

Cuyama Valley Groundwater Basin

Draft Groundwater Sustainability Plan: Undesirable Results

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3. Undesirable Results

This chapter presents the Undesirable Results statements for the Cuyama Valley Groundwater Basin (Basin). This chapter is a key component of the Cuyama Basin Groundwater Sustainability Agency's (CBGSA's) *Groundwater Sustainability Plan* (GSP), as other GSP components must be developed to set quantitative thresholds on monitoring points that indicate where Undesirable Results might occur on the monitoring network, and to shape the monitoring network to detect Undesirable Results.

The first section of this chapter is the draft Undesirable Results section. The second section contains guidance from relevant portions of the Sustainable Groundwater Management Act (SGMA) regulations about Undesirable Results, and lists guidance about addressing Undesirable Results from the *Sustainable Management Criteria Best Management Practices* (BMPs) (DWR, 2017).

On June 6, 2018, a public workshop was held where sustainability and undesirable outcomes were discussed with the public. Input from stakeholders at the meeting was tabulated, and stakeholder input was tied to the most relevant GSP component. The sorted results were used to guide creation of the Undesirable Results statements, and are included in Appendix A.

3.1 Sustainability Goal

Sustainability Goal 1: To maintain a viable groundwater resource for the beneficial use of the people and the environment of the Cuyama Groundwater Basin now and into the future.

3.2 Undesirable Results Statements

Undesirable Results are defined for use in SGMA as one or more of the following effects caused by groundwater conditions occurring throughout the Basin:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. 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.
- Significant and unreasonable reduction of groundwater storage.
- Significant and unreasonable seawater intrusion.
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
- Significant and unreasonable land subsidence that substantially interferes with surface land uses.
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.



Undesirable Results related to seawater intrusion are not present in the Basin, and are not likely to occur in the Basin.

Information is provided below for each effect as it applies to the Basin. For the sustainability indicators relevant to the Basin, the discussion:

- Describes the Undesirable Result
- Identifies Undesirable Results
- Identifies potential causes of Undesirable Results
- Identifies potential effects of Undesirable Results on beneficial uses

For any indicator not present, a justification for not establishing Undesirable Results is provided. This information was developed based on the California Water Code, SGMA regulations, BMPs, and stakeholder input.

3.2.1 Chronic Lowering of Groundwater Levels

Description of Undesirable Results

The Undesirable Result for the chronic lowering of groundwater levels is a result that causes significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

Identification of Undesirable Results

This result is considered to occur during GSP implementation when 30 percent of representative monitoring wells (i.e., 18 of 60 wells) fall below their minimum groundwater elevation thresholds for two consecutive years.

Potential Causes of Undesirable Results

Potential causes of Undesirable Results for the chronic lowering of groundwater levels are groundwater pumping that exceeds the average sustainable yield in the Basin, and changes in precipitation in the Cuyama Watershed in the future.

Potential Effects of Undesirable Results

If groundwater levels were to reach Undesirable Results levels, the Undesirable Results could cause potential de-watering of existing groundwater infrastructure, starting with the shallowest wells, could potentially adversely affect groundwater dependent ecosystems, and could potentially cause changes in irrigation practices, crops grown, and adverse effects to property values. Additionally, reaching Undesirable Results for groundwater levels could adversely affect domestic and municipal uses, including uses in disadvantaged communities, which rely on groundwater in the Basin.



3.2.2 Reduction of Groundwater Storage

Description of Undesirable Results

The Undesirable Result for the reduction in groundwater storage is a result that causes significant and unreasonable reduction in the viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

Justification of Groundwater Elevations as a Proxy

Use of groundwater elevation as a proxy metric for Undesirable Results is appropriate for groundwater storage. The change in storage is directly correlated to changes in groundwater elevation. By setting minimum thresholds for levels, storage is also effectively managed.

Identification of Undesirable Results

This result is considered to occur during GSP implementation when 30 percent of representative monitoring wells (i.e., 18 of 60 wells) fall below their minimum groundwater elevation thresholds for two consecutive years.

Potential Causes of Undesirable Results

Potential causes of Undesirable Results for the reduction in groundwater storage are groundwater pumping that exceeds the average sustainable yield in the Basin, and decreases in precipitation in the Cuyama Watershed in the future.

