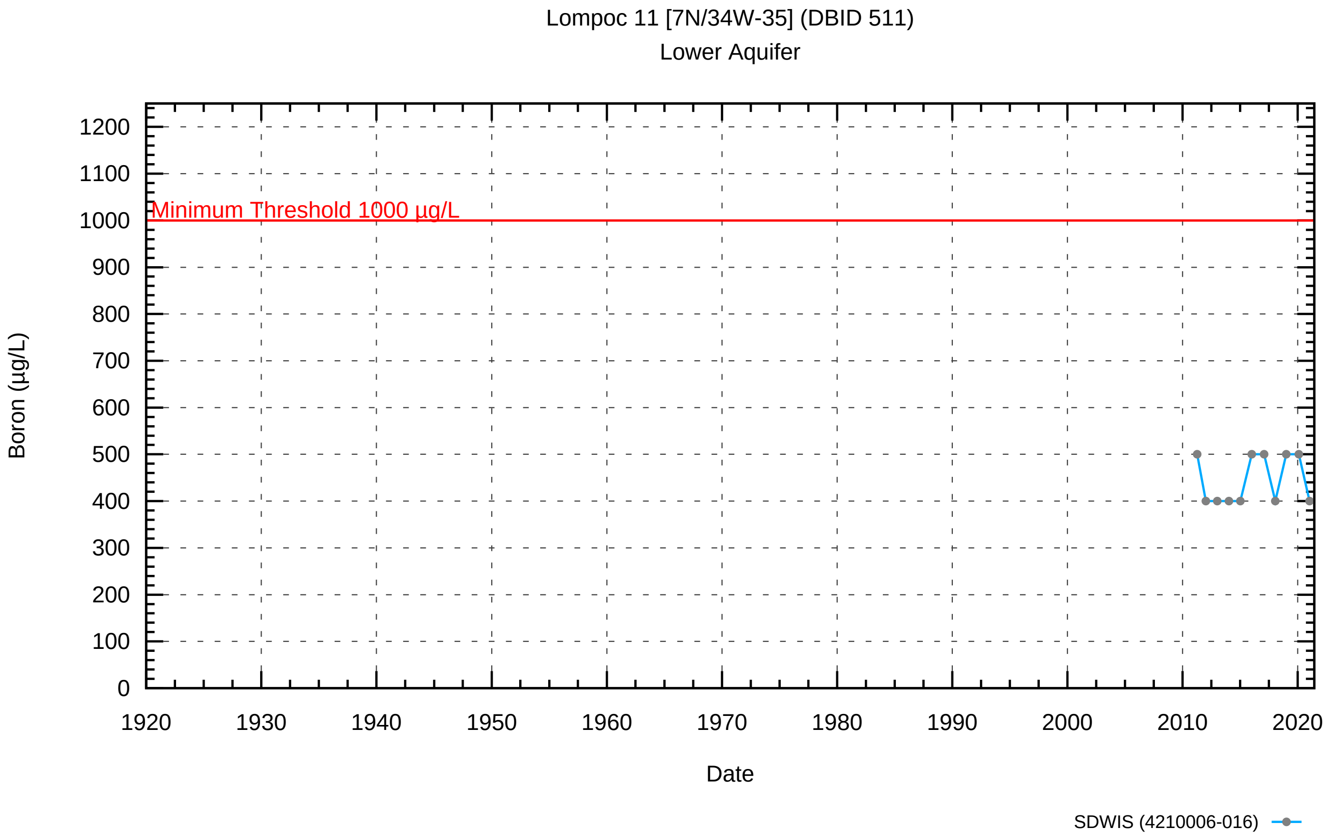
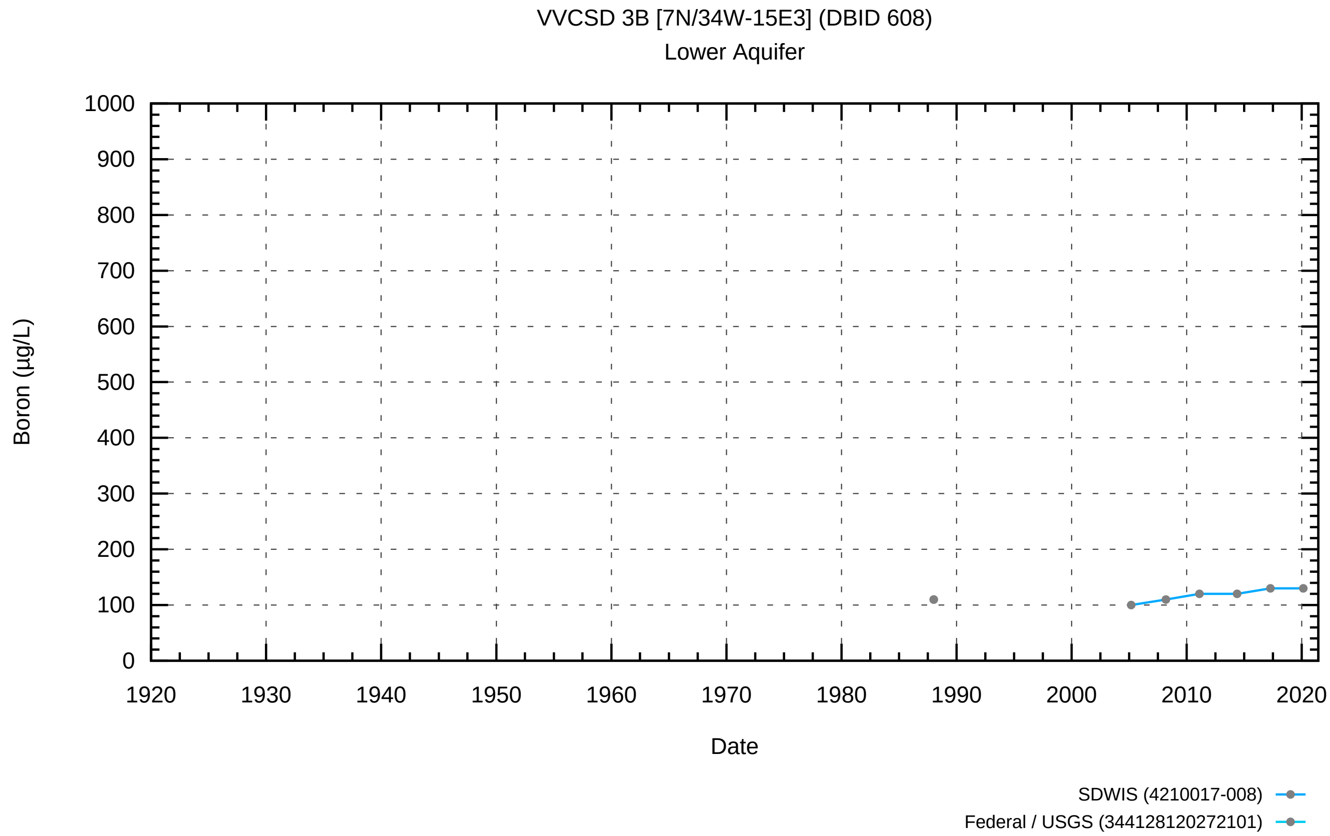
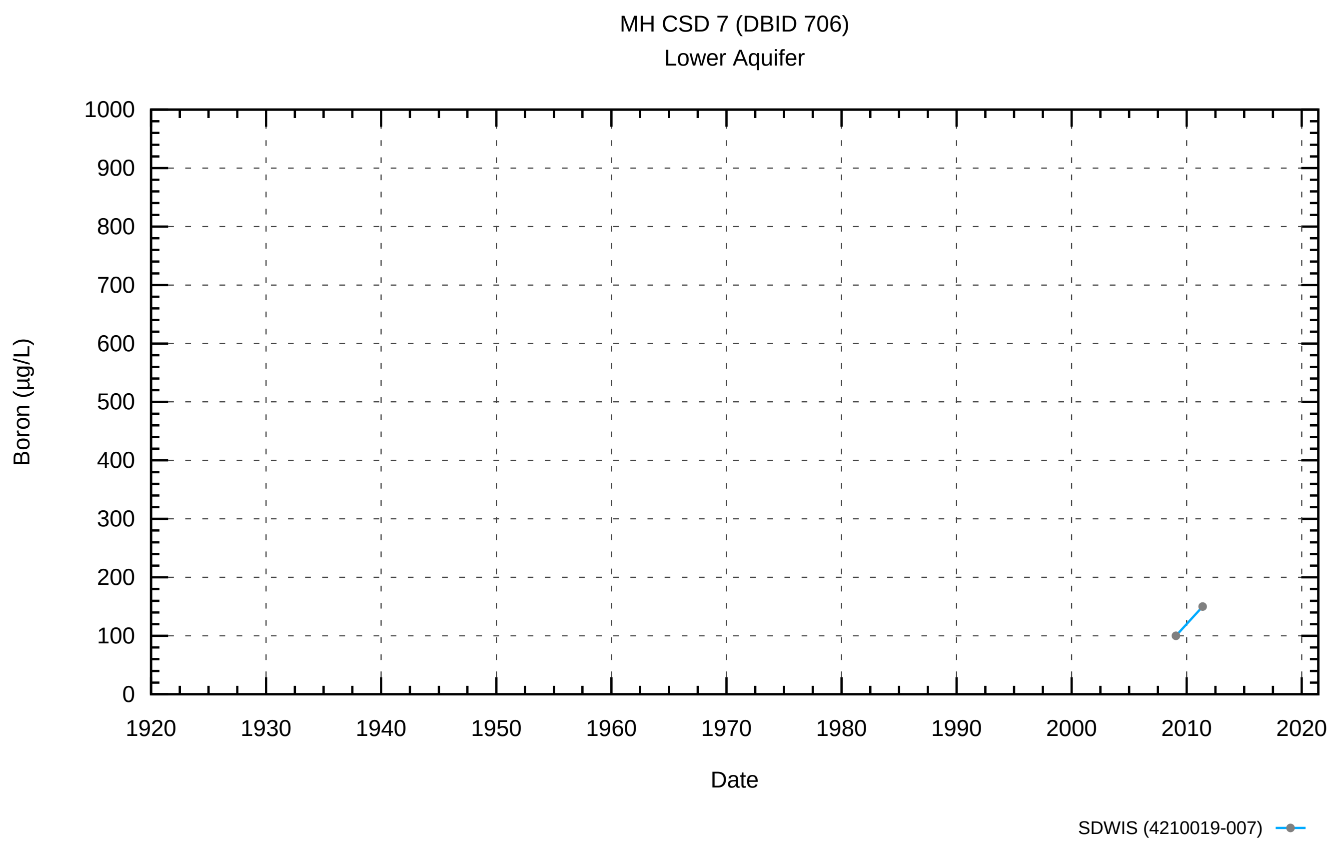
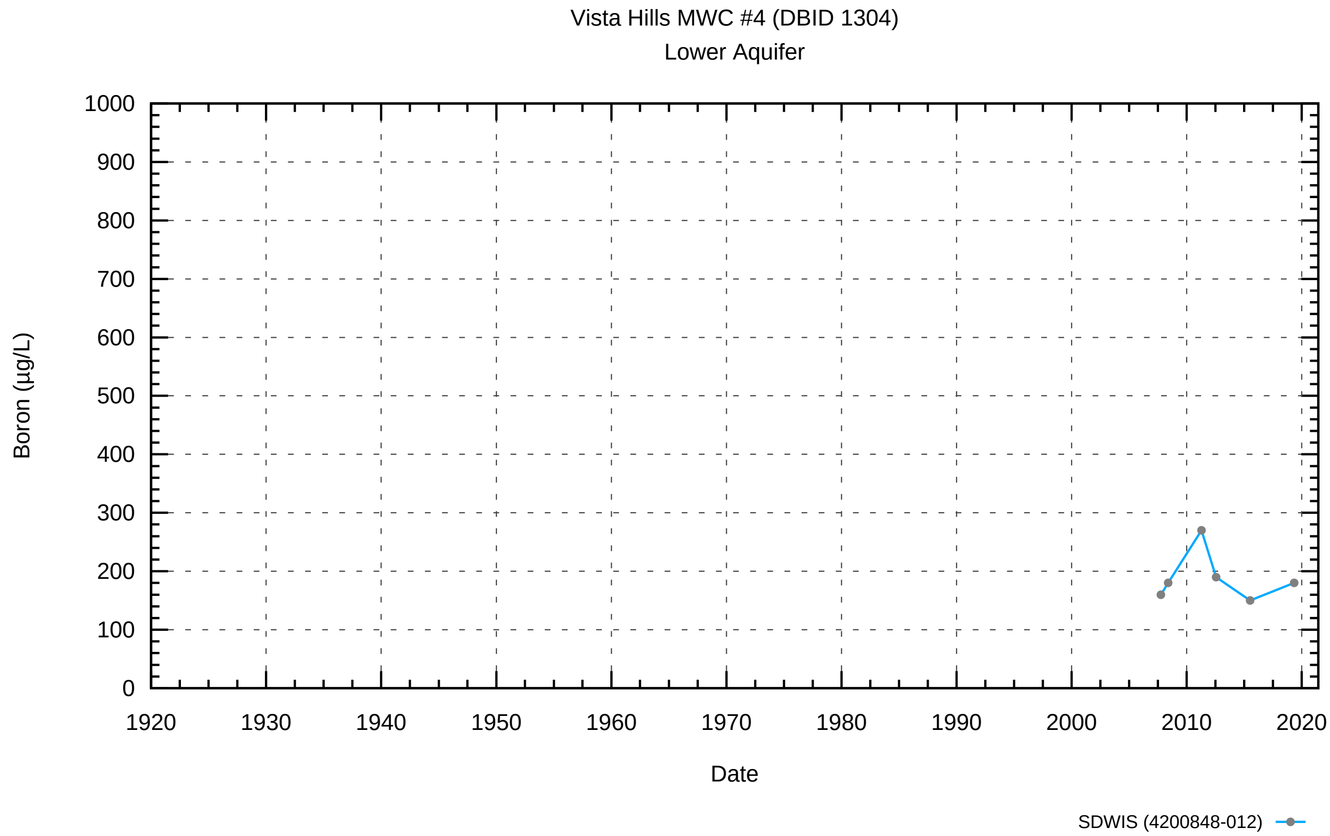


