MERCED GROUNDWATER SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

November 2019
Revised July 2022

Woodard & Curran
801 T Street
Sacramento, California 95811
916.999.8700

woodardcurran.com

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ACRONYMS

Acronym	Definition
µg/L	micrograms per liter
AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
As	Arsenic
ASO	Airborne Snow Observatory
AWMP	Agricultural Water Management Plan
bgs	below ground surface
BMP	Best Management Practices
CALSIMETAW	California Simulation of Evapotranspiration of Applied Water
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CCR	California Code of Regulations
CDEC	California Data Exchange Center
CDFW	California Department of Fish and Wildlife
CDL	Cropland Data Layer
CDP	Census Designated Place
CDPH	California Department of Public Health
CDPR	California Department of Pesticide Regulation
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CGPF	CalSim II Generated Perturbation Factors
CGPS	continuous global positioning system
CGS	California Geological Survey
Cl	chloride
CPT	cone penetration test
Cr^6	Hexavalent Chromium
CSD	Community Services District
CVDRMP	Central Valley Dairy Representative Monitoring Program
CVGM	Central Valley Groundwater Monitoring Collaborative
CVHM	Central Valley Hydrologic Model
CV-SALTS	Central Valley Salinity Alternatives for Long-Term Sustainability
CWC	California Water Code
CWD	Chowchilla Water District

CWSRF	Clean Water State Revolving Fund
DAC	disadvantaged community
DBCP	dibromochloropropane
DDW	Division of Drinking Water
DHS	Department of Health Services
DLR	Detection Limit for Purposes of Reporting
DMS	Data Management System
DPR	Department of Pesticide Regulation
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
DWSRF	Drinking Water State Revolving Fund
EC	electrical conductivity
EDB	ethylene dibromide
EPA	Environmental Protection Agency
ESJWQC	East San Joaquin Water Quality Coalition
ET / ETo	evapotranspiration / reference evapotranspiration
EWMP	Efficient Water Management Practices
F	Fahrenheit
Fe	iron
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
Flood-MAR	Flood-Managed Aquifer Recharge
ft	feet
GAMA	Groundwater Ambient Monitoring and Assessment
GAR	Groundwater Quality Assessment Report
GCM	global climate model
GDE	Groundwater Dependent Ecosystem
GICIMA	Groundwater Elevation Monitoring Groundwater Information Center Interactive Mapping Application
GIS	Geographic Information System
GPCD	gallons per capita per day
gpm	gallons per minute
GPS	global positioning system
GQTM	Groundwater Quality Trend Monitoring
GSA	Groundwater Sustainability Agency
GSAs	MIUGSA, MSGSA, and TIWD GSA-1
GSP	Groundwater Sustainability Plan

HCM	Hydrogeologic Conceptual Model
HEC-HMS	Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center River Analysis System
HUC	Hydrologic Unit Code
HVA	high vulnerability area
IDC	IWFM Demand Calculator
ILRP	Irrigated Lands Regulatory Program
IM	interim milestone
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
IWFM	Integrated Water Flow Model
JPA	Joint Powers Authority
LGAWD	Le Grand Athlone Water District
LIDAR	Light Detection and Ranging
LOCA	local analogs method
LTMWC	Lone Tree Mutual Water Company
LUST	Leaking Underground Storage Tank
MAF	million acre-feet
MAGPI	Merced Area Groundwater Pool Interests
MCL	Maximum Contaminant Level
MCWD	Merquin County Water District
MercedWRM	Merced Water Resources Model
METRIC	Mapping Evapotranspiration at High Resolution and Internalized Calibration
mg/L	milligrams per liter
MID	Merced Irrigation District
MIDH20	Merced Irrigation District Hydrologic and Hydraulic Optimization
MIRWMA	Merced Integrated Regional Water Management Authority
MIUGSA	Merced Irrigation-Urban Groundwater Sustainability
Mn	manganese
MO	measurable objective
MOA	memorandum of agreement
MOI	memorandum of intent
MOU	Memorandum of Understanding
MSGSA	Merced Subbasin Groundwater Sustainability Agency
MSL	Mean Sea Level
MT	minimum threshold
MTBE	Methyl Tertiary Butyl Ether

N	nitrogen
NCCAG	Natural Communities Commonly Associated with Groundwater
NEPA	National Environmental Policy Act
NO_3	nitrate
NTU	Nephelometric Turbidity Unit
NWIS	National Water Information System
NWR	National Wildlife Refuge
OWTS	onsite wastewater treatment systems
PBO	Plate Boundary Observatory
PCBs	polychlorinated biphenyls
PCE	tetrachloroethylene
pCi/L	picoCuries per liter of air
PFOA	perfluorooctantoic acid
PFOS	perfluorooctanesulfonic acid
PRISM	Precipitation-Elevation Regressions on Independent Slopes Model
PRMS	Precipitation Runoff Model System
PWS	Public Water System
RCP	representative climate pathway
RTS	real time simulation model
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCRO	DWR's South Central Region Office
SDAC	Severely Disadvantaged Community
SED	Substitute Environmental Document
SGMA	Sustainable Groundwater Management Act
SHE	Self-Help Enterprises
SJRRP	San Joaquin River Restoration Program
SMCL	secondary maximum contaminant level
SMMWC	Sandy Mush Mutual Water Company
SNMP	Salt and Nutrient Management Plan
SOI	Sphere of Influence
SRA	State Recreation Area
SSURGO	Soil Survey Geographic Database
Subbasin	Merced Subbasin
SWD	Stevinson Water District
SWRCB	State Water Resources Control Board
TCA	1,1,1-trichloroethane

TCE	trichloroethylene
TCP	1,2,3-trichloropropane
TDS	total dissolved solids
TFP	Tolladay, Fremming & Parson
TIWD	Turner Island Water District
TIWD GSA-1	Turner Island Water District Groundwater Sustainability Agency #1
TM	Technical Memorandum
TNC	The Nature Conservancy
TON	Threshold Odor Number
UCM or UC Merced	University of California Merced
umhos/cm	micromhos per centimeter
USACOE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
VIC	Variable Infiltration Capacity
VOC	volatile organic compound
WDL	Water Data Library
WDR	waste discharge requirements
WEAP	Water Evaluation and Planning System
WRIMS	Water Resource Integrated Modeling System (formerly CalSim II)
WY	Water Year

EXECUTIVE SUMMARY

ES-1. INTRODUCTION AND PLAN AREA

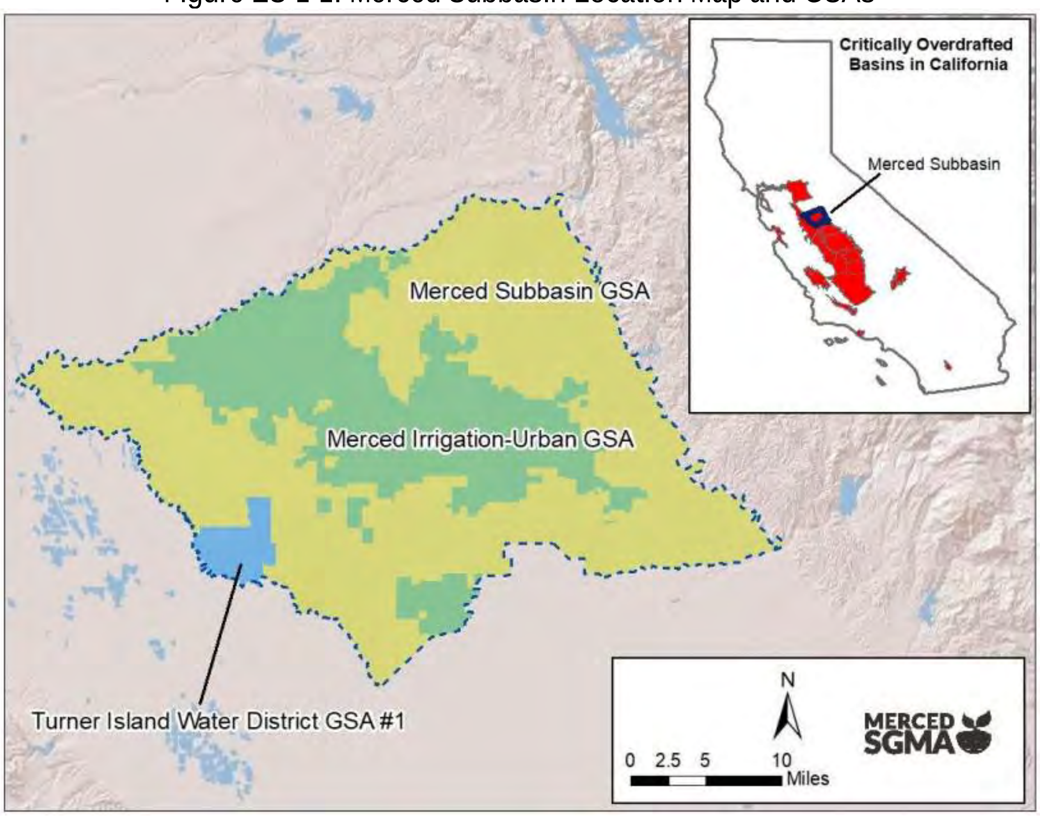
The Sustainable Groundwater Management Act (SGMA), passed in 2014, requires the formation of local Groundwater Sustainability Agencies (GSAs) to oversee the development and implementation of Groundwater Sustainability Plans (GSPs), with the ultimate goal of achieving sustainable management of California's groundwater basins. The purpose of this Groundwater Sustainability Plan is to bring the Merced Groundwater Basin (Merced Subbasin or Subbasin), a critically overdrafted basin located within the San Joaquin Valley (see Figure ES-1), into sustainable groundwater management by 2040. The Subbasin is heavily reliant on groundwater, and users recognize the basin has been in overdraft for a long period of time.

The County of Merced and water districts and cities within the Merced Subbasin formed three GSAs in accordance with SGMA: Merced Irrigation-Urban Groundwater Sustainability Agency (MIUGSA), Merced Subbasin Groundwater Sustainability Agency (MSGSA), and Turner Island Water District Groundwater Sustainability Agency #1 (TIWD GSA-1) (see Figure ES-1-1). The three GSAs coordinated efforts to develop this GSP for the Subbasin. With the adoption of this GSP, the GSAs will adopt the following sustainability goal for the Merced Subbasin:

> "Achieve sustainable groundwater management on a long-term average basis by increasing recharge and/or reducing groundwater pumping, while avoiding undesirable results."

This goal will be achieved by allocating a portion of the estimated Subbasin sustainable yield to each of the three GSAs and coordinating the implementation of programs and projects to increase both direct and in-lieu groundwater recharge, which will in turn increase the groundwater and / or surface water available in the Subbasin.

Figure ES-1-1: Merced Subbasin Location Map and GSAs



Development of the GSP was guided by a Coordinating Committee composed of members appointed by the GSA Boards to provide recommendations on technical and substantive basin-wide issues. The Coordinating Committee and GSA Boards were also informed by a Stakeholder Advisory Committee, which consisted of a broad group of groundwater beneficial users (also appointed by the GSA Boards) to review groundwater conditions, management issues and needs, and projects and management actions to improve sustainability in the basin. Extensive outreach was also conducted to seek input from additional beneficial users of groundwater through multiple venues including public workshops held in locations specifically selected to provide access to disadvantaged communities. Figure ES-1-2 illustrates the relationship among the groups described above.

Figure ES-1-2: Diagram of Levels of Engagement and Decision-Making

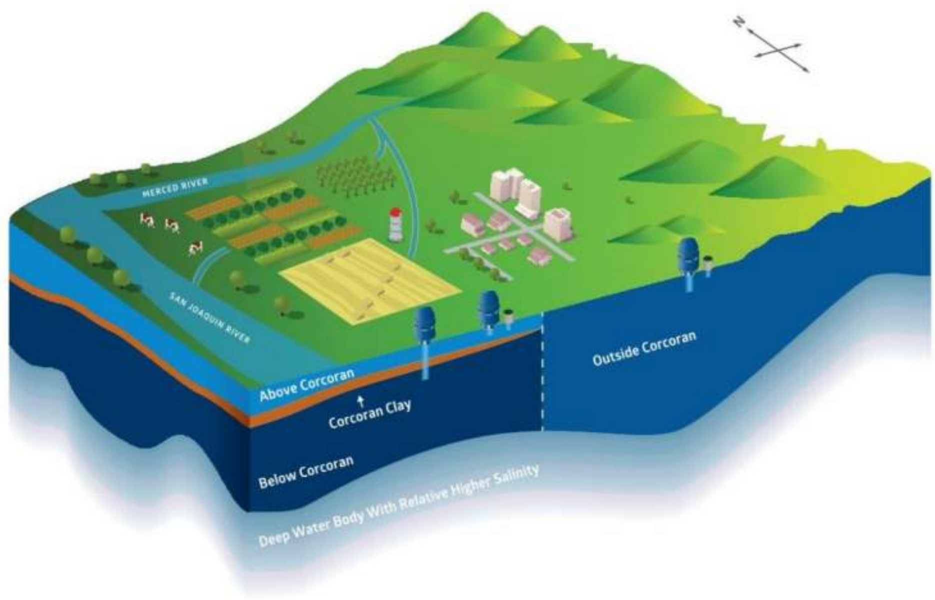
As of July 2022, the GSP has been updated in several key places to respond to comments and corrective actions contained in the *Statement of Findings Regarding the Determination of Incomplete Status of the San Joaquin Valley - Merced Subbasin Groundwater Sustainability Plan* (DWR, 2022). GSP Annual Reports submitted in April 2020, 2021, and 2022 contain more recent information on basin conditions and GSP implementation status. A redlined version of the GSP that highlights the edits can be found on MercedSGMA.org.

ES-2. BASIN SETTING

Hydrogeologic Conceptual Model

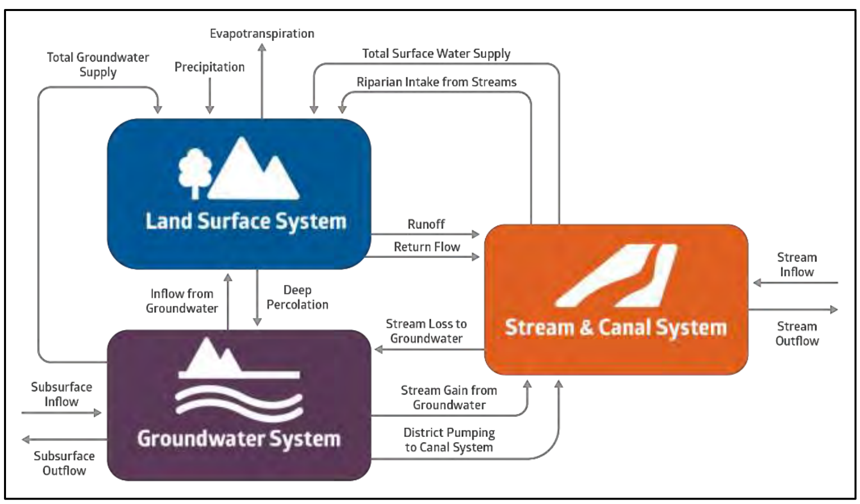
The Merced Subbasin contains three principal aquifers that are defined by their relationship to the Corcoran Clay aquitard, a laterally-extensive silt and clay layer that underlies approximately the western half of the Subbasin and acts as a significant confining layer. The Above Corcoran Principal Aquifer includes all aquifer units that exist above the Corcoran Clay Aquitard and generally contains moderate to large hydraulic conductivities and yields for domestic and irrigation uses. The Below Corcoran Principal Aquifer includes all aquifer units that exist below the Corcoran Clay Aquitard and contains hydraulic conductivities and yields ranging from small to large for irrigation as well as some domestic and municipal uses. The Outside Corcoran Principal Aquifer includes all aquifers that exist outside of the eastern lateral extent of the Corcoran Clay. The Outside Corcoran Principal Aquifer is connected laterally with the Above Corcoran Principal Aquifer at shallower depths and the Below Corcoran Principal Aquifer at deeper depths. Major uses of water in the Outside Corcoran Principal Aquifer include irrigation, domestic, and municipal uses. The Principal Aquifers are underlain by a deep aquifer with higher salinity relative to the principal aquifers. See Figure ES-1-3 for a 3D illustration demonstrating the relationship between the principal aquifers and Corcoran Clay aquitard

Figure ES-1-3: 3D Illustration of Merced Subbasin Principal Aquifers and Aquitard



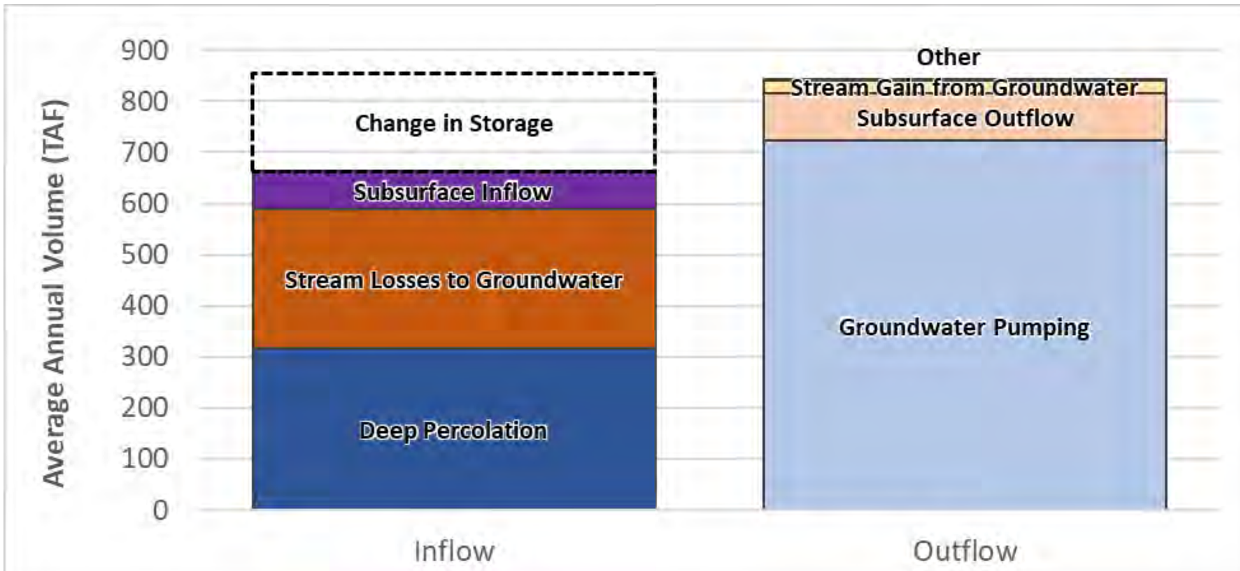
Water Budget Information

Figure ES-1-4: Generalized Water Budget Diagram



Water budgets provide quantitative accounting of water entering and leaving the Merced Subbasin and can be used to help estimate the extent of overdraft occurring now and in the future. Consistent with SGMA requirements, water budgets for historical, current, projected, and sustainable conditions were developed for the Merced Subbasin. These water budgets were developed using the Merced Water Resources Model (MercedWRM), a fully integrated surface and groundwater flow model developed and calibrated specifically for the Subbasin. See Figure ES-1-4 for a conceptual diagram of the inputs and outputs quantified by the model. The historical conditions water budget (see Figure ES-1-5) shows an annual average rate of overdraft ("Change in Storage") of 192,000 acre-feet per year (AFY) over water years 2006 through 2015. In this Figure, the "Change in Storage" represents the average annual decline in storage resulting from the Subbasin outflows, principally groundwater pumping.

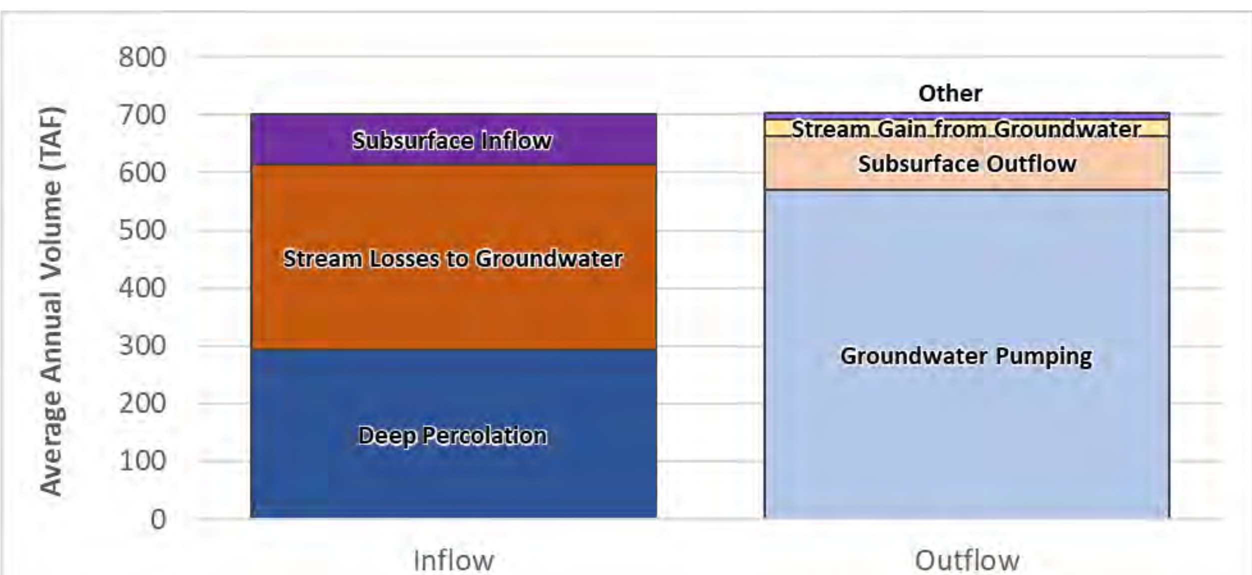
Figure ES-1-5: Historical Conditions Water Budget



SGMA defines sustainable yield as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result" (California Water Code §10721(w)).

For the Merced Subbasin, sustainable yield was estimated by modifying conditions in the groundwater model to balance out the change in stored water over time. In order to achieve a net-zero change in groundwater storage over a long-term average condition, current agricultural and urban groundwater demand in the Merced Subbasin would need to be reduced by approximately 10 percent, absent implementation of any new supply-side or recharge projects. Figure ES-1-6 illustrates the Subbasin water budget under long term sustainable conditions.

Figure ES-1-6: Groundwater Water Budget under Sustainable Groundwater Management Conditions Long-Term (50-Year) Average Annual



ES-3. SUSTAINABLE MANAGEMENT CRITERIA

SGMA requires consideration of six sustainability indicators. For each indicator, the GSP must define undesirable results for the basin ("significant and unreasonable" negative impacts) and determine if they could occur. For the indicators with the potential for undesirable results, the GSP must establish sustainable management criteria that are intended to prevent undesirable results from occurring and establish a monitoring network.

Sustainable management criteria were developed to be protective of beneficial uses in the Merced Subbasin and to support the Subbasin's sustainability goal. Demonstration by 2040 of meeting the sustainability management criteria and ~~stable groundwater elevations on a long-term average basis, combined with the~~ an absence of undesirable results~~,~~ will support a determination that the basin is operating within its sustainable yield, and thus that the sustainability goal has been achieved.

A summary of the sustainable management criteria for the Merced Subbasin is shown in Table ES-1.

Table ES-1: Summary of Sustainable Management Criteria

Sustainability Indicator	Minimum Threshold (MT)	~~Minimum Threshold (MT)~~Interim Milestone (IM)	Measurable Objective (MO)	Undesirable Result
Groundwater Levels	Fall 2015 groundwater elevation	~~Depth of shallowest well in a 2-mile radius of each representative well or minimum pre-January 1, 2015, elevation~~ Based on range of projected values that account for hydrologic uncertainty, more details in Section 3.3.3.	~~Projected average future groundwater level under sustainable yield modeling simulation~~November or October 2011 groundwater elevation (measured, or estimation if historical record not available)	Greater than 25% of representative wells fall below MT in 2 consecutive ~~wet, above normal, or below normal~~ years~~[1]~~
Groundwater Storage	Not applicable - not present and not likely to occur in the Subbasin due to the significant volumes of freshwater in storage			
Seawater Intrusion	Not applicable - not present and not likely to occur due to the distance between the Subbasin and the Pacific Ocean (and Sacramento-San Joaquin Delta)			
Degraded Water Quality	1,000 mg/L TDS	1,000 mg/L TDS	500 mg/L TDS	At least 25% representative wells exceed MT for 2 consecutive years
Land Subsidence	0 ft/year, subject to uncertainty of +/-0.16 ft/year	2025: -0.75 ft/year 2030: -0.5 ft/year 2035: -0.25 ft/year	~~-0.25~~0 ft/year	Exceedance of MT at 3 or more representative sites for 2 consecutive years
Depletions of Interconnected Surface Waters	Groundwater levels used as a proxy for this sustainability indicator			

There are two sustainability indicators deemed not applicable to the Merced Subbasin. Undesirable results related to significant and unreasonable depletions of groundwater storage are not present and not likely to occur in the Subbasin, since historical reductions have been insignificant relative to the total volume of freshwater water storage in the Subbasin. Seawater intrusion is not an applicable sustainability indicator because seawater intrusion is not present and is not likely to occur due to the distance between the Subbasin and the Pacific Ocean (and Sacramento-San Joaquin Delta).

For the remaining sustainability indicators, sustainable management criteria were established to be protective of Subbasin beneficial uses as described below.

~~[1] *Water year types based on San Joaquin Valley Water Year Index* (DWR, 2017c)~~

Minimum thresholds for chronic declining groundwater levels were developed based on the fall 2015 elevation recorded at ~~records of well depth for the shallowest domestic wells within a 2-mile radius of~~ each representative monitoring well. This threshold keeps groundwater levels generally above levels that have been experienced in the past. In this way, impacts to shallow well users and other beneficial users of groundwater will generally not exceed what has historically been experienced in the subbasin.~~. Those historical conditions are not considered undesirable results. This methodology is intended to be protective against significant and unreasonable dewatering of domestic wells. Since domestic wells are generally shallower than agricultural and municipal, this is also protective of these other well types.~~ Sustainable management criteria for declining groundwater levels were evaluated against ~~developed with a dataset including historical groundwater levels,~~the depths of the shallowest domestic and Public Water Supply wells in Merced County's well permitting database~~, and simulated groundwater levels from the MercedWRM~~. Groundwater levels are also being used as a proxy indicator for depletion of interconnected surface waters.

Degraded water quality is unique among the six sustainability indicators because it is already the subject of extensive federal, state, and local regulations carried out by numerous entities, and SGMA does not directly address the role of GSAs relative to these other entities (Moran & Belin, 2019). SGMA does not specify water quality constituents that must have minimum thresholds. Groundwater management is the mechanism available to GSAs to implement SGMA. Establishing minimum thresholds for constituents that cannot be managed by increasing or decreasing pumping was deemed inappropriate by the GSAs and basin stakeholders. The major water quality issue being addressed by sustainable groundwater management is the migration of relatively higher salinity water into the freshwater principal aquifers. The nexus between water quality and water supply management exists for the pumping-induced movement of low-quality water from the west and northwest to the east. Other water quality concerns are being addressed through various water quality programs and agencies that have the authority and responsibility to address them. The selection of a groundwater level minimum threshold based on fall 2015 elevations is consistent with the avoidance of significant and unreasonable impacts to subsidence, water quality, and depletions of interconnected surface water, as described later in this Plan.

Within the Merced Subbasin, while land subsidence has been recognized by the GSAs as an area of concern, it is not considered to have caused a significant and unreasonable reduction in the viability of the use of infrastructure. However, it is noted that subsidence has caused a reduction in freeboard of the Middle Eastside Bypass over the last 50 years and has caused problems in neighboring subbasins, highlighting the need for ongoing monitoring and management in the Merced Subbasin and surrounding subbasins. ~~Thus, s~~Sustainable management criteria were established ~~based on historical rates of subsidence in the Subbasin, and the GSAs will continue to coordinate efforts with surrounding subbasins to develop regional or local solutions to subsidence occurring in the Merced, Chowchilla, and Delta-Mendota Subbasins.~~based on the long-term avoidance of land subsidence, set with the recognition that the interconnectedness of the Merced Subbasin with surrounding subbasins, and the ability to meet the sustainability management criteria is dependent on the successful management of all nearby subbasins. The criteria are also set to be consistent with the sustainable management criteria for groundwater levels which seek to keep levels above 2015 conditions. A management action has also been developed to avoid declines in storage below historical levels, further reducing the risk of subsidence.

Depletions of interconnected surface waters will be managed using groundwater levels as a proxy due to the challenges associated with directly measuring streamflow depletions and because of the significant correlation between groundwater levels and depletions.

ES-4. MONITORING NETWORKS

Consistent with SGMA requirements, the GSAs plan to establish monitoring networks for each sustainability indicator to monitor trends in the Subbasin and evaluate GSP implementation against sustainable management criteria. The groundwater level monitoring network consists of wells from the California Statewide Groundwater Elevation Monitoring (CASGEM) Program that were selected to provide representative conditions for groundwater levels across the Subbasin. The groundwater quality monitoring network includes a combination of wells in the Subbasin that are part of the East San Joaquin Water Quality Coalition Groundwater Quality Trend Monitoring Program as well as public water system wells that report data to the Division of Drinking Water. The subsidence monitoring network relies on control points monitored by the United States Bureau of Reclamation as part of the San Joaquin River Restoration Program. While the monitoring networks reflect a robust history of monitoring Subbasin conditions, data gaps exist, and plans to fill these data gaps for each sustainability indicator are also described in this GSP.

ES-5. DATA MANAGEMENT SYSTEM

The Merced Subbasin Data Management System (DMS) was developed to serve as a data sharing portal to enable utilization of the same data and tools for visualization and analysis to support sustainable groundwater management and transparent reporting of data and results. Monitoring data can be manually input by users or batch uploaded via template and is expected to include groundwater level, groundwater quality, streamflow, and subsidence data. All monitoring locations can be viewed spatially (map or list format) and data records per site can be viewed temporally (chart or list format). Ad-hoc queries and standard reports will greatly assist in answering questions about basin characterization, providing input for decision-making, and developing reports to meet annual report submittal requirements.

ES-6. PROJECTS AND MANAGEMENT ACTIONS TO ACHIEVE SUSTAINABILITY GOAL

SGMA requires that GSPs describe the projects and management actions to be implemented as part of bringing the Subbasin into sustainability. The primary means for achieving sustainability in the basin will be reduction in groundwater pumping achieved through implementation of an allocation framework to allocate the sustainable yield of the basin to the GSAs. A water allocation framework has been the subject of much discussion during GSP development. The GSAs have agreed that they intend to allocate water to each GSA but have not yet reached agreement on allocations or how they will be implemented. Such an agreement will be developed during GSP implementation.

The GSP identifies a shortlist of 12 priority projects that met a series of screening criteria for implementation (see Table ES-2) as well as a longer list of possible future projects that were identified during GSP development. Projects and management actions will either increase surface water supplies to augment the sustainable groundwater yield or will increase groundwater recharge, which will in turn increase the amount of groundwater that may be sustainably used. Management actions will also include rewarding GSAs based on their extracted volumetric groundwater extraction, since 2015, proportioned to other GSAs in the basin.

Table ES-2: Projects Shortlist for Merced Subbasin Groundwater Sustainability Plan*

Project Name	Current Status	Expected Completion	Estimated Cost
Project 1: Planada Groundwater Recharge Basin Pilot Project	Planning, to be implemented with DWR Grant Funding	12/17/2023	$395,292
Project 2: El Nido Groundwater Monitoring Wells	Planning, to be implemented with DWR Grant Funding	12/31/2019	$400,000
Project 3: Meadowbrook Water System Intertie Feasibility Study	Planning	06/2020	$100,588
Project 4: Merquin County Water District Recharge Basin	Planning/Initial Study	12/15/2021	$1,400,000

Project 5: Merced Irrigation District to Lone Tree Mutual Water Company Conveyance Canal	Conceptual	11/2020	$3-6,000,000
Project 6: Merced IRWM Region Climate Change Modeling	Design	4/30/2021	$250,000
Project 7: Merced Region Water Use Efficiency Program	Design	12/31/2020	$500,000
Project 8: Merced Groundwater Subbasin LIDAR	Planning/Initial Study	12/2020	$150,000
Project 9: Study for Potential Water System Intertie Facilities from MID to LGAWD and CWD	Design Complete	06/01/2020	$100,000
Project 10: Vander Woude Dairy Offstream Temporary Storage	Planning/Initial Study & Conceptual Design	05/2020	$750,000
Project 11: Mini-Big Conveyance Project	Planning	06/2026	$ 6-8,000,000
Project 12: Streamlining Permitting for Replacing Sub-Corcoran Wells	Planning	1/31/2020	$75,000

*Information provided by project proponents.

ES-8. PLAN IMPLEMENTATION

Implementation of the GSP will be a substantial undertaking that will include implementation of the projects and management actions as well as GSAs administration, public outreach, implementation of the monitoring programs and filling data gaps, development of annual reports, and development of a 5-year update and report. The GSAs have developed an implementation schedule (see Table ES-3) and estimated costs for all activities, as well as potential funding mechanism options. -Implementation of the GSP is projected to run between $1.2M and $1.6M per year. Costs for projects and management actions are estimated to be an additional $22.9M in total, with costs for individual projects or management actions ranging between $75,000 to $8M in total.

Table ES-3: GSP Implementation Schedule

2020 – 2025 Monitoring and Reporting	2025 – 2030 Preparation for Allocations and Low Capital Outlay Projects	2030 – 2035 Prepare for Sustainability	2035 – 2040 Implement Sustainable Operations
• Establish monitoring network • Install new monitoring wells • Reduce/fill data gaps	• Conduct 5-year evaluation/update • Monitoring and reporting continue	• Conduct 5-year evaluation/update • Monitoring and reporting continue	• Conduct 5-year evaluation/update • Monitoring and reporting continue
• GSAs allocated initial allocations • GSAs establish their allocation procedures and demand reduction efforts • Develop metering program	• As-needed demand reduction to reach Sustainable Yield allocation • Metering program continues	• As-needed demand reduction to reach Sustainable Yield allocation	• Full implementation demand reduction as needed to reach Sustainable Yield allocation by 2040
• Funded and smaller projects implemented	• Planning/ design/ construction for small to medium sized projects	• Planning/ design/ construction for larger projects begins	• Project implementation completed
• Extensive public outreach regarding GSP and allocations	• Outreach regarding GSP and allocations continues	• Outreach continues	• Outreach continues

1 INTRODUCTION AND PLAN AREA

1.1 INTRODUCTION AND AUTHORITY

This July 2022 Revision includes updates to the November 2019 Groundwater Sustainability Plan (GSP) in response to the Statement of Findings issued by the California Department of Water Resources (DWR) on January 28, 2022 (DWR, 2022). The GSP has been updated in several key places to address DWR's recommendations. However, not all information was updated to reflect the most current information, and the GSP Annual Reports submitted in April 2020, 2021, and 2022 contain more recent information on basin conditions and GSP implementation status. A redlined version of the GSP that highlights the edits can be found on MercedSGMA.org.

1.1.1 Purpose of the Groundwater Sustainability Plan

The purpose of this ~~Groundwater Sustainability Plan (~~GSP~~)~~ is to bring the Merced Subbasin, a DWR-designated critically overdrafted basin located within the San Joaquin Valley, into sustainable groundwater management by 2040 by meeting the regulatory requirements set forth in the three-bill legislative package Assembly Bill (AB) 1739 (Dickinson), Senate Bill (SB) 1168 (Pavley), and SB 1319 (Pavley) collectively known as the Sustainable Groundwater Management Act (SGMA), §10720 - 10737.8 of the California Water Code (CWC). Under SGMA, critically overdrafted, high- and medium-priority basins must be managed by a GSP by January 31, 2020. GSPs are prepared and implemented by Groundwater Sustainability Agencies (GSAs) that are newly formed from local and regional authorities.

SGMA defines sustainable groundwater management as "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results," which are any of the following effects caused by groundwater conditions occurring throughout the Subbasin:

- 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 planning and implementation horizon is defined by SGMA as a "50-year time period over which a groundwater sustainability agency determines that plans and measures will be implemented in a basin to ensure that the basin is operated within its sustainable yield."

1.1.2 Sustainability Goal

The sustainability goal succinctly states the GSAs' objectives and desired conditions of the Merced Subbasin. The Merced Subbasin is heavily reliant on groundwater, and users recognize the Subbasin has been in overdraft for a long period of time. The sustainability goal for the Merced Subbasin is to:

Achieve sustainable groundwater management on a long-term average basis by increasing recharge and / or reducing groundwater pumping, while avoiding undesirable results.

This goal will be achieved by allocating a portion of the estimated Subbasin sustainable yield to each GSA and coordinating the implementation of programs and projects to increase both direct and in-lieu groundwater recharge, which will, in turn, increase the groundwater and / or surface water available to each GSA.

More information on the sustainability goal and sustainable management criteria is detailed in Section 3 - Sustainable Management Criteria.

1.1.3 Agency Information

This GSP for the Merced Groundwater Subbasin was developed jointly by the Merced Irrigation-Urban Groundwater Sustainability Agency (MIUGSA), the Merced Subbasin Groundwater Sustainability Agency (MSGSA), and Turner Island Water District Groundwater Sustainability Agency #1 (TIWD GSA-1). Collectively, these three GSAs will be referred to as "GSAs".

The GSAs developed a Memorandum of Understanding (MOU) that provides the basis for the agreement of the three GSAs to work together to develop and implement a GSP for the Merced Subbasin (Merced Subbasin GSA, MIUGSA, Turner Island Water District GSA-#1, 2017). The GSAs submitted an Initial Notification to jointly develop a GSP for the Merced Subbasin on January 4, 2018 (Merced Subbasin GSA, MIUGSA, Turner Island Water District GSA-#1, 2018). The MOU is provided as Appendix A to this document.

1.1.3.1 Organization and Management Structure of the GSAs

The GSAs were guided by a Coordination Committee that is composed of up to four representatives from each GSA and appointed by each respective GSA Board (Merced Subbasin GSA, MIUGSA, Turner Island Water District GSA-#1, 2017). The Coordination Committee is responsible for developing recommendations on technical and substantive Subbasin-wide issues, and then submitting the recommendations to each GSA governing board for final approval. To become fully effective, each GSA governing board must approve the Coordination Committee's recommendations. The Coordination Committee is tasked with developing actions including, but not limited to, the following:

- Budget(s) and appropriate cost sharing for any project or program that requires funding from the GSAs;
- Propose guidance and options for obtaining grant funding;
- Recommend the adoption of rules, regulations, policies, and procedures related to the MOU;
- Recommend the approval of any contracts with consultants or subcontractors that would undertake work on behalf of the GSAs and/or relate to Subbasin-wide issues and, if applicable, recommend the funding that each GSA should contribute towards the costs of such contracts;
- Report to the GSAs' respective governing boards when dispute resolution is needed to resolve an impasse or inability to make a consensus recommendation;
- Recommend action and/or approval of a GSP.

  (Merced Subbasin GSA, MIUGSA, Turner Island Water District GSA-#1, 2017)

A process for dispute resolution, including internal resolution and mediation prior to judicial or administrative remedies, is laid out in the GSAs' MOU.

The Coordinating Committee and GSA Boards were also informed by a Stakeholder Advisory Committee which consists of community representatives who review groundwater conditions, management issues and needs, and projects and management actions to improve sustainability in the basin. The committee met monthly during the development of the GSP and will meet quarterly during GSP implementation. These sessions are open to the public, providing a forum for testing ideas as well as providing information and feedback from members' respective constituencies. The committee consists of 24 members, including representatives from local cities, public and private utilities, agriculture, local nonprofits, business owners, researchers or university employees, and residents. An application to join the committee was disseminated in early 2018. More than 35 applications were received. The 23 Stakeholder Advisory Committee members were selected by the Coordinating Committee and approved by the GSAs to represent the broad interests and geography of the region (see Appendix N for a list of Stakeholder Advisory Committee members).

1.1.3.1.1 Merced Irrigation-Urban Groundwater Sustainability Agency (MIUGSA)

MIUGSA was formed by an MOU between the Merced Irrigation District, City of Merced, City of Atwater, City of Livingston, Le Grand Community Services District, Planada Community Services District, and Winton Water and Sanitary District. Decision-making is intended to be by unanimous consent of all Parties, but otherwise allows for a majority vote where MID and each of the cities is entitled to one vote and the community service districts are collectively entitled to one vote. MID is designated as the primary agent for purposes of developing technical information as well as being the point of contact and designated representative for MIUGSA for coordination with the other two GSAs in the Merced Subbasin as well as adjacent basins.

The mailing address for MIUGSA is:

Merced Irrigation-Urban Groundwater Sustainability Agency
744 W. 20th Street
Merced, CA 95340

1.1.3.1.2 Merced Subbasin Groundwater Sustainability Agency (MSGSA)

MSGSA was formed as a Joint Powers Authority (JPA), including Plainsburg Irrigation District, Le Grand-Athlone Water District, Stevinson Water District, Merquin County Water District, County of Mariposa, and County of Merced. Two mutual water companies, Lone Tree Mutual Water Company and Sandy Mush Mutual Water Company, participate in the JPA as Contracting Entities. The JPA formed a Governing Board consisting of six members:

1. An elected member of the Board of Supervisors for the County of Merced
2. One representative from the Western White Area[2] (actively and primarily engaged in agriculture, appointed by County of Merced Board of Supervisors)
3. One Representative from the Eastern White Area[3] (actively and primarily engaged in agriculture, appointed by County of Merced Board of Supervisors)
4. One member from the Board of Directors of a Contracting Entity

[2] "Western White Area" refers to all lands southwest of the Merced Irrigation District service area within the Merced Subbasin but outside of established water or irrigation districts, municipalities, community service districts, Contracting Entities, or other eligible local agencies as defined by the Act. (MSGSA, 2016)

[3] "Eastern White Area" refers to all lands northeast of the Merced Irrigation District service area within the Merced Subbasin but outside of established water or irrigation districts, municipalities, community service districts, Contracting Entities, or other eligible local agencies as defined by the Act. (MSGSA, 2016)

5. One member from the Board of Directors for either the Stevinson Water District or Merquin County Water District

6. One member from the Board of Directors for either the Le Grand-Athlone Water District or Plainsburg Irrigation District

Each Board Member has one vote, and decisions are made by affirmative vote of four Board Members, except in the following cases, which require five affirmative votes: decisions about initiating litigation, adoption of the GSP, incurring bond debt, and expenditures over $100,000.

The mailing address for MSGSA is:

Merced Subbasin Groundwater Sustainability Agency
Merced County
2222 M Street
Merced, CA 95340

1.1.3.1.3 Turner Island Water District Groundwater Sustainability Agency #1 (TIWD GSA-1)

TIWD GSA-1 is governed exclusively by the Turner Island Water District (TIWD), a local water agency. TIWD is comprised of several agriculture landowners that rely on groundwater for irrigation. The GSA is differentiated as #1 because TIWD also has a role as a GSA (TIWD GSA #2) in the adjacent Delta-Mendota Subbasin. The mailing address for TIWD GSA-1 is:

Turner Island Water District GSA #1
1269 W. I Street
Los Banos, CA 93535

1.1.3.1.4 Merced GSP Plan Manager

SGMA regulations require the GSP designate a plan manager to serve as a point of contact with ~~the Department of Water Resources (~~DWR~~)~~. The contact information for the Merced GSP Plan Manager is:

Hicham Eltal,
Merced Irrigation-Urban Groundwater Sustainability Agency
744 W. 20th Street
Merced, CA 95340
Phone: 209.722.5761
Email: heltal@mercedid.org

1.1.3.2 Legal Authority of the GSAs

Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. A single local agency can decide to become a GSA, or a combination of local agencies can decide to form a GSA by using either a JPA, a memorandum of agreement (MOA), or other legal agreement (DWR, 2016c).

MIUGSA's MOU describes the following powers in addition to authorities granted to GSAs by SGMA (MIUGSA, 2017):

- Adopt standards for measuring and reporting water use
- Adopt rules, regulations, policies and procedures to govern the adoption and implementation of the GSP, as authorized by SGMA including funding of the GSA, and the collection of fees or charges as may be applicable

- Develop and implement conservation best management practices
- Develop and implement metering, monitoring, and reporting related to groundwater pumping
- Hire consultants as determined necessary or appropriate by the GSAs
- Prepare a budget

MSGSA's JPA describes the following powers in addition to authorities granted to GSAs by SGMA (MSGSA, 2016):

- Employ agents, consultants, advisors, independent contractors, employees, and other staff members
- Enter contracts
- Acquire, hold, and convey real and personal property
- Incur debts, borrow money, accept contributions/grants/loans
- Invest money not needed for immediate necessities
- Reimburse Agency Members for expenses
- Sue and be sued

TIWD is the only local agency governing TIWD GSA-1 and has powers granted to GSAs by SGMA.

The MOU between the three GSAs describes the following collective authorities (Merced Subbasin GSA, MIUGSA, Turner Island Water District GSA-#1, 2017):

- To coordinate the implementation of SGMA among the GSAs
- To recommend the adoption of actions, rules, regulations, policies, and procedures related to the coordination of the GSAs for purposes of implementation of SGMA
- To perform all acts necessary or proper to carry out fully the purposes of the Agreement; and to exercise all other powers necessary and incidental to the implementation of the powers set forth herein.

1.1.3.3 Estimated Cost of Implementing the GSP and the GSAs' Approach to Meet Costs

Implementation of the GSP is projected to range between \$1.2M and \$1.6M per year. Costs for projects and management actions are estimated to be an additional \$22.9M in total, with costs for individual projects or management actions ranging between \$75K to \$8M in total. It is anticipated that most of these projects will be implemented within the first five years of GSP implementation. Development of this GSP was substantially funded through a Proposition 1 Sustainable Groundwater Planning Grant. The implementation of the GSP and future SGMA compliance will be a substantial and costly undertaking that will likely require GSAs to collect fees as well as seek additional outside funding. The Merced GSAs will develop a financing plan for the overall implementation of the GSP. Costs for GSP project implementation will be shared based on project beneficiaries. Costs of overall GSP administration are expected to be shared by the three GSAs consistent with the cost share in the MOU. Financing options under consideration include pumping fees, assessments, loans, and grants. Prior to implementing any fee or assessment program, the GSAs would complete a rate assessment study or other analysis consistent with the regulatory requirements.

More detailed information can be found in Chapter 7 - Plan Implementation.

1.1.4 GSP Organization

This GSP is organized according to DWR's "GSP Annotated Outline" for standardized reporting (DWR, 2016d). The Preparation Checklist for GSP Submittal in DWR formatting can be found below in Table 1-1 (DWR, 2016e).

