10-29-2021

FINAL REPORT

South American Subbasin Groundwater Sustainability Plan

South American SUBBASIN

NDGSA NORTHERN DELTA GROUNDWATER SUSTAINABILITY AGENCY

SLOUGHHOUSE Resource Conservation District HERALD | SLOUGHHOUSE | WILTON

SACRAMENTO COUNTY

SCGA Sacramento Central Groundwater Authority

Omochumne - Hartnell Water District Servicing the Community of the Cosumnes River

RECLAMATION DISTRICT 551

SOUTH AMERICAN SUBBASIN

GROUNDWATER SUSTAINABILITY PLAN

FINAL

ACKNOWLEDGEMENTS

The South American Subbasin Groundwater Sustainability Agencies (GSAs) appreciate and acknowledge the funding contribution from the California Department of Water Resources (DWR) Funding for the South American Subbasin Groundwater Sustainability Plan has been provided in part by the California Drought, Water Parks, Climate, Coastal Protection and Outdoor Access for All Act of 2018 (Proposition 68) through agreement with DWR.

Contributing GSAs

RECLAMATION DISTRICT 551

Northern Delta Groundwater Sustainability Agency, Omochumne – Hartnell Water District, Reclamation District 551, Sacramento Central Groundwater Authority, Sacramento County, and Sloughhouse Resource Conservation District contributed to the development of the South American Subbasin Groundwater Sustainability Plan.

South American Subbasin Consulting Team

Larry Walker Associates, Woodard & Curran, Kennedy/Jenks Consultants, Inc., Stockholm Environment Institute, and HDR compose the consulting technical team for the South American Subbasin Groundwater Sustainability Plan.

Other consultant contributors are GEI (staff to SCGA) and Stantec (DWR-funded facilitators).

Also, staff of SCGA have contributed to the development of the South American Subbasin Groundwater Sustainability Plan, as has The Freshwater Trust, who performed technical services as in-kind contribution for the Northern Delta GSA.

LARRY WALKER ASSOCIATES

South American Subbasin
Groundwater Sustainability Plan

Northern Delta Groundwater Sustainability Agency
Omochumne-Hartnell Water District
Reclamation District 551
Sacramento Central Groundwater Authority
Sacramento County
Sloughhouse Resource Conservation District

October 29, 2021

This report was prepared by the staff and subconsultants of Larry Walker Associates under the supervision of the Engineer(s) and/or Geologist(s) whose seal(s) and signature(s) appear hereon.

The findings, recommendations, specifications, or professional opinions are presented within the limits described by the client, in accordance with generally accepted professional engineering and geologic practice. No warranty is expressed or implied.

Date Signed: 10/29/21

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Glossary

Basin Management Objectives	Five objectives defined by the Central Sacramento County Groundwater Management Plan to help ensure viable groundwater resources for beneficial uses. The BMOs serve as a starting point for the development of the Sustainable Management Criteria. The five BMOs are to maintain the long-term average groundwater extraction rate at or below 273,000 acre-feet per year (AF/year); maintain specific groundwater elevations within all areas of the groundwater basin consistent with agreements in the WFA; protect against any potential inelastic land surface subsidence by limiting subsidence to no more than 0.007 feet per 1 foot of drawdown in the groundwater basin; protect against any adverse impacts to surface water flows in the American, Cosumnes, and Sacramento Rivers; and attain adopted water quality objectives.
Central Basin	The locally-defined Sacramento Central Groundwater Basin (SCGA's jurisdiction)
CoSANA Model	Cosumnes, South American, North American (Subbasins) Integrated Hydrological Model
Groundwater Dependent Ecosystems	Beneficial user of groundwater that rely on a connection to shallow groundwater, typically characterized by the depth to groundwater and the vegetation rooting depth.
Groundwater Sustainability Agency	A local agency or combination of local agencies with water supply, water management, or land use responsibilities may establish a Groundwater Sustainability Agency. It is the GSA’s responsibility to develop and implement a groundwater sustainability plan that considers all beneficial uses and users of groundwater in the basin/subbasin.
Groundwater Sustainability Plan (GSP)	GSAs must develop GSPs in accordance with the requirements of the California Department of Water Resources’ GSP Regulations. The GSP(s) must include management criteria (minimum thresholds, measurable objectives and interim milestones) that ensure basin sustainability within 20 years of GSP adoption. A basin may be managed by a single GSP or multiple coordinated GSPs.
Groundwater Sustainability Plan Working Group	A GSP Working Group was established per a Memorandum of Understanding to provide recommendations related to development of the GSP. This GSPWG is comprised of representatives from five of the six GSAs within the Subbasin and follows a consensus-based decision-making structure, where each GSA representative receives an equal voice. The GSPWG conducts regular coordination meetings to discuss GSP technical development and public outreach and engagement activities in order to prepare a GSP for ultimate adoption by the respective GSA Boards and submittal to DWR by January 31, 2022.

Hydrogeologic Conceptual Model	Complies geologic, hydrologic, hydraulic, chemical, environmental and other information into an integrated understanding of surface and subsurface conditions in which water is flowing through in the Basin
Measurable Objective	Specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted GSP to achieve the sustainability goal for the basin.
Minimum Thresholds	Numeric values that define the lowest acceptable level above which undesirable results do not occur at each monitoring location for each sustainability indicator.
Monitoring Network	A network comprised of monitoring points that track sustainability indicators. Each point has a minimum threshold and a measurable objective. Adequate spatial and temporal coverage are required for the subbasin in order to properly chart progress toward sustainable management of the groundwater resources.
Plan Area	Describes the Basin, including major streams and creeks, institutional entities, land uses, and locations of production wells
South American Subbasin	The South American Subbasin (SASb) (DWR Bulletin 118, 5- 21.65) is a high priority subbasin within the larger Sacramento Valley Groundwater Basin. A majority of the SASb is surrounded by rivers including the American River on the northern boundary, the Cosumnes and Mokelumne Rivers on the south, and the Sacramento River on the western boundary. The eastern boundary is not bounded by a river, but is located at the transition between alluvial sediments of the groundwater basin and the foothills of the Sierra Nevada. The SASb shares boundaries with five adjacent subbasins: the Yolo Subbasin to the northwest, Solano Subbasin to the west, North American Subbasin to the north, and the Eastern San Joaquin and Cosumnes Subbasins to the south.
South American Subbasin Groundwater Sustainability Agencies	County of Sacramento, Northern Delta, Reclamation District #551, Omochumne-Hartnell Water District, Sacramento Central Groundwater Authority, and Sloughhouse Resource Conservation District
Sacramento Central Groundwater Authority	SCGA is a Joint Powers Authority composed of the County of Sacramento and the cities of Elk Grove, Folsom, Rancho Cordova and Sacramento. The SCGA is responsible for groundwater management in the locally-defined Central Basin. The Central Basin overlaps considerably with the South American Subbasin.

Sustainable Groundwater Management Act	A California Law, comprised of three bills (AB 1739, SB 1168, and SB 1319), that provides local agencies with a framework for managing groundwater basins/subbasins in a sustainable manner. Recognizing that groundwater is most effectively managed at the local level, SGMA empowers local agencies by providing them with the authority, the technical and the financial means necessary to achieve sustainability within 20 years.
Sustainability Goal	Goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline.
Sustainability Indicators	Any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results. These indicators include: chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, degraded water quality, land subsidence, and depletion of interconnected surface waters.
Sustainable Management Criteria	Developed by the GSA(s) to define undesirable results, based on minimum thresholds, measurable objectives and interim milestones for each monitoring point for each applicable sustainability indicator.
Undesirable Results	Significant and unreasonable occurrence of any of the six sustainability indicators constitutes an undesirable result.
Water Budget	Quantification of water entering and leaving a basin for historical, current, and projected time periods

Acronyms and Abbreviations

AB	Assembly Bill
Aerojet	Aerojet-General Corporation
AF	Acre-feet
AF/Year	Acre-Feet per Year
AFB	Air Force Base
AGLAND	Irrigated Agricultural Land Waiver
Ag-Res	Agricultural Residential
Alternative	Alternative Submittal for GSP
AMSL	Above Mean Sea Level
bgs	Below Ground Surface
BMO	Basin Management Objective
BMP	Best Management Practices
Board	Board of Directors for Sacramento Central Groundwater Authority
C&E Plan	Communication and Engagement Plan
C2VSimCG	California Central Valley Groundwater-Surface Water Simulation Model Coarse Grid
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CDEC	California Data Exchange Center
cfs	Cubic Feet per Second
CGPS	Continuous Global Positioning System
CI	Commercial and Industrial
CNRA	California Natural Resources Agency
COSb	Consumnes Subbasin
CoSANA Model	Cosumnes, South American, North American Subbasins Integrated Hydrological Model
CSCGF	Central Sacramento County Groundwater Forum
CSCGMP	Central Sacramento County Groundwater Management Plan
CVGSM	Central Valley Integrated Groundwater Surface Water Model
CVRWQCB, Central Valley Water Board	Central Valley Regional Water Quality Control Board
CV-SALTS	Central Valley Salinity Alternatives for Long-Term Sustainability
CWC	California Water Code
DA	Decline Area
DAC	Disadvantaged Communities
Delta	Sacramento-San Joaquin Delta
DDW	Division of Drinking Water
DPR	California Department of Pesticide Regulation

DTW	Depth to Water
DWR	California Department of Water Resources
EDF	Electronic Deliverable Format
EIR	Environmental Impact Report
ELAP	California Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency (United States)
ET	Evapotranspiration
Flood-MAR	Flood Managed Aquifer Recharge
GAMA	Groundwater Ambient Monitoring and Assessment Program
GDE	Groundwater Dependent Ecosystems
GIS	Geographic Information System
GMP	Groundwater Management Plan
GSA	Groundwater Sustainability Agency
GSP, Plan	Groundwater Sustainability Plan
GSPWG	Groundwater Sustainability Plan Working Group
GWE	Groundwater Elevation
GW-SW	Groundwater-Surface Water
HCM	Hydrogeologic Conceptual Model
IDW	Inverse Distance Weighted
IM	Interim Milestone
InSAR	Interferometric Synthetic Aperture Radar (USGS)
IRCT	McDonnell Douglas (Boeing) Inactive Rancho Cordova Test Site
ISW	Interconnected Surface Water
JPA	Joint Powers Authority
LFG	Landfill gas
LCRS	Leachate collections and removal systems
m	Meter
Mather AFB	Mather Air Force Base
McClellan AFB	McClellan Air Force Base
MCL	Maximum Contaminant Level
μg/L	Micrograms per Liter
mg/L	Milligrams per Liter
MGD	Million Gallons per Day
MO	Measurable Objective
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MT	Minimum Threshold
NASb	North American Subbasin
NDGSA	Northern Delta Groundwater Sustainability Agency
NDMA	Nitrosodimethylamine
NDWI	Normalized Difference Water Index
NGVD 29	National Geodetic Vertical Datum of 1929

NRCS	Natural Resources Conservation Service
NSSDA	National Standard for Spatial Data Accuracy
OHWD	Omochumne-Hartnell Water District
PDF	Portable Document Format
PFAS	Polyfluoroalkyl Substances
PMA	Potential Management Actions
PWS	Public Water Supply
RA	Recharge Area
RD	Reclamation District
RMP	Representative Monitoring Point
RP	Reference Point
RPE	Reference Point Elevation
RWA	Regional Water Authority
SacIGSM	Sacramento Integrated Groundwater Surface Water Model
SAFCA	Sacramento Area Flood Control Agency
SAGBI	Soil Agricultural Banking Index
SASb, Basin	South American Subbasin
SB	Senate Bill
SCADA	Supervisory control and data acquisition
SCGA	Sacramento Central Groundwater Authority
SCWA	Sacramento County Water Agency
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
SMCL	Secondary Maximum Contaminant Level
SMWP	State Monitoring Well Program
SRCD	Sloughhouse Resource Conservation District
CSUS	California State University - Sacramento
Staff Report	Sustainable Groundwater Management Program Alternative Assessment Staff Report – South American Subbasin
State Water Board	State Water Resources Control Board
SWP	State Water Project
TCE	Trichloroethylene
TDS	Total dissolved solids
TFT	The Freshwater Trust
UCD	University of California, Davis
UNAVCO	University NAVSTAR Consortium
UR	Undesirable Result
USGS	United States Geological Survey
UST	Underground Storage Tanks
VOC	Volatile Organic Chemical
VSWTP	Vineyard Surface Water Treatment Plant

Water Forum	Sacramento Area Water Forum Successor Effort
Water Forum Agreement, WFA	Sacramento Area Water Forum Successor Effort Agreement
WG	Working Group
WQO	Water Quality Objectives
WQPS	Water Quality Protection Standards

South American Subbasin Groundwater Sustainability Plan

Abstract

The Sustainable Groundwater Management Act (SGMA), passed by the California legislature in 2014, requires local entities to jointly assess groundwater conditions in their local areas and to develop a Groundwater Sustainability Plan (GSP) by a specified deadline to ensure that sustainable conditions are achieved within 20 years of GSP adoption. An effective and efficient groundwater management plan is critical to the health and welfare of the people, the environment and all other uses and users of groundwater in a local area.

