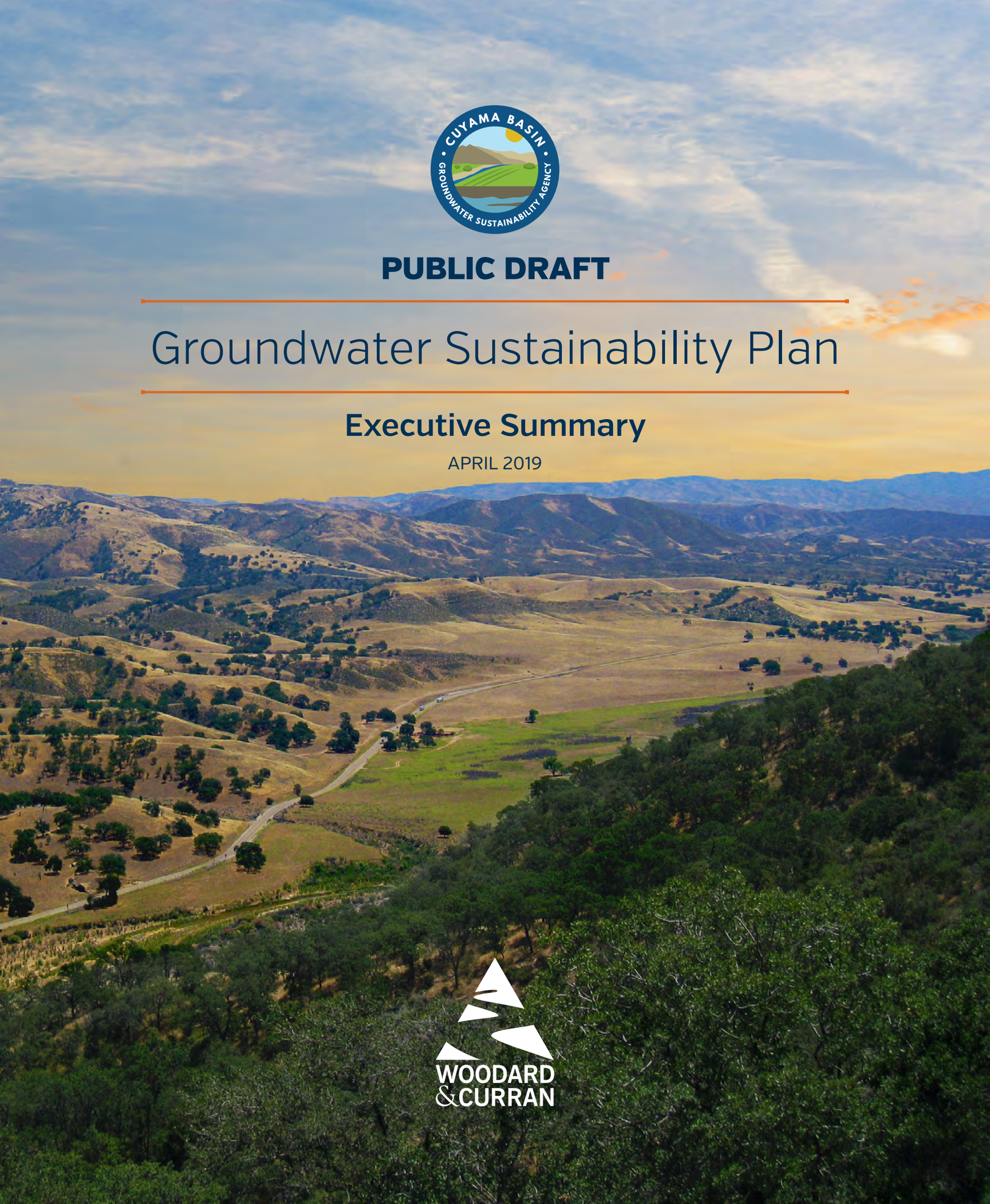


PUBLIC DRAFT

Groundwater Sustainability Plan

Executive Summary

APRIL 2019

WOODARD &CURRAN

EXECUTIVE SUMMARY

Introduction

In 2014, the California legislature enacted the Sustainable Groundwater Management Act (SGMA) in response to continued overdraft of California's groundwater resources. The Cuyama Groundwater Basin (Basin) is one of 21 basins and subbasins identified by the California Department of Water Resources (DWR) as being in a state of critical overdraft. SGMA requires preparation of a Groundwater Sustainability Plan (GSP) to address measures necessary to attain sustainable conditions in the Basin. Within the framework of SGMA, sustainability is generally defined as the conditions that result in long-term reliability of groundwater supply, and the absence of undesirable results.

Critical Dates for the Cuyama Basin

- 2020 By January 31: submit GSP to DWR
- 2025 Review and update GSP
- 2030 Review and update GSP
- 2035 Review and update GSP
- 2040 Achieve sustainability for the Basin

In 2017, in response to SGMA, the Cuyama Basin Groundwater Sustainability Agency (CBGSA) was formed. The CBGSA is a joint-powers agency that is comprised of Kern, Santa Barbara, San Luis Obispo and Ventura counties, plus the Cuyama Community Services District and the Cuyama Basin Water District. The CBGSA is governed by an 11-member Board of Directors, with one representative from Kern, San Luis Obispo and Ventura counties, two representatives from Santa Barbara County, one member from the Cuyama Community Services District, and five members from the Cuyama Basin Water District.

The Draft Cuyama Basin GSP has been prepared and is now available for public review and comment. SGMA requires the CBGSA develop a GSP that achieves groundwater sustainability in the Basin by 2040. Although SGMA references 2015 as a basis for groundwater planning, SGMA does not require a GSP to address undesirable results that occurred before 2015. The Draft GSP outlines the need for significant reduction in pumping in the central portion of the Basin and has identified two projects for potential development that could help offset the projected reductions in pumping. Although current analysis indicates groundwater pumping reductions on the order of 50 to 67 percent may be required to achieve sustainability, additional efforts are required to confirm the level of pumping reduction required to achieve sustainability. These efforts include collecting additional data and a review of the Basin model, along with other efforts as outlined in the Draft GSP.