Table 1-1: DWR Preparation Checklist

GSP Regulations Section	Water Code Section	Requirement	Description	Section(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	GW levels: 4.5.5 GW quality: 4.8.5 Subsidence: 4.9.5 Depletions of interconnected surface waters: 4.10.5
Article 5. Plan Contents, Subarticle 1. Administrative Information				
354.4		General Information	• Executive Summary • List of references and technical studies	Executive Summary: Section ES References & technical studies: Chapter 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	1.1.3
354.8(a)	10727.2(a)(4)	Map(s)	• Area covered by GSP • Adjudicated areas, other agencies within the basin, and areas covered by an Alternative • Jurisdictional boundaries of federal or State land • Existing land use designations • Density of wells per square mile	1.2
354.8(b)		Description of the Plan Area	• Summary of jurisdictional areas and other features	1.2.1

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) in the GSP
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	1.2.2
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	1.2.3
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	1.2.4

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) in the GSP
			• 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	
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	1.2.5
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	2.1
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	2.1.3.5
	10727.2(d)(4)	Recharge Areas	• Description of how recharge areas identified in the plan substantially contribute to the replenishment of the basin	2.1.3.5
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	2.2

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) in the GSP
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	2.3
	10727.2(d)(5)	Surface Water Supply	• Description of surface water supply used or available for use for groundwater recharge or in-lieu use	2.1.3.3 (Surface Water) 2.1.3.5 (Groundwater Recharge and Discharge Areas)
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	3.2
Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria				
354.24		Sustainability Goal	• Description of the sustainability goal	3.1
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	GW levels: 3.3.1 GW storage: 3.4 Seawater intrusion: 3.5 GW quality: 3.6.1 Subsidence: 3.7.1 Depletions of interconnected surface water: 3.8.1
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	GW levels: 3.3.2 GW storage: 3.4 Seawater intrusion: 3.5 GW quality: 3.6.2 Subsidence: 3.7.2 Depletions of interconnected surface water: 3.8.2

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) in the GSP
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	GW levels: 3.3.3 GW storage: 3.4 Seawater intrusion: 3.5 GW quality: 3.6.3 Subsidence: 3.7.3 Depletions of interconnected surface water: 3.8.2
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 rational (or reason) for site selection • Consistency with data and reporting standards • Corresponding sustainability indicator, minimum threshold, measurable objective, and interim milestone	Overall objectives: 4.1 GW levels: 4.5 GW storage: 4.6 Seawater intrusion: 4.7 GW quality: 4.8 Subsidence: 4.9 Depletions of interconnected surface water: 4.10
			• 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	GW levels: 4.5 GW storage: 4.6 Seawater intrusion: 4.7 GW quality: 4.8 Subsidence: 4.9 Depletions of interconnected surface water: 4.10

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) in the GSP
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	GW levels: 4.5.4 GW quality: 4.8.4 Subsidence: 4.9.4 Depletions of interconnected surface water: 4.10.4
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	GW levels: 4.5.6, 4.5.7 GW quality: 4.8.7, 4.8.8 Subsidence: 4.9.6, 4.9.7 Depletions of interconnected surface water: 4.10.6, 4.10.7
Article 5. Plan Contents, Subarticle 5. Projects and Management Actions				
354.44		Projects and Management Actions	• 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 • Time-table 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	Chapter 6
354.44(b)(2)	10727.2(d)(3)		• Overdraft mitigation projects and management actions	Chapter 6
Article 8. Interagency Agreements				
357.4	10727.6	Coordination Agreements - Shall be	Coordination Agreements shall describe the following: • A point of contact	3.9

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) in the GSP
		submitted to the Department together with the GSPs for the basin and, if approved, shall become part of the GSP for each participating Agency.	• 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	

1.2 PLAN AREA

The Description of Plan Area is a detailed description of the Merced Subbasin, including major streams and creeks, institutional entities, agricultural and urban land uses, locations of groundwater wells, and locations of state lands. The Plan Area also describes existing surface water and groundwater monitoring programs, existing water management programs, and general plans in the Plan Area.

1.2.1 Summary of Jurisdictional Areas and Other Features

The Merced Subbasin falls within the larger San Joaquin Valley Groundwater Basin (see Figure 1-1). Basin and Subbasin designations by DWR were first published in 1952, and subsequently updated in 1975, 1980, and 2003. The San Joaquin River Hydrologic Region contains 11 distinct subbasins, where the Merced Subbasin (Bulletin 118 Basin Number 5-022.04) is bordered to the north by the Turlock Subbasin (Bulletin 118 Basin Number 5-022.03), to the south by the Chowchilla Subbasin (Bulletin 118 Basin Number 5-022.05), and to the west by the Delta-Mendota Subbasin (Bulletin 118 Basin Number 5-022.07) (see Figure 1-2).

The Merced Subbasin includes lands south of the Merced River between the San Joaquin River on the west and the crystalline basement rock of the Sierra Nevada foothills on the east. The Subbasin boundary on the south stretches westerly along the Chowchilla River (Merced-Madera County boundary) and then along the northern edge of the sphere of influence boundary of Chowchilla Water District. Geologic units in the Merced Subbasin consist of consolidated rocks and unconsolidated deposits.

Figure 1-1: San Joaquin Valley Groundwater Basin

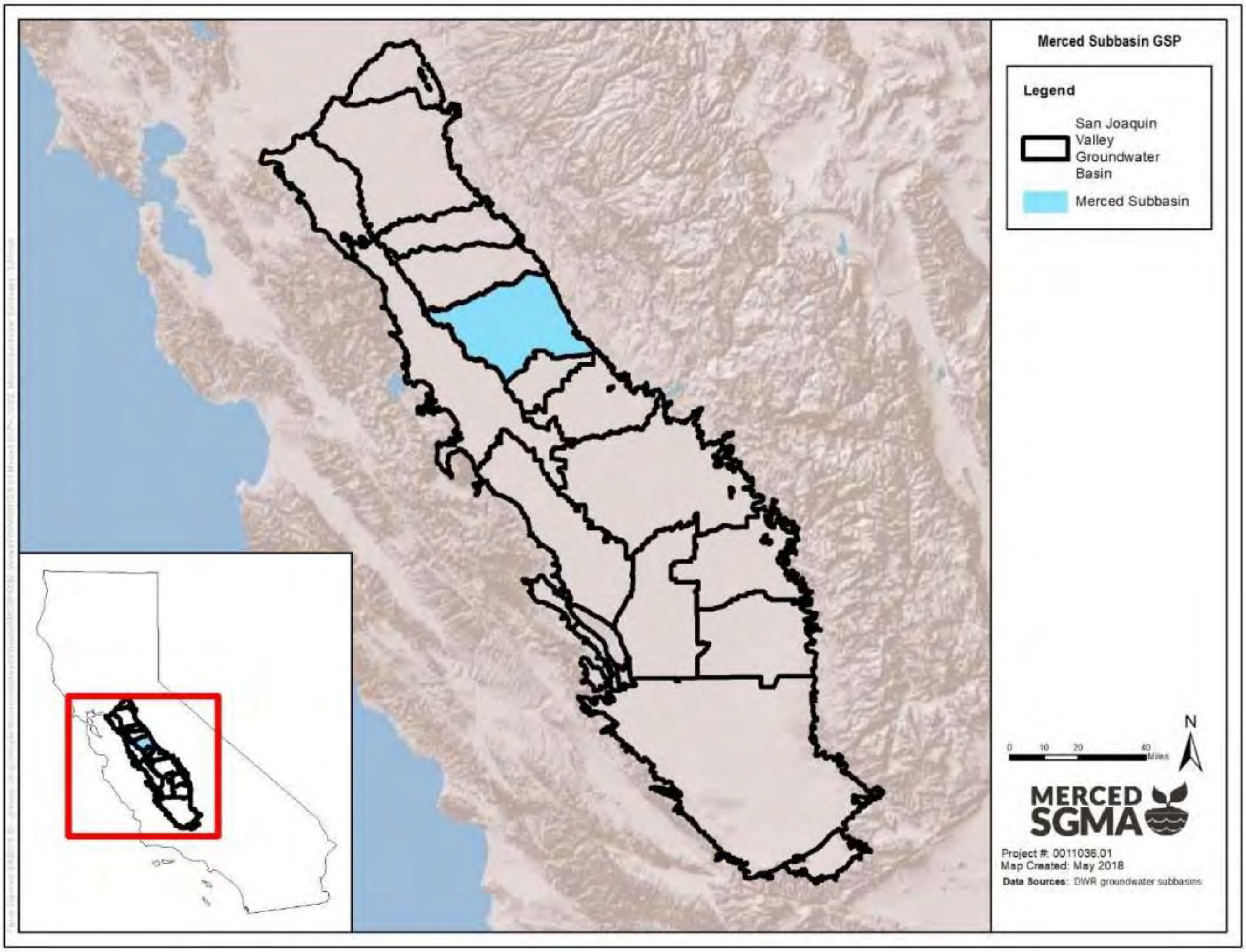


Figure 1-2: Neighboring Groundwater Subbasins

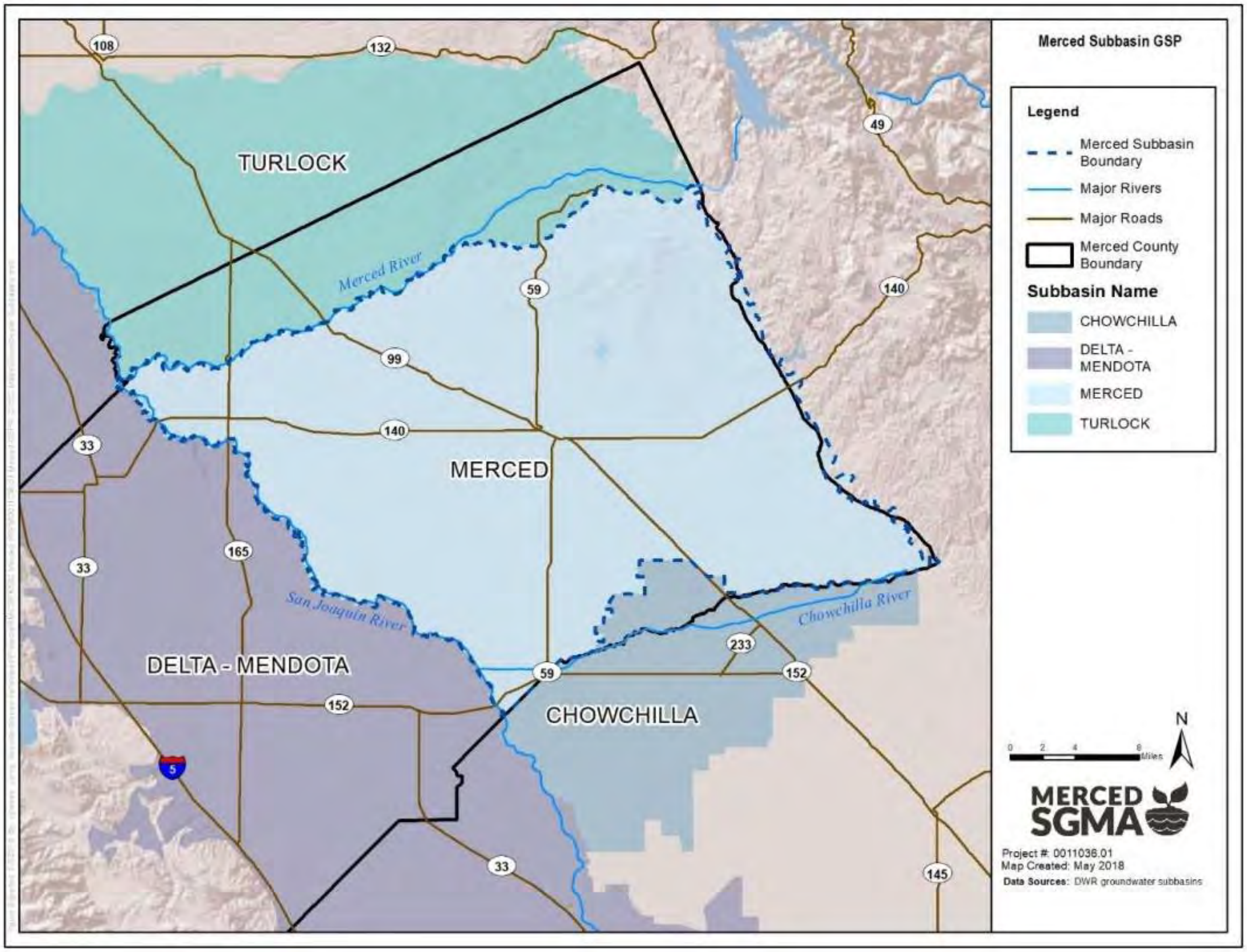


Figure 1-3 shows the location of Merced County within the State of California as well as the seven counties bordering Merced County: Tuolumne, Mariposa, Madera, Fresno, San Benito, Santa Clara, and Stanislaus.

Figure 1-3: Surrounding Counties

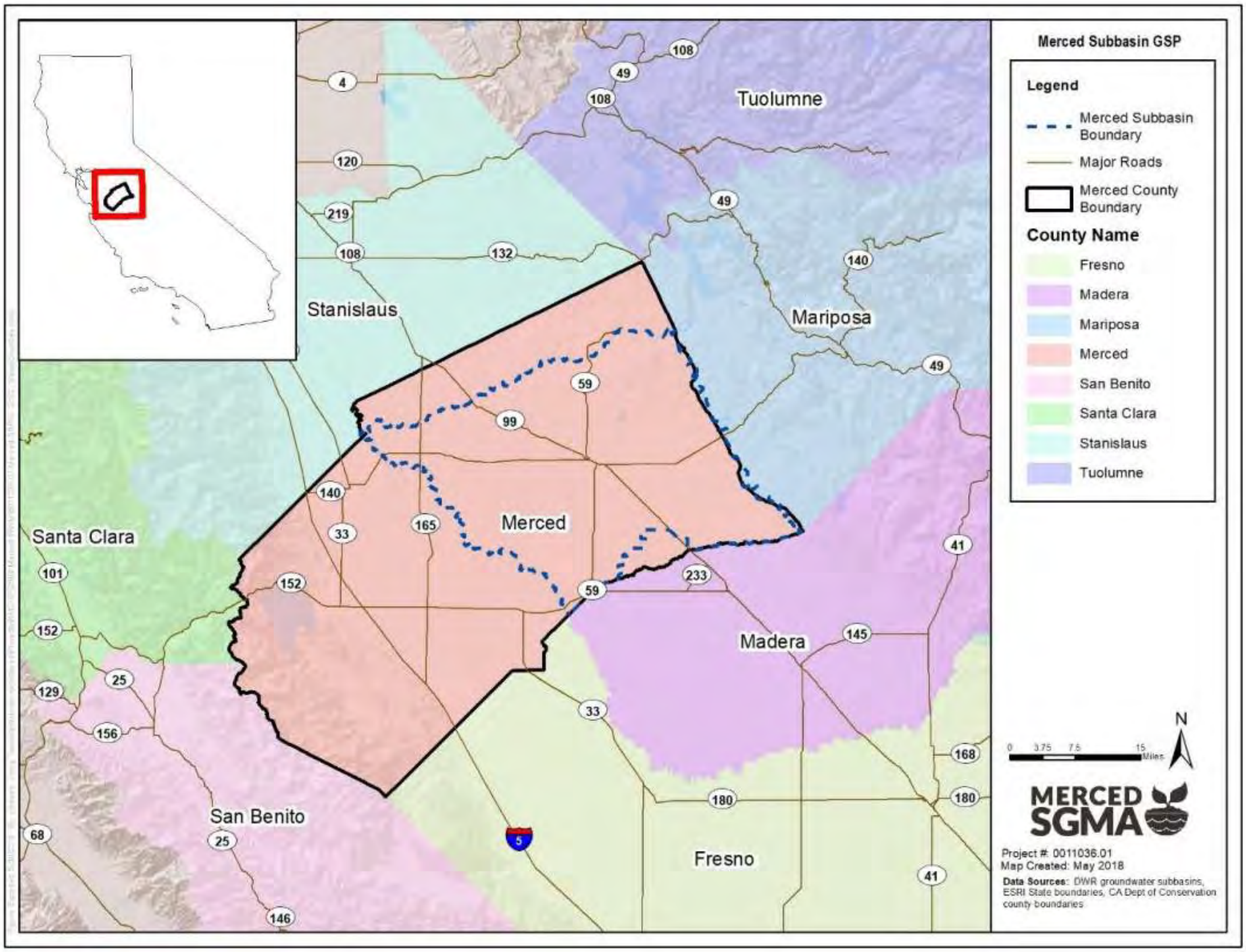


Figure 1-4 shows the Merced Subbasin and the Subbasin's key cities, communities, and major rivers. The Subbasin encompasses an area of about 801 square miles. There are five entities within the region with land use jurisdiction: the County of Merced, the City of Merced, the City of Livingston, the City of Atwater, and the University of California, Merced (UC Merced). A small portion of the Subbasin falls within the western edge of Mariposa County. The cities of Merced, Atwater, and Livingston and UC Merced are contained entirely within the Subbasin, while only part of the eastern portion of Merced County lies within the Subbasin. The Merced Subbasin encompasses the following unincorporated communities within eastern Merced County: Bear Creek (Celeste), Cressey, El Nido, Franklin/Beachwood, Le Grand, McSwain, Planada, Stevinson, Tuttle, and Winton.

Figure 1-4: City Boundaries

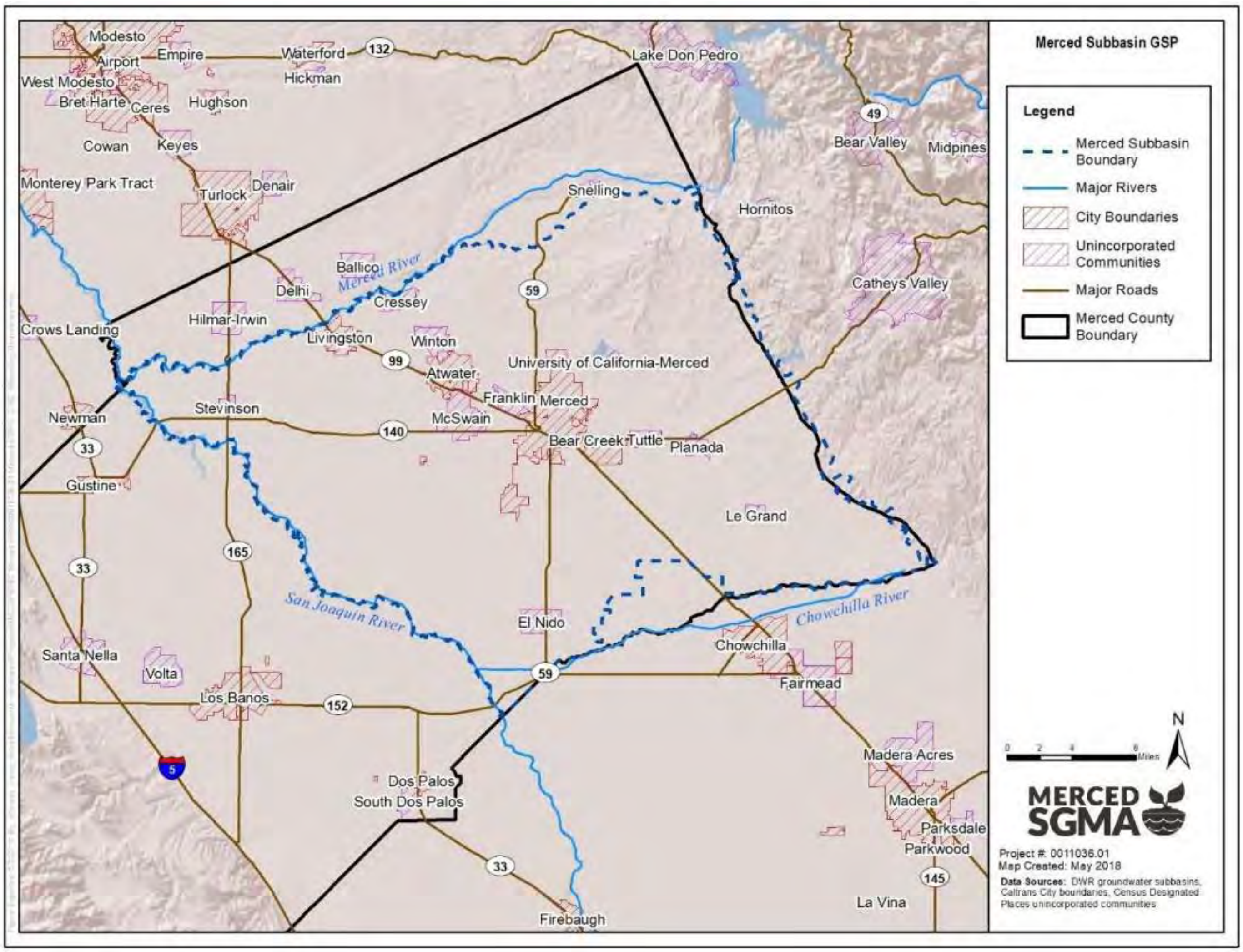


Figure 1-5 shows the extent of the three GSAs which together encompass the entire Merced Subbasin. See Section 1.1.3.1 for a description of the agencies making up each GSA.

Figure 1-5: GSA Boundaries

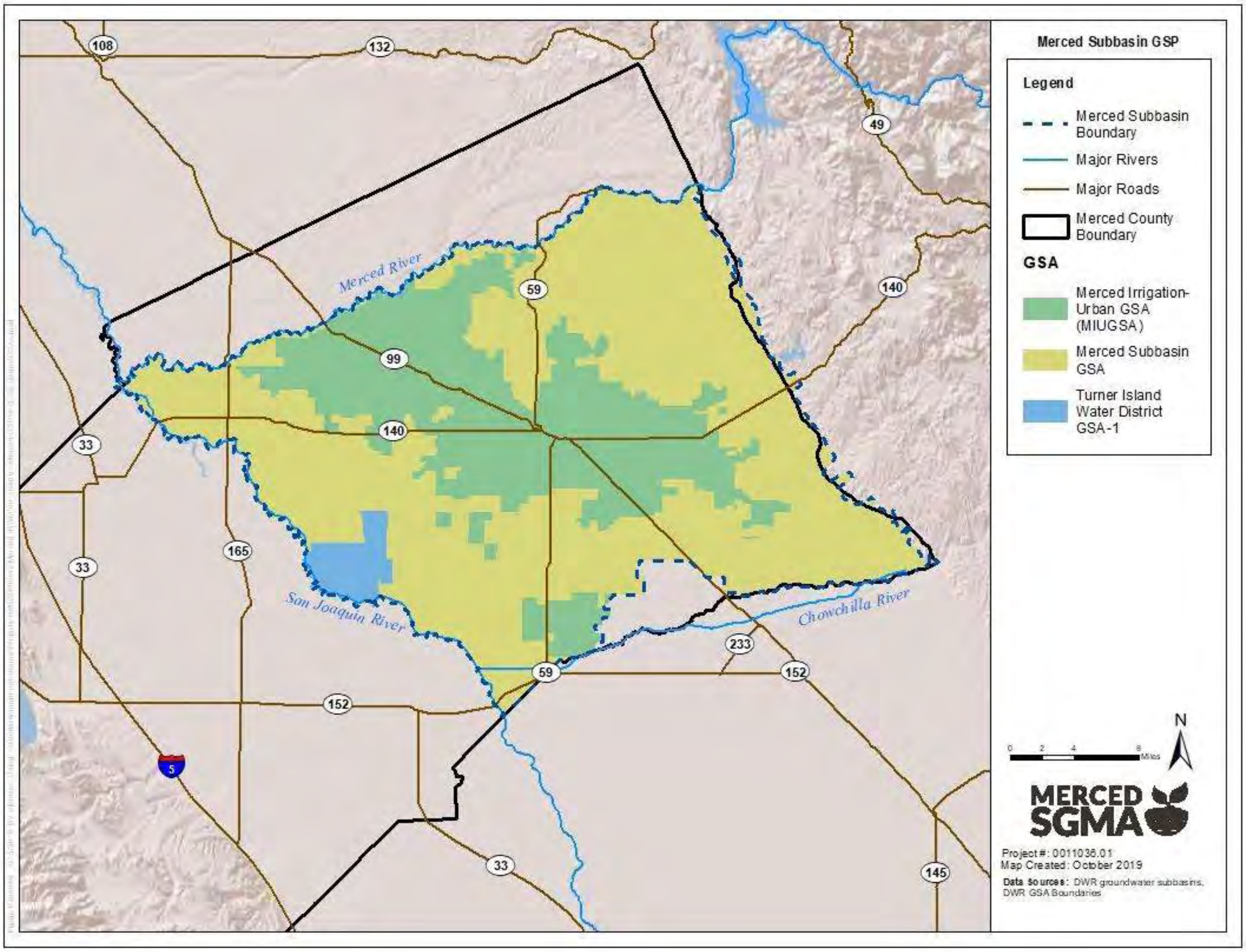


Figure 1-6 shows a map of land use in Merced County across four general categories: cropland, rangeland, undeveloped, and urban. These categories were aggregated based on categories provided by 2016 land use from the California Farmland Mapping and Monitoring Program. It is noted that these categorizations were focused on distinguishing cropland from other land uses, with less focus on specific subcategories for managed wetlands or other habitats. Areas of federal lands or state parks with managed habitats are shown in Figure 1-7. More information about groundwater dependent ecosystems can be found in Section 2.2.7.

Land use patterns in the Merced Subbasin are dominated by agricultural uses, including animal confinement (dairy and poultry), grazing, forage, row crops, vineyards, and nut and fruit trees. These uses rely heavily on purveyors/districts, private groundwater wells, and surface water sources in some areas. Urban land use relies on groundwater except for limited landscape applications. Land use is primarily controlled by local agencies. Land use patterns in the mountainous areas to the east are dominated by national forest and timber, recreation, tourism, and rangeland grazing of forested areas in the lower foothills.

Figure 1-6: Land Use

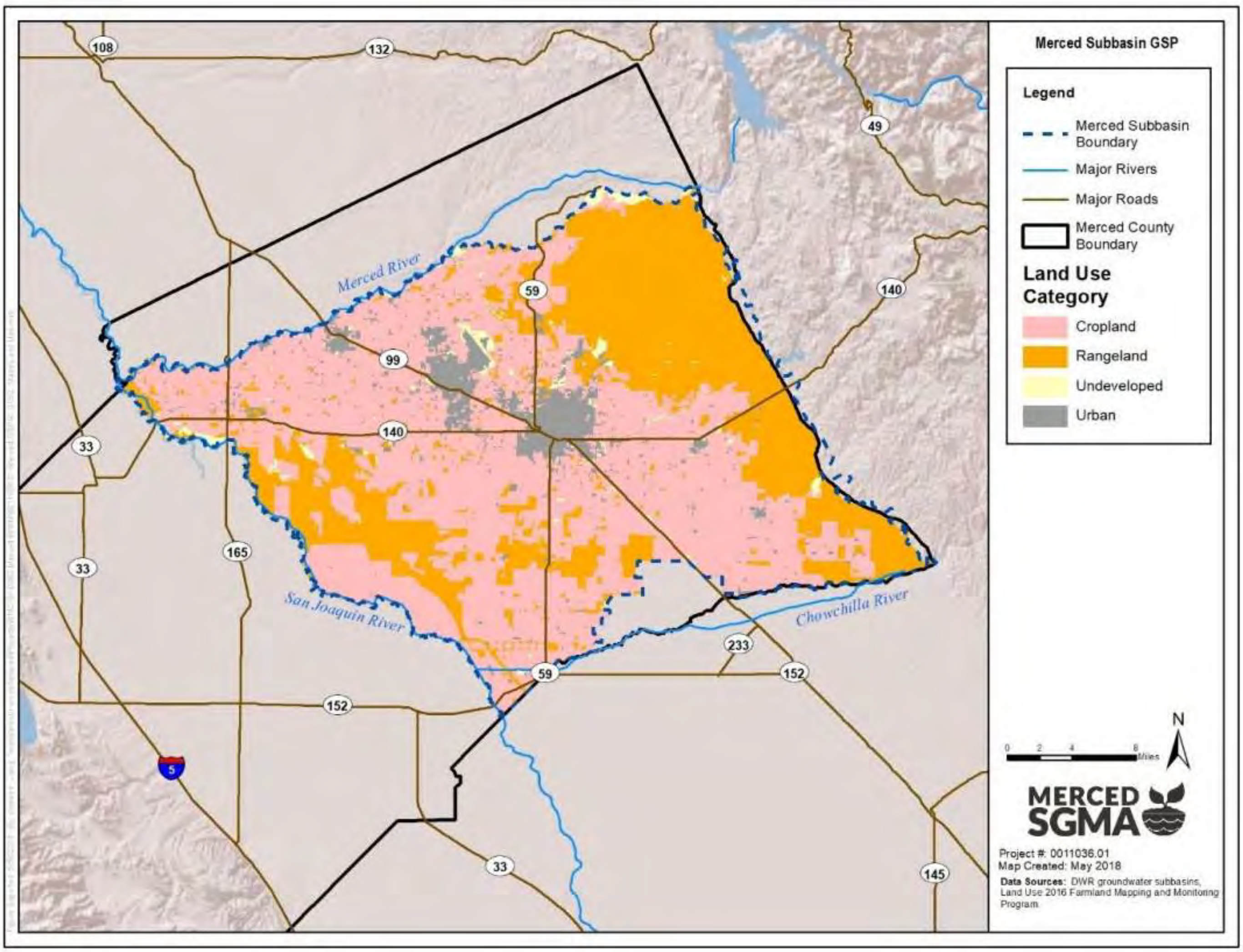


Figure 1-7 shows a map with boundaries of federal and state lands within the Merced Subbasin.

The US Fish & Wildlife Service (USFWS) has three properties at least partially within the Subbasin: San Luis National Wildlife Refuge, Merced National Wildlife Refuge, and the Grasslands Wildlife Management Area (which is composed of several fee title and easement subgroups). All properties are part of the San Luis National Wildlife Refuge Complex.

California State Parks maintains two properties that have small portions of their total area within the Subbasin: Great Valley Grasslands State Park and McConnell State Recreation Area (SRA).

Figure 1-7: Boundaries of Federal and State Lands

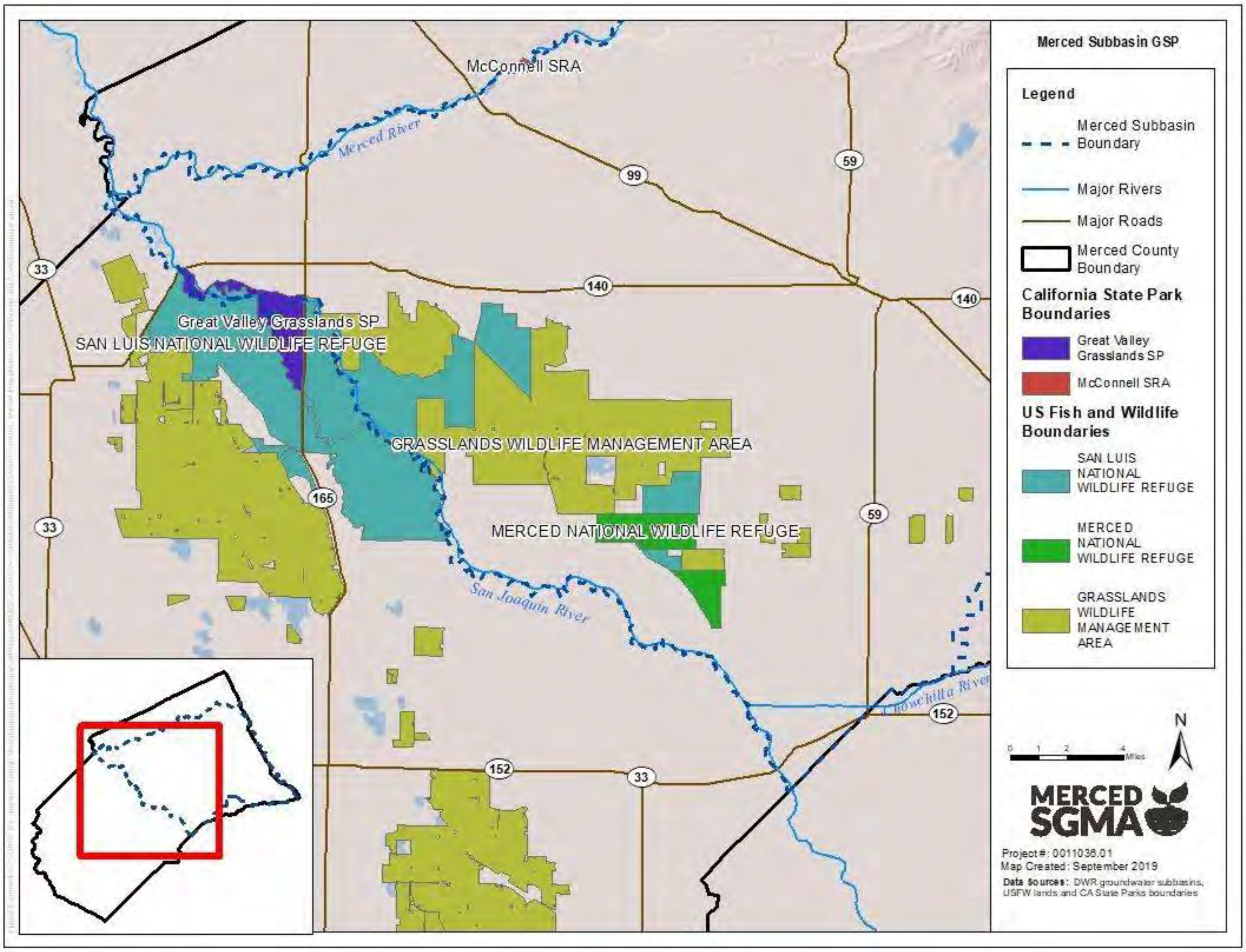


Figure 1-8 shows the density of non-domestic wells per square mile in the Merced Subbasin. This includes 887 unique wells collected primarily from DWR's Water Data Library (WDL), but also other state, regional, and local monitoring entities. Wells containing groundwater level data are described further in Section 1.2.2.1.

Figure 1-9 shows the density of domestic wells per square mile in the Merced Subbasin. ~~-~~This includes 2,388 active domestic wells from Merced County's electronic well database that records wells permitted in the 1990s or later.

In both figures below, city and unincorporated boundaries (from Figure 1-4) have been added for reference.

Figure 1-8: Density of Non-Domestic Wells per Square Mile

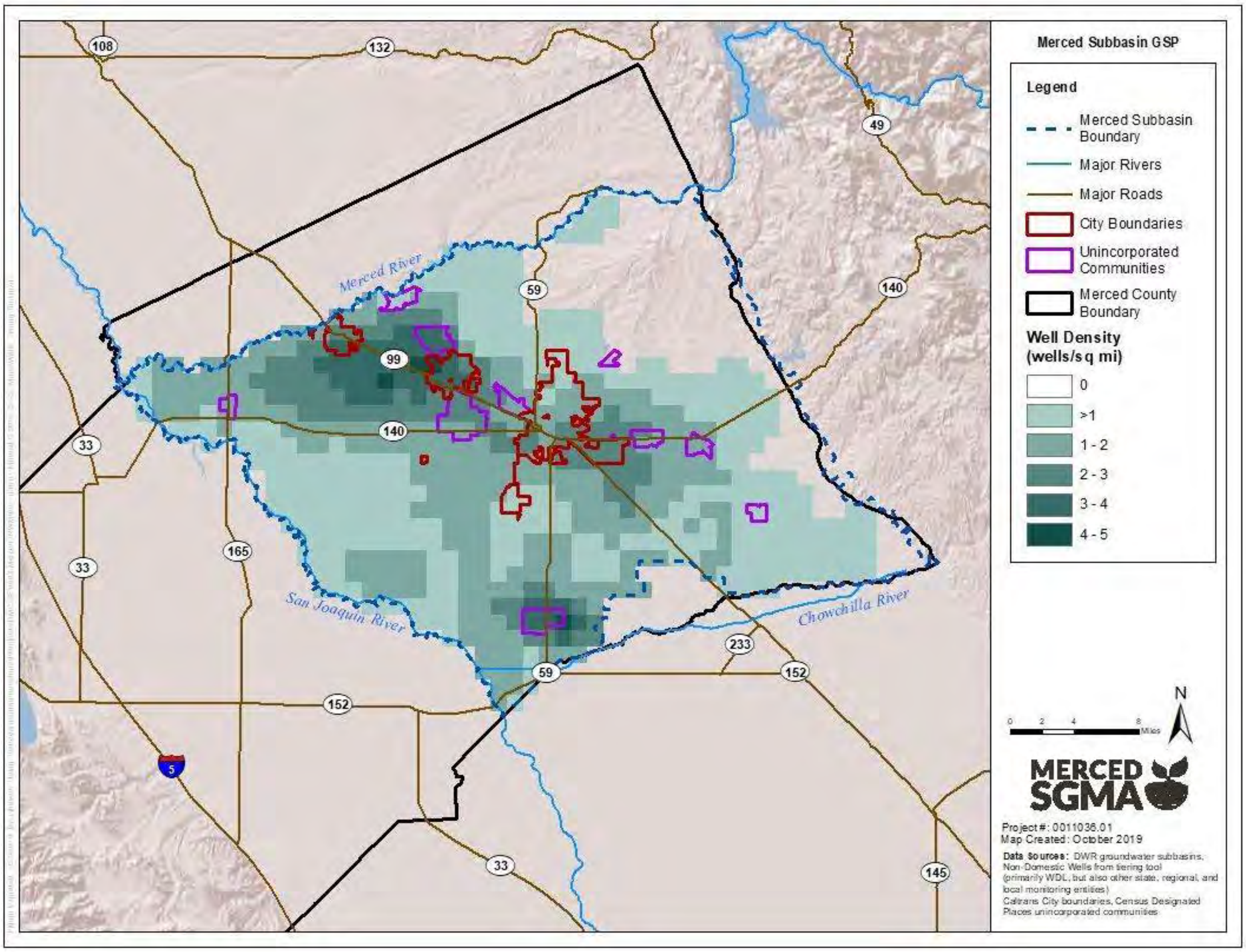
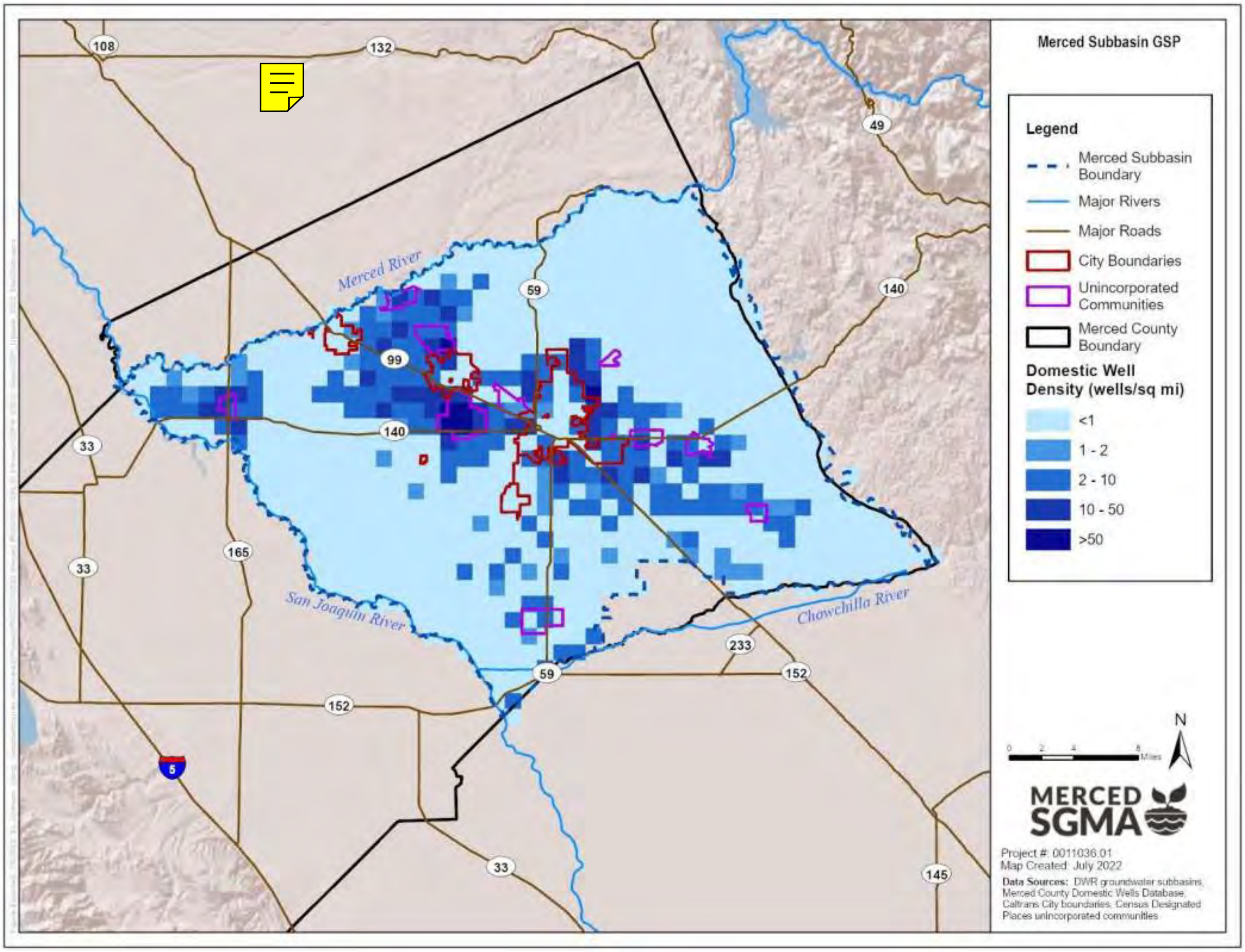


Figure 1-9: Density of Domestic Wells per Square Mile



1.2.2 Water Resources Monitoring and Management Programs

The existing monitoring and management landscape within the Merced Subbasin is a patchwork of local, regional, state, and federal programs, each serving its own specific function. This patchwork provides valuable data that has supported past needs and will assist in meeting monitoring needs under SGMA. This patchwork of programs also creates redundancies, inconsistent protocols, and inconsistent timing of monitoring that will need to be improved under SGMA.

Existing monitoring within the Merced Subbasin is extensive and complex, performed for a variety of purposes by a variety of entities. During a review of existing groundwater monitoring data and programs, data were collected from the following agencies and/or programs:

Statewide Monitoring Programs (Agencies and Databases):

- California Data Exchange Center (CDEC)

- California Department of Pesticide Regulation (CDPR)
- California Environmental Data Exchange Network (CEDEN)
- State Water Resources Control Board (SWRCB), Division of Drinking Water (DDW)
- Department of Water Resources (DWR):
    - California Statewide Groundwater Elevation Monitoring Groundwater Information Center Interactive Mapping Application (GICIMA)
    - Water Data Library (WDL)
- Groundwater Ambient Monitoring and Assessment Program (GAMA)
- UNAVCO
- United States Bureau of Reclamation (USBR)
- United States Geological Survey (USGS)

Regional Monitoring Programs:

- Groundwater Quality Trend Monitoring Program through SWRCB Irrigated Lands Regulatory Program (ILRP)
- San Joaquin River Restoration Program (SJRRP)

Local Monitoring Agencies

- City of Atwater
- City of Livingston
- Le Grand Community Service District (CSD)
- Meadowbrook Water Company
- McConnell Recreation Area
- Merced Area Groundwater Pool Interests (MAGPI)
- Merced County Department of Public Health, Division of Environmental Health
- Merced Irrigation District (MID)
- San Luis National Wildlife Refuge (NWR) Complex
- Stevinson Water District (SWD)

1.2.2.1 Groundwater Level Monitoring

1.2.2.1.1 Department of Water Resources – Water Data Library

DWR's WDL contains measurements of groundwater elevations from water supply and monitoring wells monitored by numerous entities, including local agencies, DWR, and federal agencies. Based on an export of groundwater level data requested directly from DWR on December 6, 2016, the Merced Subbasin contains 95 years of groundwater elevation measurements from 814 wells monitored between 1922 and 2016.

1.2.2.1.2 City of Livingston, Department of Public Works

The City of Livingston, Department of Public Works records depth to groundwater measurements for nine wells in their service area. Depth to groundwater readings were taken biannually from 1993 to 1994 and in 2002, and monthly from 2014 to 2017. There is a total of seven years of data for the nine wells.

1.2.2.1.3 Groundwater Information Center Interactive Mapping Application (GICIMA)

The GICIMA is an interface that displays groundwater elevations and depth to water measurements. Groundwater elevations are measured biannually, in the spring and fall, by local monitoring agencies as part of the California Statewide Groundwater Elevation Monitoring Program (CASGEM) program. Based on data downloaded from GICIMA on May 30, 2018, within the Merced Subbasin there are 67 wells with seasonal groundwater elevation and depth to groundwater data from 2011 through 2017.

1.2.2.1.4 Merced Area Groundwater Pool Interests

The Merced Area Groundwater Pool Interests was formed in 1997 and is a consortium of 15 municipal and agricultural water purveyors, one Member at Large, and two interest groups within Merced County. MAGPI selected wells from member agencies and developed a well network to form a representative groundwater profile of the Merced Subbasin. The cooperating agencies report groundwater levels to MAGPI. In total, the MAGPI monitoring network consists of 44 CASGEM wells and eight voluntary wells. Through the data request, monthly groundwater level data were received for 36 MAGPI wells for 1993 through 2014. The following specific wells from individual member agencies are reported to MAGPI:

- Black Rascal Water Company (2 wells, monthly groundwater levels from 2003-2015)
- City of Atwater – Department of Public Works (10 wells, monthly static groundwater levels)
- Le Grand CSD (3 wells, monthly static groundwater levels for 2013-2014)
- MID (310 wells, monthly static groundwater levels from 1993-2013)
- Planada CSD (5 wells, monthly static groundwater levels 2005-2015)
- Stevinson Water District (5 wells, monthly groundwater levels 1962-2008)
- Winton Water & Sanitary District (5 wells, monthly static groundwater levels 2005-2015)

1.2.2.1.5 San Luis National Wildlife Refuge Complex

The San Luis NWR Complex records groundwater elevation data for 25 wells in the Merced National Wildlife Refuge, typically only when well tests are performed by a contractor, which occurs less than once per decade on each well.

1.2.2.1.6 Merced County Department of Public Health, Division of Environmental Health

The Merced County Department of Public Health, Division of Environmental Health maintains data on 530 irrigation, domestic, and public water system wells in the Subbasin, each of which have at least one groundwater elevation measurement, but no available date.

1.2.2.2 Groundwater Quality Monitoring

Numerous agencies within Merced County collect or maintain groundwater quality data and are described in the sections below.

1.2.2.2.1 State Agencies

1.2.2.2.1.1 DWR Water Data Library (WDL)

The WDL contains water quality data recorded at 211 unique monitoring wells within the Merced Subbasin, with sampling dates from 1946 through 1988. The majority of monitoring activity took place in the 1950s and 1960s, and most wells have one to two days of sampling results, as wells are not regularly sampled. The most frequently sampled parameters (more than 1,000 sample results) are dissolved chloride, sodium, calcium, boron, magnesium, and sulfate as well as conductance, pH, and total alkalinity and hardness. Nutrients, metals, and total dissolved solids (TDS) were also sampled but have fewer sample results available.

1.2.2.2.1.2 California Department of Pesticide Regulations

The CDPR maintains a well inventory database containing data from wells sampled for pesticides by a variety of agencies, including the California Department of Public Health (prior to reporting being taken over by the SWRCB), CDPR, DWR, USGS, and SWRCB DDW. These agencies monitor a variety of wells, including monitoring, domestic, large and small water systems, irrigation, and community wells for 35 different pesticides and report measurements to the CDPR. Exact locations are not known, but based on estimation of coordinates via county, township, range, and section, there are 951 wells monitored within the Merced Subbasin with groundwater quality measurements on pesticides, such as DBCP and xylene, sampled between 1979 and 2015.