Potential Effects of Undesirable Results

If reduction of groundwater in storage were to reach Undesirable Results levels, the Undesirable Results could cause potential de-watering of existing groundwater infrastructure and springs, starting with the shallowest wells, could potentially adversely affect groundwater dependent ecosystems, and potentially cause changes in irrigation practices, crops grown, and adverse effects to property values. Additionally, reaching Undesirable Results for reduction of groundwater in storage could adversely affect domestic and municipal uses, which rely on groundwater in the subbasin.

3.2.3 Seawater Intrusion

Seawater intrusion is not an applicable sustainability indicator in the Basin, because seawater intrusion is not present and is not likely to occur due to the distance between the Basin and the Pacific Ocean, bays, deltas, or inlets.



3.2.4 Degraded Water Quality

Description of Undesirable Results

The Undesirable Result for degraded water quality is a result stemming from a causal nexus between SGMA-related groundwater quantity management activities and groundwater quality that causes significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

Identification of Undesirable Results

This result is considered to occur during GSP implementation when 30 percent of the representative monitoring points (i.e., 20 of 64 sites) exceed the minimum threshold for a constituent for two consecutive years.

Potential Causes of Undesirable Results

Potential causes of Undesirable Results for the degraded water quality are conditions where groundwater pumping degrades the groundwater quality.

Potential Effects of Undesirable Results

If groundwater quality were degraded to reach Undesirable Results levels, the Undesirable Results could potentially cause a shortage in supply to groundwater users, with domestic wells being most vulnerable as treatment costs or access to alternate supplies can be high for small users. Water quality degradation could cause potential changes in irrigation practices, crops grown, and adverse effects to property values. Additionally, reaching Undesirable Results for groundwater quality could adversely affect municipal uses, including disadvantaged communities, which could have to install treatment systems.

3.2.5 Land Subsidence

Description of Undesirable Results

The Undesirable Result for land subsidence is a result that causes significant and unreasonable reduction in the viability of the use of infrastructure over the planning and implementation horizon of this GSP.

Identification of Undesirable Results

This result is detected to occur during GSP implementation when 30 percent of representative subsidence monitoring sites (i.e., 1 of 2 sites) exceed the minimum threshold for subsidence over two years.

Potential Causes of Undesirable Results

Potential causes of future Undesirable Results for land subsidence are likely tied to groundwater pumping resulting in dewatering of compressible clays in the subsurface.



Potential Effects of Undesirable Results

If land subsidence conditions were to reach Undesirable Results, the Undesirable Results could potentially cause damage to infrastructure, including water conveyance facilities and flood control facilities roads, utilities, buildings, and pipelines.

3.2.6 Depletions of Interconnected Surface Water

Description of Undesirable Results

The Undesirable Result for depletions of interconnected surface water is a result that causes significant and unreasonable reductions in the viability of agriculture or riparian habitat within the Basin over the planning and implementation horizon of this GSP.

Identification of Undesirable Results

This result is considered to occur during GSP implementation when 30 percent of representative monitoring wells (i.e., 18 of 60 wells) fall below their minimum groundwater elevation thresholds for two consecutive years.

Justification of Groundwater Elevations as a Proxy

Use of groundwater elevation as a proxy metric for Undesirable Results is necessary given the difficulty and cost of direct monitoring of depletions of interconnected surface water. The depletion of interconnected surface water is driven by a gradient between water surface elevation in the surface water body and groundwater elevations in the connected, shallow groundwater system. By setting minimum thresholds on shallow groundwater wells near surface water, this gradient is managed, and in turn, depletions of interconnected surface water are managed.

Potential Causes of Undesirable Results

Potential causes of future Undesirable Results for depletions of interconnected surface water are likely tied to groundwater production, particularly in the shallowest zones, where surface water and groundwater are connected. Increased depletions could result in lowering of groundwater elevations in shallow aquifers near surface water courses, which changes the hydraulic gradient between the water surface elevation in the surface water course and the groundwater elevation, resulting in an increase in depletion.

Potential Effects of Undesirable Results

If depletions of interconnected surface water were to reach Undesirable Results, groundwater dependent ecosystems could be affected.



3.3 Evaluation of the Presence of Undesirable Results

DWR developed the *Sustainable Management Criteria* BMP (DWR, 2017) to help GSAs develop their sustainability criteria, and to identify the presence of Undesirable Results. The *Sustainable Management Criteria* BMP states: “Undesirable results will be defined by minimum threshold exceedances.” The *Sustainable Management Criteria* BMP helps GSAs identify the presence of an Undesirable Result by identifying a quantitative number and location of monitoring points that may be below the minimum threshold prior to a GSA identifying conditions as an Undesirable Result.