The South American Subbasin (SASb) is a groundwater basin in Sacramento County bounded by the American River to the north, the Sacramento River to the west, the Cosumnes and Mokelumne Rivers to the south, and the Sierra foothills to the east. Six local entities responded to the mandate of SGMA and formed Groundwater Sustainability Agencies (GSAs) within the SASb. Sacramento Central Groundwater Authority (SCGA), Omochumne-Hartnell Water District (OHWD), Sloughhouse Resource Conservation District (SRCD), North Delta GSAs (NDGSA), Reclamation District 551 (RD 551), and Sacramento County, henceforth “the GSAs”, have agreed to work together to develop and implement a GSP for the SASb. RD 551 entered into an agreement to be represented by NDGSA during the GSP development process. The GSAs applied for and were awarded Proposition 1 and Proposition 68 grants to fund GSP development to meet a SGMA-mandated schedule for submittal of a GSA-approved GSP to the California Department of Water Resources by January 31, 2022.

The local entities represented by the six GSAs in the SASb include the City of Sacramento, Sacramento County Water Agency, City of Elk Grove, City of Rancho Cordova, City of Folsom, Rancho Murieta, Sacramento Regional County Sanitation District, Elk Grove Water District, OHWD, SRCD and Reclamation Districts. A variety of local interests are also represented by these GSAs, including agricultural-residential water users, agricultural water users, public water systems, local land use planning agencies, environmental interests, surface water users, the federal government, tribal governments, disadvantaged communities, groundwater monitoring and reporting entities, holders of overlying groundwater rights, adjacent Subbasins, industrial users, commercial users, remediation pumpers, natural ecosystems, and the general public. Many of these local entities have a long history with groundwater and surface water management in the SASb and are well equipped to perform SGMA-required planning functions.

The six GSAs in the SASb have undertaken a thorough and timely review of past, current and projected future water resources needs and groundwater conditions to meet SGMA requirements for GSP development. Throughout the development of the SASb GSP, regular communication and engagement activities were conducted to inform and receive input from local stakeholders and the general public. The SASb GSP includes a comprehensive groundwater subbasin description, which was used in the development of a regional surface and ground water model that quantifies current water budgets and projects future conditions associated with population growth, land use changes, water conservation, climate change, and consideration of beneficial projects that are planned to occur over the next five to ten years. The

SASb GSP also includes a thorough assessment of the impacts of predicted future groundwater levels on beneficial users, including groundwater-dependent ecosystems, shallow wells, and interconnected surface water. Importantly, these assessments are used to develop measurable sustainable management criteria that avoid significant and unreasonable impacts to these beneficial users, and that can be monitored and adjusted throughout plan implementation.

The key finding of the SASb GSP, based on thorough analysis of the best available information, is that the basin will be sustainable over the next twenty years as long as planned recycled water, recharge and other projects are implemented. These projects will raise groundwater levels above current levels, maintain storage volumes, and protect ecosystems, interconnected surface water, and shallow well users. Although projected climate change conditions will increase groundwater use, these effects are not expected to cause the SASb to become unsustainable or to cause significant decreasing trends in groundwater conditions. A groundwater monitoring network comprised of more than 50 wells will be used to track groundwater levels and groundwater quality. Management criteria set at each well in the network will be implemented to assess these conditions over time and ensure that levels and quality remain within a range that avoids significant and unreasonable impacts to beneficial uses and users of groundwater.

Once approved by the GSAs, the activities identified and developed through the SASb GSP development process will be implemented, including:

- Ongoing monitoring and annual reporting on conditions in the SASb;
- Ongoing public engagement and outreach;
- Coordination among the GSAs and with neighboring subbasins;
- Development and implementation of a shallow well protection and monitoring program;
- Coordination with regional entities to develop a regional water bank;
- Coordination with land use agencies and water supply agencies to promote consistency with the GSP;
- Coordination with regional agencies in the development of updated climate change projections; and,
- Preparation of a five-year update to the GSP to be submitted in 2027.

Executive Summary

Introduction

Groundwater management in the South American Subbasin (SASb) has been occurring for decades. Stable groundwater conditions in terms of groundwater levels, storage volume, and interconnected surface waters have been achieved due to a variety of historically implemented projects and management actions. To ensure continued sustainable conditions allowing for future groundwater use to the benefit of all users in the SASb over the next 50-years, with climate change considered, a groundwater sustainability plan (GSP) has been developed and will be implemented to achieve the sustainability goal for the basin in the next 20 years. The following topics are covered in the GSP:

- Sustainable Groundwater Management Act
- Basin Setting
- Plan Area
- Hydrogeologic Conceptual Model
- Groundwater Conditions and Monitoring
- Cosumnes, South American, North American (CoSANA) Model
- Sustainable Management Criteria
- Modeling scenarios for future conditions, including climate change
- Projects and Management Actions
- GSP Implementation

ES-1 Sustainable Groundwater Management Act (Section 1)

***Section 1** describes the Sustainable Groundwater Management Act and the purpose of the Groundwater Sustainability Plan. **Section 1** also introduces the management structure of the agencies developing and implementing the GSP.*

The 2014 Sustainable Groundwater Management Act (SGMA) was established to provide local and regional agencies the authority to sustainably manage groundwater resources through the development and implementation of GSPs for high and medium priority subbasins (e.g., SASb, which has been designated as a high priority subbasin). In accordance with SGMA, this GSP was developed and will be implemented by Groundwater Sustainability Agencies (GSAs) representing the entire South American Subbasin (SASb), shown in **Figure ES-1**: Sacramento Central Groundwater Authority (SCGA), Northern Delta GSA, Omochumne-Hartnell Water District (OHWD), Sloughhouse Resources Conservation District (SRCD), Reclamation District No. 551 and Sacramento County.

The California Department of Water Resources (DWR) and the State Water Resources Control Board (State Board) provide primary oversight for implementation of SGMA. DWR adopted regulations that specify the components and evaluation criteria for groundwater sustainability plans and coordination agreements to implement such plans. To satisfy the requirements of SGMA, local agencies must do the following:

- Locally controlled and governed GSAs must be formed for all high- and medium-priority groundwater basins in California.
- GSAs must develop and implement GSPs, or alternatives to GSPs, that define a roadmap for how groundwater basins will reach long-term sustainability.
- The GSPs must consider six sustainability indicators defined as: groundwater level decline, groundwater storage reduction, seawater intrusion, water quality degradation, land subsidence, and surface-water depletion.
- The GSP must review and consider the impacts of climate change
- GSAs must submit annual reports to DWR each April 1 following adoption of a GSP for the previous water year (October 1 to September 30).
- Groundwater basins should reach sustainability within 20 years of implementing their GSPs, and maintain sustainability thereafter.

This GSP was prepared to meet the regulatory requirements established by DWR, as shown in the completed GSP Elements Guide (**Appendix 1-E**) which is organized according to the California Code of Regulation Sections of the GSP Emergency Regulations.

Purpose of the Groundwater Sustainability Plan (Section 1.2)

The SASb GSP outlines a 20-year plan for sustainable groundwater management activities that consider the needs of all users in the SASb and ensures a viable groundwater resource for beneficial use by many groups, including potable water purveyors, agricultural, agricultural-residential, domestic, commercial and industrial users, and various environmental services. This GSP is intended to achieve a sustainable regime that balances pumping and recharge and considers the needs of all water users.

South American Subbasin GSP

South American Subbasin GSAs

Figure ES-1

Legend

South American Subbasin

GSAs

- Northern Delta GSAs
- OHWD GSA (SASb)
- RD 551 GSA
- SCGA GSA
- SRCD GSA (SASb)
- Sac Co GSA

0 1.25 2.5 5 Miles

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South American SUBBASIN

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ES-2 Plan Area and Basin Setting (Section 2)

Section 2 *provides an overview of the SASb area, including groundwater conditions, interconnected surface waters, and groundwater-dependent ecosystems. These details inform the hydrogeologic conceptual model and water budgets developed for the SASb, which will be used to frame the discussion for sustainable management criteria (****Section 3****), sustainable yield, projects and management actions (****Section 4****), and implementation (****Section 5****).*

Plan Area (Section 2.1)

Section 2.1 *describes existing water management programs, remediation activities, and groundwater monitoring programs in the SASb.*

The SASb has been designated by DWR as a high priority subbasin. The SASb is located within the larger Sacramento Valley Groundwater Basin that is surrounded by local rivers and the foothills of the Sierra Nevada. The SASb shares boundaries with five adjacent subbasins including the Yolo, Solano, North American, Eastern San Joaquin, and Cosumnes Subbasins, as shown in **Figure ES-2**. Several historical groundwater management activities and plans have been previously established prior to the 2014 SGMA and are detailed below. Although outside the jurisdiction of local groundwater management agencies, groundwater remediation activities are also considered as part of a complete adaptive management strategy for the SASb.