WMA: Lompoc Uplands - Boron

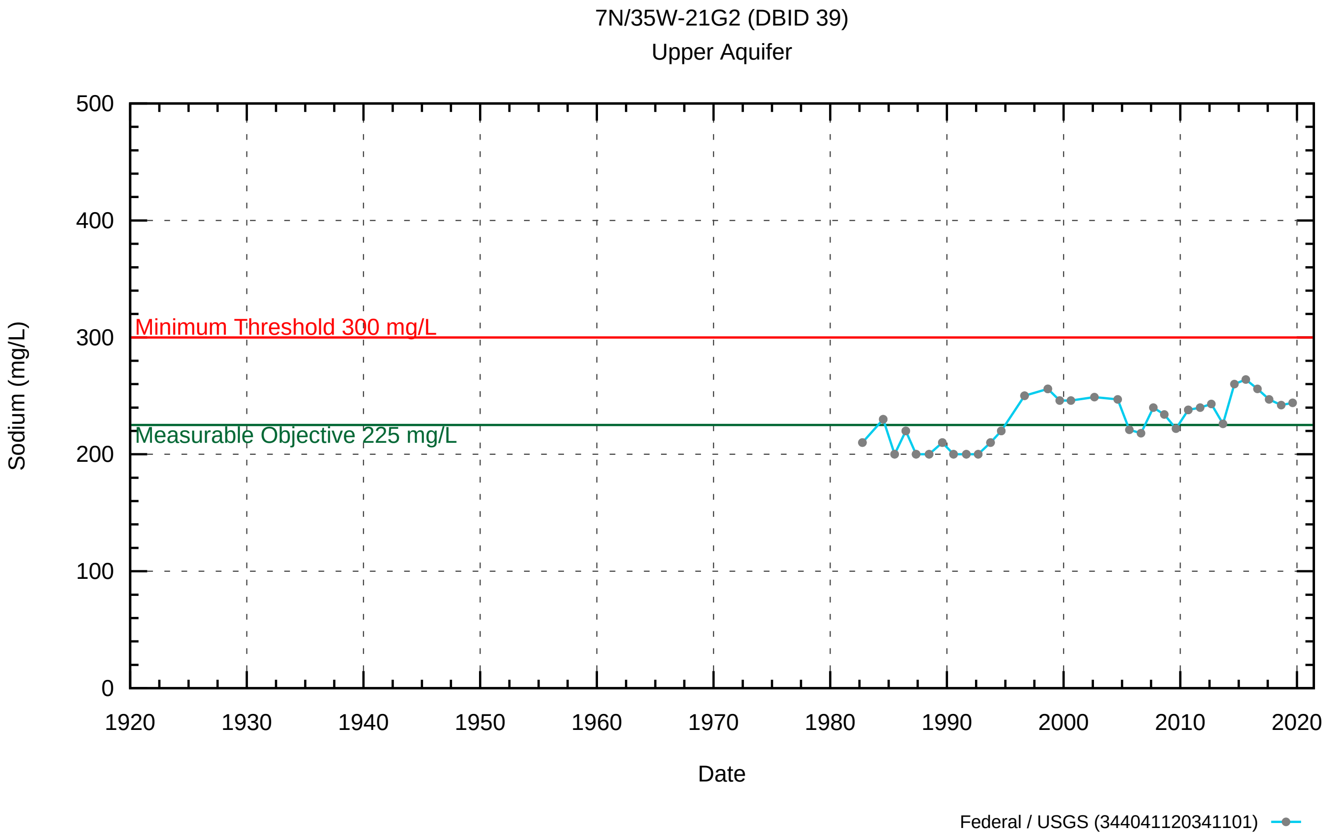


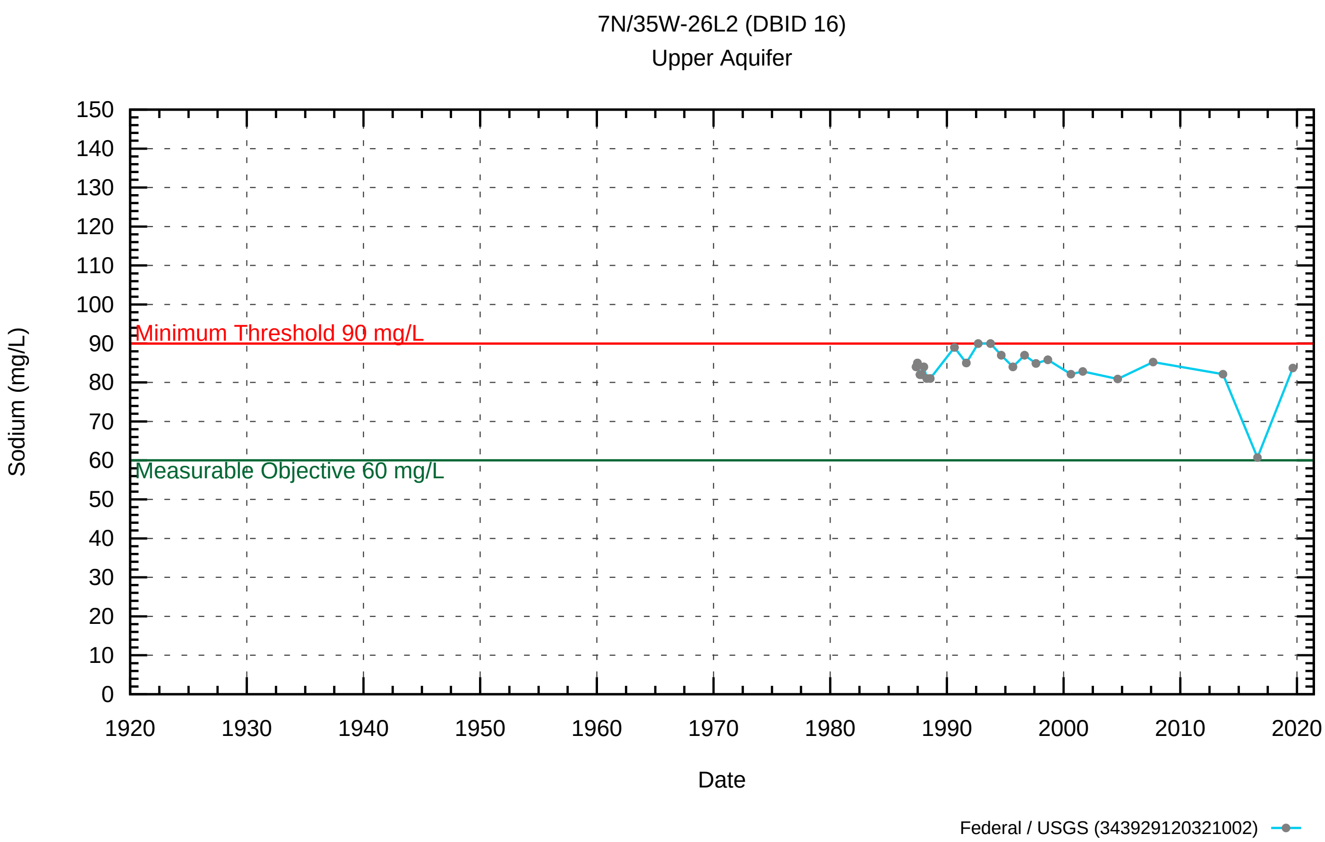


WMA: Santa Rita Uplands - Boron



WMA: Lompoc Plain - Sodium





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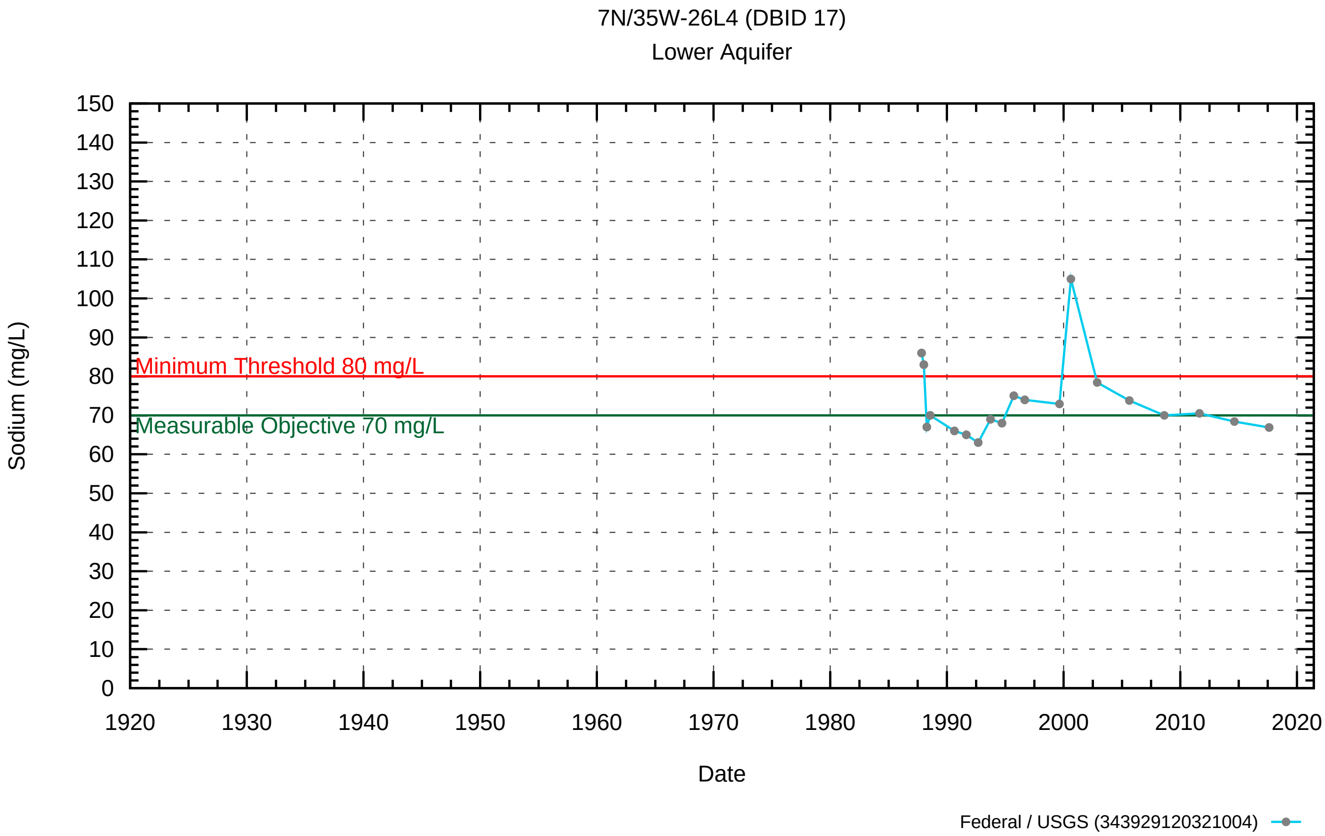

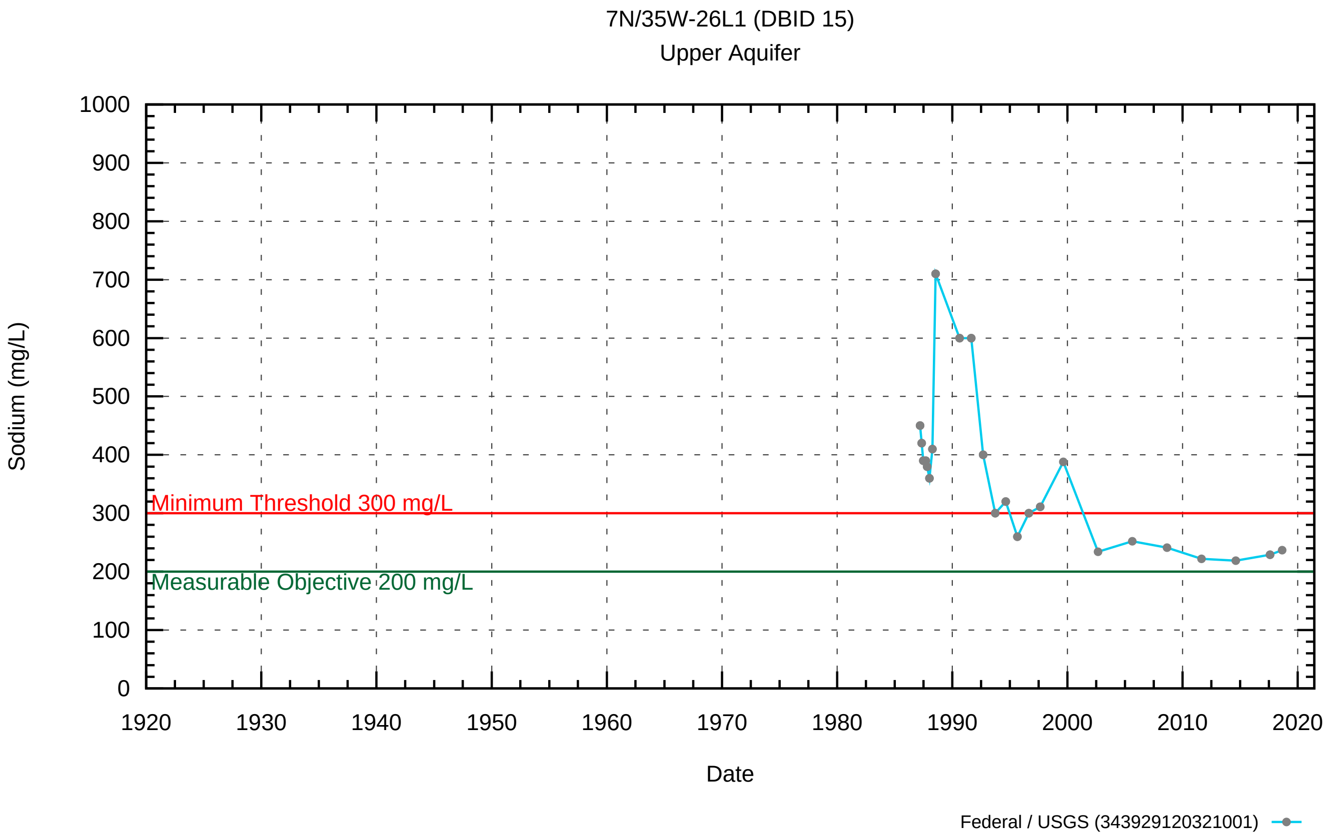

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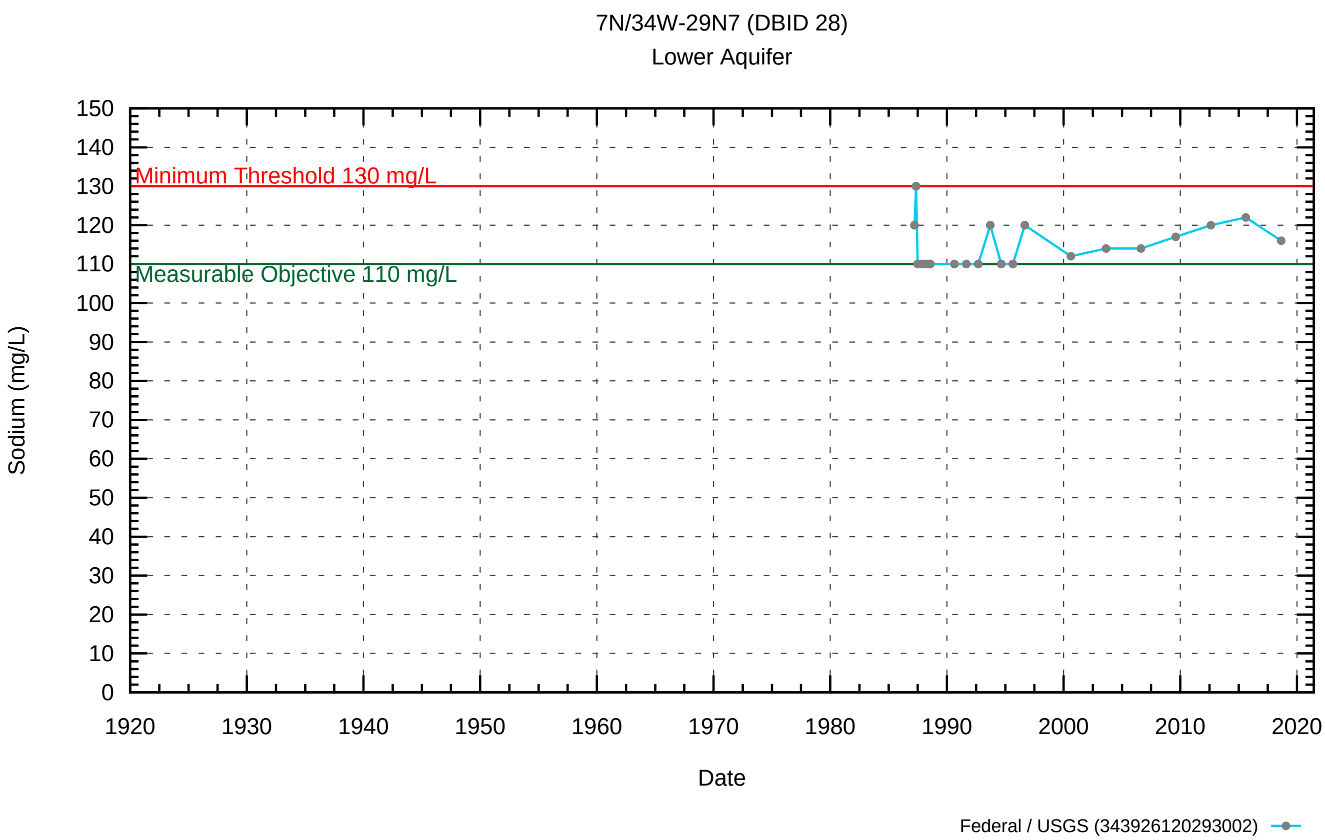
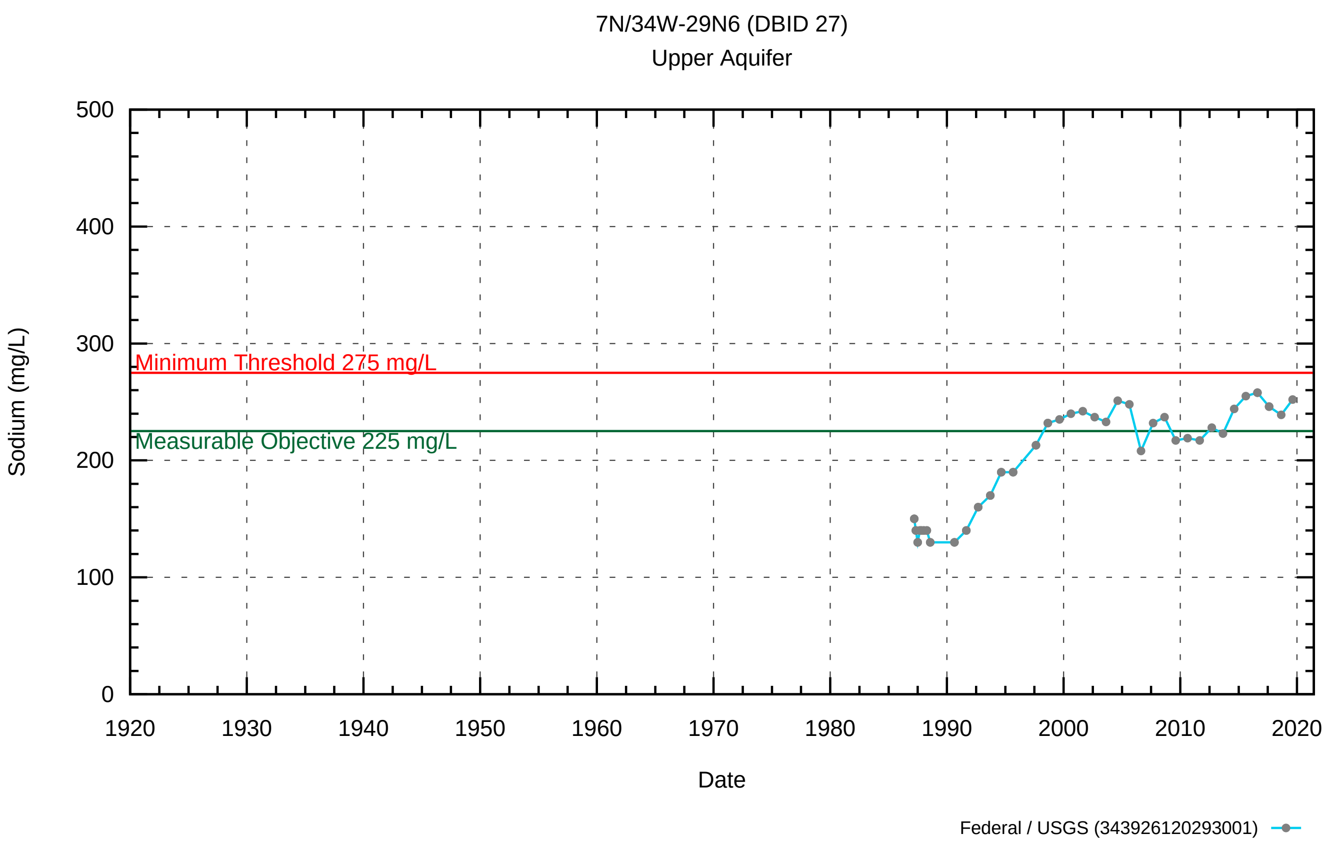
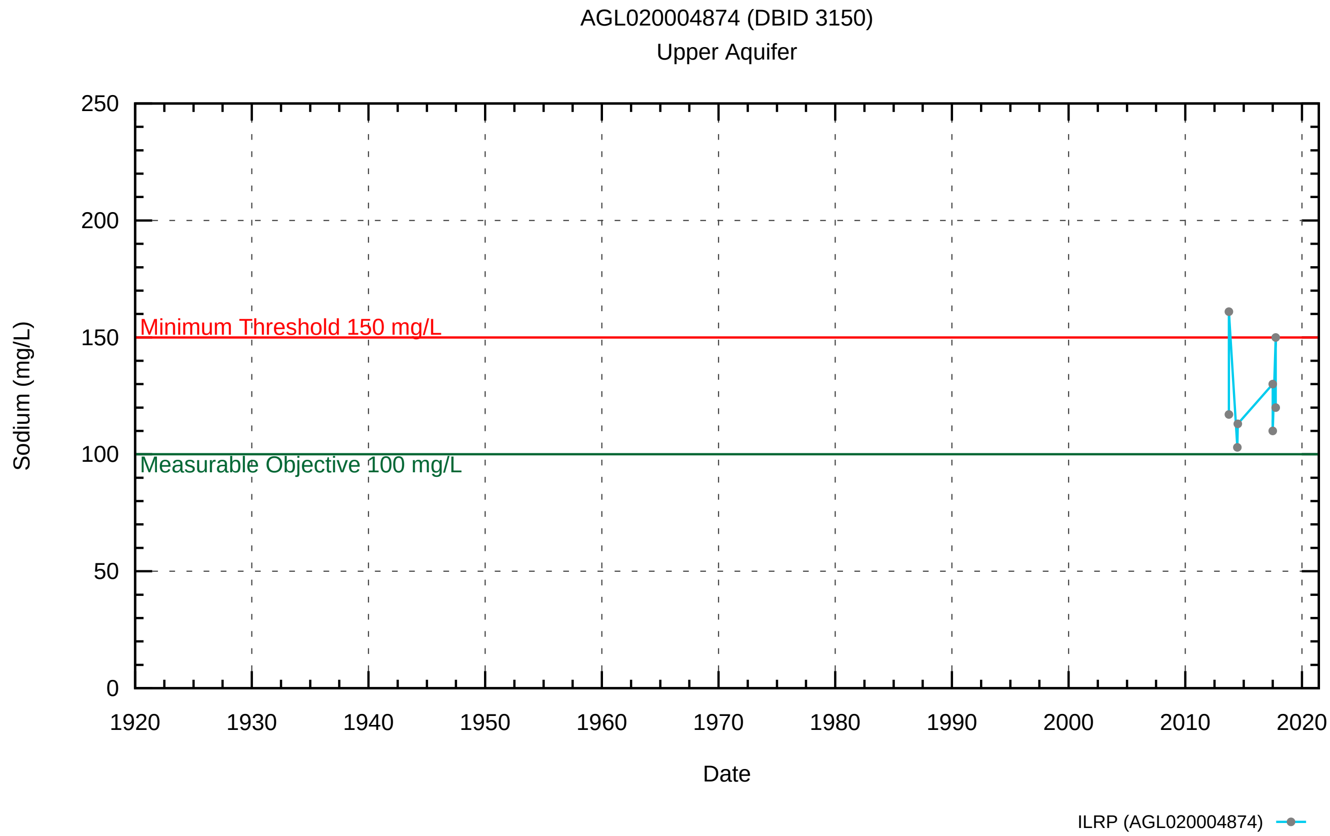
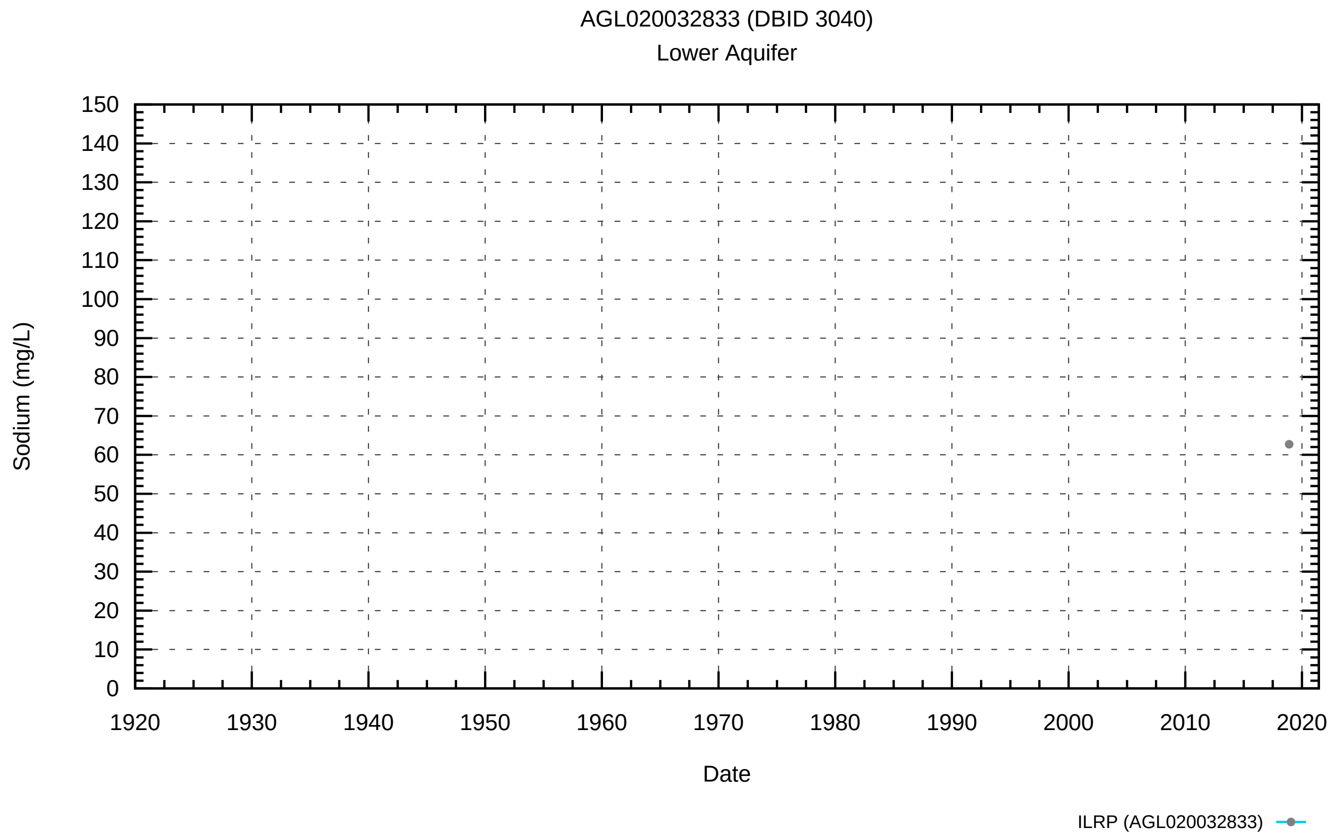


