TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Groundwater Sustainability Plan

Antelope Subbasin

JANUARY 2022

PREPARED BY

Luhdorff & Scalmanini
Consulting Engineers

ANTELOPE SUBBASIN
GROUNDWATER GUSTAINABILITY PLAN

ACKNOWLEDGMENTS

The Tehama County Groundwater Sustainability Agency gratefully acknowledges the funding contribution from the California Department of Water Resources.

TEHAMA COUNTY GROUNDWATER SUSTAINABILITY AGENCY BOARD OF DIRECTORS

The Tehama County Flood Control and Conservation District, a local and regional authority, serves as the exclusive GSA for the Red Bluff Subbasin. The GSA Board of Directors are same members of the Tehama County Board of Supervisors.

Bob Williams
Candy Carlson
Dennis Garton
John Leach
William Moule

GROUNDWATER SUSTAINABILITY PLAN GROUNDWATER COMMISSIONERS

In June 2016, the District established the Tehama County Groundwater Commission to serve as an advisory commission to the Tehama County Flood Control and Water Conservation District Board of Directors for GSA related matters. The Commission consists of 11 members. The Groundwater Commission provided input, review of draft GSP content, defined sustainable management criteria, and provided input on next steps for GSP implementation. Tehama County Groundwater Sustainability Agency appreciates the contributions of the 11 members listed below:

Kristina Miller, City of Corning
Clay Parker, City of Red Bluff
Bill Borror, City of Tehama
Kris Lamkin, El Camino Irrigation District
Todd Hamer, Los Molinos Community Services District
Martha Slack, Rio Alto Water District
Harley North, Supervisorial District 1
Sam Mudd, Supervisorial District 2
Bart Fleharty, Supervisorial District 3
Hal Crain, Supervisorial District 4
David Lester, Supervisorial District 5

MEMBER AGENCY STAFF

James N. Simon, Executive Director
Justin Jenson, Deputy Director of Public Works – Water Resources
Nichole Bethurem, Administrative Assistant

PLANNING, TECHNICAL, AND FACILITATION SUPPORT

Consensus Building Institute, Inc.
Davids Engineering
MBK Engineers
Water Resource Consulting
Pacific Agroecology

Luhdorff & Scalmanini Consulting Engineers performed modeling, planning, and other technical support for the Tehama County Groundwater Sustainability Agency in addition to composing the Red Bluff Subbasin Groundwater Sustainability Plan.

Allison Cronk, PE, Project Engineer
Bernadette Boyle, Project Hydrologist
Chris Curtis, Project Hydrogeologist
Eddy Teasdale, PG, CHG, Supervising Hydrogeologist
Evan Davis, GIT, Staff Geologist
Jeevan Jayakody, PhD, PG, Project Hydrogeologist
John McHugh, PG, CHG, Senior Hydrogeologist
Matt Sturdivant, Staff Hydrogeologist
Nick Newcomb, Senior Hydrogeologist
Nick Watterson, PG, CHG, Supervising Hydrogeologist
Pavan Dhaliwal, Project Hydrologist
Vicki Kretsinger Grabert, Senior Principal Hydrologist
Will Halligan, PG, Senior Principal Hydrogeologist

On behalf of the Tehama County Groundwater Sustainability Agency, thank you to all of the community members who participated in public meetings, information sessions, and various outreach events. Your input was vital to shaping this Plan.

FINAL REPORT

Antelope Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

Eddy Teasdale, PG, CHG

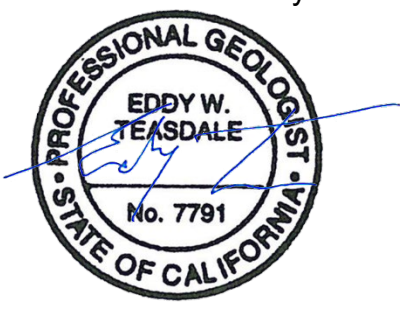


TABLE OF CONTENTS

CHAPTER 3. SUSTAINABLE MANAGEMENT CRITERIA

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS & ABBREVIATIONS

µg/L	Micrograms per Liter
µmhos/cm	Micromhos per Centimeter
AB	Assembly Bill
af	Acre-feet
AN	Above normal Sacramento Valley water year type
AWMP	Agricultural Water Management Plan
bgs	Below Ground Surface
BMP	Best Management Practice
BN	Below normal Sacramento Valley water year type
C	Critical (dry) Sacramento Valley water year type

CalEPA	California Environmental Protection Agency
CalGEM	California Geologic Energy Management Division
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CDEC	California Data Exchange Center
CDFW	California Department of Fish and Wildlife
CDPH	California Department of Public Health
CE	Communications and Engagement
CFS	Cubic Feet per Second
CNRA	California Natural Resources Agency
CVRWQCB	Central Valley Regional Water Quality Control Board
CV-SALTS	Central Valley Salinity Alternatives
CWA	Clean Water Act
CWC	California Water Code
D	Dry Sacramento Valley water year type
DAC	Disadvantaged Community
DDW	Division of Drinking Water
DMS	Data Management System
DO	Dissolve Oxygen
DOI	Department of the Interior
DPR	Department of Pesticide Regulation
DQO	Data Quality Objective
dS/m	Decisiemens per Meter
DTSC	Department of Toxic Substance Control
DTW	Depth to Water
DWR	Department of Water Resources
EC	Electrical Conductivity
ET	Evapotranspiration
ft bgs	Feet Below Ground Surface
ft msl	Feet Above Mean Sea Level
ft/day	Feet Per Day
ft/mile	Feet per Mile
ft/yr	feet per year

ft2/day	Square Feet Per Day
FTE	Full Time Equivalent
GAMA	Groundwater Ambient Monitoring and Assessment Program
GDE	Groundwater Dependent Ecosystem
GMP	Groundwater Management Plan
GPS	Global Positioning System
GQTM	Groundwater Quality Trend Monitoring
GSA	Groundwater Sustainability Agency
GSE	Ground Surface Elevation
GSP	Groundwater Sustainability Plan
GWE	Groundwater Elevation
GWMP	Groundwater Management Plan
GWS	Groundwater System
HCM	Hydrogeological Conceptual Model
iGDE	Indicators of Groundwater Dependent Ecosystems
ILRP	Irrigated Lands Regulatory Program
InSAR	Interferometric Synthetic Aperture Radar
IRWMP	Integrated Regional Water Management Plan
JPA	Joint Powers Authority
LLNL	Lawrence Livermore National Laboratory
LMMWC	Los Molinos Mutual Water Company
LSCE	Luhdorff & Scalmanini, Consulting Engineers
MAs	Management Actions
MCL	Maximum Contaminant Level
mg/L	Milligrams per Liter
MO	Measurable Objective
MOA	Memorandum of Agreement
MT	Minimum Threshold
MTJ	Mendocino Triple Junction
MWELO	Model Water Efficient Landscape Ordinance
NAVD88	North American Vertical Datum of 1988
NCCAG	Natural Communities Commonly Associated with Groundwater
NDVI	Normalized Difference Vegetation Index

NRCS	Natural Resources Conservation Service
NWIS	National Water Information System
ORP	Oxidation-Reduction Potential
PBO	Plate Boundary Observatory
PMAs	Projects and Management Actions
QA	Quality Assurance
QC	Quality Control
RMS	Representative Monitoring Sites
RP	Reference Point
RPE	Reference Point Elevation
RWQCB	Regional Water Quality Control Board
SAGBI	Soil Agricultural Groundwater Banking Index
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
SMCL	Secondary Maximum Containment Level
SVWQC	Sacramento Valley Water Quality Coalition
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWS	Surface Water System
TAC	Technical Advisory Committee
taf	Thousand acre-feet
TDS	Total Dissolved Solids
Tehama County FCWCD	Tehama County Flood Control and Water Conservation District
Tehama IHM	Tehama Integrated Hydrologic Model
TM	Technical Memorandum
UNAVACO	University NAVSTAR Consortium
USBLM	United States Bureau of Land Management
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States forest Service

USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Planning Act
W	Wet Sacramento Valley water year type
WCR	Well Completion Report
WDL	Water Data Library
WDR	Waste Discharge Requirements
WMP	Water Management Plan

FINAL REPORT

Antelope Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan (Executive Summary)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ES 1. INTRODUCTION

In 2014, the California legislature enacted three bills, AB 1739 (Dickinson), SB 1168 (Pavley), and SB 1319 (Pavley), collectively known as the Sustainable Groundwater Management Act (SGMA) in response to overdraft conditions of California's groundwater resources. Since 2016, the Tehama County Flood Control and Water Conservation District (Tehama County FCWCD) (District), a local and regional authority, is the exclusive GSA for the Antelope Subbasin. The Tehama County Groundwater Commission serves as an advisory commission to the Tehama County Flood Control and Water Conservation District Board of Directors for GSA related matters. Groundwater Commission meetings, which are open to the public, were held the 4th Wednesday of each month, except holidays.

The GSP provides information demonstrating that the past and present actions of the GSA have created a sustainably managed groundwater basin. The GSP outlines planned management oversight and activities that will result in continued sustainability of the groundwater resources in the Antelope Subbasin.

This Executive Summary and the companion GSP are organized as follows:

- Executive Summary
- Section 1 Introduction
- Section 2 Plan Area, Basin Setting and Water Budgets
- Section 3 Sustainable Management Criteria and Monitoring Network
- Section 4 Projects and Management Actions
- Section 5 Plan Implementation
- Appendices

The following sections provide factors about the Subbasin and an overview of technical content in the GSP.