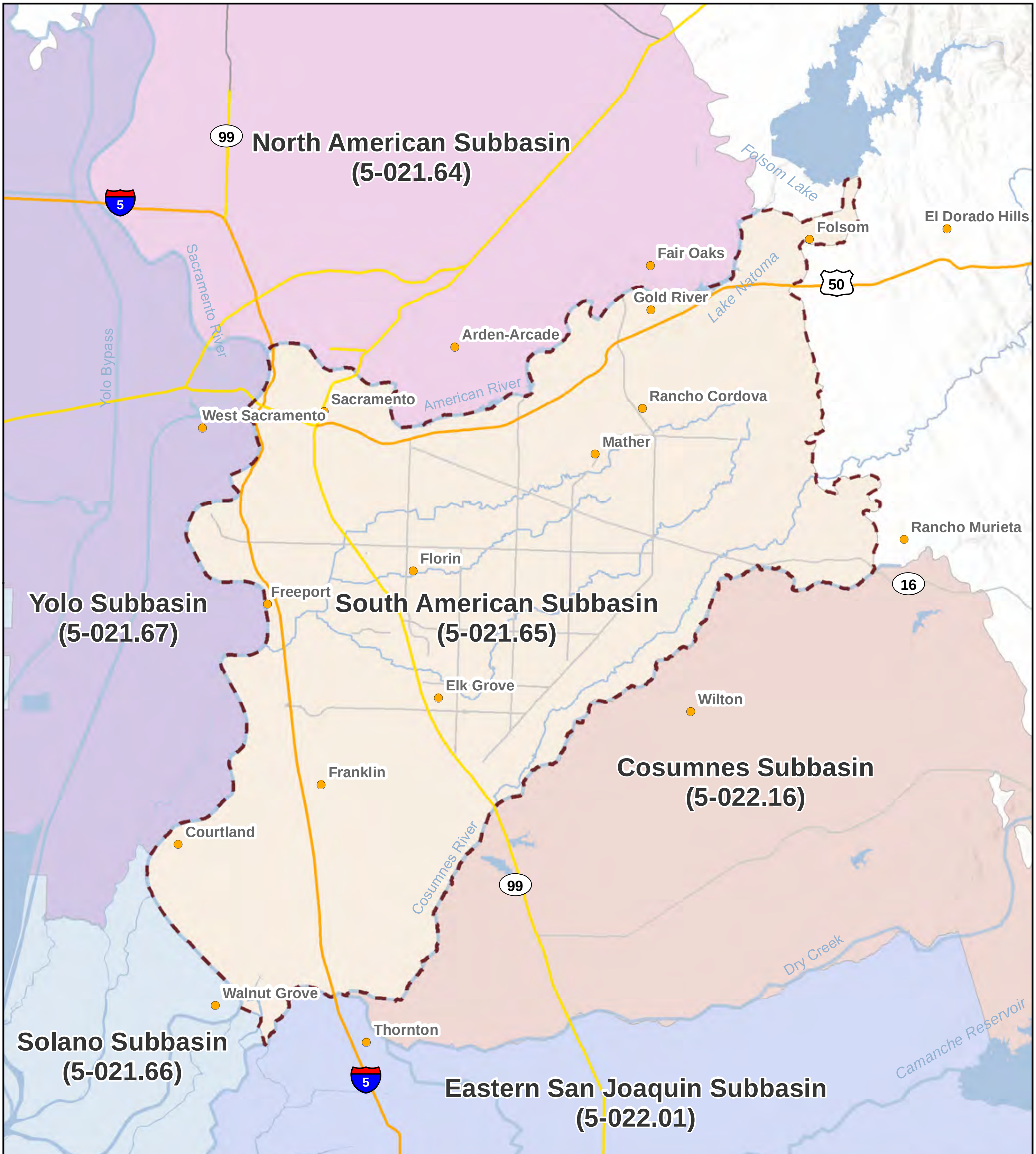
Existing Water Management Programs (Section 2.1.9)

Coordinated groundwater management in the SASb began as early as 1993 with negotiations of the Sacramento Area Water Forum Successor Effort Agreement. Since then, representatives of beneficial users of the area’s groundwater and surface water and numerous local entities have worked together to manage and preserve local water resources. **Section 2** documents this history of groundwater management, which includes water management programs, land use plans, and subbasin-wide well and stream gage monitoring in the surrounding SASb area.

*2000 Water Forum Agreement (****Section 2.1.9.1****)*

Since 2000, the Sacramento Area Water Forum Successor Effort (Water Forum), consisting of 40 stakeholder organizations, has coordinated surface water and groundwater planning in the Sacramento Metropolitan Region. Overall, the Water Forum aims to prevent water shortages, environmental degradation, groundwater contamination, threats to groundwater reliability, and limits to economic prosperity. The Water Forum maintains two co-equal objectives:

- Provide a reliable and safe water supply for the Sacramento region’s long-term growth and economic health.
- Preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River.



South American Subbasin GSP

Neighboring Groundwater Subbasins

Figure ES-2

Legend

South American Subbasin

Subbasins

- Cosumnes
- Eastern San Joaquin
- North American
- Solano
- South American
- Yolo

0 1.25 2.5 5 Miles

N

South American SUBBASIN

Map Created: June 2020

Figure Exported: 12/14/2020 By: vdeanda Using: \\woodardcurran.net\shared\Projects\RMC\SAC\0509 Sac Central Groundwater Authority\0011575.00- SCGA GSP\G. GIS\2. MXD\2. Figure 2-2 Neighboring Groundwater Basins.mxd

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To achieve these objectives, all signatories to the Water Forum Agreement were required to endorse and, where appropriate, participate in each of the Agreement's seven elements as follows:

- Increased surface water diversions.
- Actions to meet customers' needs while reducing diversion impacts in drier years.
- Support for an improved pattern of fishery flow releases from Folsom Reservoir.
- Lower American River Habitat Management Element.
- Water Conservation Element.
- Groundwater Management Element.
- Water Forum Successor Effort.

*Central Sacramento County Groundwater Management Plan (**Section 2.1.9.3**)*

As a result of the Water Forum efforts, the Central Sacramento County Groundwater Management Plan (CSCGMP) was created to outline sustainable groundwater use in the SASb. Prior to the implementation of this GSP, the CSCGMP served as the overarching groundwater management document for the region. Five basin management objectives served as the foundation of the CSCGMP, including the following:

- Maintain a long-term average groundwater extraction rate at or below 273,000 acre-feet per year (AFY).
- Establish specific minimum groundwater elevations within all areas of the basin consistent with the Water Forum.
- Protect against any potential inelastic land surface subsidence.
- Protect against any adverse impacts to surface water flows.
- Attain water quality objectives for constituents of concern.

*Other Management Plans (**Section 2.1.9.3** through **Section 2.1.9.10**)*

In addition to the CSCGMP serving as the overarching groundwater management document for the region, other water management initiatives have been developed by various agencies as summarized in **Table ES-1.** These and other existing management plans have been considered in the development of the SASb GSP.

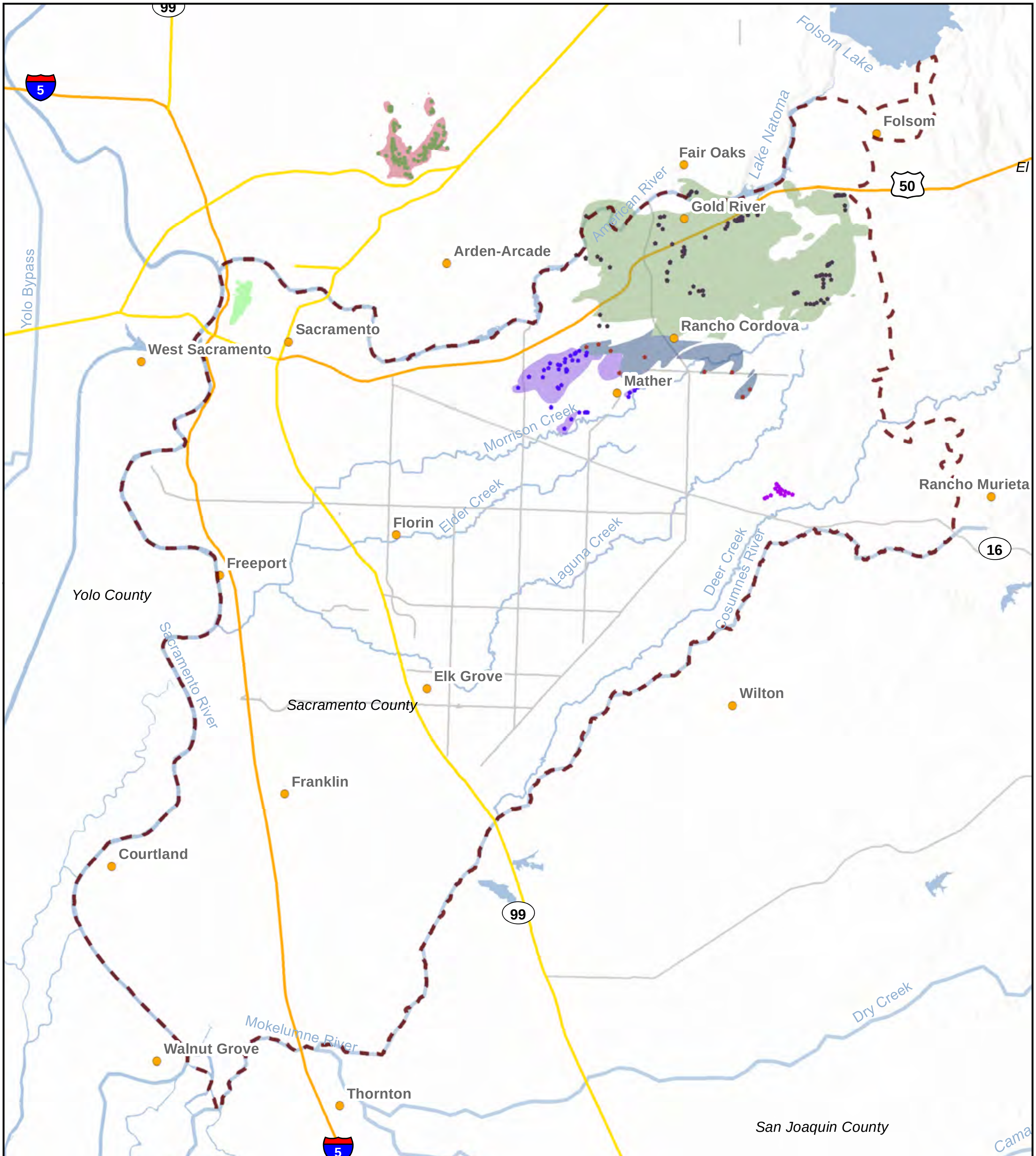
Table ES-1: Existing water management plans in the SASb

Existing Water Management Plans	Plan Purpose and Goals
2016 Sacramento Central Groundwater Authority Groundwater Elevation Monitoring Plan	1) Sets guidelines for determining depth to water including equipment, preparation, procedures, quality assurance/quality control, and data reporting to the California Statewide Groundwater Elevation Monitoring Program (CASGEM) online submittal system.
2004 Sacramento County Water Agency (SCWA) Zone 40 Groundwater Management Plan	1) Maintain or improve groundwater quality in Zone 40 area for the benefit of basin groundwater users. 2) Maintain groundwater elevations that result in a net benefit to basin groundwater users. 3) Protect against any potential inelastic land surface subsidence. 4) Protect against adverse impacts to surface water flows in the American, Cosumnes, and Sacramento Rivers. 5) Protect against adverse impacts to water quality resulting from interaction between groundwater in the basin and surface water flows in the American and Sacramento Rivers.
2014 Central Valley Regional Water Quality Control Board—Irrigated Lands Regulatory Program – Waste Discharge Requirements for Sacramento Valley Water Quality Coalition	1) Prevents agricultural runoff from impairing surface waters and groundwaters. 2) Monitors the following parameters: water column and sediment toxicity, physical and conventional parameters, organic carbon, pathogen indicator organisms, trace metals, pesticides, and nitrogen and phosphorous compounds.
Sacramento County Environmental Management Wells Program	1) Authorizes the construction, modification, repair, inactivation, or destruction of wells in Sacramento County through a formal permit and inspection process.
2018 Central Valley Salinity Alternatives for Long-Term Sustainability Initiative (CV-SALTS)	1) Sustain the Central Valley's lifestyle. 2) Support regional economic growth. 3) Retain a world-class agricultural economy. 4) Maintain a reliable, high-quality water supply. 5) Protect and enhance the environment. 6) Ensure a safe drinking water supply. 7) Achieve balanced salt and nitrate loadings. 8) Implement managed aquifer restoration program. 9) Sustainably manage nitrate and salinity.

Existing Water Management Plans	Plan Purpose and Goals
2009 Delta Stewardship Council Delta Plan	1) Develop detailed findings to establish consistency with the Delta Plan. 2) Reduce reliance on the Delta through improved regional water self-reliance. 3) Practice transparency in water contracting. 4) Develop Delta flow objectives. 5) Restore habitats at appropriate elevations. 6) Protect opportunities to restore habitat. 7) Expand floodplains and riparian habitats in levee projects. 8) Avoid introducing/habitat improvements for invasive nonnative species. 9) Locate new urban development wisely. 10) Respect local land use when siting water or flood facilities or restoring habitats. 11) Prioritize state investments in Delta levees and risk reduction. 12) Require flood protection for residential development in rural areas. 13) Protect floodways and floodplains.
2016 Sacramento County Water Agency (SCWA) Zone 40 Water Supply Master Plan	1) Meet future water demands through a conjunctive use program of groundwater, surface water, and recycled water supplies.
2013 City of Sacramento Water Conservation Plan	1) Maximize the City's existing water and fiscal resources through a comprehensive and economically supported approach.