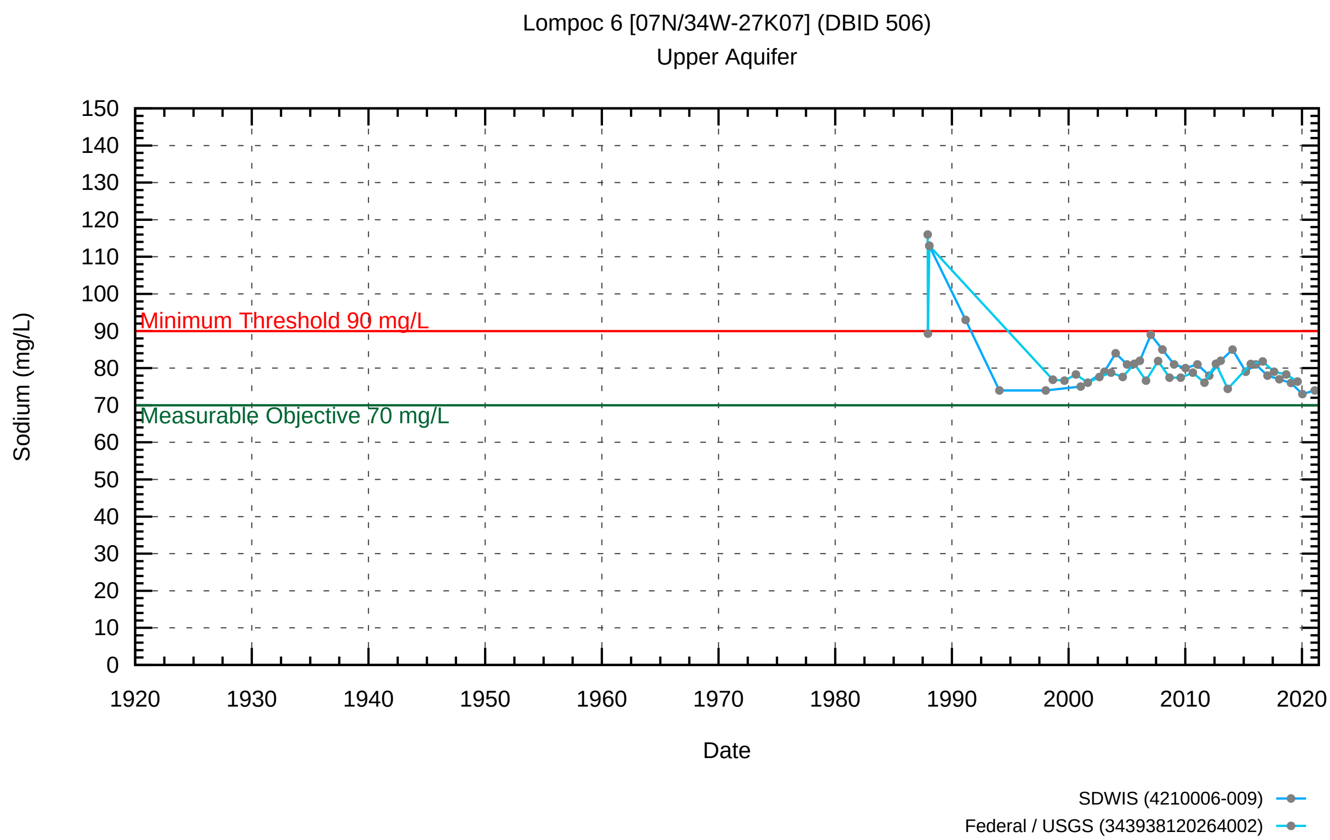


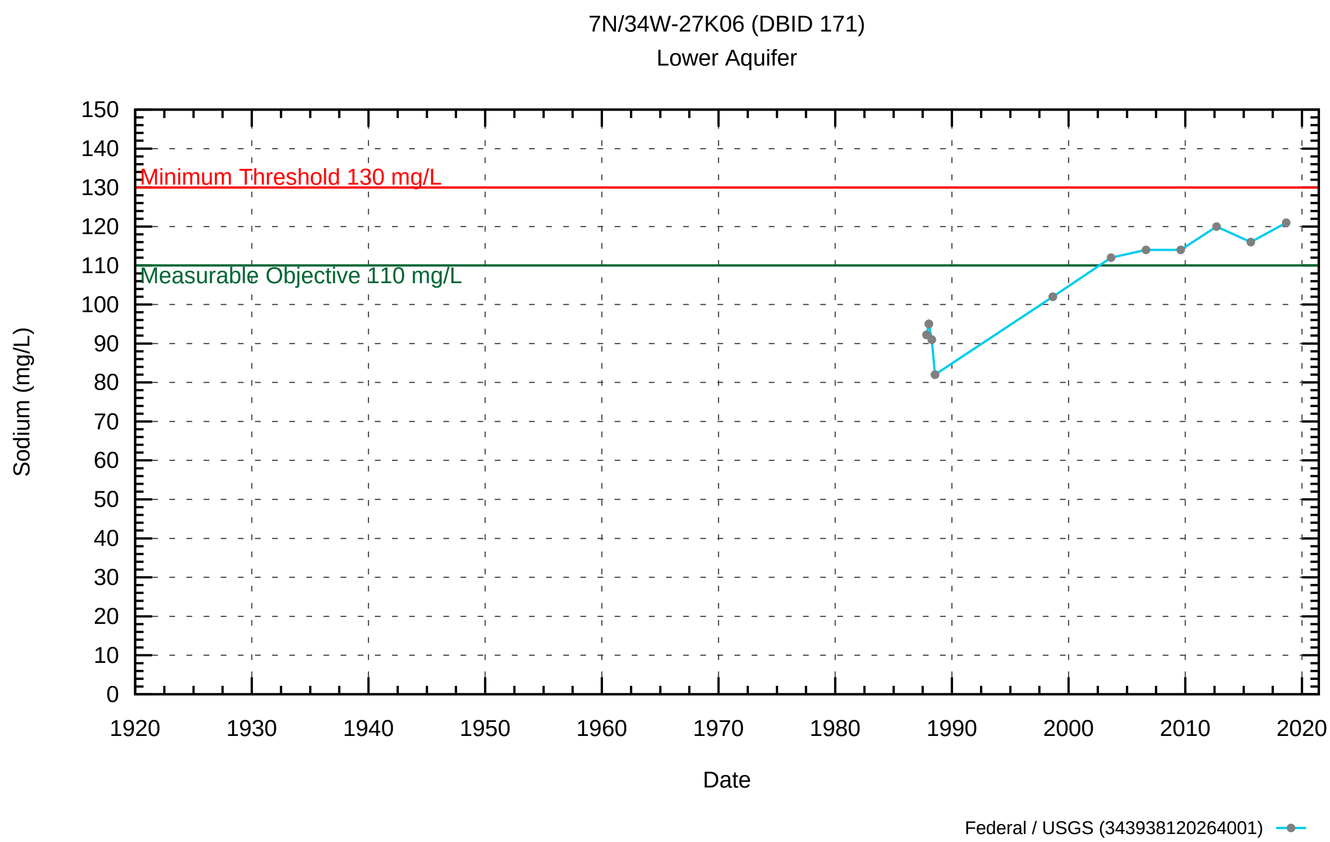
WMA: Lompoc Plain - Sodium



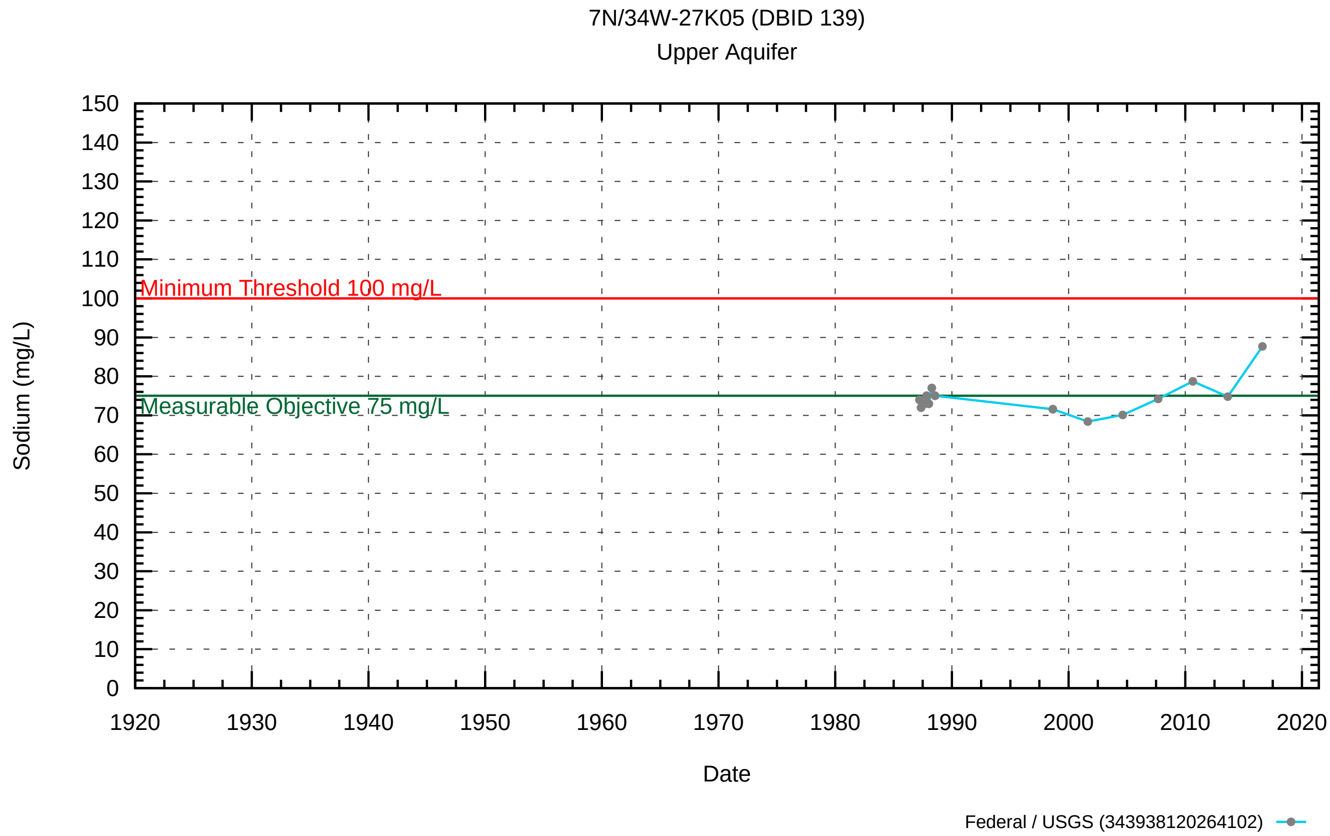


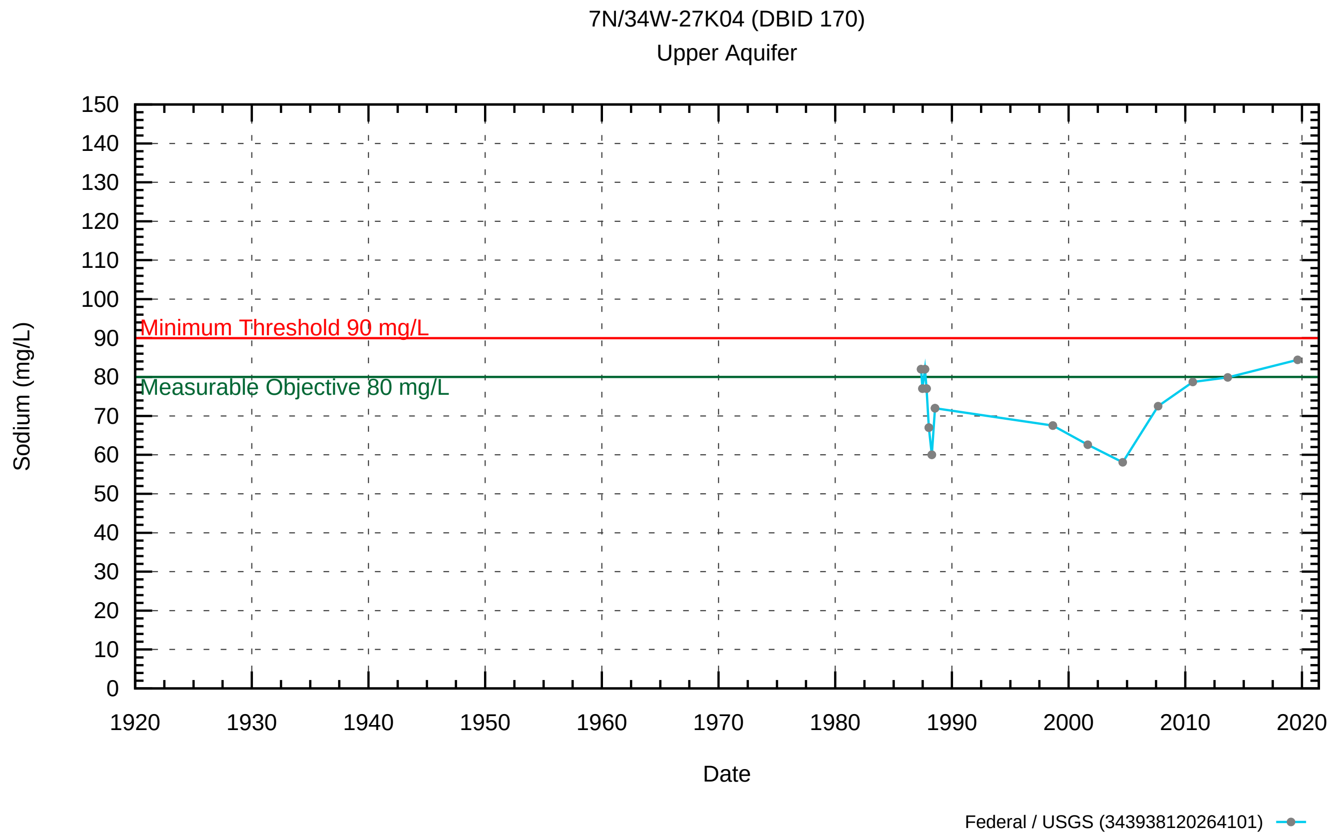
WMA: Lompoc Plain - Sodium





WMA: Lompoc Plain - Sodium





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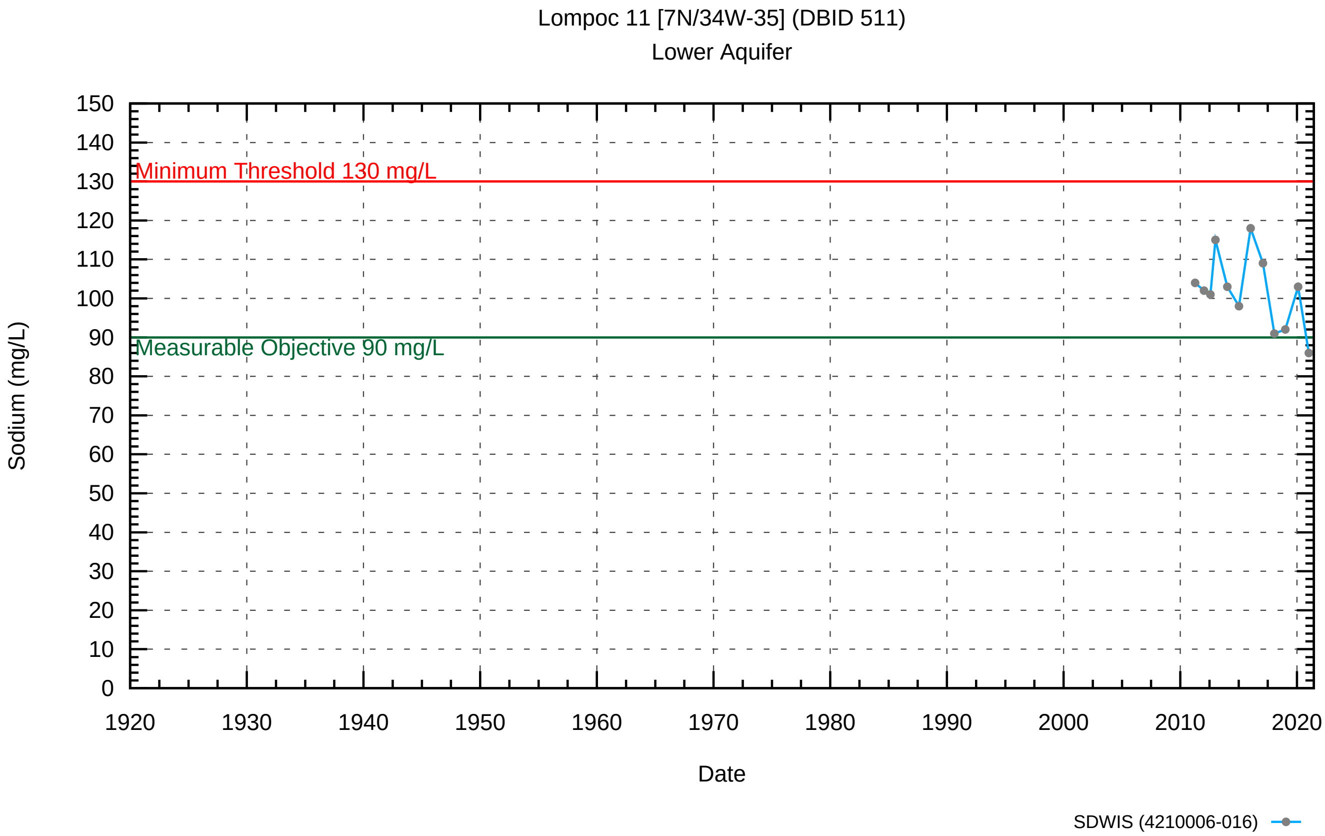
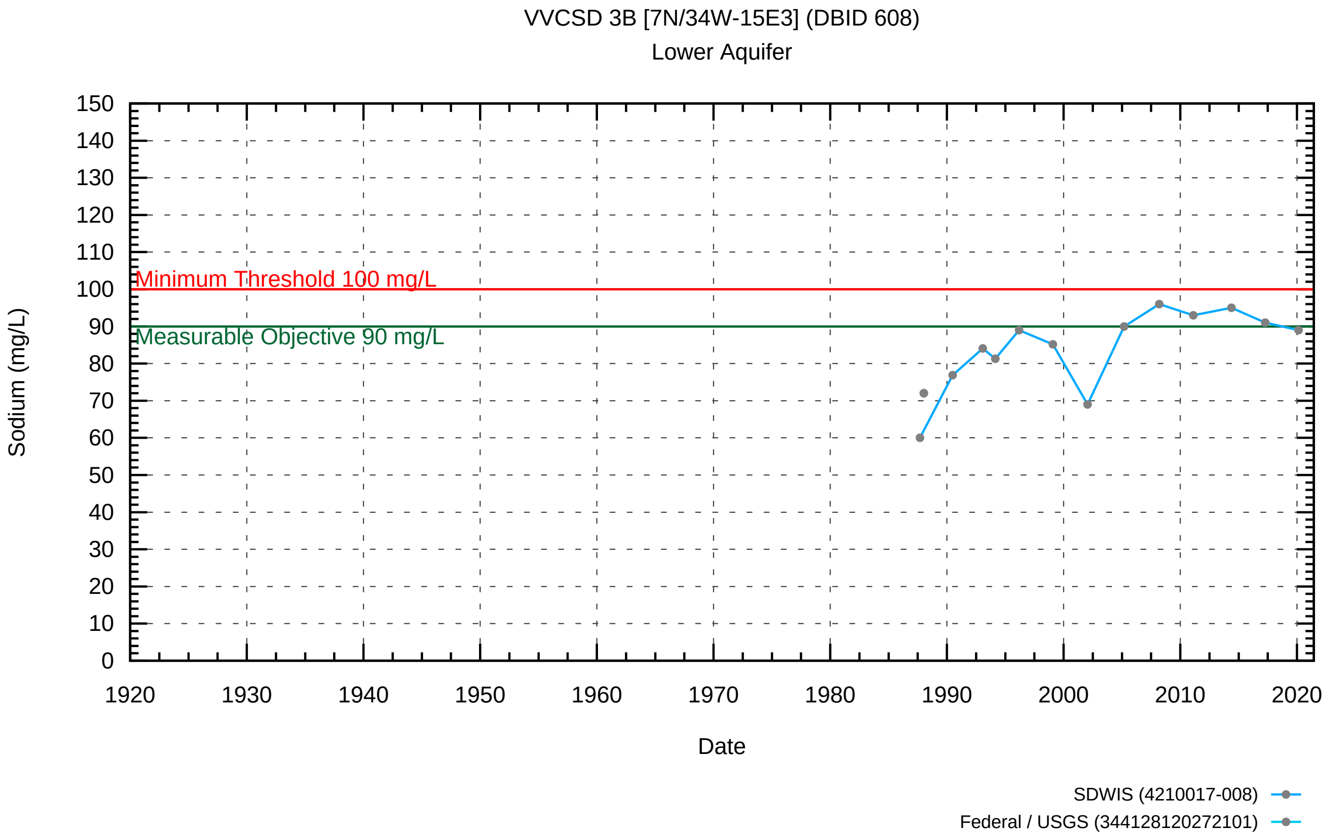
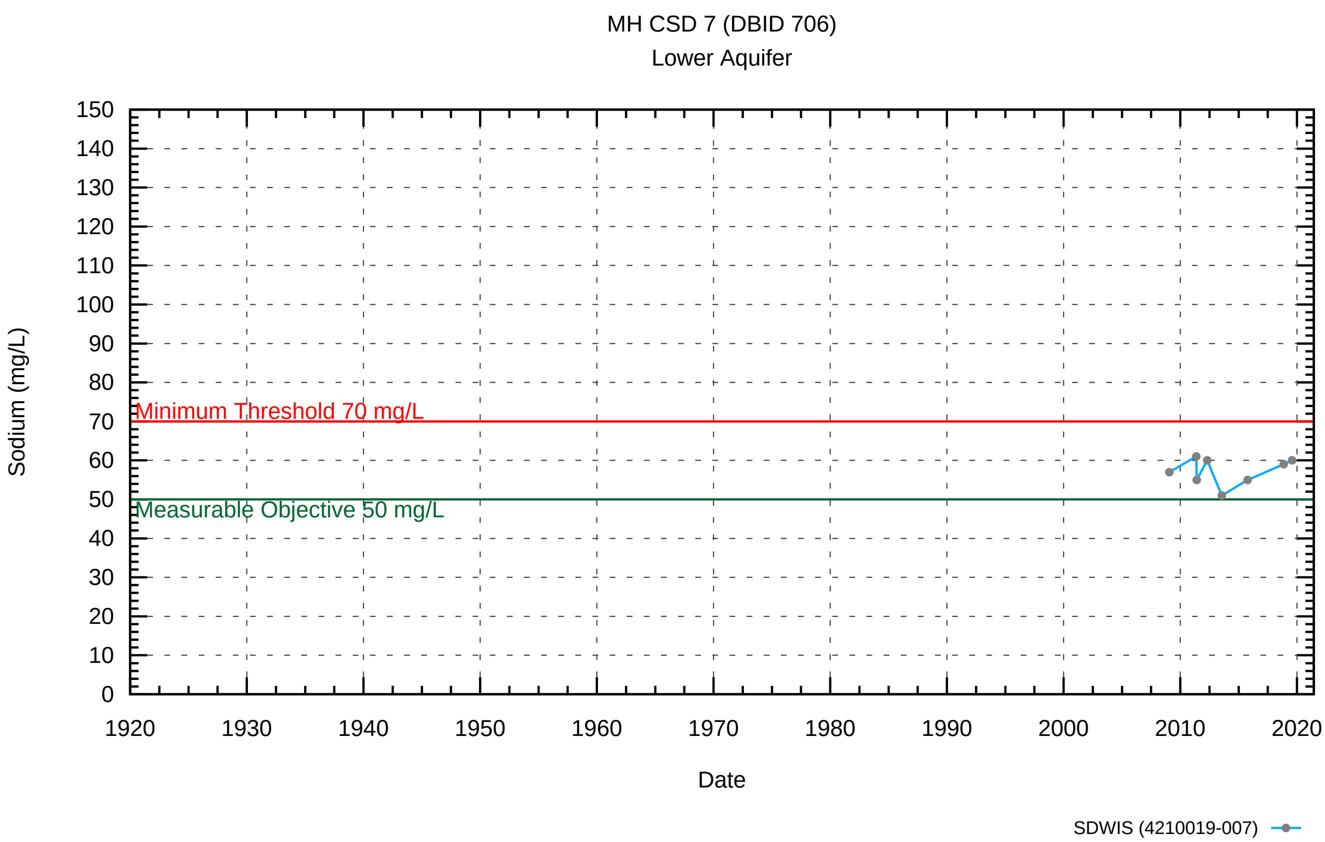