1.2.2.2.1.3 Groundwater Ambient Monitoring and Assessment Program (GAMA)

Established in 2000, the GAMA Program monitors groundwater quality throughout California. GAMA is intended to create a comprehensive groundwater monitoring program throughout the state and increase public availability and access to groundwater quality and contamination information. Agencies submit data from monitoring wells for 244 constituents including TDS, nitrates and nitrites, arsenic, and manganese. GAMA data for the Merced Subbasin contains wells monitored by the DDW, CDPR, environmental monitoring wells monitored by regulated facilities, and USGS, with sampling performed from 1930 through 2016. Most wells have one or two days with sampling results because wells are not regularly sampled. Agencies submitting data to GAMA are summarized below.

Division of Drinking Water

The SWRCB DDW monitors public water system wells for Title 22 requirements (such as organic and inorganic compounds, metals, microbial, and radiological analytes). Data are available for active and inactive drinking water sources for water systems that serve the public –defined as serving 15 or more connections or more than 25 people per day. Data are electronically transferred from certified laboratories to the DDW daily. Wells are monitored for Title 22 requirements, including pH, alkalinity, bicarbonate, calcium, magnesium, potassium, sulfate, barium, copper, iron, zinc, and nitrate. In the Merced Subbasin, DDW reported groundwater quality data for 177 wells from 1984 through 2016.

California Department of Pesticide Regulations

CDPR is described above. CDPR reports data to GAMA. Unlike data reported directly from CDPR, GAMA provides latitude and longitude coordinates for CDPR wells. In the Merced Subbasin, CDPR reported groundwater quality measurements for 170 wells with water quality data from 1981 through 2012. CDPR only monitors for pesticides and therefore does not have results on water quality constituents such as nitrates and TDS.

DWR

DWR's groundwater quality data are incorporated from the WDL, described earlier in this section.

Environmental Monitoring Wells

Environmental monitoring wells are monitored by facilities that in many cases have identified contamination but may not necessarily require an investigation and cleanup (i.e., monitoring through GeoTracker described below). Environmental monitoring wells that fall under the GAMA program typically include municipal water purveyors or small water supply systems. 355 wells were identified in the GAMA data download with water quality measurements taken from 2000 through 2016. Contaminated sites often have concentrations of constituents that are not indicative of regional groundwater quality, so environmental monitoring wells may often be excluded from water quality analysis. However, these wells and associated data may have utility in SGMA analysis related to the presence and impact of point-source contamination.

United States Geological Survey

USGS data within the GAMA database reports groundwater quality data for 173 wells within the Merced Subbasin, monitored from 1950 through 2012.

1.2.2.2.1.4 GeoTracker

GeoTracker, operated by the SWRCB, is a subset program of the GAMA program. GeoTracker GAMA does not regularly monitor for general groundwater quality constituents. GeoTracker contains records for sites that require cleanup, such as leaking underground storage tank sites, Department of Defense sites, and cleanup program sites. GeoTracker also contains records for various unregulated projects as well as permitted facilities including: Irrigated Lands Regulatory Program, oil and gas production, operating permitted underground storage tanks, and land disposal sites. GeoTracker receives records and data from SWRCB programs and other monitoring agencies. 669 are sites within Merced County, with increased density near cities such as Merced, Atwater, Livingston, Gustine, Los Banos, and Dos Palos. Of the 669 sites identified in Merced County, 80 are listed as active or open.

1.2.2.2.2 Regional Monitoring

1.2.2.2.2.1 Merced County Department of Public Health, Division of Environmental Health

Merced County Department of Public Health, Division of Environmental Health monitors 60 domestic wells in Merced County for chloride. Additionally, it has monitored nine domestic wells within the Merced Subbasin for general minerals, inorganics, dibromochloropropane (DBCP), and ethylene dibromide (EDB) since 1988 (AMEC, 2008).

1.2.2.2.2.2 Irrigated Lands Regulatory Program

The RWQCB initiated the Irrigated Lands Program in 2003, later renamed to the Irrigated Lands Regulatory Program, to regulate discharge from irrigated agriculture to surface waters and groundwater. The program monitors for a variety of pollutants found in runoff from irrigated lands, including pesticides, fertilizers, pathogens, salts, and sediment. Groundwater is required to be sampled biannually.

The Eastern San Joaquin Water Quality Coalition (ESJWQC) represents the region with waste discharge orders. ESJWQC monitors the Turlock, Merced, and Chowchilla groundwater subbasins. The ESJWQC submitted a

Groundwater Quality Assessment Report (GAR) in 2015. The GAR characterizes past and present groundwater quality (nitrates, salinity, TDS, and pesticides) and the impact of irrigated agricultural practices on groundwater quality.

1.2.2.3 Land Subsidence Monitoring

In the Merced Subbasin, subsidence monitoring is performed using continuous global positioning system (GPS) stations monitored by UNAVCO's Plate Boundary Observatory (PBO) program as well as static GPS points from the USBR's SJRRP. There are no known extensometers in the Merced Subbasin.

1.2.2.3.1 **UNAVCO's Plate Boundary Observatory Program**

The UNAVCO PBO network consists of a network of about 1,100 continuous global positioning system (CGPS) and meteorology stations in the western United States to measure deformation resulting from the constant motion of the Pacific and North American tectonic plates in the western United States. Information from this monitoring can support monitoring of land subsidence resulting from extraction of groundwater. There are two CGPS stations within Merced County but not within the Merced Subbasin: P303, near the City of Los Banos, and P252, near the City of Gustine. Both station P303 and P252 have subsidence data from 2005 to present (2017).

1.2.2.3.2 United States Bureau of Reclamation

The most comprehensive subsidence monitoring within Merced County comes from USBR's SJRRP. USBR has been surveying 85 static GPS points across the San Joaquin Valley biannually, in July and December of each year, to monitor ongoing subsidence since 2011. The Merced Subbasin contains 11 of the total 85 static GPS points, with an additional 9 points within Merced County and 31 additional GPS points located within 20 miles of the county boundary, primarily to the south.

1.2.2.3.3 United States Geological Survey

There are no known extensometers monitored by the USGS within Merced County. However, there are three USGS cable extensometers directly south of the county, with the closest extensometer approximately 3 miles southwest of the city of Dos Palos (the other two extensometers are 13 and 15 miles south of Dos Palos). The three extensometers have recorded data since 1958, 1961, and 1964, with periodic gaps in the data (i.e., most monitoring occurred in the 1960s through 1990s with a lapse in data until the early 2000s). Only the two farthest extensometers are currently monitoring subsidence, the third extensometer that is closer to the county boundary has been offline since a cable broke in 2012 (USGS, 2017).

1.2.2.4 Surface Water

1.2.2.4.1 Streamflow Monitoring Data

Streamflow monitoring data in the Merced Subbasin is available on the following waterbodies:

- Merced River
- San Joaquin River
- Bear Creek

Figure 4-9 in Chapter 4 (Monitoring Networks) shows a map of the streamflow gauging stations described in the sections below.

1.2.2.4.1.1 Department of Water Resources

DWR has a total of seven river discharge monitoring stations located in or along the border of the Merced Subbasin; four are co-operated with DWR's South Central Region Office (SCRO) and one station is co-operated with DWR's Flood Management Agency. Of the seven sites operated by DWR, SCRO, and Flood Management, two are located along the Merced River, one is located along Bear Creek, and four are located along the San Joaquin River. DWR monitors river stage (feet) and river discharge (cubic feet per second [cfs]) hourly. The oldest available data record is from 1984, but most stations went online in 1997 and have been monitoring since.

1.2.2.4.1.2 Merced Irrigation District

MID has three stream gages on the Merced River (one jointly operated with the USGS). Available data from MID monitoring of Merced River water diversions and flow extends back to 1998. Two monitoring stations monitor surface water diversions from dams to canals; one at the Merced Falls Dam into the Northside Canal and the second at the Crocker-Huffman Diversion Dam into the Main Canal. The third Merced River monitoring station monitors streamflow at the Shaffer Bridge.

1.2.2.4.1.3 United States Army Corps of Engineers

The United States Army Corps of Engineers (USACOE) has two streamflow gages on Bear Creek, one at the Bear Creek Dam and Reservoir and the other on Bear Creek at McKee Road. The USACOE has hourly data records on the inflow and outflow (cfs) to the Bear Creek Reservoir and streamflow (cfs) for Bear Creek at McKee Road, in addition to Bear Creek Reservoir storage (acre-feet [AF]), for water years 1995 through 2017.

1.2.2.4.1.4 United States Geological Survey

Within the Subbasin, the USGS operates three streamflow gages on the San Joaquin River and two on the Merced River. Rivers are monitored at 15- to 60-minute intervals for streamflow (cfs), gage height (feet), and change in gage height (feet). The oldest stream gage (#11270900) has 115 years of data (from 1901 through 2016) of daily streamflow and gage height changes. The other four gages in the Subbasin have a range from 105 years of data (#1127400, installed in 1912) to two years of data (#11260815, installed in 2014).

1.2.2.4.2 Surface Water Diversion

The following agencies divert surface water and record their diversions:

- Merquin County Water District
- Stevinson Water District
- Merced Irrigation District
- San Luis National Wildlife Refuge Complex (which includes the Merced National Wildlife Refuge)
- Turner Island Water District

1.2.2.5 Canal Diversions and Seepage

MID performed a study from 2010 through 2015 to monitor seepage and established that canal seepage is one of the main components of groundwater recharge in the Subbasin. Seepage and deep percolation from applied water on grower's fields varied between 133,000 AF and 313,000 AF between 2010 and 2015 (MID, 2016). Canal seepage alone contributed between 21,454 AF and 181,107 AF from 2010 through 2015 (MID, 2016). Results from this study helped characterize the seasonality and location of seepage, finding that seepage rates increase during low precipitation years and that about half of all seepage occurs in the utilized portions of creeks, sloughs and drains, as well as regulating reservoirs and off-channel inundated areas (MID, 2016).

Currently, MID does not monitor for water quality in the canals. In 2016, MID designated certain canals for water supply conveyance to future surface water treatment plants in Merced, Atwater, and Livingston, once the groundwater basin reaches a certain threshold for water quality and groundwater levels (MID, 2016).

1.2.2.6 Existing Water Management Programs

The subsections below contain descriptions of the Integrated Regional Water Management Plan, Agricultural Water Management Plan, and Urban Water Management Plans that apply to the Merced Subbasin.

1.2.2.6.1 Integrated Regional Water Management Plan

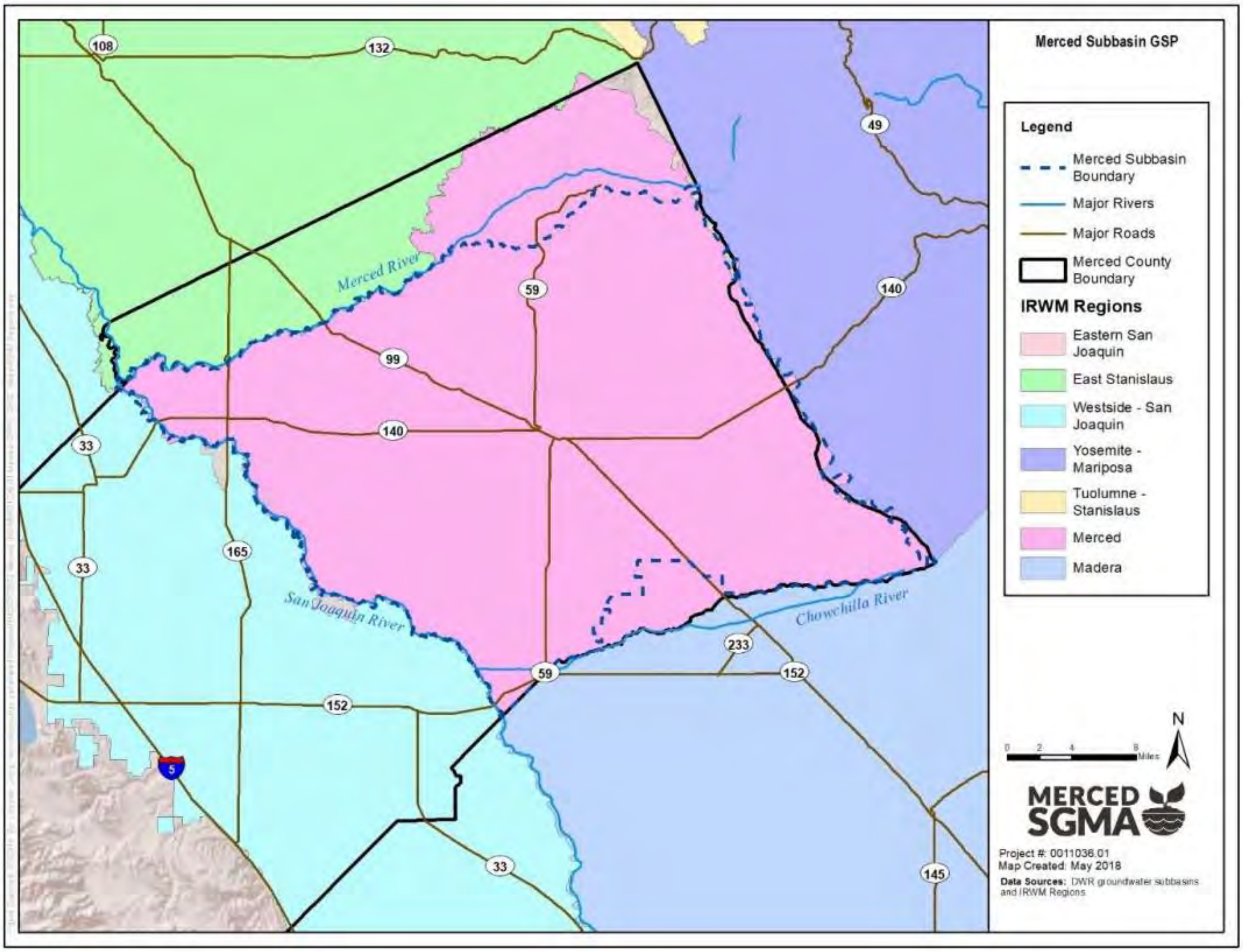
The Merced Integrated Regional Water Management Plan (Merced IRWMP) is a collaborative regional planning document that was published in August 2013. The IRWMP covers a geographic region that includes the entirety of the Merced Subbasin, and also portions of the Turlock Subbasin to the north and Chowchilla Subbasin to the south. The IRWMP boundaries are generally defined by the eastern boundary of the Merced and Turlock Groundwater Subbasins to the east, the San Joaquin River to the west, the northern boundary of the Dry Creek watershed to the north, and the Chowchilla River to the south. Low-lying areas north of the Merced River between the river's confluences with Dry Creek and the San Joaquin River are also included (RMC Water and Environment, 2013a).

The following 2013 IRWMP objectives related to groundwater use would potentially influence implementation of the GSP:

- Manage flood flows for public safety, water supply, recharge, and natural resource management
- Meet demands for all uses, including agriculture, urban, and environmental resource needs
- Correct groundwater overdraft conditions
- Protect and improve water quality for all beneficial uses, consistent with the Basin Plan

The 2013 IRWMP provides valuable resources related to potential concepts, projects, and monitoring strategies that are leveraged in this Merced GSP. See Figure 1-10 for a map of the Merced IRWM Region. An update to the 2013 Plan is currently underway.

Figure 1-10: Merced IRWM Region Setting



1.2.2.6.2 Agricultural Water Management Plan

The Agricultural Water Management Plan (AWMP) was developed and adopted by MID in 2013 in compliance with SB ~~-~~X7-7 of 2009 which required certain agricultural water suppliers to prepare an AWMP and implement Efficient Water Management Practices (EWMPs) (MID, 2013). The Critical EWMPs include:

- Measure the volume of water delivered to customer with sufficient accuracy
- Adopt a pricing structure based at least in part on quantity delivered (Volumetric Pricing)

Applicable Conditional EWMPs that have the benefit of less applied water or increasing system efficiency include:

- Facilitate financing of capital improvements for on-farm irrigation systems
- Implement an incentive pricing structure that promotes one or more of the goals identified in the CWC

- Expand line or pipe distribution systems, and construct regulating reservoirs to increase distribution system flexibility and capacity, decrease maintenance, and reduce seepage
- Increase flexibility in water ordering by, and delivery to, water customers within operational limits
- Construct and operate supplier spill and tailwater recovery systems
- Automate canal control structures
- Facilitate or promote customer pump testing and evaluation
- Designate a water conservation coordinator who will develop and implement the water management plan and prepare progress report
- Provide for the availability of water management services to water users
- Evaluate the policies of agencies that provide the supplier with water to identify the potential for institutional changes to allow more flexible water deliveries and storage
- Evaluate and improve the efficiencies of the supplier's pumps

The 2013 AWMP provides a framework of management practices to help meet water management goals that align with the goals of the Merced GSP.

1.2.2.6.3 City of Merced Urban Water Management Plan

The City of Merced 2015 Urban Water Management Plan (UWMP) was developed according to requirements of the CWC (City of Merced, 2017). The city's water supply comes from two sources: 79 percent from groundwater in the Merced Subbasin and 21 percent from recycled water. Year 2035 projections of water supplies include exchanges and transfers with MID, but groundwater and recycled water remain the top two sources of water supply. Total water demands are expected to increase from 22,741 AF per year (AFY) in 2015 to 37,829 AFY in 2035.

The City of Merced uses the following actions to encourage conservation and efficient use of water:

- Water Waste Prohibition Ordinance
- Fully metered distribution system
- Tiered water rates
- Public education and outreach efforts
- Free residential plumbing retrofit devices
- Washing Machine Rebate program

1.2.2.6.4 City of Livingston Urban Water Management Plan

The City of Livingston 2015 UWMP was developed according to requirements of the CWC (City of Livingston, 2016). The city's water supply comes entirely from the Merced Subbasin and is expected to remain the sole source of water through 2040. Total water demands are expected to increase from 2,190 AFY in 2015 to 2,604 AFY in 2040.

The City of Livingston uses the following actions to encourage conservation and efficient use of water:

- Water shortage contingency plan
- Majority of distribution system is metered
- Excess water use is billed at a variable rate
- Public education and outreach efforts

1.2.3 Land Use Elements or Topic Categories of Applicable General Plans

1.2.3.1 Existing General Plans

The Merced Subbasin is located almost entirely within Merced County, which has jurisdiction over land use planning for the majority of the surface area of the Subbasin. The incorporated cities of Merced, Atwater, and Livingston make up the remaining area. Implementation of the Merced GSP will be affected by the policies and regulations outlined in the Merced County General Plan, as well as the General Plans for the other three cities, given that the long-term land use planning decisions that would affect the Subbasin are under the jurisdiction of the county and respective cities.

This section describes how implementation of the various General Plans may change water demands in the basin, how the General Plans may influence the GSP's ability to achieve sustainable groundwater use, and how the GSP may affect implementation of General Plan land use policies.

1.2.3.1.1 Merced County General Plan

The Merced County General Plan describes the official County "blueprint" on the location of future land use, development preservation, and resource conservation decisions. It's five guiding principles encompass the core issues facing the community: support and protection of agriculture, expansion and diversification of economic development, protection of environmental quality, support of all essential public facilities and services, and coordination of transportation networks (Merced County, 2013).

1.2.3.1.1.1 Relevant Merced County General Plan Goals and Policies

The following Merced County General Plan Land Use Element goals and policies related to groundwater use would potentially influence implementation of the GSP:

- Goal LU-2: Preserve, promote, and expand the agricultural industry in Merced County.
- Policy LU-2.5: Agricultural Support Facilities (RDR/JP): Allow consideration of locating characteristically-specific commercial and industrial uses in rural areas in limited cases based on the unique nature of the use and for health and safety reasons, which require location on large parcels or in sparsely populated areas. In addition, consider the following criteria during the Conditional Use Permit review process:
  - h) The use shall not have a detrimental effect on surface or groundwater resources

- Policy LU-4.4: Efficient Development (RDR): Require efficient and environmentally sound development, which minimizes impacts on sensitive habitat/species, protects water quality and supply, and provides adequate circulation, within Rural Centers.
- Policy LU-5.F.1: New Urban Community Size and Location Requirements (RDR): Only accept applications for the establishment of additional new Urban Communities if they encompass a minimum area of 320 acres in order to achieve efficiencies in urban service delivery and provide for long-range growth needs. In addition, require that proposed new Urban Communities be located only in areas that:
  - b) Contain few wetlands or significant natural resources;
  - g) Are not located within areas that recharge to already compromised source water aquifers (i.e., in overdraft condition) or areas highly susceptible to groundwater contamination.
- Policy LU-5.F.4: Water Impacts (RDR): Prohibit new Urban Communities, or the expansion of existing urban communities, if they will negatively impact the water supply of existing users.

The following Merced County General Plan Agricultural Element goals and policies related to groundwater use would potentially influence implementation of the GSP:

- Goal AG-2: Ensure the long-term preservation and conservation of land used for productive agriculture, potentially-productive agricultural land, and agricultural-support facilities.
  - Note that the term "productive agriculture" is defined as: "farmland that has received water supplies in three of the prior 10 years and is classified as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland on the Statewide Important Farmland map." (Merced County, 2013)

The following Merced County General Plan Water Element goals and policies related to groundwater use would potentially influence implementation of the GSP:

- Goal W-1: Ensure a reliable water supply sufficient to meet the existing and future needs of the County.
- Policy W-1.1: Countywide Water Supply (MPSP/IGC): Ensure that continued supplies of surface and groundwater are available to serve existing and future uses by supporting water districts and agencies in groundwater management and water supply planning; requiring that new development have demonstrated long-term water supply; and assisting both urban and agricultural water districts in efforts to use water efficiently.
- Policy W-1.3: Agricultural Water Study (MPSP/IGC): In cooperation with local water agencies and districts, maintain the detailed General Plan study of countywide water use and needs for agriculture with periodic updates and with information that can be widely shared and publicized.
- Policy W-1.4: Groundwater Recharge Projects (RDR): Support implementation of groundwater recharge projects consistent with adopted Integrated Regional Water Management Plans to minimize overdraft of groundwater and ensure the long-term availability of groundwater.
- Policy W-1.5: New Well Guidelines (RDR/IGC): Coordinate with the cities and special districts in developing County-wide guidelines regarding the location and construction of new water wells.
- Policy W-1.7: Water Sufficiency Requirement (RDR): Require new developments to prepare a detailed source water sufficiency study and water supply assessment per Title 22 and SB 610, consistent with any Integrated

Regional Water Management Plan or similar water management plan. This shall include studying the effect of new development on the water supply of existing users, with public input.

- Policy W-1.8: Single User Well Consolidation (IGC): Encourage consolidation of single user wells into local water districts (with management plans) where feasible.
- Policy W-1.10: Groundwater Overdraft Protection (RDR/MPSP): Where a water supply source is nearby and accessible, encourage large water consumers to use available surface irrigation water (secondary water) for school athletic fields, sports complexes, and large landscape areas.
- Goal W-2: Protect the quality of surface and groundwater resources to meet the needs of all users.
- Policy W-2.1: Water Resource Protection (RDR): Ensure that land uses and development on or near water resources will not impair the quality or productive capacity of these water resources.
- Policy W-2.2: Development Regulations to Protect Water Quality (RDR): Prepare updated development regulations, such as best management practices, that prevent adverse effects on water resources from construction and development activities.
- Policy W-2.3: Natural Drainage Channels (RDR/MPSP): Encourage the use of natural channels for drainage and flood control to benefit water quality and other natural resource values.
- Policy W-2.4: Agricultural and Urban Practices to Minimize Water Contamination (JP): Encourage agriculture and urban practices to comply with the requirements of the Regional Water Quality Control Board for irrigated lands and confined animal facilities, which mandate agricultural practices that minimize erosion and the generation of contaminated runoff to ground or surface waters by providing assistance and incentives.
- Policy W-2.5: Septic Tank Regulation (RDR): Enforce septic tank and onsite system regulations of the Regional Water Quality Control Board to protect the water quality of surface water bodies and groundwater quality.
- Policy W-2.6: Wellhead Protection Program (MPSP): Enforce the wellhead protection program to protect the quality of existing and future groundwater supplies by monitoring the construction, deepening, and destruction of all wells within the County.
- Policy W-2.8: Water Contamination Protection (RDR/MPSP): Coordinate with the State Water Resources Control Board, Regional Water Quality Control Board, and other responsible agencies to ensure that sources of water contamination (including boron, salt, selenium and other trace element concentrations) do not enter agricultural or domestic water supplies~~,~~ and will be reduced where water quality is already affected.
- Policy W-3.1: Water Availability and Conservation (SO/PI): Support efforts of water agencies and districts to prevent the depletion of groundwater resources and promote the conservation and reuse of water.
- Policy W-3.2: Landscape Water Efficiency (SO/PI): Ensure the conservation of water in urban areas through the implementation of the State Model Water Efficient Landscape Ordinance as implemented in Section 18.38 (Landscaping Standards) of the County Zoning Ordinance.
- Policy W-3.4: High Water Use Processing Activities (RDR): Prohibit any processing activities with high water use practices near areas where groundwater overdraft problems exist, unless the facility uses water recycling and conservation techniques that minimize e~~a~~ffects of water use to the groundwater table.

- Policy W-3.13: Agricultural Water Reuse (RDR): Promote and facilitate using reclaimed wastewater for agricultural irrigation, in accordance with Title 22 and guidelines published by the State Department of Public Health.
- Policy W-3.14: Agricultural Water Conservation (JP): Encourage farmers to use irrigation methods which conserve water in areas where flood irrigation is used for groundwater recharge.
- Policy W-3.15: Agricultural Water Efficiency (IGC): Coordinate with the Farm Bureau and agricultural irrigation districts to promote protection of water resources in agricultural areas by encouraging programs that assist producers to use water efficiently in agricultural operations and by promoting technology for efficient water use in agriculture.
- Goal W-4: Enhance and protect County watersheds through responsible water and land use management practices that address water bodies, open spaces, soils, recreation, habitat, vegetation, groundwater recharge, and development.
- Policy W-4.1: Water Resource Protection and Replenishment (RDR/MPSP/IGC): Protect watersheds, aquifer recharge areas, and areas susceptible to ground and surface water contamination by identifying such areas, and implementing requirements for their protection such as:
    - a) Implement zoning and development regulations to protect water resources, including aquifer recharge areas and areas susceptible to ground and surface water contamination;
    - b) For new development, and when adopting new Community Plans, require community drainage systems that incorporate on-site infiltration and contaminant control measures that are compatible with the County SWMP and NPDES regulations for post-construction runoff conditions; and
    - c) Cooperate with other agencies and entities with responsibilities for water quality and watershed protection.
- Goal W-5: Promote interagency communication and cooperation between local governments, irrigation districts, and water districts in order to optimize use of resources and provide the highest level of dependable and affordable service, while respecting individual entities water rights and interests.
- Policy W-5.1: Countywide Water Supply Study (RDR/MPSP/PSR): Prepare and regularly update a comprehensive water supply study that includes all four groundwater basins and three hydrologic zones, and takes into consideration activities in neighboring counties and the region. The plan shall consider reductions in Federal and State water deliveries in the western part of the County and anticipated reductions in water supplies due to climate change.
- Policy W-5.2: Master Plan Development (IGC): Coordinate with all agricultural and urban water districts to develop water supply master plans to guide future groundwater basin water supplies through regional solutions.
- Policy W-5.3: Water Forum (IGC/FB): Support a county-wide water forum to coordinate long-term water demand and supply programs that emphasize sustainability in the County consistent with approved IRWMPs.

1.2.3.1.1.2 Merced **County General Plan's Influence on** Water Demand and Groundwater Sustainability Plan

The General Plan explicitly encourages preservation of the county's groundwater resources, and states that future urban and agricultural growth should be accommodated only while ensuring that this growth occurs within the sustainable capacity of these resources. Due to the complementary nature of the General Plan and the GSP, implementation of the GSP is anticipated to be consistent with the General Plan's goals and policies.

1.2.3.1.1.3 **Groundwater Sustainability Plan's** Influence on Merced **County General Plan's Goals and** Policies

Successful implementation of the GSP will help to ensure that the Merced Subbasin's groundwater supply is managed in a sustainable manner. Given the amount of population growth projected in the county in the coming years, it is possible that changes in groundwater management by the GSP will impact the location and type of development that will occur in the Subbasin in the future. It is anticipated that GSP implementation will reinforce the General Plan's goals related to sustainable land use development in the county.

1.2.3.1.2 City of Merced General Plan

The City of Merced General Plan describes the City's 2030 vision and provides guidance for the growth needed to achieve it (City of Merced Development Services Department, 2011). ~~-~~The General Plan for 2030 vision was built upon the Merced Vision 2015 General Plan (adopted 1997) and was developed through a series of public forums, stakeholder and property owner meetings, and joint City Council/Planning Commission study sessions to solicit input from citizens, property owners, and decision makers.

1.2.3.1.2.1 Relevant City of Merced General Plan Goals and Policies

The following City of Merced General Plan goals and policies related to groundwater use would potentially influence implementation of the GSP:

- Policy P-3.1: Ensure that adequate water supply can be provided within the City's service area, concurrent with service expansion and population growth.
- Policy P-3.2: In cooperation with the County and the Merced Irrigation District, work to stabilize the region's aquifer.

1.2.3.1.2.2 City of Merced **General Plan's Influence on Water Demand and Groundwater Sustainability Plan**

The General Plan supports the efforts of the MAGPI in preservation of groundwater resources and recognizes that groundwater recharge is critical to supporting the city's future growth (City of Merced Development Services Department, 2011). Due to the complementary nature of the General Plan and the GSP, implementation of the GSP is anticipated to be consistent with the General Plan's goals and policies.

1.2.3.1.2.3 **Groundwater Sustainability Plan's Influence on** City of Merced **General Plan's Goals and Policies**

Successful implementation of the GSP will help to ensure that the Merced Subbasin's groundwater supply is managed in a sustainable manner. Given the amount of population growth projected in the city in the coming years, it is possible that changes in groundwater management by the GSP will impact the location and type of development that will occur in the city in the future. It is anticipated that GSP implementation will reinforce the General Plan's goals related to sustainable land use development in the city.

1.2.3.1.3 City of Atwater General Plan

The City of Atwater General Plan was published in 2000 and is a guide for community growth and development (Pacific Municipal Consultants, 2000). This update of the General Plan was assisted by an 18-member Technical Work Group made of representatives from various city departments, and other local public agencies. Core group input was augment by representatives from local school districts, businesses, and community organizations.

1.2.3.1.3.1 Relevant City of Atwater General Plan Goals and Policies

The following City of Atwater General Plan goals and policies related to groundwater use would potentially influence implementation of the GSP:

- Goal CO-1: Support efforts to monitor and remediate existing groundwater contamination within the planning area.
- Goal CO-2: Prevent the creation of new groundwater contamination or the spread of existing contamination.

1.2.3.1.3.2 City of Atwater **General Plan's Influence on Water Demand and Groundwater Sustainability Plan**

The General Plan focuses on groundwater contamination in the form of nitrates, pesticides (mainly dibromochloropropane), and other contaminants as a result of past operations at Castle Air Force Base (Pacific Municipal Consultants, 2000). Groundwater overdraft is not mentioned as an issue within this General Plan, likely due to being published in 2000, prior to more recent drought and overdraft issues. Implementation of the GSP is anticipated to be consistent with the General Plan's goals and policies related to groundwater quality monitoring.

1.2.3.1.3.3 **Groundwater Sustainability Plan's Influence on** City of Atwater **General Plan's Goals and Policies**

Successful implementation of the GSP will help to ensure that the Merced Subbasin's groundwater supply is managed in a sustainable manner. While population estimates are nearly two decades old, expected ongoing growth in the city means that it is possible that changes in groundwater management by the GSP will impact the location and type of development that will occur in the Subbasin in the future. It is anticipated that GSP implementation will reinforce the General Plan's goals related to sustainable land use development in the county. It is also likely that the GSP will influence groundwater quality monitoring and remediation described in the 2000 General Plan.

1.2.3.1.4 City of Livingston General Plan

The City of Livingston General Plan was updated and published in 1999 and is a long-term, comprehensive framework to guide physical, social, and economic development within the community (Quad Knopf, Inc., 1999). The 1999 General Plan update was developed by a General Plan consultant who worked with city staff and a General Plan Review Committee, with input from meetings with local service clubs, a workshop, and four town hall meetings. Key Issues of importance that guided policies for the General Plan were identified in these sessions and include agricultural preservation, contiguous planning, payment for expansion of public facilities by new development, and neighborhood development.

1.2.3.1.5 Relevant City of Livingston General Plan Goals and Policies

The following City of Livingston General Plan goals and policies related to groundwater use would potentially influence implementation of the GSP:

- Objective 5.2 (A): Protect natural resources including groundwater, soils, and air quality, to meet the needs of present and future generations.
- Policy 5.2 (1): Protect areas of natural groundwater recharge from land uses and disposal method[s] which would degrade groundwater quality. Promote activities, which combine stormwater control, and water recharges.

- Policy 5.2 (2): Expand programs that enhance groundwater recharge in order to maintain the groundwater supply, including the installation of detention ponds in new growth areas.
- Policy 9.1 (16): To encourage groundwater recharge, ponding basins shall be designed as detention basins. However, pumping facilities shall be included in such facilities to handle peak flows and to provide for disposal of storm water into irrigation ditches when necessary. Stormwater inflow into irrigation district canals and pipelines shall be subject to existing or future agreements by and between the City and the irrigation districts specifying maximum inflow, maximum service area boundary, and any other limitation thereto.
- Policy 9.1 (22): The City of Livingston shall cooperate with local water agencies to identify and resolve long-term water supply issues.

1.2.3.1.6 City of Livingston **General Plan's Influence on Water** Demand and Groundwater Sustainability Plan

The General Plan supports the efforts of preservation of groundwater supply and quality (Quad Knopf, Inc., 1999). Due to the complementary nature of the General Plan and the GSP, implementation of the GSP is anticipated to be consistent with the General Plan's goals and policies.

1.2.3.1.7 **Groundwater Sustainability Plan's Influence on** City of Livingston **General Plan's Goals** and Policies

Successful implementation of the GSP will help to ensure that the Merced Subbasin's groundwater supply is managed in a sustainable manner. While population estimates are nearly two decades old, expected ongoing growth in the city means that it is possible that changes in groundwater management by the GSP will impact the location and type of development that will occur in the Subbasin in the future. It is anticipated that GSP implementation will reinforce the General Plan's goals related to sustainable land use development in the county.

1.2.3.2 Land Use Plans Outside the Subbasin

Land use planning in the portions of the Turlock and Delta-Mendota Subbasins that are adjacent to the Merced Subbasin are located within Merced County and are thus covered by the Merced County General Plan described in Section 1.2.3.1.

A small portion of the Chowchilla Subbasin is located within Merced County, but most of the adjacent portions are located within Madera County. The Madera County General Plan is a major guiding document for land use development adjacent to the southern portion of the Merced Subbasin. It was last updated in 1995, with 17 amendments through 2015. A notable amendment in 2004 included the resolution that "The County shall implement policies and procedures stated in the County adopted "AB3030 Groundwater Management Plan" for the Chowchilla, Delta-Mendota, and Madera Basins" (Madera County, 1995).

Land use decisions in neighboring areas experiencing subsidence and overdraft are likely to effect groundwater conditions in the Merced Subbasin.

Surface water users (Merquin County Water District, Stevinson Water District, Merced Irrigation District, and San Luis National Wildlife Refuge Complex) are more likely to be impacted by land use change outside of the Subbasin, which might affect San Joaquin River or Merced River flows.

1.2.3.3 Well Permitting

In 2015, Merced County implemented a new well permitting program for any new, replacement, back-up, and De Minimis well construction. The permit program is enforced by County Municipal Code Chapter 9.27 (Groundwater Mining and Export) and 9.28 (Wells). Applicants must provide information about groundwater elevation estimates, land elevation estimates, land subsidence rate estimates, depth to Corcoran Clay, and other basic well characteristics (Merced County, 2015). Groundwater cannot be "exported", meaning used outside of the same basin from which it is extracted, without an exemption claim.

Merced County has established water well standards that define property line setbacks, casing perforations, gravel packing, well seals, backflow prevention, disinfection requirements, sampling taps, and more, as well as the requirement for installing monitoring device(s) for groundwater extraction, elevation, and/or water quality (Merced County, n.d.).

The City of Merced also enforces water well standards through Chapter 8.12 (Water Wells) in the City Code of Ordinances, under legal authority granted under CWC, Section 13801, for "Special Ground Water Protection" to minimize impacts and prevent the migration of harmful chemicals into aquifers used by the city (City of Merced, n.d.). The standards apply to all new and existing water wells, monitoring wells, cathodic protection wells, test wells and those exploratory holes deeper than twenty feet within the jurisdictional boundaries of the city. The city requires a permit for construction, rehabilitation, sealing, modification, or destruction of wells, which includes requirements for well site inspection by the city. Permittees are directed to DWR's State Water Well Standards for all standards related to location, construction, maintenance, rehabilitation, modification, abandonment, or destruction of wells.

New monitoring wells are subject to the same permitting requirements described above.

1.2.4 Additional GSP Elements

SGMA requires that the following topics are addressed in the GSP (CWC §10727.4). See below for references to where each topic is addressed.

- Control of saline water intrusion
  - See Section 3.5 for an explanation of why the saline water intrusion sustainability indicator does not apply to the Merced Subbasin.
- Wellhead protection
  - Details on wellhead protection are discussed in Section 1.2.3.3 (Well Permitting).
- Migration of contaminated groundwater
  - Details on migration of contaminated groundwater are discussed in Section 2.2.4.4 (Point-Source Contamination).
- Well abandonment and well destruction program
  - Details on well abandonment and well destruction are discussed in Section 1.2.3.3 (Well Permitting).
- Replenishment of groundwater extractions
  - Details on projects are discussed in Chapter 6 (Projects and Management Actions to Achieve Sustainability Goal).

- Activities implementing, opportunities for, and removing impediments to, conjunctive use and underground storage
    - Details on this topic are discussed in Chapter 6 (Projects and Management Actions to Achieve Sustainability Goal).
- Well construction policies
    - Details on well construction policies are discussed in Section 1.2.3.3 (Well Permitting).
- Measures addressing groundwater contamination cleanup, recharge, in-lieu use, diversions to storage, conservation, water recycling, conveyance, and extraction projects.
    - Details on projects are discussed in Chapter 6 (Projects and Management Actions to Achieve Sustainability Goal).
- Efficient water management practices for the delivery of water and water conservation methods to improve the efficiency of water use
    - Details on efficient water management practices are discussed in Section 1.2.2.6 (Existing Water Management Programs) and Section 1.2.3 (Land Use Elements or Topic Categories of Applicable General Plans).
- Efforts to develop relationships with State and federal regulatory agencies
    - Details on this topic can be found in Section 7 (Plan Implementation).
- Land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity
    - Details on this topic can be found in Section 1.2.3 (Land Use Elements or Topic Categories of Applicable General Plans).
- Impacts on groundwater dependent ecosystems
    - Details on groundwater dependent ecosystems are discussed in Section 2.2.7 (Groundwater-Dependent Ecosystems).

1.2.5 Notice and Communication

1.2.5.1 Beneficial Uses and Users in the Basin

The California Regional Water Quality Control Board Central Valley Region designates all ground waters in the Sacramento River Basin and San Joaquin River Basin as suitable or potentially suitable, at a minimum, for municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply (Central Valley RWQCB, 2016).

Groundwater users in the region include municipalities, utilities, or other public water districts that provide groundwater as a drinking water supply, agricultural purveyors, individual private supply wells, and the environment. For the environment, the US Fish & Wildlife Service operates several wildlife refuges/management areas that are supported by groundwater. There are additional wetlands and other groundwater-dependent ecosystems throughout the Subbasin but are primarily concentrated in the western portion.

Merced National Wildlife Refuge is able to receive up to 15,000 AFY of water for environmental surface water flows from the beginning of April through the end of September from MID (according to 1993 settlement between MID and USFWS, recognized by the Federal Energy Regulatory Commission [FERC]). This GSP does not relieve any entity within the Subbasin of their commitments. Since 2000, Merced River releases by MID for the Vernalis Adaptive Management Plan to facilitate the migration of juvenile Chinook salmon have been approximately 60,000 AFY. During 2002 and again in 2007, MID released approximately 25,000 AF of surface water from the Merced River to the Environmental Water Account for protection and restoration of at-risk fish species listed under the Federal and California Endangered Species Acts. MID pumped an equal amount of groundwater to replace the surface water supply to growers within the District (AMEC, 2008).

Additional interests (as listed in CWC §10723.2) include, but are not limited to:

- Public water systems/municipal well operators:
    - Le Grand-Athlone Water District
    - Merquin County Water District
    - Plainsburg Irrigation District
    - Stevinson Water District
    - Lone Tree Mutual Water Company
    - Sandy Mush Mutual Water Company
    - California American Water, Meadowbrook District
    - Merced Area Groundwater Pool Interests (monitors and reports groundwater elevations in the Merced Subbasin)
    - Le Grand Community Services District
    - Planada Community Services District
- Local land use planning agencies: described in Section 1.2.3 - Land Use Elements or Topic Categories of Applicable General Plans
- State Agencies
    - California Department of Fish and Wildlife
    - Great Valley Grasslands State Park
- Federal government:
    - U.S. Fish and Wildlife: San Luis National Wildlife Refuge, Merced National Wildlife Refuge, and the Grasslands Wildlife Management Area (all are part of the San Luis National Wildlife Refuge Complex)
    - USDA Natural Resource Conservation Service, Fresno
    - USDA, Farm Service Agency

- o U.S. Geological Survey, California Water Science Center, Sacramento

- Disadvantaged communities (DAC), combined list based on DWR's DAC Mapping Tool[4] and Merced County's SB244 Analysis[5]:
    - o Disadvantaged: Atwater City, Le Grand Census Designated Place (CDP), Merced City, Stevinson CDP, The Grove, Tuttle CDP, Winton CDP
    - o Severely Disadvantaged: Bear Creek CDP (Celeste), El Nido CDP, Franklin CDP, Planada CDP
- Environmental interests
    - o Audubon California
    - o East Merced Resource Conservation District / Sustainable Conservation
    - o U.S. Fish and Wildlife Service
    - o California Department of Fish and Wildlife
    - o River Partners

Potential interests (listed in CWC §10723.2) that are not present in the Merced Subbasin include:

- California Native American tribes

1.2.5.2 Public Engagement and Active Involvement

A Merced Subbasin Stakeholder Engagement Strategy was developed (see Appendix N) to achieve the following goals:

- Conduct an inclusive outreach and education process that best supports the success of well-prepared GSP and that meets SGMA requirements.
- Offer a comprehensive, transparent outreach and education process that builds understanding and trust among the various stakeholders.
- Using a Planning Roadmap, that aligns the public engagement opportunities with the development of technical information at key points throughout the project, create an atmosphere of clear, concise, transparent, reliable information flow and opportunities for input.
- Engagement methods used will be evaluated throughout the GSP process and modified as needed.

  (Woodard & Curran, 2018a)

Active public participation was encouraged through the following opportunities for public engagement:

- Accepting public comment at GSA Board Meetings of all three GSAs.

[4] DWR DAC Mapping tool: https://gis.water.ca.gov/app/dacs/. Data is based on US Census ACS 2010-2014.
[5] Merced County SB244 report: http://www.co.merced.ca.us/DocumentCenter/View/12199. Report is dated May 2016, based on 2000 Census data.

- Accepting public comments at Coordinating Committee Meetings and Stakeholder Advisory Committee Meetings.
- Forming the Stakeholder Advisory Committee that includes community representatives of the diverse interests in the Subbasin to review and provide input on the elements of the GSP through monthly meetings open to the public.
- Conducting briefings and Public Workshops to provide opportunities for community members and interests groups to learn about, discuss, and comment on the GSP planning process before major decision milestones.
- Coordinating with Leadership Counsel and Self-Help Enterprises in their DAC outreach efforts.
- Developing a robust website with timely, pertinent information, opportunity to make comments, and sign-up for email notifications. The website houses information about SGMA, the GSP process, the Merced Subbasin GSA Boards, Coordinating Committee, Stakeholder Advisory Committee, Public Workshops, and draft GSP sections.
- Issuing news releases announcing public participation opportunities at Public Workshops.
- Providing translation services at Public Workshops.

The public comments received at GSA Board Meetings, Coordinating Committee Meetings, Stakeholder Advisory Committee Meeting and Public Workshops were used to inform the GSP team and allow the team to make adjustments to the GSP during its development. Meeting notes from the Stakeholder Advisory Committee, Coordinating Committee, and Public Workshops are included in Appendix B and capture the issues discussed during development of the GSP.

Noticing methods included:

- Website: (www.mercedsgma.org) Agendas for all committee meetings and public workshops were posted at least 48 hours ahead of meetings.
- A public email listserv was used to provide notice of GSA, CC, and SC meetings and Public Workshops.
- Informational e-newsletter articles: Articles that informed stakeholders about GSP planning, technical issues, and opportunities for participation and review were periodically provided to the Merced Farm Bureau, East Merced Conservation District, and the Greater Merced Area Chamber of Commerce for distribution to their constituents.
- Engagement with local and regional organizations and partners: ~~–~~ Organizations and partners assisted in noticing Community Workshops and sharing project information. Organizations and partners included the three GSAs, Merced County, City of Merced, City of Livingston, City of Atwater, participating water and irrigation districts, Merced Farm Bureau, Greater Merced Chamber of Commerce, Hispanic Chamber of Commerce (Merced), Self-Help Enterprises (SHE), Leadership Counsel for Justice and Accountability, East Merced Resource Conservation District, and several area Municipal Advisory Councils.
- Social media channels: The County of Merced, Merced Irrigation District and McSwain Municipal Advisory Council posted information about GSP development and Community Workshops on their social media platforms.
- Press Releases: To announce opportunities for participation and input, press releases were issued to media lists maintained by the County of Merced and Merced Irrigation District.

- Display Advertisements: To announce Community Workshops, display ads were placed in the forward news section of the Merced Sun Times.
- Noticing in Disadvantaged and Severely Disadvantaged Communities: Community Workshop notices and other related GSP information were distributed by Self-Help Enterprises and the Leadership Council on behalf of the Merced Subbasin GSP team.

1.2.5.3 List of Public Meetings Where the GSP was Discussed

The following lists the public meetings held from January 2018 through June 2019.