Remediation Monitoring (Section 2.1.8)

Aerospace, industrial, manufacturing, and defense industries have been a key part in the development of greater Sacramento since the late 1950s. Unfortunately, many of these industries have used and disposed of toxic and unknown substances onsite resulting in the contamination of groundwaters and soils in specific areas of the SASb. Known contaminant plumes and sites in the SASb are shown in **Figure ES-3**. Several remediation actions have and are being performed to protect human health and the environment under various state and federal regulatory programs. Local groundwater management agencies have no jurisdiction over extractions and cleanup activities and must adaptively manage groundwater conditions as changes in the cleanup programs occur over time (SCGA, 2016). Major remediation activities are summarized in **Table ES-2**.



South American Subbasin GSP

Contamination Plumes and Remediation Wells (2008)

Figure ES-3

Legend

Remediation Wells	Contamination Plume
Aerojet	Aerojet
Boeing	Boeing
Mather	Mather
McClellan	McClellan
Kiefer	Union Pacific Downtown / Curtis Park

0 1 2 4 Miles

N

South American SUBBASIN

Project #: 0011575.00
Map Created: October 2021

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Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. **Note:** Remediation well data was not available for UPRR or Sacramento Army Depot. Contamination plume data was not available for Sacramento Army Depot or Kiefer Landfill.

Table ES-2: SASb remediation activities

Remediation Site	Description
Mather Air Force Base	Mather Air Force Base was a former 5,845-acre Air Force Base located at the northern extent of the South American Subbasin. In 1982, environmental investigations began to find areas with significant soil/sediment contamination from fire training areas, drainage ditches, waste pits, oil/water separators sites, spill sites, landfills, and a wastewater treatment plant. Soils were contaminated with toxic and hazardous materials such as petroleum, oils, lubricants, solvents, and protective coatings used during routine operation and maintenance of Mather AFB. The US Air Force is currently conducting remediation activities to address the identified contaminant plumes and continues to monitor large water supply wells, nearby monitoring wells, and smaller, private-owned supply wells downgradient from the plumes.
Aerojet	The Aerojet Superfund Site is a former rocket-testing and chemical manufacturing site located in the northeastern quadrant of the subbasin. The 70-year-old site covers 5,900 acres and is located 15 miles east of Sacramento in Rancho Cordova, and half a mile from the American River. The activities at Aerojet have resulted in soil and groundwater contamination in a portion of the South American Subbasin. The site sits atop a large miles-long groundwater plume that contains various chemicals of concern, including Trichloroethylene (TCE), a volatile organic chemical (VOC), Perchlorate, and Nitrosodimethylamine (NDMA). Aerojet has installed several groundwater extraction and treatment systems, well fields, and numerous treatment facilities over the decades to contain the contaminated groundwater plume. Recent reports have found that the Aerojet Site continues to affect groundwater quality downgradient and additional remediation activities are planned.
Kiefer Landfill	The Kiefer Landfill is a 1,084-acre site with an active class III 335 acre solid waste disposal site that is owned and operated by Sacramento County. The groundwater remediation program includes source abatement with the operation of the landfill gas (LFG) extraction system and leachate collection and removal systems (LCRS). The County does consistent monitoring of groundwater parameters and LFG control to track the progress of the remediation program and for compliance with Water Quality Protection Standards (WQPS) at monitoring sites located beyond the perimeter of the contamination plume.

Remediation Site	Description
McDonnell Douglas (Boeing)	The McDonnell Douglas site is an inactive test site in Rancho Cordova. Historical activities at the site include cleaning tested materials and maintaining test areas, during which chlorinated solvents and fuels were used and released to the soil, surface water, and groundwater. Cleanup activities include pump and treat, extraction wells, soil vapor extraction, and in-situ groundwater remediation. Treated groundwater is discharged to Morrison Creek.

Hydrogeologic Conceptual Model (Section 2.2)

Section 2.2 *includes descriptions of geologic formations and structures, aquifers, and properties of geology related to groundwater, setting the hydrogeological stage for the implementation of the SASb GSP.*

Basin Boundaries (Section 2.2.5)

The SASb is part of the Sacramento Valley Groundwater Basin and is divided into seven boundary segments including five groundwater divides, one impermeable bedrock boundary, and one political boundary between the Yolo and Sacramento Counties. Neighboring Subbasins are shown in **Figure ES-2**.

Principal Aquifers and Aquitards and Surface Water Recharge (Section 2.2.6 and Section 2.2.8)

There is one primary aquifer in the SASb, which is divided into the upper aquifer and the lower aquifer. The upper aquifer is typically of high quality and is often used for private domestic and/or irrigation wells in the SASb. The lower portion of the primary aquifer is also of high quality capable of producing high yields; therefore, larger municipal supply wells will often target this lower portion of the aquifer to avoid impacting domestic wells screened in the upper portion of the aquifer.

Most recharge to the aquifer occurs from streams and rivers and a combination of rainfall and applied water. Analytical results discussed in the Sacramento Central Groundwater Authority Recharge Mapping and Field Study Technical Memorandum indicate the majority of recharge occurs in areas where soils are coarse (e.g., southwest of Folsom) and where there is extensive occurrence of agricultural applied water (e.g., south of Elk Grove and between Grant Line Road and the Cosumnes River) (RMC Water and Environment, 2015). The study also indicates that recharge rates were lower from Elk Grove to the northwest, roughly between Morrison Creek and Grant Line Road.

Groundwater Conditions (Section 2.3)

Current and historical conditions of the SASb including groundwater levels and storage, groundwater quality, interconnected surface water systems, groundwater dependent ecosystems, and remediation projects are detailed in **Section 2.3**. This section also discusses changes in the SASb in recent decades and presents groundwater hydrographs, vertical gradients, and contours that are based on available groundwater monitoring data.

Groundwater Levels (Section 2.3.1)

Groundwater levels in the western portion of the SASb have been generally increasing since the 1980s despite a turn towards drier conditions and increasing population (**Figure ES-4**). The recent increase in groundwater levels has been largely attributed to a combination of conjunctive use projects (i.e., the combined use of groundwater and surface water sources), construction of the Freeport diversion facility and Vineyard surface water treatment plant, urban conservation plans, and changes in use of previous agricultural land. Groundwater levels in some areas of the eastern portion of the SASb show decreases in groundwater levels despite the lack of significant changes in land or water use (**Figure ES-5**). The causes of these declines are not well understood but may be attributed to the combination of remediation activities at the Inactive Rancho Cordova Test Site, Aerojet Superfund Site, and Kiefer Landfill and the aquifer becoming thin and low-yielding in this area.

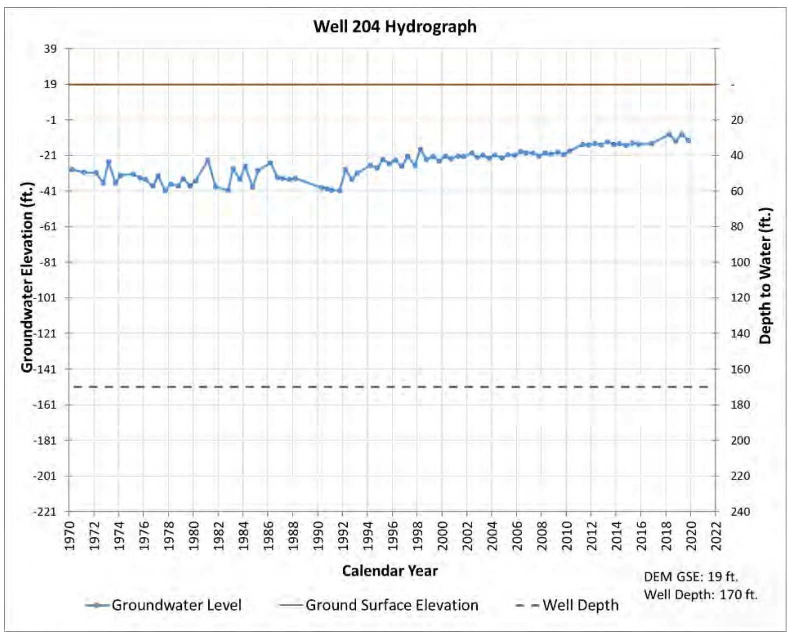


Figure ES-4: Groundwater levels as a function of time in a well in the western portion of the SASb (**Figure 2.3-8**)

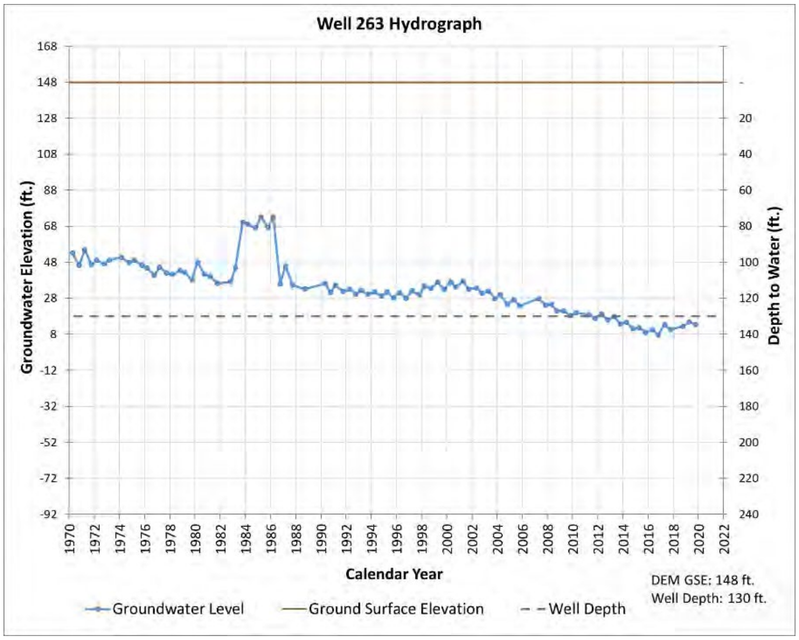


Figure ES-5: Groundwater levels as a function of time in a well in the eastern portion of the SASb (**Figure 2.3-11**)

Groundwater Quality (Section 2.3.4)

Groundwater quality in the SASb is generally of good quality and meets local needs for municipal, domestic, and agricultural uses. Several water quality parameters including nitrate, total dissolved solids (TDS), arsenic, hexavalent chromium, and per- and polyfluoroalkyl substances (PFASs) have been monitored at numerous wells in the SASb over time. Data obtained from the Groundwater Ambient Monitoring and Assessment Program (GAMA) and other data sources has been summarized and evaluated. In data spanning multiple decades, nitrate concentrations have remained consistently below the maximum contaminant level (MCL) of 10 mg/L as N and TDS concentrations have generally been lower than the recommended secondary maximum contaminant level (SMCL) of 500 mg/L. Arsenic data collected from the 1980s to present show concentrations exceeding the MCL of 10 µg/L in isolated areas in the upper aquifer of the SASb, with few exceedances in the lower aquifer. Hexavalent chromium and PFASs were monitored beginning in 2001 and 2017, respectively. Hexavalent chromium concentrations were consistently below the proposed MCL of 10 µg/L. PFOA and PFOS concentrations have been detected above State Water Board-issued reporting levels at some wells in the SASb.