This section evaluates current conditions and compares them with the minimum thresholds established in Chapter 5. Using the method identified above for each sustainability indicator, a GSA can identify the presence of Undesirable Results. For the Basin, Undesirable Results are identified at the Basin scale; this scale may be modified by the CBGSA Board if appropriate or necessary in the future.

3.3.1 Chronic Lowering of Groundwater Levels

The Undesirable Result for the chronic lowering of groundwater levels is considered to occur during GSP implementation when 30 percent of representative monitoring wells (i.e., 18 of 60 wells) fall below their minimum groundwater elevation thresholds for two consecutive years (Section 3.1.1).

Chapter 5 discusses how minimum thresholds were selected. Appendix A of Chapter 5 presents the hydrographs of groundwater levels through 2018 and the established depth of the minimum threshold for each monitoring site. Of the 60 monitoring sites, nine were below the minimum threshold in the latest measurement in 2018, which is 15 percent of representative monitoring wells (i.e., 9 of 60), indicating that the Basin does not have an undesirable condition for the chronic lowering of groundwater levels.

3.3.2 Reduction of Groundwater Storage

The Undesirable Result for the reduction of groundwater storage is monitored by proxy using groundwater levels and groundwater level minimum thresholds (Section 3.1.2). Because measurements show that levels are not in an undesirable condition, reduction of groundwater storage is not identified to be in an undesirable condition.

3.3.3 Seawater Intrusion

Seawater intrusion is not an applicable sustainability indicator, because seawater intrusion is not present and is not likely to occur due to the distance between the Basin and the Pacific Ocean, bays, deltas, or inlets (Section 3.1.3). Therefore, there is no possibility of an undesirable result due to seawater intrusion.



3.3.4 Degraded Water Quality

The Undesirable Result for the chronic lowering of groundwater levels is considered to occur during GSP implementation when 30 percent of representative monitoring wells (i.e., 20 of 64 wells) for levels fall below their minimum groundwater elevation thresholds for two consecutive years (Section 3.1.4).

Discussion of how minimum thresholds were selected is presented in Chapter 5. Table 5-2 in Chapter 5 shows the minimum thresholds and the most recent measurement for each monitoring site. Of the 64 monitoring sites, none were worse than the minimum threshold in the latest measurement in 2018, which is 0 percent of representative monitoring wells (i.e., 0 of 60), indicating that the Basin does not have an undesirable condition for the chronic lowering of groundwater levels.

3.3.5 Land Subsidence

The Undesirable Result for land subsidence is considered to occur during GSP implementation when 30 percent of representative subsidence monitoring sites (i.e., 1 of 2 sites) exceed the minimum threshold for subsidence over two consecutive years (Section 3.1.5).

Chapter 5 discussed how minimum thresholds were selected is. The minimum threshold for subsidence has been set at 2 inches per year.

The rate of subsidence at the Cuyama Valley High School (CVHS) station is measured daily. Subsidence at the CVHS station cycles annually, with elastic rebound occurring in the winter, indicated by an annual high. Highs during the period of rebound occur between January 1 and March 10 each year. Measurements taken from January 1, 2017 to March 10, 2017 were compared with measurements from January 1, 2018 to March 10, 2018. Each daily measurement was compared and the difference between each day was averaged. The average decline from a day in 2017 during that period and the same day in 2018 during that period was 33 millimeters (1.3 inches).

The rate of subsidence on the Ventucopa station was 0 inches over the same period. Because neither station showed a rate of subsidence over 2 inches per year, the Basin does not have an undesirable condition for land subsidence.

3.3.6 Depletions of Interconnected Surface Water

The Undesirable Result for the depletion of interconnected surface water is monitored by proxy using groundwater levels and groundwater level minimum thresholds (Section 3.1.6). Because measurements show that levels are not in an undesirable condition, depletion of interconnected surface water is not identified to be in an undesirable condition.



3.4 References

California Department of Water Resources (DWR). 2018. *Sustainable Management Criteria Best Management Practice*. Sustainable Groundwater Management Program. November.
<https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-6-Sustainable-Management-Criteria-DRAFT.pdf>. Accessed March 30, 2018.

