JANUARY 2022

SAN GORGONIO PASS SUBBASIN

GROUNDWATER SUSTAINABILITY PLAN

PROVOST&PRITCHARD CONSULTING GROUP

INTERA GEOSCIENCE & ENGINEERING SOLUTIONS

LIMITATION

In preparation of this Groundwater Sustainability Plan (Plan), the professional services of Provost & Pritchard consulting group were consistent with generally accepted engineering principles and practices in California at the time the services were performed.

Section 3 of this plan, basin setting, was prepared in general conformance with section 354.12 of the watercode either by and /or under the direct supervision of the appropriate professional as indicated herein.

Regulation Requirements:

§354.12 Introduction to Basin Setting
This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.

Note: Authority cited: Section 10733.2, Water Code.
Reference: Section 10733.2, Water Code.

Signed: 12/30/21

This plan is a work product of the San Gorgonio Pass Groundwater Subbasin and its respective Groundwater Sustainability Agencies' members and associated stakeholders. Judgments leading to conclusions and recommendations were made based on the best available information but are made without a complete knowledge of subsurface geological and hydrogeological conditions. This plan is intended to provide information from readily available published or public sources. We understand that the interpretations and recommendations are for use by the SGPGSA in assisting the GSA in making decisions related to potential water supplies and groundwater management activities in light of California's new and evolving Sustainable Groundwater Management Act (SGMA) Regulations.

Subsurface conditions or variations cannot be known, or entirely accounted for, with certainty in spite of significant study and evaluation. Future surface water and groundwater quantity, quality, and availability cannot be known. Trends have been estimated and projected based upon past historical data and events and are used for planning purposes. It should be noted that historic trends may not be indicative of future outcomes. Historic hydrology has been used to identify averages and potential extremes that may be experienced in future years; however, it will be important for the GSA to continually evaluate all the parameters that make up the agency water budget. Additionally, the rapidly changing regulatory environment surrounding the SGMA and state regulatory agencies may render any or all recommendations invalid in the future if not implemented and necessary approvals, permits, or rights obtained in a timely manner. Information contained in this GSP should not be regarded as a guarantee that only the conditions reported and discussed are present within the SGPGSA or that other conditions may exist which could have a significant effect on groundwater availability.

In developing methods, conclusions, and recommendations, this plan has relied on information that was prepared or provided by others. It is assumed that this information is accurate and correct, unless noted. Changes in existing conditions due to time lapse, natural causes including climate change, operations in adjoining GSAs or subbasins, or future management actions taken by a GSA may deem the conclusions and recommendations inappropriate. No guarantee or warranty, expressed or implied, is made.

Prepared by:

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Acronyms

(AF) Acre-Feet
(AFY) Acre-Feet per Year
(CALSIM) Model used to simulate California State Water Project/Central Valley Project operations
(COB) City of Banning
(CWD) Cabazon Water District
(CFS) Cubic Feet per Second
(Chrome 3) Trivalent Chromium
(Chrome-6) Hexavalent Chromium
(BCVWD) Beaumont Cherry Valley Water District
(BHMWC) Banning Heights Mutual Water Company
(BLM) Bureau of Land Management
(DAC) Disadvantaged Community
(DDW) Division of Drinking Water
(DMM) Demand Management Measures

(DMS) Data Management System
(DWA) Desert Water Agency
(DWA GSA) Desert Water Agency Groundwater Sustainability Agency
(DWR) Department of Water Resources
(EPA) Environmental Protection Agency
(FMMP) Farmland Mapping and Monitoring Program
(Ft) Feet
(GAMA) California Groundwater Ambient Monitoring Assessment
(GDE) Groundwater Dependent Ecosystem
(gpd) Gallons per Day
(GSA) Groundwater Sustainability Agency
(GHB) General head Boundary
(GSP) Groundwater Sustainability Plan
(GPCD) Gallons per Capita per Day
(HCM) Hydrogeological Conceptual Model
(HUC) Hydrologic Unit Code
(IRWM) Integrated Regional Water Management
(IRWMP) Integrated Regional Water Management Program
(ISW) Interconnected Surface Water
(Ksat) Hydraulic Conductivity
(MBMI) Morongo Band of Mission Indians
(MCL) Maximum Contaminant Level
(mgpd) Million Gallons per Day
(MO) Measurable Objective
(MOA) Memorandum of Agreement
(MSL) Mean Sea Level
(MSWD) Mission Springs Water District
(MT) Minimum Threshold
(MYA) Million Years Ago
(NASA) National Aeronautics and Space Administration
(NOI) Notice of Intent
(NRCS) Natural Resources Conservation Service
(SCE) Southern California Edison
(SDAC) Severely Disadvantaged Community
(SDWA) Safe Drinking Water Act
(SGMA) Sustainable Groundwater Management Act
(SGP) San Gorgonio Pass
(SGPGSA) San Gorgonio Pass Groundwater Sustainability Agency
(SGPWM) San Gorgonio Pass Watershed Model
(SMCL) Secondary Maximum Contaminant Level
(SWP) State Water Project
(SWRCB) State Water Resources Control Board
(TDS) Total Dissolved Solids
(TNC) The Nature Conservancy
(TPHg) Total Petroleum Hydrocarbons Gasoline
(USDA) United States Department of Agriculture
(USEPA) United States Environmental Protection Agency
(USFS) United States Forest Service

(USGS) United States Geologic Survey
(USPHS) United States Public Health Service
(UWMP) Urban Water Management Plan
(UZF) Unsaturated Zone Flow
(VGSA) Verbenia Groundwater Sustainability Agency
(WSIP) California Water Commission's Water Storage Investment Program
(WWTF) Wastewater Treatment Facility

Executive Summary

The San Gorgonio Pass Subbasin's (SGP Subbasin) respective Groundwater Sustainability Agencies (GSAs) have prepared a single Groundwater Sustainability Plan (GSP) to comply with the Sustainable Groundwater Management Act (SGMA). The GSAs include San Gorgonio Pass GSA, Verbenia GSA, and Desert Water Agency GSA. The following is a summary of the content and layout of the document.

Chapter 1 - Introduction

On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of AB 1739 (Dickinson), SB 1168 (Pavley), and SB 1319 (Pavley), collectively known as the Sustainable Groundwater Management Act of 2014 (SGMA), which is codified in Section 10720 et seq. of the California Water Code. This legislation created a statutory framework for groundwater management in California that must be achieved during the planning and implementation horizon from 2022 to 2042 for medium priority basins and sustained into the future without causing undesirable results. SGMA requires that the following six sustainability indicators must be considered:

- 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

The GSAs consist of various water agencies and municipalities that participate collaboratively to develop and implement the GSP to maintain sustainability in the SGP Subbasin. The SGP Subbasin includes three areas that are not subjected to SGMA. These include the Beaumont Basin, which is adjudicated, the United States Forest Service (USFS) lands, and the Morongo Band of Mission Indians (MBMI) reservation and trust lands.

The sustainability goal will be met by maintaining balance of water demand with available water supply. Implementation of this GSP is intended to achieve this goal while avoiding significantly or unreasonably impacts to groundwater levels, groundwater storage, water quality, or interconnected surface water.

Chapter 2 - Plan Area

The SGP Subbasin is located in Southern California between the San Bernardino Mountains to the north and the San Jacinto Mountains to the South, Coachella Valley to the East, and San Bernardino Valley to the west. The SGP Subbasin encompasses approximately 35,965 acres, which includes open land, urban, commercial, industrial, and municipal uses. There is a small portion of the

Subbasin in the northern-canyon regions which are within the United States Forest Service's jurisdiction. Of the Subbasin's approximate 35,965 acres, approximately 13,211 acres are within MBMI jurisdiction. **Figure ES 1** depicts the GSAs, adjudicated Beaumont Basin, and tribal lands within the SGP Subbasin.

The agencies and entities within the SGP Subbasin are outlined below:

Federal Lands

- United States Forest Service

Public Water Districts

- Cabazon Water District (CWD)
- Mission Springs Water District (MSWD)
- Desert Water Agency (DWA) – State Water Project Contractor
- San Gorgonio Pass Water Agency (SGPWA) – State Water Project Contractor

Mutual Water Companies (Privately Held Water Stock Companies)

- Banning Heights Mutual Water Company

Municipalities

- City of Banning

Federally Recognized Tribes

- Morongo Band of Mission Indians

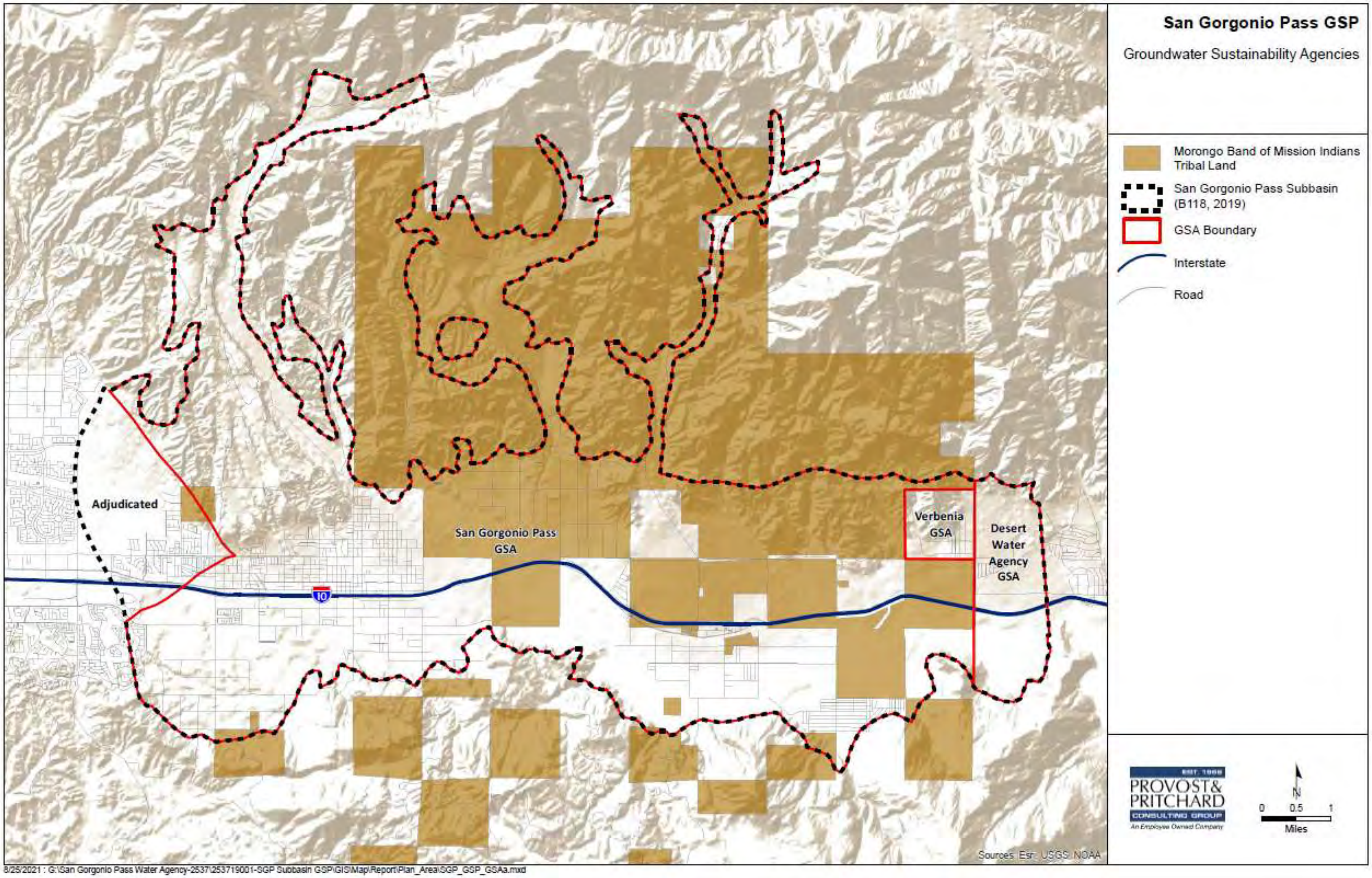

Figure ES 1 GSAs of the SGP Subbasin

Chapter 3 - Basin Setting

Chapter 3 is organized in three primary sections: hydrogeological conceptual model, groundwater conditions, and water budget.

Hydrogeological Conceptual Model/Groundwater Conditions

The Hydrogeological Conceptual Model (HCM) provides a description, based on readily available information, of the general physical characteristics of the regional hydrology, geology, geologic structure, water quality, principal aquifers, and principal aquitards in the basin setting. The SGP Subbasin is an alluvial filled groundwater basin that is bounded to the north by crystalline bedrock of the San Bernardino Mountains and to the south by rocks of the San Jacinto Mountains. Crystalline basement rocks of the San Bernardino and San Jacinto Mountains also define the bottom of the alluvial Subbasin. Alluvial fill thickness ranges from nearly 7,000 feet in a part of the adjudicated Beaumont Storage Unit and thins to zero along the flanks of the valley. Holocene and Pleistocene age alluvium and the Plio-Pleistocene age San Timoteo Formation are the main water bearing deposits within the SGP Subbasin. Several river canyons originate in the San Bernardino Mountains and debauch both water and sediment on to the valley floor portion of the SGP Subbasin. Several of these river canyons and associated alluvial deposits are included in the SGP Subbasin. Groundwater and surface water flows from these mountain canyons are significant sources of recharge to the valley floor portion of the SGP Subbasin. The SGP Subbasin includes the mountain canyons therefore, topographic relief is quite high, ranging from about 5,800 feet msl at the top of Potrero Canyon to about 1,400 feet msl at the eastern end of the SGP Subbasin.

The SGP Subbasin sits in a tectonically active area and the major faults of the San Andreas and the San Gorgonia Pass Fault Zones along with numerous ancillary faults have affected the landscape, and geologic and hydrogeologic evolution of the Subbasin. Some of these faults have demonstrated effects on groundwater flow and have been used, in part, to define several storage units in the SGP Subbasin, as discussed in **Section 3.2**. Groundwater generally flows south from the canyons and then east where a bedrock constriction creates a groundwater cascade into the Indio Subbasin. Surface water features of significance to management of the Subbasin include the numerous streams and creeks from the San Bernardino Mountains, a buried portion of the California State Water Project's (SWP) Colorado River Aqueduct, several manmade ponds and reservoirs, and a canal that brings water into the Subbasin from the Whitewater River.

Groundwater Conditions

The Groundwater Conditions section provides a historic, average, and current description of subsurface hydrology, water quality, and subsidence. The HCM and the Groundwater Conditions lay the foundation for development of water budgets, monitoring networks, and identification of data gaps. As mentioned above the SGP Subbasin is divided into Storage Units generally defined by faults. The storage units include the adjudicated Beaumont, and Banning, Banning Bench, Banning Canyon and the Cabazon which includes Potrero and Millard Canyons. Groundwater conditions vary considerably within the storage units. Groundwater contour maps prepared for the years 1998 and 2019, based on available data, show that groundwater largely originates in the canyons, flows down the canyons and then mainly east towards the Indio Subbasin. Groundwater levels have tended to be stable and recover when they do decrease in the Banning Canyon Storage Unit but have fallen about 100 feet in the Banning and Cabazon Storage Units. The largest quantity of groundwater is pumped in the Banning Canyon Storage Unit for use by downstream users. SGP

Subbasin's groundwater is of generally good quality. Currently, there are no known contaminant plumes that threaten groundwater, and historic contaminant sites are no longer active after successful mitigation. Overall groundwater quality meets public health goals with minimal exceedances of regulatory screening levels. Constituents of concern include nitrate, TDS, hexavalent chromium, arsenic, fluoride, and lead. Groundwater and surface water appear to be seasonally connected in the Banning Canyon Storage Unit but groundwater in the valley floor portion of the Subbasin is too deep to be connected to surface water and it is too deep to support groundwater dependent ecosystems (GDEs). Subsidence and saline water intrusion are not issues in the SGP Subbasin.

Water Budgets

A water budget is an account of all the water that flows into and out of a specified area and describes the various components of the hydrologic cycle (**Figure ES 2**). A water budget includes all the water supplies, demands, modes of groundwater recharge, and non-recoverable losses, making it possible to identify how much water is stored in a system and changes in groundwater storage during a given period.

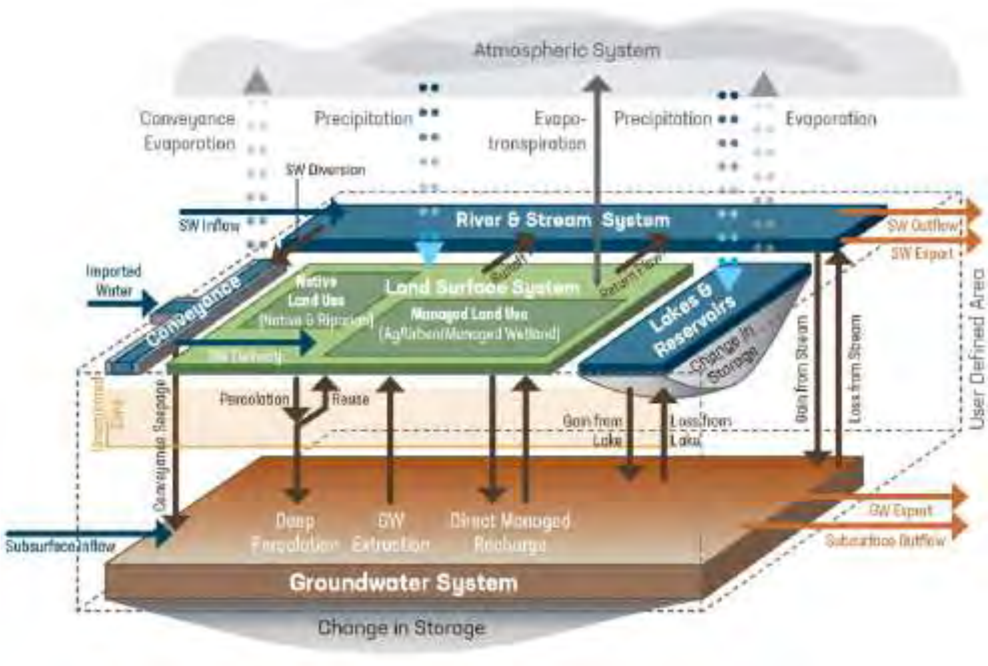

Figure ES 2 DWR Water Budget Graphic

Water budgets were prepared for a historical period (1998-2019), current period (2019), and future periods (2022-2072). The historical water budget covers a hydrologic period based on SGP Subbasin's multi-decade trends; however, the recent historic trends are drier than long-term historic conditions. The future water budgets are based on numerous assumptions related to climate change, population growth, water use, and in one scenario, future project implementation.

Because of the very dry conditions during the historical period, the groundwater storage decline in this period is not representative of average water supply conditions and as described in Section 3.3.10, does not by itself indicate that overdraft conditions are occurring.

Chapter 4 - Sustainable Management Criteria

SGMA defines sustainable groundwater management as the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. The avoidance of undesirable results is important to the success of the GSP. Several requirements from GSP regulations have been grouped together under the heading of Sustainable Management Criteria, including a Sustainability Goal, Undesirable Results, Interim Milestones, Operational Flexibility, Minimum Thresholds, and Measurable Objectives for the various indicators of groundwater conditions shown above. Development of these Sustainable Management Criteria is dependent on basin information developed and presented in HCM, groundwater conditions, and the water budget.

The three GSAs within the SGP Subbasin have been coordinating for several years on how to maintain sustainability and have assigned sustainable management criteria in alignment with historic conditions and projected conditions, without the influence of project benefits.

Chapter 5 - Monitoring Network

This chapter describes previously existing monitoring programs and resources and the representative monitoring network, defined by the GSAs that will collect sufficient data to determine short-term, seasonal, and long-term trends in groundwater conditions.

The GSAs within the SGP Subbasin have established two representative monitoring networks:

> **Representative Groundwater Levels Monitoring Network**: This network serves to monitor conditions related to groundwater levels, groundwater storage, and interconnected surface water in the Subbasin's Banning Canyon.
> **Representative Groundwater Quality Monitoring Network:** This network facilitates analysis of groundwater quality related to the identified constituents of focus, TDS and nitrates.

The data from this representative monitoring network will be reported to DWR and used to support the implementation of the GSP, evaluate the effectiveness of the GSP, monitor for compliance with sustainable management criteria, and aid in decision-making by the GSA and local water agencies.

Chapter 6 - Projects and Management Actions

Projects and management actions may be implemented to avoid undesirable results and maintain groundwater sustainability in the SGP Subbasin. The possibility of project implementation is contingent on funding support and management actions will be explored as needed.

Six projects have been identified in the SGP Subbasin that would improve groundwater conditions. The identified projects are listed below. Phases indicated in the project title correspond with their respective phase in the project development lifetime.

- Project #1: Municipal Water Conservation (Phase 1)
- Project #2: Stormwater Capture (Phase 2)
- Project #3: Additional Imported Water Spreading at Noble Creek Spreading Basins (Phase 2)
- Project #4: New Pipeline with Additional Imported Water Spreading in the Cabazon Storage Unit (Phase 2)

- Project #5: New Pipeline with Additional Imported Water Spreading in the Banning Storage Unit (Phase 2)
- Project #6: New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit (Phase 2)

Several management actions have been identified for the SGP Subbasin that may support GSP implementation efforts. The identified management actions include the following:

- Management Action #1: Implement Action Plan if Groundwater Levels Fall Below Minimum Thresholds
- Management Action #2: Well Head Requirements
- Management Action #3: Investigate Issues Promptly Regarding Water Quality and Unexpected Water Pumping
- Management Action #4: Impose SGMA or Other Available Fees on Pumpers to Encourage Reduced Pumping and Conservation
- Management Action #5: Groundwater Pumping Allocation
- Management Action #6: Groundwater Basin Adjudication

Chapter 7 - Plan Implementation

The adoption of the GSP will be the official start of the Plan Implementation. The GSAs will continue their efforts to secure necessary funding to successfully monitor and manage groundwater resources within the SGP Subbasin in a sustainable manner. While the GSP is being reviewed by DWR, the GSA will coordinate with various stakeholders and beneficial users to begin implementing the GSP and identify ways to improve the future GSP Updates.

Costs to implement, report annually, monitor, and update the GSP were estimated conservatively. Funding for projects and management actions will be through assessments and grant funds when available. The majority of the projects are conceptual. As projects are developed during the implementation period, costs will be refined. The schedules and estimates presented in the GSP are initial estimates and will likely change as the plan is implemented and periodically evaluated.

Successful implementation of this GSP over the planning and implementation horizon (2022-2042) will require ongoing efforts to engage stakeholders and the general public in the sustainability process, communicating the statutory requirement, the objectives of the GSP, and progress in maintaining the sustainability goal. The GSAs will report the result of sustainable management criteria analysis through results of representative monitoring including annual groundwater levels, extraction volume, surface water use, total water use, groundwater storage change, and progress of GSP implementation to the public and DWR on an annual basin. The GSAs have developed a Data Management System to help store and evaluate groundwater related data. In addition, the GSAs will continue to update information and have the opportunity to amend the GSP at least every five years. The update will include the results of the Subbasin operations and progress in achieving sustainability including current groundwater conditions, status of projects or management actions, evaluation of undesirable results relating to measurable objectives and minimum thresholds, changes in monitoring networks, summary of enforcement or legal actions, and agency coordination efforts to the public and DWR.

1 Introduction

1.1 Purpose of Groundwater Sustainability Plan

On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of AB 1739 (Dickinson), SB 1168 (Pavley), and SB 1319 (Pavley), collectively known as the Sustainable Groundwater Management Act of 2014 (SGMA), which is codified in Section 10720 et seq. of the California Water Code. This legislation created a statutory framework for groundwater management in California that must be achieved during the planning and implementation horizon and sustained into the future without causing undesirable results. SGMA requires that the following six sustainability indicators must be considered (**Figure 1-1**).

Figure 1-1 Sustainability Indicators

SGMA requires governments and GSAs of high and medium priority groundwater basins to establish sustainability and to ensure the subbasin will be operable without causing significant and unreasonable undesirable results related to the six sustainability indicators. Under SGMA, these basins should reach sustainability within 20 years of implementing their sustainability plans. For medium priority basins, including the San Gorgonio Pass Groundwater Subbasin (SGP Subbasin or Subbasin), the deadline for achieving sustainability is 2042.

In his signing statement, Governor Brown emphasized that "groundwater management in California is best accomplished locally." The GSAs within the SGP Subbasin, are cooperatively working to maintain basin-wide sustainability. The feasibility of maintaining sustainability within the SGP Subbasin is improved with ongoing financial and technical assistance from the Department of Water Resources.

1.2 Sustainability Goal

The GSAs of the SGP Subbasin include Desert Water Agency GSA (DWAGSA), San Gorgonio Pass GSA (SGPGSA), and Verbenia GSA (VGSA). The sustainability goal of the GSAs is to ensure that the subbasin will be managed sustainably through the implementation period. In doing so, the SGP Subbasin will be managed in a sustainable manner to maintain a reliable water supply for current and future beneficial uses and users of groundwater in the subbasin, including land uses and property interests potentially affected by the use of groundwater, without experiencing undesirable results. This goal will be met by balancing water demand with available water supply, meeting the sustainability criteria for groundwater levels, groundwater storage, groundwater quality, or interconnected surface water, and avoiding significant or unreasonable impacts to beneficial uses and users of groundwater. Subsidence and seawater intrusion are not applicable sustainability indicators because the conditions that induce either are not present in the SGP Subbasin. More information is available in **Chapter 4 - Sustainable Management Criteria**.

The SGP Subbasin, identified by the Department of Water Resources (DWR) as groundwater Subbasin Number 7-021.04, is located within the Colorado River Hydrologic Region, Coachella Valley Groundwater Basin. The 2014 CASGEM Basin Prioritization classified basins as high, medium, low and very low. SGMA requires that groundwater basins in California's medium and high priority be managed in accordance with GSPs or Alternate plans. In 2018, DWR completed and released the final Basin Prioritization as required by the Water Code., the State identified the SGP Subbasin as a "medium priority" subbasin. **Chapter 3 – Basin Setting** of this Groundwater Sustainability Plan (GSP) discusses the hydrogeologic setting, groundwater conditions, and water budget.

While the SGP Subbasin experienced a decline of a portion of its stored groundwater in the recent prolonged drought period, the aquifers within the SGP Subbasin contain a substantial amount of water in storage. This extensive storage volume has lessened the effects of water level declines during the hydrologic cycle's extended drought periods, providing a buffer against extreme fluctuations in recharge supplies that are dependent on rainfall and mountain runoff each year. More information on the hydrologic cycle of the subbasin is available in **Chapter 3 – Basin Setting**.

The GSAs in the Subbasin are to collaborate to manage the aquifer to ensure the sustainability of groundwater resources for beneficial uses in the subbasin. This coordination can be most effective when there is collaboration between the GSAs' member agencies, SGP groundwater beneficial users, adjacent Subbasins, and the Morongo Band of Mission Indians (MBMI or Tribe). MBMI is a federally recognized tribe, which means the Tribe is not subject to SGMA. However, MBMI is an active participant in the San Gorgonio Pass GSP Working Group and has provided feedback and support in the development of the GSP and intended implementation. MBMI's jurisdiction covers approximately 37-percent of the SGP Subbasin's acreage. MBMI has an interest in groundwater sustainability as the Tribe produces groundwater to support the commercial, domestic, industrial, irrigation, and municipal uses, including the Morongo Casino, Resort, and Spa, located along Interstate 10 in Cabazon, California and the Arrowhead Water Bottling Plant.

Collaboration between all beneficial users will be important as the GSAs aim to secure funding and local support to implement projects and management actions to sustain the general groundwater conditions within the SGP Subbasin. Sustaining groundwater conditions is defined as managing groundwater levels to avoid significant and unreasonable impacts to applicable sustainability indicators. The variability in natural recharge supplies, in contrast to the comparatively steady nature of water demands, makes it infeasible to achieve balance every year.

It is anticipated, there will be years where the SGP Subbasin area will increase groundwater storage and other years where the groundwater storage declines, but groundwater storage is projected to continue at stable long-term conditions within the SGP Subbasin. More information on this is available in **Section 3.3**.

Projects that can support water security, drought resilience, and adaptability to climate change by increasing the artificial groundwater recharge or increasing surface water supplies, as well as implementation of management actions, are identified in **Chapter 6– Projects and Management Actions.** The goal of the Subbasin is to maintain the trend of cyclical water table variations that provide long-term groundwater storage, with the understanding that water levels will fluctuate based on the season, hydrologic cycle, and changing groundwater demands within the subbasin.

In order to accomplish this overarching goal, this plan identifies undesirable results, which are outcomes that could occur should the plan not be effectively implemented, or the plan's strategies are not effective. Undesirable results occur when specific minimum thresholds are exceeded. Sustainable outcomes identified in this GSP may take time to achieve; however, the Subbasin's priority is to maintain sustainable groundwater conditions throughout a multi-decade hydrologic cycle. In addition to the minimum thresholds, measurable objectives, called interim milestones, have been defined to gauge progress during the intervening years to assure that the groundwater levels are within a reasonable range of the projected groundwater levels and, therefore, in alignment with achieving the sustainability goal.

Undesirable results, minimum thresholds, and measurable objectives to meet the sustainability goal of the SGP Subbasin and this GSP are all defined and discussed in detail in **Chapter 4 – Sustainable Management Criteria**.

1.3 Coordination Agreements

Coordination agreements are required if more than one GSP is submitted within a groundwater basin. The SGP Subbasin is home to three GSAs, all of whom are involved in the preparation of a single GSP. Therefore, the SGP Subbasin GSAs are not required to develop a Coordination Agreement. Despite this, the GSAs entered into a cooperative Memorandum of Agreement for development of the GSP and grant funding, which is included as **Appendix A – Memorandum of Agreement (MOA).**

1.4 Inter-basin Agreements

There are no written agreements between the SGP Subbasin and the adjudicated Beaumont Basin to the west and the Indio Subbasin to the east. Rather, the GSAs have coordinated directly with those neighboring subbasins and GSAs. Various coordination meetings have occurred between the consultant teams of the SGP Subbasin and the Beaumont Basin and Indio Subbasin to discuss estimates in projected pumping volumes, boundary flows, and other hydrogeologic estimations.

1.5 Agency Information

Regulation Requirements:

§354.6(a) The name and mailing address of the Agency

San Gorgonio Pass Subbasin
1210 Beaumont Ave.
Beaumont, CA 92223
Phone (951) 845-2577
Contact: Lance Eckhart, San Gorgonio Pass Subbasin Plan Manager

1.5.1 Organization and Management Structure of the GSAs

Regulation Requirements:

§354.6(b) The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.
§354.6(c) The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.

The SGP Subbasin includes diverse areas including commercial, industrial, municipal, and residential development; open (undeveloped) lands; and places that have been designated by the State of California as Disadvantaged Communities disproportionately impacted by environmental and socioeconomic burdens. The area is a mix of public agencies, private mutual water companies, federally recognized tribal territory, and non-districted (white area) lands. The Subbasin, which is located in Riverside County, is governed by three GSAs and their respective member agency representatives, as detailed below.

Desert Water Agency GSA Representative

Mark Krause
Desert Water Agency
1200 S Gene Autry Trl.
Palm Springs, CA 92264
(760) 323-4971

San Gorgonio Pass GSA Representatives

Larry Ellis
Banning Heights Mutual Water Company
7091 Bluff St.
Banning, CA 92220
(951) 849-2540

Calvin Louie
Cabazon Water District
14618 Broadway St.
Cabazon, CA 92230
(951) 849-4442

Arturo Vela
City of Banning
99 E. Ramsey St.

Banning, CA 92220
(951) 922-3260

Lance Eckhart
San Gorgonio Pass Water Agency
1210 Beaumont Ave.
Beaumont, CA 92223
Phone (951) 845-2577

Verbenia GSA Representative

Arden Wallum
Mission Springs Water District
66575 2nd St.
Desert Hot Springs, CA 92240
(760) 329-6448

Lance Eckhart
San Gorgonio Pass Water Agency
1210 Beaumont Ave.
Beaumont, CA 92223
Phone (951) 845-2577

Technical Consultant Representatives:

Terry Erlewine
Provost & Pritchard Consulting Group, Inc.
455 W. Fir Ave.
Clovis, CA 93611
Phone (559) 449-2700

Abishek Singh
Intera Incorporated
3838 W. Carson St. #380
Torrance, CA 90503
Phone (424) 275-4055

SGP Subbasin Plan Manager:

Lance Eckhart
San Gorgonio Pass Subbasin Plan Manager
1210 Beaumont Ave.
Beaumont, CA 92223
Fresno, CA 93725
Phone (951) 845-2577

1.5.2 Legal Authority of the GSA

Regulation Requirements:

§354.6(d) The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the plan.

The legislation requires GSAs to develop and implement a Groundwater Sustainability Plan to achieve groundwater sustainability management within the territory of the Agency in compliance with the mandates and timelines in SGMA.

While there are a number of small public and private water purveyors and agencies throughout the territory of the Subbasin, these entities do not have sufficient staff or resources to otherwise form a GSA, and these entities have agreed that the interests of the area are best served by having three individual GSAs dedicated to management of groundwater resources within the Subbasin. Accordingly, the GSAs are the exclusive local agencies within their respective designated areas with powers to comply with SGMA.

In Water Code Appendix Section 143-801, the GSA enabling act provides that, pursuant to Chapter 8 of Part 2.74 of Division 6 of the Water Code, the GSA may impose a variety of fees as it may determine to be necessary, including, but not limited to, permit fees and fees on groundwater extraction or other regulated activities. These fees would fund the costs of a groundwater sustainability program, including, but not limited to, preparation, adoption, and amendment of a GSP and investigations, inspections, compliance assistance, enforcement, and program administration during implementation of the GSP, including a prudent reserve. These fees are discussed further below.

1.5.3 Cost of Plan Implementation and Sources of Revenue

Regulation Requirements:

§354.6(e) An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.

In 2019, the Subbasin's GSAs developed a Memorandum of Agreement (MOA) included as **Appendix A - MOA** that set forth a multi-year budget within the Subbasin's awarded grant budget to cover costs for GSA administration, GSP preparation, and initial implementation of the GSP for the GSAs.

During the implementation phase, the GSAs will consider options for funding projects in addition to potential grant funding, including loans and bonds. Other sources of funding will be considered and may be implemented in the future to meet the annual estimated costs of implementing the GSP that are discussed in **Chapter 7 – Plan Implementation**.

1.6 GSP Organization and Preparation Checklist

The GSP is organized in accordance with the SGMA Regulations in a format similar to the outline provided by DWR.

- **Executive Summary** provides a summary of what will be included in the GSP.
- **Chapter 1** describes the Introduction, including purpose of the GSP, sustainability goal, agency information, and GSP organization.

- **Chapter 2** describes the Plan area, including geographic setting, existing water resources planning and programs, relationship of the GSP to other general plan documents within the Agency boundary and additional GSP components.
- **Chapter 3** serves as a scientific primer and describes the Basin Setting and includes three parts: (3.1) Hydrogeologic Conceptual Model, (3.2) Groundwater Conditions, and (3.3) Water Budget.
- **Chapter 4** sets forth the GSAs' adopted sustainability goals, addresses the mandated Undesirable Results, defines Minimum Thresholds for each Undesirable Result, and sets Measurable Objectives for both intermediate plan years (Interim Milestones) and for the Plan's complete implementation.
- **Chapter 5** describes the network of monitoring wells and other facilities adopted by the Agency to measure GSP outcomes. The chapter assesses the need for improvements to the network in order to provide fully representative data, including identification of data gaps. Monitoring protocols and data analysis techniques are also addressed.
- **Chapter 6** lists and describes each project and management action that will be evaluated and may be adopted by the GSAs in pursuit of sustainability. The section includes such project details as required permits, anticipated benefits, and project capital and operations/maintenance costs, along with management actions that may be implemented.
- **Chapter 7** describes the GSP implementation process, including estimated costs, sources of funding, an overall preliminary schedule through full implementation, description of the required data management system, methodology for annual reporting, and how progress evaluations will be made over time.
- **Chapter 8** summarizes the references and sources used to prepare and document this GSP.

A checklist detailing where each regulation is addressed in the GSP is presented in **Table 1-1**.

Table 1-1 Preparation Checklist for GSP Submittal

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 3. Technical and Reporting Standards				
352.2		Monitoring Protocols	• Monitoring protocols adopted by the GSA for data collection and management • Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin	Section 5.2 – Section 5.8
Article 5. Plan Contents, Subarticle 1. Administrative Information				
354.4		General Information	• Executive Summary • List of references and technical studies	Section 0 *(pages ES-1 – ES-7)* Section 8
354.6		Agency Information	• GSA mailing address • Organization and management structure • Contact information of Plan Manager • Legal authority of GSA • Estimate of implementation costs	Section 1.1 – Section 1.4 Section 7.1 – 7.2
354.8(a)	10727.2(a)(4)	Map(s)	• Area covered by GSP (**Figure 2-2**) • Adjudicated areas, other agencies within the basin, and areas covered by an Alternative (**Figure 2-2**) • Jurisdictional boundaries of Federal or State land **(Figure 2-3)** • Existing land use designations (**Figures 2-5, 2-6, 2-7**) • Density of wells per square mile (**Figure 2-8**)	Section 2.1

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 1. Administrative Information (Continued)				
354.8(b)		Description of the Plan Area	• Summary of jurisdictional areas and other features	Section 2.1
354.8(c) 354.8(d) 354.8(e)	10727.2(g)	Water Resource Monitoring and Management Programs	• Description of water resources monitoring and management programs • Description of how the monitoring networks of those plans will be incorporated into the GSP • Description of how those plans may limit operational flexibility in the basin • Description of conjunctive use programs	Section 2.2 Section 4.3-Section 4.4 Section 5.1 Section 5.7
354.8(f)	10727.2(g)	Land Use Elements or Topic Categories of Applicable General Plans	• Summary of general plans and other land use plans • Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects • Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans • Summary of the process for permitting new or replacement wells in the basin • Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management	Section 2.3 Section 6.2 – Section 6.3 Section 7.3

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 1. Administrative Information (Continued)				
354.8(g)	10727.4	Additional GSP Contents	**Description of Actions related to:** • Control of saline water intrusion • Wellhead protection • Migration of contaminated groundwater • Well abandonment and well destruction program • Replenishment of groundwater extractions • Conjunctive use and underground storage • Well construction policies • Addressing groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects • Efficient water management practices • Relationships with State and Federal regulatory agencies • Review of land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity • Impacts on groundwater dependent ecosystems	Section 2.4 Section 3.2
354.10		Notice and Communication	• Description of beneficial uses and users • List of public meetings • GSP comments and responses • Decision-making process • Public engagement • Encouraging active involvement • Informing the public on GSP implementation progress	Appendix B Appendix C Appendix F Section 2.5

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 2. Basin Setting				
354.14		Hydrogeologic Conceptual Model	• Description of the Hydrogeologic Conceptual Model • Two scaled cross-sections • Map(s) of physical characteristics: topographic information, surficial geology, soil characteristics, surface water bodies, source and point of delivery for imported water supplies	Section 2.3
354.14(c)(4)	10727.2(a)(5)	Map of Recharge Areas	• Map delineating existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas	Figure 3-15
	10727.2(d)(4)	Recharge Areas	• Description of how recharge areas identified in the plan substantially contribute to the replenishment of the basin	Section 3.1
354.16	10727.2(a)(1) 10727.2(a)(2)	Current and Historical Groundwater Conditions	• Groundwater elevation data • Estimate of groundwater storage • Seawater intrusion conditions • Groundwater quality issues • Land subsidence conditions • Identification of interconnected surface water systems • Identification of groundwater-dependent ecosystems	Section 3.2
354.18	10727.2(a)(3)	Water Budget Information	• Description of inflows, outflows, and change in storage • Quantification of overdraft • Estimate of sustainable yield • Quantification of current, historical, and projected water budgets	Section 3.3
	10727.2(d)(5)	Surface Water Supply	• Description of surface water supply used or available for use for groundwater recharge or in-lieu use	Section 3.1

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 2. Basin Setting (Continued)				
354.20		Management Areas	• Reason for creation of each management area • Minimum thresholds and measurable objectives for each management area • Level of monitoring and analysis • Explanation of how management of management areas will not cause undesirable results outside the management area • Description of management areas	Section 2. Section 4.2 – Section 4.6 Section 5.1 – Section 5.6
Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria				
354.24		Sustainability Goal	• Description of the sustainability goal	Section 4.1
354.26		Undesirable Results	• Description of undesirable results • Cause of groundwater conditions that would lead to undesirable results • Criteria used to define undesirable results for each sustainability indicator • Potential effects of undesirable results on beneficial uses and users of groundwater	Section 4.2
354.28	10727.2(d)(1) 10727.2(d)(2)	Minimum Thresholds	• Description of each minimum threshold and how they were established for each sustainability indicator • Relationship for each sustainability indicator • Description of how selection of the minimum threshold may affect beneficial uses and users of groundwater • Standards related to sustainability indicators • How each minimum threshold will be quantitatively measured	Section 4.3

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria (Continued)				
354.30	10727.2(b)(1) 10727.2(b)(2) 10727.2(d)(1) 10727.2(d)(2)	Measurable Objectives	• Description of establishment of the measurable objectives for each sustainability indicator • Description of how a reasonable margin of safety was established for each measurable objective • Description of a reasonable path to achieve and maintain the sustainability goal, including a description of interim milestones	Section 4.4
Article 5. Plan Contents, Subarticle 4. Monitoring Networks				
354.34	10727.2(d)(1) 10727.2(d)(2) 10727.2(e) 10727.2(f)	Monitoring Networks	• Description of monitoring network • Description of monitoring network objectives • Description of how the monitoring network is designed to: demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features; estimate the change in annual groundwater in storage; monitor seawater intrusion; determine groundwater quality trends; identify the rate and extent of land subsidence; and calculate depletions of surface water caused by groundwater extractions • Description of how the monitoring network provides adequate coverage of Sustainability Indicators • Density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends • Scientific rationale (or reason) for site selection • Consistency with data and reporting standards • Corresponding sustainability indicator, minimum threshold, measurable objective, and interim milestone	Section 5.1 – Section 5.7 Section 4.3 – Section 4.7

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
			(Monitoring Networks Continued) • Location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used • Description of technical standards, data collection methods, and other procedures or protocols to ensure comparable data and methodologies	Section 5.1 – Section 5.4
354.36		Representative Monitoring	• Description of representative sites • Demonstration of adequacy of using groundwater elevations as proxy for other sustainability indicators • Adequate evidence demonstrating site reflects general conditions in the area	Section 4.3 Section 5.1 - Section 5.4
354.38		Assessment and Improvement of Monitoring Network	• Review and evaluation of the monitoring network • Identification and description of data gaps • Description of steps to fill data gaps • Description of monitoring frequency and density of sites	Section 5.2 – Section 5.7

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 5. Projects and Management Actions				
354.44			• Description of projects and management actions that will help achieve the basin's sustainability goal • Measurable objective that is expected to benefit from each project and management action • Circumstances for implementation • Public noticing • Permitting and regulatory process • Timetable for initiation and completion, and the accrual of expected benefits • Expected benefits and how they will be evaluated • How the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included. • Legal authority required • Estimated costs and plans to meet those costs • Management of groundwater extractions and recharge	Appendix E Section 6.2 – Section 6.3
354.44(b)(2)	10727.2(d)(3)		• Overdraft mitigation projects and management actions	Appendix E Section 6.2 – Section 6.3

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 8. Interagency Agreements				
357.4	10727.6	Coordination Agreements - Shall be submitted to the Department together with the GSPs for the basin and, if approved, shall become part of the GSP for each participating Agency.	**Coordination Agreements shall describe the following:** • A point of contact • Responsibilities of each Agency • Procedures for the timely exchange of information between Agencies • Procedures for resolving conflicts between Agencies • How the Agencies have used the same data and methodologies to coordinate GSPs • How the GSPs implemented together satisfy the requirements of SGMA • Process for submitting all Plans, Plan amendments, supporting information, all monitoring data and other pertinent information, along with annual reports and periodic evaluations • A coordinated data management system for the basin • Coordination agreements shall identify adjudicated areas within the basin, and any local agencies that have adopted an Alternative that has been accepted by the Department	Section 1.3

2 Plan Area

Regulation Requirements:

§354.8 Each Plan shall include a description of the geographic areas covered, including the following information:
(a) One or more maps of the basin that depict the following, as applicable:
(1) The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.
(2) Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.
(3) Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.
(4) Existing land use designations and the identification of water use sector and water source type.
(5) The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the department, as specified in section 353.2, or best available information.
§354.8(b) A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.

2.1 Plan Area and Jurisdictional Boundary

The San Gorgonio Pass Subbasin (SGP Subbasin, Basin, or Plan Area) is located in Southern California between the San Bernardino Mountains to the north and San Jacinto Mountains to the south, Coachella Valley to the east and San Bernardino Valley to the west (**Figure 2-1**). The SGP Subbasin is bounded by the San Timoteo Groundwater Subbasin to the west and Indio Subbasin (covered by a SGMA Alternative Plan) to the east (**Figure 2-1**).

The Groundwater Sustainability Plan (GSP) area (Plan Area) includes the SGPGSA, VGSA, and the DWA GSA (**Table 2-1**). The three GSAs have cooperatively worked together to coordinate GSP development. The SGP Subbasin includes an adjudicated area, known as the Beaumont Basin, that resides outside the Plan Area and is not subjected to GSP regulations. **Figure 2-2** depicts the adjudicated area and the Plan Area that make up the SGP Subbasin.

The Plan Area additionally includes approximately 13,211 acres of land within the federally recognized Morongo Band of Mission Indians (Morongo Tribe or MBMI) dominion. The Morongo Tribe is not required to comply with SGMA; however, the entire Basin will be evaluated for sustainability, including influences from the Morongo Tribe's groundwater management to the extent that data is available. **Figure 2-2** depicts the GSA participants and MBMI's jurisdictional boundaries, and **Figure 2-3** identifies the member agencies in the SGP Subbasin.

Table 2-1 GSA Acreages

Jurisdiction	Approximate Acres	Percent of SGP Subbasin
Desert Water Agency GSA	1,975	5%
Verbenia GSA	655	2%
San Gorgonio Pass GSA[1]	33,335	93%
San Gorgonio Pass Plan Area	**35,965**	**100%**

[1]The Morongo Band of Mission Indians jurisdiction extends to approximately 13,211 acres (approximately 40-percent) of the SGP GSA area and makes up approximately 37-percent of the total SGP Subbasin acreage.

The San Gorgonio Pass Subbasin is further organized into three separate Management Areas, depicted in **Figure 2-4**. The reasoning behind Management Area assignments is described below:

Management Area 1 – Adjudicated Beaumont Basin

Management Area 1 was defined to cover the portion of the adjudicated Beaumont Basin lying within the San Gorgonio Pass Subbasin. As part of an adjudicated basin, the Beaumont Basin is not required to prepare a GSP and provides separate annual monitoring to DWR. Based on the SGMA provisions for adjudicated basins, the Beaumont Basin portion of the San Gorgonio Pass Subbasin was assigned a separate Management Area.

Management Area 2 – San Gorgonio Pass GSA and Verbenia GSA

Management Area 2, which includes the San Gorgonio Pass Water Agency, City of Banning, Cabazon Water District, Banning Heights Mutual Water Company, Mission Springs Water District, and the MBMI lands, is established as a single Management Area.

Management Area 3 – Desert Water Agency GSA

The Desert Water Agency GSA portion of the San Gorgonio Pass Subbasin is a Management Area in consideration of its unique geologic characteristics and minimal groundwater use.

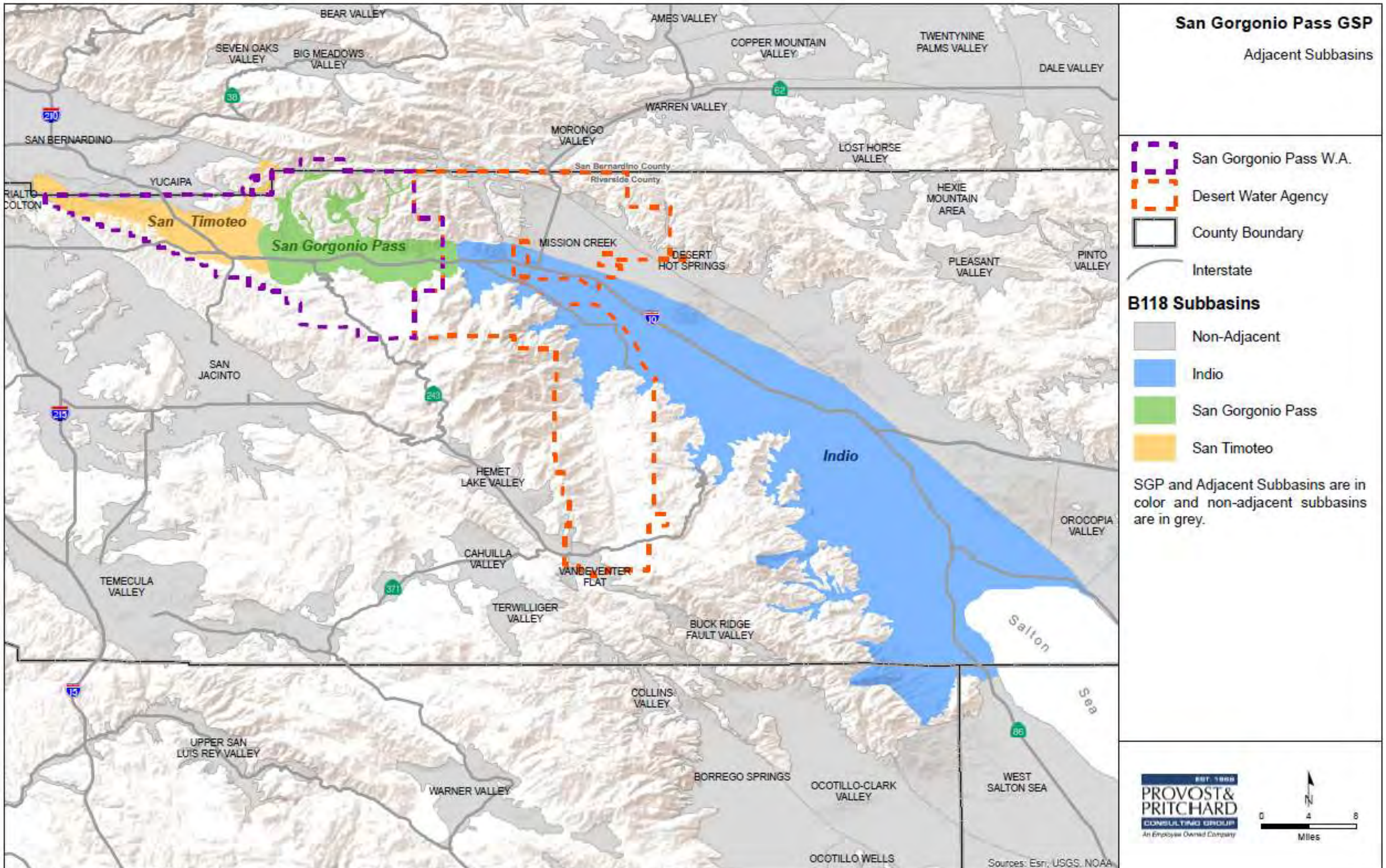

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Figure 2-1 Regional Map

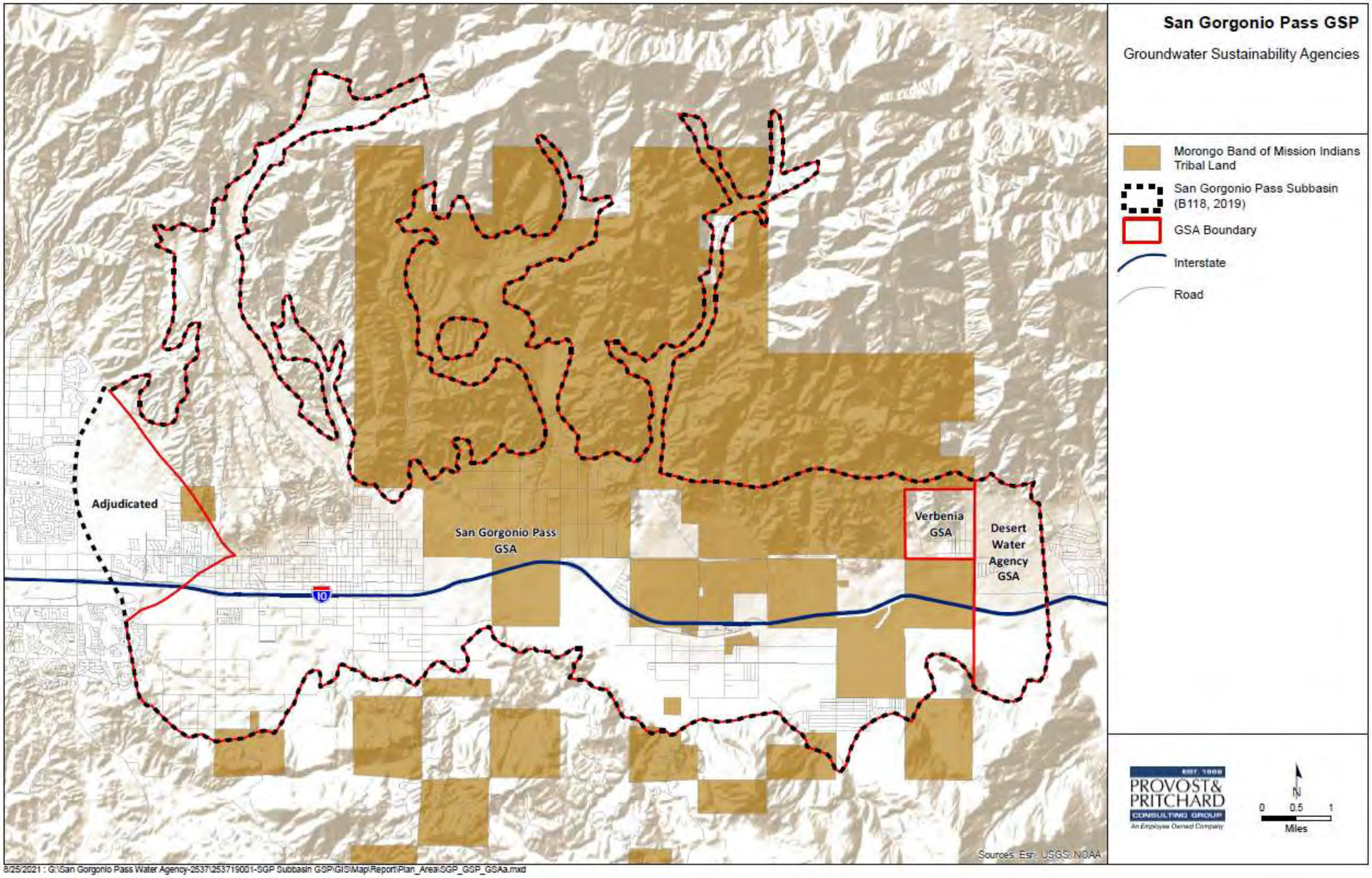

Figure 2-2 Groundwater Sustainability Agencies in the San Gorgonio Pass Subbasin

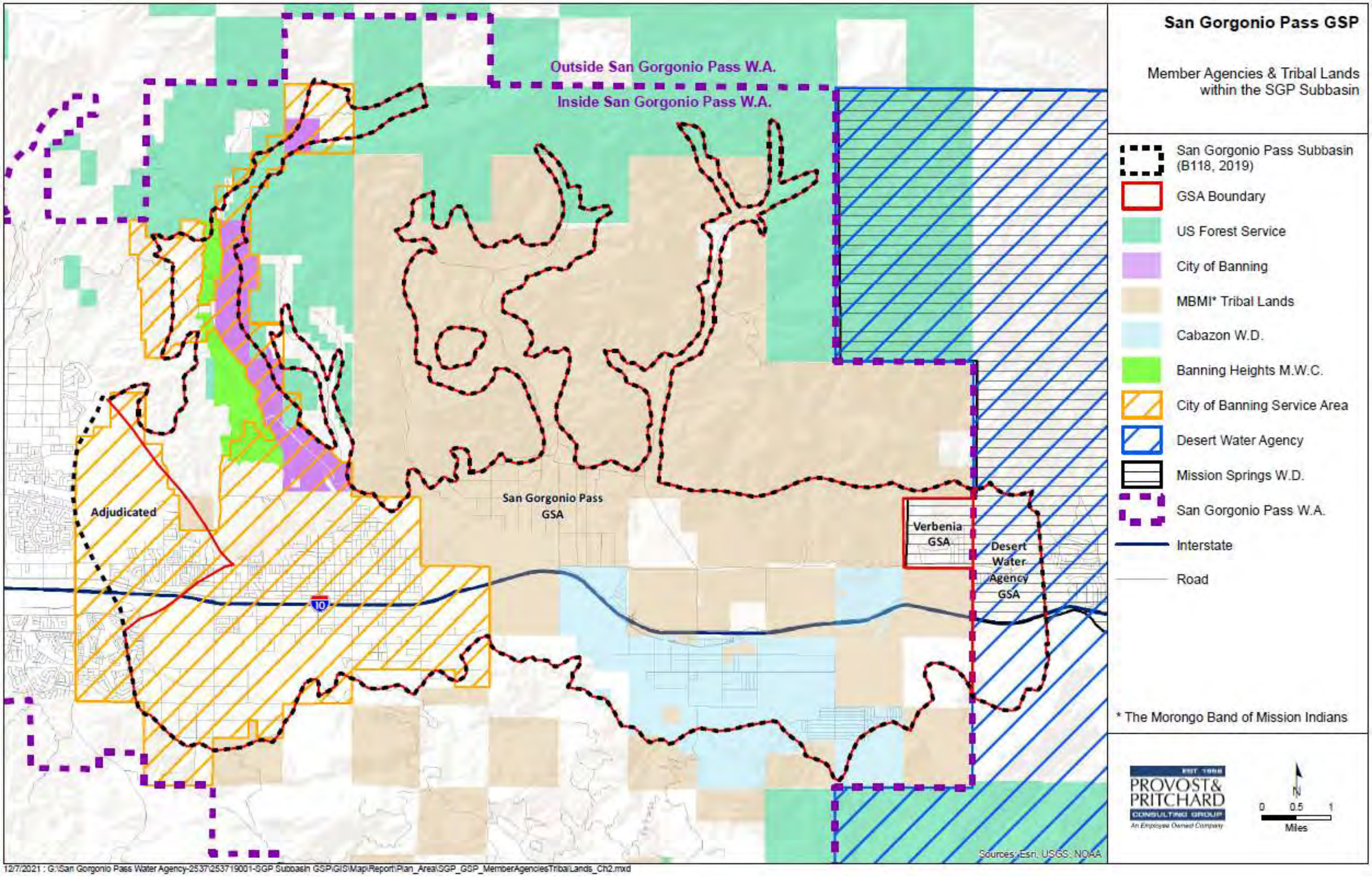

Figure 2-3 Member Agencies and Tribal Lands within San Gorgonio Pass Subbasin

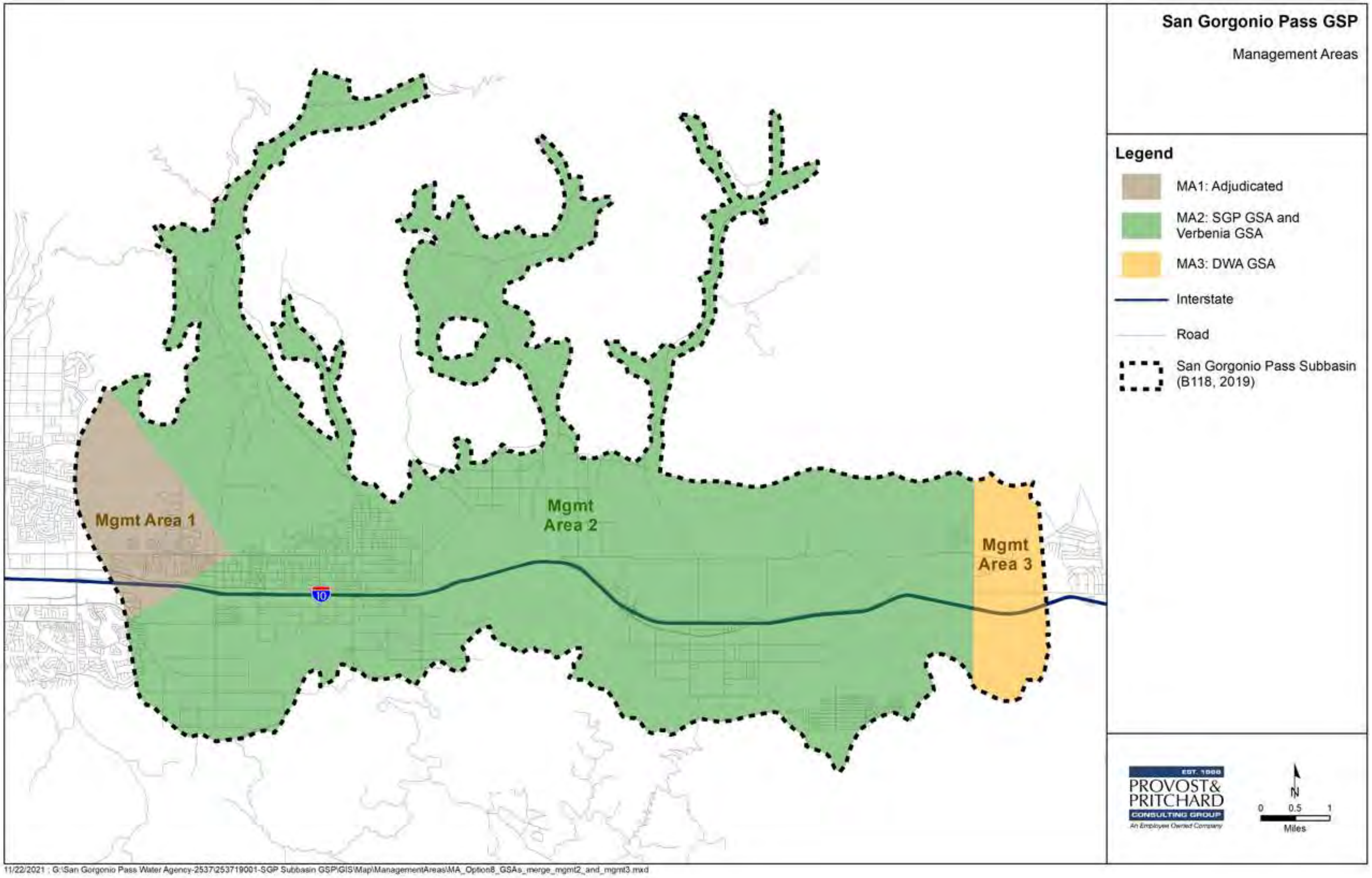

Figure 2-4 San Gorgonio Pass Subbasin Management Areas

2.1.1 Land Use

The Subbasin is predominantly rural with urbanization extending west to east along the I-10. Additional urban development is expected to be limited to areas that have potential for annexation into the City of Banning. The 2000 and 2014 DWR land use surveys are presented in **Figure 2-5** and **Figure 2-6** respectively, providing a general overview of the local land uses within the Subbasin. The method for DWR's land use surveys changed from 2000 to 2014, resulting in an apparent reduction in urban development in the 2014 survey that is inconsistent from actual conditions of increased urbanization.

To better clarify the development in the Plan Area, the 2016 Farmland Mapping and Monitoring Program (FMMP) land use survey is depicted in **Figure 2-7**, showing the dominance of undeveloped land. The 2016 FMMP survey recognizes more development in the SGP Subbasin than the 2014 DWR survey, while also confirming that the 2000 survey overstated what is typically considered to be urban development.

2.1.1.1 Undeveloped

As shown in **Figure 2-7,** the majority of the Plan Area is undeveloped open space. With predictions of the greater Los Angeles and San Bernardino metropolitan areas' urban expansion potentially influencing development in the SGP Subbasin, the SGP Subbasin's water demand may be affected as land use conversion to urban uses would result in increased overall water demands. The projected water budget considers potential growth as identified in Urban Water Management Plans (**Section 3.3)**.

2.1.1.2 Rural Residential

Rural residential properties occurring in the areas of undeveloped open space are recognized as de minimus pumpers and rely on septic systems for wastewater disposal. SGMA defines smaller pumpers as de minimis, meaning that they extract less than 2 acre-feet per year (AFY) of groundwater to use for domestic purposes.

2.1.1.3 Tribal

The MBMI land includes agricultural, commercial, industrial, municipal, residential, and rural land uses. These lands include over 36,000 acres of trust land, located in the southern flank of the San Bernardino Mountains, the northern flank of the San Jacinto Mountains, and the valley floor of the San Gorgonio River. MBMI land includes several Tribal Government buildings, enterprise facilities, the Arrowhead Bottling Plant, and one of the largest casinos in California, the Morongo Casino, Resort & Spa. Approximately 13,111 acres of the over 36,000 acres are within the SGP Subbasin.

2.1.1.4 Urban & Developed (Commercial, Municipal, Residential, Industrial)

The City of Banning, the community of Cabazon, and MBMI are the primary areas of development within the Plan Area. The urban development within the SGP Subbasin includes but is not limited to commercial lands for uses such as retail outlets and the Morongo Casino, Resort & Spa, industrial areas, municipal facilities, such as schools and the police department, as well as residential neighborhoods.

2.1.1.5 Agriculture

Agriculture is limited in the SGP Subbasin. Historically, the land near Banning Heights Mutual Water Company, located on the geologic feature known as the Banning Bench, served as the primary agricultural ground within the SGP Subbasin. The Banning Bench is located at a higher elevation than the valley and canyon floors, resulting in favorable climactic conditions for orchards with peaches, apples, and nectarines as the dominant crops. Additionally, a portion of Cabazon Water District was historically used for agriculture, also dominated by orchards much like the crops found on the Banning Bench. Peaches, apples, grapes, apricots, almonds, plums, melons, alfalfa, and vegetables were grown, and stock-watering was a common practice. Since 2000, much of the farmland has been converted to undeveloped open space or in some instances, rural residential use (**Figure 2-5** and **Figure 2-6**).

2.1.1.6 Land Management Agencies

The local, state, tribal, and Federal agencies that have jurisdiction over land management in the Subbasin are shown in **Table 2-2**.

Table 2-2 Land Management Agencies in the San Gorgonio Pass Subbasin

Cities & Unincorporated Areas
City of Banning
Riverside County
Tribal Reservations
Morongo Band of Mission Indians
Federal Lands
United States Forest Service

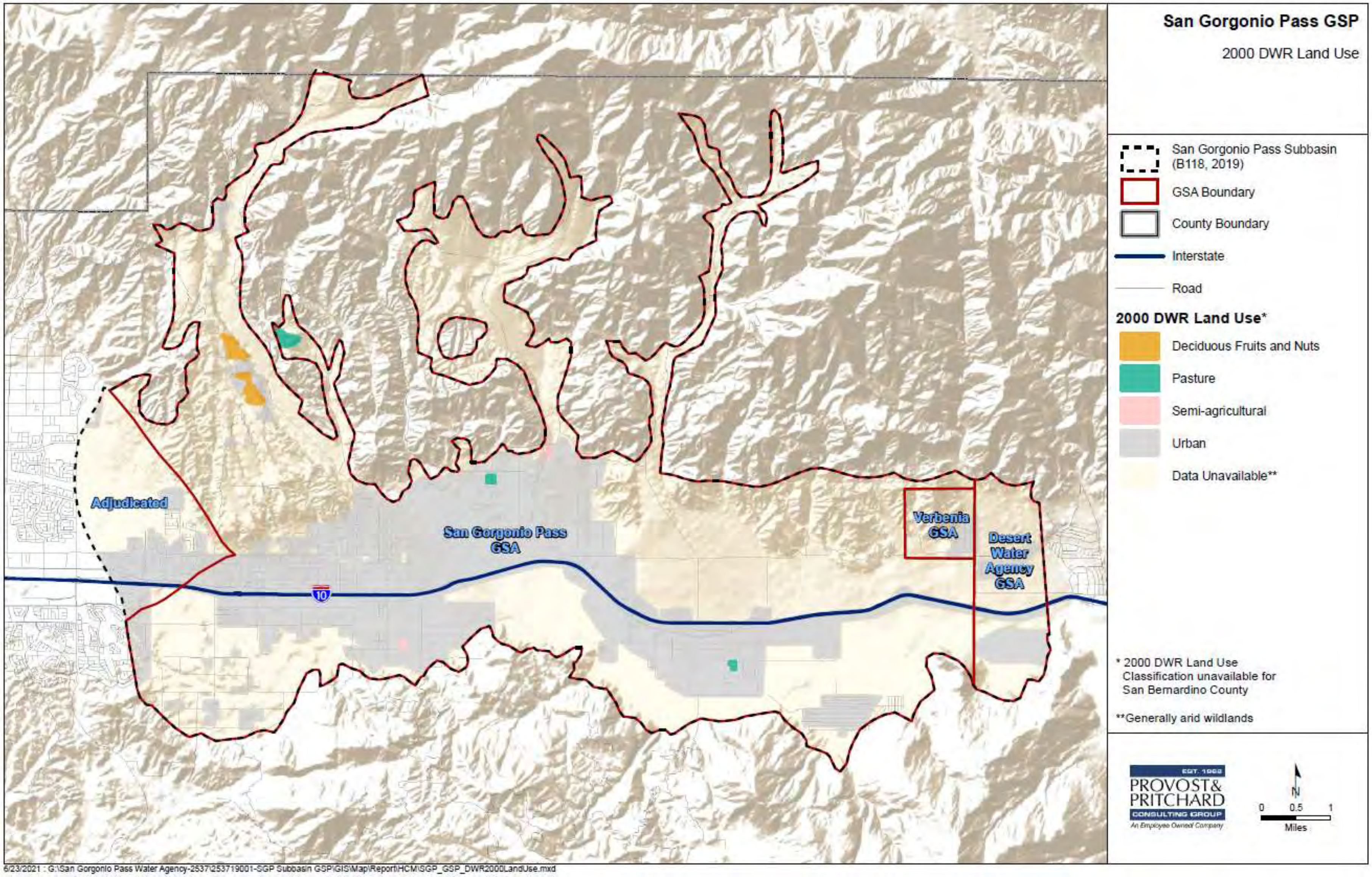

Figure 2-5 2000 DWR Land Use in the San Gorgonio Pass

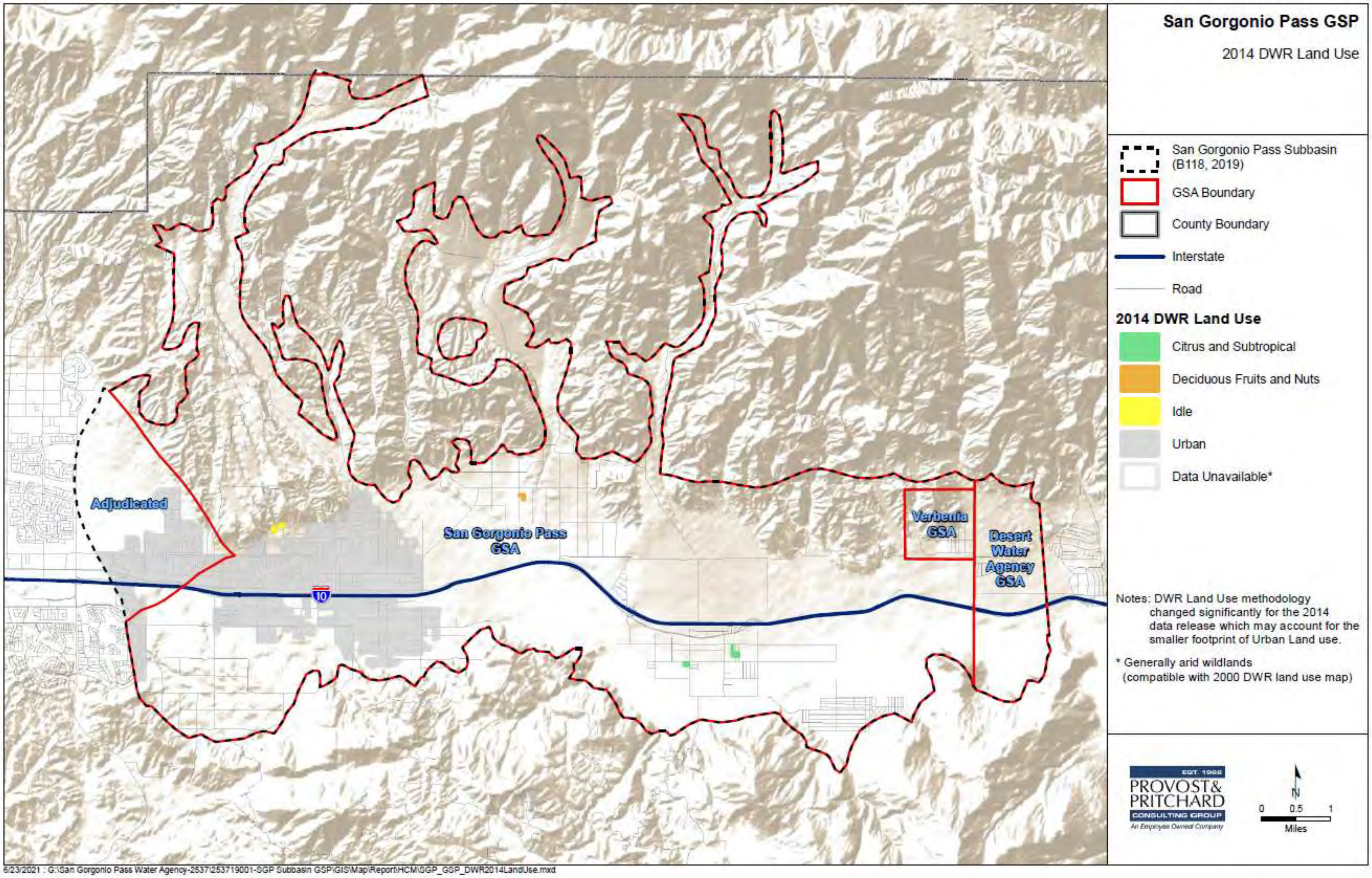

Figure 2-6 2014 DWR Land Use in the San Gorgonio Pass Subbasin

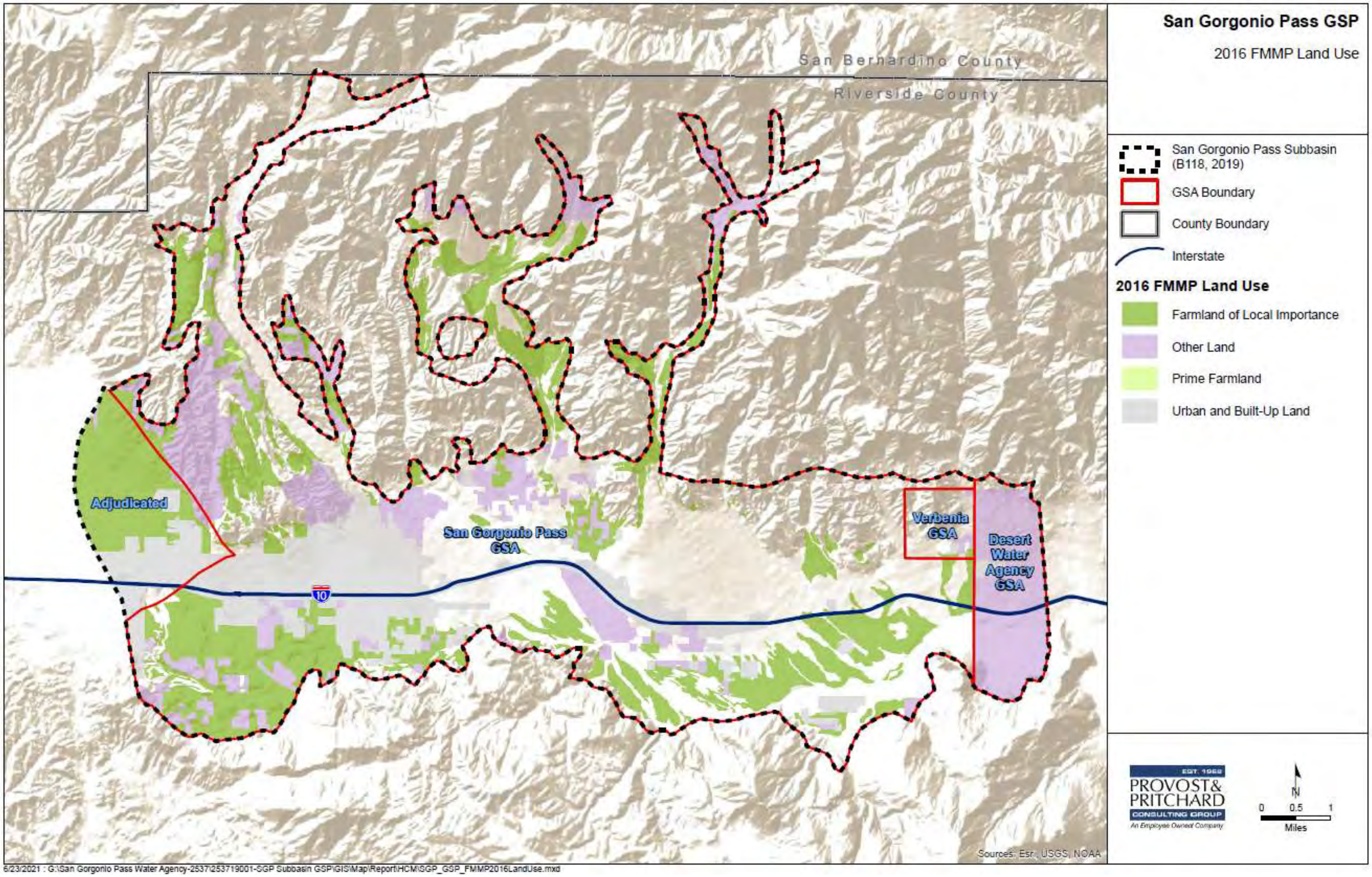

Figure 2-7 2016 FMMP Land Use in the San Gorgonio Pass Subbasin

2.1.2 Agencies

The participants of the SGP GSP are comprised of public agencies and private mutual water companies. In addition to the member agencies, a small portion of the SGP Subbasin includes unincorporated Riverside County lands, which are commonly referred to as "white areas." The MBMI as a Federally recognized tribe is not subject to SGMA. Resulting data gaps associated with the MBMI lands within the Subbasin are described in **Chapter 4 – Sustainable Management Criteria** and **Chapter 5 – Monitoring Network**. While not a participant of the SGP GSP, MBMI is recognized as a significant stakeholder in the Subbasin's groundwater sustainability and has been included as a participant in the SGP GSA's Stakeholder Advisory Group. In addition, MBMI was actively involved in coordination for the GSP development through participation in the SGP GSP Working Group and is encouraged to remain engaged with the SGP GSP Working Group through the implementation period.

The SGP GSP members include the following (See **Figure 2-3**, which clarifies which GSA each member agency is associated with):

Federal Lands

- United States Forest Service

Public Water Districts

- Cabazon Water District (CWD)
- Mission Springs Water District (MSWD)
- Desert Water Agency (DWA) – State Water Project Contractor
- San Gorgonio Pass Water Agency (SGPWA) – State Water Project Contractor

Mutual Water Companies (Privately Held Water Stock Companies)

- Banning Heights Mutual Water Company

Municipalities

- City of Banning

White Area

- Riverside County non-districted lands

2.1.3 Water Sources by Agency

Water supplies in the SGP Subbasin include public and private groundwater extractions, Whitewater River water rights, Morongo Spring water permits, and imported surface water allocated by SGPWA.

DWA is a State Water Project contractor that recharges water to the neighboring Indio Subbasin with customers in developed areas such as Palm Springs and Cathedral City. Although DWA does not supply surface water within the SGP Subbasin, the groundwater recharge benefits of DWA's activities extend into the SGP Subbasin. MSWD wells within DWAGSA pay a replenishment assessment in return for the groundwater replenishment activities managed and supplied by DWA.

Several of the SGP GSP member agencies are retail customers of the SGPWA, a State Water Project contractor and wholesale water agency, that imports water to purveyors as far west as Calimesa and as far east as Banning. The SGPWA service area is approximately 145,920 acres, of which only 33,335 acres are within the SGP Subbasin and SGP GSA boundaries.

MBMI has rights to surface water resources predominantly in Millard, Potrero, and Hathaway canyons. It also utilizes groundwater to meet its domestic needs.

Groundwater use within the SGP Subbasin is quantified in **Chapter 3 – Basin Setting**. **Figure 2-8** depicts the well density within the Subbasin, as defined by DWR's well completion report inventory. The well density map includes wells that are active, damaged, or inactive as of 2018. In general, the well density is relatively low, with some areas having no history of wells, and many areas having only a few wells constructed per square mile. An inventory of known active wells and their respective construction details was developed and used for the water budget analysis, groundwater model, and hydrogeologic conceptual model.

Table 2-3 and **Figure 2-10** summarize the water uses by agency.

A map showing the locations of identified domestic wells (as reported in DWR's Well Completion Report Map Application[1]) is shown in Figure 2-9 and a list of domestic well depths is available in **Appendix G – Domestic Well Characteristics**. Figure 2-9 shows the locations of domestic wells where information is available; where precise location data is not available, the centroid of a section is used for plotting. Figure 2-9 also indicates the well depth, where that data is available from DWR's Well Completion Report application. The DWR well completion reports, while likely not a comprehensive tabulation, are the only readily available data source. Based on the DWR well completion report summary, there are roughly 40 domestic wells in the SGP Subbasin, of which 26 are located in upstream areas within, or adjacent to, the SGP Subbasin. As described in **Chapter 3 – Basin Setting**, the upstream areas include hanging canyons with shallow groundwater resources and areas of hard rock that may lie outside of the SGP Subbasin. Groundwater in the upstream canyons and hard rock areas fluctuates based on local conditions and is not affected by groundwater in the main groundwater storage areas within the Cabazon and Banning Storage Units.

[1] https://water.ca.gov/Programs/Groundwater-Management/Wells/Well-Completion-Reports

Table 2-3 Water Sources in the San Gorgonio Pass Subbasin

Agency	Water Source(s)	Service Sector(s)
San Gorgonio Pass Water Agency	Surface Water & Groundwater • State Water Project surface water. Rural residential wells are present on rural residential properties within the service area.	• Municipal • Industrial • Residential • Commercial
City of Banning	Groundwater • Of the City of Banning's 21 potable wells, 16 are within the SGP Subbasin.	• Municipal • Residential • Commercial • Industrial
Banning Heights Mutual Water Company	Surface Water • Whitewater River surface water by way of Whitewater Flume to the approximate 200 domestic connections. • In event of emergencies, BHMWC may purchase water from City of Banning or produce residential supply from two production wells in the Banning Canyon.	• Residential
Cabazon Water District	Groundwater • Four groundwater wells serve as the sole water source for the CWD service area. All of which are currently active.	• Municipal • Residential • Commercial
Morongo Band of Mission Indians	Surface Water & Groundwater • Groundwater and Whitewater River surface water are the sources of water for the MBMI Water Department. • Rural residential wells are known to be present in the MBMI territory. • MBMI owns and operates a Wastewater treatment facility that discharges within the SGP-GSA boundary	• Cultural • Municipal • Residential • Commercial • Agricultural • Stock Watering • Industrial
Mission Springs Water District	Groundwater • Two MSWD wells are in the SGP Subbasin boundary.	• Residential
Desert Water Agency	Groundwater • There are two MSWD domestic supply wells within the DWAGSA boundary.	• Residential

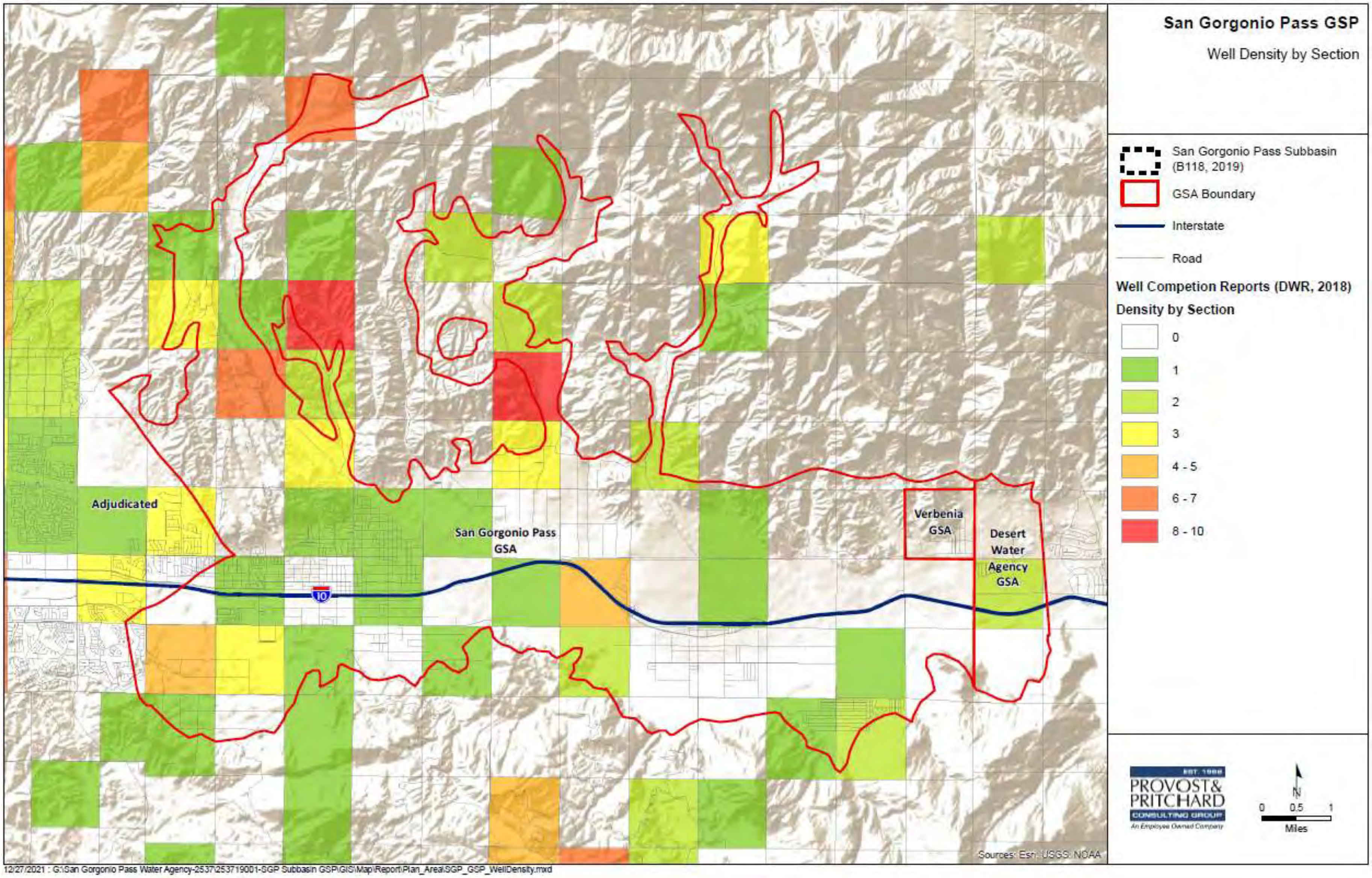

Figure 2-8 Well Completion Report Density by Section

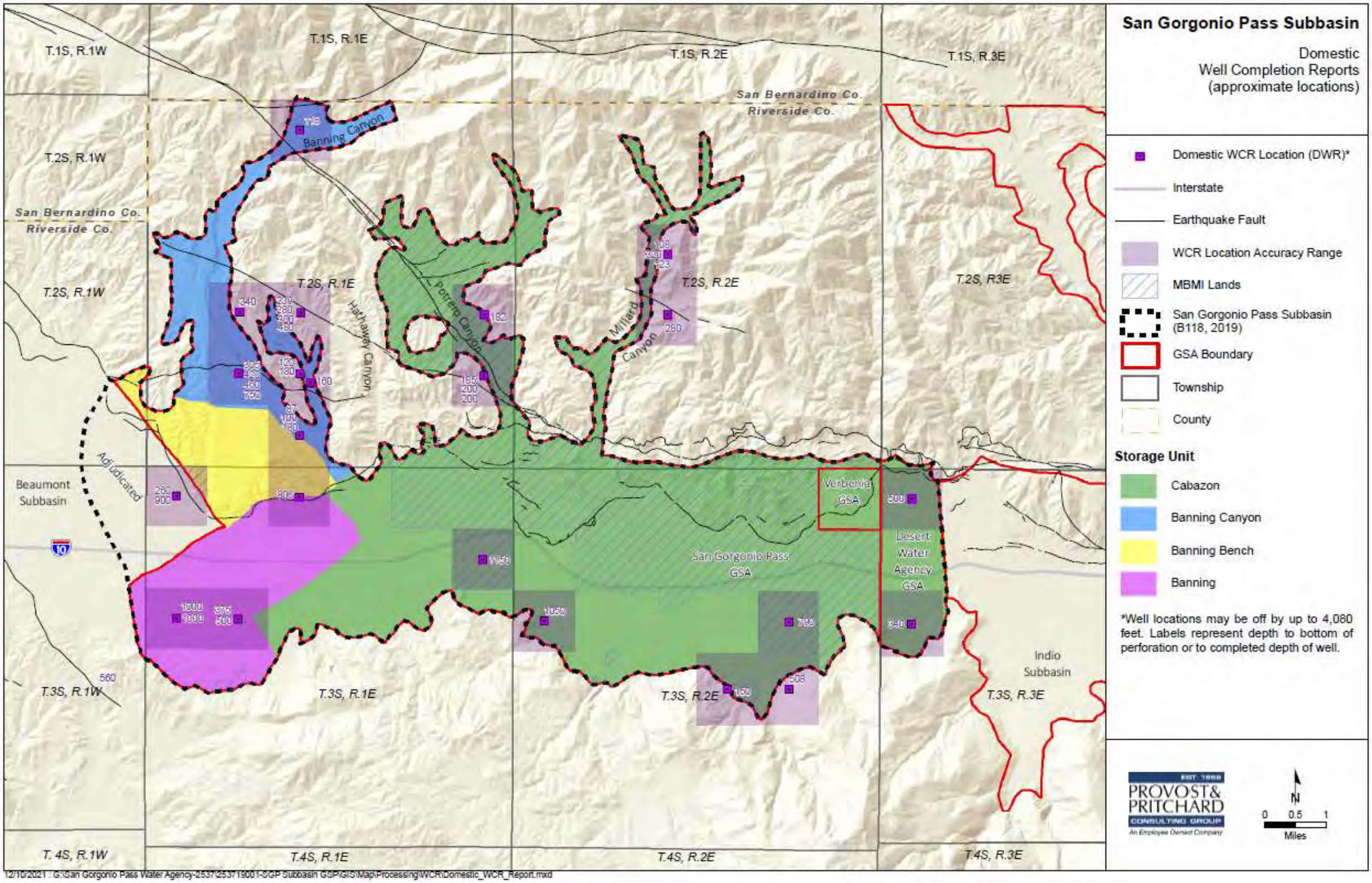

Figure 2-9 Domestic Wells

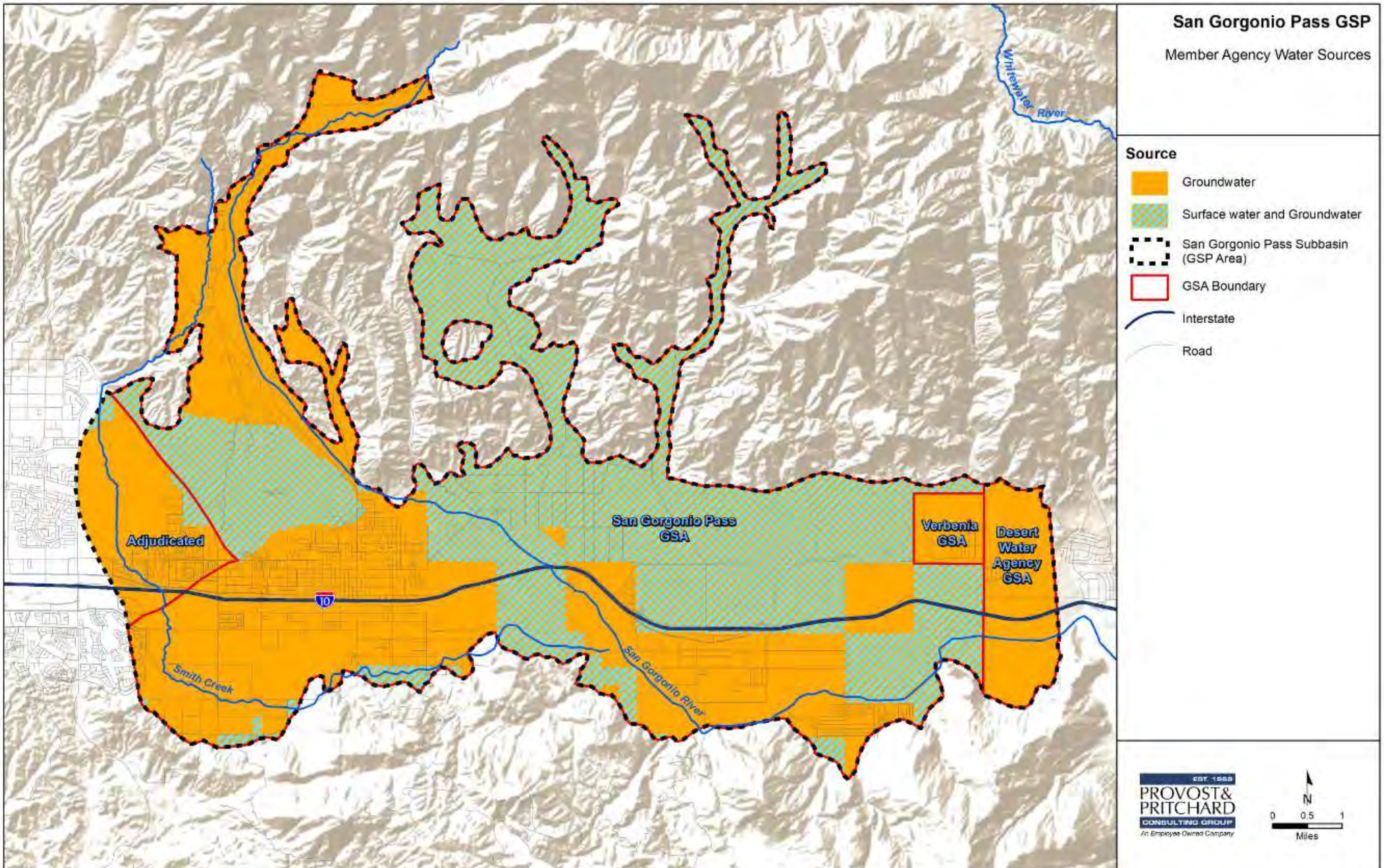

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Figure 2-10 Water Use by Service Sector in the San Gorgonio Pass Subbasin

2.1.3.1 Imported Water Sources

The SGP Subbasin contains a significant portion of the Banning and Cabazon sub-watersheds of the larger San Gorgonio River Watershed (**Figure 2-11**). The Plan Area is mostly dependent on groundwater, reflecting the limited availability and variability of surface water supplies. Despite this, the annual average groundwater consumption is minimal in relation to total groundwater storage (**Chapter 3 – Basin Setting**).

The most reliable surface water supply in areas adjacent to the Plan Area is the SWP water through SGPWA and DWA contracts with the California DWR. The SGPWA receives surface water outside of the SGP Subbasin via the East Branch Extension of the SWP's conveyance system, which was completed in 2003. The amount of SWP water available to SWP contractors is determined each year by the annual allocation of SWP water which depends on the SWP initial reservoir storage, hydrology, total water requested, and regulatory and operational constraints. The SWP surface water supplies are used as supplemental groundwater recharge for nearby basins when available and are a potential source of future supplemental supply to the Plan Area. No direct SWP deliveries are currently provided to the Plan Area.

Recharge activities sourced by DWA SWP contract water and Coachella Valley Water District at the west end of the Indio Subbasin benefit the SGP Subbasin by reducing the outflow gradient from the east end of the SGP Subbasin. Although SWP water from DWA is recharged outside of the SGP Subbasin, the resulting higher water levels in the Indio Subbasin improve groundwater storage in the SGP Subbasin boundary. **Chapter 3 – Basin Setting** discusses the beneficial impacts in more detail.

2.1.3.2 Surface Water Sources

Distributaries of the Whitewater River are one of the sole perennial surface water sources within the Subbasin. A flume (the "Flume," hereafter) conveys a portion of Whitewater River flows into the SGP Subbasin that is diverted from the South and East forks of the Whitewater River. The Flume includes a section of steel penstocks associated with historic hydroelectric power plants once operated by Southern California Edison (SCE). SCE ceased to operate the hydroelectric power plants after infrastructure failures in 1998. The City of Banning, BHMWC, and SCE have rights to divert approximately 9,600 AFY of natural flows from Banning Canyon under the 1938 Whitewater River Decree. Historically, the three entities diverted an average of approximately 1,500 AFY. Of this total, BHMWC diverts and filters approximately 1,000 AFY on average of Whitewater River supplies via the Flume. Remaining flows are diverted to the San Gorgonio River and into the City of Banning's spreading ponds for groundwater recharge within the Banning Bench Storage Unit and Banning Canyon Storage Unit.

Overall, surface water flows from the Plan Area's steep mountain areas are intermittent with runoff during the winter and spring months and during infrequent thundershowers. During such events, the gravel and sand bedded canyons provide for quick percolation, which contributes to the Plan Area's groundwater supply. The steep slopes and rapid percolation challenge flood capture projects and management actions. However, the City of Banning is evaluating opportunities for increased stormwater capture (**Chapter 6 – Projects and Management Actions**) and the MBMI has historically captured storm water run-off and unused surface and spring water supplies which are diverted into a series of spreading basins for groundwater recharge.

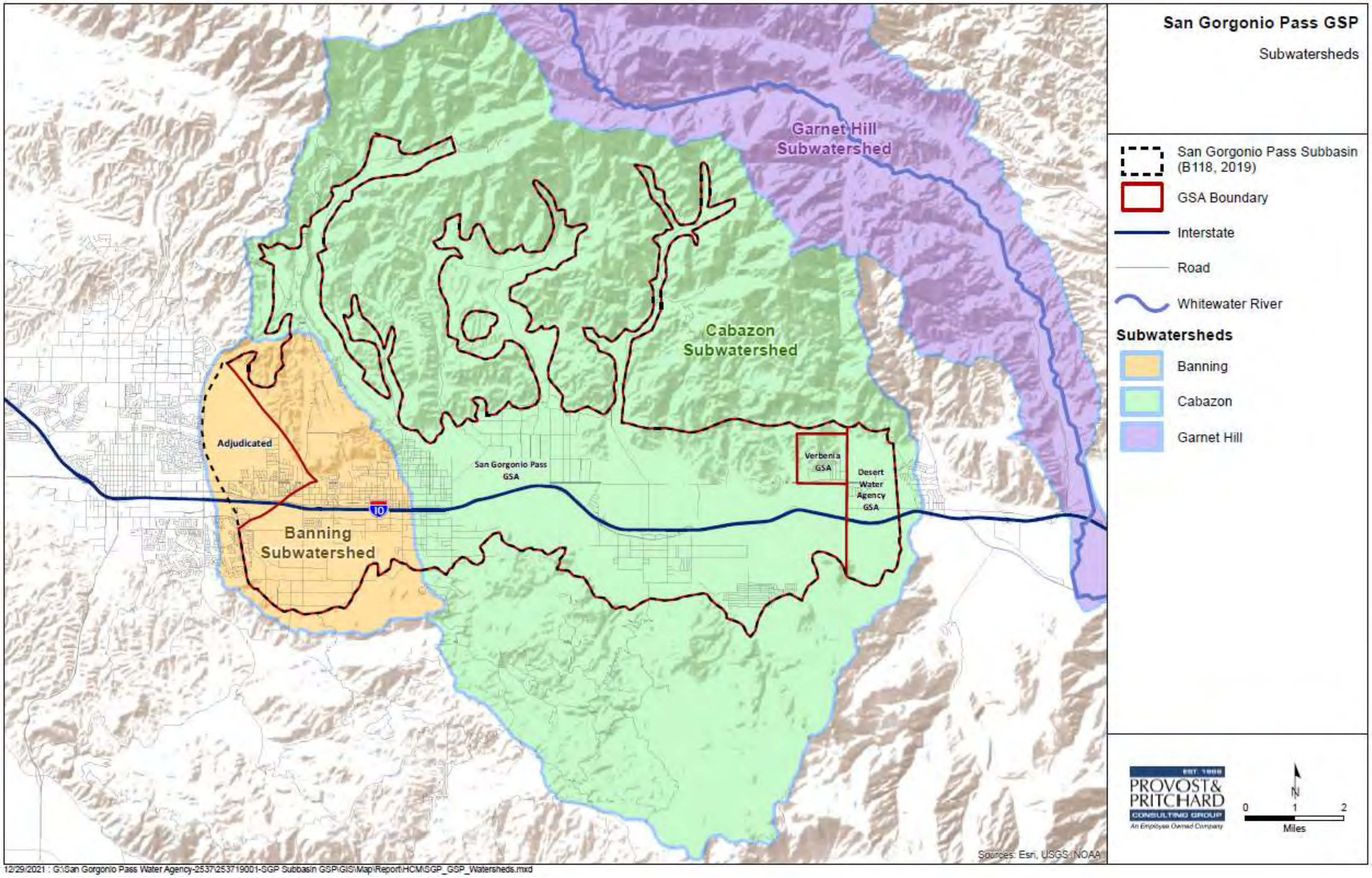

Figure 2-11 Subwatersheds of the San Gorgonio Pass Subbasin and the Whitewater River

2.2 Water Resources Monitoring and Management Programs

2.2.1 Monitoring and Management Programs

Regulation Requirements:

§354.8(c) Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan. **§354.8(d)** A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits. **§354.8(e)** A description of conjunctive use programs in the basin.

This section details monitoring initiatives in the Subbasin. More information on monitoring, available data, and the representative monitoring network are available in **Chapter 5 – Monitoring Network**

2.2.2 Groundwater Level Monitoring

While the SGP GSA, Verbenia GSA, and DWAGSA are relatively new agencies, groundwater resources within their boundaries and surrounding lands have been managed for many years by the member agencies and other entities. The groundwater level monitoring program for each member agency (depicted in **Figure 2-3**) is described below.

2.2.2.1 San Gorgonio Pass GSA

San Gorgonio Pass Water Agency

The largest public water agency in the SGP Subbasin, the SGPWA, has been involved in a variety of cooperative efforts to manage, preserve, and understand the area's water resources. The San Gorgonio Pass Water Agency supports local interests in water planning and management, develops projects, collects groundwater data, and prepares an annual report of groundwater conditions, which includes groundwater level monitoring.

The groundwater table rises or falls in response to the amount of recharge and the level of pumping. SGPWA began studying groundwater elevation and quality trends in 2006 within its service area and continues this on-going effort. Since the first SGPWA Annual Report produced in 2008, the SGPWA has promoted recharge activities and cooperated with USGS and member agency groundwater-level monitoring within the Subbasin.

Cabazon Water District

CWD performs pump tests to monitor aquifer parameters and groundwater flow in the three active CWD wells. In addition, groundwater levels and groundwater extraction are also monitored at these wells The records have been used for developing an understanding of groundwater conditions in the subbasin.

City of Banning

The City of Banning monitors groundwater extraction and elevation to inform future management decisions. The City of Banning's 2020 Urban Water Management Plan (UWMP)[2] recognizes groundwater as the City's primary water supply and describes the City's monitoring activities.

[2]https://wuedata.water.ca.gov/public/uwmp_attachments/2898679435/Banning%20Final%202020%20UWMP%20w%20Appendices%20-%2006.28.2021.pdf

Banning Heights Mutual Water Company

BHMWC primarily diverts surface water and uses a production well as a backup water supply in times of water supply emergency. BHMWC privately monitors and maintains the data history of the limited production well use.

Morongo Band of Mission Indians

While not a participating member of the SGP GSA, the MBMI has monitored groundwater levels utilizing a series of monitoring and active groundwater wells throughout the reservation boundaries; however, the data remains private. The MBMI actively participates in GSP development and contributed their understanding of groundwater conditions to the development of the plan.

2.2.2.2 Verbenia GSA

MSWD is committed to protecting groundwater resources within its service area. MSWD monitors groundwater levels, extractions, and quality to identify trends and inform projects, development, and management actions.

2.2.2.3 Desert Water Agency GSA

Two USGS monitoring wells are available within the DWAGSA boundary.

2.2.3 Groundwater Extraction Monitoring

All water agency wells for municipal use are metered and the pumping volume is recorded. Most private wells are not required to be metered because they are not held to the Safe Drinking Water Act, unlike public drinking water systems. therefore, the volume pumped is unknown. Private wells represent a small portion of the supply wells within the SGP Subbasin. **Section 3.3** addresses estimated groundwater extraction in the SGP Subbasin.

2.2.4 Groundwater Quality Monitoring

Groundwater quality is monitored at municipal wells and other areas of specific concern. The City of Banning, MSWD, and SGPWA each produce Annual Water Quality reports or water quality information available in similar reports. Not all SGP Subbasin member agencies are required to report groundwater quality information. MBMI has regulatory jurisdiction over surface water quality similar to state jurisdiction and the Clean Water Act authorizes the tribe to set its own surface water quality standards and water quality certification. The MBMI additionally reports groundwater quality information as required by the United States Environmental Protection Agency under the Safe Drinking Water Act.

Additionally, water quality in the Plan Area is being monitored and reported on GeoTracker[3]. The domestic water suppliers perform routine water quality testing as required by the State Water Resources Control Board, Division of Drinking Water (DDW). The requirements for testing are based on the size of the community system. Additional testing may be done if a site has specific constituents of concern that need to be monitored.

Most of the wells in SGP GSP are used for commercial, domestic, industrial, and municipal purposes. In addition, there are a small number of private domestic wells that are not routinely

[3] http://geotracker.waterboards.ca.gov/

monitored, and any monitoring records that may exist on these wells are typically private rather than public information. Under SGMA regulatory requirements, groundwater quality monitoring within the SGP Subbasin will continue to track regional trends and to serve as an indicator of changes in groundwater quality. Potential future groundwater quality monitoring is discussed in **Chapter 5 – Monitoring Network**, and groundwater quality is also further discussed in **Section 3.2**.

2.2.5 Land Surface Subsidence Monitoring

Monitoring and reporting on land subsidence in the Plan Area are limited to public agencies such as National Aeronautics and Space Administration (NASA) and United States Geologic Survey (USGS). Permanent land subsidence is associated with compaction of inelastic clay layers through excessive groundwater extraction activities in an aquifer below an impermeable layer. Such clay layers are not known to be present in the SGP Subbasin; therefore, subsidence is not associated with groundwater management activities. The region's seismic activity can affect the land elevations in the region, which is documented in USGS studies. More information on land subsidence is provided in **Chapter 3 – Basin Setting**.

2.2.6 Surface Water Monitoring

Surface water flows in the area is monitored by numerous agencies through various programs. Banning Heights Mutual Water Company, USGS, and SGPWA partner in monitoring flows from the Whitewater River via their Flume. Additionally, the USGS and the City of Banning cooperate in monitoring flows of Whitewater River diversions. The USFS, MBMI, and BLM monitor headwaters and perennial streams that are associated with downstream users within the Plan Area. There are no known surface water quality monitoring programs in with SGP Subbasin.

2.2.7 Regional Monitoring and Reporting

2.2.7.1 Integrated Regional Water Management Program

The Integrated Regional Water Management Program (IRWMP) recognizes that regional control, self-reliance, and collaboration are needed to achieve common social, environmental, and economic objectives. Groundwater and surface water management programs and identification of existing monitoring programs are outlined in two regional IRWM Plans. The SGP Subbasin overlaps two IRWM regions – San Gorgonio Pass and Coachella Valley. Four member agencies of the SGP GSA (CWD, SGPWA, Banning Heights Mutual Water Company, and City of Banning) are within the San Gorgonio Pass IRWM region and participated in the San Gorgonio Pass IRWM Plan[4]. DWA and MSWD are two of Coachella Valley Regional Water Management Group's five water purveyors involved in the development of the Coachella Valley IRWM and Stormwater Resources Plan, addressing water needs in the region[5]. The IRWM Program can act supplementary to SGMA because the IRWM regions do not have the groundwater management authority of GSAs.

2.2.8 GSP Monitoring and Management Plans

Member agencies are responsible for monitoring, reporting, and providing data, analyses, and supporting information to their respective GSA. As needed, the GSAs will report the water quality

[4] https://www.sgirwm.org/
[5] http://www.cvrwmg.org/

and water supply data to the SGP GSP Working Group for annual reporting and GSP updates every five years. The monitoring program is described in **Chapter 5 – Monitoring Network**.

2.2.9 Conjunctive Use Programs

The SGP Subbasin is a conjunctive use area that relies on groundwater extractions to supplement limited available surface water supplies to meet water demands. Groundwater recharge is an important component in management of the groundwater supply to meet water demands. Intentional recharge within the SGP Subbasin is outlined in **Table 2-4**.

Table 2-4 Intentional Recharge in the San Gorgonio Pass Subbasin

Jurisdiction	Within SGP Subbasin	Outside SGP Subbasin
Desert Water Agency GSA		
Desert Water Agency	Although no DWA recharge facilities exist within the Subbasin limits, recharge activities in the Indio Subbasin extend their area of benefit within the SGP Subbasin.[6]	SWP supplies exchanged with Metropolitan Water District for Colorado River water are recharged in two recharge ponds outside of the SGP Subbasin.
Verbenia GSA		
Mission Springs Water District	No known intentional recharge activities within the Subbasin.	No known intentional recharge activities outside the Subbasin.
San Gorgonio Pass GSA		
Morongo Band of Mission Indians	The MBMI discharges secondary treated wastewater into the Cabazon Storage Unit through its WWTP activities	In 2013, an application was approved to export and store up to 20,000 AF of surface water in the Beaumont Storage Unit within the Adjudicated Beaumont Basin. The actual recharge amounts of water imported are currently zero.
San Gorgonio Pass Water Agency	No known intentional recharge activities within the Subbasin.	Recharge facilities were constructed in 2018 and 2019 in the adjudicated Beaumont basin along the western portion adjacent to the Plan Area.
Banning Heights Mutual Water Company	No known intentional recharge activities within the Subbasin.	No known intentional recharge activities outside the Plan Area.

[6] Desert Water Agency. Groundwater Replenishment and Assessment, Annual Engineers Report.

Jurisdiction	Within SGP Subbasin	Outside SGP Subbasin
Cabazon Water District	No known intentional recharge activities within the Subbasin.	No known intentional recharge activities outside the Plan Area.
City of Banning	The Banning Canyon Storage Unit is recharged with Whitewater River water via the Flume when the water is available. The City of Banning recharges secondary treated wastewater to the Cabazon Storage Unit.[7]	The City of Banning is permitted to store up to 80,000 AF of surplus appropriated water in the Beaumont Storage Unit within the Adjudicated Beaumont Basin. The City of Banning has historically exported water for intentional recharge to the Beaumont Basin, ranging in volume from 1,338 AF in 2010 to 608 AF in 2014[8].

2.3 Relation to General Plans

2.3.1 Summary of General Plans/Other Land Use Plans

Regulation Requirements:

§354.8(f) A plain language description of the land use elements or topic categories of applicable general plans that include the following:
(1) A summary of general plans and other land use plans governing the basin.

California Government Code (§65350-65362) requires that each county and city in the state develop and adopt a General Plan. A General Plan states development policies and sets forth objectives, principles, standards, and plan proposals. It is a comprehensive long-term plan for the physical development of the county or city. In this sense, it is a "blueprint" for development.

The General Plan must contain seven state-mandated elements. It may also contain any other elements that the legislative body of the county or city wishes to adopt. The mandated elements are Land Use, Open Space, Conservation, Housing, Circulation, Noise, and Safety. A General Plan may be adopted in any form deemed appropriate or convenient by the legislative body of the county or city, including the combining of elements. The SGP Subbasin includes coverage from the County of Riverside's 2015 General Plan, Pass Area Specific Plan, and the City of Banning's 2013 General Plan[9].

[7] Table 6-4 http://banning.ca.us/DocumentCenter/View/4543/2015-Urban-Water-Management-Plan-UWMP?bidId=
[8] Table 2-6 https://28c3dd9f-69f5-4dd5-bf25-251074d401bb.filesusr.com/ugd/1f9eac_fc8b7c04f707485c84db00e4894fc849.pdf
[9] http://www.ci.banning.ca.us/64/Planning

The County of Riverside's 2015 General Plan[10] outlines land use policies and recommendations within the SGP Plan Area and includes the Pass Area Plan for the western half of the Subbasin. The previous General Plan was developed in 1987. The Riverside County 2015 General Plan and City of Banning 2013 General Plan set the direction for Riverside County's and the City of Banning's respective land use and development strategy through recognizing the economic base, transportation system, and preservation of the natural and cultural resources.

In addition to the County's and Cities' specific Land Use Plans, MBMI has a General Plan that reflects the intended growth and land use changes within MBMI's jurisdictional area. The General Plan evaluates MBMI's commercial, industrial, municipal, and residential planned changes to land uses, much as a County or City General Plan does. The MBMI General Plan is a confidential document and, therefore, is not available for review by the GSAs and cannot be submitted as a reference. The GSP is designed to consider impacts to beneficial users of groundwater, including MBMI. To achieve this with the best available information, the GSAs have developed estimations of projected land use changes in the MBMI lands and associated groundwater extraction estimations, discussed in **Section 3.3**.

All the aforementioned land use plans were developed prior to SGMA and this GSP.

2.3.2 Impact of GSP on Water Demands

Regulation Requirements:

§354.8(f) (2) A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects.

The General Plans in the SGP Subbasin area were adopted prior to the formation of the GSAs and development of this GSP; therefore, the documents could not consider the impacts of this Plan's implementation. However, this GSP is informed by potential land use changes identified in the applicable General Plans.

General Plans typically make assumptions for urban development. The assumed land use changes and growth rates are addressed in the County Housing, Resource Conservation, or Land Use Element for each of the communities. This GSP is consistent with the land use change assumptions identified in the General Plans for forecasting the anticipated water budget, described later in this GSP. Community and commercial growth in the SGP Plan Area are anticipated to be affected by the urban development from the greater San Bernardino and Los Angeles Metropolitan centers. Projected water budgets (**Section 3.3**) consider anticipated conversion of undeveloped land to developed land with increased water demands.

2.3.3 Impact of GSP on Land Use Plan Assumptions

Regulation Requirements:

§354.8(f) (3) A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.

[10] https://planning.rctlma.org/Zoning-Information/General-Plan

The land use and water supply issues addressed in the Riverside County General Plan are applicable to the GSAs. As noted previously, the current General Plans were developed prior to the development of this GSP and enactment of SGMA. Future General Plan updates will need to consider impacts of SGMA and this GSP along with future annual reports and GSP updates.

Projected land use changes in the Riverside General Plan and City of Banning General Plan as well as the City of Banning Urban Water Management Plan and the neighboring City of Beaumont Urban Water Management Plan were reviewed to inform the projected water budget, described in **Section 3.3.**

To sustain maintenance of groundwater levels despite changes in land development and new water demands, a list of projects and management actions are outlined in **Chapter 6 – Projects and Management Actions**. These projects and management actions support new water supplies and actions to reduce demands.

2.3.4 Permitting New or Replacement Wells

Regulation Requirements:

§354.8(f) (4) A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.

Riverside County requires a Riverside County Environmental Health Permit for construction, reconstruction, or destruction of a well within its jurisdiction. To construct or abandon a well, the well owner must first contact a registered well driller to prepare the application for submittal to the Riverside County Department of Environmental Health.[11]

Riverside County has the ability to manage the capacity and timing of current and future well development because of their requirement for a County-issued permit for the drilling of wells within their jurisdiction to provide on-site water supply when water lines are unavailable or infeasible to construct.[12]

2.3.5 Land Use Plans Outside the Basin

Regulation Requirements:

§354.8(f) (5) To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.

Generally, all nearby General Plans contain similar policies to those within the basin regarding land use and promoting water conservation and sustainable development.

2.4 Additional GSP Components

Regulation Requirements:

[11] Riverside County Department of Environmental Health. Wells. Wells | Environmental Health | County of Riverside (rivcoeh.org) accessed 7/7/2021.
[12] Riverside County General Plan. Housing Element. Page H-107. Ch08_Housing_100317.pdf (rctlma.org) accessed 7/7/2021.

§354.8(g) A description of any of the additional Plan elements included in the Water Code Section 10727.4 that the Agency determines to be appropriate.

2.4.1 Saline Water Intrusion

Saline or brackish water intrusion is the induced migration of saline water into a freshwater aquifer system and is typically observed in coastal aquifers where over-pumping of the freshwater aquifer causes saltwater from the ocean to encroach inland. Due to the distance of the SGP Plan Area from the Pacific Ocean, saline water intrusion is not an issue for the SGP GSP.

Groundwater with naturally occurring elevated concentrations of salts is not known to exist in the local aquifers. The SGP GSP member agencies strive to prevent the importation of saline surface waters that could ultimately degrade the groundwater. If alternative water sources are available for importation, the GSAs' member agencies will consider not only the cost but also the quality, including salinity, of the water. The Participants will monitor water quality in a manner that provides management information about salinity in the area.

2.4.2 Wellhead Protection

The Federal Wellhead Protection Program was established by Section 1428 of the Safe Drinking Water Act Amendments of 1986. The purpose of the program is to protect groundwater sources of public drinking water supplies. The program is based on the concept that the development and application of land use controls, usually applied at the local level, and other preventative measures can protect groundwater. Under the Act, States are required to develop an EPA-approved Wellhead Protection Program.

Wellhead protection is performed primarily during design and can include requiring annular seals, adequate drainage around wells, constructing wells at high locations, and avoiding well locations that may be subject to nearby contaminated flows. Wellhead protection is required for potable water supply wells.

Municipal wells constructed by the member agencies are designed and constructed in accordance with DWR Bulletins 74-81 and 74-90. A permit from the respective county is also needed to construct a new well. In addition, the member agencies encourage landowners to follow the same standard for privately owned wells. DWR Bulletins 74-81 and 74-90 provide specifications pertaining to wellhead protection, including methods for:

- Sealing the well from intrusion of surface contaminants
- Covering or protecting the boring at the end of each day from potential pollution sources or vandalism
- Site grading to assure drainage is away from the wellhead

2.4.3 Migration of Contaminated Groundwater

Groundwater within the SGP Plan Area is generally of excellent quality for local beneficial uses. However, some drinking water quality problems exist in specific areas due to high concentrations of certain constituents. Information on water quality within the SGP Plan Area is contained in **Section 3.2.**

2.4.4 Well Abandonment/Well Destruction Program

The member agencies have and will continue to properly destroy their wells that are no longer used. In addition, the member agencies will encourage landowners and developers to convert unusable wells to monitoring wells, rather than destroy them, so that they can become a part of the region's groundwater monitoring program.

2.4.5 Replenishment of Groundwater Extractions

Replenishment of groundwater is an important component in management of a groundwater supply to support maintaining groundwater levels with the avoidance of significant and unreasonable impacts to the beneficial users of groundwater. Groundwater replenishment occurs naturally through rainfall, rainfall runoff, stream/river seepage, and through purposeful means including deep percolation of landscape irrigation, wastewater effluent percolation, and intentional recharge. The primary local water sources for groundwater replenishment include precipitation, ephemeral recharge in the canyon areas, and the Whitewater Recharge Facilities managed by DWA. Although the Whitewater Recharge Facilities are adjacent to the SGP Subbasin, their groundwater storage and level benefits extend to the SGP Subbasin. Discussions of how groundwater recharge affects the water budget is provided in **Section 3.3**.

2.4.6 Well Construction Policies

Proper well construction is important to ensure reliability, longevity, and protection of groundwater resources from contamination. The SGP GSP member agencies follow state standards (DWR Bulletins 74-81 and 74-90) when constructing municipal wells. County's Environmental Health Department maintains well inspections during various phases of construction in accordance with State Well Standards to help assure proper construction of private wells[13]. The County maintains records of all wells drilled in the SGP Plan Area. As of 2019, there were no limits on number of wells, which may be revisited in the future.

Outside of the City of Banning service areas, private agricultural or domestic wells can be drilled with a County permit. State well standards address annular seals, surface features, well development, and various other topics. Well construction policies intended to ensure proper wellhead protection are discussed in **Section 2.4.2**.

2.4.7 Groundwater Projects

The SGP GSP member agencies share responsibility for the development and operation of recharge, storage, conservation, water recycling, and extraction projects to ensure sustainability by 2042. The member agencies generally develop their own projects to help meet their water demands and may develop additional future groundwater sustainability projects. Developing more groundwater recharge and banking projects is an option for stabilizing groundwater levels, and future projects could be implemented by member agencies and or by the GSAs. **Chapter 6 – Projects and Management Actions** provides descriptions, estimated costs, and estimated yield for numerous proposed projects.

[13] Ibid

The GSAs will also support measures to identify funding and implement regional projects that help the region achieve groundwater sustainability. This can include recharge projects that take advantage of local areas conducive to recharge and areas where recharge provides the most benefit to the SGP Plan Area. This can reduce the burden for certain agencies from having to recharge within their boundaries if they do not have suitable land, soils, or water.

2.4.8 Efficient Water Management Practices

Water conservation has been and will continue to be an important tool in local water management, as well as a key strategy in achieving sustainable groundwater management. The member agencies engage in water conservation activities which include water use restrictions, water metering, education, tiered rates, etc. During a recent drought, these water conservation programs were tested and included State-mandated urban water restrictions for the first time. Details of water conservation programs can be found in local Urban Water Management Plans. Many agencies also have multi-stage water shortage contingency plans to help conserve water in droughts. Efficient water management practices will include maximizing the beneficial uses of water along with recycled water use as it can replace potable water use in some instances. Future efforts may include an increased focus on elevating awareness on sustainable yield and explaining the requirements of SGMA. Some or all of these conservation efforts will be necessary to achieve groundwater sustainability.

2.4.9 Relationships with State and Federal Agencies

From a regulatory standpoint, the SGP GSP members have numerous relationships with State and Federal agencies related to water supply, water quality, and water management. Relationships unique to the region are briefly summarized below.

Department of Water Resources (State Water Project)

Most of the imported surface water in the vicinity comes from either direct delivery of State Water Project water or Colorado River Water exchanged for State Water Project water. The SGPWA serves as the wholesale agency selling the SWP water.

US Forest Service

The SGP Plan Area includes USFS land in the northern mountainous portion of the Subbasin. The USFS is recognized as a SGMA stakeholder and has been invited to participate in the SGP Stakeholder Advisory Group meetings.

2.4.10 Impacts on Groundwater Dependent Ecosystems

The Nature Conservancy's (TNC) GDE Pulse online interactive mapping tool has identified potential groundwater dependent ecosystems (GDEs) in the SGP Subbasin. Of the GDEs identified on GDE Pulse, those that are within the Subbasin's canyons are potentially accurate due to the depth to groundwater being within 200-feet depth to water during ephemerally wet conditions. However, the valley of the Subbasin, which includes the Cabazon and Banning Storage Units, have groundwater that drops hundreds of feet and cannot support conditions for potential GDEs. A detailed analysis of the identification and assessment of impacts of GDEs is available in **Section 3.2** The SGP GSAs will continually assess groundwater conditions that can support GDEs through the best available data during the implementation phase and will report any changes to GDE identification or methodology in 5-year updates.

Interconnected Surface Water is a Sustainability Indicator and is defined as "*surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted*." Interconnection between the surface water and groundwater could lead to GDEs and must be considered. Information on interconnected surface water can be found in **Section 3.2**.

2.5 Communication & Outreach Plan

The GSAs have prioritized public outreach and stakeholder engagement with the intention of ensuring the GSP recognizes the needs of the SGP Subbasin and the beneficial uses and users of groundwater. The outreach activities considered the water uses associated with tribes, GDEs, disadvantaged communities, adjacent subbasins, and any interested members of the public. This Section serves as the SGP Subbasin's Communication & Outreach Plan, detailing how the GSAs supported stakeholder outreach and facilitated opportunities for public comment.

2.5.1 Description of Beneficial Uses and Users

Regulation Requirements:

§354.10 Each plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:
- **(a)** A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.
- **(b)** A list of public meetings at which the Plan was discussed or considered by the Agency.
- **(c)** Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.

§354.10 (d)(2) Identification of opportunities for public engagement and a discussion of how public input and response will be used.

Identification of Stakeholders

Upon GSA formation, the three GSAs in the SGP Subbasin defined a list of stakeholders to engage during the GSP development. Throughout GSP development, the GSAs revisited the list of stakeholders to ensure the list was current. Stakeholders were identified as entities that either directly or indirectly rely on a beneficial use of groundwater. These include the United States Forest Service, the Morongo Tribe, industry, developers, Riverside County, water agencies, and more.

Beneficial Users and Uses of Groundwater

Beneficial users and uses of groundwater are listed in **Figure 2-12** below.

Stakeholder Outreach Meetings

Throughout the GSP development process, stakeholders have been invited to attend the SGP Stakeholder Advisory Group meetings that cover the progress towards GSP development and offer opportunities and encouragement for stakeholder feedback. A list of the public meetings in which the plan was discussed is included in **Table 2-5**.

In addition to the Stakeholder Advisory Group meetings, the GSA Public Hearings to adopt the Final GSP in January 2022 also provided the opportunity for public comment. Those GSA Public Hearings to adopt the Final SGP GSP occurred on the following dates:

- SGP GSA: January 11, 2022
- Verbenia GSA: January 12, 2022
- DWA GSA: January 4, 2022

Newspaper notices were published as follows to support transparency of the GSA Public Hearings for GSP adoption. Proof of publication of the notices and GSP adoption resolutions are available in **Appendix B – Noticing and Adoption Documentation**

DWA GSA
Newspaper: The Desert Sun
Publication Date: Sunday, December 19, 2021

SGP GSA – Verbenia GSA
Newspaper: Banning Record Gazette & Press-Enterprise
Publication Date for Record Gazette: Friday, December 24, 2021
Publication Date for P.E.: Sunday, December 26, 2021

SGP GSA
Newspaper: Banning Record Gazette & Press Enterprise
Publication Date for Record Gazette: Friday, December 24, 2021
Publication Date for P.E.: Sunday, December 26, 2021

Notice to Stakeholders
Stakeholders were notified via letter of initial plans to develop the SGP GSP. After the administrative Draft GSP (or Public Draft GSP) was developed, the stakeholders received an email notifying the availability of the Public Draft GSP on the SGP GSA website and the defined 60-day public comment period. See **Appendix B – Noticing and Adoption Documentation.**

Public Comments
A Public Review Draft GSP was made available on the SGP GSA website for public comment from October 1, 2021, to November 29, 2021. In advance of the document release, an email and mailed letter notice was released to interested parties and stakeholders, inviting their feedback on the Public Review Draft. In addition, a Stakeholder Advisory Group meeting was held on November 12, 2021, to provide an opportunity for discussion regarding any questions or clarifications needed on the Public Review Draft GSP. The public comments received and a summary of the responses to public comment is outlined in **Appendix C – Public Comment & Response Log**.

Incorporation of Stakeholder Feedback
Throughout the GSP process, stakeholder feedback obtained during SGP GSP Working Group Meetings, Stakeholder Advisory Group meetings, independent meetings with interested stakeholders, such as the Nature Conservancy, and the Public Comment period were considered and informed adaptations to the document. A list of Stakeholder Advisory Group meeting dates is available in Table 2-5. Stakeholder Advisory Meeting minutes, which include attendees and topics covered, are available on the SGPWA website. MBMI is a member entity of the SGP GSP Working

Group. All member entities received meeting materials, including PowerPoints and draft copies of GSP chapters, to promote a transparent and collaborative process. A list of SGP GSP Working Group Meeting topics is listed in Appendix F – San Gorgonio Pass Working Group Meeting Topics.

Notable changes to the draft GSP based on stakeholder feedback during the GSP development process included, but was not limited to the following:

- Consideration of the Apple Fire impacts on projected surface water supply and monitoring assumptions and estimations.
- Improved strategy to clarify the conditions in the Banning and Cabazon Storage Units concluded that potential GDEs cannot be supported due to significant depth to groundwater (**Section 3.2**).
- Estimations of MBMI groundwater historic and projected groundwater extractions.

In addition, response to comments on the Public Review Draft GSP is summarized in **Appendix C – Public Comment & Response Log**

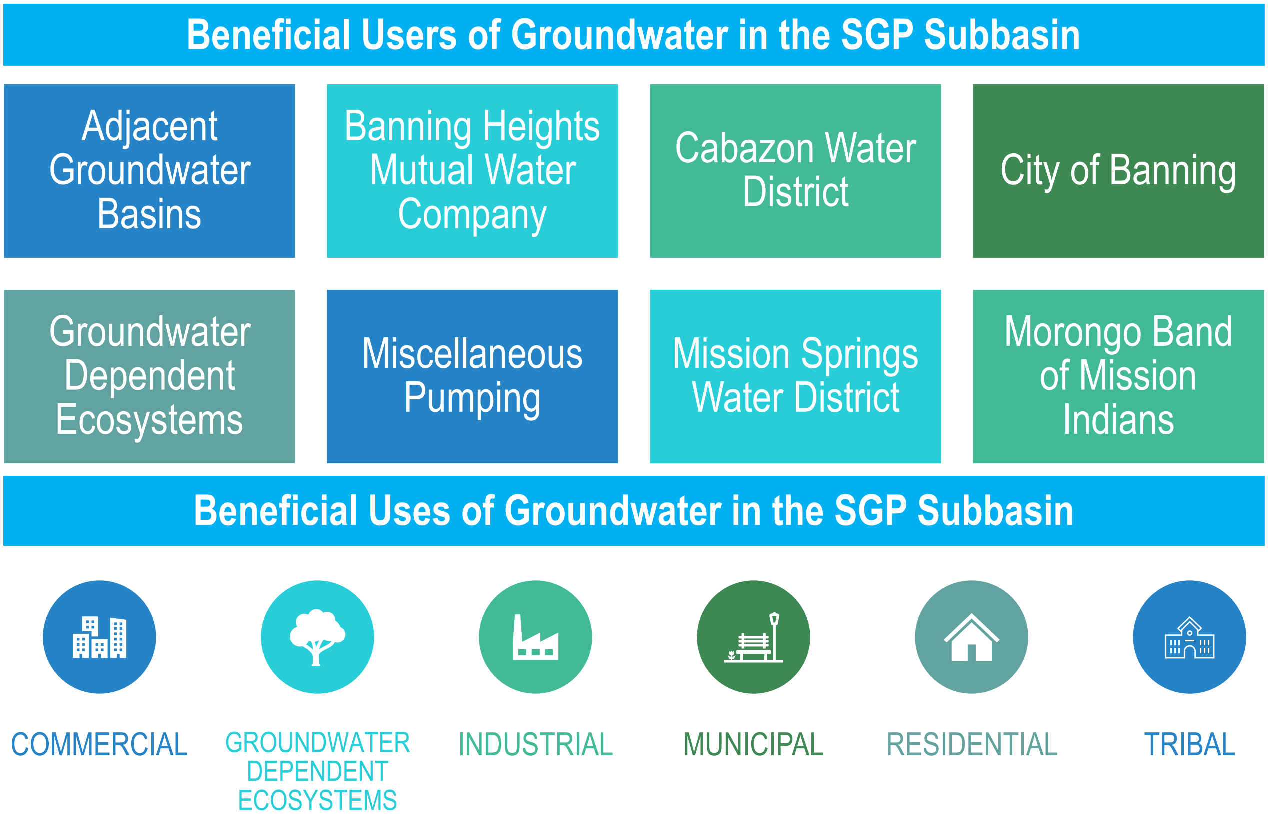

Figure 2-12 Beneficial Uses and Users of Groundwater in the San Gorgonio Pass Subbasin

Table 2-5 Public Engagement and Outreach

San Gorgonio Pass GSP Development	
Stakeholder Advisory Group Meetings	
June 12, 2019 San Gorgonio Pass Water Agency 1210 Beaumont Ave. Beaumont, CA 92223	May 11, 2020 Held via teleconference due to COVID-19 travel and gathering restrictions
August 6, 2020 Held via teleconference due to COVID-19 travel and gathering restrictions	November 10, 2020 Held via teleconference due to COVID-19 travel and gathering restrictions
January 26, 2021 Held via teleconference due to COVID-19 travel and gathering restrictions	April 6, 2021 Held via teleconference due to COVID-19 travel and gathering restrictions
July 13, 2021 Held via teleconference due to COVID-19 travel and gathering restrictions	November 12, 2021 Held via teleconference due to COVID-19 travel and gathering restrictions
*In January 2022, the GSAs held Public Hearings to adopt the Final SGP GSP. These meetings were open to all members of the public including listed stakeholders, and an opportunity for public comment was available. * Stakeholder Advisory Group meeting minutes, which include attendees and topics covered, are available on the SGPWA website (www.sgpwa.com/meeting_type/stakeholder-advisory-meeting/)	

2.5.2 Decision-Making Process

Regulation Requirements:

§354.10 (d) A communication section of the Plan that includes the following:
An explanation of the Agency's decision-making process.

The SGP GSP participants signed a Memorandum of Agreement (MOA), outlining the process for the GSA development (**Appendix A - MOA**). The participating member agencies send at least one representative to SGP GSP Working Group meetings in which feedback from stakeholders and the public are heard for consideration. The SGP GSP Working Group coordinates on technical and policy decision making at the meetings.

2.5.3 Encouraging Active Involvement

Regulation Requirements:

§354.10 (d)
(3) A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of population within the basin.
(4) The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.

Various methods of public engagement were used in the development of the GSP. These methods are summarized in **Figure 2-13** and further described below.

Public Noticing	GSA Formation	GSP Development	GSP Adoption
• Letters to Stakeholder/interested parties issued, encouraging engagement. • San Gorgonio Pass Subbasin website • Outreach materials (PowerPoints)	• Public notice • Stakeholder identification (interested parties) • Facilitation supporting GSA development	• Stakeholder advisory meetings • Member Agency Board meetings (in which the GSP was discussed) • Inter- and Intra-basin coordination • Public Draft GSP and 60-day public comment period. • Direct correspondance with interested parties	• Notifications • Written comments • Consultations with Cities and Counties

Figure 2-13 Methods of Public Engagement

2.5.3.1 Public Engagement in GSA Formation

Stakeholders and interested parties were invited to consult and comment on the formation of the GSAs of the SGP Subbasin, which culminated in a written notification to the California Department of Water Resources (DWR) by each respective GSA pursuant to Water Code §10723.8. Submittal of this notification followed Public Hearings held in accordance with Water Code §10723(b). Proof of publication of the notice of public hearings in accordance with Government Code §6066 was provided to DWR with its notification.

2.5.3.2 Public Engagement in GSP Development

Opportunities for stakeholders and interested parties to engage and consult with GSAs during development of the GSP included the standing member agency board meetings, Stakeholder Advisory Group meetings, and the 60-day period to review the Public Draft GSP and provide public comments during that period.

2.5.3.3 Disadvantaged Communities within the San Gorgonio Pass Subbasin

The Subbasin is supported by communities with diverse social, economic, and cultural backgrounds. During GSP Development, the GSAs considered the needs of all beneficial users of groundwater with an understanding of differences in resources across the Subbasin. To support groundwater sustainability, water needs, and future growth planning in conjunction with consideration of these resource discrepancies, the projects and management actions outlined in **Chapter 6 – Projects and Management Actions** prioritize benefits to Disadvantaged Communities, and the GSAs intend to support pursuance of grant funding to increase the likelihood of project and management action implementation.

Nearly all of the Subbasin is considered a Disadvantaged Community (DAC) or Severely Disadvantaged Community (SDAC). A DAC is defined as a community with a Median Household Income (MHI) less than 80 percent of the California statewide MHI. The California Department of

Water Resources (DWR) compiled U.S. Census Bureau's American Community Survey (ACS) data from 2012 to 2017; these data were used in GIS to identify DACs within the San Gorgonio Pass Subbasin. Based on the DWR criteria, 40.9 percent of the geographic area of the Subbasin is considered disadvantaged. Furthermore, a community with an MHI of less than 60 percent of the California statewide MHI, meaning an MHI of less than or equal to $38,270, is considered an SDAC. According to the U.S. Census ACS 2012-2017 data, there are a number of SDACs throughout the Subbasin, totaling 52.4 percent of the Subbasin area. **Figure 2-14** depicts the DAC and SDAC areas within the SGP Subbasin.

SGP Subbasin public water agencies, and the MBMI, are the predominant water supply source for DAC and SDAC areas. The service areas of the public water agencies essentially overly the DAC and SDAC areas, as can be seen by comparing Figure 2-3 with Figure 2-13. Based on locations of the small number of domestic wells shown in Figure 2-9, they are a water supply source primarily in the upstream canyons and adjacent non-groundwater basin areas. The lack of reliance on local domestic wells in the SGP Subbasin is likely based on the relatively high depth to water in the Banning and Cabazon storage units, which are the primary groundwater resource for the SGP Subbasin as described in **Chapter 3.** Historical depths to water in the Banning and Cabazon Storage Units are hundreds of feet and the high costs of drilling wells would have been a significant barrier to domestic well construction historically. Development in the SGP Subbasin has occurred primarily in areas, like the City of Banning, which had access to a relatively low-cost municipal groundwater supply from Banning Canyon.

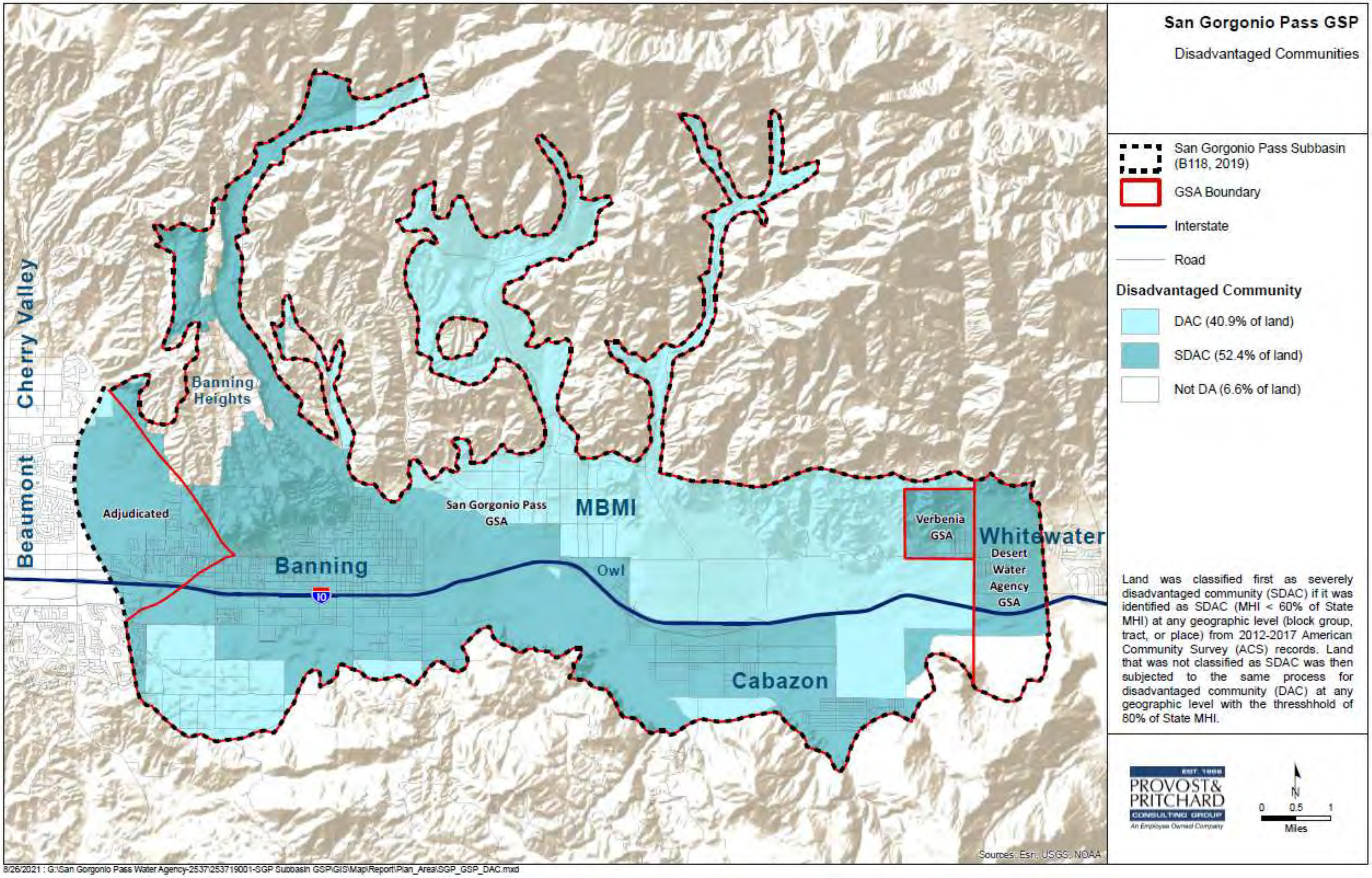

Figure 2-14 Disadvantaged Communities within the San Gorgonio Pass Subbasin

3 Basin Setting

3.1 Hydrogeologic Conceptual Model

This HCM has been written by adhering to the requirements set forth in the California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2, Article 5, Subarticle 2 (§354.14). A description of the HCM contents is provided in **Section 3.1.1.**

3.1.1 Introduction

Regulation Requirements:

§354.14(a) Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.

The purpose of a HCM is to provide an easy-to-understand description of the general physical characteristics of the regional hydrology, land use, geology, geologic structure, water quality, principal aquifers, and principal aquitards in the basin setting. Once developed, an HCM is useful in providing the context to develop water budgets, monitoring networks, and identification of data gaps.

An HCM is not a numerical groundwater model or a water budget model. An HCM is rather a written and graphical description of the hydrologic and hydrogeologic conditions that lay the foundation for future water budget models. In addition, this HCM supports and provides the hydrogeologic setting to support the Groundwater Conditions (**Section 3.2**), and Water Budget, (**Section 3.3**) of this GSP.

The narrative HCM description provided in this Section of Chapter 3 is accompanied by graphical representations of the SGP Subbasin that have attempted to clearly portray the geographic setting, regional geology, basin geometry, and general water quality. This HCM has been prepared utilizing published studies and resources and will be periodically updated as data gaps are addressed, and new information becomes available.

Several topics are touched on in the HCM, including groundwater quality, groundwater flow, and groundwater budget which are discussed in greater detail in Groundwater Conditions (**Section 3.2**) and Water Budget (**Section 3.3**).

3.1.2 Lateral Basin Boundaries

Regulation Requirements:

§354.14(b)(2) The hydrogeologic conceptual model shall be summarized in a written description that includes lateral basin boundaries, including major geologic features that significantly affect groundwater flow.

The SGP Subbasin is the portion of the Coachella Valley Groundwater Basin that lies completely within the San Gorgonio Pass. It is bounded on the north by semi-permeable rocks and the San Bernardino Mountains and to the south by the San Jacinto Mountains. The Upper Santa Ana Valley-San Timoteo (San Timoteo) Subbasin bounds the subbasin on the west and the eastern boundary is formed by a bedrock constriction that creates a groundwater cascade into the Indio Subbasin (DWR, 2004). **Figure 2-1** in Chapter 2 depicts the San Timoteo and Indio Subbasins' relation to the San Gorgonio Pass Subbasin.

3.1.3 Regional Geologic and Structural Setting

Regulation Requirements:

§354.14(b)(1) The hydrogeologic conceptual model shall be summarized in a written description that includes the regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency.

§354.14(b)(3) The hydrogeologic conceptual model shall be summarized in a written description that includes the definable bottom of the basin.

3.1.3.1 Regional Geologic and Structural Setting

Active parts of the Banning, Garnet Hill, and San Gorgonio Pass Thrust faults are associated with the San Andreas Fault through the Pass. Together, these faults accommodate strike-slip and reverse slip that contribute to both uplift of the San Bernardino Mountains and overall movement between the North American plate and the Pacific plate.

<u>San Andreas Fault</u>

The geologic structure of the region surrounding the SGP GSA is defined by the San Andreas Fault system, which includes a family of geologic features covering a large area. The San Andreas Fault is a right-lateral strike-slip fault that marks the transform boundary between the Pacific Tectonic Plate and North American Tectonic Plate. In the San Gorgonio Pass region, the San Andreas Fault steps left in a restraining bend that has resulted in compression and evolved into a complex network of three-dimensionally irregular fault surfaces (Dair and Cooke, 2009). Yule (2009) has described the San Andreas Fault in this region as disaggregating into a family of irregular and discontinuous separate fault lines. The current San Andreas Fault trace lies just north of the SGP GSA along the base of the San Bernardino Mountains.

This fractured fault system complicates how groundwater flows and moves throughout the area. Due to the numerous faults, bedrock and sediment layers have shifted resulting in significant differences in groundwater levels and flows that are difficult to understand and map. A fault system map is presented as **Figure 3-1**.

<u>Banning Fault</u>

The Banning Fault trends east-west through the San Gorgonio Pass where it generally dips steeply north and juxtaposes crystalline rocks of the San Gabriel Mountains against Cenozoic (66 mya to the present) sedimentary deposits. The Banning Fault has been modified by Quaternary reverse, thrust, and tear faults of the younger San Gorgonio Pass Fault Zone (Rewis, 2006).

<u>San Gorgonio Pass Fault Zone</u>

The San Gorgonio Pass Fault Zone is a series of Quaternary (2.6 mya to the present) reverse, thrust, and tear faults that extends from Whitewater to the Calimesa area to the west. The San Gorgonio Pass Fault Zone has a zig-zag trace caused by repetition of an L-shaped faulting pattern where the shorter base of the "L" is oriented east to northeast and the longer leg is oriented northwestward. Within the area, the San Gorgonio Pass Fault Zone has produced several tectonically created landforms with the uplifted Banning Bench being a prime example. Along the extent, the San

Gorgonio Pass Fault Zone breaks and displaces the older Banning Fault in the subsurface (Rewis et al, 2006). Water-level and geochemical data indicate that multiple groundwater barriers are associated with the Banning Storage Unit and are interpreted to be multiple strands of the San Gorgonia Pass Fault Zone (Rewis et al, 2006). Rewis maps (2006) these faults in the western portion of the SPG GSA area in the Banning Storage Unit. These faults are named the Central Banning Barrier Fault, Eastern Banning Barrier Fault, and the Banning Barrier Fault or collectively the Banning Barrier Faults (**Figure 3-1**). These faults do not have surface expressions and are interpreted by Rewis (2006) to be older than the faults that bound the Banning Bench.

Gandy Ranch Fault

The Gandy Ranch Fault extends approximately 8 miles to the northwest from the mouth of Millard Canyon and generally bisects the angle between the Banning Fault and the San Andreas Fault. East of Millard Canyon, the Gandy Ranch fault merges with the Banning Fault (Allen, 1954).

Lawrence Fault

The Lawrence Fault is located along the southern edge of the San Gorgonio Pass. It is an inactive, pre-Quaternary fault that cuts through the metasedimentary rocks in the northern portion of the San Jacinto Mountains (Rewis, 2006).

3.1.3.2 Definable Bottom of Subbasin

A large density contrast exists between the sedimentary deposits and denser basement rock in the San Gorgonio Subbasin. Using the relationship and isostatic gravity field data Langenheim et al. (2005) estimated the thickness of sedimentary deposits within the San Gorgonio Pass Subbasin. Results of this study indicates that the depth to the top of the basement complex in the Subbasin ranges from 0 feet along the margins of the basin to greater than approximately 7,000 feet northwest of Banning in the adjudicated Beaumont Storage Unit.

As shown in **Figure 3-2**, depth to the basement complex as mapped by Langenheim et al. is around 500 to 1,500 feet along the southern boundary of the basin. Across the main area of the basin, the depth of the basement complex is up to approximately 3,000 feet. Localized areas of deeper basement complex up to about 4,000 feet are located generally in the Banning and Banning Bench Storage Unit areas. It is worth noting that the older sedimentary deposits tend to have a higher degree of compaction, consolidation, and cementation than the younger deposits and as a result have greatly reduced permeability in relation to younger sedimentary deposits (Rewis, 2006).

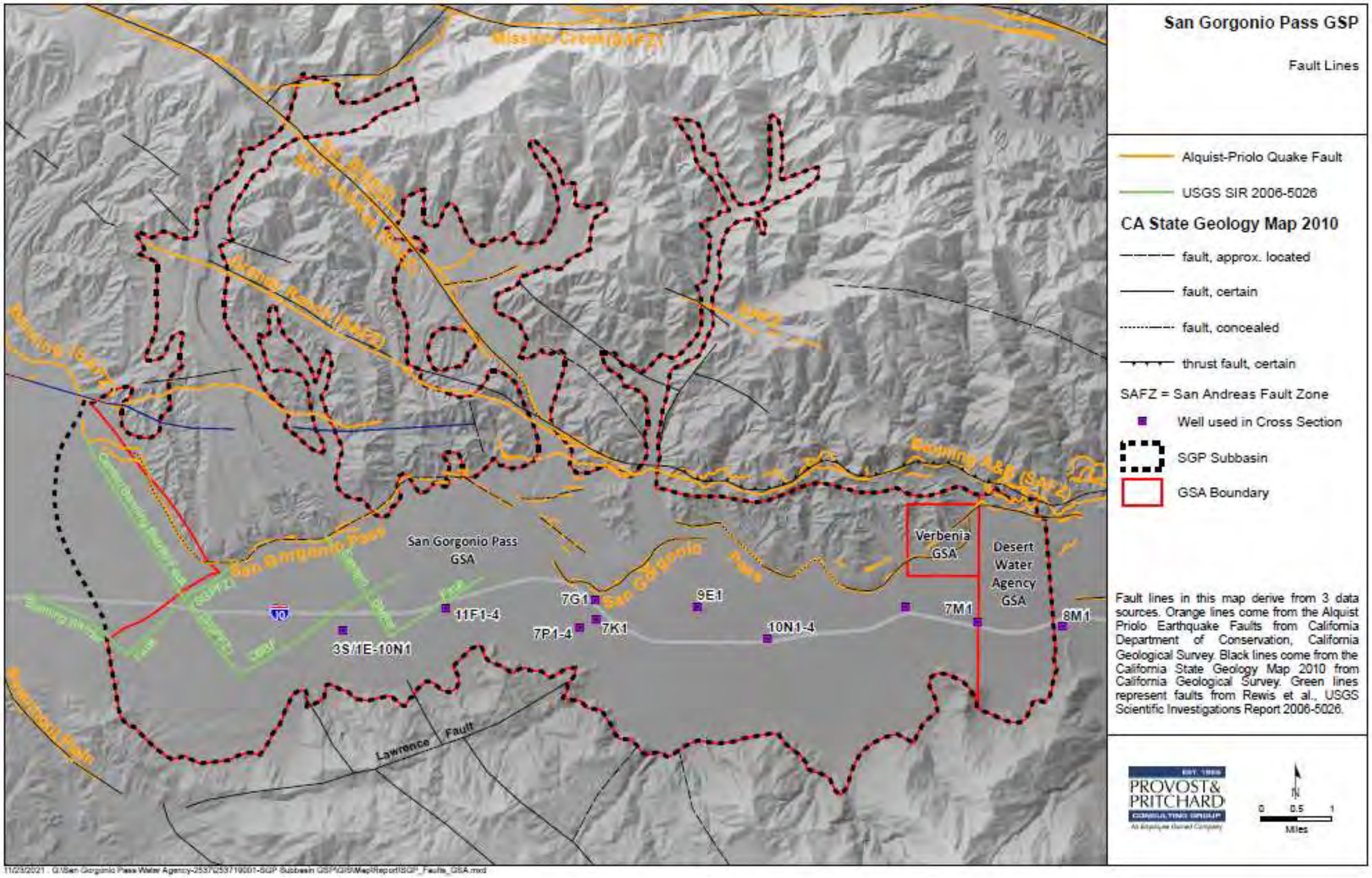

Figure 3-1 San Gorgonio Pass Fault System

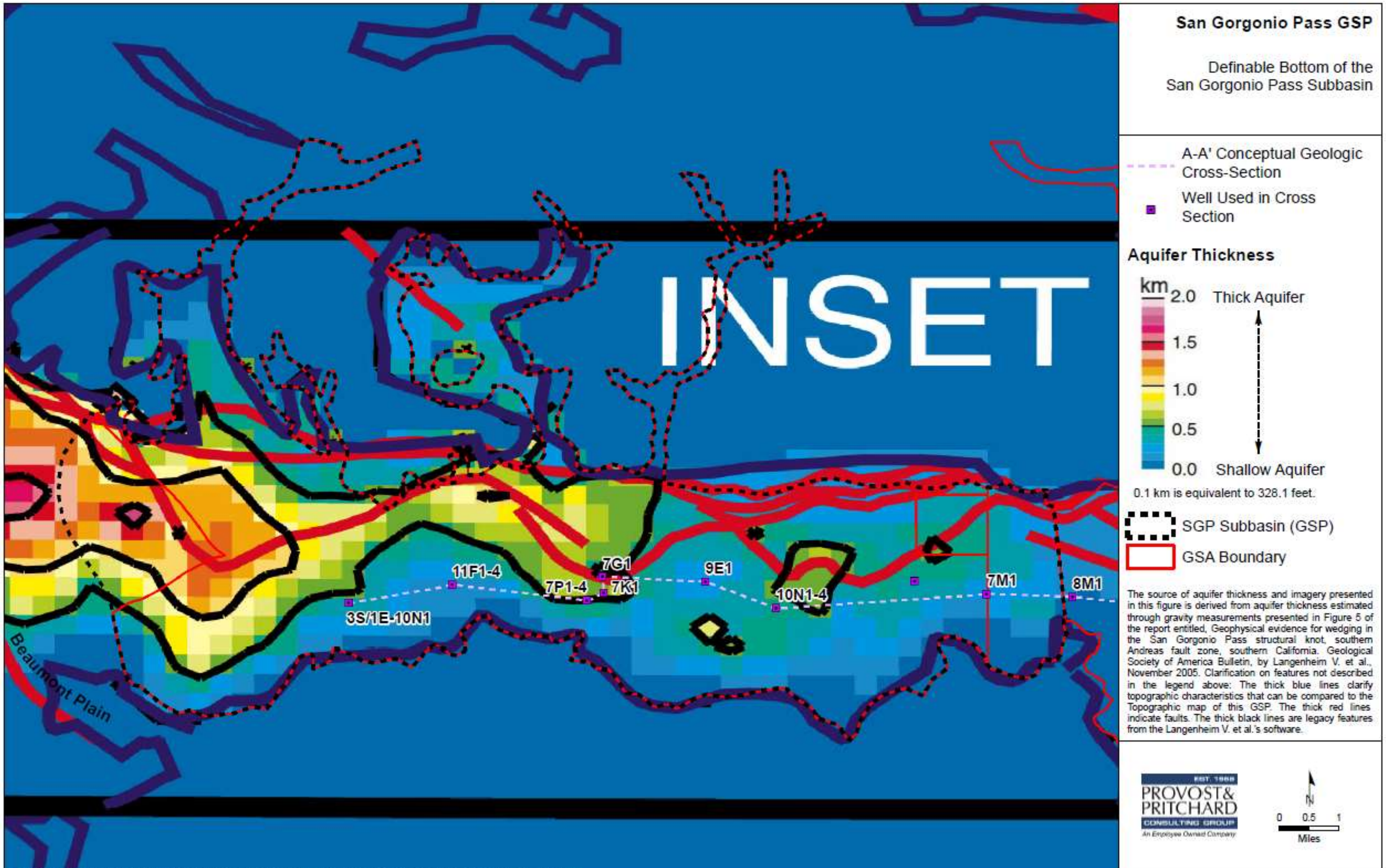

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Figure 3-2 Definable Bottom of San Gorgonio Pass Subbasin

3.1.4 Topographic Information

Regulation Requirements:

§354.14(d)(1) Physical characteristics of the basin shall be represented on one or more maps that depict topographic information derived from the U.S. Geological Survey or another reliable source.

A topographic map of the SGP GSA is presented in **Figure 3-3**. The San Gorgonio Pass Subbasin main valley has an elevation of approximately 2,600 feet above mean sea level (msl) on its western edge and approximately 1,400 feet above msl on the eastern edge. The pass itself slopes gently to the southeast. The floor of Banning Canyon is at an elevation of approximately 5,200 feet above msl at the top and at an elevation of approximately 2,600 feet above msl at the bottom in the area where it grades into the Banning Bench. The floor of Potrero Canyon is at an elevation of approximately 5,800 feet above msl at the top and approximately 2,500 feet above msl at the bottom where it grades into the main valley. The floor of Millard Canyon is at an elevation of approximately 5,500 feet above msl at the top and at approximately 2,700 feet above msl at the bottom where it grades into the main valley. The mountains to the north and south of the SGP GSA rise abruptly to elevations approaching 9,000 feet higher than the pass itself.

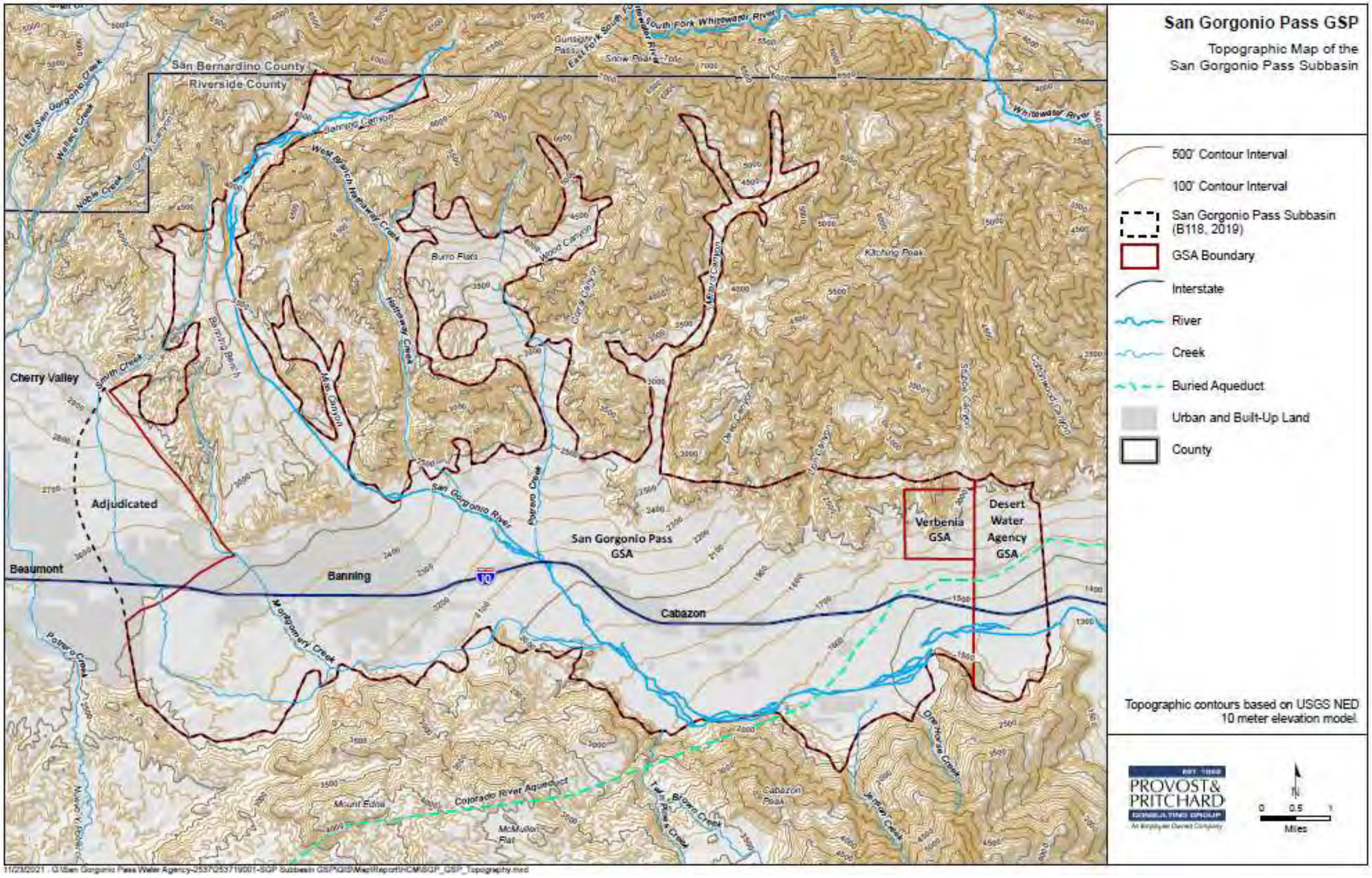


Figure 3-3 Topographic Map of the San Gorgonio Pass Subbasin

3.1.5 Surficial Geology

Regulation Requirements:

§354.14(d)(2) Physical characteristics of the basin shall be represented on one or more maps that depict surficial geology derived from a qualified map including the locations of cross-sections required by this Section.

The SGP Subbasin topography is covered by numerous alluvial fan deposits derived from the San Bernardino and San Jacinto Mountains (USGS, 2017). These alluvial fans provide wide areas that can recharge surface flows into the underlying SGP Subbasin.

A generalized geologic map, pieced together from USGS geologic maps of the San Gorgonio Mountain, Morongo Valley, Beaumont, Cabazon, and White Water quadrangle maps by T.W. Dibblee, is shown in **Figure 3-4**. As shown in **Figure 3-4**, surficial geologic materials in the SGP Subbasin consist of consolidated rocks and unconsolidated deposits. The consolidated rocks are comprised of crystalline basement rocks of the Peninsular Ranges to the south (qdx/qdi) and crystalline basement rocks of the San Gabriel Mountains to the north (qr/qd). Millard Canyon, Potrero Canyon, and Banning Canyon to the north are filled by young surficial Quaternary deposits (Qa/Qg). Additional pockets of fanglomerate materials (Qcf) are scattered around the foothills to the north. More detailed geologic mapping (**Figure 3-5** and **Figure 3-6**) was prepared by Matti and others (1992). As mapped by Matti and others, the consolidated rocks are comprised of Mesozoic, Paleozoic, and pre-Cambrian granitoid basement rocks of the Peninsular Ranges to the south (prb) and the San Gabriel Mountains (sgb). Millard Canyon and Potrero Canyon are filled by deposits of younger alluvial fans of Holocene and late Pleistocene age (Qyf). Banning Canyon is generally filled with very young surficial alluvial deposits (Qw) of Holocene age and Pleistocene age deposits of older alluvial fans (Qof). Old and very old surficial deposits of Pleistocene age (Qdf and QTst) comprise the surface of the Banning Bench. The surface deposits, as mapped by Matti and others, are shown on Conceptual Geologic A-A' to delineate contacts between surface deposits on the ground surface (**Figure 3-8**).

3.1.6 Soil Characteristics

Regulation Requirements:

§354.14(d)(3) Physical characteristics of the basin shall be represented on one or more maps that depict soil characteristics as described by the appropriate Natural Resource Conservation Service soil survey or other applicable studies.

Using the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey of Riverside County, an analysis of the properties and qualities of soils pertinent to groundwater recharge in the area was performed. Using NRCS data, the soils textural category for the identified soils have been related to Saturated Hydraulic Conductivity (Ksat). Ksat is a quantitative measure of a soil's ability to transmit water when subjected to a hydraulic gradient. The relative Ksat rates for the NRCS soil types have been mapped on **Figure 3-7**.

As shown on **Figure 3-7**, soils within the SGP Subbasin generally have relatively high Ksat rates across the entire basin. Northwest trending strings of soils with very high Ksat rates are located within areas of intermittent stream channels and within Banning Canyon. Pockets of moderately high to very low Ksat rates are located within the Banning Bench area and against the mountainous areas in the northeast and southwest portions of the SGP Subbasin.

3.1.7 Geologic Cross-sections

Regulation Requirements:

§354.14(c) The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.

Three geologic cross-sections (A-A', B-B', and C-C') are presented in **Figure 3-8** through **Figure 3-10**, respectively. The locations of the cross-sections are shown on **Figure 3-5**.

- Conceptual Cross-Section A-A' was generated based on the SGP Subbasin GSP groundwater model data, with more detailed geologic unit descriptions given in Rewis (2006) as shown on Cross-Section B-B'. Conceptual Cross-Section A-A' extends east from well 10N1 generally down the central portion of the SGP Basin. The geologic units below ground surface descriptions on Conceptual Cross-Section A-A' are based on those shown on B-B' (Rewis, 2006, Figure 6A). However, the Qo and Qvo units from Rewis (2006) are shown as a single layer from the model data on Conceptual Geologic Cross-Section A-A' (**Figure 3-8**).
- Cross-section B-B' (Rewis, 2006, Figure 6A) is along an east-west transect; however, it extends outside of the SGP GSA to the west and cuts through the Beaumont, Banning, and Cabazon Storage Units. This cross-section is useful in demonstrating the relationship between the crystalline Peninsular Range rocks, older sedimentary deposits, and the younger sedimentary deposits which makeup the water bearing deposits of the Subbasin. (**Figure 3-9**)
- Cross-section C-C' (Langenheim, 2005, Figure 5B) is along a north-south transect and cuts through the subbasin entirely to the north and the south and shows the relationship of the San Gorgonio Pass Fault Zone to the Banning Fault. (**Figure 3-10**)

There are several locations where wells appear to be deeper than the bottom of the alluvial subbasin (e.g., 11F1-4, 23B1, and 8M1). Assuming that these wells were completed above bedrock, there appears to be some discrepancies in the thickness of the aquifer materials based on Langenheim (2005). For example, the DWR Well Completion Report for 11F1 (WCR No. e0094598) shows various alluvial materials down to 1,060 feet below ground surface. Similarly, WCR No. 441043 is for 23B1, a Cabazon County Water District well, and it also shows various alluvial materials down to a depth of 1,220 feet. This appears to indicate that in these locations, bedrock is deeper than indicated by Langenheim (2005).

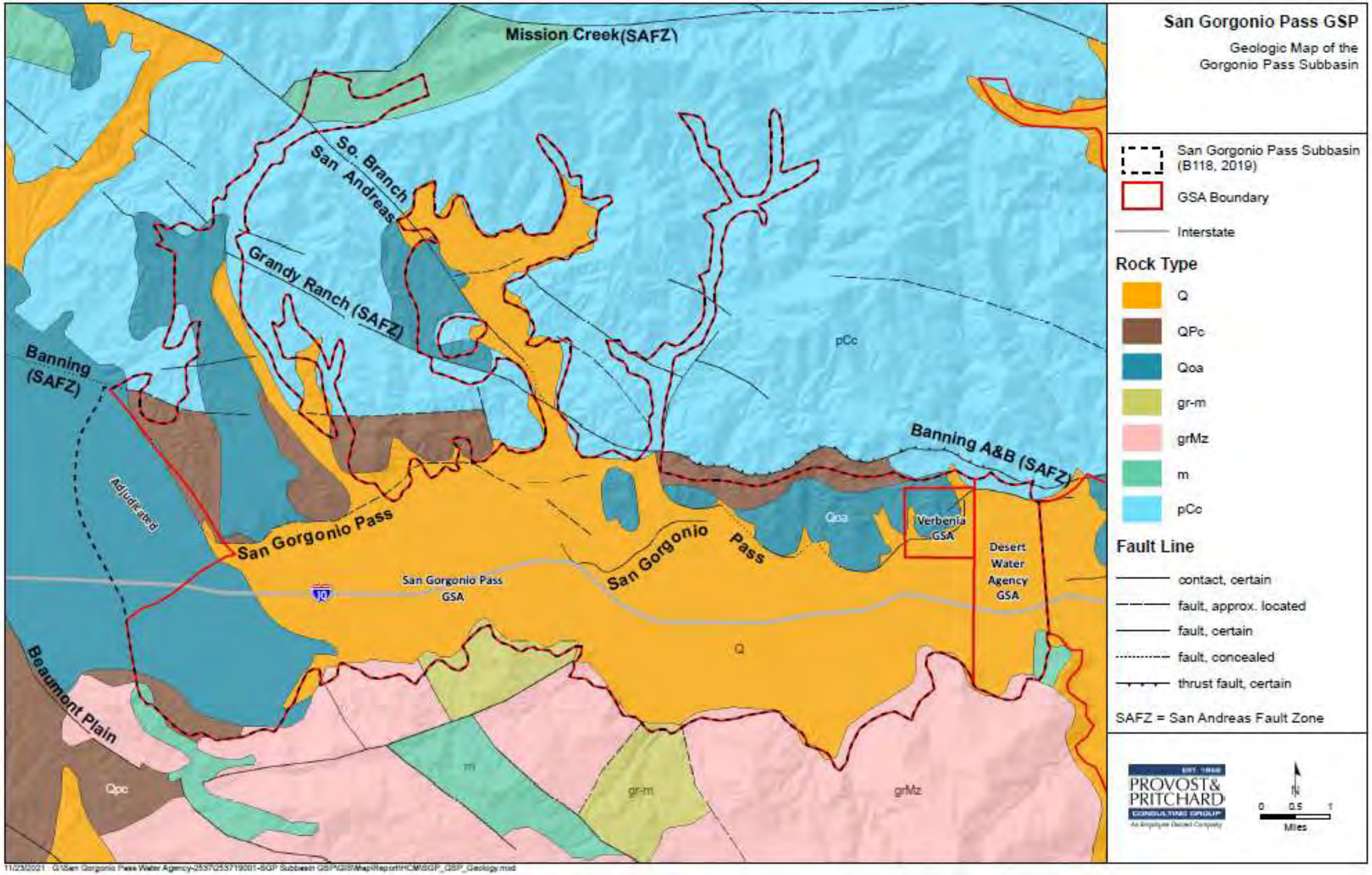


Figure 3-4 Generalized Geologic Map

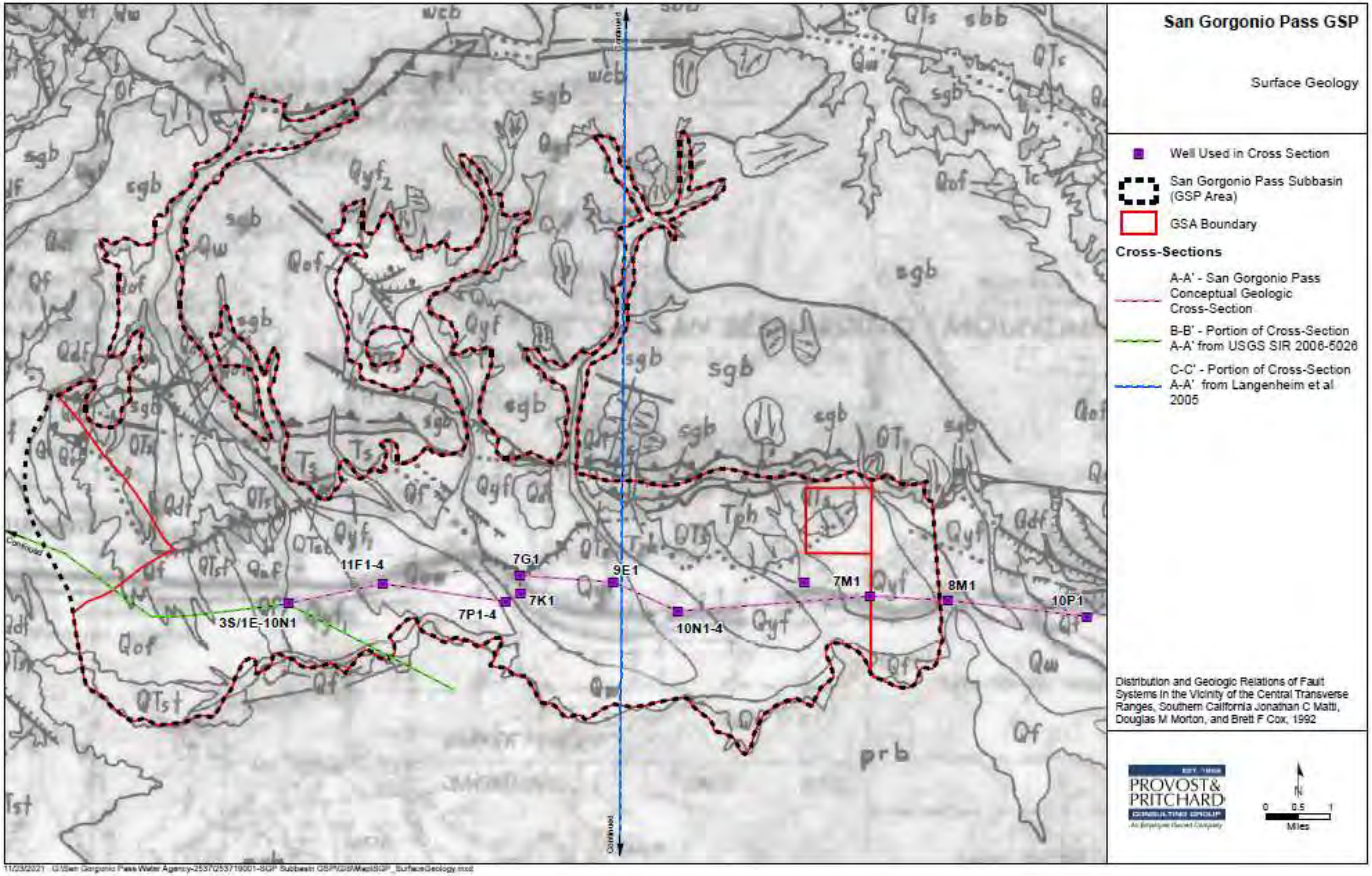


Figure 3-5 Geologic Map with Cross-Section Locations

Qw ALLUVIUM OF ACTIVE CHANNELS AND WASHES (HOLOCENE)

Qds WIND-DEPOSITED DUNE SAND (HOLOCENE)

Ql LACUSTRINE DEPOSITS OF ANCIENT LAKE COAHUILA (HOLOCENE)

Qow RECENTLY ADANDONED ALLUVIUM OF ACTIVE CHANNELS AND WASHES (HOLOCENE)

Qf DEPOSITS OF MODERN ALLUVIAL FANS (HOLOCENE)--Surfaces undissected

Qa DEPOSITS OF MODERN FLUVIAL FLOOD PLAINS (HOLOCENE)--Surfaces undissected

Qyf DEPOSITS OF YOUNGER ALLUVIAL FANS (HOLOCENE AND PLEISTOCENE)--Surfaces slightly to moderately dissected. Includes:

- **Qyf_2** Alluvial-fan deposits with slightly dissected surfaces and soil profiles lacking argillic horizons (Holocene)
- **Qyf_1** Alluvial-fan deposits with slightly to moderately dissected surfaces and soil profiles with weak argillic horizons (Holocene and latest Pleistocene)

Qya DEPOSITS OF YOUNGER FLUVIAL FLOOD PLAINS (HOLOCENE AND PLEISTOCENE)--Surfaces slightly to moderately dissected. Includes:

- **Qya_2** Flood-plain deposits with slightly dissected surfaces and soil profiles lacking argillic horizons (Holocene)
- **Qya_1** Flood-plain deposits with slightly to moderately dissected surfaces and soil profiles with weak argillic horizons (Holocene and latest Pleistocene)

Qof DEPOSITS OF OLDER ALLUVIAL FANS (PLEISTOCENE)--Surfaces moderately to well dissected; soil profiles have moderate argillic horizons

Qoa DEPOSITS OF OLDER FLUVIAL FLOOD PLAINS (PLEISTOCENE)--Surfaces moderately to well dissected; soil profiles have moderate argillic horizons

Qdf DEPOSITS OF OLDER DISSECTED ALLUVIAL FANS (PLEISTOCENE)--Surfaces moderately to well dissected; soil profiles have well developed argillic horizons

Qda DEPOSITS OF OLDER DISSECTED FLUVIAL FLOOD PLAINS (PLEISTOCENE)--Surfaces moderately to well dissected; soil profiles have well developed argillic horizons

Qs SHOEMAKER GRAVEL OF NOBLE (1954a) AS USED BY MEISLING AND WELDON (1989) (PLEISTOCENE)

Qh HAROLD FORMATION OF NOBLE (1954a) AS USED BY MEISLING AND WELDON (1989) (PLEISTOCENE)

QTs UNDIFFERENTIATED SEDIMENTARY ROCKS (PLEISTOCENE AND PLIOCENE)

QTst DEPOSITS OF SAN TIMOTEO BADLANDS OF FRICK (1921) AS USED BY MATTI AND MORTON (1975) (PLEISTOCENE AND PLIOCENE)--Locally includes underlying lithic and arkosic deposits that are unnamed

Tp PHELAN PEAK DEPOSITS OF WELDON (1985a,b) AS USED BY MEISLING AND WELDON (1989)

Tph PAINTED HILL FORMATION OF ALLEN (1957) (PLIOCENE AND MIOCENE)--Late Miocene age for basal part of the Painted Hill Formation north of the Banning fault is indicated by K/Ar age determinations of about 6 Ma (see Table 2 of text)

Ti IMPERIAL FORMATION (MIOCENE)--Late Miocene age for the Imperial Formation is indicated by K/Ar age determinations of about 6 Ma from the basal part of the overlying Painted Hill Formation north of the Banning fault (see Table 2 of text)

Ts UNDIFERENTIATED SEDIMENTARY ROCKS (PLIOCENE AND MIOCENE)--Includes: ***San Gorgonio Pass region***: Painted Hill Formation, Imperial Formation, and Hathaway Formation (of Allen, 1957) (Pliocene and Miocene); ***southeastern San Gabriel Mountains***: unnamed conglomerate (unit Tc of Morton and Matti, 1987) (Miocene)

Tc COACHELLA FANGLOMERATE AS MAPPED BY ALLEN (1957) AND PETERSON (1975)

Tsa SANTA ANA SANDSTONE OF VAUGHAN (1922) AS MAPPED BY SADLER (1982a,b) AND SADLER AND DEMIRER (1986)

Tsu UNNAMED NONMARINE SANDSTONE AND CONGLOMERATE OF MORTON AND MILLER (1975) (MIOCENE)--Mapped as Formation of Warm Springs Canyon by Matti and others (1992)

Tm MILL CREEK FORMATION OF GIBSON (1971) AS USED BY MATTI AND OTHERS (1992) (MIOCENE)

Tcr CROWDER FORMATION OF WELDON (1985b) AS USED BY WELDON AND OTHERS (1984) AND MEISLING AND WELDON (1989) (MIOCENE)

Tpc PUNCHBOWL FORMATION OF CAJON PASS REGION AS MAPPED BY WOODBURNE AND GOLZ (1972) (MIOCENE)

Tg GRANODIORITE IN SOUTHEASTERN SAN GABRIEL MOUNTAINS (MORTON, 1975b; MILLER AND MORTON, 1977; MORTON AND MATTI, 1987, UNIT Tgd) (MIOCENE)

ps PELONA SCHIST (MESOZOIC)

prb PENINSULAR RANGES BLOCK (MESOZOIC, PALEOZOIC, AND PRECAMBRIAN?)--Granitoid rocks and prebatholithic metasedimentary rocks

sgb SAN GABRIEL MOUNTAINS BLOCK (MESOZOIC, PALEOZOIC, AND PRECAMBRIAN)--Granitoid rocks and prebatholithic metaplutonic and metasedimentary rocks

sbb SAN BERNARDINO MOUNTAINS BLOCK (MESOZOIC, PALEOZOIC, AND PRECAMBRIAN)--Granitoid rocks and prebatholithic sedimentary, metasedimentary, and metaplutonic rocks. Includes:

- **TRm** Megaporhyrytic hornblende-biotite monzogranite of Matti and others (1986) and Frizzell and others (1986) that has large euhedral K-feldspar phenocrysts (Triassic). Frizzell and others (1986) obtained an age of 215 Ma on zircon using the U/Pb method
- **ms** Metaquartzite, marble, and pelitic gneiss and schist (Paleozoic and Precambrian)

Figure 3-6 Geologic Unit Descriptions (Matti, Morton, and Cox, 1992)

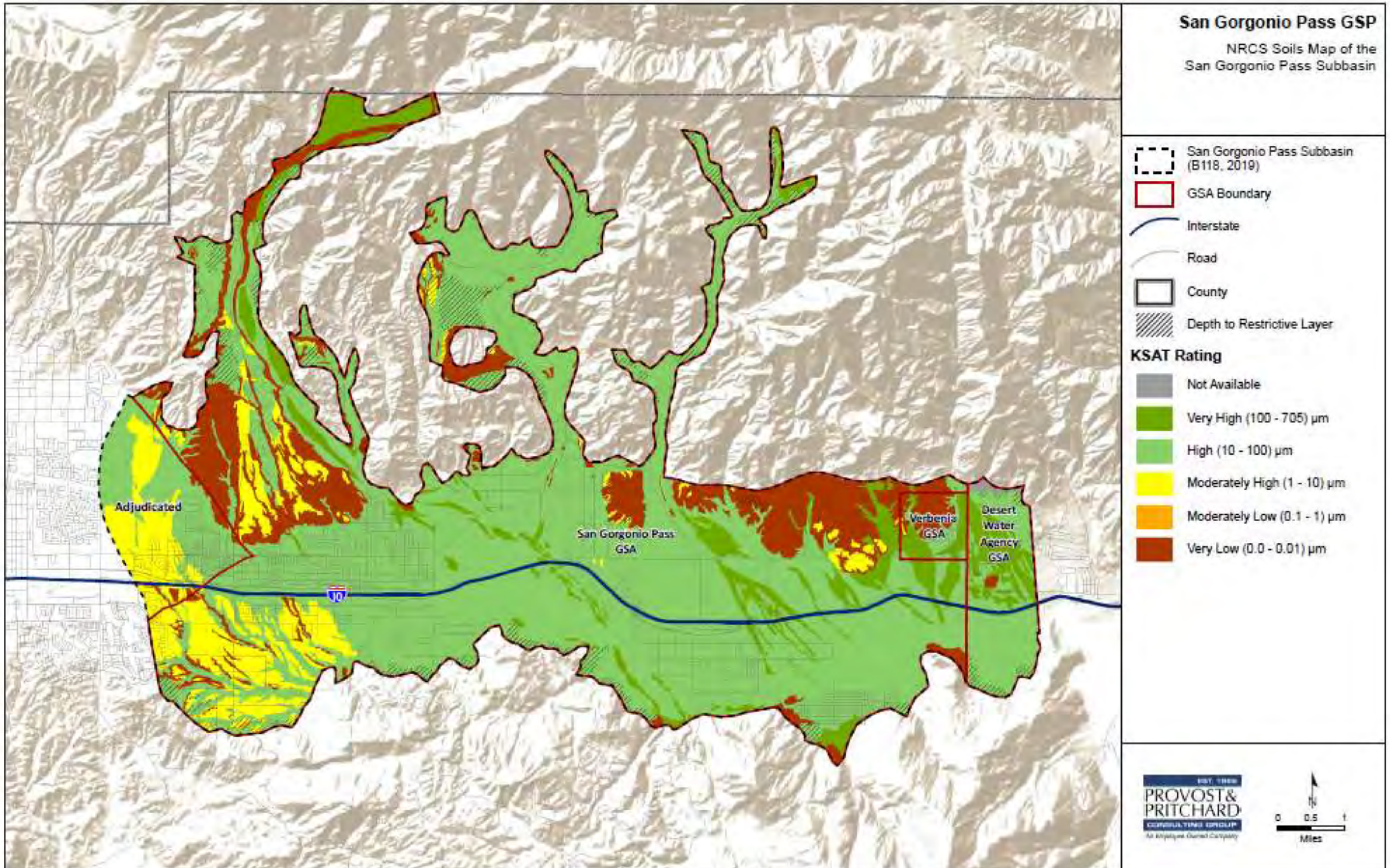


Figure 3-7 NRCS Soils Data Map

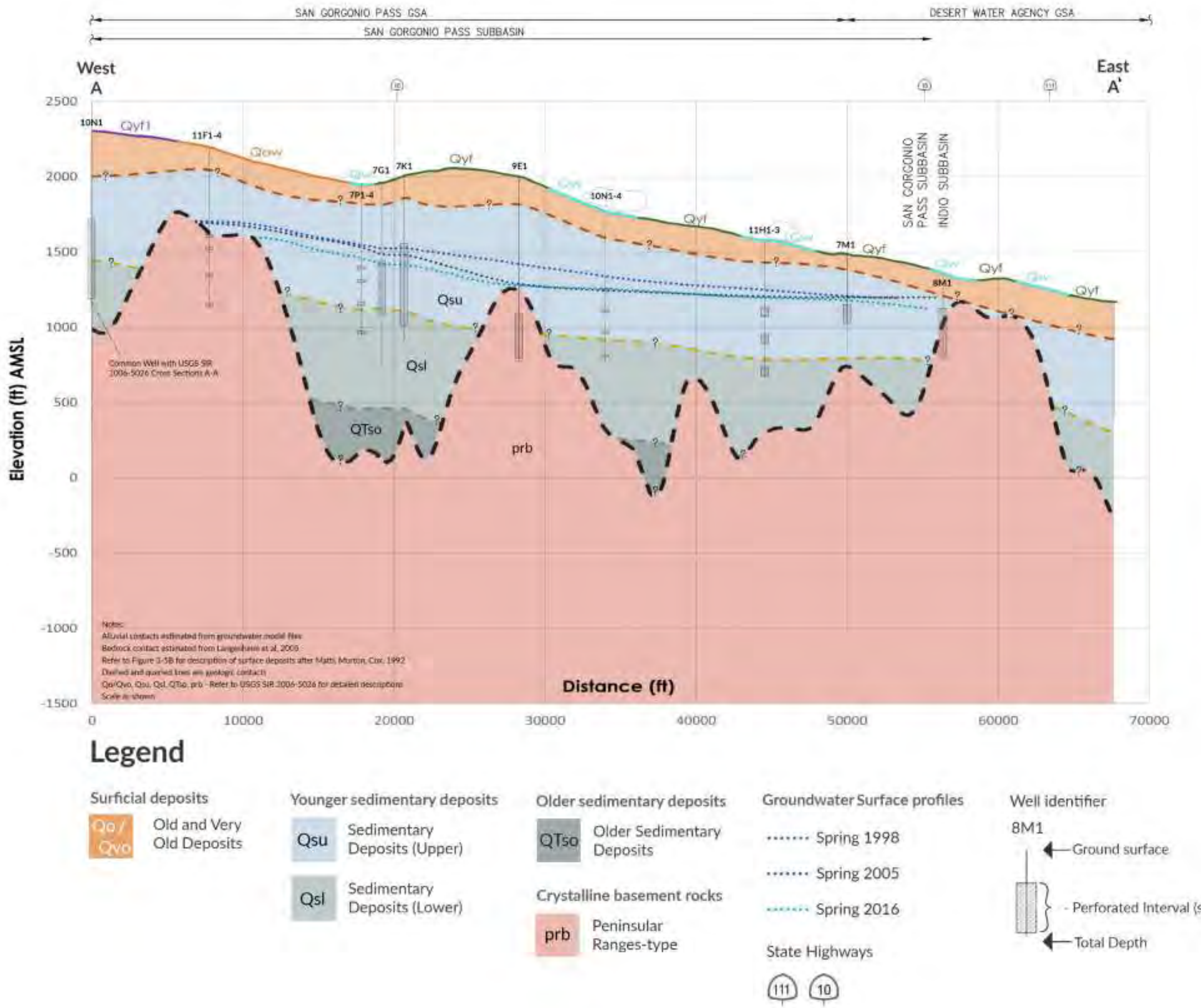


Figure 3-8 Conceptual Geologic Cross-Section A-A'

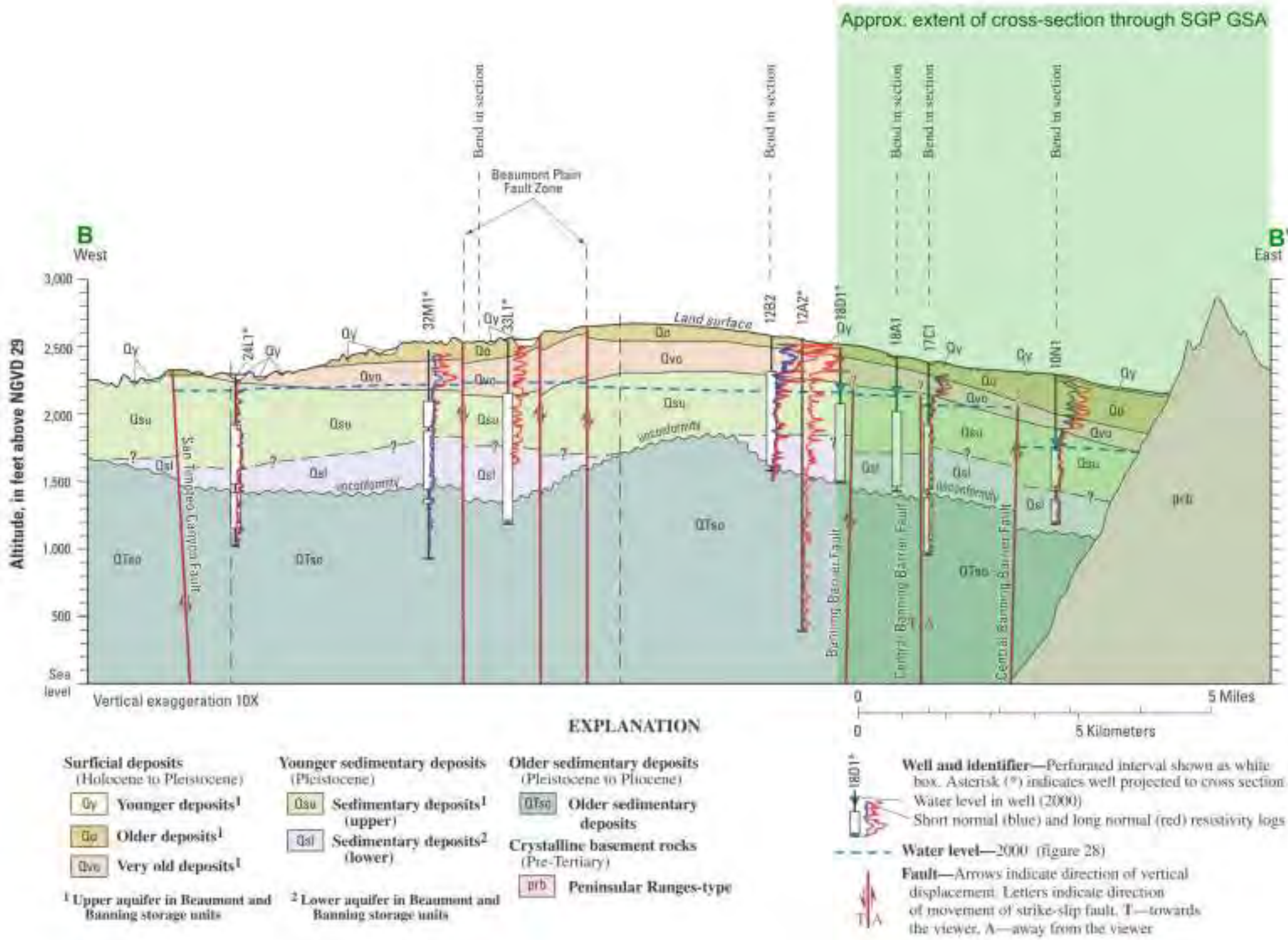


Figure 3-9 Cross-Section B-B' (Rewis et al., 2006, Figure 6A)

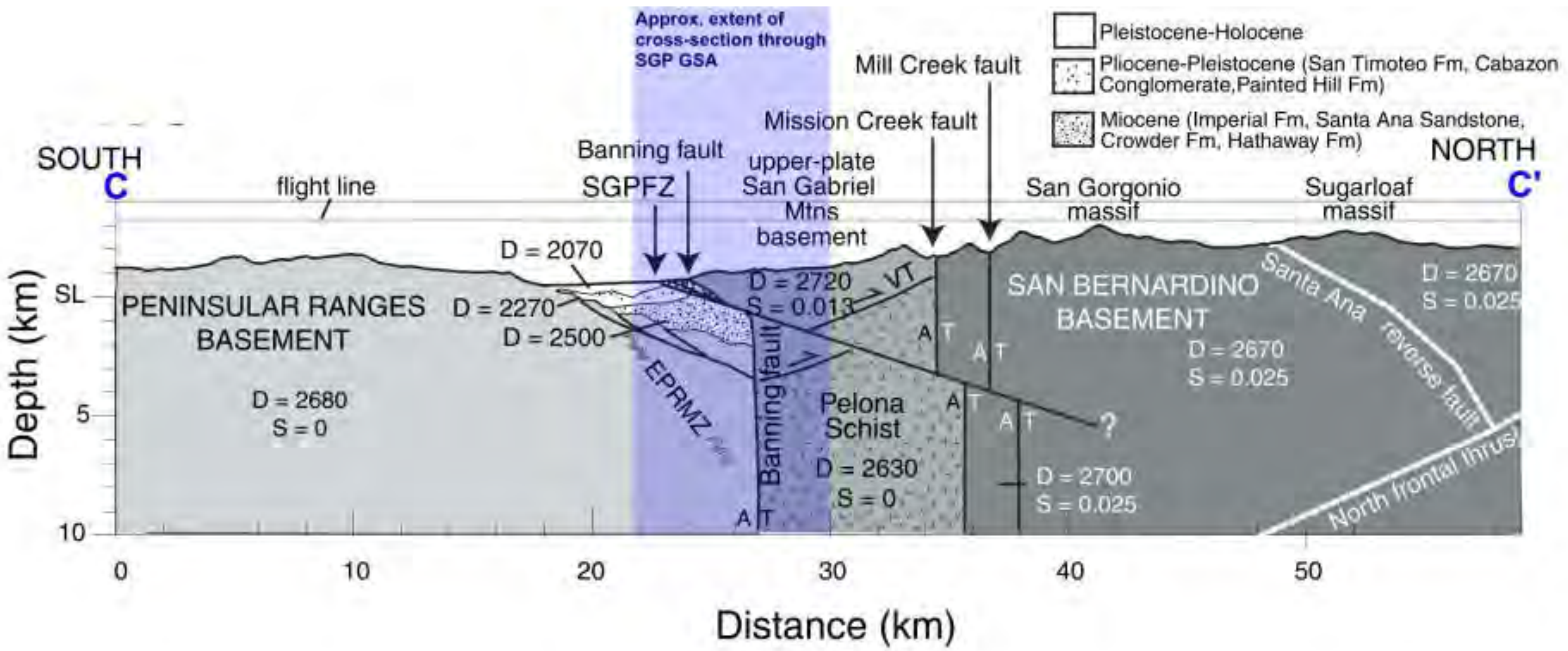


Figure 3-10 Cross-Section C-C' (Langenheim, 2005)

3.1.8 Aquifer System

Regulation Requirements:

§354.14(b)(4) The hydrogeologic conceptual model shall be summarized in a written description that includes the principal aquifers and aquitards.

§354.14(b)(4)(c) Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features.

In general terms, Holocene (12,000 years ago to the present) and Pleistocene (2.6 mya to 12,000 years ago) age alluvium and the Pliocene to Pleistocene age San Timoteo Formation are the main water bearing deposits within the SGP Subbasin. Holocene alluvium is comprised of mostly gravel and sand. These deposits lie mostly above the groundwater surface and contribute little water to wells. Holocene alluvium is found in the subbasin tributaries and allows for infiltration of runoff for recharge. Pleistocene age alluvial sands, gravels, clays, and silts lie at deeper depths and yield moderate amounts of water to wells. The San Timoteo Formation is one of the main water-bearing deposits in the SGP Subbasin and extends to depths greater than 2,000 feet below the surface. It is Pliocene to Pleistocene in age and consists of poorly sorted to sorted, partly consolidated, fine to coarse sandstone with layers of gravel and thin interbedded clays (DWR, 2004).

Five hydraulically connected groundwater storage units have been recognized within the SGP Subbasin. These storage units have been created by geologic faults that form barriers to lateral movement of groundwater leading to groundwater levels that vary significantly across adjacent storage units. Subbasin faulting is described in **Section 3.1.3.1**. The hydrologic storage unit boundaries were first defined by Bloyd (1971). In 2006, Rewis and others refined Bloyd's storage unit boundaries based on geologic and hydrologic data. The boundaries of the groundwater storage units, as mapped by the USGS (2006) are shown in **Figure 3-16.** These named units include Beaumont Storage Unit, Banning Canyon Storage Unit, Banning Bench Storage Unit, Banning Storage Unit, and the Cabazon Storage Unit. The Beaumont Storage Unit has been adjudicated and will not be discussed in detail in this GSP.

The main water-bearing deposits in the Banning and Cabazon storage units of the San Gorgonio Pass Subbasin are the saturated portions of the Quaternary surficial deposits (Qy, Ql, Qo, and Qvo) and the younger sedimentary deposits (Qsu and Qsl). These deposits can be divided into three aquifers: (1) a perched aquifer, (2) an upper aquifer, and (3) a lower aquifer. The older sedimentary deposits (QTso) and the crystal-line basement rocks (prb and trb) surround and underlie the surficial and younger sedimentary deposits. These deposits and rocks generally are impermeable, yielding only small quantities of water to wells. Although the older sedimentary deposits have considerable lithologic variability, the various lithologies are similar in terms of their greater degree of compaction, consolidation, and cementation relative to the younger sedimentary deposits, which greatly reduces the permeability of the older sedimentary deposits. The crystalline rocks and older sedimentary deposits are considered non-water bearing and form the base and, in many areas, the lateral boundaries of the ground-water basin (Rewis, 2006).

Depths to water in the Banning and Cabazon storage units are typically greater than 100 feet, and often are several hundred feet deep. Groundwater in the Banning and Cabazon storage units is recharged by surface water and groundwater discharges from the canyons (Banning Canyon, Hathaway Canyon, Potrero Canyon and Millard Canyon) storage units (Rewis, 2006). **Figure 3-11** shows a north-south cross section with water levels and subsurface flows in the eastern portion of the Cabazon storage unit (MBMI, 2012b). The alignment for this cross section is shown in **Figure 3-12** (MBMI, 2012a). As shown on this cross section, subsurface groundwater discharges from Millard Canyon into the Cabazon storage unit at the northern boundary of the Cabazon storage unit and flows southward. Based on limited water level data, similar flow patterns also occur in other parts of the Cabazon storage unit, with recharge being provided by surface runoff and groundwater discharge from the Banning Canyon and other canyon storage units. Storage capacity in the Cabazon storage unit, as described in **Section 3.2** is about 900,000 acre-feet and historical annual groundwater pumping, as described in **Section 3.3**, is relatively small.

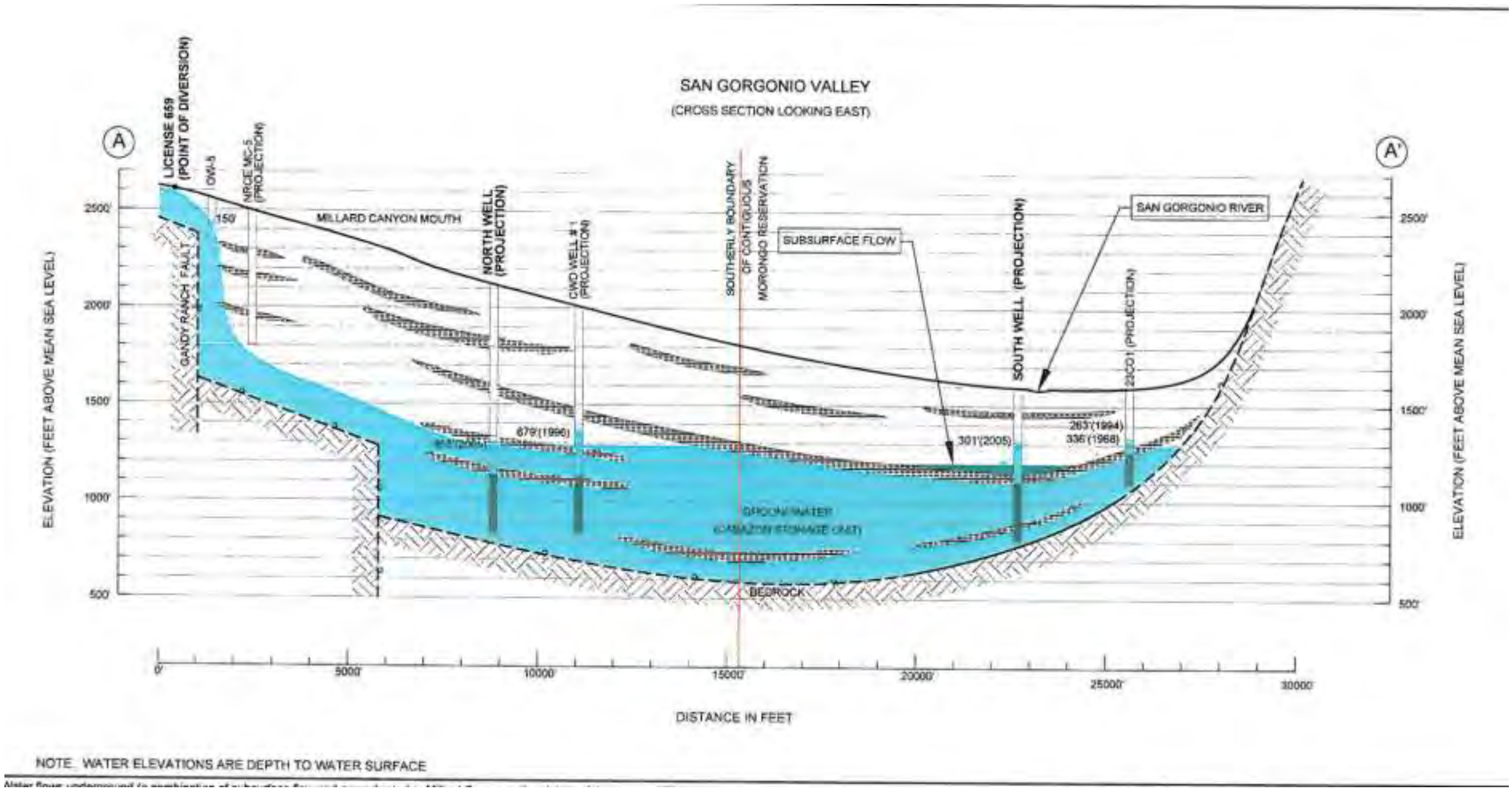


Figure 3-11 Subsurface Flow and Groundwater in the San Gorgonio Valley, Cross Section View (MBMI, 2012b)

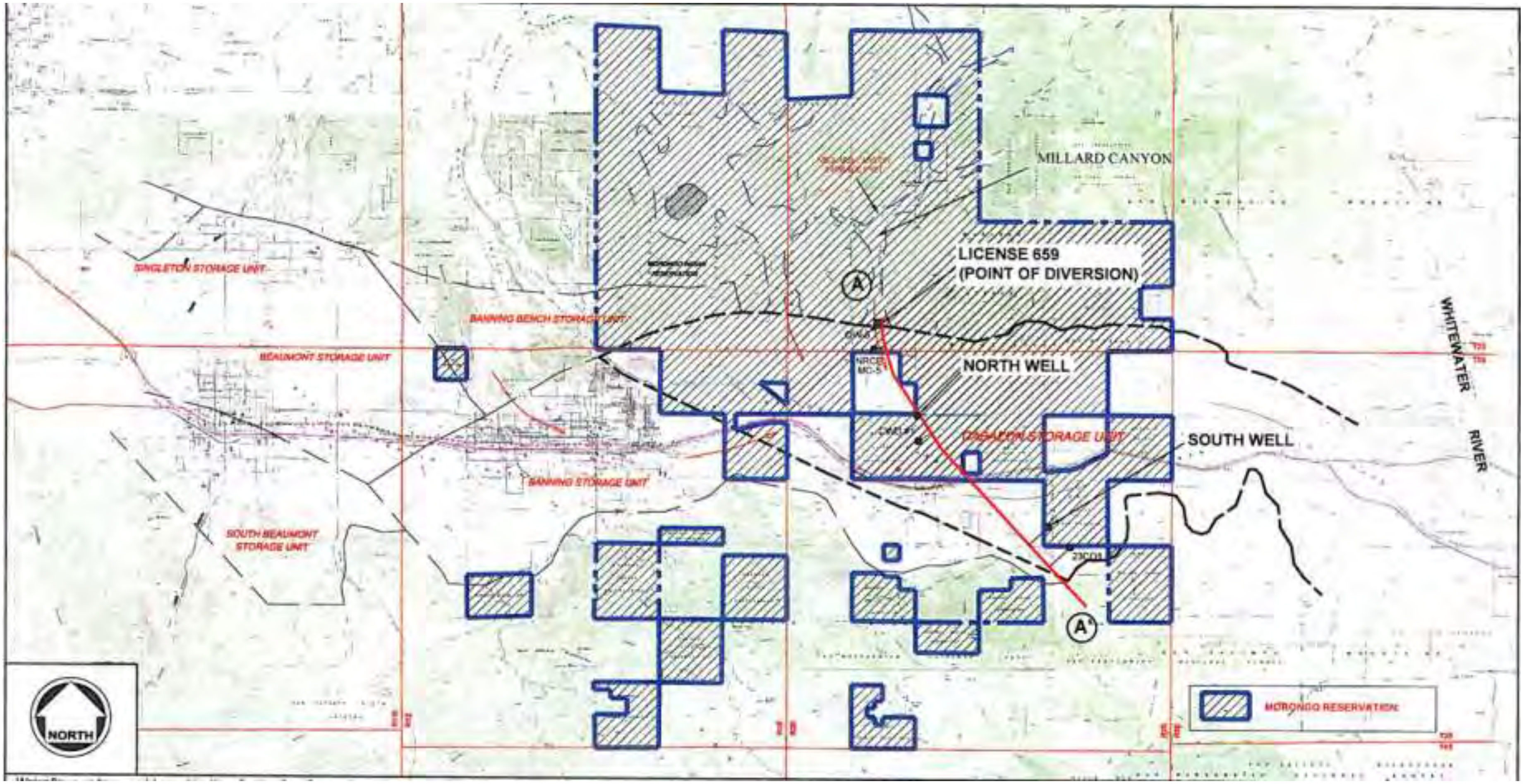


Figure 3-12 Subsurface Flow and Groundwater in the San Gorgonio Valley, Plan View (MBMI, 2012a)

The Banning Canyon is the largest canyon storage unit in the SGP and it has the majority of groundwater extractions as described in **Section 3.3**. Banning Canyon, similar to the other canyon storage units, is a shallow alluvial-filled canyon that is surrounded over much of its length by crystalline rocks of the San Bernardino Mountains. The southern portion of the Banning Canyon overlies the Banning Bench storage unit and is surrounded there by the underlying older sedimentary (QTso) deposits of the Banning Bench. The older sedimentary deposits of the Banning Bench storage unit primarily consist of San Timoteo formation materials, with less permeability than the surficial and younger sedimentary deposits and providing only domestic water supplies (Rewis, 2006). A schematic cross section showing the southern portion of the Banning Canyon and Banning Bench overlap is shown in **Figure 3-13.** With one known exception, wells in the Banning Canyon are less than 150 feet in depth and extract groundwater from the relatively shallow alluvial deposits. The water supply from groundwater wells in Banning Canyon is dependent on annual runoff owing to the limited capacity of the Banning Canyon storage units (Rewis, 2006).