Interconnected Surface Water Systems (Section 2.3.6)

Interconnected surface water (ISW) is defined as surface water which is connected to groundwater through a continuous saturated zone. SGMA mandates an assessment of the location, timing, and magnitude of ISW depletions, and demonstration that projected ISW depletions will not lead to significant and undesirable results for beneficial uses and users of groundwater.

ISW and disconnected surface waters in the SASb have been classified and mapped by relating historical groundwater levels (which fluctuate over time) and the best available streambed elevations (largely fixed). Historical trends in seasonal interconnection between streams and groundwater have been characterized between 2005 and 2018 to map ISW and disconnected reaches (**Figure ES-6**). This time period was analyzed because it represents current groundwater level conditions, overlaps with the historical timeframe for the regional groundwater model (CoSANA) used in development of the GSP, and because groundwater level data is sufficiently dense during this period. Depletions of ISW are quantified as volumetric fluxes (i.e., seepage volumes per unit time) that occur along a stream reach. Negative seepage indicates a "losing" reach, and positive seepage indicates a "gaining" reach. ISW depletion occurs in the South American Subbasin along all losing reaches (negative seepage in **Figure ES-7**). However, modeling suggests that, compared to the current conditions, planned recharge and conjunctive use projects and management actions will increase groundwater fluxes to streams (i.e., some stream reaches become more gaining), and will increase the 50th percentile of October to December streamflows. In other words, projected future groundwater usage and management is not anticipated to increase stream depletions compared to current conditions.

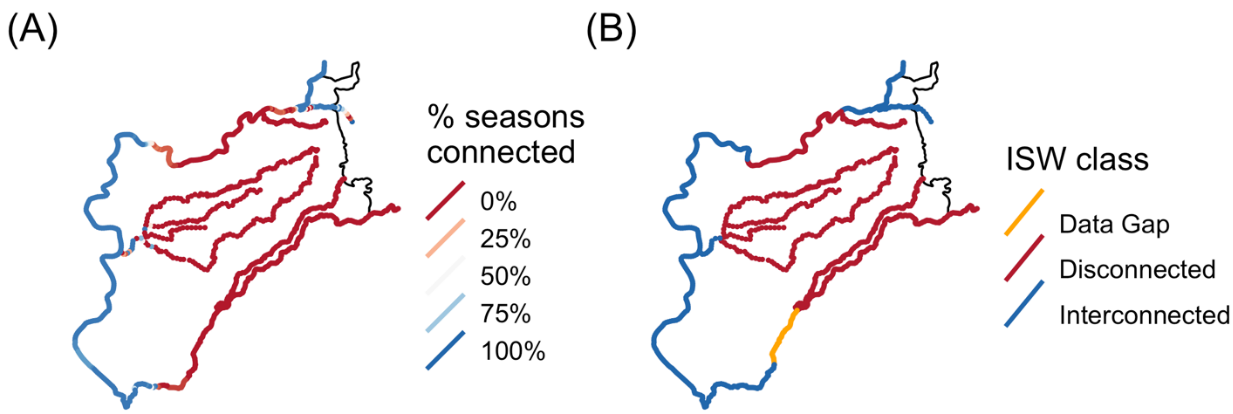


Figure ES-6: South American Subbasin Interconnected and Disconnected stream nodes according to **(A)** historical percentage of seasons between 2005 and 2018 that the node is connected to groundwater; and **(B)** final classification of ISW based on historical analysis **(Figure 2.3-43)**.
The "data gap" labeled in (B) was due to the sub-seasonal, short-term interconnection events observed along the Cosumnes River north of Twin Cities Road and south of Deer Creek, a location where more monitoring is needed to better understand stream-aquifer interactions.

Land Subsidence and Seawater Intrusion (Section 2.3.5 and Section 2.3.3)

Land subsidence is the lowering of the ground surface elevation. Little to no land subsidence has been observed in the SASb; elevation change generally ranges from 0 to -0.14 ft from 2005 to 2020. Seawater intrusion is not considered to be an applicable sustainability indicator for the SASb due to the distance between the SASb and the saline areas of the Bay-Delta influenced by the Pacific Ocean (approximately 30 miles to the west in San Francisco Bay).

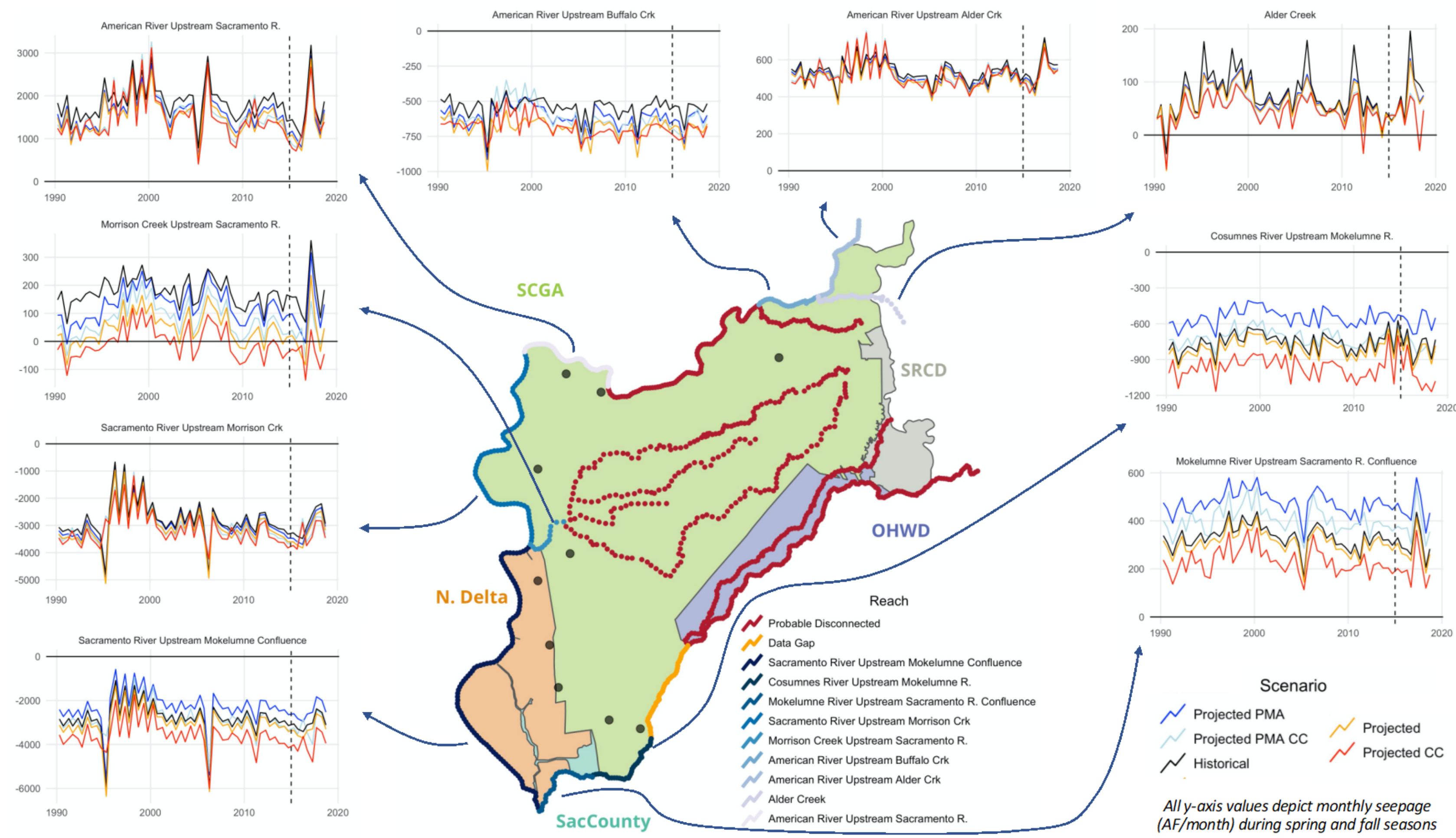


Figure ES-7: Seasonally averaged ISW depletion estimated by CoSANA at ISW designated reaches. The black line represents historical to near present-day conditions. See **Section 3.3.1.2** for more details on projected scenarios (**Figure 2.3-44**).

Groundwater Dependent Ecosystems (Section 2.3.7)

Groundwater dependent ecosystems (GDEs) are a beneficial user of groundwater that rely on a connection to near-surface groundwater, typically characterized by the land surface elevation, the depth to groundwater, and the vegetation rooting depth. GDEs were mapped and characterized, and special status species that rely on these ecosystems were catalogued. Of 26,245 acres of potential GDEs in the SASb, 11,340 acres exhibit historical groundwater levels indicative of GDEs as shown in **Figure ES-8**.

*CoSANA Model (**Section 2.4.1.2**)*

Water budgets (next section) were developed utilizing the Cosumnes-South American-North American (CoSANA) model, a fully integrated surface and groundwater numerical flow model that covers the entire South American Subbasin as well as the adjoining North American and Cosumnes Subbasins. CoSANA integrates the groundwater aquifer with the surface hydrologic system and land surface processes and operations. Using data from federal, state, and local resources, CoSANA was used to evaluate hydrogeologic conditions, agricultural and urban water demands, agricultural and urban water supplies, and current and projected future regional groundwater conditions.

Water Budget (Section 2.4)

For each “baseline condition” depicted in **Table ES-3**, water budgets were developed for the stream and canal system, the land surface system, and for the groundwater system. The groundwater system budget reports inflows (deep percolation, stream losses to the groundwater system and subsurface inflow), outflows (stream gain from the groundwater system, groundwater production, and subsurface outflow) and the estimated change in groundwater storage under different land use and climate conditions. **Table ES-3** shows average annual estimated change in groundwater storage for each baseline condition. **Figure ES-9** through **Figure ES-11** depicts the average annual values for each groundwater system component.

Table ES-3: Projected change in groundwater storage in each baseline condition

Baseline	Average Annual Groundwater Storage Change (AFY)
Historical Conditions	+7,700
Current Conditions	+2,200
Projected Conditions without Climate Change	-1,100
Projected Conditions with Climate Change	-6,200