Plan Area

The CBGSA's jurisdictional area is defined by DWR's 2013 Bulletin 118, and in the 2016 Interim Update. The Basin generally underlies the Cuyama Valley, as shown in Figure ES-1.

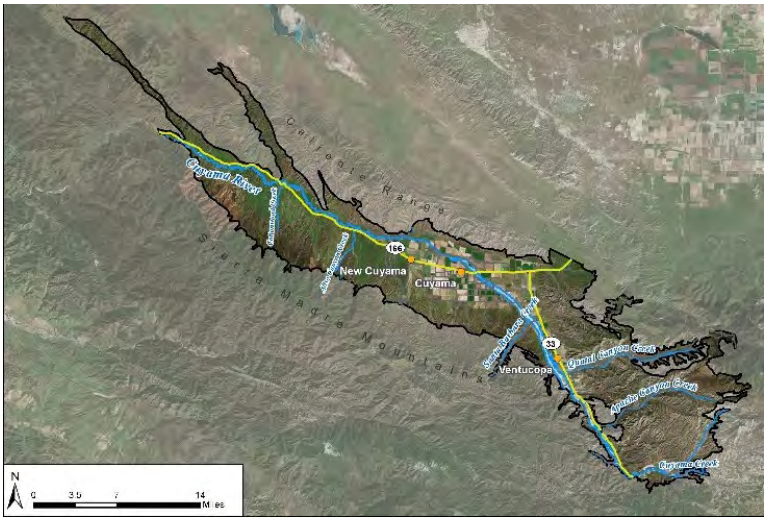


Figure ES-1: GSP Plan Area

Outreach Efforts

A stakeholder engagement strategy was developed to ensure that the interests of all beneficial users of groundwater in the Basin were considered. The strategy incorporated monthly CBGSA Standing Advisory Committee (SAC) meetings, monthly CBGSA Board meetings, quarterly community workshops, and information distribution to all property owners and residents in the Basin. Figure ES-2 shows attendees at one of the community workshops conducted during development of the GSP.

Figure ES 2 - Community Workshops

The SAC was established to encourage active involvement from diverse social, cultural, and economic elements of the population in the Basin. The SAC members represent large and small landowners and growers from different geographic locations in the Basin, longtime residents including Hispanic community members, and a manager of an environmentally-centric non-profit organization. The community workshops were conducted in both English and Spanish, creating an opportunity for local individuals to engage in the GSP development process.

Public Meeting	Number
Cuyama Basin GSA Board Meetings	20
Cuyama Basin GSA Standing Advisory Committee Meetings	18
Joint Meetings of Cuyama Basin GSA Board and Standing Advisory Committee	7
Community Workshops	5

Basin Setting

The Basin is located at the southeastern end of the California Coast Ranges, near the San Andreas and Santa Maria River fault zones and bounded on the north and south by faults. These faults create several constraints on groundwater flow through the Basin. Groundwater flows from the eastern portions of the Basin toward the western most portion of the Basin. Surface water flows in the same direction, with the major surface stream being the Cuyama River. Multiple smaller streams flow into the Cuyama River, and the Cuyama River flows to the west and eventually joins with the Santa Maria River. The location of the Basin is shown in Figure ES-3.

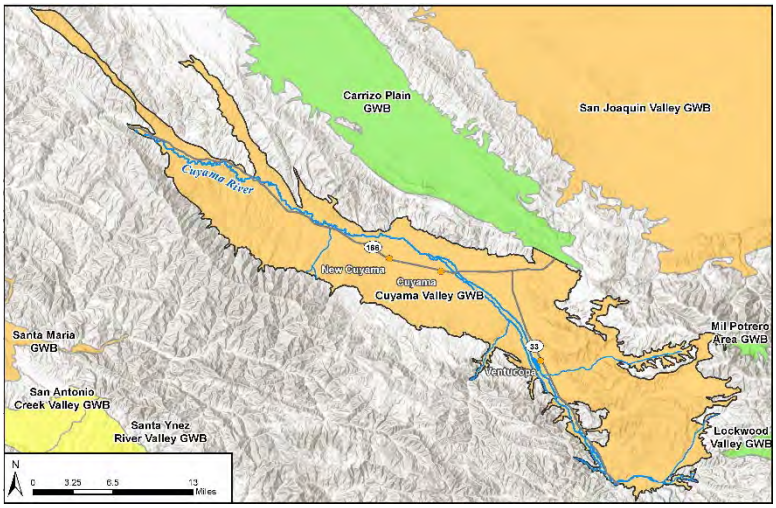


Figure ES-3: Basin Setting

Existing Groundwater Conditions

Groundwater levels in some portions of the Basin have been declining for many years while other areas of the Basin have experienced no significant change in groundwater levels. The change in groundwater levels varies across the Basin, with the greatest declines occurring in the central portion of the Basin where the greatest concentration of irrigated agriculture is practiced. The western and eastern portions of the Basin have experienced significantly less change in groundwater levels. However, additional irrigated agricultural acreage has been developed recently in the western portion of the Basin, warranting additional levels of monitoring to determine if there are any impacts to long-term groundwater levels and sustainability.