GSA Board Meetings

The Boards of the 3 GSAs met regularly during plan development and not all meetings are listed below. The following GSA Board meetings included GSP-specific presentations:

Joint GSP Planning Workshop of the 3 GSAs (MSGSA, MIUGSA, TIWD GSA-1)
2018: January 11

MSGSA Board Meeting – Presentation on Water Budgets
2018: November 1
2019: April 11

Joint Board meeting of MIUGSA, MID, and TIWD GSA-1 – Presentation on Water Budgets
2018: December 4

Joint Board meeting of MIUGSA, MID, and TIWD GSA-1 – Draft GSP Public Comments
2019: September 18

Coordinating Committee Meetings (monthly on 4th Monday starting March 2018 – current)

2018: March 26, April 23, May 29, June 25, July 23, August 27, September 24, October 22, November 26, December 17
2019: January 28, February 25, March 25, April 22, May 29, June 24, July 22, August 26, October 28

Stakeholder Advisory Committee Meetings (monthly on 4th Monday starting May 2018 – current)

2018: May 29, June 25, July 23, August 27, September 24, October 22, November 26, December 17
2019: January 28, February 25, March 25, April 22, May 29, June 24, July 22, October 28

Public Workshops (with Spanish translation available)

2018: August 2, December 4, December 13
2019: February 25, May 29

1.2.5.4 List of Additional Public Meetings Where the July 2022 GSP Update was Discussed

The following lists the public meetings held from January 2022 through June 2022 where the July 2022 GSP Update was discussed.

GSA Board Meetings

The Boards of the three GSAs continued to meet regularly after GSP adoption, including meetings to discuss the July 2022 GSP Update in the first half of 2022.

Coordination Committee Meetings

2022: February 7, March 21, April 25, June 1, June 27

Note that additional meetings of the Coordination Committee were held in 2020 (November 2 and December 1) and 2021 (February 22, April 26, July 26, October 25, and December 22) after the adoption of the GSP in 2019 to discuss ongoing implementation activities.

Stakeholder Advisory Committee Meetings

2022: January 31, March 21, April 25, June 1, June 27

Note that additional meetings of the Stakeholder Advisory Committee were held in 2021 (April 12, July 12, and November 8) after the adoption of the GSP in 2019 to discuss ongoing implementation activities.

~~1.2.5.4~~1.2.5.5 Comments Regarding the Plan

Meeting notes from the Stakeholder Advisory Committee, Coordinating Committee, and Public Workshops are included in Appendix B and capture the issues discussed during development of the GSP as well as the continued meetings post-adoption to discuss implementation of the GSP and the July 2022 update in response to DWR comments.

The Merced GSP Public Draft was published July 19, 2019 and written comments were collected for a 30-day period ending August 19, 2019. Additional comments were also received at a joint meeting of the three GSA Boards held on September 18, 2019. Individual comments from all letters and the public were reviewed, categorized, and addressed in Appendix O. Comment letters are included as an attachment to Appendix O. Comments from the joint boards meeting are documented in the meeting minutes and included as an attachment to Appendix O.

The Merced GSP July 2022 update was discussed at numerous public meetings (see Section 1.2.5.4) in the first half of 2022. The document was revised by the GSAs before review and adoption by the three GSA Boards in July 2022.

~~1.2.5.5~~1.2.5.6 Communications

~~1.2.5.5.1~~1.2.5.6.1 Decision-Making Processes

This GSP was developed jointly by MIUGSA, MSGSA, and TIWD GSA-1 (GSAs). The GSAs were guided by a Coordination Committee that is composed of up to four representatives from each GSA and is responsible for coming to unanimous agreement on recommendations for the technical and substantive Basin-wide issues, and then submitting the recommendations to the governing board of each GSA for final approval. To become fully effective, each GSA governing board must approve the Coordination Committee's recommendations (Merced Subbasin GSA, MIUGSA, Turner Island Water District GSA-#1, 2017). The Coordinating Committee met monthly during GSP development starting in March 2018. Meetings were open to the public with agendas posted at least 48 hours in advance. Coordinating Committee meeting agendas, presentations, and notes are posted on the Merced GSP website (www.mercedsgma.org).

The GSAs were also informed by a 23-member Stakeholder Advisory Committee which consisted of community representatives who reviewed groundwater conditions, management issues and needs, and projects and management actions to improve sustainability in the basin. The committee met monthly starting in May 2018 in sessions open to the public, providing a forum for testing ideas as well as providing information and feedback from members' respective constituencies. Agendas were posted at least 48 hours prior to meetings. The meeting agendas, presentations, and notes are posted to the website.

A more detailed description of the governing bodies of each individual GSA can be found in Section 1.1.3.1 - Organization and Management Structure of the GSAs.

~~1.2.5.5.2~~1.2.5.6.2 GSP Implementation and Updates to GSP

The GSAs intend to continue public outreach and provide opportunities for engagement during GSP implementation. This will include providing opportunities for public participation, especially from beneficial users, at public meetings, providing access to GSP information online, and continued coordination with entities conducting outreach to DAC communities in the Basin. Announcements will continue to be distributed via email prior to public meetings (e.g., Stakeholder Advisory Committee meetings, Coordinating Committee meetings, public workshops, and GSA Board meetings). Emails will also be distributed as specific deliverables are finalized, when opportunities are available for stakeholder input and when this input is requested, or when items of interest to the stakeholder group arise, such as relevant funding opportunities. The Merced SGMA website, managed as part of GSP Administration, will be updated a minimum of monthly, and will house meeting agendas and materials, reports, and other program information. The website may be updated to add new pages as the program continues and additional activities are implemented. Additionally, public workshops will be held semi-annually to provide an opportunity for stakeholders and members of the public to learn about, discuss, and provide input on GSP activities, progress towards meeting the Sustainability Goals of this GSP, and the SGMA program.

2 BASIN SETTING

2.1 HYDROGEOLOGIC CONCEPTUAL MODEL

This section describes the Hydrogeologic Conceptual Model (HCM) for the Merced Subbasin. The HCM is developed to understand and convey the physical conditions by which water moves through in the basin and is used elsewhere in the Groundwater Sustainability Plan (GSP) to support the development of sustainable management criteria, monitoring networks, water budgets, projects, and programs and management actions.

Consistent with the Sustainable Groundwater Management Act (SGMA) requirements, the HCM:

- Provides an understanding of the general physical characteristics related to regional hydrology, land use, geology geologic structure, water quality, principal aquifers, and principal aquitards of the basin setting*;*
- Provides the context to develop water budgets, mathematical (analytical or numerical) models, and monitoring networks; and
- Provides a tool for stakeholder outreach and communication.

The HCM is based on several existing geologic and hydrogeologic studies as briefly described below:

- R.W. Page & Gary O. Balding, 1973. *Geology and Quality of Water in the Modesto-Merced Area, San Joaquin Valley, California, with a Brief Section on Hydrology*. United States Geological Survey (USGS) Water-Resources Investigations Report 73-6, prepared in cooperation with the California Department of Water Resources (DWR).
  - Provides the basis for the understanding of the underlying geology of the Merced Subbasin.
- Page, R.W., 1977. *Appraisal of Ground-Water Conditions in Merced, California, and Vicinity*. USGS Open-File Report 77-454, prepared in cooperation with DWR.
  - Provides the basis for the understanding of the five aquifer systems and the base of fresh water in the Merced Subbasin.
- Page, R.W., 1986. *Geology of the Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections*. USGS professional paper 1401-C.
  - Provides basis for the understanding of surficial geology in the Merced Subbasin as well as underlying geologic structure.
- AMEC Geomatrix, Inc., 2008. *Merced Groundwater Basin Groundwater Management Plan Update*, submitted to Merced Area Groundwater Pool Interests, Merced, CA.
  - Provides a summary of previous geologic studies with more recent information on groundwater subbasin and water resources conditions.

2.1.1 Regional Geologic and Structural Setting

The Merced Subbasin is located in the San Joaquin Valley, a broad structural trough approximately 200 miles long and up to 70 miles wide. This trough is filled with up to 32,000 feet of marine and continental sediments deposited during periodic inundation by the Pacific Ocean and by erosion of the surrounding mountains. Continental deposits shed from the surrounding mountains form an alluvial wedge that thickens from the valley margins near the eastern boundary of the Subbasin toward the axis of the structural trough near the western boundary of the Subbasin. This depositional axis is below and slightly west of the series of rivers, lakes, sloughs, and marshes that mark the current and historical axis of the surface drainage of the San Joaquin Valley (DWR, 2004).

The Merced Subbasin is generally bounded by the foothills of the Sierra Nevada Mountain range in the east and other groundwater subbasins of the Central Valley to the north, south, and west (see more detail in Section 2.1.6). The southwest portion of the basin is underlain by the Corcoran Clay, a bed of laterally extensive reduced (blue/grey) silt and clay. The Corcoran Clay is a significant confining layer up to 60 feet thick.

This geologic setting is reflected throughout the HCM. The very deep sediments create a large volume of groundwater within the Merced Subbasin. At greater depths, this groundwater is saline, reflective of deposition of the deeper aquifer materials in a marine environment. Shallower depths have fresh groundwater, reflective of deposition in a non-marine environment or flushing with fresh water from higher in the system. The nature of the aquifer materials holding this groundwater is driven by the depositional environment. In higher-energy environments, such as fast-moving streams, larger materials are deposited, such as gravels and sands. In lower-energy environments, such as lakes, smaller materials are deposited, such as clays and silts. Thus, the aquifer system typically has coarser, more conductive materials along current or ancestral river courses and closer to the foothills. Finer, less-conductive materials are present farther from current or ancestral river courses and towards the axis of the valley near the San Joaquin River. In addition to spatial influences on aquifer materials, there is a time component as well. The deposition of continental deposits in alluvial fans emanating from the foothills was interrupted when the valley was inundated by Lake Corcoran, creating a low-energy depositional environment which resulted in the regional clay unit known as the Corcoran Clay. The Corcoran Clay is an important aquitard in that portion of the basin, separating the subsurface into two distinct aquifer systems, one above the clay and one below.

2.1.2 Geologic History

The geologic history of the Merced Subbasin is one of deposition of sediments in an environment with changing climate, changing sea levels, and tectonic movement, all of which resulted in the sediments that form today's aquifer system. A summary of the geologic history is provided below. This summary refers to the geologic time scale, which is included in Appendix C as a reference.

As with other areas on the east side of the San Joaquin Valley, the deposition of sediments occurred on a westward-tilted block of crystalline basement composed of Sierra Nevada plutonic and metamorphic rocks under the eastern part of the valley and mafic and ultramafic rocks of a presumed ophiolite of Jurassic age under the central and western parts of the valley (Bartow J. A., 1991). Thus, the bottom of the basin is a westward extension of the materials associated with the Sierra Nevada or is ophiolitic material associated with subducting oceanic crust from the west. In addition to forming the bottom of the basin, the continued tilting of the Sierran block contributed to the ability to accumulate sediments in the basin and resulted in the dipping units and angular unconformities between units.

Pre-Tertiary marine rocks are deposited at the greatest depths and in great thickness. Cretaceous Period marine rocks are as much as 20,000 feet thick in areas of the San Joaquin Valley (Page R. W., 1986).

Most of the materials relevant to groundwater management were deposited in the more recent Cenozoic Era. Near the close of the Mesozoic Era, the San Joaquin Valley area was the southern part of an extensive forearc basin (Bartow J. A., 1991). Tectonic movements elevated many Coast Range areas, including those adjacent to the Sacramento Valley and the northern San Joaquin Valley; these movements created the ancestral Tertiary San Joaquin and Sacramento basins as restricted troughs of deposition lying between the emerging Coast Ranges and the eastern Sierra Nevada (Page R. W., 1986). With significant restriction between what is now the valley and the ocean, the depositional environment varied based on sea level, tectonics, and deposition.

The Ione Formation was deposited in the middle Eocene Epoch discontinuously on pre-Tertiary rocks, dipping gently to the southwest (Bartow J. A., 1991). Overall, the formation is considered deltaic in origin, with fluvial, lacustrine, and lagoonal deposits (Page R. W., 1986). The beginning of the middle Eocene was characterized with lower eustatic sea levels resulting in a non-marine depositional environment for earlier Ione Formation materials. As eustatic sea levels rose through the middle Eocene, the depositional environment became more shoreline or shallow marine. The Merced Subbasin was generally a coastal environment with open ocean to the west. The more southwesterly portions of the Subbasin would be more likely to be shallow marine and the more northeasterly portions of the basin more likely to be non-marine. Towards the end of the middle Eocene, lower eustatic sea levels again moved the Ione to more non-marine deposition (Bartow J. A., 1991).

Deformation, driven by tectonic forces, generally resulted in west or southwest tilting. This causes the subtle angular unconformities in the Cenozoic units with discordances of generally less than 1 degree. Discordances appear to be less between Eocene and younger units compared to Eocene and older units, but there is evidence of continued tilting in the Oligocene based on differences in the gradient of depositional surfaces in the Eocene Ione and Miocene Valley Springs Formations. Currently, tilting continues to be present, likely at an accelerated rate (Bartow J. A., 1991).

The Oligocene marks a change in sedimentary history in the Merced area and the San Joaquin Valley, with a change from few, long-lasting, San Joaquin Valley-wide depositional sequences, to shorter sequences of more local extent. This is associated with a regional transition from a convergent continental margin to a transform margin (Bartow J. A., 1991).

During the Oligocene, at the time of maximum regression, the entire Subbasin was above sea level, sloping towards the south. A hiatus representing most of the Oligocene is evidence that there was negligible subsidence in the western part of the block during that interval (Bartow J. A., 1991).

The Subbasin remained above sea level during the Miocene, although uplift to the south resulted in a change in slope towards the southwest. The Valley Springs Formation was deposited in the Upper Oligocene and Lower Miocene unconformably over the Ione, dipping gently to the southwest. The Valley Springs was deposited following a period of low eustatic sea levels. While eustatic sea levels became higher during this period, the depositional environment remained non-marine, with fluvial sequences and ash deposits.

The Mehrten Formation was deposited in the Middle to Upper Miocene unconformably over the Valley Springs, dipping gently to the southwest. The Mehrten Formation is considered to have been laid down by streams carrying andesitic debris associated with the beginning of andesitic volcanism in the Sierra Nevada (Page R. W., 1986). There is no apparent angular discordance between the Mehrten and the Valley Springs, although there is an unconformity with as much as 120 meters of erosional relief in the eastern part of the outcrop area (Bartow J. A., 1991).

By the end of the Pliocene (approximately 2 million years ago), seaway connections were completely closed due to rapid filling of the San Joaquin Valley with sediment (Elam, 2012), marking the end of marine deposition and the beginning of continental deposition.

Interrupting the alluvial deposition of continental deposits, in the Pleistocene Epoch a large lake known as Lake Corcoran was impounded, filling nearly the entire valley (Bartow J. A., 1991). The period coincided with low eustatic sea levels associated with glaciation. The large lake is evidenced by the widespread deposition of the lacustrine clays today known as the Corcoran Clay. Outwash from alpine glaciers was deposited into the lake by Sierra Nevada rivers. The lake drained approximately 600,000 years ago when the present-day drainage outlet of the Carquinez Strait was carved out. However, several other smaller lakes also occupied portions of the valley later during the Quaternary Period (Bartow J. A., 1991).

More recent deposits are alluvial, aeolian, and floodplain deposits derived primarily from the Sierra Nevada (Page R. W., 1986) (Page & Balding, 1973). The presence of today's Corcoran Clay at depths of approximately 40 feet to 240 feet is indicative of rates of tectonic subsidence (not related to groundwater withdrawal) that have occurred over the past 600,000 years.

2.1.3 Surface and Near-Surface Conditions

This section describes the topography, soils, surface water, imported water supplies, and recharge areas in the basin.

2.1.3.1 Topography and Physiography

The Merced Subbasin is largely flat, with a minimum elevation of approximately 50 feet, near the confluence of the Merced and San Joaquin Rivers and a maximum elevation of 836 feet, in the foothills near the northern corner of the Subbasin. Figure 2-1 shows a map of elevation within the Subbasin.

The topography is driven by the physiography of the area. The following description of the physiography and geomorphology of the Merced Subbasin is provided to add context to the topography and is based on geomorphic descriptions and maps by the USGS (Davis, Green, Olmsted, & Brown, 1959) as referenced in the Merced Groundwater Management Plan (AMEC, 2008).

The physiographic units in the Merced Subbasin area include the Sierra Nevada, dissected uplands, low alluvial plains and fans, river floodplains and channels, and overflow lands (Page & Balding, 1973). These physiographic units are presented on Figure 2-2. The Sierra Nevada unit, which can be found along the eastern border of the Merced Subbasin, consists of metamorphic and granitic mountains that have deep river-cut canyons and highly dissected foothills.

The dissected uplands unit has a width ranging between 5 and 18 miles and covers a significant portion of the Merced Subbasin. Local relief may be up to 200 feet. Within the uplands, the Merced River has developed two terraces and a broad floodplain while the Chowchilla River is only slightly entrenched into the upland surface.

The low alluvial plains and fans unit, which consists primarily of coalescing alluvial fans, has a width ranging between 14 and 20 miles and also covers a significant portion of the Merced Subbasin. Local relief may be up to 10 feet. Between Atwater and Turlock, northwest trending sand dunes underlie the surface of the plains and fans.

The river floodplains and channels unit flank the channels of the major rivers including the Merced and Chowchilla Rivers. In the dissected uplands unit, the floodplain of the Merced River ranges in width between 0.25 and 1 mile. In the Cressey area, natural levees are present. Near the valley trough, the Merced River floodplain becomes indistinguishable from the surrounding alluvial plains. The Chowchilla River, which is entrenched about 40 feet near where it leaves the Sierra Nevada, has developed a thin floodplain through the dissected uplands. The river has deposited natural levees throughout the low alluvial plains and fans unit.

Figure 2-1: Topography

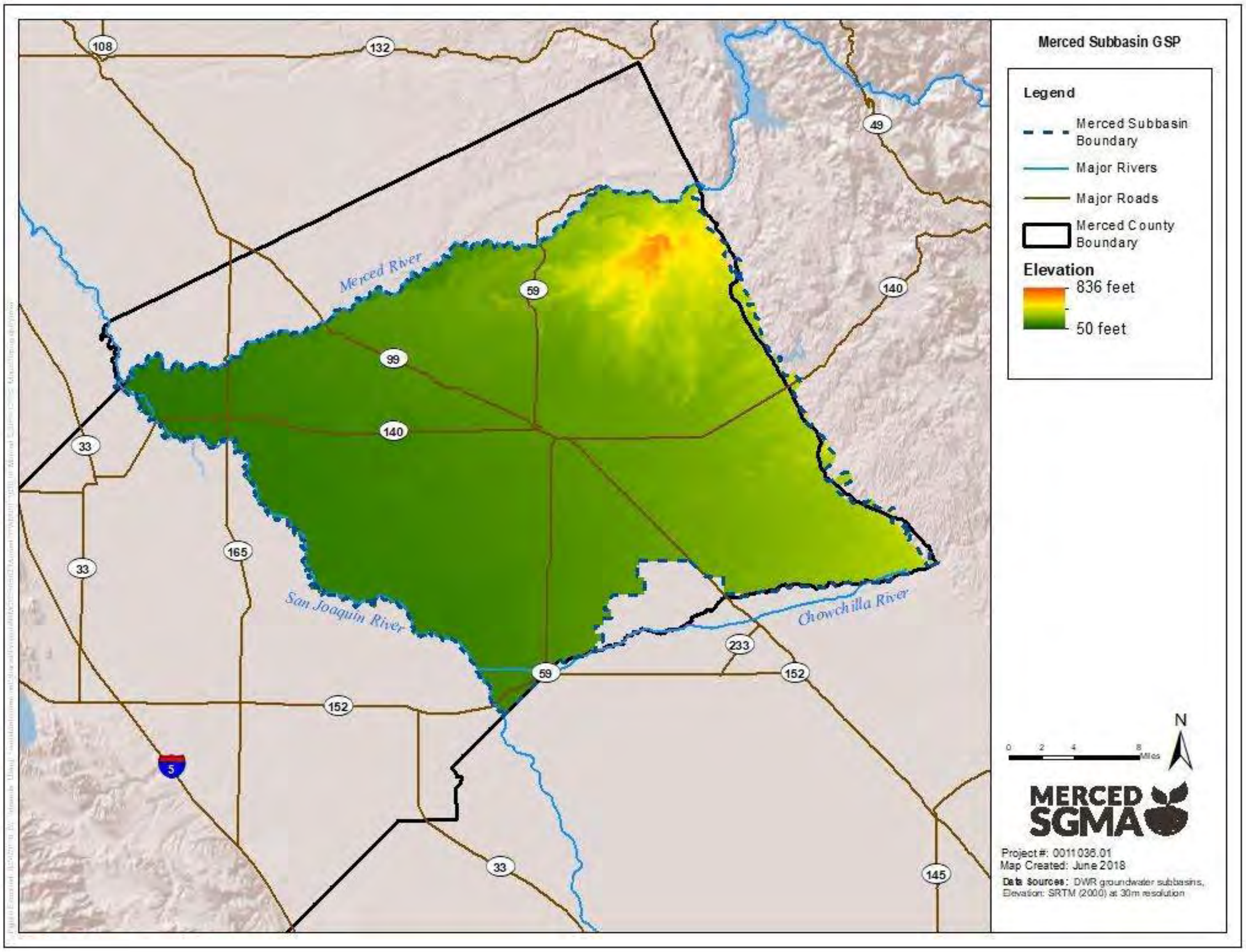
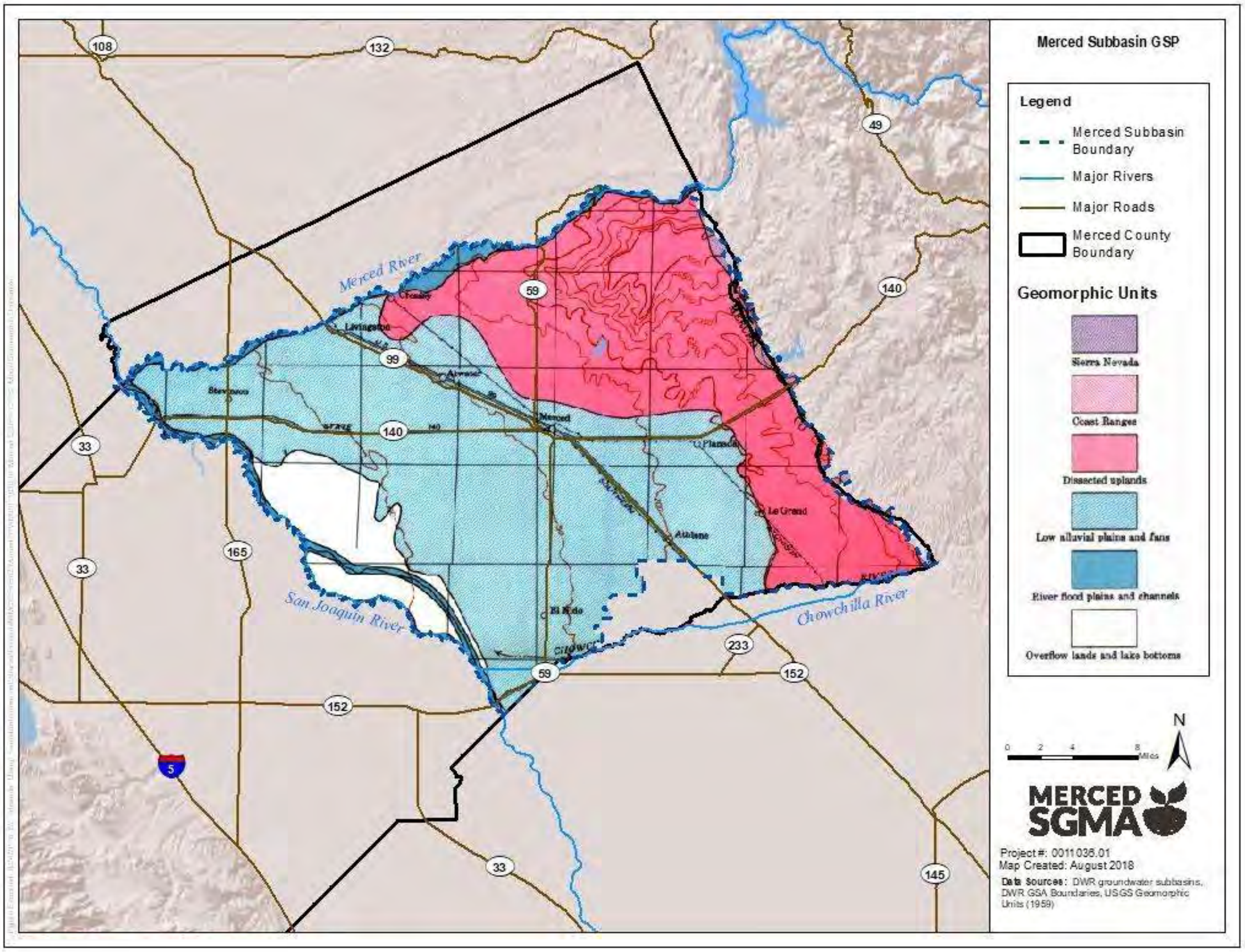


Figure 2-2: Geomorphic Units



Source: (Davis, Green, Olmsted, & Brown, 1959)

2.1.3.2 Surface Soils

The United States Department of Agriculture (USDA) Soil Conservation Service (now the USDA Natural Resource Conservation Service) conducted a soil survey in Merced County and identified more than 200 unique soil types within the Merced Subbasin. Data on soils can assist in the understanding of how water may infiltrate or run off the surface as well as how chemical constituents may interact with soils. The soil types can be grouped into 25 associations based on general soil type (Figure 2-3 and Table 2-1) and permeability (Figure 2-4), along with other characteristics identified by the USDA. Soil types and permeability were mapped using the Soil Survey Geographic (SSURGO) database last updated 2017.

Figure 2-3: Soil Types

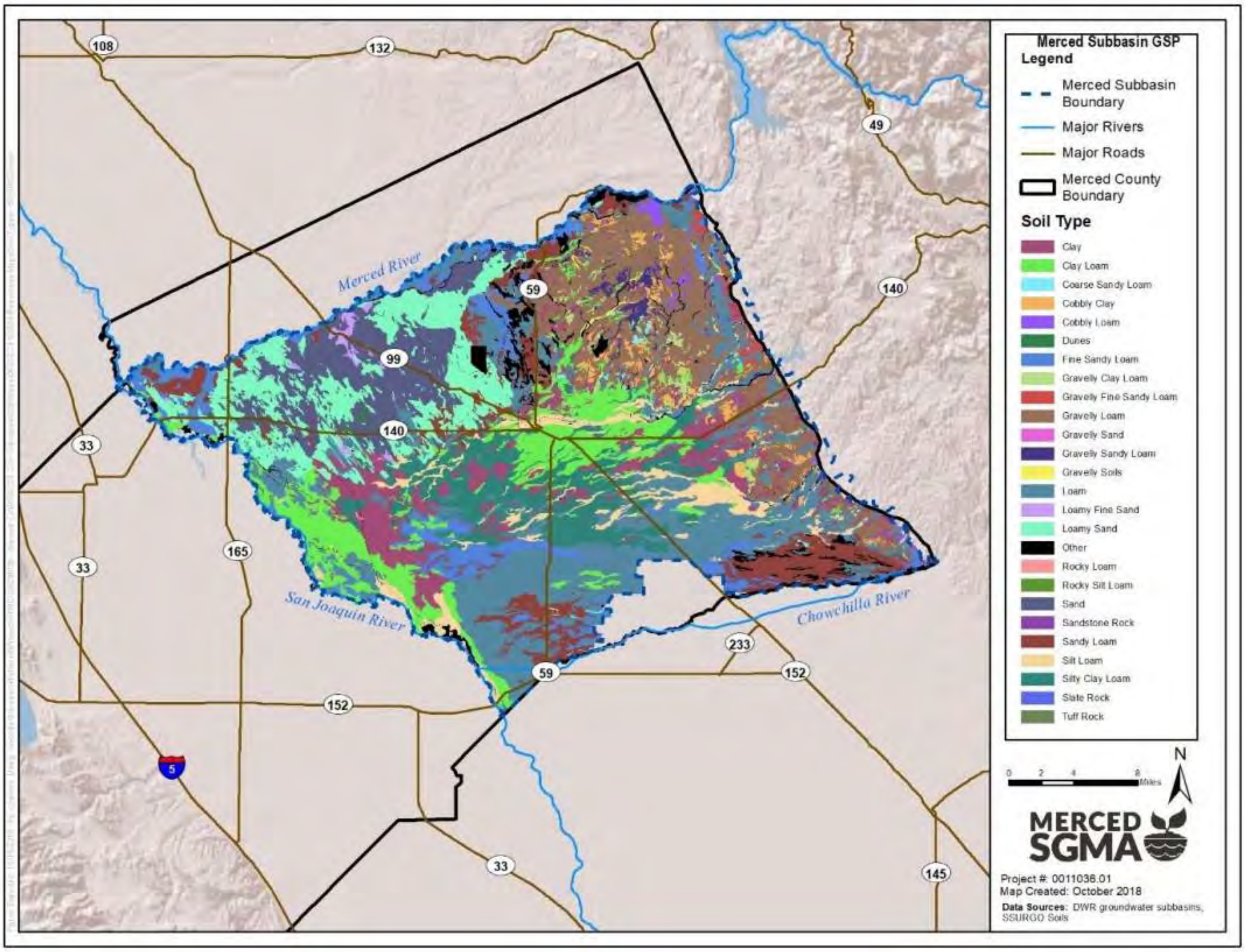
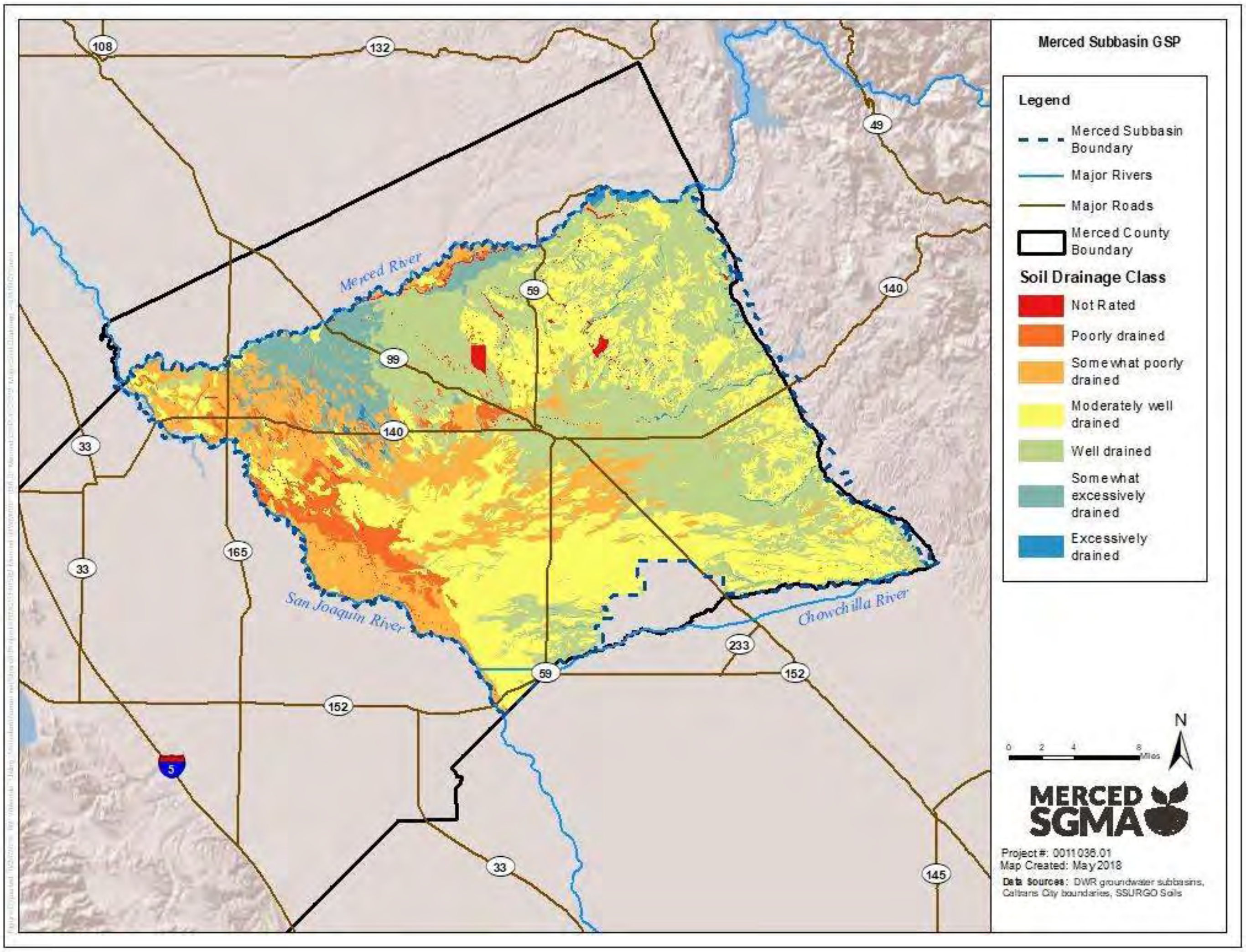


Table 2-1: Soil Type Summary

Soil Type	Area (sq miles)	% of total
Loam	145.8	18%
Gravelly Loam	96.3	12%
Clay Loam	77.8	10%
Loamy Sand	74.5	9%
Sand	66.9	8%
Silty Clay Loam	63.9	8%
Clay	62.2	8%
Sandy Loam	54.5	7%
Fine Sandy Loam	48.0	6%
Silt Loam	32.6	4%
Other (Includes Water, Fill, No Data Available)	28.2	4%
Cobbly Clay	10.9	1%
Gravelly Sandy Loam	6.7	1%
Gravelly Clay Loam	4.7	1%
Gravelly Fine Sandy Loam	4.0	1%
Loamy Fine Sand	3.8	<1%
Cobbly Loam	3.7	<1%
Coarse Sandy Loam	1.6	<1%
Gravelly Soils	1.4	<1%
Dunes	1.2	<1%
Sandstone Rock	1.1	<1%
Rocky Silt Loam	1.0	<1%
Rocky Loam	0.2	<1%
Slate Rock	0.0	<1%
Tuff Rock	0.0	<1%
Gravelly Sand	0.0	<1%
Total	791.3	100%

Figure 2-4: Soil Drainage Class

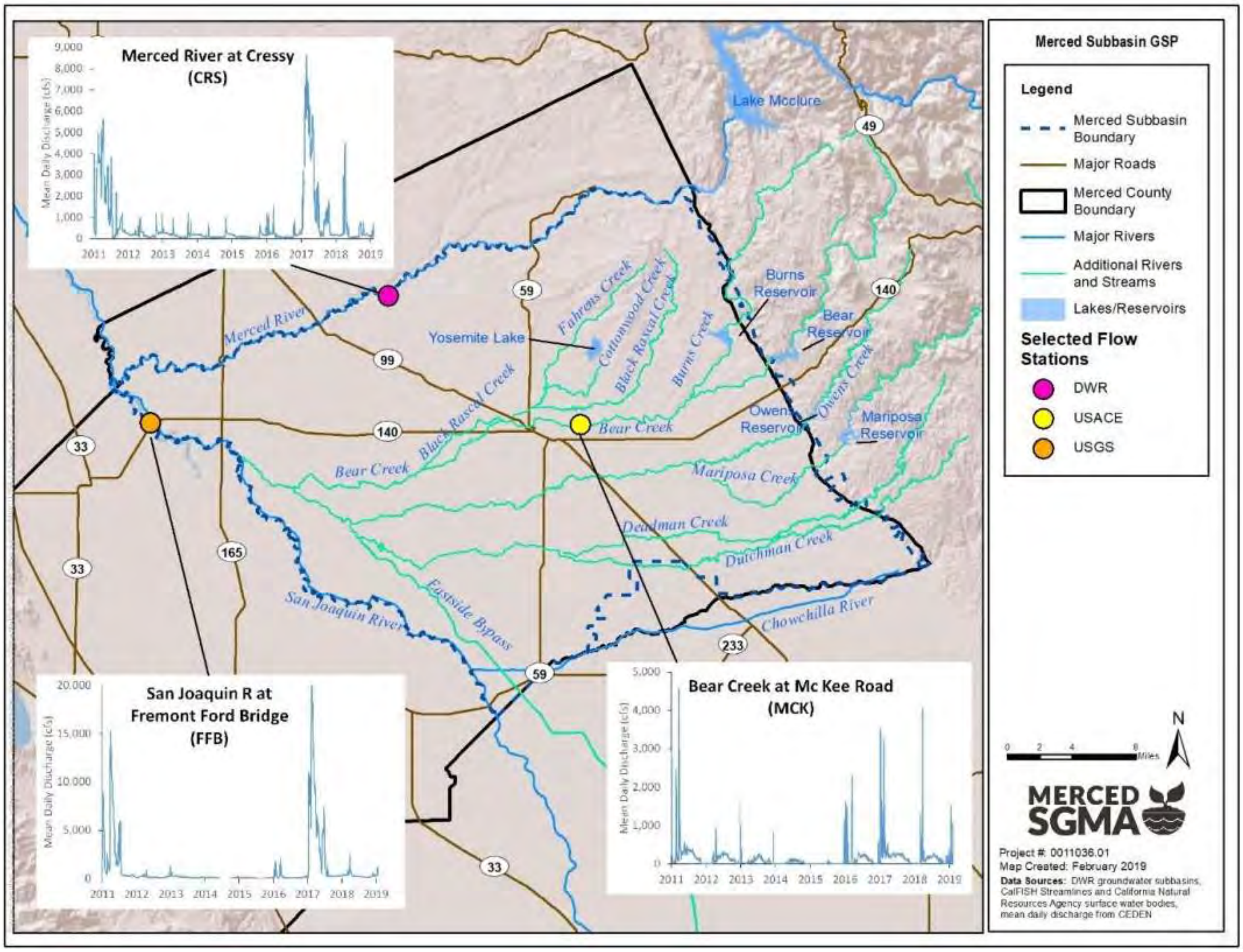


2.1.3.3 Surface Water

Many surface water courses cross the Merced Subbasin, generally flowing from the uplands in the northeast towards the San Joaquin River in the southwest. The San Joaquin River is an exception, flowing northwest towards the Sacramento-San Joaquin Delta. The San Joaquin and Merced Rivers are the largest rivers in the Subbasin. The Chowchilla River is also a significant water course.

Other surface water bodies within the Merced Subbasin include the following streams, nearly all of which are utilized for conveyance of irrigation water: Bear Creek, Black Rascal Creek, Burns Creek, Canal Creek, Cottonwood Creek, Deadman Creek, Dutchman Creek, Fahrens Creek, Little Dutchman Creek, Mariposa Creek, and Owens Creek (Figure 2-5). Figure 2-5 shows hydrographs for mean daily discharge (in cubic feet per second) at three selected gauging stations on the Merced River, San Joaquin River, and Bear Creek. The water in these surface water features is a mixture of snowpack and rainfall. No DWR, USGS, or United States Army Corps of Engineers (USACOE) stream gauges are operational on the Chowchilla River with available discharge information.

Figure 2-5: Surface Waters



Source: (DWR California Data Exchange Center)*, Hydrographs show mean daily discharge in cubic feet per second (cfs) from 2011-2018.*

The Merced River is the principal renewable surface water supply in the Merced Subbasin (see Figure 2-5). The Merced River is impounded by New Exchequer Dam, forming Lake McClure. Lake McClure has a storage capacity of over 1 million acre-feet (MAF) and is used for flood control and storage of irrigation water. Under agreement with the USACOE, each spring the storage pool in Lake McClure is reduced to a maximum of 675,000 acre-feet (AF) for flood control purposes (AMEC, 2008).

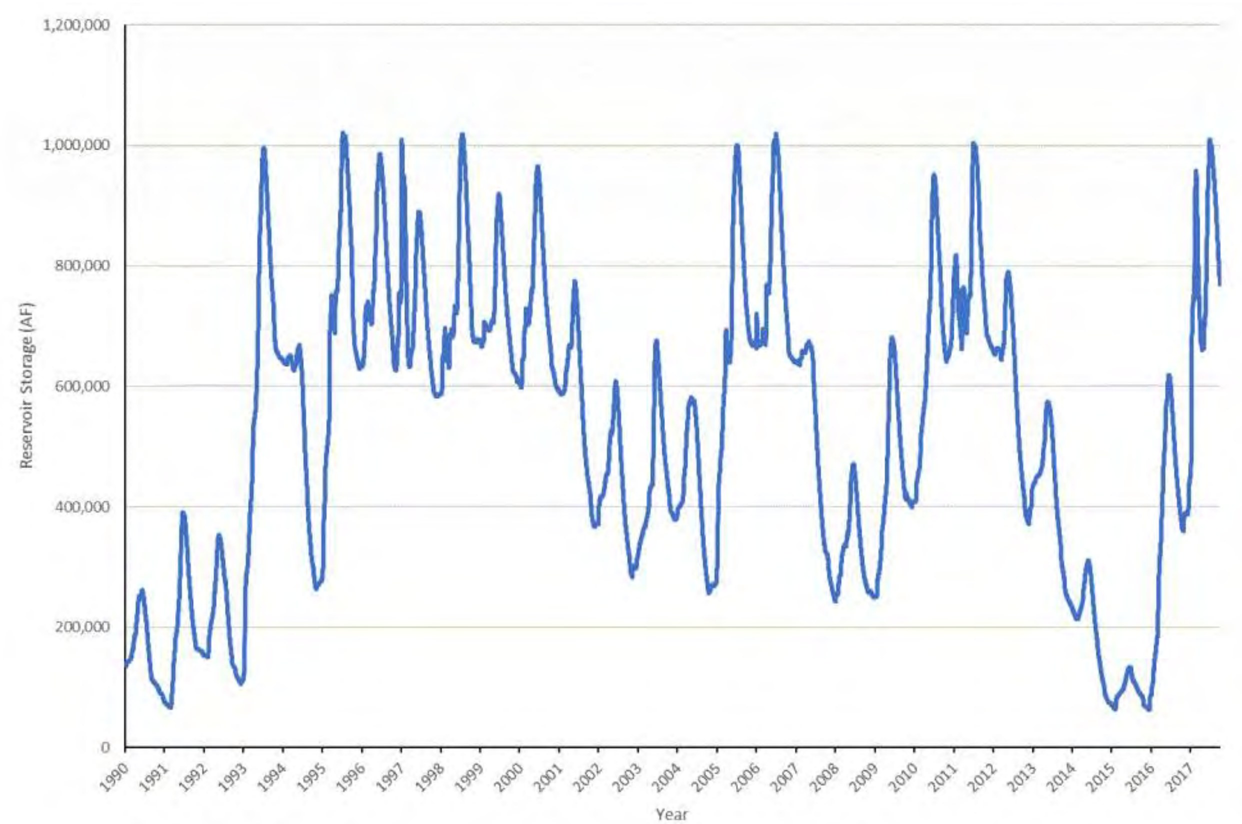
From 1990-2017, storage in Lake McClure has ranged from about 63,300 AF (February 2015) to 1,022,000 AF (July 1995) and averaged about 524,000 AF (Figure 2-6).

Diversions from the Merced River include:

- Merced Irrigation District (MID) – 430,000 acre-feet per year (AFY) (2003 - 2015 average)
- Stevinson Water District (SWD) – 18,000 AFY (2003 – 2013 average)

- Merquin County Water District (MCWD) – 16,000 AFY (2003 – 2013 average)

Figure 2-6: 1990-2017 Lake McClure Reservoir Storage



Source: USGS Data for Site 11269500 LK MCCLURE A EXCHEQUER CA

Minimum flow requirements for the Merced River downstream of Crocker-Huffman diversion dam (which is downstream of New Exchequer Dam), as measured at Shaffer Bridge, as required by MID's existing FERC license, are shown in Table 2-2. The values do not represent actual flows.

Table 2-2: Merced River Current Minimum Flow Requirements

Period	Normal Years (cfs)	Dry Years (cfs)
June 1 through October 15	25	15
October 16 through October 31	75	60
November 1 through December 31	100	75
January 1 through May 31	75	60

Source: (FERC, 2015)

The MID distribution system includes portions of natural streams (or drains), about 121 miles, that convey irrigation water, as well as 422 miles of unlined canals, and 97 miles of lined canals (MID, 2013). See Table 2-3 for details. The canals are conveyance structures that do not fall under the jurisdiction of SGMA legislation but are presented here for context of understanding the entire surface water system in the Subbasin.

Table 2-3: MID Water Conveyance and Delivery System

System Used	Number of Miles
Natural Channels (creeks and sloughs)	121
Unlined canal	422
Lined canal	97
Pipelines	177
Drains	45
Total Mileage of System	862

Source: (MID, 2013)

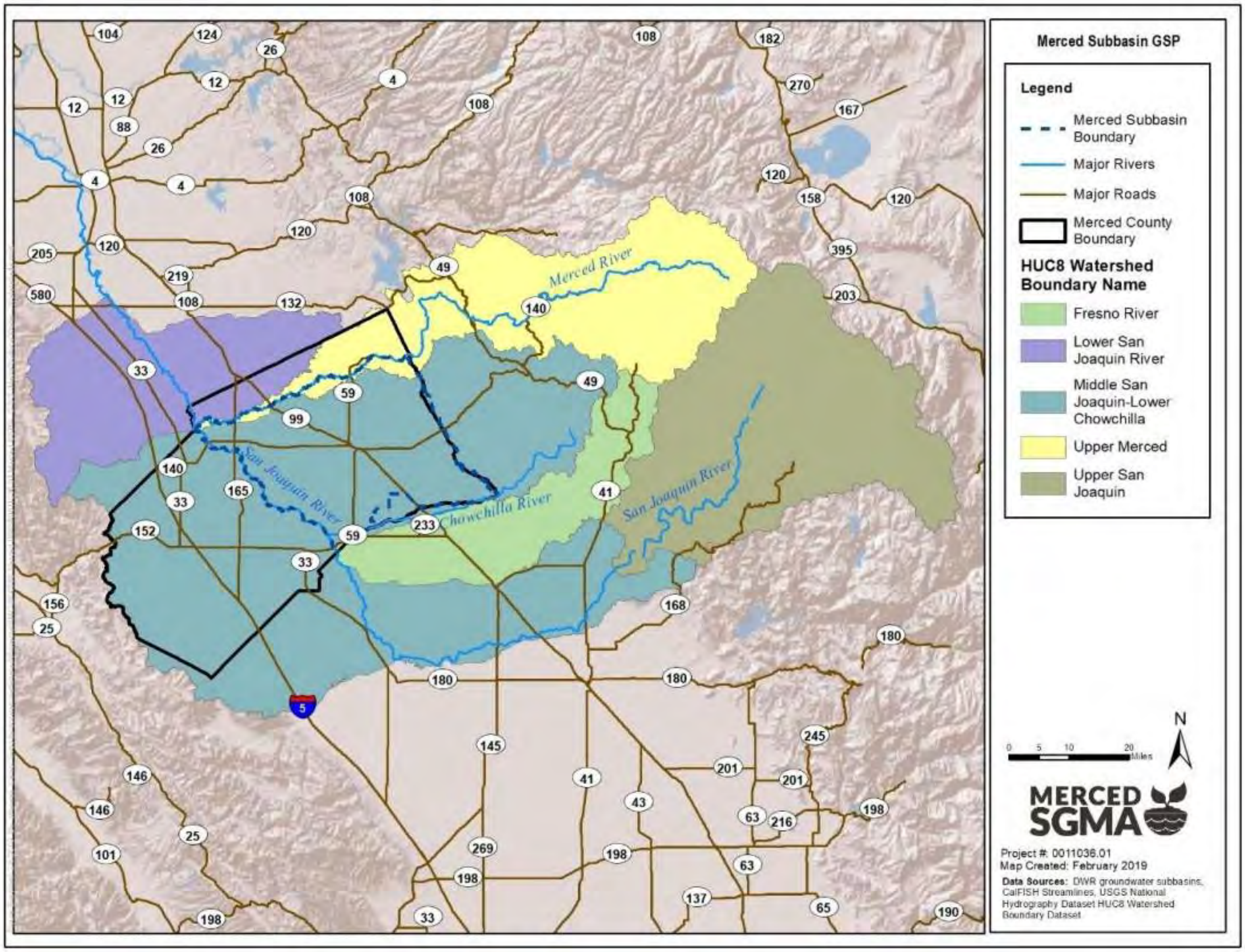
The Chowchilla River drains a 254 square-mile watershed on the western slope of the Sierra Nevada and is regulated by Buchanan Dam. Some flows downstream of the dam are diverted at Chowchilla Water District canals. Average annual natural flows from 1912 to 2008 at Buchanan Dam were approximately 70,000 AF. Chowchilla Water District has been able to take delivery of approximately 43,000 AF annually from the reservoir. The remaining 27,000 AF have been released as flood flows from the dam (RMC Water and Environment, 2015).