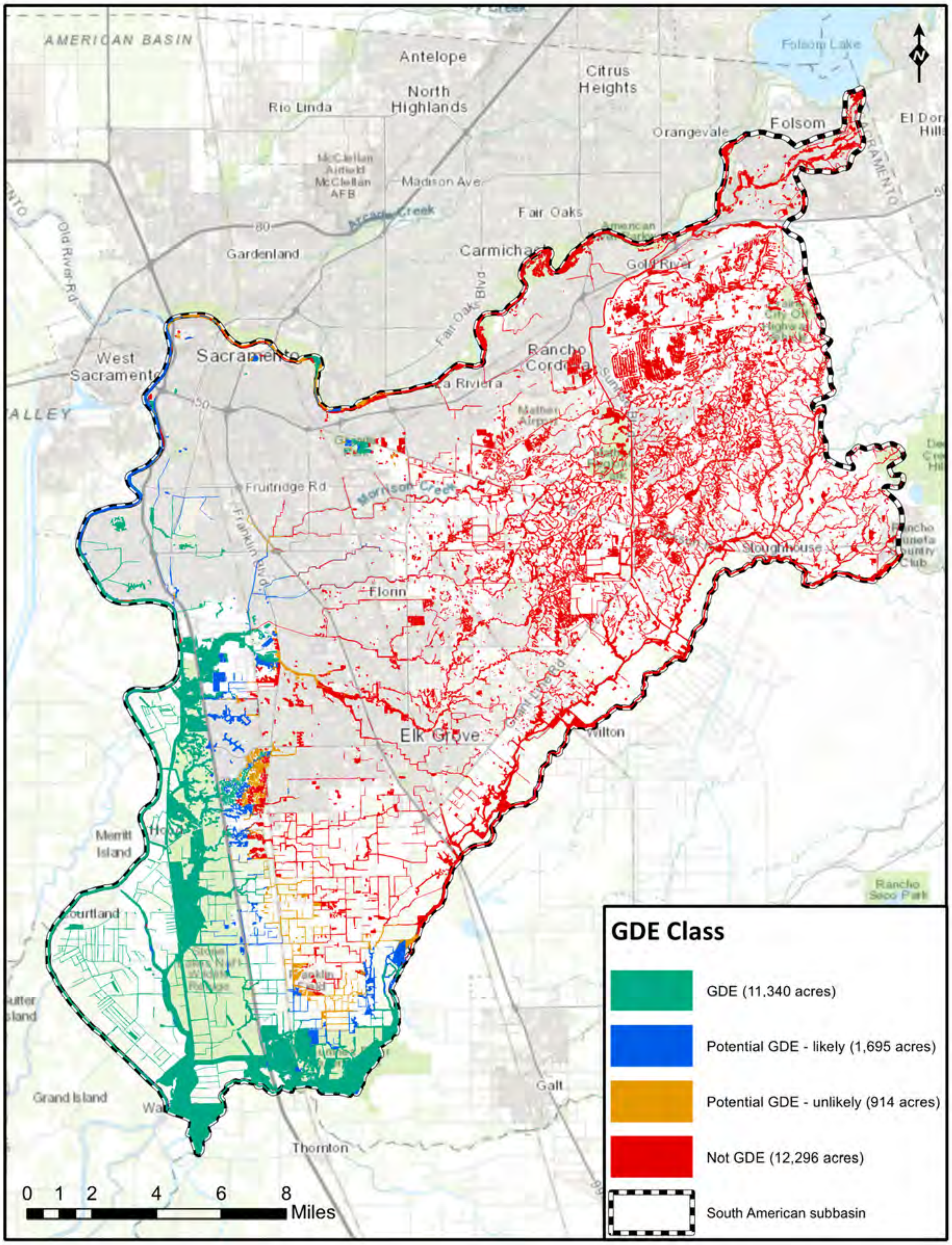


Figure ES-8: GDE likelihood classification of potential GDEs from 2005-2018

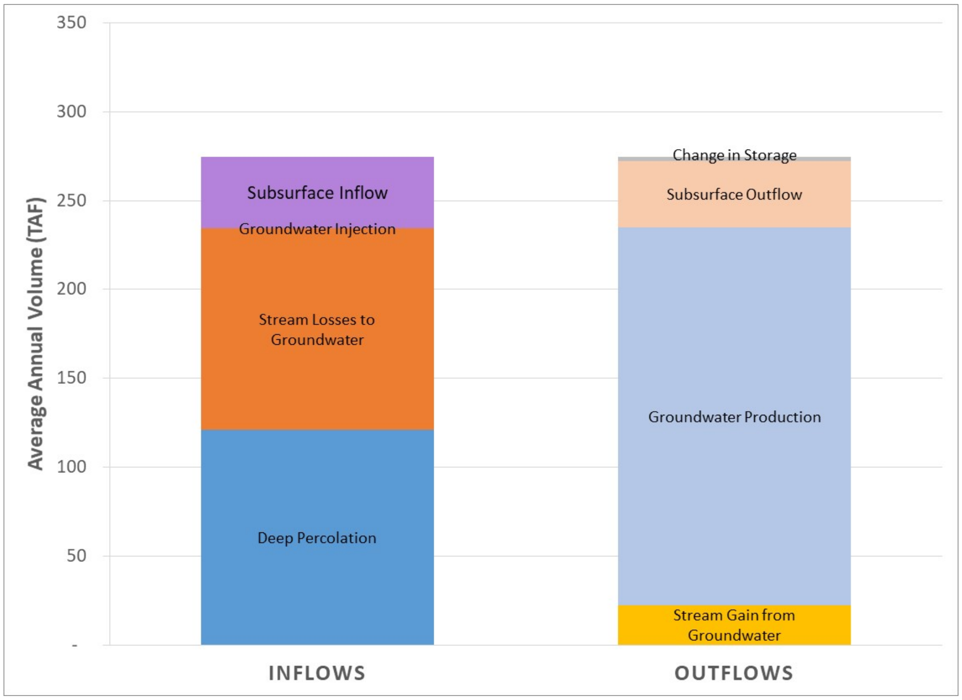


Figure ES-9: Current conditions average annual water budget – groundwater system (**Figure 2.4-8**)

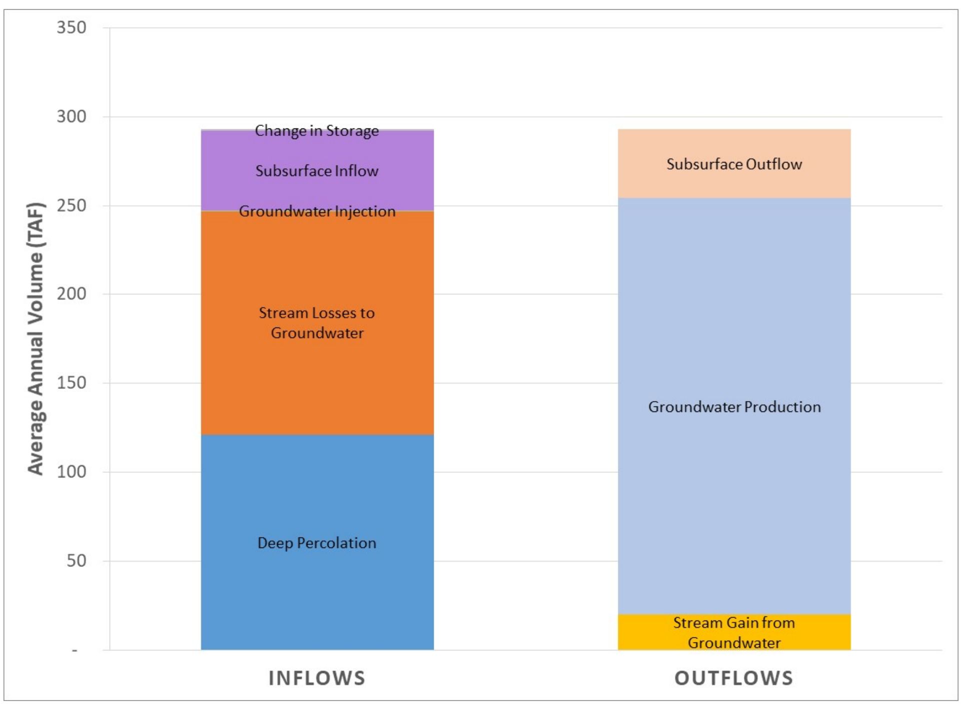


Figure ES-10: Projected conditions *without* climate change average annual water budget – groundwater system (**Figure 2.4-11**)

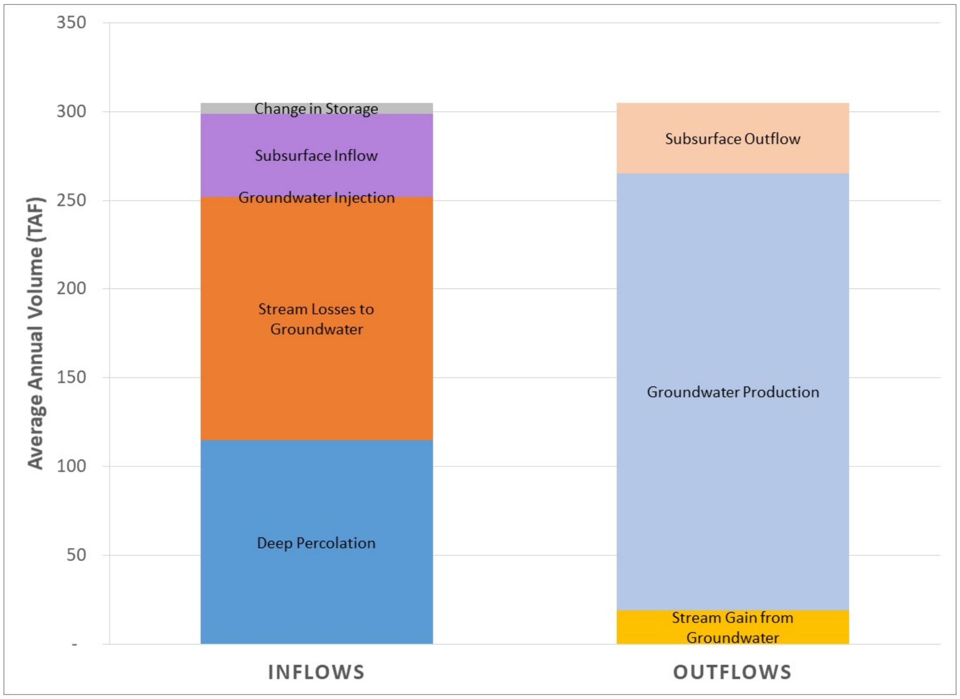


Figure ES-11: Projected conditions *with* climate change average annual water budget – groundwater system (**Figure 2.4-14**)

Groundwater Storage (Section 2.3.2)

The CoSANA model was used to estimate historical changes in storage of groundwater in the SASb from 1990 to 2018. **Figure ES-12** shows annual total groundwater storage for the SASb and the cumulative change in storage over varying water year types. Between 1990 and 2018, the cumulative storage in the subbasin is estimated to have increased by 188,000 acre-feet. For the most recent 10-year period (2009 to 2018), the cumulative storage increase is estimated to be approximately 77,000 acre-feet.

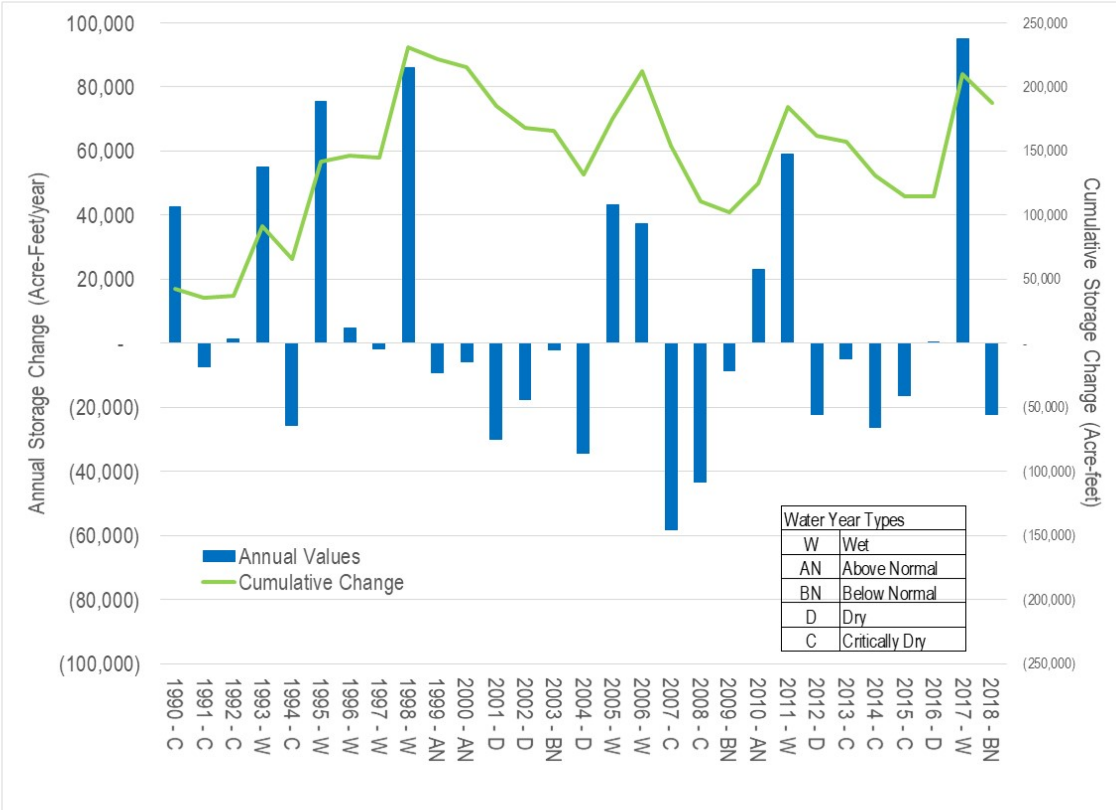


Figure ES-12: Groundwater storage by year, water year type, and cumulative water volume (**Figure 2.3-26**)

The CoSANA model was used to define a range of groundwater pumping for the SASb that does not cause significant and unreasonable results for the three sustainability indicators defined in Section 3: 1) Chronic Lowering of Groundwater Levels, 2) Reduction of Groundwater Storage, and 3) Depletion of Interconnection Surface Water. Based on analysis of historical and projected data and information from a number of CoSANA modeling scenarios representing various hydrologic and operating conditions in the Subbasin, the sustainable yield for the SASb can range between 210,000 AF and 270,00 AF in any given year, as long as a long-term average of 235,000 AFY is maintained.