The Antelope Subbasin (Subbasin) (DWR Subbasin No. 5-021.54) (**Figure ES-1**) has been identified by the California Department of Water Resources (DWR) as a high priority subbasin. Under SGMA high priority subbasins are required to prepare and be managed under a GSP by January 31, 2022. This GSP, prepared by the GSA, adequately defines groundwater conditions in the managed area and establishes criteria to maintain and/or achieve sustainability within 20 years of the GSP adoption.

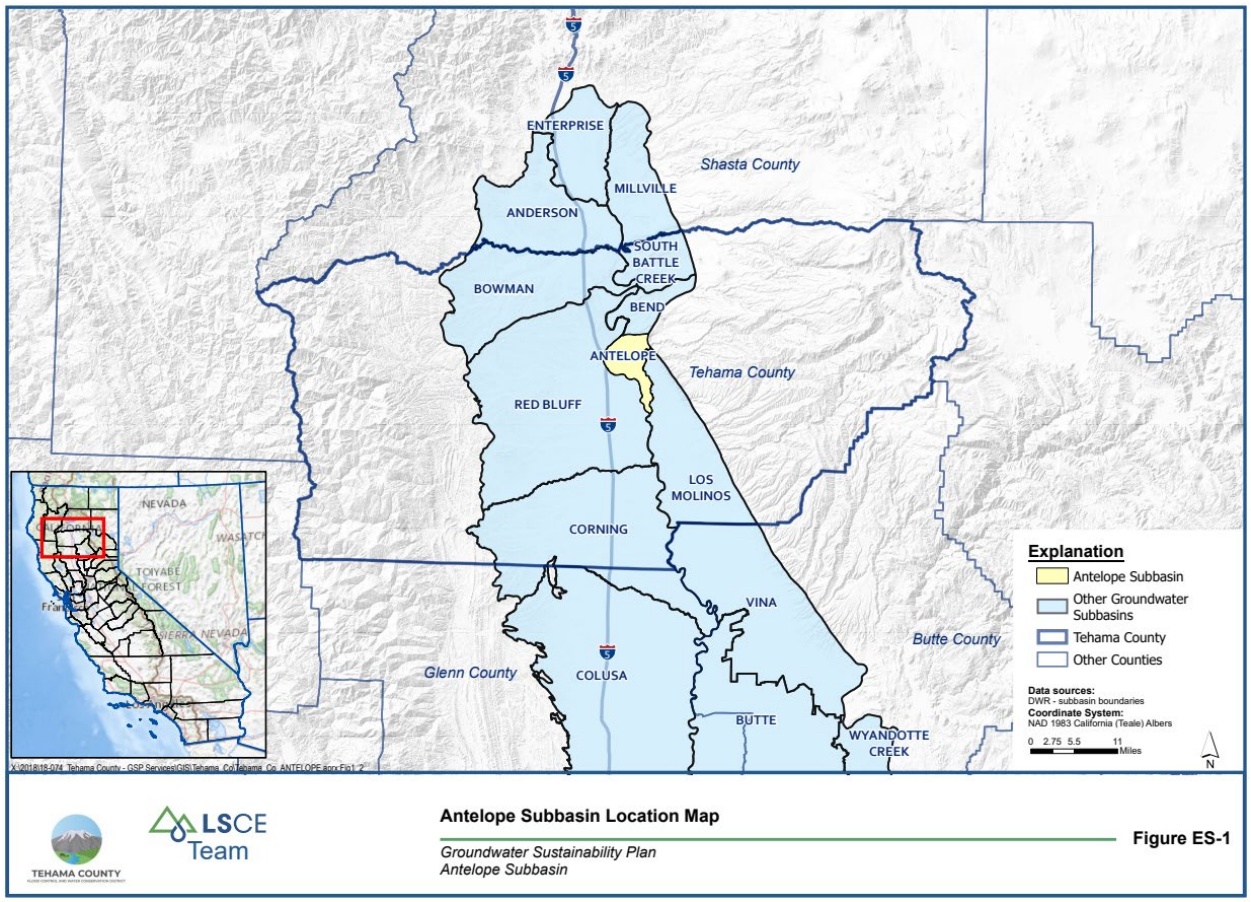


Figure ES-1: Antelope Subbasin Location Map

A Public Draft GSP was made available for public review and comment on September 24, 2021, for a period of 45 days. The GSA received comments, reviewed, and prepared responses to comments, and revised the Draft GSP. The Final GSP will include those revisions. Comment letters and responses will be included as GSP appendices.

ES 2. SUMMARY OF PLAN AREA

The Antelope Subbasin (DWR Subbasin No. 5-021.54) covers 19,100 acres and is in the Northern Sacramento Valley Groundwater Basin (**Figure ES-1**). Antelope is one of seven (7) subbasins within Tehama County. The Tehama County FCWCD is the exclusive GSA for six (6) of those subbasins: Antelope, Bend, Bowman, Los Molinos, Red Bluff, and South Battle Creek. The seventh, the Corning Subbasin, extends into Glenn County, and the GSP for that subbasin is being developed in a coordinated effort between the Tehama County FCWCD and Corning Sub-basin GSA.

The lateral extent of the Subbasin is consistent with Bulletin 118 (DWR, 2018). It is bounded on the north by the Bend Subbasin and Red Bluff Subbasin, on the east and south by the Los Molinos, and on the south and west by the Red Bluff Subbasin. The Sacramento River runs along the western extent of the Subbasin, and Antelope Creek borders the majority of the eastern Subbasin. The Subbasin extends south to the point where Antelope terminates into the Sacramento River. The vertical boundaries of the Subbasin are the

land surface (upper boundary) and the definable bottom of the basin (lower boundary). The definable bottom is the base of fresh water located at approximately 800-2,000 feet below ground surface (bgs).

Lands in the Antelope Subbasin are mostly privately owned with state and federal agencies owning a small portion. Private lands are majority farmland with nearly equal amounts riparian and other native vegetations. Over 1,500 groundwater wells exist in the Subbasin, and most are domestic wells. A few wells are operated for the public water supply and roughly ten times that number of wells are maintained for agricultural production. Numerous monitoring programs are operated in the Subbasin by federal, state, and local public agencies including the EPA, USGS and DWR. Monitoring programs collect data on groundwater levels, groundwater quality, land subsidence and surface water conditions. Data from these programs were incorporated (as applicable) into the evaluation of basin conditions within this GSP and were part of previous management plans including the Tehama County AB3030 Groundwater Management Plan (GWMP) and the Northern Sacramento Valley Integrated Regional Water Management Plan (IRWMP). Components of these management plans were incorporated into this GSP.

ES 2.1. Basin Setting and Hydrogeologic Conceptual Model

The ground surface generally slopes from the east to west with steeper slopes in the northeast of the subbasin and water generally follows the topography flowing in a west to southwestern direction. Aquifer recharge contributions to the deeper geologic formations occurs on the eastern side of the subbasin where the formations outcrop at the surface, however recharge of the Subbasin primarily occurs from the flow of the Sacramento River, Antelope Creek, Salt Creek, and other streams. Water flows downward in the upper aquifer driven by natural recharge. Gaining conditions along streams represent discharge from the aquifer and occur seasonally. Larger sources of discharge from the aquifer are likely from production of wells even though a portion returns to the aquifer via recharge from irrigations. Even with the noted groundwater withdraw there is little to no reported evidence of subsidence within the Subbasin.

A horizontal groundwater gradient magnitude ranges from 2 ft/mile to 13 ft/mile. Seasonal historic high-water levels during wet periods were between about 10 and 45 ft bgs. Groundwater quality is generally good with few exceptions most notably undesirable concentrations of nitrate in small areas of the Subbasin. Nitrate contamination from sewage disposal systems and agricultural fertilizer are a concern in the northwestern area of the Subbasin. In the northcentral portion of the Subbasin, elevated boron levels have been observed, sourced from the marine cretaceous sedimentary rocks.

The Subbasin is defined as a two-aquifer system with unconfined to semi-confined conditions in the Upper Aquifer and semi-confined to confined conditions in the Lower Aquifer. Fresh water occurs as groundwater to a maximum depth of over -2,000 ft msl in the west of the Subbasin. The major water bearing formations within the Subbasin are the Tuscan and Tehama Formations with some contribution from the shallower Quaternary sedimentary deposits. More recent geologic history is dominated by fluvial and alluvial deposition.

ES 2.2 Water Budget

In accordance with technical guidance documents provided by DWR, water budget scenarios were evaluated using a groundwater flow model that quantified historical, current, and projected groundwater budget conditions. The water budgets were developed through application of the Tehama Integrated Hydrologic Model (Tehama IHM), a numerical groundwater flow model that characterizes surface water and groundwater movement and storage across the entire Subbasin and extending outside of the Subbasin. The Tehama IHM is an integrated groundwater and surface water model developed for the purpose of conducting sustainability analyses within Tehama County. The model used foundational elements of DWR's SVSim regional model for the Sacramento Valley (DWR, 2021) and was refined locally for improved application in the Subbasin area. Use of publicly available modeling platforms is a guiding principle under DWR Best Management Practices and facilitates independent assessment of modeling results.

The model was calibrated using records from 1990-2019 (29 years). This period represents long-term average hydrologic conditions and is considered the historical water budget period. The current water budget presents information on the effects of recent hydrologic and water demand conditions on the groundwater system and spans five different recent periods. The historical and current water budget periods were selected to evaluate conditions over discrete representative periods considering the following criteria: Sacramento Valley water year type; long-term mean annual water supply; inclusion of both wet and dry periods, antecedent dry conditions, adequate data availability; and inclusion of current hydrologic, cultural, and water management conditions in the Subbasin. Water budgets were calculated for a projected 50-year period, 2022 through 2072. The 50-year projected water budget uses hydrologic conditions representative of the most recent 50 years of hydrology in the Subbasin, with adjustments applied in scenarios for evaluating the water budget under climate change and altered water supply and demand conditions.