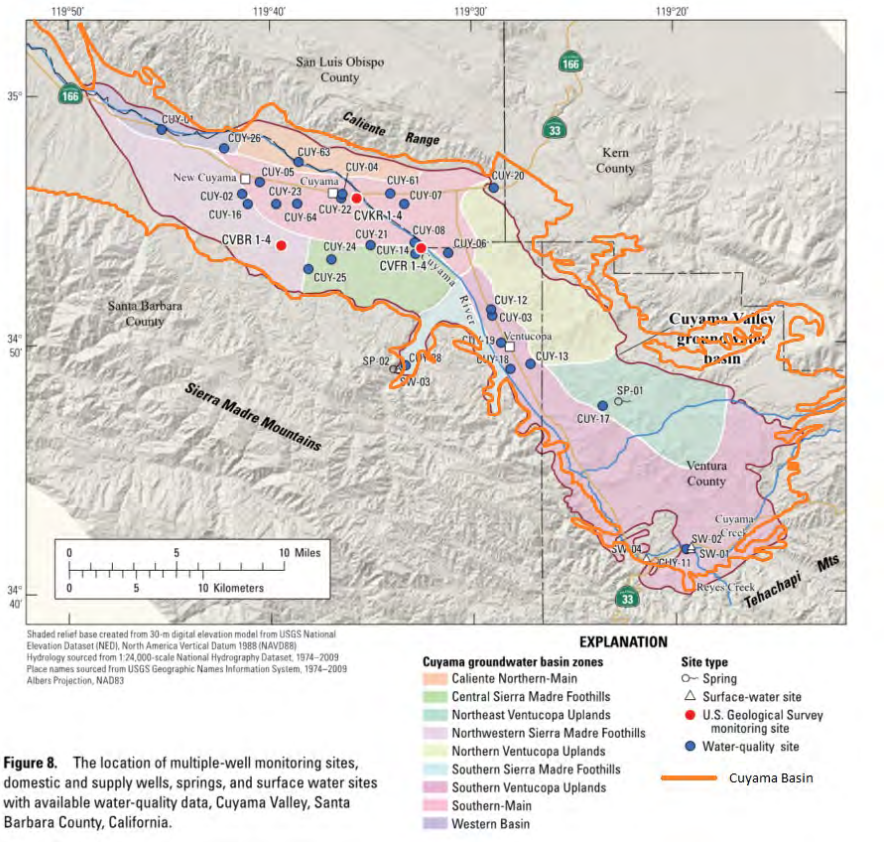


Figure 8. The location of multiple-well monitoring sites, domestic and supply wells, springs, and surface water sites with available water-quality data, Cuyama Valley, Santa Barbara County, California.

Figure ES-4: USGS Water Quality Sampling Locations

Groundwater quality in the Basin is variable, particularly along the periphery. Water quality in the Basin has historically had high levels of total dissolved solids (TDS) and sulfates. The United States Geologocal Survey (USGS) has conducted several water quality studies; areas where USGS has evaluated groundwater quality are shown in Figure ES-4. High concentrations of other constituents, such as nitrate, arsenic, sodium, boron, and hexavalent chromium are generally localized and not wide-spread. Groundwater ranges from hard to very hard and is predominantly of the calcium-magnesium-sulfate type. Average TDS concentrations across the Basin are as high as 1,500 to 6,000 milligrams per liter (mg/L) along portions of the Basin's southern boundary. These values exceed the California recommended maximum contaminant level (MCL) of 500 mg/L. Concentrations of boron at up to 15 mg/L have been observed along the southern Basin boundary, with concentrations of chloride at levels up to 1,000 mg/L in the same area.

Along the southern boundary, the groundwater quality reflects recharge from springs and runoff from the Sierra Madre Mountains. TDS concentrations in this part of the Basin range from 400 to 700 mg/L. Along the eastern edge of the Basin, near the Caliente Range, groundwater quality declines as concentrations of sodium, chloride, TDS, and boron increase. Concentrations of boron range up to 15 mg/L, concentrations of chloride increase up to 1,000 mg/L, and TDS concentrations range from 3,000 to 6,000 mg/L.

Undesirable Results

Undesirable results are defined as those conditions that cause significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses of the Basin's groundwater. SGMA identifies six defined areas for classification of undesirable results, as shown in the adjacent callout. The one undesirable result that does not impact the Basin is seawater intrusion. Water quality in the Basin is generally not good due to high TDS and other constituents, and there is some limited subsidence in the Basin, but the major areas of undesirable results are associated with the following:

- Chronic lowering of groundwater levels
- Significant and unreasonable reduction in groundwater storage
- Depletions of interconnected surface water

Figure ES-5 is a graph showing the annual and cumulative long-term reduction in groundwater storage in the Basin. This reduction in groundwater storage coincides with the lowering of groundwater levels.

Categories of Undesirable Results

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
- 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

The lowering of groundwater levels has corresponded with degradation of groundwater quality, and particularly levels of TDS. Additionally, lowering of groundwater levels has contributed to some minor but measurable levels of subsidence in the central portion of the Basin, and has contributed to depletions in interconnections of surface and groundwater systems.

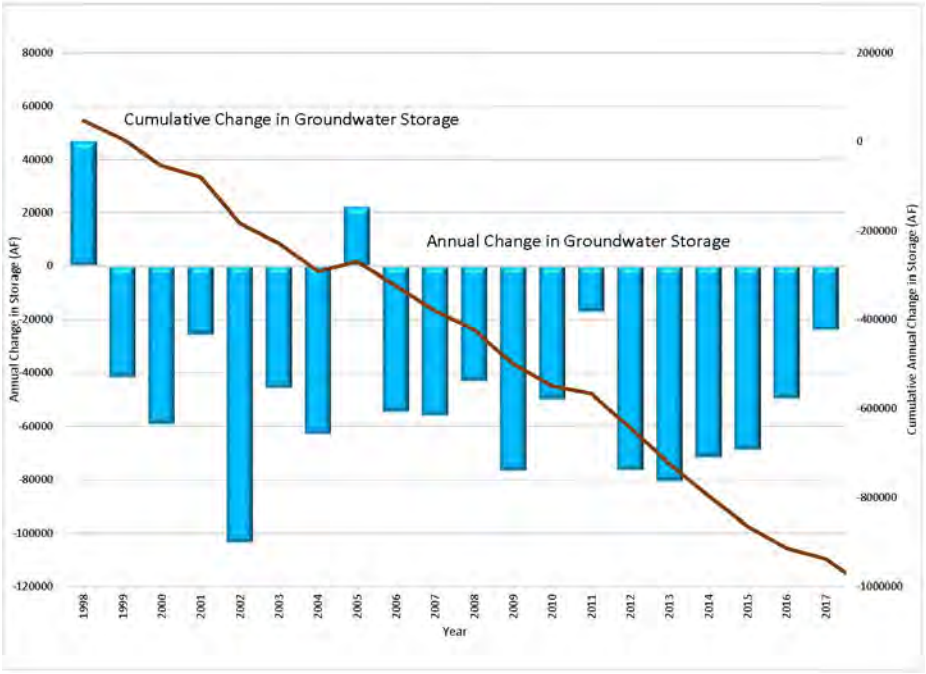


Figure ES-5: Annual and Cumulative Changes in Groundwater Storage

Sustainability

SGMA introduces several terms to measure sustainability, including:

- **Sustainability Goals** – These goals are the culmination of conditions reulting in an absence of undesirable results within 20 years.
- **Undesirable Results** – Undesirable results are the significant and unreasonable occurrence of conditions that adversely affect groundwater use in the Basin.
- **Sustainability Indicators** – Sustanability indicators refer to any of the adverse effects caused by groundwater conditions occurring throughout the Basin that, when significant and unreasonable, cause undesirable results, including the following:
  - Lowering groundwater levels
  - Reduction of groundwater storage
  - Seawater intrusion
  - Degraded water quality
  - Land subsidence
  - Depletion of interconnected surface water
- **Minimum Thresholds** – Minimum thresholds are a numeric value for each sustainability indicator, and are used to define when undesirable results occur, if minimum thresholds are exceeded in a percentage of sites in the Basin's monitoring network.
- **Measurable Objectives** – Measurable objectives are a specific set of quantifiable goals for the maintenance or improvement of groundwater conditions. They will be included in the adopted GSP, and will help the CBGSA achieve their sustainability goal for the Basin.

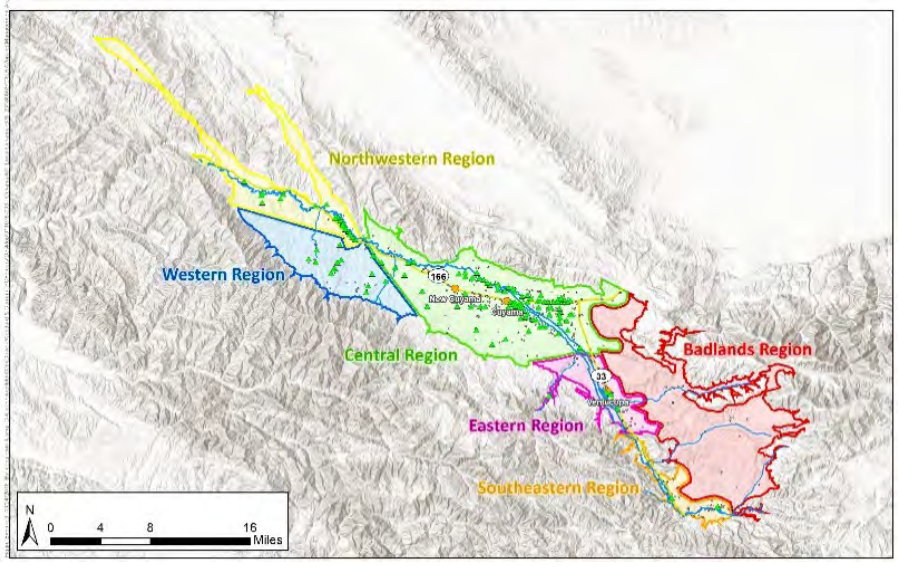


Figure ES-6: Threshold Regions

The method prescribed by SGMA to measure undesirable results involves setting minimum thresholds and measurable objectives for a series of representative wells. Geologic conditions and land use vary across the Basin. These varying conditions also cause groundwater conditions to vary across the Basin. The CBGSA Board of Directors concluded that one set of minimum thresholds for the entire Basin may not provide the appropriate degree of refinement needed to effectively manage Basin-wide sustainability. As a result, threshold regions were created to establish the appropriate sustainability criteria for each area of the Basin. The threshold regions are shown in Figure ES-6.

Representative wells were identified to provide a basis for measuring groundwater conditions throughout the Basin without having to measure each well, which would be cost prohibitive. Representative wells were selected based on availability and their history of recorded groundwater levels, and their potential to effectively represent the groundwater conditions surrounding the identified well, and consent of the well owner to utilize the identified well for monitoring purposes.

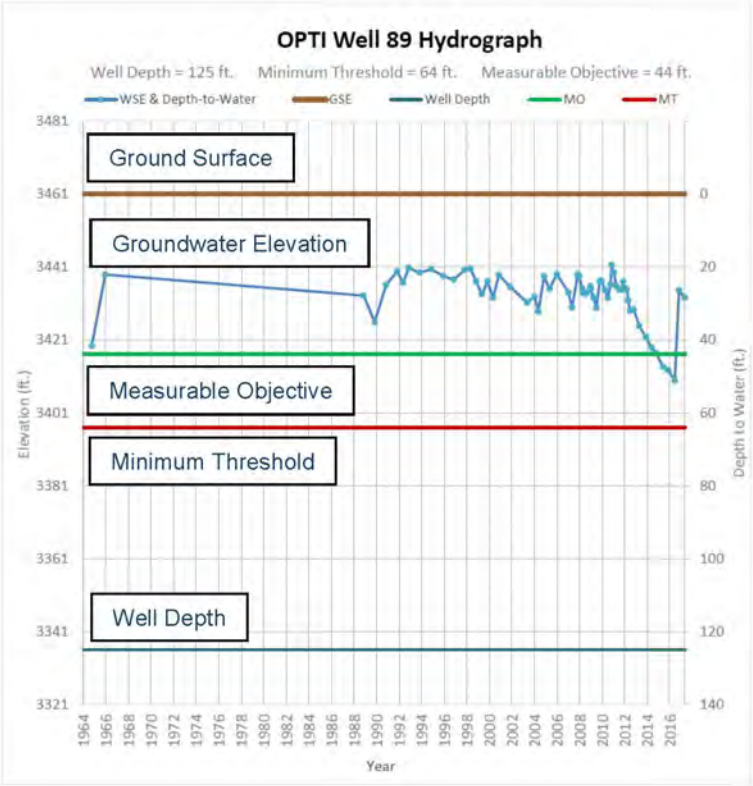


Figure ES-7: Sample Relationship Between Minimum Threshold and Measurable Objective

A total of 61 representative wells have been identified for measurement of groundwater levels in the Basin, and 64 representative wells have been identified for groundwater quality monitoring. There are five selected ground surface subsidence monitoring stations. Using groundwater level data as the basis for measuring change in groundwater storage, these representative wells and subsidence monitoring stations provide the basis for measuring the five potential undesirable results across the Basin.