ES-3 Sustainable Management Criteria (Section 3)

***Section 3** builds on the information presented in the previous sections and details the key sustainability criteria developed for the GSP, as required by SGMA.*

Recognizing the significant body of work in existing groundwater management plans and strategies that have been implemented in the SASb, this GSP builds on those efforts to establish a system of metrics to ensure the long-term viability of groundwater resources for urban, domestic, agricultural, industrial, and environmental beneficial users in the SASb.

Sustainability Goal and Sustainability Indicators (Section 3.1)

The Sustainability Goal for the SASb is to protect and ensure the long-term viability of groundwater resources for urban, domestic, agricultural, industrial, and environmental beneficial users of groundwater. The Sustainability Goal will be achieved by rigorous monitoring and assessment of potential impacts to these beneficial users, and scientifically-informed management that avoids significant and unreasonable impacts to beneficial uses and users of groundwater.

The GSP details four of the six sustainability indicators (as required by SGMA), with a goal of preventing undesirable results.

Table ES-4 defines undesirable results for each sustainability indicator as developed for the SASb. Quantifiable minimum thresholds (MT), measurable objectives (MO), and interim milestones (IM) were also developed as “management goalposts” that will be used to evaluate progress made towards the sustainability goal and are quantified in **Section 3** of the GSP. Monitoring wells throughout the basin will be used to assess conditions relevant to each sustainability indicator. These monitoring wells were selected based on location, depth, monitoring history, well information, and well access. A total of 45 wells spanning the SASb were selected to monitor groundwater levels, storage, and interconnected surface water sustainability indicators as shown in **Figure ES-13.** Additionally, 21 wells spanning the SASb were selected to monitor water quality as shown in **Figure ES-14**.

Table ES-4: SASb GSP sustainability indicators: Definitions of undesirable results

Sustainability Indicator	Undesirable Results Definitions
Chronic Lowering of Groundwater Levels	More than 25% of representative monitoring wells fall below the minimum threshold for 3 consecutive years.
Reduction of Groundwater Storage	Same as "Chronic Lowering of Groundwater Levels."
Degraded Water Quality	More than 10% of groundwater quality wells exceed maximum thresholds in each aquifer zone.
Depletions of Interconnected Surface Water	More than 25% of representative monitoring wells for ISW fall below their minimum thresholds for 3 consecutive years.
Seawater Intrusion	Not applicable to the SASb.
Land Subsidence	Not significant to the SASb.

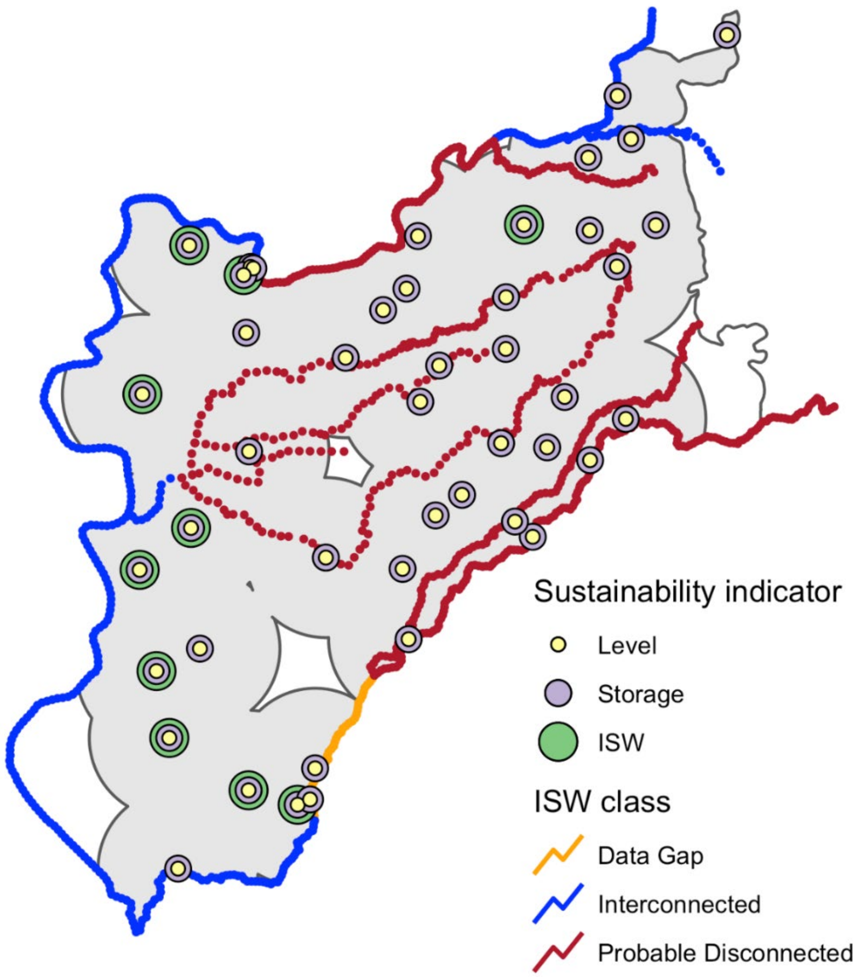
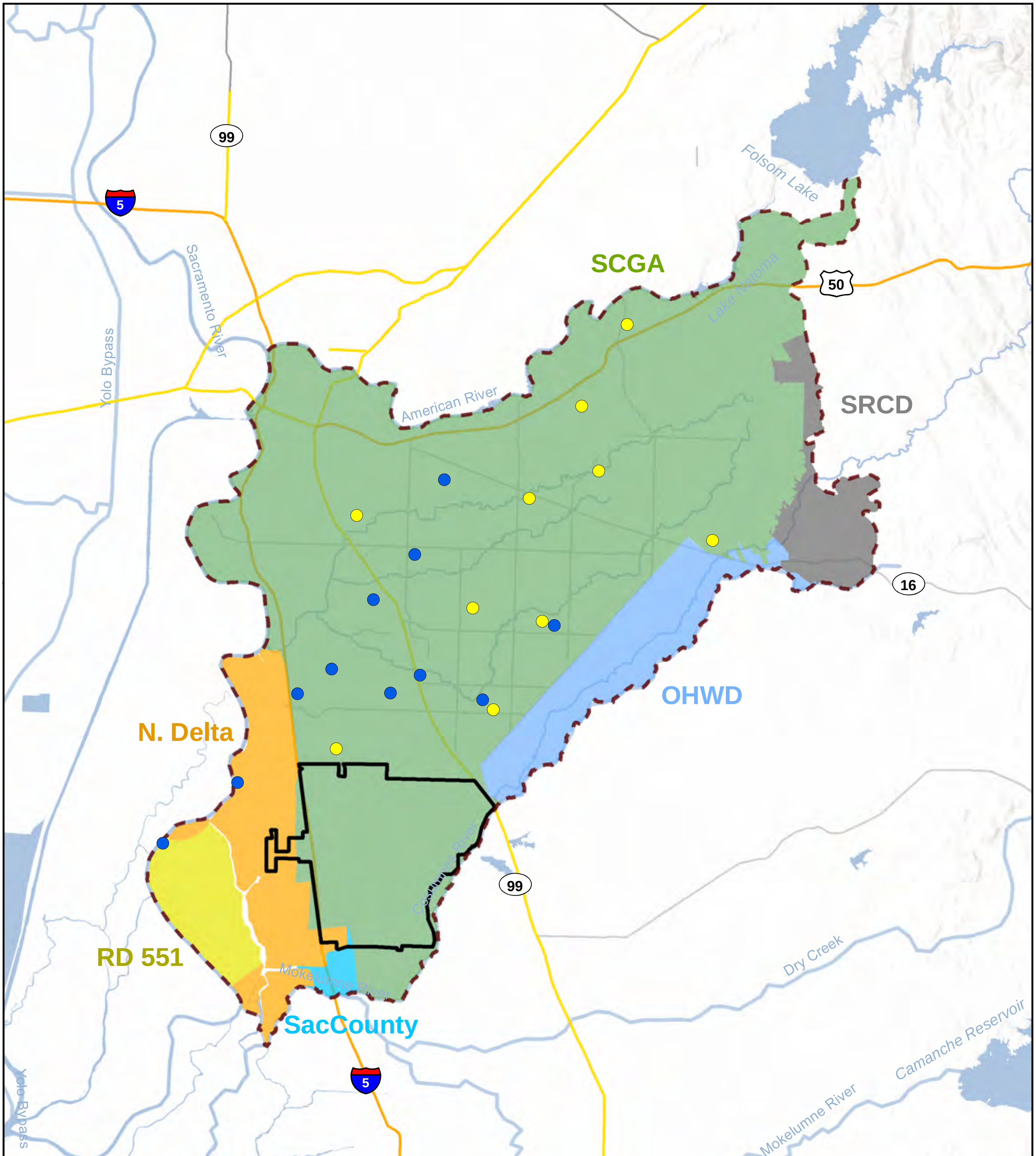


Figure ES-13: Monitoring network for groundwater level, storage, and ISW depletion sustainability indicators for the 45 representative monitoring wells in the SASb. Network density is depicted with a gray, 24-square mile circular buffer around each monitoring point that together show 92% lateral coverage by the network. (**Figure 3-23**)



South American Subbasin GSP

Proposed Water Quality Monitoring Network

Figure ES-14

Legend

Lower Layer GWQ Monitoring Points
Upper Layer GWQ Monitoring Points
Harvest Water
South American Subbasin

GSA

N. Delta
OHWD
RD 551
SCGA
SRCD
SacCounty

0 1.25 2.5 5 Miles

N

South American SUBBASIN

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ES-4 Projects and Management Actions (Section 4)

Section 4 *describes past, current, and future projects and management actions that will contribute to the achievement of the SASb GSP sustainability goal.*

To achieve the sustainability goal for the SASb by 2042, and to avoid undesirable results over the remainder of a 50-year implementation horizon, multiple planned projects and potential management actions (PMAs) have been identified and considered by the GSAs in the SASb GSP.

Types of Projects and Management Actions (Section 4.2)

A number of PMAs have been considered in the development of the GSP to evaluate the attainment of sustainability goals, measurable objectives, and minimum thresholds, and to avoid undesirable results described in the SASb GSP. PMAs considered in this GSP can be divided into three groups as follows:

- Group 1: Existing PMAs currently being implemented and expected to continue to be implemented, as needed, to support achievement of the sustainability goal.
- Group 2: PMAs already planned for near-term implementation by individual entities, which may likely, individually or in aggregate, contribute to achieving sustainability in the SASb over the next 20 years.
- Group 3: Supplemental PMAs that are in conceptual stages which may be implemented by entities in the future and would provide additional benefit in improving groundwater conditions and/or adapting to changes in future conditions.