Model results indicate that over the historical period the largest outflow from the groundwater system (GWS) comes from groundwater pumping (on average 13 thousand-acre feet (taf) per year). Groundwater discharge to the surface is 55 taf per year. Deep percolation is the largest net inflow to the GWS (12 taf per year). Subsurface inflows from adjacent subbasins and upland areas represents 50 taf per year gain to the GWS. Groundwater root uptake represents a small flux of 1.5 taf per year of the leaving the GWS. Over the 29-year historic period the average annual change in storage was around -610 af per year.

The recent three-year period from 2016 through 2018 is believed to provide a reasonable representation of the recent water budget conditions based on an evaluation of past water budgets and the hydrologic conditions over these recent periods. A comparison of several future modeled water budgets was made to define the possible effect of different climate change and management action scenarios. Overall projected storage change in the Subbasin is small and differs little between the different climate change conditions.

The sustainable yield was estimated to be 18,000 acre-feet per year, which is equal to the volume of groundwater extracted annually in the Subbasin (by pumping and by uptake) minus the simulated change in storage in the projected model scenario with future land use and 2070 climate change conditions. Under these conditions groundwater extractions total about 18,000 acre-feet per year on average. The change in storage is nearly zero which results in the sustainable yield equaling 18,000 acre-feet. Assuming potential uncertainty of 25 percent associated with the water budget estimates, an associated range of values for the estimated sustainable yield would be 13,000 to 23,000 acre-feet per year.

ES 3. SUSTAINABILITY MANAGEMENT CRITERIA

Sustainable management criteria include establishing a sustainability goal for the Subbasin, defining undesirable results, and quantifying minimum thresholds and measurable objectives.

The sustainability goal for the Antelope Subbasin GSP is to manage the groundwater Subbasin to:

- Protect and maintain safe and reliable sources of groundwater for all beneficial uses and users.
- Ensure current and future groundwater demands account for changing groundwater conditions due to climate change.
- Establish and protect sustainable yield for the Subbasin by achieving measurable objectives set forth in this GSP in accordance with implementation and planning periods.
- Avoid undesirable results defined in the GSP in accordance with SGMA.

Sustainable management criteria (SMC) also define the conditions that constitute sustainable groundwater management. Note that undesirable results have not occurred historically in the Antelope Subbasin and are not projected to occur in the future. The sustainable management criteria will commit the GSA to meeting the sustainability goal for the Subbasin.

Sustainability indicators are measurable indicators that are used to set Measurable Objectives (MO), interim milestones and Minimal Thresholds (MT) to ensure that the sustainability goals are met. Undesirable results occur when significant and unreasonable effects are caused by groundwater conditions for a given sustainability indicator. Sustainability indicators are listed in **Table ES-1** along with whether undesirable results occurred in the subbasin and if they are likely to occur in the future without GSP implementation. Sustainability indicators will be measured at representative monitoring sites (RMS) selected based on location, aquifer, and historical data. MOs, MTs and undesirable results are defined in **Table ES-2.**

Table ES-1. Summary of Undesirable Results Applicable to the Plan Area

SUSTAINABILITY INDICATOR	HISTORICAL PERIOD	EXISTING CONDITION	FUTURE CONDITIONS WITHOUT GSP IMPLEMENTATION
Chronic Lowering of Groundwater Elevations	No	No	No
Reduction of Groundwater Storage	No	No	No
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable
Degraded Water Quality	Limited	Limited	Limited
Land Subsidence	No	No	No
Depletion of Interconnected Surface Water	Data Gap	Data Gap	TBD

Table ES-2. Summary of MT, MO, and Undesirable Results

SUSTAINABILITY INDICATOR	MINIMUM THRESHOLD	MEASURABLE OBJECTIVE	UNDESIRABLE RESULT
Chronic Lowering of Groundwater Elevations	**Upper Aquifer:** Spring groundwater elevation where less than 10% or less than 20% of domestic wells could potentially be impacted. **Lower Aquifer:** Spring groundwater elevation minus 20 to 120 feet	**Upper & Lower Aquifer:** Spring 2015 groundwater elevation minus five feet (for wells with increasing or no groundwater trends) or projected Spring 2042 groundwater elevation minus five feet for wells with declining groundwater elevations	25% of groundwater elevations measured at same RMS wells exceed the associated MT for two consecutive measurements.
Reduction of Groundwater Storage	**Upper & Lower Aquifer:** Amount of groundwater in storage when groundwater elevations are at their minimum threshold	**Upper & Lower Aquifer:** Amount of groundwater storage when groundwater elevations are at their measurable objective	Same as chronic lowering of groundwater levels
Land Subsidence	Two feet over 20 years (i.e., no more than 0.5 feet of cumulative subsidence over a five-year period (beyond the measurement error), solely due to lowering of groundwater elevations	One foot over 20 years (Zero inelastic subsidence, in addition to any measurement error). If InSAR data are used, the measurement error is 0.1 feet and any measurement 0.1 feet or less would not be considered inelastic subsidence	50% of RMS exceed the minimum threshold over a 5-year period that is irreversible and is caused by lowering of groundwater elevations
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable
Degraded Water Quality	**Upper & Lower Aquifer:** TDS concentration of 750 mg/L at all RMS wells	**Upper & Lower Aquifer:** California lower limit secondary MCL concentration for TDS of 500 mg/L measured at RMS wells	At least 25% of RMS exceed the minimum threshold for water quality for two consecutive years at each well where it can be established that GSP implementation is the cause of the exceedance
Depletion of Interconnected Surface Water	Same as chronic lowering of groundwater levels (Initial)	Same as chronic lowering of groundwater levels (Initial)	25% of groundwater elevations measured at RMS wells drop below the associated threshold during two consecutive years in the Upper Aquifer.

ES 3.1. Chronic Lowering of Groundwater Elevations

Groundwater levels declined over the historical period. This trend is expected to continue without GSP implementation. The MOs for Chronic Lowering of Groundwater Elevations indicator is defined at each of the RMS (wells) as that well's spring 2015 groundwater elevation minus five feet or projected 2042 groundwater elevation minus five ft for wells with declining groundwater elevations. MTs are defined as the groundwater level at RMS wells that are estimated to impact (potentially run dry) less than 10% or less than 20% of nearby domestic wells. It is considered an Undesirable Results for Chronic Lower of Groundwater Elevations if 25% of groundwater elevations measured at RMS wells exceed the associated MT for two consecutive measurements.

ES 3.2. Reduction of Groundwater Storage

The groundwater storage reduction sustainability indicator will be evaluated using groundwater levels as a proxy in conjunction with annual evaluations of monitored groundwater level changes. Based on considerations applied in developing the groundwater level minimum thresholds, reduction in groundwater storage minimum thresholds do not exceed any identified significant and unreasonable level of depleted groundwater storage volume.

ES 3.3. Subsidence

Land subsidence is not known to have occurred in the subbasin, is not occurring presently, and is not expected to occur without GSP implementation. MOs have been defined as a decline of one foot over 20 years. Subsidence is based on InSAR data. InSAR measurement error is 0.1 feet and any measurement 0.1 feet or less would not be considered inelastic subsidence. MTs are defined by a decline of two feet over 20 years. Undesirable Results are defined as 50% of RMS exceeding the minimum threshold over a 5-year period that is irreversible and is caused by lowering of groundwater elevations. RMS for subsidence are the InSAR pixels collocated or near the water level RMS wells.

ES 3.4. Degraded Water Quality

Groundwater quality in the Subbasin is generally good with a few exceptions. Present conditions are unchanged from conditions within the historical period however conditions could worsen without GSP implementation. MOs are defined by the California MCL for TDS of 500 mg/L measured at RMS wells. MTs are set at 750 mg/L TDS measured at RMS wells. Undesirable Results occur if 25% of RMS exceed the minimum threshold for water quality for two consecutive years at an individual well where it can be established that GSP implementation is the cause of the exceedance.

ES 3.5. Seawater Intrusion

Due to the location of the Subbasin relative to any potential source of seawater this sustainability criterium is not applicable to this subbasin.

ES 3.6. Depletion of Interconnected Surface Waters

The interconnected surface water sustainability indicator could not be properly defined due to gaps in historical surface and groundwater monitoring programs. It is not known if conditions will worsen without GSP implementation without a reliable way to correlate the groundwater and surface water elevations. Due to the lack of data associated with this sustainability indicator the MOs and MTs are considered

interim and will use the Chronic Lowering of Groundwater Elevations sustainability indicator as a proxy. An Undesirable Result is defined as 25% of groundwater elevations measured at upper aquifer RMS wells dropping below the associated threshold during two consecutive years.

ES 3.7. Monitoring Network

Monitoring networks are developed to quantify current and future groundwater conditions in the Antelope Subbasin, as well as within individual GSA jurisdictions. The monitoring network for sustainability indicators is summarized in **Figure ES-2.** There are a total of four RMS wells in the Antelope Subbasin, three in the Upper Aquifer and one in the Lower Aquifer. The three Upper Aquifer RMS wells serves as the monitoring locations for the Chronic Lowering of Groundwater Elevations, Reduction of Groundwater Storage, Depletion of Interconnected Surface Water, and Water Quality indicators. The Lower Aquifer RMS well is associated with the first three indicators, but not the Interconnected Surface Water Depletion indicator. The InSAR RMS are pixels collocated or near the water level RMS wells. Measured water level elevations will inform MO and MTs for Chronic Lowering of Groundwater Elevations, Reduction of Groundwater Storage, Depletion of Interconnected Surface Water indicators. Water quality samples taken from RMS wells will inform the MOs and MTs for the Degraded Water Quality indicator. Land Subsidence will be informed at RMS (select pixels) using satellite InSAR data. The monitoring network will be periodically reviewed and modified as needed; for instance, additional RMS wells may be added to better understand interconnected surface waters.