The San Joaquin River is regulated by Millerton Reservoir and other reservoirs on upstream tributaries. In the Merced Subbasin, the river is a source of water supplies for Turner Island Water District which diverts approximately 20,000 ~~-~~AFY (2003 to 2013 average) using the San Luis Canal Company conveyance. Turner Island Water District also receives periodic flood flows from the Eastside Bypass of 5,000 AFY, when available.

Based on outreach to stakeholders, there are no known active springs or seeps within the Merced Subbasin. Wetlands within the Subbasin are generally supplied supplemental water and are not dependent on shallow groundwater. Additional information on groundwater dependent ecosystems can be found in Section 2.2.7.

Figure 2-7 shows the Merced River, San Joaquin River, and Chowchilla River within their respective Hydrologic Unit Code (HUC) 8 watershed boundary, where HUC8 is a designation within the USGS Watershed Boundary Dataset. HUC's range in size from 2 (large regional systems) to 12 (small subwatersheds), with 8 being an appropriate size designation to provide some context of the size and location of the regional watersheds compared to the Merced Subbasin.

Figure 2-7: HUC8 Watershed Boundaries



2.1.3.4 Imported Water

No agencies in the Merced Subbasin benefit from imported water supplies from outside the Subbasin, such as from the Central Valley Project or State Water Project. The Turner Island Water District is split into two GSAs. Turner Island Water District GSA #1 (TIWD GSA-1) is the portion of the water district that falls within the Merced Subbasin while #2 falls within the Delta-Mendota Subbasin. There is some transfer of groundwater between the two GSAs, though the exact volume is unknown.

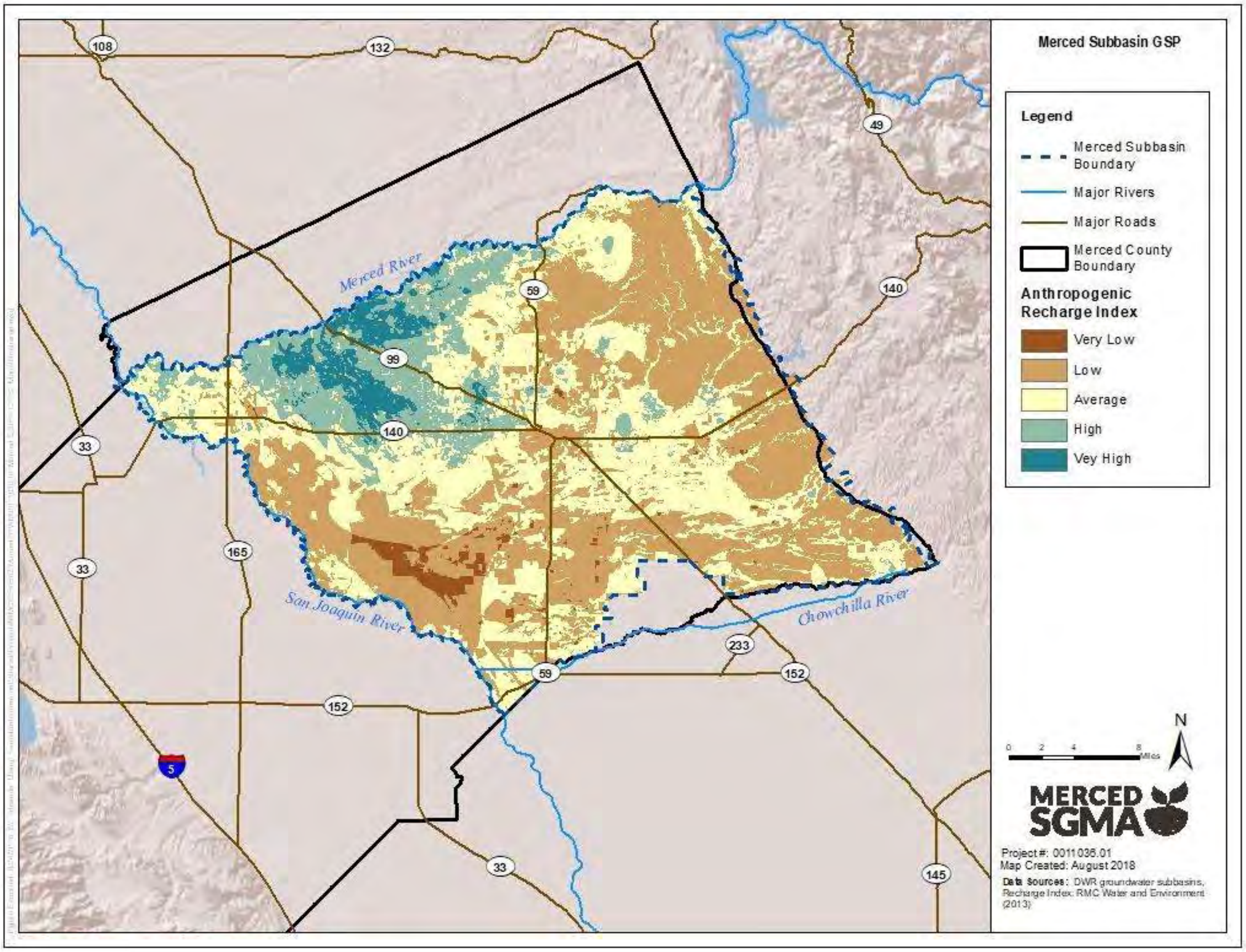
2.1.3.5 Groundwater Recharge and Discharge Areas

Groundwater recharge and discharge is driven by both natural and anthropogenic (human-influenced) factors. Areas of recharge and discharge within the Merced Subbasin are discussed below. Quantitative information about natural and anthropogenic recharge and discharge is provided in the water budget section.

2.1.3.5.1 Anthropogenic Groundwater Recharge

Anthropogenic recharge, particularly deep percolation from agricultural irrigation and earthen-lined canals, is a key source of recharge in the Merced Subbasin. A Groundwater Recharge Study was conducted as part of the Merced Integrated Regional Water Management (IRWM) Plan Development in 2013 to identify where recharge is occurring. The study used a Geographic Information System (GIS) overlay method to analyze spatial data and integrate information to interpret recharge areas (RMC Water and Environment, 2013b). The Subbasin was divided into five different categories, relating the relative amount of recharge occurring in the area (see Figure 2-8). The map shows recharge is occurring in areas with coarser materials in the upper subsurface and in areas with extensive applied water to support irrigated agriculture. The map does not show the recharge occurring from surface water courses, including rivers and canals. Estimates of the quantities of these recharge components are provided in the water budget discussion in Section 2.3.

Figure 2-8: Areas of Recharge



2.1.3.5.2 Natural Groundwater Recharge and Discharge

Groundwater discharge is primarily through groundwater production wells. However, groundwater also discharges to rivers and streams where groundwater elevations are higher than river stage. This occurs in limited areas in the lower portions of the Subbasin. Figure 2-9 shows gaining streams in red where groundwater discharges to rivers, while losing streams are shown in blue where streams recharge groundwater.

This analysis was based on modeling results from the Merced Water Resources Model (MercedWRM) for approximately 1,500 stream nodes in the Merced Subbasin. The stream nodes within the MercedWRM contain information on the quantity of stream gains and losses on a monthly basis. Using the historical simulation (see 2.3.4.1 - Historical Water Budget), the median value of monthly stream gains and losses was calculated over the 2005 to 2015 time period. Figure 2-9 indicates where these stream nodes indicate gaining conditions (groundwater contributing to streamflow, where median monthly gains were larger than losses) and where they indicate losing conditions (surface water recharging groundwater, where median monthly gains were less than losses). Any stream nodes that are disconnected from the principal aquifer (see Figure 2-10) are noted as losing. Disconnection from the principal aquifer was determined where the invert elevation of the streambed is higher than the elevation of the groundwater levels within the MercedWRM aquifer hydrogeologic structure. In areas of the Shallow Unconfined Aquifer (described later in Section 2.1.7.1 - Aquifer Systems in the Basin), conditions can result in regions of perched water tables (AMEC, 2008) which are often associated with or affected by instream flow levels and may not always be considered a full interconnection with the deeper groundwater system typically accessed by production wells.

The groundwater elevation data indicate that there is groundwater discharge along the San Joaquin River (gaining stream). There is a trough in the water table elevations that follows the San Joaquin River. Groundwater inflow to the river and surrounding areas occurs from both sides of the San Joaquin Valley. Apart from groundwater pumping, this river and the surrounding areas are the primary groundwater discharge area for the valley (AMEC, 2013).

On the north side of the Merced Subbasin west of State Highway 99, the lower reaches of the Merced River appear to be a groundwater discharge area (where the Merced River is a gaining stream). East of the highway, the river may be acting as a constant head source and supplying water to the pumping depression centered approximately 17 miles northwest of Merced. East of Oakdale Road (Township 5 South, Range 12 East, Section 36), the river is higher than the groundwater and probably provides some recharge to the groundwater (AMEC, 2013).

Comparison of Chowchilla River elevations with groundwater levels indicates that the river is higher than the groundwater. Consequently, the river probably contributes some recharge to groundwater along the reach south of the study area. The pumping depressions near the Chowchilla River do not appear to be affected by the presence of the river (AMEC, 2013).

Figure 2-9: Losing and Gaining Streams

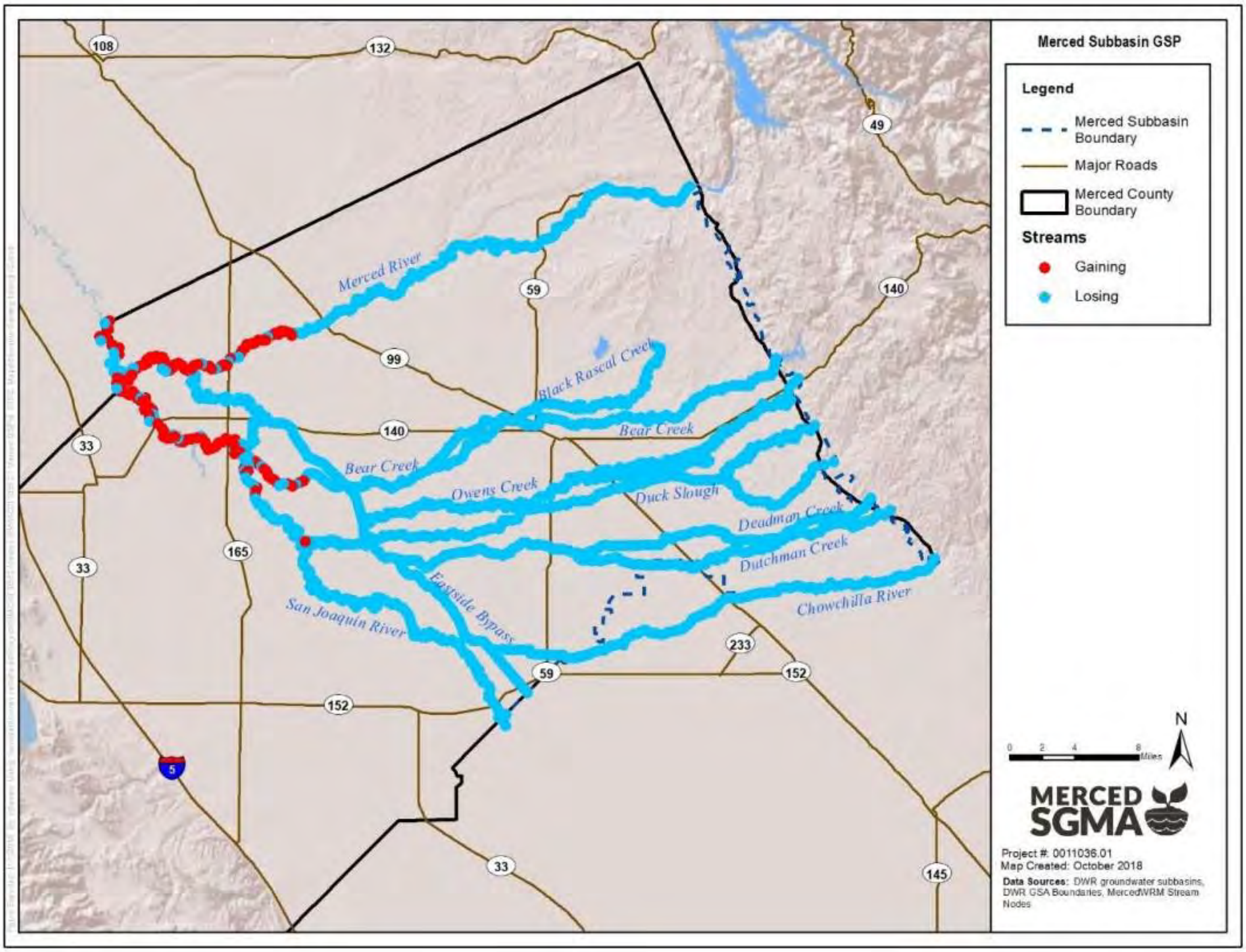
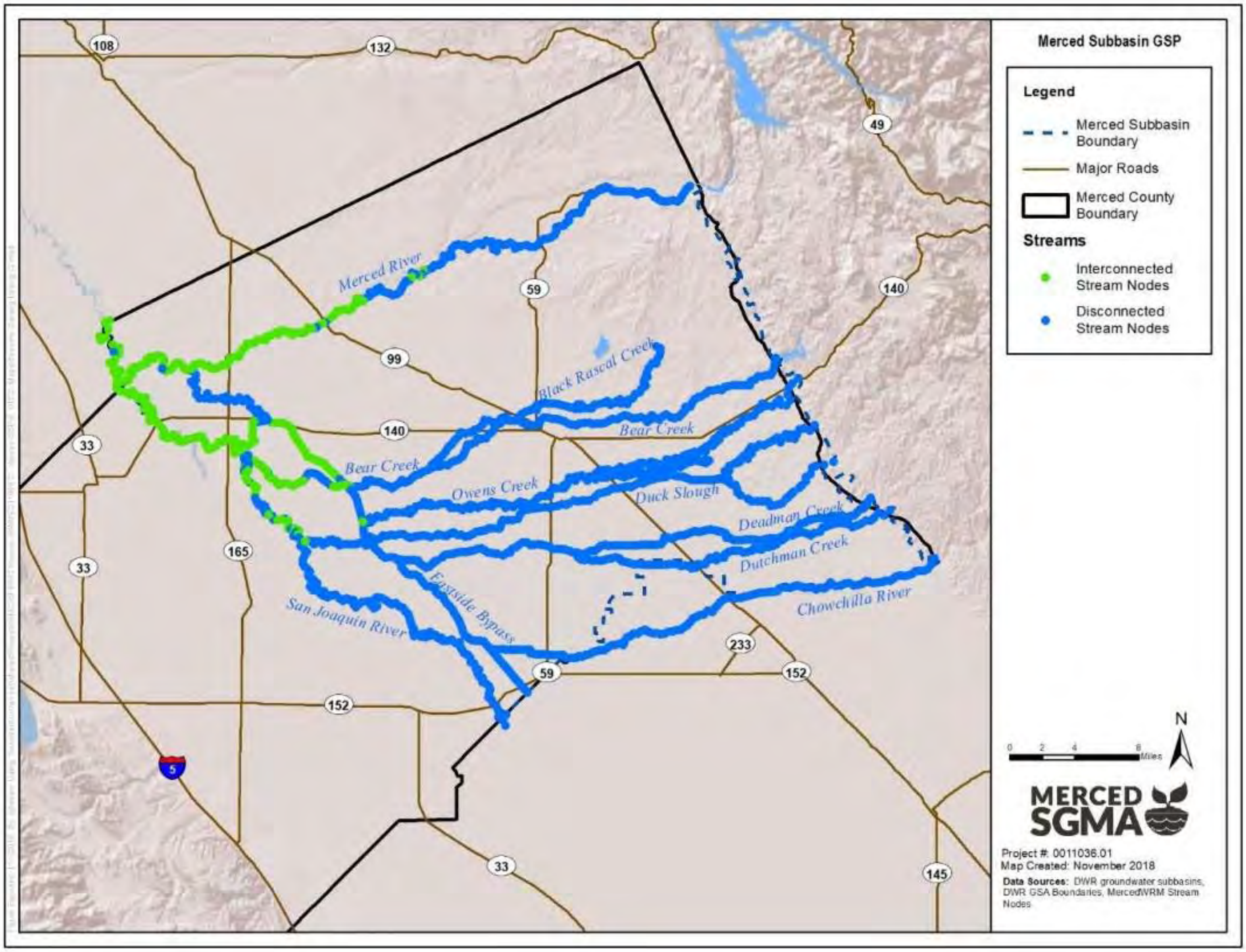


Figure 2-10: Interconnected and Disconnected Streams



2.1.4 Geologic Formations and Stratigraphy

DWR's best management practices (BMP) for the HCM suggests using California Geological Survey (CGS) or USGS data for surficial geologic mapping. For this GSP, surficial geology as well as cross-sections were developed based on detailed USGS work performed by Page & Balding (1973), Page (1977), and Page (1986).

The Merced Subbasin is underlain by consolidated rocks and unconsolidated deposits. The consolidated rocks, from bottom to top, include the Sierra Nevada basement complex, Ione Formation and other sedimentary rocks, the Valley Springs Formation, and the Mehrten Formation (Page & Balding, 1973). The unconsolidated deposits include continental deposits, lacustrine and marsh deposits, older alluvium, younger alluvium, and flood-basin deposits.

A description of the consolidated rocks and unconsolidated deposits is provided below, with a map of surficial geology shown as Figure 2-11 and a summary table of the units and their water-bearing characteristics provided as Table 2-4.

Note that the text, table, and maps are taken from different sources and use slightly different terminology. Therefore, Table 2-5 is provided to map terminology between items.

The Merced Groundwater Management Plan (AMEC, 2008) provides the following description of the Subbasin geology in the following subsections. The discussions are supported by a geologic map (Figure 2-12) and cross sections (Figure 2-13 through Figure 2-22) from several sources.

2.1.4.1 Consolidated Rocks

The consolidated rocks include the Sierra Nevada basement complex, Ione Formation and other sedimentary rocks, the Valley Springs Formation, and the Mehrten Formation.

The Sierra Nevada bedrock complex consists largely of metasedimentary and metavolcanic rock of pre-Tertiary age (Page & Balding, 1973). These rocks occur as foothill ridges along the eastern edge of the Merced Subbasin (Figure 2-11). Where the basement complex occurs near the surface, fracture sets and joints within the bedrock complex may contain sufficient groundwater for domestic or stock supplies.

The Eocene Ione Formation unconformably overlies the Sierra Nevada bedrock complex and is composed of marine to non-marine clay, sand, sandstone, and conglomerate. These rocks occur as foothill ridges along the eastern edge of the Merced Subbasin (Figure 2-11). The Ione is characterized by a white sandy clay (kaolinite) at its base and beds of conglomerate and yellow, red, and gray sandstone in its upper parts. In localized areas near the Sierra Nevada foothills, the formation contains fresh water; however, well yields are highly variable.

The Miocene Valley Springs Formation overlies the Ione Formation and is composed of a fluvial sequence of rhyolitic ash, sandy clay, and siliceous gravel in a clay matrix. These rocks occur as foothill ridges along the eastern edge of the Merced Subbasin (Figure 2-11). Because of the abundant ash and clay matrix, the Valley Springs has a relatively low groundwater yield, sufficient for domestic or stock supplies, but generally insufficient for irrigation.

The Miocene/Pliocene Mehrten Formation overlies the Valley Springs Formation and is composed of fluvial deposits of sandstone, breccia, conglomerate, luff, siltstone and claystone. It contains a large amount of andesitic material, making it easy to distinguish. The Mehrten outcrops over a large area in eastern Merced Subbasin (Figure 2-11). It forms an important aquifer in the Merced Subbasin with relatively high yields.

2.1.4.2 Unconsolidated Deposits

The unconsolidated deposits, from bottom to top, include continental deposits, lacustrine and marsh deposits, older alluvium, younger alluvium, and flood-basin deposits.

The Pliocene/Pleistocene continental deposits consist of a heterogeneous mixture of poorly sorted gravel, sand, silt and clay derived primarily from the Sierra Nevada. The sediments, which are found throughout the Merced Subbasin, dip gently to the southwest and have variable thickness up to 700 feet. The continental deposits have relatively large yields to wells and are an important part of the aquifer system.

The lacustrine and marsh deposits consist of two beds: the Corcoran Clay Member of the Pleistocene Tulare Formation and a shallow clay bed of Holocene age (Page R. W., 1977). The Corcoran Clay is a bed of laterally extensive reduced (blue/grey) silt and clay that underlies about 437 square miles in the southwest portion of the Merced Subbasin (Figure 2-37). The Corcoran Clay is a significant confining layer up to 60 feet thick. The shallow clay bed of Holocene age is composed of oxidized (brown/red) sandy clay and clay with silica cemented intervals (hardpan). It is found throughout most of the Merced Subbasin at a shallow depth (-35 feet). For more information on the Corcoran Clay, see Section 2.1.7.2: Principal Aquifers and Aquitards.

The older alluvium consists of a heterogeneous mixture of poorly sorted gravel, sand, silt and clay up to 400 feet thick derived primarily from the Sierra Nevada. The sediments, which are found throughout the Merced Subbasin, were deposited as a series of interbedded coarse-grained and fine-grained layers and form a leaky-aquifer system.

The flood-plain deposits consist of intercalated lenses of reduced to oxidized fine sand, silt, and clay. These deposits are found in the southwestern portion of the Merced Subbasin (Figure 2-11) and generally are less than 30 feet thick.

The younger alluvium consists of well-sorted gravel and sand derived primarily from the Sierra Nevada. The younger alluvium is found in a narrow band along the stream channels throughout the Merced Subbasin (Figure 2-11) (Page & Balding, 1973).

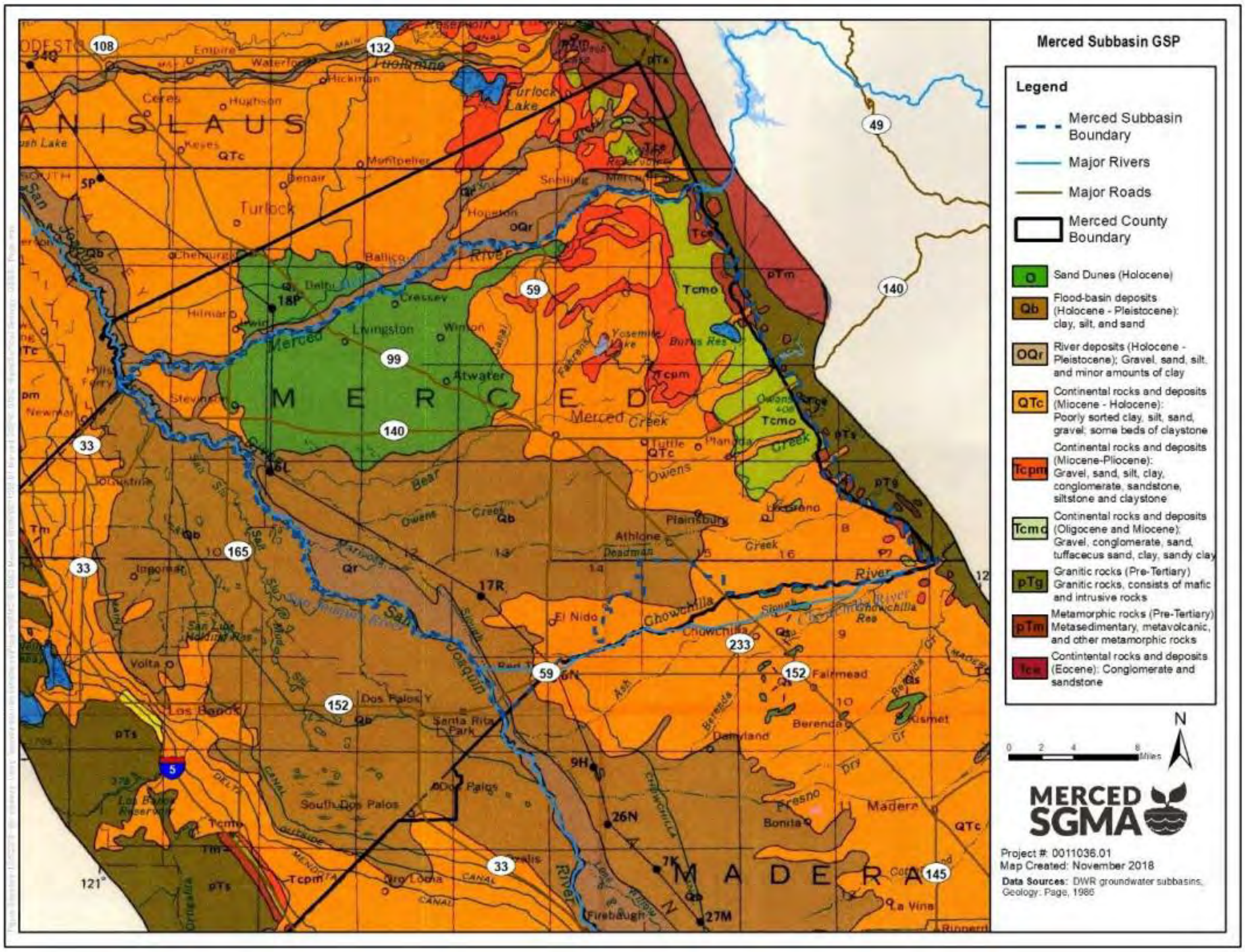
Table 2-4: Generalized Section of Geologic Units and Their Water-Bearing Characteristics

Period and Epoch		Geologic Unit	Lithologic Character	Maximum thickness (feet)	Water-Bearing Character	For Reference - Figure 2-11 Formation Name
Unconsolidated Deposits						
Quaternary	Holocene	Flood-basin deposits	Silt, clay, and fine sand, bluish-gray, brown, and reddish-brown.	100	Small hydraulic conductivities and small yields to wells.	Qb (Flood-basin deposits [Holocene-Pleistocene])
Quaternary	Holocene	Younger alluvium	Gravel, sand, and find sand, some silt and clay, little or no hardpan; yellow, yellowish-brown, brown.	100	Moderate to large hydraulic conductivities, where saturated yields moderate quantities to wells. Unconfined.	Qr (River deposits [Holocene-Pleistocene])
Quaternary	Pleistocene and Holocene?	Older alluvium	Gravel, sand, silt, and clay, some hardpan; brown, reddish-brown, gray, brownish-gray, white, blue, and black.	400 (in northern part of area) 700 (in southern part of area)	Moderate to large hydraulic conductivities; yields to wells reported as large as 4,451 gpm (gallons per minute); average yield to large wells (1900 gpm). North of study area transmissivities of about 11,700 ft^2/day (cubic feet per day per foot). Unconfined and confined.	QTc (Continental rocks and deposits [Miocene-Holocene])
Quaternary	Pleistocene	Lacustrine and marsh deposits	Silt, silty clay, and clay, gray and blue.	100	Confining bed, very small hydraulic conductivities. (includes the Corcoran Clay)	(not pictured)
Tertiary and Quaternary?	Pliocene and Pleistocene	Continental deposits	Gravel, sand, silt, and clay; brown, yellow, gray, blue, and black.	>450 (In northern part of area) >700 (in southern part of area)	Moderate to large hydraulic conductivities; yield to wells as large as 2,102 gpm. North of study area transmissivities of about 8,000 ft^2/day. Confined beneath lacustrine and marsh deposits. In extreme western part of area, water contains in excess of 2,000 mg/l (milligrams per liter) dissolved solids.	QTc (Continental rocks and deposits [Miocene-Holocene])

Period and Epoch		Geologic Unit	Lithologic Character	Maximum thickness (feet)	Water-Bearing Character	For Reference - Figure 2-11 Formation Name
Consolidated Rocks						
Tertiary	Miocene and Pliocene	Mehrten Formation	Sandstone, breccia, conglomerate, tuff, siltstone, and claystone; brown, yellowish-brown, grayish-brown, pinkish-brown, pink, blue, yellow, green, gray, and black. Large amounts of andesitic material occur in beds.	200 (In northern part of area) >700 (In southern part of area)	Small to moderate hydraulic conductivities. North of study area ranges in hydraulic conductivity from 0.01 to 67 ft/day. Yield to wells as large as 2,102 gpm. In western part of area, water contains in excess of 2,000 mg/l dissolved solids content. Locally in eastern part of area water probably contains in excess of 2,000 mg/l dissolved solids.	Tcpm (Continental rocks and deposits [Miocene-Pliocene])
	Miocene and Pliocene	Valley Springs Formation	Ash, sandy clay, and siliceous sand and gravel generally in clay matrix, tuff, siltstone, and claystone; yellow, yellowish-brown, brown, reddish-brown, gray, greenish-gray, white, pink, green, and blue. Rhyolitic material occurs in beds.	900 (In northern part of area) Unknown in southern part of area	Probable small hydraulic conductivities. Quality of water ranges from fair to poor.	Tcmo (Continental rocks and deposits [Oligocene and Miocene])
	Eocene	Ione Formation and other sedimentary rocks	Conglomerate, sandstone, clay and shale; partly marine; yellow, red, gray, and white.	800 (In northern part of area) Unknown in southern part of area	Probable small to moderate hydraulic conductivities. In places reported to yield saline water.	Tce (Continental rocks and deposits [Eocene])
Cretaceous		Marine sandstone and shale	Sandstone and shale.	>9,500 (In northern part of area) Unknown in southern part of area	Unknown. Reported to yield saline water.	(not pictured)
Pre-Tertiary		Basement complex	Metamorphic and igneous rocks.		Fractures and joints locally yield small quantities of water; otherwise virtually impermeable.	pTm (Metamorphic rocks [Pre-Tertiary])

Source: (Page & Balding, 1973)

Figure 2-11: Surficial Geology



The units generally dip to the west; that is, the elevation of the units is higher in the east than in the west. Some units are not present across the entire basin. Notably, this is true of the Corcoran Clay which extends east to near Highway 99, where it is generally shallow and thin, and becomes deeper and thicker to the west where it extends beyond the western boundary of the Subbasin. Details on materials in the subsurface are provided through cross sections and a three-dimensional rendering of the basin.

Five cross sections were developed by Page & Balding (1973) across the Merced Subbasin and neighboring Turlock Subbasin. The locations of the cross-section are shown on Figure 2-12, with the cross-sections themselves shown on Figure 2-13 through Figure 2-17. The cross sections show the units dipping towards the west, highlighting the depth, thickness and extent of the Corcoran Clay as well as the depth of the base of fresh water (short dashed line). Note that these cross sections include vertical exaggeration in order to highlight the small difference in the vertical axis. Distances shown vertically are 52.8 times the horizontal distances, allowing visualization of finer detail with depth, but also resulting in dip angles appearing much steeper and the overall aquifer appearing much deeper than in reality.

Four additional cross sections were developed by Page (1977) more specifically for the City of Merced-City of Atwater area. The locations of these cross-sections are shown on Figure 2-18, with the cross sections shown on Figure 2-19 through Figure 2-22.

Figure 2-12: Location of Geologic Cross Sections (Page & Balding 1973)

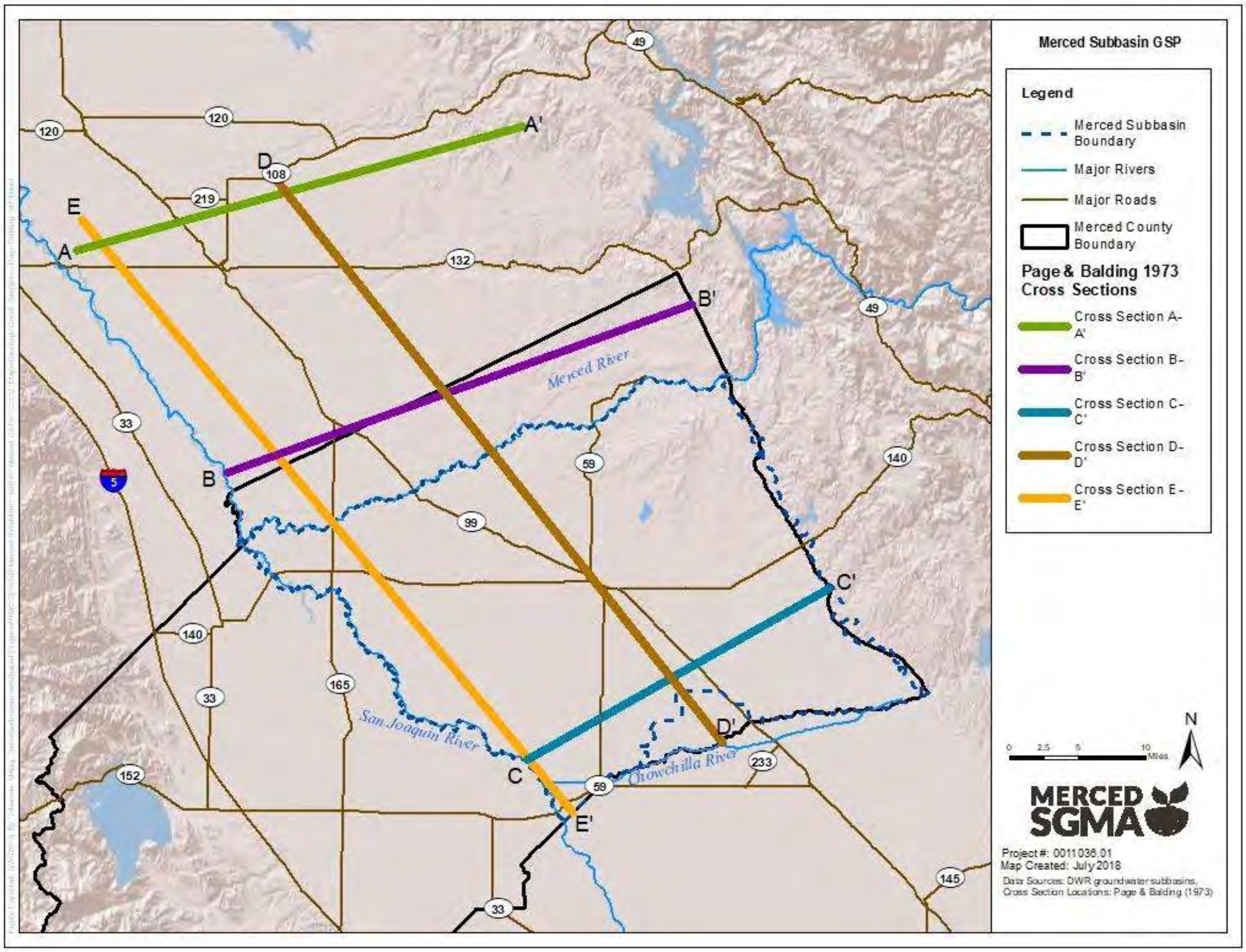
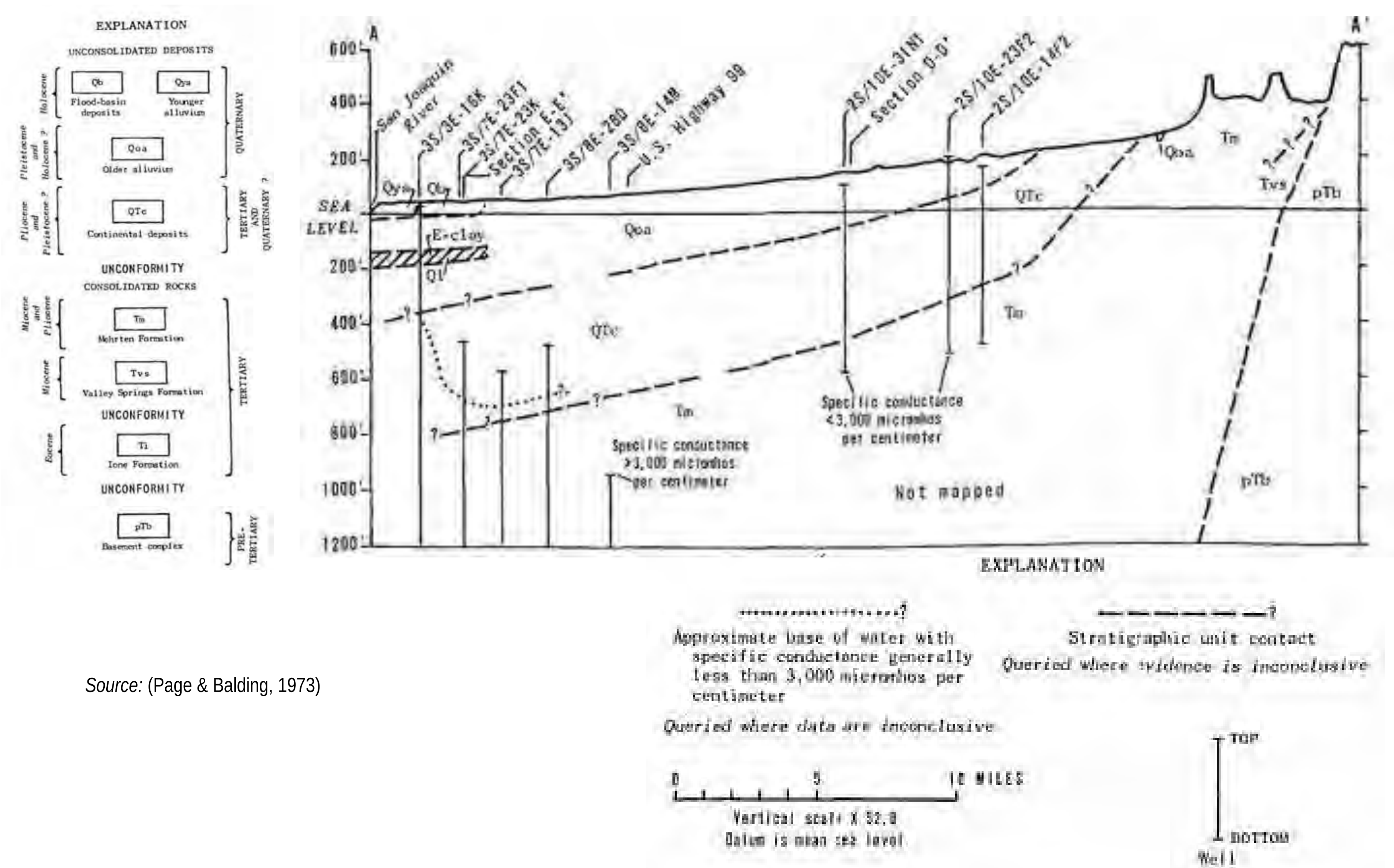
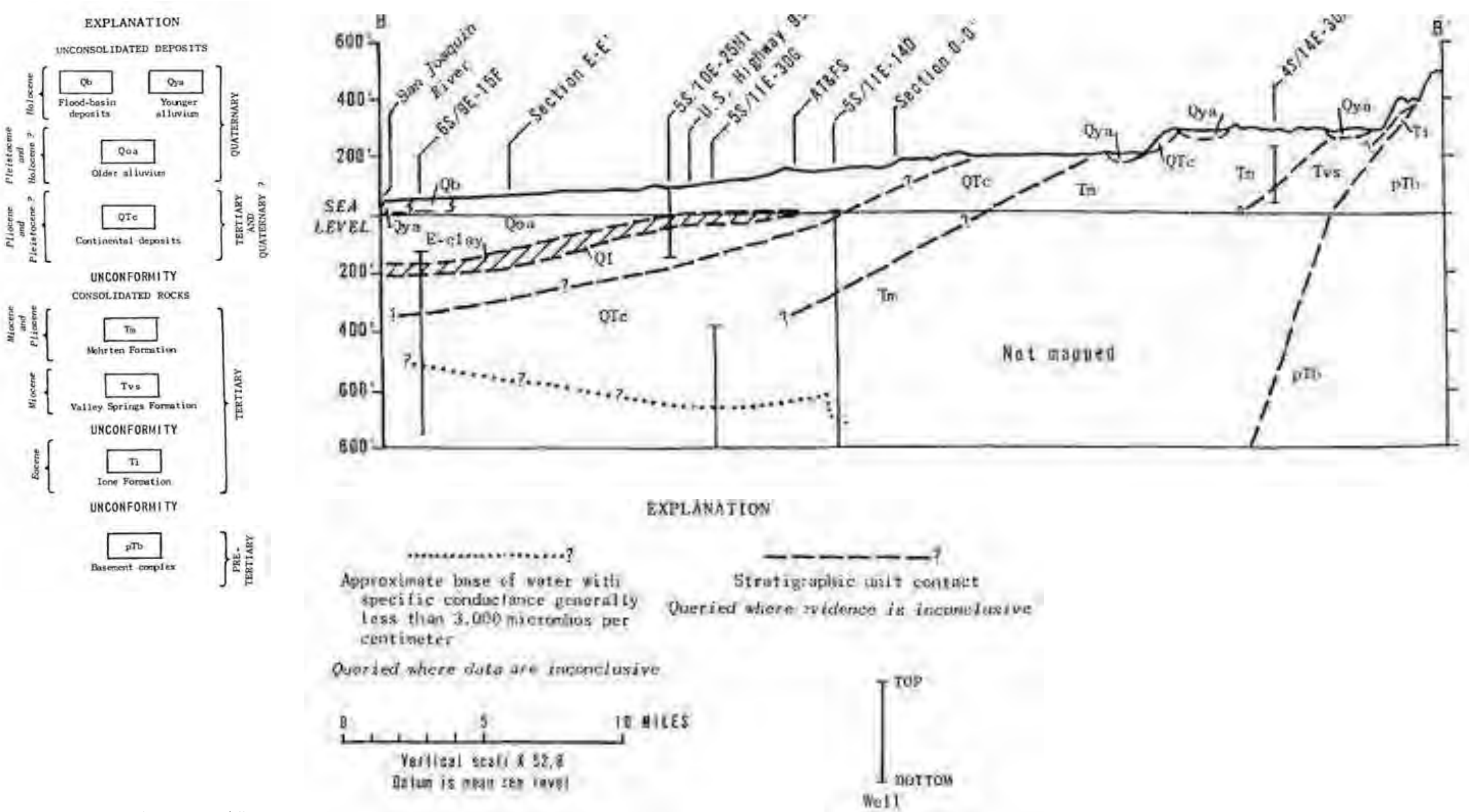


Figure 2-13: Geologic Cross-Section A (Page & Balding 1973)



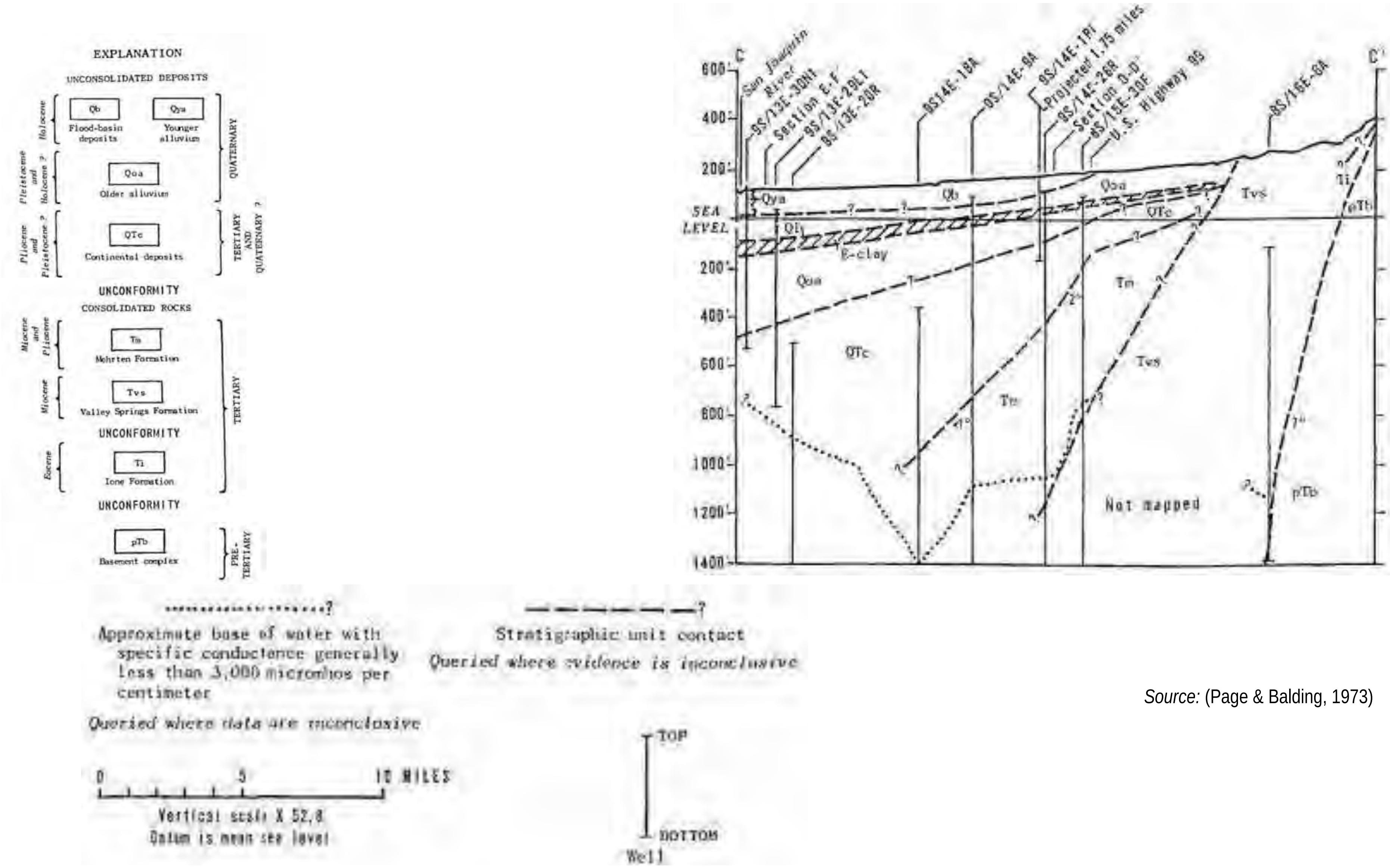
Source: (Page & Balding, 1973)

Figure 2-14: Geologic Cross-Section B (Page & Balding 1973)