Minimum thresholds and measurable objectives were developed for each of the identified representative wells. Figure ES-7 shows a typical relatonship of the minimum thresholds, measurable objectives, and other data for a sample well.

Thresholds were developed with reference to 2015 groundwater levels. In general, measurable objectives were established based on providing a 5-year drought buffer above the minimum threshold. The opposite approach was taken in the southeastern region where the measurable objective was established based on 2015 groundwater levels and the minimum threshold was determined by providing a 5-year drought buffer below the established measurable objective.

A table summarizing minimum thresholds and measurable objectives is included in the GSP. Graphs showing the minimum threshold and measurable objective for each of the representative wells are contained in an appendix to the GSP.

Water Budgets

The Basin has been in an overdraft condition for many years. Overdraft conditions in the Basin were first documented in the 1950s. Since then, groundwater pumping has increased in response to increased levels of agricultural production, leading to increased levels of groundwater overdraft.

The groundwater evaluations conducted as a part of GSP development have provided estimates of the historical, current and future groundwater budget conditions.

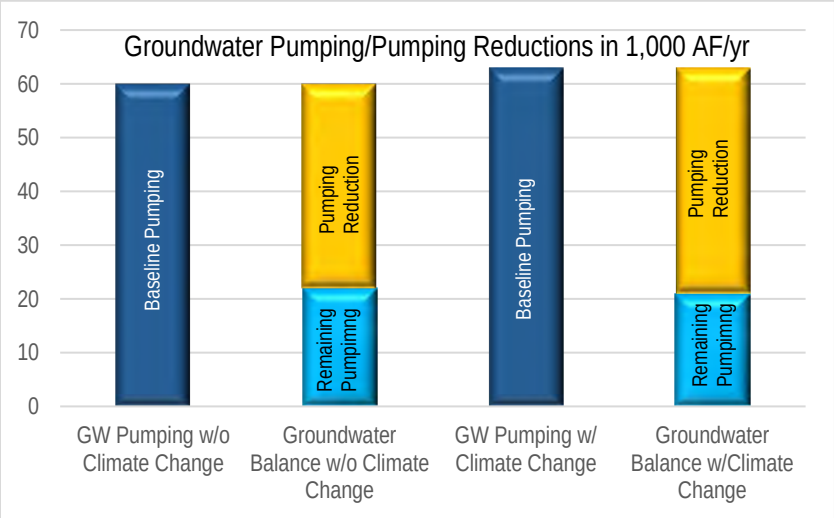


Figure ES-8: Basin-Wide Groundwater Pumping and Reductions Required to Achieve Sustainability

These analyses show that at current groundwater pumping levels, the average annual overdraft is estimated to be approximately 26,000 acre-feet, and the reduction in groundwater pumping required to achieve sustainability is approximately 40,000 acre-feet per year. Future groundwater conditions in the Basin will continue to show decreased groundwater levels based on projections of current land and water uses. Since there are no projected changes in land use or population in the Basin, the projected annual decline in groundwater storage is estimated to be the same as under current conditions.

The projected Basin water budget was also evaluated under climate change conditions. Under the intermediate climate change scenario prescribed by DWR, the annual groundwater overdraft is projected to increase to approximately 27,000 acre-feet, requiring an approximate 42,000 acre-feet per year reduction in groundwater pumping to achieve sustainability. These changes are shown in Figure ES-8.

The current analysis was prepared using the best available information and through development of a new groundwater modeling tool. Although the Basin has been studied for many years, the available data are not as robust in areas outside the center of the Basin as compared to many other basins, thus leading to some level of uncertainty in the analyses. A data collection program has been designed to augment existing information, and is included in the GSP. It is anticipated that as additional information becomes available, the new model can be updated, and more refined estimates of annual pumping and overdraft can be developed.

Analysis of the Basin as a whole shows that much of the Basin is in hydrologic balance. Existing and projected groundwater levels in the western portions of the Basin, along with the Southeastern Region, show those areas to be sustainable under current and projected conditions. However, the Central Threshold Region shows an annual water budget of approximately minus 25,000 acre-feet per year.

Monitoring Networks

The Draft GSP outlines the monitoring networks for the five sustainability indicators that apply to the Basin. The objective of these monitoring networks is to monitor conditions across the Basin and to detect trends toward undesirable results. Specifically, the monitoring network was developed to do the following:

Five Sustainability Indicators Applicable to the Cuyama Groundwater Basin

- Chronic lowering of groundwater levels
- Reduction in groundwater storage
- Degraded water quality
- Land subsidence
- Depletions of interconnected surface water

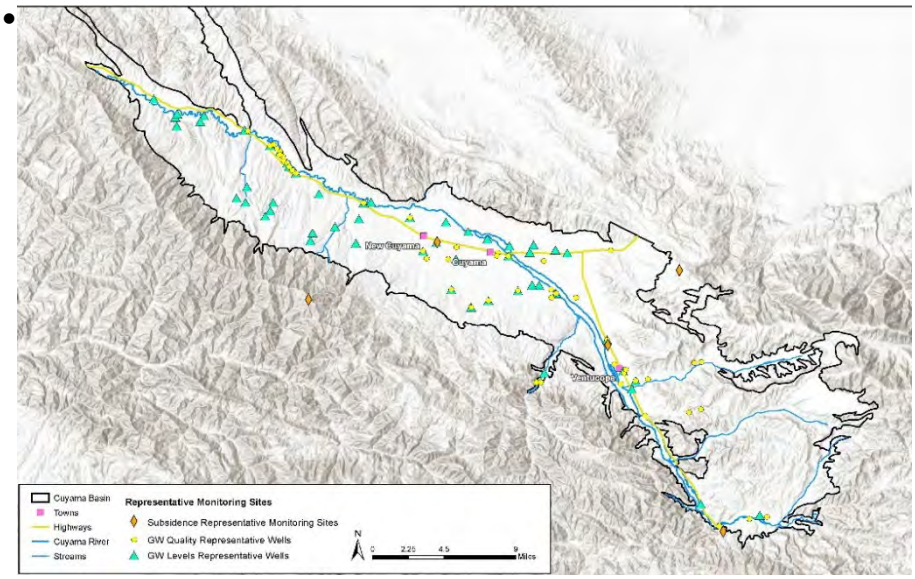
- Monitor impacts to the beneficial uses or users of groundwater
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds
- Demonstrate progress toward achieving measurable objectives described in the GSP
- 

Figure ES-9: Groundwater Monitoring Wells

The monitoring networks were designed by evaluating data sources provided by DWR, including the California Statewide Groundwater Elevation Monitoring (CASGEM) Program, the USGS, participating counties, and private landowners. The monitoring network consists of wells that are already being used for monitoring in the Basin. Additional wells are being added, and there is the potential for installing new dedicated monitoring wells through DWR's Technical Support Services program.