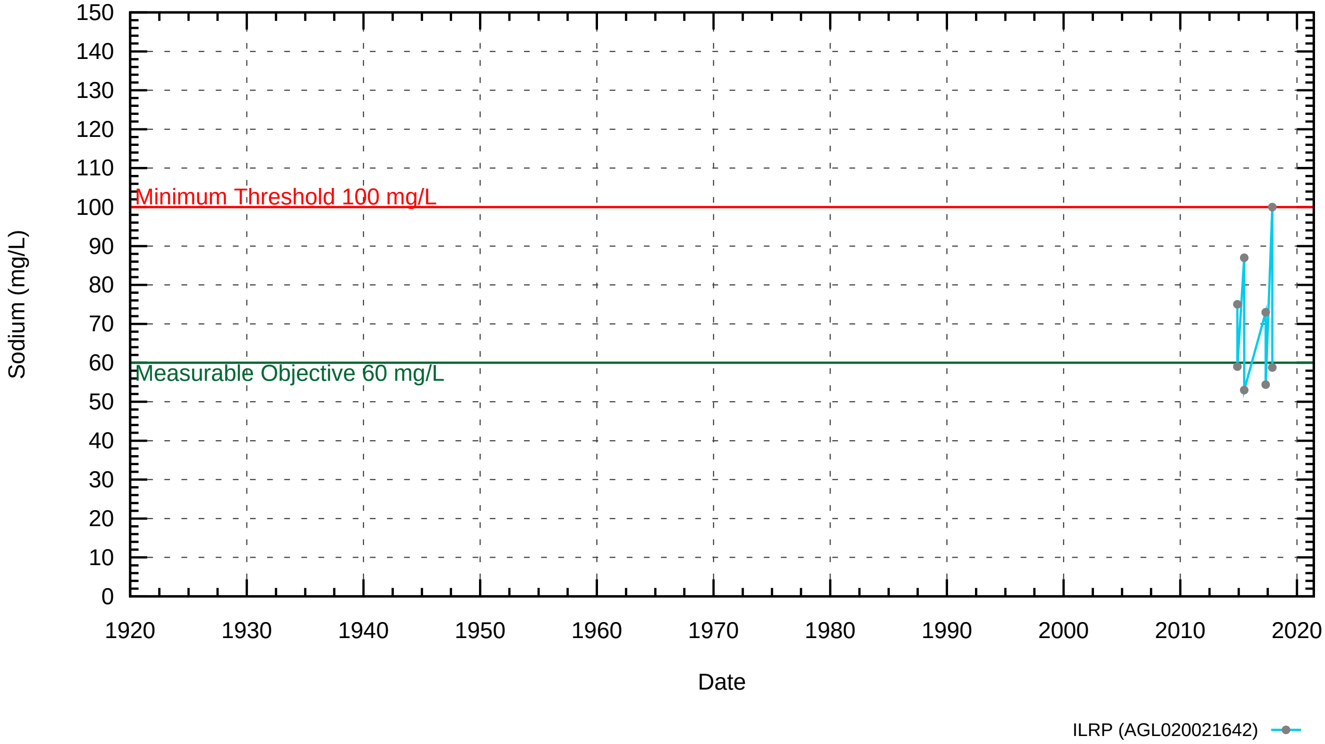
WMA: Lompoc Uplands - Sodium



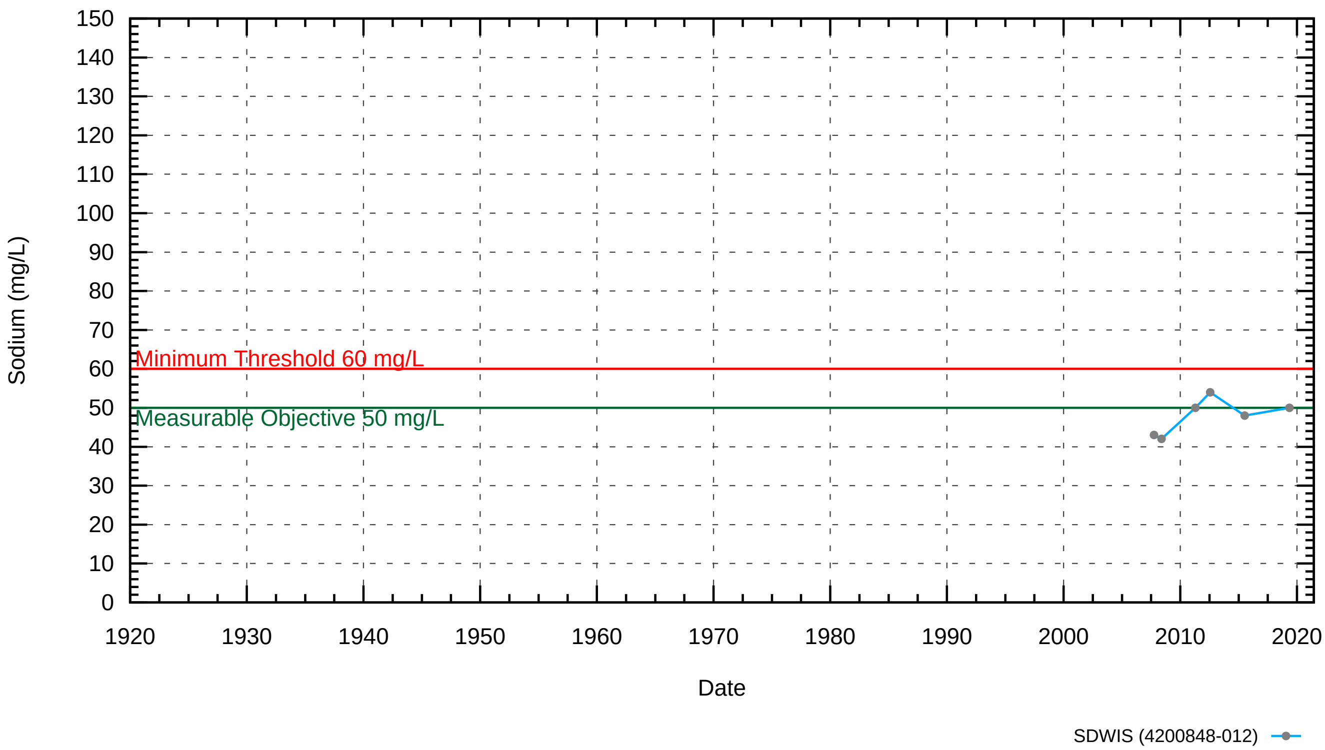


WMA: Santa Rita Uplands - Sodium

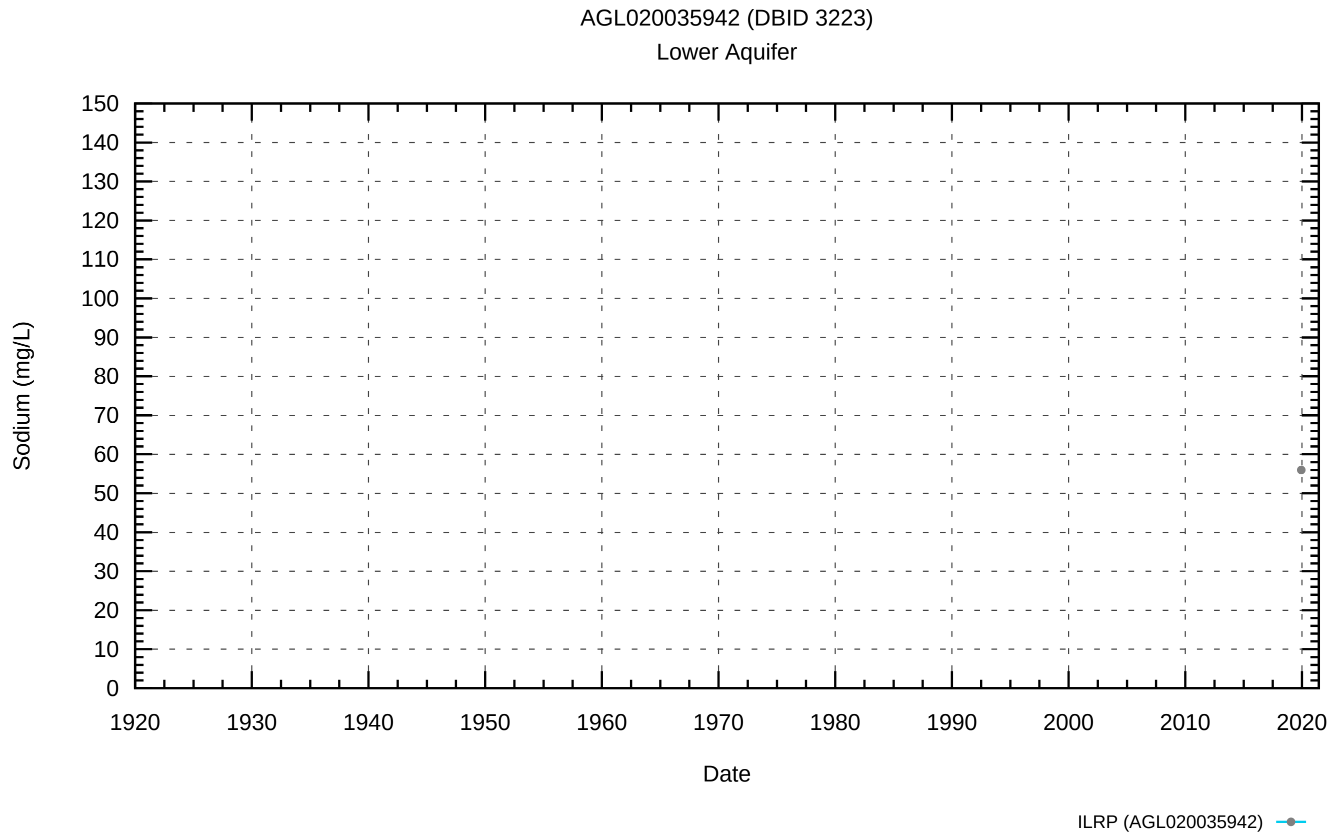
AGL020021642 (DBID 3172)
Lower Aquifer



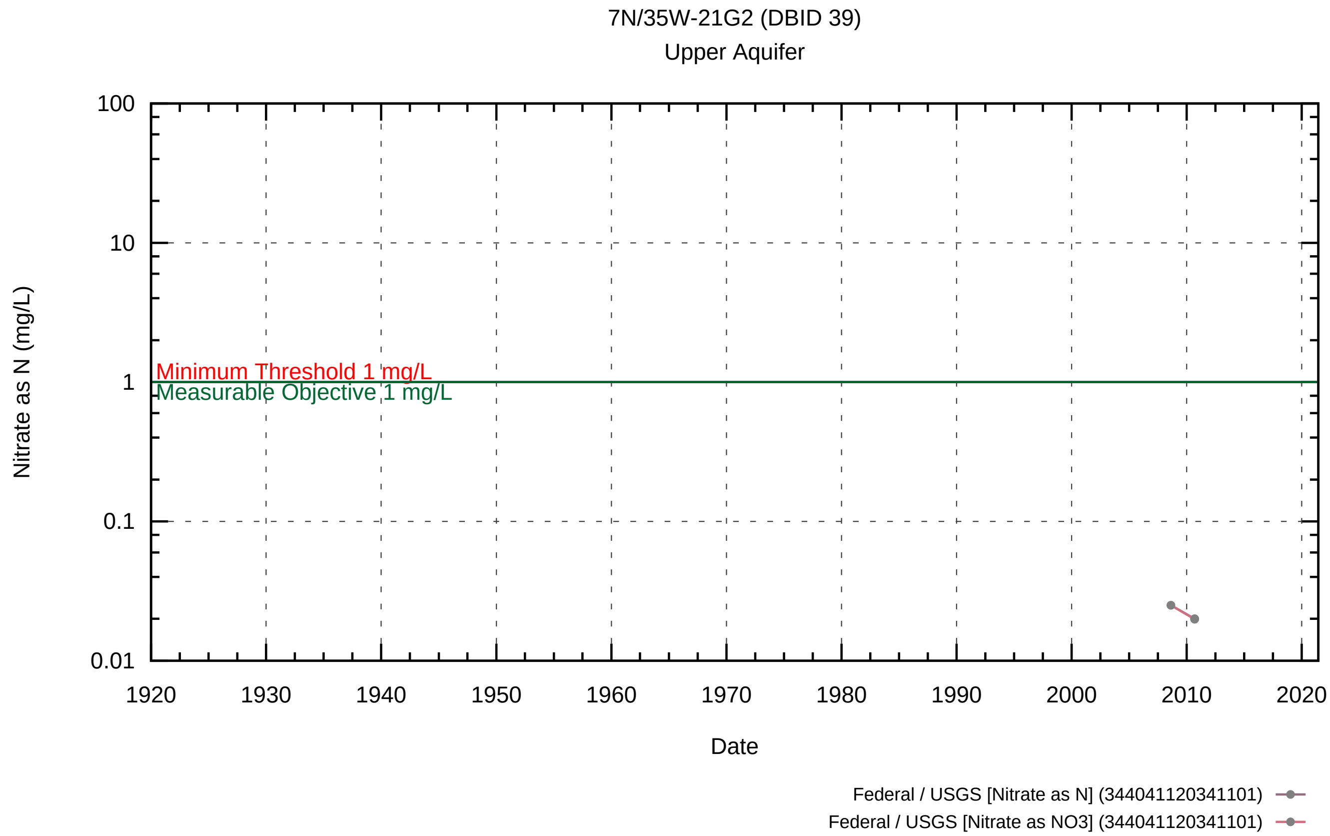
Vista Hills MWC #4 (DBID 1304)
Lower Aquifer