A Data Management System (DMS) was developed to store and analyze data collected as part of this GSP. With submittal and implementation of the Antelope Subbasin GSP, there will be a publicly accessible weblink to view reports, maps, graphs, and current data under the Subbasin monitoring plan.

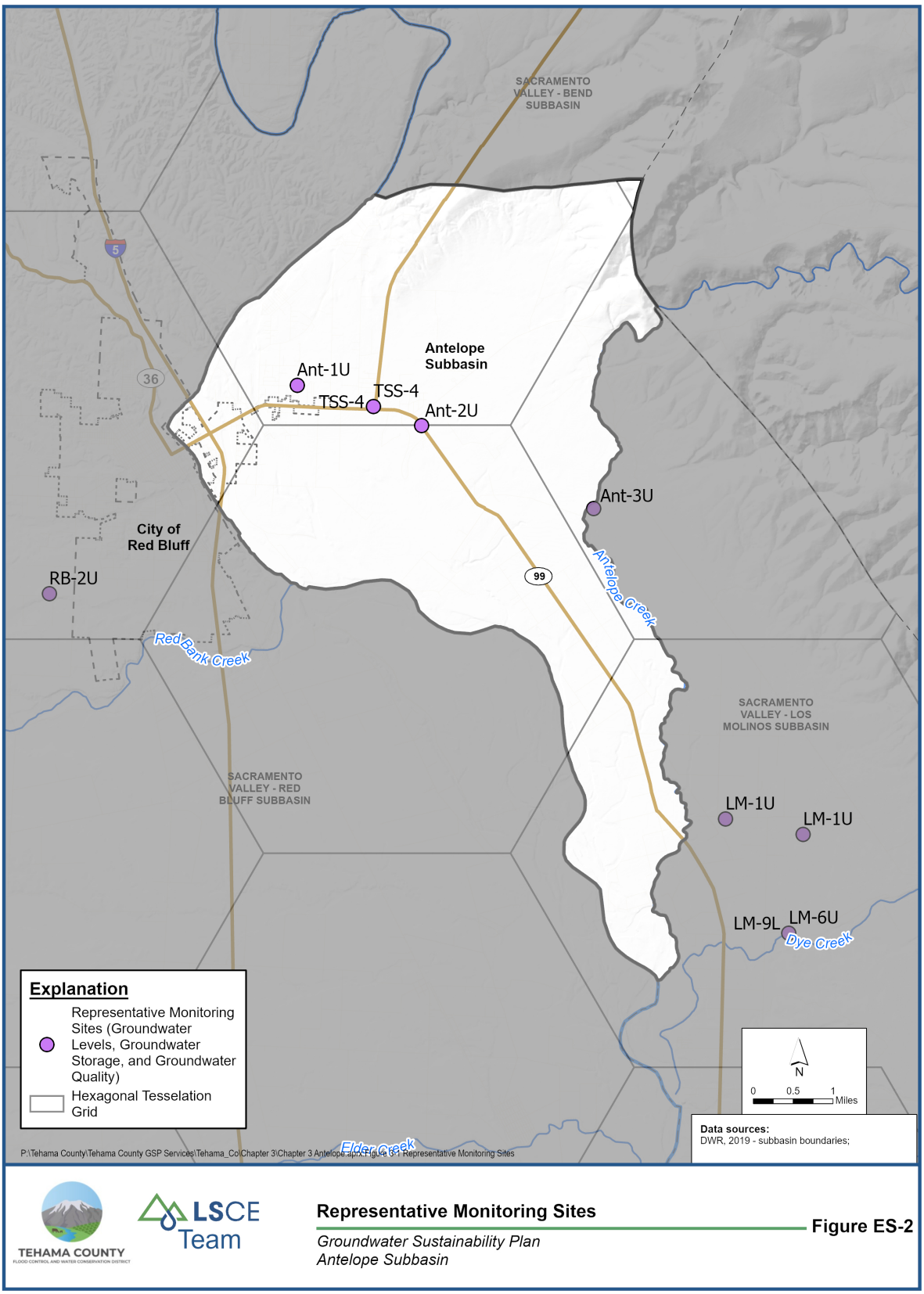


Figure ES-2: Map of all Sustainability Indicator Wells

ES 4. OVERVIEW OF PROJECTS AND MANAGEMENT ACTIONS

In accordance with 23 CCR §354.44, Projects and Management Actions (PMAs) were developed to achieve and maintain the Subbasin sustainability goal by 2042 and avoid undesirable results over the GSP planning and implementation horizon. Projects generally refer to structural features whereas management actions are typically non-structural programs or policies designed to support sustainable groundwater management. Because the Antelope Subbasin is currently and projected to be sustainable (i.e., no onset of undesirable results), PMAs are not expected to be essential for sustainability. However, future conditions are uncertain and PMAs will be employed through the principle of adaptive management on an as-needed basis.

Even so, the GSA plans to continue monitoring sustainability indicators throughout GSP implementation and will initiate and scale PMAs as needed to ensure that the measurable objectives are met. The following describes PMAs identified for the Antelope Subbasin.

ES 4.1. PMAs Planned for Implementation

The GSA has identified PMAs that are planned to be completed prior to 2042. These projects and management actions are expected to support the GSA in achieving the GSP sustainability goal and responding to changing conditions in the Subbasin.

ES 4.1.1. Multi-Benefit Groundwater Recharge Programs

A multi-benefit recharge program will provide groundwater recharge through normal farming operations while also providing critical wetland habitat for shorebirds migrating along the Pacific Flyway. The Nature Conservancy (TNC) has prepared guidance to assist GSAs in planning on-farm multi-benefit groundwater recharge programs.

ES 4.1.2. Grower Education and Outreach

This program will provide growers with educational resources that help them to plan and implement on-farm practices that simultaneously support groundwater sustainability and maintain or improve agricultural productivity.

ES 4.2. Proposed Potential PMAs

Projects and Management Actions in this category are proposed as potential options that GSAs may wish to implement, as needed, to support ongoing sustainability, to adapt to changing conditions in the Subbasin, and to achieve other water management objectives.

ES 4.2.1 Direct Groundwater Recharge

Potential projects would support efforts to recharge groundwater with excess surface water in wet years for use in dry years. Recharge may be done in conveyances such as unlined canal and laterals, natural drainages such as creek beds, recharge basins, agricultural fields, and aquifer storage and recovery (ASR) wells. Projects could also be directed at making improvements to stormwater management facilities to enhance groundwater recharge of stormwater, capture rainfall through modification of on-field conditions and facilitate use of recycled water for groundwater recharge.

ES 4.2.2. Groundwater Demand Reduction

Groundwater demand reduction can be achieved by conveyance improvements such as removal of invasive plants from creeks and irrigation canals. Plant removal would reduce conveyance issues, reduce evapotranspiration (ET), and allow for more water in the shallow groundwater areas, restoring conditions for GDEs and native riparian species.

ES 4.2.3. Surface Water Supply Augmentation & In-Lieu Groundwater Recharge

Programs directed at promoting inter-basin surface water transfers or exchanges can potentially subsidize surface water costs so that it is less expensive than groundwater. Construction, renovation, or conversion of flood control facilities to water supply reservoirs can increase available supply of surface water.

ES 4.2.4. Education/Outreach, In-Lieu Groundwater Recharge

This management action assist growers with conversion to efficient and dual-source irrigation systems, improve surface water conveyance and irrigation infrastructure to allow growers to utilize both surface water and groundwater for drip irrigation of orchards, assist growers with capital improvements to irrigation infrastructure, from use of groundwater to use of surface water or dual-source systems.

ES 4.2.5. Groundwater Demand Reduction.

Management actions aimed at reduction of groundwater demand may offer incentives for urban, residential, and commercial projects that improve water use efficiency, such as high efficiency appliance rebates and incentives for lawn removal, low-water landscape installation, rain barrels, graywater reuse, etc. Action may promote the conversion of agricultural lands to less water intensive crops to reduce water use while continuing to promote agriculture land use.

ES 4.2.6. In-Lieu Groundwater Recharge

Management actions aimed at increasing In-Lieu recharge may incentivize use of surface water for irrigation when available to allow groundwater levels to recover in between drought years when surface water is not available. Effective management actions may also increase use of surface water by creating a water market for exchanging surface water and groundwater.

ES 4.2.7. Monitoring to Fill Data Gaps & Programs to Support Wells

Several data gaps have been identified in this GSP. Additional studies of GDEs and groundwater surface water interactions, expanded subbasin monitoring and aquifer testing, install additional agroclimate stations, maintain and expand groundwater level monitoring network, and a one-time groundwater quality snapshot are all actions that can be taken to reduce data gaps.

To support well owners and reduce impacts of potential undesirable results a county-wide system to tracking dry domestic wells will better inform and lead to better management of assistance to domestic well owners when water levels drop, and wells go dry.

ES 5. PLAN IMPLEMENTATION

This GSP will be implemented to achieve the Subbasin sustainability goal by 2042 and avoid undesirable results through 2070 as required by SGMA and GSP regulations. Implementation of this GSP includes PMAs in addition to on-going activities that will be completed by the GSA related to monitoring, management, administration, updates, reporting, and public outreach.