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Appendix A

Framework for Developing
Sustainable Management Criteria

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Appendix A

**Cuyama Basin Groundwater Sustainability Agency Groundwater Sustainability Plan
Framework for Developing Sustainable Management Criteria**

| Sustainability Goal ¹: To maintain a viable groundwater resource for the beneficial use of the people and the environment of the Cuyama Groundwater Basin now and into the future. | | | | | |
|--|--|---|---|--|--|
| Sustainability Indicator ² | I. GROUNDWATER ELEVATION | II. GROUNDWATER STORAGE | III. WATER QUALITY | IV. LAND SUBSIDENCE | V. SURFACE WATER CONNECTIVITY |
| Undesirable Result Considerations ³ | Chronic lowering of groundwater levels indicating unreasonable depletion of supply, which results in: <ul style="list-style-type: none"> • Adverse impacts to the viability of agriculture, and the agricultural economy. • Adverse impacts to the viability of CSD and other domestic water users. • Dewatering of wells. • Groundwater Dependent Ecosystems | Unreasonable reduction of groundwater storage, which results in: <ul style="list-style-type: none"> • Adverse impacts to the viability of agriculture, and the agricultural economy. • Adverse impacts to the viability of CSD and domestic uses. • Dewatering of wells. | Significant and unreasonable degraded water quality that adversely impacts drinking, irrigation, industrial, and environmental uses: <ul style="list-style-type: none"> • Drinking • Domestic uses (Swamp coolers, laundry) • Agriculture • Local economy | Significant and unreasonable land subsidence that substantially interferes with surface land uses causing: <ul style="list-style-type: none"> • Damage to public and private infrastructure (e.g., roads and highways, pipelines, utilities, public buildings, residential and commercial structures). • Permanent loss of groundwater storage capacity. | Significant and unreasonable depletions of interconnected surface water that results in: <ul style="list-style-type: none"> • Adverse impacts to agricultural uses • Adverse impacts to riparian habitat |
| Minimum Threshold Considerations ⁴ | <ul style="list-style-type: none"> • Well depths • Historic recorded lows in monitoring wells • Conditions in spring of 2015 • Allowance for operational flexibility during GSP implementation | <ul style="list-style-type: none"> • Well depths • Historic recorded lows in monitoring wells • Conditions in spring of 2015 • Use groundwater levels as a proxy | <ul style="list-style-type: none"> • Salinity MCL (Maximum Contaminant Level) for drinking water and agriculture • Arsenic MCL for drinking water • Conditions in spring of 2015 • Consider other constituents | <ul style="list-style-type: none"> • Land subsidence rate and magnitude indicating inelastic land subsidence at established monuments. • Conditions in spring of 2015 • Delayed compaction estimates | <ul style="list-style-type: none"> • Estimated volume of water contributed from surface water to groundwater. |
| Measurable Objective Considerations ⁵ | <ul style="list-style-type: none"> • Drought buffer • Operational flexibility buffer • Conditions prior to 2015 • Consideration of climate change | <ul style="list-style-type: none"> • Drought buffer • Operational flexibility buffer • Conditions prior to 2015 • Use groundwater levels as a proxy | <ul style="list-style-type: none"> • Drought buffer • Operational flexibility buffer • Conditions prior to 2015 • Secondary MCLs | <ul style="list-style-type: none"> • Conditions at 2015 | <ul style="list-style-type: none"> • Conditions at 2015 |
| Planning Principles ⁶ | <ul style="list-style-type: none"> • All stakeholders, and other agencies/entities will cooperatively develop the GSP. • The planning process will be inclusive and transparent. • The GSP will use empirical data and quantitative objectives. • The GSP will be considerate of the diverse needs of the basin's population. • The GSP will work towards sustaining economic activity in the region. • Consideration of mitigation measures as part of establishing Undesirable Results | | | | |

Notes:

- Sustainability Goal** refers to the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield.
- Sustainability Indicator** refers to any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results.
- Undesirable Result** means one or more of the following effects caused by groundwater conditions occurring in the basin: (1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. (2) Significant and unreasonable reduction of groundwater storage. (3) Significant and unreasonable seawater intrusion. (4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies. (5) Significant and unreasonable land subsidence that substantially interferes with surface land uses. (6) Depletion of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.
- Minimum Threshold** refers to a numeric value for each sustainability indicator used to define undesirable results.
- Measurable Objective** refers to 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 within 20 years. Uses the same metric as defined by the minimum threshold for the same sustainability indicator.
- Planning Principles** describes "how" the planning process will be conducted and provide overall guidance.

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