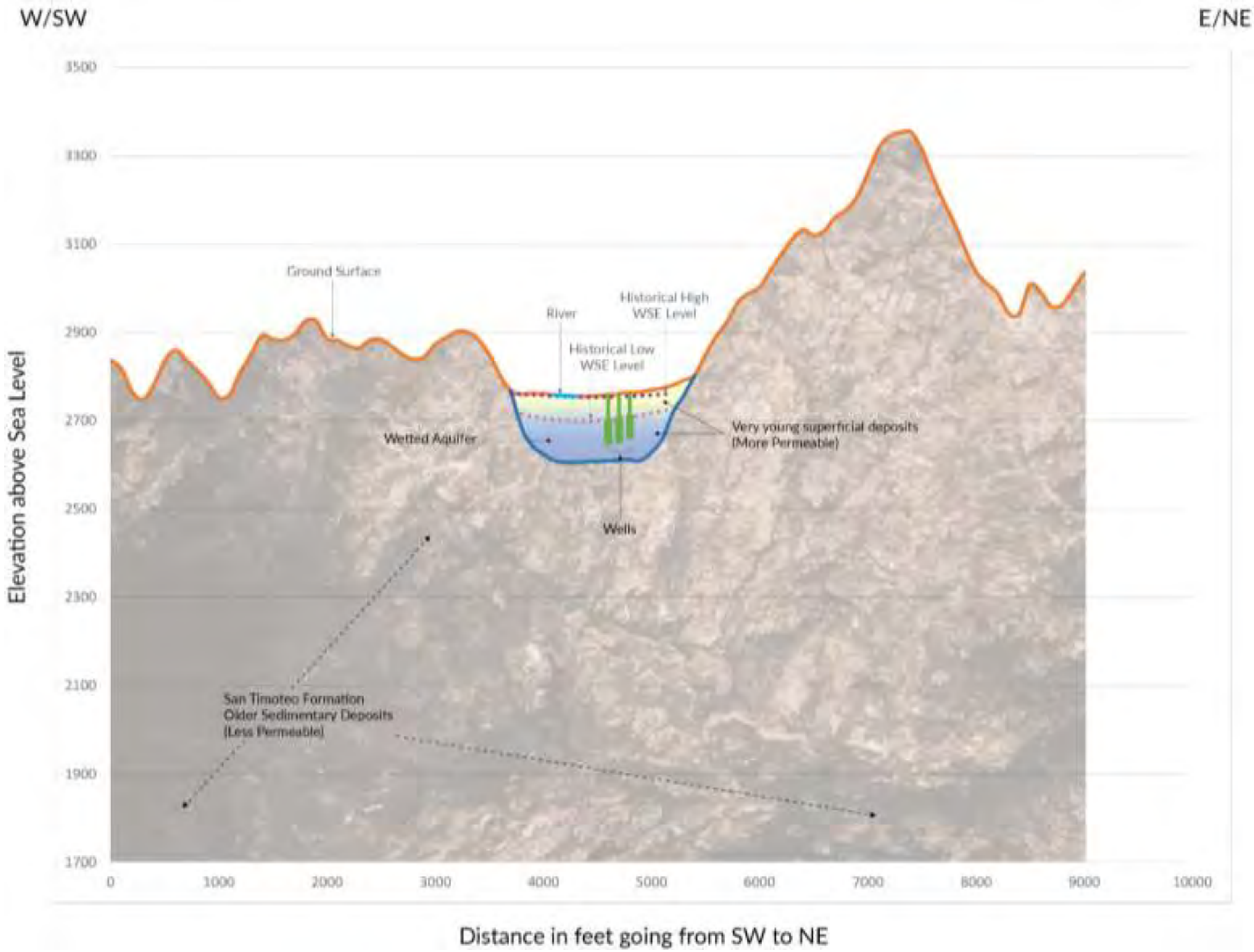


Figure 3-13 Schematic Cross-Section View of Banning Canyon Storage Unit (southern portion overlap with Banning Bench Storage Unit)

3.1.8.1 Aquifer Characteristics and Properties

Regulation Requirements:

§354.14(b)(4)(b) Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information.

The transmissivity of the Banning Storage Unit is approximately 15,000 to 34,000 gallons per day per foot (gpd/ft) with an average aquifer thickness of approximately 600 feet. The hydraulic conductivity ranges from 15 to 60 gpd/ft^2 (Geoscience, 1991). It is estimated that wells within the San Gorgonio Pass Subbasin can yield 1,000 gpm from the San Timoteo formation. Aquifer transmissivity or hydraulic conductivity data in the Banning Canyon Storage Unit is unavailable; however, the saturated thicknesses range from 30 feet to 160 feet (Geoscience, 2011).

3.1.8.2 Aquifer Uses

Regulation Requirements:

§354.14(b)(4)(e) Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.

Groundwater has historically been the only source of potable water supply for agricultural, industrial, and residential users in the SGP Subbasin (Bloyd, 1971). To this day, beneficial uses of groundwater within the San Gorgonio Subbasin region includes agriculture, industrial, and municipal (IRWMP, 2018).

3.1.8.3 Geologic Formations

Regulation Requirements:

§354.14(b)(4)(a) Formation names, if defined.

Generalized descriptions of geologic formations are provided herein and illustrated on **Figure 3-14** (Christensen, 2000).

	San Timoteo badlands (Frick, 1921;) (Axelrod, 1950;) (English, unpubl.)	Western San Gorgonio Pass (this report)	Eastern San Gorgonio Pass (this report)	Indio and Mecca Hills (Dibblee, 1954)
Pleistocene	Bautista fm.	Heights fgl. Cabezon fgl.	Cabezon fgl. Deformed gravels of Whitewater River	Ocotillo cgl.
Upper Pliocene	San Timoteo fm.	San Timoteo(?) fm.		
Middle Pliocene	Mt. Eden fm.	Painted Hill fm.	Painted Hill fm.	Palm Spring fm. and Canebrake cgl.
Lower Pliocene		Imperial fm. Hathaway fm.	Imperial fm.	
Upper Miocene	Jackrabbit ss.		Coachella fgl.	Imperial fm. Mecca f.

Figure 3-14 Geologic Formations (Christensen, 2000)

Painted Hill Formation

The Painted Hill Formation outcrops on the eastern side of the San Gorgonio River east of the Banning Bench. Additional areas of outcrops are located further east, approximately 3 miles northeast of Cabazon. The unit is characterized by pale-brown to light gray conglomeratic sandstone. Clasts found in the unit include basalt, gneiss, and pegmatites. A large portion of the formation is Pliocene in age; however, its lowest part is latest Miocene. This formation rests conformably on the Imperial Formation and at the same stratigraphic level as the San Timoteo Formation and the Mt. Eden Formation to the west (Allen, 1957; Christensen, 2000).

San Timoteo Formation

The San Timoteo Formation crops out mainly in the San Mateo Badlands, where it is traversed by Highway 60 (Matti and others, 2015). The San Timoteo Formation is Pliocene to Pleistocene age and comprised generally of poorly sorted to sorted, partly consolidated, fine to coarse sandstone along with layers of gravel and thin interbeds of clay. The San Timoteo Formation extends up to 2,000 feet below ground and is one of the major water-bearing deposits in the subbasin (DWR, 2004).

Mount Eden Formation

The Mount Eden Formation is located below the western San Gorgonio Pass region, below the San Timoteo Formation and above the metamorphic schist, which is part of the basement complex of the Peninsular Ranges Batholith (Frick, 1921). The Mount Eden Formation has been divided into two members. The lower Red Bed member is characterized by coarse red to gray arkosic sandstone that grades upward to finer greenish-gray sandstone with a thickness estimated at 1,800 feet. It crops out approximately 5 to 6 miles south of Beaumont along Highway 79, north of the Claremont Fault. The upper unit is characterized by calcareous blue to green shale, limestone breccias, and massive beds of gray micaceous sandstones (Frick, 1921; Fraser, 1931).

Imperial Formation

The Imperial Formation is a marine unit that crops out within the San Gorgonio Pass and approximately 3 miles northeast of Cabazon and has been described as sandstone containing marine fossil of Lower Pliocene age. The Imperial Formation has parallel bedding with the Hathaway Formation below and interfingers between the Painted Hill Formation above, which indicates the contacts above and below the Imperial Formation are conformable (Allen, 1957).

Hathaway Formation

The Hathaway Formation crops out on the east side of the San Gorgonio River, north of Banning and approximately two miles north-northeast of Cabazon. Two members of the Hathaway Formation have been documented. The Lower member has been described as a 1,100-foot thick arkosic sandstone with beds of conglomerate. The Upper member is a coarser conglomerate unit with clasts of gneiss as large as 3 feet in diameter (Allen, 1957).

3.1.9 General Groundwater Quality

Regulation Requirements:

§354.14(b)(4)(d) General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.

Groundwater within the SGP Subbasin is predominantly calcium-sodium bicarbonate type. TDS values for selected municipal wells have ranged from 106 to 205 mg/L (DWR, 2004).

The SGP Subbasin's groundwater quality is of generally good quality. Currently, there are no known contaminant plumes, and historic contaminant sites are no longer active after successful mitigation. Based on current water quality standards, there is no need for additional treatment systems. Commercial, domestic, industrial, and municipal producers in the SGP conduct regular water quality sampling and reporting as required by state and federal agencies. Additional discussions of groundwater quality in the SGP Subbasin are discussed in **Section 3.2.**

3.1.10 Surface Water Features

Regulation Requirements:

§354.14(d)(5) Physical characteristics of the basin shall be represented on one or more maps that depict surface water bodies that are significant to the management of the basin.

The surface-water drainage features of the San Gorgonio Pass are part of the Salton Sea watershed, which drains to the Salton Sea. The main surface drainage feature of the SGP Subbasin is the San Gorgonio River which flows intermittently over the Subbasin (DWR, 2004). Smaller tributaries within the subbasin originating from the San Bernardino Mountains to the north or from the San Jacinto Mountains to the south include Smith Creek, Montgomery Creek, Hathaway Creek, Potrero Creek, Twin Pines Creek, Jensen Creek, and One Horse Creek. As shown in **Figure 3-15**, the subbasin drainage features tend to have a northwest-southeast orientation. The drainage features coalesce along the southern part of the SGP and drain eastward to the Indio Subbasin.

A few manmade ponds related to mining operations are located to the east of the Banning Bench and near the southern center of the SGP Subbasin. The Banning Wastewater Treatment Facility (WWTF) has several ponds and is located southeast of the City of Banning (**Figure 3-15**). The WWTF receives and treats on average 2.0 million gallons a day (mgd). The effluent from this plant is discharged to above-ground ponds that recharge the Cabazon Storage Unit. The MBMI also has a WWTF north of Cabazon, which is not shown on **Figure 3-15**.

The Colorado River Aqueduct crosses the SGP Subbasin east of Cabazon where it goes from the valley floor into and through Mount San Jacinto and out of the Region (IRWMP, 2018). While this Colorado River Aqueduct is not a surface water feature, it is an important water conveyance facility for southern California that runs through the SGP Subbasin and is therefore mentioned to provide general background.

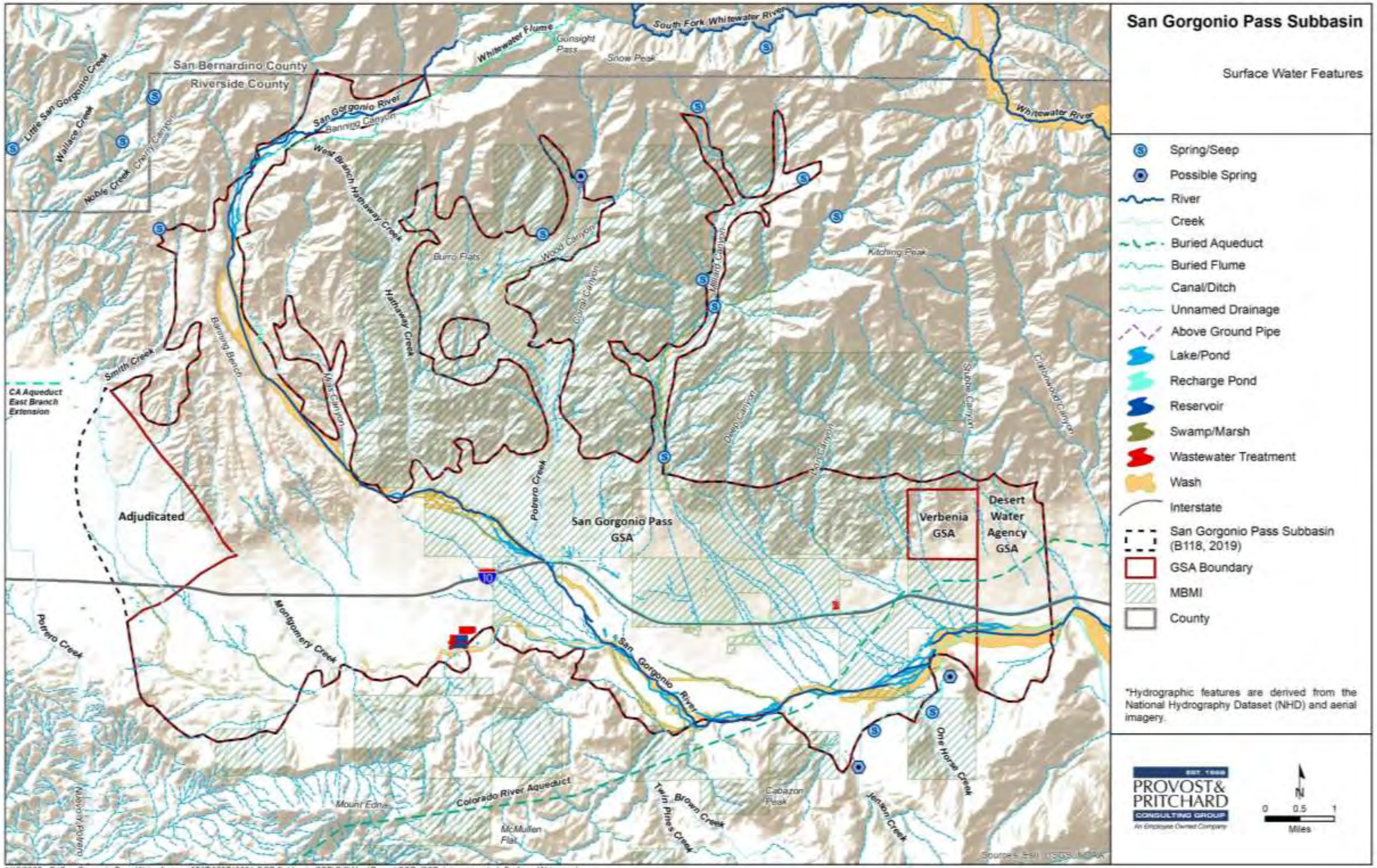


Figure 3-15 Surface Water Features Significant to the Management of the Subbasin

3.1.11 Source & Point of Delivery of Imported Water

Regulation Requirements:

§354.14(d)(6) Physical characteristics of the basin shall be represented on one or more maps that depict the source and point of delivery for imported water supplies.

In 1961, the San Gorgonio Pass Water Agency (SGPWA) contracted with the California Department of Water Resources to receive 17,300 acre-ft/year of water to be delivered by the California State Water Project (SWP) to supplement natural recharge. A pipeline delivers SWP water into the San Gorgonio Pass area which the SGPWA uses to artificially recharge the ground-water system using ponds located along Little San Gorgonio Creek in the Cherry Valley area, just west of the SGP GSA (USGS, 2006).

SWP water originates as precipitation (melted snow and rainfall runoff) from the Sierra Nevada Mountains of Northern California. Water captured in the Oroville Reservoir travels to the Sacramento-San Joaquin Delta (Delta), which is a network of natural and artificial channels and reclaimed islands at the confluence of the Sacramento and San Joaquin rivers. The Delta forms the eastern portion of the San Francisco Bay estuary, receiving runoff from more than 40% of California's lands. From the Delta, the water is pumped into a series of canals and stored in reservoirs, which provides water to urban and agricultural users throughout the San Francisco Bay Area and Central and Southern California (IRWMP, 2018).

The City of Banning purchases imported water from the SGPWA, which is discharged to Beaumont-Cherry Valley Water District (BCVWD) and SGPWA recharge facilities, is stored in the adjudicated Beaumont Basin. The City of Banning accesses this supply through five wells and three additional wells co-owned with BCVWD. The supply produced from these wells is conveyed into the City of Banning's water supply system through pipelines also owned and operated by the city. The Region does not directly purchase any treated imported water supply and instead treats imported water in combination with groundwater and local surface supplies.

3.1.12 Recharge and Discharge Areas

Regulation Requirements:

§354.14(d)(4) Physical characteristics of the basin shall be represented on one or more maps that depict delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin.

Holocene alluvium is found in the subbasin tributaries and allows for infiltration of runoff for recharge (DWR, 2004).

Under a 1928 Division of Water Rights determination that was confirmed by the 1938 Whitewater River adjudication, Southern California Edison (SCE), City of Banning, and Banning Heights Mutual Water Company (BHMWC) jointly have rights to divert 13.26 cfs of natural flow from the South Fork of the Whitewater River. Since 1961, the three parties have collectively diverted an average of 1,500 AFY. BHMWC diverts approximately 1,000 AFY of the Whitewater River diversions from the Whitewater Flume through a pipeline and a storage tank. This diverted water is treated at a filtration plant operated by BHMWC. The remainder of the diverted water flows into the San Gorgonio River, where a portion of the natural runoff and the Whitewater River diversions are diverted into spreading ponds for groundwater recharge in the Banning Canyon Storage Unit. It is uncertain exactly how much of the diverted water is currently recharged into the aquifer of the Canyon storage unit as the flows are not metered. BHMWC and the City of Banning jointly have appropriative diversion rights from the South Fork of the Whitewater River through the Whitewater Flume, which has been operated by SCE as part of a hydroelectric project. SCE ceased to operate the diversion for power generation in 1998 but continues to operate the flume per their Federal Energy Regulatory Commission license and agreements with BHMWC and the City of Banning for surface runoff diversion for irrigation and domestic beneficial use by BHMWC and the City of Banning (IRWMP, 2018).

The City of Banning diverts surface water from the San Gorgonio River into percolation ponds located in lower Banning Canyon to recharge this portion of the Banning Canyon Storage Unit. At the point of diversion, the San Gorgonio River includes the supplies diverted by the City of Banning from the upper watershed of the Whitewater River. The contribution of the percolation ponds to subsurface groundwater flows into the lower portion of the Banning Canyon Storage Unit is unknown as it is not metered at the recharge basins (IRWMP, 2018). The location of the percolation ponds is shown on **Figure 3-15**.

Overall, surface water flows from the Plan Area's steep mountain areas are intermittent with runoff during the winter and spring months and during infrequent thundershowers. During such events, the gravel and sand bedded canyons provide for quick percolation, which contributes to the GSA's groundwater supply. The steep slopes and rapid percolation hinder flood capture projects and management actions. However, the City of Banning is evaluating opportunities for increased stormwater capture (**Chapter 6**). Atwell and Rancho San Gorgonio are planned developments within the Region, and both developments' Specific Plans incorporate stormwater capture. The Atwell Project includes design features that are estimated to capture and recharge approximately 600 AFY of stormwater flows from Smith Creek around 2040 (PACE Engineering, 2020), and the Rancho San Gorgonio Specific Plan includes design features that are estimated to capture and recharge approximately 199 AFY of stormwater at full buildout (IRWMP, 2018).

Additional recharge occurs at the City of Banning WWTF where the Cabazon Storage Unit receives recharge from secondary treated water. The WWTF receives and treats on average 2.0 mgd. The location of the WWTF ponds is shown on **Figure 3-15**.

The Desert Water Agency (DWA), which is partially located within the SGP Subbasin, recharges purchased SWP water through exchange with the Metropolitan Water District. The DWA recharge areas are located in the Indio Subbasin, approximately five miles east of the SGP Subbasin eastern boundary and southwest of the Mission Creek Subbasin, where DWA owns and operates an additional recharge facility. This recharge may benefit the water levels within the boundaries of the DWAGSA by maintaining higher water levels in the adjacent Indio Subbasin which can reduce the groundwater gradient and subsurface outflow from the SGP Subbasin.

3.2 Current and Historical Groundwater Conditions

Regulation Requirements:

§354.16 Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:

Current and historical groundwater conditions in the SGP Subbasin were evaluated based on information collected in prior studies and review of additional recent data. As described previously, SGP Subbasin groundwater conditions vary considerably within Storage Units in the Subbasin. Excluding the adjudicated portion of the Beaumont Storage Unit, prior USGS studies (USGS 2006, USGS 2021) have identified four Storage Units that are described in this section, the Banning Storage Unit (also known as the West Banning Storage Unit in the 2020 City of Banning Urban Water Management Plan), the Banning Bench Storage Unit, Banning Canyon Storage Unit, and the Cabazon Storage Unit. These four storage units are shown in **Figure 3-16**.

3.2.1 Groundwater Level Data

Regulation Requirements:

§354.16(a) Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:

1. Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.
2. Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.

Groundwater level data has been analyzed for the SGP Subbasin Storage Units through preparation of groundwater elevation contour maps and evaluation of groundwater level hydrographs.

3.2.1.1 Groundwater Level Contours and Flow

Groundwater elevation contour maps have been prepared for 1998 and 2019 for portions of the SGP Subbasin with available data, which correspond with the beginning and the end of the hydrologic period analyzed in the water budget. Groundwater level data for preparing contour maps has been concentrated in the Banning Canyon Storage Unit, where groundwater production has historically been concentrated and multiple wells (primarily production wells) are available that provide generally consistent data. By contrast, water level measurements in the Banning Storage Unit are limited to a few wells (primarily municipal production wells) and water level measurements in the Cabazon Storage Unit have even sparser concentrations of measured wells. As noted below, discussion of the Banning Bench Storage Unit will be limited to the portion of the storage unit that appears to be overlain by the Banning Canyon Storage Unit, as no wells are available that are clearly in the Banning Bench Storage Unit proper.

Figure 3-16 below shows groundwater elevation contours for 1998, which was selected as the start of the historical water budget period. A description of the groundwater levels by storage unit is available below. The storage units are defined based on geologic structures that impact water levels to create unique conditions in each unit.

Banning Canyon Storage Unit. Figure 3-16 shows groundwater flow from the upper Banning Canyon Storage Unit downstream to the mouth of Banning Canyon, with water levels ranging from 4,400 feet above MSL at the northern end of Banning Canyon to 2,700 feet above MSL near the mouth of Banning Canyon.

Cabazon Storage Unit. Water Levels in the Cabazon Storage Unit are considerably lower than in the Banning Canyon Storage Unit. The Cabazon Storage Unit water levels show a gradient from recharge sources in the west to the outflow boundary to the Indio Subbasin at the eastern border of the SGP Subbasin. Water levels in the Cabazon Storage Unit fall from 1,700 feet above MSL at the western end to below 1,200 feet above MSL at the eastern boundary, a difference of about 500 feet in elevation over nearly 10 miles. There is a notable water level decline from the mouth of the Banning Canyon Storage Unit to the western end of the Cabazon Storage Unit with water levels falling from 2,600 feet above MSL to about 1,700 feet above MSL over a distance of less than one mile at the transition from the Banning Canyon and Cabazon Storage Units.

Banning Storage Unit. Water levels in the Banning Storage Unit range from about 2,200 to 2,100 feet above MSL, with a slight gradient from west to east.

Data Gaps. There are several distinct gaps in groundwater levels apparent in the area of the eastern Banning/extreme western Cabazon Storage Units, in the Banning Bench Storage Unit, in several canyons in the northern portion of the Cabazon Storage Unit (Potrero, Hathaway and Millard Canyons), and in the northern portion of the Cabazon Storage Unit. The data gaps in the Cabazon Storage Unit partially reflect the lack of wells in the northern portion of the Storage Unit, where the aquifer is shallow as a result of its base being elevated above the main portion of the Cabazon Storage Unit. The Cabazon Storage Unit data gaps also reflect the lack of data from the MBMI lands, which account for about 37-percent of the SGP Subbasin acreage in total. More information on data gaps and the plan to address them are detailed in **Chapter 5 – Monitoring Network**.

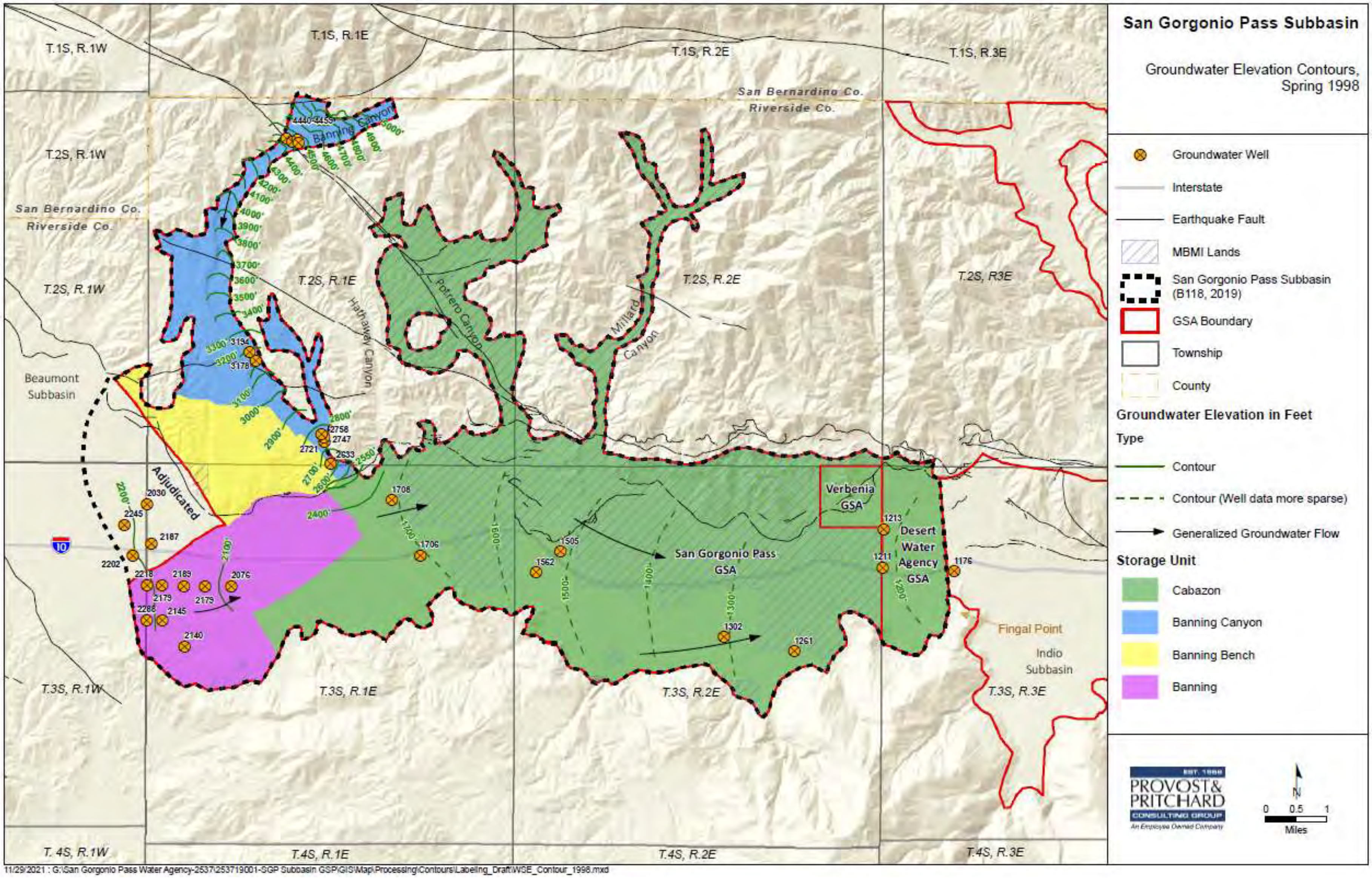


Figure 3-16 Groundwater Elevation in Wells, Spring 1998

Contour maps for other periods show generally similar gradients as appear in the Spring 1998 maps. The data available for preparation of the contour maps in the Cabazon Storage Unit improves significantly beginning around 2006, when the USGS began constructing several monitoring wells.

Figure 3-17 shows water level contours for spring 2019. **Figure 3-17** shows similar groundwater flow patterns as for 1998, although at lower elevations for some of the Storage Units. The contours for the Banning Canyon Storage Unit show nearly identical levels and flow patterns after 20 years, reflecting very stable groundwater levels. The contours for the Banning Storage Unit show a similar west to east gradient, with the water levels being generally about 100 feet lower than in the 1998 contour map. The Cabazon Storage Unit also shows a consistent west to east gradient, with water levels having dropped about 100 feet from 1998 to 2019.

Also shown in **Figure 3-17** are water level values at wells for Fall 2019 conditions. The Fall 2019 water levels are very consistent with the Spring 2019 water levels, and the resulting contours of water surface elevation are essentially identical to the Spring 2019 water levels. Based on the very similar water level measurements, the Spring 2019 water level contour map is considered to be representative of Fall 2019 water level contours, and representative of seasonal low water levels. The small seasonal difference in water levels (in the primary Banning and Cabazon Storage areas) are consistent with the groundwater level hydrographs presented later in **Figure 3-25** to **Figure 3-32**. Those hydrographs do not show significant seasonal water level variations. Instead, water level in the Banning and Cabazon Storage Units show consistent, long term trends, without seasonal water level variations that are common in many California groundwater basins.

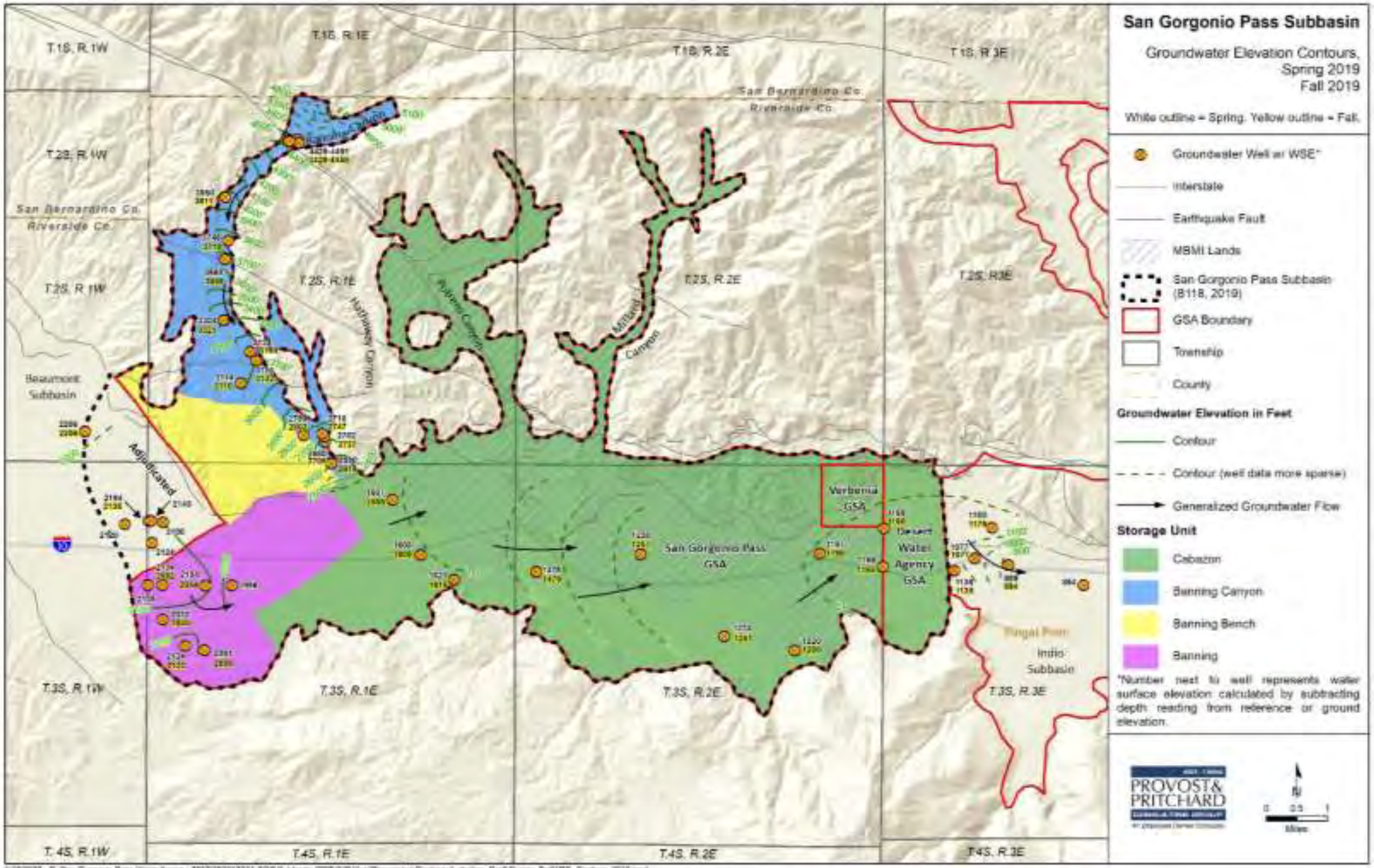


Figure 3-17 Groundwater Elevation in Wells, Spring and Fall 2019

3.2.1.1 Groundwater Level Hydrographs and Gradients

Groundwater level hydrographs were prepared for selected wells in the SGP Subbasin and are described here separately for the four Storage Units – Banning Canyon, Banning Bench, Banning and Cabazon Storage Units. **Figure 3-18** shows the location of measured wells in the SGP Subbasin and the adjacent Indio Subbasin.

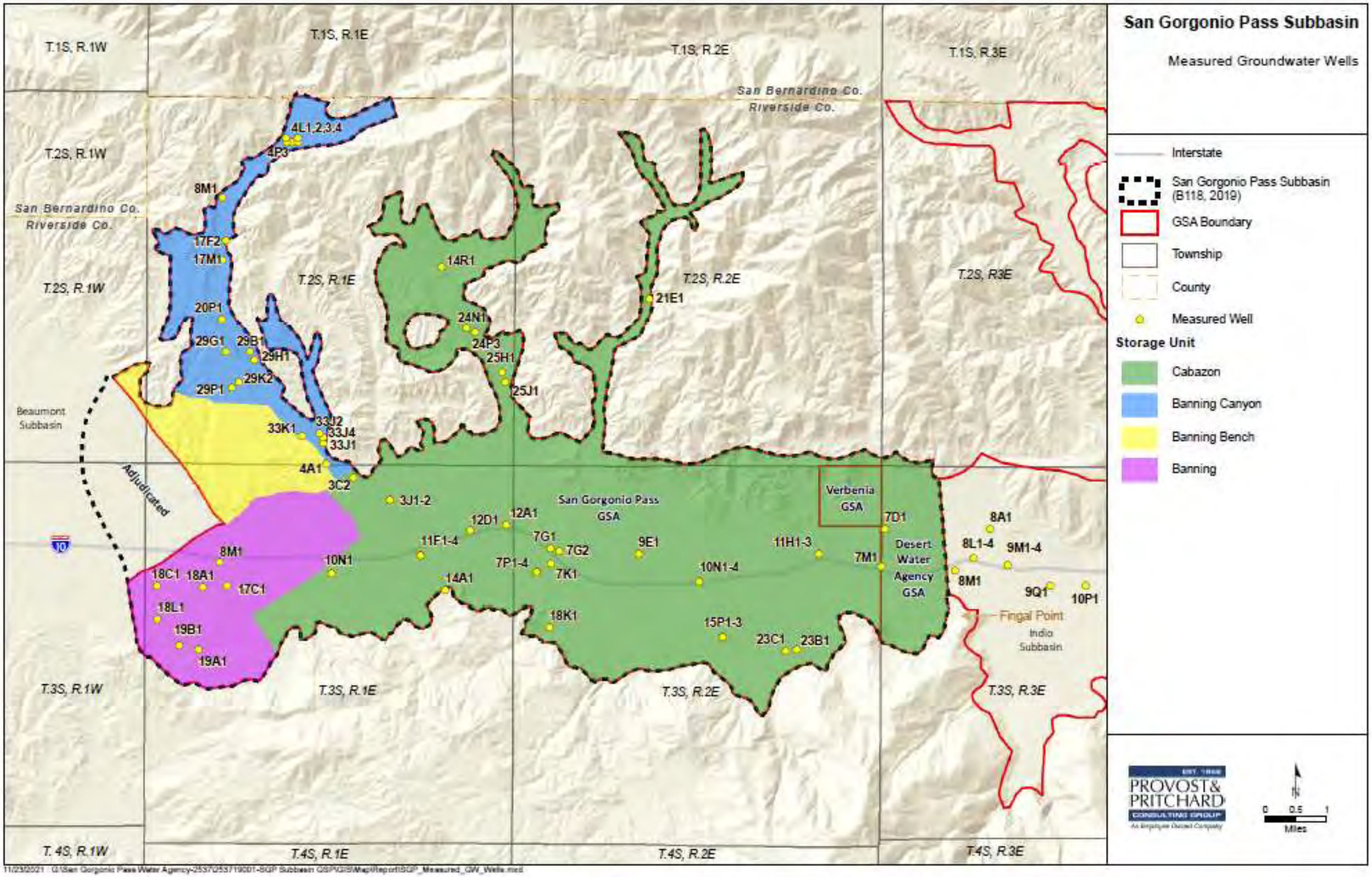


Figure 3-18 Measured Groundwater Wells

Banning Canyon Storage Unit– Banning Canyon, which constitutes only 10% acreage of the SGP Subbasin, has the longest history and largest quantities of groundwater production in the SGP Subbasin. The Banning Canyon Storage Unit lies in a canyon that has been eroded by the San Gorgonio River and contains coarse recent alluvial deposits. In addition to recharge in the riverbed from intermittent flows, the City of Banning recharges available high flows in spreading basins in the Canyon. Hydrographs of several typical wells in the Banning Canyon, shown on **Figure 3-19, Figure 3-20, Figure 3-21,** and **Figure 3-22**, show changes in water levels that are related to pumping and streamflow recharge in the nearby San Gorgonio River. Wells 4L1, 4L2, 4L3 and 4L4, shown in **Figure 3-19** and **Figure 3-20**, are located at the upper end of Banning Canyon, with well depths ranging from 107 to 162 feet and depths to water ranging from nearly zero to 100 feet. These wells show seasonal and annual variations that are in a range of about 50 feet, with long-term stable water levels.

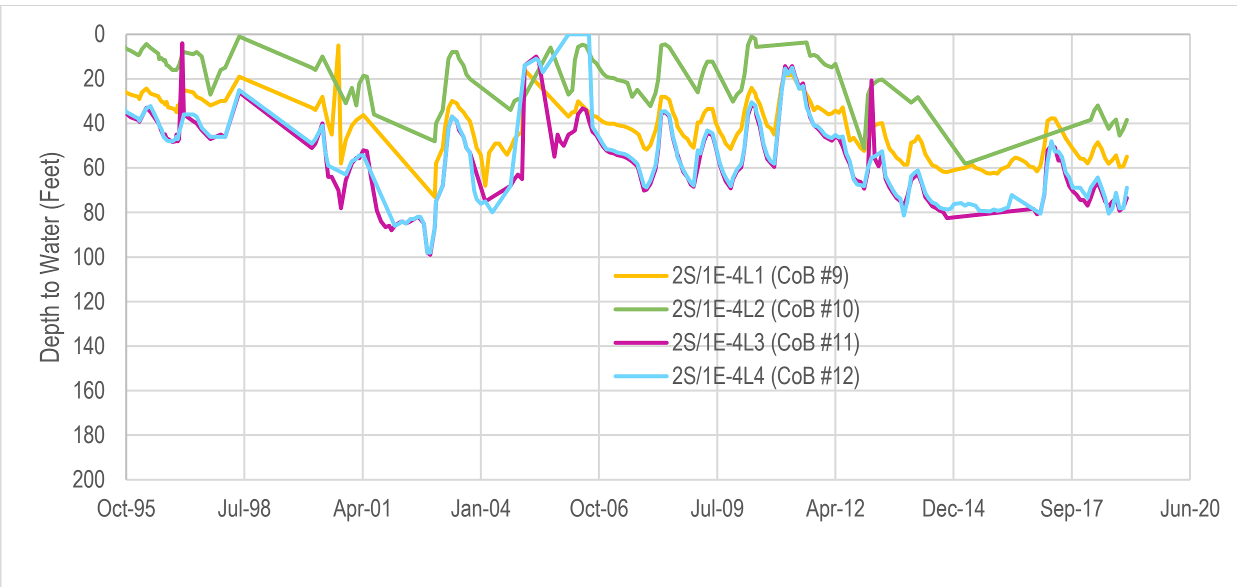


Figure 3-19 Depth to Water in the Upper Portion of Banning Canyon Storage Unit

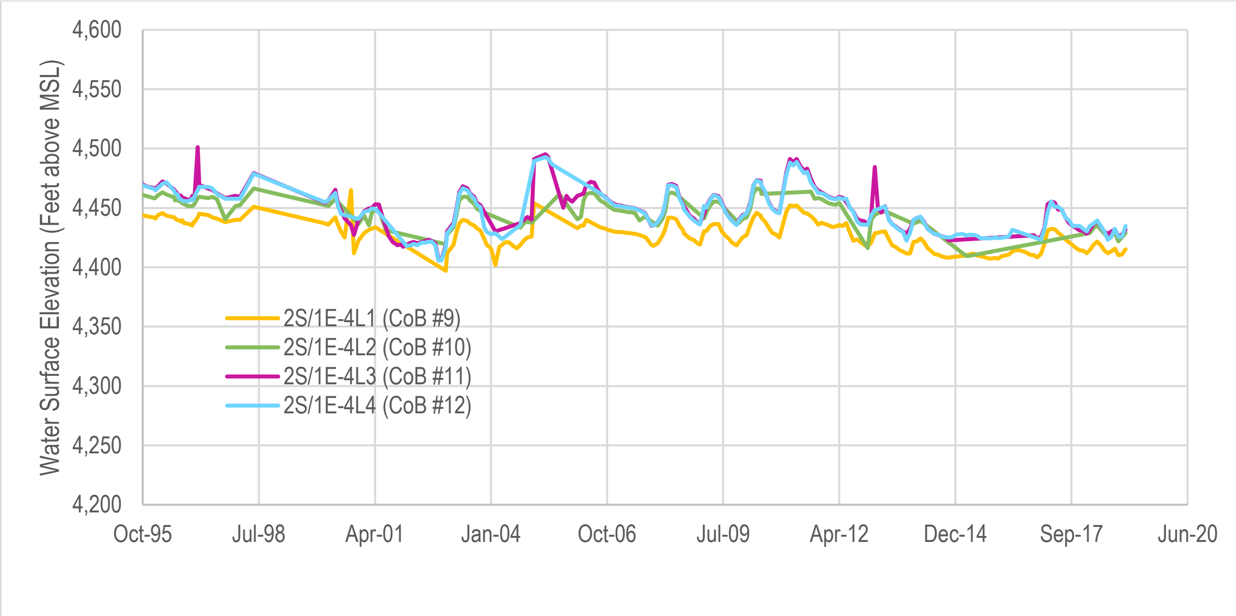


Figure 3-20 Water Surface Elevations in the Upper Portion of Banning Canyon Storage Unit

Wells 29H1 and 20P1, located in the middle portion of Banning Canyon, have depths of 117 feet and 212 feet respectively. As shown in **Figure 3-21** and **Figure 3-22**, wells 29H1 and 20P1 have seasonal and multi-annual water level variations, with no long-term trend and depths to water varying from about 10 feet to less than 100 feet. Depths to water in well CoB #5 (which does not have a State Well Number) range from about 10 feet to nearly 170 feet.

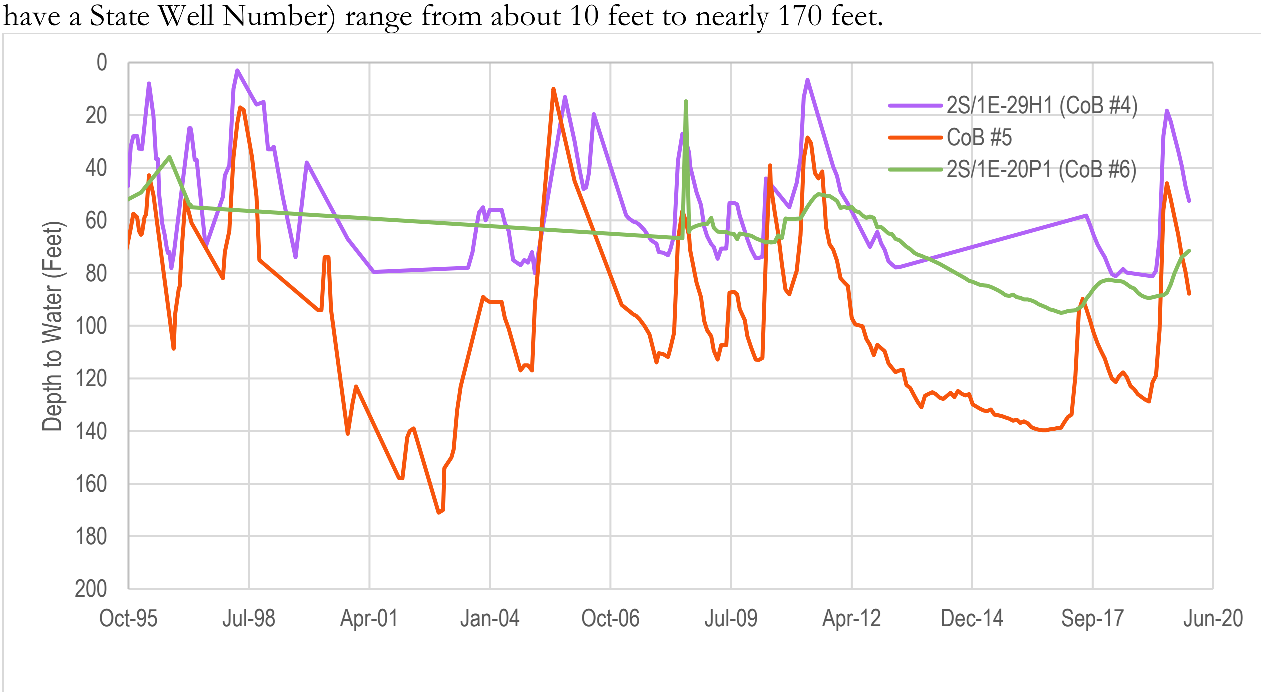


Figure 3-21 Depth to Water in the Middle Portion of Banning Canyon Storage Unit

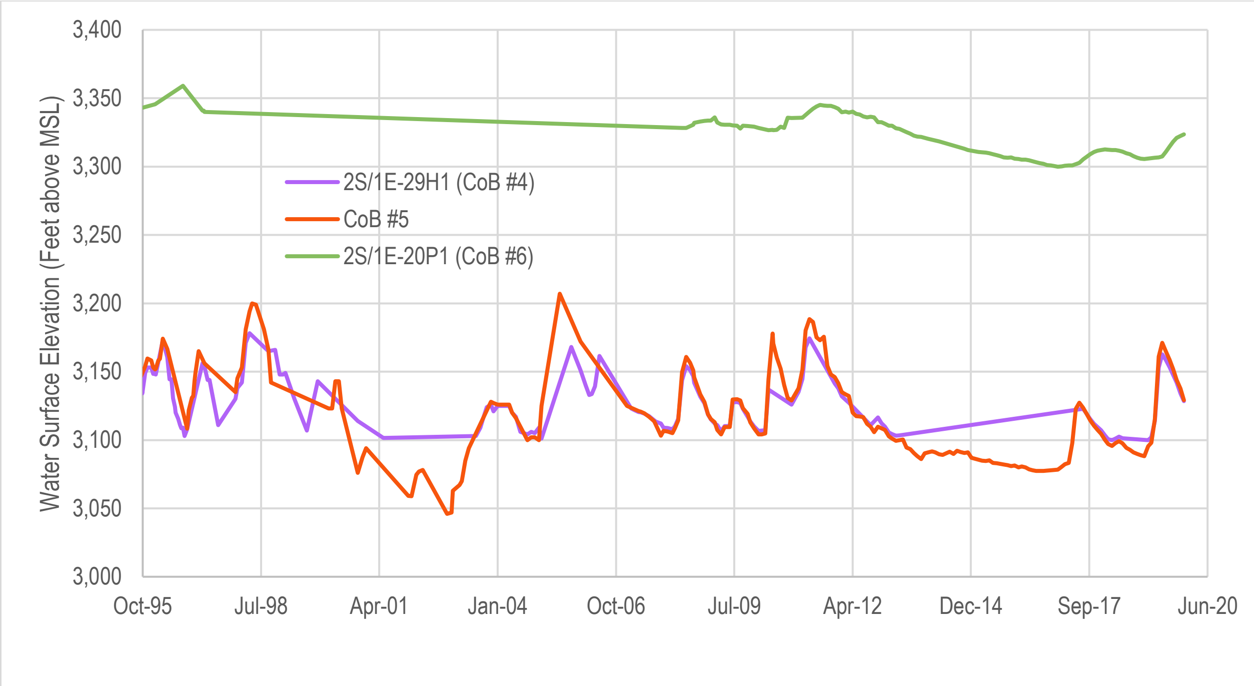


Figure 3-22 Water Surface Elevations in the Middle Portion of Banning Canyon Storage Unit

Banning Canyon Storage Unit overlying the Banning Bench Storage Unit – As described in the HCM, the Banning Bench Storage Unit consists of partly consolidated sandstone that can extend to depths greater than 2,000 feet below ground surface. A portion of the Banning Bench Storage Unit is overlain by the San Gorgonio River, which has significantly eroded the Banning Bench Storage Unit, creating the local topographic feature known as Banning Heights. While the older consolidated materials in the Banning Bench Storage Unit itself have poor permeability and limited groundwater development, there is significant groundwater production from the shallow recent alluvium overlying the Banning Bench adjacent to the San Gorgonio River. Hydrographs of three City of Banning wells near the mouth of Banning Canyon storage unit overlying the Banning Bench are shown in **Figure 3-23** and **Figure 3-24**. The three wells are constructed to depths of 100 to 124 feet and appear to be located entirely in the overlying Banning Canyon storage unit. The hydrographs of the three wells have similar variations to those in the Banning Canyon, with shorter term seasonal and annual variations and no long-term trend.

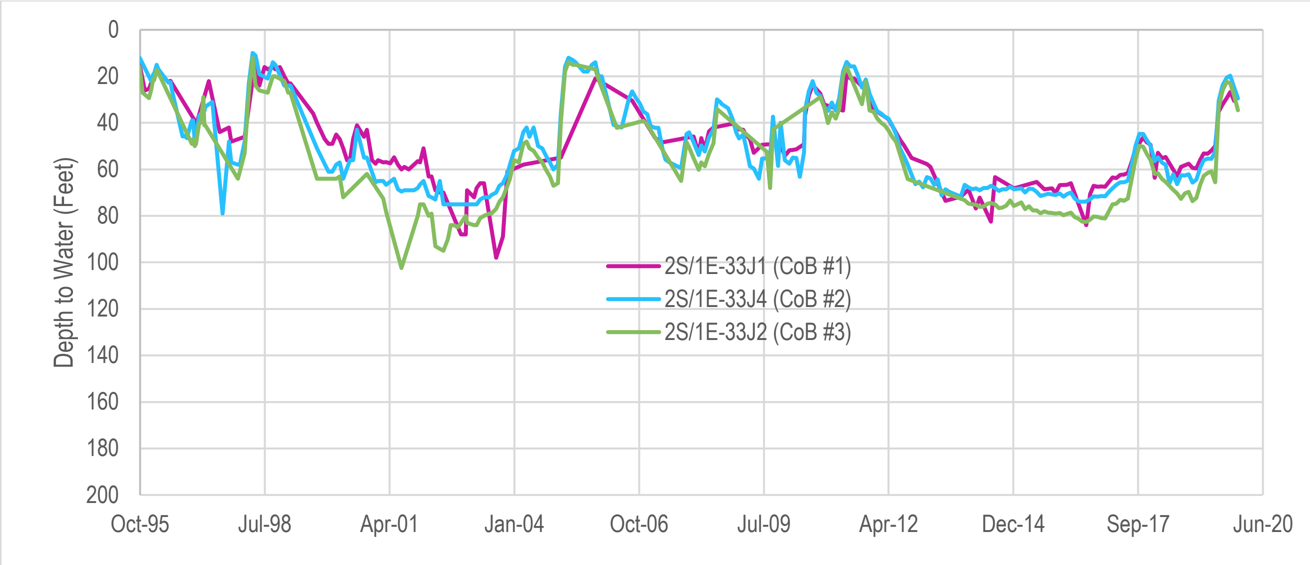


Figure 3-23 Depth to Water Adjacent to the Banning Bench Storage Unit

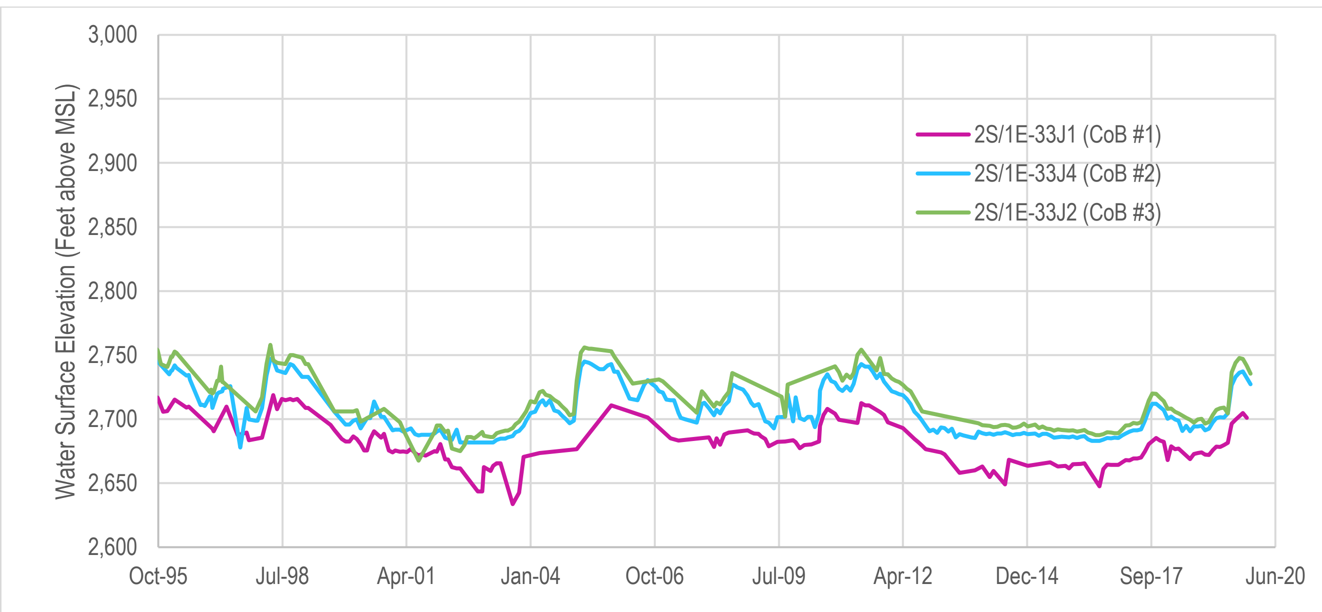


Figure 3-24 Water Surface Elevations Adjacent to the Banning Bench Storage Unit

Banning Storage Unit – There was extremely limited groundwater use in the Banning Storage Unit (also sometimes referred to as the West Banning storage unit) prior to 1992 and groundwater pumping there rose above 1,000 acre-feet per year only after 2000. During the 1998-2019 hydrologic period, the City of Banning used four production wells in the Banning Storage Unit (Wells C5, M10, M11 and M12) which collectively pumped nearly 2,000 acre-feet per year. Water level measurements from these production wells are available and hydrographs for the wells are presented in **Figure 3-25 and Figure 3-26**. Although the water level measurements indicate whether the measurements are taken during static or pumping conditions, the four wells are all located relatively close to each other, and anomalous results occasionally are apparent that may reflect pumping in adjacent wells or residual drawdown from a recent pump shutdown. No multiple completion wells with measurements in different vertical zones are available to identify trends in hydraulic gradients between principal aquifers.

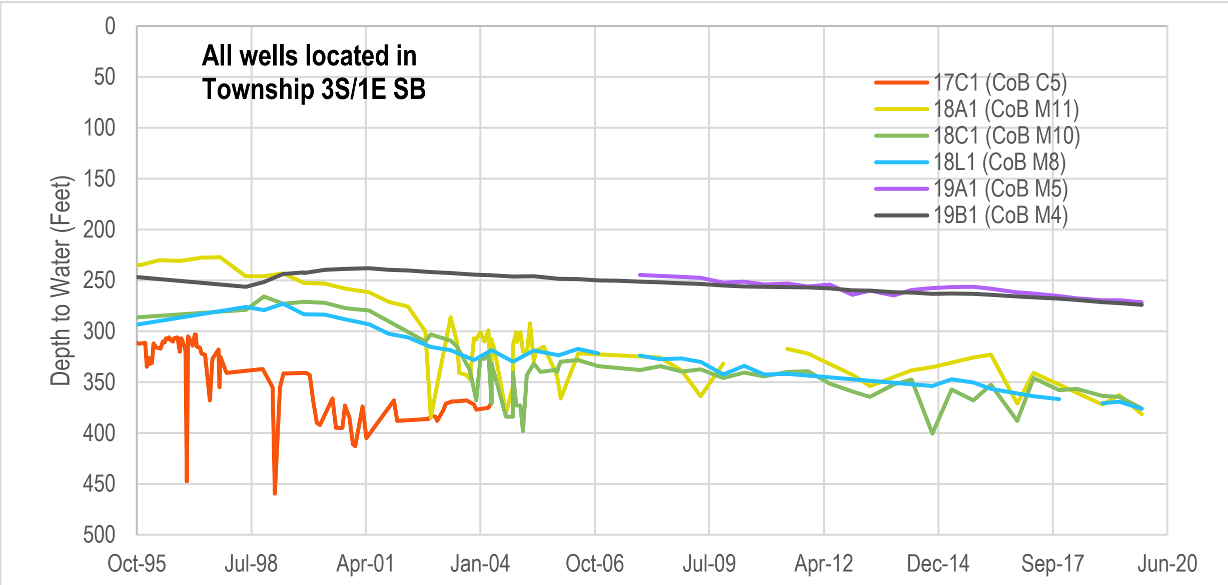


Figure 3-25 Depth to Water in Banning Storage Unit

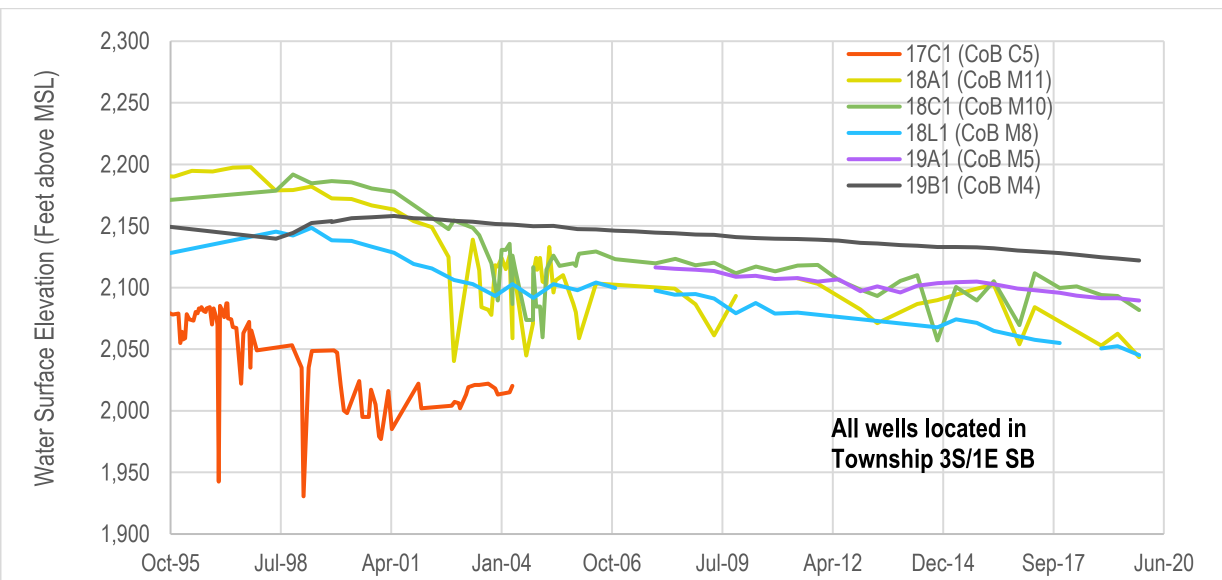


Figure 3-26 Water Surface Elevations in Banning Storage Unit

The Banning Storage Unit hydrographs in **Figure 3-25 and Figure 3-26** show generally consistent water level trends, with water levels gradually declining since about 1998 which corresponds with increased pumping and a prolonged drought period. The depths to water shown in **Figure 3-25** also show a significant depth to groundwater of 200 to 400 feet. The relatively high cost of drilling wells to obtain water in the Banning Storage Unit is likely to be at least a partial cause for its later development and higher reliance on groundwater in the Banning Canyon Storage Unit, where depths to water are typically less than 100 feet.

Cabazon Storage Unit – The Cabazon Storage Unit is by far the largest portion of the SGP Subbasin and is described in three parts here – the Western, Central, and Eastern portions. Groundwater in the Cabazon Storage Unit generally flows from west to east, with subsurface outflows at Fingal Point draining into the Indio Subbasin. Over the past 20 years, SGPWA has provided funding to the US Geological Survey to install multiple completion monitoring wells at several locations in the Cabazon Storage Unit to provide data on vertical groundwater gradients. While these monitoring wells have generally short records, they provide consistent water level monitoring representing known aquifer conditions and provide reliable information on groundwater conditions. **Table 3-1** summarizes the construction information for these wells and the average groundwater level measurements. The vertical gradients at these wells are described below in the applicable section of the Cabazon Storage Unit.

Table 3-1 USGS Multiple Completion Well Clusters in the Cabazon Storage Unit

Well Cluster	Well	Depth of Top of Perforations (feet)	Depth of Bottom of Perforations (feet)	Begin Measurement	Last Measurement	Mean Water Surface Elevation (feet above MSL)	Vertical Gradient
3S/1E-11F1	11F4	580	600	17-Aug-09	11-Dec-20	1,638.05	-
	11F3	660	680	17-Aug-09	10-Dec-20	1,638.10	0.05
	11F2	840	860	17-Aug-09	9-Dec-20	1,636.87	-1.18
	11F1	1,040	1,060	17-Aug-09	8-Dec-20	1,636.61	-1.44
3S/1E-3J	3J2	598	618	9-Nov-04	9-Dec-20	1,804.97	-
	3J1	940	1,000	19-May-06	9-Dec-20	1,642.78	-162.19
3S/2E-7P	7P4	550	570	22-Feb-07	10-Dec-20	1,504.48	-
	7P3	640	660	22-Feb-07	10-Dec-20	1,506.80	2.32
	7P2	790	810	22-Feb-07	10-Dec-20	1,509.70	5.22
	7P1	980	1,000	22-Feb-07	10-Dec-20	1,531.81	27.32
3S/2E-10N	10N4	510	530	11-Jan-00	16-Aug-00	1,296.39	-
	10N3	650	670	11-Jan-00	16-Aug-00	1,295.20	-1.19
	10N2	790	810	11-Jan-00	16-Aug-00	1,295.28	-1.11
	10N1	950	970	6-Oct-99	16-Aug-00	1,295.50	-0.89
3S/2E-11H	11H3	520	540	29-Aug-19	11-Dec-20	1,191.98	-
	11H2	640	660	29-Aug-19	11-Dec-20	1,192.00	0.02
	11H1	860	880	29-Aug-19	11-Dec-20	1,191.99	0.01
3S/2E-15P	15P3	240	260	8-Dec-07	10-Dec-20	1,355.07	-
	15P2	330	350	8-Dec-07	9-Dec-20	1,252.79	-102.28
	15P1	373	383	8-Dec-07	9-Dec-20	1,244.78	-110.30
3S/3E-8L	8L4	390	410	24-Apr-19	11-Dec-20	1,057.80	-
	8L3	490	510	24-Apr-19	11-Dec-20	1,074.86	17.06
	8L2	660	680	24-Apr-19	11-Dec-20	1,078.17	20.38
	8L1	870	890	24-Apr-19	11-Dec-20	1,146.89	89.09
3S/3E-9M	9M4	600	620	24-Apr-19	11-Dec-20	883.50	-
	9M3	740	760	24-Apr-19	11-Dec-20	882.25	-1.24
	9M2	930	950	24-Apr-19	11-Dec-20	876.86	-6.64
	9M1	1,060	1,080	24-Apr-19	11-Dec-20	820.87	-62.63

The western portion of the Cabazon Storage Unit (generally identified as the portion within Township 3S/1E) has relatively small amounts of pumping, primarily at City of Banning Well C6 (10N1) which is itself very close to an assumed fault boundary at the border between the Cabazon and Banning Storage Units. Since the location of the fault boundary is not well known, the well may actually be within the Banning Storage Unit. Outside of the City of Banning C6 (10N1) well, water level measurements shown in **Figure 3-27 and Figure 3-28** do not appear to show obvious pumping influences, with no visible anomalous variations in seasonal water levels. As with the Banning Storage Unit, depths to water in the western portion of the Cabazon Storage Unit are very deep – from about 350 feet to nearly 800 feet below te ground surface. The high cost of developing wells at such deep depths is likely a cause of the small amount of pumping in this portion of the storage unit. The main trend apparent in the western portion of the Cabazon Storage Unit is a long-term decline (occurring during the entire 1998-2019 base period in well 14A1). This decline appears in both USGS well clusters (03J and 11F) since their installation in 2004 and 2009, respectively. The long-term decline matches an extended period of below average precipitation during the 1998-2019 base period and is similar to trends in other portions of the Cabazon Storage Unit.

Water levels in vertical zones at the 03J well cluster have a large downward gradient of 162 feet across a perforation interval of 362 feet. Water levels at the 11F multiple completion well have a very small average downward gradient of 1.4 feet across a perforation interval of 460 feet.

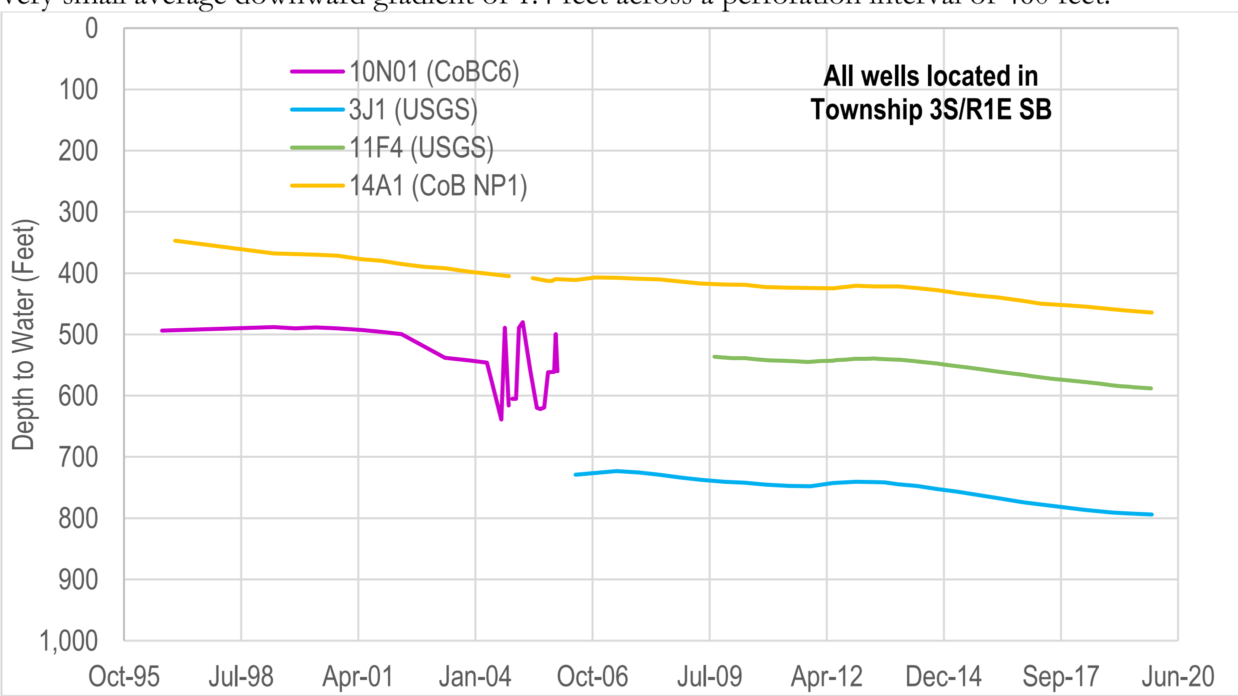


Figure 3-27 Depth to Water in the Western Portion of the Cabazon Storage Unit

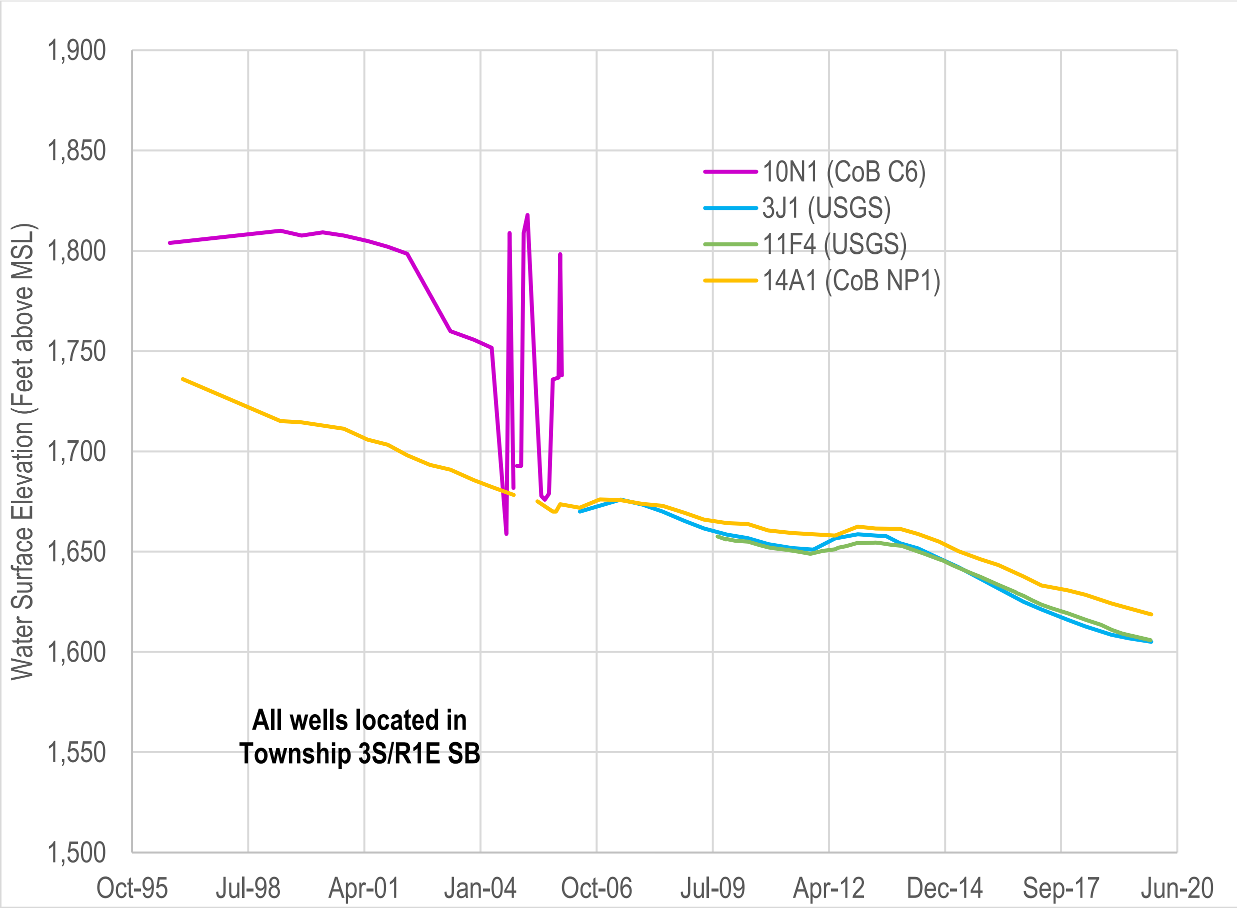


Figure 3-28 Water Surface Elevations in the Western Portion of the Cabazon Storage Unit

The central portion of the Cabazon Storage Unit (generally, the western half of Township 3S/Range 2E), has the majority of water use in the Cabazon Storage Unit. MBMI, Cabazon Water District and Robertson's Ready Mix pump groundwater from areas in the vicinity of the Morongo Casino and the Cabazon Outlets. As with the western portion of the Cabazon Storage Unit, the limited groundwater level data available indicate a long-term decline in the 1998-2019 base period, which is shown in the hydrographs in **Figure 3-29 and Figure 3-30**. Two of the Cabazon Water District wells (7K1 and 23B1) show parallel declines from 1998 through about 2009. Similar declines appear in the USGS monitoring wells (7P4 and 15P) after their installation in 2006 and 2008. Depths to water vary from more than 300 feet to nearly 800 feet below the ground surface. As with the Banning Storage Unit and the western portion of the Cabazon Storage Unit, the high costs for drilling groundwater wells and pumping groundwater has likely been the cause of delayed groundwater use in much of the Cabazon Storage Unit.

The USGS 7P monitoring well cluster has a definite upward vertical flow, with water levels in the deepest zone (980-1000 feet deep) having piezometric levels averaging 27 feet higher than shallower zones (the shallowest being 550-570 feet deep). USGS 15P monitoring well cluster had periods of both upward vertical flow (2007 to 2012) and downward vertical flow (since 2012). Vertical gradients are presented in **Table 3-1**. The 15P cluster is relatively shallow (the deepest measured zone being 383 feet deep) and the shallower zones measured there have been dry for extended periods since 2014.

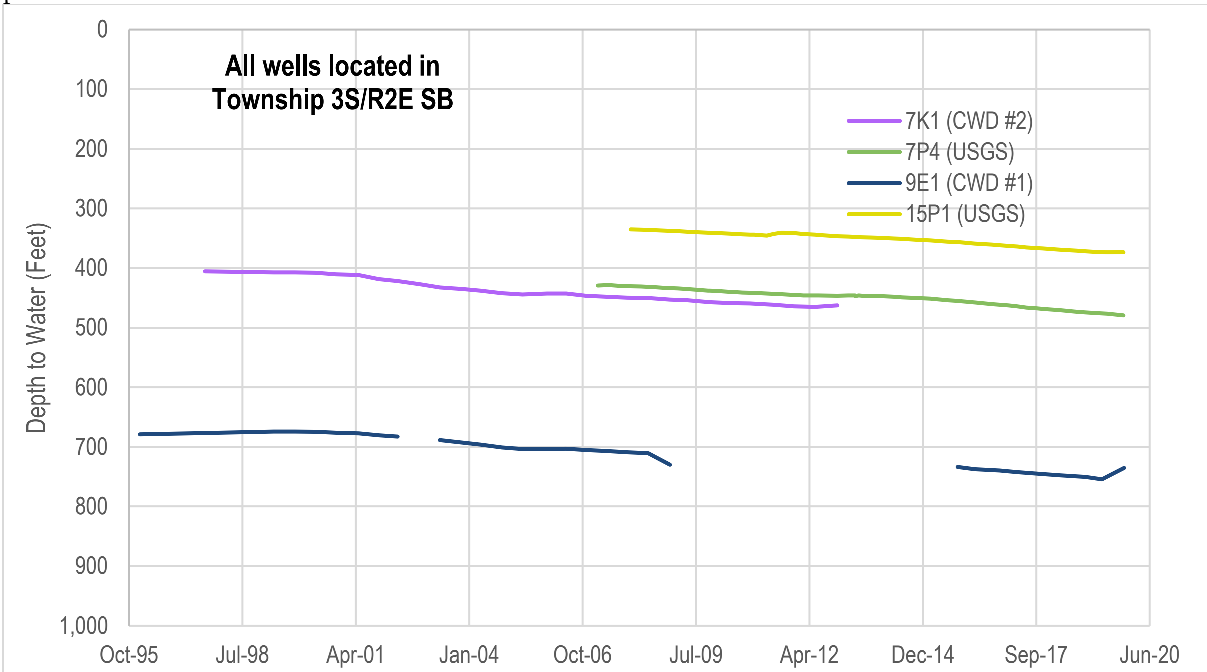


Figure 3-29 Depth to Water in the Central Portion of the Cabazon Storage Unit

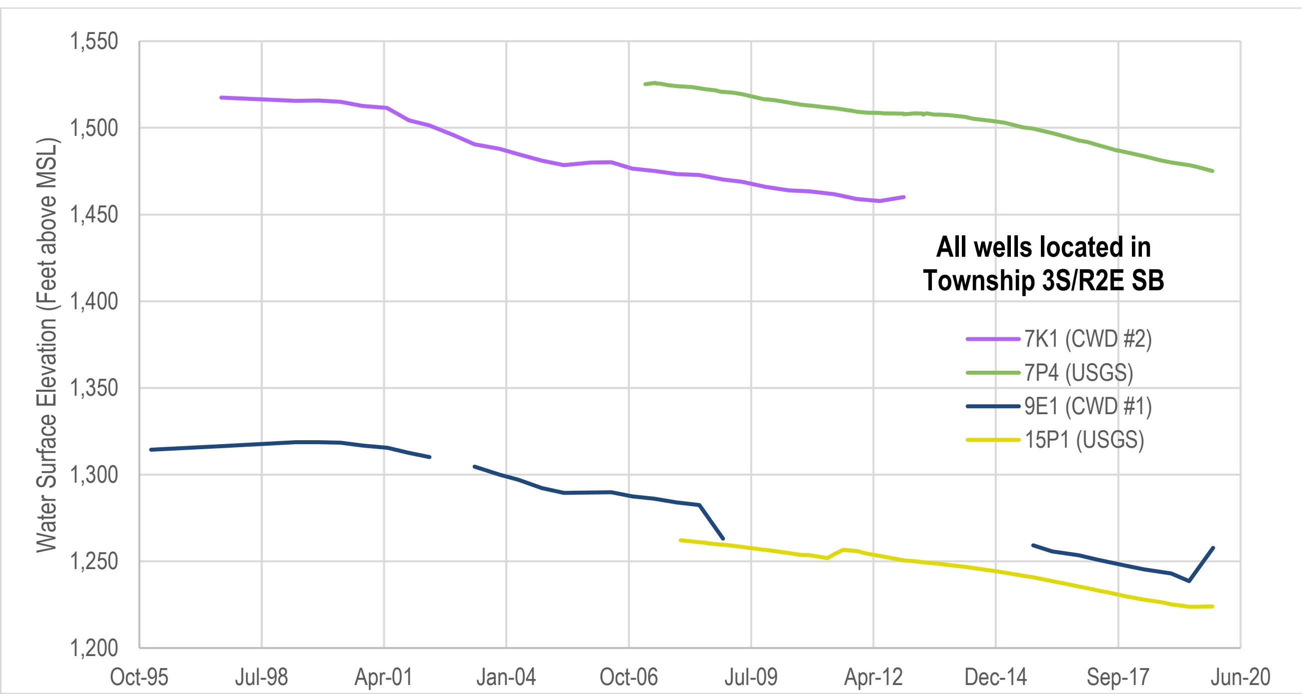


Figure 3-30 Water Surface Elevations in the Central Portion of the Cabazon Storage Unit

The eastern portion of the Cabazon Storage Unit (generally the eastern half of Township 3S/Range 2E, and a bordering area of Township 3S/3E) has the lowest water levels in the Cabazon Storage Unit with relatively minor groundwater use. Groundwater pumping is reported only for two Mission

Springs Water District (MSWD) wells that supply water to an unincorporated portion of the Whitewater community.

Figure 3-31 and Figure 3-32 shows hydrographs for available well data in the eastern portion of the Cabazon Storage Unit. Depths to water are generally smaller than in the western and central portions of the Cabazon Storage Unit, varying from less than 200 feet to nearly 500 feet below the ground surface. The depths to water generally increase the farther west that a well is located. Two MWSD wells (7M1 and 8M1) have long term hydrographs that are very consistent with each other and indicate a continued decline in groundwater levels since 1998. In 2019, SGPWA funded USGS installation of three new multiple completion monitoring wells in the eastern portion of the Cabazon Storage Unit (11H, 8L and 9M) around the area of subsurface flow constriction at Fingal Point. The two western-most of the well clusters (11H and 8L) show consistent trends (as limited by the short period of record) with the longer-term production well measurements. The easternmost of the well clusters (9M) is located to the east of the presumed Fingal Point flow constriction and has a large increase in water levels that corresponds to recharge activities by Coachella Valley Water District and Desert Water Agency in the Indio Subbasin. It also has water levels that are nearly 300 feet lower than those of the other monitoring wells, some of which (8L) are located less than one mile away.

Wells at the 11H monitoring cluster have essentially no vertical flow gradient, with piezometric levels differing by only 0.02 feet across a perforation interval of 340 feet. Well cluster 8L appears to be located immediately adjacent to the Fingal Point outflow constraint and has a strong upward vertical flow. The lower zones at Well cluster 8L have piezometric levels 89 feet higher than shallower zones. This upward vertical flow likely results from the subsurface structure and presumed faulting there. Well Cluster 9M is the farthest east of the USGS monitoring wells and has a strong downward vertical flow gradient of 63 feet across a perforation interval averaging 460 feet.

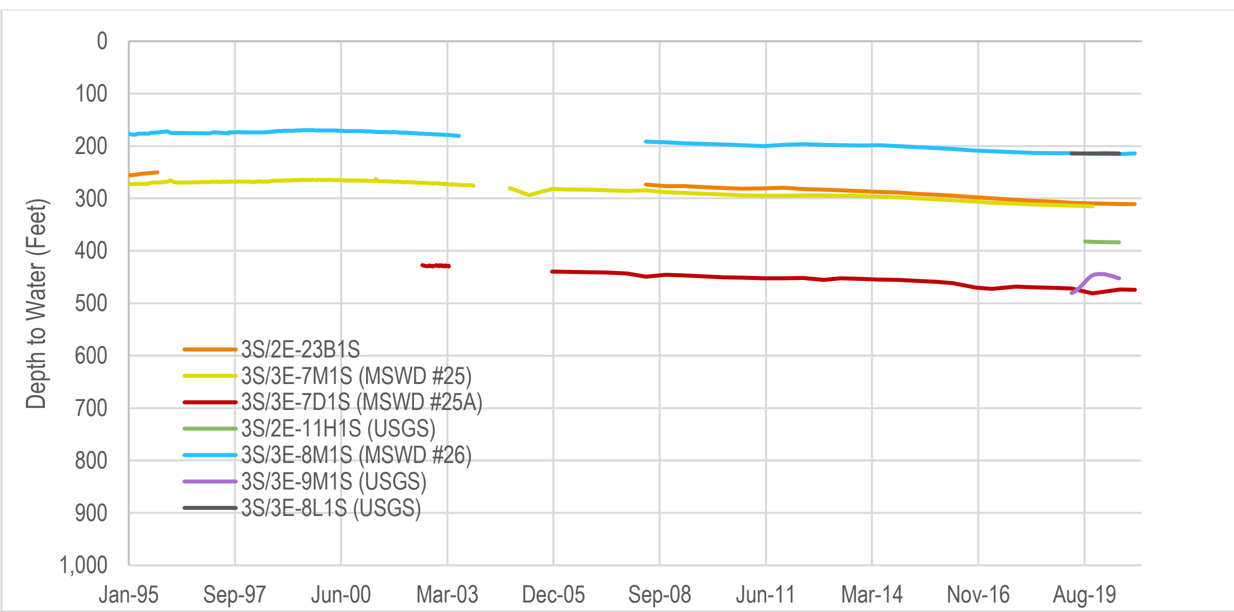


Figure 3-31 Depth to Water in the Eastern Portion of the Cabazon Storage Unit

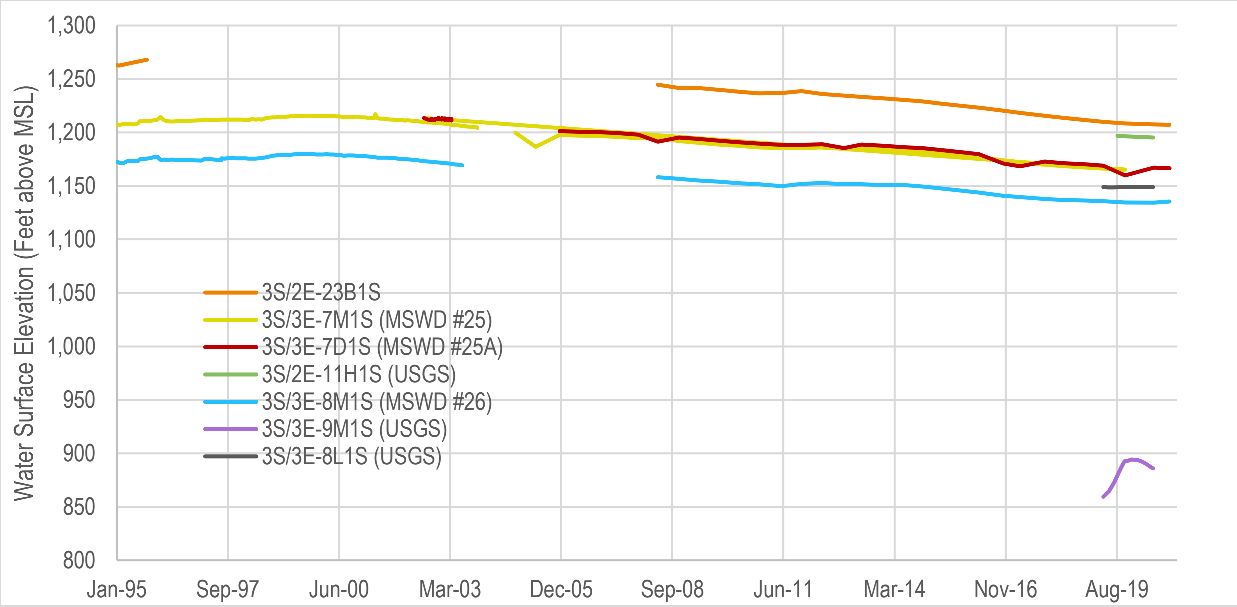


Figure 3-32 Water Surface Elevations in the Eastern Portion of the Cabazon Storage Unit

3.2.2 Estimate of Groundwater Storage

Regulation Requirements:

§354.16(b) A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.

Estimated annual groundwater storage change was developed using the SGP Groundwater Model for the Banning and Cabazon Storage Units. Monthly groundwater level storage change amounts were summed annually for the Banning and Cabazon Storage Unit for water years 1998-2019 that are shown in **Figure 3-33 Change in Groundwater Storage in Cabazon and Banning Storage Units**. Also shown in **Figure 3-33 Change in Groundwater Storage in Cabazon and Banning Storage Units** are cumulative storage change for the 1998-2019 base period. During the 22-year base period (1998-2019), groundwater levels in the Cabazon and Banning Storage Units declined an average of 9,200 acre-feet per year and the cumulative storage change was a decline of 202,400 acre-feet. Groundwater levels rose slightly in 1998 and 1999 as a result of significant recharge in 1998 and prior years. However, groundwater levels declined starting in 2000 and continued their decline through 2019. Groundwater pumping had no apparent effect on the variable groundwater level declines in the years after 2000.

Groundwater storage for the Banning Canyon Storage Unit, where the groundwater model could not be calibrated, was estimated using specific yields from the SGP Groundwater Model and groundwater levels from spring groundwater contour maps for 1998, 2005, and 2019. The Banning Canyon has very limited groundwater storage – about 14,000 acre-feet total – due to its small area and narrow thickness. Groundwater storage changes was very small for the 1998-2019 base period, with a total decline of 1,700 acre-feet, or about 80 acre-feet per year. Annual water level maps were not prepared for the Banning Canyon area because this area has relatively stable levels. Additionally, several other areas in the SGP (including the Potrero, Hathaway and Millard Canyons and Banning Bench Storage Unit) have no or limited reported groundwater level data and groundwater storage change there has not been computed. Groundwater storage changes estimates for the Banning Canyon Storage Units are shown in **Figure 3-34.**

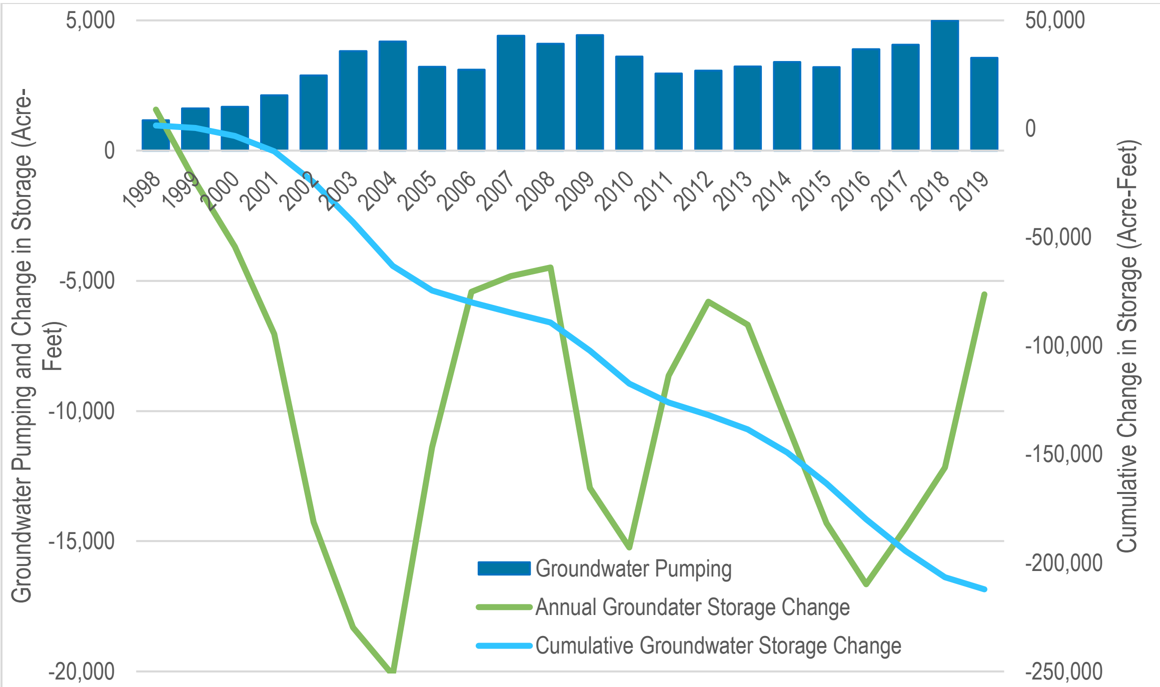


Figure 3-33 Change in Groundwater Storage in Cabazon and Banning Storage Units

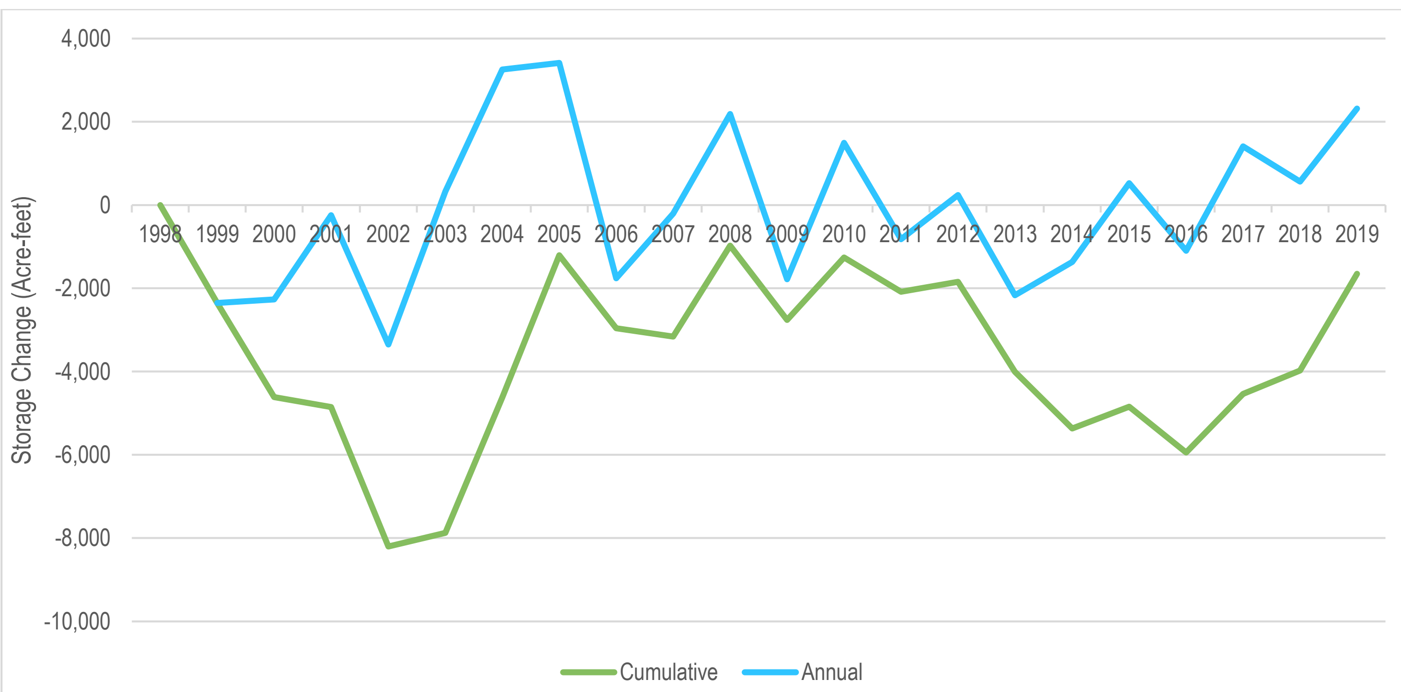


Figure 3-34 Change in Groundwater Storage in Banning Canyon Storage Unit

3.2.3 Seawater Intrusion

Regulation Requirements:

§354.16(c) Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.

Seawater intrusion is not an applicable sustainability index for the SGP Subbasin. The Subbasin is not adjacent to the Pacific Ocean, a bay, or an inlet.

3.2.4 Groundwater Quality Conditions

Regulation Requirements:

§354.16(d) Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.

The SGP Subbasin's groundwater is of generally good quality. Currently, there are no known contaminant plumes, and all historic contaminant sites are no longer active after successful mitigation. Based on current water quality standards, there is no need for additional treatment systems. Commercial, domestic, industrial, and municipal producers in the SGP conduct regular water quality sampling and reporting as required by state and federal agencies.

The GSAs acknowledge existing groundwater quality standards, such as Title 22 of California's Code of Regulations, which refers to state guidelines for how treated and recycled water is discharged and used. These guidelines are used to inform the groundwater quality assessment and representative monitoring, described in **Chapter 5- Monitoring Network**.

Groundwater Quality Data

Groundwater within the SGP Subbasin is used to meet commercial, domestic, industrial, and municipal producers and Groundwater Dependent Ecosystem (GDE) demands. The groundwater quality assessment for the SGP Subbasin has been prepared using available information obtained from the California Groundwater Ambient Monitoring and Assessment (GAMA) Program database, which includes water quality information collected by the California DWR, the State Water Resources Control Board (SWRCB), and the United States Geological Survey (USGS). GAMA incorporates available data collected by state and federal agencies, as wells as locally collected data that is reported to the state and federal agencies. The GAMA dataset has been augmented with information available from previous scientific investigative data collection and reporting efforts.

Data was initially assembled by downloading available water quality from the GAMA database that fall within the SGP Subbasin boundary. This data set was then reviewed to distinguish between wells that had multiple years of water quality sampling data and wells with limited sampling though comprehensive in nature. For wells in which construction information was available, well perforation depths were evaluated for correlations in groundwater quality across the well depths. No meaningful or significant correlations across groundwater depths was found, and the general quality of the groundwater across the Subbasin has been sufficient to support the Subbasin's beneficial use needs.

Commercial, Domestic, Industrial, and Municipal producers of Groundwater

Most wells in the SGP Subbasin with water quality data are production wells for commercial, domestic, industrial, and municipal uses and have a groundwater quality record.

Depth to groundwater is significant in the Banning and Cabazon Storage Units, which makes drilling new wells expensive and likely unaffordable for most de minimis rural residential groundwater users. Consequently, there are very few small residential wells compared to many other areas in the State. Most domestic groundwater users are connected to community groundwater systems, who are required to analyze constituents of concern related to drinking water and report their results to the state. As a result, there is a sufficient historic record of groundwater quality across the Subbasin to assess the general trends and quality conditions.

GDE Use of Groundwater

The City of Banning monitors groundwater quality at the city's production wells in areas adjacent to GDE in the Banning Canyon Storage Unit and reports the results to the state. This groundwater quality information was used to analyze groundwater quality related to the City's beneficial uses, as well as the potential GDEs near the city's wells. A discussion of groundwater dependent ecosystems is provided in **Section 3.2.7**.

Chapter 5 – Monitoring Network and **Chapter 4 – Sustainable Management Criteria** explain the subset of wells that were identified for focused monitoring throughout the GSP Implementation period related to groundwater quality.

Water Quality Hydrogeologic Conceptual Model

As discussed in **Section 3.1**, the depth to bedrock varies greatly in the SGP Subbasin due to faulting and recent geologic activity. No significant confining layer has been identified in the SGP Subbasin, resulting in a single primary aquifer across the various geologic Storage Units. The HCM also identified a significant depth to groundwater of several hundred feet, resulting in a lengthy time lag for recharge infiltration through the vadose zone to the aquifer. Because of the thickness of the vadose zone in most parts of the SGP Subbasin, there may be legacy contaminants that may appear and the GSAs' member agencies' commitment to ongoing groundwater quality monitoring is required in their reporting to the state and is described in **Chapter 5 – Monitoring Network**.

Benchmarks for Water Quality Characterization

To aide in the evaluation of existing groundwater quality a baseline should be defined for comparing current and future water quality constituents. The great majority of groundwater use in the SGP Subbasin is for commercial, domestic, industrial, and municipal producers' purposes, which require strict water quality regulation compliance for human consumption. The drinking water standards associated with the commercial, domestic, and municipal uses exceed the groundwater quality needs of the other remaining beneficial use of groundwater in the Subbasin, GDEs. There is currently no known agriculture activity in the SGP Subbasin; therefore, agriculture is not identified as a beneficial use.

Water quality standards for the United States were established with the enactment of the Safe Drinking Water Act (SDWA) in 1974. Prior to the passage of this bill enforcement of water quality standards was difficult and often ineffectively applied by many states (AWWA, 1990). The SDWA requires the United States Environmental Protection Agency (USEPA) to develop enforceable water quality standards for public water systems. The regulatory standards are known as maximum contaminant levels (MCLs) which define the maximum concentration of specific constituent that are allowable in potable water sources. Each state is required to enforce the federal standards as a minimum, but they may create stricter standards at their discretion. The State of California has on a number of occasions developed more stringent standards. Since the promulgation of the initial regulatory standards the number of regulated constituents has steadily grown.

Water quality standards, as established by the USEPA, are of two categories: National Primary Drinking Water Regulations, which are enforceable standards that have been established based on health effects from contaminants; and Secondary Drinking Water Standards, which are unenforceable standards established for contaminants that may negatively affect the aesthetics of water quality. A list of screened contaminants and associated regulation standards is provided in **Table 3-2.**

Groundwater quality characterization for the SGP Subbasin is based on the data obtained from the GAMA online database, which is considered to be the best available information. As best practice, the groundwater assessment considers concerns from the perspective of human health for drinking water and suitability for the mentioned beneficial uses. Water quality information for each well has been compared to the outlined benchmarks. Based on review of the available data the water quality constituents of concern within the Subbasin are provided in the following table and discussed further in this section. Other constituents commonly monitored in relation to drinking water standards were assessed; however, they were not considered relevant or significant to the region and are not included in the discussion below.

Table 3-2 Water Quality Constituents of Concern and Standard Category

Groundwater Quality Constituents of Concern and Standard Category	
Primary MCL	Secondary MCL
Arsenic	Iron
Chromium-6	Manganese
Fluoride	Total Dissolved Solids
Lead	
Nitrate	

As part of the water quality review an effort was undertaken to examine whether there were observed changes in individual water constituents over a 22-year period, from 1997 to 2019. The period was selected to generally correlate with the hydrologic period used for the water budget (1998 Water Year to 2019 Water Year). The water quality data is available by calendar year, and 1997 was included in the analysis to account for measurements taken within October to December 2017, which falls within the 1998 Water Year. Figures depicting the median results at each respective well within this period are available in this Section below.

National Primary Drinking Water Regulation Concentrations

The following discussion summarizes the constituents that were found at concentrations higher than established regulatory enforceable maximum contaminate levels in the SGP Subbasin within the 22-year period of groundwater quality analysis.

Much of the SGP Subbasin's water use is potable, resulting in many of the Subbasin's production wells complying with state and federal drinking water standards. In the case of constituent exceedances, those water producers have implemented appropriate treatment to supply adequate quality potable water.

Despite the positive overall assessment of groundwater quality conditions in the SGP Subbasin, municipal water supplies are required to continue groundwater quality monitoring at commercial, domestic, industrial, and municipal production wells. In addition, GSAs have committed to GSP-specific monitoring for nitrates and TDS, as they are identified as being a common concern in nearby Subbasins. Future monitoring of TDS and nitrates is described in **Chapter 4** and **Chapter 5**.

Arsenic. The presence of arsenic in groundwater can be attributed naturally to desorption from arsenic-containing rocks and is often present in clay formations. Anthropogenic (caused or influenced by humans) sources include compounds used in manufacturing electronic components; processing of ceramics, paints, and textiles; and agricultural related pesticides and insecticides. Arsenic is listed as a carcinogen, and when ingested at elevated concentrations may increase the risk of bladder, kidney, liver, lung, and skin cancer. Prior to 2006, the MCL for arsenic was 50 μg/L, but following reevaluation by the USEPA at that time, the MCL was lowered to the present level of 10 μg/L (SWRCB, 2017a).

Based on the selected data set, arsenic concentrations in excess of the MCL occur in the deep aquifer formations. Concentrations in the moderate to shallow segments of the aquifer are largely below the MCL. This may indicate that lowering of groundwater levels may not impart a significant change in higher arsenic levels but may give cause for elevated concern if water within the areas of lower depths is withdrawn. **Figure 3-35** summarizes the results of all arsenic monitoring events from 1997 to 2019 in relation to the MCL. **Figure 3-36** below displays the location of water quality sampling in the 22-year analysis period and identifies two wells that have a recorded median arsenic result greater than half the MCL. No wells had data that consistently exceeded the MCL.

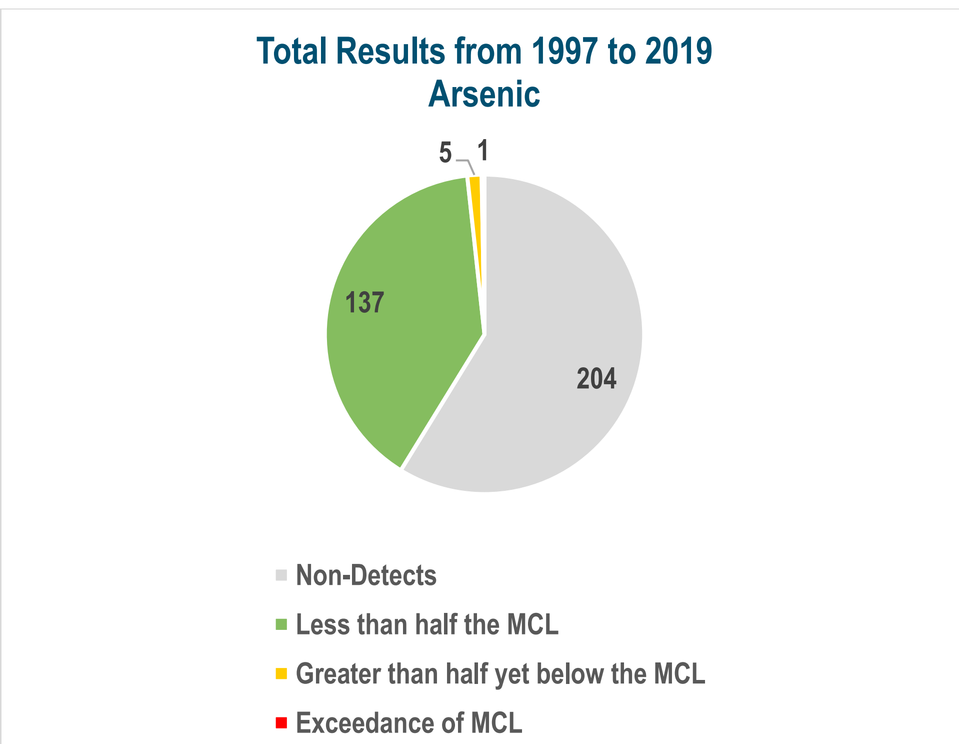


Figure 3-35 Arsenic Results (1997-2019)

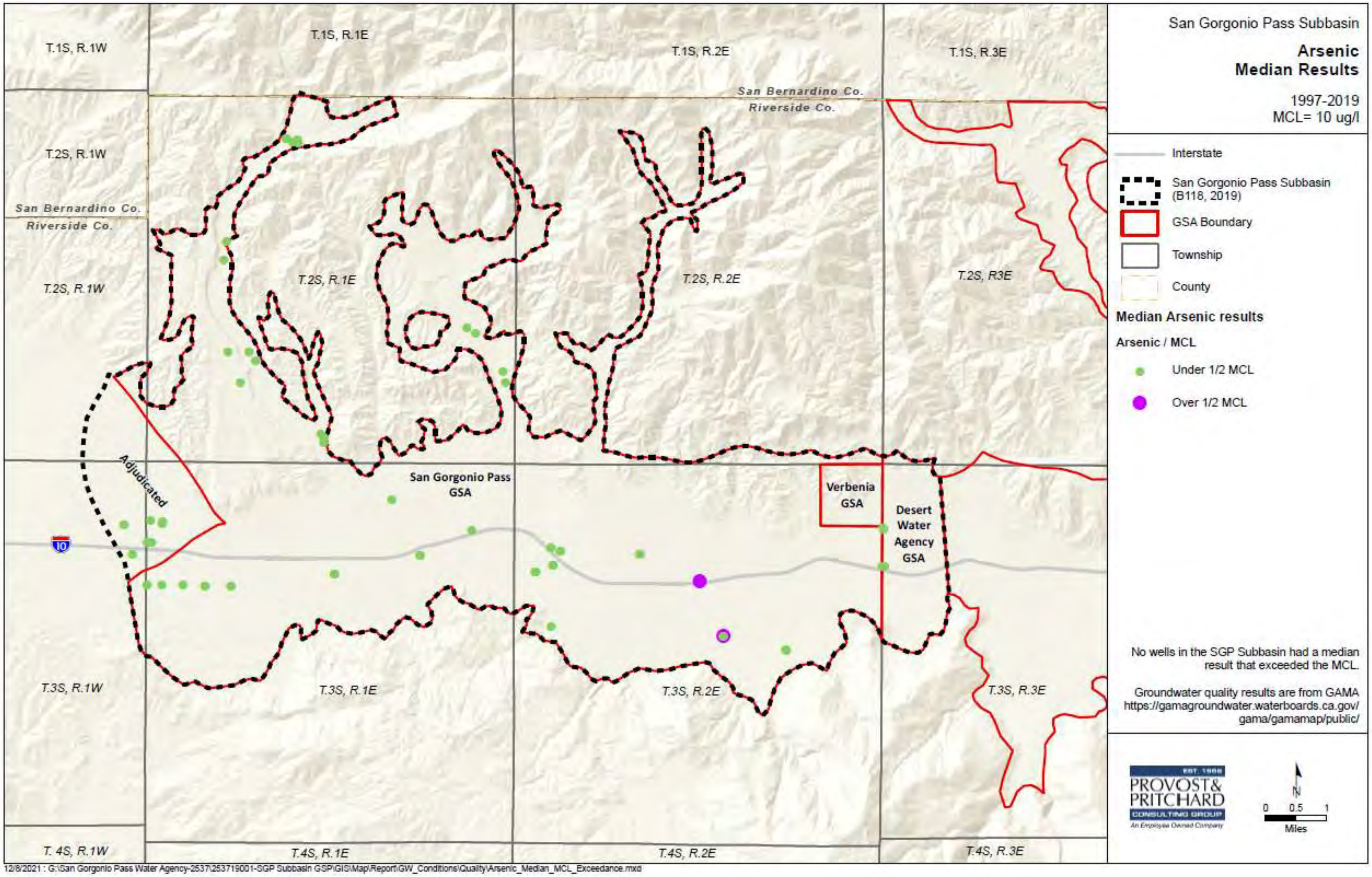


Figure 3-36 Arsenic -- Groundwater Quality Analysis (1997-2019)

Chromium-6. Chromium is present in nature as trivalent chromium (Chrome-3) and hexavalent chromium (Chrome-6). Chrome-3 is an essential human dietary element and is found in food sources such as, vegetables, fruits, meats, and grains (USEPA, website: chromium-drinking-water). The occurrence of Chrome-6 in groundwater is associated with erosion of natural chromium deposits. Anthropogenic sources of trivalent chromium include the discharges of dyes and paint pigments, wood preservatives, chrome plating liquid wastes, and leaching from hazardous waste sites (SWRCB, 2017b). Exposure to hexavalent chromium through inhalation is known to cause increased risks of gastrointestinal cancer and may cause damage to the lining of the nose, throat, and lungs. The USEPA has established a MCL for Total Chromium (all forms of chromium) at 100 μg/L, while the State of California set the MCL for Total Chromium at 50 μg/L. In 2017, the Superior Court of Sacramento County issued a judgment invalidating the statewide hexavalent chromium MCL of 10 ug/L. The SWRCB is projected to release a Publication of a Notice of Proposed Rulemaking for a MCL; however, it was not made available by the time of GSP finalization. The SWRCB is currently evaluating alternative MCL options and potential for funding assistance to support treating Chrome-6 in the most affected communities.

Water quality data shows only a few low detections of total chromium across the Subbasin. There are more detections of total chromium in the intermediate zone near the City of Banning (approximately 20 to 25 μg/L). The change in concentrations relative to time show slight variation, and overall shows the SGP Subbasin is well below the MCL for total chromium. The GSAs and their member agencies will comply with Chrome-6 treatment requirements defined by the SWRCB if necessary. Considering the lack of active MCL for Chrome-6, there is no exceedance statistics figure for Chrome-6, unlike the other constituents presented in this Section; however, **Figure 3-37** presents the median Chrome-6 groundwater quality results across the Subbasin from 1997-2019.

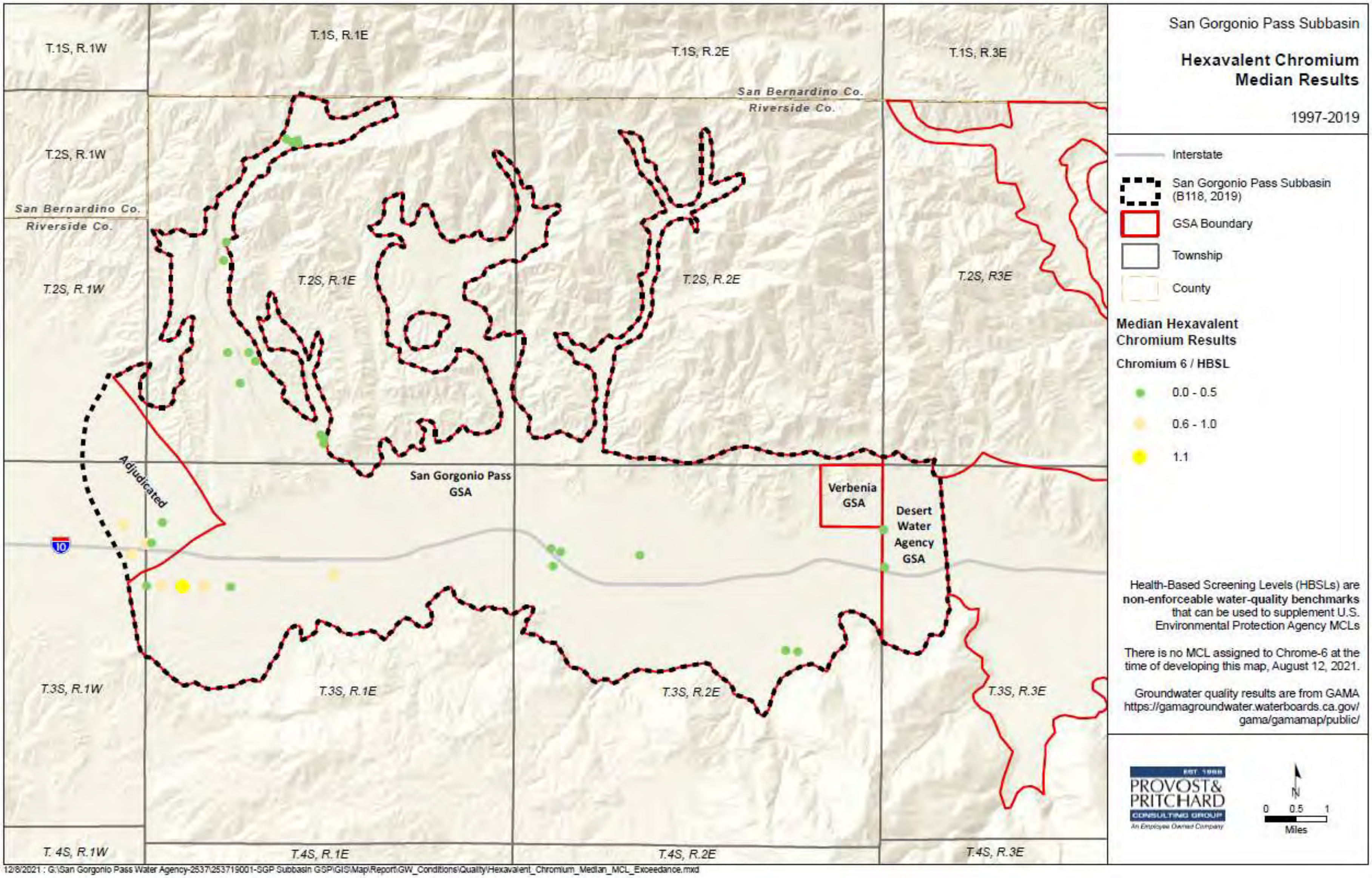


Figure 3-37 Chrome-6 -- Groundwater Quality Analysis (1997-2019)

Fluoride. The presence of fluoride in groundwater drinking water occurs as rainwater percolates through deposits containing fluorine which then combines with minerals to form fluoride salts. Anthropogenic sources include discharge from fertilizers and aluminum factories. Fluoride offers health benefits by helping prevent tooth decay, however, long-term exposure to elevated concentrations of fluoride can be detrimental causing discoloration of teeth and skeletal fluorosis. The United States Public Health Service (USPHS, 2015) recommends an optimal fluoride concentration of 0.7 mg/L for prevention of dental cavities. The USEPA has established an MCL for fluoride at 2 mg/L (or 2,000 µg/L).

Fluoride exceedances have not occurred in the SGP Subbasin within the 22-year period. **Figure 3-38** summarizes the results of all fluoride monitoring events from 1997 to 2019 in relation to the MCL. **Figure 3-39** depicts the median results of Fluoride in the Subbasin from 1997 to 2019. Water producers in the Subbasin have the capacity to treat for fluoride should there be a risk to human health or other beneficial use.

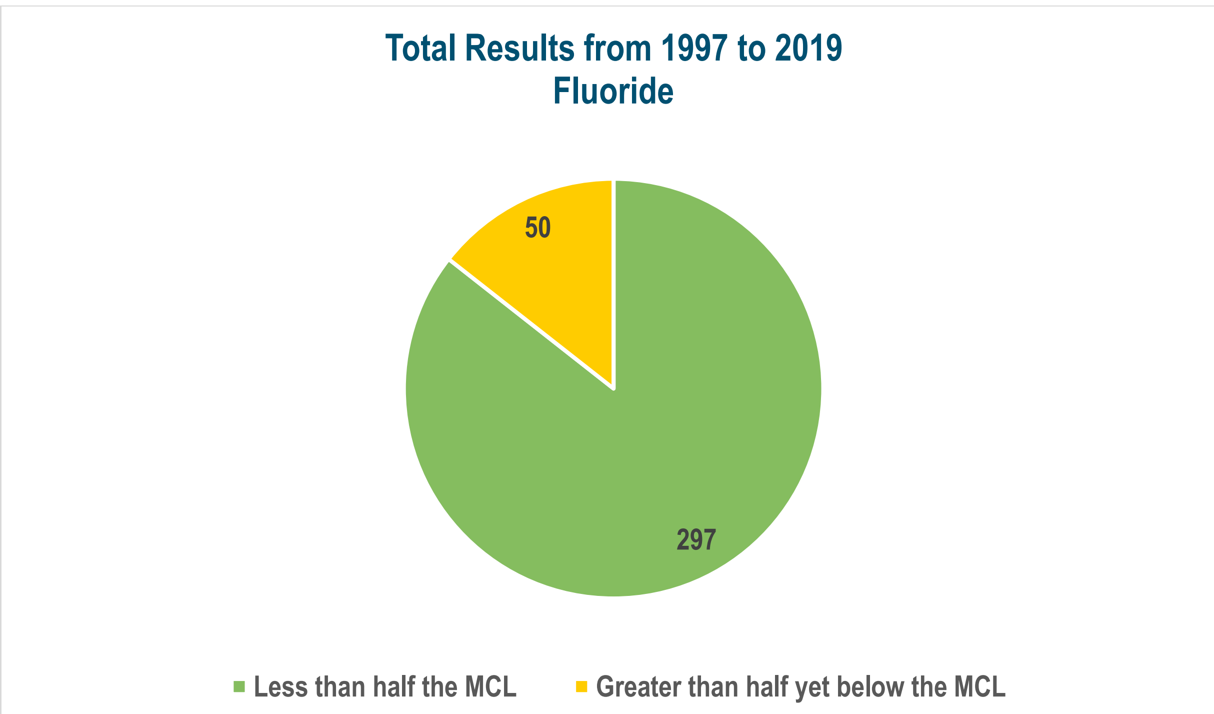


Figure 3-38 Fluoride Results (1997-2019)

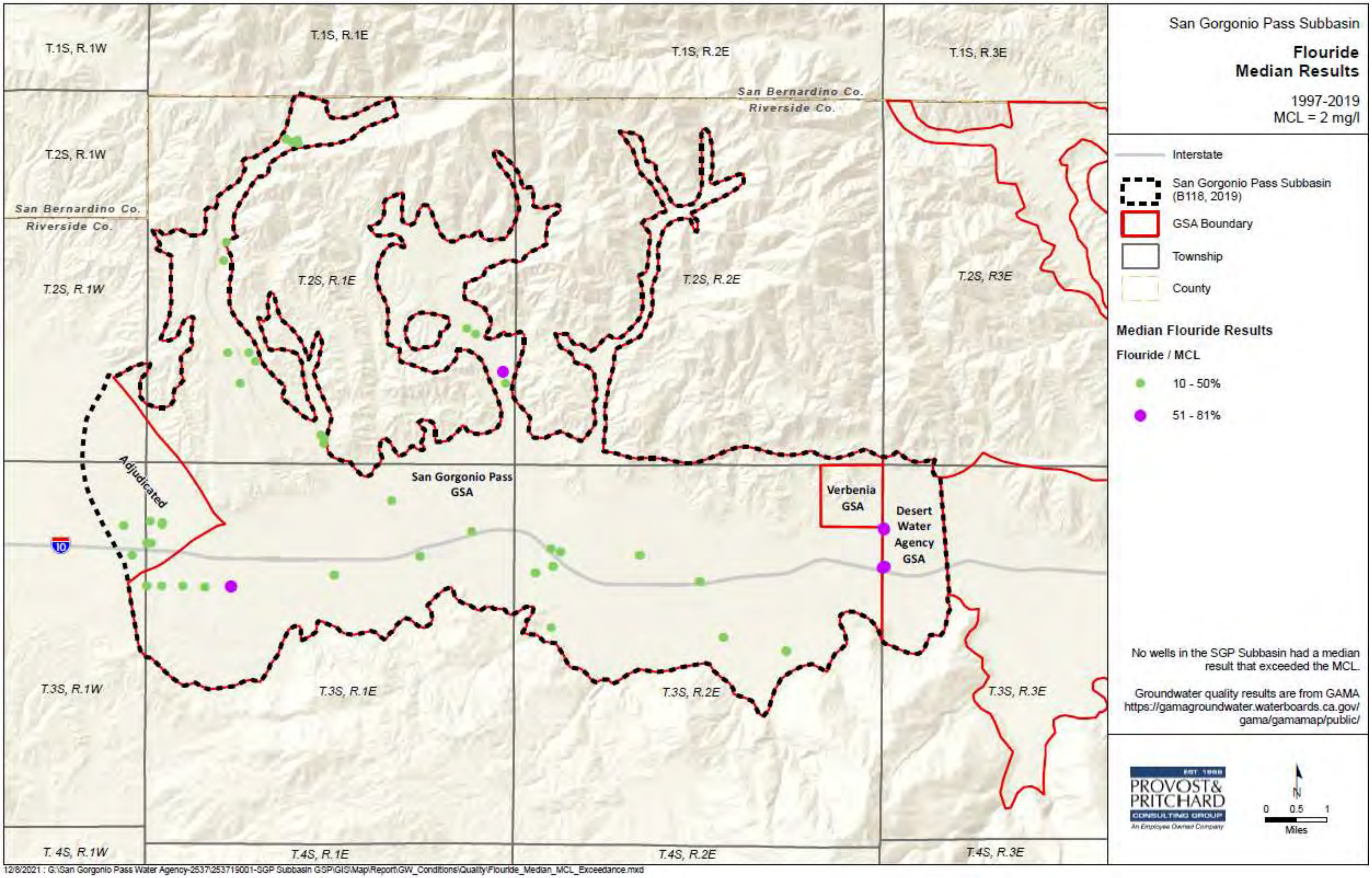


Figure 3-39 Fluoride -- Groundwater Quality Analysis (1997-2019)

Lead. Lead may be found in groundwater supplies through erosion of natural deposits. In recent years, significant concern about lead in drinking water has arisen from the highly publicized widespread contamination that occurred from lead leaching from water service lines in Flint, Michigan. No similar lead water quality concerns have been identified in the SGP Subbasin. Health effects from elevated concentration of lead include delays of mental and physical development in children, and high blood pressure and kidney disease in adults (SWRCB, 2017d). The USEPA regulates the concentration of lead in drinking water by an Action Level (AL), which is similar to an MCL but requires additional testing at customer services. The USEPA AL for lead is 15 µg/L.

Figure 3-40 summarizes the results of all lead monitoring events from 1997 to 2019 in relation to the action level. Lead occurs in low levels within the SGP Subbasin. One lead risk was identified within the 22-year analysis period (**Figure 3-41**). Water producers in the Subbasin have the capacity to treat for lead should there be a risk to human health or other beneficial use.

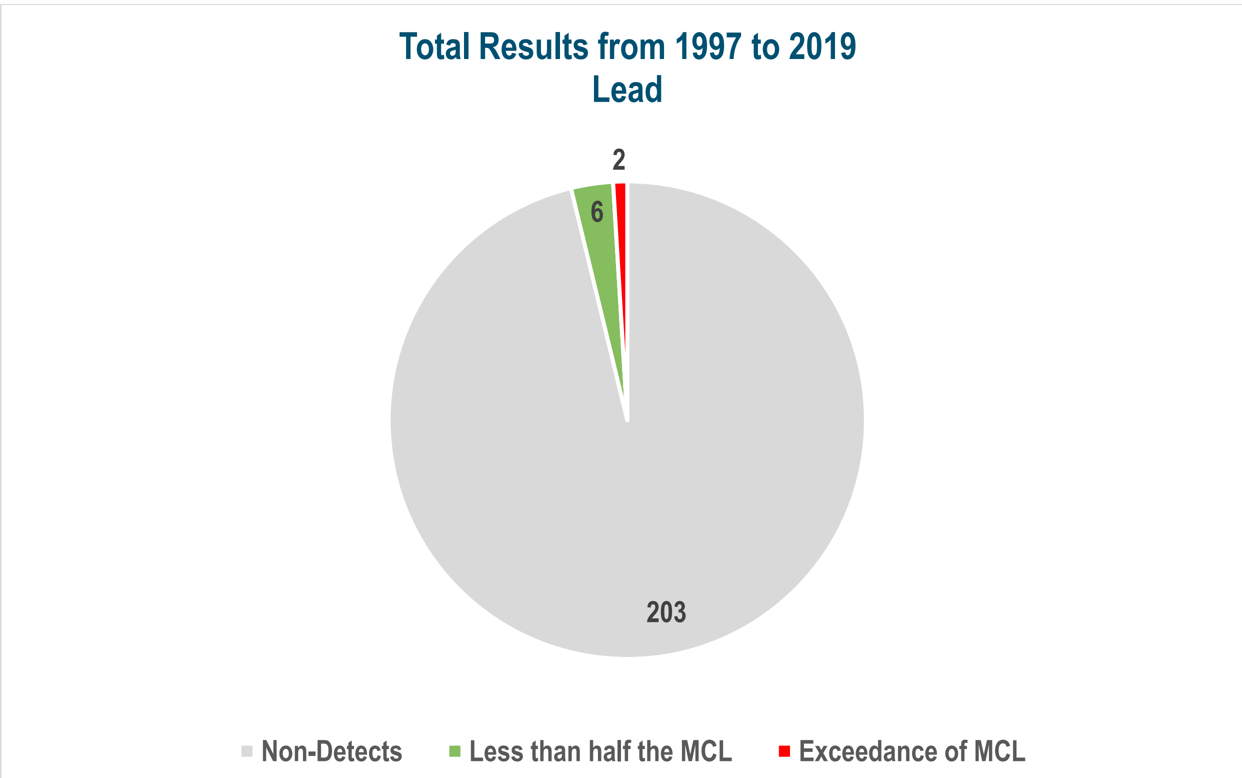


Figure 3-40 Lead Results (1997-2019)

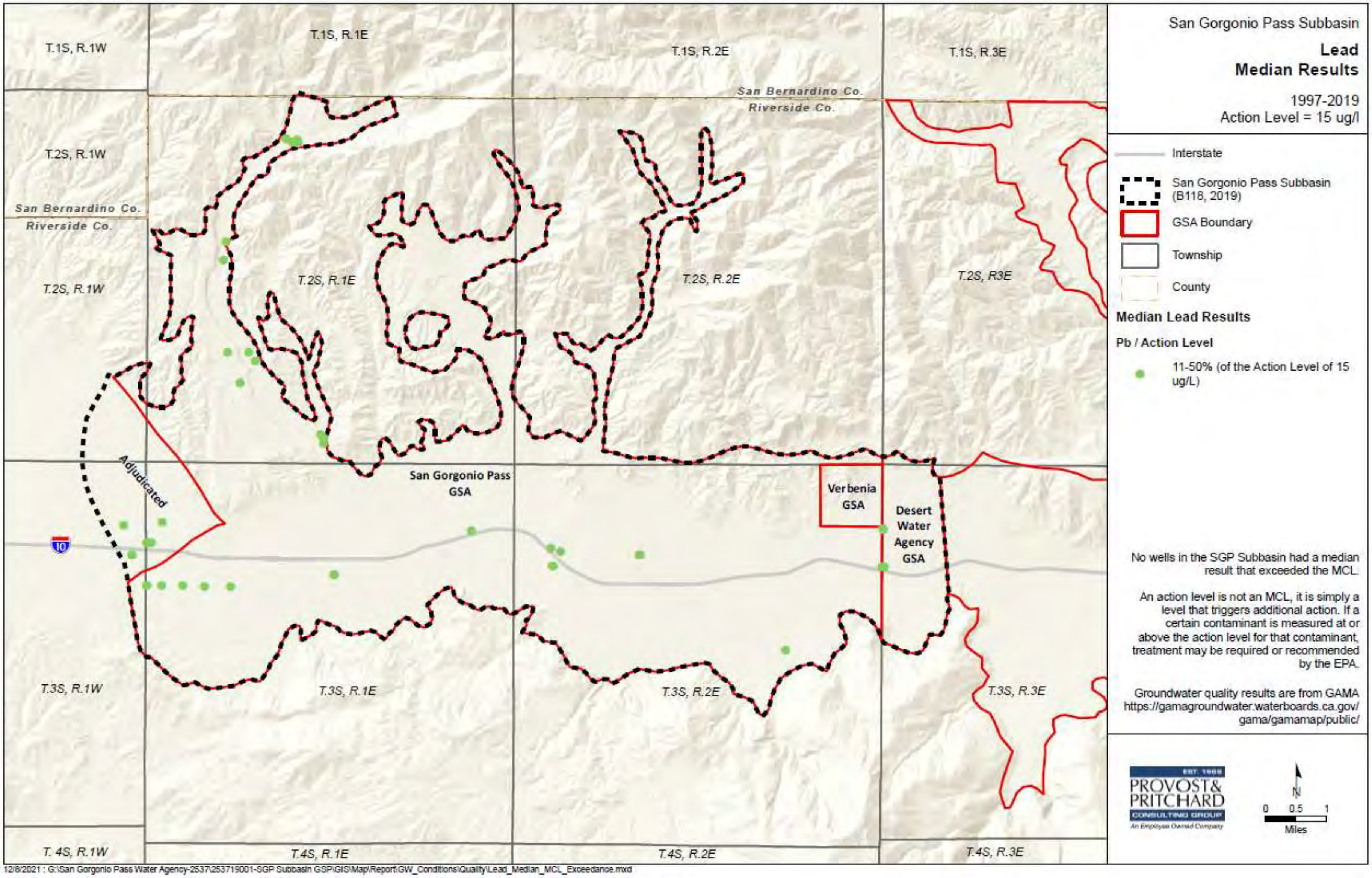


Figure 3-41 Lead -- Groundwater Quality Analysis (1997-2019)

Nitrate. The presence of nitrate in groundwater may occur from oxidation of atmospheric nitrogen gas by lightning, that may then naturally get into groundwater, but this generally produces low concentrations typically below 2 mg/L (as N) (SWRCB, 2017e). The largest contributors of nitrates in groundwater are anthropogenic sources, such as fertilizer applications, septic tanks, wastewater discharges, manure fertilizer applications, and agricultural ponds. Infants under the age of 6 months are the most susceptible to health-effects from nitrates, known as methemoglobinemia ("blue baby syndrome"). Methemoglobinemia is the result of ingesting nitrate and its subsequent conversion by digestive bacteria into the more toxic nitrite, which enters the bloodstream and hinders the body's ability to carry oxygen. The MCL for nitrate is 10 mg/L (as N). Use of public water systems monitoring information to identify nitrate concerns may be misleading as the public water sources are typically taken offline as soon as there is an exceedance. Use of only public water system water quality data in analysis may erroneously indicate that contamination has subsided, but it may persist in the area. Care needs to be exercised in making conclusions on contributory sources and causative groundwater impacts associated to the occurrence of nitrates in groundwater.

Nitrates are identified as a monitored constituent in the representative water quality monitoring network, described in **Chapter 5**, due to the prevalence of exceedance in nearby and similar Subbasins.

Figure 3-42 summarizes the results of all nitrate monitoring events from 1997 to 2019 in relation to the MCL. As seen in **Figure 3-43,** most measurements in the Subbasin are identified as being below the MCL over the 22-year analysis period. Areas in which there was an exceedance experienced improved groundwater conditions shortly after exceeding the MCL.

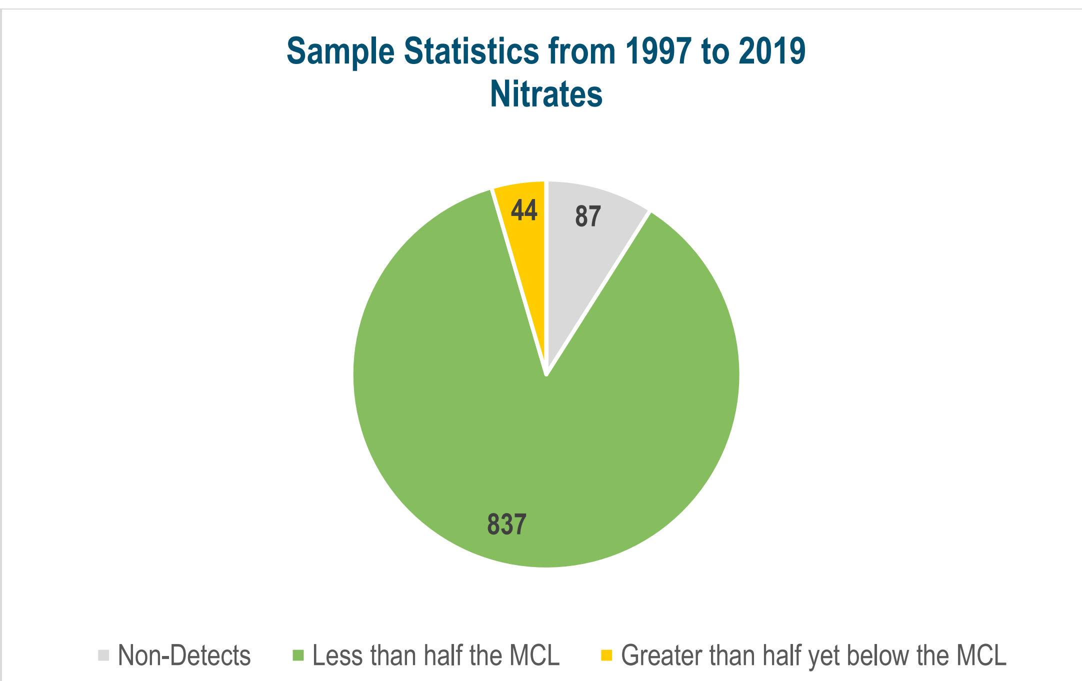


Figure 3-42 Nitrate Results (1997-2019)

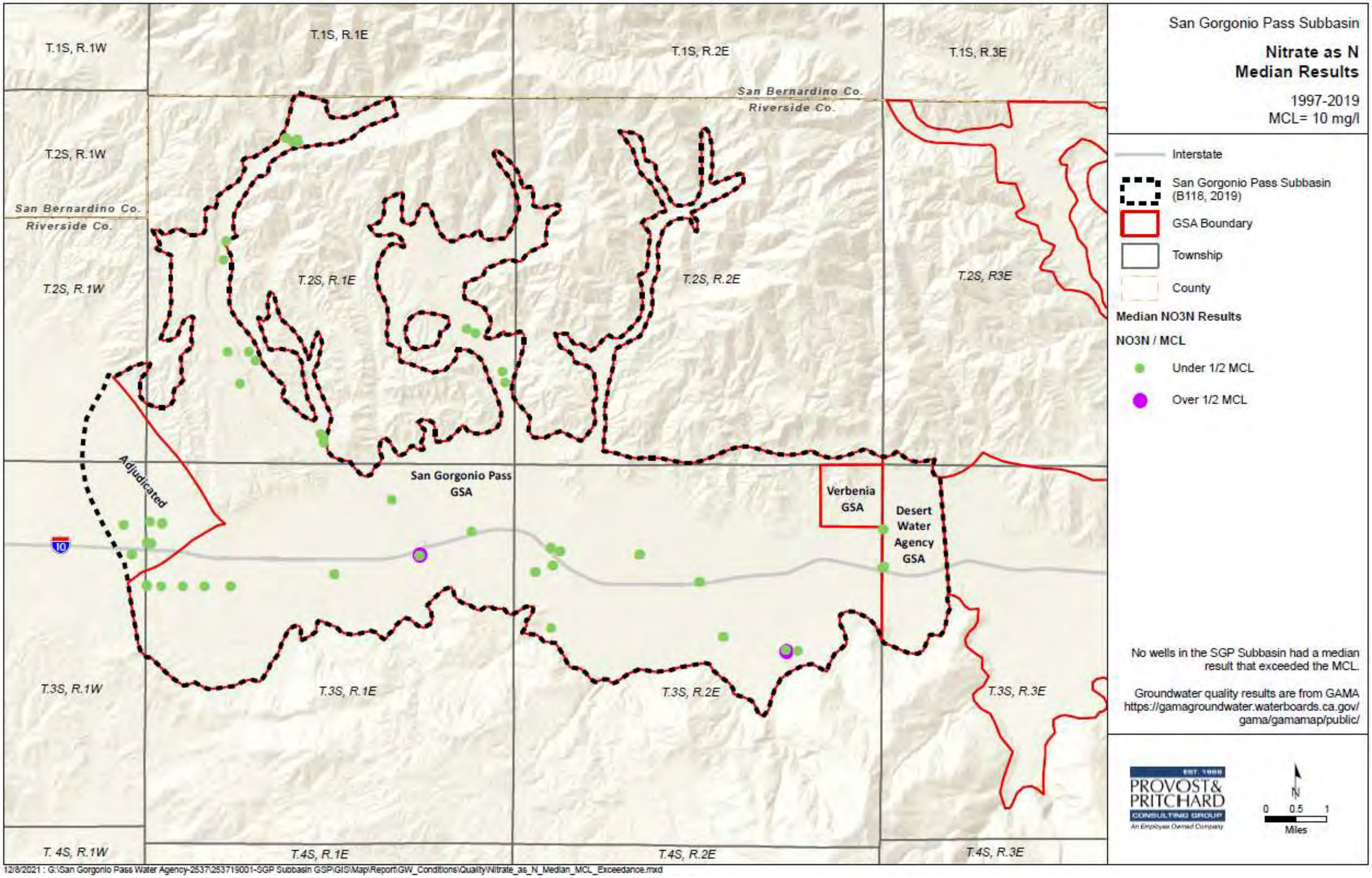


Figure 3-43 Nitrate -- Groundwater Quality Analysis (1997-2019)

Secondary Drinking Water Standard Concentrations

The following discussion summarizes the constituents that were found at concentrations higher than established secondary drinking water standards within the SGP Subbasin (SMCL)[14]. To the degree possible with the available data, the variability of constituent concentrations by depth is provided. The constituents that are held to secondary drinking water standards are not health threatening at their respective SMCL. Public water systems only need to test for them on a voluntary basis. However, if these contaminants are present in water at levels above the SMCL, the contaminants may cause the water to appear cloudy or colored, or to taste or smell bad. This may cause a great number of people to stop using water from their public water system even though the water is actually safe to drink.

Secondary standards are set to give public water systems some guidance on removing these chemicals to levels that are below what most people will find to be noticeable.

Iron. Iron is found in nature in rocks, soils, and minerals. Groundwater passing through these materials will dissolve the iron, taking it into solution. Iron is considered an essential and beneficial element of human diet, and no primary MCL has been set. The USEPA has established a secondary maximum contaminant level (SMCL) for iron, for water aesthetics, at 0.3 mg/L (or 300 µg/L). Concentrations at or above this level can oxidize when exposed to oxygen causing the water to take on a rusty color which can stain laundry and will also have a metallic taste.

There were two wells that experienced exceedances of the SMCL for iron; however, those same wells had reported improved quality conditions in more recent years. **Figure 3-44** summarizes the results of all iron monitoring events from 1997 to 2019 in relation to the SMCL. **Figure 3-45** depicts the median results of Iron in the Subbasin from 1997 to 2019.

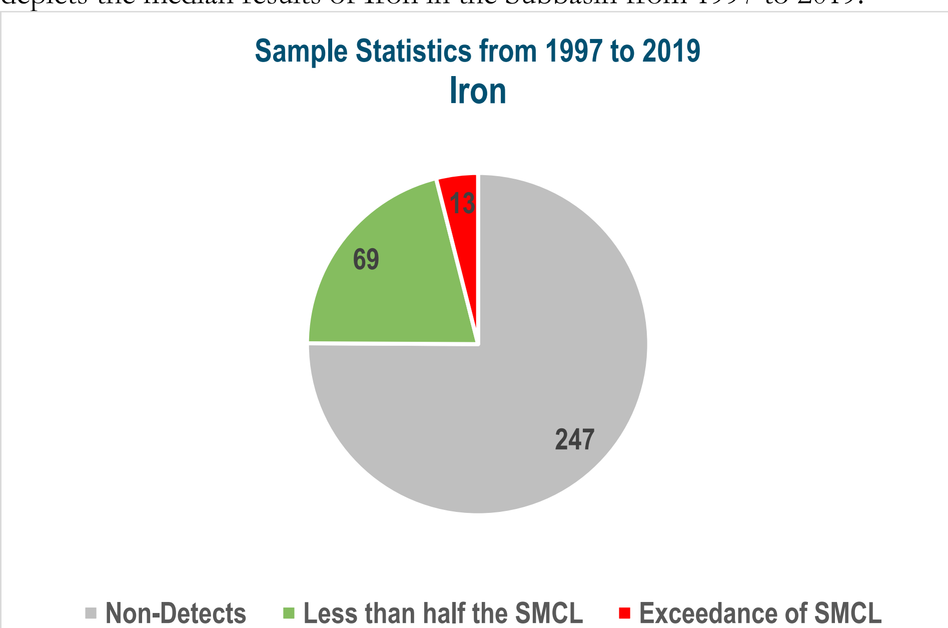


Figure 3-44 Iron Results (1997-2019)

[14] Secondary Drinking Water Standards: Guidance for Nuisance Chemicals | US EPA

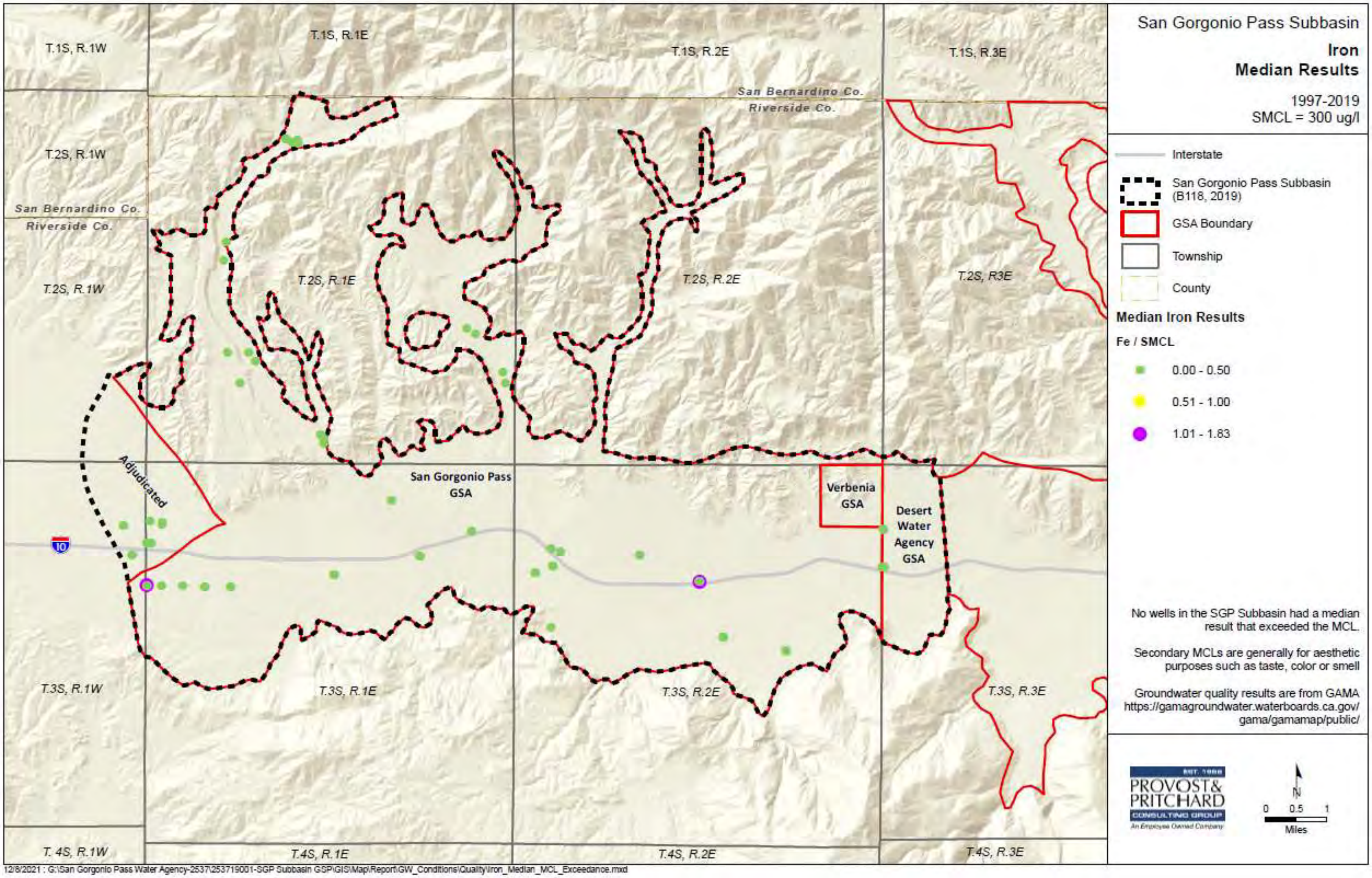


Figure 3-45 Iron -- Groundwater Quality Analysis (1997-2019)

Manganese. Manganese, like iron, is a naturally occurring element and is typically dissolved from rocks and minerals as water flows through formations containing this element. As with iron, manganese is considered an essential element in human diet, but there are health concerns from over-exposure that can cause neurological effects (USEPA, 2004). Manganese can cause objectionable aesthetic issues such as black discoloration of water. In a chlorinated domestic or municipal water system with elevated iron and manganese levels, iron is converted to the ferric state (rust) while the manganese is converted to manganese dioxide, which is a black precipitate. Together, these two reaction products can create permanent staining of fixtures and laundry leading to widespread customer complaints. The SMCL for manganese is 50 µg/L.

Manganese concentrations have exceeded their secondary MCL at two wells within the Subbasin within the 22-year period. During that period, the manganese concentrations have fluctuated and experienced positive quality conditions at those same sites. **Figure 3-46** summarizes the results of all manganese monitoring events from 1997 to 2019 in relation to the SMCL. **Figure 3-47** below reports the median concentration ranges at each well over the analysis period of 1997-2019. Water suppliers have the capacity to treat manganese contamination, and the groundwater producers will continue to monitor manganese as required by state regulations.

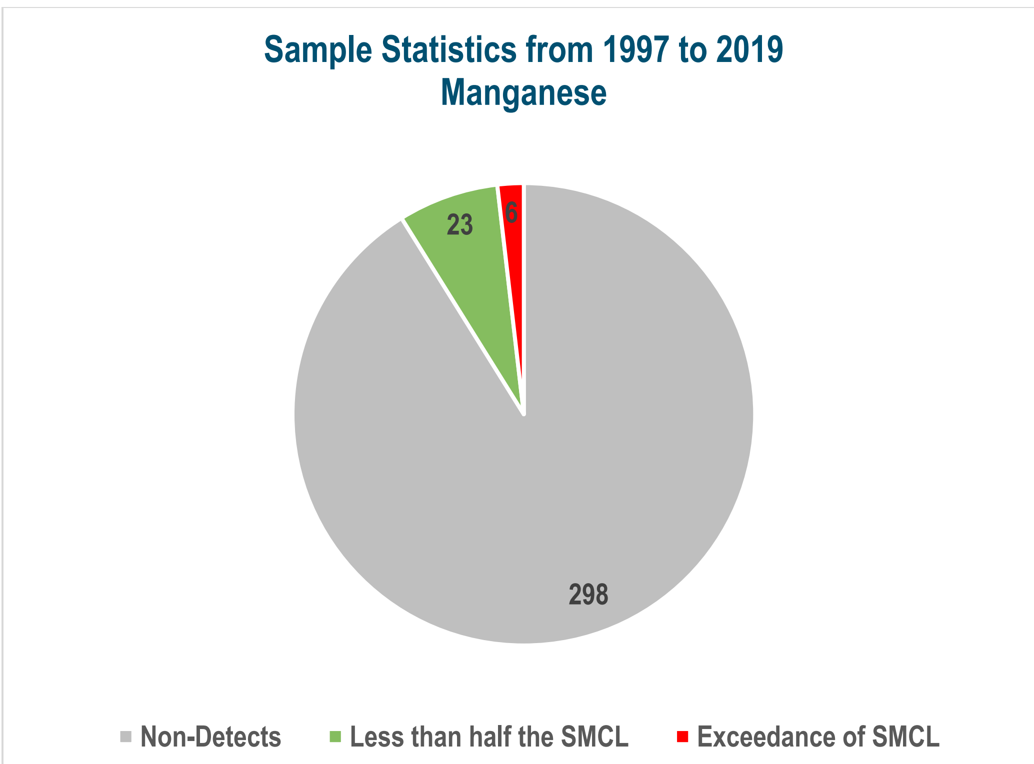


Figure 3-46 Manganese Results (1997-2019)

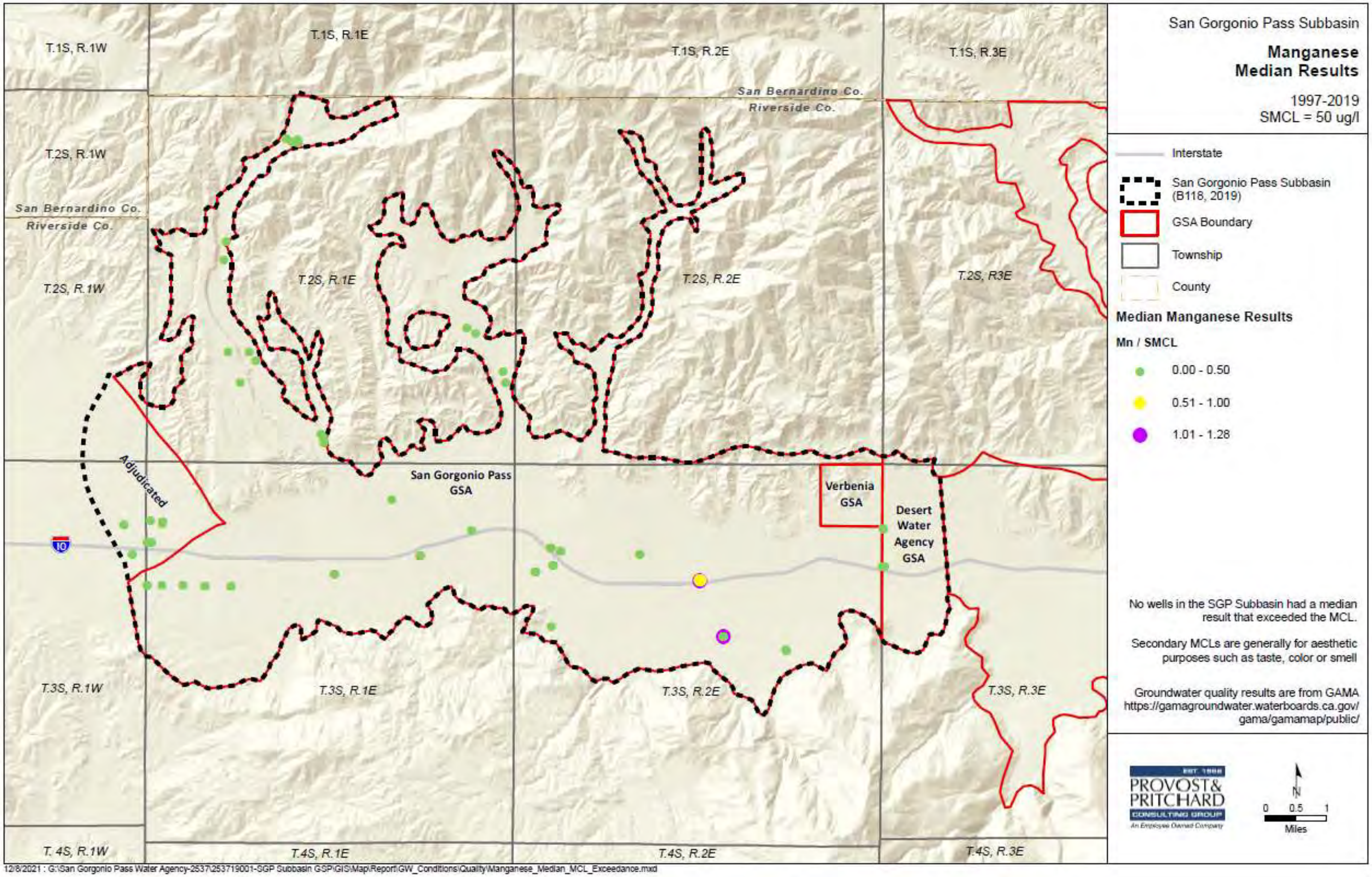


Figure 3-47 Manganese -- Groundwater Quality Analysis (1997-2019)

Total Dissolved Solids. The presence and accumulation of dissolved solids in groundwater may be attributed to rainwater percolating through soil and rocks causing salts and minerals to leach from these formations. Another contributory source of solids and salts is imported irrigation water that may be laden with dissolved solids which can further increase the accumulation and concentrations of dissolved solids in groundwater. Anthropogenic sources include discharges from water softeners and wastewater plants, industrial discharges from cooling towers, food processors, legacy septic tanks and canning facilities (SWRCB, 2017g).

The secondary SMCL, for taste and odor, for TDS is provided as a range from 500 mg/L (recommended) to 1,000 mg/L. For rare and limited short-term durations concentrations up to 1,500 mg/L for TDS may be permissible. From the natural accumulation of salts via evapo-concentration, salinity can impact drinking water quality, GDE health, and other beneficial uses. TDS is a common constituent of concern in nearby and similar Subbasins, and therefore has been included in the Representative Water Quality Monitoring Network (**Chapter 5**).

Figure 3.2-25 summarizes the results of all TDS monitoring events from 1997 to 2019 in relation to the SMCL. The median concentration of TDS has remained below the SMCL in the SGP Subbasin within the period of 1997-2019, as shown in **Figure 3.2-26** below.

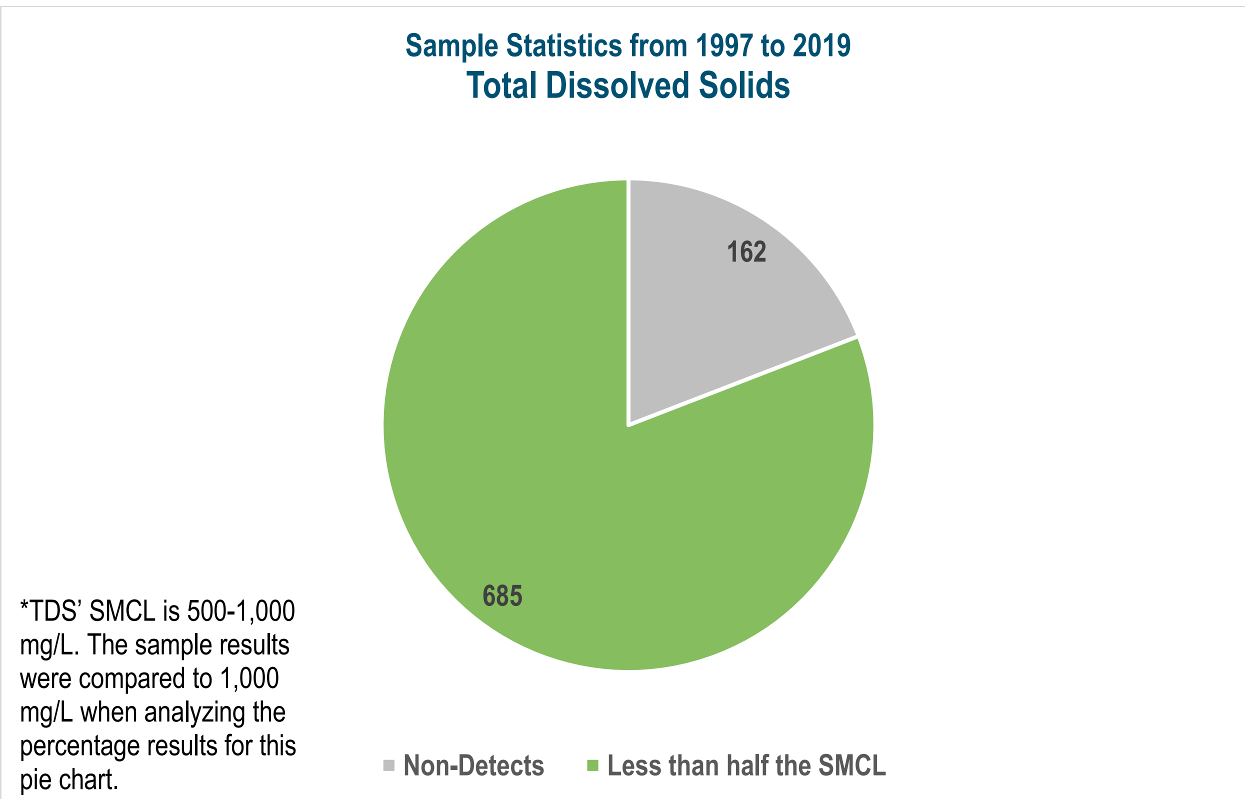


Figure 3-48 TDS Results (1997-2019)

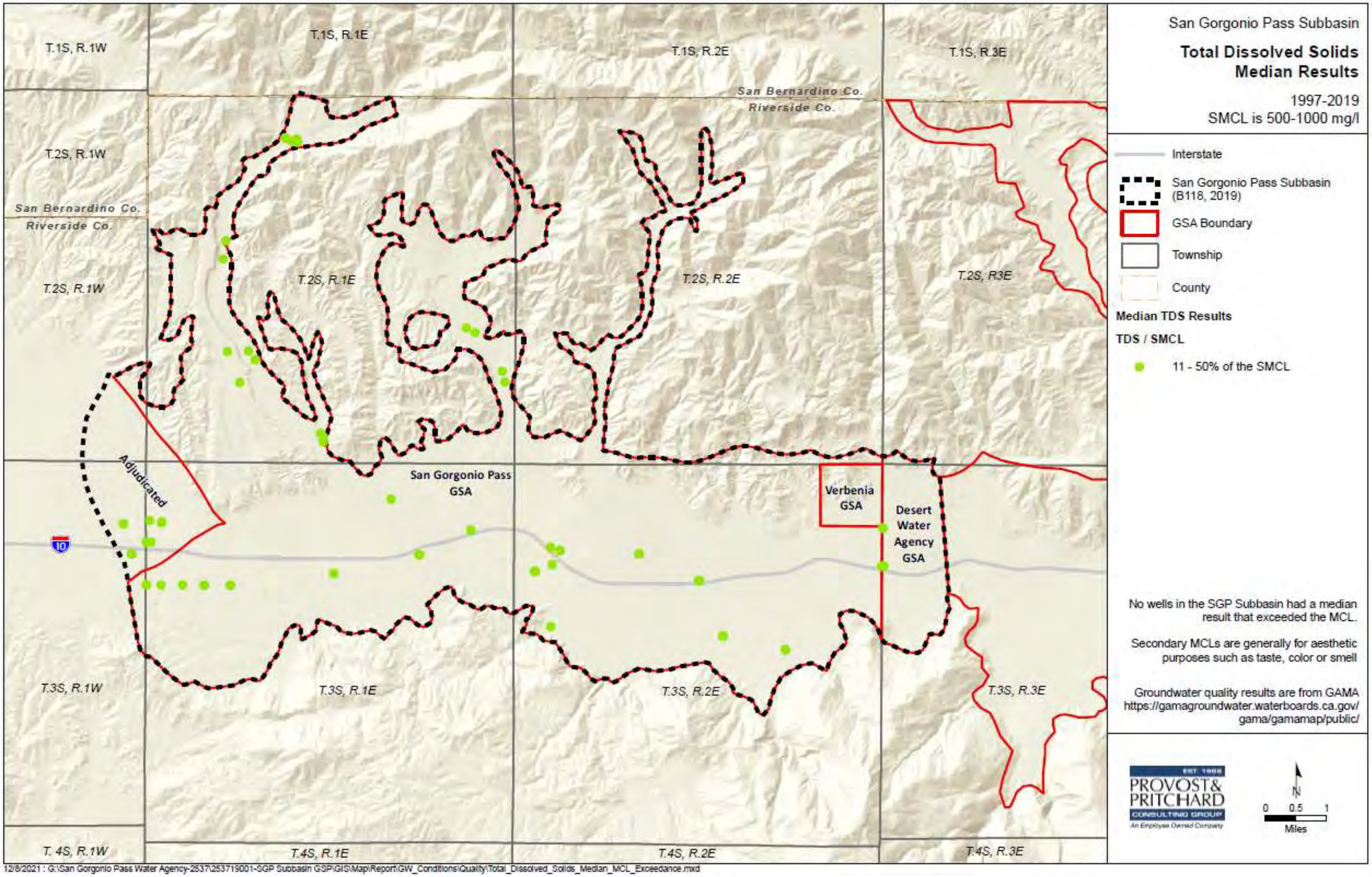


Figure 3-49 TDS -- Groundwater Quality Analysis (1997-2019)

Known Contamination/Plumes

To identify known plumes and contamination within the Plan Area SWRCB GeoTracker was reviewed for active clean-up sites of all types. Although there have been numerous leaky underground storage tanks (LUST) and other cleanup sites identified within the SGP Subbasin, all these cases have been closed or inactive (**Figure 3-50**).

The single site that is currently open is identified as "open-inactive."[15] The W. Ramsey Street former USA Petroleum Gas site (T0606537906) case opened in January 2005. The site had four tanks removed on January 14, 2005. Soil Samples from piping, dispensers and tanks were analyzed. Two of the four tanks were clean, and the remaining two tanks had recorded 12 ppm total petroleum hydrocarbons gasoline (TPHg) and 3,400 ppm TPHg concentrations, requiring remedial action. The primary concern included soil and did not include groundwater contamination. Although there is no current risk to groundwater contamination, the GSAs will revisit the GeoTracker website annually to evaluate the status of this site and others in the SGP Subbasin.

[15] GeoTracker (ca.gov)

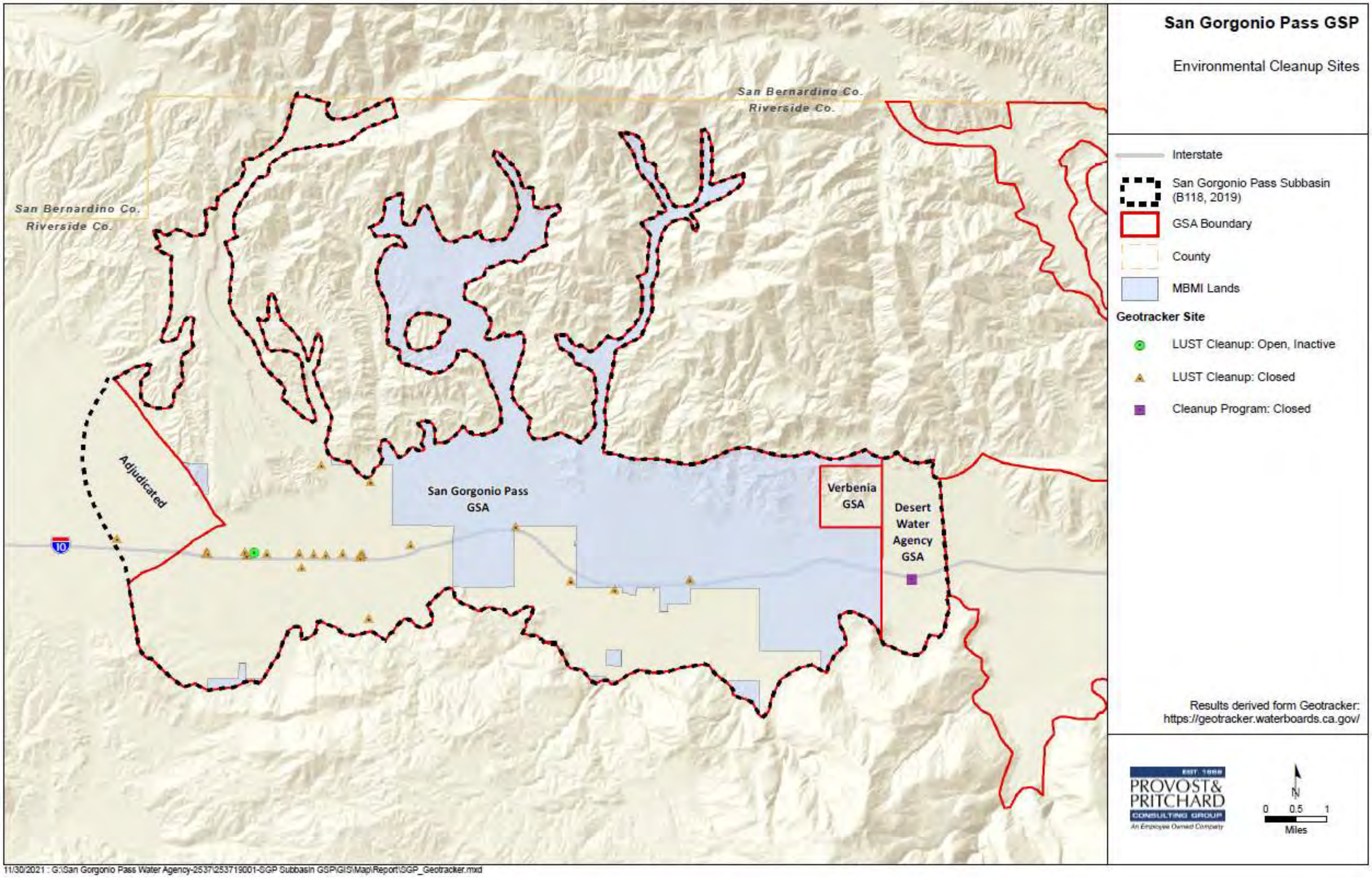


Figure 3-50 GeoTracker Contamination Review

3.2.5 Land Subsidence Conditions

Regulation Requirements:

§354.16(e) The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or best available information.

Land subsidence can result from compression of clayey aquifer materials that are subject to groundwater level declines. The SGP Subbasin is located in an area of active geological activity. Compressible clay zones would not be expected to be present in the SGP Subbasin based on its geologic activity and none have been identified. Measured land subsidence from the TRE ALTAMIRA InSAR[16] analysis for the SGP Subbasin is shown in **Figure 3-51** which indicates measured ground surface elevation changes of -.25 to 0.25 feet for four-year period from June 2015 through September 2019. This small range of elevation change would include changes from factors such as tectonic activity, which is a potential cause for land surface elevation changes in the area. The reported change is potentially within a margin of error for this technology and is considered insufficient to indicate any observable land subsidence.

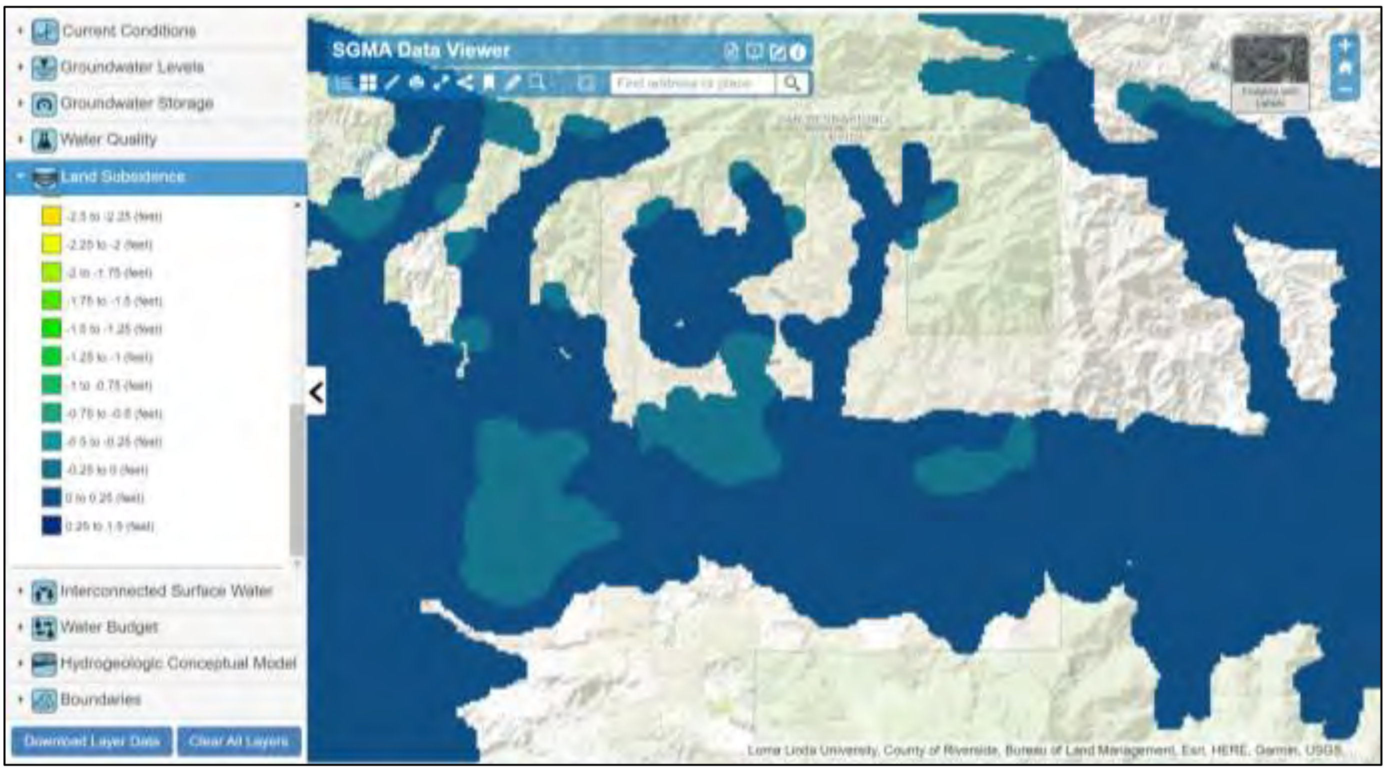


Figure 3-51 Ground Surface Elevation Changes

3.2.6 Surface Water and Groundwater Interconnections

Regulation Requirements:

§354.16(f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or best available information.

[16] https://data.cnra.ca.gov/dataset/tre-altamira-insar-subsidence

SGMA regulations require the GSA to quantify the volume or rate of surface water depletion caused by groundwater pumping in basins where surface water and groundwater are interconnected. Interconnected surface water systems are defined as surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted (Modeling Best Management Practices, DWR, 2016).

The purpose of this section is to identify any known areas within the SGP Subbasin where groundwater pumping has caused surface water depletion. The only waterway within the Subbasin that falls within SGMA's jurisdiction is San Gorgonio River, an ephemeral tributary of the Whitewater River that flows through the Banning Canyon. San Gorgonio River flows are also supplemented by diversions from the upper Whitewater River watershed through a flume system developed by Southern California Edison. At this time, there is no evidence that active wells along the San Gorgonio Pass River within the Banning Canyon are causing increased seepage loss or impacts to downstream beneficial uses. More information on the hydrologic patterns is explained in both **Section 3.1** and **Section 3.3**.

Additional ephemeral distributaries from the Whitewater River are present in the Potrero, Hathaway, and Millard Canyons that fall within MBMI lands. These waterways and the downstream uses are confined to MBMI's jurisdiction, which is not subject to SGMA due to the Tribe's federally recognized status. Because of this, the description of interconnected surface water in this Section is limited to Banning Canyon and the respective San Gorgonio River. San Gorgonio River and canyons are identified in **Figure 2-10** and **Figure 3-52**.

Present Day Conditions

The head differential in the San Gorgonio River between stream water elevations and the underlying groundwater elevations induces seepage losses from the stream (losing stream). River flows within the Canyon result primarily from natural runoff from its watershed. and can be supplemented by diversions from the Southern California Edison's flume system into the Canyon.

3.2.7 Interconnected Surface Water Systems

San Gorgonio River is an interconnected surface water system during high precipitation years; however, these conditions are not consistent throughout the year and are not assured in all years. The river can have a hydraulic connection with groundwater in the Banning Canyon aquifer when San Gorgonio River flows are adequate to saturate the vadose zone between the river and the groundwater table.

The Banning Canyon has a shallow depth to bedrock, sloped bedrock, and is predominantly composed of highly permeable alluvial materials. These conditions generate rapid recharge rates of the San Gorgonio River and quick groundwater velocity.

During wet periods when the San Gorgonio River flows downstream to the mouth of the canyon, the connection tapers off as the canyon spreads into an alluvial fan in the Cabazon Storage Unit, and remaining surface waters recharge the lower aquifer in the Cabazon Storage Unit.

A depiction of all waterways, including ephemeral systems, are included in **Figure 3-52** below.

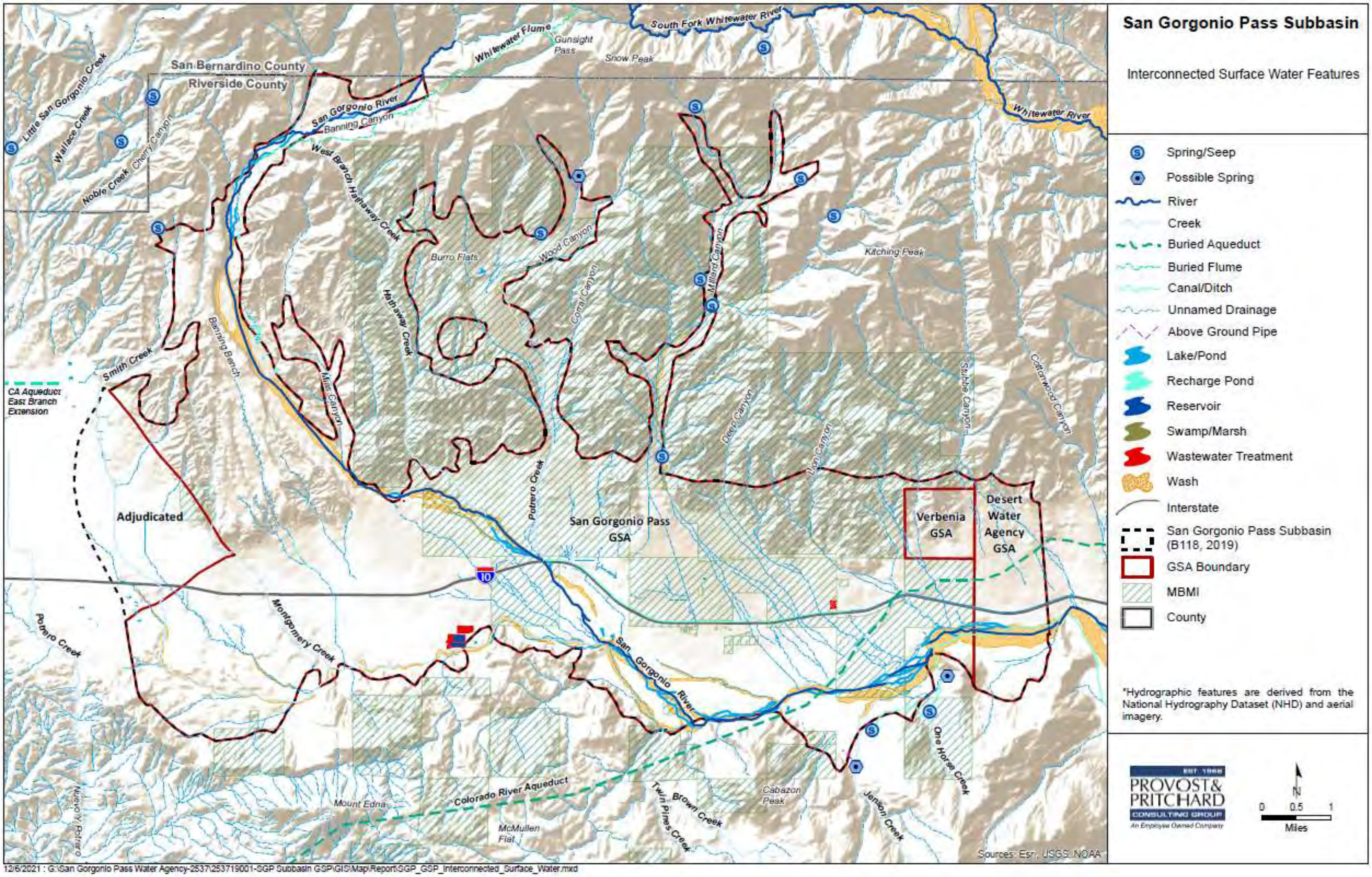


Figure 3-52 Interconnected Surface Water Features in the SGP Subbasin

3.2.8 Groundwater Dependent Ecosystems

Regulation Requirements:

§354.16(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or best available information.

GDEs are defined as "ecological communities of species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" (23 CCR § 351(m)). GDEs are organized into two primary types: (1) Vegetative GDEs, characterized as zones with wetland or facultative wetland vegetation that have rooting depths supported by a shallow groundwater table and (2) Wetland GDEs, characterized as areas that experience hydric soil conditions indicative of near-surface groundwater tables. A GDE can be identified as either a Vegetative GDE and a Wetland GDE, or in some instances, both.

GDEs have been identified using the approach recommended by the Nature Conservancy (TNC) in their 2018 Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act guidance document[17]:

Step 1. Where are GDEs?
Step 2. Are GDEs being impacted by current groundwater conditions, and could they be impacted by future groundwater conditions?
Step 3. How can management achieve sustainability and avoid adverse impacts to GDEs?
Step 4. How can progress and success be tracked through a monitoring network?
Step 5. What actions can be taken to achieve sustainability?

This Section describes how the SGP Subbasin's GSAs evaluated GDEs through the five-steps.

Step 1. Where are GDEs?
GDEs are recognized as requiring sufficiently shallow groundwater to support groundwater dependent vegetation or hydric soil conditions. Therefore, depth to groundwater was the primary metric for identifying potential GDEs in the Subbasin. TNC's GDE Pulse interactive mapping tool was used in conjunction with long-term groundwater level data, hydrogeologic cross-sections, and historic aerial imagery to analyze the potential for GDE presence.

Figure 3-53 depicts the potential GDEs in the SGP Subbasin, and the areas in which there was sufficient evidence to determine that the groundwater conditions required by GDEs were not present, despite TNC's identification of their presence via their GDE Pulse tool. It is important to acknowledge that there may be GDEs within the Potrero, Hathaway, and Millard Canyons; however, they are within the MBMI lands. MBMI lands are not subject to SGMA, and data are not generally available in those areas for full identification as GDEs. These areas have been identified as a data gap. To be conservative, these canyons are identified as potential GDE areas.

Groundwater levels in the Banning Bench, Banning, and Cabazon Storage Units have a significant depth to groundwater, which exceed hundreds of feet deep over most of those Storage Units. In addition, there is no presence of perched aquifers, or the shallow

[17] GWR_Hub_GDE_Guidance_Doc_2-1-18.pdf (groundwaterresourcehub.org)

impermeable layers that can create conditions for a perched aquifer within the Banning Bench, Banning, and Cabazon Storage Units. These groundwater levels cannot sustain Vegetative GDE or Wetland GDEs for any part of any water year. The significant depth to groundwater is consistently supported by the groundwater level data across the historic hydrologic period. Maps showing the groundwater surface elevation contours, including in the Banning Canyon are available in **Figure 3-16**, representing the start of the hydrologic base period (1998), and in **Figure 3-17**, representing the end of the hydrologic base period (2019). In addition, **Figure 3-54** depicts the depth to groundwater contours when the groundwater level was the shallowest in the SGP Subbasin.

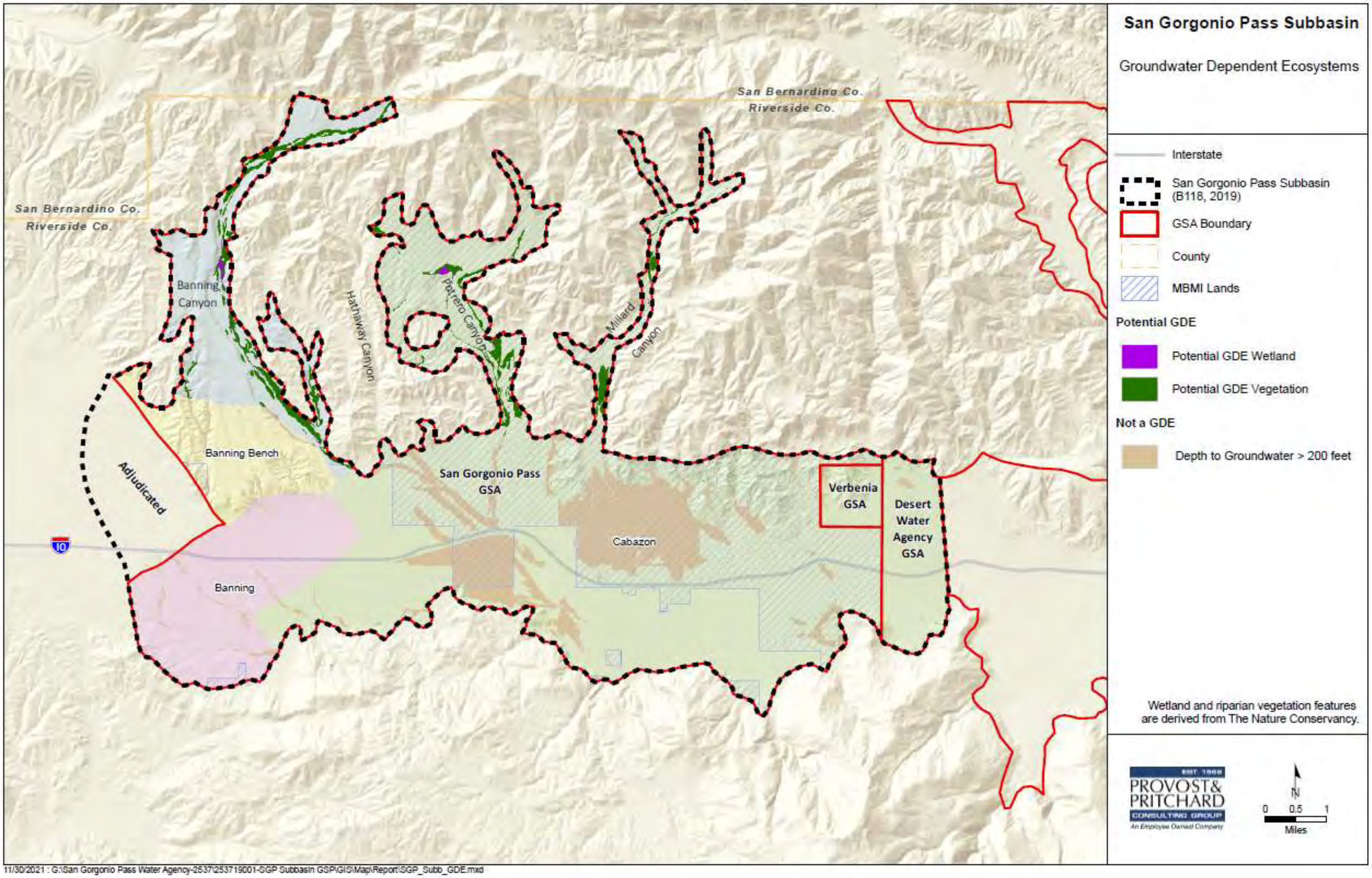


Figure 3-53 Potential GDEs in the SGP Subbasin

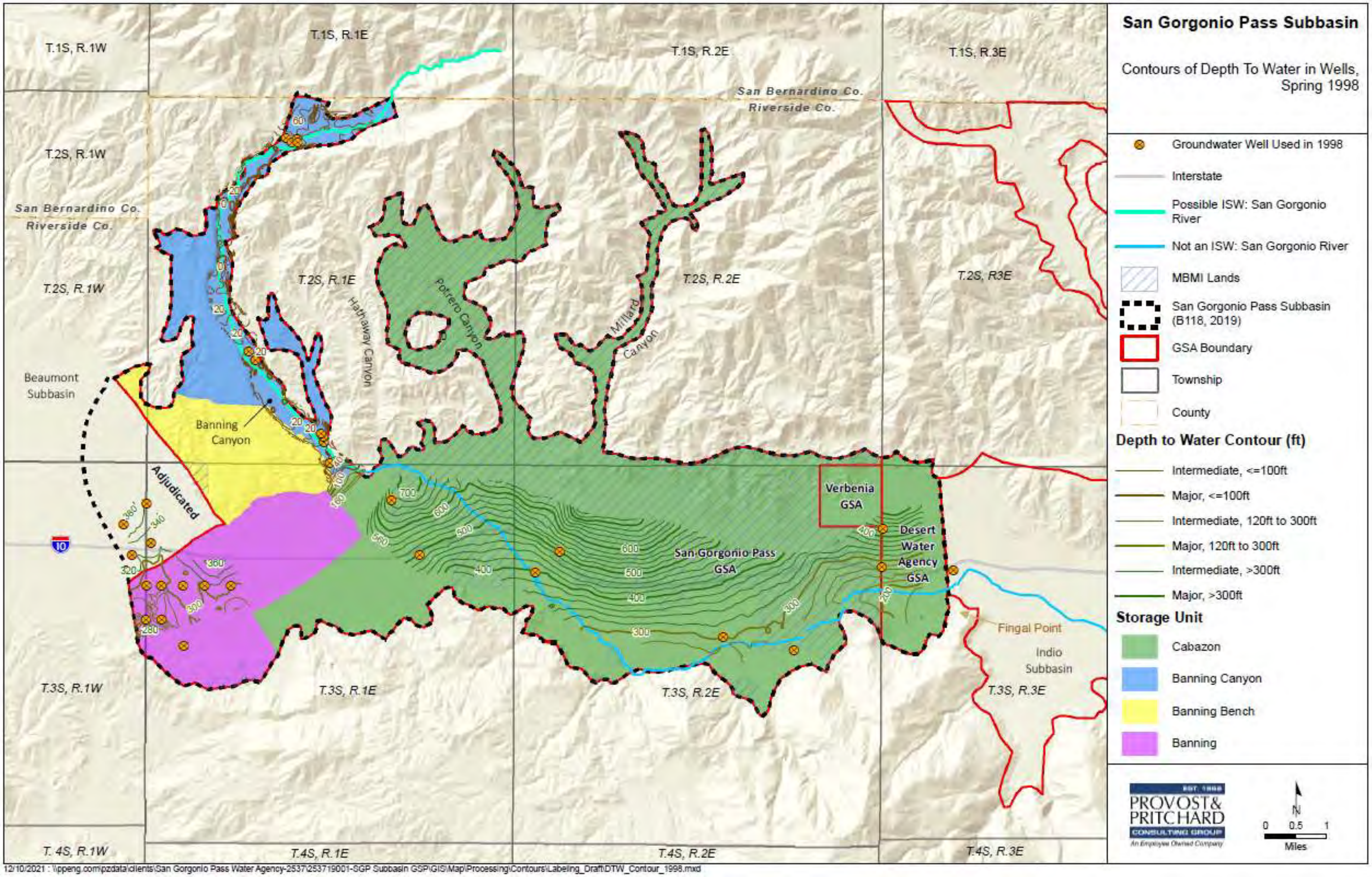


Figure 3-54 Depth to Groundwater Contours (1998)

Step 2. Are GDEs being impacted by current groundwater conditions, and could they be impacted by future groundwater conditions?

Current and projected conditions in the Banning Canyon

The ephemeral San Gorgonio River feeds the groundwater of the Banning Canyon Storage Unit. The San Gorgonio River is supplied by upstream precipitation and snowpack. This climactically driven system experiences a significant variation in supply, as indicated in the historic precipitation and snowpack record. The SGP Subbasin's hydrologic base period lasts approximately twenty years, which include extended drought periods.

As a result, decreases and increases in GDE extent are a frequent occurrence in this ephemeral system. Capturing a full hydrologic cycle in the analysis of the change in GDE extent is critical for providing a representative assessment of significant and unreasonable Undesirable Results related to this beneficial user.

According to TNC's GDE Pulse tool's longest available period of record (1985 to 2018), the GDEs in the SGP Subbasin experienced "little or no change" (**Figure 3-55**). The 1985 to 2018 period includes a full hydrologic cycle and several years prior. The GDE Pulse tool did not have the option to select the exact period of the SGP Subbasin's most recent hydrologic period that was used for the GSP's groundwater model, water budget, and other trend analyses (1998 to 2019); however, the 1985 to 2018 period available via the GDE Pulse Tool covered enough years and a full variety of conditions to provide the most representative trend analysis of the analysis periods available.

Current and projected conditions in the Banning and Cabazon Storage Units

Depth to groundwater in the Banning and Cabazon Storage Units have historically and are projected to exceed hundreds of feet, which prevents them from supporting and sustaining GDEs. A tangible demonstration of these deep groundwater levels is a gravel quarry in the north-western edge of the Cabazon Storage Unit which is deeper than 100 feet below ground surface and does not have standing groundwater. Historic, current, and projected groundwater levels in the adjacent Banning geologic Storage Unit suggest comparable conditions.[18]

Groundwater conditions in the Banning Canyon Storage Unit have shallower depths to water historically, which supported GDE. The generally shallow groundwater levels in Banning Canyon are anticipated to behave similarly to historic circumstances, mostly due to the shallow depth to bedrock and variable recharge supplies that are characteristic of groundwater and surface water conditions in that vicinity

[18] City of Banning, City Council Agenda. July 22, 2014. Review of Robertson's Ready Mix Conditions and Mining Tax.

Figure 3-55 GDE Trend (1985-2018)

Step 3. How can management achieve sustainability and avoid adverse impacts to GDEs?
Water resources management can support sustainability and consequently avoid adverse impacts to GDEs by maintaining the historic net trend within a hydrologic cycle. In the SGP Subbasin, a hydrologic period, a continuous period that reflects a representative and unbiased period of both averages and water level variability, is approximately twenty years. Although the GDE Pulse tool does not offer the ability to analyze the Subbasin's exact hydrologic period used for the historical water budget (1998-2019), the net trend from 1985 to 2018 was available for analysis and was identified as being "little to no change" across the Banning Canyon (**Figure 3-55**). When analyzing the next longest period via the GDE Pulse tool (2009 to 2018), which includes extended drought conditions, the majority of the Banning Canyon experienced "little to no change" with isolated and small areas identified as experiencing a decrease. Short term variability is expected to influence conditions within the Canyons and greater Subbasin area; however, a minimum of a full hydrologic cycle presents the most representative conditions and potential for sustained health of GDEs. The Banning Canyon's groundwater levels will be managed to the sustainable management criteria described in **Chapter 4 – Sustainable Management Criteria** that were assigned to maintain the groundwater conditions within the last hydrologic cycle.

Step 4. How can progress and success be tracked through a monitoring network?
Chapter 5 – Monitoring Network describes how the representative interconnected surface water monitoring network were assigned to assess impacts to beneficial uses of groundwater in the Banning Canyon, including GDEs. In addition to this monitoring, the SGP Subbasin's GSAs are interested in reviewing and supporting updates to TNC's GDE Pulse tool during the implementation period.

Step 5. What actions can be taken to achieve sustainability?
Sustainability of the groundwater conditions for beneficial users in the Banning Canyon can be supported by maintaining existing conditions across a full hydrologic cycle, as described in this Section. The Sustainable Management Criteria assigned for interconnected surface water in **Chapter 4 – Sustainable Management Criteria** were assigned with maintenance of historic conditions in mind.

3.3 Water Budget Information

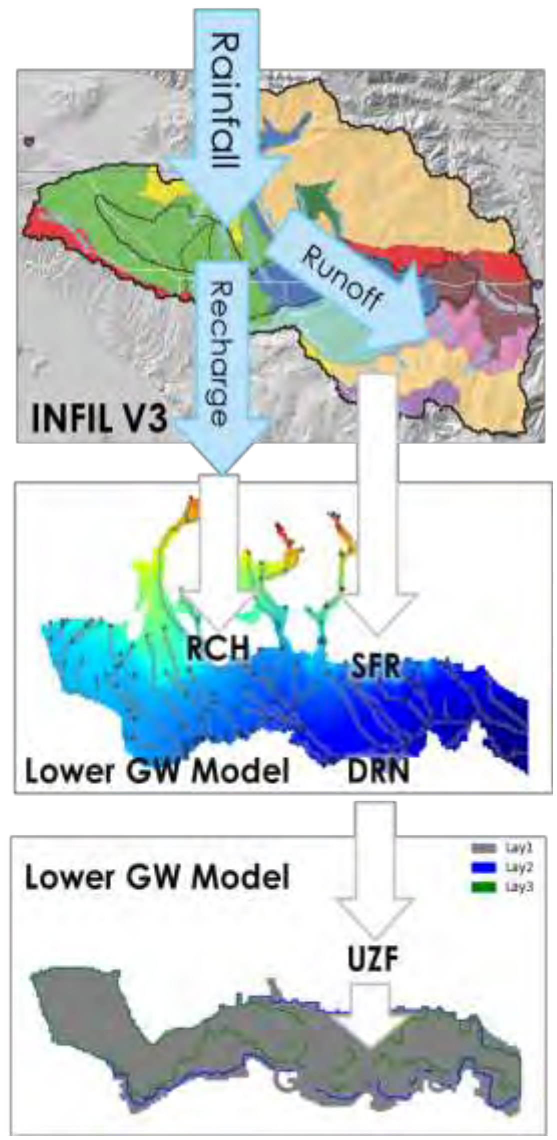
Regulation Requirements:

§354.18 (a) Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.

As specified in SGMA, a water budget has been prepared for the SGP Subbasin. The water budget quantifies the components of water supply and use along with change in groundwater storage. The water budget can be used as tools in numerous aspects of groundwater sustainability management including:

- Determining sustainable yield
- Identifying overdraft
- Identifying beneficial groundwater uses
- Identifying data uncertainties and monitoring needs
- Quantifying the effects of proposed projects and management actions
- Supporting development of sustainable management criteria

Historical, current, and projected water budgets have been developed from data that have been incorporated into or extracted from a groundwater model for the SGP Subbasin. The water budgets also rely on estimates of surface water flow and recharge that are developed by the San Gorgonio Pass Watershed Model (SGPWM) using the USGS INFIL watershed model. The SGP groundwater model was developed specifically for this GSP and is described in detail in **Appendix D**, San Gorgonio Pass Subbasin Groundwater Model Technical Memorandum.



The SGP groundwater model is configured as two separate models (**Figure 3-56** and **Figure 3-57**).

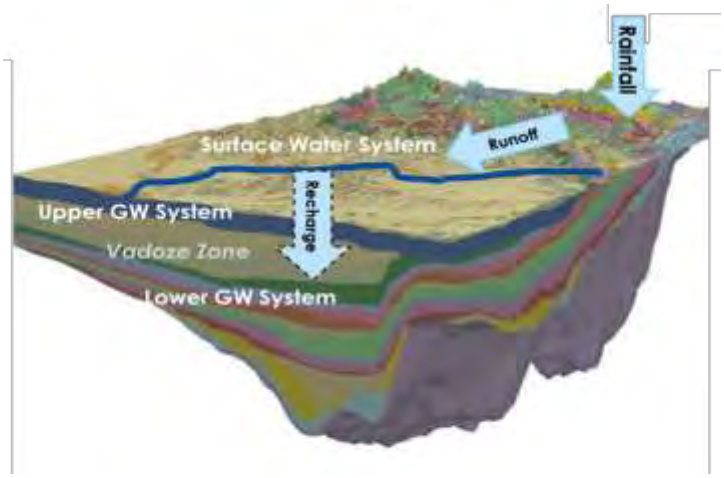


Figure 3-56 San Gorgonio Pass Groundwater Basin Groundwater Model Framework

The upper model incorporates nearly the entire surface area of the SGP Subbasin, including the areas of the Banning Canyon, Banning Bench, Banning and Cabazon Storage Units, in addition to the upstream canyon areas of Potrero, Hathaway, and Millard Canyons. The upper model is meant to simulate streamflows, shallow groundwater flow, and infiltration in the shallow subsurface. The thickness of the upper model varies over the simulation area. In the upstream canyon areas, the upper model is generally less than 200 feet thick and has limited storage capacity. Because of the dynamic nature of runoff and groundwater flows processes in the canyon areas of the upper model, it is usually not possible to accurately predict groundwater levels there. In the Banning and Cabazon Storage Units, the upper model can be as deep as 500 feet and represents subsurface vadose zone conditions. There are no groundwater level measurements in the Banning and Cabazon Storage Units that represent conditions in the shallower subsurface that is simulated by the upper model. Due to these limitations, the upper model cannot be calibrated to groundwater levels and serves to approximate streamflow and infiltration processes in the shallower areas of the subsurface. Water draining through the upper model represents infiltration to the vadose zone. A portion of this infiltration reaches the groundwater table in the lower model as deep groundwater recharge. Storage and lag in the vadose zone represented by the upper model leads to attenuation of the recharge to the lower model.

The lower model, which varies from 400 to 4,300 feet deep, represents the primary deeper aquifers of the SGP Subbasin located in the Banning and Cabazon Storage Units. The water budget discussion includes both the upper and the lower models; however, the emphasis is on the lower model as it contains the preponderance of groundwater storage in the SGP Subbasin.

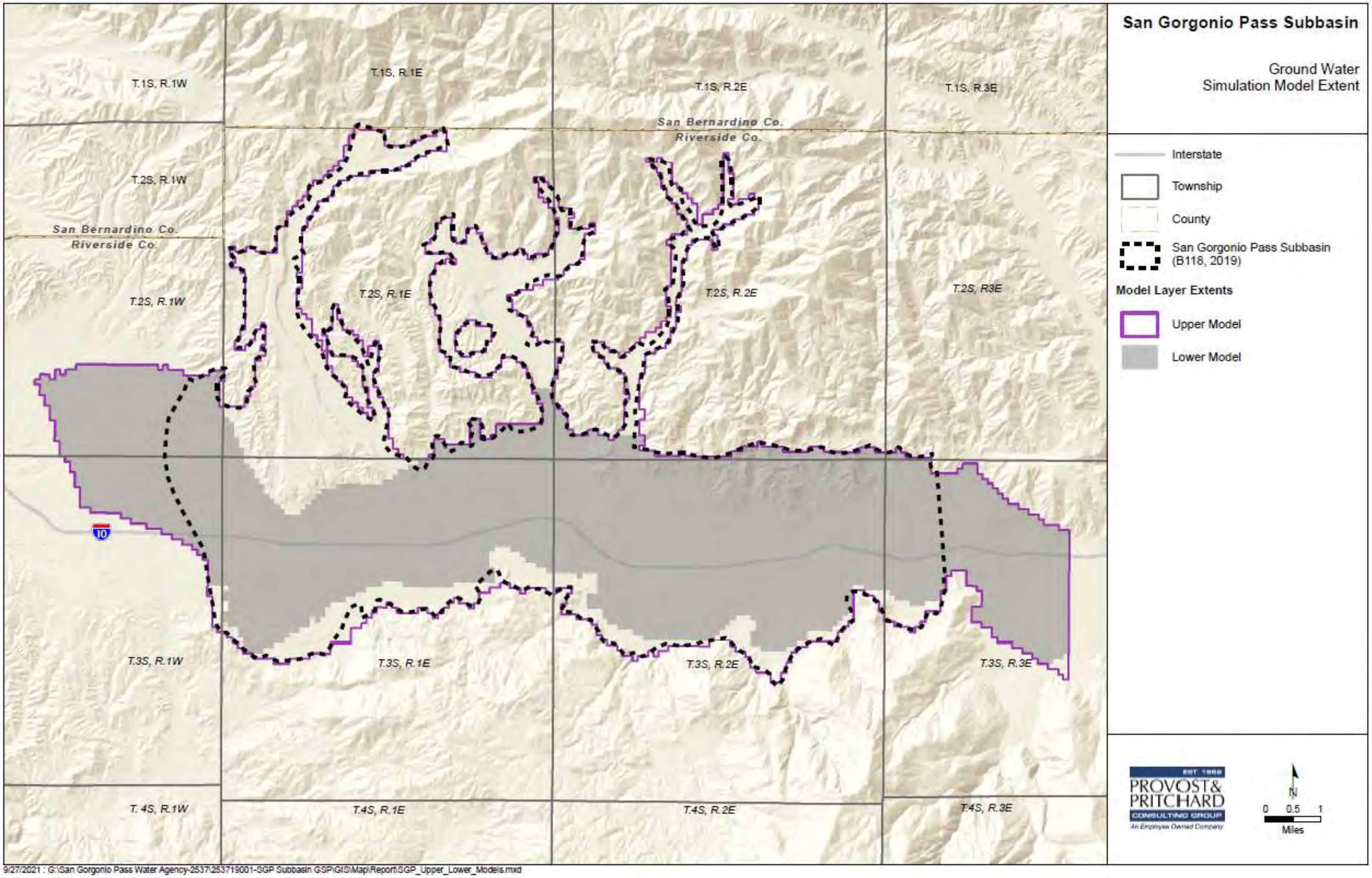


Figure 3-57 San Gorgonio Pass Groundwater Basin Groundwater Model

The water budgets quantify the following information in conformance with SGMA Regulation §354.18 (b):

(1) Total surface water entering or leaving the subbasin
(2) Inflows to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs, and conveyance systems
(3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow
(4) The change in the annual volume of groundwater in storage between seasonal high conditions
(5) Identification of overdraft over a period of years during which water year and water supply conditions approximate average conditions
(6) The water year type associated with the annual supply, demand, and change in groundwater stored
(7) An estimate of sustainable yield for the basin

3.3.1 Description of Water Budget

Regulation Requirements:

§354.18

(e) Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.

(f) The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.

Historical water budgets were developed for the SGP Subbasin using information that was input to or derived from a numerical groundwater model. As described above, the numerical model includes an upper model and a lower model. Both the upper and lower models use the USGS MODFLOW software. Revisions to the model input data were identified for future climate change periods for predicted 2030 and 2070 conditions, which are described below. A schematic of the groundwater budget is shown below on **Figure 3-58**.

The historical water budget for the SGP Subbasin was developed for a base period of 1998 through 2019. This period was selected to conform to the SGMA requirement for using the most recent ten years of data and also provides an extended period for calibration of the groundwater model to demonstrate its ability to simulate the aquifer's response to different water year types. The 1998-2019 historical period has precipitation conditions that are about 80% of the long-term (1910-2019) estimated average precipitation. The lack of average precipitation conditions makes determination of overdraft (described in **Section 3.3.10** more challenging, as overdraft is most directly determined through use of a recent period with average precipitation conditions. Other periods, such as the most recent ten-year period (2010-2019) were also considered for the historical base period; however, they also had precipitation conditions that are substantially lower than normal and do not provide the longer analysis period needed to evaluate aquifer responses. Ultimately, the 1998-2019 base period was retained for the historical analysis as the best combination of recent data with a longer period for a more robust groundwater model calibration.

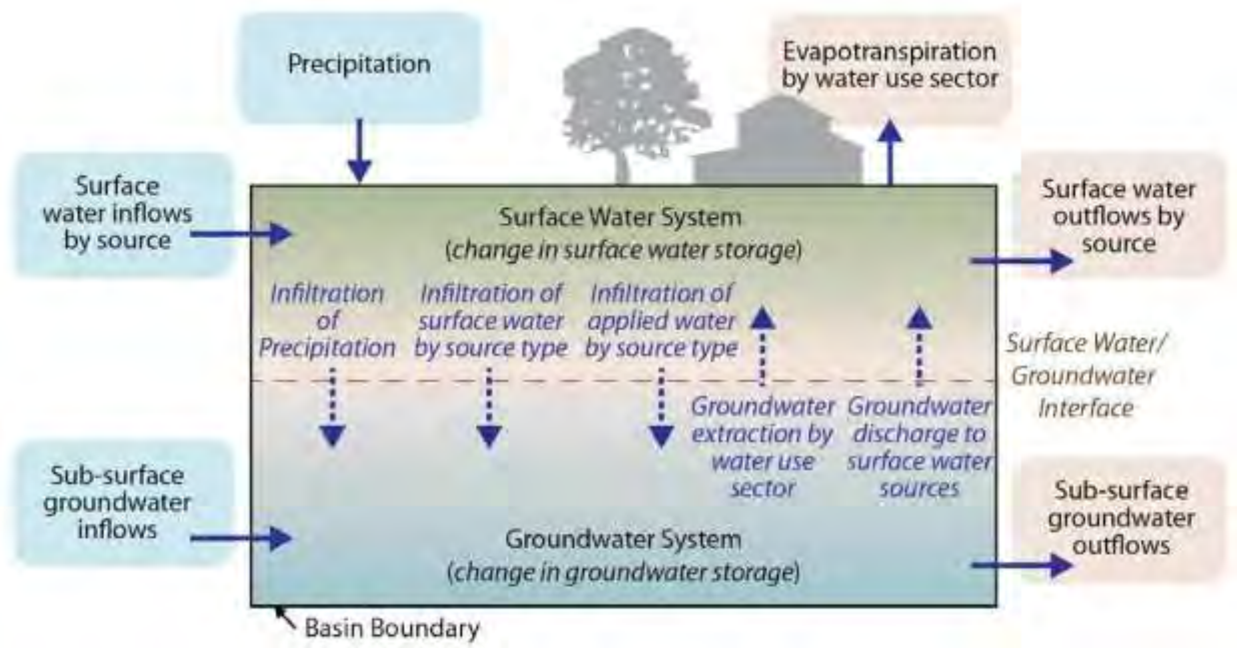


Figure 3-58 Groundwater Basin Water Budget Schematic

3.3.2 Description of Inflows to Groundwater Basin

Regulation Requirements:

§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data: (1) Total surface water entering and leaving a basin by water source type.

Quantities of water entering the SGP Subbasin at the surface, either as surface flows or precipitation, are described and quantified in the following sections using the procedures described in each.

3.3.2.1 Surface Water Inflows

The primary source of surface water to the SGP is the San Gorgonio River which has a drainage area of 44 square miles at the USGS San Gorgonio River at Banning gage location. The San Gorgonio River has been measured historically by the USGS only for brief periods at two locations within the GSP area, upstream in the Banning Canyon (San Gorgonio River near Banning, USGS Site #10256200) for the period October 1975 to September 1977 and east of Banning along Interstate 10 (San Gorgonio River at Banning, USGS Site #10256300) for the period February 1981 to September 1981. The San Gorgonio River has only infrequent flows below the canyon mouth, near Banning. When flows do occur, they are highly variable. Flows have not been measured in other watersheds in the SGP subarea.