GSP implementation costs include both costs specific to projects and management actions and costs for the GSA to administer and operate all other tasks associated with the GSP over the 20-year implementation period. The total cost is estimated to be approximately $19,757,000.

These costs may be subject to change, as they are projections based on the time of development of this report. GSP implementation and GSA support costs are estimated on an annual basis and are described in further detail below.

Table ES-3. Estimated GSP Implementation Costs through 2042

FISCAL YEAR	GSA ADMINISTRATION	MONITORING	5-YEAR UPDATES	10% CONTINGENCY	TOTAL
2022	$470,000	$104,000	$0	$57,000	$631,000
2023	$484,000	$107,000	$0	$59,000	$650,000
2024	$499,000	$110,000	$0	$61,000	$670,000
2025	$514,000	$114,000	$0	$63,000	$690,000
2026	$529,000	$117,000	$150,000	$80,000	$876,000
2027	$545,000	$121,000	$150,000	$82,000	$897,000
2028	$561,000	$124,000	$0	$69,000	$754,000
2029	$578,000	$128,000	$0	$71,000	$777,000
2030	$595,000	$132,000	$0	$73,000	$800,000
2031	$613,000	$136,000	$169,000	$92,000	$1,010,000
2032	$632,000	$140,000	$174,000	$95,000	$1,040,000
2033	$651,000	$144,000	$0	$79,000	$874,000
2034	$670,000	$148,000	$0	$82,000	$900,000
2035	$690,000	$153,000	$0	$84,000	$927,000
2036	$711,000	$157,000	$196,000	$106,000	$1,170,000
2037	$732,000	$162,000	$202,000	$110,000	$1,205,000
2038	$754,000	$167,000	$0	$92,000	$1,013,000
2039	$777,000	$172,000	$0	$95,000	$1,044,000
2040	$800,000	$177,000	$0	$98,000	$1,075,000
2041	$824,000	$182,000	$227,000	$123,000	$1,357,000
2042	$849,000	$188,000	$234,000	$127,000	$1,397,000
Total	$13,478,000	$2,983,000	$1,502,000	$1,798,000	$19,757,000

Development of this GSP was funded through Proposition 1 and Proposition 68 Grants. Ongoing implementation, monitoring, and reporting are expected to be funded through fees and outside grants and funding. The GSA is currently developing a financing plan that will include one or more of the following financing approaches

- Grants and low-interest loans: GSA will continue to pursue grants and low interest loans to help fund planning studies and other GSA activities. However, grants and low-interest loans are not expected to cover all of the GSA operating costs for GSP implementation
- GSP Implementation Costs: Initial implementation costs not covered by grant funding will be assessed through either land-based charge or groundwater usage charge. In the future the GSA may adopt a volumetric charge on groundwater extracted from the Subbasin.
- Taxes: This could include general property related taxes that are not directly related to the benefit or cost of a service (ad valorem and parcel tax), or special taxes imposed for a specific purpose related to GSA activities.

The GSA is pursuing a combined approach, targeting available grants and low interest loans, and considering a combination fee and assessment to cover operating and program-specific costs. The GSA will comply with statutory and California constitutional requirements to adopt any rate, fee, charge, or assessment to fund implementation of the GSP.

This GSP will be adopted and submitted to DWR by January 31, 2022. The implementation timeline will begin thereafter and will allow the GSA to develop and implement projects and management actions to meet sustainability objectives by 2042. GSP implementation also includes annual and periodic evaluations and submittals to DWR. The full schedule for implementation is subject to change, will be evaluated, and updated as necessary based on implementation progress, sustainability goals, monitoring, and other factors that could affect implementation. The implementation timeline as presently described is outlined below in **Figure ES-3**.

The GSP uses best available information and the best available science to provide a road map for the Antelope Subbasin to meet its sustainability goal by 2042 and comply with SGMA regulations. During each five-year update, progress will be assessed, and the GSP revised as necessary, to achieve the sustainability goal by 2042 and comply with SGMA regulations.

Annual reports will be completed and submitted to DWR by April 1 of each year pursuant to GSP Regulation §356.2. Annual reports will include sections on general information, basin conditions, and plan implementation progress for the reporting period. The annual report submitted to DWR will comply with the requirements of §356.2. The GSA will evaluate the GSP every five years and whenever the plan is amended. The evaluation will be submitted to DWR and include the elements of the Annual Report, a summary of the GSP, project, and management action implementation progress, and progress toward meeting the sustainability goal of the Subbasin.

Figure ES-3. GSP Implementation Schedule

TASK NAME	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Plan Implementation																					
GSP Submittal to DWR	x																				
Outreach and Communication																					
Monitoring and DMS																					
GSP Reporting																					
Annual Reports	x	x	x	x	x		x	x	x	x		x	x	x	x		x	x	x	x	
5-year GSP Evaluation Reports						x					x					x					x

x Indicates a submittal.
Indicates ongoing event.

ES 6. OVERVIEW OF GOVERNANCE

In adopting the Sustainable Groundwater Management Act ("SGMA"), the Legislature made clear that nothing in SGMA "determined or alters surface water of groundwater rights under common law or any provision of the law that determines or grants surface water rights. In other words, the Legislature intended that actions undertaken in accordance with SGMA to respect common law water rights.

This GSP established the objectives of maximizing the beneficial use of water with the Antelope Subbasin, without causing undesirable results. The powers of the GSA are set forth in SGMA. This GSP meets the requirements of SGMA and vests the management authority in the GSA. Authorities include Powers of the Board, Rules and Regulations, Committees, Specific Powers, Variances and Complaints.

FINAL REPORT

Antelope Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan (Chapter 1 - Introduction)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS & ABBREVIATIONS

AB	Assembly Bill
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CWC	California Water Code
DWR	California Department of Water Resources
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWMP	Groundwater Management Plan
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
TAC	Technical Advisory Committee
Tehama County FCWCD	Tehama County Flood Control and Water Conservation District

1 INTRODUCTION

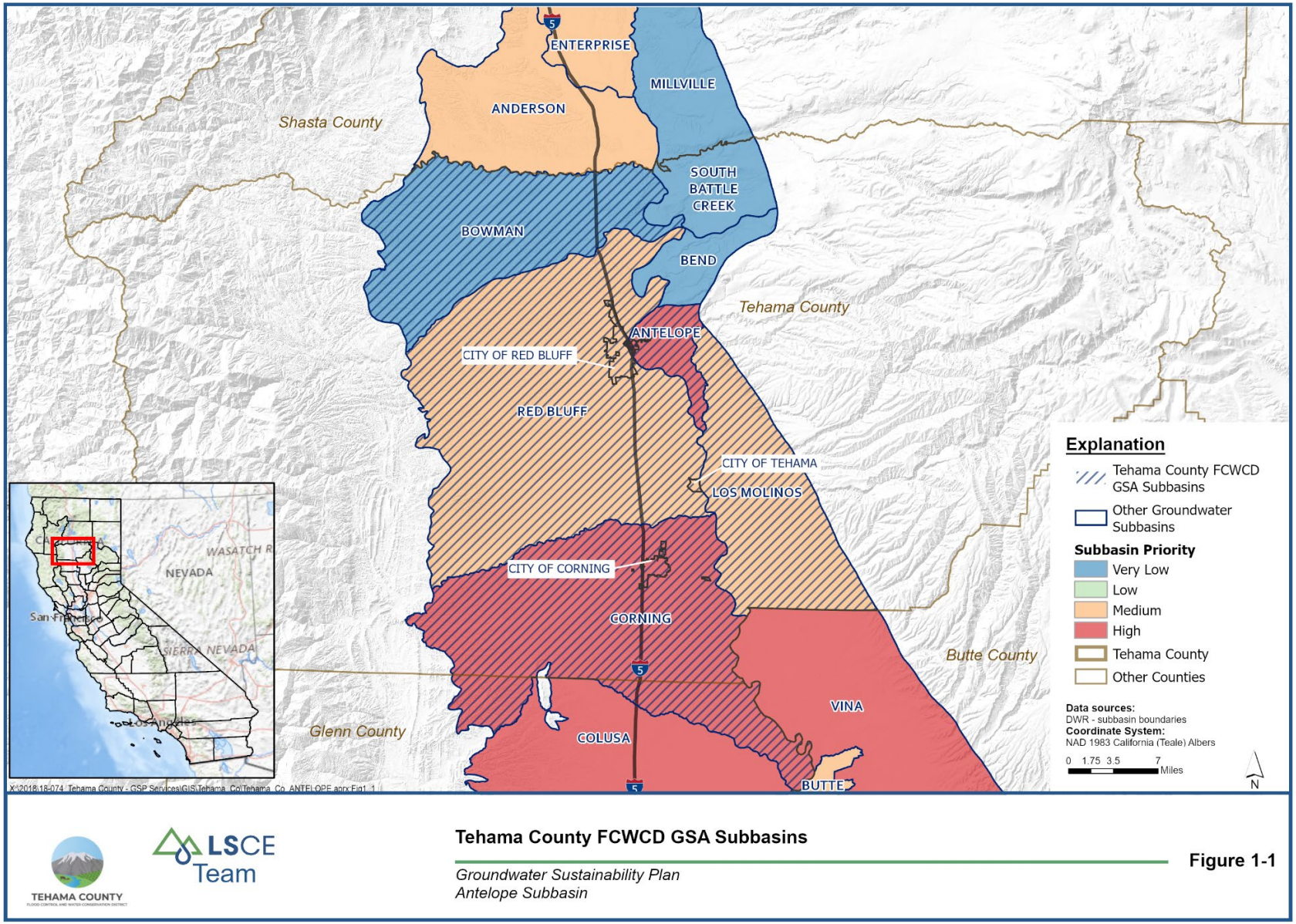
Groundwater serves as an important source of supply for agricultural, municipal, domestic, environmental, and industrial beneficial uses throughout Tehama County, which underlies approximately 1.9 million acres of the County. Agriculture in Tehama County relies on groundwater to produce an array of commodities that contribute to the agricultural economies of the County. Groundwater also supports the majority of domestic, municipal, and industrial water use in and around the City of Corning, City of Red Bluff, and City of Tehama. Thus, the sustainable management of groundwater in the County is important for long-term prosperity.