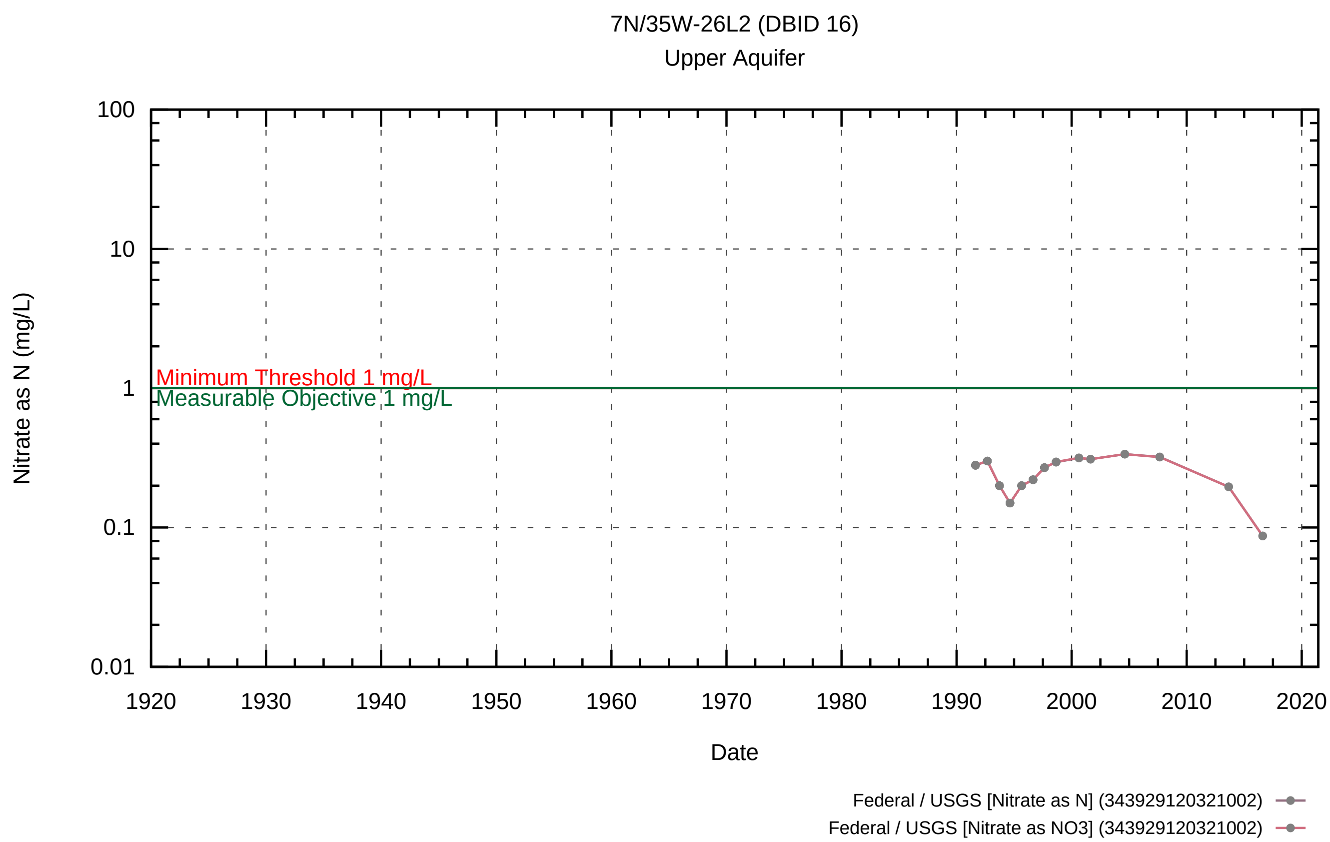


WMA: Santa Rita Uplands - Sodium

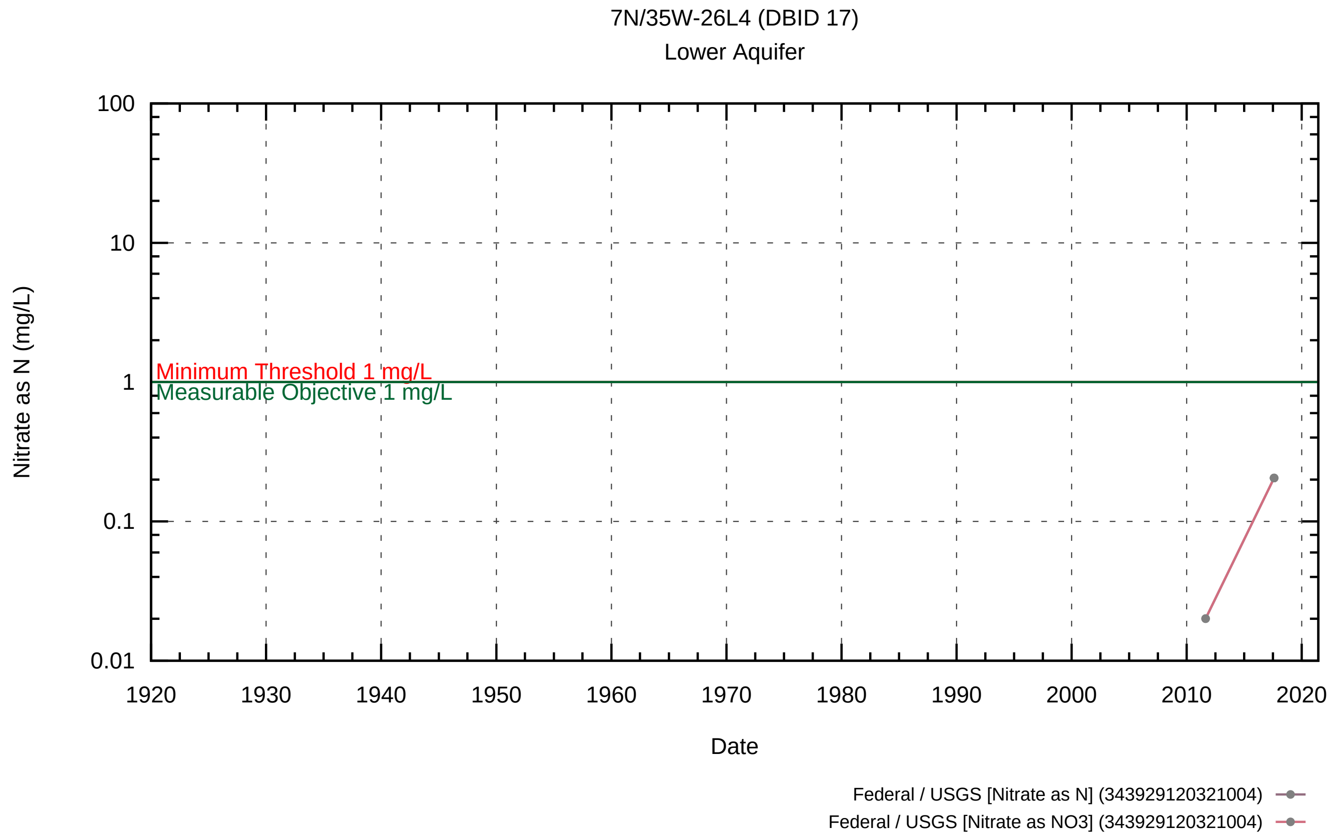


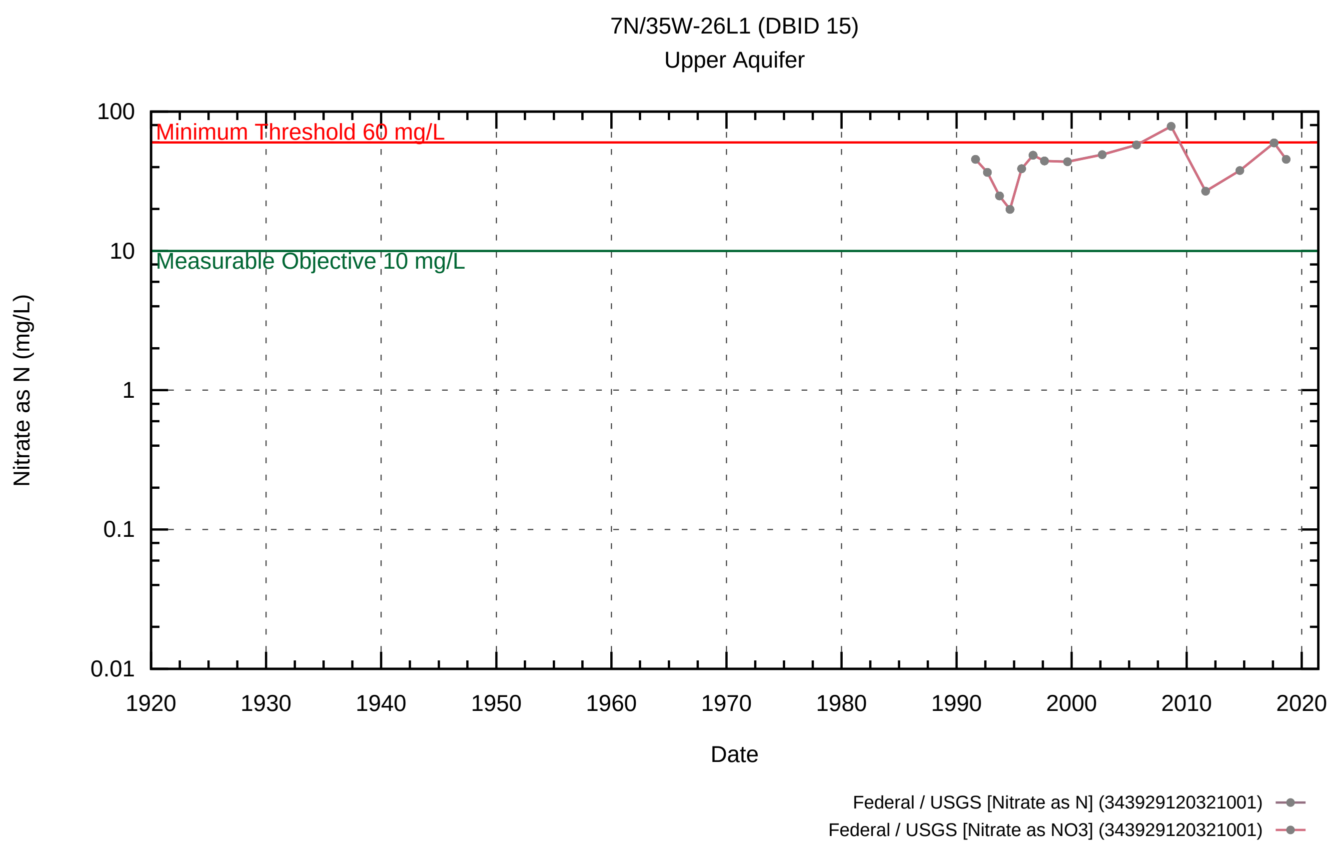
WMA: Lompoc Plain - Nitrate



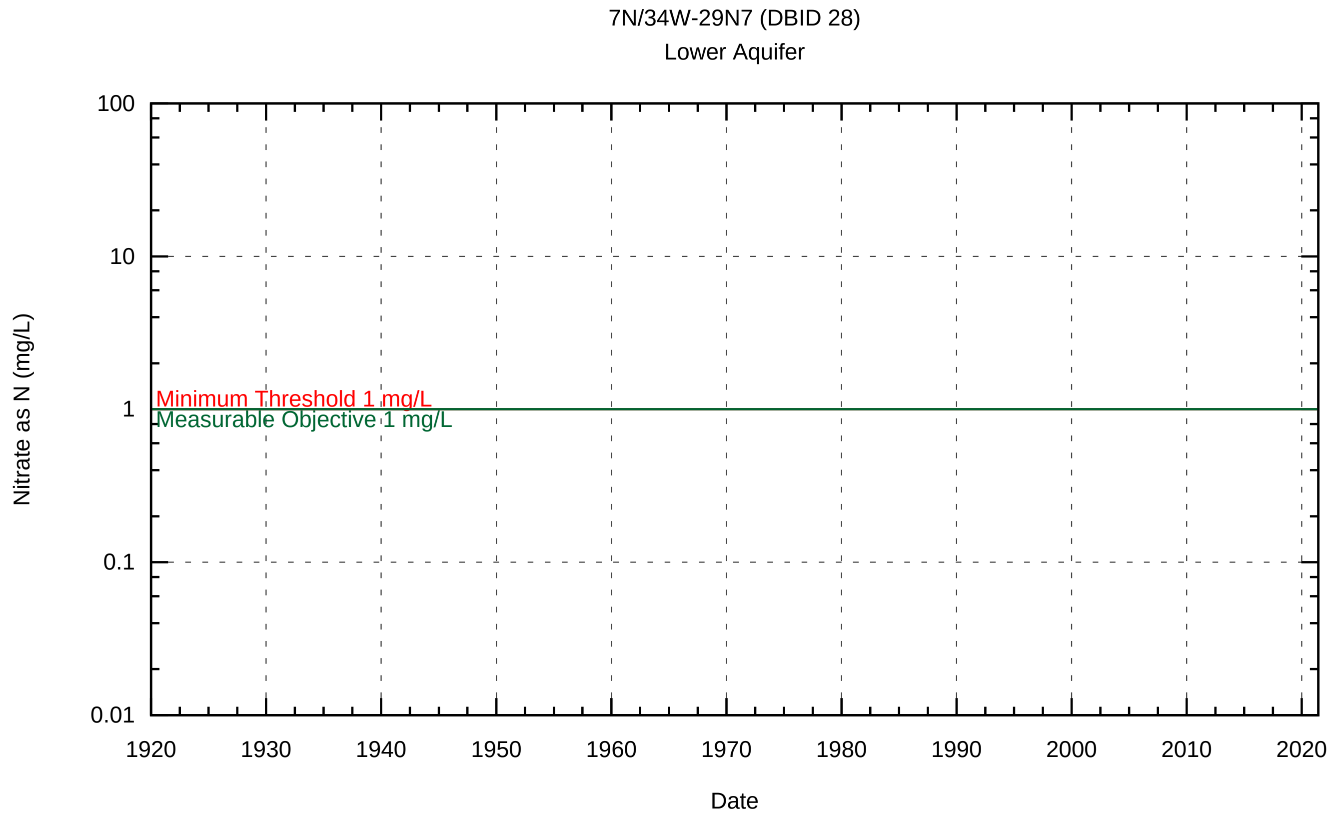


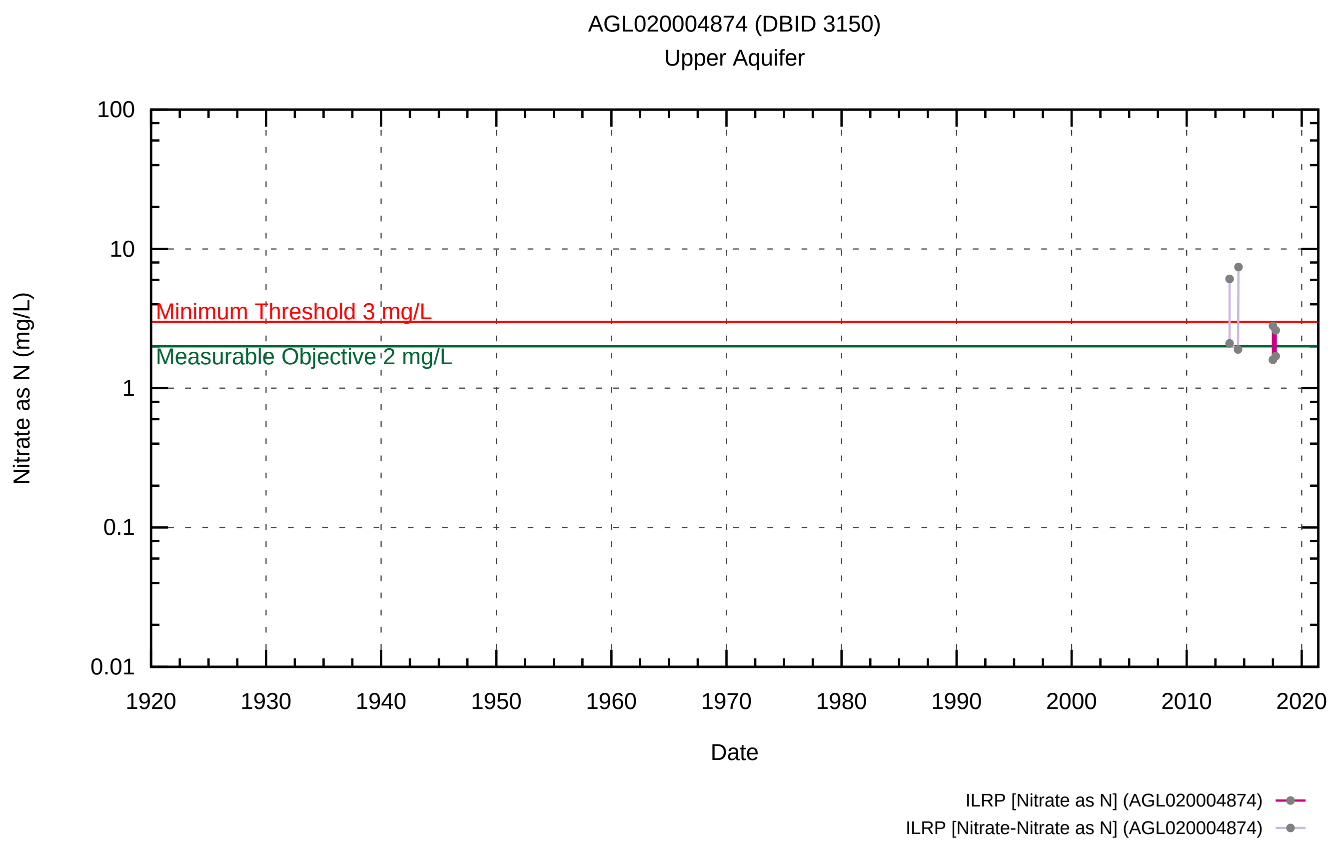
WMA: Lompoc Plain - Nitrate



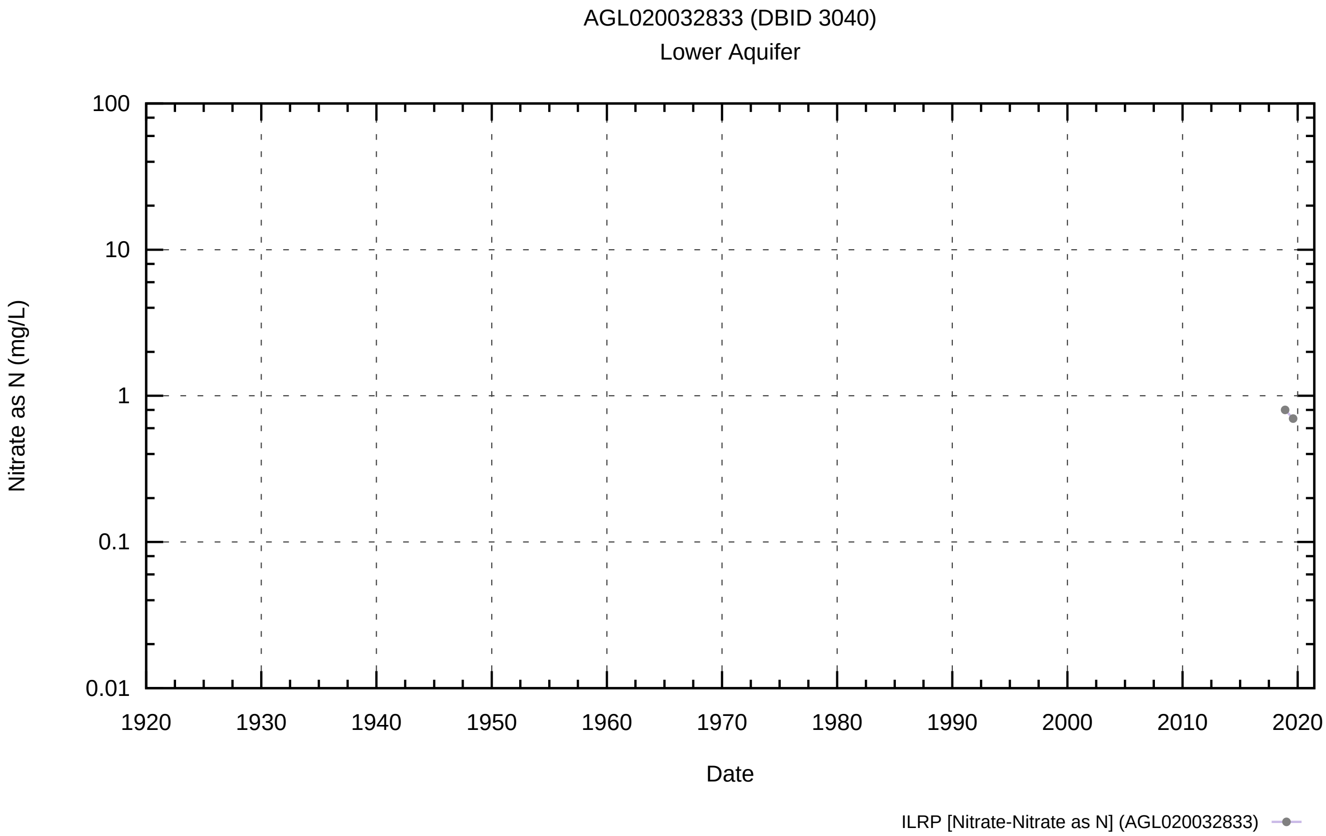


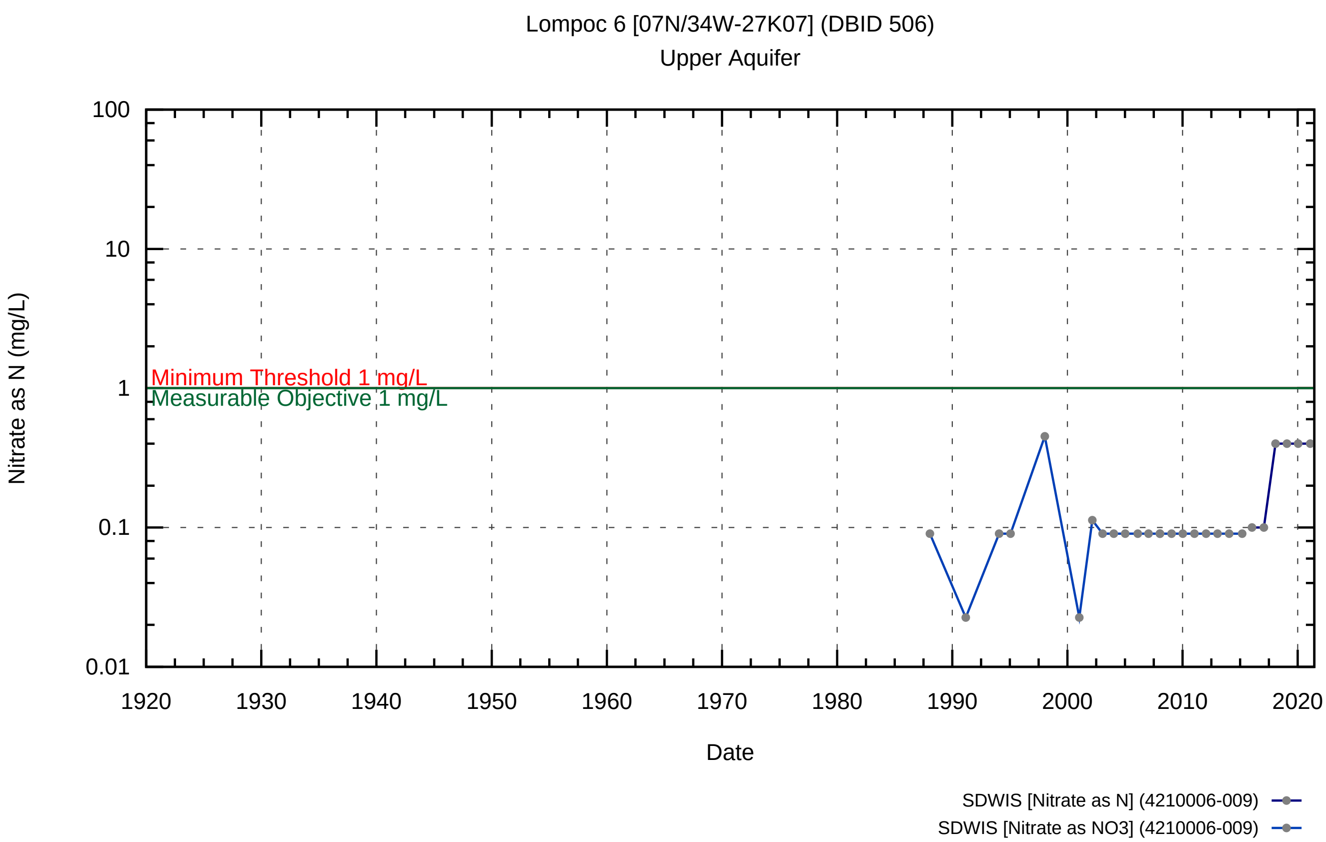
WMA: Lompoc Plain - Nitrate



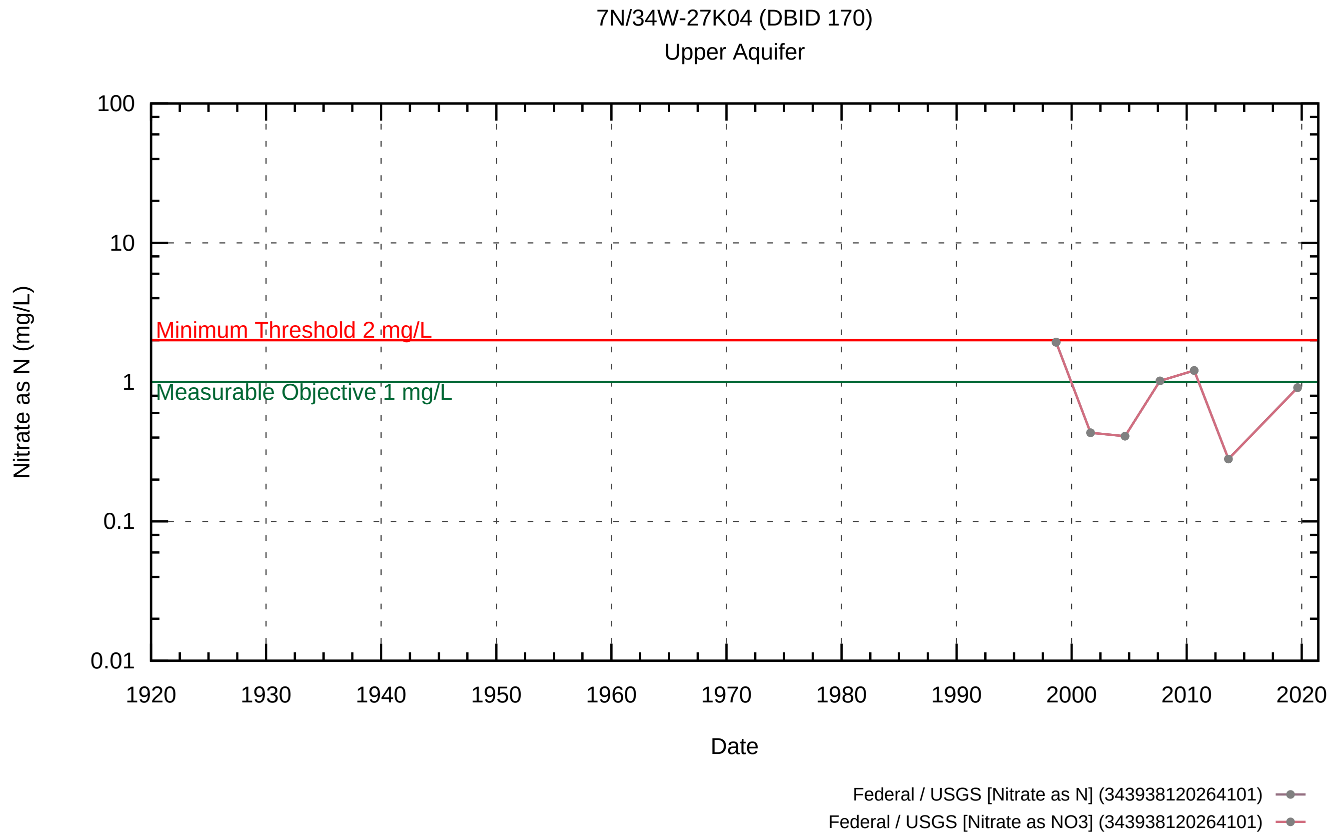


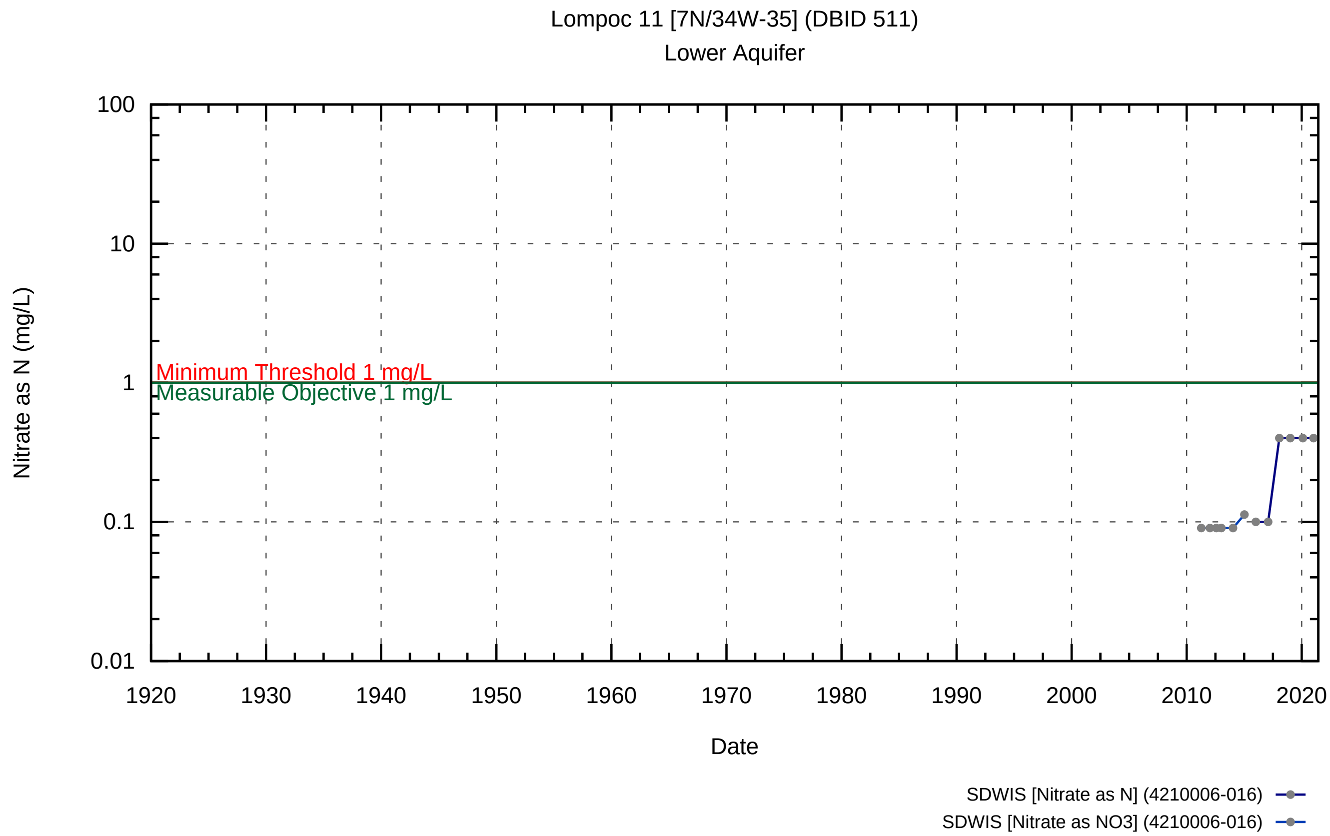
WMA: Lompoc Plain - Nitrate



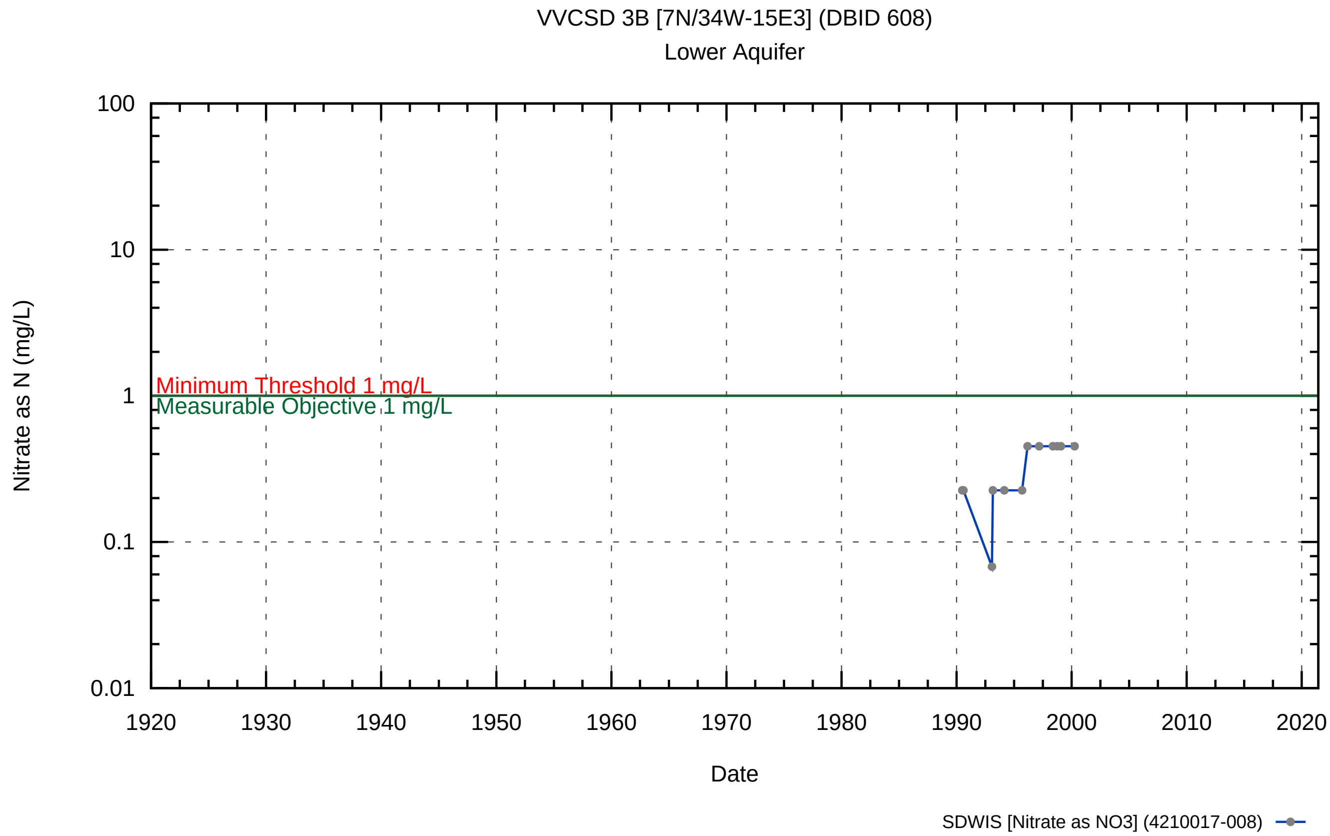


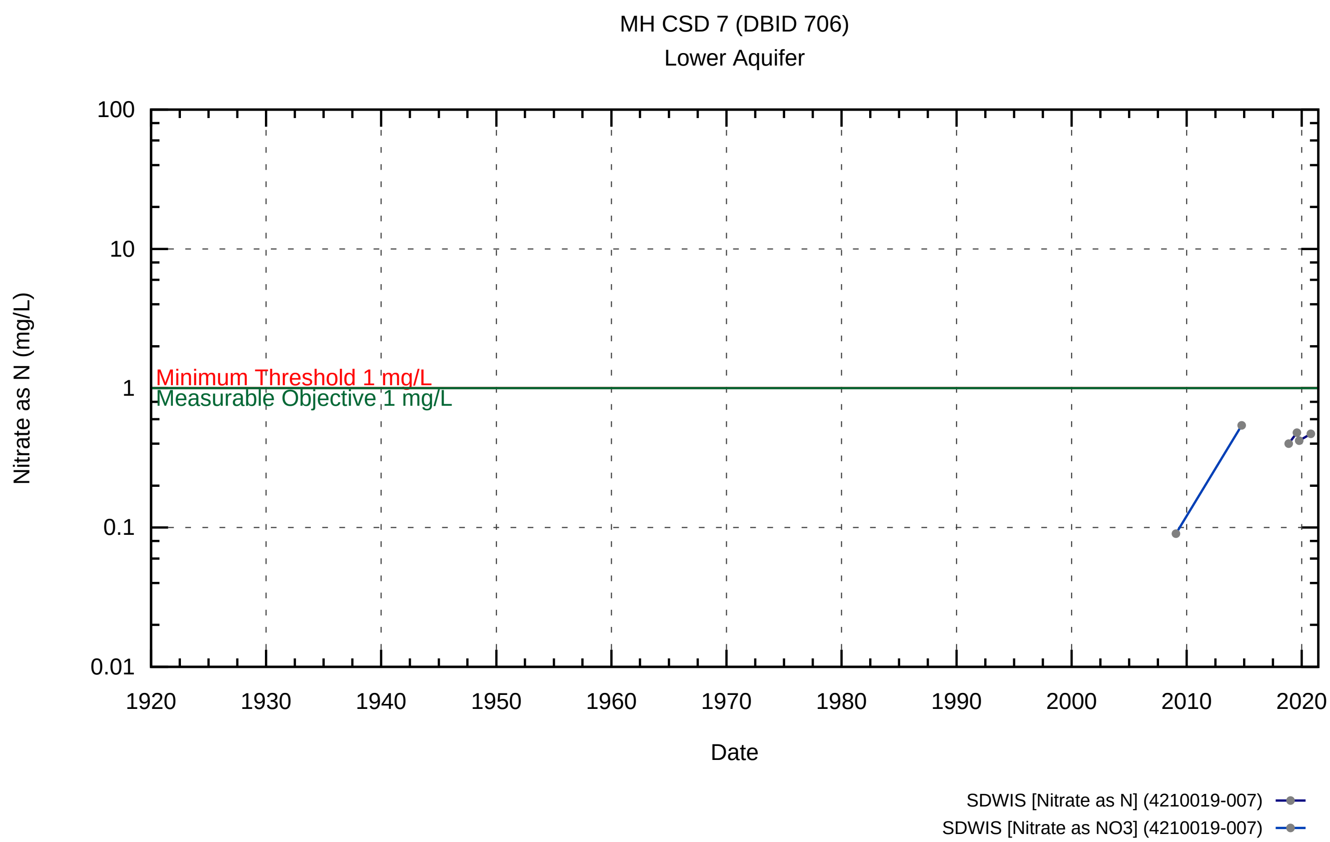