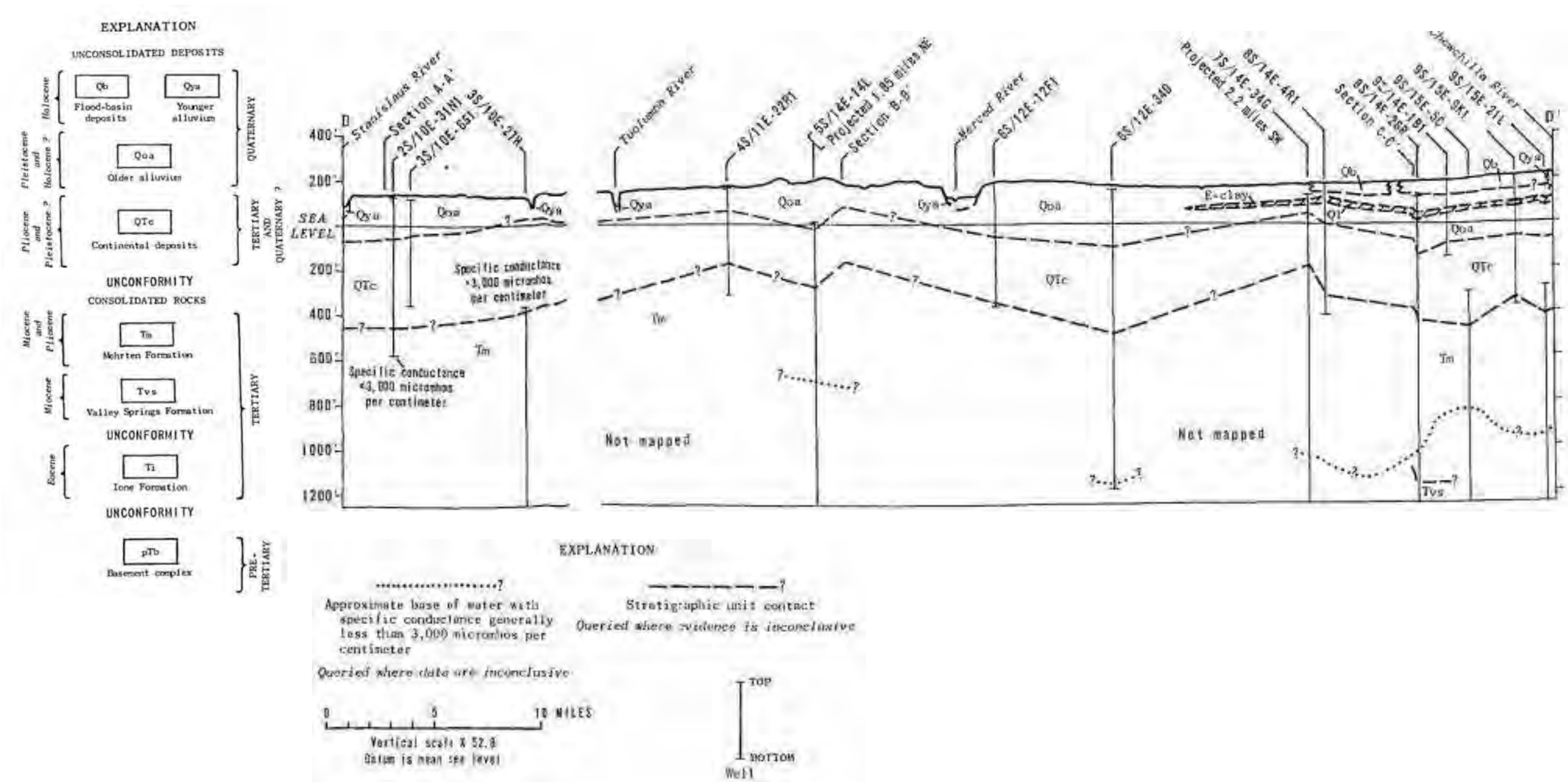
Source: (Page & Balding, 1973)

Figure 2-15: Geologic Cross-Section C (Page & Balding 1973)



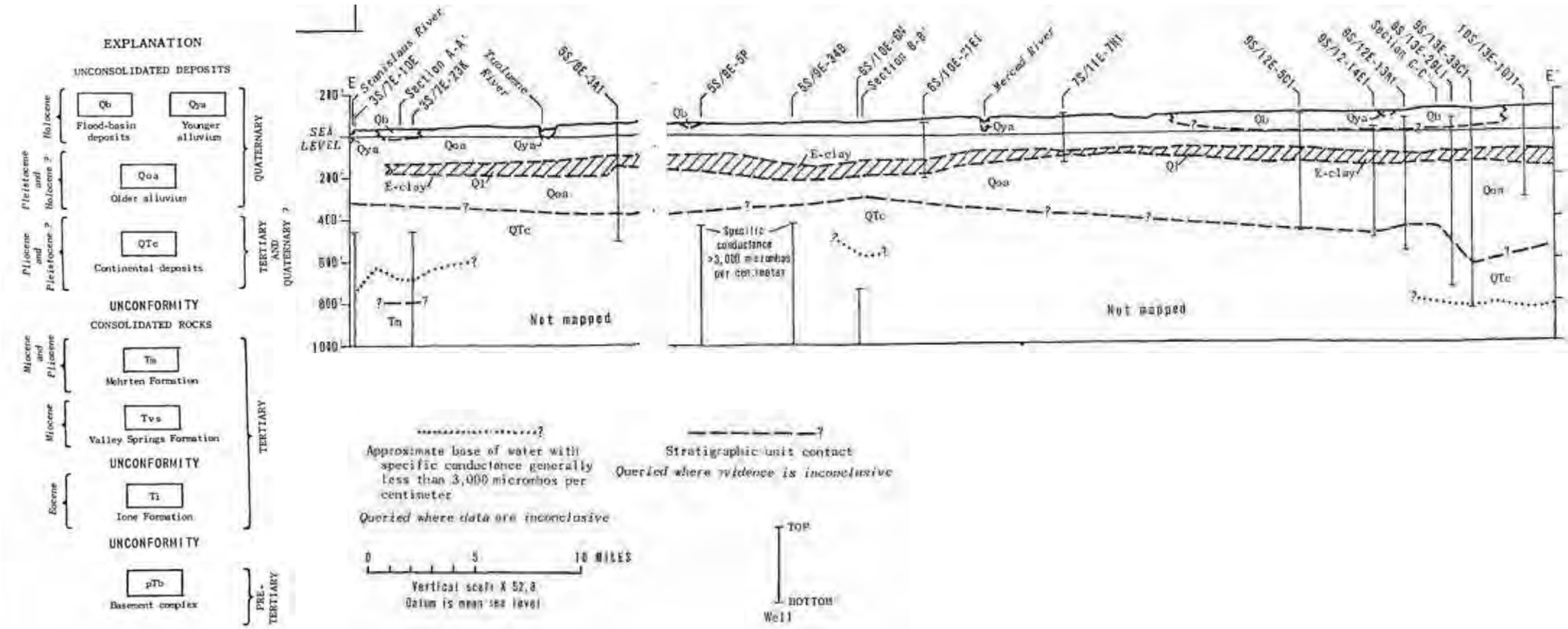
Source: (Page & Balding, 1973)

Figure 2-16: Geologic Cross-Section D (Page & Balding 1973)



Source: (Page & Balding, 1973)

Figure 2-17: Geologic Cross-Section E (Page & Balding 1973)



Source: (Page & Balding, 1973)

Figure 2-18: Location of Geologic Cross Sections (Page 1977)

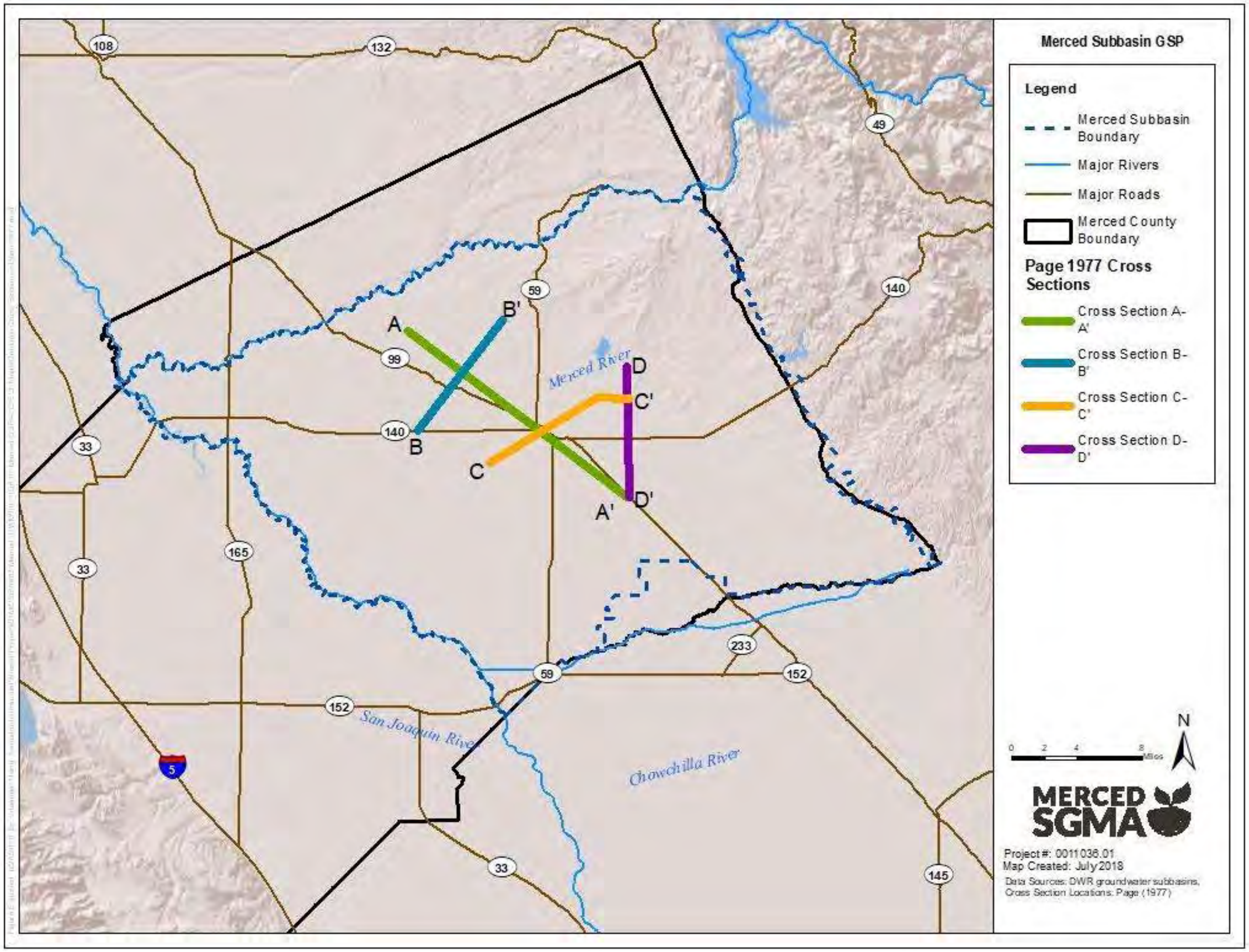
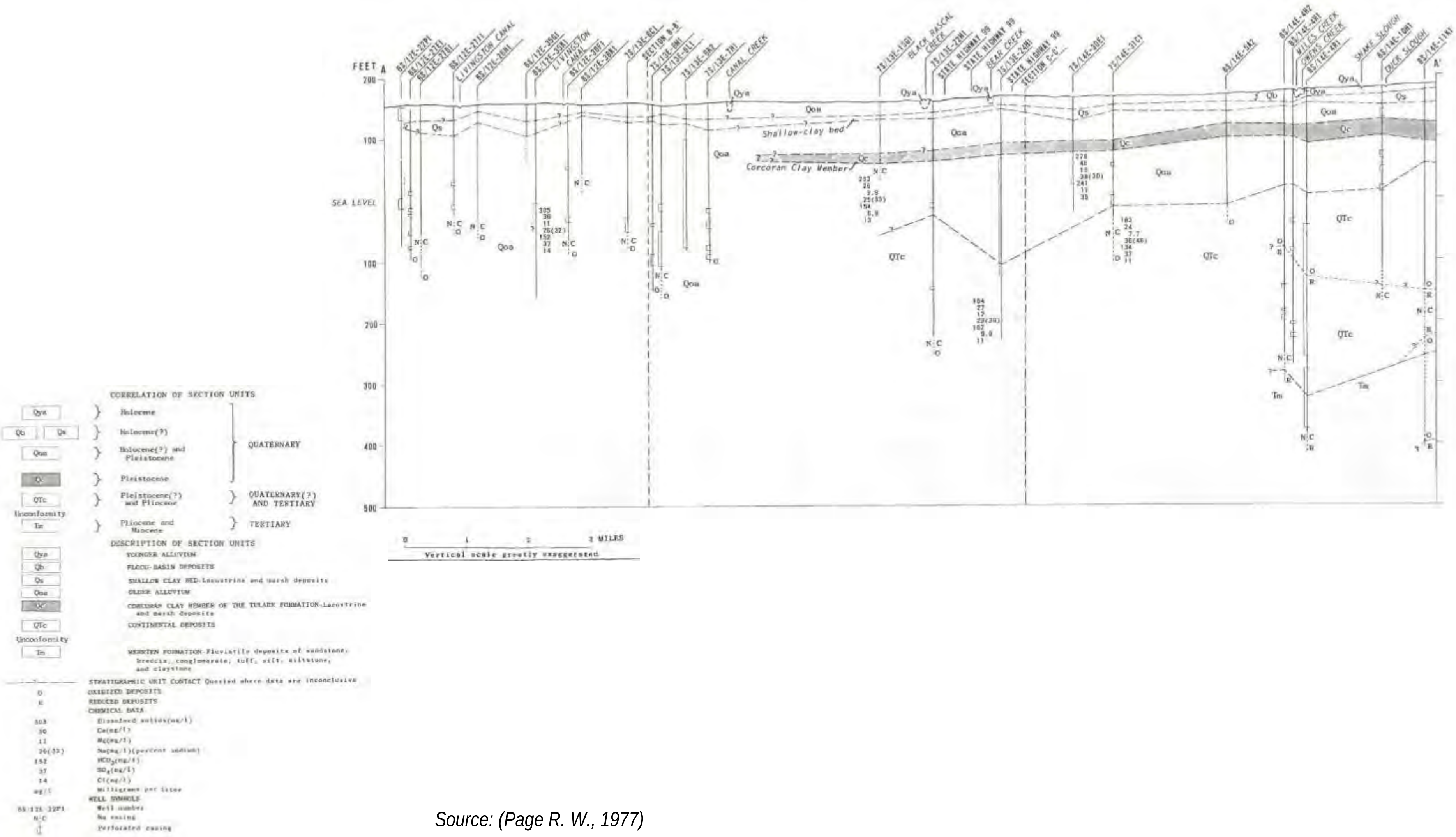
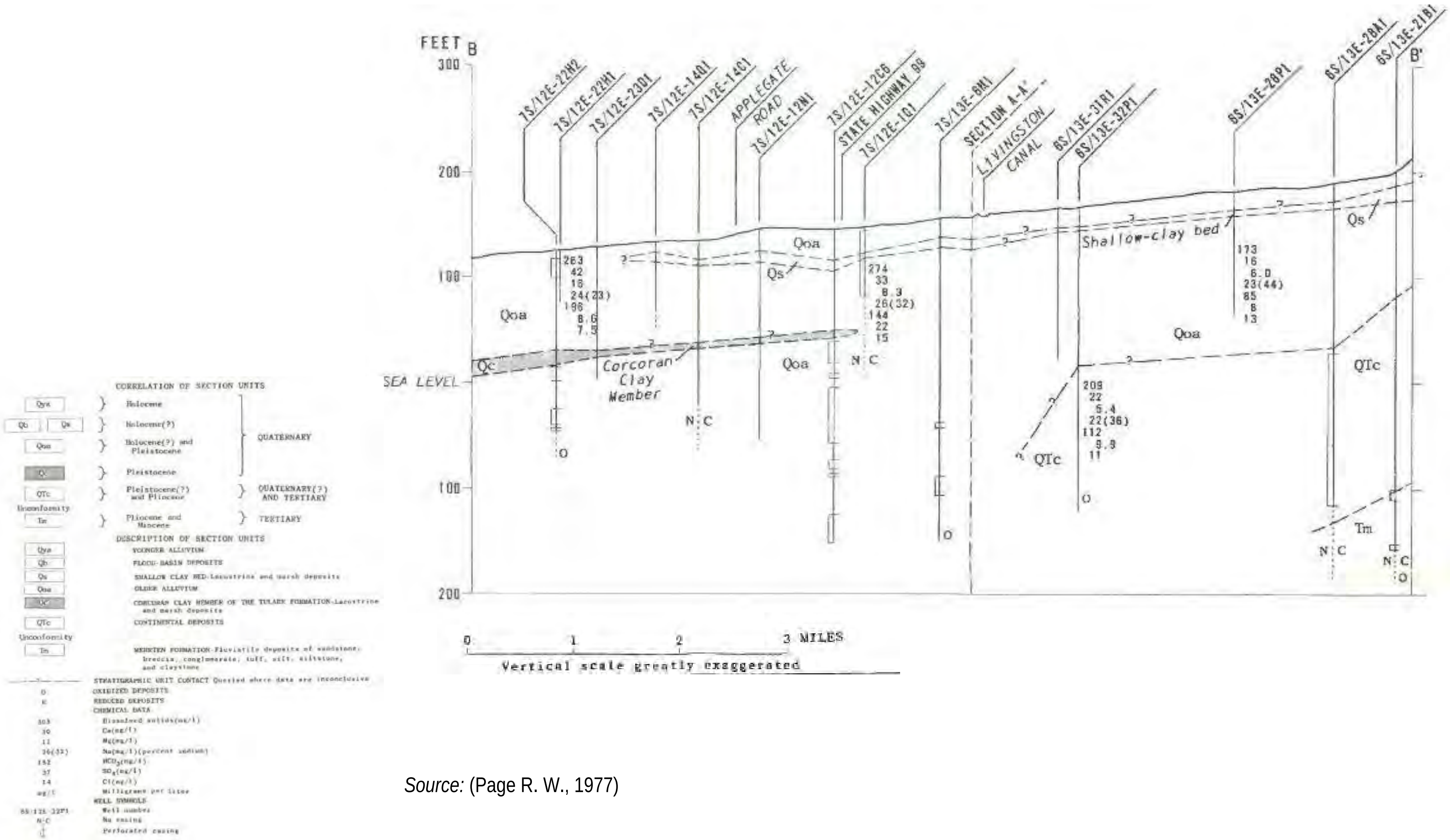


Figure 2-19: Geologic Cross-Section A (Page 1977)



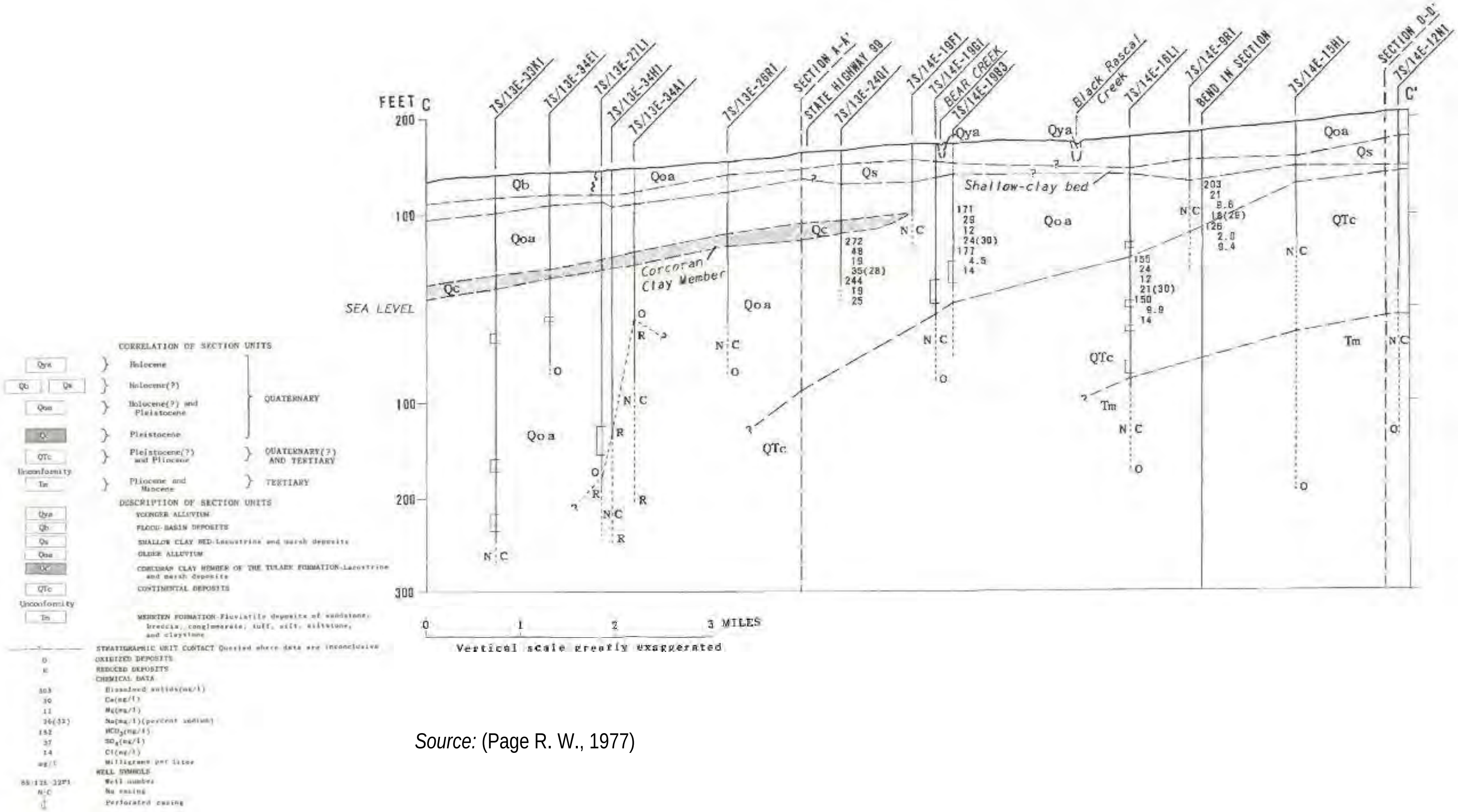
Source: (Page R. W., 1977)

Figure 2-20: Geologic Cross-Section B (Page 1977)



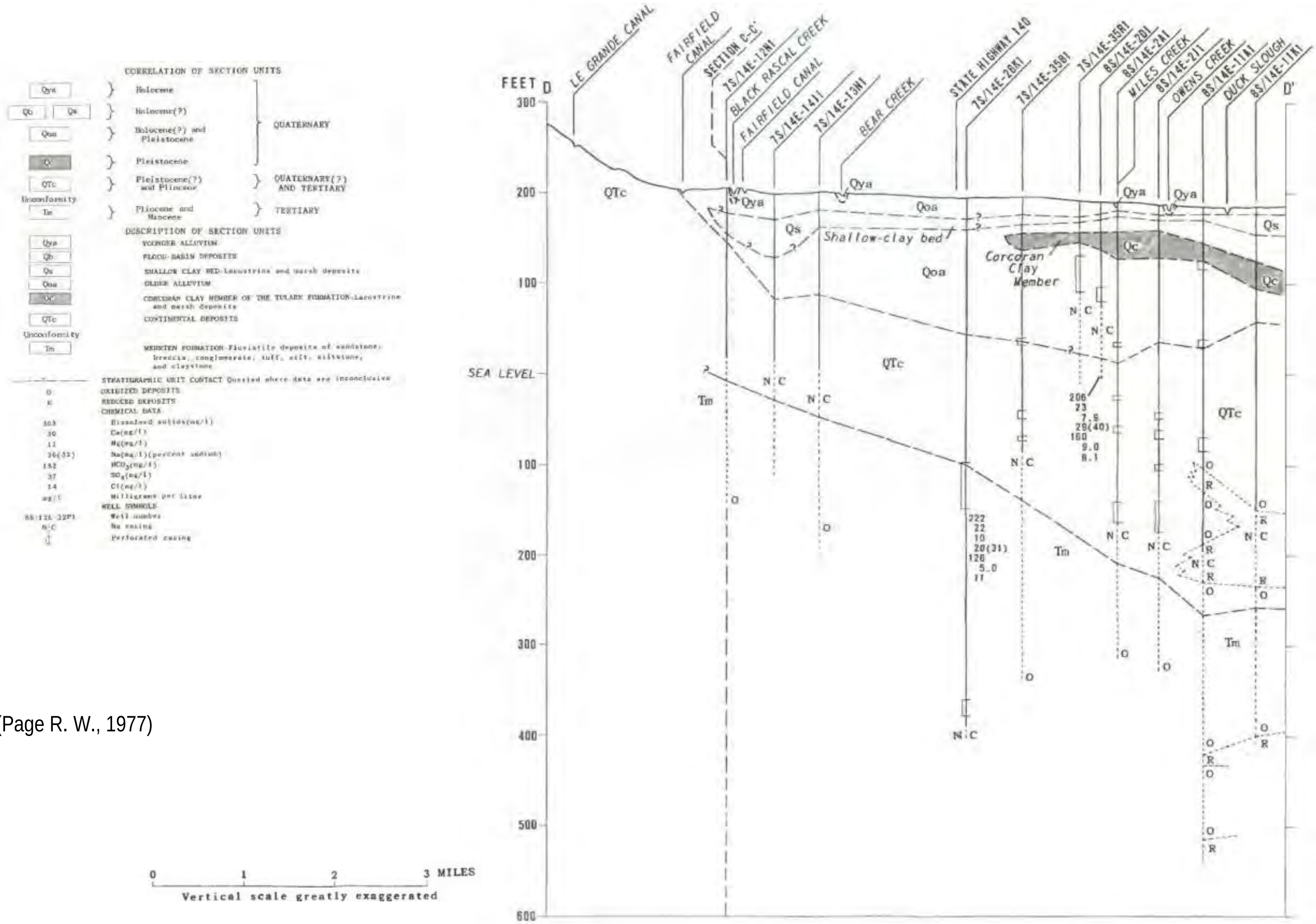
Source: (Page R. W., 1977)

Figure 2-21: Geologic Cross-Section C (Page 1977)



Source: (Page R. W., 1977)

Figure 2-22: Geologic Cross-Section D (Page 1977)



Source: (Page R. W., 1977)

Table 2-5 provides a lookup table that links the various names used for the formations described in the earlier text of Section 2.1.3 with the cross sections shown below (Figure 2-13 through Figure 2-22).

The cross sections from Page & Balding (1973) and Page (1977) were used together with the USGS Central Valley Hydrologic Model (CVHM) texture model to develop the basis of the physical structure and hydrogeologic characteristics of the MercedWRM. The texture model was used to augment the cross sections with more recent boring log data through 2004 at a finer spatial resolution. The USGS applied data from several thousand boreholes to a geostatistical analysis to estimate the percentage of fine- and coarse-grained materials, which relates to aquifer parameters. These parameters were then adjusted and calibrated within the MercedWRM to reflect long-term trends in water levels. Additional information about incorporation of USGS CVHM Texture Model data can be found in Appendix D (MercedWRM Documentation).

Table 2-5: Formation Name Lookup for Geologic Text, Tables, and Figures

<table>
<tr><th colspan="2">Formation Name in Report Text</th><th>Formation Name in Surficial Geology Map (Page 1986)</th><th>Formation Name in Page & Balding 1973 Cross Sections</th><th>Formation Name in Page 1977 Cross Sections</th></tr>
<tr><td colspan="2">Sierra Nevada bedrock complex</td><td>pTm (Metamorphic rocks [Pre-Tertiary]) + pTg (Granitic rocks (Pre-Tertiary)]</td><td>pTb (Basement complex)</td><td>-</td></tr>
<tr><td colspan="2">Eocene Ione Formation</td><td>Tce (Continental rocks and deposits [Eocene])</td><td>Ti (Ione Formation)</td><td>-</td></tr>
<tr><td colspan="2">Miocene Valley Springs Formation</td><td>Tcmo (Continental rocks and deposits [Oligocene and Miocene])</td><td>Tvs (Valley Springs Formation)</td><td>-</td></tr>
<tr><td colspan="2">Micoene/Pliocene Mehrten Formation</td><td>Tcpm (Continental rocks and deposits [Miocene-Pliocene])</td><td>Tm (Mehrten Formation)</td><td>Tm (Mehrten Formation - Fluviatile deposits of sandstone, breccia, conglomerate, tuff, silt, siltstone, and claystone)</td></tr>
<tr><td rowspan="2">Lacustrine and marsh deposits</td><td>Corcoran Clay Member</td><td>N/A – not surficial</td><td>E-clay or Ql</td><td>Qc (Corcoran Clay Member of the Tulare Formation - Lacustrine and marsh deposits)</td></tr>
<tr><td>Shallow clay bed (Holocene age)</td><td>N/A – not surficial</td><td>-</td><td>Qs (Shallow Clay Bed - Lacustrine and marsh deposits)</td></tr>
<tr><td colspan="2">Pliocene/Pleistocene continental deposits</td><td rowspan="2">QTc (Continental rocks and deposits [Miocene-Holocene])</td><td>QTc (Continental deposits)</td><td>QTc (Continental deposits)</td></tr>
<tr><td colspan="2">Older alluvium</td><td>Qoa (Older alluvium)</td><td>Qoa (Older alluvium)</td></tr>
<tr><td colspan="2">Flood-plain deposits</td><td>Qb (Flood-basin deposits [Holocene-Pleistocene])</td><td>Qb (Flood basin deposits)</td><td>Qb (Flood basin deposits)</td></tr>
<tr><td colspan="2">Younger alluvium</td><td>Qr (River deposits [Holocene-Pleistocene])</td><td>Qya (Younger alluvium)</td><td>Qya (Younger alluvium)</td></tr>
</table>

A three-dimensional representation of the Subbasin (Figure 2-23) provides the capability to understand geologic conditions at different depths and locations throughout the Subbasin. The three-dimensional representation allows for the development of cross sections at any location, with examples shown in Figure 2-24 and Figure 2-25. Originally developed for the MercedWRM, the three-dimensional representation incorporates information from the Page & Balding (1973) cross sections and the surficial geologic map, in addition to subsurface texture data from the USGS. Model layers were aligned with the formations and are described in detail in Section 2.1.7 - Principal Aquifers and Aquitards. More information on the MercedWRM can be found in Appendix D.

Figure 2-23: 3D Rendering Cross Section Overview

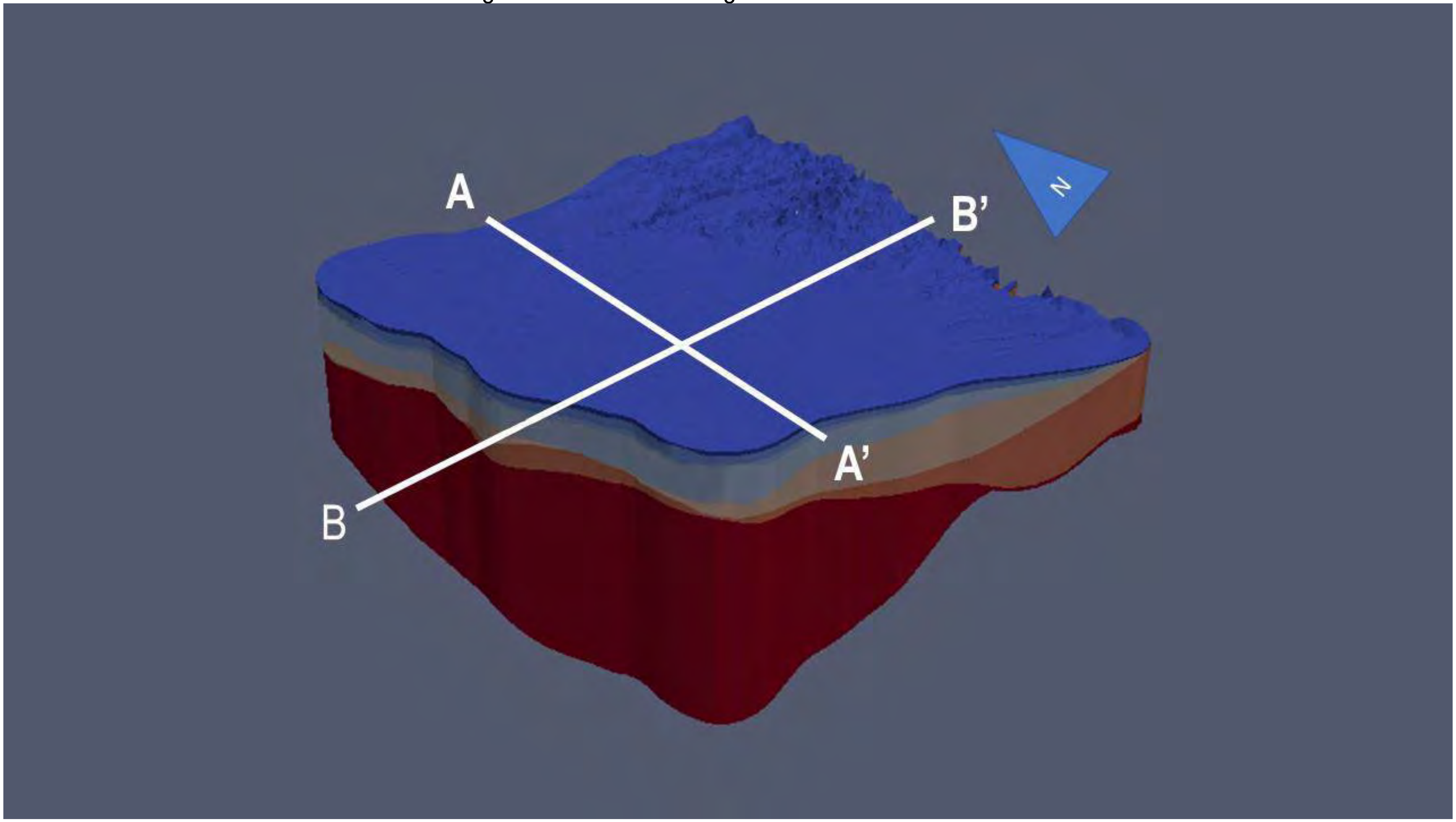


Figure 2-24: 3D Rendering A-**A'**

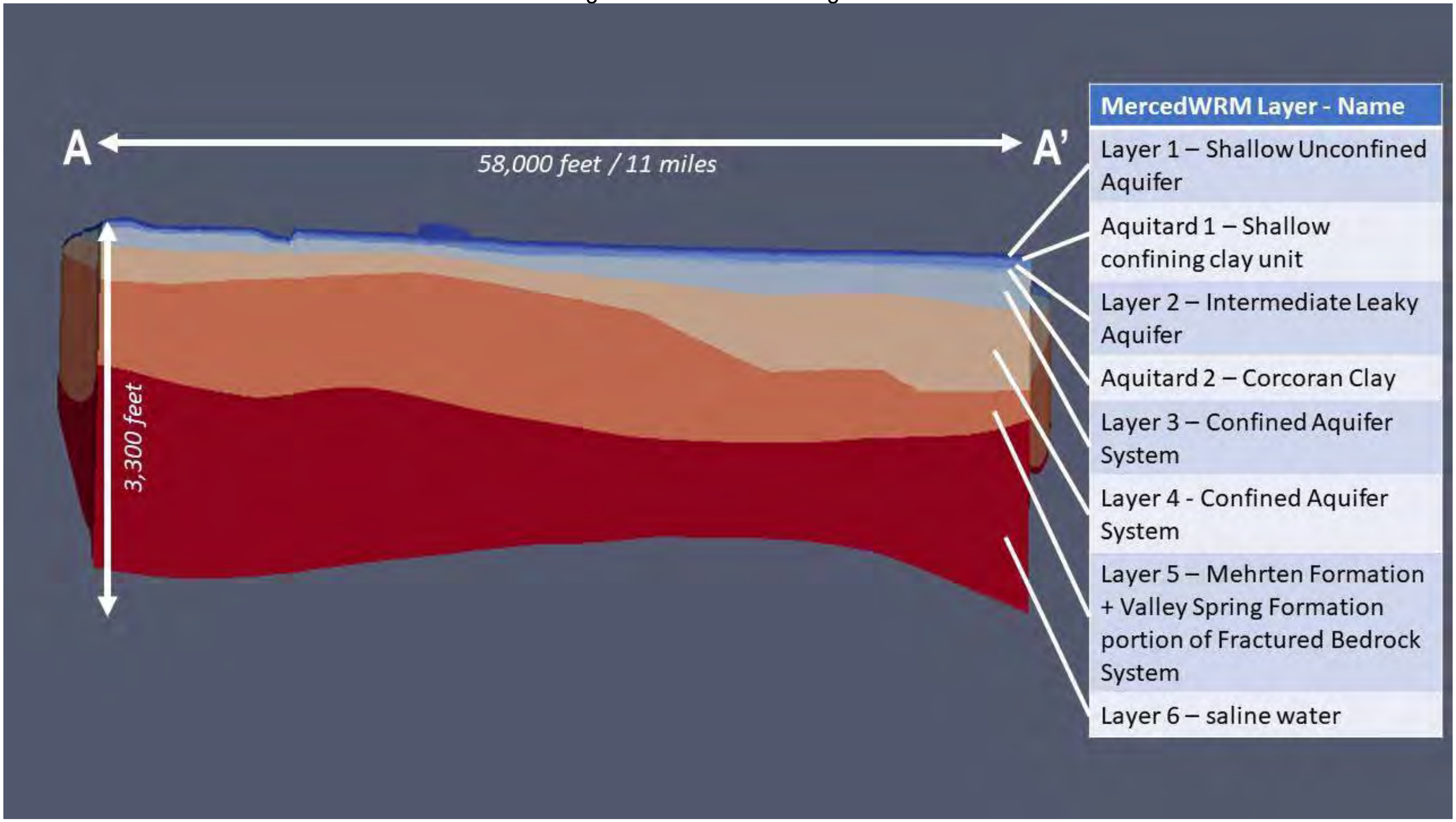
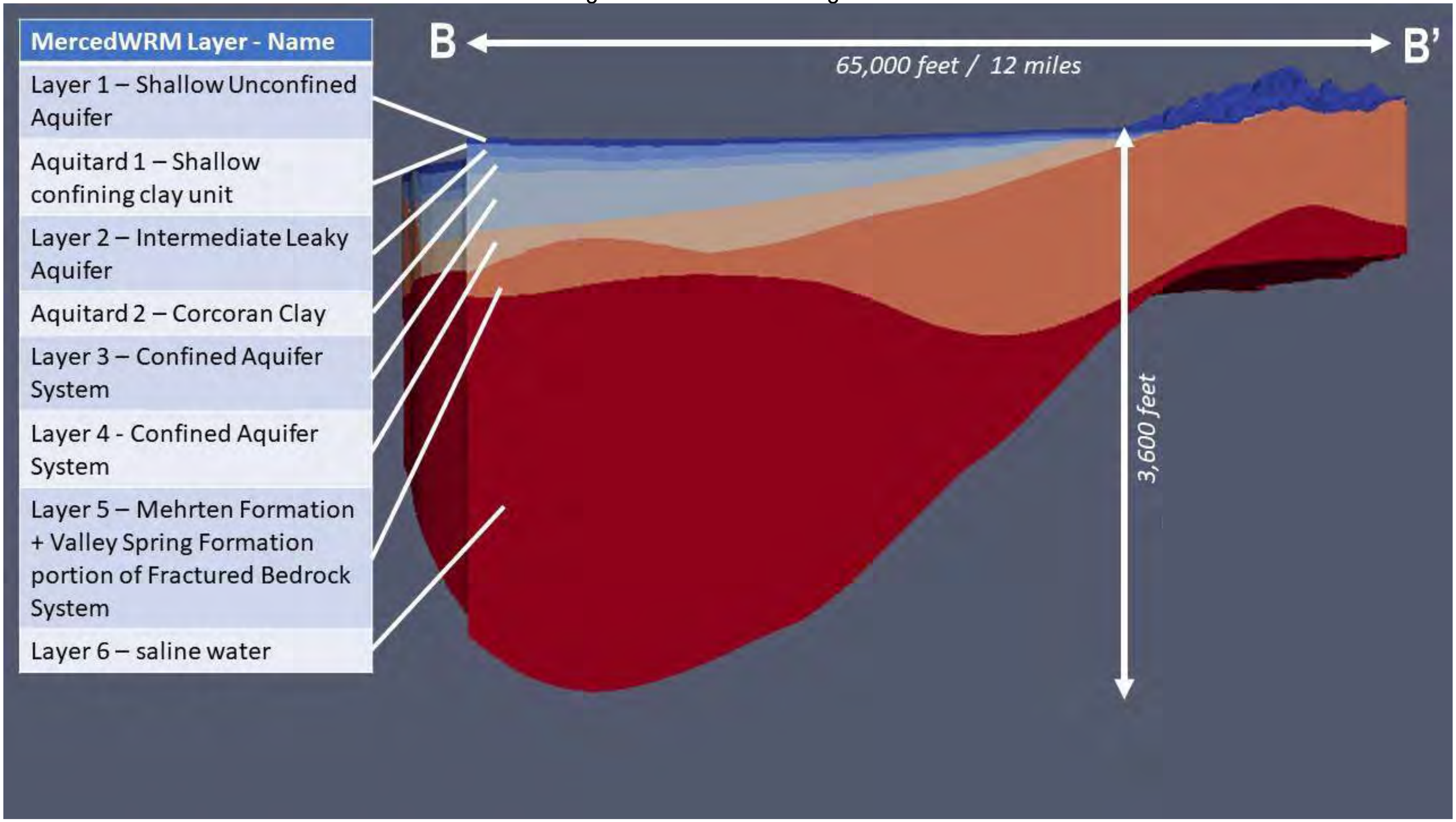


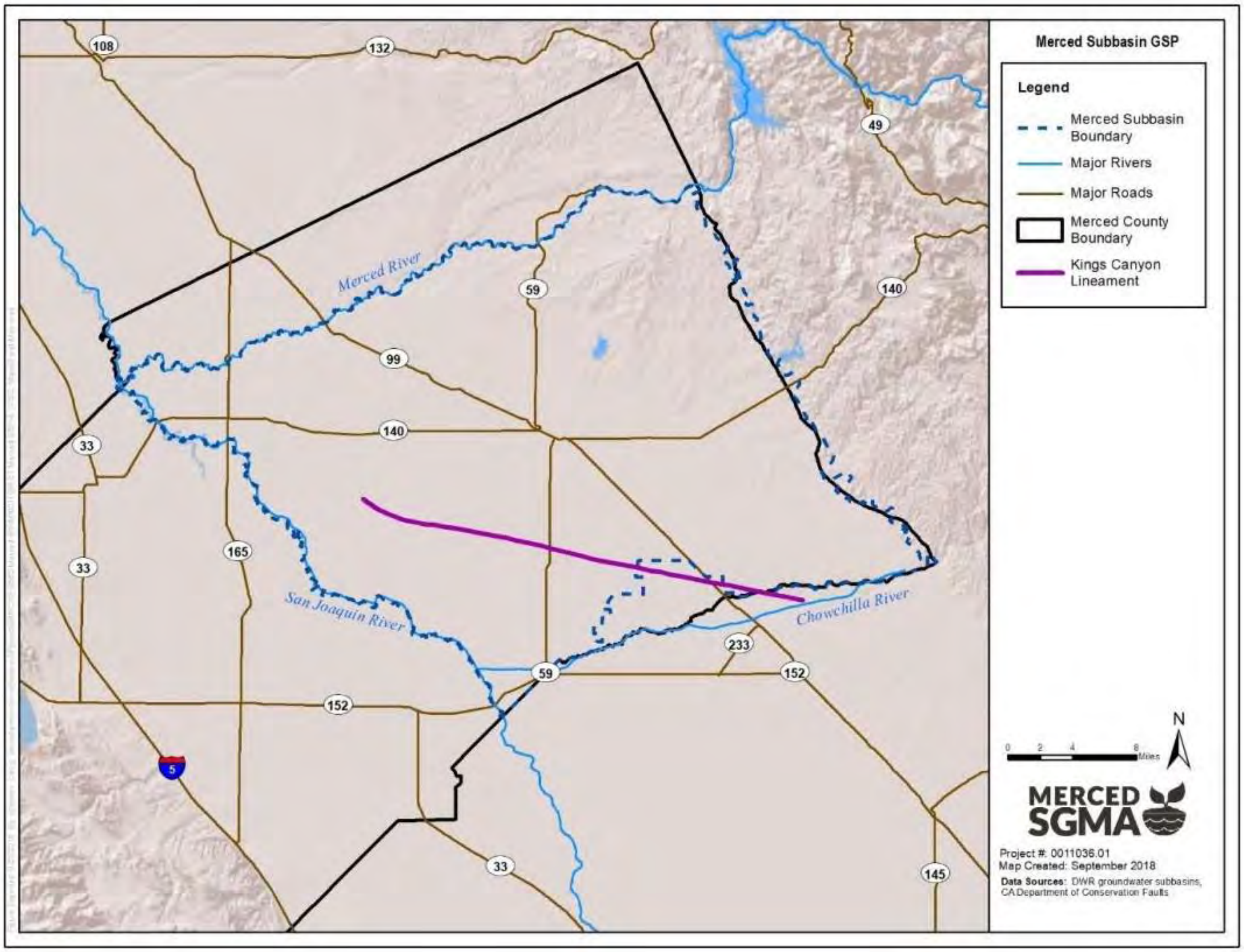
Figure 2-25: 3D Rendering B-**B'**



2.1.5 Faults and Structural Features

There are no major faults, anticlines, or synclines in the Merced Subbasin. The only minor feature present in the Subbasin is the Kings Canyon Lineament, shown in Figure 2-26 (California Geological Survey, 2010). This feature coincides with an unnamed inferred fault based on apparent offset of subsurface materials (Bartow J. A., 1985) and is not known to affect groundwater flow in the basin (DWR, 2004) nor is it known to affect subsidence or groundwater quality. The key geologic feature that affects groundwater flows is the Corcoran Clay, which is described previously.

Figure 2-26: Fault Map



2.1.6 Subbasin Boundaries

The horizontal and vertical boundaries of the Merced Subbasin are described below.

2.1.6.1 Lateral Boundaries and Boundaries with Neighboring Subbasins

The Merced Subbasin includes lands south of the Merced River between the San Joaquin River on the west and the crystalline basement rock of the Sierra Nevada foothills on the east. The Subbasin boundary on the south stretches westerly along the Chowchilla River (Merced-Madera County boundary) and then along the northern edge of the sphere-of-influence boundary of Chowchilla Water District.