In the absence of surface water measurements, flows have been estimated through use of the San Gorgonio Pass Watershed Model (SGPWM) (Hevesi and Christensen, 2015). SGPWM uses the USGS INFILtration version 3.0 (INFILv3) model with spatially distributed daily precipitation and temperature based on recorded or estimated values. SGPWM was developed to cover three primary watersheds – San Timoteo Creek, Potrero Creek, and San Gorgonio River – which are shown in **Figure 3-59**. SGPWM uses a 150-meter gridded discretization of the watershed to represent the spatial variability in climate and watershed characteristics in the SGP Subbasin. As developed by the USGS, SGPWM was used to simulate recharge and runoff for water years 1913-2012, providing inflows to the SGP groundwater model. SGPWM was calibrated by comparing predicted runoff with measured runoff at nearby watersheds. For purposes of this GSP, the SGPWM analysis period was extended to include more recent years through 2019.

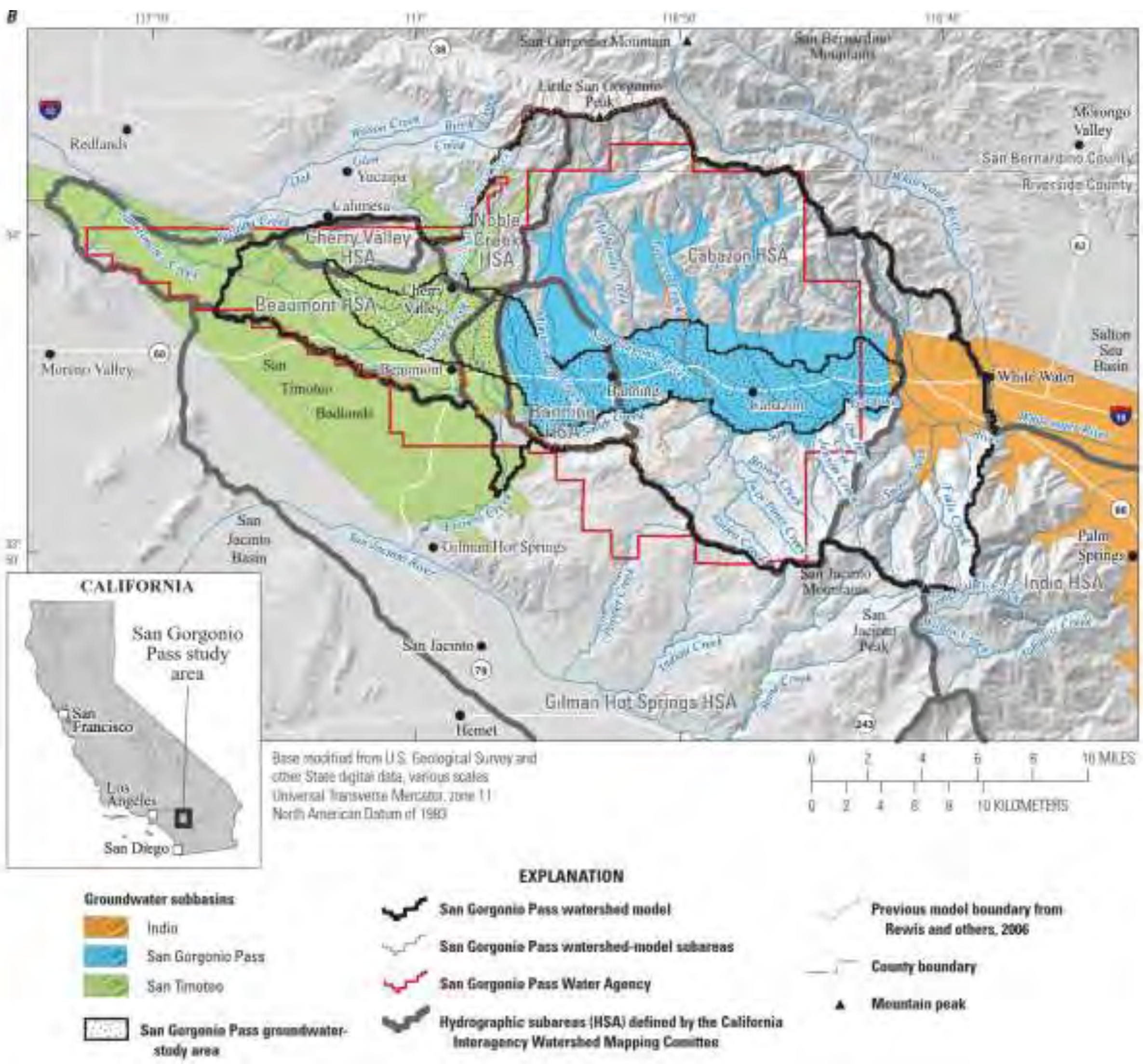


Figure 3-59 San Gorgonio Pass Watershed Model Study Area (Hevesi and Christensen, 2015)

The SGPWM watersheds contributing flows to the SGP Groundwater Model are located in the Cabazon and Banning HSAs. For the 1998-2019 historical period, these watersheds were identified as having surface runoff flows of 28,700 acre-feet. These flows were distributed as indicated in **Table 3-3**, and the runoff is incorporated into the upper model as inflows to streams at the locations shown in **Figure 3-60**. Streamflow runoff provides a source of supply for groundwater pumping in the upper model SGP groundwater model in the Banning, Potrero, and Millard Canyons. As described previously, the upper model also represents the vadose zone in the Banning and Cabazon Storage Units with leakage to the lower model that represents the primary water supply aquifer for the SGP Subbasin.

Table 3-3 SGPWM Estimated Runoff Tributary to SGP Groundwater Model

Sub-Watershed	Watershed Area (Acres)	1998-2019 Average Runoff (Acre-feet/Year)
Banning Bench	767	0
Brown Creek	11,503	3,100
Cabazon	33,304	5,700
Hathaway Creek	4,592	300
Indio	17,269	6,100
Lower San Gorgonio River	1,879	500
Millard Creek	6,283	2,600
Potrero Creek	3,447	2,000
San Timoteo	10,642	1,300
Smith Creek	4,453	300
Stubbe Canyon	3,970	500
Upper San Gorgonio River	6,277	6,300
Total	104,386	28,700

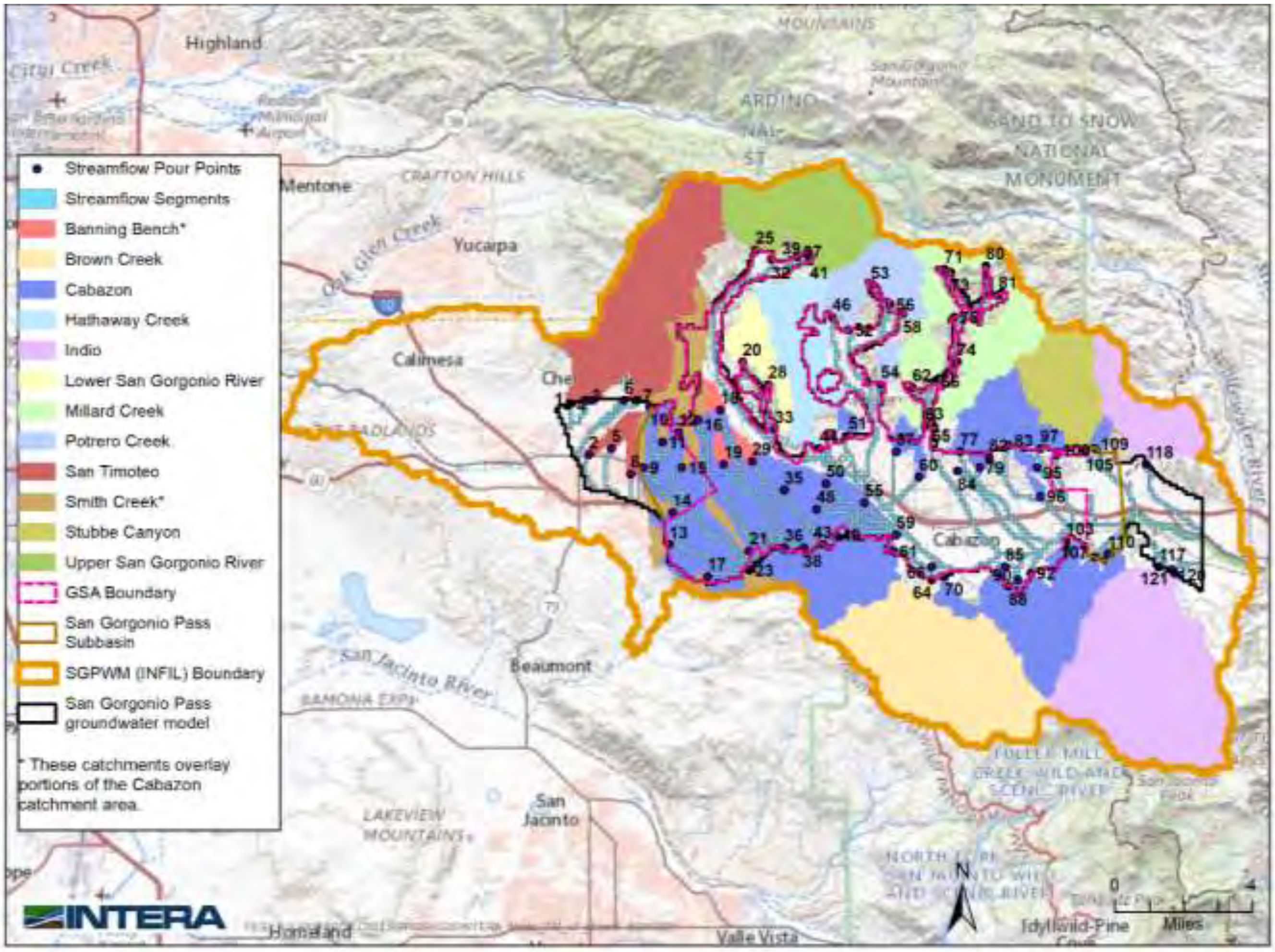


Figure 3-60 San Gorgonio Pass Subbasin Upper Model Streamflow Stream Inflow Locations

3.3.2.2 Precipitation

Precipitation data for watersheds in the SGPWM was gathered from a network of 134 climate stations in southern California centered on the SGPWM that were averaged to estimate average monthly precipitation for grid cells and climate stations. The average precipitation from SGPWM summarized for watersheds[19] that are tributary to the SGP Groundwater model is shown in **Figure 3-61**. The average annual precipitation for the 1910-2019 period is 19.3 inches. The average annual precipitation for the 1998-2019 historical period is 15.6 inches, which is 81-percent of the long-term average. The cumulative departure of annual precipitation from the long-term average is also shown in **Figure 3-61**. The cumulative departure shows that the 1998-2019 historical period has the driest extended dry period in the historical record.

[19] The watersheds also include the valley floor area for Cabazon and Banning Storage Units

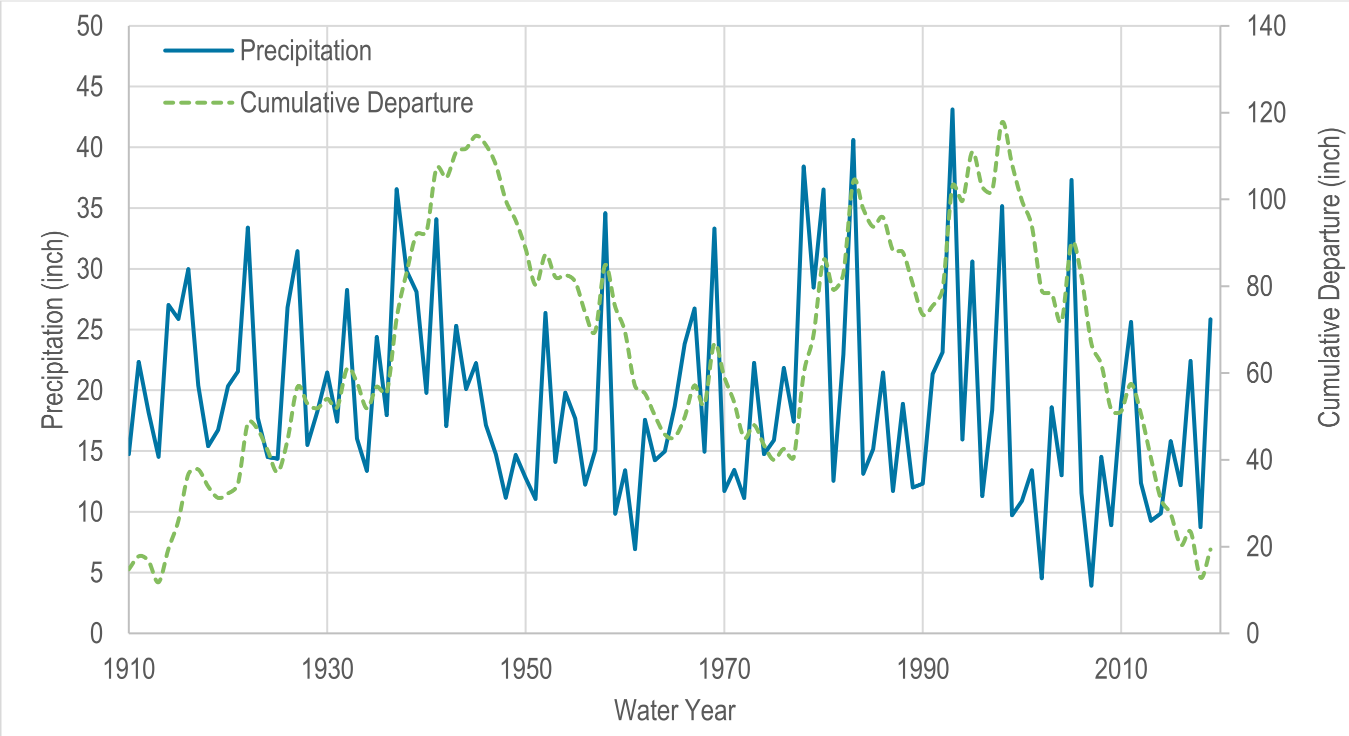


Figure 3-61 San Gorgonio Pass Watershed Model Study Area Precipitation

3.3.2.3 Surface Water Diversions

The Whitewater Flume, originating outside of the San Gorgonio River watershed on the south and east forks of the Whitewater River, has historically diverted available flows about fourteen miles into the SGP watershed. The diversion is operated under a 1906 water right of 13.26 cubic feet per second under the 1938 Whitewater adjudication decree. The flume, operated by Southern California Edison, originally provided water to the Banning Heights Mutual Water Company (BHMWC) and the City of Banning. Southern California Edison has been in the process of transferring ownership to either BHMWC or the City of Banning. Diversions through the flume have not been measured in recent years, but historically were reported to provide 1,500 acre-feet of annual water supply (RMC, 2018). Water from the flume was historically treated by BHMWC for use in its service area and recharged in Banning Canyon for subsequent extraction by the City of Banning. Over time, portions of the flume have been damaged, and its capacity has deteriorated (Geoscience, 2011). Most recently, the Apple Fire in 2020 destroyed many segments of the flume and it is currently in the process of being repaired for use. For modeling and water balance purposes, continuing recharge of 1,000 acre-feet per year is assumed to occur in the upper Banning Canyon that provides for a portion of City of Banning pumping.

In addition to the Whitewater Flume diversion, the 1938 Whitewater adjudication decree provides the City of Banning (as successor to the Banning Water Company) with rights to divert San Gorgonio River natural flows for recharge and to subsequently pump that recharge for use in its service area. The 1938 Whitewater adjudication decree also provides water rights for to the MBMI for Hathaway Canyon and Potrero Canyon. MBMI also purchased the water rights for Millard Canyon that the Whitewater adjudication decree originally assigned to the Southern Pacific Railroad Company and Cabazon Water Company. MBMI diversions based on these water rights are not reported for Hathaway and Potrero Canyons, and they are included in the groundwater model as groundwater pumping as described in **Section 3.3.4.1**.

3.3.2.4 Groundwater Inflows

Groundwater can flow into the SGP Subbasin at the west end from the adjudicated Beaumont Basin. The source of this groundwater is a combination of local recharge in the Beaumont Basin and intentional recharge of imported water at the Noble Creek recharge basins. The SGP Groundwater model includes a portion of the adjudicated Beaumont Basin to the west, including the Noble Creek recharge basins. For the historical period, estimates of groundwater flows at the SGP Groundwater Model boundary were obtained from the Beaumont Basin watermaster and included in the groundwater model as time-varying flow amounts. Based on projections of the SGP Groundwater model, the average inflow from the Beaumont Basin into the SGP Subbasin is estimated to be 1,700 acre-feet during the 1998-2019 base period.

3.3.3 Description of Flows to Groundwater System

Regulation Requirements:

§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:

(2) Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems.

Quantities of water entering the groundwater body in the SGP Subbasin as forms of recharge are described and quantified in this section using the procedures described below.

3.3.3.1 Percolation of Precipitation

Percolation of precipitation to groundwater was estimated by the SGPWM. SGPWM estimated the recharge based on distributed precipitation, evapotranspiration rates, and soil properties during the 1998-2019 base period. SGPWM estimates the amount of precipitation that runs off or percolates into the soil column on a daily basis. Water in the soil column is used to meet native vegetation or developed evapotranspiration demands with the remainder considered to be percolation to the groundwater.

Because the depth to water in the Cabazon and Banning Storage Units is several hundred feet deep in most of those storage units, there is a delay in recharge and recharge to the aquifers is attenuated. Consistent with assumptions used in the Beaumont and Banning groundwater model (Rewis, etal, 2005), the assumption is made that precipitation recharge to the lower model occurs at a constant rate. Based on the SGPWM, an estimated 7,300 acre-feet per year of recharge from precipitation is applied to the SGP upper groundwater model. As with other sources of surface water, this percolation is assumed to be subject to subsequent vadose zone consumptive losses that are discussed in **Section 3.3.3.3**.

3.3.3.2 Deep Percolation of Municipal and Industrial Water

Deep percolation of municipal and industrial (M&I) water includes two components: 1) Indoor water usage sent to treatment plants and septic systems and 2) Outdoor landscape water that percolates past the root zone.

Where sewer flows are measured or directly estimated at wastewater treatment plants, the volume percolated is equal to the plant deliveries minus percolation pond evaporation and bio-solids removal. The City of Banning measures its wastewater plant discharges into the Cabazon Storage Unit, which averaged 2,500 acre-feet per year for the historical period. MBMI wastewater plant, which serves the Morongo Casino, had estimated discharges into the Cabazon Storage Unit for 2016 that are documented in the Woodard & Curran's technical report's Appendix A – Morongo Reservation Water Demand Estimate of the San Gorgonio Water Supply Reliability Study (Woodard and Curran, 2018). For 2016, the MBMI discharges were estimated as 400 acre-feet, which was assumed to be an average that was applied to the entire 1998-20019 historical period.

The remaining municipal and rural developments in the SGP Subbasin (including Banning Heights Mutual Water Company, Cabazon Water District, and Mission Springs Water District) use septic systems which discharge directly to the vadose zone. In areas with septic systems, about 30 % of the total groundwater pumping is assumed to be delivered indoors and supply return flows to groundwater. The estimate of 30% indoor use for septic systems was developed based on wastewater treatment plant discharges as a percent of delivered water for the City of Banning.

It is assumed that the primary outdoor water use is for landscape irrigation. All water applied in excess of landscape irrigation demands is assumed to percolate past the root zone and eventually reach the water table. USGS SIR 2006-5026 (Rewis etal, 2006) assumes return flows of 40% for outdoor landscape use, which implies consumptive use of 60% of irrigation applications. Based on the assumption that 30% of municipal and rural residential use is for indoor application, the remaining 70% of water use would be distributed 42% (0.6*70%) to outdoor Consumptive Use and 28% (0.4*70%) to Return Flows.

Portions of the City of Banning have remained on septic systems that do not discharge to the wastewater treatment plant and would discharge to the vadose zone. Return flows in the City of Banning from municipal use, including septic system flows, were computed by subtracting Wastewater Treatment Plant discharges and reported distribution seepage losses averaging about 900 acre-feet per year from the City's total groundwater pumping. The remainder was assumed to be applied to outdoor uses, of which 40% would constitute return flows to groundwater. About 54% of the City of Banning service area is located within the SGP Subbasin and provides a source of water supply to the SGP Subbasin.

Table 3-4 shows the average values for wastewater treatment plant discharges and municipal return flows for the various areas in the SGP Subbasin, which were an input to the upper groundwater model. As with other components in the upper groundwater model that can result in leakage to the lower model, these were potentially subject to vadose zone losses of approximately 60% as described below.

Table 3-4 San Gorgonio Pass Subbasin Wastewater Treatment Plant Discharges and Estimated Municipal Return Flows (Acre-Feet)

	City of Banning				MBMI		Robertson's Ready Mix	Cabazon WD	Mission Springs WD	Banning Heights MWC	SGP Subbasin Total
Year	Delivery Losses	Total Wastewater Discharge	Total M&I Return	SGP Subbasin Subtotal	Wastewater Discharge	M&I Return	Return Flow	M&I Return	M&I Return	M&I Return	Return Flows
1998	900	2,498	2,062	4,562	296	132	60	422	87	74	5,633
1999	900	2,520	1,862	4,445	313	132	65	550	87	140	5,732
2000	900	2,569	2,260	4,771	330	132	68	277	87	70	5,735
2001	900	2,532	2,598	4,970	346	132	0	604	87	89	6,228
2002	900	2,538	2,526	4,926	363	132	0	832	96	160	6,509
2003	900	2,547	2,642	5,016	380	132	0	512	98	120	6,258
2004	900	2,602	2,765	5,157	392	132	137	633	91	19	6,561
2005	900	2,974	2,134	5,089	392	132	90	531	99	42	6,375
2006	900	2,955	2,551	5,361	392	132	109	478	110	12	6,594
2007	900	2,737	2,633	5,199	392	132	288	535	119	13	6,678
2008	900	2,639	2,734	5,172	392	132	324	508	95	18	6,641
2009	900	2,461	2,351	4,727	392	132	142	525	94	2	6,014
2010	900	2,477	2,005	4,058	392	132	151	412	84	10	5,239
2011	900	2,421	2,037	4,019	392	132	192	295	87	8	5,125
2012	900	2,369	2,107	4,005	392	132	190	156	85	26	4,986
2013	900	2,357	2,176	4,030	392	132	175	495	86	40	5,350
2014	900	2,246	2,115	3,886	392	132	244	364	90	45	5,153
2015	900	2,207	1,441	3,481	392	132	273	299	85	17	4,679
2016	900	2,179	1,575	3,525	392	132	276	288	84	12	4,709
2017	900	2,216	1,769	3,668	392	132	564	295	90	5	5,146
2018	900	2,259	1,896	3,780	392	132	589	289	88	32	5,302
2019	900	2,234	1,626	3,608	392	132	576	264	83	23	5,078
1998-2019 Average	900	2,479	2,176	4,430	377	132	205	435	91	44	5,715

3.3.3.3 Rejected Infiltration and Losses in the Vadose Zone

In the majority of the SGP Subbasin (in areas where the lower groundwater model exists), depths to groundwater are several hundred feet. As such, the deep groundwater table is separated from the shallow subsurface by a thick vadose zone. The shallow subsurface is represented by the upper model, which simulates streamflows, shallow groundwater flow, and drainage into the underlying vadose zone.

Infiltration into the vadose zone is limited by the vertical hydraulic conductivity of the underlying (unsaturated) soil and rock matrix. Infiltration at rates higher than the (saturated) vertical conductivities of the vadose zone leads to "rejection of infiltration" (Niswonger et al., 2006; Hunt et al., 2008). There can also be undifferentiated losses within the vadose zone from evaporation (driven by high temperatures in this semi-arid environment) and transpiration from deep root water uptake. Hence, portions of the infiltrated water can be lost to these consumptive use processes. Similar issues with streamflow recharge reductions were identified in the USGS development of a groundwater model for the adjacent Beaumont and Banning Storage Units (Rewis et al., 2006). In the USGS Beaumont and Banning Storage Unit models, the recharge from stream channels was estimated to be an average of 42% lower than the estimated raw streamflow quantities. The San Gorgonio Model accounts for these losses by a) scaling recharge from the upper model to the lower model to account for consumptive losses in the vadose zone and b) routing the infiltration from the upper model through an Unsaturated Zone Flow (UZF) package in the lower model which limits recharge based on the vertical conductivity of the aquifer while lagging and attenuating the recharge signal. Due to these rejected recharge losses and undifferentiated vadose zone losses, the drainage from the upper model to the lower model SGP groundwater model reduced by an average of 36%, which varied from year to year. During the 1998-2019 base period, the SGPWM estimated that the combined vadose zone and rejected recharge losses averaged 10,900 acre-feet.

3.3.4 Description of Outflows from Groundwater System

Regulation Requirements:

§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.

Outflows from the groundwater body are underflow to the Indio Subbasin and groundwater pumping for M&I and other purposes. Evapotranspiration losses are expected to be predominantly in the shallow subsurface and the vadose zone (accounted for in the SGPWM and the UZF package); hence, evapotranspiration losses from the deep groundwater system are not expected to be significant. Outflows from the groundwater basin itself are also summarized based on results from the groundwater model.

3.3.4.1 Groundwater Pumping

Although historically there was some groundwater pumping for agricultural purposes, there were no identified commercial agricultural users that were active in the SGP Subbasin during the 1998-2019 historical period. M&I groundwater pumping by urban water suppliers was collected directly from the local urban agencies for the historical period. The City of Banning, Cabazon Water District and Mission Springs Water District have monthly records of pumped groundwater by well for all or part of the historical period, which were used as available and supplemented with tabulated annual pumping data were monthly data was missing. Miscellaneous other municipal water use and known private well use, as tabulated by San Gorgonio Pass Water Agency, were also included.

The MBMI also pumps groundwater for agricultural, commercial, municipal, and residential purposes on their reservation and at their casino from wells in Potrero Canyon and in the Cabazon Storage Unit. They also have groundwater wells in the Cabazon Storage Unit that can be used for municipal supply for a bottling plant in Cabazon within MBMI reservation boundaries. No data were provided by the MBMI on their historical or projected water use. Estimates for MBMI pumping were taken from Woodard and Curran's technical report's Appendix A – Morongo Reservation Water Demand Estimate of the San Gorgonio Water Supply Reliability Study (Woodard and Curran, 2018). Based on the Appendix A, MBMI groundwater use in 2016 was approximately 1,007 acre-feet for water use in residential areas and at the Morongo Casino. In addition, there was an estimated 696 acre-feet of use at the Arrowhead Water Bottling Plant. Pumping for the MBMI was assumed to occur in Potrero Canyon and in the Cabazon Storage Unit. Pumping in Potrero Canyon was assumed as approximately 650 acre-feet per year based on relative size and watershed area to the Millard Canyon, which has had reported diversions averaging approximately 700 acre-feet per year. The remaining 357 acre-feet per year of MBMI pumping (1,007 AF less 650 AF Potrero Canyon supply) is assumed to occur in the Cabazon Storage Unit. As the Morongo Casino and Arrowhead Bottling Plants both went into operation during the 1998-2019 historical period, a rough approximation of historical groundwater pumping prior to 2016 was developed using known information on the installation of the casino and hotel, a bottling plant and estimated residential use. Pumping by MBMI from various sources is assumed to be based on water rights from the

Whitewater River Decree, SWRCB water rights and the MBMI share of percolating groundwater in the SGP Subbasin.

The estimated groundwater pumping for the 1998-2019 historical period is shown in

Table 3-5.

Table 3-5 San Gorgonio Pass Subbasin Measured and Estimated Historical Period Groundwater Pumping (Acre-Feet)[20]

Year	Potrero Canyon	Millard Canyon	Cabazon Storage Unit					Banning Storage Unit	Banning Canyon Storage Unit			Total
	MBMI	MBMI	MBMI	Cabazon WD	Mission Springs WD [1]	Robertson's Ready Mix	City of Banning	City of Banning	Banning Heights MWC	City of Banning	Other	
1998	650	700	173	728	65	109	0	280	128	8,291	65	11,189
1999	650	700	205	949	65	114	0	424	242	6,898	65	10,312
2000	650	700	237	477	65	117	0	586	120	5,533	65	8,550
2001	650	700	269	1,042	65	4	0	849	153	5,814	75	9,621
2002	650	700	301	1,434	65	4	0	1,112	275	3,671	75	8,287
2003	650	700	333	882	65	4	0	2,389	207	3,246	82	8,558
2004	650	700	357	1,092	65	186	323	1,792	32	4,535	82	9,813
2005	650	700	357	915	65	139	219	1,275	73	5,945	76	10,414
2006	650	700	357	824	65	158	612	1,225	21	6,367	65	11,044
2007	650	700	357	923	65	337	1,202	1,311	22	4,761	75	10,402
2008	650	700	357	875	65	373	946	1,052	31	4,426	75	9,550
2009	650	700	357	905	70	191	982	1,806	4	4,108	75	9,848
2010	650	700	357	710	65	200	565	1,218	17	5,360	75	9,916
2011	650	700	357	509	62	241	499	1,345	13	5,127	75	9,578
2012	650	700	357	269	66	239	455	1,260	45	5,690	75	9,806
2013	650	700	357	854	62	224	11	1,747	69	4,849	75	9,599
2014	650	700	357	628	68	293	787	1,394	78	3,559	75	8,589
2015	650	700	357	515	59	322	1,207	527	29	3,110	75	7,552
2016	650	700	357	497	64	325	1,211	1,396	21	2,665	75	7,961
2017	650	700	357	508	65	613	685	1,923	8	3,455	75	9,039
2018	650	700	357	498	72	638	1,006	1,996	55	2,694	75	8,741
2019	650	700	357	455	64	625	526	1,330	40	3,613	75	8,436
Average	650	700	329	750	65	248	511	1,283	77	4,714	74	9,400

[1] Mission Springs Water District 1998-2008 Pumping estimated from subsequent years data

3.3.4.2 Groundwater Outflows

Groundwater outflows to the Indio Subbasin were identified by the groundwater model based on simulated water levels and calibrated hydraulic properties at the SGP-Indio Subbasin boundary. The SGP groundwater model extends about two miles east of the SGP Subbasin boundary with the Indio Subbasin to attenuate boundary effects. Groundwater flows at the Subbasin and model

[20] Pumping amounts shown do not differentiate among various water rights types and are believed to include Whitewater River Decree rights, percolating groundwater rights and other State water rights.

boundaries are significantly affected by recharge activities adjacent to the Whitewater River by Desert Water Agency and Coachella Valley Water District. Groundwater levels at the SGP groundwater model eastern boundary were simulated using the MODFLOW General Head Boundary (GHB) model package. The variable groundwater levels for the GHB package were based on historical and estimated water levels at well 3S/3E-10P1 on the SGP groundwater model eastern boundary. The water level estimates at well 3S/3E-10P1 for periods without measured water levels were extended based on a correlation with available water level measurements from well 3S/4E-20F3.

Based on the SGP groundwater model, outflows from the SGP Subbasin to the Indio Subbasin averaged 25,000 acre-feet per year with variations from 21,300 acre-feet in 2019 to 27,600 acre-feet in 2004. These subsurface flow estimates were reviewed with comparable estimates from the Indio Subbasin groundwater model, which were not identical. The quantity of SGP Subbasin outflows to the Indio Subbasin has been identified as a data uncertainty for the GSP and will continue to be under review as the GSP is implemented.

3.3.5 Change in Groundwater in Storage

Regulation Requirements:

§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:

(4) The change in the annual volume of groundwater in storage between seasonal high conditions.

The SGP groundwater model computes annual changes in groundwater storage as a product of its groundwater model simulations. Storage change computed by the SGP groundwater model for the 1998-2019 historical period shown in **Figure 3-61** include results from the calibrated lower model and the uncalibrated upper model. As water levels from the calibrated lower model of the SGP groundwater model reasonably matched measured water levels for the 1998-2019 historical period, the model-generated storage changes amounts are considered to be reasonable estimates for the primary Banning and Cabazon Storage Units. **Figure 3-62** also includes a minor amount (averaging less than eight percent of the total storage change) of storage change from the uncalibrated upper model, representing the shallow canyon aquifers and near surface, mostly vadose, zones.

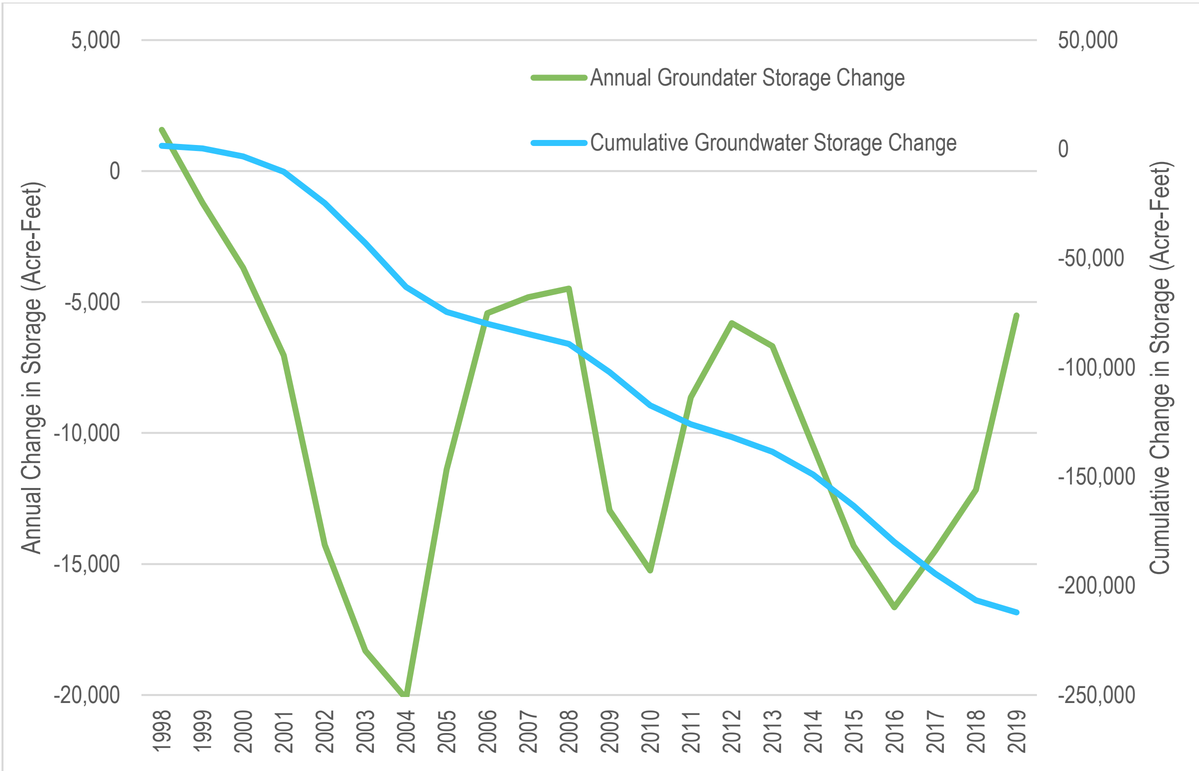


Figure 3-62 San Gorgonio Pass Groundwater Basin Annual and Cumulative Storage Change

The average annual storage change in the 1998-2019 historical period was -10,000 acre-feet and the cumulative storage change over the entire period was -220,000 acre-feet. Of the 10,000 acre-feet annual decline, 9,600 acre-feet was in the lower model representing the Banning and Cabazon Storage Units. Annual storage change in the upper model, which includes the Banning Canyon Storage Unit and the Hathaway, Potrero, and Millard Canyons and while occasionally large from year to year, was relatively small for the entire historical period – having an average decline of 400 acre-feet per year. As discussed earlier in this chapter, the 1998-2019 historical period represents a period with below average precipitation that is about 80-percent of the long-term average. **Because of the very dry conditions during the historical period, the groundwater storage decline in this period is not representative of average water supply conditions and as described in Section 3.3.10, does not by itself indicate that overdraft conditions are occurring.** The relationship of groundwater storage declines during the dry historical period and average precipitation representative of long-term conditions is discussed later in the section on Sustainable Yield.

3.3.6 Water Year Types

DWR released an evaluation of potential water year types for watersheds statewide in a report in January 2021, "Water Year Type Dataset Development Report", (DWR, 2021). The DWR water year type report identified potential year type classifications into Wet, Above Normal, Below Normal, Dry, and Critical categories for watersheds in California for Water Years 1931-2018 that are outside of the Central Valley. The water year types for Hydrologic Unit Code (HUC) 18100201 (the Whitewater River watershed) were consistent with precipitation conditions in the SGP Subbasin and are used as the water year type in this GSP. **Figure 3-63** shows the average SGP Subbasin watershed precipitation along with the year types for HUC 18100201. Based on estimated precipitation in the SGP Subbasin in 2019, that year was equivalent to a wet year classification based on comparable year types.

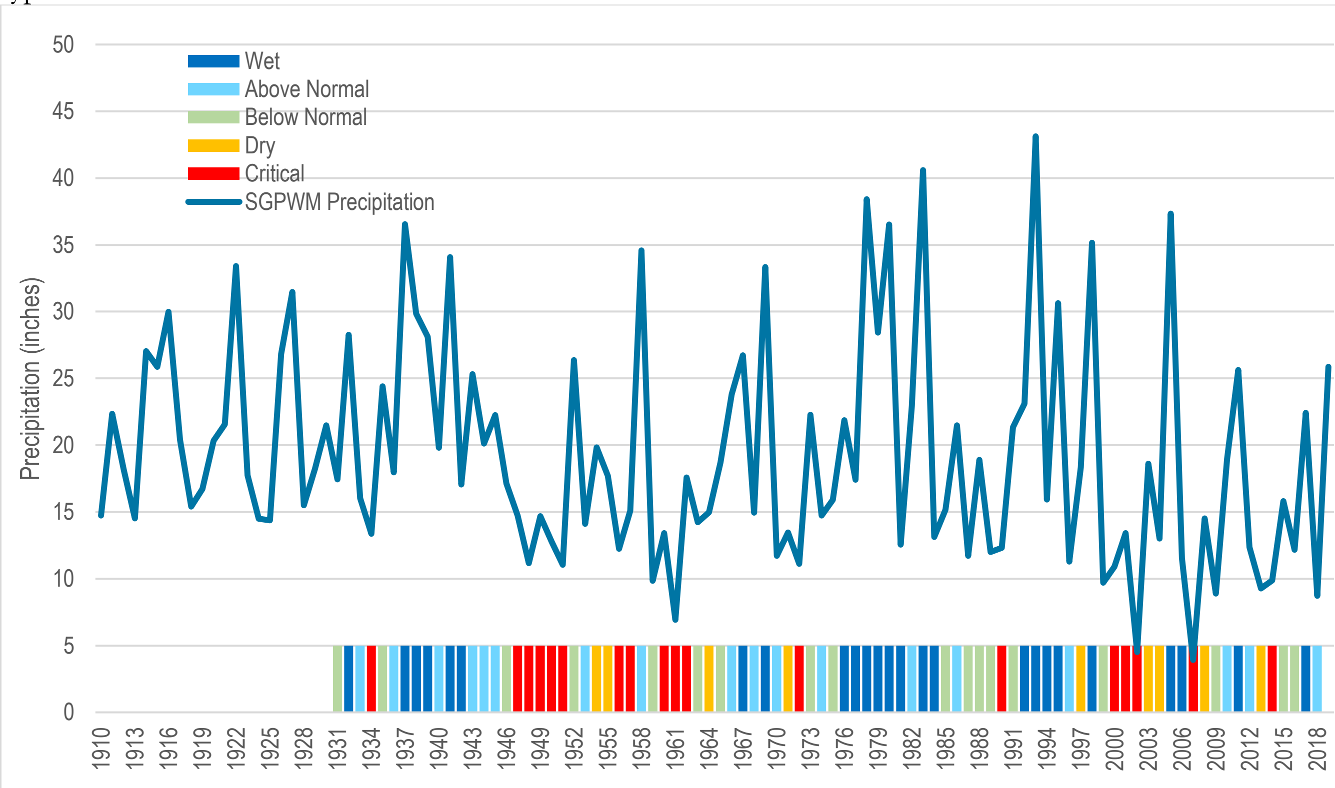


Figure 3-63 San Gorgonio Pass Subbasin Water Year Types[21]

[21] The figure shows year types going back as far as 1931, which is the oldest date that DWR year type information was available.

3.3.7 Historical Water Budget

Regulation Requirements:

§354.18

(c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:
(2) Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:
(A) A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information.
(B) A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.
(C) A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.

(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:
(1) Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.

A water budget was prepared for the 1998-2019 historical period using the calibrated SGP groundwater model with input data as described above. **Table 3-6** shows a groundwater system water budget for the SGP Subbasin, combining values from the upper and lower groundwater models.

As indicated in the water budget, the largest water outflow component in the basin is for underflows to the Indio Subbasin[22]. The largest component of water supply to the basin is stream channel percolation. Groundwater storage in the subbasin declines for all but four wet years in the 21-year historical period. The average values for the water budget components show some very limited relationship to year types, with the relationship appearing to be most significant for wet years. There is a pronounced increase in stream channel percolation and more positive groundwater storage change in wet year types. However, the average values for other water use and water demand categories for other year types are similar and do not seem to vary based on year types. Another characteristic of the historical water budget is the predominance of unmanageable water budget components – mainly the stream channel percolation and Indio Subbasin outflow. Groundwater pumping in the historical period is about 21% of the amount of total water discharged.

As noted earlier, because this historical period has below average wetness conditions, **the presence of groundwater decline** (averaging 10,000 acre-feet) **does not necessarily indicate that overdraft conditions are occurring.** The current water budget presented in the next section uses an average hydrologic period for analysis that is more representative of mean conditions.

[22] The composite total for rejected recharge and vadose zone losses, while also a large amount, includes rejected recharge and vadose loss processes which are typically not considered part of the groundwater basin water budget. They are shown in this water budget to reflect the SGP groundwater model's use of an upper groundwater model that, in part, incorporates computations often applied externally to groundwater model inputs.

Table 3-6 San Gorgonio Pass Subbasin Historical Water Budget

(Acre-Feet)											
		Water Supply					Water Use				
Water Year	Year Type	Stream Channel Percolation	Precipitation Percolation	Return Flows from M&I Use	Beaumont Basin Subsurface Flow	Total Supply	Rejected Recharge/ Vadose Zone Losses	Groundwater Pumping	Indio Subasin Subsurface Flow	Total Use	Change in Groundwater Storage
1998	Wet	39,919	7,309	6,818	1,123	55,169	14,887	10,989	25,733	51,609	3,576
1999	Below Normal	26,650	7,309	6,947	1,004	41,910	13,356	10,157	24,875	48,389	-6,469
2000	Critical	24,735	7,309	6,986	835	39,864	12,963	9,328	25,285	47,576	-7,701
2001	Critical	18,590	7,309	7,362	786	34,047	11,604	8,987	26,424	47,014	-12,953
2002	Critical	11,269	7,309	7,711	610	26,899	10,342	8,490	27,381	46,212	-19,309
2003	Dry	10,524	7,309	7,594	865	26,292	9,633	8,373	27,999	46,004	-19,709
2004	Dry	9,093	7,309	7,783	1,088	25,272	9,596	10,115	28,084	47,795	-22,516
2005	Wet	43,131	7,309	7,696	1,269	59,405	14,061	9,794	27,953	51,808	7,576
2006	Wet	28,206	7,309	7,818	1,460	44,793	12,562	11,185	27,113	50,859	-6,057
2007	Critical	28,402	7,309	7,937	1,316	44,964	13,142	10,991	25,503	49,636	-4,661
2008	Dry	21,521	7,309	7,936	1,315	38,081	12,371	9,511	25,954	47,836	-9,709
2009	Below Normal	11,076	7,309	7,465	1,419	27,269	10,194	10,071	26,701	46,966	-19,690
2010	Above Normal	15,465	7,309	6,709	1,446	30,928	9,841	10,132	26,852	46,825	-15,888
2011	Wet	29,230	7,309	6,413	1,456	44,408	11,104	9,718	25,256	46,078	-1,658
2012	Above Normal	18,629	7,309	6,287	1,477	33,702	9,737	9,677	22,696	42,111	-8,393
2013	Dry	16,084	7,309	6,529	1,647	31,569	9,425	9,886	22,013	41,324	-9,745
2014	Critical	11,476	7,309	6,493	1,583	26,861	8,798	8,633	23,177	40,608	-13,746
2015	Below Normal	8,733	7,309	6,034	1,748	23,824	8,304	7,925	24,787	41,016	-17,187
2016	Below Normal	8,351	7,309	5,991	1,857	23,508	8,274	7,943	25,581	41,799	-18,285
2017	Wet	21,686	7,309	6,285	1,711	36,990	9,811	8,609	25,622	44,042	-6,943
2018	Above Normal	12,575	7,309	6,513	1,689	28,087	8,703	9,318	23,902	41,924	-13,822
2019	Wet	27,229	7,309	6,400	1,726	42,664	10,054	8,357	21,618	40,029	2,722
Average	All Years	20,117	7,309	6,987	1,338	35,750	10,853	9,463	25,478	45,794	-10,026
	Averages by Year Types										
	Wet	31,567	7,309	6,905	1,457	47,238	12,080	9,775	25,549	47,404	-131
	Above Normal	15,556	7,309	6,503	1,537	30,906	9,427	9,709	24,484	43,620	-12,701
	Below Normal	13,703	7,309	6,609	1,507	29,128	10,032	9,024	25,486	44,542	-15,407
	Dry	14,306	7,309	7,460	1,229	30,303	10,256	9,471	26,012	45,740	-15,420
	Critical	18,894	7,309	7,298	1,026	34,527	11,370	9,286	25,554	46,209	-11,674

3.3.8 Current Water Budget

Regulation Requirements:

§354.18

(c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:
(1) Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.

(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:
(2) Current water budget information for temperature, water year type, evapotranspiration, and land use.

A current water budget for the SGP Subbasin was prepared to represent current water demands with long-term average hydrologic conditions. The current water budget was developed by the groundwater model using a similar methodology to the historical period. The 50-year baseline selected for use was the 1949-1998 period, which has hydrologic conditions (as indicated by precipitation estimated by SGPWM for the SGP groundwater model watershed) that are about 1.9% above normal as compared to the 1910-2019 long-term period of record. The 1949-1998 hydrologic period stream channel flows, recharge from precipitation, and other natural vegetation processes were computed by the SGPWM based on historical estimates of precipitation and evapotranspiration. Estimated stream channel percolation of 34,909 acre-feet was substantially higher (23-percent higher) than during the 1998-2019 historical period, as would be expected based on the higher level of precipitation in the 1949-1998 hydrologic period.

Groundwater pumping estimates and return flows from municipal use for current conditions were estimated based on average pumping and return flows for the last five years of the historical period (2015-2019). The prior five-year period is a reasonable estimate of current levels of water use. The estimated current pumping, municipal return flows, and wastewater treatment plan discharges are summarized in **Table 3-7**. **Table 3-7** also includes projected future amounts of pumping, municipal return flows and wastewater treatment plant discharges for 2030 and 2070 conditions that are described in **Section 3.3.12**.

Estimates of SGPWA imported water recharge in the Noble Creek recharge basins, while not directly recharging the SGP Subbasin, were needed for the SGP groundwater model as they affect subsurface flows from the adjudicated Beaumont Basin. SGPWA imported water supplies include State Water Project supplies, in addition to smaller amounts of other supplies. The availability of imported SWP water supplies for Noble Creek was based on the pattern of DWR CALSIM (model) estimates of SGPWA deliveries in the 2019 SWP Delivery Capability Report. Based on data from the Delivery Capability Report, considering other non-SWP supplies available to SGPWA and adjusting for the share of SGPWA supply to the SGP Groundwater model area, an average of 11,300 acre-feet of water would be recharged at the Noble Creek recharge facilities.

Estimates were also made of Colorado River Aqueduct recharge at the Whitewater Spreading facilities located east of the SGP Subbasin, which affects the SGP groundwater model general head boundary at the eastern boundary. The Whitewater recharge amounts were based on the 2019 SWP Delivery Capability Report's CALSIM-estimated SWP water supply availability and were used in a correlation for boundary water levels as input to the SGP groundwater model.

Table 3-7 SGP Subbasin Current Level and Projected Groundwater Pumping, Municipal Return Flows and Wastewater Treatment Plant Discharge for SGP Subbasin Demands (Acre-Feet)[23]

Year		2015	2016	2017	2018	2019	2015-19 Average (Current)	2030 Projection	2070 (2045) Projection
Groundwater Pumping by Storage Unit/Agency									
Potrero Canyon									
	MBMI	650	650	650	650	650	650	650	650
Millard Canyon									
	MBMI	700	700	700	700	700	700	700	700
Cabazon Storage Unit									
	MBMI	357	357	357	357	357	357	357	357
	Cabazon WD	515	497	508	498	455	495	491	489
	Mission Springs WD [1]	59	64	65	72	64	65	66	66
	Robertson's Ready Mix	322	325	613	638	625	505	541	584
	City of Banning	1,207	1,211	685	1,006	526	927	960	1,208
Banning Storage Unit									
	City of Banning	1,734	2,607	2,651	2,963	1,326	2,256	1,430	1,430
Banning Canyon Storage Unit									
	Banning Heights MWC	29	21	8	55	40	31	31	33
	City of Banning	3,110	2,666	3,455	2,696	3,256	3,037	4,917	5,060
	Other	75	75	75	75	75	75	75	75
Total Pumping		**8,758**	**9,173**	**9,767**	**9,710**	**8,074**	**9,096**	**10,218**	**10,653**
M&I Return Flows by Agency									
	City of Banning	1,441	1,575	1,769	1,896	1,626	1,660	1,660	1,660
	Banning Heights MWC	17	12	5	32	23	20	20	20
	Cabazon WD	299	288	295	289	264	290	290	290
	Mission Springs WD	85	84	90	88	83	90	90	90
	MBMI	132	132	132	132	132	130	130	130
Wastewater Treatment Plant Discharge by Agency									
	City of Banning	2,207	2,179	2,216	2,259	2,234	2,220	3,433	4,620
	MBMI	392	392	392	392	392	390	390	390

[1] Mission Springs Water District 1998-2008 Pumping estimated from subsequent years data

The Current Water Budget is summarized in **Table 3-8**. As with the historical period, the biggest components of water supply and use are natural processes – streamflow percolation and outflow to the Indio Subbasin – that have limited capability for management. Also, similar to the historical period, most water budget components were relatively constant. Only the stream channel percolation and the vadose zone losses had significant variations by year type. Other water budget components were relatively insensitive to variations in water year type.

Groundwater pumping averaged just less than 20 percent of the total water use, meaning there is limited ability to manage basin conditions through adjustments only in pumping amounts. The other opportunity currently available for managing the Subbasin water levels is imported water recharged in the existing Noble Creek recharge basins in the adjudicated Beaumont Basin, which can increase subsurface flows to the Banning Storage Unit of the SGP Subbasin.

[23] Pumping amounts shown do not differentiate among various water rights types and are believed to include Whitewater River Decree rights, percolating groundwater rights and other State water rights.

Table 3-8 SGP Subbasin Current Water Budget

San Gorgonio Pass Subbasin Current (1949-1998 Hydrology) Projection (Acre-Feet)											
		Water Supply					Water Use				
Water Year	Year Type	Stream Channel Percolation	Precipitation Percolation	Return Flows from M&I Use	Beaumont Basin Subsurface Flow	Total Supply	Rejected Recharge/ Vadose Zone Losses	Groundwater Pumping	Indio Subasin Subsurface Flow	Total Use	Change in Groundwater Storage
1949	Critical	5,115	8,164	6,061	471	19,811	15,416	7,627	21,774	44,817	-25,039
1950	Critical	5,503	8,164	6,108	983	20,757	10,185	7,943	21,838	39,966	-19,191
1951	Critical	5,387	8,164	6,447	1,189	21,186	9,739	8,609	21,361	39,709	-18,521
1952	Below Normal	15,661	8,164	6,658	1,279	31,761	11,322	9,318	20,322	40,963	-9,207
1953	Above Normal	10,831	8,164	6,549	1,420	26,964	10,263	8,357	19,741	38,361	-11,370
1954	Dry	15,772	8,164	6,180	1,601	31,717	10,308	7,889	19,836	38,033	-6,311
1955	Dry	11,369	8,164	6,108	1,833	27,473	10,200	7,943	20,595	38,738	-11,248
1956	Critical	8,516	8,164	6,447	1,822	24,949	9,554	8,609	20,748	38,911	-13,954
1957	Critical	8,434	8,164	6,658	1,758	25,013	9,216	9,318	20,089	38,623	-13,612
1958	Above Normal	34,038	8,164	6,549	1,719	50,470	12,736	8,357	19,284	40,376	9,091
1959	Below Normal	20,460	8,164	6,180	1,805	36,608	11,341	7,889	18,859	38,088	-1,465
1960	Critical	20,322	8,164	6,108	2,014	36,607	12,529	7,943	19,121	39,593	-2,962
1961	Critical	15,522	8,164	6,447	1,981	32,113	11,864	8,609	19,517	39,991	-7,831
1962	Critical	9,675	8,164	6,658	1,876	26,373	9,941	9,318	19,526	38,785	-12,364
1963	Below Normal	7,179	8,164	6,549	1,802	23,693	9,300	8,357	19,111	36,768	-13,017
1964	Dry	7,550	8,164	6,180	1,854	23,747	8,758	7,889	18,808	35,454	-11,671
1965	Below Normal	7,010	8,164	6,108	2,016	23,298	8,430	7,943	18,431	34,804	-11,489
1966	Above Normal	34,179	8,164	6,447	1,994	50,784	13,042	8,609	17,924	39,575	11,090
1967	Wet	30,448	8,164	6,658	1,975	47,244	13,791	9,318	17,414	40,523	6,425
1968	Above Normal	24,241	8,164	6,549	1,957	40,910	13,021	8,357	17,366	38,744	2,173
1969	Wet	47,114	8,164	6,180	2,083	63,541	18,123	7,889	17,481	43,493	19,255
1970	Above Normal	30,656	8,164	6,108	2,260	47,187	16,178	7,943	17,623	41,745	5,463
1971	Dry	34,228	8,164	6,447	2,300	51,139	16,680	8,609	18,135	43,424	7,724
1972	Critical	23,634	8,164	6,658	2,230	40,685	14,493	9,318	18,938	42,749	-2,000
1973	Below Normal	21,635	8,164	6,549	2,135	38,483	11,782	8,357	19,261	39,400	-831
1974	Above Normal	14,583	8,164	6,180	2,165	31,092	9,871	7,889	18,942	36,701	-5,584
1975	Below Normal	11,746	8,164	6,108	2,341	28,359	9,452	7,943	18,676	36,072	-7,695
1976	Wet	11,051	8,164	6,447	2,337	27,999	9,024	8,609	18,861	36,494	-8,485
1977	Wet	14,335	8,164	6,658	2,253	31,409	10,074	9,318	19,582	38,975	-7,558
1978	Wet	54,705	8,164	6,549	2,161	71,579	15,842	8,357	19,465	43,664	27,854
1979	Wet	55,501	8,164	6,181	2,083	71,928	19,806	7,889	18,852	46,547	25,422
1980	Wet	75,747	8,164	6,108	2,276	92,295	27,249	7,943	19,063	54,256	38,058
1981	Wet	73,690	8,164	6,448	2,263	90,564	25,983	8,609	20,036	54,628	35,912
1982	Above Normal	55,599	8,164	6,658	2,273	72,693	18,727	9,318	20,765	48,811	23,924
1983	Wet	55,533	8,164	6,550	2,264	72,510	18,741	8,357	20,805	47,902	24,621
1984	Wet	38,189	8,164	6,181	2,468	55,001	15,419	7,889	21,131	44,439	10,536
1985	Below Normal	35,083	8,164	6,108	2,725	52,080	13,381	7,943	21,684	43,008	9,111
1986	Above Normal	29,786	8,164	6,448	2,722	47,119	12,212	8,609	22,049	42,870	3,812
1987	Below Normal	15,039	8,164	6,658	2,638	32,498	10,235	9,318	23,238	42,792	-10,276
1988	Below Normal	15,725	8,164	6,550	2,548	32,987	10,139	8,357	24,516	43,011	-10,003
1989	Below Normal	11,916	8,164	6,181	2,424	28,684	9,111	7,889	24,520	41,519	-12,810
1990	Critical	9,920	8,164	6,109	2,457	26,649	8,895	7,943	24,344	41,182	-14,512
1991	Below Normal	20,512	8,164	6,448	2,373	37,496	9,886	8,609	24,528	43,024	-5,505
1992	Wet	27,139	8,164	6,658	2,246	44,207	10,600	9,318	24,532	44,450	-259
1993	Wet	53,582	8,164	6,550	2,116	70,411	16,024	8,357	24,013	48,394	22,020
1994	Wet	52,711	8,164	6,181	2,060	69,115	20,725	7,889	23,449	52,063	17,070
1995	Wet	70,664	8,164	6,109	2,318	87,255	22,615	7,943	23,316	53,874	33,379
1996	Above Normal	48,535	8,164	6,448	2,272	65,419	18,546	8,609	23,362	50,518	14,895
1997	Dry	32,366	8,164	6,658	2,328	49,517	12,783	9,318	23,554	45,655	3,844
1998	Wet	39,606	8,164	6,550	2,425	56,745	13,923	8,357	23,189	45,469	10,752
Average	All Years	27,555	8,164	6,386	2,058	44,162	13,350	8,418	20,592	42,359	1,753
	Averages by Year Types										
	Wet	46,668	8,164	6,400	2,222	63,454	17,196	8,403	20,746	46,345	17,000
	Above Normal	31,383	8,164	6,437	2,087	48,071	13,844	8,450	19,673	41,967	5,944
	Below Normal	16,542	8,164	6,372	2,190	33,268	10,398	8,357	21,195	39,950	-6,653
	Dry	20,257	8,164	6,315	1,983	36,718	11,746	8,330	20,185	40,261	-3,532
	Critical	11,203	8,164	6,370	1,678	27,414	11,183	8,524	20,726	40,433	-12,998

3.3.9 Projected Water Budget

Regulation Requirements:

§354.18

(c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:
(3) Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:
(A) Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.
(B) Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.
(C) Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.

(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:
(3) Projected water budget information for population, population growth, climate change, and sea level rise.

Projected water budgets (future water budgets) have been developed for an early future (2030 level) and a late future (2070 level) period. Both the early future (2030 level) and late future (2070 level) are based on the 1949-1998 hydrologic sequence used for the current level model projections, with adjustments for climate change as described below. The early future water budget is the focus of this analysis as it represents near term future conditions and requires less speculative estimates of projected future climate change impacts. The early future water budget is based on the 2030 level climate change projections. The early future water budget was summarized by water year type to identify changes resulting from differing hydrologic conditions with the focus on achieving sustainability in the planning and implementation period (through 2042).

Water supply changes for the early future and late future conditions were estimated based on available climate change projection datasets provided by DWR (DWR, 2018) at their SGMA climate change website[24]. The DWR climate change datasets were developed for the California Water Commission's Water Storage Investment Program (WSIP). As described by DWR, the WSIP dataset is consistent with other DWR programs, is based on best available science, builds on previous efforts, incorporates latest advances in projections, and follows Climate Change Technical Advisory Group guidance. The available datasets include central tendency projections of ensembles of general circulation models for 2030 and 2070 levels. The datasets also include climatic bookends for late future (2070 level) conditions, with a drier, extreme warming scenario and a wetter, moderate warming scenario being provided. Only the central tendency simulation is used for preparing late future (2070 level) water budgets for the SGP Subbasin, which DWR considers to be the most likely future conditions.

[24] https://data.cnra.ca.gov/dataset/sgma-climate-change-resources

The WSIP climate change factors for precipitation and evapotranspiration for the Whitewater watershed (USGS Hydrologic Unit Code 18100201) were applied to the precipitation, temperature, and evaporation assumptions used in the SGPWM. With these adjusted factors, updated streamflow runoff, precipitation, and other natural water budget components were estimated for the 1949-1998 hydrologic period. Overall, these adjustments for climate change had minimal effect on water budget components for the SGP groundwater model. The streamflow percolation estimates from SGPWM incorporating the climate change factors for 2030 and 2070 all remained within 1% of the current level amounts.

<u>Early Future (2030 level)</u>

Additional early future (2030 level) adjustments to SGP groundwater model inputs were made for human-induced factors including groundwater pumping and municipal return flows. Groundwater pumping for the City of Banning and Beaumont-Cherry Valley Water District were estimated as continuing annual amounts based on the 2020 Urban Water Management Plan (UWMP) projections from both agencies. The annual amounts were distributed to monthly values using the monthly distributions at wells for the most recent five years with data (2015-2019). Municipal groundwater use by other agencies (Banning Heights Mutual Water Company, Cabazon Water District, and Mission Springs Water District) was left at current levels (2015-2019 average) for the projection, reflecting minimal planned development in those areas. No projected groundwater pumping amounts were available for MBMI and the baseline 2030 projections assume continued pumping at estimated recent historical levels. As described in the **Chapter 6 – Projects and Management Actions**, an alternative early future (2030 level) baseline projection was developed that includes potential increased MBMI water use. The assumptions for that alternative projection are described in Chapter 6 and are not described here.

Wastewater treatment plant releases for the City of Banning were increased in the future, corresponding to increased municipal use, from a current level of 2,251 acre-feet per year to 3,433 acre-feet per year. The 2030-level projections also incorporate about 1,000 acre-feet per year of recycled water use for the City of Banning. MBMI wastewater treatment plant recharge was left at levels used for the current projections. Municipal return flows for other entities (including septic systems) were left at the historic levels used in the current level projections, which is consistent with the assumption that groundwater use in those was also maintained at the current projection level. The early future (2030 level) forecast pumping, wastewater discharge and M&I return flow estimated were included in **Table 3-7**.

Projected State Water Project (SWP) and other imported water supply deliveries for recharge to the Noble Creek recharge basins were updated to the early future (2030 level). While Noble Creek is located in the Beaumont Basin, recharge there can have a positive effect on subsurface flows to the Banning Storage Unit of the SGP Subbasin. Based on the WSIP projected CALSIM deliveries to SGPWA for the future (2030 level) conditions, the portion of SGPWA supplies available for the SGP groundwater model area averaged 10,800 acre-feet per year. Similar adjustments were made for recharge of Colorado River Aqueduct water at the Whitewater spreading facilities located east of the SGP Subbasin. The Whitewater recharge amounts were based on early future (2030 level) CALSIM-estimated SWP water supply availability and were used in a correlation for boundary water levels as input to the SGP groundwater model.

The average projected water budgets for baseline early future (2030 level) are shown in **Table 3-9**. The early future water budgets are similar to the current water budgets, being based on the same 1949-1998 hydrologic period. As with the current-level projections, there are no significant trends with water year types for most of the water budget components with the major exception of higher streamflow percolation amounts for the wet year types. The projected early future (2030 level) storage change shows a slight decrease in groundwater storage, averaging about 500 acre-feet per year of average storage decline. Average streamflow runoff, the primary natural hydrologic factor, was reduced about 2.5% as a result of the climate change adjustments. While municipal use increased modestly from current level to early future (2030 level), much of the additional groundwater pumping associated with increased municipal water demands for the City of Banning occurred in the adjacent Beaumont Basin.

While the current level water budgets indicated a positive groundwater storage change, the early future (2030 level) water budgets show a slight decrease in groundwater storage, averaging about 500 acre-feet per year. The storage decline results from slightly higher pumping and slightly lower recharge for the early future (2030 level). No early future (2030 level) water budgets were prepared for projections that include projects and management actions. Groundwater model projections were made to predict the benefits of several projects identified in **Chapter 6 – Projects and Management Actions**, which are shown in that chapter. While the projects and management actions identified in Chapter 6 would not be required based on the current-level water budgets shown in this chapter, the early future (2030 level) water budget projections indicate that some combination of those projects or management actions may be needed to maintain pumping below the sustainable yield. Many of the projects and management actions are contingent measures that are identified as alternative that could be implemented in the event of changed circumstances. The decision to implement one or more of the projects and management actions to maintain sustainable groundwater conditions will be reviewed in the five-year GSP review in 2027. The projected groundwater levels for three projects are shown in **Chapter 6 – Projects and Management Actions**.

Table 3-9 SGP Subbasin Early Future (2030) Water Budget

San Gorgonio Pass Subbasin Early Future (1949-1998 Hydrology, 2030 Climate) Projection (Acre-Feet)											
		Water Supply					Water Use				
Water Year	Year Type	Stream Channel Percolation	Precipitation Percolation	Return Flows from M&I Use	Beaumont Basin Subsurface Flow	Total Supply	Rejected Recharge/ Vadose Zone Losses	Groundwater Pumping	Indio Subasin Subsurface Flow	Total Use	Change in Groundwater Storage
1949	Critical	5,303	7,042	7,281	420	20,046	15,944	10,218	21,968	48,130	-28,067
1950	Critical	5,423	7,042	7,355	738	20,559	10,463	10,190	22,303	42,957	-22,404
1951	Critical	5,407	7,042	7,674	991	21,113	9,859	10,401	21,556	41,816	-20,720
1952	Below Normal	14,993	7,042	7,842	1,161	31,039	11,291	10,518	20,420	42,230	-11,188
1953	Above Normal	10,701	7,042	7,742	1,345	26,830	10,194	10,479	19,805	40,477	-13,618
1954	Dry	15,091	7,042	7,400	1,487	31,019	10,279	10,274	19,793	40,345	-9,306
1955	Dry	11,215	7,042	7,355	1,557	27,169	10,310	10,190	20,504	41,004	-13,838
1956	Critical	8,676	7,042	7,674	1,557	24,948	9,588	10,401	20,735	40,725	-15,791
1957	Critical	8,581	7,042	7,842	1,547	25,013	9,213	10,518	20,178	39,909	-14,893
1958	Above Normal	34,341	7,042	7,742	1,537	50,662	12,279	10,479	19,351	42,109	8,251
1959	Below Normal	20,803	7,042	7,400	1,559	36,804	11,675	10,274	18,953	40,902	-4,074
1960	Critical	20,302	7,042	7,355	1,592	36,290	12,467	10,190	19,094	41,750	-5,435
1961	Critical	15,672	7,042	7,674	1,589	31,976	11,839	10,401	19,355	41,594	-9,587
1962	Critical	9,592	7,042	7,843	1,578	26,054	9,948	10,518	19,361	39,827	-13,789
1963	Below Normal	7,153	7,042	7,742	1,560	23,496	9,275	10,479	18,855	38,609	-15,108
1964	Dry	7,158	7,042	7,400	1,573	23,172	9,058	10,050	18,442	37,550	-14,373
1965	Below Normal	6,605	7,042	7,355	1,588	22,590	8,650	10,008	17,973	36,630	-14,031
1966	Above Normal	35,430	7,042	7,674	1,606	51,751	12,602	10,401	17,438	40,440	11,327
1967	Wet	30,679	7,042	7,843	1,670	47,233	13,495	10,518	16,945	40,958	6,358
1968	Above Normal	22,847	7,042	7,742	1,696	39,326	12,799	10,479	16,952	40,230	-829
1969	Wet	46,165	7,042	7,400	1,725	62,331	17,879	10,274	17,098	45,251	17,158
1970	Above Normal	27,824	7,042	7,355	1,787	44,008	15,095	10,190	17,194	42,479	1,591
1971	Dry	30,655	7,042	7,674	1,848	47,219	14,868	10,401	17,640	42,908	4,366
1972	Critical	21,471	7,042	7,843	1,868	38,223	13,664	10,518	18,852	43,034	-4,751
1973	Below Normal	20,540	7,042	7,742	1,841	37,166	12,077	10,479	19,439	41,995	-4,756
1974	Above Normal	13,981	7,042	7,400	1,834	30,257	10,661	10,274	18,852	39,786	-9,468
1975	Below Normal	10,750	7,042	7,356	1,833	26,980	9,876	10,190	18,254	38,320	-11,303
1976	Wet	10,978	7,042	7,674	1,851	27,545	9,469	10,401	18,619	38,489	-10,925
1977	Wet	14,533	7,042	7,843	1,865	31,283	10,283	10,518	19,344	40,145	-8,858
1978	Wet	55,960	7,042	7,742	1,869	72,613	16,742	10,479	18,978	46,199	26,431
1979	Wet	55,535	7,042	7,400	1,775	71,752	20,764	10,274	18,229	49,267	22,497
1980	Wet	73,713	7,042	7,356	1,730	89,840	28,122	10,190	18,292	56,604	33,229
1981	Wet	69,370	7,042	7,674	1,736	85,822	27,670	10,401	19,074	57,144	28,728
1982	Above Normal	52,587	7,042	7,843	1,827	69,300	19,457	10,518	19,681	49,657	19,677
1983	Wet	55,028	7,042	7,742	1,867	71,680	19,795	10,479	19,469	49,743	21,940
1984	Wet	37,212	7,042	7,400	2,000	53,654	16,245	10,274	19,736	46,254	7,300
1985	Below Normal	35,028	7,042	7,356	2,076	51,502	13,642	10,190	20,425	44,257	7,259
1986	Above Normal	29,981	7,042	7,674	2,094	46,791	12,554	10,401	20,913	43,868	2,566
1987	Below Normal	14,919	7,042	7,843	2,076	31,880	10,530	10,518	21,946	42,995	-11,106
1988	Below Normal	15,117	7,042	7,743	2,057	31,958	10,131	10,479	22,951	43,561	-11,574
1989	Below Normal	11,513	7,042	7,400	1,966	27,921	9,687	10,274	22,837	42,797	-14,822
1990	Critical	9,690	7,042	7,356	1,890	25,978	9,227	10,190	22,587	42,003	-15,953
1991	Below Normal	19,566	7,042	7,674	1,851	36,133	10,110	10,401	22,717	43,228	-7,046
1992	Wet	27,719	7,042	7,843	1,837	44,441	10,408	10,518	22,694	43,620	903
1993	Wet	54,814	7,042	7,743	1,806	71,405	16,190	10,479	22,152	48,820	22,572
1994	Wet	50,905	7,042	7,400	1,725	67,073	18,833	10,274	21,532	50,639	16,379
1995	Wet	67,214	7,042	7,356	1,829	83,441	23,024	10,190	21,317	54,531	28,938
1996	Above Normal	45,176	7,042	7,674	1,782	61,674	17,897	10,401	21,268	49,565	12,207
1997	Dry	30,929	7,042	7,843	1,890	47,705	12,452	10,518	21,557	44,528	3,204
1998	Wet	38,927	7,042	7,743	2,021	55,732	13,177	10,479	21,316	44,971	10,586
Average	All Years	26,875	7,042	7,601	1,690	43,208	13,435	10,363	19,899	43,697	-483
	Averages by Year Types										
	Wet	45,917	7,042	7,611	1,820	62,390	17,473	10,383	19,653	47,509	14,882
	Above Normal	30,319	7,042	7,650	1,723	46,733	13,726	10,402	19,050	43,179	3,523
	Below Normal	16,090	7,042	7,587	1,779	32,497	10,631	10,346	20,434	41,411	-8,886
	Dry	19,010	7,042	7,534	1,671	35,257	11,394	10,287	19,587	41,267	-5,989
	Critical	11,012	7,042	7,590	1,377	27,020	11,221	10,355	20,599	42,175	-15,139

Late Future (2070 level)

Projected water budgets for late future (2070 level) conditions were prepared with adjustments similar to those for the early future (2030 level) projections. Natural components of the water balance, including estimated streamflow, precipitation, and native evapotranspiration were developed using the SGPWM with 2070-level climate change factors from the WSIP studies provided by DWR. As with the early future projections, these result in minimal impacts to the projected streamflow percolation amounts.

Municipal pumping estimates for the City of Banning and Beaumont-Cherry Valley Water District were developed based on 2045-projected groundwater pumping estimates from their respective draft 2020 UWMPs. The 2045 water use projection was used as that is the most distant forecast available in the 2020-UWMPs, which are considered to be the best forecasts available. While these resulted in higher estimates of groundwater pumping in the SGP groundwater model, most of the increase from current-level to early-future and late-future conditions occurred in the Beaumont Basin portion of the SGP groundwater model and are not displayed in the SGP Subbasin water budget. Municipal groundwater pumping by other agencies in the SGP Subbasin was left at the recent historical values (2015-2019 average) used for the current-level model projection. The late future (2070 level) forecast pumping, wastewater discharge and M&I return flow estimated were included in **Table 3-7**.

Recharge to the SGP groundwater model at the Noble Creek recharge facilities was updated based on the 2070-level WSIP CALSIM studies and include some imported water sources in addition to SGPWA's primary SWP supplies. The average recharge at the Noble Creek facilities was reduced to 10,300 acre-feet, based on minor reductions in overall SWP water supply availability resulting from climate change at the 2070-level. The 2070-level WSIP CALSIM studies for SWP were also used to update the Colorado River Aqueduct spreading at the Whitewater spreading facilities in the Indio Subbasin, which are based on an exchange of SWP deliveries for Colorado River Aqueduct water. As with the current-level and 2030-level studies, the Whitewater spreading amounts were applied to a correlation with Indio Subbasin area groundwater levels that are used as variable groundwater level boundary conditions at the SGP groundwater eastern boundary.

The projected late future (2070 level) water budget is shown in **Table 3-10**. This water budget is very similar to the early future (2030 level) water budgets. Predicted late future (2070 level) groundwater storage decreases about 1,800 acre-feet per year, which is the result of additional increases in groundwater use and projected additional reductions in streamflow recharge resulting from climate change. As with the early future (2030 level) projections, the 2070 level water budget indicates the likely need for implementation of projects or management identified in the **Chapter 6 – Projects and Management Actions.** The late future (2070 level) water budgets are an early indication of the need for planning to implement individual or combined projects or management actions to maintain sustainable groundwater conditions in the SGP Subbasin.

Table 3-10 SGP Subbasin Late Future (2070) Average Water Budget

San Gorgonio Pass Subbasin Late Future (1949-1998 Hydrology, 2070 Climate) Projection
(Acre-Feet)

		Water Supply					Water Use				
Water Year	Year Type	Stream Channel Percolation	Precipitation Percolation	Return Flows from M&I Use	Beaumont Basin Subsurface Flow	Total Supply	Rejected Recharge/ Vadose Zone Losses	Groundwater Pumping	Indio Subasin Subsurface Flow	Total Use	Change in Groundwater Storage
1949	Critical	4,627	7,082	8,468	406	20,584	17,126	10,672	21,966	49,764	-29,196
1950	Critical	4,810	7,082	8,542	672	21,106	11,628	10,352	22,311	44,291	-23,197
1951	Critical	4,944	7,082	8,861	900	21,786	11,006	10,404	21,618	43,028	-21,258
1952	Below Normal	12,937	7,082	9,030	1,053	30,102	12,296	10,696	20,586	43,578	-13,464
1953	Above Normal	9,528	7,082	8,929	1,219	26,758	11,124	10,865	19,933	41,922	-15,164
1954	Dry	14,503	7,082	8,587	1,341	31,512	11,119	10,660	19,795	41,573	-10,070
1955	Dry	10,321	7,082	8,542	1,412	27,358	11,242	10,576	20,442	42,260	-14,905
1956	Critical	8,005	7,082	8,861	1,413	25,361	10,578	10,579	20,715	41,872	-16,533
1957	Critical	7,882	7,082	9,030	1,401	25,394	10,290	10,684	20,322	41,295	-15,894
1958	Above Normal	32,491	7,082	8,929	1,378	49,880	13,036	10,865	19,674	43,574	6,325
1959	Below Normal	20,008	7,082	8,587	1,408	37,084	12,581	10,660	19,248	42,489	-5,413
1960	Critical	18,365	7,082	8,542	1,392	35,382	13,274	10,576	19,214	43,063	-7,668
1961	Critical	14,381	7,082	8,861	1,401	31,724	12,709	10,787	19,695	43,190	-11,429
1962	Critical	8,869	7,082	9,030	1,387	26,368	10,887	10,904	19,874	41,665	-15,254
1963	Below Normal	6,798	7,082	8,929	1,358	24,167	10,222	10,865	19,142	40,228	-16,030
1964	Dry	6,696	7,082	8,587	1,364	23,729	10,038	10,228	18,982	39,248	-15,509
1965	Below Normal	5,706	7,082	8,543	1,367	22,697	9,696	9,995	18,794	38,485	-15,770
1966	Above Normal	32,217	7,082	8,861	1,367	49,527	13,280	10,787	18,087	42,153	7,426
1967	Wet	27,545	7,082	9,030	1,408	45,064	13,688	10,904	17,370	41,963	3,132
1968	Above Normal	20,759	7,082	8,929	1,423	38,193	13,524	10,865	16,882	41,271	-3,065
1969	Wet	44,699	7,082	8,587	1,480	61,848	18,385	10,660	16,816	45,861	15,941
1970	Above Normal	25,948	7,082	8,543	1,493	43,065	15,497	10,576	16,825	42,898	175
1971	Dry	27,423	7,082	8,861	1,575	44,941	15,360	10,787	17,065	43,212	1,738
1972	Critical	18,049	7,082	9,030	1,621	35,781	12,956	10,904	18,125	41,985	-6,186
1973	Below Normal	18,749	7,082	8,929	1,615	36,376	12,132	10,865	18,694	41,690	-5,313
1974	Above Normal	12,566	7,082	8,587	1,610	29,845	11,385	10,660	18,084	40,128	-10,270
1975	Below Normal	9,345	7,082	8,543	1,610	26,580	10,927	10,576	17,428	38,932	-12,345
1976	Wet	11,112	7,082	8,861	1,643	28,698	10,608	10,355	17,804	38,766	-10,067
1977	Wet	14,424	7,082	9,030	1,717	32,253	11,717	10,904	18,547	41,168	-8,910
1978	Wet	54,110	7,082	8,930	1,686	71,807	17,736	10,865	18,265	46,865	24,832
1979	Wet	51,690	7,082	8,587	1,514	68,873	21,021	10,660	17,550	49,230	19,630
1980	Wet	68,950	7,082	8,543	1,499	86,074	27,754	10,576	17,551	55,881	30,178
1981	Wet	65,648	7,082	8,861	1,517	83,108	28,676	10,787	18,339	57,801	25,306
1982	Above Normal	50,638	7,082	9,030	1,598	68,348	20,208	10,904	18,870	49,982	18,374
1983	Wet	51,758	7,082	8,930	1,636	69,406	20,325	10,865	18,509	49,699	19,745
1984	Wet	32,880	7,082	8,587	1,769	50,318	16,200	10,660	18,554	45,414	5,078
1985	Below Normal	31,520	7,082	8,543	1,863	49,007	14,338	10,576	19,212	44,126	4,931
1986	Above Normal	28,299	7,082	8,861	1,937	46,179	13,228	10,787	19,813	43,828	2,371
1987	Below Normal	13,823	7,082	9,030	1,923	31,858	11,261	10,904	20,784	42,949	-11,062
1988	Below Normal	13,757	7,082	8,930	1,908	31,677	10,785	10,865	21,719	43,369	-11,660
1989	Below Normal	10,183	7,082	8,587	1,823	27,675	10,428	10,660	21,589	42,677	-14,977
1990	Critical	9,094	7,082	8,543	1,737	26,457	10,203	10,576	21,336	42,116	-15,634
1991	Below Normal	18,838	7,082	8,861	1,687	36,469	11,108	10,787	21,471	43,366	-6,882
1992	Wet	26,749	7,082	9,030	1,656	44,517	11,460	10,904	21,458	43,822	695
1993	Wet	52,476	7,082	8,930	1,548	70,036	16,702	10,865	20,955	48,522	21,426
1994	Wet	47,404	7,082	8,588	1,522	64,595	18,439	10,660	20,400	49,499	15,087
1995	Wet	62,457	7,082	8,543	1,610	79,691	22,361	10,576	20,302	53,238	26,396
1996	Above Normal	42,305	7,082	8,862	1,588	59,837	18,398	10,787	20,128	49,312	10,558
1997	Dry	29,082	7,082	9,030	1,670	46,864	13,355	10,904	20,365	44,625	2,275
1998	Wet	36,638	7,082	8,930	1,816	54,466	13,717	10,865	20,271	44,853	9,515
Average	All Years	25,040	7,082	8,788	1,499	42,409	14,120	10,705	19,430	44,255	-1,840
	Averages by Year Types										
	Wet	43,236	7,082	8,798	1,601	60,717	17,919	10,740	18,846	47,506	13,199
	Above Normal	28,306	7,082	8,837	1,513	45,737	14,409	10,788	18,699	43,896	1,859
	Below Normal	14,697	7,082	8,774	1,601	32,154	11,434	10,677	19,879	41,990	-9,817
	Dry	17,605	7,082	8,722	1,472	34,881	12,223	10,631	19,330	42,184	-7,294
	Critical	9,903	7,082	8,777	1,233	26,994	12,066	10,644	20,518	43,227	-16,225

3.3.10 Quantification of Overdraft

Regulation Requirements:

§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data: (5) If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.

Based on the DWR Bulletin 118 definition of overdraft as occurring when groundwater storage declines over a period of years during which water supply conditions approximate average conditions, no overdraft is identified in the SGP Subbasin for current conditions. The water budget projections with early future (2030 level) and late future (2070 level) climate change conditions have very slight amounts of long-term groundwater level decline. While there was a significant extended period of groundwater level declines from 1998-2019, that period had water supply conditions that were about 20-percent below the long-term average. Based on the water budgets for current conditions, which have close to average long-term precipitation, a very small increase in water levels and groundwater storage is projected. The projections show that future climate change, combined with projected additional development, would result in slight amounts of overdraft for the early future (2030 level) and late future (2070 level) that could be addressed through possible implementation of projects or management actions described in **Chapter 6 – Projects and Management Actions**, such as Project #3.

3.3.11 Water Year Type Associated with Water Budget Components

Regulation Requirements:

§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data: (6) The water year type associated with the annual supply, demand, and change in groundwater stored.

As described earlier, water year types were identified for the SGP Subbasin and compared to water budget components for the different historical and predictive projections. The average values for water budget components and the percentage of the long-term average by water year type are shown in **Table 3-11**. There was a consistent correlation of high streamflow percolation values (as a percent of the long-term average) with wet water year types. Other relationships for water budget components with water year types were not as apparent and appear to be very weak or non-existent. Many of the water budget components appear to be relatively invariable and do not change according to water year types.

Table 3-11 SGP Subbasin Historical, Current, and Projected Water Budget by Year Type

	Water Budget by Water Year Type (% of Total Simulation Average)								
Year Type	Stream Channel Percolation	Precipitation Percolation	Return Flows	Beaumont Basin Subsurface Flow	Total Supply	Rejected Recharge/ Vadose Zone Losses	Groundwater Pumping	Indio Subasin Subsurface Flow	Total Use
Historical (1998-2019)									
Average (Acre-feet)	20,117	7,309	6,987	1,338	35,750	10,853	9,463	25,478	45,794
Wet	157%	100%	99%	109%	132%	111%	103%	100%	104%
Above Normal	77%	100%	93%	115%	86%	87%	103%	96%	95%
Below Normal	68%	100%	95%	113%	81%	92%	95%	100%	97%
Dry	71%	100%	107%	92%	85%	95%	100%	102%	100%
Critical	94%	100%	104%	77%	97%	105%	98%	100%	101%
Current Level									
Average (Acre-feet)	27,555	8,164	6,386	2,058	44,162	13,350	8,418	20,592	42,359
Wet	169%	100%	100%	108%	144%	129%	100%	101%	109%
Above Normal	114%	100%	101%	101%	109%	104%	100%	96%	99%
Below Normal	60%	100%	100%	106%	75%	78%	99%	103%	94%
Dry	74%	100%	99%	96%	83%	88%	99%	98%	95%
Critical	41%	100%	100%	82%	62%	84%	101%	101%	95%
Early Future (2030)									
Average (Acre-feet)	26,875	7,042	7,601	1,690	43,208	13,435	10,363	19,899	43,697
Wet	171%	100%	100%	108%	144%	130%	100%	99%	109%
Above Normal	113%	100%	101%	102%	108%	102%	100%	96%	99%
Below Normal	60%	100%	100%	105%	75%	79%	100%	103%	95%
Dry	71%	100%	99%	99%	82%	85%	99%	98%	94%
Critical	41%	100%	100%	81%	63%	84%	100%	104%	97%
Late Future (2070)									
Average (Acre-feet)	25,040	7,082	8,788	1,499	42,409	14,120	10,705	19,430	44,255
Wet	173%	100%	100%	107%	143%	127%	100%	97%	107%
Above Normal	113%	100%	101%	101%	108%	102%	101%	96%	99%
Below Normal	59%	100%	100%	107%	76%	81%	100%	102%	95%
Dry	70%	100%	99%	98%	82%	87%	99%	99%	95%
Critical	40%	100%	100%	82%	64%	85%	99%	106%	98%

3.3.12 Estimate of Sustainable Yield for the Basin

Regulation Requirements:

§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:

(7) An estimate of sustainable yield for the basin.

As shown by the current level water budget, current groundwater pumping of 8,400 acre-feet per year resulted in a small groundwater storage increase of 1,800 acre-feet per year over close to long-term average conditions. Assuming that 1,800 acre-feet of additional pumping could occur without causing groundwater storage declines, an approximate estimate of the sustainable yield for the SGP Subbasin is 10,200 acre-feet per year, which is about 20-percent more than current pumping levels.

While the water budget for current conditions suggests a sustainable yield of 10,200 acre-feet per year, the SGMA definition of sustainable yield is the amount of pumping that can occur without causing undesirable results. The level of pumping that does not result in undesirable results is not necessarily the same as the amount of pumping that would result in no storage change based on the water budget. The sustainable yield will be evaluated in the future based on monitoring data that indicate the presence or absence of undesirable results.

The early future (2030 level) and late future (2070 level) water budgets both indicate slight declines in long term storage, which are one indication of potential undesirable results. The early future (2030 level) projections developed by the model and presented in **Chapter 4 – Sustainable Management Criteria** do not indicate the occurrence of undesirable results. Based on those projections, the 2030 level of pumping would be sustainable, even though the long-term water budgets indicate a very slight decline in storage. This apparent discrepancy between model projections and the water budget likely includes the benefits of temporary surplus in the basin and ongoing monitoring would need to be closely reviewed to confirm that undesirable results have not occurred or are not imminent.

4 Sustainable Management Criteria

Regulation Requirements:

§354.22 This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.

The SGMA defines Sustainable Groundwater Management as "*the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results*." The avoidance of undesirable results is crucial to the success of the GSP. Several requirements from GSP regulations have been grouped together under the heading of sustainable management criteria, including a sustainability goal, undesirable results, minimum thresholds, and measurable objectives for various indicators of groundwater conditions. These terms are described in **Table 4-1** below:

Table 4-1 Sustainable Management Criteria Definitions

Term	Definition
Sustainability Goal	A succinct qualitative statement including objectives and desired conditions of the groundwater basin, how the basin will get to that desired condition, and why the measures planned will lead to success.
Measurable Objective	Quantitative goals that reflect the basin's desired groundwater conditions and allow the GSA to achieve the sustainability goal within 20 years.
Minimum Threshold	The quantitative value that represents the groundwater conditions at a monitoring site that, when exceeded individually or in combination with minimum thresholds at other monitoring sites, may cause undesirable result(s) in the basin.
Undesirable Result	A situation that occurs when conditions related to any of the six sustainability indicators become significant and unreasonable.

Sustainability indicators for the management of groundwater were identified in the SGMA legislation based on what is important to the health and general well-being of the public. In the SGP Subbasin, only four of the six sustainability indicators have been identified as applicable due to the specific physical circumstances in the subbasin. The four applicable sustainability indicators that must be monitored throughout the planning and implementation period of the GSP are shown below in **Figure 4-1** along with the two sustainability indicators (Land Subsidence and Seawater Intrusion) that are not applicable.

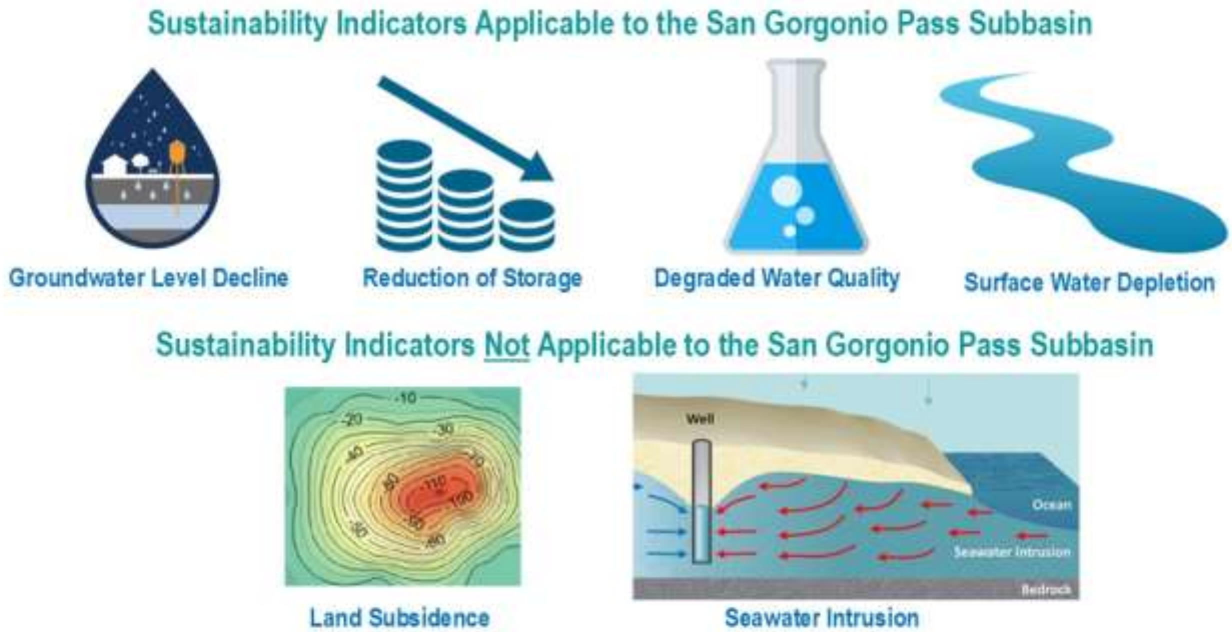


Figure 4-1 Sustainability Indicators

This chapter will describe each indicator, explain why it is significant, and define management thresholds. Development of these Sustainable Management Criteria is dependent on basin information developed and presented in the hydrogeologic conceptual model, groundwater conditions, and water budget chapters of this GSP.

4.1 Sustainability Goal

Regulation Requirements:

§354.24 Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.

The sustainability goal of the San Gorgonio Pass Subbasin is to ensure that by 2042, the Subbasin is being operated to maintain a reliable water supply for current and future beneficial uses without experiencing undesirable results. This goal will be met by balancing water demand with available water supply to stabilize groundwater levels without significantly and unreasonably impacting water quality or interconnected surface water. The beneficial users and uses of groundwater are detailed in **Chapter 2 – Plan Area**.

Two sustainability indicators are not applicable to the San Gorgonio Pass Subbasin: land subsidence and seawater intrusion. The possibility of land subsidence related to groundwater management is unlikely in the SGP Subbasin due to an absence of confining clay aquitards (Rewis,2006), which are susceptible to subsidence, and the lack of historic subsidence based on available InSAR remote sensing data. Seawater intrusion is also not known to occur in the SGP Subbasin due to geographic distance from the Pacific Coast.

The goal of the subbasin management is to generally stabilize long-term groundwater levels, while maintaining the historical trend of cyclical water table variations with the understanding that water levels will fluctuate based on the season, hydrologic cycle, and changing groundwater demands within the subbasin.

Conditions within the SGP Subbasin will be considered sustainable when groundwater levels are maintained to prevent undesirable results of applicable sustainability indicators.

For several years, the three GSAs within the SGP Subbasin have been coordinating efforts on how to reach and maintain sustainability. As described in **Chapter 3 - Basin Setting**, the SGP Subbasin has significant local variations in geologic conditions, water supplies, groundwater quality, and land uses that lead to different conditions and obligations within each GSA. The degree of groundwater level variations in the SGP Subbasin varies by location and is primarily affected by local land use and locally available surface water supplies.

Collectively, the SGP Subbasin's GSAs are responsible for implementing projects and management actions required to maintain sustainability and avoid overdraft. The measures to be implemented to ensure the Subbasin will be operated generally within the sustainable yield are described in **Chapter 6 – Projects and Management Actions to Achieve Sustainability**. These projects and management actions have been identified to maintain Subbasin sustainability through 2042 and beyond. Projects and management actions will be developed as necessary throughout the 20-year implementation period, but many benefits may not be seen until the latter years of the implementation period and beyond. The project and management action descriptions include technical data and estimates of project benefits. The resultant increased groundwater yield from individual potential projects can support the maintenance of sustainability in the subbasin. The GSAs will continue to coordinate through the implementation period in reviewing data, evaluating impacts, and ensuring that all GSAs are meeting their milestones and that sustainability is being maintained.

4.2 Undesirable Results

SGMA regulations define an undesirable result as a situation when a sustainability indicator becomes significant and unreasonable; however, the term "significant and unreasonable" is not defined in the regulations. Rather, the conditions leading to this classification are determined by the GSA with input from stakeholders.

4.2.1 Definition of Significant and Unreasonable

The SGP Subbasin GSAs' qualitative definition of significant and unreasonable effects (undesirable results) and quantitative measure are detailed in **Table 4-2**. The quantitative measure refers to "minimum thresholds" which are explained in detail in **Section 4.3**.

As previously stated, seawater intrusion and land subsidence are not applicable sustainability indicators and, therefore, are not described in this section. More information on those sustainability indicators can be found in **Section 4.5**.

Undesirable Result No. 1 in **Table 4-2** includes two categories, (1) Banning and Cabazon Storage Units and (2) Banning Canyon Storage Unit. This is due to the unique hydrology and conditions in the Banning Canyon, as compared to the rest of the Subbasin.

The Banning Canyon Storage Unit is perched upstream of the rest of the subbasin in the alluvium of the San Gorgonio River. The Banning Canyon Storage Unit is a shallow storage unit, usually less than 200 feet deep, with very limited storage capacity. The stored volume of the canyon's aquifer changes on a seasonal basis, increasing with runoff and snowmelt in the winter and decreasing with underflow and pumping in the summer. The seasonal hydrologic cycle in the canyon is markedly different from the long term (20+ year) hydrologic cycle seen in the rest of the subbasin.

The canyon has been pumped for beneficial uses since 1914 with groundwater levels decreasing due to pumping each summer until they are replenished with annual precipitation each winter/spring. Although the City of Banning pumps groundwater from Banning Canyon until the groundwater levels naturally drop due to the outflow from the steep gradient and limited capacity, groundwater levels routinely recover because of the canyon's unique hydrology and geology. Whereas the rest of the subbasin is experiencing groundwater level decline over the past 20 years, the Banning Canyon has maintained conditions of annual depletion and annual recharge for the last fifty years. The ongoing management approach in Banning Canyon has been to pump until the yield drops, thus operating within the physical limits of the unique and small aquifer. This is further explained in **Section 3.2**

Table 4-2 Undesirable Results in the San Gorgonio Pass Subbasin

	Qualitative Definition	Quantitative Definition	Sustainability Indicator
Undesirable Result No. 1	Banning and Cabazon Storage Units: The groundwater level has declined to a depth such that multiple wells need to be deepened (where feasible) to provide the minimum necessary groundwater supplies for beneficial uses in the Banning and Cabazon Storage Units.	Undesirable Result No. 1 is defined as two of the six representative water level monitoring wells in the Banning and Cabazon Storage Units exceeding their minimum threshold for two consecutive years at each of the respective sites in a 5-year rolling period. Two wells are selected to ensure isolated anomalies related to well monitoring or construction failures in one well are not misconstrued to represent the entire Subbasin. The 5-year rolling period is defined as an appropriate period to assess exceedances because it allows enough time for groundwater levels to rebound or be adaptively managed following a single or few years critical period and because it can be assessed with the fixed 5-year GSP Update periods.	Groundwater Levels Groundwater Storage
	Banning Canyon Storage Unit: The groundwater levels in the Banning Canyon develop a declining multi-year trend uncharacteristic of the usual annual fluctuations that include rebound of water levels during the annual wet season.	Undesirable Result No. 1 is defined as two of the three representative water level monitoring sites in the Banning Canyon exceeding their minimum threshold for 5 consecutive years. This would be an indicator that the annual fluctuations are trending to a chronic decline, rather than a short-term deviation from the historic groundwater level trends. In the event the conditions of Undesirable Result No. 1 were to occur, the GSAs can investigate if the declining trend is caused by groundwater management. Upon the first year of a threshold exceedance, the GSAs can evaluate the need for projects and management actions.	
Undesirable Result No. 2	As a result of groundwater management actions, the groundwater quality diminishes to the point that the water producer is responsible for expensive treatment adjustments.	Undesirable Result No. 2 is defined as two representative water quality monitoring sites exceeding their groundwater quality minimum threshold of either nitrates or TDS in two consecutive monitoring periods (every three years), as a result of groundwater management actions.[1]	Groundwater Quality

	Qualitative Definition	Quantitative Definition	Sustainability Indicator
Undesirable Result No. 3	The groundwater levels in Banning Canyon have resulted in a significant decline in GDEs compared to historic conditions in prolonged drought periods.	Undesirable Result No. 3. is defined as two of the three Banning Canyon representative water level/interconnected surface water monitoring sites experiencing minimum threshold exceedances for five consecutive years. Five consecutive years of exceedances would indicate that the annual fluctuations are trending to a long-term, rather than short-term, decline from the historic groundwater level trends. In the event these conditions occur, the GSAs can further investigate if groundwater management caused the undesirable result and if the potential Groundwater Dependent Ecosystem (GDE) footprint experiences a "large decrease" compared to 2014 conditions as defined by GDE Pulse.[2]	Groundwater Levels Groundwater Storage Interconnected Surface Water

[1] Constituents of concern were identified as being Total Dissolved Solids (TDS) or Nitrate for the SGP Subbasin, as defined in **Section 3.2 – Groundwater Conditions**.

[2] The Nature Conservancy's (TNC) GDE Pulse evaluation of GDE footprints are produced in approximately 5-year increments. (GDE Pulse (codefornature.org)). SGMA was signed into law in 2014, informing the baseline period for the GDE analysis as 2014.

In the event a quantitative undesirable result occurs, the conditions that led to the occurrence and the presence of qualitative undesirable results will be assessed by the GSAs to evaluate if the occurrence is related to anomalous circumstances or if the occurrence is representative of the qualitative definition of undesirable results. In the event qualitative undesirable results are present at any point, independent of a quantitative undesirable result occurrence, the GSAs will consider opportunities of mitigation and adaptive management opportunities, such as projects and management actions listed in Chapter 6.

4.2.2 Criteria to Define Undesirable Results and Causes Leading to Groundwater Undesirable Results

The GSAs reviewed potential causes of groundwater conditions that could result in significant and unreasonable impacts. This information was considered when developing criteria to define undesirable results.

Regulation Requirements:

§354.26 (a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.

§354.26 (b) The description of undesirable results shall include the following:

(1) The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.

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

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

4.2.2.1 Groundwater Levels & Storage

This Section describes sustainable management criteria for both groundwater levels and groundwater storage. These two sustainability indicators have a direct relationship with one another; declining groundwater levels indicate a reduction in groundwater storage and vice versa. Hence, the sustainable management criteria for both indicators are jointly presented in this chapter.

To define undesirable results related to groundwater levels and groundwater storage, the GSAs identified potential significant and unreasonable impacts to the beneficial uses of groundwater in the Subbasin, including management impacts, economic impacts, and environmental impacts.

Considering the significant depth to groundwater in the portion of the SGP Subbasin outside of the Banning Canyon, potential significant and unreasonable undesirable results are the impacts of increased groundwater pumping costs, lowering pump settings and drilling deeper wells to access available groundwater storage. The potential undesirable results in the shallow aquifer of the Banning Canyon Storage Unit are associated with avoiding significant reductions to groundwater levels and damage to Groundwater Dependent Ecosystems, which may be present. **Table 4-2** presents the three components of the SGP Subbasin's definition of undesirable result.

Currently, the SGP Subbasin has not experienced significant and unreasonable undesirable results caused by groundwater level decline and associated groundwater storage reduction. In the future, various factors, such as pumping increases, have the potential to cause changes leading to undesirable results. The groundwater elevation at which an undesirable result could possibly occur varies throughout the Subbasin and within each GSA.

A continued decline of groundwater levels below the minimum threshold (clarified in **Table 4-1**) may indicate the potential for an Undesirable result. The decline of the water table below minimum threshold levels could be caused by:

- The future hydrologic cycle being significantly drier than historic average conditions.
- Extended or worse drought conditions than the historic 2008-2019 drought.

- Adjacent groundwater Subbasins and entities significantly increasing their groundwater extraction activities.
- Increased demand and pumping within the SGP Subbasin beyond what is planned in the water budget.
- Fire damage, or another natural disaster, impacting water infrastructure and reducing surface water supply, such as the near-term impacts related to the 2020 Apple Fire[25].

The potential effect of prolonged lowering of groundwater levels would be a need to deepen wells and/or pumps to maintain their productivity in areas of the Subbasin in which that is possible. In the event hydrologic conditions deviate significantly from the projected conditions, and if identified of projects and management actions (noted in **Chapter 6 – Projects and Management Actions**) are not implemented, then there is potential for various areas in the Subbasin to require further deepening of wells, which would result in increased financial burden on stakeholders, particularly those who are classified as Disadvantage Communities (DAC) or Severely Disadvantaged Communities (SDAC). In the event it is necessary to implement projects and management actions to maintain sustainable groundwater levels above the minimum thresholds (**Section 4.2.2**), doing so would prevent significant and unreasonable undesirable results and support sustainable long-term conditions within the Subbasin.

4.2.2.2 Groundwater Quality

Within the SGP Subbasin, undesirable results for groundwater quality will be based initially on Maximum Contaminant Levels (MCLs) assigned in the California Title 22 Code of Regulations. Title 22 of California's Code of Regulations refers to state guidelines for how treated and recycled water is discharged and used.

The intent of SGMA is that GSAs be responsible for groundwater management activities related to pumping, recharge supply, and conjunctive use projects. Other existing agencies and programs are generally responsible for tracking and remediation of groundwater quality, and the sustainable management criteria assigned for groundwater quality are based on the efforts of these existing programs. These other agencies and programs include the Regional Water Quality Control Board, Department of Toxic Substances Control, and others.

While there are several existing groundwater monitoring programs, not all wells within the Subbasin are being monitored. Water quality of private domestic wells is largely unknown because testing of the wells is not required by law. Due to these limitations, the data from these domestic wells cannot be relied on to set sustainable management criteria at this time.

Generally, California Domestic Water Quality and Monitoring Regulations do not require all chemicals and contaminants to be tested at public supply wells. Instead, the intent of the regulations is to test for chemicals and contaminants that are known or likely to occur in the area. Therefore, not all constituents of concern will be tested in every well and the monitoring frequency for individual constituents can vary from once every 3 months to once every 6 years depending on well history and well location relative to known groundwater impacts. As described in Section 3.2, the SGP Subbasin has generally good quality groundwater. Nitrates and TDS, the constituents tracked

[25] Watershed Emergency Response Team Evaluation APPLE and EL DORADO FIRES. Cal Fire. California Dept. of Conservation. November 2, 2020.

for groundwater quality sustainability, are only required to be monitored every 3 years. The Subbasin's groundwater monitoring is detailed in **Chapter 5 – Monitoring Network**.

To evaluate undesirable results related to groundwater quality, groundwater monitoring results from the wells within the SGP Representative Monitoring Network (described in **Chapter 5**) will be reviewed as they are made available and the analytical results for the constituents of concern specific to the individual well locations will be compared against the respective MCL values for the constituents of concern. Undesirable results related to groundwater quality for the Subbasin's constituents of concern are defined in **Table 4-2**. The sustainable management criteria related to groundwater quality in the SGP Subbasin are presented in **Table 4-4** below. Despite the generally good quality of the groundwater in the Subbasin, the GSAs have assigned TDS and nitrates as constituents of concern for several reasons: their prevalence in nearby and similarly managed basins, their ability to negatively impact the beneficial uses of groundwater in the subbasin, or the cost required to address them with treatment operations or replacement well construction. Additionally, TDS and nitrates are both typically a good indicator of general water quality.

There are several potential causes of groundwater quality degradation that could lead to undesirable results. These include but are not limited to:

- Accumulated effects of fertilizer nutrient application for municipal, domestic, and commercial landscaping;
- Accumulated effects of waste discharge streams from wastewater treatment facilities, septic systems, industry, and food processors;
- Mobilization of groundwater contaminant plumes by groundwater pumping;
- Improperly located recharge projects, causing either downward movement of contaminants in the vadose zone or mobilization groundwater contaminant plumes; and
- Overall increase in dissolved constituents (TDS) from lowering the groundwater levels or other practices.

The potential effects on beneficial users of reaching undesirable results may vary by location and which constituent has been exceeded. Agencies that provide drinking water are legally required to regularly sample groundwater from their wells, compare the results to potable water standards (MCL), and report these results in Consumer Confidence Reports that are publicly available. This has allowed the GSAs to analyze the water quality conditions in the Subbasin (**Section 3.2**). Degraded groundwater quality can make drinking water treatment more difficult and expensive. However, there are no known significant groundwater quality concerns in the SGP Subbasin at this time.

4.2.2.3 Interconnected Surface Water

Documentation of interconnected surface waters in the SGP Subbasin is limited to the Banning Canyon. The Millard, Hathaway, and Potrero Canyons are excluded because they are outside of the GSP's jurisdiction, as they are located within MBMI lands which are not subject to SGMA. The potential interconnected surface water within the Subbasin is of interest, as it is a sustainability indicator defined by SGMA and also it can correlate with areas of GDEs as a beneficial user of groundwater. Therefore, the Banning Canyon has been identified as an area of potential GDEs. The remaining potential GDEs that fall within the lands subject to SGMA are located within the Banning Canyon. As shown by the groundwater elevation data in Section 3.2, the depth to groundwater in Banning and Cabazon Storage Units is hundreds of feet deep, which is too deep to support GDEs.

The criteria to define undesirable results related to interconnected surface water (**Table 4-2**) are informed by the most limiting beneficial use, which are GDEs. The groundwater levels in the Banning Canyon are unique in that the depth to bedrock is very shallow (**Section 3.2**) and at a sloped gradient draining into the Cabazon Storage Unit. In addition, the alluvial material composing the Canyon is highly permeable and swiftly reflects changes in the hydrology. The Banning Canyon has a lower storage capacity than the rest of the Subbasin. Its source water is San Gorgonio River, which is an ephemeral stream with flows generated from precipitation and upstream snowmelt.

Although there are periods in which groundwater levels can support wetland vegetation, for most of the year, the depth to groundwater in Banning Canyon exceeds 200-feet; which is deeper than the deepest possible rooting depth of GDE vegetation in the Canyon. This depth to groundwater for most of the year is not controllable by groundwater management, rather, it is a product of the steep gradient, limited aquifer capacity, and climactic conditions. See **Section 3.2** for a detailed description of the GDE analysis.

In addition to GDEs, the City of Banning is another beneficial user with interest in maintaining historic groundwater conditions in the Banning Canyon because it uses the groundwater to support production demands and offset its groundwater extractions in the Banning Storage Unit and the adjudicated Beaumont Basin. In addition, this groundwater has historically supported Banning Heights Mutual Water Company in times of emergency, such as after the 2020 Apple Fire impacted their water supply infrastructure.

There are several potential causes that could lead to undesirable results related to interconnected surface water. These include but are not limited to:

- Climate change impacting snowpack and upstream runoff.
- Fire damage impacting water conveyance infrastructure that had previously contributed seepage from the Whitewater River flume into the Banning Canyon.

4.3 Minimum Thresholds

Minimum thresholds are defined by SGMA as "the quantitative value that represents the groundwater conditions at a monitoring site that, when exceeded individually or in combination with minimum thresholds at other monitoring sites, may cause undesirable result(s) in the subbasin." The GSAs' definitions of specific minimum thresholds are outlined in **Table 4-3** and **Table 4-4**.

4.3.1 Definition of Minimum Thresholds

Regulation Requirements:

§354.26 (c) The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.

§354.28 (a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.

(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.

The representative monitoring network is composed of nine groundwater level monitoring sites, five water quality monitoring sites, and three interconnected surface water monitoring sites identified by the GSAs (**Chapter 5 – Monitoring Network**). These sites are distributed widely across the Subbasin, providing helpful coverage to assess the variety of groundwater conditions by storage unit.

A unique minimum threshold is defined at each of the representative monitoring sites. Because of the potential for occasional anomalous measurements of water levels or water quality, it is not reasonable for a single minimum threshold exceedance to lead to an undesirable result for the entire SGP Subbasin; therefore, an undesirable result determination will be based on multiple monitoring locations within the SGP Subbasin exceeding MCLs over a defined period The number of minimum threshold exceedances and defined period that would constitute a significant and unreasonable impact (undesirable result) are described in **Table 4-2**.

4.3.1.1 Groundwater Levels, Groundwater Storage, and Interconnected Surface Water

Groundwater levels are used as a proxy for two other sustainability indicators: groundwater storage and interconnected surface water. All representative water level monitoring sites are a proxy for groundwater storage. Three wells in the Banning Canyon, 4L3 (COB #11), 17F2 (COB #8), and 33J4 (COB #2) are a proxy for interconnected surface water (depletion of interconnected surface water). The representative water level and interconnected surface water sites are included in **Figure 4-2** and. the groundwater level minimum thresholds are presented in **Table 4-3**.

Table 4-3 Groundwater Levels - Sustainable Management Criteria

Representative Monitoring Site	Measurable Objective	Minimum Threshold	Sustainability Indicator		
	Water Surface Elevation in Feet (Above Mean Sea Level)		Groundwater Levels	Groundwater Storage	Interconnected Surface Water
4L3 (COB #11)	4,425	4,400	✔	✔	✔
17F2 (COB #8)	3,665	3,640	✔	✔	✔
33J4 (COB #2)	2,705	2,680	✔	✔	✔
18A1 (COB #M11)	1,955	1,905	✔	✔	
11F4	1,570	1,520	✔	✔	
7P4	1,440	1,390	✔	✔	
23B1 (Jensen #2)	1,165	1,140	✔	✔	
7M1 (MSWD #25)	1,132	1,107	✔	✔	
8M1 (MSWD #26)	1,105	1,080	✔	✔	

4.3.1.2 Groundwater Quality

Groundwater quality in the SGP Subbasin is generally suited for commercial, domestic, industrial, and municipal use, and in the Banning Canyon, it is also suited for GDE use. The minimum thresholds have been set consistent with state and local groundwater quality standards to be protective of water uses and users and are intended to be protective of human health (Title 22 of the CCR). Publicly available groundwater quality data from the selected representative wells will be obtained every three years, consistent with existing monitoring.

Groundwater pollution characterization and mitigation are typically the responsibility of local agencies and state programs. The SGP Subbasin will have limited authority related to groundwater pumping policies and supply projects that could affect groundwater quality, such as new surface water deliveries and recharge projects within the GSA boundaries. The GSAs will review and analyze publicly available routine groundwater monitoring data reported by the municipal, community, and non-community public production wells to monitor if groundwater pumping or other groundwater management actions may be exacerbating groundwater quality concerns, and where pumping restrictions or other mitigation measures should be enforced, if necessary.

Because groundwater from the SGP Subbasin is used as a potable water source, the minimum thresholds for groundwater quality are exceedances of Maximum Contaminant Level (MCL) for nitrates and the Secondary MCL (SMCL) for TDS. These constituents can be largely influenced by groundwater management actions in the SGP Subbasin. MCLs are defined with respect to human health, and SMCLs are defined mainly for aesthetics, taste, and odor.

Declining water levels can potentially lead to increased concentrations of some constituents that reside in larger proportions in deeper aquifer zones. Conversely rising water levels can also lead to increased concentrations of some constituents of concern. For example, nitrates that may reside in unsaturated soils at shallower depths can enter the groundwater if the water table rises. However, groundwater levels will not be used as a proxy for water quality due to a lack of clear correlation between groundwater levels and changes in water quality in the SGP Subbasin. Water quality conditions in the subbasin are described in **3.2**. The sustainable management criteria for water quality are outlined in **Table 4-4** below and the representative water quality monitoring sites are included on **Figure 4-3**.

Table 4-4 Groundwater Quality - Sustainable Management Criteria

Storage Unit	Representative Monitoring Site	2027 Interim Milestone	2032 Interim Milestone	2037 Interim Milestone	2042 Interim Milestone	Measurable Objective	Minimum Threshold
TDS		**TDS (mg/L)[1]**					
Banning Canyon	17M1 (COB #7)	800				800	1,000
Banning	18A1 (COB #M11)						
Cabazon	9E1 (CWD #1)						
Cabazon	7K1 (CWD #2)						
Cabazon	7D1 (MSWD #25A)						
Nitrates		**Nitrates (mg/L as N)[2]**					
Banning Canyon	17M1 (COB #7)	8				8	10
Banning	18A1 (COB #M11)						
Cabazon	9E1 (CWD #1)						
Cabazon	7K1 (CWD #2)						
Cabazon	7D1 (MSWD #25A)						

[1]The SMCL for TDS is a range, 500 mg/L to 1,000 mg/L with 1000 mg/L correlating with inappropriate for human consumption. With consideration of the beneficial uses of groundwater, 800 mg/L is defined as the measurable objective and 1,000 mg/L is defined as the minimum threshold.

[2]The MCL of 10 mg/L for nitrates is defined as the minimum threshold, with 80% of the minimum threshold (8 mg/L) serving as the measurable objective.

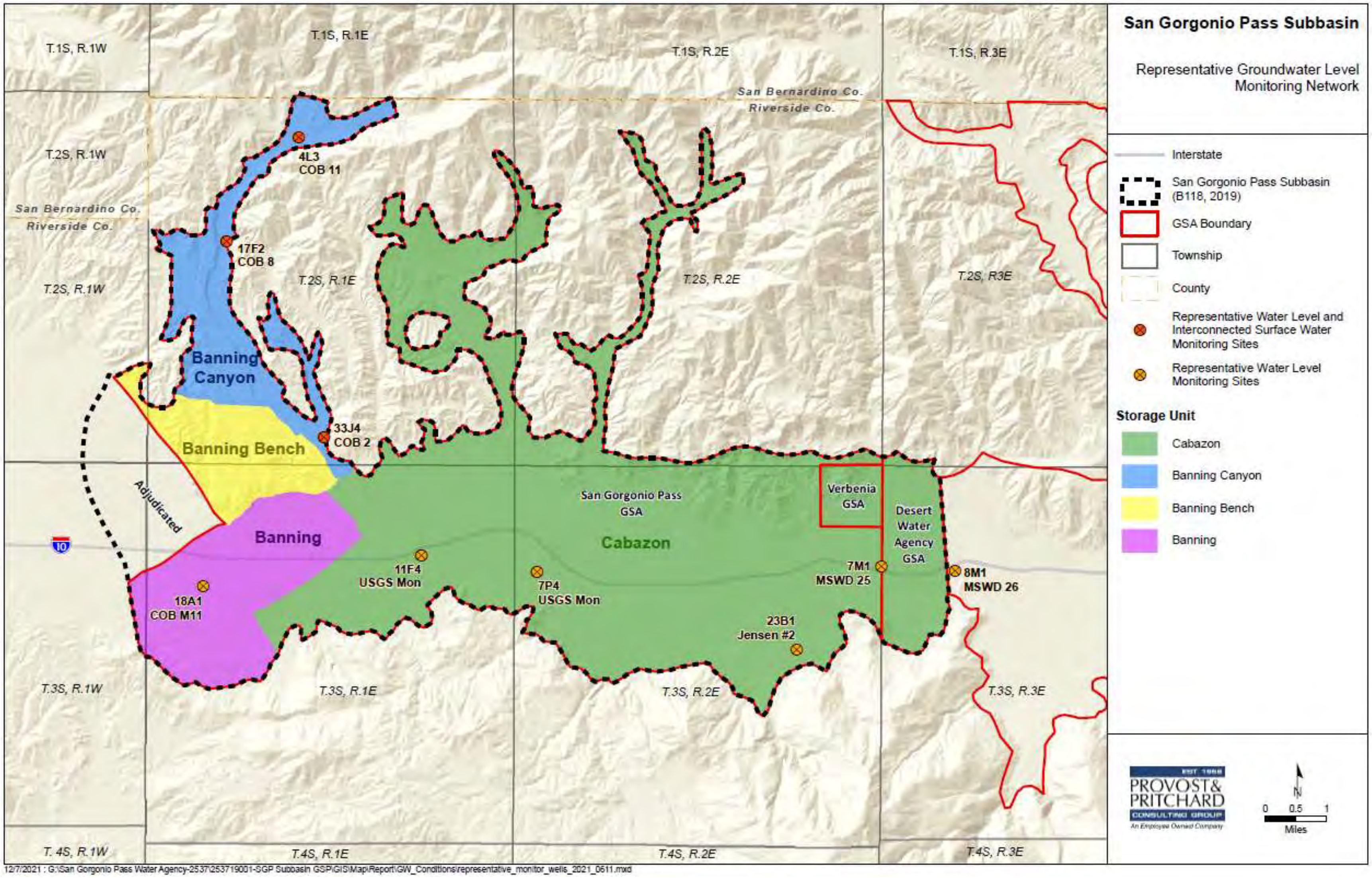


Figure 4-2 Representative Groundwater Level Monitoring Network

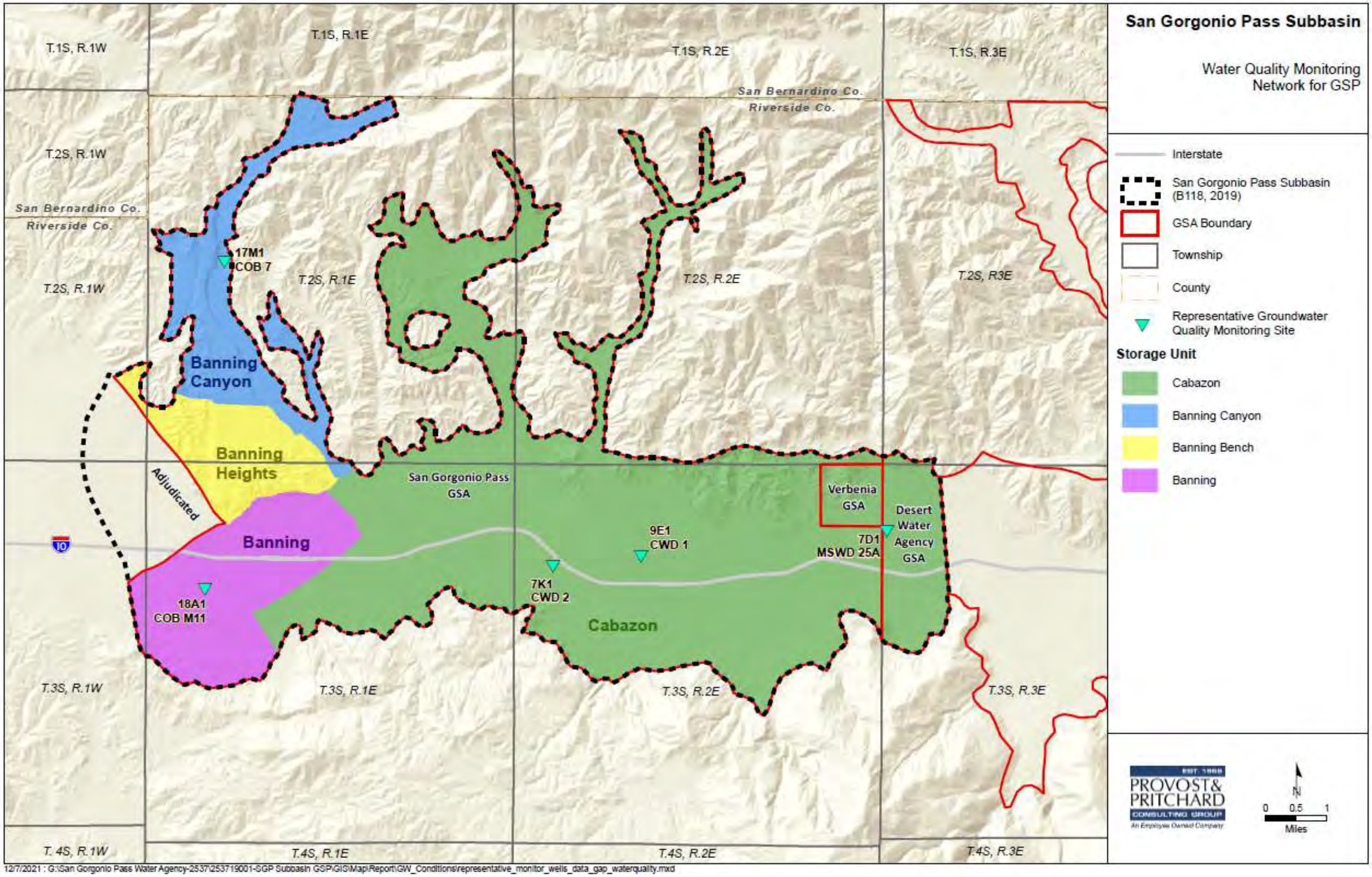


Figure 4-3 Representative Groundwater Quality Monitoring Network

4.3.2 Criteria to Define Minimum Thresholds

Regulation Requirements:

§354.28 (b) The description of minimum thresholds shall include the following: (1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.
§354.28 (c) Minimum thresholds for each sustainability indicator shall be defined as follows: (1) Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following: (A) The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin. (2) Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.

Minimum thresholds were defined for each representative monitoring network. This section details the criteria to define them.

4.3.2.1 Groundwater Levels and Groundwater Storage

As shown in **Table 4-3** above and the hydrographs in **Figure 4-4 through Figure 4-12**, the minimum threshold water surface elevation is set below the measurable objective. The water level range between the minimum threshold and measurable objective defines a range of operational flexibility that allows for periods of increased groundwater pumping during drought periods without causing significant and unreasonable undesirable results. The operational flexibility occurring between the measurable objective and the minimum threshold provides for the ability to use groundwater on a conjunctive basis and supports the ability to recharge available water supplies in wet years for use in subsequent dry years.

The establishment of each respective minimum threshold is based on review of actual and projected groundwater elevations at each of the wells chosen to be in the representative monitoring network. The method for assigning minimum thresholds is as follows:

1. Historic groundwater elevation data (where available) were plotted for each representative monitoring network site.
2. In the Banning and Cabazon Storage Units, groundwater elevations were projected into the future for 50 years, incorporating impacts from both climate change and projected groundwater pumping within and adjacent to the GSAs. The projected groundwater elevations were generated from the modeling effort described in **Chapter 3 – Basin Setting**. In the Banning Canyon Storage Unit, groundwater levels are projected to remain within the general range of historic groundwater conditions; therefore, historic groundwater levels were more relevant for the Banning Canyon Storage Unit analysis than model-projected groundwater levels. Groundwater level projection analyses were completed that included (1) projects and management action impacts, (2) climate change impacts and (3) projected pumping changes. Only the latter two were used to assess sustainable management criteria because projects and management actions may not be necessary to support maintaining sustainability in the SGP Subbasin. Because the groundwater model does not always exactly represent current absolute groundwater levels, most of the hydrographs include an offset of the actual model projections to represent the difference between current water levels as actually measured and projected by the model.
3. Well construction information at representative monitoring sites was compared to the projected groundwater elevation hydrograph to consider the potential need to deepen wells or adjust pump settings.

4. Minimum thresholds were assigned based on unique criteria in response to the most limiting significant and unreasonable undesirable result. These criteria and rationale are presented in **Table 4-4**.
5. Projected and historic data from wells nearest to representative monitoring sites were examined to see if the minimum threshold and measurable objectives were in alignment with their projected trends.
6. Construction information for other wells adjacent to representative monitoring wells was compared to minimum thresholds and measurable objectives at the representative monitoring sites to ensure the sustainable management criteria are in alignment with the needs of beneficial uses of groundwater.

Minimum thresholds in the Banning and Cabazon Storage Units generally represent the minimum projected water level through the Implementation Period, ending in 2042. The minimum projected Implementation Period water levels did not result in identified significant and unreasonable impacts on the beneficial uses of the representative monitoring wells, such as the need for lowering pump settings or drilling new wells. A more detailed rationale for minimum thresholds of water levels and groundwater storage is outlined in **Table 4-5**.

Minimum thresholds in the Banning Canyon Storage Unit are set to generally maintain the annual historical fluctuations observed in that Storage Unit and to maintain historical operations which have not resulted in undesirable results in the past.

The Banning Canyon has been pumped for beneficial uses since 1914 with groundwater levels decreasing due to pumping each summer until they are replenished with annual precipitation and snowpack melt each wet period in winter and spring. Although the City of Banning pumps from Banning Canyon until the yield drops, groundwater levels always recover because of the canyon's unique hydrology and geology. Whereas the rest of the subbasin is experiencing groundwater level decline over the past 20 years, the status quo in Banning Canyon for the past 50 years has been annual depletion and annual recharge.

4.3.2.2 Groundwater Quality

The minimum thresholds for groundwater quality are exceedances of Maximum Contaminant Level (MCL) for nitrates and the Secondary MCL (SMCL) for TDS.

The SMCL for TDS is a range of 500 mg/L to 1,000 mg/L. With consideration for the beneficial uses of groundwater, sustainable management criteria are consistent with existing water quality standards. The measurable objective for TDS is defined as 800 mg/L and the minimum threshold is defined as 1,000 mg/L. The minimum threshold for nitrates is defined as the MCL (10 mg/L) and the measurable objective is defined as 80-percent of the MCL (8 mg/L).

There currently are no water quality concerns in the SGP Subbasin and none are expected during the implementation period. Therefore, TDS and nitrates were selected as the constituents for representative monitoring, because of their correlation with general quality groundwater and their sensitivity to exceedances in similarly managed basins.

4.3.2.3 Interconnected Surface Water

The establishment of each respective minimum threshold is based on actual and projected groundwater elevations at each of the wells selected for the representative interconnected surface water monitoring network. There are no stream gages in or adjacent to the SGP Subbasin to monitor flows from the San Gorgonio River; therefore, a volumetric analysis to inform sustainable management criteria is not feasible. The method for assigning minimum thresholds is as follows:

1. Historic groundwater elevation data were plotted for each representative monitoring network site in Banning Canyon.
2. The minimum threshold was assigned at the point in which groundwater extractions from the Banning Canyon Storage Unit typically halt and the City of Banning converts to pumping in the Banning Storage Unit to supply the needs of the city. This minimum threshold was defined to maintain the status quo, which has not caused undesirable results related to interconnected surface water.
3. To consider the interests of the beneficial use of groundwater by GDEs, the historic canyon groundwater elevation and extraction data were compared to historic GDE footprints documented by TNC's GDE Pulse, which confirmed there were no undesirable results because of groundwater management during the most significant drought periods.

It is important to acknowledge that the vegetation in Banning Canyon, identified as potential GDE area, may be composed of surface water dependent vegetation (rather than interconnected or groundwater dependent). The depth to groundwater in the canyon exceeds 50-feet for most of the year and can remain greater than 50-feet depth to groundwater during the wet season in dry, critical, and below normal water year types. Depth to groundwater in Banning Canyon across water year types is presented in hydrographs **Section 3.2.1**.

Table 4-5 Rationale for Assigning Sustainable Management Criteria

Rationale for Assigning Groundwater Level Sustainable Management Criteria				
Storage Unit	Representative Monitoring Site	Minimum Threshold (qualitative definition)	Measurable Objective (qualitative definition)	Rationale for Assigning Minimum Threshold and Measurable Objective
Banning Bench	The only publicly available wells in the vicinity of the Banning Bench Storage Unit appear to be perforated only in the overlying Banning Canyon storage units and are not representative of Banning Bench groundwater conditions. This area is considered a high-priority data gap.			
Banning Canyon	4L3 (COB #11) 17F2 (COB #8) 33J4 (COB #2)	The minimum threshold is assigned at the point in which groundwater extractions from the Banning Canyon typically halt, and the City of Banning converts to pumping in the Banning Storage Unit to supply the needs of the city.	The measurable objective is set to 25-feet WSE above the minimum threshold. The measurable objective is set to reflect the groundwater levels during the wet period in winter and spring.	The Banning Canyon has a distinctly different hydrologic cycle than the rest of the Subbasin, lasting a single water year with seasonal fluctuations. The minimum threshold and measurable objective are assigned to maintain the historic fluctuations and natural range in groundwater levels within the Banning Canyon. The historic groundwater level has not produced undesirable results; therefore, maintenance of these conditions is expected to continue avoidance of undesirable results. With the Banning Canyon Storage Unit's sustainable management criteria correlated with maintaining historic conditions, the projected groundwater levels can support the immediate and long-term needs of beneficial users of groundwater. Consequently, the projected groundwater levels are predicted to avoid significant and unreasonable impacts to the Banning Canyon's potential GDEs.
Banning	18A1 (COB #M11)	The minimum threshold is defined as the projected groundwater level low, which can support the needs of City of Banning.	The Measurable objective is defined as 25-feet WSE above the minimum threshold, which would allow a minimum of 10-year reaction period before reaching the minimum threshold if the groundwater levels continue at the same rate.	The minimum threshold was defined to avoid requiring the local beneficial users of groundwater to require deepening wells or installing new wells because of declined water levels. These beneficial users of groundwater include the residential, commercial, industrial, and municipal uses supplied by City of Banning.
Cabazon *Western Area*	11F4 7P4 23B1 (Jensen #2)	The minimum threshold is defined as the projected lowest groundwater level which can support the demands of Cabazon Water District.	The measurable objective is defined as 50-feet WSE above the minimum threshold for 11F4 and 7P4. The measurable objective for 23B1 (Jensen #2) is 25-feet WSE above the minimum threshold. These were defined to reflect conditions which would allow a minimum of 10-year reaction period before reaching the minimum threshold at those respective sites.	The minimum threshold was defined to avoid requiring the local beneficial users of groundwater to require deepening wells or installing new wells because of declined water levels. These beneficial users of groundwater include the residential, commercial, industrial, municipal, and tribal uses supplied within and adjacent to Cabazon Water District.
Cabazon *Eastern Area*	7M1 (MSWD #25) 8M1 (MSWD #26)	The minimum thresholds are assigned at the water level in which MSWD can continue to meet the current and projected demands.	The measurable objective is defined as 25-feet WSE above the minimum threshold. This was considered reasonable considering the variability in groundwater levels is less than conditions near wells 11F4 and 7P4 in the western and central areas of the Cabazon Storage Unit, where the differential between minimum threshold and measurable objective is 50-feet.	The projected groundwater levels are below the top of perforation for wells 7M1 and 8M1. However, MSWD's lowest production (current and projected) and consequential drawdown is not anticipated to render significant and unreasonable Undesirable results, defined in **Table 4-1**. The measurable objective is defined to allow a minimum of 10-year reaction period before hitting the minimum threshold. While this method is the same across much of the Subbasin, the measurable objective and minimum threshold are separated by 25-feet for wells 7M1 and 8M1. In addition, the minimum threshold is within 10-feet of the lowest historic groundwater level. No undesirable results were experienced historically, further validating the sustainable management criteria as conservatively assigned.

4.3.3 Relationship Between Minimum Thresholds and Sustainability Indicators

Regulation Requirements:

§354.28 (b) The description of minimum thresholds shall include the following: (2) The relationship between the minimum thresholds for each sustainability indictor, including and explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.
§354.28 (c) Minimum thresholds for each sustainability indicator shall be defined as follows: (1) Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following: (B) Potential effects on other sustainability indicators.

The following provides an explanation of the relationship between the groundwater level minimum thresholds and the other sustainability indicators and the rational for determining that the minimum thresholds will avoid undesirable results for each sustainability indicator:

- **Groundwater Storage**. The minimum thresholds used for groundwater levels have a direct correlation with the overall groundwater storage volume desired to be maintained for sustaining groundwater beneficial uses in the SGP Subbasin during extended drought periods.
- **Sea Water Intrusion**. This indicator is not applicable to the SGP Subbasin because of its geographic distance from the Pacific Coast and the absence of saline plumes within or adjacent to the Subbasin.
- **Groundwater Quality**. This GSP has set separate groundwater quality sustainable management criteria and the GSAs will monitor water quality as water levels change. Changing groundwater levels can positively or negatively impact groundwater contaminant concentrations. There are no known contaminant plumes that are expected to migrate because of changes in groundwater levels. The groundwater quality minimum thresholds were compared with known contaminants of concern where data was available on groundwater quality by elevation. Groundwater levels are not used as proxy for groundwater quality conditions.
- **Land Subsidence**. This indicator is not applicable because of the absence of the type of compressible clay material that can generate subsidence, as well as a lack of historical subsidence in the SGP Subbasin.
- **Interconnected Surface Water**. The minimum thresholds used for groundwater levels in the Banning Canyon Storage Unit are also applicable for monitoring impacts to interconnected surface water, specifically as groundwater levels may pertain to potential GDEs present in the Banning Canyon.

4.3.4 Impact of Minimum Thresholds on Beneficial Uses, Users, and Adjacent Basins

Regulation Requirements:

§354.28 (b) The description of minimum thresholds shall include the following: (3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals. (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.

A description of how the minimum thresholds considered avoidance of impacts to beneficial users and uses of groundwater in the SGP Subbasin as well as in adjacent basins is detailed blow. **Table 4-6** details each representative monitoring network's relationship to beneficial uses and their applicability of monitoring impacts of adjacent basins.

Table 4-6 Beneficial Uses of Groundwater by Storage Unit and Representative Monitoring Sites

Beneficial Uses of Groundwater	Storage Unit: Banning Canyon	Storage Unit: Banning	Storage Unit: Cabazon		
	Representative Monitoring Network Sites				
	4L3 (COB #11) 17F2 (COB #8) 33J4 (COB #2)	**18A1 (COB #M11)**	**11F4**	**7P4 23B1 (Jensen #2)**	**7M1 (MSWD #25) 8M1 (MSWD #26)**
Groundwater Dependent Ecosystems	✔				
City of Banning	✔	✔	✔		
Banning Heights Mutual Water Company	✔				
Cabazon Water District				✔	
Morongo Band of Mission Indians			✔	✔	
Mission Springs Water District					✔
Miscellaneous Pumping[1]	✔	✔	✔	✔	✔
Adjacent Groundwater Basins		✔			✔

[1]Miscellaneous pumping includes de minimis groundwater extractors, including private domestic supplies.

4.3.4.1 Groundwater Levels and Groundwater Storage

The minimum thresholds for water levels have been established using varying approaches that reflect the conditions in different parts of the SGP Subbasin. The minimum thresholds have been established to allow for continued beneficial uses within the SGP Subbasin and help assure long-term groundwater availability for beneficial users.

Banning Canyon Storage Unit and Banning Bench Storage Unit

The groundwater level conditions vary throughout the year and in different water year types in the Banning Canyon and Banning Bench Storage Units. The beneficial uses of groundwater within the Banning Canyon consists of potential GDEs as well as the municipal, commercial, and domestic uses supplied by City of Banning production wells in the canyon. Beneficial uses of groundwater within the Banning Bench include rural domestic wells, however the aquifer there consists of older sedimentary deposits with limited capability for supply and limited available data. A detailed description of the potential GDEs in the Banning Canyon is outlined in **Section 3.2.8.**

The Banning Canyon consists of highly permeable shallow alluvium, with underlying low permeability bedrock, and resultant low storage capacity. Because of this, the City of Banning's groundwater production wells in the Banning Canyon Storage Unit are shallow and cannot sustain large water level declines. Banning Canyon is a unique area in the subbasin due to its seasonal hydrologic cycle and its long history of use for water supply. The stored volume of the canyon's aquifer changes on a seasonal basis, increasing with runoff and snowmelt in the winter and spring and decreasing with pumping in the summer.

The sustainable management criteria for the Banning Canyon Storage Unit's representative monitoring network are based on maintaining historic groundwater levels. **Section 4.2.1** describes the historic groundwater pumping and established status quo for management in the Banning Canyon.

The minimum threshold is assigned at the groundwater level where groundwater extractions from the Banning Canyon Storage Unit is typically impaired, and the City of Banning switches to pumping in other areas such as the Banning Storage Unit or the Banning Basin to supply the city's needs. The measurable objective is set to 25-feet higher groundwater levels than the minimum threshold. The difference between the measurable objective and the minimum threshold creates a reasonable operational flexibility given the limited storage capacity; however, it also reflects the annual hydrologic cycle and seasonality of the groundwater level changes in the Banning Canyon Storage Unit. The Banning Canyon Storage Unit's sustainable management criteria is set to maintain historic conditions and the projected groundwater levels can support the immediate and long-term needs of beneficial users of groundwater. The rationale for the sustainable management criteria designations is further defined in **Table 4-5**.

Banning Storage Unit & Cabazon Storage Unit

Minimum thresholds for water levels in the Banning and Cabazon Storage Units were developed using an iterative process that used groundwater model projections and historical water level data. Initially, groundwater levels were projected using the groundwater model under current conditions for the long-term hydrologic period. These projected water levels were then compared to well construction characteristics at representative monitoring wells and other known nearby production wells to identify the level of impacts. Where the groundwater level projections did not result in significant and unreasonable impacts to known beneficial uses (production for the domestic, commercial, municipal, and industrial uses), the minimum threshold was set to the lowest level of the projections for wells 18A1 COB #M11, 11H3, and 7P4. Where significant and unreasonable impacts to beneficial uses were identified in the projections (such as water levels falling below pump settings or well depth), the minimum thresholds were revised upward to levels that would avoid those impacts. In addition to the groundwater level projections, the identification of minimum thresholds also considered long-term water level hydrographs where that data was available. The historical lows of these long-term hydrographs also indicate an upper bound on the risk of significant and unreasonable impacts from groundwater levels on beneficial uses, as no significant impacts were noted at the time of those historical water level lows. The long-term hydrographs were only available for areas on the eastern edge of the Cabazon Storage Unit and were not a consideration for the Banning Storage Unit and the remainder of the Cabazon Storage Unit.

The minimum thresholds for the wells on the eastern end of the Subbasin, 7M1 (MSWD #25) and 8M1 (MSWD #26) were assigned based on construction and operation conditions, then confirmed to be within 10-feet of the historic groundwater level lows. These thresholds meet the production demands of MSWD, generally maintain conditions within the area as well as flows to the neighboring Indio Subbasin, and avoid the need to install new wells or deepen existing wells. The rationale for the SMC designations is further defined in **Table 4-5**.

The beneficial uses of groundwater that were considered during the development of the sustainable management criteria, including the minimum thresholds, are outlined in **Table 4-6** below.

Adjacent Basins

Implementation of this GSP is expected to positively support the groundwater management of the adjacent adjudicated Beaumont Basin and the Indio Subbasin. The SGP Subbasin groundwater elevations and storage are influenced by groundwater extractions in areas that are not subject to SGMA, including the adjudicated Beaumont Basin to the west and MBMI in the SGP GSA. The SGP Subbasin's easterly groundwater flows often enter the Indio Subbasin by spilling over a steeply vertical, impermeable, underground bedrock structure near Fingal Point. DWA and Coachella Valley Water District groundwater recharge activities in the Indio Subbasin, which are adjacent to the SGP Subbasin, appear to have affected the groundwater gradient between the two Subbasins, having a net positive impact on both Subbasins' groundwater levels, storage, and changing the amount of boundary flows.

The consultant teams for SGP GSAs and Indio Subbasin GSAs have met and discussed modeling results, boundary flows, and other inter-basin analyses. DWA, which is a GSAs in both the Indio and SGP Subbasins, was particularly helpful in review and discussions of boundary flows, sustainable management criteria, potential impacts, and consistency across both groundwater subbasins methodology and results for both subbasins. In addition, the SGP GSAs have also coordinated with the adjudicated Beaumont Basin to refine projected groundwater extraction estimates, which are included as a parameter in projecting groundwater levels used to define the minimum threshold and measurable objectives of the representative monitoring sites.

4.3.4.2 Groundwater Quality

There are currently no known chronic or migratory groundwater quality issues in SGP Subbasin. The established minimum threshold for groundwater quality is protective of groundwater uses and users, will prevent causing undesirable results in adjacent basins, and will not affect the ability of adjacent basins to achieve their sustainability goals.

4.3.4.3 Interconnected Surface Water

The impacts of interconnected surface water in the Banning Canyon are limited to the SGP Subbasin and will not impact adjacent basins.

4.3.5 Measurement of Minimum Thresholds

Regulation Requirements:

§354.28 (b) The description of minimum thresholds shall include the following:
(6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.

Groundwater level and groundwater quality readings will be measured at the representative groundwater level monitoring sites and groundwater quality monitoring sites in accordance with water level and groundwater quality measurement protocols described in **Chapter 5 - Monitoring Network**. The groundwater level monitoring in the Banning Canyon serves as the monitoring for both groundwater levels/storage and interconnected surface water.

4.3.6 Current Standards Relevant to Sustainability Indicator

Regulation Requirements:

> **§354.28 (**b) The description of minimum thresholds shall include the following:
> (5) How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.

Details of existing regulatory standards applicable to the sustainability indicators are outlined below.

4.3.6.1 Groundwater Levels and Groundwater Storage

There are currently no state, federal, or local regulatory standards applicable to groundwater levels. This GSP will become the basis for local regulatory standards.

4.3.6.2 Groundwater Quality

The minimum thresholds for groundwater quality are protective of human health and intended beneficial uses and are based on MCLs found in Title 22 of the California Code of Regulations. The intent of SGMA is that GSAs be responsible for groundwater management related to pumping, projects, and management actions. Other existing agencies and programs are generally responsible for groundwater quality remediation.

4.3.6.3 Interconnected Surface Water

There is existing legislation in place to mitigate and conserve wetland habitat, most notably the federal No Net Loss Wetlands policy. The GSAs do not have the authority to enforce wetland protections however, they can support groundwater sustainability which may have a positive impact for potential wetland vegetation in the Banning Canyon.

4.4 Measurable Objectives

4.4.1 Description of Measurable Objectives

Regulation Requirements:

> **§354.30 (**a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin with 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.
> (b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.

The measurable objectives were developed differently across the various geologic conditions in the Subbasin. The rationale and relationship between the minimum threshold, measurable objective, beneficial users of groundwater, and undesirable results are captured in **Table 4-5** above.

4.4.1.1 Groundwater Levels and Groundwater Storage

Banning Canyon Storage Unit:

As described earlier, the measurable objective in the Banning Canyon is set at the elevation of pump settings for City of Banning production wells, which correlates with a 25-foot operational flexibility buffer between the minimum threshold and measurable objective. This is a conservative level for the measurable objective and reflects long-term historical operational practices of the City of Banning. The Banning Canyon sustainable management criteria are assigned to maintain the hydrologic system with respect to the annual hydrologic cycle unique to the canyon and protect the beneficial uses of groundwater (**Table 4-6**) in doing so.

Banning Bench Storage Unit:

There are no representative monitoring wells within the Banning Bench, therefore the area is recognized as a data gap. There are few groundwater extraction activities within the Banning Bench Storage Unit, and of the limited extractions, they are known to be de minimis. The SGP Subbasin will seek funding opportunities to add a representative monitoring site in the Banning Bench. The City of Banning has historically monitored their wells COB #1, COB #2, and COB #3 which occur in the geologic overlap region between the Banning Canyon and Banning Bench Storage Units.

Banning Storage Unit:

The measurable objectives within the Banning Storage Unit were established at a level 25-feet higher than the minimum threshold. This 25-foot differential was identified as providing a measure of operational flexibility for effective conjunctive use of groundwater storage in the Banning Storage Unit. Based on water levels projected by the groundwater model, this 25-foot difference considers water level declines corresponding to at least ten years of operational flexibility. This level of operational flexibility provides adequate time for possible implementation of required projects or management actions to avoid unreasonable impacts to beneficial uses of groundwater, should those actions be required. Well construction was considered in the development of the sustainable management criteria.

Cabazon Storage Unit:

The Cabazon Storage Unit area covers the majority of the SGP Subbasin, yet conditions vary across the geological storage unit including depth to bedrock, historic groundwater level trends, and average groundwater extraction intensity. Different average groundwater extraction intensity in the western, middle, and eastern portions of the Cabazon Storage Unit support the decision to assign differing groundwater level operational flexibility ranges across the Cabazon Storage Unit:

> ***Cabazon – Western and Central Area:*** The representative monitoring wells 11F4 and 7P4 in the western and middle portions of the Cabazon Storage Unit have a 50-foot differential between the minimum threshold and the measurable objective. Jensen #2, located in the mid-eastern portion of the Cabazon Storage unit has a 25-foot differential between the minimum threshold and measurable objective. . The measurable objectives for the three wells are assigned with consideration of the projected groundwater levels allowing for an estimated 10-year period for mitigation in the event a well is approaching its minimum threshold. The assigned sustainable management criteria consider the well construction information of the representative monitoring site and nearby production wells.
>
> ***Cabazon – Eastern Area:*** The representative monitoring wells in the eastern portion of the Cabazon Storage Unit have a 25-foot differential between the minimum threshold and the measurable objective. The operational flexibility of the production wells in the eastern portion of the Cabazon Storage Unit are informed by the current groundwater levels that are below the top of the screened interval of the well. Despite this, there is no current or historic record of significant and unreasonable undesirable results in the Cabazon Storage Unit. A 25-foot differential was selected as appropriate because groundwater levels vary less than near wells 11F4 and 7P4 of the western and central Cabazon Storage Unit, and the existing, historic, and near future groundwater levels would all be near or below the measurable objective if it were set higher. The 25-foot differential allows for a more realistic approach at managing the eastern Cabazon groundwater levels.

The historical lack of significant and unreasonable undesirable results in the eastern portion of the Cabazon Storage Unit is mostly attributed to the significant length of the screened intervals and the low volume of groundwater extractions at both 7M1 (MSWD #25) and 8M1 (MSWD #26). When assigning the minimum threshold and sustainable management criteria, projected groundwater demand within and adjacent to this area was considered to ensure the beneficial uses can be successfully and sustainably met by groundwater levels remaining above the bottom of the screened interval. In addition, the minimum threshold is correlated with the lowest groundwater level in the historic record with no past instances of undesirable results, further validating that this is an appropriate and conservative minimum threshold.

The well construction information in relation to the SMCs at wells 7M1 (MSWD #25) and 8M1 (MSWD #26) are available in **Table 4-7** below.

Table 4-7 Well Construction Information and Sustainable Management Criteria at the Eastern Area of the Cabazon Storage Unit

Well ID	Perforated Interval	Pump Setting	Historic Groundwater Low	Measurable Objective	Minimum Threshold
	Elevation (Feet Above Mean Sea Level)				
7M1 (MSWD#25)	1,150-1,025	1,060	1,140	1,132	1,107
8M1 (MSWD #26)	1,148 - 968	1,083	1,100	1,105	1,080

The measurable objective for each representative groundwater level monitoring site is indicated in **Table 4-3** and the hydrographs presented in **Figure 4-4** through **Figure 4-12**. The groundwater level measurable objective applies to both the groundwater level sustainability indicator and the groundwater storage sustainability indicator. In addition, the groundwater level measurable objectives for the three representative monitoring sites located within Banning Canyon (4L3 (COB #11), 17F2 (COB #8), and 33J4 (COB #2)) are also applicable to the interconnected surface water sustainability indicator.

The interim milestones are a supplemental measure of progress toward implementation, reported in 5-year increments from the start of the GSP implementation in January 2022 to the end of the 20-year planning horizon, which concludes in 2042. The Interim Goals (presented in **Table 4-8**) correspond with the groundwater levels that are projected to occur during those 5-year increments (2027, 2032, 2037, and 2042). Current groundwater levels may be at or below the measurable objective because they start and are projected through a prolonged drought period. Based on the long-term hydrologic record, water supply conditions are expected to improve and a return to average water supply conditions would result in improved groundwater levels.

Table 4-8 Interim Milestones -- Groundwater Levels and Groundwater Storage

Representative Monitoring Site	2027 Interim Milestone	2032 Interim Milestone	2037 Interim Milestone	2042 Interim Milestone
	Water Surface Elevation (ft about MSL)			
4L3 (COB #11)	4,425	4,425	4,425	4,425
17F2 (COB #8)	3,665	3,665	3,665	3,665
33J4 (COB #2)	2,705	2,705	2,705	2,705
18A1 (COB #M11)	1940	1,930	1,920	1,910
11F4	1,555	1,545	1,525	1,540
7P4	1,425	1,410	1,390	1,390
23B1 (Jensen #2)	1,175	1,165	1,150	1,165
7M1 (MSWD #25)	1,150	1,145	1,135	1,140
8M1 (MSWD #26)	1,120	1,120	1,115	1,120
Interim Milestone are defined as the projected groundwater level at each respective 5-year mark for the wells in the Banning and Cabazon Storage Units. Interim Milestone are defined as the measurable objective for the Banning Canyon Storage Unit wells; see explanation in ***Section*** *4.2.2.*				

4.4.1.2 Groundwater Quality

The measurable objectives for groundwater quality are presented in **Table 4-4**. Groundwater within the SGP Subbasin is generally used beneficially for municipal, commercial, industrial, domestic, and GDE consumption. The minimum threshold for degraded water quality has been set at values that are protective of human health and the intended beneficial use and users of groundwater resources (i.e., CCR Title 22).

The measurable objective for groundwater quality is to maintain potable water standards (below SMCL for TDS and MCL for nitrates). In each case, the measurable objective is defined as 80-percent of the minimum threshold. The 80-percent criterion allows for enough time to identify a changing trend in groundwater quality and prepare mitigation measures, if needed, to avoid exceedances of the minimum threshold and/or experiencing significant and unreasonable undesirable results. The interim milestones for water quality are defined as any measurement below the measurable objective and remains constant across the implementation period. The interim milestone for TDS is <800 mg/L and <8 mg/L for nitrates.

4.4.1.3 Interconnected Surface Water

The measurable objectives for the three representative interconnected monitoring sites are outlined in **Table 4-3**. The measurable objective is set 25-feet higher than the minimum threshold and considers both the well construction and the historic groundwater trends. The beneficial users of interconnected surface water and groundwater in the SGP Subbasin are potential GDEs and the City of Banning. Neither type of beneficial user has historically experienced significant and unreasonable undesirable results related to interconnected surface water.

The impact analysis for interconnected surface water in the Subbasin is limited to locations with surface water and locations where the GSAs have jurisdiction. Only Banning Canyon meets these criteria. Although Potrero Canyon, Hathaway Canyon, and Millard Canyon are located in the Subbasin, have surface water, and may have interconnected surface waters, these areas belong to

MBMI, a federally recognized tribe which is not subject to SGMA (**Figure 3-53**). Groundwater levels in Banning Canyon are expected to be maintained at levels consistent with historic conditions in the multi-decadal hydrologic cycle due to both the absence of proposed increased pumping and the potential for improved surface water conveyance infrastructure into the canyon for recharge, described in **Chapter 6 – Project and Management Actions**.

Impacts from climate change may result in increased annual variability in Banning Canyon. Potential impacts from climate change or other variables will be examined by the GSAs during the 5-year updates and Annual Reporting required by SGMA.

4.4.2 Operational Flexibility

Regulation Requirements:

> **§354.30** (c) Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.

Operational flexibility is defined as the range of water levels that that will accommodate droughts, climate change, conjunctive use operations, or other groundwater management activities.

4.4.2.1 Groundwater Levels, Groundwater Storage, and Interconnected Surface Water

The range of operational flexibility is defined as the difference between the measurable objective and the minimum threshold. This range provides the flexibility that the GSAs have under adverse groundwater conditions to continue groundwater extractions and water management practices while maintaining sustainability.

4.4.2.2 Groundwater Quality

There are no recent historical concentrations above the SMCL for TDS and MCL for nitrates in the monitoring network wells. Therefore, the GSAs aim to maintain and monitor conditions to ensure the groundwater quality remains within the MCL and SMCL for nitrates and TDS respectively. The minimum threshold and measurable objectives for groundwater quality are presented in **Table 4-4**. The operational flexibility is defined as the difference between the minimum threshold and measurable objective. For TDS, that is the range of >800 mg/L to <1,000 mg/L. For nitrates, the operational flexibility is the range of >8 mg/L to <10 mg/L. Despite this definition of operational flexibility, the groundwater management will continue to support good quality groundwater in the Subbasin, at or below the measurable objective for both constituents.

4.4.3 Representative Monitoring

Regulation Requirements:

> **§354.30** (d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.

The measurable objective for groundwater levels serves as an appropriate proxy for the sustainability indicators of groundwater storage and interconnected surface water (in the case of the three Banning Canyon representative monitoring sites). **Table 4-3** outlines the measurable objectives in relation to the sustainability indicators being monitored.

Groundwater levels will not be used as a proxy for groundwater quality due to a lack of clear correlation between groundwater levels and changes in groundwater quality in the SGP Subbasin.

4.4.4 Path to Achieve Measurable Objectives

Regulation Requirements:

§354.30 (e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.

To monitor the progress towards implementation, the SGP Subbasin Annual Report will include an assessment of the representative monitoring site results as compared to the sustainability criteria, including the measurable objective, interim milestones, and minimum thresholds. Additionally, a more comprehensive review will be conducted during the GSAs' opportunities to update this GSP during the five-year GSP Updates.

4.4.4.1 Groundwater Levels and Groundwater Storage

The SGP GSAs recognizes their ability to implement projects, programs, and management actions, as needed, to support sustainability in the Subbasin. Based on the five-year GSP Updates, the Subbasin success in achieving it interim milestones will be evaluated and projects and management actions will be implemented as appropriate to maintain sustainability. The potential actions are described in **Chapter 6 – Projects and Management Actions** of this GSP and the plan for implementing the projects and management actions is discussed in **Chapter 7 - Plan Implementation** of the GSP.

4.4.4.2 Groundwater Quality

Groundwater pollution characterization and remediation are enforced by local agencies and state level programs. According to SGMA, the GSAs will only have authority related to groundwater management activities such as groundwater pumping policies, recharge supply, and conjunctive use projects. However, the GSAs will review and analyze publicly available routine groundwater monitoring data reported by community and non-community public supply wells in order to understand how and if groundwater pumping is exacerbating groundwater quality concerns, and when and where to enforce pumping restrictions or other mitigation measures if necessary. Management of groundwater pumping will occur over the planning and implementation time horizon through 2042, therefore the Interim Goals match the measurable objective.

If an undesirable result occurs with regards to groundwater quality, and groundwater management actions are identified as a contributing factor, management actions will be evaluated that may include:

- Increased sampling frequency of monitoring wells;
- Additional data analysis;
- Increased groundwater recharge in the area(s) of concern if that recharge would improve water quality conditions;
- Increased use of surface water in the area(s) of concern to reduce groundwater pumping; and
- Collaboration with state and local groundwater quality protection agencies and programs.

Within the SGP Subbasin, the measurable objective shall be to maintain water quality at potable water standards, or in other words, below MCLs for constituents of concern.

4.4.4.3 Interconnected Surface Water

Water levels in the Banning Canyon will be assessed annually and compared to the most recently available data from TNC's GDE Pulse. In addition, historic trends will be analyzed using available aerial photography that can depict the general vegetative extent of GDEs, particularly in similar historic water year types. If the three interconnected surface water representative monitoring network sites exceed their respective minimum thresholds for five consecutive years, field visits may be considered to assess conditions and aid in mitigation planning. The measurable objectives and interim milestones for Interconnected Surface Water are provided in **Table 4-8**.

It is important to acknowledge that the 2020 Apple Fire likely resulted in substantial impacts to vegetative GDEs in the canyons, which may not be reflected in aerial imagery or GDE Pulse based on the periods of image capture occurring prior to the 2020 fire event.

4.5 Not Applicable Sustainability Indicators

Two sustainability indicators are not applicable to the SGP Subbasin: seawater intrusion and subsidence. This is due to their historic and projected absence within the Subbasin, discussed further below.

4.5.1 Seawater Intrusion

Regulation Requirements:

§354.26 (d) An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.
§354.28 (c) (3) Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following: (A) Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer. (B) A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.
§354.28 (e) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.

Seawater intrusion occurs when saline water from the ocean infiltrates the groundwater system and begins to flow into areas of freshwater due to pressure differentials, in many cases caused by groundwater pumping. The influence of seawater intrusion on groundwater quality is not applicable to the San Gorgonio Pass Subbasin because its location is a significant distance from the coast and is geologically separated from coastal hydrologic influences (**Figure 4-1**).

4.5.2 Land Subsidence

Regulation Requirements:

§354.28 (c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(5) Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:
(A) Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including and explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects.
(B) Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.
§354.26 (d) An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.

An undesirable result for land subsidence would be the significant and unreasonable loss of functionality of bridges, roads or highways, wells, and pumps, and other critical infrastructure such as levees, canals, and structures due to land subsidence. However, the geology of the SGP Subbasin indicates the absence of the clay material capable of causing inelastic land subsidence. Therefore, land subsidence is considered an inapplicable sustainability indicator for the SGP Subbasin (**Figure 4-1**). **Section 3.2** describes the absence of land subsidence related geologic materials and includes a map evaluating the historic absence of land surface elevation changes in the Subbasin.

4.6 Hydrographs Depicting Sustainable Management Criteria

Figure 4-4 through **Figure 4-12** present hydrographs of the nine-groundwater level representative monitoring wells that depict sustainable management criteria and projected groundwater levels. The influences of projected changes in groundwater extractions and climate change are incorporated in the hydrographs.

The hydrographs vary in period presented. As discussed previously, only historical water levels were evaluated for the Banning Canyon Storage Unit. In the Banning and Cabazon Storage Units, the groundwater model was used to project long term water level conditions with average precipitation. Where long term historical water level data were available, that historical data was also analyzed along with projected groundwater levels. The rationale for the presented periods, based on the availability of data to inform development of the sustainable management criteria, is described in detail below. For those wells with available projected groundwater levels, the 1949-1998 hydrologic period selected for analysis, while having long term normal water supply, contain initial dry conditions that are followed by wetter conditions. Consequently, the beginning of the projected period included a continuation of the prolonged ongoing drought period. Because of the 1949-1998 hydrologic period that was used in the projections, the projected hydrographs all show groundwater levels recovering towards the end of the implementation period (2042).

Banning Canyon Storage Unit Hydrographs (4L3 (COB #11), 17F2 (COB #8), and 33J4 (COB #2))

Because the SGP Upper Groundwater Model was not calibrated for the Banning Canyon Storage Unit, the representative monitoring wells in that are (4L3 (COB #11), 17F2 (COB #8), and 33J4 (COB #2)) do not include groundwater level projections and instead report historic groundwater levels. The historic period was used to inform the sustainable management criteria in the Banning Canyon. The annual hydrologic cycle in the Banning Canyon is markedly shorter than the long term

(20+ year) hydrologic cycle seen in the rest of the subbasin and includes significantly less storage capacity. The sustainability of the status quo pumping of the canyon is apparent both in its annual replenishment and in the absence of significant and unreasonable impacts in the historical record. Future conditions are expected to mimic historical conditions with respect to average and minimum groundwater levels.

Banning Storage Unit Representative Monitoring Well (18A1 COB #M11)

Well 18A1 COB #M11's hydrograph includes projected groundwater levels only as the limited long term water level measurements available do not represent historical drought conditions. The projected groundwater levels are presented are indicated as "2020 Base" and "2030 Base" on the hydrographs. The "2020-Base" and "2030 Base" refer to the modeled projections using 1949-1998 hydrologic conditions as a baseline, with adjustment for climate change and estimated increased pumping. While lengthy historic water level data was not available at this site however, the limited historic water level records were used to calibrate the groundwater model.

Western and Central Cabazon Storage Unit Hydrographs 11F4, 7P4, 23B1 Jensen #2

Wells 7P4 and 11F4 are specially constructed USGS monitoring wells that are relatively new and have short historic records. Therefore, only model-projected groundwater levels ("2020 Base" and "2030 Base") are presented in their respective hydrographs. Despite the lack of historic record, they were selected for inclusion in the representative monitoring network due to their location near the beneficial users' production wells and their design as monitoring wells.

The hydrograph for well 23B1 (Jensen #2) includes both historic and projected groundwater levels. Although not extending back to periods of low historical groundwater levels (the late 1970s), Well 23B1 Jensen #2 has adequate historic records for inclusion in the representative monitoring network.

Eastern Cabazon Storage Unit 7M1 (MSWD #25)8M1 (MSWD #26))

The hydrographs for wells (7M1 (MSWD #25) and 8M1 (MSWD #26)) include both the historic records and projected "2020 Base" and "2030 Base" groundwater levels. These wells have a lengthy historic record used to supplement the modeled projections for these wells. The long-term historic record at wells 7M1 (MSWD #25) and 8M1 (MSWD #26) was used to verify the assignment of SMCs at these representative monitoring sites. In the hydrographs for these wells, the historic record and the projected groundwater levels both include periods of long-term decline, following by long periods of groundwater recovery.

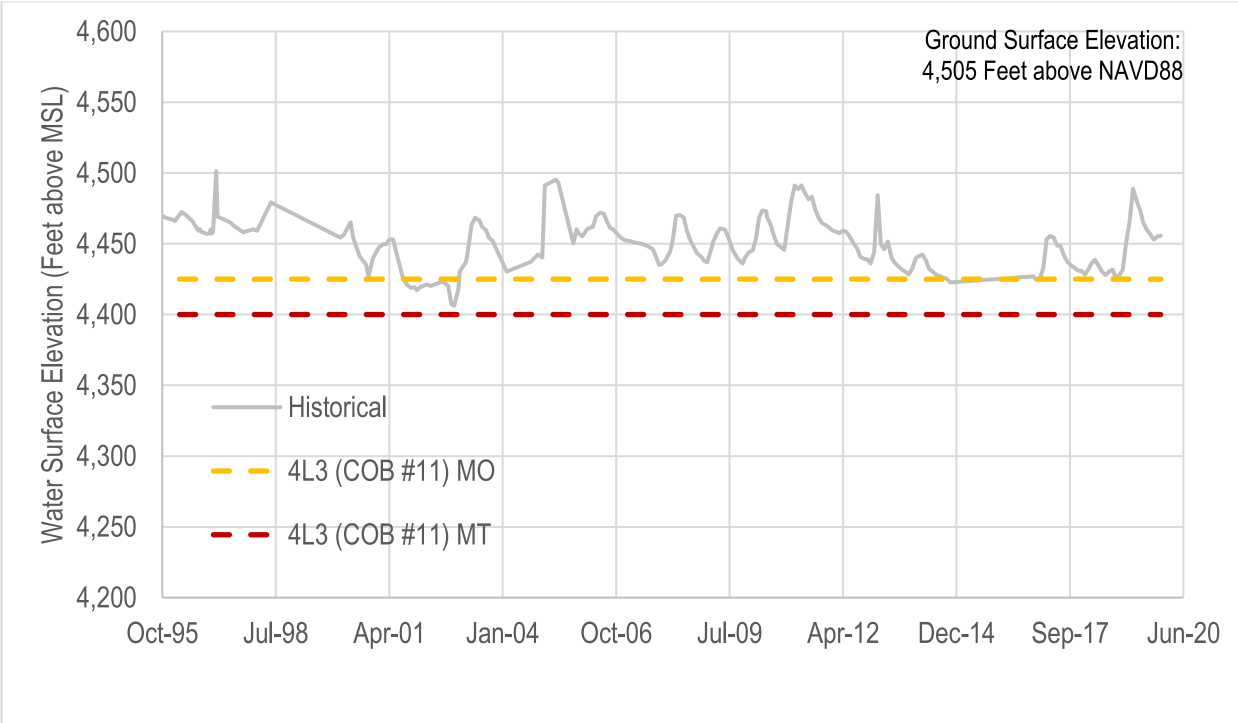


Figure 4-4 Well 4L3 (COB #11) - Historical Groundwater Level and Sustainable Management Criteria

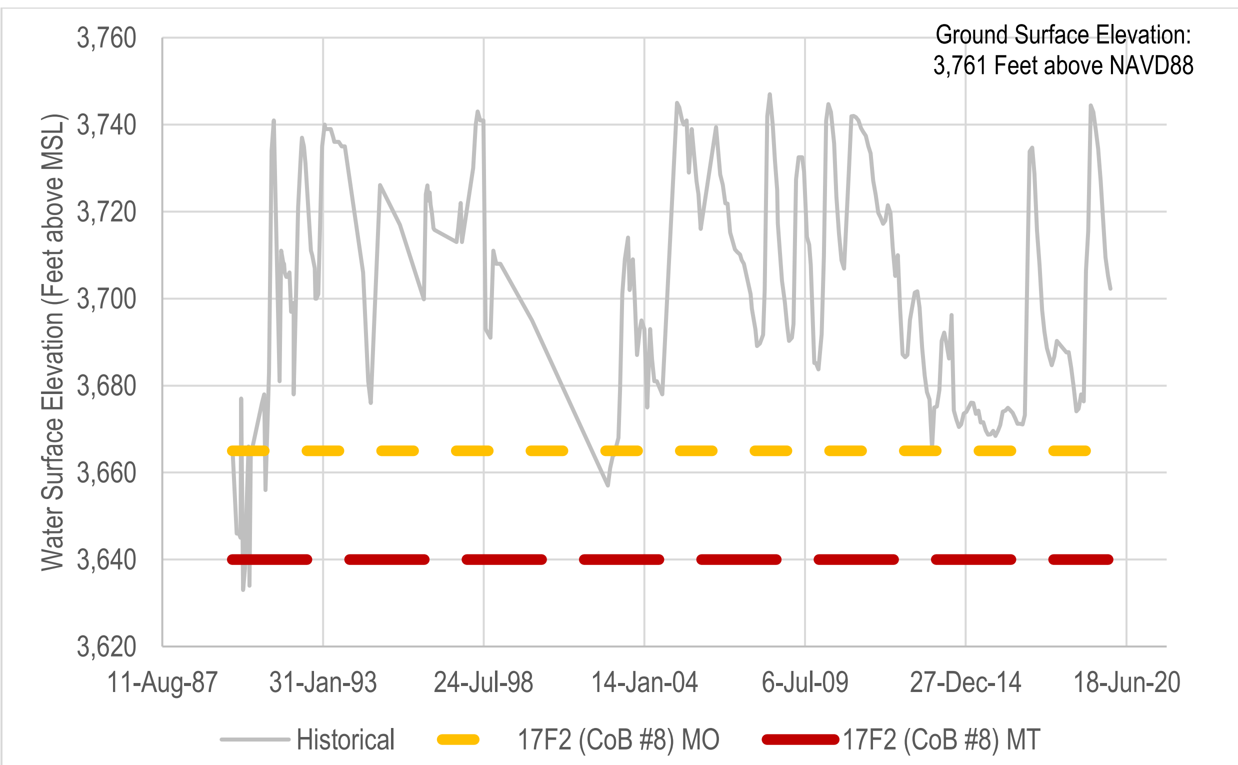


Figure 4-5 Well 17F2 (COB #8) - Historical Groundwater Level and Sustainable Management Criteria

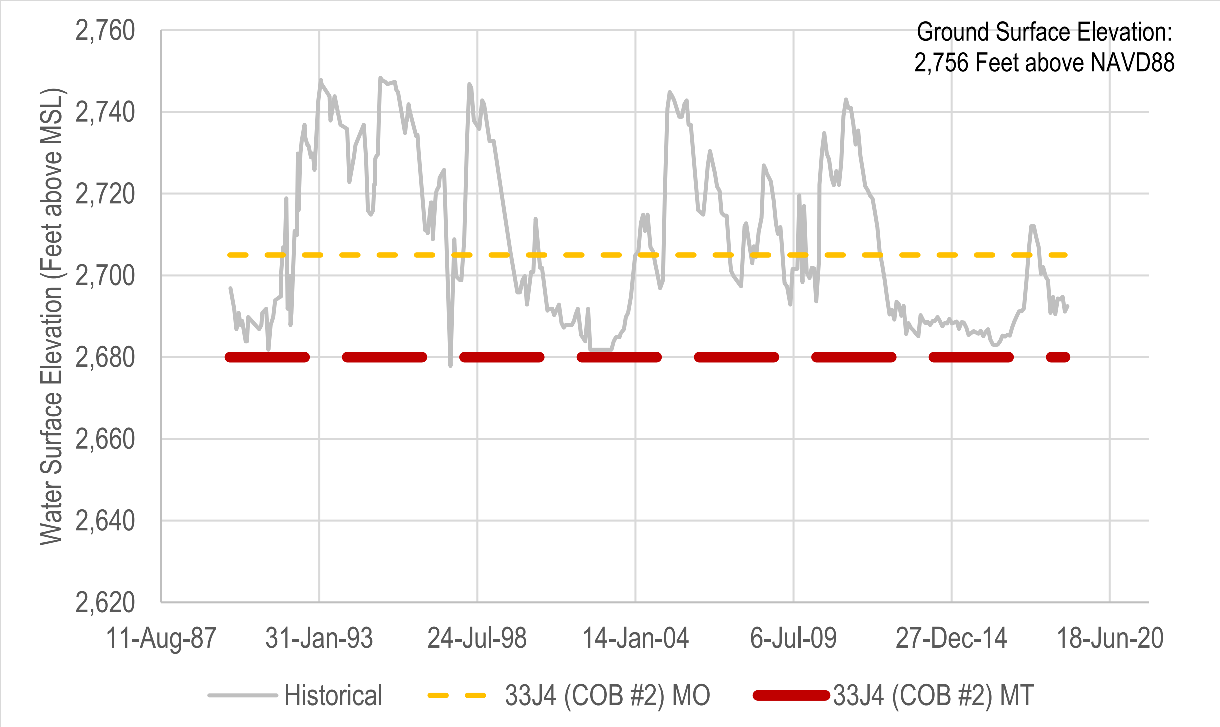


Figure 4-6 Well 33J4 (COB #2) - Historical Groundwater Level and Sustainable Management Criteria

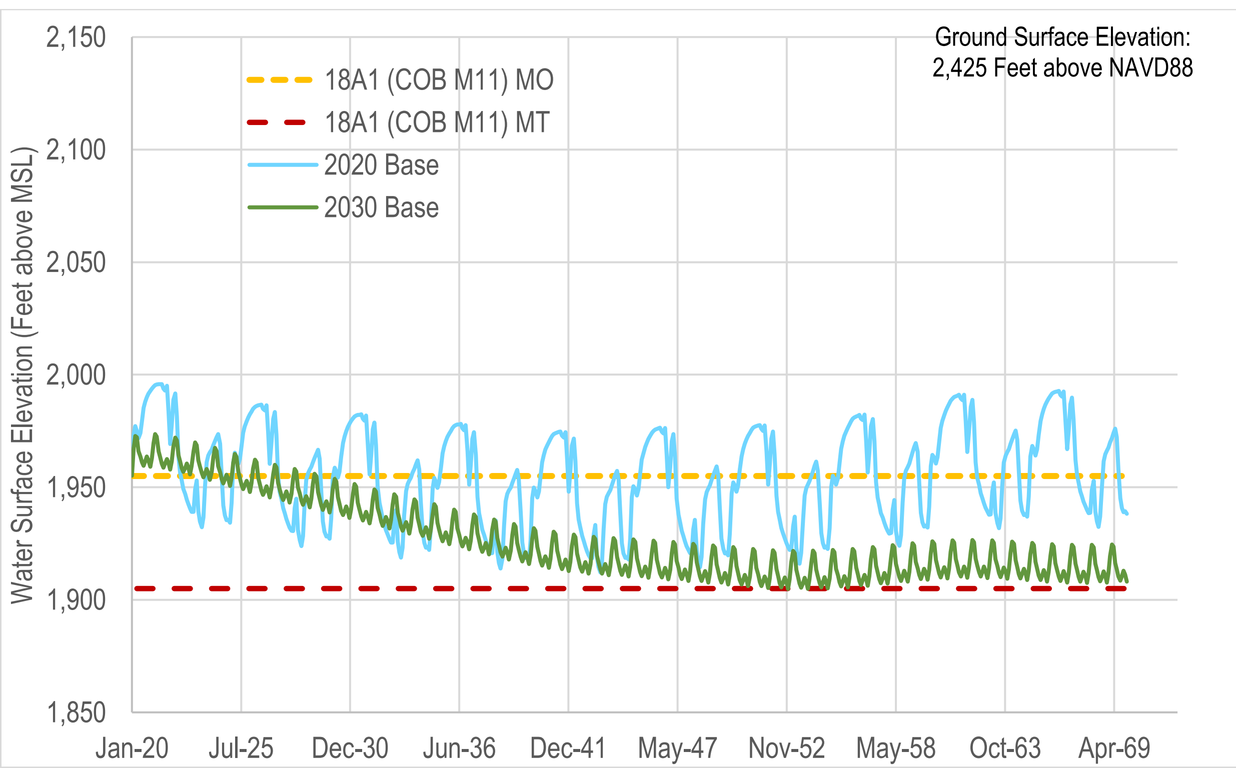


Figure 4-7 Well 18A1 (COB #M11) - Projected Groundwater Level and Sustainable Management Criteria

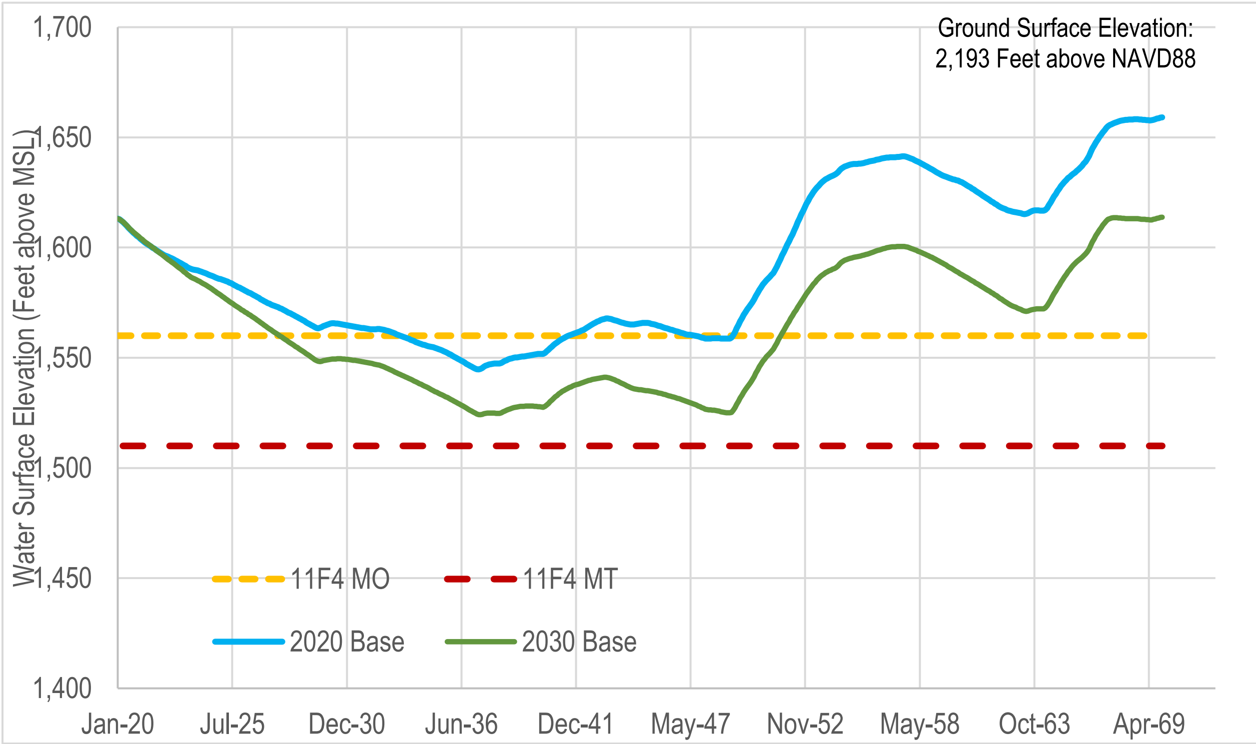


Figure 4-8 Well 11F4 (USGS) - Projected Groundwater Level and Sustainable Management Criteria

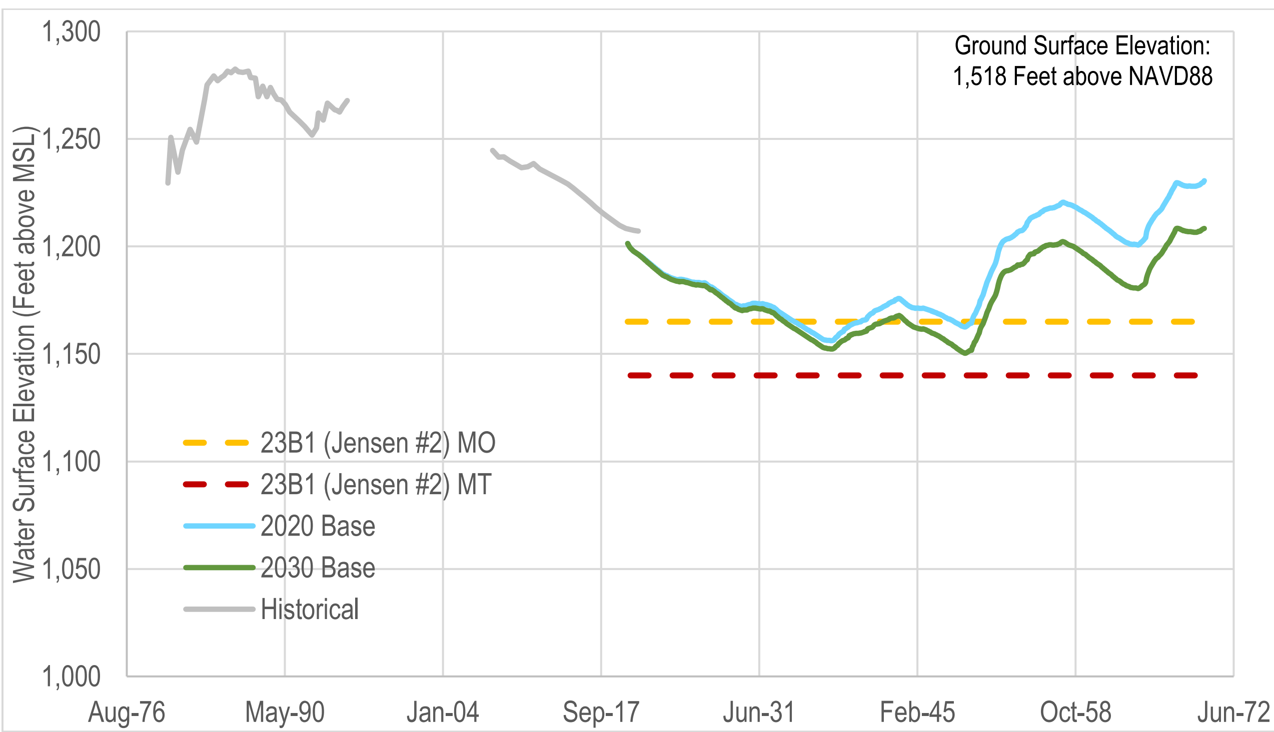


Figure 4-9 Well 23B1 (Jensen #2) – Historical and Projected Groundwater Level and Sustainable Management Criteria

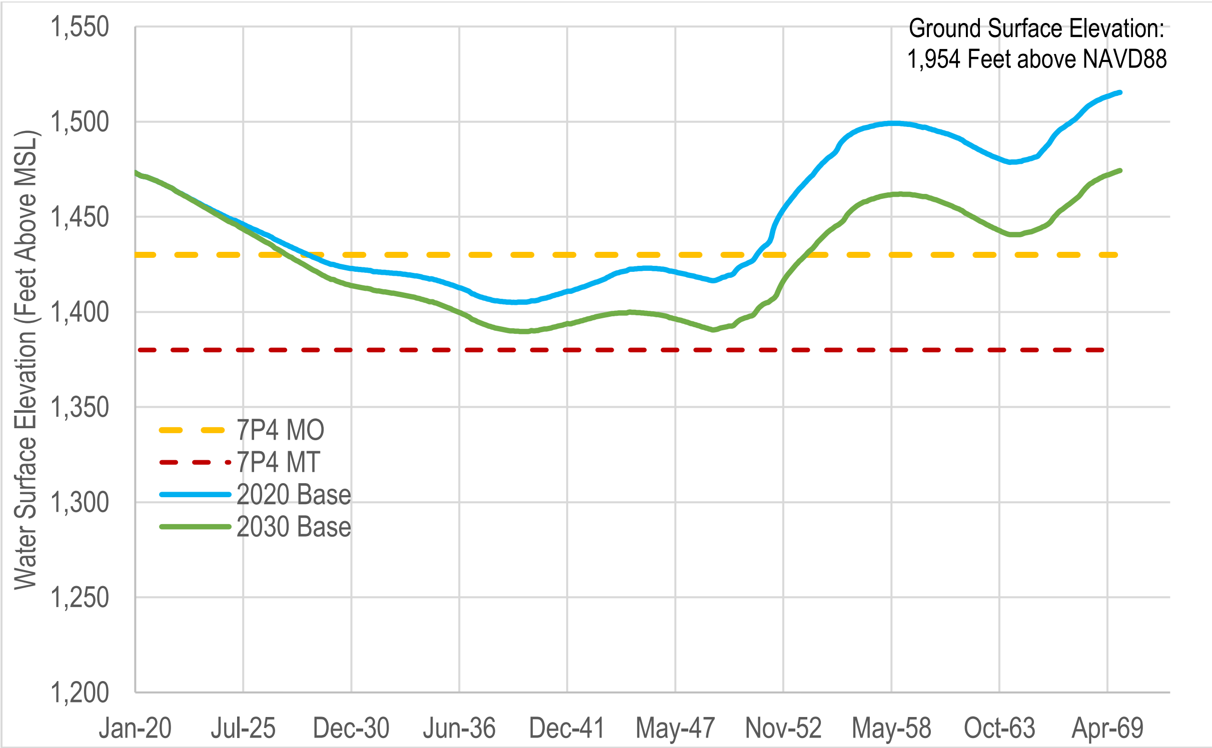


Figure 4-10 Well 7P4 (USGS) - Projected Groundwater Level and Sustainable Management Criteria

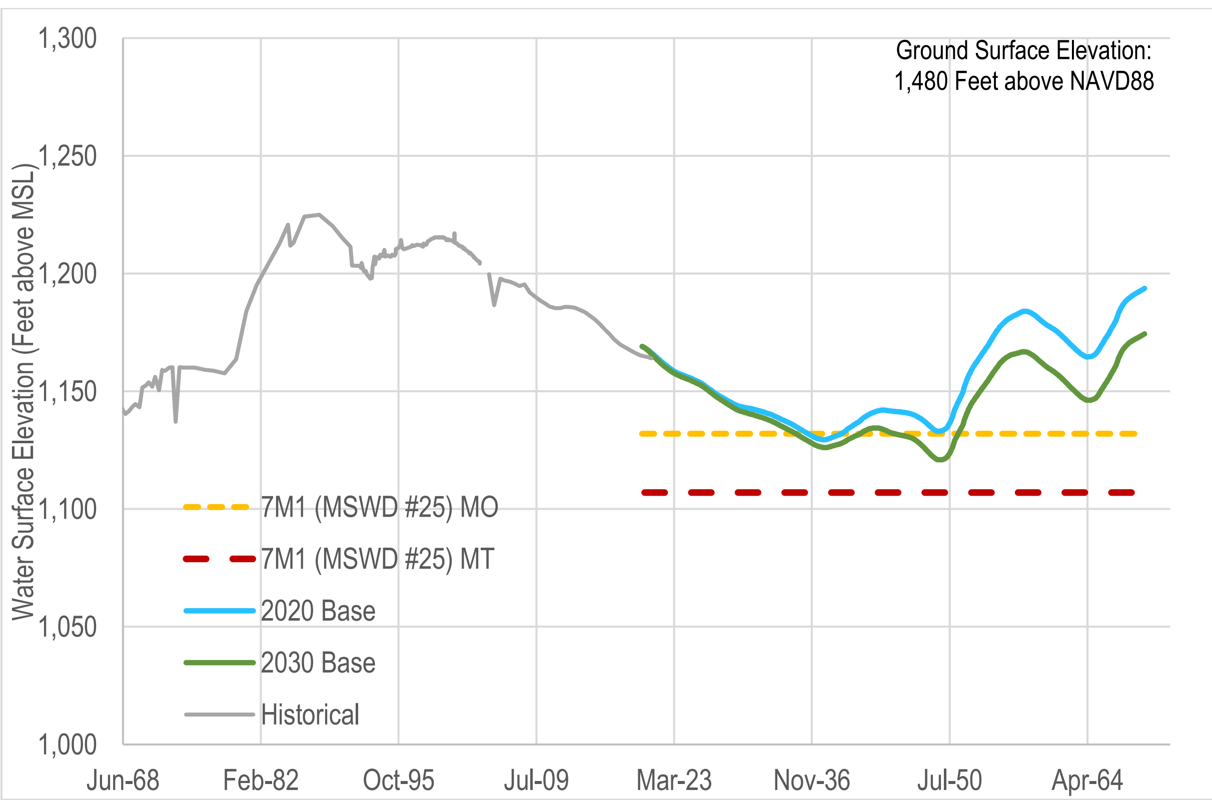


Figure 4-11 Well 7M1 (MSWD #25) – Historical and Projected Groundwater Level and Sustainable Management Criteria

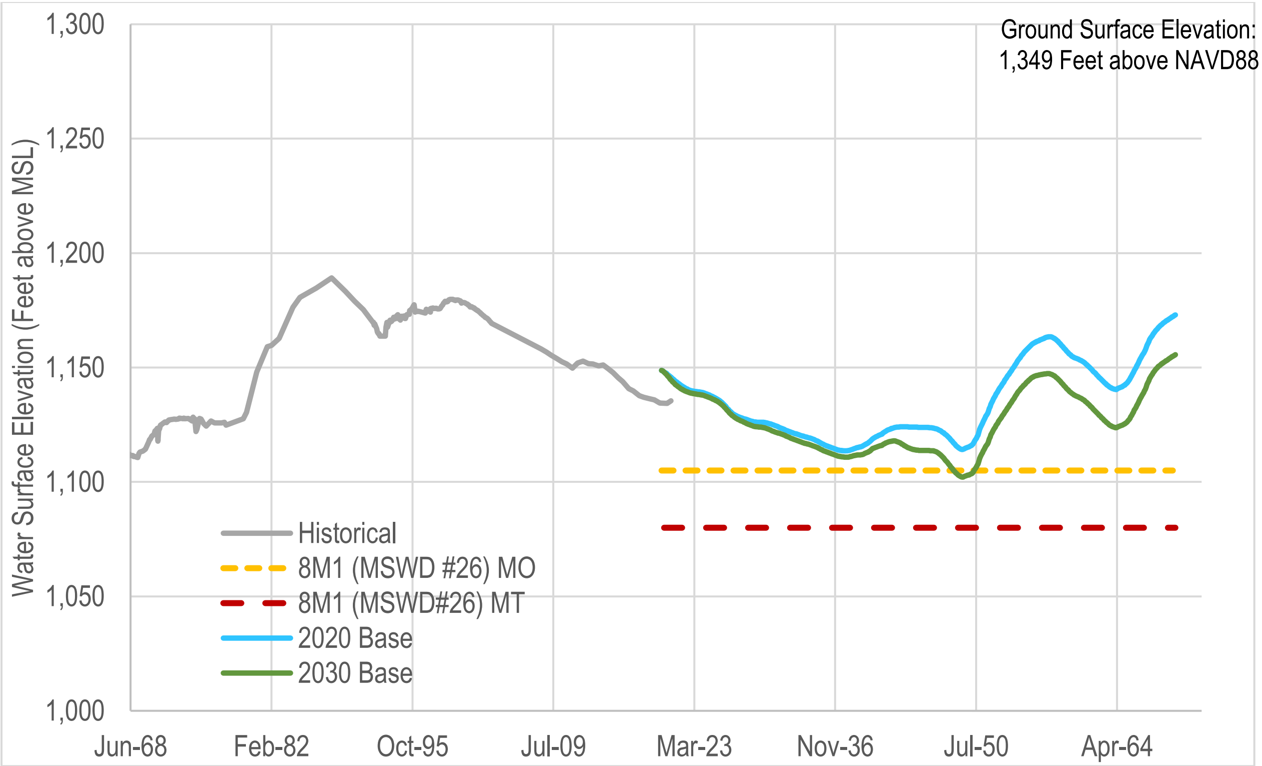


Figure 4-12 Well 8M1 (MSWD #26) – Historical and Projected Groundwater Level and Sustainable Management Criteria

4.7 Measurable Objectives for Additional Plan Elements

Regulation Requirements:

§354.30 (f) Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.
§354.30 (g) An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for finding of inadequacy of the Plan.

The SGP Subbasin will not be setting measurable objectives or interim milestones for additional plan elements described in Water Code Section 10727.4. since they are not applicable, as discussed above.

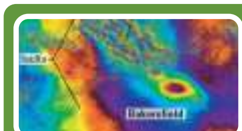
5 Monitoring Network

Regulation Requirements:

> **§354.32** This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.

A comprehensive monitoring network is a fundamental component of groundwater management and is needed to measure progress toward groundwater sustainability. **Table 5-1** indicates the monitoring programs needed to comply with SGMA monitoring and reporting requirements.

Table 5-1 Monitoring Requirements

	**Groundwater Levels** Monitoring of static groundwater levels each spring and fall
	**Groundwater Storage** Measurement of the annual change in groundwater storage
	**Water Quality** Monitoring for water quality degredation that could impact available groundwater supplies
	**Land Subsidence** Surface land subsidence caused by groundwater extraction. This is not applicable to the San Gorgonio Pass Subbasin.
	**Depletion of Interconnected Surface Water** Loss of permanent connections between surface water and groundwater
	**Seawater Intrusion** Intrusion of seawater into local aquifers. This is not applicable to the San Gorgionio Pass Subbasin.

Of the six sustainability indicators, two are not applicable to the SGP Subbasin: subsidence and seawater intrusion. The Subbasin does not contain the compressible clay layers that make subsidence possible, and the Subbasin is located a sizable distance from the Pacific Coast or another saltwater-rich groundwater source. Based on conditions in the SGP Subbasin, the sustainability indicators that are applicable for monitoring during the GSP implementation phase are: groundwater levels, groundwater storage, groundwater quality and depletion of interconnected surface water.

Monitoring programs for these indicators are described below including the history of the monitoring programs, proposed monitoring to comply with SGMA, and the adequacy and scientific rationale for the representative monitoring network. Historic monitoring of groundwater pumping, groundwater recharge, and surface water deliveries is discussed in **Section 3.3**.

5.1 Introduction

Regulation Requirements:

§354.34(a) Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan Implementation.

This chapter describes the existing and proposed monitoring networks in the San Gorgonio Pass Subbasin that will provide data to determine short-term, seasonal, and long-term trends in groundwater and surface conditions related to the sustainability indicators. Data collected from the monitoring networks will yield information necessary to support the implementation of this Plan, evaluate the effectiveness of this Plan, and guide decision making by the San Gorgonio Pass GSP participants' management. Information and data from historical monitoring efforts can be found in **Section 3.2**.

Figure 5-1 and **Figure 5-2** show the currently proposed monitoring site locations for groundwater levels and groundwater storage (**Figure 5-1**) and groundwater quality (**Figure 5-2**). Areas of potential monitoring for interconnected surface water are also shown on **Figure 5-1**, including three sites in Banning Canyon.

Monitoring programs for land subsidence and seawater intrusion sustainability indicators are not applicable, considering the lack of confinable clay layer presence and geographic distance from the Pacific Ocean. Despite the lack of potential for groundwater extraction activities to induce land subsidence and/or seawater intrusion in the SGP Subbasin, the SGP GSP participants will continue to evaluate publicly available land elevation data and total dissolved solids (TDS) in the Plan Area. See **Section 5.1.3** regarding Supplemental Monitoring Network subsidence monitoring.

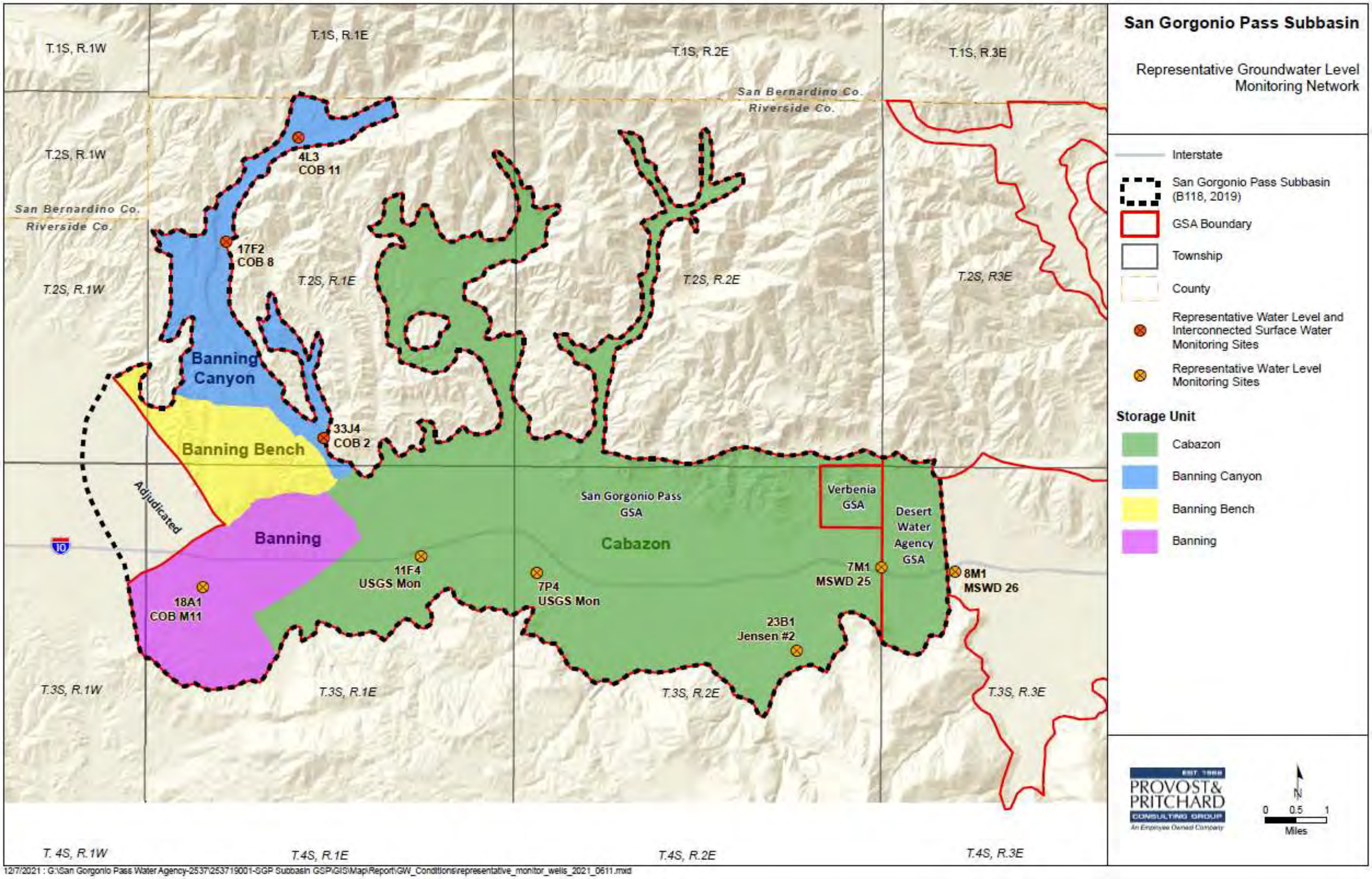


Figure 5-1 Representative Water Level Monitoring Network

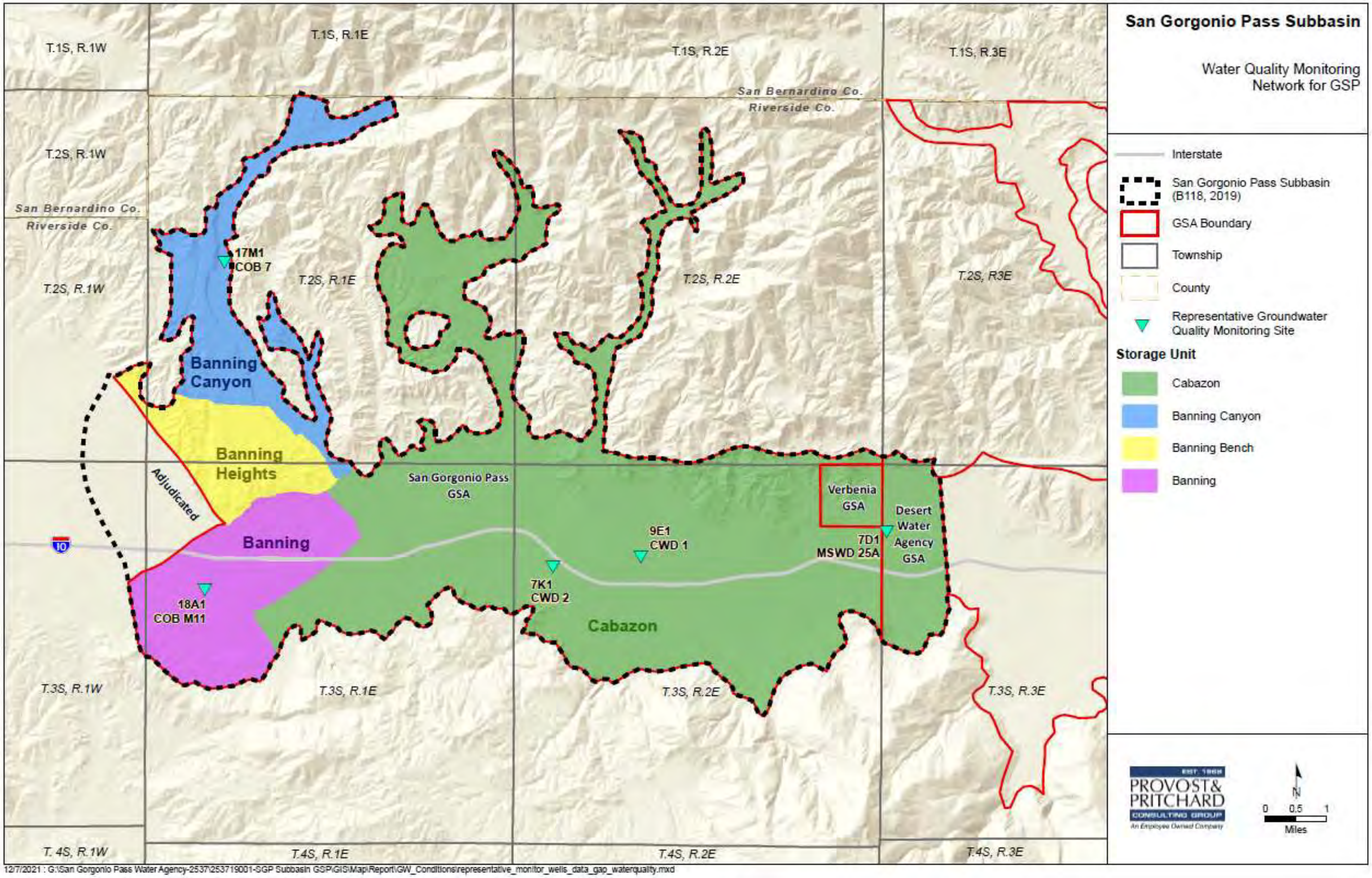


Figure 5-2 Representative Groundwater Quality Monitoring Network

5.1.1 Monitoring Network Objectives

Regulation Requirements:

§354.34(b) Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following: 1) Demonstrate progress toward achieving measurable objectives described in the Plan. 2) Monitor impacts to the beneficial uses or users of groundwater. 3) Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds. 4) Quantify annual changes in water budget components.

The objectives of the various monitoring programs include the following:

1. Establish or enhance a baseline for future monitoring;
2. Provide warning of potential future problems;
3. Use data gathered to generate information for water resources evaluation;
4. Help to quantify annual changes in water budget components;
5. Develop meaningful long-term trends in groundwater characteristics;
6. Provide comparable data from various places in the Subbasin;
7. Demonstrate progress toward achieving measurable objectives described in the Plan;
8. Monitor changes in groundwater conditions relative to minimum thresholds;
9. Monitor impacts to the beneficial uses or users of groundwater; and
10. Provide sufficient detail to guide annual water management actions for the current water year.

5.1.2 Network Development Process

Regulation Requirements:

§354.34(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator: [§354.34(c)(1) through §354.34(c)(6) are individually listed below]

Sections 5.2 and **5.3** describe existing networks within the boundary of the Subbasin used to track groundwater levels, groundwater storage, and depletion of interconnected surface water. **Section 5.4** describes the groundwater quality monitoring network. **Sections 5.5** and **5.6** describe the inapplicability of subsidence and seawater intrusion to the SGP Subbasin.

For each applicable sustainability indicator, the adequacy of the monitoring network is discussed, as well as the quantitative values for minimum thresholds, measurable objectives, and interim milestones. The sections also include a review of each monitoring network for monitoring frequency and density, identification of data gaps, plans to fill data gaps, and future site selection. The supporting monitoring network information will be reviewed and evaluated during each five-year GSP assessment.

5.1.3 Description of Existing Monitoring Resources

The SGP Subbasin GSAs defined a representative monitoring network (**Figure 5-1** and **Figure 5-2**) to monitor applicable sustainability indicators in relation to sustainable management criteria (defined in **Chapter 4 – Sustainable Management Criteria**). Those applicable indicators include groundwater levels, groundwater storage, groundwater quality, and interconnected surface water.

The SGP Representative Monitoring Network is a subset of the broader monitoring activities within and adjacent to the Subbasin, referred to as the "Supplemental Monitoring Network." Components of the Supplemental Monitoring Network include but are not limited to the resources described below. The Supplemental Monitoring Network's monitoring activities and resources allow for analysis of all six sustainability indicators and groundwater dependent ecosystems (GDEs); include federal, state, and local sources; and are available as resources to support the understanding of groundwater conditions through the implementation period. **Figure 5-3** summarizes the relationship between the supplemental monitoring network and the representative monitoring network.

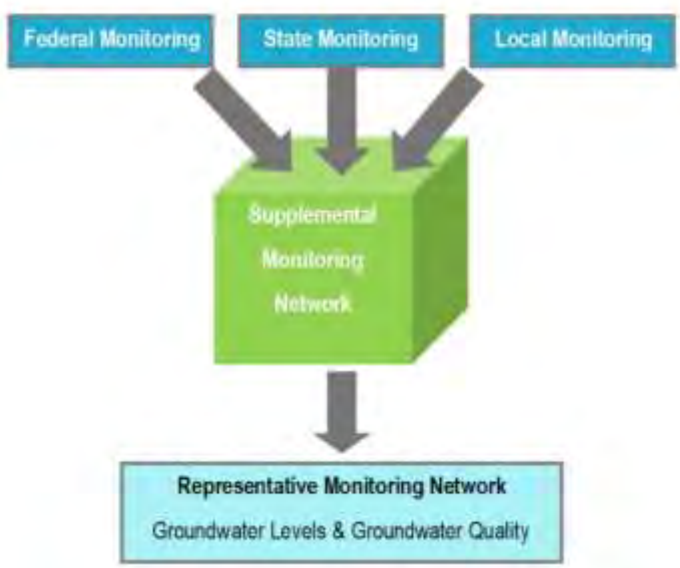


Figure 5-3 Monitoring Network Resource Process

Supplemental Monitoring Network

The Supplemental Monitoring Network is an evolving accumulation of hydrogeologic and water resources data. This network includes a wide variety of sources, programs, and parameters of study that have been useful in the development of this GSP. The SGP GSAs recognize the continuing value of the Supplemental Monitoring Network during the implementation phase of the GSP.

The Supplemental Monitoring Network is intended as an additive collection of monitoring resources, housing historic and current data and incorporating newly available monitoring programs and data. A summary of the existing data resources that makeup the current Supplemental Monitoring Network is included below and organized by monitoring parameter.

Supplemental Monitoring Network: Groundwater Levels and Groundwater Storage

Groundwater surface elevation and depth to water data are monitored by federal, state, and local programs and agencies. Most of the publicly available data is consolidated and reported in the DWR

Water Data Library (WDL) and CASGEM. These databases include data from DWR, U.S. Geological Survey (USGS), municipalities, and other available data sources.

In addition to the WDL, groundwater level data provided by local agencies within and adjacent to the SGP Subbasin have been consolidated into a database system and, where sufficient attributes were available, used in the development of the groundwater model described in **Chapter 3 – Basin Setting** and the understanding of the groundwater conditions.

Supplemental Monitoring Network: GDEs and Interconnected Surface Water

The Groundwater Resources Hub[26] and associated GDE Pulse[27] from the Nature Conservancy (TNC) are DWR's preferred resource for evaluating GDEs. The data and references from TNC are used in conjunction with available groundwater level data and geologic conditions to refine the understanding.

Supplemental Monitoring Network: Groundwater Quality

Groundwater quality is measured by the local water districts, water agencies, and municipalities that provide groundwater to their respective customers, many of which provide annual groundwater quality monitoring reports to the Regional Water Quality Control Board (RWQCB).

Several other agencies play important roles in the monitoring of groundwater quality. These include the State Water Quality Control Board, U.S. Environmental Protection Agency, Department of Toxic Substances Control, USGS, and the U.S. Bureau of Reclamation. The SGP Subbasin's GSAs make efforts to collect and review pertinent water quality data published by these agencies.

Supplemental Monitoring Network: Subsidence

Although there is an absence of geologic materials conducive to groundwater extraction related subsidence in the SGP Subbasin, changes in land surface elevation can be evaluated via the NASA Jet Propulsion Laboratory's Interferometric Synthetic Aperture Radar (InSAR) data. These data and more subsidence related data in the state are available on DWR's SGMA Data Viewer.[28]

Supplemental Monitoring Network: Land Use

Land use data are relevant to study when considering evapotranspiration and historic, current, and projected water demand estimates. Land use resources are available from the City of Banning, City of Beaumont, and Riverside County General Plans and websites.

Supplemental Monitoring Network: Hydrogeology

To support the analysis of the geology and associated hydrogeology in the Subbasin, reports, data, and coordination with the USGS have served as critical resources to identify faulting location and hydrologic impacts, groundwater levels, base of the aquifer, and parent materials.

5.2 Groundwater Levels and Groundwater Storage

Groundwater level monitoring can be used to evaluate groundwater storage. This section details the representative groundwater level monitoring network for the SGP Subbasin.

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[26] Groundwater Resource Hub
[27] GDE Pulse (codefornature.org)
[28] Web Map Viewer (ca.gov)

5.2.1 Description of Representative Groundwater Levels Monitoring Network

Regulation Requirements:

§354.34(c)(1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:

A) A sufficient density of monitor wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.

B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.

§354.36 Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:

§354.36(a) Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.

SGP Subbasin water level monitoring network will utilize existing wells that are currently monitored for groundwater levels including but not limited to USGS, municipality, DWR, agency, and private wells. Data gap areas have been identified in **Section 5.7** and opportunities to install new wells or access private wells will be revisited during the Annual Reporting and 5-year GSP Update periods. The groundwater elevation measurements will be collected every April 1 to May 31 and October 1 to November 30 to provide data on the seasonal low and seasonal high groundwater conditions. Each GSA will upload their respective data for inclusion in the SGP Subbasin's Data Management System and Annual Reports.

There were approximately 70 wells identified within the SGP Subbasin; however, many did not publicly disclose critical attributes, such as construction information, active status, and/or site access. Wells with unidentified construction characteristics could be perforated in multiple aquifer zones and it is unknown which aquifer zone is being reflected in measured water levels. Of the 70 wells, approximately 25 active production wells and less than 10 active monitoring wells had sufficient construction information and the necessary site access to be considered for inclusion in the representative water level monitoring network.