WMA: Lompoc Plain - Nitrate



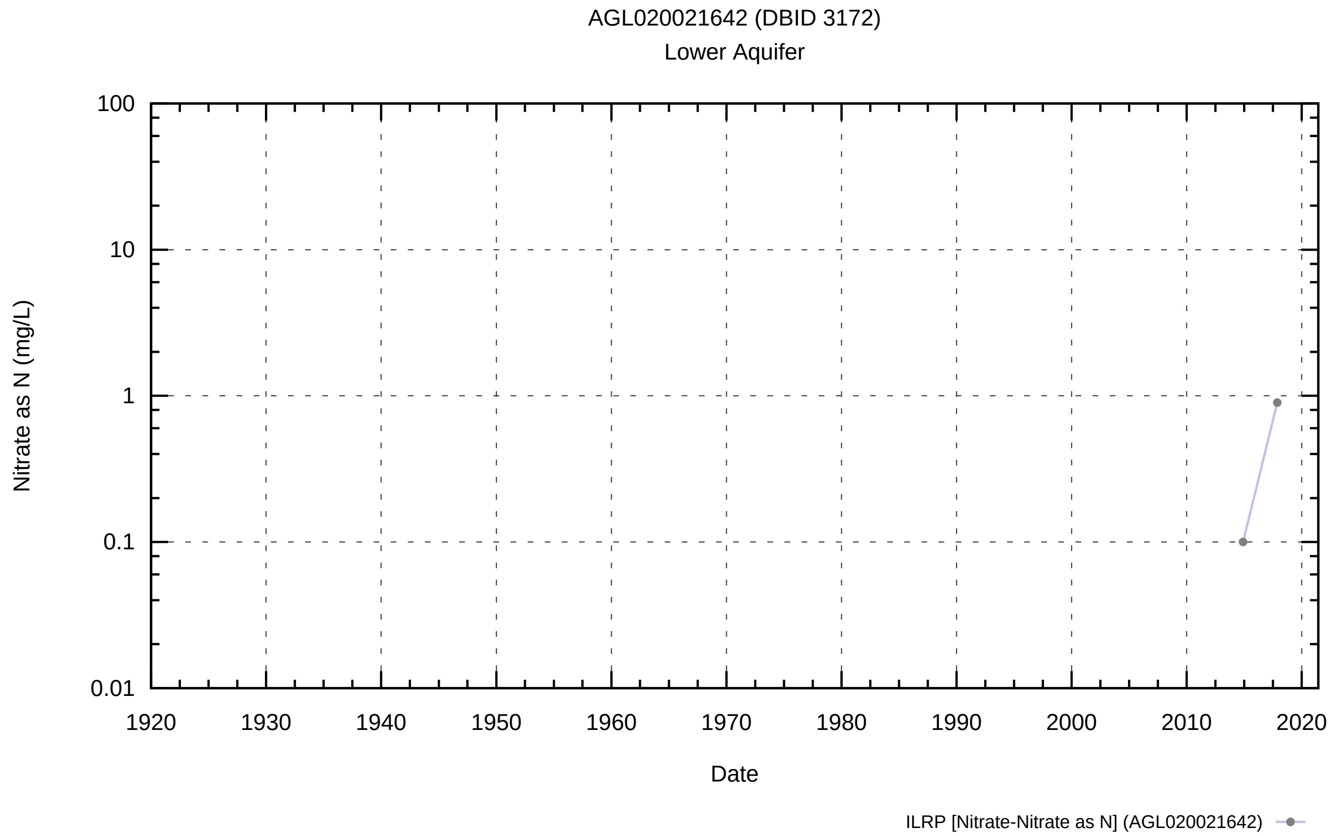


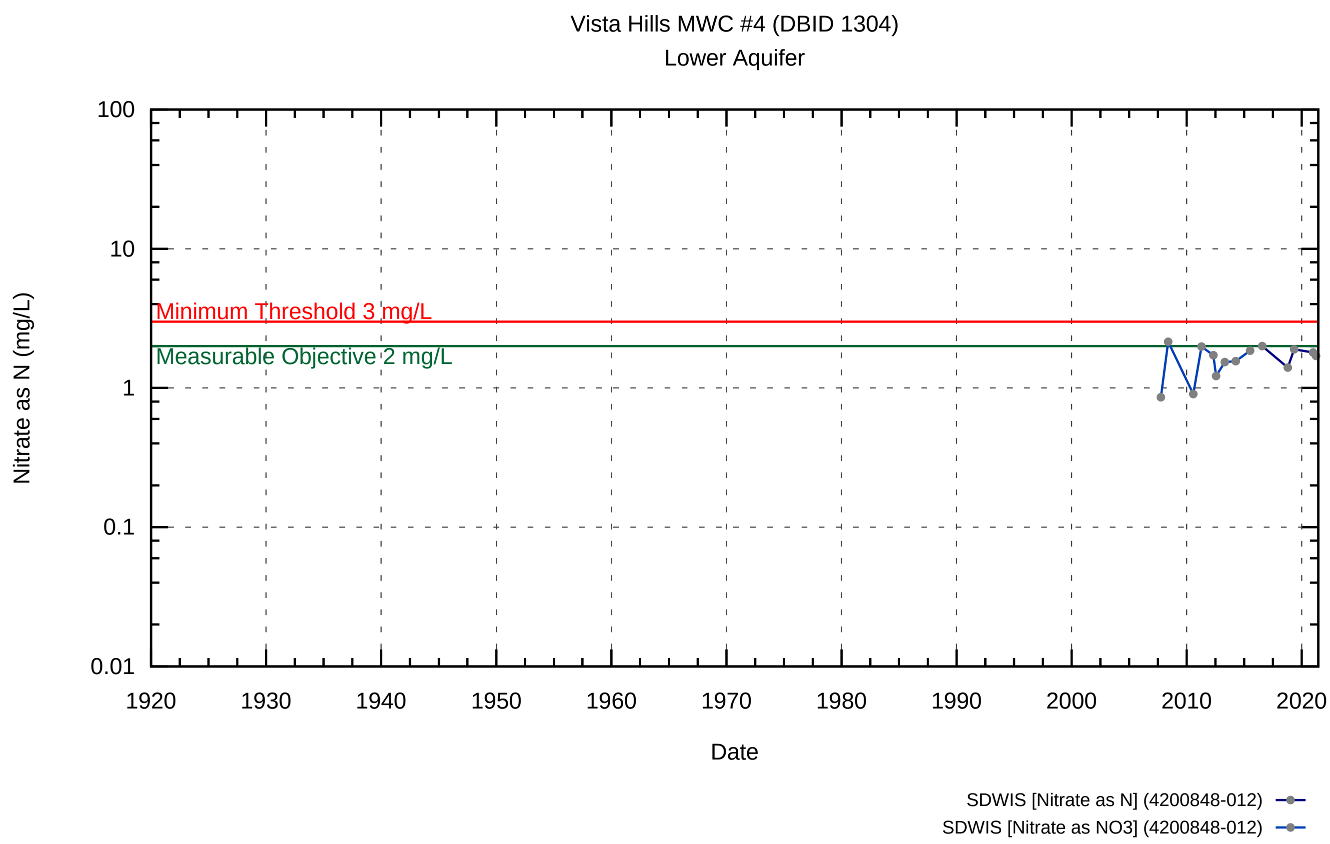
WMA: Lompoc Uplands - Nitrate





WMA: Santa Rita Uplands - Nitrate





SUSTAINABLE MANAGEMENT CRITERIA
WESTERN MANAGEMENT AREA

APPENDIX C: SURFACE WATER DEPLETION GROUNDWATER LEVEL HYDROGRAPHS

This appendix includes historical hydrographs of the representative wells for monitoring potential surface water depletion as well as the established sustainable management criteria of the measurable objective, early warning, and minimum threshold.

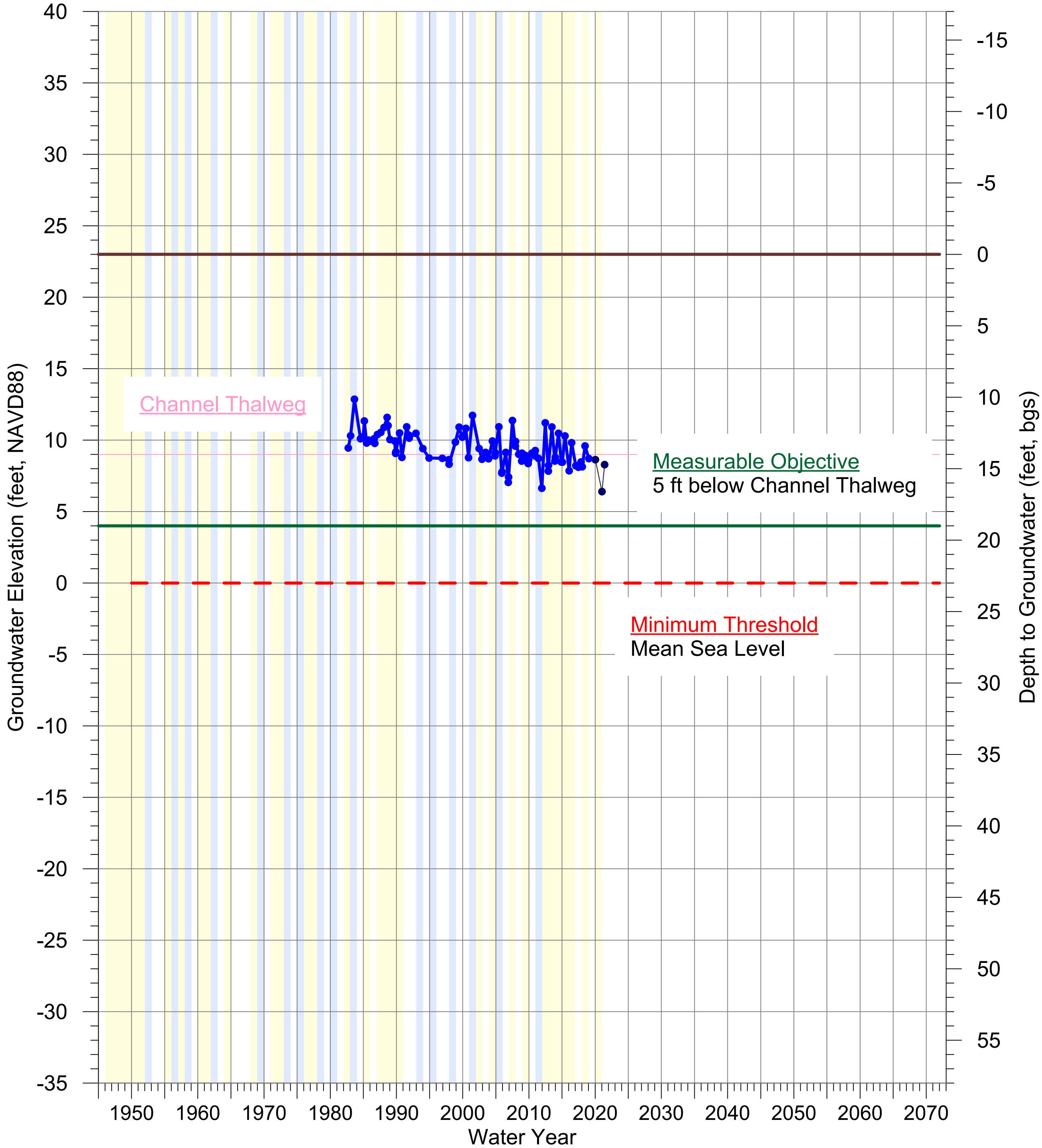
LIST OF ACRONYMS AND ABBREVIATIONS

BGS	below ground surface
CASGEM	California Statewide Groundwater Elevation Monitoring
FT	feet
NAVD88	North American Vertical Datum of 1988
USBR	United States Bureau of Reclamation
USGS	United States Geologic Survey
WL	Water Level
WMA	Western Management Area

FIGURE C-01

CASGEM ID
49153
Voluntary

WMA Representative Monitoring Well
for Groundwater Dependent Ecosytems
(Lompoc Plain Subarea)
7N/35W-21G2



USGS (344041120341101)
County of Santa Barbara
Ground Surface (23 feet above mean sea level)
Depth of Well (180 feet); Perforations TBD

DRAFT
7/2/2021

STETSON ENGINEERS INC.