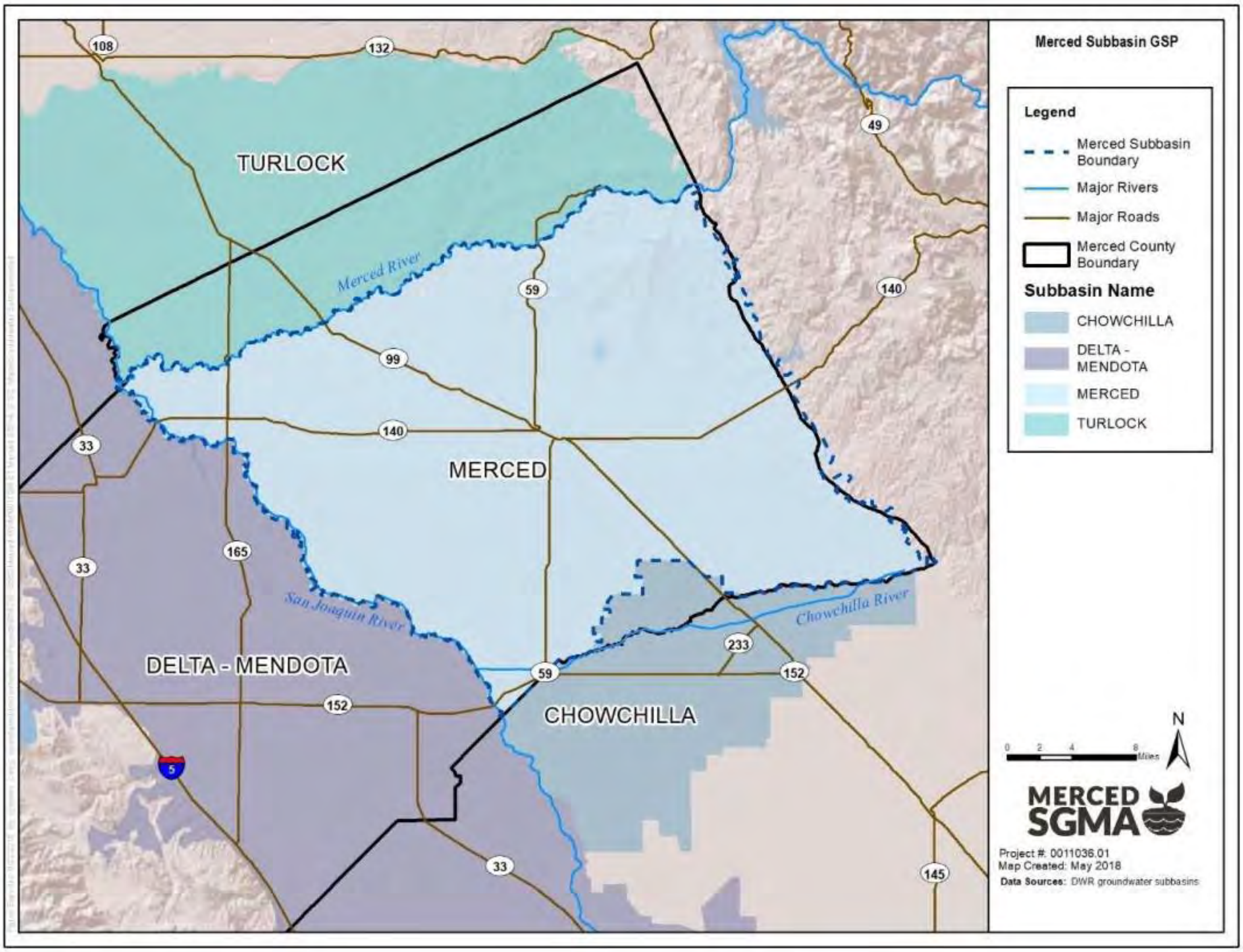
DWR defines boundaries based on the following restrictions on groundwater flow: impermeable bedrock, constructions in permeable materials, faults, low permeability zones, groundwater divides, and adjudicated basin boundaries (DWR, 2003). While boundaries divide the Merced Subbasin from surrounding subbasins of the San Joaquin Valley Groundwater Basin, groundwater within the Merced Subbasin is hydraulically connected with groundwater in the surrounding subbasins. The boundaries of the Merced Subbasin are described below in Table 2-6 based on these boundary types. Figure 2-27 shows a map of the surrounding subbasins.

Table 2-6: Basin Boundary Description and Type

Boundary	Boundary Type	DWR Definition	Boundary Description
Eastern	Impermeable Bedrock	"Impermeable bedrock with lower water yielding capacity. These include consolidated rocks of continental and marine origin and crystalline/or metamorphic rock." (DWR, 2003)	Bounded by the crystalline bedrock of the Sierra Nevada mountain range.
Northern	Groundwater Divide	"A groundwater divide is generally considered a barrier to groundwater movement from one basin to another for practical purposes. Groundwater divides have noticeably divergent groundwater flow directions on either side of the divide with the water table sloping away from the divide. The location of the divide may change as water levels in either one of the basins change, making such a "divide" less useful. Such a boundary is often used for subbasins." (DWR, 2003).	The Merced River forms northern boundary of Merced Subbasin (Bulletin 118 Basin Number 5-022.04) and divides the Subbasin from the Turlock Subbasin (Bulletin 118 Basin Number 5-022.03).
Southern (eastern side)	Groundwater Divide	(defined above)	The Chowchilla River divides the Merced Subbasin from the Chowchilla Subbasin (Bulletin 118 Basin Number 5-022.05) along the eastern edge of the southern boundary. The Chowchilla River also generally forms the boundary between Merced and Madera Counties in this area.

Boundary	Boundary Type	DWR Definition	Boundary Description
Southern (western side)	Jurisdictional Boundary	Not defined.	The boundary generally follows the sphere-of-influence boundary of Chowchilla Water District. Starting from the intersection of the Chowchilla River at the northwest corner of Section 13, Township 9 South, Range 15 East, it runs north and west along the east and north boundary of Section 11, Township 9 South, Range 15 East until it reaches the Southern Pacific Railroad tracks. Then northwesterly along the Southern Pacific Railroad tracks until it reaches the northeast corner of Section 4, Township 9 South Range 15 East. Then west along the north boundary of Sections 4, 5, and 6, Township 9 South, Range 15 East. Then southwesterly along the boundary of the Chowchilla Water District until it reaches the northern boundary of Madera County (County of Madera, 2016).
Western	Groundwater Divide	(defined above)	Based on the San Joaquin River, which divides the Merced Subbasin from the Delta-Mendota Subbasin (Bulletin 118 Basin Number 5-022.07).

Figure 2-27: Neighboring Subbasins

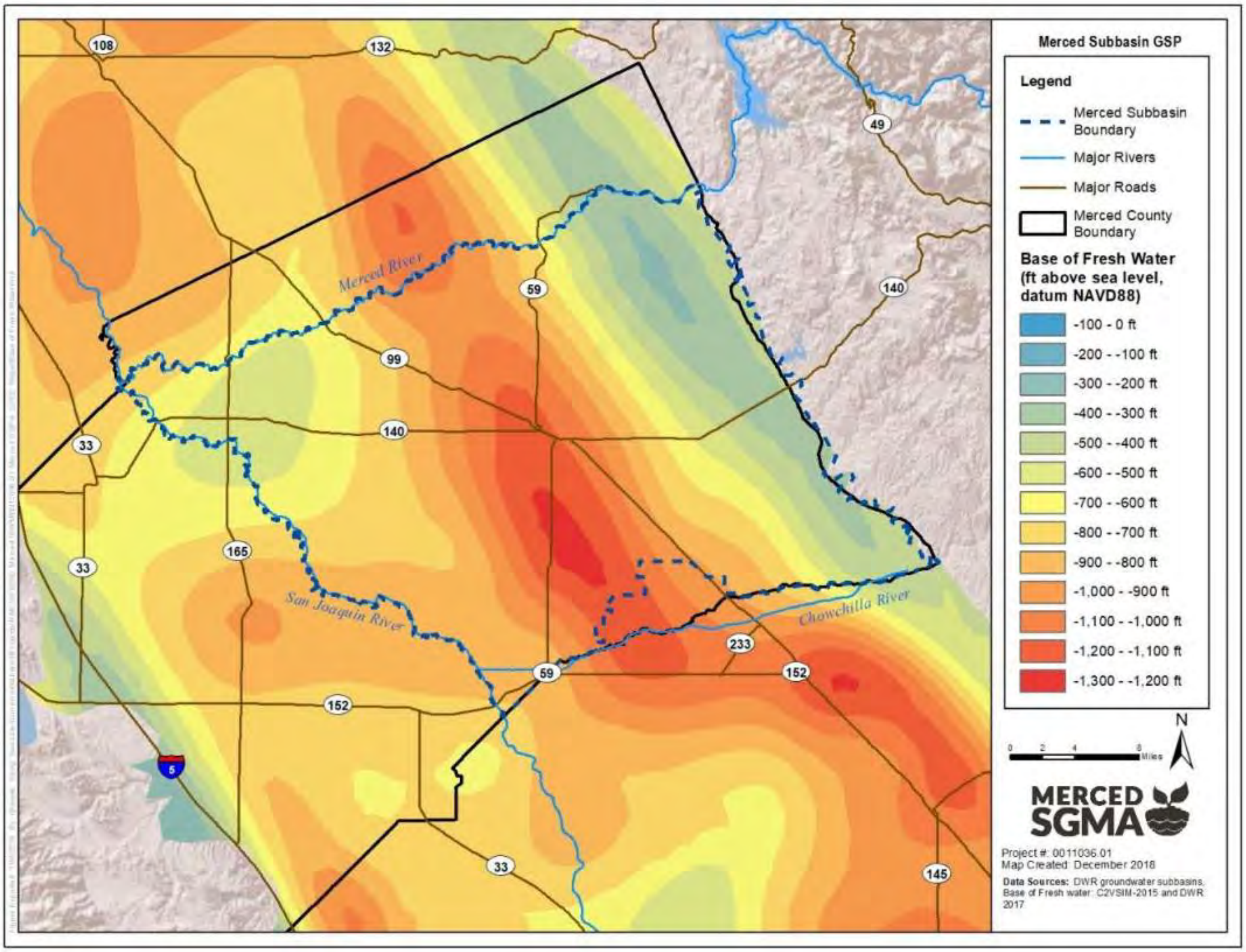


2.1.6.2 Bottom of the Merced Basin

As discussed above, the San Joaquin Valley is filled with up to 32,000 feet of marine and continental sediments. However, only the uppermost portion of these sediments are saturated with fresh groundwater. Deeper sediments contain saline groundwater. The bottom of the Merced Basin is defined as the lowest elevation of fresh water. This elevation is called the "base of fresh water" and is defined here as specific conductance of less than 3,000 micromhos per centimeter. The depth of the base of fresh water is defined by Page (1973), who mapped the base of fresh water based on measurements at wells of specific conductance of less than 3,000 micromhos per centimeter. Page's interpretation of the base of fresh water is incorporated into the California Central Valley Groundwater-Surface Water Simulation Model, which includes this information in the definition of model layers and was last updated by DWR in 2017 (see Figure 2-28 which shows elevation of the base of fresh water in feet above sea level). In most parts of the Subbasin, the base of fresh water is very deep (greater than 500 feet) which is reflected in the relatively large total storage volume described elsewhere in this GSP. The variations in the elevation of the base of fresh water are driven by underlying geology as well as locations of deeper saline groundwater.

A well depth analysis completed in March 2018 found that, based on information in Merced County's well permit database, 56 wells (approximately 4% of wells with data) extended below the bottom of the basin as defined above, primarily located along the central portion of the County just east of the San Joaquin River (Woodard & Curran, 2018b). The quality of water produced from these wells is not known, and no data are available to show that the wells are actively used.

Figure 2-28: Base of Fresh Water



2.1.7 Principal Aquifers and Aquitards

There are five different aquifer systems identified in the Subbasin based on their differing geologic history and hydrogeologic characteristics. These systems have been modeled in the MercedWRM. The systems interact with each other throughout the Subbasin but are separated in some areas by the presence of the confining Corcoran Clay layer. Based on these interactions and for the practical purpose of developing and implementing this GSP, the five aquifer systems have been combined into three pertinent Principal Aquifers and are described further in the sections below.

2.1.7.1 Aquifer Systems in the Basin

Five aquifer systems have been identified in the Merced Subbasin by the Merced Groundwater Management Plan (AMEC, 2008), including, in order of decreasing depth: a fractured bedrock aquifer, the Mehrten Formation, a confined aquifer, an intermediate "leaky" aquifer, and a shallow unconfined aquifer. These aquifer systems interact with each other throughout the basin, except where the Corcoran Clay exists.

In addition to the descriptive information from the Merced Groundwater Management Plan, the MercedWRM (see Appendix D) provides information on aquifer characteristics by aggregating available data and calibrating selected characteristics to closely match observed and simulated groundwater elevation and streamflows. The model uses five distinct fresh-water aquifer layers, one saline aquifer, and two confining units. The fresh water aquifer layers correspond closely with the aquifer formations described below from the Merced Groundwater Management Plan.

Hydraulic conductivity, specific storage, and specific yield are three aquifer parameters that describe physical characteristics of aquifers that are important for groundwater modeling.

Hydraulic conductivity is defined and mapped separately for each aquifer layer (Figure 2-29 through Figure 2-33

). Hydraulic conductivity is a numeric characteristic of an aquifer that describes the ease with which groundwater moves through pore spaces or fractures in soil or rock.

During a sensitivity analysis in which changes in aquifer parameters were compared against modeled groundwater level outputs, specific storage (Figure 2-34) and specific yield (Figure 2-35) were determined to not vary significantly between aquifer layers and thus are defined across the entire Subbasin for all aquifer layers (Woodard & Curran, 2019). Specific storage describes the unit volume of water released or taken into storage per unit change in hydraulic head. It is a unitless quantity. Specific storage is a more important characteristic for unconfined aquifers (i.e., above the Corcoran Clay) and has less importance for confined aquifers (i.e., below the Corcoran Clay). Specific yield describes the unit volume released from the aquifer per unit change in head under the force of gravity.

These five aquifer systems are described from deepest to shallowest, and the following Section 2.1.7.2 describes the three principal aquifers to be used in this GSP based on the interactions of the five systems described below. Table 2-7 shows the relationship between MercedWRM layer, formation name, and principal aquifer name.

Fractured Bedrock - Along the eastern edge of the Merced Subbasin, wells have been completed within the Valley Springs and Ione Formations (Page & Balding, 1973), (Page R. W., 1977). The Ione Formation unconformably overlies the Sierra Nevada bedrock complex and is composed of marine to non-marine clay, sand, sandstone, and conglomerate. The Valley Springs Formation is composed of a fluvial sequence of rhyolitic ash, sandy clay, and siliceous gravel in a clay matrix. Wells in this system appear to be completed in fractured bedrock with limited and variable yields. Because of the limited extent (and poor yields) of the fractured bedrock aquifer, the fractured aquifer is not a significant source of water in the Merced Subbasin (AMEC, 2008).

Hydraulic conductivity is shown in Figure 2-29 as part of the MercedWRM Layer 5 which contains both the Valley Springs Formation portion of the Fractured Bedrock system where it underlies the Mehrten Formation as well as the Mehrten Formation itself (described below).

The Mehrten Formation - The Mehrten Formation outcrops over a large area in the Merced Subbasin. It is composed of fluvial deposits of sandstone, breccia, conglomerate, luff, siltstone and claystone. It contains a large amount of andesitic material, making it easy to distinguish. Many water supply wells in the eastern portion of the Merced Subbasin penetrate the formation, and it is a significant source of groundwater. Where the Mehrten occurs beneath the Corcoran Clay, it is considered a confined aquifer. Where the Mehrten does not underlie the Corcoran Clay, there is insufficient data to determine the degree of confinement of the formation (AMEC, 2008).

Laboratory and field tests made by the United States Army Corps of Engineers (USACOE) and DWR in other areas indicate a range in hydraulic conductivity in the Mehrten Formation range from 0.01 to about 67 ft/day. Yields from the Mehrten, therefore, can be expected to differ greatly from place to place and at different depths. Based on another DWR regional study, the Mehrten formation has a yield of about 1,000 gallons per minute (gpm) and a horizontal transmissivity of about 9,100 ft^2/day (Page & Balding, 1973).

Hydraulic conductivity is shown in Figure 2-29 as part of the MercedWRM Layer 5 which contains both the Mehrten Formation and the Valley Springs Formation portion of the Fractured Bedrock system (described above).

Confined Aquifer - The confined aquifer occurs in older alluvium (and Mehrten Formation) deposits that underlie the Corcoran Clay (Figure 2-37). The older alluvium consists of a heterogeneous mixture of poorly sorted gravel, sand, silt and clay up to 400 feet thick derived primarily from the Sierra Nevada. Many water supply wells in the western portion of the Merced Subbasin penetrate the Corcoran Clay into the confined aquifer, and it is a significant source of groundwater (AMEC, 2008).

In the older alluvium, yields to wells were as large as 4,450 gpm with an average 1,900 gpm. The specific capacity of 101 sampled wells ranged from 8.2 gpm/ft to 134.6 gpm/ft with a mean of 41.9 gpm/ft and a median of 36.7 gpm/ft. Specific capacities in the eastern part of the area, where wells penetrate older rocks and deposits, were generally smaller than those in the west. Because specific capacity is a rough indicator of transmissivity, the pattern indicates smaller transmissivities in the eastern part of the area near where the consolidated rocks crop out (Page & Balding, 1973).

The Confined Aquifer's hydraulic conductivity is shown in both Figure 2-30 and Figure 2-31 as part of the MercedWRM Layers 3 and 4 which together describe the Confined Aquifer. Layer 3 consists of older alluvium while layer 4 consists of continental deposits.

Intermediate Leaky-Aquifer - The intermediate leaky aquifer occurs in older alluvium deposits that overlie the Corcoran Clay or are east of the Corcoran Clay. Where the Corcoran Clay is absent, the intermediate leaky aquifer extends to the Mehrten Formation. In the eastern portion of the Merced Subbasin the intermediate aquifer consists of a series of interbedded coarse-grained (gravel and sand) layers separated by fine-grained (silt and clay) layers. The fine-grained layers inhibit, but do not prevent vertical groundwater flow between layers and thus form a leaky-aquifer system. Many water supply wells in the Merced Subbasin are completed in the intermediate leaky-aquifer, and it is a significant source of groundwater (AMEC, 2008).

The intermediate leaky-aquifer is the most extensively developed aquifer in the Merced Subbasin. Measured well yields within the Merced Subbasin range from 670 to 4,000 gpm (Page & Balding, 1973). Estimates of specific capacity of supply wells throughout the Merced Subbasin range from about 20 to 40 gpm/ft of drawdown and indicate that the specific capacity increases from east to west.

Hydraulic conductivity is shown in ~~–~~ Figure 2-32 as part of the MercedWRM Layer 2.

Shallow Unconfined Aquifer - The shallow unconfined aquifer occurs in older and younger alluvium deposited above the shallow clay bed. Because of its shallow depth, few water supply wells are completed in the shallow unconfined aquifer. Where water levels in the intermediate leaky aquifer fall below the base of the shallow clay bed, groundwater in the intermediate aquifer becomes unconfined and water in the overlying shallow aquifer becomes perched (AMEC, 2008).

Hydraulic conductivity is shown in Figure 2-33 as part of the MercedWRM Layer 1.

The sixth layer of the model (not mapped) consists of saline water below the base of fresh water (described in 2.1.6.2) and was implemented as a refinement to the water quality model and for the potential use of scenario development for the simulation of deep well production (Woodard & Curran, 2019).

Table 2-7: Formation, Aquifer Name, and MercedWRM Layer Number Lookup

Formation/Aquifer Name	Principal Aquifer for GSP	MercedWRM Layer Number
Ione Formation	N/A	6
Valley Springs Formation	Outside Corcoran Clay	5
Mehrten Formation (outside of Corcoran Clay extent)	Outside Corcoran Clay	5
Mehrten Formation (within Corcoran Clay extent)	Below Corcoran Clay	5
Confined Aquifer	Below Corcoran Clay	4 (continental deposits)
	Below Corcoran Clay	3 (older alluvium)
Intermediate Leaky-Aquifer (within Corcoran Clay extent)	Above Corcoran Clay	2
Intermediate Leaky-Aquifer (outside of Corcoran Clay extent)	Outside Corcoran Clay	2
Shallow Unconfined Aquifer (outside of Corcoran Clay extent)	Outside Corcoran Clay	1
Shallow Unconfined Aquifer (within Corcoran Clay extent)	Above Corcoran Clay	1

Figure 2-29: Hydraulic Conductivity – Mehrten Formation and Valley Springs Portion of Fractured Bedrock System (MercedWRM Layer 5)

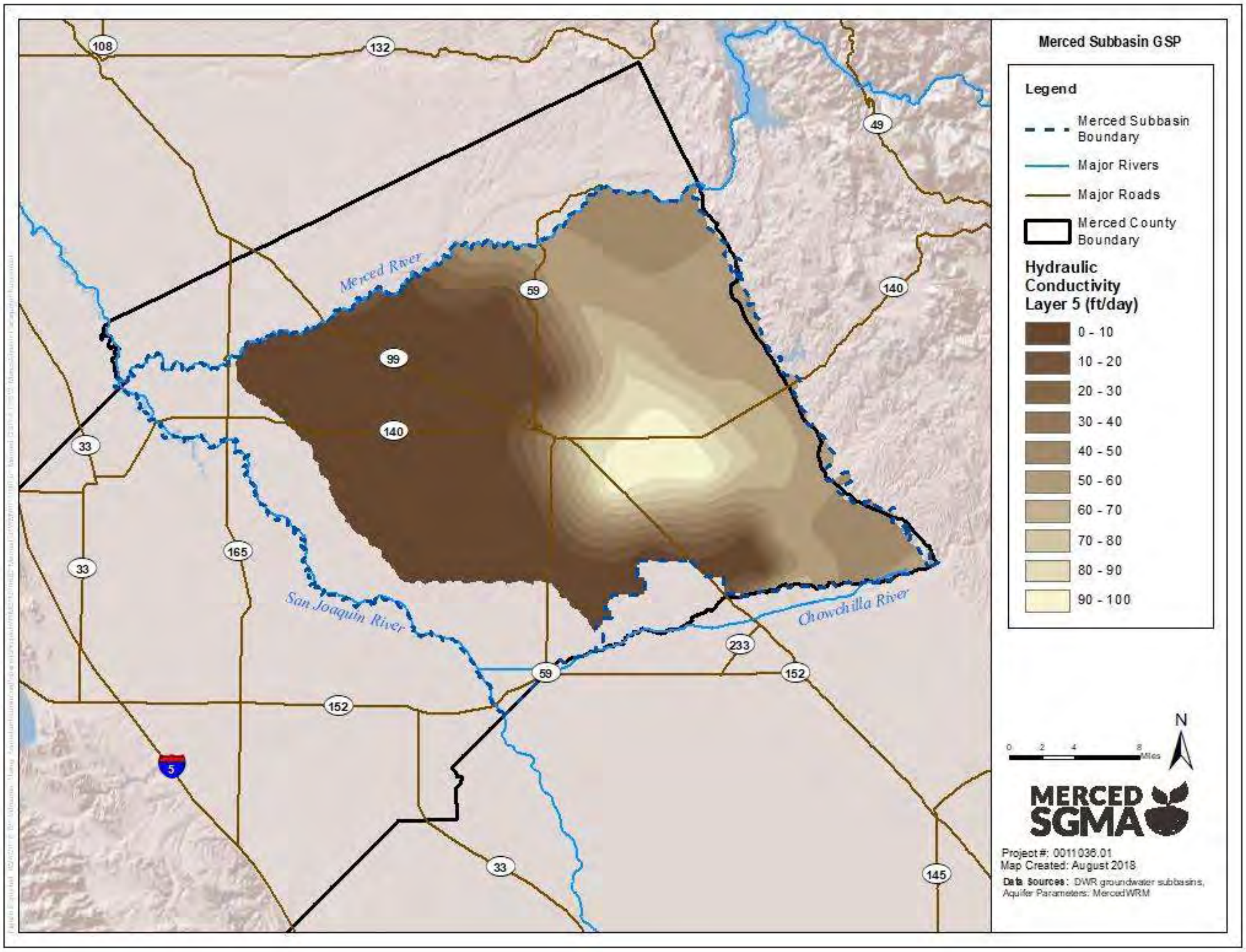


Figure 2-30: Hydraulic Conductivity – Confined Aquifer (MercedWRM Layer 4)

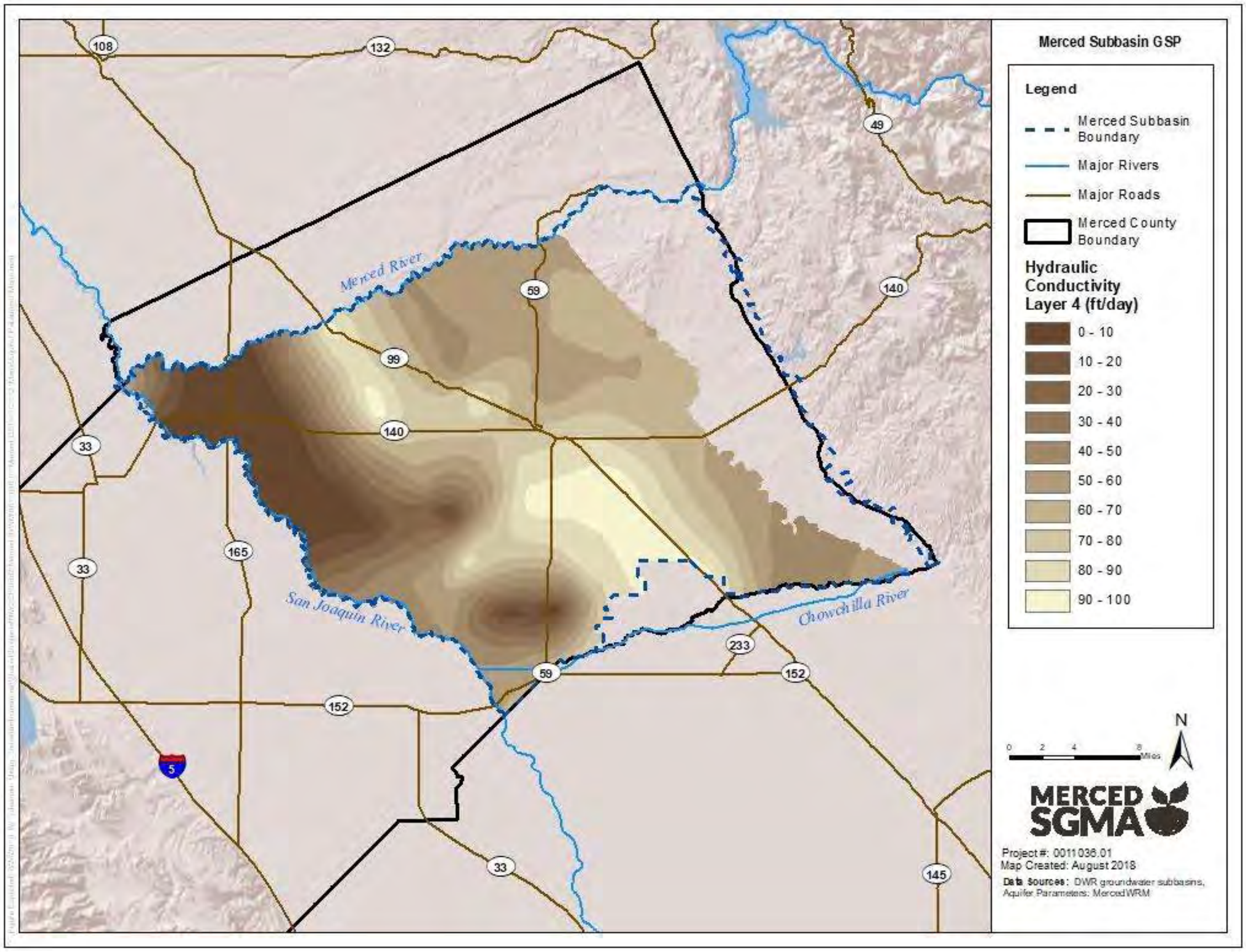


Figure 2-31: Hydraulic Conductivity – Confined Aquifer (MercedWRM Layer 3)

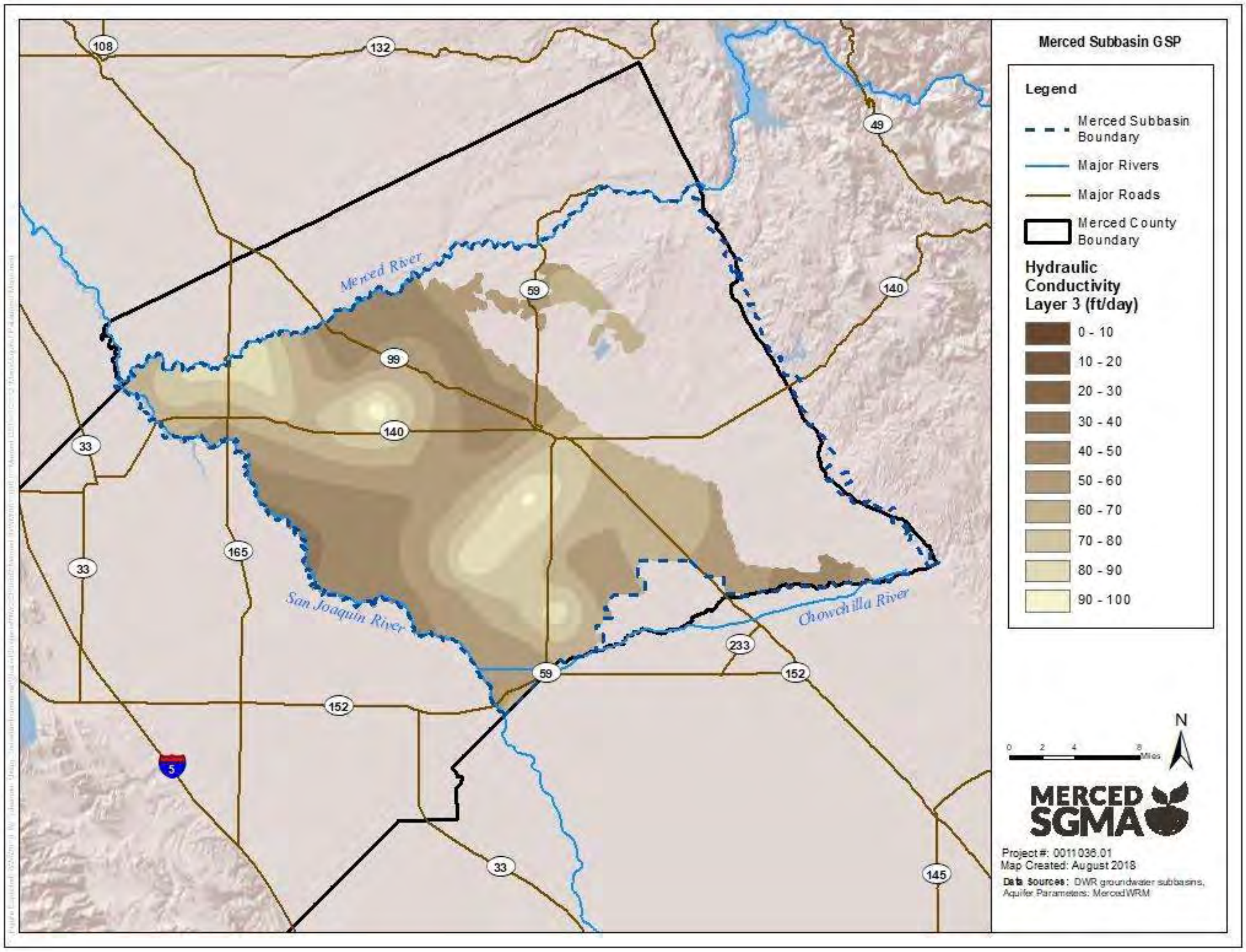


Figure 2-32: Hydraulic Conductivity – Intermediate Leaky-Aquifer (MercedWRM Layer 2)

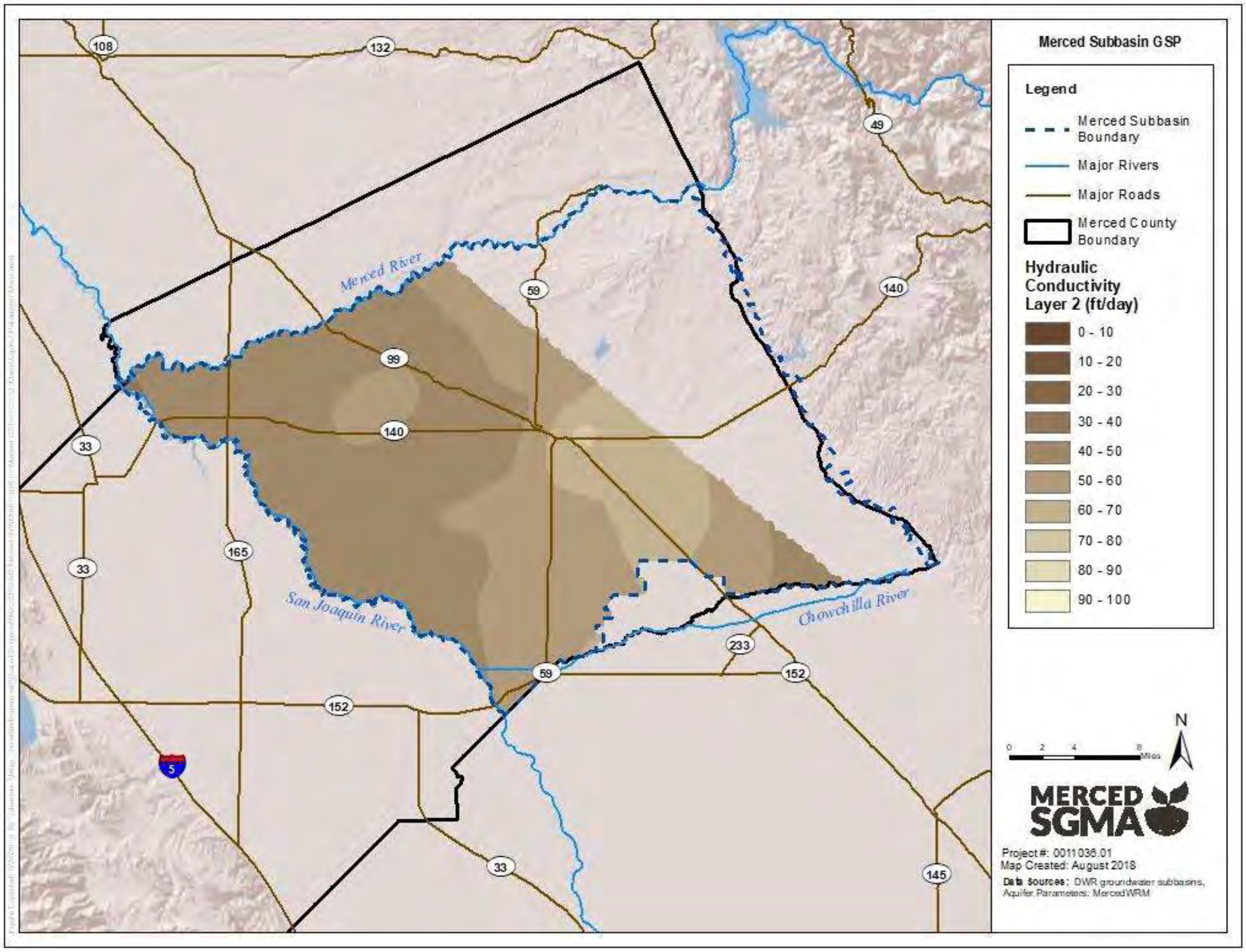


Figure 2-33: Hydraulic Conductivity – Shallow Unconfined Aquifer (MercedWRM Layer 1)

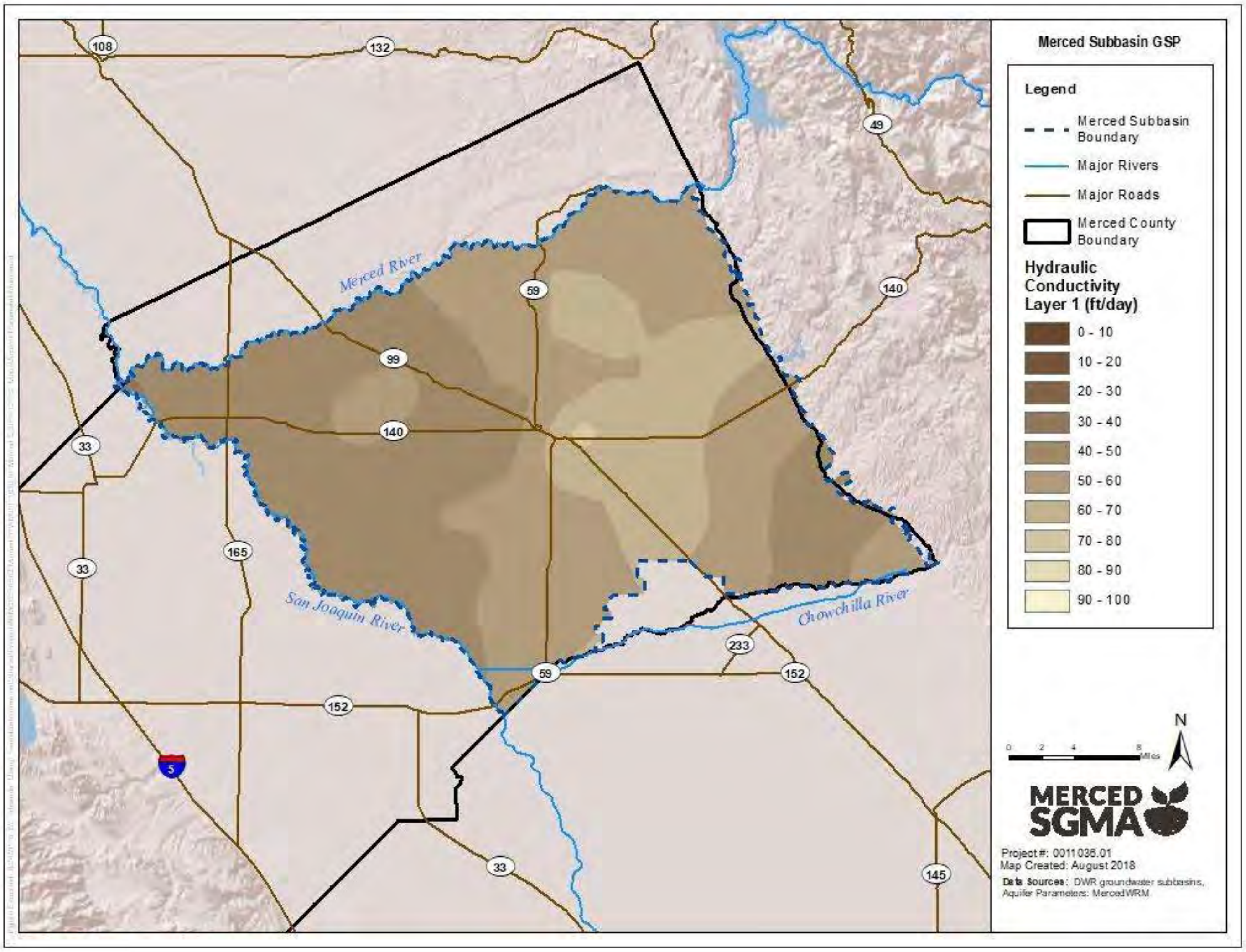
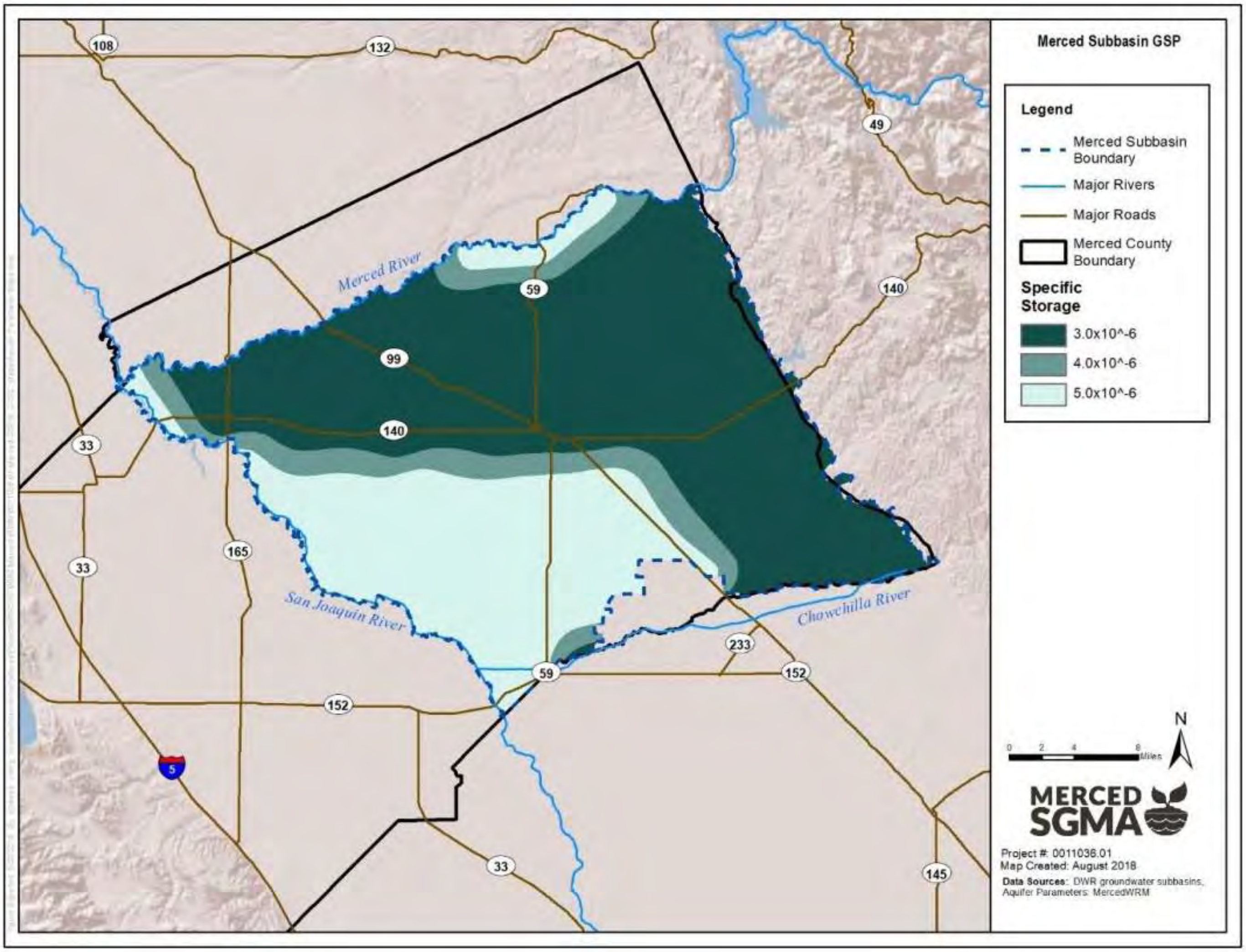
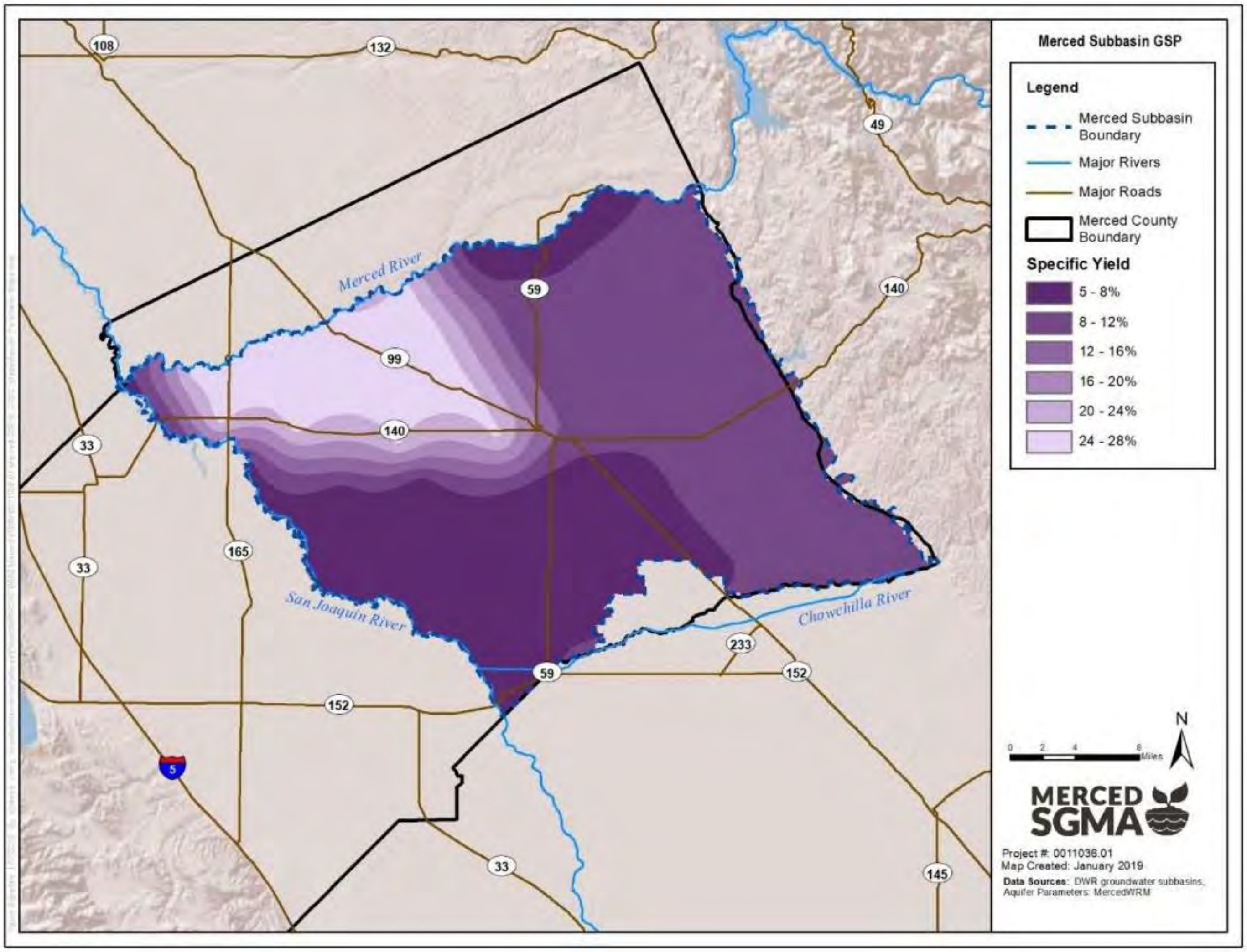


Figure 2-34: Specific Storage (all aquifer layers)



(Note that Specific Storage is a dimensionless (unitless) quantity)

Figure 2-35: Specific Yield (all aquifer layers)



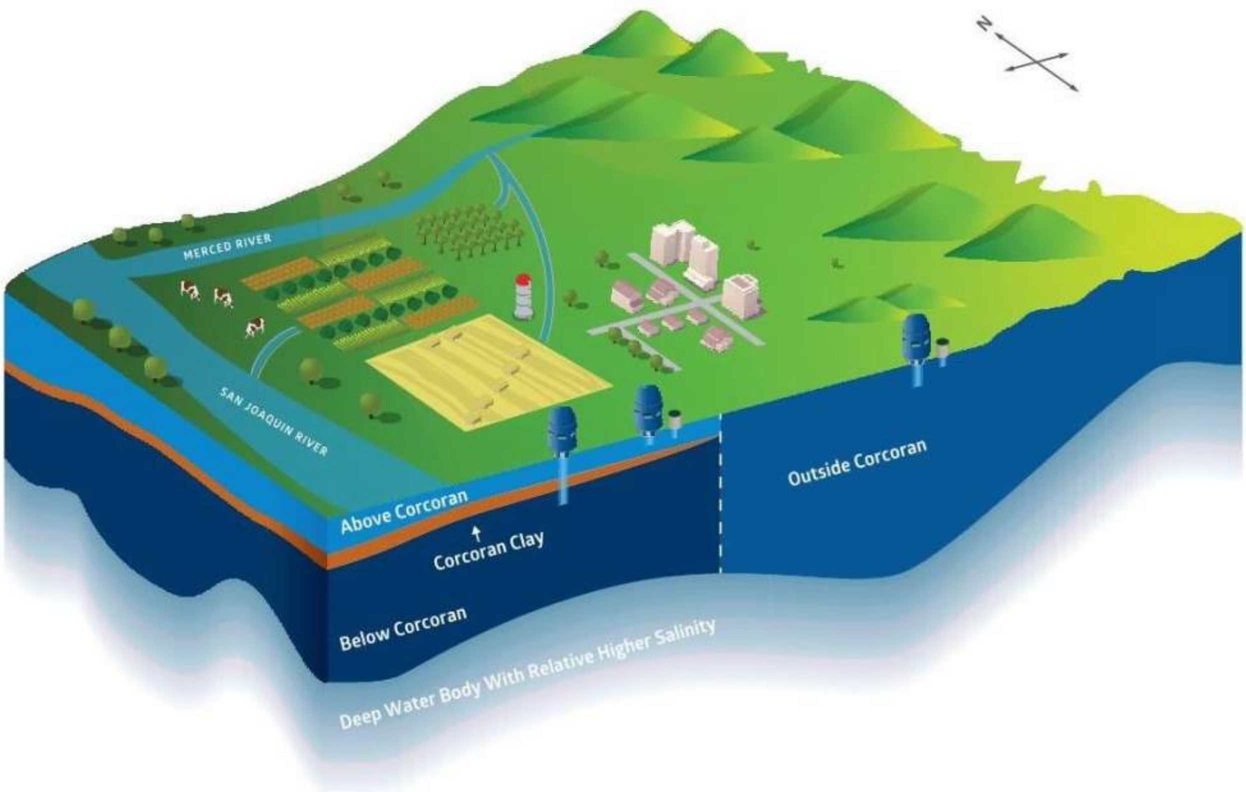
2.1.7.2 Principal Aquifers and Aquitards

The five aquifer systems described in Section 2.1.7.1 interact with each other throughout the basin, except where the Corcoran Clay exists. The three principal aquifers in the Merced Subbasin and their associated characteristics are described below by referencing the specific formations defined earlier. Included in the sections below is a description of general water quality characteristics for the principal aquifers based primarily on the work of Page & Balding (1973). Specific constituents of concern with values and spatial distributions (where applicable) are described later in Section 2.2.4 – Groundwater Quality under Section 2.2 – Current and Historical Groundwater Conditions. Table 2-8 provides a summary of key characteristics of the principal aquifers. Figure 2-36 shows a three-dimensional illustration of the three principal aquifers and the Corcoran Clay aquitard.