Figure 5-1 shows the locations of the wells in the representative water level monitoring network and a table of the well information is presented in **Table 5-2**. Wells not included in the representative monitoring network but were considered and are part of the supplemental monitoring network are included in **Section 3.2.** The applicable beneficial uses of groundwater by storage unit are further clarified in **Chapter 2 – Plan Area**. The current water level monitoring network is a combination of production wells, unused wells, and dedicated monitoring wells.

Table 5-2 Representative Water Level Monitoring Network

San Gorgonio Pass Subbasin Representative Water Level Monitoring Network			
Management Area	**Storage Unit**	**Representative Monitoring Well**	**Sustainability Indicators**
Management Area 2	Banning Canyon	4L3 – COB #11 17F2 – COB #8 33J4 – COB #2	Water Levels Interconnected Surface Water Groundwater Storage
Management Area 2	Banning Bench	No wells with public access in the Banning Bench were available for inclusion in the representative monitoring network. Additionally, all known wells within the Banning Bench fall under SGMA's de minimis category of pumping less than 2 acre-feet per year. This area is considered a data gap.	
Management Area 2	Banning	18A1 – COB #M11	Water Levels Groundwater Storage
Management Area 2	Cabazon	11F4 7P4 23B1 -- Jensen #2	Water Levels Groundwater Storage
Management Area 2 Management Area 3	Cabazon	7M1 -- MSWD #25 8M1 -- MSWD #26	Water Levels Groundwater Storage

5.2.1.1 Adequacy of Representative Water Levels Monitoring Network

Regulation Requirements:

§354.34(d) The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.
§354.34(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

Regulation Requirements:

§354.34(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:
1) Amount of current and projected groundwater use.
2) Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.
3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.
4) Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.

The SGP Subbasin's Representative Monitoring Network was designed with consideration of spatial density, hydrogeologic variability in the Subbasin, and the beneficial uses of groundwater in each geologic storage unit.

In the Banning, Banning Bench, and Cabazon Storage Units, the beneficial use of groundwater includes commercial, domestic, industrial, and municipal groundwater extractions. This includes the categories of extraction use within the stakeholder MBMI lands that are not subject to SGMA but still use the SGP Subbasin's primary aquifer.

The Banning Canyon Storage Unit includes groundwater uses for commercial, domestic, and municipal purposes, as well as use by potential GDEs. Three representative monitoring sites were included in the Banning Canyon to indicate the potential groundwater management influences on the shallow aquifer's climactically driven hydrologic system.

In addition to consideration of the geologic storage unit boundaries, the representative monitoring network also met sufficient coverage to analyze the groundwater conditions in the non-adjudicated management areas. The SGP Subbasin has established three management areas that correspond with the following boundaries: (1) Adjudicated Beaumont Basin, (2) SGP GSA and Verbenia GSA, and (3) DWA GSA.

Management Area 1: Adjudicated Beaumont Basin

The adjudicated Beaumont Basin is not subjected to SGMA and this GSP does not specify representative monitoring in this area of the SGP Subbasin. The Beaumont Basin Watermaster is responsible for assembling and reviewing groundwater level monitoring data, which is documented in periodic report. The SGP GSP Working Group has requested and reviewed available data and information from Management Area 1 to identify impacts to the SGP Subbasin.

Management Area 2: SGP GSA & Verbenia GSA

Management Area 2 includes four geologic storage units: Cabazon Storage Unit, Banning Canyon, Banning Bench, and Banning Storage Unit. An assessment was completed to identify a minimum of one well in each of these storage units to ensure adequate coverage, in alignment with DWR's Monitoring Network Best Management Practices guidance document. The following identified wells resulted from this evaluation:

1. Cabazon Storage Unit: 3 wells (distanced to maximize spatial coverage)
2. Banning Canyon: 3 wells (distanced to maximize spatial coverage)
3. Banning Bench: The wells on the Banning Bench are known to be rural residential with de minimis extractions of less than 2 acre-feet per year. These wells are also private; therefore, the ability to assign one as a representative monitoring network is not possible at the time of this 2022 GSP development. This area is identified as a data gap, further reviewed in **Section 5.3**
4. Banning Storage Unit: 1 well

Although there was limited groundwater level data available in the Cabazon Storage unit prior to 2008, the existing groundwater-level monitoring network has generally adequate data to prepare groundwater contour maps and identify groundwater level trends over the years in the areas subject to SGMA: SGP GSA, Verbenia GSA, and DWA GSA. However, the MBMI lands cover a sizeable portion of the SGP Subbasin and are not required to publicly release water levels or extraction information through the SGMA process or other state and federal groundwater monitoring programs. Therefore, in the absence of possible future voluntary agreements to obtain MBMI data, the monitoring of groundwater levels will be limited to the areas that are subject to SGMA.

To minimize discrepancies with privately held MBMI water level data and groundwater conditions, the SGP GSP Working Group and the MBMI have cooperated via Stakeholder Outreach throughout the GSP development.

Management Area 3: DWA GSA

DWA GSA is identified as a management area with regard to the GSA's unique groundwater conditions. DWA GSA's groundwater in the SGP subbasin has minimal to no groundwater extractions and benefits from groundwater replenishment through recharge at the Whitewater Spreading Area operated by DWA and Coachella Valley Water District, just outside of the SGP Subbasin Boundary. To represent groundwater conditions in Management Area 3, MSWD monitoring well 8M1 (MSWD #26) has been selected as a representative monitoring network site. Well 8M1 (MSWD#26) is slightly outside of the SGP Subbasin SGMA boundary; however, the well is understood to be located near the geologic boundary between the SGP Subbasin and the Indio Subbasin at Fingal Point, described in **Chapter 3 – Basin Setting**. Well 8M1 (MSWD #26)'s location on the geologic boundary with the Indio Basin serves as a prime location to determine boundary flows to the Indio Subbasin and to evaluate the groundwater level influences of the groundwater recharge activities by DWA on the SGP Subbasin.

Monitoring Frequency

The groundwater elevation measurements will be collected every April 1 to May 31 and October 1 to November 30 to provide data on the seasonal low and seasonal high groundwater conditions (**Table 5-3**).

Table 5-3 Representative Water Level Monitoring Frequency

San Gorgonio Pass Subbasin Coordinated Representative Water Level Monitoring Frequency		
Monitoring Parameter	**Frequency**	**Period of Measurement Notes**
Groundwater Levels	Semi-Annually (spring & fall)	Spring: April 1 to May 31 Fall: October 1 to November 30

5.2.2 Representative Water Levels Monitoring Network Information

This section details the rationale for representative monitoring site selection and location.

5.2.2.1 Scientific Rationale for Site Selection

Regulation Requirements:

§354.34(g) Each Plan shall describe the following information about the monitoring network:
(1) Scientific rationale for the monitoring site selection process.
§354.34(g) Each Plan shall describe the following information about the monitoring network:
(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.
§354.34(g)(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.

The representative monitoring network sites were selected with the following scientific criteria prioritized:

1. Ability to monitor a variety of groundwater level conditions in the Subbasin by assigning a representative monitoring site in each geologic storage unit[29]
2. Minimum of five years of historic data to assign meaningful projections and sustainable management criteria
3. Location at or near groundwater production sites to analyze the impacts to beneficial users more directly
4. A minimum of two sites in Banning Canyon to inform assessments of groundwater level impacts on GDEs and surface water groundwater interactions
5. Location at or near the adjudicated Beaumont Basin to study groundwater inflows
6. Location at or near the Indio Subbasin to study groundwater outflows and influences of Desert Water Agency groundwater recharge activities on the outflow gradient and Subbasin storage

After the first draft of monitoring sites were selected, those sites underwent another qualification analysis, with the following factors considered:

1. Can the proposed monitoring site represent impacts to beneficial uses of groundwater?
2. Does the proposed monitoring site consider the perforated intervals and depths of neighboring wells to maximize representation of storage unit beneficial uses?
3. Is there a historic record of at least 5-years of data to assign sustainable management criteria?
4. Is the proposed monitoring site expected to be retired within the planning horizon?
5. Is there access to monitor the proposed site?
6. Does the proposed monitoring site consider projected development changes in groundwater use?
7. Are there enough wells to represent the boundary conditions of the adjudicated Beaumont Basin's inflows and the outflows to the Indio Subbasin?

With the exception of well 8M1(MSWD #26), the selected representative monitoring sites comply with the data and reporting standards indicated in SGMA Section 352.4. Well 8M1 (MSWD #26) is located just outside the SGP Subbasin's eastern border in the Indio Subbasin and was constructed in 2019, so it has less than five years of data. The site was selected as it is a specially constructed multiple completion monitoring well and represents the conditions at the SGP Subbasin's eastern boundary. The eastern boundary of the Subbasin is understood as being at an impermeable and raised subsurface fault formation known as Fingal Point, where subsurface outflows from the SGP Subbasin are constrained. Well 8M1 (MSWD #26)) is located near and north of the Fingal Point formation and was selected as a representative monitoring site to determine the influences of

[29] There were no wells with public access in the Banning Bench Storage Unit, and this area is considered a data gap.

groundwater recharge activities just east of Fingal Point on the groundwater gradient and the effects of those gradients on subsurface outflows to the Indio Subbasin. The water levels, groundwater gradient, and outflows all have direct research value in understanding the impacts of groundwater levels and storage on the beneficial groundwater uses in the SGP Subbasin. Data from recent and nearby USGS multiple completion wells will be reviewed during the 5-year GSP Update to reconsider they should be added or replace the representative monitoring network sites in the eastern end of the SGP Subbasin.

In spring 2021, SGP Subbasin consultant staff coordinated with the consultant staff of the Indio Subbasin and Desert Water Agency, who has GSAs in both the SGP Subbasin and the Indio Subbasin to compare data and understanding of the groundwater conditions at this site and outflow estimations.

All other representative monitoring sites within the SGP Subbasin are in alignment with the data and reporting standards.

5.2.2.2 Representative Water Levels Monitoring Network Location

Regulation Requirements:

§354.34(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.

The representative groundwater level monitoring network's spatial distribution was selected to assess the groundwater conditions that vary across the geologic storage units of the SGP Subbasin. The geologic storage units and sites are depicted on **Figure 5-1** and included in **Table 5-2**. There are no publicly available wells available to represent the Banning Bench Storage Unit; therefore, this area is identified as a data gap.

Regulation Requirements:

§354.36 Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:
§354.36(a) Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.

The representative monitoring network identified on **Figure 5-1** and in **Table 5-2** include a subset of the total wells available for consideration in the SGP Subbasin. The selected wells are considered to be the most representative of the Subbasin conditions, as explained in **Section 5.2.2.1**.

The sustainable management criteria assigned for the representative monitoring sites are explained in detail in **Chapter 4 – Sustainable Management Criteria**.

5.2.2.3 Use of Groundwater Elevations as Proxy for Other Sustainability Indicators

Regulation Requirements:

> **§354.36(b)** Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:
> 1) Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.
> 2) Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.

The representative monitoring network accounts for the applicable sustainability indicators in the SGP Subbasin: declining water levels, interconnected surface water, and groundwater storage, all with the ability to use groundwater level measurements to evaluate trends and impacts.

Groundwater levels are used as a proxy for evaluating the groundwater storage and interconnected surface water, as significant correlations exist.

The primary aquifers in the SGP Subbasin are unconfined; therefore, changes in groundwater storage can be directly correlated with measured water levels and the base of the aquifer (available in **Chapter 3 – Basin Setting**).

The Banning Canyon's aquifer is uniquely shallow. The groundwater levels and associated groundwater storage vary significantly within a water year due to the depth and geometry of the aquifer, which dictates the groundwater gradient, and the isolated and directly climatically driven replenishment source. Although groundwater management is not the primary influence of the variability in Banning Canyon, based on historic records and aerial imagery of dry year conditions, the interconnection of surface water and groundwater is to be considered through representative monitoring of groundwater levels as a proxy.

Sustainable management criteria, including measurable objectives and operational flexibility, are further explained in **Chapter 4 – Sustainable Management Criteria**.

5.2.3 Representative Water Levels Monitoring Protocols

Regulation Requirements:

> **§352.2** Each Plan shall include monitoring protocols adopted by the Agency for data collection and management, as follows:
> (a) Monitoring protocols shall be developed according to best management practices.
> (b) The Agency may rely on monitoring protocols included as part of the best management practices developed by the Department, or may adopt similar monitoring protocols that will yield comparable data.
> (c) Monitoring protocols shall be reviewed at least every five years as part of the periodic evaluation of the Plan, and modified as necessary.
>
> **§354.34(i)** The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

The Data Quality Objectives (DQO) process will be used to develop monitoring protocols that assist in meeting measurable objectives and sustainability goals of this GSP. The DQO process includes the following:

1. State the problem;
2. Identify the goal;
3. Identify the inputs;

4. Define the boundaries of the area/issue being studied;
5. Develop an analytical approach;
6. Specify performance or acceptance criteria; and
7. Develop a plan for obtaining data.

Groundwater level monitoring will generally follow the protocols identified in the *Monitoring Protocols, Standards, and Sites BMP* (DWR, December 2016b)[30]. The SGP Subbasin may develop standard monitoring forms in the future, if deemed necessary.

The following comments and exceptions to the DWR Monitoring Protocols, Standards, and Site BMP[31] should be noted:

1. SGMA regulations require that groundwater levels be measured to the nearest 0.1 foot. The BMP suggests measurements to the nearest 0.01 foot. This is not practical for many measurement methods. This level of accuracy would have little value since groundwater contour maps typically have 10-foot intervals, and storage calculations are based on groundwater levels rounded to the nearest foot. The accuracy of groundwater level measurements will vary based on the well type and condition. For instance, for wells with nearby pumping wells, measurements can be affected if that pumping is ongoing or recently terminated.
2. Well sounding equipment has to be decontaminated after use if used in a well with suspected or known contamination or if there are obvious signs of contamination, such as oil.

Regulation Requirements:

§354.36(c) The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.

The representative monitoring network locations were identified to represent the various conditions across the Subbasin by assigning wells in each geologic storage unit, except for the Banning Bench which does not have known extractions above the de minimis volume. The groundwater level data of wells nearby to each representative monitoring site were examined in comparison to the selected site to verify that the representative monitoring site reflected the localized conditions of the area.

Therefore, the designation of each site and the greater representative monitoring network adequately reflects the general conditions in the area and in the Subbasin. The adequacy of the representative water level monitoring network is expanded on in **Section 5.2.1.1**.

5.3 Representative Interconnected Surface Water Monitoring Network

Groundwater level data, storage capacity of the Banning Canyon, and the seasonal fluctuations in precipitation and snowmelt that feed into the Banning Canyon were analyzed to define the representative water level monitoring network.

[30] *Monitoring Protocols, Standards, and Sites BMP* (DWR, December 2016b)
[31] *Monitoring Protocols, Standards, and Sites BMP* (DWR, December 2016b)

5.3.1 Description of Representative Interconnected Surface Water Monitoring Network

Regulation Requirements:

§354.34(c)(6) Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:
A) Flow conditions including surface water discharge, surface water head, and baseflow contribution.
B) Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.
C) Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.
D) Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.
§354.36(c) The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.

The canyon regions within the SGP Subbasin may experience seasonal surface water interconnection with the underlying groundwater. The canyons in the SGP Subbasin include, from west to east, Banning Canyon, Hathaway Canyon, Potrero Canyon, and Millard Canyon. Of these canyons, Potrero and Millard Canyons are both located entirely on MBMI properties and cannot be directly monitored.

On the SGP Subbasin valley floor in the Cabazon and Banning Subbasins, there are limited interactions between surface water and groundwater, because of the significant depth to water, as explained in **Section 3.1**. Therefore, the assessment of sustainable management criteria related to interconnected surface water and associated GDEs is focused within the canyon zones of the Subbasin where interconnected surface water is present.

Banning Canyon, which is traversed by the San Gorgonio River, is the largest of the SGP canyons with GDE. San Gorgonio River flows through the Banning Canyon under ephemeral conditions, during the wet season and only when enough volume is possible to flow. The wet season ranges from December to March, and the San Gorgonio River is usually dry the remaining months of the year. A fault exists mid-way in the Banning Canyon and subsurface groundwater may flow to the surface at that fault in wet years.

Flow conditions in Banning Canyon are not currently measured to provide data on surface water head and baseflow contributions. The soil conditions within the canyon are gravelly with a high hydraulic conductivity, resulting in the Banning Canyon functioning as a natural recharge area. The storage capacity available for recharge is limited by the Banning Canyon's shallow aquifer, explained in **Section 3.1**.

The beneficial uses of groundwater in the Banning Canyon include potential GDEs and groundwater pumping by the City of Banning and other entities when sufficient groundwater is available. The hydrologic conditions in Banning Canyon are highly dependent on climactic conditions. The source water in Banning Canyon is from precipitation, natural stream discharge, and Whitewater River water diversions into the San Gorgonio River via a flume, which is also subjected to the same natural source limitations as the San Gorgonio River.

The representative monitoring in the Banning Canyon includes three sites, spatially distributed from the north, center, and south of the canyon. These sites are included in the representative monitoring network shown on **Figure 5-1** and in **Table 5-2**. The intention of these three sites is to evaluate the water levels in the canyon, and as they relate to potential variable climactic and management impacts on water levels, groundwater storage, and interconnected surface water in this portion of the SGP Subbasin.

As noted previously, the Potrero, Hathaway, and Millard Canyons are located on MBMI lands and data are not currently available for directly monitoring those areas.

5.3.2 Adequacy of Representative Interconnected Surface Water Monitoring Network

Regulation Requirements:

§354.34(d) The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.
§354.34(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.
§354.34(g) Each Plan shall describe the following information about the monitoring network:
(1) Scientific rationale for the monitoring site selection process.

Banning Canyon is the only area in the SGP Subbasin that is subject to SGMA with respect to interconnected surface water and has a history of depth to water occurring seasonally at less than 50-feet within the historic period (1998-2019). To ensure adequate coverage, this geologic storage unit was assigned three representative monitoring sites that are spatially distributed to assess conditions at the northern, center, and southern (outlet) portions of the Banning Canyon.

5.3.2.1 Density of Monitoring Sites and Frequency of Measurements

Regulation Requirements:

§354.34(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:
1) Amount of current and projected groundwater use.
2) Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.
3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.
4) Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.

The current and projected groundwater use as well as potential impacts to beneficial uses of the Banning Canyon groundwater was considered in the assignment of the sustainable management criteria detailed in **Chapter 4 – Sustainable Management Criteria**.

There are no known significant groundwater extraction activities directly upgradient of the Banning Canyon's aquifer, as due north includes USFS territory. The decades of historic data in the Banning Canyon indicate the greatest influence on groundwater levels, groundwater storage, and interconnected surface water are rainfall and snowpack conditions of the water year and the current point in the water year hydrologic cycle. Impacts to beneficial uses of this storage unit aquifer must be with consideration for its highly variable and climate-driven nature.

Aquifer characteristics are detailed in **Chapter 3 – Basin Setting**.

5.3.3 Representative Interconnected Surface Water Monitoring Network Information

This section details consistency with data and reporting standards, where to find the qualitative values to analyze interconnected surface water, and the use of groundwater elevation as a proxy for interconnected surface water in the Banning Canyon.

5.3.3.1 Consistency with Data and Reporting Standards

Regulation Requirements:

> **§354.34(g)** Each Plan shall describe the following information about the monitoring network:
> **(2)** Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.

The interconnected surface water monitoring includes the three sites in the representative water level monitoring network (**Figure 5-1**) that are located in the Banning Canyon. See **Section 5.2.1.1** for clarification on the consistency of data and reporting.

5.3.3.2 Quantitative Values

Regulation Requirements:

> **§354.34(g)(3)** For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.
> **§354.36(a)** Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.

The sustainable management criteria assigned for the representative monitoring sites are explained in detail in **Chapter 4 – Sustainable Management Criteria**.

5.3.3.3 Use of Groundwater Elevations as Proxy for other Sustainability Indicators

Regulation Requirements:

> **§354.36(b)** Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:
> 1) Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.
> 2) Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.

See **Section 5.2.2.3**, which details how water levels are appropriate for use as a proxy for evaluating groundwater storage and interconnected surface water.

5.3.4 Representative Interconnected Surface Water Monitoring Protocols

Regulation Requirements:

> **§354.34(h)** The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.
> **§352.2** Each Plan shall include monitoring protocols adopted by the Agency for data collection and management, as follows:
> (a) Monitoring protocols shall be developed according to best management practices.
> (b) The Agency may rely on monitoring protocols included as part of the best management practices developed by the Department, or may adopt similar monitoring protocols that will yield comparable data.

(c) Monitoring protocols shall be reviewed at least every five years as part of the periodic evaluation of the Plan, and modified as necessary.

§354.34(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

See **Table 5-2** and **Figure 5-1** for information on the three representative interconnected surface water sites. The frequency of monitoring and monitoring protocols matches that of the representative water level monitoring detailed in **Table 5-3**.

5.4 Representative Groundwater Quality Monitoring

The representative groundwater quality monitoring network is detailed in this section.

5.4.1 Description of Representative Groundwater Quality Monitoring Network

Regulation Requirements:

§354.34(c)(4) Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.

§354.34(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.

As described in **Section 3.1,** there are no existing significant quality concerns that can be linked to groundwater management influences in the Subbasin. However, the SGP Subbasin GSAs are committed to using the representative groundwater quality monitoring network (**Figure 5-2**) to evaluate impacts of groundwater management activities on groundwater quality.

The sites identified in **Table 5-4** were selected for inclusion in the representative groundwater quality monitoring network.

Water quality monitoring is an important aspect of groundwater management and serves the following purposes:

1. Spatially characterize water quality according to soil types, soil salinity, geology, surface water quality, and land use;
2. Compare constituent levels at a specific well over time;
3. Determine the extent of groundwater quality problems in specific areas;
4. Identify groundwater quality protection and enhancement needs;
5. Determine water treatment needs;
6. Identify impacts of associated land use;
7. Identify impacts of recharge projects on water quality; and
8. Monitor the development and migration of potential contaminant plumes (such as nitrate).

A discussion of groundwater conditions and the high-quality potable groundwater in the SGP Subbasin is detailed in **Section 3.2.** The data used for the water quality analysis is primarily from the California Groundwater Ambient Monitoring and Assessment (GAMA) Program database, which includes water quality information collected by the DWR, California State Water Resources Control Board (SWRCB), Division of Drinking Water (DDW), and the United States Geological Survey

(USGS). The network of wells used for assessing groundwater quality in the Subbasin was selected based on availability of well construction information and recurrence of sampling events.

Table 5-4 Representative Groundwater Quality Monitoring Network

San Gorgonio Pass Subbasin Representative Groundwater Quality Monitoring Network		
Management Area	**Geologic Storage Unit**	**Representative Monitoring Well**
Management Area 2	Banning Canyon	17M1 (COB #7)
Management Area 2	Banning	18A1 (COB #M11)
Management Area 2	Cabazon	9E1 (CWD #1)
Management Area 2	Cabazon	7K1 (CWD #2)
Management Area 2	Cabazon	7D1 (MSWD #25A)

5.4.2 Adequacy of Representative Groundwater Quality Monitoring Network

Regulation Requirements:

§354.34(d) The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.
§354.34(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

The representative groundwater quality network was selected considering spatial coverage and geologic and hydrologic differences among the Banning, Banning Canyon, and Cabazon storage units. The density and location spread of the representative groundwater quality monitoring wells meet the DWR BMP[32] criteria for a sufficient monitoring network.

There are not representative monitoring sites within the MBMI lands or the Beaumont Basin. This is because MBMI is not subjected to SGMA, the Beaumont Basin is adjudicated.

Density of Monitoring Sites and Frequency of Measurements

Regulation Requirements:

§354.34(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:
1) Amount of current and projected groundwater use.
2) Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.
3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.
4) Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.

§354.36(c) The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.

[32] *Monitoring Protocols, Standards, and Sites BMP* (DWR, December 2016b)

The selection process used for the water quality network identified wells with water quality data from several years that are expected to continue to be monitored regularly in the future as part of their respective regulatory programs.

The water quality network wells are fairly well distributed in the SGP Subbasin. They are suitable for providing a representative characterization of current groundwater conditions. The water quality network is also distributed vertically across the various aquifer zones in the Subbasin, such as in the Banning Canyon and on the Subbasin's valley floor. Many of the wells are community drinking water sources; thus, the network is informed by existing monitoring programs and biased towards a more sensitive beneficial use (municipal drinking water).

The SGP Subbasin is approximately 56 miles^2, with four representative water quality monitoring sites. This is sufficient compared to Hopkins (1984)[33]'s recommendation of four monitoring wells per basin for those that extract more than 10,000 acre-feet per 100 miles^2. Hopkins (1984) was a recommended resource to assigning monitoring density in the DWR BMP[7] criteria.

Table 5-5 details the monitoring frequency for the representative groundwater quality monitoring network.

Table 5-5 Representative Water Level Monitoring Frequency

San Gorgonio Pass Subbasin Coordinated Representative Groundwater Quality Monitoring Frequency		
Monitoring Parameter	**Frequency**	**Period of Measurement Notes**
Nitrates	every 3 years	June-August
TDS	every 3 years	June-August

5.4.3 Representative Groundwater Quality Monitoring Network Information

Details on the rationale behind the representative groundwater quality monitoring site selection are detailed below.

5.4.3.1 Scientific Rationale for Site Selection

Regulation Requirements:

§354.34(g) Each Plan shall describe the following information about the monitoring network:
(1) Scientific rationale for the monitoring site selection process.

§354.34(g) Each Plan shall describe the following information about the monitoring network:
(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.

[33] Hopkins, J., 1994. Explanation of the Texas Water Development Board groundwater level monitoring program and water-level measuring manual: UM-52, 53 p. http://www.twdb.texas.gov/groundwater/docs/UMs/UM-52.pdf

The scientific rationale for selecting water quality monitoring sites include:

- Select dedicated monitoring wells over production wells where feasible;
- Select wells with available construction information (i.e., depth, perforated interval);
- Determine spatial distribution so that water quality can be defined across the SGP Subbasin;
- Select sites so that each aquifer is represented (vertical distribution); and
- Consider nearby beneficial uses.

The data gathered through the monitoring networks is and will continue to be consistent with the standards identified in Section 352.4 of the California Code of Regulations related to Groundwater Sustainability Plans. The main topics of Section 352.4 are outlined below.

- Data reporting units and accuracy;
- Monitoring site information;
- Well attribute reporting;
- Map standards;
- Hydrograph requirements.
- Groundwater and surface water models; and
- Availability of input and output files to DWR.

5.4.3.2 Quantitative Values

Regulation Requirements:

§354.34(g)(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.
§354.36(a) Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.
§354.36 Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:

Because groundwater from the San Gorgonio Pass Subbasin is used as a potable source, the minimum thresholds for groundwater quality are exceedances of Maximum Contaminant Levels (MCLs) or other applicable regulatory limits that are directly attributable to groundwater management actions in the San Gorgonio Pass Subbasin that prevent the use of groundwater for its intended purpose.

Chapter 4 – Sustainable Management Criteria details the sustainable management criteria for each representative monitoring site.

5.4.4 Representative Groundwater Quality Monitoring Protocols

Regulation Requirements:

§352.2 Each Plan shall include monitoring protocols adopted by the Agency for data collection and management, as follows:
(a) Monitoring protocols shall be developed according to best management practices.
(b) The Agency may rely on monitoring protocols included as part of the best management practices developed by the Department, or may adopt similar monitoring protocols that will yield comparable data.
(c) Monitoring protocols shall be reviewed at least every five years as part of the periodic evaluation of the Plan, and modified as necessary.
§354.34(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

Groundwater quality monitoring will generally follow the protocols identified in the *Monitoring Protocols, Standards, and Sites BMP* (DWR, December 2016b)[34]. The SGP Subbasin GSAs may develop standard monitoring forms in the future if deemed necessary.

5.5 Seawater Intrusion Monitoring

Regulation Requirements:

§354.34(c)(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.
§354.34(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

By definition, seawater intrusion occurs when saline water from the ocean infiltrates the groundwater system and begins to flow into areas of freshwater due to pressure differentials, in many cases caused by groundwater pumping. The influence of seawater intrusion on groundwater quality is not applicable to the San Gorgonio Pass Subbasin, considering the distance from the coast and geologic separation from coastal hydrologic influences. Due to the lack of potential seawater intrusion in the SGP Subbasin, no monitoring network is needed.

5.6 Land Subsidence Monitoring

Regulation Requirements:

§354.34(c)(5) Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.
§354.34(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

Lowering of groundwater levels can directly impact inelastic land subsidence when it is caused by dewatering or depressurizing geologic materials that contain significant compressible clays. Due to the active geological deposition conditions in the SGP Subbasin, the confining clay aquitards that are susceptible to inelastic subsidence have not been identified in the SGP Subbasin. Therefore, the influence of groundwater management on land subsidence is not applicable in the Subbasin. However, changes in land surface elevation are monitored via the supplemental monitoring network (InSAR remote sensing data) and will continue to be examined through the GSP implementation via DWR's SGMA Data Viewer website (https://sgma.water.ca.gov/webgis/).

[34] *Monitoring Protocols, Standards, and Sites BMP* (DWR, December 2016b)

Section 3.1 further details the lack of subsidence in the region and any changes in land surface elevation being caused by seismic activity.

5.7 Assessment and Improvement of the Representative Monitoring Network

The GSAs have identified data gaps and ways to improve their representative monitoring network in the future with additional resources and time to implement. A discussion of those data gaps and potential improvements are detailed below.

5.7.1 Review and Evaluation of Representative Monitoring Network

Regulation Requirements:

§354.38(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

This section includes a description of the different types of data gaps, a summary of existing data gaps in each monitoring network and plans to fill the data gaps. The San Gorgonio Pass Subbasin plans to reevaluate these data gap impacts on the ability to achieve the sustainability goal throughout the implementation process.

5.7.2 Identification of Data Gaps

Regulation Requirements:

§354.38(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.

§354.38(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:

1) The location and reason for data gaps in the monitoring network.
2) Local issues and circumstances that limit or prevent monitoring.

The data gap areas in the SGP Subbasin are identified on **Figure 5-4**. The data gap areas are clarified below:

Banning Bench:

There are minimal publicly available water well measurements in the Banning Bench area. Additionally, groundwater extractions in the area are de minimis, with extractions of less than 2 acre-feet per year per well. The limited groundwater use in the Banning Bench is due to groundwater deposits with limited yield and poor recharge. A resultant spatial data gap for groundwater levels, groundwater storage, and groundwater quality is identified in the Banning Bench Storage Unit.

There are no expected plans for increased groundwater production in the Banning Bench Storage Unit, hindering the opportunity for a joint production-monitoring well. The Banning Heights Mutual Water Company, that comprises most of this storage unit, is primarily supplied via the Whitewater Flume system with supplemental water available from the City of Banning in emergency situations, such as during periods of flume outages such as occurred from the Apple Fire in 2020.

A potential monitoring site in the southwestern corner of the Banning Canyon, just north of the Banning Bench may support Banning Bench monitoring, and therefore is included in the data gap area depicted on **Figure 5-4**.

Banning (northern portion):

The Banning Storage Unit includes a variety of wells considered for inclusion in the representative monitoring network; however, a spatial data gap exists in the northern portion of the Banning Storage Unit. There currently are no active wells in this area to select for monitoring.

MBMI:

The MBMI lands are not subjected to SGMA, as MBMI is a federally recognized tribe. Over 36,000 acres of the Subbasin fall within MBMI's jurisdiction. It is within MBMI's right to keep water level and other data private. Therefore, this area is considered a permanent data gap in the SGP Subbasin.

Indio Subbasin Boundary:

The quantity of subsurface outflow at the SGP Subbasin eastern boundary with the Indio Subbasin represents one of the largest unknowns in the water budget and groundwater modeling. Ongoing data collection following the 2019 grant-supported installation of three multiple-completion monitoring wells will provide useful data for refining the subsurface flow estimate. These wells were installed with the intent of better understanding the hydrology along the Subbasin boundary, and its impacts on interbasin flows. The data will be used in five-year model updates to refine the estimate of subsurface flow into the Indio Subbasin. In addition to the regular water level data collection, the feasibility of a potential groundwater tracer study at the Fingal Point boundary with the Indio Subbasin will be evaluated and implemented if feasible.

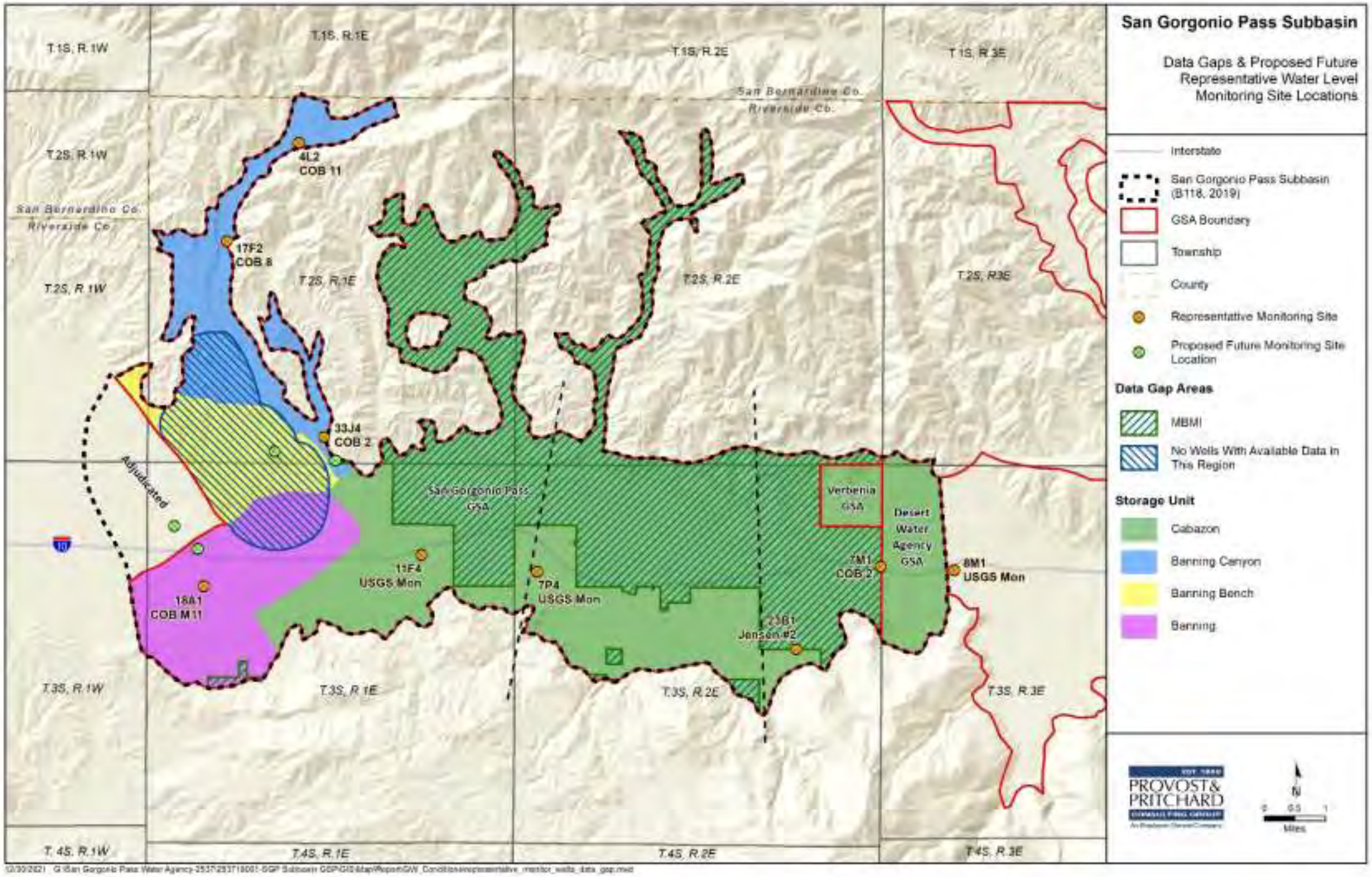

Figure 5-4 Data Gap Areas and Proposed Future Water Level Monitoring Site Locations

5.7.3 Plans to Fill Data Gaps

Regulation Requirements:

§354.38 (d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

The SGP GSP Working Group is interested in securing funding assistance for installation of new monitoring wells in the Banning Bench Storage Unit, the northern portion of the Banning Storage Unit, and areas on boundary of the MBMI lands. Unlike the Banning Bench Storage Unit and northern Banning Storage Unit data gap areas, the MBMI data gap area is not anticipated to have opportunities to monitor during the implementation period, based on MBMI's right to retain data privately.

Specific locations of proposed future monitoring wells, intended to mitigate the most significant data gap regions, are identified in **Figure 5-4**.

5.7.4 Adjustment to Density of Monitoring Sites and Frequency of Measurements

Regulation Requirements:

§354.38(e) Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:

1) Minimum threshold exceedances.
2) Highly variable spatial or temporal conditions
3) Adverse impacts to beneficial uses and users of groundwater.
4) The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.

The frequency and density of the proposed monitoring programs are discussed in previous sections. The criteria are considered adequate to provide the monitoring data to satisfy SGMA requirements. During the start of the GSP Implementation period after January 2022, when groundwater conditions are compared to sustainability goals, the monitoring network may be modified or enhanced if deemed necessary.

5.8 Reporting Monitoring Data to the Department

Regulation Requirements:

§354.40 Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.

The SGP Subbasin GSAs have coordinated in development of a Data Management System (DMS) for SGMA annual reporting and ongoing data evaluations. More information on the DMS is included in **Chapter 7**. The GSAs are prepared to coordinate on annual reporting requirements and data submittal to the DWR data and monitoring portal.

6 Projects and Management Actions to Achieve Sustainability

Regulation Requirements:

§354.42 Introduction to Projects and Management Actions. This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.

§354.44(a) Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following:

(A) A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

(B) The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.

(2) If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.

(3) A summary of the permitting and regulatory process required for each project and management action.

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

(5) An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.

(6) An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

(8) A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.

(9) A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.

(c) Projects and management actions shall be supported by best available information and best available science.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

6.1 Introduction

Multiple projects and management actions have been identified that will support the SGP Subbasin in maintaining its sustainability goals. Projects include actions that would improve water supply conditions in the SGP Subbasin, such as additional recharge projects. Management actions include efforts that would facilitate efficient groundwater management in the Subbasin.

The projects and management actions identified below fall into two phases. Phase 1 includes projects and management actions that could be implemented upon approval of the GSP, in the event their need is apparent. Phase 2 includes projects and management actions that would be considered for future implementation, after the 2027 and subsequent five-year GSP updates, or earlier in the event of increased water demands. Phase 2 projects would generally be projects that are not currently needed and would only proceed based on future water supply conditions. The SGP Subbasin is projected to maintain sustainability, independent of project and management action influence, through 2030. The Phase 2 projects and management actions presented may support increased groundwater pumping or climactic condition changes, which are projected to result in long term storage declines and potentially unsustainable groundwater use by 2030.

This chapter describes the proposed projects and management actions, including available information on required facilities and costs. These descriptions reference **Appendix E** which contains more detailed information on specific aspects of the projects and management actions, such as permitting, implementation plans and other SGMA regulation §354.44 requirements. The evaluation of project impacts and water supply improvements corresponds to the level of detail that has been developed. At this stage, some of the projects and management actions are conceptual and their benefits are described qualitatively. Other projects have been developed in more detail and their impacts to groundwater levels were evaluated with the SGP Groundwater Model.

6.2 Projects

Six projects have been identified in the SGP Subbasin that would improve groundwater conditions. The identified projections include the following in **Table 6-1**.

Table 6-1 Projects

Project No.	Project Title
Project 1	Municipal Water Conservation (Phase 1)
Project 2	Stormwater Capture (Phase 2)
Project 3	Additional Imported Water Spreading at Noble Creek Spreading Basins (Phase 2)
Project 4	New Pipeline with Additional Imported Water Spreading in the Cabazon Storage Unit (Phase 2)
Project 5	New Pipeline with Additional Imported Water Spreading in the Banning Storage Unit (Phase 2)
Project 6	New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit (Phase 2)

As the GSP is being implemented, the GSAs will maintain a standing list of proposed projects and their characteristics, along with their development status, and will use this list to prioritize and secure funding as opportunities become available. The GSAs will seek out and encourage projects that provide multi-benefits if feasible.

6.2.1 Project #1 Municipal Water Conservation (Phase 1)

The major anthropogenic water use in the SGP Subbasin is municipal water supply, either from pumping by local municipal water agencies or pumping by groundwater users such as the Morongo Band of Mission Indians (MBMI). The City of Banning, which is the largest municipal local water supplier, currently has a high efficiency in its water supply with total urban use at 8,369 acre-feet (AF) for year 2020 and averaging 218 gallons per capita day (GPCD) for potable consumption for years 2016 to 2020. The City met their 2020 water use target of 252 GPCD as identified in their Urban Water Management Plan with actual use at 247 GPCD, indicating that City use of various conservation measures has paid off (West & Associates, 2020). Other local water suppliers, including Cabazon WD and Mission Springs WD, have similarly high-water use efficiency as the City of Banning.

The City of Banning 2020 Urban Water Management Plan (West, 2020) indicates that the City is already implementing the Urban Water Management Plan Act required Demand Management Measures (DMM):

1. Water Waste Prevention Ordinances
2. Metering
3. Conservation Pricing
4. Public Education & Outreach
5. Programs to Assess and Manage Distribution Systems Real Loss
6. Water Conservation Program Coordination and Staffing Support
7. Other DMM that have a significant impact on water use

While there is already high efficiency in local water use, increased water use efficiency is an option that can be investigated in the future as a project for the SGP GSP or its individual member agencies. Increased water use efficiency would be most beneficial for the SGP GSP if it results in actions, such as turf replacement, that reduce consumptive use in the SGP Subbasin. While many water conservation measures are available that reduce non-consumptive uses (for example, indoor plumbing), these measures, while providing possible energy saving benefits, would likely provide minimal improvements in water supply conditions. A municipal water conservation action that is focused on reducing outdoor water consumptive uses such as vegetation transpiration or evaporation from water surfaces, would be most beneficial for the SGP GSP.

The project would implement a yet-to-be determined water use efficiency measure in order to reduce demand for potable water. The yield of a water use efficiency project would be dependent on customer interest in a future program. The San Gorgonio Water Supply Reliability Study (Woodard & Curran (formerly RMC), 2018) identified potential water use programs as follows:

- Turf removal rebates
- High-Efficiency Toilet rebates
- High efficiency nozzle distribution
- Large landscape surveys and retrofits
- Sprinkler giveaways or rebates
- Smart controller rebates
- Urinal retrofits
- Water surveys

It is thought that a Turf Replacement program may be the initial water conservation program implemented, as landscape irrigation is estimated to account for about 42 percent of annual residential water consumption statewide. In the Desert Zone/Inland Empire area like Riverside County, the average residential lots use 0.35 AF/year and turf replacement is estimated to save 51 gallons/square foot for the conversion of turf with less water-intensive landscaping plants being drip irrigated (Public Policy Institute of California, 2006).

For simplicity, it can be assumed that turf replacement occurs only in the front yard and that the area replaced is 50 feet by 20 feet or 1,000 square feet. Therefore, for each household that converts their turf, the savings is estimated at about 0.16 AF/year (1,000 sq. ft. * 51 gallons/sq. ft. ÷ 325,851 gallons/AF = 0.157 AF). In 2020, the City of Banning had 3,966 single family residential customers (West & Associates, 2020). If about five percent of the City of Banning single family residential customers, or 200 customers converted their turf, savings are estimated to be 32 AF per year (200 customers * 0.16 AF/year = 32 AF/year) and the savings over 15 years (estimated life of the irrigation system) could be as much as 480 AF. Typical turf rebates in other southern California locations have been as high as $2/square foot. For the 200 customers replacing 1,000 square foot of turf, costs (excluding administrative costs) would approximate $400,000 (200 customers * 1,000 sq. ft./customer * $2/sq. ft. = $400,000). Therefore, agency costs for the water are about $800/AF ($400,000 ÷ 480 AF = $833/AF). All estimated costs are subject to change, pending results from feasibility studies, environmental planning costs, and other unknown variables.

6.2.2 Project #2 Stormwater Capture (Phase 2)

The SGP Subbasin is a generally arid area, however occasional heavy precipitation events result in surface runoff that can recharge local aquifers, or on occasion result in downstream outflows to adjacent subareas. There are extremely limited measurements of local runoff in the SGP, however there have been some very infrequent observations of runoff from the San Gorgonio River and its tributaries to the Indio Subbasin to the east.

To estimate the approximate volumes of water that might be available for stormwater capture, the INFIL watershed model (SGP Groundwater Model Technical Memorandum, 2021) was used to quantify runoff volume and frequency for a small 250-acre representative watershed in the Pershing Creek watershed at the SGP Subbasin's western end. In general, rainfall decreases to the east, so the selected western location would likely be a high estimate of available stormwater. Additionally, no estimate was available of how much of this runoff may have percolated downstream to the SGP groundwater basin under natural conditions in the absence of a stormwater capture project. Because of these optimistic assumptions, the estimate of volume that could be captured is likely overestimated.

Considering the assumptions described above, a typical potential stormwater capture program was identified for the representative watershed conditions identified above. Based on the INFIL watershed model runoff for the representative 250-acre watershed, runoff would have occurred in ten months during the 94-year analysis period (1926-2019). The total average runoff from the representative 250-acre watershed would have been 0.6 AF. Assuming that a 1-acre-detention basin is constructed with a depth of 2 feet, an ability for 2 AF to be retained from each storm event is assumed. Over the 94-year analysis period, the average actual amount retained is estimated at about 0.11 AF. This is considerably less than the average amount of flow that is estimated to occur, as the great majority of the average runoff would have occurred in two individual months during the analysis period. At most, only 2AF of runoff would be retained in an individual event and flows averaging about 0.5 AF would flow past a potential detention basin and be lost to the SGP Subbasin

The land purchase and construction costs for the representative 1-acre detention basin were estimated very approximately as $150,000 per acre. With a project interest rate of 5.5% and a thirty-year repayment period, the construction cost would equate to about $10,300 per year and result in an estimated cost of nearly $100,000 per acre-foot of water retained. All estimated costs are subject to change, pending results from feasibility studies, environmental planning costs, and other unknown variables.

Based on the high cost identified for a stormwater capture project, construction of detention basins for purposes of stormwater capture does not appear to be an affordable water supply source. As the City of Banning and other urban areas of the SGP GSP develop, it is expected that detention basins will be constructed as appropriate for purposes of flood peak attenuation and as part of land development projects. However, the amount of additional stormwater that is retained is likely to be minimal (6 AF per year for an assumed 54 acres of detention basins). For purposes of GSP planning, no additional quantifiable yield is assumed from stormwater capture. However, if a stormwater basin were constructed as part of land development in a favorable recharge area and imported surface water supplies could also be recharged in the facility, it would increase the flexibility to recharge in the Subbasin and create more area for overall recharge.

6.2.3 Project #3 Additional Imported Water Spreading at Noble Creek Spreading Basins (Phase 2)

This Phase 2 project would provide increased groundwater recharge at existing spreading basins adjacent to Noble Creek in the adjudicated Beaumont Basin. Beaumont-Cherry Valley Water District has constructed the Noble Creek Recharge Facility containing about 23 acres of spreading basins along Noble Creek[35] and SGPWA has constructed the Brookside Recharge Facility containing about 25 acres that are also adjacent to Noble Creek [36]. SWP water that has been contracted for by SGPWA is supplied through the East Branch Extension for recharge at the BCVWD and SGPWA spreading basins along Noble Creek. Recharge at this location directly supplies the adjudicated Beaumont groundwater basin and flows downstream (and southeasterly) to supplement groundwater supplies in the Banning Storage Unit. The location of the project facilities for Project #3, along with other potential project facilities for Projects #4 and #5 that are described later, is shown on **Figure 6-1**.

Currently, water spreading at the Noble Creek Spreading Basins is limited to the existing SGPWA water supplies, which include SWP Table A Amounts, purchased water from La Hacienda Corporation (Nickel Water), and water transfers from other sources such as the Yuba Accord. These current water supply sources may need to be supplemented to meet SGPWA projected future need in the SGP Subbasin and other areas. This proposed project would provide for increased purchases of available water supplies for recharge at the Noble Creek Spreading Basins, which could meet projected local needs in the Banning Storage Unit of the SGP Subbasin as identified in the 2015 Urban Water Management Plan (UWMP) prepared by SGPWA[37].

At the time that this project was being identified, the 2020 UWMP for SGPWA was in development and was not available for identifying potential recharge amounts. In the absence of the draft 2020 SGPWA UWMP, the 2015 SGPWA UWMP was used together with draft information from the 2020 Beaumont-Cherry Valley Water District and City of Banning UWMP reports. Based on this information, a potential supplemental supply use of 2,000 AF per year in the SGP model area was identified for 2030. Note that the final 2020 SGPWA UWMP, which was not available at the time that these estimates were developed, does not indicate a supply shortfall for 2030 projections. As with other Phase 2 projects, actual amounts of additional Noble Creek imported water spreading would be based on needs identified in future five-year GSP updates.

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[35] https://bcvwd.org/noblecreekrecharge/ retrieved June 10, 2021
[36] https://www.sgpwa.com/groundwater-recharge-facility-construction-notice/ retrieved June 10, 2021
[37] https://www.sgpwa.com/2020-urban-water-management-plan-adopted/

Based on the preliminary assumptions identified above, this project was defined as using existing conveyance facilities along with assumed additional surface water imports. This project assumes that additional average deliveries of 2,000 AF per year would be obtained from some imported source and used within SGPWA. Based on the 2019 SWP Delivery Capability Report (DWR 2020), average SWP deliveries would be 59% of the nominal Table A Amounts on a long-term basis. Based on the estimated 59% SWP delivery capability, an equivalent of 3,390 acre-feet of Table A Amounts would need to be obtained to meet the average water supply delivery target of 2,000 acre-feet. Estimated purchase costs are $5,000 per acre-foot for 3,390 acre-feet of SWP Table A Amounts, with resulting total purchase costs of about $16.9 million. The purchase cost would be equivalent to an annual cost of $580 per acre-foot (assuming a 5.5% interest rate with a 30-year supply period). In addition to purchase costs, SWP operational costs of $490 to 590[38]/AF would be required to pay for conveyance use and pumping. No incremental costs for operating the Noble Creek spreading basins were assumed. The total annual cost of this alternative is estimated to range from $1,070 to $1,170 /AF. All estimated costs are preliminary and subject to change, pending actual purchase prices for SWP supplies, results from feasibility studies, environmental planning costs, and other unknown variables.

The effects of the proposed project on groundwater levels were evaluated using the SGP Groundwater Model at the 2030 level of climate change. The project was evaluated as a 2,000 acre-foot increase in Noble Creek recharge in addition to a current level of 10,500 acre-feet of imported supply. The 12,500 acre-feet of total imported water recharge is within the 18,000 acre-feet capacity of the BCVWD and SGPWA Noble Creek recharge facilities. Peak imported water supply amounts in high water supply years would occasionally exceed the 18,000 acre-foot capacity of the Noble Creek Recharge facilities and could require carryover to a subsequent year at the SWP San Luis Reservoir. As noted earlier, the assumed 2,000 AF imported water supply increase was based on preliminary water demand projections and potentially overstates the potential need for additional supply. In addition, the assumed 2,000 acre-foot increase in imported water supply was developed based on projected demands within the SGP Subbasin as well as in the adjacent Beaumont Basin.

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[38] The indicated SWP costs would vary depending on which SWP contractor that additional water supply is purchased from, which determined the amount of fixed costs that a purchasers would need to pay.

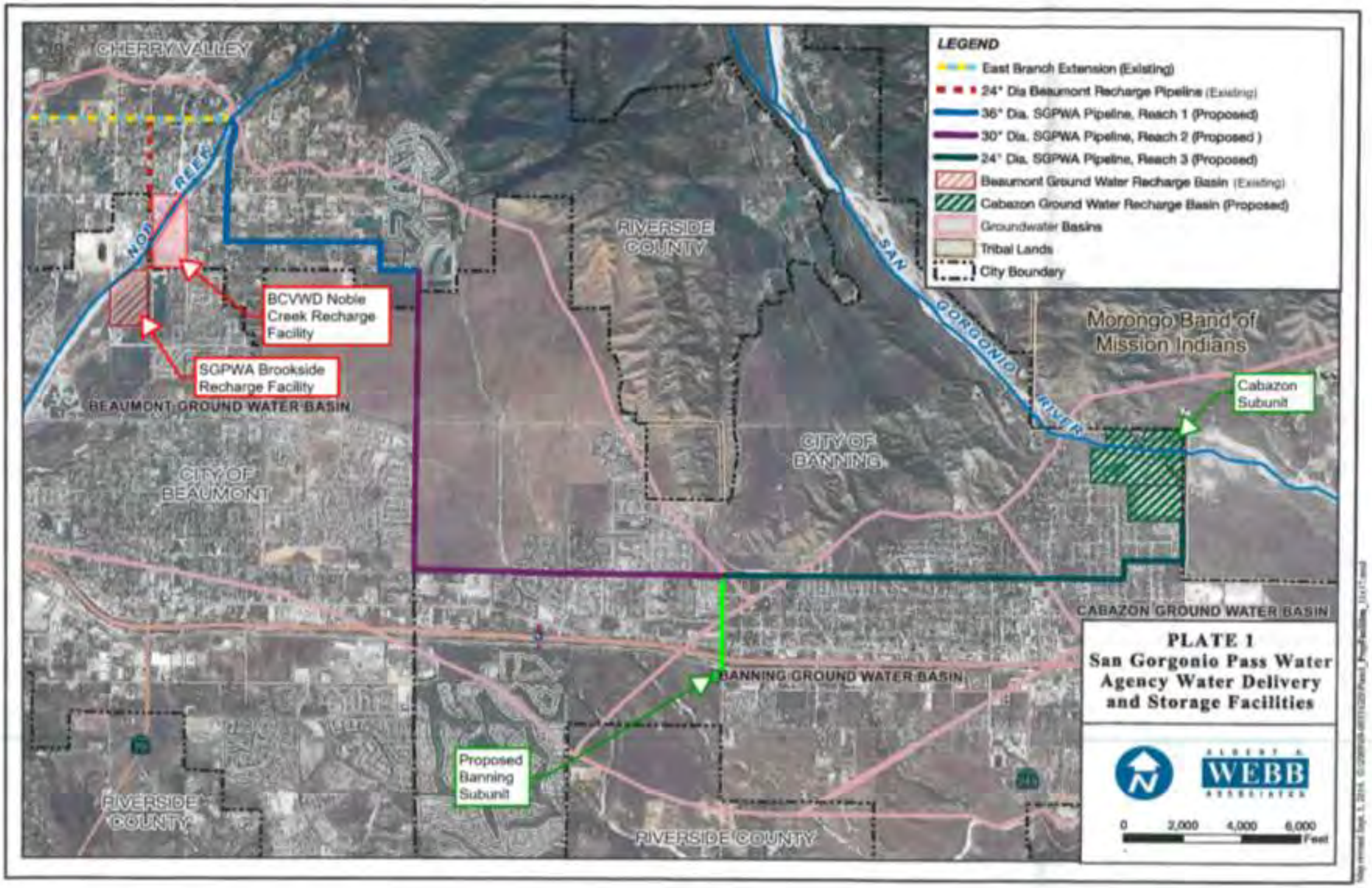

Figure 6-1 San Gorgonio Pass Water Agency Water Delivery and Storage Facilities (Webb, 2020)

The groundwater model projections for Project #3 at the 2030 level of development and climate change are shown in **Figure 6-2** for the Banning Storage Unit representative monitoring well 3S/1E-18A01.

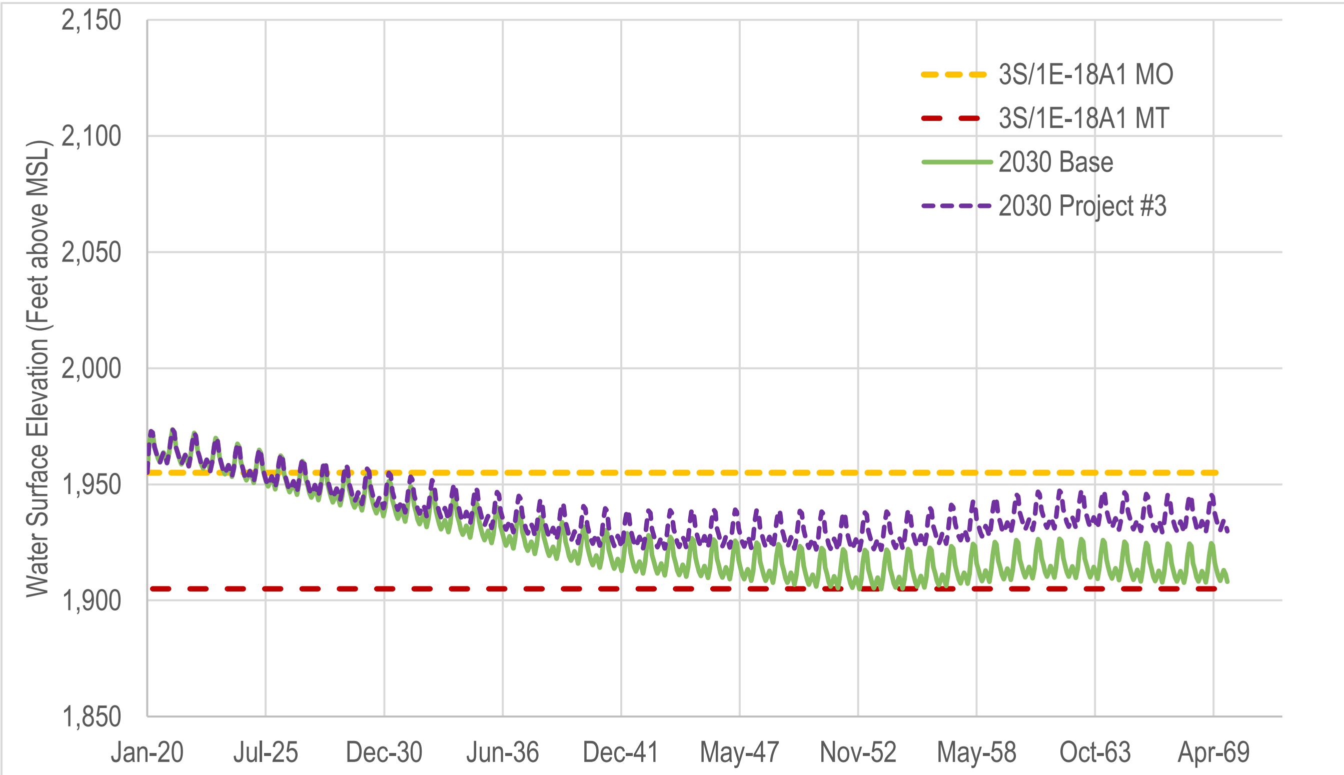

Figure 6-2 Projected Groundwater Levels for Project #3 at Banning Storage Unit Representative Monitoring Well 3S/1E-18A1

Figure 6-2shows 2030-level baseline projections, which are labeled 2030 Base. These projections are always maintained above the minimum threshold but are below the measurable objective for more than half of the projection period. The 2030-level groundwater level projections with the additional recharge resulting from Project #3 are labelled 2030-Project #3. After 2030, the groundwater levels projections resulting from Project #3 are consistently about 20 feet higher than the 2030 base line water levels. These higher water levels provide more flexibility in groundwater basin management and a larger cushion for avoiding water levels dropping below the minimum threshold. Although these results demonstrate that additional Noble Creek recharge improves water supply conditions in the Banning Storage Unit, there is some uncertainty in the model predictions of this additional recharge, which is at levels that exceed actual operations during the calibration period. As recharge at Noble Creek is increased in the future, the groundwater model should be periodically evaluated to confirm its predictive capability. Finally, the effects of Project #3 are minimal for locations east of the Banning Storage Unit and no hydrographs are shown here for representative monitoring wells in the Cabazon Storage Unit.

6.2.4 Project #4 New Pipeline with Additional Imported Water Spreading in the Cabazon Storage Unit (Phase 2)

Project #4 is a potential Phase 2 recharge program that could be implemented in the future to address future uncertain potential water use increases in the Cabazon Storage Unit. In projecting groundwater levels for the SGP GSP, the groundwater model is provided with estimates of future groundwater pumping by all parties for current, 2030-level and 2070-level conditions. Where available, projections of future groundwater extractions have been used from sources such as UWMP for urban areas within the SGP GSP. The San Gorgonio Pass Integrated Regional Water Management Plan (SGPIRWM) has reported that MBMI annual water demands are projected to increase by only 539 acre-feet between 2020 and 2040, with that increase to be included as a part of the Project #4 described in this section.

Project #4 has been developed as a potential approach to providing a sustainable water supply for potential future local developments by any SGP entity beyond increases anticipated in the 2020 UWMP, the SGPIRWPM and other planning documents, based on assumptions defined below. The potential increased MBMI pumping could include a portion of unused Federal Reserved Water Rights (FRWR) or increased use of their share of the Subbasin's sustainable yield. The water use assumptions indicated for Project #4 are, therefore, an extreme projection that likely will not occur in the planning horizon.

The potential Phase 2 Project #4 uses a proposed new pipeline extension from the terminus of the East Branch Extension to the Cabazon Storage Unit near San Gorgonio River that has been evaluated as a conceptual project by SGPWA. The preliminary alignment and features of the proposed new pipeline are shown in **Figure 6-1.** The pipeline would have three reaches. Reach 1 from Noble Creek to the intersection of Highland Springs Avenue and Brookside Avenue would have a 36-inch diameter and an estimated capacity of 52 cfs. Reach 2 would extend from the end of Reach 1 to the intersection of Sunset Avenue and Wilson Street, with a diameter of 30 inches and an estimated flow capacity of 30 cfs. Reach 3 would continue from the end of Reach 2 to proposed recharge basins adjacent to the San Gorgonio River. The recharge basins would consist of 54 acres of developed basins at the Robinson's Ready Mix Quarry site in the City of Banning. The pipeline alignment and recharge basin locations are all preliminary and were used for purposes of cost estimation for SGPWA (Webb & Associates, 2020).

The estimated costs for the conceptual pipeline are $36.3 million and for the proposed recharge basins as $14.2 million, with both estimates including a 15% contingency. The total cost for the facilities would be $50.4 million. The pipeline and recharge basins would have the capacity to provide up to 22 cfs of recharge at the proposed new recharge basins, which would have a total annual capacity of 15,540 AF. In addition to the capital costs, the project would require imported water purchase and annual operational costs estimated as $1,070 to $1,170 per AF as with Project #3. Responsibility for payment of these costs has not been determined and would depend on how much Subbasin entities benefit from the increased recharge.

Water supply for the new pipeline and recharge facilities would exceed the currently available SGPWA contracted supplies. SGPWA is currently conducting an infrastructure study to identify necessary water supply sources, which could include supply augmentation actions such as purchased SWP Table A amounts (either permanent or on a year-to-year basis), participation in the Sites

Reservoir Project, or participation in the Delta Conveyance Project. Additionally, other possible imported supply augmentation projects could be developed by MBMI for any proposed increase in their use. Recharge in the Cabazon Storage Unit with the proposed new facilities would require access to additional water supply sources, which are to be determined.

For purposes of evaluating the effect of Project # 4 on groundwater levels and storage, a groundwater model simulation was prepared. The simulation was based on an alternative 2030 water budget, with assumed increased pumping by SGP water users, including the MBMI. An approximate estimate of a theoretical development was prepared based on assumed development of 5,000 acres land in the SGP Subbasin located generally within a mile of Interstate 10. Groundwater pumping increases from such development would depend on the proposed use, which is also uncertain. To provide an approximate estimate of the amount of potential use that could occur from such a development, the water use characteristics for the recently proposed Rancho San Gorgonio suburban development were used[39]. Based on the unit water use characteristics for the Rancho San Gorgonio project, the theoretical development could result in increased groundwater pumping of as much as 7,200 AF per year. The theoretical groundwater development was assumed to occur generally in the proposed development areas, being distributed from near the City of Banning in the west to the boundary of SGPWA in the east. Considering potential recycled water use from such a project and recharge from return flows, such a development would result in a net use of approximately 5,300 AF. As noted earlier, the projected development is uncertain, both in the assumed quantities and its development timing. The identified projection is considered to be on the high side and it is unknown what year it would occur, or if it would even occur at all within the GSP implementation period.

This Project is identified as an option that provides a long-term average supply of 5,300 AF per year, with the delivery pattern taken to be proportional to the SWP projected water supplies to the SGPWA. The actual sources of imported supplies have not been determined and could be obtained from various imported or exchanged sources. For analysis purposes, a SWP supply sources has been used, which could vary considerably from year to year based on water supply conditions in Northern California. While SWP supplies might not be the specific supply used for this Project, it is likely that the availability of any imported water source made available for this Project would vary based on Northern California wetness conditions for modeling purposes. The supply identified in this projection varied from a minimum of 1,200 AF per year in 1977 to a maximum of 8,800 AF in 1983, with a long-term average of 5,300 AF per year.

Based on the theoretical development described above, additional net use of 5,300 AF, and additional recharge of 5,300 AF to support the potential additional net use, groundwater level projections were prepared. The groundwater level projections are based on 2030-level climate change conditions and baseline water use projections as described in **Chapter 3 – Basin Setting**. The groundwater level projections also incorporate the theoretical additional groundwater use and this Project's recharge of 5,300 AF. The results of these projections for groundwater conditions in the Cabazon Storage Unit are shown in Figure 6-3 and Figure 6-4 Groundwater level impacts from this Project were minimal in the Banning Storage Unit and projections are not shown for that area.

[39] http://banning.ca.us/432/Rancho-San-Gorgonio-Specific-Plan

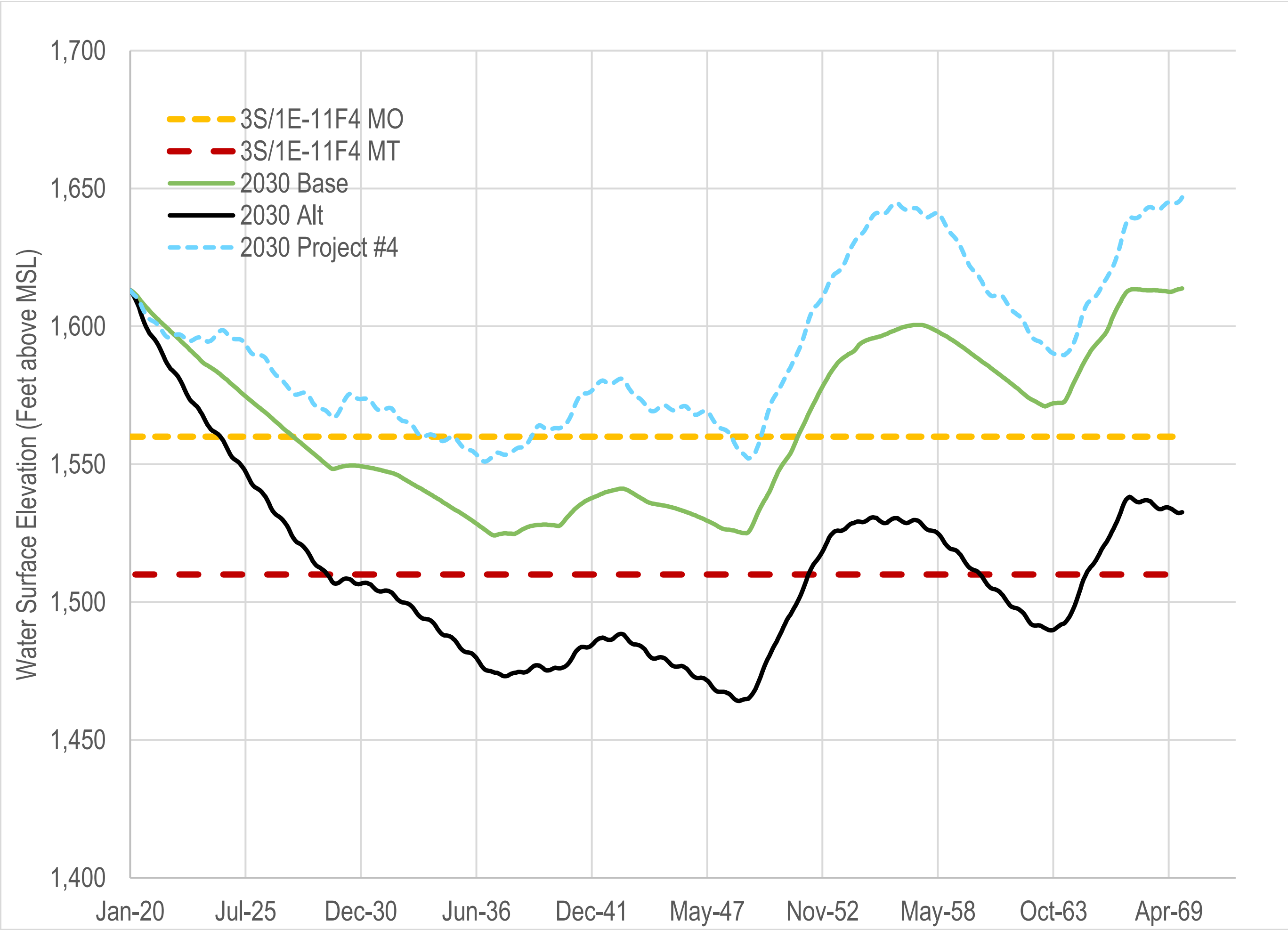

Figure 6-3 Projected Groundwater Levels for Project #4 at Cabazon Storage Unit Representative Monitoring Well 3S/1E-11F4

Figure 6-3 shows projected groundwater levels for Project #4 in the western portion of the Cabazon Storage Unit. The projections show the 2030 Base projections (labelled 2030 Base) along with the alternative increased water use projection (labelled 2030 Alt). The water levels with Project #4 are shown as 2030 Project #4. The projected water levels in the western Cabazon Storage Unit are closest to the proposed groundwater recharge source and show considerable improvements as compared to the 2030 base projections as well as the alternative projection with higher water use. The projection shows that Project #4 would maintain groundwater levels in the western area of the Cabazon Storage unit above the proposed minimum thresholds.

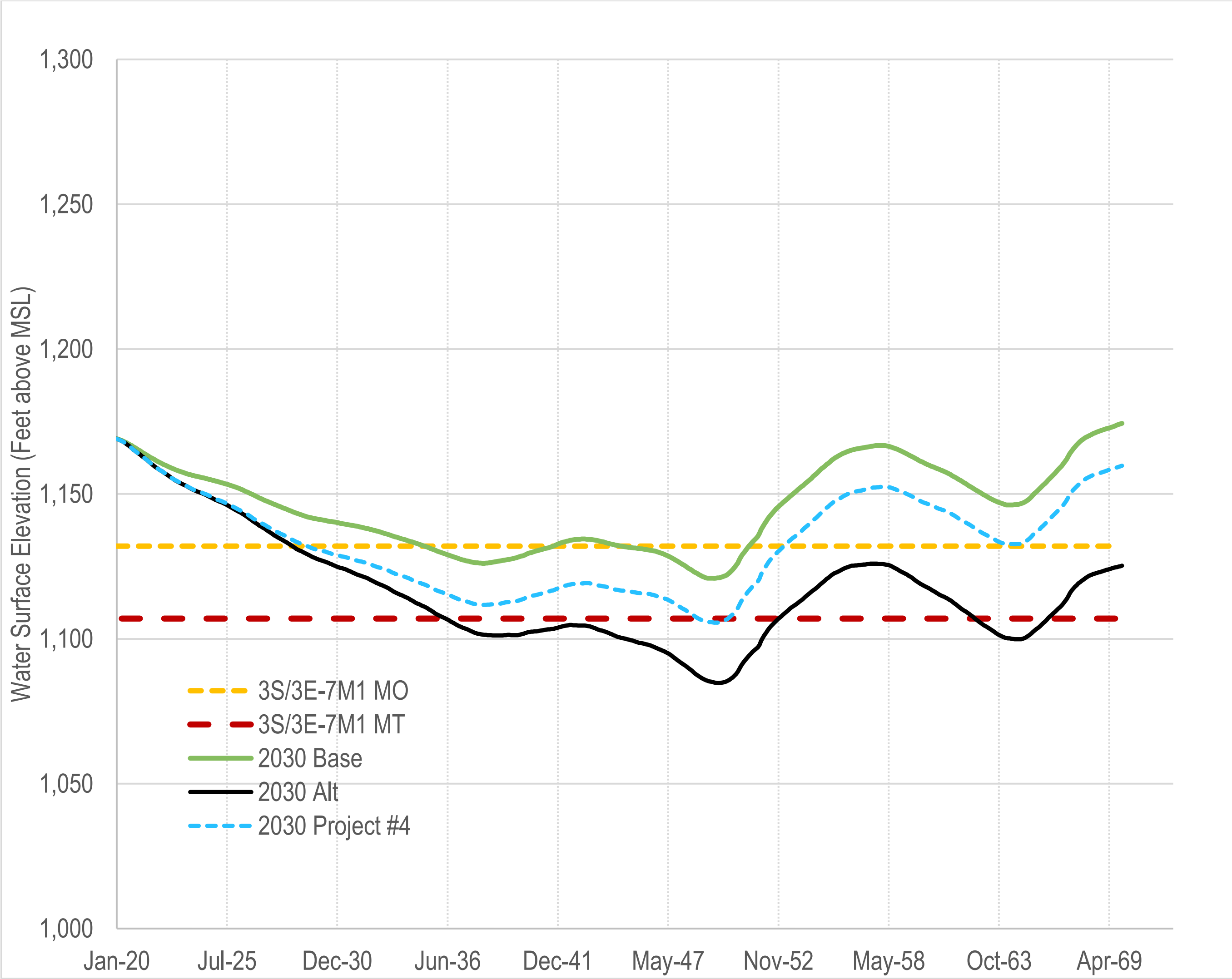

Figure 6-4 Projected Groundwater Levels for Project #4 at Cabazon Storage Unit Monitoring Well 3S/3E-7M1

Figure 6-4 shows projected groundwater levels at representative monitoring well 3S/3E-7M1 in the eastern portion of the Cabazon Storage Unit. As with the western Cabazon Storage Unit, the projected water levels predict water levels for the 2030 Baseline (labeled 2030 Base), the 2030 Alternative Baseline (labeled 2030 Alt) and for Project #4 (labeled 2030 Project #4). These projections show that the 2030 Alternative baseline would be considerably lower than the 2030 Baseline and result in groundwater levels that are well below the proposed minimum threshold. The 2030 Alternative results in increased water levels (as compared to the 2030 Alternative Baseline) which remain mostly above the proposed minimum threshold. The projected Project #4 water levels show lesser improvements as compared to the Alternative Baseline than those in the western Cabazon Storage Unit (Well 3S/1E-11F4), which likely represents the more distant location of recharge in the western portion of the Cabazon Storage Unit and the relatively higher umping increases in the eastern portion of the Cabazon Storage Unit. While the projections show water levels that appear to fall below the minimum threshold for short periods, the results are within the groundwater model's margin of error. If Project #4 is developed at some point in the future, more refined specifications of the proposed extraction and recharge locations are possible that would avoid apparent instances of water levels falling below the minimum thresholds.

6.2.4 Project #5 New Pipeline with Additional Imported Water Spreading in the Banning Storage Unit

A new pipeline to provide for additional recharge in the SGP Subbasin is shown in Figure 6-1 and described in Project # 4 (New Pipeline with Additional Imported Water Spreading in the Cabazon Storage Unit). Project #5 (New Pipeline with Additional Imported Water Spreading in the Banning Storage Unit) would use reaches 1 and 2 of the new pipeline to provide additional recharge to the Banning Storage Unit (the Five Bridges Recharge Site in the 2018 Water Supply Reliability Study by RMC). This Phase 2 potential project would include use of Reaches 1 and 2 in the Project #4 pipeline, with a smaller lateral pipeline to be constructed at the end of Reach 2. The lateral pipeline would begin at the end of Reach 2 and run southerly along Sunset Avenue south of Interstate 10. A 10-acre spreading basin would be constructed at a location generally along the west side of Sunset Avenue between Interstate 10 and the extension of Bobcat Road, with the precise location not yet determined. The pipeline alignment and preliminary recharge basin location are shown in **Figure 6-1.**

Assuming recharge rates of one acre-foot per acre per day and a use factor of 80%, this recharge facility would have a capacity for 2,900 AF per year. Assuming a supply source of State Water Project (SWP) imported water, recharge at this site would average about 1,700 AF per year over the long term, with projected annual recharge varying from a minimum of 500 AF to a maximum of 2,900 AF.

This proposed recharge location would increase the capability to recharge the Banning Storage Unit and supplement intentional recharge to the Beaumont Basin from the existing Noble Creek Spreading Basins. As noted in the **Chapter 3 – Basin Setting** discussion, increased spreading in the Noble Creek Spreading Basins has an uncertain effect on groundwater levels in the southern part of the Beaumont Basin and adjacent areas in the Banning Storage Unit due to uncertain hydraulic conductivities in the Beaumont and Banning Storage Units, and uncertain flow constraints due to faulting between the Beaumont and Banning Storage Units and potentially other locations.

As discussed in the descriptions for Project #3 (*Additional Imported Water Spreading at Noble Creek Spreading Basins (Phase 2)*) and Project #4 (*New Pipeline with Additional Imported Water Spreading in the Cabazon Storage Unit (Phase 2)*), water supply for the new pipeline and recharge facilities would likely exceed the currently available SGPWA contracted supplies. SGPWA is currently conducting an infrastructure study to identify necessary water supply sources, which could include supply augmentation actions such as purchased SWP Table A amounts (either permanent or on a year-to-year basis), participation in the Sites Reservoir Project, participation in the Delta Conveyance Project or other possible projects that replace lost SWP supply or augment imported supplies. Recharge in the Banning Storage Unit with the proposed new facilities would require access to some of the additional water supply being evaluated by the SGPWA Infrastructure Study.

As with Projects #3 and Project #4, groundwater level projections were developed for this project (Project #5). The projections assume additional recharge averaging 1,700 AF per year for the new recharge basins in the Banning Storage Unit. With Project #3, the total additional recharge was 2,000 AF per year, but much of the potential additional Noble Creek recharge for Project #3 would be moved to Project #5's proposed recharge basin in the Banning Storage Unit. As such, the Project #5 additional recharge of 1,700 AF per year would be implemented with a modified Project #3 increase of only 300 AF per year. As with Project #3 and Project #4, the projections for Project #5 are developed at the 2030 level of development and climate change.

Projected groundwater levels for Project #5 are shown in Figure 6-5 or the representative monitoring well location in the Banning Storage Unit. The projections had minimal effects in the Cabazon Storage Unit and those projected groundwater levels are not shown or described here. Projected water levels in the adjacent adjudicated Beaumont Basin are also not shown

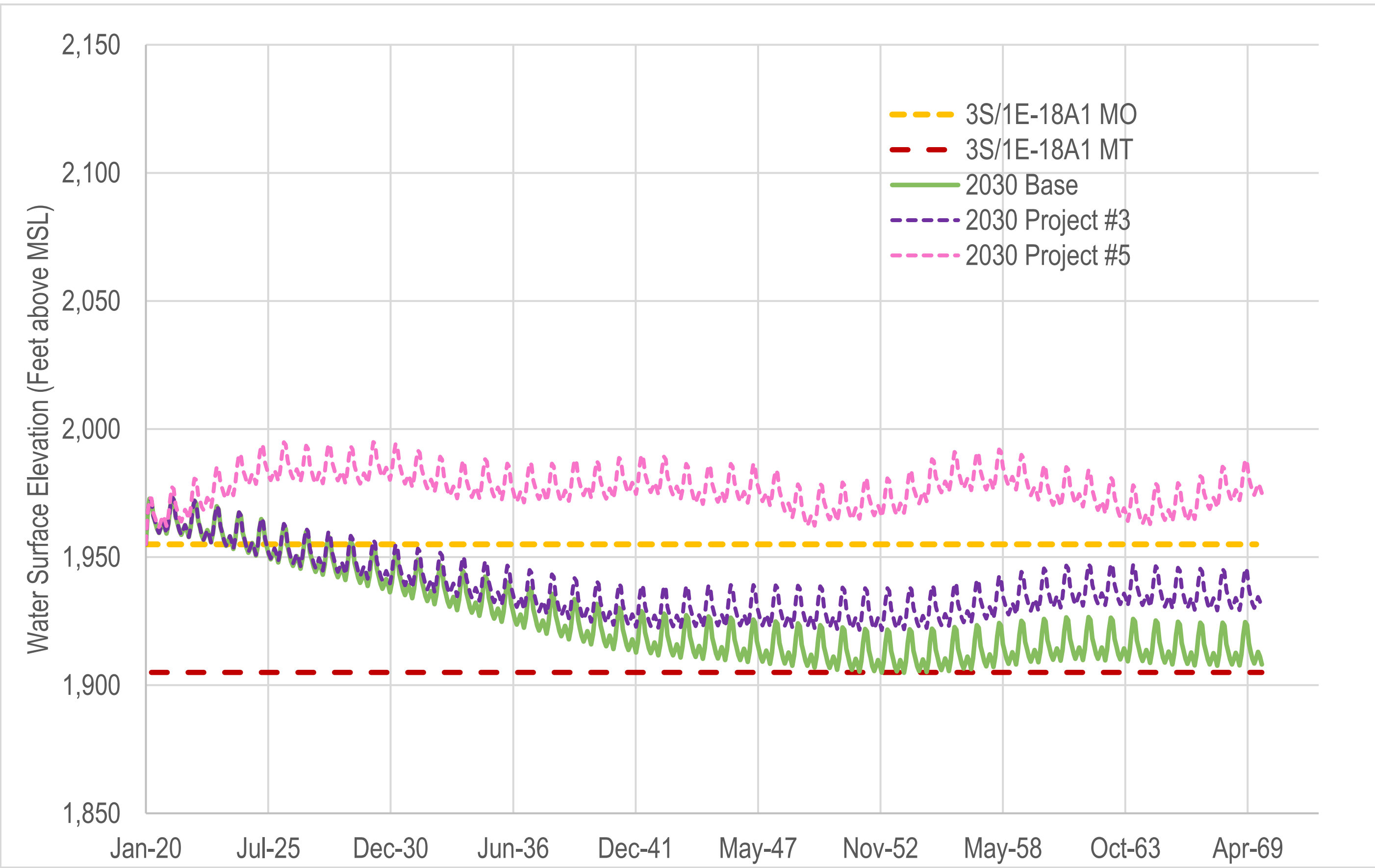

Figure 6-5 Projected Groundwater Levels for Project #5 at Banning Storage Unit Monitoring Well 3S/1E-18A1

The water levels in Figure 6-5 show projected levels for the 2030 baseline conditions (labelled 2030 Base), 2030-Level Project #5 projections and 2030-Level Project #3 projections. The projected groundwater levels for Project #5 show considerable improvement in groundwater levels in the Banning Storage Unit. While Project #3 and Project #5 have the same level of additional water supply (2,000 AF per year on average), Project #5 has higher projected groundwater level conditions, averaging more than 20 feet higher than Project #3. As with other Phase 2 projects, implementation of Project #5 would depend on ongoing evaluation of groundwater conditions in the southern Beaumont Basin and the adjacent Banning Storage Unit. Project #5 would be a likely candidate for implementation primarily if ongoing groundwater monitoring and evaluation identifies that Noble Creek recharge movement into the Banning Storage Unit is restricted.

6.2.5 Project #6 New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit (Phase 2)

Project #6 is a Phase 2 project that would include additional recharge in the Cabazon Storage Unit based on a potential exchange of imported SWP water with Colorado River Aqueduct water. As shown in Figure 6-6, the project would take water from the Colorado River Aqueduct portal south of Cabazon and supply the proposed recharge basins. This potential Phase 2 Project #6 would potentially provide supplemental water supplies to water users in the eastern portion of Cabazon Storage Unit as necessary to maintain their ongoing groundwater extractions.

A new turnout would be constructed on Metropolitan Water District of Southern California's Colorado River Aqueduct at the eastern portal of the San Jacinto Tunnel, just south of Cabazon. To meet Cabazon Water District's 750 AF average demands, a new recharge basin of 4 acres is assumed to be constructed in the vicinity of the San Jacinto Tunnel east portal. Assuming recharge rates of 1 AF per acre, this recharge facility would have a 2.5 cfs maximum recharge rate and provide a maximum of 1,200 AF per year of recharge with an 80% usage factor. The reconnaissance level estimated cost for the proposed turnout is $3 million and for the recharge facilities is $300,000, resulting in a total capital cost of $3.3 million. In addition to the initial capital costs, the project would likely require purchase cost for additional imported water supplies and operations costs as for Project #3, totaling $1,070 to $1,170 per AF. No groundwater model projections were made to show the effects of this additional recharge. All estimated costs are subject to change, pending results from feasibility studies, environmental planning costs, and other unknown variables.

A potential concern with Project #6 could be adverse effects on SGP Subbasin salinity from Colorado River Aqueduct water, which has salinity (total dissolved solids) that generally varies from about 550 to 700 mg/L. By comparison, SGP Subbasin groundwater salinity in the vicinity of Cabazon Water District averages less than 500 mg/L TDS. Using a conservative estimate of the total groundwater storage in the Cabazon Storage Unit of 800,000 AF and an average TDS of 400 mg/L for the Cabazon Storage Unit, use of 750 AF of Colorado River Aqueduct water with an assumed salinity of 700 mg/L would increase SGP Subbasin TDS from 400 mg/L to 433 mg/L over 50 years, which is less than the TDS' Maximum Contaminant Level of 500 mg/L. This computation is very conservative as it doesn't account for drainage of some of the recharged salinity out of the SGP Subbasin during that period.

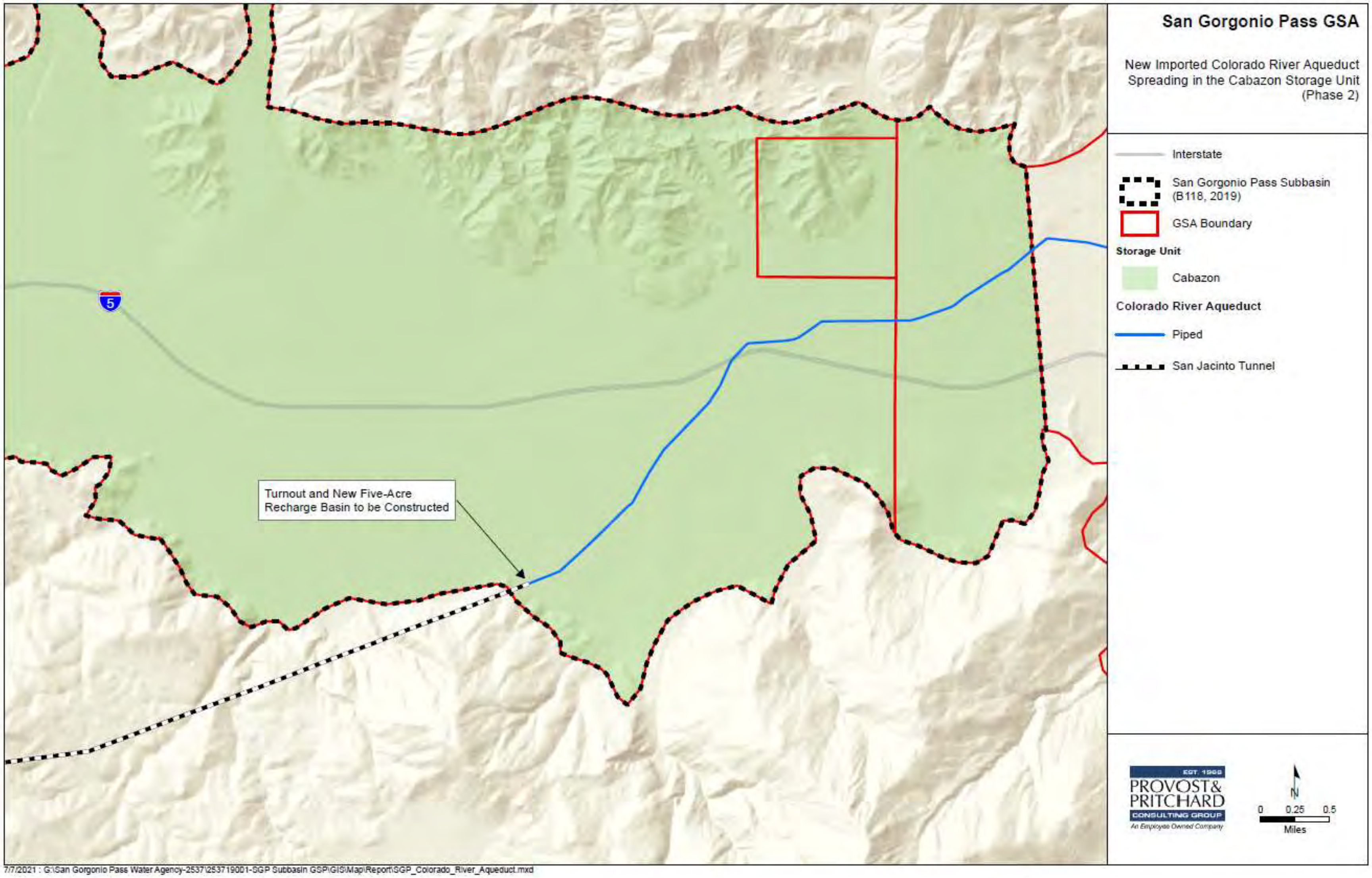

Figure 6-6 Project #6 New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit (Phase 2)

6.3 Management Actions

Several management actions have been identified for the SGP Subbasin to support GSP implementation efforts. The identified management actions include the following **Table 6-2**.

Table 6-2 Management Actions

Management Action No.	Project Title
Management Action 1	Implement Action Plan if Groundwater Levels Fall Below Minimum Thresholds
Management Action 2	Well Head Requirements
Management Action 3	Investigate Issues Promptly Regarding Water Quality and Unexpected Water Pumping
Management Action 4	Impose SGMA or Other Available Fees on Pumpers to Encourage Reduced Pumping and Conservation
Management Action 5	Groundwater Pumping Allocation
Management Action 6	Groundwater Basin Adjudication

6.3.1 Management Action #1 Implementation Action Plan if Groundwater Levels Fall Below Minimum Thresholds

The SGP GSP implementing GSAs plan to comply with the GSP which will facilitate avoidance of significant and unreasonable impacts to groundwater resources. Reports of ongoing groundwater monitoring, as compiled in the GSP annual reports, will provide visibility to the status of groundwater indicators, especially the measurable objectives and minimum thresholds.

The measurable objective provides an initial indication of a threat to groundwater sustainability indicators. If groundwater levels at representative monitoring wells fall below measurable objectives, an initial reaction would be to review hydrologic conditions and compare groundwater extractions to the sustainable yield. If hydrologic conditions have been below the long-term average, and extractions have averaged less than the sustainable yield, then that indicates that a drought period is occurring and the Subbasin is appropriately using its operational flexibility to facilitate long-term conjunctive use. Alternatively, if recent hydrologic conditions have been average or above average, and groundwater extractions have been higher than the sustainable yield, that is an indication that the Subbasin may be operating unsustainably. If the initial indication is that the Subbasin is operating unsustainably, then measures need to be taken to implement one or more of the projects or management actions identified in this Section. To ensure the GSP is being followed by all pumpers in the Subbasin, the GSAs will consider adopting rules, regulations and ordinances as means of enforcement, including imposing fines and penalties as allowed under law.

A parallel approach to the above should be taken if measured water quality at representative monitoring sites exceeds the measurable objective. The GSAs would then work together with the Regional Board, as the primary enforcer of water quality regulations, to address the issues.

6.3.2 Management Action #2 Well Head Requirements

The GSAs recognize that community involvement and outreach alone will not curtail groundwater overdraft if management actions must be implemented to reduce water demand. Additional well requirements may be required to manage and understand the dynamic groundwater conditions more effectively. Within the Subbasin, well construction permitting is managed by Riverside County Environmental Health Division (EHD) as detailed in **Chapter 2 – Plan Area**. Obtaining a well permit is currently a ministerial process, not requiring discretionary action or CEQA. The intent of this management action is to have the GSAs work with the EHD to increase well requirements for new wells without disrupting the current ministerial permit process. Additionally, the GSAs would promote regular communication with the EHD and would seek to maintain more monitoring responsibility. The GSAs may adopt a policy to augment the current well requirements set by the State/EHD and establish new permit criteria, enforce GSA policies, and require GSAs' approval of all permit paperwork for non-de minimis extractors before EHD permit issuance. The policy would affect permits to construct, deepen, destroy, recondition, or repair a well. In order to increase data collection, reporting, and ongoing groundwater management efforts, the additional well requirements policy may contain the following information:

- Registration of extraction facilities with the GSAs to supplement and confirm information obtained from a well canvass of the GSA(s) area.
- Require the installation of flowmeters on all new or repaired wells, and installation of sounding tubes on all new wells.
- Require the well owner to self-report groundwater extraction volumes, static water levels, and water quality data.

The GSAs will request that the County notify the GSAs of any new well permits or well destructions and that well completion reports, and water quality test data of new wells be submitted to the GSAs. The GSAs may consider separating the additional well requirements management action into multiple policies or be silent on various bulleted components until the GSAs deem them necessary. For example, the requirement of installing a flow meter on the pump discharge may be enacted before the requirement of installing a sounding tube. Further explanation and detail of the potential additional well requirements are continued below.

The desired outcome of additional well permitting requirements is the ability to monitor groundwater extractions, water levels, and water quality in a thorough, accurate, and efficient manner across the GSAs. The evaluation criteria differ amongst the bulleted considerations.

MBMI, which may construct wells in the SGP Subbasin, is a sovereign nation and would be exempt from required compliance with any well head construction requirements. Documentation of any proposed well head requirements would be provided to the MBMI along with description of the expected benefits to the SGP Subbasin, and MBMI could choose to voluntarily comply with the proposed well head requirements, or alternatives that they identify.

Registration of Extraction Facilities

As stated in SGMA Section 10725.6, "a GSA may require the registration of a groundwater extraction facility within the management area of the GSA." The GSAs may adopt this policy to hopefully improve and supplement the existing well records housed by the EHD and DWR and provide a complete record of the number of wells within the GSAs. The GSAs have greatly benefited from the current exchange of well information and use of the online DWR Well Completion Report Map Application tool[40]. However, through local outreach and research of the proposed well monitoring network, the GSAs suspect many existing wells do not have the State and EHD well completion reports (the well driller documentation on the geology and well construction details) or the reports have not been entered into the DWR database and/or EHD records. Unfortunately, the historic well completion reports (especially the older ones) and available DWR 429 Forms (Well Data Form indicating the state well number and detailed well location information) often have insufficient information to confidently locate the exact position of an older well, which is necessary to match up water level and quality information with the area in which pumping is occurring. In recent decades, the advances in technology, standardization of forms, and accessibility to GPS location have significantly improved the accuracy of well completion reports through better location identification and recordkeeping. The intent of registration of groundwater extraction facilities would be to complement existing well recordkeeping and ensure that the GSAs can fully understand and quantify the potential impacts of groundwater decline. Coupled with the registration of extraction facilities, the GSAs may invest in a complete well canvass study to verify the number of wells and presence or absence of a flow meter.

Installation of Well Flow Meters

The GSAs will investigate options for quantifying groundwater use by individual landowners and may require the installation of a flow meter on all groundwater extraction facilities (with extractions greater than the SGMA de-minimis level of 2 AF per year) in the future to provide accurate quantities of groundwater extraction and serve as the nexus to other management actions. The policy would describe the acceptable types of flow measurement devices, installation standards and requirements, operation and maintenance requirements, and penalties for tampering, neglect, or misconduct. For example, the flow meter would be installed inline on the pump discharge before any other connections or discharge points in accordance with the meter manufacturer's specifications. The meter must accurately quantify the volume of extracted groundwater in AF and be routinely maintained by the well owner. The policy for flow meter installation may require a meter equipped with telemetry for remote reading of the groundwater extraction by the GSAs. Failure to comply with the policy may result in civil penalty or criminal fine in accordance with SGMA Section 10732. Once the meter installation was complete, a certification report would be submitted by the landowner or agency documenting that the work was completed in accordance with the GSAs' well requirements policy.

Installation of Sounding Tubes and Water Quality Sample Ports

The GSAs may require the installation of a well sounding tube, air line, electric depth gauge, and/or other water level sensor in selected locations for the purpose of measuring water levels throughout the Subbasin especially on new well installations. In addition, the GSAs may require the installation of a sample port on the well discharge piping in selected locations for the purpose of potentially collecting water quality samples throughout the Subbasin. The accurate and widespread collection of water level and water quality data will supplement the monitoring network information and provide the GSAs with additional information to monitor the success/failure of the GSP against the established Sustainable Management Criteria in **Chapter 4 – Sustainable Management Criteria**. The policy would describe the acceptable types of water level measuring devices and sample ports,

[40] https://dwr.maps.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37

installation requirements, and penalties for tampering, neglect, or misconduct. The installation must provide or allow for the accurate measurement of static groundwater level in feet below the ground surface and water sample collection. If applicable, the water level measurement device must be routinely maintained by the well owner. Once the installation was complete, a certification report would be submitted by the landowner or agency documenting that the work was completed in accordance with the GSAs' well requirements policy.

Self-Reporting of Groundwater Extraction

If the GSAs select flow meters as the method of quantifying groundwater extraction, and if the installed meters are not equipped with telemetry, then the GSAs may require the well owner to self-report to the GSAs the metered groundwater extraction volumes on an annual basis. The policy would describe the frequency and various methods of reporting, due dates, and specific instructions for data submission. The GSAs may provide extractors with a self-addressed mailer for return mailing. The mailer may include information for reporting instructions such requirements that the groundwater extraction volume be reported in AF and include the current flow meter totalizer reading. Other information requests may include self-reporting of static water level readings if the well is equipped with a sounding tube, along with instructions on how static water level measurements should be measured twice per year once water levels have stabilized after pump shutdown. If there is limited compliance with self-reporting, the GSAs may elect to gather the appropriate data with their own staff. The policy would describe that the frequency of the reporting may be temporarily increased if minimum thresholds are exceeded.

6.3.3 Management Action #3 Investigate Issues Promptly Regarding Water Quality and Unexpected Water Pumping

The GSAs intend to take full advantage of the powers granted them under SGMA by promptly investigating for all the purposes outlined in Water Code section 10725.4 particularly to the extent specified, water quality or other issues are identified.

The GSAs will have the opportunity to review groundwater quality conditions as drinking water producers are required to monitor and report groundwater quality, which become publicly available. In addition, groundwater levels and storage will be assessed on an annual basis, as part of the Annual Reporting required by SGMA. Anomalies or significant changes in water levels are to be studied as part of data quality assurance protocols. In the event significant water quality impairments or groundwater level data reveals significant unexpected groundwater extraction impacts, the GSAs intend to investigate further to understand causation and support mitigation planning that may involve implementation of projects and management actions listed in this chapter.

6.3.4 Management Action #4 Impose SGMA or Other Fees on Pumpers to Encourage Reduced Pumping and Conservation

The GSAs have been granted the authority to impose fees by ordinance or resolution to fund costs of a groundwater sustainability program including preparation, adoption, and amendment to a groundwater sustainability plan, and investigations, inspections, compliance assistance, enforcement, and program administration. Once the GSP is adopted, GSAs have the authority to impose fixed fees or volumetric based fees to cover the costs of (1) GSP administration, operation, and maintenance, (2) Acquisition of lands or other property, facilities, and services, (3) Supply, production, treatment, or distribution of water, and (4) other activities necessary or convenient to implement the plan.

While initially there may be limited necessity for any new fees, the GSAs may choose to implement new fees if measurable objectives have been exceeded, to encourage conservation and reduced groundwater extractions, and assist in avoiding exceedances of minimum thresholds. The fees would not apply to pumping by the MBMI who, as a federally recognized tribe, are not subject to SGMA jurisdiction. Groundwater producers throughout the subbasin, or in the vicinity of a nearby measurable objective exceedance, may be subject to the fees within 2-years of the groundwater level exceedance. Details on the methodology to develop the fee and the fee amounts would be determined after at least one GSP Update (5-years after implementation in January 2022).

Revenue collected through potential pumping fees would support ongoing GSP implementation activities, project development and implementation of actions to address data gaps The pumping fee revenues would also be available for use in developing projects, and applying for grant funds, to improve groundwater infrastructure in the SGP Subbasin, especially in areas with DAC or SDAC. Details on the methodology to develop the fee, potential fee amounts, guidelines for using the funds and potential programs developed to support GSP implementation, would be developed upon approval of the GSP.

Although MBMI is not subject to SGMA, they are recognized as a water producer from the SGP Subbasin that may affect the overall condition of the SGP Subbasin. Additionally, MBMI may benefit from the activities and projects funded through pumping fees and therefore they will be invited to participate in funding said activities and projects although their participation is not mandatory.

6.3.5 Management Action #5 Groundwater Pumping Allocation

As part of SGMA, GSAs have been granted authority to regulate the quantity of pumped groundwater. Regulating groundwater pumping is a potential GSP tool that could reduce pumping in the event that it exceeded the sustainable yield of a Subbasin. The regulation of pumping would likely take the form of allocation of a share of the sustainable yield to groundwater users in the Subbasin. Other rules could be established that would allow for a user's allocation over multiple years to transfer to other users and other rules that would facilitate effective water management. While SGMA provides GSAs with the authority to regulate groundwater pumping quantities, it also specifies that this is not the final determination of water rights, which remains with the courts. As noted later in this section, a major limitation to a groundwater pumping allocation action is that it would not be constraining on federally recognized tribal water users such as the MBMI, who are large groundwater users in the SGP. Based on this limited jurisdiction and without the voluntary participation of the MBMI, the groundwater pumping allocation approach based on GSA authorities described here could be difficult to implement and meet SGMA requirements for sustainable groundwater management.

GSAs experiencing large amounts of continuous annual groundwater overdraft, including in wet years, may pursue individual groundwater allocations if the development of projects and new water supplies cannot solely offset the current groundwater demands and overdraft conditions over the planning and implementation horizon. Demand management may become increasingly more important in the event of further reduced reliability of imported and flood water supplies, especially when taking into consideration the historical drought periods, the uncertain role of climate change, and increased competition for available water supplies. Specific program details may be developed and adopted by the GSAs in the future.

The GSAs' future policy may provide a finite groundwater allocation on a per acre basis for the GSAs as a whole, or for sub-areas of a GSA. The policy would identify and forecast the demands associated with prior rights (including MBMI), domestic and environmental uses. The sustainable yield and ultimate groundwater allocation would take into consideration the existing water rights holders, disadvantaged communities (DACs), community service districts (CSDs), public utility districts (PUDs), public water systems (PWS), and groundwater-dependent ecosystems (GDEs). The GSAs, through collaboration with its users and beneficial users, may consider whether an equal-, reduced-, or zero-allocation is given to lands with unexercised groundwater rights. The report *Groundwater Pumping Allocations under California's Sustainable Groundwater Management Act (Environmental Defense Fund et. al, 2018)* identifies four possible methods of establishing groundwater pumping allocations.

There are multiple advantages and disadvantages associated with different methods of establishing groundwater pumping allocations, which are described in more detail in the report (EDF, 2018). The "Comprehensive Allocation Method," which establishes allocations based on a comprehensive consideration of California groundwater law to the extent practical, and is recommended by EDF, is one possible approach that could be considered because it offers GSAs the important advantage of presenting to the Court an allocation methodology that tracks judicial precedent if an adjudication is ultimately initiated.

The goals of any groundwater pumping management action would be to ensure a fair groundwater allocation, allow groundwater users time to adjust, provide future flexibility in allocation determinations, and to quantify groundwater extractions accurately and efficiently, while also respecting federal reserved water rights (FRWR).

The method of evaluation of groundwater extraction depends upon the GSAs' selected quantification method or combination of methods. The GSAs' evaluation of various methods may consider a wide range of factors including cost, accuracy, reliability, timeliness, functionality, personnel required, and legal defense. Once the GSAs have established a consistent quantification method, the evaluation of the "ramp-down" gradual allocation decrease could be analyzed in the annual comparison of groundwater extraction. Though the annual groundwater extraction amount would be affected by other factors such as weather and available surface water supplies, the total extraction amount could be normalized to an average water year for comparative purposes. The GSAs may adopt policies indicating an adaptive management approach, whereby the groundwater allocation may be reviewed, changed, and reestablished periodically or during extreme drought as necessary to achieve long term sustainability instead of a ramp down gradual allocation.

As noted earlier in this summary, a significant limitation on the efficacy of this management action is that it would not constrain water use by federally recognized tribal water users, such as the MBMI. FRWR are distinct from water rights that are based in State law and SGMA directs that FRWR be respected in full. The FRWR of the MBMI have not been quantified and could directly affect the ability of a SGMA-based pumping allocation approach to achieve identified goals. Based on the limitation of a groundwater pumping allocation to a specific set of groundwater pumpers, and without the voluntary participation of entities with FRWR (such as MBMI), a groundwater pumping allocation approach based on GSA authorities could be difficult to implement and meet SGMA requirements for sustainable groundwater management.

6.3.6 Management Action #6 Groundwater Basin Adjudication

Groundwater pumpers or landowners in the Subbasin could initiate the process for groundwater adjudication to occur in the Subbasin if sustainability does not appear to be occurring during the SGMA implementation period. In 2015, largely as a "follow on" to the enactment of SGMA, two bills - AB 1390 and SB 226 - were enacted and became law on January 1, 2016. Those two bills restructured the groundwater adjudication process in California by attempting to streamline the process and to provide clarification as to how adjudications relate to SGMA. These laws require that any judgments issued in an adjudication be consistent with SGMA and allow the courts to issue preliminary orders to achieve consistency. Among other things, these bills allow GSAs, cities, counties, and the State to intervene in adjudication actions and require the court to manage proceedings consistently with the timeframes laid out for groundwater sustainability in SGMA. Under SGMA, unreconciled differences over GSP provisions are likely to result in adjudications. However, even with the new legislation, adjudications will remain complex, lengthy, and expensive to pursue (EDF, 2018). Additionally, the GSAs would continue to be responsible for SGMA compliance in the event of a groundwater adjudication, provided in Water Code Section 10737.2

As described in Management Action #5, a potential allocation of groundwater pumping amounts will be considered, along with other potential projects, as an early response to any increases in groundwater pumping or identified long term changes in local water supply availability, that can adversely affect achieving groundwater sustainability. As indicated in Management Action #5, any allocation of groundwater pumping amounts could be challenged by groundwater pumpers in the SGP Subbasin as not being consistent with their rights under California groundwater law and would not be applicable to the MBMI, unless pursuant to a court decree.

If local disagreements over allocated pumping amounts in Management Action #5 and/or increased groundwater pumping in the Subbasin results in increased challenges in meeting its sustainability goals during the SGMA implementation period, water users in the SGP may sue to bring about an eventual groundwater adjudication. An adjudication would proceed under state laws, including the 2016 changes to the water code that streamline the adjudication process. Even with a streamlined adjudication, an adjudication, particularly a contested adjudication, would likely take multiple years or decades to be resolved and implemented. Assuming that SGP water users did not voluntarily participate in SGP GSP implementation efforts (such as a groundwater pumping allocation), it could be difficult for the SGP to meet its sustainable groundwater management responsibilities during an extended period while the court adjudication proceeds.

7 Plan Implementation

The adoption of the SGP GSP will be the official start of the Plan Implementation. The GSAs will continue their efforts to engage the public and secure necessary funding to successfully monitor and manage groundwater resources within the SGP Subbasin in a sustainable manner. While the GSP is being reviewed by DWR, the GSAs will coordinate with various stakeholders and beneficial users to, as appropriate, refine the monitoring networks and begin the implementation of ready projects and management actions.

7.1 Estimate of GSP Implementation Costs

Regulation Requirements:

§ 354.6. Agency Information
When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:
(**e**) An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.

The GSAs' preliminary estimate of plan implementation costs includes five categories:

1. Regular/Ongoing SGMA Compliance Activities;
2. GSP Five-Year Update;
3. Plans to Fill Data Gaps;
4. Projects; and
5. Management Actions.

Table 7-1 provides a cost estimate for items 1 through 5 listed above. The projects and management actions are summarized in two categories: Phase 1 (Priority) and Phase 2 (Optional). Throughout the implementation period, should funding become available, the Phase 2 projects and management actions will have the opportunity to be revisited regarding their urgency to supporting subbasin sustainability and potential feasibility.

The list below summarizes the Phase 1 and Phase 2 projects and management actions. Phase 1 projects are considered priority projects and Phase 2 projects are noted as optional. Within each phase, there is no prioritization of projects based on name or order. For example, Project 1 is not more important than Project 3. Phase 2 projects and management actions are identified based on: (1) the project is less cost effective than a priority project and/or management action, (2) the project is an alternative to a priority project that provides similar benefits, (3) the project or management action is unlikely to be developed within the implementation period, unless additional funding is secured, or (4) future conditions differ substantially from projections thereby necessitating additional measures. In the case of Project 6, it serves as an alternative to Projects 4 and/or 5. More information on each project and management action, including a description and cost estimate for all projects and management actions are included in **Chapter 6**.

Phase 1 (Priority) Projects and Management Actions
Project 1: Municipal Water Conservation
Project 3: Additional Imported Water Spreading at Noble Creek Spreading Basins
Management Action 1: Implement Action Plan if Groundwater Levels Fall Below Minimum Thresholds
Management Action 2: Well Head Requirements

Management Action 3: Investigate Issues Promptly Regarding Water Quality and Unexpected Water Pumping

Phase 2 (Optional) Projects and Management Actions

Project 4: New Pipeline with Additional Imported Water Spreading in the Cabazon Storage Unit

Project 5: New Pipeline with Additional Imported Water Spreading in the Banning Storage Unit

Project 6: New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit

Management Action 4: Impose SGMA or Other Available Fees on Pumpers to Encourage Reduced Pumping and Conservation

Management Action 5: Groundwater Pumping Allocation

Management Action 6: Groundwater Basin Adjudication

Table 7-1 SGP GSP Implementation Cost Estimate

SGP PLAN IMPLEMENTATION COST ESTIMATE	2022 - 2027		2027 - 2032		2032 - 2037		2037 - 2042		2022 - 2042	
	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost	Total Cost	Explanation of Cost/Notes
1. Regular/Ongoing SGMA Compliance Activities										
Administration	$ -	$ 20,000	$ -	$ 20,000	$ -	$ 20,000	$ -	$ 20,000	$ 400,000	
Correspondence and Outreach Materials	$ -	$ 5,000	$ -	$ 6,000	$ -	$ 7,000	$ -	$ 8,000	$ 130,000	
Database Management System	$ 20,000	$ 15,000	$ -	$ 15,000	$ -	$ 15,000	$ -	$ 30,000	$ 395,000	
Annual Reporting	$ -	$ 50,000	$ -	$ 30,000	$ -	$ 30,000	$ -	$ 30,000	$ 700,000	
Enforcement	$ -	$ 1,000	$ -	$ 3,000	$ -	$ 6,000	$ -	$ 20,000	$ 150,000	These estimated costs include only external costs and do not include each member agency's in-house fees.
								Subtotal	**$ 1,775,000**	
2. GSP Five-Year Update										
Engineering Consultant	$ 200,000	$ -	$220,000	$ -	$ 220,000	$ -	$ 230,000	$ -	$ 870,000	These estimated costs include only external costs and do not include each member agency's in-house fees.
								Subtotal	**$ 870,000**	
3. Plans to Fill Data Gaps										
Coordination and Implementation	$850,000	$ 25,000	$ -	$ 25,000	$ -	$ 25,000	$ -	$ 25,000	$ 1,350,000	These estimated costs include cost share and projected funds for grant applications in regard to solutions to data gaps. The identified data gaps include four monitoring wells and a tracer study at the Indio Subasin boundary.
								Subtotal	**$ 1,350,000**	
4. Phase 1 (Priority) Projects										
P1 - Municipal Water Conservation	$ -	$ -	$400,000	$ -	$ -	$ -	$ -	$ -	$ 400,000	
P3 - Additional Imported Water Spreading at Noble Creek Spreading Basins	$ 20,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,000	Visit Chapter 6 – Projects and Management Actions for details on cost rationalization.
5. Phase 2 (Optional) Projects										
Phase 2 projects are assumed not to be implemented within the Implementation Period. However, their status as Phase 2 projects is contingent to changes based on future planning and/or project funding opportunities.										
P2 - Stormwater Capture	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
P4 - New Pipeline with Additional Water Spreading in the Cabazon Subunit	$500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500,000	
P5 - New Pipeline with Additional Water Spreading in the Banning Subunit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	Visit Chapter 6 – Projects and Management Actions for details on cost rationalization. No costs are listed in this table with consideration that the Phase 2 projects are unlikely to be implemented during the 20-year Implementation period.

SGP PLAN IMPLEMENTATION COST ESTIMATE	2022 - 2027		2027 - 2032		2032 - 2037		2037 - 2042		2022 - 2042	
	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost	Total Cost	Explanation of Cost/Notes
P6 - New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit (Phase 2)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
								Subtotal	**$ 920,000**	
6. Phase 1 (Priority) Management Actions										
MA1 - Implementation Plan	$ 75,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 75,000	
MA2 - Well Head Requirements	$ 50,000	$ 25,000	$ -	$ 25,000	$ -	$ 25,000	$ -	$ 25,000	$ 550,000	
MA3 - Investigate Issues Promptly Regarding Water Quality and Unexpected Water Pumping	$ -	$ 5,000	$ -	$ 5,000	$ -	$ 5,000	$ -	$ 5,000	$ 100,000	Visit Chapter 6 – Projects and Management Actions for details on cost rationalization.
7. Phase 2 (Optional) Management Actions										
Phase 2 projects are assumed to not be implemented within the Implementation Period.										
MA4 - Impose SGMA or Other Available Fees on Pumpers to Encourage Reduced Pumping and Conservation	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ 50,000	
MA5 - Groundwater Pumping Allocation	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ 50,000	Visit Chapter 6 – Projects and Management Actions for details on cost rationalization. Costs appear limited with consideration that the Phase 2 management actions are unlikely to be implemented during the 20-year implementation period.
MA6 - Groundwater Basin Adjudication	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
								Subtotal	**$ 825,000**	
								TOTAL	**$ 5,740,000**	

7.2 Identify Funding Alternatives

Regulation Requirements:

§ 354.6. Agency Information

When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:

(**e**) An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.

The annual operational costs are ongoing. GSA members fund various agency operations and activities that are required by SGMA, including retaining consulting firms and legal counsel to provide agency oversight and lead the agencies through the steps for SGMA compliance. Expenses consist of administrative support, GSP development, and GSP implementation. GSP updates will occur every five years, and GSA administration and GSP implementation are anticipated to be on-going expenses.

The administrative annual expenses include an assumed 3% inflation factor. Assessments will continue beyond Fiscal Year 2024-25, but at this time the assessment rate after the initial five-year period is unknown because the actual GSP implementation costs will not be fully determined until after the GSP is adopted. The projects and management actions in the GSP will require supplemental funding.

The GSAs will actively be pursuing Technical Support Services and Sustainable Groundwater Management Implementation grant funding as available from Proposition 1 and other potential sources. These funds will be used to offset some of the capital improvement costs associated with the development of new monitoring wells to fill identified data gaps in the monitoring network. The GSAs will be exploring all federal and state grant funding opportunities and low interest loans to help finance the initial steps of plan implementation. If local, state, and federal funding is not readily available, the GSAs may consider implementing various management actions to impose fees as discussed in **Chapter 6** which, after formal adoption, could generate an ongoing revenue stream for future GSP implementation costs.

7.3 Schedule for Implementation

Regulation Requirements:

§ 350.4. General Principles

Consistent with the State's interest in groundwater sustainability through local management, the following general principles shall guide the Department in the implementation of these regulations.

(f) A Plan will be evaluated, and its implementation assessed, consistent with the objective that a basin be sustainably managed within 20 years of Plan implementation without adversely affecting the ability of an adjacent basin to implement its Plan or achieve and maintain its sustainability goal over the planning and implementation horizon.

The initial schedule for implementing projects and management actions is provided in **Table 7-2** below. This schedule is an estimate based on experience developing and implementing projects and management actions within the Subbasin; however, there may be changes induced by funding availability, environmental documentation, or other schedule influences.

Table 7-2 SGP GSP Implementation Schedule[41]

SGP PLAN IMPLEMENTATION SCHEDULE									
Estimated Projects and Management Actions	2022 - 2027		2027 - 2032		2032 - 2037		2037 - 2042		2042+
Plans to Fill Data Gaps									
P1 - Municipal Water Conservation									
P2 - Stormwater Capture									
P3 - Additional Imported Water Spreading at Noble Creek Spreading Basins									
P4 - New Pipeline with Additional Water Spreading in the Banning Subunit									
P5 - New Pipeline with Additional Water Spreading in the Cabazon Subunit									
P6 - New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit (Phase 2)									
MA1 - Implementation Plan									
MA2 - Well Head Requirements									
MA3 - Investigate Issues Promptly Regarding Water Quality and Unexpected Water Pumping									
MA4 - Impose SGMA or Other Available Fees on Pumpers to Encourage Reduced Pumping and Conservation									
MA5 - Groundwater Pumping Allocation									
MA6 - Groundwater Basin Adjudication									

Legend	Priority PMA	Optional PMA
Planning		
Implementation		
Benefits Realized		
Ongoing O&M		

[41] Projects will only be implemented if needed to achieve sustainability. Priority projects would be implemented before optional projects.

The SGP Subbasin's projected path to sustainable groundwater conditions will consider the highly variable water supplies in the region. The historic record indicates that the Subbasin's hydrologic cycle spans a minimum of 21 years (**Chapter 3 – Basin Setting**) which means that extended drought periods occur. Based on the estimated current and projected water budgets, the Subbasin should be able to remain sustainable. However, as the Subbasin is approximately 20-years into an extended dry period, with no certainty that conditions will revert to more normal conditions in the foreseeable future, the GSAs will closely monitor groundwater conditions during the implementation period. Since the planning horizon of twenty years is comparable to the span of a full hydrologic cycle in the Subbasin, the GSAs recognize that they will need to carefully monitor conditions identified in the five-year assessments for potential future modifications to the implementation plan.

The additional challenges of addressing uncertain future pumping amounts related to potential increased pumping based on unknown FRWR is also factor that could affect the implementation schedule. The implementation schedule shown in Figure 7-2 is based on current known projected groundwater use in the SGP Subbasin. As described in Section 6.3.6 and other sections of the GSP, the MBMI are a sovereign nation and are not required to participate in GSP implementation. While the SGP will work to include the MBMI in the GSP planning and implementation process, their involvement would be strictly voluntary and ultimately there is no certainty that advance information on potential increased used of FRWR would be available. In the absence of advance notice of pumping increases, ongoing visual observation of development activities in the SGP Subbasin will provide some indication of potential groundwater use in advance of full development. Any identified development likely to result in increased water use will be routinely monitored and groundwater projections will be updated based on revised pumping use at least as frequently as the five-year updates. As an example of potential impacts, the increased water use in Project #4 would result in declines of 26 feet after five years at the 3S/1E-11F4 representative monitoring site, which is the area that would be most affected by the Project #4 assumed additional development. Any unexpected development would result in many months of visual indication prior to water use, have some period where water use would increase incrementally and, once fully implemented, would result in a maximum of up to 26 feet of water level impacts after five years. The GSAs would update the implementation schedule based on observed development, which would likely result in multiple years of lead time to anticipate potential groundwater impacts. This kind of adaptation of the implementation is not ideal, but is anticipated to be a feasible approach given potential uncertain forecasts.

7.4 Data Management System

Regulation Requirements:

§ 352.6. Data Management System

Each Agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the Plan and monitoring of the basin.

In a coordinated effort, the GSAs of the Subbasin have developed a Data Management System (DMS) to share data and store the necessary information for annual reporting and ongoing groundwater analyses. The GSAs have hired a software consultant to build a user-friendly and accessible database that standardizes the Subbasin-wide data and allows GSA representatives to input their data and use basic tools for viewing, exporting, or printing information for their GSA or the Subbasin. The DMS uses web-based software hosted on a cloud server. It serves as the single repository for data aggregation and analysis for the Subbasin and is designed to generate the required annual reporting information that will be submitted to DWR. GSA representatives have access to all data in the DMS. The DMS currently includes the necessary elements required by the regulations, including:

- Well location and construction information (where available)
- Water level readings and hydrographs including water year type
- Seasonal groundwater elevation contours
- Estimated groundwater extraction by water use category
- Total water use by source type
- Estimated groundwater storage change, including map and tables
- Graphs with water year type, groundwater use, and annual cumulative storage change

The DMS also includes basic reference data layers including GSA boundaries, topographic information, land use, streets, aerial imagery, geologic information, and specific yield information. Additional items may be added to the DMS in the future as required. A screen shot of the DMS is shown in **Figure 7-1 San Gorgonio Pass Subbasin Data Management System Screenshot** .

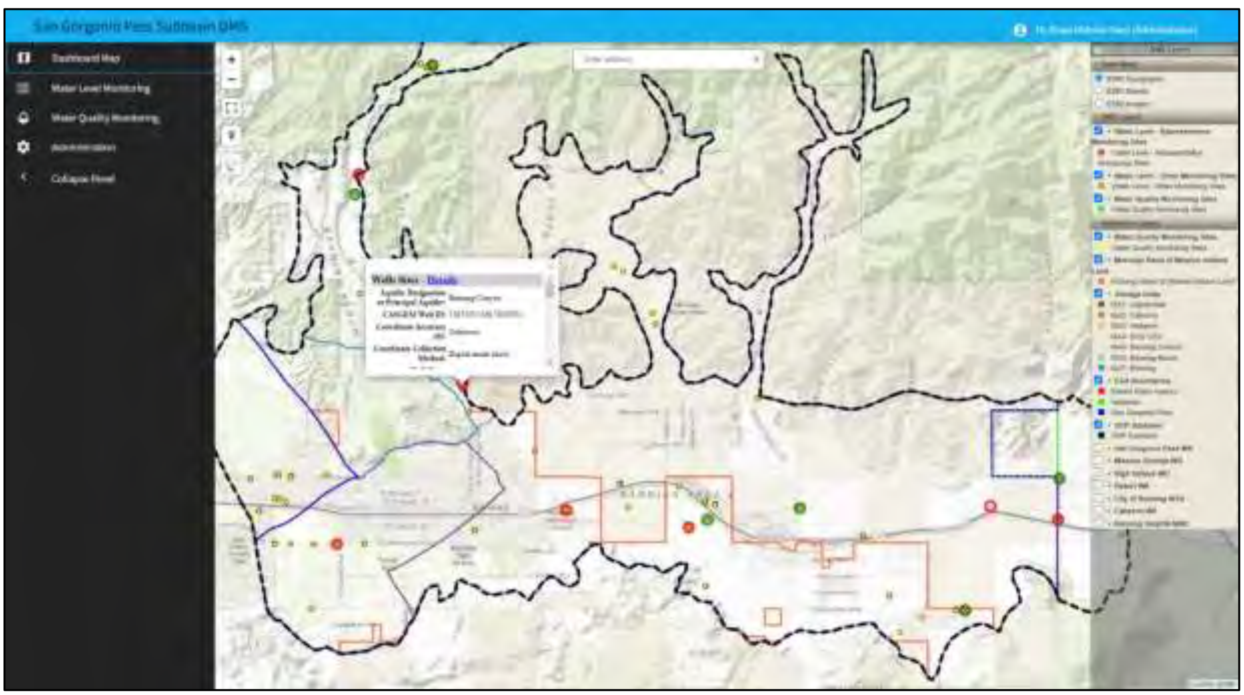

Figure 7-1 San Gorgonio Pass Subbasin Data Management System Screenshot

Although much of the data associated with reporting requirements are uploaded into the DMS are auto generated into the Annual Report template, several components of the Annual Report are produced external to the DMS. These include groundwater level contours, groundwater storage calculations and groundwater estimates. Groundwater level contours are prepared outside of the DMS because of the need to evaluate the integrity of the data collected and to generate a static contour set that has been reviewed and will not change once approved. Groundwater storage calculations are performed in accordance with the method described in **Chapter 3.2**, outside of the DMS, then the results of those calculations are uploaded to the DMS for annual reporting and trend monitoring.

Not all the pumping data in the Subbasin is accessible due to lack of measurements, de minimis qualification, or location being within tribal lands that are not subject to SGMA. Therefore, groundwater pumping estimates are also calculated outside of the DMS using the agreed Subbasin-wide water budget approach and then uploaded to the DMS for annual reporting and trend analysis.

Table 7-3 provides of the DMS Annual Reporting Requirements and the inputs to the DMS that addresses each required element.

Table 7-3 DMS Annual Reporting Requirements

DMS Annual Reporting Requirements		
Regulation	**Requirement**	**Input to DMS**
356.2(b)(1)(B)	Hydrographs including water year type from January 2015	Generated in DMS from water level data input by GSAs
356.2(b)(1)(A)	GW Elevation Contours (spring & fall)	Generated outside DMS using data from DMS then contour lines uploaded into DMS
356.2(b)(2)	GW extraction by water use sector including method of determination and map	Determined outside DMS. Total use by sector input by each GSA then summarized for subbasin in DMS
356.2(b)(3)	Surface Water use by source	Total by GSA input to DMS and summarized for subbasin in DMS
356.2(b)(4)	Total Water use by sector	DMS summary table of water supplies by sector per GSA
356.2(b)(5)(A)	Change in GW Storage map	Calculated outside DMS from contour data using subbasin-wide method then total per GSA input into DMS
356.2(b)(5)(B)	Graph with Water Year type, GW use, annual & cumulative GW Storage change	DMS generated subbasin total graph using data in DMS

7.5 Annual Reporting

Regulation Requirements:

§ 356.2. Annual Reports

Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:

(a) General information, including an executive summary and a location map depicting the basin covered by the report.

(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:

(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:

(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.

(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.

(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.

(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.
(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.
(5) Change in groundwater in storage shall include the following:
(A) Change in groundwater in storage maps for each principal aquifer in the basin.
(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.
(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.

Each GSA will provide the Basin Coordinator the required information of groundwater levels, extraction volume, surface water use, total water use, groundwater storage change through the DMS. Each GSA will also provide the Basin Coordinator with a progress update on GSP implementation for the Subbasin Annual Report in accordance with the timelines required to meet the April 1 deadline each year.

7.6 Periodic Evaluations

Regulation Requirements:

§ 356.4. Periodic Evaluation by Agency

Each Agency shall evaluate its Plan at least every five years and whenever the Plan is amended and provide a written assessment to the Department. The assessment shall describe whether the Plan implementation, including implementation of projects and management actions, are meeting the sustainability goal in the basin, and shall include the following:
(a) A description of current groundwater conditions for each applicable sustainability indicator relative to measurable objectives, interim milestones and minimum thresholds.
(b) A description of the implementation of any projects or management actions, and the effect on groundwater conditions resulting from those projects or management actions.
(c) Elements of the Plan, including the basin setting, management areas, or the identification of undesirable results and the setting of minimum thresholds and measurable objectives, shall be reconsidered and revisions proposed, if necessary.
(d) An evaluation of the basin setting in light of significant new information or changes in water use, and an explanation of any significant changes. If the Agency's evaluation shows that the basin is experiencing overdraft conditions, the Agency shall include an assessment of measures to mitigate that overdraft.
(e) A description of the monitoring network within the basin, including whether data gaps exist, or any areas within the basin are represented by data that does not satisfy the requirements of Sections 352.4 and 354.34(c). The description shall include the following:
(1) An assessment of monitoring network function with an analysis of data collected to date, identification of data gaps, and the actions necessary to improve the monitoring network, consistent with the requirements of Section 354.38.
(2) If the Agency identifies data gaps, the Plan shall describe a program for the acquisition of additional data sources, including an estimate of the timing of that acquisition, and for incorporation of newly obtained information into the Plan.
(3) The Plan shall prioritize the installation of new data collection facilities and analysis of new data based on the needs of the basin.
(f) A description of significant new information that has been made available since Plan adoption or amendment, or the last five-year assessment. The description shall also include whether new information warrants changes to any aspect of the Plan, including the evaluation of the basin setting, measurable objectives, minimum thresholds, or the criteria defining undesirable results.
(g) A description of relevant actions taken by the Agency, including a summary of regulations or ordinances related to the Plan.
(h) Information describing any enforcement or legal actions taken by the Agency in furtherance of the sustainability goal for the basin.
(i) A description of completed or proposed Plan amendments.
(j) Where appropriate, a summary of coordination that occurred between multiple Agencies in a single basin, Agencies in hydrologically connected basins, and land use agencies.
(k) Other information the Agency deems appropriate, along with any information required by the Department to conduct a periodic review as required by Water Code Section 10733.

The GSAs will have the opportunity to develop and submit an updated GSP every five years. Certain components of the GSP may be re-evaluated more frequently than every five years, if deemed necessary. The GSAs intend to include updates or interim changes to the GSP and identify potential policy changes in Annual Reports that will be submitted to DWR.

In addition, the GSAs will provide an assessment to DWR at least every five years, in accordance with the regulatory requirements. The assessment will include an update on progress in achieving sustainability that considers updates to groundwater conditions, status of projects or management actions, evaluation of undesirable results relating to measurable objectives and minimum thresholds, changes in monitoring network, summary of enforcement or legal actions, and agency coordination efforts in accordance with SGMA law §356.4. Periodic Evaluation by Agency.

8 References

Regulation Requirements:

§ 354.4. General Information
Each Plan shall include the following general information:
(a) An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.
(b) A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public. Note: Authority cited: Section 10733.2, Water Code.
Reference: Sections 10733.2 and 10733.4, Water Code.

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Appendices

Appendix A – Memorandum of Agreement (MOA)

MEMORANDUM OF AGREEMENT TO FORM A GROUNDWATER SUSTAINABILITY AGENCY FOR A PORTION OF THE SAN GORGONIO PASS SUBBASIN AND TO COORDINATE WITH OTHER GROUNDWATER SUSTAINABILITY AGENCIES

This 2017 Memorandum of Agreement (MOA) is entered into by and among Cabazon Water District (CWD), City of Banning (Banning), Banning Heights Mutual Water Company (BHMWC), San Gorgonio Pass Water Agency (SGPWA), Mission Springs Water District (MSWD), and Desert Water Agency (DWA), which may be referred to herein individually as a "Party" and collectively as the "Parties."

Pursuant to the Sustainable Groundwater Management Act (SGMA) and as further set forth herein, the purposes of this MOA are to form a Groundwater Sustainability Agency (GSA) for a portion of the San Gorgonio Pass Subbasin, as described in greater detail below (Basin), the members of which GSA shall be CWD, Banning, BHMWC, and SGPWA (herein, the SGP-GSA), and to establish that the SGP-GSA will coordinate and cooperate with other GSAs that already exist and will be formed in the Basin.

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act (SGMA), codified in certain provisions of the California Government Code, commencing with Section 65350.5, and in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720; and

WHEREAS, SGMA went into effect on January 1, 2015; and

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, allowing, among other things, mutual water companies and water corporations regulated by the Public Utilities Commission to participate in a GSA through a memorandum of agreement or other legal agreement; and

WHEREAS, the San Gorgonio Pass Subbasin (Basin), as further depicted in **Exhibit A** to this MOA, is identified by the California Department of Water Resources (DWR) Bulletin 118 as Subbasin No. 7-21.04 of the Coachella Valley Groundwater Basin, and is designated by DWR as medium priority, and therefore, except as provided by SGMA, the Basin is subject to the requirements of SGMA; and

WHEREAS, the Parties recognize and agree that a portion of the Basin (the "Adjudicated Area") is subject to the Beaumont Basin adjudication and Judgment in the case referred to as *San Timoteo Watershed Management Authority v. City of Banning, et al.*, Riverside County Superior Court Case No. RIC 389197, and that pursuant to SGMA Section 10720.8(a)(1), said portion of the Basin generally is not subject to the requirements of SGMA and will not be managed by the SGP-GSA; and

WHEREAS, SGMA Section 10720.7 requires the Basin, as a medium priority basin which is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan (GSP) or coordinated GSPs by January 31, 2022; and

WHEREAS, SGMA Section 10727(b) authorizes (1) a single GSP covering the entire Basin developed and implemented by one GSA, (2) a single GSP covering the entire Basin developed and implemented by multiple GSAs, or (3) multiple GSPs developed and implemented by multiple GSAs and coordinated pursuant to a single coordination agreement that covers the entire Basin; and

WHEREAS, SGMA Section 10735.2 requires the formation of a GSA or multiple GSAs for the Basin by June 30, 2017; and

WHEREAS, SGMA Section 10723.6(a) authorizes a combination of local agencies to form a GSA pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement, and SGMA Section 10723.6(b) authorizes a water corporation regulated by the Public Utilities Commission or a mutual water company to participate in a GSA through a memorandum of agreement or other legal agreement; and

WHEREAS, for purposes of forming the SGP-GSA, as further depicted in **Exhibit B** to this MOA, CWD, Banning, and SGPWA are local agencies as defined by SGMA, and BHMWC is a mutual water company, wherein each overlies at least a portion of the Basin and each has respective water supply, water management, and/or land use responsibilities within the Basin, and thus each is authorized by SGMA to become part of the SGP-GSA; and

WHEREAS, pursuant to SGMA Section 10723(c)(1)(C), DWA has been established as the exclusive GSA for a certain portion of the Basin (herein, the DWA-GSA), as further specified and depicted in **Exhibit C** to this MOA; and

WHEREAS, on or about September 28, 2016, MSWD filed an amended notice of intent to be a GSA for an approximately one-square mile area in the northeastern portion of the Basin that lies within the service areas of MSWD and SGPWA, which one-square mile area is further specified and depicted in **Exhibit D** to this MOA and is referred to herein as the "Verbenia Area"; and

WHEREAS, on or about January 10, 2017, SGPWA also filed a notice of intent to be a GSA for the Verbenia Area, as further specified and depicted in **Exhibit D** to this MOA; and

WHEREAS, on or about January 13, 2017, DWR designated the Verbenia Area to be in overlap for purposes of the competing GSA notices filed by MSWD and SGPWA, and thus MSWD and SGPWA are working together to establish a separate GSA for the Verbenia Area (herein, the Verbenia-GSA); and

WHEREAS, in accordance with the terms of this MOA, and in furtherance of the shared intent of the Parties to maximize funding opportunities for the Basin and avoid potential intervention in the Basin by the State Water Resources Control Board, the Parties agree that the SGP-GSA formed by this MOA will cover the entire Basin except (A) that portion of the Basin covered by the DWA-GSA wherein DWA is the exclusive GSA, (B) that portion of the Basin to be covered by the Verbenia-GSA to be established by MSWD and SGPWA, and (C) the Adjudicated Area portion of the Basin, and the Parties mutually desire and intend that the SGP-GSA, the DWA-GSA, and the Verbenia-GSA will cooperate and coordinate in subsequently preparing and implementing one or more GSPs for sustainable management of the Basin; and

WHEREAS, the Parties mutually desire and intend to work with local stakeholders and interested entities in the Basin that are not Parties to this MOA, including but not limited to the Morongo Band of Mission Indians (MBMI), the County of Riverside, High Valleys Water District, overlying landowners, and others, and as further specified in this MOA, to carry out the policy, purposes, and requirements of SGMA in the Basin; and

WHEREAS, in accordance with SGMA Section 10720.3 and other applicable law, the Parties mutually understand and agree that nothing in SGMA and nothing in this MOA grants or confers any new or additional authority, discretion, or jurisdiction to any of the Parties over any Tribal lands or activities of the MBMI, and that any ongoing or continued participation by MBMI in relation to this MOA or the Parties' implementation of SGMA in the Basin is completely voluntary on the part of MBMI.

NOW, THEREFORE, in consideration of the promises, terms, conditions, and covenants contained herein, it is mutually understood and agreed as follows:

I. Incorporation of Recitals

The Recitals stated above are incorporated herein by reference.

II. Purposes

The purposes of this MOA are as follows:

A. To form the SGP-GSA for a portion of the Basin as specified herein and as depicted in **Exhibit B** to this MOA pursuant to applicable provisions and requirements of SGMA, including but not limited to SGMA Sections 10723 and 10723.6; and

B. To establish initial terms for the SGP-GSA, the DWA-GSA, and the Verbenia-GSA to cooperate and coordinate with each other in preparing and implementing one or more GSPs for the Basin and carrying out the policy, purposes, and requirements of SGMA in the Basin.

III. Approval of MOA and Formation of the SGP-GSA

Approval of this MOA and formation of the SGP-GSA shall be accomplished as follows:

A. CWD, Banning, and SGPWA each will hold its own noticed public hearing pursuant to SGMA Section 10723(b) and Government Code Section 6066 and at such hearing will consider approval of a Resolution by its governing board to enter this MOA and jointly form the SGP-GSA as specified in this MOA;

B. BHMWC will conduct an official meeting in accordance with any articles of incorporation, bylaws, or other laws applicable to BHMWC and at such meeting will consider approval of a Resolution by its governing board to enter this MOA and jointly form the SGP-GSA as specified in this MOA;

C. DWA and MSWD each will hold its own regular or special meeting and at such meeting will consider approval of a Resolution by its governing board to enter this MOA;

D. Upon the foregoing approvals by CWD, Banning, BHMWC, and SGPWA, there shall be established the San Gorgonio Pass Subbasin Groundwater Sustainability Agency (SGP-GSA), the members of which shall be CWD, Banning, BHMWC, and SGPWA as provided in this MOA.

IV. Definitions

The following terms, whether used in the singular or plural, and when used with initial capitalization, shall have the meanings specified herein. The Parties agree that any definitions set forth herein are intended to be consistent with SGMA, and in the event of any discrepancy between a defined term in this MOA and a defined term in SGMA, the terms of SGMA shall control.

A. **Adjudicated Area** refers to that portion of the Basin that is subject to the Beaumont Basin adjudication and Judgment in the case referred to as *San Timoteo Watershed Management Authority v. City of Banning, et al.*, Riverside County Superior Court Case No. RIC 389197.

B. **Basin** refers to the San Gorgonio Pass Subbasin, designated by the California Department of Water Resources Bulletin 118 as Subbasin No. 7-21.04, as further specified and depicted in **Exhibit A** to this MOA.

C. **Banning** means the City of Banning.

D. **BHMWC** means the Banning Heights Mutual Water Company.

E. **CWD** means the Cabazon Water District.

F. **DWA** means the Desert Water Agency.

G. **DWR** means the California Department of Water Resources.

H. **DWA-GSA** refers to the GSA that has been established for a certain portion of the Basin pursuant to SGMA Section 10723(c)(1)(C), wherein DWA has been designated as the exclusive GSA, as further specified and depicted in **Exhibit C** to this MOA.

I. **GSA** means Groundwater Sustainability Agency, as defined by SGMA.

J. **GSP** means Groundwater Sustainability Plan, as defined by SGMA.

K. **MBMI** means the Morongo Band of Mission Indians.

L. **Memorandum of Agreement** or **MOA** refers to this Memorandum of Agreement.

M. **MSWD** means the Mission Springs Water District.

N. **Party** or **Parties** refers individually or collectively to Cabazon Water District, City of Banning, Banning Heights Mutual Water Company, Mission Springs Water District, San Gorgonio Pass Water Agency, and Desert Water Agency, as signatories to this MOA.

O. **SGMA** refers to the Sustainable Groundwater Management Act.

P. **SGP-GSA** refers to the San Gorgonio Pass Subbasin GSA formed under this MOA, the members of which GSA are CWD, Banning, BHMWC, and SGPWA.

Q. **SGPWA** means the San Gorgonio Pass Water Agency.

R. **Verbenia-GSA** refers to a GSA to be formed by MSWD and SGPWA for an approximately one-square mile area in the northeastern portion of the Basin that lies within the service areas of MSWD and SGPWA, as further specified and depicted in **Exhibit D** to this MOA.

V. Boundaries of GSAs

A. The boundaries of the SGP-GSA shall be the entire Basin except (A) that portion of the Basin covered by the DWA-GSA wherein DWA is the exclusive GSA, as further specified and depicted in **Exhibit C** to this MOA, (B) that portion of the Basin to be covered by the Verbenia-GSA to be established by MSWD and SGPWA, as further specified and depicted in **Exhibit D** to this MOA, and (C) that portion of the Basin constituting the Adjudicated Area.

B. The boundaries of DWA-GSA are that portion of the Basin within which DWA is the exclusive GSA pursuant to SGMA Section 10723(c)(1)(C), as further specified and depicted in **Exhibit C** to this MOA.

C. The boundaries of the Verbenia-GSA are the approximately one-square mile area in the northeastern portion of the Basin that lies within the service areas of MSWD and SGPWA, as further specified and depicted in **Exhibit D** to this MOA.

D. The Parties understand and agree that pursuant to SGMA Section 10720.8, the portion of the Basin which is subject to the Beaumont Basin adjudication and Judgment in the case referred to as *San Timoteo Watershed Management Authority v. City of Banning, et al.*, Riverside County Superior Court Case No. RIC 389197, generally is not subject to the requirements of SGMA.

E. The Parties understand and agree in accordance with SGMA Section 10720.3 and other applicable law that nothing in SGMA and nothing in this MOA grants or confers any new or additional authority, discretion, or jurisdiction to any of the Parties over any Tribal lands or activities of the MBMI, and that any ongoing or continued participation by MBMI in relation to this MOA or the Parties' implementation of SGMA in the Basin is completely voluntary on the part of MBMI.

VI. Coordination and Cooperation

A. <u>Continued Cooperation</u>. The Parties to this MOA will continue to meet, confer, coordinate, and collaborate to discuss and develop technical, managerial, financial, and other criteria and procedures for the preparation, governance, and implementation of a GSP or coordinated GSPs in the Basin and to carry out the policy, purposes, and requirements of SGMA in the Basin.

B. Points of Contact. Each Party shall designate a principal contact person for that Party, who may be changed from time to time at the sole discretion of the designating Party. The principal contact person for each Party shall be responsible for coordinating with the principal contact persons for the other Parties in scheduling meetings and other activities under this MOA.

C. Management Areas. The Parties acknowledge that SGMA, and provisions of the SGMA regulations promulgated by DWR, including but not limited to Section 354.20 (23 C.C.R. § 354.20), authorize the establishment of management areas for the development and implementation of sustainable groundwater management within the Basin, and accordingly the Parties acknowledge and agree that the establishment of management areas within the Basin is a governance alternative that the Parties may explore.

VII. Roles and Responsibilities

A. The Parties agree to jointly establish their roles and responsibilities for implementing a GSP or coordinated GSPs for the Basin in accordance with SGMA.

B. The Parties agree to work in good faith and coordinate all activities to carry out the purposes of this MOA in implementing the policy, purposes, and requirements of SGMA in the Basin.

C. CWD, Banning, BHMWC, and SGPWA, as members of the SGP-GSA, shall coordinate with each other to cause all applicable noticing and submission of required information to DWR regarding formation of the SGP-GSA.

D. SGPWA shall continue to undertake ongoing CASGEM reporting activities in the Basin as provided by terms outside of this MOA.

E. As provided in this MOA, the Parties will continue to meet, confer, coordinate, and collaborate to discuss and develop governance, management, technical, financial, and other matters, including respective roles and responsibilities for activities such as, but not limited to, the following:

i. Modeling;
ii. Metering;
iii. Monitoring;
iv. Hiring consultants;
v. Developing and maintaining list of interested persons under SGMA Section 10723.4;
vi. Budgeting; and
vii. Other initial tasks as determined by the Parties.

VIII. Funding and Budgeting

The Parties agree to cooperate and coordinate in pursuing state and/or federal grant and loan funding opportunities that may apply to carrying out SGMA in the Basin. The Parties shall mutually develop reasonable budgets and cost sharing agreements or arrangements for work to be undertaken in carrying out SGMA in the Basin.

IX. Stakeholder Access

A. The Parties agree to work together in ensuring public outreach and involvement of the public and other interested stakeholders throughout the SGMA process, including but not limited to all beneficial uses and users of groundwater as provided in SGMA Section 10723.2.

B. The Parties acknowledge, agree, and desire that the preparation, adoption, and implementation of one or more GSPs for the Basin, and the ongoing process of ensuring compliance with the requirements of SGMA in the Basin, will involve close coordination and cooperation with the Morongo Band of Mission Indians.

X. Term, Termination, and Withdrawal

A. Term. This MOA shall continue and remain in effect unless and until terminated by the unanimous written consent of the Parties, or as otherwise provided in this MOA or as authorized by law.

B. Withdrawal. Any Party may decide, in its sole discretion, to withdraw from this MOA by providing ninety (90) days written notice to the other Parties. A Party that withdraws from this MOA shall remain obligated to pay its share of costs and expenses incurred or accrued under this MOA and any related cost sharing agreement or arrangement up to the date the Party provides its notice of withdrawal as provided herein. Withdrawal by a Party shall not cause or require the termination of this MOA or the existence of the SGP-GSA with respect to the non-withdrawing Parties.

1. In the event of withdrawal by BHMWC from this MOA and the SGP-GSA, CWD, Banning, and SGPWA, as the local agency parties to the SGP-GSA, shall meet and confer regarding: (i) whether the SGP-GSA wishes to retain its GSA status over the affected portion of the Basin; (ii) whether one or more of the local agency parties of the SGP-GSA wishes to retain GSA status over the affected portion of the Basin; or (iii) whether to address the GSA issues in a different manner. Any resolution of such and other GSA issues shall be undertaken in a manner that satisfies all requirements of SGMA and DWR, including any requirement to file new GSA notices.

2. In the event of withdrawal by CWD, Banning, or SGPWA from this MOA and the SGP-GSA, said three local agency parties shall meet and confer regarding whether the withdrawing local agency party wishes to seek GSA status for a portion of the Basin underlying the service area or management area of the withdrawing party. Said three local agency parties also shall meet and confer regarding: (i) whether the SGP-GSA, or one or both of the non-withdrawing

local agency parties, wishes to retain GSA status over the affected portion of the Basin; (ii) whether to enter a co-GSA management or other arrangement with the withdrawing party; or (iii) whether to address the GSA issues in a different manner. Any resolution of such and other GSA issues shall be undertaken in a manner that satisfies all requirements of SGMA and DWR, including any requirement to file new GSA notices.

3. Any decision by DWA or MSWD not to execute this MOA, or any decision by DWA or MSWD to withdraw after executing this MOA shall not cause or require the termination of this MOA and shall not affect the formation or continued existence of the SGP-GSA.

XI. Notice Provisions

All notices required by this MOA shall be made in writing and delivered to the respective representatives of the Parties at their respective addresses as follows:

Banning Heights Mutual Water Company
President
7091 Bluff Street
Banning, CA 92220, Fax: 951-849-6068

City of Banning
City Manager
99 East Ramsey Street
Banning, CA 92220, Fax: 951-922-3128

Cabazon Water District
General Manager
14618 Broadway
P.O. Box 297
Cabazon, CA 92230, Fax: 951-849-2519

Desert Water Agency
General Manager
1200 S Gene Autry Trail
Palm Springs, CA 92264, Fax: 760-325-6505

San Gorgonio Pass Water Agency
General Manager
1210 Beaumont Avenue
Beaumont, CA 92223, Fax: 951-845-0281

Mission Springs Water District
General Manager
66575 Second Street
Desert Hot Springs, CA 92240, Fax: 760-329-2482

Any Party may change the address to which notices are to be given under this MOA by providing the other Parties with written notice of such change at least fifteen (15) calendar days prior to the effective date of the change. All notices shall be effective upon receipt and shall be deemed received upon confirmed personal service, confirmed facsimile delivery, confirmed courier service, or on the fifth (5^{th}) calendar day following deposit of the notice in registered first class mail.

XII. General Terms

A. Amendments. Amendments to this MOA require unanimous written consent of all Parties and approval by the Parties' respective governing boards; provided, however, that amendments to this MOA pertaining to the SGP-GSA only require unanimous written consent and board approval of the members of the SGP-GSA.

B. Successors and Assigns. The terms of this MOA shall be binding upon all successors in interest and assigns of each Party; provided, however, that no Party shall assign its rights or obligations under this MOA without the signed written consent of all other Parties to this MOA.

C. Waiver. No waiver of any provision of this MOA by any Party shall be construed as a further or continuing waiver of such provision or any other provision of this MOA by the waiving Party or any other Party.

D. Authorized Representatives. Each person executing this MOA on behalf of a Party hereto affirmatively represents that such person has the requisite authority to sign this MOA on behalf of the respective Party.

E. Exemption from CEQA. The Parties recognize and agree that, pursuant to SGMA Section 10728.6 and Public Resources Code Section 21065, neither this MOA nor the preparation or adoption of a GSP constitutes a "project" or approval of a project under the California Environmental Quality Act (CEQA) or the State CEQA Guidelines, and therefore this MOA is expressly exempt from CEQA review.

F. Governing Law and Venue. This MOA shall be governed by and construed in accordance with the laws of the State of California. Any suit, action, or proceeding brought under the scope of this MOA shall be brought and maintained to the extent allowed by law in the County of Riverside, California.

G. Attorney's Fees, Costs, and Expenses. In the event of a dispute among any or all of the Parties arising under this MOA, each Party shall assume and be responsible for its own attorney's fees, costs, and expenses.

H. Entire Agreement/Integration. This MOA constitutes the entire agreement among the Parties regarding the specific provisions of this MOA, and the Parties hereto have made no agreements, representations or warranties relating to the specific provisions of this MOA which are not set forth herein.

I. Construction and Interpretation. The Parties agree and acknowledge that this MOA has been developed through a negotiated process among the Parties, and that each Party has had a full and fair opportunity to review the terms of this MOA with the advice of its own legal counsel and to revise the terms of this MOA, such that each Party constitutes a drafting Party to this MOA. Consequently, the Parties understand and agree that no rule of construction shall be applied to resolve any ambiguities against any particular Party as the drafting Party in construing or interpreting this MOA.

J. Force Majeure. No Party shall be liable for the consequences of any unforeseeable force majeure event that (1) is beyond its reasonable control, (2) is not caused by the fault or negligence of such Party, (3) causes such Party to be unable to perform its obligations under this MOA, and (4) cannot be overcome by the exercise of due diligence. In the event of the occurrence of a force majeure event, the Party unable to perform shall promptly notify the other Parties in writing to the extent practicable. It shall further pursue its best efforts to resume its obligations under this MOA as quickly as possible and shall suspend performance only for such period of time as is necessary as a result of the force majeure event.

K. Execution in Counterparts. This MOA may be executed in counterparts, each of which shall be deemed an original and all of which when taken together shall constitute one and the same instrument.

L. No Third Party Beneficiaries. This MOA is not intended, and will not be construed, to confer a benefit or create any right on a third party or the power or right of any third party to bring an action to enforce any of the terms of this MOA.

M. Timing and Captions. Any provision of this MOA referencing a time, number of days, or period for performance shall be measured in calendar days. The captions of the various articles, sections, and paragraphs of this MOA are for convenience and ease of reference only, and do not define, limit, augment, or describe the scope, content, terms, or intent of this MOA.

IN WITNESS WHEREOF, the Parties hereto have approved and executed this MOA as of the respective dates specified in the adopting Resolution of each Party as provided above in Article III of this MOA.

[*Signature Pages to Follow*]

IN WITNESS WHEREOF, the Parties hereto have approved and executed this MOA as of the respective dates specified in the adopting Resolution of each Party as provided above in Article III of this MOA.

CITY OF BANNING

By: ______________________
Michael Rock, City Manager

Dated: 4-13-17

IN WITNESS WHEREOF, the Parties hereto have approved and executed this MOA as of the respective dates specified in the adopting Resolution of each Party as provided above in Article III of this MOA.

CABAZON WATER DISTRICT

By: ______________________
Robert Lynk, Board Chair

IN WITNESS WHEREOF, the Parties hereto have approved and executed this MOA as of the respective dates specified in the adopting Resolution of each Party as provided above in Article III of this MOA.

BANNING HEIGHTS MUTUAL WATER COMPANY

By: Julie L. Hutchinson
Julie L. Hutchinson
Board President

By: Lawrence E. Ellis
Lawrence E. Ellis
Director

IN WITNESS WHEREOF, the Parties hereto have approved and executed this MOA as of the respective dates specified in the adopting Resolution of each Party as provided above in Article III of this MOA.

SAN GORGONIO PASS WATER AGENCY

By: Jeffrey W Davis

IN WITNESS WHEREOF, the Parties hereto have approved and executed this MOA as of the respective dates specified in the adopting Resolution of each Party as provided above in Article III of this MOA.

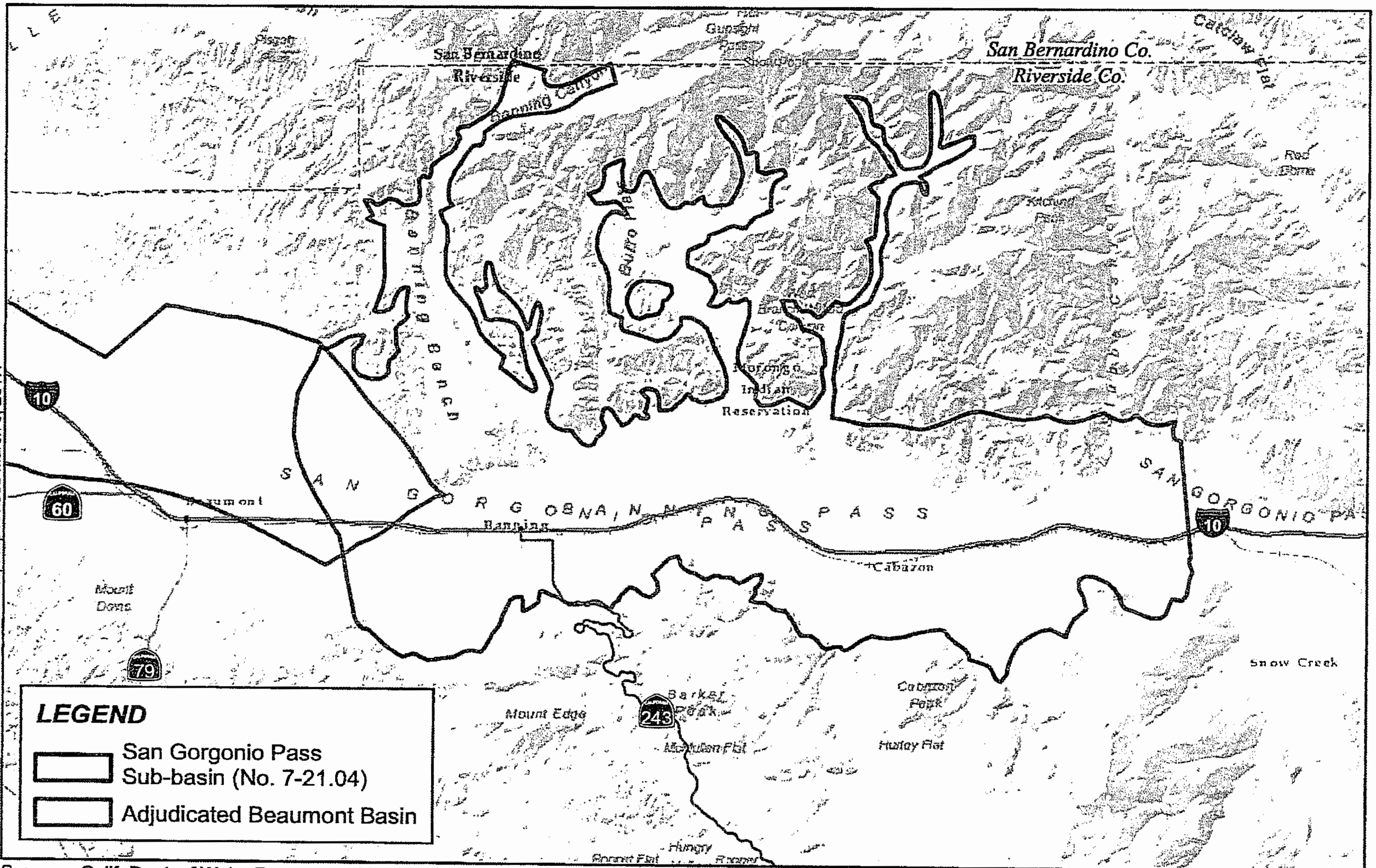
MISSION SPRINGS WATER DISTRICT

By:____________________________

IN WITNESS WHEREOF, the Parties hereto have approved and executed this MOA as of the respective dates specified in the adopting Resolution of each Party as provided above in Article III of this MOA.

DESERT WATER AGENCY

By: Mark S. Krause



Sources: Calif. Dept. of Water Resources, 2016; Riverside Co. GIS, 2016.

0 2 4 6 Miles

G:\2008\08-0007\GIS\SGMA_Ex_A.mxd; Map revised March 9, 2017.

Exhibit A

San Gorgonio Pass Sub-basin

ALBERT A. WEBB ASSOCIATES

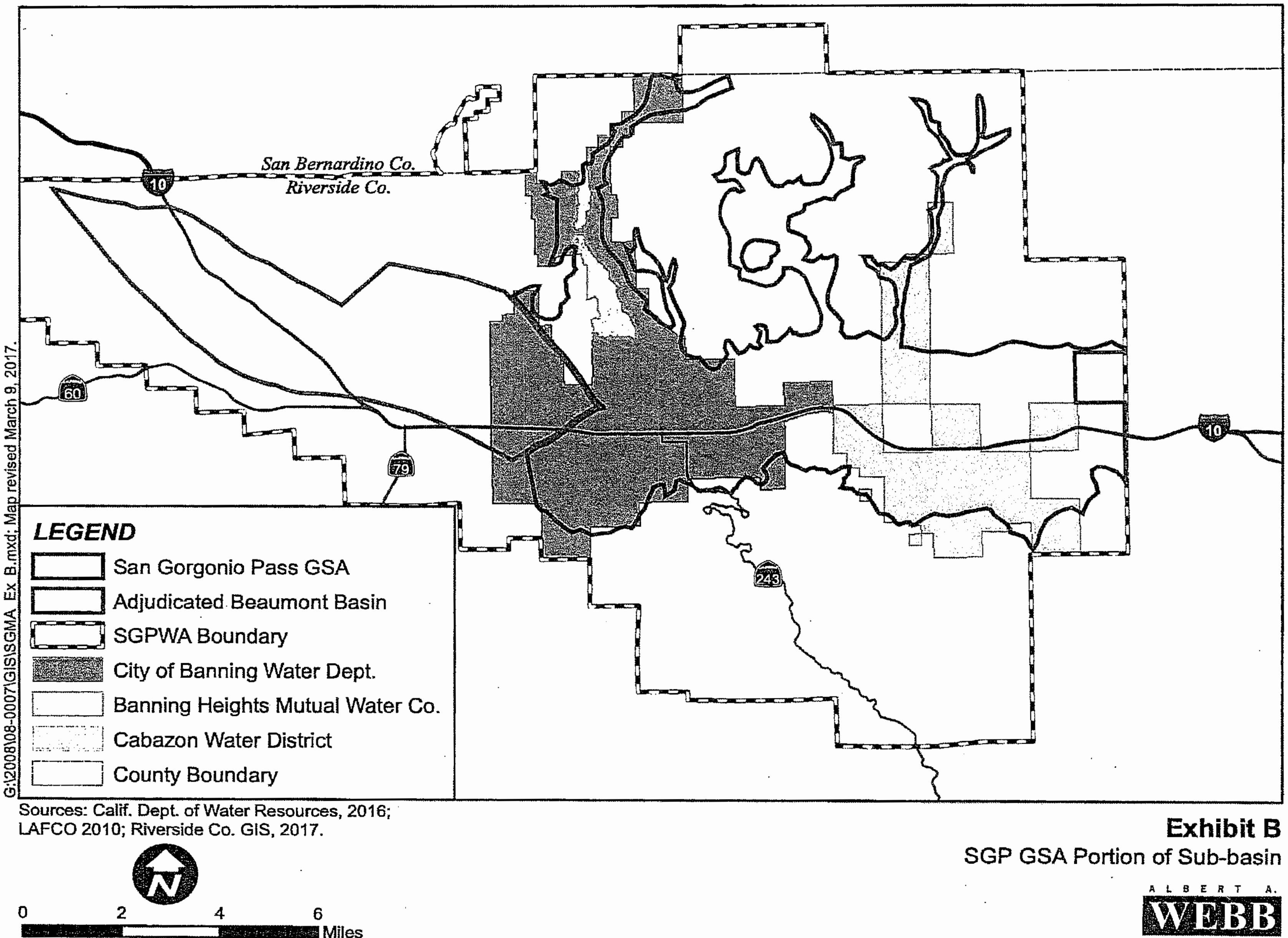
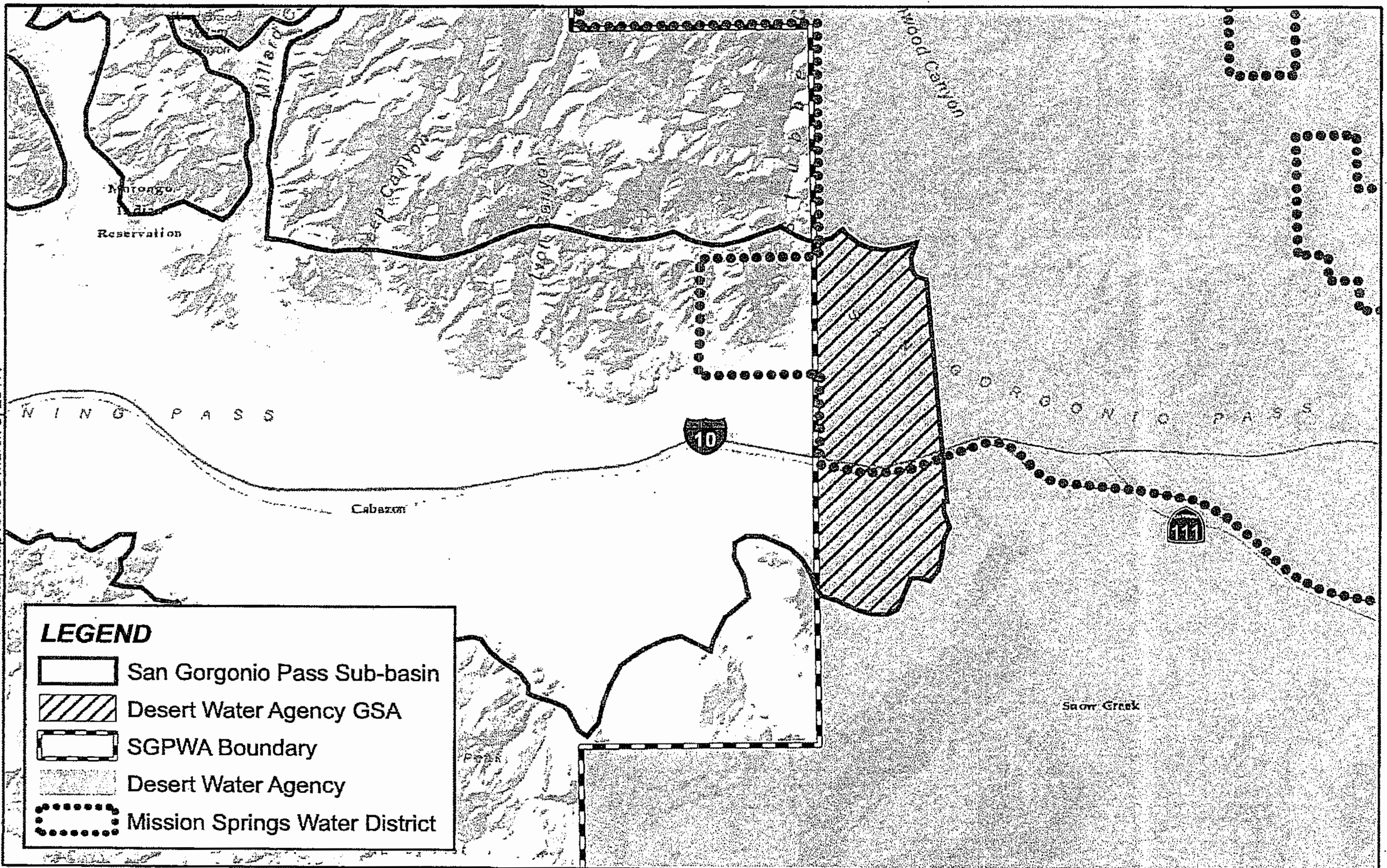


Exhibit B

SGP GSA Portion of Sub-basin

ALBERT A. WEBB ASSOCIATES



G:\2008\08-0007\GIS\SGMA_Ex_C.mxd; Map revised March 9, 2017.

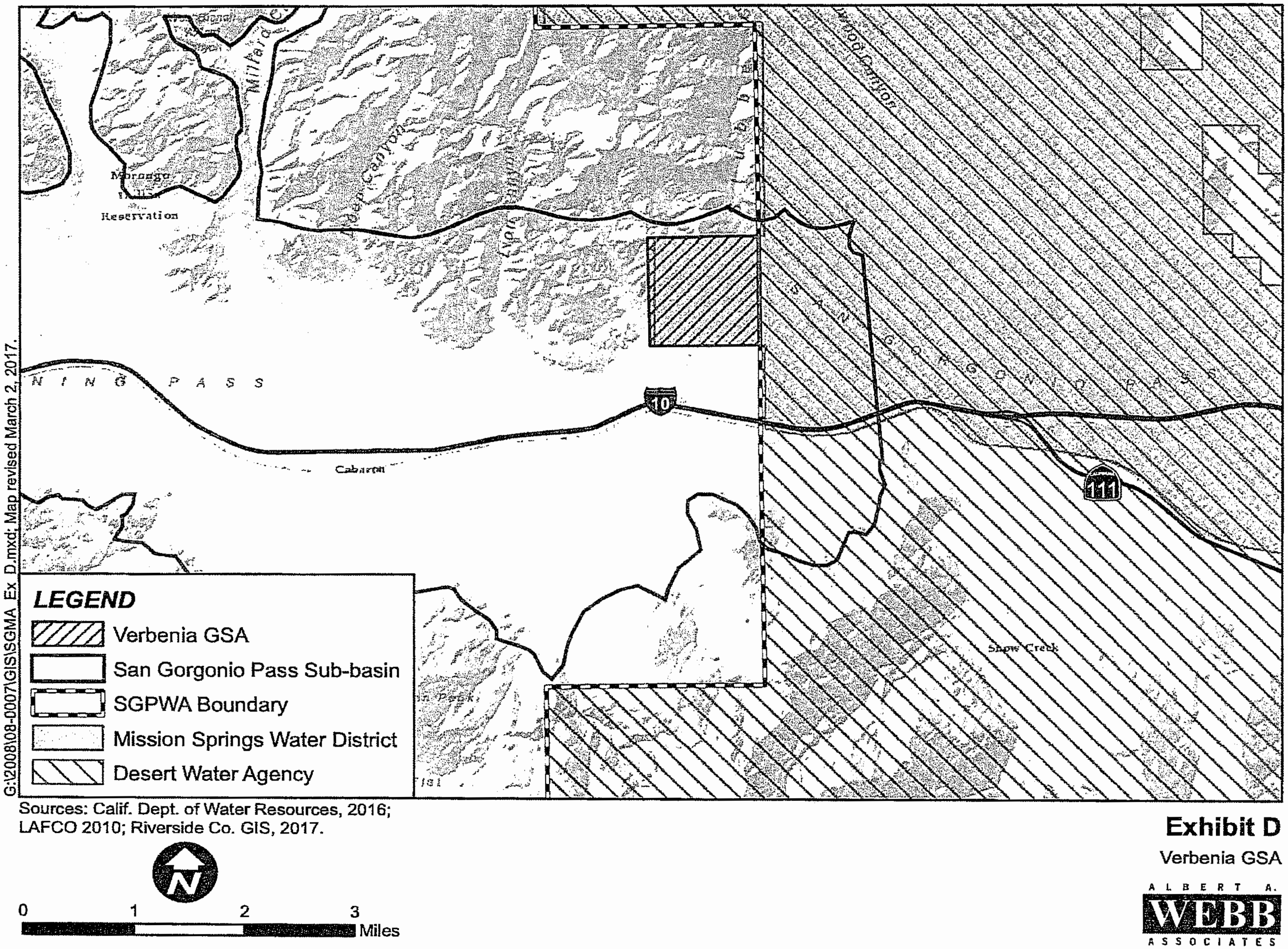
Sources: Calif. Dept. of Water Resources, 2016;
Riverside Co. GIS, 2016.

0 1 2 3 Miles

Exhibit C

Desert Water Agency GSA

ALBERT A. WEBB ASSOCIATES



G:\2008\08-0007\GIS\SGMA_Ex_D.mxd; Map revised March 2, 2017.

Sources: Calif. Dept. of Water Resources, 2016; LAFCO 2010; Riverside Co. GIS, 2017.

Exhibit D

Verbenia GSA

ALBERT A. WEBB ASSOCIATES

Appendix B – Noticing and Adoption Documentation

September 17, 2021

City of Banning
County of Riverside

Re: Notice of Intent to Adopt a Groundwater Sustainability Plan

On behalf of the Groundwater Sustainability Agencies (GSAs) within the San Gorgonio Pass (SGP) Subbasin (referred to herein as "GSAs of SGP Subbasin"), pursuant to California Water Code (CWC) Section 10728.4,, the San Gorgonio Pass Water Agency (SGPWA), acting as plan manager on behalf of the GSAs of the SGP Subbasin, hereby gives notice that these GSAs intend to adopt a Groundwater Sustainability Plan (GSP) for the SGP Subbasin (Basin No. 7-021.04) as encompassed by the boundaries of the GSAs of the SGP Subbasin. Further information about the Subbasin can be found at https://sgma.water.ca.gov/portal/gsa/print/262

The undersigned GSAs specifically provide notice to the City of Banning and County of Riverside of each GSA's intent to adopt the SGP GSP no earlier than 90-days after your receipt of this notice. The GSA's will review and consider any comments received from the City of Banning and County of Riverside. Once adopted, the SGP GSP will govern sustainable groundwater management actions within each GSA's jurisdictional boundaries located in the SGP Subbasin (Basin No. 7-021.04). CWC Section 10728.4, pursuant to passage of the Sustainable Groundwater Management Act of 2014, obligates distribution of this notice to any city or county whose jurisdictional area is within the area of the proposed GSP (see attached map).

Cities or counties that receive this notice may request to consult on the SGP GSP. These requests must be received within 30 calendar days after receipt of this notice. Written requests to consult with one or more GSAs intending to adopt the SGP GSP shall be delivered to the SGP coordinator identified below.

Lance Eckhart
1210 Beaumont Ave, Beaumont, CA 92223
leckhart@spgwa.org

To review the list of GSA public hearings scheduled for the adoption proceedings of the SGP GSP, to download a copy of the Public Draft GSP when it is available, and to receive other information, visit www.SGPGSA.org

Sincerely,

Lance Eckhart,
SGMA Coordinator for the SGP GSA and Plan Manager

GSAs:
Desert Water Agency GSA
San Gorgonio Pass GSA
Verbenia GSA

Record Gazette
218 N. Murray St.

Proof of Publication

(2015.5 C.C.P.)

187047 GSP APPROVAL PHN

State of California)
County of Riverside) **ss.**

I am a citizen of the United States and a resident of the State of California; I am over the age of eighteen years, and not a party to or interested in the above matter. I am the principal clerk of the printer and publisher of Record Gazette, a newspaper published in the English language in the City of Banning, County of Riverside, and adjudicated a newspaper of general circulation as defined by the laws of the state of California by the Superior Court of the County of Riverside, under the date October 14, 1966, Case No. 54737. That the notice, of which the annexed is a copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

December 24, 2021

Executed on: 12/24/2021

At Banning , CA

I ceritfy (or declare) under penalty of perjury that the foregoing is true and correct.

Ana Rivera

Signature

Public Hearing Notice

You are invited by the San Gorgonio Pass Groundwater Sustainability Agency (GSA) to attend a public hearing to consider adoption of a Groundwater Sustainability Plan (GSP) for the San Gorgonio Pass Subbasin (DWR Basin No. 7-021.04). The GSP was prepared pursuant to the Sustainable Groundwater Management Act and California Water Code Section 10727 et seq. The GSA provided a Notice of Intent to adopt a GSP to Riverside County and the City of Banning on September 17, 2021. A downloadable copy of the GSP has been posted on the GSA website (www.sgpgsas.org) for public review since October 1, 2021.

The public, agencies, and other interested parties are invited to attend the public hearing and to provide oral or written comments. Comments received during the public hearing may be considered by the GSA for its determination to adopt the proposed GSP. The GSA is expected to consider adoption of the GSP immediately following the public hearing.

More information (including downloadable copies of the GSP and notices) can be found at www.sgpgsas.org.

Public Hearing San Gorgonio Pass GSA

Topic: Adoption of the San Gorgonio Pass Subbasin Groundwater Sustainability Plan

When: January 12, 2022 at 10:00 a.m.

Where: Online only due to Covid-19

Join At: Meeting will be held virtually and properly noticed at www.sgpgsas.org.

Published in
The Record Gazette
No. 187047
12/24/2021

Record Gazette
218 N. Murray St.

Proof of Publication

(2015.5 C.C.P.)

187048 VERBENIA PUBLIC NOTICE

State of California)
County of Riverside) **ss.**

I am a citizen of the United States and a resident of the State of California; I am over the age of eighteen years, and not a party to or interested in the above matter. I am the principal clerk of the printer and publisher of Record Gazette, a newspaper published in the English language in the City of Banning, County of Riverside, and adjudicated a newspaper of general circulation as defined by the laws of the state of California by the Superior Court of the County of Riverside, under the date October 14, 1966, Case No. 54737. That the notice, of which the annexed is a copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

December 24, 2021

Executed on: 12/24/2021

At Banning, CA

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Ana Rivera

Signature

Public Hearing Notice

You are invited by the Verbenia Groundwater Sustainability Agency (GSA) to attend a public hearing to consider adoption of a Groundwater Sustainability Plan (GSP) for the San Gorgonio Pass Subbasin (DWR Basin No. 7-021.04). The GSP was prepared pursuant to the Sustainable Groundwater Management Act and California Water Code Section 10727 et seq. The GSA provided a Notice of Intent to adopt a GSP to Riverside County and the City of Banning on September 17, 2021. A downloadable copy of the GSP has been posted on the GSA website (www.sgpgsas.org) for public review since October 1, 2021.

The public, agencies, and other interested parties are invited to attend the public hearing and to provide oral or written comments. Comments received during the public hearing may be considered by the GSA for its determination to adopt the proposed GSP. The GSA is expected to consider adoption of the GSP immediately following the public hearing.

More information (including downloadable copies of the GSP and notices) can be found at www.sgpgsas.org.

Public Hearing Verbenia GSA

Topic: Adoption of the San Gorgonio Pass Subbasin Groundwater Sustainability Plan

When: January 11, 2022 at 10:00 a.m.

Where: Online only due to Covid-19

Join At: Meeting will be held virtually and properly noticed at www.sgpgsas.org.

Published in

The Record Gazette

No. 187048

12/24/2021

THE PRESS-ENTERPRISE

Ad Copy:

1825 Chicago Ave, Suite 100
Riverside, CA 92507
951-684-1200
951-368-9018 FAX

PROOF OF PUBLICATION
(2010, 2015.5 C.C.P)

Publication(s): The Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: Public Hearing - Verbenia GSA /

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper in general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673, under date of August 25, 1995, Case Number 267864, and under date of September 16, 2013, Case Number RIC 1309013; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

12/26/2021

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: December 26, 2021
At: Riverside, California

Legal Advertising Representative, The Press-Enterprise

SAN GORGONIO PASS WATER AGENCY
1210 BEAUMONT AVE
ATTN: CHERYLE STIFF
BEAUMONT, CA 92223

Ad Number: 0011507749-01

P.O. Number:

Public Hearing Notice

You are invited by the Verbenia Groundwater Sustainability Agency (GSA) to attend a public hearing to consider adoption of a Groundwater Sustainability Plan (GSP) for the San Gorgonio Pass Subbasin (DWR Basin No. 7-021.04). The GSP was prepared pursuant to the Sustainable Groundwater Management Act and California Water Code Section 10727 et seq.

The GSA provided a Notice of Intent to adopt a GSP to Riverside County and the City of Banning on September 17, 2021. A downloadable copy of the GSP has been posted on the GSA website (www.sgpgsas.org) for public review since October 1, 2021.

The public, agencies, and other interested parties are invited to attend the public hearing and to provide oral or written comments. Comments received during the public hearing may be considered by the GSA for its determination to adopt the proposed GSP. The GSA is expected to consider adoption of the GSP immediately following the public hearing.

More information (including downloadable copies of the GSP and notices) can be found at www.sgpgsas.org.

Public Hearing – Verbenia GSA
Topic: Adoption of the San Gorgonio Pass Subbasin Groundwater Sustainability Plan
When: January 11, 2022 at 10:00 a.m.
Where: Online only due to Covid-19
Join At: Meeting will be held virtually and properly noticed at www.sgpgsas.org.

Press-Enterprise: 12/26

THE PRESS-ENTERPRISE

Ad Copy:

1825 Chicago Ave, Suite 100
Riverside, CA 92507
951-684-1200
951-368-9018 FAX

PROOF OF PUBLICATION
(2010, 2015.5 C.C.P)

Publication(s): The Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: Public Hearing - San Gorgonio Pass GSA /

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper in general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673, under date of August 25, 1995, Case Number 267864, and under date of September 16, 2013, Case Number RIC 1309013; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

12/26/2021

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: December 26, 2021
At: Riverside, California

Legal Advertising Representative, The Press-Enterprise

SAN GORGONIO PASS WATER AGENCY
1210 BEAUMONT AVE
ATTN: CHERYLE STIFF
BEAUMONT, CA 92223

Ad Number: 0011507747-01

P.O. Number:

Public Hearing Notice

You are invited by the San Gorgonio Pass Groundwater Sustainability Agency (GSA) to attend a public hearing to consider adoption of a Groundwater Sustainability Plan (GSP) for the San Gorgonio Pass Subbasin (DWR Basin No. 7-021.04). The GSP was prepared pursuant to the Sustainable Groundwater Management Act and California Water Code Section 10727 et seq.

The GSA provided a Notice of Intent to adopt a GSP to Riverside County and the City of Banning on September 17, 2021. A downloadable copy of the GSP has been posted on the GSA website (www.sgpgsas.org) for public review since October 1, 2021.

The public, agencies, and other interested parties are invited to attend the public hearing and to provide oral or written comments. Comments received during the public hearing may be considered by the GSA for its determination to adopt the proposed GSP. The GSA is expected to consider adoption of the GSP immediately following the public hearing.

More information (including downloadable copies of the GSP and notices) can be found at www.sgpgsas.org.

Public Hearing – San Gorgonio Pass GSA
Topic: Adoption of the San Gorgonio Pass Subbasin Groundwater Sustainability Plan
When: January 12, 2022 at 10:00 a.m.
Where: Online only due to Covid-19
Join At: Meeting will be held virtually and properly noticed at www.sgpgsas.org.

Press-Enterprise: 12/26

Desert Sun mediagroup
PART OF THE USA TODAY NETWORK

PO Box 23430
Green Bay, WI 54305-3430
Tel: 760-778-4578 / Fax 760-778-4731
Email: legals@thedesertsun.com

PROOF OF PUBLICATION

STATE OF CALIFORNIA SS.
COUNTY OF RIVERSIDE

SAN GORGONIO PASS WATER AGENCY
1210 BEAUMONT AVENUE

BEAUMONT CA 92223

I am over the age of 18 years old, a citizen of the United States and not a party to, or have interest in this matter. I hereby certify that the attached advertisement appeared in said newspaper (set in type not smaller than non pariel) in each and entire issue of said newspaper and not in any supplement thereof of the following issue dates, to wit:

12/19/2021

I acknowledge that I am a principal clerk of the printer of The Desert Sun, printed and published weekly in the City of Palm Springs, County of Riverside, State of California. The Desert Sun was adjudicated a Newspaper of general circulation on March 24, 1988 by the Superior Court of the County of Riverside, State of California Case No. 191236.

I certify under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.. Executed on this 20th of December 2021 in Green Bay, WI, County of Brown.

DECLARANT

Ad#:0005037260
PO:
This is not an invoice
# of Affidavits: 1

Public Hearing Notice

You are invited by the Desert Water Agency Groundwater Sustainability Agency (GSA) to attend a public hearing to consider adoption of a Groundwater Sustainability Plan (GSP) for the San Gorgonio Pass Subbasin (DWR Basin No. 7-021.04). The GSP was prepared pursuant to the Sustainable Groundwater Management Act and California Water Code Section 10727 et seq.

The GSA provided a Notice of Intent to adopt a GSP to Riverside County and the City of Banning on September 17, 2021. A downloadable copy of the GSP has been posted on the GSA website (www.sgpgsas.org) for public review since October 1, 2021.

The public, agencies, and other interested parties are invited to attend the public hearing and to provide oral or written comments. Comments received during the public hearing may be considered by the GSA for its determination to adopt the proposed GSP. The GSA is expected to consider adoption of the GSP immediately following the public hearing.

More information (including downloadable copies of the GSP and notices) can be found at www.sgpgsas.org
Topic: Adoption of the San Gorgonio Pass Subbasin Groundwater Sustainability Plan
- Desert Water Agency GSA
When: January 4, 2022 at 8:00 a.m.
Where: Online only due to Covid-19
Join At: Meeting will be held virtually and properly noticed at https://dwa.org
Published: 12/19/21

Public Hearing Notice

You are invited by the Desert Water Agency Groundwater Sustainability Agency (GSA) to attend a public hearing to consider adoption of a Groundwater Sustainability Plan (GSP) for the San Gorgonio Pass Subbasin (DWR Basin No. 7-021.04). The GSP was prepared pursuant to the Sustainable Groundwater Management Act and California Water Code Section 10727 et seq.

The GSA provided a Notice of Intent to adopt a GSP to Riverside County and the City of Banning on September 17, 2021. A downloadable copy of the GSP has been posted on the GSA website (www.sgpgsas.org) for public review since October 1, 2021.

The public, agencies, and other interested parties are invited to attend the public hearing and to provide oral or written comments. Comments received during the public hearing may be considered by the GSA for its determination to adopt the proposed GSP. The GSA is expected to consider adoption of the GSP immediately following the public hearing.

More information (including downloadable copies of the GSP and notices) can be found at www.sgpgsas.org
Topic: Adoption of the San Gorgonio Pass Subbasin Groundwater Sustainability Plan
- Desert Water Agency GSA
When: January 4, 2022 at 8:00 a.m.
Where: Online only due to Covid-19
Join At: Meeting will be held virtually and properly noticed at https://dwa.org
Published: 12/19/21

RESOLUTION NO. 1269

RESOLUTION OF THE BOARD OF DIRECTORS OF DESERT WATER AGENCY ADOPTING THE SAN GORGONIO PASS SUBBASIN SUSTAINABLE GROUNDWATER MANAGEMENT ACT (SGMA) GROUNDWATER SUSTAINABILITY PLAN

WHEREAS, the California Legislature enacted a statewide framework for sustainable groundwater management, known as the Sustainable Groundwater Management Act (California Water Code section 10720 et seq.), pursuant to Senate Bill 1168, Senate Bill 1319, and Assembly Bill 1739, which was approved by the Governor and Chaptered by the Secretary of State on September 16, 2014; and

WHEREAS, the Sustainable Groundwater Management Act (SGMA) went into effect on January 1, 2015; and

WHEREAS, SGMA requires all medium- and high-priority groundwater basins, as designated by the California Department of Water Resources (DWR) Bulletin 118, to be managed by a Groundwater Sustainability Agency (GSA) or multiple GSAs; and

WHEREAS, the San Gorgonio Pass Subbasin of the Coachella Valley Groundwater Basin has been designated by DWR as a medium-priority basin (DWR Bulletin 118 No. 7-021.01); and

WHEREAS, Desert Water Agency elected on November 17, 2015 to become a GSA for the San Gorgonio Pass Subbasin of the Coachella Valley Groundwater Basin; and

WHEREAS, a Memorandum of Agreement (MOA) dated March 7, 2017 was entered into among the following entities (Parties): Cabazon Water District, City of Banning, Banning Heights Mutual Water Company, San Gorgonio Pass Water Agency, Mission Springs Water District, and Desert Water Agency. The purpose of the MOA is to develop a common understanding among the Partners regarding the governance structures applicable to implementation of SGMA, and to cooperate and coordinate preparing a GSP for the San Gorgonio Pass Subbasin; and

WHEREAS, each of the Parties has become a member of a GSA pursuant to Water Code section 10723

WHEREAS, the San Gorgonio Pass Subbasin GSAs have jointly developed a *San Gorgonio Pass Subbasin: Sustainable Groundwater Management Act (SGMA)* Groundwater Sustainability Plan for the San Gorgonio Pass Subbasin and on October 1, 2021, released the Groundwater Sustainability Plan for public comment; and

WHEREAS, Desert Water Agency conducted a public hearing on January 4, 2022 for the purpose of receiving public comments and considering adoption of the Groundwater Sustainability Plan for the San Gorgonio Pass Subbasin; and

WHEREAS, Water Code Section 10727 requires that Groundwater Sustainability Plans be submitted to DWR for review; and

WHEREAS, this resolution and approval of the Groundwater Sustainability Plan are not subject to the California Environmental Quality Act (CEQA) pursuant to California Code of Regulations

(CCR) 15262 and SGMA 10728.6 because CEQA does not apply to planning studies for possible future actions not yet approved, adopted, or funded by this Agency (CCR 15262) or to the preparation and adoption of plans pursuant to SGMA (SGMA 10728.6), and because projects to implement actions taken pursuant to the Alternative Plan will be analyzed in accordance CEQA based on the nature of the project, environmental setting and potential environmental impacts before those projects are approved.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Desert Water Agency as follows:

1. The foregoing recitals are true and correct and made an operative part of this Resolution.

2. The Groundwater Sustainability Plan for the San Gorgonio Pass Subbasin of the Coachella Valley Groundwater Basin is hereby approved and adopted, subject to minor, non-substantive modifications to the text agreed upon by the three San Gorgonio Pass Subbasin GSAs prior to submittal to DWR on or before January 31, 2022. A copy of the San Gorgonio Pass Subbasin Groundwater Sustainability Plan is attached hereto and incorporated herein by reference.

3. The Board of Directors hereby designates SGP GSA to provide notification of this approval and adoption to DWR, including a copy of this Resolution, the approved Groundwater Sustainability Plan, and any additional information/documentation required by law.

ADOPTED this 4th day of January 2022.

Kristin Bloomer, President

ATTEST:

Joseph K. Stuart, Secretary-Treasurer

RESOLUTION NO. 1269
LINK TO SAN GORGONIO PASS SUBBASIN SUSTAINABLE GROUNDWATER MANAGEMENT ACT GROUNDWATER SUSTAINABILITY PLAN

https://www.sgpgsas.org/wp-content/uploads/2021/10/PublicReviewDraftSGPGSP_10_01_2021-web2.pdf

RESOLUTION 2022-02

A RESOLUTION OF THE BOARD OF THE SAN GORGONIO PASS GROUNDWATER SUSTAINABILITY AGENCY ADOPTING THE GROUNDWATER SUSTAINABILITY PLAN FOR THE SAN GORGONIO PASS SUBBASIN

WHEREAS, the California Legislature passed a statewide framework for sustainable groundwater management, known as the Sustainable Groundwater Management Act (California Water Code Section 10720 *et seq.*), pursuant to Senate Bill 1168, Senate Bill 1319, and Assembly Bill 1739, which was approved by the Governor and Chaptered by the Secretary of State on September 16, 2014; and

WHEREAS, the Sustainable Groundwater Management Act (SGMA) went into effect on January 1, 2015; and

WHEREAS, SGMA requires all high and medium-priority basins, as designated by the California Department of Water Resources (DWR) Bulletin 118 to be managed by one or more Groundwater Sustainability Agencies (GSA's); and

WHEREAS, the San Gorgonio Pass Subbasin has been designated by DWR as a medium-priority basin (Bulletin 118 Groundwater Basin: 7-021.04; and

WHEREAS, the San Gorgonio Pass Water Agency, the City of Banning, Cabazon Water District, and the Banning Heights Mutual Water Company (participating by Memorandum of Agreement) formed the San Gorgonio Pass GSA and chose, on March 28, 2017, to become the San Gorgonio Pass Groundwater Sustainability Agency (San Gorgonio Pass GSA), one of three GSA's in the Subbasin; and

WHEREAS, each forming member of the GSA has appointed a representative to serve as its respective representative to the San Gorgonio Pass GSA; and

WHEREAS, SGMA requires, pursuant to Water Code Sections 10720.7 and 10727, that a Groundwater Sustainability Plan (GSP) or multiple GSP's be developed and implemented by January 31, 2022 for each medium-priority basin; and

WHEREAS, the San Gorgonio Pass GSA, in concert with the Verbenia GSA and the Desert Water Agency GSA, has prepared a GSP for the San Gorgonio Pass Subbasin in accordance with Water Code Section 10727.2, as required by SGMA; and

WHEREAS, the San Gorgonio Pass GSA Board of Directors has had the opportunity to review the most current version of the GSP; and

WHEREAS, the San Gorgonio Pass GSA, the Verbenia GSA, and the Desert Water Agency GSA gave notice on September 17, 2021, pursuant to Water Code Section 10728.4, to the County of Riverside and the City of Banning regarding their intent to adopt a GSP; and

WHEREAS, the San Gorgonio Pass GSA held a public hearing on January 12, 2022 for the purpose of receiving public comment and considering adoption of a GSP for the San Gorgonio Pass Subbasin; and

WHEREAS, upon adoption of a GSP, Water Code Section 10733.4 requires that GSP to be submitted by an authorized plan manager to DWR for review; and

WHEREAS, in accordance with Cal. Code Regs., tit. 23, Sections 351(z) and 353.4, the San Gorgonio Pass GSA hereby authorizes Provost and Pritchard (Plan Manager), or designee, as the authorized representative of the San Gorgonio Pass GSA to do the following on behalf of the San Gorgonio Pass GSA: (a) submit the GSP to DWR; (b) submit the First Annual Report; and (c) to otherwise serve as the point of contact with DWR on behalf of the San Gorgonio Pass GSA with respect the San Gorgonio Pass GSP and First Annual Report; and

WHEREAS, The San Gorgonio Pass GSA Board finds that pursuant to Public Resources Code § 20165 and CEQA Guidelines § 15378(a), the adoption of the GSP is not a "project" subject to CEQA. The Board further finds that even if the adoption is a project, the adoption is exempt from CEQA pursuant to Water Code Section 10728.6 and CEQA Guidelines Section 15061(b)(3) and Section 15300.2. The Board hereby directs that all documents and other materials constituting the record of proceedings related to the adoption of the GSP be maintained by the General Manager of the San Gorgonio Pass GSA, or his designee, on file at the San Gorgonio Pass Groundwater Sustainability Agency, 1210 Beaumont Avenue, Beaumont, CA. The Board of Directors directs Staff to file a Notice of Exemption with the County Clerk for the County of Riverside.

NOW, THEREFORE, BE IT RESOLVED by the San Gorgonio Pass Groundwater Sustainability Agency as follows:

1. The forgoing is true and correct and incorporated herein by this reference.
2. The GSP in the form presented this day to the San Gorgonio Pass GSA is hereby approved and adopted.
3. The Plan Manager named above, or designee, is hereby authorized and directed to submit the GSP to DWR and to serve as the point of contact with DWR on behalf of the San Gorgonio Pass GSA consistent with the authorization described above and the requirements contained within the GSP Regulations. Without limiting the foregoing, the Plan Manager is hereby authorized to provide to DWR all information required by SGMA and necessary for DWR's evaluation of the San Gorgonio Pass GSP thereunder, to submit the Annual Report required under SGMA, and to take such further actions as may be necessary to effectuate the purposes of this Resolution.
4. The San Gorgonio Pass GSA Board finds that pursuant to Public Resources Code § 20165 and CEQA Guidelines § 15378(a), the adoption of the GSP is not a "project" subject to CEQA. The Board further finds that even if the adoption is a project, the adoption is exempt from CEQA pursuant to Water Code Section 10728.6 and CEQA Guidelines Section 15061(b)(3) and Section 15300.2. The Board hereby directs that all documents and other materials constituting the record of proceedings related to the adoption of the GSP be maintained by the General Manager of the San Gorgonio Pass Groundwater Sustainability Agency, or his designee, on file at the San Gorgonio Pass Groundwater Sustainability Agency, 1210 Beaumont Avenue, Beaumont, CA. The Board of Directors directs Staff to file a Notice of Exemption with the County Clerk for the County of Riverside.

PASSED AND ADOPTED by the San Gorgonio Pass Groundwater Sustainability Agency, this 12th day of January, 2022, by the following vote:

AYES: Larry Ellis (Banning Heights Mutual Water Company, Calvin Louie (Cabazon Water District), Art Vela (City of Banning), and Lance Eckhart (San Gorgonio Pass Water Agency)

NAYS:

ABSENT:

ABSTAIN:

____

Chair

RESOLUTION 2022-02

A RESOLUTION OF THE BOARD OF THE VERBENIA GROUNDWATER SUSTAINABILITY AGENCY ADOPTING THE GROUNDWATER SUSTAINABILITY PLAN FOR THE SAN GORGONIO PASS SUBBASIN

WHEREAS, the California Legislature passed a statewide framework for sustainable groundwater management, known as the Sustainable Groundwater Management Act (California Water Code Section 10720 *et seq.*), pursuant to Senate Bill 1168, Senate Bill 1319, and Assembly Bill 1739, which was approved by the Governor and Chaptered by the Secretary of State on September 16, 2014; and

WHEREAS, the Sustainable Groundwater Management Act (SGMA) went into effect on January 1, 2015; and

WHEREAS, SGMA requires all high and medium-priority basins, as designated by the California Department of Water Resources (DWR) Bulletin 118 to be managed by one or more Groundwater Sustainability Agencies (GSA's); and

WHEREAS, the San Gorgonio Pass Subbasin has been designated by DWR as a medium-priority basin (Bulletin 118 Groundwater Basin: 7-021.04); and

WHEREAS, on or about May 16, 2017, the San Gorgonio Pass Water Agency and the Mission Springs Water District formed the Verbenia Groundwater Sustainability Agency (Verbenia GSA) and notified the DWR on June 9, 2017, of its decision to become the Verbenia Groundwater Sustainability Agency (Verbenia GSA) for that portion of the Subbasin within its jurisdictional boundaries, as one of three GSA's in the Subbasin; and

WHEREAS, each forming member of the Verbenia GSA has appointed a representative to serve as its respective representative to the Verbenia GSA board; and

WHEREAS, SGMA requires, pursuant to Water Code Sections 10720.7 and 10727, that a Groundwater Sustainability Plan (GSP) or multiple GSP's be developed and implemented by January 31, 2022 for each medium-priority basin; and

WHEREAS, the Verbenia GSA, in concert with the San Gorgonio Pass GSA and the Desert Water Agency GSA, has prepared a GSP for the San Gorgonio Pass Subbasin in accordance with Water Code Section 10727.2, as required by SGMA; and

WHEREAS, the Verbenia GSA Board of Directors has had the opportunity to review the most current version of the GSP; and

WHEREAS, the San Gorgonio Pass GSA, the Verbenia GSA, and the Desert Water Agency GSA gave notice on September 17, 2021, pursuant to Water Code Section 10728.4, to the County of Riverside and the City of Banning regarding their intent to adopt a GSP; and

WHEREAS, the Verbenia GSA held a public hearing on January 11, 2022 for the purpose of receiving public comment and considering adoption of a GSP for the San Gorgonio Pass Subbasin; and

WHEREAS, upon adoption of a GSP, Water Code Section 10733.4 requires that GSP to be submitted by an authorized plan manager to DWR for review; and

WHEREAS, in accordance with Cal. Code Regs., tit. 23, Sections 351(z) and 353.4, the Verbenia GSA hereby authorizes Provost and Pritchard (Plan Manager), or designee, as the authorized representative of the Verbenia GSA to do the following on behalf of the Verbenia GSA: (a) submit the GSP to DWR; (b) submit the First Annual Report; and (c) to otherwise serve as the point of contact with DWR on behalf of the Verbenia GSA with respect the San Gorgonio Pass GSP and First Annual Report; and

WHEREAS, The Verbenia GSA Board finds that pursuant to Public Resources Code § 20165 and CEQA Guidelines § 15378(a), the adoption of the GSP is not a "project" subject to CEQA. The Board further finds that even if the adoption is a project, the adoption is exempt from CEQA pursuant to Water Code Section 10728.6 and CEQA Guidelines Section 15061(b)(3) and Section 15300.2. The Board hereby directs that all documents and other materials constituting the record of proceedings related to the adoption of the GSP be maintained by the General Manager of the Verbenia GSA, or his designee, on file at the Verbenia Groundwater Sustainability Agency, 1210 Beaumont Avenue, Beaumont, CA. The Board of Directors directs Staff to file a Notice of Exemption with the County Clerk for the County of Riverside.

NOW, THEREFORE, BE IT RESOLVED by the Verbenia Groundwater Sustainability Agency as follows:

1. The forgoing is true and correct and incorporated herein by this reference.
2. The GSP in the form presented this day to the Verbenia GSA is hereby approved and adopted.
3. The Plan Manager named above, or designee, is hereby authorized and directed to submit the GSP to DWR and to serve as the point of contact with DWR on behalf of the Verbenia GSA consistent with the authorization described above and the requirements contained within the GSP Regulations. Without limiting the foregoing, the Plan Manager is hereby authorized to provide to DWR all information required by SGMA and necessary for DWR's evaluation of the San Gorgonio Pass GSP thereunder, to submit the Annual Report required under SGMA, and to take such further actions as may be necessary to effectuate the purposes of this Resolution.
4. The Verbenia GSA Board finds that pursuant to Public Resources Code § 20165 and CEQA Guidelines § 15378(a), the adoption of the GSP is not a "project" subject to CEQA. The Board further finds that even if the adoption is a project, the adoption is exempt from CEQA pursuant to Water Code Section 10728.6 and CEQA Guidelines Section 15061(b)(3) and Section 15300.2. The Board hereby directs that all documents and other materials constituting the record of proceedings related to the adoption of the GSP be maintained by the General Manager of the Verbenia Groundwater Sustainability Agency, or his designee, on file at the Verbenia Groundwater Sustainability Agency, 1210 Beaumont Avenue, Beaumont, CA. The Board of Directors directs Staff to file a Notice of Exemption with the County Clerk for the County of Riverside.

PASSED AND ADOPTED by the Verbenia Groundwater Sustainability Agency, this 11th day of January, 2022, by the following vote:

AYES: Arden Wallum, Lance Eckhart

NAYS:

ABSENT:

ABSTAIN:

____
Lance Eckhart, Chair

Appendix C – Public Comment & Response Log

MORONGO
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A SOVEREIGN NATION

November 23, 2021

Lance Eckhart
General Manager [Plan Manager]
San Gorgonio Pass Water Agency
1210 Beaumont Ave. Beaumont, CA 92223
Sent via email to: leckhart@sgpway.org

Re: Draft San Gorgonio Pass Groundwater Sustainability Plan, Public Review Draft, October 1, 2021

Dear Mr. Eckhart,

On behalf of the Morongo Band of Mission Indians (MBMI or Tribe), I am submitting this comment letter during the public review period for the above-referenced draft Plan. The draft Plan has been reviewed by the Tribe's staff, consultants, and legal counsel. We appreciate the opportunity to provide these comments as referenced in Attachment A.

The Tribe is invested in the health of the Basin, which is the subject of the draft Plan, and in the long-term sustainability of the Basin. While not a standing member of any of the three Groundwater Sustainability Agencies, the Tribe has participated in the San Gorgonio Pass Stakeholder Advisory Group meetings through John Covington, Water Department Manager and Reservation Services Administrator.

Our comments primarily are directed at the references to the Tribe's involvement in the Sustainable Groundwater Management Act (SGMA) process to-date and to our federally reserved water rights held by the United States for the benefit of the Tribe and our Reservation.

First, the Tribe did not develop this draft Plan, nor was the Tribe presented with any data to review prior to the issuance of this draft Plan. (See p. 2-19 - 2-20 characterizing the Tribe as having participated in the development of the GSP.) Any data in the Plan which references the Tribe's water usage is data developed by the GSAs and their consultant to develop and draft the Plan; such data has not been presented specifically to the Tribe for review nor verified by the Tribe. Any suggestion in the draft Plan to the contrary would be inaccurate.

Second, as the draft Plan acknowledges, the Tribe holds unquantified federally reserved water rights in several sub-basins within the boundary of the San Gorgonio Pass Groundwater Sustainability Agency. While the quantity of the reserved rights is unknown and the Tribe's data is confidential, the initial date of the reserved rights is 1877, which means the Tribe is the senior rights holder in the Basin. In light of that fact, I question whether any elements of the draft Plan are designed to protect those senior rights: Failing to do so would be an inappropriate framing and goal for the Plan as well as contrary to the intent of SGMA to protect and preserve water rights in general and to fully respect federally reserved water rights (see California Water Code Section 10720).

In Section 6, the draft Plan contains a partial estimate of those reserved rights by estimating the theoretical land use changes on the Reservation by 2030 and the associated extractions of groundwater necessary to support such land use. As identified on page 6-10, these estimates conclude that the Tribe would use approximately 7,200 acre feet of water per year, which, after taking into consideration use of recycled water and recharge from return flows, would result in a net increased usage of 5,300 acre feet. The current Basin sustainable yield estimate of 10,200 acre feet per year, which includes the current estimated water demands of the MBMI (information obtained from the San Gorgonio Pass IRWMP), suggests that the Tribe's theoretical development and estimated water demand for that development will result in usage in excess of the sustainable yield of the Basin. The proposed Project #4 is presented as a solution to this problem caused only by the estimation of the Tribe's increased use for an imagined future development. The proposed Project #4 does not reference any other Basin water user whose water demands might increase in the future and create the need for Project #4 or any other project to maintain sustainability.

Given our status as the senior water rights holder in the Basin, we would have expected a different groundwater management approach that starts with the protection of our federally reserved water rights. For example, the Indian Wells Valley Groundwater Sustainability Plan characterized the manner in which pumping allocations in that basin must be managed in order to protect existing federally reserved rights. The Indian Wells Valley GSA determined that the entire sustainable yield of that basin could be consumed by the unquantified federally reserved rights of a federal water user in that basin and that all management activities must be implemented with the goal of allocating groundwater to other users in a manner which would not interfere with those federally reserved rights. This approach is in compliance with California Water Code Section 10723.2, which provides:

> In an adjudication of rights to the use of groundwater, *and in the management of a groundwater basin or subbasin by a groundwater sustainability agency or by the board, federally reserved water rights to groundwater shall be respected in full. In case of conflict between federal and state law in that adjudication or management, federal law shall prevail.* The voluntary or involuntary participation of a holder of rights in that adjudication or management shall not subject that holder to state law regarding other proceedings or matters not authorized by federal law. This subdivision is declaratory of existing law.
>
> (Emphasis added.)

The draft Plan fails to state that the MBMI is the senior water rights holder in the Basin and that this fact must be taken into account in developing any water management projects or plans.

Third, the draft Plan proposes that a groundwater basin adjudication might be a necessary management action based solely on the fact that MBMI is a federally recognized Indian Tribe with unquantified federally reserved water rights that, in an unspecified fashion, **might** hinder the GSA in its sustainability goals pursuant to SGMA. No other reason is provided for this proposed management action. (See Section 6.3.6 Management Action #6.) As noted above, it is the legal responsibility of the GSA to manage the basin to protect and not infringe upon any federally reserved rights. This legal responsibility is reinforced given that the Tribe's status as the senior rights holder is not in question, that the Tribe holds 37% of the land within the area covered by the draft Plan, and that the Tribe holds 68% of the land within the Cabazon Storage Unit.

Finally, attached hereto are comments developed by our staff, consultants, and legal counsel after review of the draft Plan. We have limited our comments to those elements of the draft Plan which could be improved in order to increase the opportunity for the best appropriate management of the Basin, a goal we have in common with all users.

Sincerely,

Charles Martin

Charles Martin, Tribal Chairman

ATTACHMENT A

COMMENTS ON THE GROUNDWATER SUSTAINABILITY PLAN

In accordance with the requirements of the Sustainable Groundwater Management Act (SGMA), the three Groundwater Sustainability Agencies (GSAs) for the San Gorgonio Pass Subbasin (Basin) have prepared a single Groundwater Sustainability Plan (GSP). The public review draft of the Basin GSP was released for public comment from October 1, 2021 through November 29, 2021.

1. **Page ES-3**: Figure ES1 inaccurately depicts Tribal Trust Lands, refer to Figure 2-2.

2. **Page 2-5**: Figure 2-3 inaccurately depicts City of Banning and the Cabazon Water District Service Area over Tribal Trust Land

3. **Page 2-20**: [2.2.2.1 Titled Morongo Band of Mission Indians]Should read as follows: — *While not a participating member of the SGP-GSA* the MBMI has monitored groundwater levels utilizing a series of monitoring and active groundwater wells throughout the reservation boundaries; however, the data remains private. The MBMI actively participates in GSP development and contributed their understanding of groundwater conditions to the development of the plan.

   Page 2-20: [2.2.4] Add the following: The MBMI additionally reports groundwater quality information as required by the United States Environmental Protection Agency under the Safe Drinking Water Act.

4. **Page 2-21**: "Permanent land subsidence is associated with compaction of inelastic clay layers through excessive groundwater extraction activities in an aquifer below an impermeable layer. Such clay layers are not known to be present in the SGP Subbasin; therefore, subsidence is not associated with groundwater management activities."

   a. Comment: The GSP does not consider groundwater management (i.e. extractions) to be a significant factor to land subsidence. According to the California Department of Water Resources' 2014 *Summary of Recent, Historical, and Estimated Potential for Future Land Subsidence in California*, potential for future subsidence in the Basin is "medium to low"; however, observable land subsidence conditions have been recorded within the Beaumont Basin (see the USGS mapping tool at the following webpage: https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html). Although the portion of the Basin that overlaps with the adjudicated Beaumont Basin is beyond the jurisdiction of SGMA, the GSP should include provisions for potentially monitoring and addressing land subsidence conditions in the Beaumont portion of the basin should additional land subsidence conditions occur during the implementation horizon. Currently available InSAR data for land subsidence within the Basin is discussed on page 3-72. The GSAs should continue reviewing, evaluating and presenting future available land subsidence data, including for the Cabazon Storage Unit, for subsequent GSP reports and updates.

5. **Page 2-22**: Table 2-4—Should read as follows: In 2013, an application was approved to import and store up to 20,000 AF of surface water in the Beaumont Storage Unit within the Adjudicated Beaumont Basin. The actual recharge amounts of water imported are currently zero.

6. **Page 2-24**: "...MBMI has a General Plan that reflects the intended growth and land use changes within MBMI's jurisdictional area. The MBMI General Plan is a confidential document and, therefore, is not available for review by the GSAs and cannot be submitted as a reference. The GSP is designed to consider impacts to beneficial users of groundwater, including MBMI. To achieve this with the best available information, the GSAs have developed estimations of projected land use changes in the MBMI lands and associated groundwater extraction estimations, discussed in Section 3.3."

    a. Comment: The GSP's assumptions regarding projected land use changes in MBMI lands and the associated groundwater extraction projections are discussed on pages 3-106 and 6-10. These assumptions include a projection of 5,000 acres of development, with a corresponding net increase in MBMI groundwater extractions of approximately 5,300 acre-feet per year. To demonstrate the intent to engage tribal entities for the purpose of sustainability planning (see California Water Code §10720.3), the GSP should describe whether and to what extent these assumptions were presented to MBMI for review.