The Antelope Subbasin, which is entirely located within Tehama County, is comprised of approximately 19,100 acres, and relies on an average of approximately 12,100 acre-feet (AF) of groundwater annually for agriculture (1991-2019), has been identified by the California Department of Water Resources (DWR) as a high priority subbasin. Under the Sustainable Groundwater Management Act (SGMA) of 2014, high priority subbasins are required to prepare and be managed under a Groundwater Sustainability Plan (GSP, or Plan) by January 31, 2022 (California Water Code (CWC) Section 10720.7(a)(1)) (**Figure 1-1**).

SGMA provides for local control of groundwater resources while requiring sustainable management of these resources. SGMA requires groundwater basins or subbasins to establish governance by forming local Groundwater Sustainability Agencies (GSAs) with the authority to develop, adopt, and implement a GSP. Under this Plan, GSAs must adequately define and monitor groundwater conditions in the Subbasin and establish criteria to maintain or achieve sustainable groundwater management within 20 years of GSP adoption without causing "undesirable results" as defined by SGMA: significant and unreasonable lowering of groundwater levels, loss of groundwater storage and supply, degradation of water quality, land subsidence, and surface water depletion. Sea water intrusion, while a SGMA-defined undesirable result, is not applicable to the Antelope Subbasin.

1.1 Purpose of Groundwater Sustainability Plan

The purpose of this GSP is to optimize groundwater use and groundwater storage in the Antelope Subbasin while meeting the regulatory requirements set forth in the three-bill legislative package, Assembly Bill (AB) 1739 (Dickinson), Senate Bill (SB) 1168 (Pavley), and SB 1319 (Pavley), collectively known as the Sustainable Groundwater Management Act which became effective in California in January 2015 (Water Code §§ et seq). Under SGMA, all high or medium priority groundwater basins or subbasins must form a GSA to represent the subbasin or a portion thereof and submit an adopted GSP to DWR) by January 31, 2022. The Antelope Subbasin (DWR Subbasin No. 5-021.54) of the Sacramento Valley Groundwater Basin was assigned a high priority designation by DWR and is required to submit a GSP. The Tehama County Flood Control and Water Conservation District (Tehama County FCWCD) (District), a local and regional authority, serves as the exclusive GSA for the Antelope Subbasin.


ENTERPRISE
MILLVILLE
ANDERSON
Shasta County
SOUTH BATTLE CREEK
BOWMAN
BEND
Tehama County
ANTELOPE
CITY OF RED BLUFF
RED BLUFF
CITY OF TEHAMA
LOS MOLINOS
CITY OF CORNING
CORNING
Butte County
VINA
COLUSA
Glenn County
BUTTE
Explanation
Tehama County FCWCD GSA Subbasins
Other Groundwater Subbasins
Subbasin Priority
Very Low
Low
Medium
High
Tehama County
Other Counties
Data sources:
DWR - subbasin boundaries
Coordinate System:
NAD 1983 California (Teale) Albers
0 1.75 3.5 7
Miles
N
NEVADA
SIERRA NEVADA
San Francisco
Los Angeles
LSCE Team
TEHAMA COUNTY
Tehama County FCWCD GSA Subbasins
Groundwater Sustainability Plan
Antelope Subbasin
Figure 1-1

There are seven (7) subbasins within Tehama County. The Tehama County FCWCD is the exclusive GSA for six (6) of those subbasins: Antelope, Bend, Bowman, Los Molinos, Red Bluff, and South Battle Creek **(Figure 1-2).** The seventh, the Corning Subbasin, extends into Glenn County, and the GSP for that subbasin is being developed in a coordinated effort between the Tehama County FCWCD and Corning Sub-basin GSA. Both GSAs retain jurisdictional authority over the portion of the Corning Subbasin that is within their county. Of the seven (7) subbasins in the County, the Antelope, Corning, Los Molinos, and Red Bluff Subbasins are designated as medium or high priority and required to submit a GSP in January 2022 **(Figure 1-1).** The Bowman Subbasin was initially designated as medium priority and the District was awarded funding for the Bowman Subbasin under the Proposition 1, Round 2 grant. The District has elected to lead development of a SGMA compliant Plan for the Bowman Subbasin (subsequently, the subbasin's prioritization was changed by DWR to a very low priority) to be submitted in January 2022.

The GSPs for the Antelope, Bowman, Los Molinos, and Red Bluff Subbasins are being developed concurrently, and will be submitted as four (4) separate GSPs. The Corning Subbasin GSP will be submitted in a coordinated effort between the District and the Corning Sub-basin GSA.

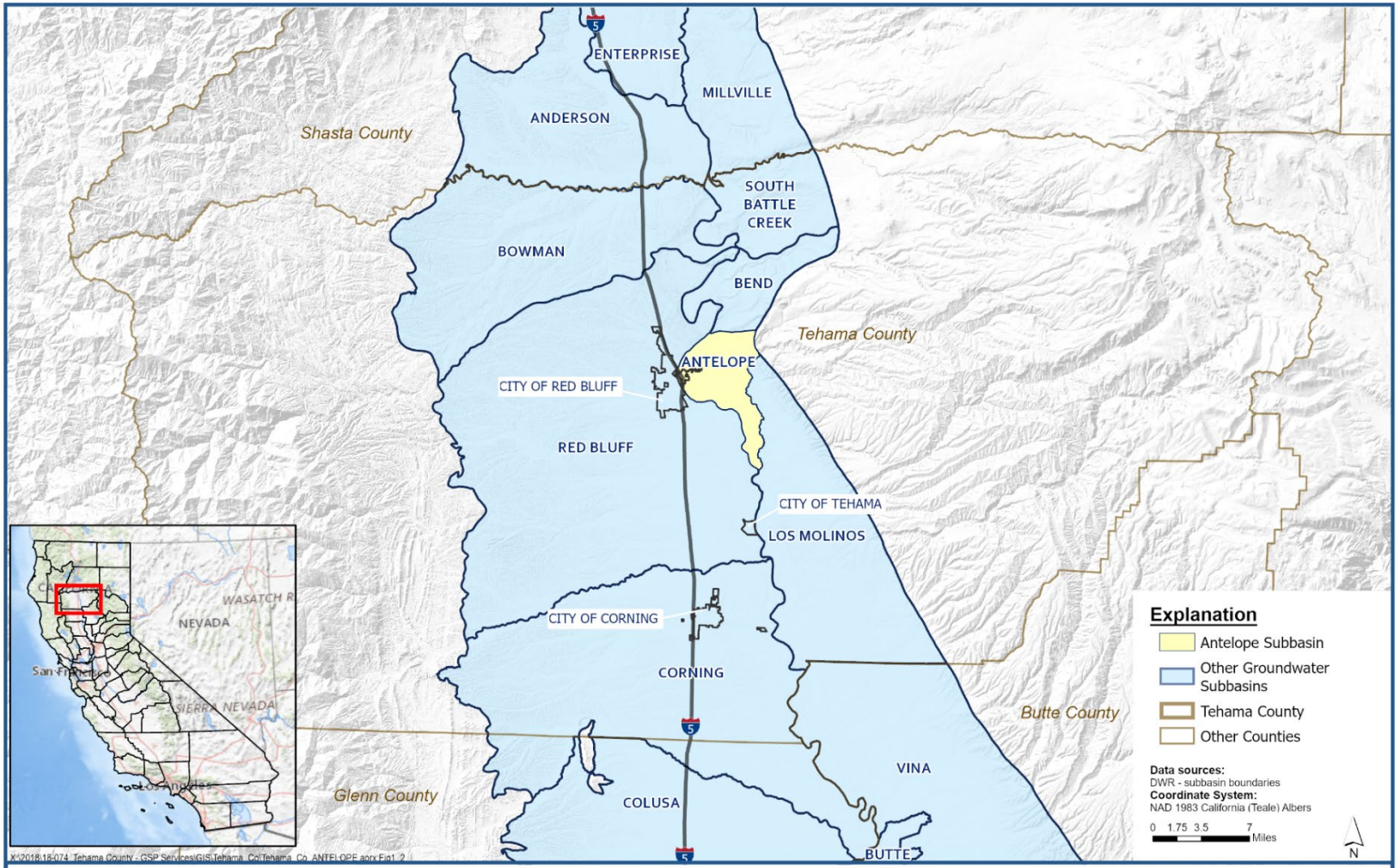
SGMA defines sustainable groundwater management as "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon (50 years from 2022 through 2072) without causing undesirable results" (Water Code, § 10721(v)). Undesirable results, caused by groundwater pumping in the Subbasin, are recognized as:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion
- Significant and unreasonable degraded water quality
- Significant and unreasonable land subsidence
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

Each applicable sustainability indicator will be addressed in this GSP and integrated into subbasin-wide monitoring programs based on existing hydrogeologic conditions and current management practices in the Subbasin. Measurable objectives and minimum thresholds have been set for each sustainability indicator based on an analysis of projected hydrologic conditions simulated by a numerical groundwater flow model. This GSP will be implemented over the next 20 years with the intention of establishing sustainable use of groundwater resources for all beneficial users in the Subbasin.