Summary of Existing Monitoring Wells	
Number of CASGEM wells	6
Number of voluntary wells	107
Total number of DWR and CASGEM wells	222
Earliest measurement year	1946
Longest period of record	68 years
Median period of record	12

Most wells in the monitoring network are measured on either a semi-annual or annual schedule. Historical measurements have been entered into the Basin Data Management System (DMS), and future data will also be stored in the Basin DMS.

A summary of the existing monitoring wells is shown in the adjacent table.

Data Management System

The Basin DMS was built on a flexible, open software platform that uses familiar Google maps and charting tools for analysis and visualization. The Basin DMS serves as a data-sharing portal that enables use of the same data and tools for visualization and analysis. These tools support sustainable groundwater management and create transparent reporting about collected data and analysis results.

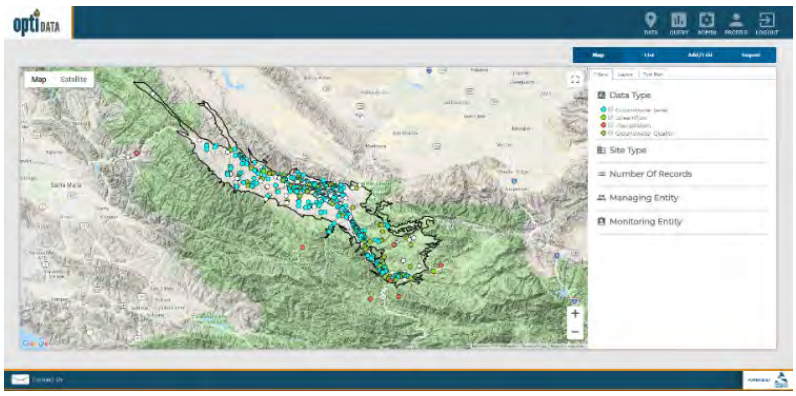


Figure ES-10: Opti DMS Screenshot

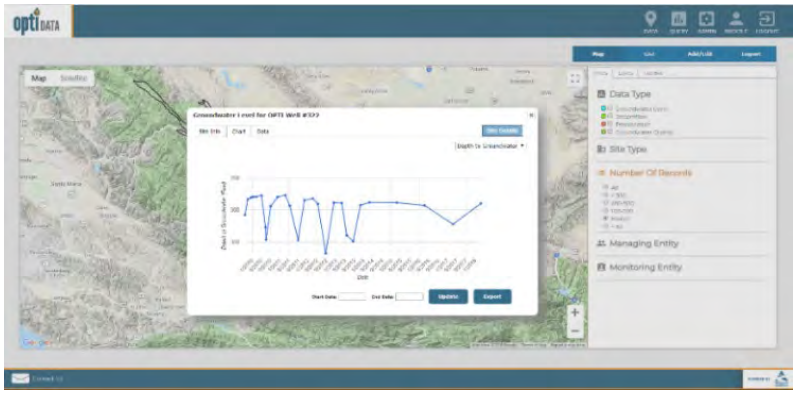


Figure ES-11: Typical DMS Data Display

The Basin DMS is web-based; the public can easily access this portal using common web browsers such as Google Chrome, Firefox, and Microsoft Edge. The Basin DMS is currently populated with available historical data. Additional data will be entered into the system as it is collected.

The Basin DMS portal provides easy access and the ability to query information stored in the system. Groundwater data can be plotted for any of the available data points, providing a pictorial view of historical and current data.

The DMS can be accessed https://opti.woodardcurran.com/cuyama/login.php.

Projects and Management Actions

Achieving sustainability in the Basin requires implementation of management actions and, if demonstrated to be feasible, projects that will increase water supply. One management action, which is reductions in groundwater pumping, is required to achieve sustainability irrespective of the feasibility of any other water supply projects. The exact amount of required reduction in groundwater pumping will be reevaluated after additional data are collected and analyzed. Based on current information, groundwater pumping in the Basin may have to be reduced by as much as 50 to 67 percent. Additional evaluations of pumping reductions required to achieve sustainability are planned over the next several years. These additional evaluations may lead to modification of levels of pumping reduction associated with the attainment of reliability.

Additional management actions included in the Draft GSP include the following:

- Monitoring and recording of groundwater levels, groundwater quality, and subsidence data
- Maintaining and updating the Basin DMS with newly collected data
- Monitoring of groundwater use through use of satellite imagery
- Annual monitoring of progress toward sustainability
- Annual reporting of Basin conditions to DWR as required by SGMA

Several alternative projects to potentially increase water supply availability in the Basin were identified and considered. The initial set of alternatives were reviewed with the Basin SAC and the CBGSA Board of Directors, resulting in two potential water supply projects included in the Draft GSP. These projects require further analysis and permitting to determine feasibility and cost effectiveness. These projects are described below.

The first project is rainfall enhancement through what is commonly referred to a cloud seeding. Cloud seeding is a type of weather modification with the objective to increase the amount of precipitation that would fall in the Basin watershed. The concept is to introduce silver iodide, or similar substance, into the clouds to induce greater rainfall. Cloud seeding has been used in numerous areas throughout California and other western states. Preliminary estimates suggest up to approximately 5,000 acre-feet per year of additional water supply could be added to the Basin. The target area for rainfall enhancement is shown in Figure ES-12.