7. **Pages 3-97 & 3-99, Historical Water Budget**: "As noted earlier, because this historical period has below average wetness conditions, the presence of groundwater decline (averaging 10,000 acre-feet [per year]) does not necessarily indicate that overdraft conditions are occurring. The current water budget presented in the next section uses an average hydrologic period for analysis that is more representative of mean conditions."

    a. Comment: The current water budget was developed through modeling using historic hydrologic conditions from 1949 through 1998, but the historical water budget was developed using only hydrologic conditions from 1998 through 2019. The historical water budget should encompass the period from 1949 through 2019 so that the GSAs can determine whether and to what extent overdraft conditions have occurred through a full historic period of record that includes a wider range of hydrologic conditions. This comment is further reinforced given that the current water budget as shown on page 3-104 (Table 3-8) indicates that the Basin experiences significant losses of groundwater in storage (ranging from approximately 3,500 – 13,000 AFY) for all hydrologic conditions other than "wet" and "above normal".

8. **Page 3-112, Current Water Budget/Estimate of Sustainable Yield**: "As shown by the current level water budget, current groundwater pumping of 8,400 acre-feet per year resulted in a small groundwater storage increase of 1,800 acre-feet per year over close to

long-term average conditions….[A]n approximate estimate of the sustainable yield for the SGP Subbasin is 10,200 acre-feet per year, which is about 20 percent more than current pumping levels."

a. Comment: The GSP indicates the Basin sustainable yield will be continually evaluated in the future based on monitoring data that indicate the presence or absence of undesirable results. However, the GSP should consider evaluating the Basin sustainable yield through an analysis of water budgets for the individual storage units, as a net zero change in total Basin groundwater storage may not necessarily ensure that groundwater levels in certain storage units will not decline, or that groundwater quality in certain storage units may not experience degradation. Various storage units in the Basin (such as the Cabazon Storage Unit, Potrero Canyon Storage Unit, and Millard Canyon Storage Unit) are hydraulically interconnected, and any stress change to the Potrero and Millard Canyon Storage Units may result in changes to the sustainable yield of the Cabazon Storage Unit.

9. **Page 3-111, Quantification of Overdraft**

   a. Comment: This section states that "no overdraft is identified in the SGP Subbasin for current conditions" and justifies this point using the Bulletin 118 definition of overdraft as occurring when "groundwater storage declines over a period of years during which water supply conditions approximate average conditions." The current water budget as shown on page 3-104 (Table 3-8) indicates that the Basin experiences significant losses of groundwater in storage (ranging from approximately 3,500 – 13,000 AFY) for all hydrologic conditions other than "wet" and "above normal". Water levels in the Cabazon Storage Unit have experienced steady declines since 2003. The information presented in the GSP is not completely consistent with the GSP's conclusions in identifying and quantifying Basin overdraft conditions.

10. **Pages 4-5 & 4-6, Table 4-2**: Undesirable results in the Basin are described in this table. The undesirable results are defined quantitatively as representative monitoring sites for water levels, water quality, and/or interconnected surface water exceeding their minimum threshold values over 5 consecutive years (for water levels and interconnected surface water) or for two consecutive monitoring periods/every 6 years (for water quality).

    a. Comment: Given that Basin sustainability must be achieved by 2042, the quantitative definitions of undesirable results appear too conservative in that their potential occurrence due to groundwater management cannot be determined until at least 5 years after GSP adoption. Such a schedule may not provide sufficient time for the GSAs to implement appropriate corrective action (i.e. projects and management actions) to mitigate the undesirable results before the sustainability deadline. The quantitative definitions of undesirable results should be re-evaluated to include more frequent (potentially separate) GSP monitoring, particularly for water quality, and allow for a sufficient schedule to implement appropriate corrective actions in the event that minimum thresholds are exceeded.

11. **Page 4-13, Table 4-4**: This table lists the representative monitoring sites for water quality as well as the respective minimum threshold values for nitrate and Total Dissolved Solids (TDS). The minimum threshold value for nitrate is equal to the statewide primary maximum contaminant level (MCL) of 10 milligrams per liter (mg/L), and the measurable objective value for nitrate is equal to 8 mg/L. The minimum threshold value for TDS is equal to 1,000 mg/L, and the measurable objective value for TDS is equal to 800 mg/L. The statewide secondary MCL for TDS ranges from 500 – 1,000 mg/L.

    a. Comment #1: According to Table 4-4, the representative monitoring sites for water quality are municipal production wells for public drinking water supplies. If this is the case, the GSAs again may wish to consider re-evaluating the quantitative definition of Undesirable Result No. 2, as the occurrence of nitrate concentrations in exceedance of the minimum threshold (i.e. the primary MCL) at any time will require immediate corrective action.

    b. Comment #2: As stated on page 3-26, current TDS values within the Basin have ranged from approximately 106 – 205 mg/L. By establishing a minimum threshold of 1,000 mg/L, the GSP allows the Basin water quality to degrade significantly, and establishing a measurable objective of 800 mg/L might lead to degradation of the water quality in the Basin without action during the implementation horizon. The GSP does not adequately consider impacts to current and potential future beneficial uses within the Basin when establishing the sustainable management criteria for TDS.

12. **Pages 4-17 & 4-18**: "There are no stream gages in or adjacent to the SGP Subbasin to monitor flows from the San Gorgonio River; therefore, a volumetric analysis to inform sustainable management criteria is not feasible."

    a. Comment: A USGS stream gaging station potentially for the San Gorgonio River is located just outside of the Basin's Bulletin 118 boundaries. The station is called USGS Site No. 340229116510601 (Burnt Canyon C ABV DIV DAM NR BANNING CA). See the link: https://waterdata.usgs.gov/nwis/inventory/?site_no=340229116510601&agency_cd=USGS&amp

13. **Page 4-19, Table 4-5**: This table lists the rationale for assigning sustainable management criteria for representative monitoring sites, organized by Basin storage unit, and states that "there are no publicly available wells in the Banning Bench Storage Unit that were available for use in the representative monitoring network. This area is considered a high-priority data gap."

a. Comment: The GSAs may wish to consider reviewing available data at the following USGS monitoring sites located approximately within the Banning Bench Storage Unit:
    i. Site Name 002S001E33J004S
    ii. Site Name 002S001E33J002S
    iii. Site Name 002S001E33J001S
    iv. Site Name 002S001E33K001S
    v. Site Name 003S001E03C002S

14. **Pages 4-33 through 4-37**: The figures on these pages show the historic and projected groundwater levels as well as the sustainable management criteria for wells within the water level representative monitoring network.

    a. Comment: The GSAs may wish to consider adding the respective ground surface elevations for each representative monitoring well on Figures 4-4 through 4-12. This addition would assist in determining approximate depth-to-water conditions for each well's measurable objective and minimum threshold.

15. **Section 6 – Projects and Management Actions to Achieve Sustainability**

    a. Comment: For each project and management action described in this section, the following items should be further discussed, as required in the GSP Emergency Regulations § 354.44.
        i. Permitting and regulatory process
        ii. Expected benefits and how they will be evaluated
        iii. Legal authority required to implement the project/management action

16. **Page 6-2**: Under CCR, Title 23 Division 2, §354.44, Projects and Management Actions require a comprehensive description and specific information related to such projects and actions. This information is identified in Appendix E, however, no information was provided in the draft report.

17. **Page 6-9**: "Project #4 is a potential Phase 2 recharge program that could be implemented in the future to address future uncertain potential increases in water use in the Cabazon Storage Unit." **Page 6-10**: "This Project is identified as an option that provides a long-term average supply of 5,300 AF per year…"

    a. Comment #1: The proposed Project #4 seems intended to recharge a quantity of imported water equal to the potential increase in future pumping by MBMI. The project description acknowledges that MBMI is not subject to SGMA and is not obligated to participate in the GSP. However, the project description should also state that MBMI shall not hold any financial responsibility for funding any components of the proposed Project #4, including water purchases.

    b. Comment #2: This project appears to be predicated on a "theoretical" future water use solely by the MBMI and does not consider future water use by other users or

MBMI's existing senior water rights in the Basin. As identified in the 2018 San Gorgonio IRWMP [Table 2-4], projected MBMI annual water demands between 2020 and 2040 increase by only a total of 539 acre-feet and are based on existing regional planning documents.

18. **Page 6-18**: Management Action #2 (Wellhead Requirements) may be implemented to establish new permit criteria, enforce GSA policies, and require GSAs' approval of all permit paperwork for non-de minimis extractors before issuance of a County well permit. These requirements would be imposed only on new wells and may include registration, installing flow meters, installing sounding tubes/sampling ports, and requiring self-reporting of production, static water levels, and water quality.

    a. Comment: The description of Management Action #2 should explicitly state that due to MBMI's status as a sovereign nation, MBMI is not subject to SGMA, and MBMI would be exempt MBMI from any potential wellhead requirements or policies in the event that MBMI constructs a new well(s) in the future.

19. **Pages 6-22**: Management Actions #5 (Groundwater Pumping Allocation) is described as a possible implementation action to regulate and reduce groundwater pumping activities in the event that total pumping exceeds the sustainable yield of the Basin.

    a. Comment: Management Action #5 description acknowledges MBMI's federally reserved water rights (FRWRs) and how those FRWRs must be fully respected in an allocation process. The GSP describes MBMI's FRWRs as not currently quantified. The GSP should also state that MBMI is the most senior rights holder in the Basin, with the initial date of MBMI's federally reserved rights being 1877.

20. **Pages 6-25 & 6-26**: Management Action #6 (Groundwater Basin Adjudication) is described as a possible implementation action "if sustainability does not appear to be occurring during the SGMA implementation period, even though GSAs are committed to complying with the GSP requirements." An adjudication is described as a possible implementation action because "MBMI is considered to be one of the largest groundwater users in the Subbasin, but the GSAs do not have data on the amount of water being pumped, nor can the GSAs control the pumping by MBMI so that the Subbasin complies with SGMA." An adjudication is also considered in this GSP because "MBMI's independence from SGMA jurisdiction may impact sustainable management in the SGP Subbasin and impair the GSAs' ability to comply with SGMA, potentially resulting in uncertainty and tension in the Subbasin."

    a. Comment #1: The description of Management Action #6 unnecessarily labels the confidential nature of MBMI's groundwater pumping and groundwater monitoring data as a reason for initiating a groundwater adjudication. The overall tone of the adjudication description suggests that MBMI's unwillingness to fully participate in SGMA and the GSP may be responsible for the GSAs' consideration of an adjudication as a last resort to achieve sustainability. Instead of initiating an adjudication, the GSAs should take all possible actions within their jurisdiction, including limiting pumping by those under their jurisdiction and implementing the other Management Actions, to govern and sustainably manage the Basin without imposing on MBMI's senior water rights.

b. Comment #2: As stated previously, MBMI's FRWRs are not quantified at this time. According to the adjudication description, "the US Supreme Court has held that state courts can adjudicate Tribal reserved water rights based on the 1925 McCarran Amendment". MBMI questions this claim and questions whether Tribes can be mandated by the State to comply with an adjudication in State court. MBMI's experience with Tribal FRWRs has suggested that State courts cannot compel Tribes to participate in an adjudication in State court; rather, the Tribe must agree to do so.

c. Comment #3: The description also mentions that the Basin may be unable to meet sustainability during an extended period while a court adjudication proceeds. These statements contradict previous expressions in the GSP that the GSAs are committed to complying with SGMA requirements and protecting groundwater resources. Instead of considering a groundwater adjudication, the GSAs should consider adding a section to the GSP describing "adaptive management", meaning that the process of sustainably managing the Basin may deviate from the current version of the GSP due to any future changes in groundwater conditions, data availability, project implementation ability, etc.

d. Comment #4: Other GSPs, such as the one prepared for the Indian Wells Valley Groundwater Basin, have concluded that the entire sustainable yield of a groundwater basin may be claimed by only senior FRWRs. As such, all junior rights pumping in excess of the sustainable yield would be subject to GSP projects and management actions as well as financial responsibility for achieving sustainability.

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November 29, 2021

San Gorgonio Pass Subbasin GSAs
1210 Beaumont Avenue
Beaumont, CA 92223

Submitted via email: leckhart@sgpwa.org

Re: Public Comment Letter for San Gorgonio Pass Subbasin Draft GSP

Dear Lance Eckhart,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Draft Groundwater Sustainability Plan (GSP) for the San Gorgonio Pass Subbasin being prepared under the Sustainable Groundwater Management Act (SGMA). Our organizations are deeply engaged in and committed to the successful implementation of SGMA because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of changing climate. Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, such as domestic well owners, environmental users, surface water users, federal government, California Native American tribes and disadvantaged communities (Water Code 10723.2).

As stakeholder representatives for beneficial users of groundwater, our GSP review focuses on how well disadvantaged communities, drinking water users, tribes, climate change, and the environment were addressed in the GSP. While we appreciate that some basins have consulted us directly via focus groups, workshops, and working groups, we are providing public comment letters to all GSAs as a means to engage in the development of 2022 GSPs across the state. Recognizing that GSPs are complicated and resource intensive to develop, the intention of this letter is to provide constructive stakeholder feedback that can improve the GSP prior to submission to the State.

Based on our review, we have significant concerns regarding the treatment of key beneficial users in the Draft GSP and consider the GSP to be **insufficient** under SGMA. We highlight the following findings:

1. Beneficial uses and users **are not sufficiently** considered in GSP development.
    a. Human Right to Water considerations **are not sufficiently** incorporated.
    b. Public trust resources **are not sufficiently** considered.
    c. Impacts of Minimum Thresholds, Measurable Objectives and Undesirable Results on beneficial uses and users **are not sufficiently** analyzed.

2. Climate change **is not sufficiently** considered.
3. Data gaps **are not sufficiently** identified and the GSP **needs additional plans** to eliminate them.
4. Projects and Management Actions **do not sufficiently consider** potential impacts or benefits to beneficial uses and users.

Our specific comments related to the deficiencies of the San Gorgonio Pass Subbasin Draft GSP along with recommendations on how to reconcile them, are provided in detail in **Attachment A.**

Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A	GSP Specific Comments
Attachment B	SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users
Attachment C	Freshwater species located in the basin
Attachment D	The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset"

Thank you for fully considering our comments as you finalize your GSP.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

Danielle V. Dolan
Water Program Director
Local Government Commission

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

Melissa M. Rohde
Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the San Gorgonio Pass Subbasin Draft Groundwater Sustainability Plan

1. Consideration of Beneficial Uses and Users in GSP development

Consideration of beneficial uses and users in GSP development is contingent upon adequate identification and engagement of the appropriate stakeholders. The (A) identification, (B) engagement, and (C) consideration of disadvantaged communities, drinking water users, tribes,[1] groundwater dependent ecosystems, streams, wetlands, and freshwater species are essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.

A. Identification of Key Beneficial Uses and Users

Disadvantaged Communities, Drinking Water Users, and Tribes

The identification of Disadvantaged Communities (DACs), drinking water users, and tribes is **incomplete**. The GSP maps lands of the Morongo Band of Mission Indians (MBMI), which covers approximately 37 percent of the subbasin's acreage. The GSP provides information on DACs, including identification by name and location on a map. However, the GSP fails to clearly state the population of each DAC or include the population dependent on groundwater as their source of drinking water in the subbasin.

The GSP includes a density map of water wells in the subbasin (Figure 2-8). However, the map groups all wells together and does not differentiate between well types such as domestic, irrigation, or industrial wells. Additionally, the plan fails to provide depth of these wells (such as minimum well depth, average well depth, or depth range) within the subbasin. This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the subbasin.

These missing elements are required for the GSAs to fully understand the specific interests and water demands of these beneficial users, and to support the consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions.

RECOMMENDATIONS
• Provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). • Include a domestic well density map for the subbasin.

[1] Our letter provides a review of the identification and consideration of federally recognized tribes (Data source: SGMA Data viewer) within the GSP from non-tribal members and NGOs. Based on the likely incomplete information available to our organizations for this review, we recommend that the GSA utilize the California Department of Water Resources' "Engagement with Tribal Governments" Guidance Document (https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents) to comprehensively address these important beneficial users in their GSP.

- Include a map showing domestic well locations and average well depth across the subbasin.

Interconnected Surface Waters

The identification of Interconnected Surface Waters (ISWs) is **insufficient**, due to lack of supporting information provided for the ISW analysis. The GSP does not provide any analysis of interconnectivity of surface water and groundwater in the subbasin. The GSP states in the Monitoring Network Chapter (p. 5-17): *"Banning Canyon is the only area in the SGP Subbasin that is subject to SGMA with respect to interconnected surface water and has a history of depth to water occurring seasonally at less than 50-feet within the historic period (1998-2019)."* There is no further discussion of the 50-foot screening depth, or any maps provided in the GSP that show depth to groundwater contours, only groundwater elevation contours from spring 1998 (Figure 3-16) and spring 2019 (Figure 3-17).

The GSP states (p. 3-73): *"San Gorgonio River is an interconnected surface water system during high precipitation years; however, these conditions are not consistent throughout the year and are not assured in all years."* Note the regulations [23 CCR §351(o)] define ISW as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted". "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

The GSP states (p. 3-73): *"Additional ephemeral distributaries from the Whitewater River are present in the Potrero, Hathaway, and Millard Canyons that fall within MBMI lands. These waterways and the downstream uses are confined to MBMI's jurisdiction, which is not subject to SGMA due to the Tribe's federally recognized status."* However, SGMA states that "Federally recognized Indian Tribes...may voluntarily agree to participate in the preparation and administration of a groundwater sustainability plan" [Water Code §10720.3(c)]. Finally, SGMA defines the California Native American Tribes as beneficial users of groundwater [Water Code §10723.2(h)]. Please include information on what steps were taken to address these requirements.

The GSP states (p. 3-73): *"A depiction of all waterways, including ephemeral systems, are included in Figure 3-52 below."* Figure 3-52 is captioned "Interconnected Surface Water Features in the SGP Subbasin" but no descriptive labels are provided on this figure, including which stream reaches are considered interconnected or disconnected.

RECOMMENDATIONS

- On the map of streams in the subbasin (Figure 3-52), clearly label reaches as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

- Overlay the subbasin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used to create the maps.

- For the depth-to-groundwater contour maps, use the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

- Provide further information about the steps taken to involve or collaborate with the MBMI regarding ISWs located within the subbasin.

Groundwater Dependent Ecosystems

The identification of Groundwater Dependent Ecosystems (GDEs) is **insufficient**, due to a lack of comprehensive, systematic analysis of the subbasin's GDEs.

The GSP states (p. 3-75): *"Depth to groundwater was the primary metric for identifying potential GDEs in the Subbasin. TNC's GDE Pulse interactive mapping tool was used in conjunction with long-term groundwater level data, hydrogeologic cross-sections, and historic aerial imagery to analyze the potential for GDE presence."* The GSP discusses depth to water in general terms, but does not provide depth-to-water contours, only groundwater elevation contours for spring 1998 (Figure 3-16) and spring 2019 (Figure 3-17). There is no further discussion of the use of hydrogeologic cross-sections or historic aerial imagery.

Figure 3-53 provides a map of potential GDEs in the subbasin, along with areas marked as depth to groundwater > 200 feet. The text does not state how the GDE mapping was conducted, nor do any figures show depth-to-groundwater contours for depths other than 200 feet.

The GSP states (p. 3-75): *"MBMI lands are not subject to SGMA, and data are not generally available in those areas for full identification as GDEs. These areas have been identified as a data gap. To be conservative, these canyons are identified as potential GDE areas."* As stated above under the ISW section, provide further information about the steps taken to involve or collaborate with the MBMI regarding GDEs located within the subbasin.

RECOMMENDATIONS

- Develop and describe a systematic approach for analyzing the subbasin's GDEs. For example, provide a map of the NC Dataset. On the map, label polygons retained or removed from the NC dataset (and the removal reason if polygons are not considered potential GDEs). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.

- Provide depth-to-groundwater contour maps, noting the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.
- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the subbasin and note any threatened or endangered species (see Attachment C in this letter for a list of freshwater species located in the San Gorgonio Pass Subbasin).
- Provide further information about the steps taken to involve or collaborate with the MBMI regarding GDEs located within the subbasin.

Native Vegetation and Managed Wetlands

Native vegetation and managed wetlands are water use sectors that are required to be included in the water budget.[2,3] The integration of native vegetation into the water budget is **insufficient**. The water budget did not include the current, historical, and projected demands of native vegetation. The omission of explicit water demands for native vegetation is problematic because key environmental uses of groundwater are not being accounted for as water supply decisions are made using this budget, nor will they likely be considered in project and management actions. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the subbasin.

RECOMMENDATIONS

- Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.
- State whether or not there are managed wetlands in the subbasin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

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[2] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[3] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

B. Engaging Stakeholders

Stakeholder Engagement During GSP Development

Stakeholder engagement during GSP development is **insufficient**. SGMA's requirement for public notice and engagement of stakeholders is not fully met by the description in the Communication & Outreach Plan (Section 2.5).[4]

The GSP discusses engagement with the MBMI through the GSP development process. The plan has emphasized a commitment to collaboration with MBMI to meet the subbasin's sustainability goals. The plan also highlights how stakeholder input was incorporated into the GSP development process.

However, we note the following deficiencies with the overall stakeholder engagement process:

- The GSP documents opportunities for public involvement and engagement in general terms, including standing member agency board meetings, Stakeholder Advisory Group meetings, and the 60-day period to review the Public Draft GSP and provide comments. The plan lacks specific details of outreach and engagement targeted to DACs, domestic well owners, and environmental stakeholders during the GSP development process.

- The GSP fails to include opportunities for engagement through the *implementation* phase of the GSP that is specifically directed to DACs, domestic well owners, tribes, and environmental stakeholders.

RECOMMENDATIONS

- Clearly identify which stakeholders members of the Stakeholder Advisory Group represent (e.g., DACs, environmental, tribal) and how their input was incorporated into the GSP.

- In the Communication & Outreach Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.

- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the subbasin.[5]

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[4] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

[5] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

C. Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users

The consideration of beneficial uses and users when establishing sustainable management criteria (SMC) is **insufficient**. The consideration of potential impacts on all beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[6,7,8]

Disadvantaged Communities and Drinking Water Users

Minimum thresholds for chronic lowering of groundwater levels were developed using an iterative process that used groundwater model projections and historical water level data. Minimum thresholds for some wells were set to meet the production demands of Mission Springs Water District (MSWD). For other wells, the GSP states (4-22): *"Initially, groundwater levels were projected using the groundwater model under current conditions for the long-term hydrologic period. These projected water levels were then compared to well construction characteristics at representative monitoring wells and other known nearby production wells to identify the level of impacts. Where the groundwater level projections did not result in significant and unreasonable impacts to known beneficial uses (production for the domestic, commercial, municipal, and industrial uses), the minimum threshold was set to the lowest level of the projections for wells 18A1 COB M11, 11H3, and 7P4. Where significant and unreasonable impacts to beneficial uses were identified in the projections (such as water levels falling below pump settings or well depth), the minimum thresholds were revised upward to levels that would avoid those impacts."* This is the only discussion related to well impacts, and no further details are provided on the impacts to domestic wells. Therefore, the GSP does not sufficiently describe whether minimum thresholds will avoid significant and unreasonable loss of drinking water to domestic well users that are not protected by the minimum threshold, and whether the undesirable results are consistent with the Human Right to Water policy,[9] especially given the absence of a domestic well mitigation plan in the GSP. In addition, the GSP does not sufficiently describe or analyze direct or indirect impacts on DACs, domestic well owners, or tribes when defining undesirable results, nor does it describe how the groundwater level minimum thresholds are consistent with Human Right to Water policy and will avoid significant and unreasonable impacts on these beneficial users.

Undesirable results are established as two of the six representative water level monitoring wells exceeding their minimum threshold in a 5-year period. The GSP states (p. 4-5): *"Two wells are selected to ensure isolated anomalies related to well monitoring or construction failures in one well are not misconstrued to represent the entire Subbasin. The 5-year period is defined as an appropriate period to assess exceedances because it allows enough time for groundwater levels to rebound or be adaptively managed following a single or few years critical period and because it corresponds with the 5-year GSP Update periods."* This implies that significant and unreasonable impacts to beneficial users experienced during dry years or periods of drought will not result in an undesirable result. This is problematic given that a 5-year period is sufficient time frame for drinking water wells to go dry and thus the GSP is failing to manage the subbasin in such a way that strives to minimize significant adverse impacts to beneficial users, which are often felt greatest in below-average, dry, and drought years.

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[6] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[7] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[8] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[9] California Water Code §106.3. Available at: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=106.3

Minimum thresholds for groundwater quality are set to the maximum contaminant level (MCL) for nitrate of 10 mg/L and the secondary MCL (SMCL) of 1,000 mg/L for TDS. In each case, the measurable objective is defined as 80 percent of the minimum threshold which is a significant trigger level for drinking water users. According to the state's anti-degradation policy,[10] high water quality should be protected and is only allowed to worsen to the MCL if a finding is made that it is in the best interest of the people of the State of California. No analysis has been done and no such finding has been made. Also, Section 3.2.4 of the GSP (Groundwater Quality Issues) presents water quality data and discusses trends for several other naturally occurring water quality constituents (arsenic, iron, chromium-6, manganese, and fluoride) that have exceeded regulatory standards. No SMC have been established for these additional constituents, however. SMC should be established for all COCs in the subbasin impacted or exacerbated by groundwater use and/or management, in addition to coordinating with water quality regulatory programs.

RECOMMENDATIONS

Chronic Lowering of Groundwater Levels

- Describe direct and indirect impacts on drinking water users, DACs, and tribes when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.
- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users, DACs, and tribes within the subbasin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.
- Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the subbasin.

Degraded Water Quality

- Describe direct and indirect impacts on drinking water users, DACs, and tribes when defining undesirable results for degraded water quality.[11] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[12]
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users, DACs, and tribes.
- Set minimum thresholds and measurable objectives for all water quality constituents within the subbasin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.

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[10] Anti-degradation Policy
https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/1968/rs68_016.pdf

[11] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

[12] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act
https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

- Set minimum thresholds that do not allow water quality to degrade to levels at or above the MCL trigger level.

Groundwater Dependent Ecosystems and Interconnected Surface Waters

Sustainable management criteria are established for chronic lowering of groundwater levels at three wells in the Banning Canyon area, where the GSP has determined GDEs are a beneficial user of groundwater (Table 4-6). Sustainable management criteria for depletion of interconnected surface water are established by proxy using groundwater elevations at these same three wells.

The minimum thresholds at wells located in Banning Canyon were established as follows (p. 4-18): *"The minimum threshold was assigned at the point in which groundwater extractions from the Banning Canyon Storage Unit typically halt and the City of Banning converts to pumping in the Banning Storage Unit to supply the needs of the city. This minimum threshold was defined to maintain the status quo, which has not caused undesirable results related to interconnected surface water."* Hydrographs of groundwater elevations at these wells show that the minimum thresholds are set to elevations at or below historic groundwater elevations. For discussion of impacts on GDEs, the GSP states (p 4-10): "*To consider the interests of the beneficial use of groundwater by GDEs, the historic canyon groundwater elevation and extraction data were compared to historic GDE footprints documented by TNC's GDE Pulse, which confirmed there were no undesirable results because of groundwater management during the most significant drought periods."* The GSP states (p. 4-6): *"Undesirable Result No. 3. is defined as two of the three Banning Canyon representative water level/interconnected surface water monitoring sites experiencing minimum threshold exceedances for five consecutive years."* However, if minimum thresholds are set to levels lower than historic low groundwater levels and the subbasin is allowed to operate at or close to those levels over many years, there is a risk of causing catastrophic damage to ecosystems that are more adverse than what was occurring at the height of the 2012-2016 drought. This is because California ecosystems, which are adapted to our Mediterranean climate, have some drought strategies that they can utilize to deal with short-term water stress. However, if the drought conditions are prolonged, the ecosystem can collapse.

No analysis or discussion is presented to describe how the SMC will affect beneficial users, and more specifically GDEs, or the impact of these minimum thresholds on GDEs in the subbasin. Furthermore, the GSP makes no attempt to evaluate how the proposed minimum thresholds and measurable objectives avoid significant and unreasonable effects on surface water beneficial users in the subbasin (see Attachment C for a list of environmental users in the subbasin), such as increased mortality and inability to perform key life processes (e.g., reproduction, migration).

RECOMMENDATIONS

- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the subbasin.[13] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[14]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached.[15] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[6,16]

- When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

2. Climate Change

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17] The effects of climate change will intensify the impacts of water stress on GDEs, making available shallow groundwater resources especially critical to their survival. Condon *et al.* (2020) shows that GDEs are more likely to succumb to water stress and rely more on groundwater during times of drought.[18] When shallow groundwater is unavailable, riparian forests can die off and key life processes (e.g., migration and spawning) for aquatic organisms, such as steelhead, can be impeded.

The integration of climate change into the projected water budget is **insufficient**. The GSP does incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the plan does not consider multiple climate scenarios (e.g., the 2070 extremely wet and extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the subbasin. While these extreme scenarios

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[13] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[14] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[15] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[16] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

[18] Condon et al. 2020. Evapotranspiration depletes groundwater under warming over the contiguous United States. Nature Communications. Available at: https://www.nature.com/articles/s41467-020-14688-0

may have a lower likelihood of occurring, their consequences could be significant and their inclusion can help identify important vulnerabilities in the subbasin's approach to groundwater management.

The GSP integrates climate change into key inputs (e.g., changes in precipitation and surface water flows) of the projected water budget. Although the GSP states that evapotranspiration is adjusted for climate change, inputs are not included in the budget tables or figures for the historic, current, and projected water budgets, making the quantified changes on this input unclear. Furthermore, the sustainable yield is not calculated based on the projected water budget with climate change incorporated. If the water budgets are incomplete, including the omission of extreme climate scenarios and sustainable yield not calculated based on climate change projections, then there is increased uncertainty in virtually every subsequent calculation used to plan for projects, derive measurable objectives, and set minimum thresholds. Plans that do not adequately include climate change projections may underestimate future impacts on vulnerable beneficial users of groundwater such as ecosystems, DACs, tribes, and domestic well owners.

RECOMMENDATIONS

- Present evapotranspiration inputs in the tables and figures for the historic, current, and projected water budgets. Estimate the amount of change in evapotranspiration due to climate change.
- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

3. Data Gaps

The consideration of beneficial users when establishing monitoring networks is **insufficient**, due to lack of specific plans to increase the Representative Monitoring Sites (RMSs) in the monitoring network that represent water quality conditions around GDEs and ISWs in the subbasin. These beneficial users may remain unprotected by the GSP without adequate monitoring and identification of data gaps in the shallow aquifer. The Plan therefore fails to meet SGMA's requirements for the monitoring network.[19]

Figure 5-1 (Representative Water Level Monitoring Network) shows sufficient spatial representation of DACs and drinking water users for groundwater elevation monitoring, however depth representation cannot be determined from the information provided in the GSP. Likewise, Figure 5-2 (Representative Groundwater Quality Monitoring Network) shows sufficient spatial representation of DACs and drinking water users for water quality monitoring, however depth representation cannot be determined from the information provided in the GSP.

[19] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

We cannot assess the monitoring network on federal MBMI lands with the information presented in the GSP. The GSP states (p. 5-25): "*The MBMI lands are not subjected to SGMA, as MBMI is a federally recognized tribe. Over 36,000 acres of the Subbasin fall within MBMI's jurisdiction. It is within MBMI's right to keep water level and other data private. Therefore, this area is considered a permanent data gap in the SGP Subbasin.*" Furthermore, the GSP states (p. 6-25): *"MBMI representatives have voluntarily participated in the GSP Working Group supporting the development of the SGP GSP, but MBMI has elected to not submit data and water use information to the GSAs for inclusion in the GSP."*

The GSP does not discuss data gaps for GDEs and ISWs, other than the data gap for GDEs on MBMI land. Proposed future water level monitoring site locations are shown on Figure 5-4, however the locations do not appear to be prioritized for GDE or ISW monitoring.

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of RMSs in the shallow aquifer across the subbasin as needed to map ISWs and adequately monitor all groundwater condition indicators across the subbasin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.
- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.
- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the subbasin.

4. Addressing Beneficial Users in Projects and Management Actions

The consideration of beneficial users when developing projects and management actions is **insufficient**, due to the failure to completely identify benefits or impacts of identified projects and management actions, including water quality impacts, to key beneficial users of groundwater such as GDEs, aquatic habitats, surface water users, DACs, drinking water users, and tribes. Therefore, potential project and management actions may not protect these beneficial users. Groundwater sustainability under SGMA is defined not just by sustainable yield, but by the avoidance of undesirable results for *all* beneficial users.

While the GSP describes groundwater recharge projects such as Project #2 (Stormwater Capture) and Project #3 (Additional imported Water Spreading at Noble Creek Spreading Basins), it fails to describe the projects' explicit benefits or impacts to key beneficial users, such as the environment and DACs. The GSP also fails to include a domestic well impact mitigation program to avoid significant and unreasonable loss of drinking water.

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program.

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plan to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[20]

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[20] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program.
- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plan to mitigate such impacts.
- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[20]
- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[20] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

Attachment C

Freshwater Species Located in the San Gorgonio Pass Basin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result "depletion of interconnected surface waters", Attachment C provides a list of freshwater species located in the San Gorgonio Pass Basin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015[1]. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife's BIOS[2] as well as on The Nature Conservancy's science website[3].

Scientific Name	Common Name	Legal Protected Status		
		Federal	State	Other
BIRDS				
Anas platyrhynchos	Mallard			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Megaceryle alcyon	Belted Kingfisher			
Setophaga petechia	Yellow Warbler			BSSC - Second priority
Tachycineta bicolor	Tree Swallow			
Vireo bellii pusillus	Least Bell's Vireo	Endangered	Endangered	
HERPS				
Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Anaxyrus californicus	Arroyo Toad	Endangered	Special Concern	ARSSC
Anaxyrus punctatus	Red-spotted Toad			
Pseudacris cadaverina	California Treefrog			ARSSC
Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC
Rana muscosa	Southern Mountain Yellow-legged Frog	Endangered	Candidate Endangered	ARSSC

[1] Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoSONE, 11(7). Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710

[2] California Department of Fish and Wildlife BIOS: https://www.wildlife.ca.gov/data/BIOS

[3] Science for Conservation: https://www.scienceforconservation.org/products/california-freshwater-species-database

Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Thamnophis hammondii hammondii	Two-striped Gartersnake		Special Concern	ARSSC
Thamnophis sirtalis sirtalis	Common Gartersnake			
Anaxyrus boreas halophilus	California Toad			ARSSC
INSECTS & OTHER INVERTS				
Capnia teresa	Bernardino Snowfly			
Enochrus carinatus				Not on any status lists
Enochrus piceus				Not on any status lists
Sympetrum corruptum	Variegated Meadowhawk			
MAMMALS				
Castor canadensis	American Beaver			Not on any status lists
MOLLUSKS				
Gyraulus vermicularis	Pacific Coast Gyraulus			CS
PLANTS				
Alnus rhombifolia	White Alder			
Baccharis salicina				Not on any status lists
Castilleja minor minor	Alkali Indian-paintbrush			
Eleocharis montevidensis	Sand Spikerush			
Eleocharis parishii	Parish's Spikerush			
Hydrocotyle ranunculoides	Floating Marsh-pennywort			
Hydrocotyle umbellata	Many-flower Marsh-pennywort			
Juncus textilis	Basket Rush			
Juncus xiphioides	Iris-leaf Rush			
Lythrum californicum	California Loosestrife			
Mimulus guttatus	Common Large Monkeyflower			
Mimulus pilosus				Not on any status lists
Phacelia distans	NA			
Pluchea sericea	Arrow-weed			
Salix exigua exigua	Narrowleaf Willow			
Salix gooddingii	Goodding's Willow			
Salix laevigata	Polished Willow			

Salix lasiolepis lasiolepis	Arroyo Willow			

Attachment D

The Nature Conservancy

July 2019

IDENTIFYING GDEs UNDER SGMA

Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online[1] to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)[2]. This document highlights six best practices for using local groundwater data to confirm whether mapped features in the NC dataset are supported by groundwater.

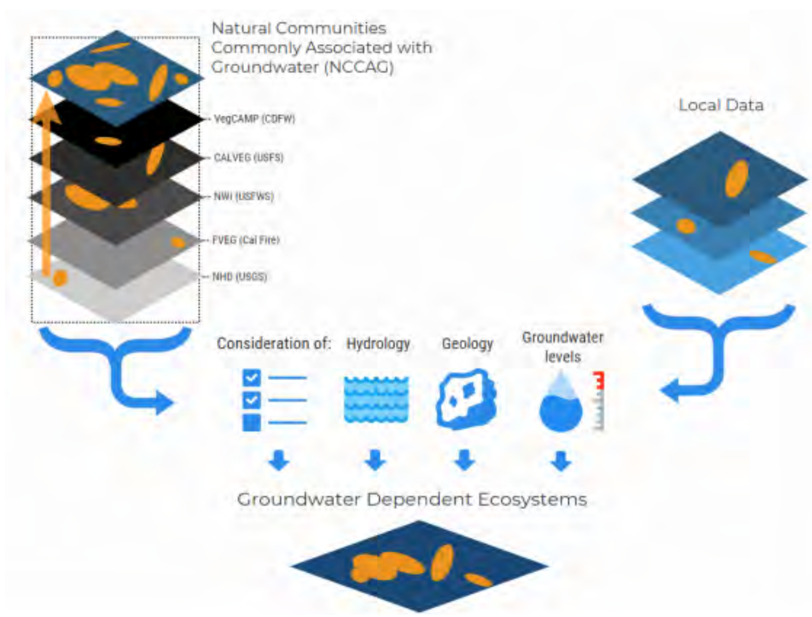

Figure 1. Considerations for GDE identification.
Source: DWR[2]

[1] NC Dataset Online Viewer: https://gis.water.ca.gov/app/NCDatasetViewer/
[2] California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California[3]. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset[4] on the Groundwater Resource Hub[5], a website dedicated to GDEs.

BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2a) or multiple aquifers stacked on top of each other (Figure 2b). In unconfined aquifers (Figure 2a), using the depth-to-groundwater and the rooting depth of the vegetation is a reasonable method to infer groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2d). However, it is important to consider local conditions (e.g., soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2c). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2b) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and GDEs (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

[3] For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf
[4] "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at: https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/
[5] The Groundwater Resource Hub: www.GroundwaterResourceHub.org

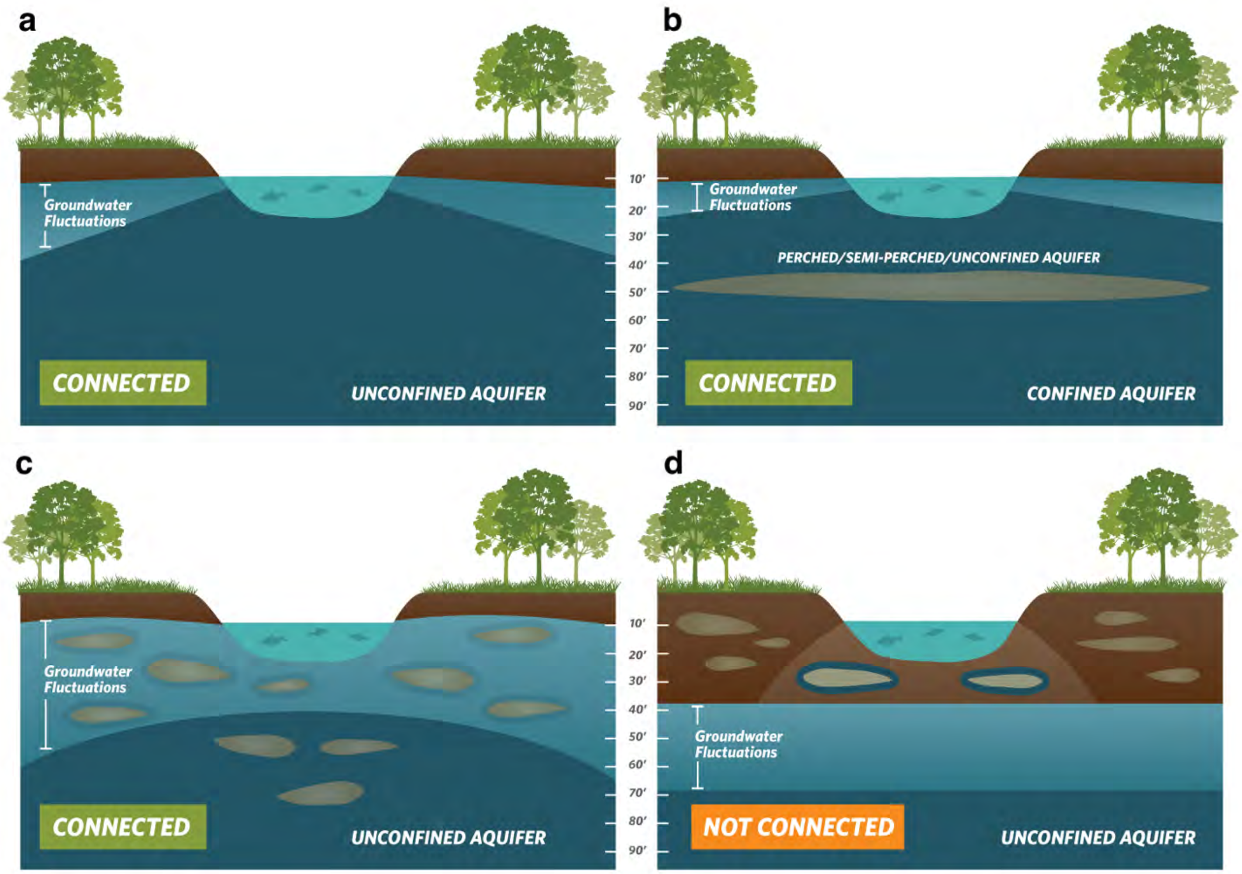

Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a) Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(b)** Depth-to-groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (c)** Depth-to-groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. **(d)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under the surface water feature. These areas are not connected to groundwater and typically support species that do not require access to groundwater to survive.

BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets[6] recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline[7] could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach[8] for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document[4], one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (see Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however if these groundwater conditions are prolonged, adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet[4] of the land surface are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer[9]. However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP <u>until</u> data gaps are reconciled in the monitoring network (see Best Practice #6).

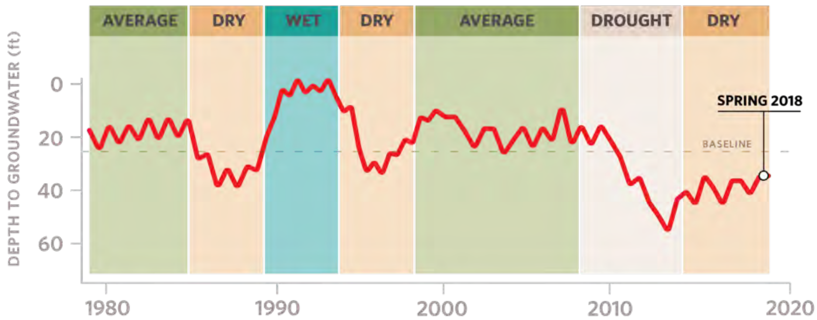

Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

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[6] DWR. 2016. Water Budget Best Management Practice. Available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

[7] Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]

[8] Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs[4]).

[9] SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around a GDE does not preclude the possibility that it is supported by groundwater, too. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals[10], which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

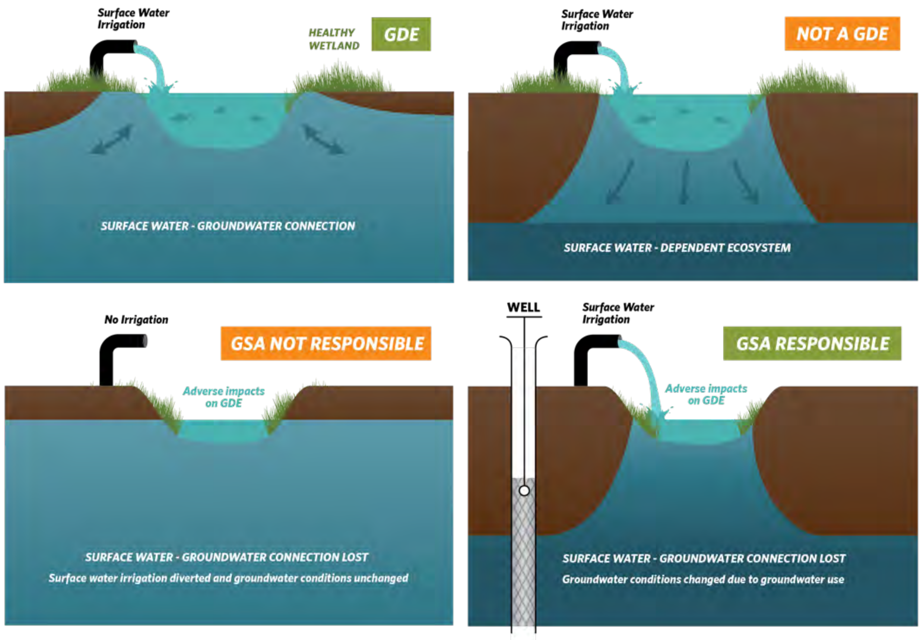

Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

[10] For a list of environmental beneficial users of surface water by basin, visit: https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.

- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.

- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

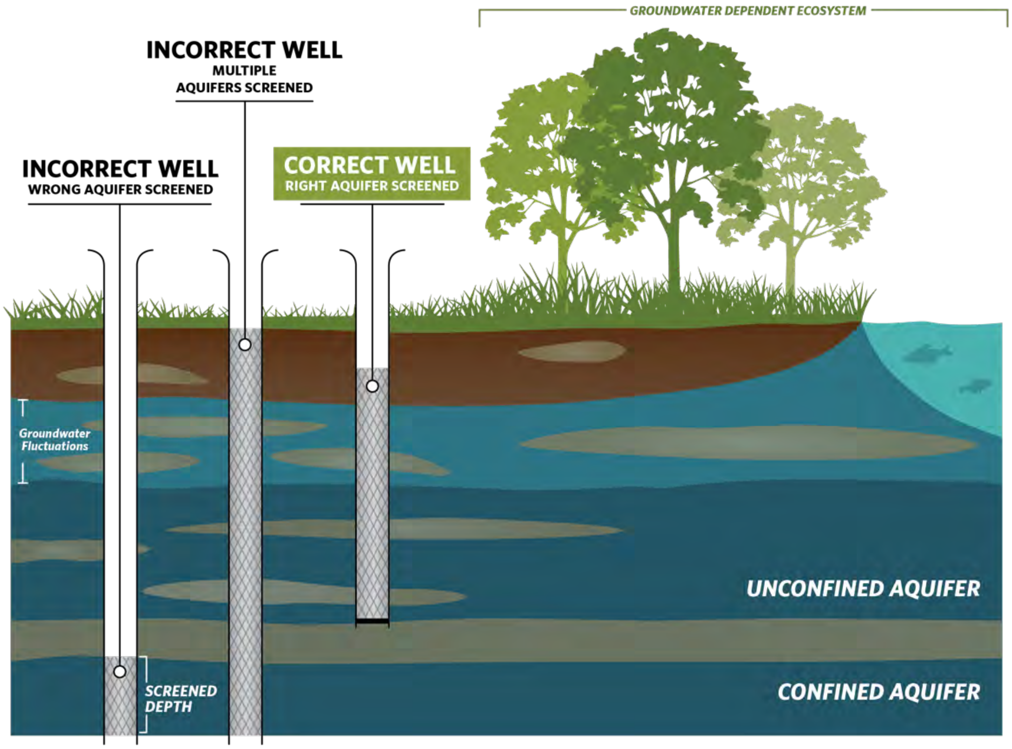

Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like stream and wetland depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6a). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get groundwater elevation contours across the landscape. This layer can then be subtracted from land surface elevations from a Digital Elevation Model (DEM)[11] to estimate depth-to-groundwater contours across the landscape (Figure b; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

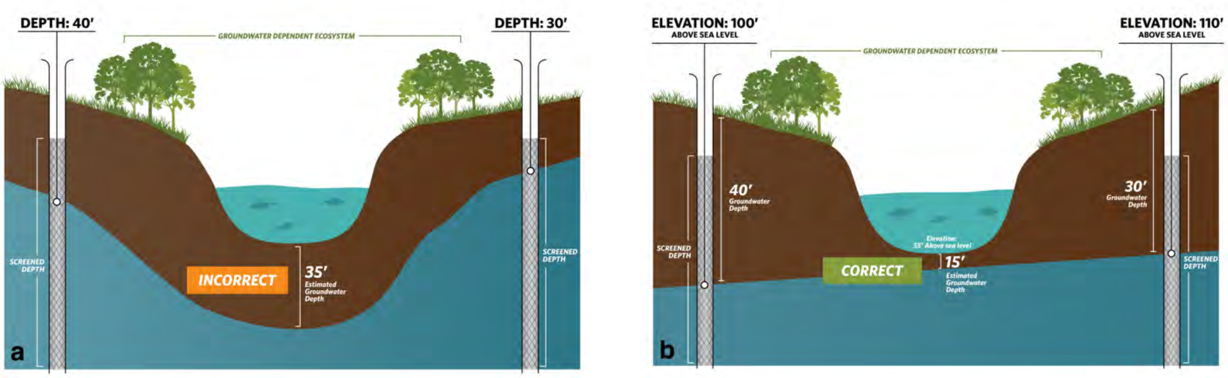

Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(b)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

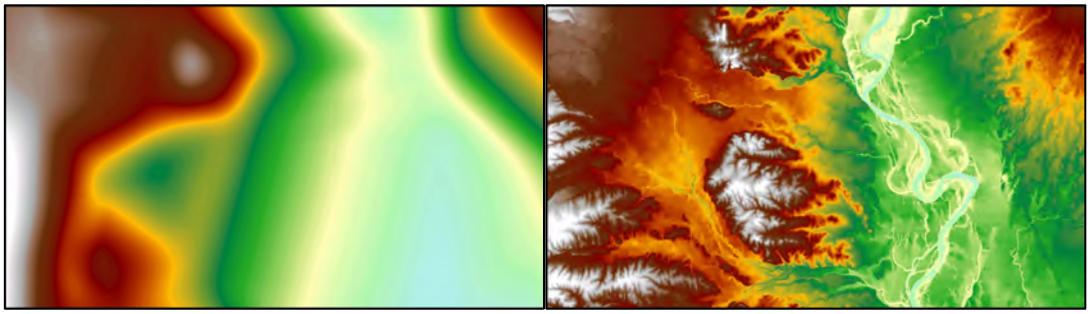

Figure 7. Depth-to-groundwater contours in Northern California. (Left) Contours were interpolated using depth-to-groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth-to-groundwater contours. The image on the right shows a more accurate depth-to-groundwater estimate because it takes the local topography and elevation changes into account.

[11] USGS Digital Elevation Model data products are described at: https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services and can be downloaded at: https://iewer.nationalmap.gov/basic/

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring programs to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. *23 CCR §341(g)(1)*

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. *23 CCR §351(m)*

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. *23 CCR §351(o)*

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. *23 CCR §351(aa)*

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

The Public Review Draft San Gorgonio Pass Groundwater Sustainability Plan was available for public comment from October 1 through November 29, 2021. The below table inventories the subbasin's GSAs' response to comments received.

Response to Public Comments on the Public Review Draft SGP GSP

Commenting Entity	Number	Comment	Response
TNC, etal	1	Provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems and public water systems)	Based on estimations of populations served by the various water providers in the Subbasin, approximately 99.7 percent of groundwater use in the Subbasin is from public water systems, such as City of Banning, Cabazon Water District, Mission Springs Water District and MBMI. Of the known domestic wells, they account for approximately 0.3 percent of groundwater use in the Subbasin. A map of domestic wells has been added as Figure 2-9 and a table of domestic well characteristics has been added in Appendix G. A DAC map is available as Figure 2-14.
TNC, etal	2	Include a domestic well density map for the subbasin.	A map of domestic wells has been added as Figure 2-9 and a table of domestic well characteristics has been added as Appendix G.
TNC, etal	3	Include a map showing domestic well locations and average well depth across the subbasin.	A map of domestic wells has been added as Figure 2-9 and a table of domestic well characteristics has been added as Appendix G.
TNC, etal	4	On the map of streams in the subbasin (Figure 3-52), clearly label reaches as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP	A new Figure 3-54 Depth to Groundwater Contours (1998) is added and labels the San Gorgonio River as a possible ISW. A map of data gap areas is presented in Figure 5-4. Sections 3.2.7 and 4.3.2.3 describe the nature of the San Gorgonio River, including its unique underlying hydrogeology, ephemeral characteristics, and water year fluctuations.
TNC, etal	5	Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMWA baseline period of 2005-2015	Seasonal groundwater elevation and depth to water data, across various water year types were analyzed and presented in hydrographs representing the Banning Canyon where ISWs may be present, in Chapter 3, 3-19 through 3-22. The period presented includes all available data for the available wells, extending to the mid to late 1990's to present, exceeding the requested 2005-2015 period.
TNC, etal	6	Overlay the subbasin's stream reaches on depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used to create the maps.	A new Figure 3-54 Depth to Groundwater Contours (1998) has been added. The year 1998 was selected because it had the highest groundwater levels (to analyze the most conservative scenario).
TNC, etal	7	For the depth-to-groundwater contour maps, use the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depths to groundwater along streams and other land surface depressions were GDEs are commonly found.	The elevation nuances in the Banning Canyon interfere with using a DEM analysis; therefore, the hydrographs for Banning Canyon provided in Chapter 3 are recommended to review the groundwater elevation and depth to groundwater trends where potential GDEs may exist.
TNC, etal	8	Provide further information about the steps taken to involve or collaborate with the MBMI regarding ISWs located within the subbasin.	An MBMI representative has attended the SGP GSP Working Group meetings in which sustainable management criteria development, including for ISWs, was discussed. MBMI public comments on the Public Review Draft (issued Oct 1, 2021 - Nov 29, 2021) is included within this appendix, as is the response to MBMI comments. Appendix F outlines the dates and respective agenda topics at each SGP GSP Working Group meeting, as well as dates in which all SGP GSP Working Group members received a draft copy of a chapter or GSP version to review. All members of the SGP GSP Working Group received copies of the meeting materials for each GSP Working Group meeting, including PowerPoint presentation.
TNC, etal	9	Develop and describe a systematic approach for analyzing the subbasin's GDEs. For example, provide a map of the NC Dataset. On the map, label polygons retained or removed from the NC dataset (and the removal reason if polygons are not considered potential GDEs). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.	The steps outlined in Chapter 3, Section 3.2.8. align with the TNC's GDE Guidance document's recommended steps for GDE identification. A figure of the NC Dataset Viewer's GDEs in areas in which the groundwater exceeded 200-ft is included as Figure 3-53 of the Public Review Draft and included in this GSP's Chapter 3. In addition, a screen capture from TNC's GDE Pulse tool in the area of interest, where depth to groundwater occasionally is less than 200-ft (Banning Canyon) is included as Figure 3-54 of the Public Review Draft and in this GSP's Chapter 3. A discussion of how local groundwater data was used to verify where the NC Dataset may be accurate or where is inaccurate is included in Section 3.2.8. (areas with depth to water always exceeding 200-feet being ruled out as areas of potential GDEs).
TNC, etal	10	Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.	Groundwater elevation contours and hydrographs across the SGP Subbasin are provided in Chapter 3. The text in Chapter 3 clarifies how this information was used to validate or invalidate the possibility of GDEs.
TNC, etal	11	Provide depth-to-groundwater contour maps, noting the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.	Groundwater elevation contours and hydrographs across the SGP Subbasin are provided in Chapter 3. The text in Chapter 3 clarifies how this information was used to validate or invalidate the possibility of GDEs.
TNC, etal	12	If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.	The groundwater elevation contours as well as depth to water hydrographs presented in Chapter 3 provide groundwater level conditions across the Subbasin. These data support that depth to groundwater exceeds the possible rooting depth or hydric soil conditions required for vegetative or wetland GDEs respectively.
TNC, etal	13	Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the subbasin and note any threatened or endangered species (see Attachment C in this letter for a list of freshwater species located in the San Gorgonio Pass Subbasin).	The Emergency GSP Regulations do not require a species analysis in the Subbasin. Because the groundwater system in Banning Canyon, where potential GDEs are identified, is climactically driven with no proposed changes to management of the groundwater system, there are no significant and unreasonable undesirable impacts to GDEs or their respective species that would be produced through groundwater management.
TNC, etal	14	Provide further information about the steps taken to involve or collaborate with the MBMI regarding GDEs located within the subbasin. Clearly identify which stakeholders members of the Stakeholder Advisory Group represent (e.g., DACs, environmental, tribal) and how their input was incorporated into the GSP.	An MBMI representative has attended meetings in which the ISW determination was discussed, as well as received two draft copies of iterations of the GSP. In addition, requests for data with acknowledgement of the Tribe's right to data privacy had been made in writing; however, the Tribe is exercising their right to privacy with possible data or information about ISWs, GDEs, or groundwater levels in their respective lands. MBMI has been involved as a stakeholder in the Stakeholder Advisory Committee meetings, hosted by SGPWA. Meeting Minutes for the Stakeholder Advisory Committee meetings that include the attendees of such meetings are publicly available on the San Gorgonio Pass Water Agency's website. Attendees include representatives from MBMI, USFS, and Water Districts/agencies. In addition to being a participant in the of the Stakeholder Advisory Committee, MBMI has served as a member entity in the SGP GSP Working Group. Appendix F outlines the dates and respective agenda topics at each SGP GSP Working Group meeting, as well as dates in which all SGP GSP Working Group members received a draft copy of a chapter or GSP version to review. All members of the SGP GSP Working Group received copies of the meeting materials for each GSP Working Group meeting, including PowerPoint presentation.
TNC, etal	15	Quantify and present all water use sector demands in the historical, current and projected water budgets with individual line items for each water use sector, including native vegetation	Chapter 3.3 describes the groundwater model, which included a watershed model that incorporated the water use throughout the SGP Subbasin, including native vegetation.
TNC, etal	16	State whether or not there are managed wetlands in the subbasin. If there are, ensure that their groundwater demands are included as a separate line item in the historical, current, and projected water budgets.	GSP Regulations do not require identification of managed wetlands; however, Figure 3-52 supports the understanding that there are are no managed wetlands in the SGP Subbasin.
TNC, etal	17	Clearly identify which stakeholders members of the Stakeholder Advisory Group represent (e.g., DACs, environmental, tribal) and how their input was incorporated into the GSP.	MBMI has been involved as a stakeholde rin the Stakeholder Advisory Committee meetings, hosted by SGPWA. Meeting Minutes for the Stakeholder Advisory Committee meetings that include the attendees of such meetings are publicly available on the San Gorgonio Pass Water Agency's website. Attendees include representatives from MBMI, USFS, and Water Districts/agencies. Stakeholders and interested parties also received an email and mailed letter inviting review and public comment of the Draft GSP. Public comments from the Stakeholder Advisory Committee meetings and the public comment period were helpful in development of the GSP. In addition, an MBMI representative has participated as a member of the SGP GSP Working Group, meeting approximately bi-monthly to monthly to support the technical and policy details of the GSP. MBMI's contributions were integral to the development of the GSP. Appendix F outlines the dates and respective agenda topics at each SGP GSP Working Group meeting, as well as dates in which all SGP GSP Working Group members recieved a draft copy of a chapter or GSP version to review. All members of the SGP GSP Working Group recieved copies of the meeting materials for each GSP Working Group meeting, including PowerPoint presentation.
TNC, etal	18	In the Communication & Outreach Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.	The Stakeholder Advisory Committee supported active and targeted outreach to strengthen the GSP, and ensure it is representative of the groundwater conditions and beneficial users' needs. An list of meeting dates is available in the GSP's Communication and Outreach Plan. Meeting minutes from those meetings are available on the San Gorgonio Pass Water Agency's website.
TNC, etal	19	Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the subbasin.	DWR's tribal engagement guidance has been considered an implemented in the GSP development process.
TNC, etal	20	Describe direct and indirect impacts on drinking water users, DACs, and tribes when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.	The drinking water suppliers (municipal and water agencies/districts) identified as beneficial users of groundwater are DACs/SDACs themselves for water service providers of DACs/SDACs. A DAC map is available as Figure 2-14. In Figure 2-12 and Table 4-7, Tribal use is identified as a beneficial use of groundwater. Section 4.2.2. outlines how the SMCs are assigned to avoid undesirable results to beneficial users/uses of groundwater.

TNC, etal	21	Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users, DACs, and tribes within the subbasin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.	The drinking water suppliers (municipal and water agencies/districts) identified as beneficial users of groundwater are DACs/SDACs themselves or water service providers for DACs/SDACs. A DAC map is available as Figure 2-14. In Figure 2-12 and Table 4-7, Tribal use is identified as a beneficial use of groundwater. Section 4.2.2. outlines how the SMCs are assigned to avoid undesirable results to beneficial users/uses of groundwater.
TNC, etal	22	Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the subbasin.	Historic and projected drought periods were paramount to assigning SMCs that avoid undesirable results. Extended drought periods can be correlated with conditions that may lead to undesirable results. A detailed discussion of available data used to inform SMC development, including historic and projected groundwater levels (where available) which include drought periods, is included in Section 4.6.
TNC, etal	23	Describe direct and indirect impacts on drinking water users, DACs, and tribes when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."	The drinking water suppliers (municipal and water agencies/districts) identified as beneficial users of groundwater are DACs/SDACs themselves or water service providers for DACs/SDACs. A DAC map is available as Figure 2-14. In Figure 2-11 and Table 4-7, Tribal use is identified as a beneficial use of groundwater. Section 4.2.2. outlines how the SMCs are assigned to avoid undesirable results to beneficial users/uses of groundwater.
TNC, etal	24	Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users, DACs, and tribes.	The drinking water suppliers (municipal and water agencies/districts) identified as beneficial users of groundwater are DACs/SDACs themselves or water service providers for DACs/SDACs. A DAC map is available as Figure 2-14. In Figure 2-12 and Table 4-7, Tribal use is identified as a beneficial use of groundwater. Section 4.2.2. outlines how the SMCs are assigned to avoid undesirable results to beneficial users/uses of groundwater.
TNC, etal	25	Set minimum thresholds and measurable objectives for all water quality constituents within the subbasin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.	There are no existing groundwater management activities that are causing significant impacts or projected impacts to groundwater quality. In the event proposed management activities indicate a trend towards a signficiant and unreasonable undesirable result, the GSAs will have the opportunity to assess adaptive management strategies to avoid such results when evaluating groundwater quality data based for the Annual Reports.
TNC, etal	26	Set minimum thresholds that do not allow water quality to degrade to levels at or above the MCL trigger level.	The minimum thresholds are assigned at the MCL for Nitrates and Secondary MCL for TDS, indicating groundwater quality is to remain below these limits. See Sections 4.2, 4.3, and 4.4.
TNC, etal	27	When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable effect on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the subbasin. Defining undesirable results is the crucial first step before the minimum thresholds can be determined.	The best available data is considered when evaluating impacts to beneficial users. In the case of GDEs, the best available resource is TNC's GDE Pulse tool or NC Dataset viewer. As those resources are updated, they can be used to inform changes in habitat footprints in conjunction with an assessment of groundwater levels, climactic trends, and groundwater management. It is understood that the climate (precipitation, fires, etc.). drive the hydrology and ecology in the Banning Canyon (where potential GDEs are present), rather than groundwater management.
TNC, etal	28	When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached. The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left un protected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.	It is understood that the climate (precipitation, fires, etc.). drive the hydrology and ecology in the Banning Canyon (where potential GDEs are present), rather than groundwater management. A description of potential impacts to GDEs correlated with interconnected surface water is identified in Section 4.3.2.3. Depth to groundwater in Banning Canyon across water year types is presented in hydrographs in Section 3.2.1. A new depth to groundwater contour map depicting 1998 conditions is added as Figure 3-54, with the San Gorgonio River identified as a possible ISW. Furthermore, Section 4.3.6.3. acknowledges existing legislation relevant to GDEs and interconnected surface water.
TNC, etal	29	When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."	GDEs are considered a beneficial user and considered during SMC development, particularly for the groundwater levels in the Banning Canyon, where potential GDEs may be present.
TNC, etal	30	Present evapotranspiration inputs in the tables and figures for the historic, current projected water budgets. Estimate the amount of change in evapotranspiration climate change.	This is included in the water budget tables in Section 3.3.
TNC, etal	31	Integrate climate change, including extreme climate scenarios, into all elements projected water budget to form the basis for development of sustainable management criteria and projects and management actions.	This is included in the water budget projections. A description of climate change factor incorporation is included in Section 3.3.
TNC, etal	32	Calculate sustainable yield based on the projected water budget with climate change incorporated.	Comment noted. Section 3.3.12 references 2030 water budget projections which were a basis for determining sustainable yield.
TNC, etal	33	Incorporate climate change scenarios into projects and management actions.	Chapter 6 includes hydrographs that include projections with climate change and potential influences from project implementation.
TNC, etal	34	Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.	The representative monitoring network is included in Figures in Chapter 4 and repeated in Chapter 5. A DAC map is included as Figure 2-14. A new domestic well map and table are added as Figure 2-9 and Appendix G respectively.
TNC, etal	35	Increase the number of RMSs in the shallow aquifer across the subbasin as needed to map ISWs and adequately monitor all groundwater condition indicators across the subbasin and at appropriate depths for all beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMSs.	The count of representative monitoring wells where the potential GDEs exist exceed DWR's BMP recommendation for monitoring well density by 3x. (Hopkins (1984) 's recommendation of four monitoring wells per basin for those that extract more than 10,000 acre-feet per 100 miles squared). The three monitoring sites are strategically assigned to capture the groundwater levels in the upper, middle, and lower Banning Canyon to ensure adequate spatial coverage was available to understand the groundwater levels and potential interconnection of surface water could be analyzed during the implementation period.
TNC, etal	36	Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for all beneficial users -- especially, DACs, domestic wells, and GDEs.	The count of representative monitoring wells exceed DWR's BMP recommendation for monitoring well density, and are placed near or within areas of DACs, domestic wells impacts, and GDEs. (Hopkins (1984) 's recommendation of four monitoring wells per basin for those that extract more than 10,000 acre-feet per 100 miles squared).
TNC, etal	37	Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the subbasin.	The best available data is considered when evaluating impacts to beneficial users. In the case of GDEs, the best available resource is TNC's GDE Pulse tool or NC Dataset viewer.
TNC, etal	38	For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendation on how to implement a drinking water well mitigation program.	Projects and management actions will be considered and implemented as monitoring is evaluated and a need is determined.
TNC, etal	39	For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plan to mitigate such impacts.	The groundwater is of good quality in the Subbasin (Chapter 3). No projects are anticipated to result in groundwater quality exceeding state and federal drinking water standards. The proposed continual monitoring will allow the GSAs to determine if and when there are any impacts, and projects and management actions will be implemented accordingly.
TNC, etal	40	Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Mythology Guidance Document"	The GSAs recognize the prospect of incorporate multi-benefit features to potential recharge projects, should funding and feasibility provide the opportunity.
TNC, etal	41	Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.	Climate change is embedded in the groundwater level projections, including those used to assign SMCs. Water delivery uncertainties fall within the margin of uncertainty in the water budget projections.
MBMI	1	Figure ES1 inaccurately depicts Tribal Trust Lands, refer to Figure 2-2	Map edits have been made to reflect the current conditions of MBMI lands.
MBMI	2	Figure 2-3 inaccurately depicts City of Banning and the Cabazon Water District Service Area over Tribal Trust Land	Map edits have been made to reflect the current conditions of MBMI lands.
MBMI	3.a	Page 2-20: Titled Morongo Band of Mission Indians: Should read as follows: **While not a participating member of the SGP-GSA,** the MBMI has monitored groundwater levels …	Language has been added.
MBMI	3.b	Page 2-20: Add the following: The MBMI additionally reports groundwater quality information as required by the United States Environmental Protection Agency under the Safe Drinking Water Act	Language has been added.
MBMI	4	Page 2-21: Permanent land subsidence is associated with compaction … Although the portion of the SGP Basin that overlaps with the adjudicated Beaumont Basin is beyond the jurisdiction of SGMA, the GSP should include provisions for potentially monitoring and addressing land subsidence conditions in the Beaumont portion of the basin should additional land subsidence conditions occur during the implementation horizon. Currently available InSAR data for land subsidence within the Basin is discussed on page 3-72. The GSAs should continue reviewing, evaluated and presenting future available land subsidence data including for the Cabazon Storage Unit for subsequent GSP reports and updates.	The GSAs will be required to evaluate subsidence as part of the 5-year GSP updates. This analysis will consider areas within and adjacent to the SGP Subbasin. Although unlikely considering the clays required for subsidence are absent from the Subbasin, if subsidence were to occur, the GSAs would be required to consider subsidence as an applicable sustainability indicator in the next GSP Update, and continue reviewing available subsidence data annually. Text is available in Section 5.6 explaining that land subsidence will still be evaluated during the implementation period. A new additional reference to DWR's SGMA Data Viewer has been added to Section 5.6 to point to a DWR-SGMA source that can be used to evaluate subsidence in the implementation period.
MBMI	5	Page 2-22: Appendix G should read as follows: In 2013, an application was approved to import and store up to 20,000 AF of surface water in the Beaumont Storage Unit within the Adjudicated Beaumont Basin. The actual recharge amounts of water imported are currently zero.	Revision made to GSP text.

MBMI	6	Page 2-24: "… MBMI has a General Plan that reflets intended growth … The GSPs assumptions regarding projected land use changes in MBMI lands and the associated groundwater extraction projections are discussed on pages 3-106 and 6-10. These assumptions include a projection of 5,000 acres of development, with a corresponding net increase in MBMI groundwater extractions of approximately 5,300 acre-feet per year. to demonstrate the intent to engage tribal entities for the purpose of sustainability planning (See California Water Code 10720.3), the GSP should describe whether and to what extent these assumptions were presented to MBMI for review.	A summary of information provided to the MBMI and their representatives has been added in Appendix F.
MBMI	7	Pages 3-97 & 3-99: The current water budget was developed through modeling using historic hydrologic conditions from 1949 through 1998, but the historical water budget was developed using only hydrologic conditions from 1998 through 2019. The historical water budget should encompass the period from 1949-2019, so that the GSAs can determine whether and to what extent overdraft conditions have occurred through a full historic period of record that includes a wider range of hydrologic conditions.	Extending the based period to 1949 would add a signficiant period of changed water use conditions. Section 3.3.7. explains the historic period.
MBMI	8	Pages 3-112, Current Water Budget/Sustainable Yield: The GSP should consider evaluating the Basin sustainable yield through an analysis of water budgets for the individual storage units, as a new change in Total Basin groundwater storage may not necessarily ensure that groundwater levels in certain storage units may not experience degradation. any stress change to the Portrero and Millard Canyon Storage Units may result in changes to the sustainable yield of the Cabazon Storage Unit.	Thank you for the suggestion. SGMA requires the subbasin as a whole to be managed sustainably. Any more granular analysis may be considered as part of the future updates.
MBMI	9	Page 3-111, Quantification of Overdraft. Water levels in the Cabazon Storage Unit have experienced steady declines since 2003. The information presented in the GSP is not completely consistent with the GSP's conclusions in identifying and quantifying Basin overdraft conditions.	The GSP describes that precipitation conditions since 1998 have been below long term averages, which means that storage change during that period would not necessarily indicate overdraft conditions. A desciption of the quantification of overdraft is available in Section 3.3.10. and information clarifying what is deemed unsustainable (undesirable result) is available in Section 4.2.
MBMI	10	Pages 4-5 & 4-6, Table 4-2, Undesirable results in the Basin are defined quantitively as representative monitoring sites for water levels, water quality and/or interconnected surface water exceeding their minimum threshold values over 5 consecutive years (for water levels and interconnected surface water) and for two consecutive monitoring periods/every 6 years (for water quality). Given that the Basin sustainability must be achieved by 2042, the quantitative definitions of undesirable results appear too conservative in their potential occurrence due to groundwater management cannot be determined until at least 5 years after GSP adoption. Such a schedule may not provide sufficient time of the GSAs to implement appropriate corrective action to mitigate the undesirable results before the sustainability deadline. The quantitative definitions of undesirable results should be reevaluated to include more frequent (potentially separate) GSP monitoring, particularly for water quality, and allow for sufficient schedule to implement appropriate corrective actions in the event that minimum thresholds are exceeded.	The GSAs would be monitoring groundwater level, quality, and interconnected surface water trends, and may pursue projects and management actions in advance of a minimum threshold exceedance if the groundwater levels are exceeding the projected groundwater trends or if groundwater quality experiences a signficant rate of degredation that can be traced back to water management. The intention of the annual reporting and 5-year GSP updates is to allow a review of the available data and analysis of the progress towards implementation, such as identifying if adaptive management measures would be appropriate to pursue.
MBMI	11.a	Page 4-13, Table 4-4, According to Table 4-4, the representative monitoring sites for water quality are municipal production wells for public drinking water supplies. If this is the case, the GSAs again may wish to consider re-evaluating the quantitative definition of Undesirable Result No. 2, as the occurrence of nitrate concentrations in exceedance of the minimum threshold (i.e. the primary MCL) at any time will require immediate corrective action.	The GSAs' member agencies that supply drinking water will continue to be held to the federal and state drinking water standards and recognize the GSA definition of significant and unreasonable result does not override existing legislative requirements to maintain good quality groundwater in the Subbasin. The intention of the annual reporting and 5-year GSP updates is to allow a review of the available data and analysis of the progress towards implementation, such as identifying if adaptive management measures would be appropriate to pursue. In the case of groundwater quality, the measureable objective serves as a point in which the GSAs evaluate potential causation of quality degredation and have time to implement mitigation measures, if deemed necessary.
MBMI	11.b	Page 4-13, Table 4-4, As stated on page 3-26, current TDS values within the Basin have ranged from approximately 106-205 mg/L. By establishing a minimum threshold of 1,000 mg/L, the GSP allows the Basin water quality to degrade significantly, and establishing a measurable objective of 800 mg/L might lead to degradation of water quality in the Basin without action during the implementation horizon. The GSP does not adequately consider impacts to current and potential beneficial uses within the Basin when establishing the sustainable management criteria for TDS.	The measurable objective and minimum threshold for TDS were defined with consideration of existing water quality standards for drinking water (TDS' secondary MCL is a range of 500 mg/L to 1,000 mg/L); therefore, the existing and potential beneficial use of groundwater quality has been considered. Ongoing monitoring will inform the GSAs of any concerning trends that may prompt action prior to experiencing a measurable objective or minimum threshold.
MBMI	12	Pages 4-17 & 4-18, A USGS stream gaging station potentially for the San Gorgonio River is located just outside of the Basin's Bulletin 118 boundaries. The station is called USGS Site No. 340229116510601 (Burnt Canyon C ABV DIV Dam NR Banning CA).	This stream gaging station can be further evaluated during the implementation phase; however, would be most useful if additional stream gage and whitewater river flume data was available as the surface water conveyance changes when entering the Subbasin.
MBMI	13	Page 4-19, Table 4-5, The GSAs may wish to consider reviewing available data at the following USGS monitoring sites located within the Banning Bench Storage Unit: (1) 002S001E33J004S, (2) 002S001E33J002S, (3) 002S001E33J001S, (4) 002S001E33K001S, (5) 003S001E03C002S	The wells are in an area that has been historically mapped as part of the Banning Bench Storage Unit, but is overlain by the Banning Canyon Storage Unit. Based on well construction characteristics, the indicated wells are representative of the Banning Canyon Storage Unit and additional data would needed to identify Banning Bench conditions. Table 4-5 has been modified accordingly.
MBMI	14	Pages 4-33 through 4-37, The GSAs may wish to consider adding the respective ground surface elevations for each representative monitoring well on Figures 4-4 through 4-12. This addition would assist in determining approximate depth-to-water conditions for each well's measurable objective and minimum threshold.	Ground surface elevation for representative monitoring wells are more are available in Chapter 3, Section 3.2. Ground surface elevation is now provided in a text box.
MBMI	15	Section 6 - Projects and Management Actions to Achieve Sustainability, For each project and management action described in this section, the following items should be further discussed as required in the GSP Emergency Regulations 354.44: (1) permitting and regulatory process, (2) expected benefits and how they will be evaluated, (3) legal authority required to implement the project/management action.	This information is included in Appendix E. Projects & Management Actions.
MBMI	16	Page 6-2, Under CCR, Title 23 Division 2 354.44, Projects and Management Actions require a comprehensive description and specific information related to such projects and management actions. This information is identified in Appendix E, however, no information was provided in the Draft Report.	Draft Appendix E. was made available upon request on November 15, 2021 via email, and a prior draft was made available to all members of the SGP GSP Working Group on July 9, 2021 (Appendix F).
MBMI	17.a	Page 6-9, Project #4 seems intended to recharge the quantity of imported water equal to the potential increase in future pumping by MBMI. The project description acknowledges that MBMI is not subject to SGMA and is not obligated to participate in the GSP. However, the project description should also state that MBMI shall not hold any financial responsibility for funding any components of the proposed Project #4, including water purchases.	Project #4 description modified to indicate MBMI financial responsibility only for any pumping that exceeds their Federally Reserved Water Right.
MBMI	17.b	Page 6-9, This project (project #4) appears to be predicated on a theoretical future water use solely by the MBMI and does not consider future water use by other users or MBMI's existing senior water rights in the Basin. As identified in the 2018 San Gorgonio IRWMP (Appendix G), projected MBMI annual water demands between 2020 and 2040 increase by only a total of 539 acre-feet and are based on existing regional planning documents.	Project #4 description modified to reflect reported increase of only 539 acre-feet and indicate that the higher amount of water use is a conservative assumption.
MBMI	18	Page 6-18, Management Action #2 should explicitly state that due to MBMI's status as a sovereign nation, MBMI is not subject to SGMA, and MBMI would be exempt from any potential wellhead requirements or policies in the event that MBMI constructs new well(s) in the future.	Management Action #2 modified as proposed.
MBMI	19	Page 6-22, Management Action #5 description acknowledges MBMI's federally reserved water rights (FRWRs) and how those FRWRs must be fully respected in an allocation process. The GSP describes MBMI's FRWRs as not currently quantified. The GSP should also state that MBMI is the most senior rights holder in the Basin, with the initial date of MBMI's federally reserved rights being 1877.	The GSAs preference is to not include any determinations in the GSP that are under litigation or could be the subject of future litigation. The GSP's section on Management Action #5 recognizes, "FRWR are distinct from water rights that are based in State law and SGMA directs that FRWR be respected in full."
MBMI	20.a	Page 6-25 & 6-26, Management Action #6 unnecessarily labels the confidential nature of MBMI's groundwater pumping and groundwater monitoring data as a reason for initiating a groundwater adjudication. The overall tone of the adjudication description suggests that MBMI's unwillingness to fully participate in SGMA and the GSP may be responsible for the GSAs' consideration of an adjudication as a last resort to achieve sustainability. Instead of initiating an adjudication, the GSAs should take all possible actions within their jurisdiction, including limiting pumping by those under their jurisdiction and implementing the other management actions, to govern and sustainably manage the Basin without imposing on MBMI's senior water rights.	Management Action #6 modified to address comment and indicate that GSA's would take all possible actions to comply with SGMA, regardless of the status of a potential adjudication.
MBMI	20.b	Pages 6-25 & 6-26, As stated previously, MBMI's FRWRs are not quantified at this time. According to the adjudication description, "the US Supreme Court has held that state courts can adjudicate Tribal reserved water rights based on the 1925 McCarran Amendment". MBMI questions this claim and questions whether Tribes can be mandated by the State to comply with an adjudication in State court. MBMI's experience with Tribal FRWRs has suggested that State courts cannot compel Tribes to participate in an adjudication in State court; rather, the Tribe must agree to do so.	Management Action #6 revised to be less definitive about involvement of MBMI in an adjudication.
MBMI	20.c	Page 6-25 & 6-26, The description also mentions that the Basin may be unable to meet sustainability during an extended period while a court adjudication proceeds. These statements contradict previous expressions in the GSP that the GSAs are committed to complying with SGMA requirements and protecting groundwater resources. Instead of considering a groundwater adjudication, the GSAs should consider adding a section to the GSP describing "adaptive management", meaning that the process of sustainably managing the Basin may deviate from the current version of the GSP due to any future changes in the groundwater conditions, data availability, project implementation ability, etc.	Management Action #6 description modified to confirm that GSAs would be responsible for SGMA compliance regardless of resolution of an adjudication process. A discussion of adaptive management has also been added to the Implementation Plan describing how the GSAs would address unplanned groundwater pumping increases.
MBMI	20.d	Page 6-25 & 6-26, Other GSPs, such as the one prepared for the Indian Wells Valley Groundwater Basin, have concluded the entire sustainable yield of a groundwater basin may be claimed by only senior FRWRs. As such, all junior rights pumping in excess of the sustainable yield would be subject to GSP projects & management actions as well as financial responsibility for achieving sustainability.	Comment noted.

Appendix D – Model Technical Memorandum

INTERA Incorporated
3838 W. Carson Street, Suite 380
Torrance, California 90503 USA
424.275.4055

TECHNICAL MEMORANDUM

To: The San Gorgonio Pass Subbasin Groundwater Sustainability Agency (SGPSGSA)

From: Abhishek Singh, PhD, PE; Saman Tavakoli-Kivi, PhD; Mitsuyo Tsuda; INTERA Incorporated

Date: December 10, 2021

Re: San Gorgonio Pass (SGP) Subbasin Numerical Models - Construction, Calibration, Predictive Modeling and Sensitivity/Uncertainty Analysis

1.0 INTRODUCTION

This technical memorandum provides the documentation for the numerical models constructed and calibrated to support the development of the groundwater sustainability plan (GSP) for the San Gorgonio Pass (SGP) Subbasin. The numerical models consist of a watershed model referred to as the San Gorgonio Pass Watershed Model (SGPWM) and two (an upper and lower) groundwater models referred to as the San Gorgonio Pass Subbasin Groundwater Models (SGPSGM).

The Sustainable Groundwater Management Act (SGMA) requires all groundwater and surface water models used for a GSP to meet the following standards (CCR 352.4(f)):

(1) The model shall include publicly available supporting documentation.

(2) The model shall be based on field or laboratory measurements, or equivalent methods that justify the selected values, and calibrated against site specific field data.

(3) Groundwater and surface water models developed in support of a Plan after the effective date of these regulations shall consist of public domain opensource software.

The SGP models address the above-listed SGMA requirements. This memorandum provides the required supporting documentation. The models utilize the publicly available United States Geologic Survey public-domain codes INFIL and MODFLOW and were developed using the best available science and data for the SGP Subbasin, including basin-specific groundwater information consisting of geologic/lithologic data, geophysical data, streamflow data, and groundwater levels.

The primary purpose of the models is to simulate historical and future groundwater levels and water budget terms in the deep groundwater system. The models are also used to assess impacts to groundwater levels and water budget terms from future pumping, climate-change, and projects and management actions as well as estimate the sustainable yield for the SGP subbasin.

The SGP models incorporate key watershed, surface-water, and groundwater processes within and around the SGP Subbasin. Figure 1.1 shows a schematic with the conceptual and numerical modeling frameworks for the SGP Subbasin with Table 1.1 showing the key hydrologic processes simulated by each model. The SGPWM is a daily rainfall- runoff-recharge model covering three watersheds: San Timoteo Creek, Potrero Creek, and San Gorgonio River. The model was developed and calibrated by the United States Geologic Survey (USGS) for the period 1913 – 2012 (Hevesi and Christensen, 2015). The model was temporally extended through December 2019 to cover the historical planning period. The SGPWM is primarily used to estimate (precipitation-based) recharge and runoff for the SGPSGM. The SGPSGM are based on existing groundwater models of the subbasin and surrounding areas. Model stratigraphy, properties, and boundary conditions from these existing models were incorporated into the SGPSGM and subsequently updated and recalibrated using basin-specific groundwater data. The SGPSGM consist of an upper groundwater model (upper SGSPGM) and a lower groundwater model (lower SGPSGM). The upper SGPSGM simulates surface-flows, surficial recharge, and shallow groundwater inflows/outflows in the shallow perched groundwater system. Recharge from the upper SGPSGM drains to the lower SGPSGM through the intermediate vadose zone. The lower SGPSGM, which includes the primary productive unit in the SGP Subbasin, incorporates vadose zone processes between the upper and lower groundwater systems and simulates deep groundwater levels, inflows, and outflows. The lower SGPSGM was calibrated to available historical (1970 - 2019) groundwater level data in the subbasin and exceeds industry calibration standards. The SGP models were updated and applied consistent with the American Society for Testing and Materials (ASTM) standards D5447[*] and D5891[†].

In addition, climate change datasets (provided by California Department of Water Resources (DWR) for SGMA planning purposes) and projections for future water use and pumping were incorporated into the models to develop 50-year predictive scenarios to assess future water levels and groundwater budgets, as required by SGMA and the GSP Emergency Regulations. Finally, comprehensive sensitivity/uncertainty analysis was undertaken to assess the sensitivity of groundwater model calibration and output (water levels and water budget components) to uncertain model parameters and inputs. This analysis was used to quantify the uncertainty in key water budget components, especially recharge to and underflows from the SGP Subbasin.

2.0 BASIN SETTING AND HYDROGEOLOGY

The SGP Subbasin regional setting, hydrogeologic conceptual model (HCM), and groundwater conditions are discussed in detail in Chapter 3 of the SGP Subbasin Groundwater Sustainability Plan. This section summarizes salient HCM features:

- The San Gorgonio Pass Subbasin (Department of Water Resources Basin Number 7-21.04) is part of the Coachella Valley Groundwater Basin located in Riverside County, CA.
- The SGP Subbasin is approximately 60 square miles and is bounded on the north by semi-permeable rocks and the San Bernardino Mountains and to the south by the San Jacinto Mountains (as shown in Figure 3.1).
- The San Gorgonio Pass Subbasin main valley has an elevation of approximately 2,600 feet above mean sea level (msl) on its western edge and approximately 1,400 feet above msl on

[*]ASTM D5447: Standard Guide for Application of a Numerical Groundwater Flow Model to a Site-Specific Problem
[†]ASTM D5981: Standard Guide for Calibrating a Groundwater Flow Model Application

the eastern edge. Ground surface rises sharply to the north and south, with the mountains to the north and south 9000 ft higher than the pass itself.

- A surface drainage divide between the Colorado River and South Coastal Hydrologic Study Areas define the western boundary of the Subbasin with the Upper Santa Ana Valley-San Timoteo (San Timoteo) Subbasin bounding the subbasin on the west (DWR 2004). The adjudicated Beaumont storage unit (part of the San Timoteo Subbasin) is adjacent to the SGP Subbasin's western boundary.
- The eastern boundary is formed by a bedrock constriction that creates a groundwater cascade into the Indio Subbasin (DWR 2004).
- The San Gorgonio Pass region has a transitional climate characterized by the marine coastal influences from the west and arid Mojave Desert influences from the east, with low rainfall amounts, hot summers, and cool winters. The long-term average annual precipitation at Beaumont (1910–2019) is 19.3 inches, most of which occurs in November through March.
- The geologic structure of the region surrounding the SGP Subbasin is defined by the San Andreas Fault system. Active parts of the Banning, Garnet Hill, and San Gorgonio Pass Thrust faults are associated with the San Andreas Fault system through the SGP Subbasin. Yule (2009) has described the San Andreas Fault in this region as disaggregating into a family of irregular and discontinuous separate fault lines. The Banning Fault trends east-west through the San Gorgonio Pass where it generally dips steeply north and juxtaposes crystalline rocks of the San Gabriel Mountains against Cenozoic (66 mya to the present) sedimentary deposits. The San Gorgonio Pass Fault Zone is a series of Quaternary (2.6 mya to the present) reverse, thrust, and tear faults that extends from Whitewater to the Calimesa area to the west. The San Gorgonio Pass Fault Zone has produced several tectonically created landforms with the uplifted Banning Bench being a prime example. Water-level and geochemical data indicate that multiple groundwater barriers are associated with the Banning Bench and are interpreted to be multiple strands of the San Gorgonia Pass Fault Zone (Rewis et al, 2006). In general, due to the numerous faults, bedrock and sediment layers have shifted resulting in significant differences in groundwater levels and flows across the Subbasin.
- Bloyd (1971) divided the San Gorgonio Pass region into the Beaumont, Banning, Cabazon, Calimesa, San Timoteo, South Beaumont, Banning Bench, Singleton, and canyon storage units (Banning, Hathaway, Potrero, and Millard Canyons). Rewis and others (2006) further refined Beaumont, Banning, Cabazon, and canyon storage units (as shown in Figure 2.1).
- A large density contrast exists between the sedimentary deposits and denser basement rock in the San Gorgonio Subbasin. Using the relationship and isostatic gravity field data Langenheim et al. (2005) estimated the thickness of sedimentary deposits within the San Gorgonio Pass Subbasin. Results of this study indicates that the depth to the top of the basement complex in the Subbasin ranges from 0 feet along the margins of the basin to greater than approximately 7,000 feet northwest of Banning in the adjudicated Beaumont Storage Unit. Across the main area of the basin, the depth of the basement complex is up to approximately 3,000 feet. Localized areas of deeper basement complex up to about 4,000 feet are located generally in the Banning and Banning Bench Storage Unit areas. Older sedimentary deposits tend to have a higher degree of compaction, consolidation, and

cementation than the younger deposits and as a result have greatly reduced permeability in relation to younger sedimentary deposits (Rewis, 2006).

- Holocene (12,000 years ago to the present) and Pleistocene (2.6 mya to 12,000 years ago) age alluvium and the Pliocene to Pleistocene age San Timoteo Formation are the main water bearing deposits within the SGP Subbasin, extending to depths beyond 2000 ft below ground surface.
- The surface-water drainage features of the San Gorgonio Pass are part of the Salton Sea watershed, which drains to the Salton Sea. The main surface drainage feature of the SGP Subbasin is the San Gorgonio River which flows intermittently over the Subbasin (DWR, 2004). Smaller tributaries within the subbasin originating from the San Bernardino Mountains to the north or from the San Jacinto Mountains to the south include Smith Creek, Montgomery Creek, Hathaway Creek, Potrero Creek, Twin Pines Creek, Jenson Creek, and One Horse Creek. The subbasin drainage features tend to have a northwest-southeast orientation. The drainage features coalesce along the southern part of the SGP and drain eastward to the Indio Subbasin.
- The San Gorgonio Pass area experiences periods of great variability in recharge and runoff in response to variability in precipitation. Hence, the streamflow is generally ephemeral to intermittent and the episodic stream flows that discharge from higher elevations quickly infiltrate the gravel and sand bedded canyons, contributing to the subbasin groundwater supply.
- Relatively shallow surficial quaternary deposits are present in the canyons (primarily along the San Bernardino Mountain foothills). The canyons get recharged by the intermittent surficial flows in the creeks and streams that cut through the canyons. Water levels in the canyons are highly transient and are driven primarily by surface flow events. Though intermittent, surface flows and groundwater underflows through the canyons are an important source of recharge to the deeper groundwater system.
- Groundwater levels, lithological data, and geophysical logs indicate that the deep groundwater system (where much of the pumping is located) is separated from the shallow perched groundwater system (driven by surface flows and surficial recharge) by a vadose zone in the deeper part of the Subbasin along the valley floor. The vadose zone limits and attenuates vertical recharge to the deeper groundwater system along the valley floor. No known extensive aquitards exist across the subbasin; hence the deeper groundwater system is primarily unconfined or locally semi-confined.
- The primary inflows to the subbasin are: recharge from stream flows and precipitation; return flow from outdoor irrigation and septic systems; recharge from percolation ponds (from diverted water from the canyon); and underflows from the Beaumont subbasin (where the Noble Creek imported water recharge basins are located). Underflows to the Indio subbasin (to the east) and groundwater pumping in the canyons and deeper groundwater system are the primary outflows from the subbasin.

3.0 PREVIOUS MODELING STUDIES

The SGP and surrounding areas have been the focus of various conceptual and numerical modeling studies. Bloyd (1971) evaluated the hydrogeology and conceptual water budget terms (including available basin storage) in the SGP area. DWR conducted a similar study evaluating the storage, movement, and quality of groundwater in the SGP Subbasin (DWR, 1987). Swain (1978) developed a two-dimensional finite-element models of ground-water flow and transport for the upper Coachella Valley, which included the SGP and Indio subbasins. This model was further evaluated and extended by the USGS (Reichard and Meadows, 1992) to quantify water budget terms and identify key uncertainties, data gaps, and future modeling needs. Boyle (1988; 1993) calculated the groundwater dependable yield and performed groundwater investigations for the San Gorgonio Pass Water Agency. Geoscience (2011) estimated the maximum perennial yield for the Banning and Cabazon storage units as well as available water supply from the Beaumont Subbasin.

The USGS has been conducting watershed and groundwater investigations in the SGP area for several years. Rewis et al. (2006) developed a watershed rainfall-runoff- recharge model (using the INFILv3 code [USGS, 2008]) and a groundwater flow model (using MODFLOW) for the Beaumont and Banning storage units within the SGP Subbasin. The Rewis (2006) watershed model was extended by Hevesi and Christensen (2015) to cover the San Timoteo Creek, the Potrero Creek, and the San Gorgonio River drainage areas. This model is henceforth referred to as the San Gorgonio Pass Watershed Model (SGPWM) The Rewis (2006) groundwater model from this study was further expanded, refined, and updated by Thomas Harder and Company (2015) for the Beaumont Watermaster to assess the safe yield and support the Beaumont subbasin adjudication. As part of their SGP groundwater investigations, the USGS is also developing two (henceforth unpublished) connected models: an upper groundwater model for the shallow subsurface in the Banning Canyon and Cabazon storage units; and a lower groundwater model for the deeper groundwater system in the Cabazon storage unit (personal correspondence with Allen Christensen, USGS). Drainage from the upper model is used as recharge for the lower model, which includes an unsaturated zone critical to simulating the lag and attenuation observed between precipitation events and groundwater levels in the subbasin. Draft model files of this groundwater model were made available to the SGPGSA for prior and the GSP modeling study.

Woodard and Curran (2018a) developed the San Gorgonio integrated watershed and groundwater model (SGIWGM) based on the draft USGS models for the SGP subbasin covering the Banning, Banning Canyon, and Cabazon storage units. The model was developed to support the San Gorgonio Integrated Regional Water Management (IRWM) Plan development efforts. The model was subsequently extended (Woodard and Curran, 2018b) to include parts of the Beaumont, South Banning, and Banning Bench storage units as well as the Hathaway, Potrero, and Millard Canyons to the north. The model was built using the GSFLOW code (Markstrom et al., 2008) and coupled the Precipitation Runoff Modeling System (PRMS) watershed model with the underlying MODFLOW groundwater model. Figure 3.1 shows the extents of the various models in and around the SGP Subbasin. Table 3.1 shows specifics about each of the numerical models relevant to this study.

4.0 GSP MODELING FRAMEWORK

As shown in Figure 1.1, the current modeling framework consists of three interconnected models, as summarized below:

- The upper-most SGPWM, developed in INFILv3 (USGS, 2008), is a grid-based, distributed-parameter, deterministic water-balance model that calculates the temporal and spatial distribution of daily net runoff and infiltration of water across the root zone.
- The upper SGPSGM (developed in MODFLOW-OWHM [Hanson et al., 2014]) overlies the entire SGP Subbasin area (including parts of the Beaumont subbasin) and simulates the shallow groundwater system. Runoff and recharge from SGPWM is input into the upper SGPSGM. The upper SGPSGM includes a streamflow routing (SFR2) package, which takes runoff from the SGPWM and simulates surface flows through the streams, creeks, tributaries, and the San Gorgonio River that run through the SGP Subbasin. The upper model also simulates groundwater flows in the Canyons and at shallow/perched depths across the valley floor. The upper model is used to calculate underflows from the surrounding Canyons and vertical drainage from the shallow/perched groundwater system across the valley floor.
- The lower SGPSGM (developed in MODFLOW-NWT [Niswonger et al., 2011]) represents the deeper groundwater systems within the Beaumont, Banning, and Cabazon storage units. Vertical drainage from the upper SGPSGM is input as potential deep groundwater recharge to the lower SGPSGM. Groundwater at depth within these storage units can be separated from the shallow/perched groundwater above by a thick vadose zone that limits and attenuates deep groundwater recharge. Hence, the lower SGPSGM includes an unsaturated zone flow (UZF) package to simulate key vadose zone processes. Recharge from the upper model can be limited by the infiltration and storage capacities of the vadose zone. Recharge can also lag by several years before it reaches the deep groundwater system, depending on the thickness and hydraulic conductivity of the intervening vadose zone.

Note, ideally, the upper and lower models would be dynamically coupled with the ability to simulate the perched, intermediate vadose zone, and deep groundwater flow within an integrated model. However, MODFLOW does not have the ability to simulate unsaturated zone conditions between two saturated layers. The unsaturated zone flow (UZF) package can only be specified above the top layer of a MODFLOW model. Hence, the upper and lower model had to be decoupled with drainage from the upper model provided as recharge to the UZF package of the lower model, which in turn routed the flows to the uppermost layer of the lower model, representing the top of the deep groundwater system.

The following sections describe each model construction, boundary conditions, and parameters in more detail.

4.1 San Gorgonio Pass Watershed Model (SGPWM)

The SGPWM is based on the INFILv3 model developed by the USGS (Hevesi and Christensen, 2015) for the San Gorgonio Pass Watershed (Figure 3.1). The SGPWM is a daily watershed rainfall-runoff-recharge model used to estimate spatially and temporally distributed recharge and runoff for the San Gorgonio Pass area, consisting of the San Timoteo Creek, Potrero Creek, and San Gorgonio River watersheds. Recharge and runoff from the SGPWM is used as input for the upper SGPSGM. The original USGS watershed model covered the hydrologic period from 1913 to 2012. The SGPSGM simulation period for the GSP extends from 1970 – 2019. Hence, the USGS watershed model was extended through December 2019 to develop recharge and runoff inputs for the SGPSGM. The model extension entailed extending the precipitation and temperature input timeseries for all active (between 2012 and 2019) gauges used in the original INFILv3 model. The spatial extent, model grid (uniform 150 meters), model layers (seven with six layers representing the root zone and the seventh representing perched groundwater), and all model parameters (topography, land cover, soils, geology, and root zone properties) of the SGPWM were kept the same as the original USGS watershed model (Hevesi and Christensen, 2015). Similar to the original USGS watershed model, a 45-month (starting January 1909) "spin-up" period was used to stabilize model output with respect to the initial conditions in the SGPWM. Hence, the extended SGPWM simulation period went from 1909 to 2019.

4.2 Upper San Gorgonio Pass Subbasin Groundwater Model (Upper SGPSGM)

The upper SGPSGM simulates surface-water and shallow/perched groundwater flows in the SGP Subbasin and adjacent areas. As described above, the model receives recharge and runoff from the SGPWM (Section 4.1). The primary purpose of the upper model is to calculate underflows from the surrounding Canyons and vertical drainage from the shallow/perched groundwater system to the lower SGPSGM.

4.2.1 Model Design

4.2.1.1 Software Code, Discretization, and Simulation Period

The upper SGPSGM model was developed in the MODFLOW-OWHM code (Hanson et al., 2014), consistent with the USGS upper groundwater model. Grid spacing (uniform 150 m) and orientation were kept the same as the SGIWGM model. The grid was consistent with the SGPWM to allow for alignment of recharge and runoff inputs from the watershed model with the groundwater model. The model consists of monthly stress-periods covering a simulation period from 1970 to 2019, providing 50 years of historical and baseline conditions for SGMA planning purposes. Consistent with the USGS groundwater models, the model has units of meters (m) and days. Water levels and volumes were converted to feet and acre-feet for reporting purposes.

The MODFLOW datasets were developed to be compatible with Groundwater Vistas for Windows Version 8.04 (Rumbaugh and Rumbaugh, 2005). Groundwater Vistas was used to visualize model properties and results. Changes to static model properties (such as hydraulic conductivities and storage coefficients) were made in Groundwater Vistas. Spatio-temporal input packages (e.g., Stream Flow River [SFR], Well [WEL], Multi-Node Well [MNW2], and Recharge [RCH]) were created and modified using Python scripts outside Groundwater Vistas. Since the model utilizes input packages created outside Groundwater Vistas, it was run outside Groundwater Vistas using the Windows Command Prompt and the MODFLOW-OWHM executable.

4.2.1.2 Extent and Stratigraphy

The model covers an area of 21,620 acres including the Banning Bench, Banning, South Banning, and Cabazon storage units as well as the Canyons areas (Figure 2.1). To provide hydraulic continuity with adjacent subbasins, the upper SGPSGM also includes parts of the Beaumont Basin to the west and the Indio subbasin to the east (Figure 2.1).

The model consists of two model layers. The first model layer represents the shallow geologic unit covering the Canyons and the valley floor storage units. The existing Woodard and Curran (2018) SGIWGM and the draft USGS upper groundwater model were the basis for the extent and stratigraphy of the first model layer. Aquifer stratigraphy and thickness in the SGIWGM and the USGS groundwater model were based on a recent USGS geologic investigation and gravity survey (USGS, Draft 2019), which mapped depth to bedrock across the SGP valley floor and surrounding Canyons. Hence, the extent and stratigraphy of the first layer of the SGPSGM were kept the same as the first layer of the SGIWGM model. The top of the first layer is coincident with ground surface and the average thickness is approximately 200 ft.

The second model layer in the upper SGPSGM is only present in the valley floor areas, where shallow/perched groundwater can percolate to the deeper groundwater system (through the vadose zone, if present). The second model layer *does not represent a geologic unit* and is essentially a “dummy” model layer with drain cells that collects water to flow out vertically of the model domain. The layer thickness varies from 1000 to 2000 ft with the bottom set at 200 m or 656 ft above mean sea level (amsl).

Figures 4.1 – 4.3 show the layer 1 top elevations, bottom elevations, and thickness. Figures 4.4a and 4.4b show two model cross-sections running east-west and north-south, respectively.

4.2.2 Model Boundary Conditions

4.2.2.1 Precipitation-Based Recharge

Spatially distributed precipitation-based recharge values for the upper SGPSGM are obtained from the SGPWM (Section 4.1) and applied using the MODFLOW RCH package across the Banning, Banning Bench, South Banning, Cabazon, Indio storage units and the Canyon areas. Consistent with the USGS upper groundwater model, the recharge values were temporally averaged and kept constant over time. This was done to reduce the computational burden of the model (large swings in recharge can cause convergence issues making for longer model run-times). Because precipitation-based recharge in the basin is much less than the recharge from surface-water flows (which were kept transient, as described in Section 4.2.2.2) this was seen as acceptable modeling tradeoff. Figure 4.5 shows the precipitation-based recharge for the upper SGPSGM.

Note, that recharge in the Beaumont subbasin part of the model were handled differently and are discussed in Section 4.2.2.3.

4.2.2.2 Streamflows

The MODFLOW streamflow routing (SFR2) package (Prudic et al., 2004; Niswonger and Prudic, 2005) was used to simulate the surface-water flows in the upper SGPSGM. The SFR2 package uses the continuity (conservation of mass) equation to route surface water flow through one or more simulated rivers, streams, canals, or ditches. Streams are divided into segments and segments into reaches where reaches are specified for an individual model cell. Each reach can have spatially variable but temporally constant physical properties (such as length, elevation, slope, streambed thickness, streambed conductivity). A stream segment represents a set of reaches that can have different time-variant inputs and properties. For each stream segment, SFR2 allows for inflows, outflows, diversions, tributary contributions, and other gains/losses (such as direct precipitation gains or evapotranspiration losses) to be specified for each stress-period. SFR2 also allows for several approaches (such as Manning Coefficients, rating curves, 8-point cross-section, or a lookup table) to define time-varying flow-width and flow-depth relationships for each segment.

SFR routes the surface water inflows and outflows from one reach to the next (downstream reach), including tributary contributions and apportioning diversion flows based on the diversion rules specified. For each reach SFR uses the flow-width/flow-depth relationship (for the given segment) to calculate the channel width and stage. The channel width is used in the calculation of riverbed conductance, which also takes into account the riverbed thickness and conductivity. Groundwater gains and losses are iteratively calculated based on the riverbed conductance and the relative elevations of the stream stage and groundwater elevations – when groundwater elevations are higher than the stage then the river reach gains groundwater proportional to the riverbed conductance and the difference between the groundwater table and stage; when groundwater elevations are below the stage but above the river bottom then the river reach loses surface water to groundwater proportional to the riverbed conductance and the difference between the stage and the groundwater table; when the groundwater elevation is below the river bottom then the river reach loses surface water to groundwater at a constant rate proportional to the riverbed conductance (i.e. the groundwater table is disconnected from the river and surface water losses are independent of the water table elevations).

Finally, the SFR2 package also allows for the simulation of unsaturated flow beneath streams (distinct from groundwater flow) whenever the water table is below the bottom of the streambed (Niswonger and Prudic, 2005). Without the specification of the unsaturated zone, recharge from losing stream segments directly reaches the groundwater table without accounting for the lag, attenuation, and storage effects from the intermediate vadose zone.

The SFR2 reaches and segments for the upper SGPSGM were initialized based on the SGIWGM. The stream network geometry, stream properties, and flow connections were checked in GIS and any inconsistencies or errors fixed. Figure 4.6a shows the stream network for the upper SGPSGM. Flows in the stream network represent runoff contributions from across the watershed. Hence, runoff values from the SGPWM (Section 4.1) were aggregated from the contributing catchment areas corresponding to upstream nodes of segments at the edges of the model domain to develop monthly inflow timeseries for the SFR2 segments. Figure 4.6a shows the “pour points” where these runoff inflows were specified for the SFR2 segments. In addition to direct runoff from storm events (simulated by the SGPWM), streams also receive baseflows from slow drainage of the soils and bedrock in the watershed. Based on the comparison of observed and simulated flows (documented in Hevesi and Christensen [2015]), it was ascertained that the SGPWM underestimated baseflow contributions. Hence, an additional baseflow component was calculated by temporally averaging (using a 36-month backward looking moving time-window) the runoff timeseries for each inflow point. Figure 4.6b shows the direct runoff (stormflow) and baseflows timeseries for one such pour point (for Segment 75 in the Millard Canyon). Note, the SGPWM is a daily model, hence runoff contributions had to be averaged to the monthly scale for input to the upper SGPSGM. Table 4.1 shows the average inflows (including stormflows and baseflows) for each pour point in the stream network.

The streambed geometry was kept the same as the SGIWGM and the USGS upper model and was based on an eight-point geometry as shown in Figure 4.7. A uniform riverbed conductivity of 200 m/d (656 ft/day) and riverbed thickness of 2 m (6.6 ft) was used. The unsaturated zone underlying the stream was modeled using a Brooks-Corey coefficient (which relates hydraulic conductivity with water content) of 3.5, a maximum (saturated) vertical conductivity of 0.25 m/day (0.82 ft/day), and a minimum and maximum water content of 0.02 and 0.4, respectively. The SFR2 package routes flow through the stream network, dynamically calculating the river stage, width, as well as exchanges with the water table (when the water table is connected to the stream bed) or underlying vadose zone (when the water table is below and disconnected from the stream bed).

4.2.2.3 Return Flows and Applied Recharge

Return flows from septic parcels, waste-water treatment plant (WWTP) discharges, outdoor M&I water-use, and the Banning Canyon flume were reviewed and compiled by Provost and Pritchard (the GSP Consultant) and provided for the modeling effort. These inflows were applied as specified inflows using the MODFLOW WEL package. The locations for specific return flow areas were also decided based on discussions with Provost and Pritchard and known locations of relevant facilities. Additional details on return flow estimates and assumptions are provided in Chapter 3.3 of the GSP.

Areal recharge (inclusive of precipitation-based recharge and return flows) over the Beaumont portion of the model were obtained from Thomas Harder and Company and were based on the Beaumont Groundwater Model. These recharge values were also applied as specified inflows using the WEL package in the corresponding model grid cells.

Recharge from the Noble Creek Recharge Facility were also obtained from Thomas Harder and Company based on the Beaumont Groundwater Model. These values were initially included as specified inflows with the MODFLOW WEL package in the upper SGPSGM. Deep groundwater levels (for example, at well 35J) show a characteristic response to the Noble Creek recharge, with water levels declining through the 2000s and rising once significant amounts of recharge were applied at the basin (2010 and later). Initial calibration with the Noble Creek Recharge in the upper SGPSGM showed deeper groundwater levels were not showing the observed response. Hence, the Noble Creek inflows were moved to the lower SGPSGM.

Locations for the return flows and applied recharge WEL cells are shown in Figure 4.8. Note, the area to the east where recharge from the Beaumont Groundwater Model was applied directly to the upper SGPSGM (no SGPWM recharge was included in this area). Table 4.3 summaries the inflows for return flow and applied recharge components for the upper SGPSGM models.

4.2.2.4 Underflow from Beaumont

Underflow from the Beaumont model were obtained from Thomas Harder and Company, who extracted flows for the corresponding SGPSGM model boundary cells and simulation period from the Beaumont Groundwater Model. The Beaumont Groundwater Model is a transient two-layer model. Underflows from layer 1 of the Beaumont Groundwater Model were applied to layer 1 of the upper SGPSGM and from layer 2 of the Beaumont Groundwater Model were applied to layer 1 of the lower SGPSGM. The underflows were split into four zones (north, northwest, southeast, and south) along the SGPSGM model boundary, as shown in Figure 4.9 and applied uniformly to all cells within each zone as specified cells with the MODFLOW WEL package. The underflows provided were transient (annual through 2002 and monthly thereafter) and these timeseries were applied as monthly inflows (constant within a year for pre-2002 years) to the WEL cells along the boundary. Table 4.3 shows the average, minimum, and maximum underflows from Beaumont applied to the SGPSGM western boundary.

4.2.2.5 Groundwater Extractions

Groundwater extraction rates, locations, and layering were obtained from the Woodard and Curran (2018) SGIWGM and draft USGS model for the period from 1970 to 2012. The extraction volumes, locations, and depths were reviewed along with Provost and Pritchard and adjusted, as needed, to reflect the most up to date well and pumping data from various basin agencies. Pumping data from 2012 to 2019 were compiled by Provost and Pritchard and provided for this modeling effort. Additional details on groundwater pumping data and assumptions are provided in Chapter 3.3 of the GSP. Groundwater extractions were simulated using the MODFLOW multimode well (MNW) package. Groundwater extractions in the upper SGPSGM are concentrated in the Canyons as shown in Figure 4.8. Table 44 summarizes the groundwater pumping for the upper SGPSGM.

4.2.2.6 Drainage to Vadose Zone

Shallow/perched groundwater along the valley floor of the SGP subbasin percolates downward through a vadose zone before reaching the deep groundwater table. Drainage from the upper system was simulated by specifying “drains” (using the MODFLOW DRN package) in the second layer of the upper model. MODFLOW DRN cells allow for outflow of groundwater anytime water levels in the model are higher than a specified drain elevation for the DRN cells, with the outflows dependent on the head difference between the simulated head and DRN elevation as well as the drain conductance. Figure 4.10 shows the DRN cells (all in layer 2) in the upper SGPSGM. An arbitrarily low DRN elevation (50 m or 164 ft) and high DRN conductance ($1x10^7$ m^2/day) were specified to allow free drainage from the upper model. Note, that the UZF package in the lower model limits recharge based on the unsaturated zone hydraulic conductivity. Hence, not all the drainage from the upper model reaches the deep groundwater system, and some of this may become “rejected recharge” from the UZF package. Thus, the volume and timing of recharge reaching the deeper groundwater system depends on the drainage from the upper model and UZF properties and these were adjusted during calibration to match observed trends in deep groundwater levels.

High groundwater levels (compared to observed) were seen in the western portion of the model (in the Beaumont subbasin part of the model domain) during the initial calibration phase. Thus, vertical drainage from the upper model was limited in this area by reducing the DRN conductance and increasing the DRN elevation. This caused groundwater flows in the upper model to move laterally and drain further to the east in the Banning and South Banning areas (where the DRN cells had lower elevations and higher conductance). This improved calibration within the Beaumont and Banning areas.

4.2.3 Model Properties

4.2.3.1 Faults and Flow Barriers

Given its regional setting, the SGP Subbasin has highly complex geology with extensive faulting and folding restricting flow across the Subbasin. The Woodard and Curran (2018) SGIWGM and the draft USGS model included faults in both the upper and lower model domains, based on previous and ongoing geologic investigations in the Basin (USGS, Draft 2019). The fault locations in the upper SGPSGM were kept consistent with these studies. The Faults and flow barriers in the model were modeled using the MODFLOW HFB (hydraulic flow barrier) package, which reduces the horizontal conductance between adjacent model grid cells. Figure 4.11 shows the locations and properties of the HFB cells in the upper SGPSGM. All HFBs were assumed to be 1 m (3.28 ft) wide. Fault conductivities were kept low for the Banning Canyon and Banning Bench faults. Fault conductivities in other parts of the model were left relatively high at 1 m/day (3.28 ft/day) as there was limited evidence of lateral flow restrictions in the shallow/perched system in the rest of the subbasin. Note, that in valley floor areas with DRN cells, groundwater flow is predominantly vertical, hence the faults have limited impact on heads of flows in the upper model across much of the valley floor.

4.2.3.2 Hydraulic Conductivities

Hydraulic conductivities for the upper SGPSGM were extracted from the first layer of the Woodard and Curran (2018) SGIWGM. In general, there was consistency between the SGIWGM and the draft USGS model in areas where both models had overlap. Reasonable, water levels and flows were simulated with these initial properties, hence no changes were deemed necessary for the hydraulic conductivity distributions in the upper model. Note, that there are limited data on shallow groundwater levels across the basin, hence the hydraulic conductivities of the upper model are relatively unconstrained in much of the Subbasin. Shallow water levels were only available in the Banning Canyon area, and most of these showed reasonable fit with simulated water levels in this area. Figures 4.12a and 4.12b show the horizontal and vertical conductivities in layer 1 of the upper SGPSGM. Note, the relatively low vertical hydraulic conductivity in the Beaumont and Banning storage units, which were needed to move the shallow groundwater eastward from Beaumont to achieve calibration of the deeper groundwater levels in the Beaumont and Banning storage units.

4.2.3.3 Storage Properties

Similar to hydraulic conductivities, storage properties for the upper SGPSGM were extracted from the first layer of the Woodard and Curran (2018) SGIWGM. Figure 4.13 shows the specific yield for the first layer of the upper SGPSGM. Note, the specific yield was relevant only in areas with significant storage change in the model. Model cells with high conductance drains mostly act as vertical conduits and are not impacted by storage properties.

4.2.3.4 Initial Heads

The Woodard and Curran (2018) SGIWGM simulated groundwater heads from 1982 – 2012. Heads from the first stress period (January 1982) were used as initial heads for the upper SGPSGM. Since the SGPSGM simulation period started in 1970, initial heads were locally modified and made consistent with observed water levels from the 1970s in areas where these were available. Initial heads were also modified in select areas during the calibration phase to improve the match between simulated and observed water levels. Figure 4.14 shows the initial heads used for the upper SGPSGM.

4.3 Lower San Gorgonio Pass Subbasin Groundwater Model (Lower SGPSGM)

4.3.1 Model Design

4.3.1.1 Software Code, Discretization, and Simulation Period

The model was developed in the MODFLOW-NWT code (Niswonger et al., 2011), consistent with the draft USGS lower groundwater model. Grid spacing (uniform 150 m) and orientation were kept the same as the SGIWGM model. Similar to the upper model, the lower model consists of monthly stress-periods covering the period from 1970 to 2019. Consistent with the USGS groundwater models, the model has units of meters (m) and days. Water levels and volumes were converted to feet and acre-feet for reporting purposes.

Similar to the upper model, the lower model's datasets were developed to be compatible with Groundwater Vistas for Windows Version 8.04 (Rumbaugh and Rumbaugh, 2005). Groundwater Vistas was used to visualize model properties and results. Changes to static model properties (such as hydraulic conductivities and storage coefficients) were made in Groundwater Vistas. Spatio-temporal input packages (e.g., UZF, WEL, MNW2, and RCH) were created and modified using Python scripts outside Groundwater Vistas. Since the model utilizes input packages created outside Groundwater Vistas, it was run outside Groundwater Vistas using the Windows Command Prompt and the MODFLOW-OWHM executable.

4.3.1.2 Extent and Stratigraphy

The lower model includes areas within and around the SGP Subbasin with deep groundwater, including the Banning, South Banning, and Cabazon storage units as well as parts of the Beaumont Basin to the west and the Indio subbasin to the east. Figure 4.15 shows the active extent of the lower model.

The model consists of three model layers. Model stratigraphy was based on the lower three layers from the Woodard and Curran (2018) SGIWGM (in turn based on recent USGS geologic investigation and gravity survey [USGS, Draft 2019]). Model stratigraphy was also checked against the draft USGS lower groundwater model and found to be consistent. Figures 4.16a – 4.18b show the elevations and thickness for each of the model layers. Figures 4.19a and 4.19b show two cross-sections running through the lower model in an east-west and north-south direction, respectively. The elevations in the lower model range from a top high of 3000 ft amsl (in the Beaumont area) to a bottom low of -3300 ft amsl (also in the Beaumont area, where the lower model is the thickest). Note, the bedrock ridge just west and the steep downdip in bedrock depth just east of the SGP boundary with the Indio subbasin. This is an important structural feature and has a significant effect on groundwater heads on both sides of the SGP Subbasin boundary and outflows from SGP Subbasin to Indio Subbasin.

4.3.2 Model Boundary Conditions

4.3.2.1 Applied Recharge

Drain outflows from the upper SGPSGM represent available recharge for the deep groundwater system. The drain outflows were used as input to the UZF package (described in the subsequent section) for the lower model. Due to the fact, that the drain package in the upper model was set-up to simulate free (vertical) drainage from the shallow/perched system the drain outflows represent an upper bound on deep recharge. In actuality, this water could flow laterally in the shallow system, outflow to surface drainage features (in low elevation areas), be held in storage in the soil matrix, or be lost to evapotranspiration from shallow depths. Direct application of the recharge from the upper model led to simulated heads in the lower model being higher than observed across the subbasin. As such, the recharge was scaled by a factor of 75% (i.e. 75% of the drain outflow was applied as recharge to the lower model) to improve calibration in the lower model.

Figures 4.20a – 4.20d show the recharge distribution for wet (February) and dry (September) months for drier than average (2014) and wetter than average (2019) years. Note the relatively high applied recharge along the fringes of the Subbasin, representing underflow from the higher elevation Canyons. Recharge in the Beaumont area was limited due to the low conductance/high elevation drains specified in this area (Figure 4.10), this groundwater from the Beaumont portion of the model area is seen to recharge into the lower model at western margin of the high conductivity/low elevation drain cells. Focused recharge from surface-water features, septic system, WWTP, and other M&I return flows is evident in the recharge distribution.

The applied recharge for the lower model also includes recharge from the Noble Creek facility, which was moved from the upper model to the lower model (described in 4.2.2.3) to better match simulated and observed heads in the Beaumont area. Figure 4.21 shows where the recharge from the Noble Creek facility was applied to the lower model. This recharge was implemented as specified inflows using the MODFLOW WEL package. Hence, the recharge goes directly to the water table and was not routed through the UZF package. Note, the 75% scaling factor was *not* applied to the Noble Creek recharge.

4.3.2.2 Flow through Unsaturated Zone

The MODFLOW UZF package (Niswonger et al., 2006) was used to simulate the vertical movement of recharge from the shallow/perched groundwater system to the deeper groundwater table through to the intervening vadose zone. The UZF package takes recharge applied at surface (top of the first layer) and simulates the vertical (one-dimensional) movement of the wetting front under gravity, all the way to the water table (which can change spatially and temporally). The UZF code accounts for the change of effective vertical hydraulic conductivities based on the saturation along the moving wetting front. The code also accounts for storage in the vadose zone as well as limitations on infiltration from the vertical conductivity (infiltration rates in excess of the hydraulic conductivity are rejected) or rising water levels (if water levels reach above the ground surface, additional recharge is rejected from infiltrating downward). Note, that the thickness of the unsaturated zone can change in space and time with changes in water levels in the underlying saturated layer. The effect of the unsaturated zone on the effective recharge to the groundwater table is ostensible as a) a delay between surface infiltration events and changes in groundwater levels and storage, and b) reduced groundwater recharge compared to surficial recharge due to limitations on infiltration from the hydraulic conductivity and storage in the unsaturated zone. The UZF package was implemented in the lower SGPSGM using uniform vadose zone parameters as shown in Table 4.5. The parameters were initialized based on the draft USGS lower groundwater model. The Brooks-Corey coefficient, relating the unsaturated hydraulic conductivity with water content, was set at 6.987; the maximum (saturated) vertical conductivity was set at 0.25 m/day (0.469 ft/day), and a minimum and maximum water content of 0.04 and 0.1, respectively.

4.3.2.3 Groundwater Extractions

Groundwater extraction rates, locations, and layering were obtained from the Woodard and Curran (2018) SGIWGM and draft USGS model for the period from 1970 to 2012. In addition, groundwater extraction rates for wells in the Beaumont part of the model were obtained from Thomas Harder and

Company based on the Beaumont Groundwater Model. The extraction volumes, locations, and depths were reviewed along with Provost and Pritchard and adjusted, as needed, to reflect the most up to date well and pumping data from various basin agencies. Pumping data from 2012 to 2019 for the Banning, South Banning, Cabazon, and Canyon areas were compiled by Provost and Pritchard and provided for this modeling effort. Additional details on groundwater pumping data and assumptions are provided in Chapter 3.3 of the GSP. Groundwater extractions were simulated using the MODFLOW multimode well (MNW) package. Groundwater extractions in the upper SGPSGM are concentrated in the Canyons as shown in Figure 4.8. Table 4.4 summarizes the groundwater pumping for the lower SGPSGM.

4.3.2.4 Underflow from Beaumont

Similar to the upper model, inflows from the Beaumont Groundwater Model (from layer 2) were applied to the western boundary cells in layer 1 of the lower model using the WEL package. As described in Section 4.2.2.3, recharge from Noble Creek was also applied as inflows in the first layer of the lower model. Figure 4.21 shows the locations of the specified inflows in the lower model. Table 4.3 summarizes the applied recharge rates for the lower model.

4.3.2.5 Underflow to Indio

The eastern boundary of the SGP subbasin is formed by a bedrock constriction (locally referred to as “Fingle Point”) that creates a groundwater cascade into the Indio Subbasin (DWR, 1964). Bedrock elevations and groundwater heads are much lower (more than 100 ft) just east (in the Indio Subbasin) of the constriction compared to the west (in the GSP Subbasin). Hence, groundwater flows from the SGP to the Indio Subbasin across the bedrock constriction based on groundwater levels in the SGP, bedrock elevation across the constriction, and groundwater heads in the Indio subbasin. To simulate this dynamic flow across the subbasin boundary, the SGP groundwater model extends past the SGP subbasin boundary and into the Indio subbasin (Figure 2.1). Outflows from the model boundary are simulated by a general head boundary (GHB) with time-varying heads and specified conductance. Flows across the GHB are proportional to the difference in simulated and specified head along the GHB cells and the conductance of the GHB cells. Figure 4.22a shows the location of the GHB cells (located in the first layer of the lower model). Transient heads for the GHB were calculated based on observed heads at USGS well 10P located on the boundary. Heads at 10P were only available from 1970 - 1987. For other simulation periods heads at the boundary were estimated by extrapolating water levels at 10P based on the correlation between heads at 10P and downgradient well 20F (also in the Indio Subbasin). Figure 4.22b shows the locations and observed water levels at the two wells along with the extrapolated water level at 10P. Since heads were available at the location of the boundary, the conductance for the GHB cells were initialized based on the draft USGS lower groundwater model and kept high (53,293 m^2/day or 573,639 ft^2/day) to allow the model heads to equilibrate to the GHB heads along the boundary. The extrapolated GHB heads were further refined during calibration to improve the match between observed and simulated groundwater levels at upstream wells in the SGP Subbasin.

4.3.3 Model Properties

4.3.3.1 Faults and Flow Barriers

Faults and structural flow barriers have a significant impact on flows and groundwater levels in the deeper aquifer system. The Woodard and Curran (2018) SGIWGM and the draft USGS model included faults in both the upper and lower model domains, based on previous and ongoing geologic investigations in the Basin (USGS, Draft 2019). The lower SGPSGM faults and flow barriers were initialized with HFBs (hydraulic flow barrier) from these previous models. During initial testing, the simulated groundwater heads were seen to be extremely sensitive to HFB conductivities and locations. As such, the HFBs were adjusted during the calibration phase to better match simulated and observed heads at groundwater wells across the SGP Subbasin. Figure 4.23 shows the locations and conductivities of the HFBs in the lower model. All HFBs were assumed to be 1 m (3.28 ft) wide. Key HFBs included: the Garnet East (GARNET_EAST) and Cabazon East (CAB_EAST) faults to the east which were seen to control heads in the fault block on the eastern edge of the model (around well 8A); the Garnet West (GARNET_WEST), a westerly extension of the Garnet East fault, that impacted flows and hydraulic gradients across the SGP and Indio Subbasins boundary; the Coach Barrier (COACH_BAR), which represented the “Fingle Point” bedrock constriction, and was critical to simulating the observed hydraulic gradients across the SGP and Indio Subbasin boundary; the Cabazon (CAB_1) and Banning-Cabazon (CABBAN) that impeded the easterly flow within the Cabazon storage unit and were important to matching simulated and observed heads and hydraulic gradients in wells in the Banning and eastern portion of the Cabazon storage units; and the East Banning (EBAN), West Banning (WBAN), and South Banning (SBAN) fault system, which was critical to simulating observed water levels and hydraulic gradients in the South Banning and Banning storage units, as well as flows between the Beaumont and South Banning/Banning storage units. The faults were also important in simulating vertical gradients, especially the upward vertical gradients observed in the eastern portion of the Cabazon storage unit where the faults restrict lateral flows and cause upwelling in the lower layers at the basin boundary flow constriction. Note, that the Coach Barrier, while modeled as an HFB, may actually represent a structural flow barrier such as a bedrock ridge that restricts lateral flows. The geology and hydrostratigraphy at the basin boundary is extremely complex with faults and structural features controlling lateral flows. The USGS has installed several nested monitoring wells in this area. Once additional data from the nested monitoring wells becomes available, the conceptualization and numerical representation of this flow barriers in this area will be further refined.

4.3.3.2 Hydraulic Conductivities

Horizontal and vertical hydraulic conductivities for the lower SGPSGM model layers were extracted from the lower three layers of the Woodard and Curran (2018) SGIWGM. These were compared against the draft USGS lower groundwater model properties to assess plausible ranges of properties. As expected, hydraulic heads and gradients were sensitive to hydraulic conductivities. Hence, the conductivities were adjusted during the calibration process to match simulated and observed heads at key observation wells. Figures 4.24a – 4.26b show the horizontal and vertical conductivities for each of the three model layers. In most cases, the hydraulic conductivities were kept uniform within a fault block. However, within the Cabazon storage unit a local zone of higher conductivities was needed in the south-east to raise heads downgradient of that area (Figure 4.24a). Most of the groundwater pumping is in the first layer of the model, which is conceptualized to be a younger, less consolidated, and more permeable interval within the lower system. As such, layers 2 and 3 had lower conductivities than layer 1. However, a few wells were screened in the lower units. Hence, local adjustments were made by increasing the horizontal and vertical conductivities of the second layer (for example, in the South Banning storage unit) to avoid excessive drawdown from the production wells screened in the lower layers in these areas. The vertical conductivity of layer 2 was also increased just east of the COACH_BAR HFB to raise heads in layer 1 (heads in layer 2 are generally higher than layer 1 in this area due to upwelling upgradient of the bedrock ridge) and better match observed heads at well 8M.

4.3.3.3 Storage Properties

Specific storage and specific yield for the lower SGPSGM model layers were extracted from the lower three layers of the Woodard and Curran (2018) SGIWGM. These were compared against the draft USGS lower groundwater model properties to assess plausible ranges of storage properties. The specific yield was adjusted during the model calibration phase to better match observed changes in groundwater levels (especially in areas with pumping). Figures 4.27a – 4.29b show the specific storage and specific yields for all three layers in the lower SGPSGM.

4.3.3.4 Initial Heads

Initial heads for the lower SGPSGM were extracted from the first stress period (January 1982) of the Woodard and Curran (2018) SGIWGM. Heads in the 1970s were, in general, lower than heads in the 1980s. As such, initial heads for layer 1 were adjusted (lowered) locally to better match observed heads (where available) in the 1970s and 1980s. Figure 4.30 shows the initial heads in layer 1 of the lower SGPSGM.

5.0 MODEL CALIBRATION AND RESULTS

Model calibration entailed adjusting model hydraulic parameters and select boundary conditions via trial and error to match simulated and observed groundwater levels from January 1970 to December 2019. Since most of the groundwater level measurements were in the deep groundwater system, calibration efforts focused on the lower model. Model parameters adjusted during calibration included: drain conductances and elevations in the upper model (described in 4.2.2.6); applied recharge in the upper and lower models (4.2.2.3); recharge scaling factor (described in 4.3.2.1); HFB conductivities in both models (described in 4.2.3.1 and 4.3.3.1); hydraulic conductivities in the lower model (described in 4.3.3.2); specific yield in the lower model (described in 4.3.3.3); and the GHB heads in the lower model (described in 4.3.2.5).

Groundwater level measurements were available for more than 20 groundwater wells in the Subbasin and were used for calibration. Figures 5.1a to 5.1u show observed versus simulated groundwater levels for select wells in both the upper and lower model. The heads in the 1970s are impacted by the initial heads and equilibration with the UZF package drainage. A few of the initial stress-periods also had convergence issues that led to relatively high mass-balance errors. Hence, the model heads in the early 1970s are not as accurate as the post-1980 heads. In general, the lower model captures the magnitude and trend in water levels across the Subbasin, especially for the simulation period from 1980 to 2019. The declining water levels observed in several wells from the 2000s onwards is well-captured by the model. Simulated water levels at the outflow point from the SGP Subbasin (wells 8L, 8M, and 8A in Figures 5.1a, 5.1b, and 5.1d) have a fairly good match with observed water levels, raising confidence in the outflow estimates from the models.

Water levels in the Beaumont area (well 35J, Figure 5.1p) capture the pre-2010 decline and the post-2010 rise in groundwater levels in response to recharge from the Noble Creek facility. Wells in the Banning area (wells 18D and 12K, Figures 5.1n and 5.1o) are within the range of observed water levels and show the response to pumping. Note, the model simulates monthly pumping whereas wells in the area cycle through different pumping rates on a daily basis with pumping wells turned off to take water level measurements. Hence, the highs and lows in the observed water levels are in response to pumping variations at a scale that cannot be captured by the model.

Well 3C (Figure 5.1l and 5.1m) seems to have water levels that are much higher than surrounding groundwater levels in the lower system (Figure 5.1l), and much lower than surrounding heads in the upper model (Figure 5.1m). The well could be screened in an intermediate zone with heads between the upper and lower system. The well could also be impacted by local faulting offsets. As such, water levels at this well were calibrated such that heads in the upper and lower model bounded the observed heads at this well.

Limited data were available for water levels in the shallow system. Most of the water levels available were in the Banning Canyon. These groundwater levels showed large variability primarily driven by surface flows, with some local response to groundwater pumping in the Canyons. In general, the simulated water levels matched the trends in observed water levels but showed varying levels of calibration with the magnitude and range of observed water levels. Simulated and observed heads compared very well for some wells in the Canyon (e.g., Figures 5.1q and 5.1t), but were biased higher than observed for other wells (e.g., Figures 5.1r, 5.1s, and 5.1u). Note, the surface flows in the Canyon are estimated by the SGPWM and are not constrained by observed surface flows in this area. Hence, there is uncertainty in the volume and timing of surface flows in much of the upper Model. The Banning Canyon was also assumed to receive a constant return flow of approximately 1000 AFY from the Banning Canyon Flume. The volume and spatial distribution of the surface and return flows is uncertain, which could lead to the lack of local calibration at some wells. Note, simulated heads at the most downgradient well (well 4A shown in Figure 5.1q) matched observed water levels well. One of the primary objectives of the upper model was to provide underflow and recharge estimates for the lower model. Given the good calibration at the outflow point of the Canyon (well 4A shown in Figure 5.1q), the calibration was deemed satisfactory for meeting the modeling objectives for the upper model. Given the uncertainty in the return flows, surface flows, and the contradictory calibration at nearby wells, no attempt was made to refine the calibration upstream in the Canyon. Additional calibration and refinement will be carried out in the future when better estimates and measurements of flows are available for the Canyons.

Figure 5.2a – 5.3d show spatial distribution of water levels for wet and dry months (February and September, respectively) for select wet and dry years (2014 and 2019, respectively). In the upper model, flows converge west to east from the Beaumont and Banning area, and from the higher elevation areas along the Canyons and the mountains in the south towards the Cabazon storage unit. Note, the relatively low and flat heads in the upper model in areas with the drain cells in the Cabazon storage unit (Figure 4.10). This is to be expected as the drain cells in this area allow for vertical drainage of groundwater into the vadose zone overlying the deeper system. Heads in the lower model follow a west to east gradient with groundwater flowing across the Fingle point constriction into the Indio Subbasin. The impact of the faults is clear in the head breaks observed in the simulated water levels.

Figure 5.4 shows a scatterplot for observed and simulated water levels for all wells used for model calibration in the upper and lower models. As can be seen from the figure, the observed and simulated water levels are strongly correlated and do not indicate any systematic bias. Heads in the upper model do show a wider spread than for the lower model, which is to be expected given the variability in observed water levels in the upper system as well as the focus of calibration on the lower model. Table 5.1 shows model calibration statistics for observed versus simulated groundwater levels in the lower model. The mean absolute error (MAE) and root mean square error (RMSE) - measures of model error - are approximately 20.5 and 29 ft, respectively. The scaled RMSE (ratio of the model error metric to the range of observed water levels) is 1.8%, respectively. Thus, the model is able to explain much of the variability and transience in the observed water levels. The scaled RMSE is significantly less than the industry calibration standard of 10% scaled RMSE (Spitz and Moreno, 1996; Rumbaugh and Rumbaugh, 2005). Based on the match between the observed and simulated groundwater hydrographs at key wells, the strong correlation between observed and simulated water levels, and the low scaled MAE and RMSE statistics, the groundwater model can be seen to be calibrated well within industry standards.

Tables 5.2a – 5.2c show the water budget for the upper model, the vadose zone, and the lower model. Inflows to the upper model water are dominated by stream leakage followed by return flows and precipitation-based recharge. Drainage to the vadose zone is the primary outflow followed by pumping (mostly in the Canyons). The vadose zone water budget shows the net amount of shallow recharge into the vadose zone and the recharge reaching the deep groundwater system, with the difference being rejected recharge (limited by the conductivity of the vadose zone) and storage in the vadose zone.

The model was used to perform a zone budget analysis to calculate the water budget for the SGPGSA area. Figure 5.5 shows the zones used for the zone budget analysis. Figures 5.6a and 5.6b show the water budget components for the upper and lower models. Note the steady decline in cumulative storage from the 2000s driven by the lower-than-average recharge reaching the groundwater table the recent decades. Comparison of the water budgets for the upper and lower models, shows the lag (approximately 2-3 years) between wet conditions on the surface and recharge to the deep water table. Note also that water levels and storage in the deeper aquifers are driven more by the frequency and duration of successively wet years. Successive wet years in the 1980s and mid 1990s led to storage increase in the deeper aquifers. However, a lone wet year like 2005 was not sufficient to reverse the decline storage trends in the 2000s.

6.0 PREDICTIVE MODELING

The calibrated upper SGPSGM, and lower SGPSGM were used to develop predictive models for the GSP planning horizon. SGMA requires a 50-year future water budget, incorporating impacts from climate change and land-use changes. The baseline period chosen for the GSP was 1949 – 1998, which has hydrologic conditions (as indicated by precipitation estimated by SGPWM for the SGP groundwater model watershed) that are about 1.9% above normal as compared to the 1910-2019 long-term period of record.

DWR climate-change factors and methodology (DWR, 2018) were used to scale this baseline hydrology to future climate-change impacted conditions for the 2030s (near-term climate change) and the 2070s (long-term climate change). DWR climate-change factors for precipitation, evapotranspiration, streamflows were downloaded from the DWR SGMA data portal for the San Gorgonio watershed (designated HUC8 18070202, 18070203, and 18100200 by DWR). Since DWR change-factors for precipitation, ET, and streamflows were calculated using a watershed model (DWR, 2018), the SGPWM was not utilized for the future projections. Instead, the outputs (recharge and streamflows) from the SGPWM for the baseline period (1949 - 1998) were scaled by the precipitation, ET, and streamflow change-factors and used as inputs to the upper SGPSGM.

For GSP planning purposes, 4 alternative baseline scenarios (2020s baseline with no climate change, 2030s baseline with near-term climate change, 2030s alternative baseline with near-term climate change and additional pumping, and 2070s baseline with long-term climate change) were defined. 3 projects and management action (PMA) scenarios were defined with the 2030s baseline and alternative baseline scenarios. Table 6.1 provides details for each modeling input/assumption for the baseline and PMA scenarios. The methodology to develop future projections for key model inputs/assumptions is summarized below:

- **Precipitation-based recharge:** precipitation-based recharge from SGPWM was averaged over the baseline period from 1949 – 1998 to develop the baseline recharge (without climate-change). This was multiplied by the average (from 1949 - 1998) precipitation change-factor and divided by the average (from 1949 - 1998) ET change-factor for the 2030s and 2070s to develop the precipitation-based recharge estimates for the 2030s and 2070s scenarios. The recharge distribution was used for the RCH package for the upper model. On average, the recharge reduced by 9% and 13% from the baseline for the 2030s and 2070s, respectively.
- **Stream inflows:** Monthly flows from SGPWM for the baseline period (1949 - 1998) were adjusted to 2030 and 2070 future conditions using the annual and monthly streamflow change factors, using the methodology for application of time series change factor data described in DWR (2018) guidance. Note, the DWR streamflow change factors change the volume and the timing of streamflows using annual and monthly change factors. On average, the streamflows were reduced by approximately 1% and 9% compared to the baseline for the 2030 and 2070 scenarios, respectively.
- **Return flows:** Return flows for the last five years of the historical model were repeated cyclically over the projected 50-year period. The locations and volumes for all return flows was kept the same as the (last five years of the) historical model.
- **Recharge at Noble Creek and Future Project Facilities:** Future Noble Creek recharge was provided by Provost and Pritchard for the model. The future Noble Creek baseline recharge estimates were based on projections of future state-water deliveries (in turn, based on the pattern of DWR CALSIM estimates of SGPWA deliveries in the 2019 SWP Delivery Capability Report), as documented in Chapter 3 of the GSP. Project #4 entailed additional recharge (by 5,300 AFY) at Noble Creek and Project #5 entailed an additional recharge basin in the Banning Storage Unit. The new recharge basin for Project #5 was approximately 500 ft x 500 ft and located west of Sunset Avenue and Lincoln Street in City of Banning (approximately on 33.922 North, 116.917W).
- **Pumping:** Pumping from the last five years was repeated for the 2020 Baseline scenario. Pumping for the other baseline and PMA scenarios was provided by Provost and Pritchard for the Model and is summarized in Table 6.1 for each pumping entity in the Subbasin. For Banning and the Beaumont Cherry Valley District, future pumping was based on projections in the Draft

2020 Urban Water Management Plans (UWMP). The 2070s scenario included a new well (well C8) for the City of Banning in the Beaumont Subbasin. For the 2030s alternative and 2030 PMA scenarios pumping from the Morongo Band of Mission Indians (MBMI) was increased by approximately 7,200 AFY.

- **Underflows from Beaumont:** Underflows from Beaumont depend on the hydraulic gradient across the model boundary that runs through the Beaumont Subbasin. The hydraulic gradient depends on water levels in the Beaumont Subbasin (upgradient of the model boundary) and water levels within the model area, which are strongly influenced by Noble Creek Recharge. Hence, future underflows from Beaumont were tied to future Noble Creek Recharge. Linear correlation models were developed for each of the Beaumont underflow zones (Figure 4.9) between historical underflows (provided by Thomas Harder and Company and used in the historical model) and historical Noble Creek Recharge. The correlation models are as follows:

  *North Zone: Underflow($Year_i$) = 4047.32-0.212*Noble Creek Recharge($Year_i$)*

  *Northwest Zone: Underflow($Year_i$) = 752.06-0.094*Noble Creek Recharge($Year_i$) - 0.055*Noble Creek Recharge($Yeari_{i-1}$)*

  *Southwest Zone: Underflow($Year_i$) = 746.92-0.01*Noble Creek Recharge($Year_i$) - 0.027*Noble Creek Recharge($Year_{i-1}$)*

  South Zone: 1077 AFY (Constant value)

  These correlations were then used to develop projections of Beaumont underflows based on future Noble Creek recharge projections for each of the scenarios.

- **Underflows to Indio:** Underflows to Indio are based on hydraulic gradients across the model GHB boundary. Hence, groundwater heads for the GHB were projected into the future period. Heads at the GHB (historically based on water levels at monitoring well 10P) are strongly influenced by recharge at the Whitewater Recharge Facility in the Indio Basin (Figure 4.22b). A correlation model was developed between historical heads at the 10P well and historical recharge at the Whitewater Recharge Facility as follows:

  *Head at Boundary ($Year_i$) = 107.84 + 0.51 * Head at Boundary ($Yeari_{i-1}$) + 0.000143 * Recharge ($Year_i$)*

  Figure 6.1 shows historical Whitewater Recharge, historical GHB head (specified in the historical model) and estimated (using the correlation model) GHB heads using the correlation model. The correlation model was used to project GHB heads

Future water levels at key monitoring wells were computed for each of the future modeling scenarios. Figures 6.2 shows the location of key monitoring wells proposed in the GSP to monitor minimum thresholds (MT) and measurable objectives (MO) across the basin. Figures 6.3a – 6.4e present future water levels for all key monitoring wells for the baseline and PMA scenarios.

Zone budget analysis was undertaken for the SGPGSA boundary for each of the future modeling scenarios. Figures 6.5a – 6.11b show the upper and lower model water budgets for the SGPGSA for each of the future scenarios.

7.0 SENSITIVITY/UNCERTAINTY ANALYSIS

Sensitivity/uncertainty analysis was undertaken for the groundwater models to assess the sensitivity of the model calibration and key outputs (water levels and water budget terms) to changes in key uncertain model parameters and inputs. In particular, the sensitivity/uncertainty of the underflows to the Indio Basin was quantified through this process. The sensitivity/uncertainty analysis process involved the following steps:

- Selection of key uncertain model parameters and inputs of the upper and lower SGPSGM
- Identifying uncertain ranges for key parameters and inputs. Spatial zones were defined for spatially varying parameters.
- Sampling parameter values from within the range for each parameter/input (or parameter zones for spatially varying parameters). A total of 250 samples were generated.
- Creating model "realizations" by combining different parameter/input samples. A total of 250 model realizations were created.
- Running and post-processing all 250 model realizations
- Assessing calibration (Root Mean Square Error (RMSE)) for each model realization
- Visualizing and analyzing key model outputs (water levels and water budget terms) for all 250 model realizations, including those within a prescribed calibration range. This consisted of time-series plots for temporally variable inputs and outputs and "Box and whisker" plots to show the statistical distribution of key inputs and outputs.

These steps are discussed in more detail in the following sections.

7.1 Selected Parameters and Ranges

Figure 7.1 shows the integrated surface/groundwater model and key water-budget components, connecting the SGPWM, the upper SGPSGM, and the lower SGPSGM. The two most important inputs to the groundwater system are the a) surficial recharge from the SGPWM to the upper SGPSGM and b) the inflows (accumulated runoff) from the SGPWM to the stream package of the upper SGPSGM. Both these terms are driven by the rainfall, soil, and land-use distribution specified in the SGPWM. However, the SGPWM has a 16 – 20-hour simulation time; hence, including it in the sensitivity analysis would have imposed a significant computational burden. Moreover, varying the precipitation distribution in SGPWM was compounded by the fact that the spatial and temporal values were interpolated based on measured data at precipitation gauges. Making changes to the interpolated precipitation values would entail making changes to the underlying INFIL precipitation interpolation algorithm, which was beyond the scope of this modeling exercise. Given that the focus of this sensitivity/uncertainty analysis was the groundwater system, the parameters of the SGPWM were not included in the sensitivity analysis. However, key SGPWM outflows (recharge and runoff) that were input to the groundwater model *were* varied as part of the sensitivity analysis.

Key groundwater model parameters/inputs selected for sensitivity analysis are listed below:

Upper SGPSGM

- Recharge (from SGPWM)
- Stream inflows (from SGPWM)
- Stream conductance

Lower SGPSGM

- Scaling Factor for Drainage from upper model to lower model (UZF Scaling Factor)
- Unsaturated zone hydraulic conductivity in the lower model (UZF VK)
- Specified heads for the General Head Boundary (GHB) along the eastern model boundary
- Conductance for the General Head Boundary (GHB) along the eastern model boundary
- Horizontal and Vertical conductivity in Layer 1 of the lower model
- Hydraulic flow barrier (HFB) conductivity

These parameters were selected and varied based on the sensitivity observed during the model calibration exercise. Table 7.1 lists the selected parameters, initial values, and the range that sensitivity analysis performed. The parameters and range selection are described in more detail in the following sub-sections.

7.1.1 Upper SGPSGM Parameters and Ranges

Recharge

The upper SGPSGM recharge distribution (obtained from SGPWM as described in 4.2.2.1) was varied by applying a (spatially) uniform and constant (over time) scaling factor. The factor ranged from 0.5 to 1.5 for different model realizations. In effect, the precipitation was varied over a range of 50% across the different model realizations. Note, that a constant scaling factor was used for recharge, hence the spatial pattern of calibrated recharge was not modified in the sensitivity analysis.

Stream Inflows and Conductance

Stream inflow values (obtained from SGPWM as described in 4.2.2.2) and streambed conductances were varied for the sensitivity analysis. The stream segments were divided into six spatial zones as shown in Figure 7.3. These zones corresponded to:

1- Banning Canyon

2- Potrero Canyon

3- Millard Canyon

4- Tributaries from North

5- Tributaries from South

6- Beaumont Area

For each zone, stream inflow values and streambed conductance were increased or decreased by 50% (using a scaling factor ranging from 0.5 to 1.5). The scaling factors for different zones were kept independent, to allow for a wide range of streamflows (higher and lower than the calibrated values) across different spatial zones.

Figure 7.4 shows the time series (on a logarithmic Y-axis) of total stream inflows for all the 250 realizations used for the sensitivity analysis. Figure 7.5 shows the range and statistical characteristics for the total stream inflow using a “Box and Whisker” plot. A “Box and Whisker” plot displays the minimum, lower quartile (25^{th} percentile), median, upper quartile (75^{th} percentile), and maximum value for a random variable. In addition to these statistical properties, the figure also shows the value associated with total stream inflow for the calibrated model (shown by the red dashed line).

Unsaturated Zone Flow (UZF) Scaling Factor and Vertical Conductivity

As described earlier, the water released from the Drain (DRN) package of the upper SGPSGM is applied as recharge to the UZF package of the lower SGPSGM. In the historically calibrated model, the drained water was scaled by a factor of 75% (applied uniformly across the basin) to achieve calibration. This scaling factor represents losses (e.g., evapotranspiration, lateral underflows, or shallow groundwater losses to streams) in the shallow groundwater system or underlying vadose zone. To assess the sensitivity of the model to the spatial distribution and scaling of UZF recharge, eight (8) spatial zones (corresponding to the different fault blocks in the lower model) were defined as shown in Figure 7.6. The scaling factor for each zone was then varied by 50% (compared to historically calibrated scaling factor of 75%). In effect, this meant varying the scaling factor from 37.5% (50% of 75%) to 112.5% (150% of 75%) for the different spatial zones. The scaling factors for different zones were kept independent, to allow for a wide range of applied recharge (higher and lower than the calibrated values) across different spatial zones.

The model uses a single vertical conductivity for the UZF package. This parameter controls the a) maximum recharge rate through the unsaturated zone and b) the travel time of the recharge pulse within the vadose zone. The vertical conductivity (Vk) in UZF package was also varied by 50% (increase or decrease) over the entire model domain.

7.1.2 Lower SGPSGM Parameters and Ranges

General Head Boundary (GHB) Conductance and Heads

The general head boundary (GHB), specified at the eastern edge of the model domain (described in more detail in 4.3.2.5), controls the underflow between the SGP and Indio subbasins. The underflow is dependent on the gradient between heads in the SGP subbasin and heads specified in the GHB package as well as the GHB conductance. Heads for the GHB were estimated based on observed heads at wells 20F and 10P (see section 4.3.2.5 for more detail). Figure 7.7 shows the boundary cell location and water levels simulated in the historically calibrated model from 1970 – 2019. However, there remains uncertainty in the magnitude and timing of the estimated heads and conductance along this boundary. To assess the sensitivity of the underflow SGP-Indio subbasin underflows, the specified GHB heads and conductance were varied as part of the sensitivity analysis. GHB conductance were increased/decreased within a 50% range of the calibrated GHB conductance (by scaling the calibrated GHB conductance by a factor ranging from 0.5 to 1.5). GHB heads were also varied as part of the sensitivity analysis. The upper bound on the head variation was kept at 50% higher (scaling factor of 1.5) than the calibrated heads. The lower bound was constrained by the fact that GHB heads in a given model layer cannot be below the base of the layer. The bottom elevation of the model layer 1 (where the GHB was specified) was approximately 68% of the lowest calibrated GHB head. Hence, the lower range for the scaling factor was kept at 0.68. In effect, the GHB heads were scaled by a factor ranging from 0.68 to 1.5 across the different model realizations.

Hydraulic Conductivities

Much of the pumping and flow in the lower model is in the first model layer. The horizontal hydraulic conductivity of the first layer controls much of the lateral flow and gradient of groundwater in the upper model. The vertical hydraulic conductivity of the first layer controls the vertical flow and gradient across the first and second layers of the model. Horizontal hydraulic conductivity was varied by 50% (by scaling with a factor ranging from 0.5 and 1.5) in seven (7) spatial zones, corresponding to unique conductivity values in the calibrated model. Figure 7.8 shows the zones used for horizontal conductivities. Vertical conductivities were varied by 50% in four (4) zones, corresponding to unique vertical hydraulic conductivity values in the calibrated model.

Hydraulic Flow Barrier (HFB) Conductivity

Groundwater head calibration was extremely sensitive to the location and conductivities of the hydraulic flow barriers (HFB) in the lower model (see section 4.3.3.1 for details). This was especially true in the Cabazon storage unit as the GARNET WEST fault system limits the outflows to the east. Hence, HFB conductivities varied in the lower model over a range of 50% (by scaling the conductivities with a factor ranging from 0.5 to 1.5).

7.2 Sampling Methodology

The scaling factors for all selected parameters were sampled using an efficient random sampling technique referred to as “Latin Hypercube Sampling (LHS)” (Jin et al., 2005). LHS is a statistical method and a type of stratified Monte Carlo sampling that divides the sampling region into n-interval and takes samples from each interval. The python package pyDOE (https://pythonhosted.org/pyDOE/index.html) was used to implement LHS (additional details can be obtained from https://smt.readthedocs.io/en/latest/_src_docs/sampling_methods/lhs.html). The LHS algorithm has various options to optimize the spread of the random samples. For this exercise the option was chosen to “maximize the minimum distance between points and place the point in a randomized location within its interval”. A total of 250 “model realizations” (combinations of randomly generated model parameters/inputs) were generated by sampling each scaling factor and applying it to the corresponding model parameter/input for the given model realization. The samples were assumed to be independent (i.e., no correlation was assumed across scaling factors). The 250 model realizations were run and post-processed in parallel on multi-core and multi-threaded computing servers.

7.3 Results and Conclusions

Each of the model simulations were post-processed to generate two types of results: “Box and Whisker” plots to summarize aggregate statistics for model inputs and outputs, and time series “Spaghetti” plots to visualize the temporal range and variability in transient model inputs and outputs. A "Box and Whisker" Plot is a method that visually displays the data distribution through their quartiles. As explained above, the "Box and Whisker" plot displays the minimum, lower quartile (25th percentile), median (the 50th percentile), upper quartile (75th percentile), and maximum value for a statistical quantity. The "box" represents the interquartile range for the variable, while the lines ("whiskers") extending outside the boxes indicate the variability outside the upper and lower quartiles. Comparing the range of the values in the box with the median and mean provides information on the skewness of the distribution. The calibration statistic of Root Mean Square Error (RMSE) was also calculated for each of the model realizations. This calibration statistic was a measure of the likelihood of the given model realization (Neuman and Wierenga, 2003). For all the box and whisker plots as well as the time-series plots the calibrated model as well as realizations with RMSE within a specified range of the calibrated model were also displayed.

Figure 7.11 shows the Root Mean Square Error (RMSE) for the 250 realizations. The historical calibrated model had an RMSE of 29 ft. As depicted in the figure, all of the realizations have a higher RMSE compared to historically calibrated model, indicating that the historically calibrated model is the *most likely* model parameter configuration across all 250 model realizations tested. The figure also shows the range for RMSEs within 50% of the calibrated model, i.e. realizations with RMSE between 29 ft and 44 ft (1.5 times 29 ft). Based on the Maximum Likelihood Bayesian Model Averaging (Neuman and Wierenga, 2003; Ye et al., 2004) this range represents a greater than 95% likelihood for the calibrated model input/output. In other words, there is a greater than 95% likelihood that the true inputs/outputs are within this range of model inputs/outputs. As can be seen, a majority of the realizations were outside this 95% range, indicting that the calibrated model was very sensitive to the perturbed parameters and inputs and there was a very narrow range of parameter/input values that retained the historical calibration level.

The following sections describe the sensitivity/uncertainty results for key model outputs.

Average Drainage from the Upper SGPSGM:

Figure 7.12 shows the box and whisker plot for the average drainage from the upper SGPSGM to the lower SGPSGM. Negative value indicate water leaving the upper model to the lower system. Based on the plot, 50% of the realizations (range represented by the box) had drainage within approximately 43,000 AFY to 50,000 AFY for the 250 realizations. The calibrated value was approximately -47,000 AFY. The plot also shows the range (dashed black box) for realizations within 50% of the calibrated value (indicating a greater than 95% likelihood of the value being within this range). This range is from approximately 39,000 AFY to 55,000 AFY.

Average Recharge to the Water Table:

Figure 7.13a shows the box plot for the average Recharge values that reaches the groundwater table (after passing through the unsaturated zone). Average groundwater recharge values range from 24,000 AFY to 30,000 AFY for 50% of the realization (range represented by the box) with the historically calibrated model with recharge value of approximately 29,000 AFY. The dashed box represents the groundwater recharge values for realizations with RMSE within 50% of the calibrated value (indicating a greater than 95% likelihood of the value being within this range). This range is between approximately 38,000 AFY to 21,000 AFY.

Figure 7.13b show the time series plot for all 250 realizations as well as the realizations with RMSEs within 50% of the calibrated model. As can be seen there is significant inter-annual variability in the groundwater recharge time-series. A large spread is seen across the different realizations, especially for the peak recharge values (corresponding to recharge from wet years reaching the groundwater table).

General Head Boundary (GHB) Underflows:

Figures 7.14a and 7.14b show the box and whisker plot and time series plot for the GHB underflow at the eastern edge of the model, respectively. Negative value indicate water leaving the model domain (from west to east) and positive value indicate water entering the model domain (from east to west).

Average GHB underflows range from 17,000 AFY to 27,000 AFY for 50% of the realization (range represented by the box) with the historically calibrated model with recharge value of approximately 26,000 AFY. The dashed box represents the GHB underflows values for realizations with RMSE within 50% of the calibrated value (indicating a greater than 95% likelihood of the value being within this range). This range is between approximately 20,000 AFY to 33,000 AFY.

Underflows between the SGP subbasin to the Indio subbasin are shown in Figures 7.15a and 7.15b, respectively. 50% of the realizations had a range between approximately 20,000 AFY to 27,000 AFY. The range of values for realizations with RMSE within 50% of the calibrated model (indicating a greater than 95% likelihood of the value being within this range) was between 21,000 AFY to 32,000 AFY.

Hydrographs at Key Wells

Hydrographs at select wells were compiled for all 250 model realizations to demonstrate the variability and uncertainty in groundwater levels at different locations within the model. These hydrographs are presented in Figures 7.16 to 7.22. The plots also show the observed water levels (black solid dots) and the calibrated water levels (solid black line) for each of the wells. Hydrographs for realizations with RMSE within 50% of the calibrated model are shown with the colored lines. Based on the variability in the hydrographs for realizations within the calibration range, wells to the east were seen to have lower degree of uncertainty (colored lines on Figure 7.16 – 7.19 for wells 8M, 7M, 7D, and 9E tend to be tightly clustered around the calibrated value), whereas wells near the western boundary (in the Beaumont basin) were seen to have a very high degree of uncertainty (the large spread of colored lines on Figure 7.22 for well 35J indicate that the heads in this area are not well constrained by calibration).

8.0 MODEL UNCERTAINTIES AND LIMITATIONS

The model represents the best available basin-specific predictive tool and was well calibrated to regional-scale groundwater-level measurements in the deep aquifer system. However, there remain some key conceptual, numerical, and data uncertainties in the model as summarized below:

- The precipitation gauges used in the SGPWM had several data gaps (in space and time). Thus, there is uncertainty in the precipitation distribution used for the watershed model. This, in turn, leads to uncertainty in the SGPWM predictions of runoff and recharge.
- Limited surface-water flow and shallow water level measurements were available for calibration of the SGPWM and the upper SGPSGM. Hence, these model parameters and results are not well

constrained by hydrologic data. This leads to uncertainty in the model predictions of runoff, streamflow, and recharge, which are key hydrologic drivers in the basin.

- Due to the lack of data on surface flows, limited time and effort was spent on refined calibration in the upper model. Water levels in the Canyons showed a high degree of variability (driven by surface flows) with varying degrees of calibration at nearby wells. Hence, there is significant uncertainty in the simulated water levels in the upper model, especially in areas with no surface-water and/or shallow groundwater level measurements. As such, the shallow SGPSGM should not be used to assess sustainable management criteria (such as streamflow depletions or impacts on groundwater dependent ecosystems) based on shallow water level predictions.
- The vadose zone is an important driver for the magnitude, distribution, and timing of recharge reaching the deep groundwater table. The model used spatially uniform parameters for the UZF package. Furthermore, the depth to the water table is uncertain in areas without groundwater level measurements. This introduces uncertainty in the magnitude, distribution, and timing of localized recharge reaching the water table. This, in turn, leads to uncertainty in localized predictions of groundwater levels.
- Given its regional setting, the geology and hydrostratigraphy of the SGP Subbasin is highly complex with several faults, folds, and bedrock constrictions controlling flow across the basin. The location, depths, strikes, and dips of several of these faults is uncertain and interpreted. HFBs were needed in the lower SGPSGM model to simulate observed lateral head gradients across the basin, but the extent, depths, and conductivity of these faults are uncertain. As such, it is difficult to accurately predict local groundwater levels in the fault impacted areas.
- Limited (geologic and groundwater level) data were available to parameterize and calibrate the deeper sections of the lower SGPSGM. Hence, the model properties and groundwater heads in the deeper portions of the aquifer are uncertain. Additional data from USGS nested monitoring wells will be used in the future to refine the calibration in the deeper layers of the lower SGPSGM.
- Several of the groundwater levels used for calibration purpose were from areas with significant pumping (for example, in the Banning and South Banning storage units). Given the monthly stress-periods the model has limited capability to capture the variability seen in measured water levels in these areas.
- Historical estimates of pumping have uncertainty and data-gaps. Historical and future pumping for the MBMI and some other pumpers in the basin had to be estimated. Due to the uncertainty in historical and future pumping, there is uncertainty in groundwater levels and associated water budget terms in areas with limited pumping data availability.
- The model is built using a 150 m x 150 m grid and monthly stress-period. Hydrogeologic processes at spatial and temporal scales smaller than the model grid or stress-period cannot be accurately simulated by the model. This should be kept in mind when using the model for local project or management action evaluations.
- A comprehensive uncertainty/sensitivity analysis was undertaken by varying key model parameters and inputs across a total of 250 model realizations. The analysis demonstrated that the calibrated model was very sensitive to the perturbed parameters and inputs and there was a

very narrow range of parameter/input values that retained the historical calibration level. This indicates there is not a great degree of non-uniqueness (wherein multiple parameter combinations can lead to similar model calibration) with the current model conceptualization and parameterization. This builds confidence in the calibrated model parameters for the current model conceptualization and parameterization. In general, heads in the east were seen to be well constrained by calibration while heads near the western boundary (in the Beaumont basin) were seen to be poorly constrained by calibration, indicating a higher level of uncertainty in the western part of the model.

- Based on the results of the sensitivity/uncertainty analysis, the range of groundwater recharge was between 21,000 AFY to 38,000 underflows to Indio was within 21,000 AFY and 32,000 AFY. Note, that the sensitivity/uncertainty analysis results as well as the range and likelihoods associated with the underflows is contingent on the current conceptual model and parameterization. If the conceptual model or the parameterization were to change significantly, the sensitivity/uncertainty analyses as well as the associated range likelihoods will need to be revaluated.

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TABLES

Table 1.1 Hydrologic Processes Simulated by the SGPS models

Model	Hydrologic Processes Simulated
SGPWM (INFILv3)	• Precipitation • Evapotranspiration • Runoff • Recharge to Shallow GW
Upper SGPSGM (MODFLOW)	• Shallow Recharge (from SGPWM) • Return Flows • Streamflow (Inflows from SGPWM) • GW Flow and Storage (Canyons) • GW Pumping (Canyons) • Underflow from Beaumont • Drainage to Vadose zone
Lower SGPSGM (MODFLOW)	• Deep Recharge through Vadose zone (from Upper SGPSGM) • Noble Creek Recharge • GW Flow and Storage • GW Pumping • Underflow from Beaumont • Underflow to Indio

Table 3.1 Summary of Models Related to the SGP Subbasin

MODEL	ACRONYM	SOFTWARE	SOURCE	DATE	SIMULATION PERIOD	STRESS PERIOD
San Gorgonio Integrated Watershed & Groundwater Model	SGIWGM	GSFLOW	Woodard & Curran	2018	1982 - 2012	Daily
San Gorgonio Pass Watershed Model	SGPWM	INFILv3	USGS (extended by INTERA)	2015	1913-2012 (USGS) 1913 – 2019 (INTERA)	Daily
Beaumont and Banning Watershed and Groundwater Models	--	INFILv3 & MODFLOW96	USGS	2006	1926-2003	Yearly
San Gorgonio Pass Subbasin (upper and lower) Groundwater Models	--	MODFLOW-OWHM (upper) and MODFLOW-NWT (lower)	USGS	In Development	1913 - 2012	Monthly
Beaumont Groundwater Model	--	MODFLOW 2005	Thomas Harder & Co.	2020	1927 - 2019	Yearly from 1927-2002 and Monthly from 2003 - 2019
San Gorgonio Pass Subbasin (upper and lower) Groundwater Models	SGPSGM	MODFLOW-OWHM (upper) and MODFLOW-NWT (lower)	INTERA	2021	1970 - 2019	Monthly

Table 4.1 Average Inflow (AFY) for Each Pour Point

Seg No.	Average AFY (1970 - 2019)
1	10.46
2	1.68
3	472.85
4	1598.67
5	1.52
6	234.77
7	83.99
8	1.33
9	1.11
10	151.55
11	1.72
12	31.07
13	8.76
14	1.50
15	1.31
16	60.38
17	70.66
18	2.23
19	1.60
20	617.41
21	0.89
23	196.01
25	2437.36
28	270.40
29	2.28
32	260.98
33	70.15
35	0.48
36	758.07
37	459.02
38	38.88
39	4169.94
41	898.89
43	627.82
44	737.28
46	303.59
48	0.09
49	1542.86
50	0.33

Seg No.	Average AFY (1970 - 2019)
51	20.67
52	308.53
53	308.29
54	278.90
55	0.21
56	1130.31
57	0.92
58	588.51
59	1457.06
60	0.82
61	850.88
62	155.73
63	156.18
64	5225.68
65	245.16
66	479.58
68	0.02
70	284.27
71	462.73
73	259.12
74	1132.83
75	518.87
77	79.47
79	1.68
80	321.90
81	229.48
82	1.52
83	324.42
84	0.03
85	60.98
88	255.48
90	196.53
92	2294.34
95	2.14
96	0.07
97	0.55
100	0.43
103	831.67
105	1252.78
107	234.97

Seg No.	Average AFY (1970 - 2019)
109	18.85
110	123.69
117	458.86
118	516.71
120	26.16
121	8494.20

Table 4.3 Average Septic and WWTP Return Flows, Applied Recharge, and Beaumont Inflows (AFY) applied to the Upper and Lower Models

Item	Period of Analysis	Average (AFY)	Min (AFY)	Max (AFY)
Beaumont Septic (Upper Model)	1970 - 2019	1208	1009	1447
Banning Bench Septic (Upper Model)	1970 - 2019	44	2	160
Banning Canyon Flume (Upper Model)	1970 - 2019	1022	1022	1022
West of Banning M&I Return Flow (Upper Model)	1970 - 2019	442	201	634
Banning M&I Return Flow (Upper Model)	1970 - 2019	1224	718	1662
East of Banning M&I Return Flow (Upper Model)	1970 - 2019	635	336	893
Banning WWTP (Upper Model)	1970 - 2019	2034	1203	2974
Morongo Septic (Upper Model)	1970 - 2019	132	132	132
Cabazon Septic (Upper Model)	1970 - 2019	415	156	832
Morongo WWTP (Upper Model)	1984 - 2019	288	2.6	392
Mission Springs M&I Return Flows (Upper Model)	1970 - 2019	89	83	119
Robertson's Ready Mix Return Flows (Upper Model)	1998 - 2019	205	0	589
Recharge in the Beaumont Area (Upper Model)	1970 - 2019	1208	1009	1447
Inflows from Western Boundary (Upper Model)	1970 - 2019	3629	490	5483
Inflows from Western Boundary (Lower Model)	1970 - 2019	565	385	1001
Noble Creek Recharge Facility (Lower Model)	2006- 2019	8008	3593	14988

Table 4.4 Groundwater Production Rates (AFY) for the Upper and Lower Models

Item	Period of Analysis	Average (AFY)	Min (AFY)	Max (AFY)
Banning (Upper Model)	1970 - 2019	5354	2665	8291
Potrero Canyon Pumping (Upper Model)	1970 - 2019	502	253	650
Millard Canyon Pumping (Upper Model)	1970 - 2019	700	700	700
Banning Heights (Upper Model)	1998 - 2019	77	4	275
East Cabazon (Mission Spring Water District) (Lower Model)	1970 - 2019	135	68	207
Banning (Lower Model)	1970 - 2019	2302	1.12	6816
Beaumont-Cherry Valley Water District (Lower Model)	1970 - 2019	4150	463	9115
Morongo Pumping (Lower Model)	1993 - 2019	282	13	357
Central Cabazon (Lower Model)	1970 - 2019	616	70	1170
Desert Water District (Lower Model)	1990 - 2019	155	32	540
Robertson's Ready Mix (Lower Model)	1998 - 2019	248	4	638

Table 4.5 Unsaturated Zone Properties

Item	Value
Saturated vertical hydraulic conductivity	0.469 ft/day
Brooks-Corey Epsilon	6.987
Saturated water content of the unsaturated zone	0.1
Residual water content	0.04

Table 5.1 Calibration Statistics

Statistic	Value
Residual Mean	2.2 ft
Mean Absolute Error	20.5 ft
RMSE	29 ft
Range of Obs.	1619.5 ft
Normalized RMSE	1.8 %

Table 5.2a Water Budget Summary (Upper Model)

	AFY					
Water Year	Discharge into the vadose zone	Precip Recharge	Storage Change	Stream Leakage	Pumping	Return Flows & Underflows
1970*	-184654	8206	-320363	269	-5287	9987
1971	-48631	8206	-4633	30150	-4405	9976
1972	-41395	8206	-4821	23953	-5391	9818
1973	-31343	8206	2331	21955	-5795	9317
1974	-28587	8206	30	17378	-7195	10222
1975	-24904	8206	376	13303	-6492	10262
1976	-22129	8206	2202	12579	-6386	9933
1977	-21912	8206	4157	14166	-5681	9376
1978	-44359	8206	32326	65169	-6564	9853
1979	-62550	8206	15057	66388	-6986	9953
1980	-82025	8206	17549	83313	-2194	10197
1981	-99371	8206	4269	86233	-953	10155
1982	-84577	8206	2432	70077	-953	9681
1983	-78349	8206	8352	76334	-7947	10106
1984	-64935	8206	-3824	50474	-7753	10167
1985	-58616	8206	-1696	45931	-7576	10346
1986	-52516	8206	-2400	38728	-7384	10441
1987	-41835	8206	-8748	21604	-7301	10570
1988	-35685	8206	-2885	20611	-6973	10945
1989	-32955	8206	-3819	15543	-5889	11273
1990	-29197	8206	-3067	11617	-4964	11252
1991	-29587	8206	8298	21306	-2776	11144
1992	-37095	8206	8831	32418	-5760	11067
1993	-55763	8206	23966	67819	-7299	11002
1994	-73159	8206	3794	64985	-7056	10814
1995	-89076	8206	9950	87716	-7475	11081
1996	-83939	8206	-7732	65213	-8963	11765
1997	-60626	8206	-7114	42431	-9206	12071
1998	-56884	8206	2261	48454	-9831	12308
1999	-52298	8206	-4901	35210	-8537	12511
2000	-49685	8206	-4675	31665	-7651	12780
2001	-46031	8206	-7027	24273	-6865	13378
2002	-36642	8206	-6964	13618	-5603	13456
2003	-32421	8206	-2919	12271	-4557	13581
2004	-30715	8206	-3905	10453	-5929	14074

	AFY					
Water Year	**Discharge into the vadose zone**	**Precip Recharge**	**Storage Change**	**Stream Leakage**	**Pumping**	**Return Flows & Underflows**
2005	-43199	8206	22454	49393	-6576	14651
2006	-50536	8206	779	36534	-8077	14652
2007	-52035	8206	-502	36996	-6585	12906
2008	-52295	8206	-5837	29571	-5407	14043
2009	-39439	8206	-9223	14587	-5636	13051
2010	-35894	8206	-3025	19386	-6522	11789
2011	-42519	8206	4978	35126	-6756	10907
2012	-42634	8206	-4573	25799	-6607	10651
2013	-40525	8206	-4767	22723	-6661	11481
2014	-35822	8206	-4386	16078	-5229	12378
2015	-29871	8206	-3880	10227	-4727	12284
2016	-28457	8206	-3254	9545	-4054	11504
2017	-32446	8206	4381	23488	-4549	9577
2018	-35536	8206	-4556	16837	-4337	10261
2019	-39412	8206	7194	33094	-4798	10017
Mean*	**-47355**	**8206**	**1242**	**35158**	**-6098**	**11327**

*Water Year 1970 water budget is estimated (since the model starts in January 1970) and has high mass balance error due to numerical convergence issues in the first few stress-periods. This year is not included in the mean statistic.

Table 5.2b Water Budget Summary (Vadose Zone)

	AFY			
Water Year	Recharge into the Vadose zone	Storage Change (Unsaturated Zone)	Rejected Recharge	Recharge to Lower Groundwater Model
1970*	-138490	5093	139970	28975
1971	-36474	-3789	11014	21670
1972	-31046	-3467	5051	22527
1973	-23507	-4025	2939	16542
1974	-21440	-3630	2052	15756
1975	-18678	-3215	1786	13676
1976	-16597	-3096	1623	11878
1977	-16434	-3515	1538	11380
1978	-33269	-5411	3078	24779
1979	-46913	-3701	4598	38611
1980	-61519	-4731	7865	48920
1981	-74528	-2958	8355	63212
1982	-63433	-337	6576	56516
1983	-58762	-830	6565	51364
1984	-48701	95	5007	43786
1985	-43962	971	4298	40633
1986	-39387	2057	4106	37335
1987	-31376	1540	3935	28979
1988	-26764	-2270	3758	20735
1989	-24716	-2942	3619	18153
1990	-21898	-2779	3641	15477
1991	-22190	-3443	3530	15216
1992	-27821	-3380	3549	20891
1993	-41822	-3175	5595	33051
1994	-54869	-1006	7335	46526
1995	-66807	-1706	9261	55838
1996	-62955	1036	7825	56162
1997	-45470	900	5759	40607
1998	-42663	649	6110	37200
1999	-39223	-471	5528	33222
2000	-37264	-2169	5125	29967
2001	-34523	-1839	4612	28070
2002	-27481	-2322	4117	21041
2003	-24316	-2534	3491	18290
2004	-23037	-2925	3207	16903

	AFY			
Water Year	**Recharge into the Vadose zone**	**Storage Change (Unsaturated Zone)**	**Rejected Recharge**	**Recharge to Lower Groundwater Model**
2005	-32400	-3334	4061	25002
2006	-37902	-106	3738	34056
2007	-39026	-1997	3611	33417
2008	-39221	-1596	3402	34221
2009	-29579	-1868	2807	24902
2010	-26920	-1745	2581	22592
2011	-31889	2215	3036	31066
2012	-31975	728	3170	29532
2013	-30394	-1393	3575	25424
2014	-26867	-1901	3582	21382
2015	-22404	-2241	3368	16794
2016	-21342	-2598	3402	15341
2017	-24334	-2526	3394	18413
2018	-26652	295	3724	23222
2019	-29559	-1483	4135	23940
Mean	**-35516**	**-1795**	**4450**	**29270**

*Water Year 1970 water budget is estimated (since the model starts in January 1970) and has high mass balance error due to numerical convergence issues in the first few stress-periods. This year is not included in the mean statistic.

Table 5.2c Water Budget Summary (Lower Model)

	AFY				
Water Year	Underflow to Indio	Storage Change	Recharge to Lower Groundwater Model	Pumping	Applied Recharge (Return Flows, Underflows, and Noble Creek Recharge)
1970*	-27081	444	28975	-2602	460
1971	-28246	-9008	21670	-2993	481
1972	-32027	-12187	22527	-3170	513
1973	-31488	-17251	16542	-2825	522
1974	-31326	-18111	15756	-3062	527
1975	-30499	-19291	13676	-2985	522
1976	-29564	-20181	11878	-2970	497
1977	-28648	-19633	11380	-2799	485
1978	-28777	-6983	24779	-3467	504
1979	-27282	8767	38611	-3143	524
1980	-14590	32714	48920	-2617	522
1981	3445	65435	63212	-1906	480
1982	-13429	42827	56516	-1138	436
1983	-16956	34051	51364	-1036	413
1984	-4775	38884	43786	-1256	405
1985	2025	41474	40633	-2473	429
1986	18967	54414	37335	-2796	451
1987	13649	39549	28979	-3714	474
1988	-107673	-91738	20735	-4850	510
1989	-81078	-70122	18153	-7199	567
1990	-35982	-27822	15477	-7777	588
1991	-53950	-45758	15216	-7374	609
1992	-47586	-33073	20891	-6402	606
1993	-4472	24551	33051	-4634	575
1994	4822	47420	46526	-4595	560
1995	-40910	12147	55838	-2914	556
1996	-7891	45944	56162	-2919	558
1997	7764	45283	40607	-3711	568
1998	-6557	27152	37200	-4262	590
1999	-37904	-10037	33222	-5936	617
2000	-62463	-39871	29967	-7978	649
2001	-64969	-45414	28070	-9124	695

	AFY				
Water Year	Underflow to Indio	Storage Change	Recharge to Lower Groundwater Model	Pumping	Applied Recharge (Return Flows, Underflows, and Noble Creek Recharge)
2002	-63946	-54573	21041	-12337	742
2003	-48325	-41461	18290	-12180	780
2004	-44253	-39791	16903	-13220	834
2005	-12996	1284	25002	-11720	994
2006	36150	62602	34056	-11336	3629
2007	-49797	-26504	33417	-15116	5016
2008	-59376	-36062	34221	-15770	4857
2009	-55141	-38724	24902	-14232	5812
2010	16136	34589	22592	-11581	7317
2011	46600	76107	31066	-10592	8874
2012	-10057	17474	29532	-11388	9385
2013	-58713	-36750	25424	-12819	9437
2014	-87066	-73229	21382	-13893	6402
2015	-68143	-58131	16794	-11342	4590
2016	-48113	-36782	15341	-13760	9746
2017	22489	42303	18413	-13282	14443
2018	49694	71735	23222	-14914	13659
2019	-41270	-18051	23940	-14558	13880
Mean	**-26418**	**-1629**	**29270**	**-7307**	**2792**

*Water Year 1970 water budget is estimated (since the model starts in January 1970) and has high mass balance error due to numerical convergence issues in the first few stress-periods. This year is not included in the mean statistic.