More than 170 PMAs have been identified in available planning documents in the SASb, dedicated to topics ranging from recharge, flood/stormwater management, water quality, supply augmentation, demand management, community stewardship, and conjunctive use. Notably, several PMAs focus on enhanced conjunctive use, which is defined as the coordinated use of groundwater and surface water to meet water supply demands and preserve groundwater sustainability.

Projects (Section 4.3 through Section 4.5)

Several Group 1 projects have been implemented to date that primarily focus on conjunctive use. Specifically, these projects include:

1. The construction of the Freeport Intake on the Sacramento River as a result of a joint venture by the Sacramento County Water Agency and East Bay Municipal Utility District to divert 185 million gallon per day (MGD) of water from the Sacramento River.
2. The construction of the 50-MGD Vineyard Surface Water Treatment Plant (VSWTP) in 2011. The 80-acre site includes adequate space to expand the capacity to 100 MGD.
3. Ongoing efforts to increase operational flexibility and capacity for conjunctive use by construction of system interties, treatment plant improvements, and development of groundwater wells. These efforts have been and are being taken by

California--American Water, City of Sacramento, Sacramento County Water Agency, and the Golden State Water Company.

Group 2 projects are expected to be operational within the next 5 years and implemented by entities in the SASb. Major projects include:

1. The Harvest Water project is sponsored by the Sacramento Regional County Sanitation District and will provide a safe and reliable supply of disinfected tertiary-treated recycled water, up to 50,000-acre feet per year (AFY) to irrigate more than 16,000 acres of agricultural and 400 acres of habitat lands. Moreover, this project will reduce the need for groundwater pumping, support habitat protection efforts, restore depleted groundwater levels by up to 35 feet within 15 years, and increase groundwater storage by approximately 245,000 AF within 10 years.

2. Omochumne-Hartnell Water District groundwater recharge project will divert up to 4,000 AF per year of surface water from the Cosumnes River to an 1,168-acre spreading basin between the Cosumnes River and Deer Creek to help alleviate groundwater storage overdraft in both the SASb and the Cosumnes Subbasin. The use of available water during high flow events could allow the watershed to recover and cause longer flows in the Cosumnes River to persist during the dry season as the groundwater levels are incrementally increased through the recharge. To the extent the duration and location of flows in the Cosumnes River are extended, the local ecosystem will also be enhanced as a result of the project.

3. Regional Conjunctive Use Program elements will increase conjunctive use among both the SASb and the North American Subbasin municipal and industrial water purveyors, currently including California-American Water, Citrus Heights Water District, City of Lincoln, City of Sacramento, Golden State Water Company, Sacramento County Water Agency, and Sacramento Suburban Water District. The planned projects will utilize existing infrastructure to leverage ongoing planning processes to use available additional surface water through water transfers, groundwater recharge projects, wholesale agreements, or wheeling agreements. The goal is to provide long-term basin benefits through use of additional surface water supplies during wet years which would result in a net reduction of groundwater use and contribute to basin recovery. It is expected that an average of 20,400 AF of surface water would be made available during wet years within the SASb, directly offsetting the use of groundwater and equating to an average annual benefit of about 7,200 AF/year. Consistent with other conjunctive use projects, this project will increase regional and state water supply reliability and drought resiliency.

Group 3 projects are still in the conceptual stage and not expected to be operational within the next 5 years. One major project in this category includes:

1. The Sacramento Area Flood Control Agency's (SAFCA) Flood-MAR[1] project would modify the three largest non-federal dams in the American River Basin to safely contain floods with a 1-in-500 annual probability of occurrence. This project has been initiated due to concerns regarding climate-driven changes in precipitation patterns and is enabled by recent advances in meteorological forecasting. The SAFCA Floor-MAR project also includes measures to conserve water for environmental, agricultural, and

urban use by allowing conditional storage, aquifer recharge, and beneficial use of winter runoff ([1]Managed Aquifer Recharge).

Projected Future Conditions (Section 4.6)

To evaluate the potential effects of proposed projects and management actions in meeting the sustainability goals of the SASb GSP, the Group 2 (near-term) projects described above were analyzed using the CoSANA model. Several scenarios were modeled, and the results are summarized in **Table ES-5** below for scenarios without consideration of climate change and, in **Table ES-6** below, for scenarios simulated with climate change. The tables show the projected change from current baseline conditions under different scenarios.

All scenarios result in lower average annual groundwater pumping and an improvement in groundwater storage in the SASb relative to the balance between inflows and outflows. Note that Scenarios 1 and 2 (Demand Reduction) were run separately from Scenarios 3, 4 and 5 (Project) to assess the isolated benefit of either expected urban reductions or potential agricultural reductions. Therefore, estimated storage benefits resulting from Scenarios 1 and 2, which fall in the Group 1 category, are additive to the outcomes from the other scenarios, which are comprised of Group 2 projects. Long-term groundwater basin sustainability will be achieved under any of the project and management action scenarios without climate change. With implementation of all the planned projects included in Scenario 5 and accounting for an expected minor planned reduction in demand, long-term groundwater basin sustainability is projected to be achieved under the modeled climate change conditions.

Table ES-5: Summary of PMA modeling scenarios *without* consideration of climate change

CoSANA Model Scenarios	Description	Average Annual Groundwater Pumping (AFY)	Average Annual Groundwater Storage Change (AFY)
PCBL	Projected Condition Baseline	234,000	-1,100
Scenario 1	Demand reduction (5% Ag; 10% Urban)	216,500	+2,000
Scenario 2	Demand reduction (10% Ag; 10% Urban)	210,900	+2,800
Scenario 3	Harvest Water & OHWD Recharge	211,800	+3,200
Scenario 4	Regional Conjunctive Use	227,400	+200
Scenario 5	Harvest Water, OHWD Recharge & Regional Conjunctive Use	205,200	+4,500

Table ES-6: Summary of PMA modeling scenarios, w*ith* consideration of climate change

CoSANA Model Scenarios	Description	Average Annual Groundwater Pumping (AFY)	Average Annual Groundwater Storage Change (AFY)
PCBL CC	Projected Condition Baseline with Climate Change	245,800	-6,200
Scenario 2	Demand reduction (10% Ag; 10% Urban)	220,400	-1,800
Scenario 4	Regional Conjunctive Use	239,100	-4,800
Scenario 5	Harvest Water, OHWD Recharge & Regional Conjunctive Use	216,600	-100

Management Actions (Section 4.7)

In addition to the identified planned projects and expected actions that will be implemented by individual entities in the SASb, the following additional management actions are proposed to be implemented by GSAs in the SASb to ensure protection of sensitive users and to fulfill SGMA requirements.

1. The Shallow/Vulnerable Well Protection Program will provide financial relief for qualifying users of shallow wells that may be impacted by groundwater decline in the vicinity of their wells. Analysis, based on best available information, indicates that the incidence of such impacts on vulnerable wells is projected to be very low in the SASb over the GSP implementation horizon. The creation of the program is intended to address the cases of shallow well users impacted by groundwater level decline and will be developed jointly by participating GSAs and local stakeholders.

2. GSAs will coordinate with the Sacramento County Environmental Management Wells Program and local agencies to establish revised requirements for well construction to avoid future impacts on shallow well users, GDEs and on the GSP monitoring network.

3. GSAs will plan, implement and fund efforts to fill data gaps identified in the GSP (e.g., to refine information regarding specific wells in the GSP Monitoring Network, to improve understanding of surface water and groundwater interactions along a portion of the Cosumnes River)

4. GSA Coordination Activities: Multiple coordination activities and resource commitments between the GSAs of the SASb are required to support GSP implementation; and these coordination activities are summarized in **Table ES-7**.

Table ES-7: GSA coordination activities

GSAs Coordination Activities	Topic/Action
GSAs in SASb	Overarching groundwater management consistent with the GSP, GSP implementation measures, joint management actions, regional water bank/accounting, and grant applications supporting recharge and other beneficial projects
Local land use authority agencies	Identify and proactively address development activities to promote consistency with the GSP. Identify issues and communicate regarding activities that may impact SASb sustainability
Entities sponsoring beneficial projects	Provide support and facilitate implementation, including support for grant funding.
Water supply agencies	Obtain updated information regarding water use efficiency programs, encourage such programs, and obtain information regarding the impacts of those programs on water demands. Coordination with subbasin water purveyors and groundwater pumpers to monitor water conservation and efficiency results of regional water conservation programs that impact the subbasin
GSAs in adjacent basins	Coordinate possible future agreements, information exchange, and monitoring network augmentation. Because CoSANA is a common modeling tool among the North American Subbasin (NASb), SASb, and Cosumnes Subbasin (COSb), coordination on data collection, model upgrades, calibration updates, and application is needed among various GSAs in SASb and neighboring subbasins
Regional Water Authority (RWA)	Support and participate in continued planning effort to develop Sacramento Region Groundwater Bank and associated accounting framework that is consistent with long term sustainability of the SASb and encourages beneficial conjunctive use operations.
RWA, Water Forum, and the neighboring subbasin GSAs	Support a regional project to track climate change research and coordinate with regional partners to continue to refine climate change modeling and analysis in preparation for the next five year update to the GSP

ES-5 GSP Implementation (Section 5)

***Section 5** details key GSP implementation steps and timelines. Cost estimates and elements of a plan for funding GSP implementation are also presented in this section.*

Implementation of the GSP will focus on the following several key elements:

1. GSA management, administration, legal, and day-to-day operations.
2. Implementation of the annual GSP monitoring program.
3. Technical support, including model updates and other technical analysis.
4. Coordination activities among GSAs within SASb and with other entities as described in **Table ES-7**.
5. Reporting, including preparation of annual reports and 5-year evaluations and GPS updates.
6. Implementation of Management Actions pertaining to protection of shallow/vulnerable wells, revision of Sacramento County well construction requirements, and actions to collect information to fill identified data gaps.
7. Ongoing engagement and outreach activities to stakeholders consistent with existing Communication and Engagement Plan and policy of transparency in information sharing and decision making.

The 20-year GSP implementation timeline is shown in **Table ES-8**.

Table ES-8: GSP implementation timeline

Description	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**
GSP Development & Adoption	■																					
GSP Submittal to DWR																						
Agency Administration & Operations	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Management & Coordination																						
Monitoring: Groundwater	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Monitoring: Streamflow	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Data Collection	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Data Management	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
GSP Reporting																						
Annual Reports		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Five-year Assessment Report							■					■					■					■
Outreach & Education	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Implementation of the GSP over the 20-year horizon by the SASb GSAs is projected to cost $860,000 per year, to be shared among the GSAs. The costs for management and administration of each GSA are not included in this estimate, which is preliminary and will be refined during the implementation of the GSP. A portion of the funding for GSP implementation will be obtained from the annual contributions made by the GSA member agencies. This cost allocation may change as the GSA's understanding of Subbasin sustainability evolves over time through GSP data collection and the assessment of the beneficial impacts of agency PMAs on groundwater sustainability. The total and individual agency contributions will be evaluated and may be refined annually, as needed.

The GSAs will be expected to pursue funding from state and federal sources for GSP implementation. As the GSP implementation proceeds, the GSAs will further evaluate funding mechanisms and fee criteria. During GSP implementation, the GSAs may perform additional analysis of revenue sources to support potential refinements to the GSP.

ES-6 Summary

In conjunction with projects that are currently planned to occur in the SASb through the initiative of individual entities and proposed management actions by the GSAs, the SASb is projected to maintain sustainable conditions under conditions of future planned growth and with anticipated climate change impacts. By operating in a collaborative and coordinated fashion, the entities comprising the GSAs in the SASb can ensure that beneficial uses and users of groundwater are protected and that undesirable results associated with SGMA's sustainability indicators are avoided into the foreseeable future.

Contact Information

sasbgroundwater.org

info@sasbgroundwater.org