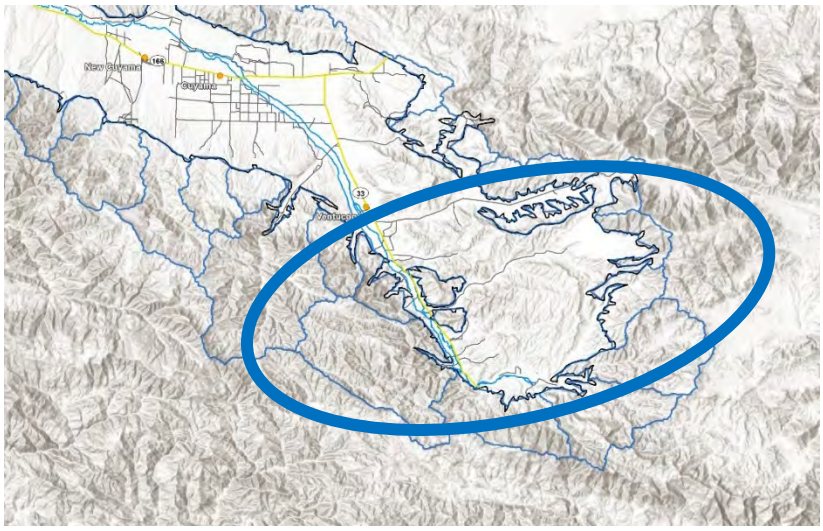


Figure ES-12: Target Area for Potential Rainfall Enhancement

The next step toward implementation of this water supply project is to refine the analysis to better determine the potential increase in precipitation that could be achieved, and to refine the estimated cost of implementation. The project would require completion of an environmental document consistent with the requirements of the California Environmental Quality Act (CEQA).

The second potential project is capture of high stormwater flows in the Cuyama River, and diversion into recharge basins that would be sited in the Central Area of the Basin. The captured stormwater flows would percolate into the groundwater basin resulting in increased recharge of groundwater. The potential stormwater recharge project has several challenges associated with it, including ensuring water rights availability, managing sediment that will be present in any diverted stormwater flows, and obtaining lands for construction of the recharge basins. Preliminary estimates suggest that up to 4,000 acre-feet per year of additional water supply could be added to the Basin. The general location of the potential recharge basins are shown in Figure ES-13.

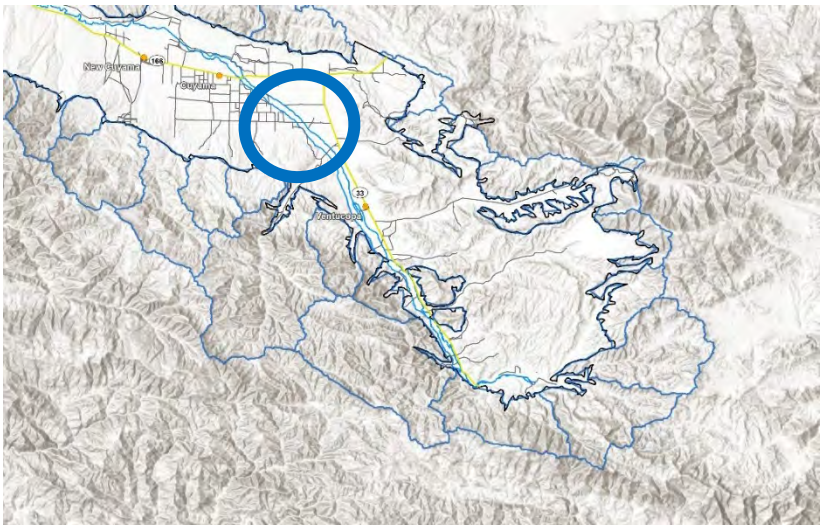


Figure ES-13: General Location of Potential Recharge Basins

The next step toward implementation of this potential project is to evaluate each of these areas of uncertainty and to develop more refined estimates of potential water supply benefit and cost.

The Draft GSP also includes projects specific to the domestic water systems in Ventucopa, Cuyama, and New Cuyama. These projects include installing new wells to secure reliability of water supply to residents of these communities. Implementation of these community well projects would be the responsibility of each of the three communities, as the projects address reliability of available supply for each community.

GSP Implementation

Achieving sustainability in the Basin requires implementation of management actions and, if demonstrated to be feasible, projects that will increase water supply. One management action, which is reductions in groundwater pumping, is required to achieve sustainability irrespective of the feasibility of any other water supply projects. Implementing project and management actions can best be achieved through development of Basin Management Areas to focus necessary activities on the areas of the Basin with projected long-term overdraft.

Two Management Areas have been established in the Basin to aid in administering projects and management actions, as shown in Figure ES-14. The Central and Ventucopa Management Areas were identified based on projected groundwater levels decreasing at a rate of 2 feet or more per year over the next 20 years.

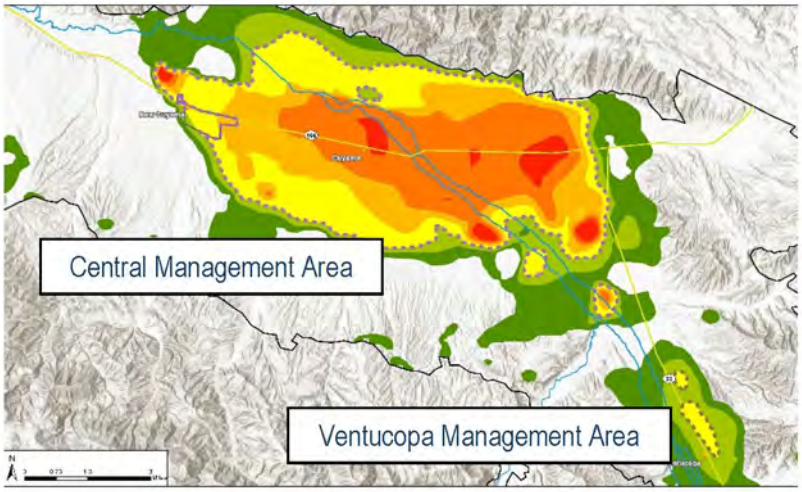


Figure ES-14: Location of Central and Ventucopa Management Areas

Figure ES-15 depicts the general boundaries of the proposed Management Areas. The highlighted colors show the projected annual change in groundwater levels, with clear and green indicating no change to less than 2 feet of projected annual decline in groundwater levels, and the yellow, orange and red areas indicating areas of increasing projections of annual declines in groundwater levels, ranging from more than 2 feet per year up to more than 4 feet per year.