Table 6.1 Predictive Scenario Matrix

Scenario	Simulation Period (Water Year)	Hydrology	Recharge (Entire Model Area)						Pumping			
			(Natural) Areal Recharge	(Natural) Stream Recharge	Managed Recharge	Return Flows	Return Flows (WWTP)	Beaumont Underflows	City of Banning	Beaumont-Cherry Valley WD	Morongo Band of Mission Indians	Miscellaneous
Hydrologic Assumption – Current Conditions, no Climate Change												
2020 Baseline (Future with no Climate Change)	50 yrs: 1949 - 1998	Historical Conditions	Based on Historical Precip/ET	Based on Historical Hydrology	Projected Noble Creek Recharge facility	Repeat last 5 years stress periods of Historical Model	Historical Banning WWTP and other return flows	Regressed Based on Noble Creek developed correlation	Repeat last 5 years stress periods of Historical Model	Repeat last 5 years stress periods of Historical Model	Repeat last 5 years stress periods of Historical Model	Repeat last 5 years stress periods of Historical Model
Hydrologic Assumption – 2030 Climate Change Projection												
2030 Baseline	50 yrs: 1949 - 1998	Historical impacted by 2030 CC Factors	Historical impacted by 2030 CC Precip/ET	Historical impacted by 2030 CC Precip or Streamflow	Projected Noble Creek Recharge facility for 2030s	Repeat last 5 years stress periods of Historical Model	Banning WWTP reduced for Recycled, historical for others (3,433 AFY)	Regressed Based on Noble Creek developed correlation	2030-level Pumping based on COB 2020 draft UWMP	2030-level Pumping based on BCVWD 2020 draft UWMP	Repeat last 5 years stress periods of Historical Model	Repeat last 5 years stress periods of Historical Model
2030 Project #3: Additional Surface Water Imports for SGP Agencies	50 yrs: 1949 - 1998	Historical impacted by 2030 CC Factors	Historical impacted by 2030 CC Precip/ET	Historical impacted by 2030 CC Precip or Streamflow	Projected Noble Creek Recharge facility for 2030s	Repeat last 5 years stress periods of Historical Model	Banning WWTP reduced for Recycled, historical for others (3,433 AFY)	Regressed Based on Noble Creek developed correlation	2030-level Pumping based on COB 2020 draft UWMP	2030-level Pumping based on BCVWD 2020 draft UWMP	Repeat last 5 years stress periods of Historical Model	Repeat last 5 years stress periods of Historical Model
2030 Alternative Baseline	50 yrs: 1949 - 1998	Historical impacted by 2030 CC Factors	Historical impacted by 2030 CC Precip/ET	Historical impacted by 2030 CC Precip or Streamflow	Projected Noble Creek Recharge facility for 2030s	Repeat last 5 years stress periods of Historical Model	Banning WWTP = 3,433 AFY, Morongo WWTP = 1,909 AFY	Regressed Based on Noble Creek developed correlation	2030-level Pumping based on COB 2020 draft UWMP	2030-level Pumping based on BCVWD 2020 draft UWMP	Increase MBMI Pumping by 7,179 AFY by adding 6 new wells	Repeat last 5 years stress periods of Historical Model
2030 Project #4: Additional Surface Water for Project #3 and MBMI	50 yrs: 1949 - 1998	Historical impacted by 2030 CC Factors	Historical impacted by 2030 CC Precip/ET	Historical impacted by 2030 CC Precip or Streamflow	Projected Noble Creek Recharge facility for 2030s + 5,300 AF of recharge at the new Cabazon recharge site	Repeat last 5 years stress periods of Historical Model	Banning WWTP = 3,433 AFY, Morongo WWTP = 1,909 AFY	Regressed Based on Noble Creek developed correlation	2030-level Pumping based on COB 2020 draft UWMP	2030-level Pumping based on BCVWD 2020 draft UWMP	Increase MBMI Pumping by 7,179 AFY	Repeat last 5 years stress periods of Historical Model
2030 Project #5: Additional Surface Water for Project #3 and MBMI	50 yrs: 1949 - 1998	Historical impacted by 2030 CC Factors	Historical impacted by 2030 CC Precip/ET	Historical impacted by 2030 CC Precip or Streamflow	Projected Noble Creek Recharge facility for 2030s + new recharge at Banning Storage Unit	Repeat last 5 years stress periods of Historical Model	Banning WWTP reduced for Recycled, historical for others (3,433 AFY)	Regressed Based on Noble Creek developed correlation	2030-level Pumping based on COB 2020 draft UWMP	2030-level Pumping based on BCVWD 2020 draft UWMP	Increase MBMI Pumping by 7,179 AFY	Repeat last 5 years stress periods of Historical Model

Scenario	Simulation Period (Water Year)	Hydrology	Recharge (Entire Model Area)						Pumping			
			(Natural) Areal Recharge	(Natural) Stream Recharge	Managed Recharge	Return Flows	Return Flows (WWTP)	Beaumont Underflows	City of Banning	Beaumont-Cherry Valley WD	Morongo Band of Mission Indians	Miscellaneous
Hydrologic Assumption – 2070 Climate Change Projection												
2070 Baseline	50 yrs: 1949 - 1998	Historical impacted by 2070 CC Factors	Historical impacted by 2070 CC Precip/ET	Historical impacted by 2070 CC Precip or Streamflow	Projected Noble Creek Recharge facility for 2070s	Repeat last 5 years stress periods of Historical Model	Banning WWTP = 4,620 AFY	Regressed Based on Noble Creek developed correlation	2045-level Pumping based on COB 2020 draft UWMP	2045-level Pumping based on BCVWD 2020 draft UWMP	Repeat last 5 years stress periods of Historical Model	Repeat last 5 years stress periods of Historical Model

Table 7.1 Selected Factor and Lower and Upper Range

Parameter	Initial Values	Lower	Upper
Recharge	-	0.5	1.5
SFR Stream Flow Zone 1	**1148[1] AFY**	0.5	1.5
SFR Stream Flow Zone 2	**486[1] AFY**	0.5	1.5
SFR Stream Flow Zone 3	**396[1] AFY**	0.5	1.5
SFR Stream Flow Zone 4	**116[1] AFY**	0.5	1.5
SFR Stream Flow Zone 5	**1045[1] AFY**	0.5	1.5
SFR Stream Flow Zone 6	**215[1] AFY**	0.5	1.5
SFR Conductance Zone 1	200	0.5	1.5
SFR Conductance Zone 2	200	0.5	1.5
SFR Conductance Zone 3	200	0.5	1.5
SFR Conductance Zone 4	200	0.5	1.5
SFR Conductance Zone 5	200	0.5	1.5
SFR Conductance Zone 6	200	0.5	1.5
UZF Reduction Factor Zone 1	0.75	0.5	1.5
UZF Reduction Factor Zone 2	0.75	0.5	1.5
UZF Reduction Factor Zone 3	0.75	0.5	1.5
UZF Reduction Factor Zone 4	0.75	0.5	1.5
UZF Reduction Factor Zone 5	0.75	0.5	1.5
UZF Reduction Factor Zone 6	0.75	0.5	1.5
UZF Reduction Factor Zone 7	0.75	0.5	1.5
UZF Reduction Factor Zone 8	0.75	0.5	1.5
UZF VK	1.43E-01	0.5	1.5
GHB Conductance	53292.767	0.5	1.5
GHB Heads	Refer to Figure 7.7	**0.58[2]**	1.5
Hk in Layer 1 Zone 1	Refer to Figure 7.8	0.5	1.5
Hk in Layer 1 Zone 2	Refer to Figure 7.8	0.5	1.5
Hk in Layer 1 Zone 3	Refer to Figure 7.8	0.5	1.5
Hk in Layer 1 Zone 4	Refer to Figure 7.8	0.5	1.5
Hk in Layer 1 Zone 5	Refer to Figure 7.8	0.5	1.5
Hk in Layer 1 Zone 6	Refer to Figure 7.8	0.5	1.5
Hk in Layer 1 Zone 7	Refer to Figure 7.8	0.5	1.5
Vk in Layer 1 Zone 1	Refer to Figure 7.9	0.5	1.5
Vk in Layer 1 Zone 2	Refer to Figure 7.9	0.5	1.5
Vk in Layer 1 Zone 3	Refer to Figure 7.9	0.5	1.5
Vk in Layer 1 Zone 4	Refer to Figure 7.9	0.5	1.5
Fault Conductance 1	Refer to Figure 7.10	0.5	1.5
Fault Conductance 2	Refer to Figure 7.10	0.5	1.5
Fault Conductance 3	Refer to Figure 7.10	0.5	1.5
Fault Conductance 4	Refer to Figure 7.10	0.5	1.5

Parameter	Initial Values	Lower	Upper
Fault Conductance 5	Refer to Figure 7.10	0.5	1.5
Fault Conductance 6	Refer to Figure 7.10	0.5	1.5
Fault Conductance 7	Refer to Figure 7.10	0.5	1.5
Fault Conductance 8	Refer to Figure 7.10	0.5	1.5
Fault Conductance 9	Refer to Figure 7.10	0.5	1.5
Fault Conductance 10	Refer to Figure 7.10	0.5	1.5
Fault Conductance 11	Refer to Figure 7.10	0.5	1.5
Fault Conductance 12	Refer to Figure 7.10	0.5	1.5

1. **Average of the "Average Stream flow" for the pour points within the zone for the historically calibrated model from 1970 – 2019.**
2. **GHB heads are restricted by the elevation of the lowest active cell in which the boundary head is located.**

FIGURES

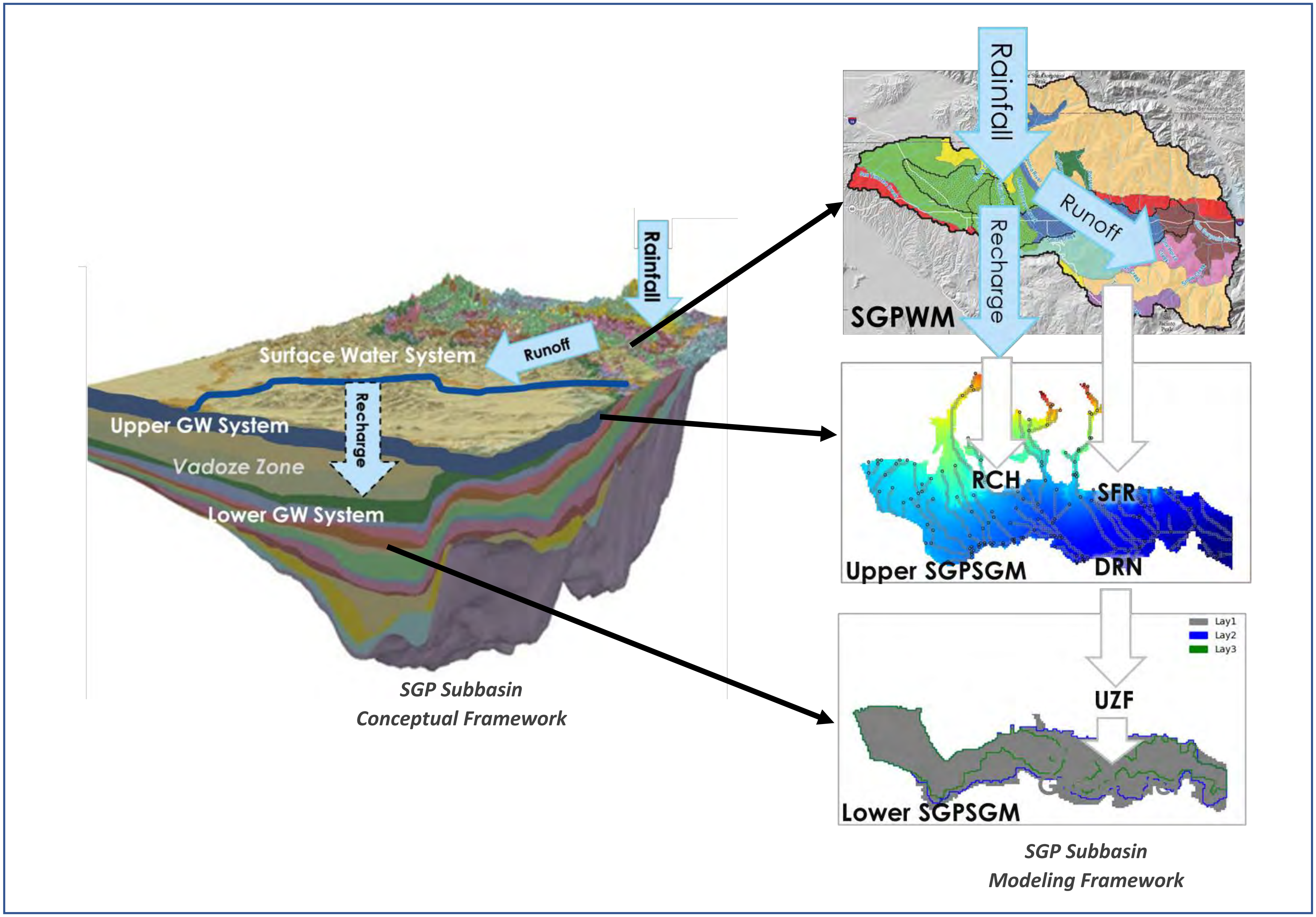


Figure 1.1 Conceptual and Numerical Model Framework

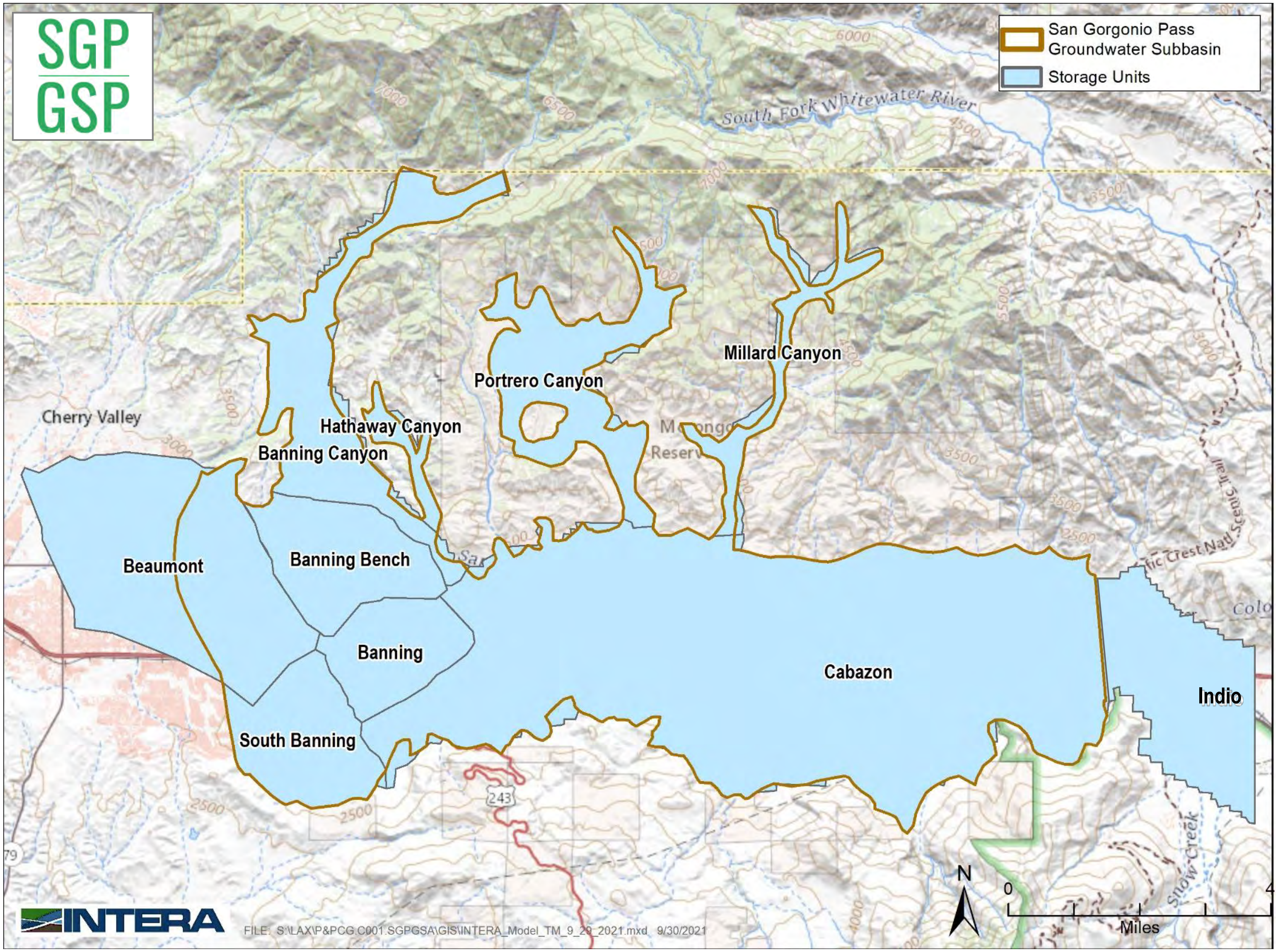


Figure 2.1 San Gorgonio Pass Groundwater Subbasin and Adjacent Storage Units

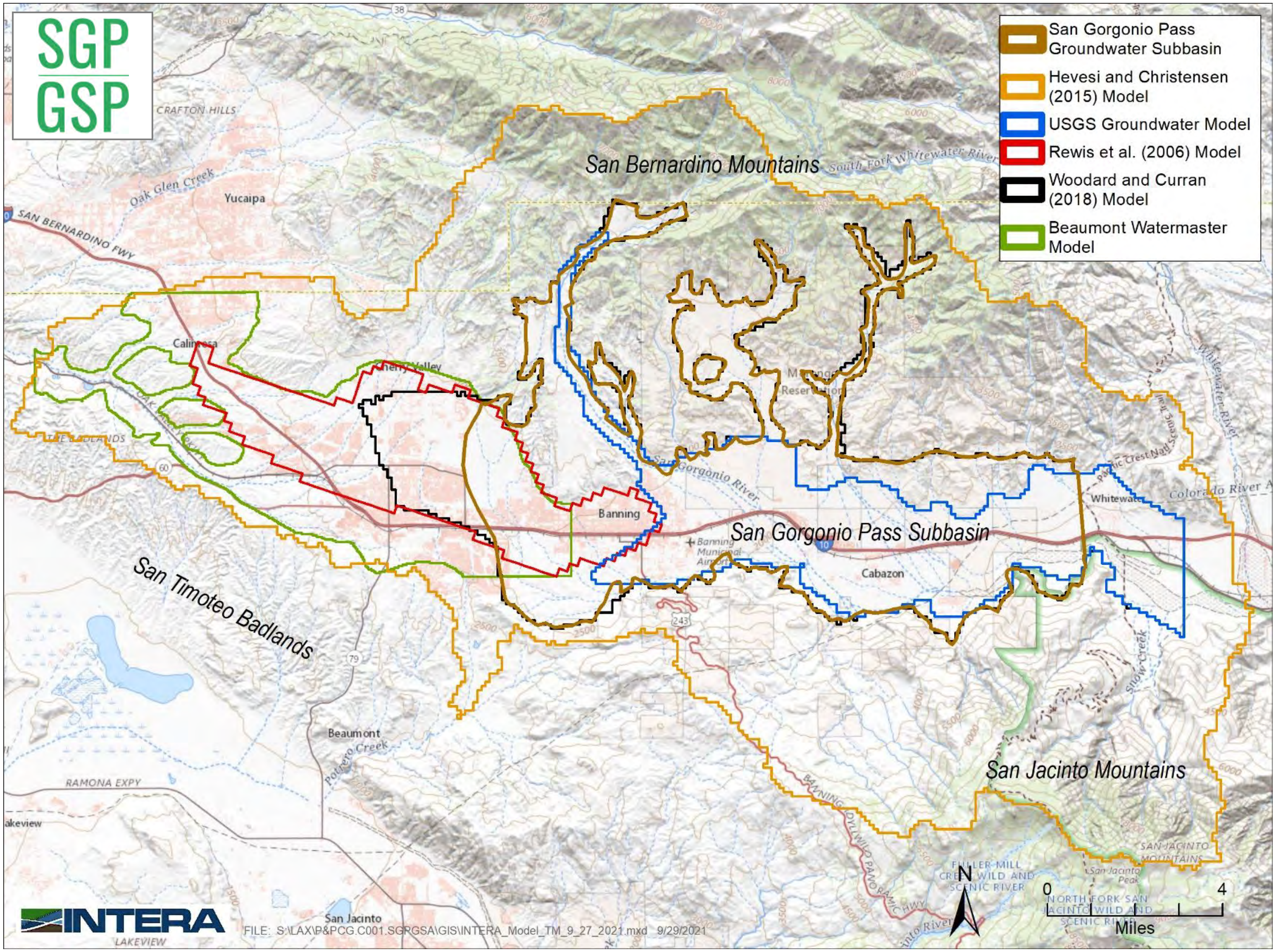


Figure 3.1 Model Extents for the SGP Study Area

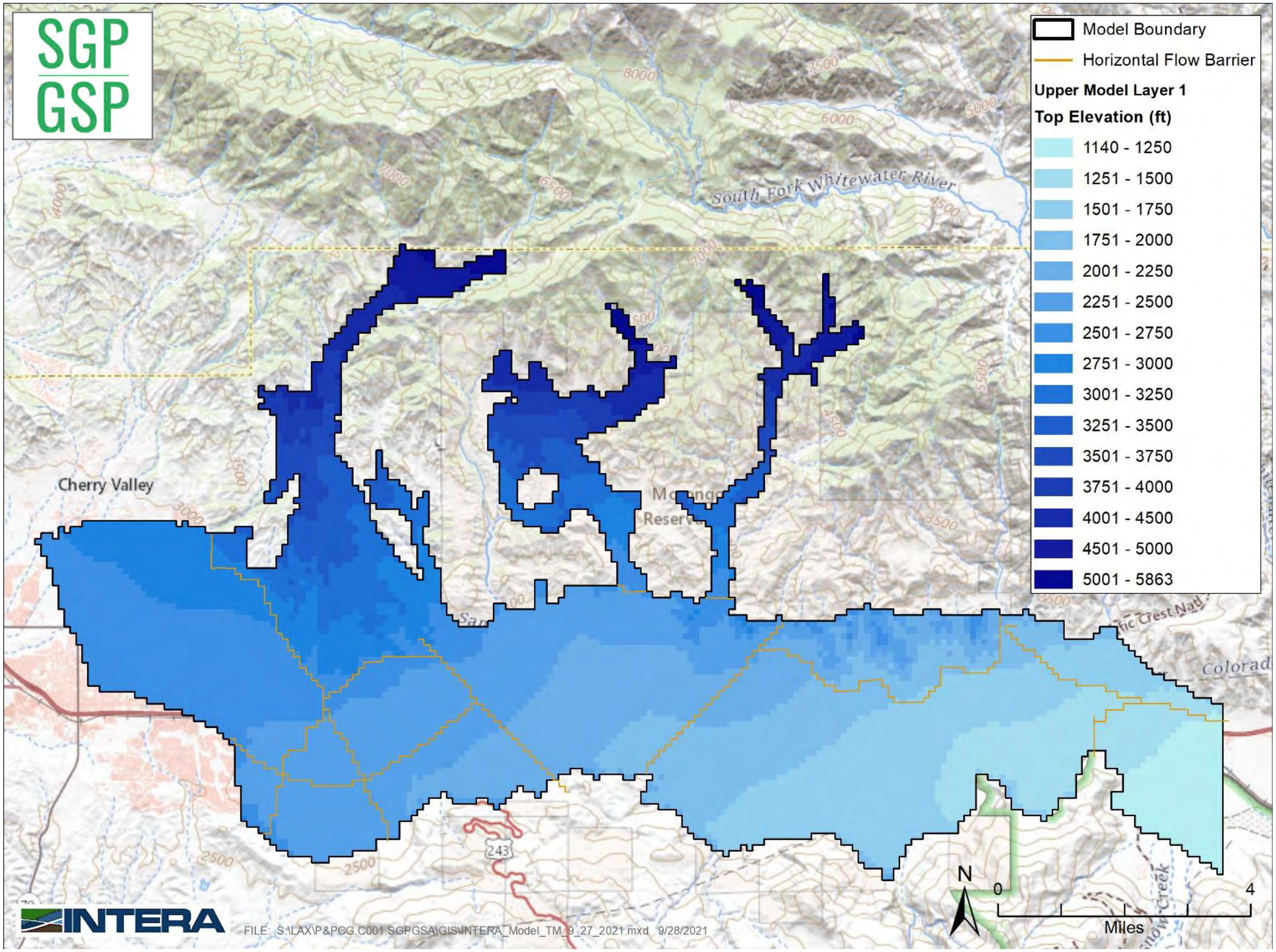


Figure 4.1 Upper Model Top Elevation

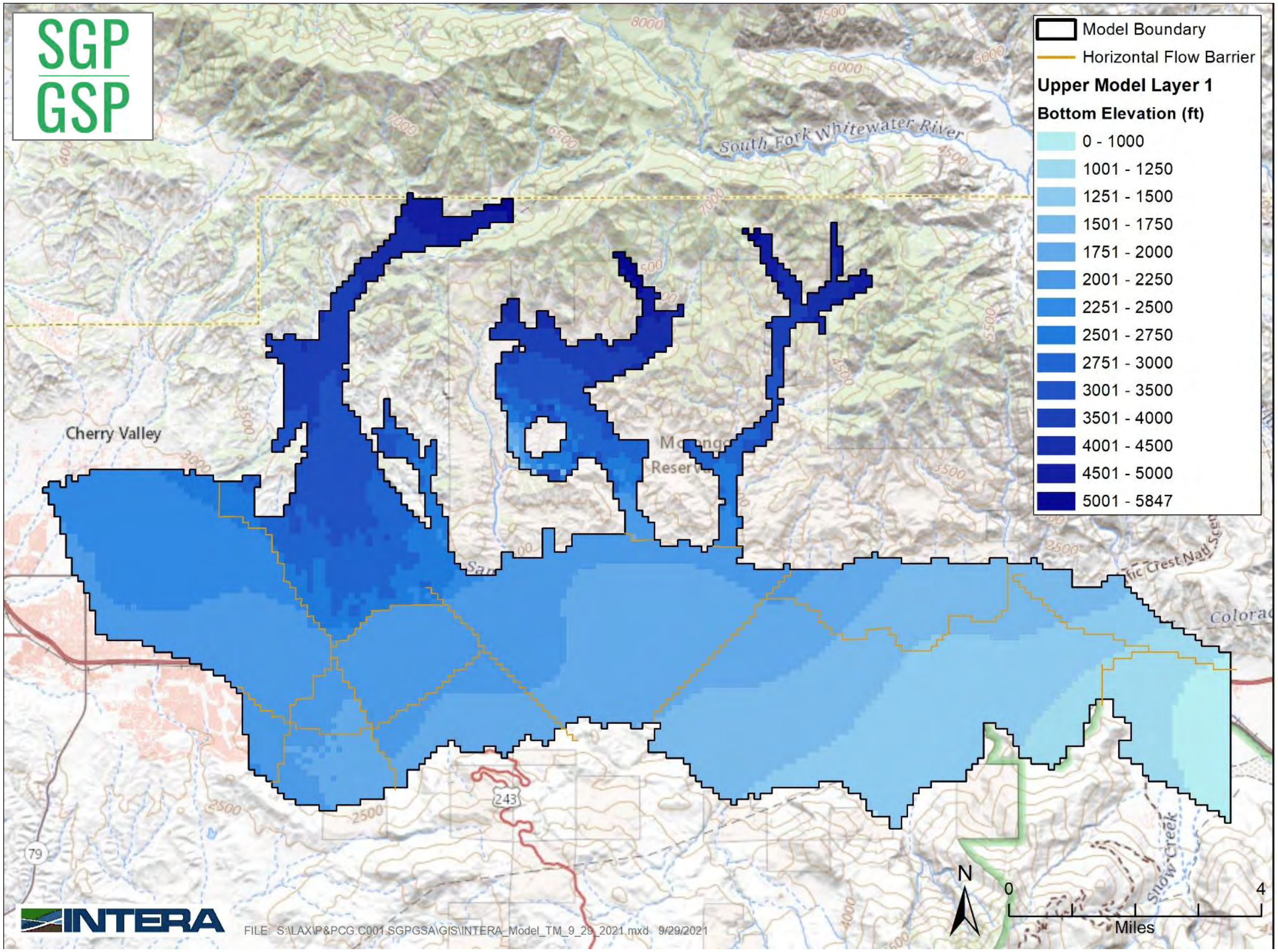


Figure 4.2 Upper Model Bottom Elevation

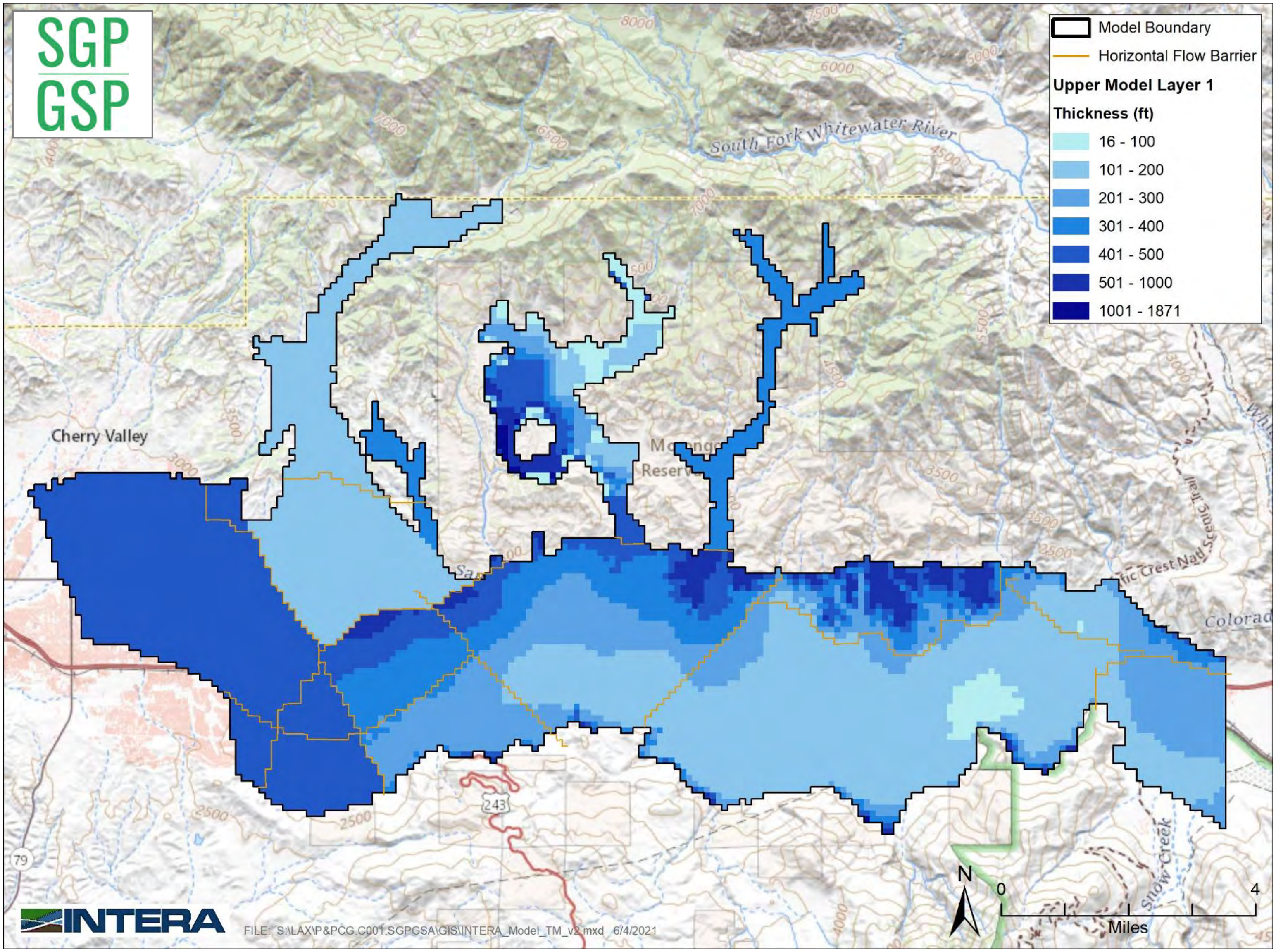


Figure 4.3 Upper Model Aquifer Thickness

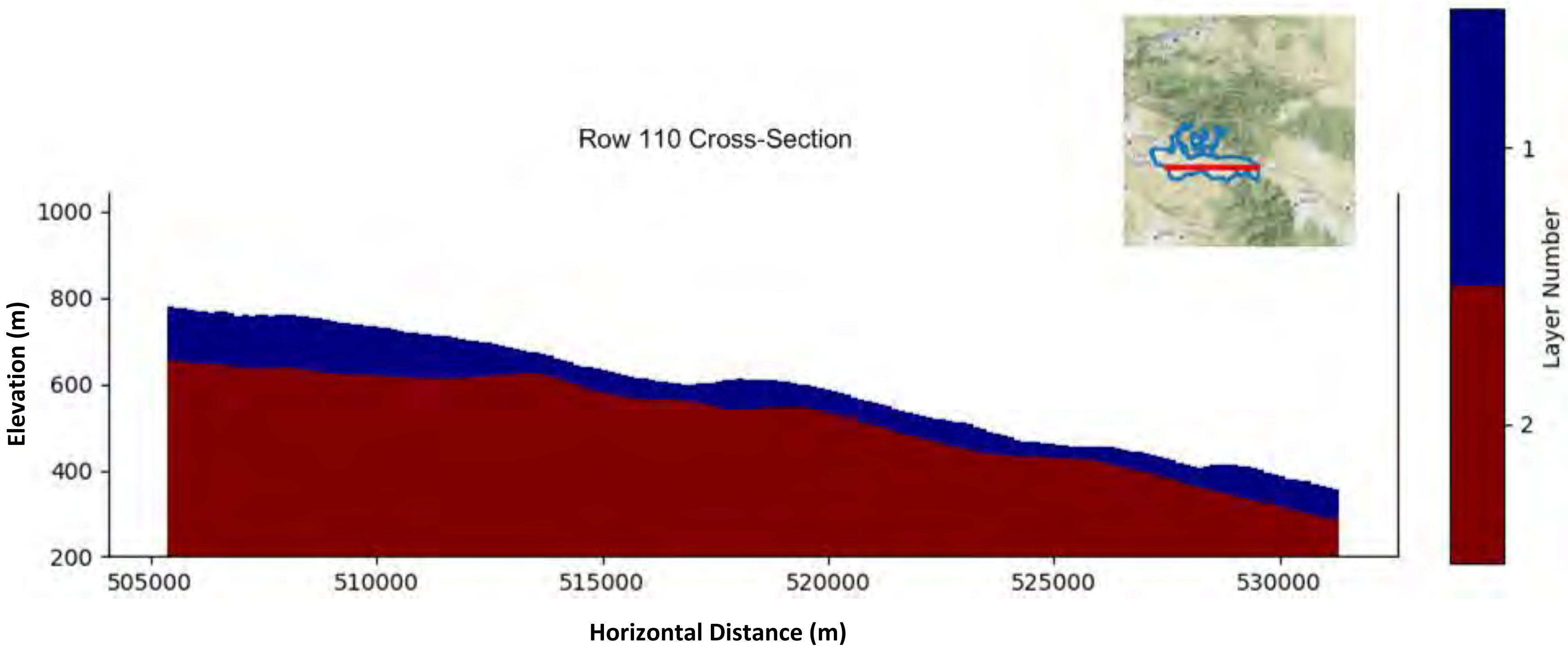


Figure 4.4a Upper Model Cross Section Location – East-West Cross Section

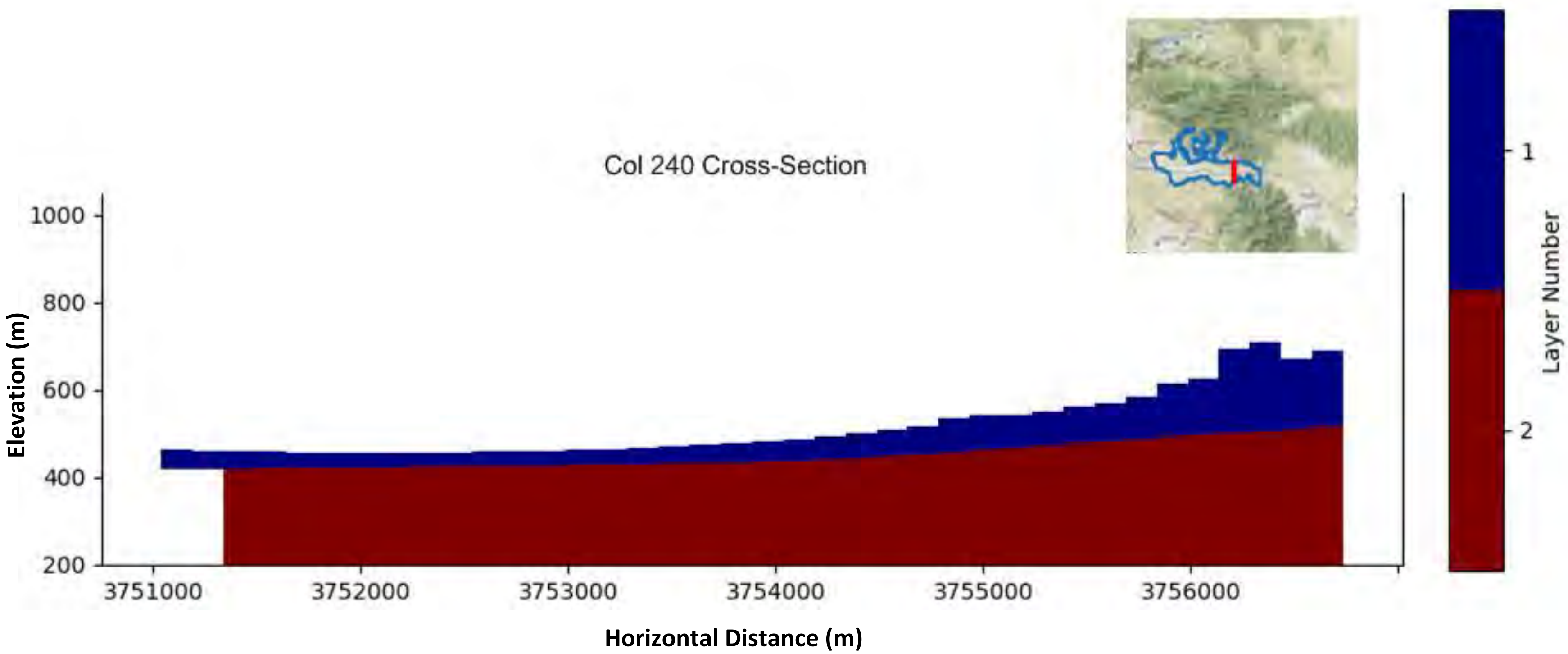


Figure 4.4b Upper Model Cross Section Location – North-South Cross Section

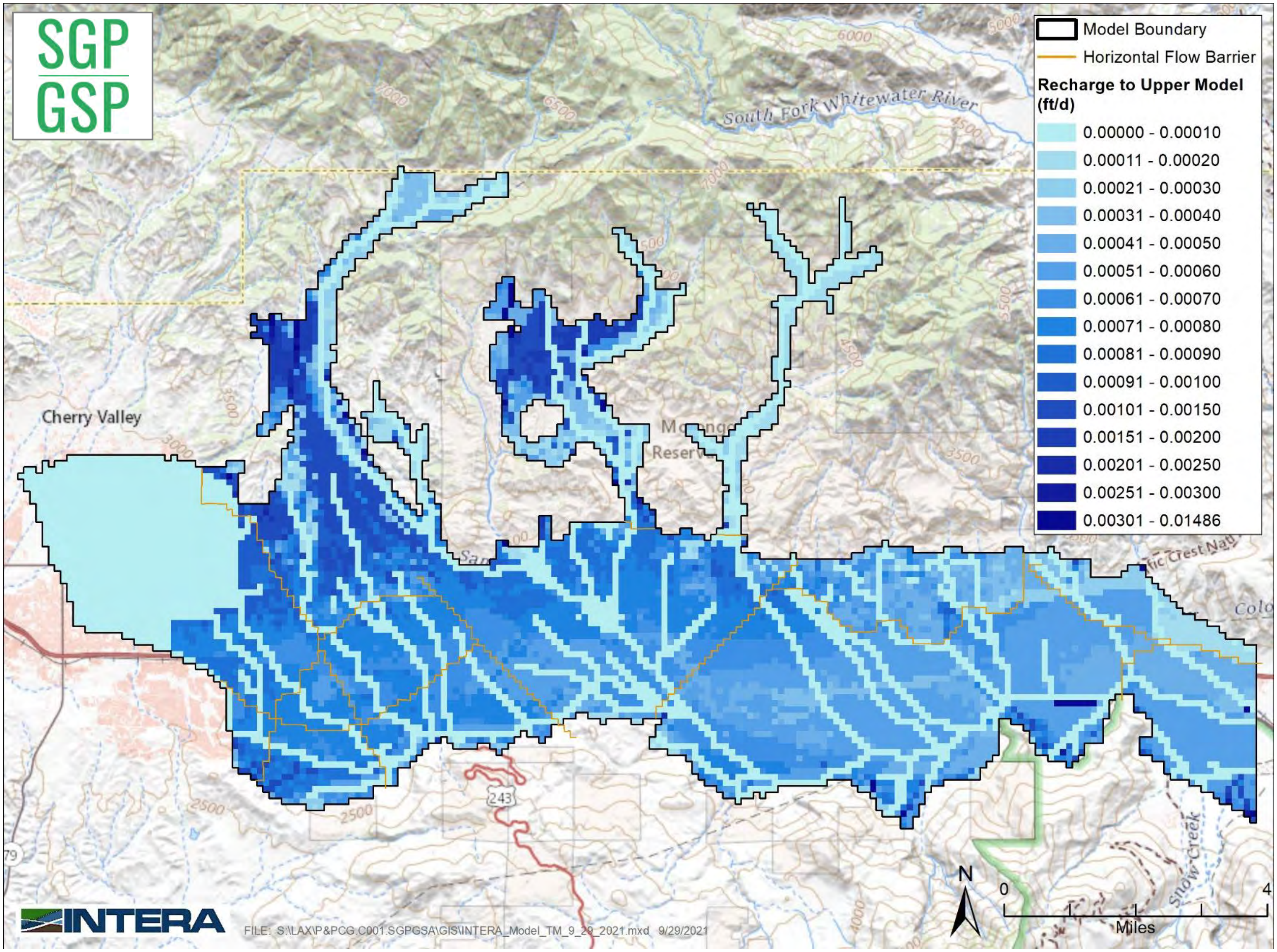


Figure 4.5 Precipitation-Based Recharge for Upper Model

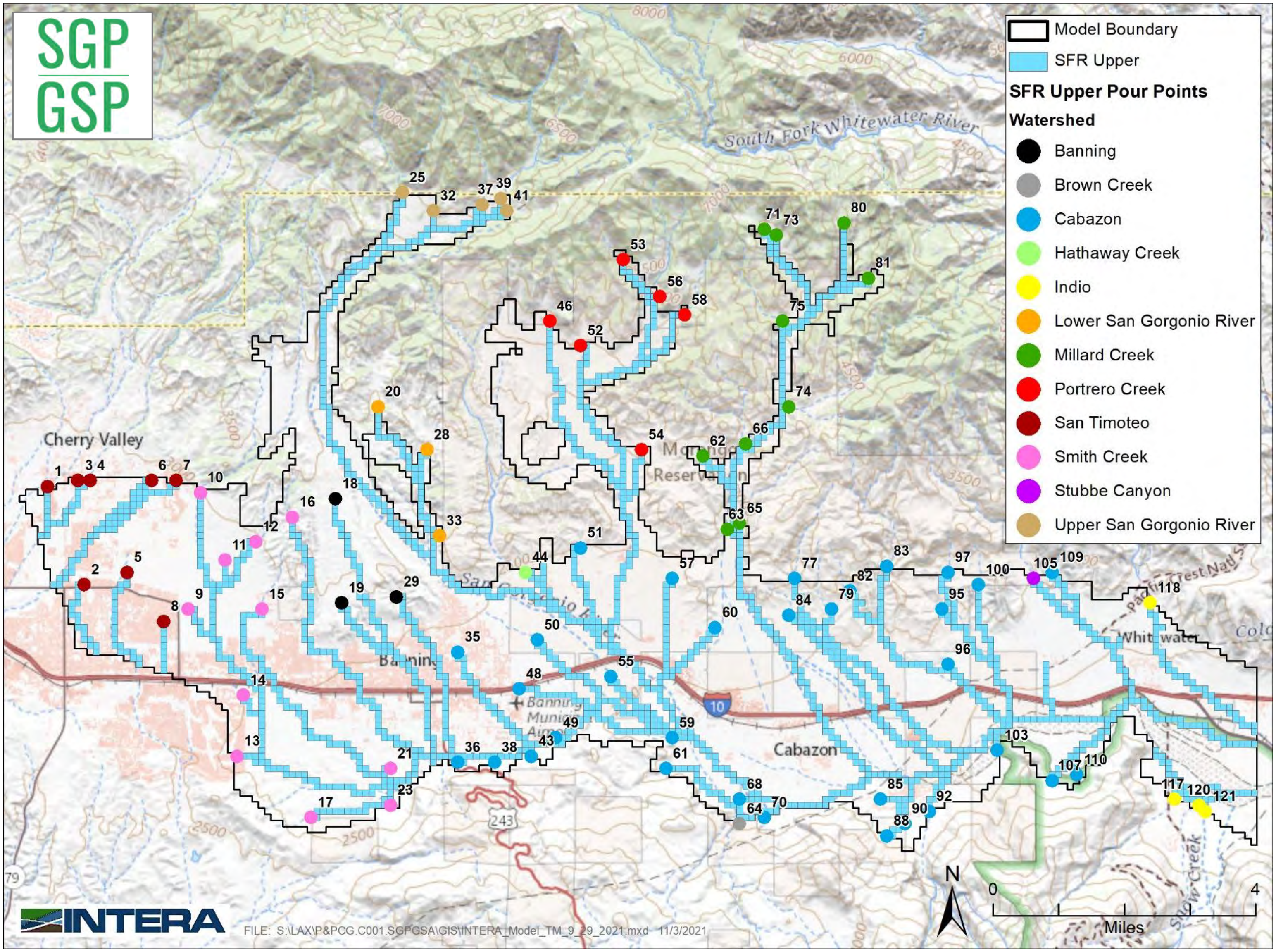
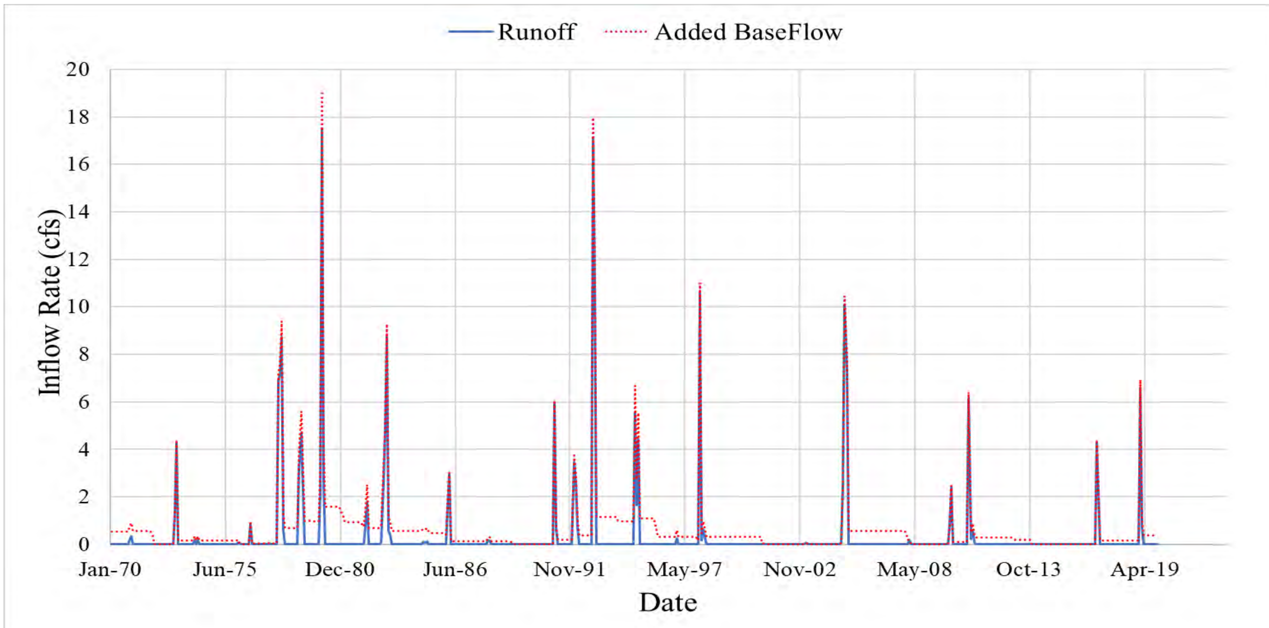


Figure 4.6a Stream Flow Network and Pour Points



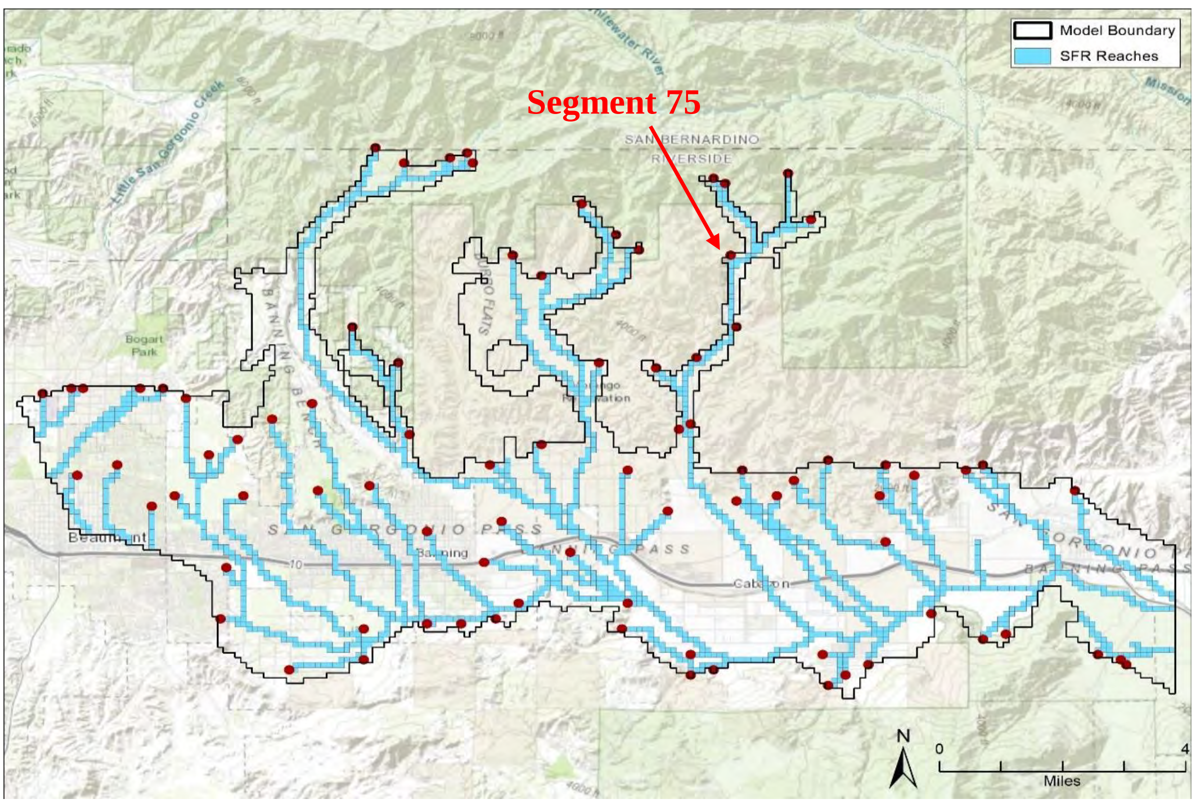


Figure 4.6b:
INFIL vs Baseflow for Segment 75

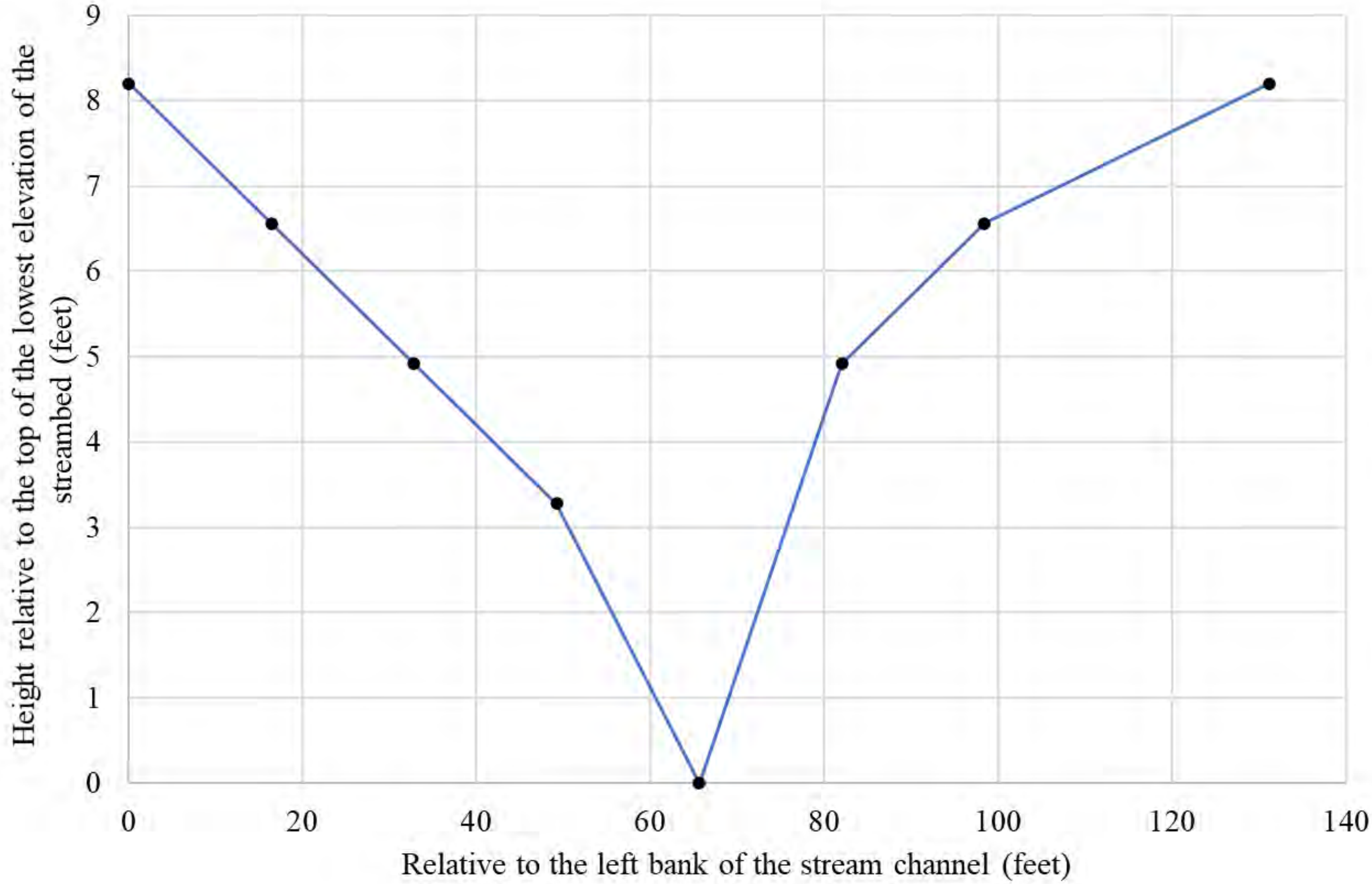


Figure 4.7 SFR Geometry

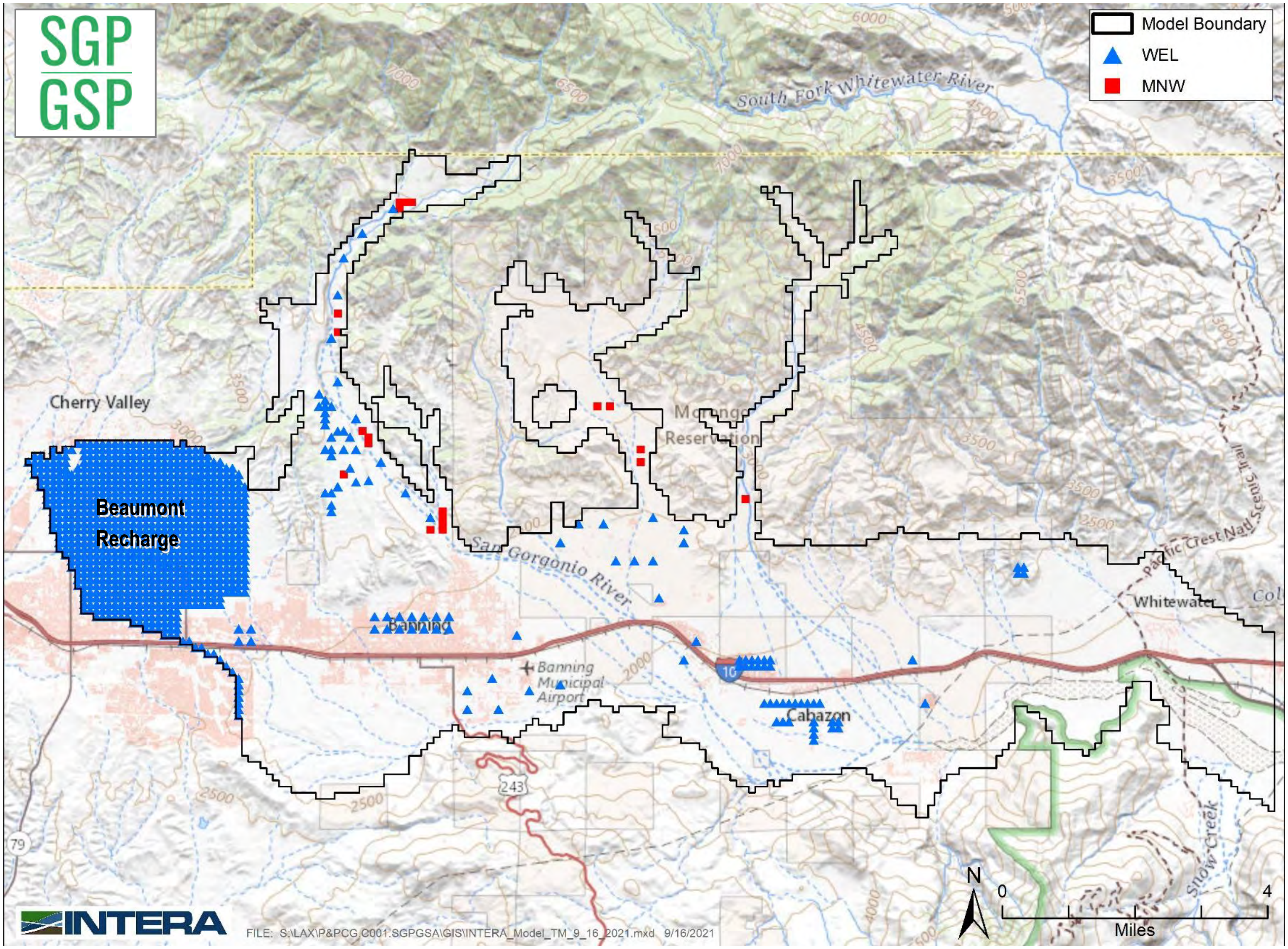


Figure 4.8 Upper Model Applied Recharge and Groundwater Production Locations

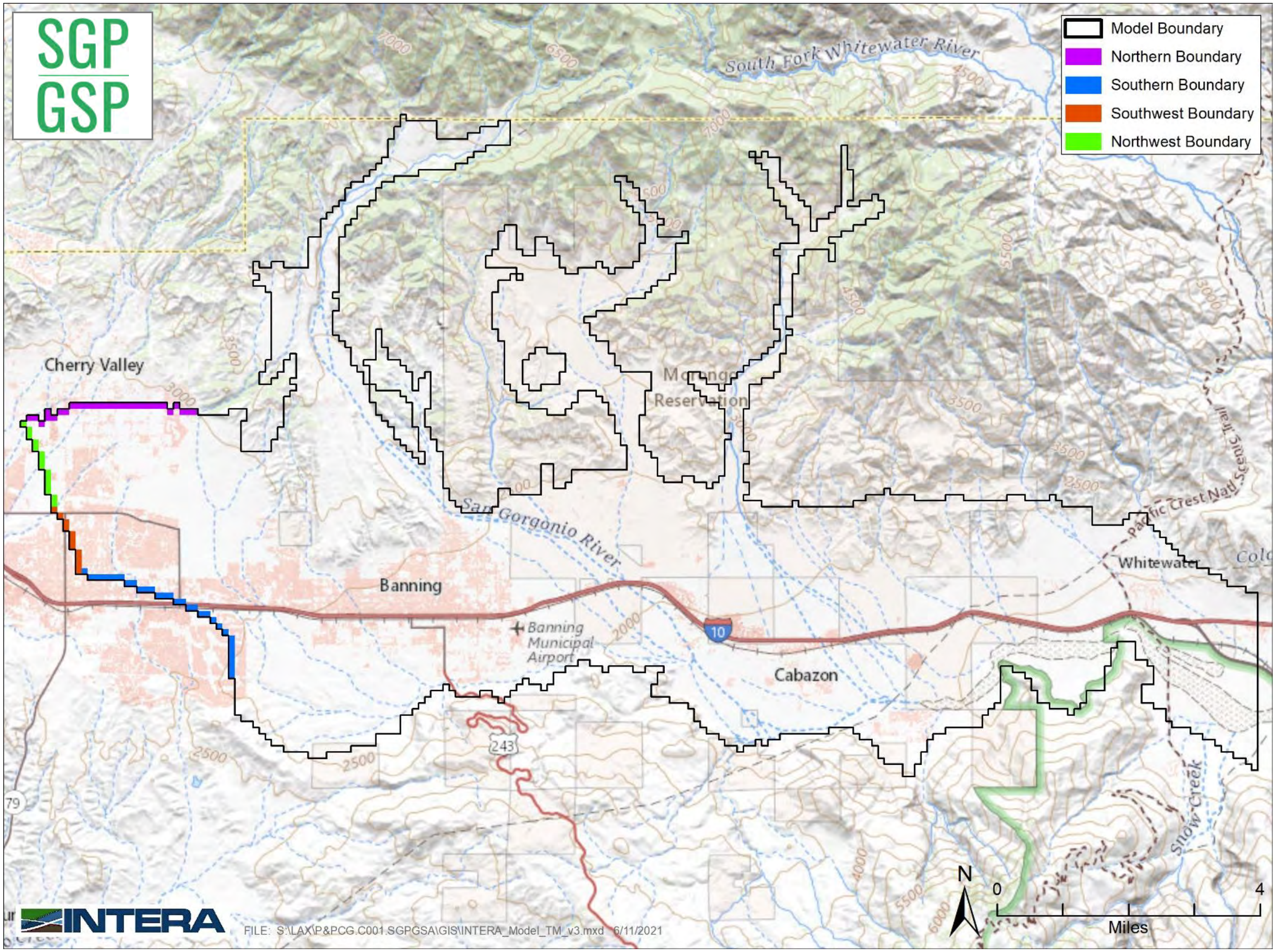


Figure 4.9 Beaumont Underflow Zones

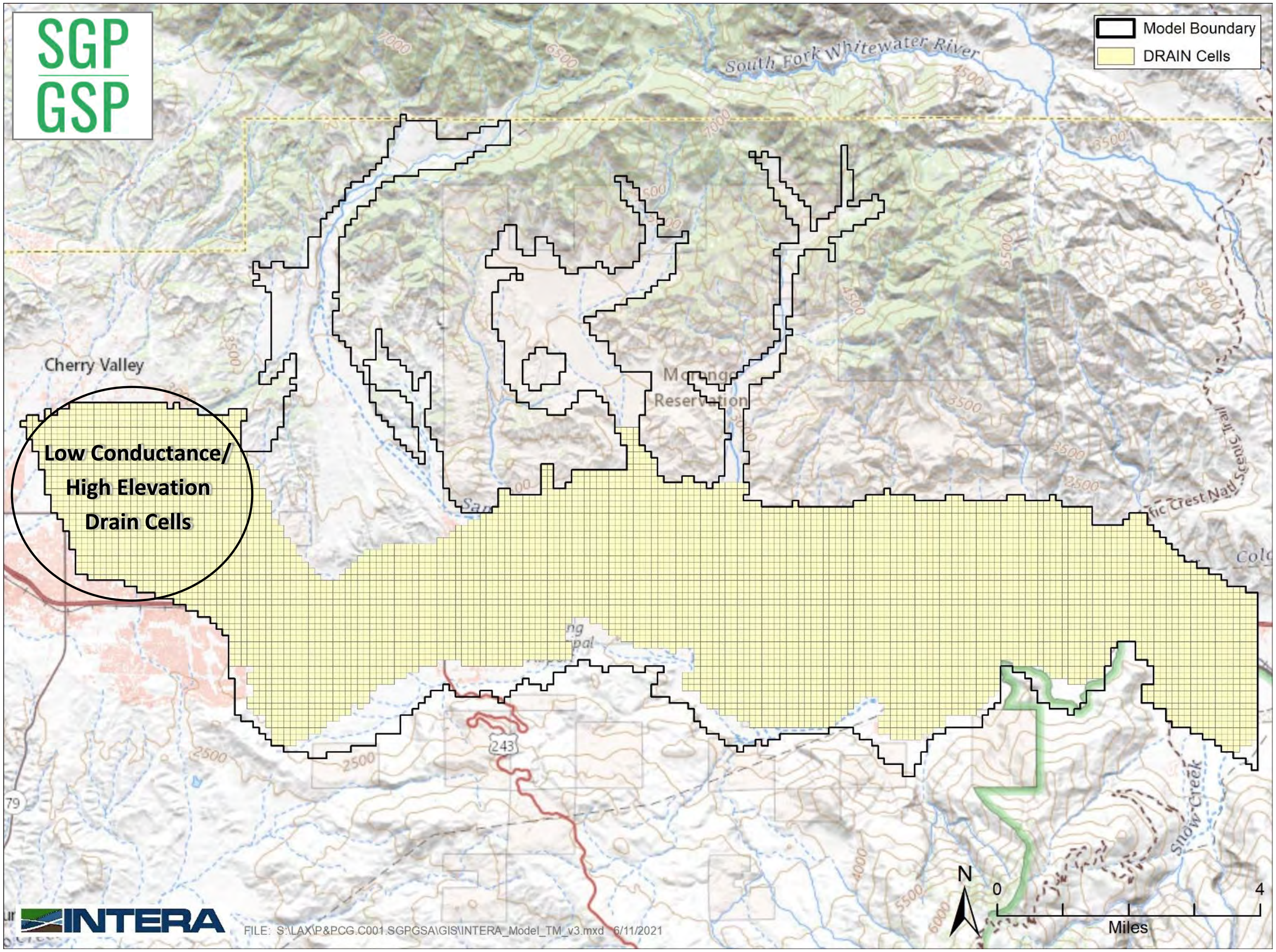
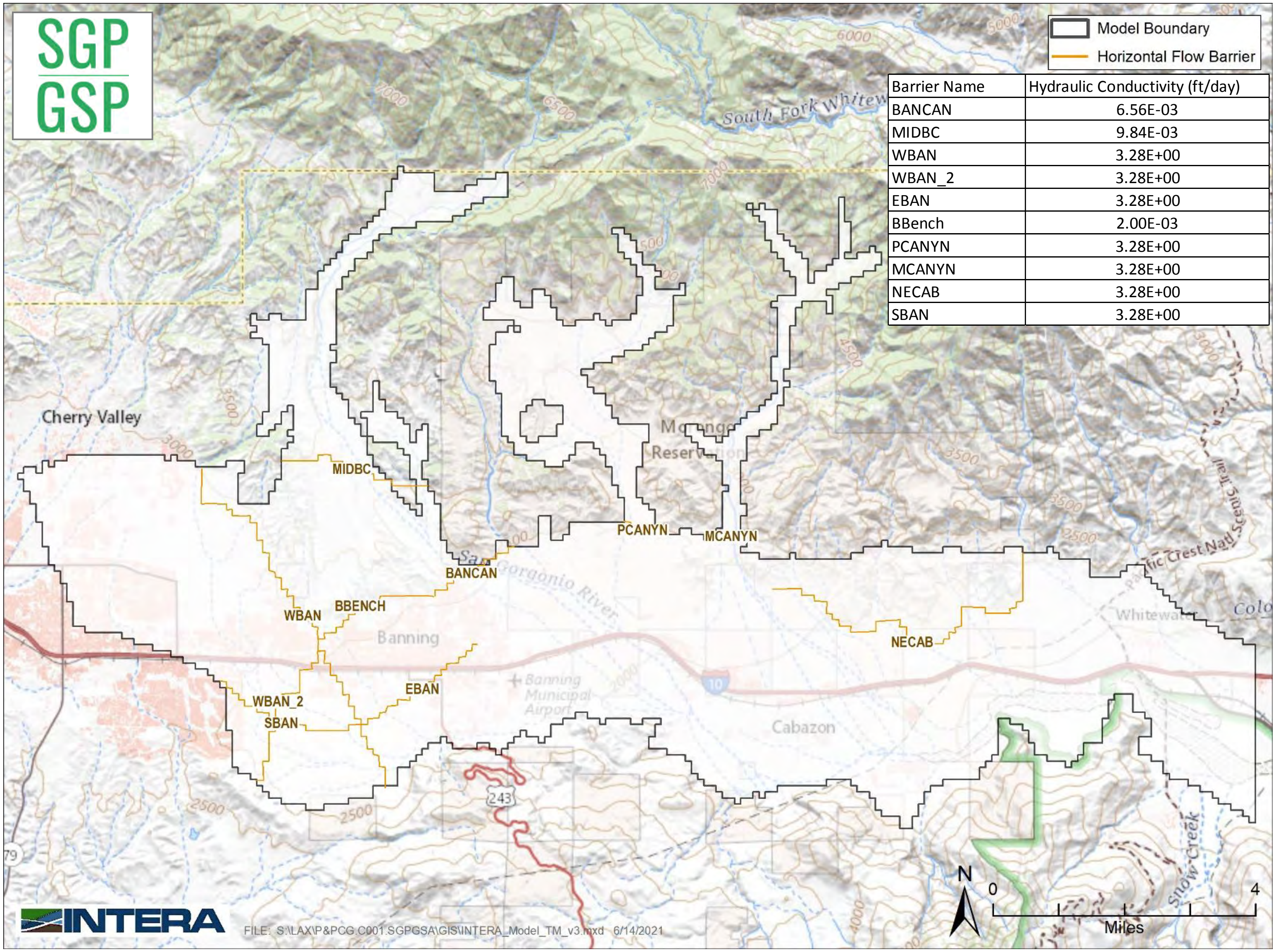


Figure 4.10 DRAIN Cells



Barrier Name	Hydraulic Conductivity (ft/day)
BANCAN	6.56E-03
MIDBC	9.84E-03
WBAN	3.28E+00
WBAN_2	3.28E+00
EBAN	3.28E+00
BBench	2.00E-03
PCANYN	3.28E+00
MCANYN	3.28E+00
NECAB	3.28E+00
SBAN	3.28E+00

Figure 4.11 Upper Model Fault/Barrier Locations and Properties

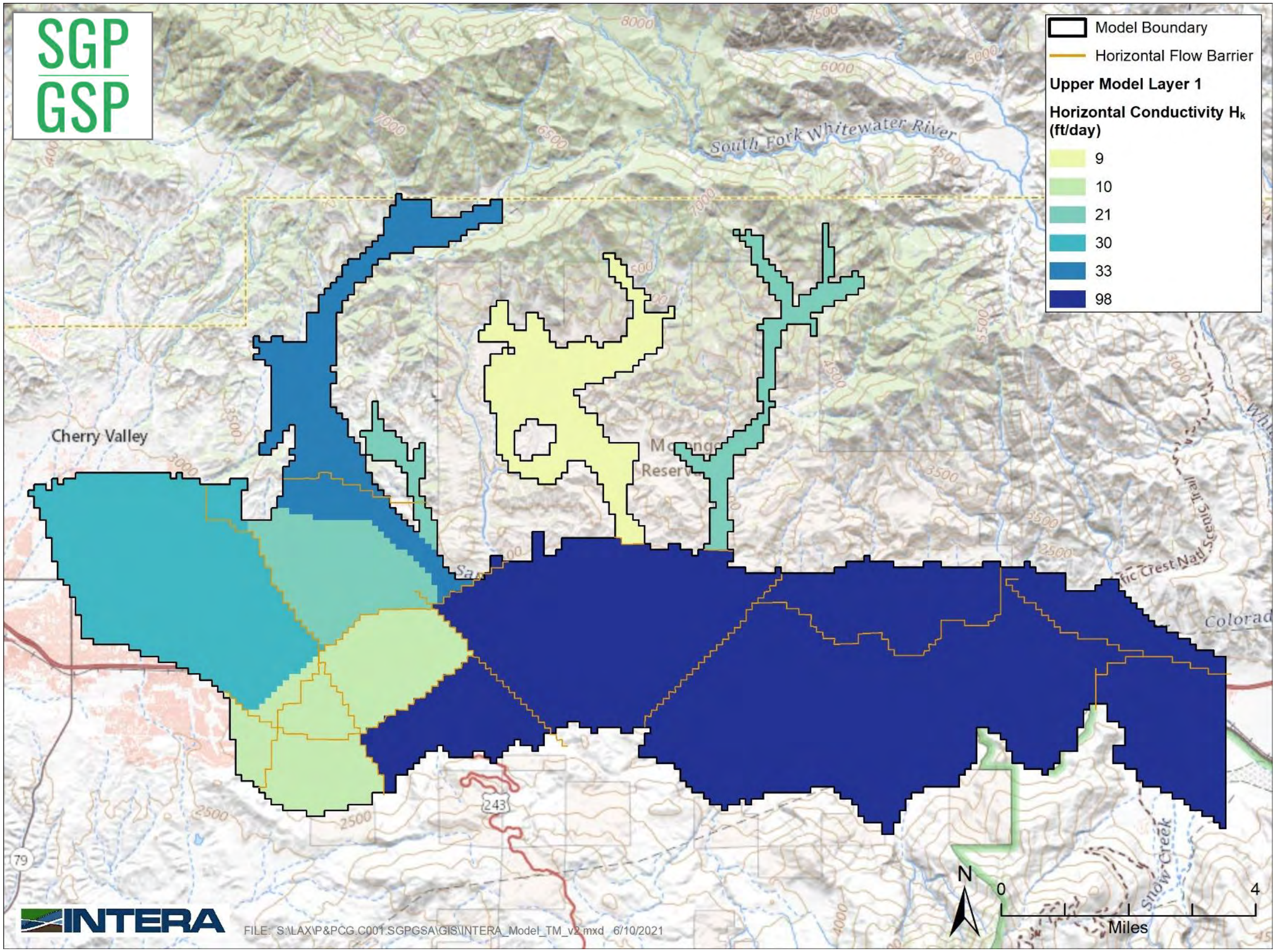


Figure 4.12a Upper Model Hk - Layer 1

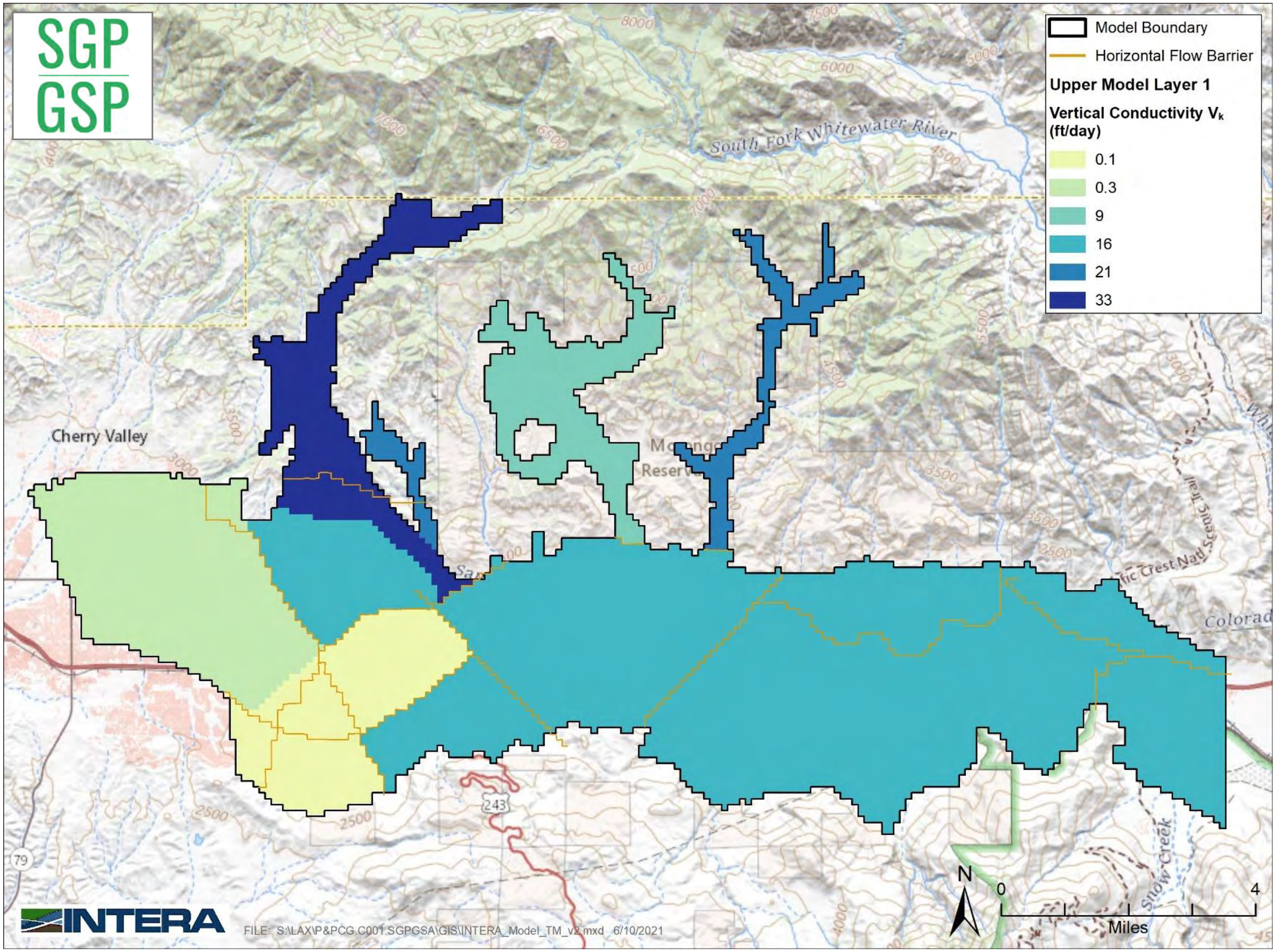


Figure 4.12b Upper Model Vk - Layer 1

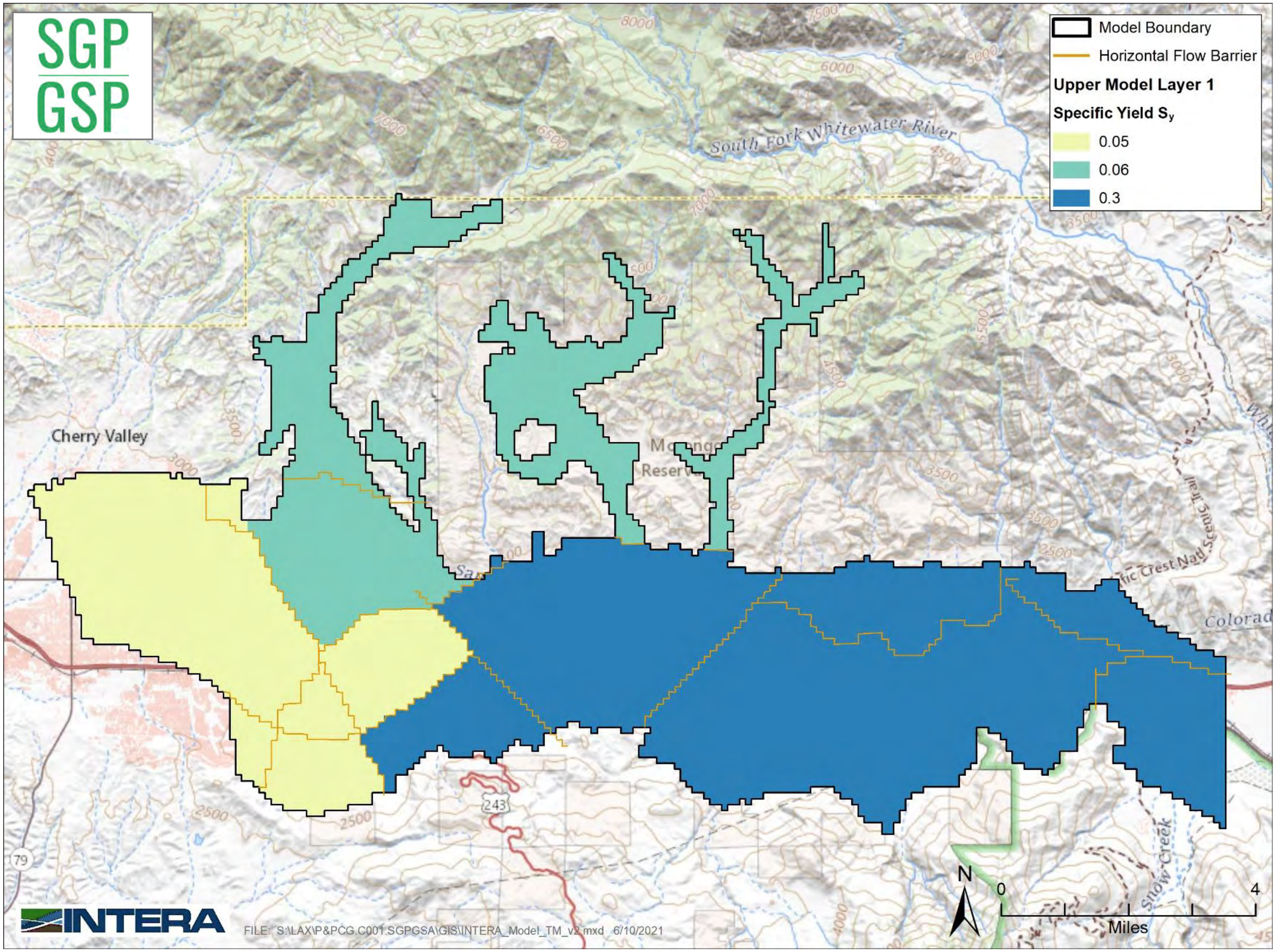


Figure 4.13 Upper Model Sy - Layer 1

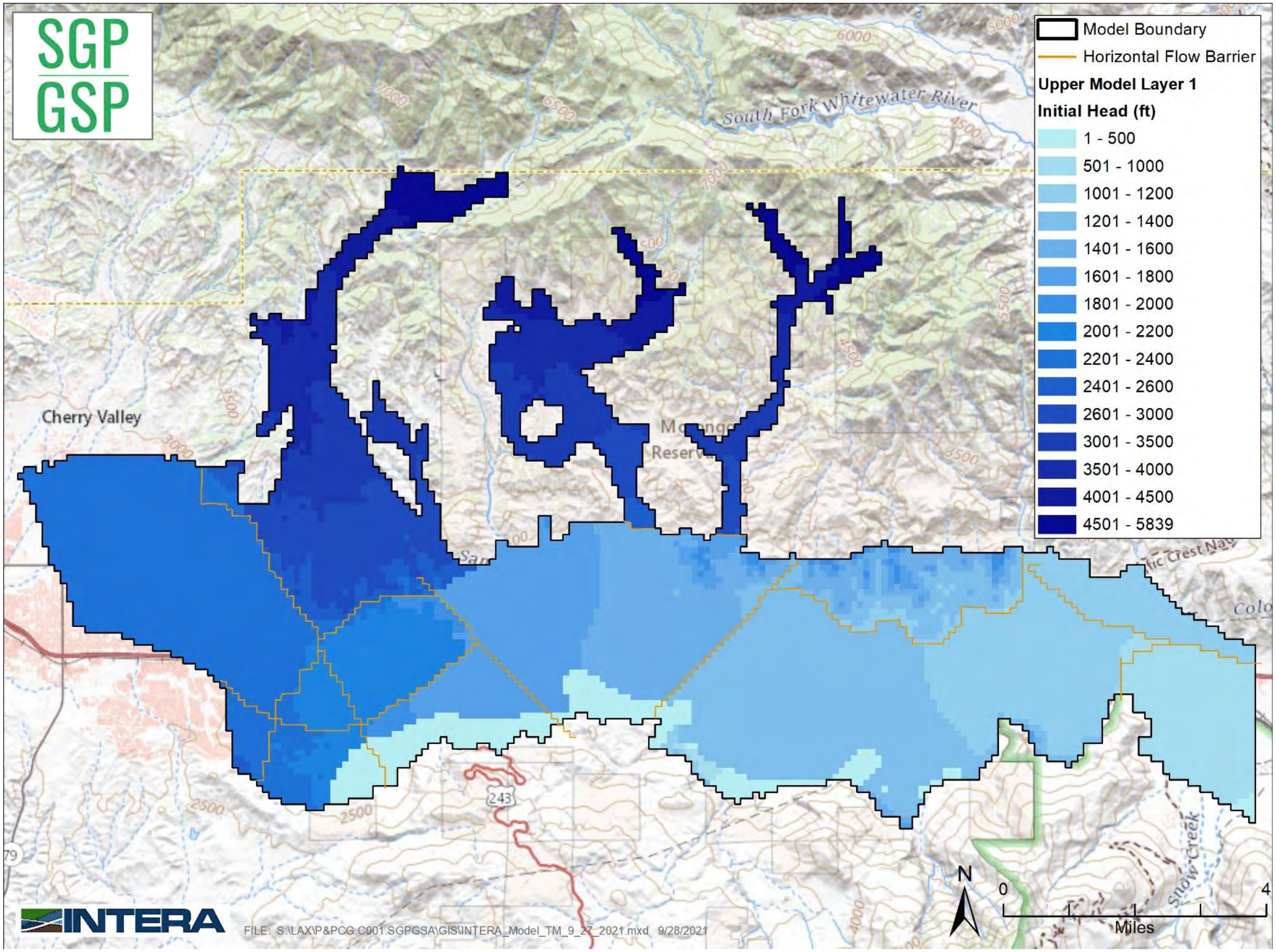


Figure 4.14 Upper Model Initial Heads - Layer 1

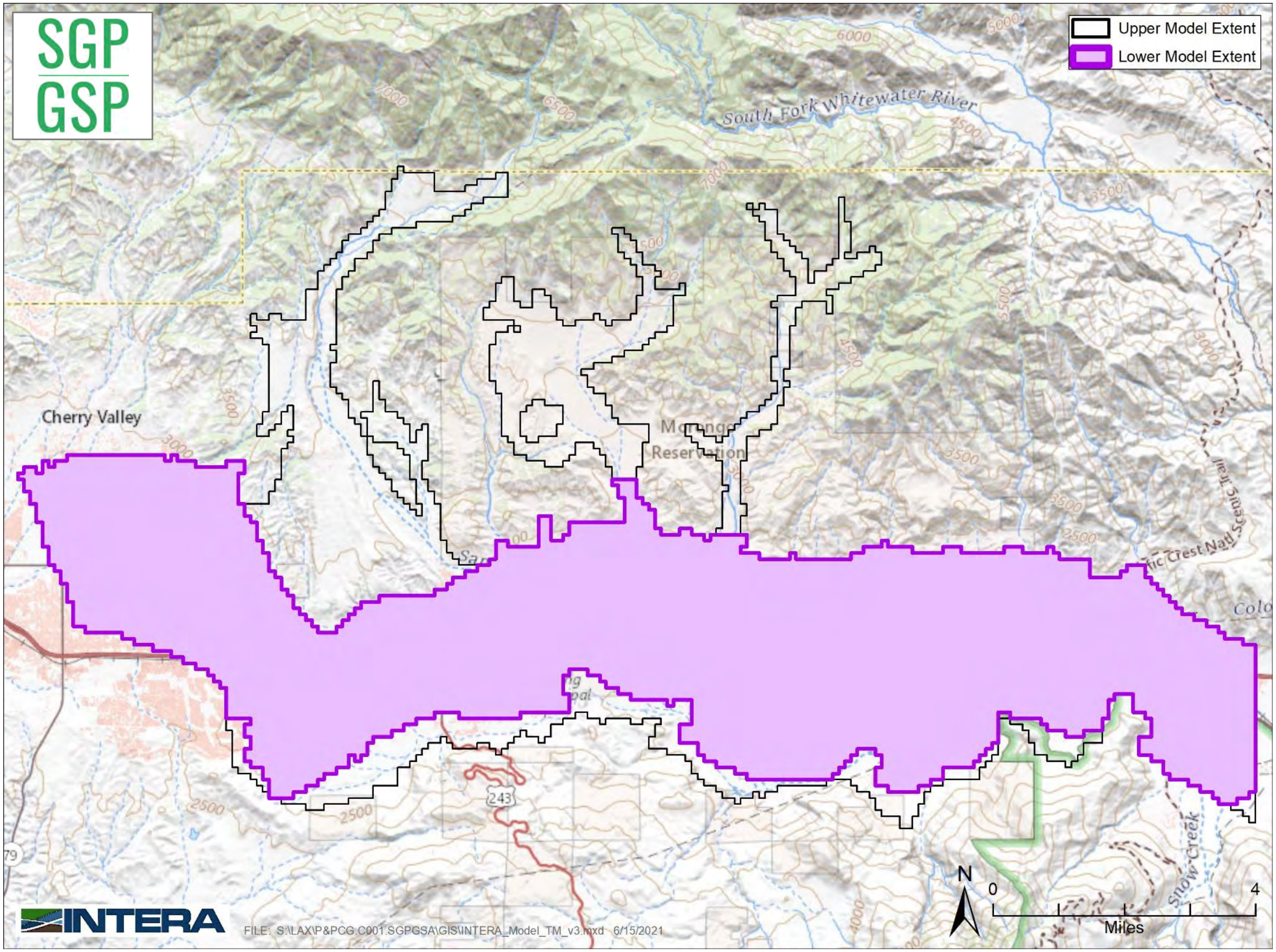


Figure 4.15 Lower Groundwater Model Boundary

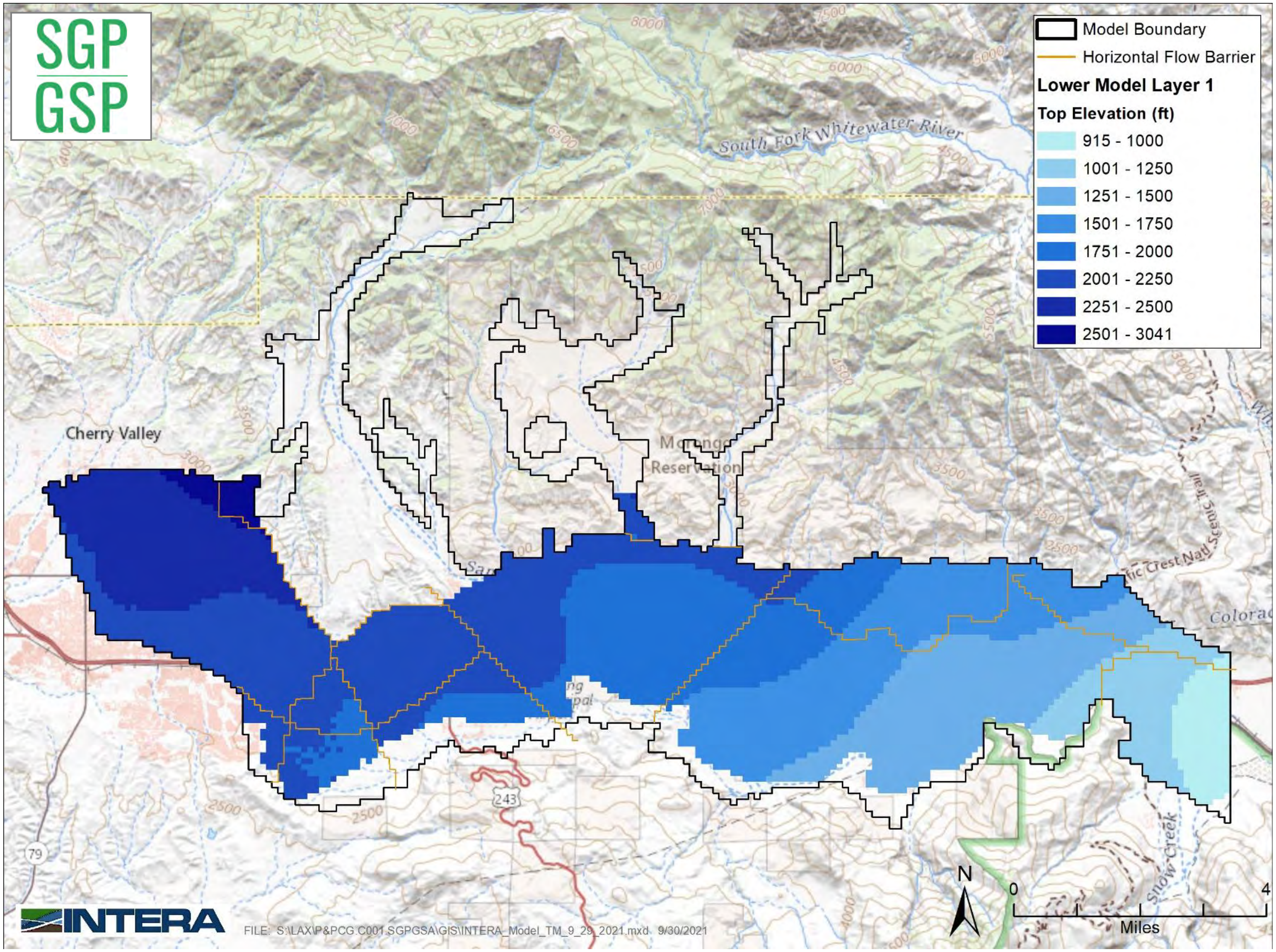


Figure 4.16a Top Elevation of Layer 1 of the Lower Model

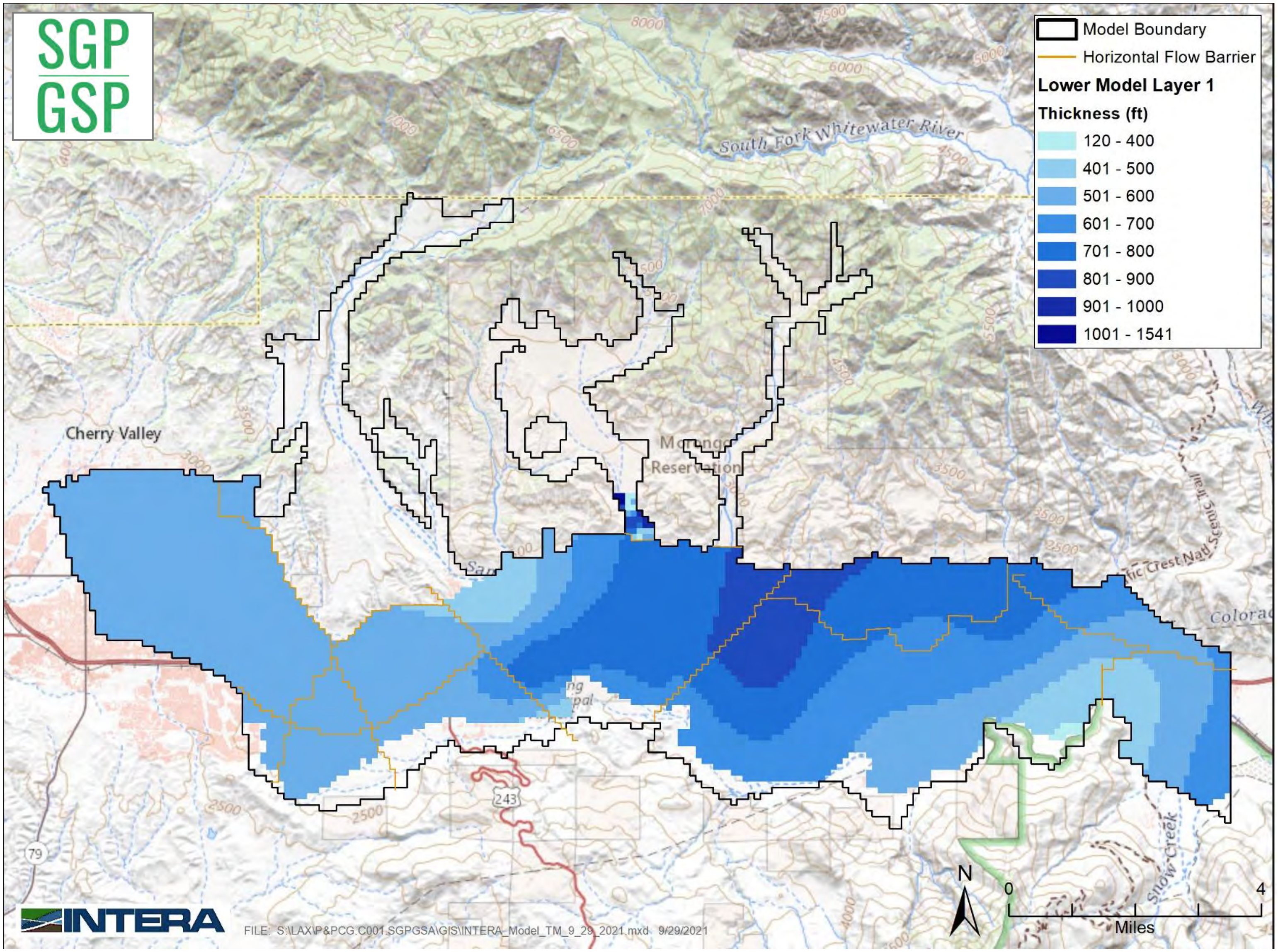


Figure 4.16b Thickness of Layer 1 of the Lower Model

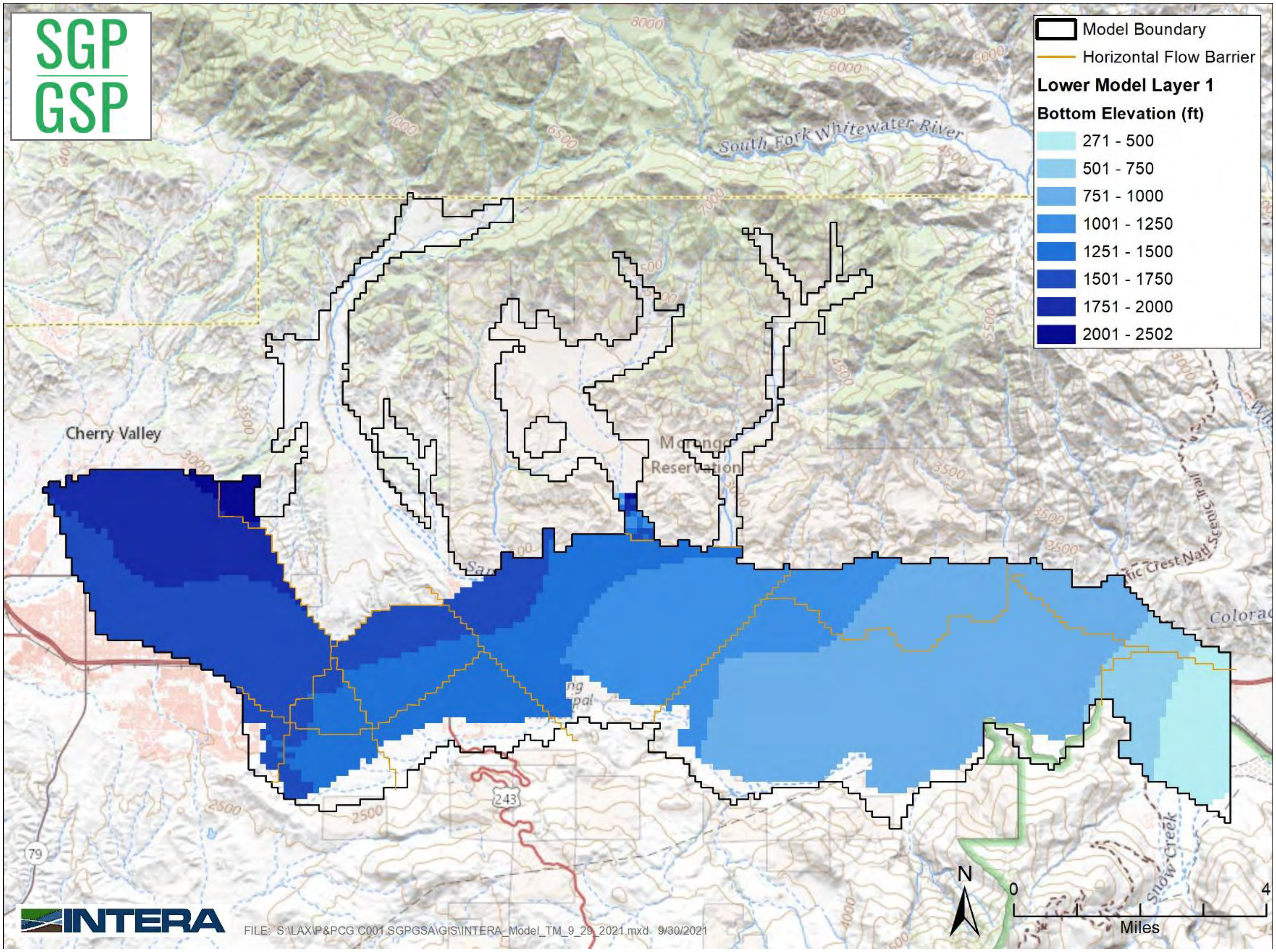


Figure 4.16c Bottom Elevation of Layer 1 of the Lower Model

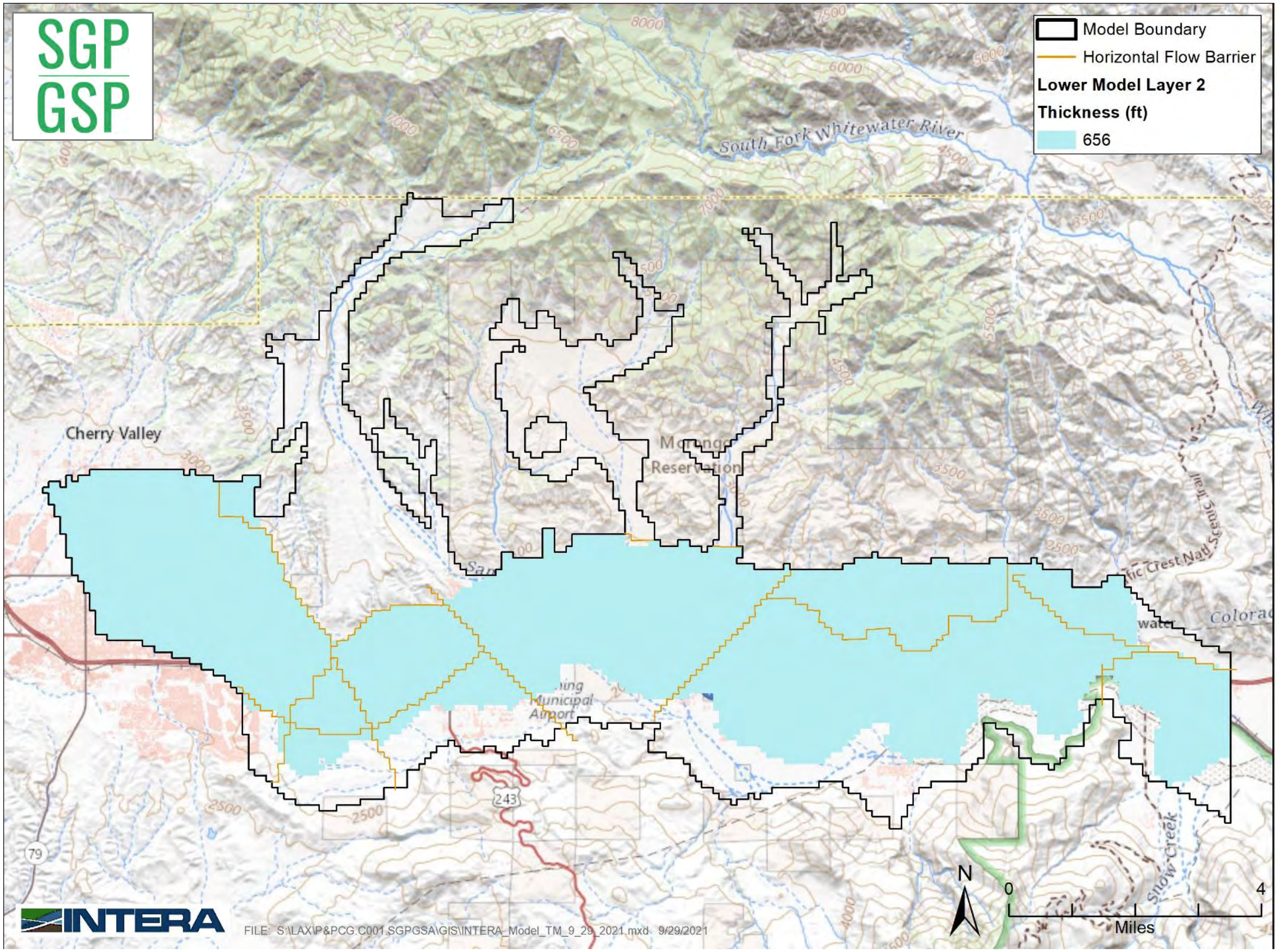


Figure 4.17a Thickness of Layer 2 of the Lower Model

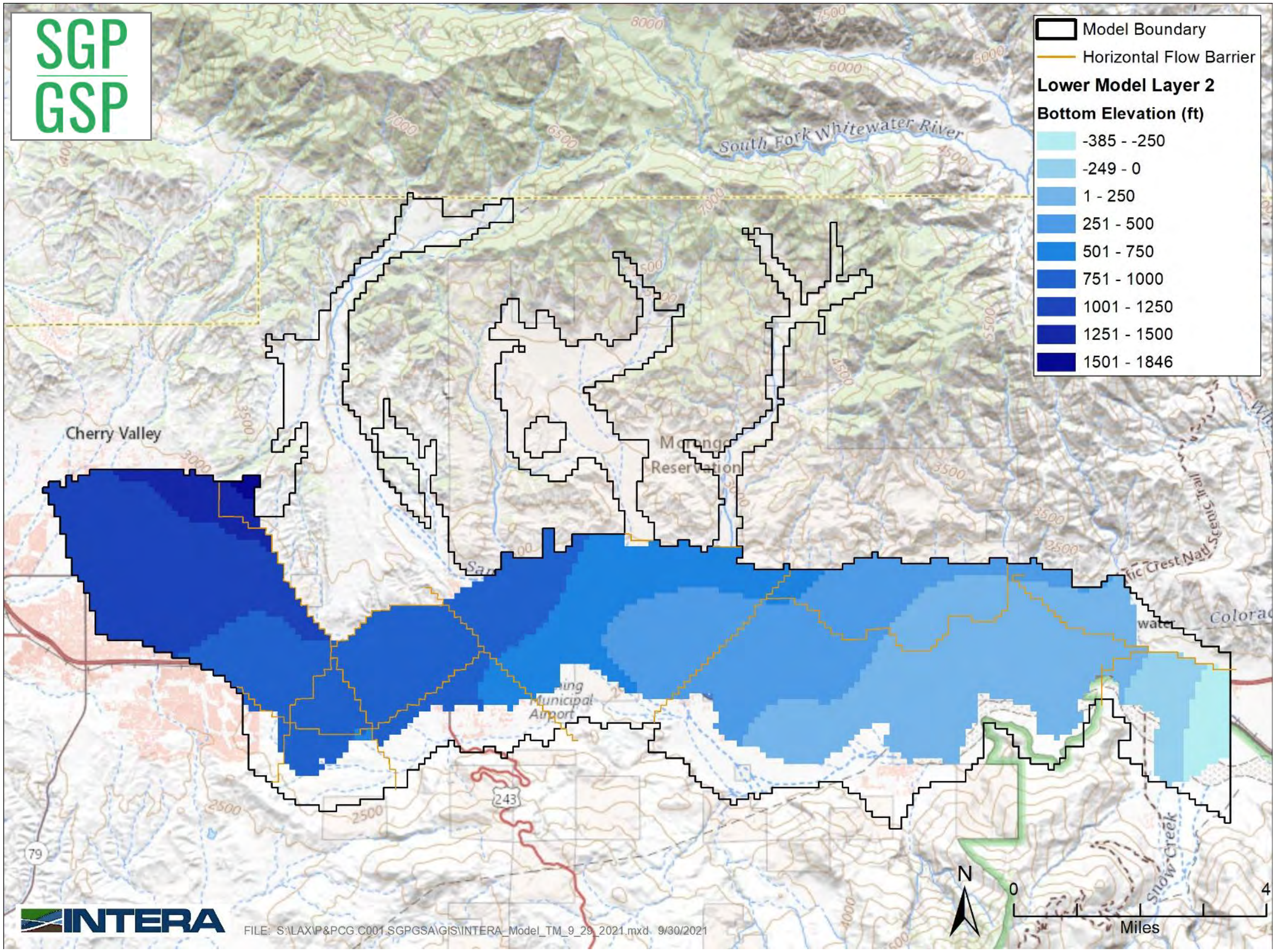


Figure 4.17b Bottom Elevation of Layer 2 of the Lower Model

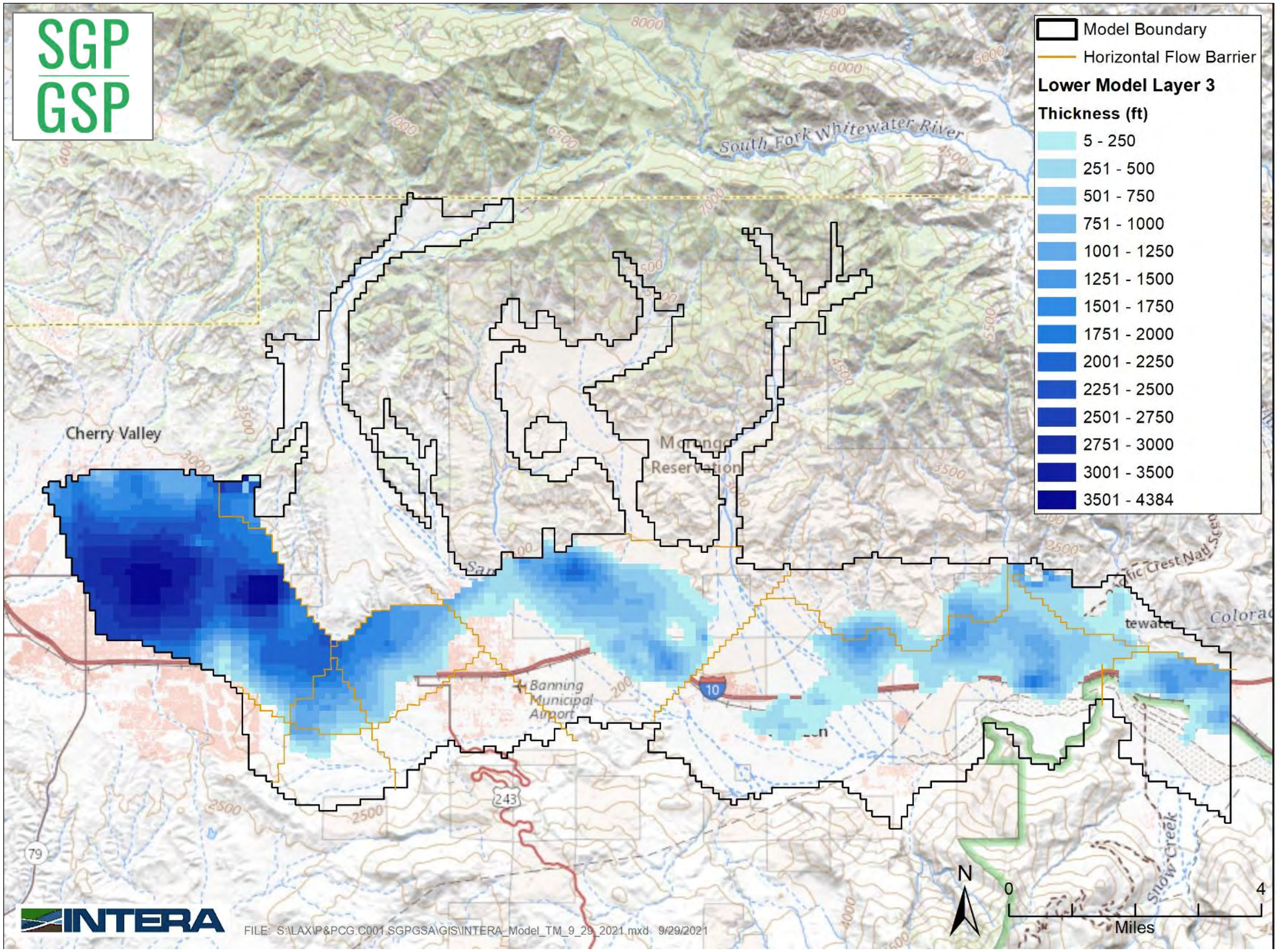


Figure 4.18a Thickness of Layer 3 of the Lower Model

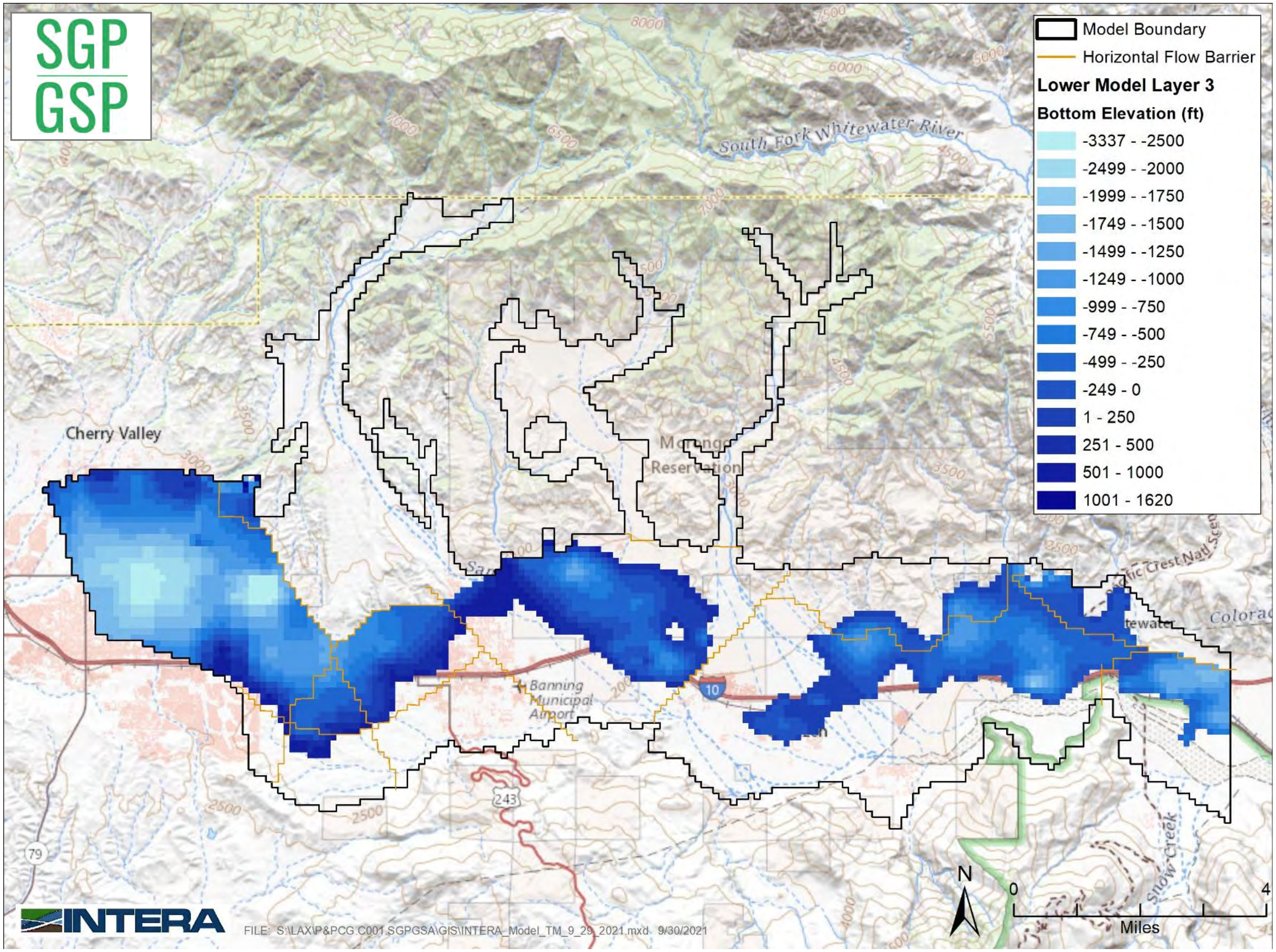


Figure 4.18b Bottom Elevation of Layer 3 of the Lower Model

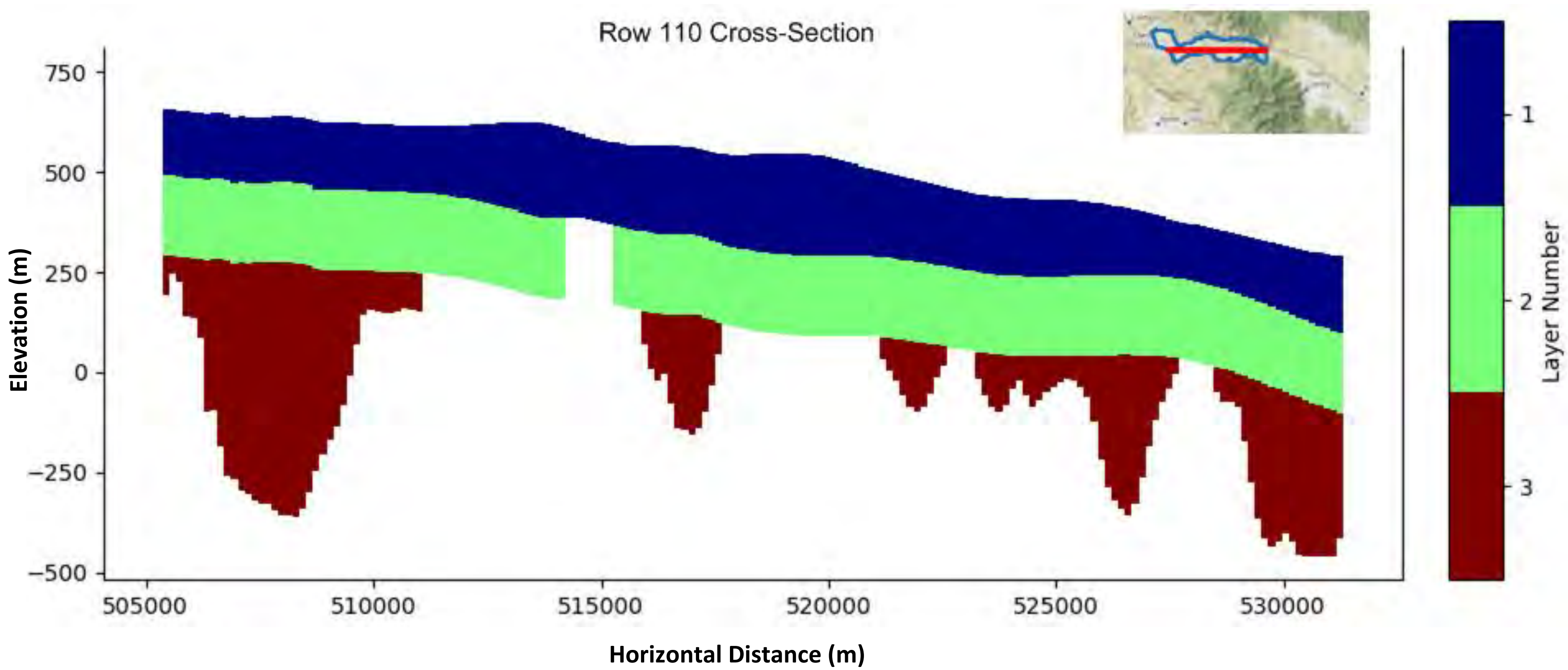


Figure 4.19a Lower Model Cross Section Location- East-West Cross Section

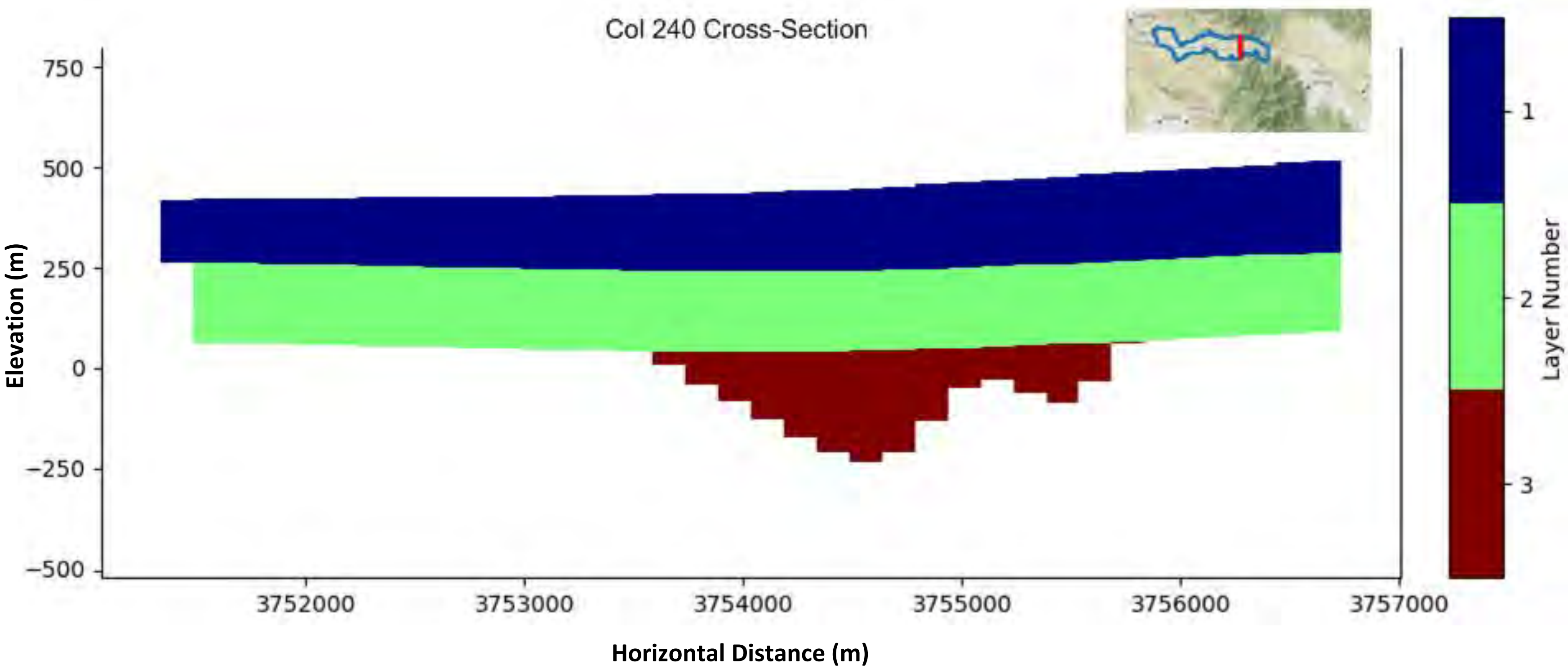


Figure 4.19b Lower Model Cross Section Location- North-South Cross Section

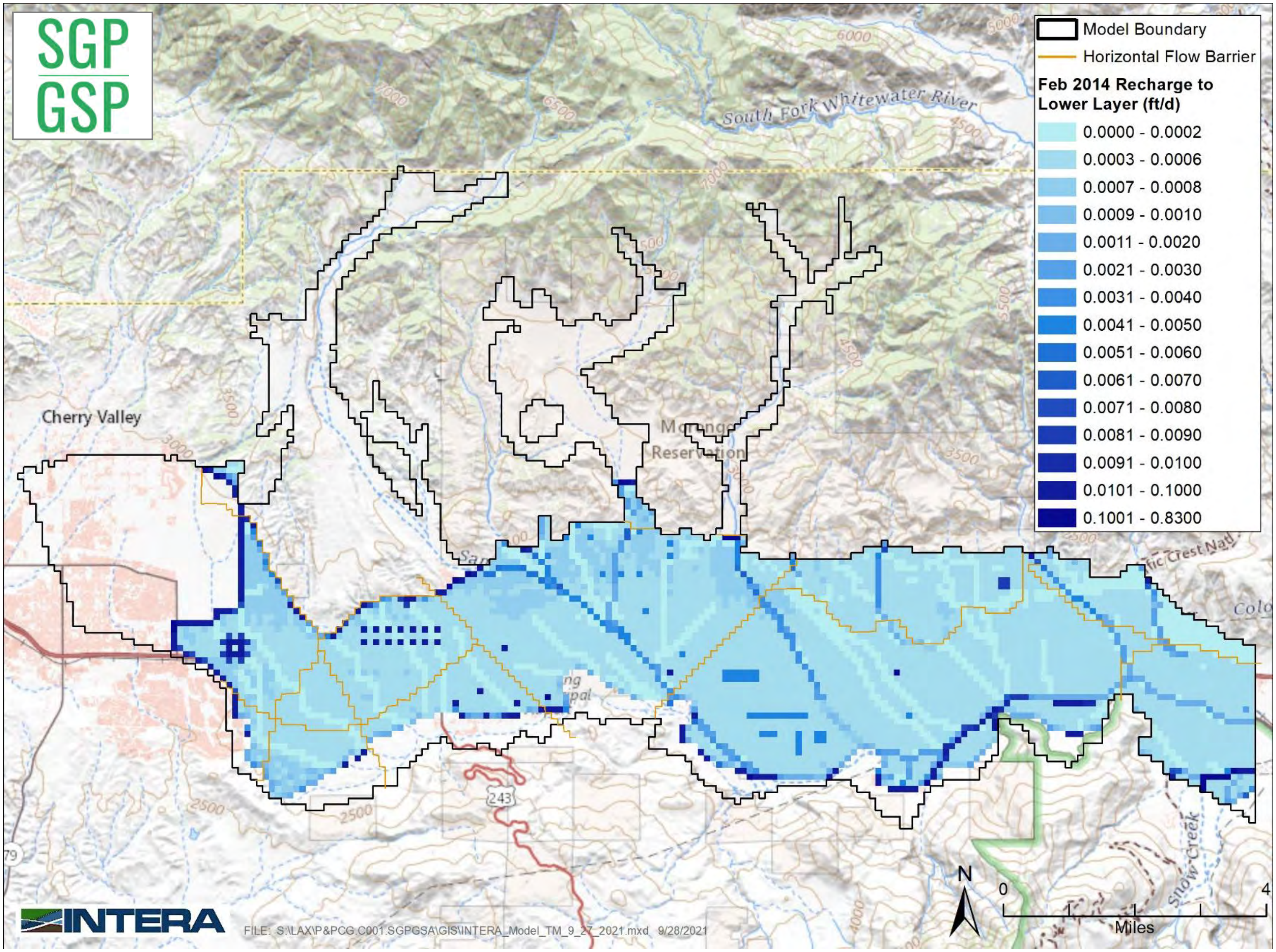


Figure 4.20a Recharge to Lower Model, Feb 2014

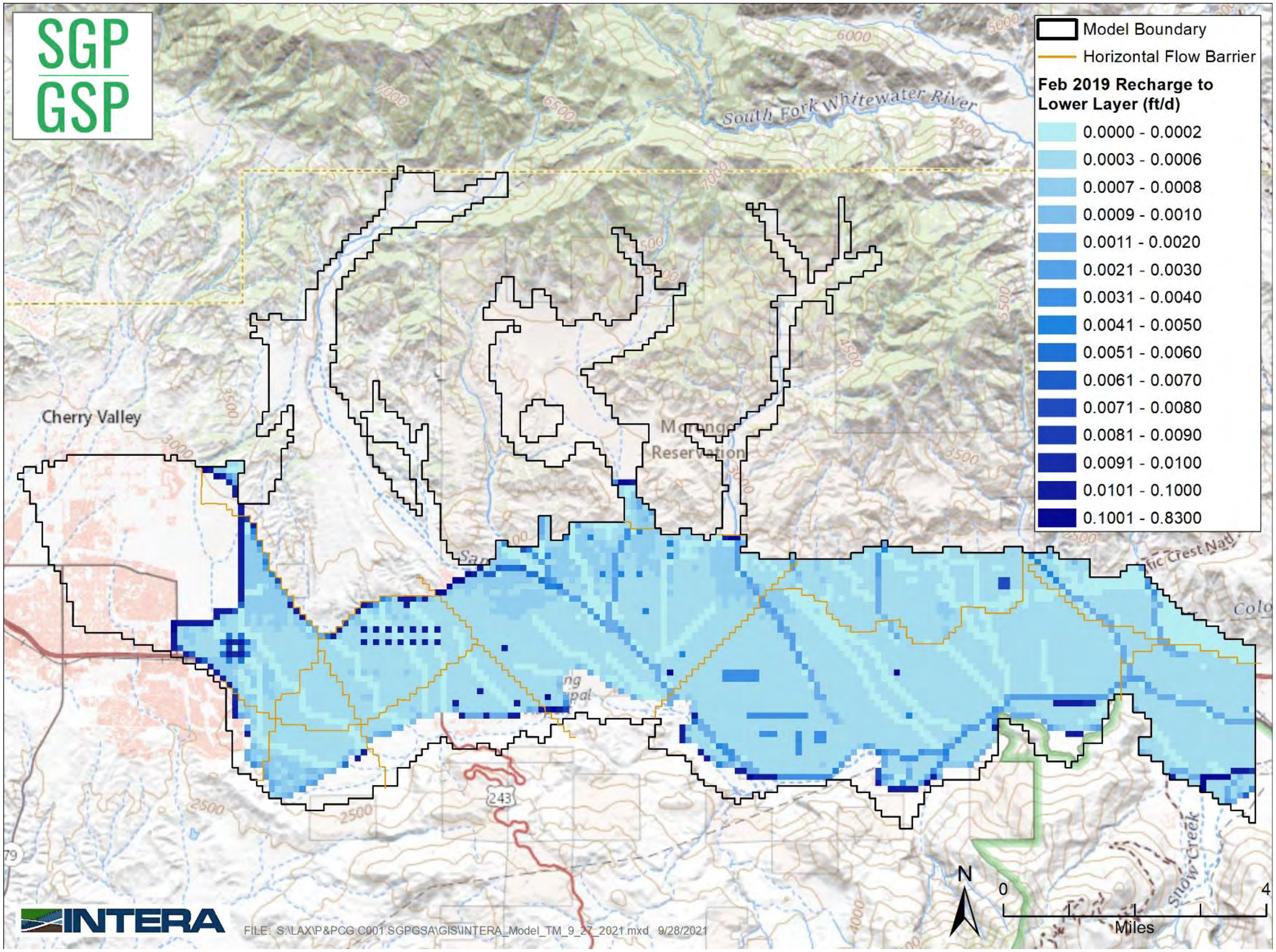


Figure 4.20b Recharge to Lower Model, Feb 2019

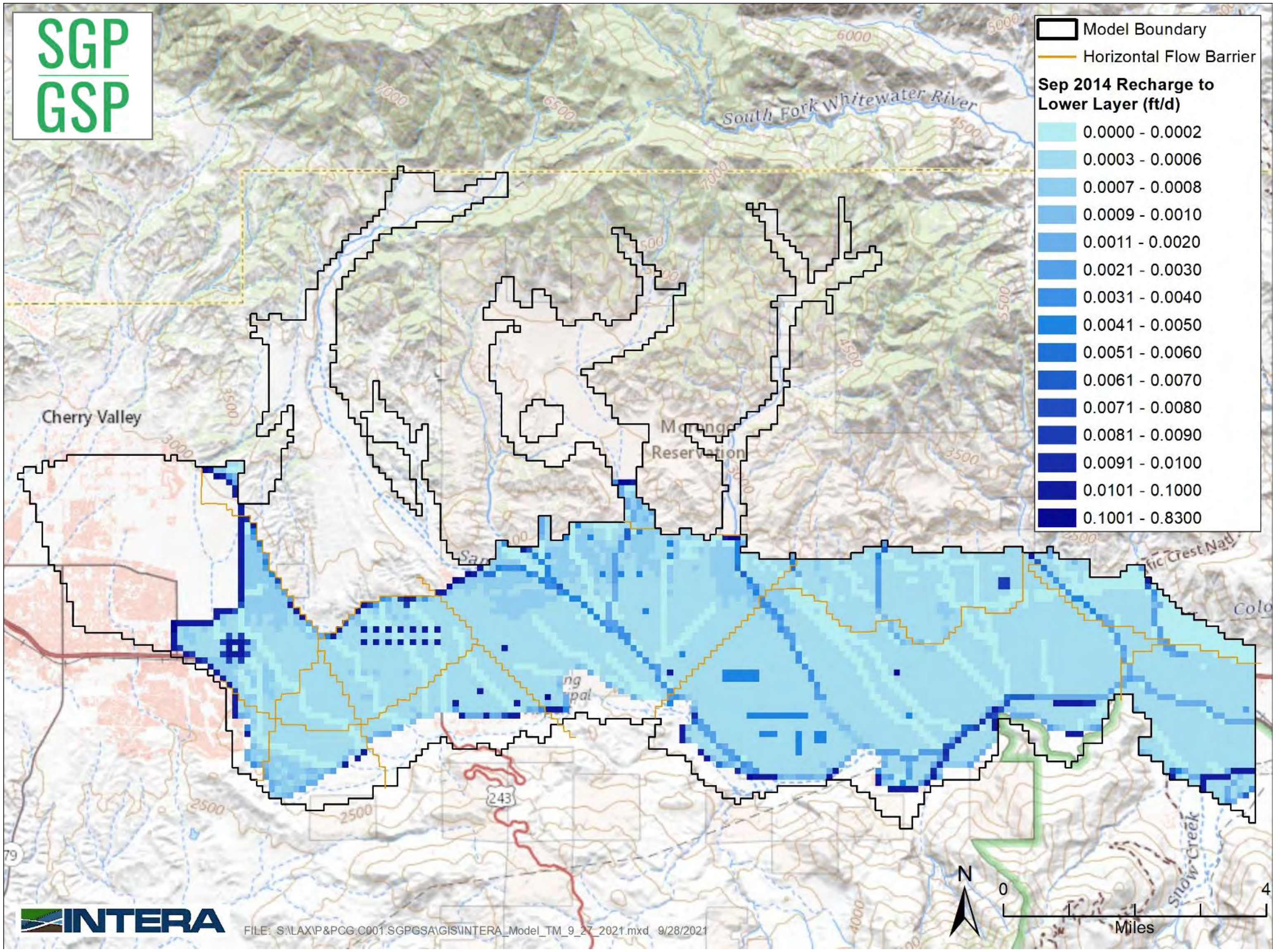


Figure 4.20c Recharge to Lower Model, Sep 2014

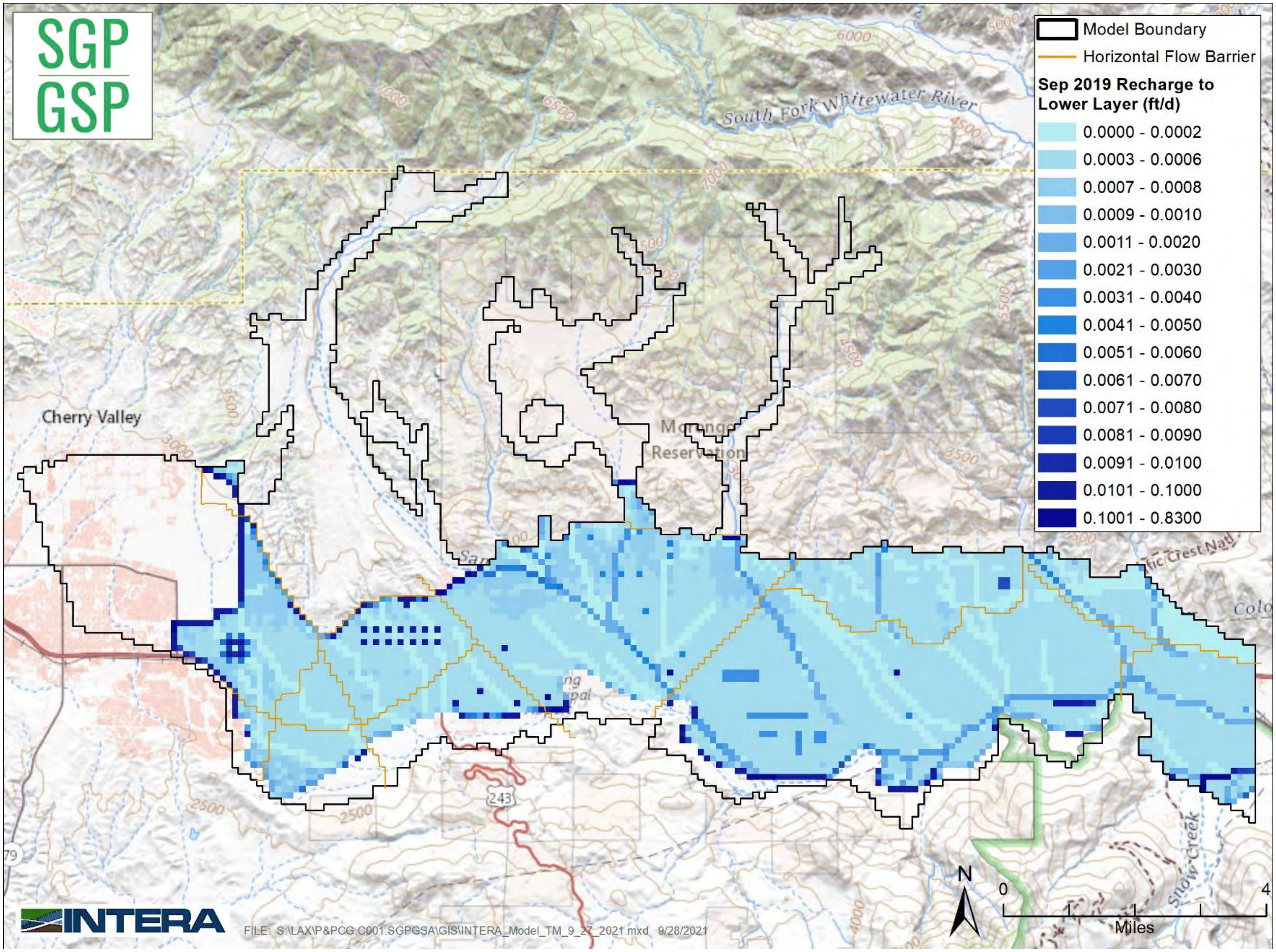


Figure 4.20d Recharge to Lower Model, Sep 2019

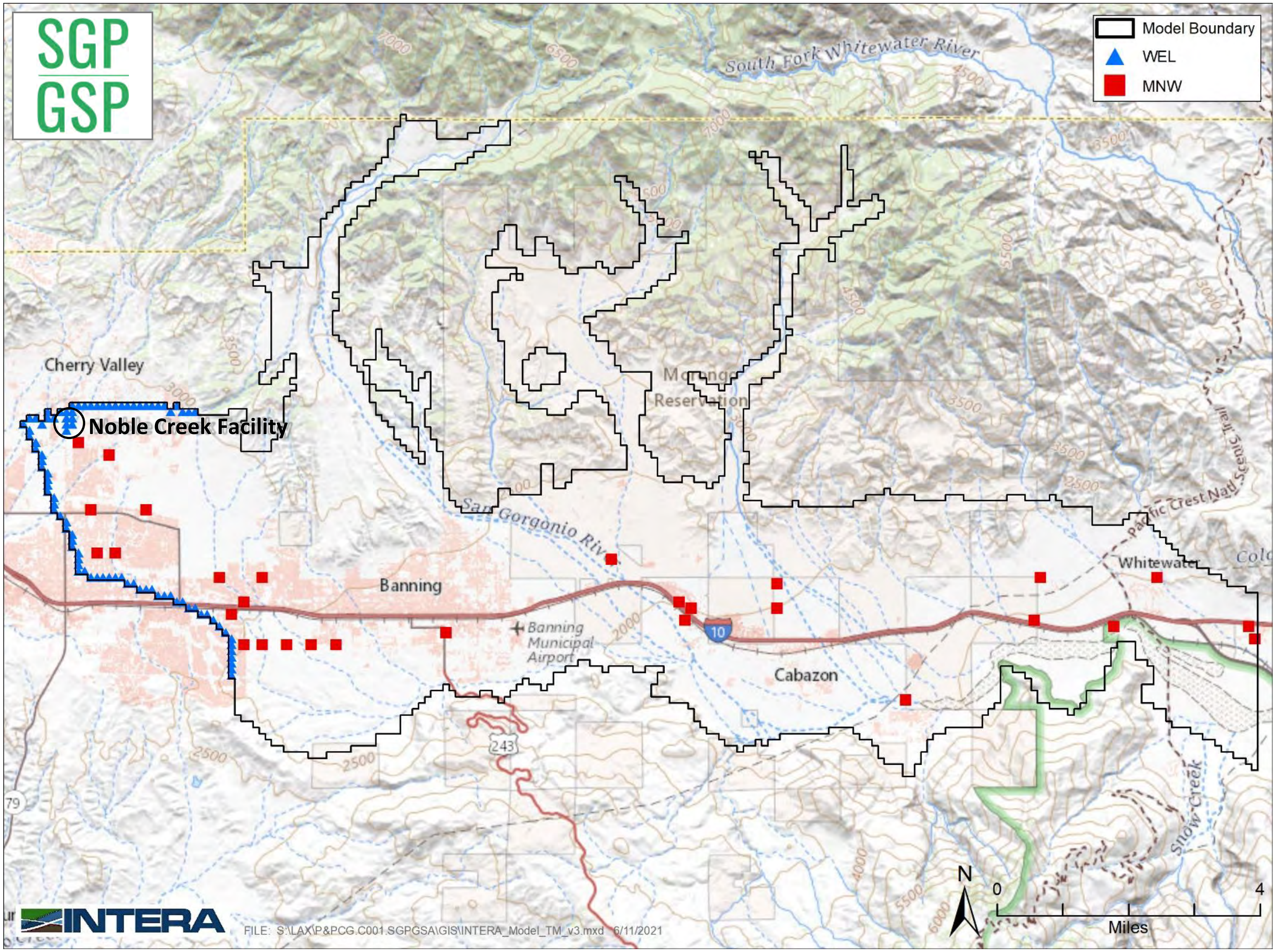


Figure 4.21 Lower Model Production and Applied Recharge Locations

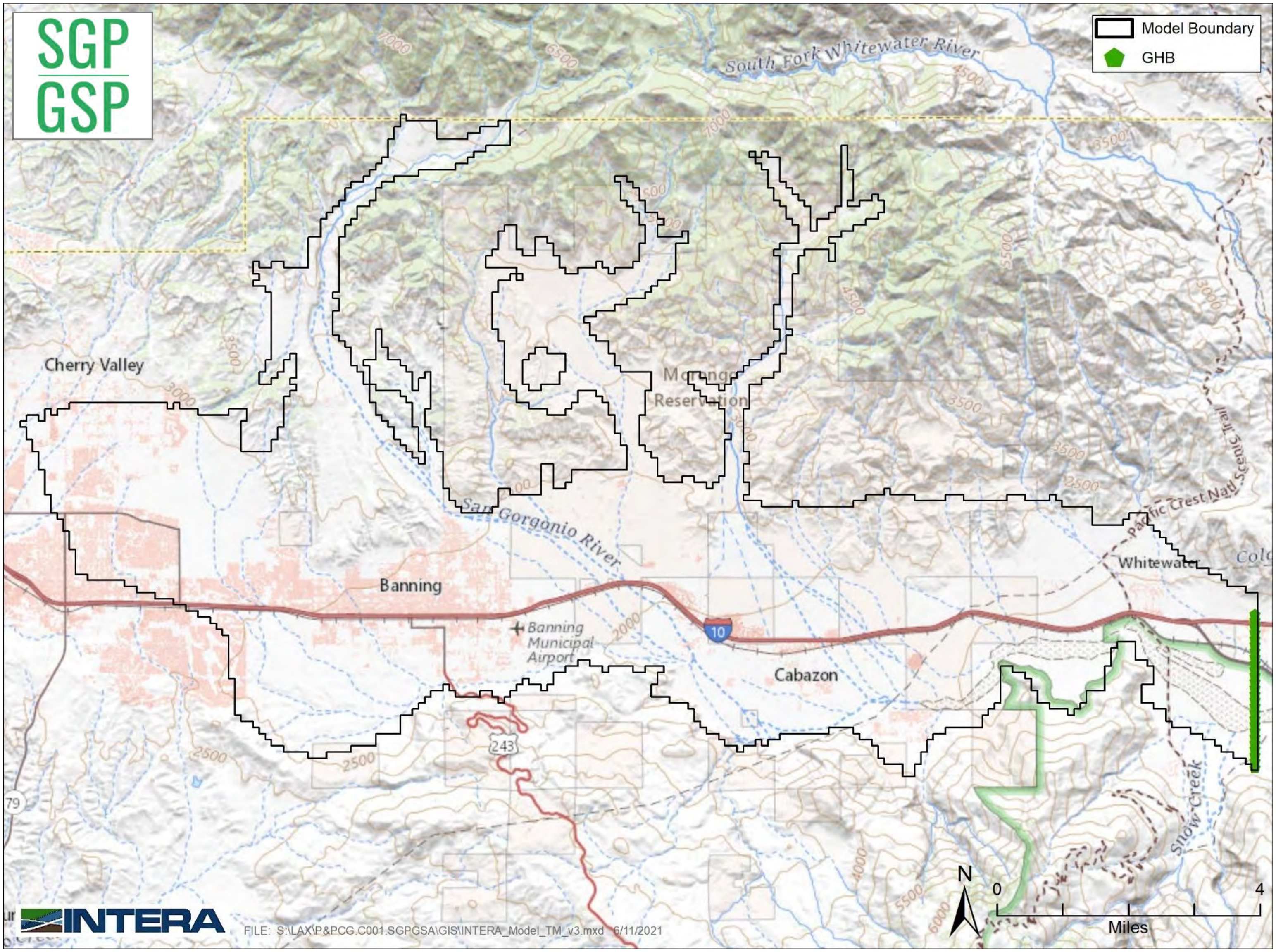
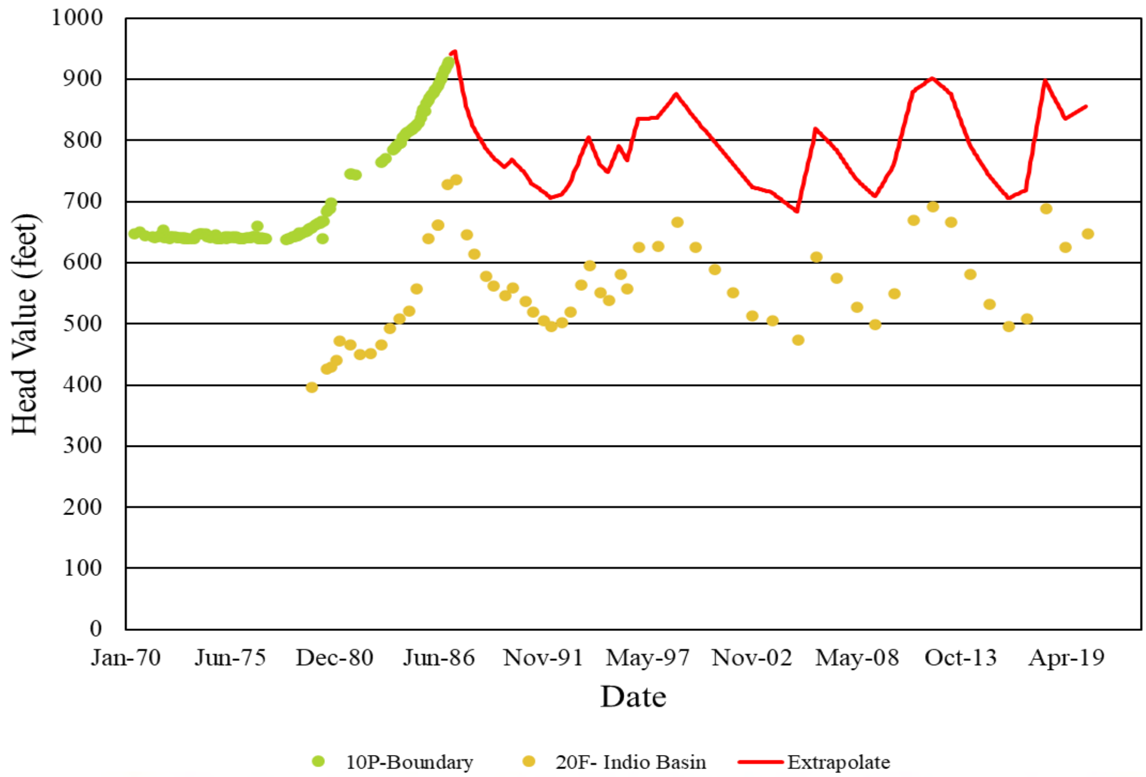
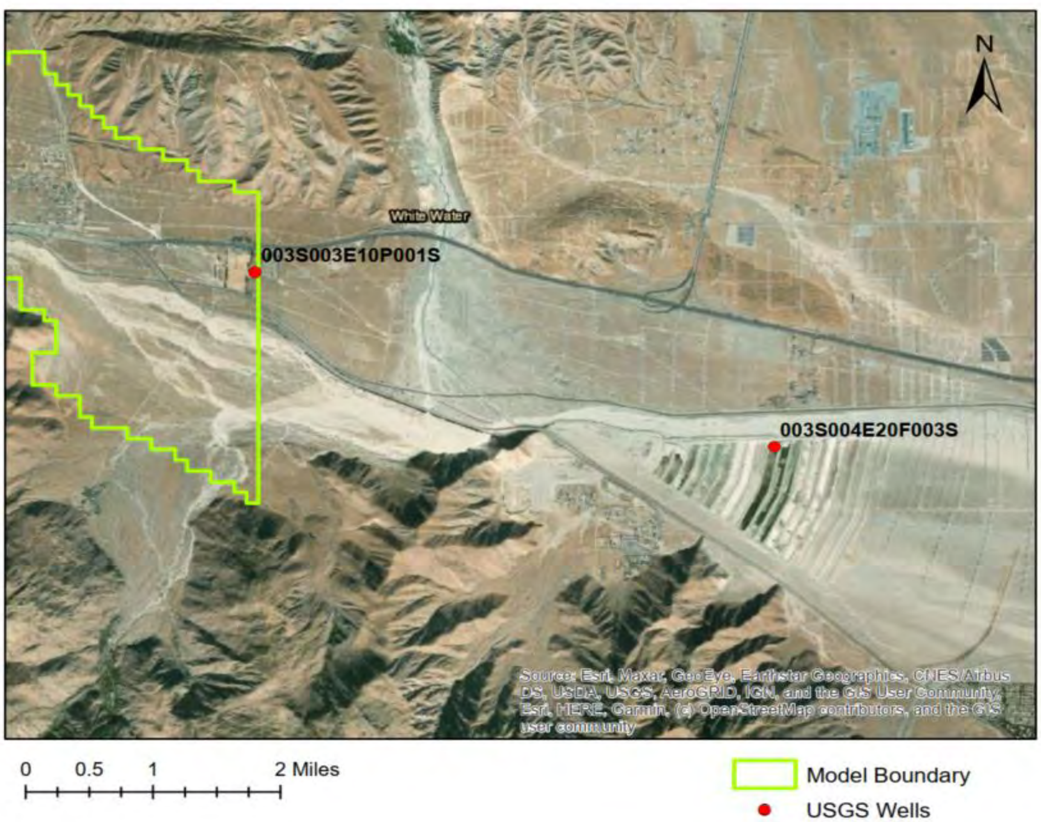


Figure 4.22a GHB Locations





INTERA

Figure 4.22b:
GHB Heads Locations and Extrapolation

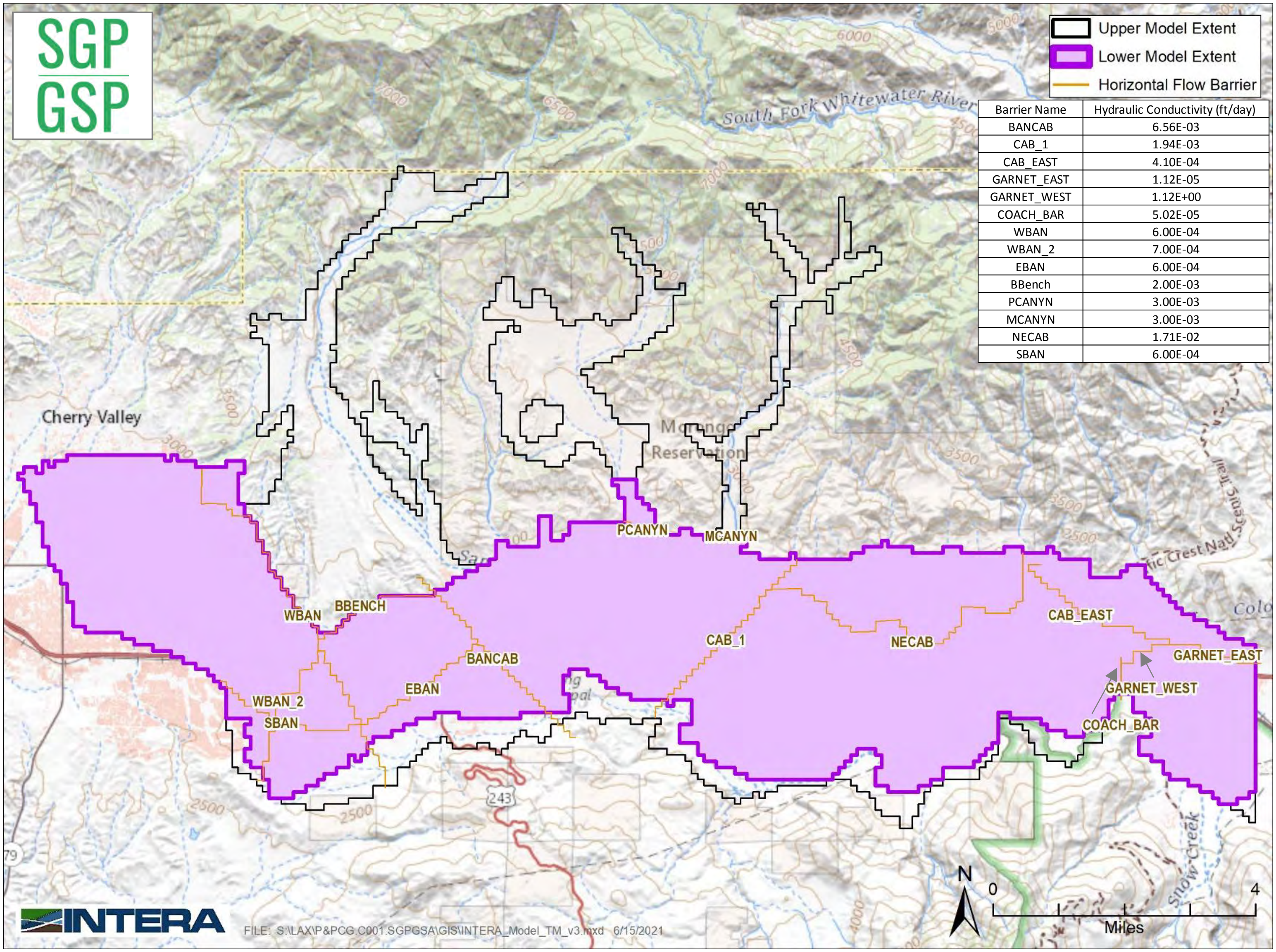


Figure 4.23 Lower Model Fault and Flow Barrier Locations

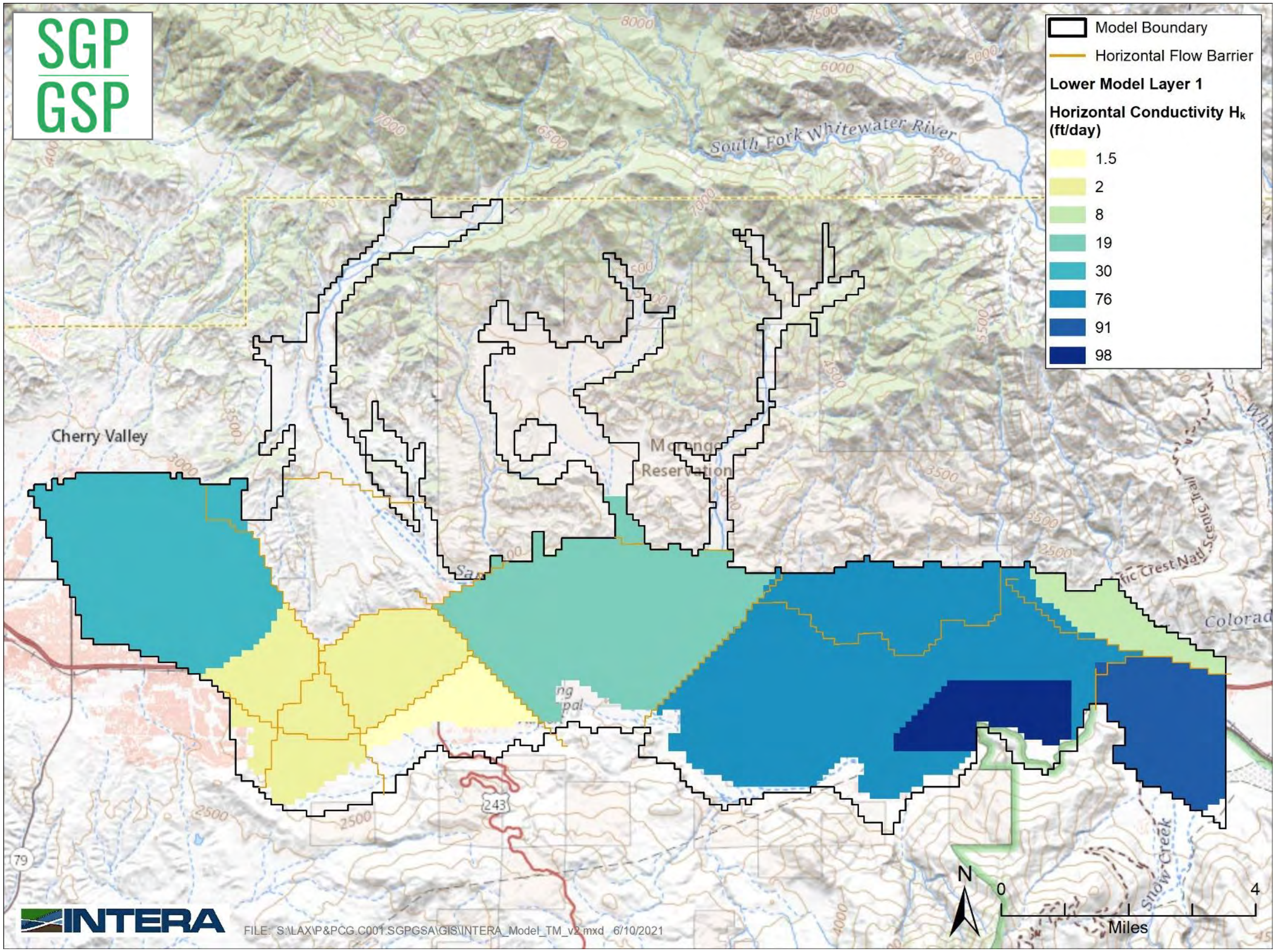


Figure 4.24a Lower Model Hk - Layer 1

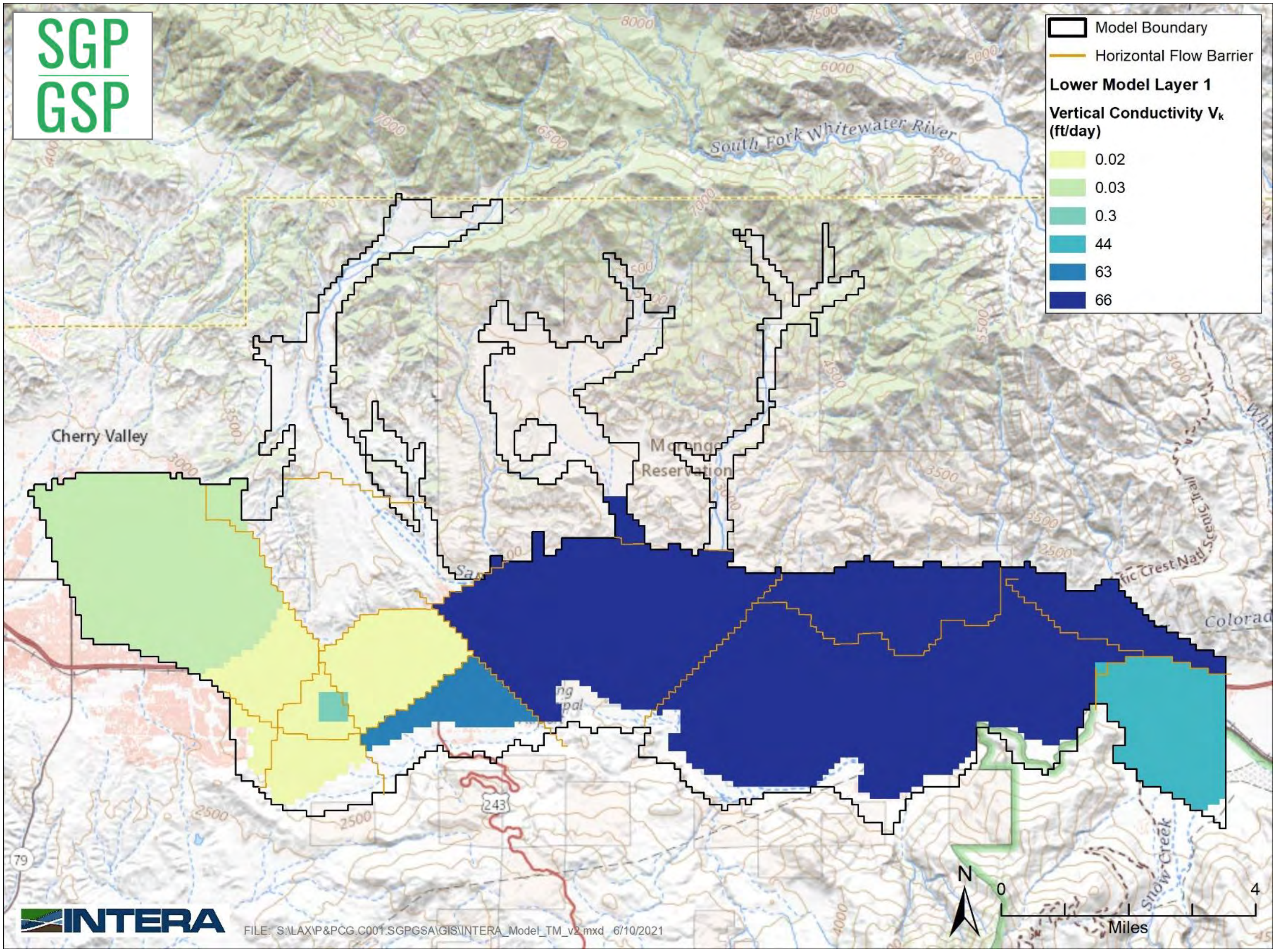


Figure 4.24b Lower Model Vk - Layer 1

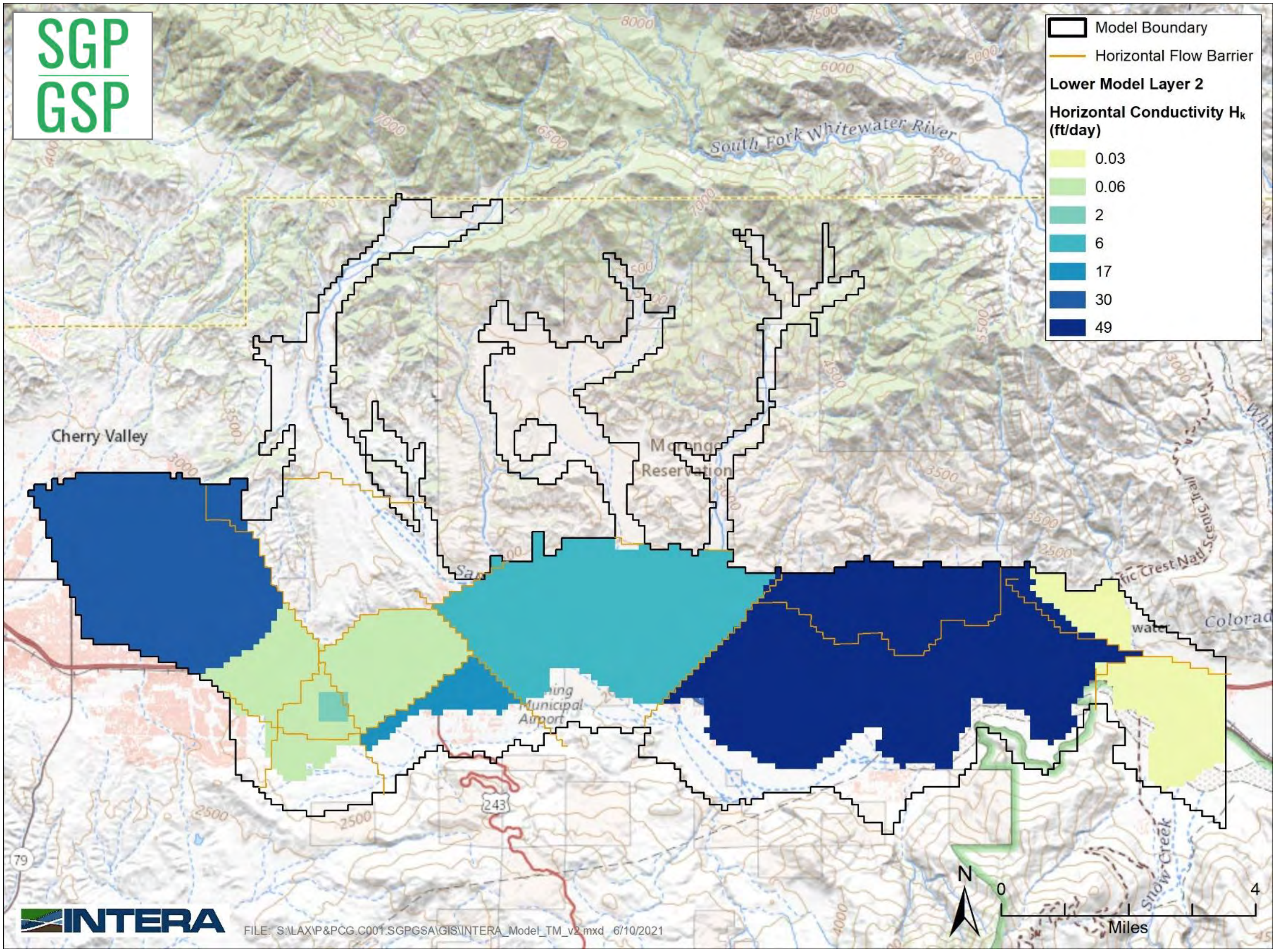


Figure 4.25a Lower Model Hk - Layer 2

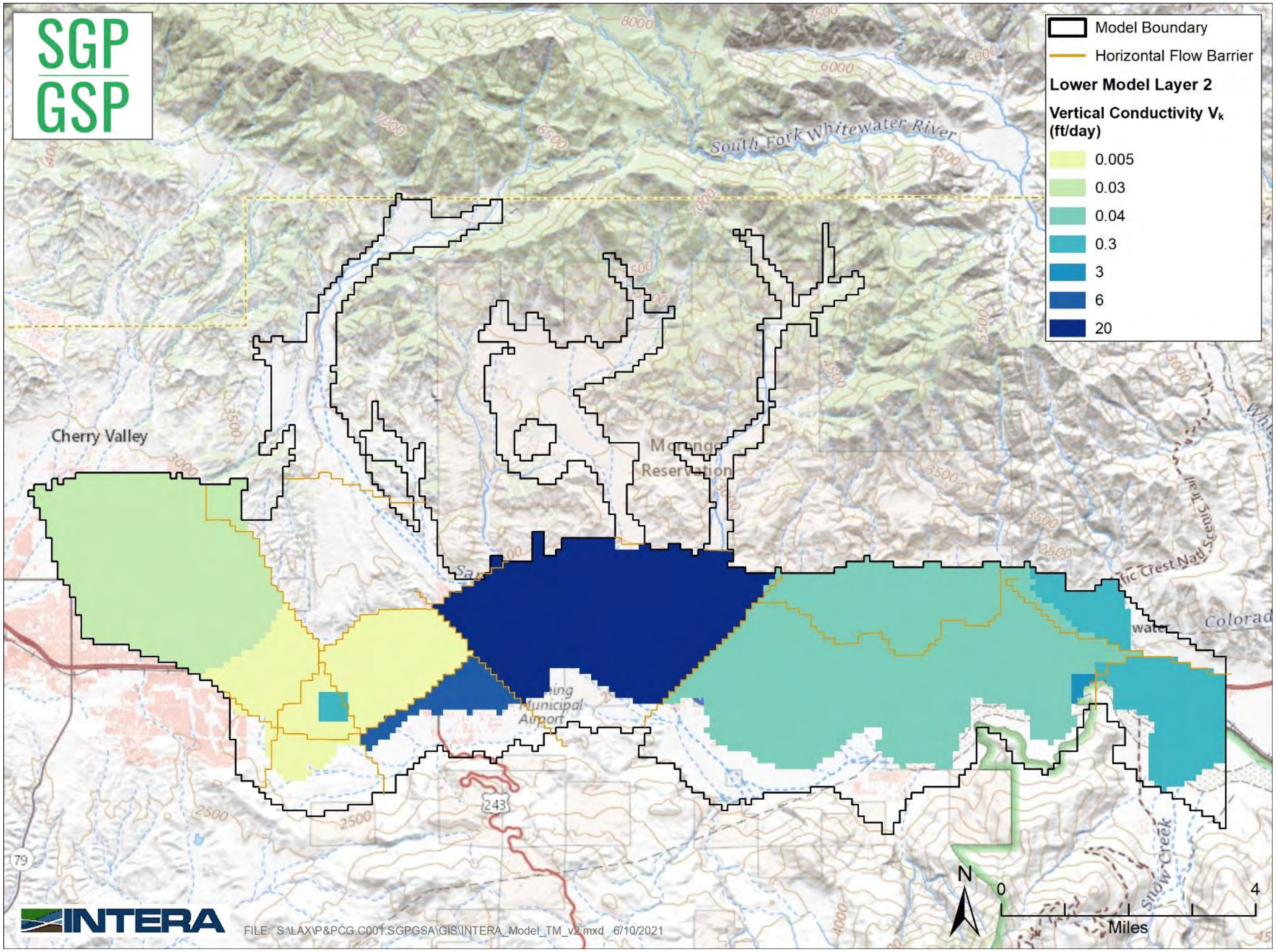


Figure 4.25b Lower Model Vk - Layer 2

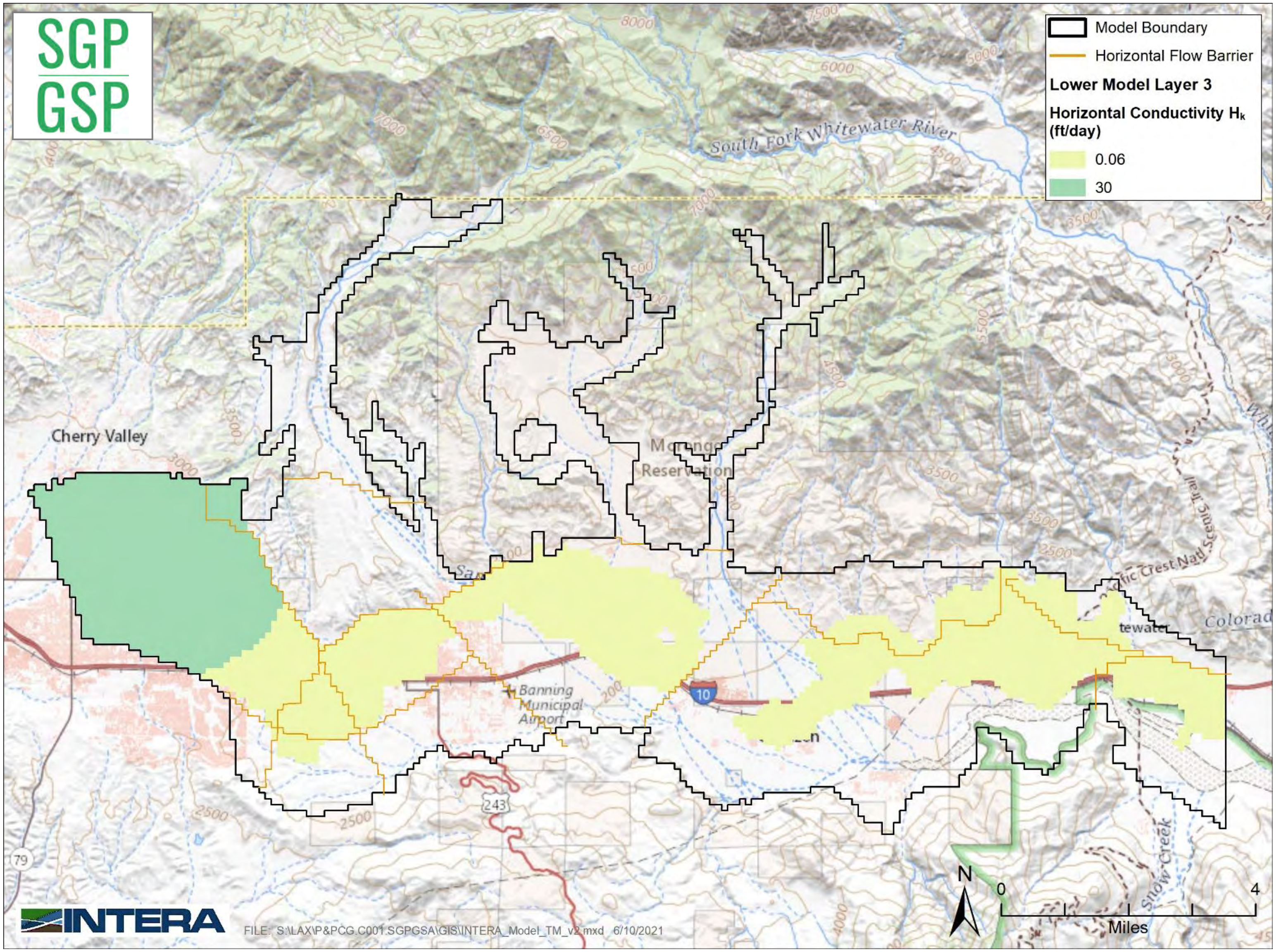


Figure 4.26a Lower Model Hk - Layer 3

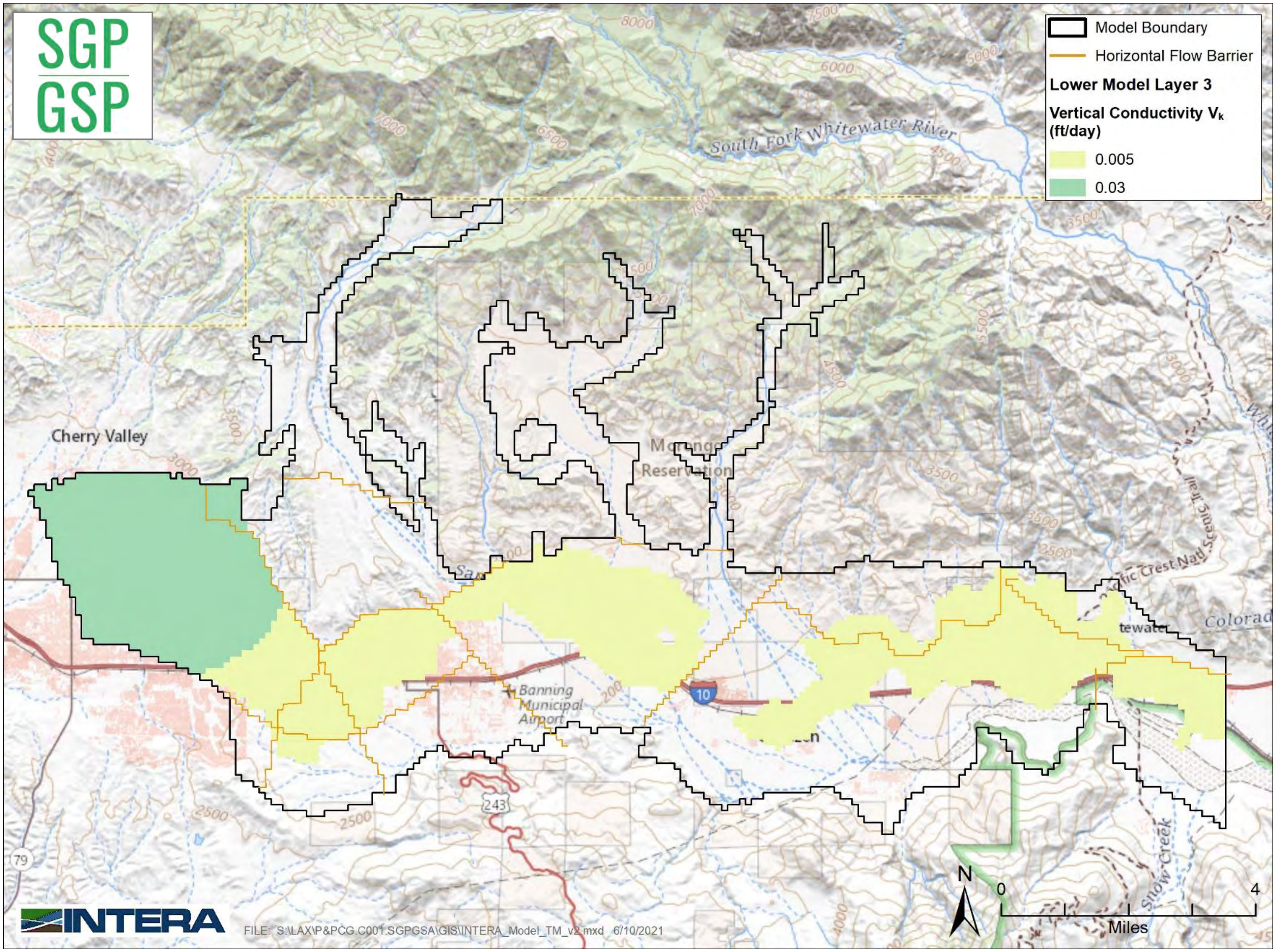


Figure 4.26b Lower Model Vk - Layer 3

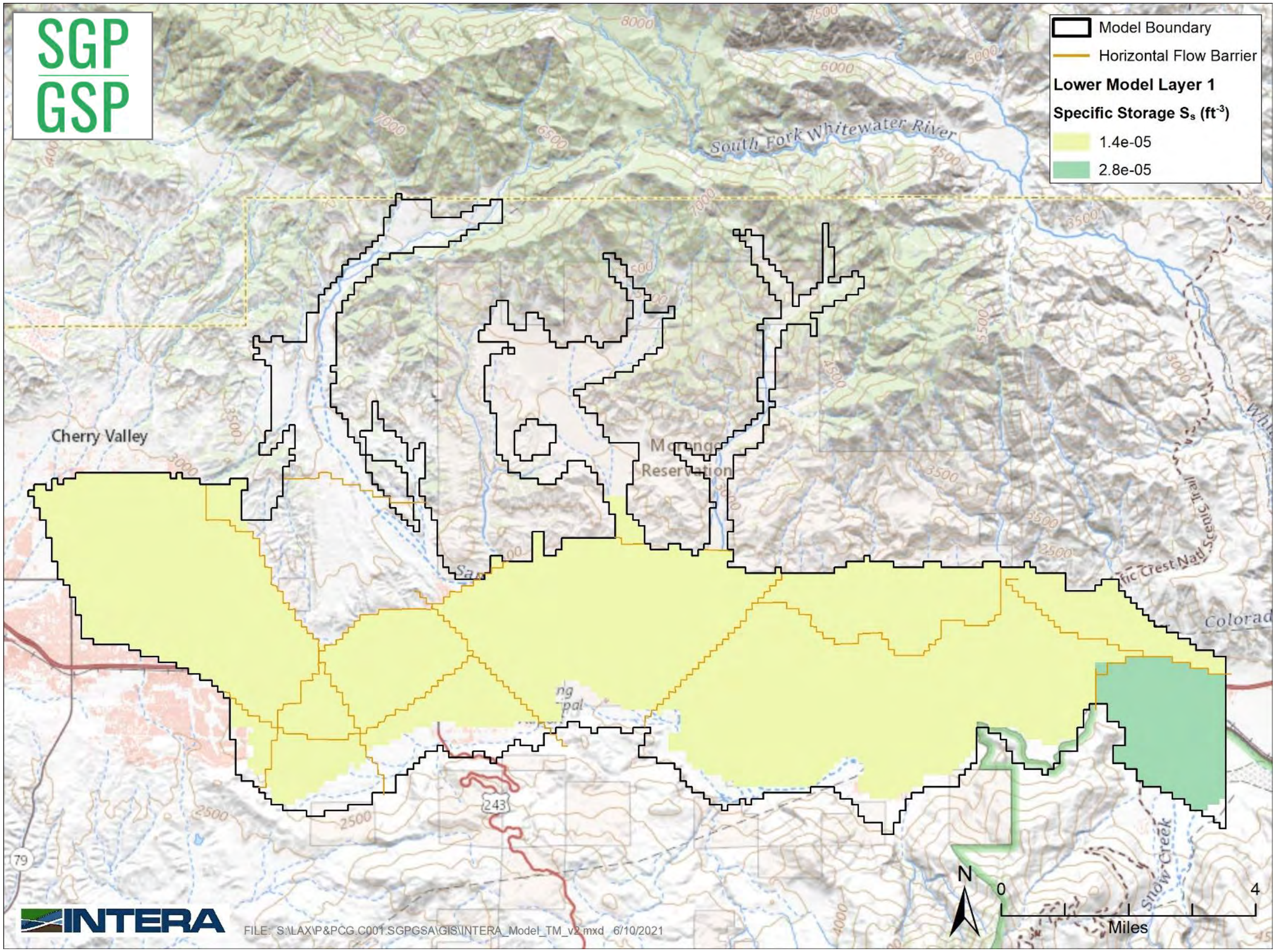


Figure 4.27a Lower Model Ss - Layer 1

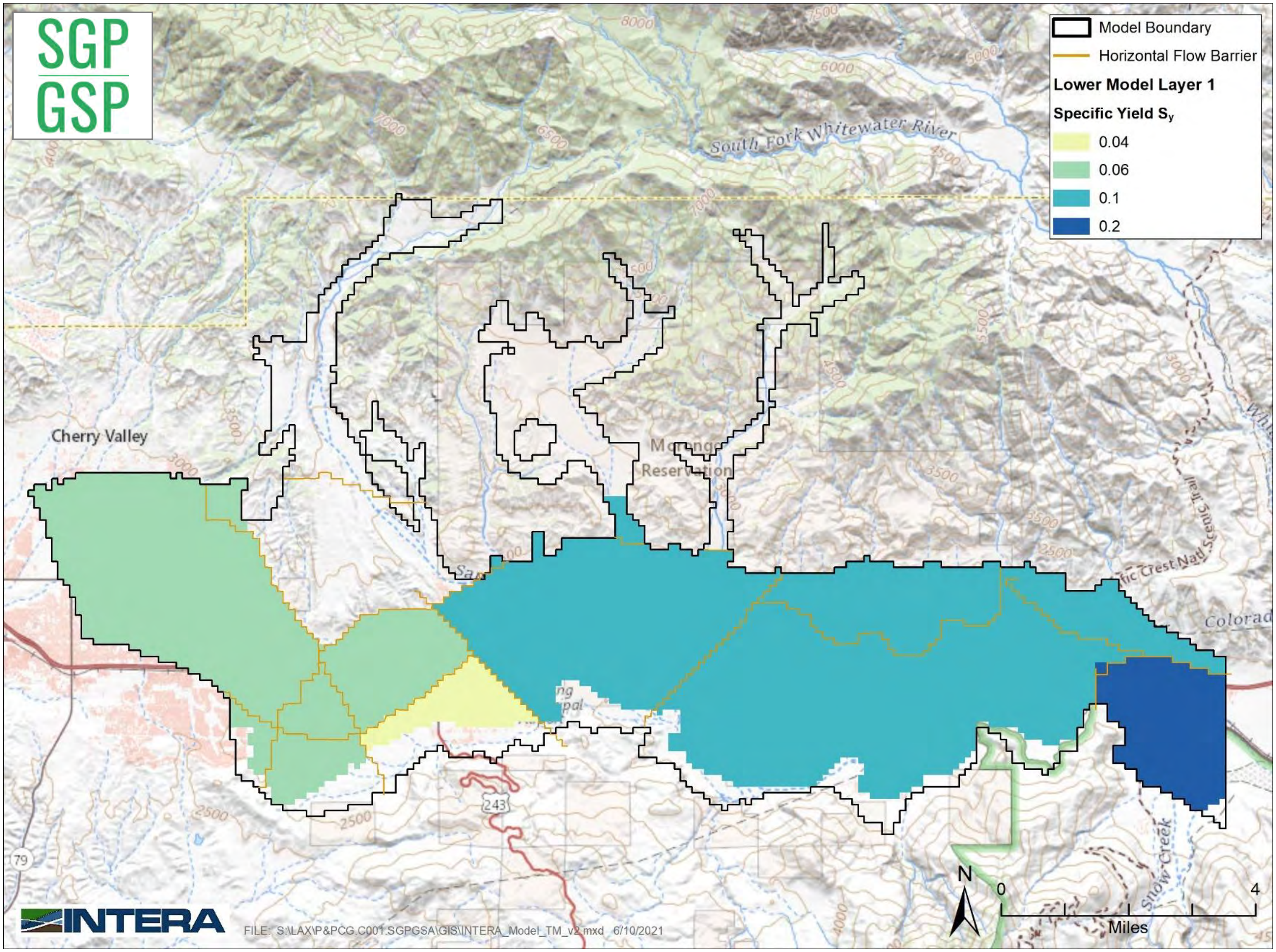


Figure 4.27b Lower Model Sy - Layer 1

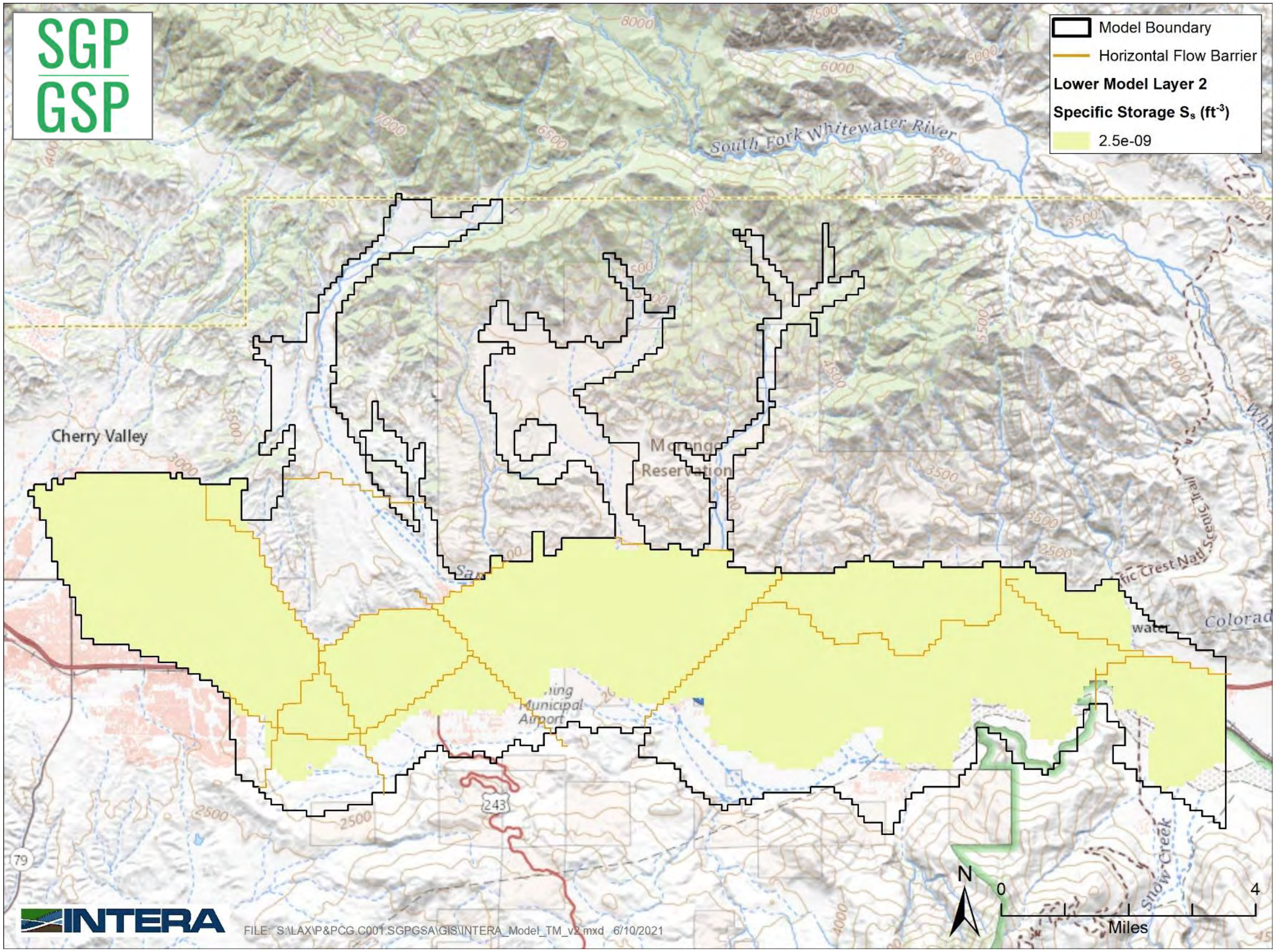


Figure 4.28a Lower Model Ss - Layer 2

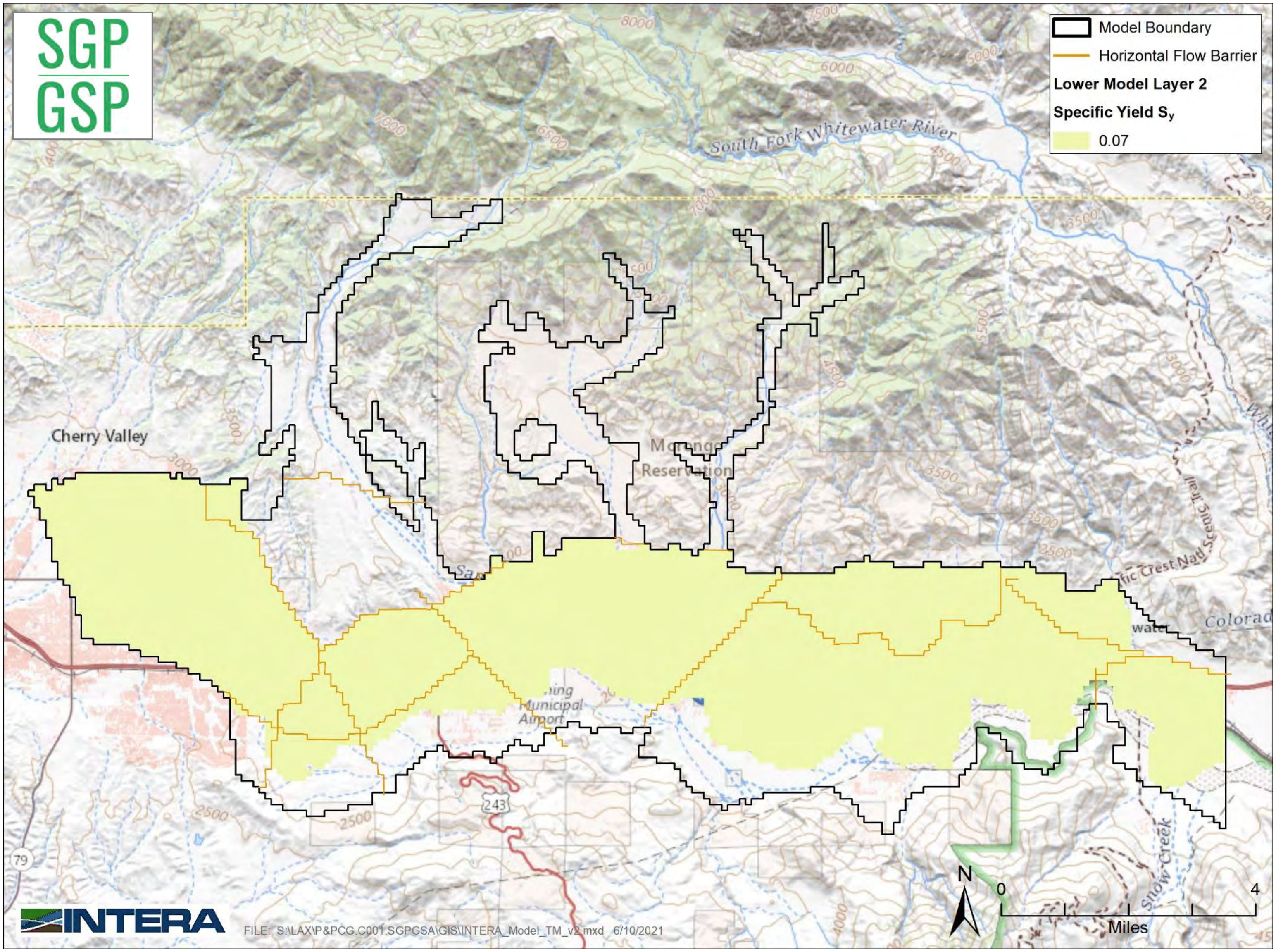


Figure 4.28b Lower Model Sy - Layer 2

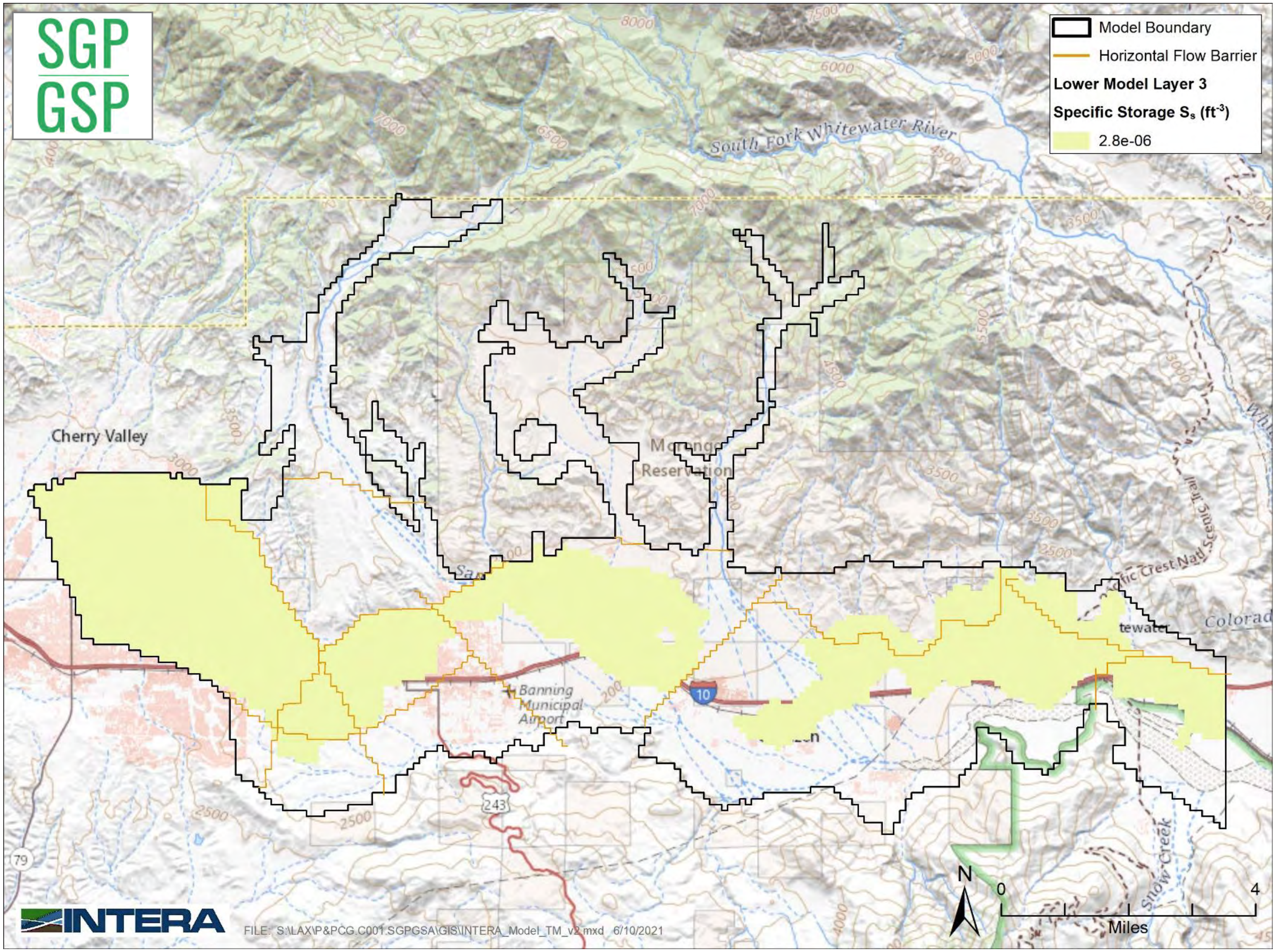


Figure 4.29a Lower Model Ss - Layer 3

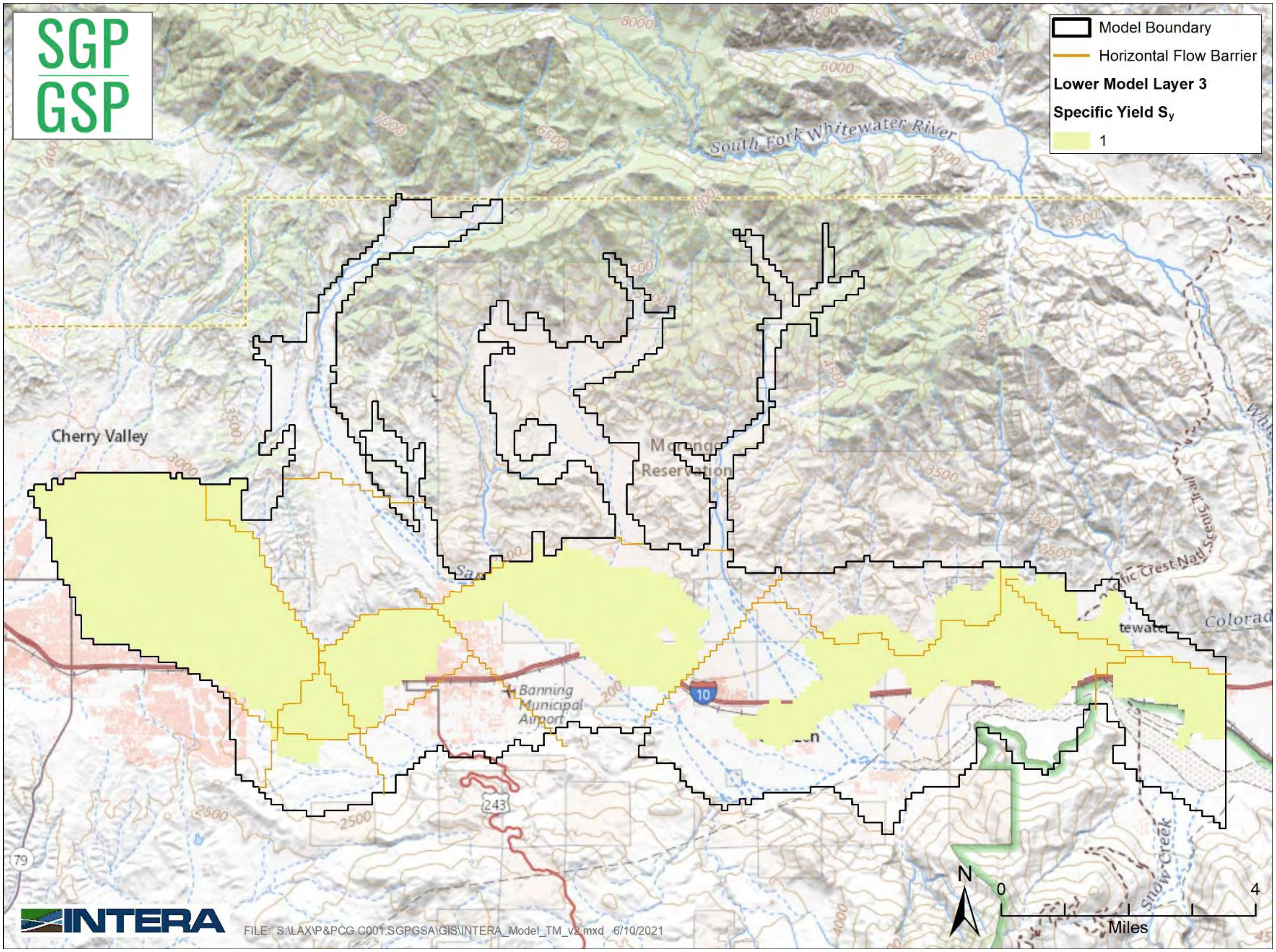


Figure 4.29b Lower Model Sy - Layer 3

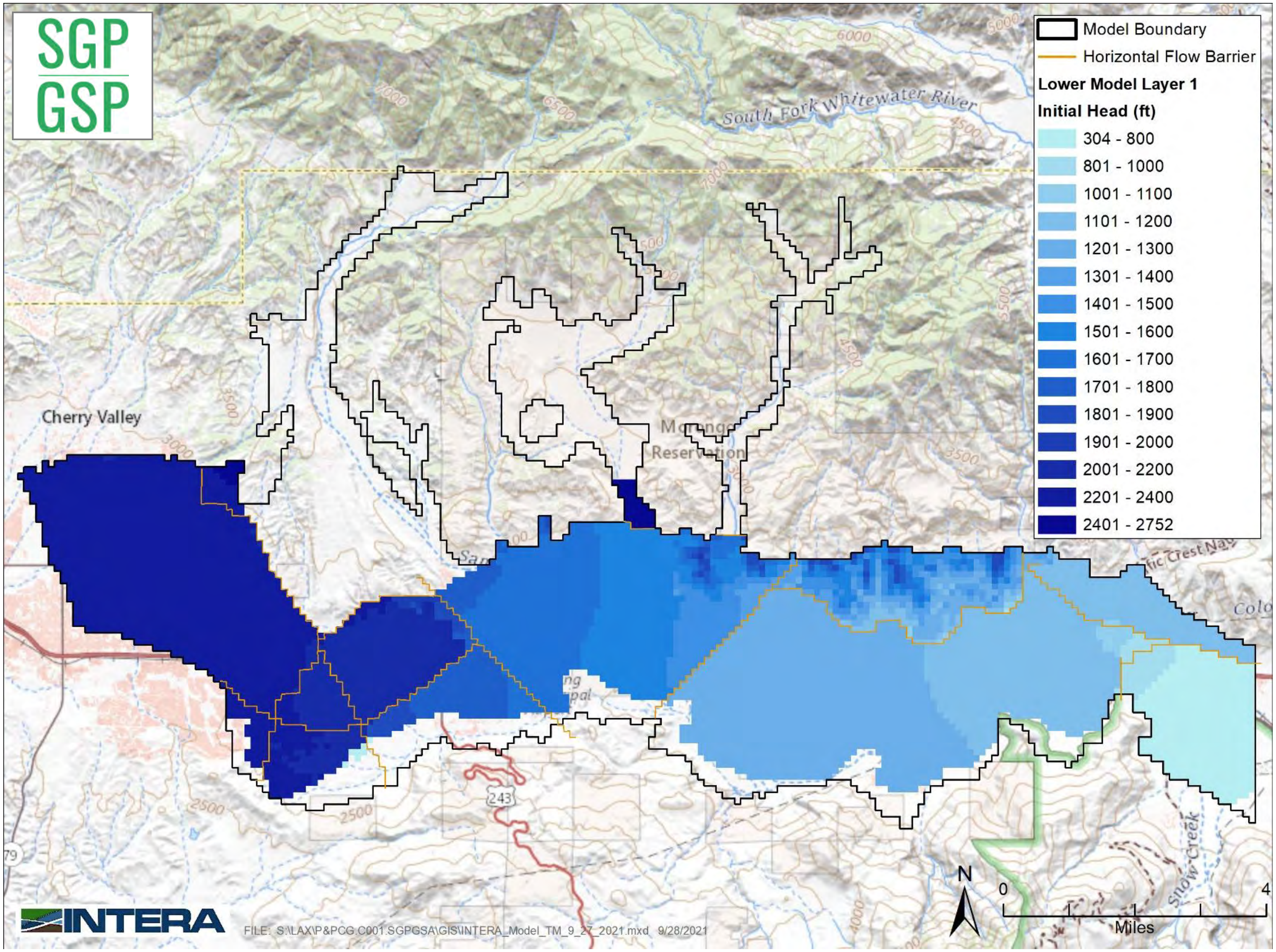
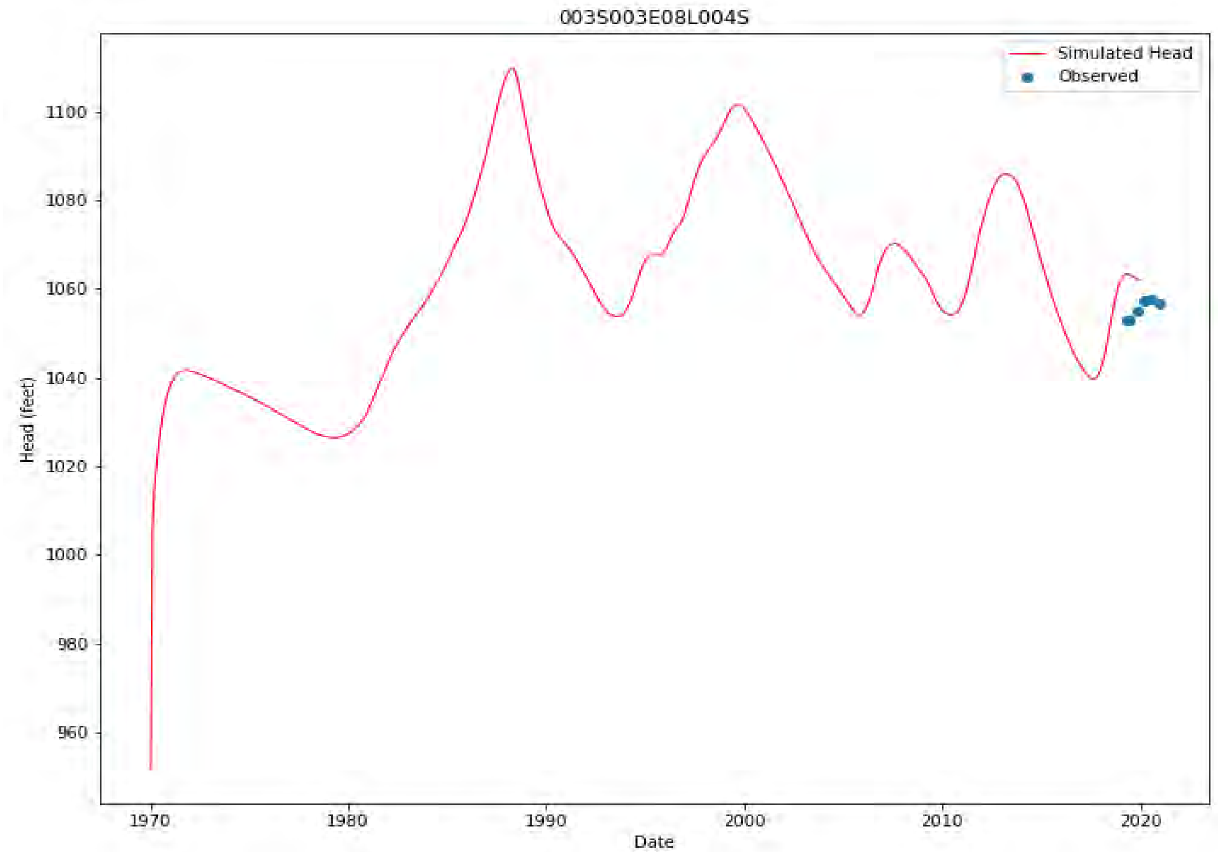


Figure 4.30 Lower Model Initial Heads - Layer 1



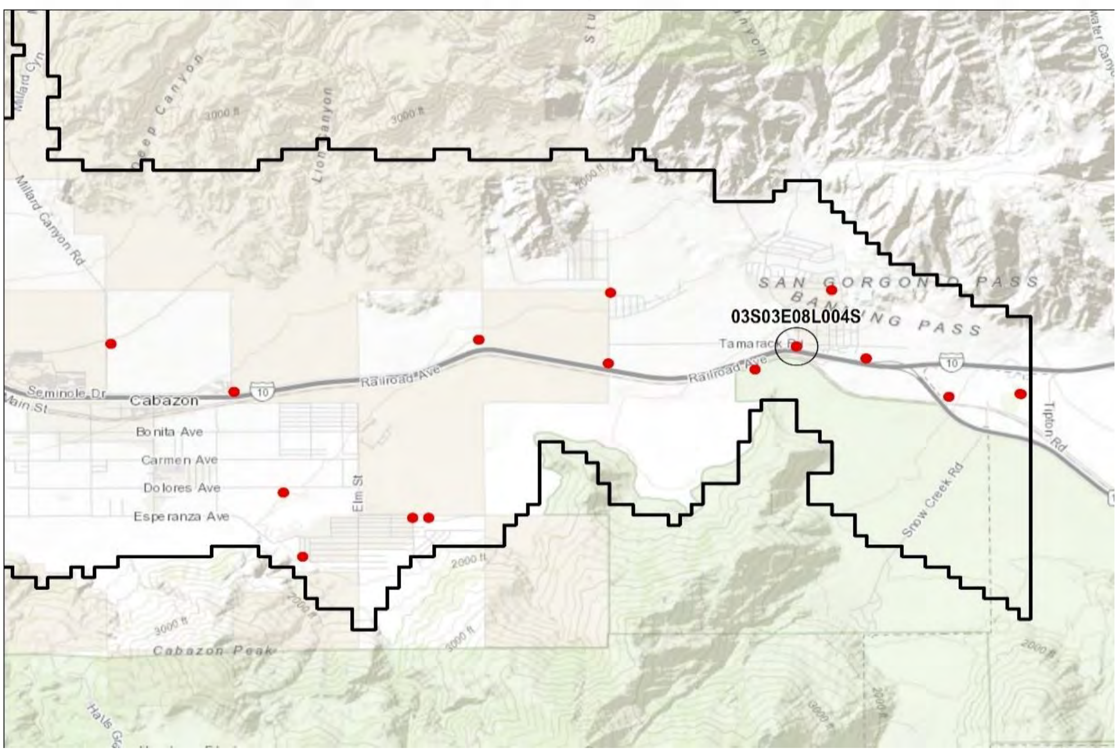
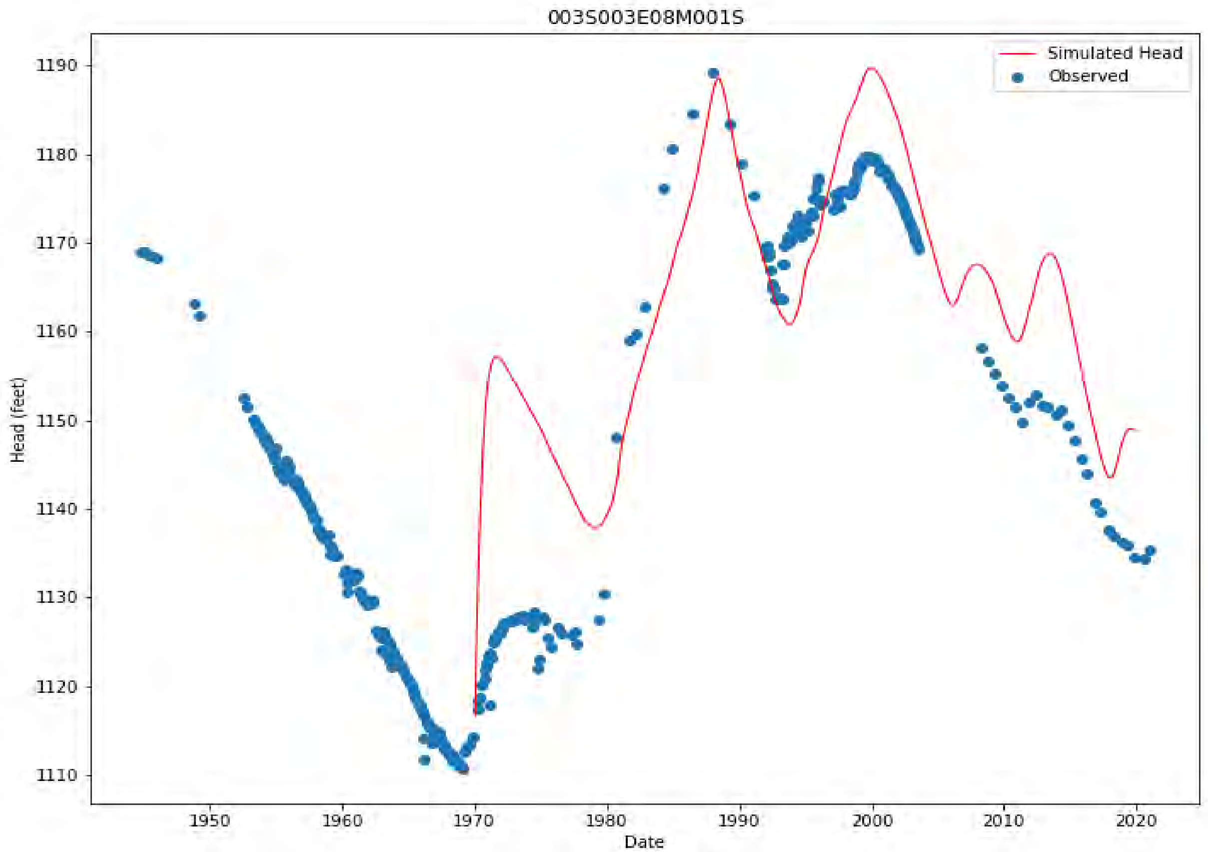


Figure 5.1a:
Hydrograph - 03S03E08L004S



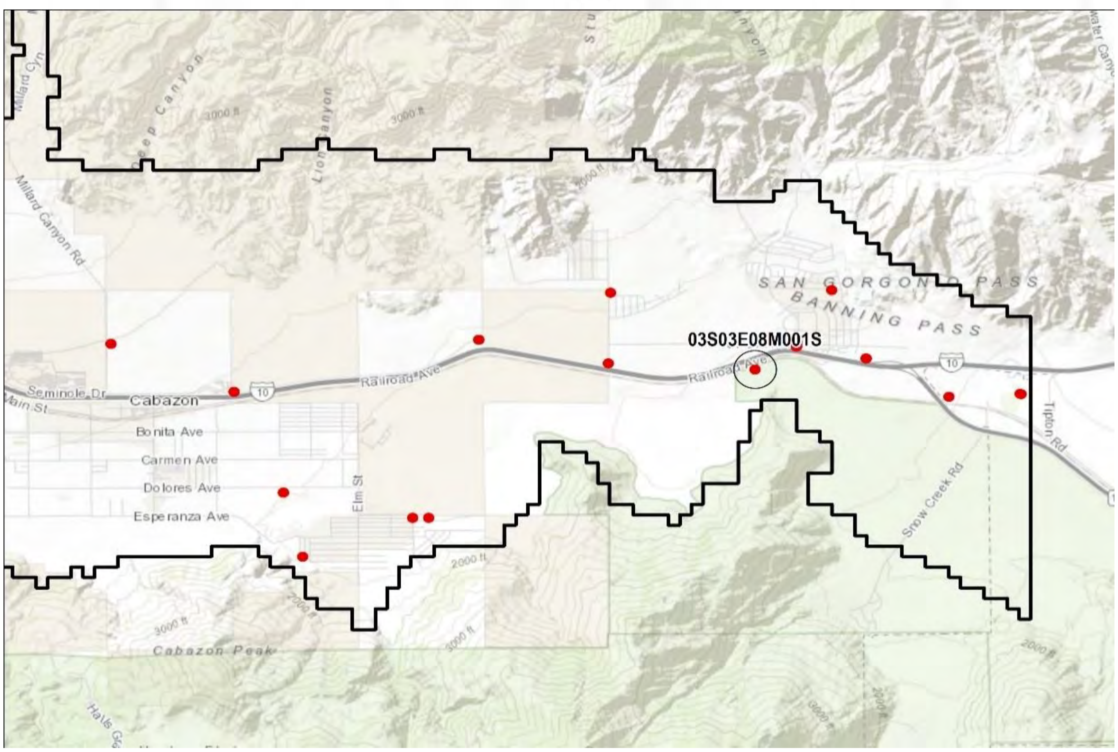
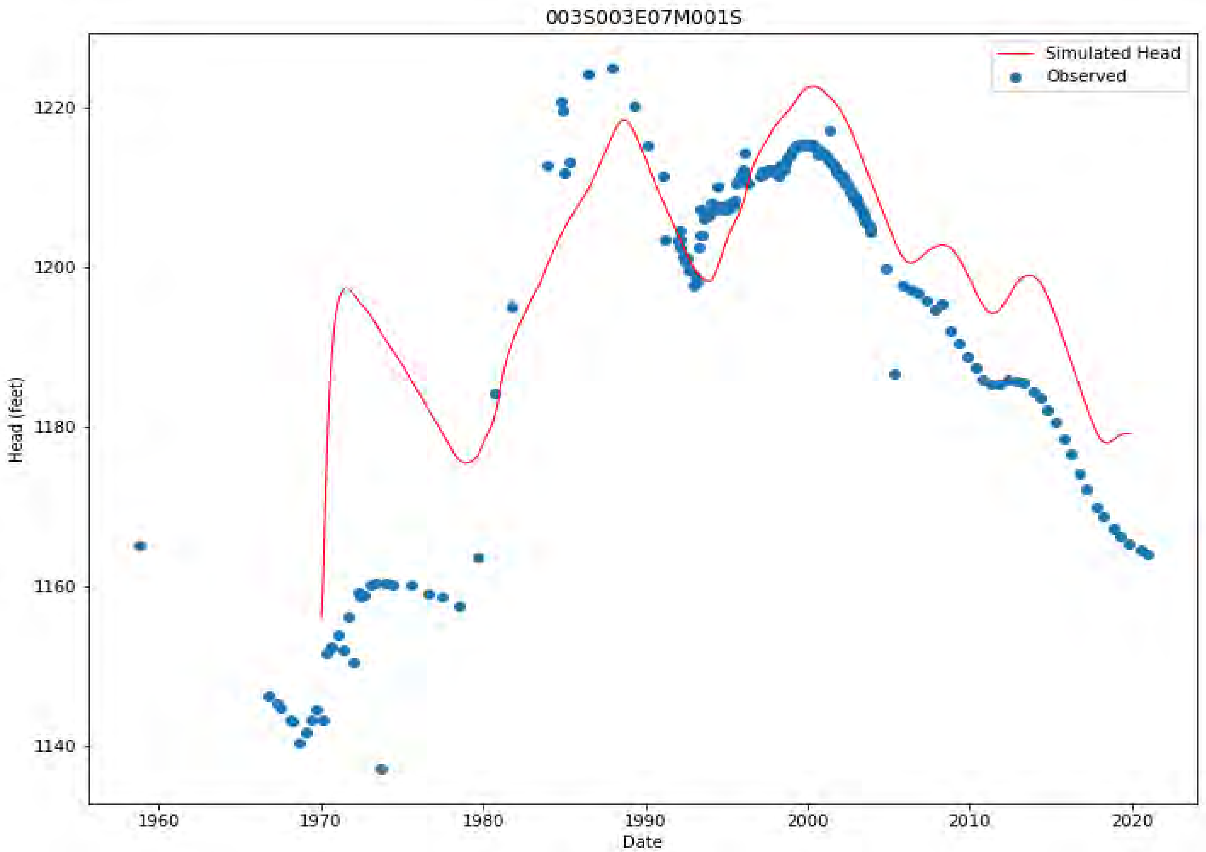


Figure 5.1b:
Hydrograph - 03S03E08M001S



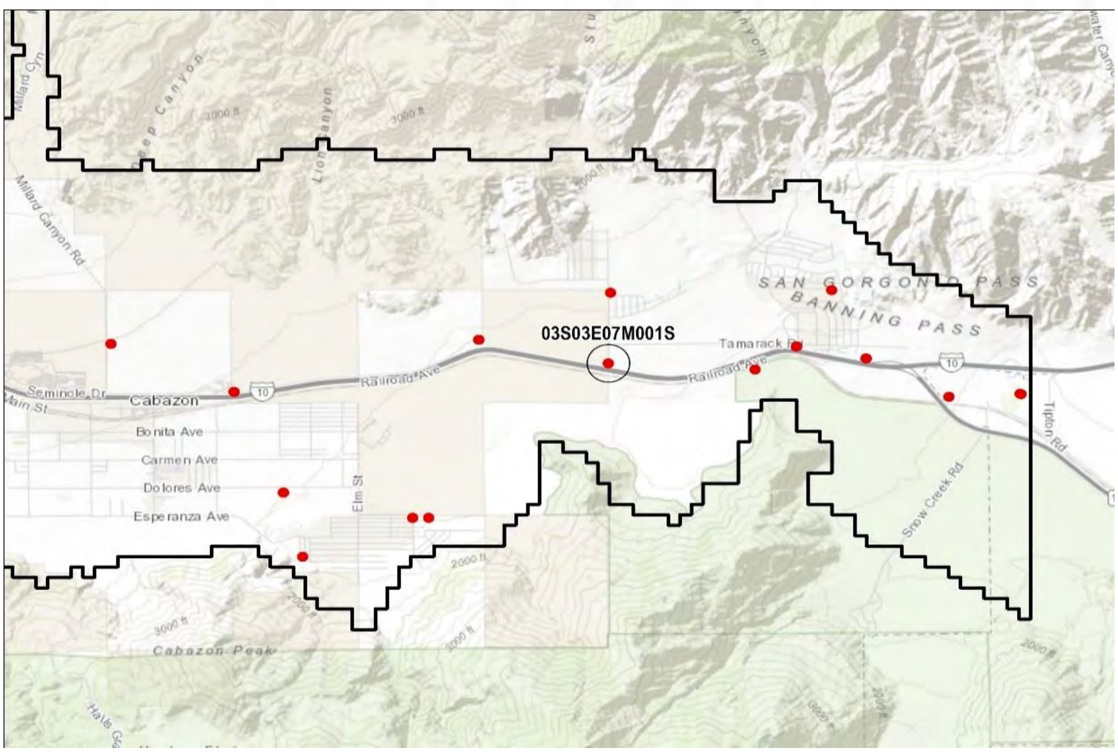
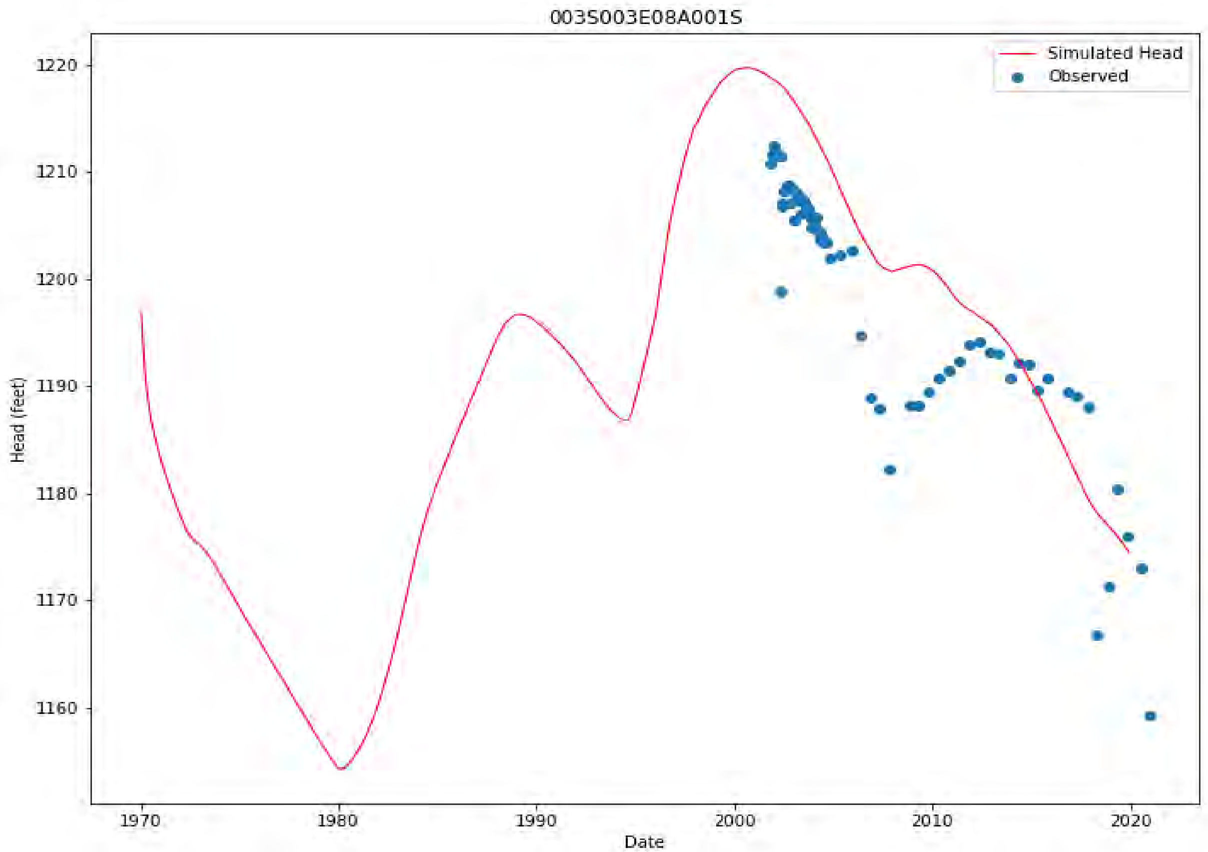


Figure 5.1c:
Hydrograph - 03S03E07M001S



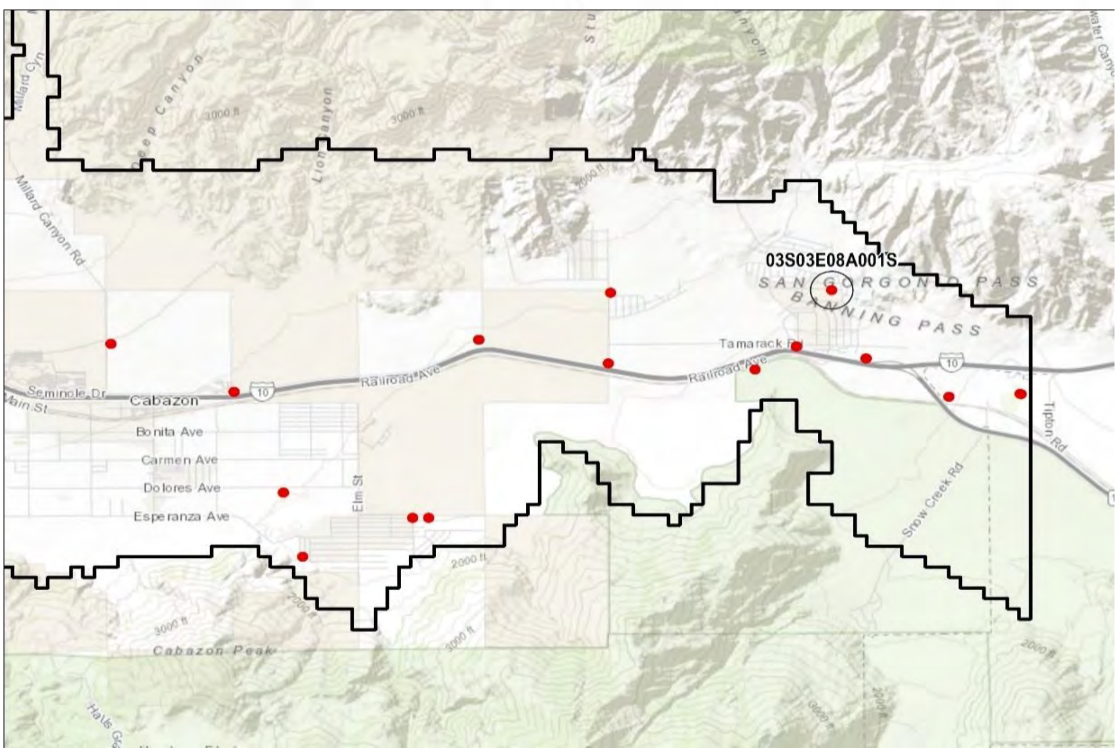
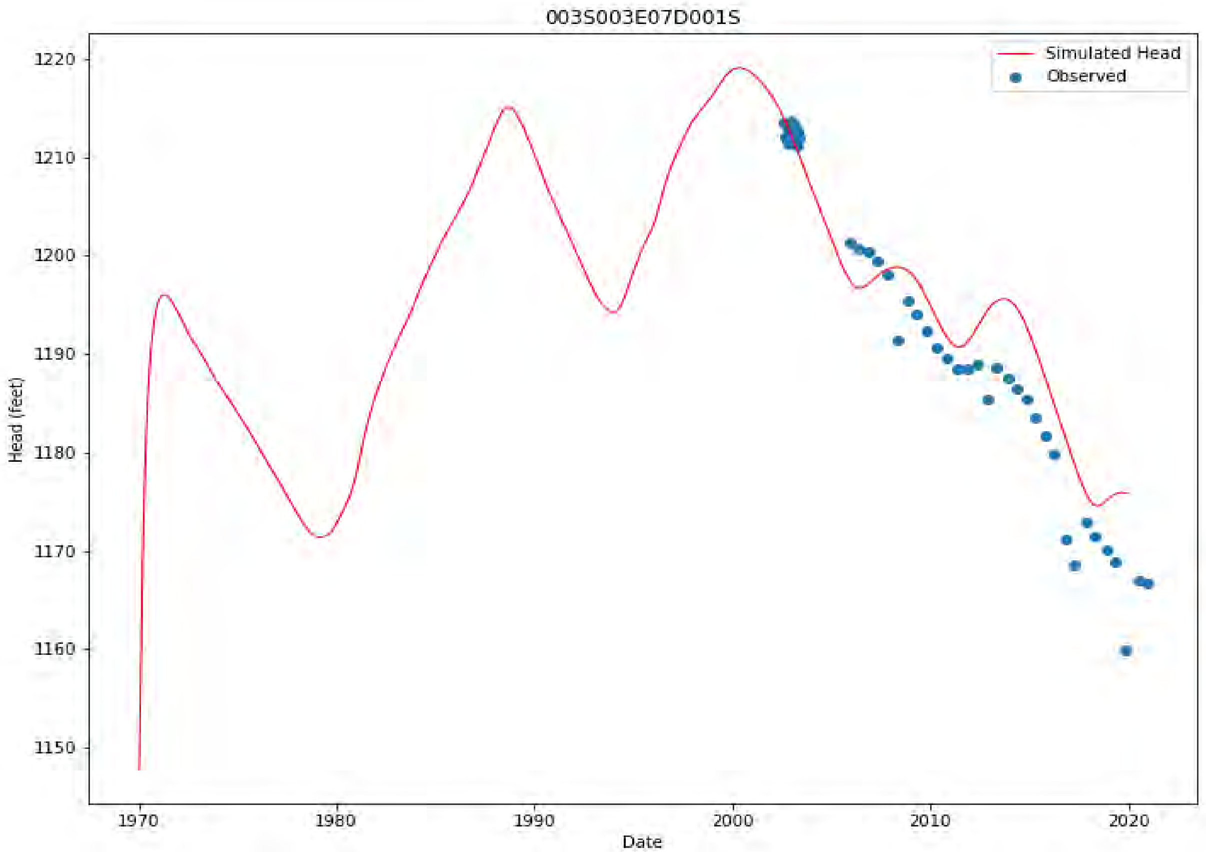