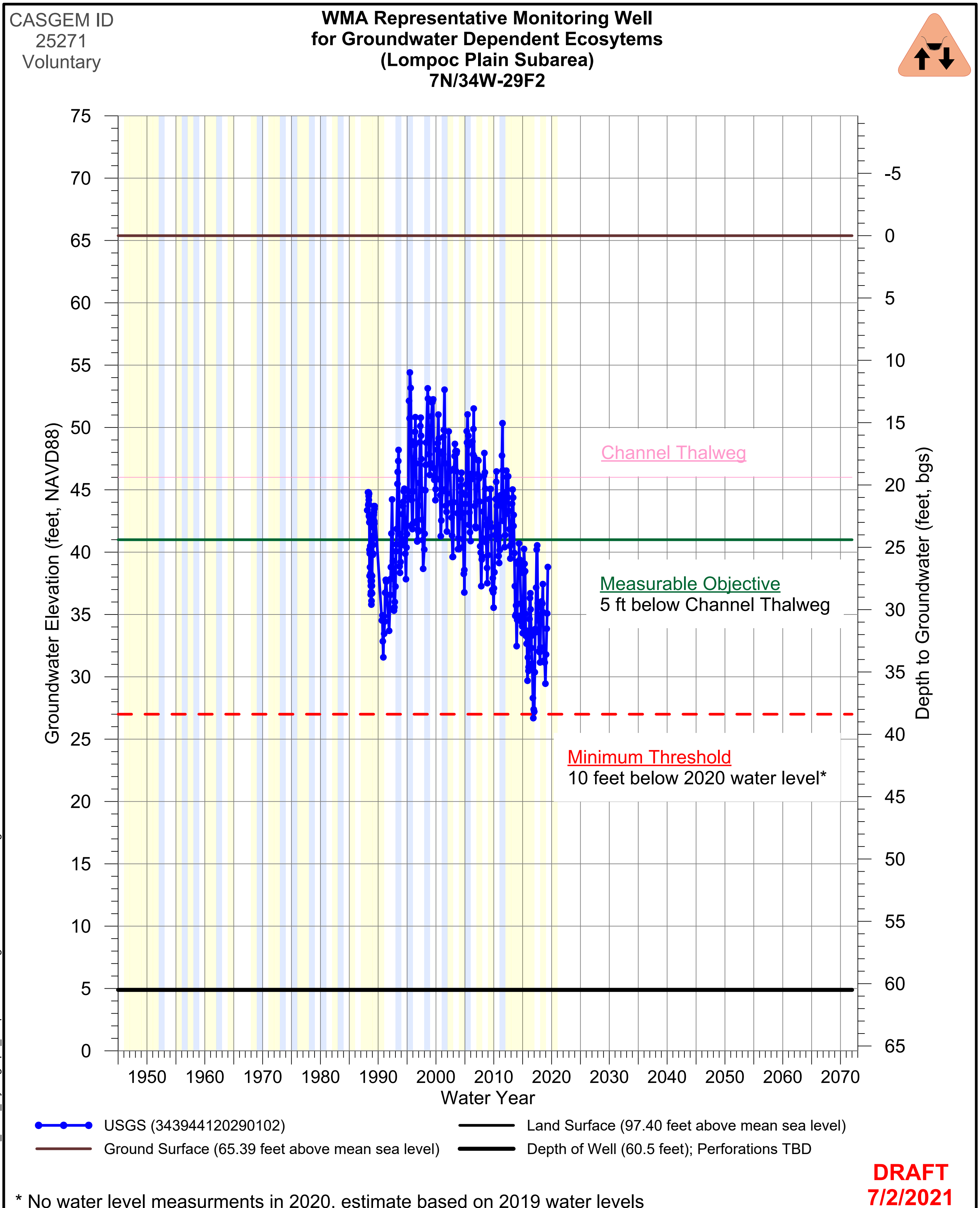
WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL GROUNDWATER DEPENDENT ECOSYSTEMS

Water Year Type (1942-2020)
Wet
Above/Below Normal
Dry / Critically Dry

F:\DATA\2710\Monitoring\SMC\GDE\WMA_GDE_Hydrograph_Grapher\WMA Fig C-01 LP-U-S 39 21G2.grf 7/2/2021 M. McCammon

FIGURE C-02



* No water level measurments in 2020, estimate based on 2019 water levels

DRAFT
7/2/2021

F:\DATA\2710\Monitoring\SMC\GDE\WMA_GDE_Hydrograph_Grapher\WMA Fig C-02 LP-U 167 29F2.grf 7/2/2021 M. McCammon

STETSON ENGINEERS INC.

WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

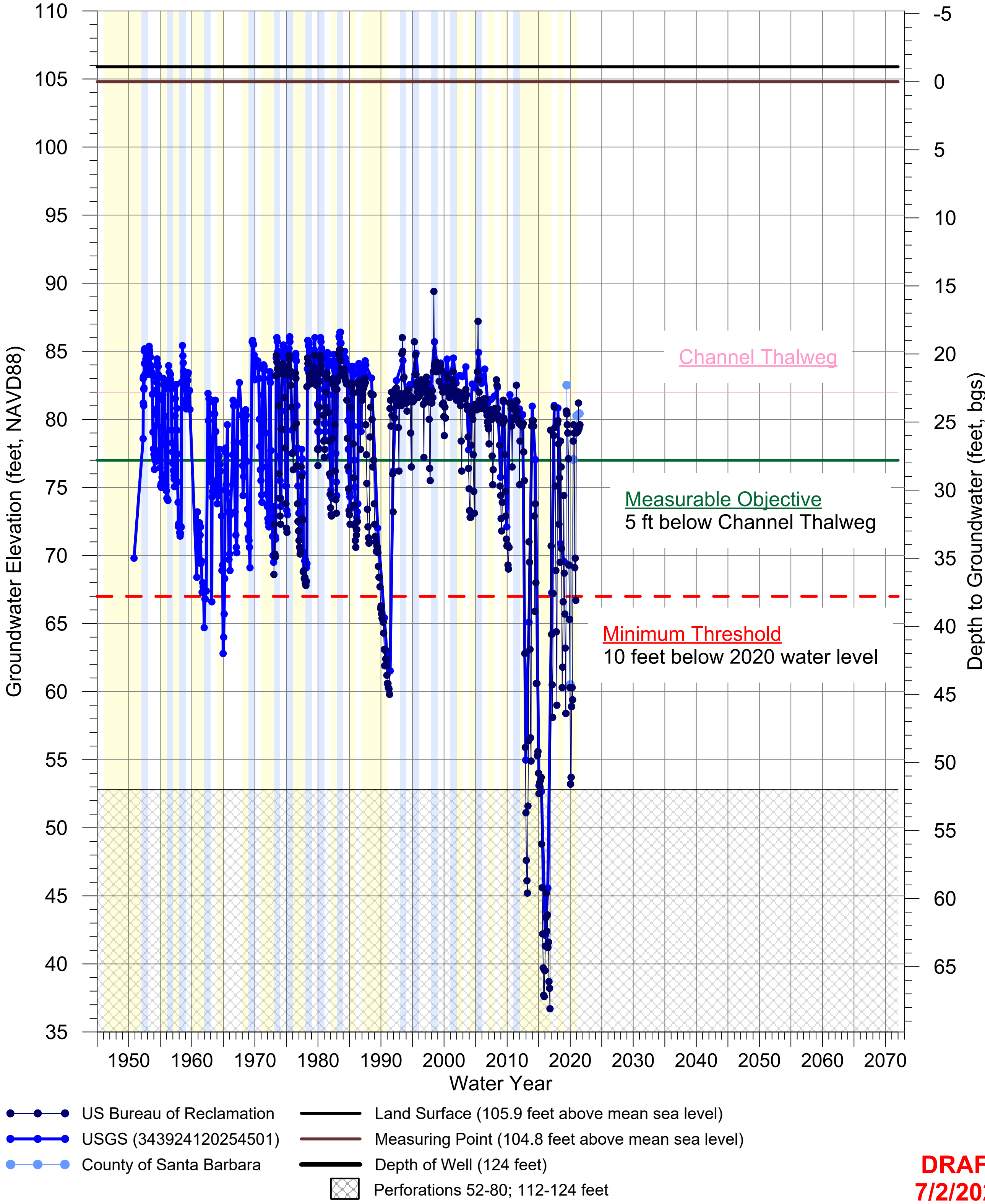
REPRESENTATIVE
MONITORING WELL
GROUNDWATER DEPENDENT
ECOSYSTEMS

Water Year Type (1942-2020)
Wet
Above/Below Normal
Dry / Critically Dry

FIGURE C-03

CASGEM ID
36328
Voluntary

WMA Representative Monitoring Well
for Groundwater Dependent Ecosytems
(Lompoc Plain Subarea)
7N/34W-35K9



DRAFT
7/2/2021

F:\DATA\2710\Monitoring\SMC\GDE\WMA_GDE_Hydrograph_Grapher\WMA Fig C-03 LP-U 32 35K9.grf 7/2/2021 M. McCammon

STETSON ENGINEERS INC.

WMA
Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPRESENTATIVE MONITORING WELL GROUNDWATER DEPENDENT ECOSYSTEMS

Water Year Type (1942-2020)
- Wet
- Above/Below Normal
- Dry / Critically Dry

SUSTAINABLE MANAGEMENT CRITERIA
WESTERN MANAGEMENT AREA

APPENDIX D: SEAWATER INTUSION
CHLORIDE CONCENTRATION TIMESERIES

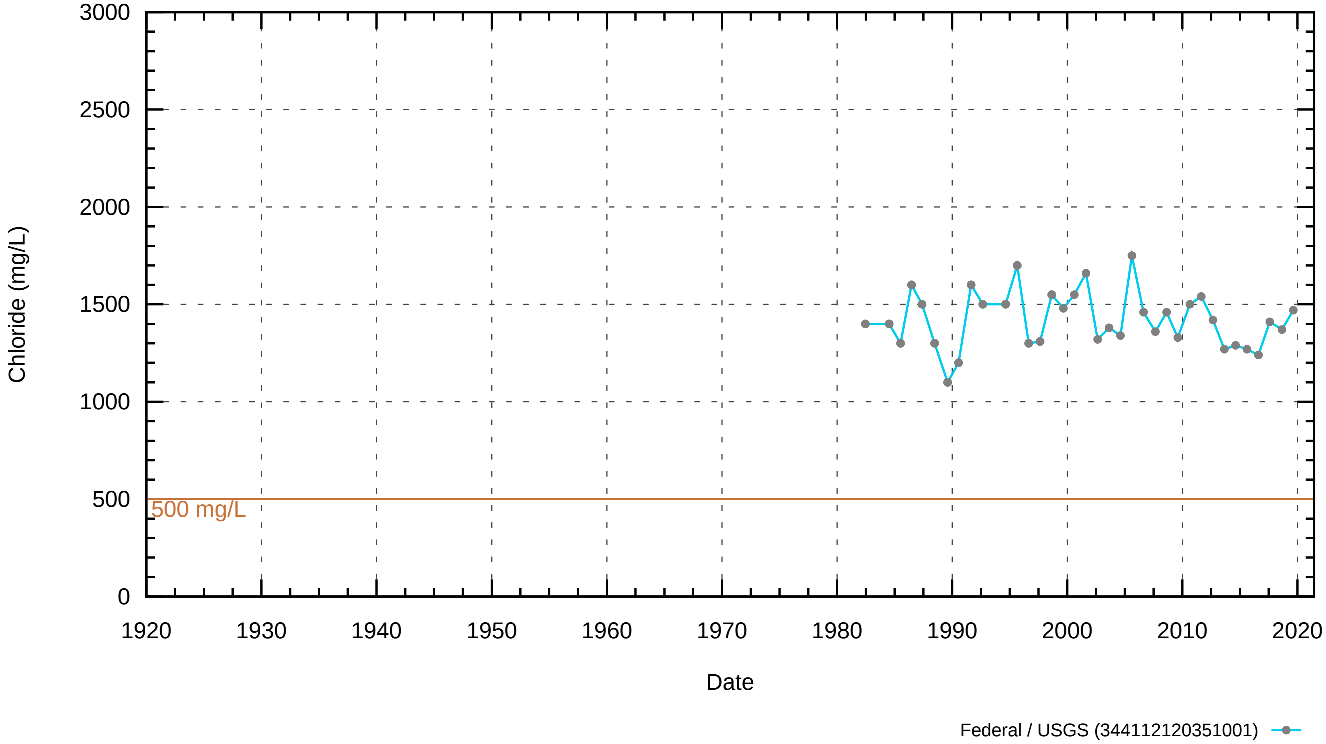
This appendix includes concentration time series graphs of chloride at representative wells for measuring potential seawater intrusion. Concentrations of chloride at particular wells are used to determine the location of the chloride iso-contour. Movement of the chloride iso-contour inland (i.e. increases in chloride at wells) is an indicator of seawater intrusion. The location of the 500 mg/L iso-contour is the minimum threshold for this suitability indicator.

LIST OF ACRONYMS AND ABBREVIATIONS

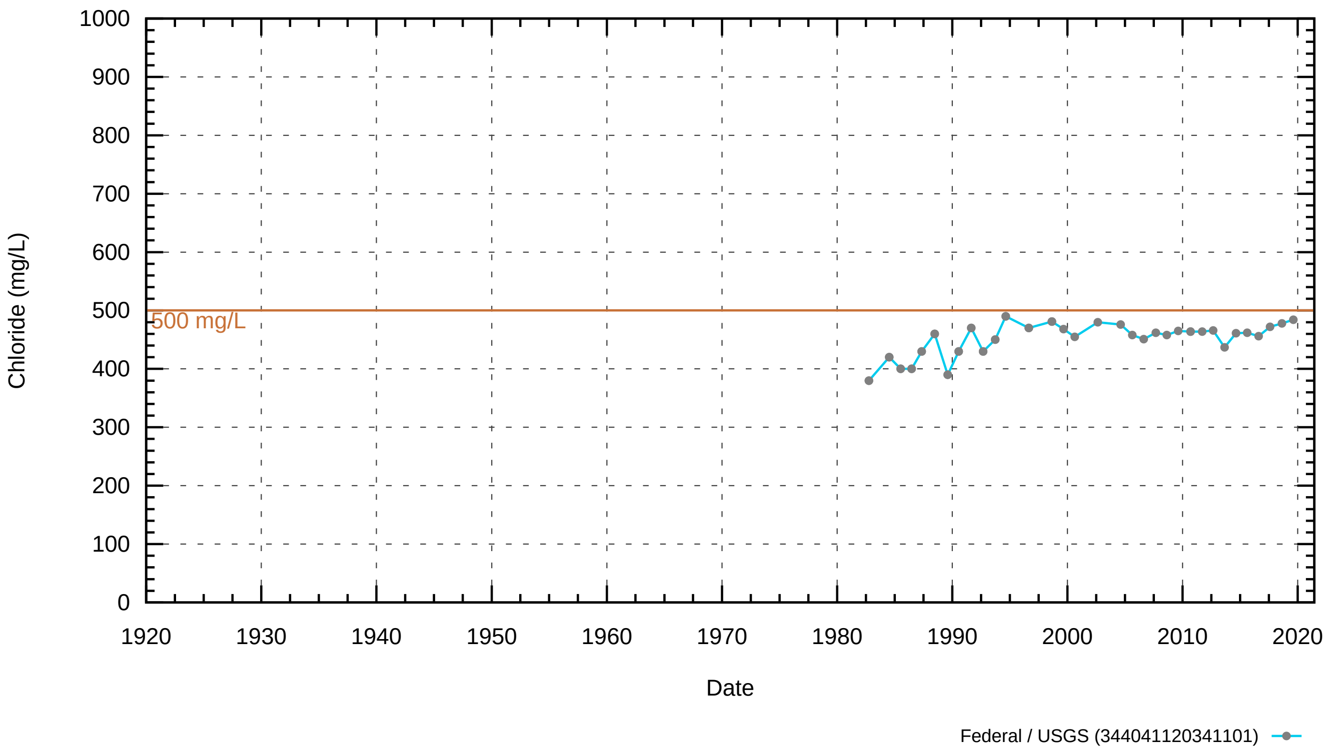
mg/L	milligrams per liter
USGS	United States Geologic Surveys
WMA	Western Management Area

Seawater Intrusion - Chloride

7N/35W-17K20 (DBID 1)
Upper Aquifer



7N/35W-21G2 (DBID 39)
Upper Aquifer



Seawater Intrusion - Chloride