Overdraft conditions in the Central Management Area requires reductions in groundwater pumping. The exact amount of required reduction in groundwater pumping will be reevaluated after additional data are collected and analyzed. However, based on current information, total Basin-wide groundwater pumping may have to be reduced by as much as 50 to 67 percent, with the major proportion or reduction required in the Central Management Area.

Both Management Areas will be administered by the CBGSA. However, the CBGSA may elect to delegate administrative responsibility to another party such as the Cuyama Basin Water District, since all wells supplying the affected lands are within the Cuyama Basin Water District boundary.

Implementing the GSP will require numerous management activities that will be undertaken by the CBGSA, including the following:

- Preparing annual reports summarizing the conditions of the Basin and progress towards sustainability and submitting them to DWR
- Monitoring groundwater conditions for all five sustainability indicators twice each year
- Entering updated groundwater data into the Basn DMS
- Monitoring basin-wide groundwater use using satellite imagery
- Updating the GSP once every five years

The CBGSA Board adopted a preliminary schedule for reduction of groundwater pumping in the Central Management Area.

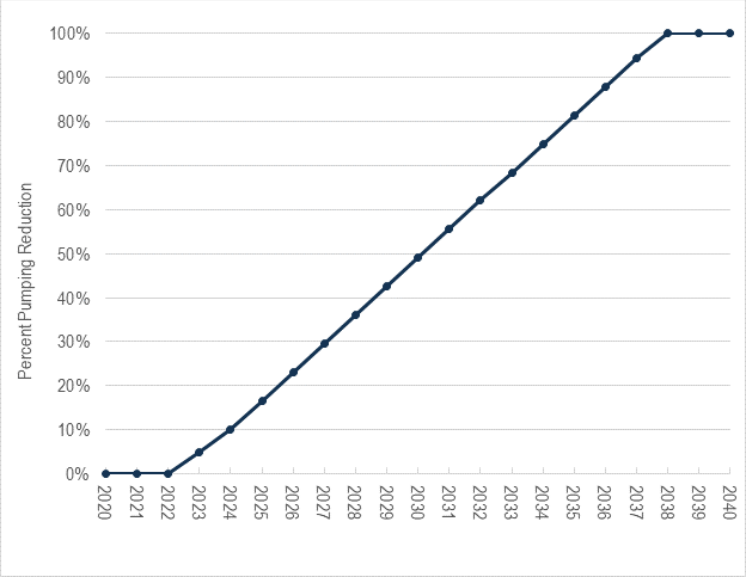


Figure ES-15: Schedule for Proposed Reductions in Groundwater Pumping

For the Central Management Area, pumping reductions are scheduled to begin in 2023 with full implementation by 2040, as shown in Figure ES-15. This approach provides adequate time to put into place methods necessary to monitor groundwater use and reductions. The specific methods for monitoring and reporting will be developed beginning in 2021, with the target of methods being in place by the end of 2022 to allow effective monitoring to beginning in 2023. In 2023, monitoring in 2023 will demonstrate achievement of the proposed levels of pumping reduction by the end of that year.

Pumping reductions are not currently recommended for the Ventucopa Area. The recommendation is to undertake additional monitoring, incorporate new monitoring wells, and further evaluate groundwater conditions in the area over the next two to five years. Once additional data are obtained and evaluated, the need for any reductions in pumping will be determined.

Evaluation and possible implementation of the two identified projects will also be initiated between 2020 and 2025. Further evaluation of the two projects is necessary to determine technical, economic, and institutional feasibility. A critical aspect of feasibility for the stormwater diversion project will be confirmation of water rights availability. Downstream water right holders will have to be maintained whole for the project to be feasible, requiring a more in-depth analysis of water flows and availability. As a result, the first step in determining feasibility will be to evaluate the potential for obtaining a right for diversion from the Cuyama River.

Figure ES-16 presents the overall schedule of activities over the next 20 years

Figure ES-16: Implementation Plan Schedule of Activities
* Represents Management Area activities

Funding

Implementation of the GSP requires funding sources. To the degree they become available, outside grants will be sought to assist in reducing cost of implementation to residents and landowners of the Basin. However, there will be a need to collect funds to support implementation.

The areas associated with GSA-wide management and GSP implementation will be borne by the landowners across the Basin. These costs include:

- GSA administration
- Groundwater level monitoring and reporting
- Groundwater quality monitoring and reporting
- Ground surface subsidence monitoring and reporting
- Water use estimation
- Data management
- Stakeholder engagement
- Annual report preparation and submittal to DWR
- Developing and implementing a funding mechanism
- Grant applications
- GSP updates (every five years)

For budgetary purposes, the estimated initial cost of these activities is on the order $800,000 to $1.2 million per year. The CBGSA Board of Directors will evaluate options for securing the needed funding. Options for funding include fees based on groundwater pumping, acreage, or combinations of these, and pursuit of any available grant funds.

Activities associated with the two Management Areas will be borne by the landowners and water users within the two Management Areas.

For the Ventucopa Management Area, the costs include monitoring of groundwater level data and evaluation of the need for additional or new representative wells and potential need for pumping allocations. The estimated initial cost of these activities is on the order $40,000 to $80,000 per year.

For the Central Management Area, costs include the following:

- Developing and implementing a system for pumping allocations, tracking, and management
- Developing and implementing a funding mechanism
- Evaluation and implementing water supply projects

The estimated initial cost of these activities is on the order $200,000 to $500,000 per year, plus costs associated with evaluating and implementing either of the two potential water supply projects. Depending on feasibility, the annual costs of the rainfall enhancement project would be on the order of $150,000 per year. The stormwater water capture project cost could be on the order of $3 to $4 million per year to amortize the capital cost of the project and to provide funds for annual operations and maintenance.

The CBGSA Board of Directors will evaluate options for securing the needed funding. Similar to the funding options for the GSA-wide activities, options for funding include fees based on groundwater pumping, acreage, or combinations of these, and pursuit of any available grant funds. The CBGSA Board of Directors will evaluate options for securing the needed funding.

Funding for new community wells or well improvements is the responsibility of the three Basin communities. There are potential opportunities for grant funds, depending on timing and state and federal grant funding availability.

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