1.1.1 Justification for Management Area

Management areas are not being incorporated into this GSP for the Antelope Subbasin.



TEHAMA COUNTY

LSCE Team

Antelope Subbasin Vicinity Map

Groundwater Sustainability Plan
Antelope Subbasin

Figure 1-2

1.2 Sustainability Goal

The Tehama County FCWCD will manage groundwater resources responsibly and sustainably in order to maintain acceptable standards and prevent undesirable results, as defined by SGMA, while recognizing the importance of maintaining groundwater supplies and quality for the beneficial users of groundwater within the Subbasin over the 50-year planning and implementation horizon. As mandated under Title 23 of the California Code of Regulations (CCR) Section 354.24, the GSA within the Antelope Subbasin has established a "sustainability goal for the basin that culminates in the absence of significant and unreasonable undesirable results within 20 years of the applicable statutory deadline." Specifically, this sustainability goal establishes that the Antelope Subbasin will be operated within its sustainable yield by 2042, or 20 years following GSP adoption and implementation in January 2022.

SGMA regulations define sustainable yield as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result" (CWC Section 10721(w)). Subbasin sustainable yield must therefore be determined in the context of the complete basin setting, which includes historical, current, and projected conditions regarding groundwater, surface water, and land use.

To achieve the sustainability goal, this GSP details the accounting of the Subbasin's sustainable yield and establishes the sustainable management criteria to guide the District in sustainably managing the groundwater resources in the Subbasin. Monitoring networks, projects, and management actions are proposed to achieve and verify sustainable groundwater use. The GSA will review the progress of the GSP in meeting the sustainability goal during the five-year periodic reviews and update the GSP as needed to ensure the GSP will achieve subbasin sustainability. To facilitate review, **Table 1-1** aligns the regulations with this GSP's corresponding section.

Table 1-1. Sustainability Goal Development and Associated GSP Sections

SUSTAINABILITY GOAL DEVELOPMENT	23 CCR SECTION	REQUIREMENT	GSP SECTION
Context, Basis for Goal	§ 354.12	Basin Setting	2.2
	§ 354.14	Hydrogeologic Conceptual Model	2.2.1
	§ 354.16	Groundwater Conditions	2.2.2
	§ 354.18	Water Budget	2.3
	§ 354.20	Management Areas	2.4
Establishment of Goal	§ 354.24	Sustainability Goal	3.1
	§ 354.26	Undesirable Results	3.4
	§ 354.28	Minimum Thresholds	3.3
	§ 354.30	Measurable Objectives	3.2
Measures of Ensuring Goal Achievement	§ 354.32	Introduction to Monitoring Networks	3.5
	§ 354.34	Monitoring Network	3.5
	§ 354.36	Representative Monitoring	3.6.8
	§ 354.38	Assessment and Improvement of Monitoring Network	3.6.9
	§ 354.44	Projects and Management Actions	4

1.3 Agency Information

The Antelope Subbasin is comprised of 19,091 acres within Tehama County in the northern portion of the Sacramento Valley Groundwater Basin **(Figure 1-2)**. It is bordered by the Bend Subbasin (DWR Basin 5-021.53) to the north, the Los Molinos Subbasin (DWR Basin 5-021.56) to the south and east, and the Red Bluff Subbasin (DWR Basin 5-021.50) to the west. The Tehama County FCWCD was formed in 1957 by the Tehama County Flood Control and Water Conservation District Act and is based in Gerber, California **(Appendix 1-A Act of District Formation)**. Upon formation, the Act defined the area of the District as "all that territory of the County of Tehama lying within the exterior boundaries thereof."

Tehama County FCWCD is responsible for disseminating drought information, levee system management, providing emergency flood information, water resource management, groundwater monitoring, and sustainable groundwater management. The District provides this information and management for public use within the County. Groundwater information maintained and managed by the District includes monitoring wells that are part of the California Statewide Groundwater Elevation Monitoring (CASGEM) program, a Groundwater Management Plan (GWMP), and compliance with SGMA.

1.3.1 Organization and Management Structure of the GSA

The Tehama County FCWCD is governed by a five-member Board of Directors, these five directors are the same five members of the Tehama County Board of Supervisors. The Board of Supervisors members are elected officials within Tehama County, serving 4-year terms. The Tehama County Flood Control and Water Conservation District Board of Directors meetings, which are open to the public, are held the 4th

Wednesday of each month. Meeting agendas and minutes are available on the District's website: https://tehamacountywater.org/.

In June 2016, the District established the Tehama County Groundwater Commission to serve as an advisory commission to the Tehama County Flood Control and Water Conservation District Board of Directors for GSA related matters. The Commission consists of 11 members with one member from each of the following entities:

- City of Corning
- City of Red Bluff
- City of Tehama
- El Camino Irrigation District
- Los Molinos Community Services District
- Rio Alto Water District
- Five at-large members appointed by the Tehama County FCWCD Board of Directors

The five at-large commission members represent each of the five Supervisorial Districts, which include two private pumpers, two surface water agencies or districts, and one at large member within the County and are selected by the Tehama County FCWCD to represent various areas of groundwater interest. These five at-large members initially selected for the Commission had varying term expirations: two members with a one-year term, one member with a two-year term, one member with a three-year term, and one member with a four-year term. Thereafter, all positions are appointed for a term of four years. Members representing cities or districts were selected by their respective agencies and have no term expiration.

Groundwater Commission meetings, which are open to the public, are held the 4th Wednesday of each month, except holidays. Meeting agendas and minutes are available on the Tehama County meeting portal: https://tehamacountywater.org/meetings/groundwater-commission/#meetings.

The GSA Governing Body is the Tehama County FCWCD Board of Directors which has responsibilities that include, but are not limited to, the following:

1. Approve the final GSP and any future amendments, and all GSA ordinances, rules, regulations, and fees.
2. Provide primary responsibility for funding, resources, and staffing
    - Provide staff assistance to Groundwater Commission and Board of Directors throughout GSP development and implementation process
    - Where necessary, provide additional resources from FCWCD's existing funding or grant opportunities pursued by Tehama County FCWCD
    - Apply for and receive grants to fund GSA activities (with the Commission's recommendation), including responsibility for executing and implementing grant contracts and associated requirements
    - Further revenue measures, if any, would be reviewed by the Commission prior to adoption by the Board of Directors

3. Decide on appeals, if any, from decisions of the Groundwater Commission on permits, similar entitlements, and enforcement matters
4. Confirm appointments of the five "Supervisorial District Representative" members of the Groundwater Commission (upon recommendation of the Commission)

The Groundwater Commission's responsibilities include, but are not limited to, the following:

1. Develop GSP and any future amendments, and all GSA ordinances, rules, and regulations, including holding public hearings and making final recommendations to the Board of Directors.
2. Conduct investigations to determine the need for groundwater management, monitor compliance and enforcement, propose, and update fees, and make final recommendations to the Board of Directors.
3. Review all proposed grant applications and advise Board of Directors regarding grant funding opportunities.
4. Issue permits or similar entitlements issued by the GSA e.g., well spacing (with appeal).
5. Make quasi-judicial decisions in GSA enforcement matters (with appeal).
6. Provide recommendations to the Board of Directors for selection of the five (5) representatives from each County Supervisorial District

The AB3030 Technical Advisory Committee (TAC) also provides technical assistance as needed. The TAC provides input on groundwater management in Tehama County based on the District's AB3030 GWMP. The TAC consists of three agricultural pumpers, three water district representatives, one natural resources representative, and one representative each from the City of Corning, the City of Red Bluff, and the City of Tehama.

Contact information for the District's GSP Manager is provided below:

Agency: Tehama County Flood Control and Water Conservation District

Address: 9380 San Benito Avenue

Gerber, CA 96035-9701

Plan Manager: Justin Jenson, Deputy Director of Public Works – Water Resources

Phone: 530-385-1462

Email: jjenson @tcpw.ca.gov

1.3.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin is eligible to become a GSA. A single local agency can decide to become a GSA, or a combination of local agencies can decide to form a GSA by using a joint powers authority, a memorandum of agreement, or other legal agreement (DWR, 2016c). A timeline of the authoritative actions by the District for GSA formation and GSP submission is provided in **Table 1-2** below. GSA formation documents are provided in **Appendix 1-B**.

Table 1-2. GSA Formation Timeline

DATE	EVENT
January 1, 2015	SGMA became effective
June 2, 2015	Public Hearing
November 3, 2015	Public Hearing
August 17, 2015 – December 18, 2015	**Letters of Support** were provided by local Cities and Districts: City of Corning, City of Red Bluff, City of Tehama, El Camino Irrigation District, Gerber Las Flores Community Services District, Los Molinos Community Services District, and Rio Alto Water District
November 3, 2015	**Resolution No. 05-2015 Adopted:** A Resolution of the Board of Directors of the Tehama County Flood Control and Water Conservation District Electing to be the Groundwater Sustainability Agency for all those Portions of the Rosewood, Bowman, South Battle Creek, Red Bluff, Bend, Antelope, Dye Creek, Los Molinos, Corning, Vina, and Colusa Subbasins Located within Tehama County
November 4, 2015	**Notice of Intent** to Become a Groundwater Sustainability Agency for all eleven (11) Groundwater Subbasins located within Tehama County was submitted to DWR
February 11, 2016	**Listing as an Exclusive GSA** for the following Subbasins or portions of Subbasins within Tehama County: Rosewood, Bowman, Red Bluff, Corning, Colusa, Vina, Los Molinos, Dye Creek, Antelope, Bend, and South Battle Creek
February 18, 2016	**Jurisdictional Consolidation** of portion of Colusa Subbasin within Tehama County into the Corning Subbasin
June 7, 2016	**Ordinance 2016-1 Adopted:** An Ordinance of the Tehama County Flood Control and Water Conservation District Board of Directors establishing the Tehama County Groundwater Commission
June 30, 2017	GSA establishment deadline
September 27, 2018*	**Jurisdictional Consolidation** of portion of Vina Subbasin within Tehama County and the Dye Creek Subbasin into the Los Molinos Subbasin
September 27, 2018*	**Jurisdictional Consolidation** of the Rosewood Subbasin into the Bowman Subbasin
September 27, 2018*	**Jurisdictional Consolidation** of portion of Millville Subbasin within Tehama County into the South Battle Creek Subbasin
January 31, 2022	Adopted GSP Due to DWR

*Following the consolidations on September 27, 2018, the number of subbasins in Tehama County was reduced from eleven (11) to seven (7).