Figure 5.1d:
Hydrograph - 03S03E08A001S



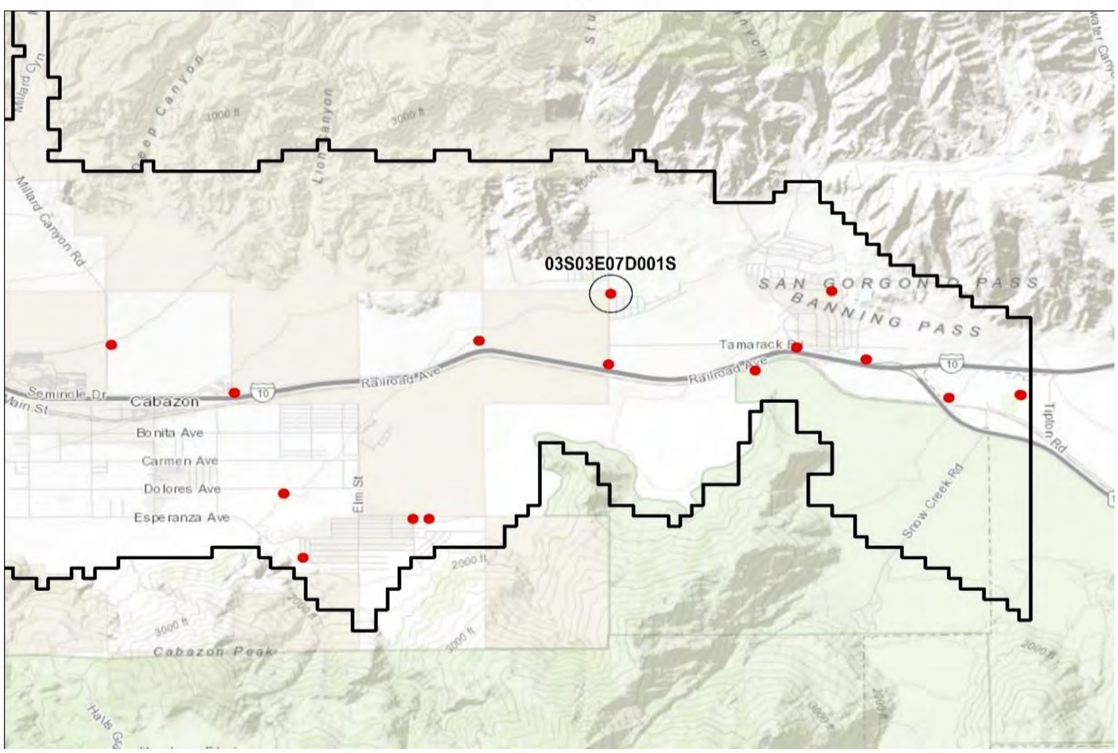
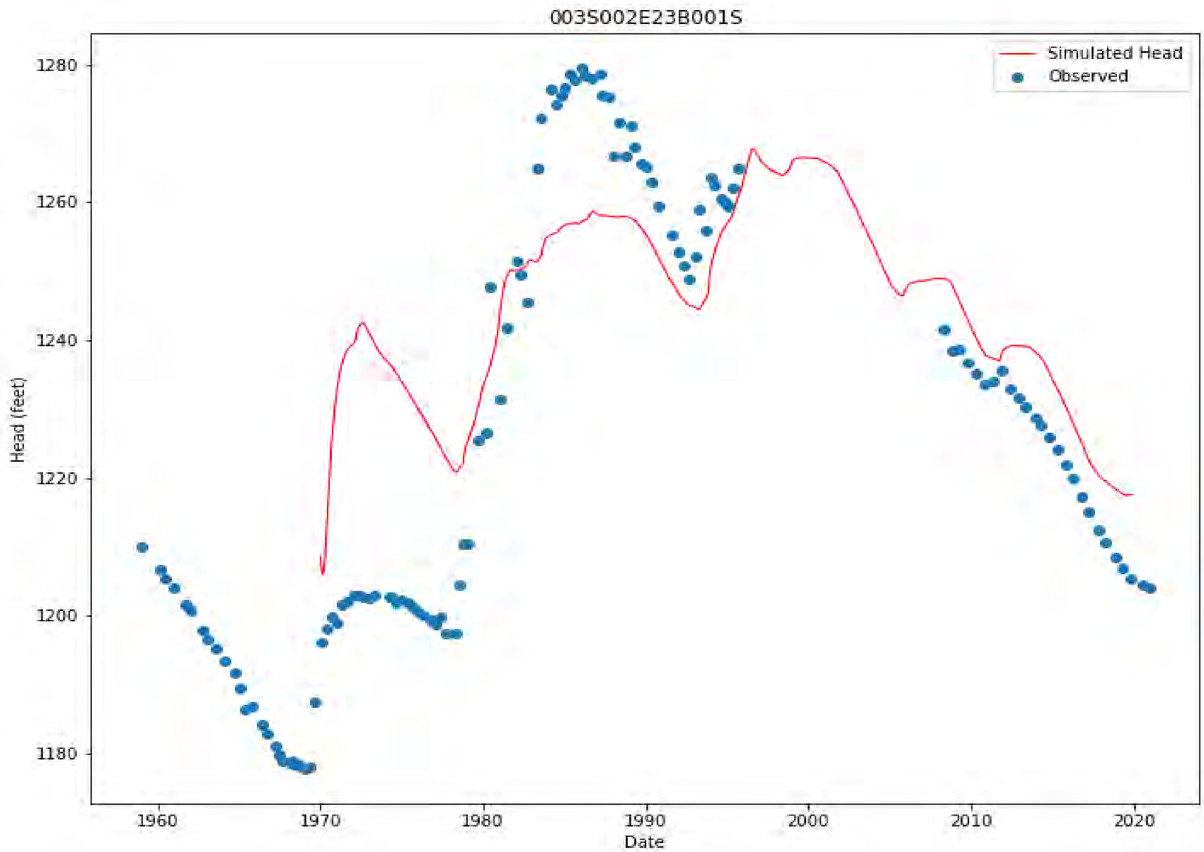
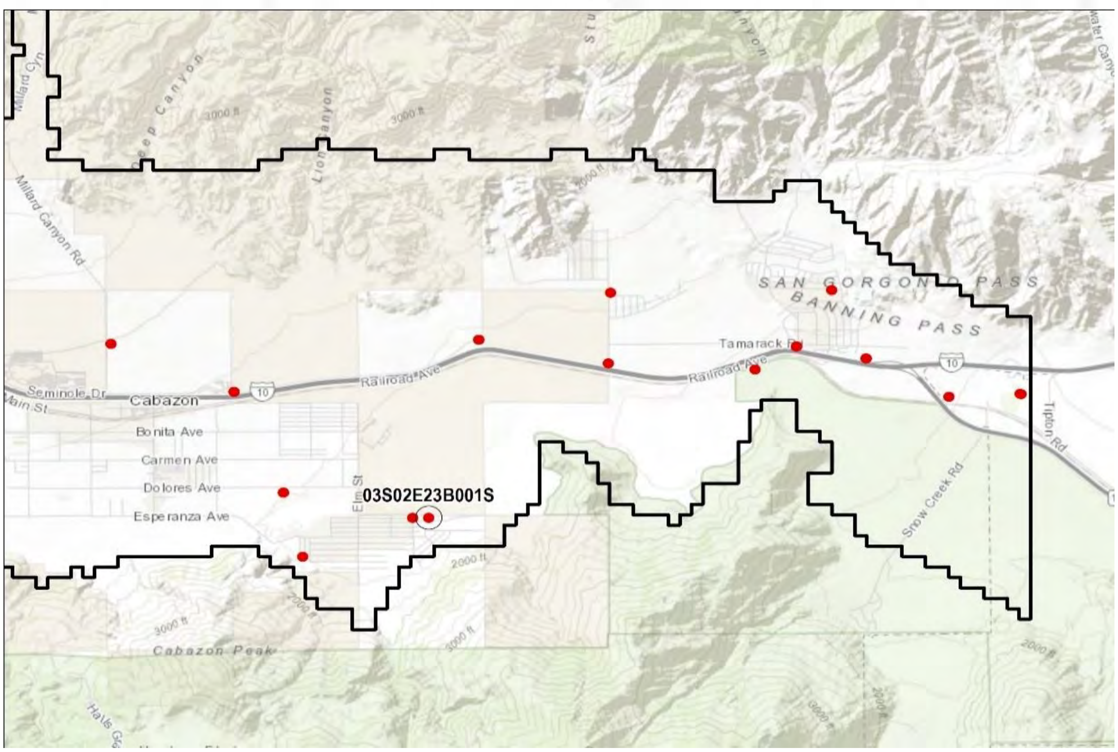


Figure 5.1e:
Hydrograph - 03S03E07D001S





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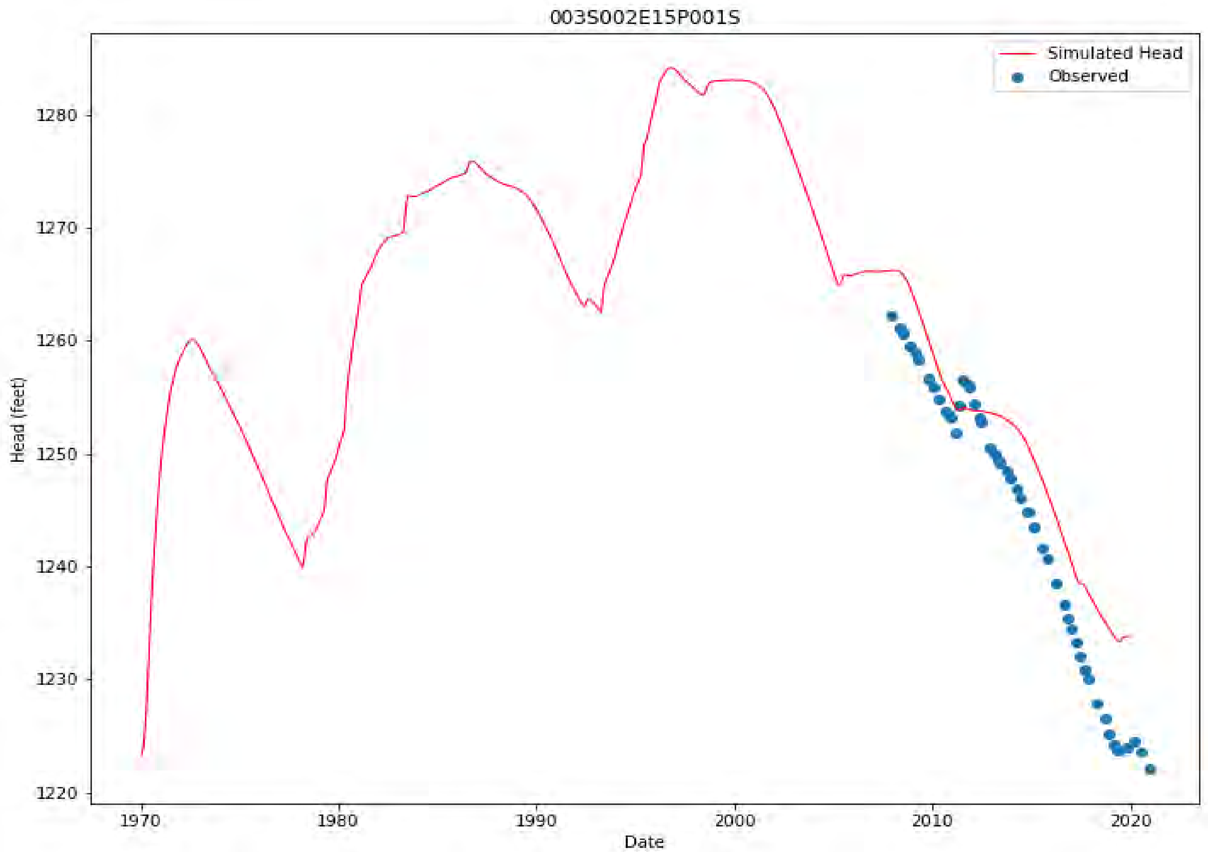
Hydrograph - 03S02E23B001S



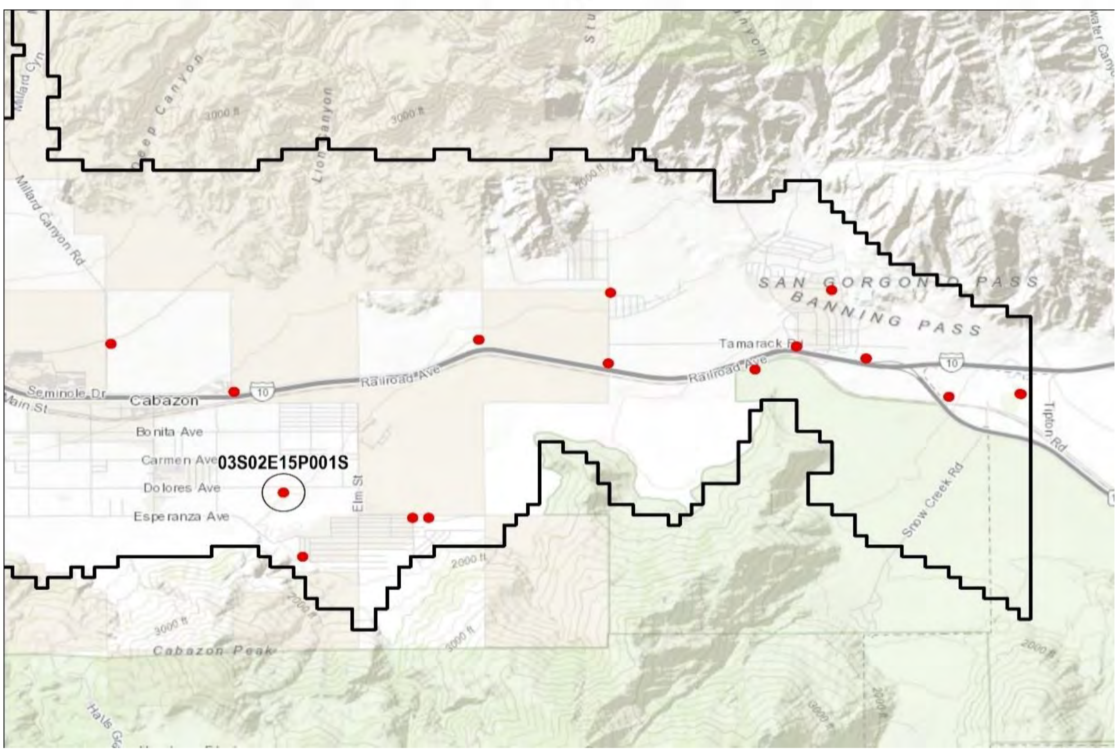
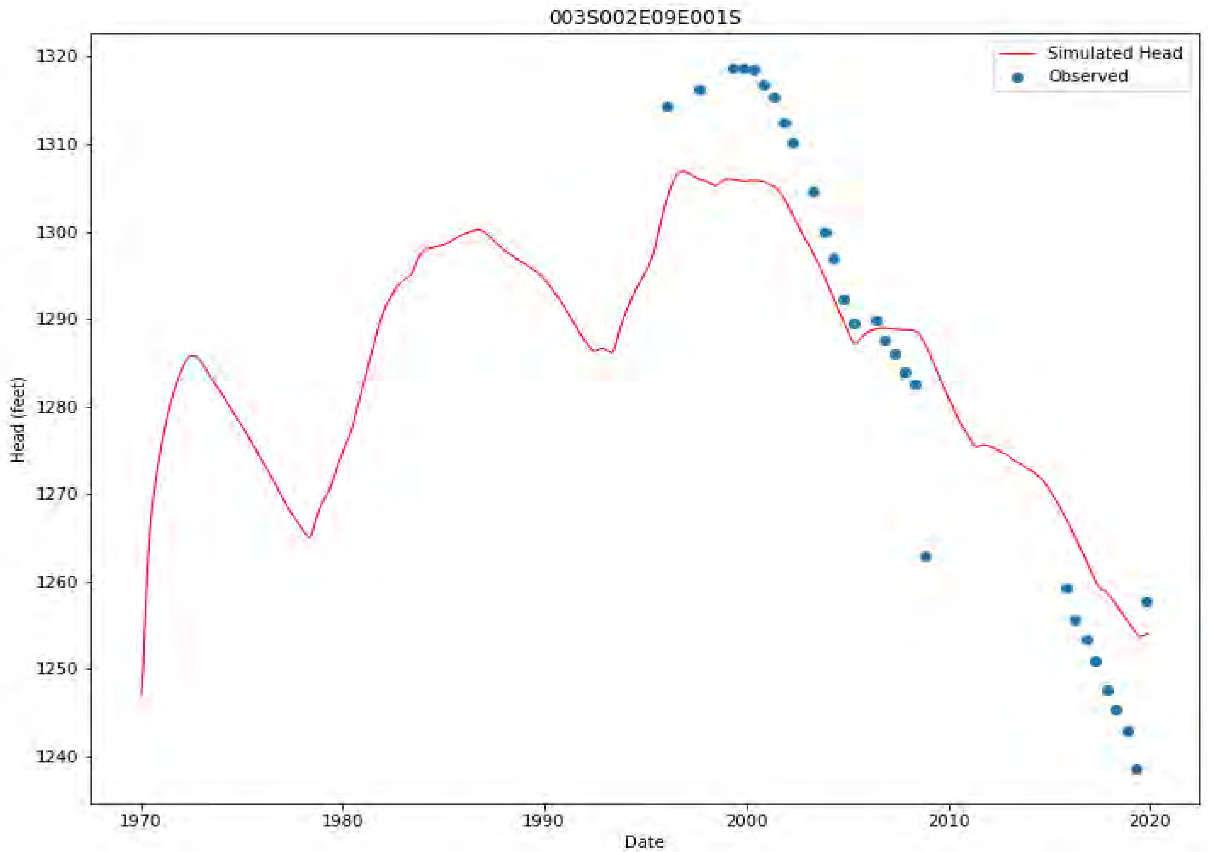


Figure 5.1g:
Hydrograph - 03S02E15P001S



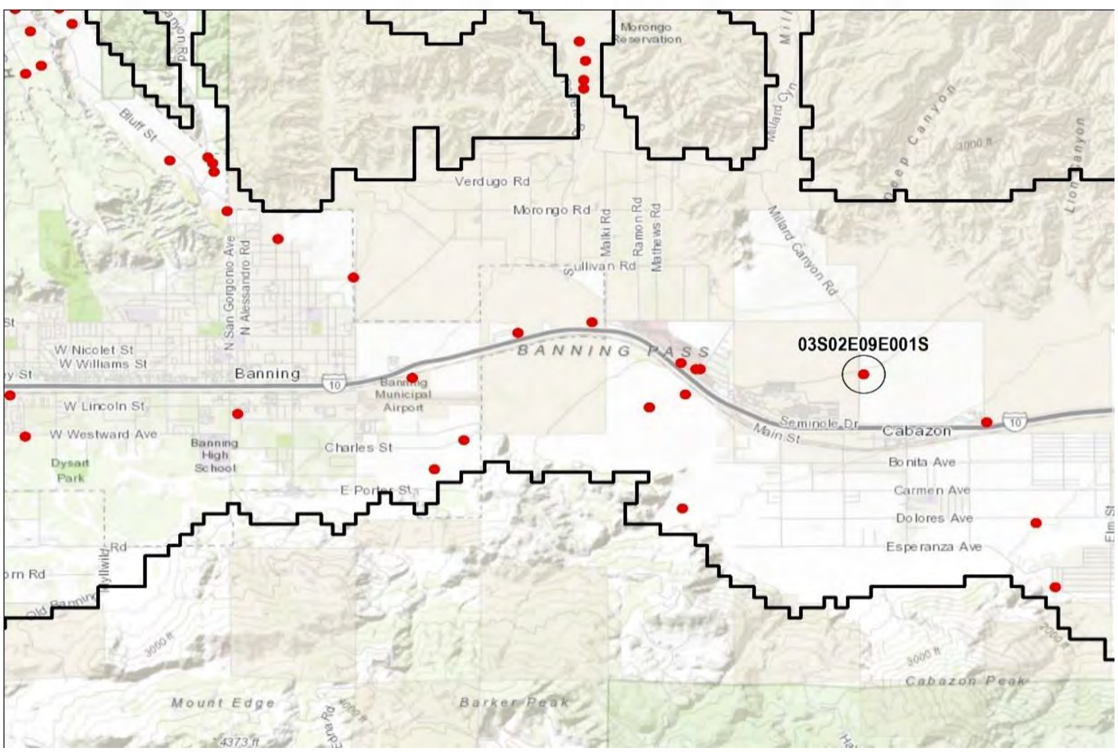
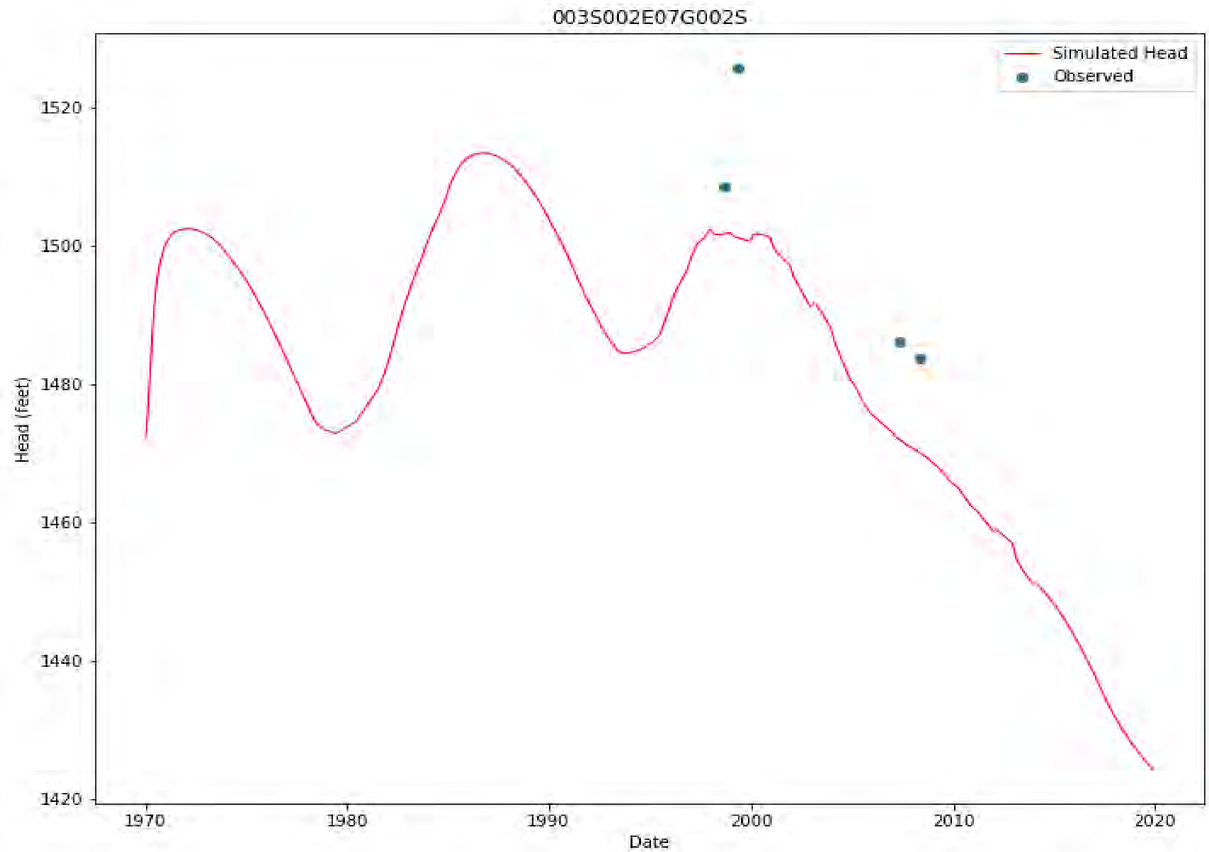


Figure 5.1h:
Hydrograph - 03S02E09E001S



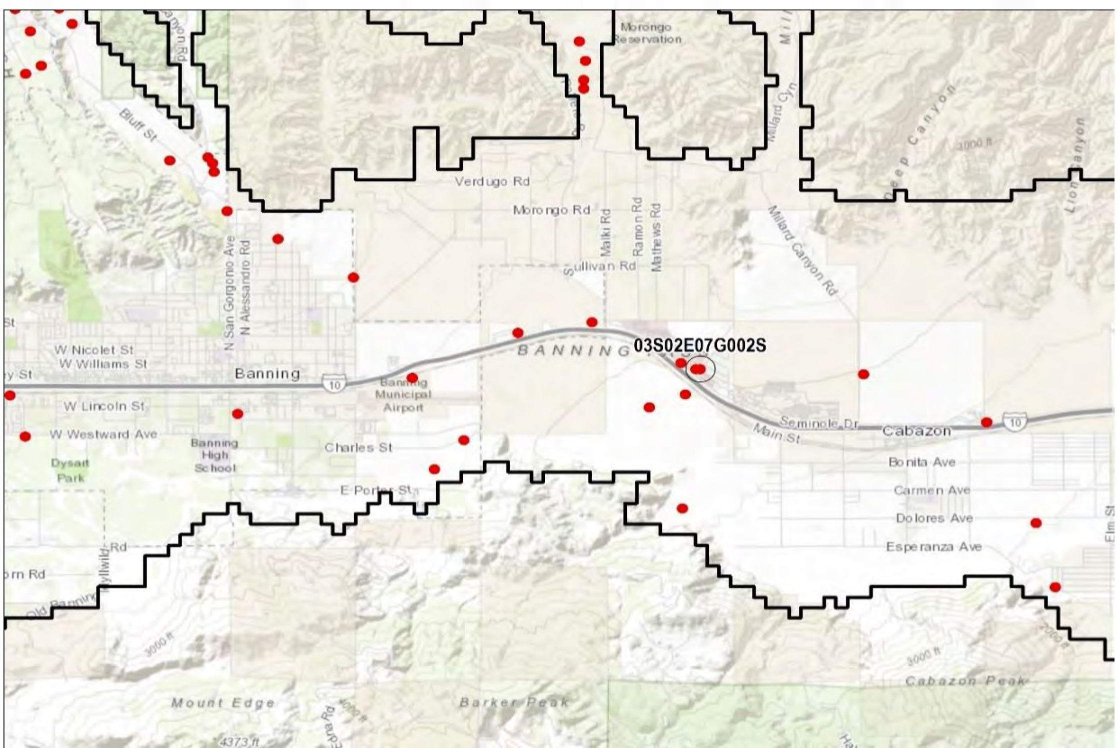
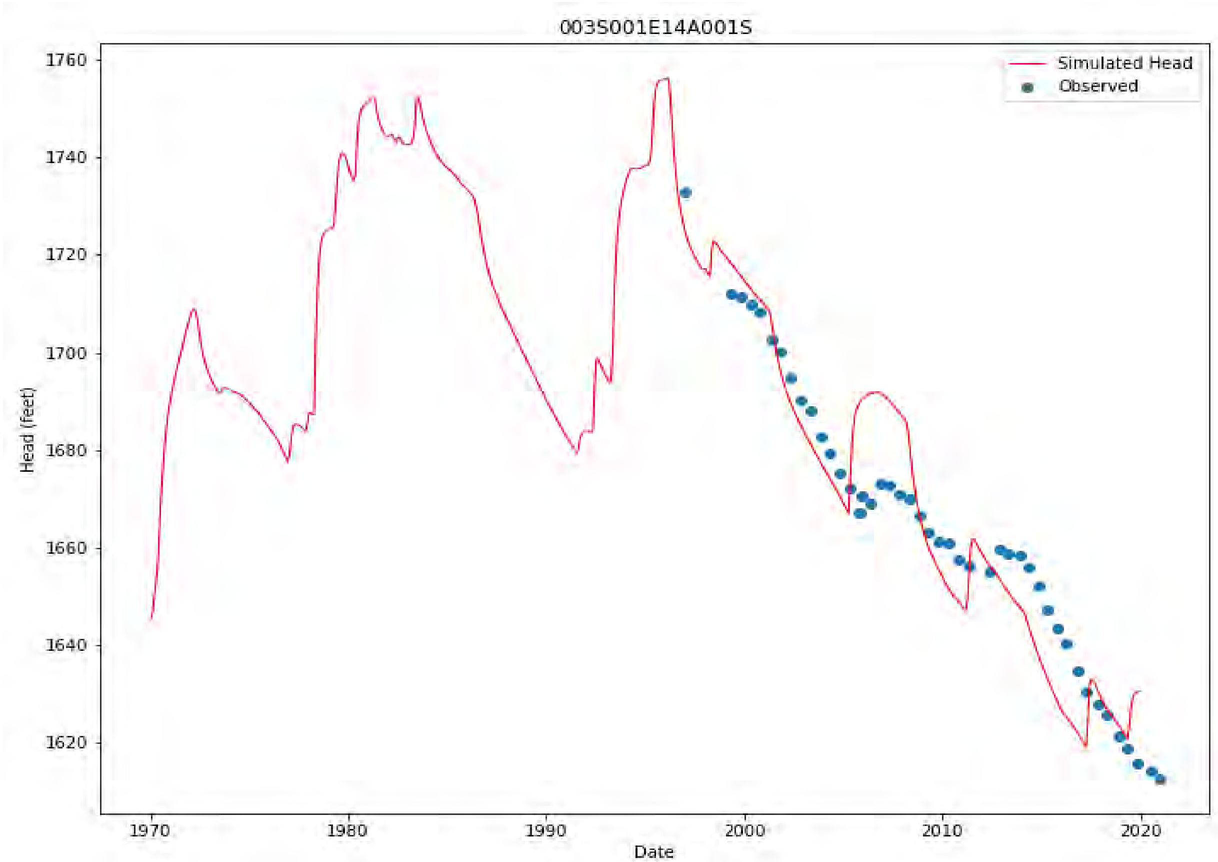


Figure 5.1i:
Hydrograph - 03S02E07G002S



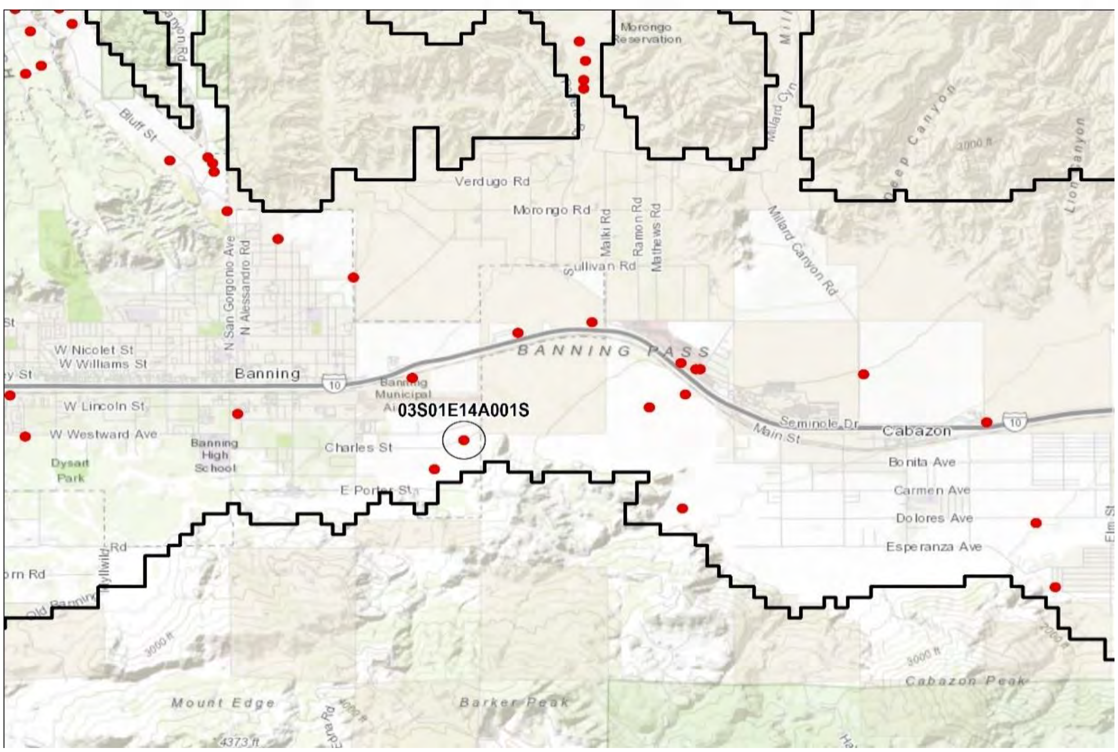
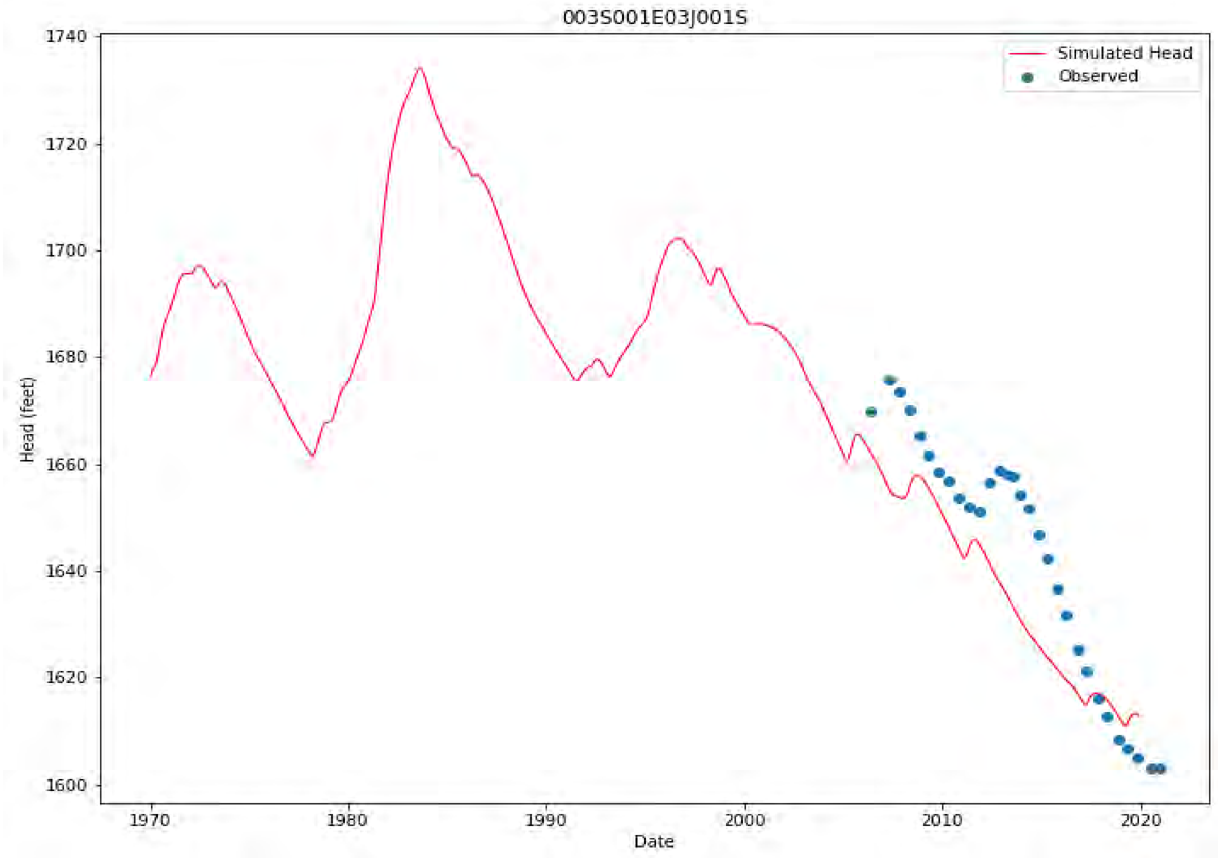


Figure 5.1j:
Hydrograph - 03S01E14A001S



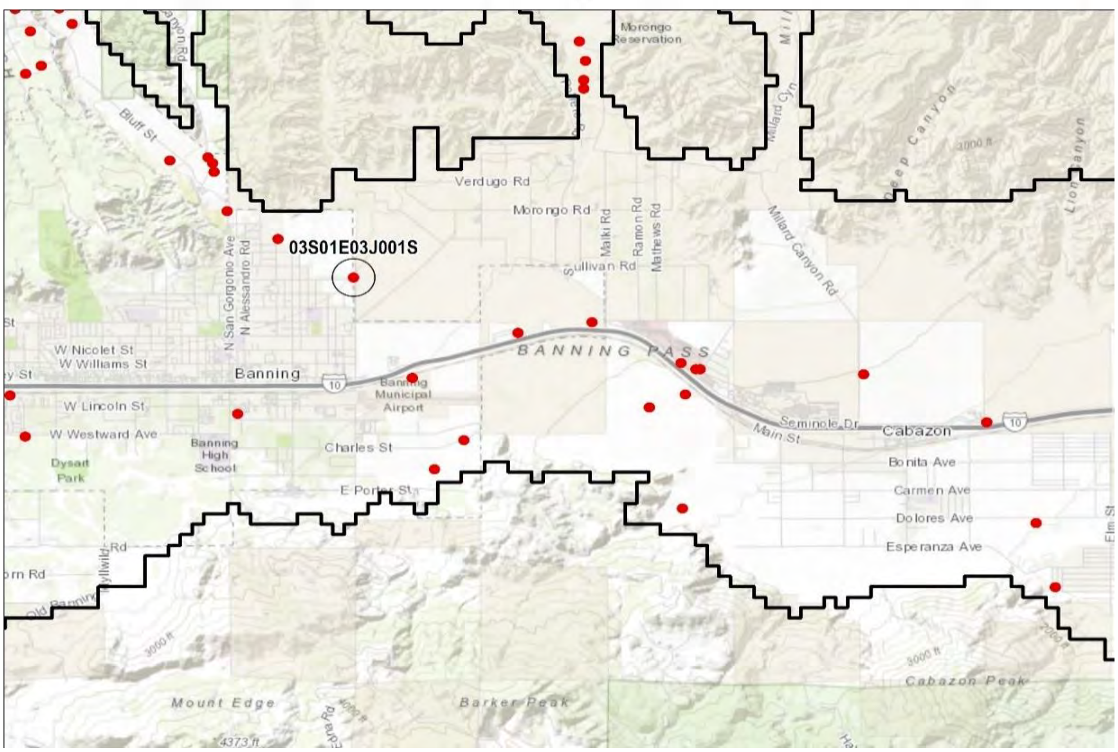
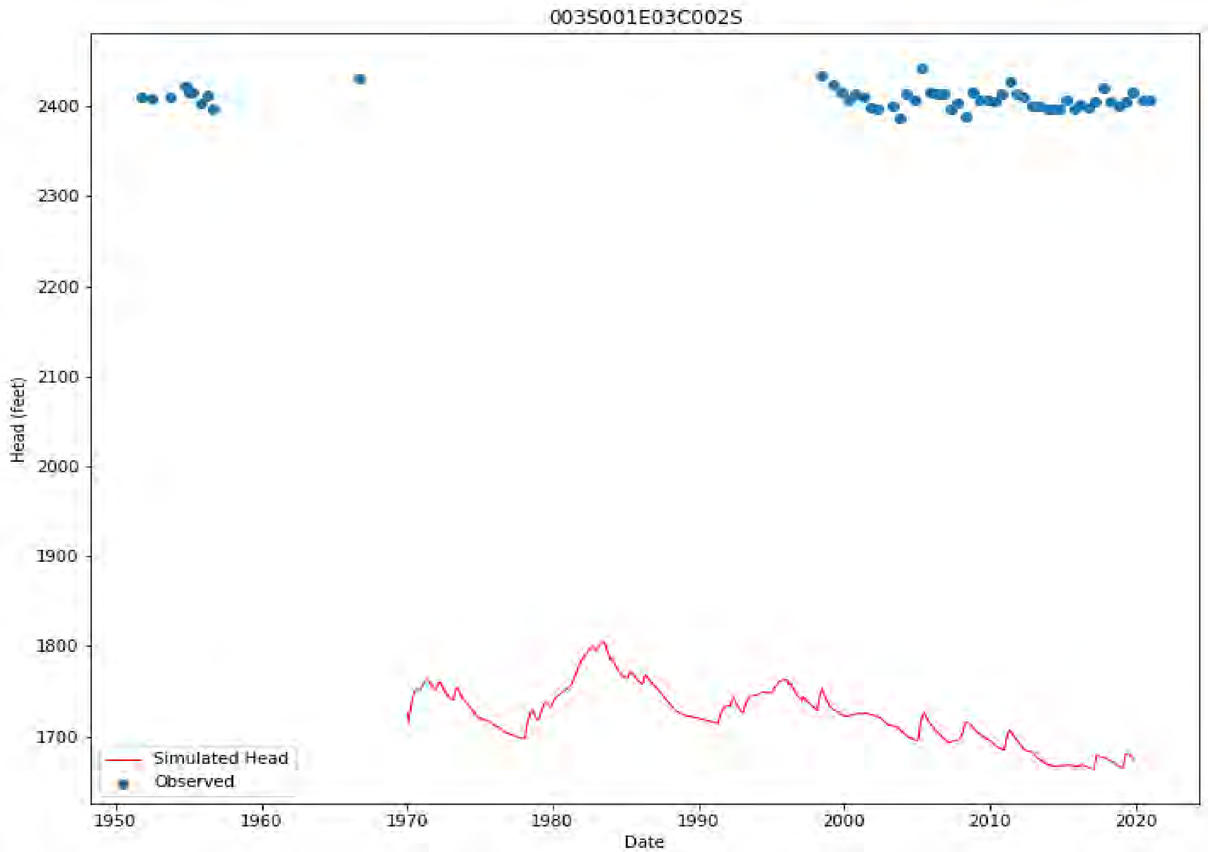


Figure 5.1k:
Hydrograph - 03S01E03J001S



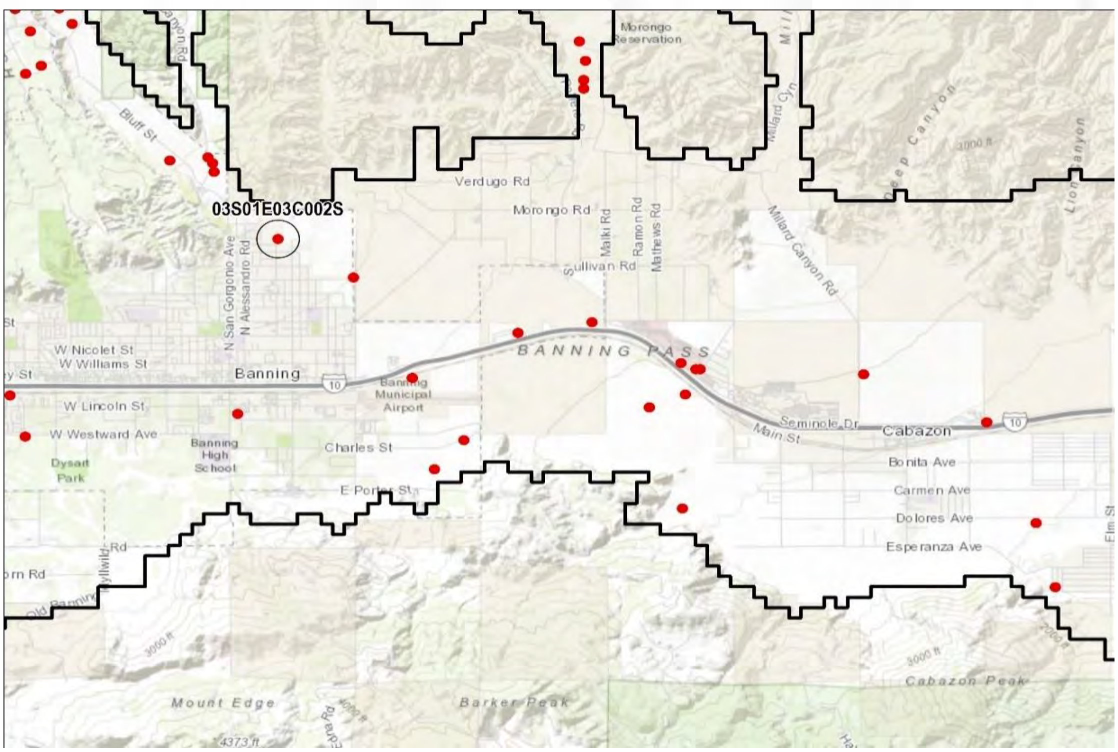
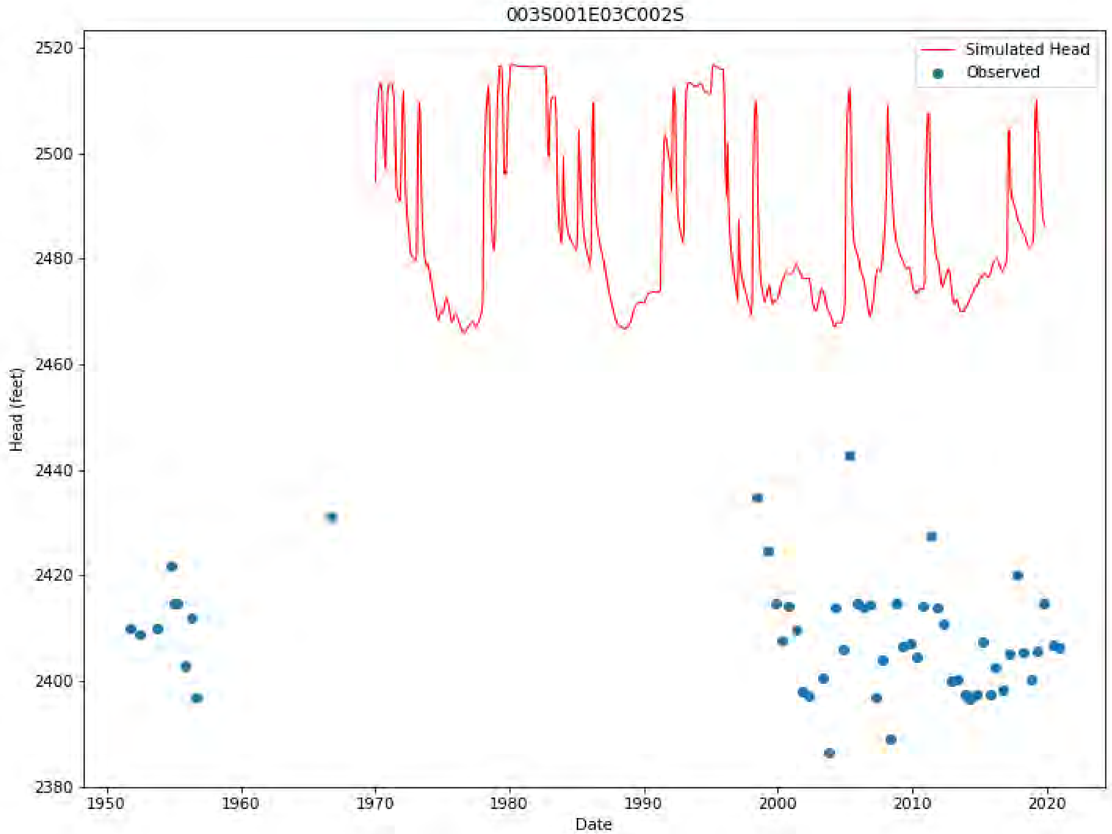
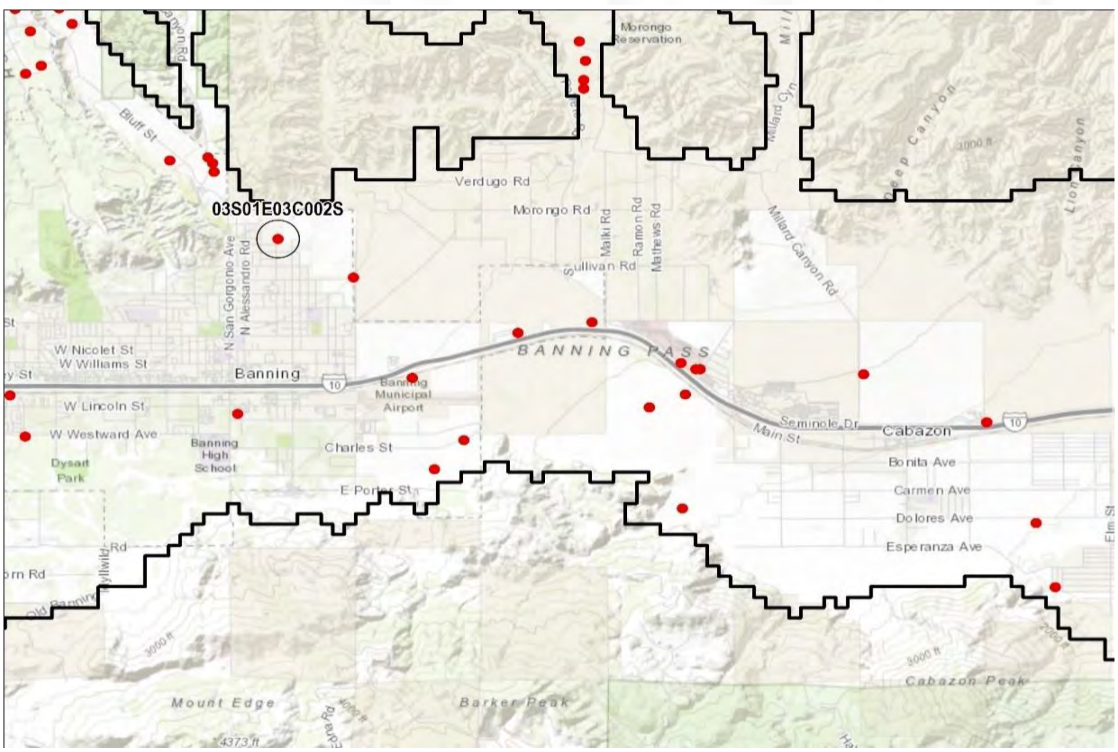


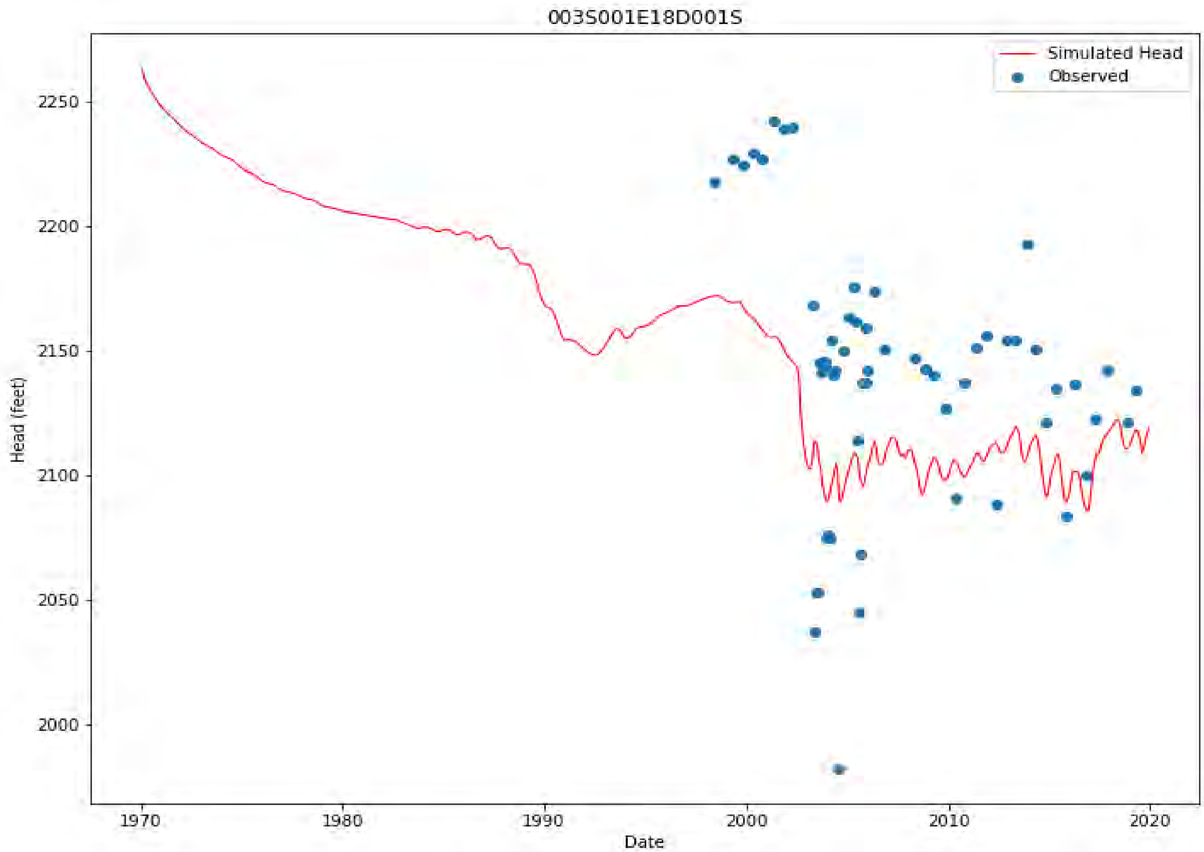
Figure 5.1l:
Hydrograph - 03S01E03C002S
Lower Model





![INTERA logo]

Figure 5.1m:
Hydrograph - 03S01E03C002S
Upper Model



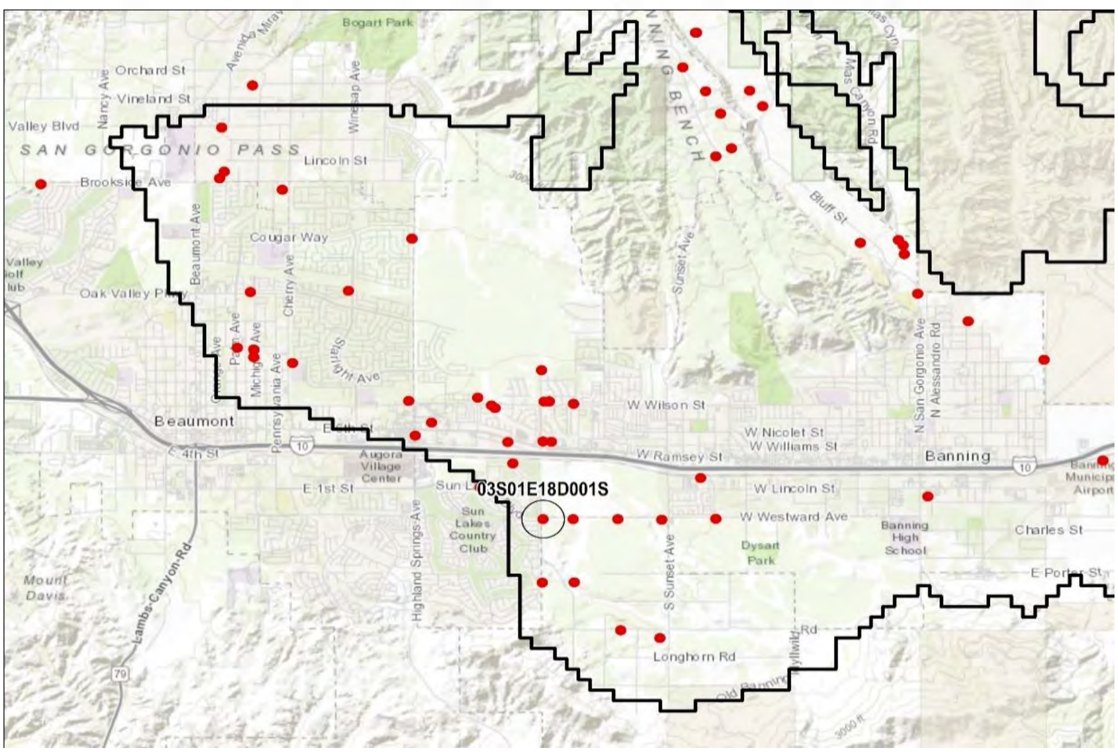
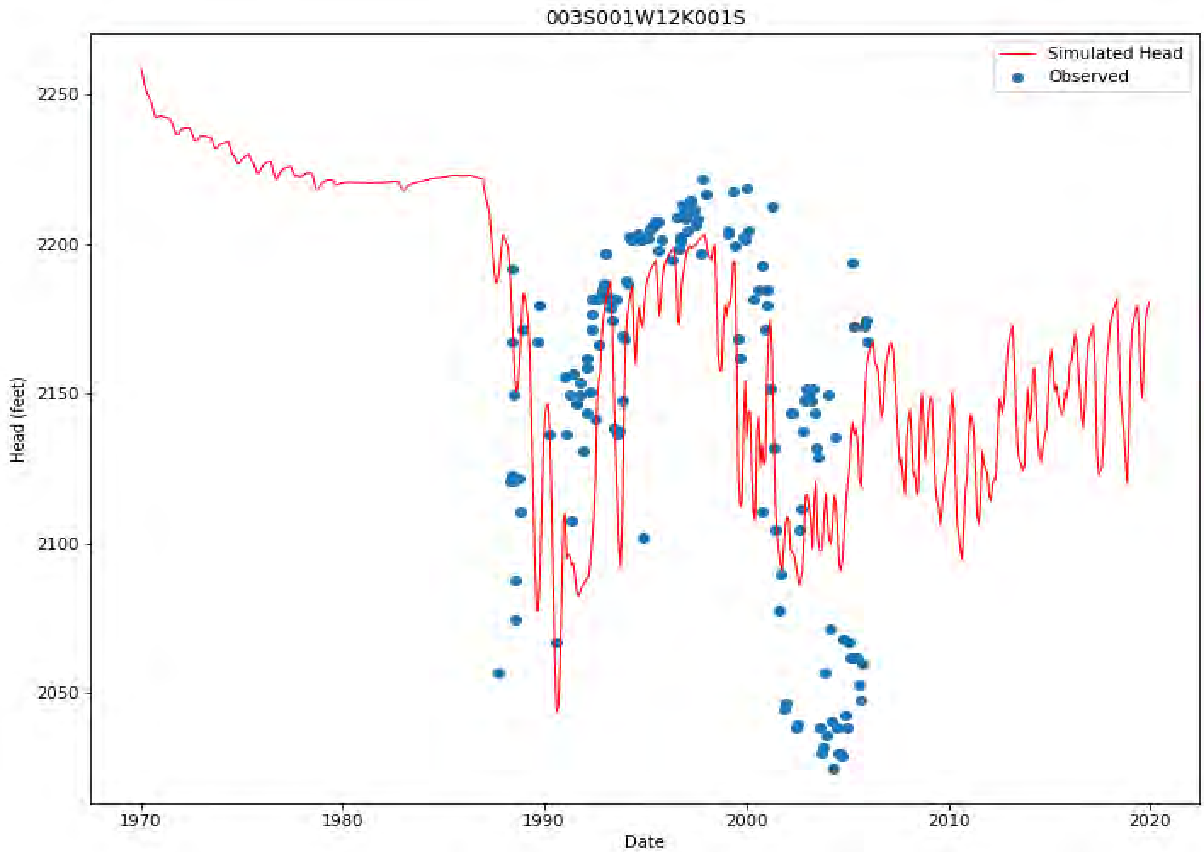


Figure 5.1n:
Hydrograph - 03S01E18D001S



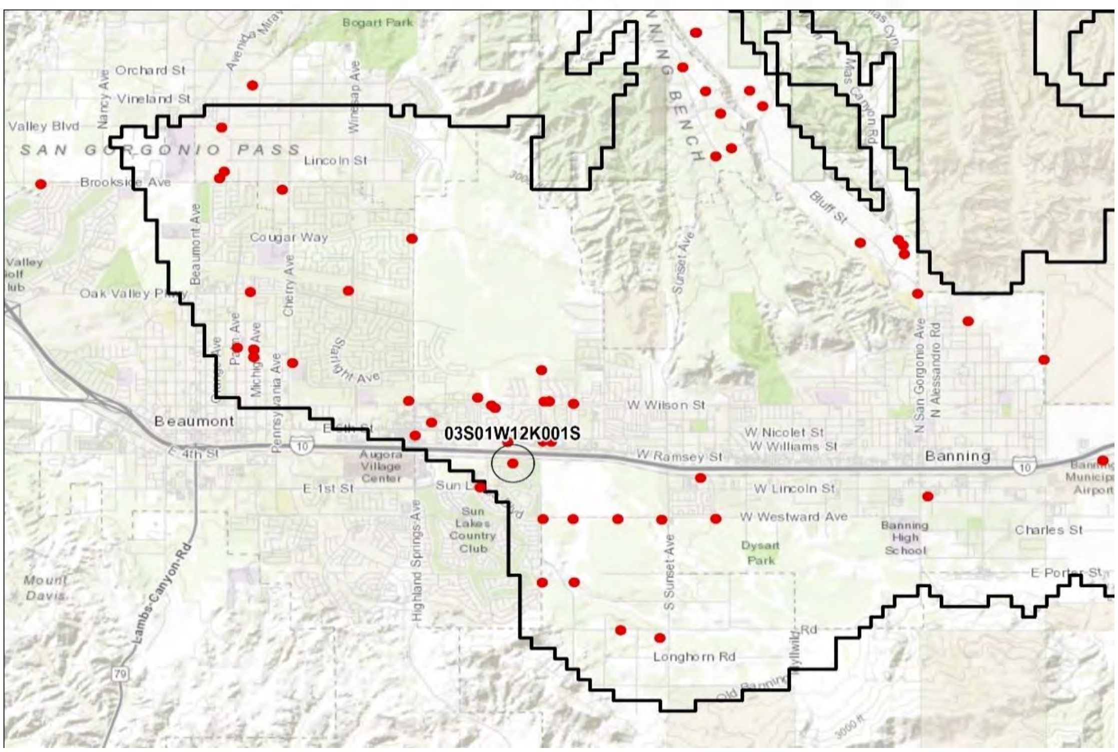
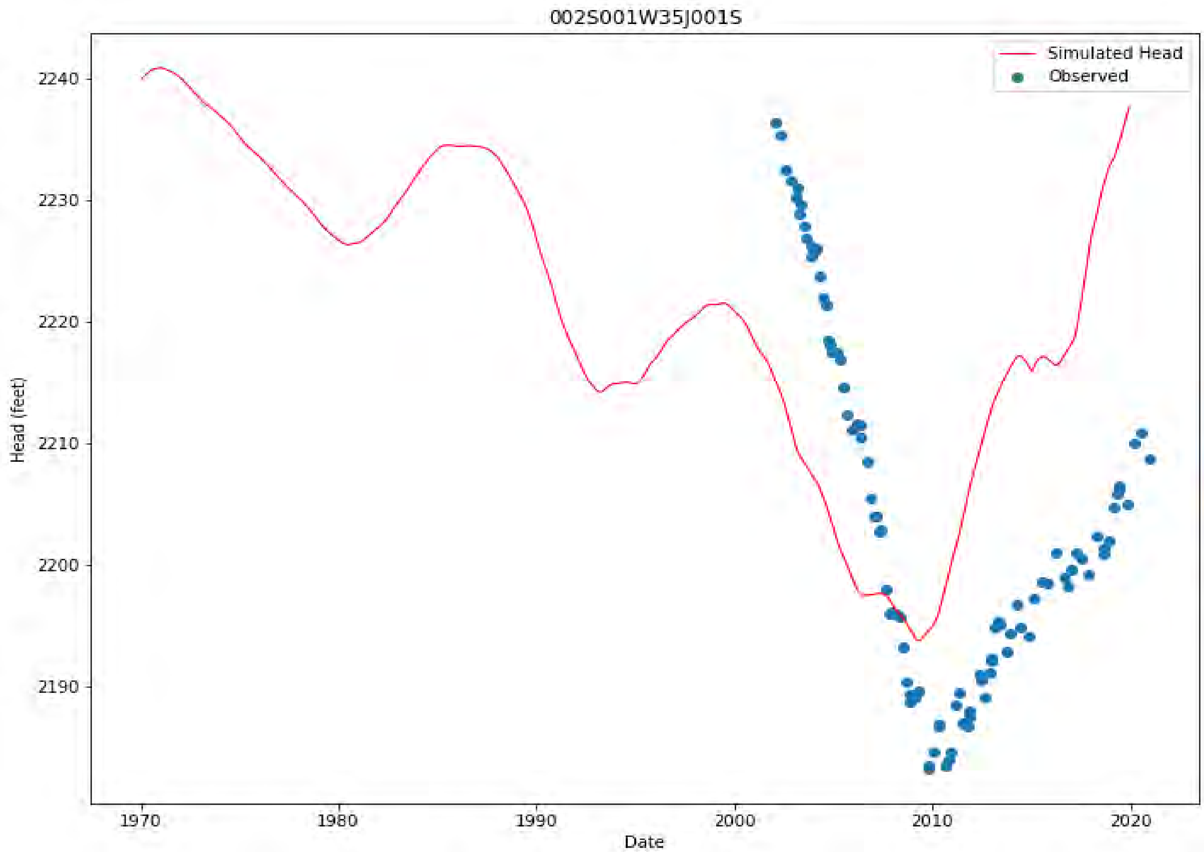


Figure 5.1o:
Hydrograph - 03S01W12K001S



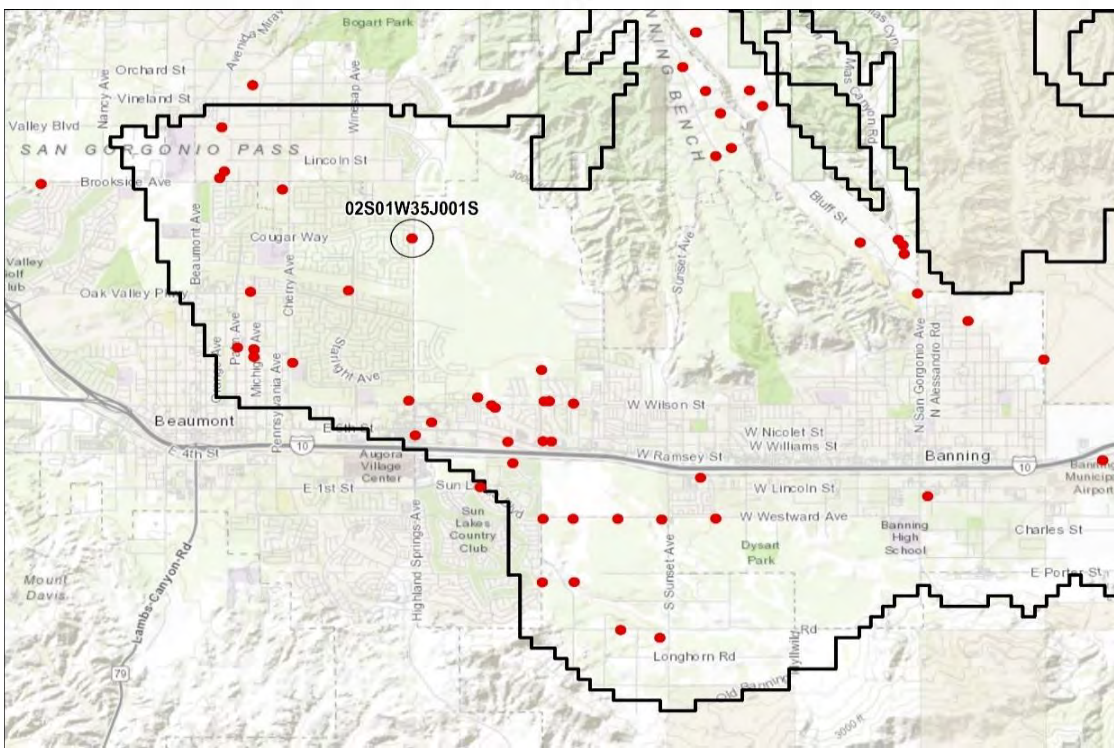
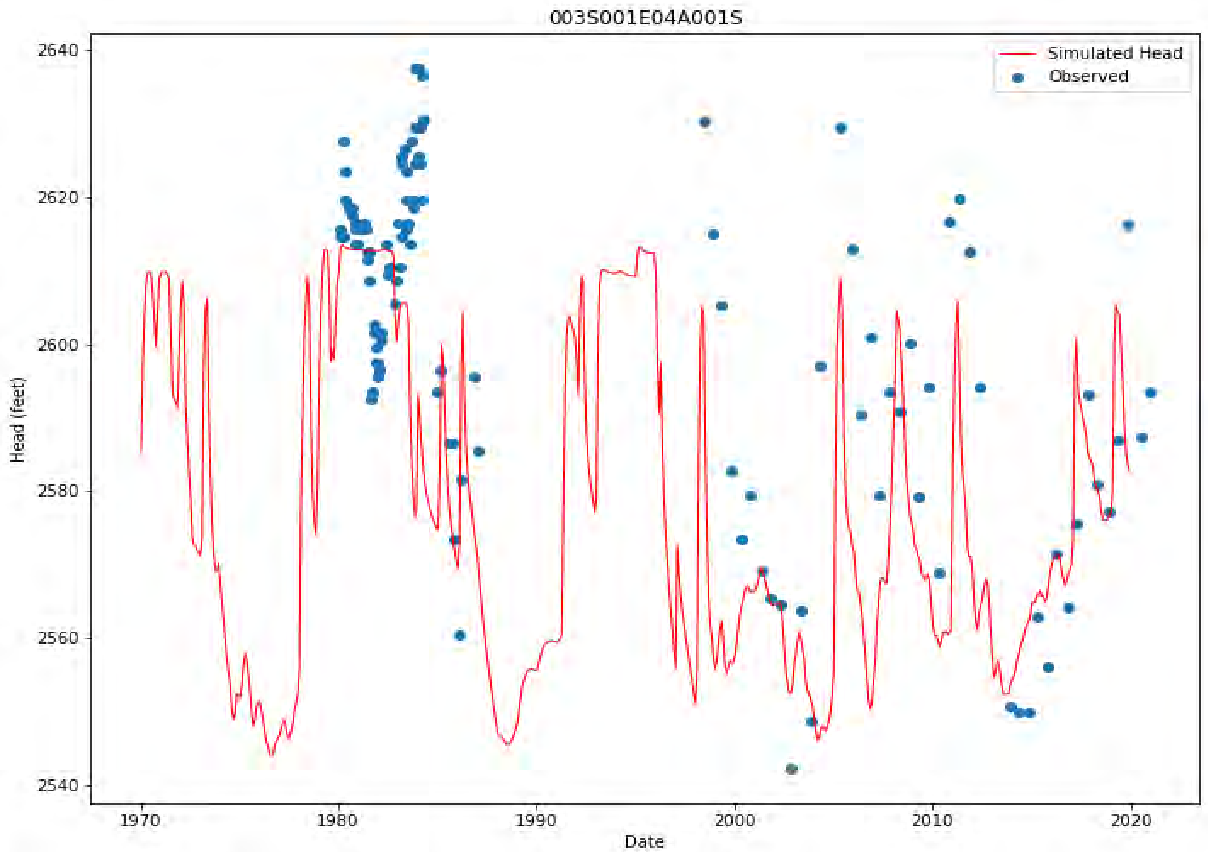


Figure 5.1p:
Hydrograph - 02S01W35J001S



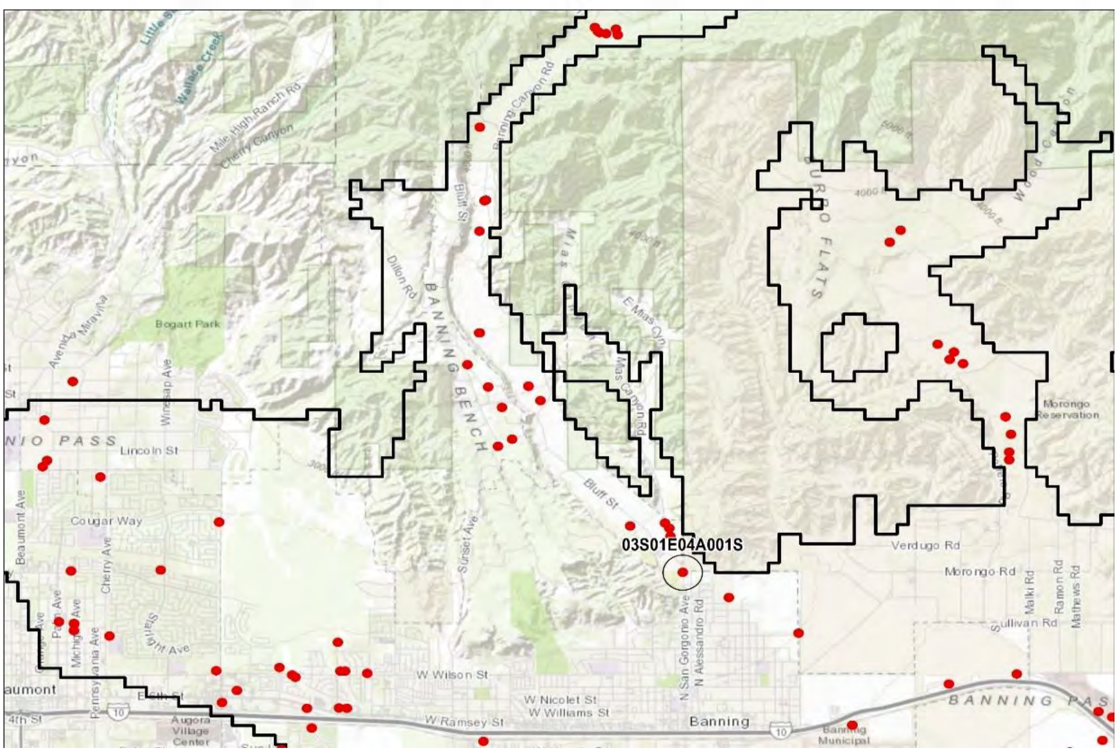
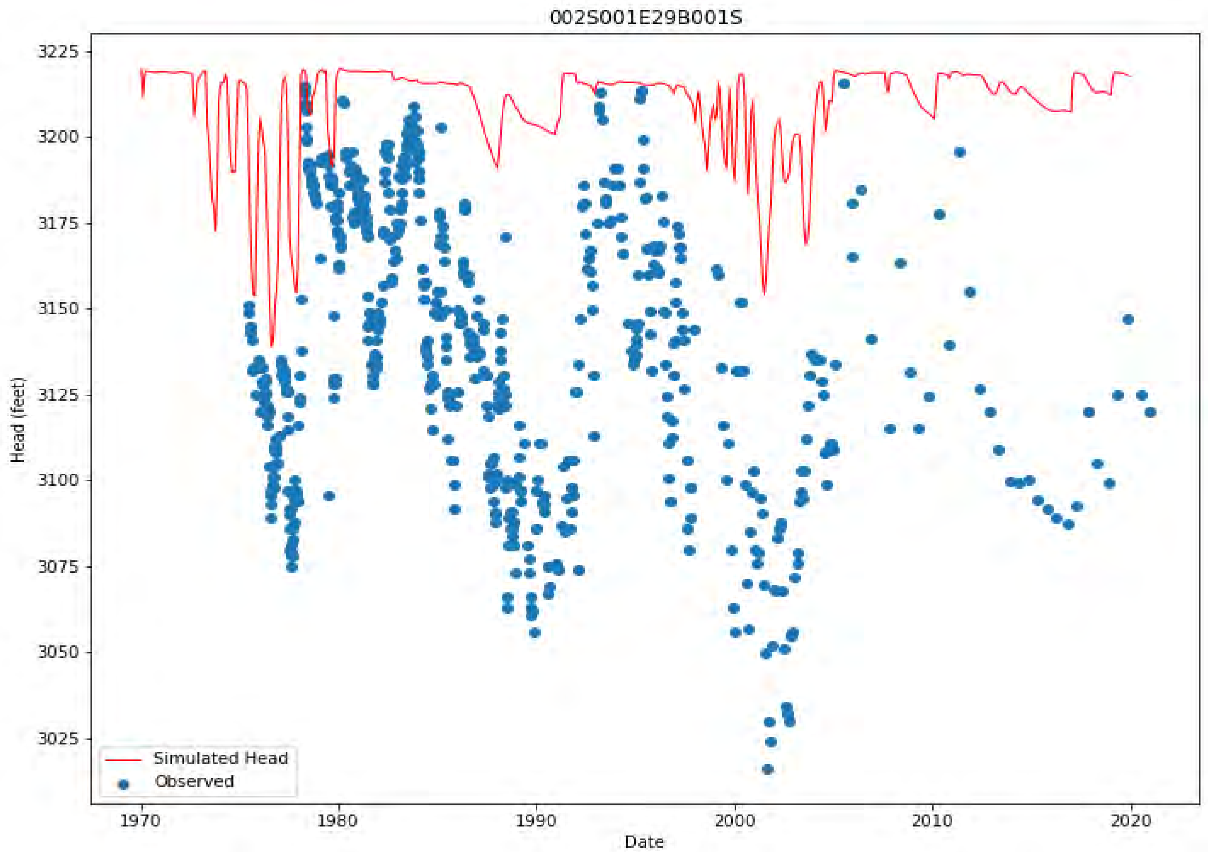


Figure 5.1q:
Hydrograph - 03S01E04A001S



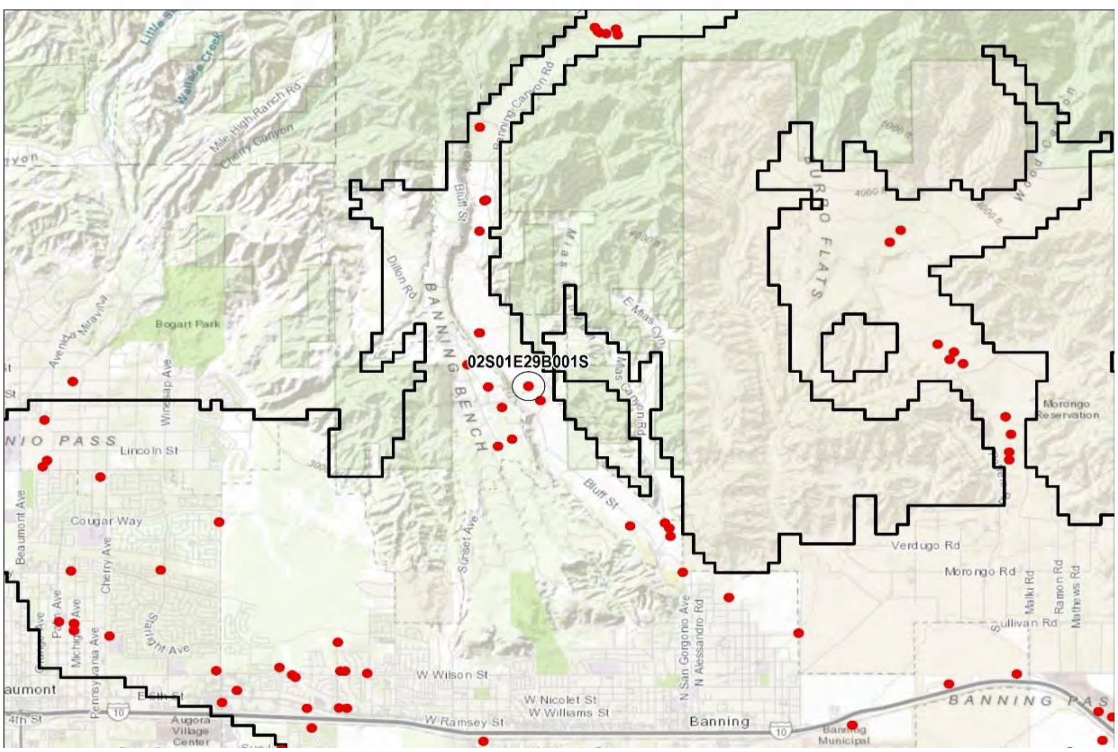
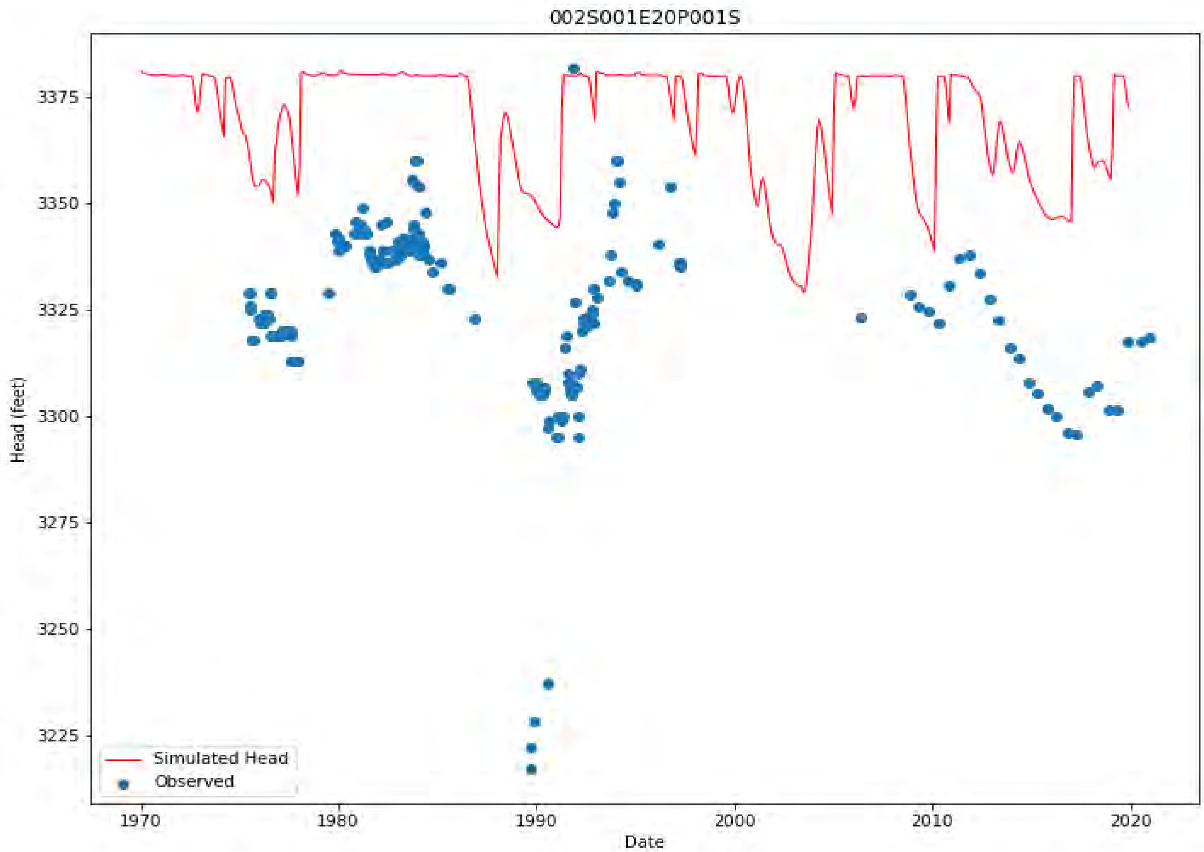


Figure 5.1r:
Hydrograph - 02S01E29B001S



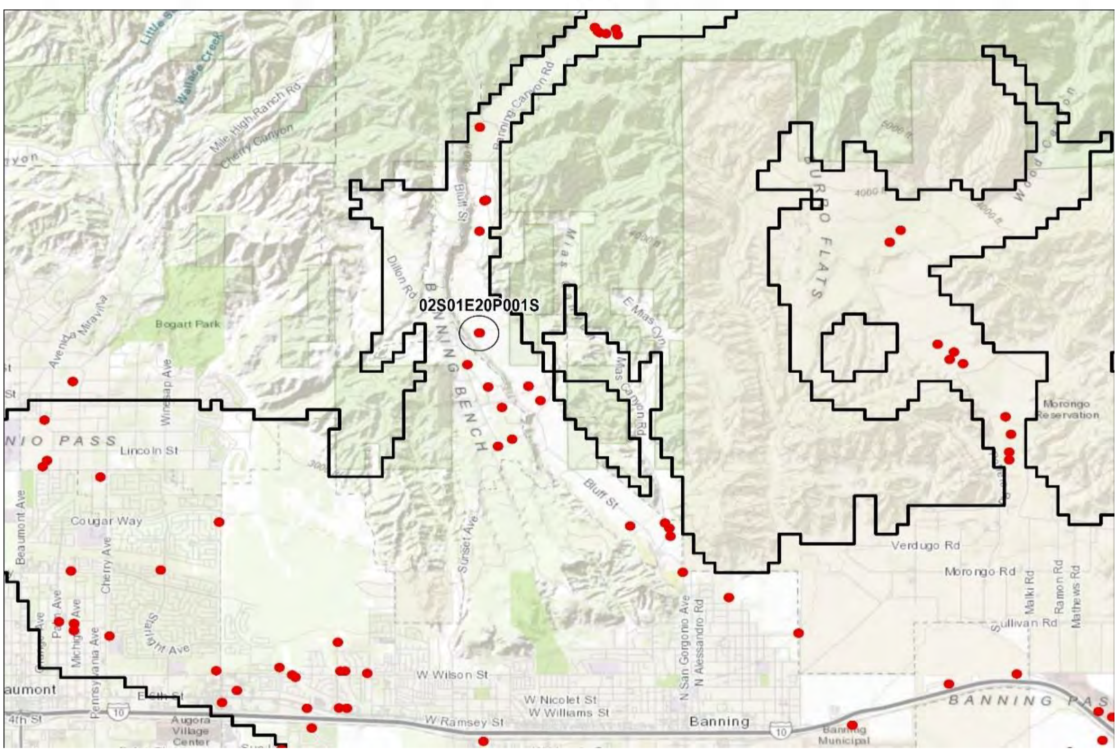
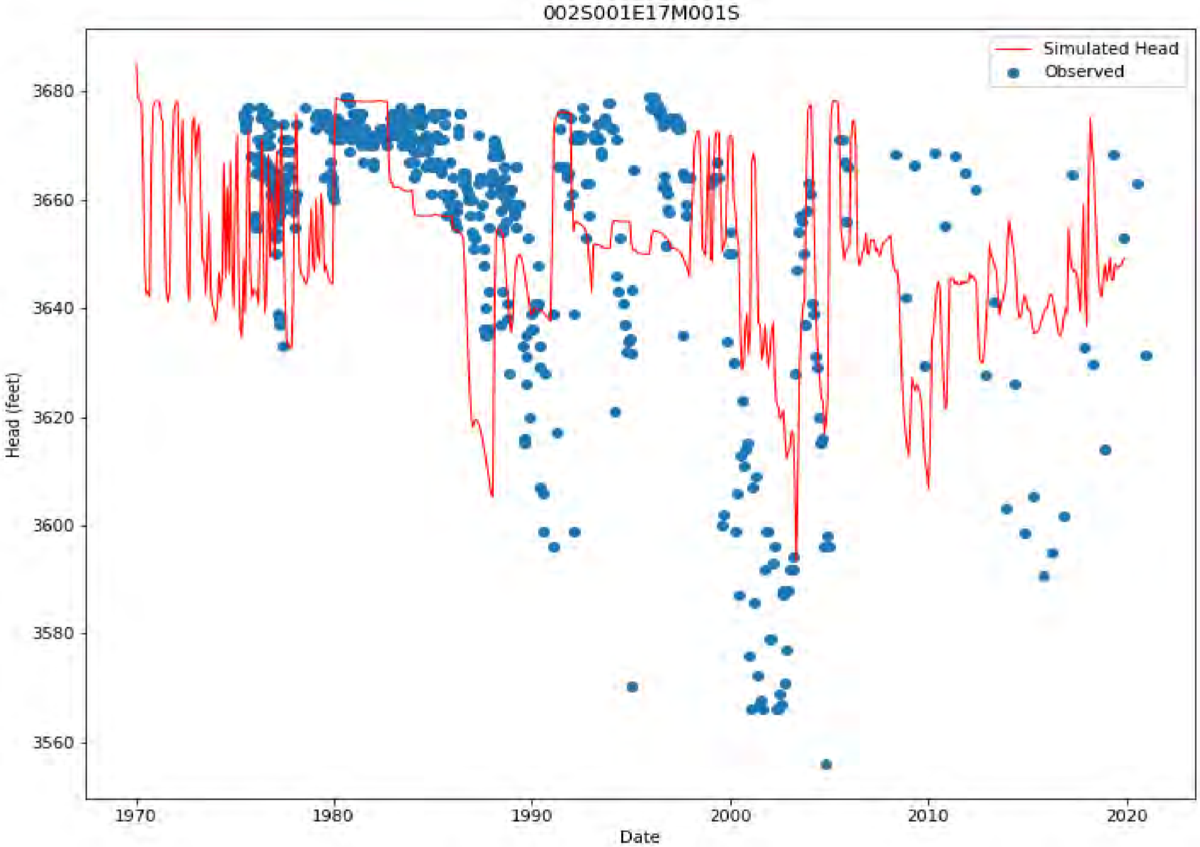


Figure 5.1s:
Hydrograph - 02S01E20P001S



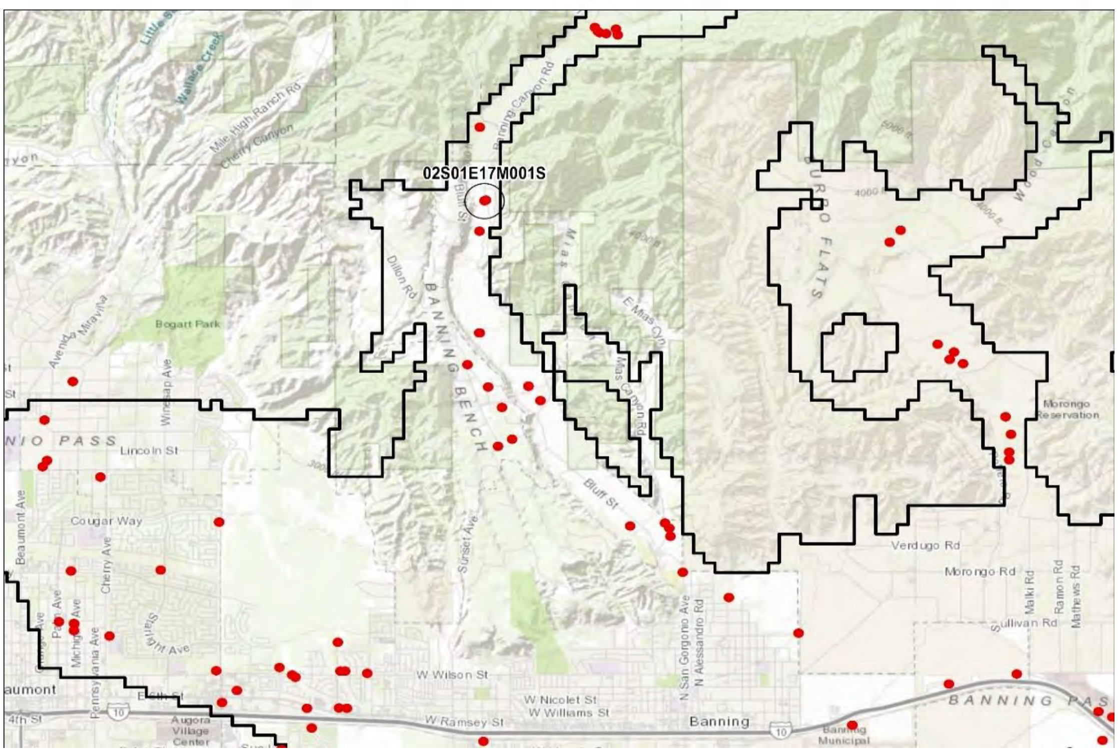
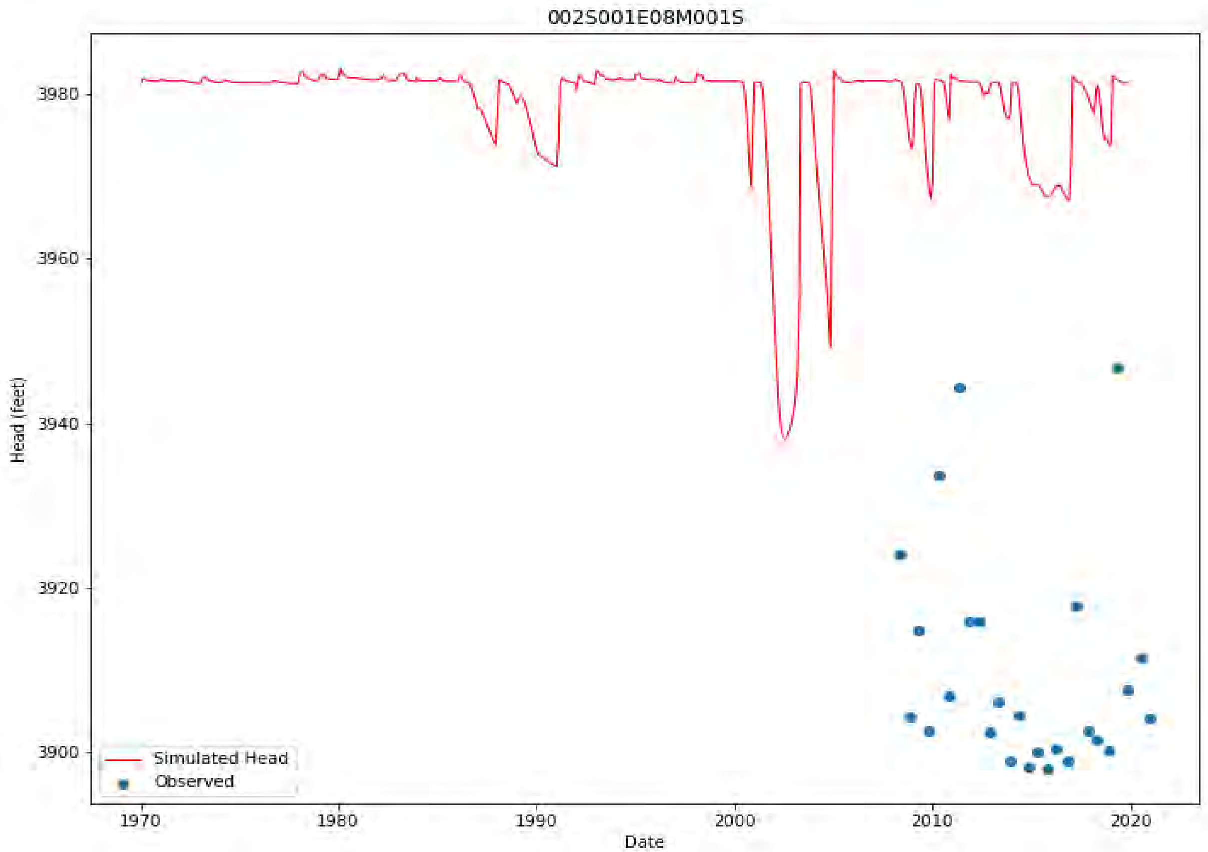


Figure 5.1t:
Hydrograph - 02S01E17M001S



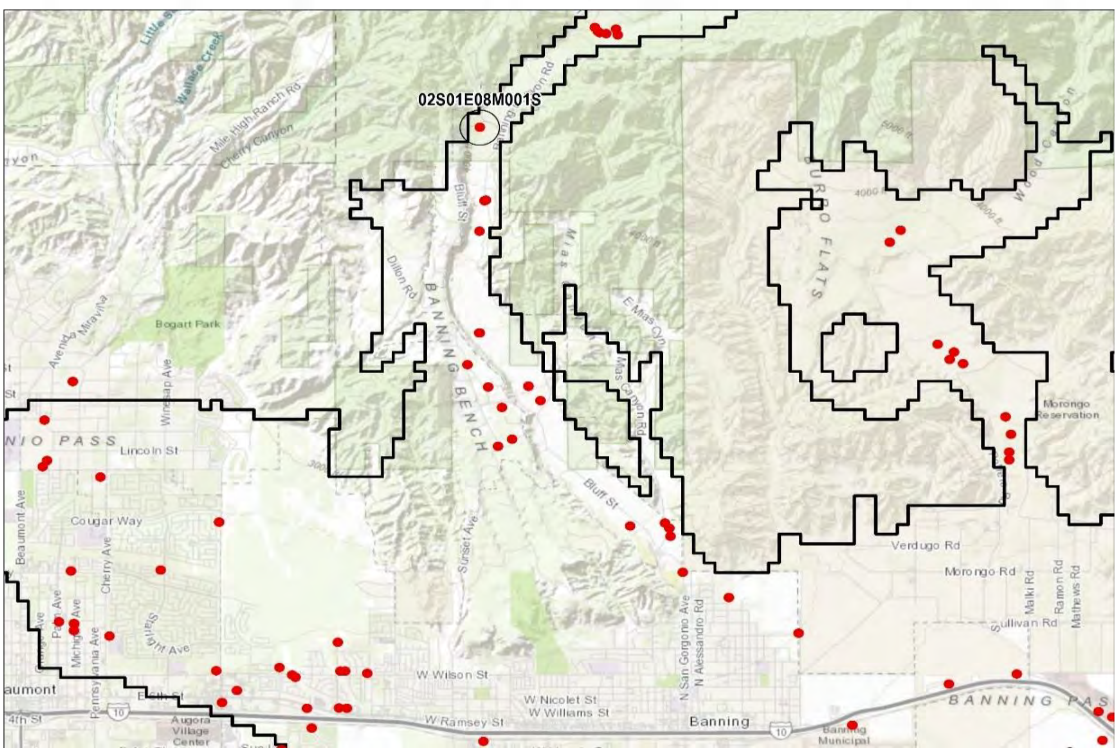


Figure 5.1u:
Hydrograph - 02S01E08M001S

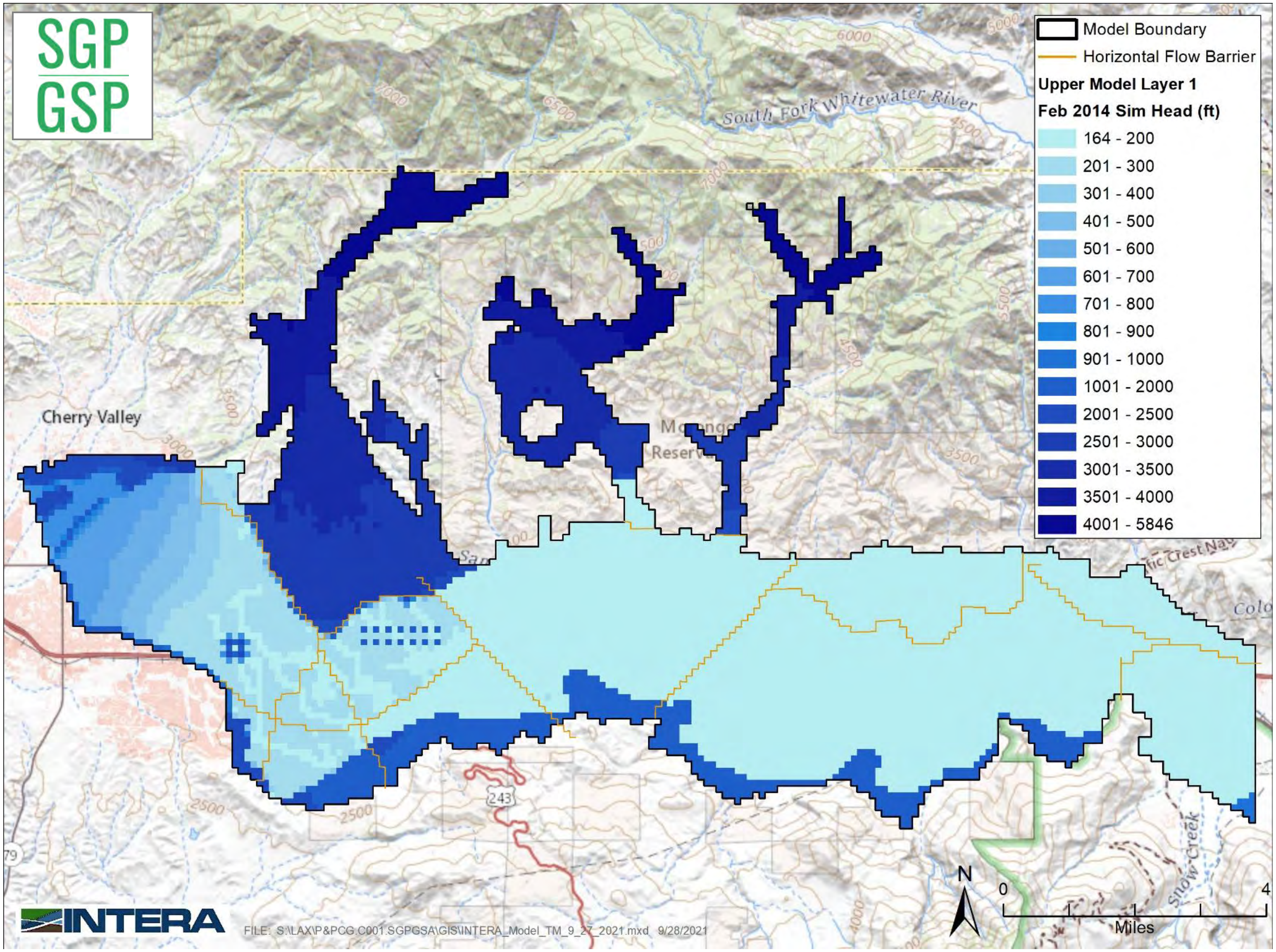


Figure 5.2a Upper Model Simulated Heads - Layer 1, Feb 2014

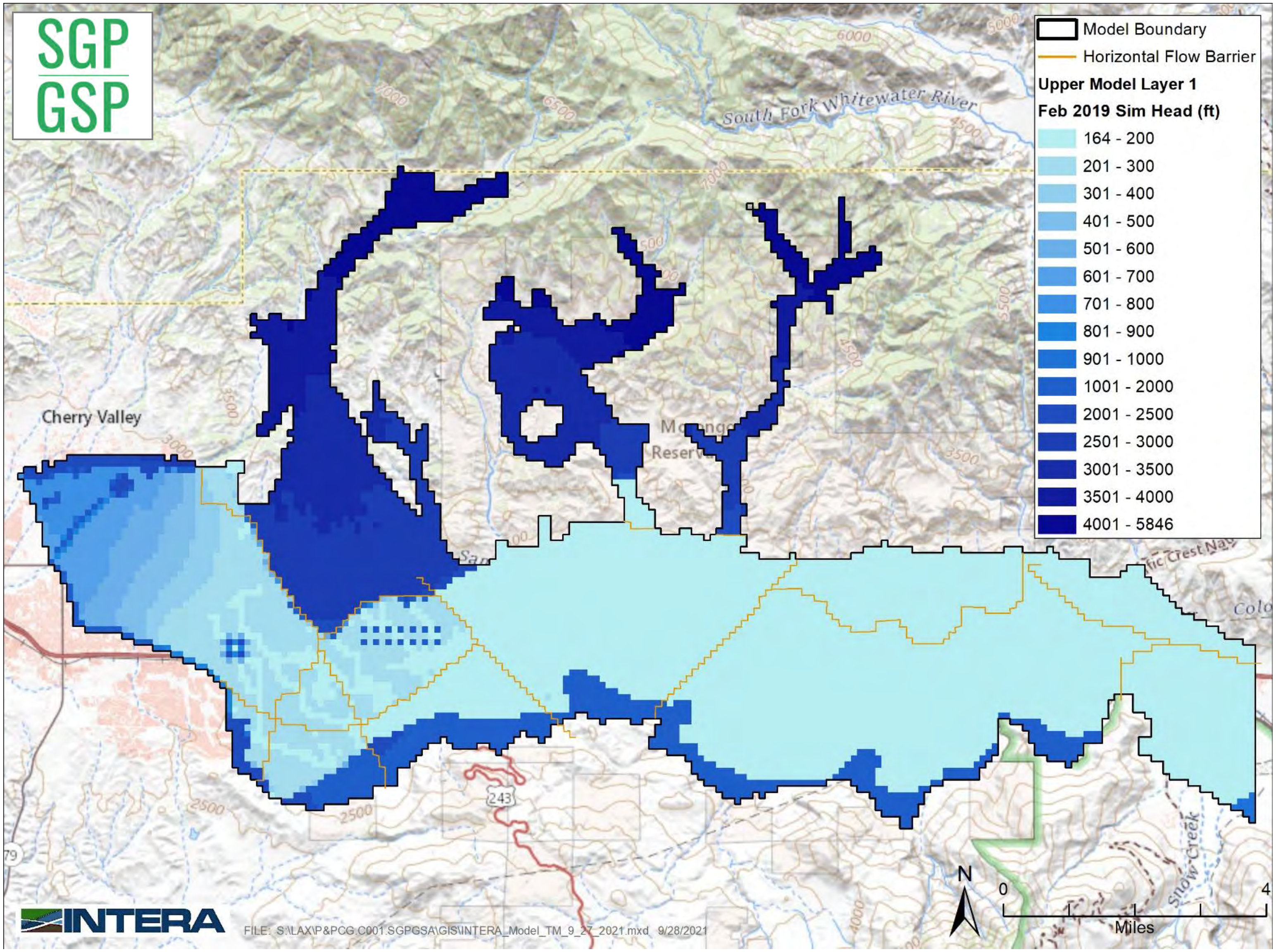


Figure 5.2b Upper Model Simulated Heads - Layer 1, Feb 2019

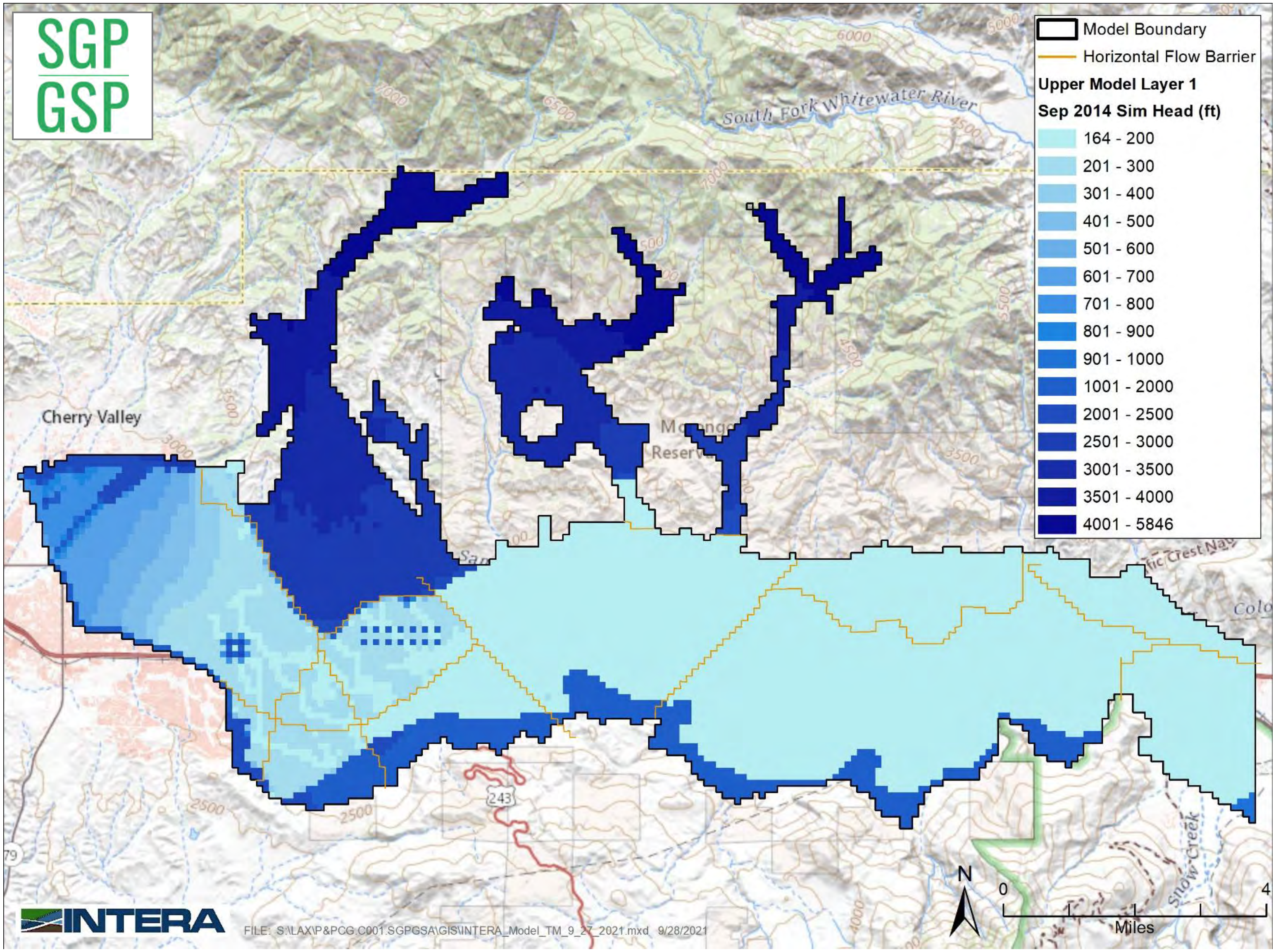


Figure 5.2c Upper Model Simulated Heads - Layer 1, Sep 2014

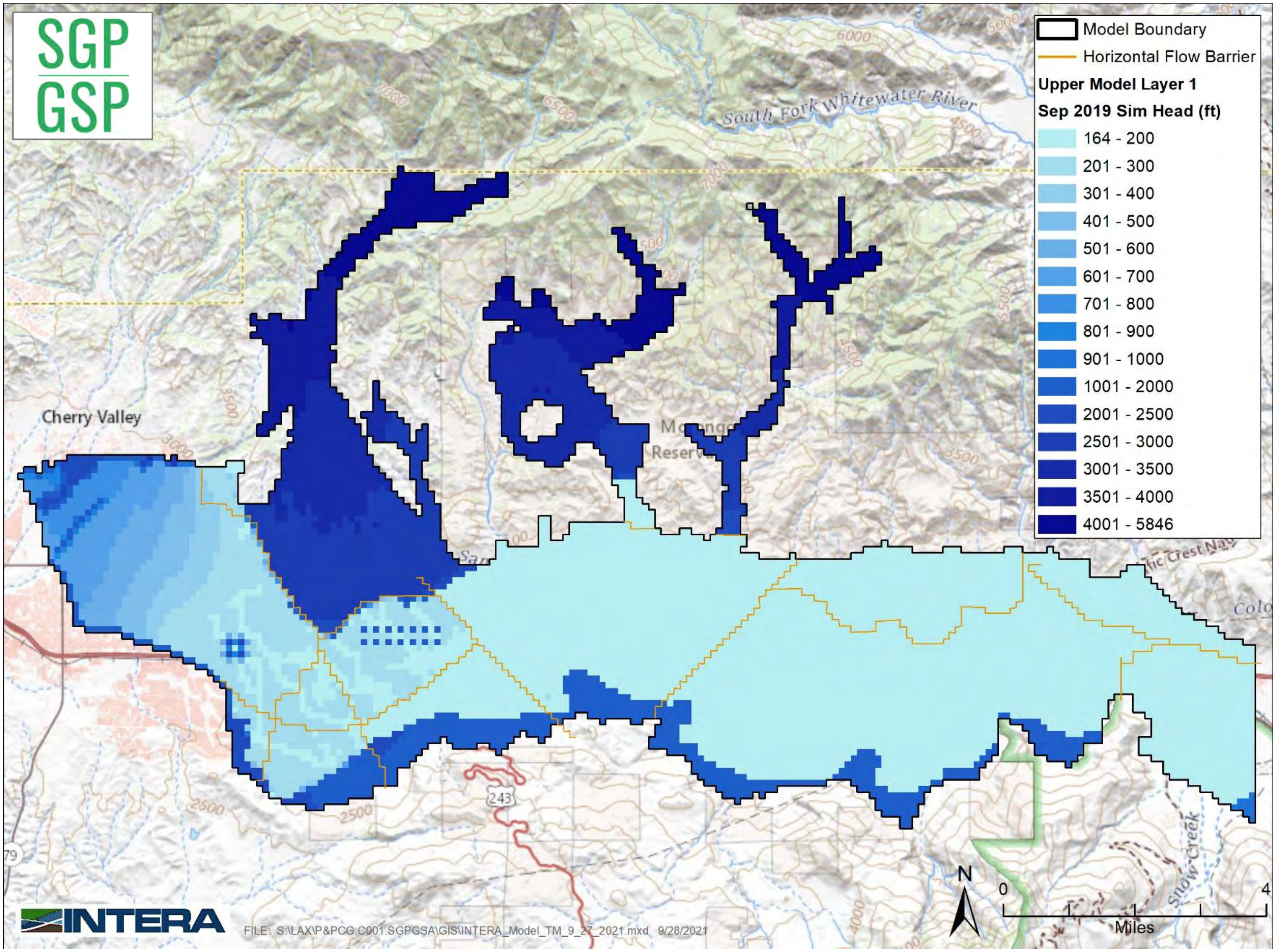


Figure 5.2d Upper Model Simulated Heads - Layer 1, Sep 2019

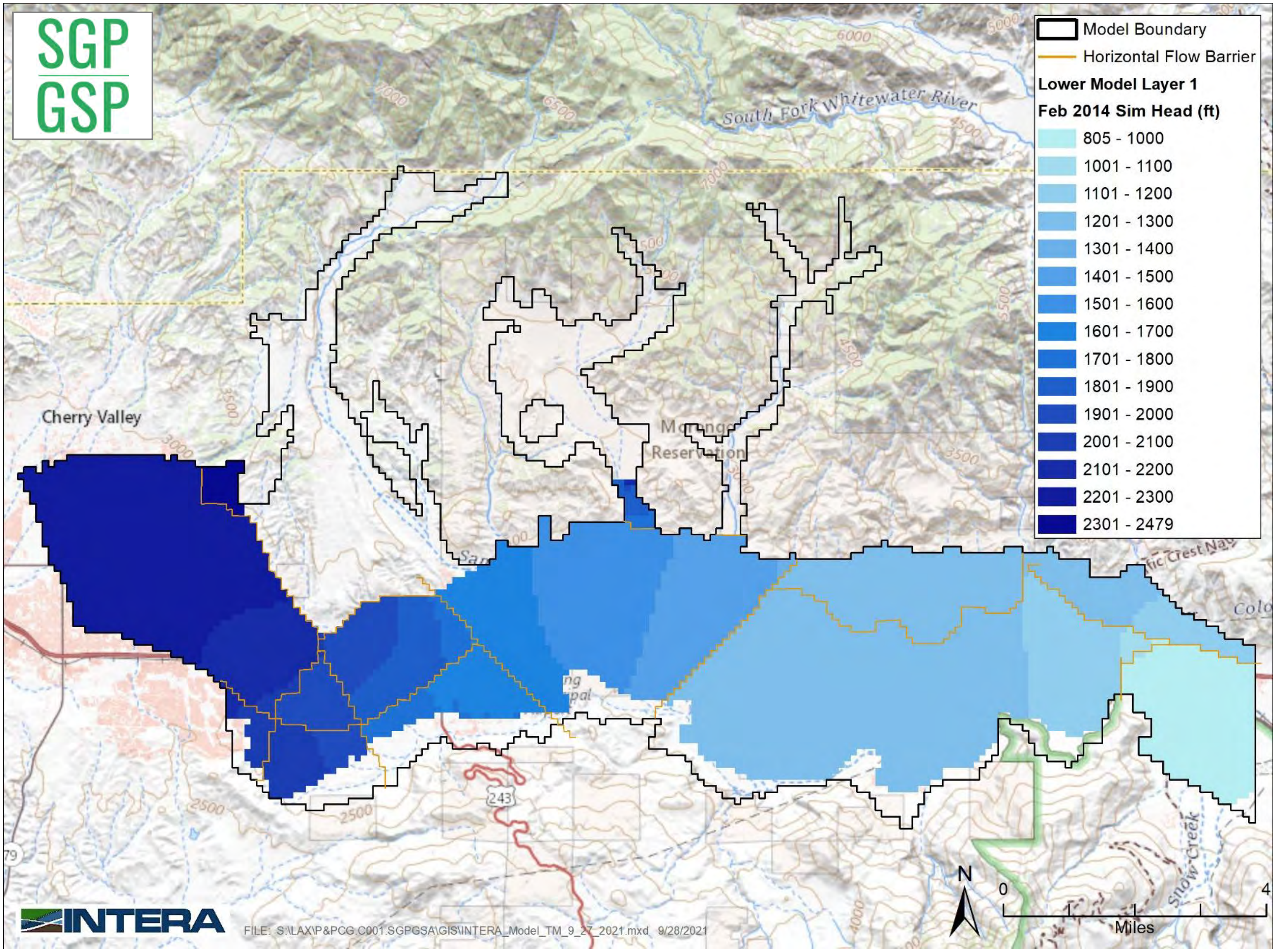


Figure 5.3a Lower Model Simulated Heads - Layer 1, Feb 2014

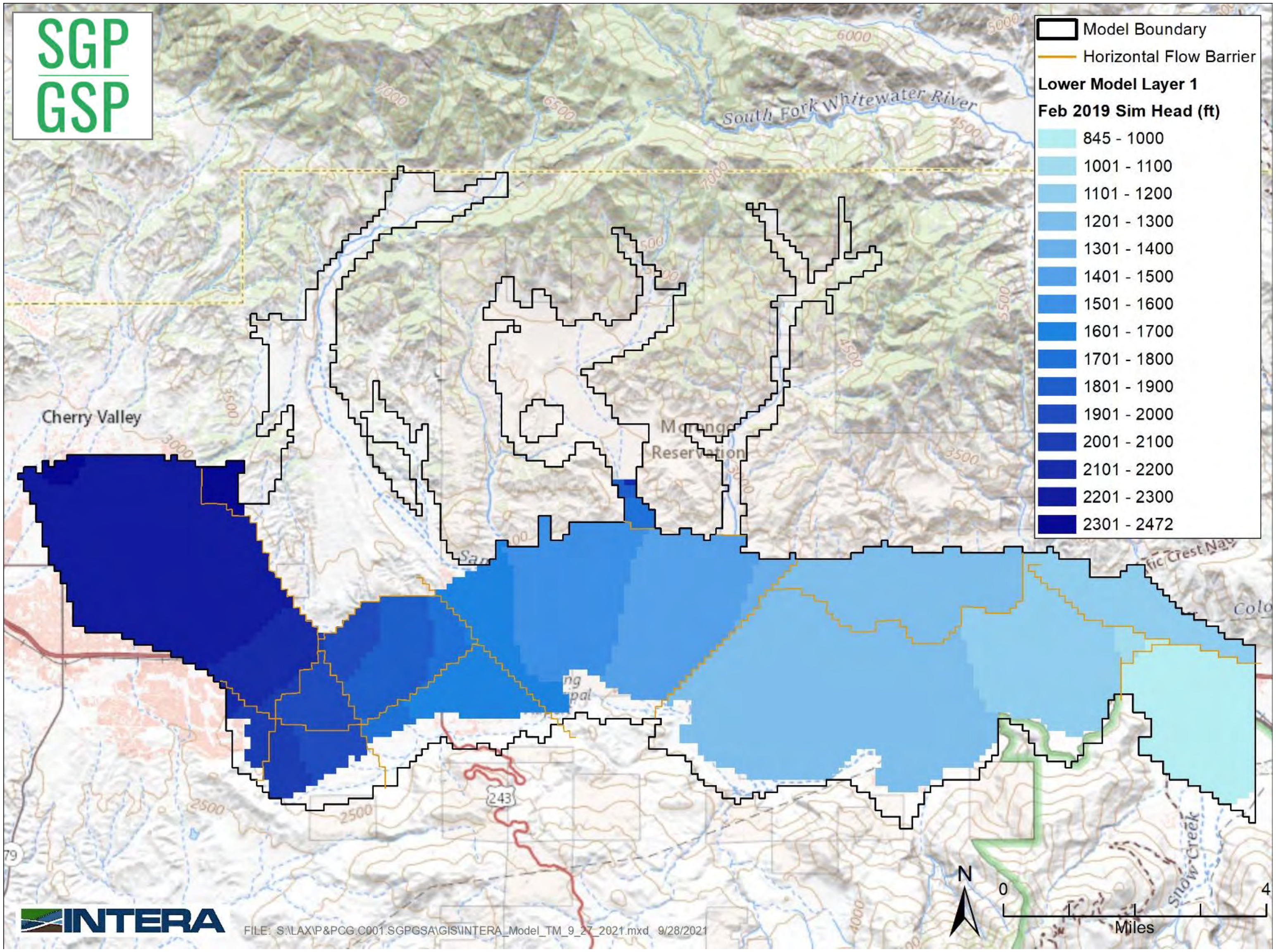


Figure 5.3b Lower Model Simulated Heads - Layer 1, Feb 2019

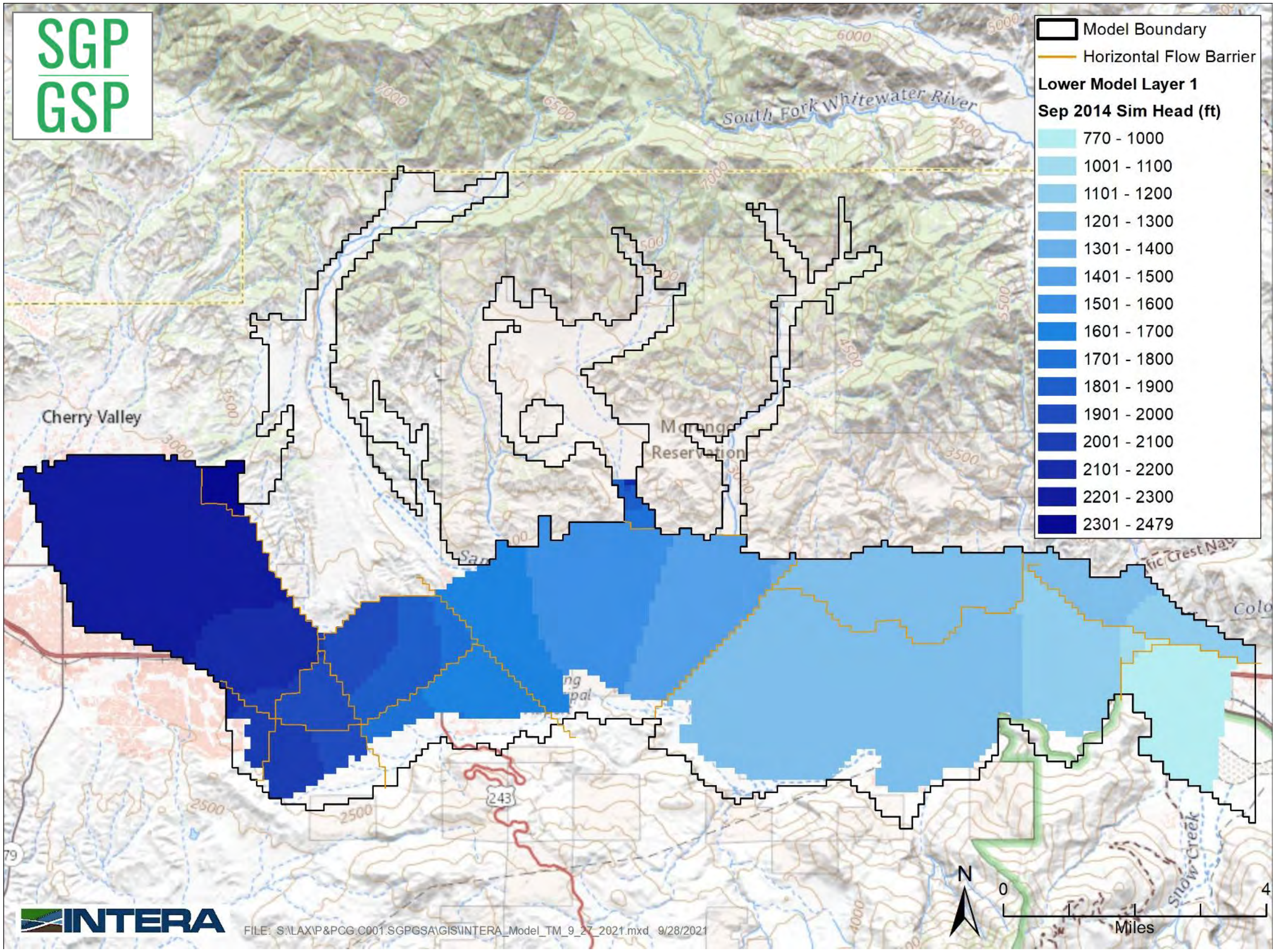


Figure 5.3c Lower Model Simulated Heads - Layer 1, Sep 2014

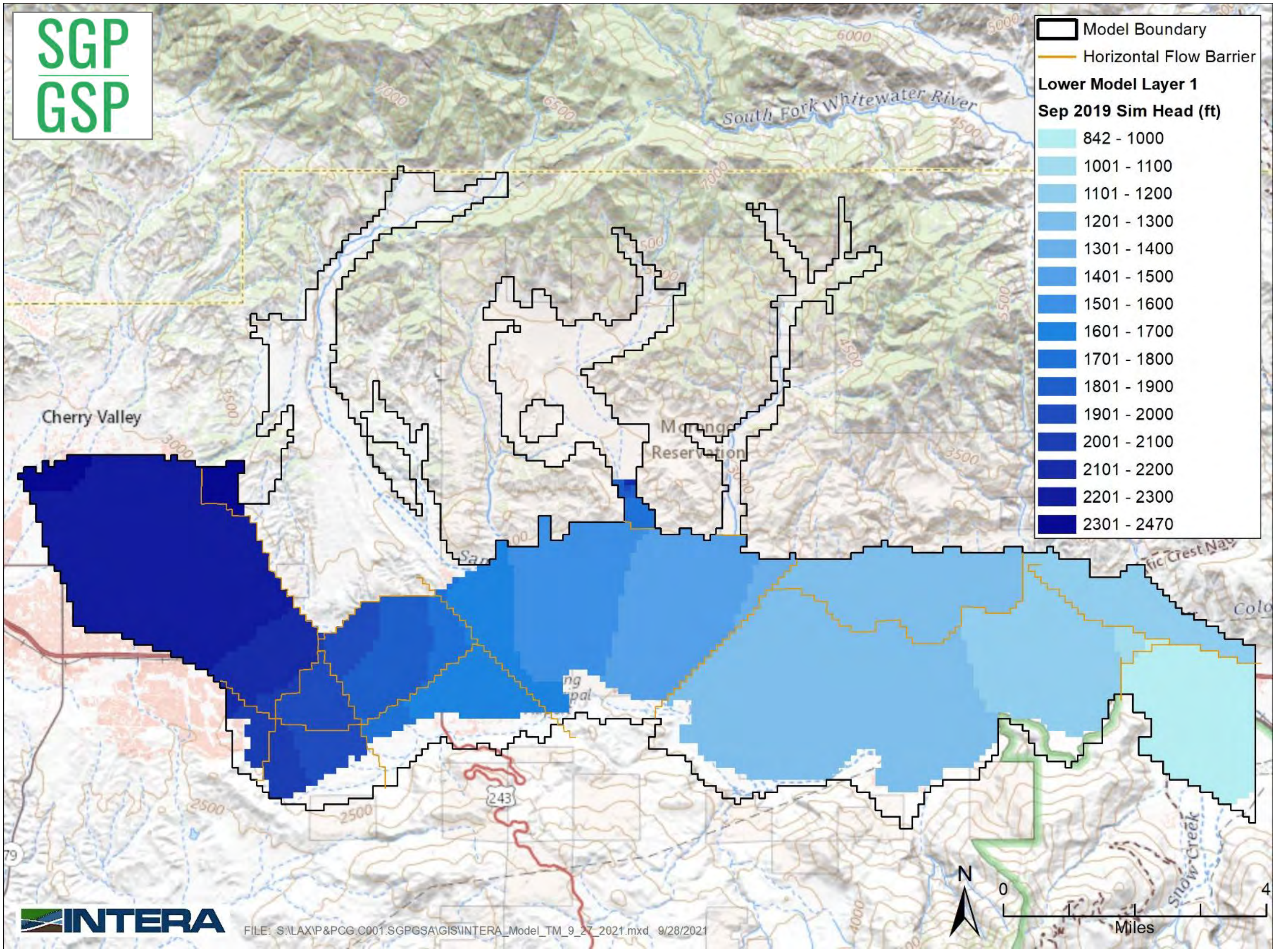
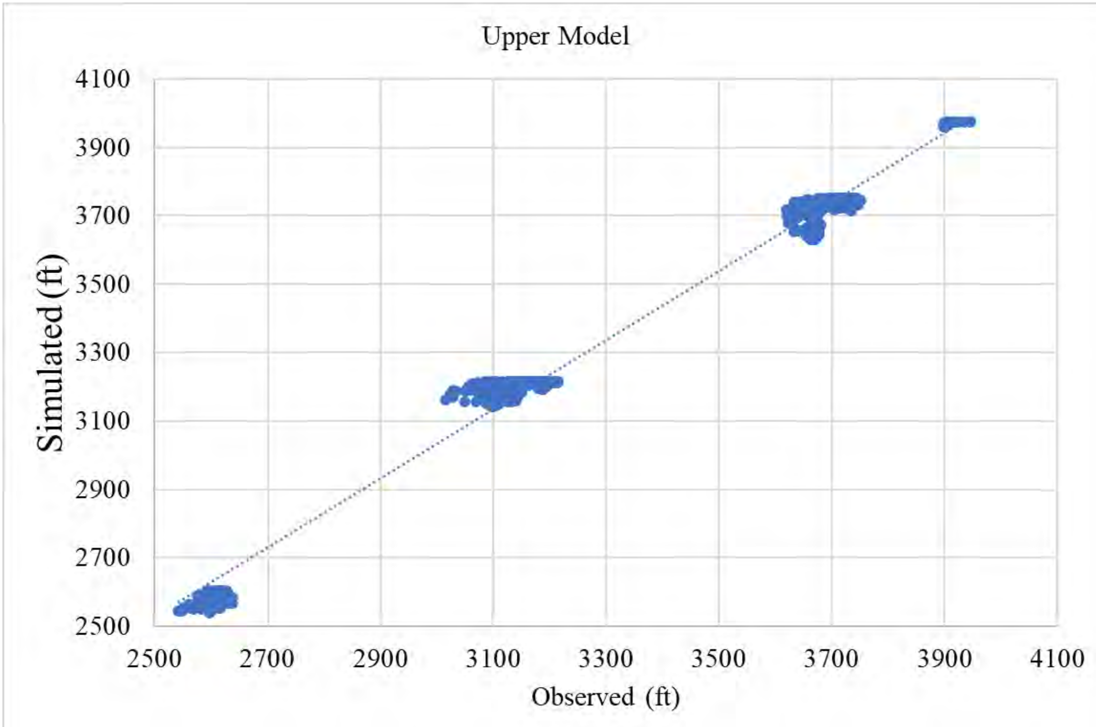


Figure 5.3d Lower Model Simulated Heads - Layer 1, Sep 2019



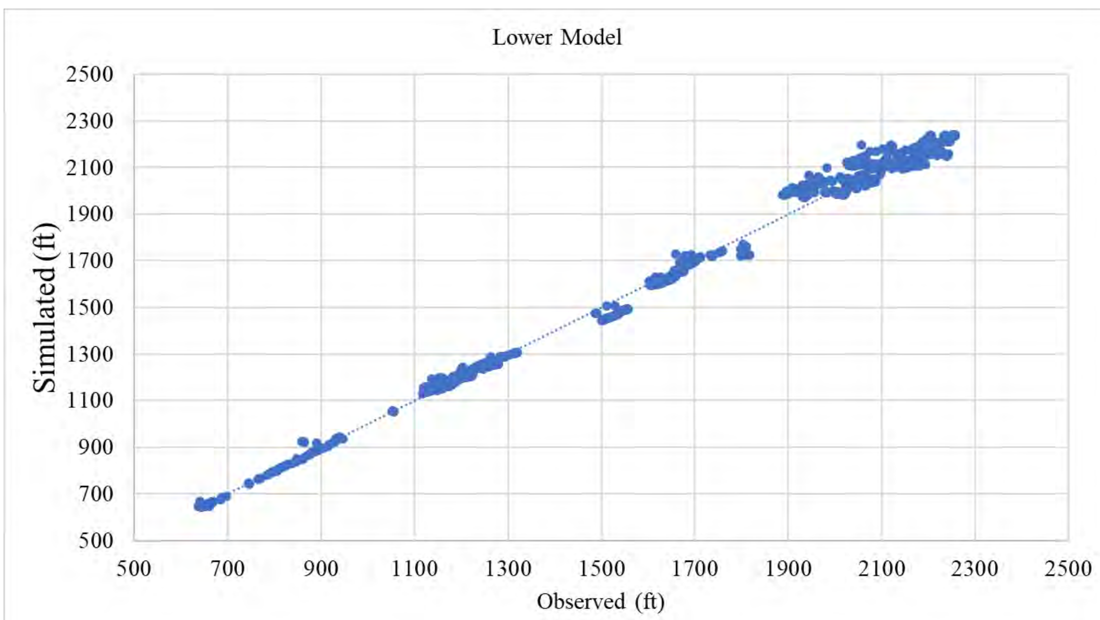


Figure 5.4 Observed versus Simulated Groundwater Levels in the Upper and Lower Model

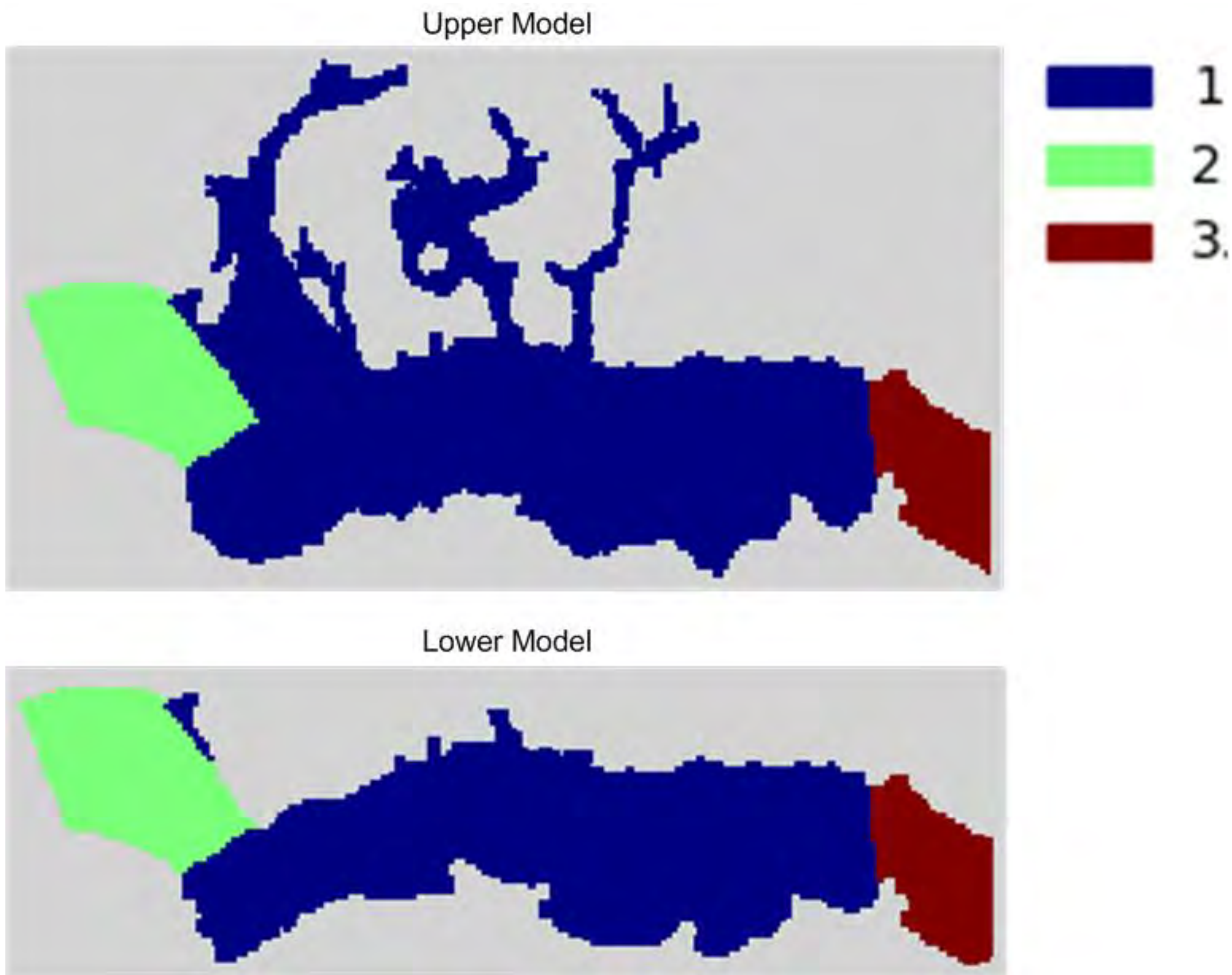


Figure 5.5 SGP GSP Water Budget Area

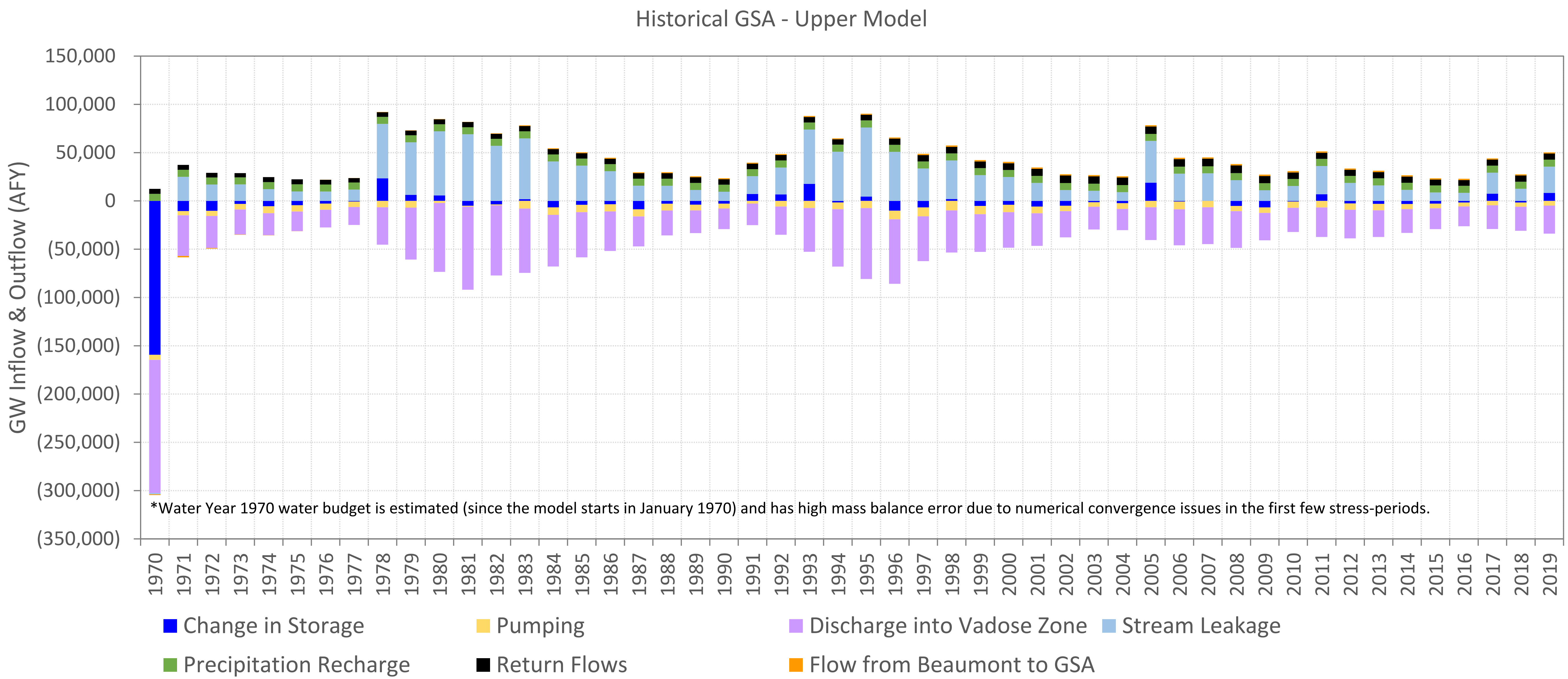


Figure 5.6a Water Budget for the SGP GSP Area, Historical - Upper Model

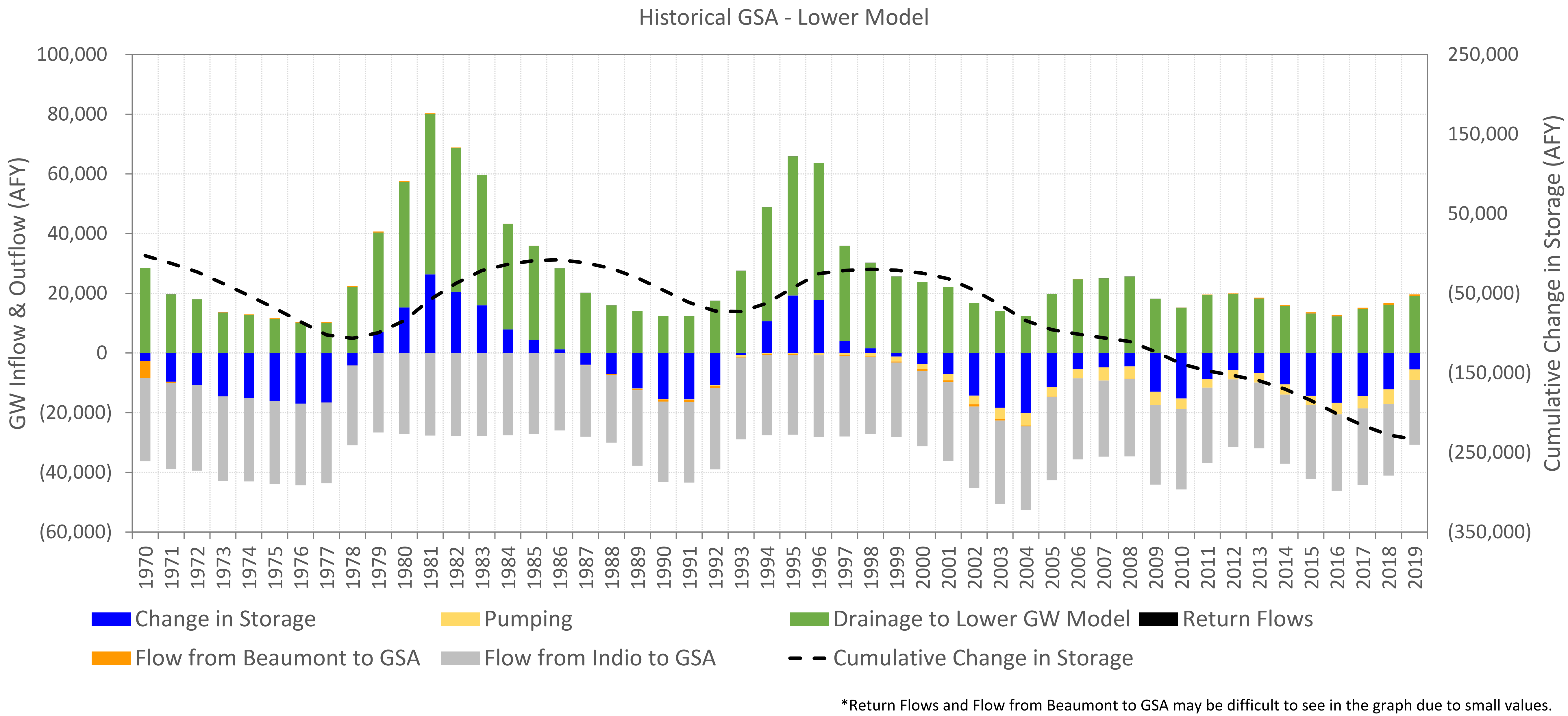


Figure 5.6b Water Budget for the SGP GSP Area, Historical - Lower Model

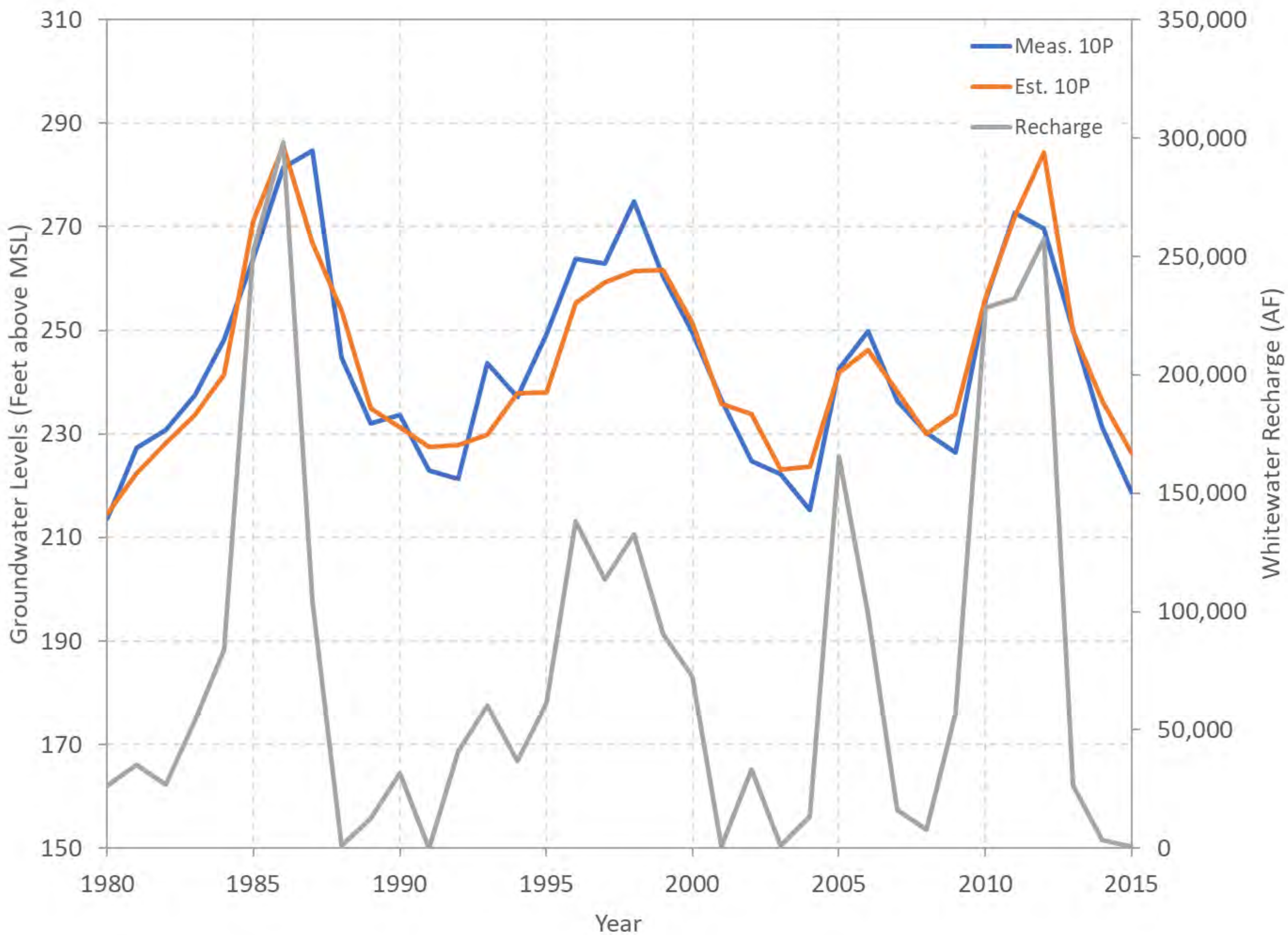


Figure 6.1 Historical model and estimated GHB heads (at well 10P) compared to Whitewater Recharge

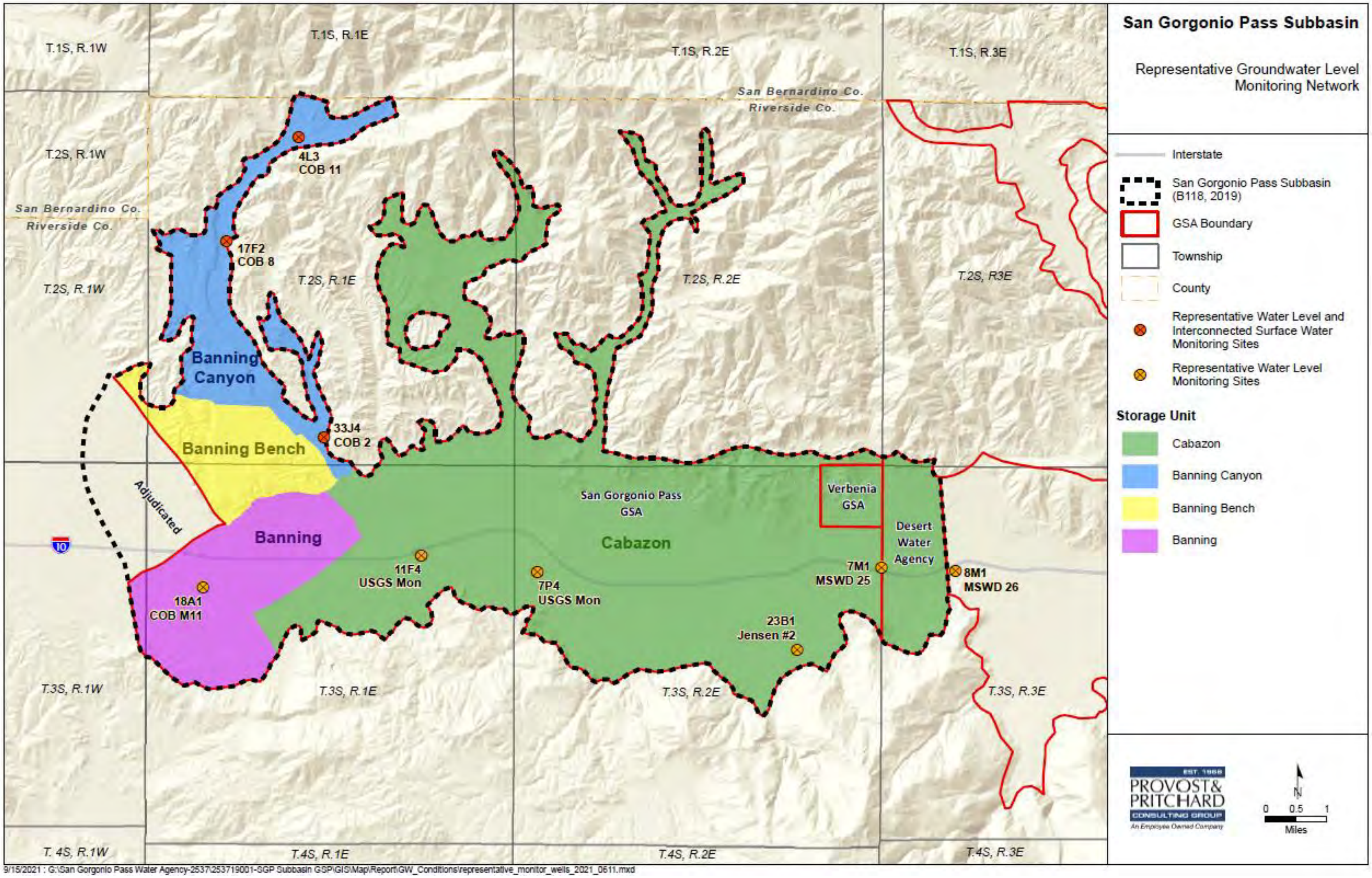


Figure 6.2 Representative Monitoring Sites

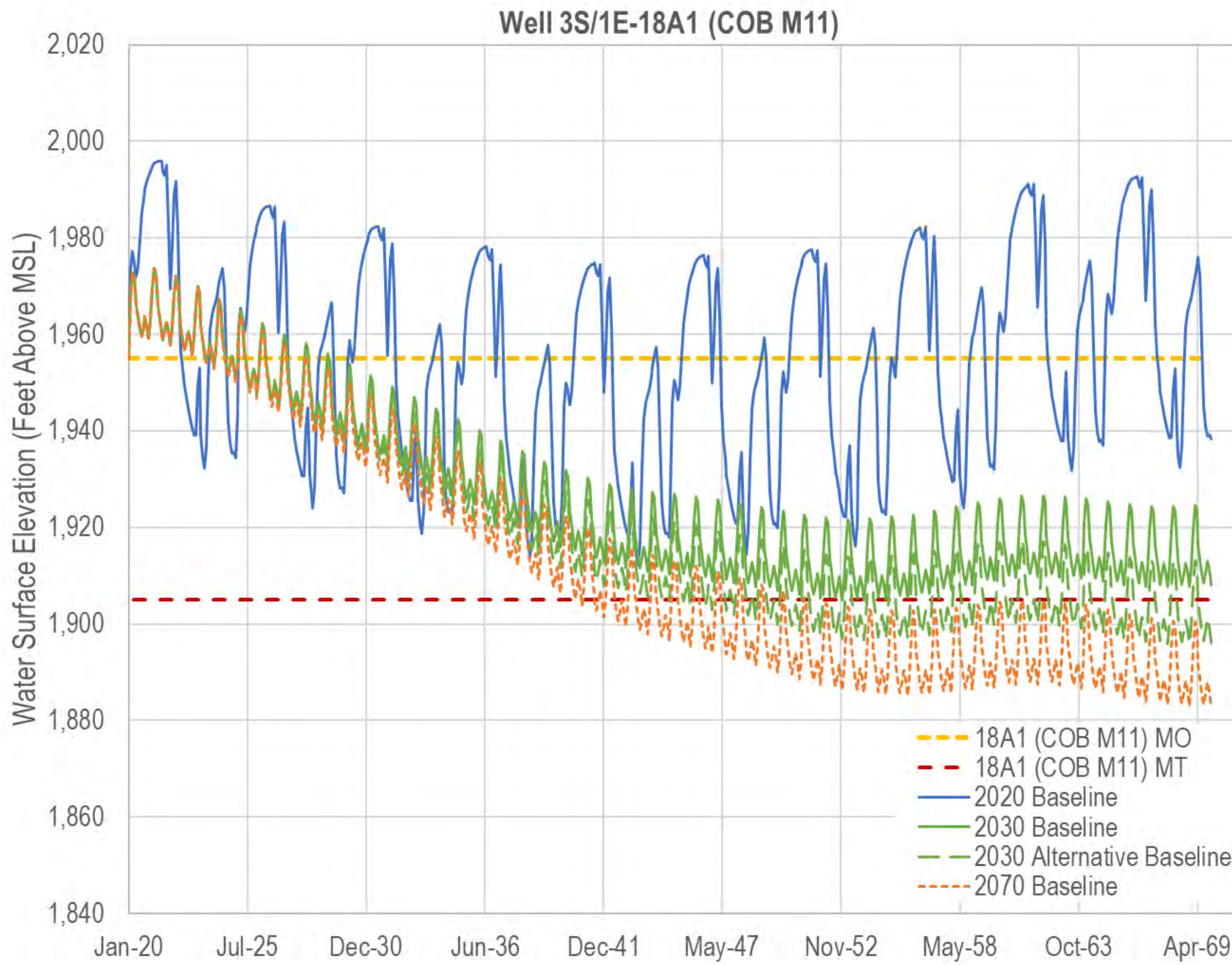


Figure 6.3a Hydrograph – Baseline Scenarios (Well 3S/1E-18A1)

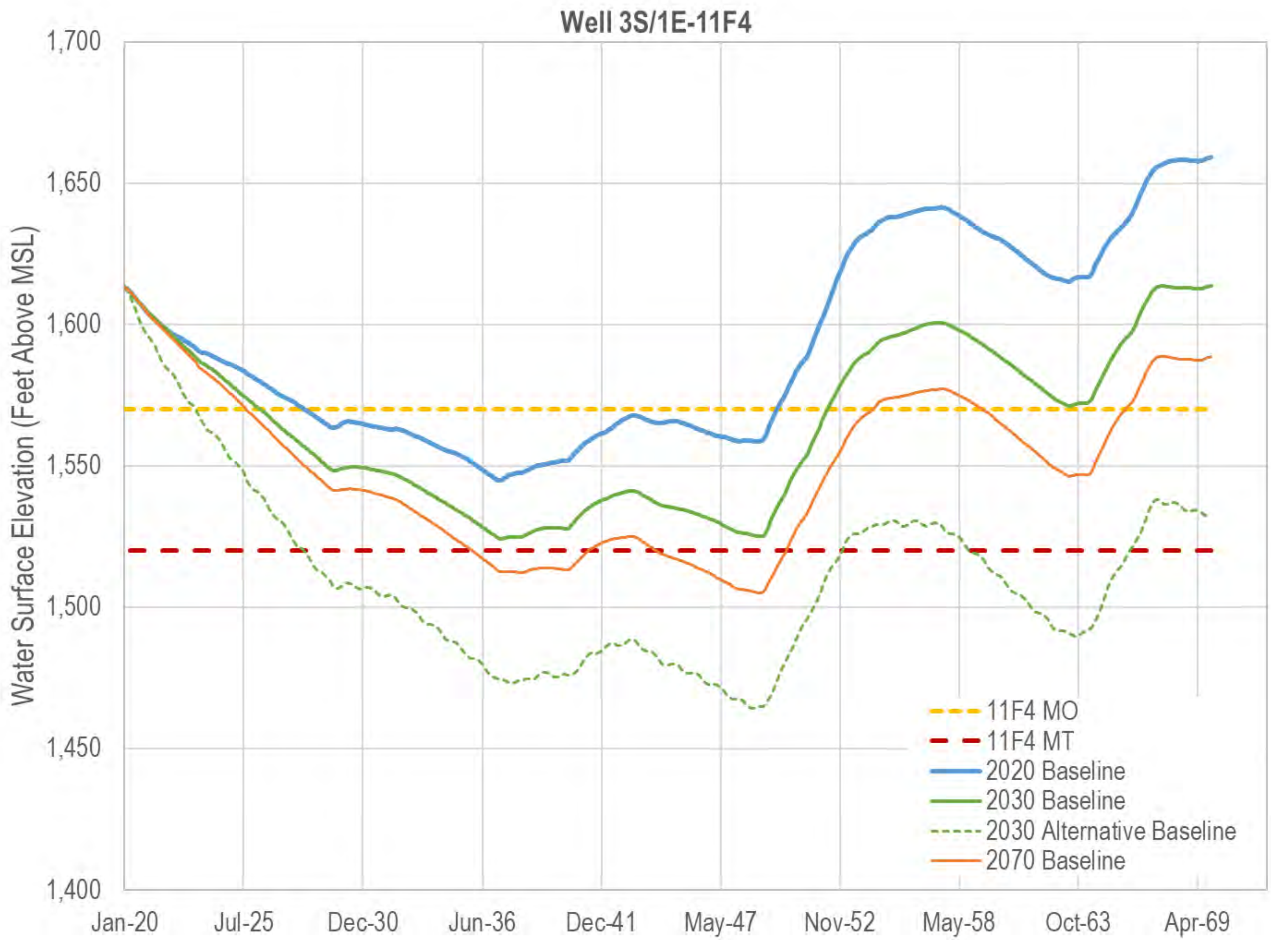


Figure 6.3b Hydrograph – Baseline Scenarios (Well 3S/1E-11F4)

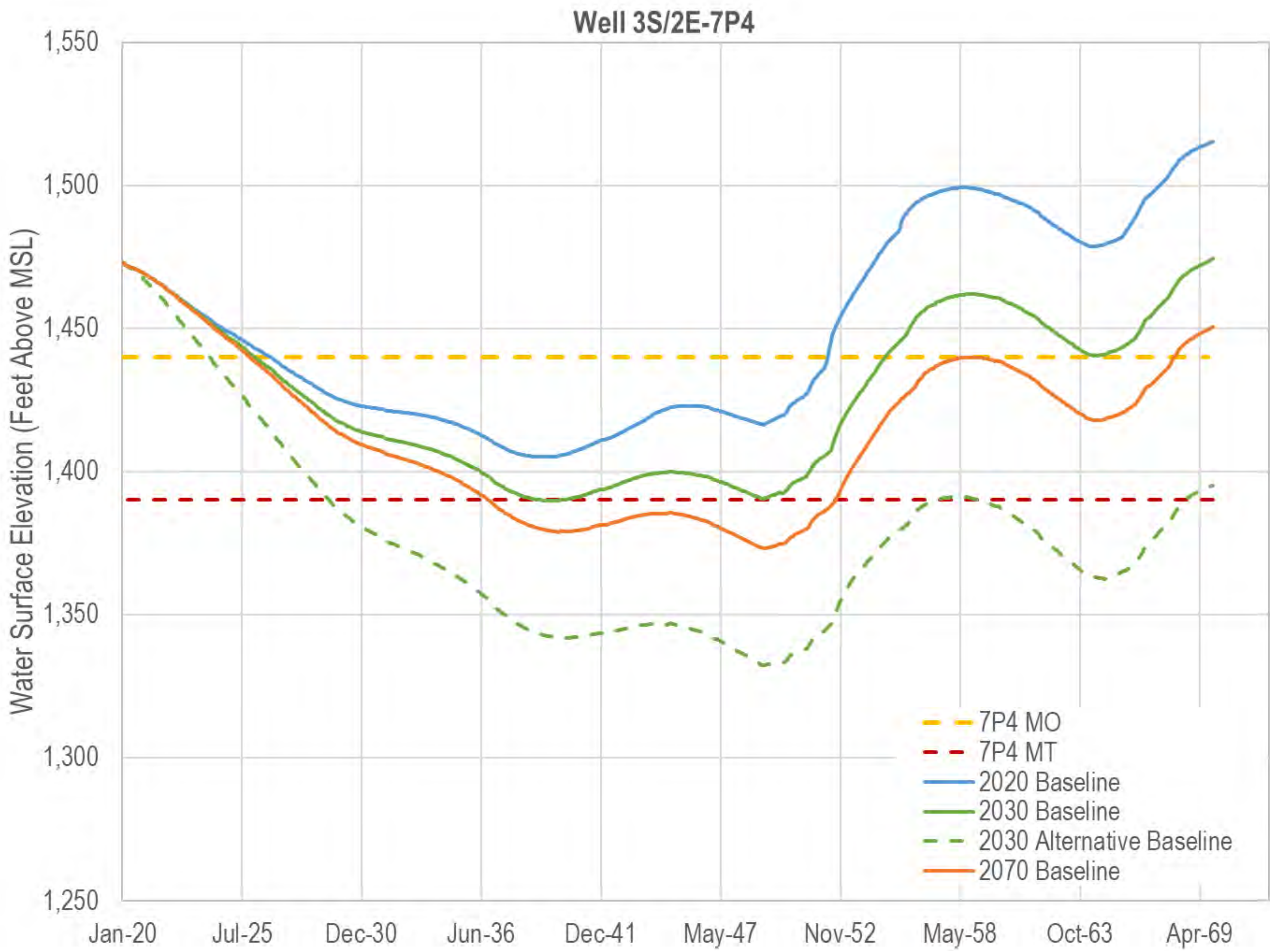


Figure 6.3c Hydrograph – Baseline Scenarios (Well 3S/2E-7P4)

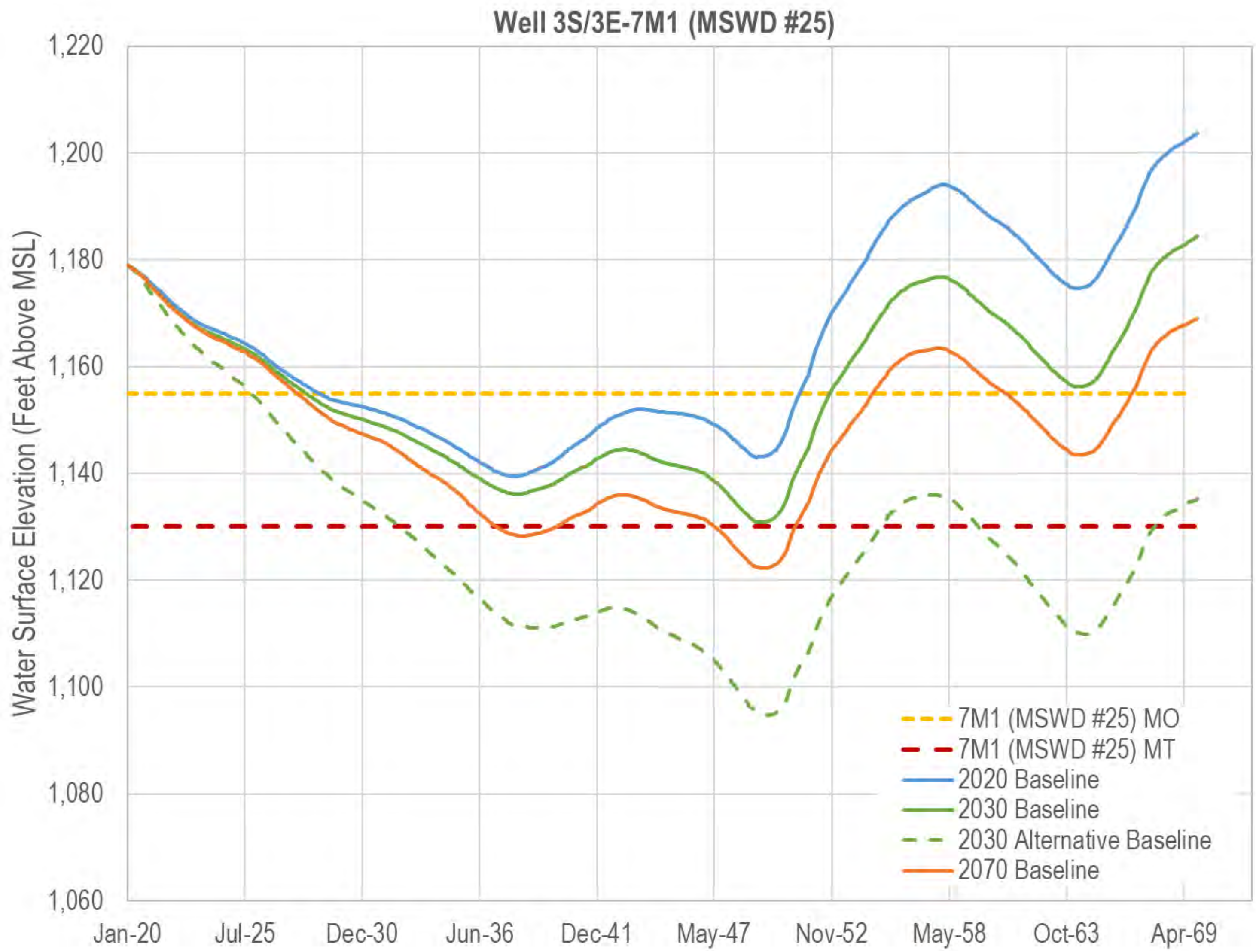


Figure 6.3d Hydrograph – Baseline Scenarios (Well 3S/3E-7M1)

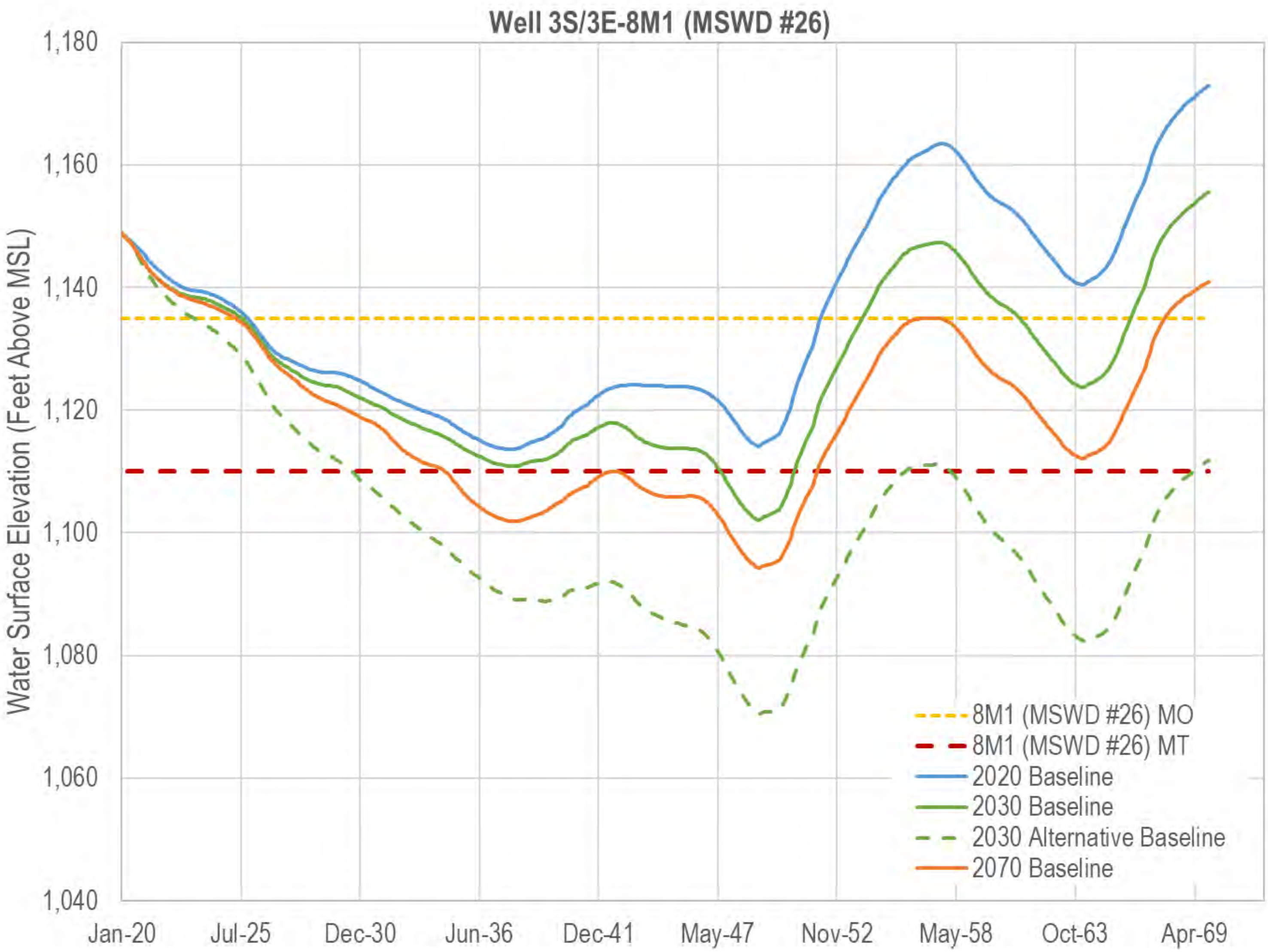


Figure 6.3e Hydrograph – Baseline Scenarios (Well 3S/3E-8M1)

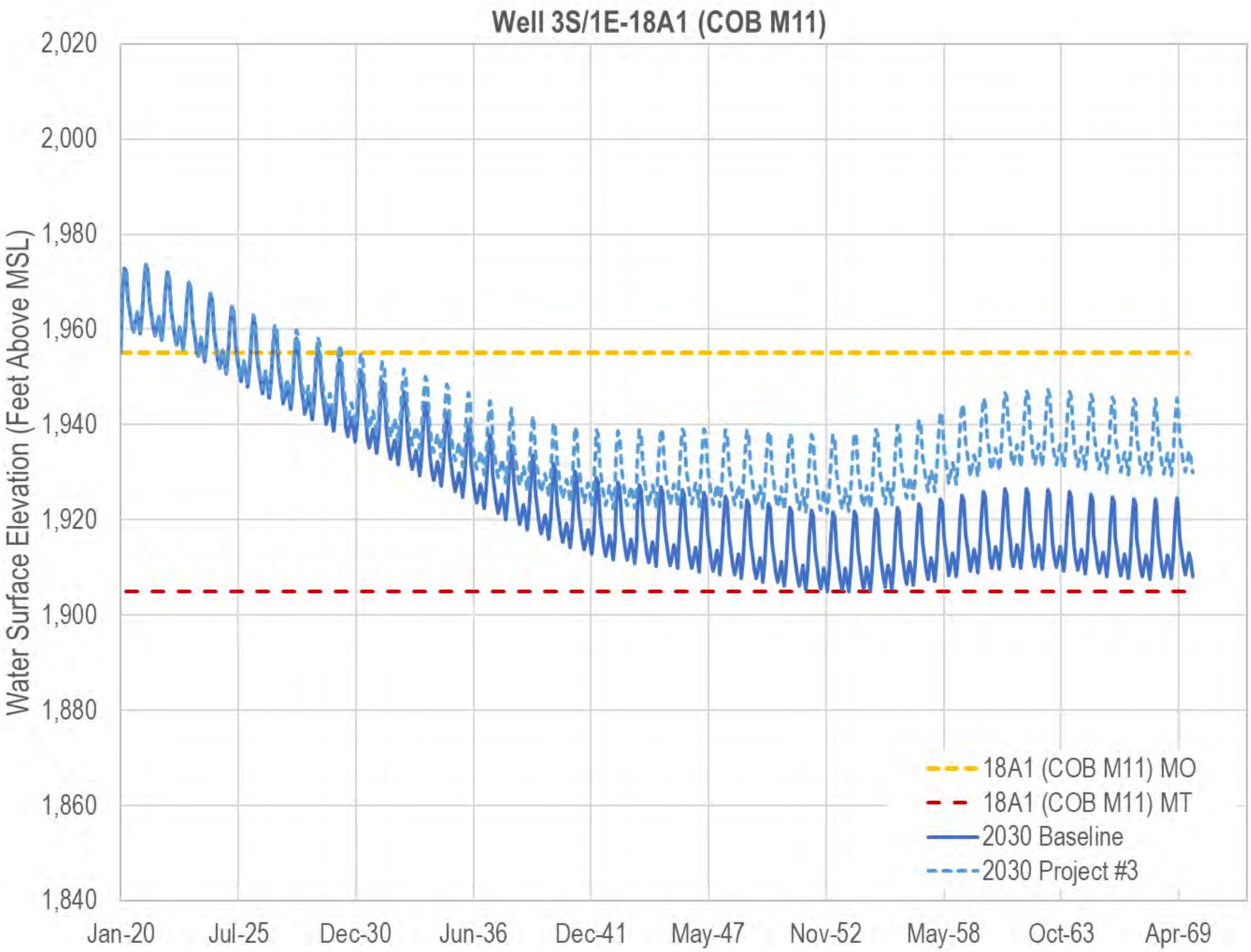


Figure 6.4a Hydrograph – 2030 Baseline and PMA Scenarios (Well 3S/1E-18A1)

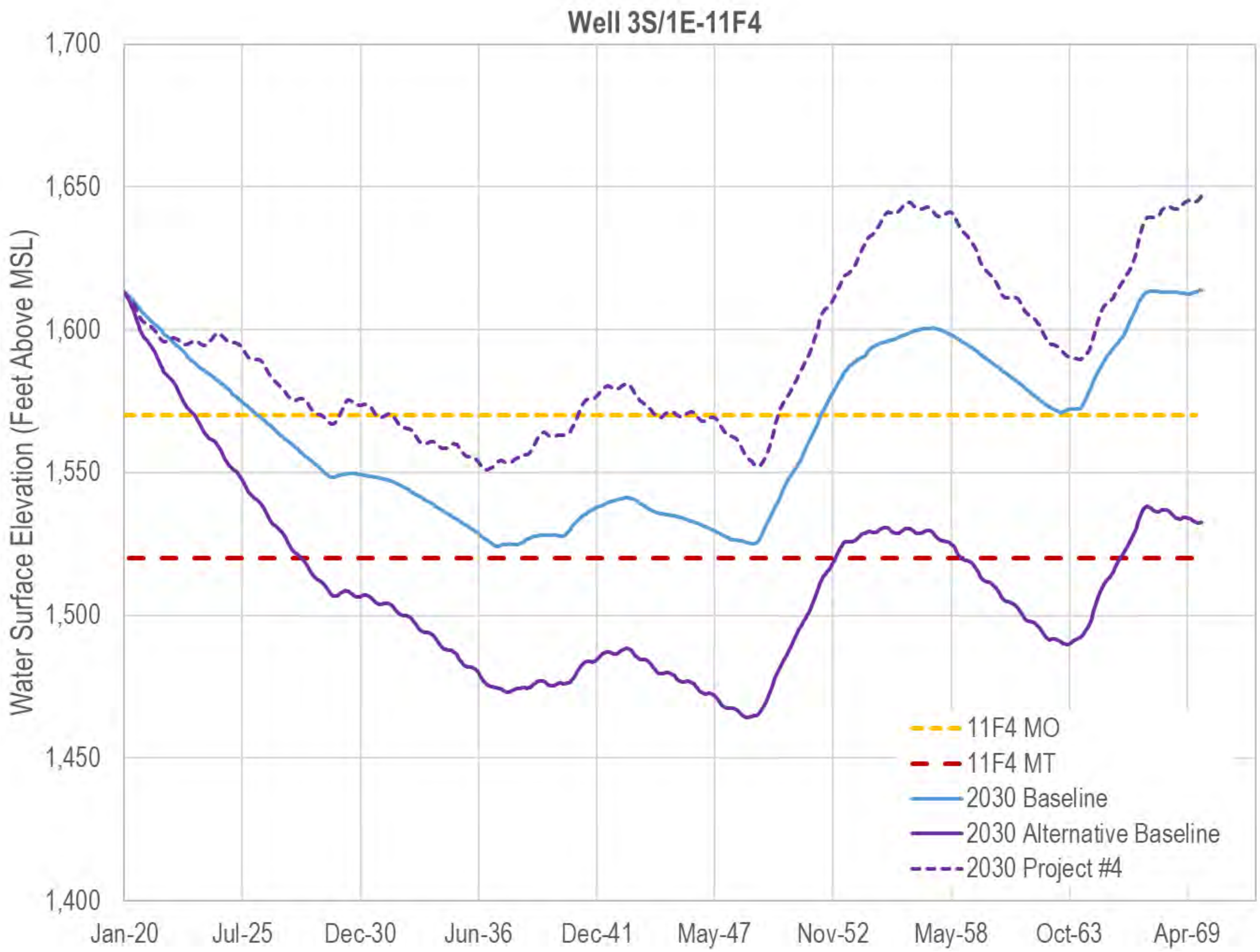


Figure 6.4b Hydrograph – 2030 Baseline and PMA Scenarios (Well 3S/1E-11F4)

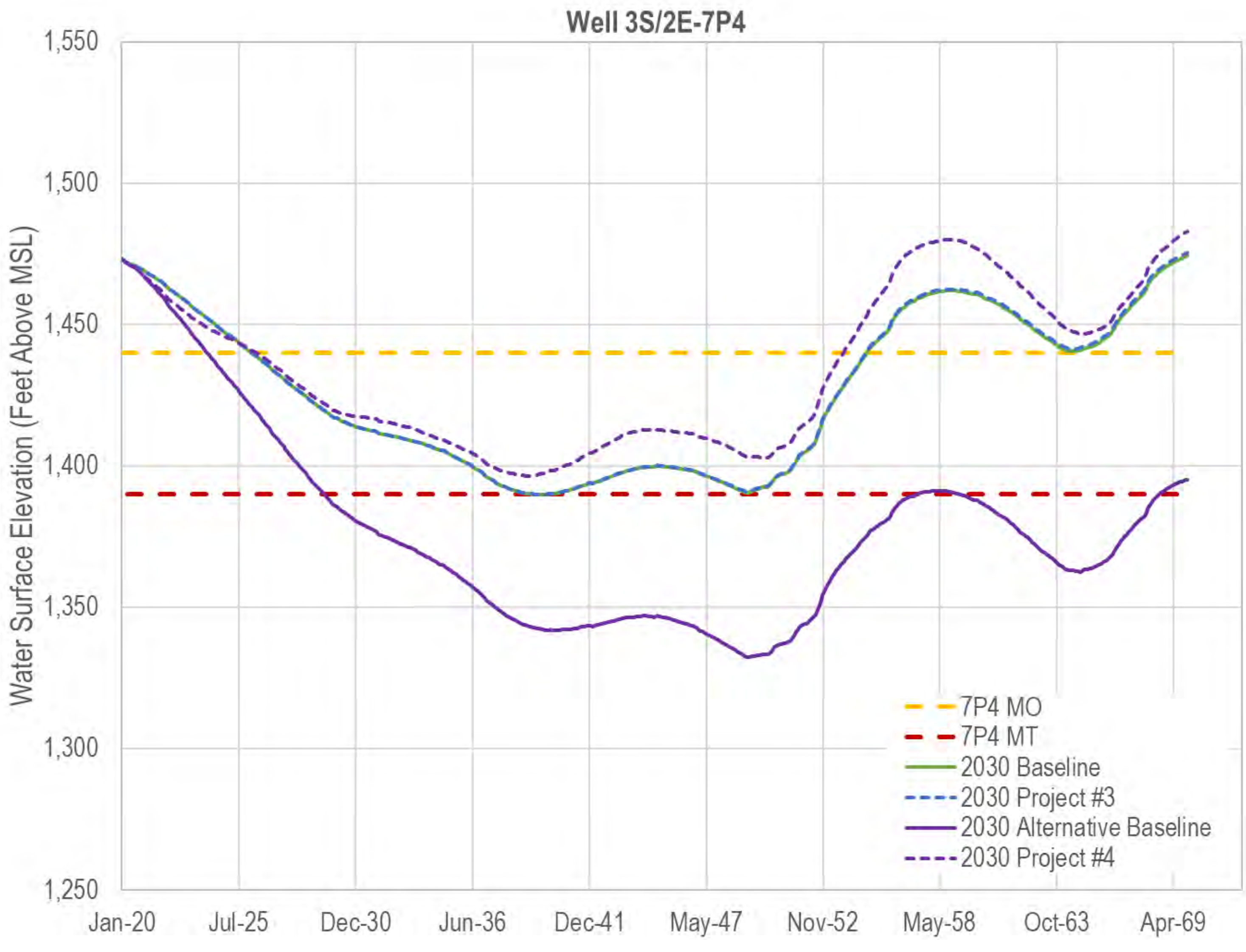


Figure 6.4c Hydrograph – 2030 Baseline and PMA Scenarios (Well 3S/2E-7P4)

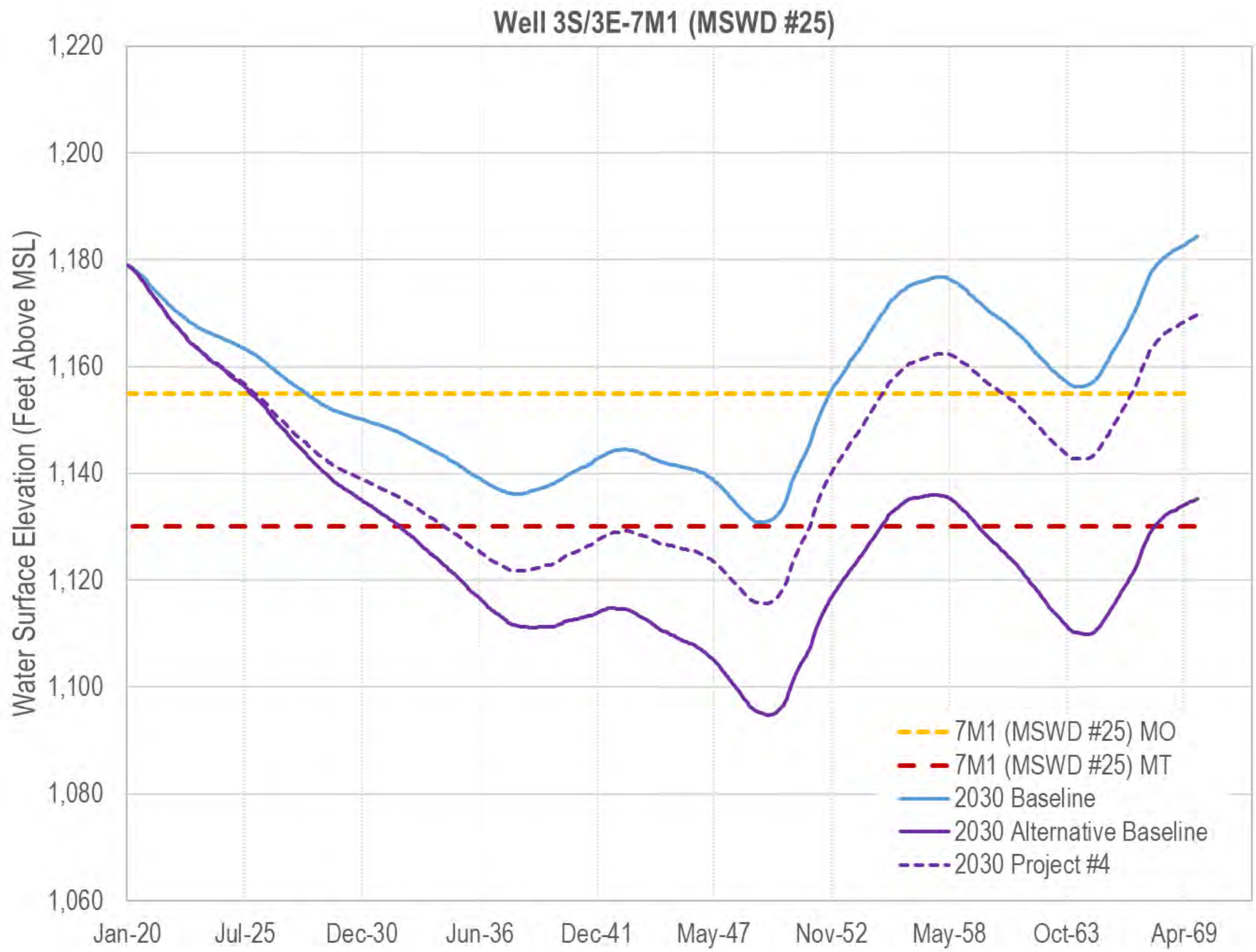


Figure 6.4d Hydrograph – 2030 Baseline and PMA Scenarios (Well 3S/3E-7M1)

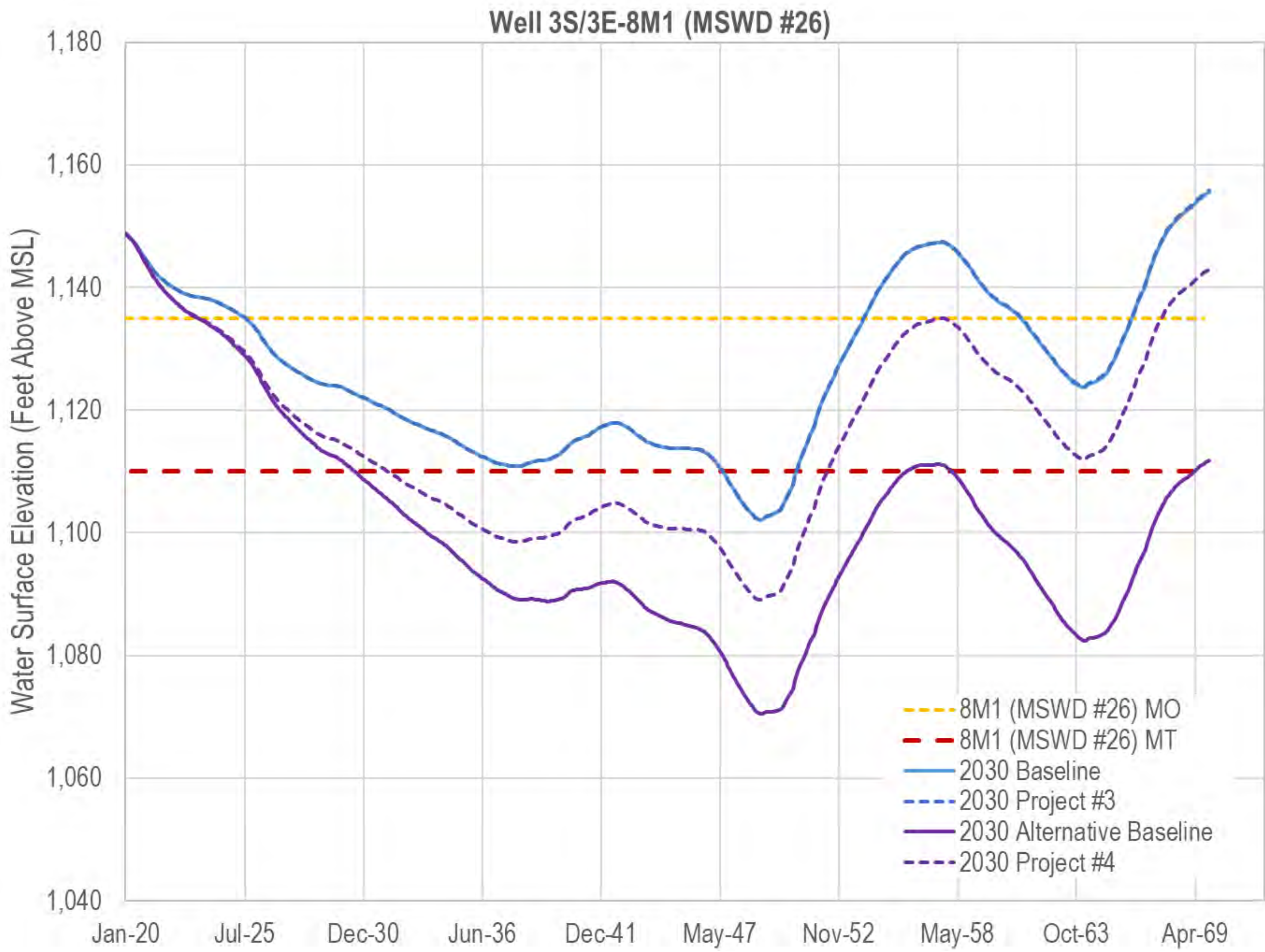
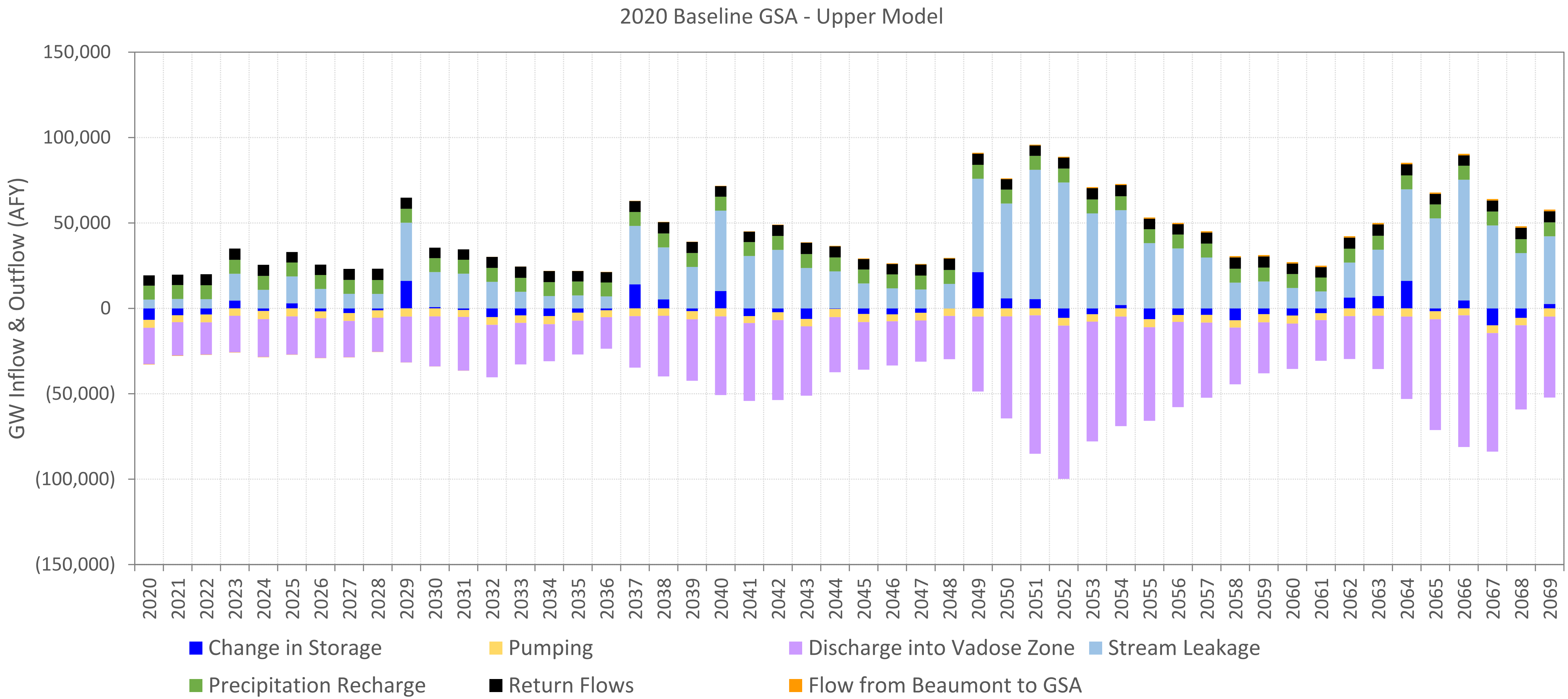


Figure 6.4e Hydrograph – 2030 Baseline and PMA Scenarios (Well 3S/3E-8M1)



*Flow from Beaumont to GSA may be difficult to see in the graph due to small values.

Figure 6.5a Water Budget – 2020 Baseline GSA, Upper Model

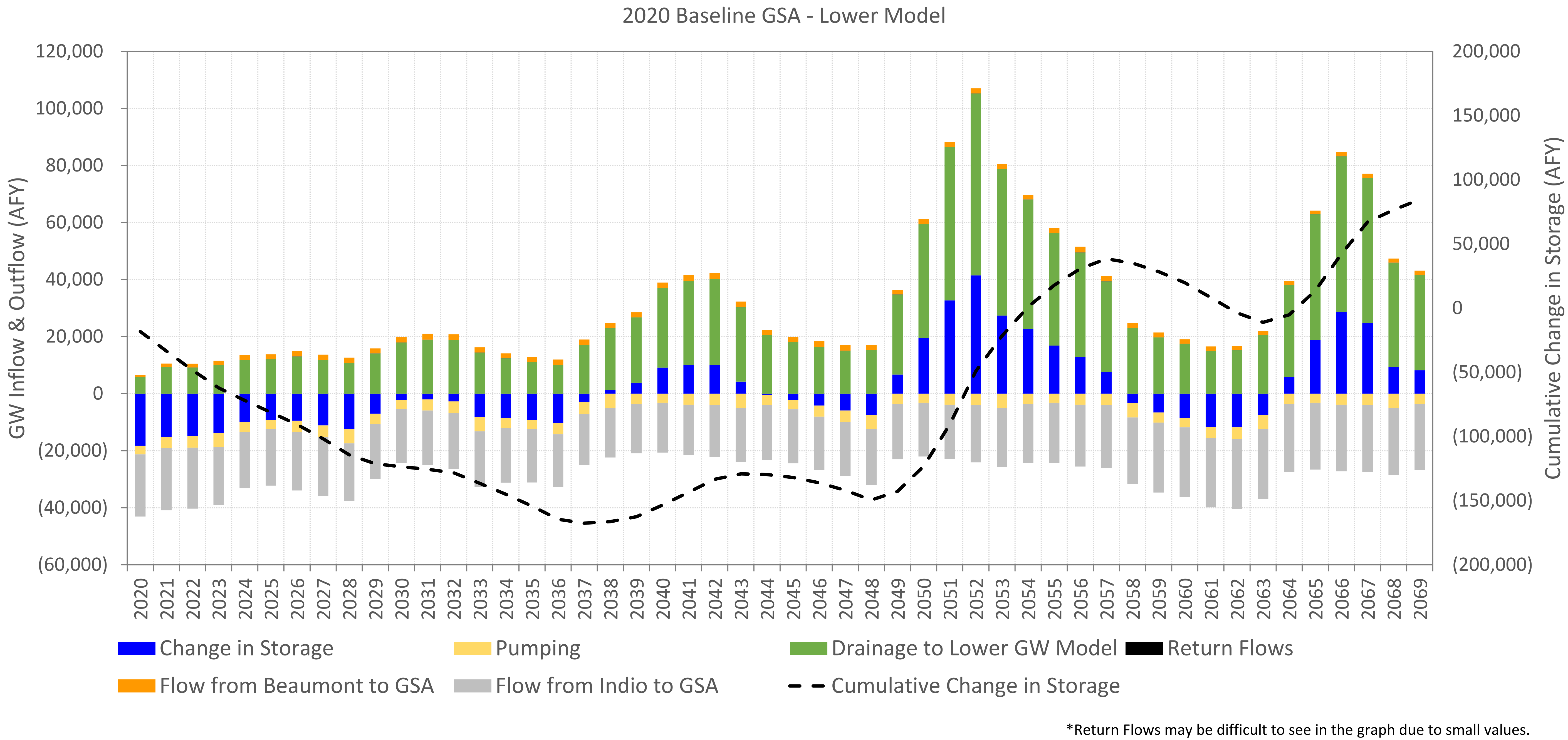
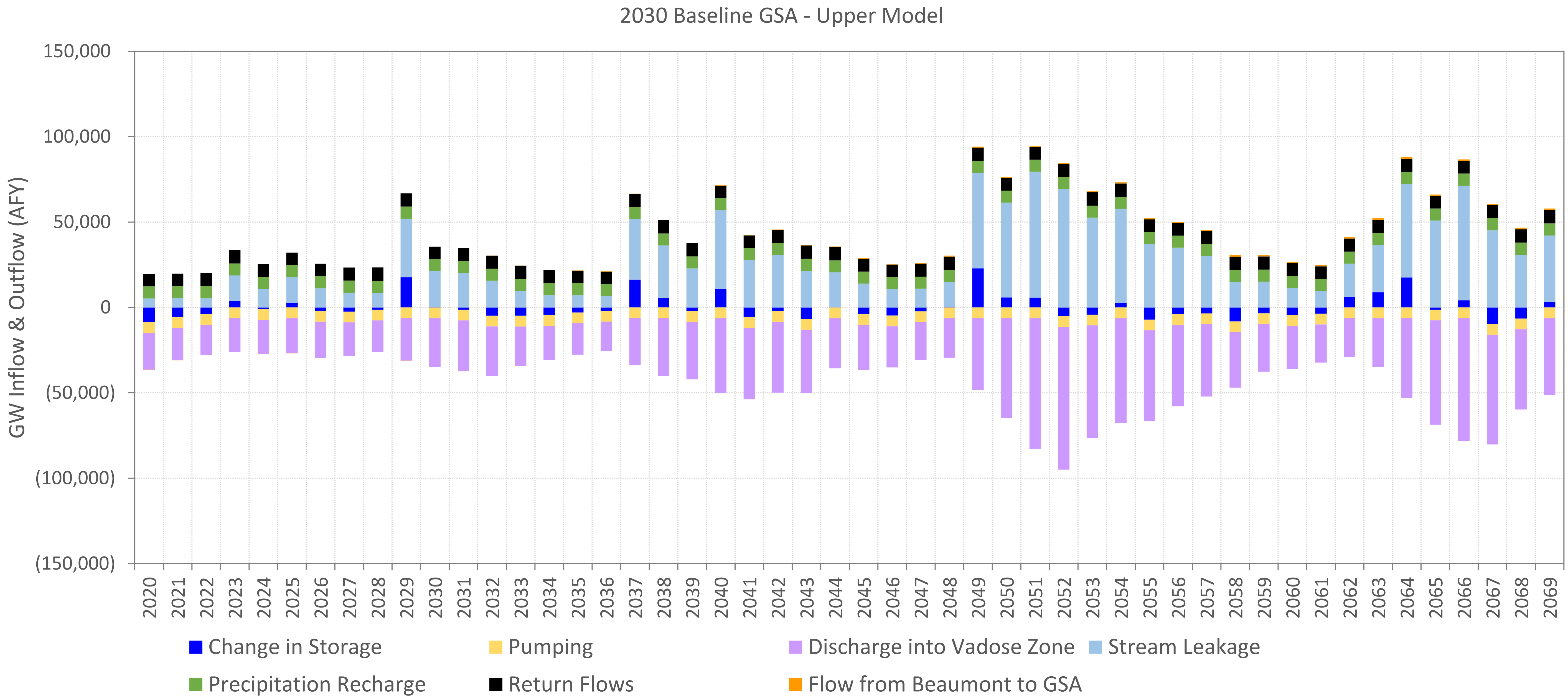


Figure 6.5b Water Budget – 2020 Baseline GSA, Lower Model



*Flow from Beaumont to GSA may be difficult to see in the graph due to small values.

Figure 6.6a Water Budget – 2030 Baseline GSA, Upper Model

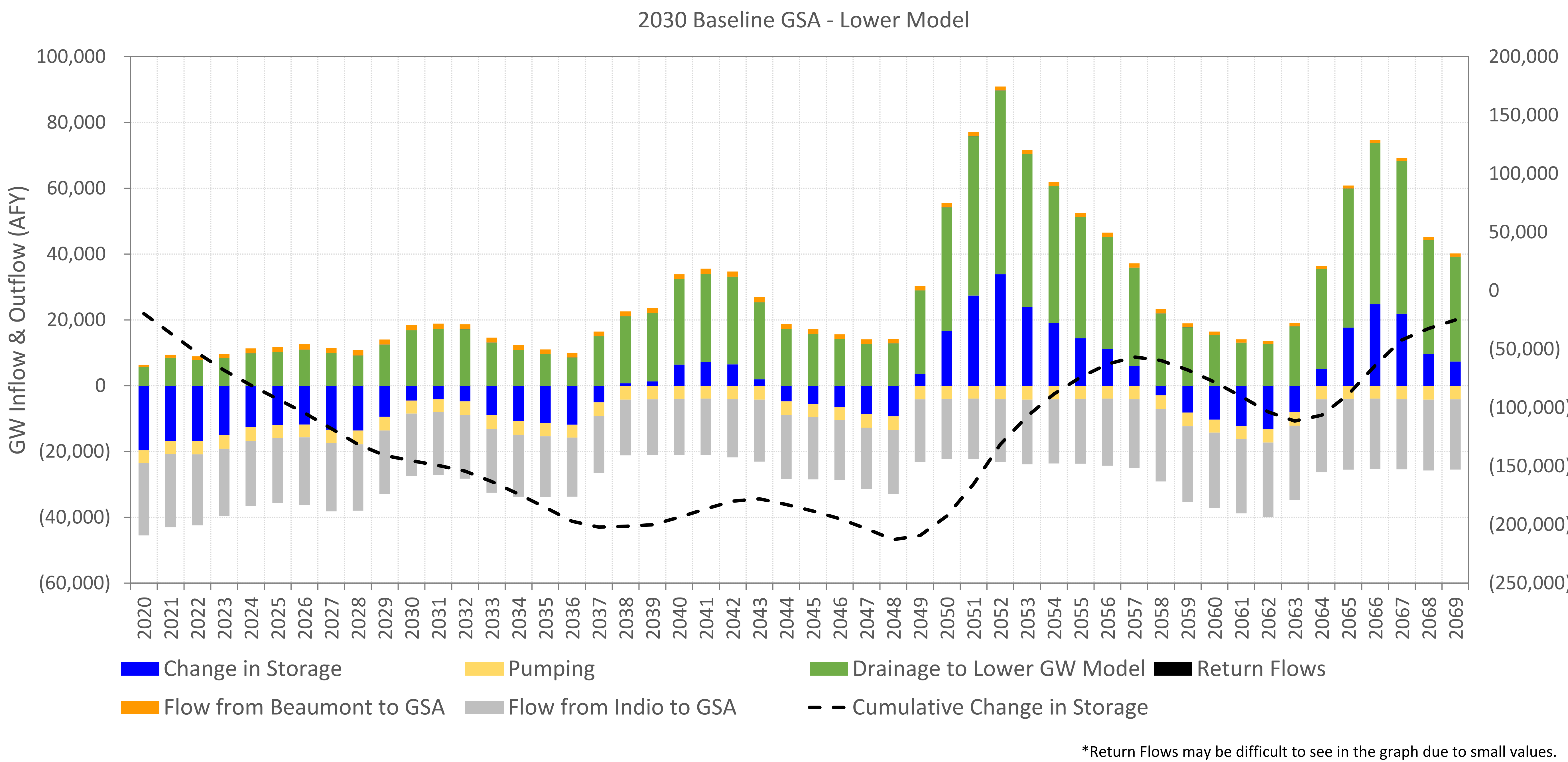
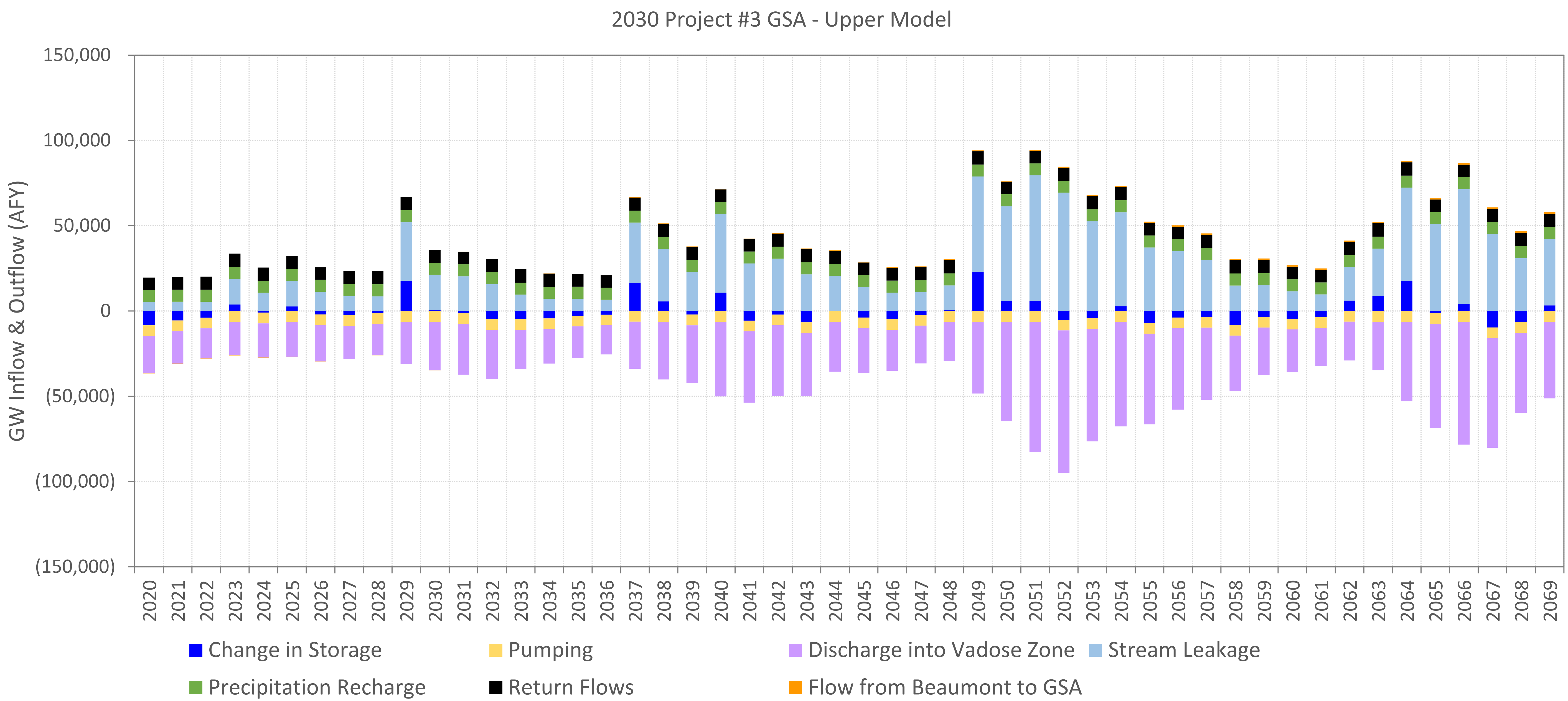


Figure 6.6b Water Budget – 2030 Baseline GSA, Lower Model



*Flow from Beaumont to GSA may be difficult to see in the graph due to small values.

Figure 6.7a Water Budget – 2030 Project #3 GSA, Upper Model

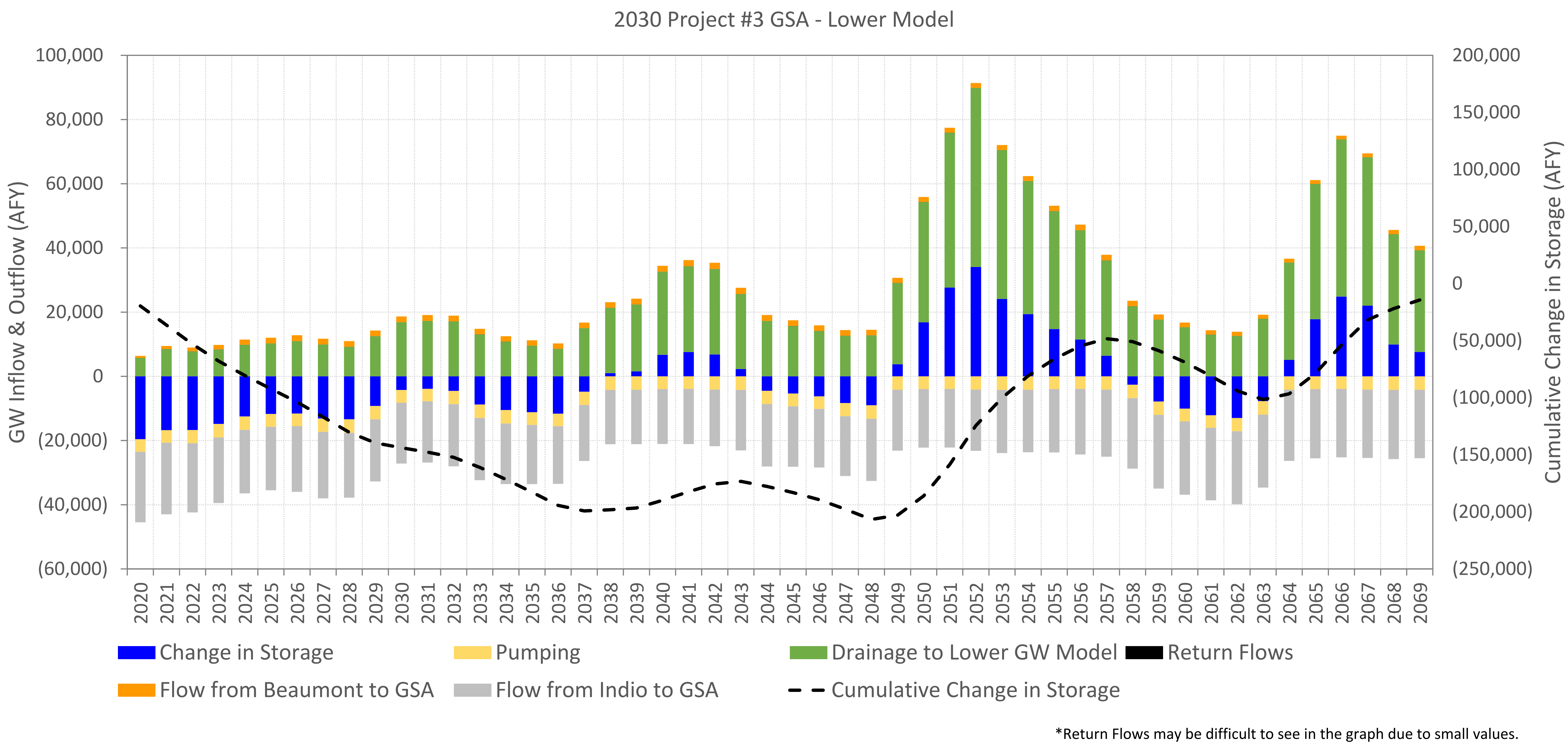


Figure 6.7b Water Budget – 2030 Project #3 GSA, Lower Model

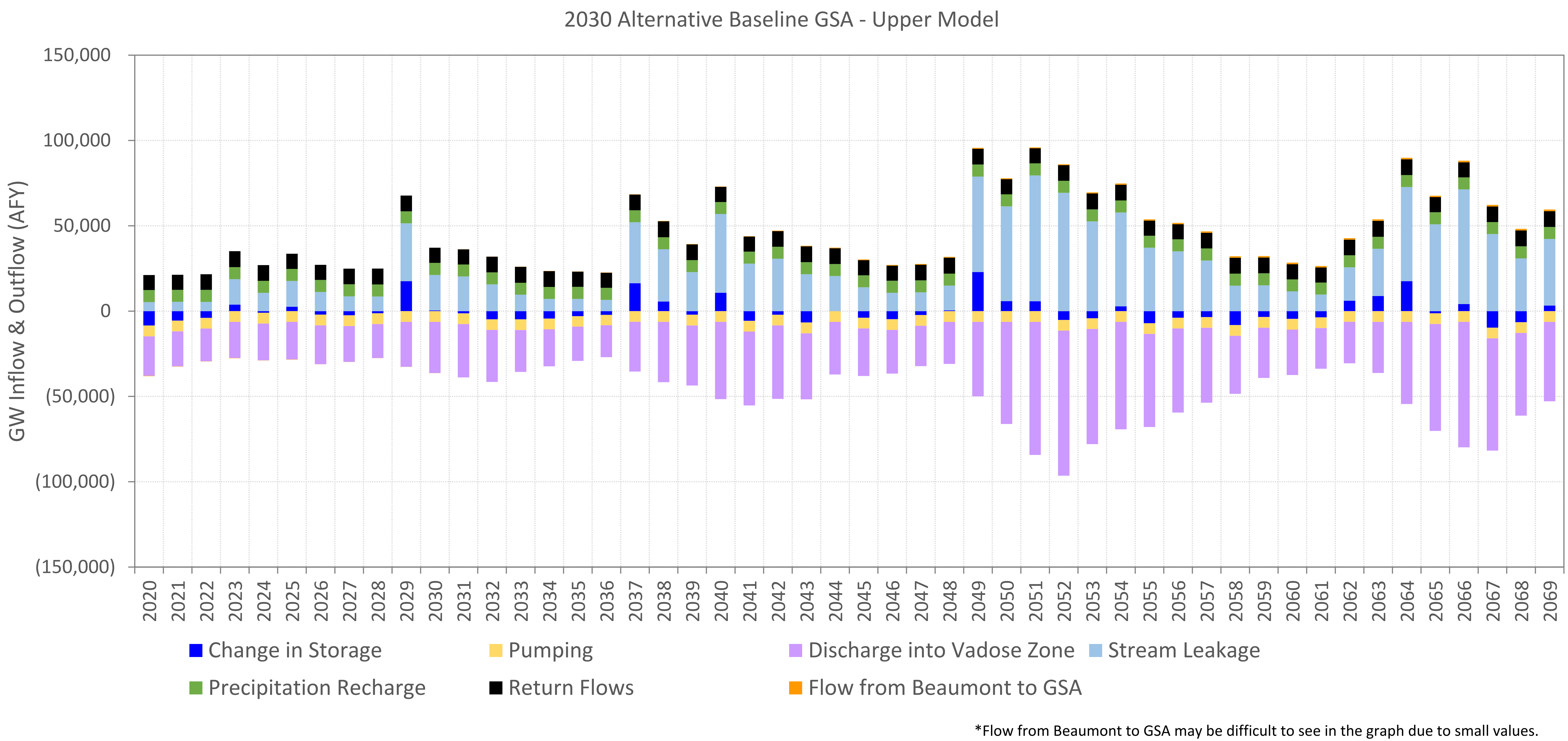


Figure 6.8a Water Budget – 2030 Alternative Baseline GSA, Upper Model

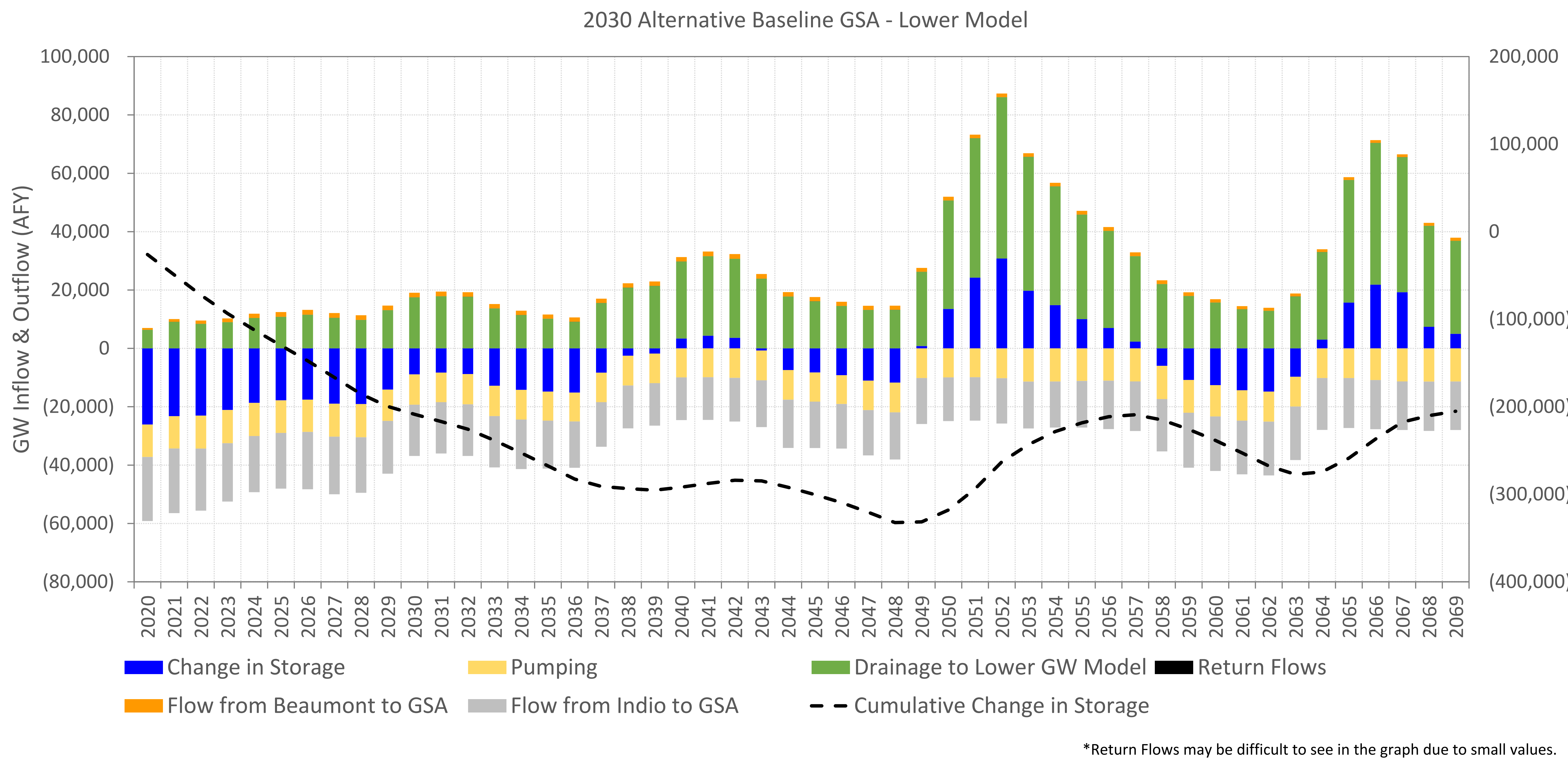


Figure 6.8b Water Budget – 2030 Alternative Baseline GSA, Lower Model

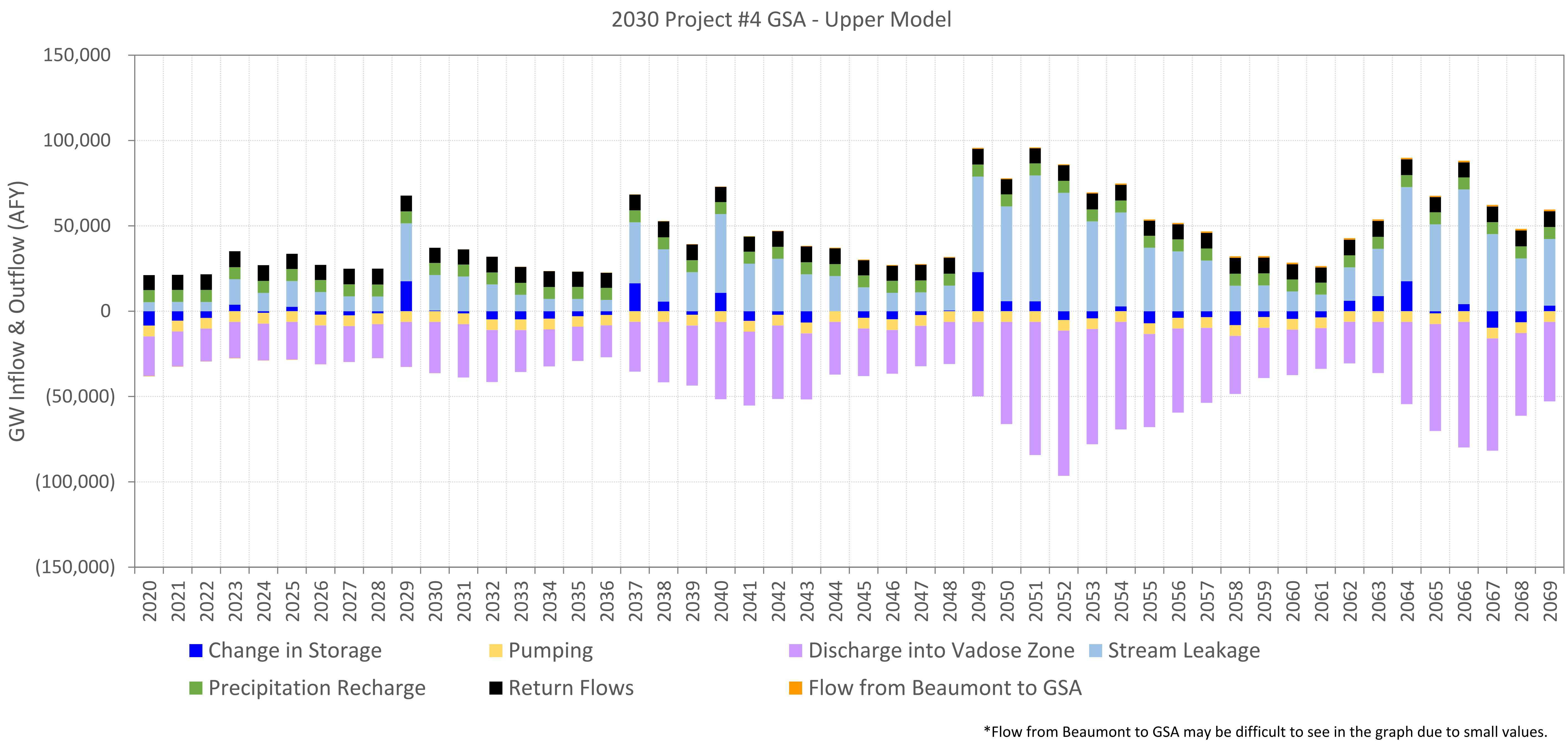


Figure 6.9a Water Budget – 2030 Project #4 GSA, Upper Model

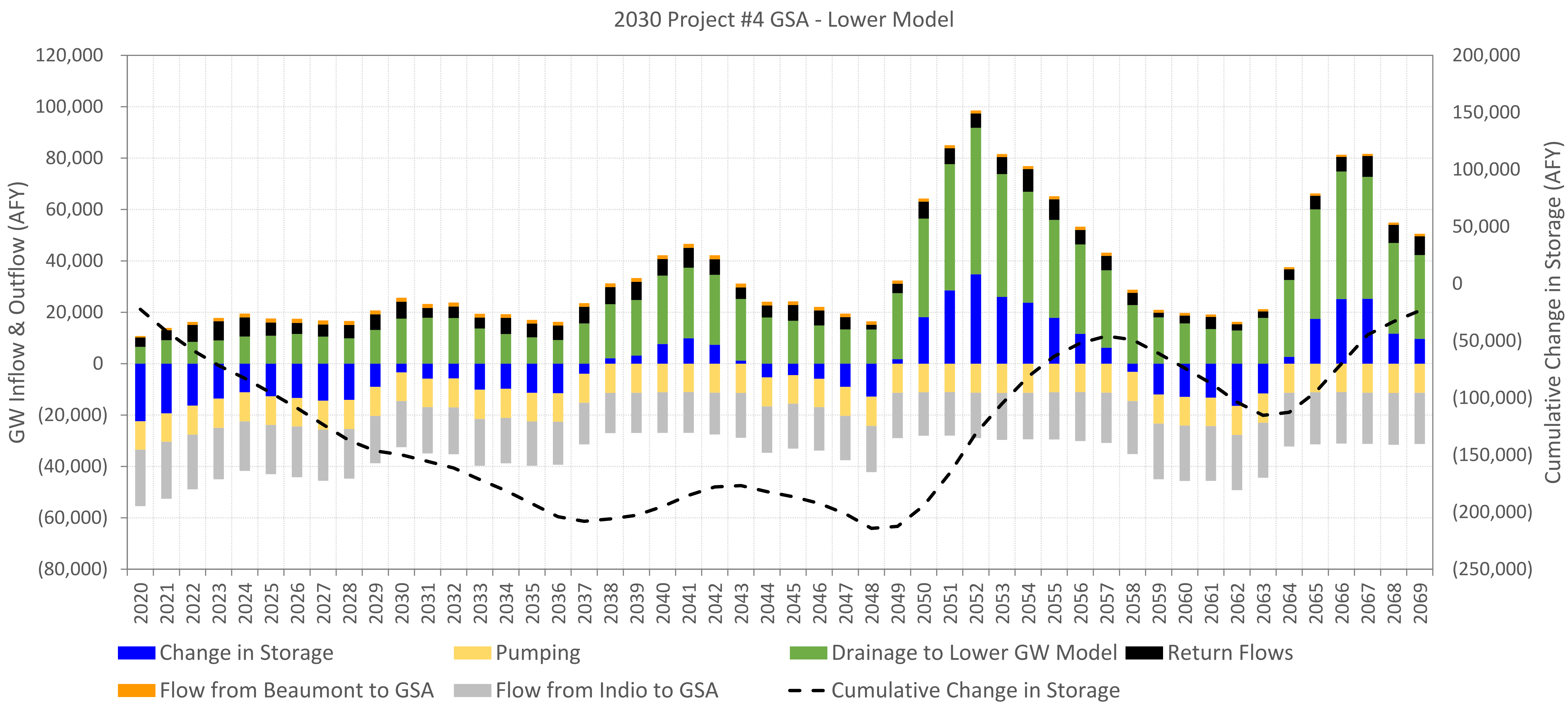


Figure 6.9b Water Budget – 2030 Project #4 GSA, Lower Model

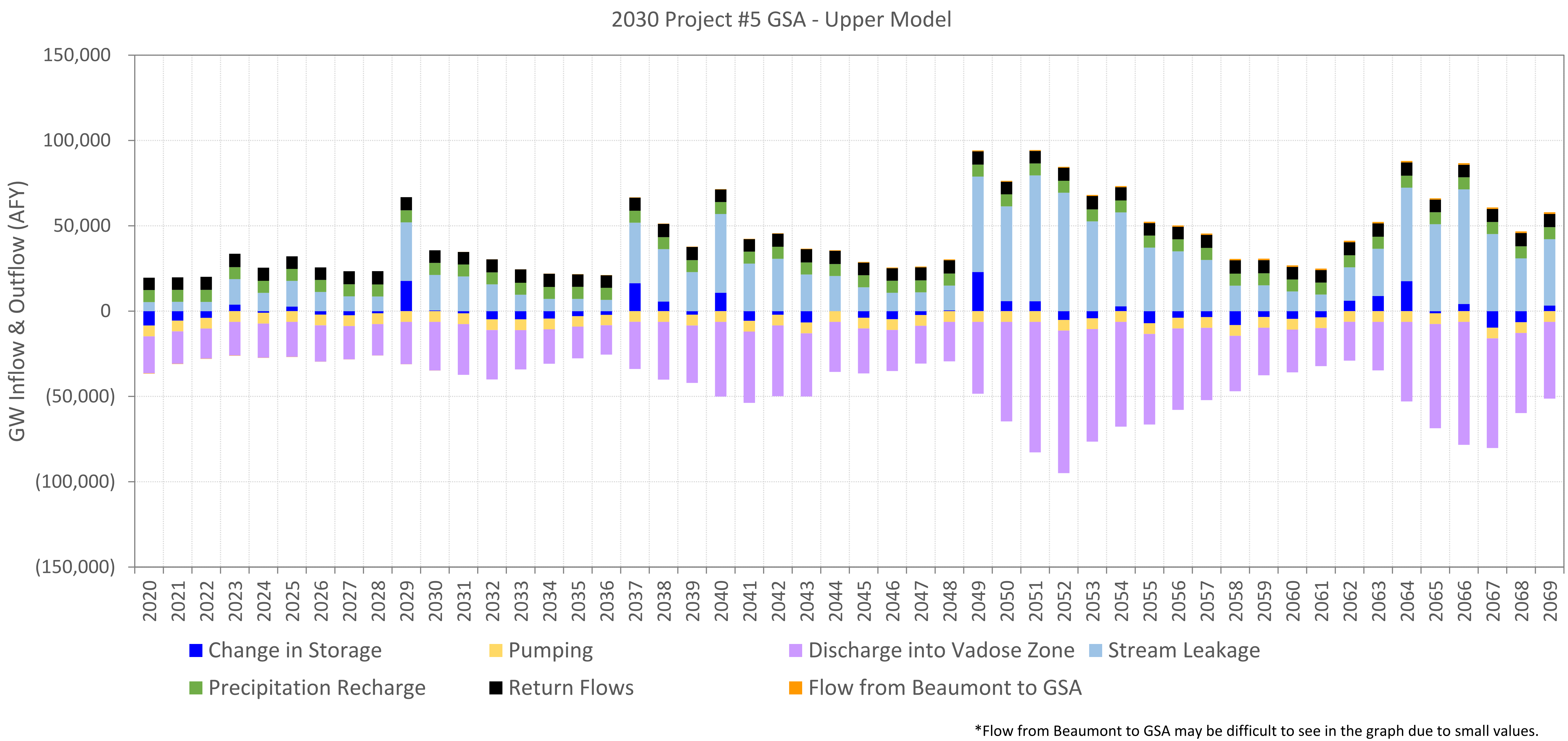


Figure 6.10a Water Budget – 2030 Project #5 GSA, Upper Model

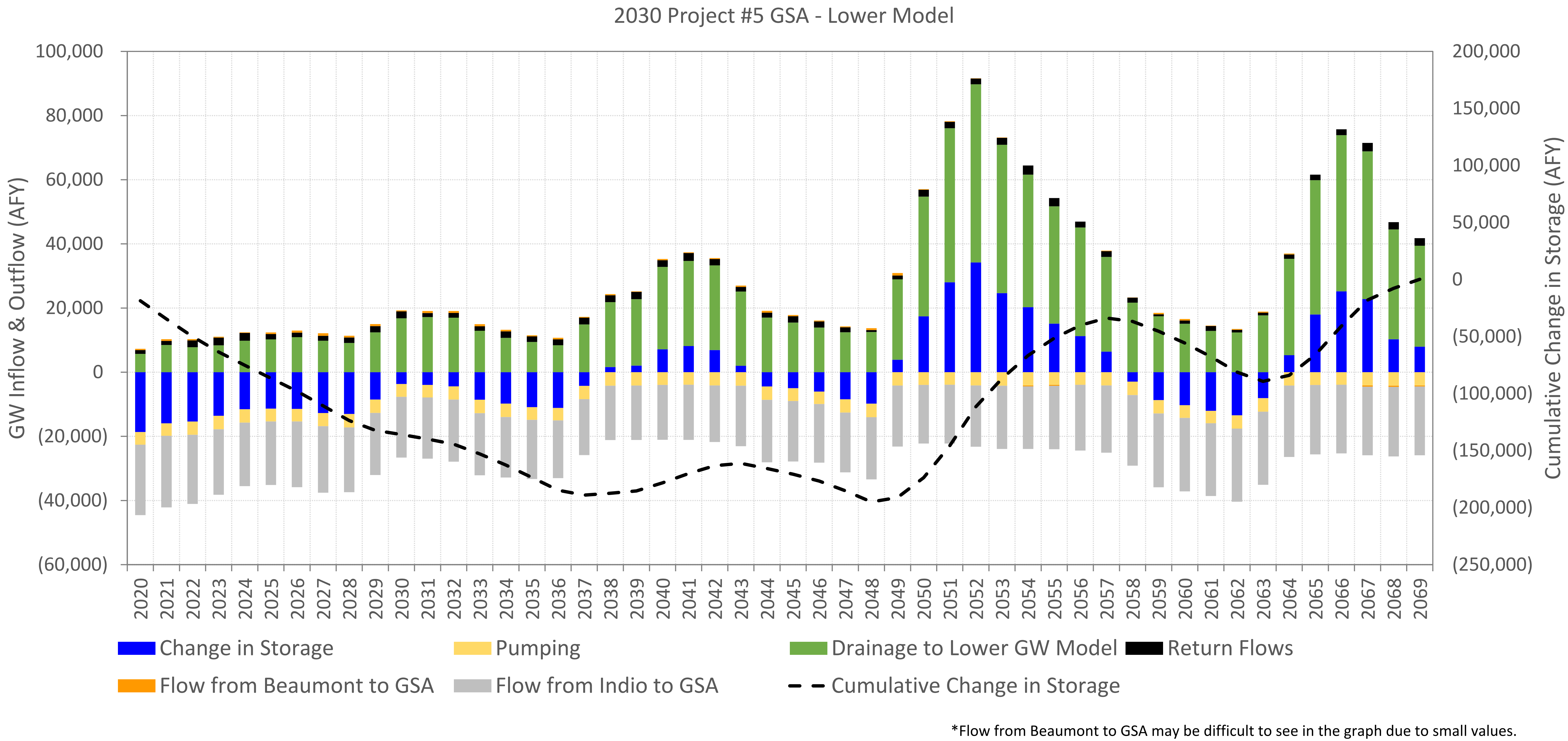


Figure 6.10b Water Budget – 2030 Project #5 GSA, Lower Model

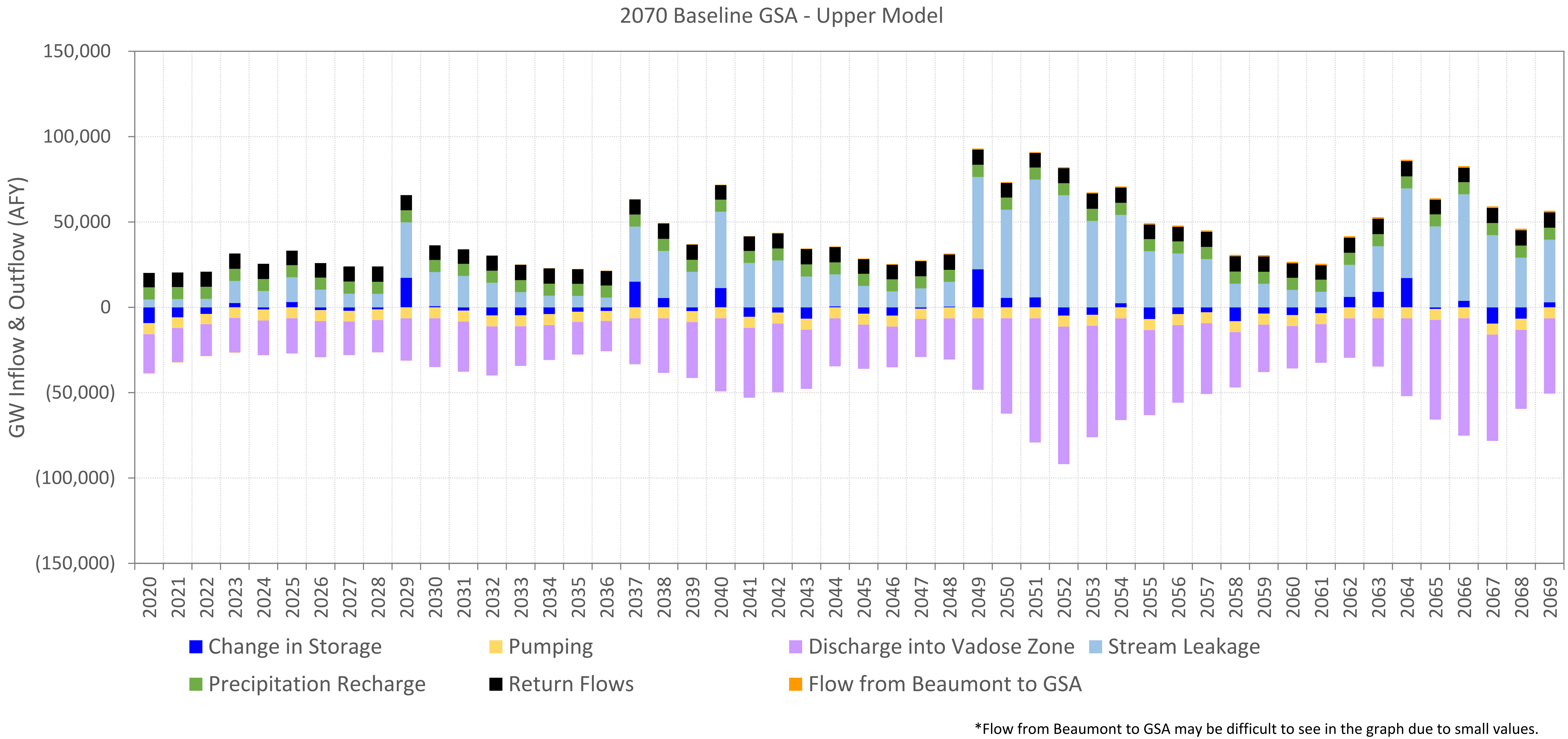


Figure 6.11a Water Budget – 2070 Baseline GSA, Upper Model

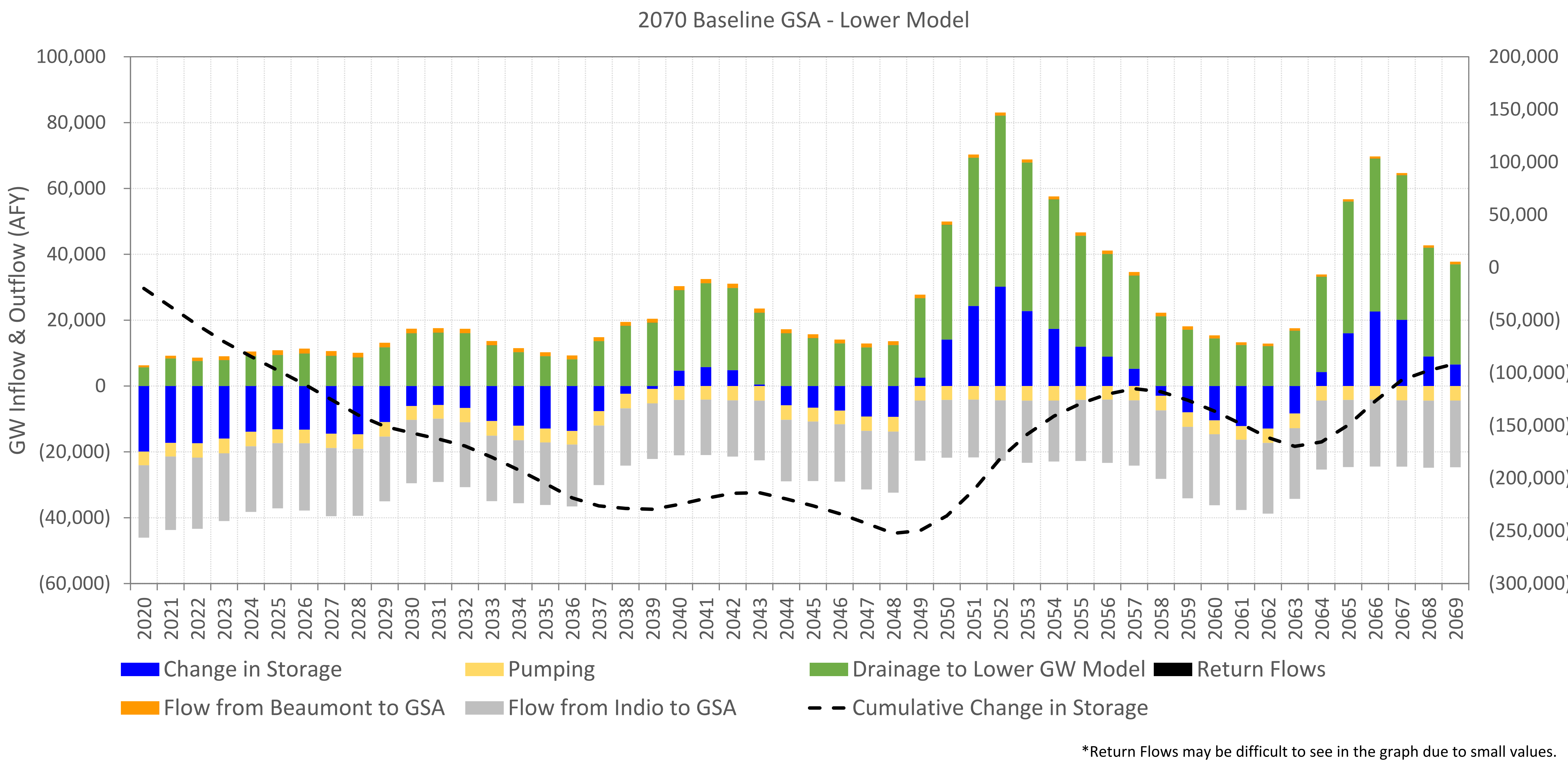


Figure 6.11b Water Budget – 2070 Baseline GSA, Lower Model

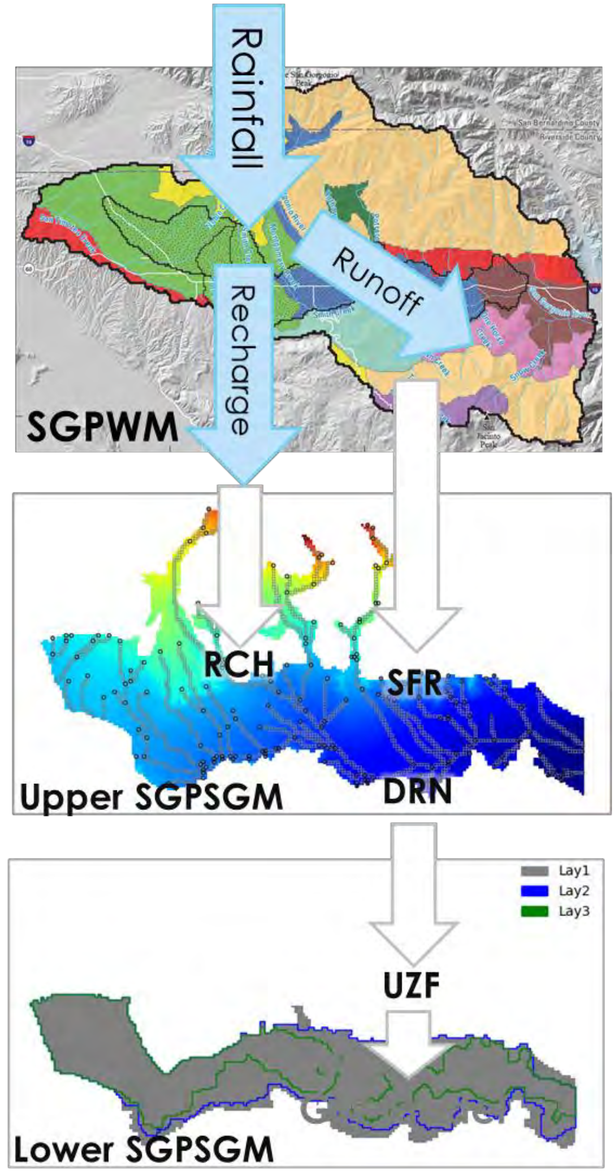


Figure 7.1 Selected Parameters

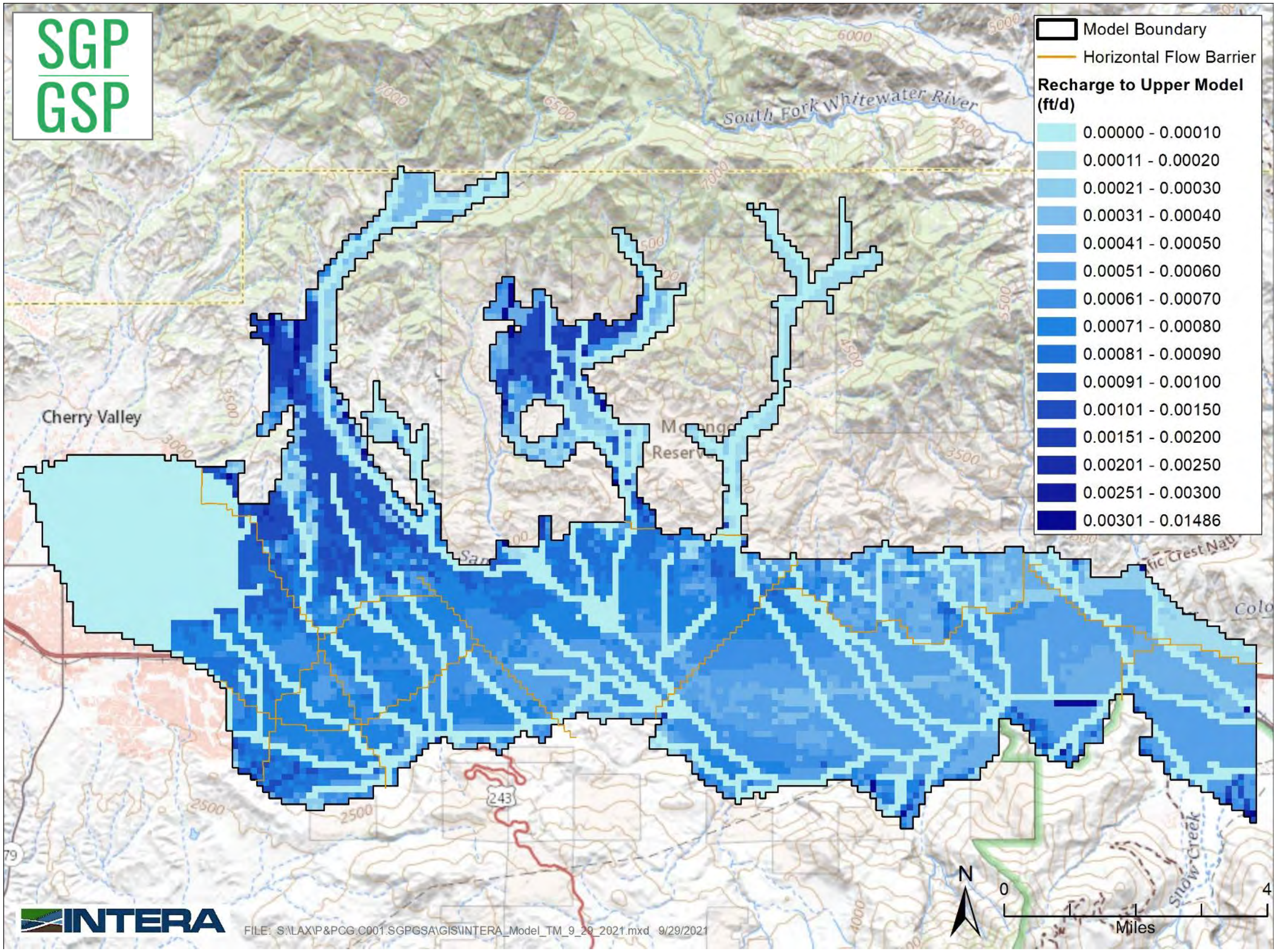


Figure 7.2 Upper Model Recharge

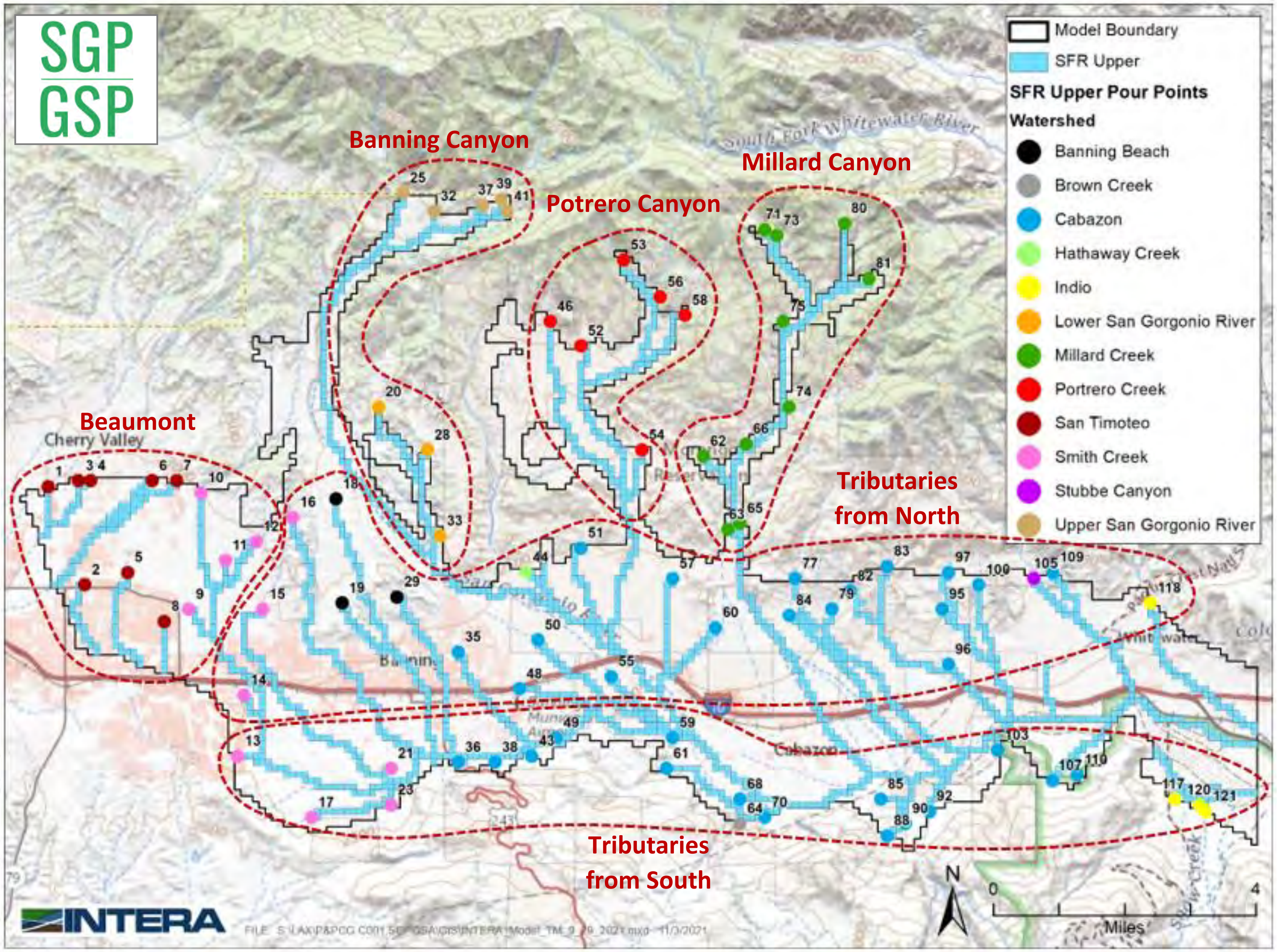


Figure 7.3 Upper Model Stream Flow Zones

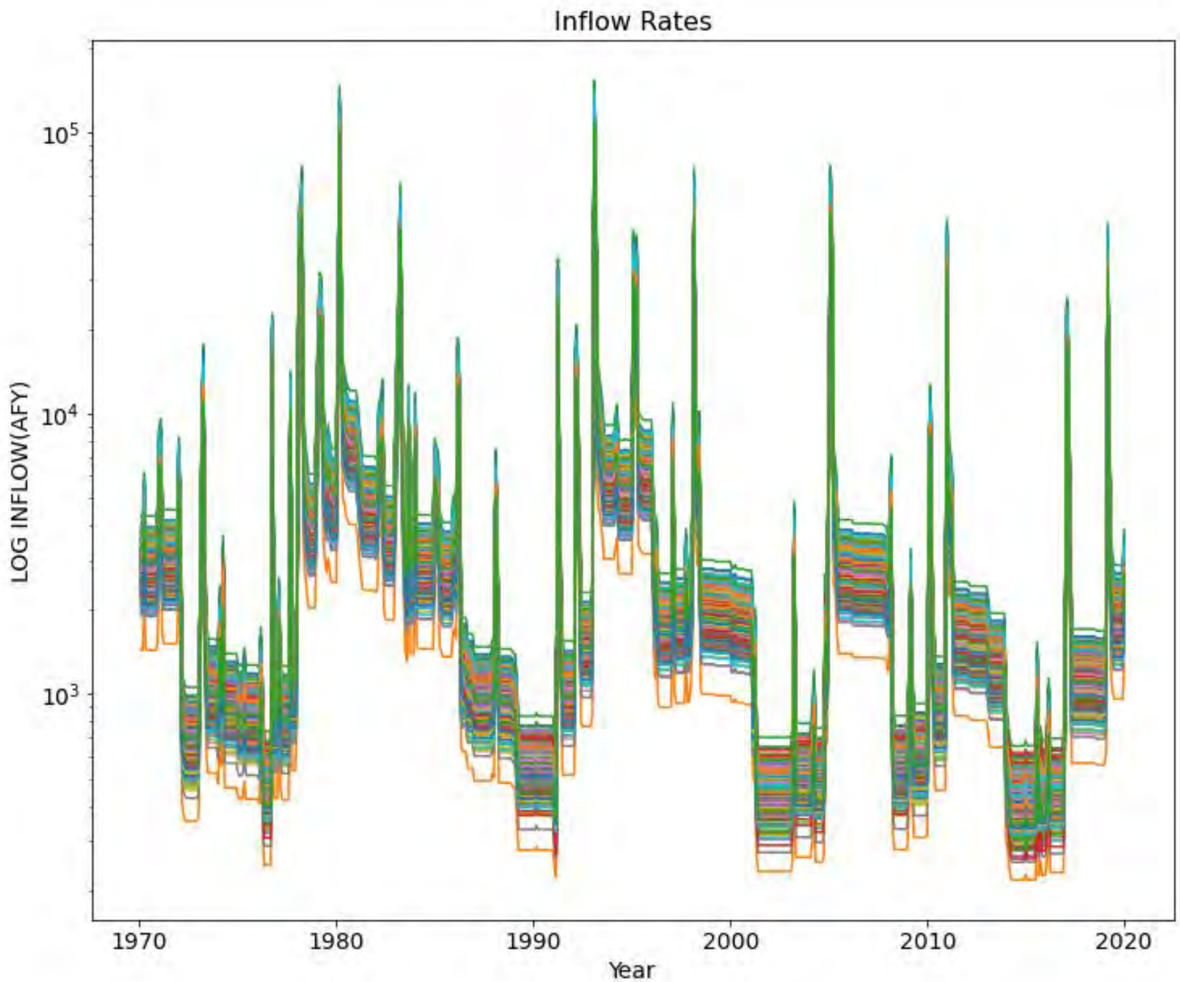


Figure 7.4 Stream Flow Inputs – Time-Series

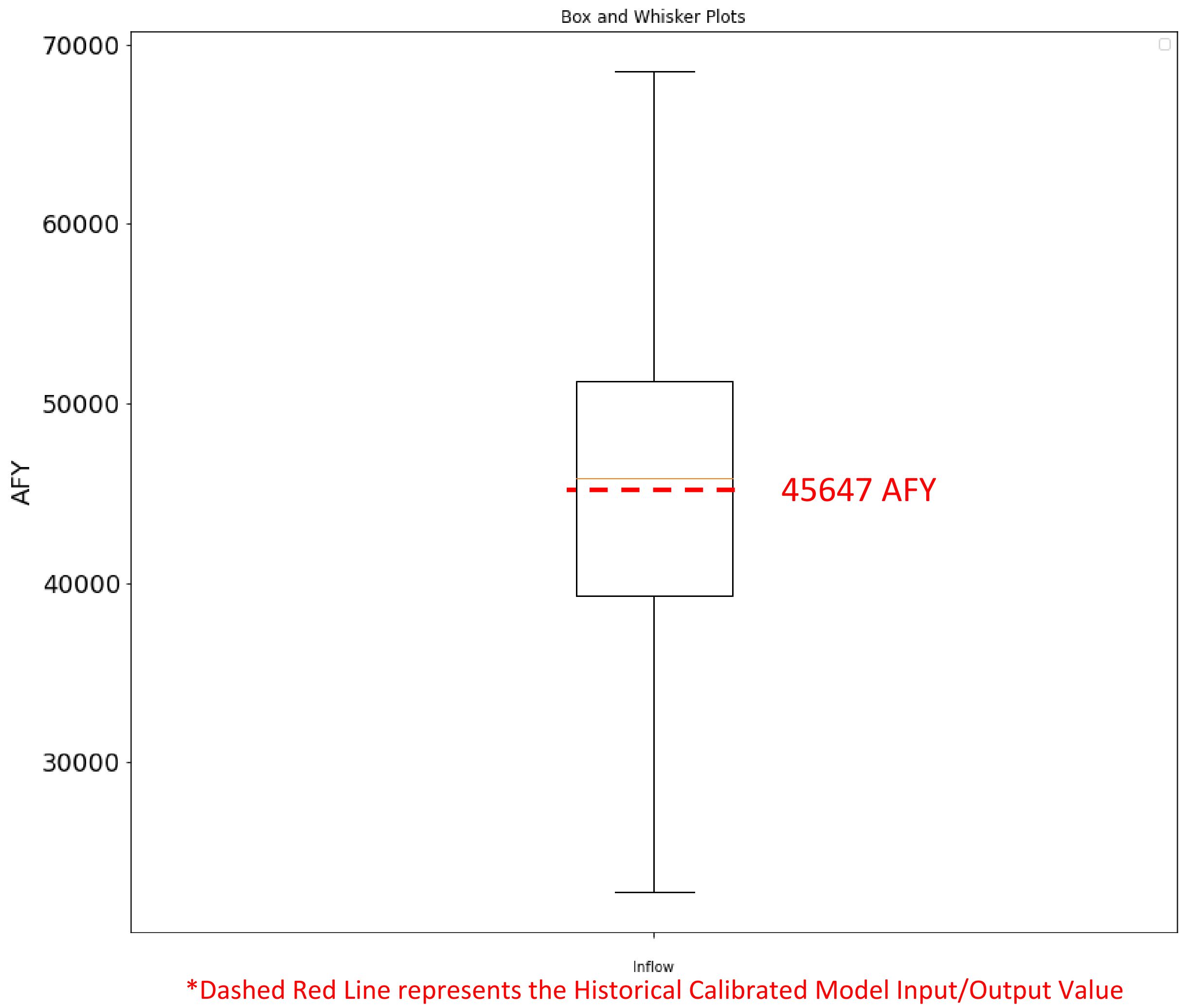


Figure 7.5 Stream Flow Inputs – Box Plot

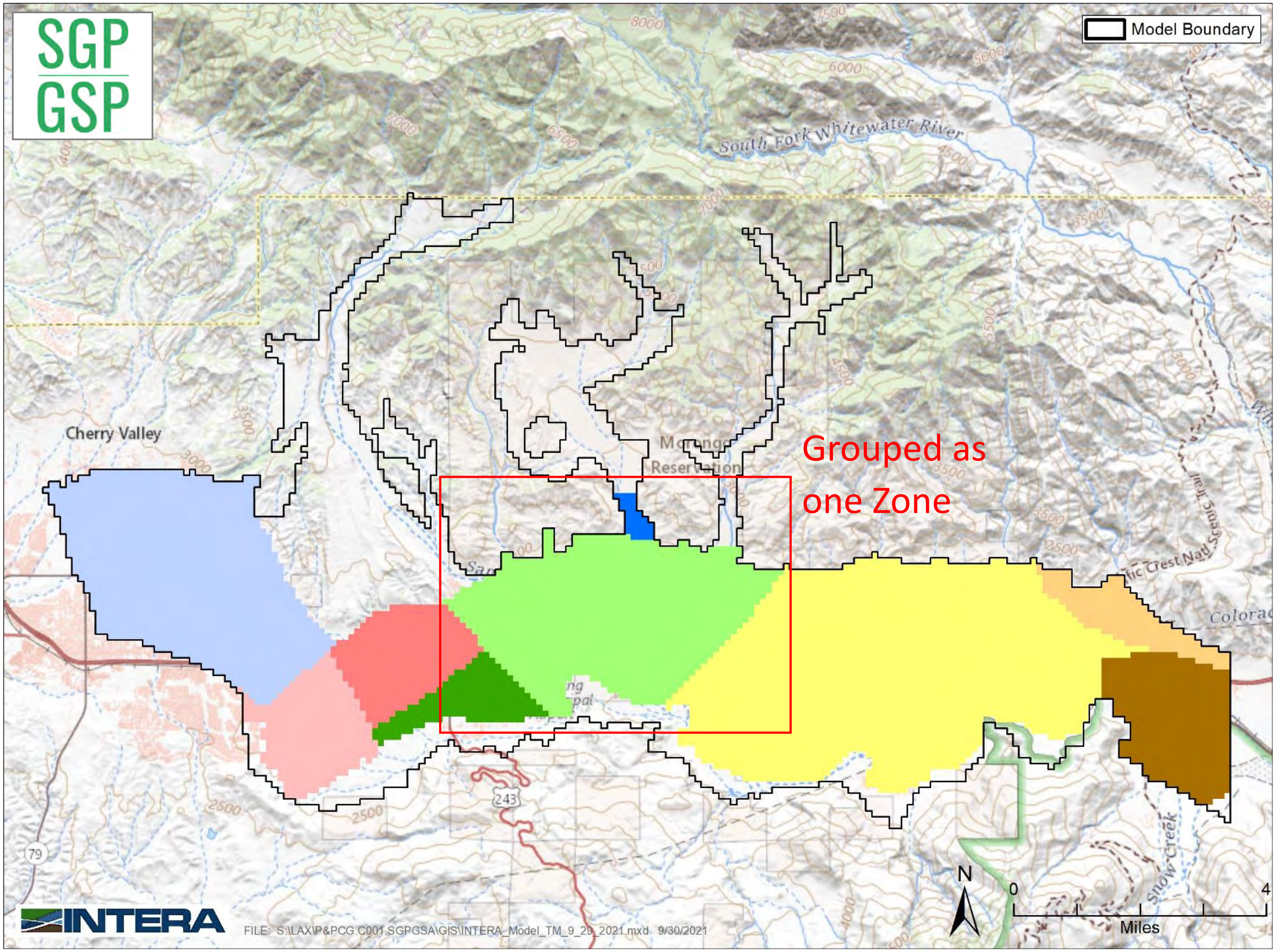
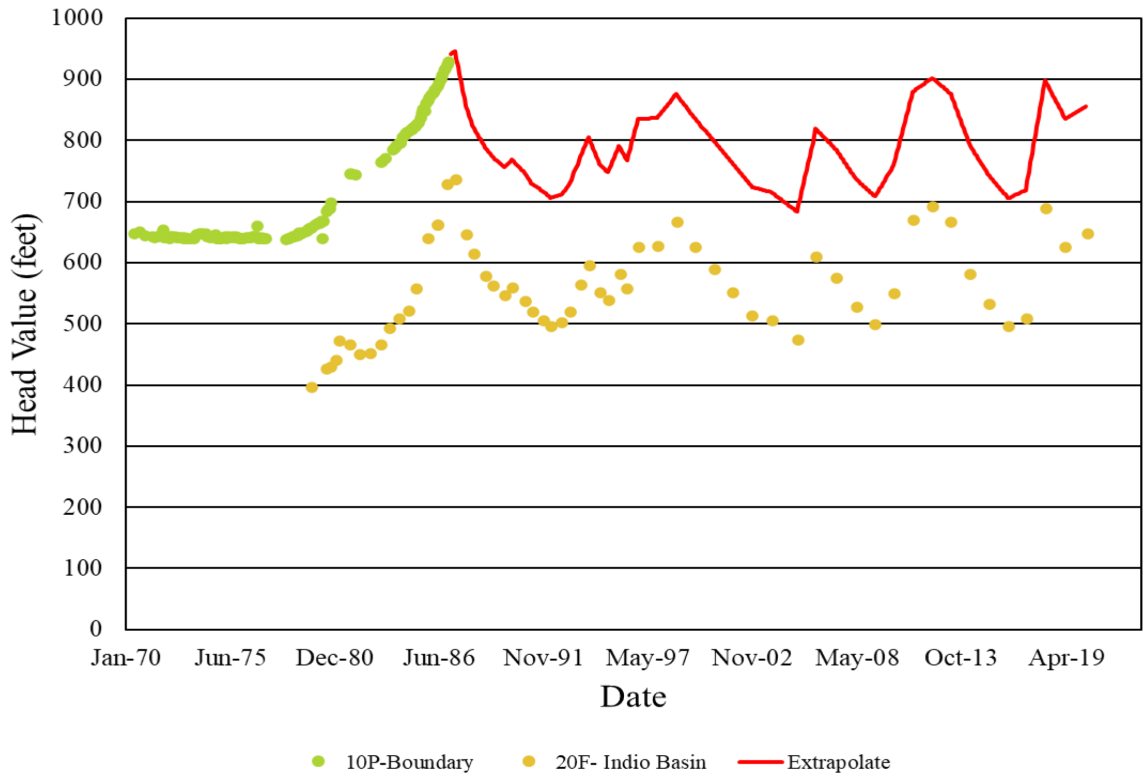


Figure 7.6 Lower Model UZF Reduction Factor Zones



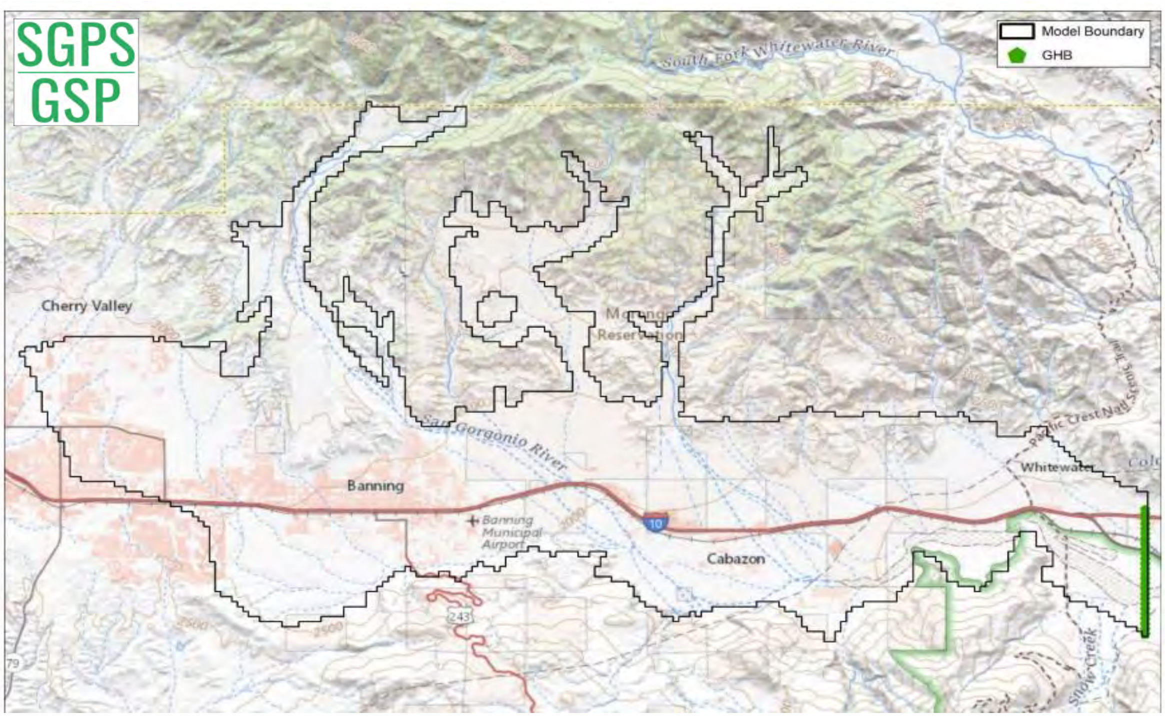


Figure 7.7:
GHB Conductance and Heads

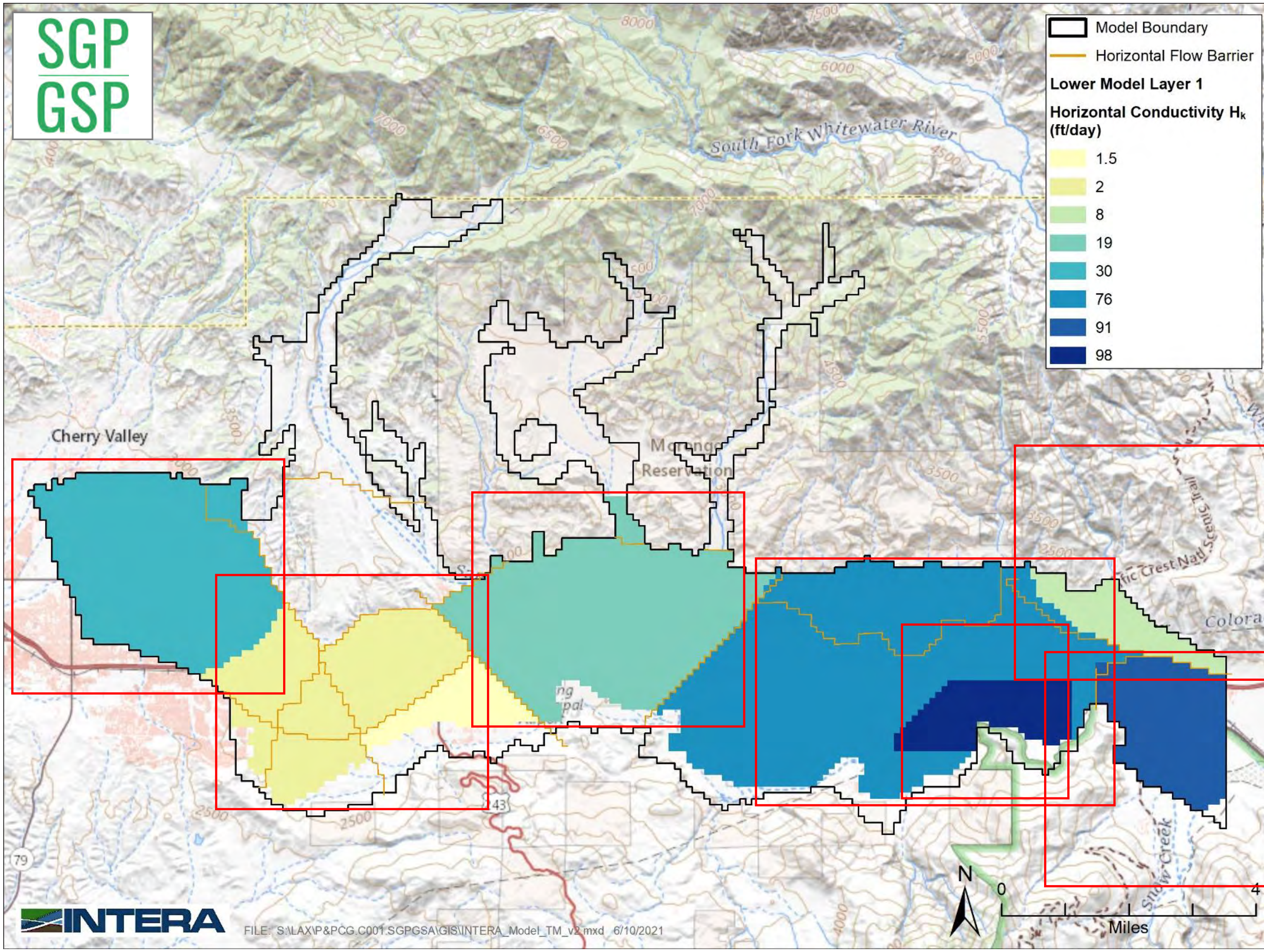


Figure 7.8 Lower Model Hk Layer 1 Zones

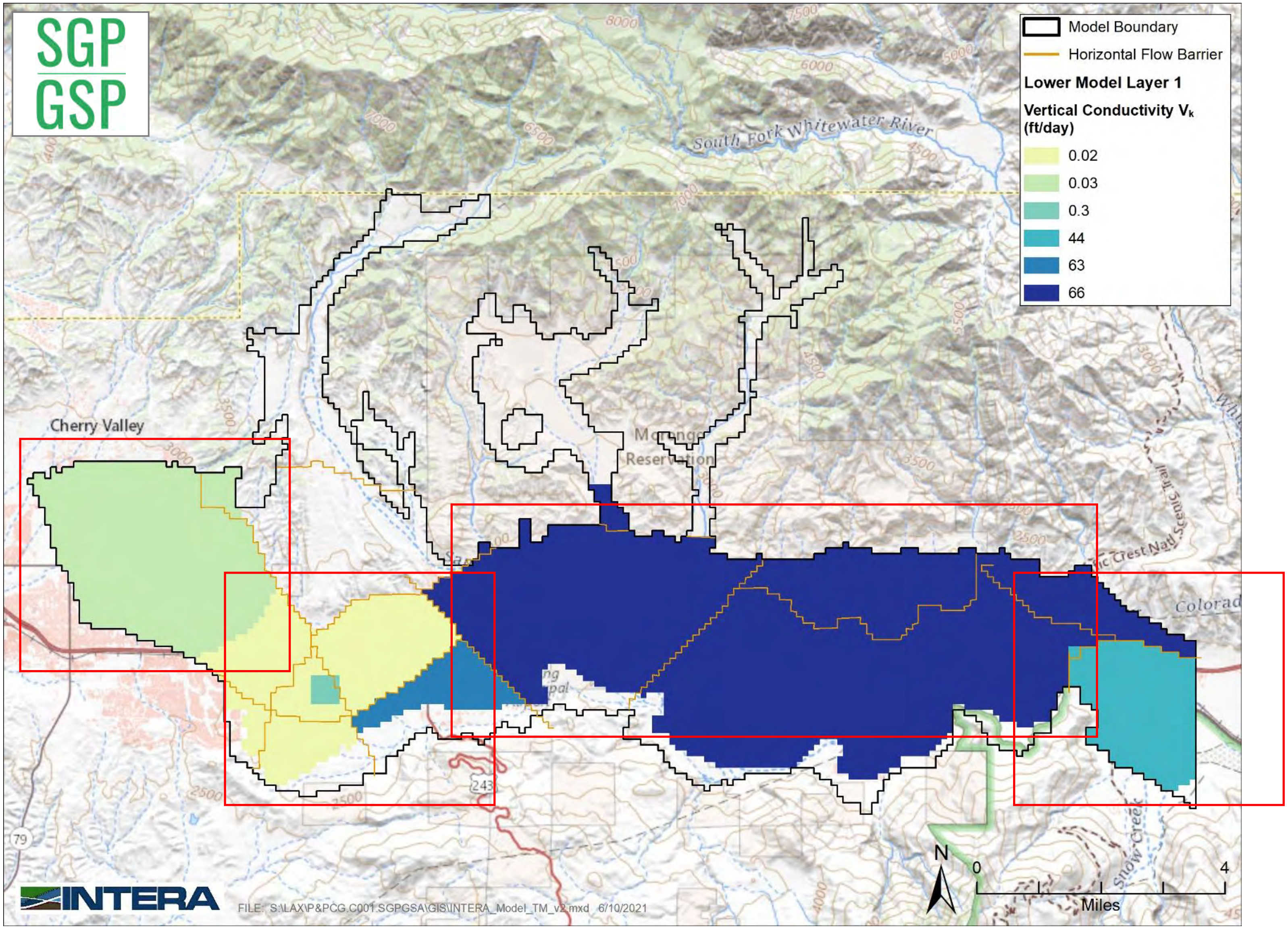
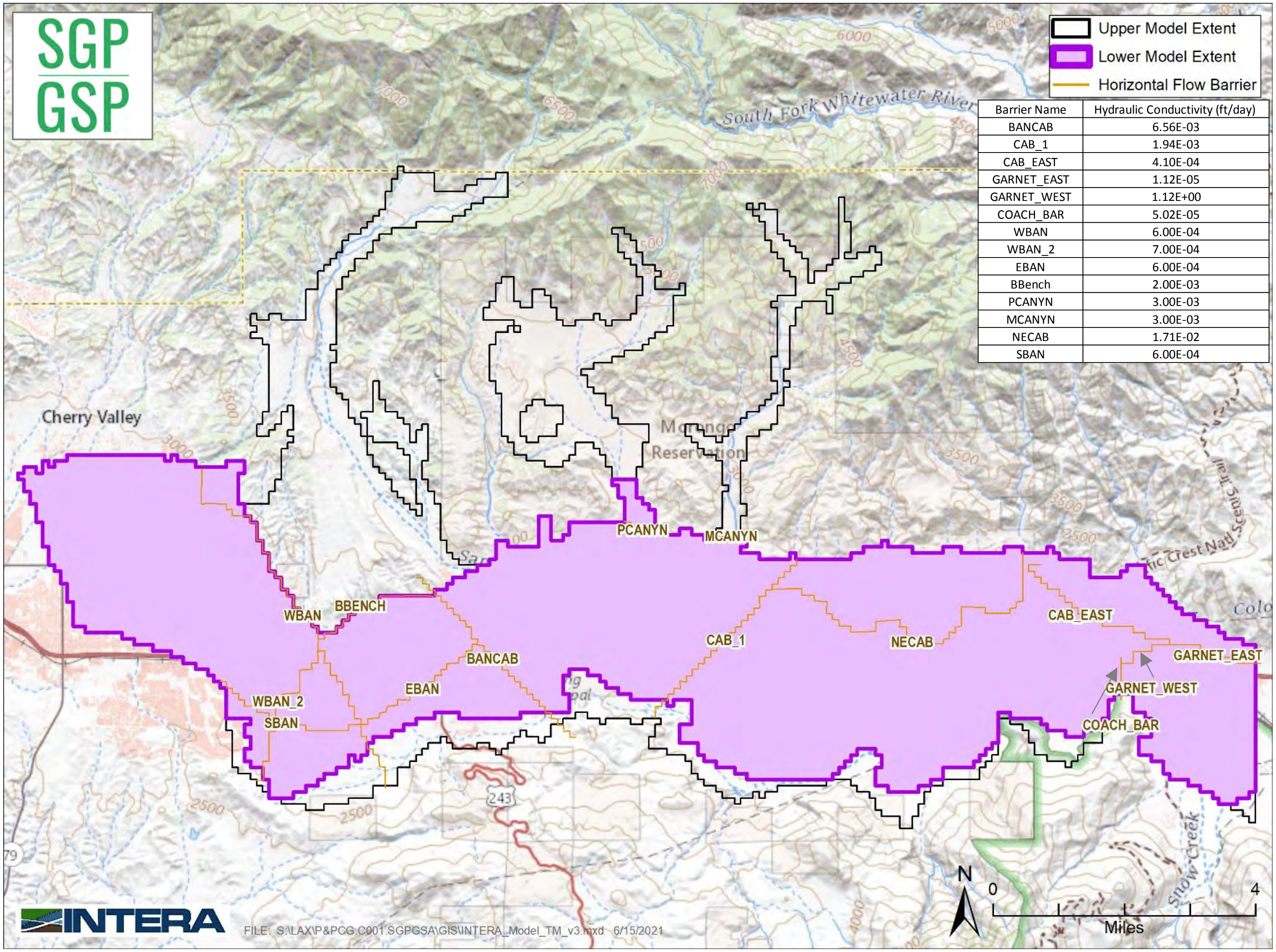
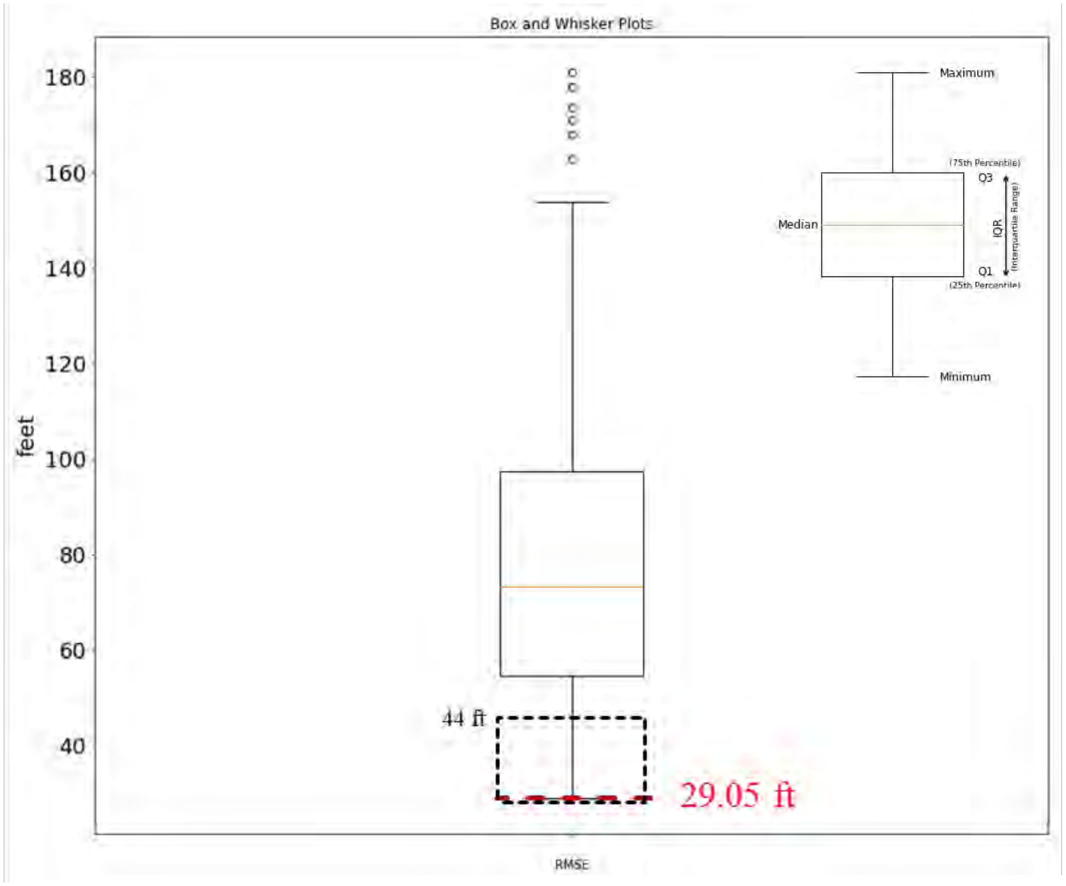


Figure 7.9 Lower Model Vk Layer 1 Zones



Barrier Name	Hydraulic Conductivity (ft/day)
BANCAB	6.56E-03
CAB_1	1.94E-03
CAB_EAST	4.10E-04
GARNET_EAST	1.12E-05
GARNET_WEST	1.12E+00
COACH_BAR	5.02E-05
WBAN	6.00E-04
WBAN_2	7.00E-04
EBAN	6.00E-04
BBench	2.00E-03
PCANYN	3.00E-03
MCANYN	3.00E-03
NECAB	1.71E-02
SBAN	6.00E-04

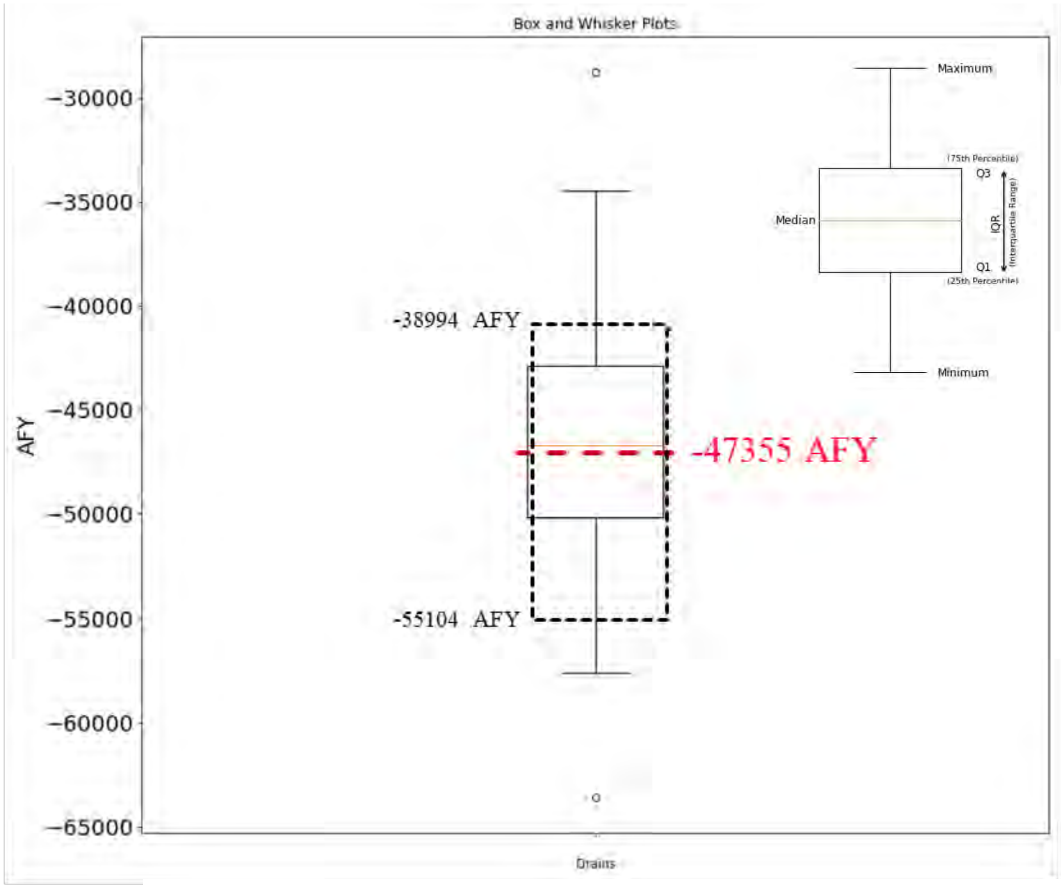
Figure 7.10 Lower Model Fault Conductance



--- Dashed red line represents the historical calibrated value

--- Dashed black box represents the range for realizations with RMSE within 50% of the calibrated RMSE

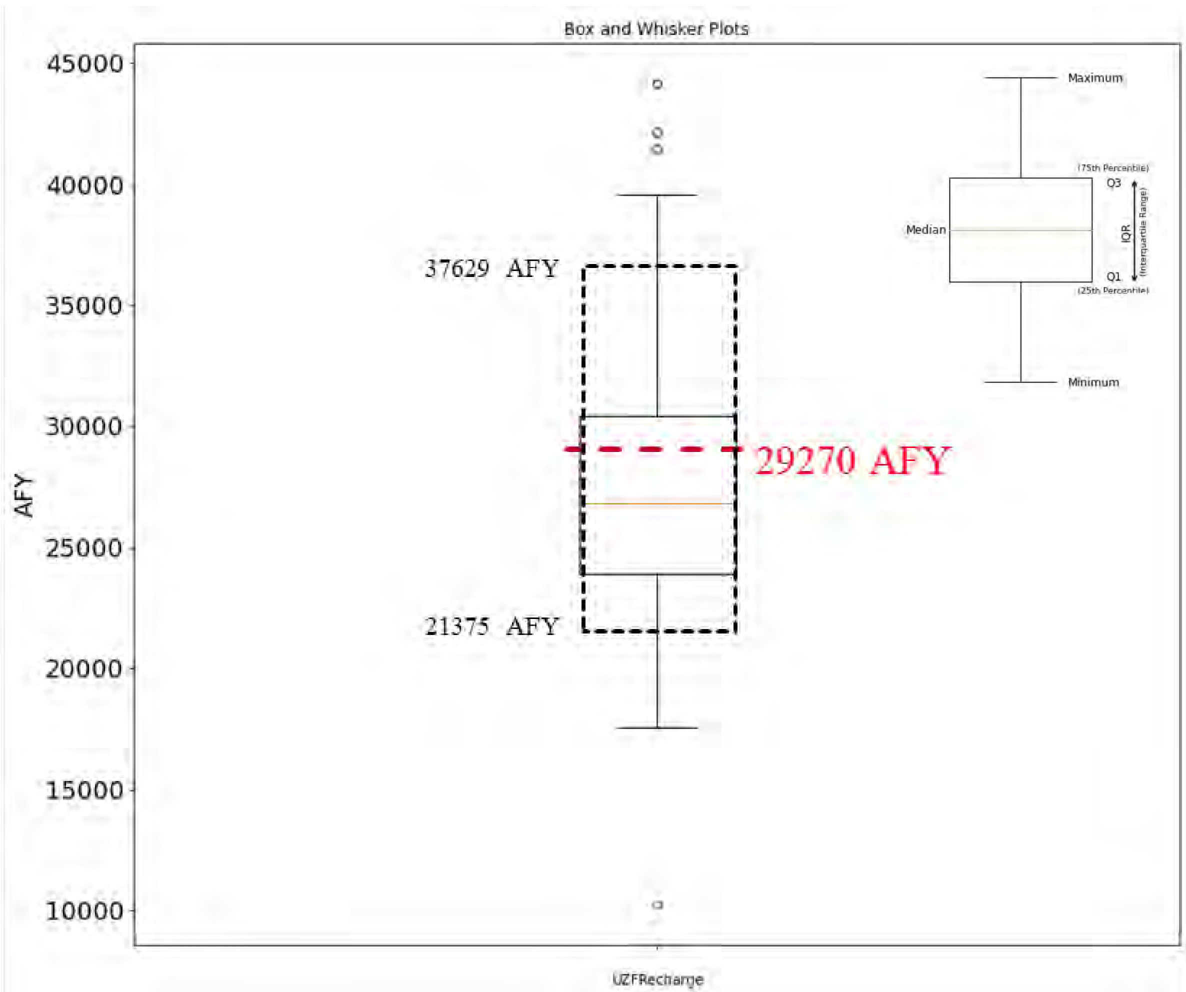
Figure 7.11 Root Mean Square Error (RMSE) – Box and Whisker Plot



--- Dashed red line represents the historical calibrated value

--- Dashed black box represents the range for realizations with RMSE within 50% of the calibrated RMSE

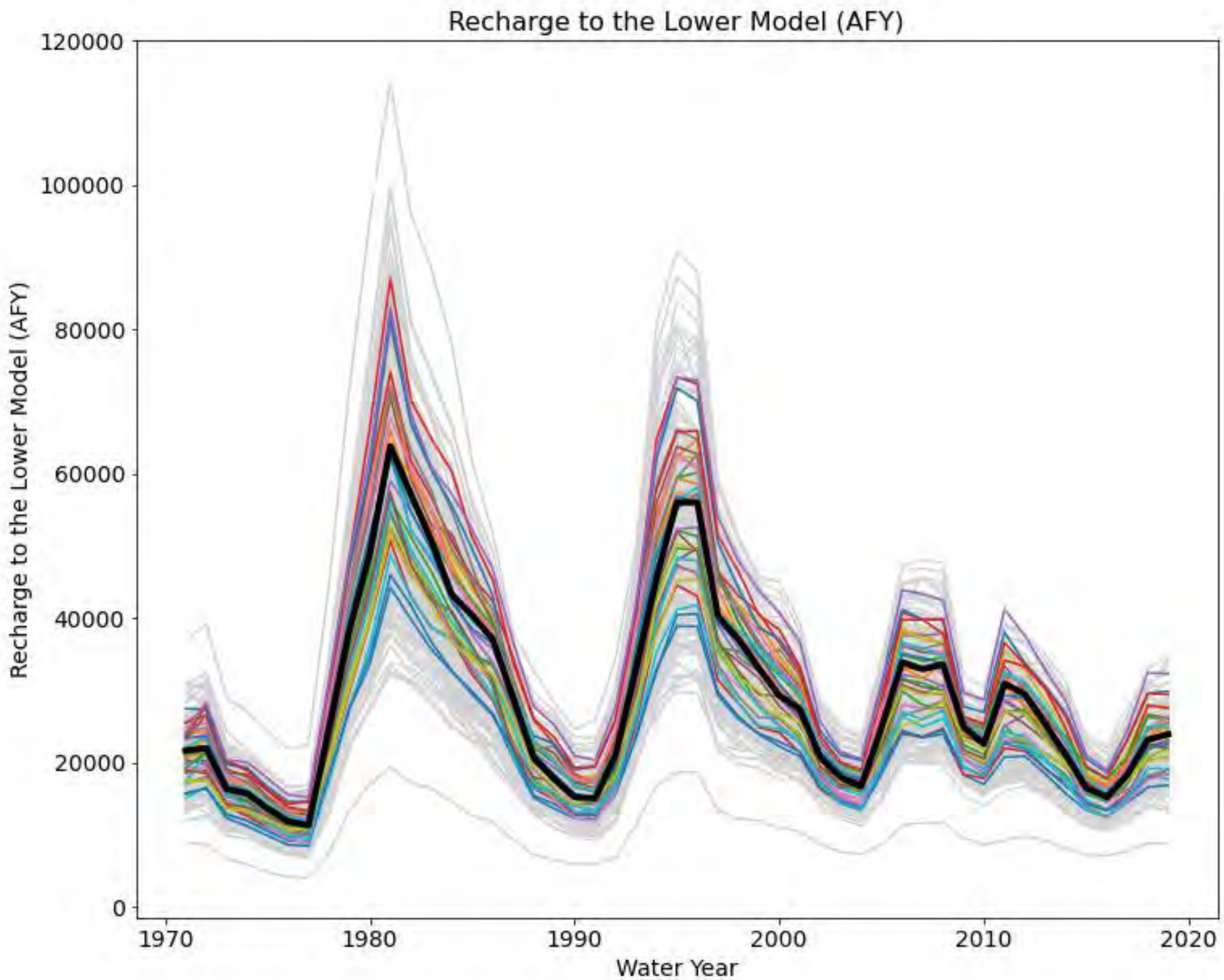
Figure 7.12 Average Drainage from the Upper Model (negative values represent flows leaving the upper model) – Box and Whisker Plot



--- Dashed red line represents the historical calibrated value

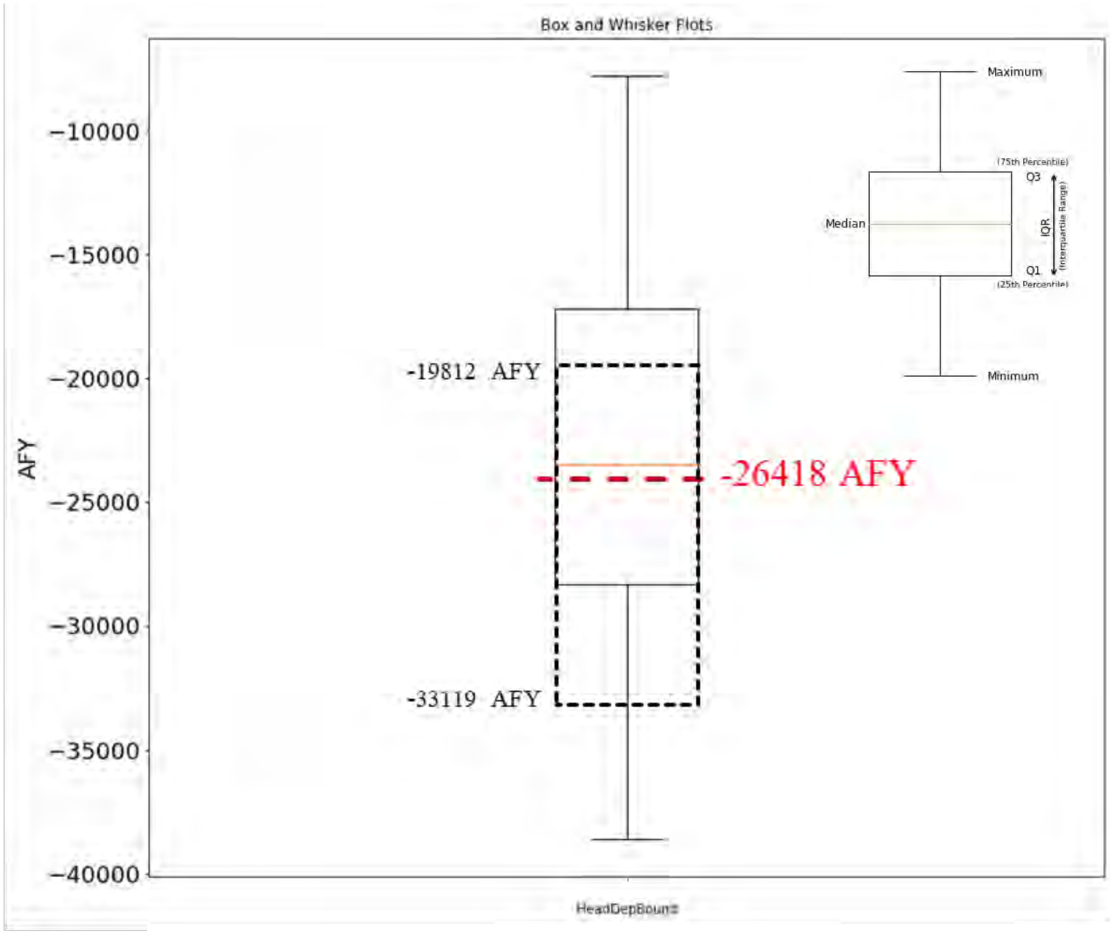
--- Dashed black box represents the range for realizations with RMSE within 50% of the calibrated RMSE

Figure 7.13a Average Recharge to the Water Table – Box and Whisker Plot



--- Grey lines represent all model realizations
--- Colored lines represent realizations with RMSE within 50% of the calibrated RMSE
--- Bold line represents calibrated model

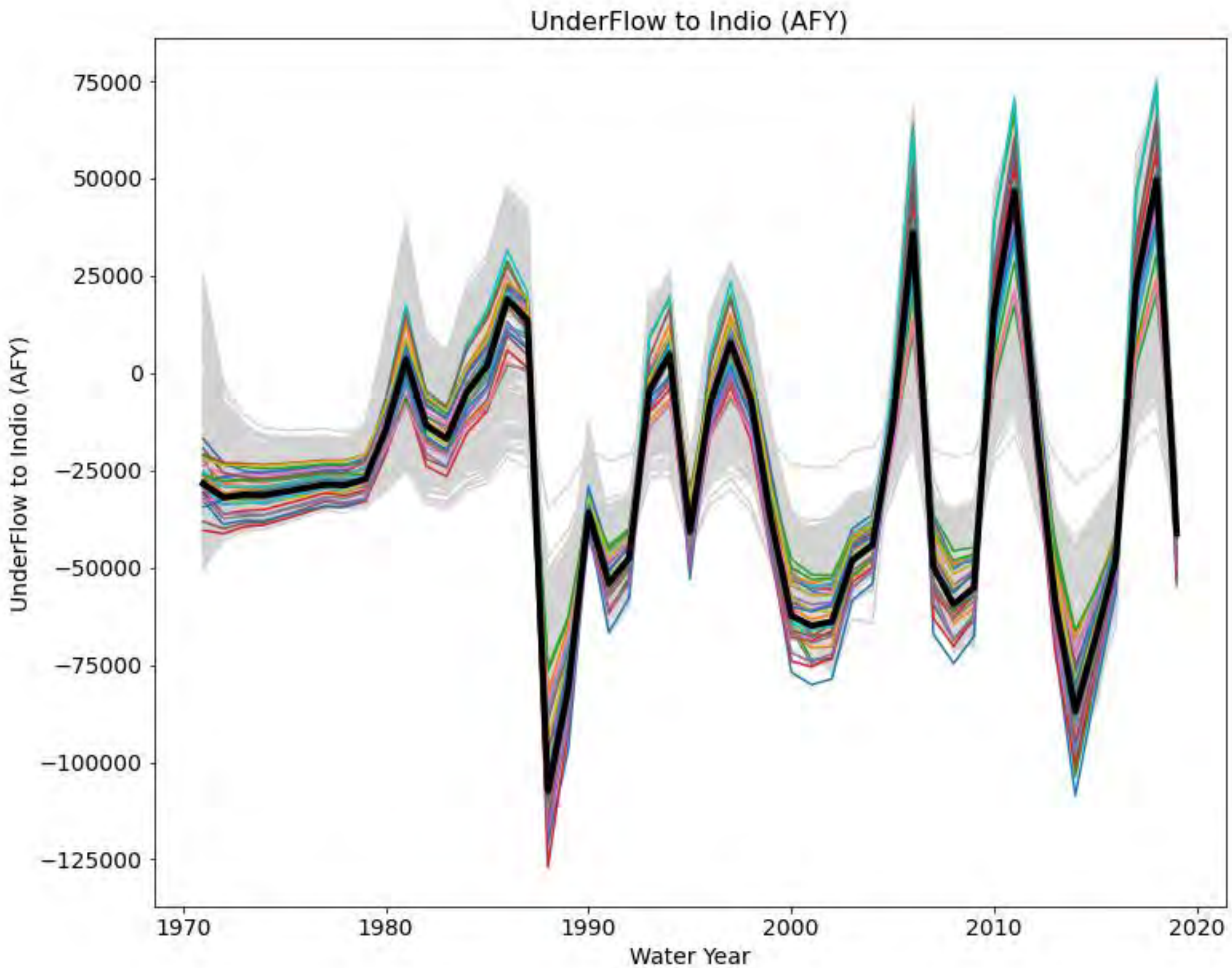
Figure 7.13b Average Recharge to the Water Table – Time-Series



--- Dashed red line represents the historical calibrated value

--- Dashed black box represents the range for realizations with RMSE within 50% of the calibrated RMSE

Figure 7.14a General Head Boundary (GHB) Underflow (negative numbers represent outflows from the SGP Subbasin) – Box and Whisker Plot

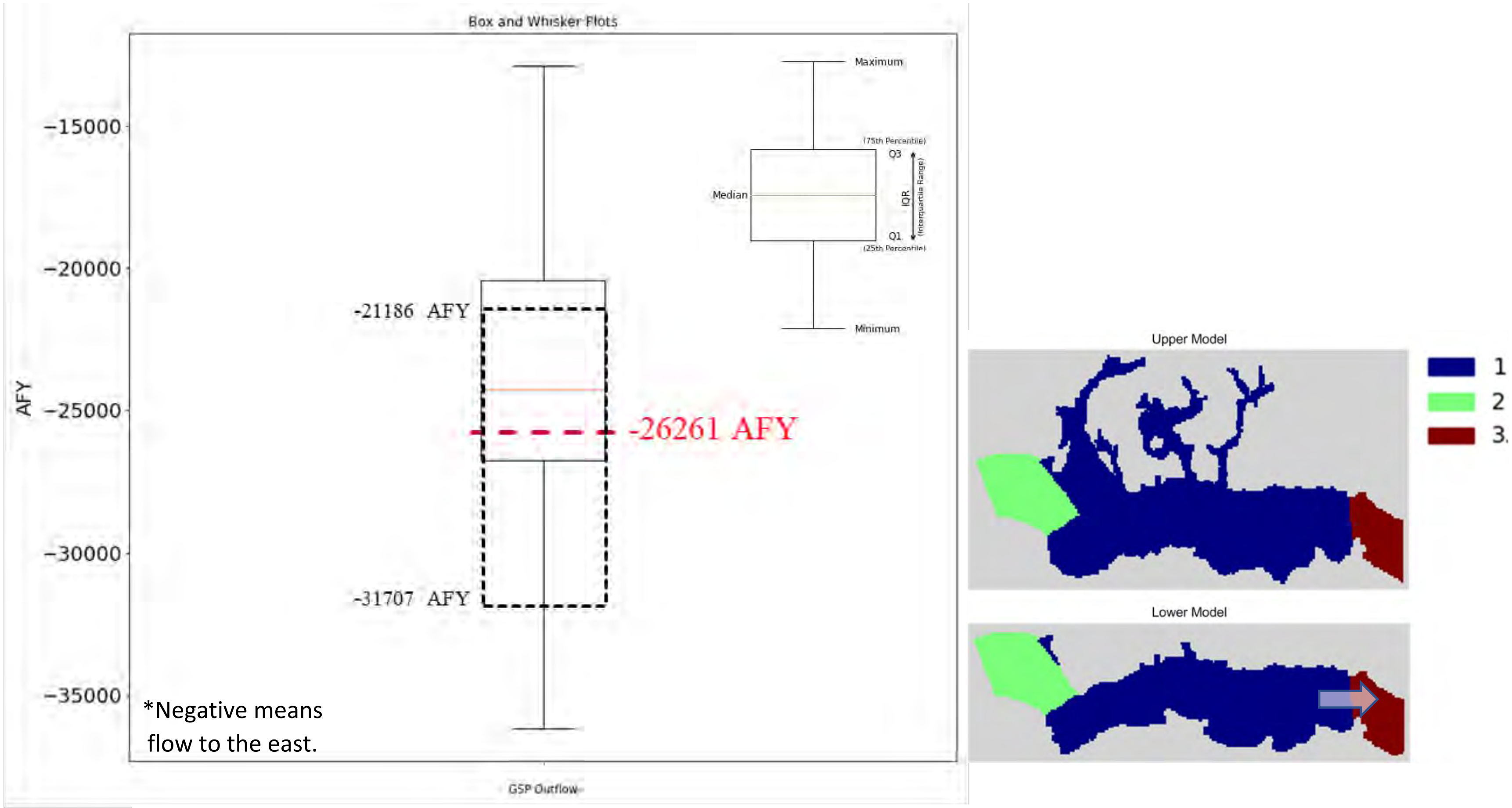


--- *Grey lines represent all model realizations*

--- *Colored lines represent realizations with RMSE within 50% of the calibrated RMSE*

--- Bold line represents calibrated model

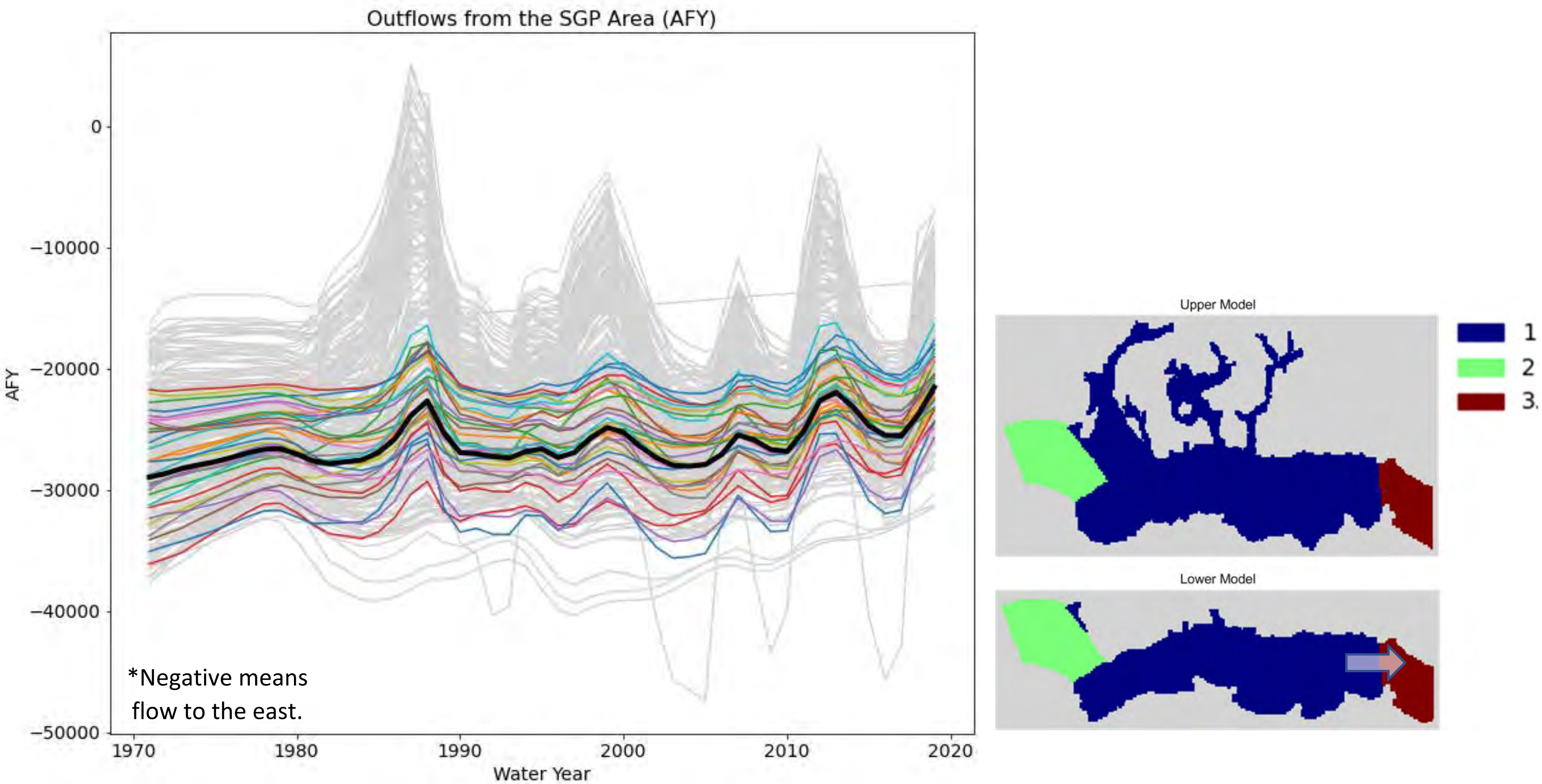
Figure 7.14b General Head Boundary (GHB) Underflow (negative numbers represent outflows from the SGP Subbasin) – Time-Series



--- Dashed red line represents the historical calibrated value

--- Dashed black box represents the range for realizations with RMSE within 50% of the calibrated RMSE

Figure 7.15a Underflow to the Indio Basin (negative numbers represent outflows from the SGP Subbasin) – Box and Whisker Plot

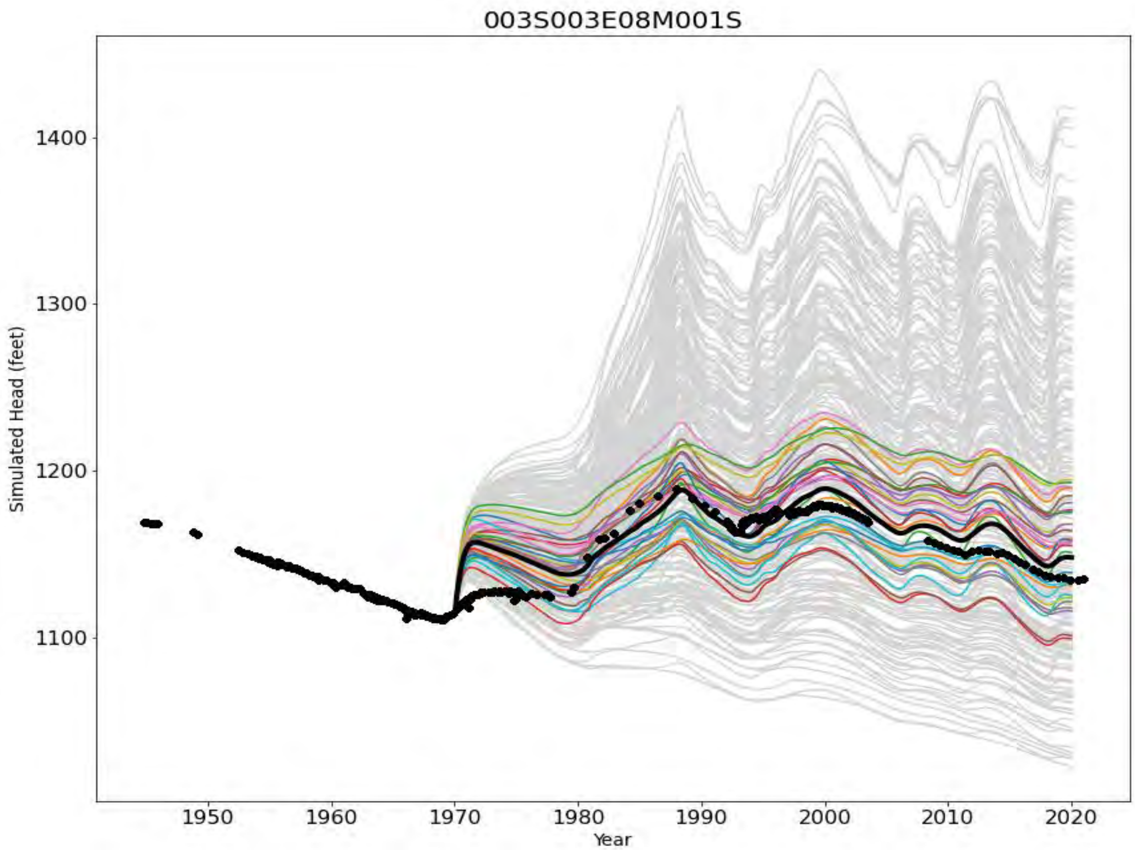


--- *Grey lines represent all model realizations*

--- *Colored lines represent realizations with RMSE within 50% of the calibrated RMSE*

--- Bold line represents calibrated model

Figure 7.15b Underflow to the Indio Basin (negative numbers represent outflows from the SGP Subbasin) – Time-Series



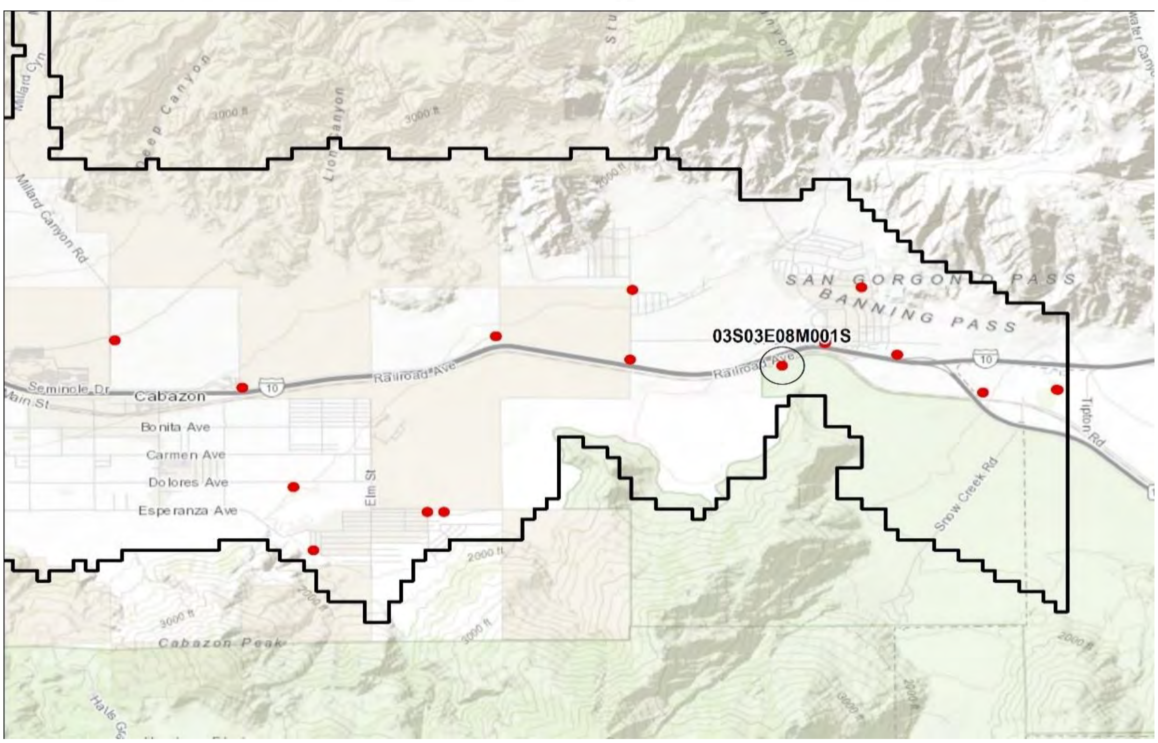
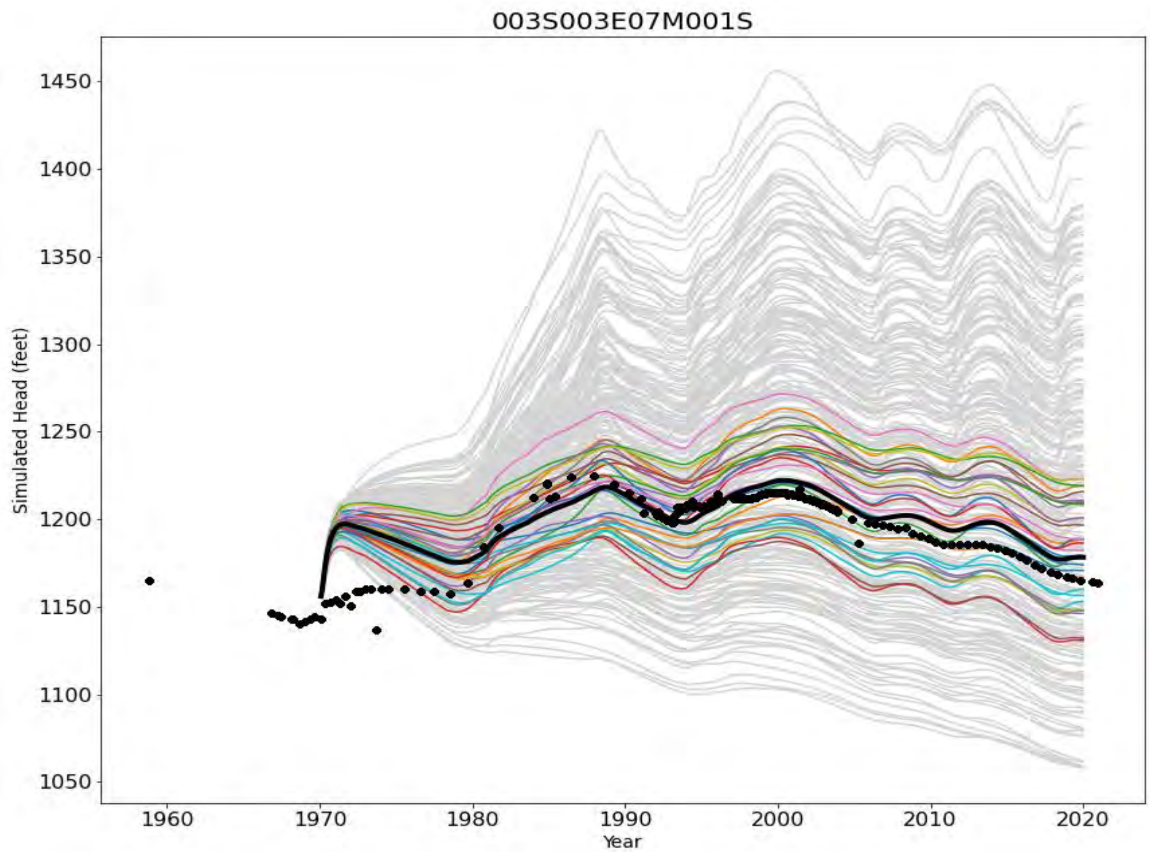


Figure 7.16:
Sensitivity Analysis Hydrograph
03S03E08M001S



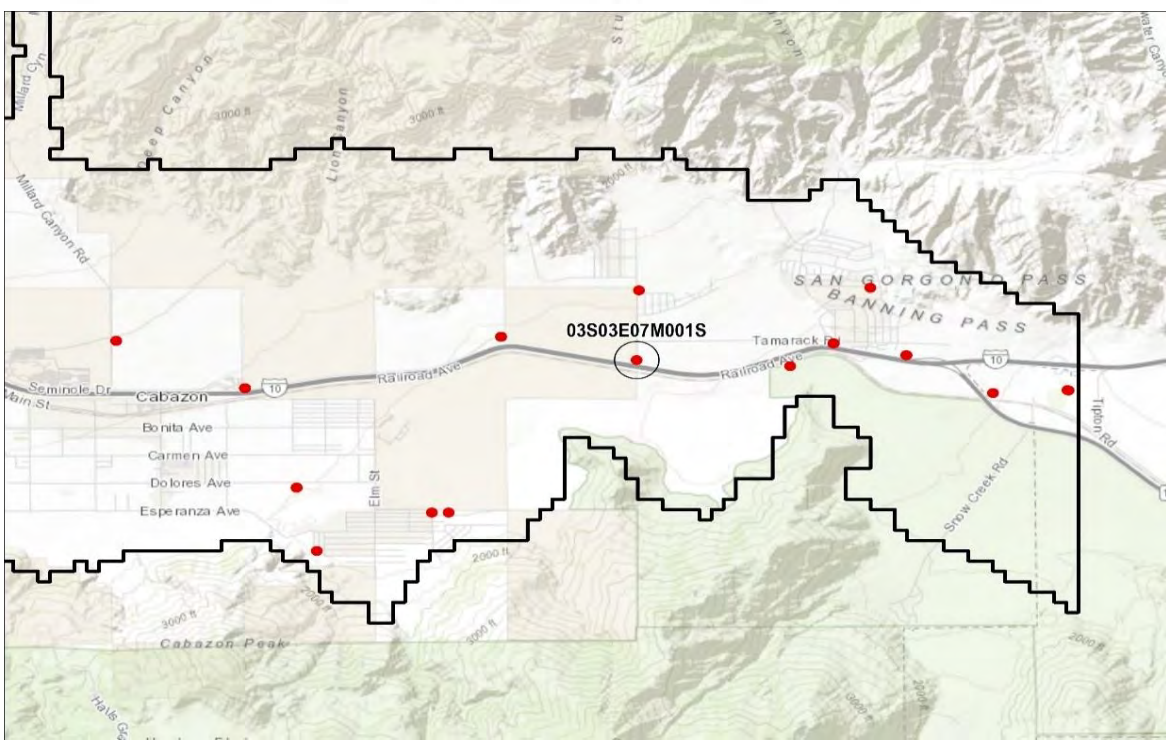
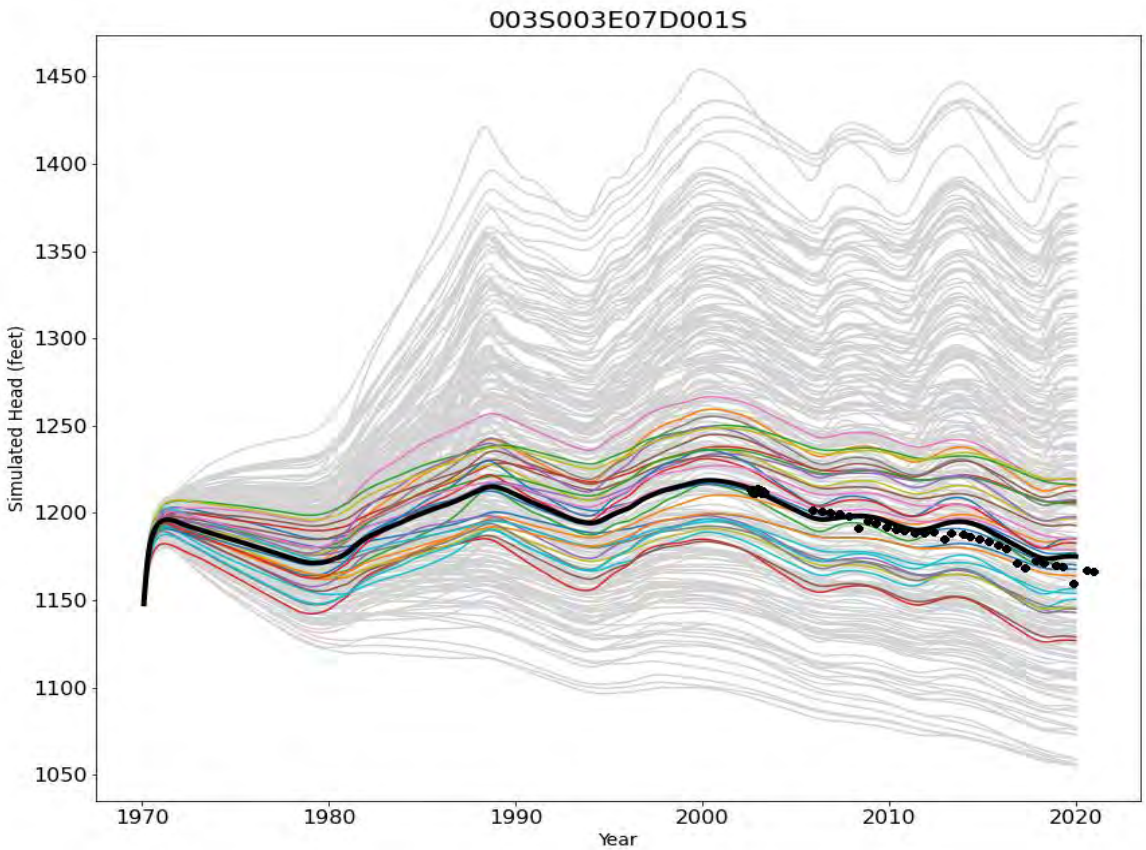
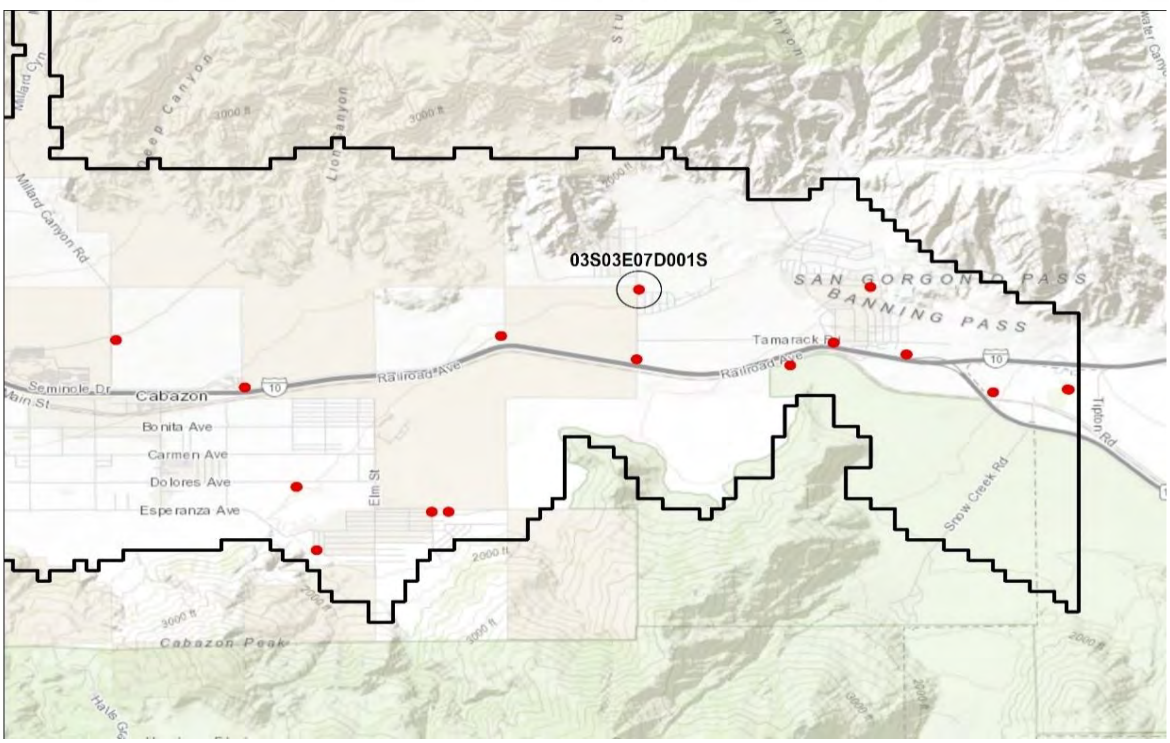


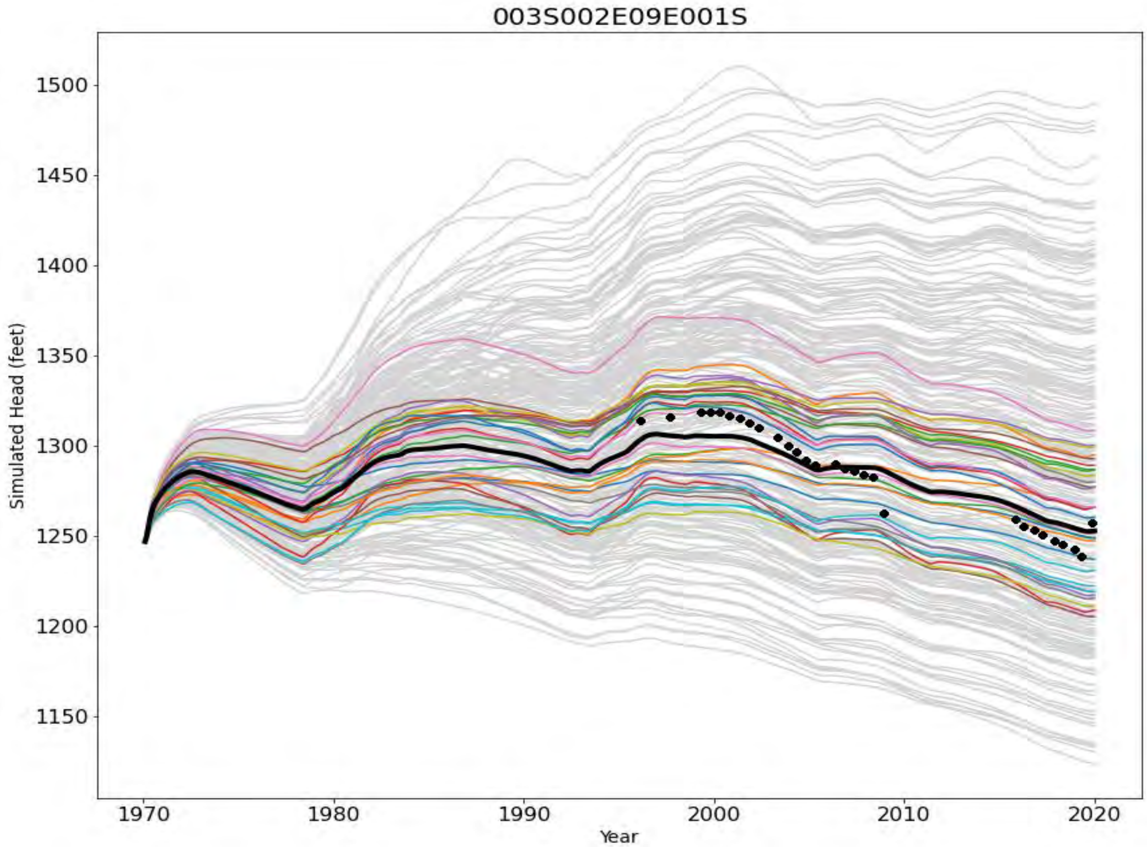
Figure 7.17:
Sensitivity Analysis Hydrograph
03S03E07M001S





INTERA

Figure 7.18:
Sensitivity Analysis Hydrograph
03S03E07D001S



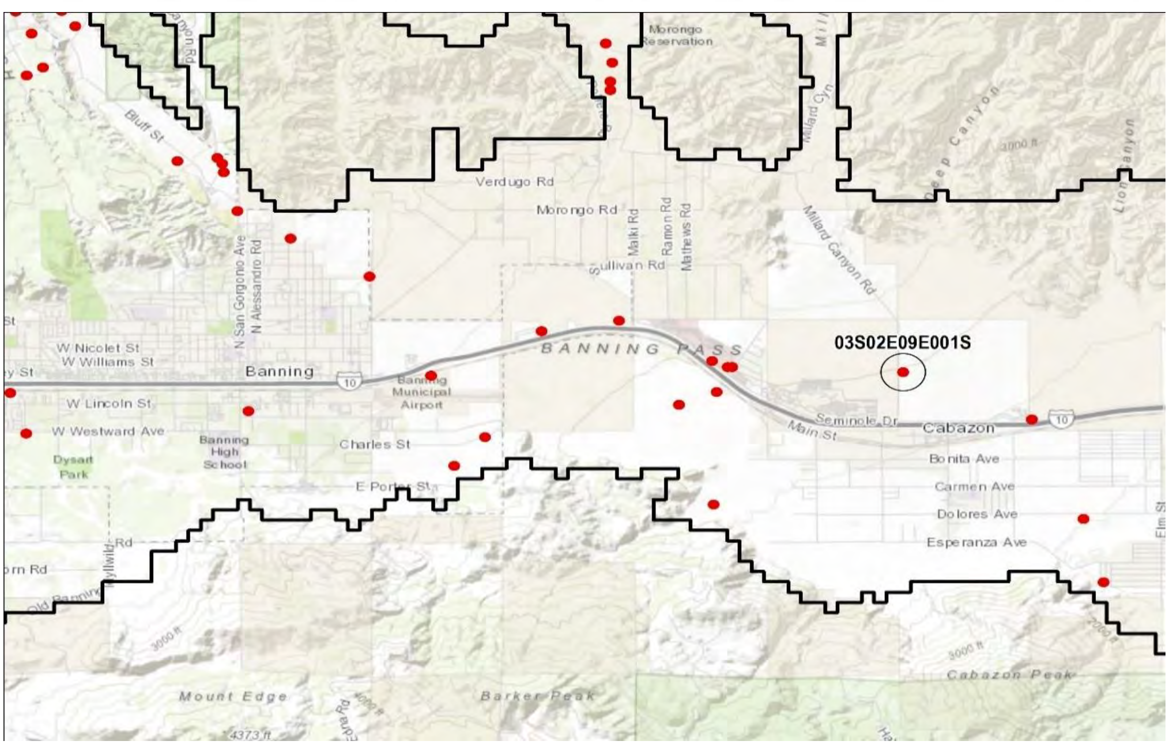
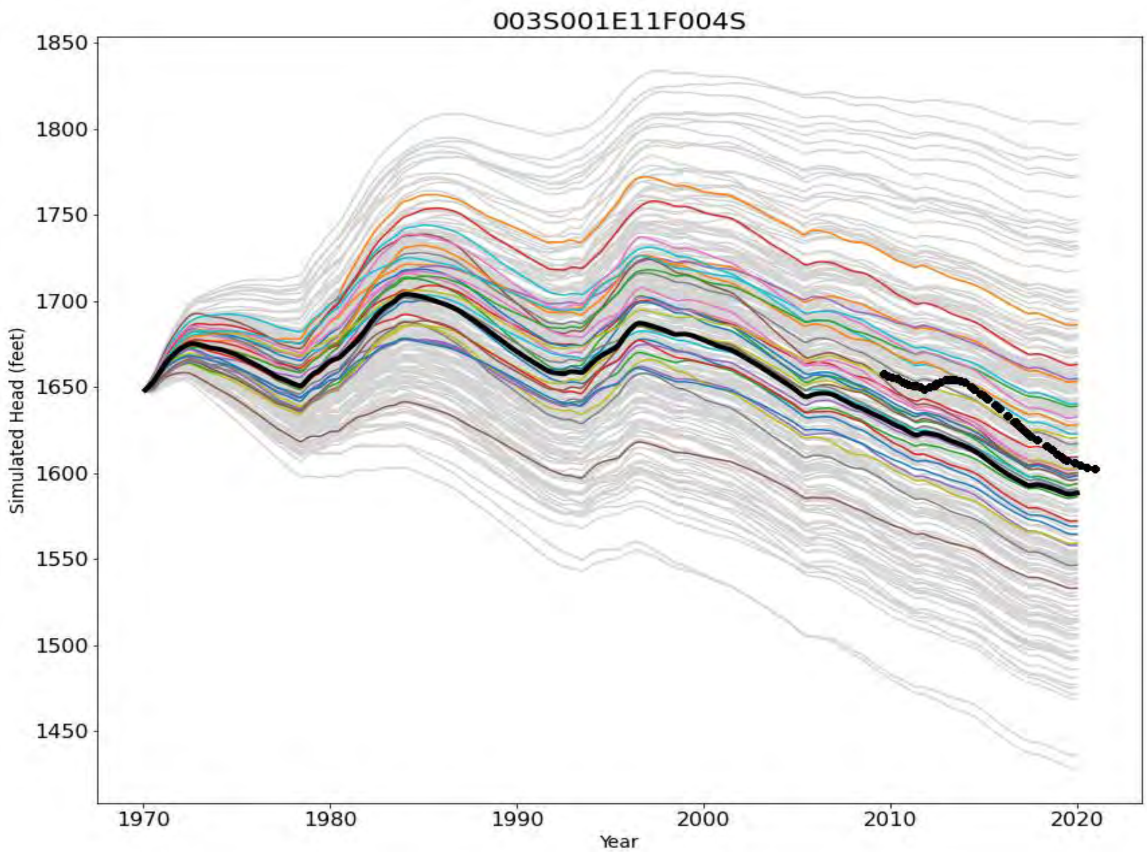
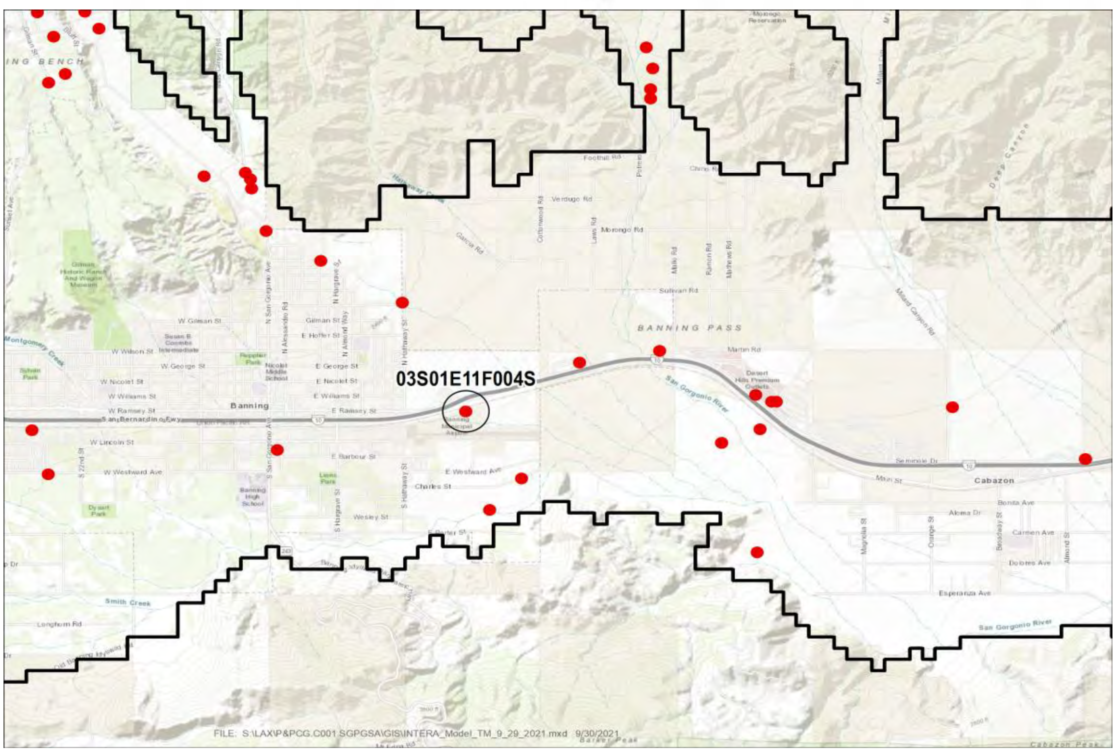


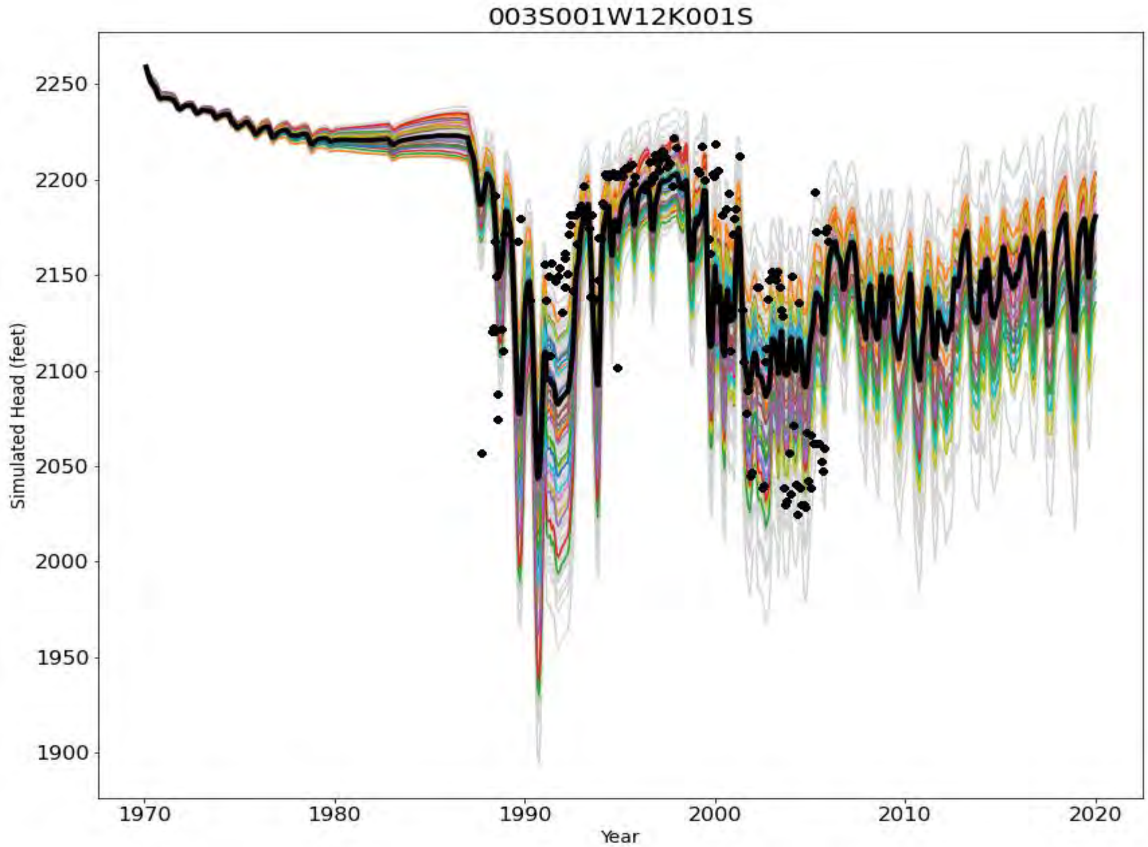
Figure 7.19:
Sensitivity Analysis Hydrograph
03S02E09E001S





INTERA

Figure 7.20:
Sensitivity Analysis Hydrograph
03S01E11F004S



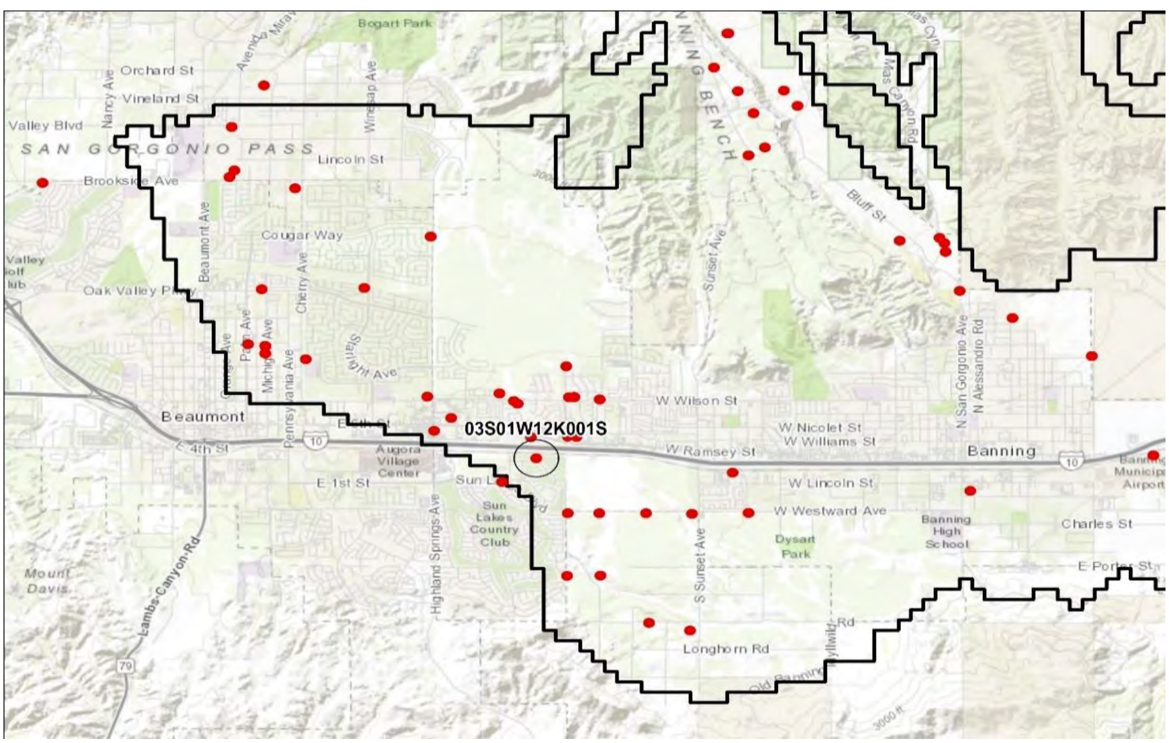
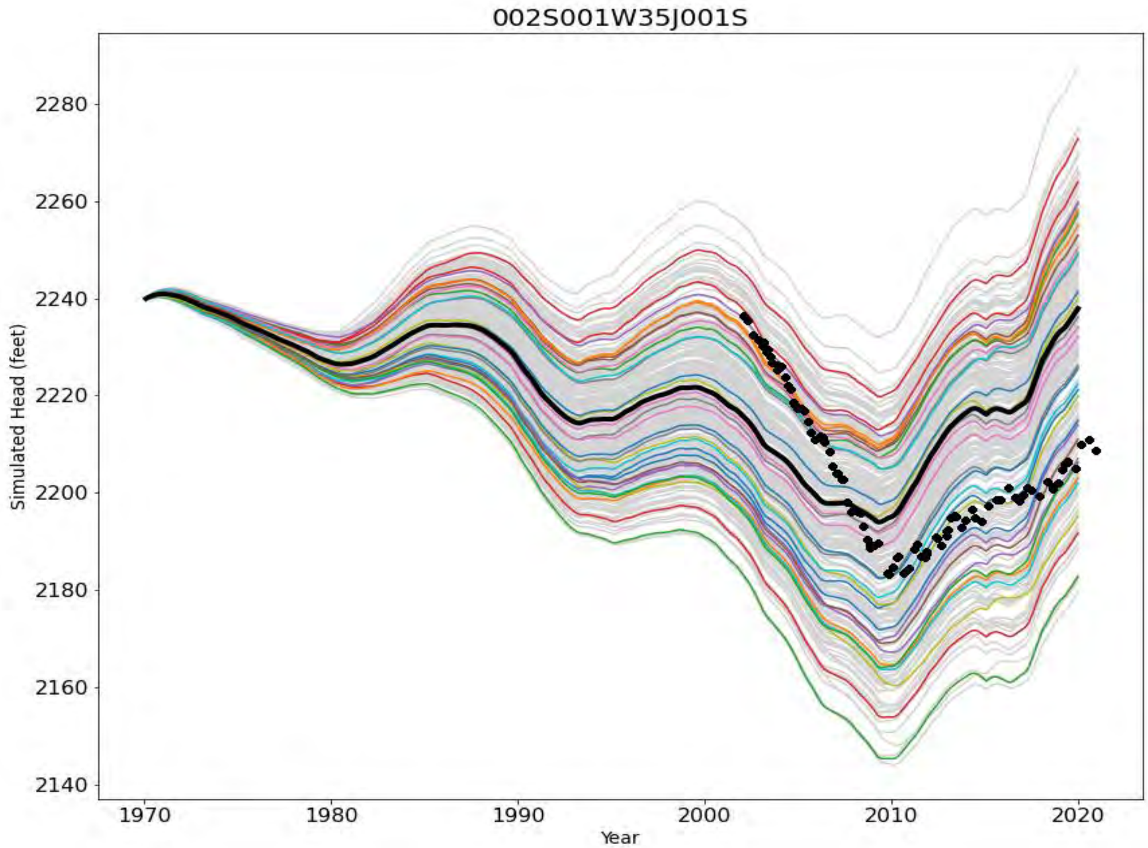


Figure 7.21:
Sensitivity Analysis Hydrograph
03S01W12K001S



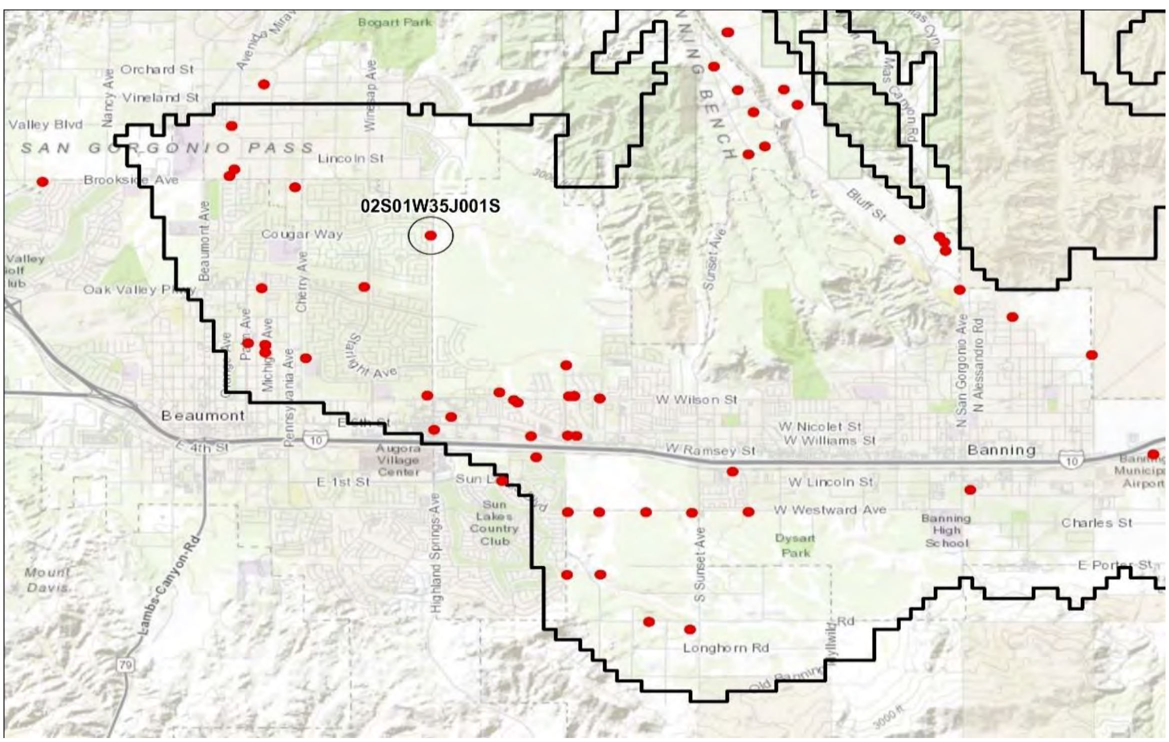


Figure 7.22:
Sensitivity Analysis Hydrograph
02S01W35J001S

Appendix E – Projects & Management Actions

Municipal Water Conservation — Project #1

Project Type

Water Use Efficiency/Water Conservation

Project Location

City of Banning, CA - Latitude: 33.925928°, Longitude: -116.875888° (City Hall)

Implementing Agency

City of Banning in cooperation with the San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA).

Description - 354.44(a)

Although there are many municipal water conservation programs that could be implemented, the proposed project is initially proposed to be a Turf Replacement. Landscape irrigation is estimated to account for about 42 percent of annual residential water consumption statewide. In the Desert Zone/Inland Empire area like Riverside County, the average residential lots uses 0.35 AF/year and turf replacement is estimated to save 51 gallons/square foot for the conversion of turf with less water-intensive plants being drip irrigated (Public Policy Institute of California, 2006).

For simplicity, it can be assumed that turf replacement occurs only in the front yard and that the area replaced is 50 feet by 20 feet or 1,000 square feet. Therefore, for each household that converts their turf, the savings is estimated at about 0.16 AF/year (1,000 sq. ft. * 51 gallons/sq. ft. ÷ 325,851 gallons/AF = 0.157 AF). In 2020, the City of Banning had 3,966 single family residential customers (West & Associates, 2020). If about five percent of the City of Banning single family residential customers, or 200 customers converted their turf, savings are estimated to be 32 AF per year (200 customers * 0.16 AF/year = 32 AF/year) and the savings over 15 years (estimated life of the irrigation system) could be as much as 480 AF. Typical turf rebates in other southern California locations have been as high as $2/square foot. For the 200 customers replacing 1,000 square foot of turf, costs (excluding administrative costs) would approximate $400,000 (200 customers * 1,000 sq. ft./customer * $2/sq. ft. = $400,000). Therefore, agency costs for the water generated are about $800/AF ($400,000 ÷ 480 AF = $833/AF). These estimated costs do not include administrative expenses to run the program.

Measurable Objective(s) Addressed - 354.44(b)(1)

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☒ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44(b)(1)(a)

This project can be implemented even prior to GSP adopted as soon as funds are available for the development of the water conservation program.

Process to Provide Notice of Implementation - 354.44(b)(1)(b)

The project would be noticed publicly through the implementing agency, the City of Banning City Council meetings, in addition to the city website and as a flyer with customer water utility bills.

Estimated Annual Project Benefits (AF/yr) - 354.44(b)(2)

For 200 customers who convert 1,000 square feet of turf to less water-intensive plants being drip irrigated, total water saved is estimated at 32 AF/year.

Permitting and Regulatory Requirements - 354.44(b)(3)

Municipal Water Conservation	**Project #1**

The turf replacement program is likely to qualify for one or more of the categorical exemptions under the California Environmental Quality Act (CEQA).

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

With appropriate funding, the project could start as soon as the program requirements are developed and approved by the City of Banning.

Evaluation of Benefits - 354.44**(b)(5)**

Benefits would be documented by the acreage of turf removed and water savings estimated.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Through implementation of the program, water will be saved by conservation and reduction in groundwater pumping by the City of Banning.

Legal Authority - 354.44**(b)(7)**

City of Banning.

Cost - 354.44**(b)(8)** Estimated Capital Cost

Funding for the rebate is estimated at $400,000 based on the noted estimates. Administrative costs are not included in the estimate.

Funding Source - 354.44**(b)(8)**

Grant funding if available.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

Groundwater extraction would be reduced due to water conservation measures implemented.

Level of Uncertainty - 354.44**(d)**

There is a level of uncertainty associated with residential customers applying for the program and complying with program requirements. However, similar programs have been successfully implemented in other Southern California location in recent years.

Stormwater Capture — Project #2

Project Type

Surface Water Recharge

Project Location

City of Banning, CA - Latitude: 33.925928°, Longitude: -116.875888° (City Hall)

Implementing Agency

San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA).

Description - 354.44(a)

The SGP Subbasin is a generally arid area, however occasional heavy precipitation events result in surface runoff that can recharge local aquifers, or on occasion result in downstream outflows to adjacent subareas. There are extremely limited measurements of local runoff in the SGP, however there have been some very infrequent observations of runoff from the San Gorgonio River and its tributaries to the Indio Subbasin to the east.

To estimate the approximate volumes of water that might be available for stormwater capture, the INFIL watershed model (SGP Groundwater Model Technical Memorandum, 2021) was used to quantify runoff volume and frequency for a small 250-acre representative watershed in the Pershing Creek watershed at the western end of the SGP Subbasin. In general, rainfall decreases to the east, so the selected western location would likely be a high estimate of available stormwater. Additionally, no estimate was available of how much of this runoff may have percolated downstream to the SGP groundwater basin under natural conditions in the absence of a stormwater capture project. Because of these optimistic assumptions, the estimate of volume that could be captured is likely overestimated.

Measurable Objective(s) Addressed - 354.44(b)(1)

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☒ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44(b)(1)(a)

This project can be implemented as part of land development projects that are approved by the cities in the subbasin or Riverside County. Based on the costs involved for the minimal capture of runoff, separate projects outside of land development are unlikely to be initiated.

Process to Provide Notice of Implementation - 354.44(b)(1)(b)

The project would be noticed publicly through the agency with oversite for land development in the subbasin.

Estimated Annual Project Benefits (AF/yr) - 354.44(b)(2)

Considering the assumptions described above, a typical potential stormwater capture program was identified for the representative watershed conditions identified above. Based on the INFIL watershed model runoff for the representative 250-acre watershed, runoff would have occurred in ten months during the 94-year analysis period (1926-2019). The total average runoff from the representative 250-acre watershed would have been 0.6 AF. Assuming that a 1-acre-detention basin is constructed with a depth of 2 feet, an assumed ability for 2 AF to be retained from each storm event. Over the 94-year analysis period, the average actual amount retained is estimated at about 0.11 AF. This is considerably less than the average amount of flow that is estimated to occur, as the great majority of the average

Stormwater Capture	**Project #2**

runoff would have occurred in two individual months during the analysis period. At most, only two AF of runoff would be retained in an individual event and flows averaging about 0.5 AF would flow past a potential detention basin and be lost to the SGP Subbasin. Extrapolating for a potential drainage area of 14,000 acres for the western portion of the City of Banning, development of 54 acres of detention basins would result in average water retained of approximately 6 AF per year on an average annual basis.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

The County of Riverside and cities with authority to regulate land development as part of their General Plans and Subdivision Map Act would have oversight.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

No schedule has been identified, though stormwater capture projects as part of approved land development in the region are ongoing.

Evaluation of Benefits - 354.44**(b)(5)**

Monitoring of rainfall events to estimate infiltrated amounts. Based on the estimates of runoff, it is unlikely that monitoring of groundwater levels would indicate any change in groundwater levels due to the recharge amounts.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

The water available is local runoff that may be captured infrequently through the construction of recharge facilities as part of land development projects.

Legal Authority - 354.44**(b)(7)**

Agencies with authority through their General Plans can incorporate storm drainage requirements as part of land development projects.

Cost - 354.44**(b)(8)** Estimated Capital Cost

The land purchase and construction costs for the representative 1-acre detention basin were estimated very approximately as $150,000 per acre. With a project interest rate of 5.5% and a thirty-year repayment period, the construction cost would equate to about $10,300 per year and result in an estimated cost of nearly $100,000 per AF of water retained.

Based on the high cost identified for a stormwater capture project, construction of detention basins for purposes of stormwater capture does not appear to be an affordable water supply source. As the City of Banning and other urban areas of the SGP GSP develop, it is expected that detention basins will be constructed as appropriate for purposes of flood peak attenuation and as part of land development projects. However, the amount of additional stormwater that is retained is likely to be minimal (6 AF per year for an assumed 54 acres of detention basins). For purposes of GSP planning, no additional quantifiable yield is assumed from stormwater capture. However, if a basin was constructed as part of land development in a favorable recharge area and imported surface water supplies could also be recharge in the facility, it would increase the flexibility to recharge in the subbasin and create more area for overall recharge.

Funding Source - 354.44**(b)(8)**

Developers would pay for most of the infrastructure as part of any land development projects within the cities or County as they currently are for storm water being captured off the properties and roads within the subbasin.

Stormwater Capture	**Project #2**

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project could contribute minimally to the replenishment of extracted groundwater, for recovery in dry periods.

Level of Uncertainty - 354.44**(d)**

Based on the high costs involved compared to the minimal yield, there is likely that the dedicated projects would not be built to capture stormwater runoff, except as part of ongoing land development projects that already require the management of stormwater runoff.

Additional Imported Water Spreading at Noble Creek Spreading Basins — Project #3

Project Type

Surface Water Recharge

Project Location

Northeast and Southwest of the intersection of Brookside and Beaumont Avenues in Beaumont, CA.
Noble Creek Recharge - Latitude: 33.961610°, Longitude: -116.977072°,
Brookside Recharge - Latitude: 33.960820°, Longitude: -116.977773°

Implementing Agency

San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA) in cooperation either with San Gorgonio Pass Water Agency (SGPWA) and Beaumont-Cherry Valley Water District (BCVWD).

Description - 354.44**(a)**

The proposed project would provide increased groundwater recharge at existing spreading basins adjacent to Noble Creek in the adjudicated Beaumont Basin. Beaumont-Cherry Valley Water District has constructed the Noble Creek Recharge Facility containing about 23 acres of spreading basins along Noble Creek and SGPWA has constructed the Brookside Recharge Facility containing about 25 acres that are also adjacent to Noble Creek. State Water Project water that has been contracted for by SGPWA is supplied through the East Branch Extension for recharge at the BCVWD and SGPWA spreading basins along Noble Creek. Recharge at this location directly supplies the adjudicated Beaumont groundwater Basin and flows downstream (and southward) to supplement groundwater supplies in the Banning Storage Unit. Currently, water spreading at the Noble Creek Spreading Basins is limited by the SGPWA water supplies, which include State Water Project Table A Amounts, purchased water from La Hacienda Corporation (Nickel Water), and water transfers from other sources such as the Yuba Accord. These current water supply sources are not adequate to meet SGPWA projected future need in the SGP Subbasin and other areas. This proposed project would provide for increased purchases of available water supplies for recharge at the Noble Creek Spreading Basins, which could meet increased local needs in the Banning Storage Unit of the SGP Subbasin.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☒ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

This project can be implemented even prior to GSP adopted as soon as funds are available for the purchase of additional surface water supplies.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

With a recharge area footprint of about 48 acres between the two existing sites and estimated recharge rate of 0.5 feet/day, the two sites would recharge about 24 AF/day. For each month of operations, recharge is therefore estimated at 720 AF. The project can be used throughout the year when water is available and the recharge sites are not in use by the owner agencies.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

Additional Imported Water Spreading at Noble Creek Spreading Basins	**Project #3**

Since the recharge facilities are existing, environmental documents would be limited to those required for the purchase or permanent transfer of surface water supplies, which would likely include an initial study and negative declaration required by the California Environmental Quality Act (CEQA).

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

With funding, additional project planning could start immediately. However, it is likely to only commence after additional monitoring occurs during the first five years of the implementation period, and only if the data indicates the Subbasin is not operating sustainably.

Evaluation of Benefits - 354.44**(b)(5)**

Monitoring of groundwater levels and measurement of surface water recharged.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Since the San Gorgonio Pass Water Authority is a State Water Project Contractor the purchase of available State Water Project supplies is the most likely source of water. Non-State Water Project supplies could also be purchased from willing sellers North of the Delta and transferred to the local agency.

Legal Authority - 354.44**(b)(7)**

San Gorgonio Pass Water Authority is a State Water Project contractor.

Cost - 354.44**(b)(8)** Estimated Capital Cost

No new physical facilities would be required for this project, but the assumed 2,000 acre-feet per year of average supply would need to be purchased from an outside source. One-time purchase costs of State Water Project supplies or other outside supply sources are not well defined and could vary depending on purchase terms. For this project an approximate up-front purchase cost of $10,000 per acre-foot was assumed, resulting in total capital costs of approximately $20 million for purchase of 2,000 acre-feet of average supply.

Funding Source - 354.44**(b)(8)**

Grant funding if available, or future land-based assessments or groundwater extraction charges.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project will contribute to the replenishment of extracted groundwater, for recovery in dry periods.

Level of Uncertainty - 354.44**(d)**

There is a level of uncertainty associated with the effects of groundwater replenishment and fluctuations in groundwater elevations. The GSA will take this into account when developing the benefit to the Subbasin, through monitoring of the groundwater.

New Pipeline with Additional Imported Water Spreading in the Cabazon Storage Unit	**Project #4**

Project Type

Surface Water Recharge

Project Location

Northwest of the Hathaway and Theodore Streets alignment on the edge of the City of Banning, CA. Cabazon Storage Unit Recharge - Latitude: 33.938877°, Longitude: -116.860103°

Implementing Agency

San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA) in cooperation with the San Gorgonio Pass Water Agency.

Description - 354.44**(a)**

SGPWA reviewed a potential new pipeline extension from the terminus of the East Branch Extension at Noble Creek to the Cabazon Storage Unit near the San Gorgonio River. The preliminary pipeline design would have three reaches. Reach 1 from Noble Creek to the intersection of Highland Springs/Brookside Avenues with a 36" diameter and an estimated capacity of 52 cfs. Reach 2 would extend from the end of Reach 1 to the intersection of Sunset Avenue/Wilson Street, with a diameter of 30 inches and an estimated flow capacity of 30 cfs. Reach 3 would continue from the end of Reach 2 to proposed recharge basins adjacent to the San Gorgonio River. The recharge basins would consist of 54 acres of developed basins at the Robinson's Ready Mix Quarry site in the City of Banning. The pipeline alignment and recharge basin locations are all preliminary and were used for purposes of cost estimation by Webb 2020.

Webb 2020 estimated the costs for the conceptual pipeline as $36.3 million and for the proposed recharge basins as $14.2 million, with both estimates including a 15% contingency. The total cost for the facilities would be $50.4 million. The pipeline and recharge basins would have the capacity to provide up to 22 cfs of recharge at the proposed new recharge basins, which would have a total annual capacity of 15,540 AF.

Water supply for the new pipeline and recharge facilities would likely exceed the currently available SGPWA contracted supplies. SGPWA is currently conducting an infrastructure study to identify necessary water supply sources, which could include supply augmentation actions such as purchased SWP Table A amounts (either permanent or on a year-to-year basis), participation in Sites Reservoir Project, participation in Delta Conveyance Project or other possible augmentation projects. Recharge in the Cabazon Storage Unit with the proposed new facilities would require access to some of the additional water supply being evaluated by the SPWA Infrastructure Study.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☒ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

Additional project planning can start as soon as the GSP is adopted and funds are available for the project and purchase of additional surface water supplies. In the event that the subbasin exceeds the

New Pipeline with Additional Imported Water Spreading in the Cabazon Storage Unit	**Project #4**

identified SMC for levels or storage, the project would be a critical component for groundwater sustainability.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

5,300 AF/year average based on the model simulation noted below.

For purposes of evaluating the effect of this project on groundwater levels and storage, a groundwater model simulation was prepared. The simulation was based on an alternative 2030 water budget, with assumed increased water use by MBMI that is external to the GSP but affects SGP water supplies. A project was evaluated that provides a long-term average of 5,300 AF per year, with the delivery pattern taken to be proportional to the SWP projected water supplies to the SGPWA. The supply identified in this projection varied from a minimum of 1,200 AF per year in 1977 to a maximum of 8,800 AF in 1983.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

Through the initial study (IS) required by the California Environmental Quality Act (CEQA) for the construction and purchase or permanent transfer of surface water supplies, the required permits and regulatory requirements would be identified. The breadth of construction is likely to require a mitigated negative declaration (MND) or environmental impact report (EIR).

At a minimum, work in public road rights-of-way would require encroachment permits from Riverside County, and Cities of Beaumont and Banning. A crossing of Noble Creek and possible other drainages would requirement a 1600 Agreement with the California Department of Fish and Wildlife. Changes to the existing gravel pits for the recharge sites may require compliance with existing requirements under jurisdiction of the Surface Mining and Reclamation Act of 1975 (SMARA) and conditional use permit from Riverside County.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

With funding, additional project planning could start immediately. However, it is likely to only commence after additional monitoring occurs during the first five years of the implementation period, and only if the data indicates the Subbasin is not operating sustainably.

Evaluation of Benefits - 354.44**(b)(5)**

Monitoring of groundwater levels and measurement of surface water recharged.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Since the San Gorgonio Pass Water Authority is a State Water Project contractor the purchase of available State Water Project supplies is the most likely source of water. Non-State Water Project supplies could also be purchased from willing sellers North of the Delta and transferred to the local agency.

Legal Authority - 354.44**(b)(7)**

San Gorgonio Pass Water Authority is a State Water Project contractor.

Cost - 354.44**(b)(8)** Estimated Capital Cost

New Pipeline with Additional Imported Water Spreading in the Cabazon Storage Unit	**Project #4**

Capital costs (2020 preliminary level) were estimated by Webb at $50.4 million for the recharge facilities, pipeline and land purchase One-time purchase costs of State Water Project supplies or other outside supply sources are not well defined and could vary depending on purchase terms. For this project an approximate up-front purchase cost of $10,000 per acre-foot was assumed, resulting in capital costs of approximately $53 million for purchase of 5,300 acre-feet of average supply.

Funding Source - 354.44**(b)(8)**

A portion of funding is based on development connection fees obtained from residential/commercial development. Also, grant funding if available, as well as future land-based assessments.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project will contribute to the replenishment of extracted groundwater, for recovery in dry periods.

Level of Uncertainty - 354.44**(d)**

The proposed project would be developed to meet increased groundwater use for additional development on MBMI lands. MBMI, As the primary beneficiary of the increased use, the project is assumed to be developed and funded primarily by the MBMI. As a federally recognized tribe, the MBMI are not subject to SGMA and, in the absence of a process such as adjudication, they would not have a regulatory obligation to develop a new water supply for their increased groundwater use. Additionally, there is a level of uncertainty associated with the effects of groundwater replenishment and fluctuations in groundwater elevations, as the groundwater replenishment activities would be in excess of past such activities. The GSA will take this into account when developing the benefit to the Subbasin, through monitoring of the groundwater.

New Pipeline with Additional Imported Water Spreading in the Banning Storage Unit	**Project #5**

Project Type

Surface Water Recharge

Project Location

Southwesterly of the intersection of Sunset Avenue and Interstate 10 in the City of Banning, CA. Banning Storage Unit Recharge - Latitude: 33.923147°, Longitude: -116.912172°

Implementing Agency

San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA) in cooperation with the San Gorgonio Pass Water Agency and the City of Banning.

Description - 354.44**(a)**

An open piece of land was identified near the City of Banning that could provide additional recharge to the Banning Storage Unit. This variation would include use of Reaches 1 and 2 in the Project #4 pipeline, with a smaller lateral pipeline to be constructed at the end of Reach 2. The lateral pipeline would take off from the end of Reach 2 and run in a southerly along Sunset Avenue south of Interstate 10. A 10-acre spreading basin would be constructed along the west side of Sunset Avenue between Interstate 10 and the extension of Bobcat Road. Assuming recharge rates of 1 AF per acre per day and a use factor of 80%, this recharge facility would have a capacity for 2,900 AF per year. Assuming a supply source of SWP imported water, recharge at this site would average about 1,700 AF per year over the long term, with projected annual recharge varying from a minimum of 500 AF to a maximum of 2,900 AF. Recharge at the Project #5 site would, in part, substitute for recharge at the Project #3 site, with the total amount of recharge at the two sites remaining at the 2,000 AF per year level indicated in Project #3.

As discussed as part of Project #3, water supply for the new pipeline and recharge facilities would likely exceed the currently available SGPWA contracted supplies. SGPWA is currently conducting an infrastructure study to identify necessary water supply sources, which could include supply augmentation actions such as purchased SWP Table A amounts (either permanent or on a year-to-year basis), participation in Sites Reservoir Project, participation in Delta Conveyance Project or other possible augmentation projects. Recharge in the Banning Storage Unit with the proposed new facilities would require access to some of the additional water supply being evaluated by the SPWA Infrastructure Study.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☒ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

Project planning can start as soon as the GSP is adopted and funds are available for the project and purchase of additional surface water supplies. In the event that the subbasin exceeds the identified SMC for levels or storage, the project would be a critical component for groundwater sustainability. Also, land development in the City of Banning could also cause the project to be implemented to provide the needed water supply for new development.

New Pipeline with Additional Imported Water Spreading in the Banning Storage Unit	**Project #5**

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

With an initial recharge area footprint of about 10 acres and estimated recharge rate of 1.0 feet/day, the site would recharge about 10 AF/day and have the ability to recharge 300 AF for each month of operation. With a use factor of 80%, the recharge facility would have a capacity of 2,900 acre-feet per year. The project can be used throughout the year when water is available.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

Through the initial study (IS) required by the California Environmental Quality Act (CEQA) for the construction and purchase or permanent transfer of surface water supplies, the required permits and regulatory requirements would be identified. Based on the extent of project construction, it is likely to require a mitigated negative declaration (MND) or environmental impact report (EIR).

At a minimum, work in public road rights-of-way would require encroachment permits from Riverside County, and Cities of Beaumont and Banning. A crossing of Noble Creek and possible other drainages would requirement a 1600 Agreement with the California Department of Fish and Wildlife. Crossing Interstate 10 would require an encroachment permit from CalTrans.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

The project could start immediately but would start if there is a need for additional supplies for recharge. It is anticipated that monitoring will occur for the first five year of the GSP implementation period to determine if additional recharge is needed while conceptual and feasibility level studies are conducted to develop the project further.

Evaluation of Benefits - 354.44**(b)(5)**

Monitoring of groundwater levels and measurement of surface water recharged.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Since the San Gorgonio Pass Water Authority is a State Water Project Contractor the purchase of available State Water Project supplies is the most likely source of water. Non-State Water Project supplies could also be purchased from willing sellers North of the Delta and transferred to the local agency.

Legal Authority - 354.44**(b)(7)**

San Gorgonio Pass Water Authority is a State Water Project contractor.

Cost - 354.44**(b)(8)** Estimated Capital Cost

The portions of the cost for Reach 1 and Reach 2 of Project #4 are estimated by Webb (2020) as about $22 million. If Project #4 was already constructed, additional costs to bring the surface water to the Banning Storage Unit for recharge are about $2 million (based on proportioning the Webb estimate).

One-time purchase costs of State Water Project supplies or other outside supply sources are not well defined and could vary depending on purchase terms. For this project an approximate up-front purchase cost of $10,000 per acre-foot was assumed, resulting in total capital costs of approximately $20 million for purchase of 2,000 acre-feet of average supply.

New Pipeline with Additional Imported Water Spreading in the Banning Storage Unit	Project #5

Funding Source - 354.44**(b)(8)**

Grant funding if available, or future land-based assessments or groundwater extraction charges.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project will contribute to the replenishment of extracted groundwater, for recovery in dry periods.

Level of Uncertainty - 354.44**(d)**

There is a level of uncertainty associated with the effects of groundwater replenishment and fluctuations in groundwater elevations. The GSA will take this into account when developing the benefit to the Subbasin, through monitoring of the groundwater.

New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit (Phase 2)	**Project #6**
Project Type	
Surface Water Recharge	
Project Location	
Latitude: 33.900892°, Longitude: -116.771617°	
Implementing Agency	
San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA) in cooperation with the San Gorgonio Pass Water Agency and Cabazon Water District.	
Description - 354.44**(a)**	

Project #6 is a Phase 2 project that would include additional recharge in the Cabazon Storage Unit based on a potential exchange of imported SWP water with Colorado River Aqueduct water. The project would take water from the Colorado River Aqueduct portal south of Cabazon and infiltrate surface water in yet to be constructed recharge basins. This potential Phase 2 Project would potentially provide supplemental water supplies to water users in the Cabazon Water District as necessary to maintain their ongoing groundwater extractions.

A new turnout would be constructed on Metropolitan Water District of Southern California's Colorado River Aqueduct at the eastern portal of the San Jacinto Tunnel, just south of Cabazon. To meet Cabazon Water District's 750 AF average demands, a new recharge basin of 5 acres is assumed to be constructed in the vicinity of the San Jacinto Tunnel east portal. Assuming recharge rates of 1 AF per acre, this recharge facility would have a 2.5 cfs maximum recharge rate, or 5 AF/day when operating. No groundwater model projections were made to show the effects of this additional recharge.

A potential concern with Project #6 could be adverse effects on SGP Subbasin salinity from Colorado River Aqueduct water, which has salinity (total dissolved solids) that generally varies from about 550 to 700 mg/L. By comparison, SGP Subbasin groundwater salinity in the vicinity of Cabazon Water District averages less than 500 mg/L TDS. Using a conservative estimate of the total groundwater storage in the Cabazon Storage Unit of 800,000 AF and an average TDS of 400 mg/L for the Cabazon Storage Unit, use of 750 AF of Colorado River Aqueduct water with an assumed salinity of 700 mg/L would increase SGP Subbasin TDS from 400 mg/L to 433 mg/L over fifty years. This computation is very conservative as it doesn't account for drainage of some of the recharged salinity out of the SGP Subbasin during that period.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☒ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit (Phase 2) — Project #6

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

Project planning can start as soon as the GSP is adopted and funds are available for the project and purchase of additional surface water supplies. If the Subbasin exceeds the identified minimum threshold for groundwater levels or storage, the project would be a critical component for groundwater sustainability. Also, land development in the community of Cabazon could also cause the project to be implemented to provide the needed water supply for new development.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

With an initial recharge area footprint of about 4 acres and estimated recharge rate of 1.0 feet/day, the site would recharge about 4 AF/day and could recharge 100 AF for each month of operation assuming an 80% usage factor. The project can be used throughout the year when water is available.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

Through the initial study (IS) required by the California Environmental Quality Act (CEQA) for the construction and purchase or permanent transfer of surface water supplies, the required permits and regulatory requirements would be identified. Based on the extent of project construction, it is likely to require a mitigated negative declaration (MND) or environmental impact report (EIR).

At a minimum, work in public road rights-of-way would require encroachment permits from Riverside County. A crossing of possible drainages would requirement a 1600 Agreement with the California Department of Fish and Wildlife. An encroachment permit would be required from Metropolitan Water District of Southern California for the turnout construction.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

The project could start immediately upon securing the necessary funding but would start if there is a need for additional supplies for recharge. It is anticipated that monitoring will occur for the first five year of the GSP implementation period to determine if additional recharge is needed while conceptual and feasibility level studies are conducted to develop the project further.

Evaluation of Benefits - 354.44**(b)(5)**

Monitoring of groundwater levels and measurement of surface water recharged.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Since the San Gorgonio Pass Water Authority is a State Water Project contractor the purchase of available State Water Project supplies is the most likely source of water. Non-State Water Project supplies could also be purchased from willing sellers North of the Delta and transferred to the local agency.

New Imported Colorado River Aqueduct Spreading in the Cabazon Storage Unit (Phase 2)	**Project #6**

Legal Authority - 354.44**(b)(7)**

San Gorgonio Pass Water Authority is a State Water Project contractor.

Cost - 354.44**(b)(8)** Estimated Capital Cost

The preliminary order of magnitude estimated cost for the project is about $3.3 million which includes the proposed turnout at $3 million, the estimated cost for the recharge facilities is $300,000. Additional capital costs of $6.5 million would be involved for the purchase of equivalent Table A Amounts of 1,300 acre-feet (750 acre-feet/59% SWP Supply Capability).

Funding Source - 354.44**(b)(8)**

Grant funding if available, and possibly a cost share sourced by future land-based assessments or groundwater extraction charges.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project will contribute to the replenishment of extracted groundwater, for recovery in dry periods.

Level of Uncertainty - 354.44**(d)**

There is a level of uncertainty associated with the effects of groundwater replenishment and fluctuations in groundwater elevations. The GSA will take this into account when developing the benefit to the Subbasin, through monitoring of the groundwater.

Implementation Plan if Groundwater Levels Fall Below Minimum Threshold	Management Action #1

Project Type

Management Action – Plan Implementation

Project Location

San Gorgonio Pass Subbasin

Implementing Agency

San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA), Verbenia GSA and Desert Water Agency.

Description - 354.44(a)

The SGP GSP implementing GSAs plan to comply with the GSP which will facilitate avoidance of significant and unreasonable impacts to groundwater resources. Reports of ongoing groundwater monitoring, as compiled in the GSP annual reports will provide visibility to the status of groundwater indicators, especially the measurable objectives and minimum thresholds.

The measurable objective provides an initial indication of a threat to groundwater sustainability indicators. As groundwater levels at representative monitoring wells fall below measurable objectives, an initial reaction is to review hydrologic conditions and compare groundwater extractions to the sustainable yield. If hydrologic conditions for recent years have been below the long-term average, and extractions have averaged less than the sustainable yield, then that indicates that a drought period is occurring, and the basin is appropriately using its operational flexibility to facilitate long-term conjunctive use. Alternatively, if recent hydrologic conditions have been average or above average, and groundwater extractions have been higher than the sustainable yield, that is an indication that the basin is operating unsustainably. If the initial indication is that the basin is operating unsustainably, then measures need to be taken to implement one or more of the projects or management actions identified in this section.

Measurable Objective(s) Addressed - 354.44(b)(1)

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☒ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44(b)(1)(a)

Additional Management Action #1 planning can start as soon as the GSP is adopted; however, the Management Action #1 would be implemented if and when it is deemed helpful or applicable.

Process to Provide Notice of Implementation - 354.44(b)(1)(b)

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements.

Estimated Annual Project Benefits (AF/yr) - 354.44(b)(2)

Quantification of benefits in AF/yr is not available at this time. From a qualitative measure, Management Action #1 would support the GSAs ability to manage the groundwater levels based on the sustainable management criteria defined in the SGP GSP.

Implementation Plan if Groundwater Levels Fall Below Minimum Threshold	Management Action #1

Permitting and Regulatory Requirements - 354.44**(b)(3)**

No permitting or regulatory requirements are anticipated to be required of GSAs to implement Management Action #1.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

With funding, additional project planning could start immediately. However, it is likely to only commence after additional monitoring occurs during the first five years of the implementation period, and only if the data indicates the Subbasin is not operating sustainably.

Evaluation of Benefits - 354.44**(b)(5)**

Monitoring and evaluation of groundwater levels and measurement of surface water recharged.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

No outside water source needed to accomplish. To accomplish Management Action #1, GSA coordination and review of data would be required, as is also required for the concurrent Annual Report development efforts.

Legal Authority - 354.44**(b)(7)**

GSAs have the authority to develop clarified Implementation Plans in support of managing to their sustainable management criteria.

Cost - 354.44**(b)(8)** Estimated Capital Cost

Estimated costs would be associated with Implementation Plan development costs, any policies that are developed by the GSAs to support implementation, as well as the costs to ensure successful implementation of the plan. That is estimated to be approximately $75,000 initially and thereafter annual costs; however, a refined cost estimate can be determined after receiving initial monitoring results following GSP Implementation.

Funding Source - 354.44**(b)(8)**

Funding can be secured by grant opportunities or future land-based assessments or groundwater extraction charges.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

Not applicable.

Level of Uncertainty - 354.44**(d)**

Not applicable.

Well Head Requirements	**Management Action #2**

Project Type

Management Action – Well Head Requirements

Project Location

San Gorgonio Pass Subbasin

Implementing Agency

San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA), Verbenia GSA and Desert Water Agency.

Description - 354.44**(a)**

Well head requirements may be required to manage and understand the dynamic groundwater conditions within the subbasin more effectively. Well construction permitting is managed by Riverside County Environmental Health Divisions (EHD). Obtaining a well permit is currently a ministerial process, not requiring discretionary action or CEQA. The intent of this management action is to have the GSAs with the EHD to increase well requirements for new wells without disrupting the current ministerial permit process. Additionally, the GSAs would promote regular communication with the EHD and would seek to maintain more monitoring responsibility. The GSAs may adopt a policy to augment the current well requirements set by the State/EHD and establish new permit criteria, enforce GSA policies, and require GSA approval of all permit paperwork for non-de minimis extractors before EHD permit issuance. The policy would affect permits to construct, deepen, destroy, recondition, or repair a well. In order to increase data collection, reporting, and ongoing groundwater management efforts, the additional well requirements policy may contain the following information:

- Registration of extraction facilities with the GSA to supplement and confirm information obtained from a well canvass of the GSA area.
- Require the installation of flowmeters on all new or repaired wells, and installation of sounding tubes on all new wells.
- Require the well owner to self-report groundwater extraction volumes, static water levels, and water quality data.

The GSAs will request that the counties notify the GSAs of any new well permits or abandonments, and that well completion reports and water quality test data of new wells be submitted to the GSAs. The GSAs may consider separating the additional well requirements management action into multiple policies or be silent on various bulleted components until the GSAs deems them necessary. For example, the requirement of installing a flow meter on the pump discharge may be enacted before the requirement of installing a sounding tube. Further explanation and detail of the potential additional well requirements are continued below.

The desired outcome of additional well permitting requirements is the ability to monitor groundwater extractions, water levels, and water quality in a thorough, accurate, and efficient manner across the GSAs. The evaluation criteria differ amongst the bulleted considerations.

Registration of Extraction Facilities

As stated in SGMA Section 10725.6, "a GSA may require the registration of a groundwater extraction facility within the management area of the GSA." The GSAs may adopt this policy to hopefully improve and supplement the existing well records housed by the EHD and DWR and provide a complete record of the number of wells within the GSA. Unfortunately, the historic well completion reports (especially the older ones) and available DWR 429 Forms (Well Data Form indicating the state well number and detailed well location information) often have insufficient information to confidently locate the exact position of an older well, which is necessary to match up water level and quality information with the area pumping is occurring. In recent decades, the advances in technology, standardization of forms, and accessibility to GPS location have significantly improved the accuracy of well completion reports through better location identification and recordkeeping. The intent of registration of groundwater extraction facilities would be to complement existing well recordkeeping and ensure that the GSAs can fully understand and quantify the potential impacts of groundwater decline. Coupled with the registration of extraction facilities, the GSAs may invest in a complete well canvass study to verify the number of wells and presence or absence of a flow meter.

Installation of Well Flow Meters

The GSAs will investigate options for quantifying groundwater use by individual landowners and may require the installation of a flow meter on all groundwater extraction facilities in the future to provide accurate quantities of groundwater extraction and serve as the nexus to other management actions. The policy would describe the acceptable types of flow measurement devices, installation standards and requirements, operation and maintenance requirements, and penalties for tampering, neglect, or misconduct. For example, the flow meter would be installed inline on the pump discharge before any other connections or discharge points in accordance with the meter manufacturer's specifications. The meter must accurately quantify the volume of extracted groundwater in AF and be routinely maintained by the well owner. The policy for flow meter installation may require a meter equipped with telemetry for remote reading of the groundwater extraction by the GSAs. Failure to comply with the policy may result in civil penalty or criminal fine in accordance with SGMA Section 10732. Once the meter installation was complete, a certification report would be submitted by the landowner or agency documenting that the work was completed in accordance with the GSAs well requirements policy.

Installation of Sounding Tubes and Water Quality Sample Ports

The GSAs may require the installation of a well sounding tube, air line, electric depth gauge, and/or other water level sensor in selected locations for the purpose of measuring water levels throughout the GSAs, especially on new well installations. In addition, the GSAs may require the installation of a sample port on the well discharge piping in selected locations for the purpose of potentially collecting water quality samples throughout the GSAs. The accurate and widespread collection of water level and water quality data will supplement the monitoring network information and provide the GSAs with additional information to monitor the success/failure of the GSP against the established Sustainable Management Criteria. The policy would describe the acceptable types of water level measuring devices and sample ports, installation requirements, and penalties for tampering, neglect, or misconduct. The installation must provide or allow for the accurate measurement of static groundwater level in feet below the ground surface and water sample collection. If applicable, the water level measurement device must be routinely maintained by the well owner. Once the installation was complete, a certification report would be submitted by the landowner or agency documenting that the work was completed in accordance with the GSAs well requirements policy.

Self-Reporting of Groundwater Extraction

If the GSAs selects flow meters as the method of quantifying groundwater extraction, and if the installed meters are not equipped with telemetry, then the GSAs may require the well owner to self-report to the GSAs the metered groundwater extraction volumes on a semi-annual or annual basis. The policy would describe the frequency of reporting, various methods of reporting, due dates, and specific instructions for data submission. The GSAs may provide extractors with self-addressed mailer for return mailing. The mailer may include information for reporting instructions such as, the well owner must report the groundwater extraction volume in AF and include the current flow meter totalizer

Well Head Requirements	**Management Action #2**

reading. Other information requests may include self-reporting of static water level readings if the well is equipped with sounding tubes, along with instructions on how static water level measurements should be taken twice per year once water levels have stabilized after pump shutdown. If there is limited compliance with self-reporting, the GSAs may elect to gather the appropriate data with their own staff. The policy would describe that the frequency of the reporting may be temporarily increased if minimum thresholds are exceeded.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☐ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

Additional Management Action #2 planning can start as soon as the GSP is adopted; however, the Management Action #2 would be implemented if and when it is deemed helpful or applicable.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

Quantification of benefits in AF/yr is not currently available. From a qualitative measure, Management Action #2 would support the GSAs ability to manage the groundwater levels and understand groundwater trends with additional data support.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

No permitting or regulatory requirements are anticipated to be required of the GSAs to implement Management Action #1.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

With funding, additional project planning could start immediately. However, it is likely to only commence after additional monitoring occurs during the first five years of the implementation period, and only if the data indicates the Subbasin is not operating sustainably.

Evaluation of Benefits - 354.44**(b)(5)**

Monitoring and evaluation of groundwater levels and measurement of surface water recharged.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

No outside water source needed to accomplish. To accomplish Management Action #1, GSA coordination and review of data would be required, as is also required for the concurrent Annual Report development efforts.

Legal Authority - 354.44**(b)(7)**

GSAs have the authority to investigate impacts to their ability to successfully implement the GSP and maintain Subbasin sustainability.

Cost - 354.44**(b)(8)** Estimated Capital Cost

Estimated costs would be associated with the legal, consultant, and coordination costs associated with the development of the policy to determine any Well Head Policy, estimated to be about $50,000

Well Head Requirements	**Management Action #2**

initially. Estimated costs would also be associated with ensuring well head requirements are implemented and GSA coordination with Riverside County costs, as well as the costs to ensure successful implementation of the GSP for the development of a database to store the meter information and extraction data. Cost will also depend on whether any policy ultimately developed has the well owner pay for any needed improvements or if the GSAs pay for flowmeter installations for example. That is estimated to be approximately $50,000 for initial development and $25,000 annually for monitoring costs; however, a refined cost estimate can be determined after receiving initial monitoring results following GSP Implementation.

Funding Source - 354.44**(b)(8)**

Funding can be secured by grant opportunities or future land-based assessments or groundwater extraction charges.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

Not applicable.

Level of Uncertainty - 354.44**(d)**

Not applicable.

Investigate Issues Promptly Regarding Water Quality and Unexpected Water Pumping — Management Action #3

Project Type

Management Action -Water Quality/Unexpected Pumping Investigation

Project Location

San Gorgonio Pass Subbasin

Implementing Agency

San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA), Verbenia GSA and Desert Water Agency.

Description - 354.44(a)

The GSAs intend to take full advantage of the powers granted them under SGMA by promptly investigating for all the purposes outlined in Water Code section 10725.4 particularly to the extent specified, water quality or other issues are identified.

The GSAs will have the opportunity to review groundwater quality conditions as drinking water producers are required to monitor and report groundwater quality, which become publicly available. In addition, groundwater levels and storage will be assessed on an annual basis, as part of the Annual Reporting required by SGMA. Anomalies or significant changes in water levels are to be studied as part of data quality assurance protocols. In the event significant water quality impairments or groundwater level data reveals significant unexpected groundwater extraction impacts, the GSAs intend to investigate further to understand causation and support mitigation planning that may involve implementation of projects and management actions listed in this chapter.

Measurable Objective(s) Addressed - 354.44(b)(1)

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☒ Degraded Water Quality
- ☒ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44(b)(1)(a)

Additional Management Action #3 planning can start as soon as the GSP is adopted; however, the Management Action #3 would be implemented if and when it is deemed helpful or applicable.

Process to Provide Notice of Implementation - 354.44(b)(1)(b)

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements.

Estimated Annual Project Benefits (AF/yr) - 354.44(b)(2)

Quantification of benefits in AF/yr is not currently available. From a qualitative measure, Management Action #3 would support the GSAs ability to manage the groundwater levels based on the sustainable management criteria defined in the SGP GSP.

Permitting and Regulatory Requirements - 354.44(b)(3)

No permitting or regulatory requirements are anticipated to be required of the GSAs to implement Management Action #3.

Schedule - 354.44(b)(4) Anticipated Start & Completion, Timeframe to accrue benefits

Investigate Issues Promptly Regarding Water Quality and Unexpected Water Pumping	**Management Action #3**

With funding, additional project planning could start immediately. However, it is likely to only commence after additional monitoring occurs during the first five years of the implementation period, and only if the data indicates the Subbasin is not operating sustainably.

Evaluation of Benefits - 354.44**(b)(5)**

Evaluation of groundwater levels and improve depth of study regarding groundwater extraction impacts.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

No outside water source needed to accomplish. To accomplish Management Action #1, GSA coordination and review of data would be required, as is also required for the concurrent Annual Report development efforts.

Legal Authority - 354.44**(b)(7)**

GSAs have the authority to investigate impacts to their ability to successfully implement the GSP and maintain Subbasin sustainability.

Cost - 354.44**(b)(8)** Estimated Capital Cost

Estimated costs would be associated with investigation of water quality and unexpected significant impacts from groundwater extractions costs, as well as the costs to ensure successful implementation of the GSP. That is estimated to be approximately an additional $5,000/year and incorporated as a duty of existing staff; however, a refined cost estimate can be determined after receiving initial monitoring results following GSP Implementation.

Funding Source - 354.44**(b)(8)**

Funding can be secured by grant opportunities or future land-based assessments or groundwater extraction charges.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

Not applicable.

Level of Uncertainty - 354.44**(d)**

Not applicable.

Impose SGMA or Other Available Fees on Pumpers to Encourage Reduced Pumping and Conservation — Management Action #4

Project Type

Management Action – Pumping Fees for Groundwater Extraction

Project Location

San Gorgonio Pass Subbasin

Implementing Agency

San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA), Verbenia GSA and Desert Water Agency.

Description - 354.44(a)

The GSAs have been granted the authority to impose fees by ordinance or resolution to fund costs of a groundwater sustainability program including preparation, adoption, and amendment to a groundwater sustainability plan, and investigations, inspections, compliance assistance, enforcement and program administration. Once the GSP is adopted, GSAs have the authority to imposed fixed fees or volumetric based fees to cover the costs of (1) GSP administration, operation and maintenance, (2) Acquisition of lands or other property, facilities, and services, (3) Supply, production, treatment, or distribution of water, and (4) other activities necessary or convenient to implement the plan.

While initially there may be limited necessity for any new fees, the GSAs may choose to implement new fees if measurable objectives have been exceeded, to encourage conservation and reduced groundwater extractions and assist in avoiding exceedances of minimum thresholds. The fees would not apply to pumping by the MBMI who, as a federally recognized tribe, are not subject to SGMA jurisdiction. Groundwater producers throughout the subbasin, or in the vicinity of a nearby measurable objective exceedance, may be subject to the fees within 2-years of the groundwater level exceedance.

Revenue collected through potential pumping fees would support ongoing GSP implementation activities, project development and implementation of actions to address data gaps The pumping fee revenues would also be available for use in developing projects, and applying for grant funds, to improve groundwater infrastructure in the SGP Subbasin, especially in areas with DAC or SDAC. Details on the methodology to develop the fee, potential fee amounts, guidelines for using the funds and potential programs developed to support GSP implementation, would be developed upon approval of the GSP.

Although MBMI is not subject to SGMA, they are recognized as a water producer from the SGP Subbasin that may affect the overall condition of the SGP Subbasin. Additionally, MBMI may benefit from the activities and projects funded through pumping fees and therefore they will be invited to participate in funding said activities and projects although their participation is not mandatory.

Measurable Objective(s) Addressed - 354.44(b)(1)

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☐ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44(b)(1)(a)

Impose SGMA or Other Available Fees on Pumpers to Encourage Reduced Pumping and Conservation	Management Action #4

Additional Management Action #4 planning can start as soon as the GSP is adopted; however, the Management Action #4 would be implemented if and when it is deemed helpful or applicable.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

Quantification of benefits in AF/yr is not currently available. From a qualitative measure, Management Action #4 would support the GSAs ability to manage the groundwater levels based on the sustainable management criteria defined in the SGP GSP.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

No permitting or regulatory requirements are anticipated to be required of the GSAs to implement Management Action #4.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

Additional project planning could start immediately. However, implementation would commence after additional monitoring occurs during the first five years of the implementation period, and only if the data indicates the Subbasin is not operating sustainably.

Evaluation of Benefits - 354.44**(b)(5)**

Evaluation of groundwater levels and reduced groundwater extractions by incentivizing groundwater extractors to pump in a sustainable fashion.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

No outside water source needed to accomplish. To accomplish Management Action #4, GSA coordination and review of data would be required, as is also required for the concurrent Annual Report development efforts.

Legal Authority - 354.44**(b)(7)**

GSAs have the authority as outlined in SGMA to adopt ordinances, impose fees, and enforce policies to successfully implement the GSP and maintain Subbasin sustainability.

Cost - 354.44**(b)(8)** Estimated Capital Cost

Estimated costs would be associated with the legal, consultant, and coordination costs associated with the development of the policy to determine groundwater extraction fees, estimated to be about $50,000. Additional costs to implement the policy and document extractions would be determined by the frequency of meter readings and the number of well locations in the subbasin, which are unknown at this time, but would be determined at the time of policy development. Once adopted the fees may help fund other projects and management actions.

Funding Source - 354.44**(b)(8)**

A portion of funding can be secured with technical assistance or implementation funding from grant sources, or future land-based assessments or groundwater extraction charges.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

Not applicable.

Impose SGMA or Other Available Fees on Pumpers to Encourage Reduced Pumping and Conservation	Management Action #4

Level of Uncertainty - 354.44**(d)**

Not applicable.

Groundwater Pumping Allocation	**Management Action #5**

Project Type

Management Action – Groundwater Pumping Allocation

Project Location

San Gorgonio Pass Subbasin

Implementing Agency

San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA), Verbenia GSA and Desert Water Agency.

Description - 354.44**(a)**

As part of SGMA, GSAs have been granted authority to regulate the quantity of pumped groundwater. Regulating groundwater pumping is a potential GSP tool that could reduce pumping in the event that it exceeded the sustainable yield of a Subbasin. The regulation of pumping would likely take the form of allocation of a share of the sustainable yield to groundwater users in the Subbasin. Other rules could be established that would allow for a user's allocation over multiple years to transfer to other users and other rules that would facilitate effective water management. While SGMA provides GSAs with the authority to regulate groundwater pumping quantities, it also specifies that this is not the final determination of water rights, which remains with the courts. As noted later in this section, a major limitation to a groundwater pumping allocation action is that it would not be constraining on federally recognized tribal water users such as the MBMI, who are large groundwater users in the SGP. Based on this limited jurisdiction and without the voluntary participation of the MBMI, the groundwater pumping allocation approach based on GSA authorities described here could be difficult to implement and meet SGMA requirements for sustainable groundwater management.

GSAs experiencing large amounts of continuous annual groundwater overdraft, including in wet years, may pursue individual groundwater allocations if the development of projects and new water supplies cannot solely offset the current groundwater demands and overdraft conditions over the planning and implementation horizon. Demand management may become increasingly more important in the event of further reduced reliability of imported and flood water supplies, especially when taking into consideration the historical drought periods, the uncertain role of climate change, and increased competition for available water supplies. Specific program details may be developed and adopted by the GSAs in the future.

The GSAs' future policy may provide a finite groundwater allocation on a per acre basis for the GSAs as a whole, or for sub-areas of a GSA. The policy would identify and forecast the demands associated with prior rights (including MBMI), domestic and environmental uses. The sustainable yield and ultimate groundwater allocation would take into consideration the existing water rights holders, disadvantaged communities (DACs), community service districts (CSDs), public utility districts (PUDs), public water systems (PWS), and groundwater-dependent ecosystems (GDEs). The GSAs, through collaboration with its users and beneficial users, may consider whether an equal-, reduced-, or zero-allocation is given to lands with unexercised groundwater rights. The report *Groundwater Pumping Allocations under California's Sustainable Groundwater Management Act (Environmental Defense Fund et. al, 2018)* identifies four possible methods of establishing groundwater pumping allocations.

There are multiple advantages and disadvantages associated with different methods of establishing groundwater pumping allocations, which are described in more detail in the report (EDF, 2018). The "Comprehensive Allocation Method," which establishes allocations based on a comprehensive

Groundwater Pumping Allocation	**Management Action #5**

consideration of California groundwater law to the extent practical, and is recommended by EDF, is one possible approach that could be considered because it offers GSAs the important advantage of presenting to the Court an allocation methodology that tracks judicial precedent if an adjudication is ultimately initiated.

The goals of any groundwater pumping management action would be to ensure a fair groundwater allocation, allow groundwater users time to adjust, provide future flexibility in allocation determinations, and to quantify groundwater extractions accurately and efficiently, while also respecting federal reserved rights (FRWR).

The method of evaluation of groundwater extraction depends upon the GSAs' selected quantification method or combination of methods. The GSAs' evaluation of various methods may consider a wide range of factors including cost, accuracy, reliability, timeliness, functionality, personnel required, and legal defense. Once the GSAs have established a consistent quantification method, the evaluation of the "ramp-down" gradual allocation decrease could be analyzed in the annual comparison of groundwater extraction. Though the annual groundwater extraction amount would be affected by other factors such as weather and available surface water supplies, the total extraction amount could be normalized to an average water year for comparative purposes. The GSAs may adopt policies indicating an adaptive management approach, whereby the groundwater allocation may be reviewed, changed, and reestablished periodically or during extreme drought as necessary to achieve long term sustainability instead of a ramp down gradual allocation.

As noted earlier in this summary, a significant limitation on the efficacy of this management action is that it would not constrain water use by federally recognized tribal water users, such as the MBMI. FRWR are distinct from water rights that are based in State law and SGMA directs that FRWR be respected in full. The FRWR of the MBMI have not been quantified and could directly affect the ability of a SGMA-based pumping allocation approach to achieve identified goals. Based on the limitation of a groundwater pumping allocation to a specific set of groundwater pumpers, and without the voluntary participation of entities with FRWR (such as MBMI), a groundwater pumping allocation approach based on GSA authorities could be difficult to implement and meet SGMA requirements for sustainable groundwater management.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☐ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

Additional Management Action #5 planning can start as soon as the GSP is adopted; however, the Management Action #5 would be implemented if and when it is deemed helpful or applicable.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

Quantification of benefits in AF/yr is not available at this time. From a qualitative measure, Management Action #5 would support the GSAs ability to manage the groundwater levels based on the sustainable management criteria defined in the SGP GSP.

Groundwater Pumping Allocation — Management Action #5

Permitting and Regulatory Requirements - 354.44**(b)(3)**

No permitting or regulatory requirements are anticipated to be required of the GSAs to implement Management Action #5.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

With funding, additional project planning could start immediately. However, it is likely to only commence after additional monitoring occurs during the first five years of the implementation period, and only if the data indicates the Subbasin is not operating sustainably.

Evaluation of Benefits - 354.44**(b)(5)**

Clarified groundwater extraction volumes.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

No outside water source needed to accomplish. To accomplish Management Action #5, GSA coordination and review of data would be required, as is also required for the concurrent Annual Report development efforts.

Legal Authority - 354.44**(b)(7)**

GSAs have the authority to impose allocations to successfully implement the GSP and maintain Subbasin sustainability.

Cost - 354.44**(b)(8)** Estimated Capital Cost

Estimated costs would be associated with the legal, consultant, and coordination costs associated with the development of the policy to assign an allocation, estimated to be $50,000 initially. Additional costs to implement the policy and monitor extractions are unknown and would be developed at the time of policy development.

Funding Source - 354.44**(b)(8)**

A portion of funding can be secured with technical assistance or implementation funding from grant sources, or or future land-based assessments or groundwater extraction charges.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

Not applicable.

Level of Uncertainty - 354.44**(d)**

Not applicable.

Groundwater Basin Adjudication	**Management Action #6**

Project Type

Management Action – Groundwater Adjudication

Project Location

San Gorgonio Pass Subbasin

Implementing Agency

California Court system with process initiated by the San Gorgonio Pass Groundwater Sustainability Agency (SGPGSA), Verbenia GSA, Desert Water Agency or landowner(s) in the subbasin.

Description - 354.44**(a)**

Groundwater pumpers or landowners in the Subbasin could initiate the process for groundwater adjudication to occur in the Subbasin if sustainability does not appear to be occurring during the SGMA implementation period. In 2015, largely as a "follow on" to the enactment of SGMA, two bills - AB 1390 and SB 226 - were enacted and became law on January 1, 2016. Those two bills restructured the groundwater adjudication process in California by attempting to streamline the process and to provide clarification as to how adjudications relate to SGMA. These laws require that any judgments issued in an adjudication be consistent with SGMA and allow the courts to issue preliminary orders to achieve consistency. Among other things, these bills allow GSAs, cities, counties, and the State to intervene in adjudication actions and require the court to manage proceedings consistently with the timeframes laid out for groundwater sustainability in SGMA. Under SGMA, unreconciled differences over GSP provisions are likely to result in adjudications. However, even with the new legislation, adjudications will remain complex, lengthy, and expensive to pursue (EDF, 2018). Additionally, the GSAs would continue to be responsible for SGMA compliance in the event of a groundwater adjudication, provided in Water Code Section 10737.2

As described in Management Action #5, a potential allocation of groundwater pumping amounts will be considered, along with other potential projects, as an early response to any increases in groundwater pumping, or identified long term changes in local water supply availability, that can adversely affect achieving groundwater sustainability. As indicated in Management Action #5, any allocation of groundwater pumping amounts could be challenged by groundwater pumpers in the SGP Subbasin as not being consistent with their rights under California groundwater law and would not be applicable to the MBMI, unless pursuant to a court decree.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

☒ Chronic Lowering of Groundwater Levels	☒ Reduction of Groundwater Storage
☐ Seawater Intrusion – *not applicable*	☐ Degraded Water Quality
☐ Land Subsidence	☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

Management Action #6 can be explored more if circumstances within the Basin result in adjudication being a necessary measure to ensure Subbasin sustainability.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project would be noticed publicly through the implementing agencies Board of Directors meetings as well as any other noticing needed by specific regulatory requirements and the court system.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

Groundwater Basin Adjudication	**Management Action #6**

Quantification of benefits in AF/yr is not available at this time. From a qualitative measure, Management Action #6 would support the GSAs ability to manage the groundwater levels based on the sustainable management criteria defined in the SGP GSP.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

No permitting or regulatory requirements are anticipated to implement Management Action #6, though the California Court system would be asked to define the rights that various entities have to use groundwater resources in subbasin.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

With funding, additional project planning could start immediately. However, it is likely to only commence after additional monitoring occurs during the first five years of the implementation period, and only if the data indicates the Subbasin is not operating sustainably. Even with the 2015 Comprehensive Adjudication Reform Act (AB 1390/SB 226), which streamlined California's groundwater adjudication alongside the Sustainable Groundwater Management Act, the adjudication process could take a decade or more.

Evaluation of Benefits - 354.44**(b)(5)**

Clarification of groundwater extraction rights and limitations.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

No water source needed to accomplish. To accomplish Management Action #4, GSA coordination and review of data would be required, as is required for the concurrent Annual Report development efforts.

Legal Authority - 354.44**(b)(7)**

GSAs or landowners in the subbasin have the authority to bring a lawsuit to initiate the adjudication process to successfully maintain Subbasin sustainability.

Cost - 354.44**(b)(8)** Estimated Capital Cost

Estimated costs would be associated with the legal, consultant, and coordination costs associated with adjudication. Costs are unknown at this time, though they could be in the millions based on other adjudications that have occurred in California.

Funding Source - 354.44**(b)(8)**

A portion of funding can be secured with technical assistance or implementation funding from grant sources, or future land-based assessments or groundwater extraction charges.

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

Not applicable.

Level of Uncertainty - 354.44**(d)**

Not applicable.

Appendix F – San Gorgonio Pass Working Group Meeting Topics

San Gorgonio Pass Groundwater Sustainability Plan Working Group Meeting Agenda Topics

The San Gorgonio Pass (SGP) Groundwater Sustainability Plan (GSP) Working Group meeting dates and associated topics discussed are listed below.

All presentation materials, including PowerPoint presentations, were made available to members of the SGP GSP Working Group. Those members include representative from the following entities: Banning Heights Mutual Water Company, Cabazon Water District, City of Banning, Desert Water Agency, Mission Springs Water District, Morongo Band of Mission Indians, San Gorgonio Pass Water Agency.

Although uncommon, if a member entity was not present at a SGP GSP Working Group Meeting, then a separate call and/or correspondence was had between the consultant (Provost & Pritchard) and the absent member entity representative to ensure a transparent and collaborate process.

In addition to presentation materials, the San Gorgonio Pass working group received draft copies of the GSP and memoranda summarizing changes made based on working group or stakeholder feedback. The dates in which draft chapters were issued to all members of the SGP GSP Working Group are summarized in **Table 1** below.

Table 1. Draft Chapter Releases to the SGP GSP Working Group

Content Released	Release Date	Notes
Executive Summary	October 1, 2021	Available in DRAFT Public Review Draft
Chapter 1	July 12, 2021	
Chapter 2	July 12, 2021	
Chapter 3.1	August 5, 2021	
Chapter 3.2	July 1, 2021	
Chapter 3.3	July 30, 2021	
Chapter 4	July 1, 2021	
Chapter 5	May 14, 2021	
Chapter 6	July 9, 2021	Draft Appendix D also made available for review
Chapter 7	July 30, 2021	
DRAFT Public Review Draft	September 17, 2021	
Public Review Draft	October 1, 2021	
DRAFT Final Review Draft	December 13, 2021	

2019 SGP GSP Working Group Meetings

October 29, 2019

- Introductions
- SGMA 200-Management Areas
- GSP Outline
- Groundwater Model Status
- Data Management System Scope
- SGMA 200-Sustianable Management Criteria

2020 SGP GSP Working Group Meetings

January 9, 2020

- Introductions
- Model Update
- Management Areas
- Data Management System
- Chapter 2
- Chapter 3-
- Sustainable Management Criteria
- Cost Share
- Next Steps

January 28, 2020

- Introductions
- Model Update
- Future Conditions Assumptions: Projections
- Sustainable Management Criteria
- Projects and Management Actions
- Morongo Band of Mission Indians Coordination
- Data Management System Update
- Budget/Next Steps

February 25, 2020

- Introductions
- Model Update
- Management Areas

- Data Management System
- Chapters 2 & 3
- Sustainable Management Criteria
- Monitoring Network
- Projects & Management Actions
- Budget Update
- Next Steps

<u>April 6, 2020</u>

- Introductions
- Management Areas
- Data Management System
- Model Update
- Water Budget & Hydrologic Period
- Sustainable Management Criteria
- Groundwater Dependent Ecosystems
- Monitoring Network
- Budget Update

<u>April 28, 2020</u>

- Introductions
- Model Update
- Sustainable Management Criteria
- Monitoring Network
- Projects & management Actions
- Budget Update

<u>June 2, 2020</u>

- Introductions
- Data Management System
- Model Update
- Basin Setting
- Groundwater Dependent Ecosystems
- Sustainable Management Criteria: Minimum Thresholds
- Stakeholder Outreach Meeting
- Budget Update
- Next Steps

August 25, 2020

- Introductions
- Review Revised Schedule
- Data Management System Update
- Model Update
- Groundwater Contours & Initial Storage Change
- Monitoring Network
- Applicability of Sustainability Indicators
- Stakeholder Outreach Meeting
- Budget Update
- Next Steps

October 13, 2020

- Introductions
- Data Management System Update
- Model Update
- Sustainable management Criteria: Canyons & GDEs
- Correspondence with Morongo Band of Mission Indians
- Budget Update
- Next Steps

December 7, 2020

- Introductions
- Model Update
- San Jacinto Tunnel Seepage
- Future Conditions Assumptions: Projections and Apple Fire
- Sustainable Management Criteria
- Projects and Management Actions
- Morongo Band of Mission Indians Coordination
- Data Management System Update
- Budget/Next Steps

2021 SGP GSP Working Group Meetings

<u>March 11, 2021</u>

- Introductions
- Model Update
- Federal Reserved Water Rights
- SMC and Monitoring Network
- Coordination Agreement with Adjudicated Beaumont Basin
- SGP Working Group Decision Review
- Budget Update
- Next Steps

<u>May 13, 2021</u>

- Introductions
- Model Update
- Sustainable Management Criteria
- Water Quality Monitoring & SMCs
- Groundwater Contours
- Projects and Management Actions
- Schedule Update
- Budget Update
- Next Steps

<u>June 25, 2021</u>

- Introductions
- Schedule Update
- Budget Update
- Model Update
- Sustainable Management Criteria
- Projects & Management Actions
- Chapter 5 Review
- Next steps

<u>August 11, 2021</u>

- Introductions
- Addressing Chapter Comments

- Basin Setting (Chapter 3)
- Schedule
- Plan for GSA Public Hearings
- Budget
- Next Steps

<u>September 13, 2021</u>

- Introductions
- Addressing Chapter Comments
- Schedule
- Notification of Adoption
- Public Comment Period
- Plan for GSA Public Hearings
- Budget
- Next Steps

<u>November 4, 2021</u>

- Introductions
- Schedule & Public Hearing Dates
- Changes to SMCs
- Sensitivity Analysis
- Annual Report Proposal
- Budget
- Next Steps

<u>December 7, 2021</u>

- Introductions
- Schedule & Public Hearing Dates
- Working Group Comments on Public Draft
- Public Comments on Public Draft
- Budget
- Next Steps

Appendix G – Domestic Well Characteristics

Available Domestic Well Characteristics (Source: DWR)

WCR Number	Legacy Log No.	Township	Range	Section	Work Date	Total Completion	Top Of Perforation	Bottom of Perforation	Casing Diameter
Banning Storage Unit									
WCR1954-001636	54112	03S	01E	17	25-Feb-54	375	340	375	10
WCR1978-007203	9946	03S	01E	18	13-Jul-78	1020	400	1000	26
WCR2005-011977	904402	03S	01W	24	01-Jun-05	560	400	560	5
WCR1997-010125	461904	03S	01E	17	09-May-97	500	20	500	6
WCR1978-008797	9946	03S	01E	18	13-Jul-78	1020	400	1000	26
Cabazon Storage Unit									
WCR1991-018401	350753	03S	01E	12	01-Jun-91	1150	None	None	8
WCR2005-016607	e038042	03S	02E	14	02-Dec-05	800	490	790	18
WCR1987-012616	182145	03S	02E	18	07-Oct-87	1050	None	None	8
WCR1961-002051	98034	03S	02E	22	15-Jul-61	280	70	150	8
WCR1963-001665	98062	03S	02E	23		508	330	508	9
WCR2006-012963	1085324	03S	03E	6	12-Sep-06	500	200	500	5
WCR1998-010304	518558	03S	03E	18		340	None	None	12
Banning Canyon/Banning Bench/Other Canyons									
WCR1984-007171	241734	02S	01E	16	18-Jul-84	240	140	240	4
WCR2003-013431	792616	02S	01E	20	13-Aug-03	340	200	340	5
WCR1977-009188	5987	02S	01E	21	23-Dec-77	239	117	239	7
WCR1988-015702	281721	02S	01E	21		280	None	None	5
WCR1987-012586	269685	02S	01E	21	15-Sep-87	480	260	480	4
WCR1776-010308	108832	02S	01E	21		300	120	300	12
WCR1964-001998	None	02S	01E	24	06-Feb-64	192	43	182	16
WCR1977-009205	107282	02S	01E	25	28-Jun-77	200	80	200	12
WCR1977-010841	107282	02S	01E	25	28-Jun-77	200	80	200	12
WCR1964-001936	100588	02S	01E	25	06-Feb-64	192	44	185	16
WCR2018-008759	e0365995	02S	01E	28	13-Apr-18	160	60	160	4.5
WCR1962-001869	99745	02S	01E	28	21-Jul-62	121	100	120	8
WCR1987-012500	269698	02S	01E	28	21-Aug-87	180	60	180	4
WCR2003-014967	792637	02S	01E	29		460	160	460	5
WCR1989-019110	182330	02S	01E	29	21-Apr-89	305	100	305	12
WCR1992-016205	402436	02S	01E	29	09-Apr-92	750	None	None	10
WCR2006-010048	e043409	02S	01E	29	22-Aug-06	420	100	420	5
WCR1962-001870	99743	02S	01E	33	05-Jul-62	96	70	87	8
WCR1776-010303	108830	02S	01E	33		100	60	100	12
WCR1987-012588	269699	02S	01E	33	19-Aug-87	180	40	180	4
WCR1776-011049	44	02S	02E	16		108	None	None	None
WCR1988-015704	253135	02S	02E	16	29-Oct-88	320	280	320	6
WCR1974-003974	78198	02S	02E	16	17-Jan-74	325	103	123	7
WCR2009-009946	e0099730	02S	02E	21	09-Oct-09	270	60	280	4
WCR1953-001355	53430	03S	01E	4		819	350	806	13
Wells Located outside SGP Subbasin or Misidentified as Domestic									
WCR1989-019123	182232	02S	01E	4	24-Mar-89	118	38	118	26
WCR1989-017410	182232	02S	01E	4	24-Mar-89	118	38	118	26
WCR1989-019124	182331	02S	01E	4	06-Feb-89	118	35	118	26
WCR1989-017409	182331	02S	01E	4	06-Feb-89	118	35	118	26
WCR2006-010215	1082042	02S	01E	21	29-Jun-06	300	80	300	9
WCR2010-009662	e0104207	02S	01E	21	08-Jan-10	500	200	500	4
WCR2006-013112	449016	02S	01E	21	22-Sep-06	300	160	300	5
WCR1987-012587	269704	02S	01E	21	31-Aug-87	180	60	180	4
WCR1990-018646	328195	02S	01E	21	15-Aug-90	360	320	360	6
WCR2002-011932	763576	02S	01E	36	05-Feb-02	225	145	225	5
WCR1961-001817	33-1155	02S	01W	26	01-Jan-61	255	207	255	11
WCR1972-003097	79140	02S	01W	26	10-Oct-72	528	200	527	16
WCR2006-012225	1086201	02S	01W	35	01-Jun-06	1470	1280	1450	20
WCR1978-008979	565	03S	01E	6	15-Jul-78	260	80	260	4
WCR1959-001338	54448	03S	01E	6	01-Dec-59	900	360	900	14
WCR1987-012614	151500	03S	01E	6	26-Jan-87	1200	600	1200	26
WCR2008-010102	e0082205	03S	01E	16	23-Oct-08	700	320	700	5
WCR1990-018649	321930	03S	01E	18		1000	300	980	26
WCR1997-010144	539471	03S	01E	19	25-Jul-97	487	0	487	4
WCR1995-011713	456939	03S	02E	7	05-Oct-95	890	510	870	16
WCR1957-001982	30756	03S	02E	23	14-Dec-57	500	414	491	None

Domestic well data retrieved from DWR’s inventory of well completion reports December 2019.