1.3.3 Estimated Cost of Implementing the GSP

The GSA is responsible for the finances of GSP implementation, GSA staffing, contracting, and daily operations related to Antelope GSP implementation. The Antelope, Bowman, Los Molinos, and Red Bluff Subbasin GSP development costs were funded through Proposition 1 and 68 grants totaling $2,998,160 (Proposition 1, Round 2 total was $1,498,960 and Proposition 68, Round 3 total was $1,499,200). The grant funding represents the cost of GSP development. Funding for the development of the Corning Subbasin GSP (~$1 million) was awarded to Glenn County under Proposition 1, Round 2.

The GSP implementation estimated annual costs (in current dollars) are estimated to be $470,000 for GSA Administration, Management, and Operations of all five GSPs managed by the Tehama County FCWCD and $104,000 for annual monitoring associated with the Antelope GSP as described in Chapter 5. Plan updates are also expected to cost $300,000 (current dollars) every five years. Estimated annual operations and maintenance (O&M) costs for all Antelope GSP projects and management actions are described in Chapter 4. All costs are preliminary estimates that will be refined by the GSA as the GSP is implemented. The GSA will manage the financing of GSP implementation, GSA staffing, contracting, and daily operations related to Antelope GSP implementation. Additional information is provided in Chapter 5 of this GSP.

1.4 GSP Organization

This GSP is organized according to DWR's "GSP Annotated Outline" for standardized reporting (CA DWR SGMP, 2016d) and DWR's Elements Guide. To facilitate DWR review and assure compliance with all applicable GSP regulations, **Table 1-3** was prepared to cross-reference sections of this GSP to applicable sections and the GSP regulations. Terminology in this GSP has also been used in alignment with the SGMA definitions provided in California Water Code (CWC) Section 10721 and 23 CCR Section 351. These definitions are provided as **Appendix 1-C**. of this GSP. Refer to the Elements Guide in **Appendix 1-D** for a detailed breakdown of the required GSP elements and their locations in this GSP. The structure of the GSP is as follows:

Executive Summary:

Provides a consolidated overview of the GSP.

Chapter 1 - Introduction:

Describes the purpose of the plan, Subbasin sustainability goal, agency formation and contact information, and the organization of the GSP.

Chapter 2 - Subbasin Plan Area and Basin Setting:

Section 1 provides a general overview of the Plan Area including a summary of the jurisdictional areas, relevant water resource monitoring and management programs, description of applicable general plan elements, and GSP notification and communication.

Section 2 describes the hydrogeologic setting of the Subbasin, current and historic groundwater conditions, and provides details on groundwater modeling and the water budget.

Chapter 3 - Sustainable Management Criteria:

Establishes the Subbasin sustainability goal to be achieved. This section also establishes measurable objectives, minimum thresholds, and undesirable results for each sustainability indicator, followed by a description of the proposed monitoring network to track and verify progress toward the Subbasin sustainability goal.

Chapter 4 - Projects and Management Actions:

Describes the programs and management actions the Tehama County FCWCD has determined will achieve the sustainability goal for the Subbasin.

Chapter 5 - Plan Implementation:

Includes an estimate of GSP implementation costs, schedule, and a plan for annual reporting and 5-year updates.

Chapter 6 - References

Table 1-3. Cross Reference of GSP Regulations and Associated GSP Sections

SUBARTICLE	SECTION	PARAGRAPH	REQUIREMENT	GSP SECTION
1. Administrative Information	4. General Information	(a)	Executive summary	Executive Summary
		(b)	List of references and technical studies	6
	6. Agency Information	-	Agency information pursuant to CWC Section 10723.8, along with:	App. 1
		(a)	Agency name and mailing address	1.3
		(b)	Agency organization and management structure, persons with management authority for Plan implementation	1.3.1
		(c)	Plan manager name and contact information	1.3
		(d)	Legal authority of agency	1.3.2
		(e)	Estimate of Plan implementation costs and description of how Agency plans to meet costs	1.3.3, 5.1
	8. Description of Plan Area	(a)	Maps of Plan area	2.1
		(b)	Written description of Plan area	2.1
		(c)-(d)	Identification of existing water resource monitoring and management programs, and description of any such planned programs	2.1.2
		(e)	Description of conjunctive use programs	2.1.2
		(f)	Description of the land use elements or topic categories	2.1.3
		(g)	Description of additional Plan elements (CWC Section 10727.4)	2.1.4
	10. Notice and Communication	(a)	Description of the beneficial uses and users of groundwater in the Subbasin	2.1.5
		(b)	List of public meetings	2.1.5
		(c)	Comments and responses regarding the Plan	2.1.5
		(d)	Description of communication procedures	2.1.5

SUBARTICLE	SECTION	PARAGRAPH	REQUIREMENT	GSP SECTION
2. Basin Setting	12. Introduction to Basin Setting	-	Information about the basin setting (physical setting, characteristics, current conditions, data gaps, uncertainty)	2.2
	14. Hydrogeologic Conceptual Model	(a)	Description of the Subbasin hydrogeologic conceptual model	2.2.1
		(b)	Summary of regional geologic and structural setting, Subbasin boundaries, geologic features, principal aquifers, and aquitards	2.2.1
		(c)	Cross-sections depicting major stratigraphic and structural features	2.2.1
		(d)	Maps of Subbasin physical characteristics	2.2.1
	16. Groundwater Conditions	(a)-(g)	Description of current and historical groundwater conditions including: 1. Groundwater elevation 2. Change in storage 3. Seawater intrusion 4. Groundwater quality issues 5. Land subsidence 6. Interconnected surface water systems 7. Groundwater dependent ecosystems	2.2.2
	17. Water Budget	(a)	Water budget providing total annual volume of groundwater and surface water entering and leaving the Subbasin, including historical, current, and projected water budget conditions, and change in storage	2.3
		(b)-(f)	Development of a numerical groundwater and surface water model to quantify current, historical, and projected: 1. Total surface water entering and leaving by water source type 2. Inflow to the groundwater system by water source type	2.3

SUBARTICLE	SECTION	PARAGRAPH	REQUIREMENT	GSP SECTION
2. Basin Setting			3. Outflows from the groundwater system by water use sector 4. Change in groundwater storage 5. Overdraft over base period 6. Annual supply, demand, and change in storage by water year type. 7. Estimated sustainable yield	
	20. Management Areas	(a)	Description of management areas	2.4
		(b)	Describe purpose, minimum thresholds, measurable objectives, monitoring, analysis	2.4
		(c)	Maps and supplemental information	2.4
3. Sustainable Management Criteria	22. Introduction to Sustainable Management Criteria	-	Criteria by which an Agency defines conditions that constitute sustainable groundwater management for the Subbasin	3
	24. Sustainability Goal	-	Description of Subbasin sustainability goal, including basin setting information used to establish the goal, sustainability indicators, discussion of measures to ensure the Subbasin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved and maintained	3.1
	26. Undesirable Results	(a)	Processes and criteria used to define undesirable results applicable to the Subbasin	3.4
		(b)-(c)	Description of undesirable results, including cause of groundwater conditions and potential effects on beneficial uses and users of groundwater	3.4
	28. Minimum Thresholds	(a)	Establish minimum thresholds to quantify groundwater conditions for each applicable sustainability indicator	3.3

SUBARTICLE	SECTION	PARAGRAPH	REQUIREMENT	GSP SECTION
		(b)-(d)	Describe information and criteria to select, establish, justify, and quantitatively measure minimum thresholds	3.3
	30. Measurable Objectives	(a)-(g)	Establish measurable objectives, including interim milestones in increments of five years, to achieve and maintain the Subbasin sustainability goal	3.2
4. Monitoring Networks	32. Introduction to Monitoring Networks	-	Description of monitoring network, monitoring objectives, monitoring protocols, and data reporting	3.5
	34. Monitoring Network	(a), (e)-(g)	Development of monitoring network to yield representative information about groundwater conditions	3.5.1
		(b)-(d)	Monitoring network objectives	3.5.1
		(h)	Maps and tables of monitoring sites	3.5.1
		(i)	Monitoring protocols	3.6
	36. Representative Monitoring	(a)-(c)	Designation of representative monitoring sites	3.6.8
	38. Assessment and Improvement of Monitoring Network	(a)-(d)	Evaluation of monitoring network, including uncertainty, data gaps, and efforts to fill data gaps	3.6.9
		(e)	Adjustment of monitoring frequency and density to assess management action effectiveness	3.6.9
	40. Reporting Monitoring Data to the Department	(f)	Copy of monitoring data from data management system	
5. Projects and Management Actions	44. Projects and Management Actions	(a)-(c)	Description of projects and management actions to achieve and maintain the Subbasin sustainability goal	4