Table 2-8: Summary of Characteristics of Principal Aquifers

Parameter	Above Corcoran Principal Aquifer	Below Corcoran Principal Aquifer	Outside Corcoran Principal Aquifer
Aquifer System Names	Intermediate Leaky-Aquifer Shallow Unconfined Aquifer (within Corcoran Clay lateral extent)	Mehrten Formation Confined Aquifer (within Corcoran Clay lateral extent)	Fractured Bedrock Mehrten Formation Intermediate Leaky-Aquifer Shallow Unconfined Aquifer (outside of Corcoran Clay lateral extent)
Geologic Formation Names	Older Alluvium Flood-basin deposits Younger Alluvium (within Corcoran Clay lateral extent)	Valley Springs Formation Mehrten Formation Older Alluvium (within Corcoran Clay lateral extent)	Valley Springs Formation Mehrten Formation Older Alluvium Younger Alluvium (outside of Corcoran Clay lateral extent)
Vertical Extent	From the groundwater surface elevation to top of Corcoran Clay	From bottom of Corcoran Clay to base of Fresh Water	From the groundwater surface elevation to base of fresh water
Lateral Extent	Located within the lateral boundary of the Corcoran Clay	Located within the lateral boundary of the Corcoran Clay	Located outside the lateral boundary of the Corcoran Clay
Hydraulic Conductivity	Defined in Figure 2-32Figure 2-32 and Figure 2-33	Defined in Figure 2-29, Figure 2-30, and Figure 2-31	Defined in Figure 2-29, Figure 2-32, and Figure 2-33
Specific Storage & Specific Yield	Defined in Figure 2-34 and Figure 2-35		
Properties that Restrict Groundwater Flow	Corcoran Clay aquitard (below)	Corcoran Clay aquitard (above)	-
General Water Quality	Changes east to west from a calcium bicarbonate type to a calcium sodium or calcium magnesium bicarbonate type to a sodium bicarbonate type. Hardness is moderately hard to hard to very hard	Mostly a sodium or calcium bicarbonate type with hardness ranging from soft to very hard	Changes east to west from a calcium bicarbonate type to a calcium sodium or calcium magnesium bicarbonate type to a sodium bicarbonate type. Hardness is moderately hard to hard to very hard
Primary Uses	Domestic & Irrigation	Irrigation with some Domestic & Municipal	Irrigation, Domestic, & Municipal

Figure 2-36: 3D Illustration of Merced Subbasin Principal Aquifers and Aquitard



The Above Corcoran Principal Aquifer includes all aquifers that exist above the Corcoran Clay Aquitard, namely the Intermediate Leaky-Aquifer (where it overlies the Corcoran Clay) and the Shallow Unconfined Aquifer, both described above. This excludes areas that are located east of the extent of the Corcoran Clay. The related geologic formations are the Older Alluvium, Flood-plain deposits, and Younger Alluvium. While the flood-basin deposits have small hydraulic conductivities and small yields, the Older and Younger Alluvium deposits have moderate to large hydraulic conductivities and yields. Major uses of water in the Above Corcoran Principal Aquifer include domestic and irrigation uses.

The general chemical composition of groundwater in the unconfined aquifers (including both the Above Corcoran Clay and Outside of Corcoran Clay Principal Aquifers) changes spatially across the basin; moving downgradient from east to west, the water quality generally changes from a calcium bicarbonate type to a calcium sodium or calcium magnesium bicarbonate type to a sodium bicarbonate type. In terms of hardness, groundwater was generally moderately hard (61-120 mg/L) east of Highway 99 and hard to very hard (121-180 or >180 mg/L) west of Highway 99 (Page & Balding, 1973).

The Corcoran Clay Principal Aquitard is a member of the Pleistocene Tulare Formation. It is a laterally extensive reduced (blue/grey) silt and clay that underlies about 437 square miles in the southwest portion of the Merced Subbasin. The Corcoran Clay is a significant confining layer up to 60 feet thick (Page & Balding, 1973). Numerous silt and clay beds occur above and below the Corcoran Clay, but they could not be correlated over large areas and are therefore only of local importance to the confinement of groundwater (Page & Balding, 1973). The depth (and lateral extent) of the Corcoran Clay is shown on Figure 2-37. Thickness of the Corcoran Clay is shown on Figure 2-38.

The Below Corcoran Principal Aquifer includes all aquifers that exist below the Corcoran Clay Aquitard, namely the Confined Aquifer and any portion of the Mehrten Formation or Fractured Bedrock system that underlies the Corcoran Clay, described above. The related geologic formations are the Older Alluvium, Mehrten Formation, and Valley Springs Formation. The Valley Springs Formation has a low water-bearing character (small hydraulic conductivity), while the Mehrten Formation has small to moderate hydraulic conductivity. The Older Alluvium has a moderate to large hydraulic conductivity and yield.– Major uses of water in the Below Corcoran Principal Aquifer include irrigation as well as some domestic and municipal use.

Water quality of the Below Corcoran Clay Principal Aquifer is mostly a sodium or calcium bicarbonate type. In terms of hardness, groundwater was found to range from soft (>60 mg/L) to very hard (>180 mg/L) (Page & Balding, 1973).

The Outside Corcoran Principal Aquifer includes all aquifers that exist outside of the eastern lateral extent of the Corcoran Clay, namely portions of the Mehrten Formation, Fractured Bedrock, Intermediate Leaky-Aquifer, and Shallow Unconfined Aquifer. This aquifer is connected laterally with the Above Corcoran Principal Aquifer at shallower depths and the Below Corcoran Principal Aquifer at deeper depths. Related geologic formations include all of the geologic formations described above in the Above and Below Corcoran Principal Aquifers with the exception of the flood-plain deposits. Major uses of water in the Outside Corcoran Principal Aquifer include irrigation, domestic, and municipal use.

General water quality of the Outside of Corcoran Clay Principal Aquifer is described several paragraphs above under the section for Above Corcoran Clay where the literature refers to both the Principal Aquifers together as the "unconfined aquifers". In general, groundwater salinity is lowest in the easterly portion of the Subbasin. Salinity increases westward toward the San Joaquin River and southward toward the Chowchilla River. A small area of predominantly sodium-chloride type water has been identified near the confluence of the Merced and San Joaquin Rivers.

Data gaps and uncertainties related to the principal aquifers are primarily related to water quality and to the extent to which the Corcoran Clay reduces the vertical flow of water. Both the depth below ground and thickness of the clay varies throughout the basin (Figure 2-37 and Figure 2-38), and there are areas where the clay may be thin or not present. Additionally, the presence of numerous wells that penetrate the Corcoran Clay provides conduits for flow. Some of these wells are screened above and below the Corcoran Clay, although this practice is not currently allowed by Merced County Code, greatly increasing opportunities for vertical flow when pumps are not operating. With regards to water quality, there is limited depth-specific water quality data for the basin. The most recent, comprehensive study on general water quality types in the Subbasin dates from the 1970s and should be updated in the future with more recent, depth-specific water quality measurements.

Figure 2-37: Corcoran Clay Depth Below Ground Surface

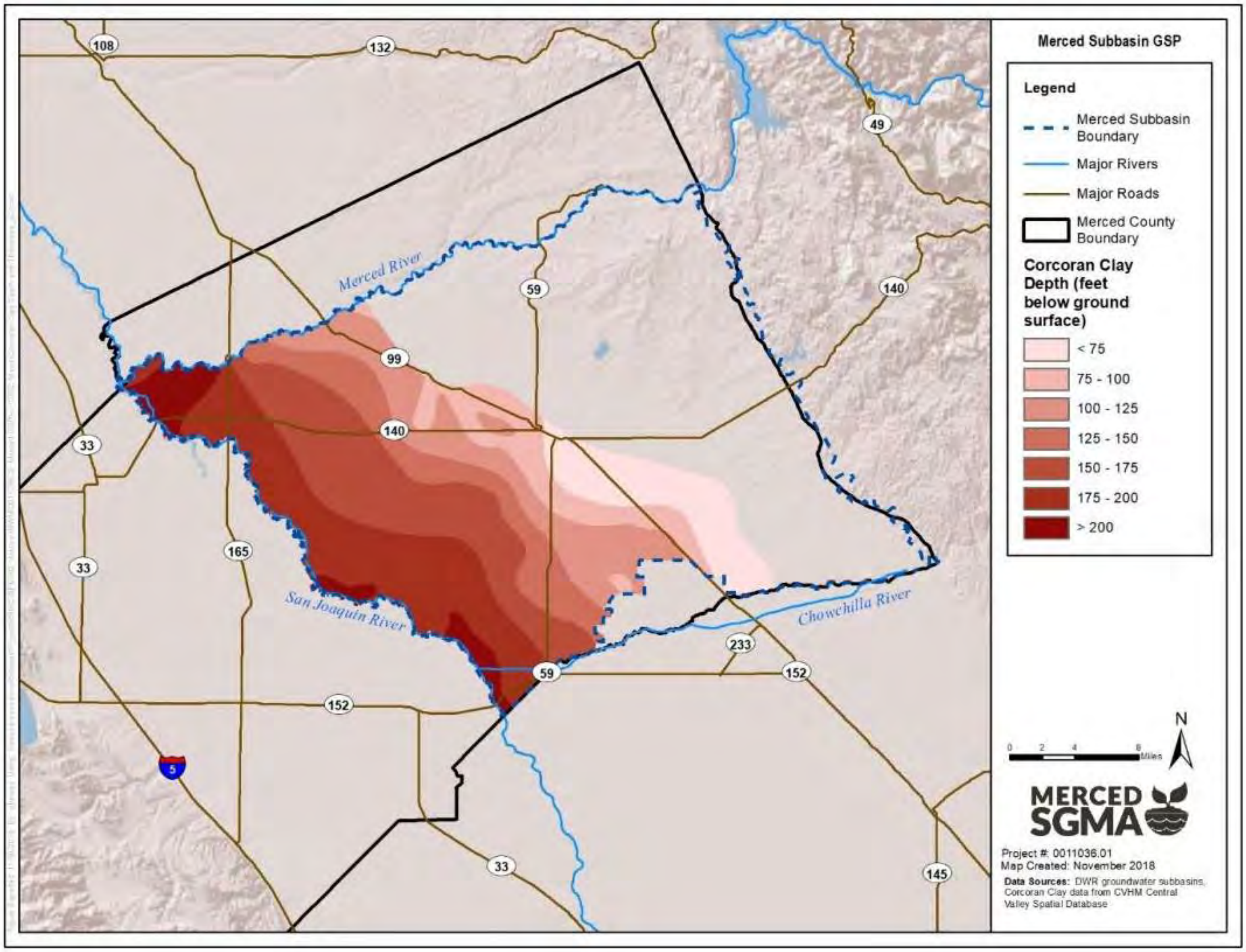


Figure 2-38: Corcoran Clay Thickness

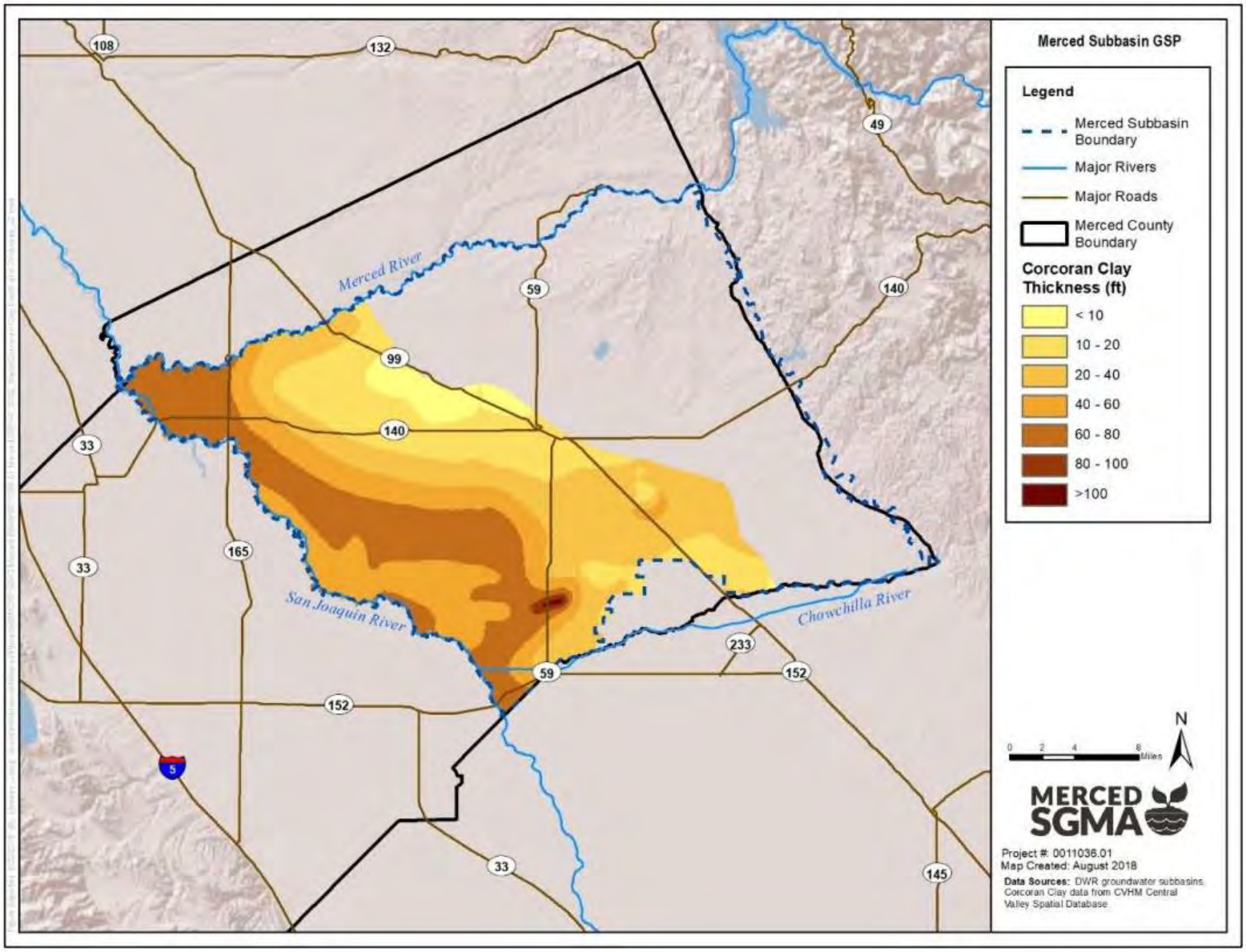
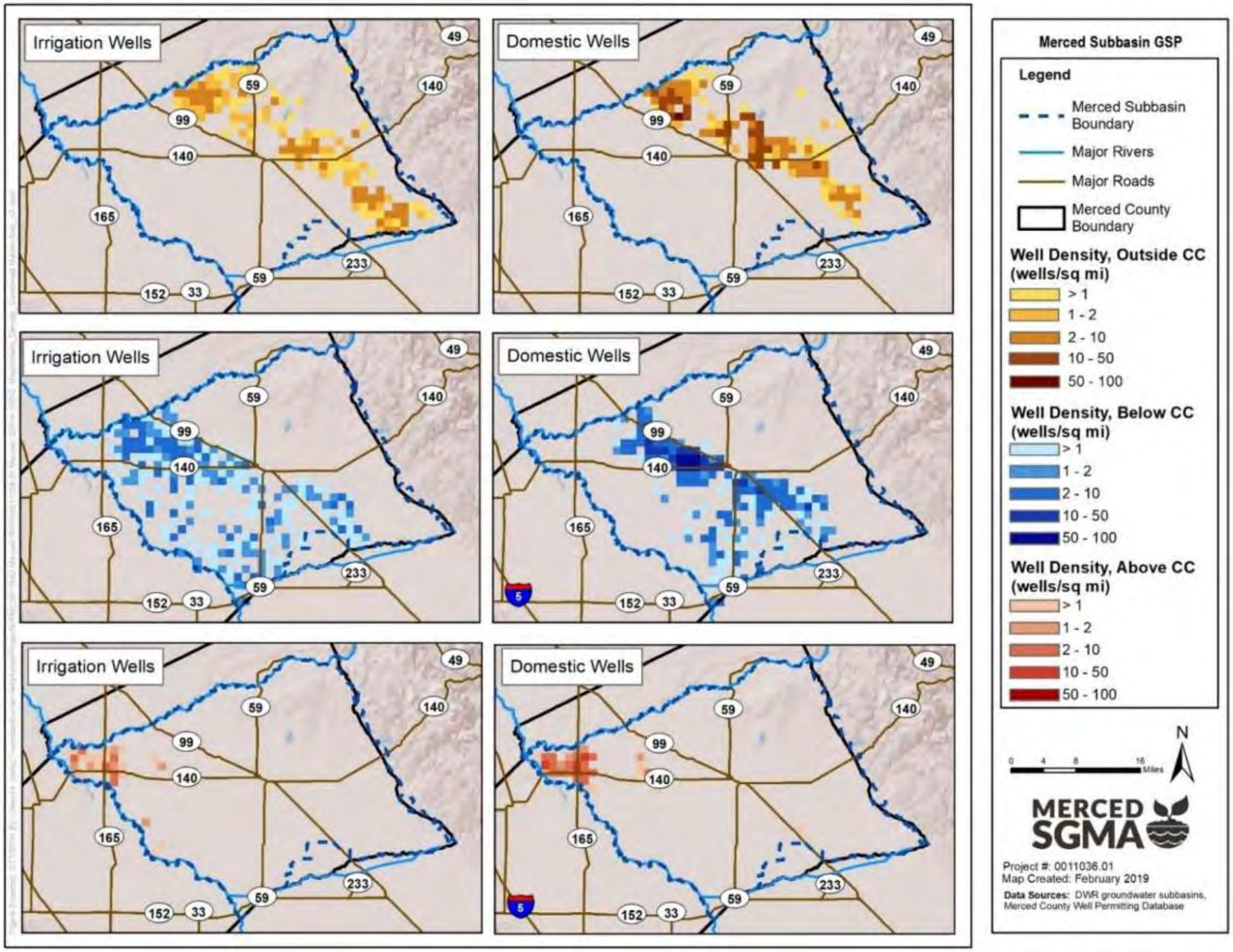


Figure 2-39 contains a series of maps showing the density per square mile of irrigation and domestic wells per principal aquifer. These wells were mapped based on the Merced County Well Permitting Database which contains a record of domestic and irrigation wells permitted from the early to mid-1990s through present. Only wells that were flagged with an “active” status (e.g., not flagged as “inactive” or “destroyed”) were included. It is possible that some of wells with an “active” flag may have been abandoned but the information is not yet reflected in the database. About 9 percent of active wells in the database either did not have a latitude/longitude recorded or could not be matched to a location by parcel number and are thus not included in the density map. About 7 percent of the remaining wells with locations did not have a depth value and were also not included in the density map. As Figure 2-39 shows, within the Corcoran Clay area, there is a greater density and spatial distribution of both domestic and irrigation wells within the Below Corcoran Clay Principal Aquifer than the Above Corcoran Clay Principal Aquifer.

Figure 2-39: Domestic and Non-Domestic/Non-Observation Well Densities by Principal Aquifer



2.1.8 HCM Data Gaps

All hydrogeologic conceptual models contain a certain amount of uncertainty and can be improved with additional data and analysis. The Merced Subbasin HCM data gaps are present in the understanding of the HCM presented in this GSP. These data gaps will be revised after further research and data gathering for future GSP updates:

- Water quality of principal aquifers
  - Lack of depth-specific water quality data makes it difficult to spatially characterize the water quality in the aquifer.
  - Additional monitoring at various depths that cover all three Principal Aquifers for different constituents will help inform the understanding of water quality. This can be achieved through installation of new monitoring wells or through determination of screened intervals of existing monitoring wells.
- Aquifer Characteristics
  - Aquifer characteristics (such as hydraulic conductivity) have a significant impact on how projects and management action in one part of the basin may influence sustainability in other parts of the basin.~~ ~~ Aquifer characteristics should be confirmed through additional aquifer testing or additional monitoring wells.

2.1.9 HCM Data Recommendations

While not necessarily data gaps, the item below is a recommendation for improving or updating existing information:

- Supplement the Page & Balding (1973) and Page (1977) cross-sections with more recent data. While the MercedWRM uses these cross sections as well as more recent supplemental information from the USGS texture model, incorporation of more recent work (e.g., work by K. Schmidt) could be used to provide additional information for updating cross sections in the future.

2.2 CURRENT AND HISTORICAL GROUNDWATER CONDITIONS

This section describes the current and historical groundwater conditions in the Merced Subbasin. As defined by the GSP regulations by DWR, the Groundwater Conditions section is intended to:

- Define current groundwater conditions in the Subbasin
- Describe historical groundwater conditions in the Subbasin
- Describe the distribution, availability, and quality of groundwater
- Identify interactions between groundwater, surface water, groundwater dependent ecosystems, and subsidence
- Establish a baseline of quality and quantity conditions that will be used to monitor changes in the groundwater conditions relative to measurable objectives and minimum thresholds
- Inform development of measurable objectives to maintain or improve specified groundwater conditions

- Support monitoring to demonstrate that the GSP is achieving sustainability goals of the Subbasin

The groundwater conditions described in this section are intended to convey the present and historical availability, quality, and distribution of groundwater. These conditions are used elsewhere in the GSP to identify sustainability indicators, establish undesirable results, and define measurable objectives.

2.2.1 Groundwater Elevation

2.2.1.1 Historical Groundwater Elevations

To visually show long-term trends in groundwater elevations in the Merced Subbasin, 13 wells with long periods of record and that are relatively evenly distributed across the Subbasin were selected from the larger available dataset (see Figure 2-40). Across all three Principal Aquifers, this includes four wells screened above the Corcoran Clay, five wells screened from below the Corcoran Clay, and four wells located outside the extent of the Corcoran Clay. Long-term hydrographs prepared for these wells show that, throughout most of the Merced Subbasin, groundwater elevations are declining with time (see Figure 2-40).

Average groundwater level decline per Principal Aquifer was quantified for 1996-2015. In Section 2.3 –Water Budget Information, the Historical Water Budget uses 1996-2015 as a representative hydrologic period which includes an average annual precipitation of 11.6 inches, nearly the same as the long-term average of 12.2 inches. The 1996-2015 period also includes the recent 2012-2015 drought, the wet years of 1996-1998, and periods of normal precipitation. This was calculated using all California Statewide Groundwater Elevation Monitoring Program (CASGEM) and Voluntary wells with groundwater level data available for 1996-2015 (totaling 51 wells).

Based on data from 11 wells in the Above Corcoran Clay Principal Aquifer, average groundwater level decline was 1.3 ~~-~~ft/yr from 1996-2015. Based on data from 15 wells in the Below Corcoran Clay Principal Aquifer, average groundwater level decline was 2.4 ft/yr from 1996-2015. Based on data from 25 wells in the Outside Corcoran Clay Principal Aquifer, average groundwater level decline was 1.2 ft/yr from 1996-2015. Note that most of the CASGEM wells for the Outside Corcoran Clay Principal Aquifer were Voluntary wells that did not report beyond 2012. It is possible that some portion of additional groundwater level decline during the 2012-2015 drought is missing from the overall 1996-2015 average for the Outside Corcoran Clay Principal Aquifer. Voluntary wells provide important long-term historical information about groundwater levels, but since they do not meet the full CASGEM program standards, they are not included in the future monitoring program for this GSP.

Figure 2-40: Hydrographs for Selected Wells in the Merced Subbasin

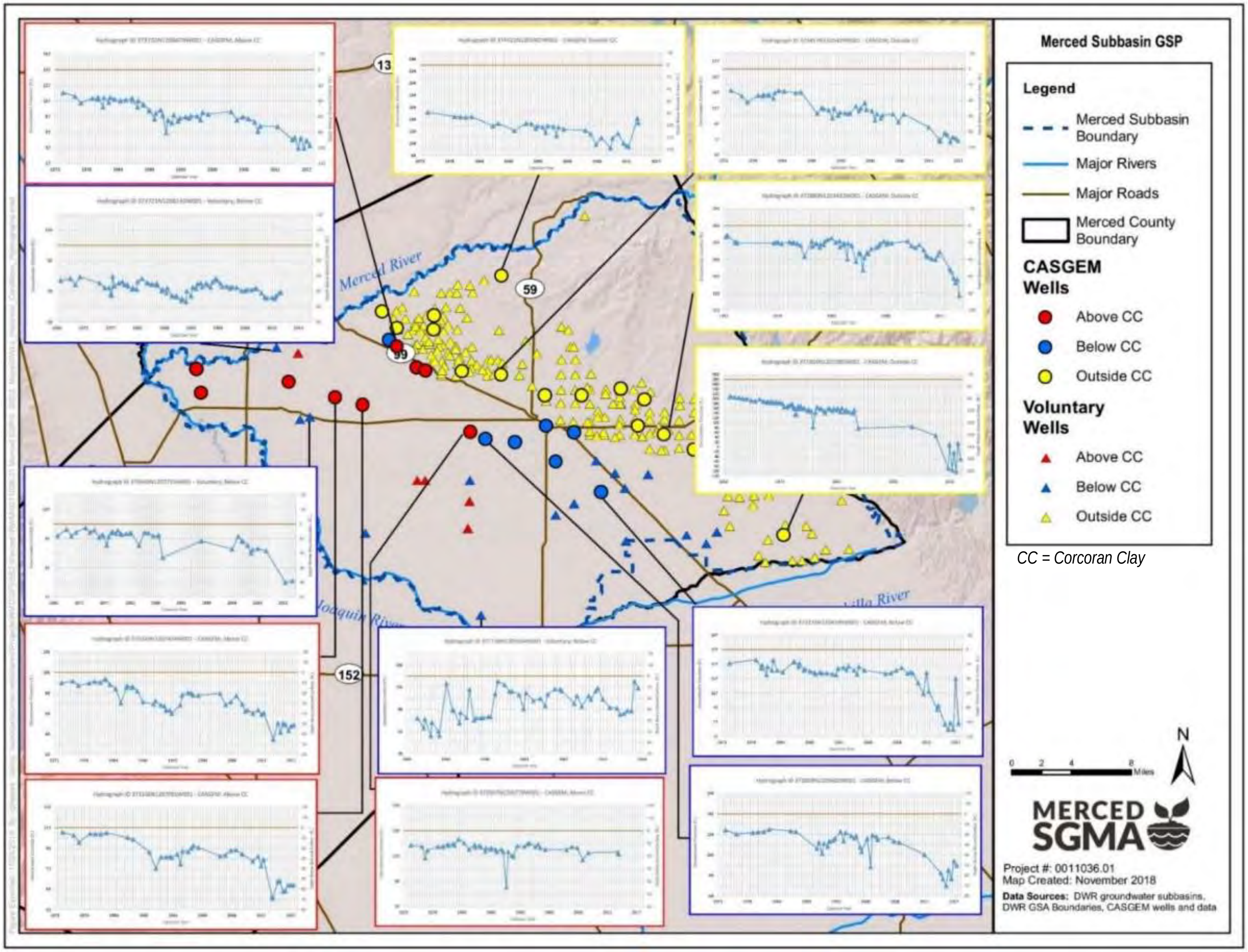


Figure 2-41 through Figure 2-43 show groundwater elevations (in feet above sea level, datum NAVD88) in fall 2014 based on measurements recorded at CASGEM wells, including voluntary wells where data was available. Fall 2014 is the closest season of available CASGEM data to display conditions as of January 1, 2015, representing conditions when SGMA became law. Groundwater elevations are mapped separately for the three principle aquifers: Above, Below, and Outside of the Corcoran Clay.

Figure 2-41: Fall 2014 Groundwater Elevation, Principal Aquifer: Above Corcoran Clay

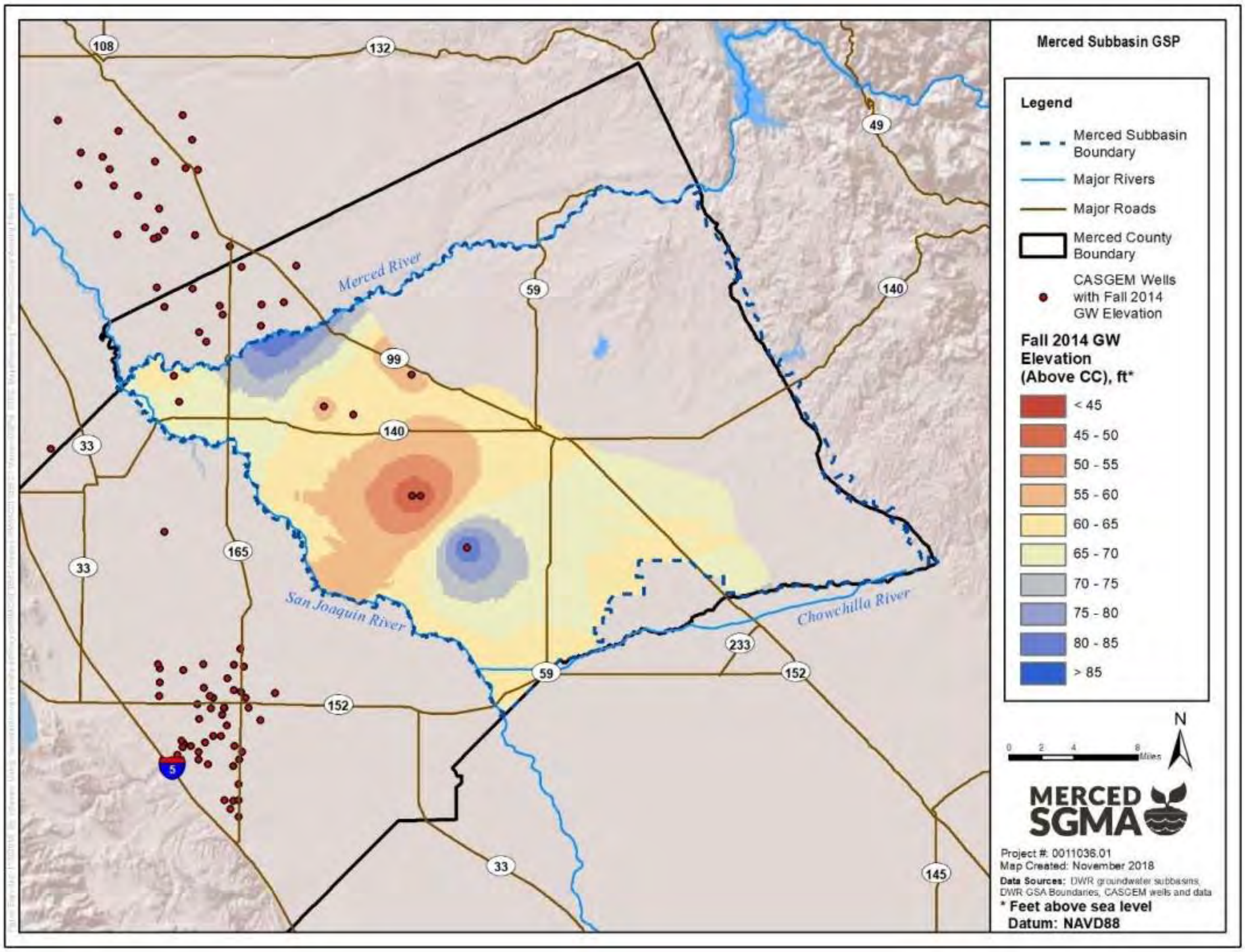


Figure 2-42: Fall 2014 Groundwater Elevation, Principal Aquifer: Below Corcoran Clay

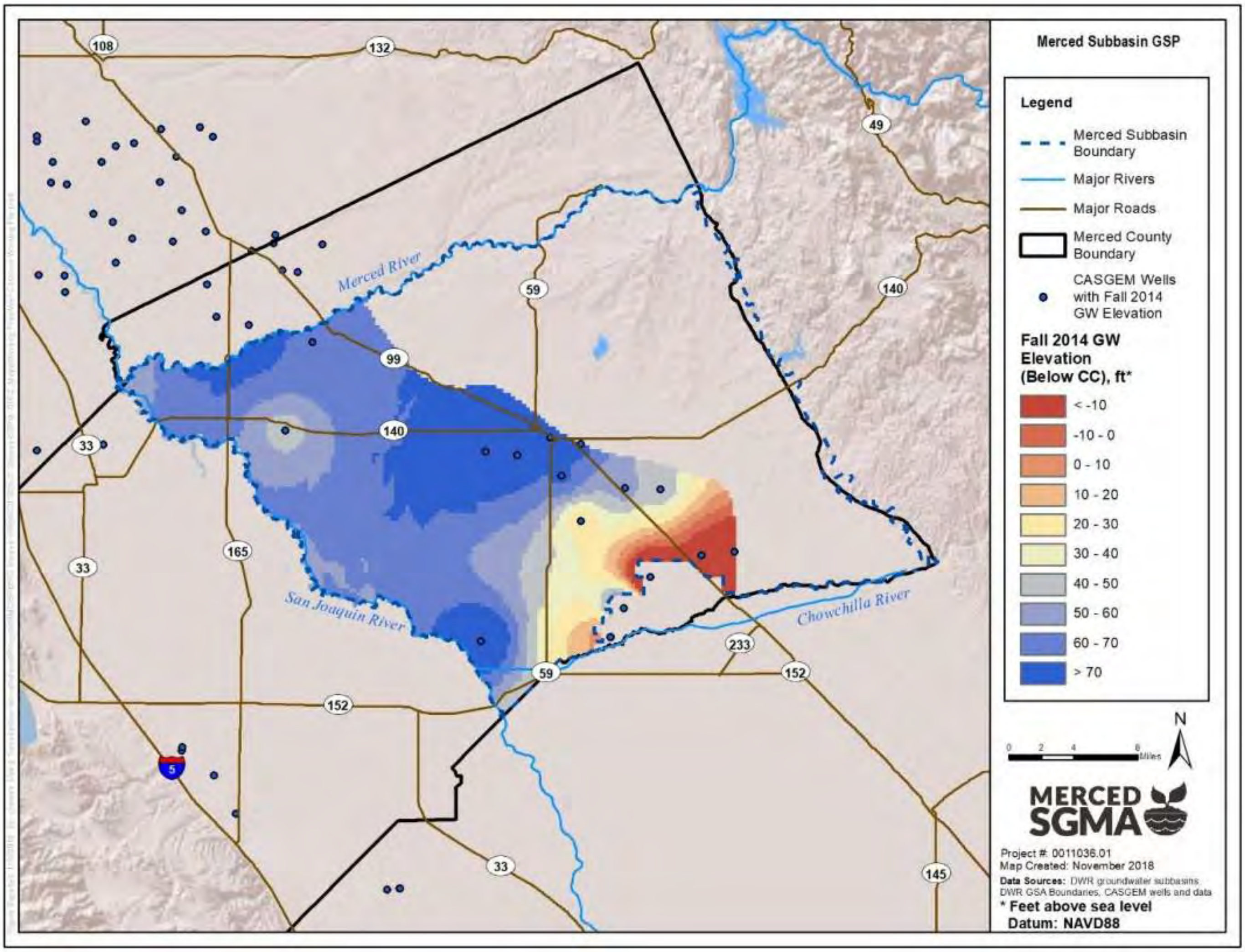
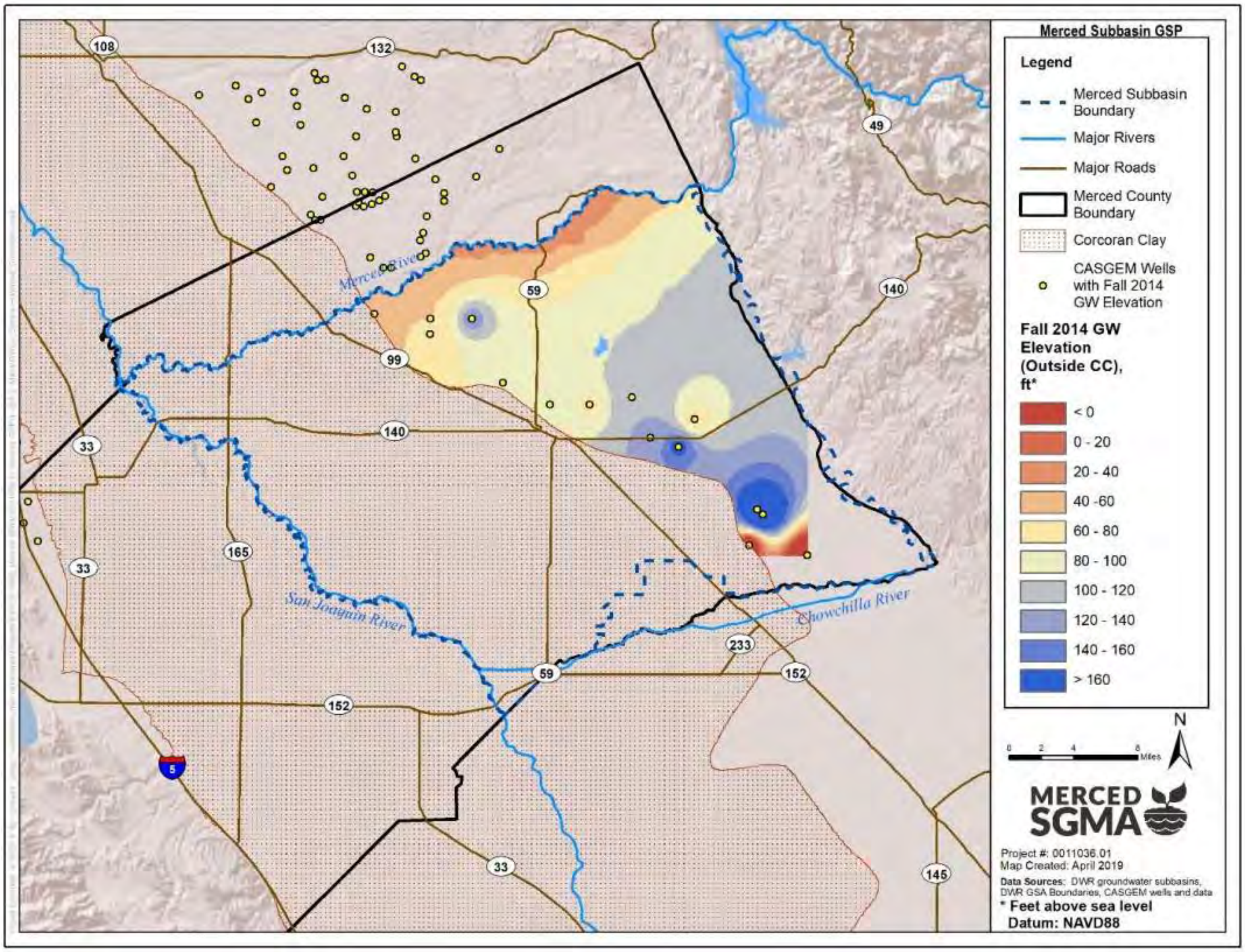


Figure 2-43: Fall 2014 Groundwater Elevation, Principal Aquifer: Outside Corcoran Clay[1]



[1] Groundwater elevations are missing for the southeast corner of the Outside Corcoran Clay Principal Aquifer due to a lack of data in this corner of the Subbasin from Fall 2014.

2.2.1.2 Current Groundwater Conditions

Figure 2-44 through Figure 2-46 show groundwater elevations in spring 2017 (most recent seasonal high), while Figure 2-47 through Figure 2-49 show groundwater elevations in fall 2017 (most recent seasonal low). Groundwater elevations are mapped for California Statewide Groundwater Elevation Monitoring Program (CASGEM) wells (including voluntary wells) separately for the three principle aquifers: Above, Below, and Outside of the Corcoran Clay.

Above the Corcoran Clay, groundwater generally flows northerly from the southern portion of the aquifer boundary and southerly from the northern portion of the aquifer boundary, meeting at a low point in the middle. The lateral gradient is fairly shallow at approximately 4 ft/mi.

Below the Corcoran Clay, groundwater generally flows in an easterly or southeasterly direction towards the Chowchilla Subbasin. The lateral gradient is approximately 7 ft/mi.

Outside of the Corcoran Clay, groundwater generally flows from the center of the aquifer region to the north. There also appears to be localized highs and depressions without a dominant lateral gradient to the southern end of the aquifer region, possibly due to pumping or stream influences. The lateral gradient is approximately 5.2 ft/mi.

Figure 2-44: Spring 2017 Groundwater Elevation, Principal Aquifer: Above Corcoran Clay

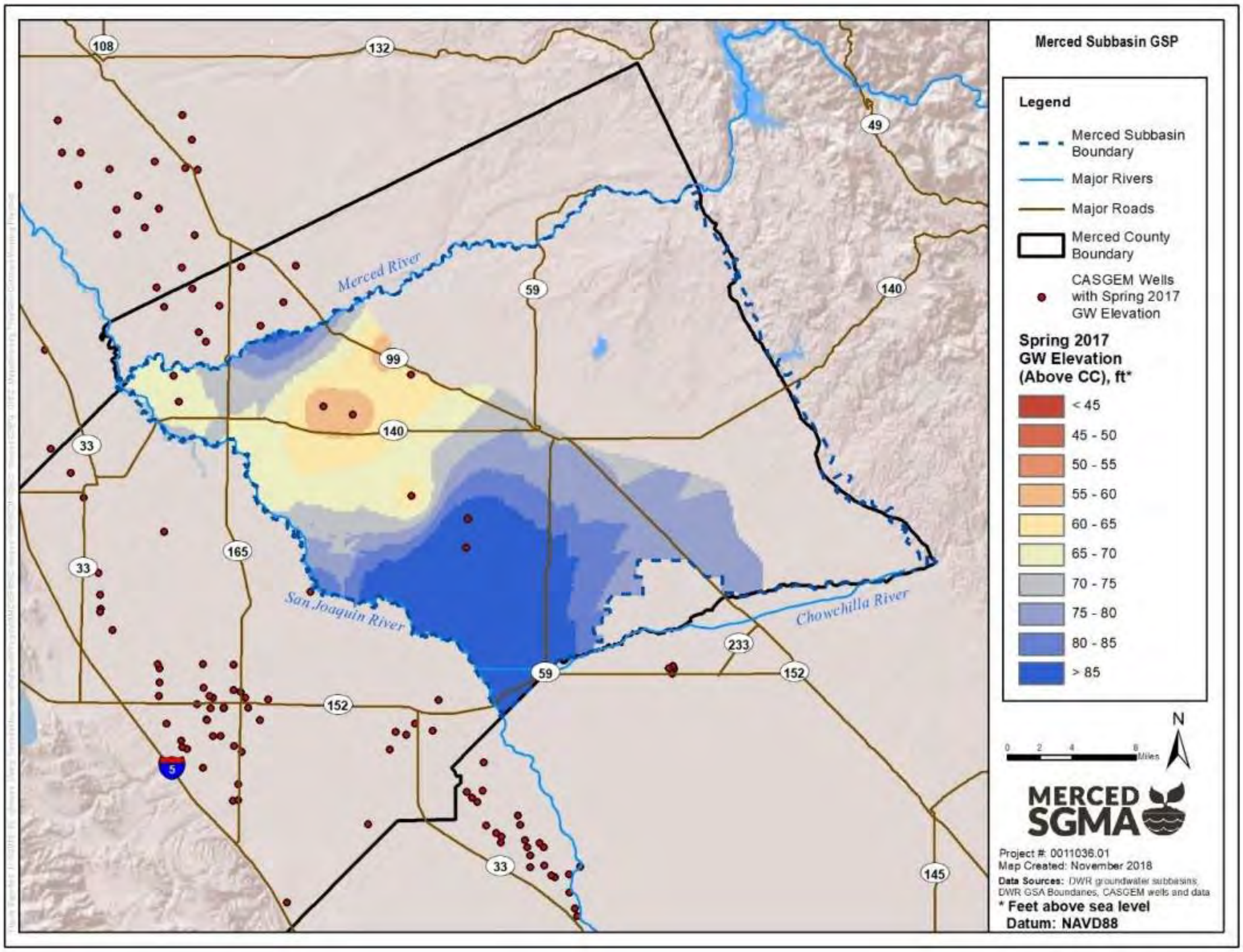


Figure 2-45: Spring 2017 Groundwater Elevation, Principal Aquifer: Below Corcoran Clay

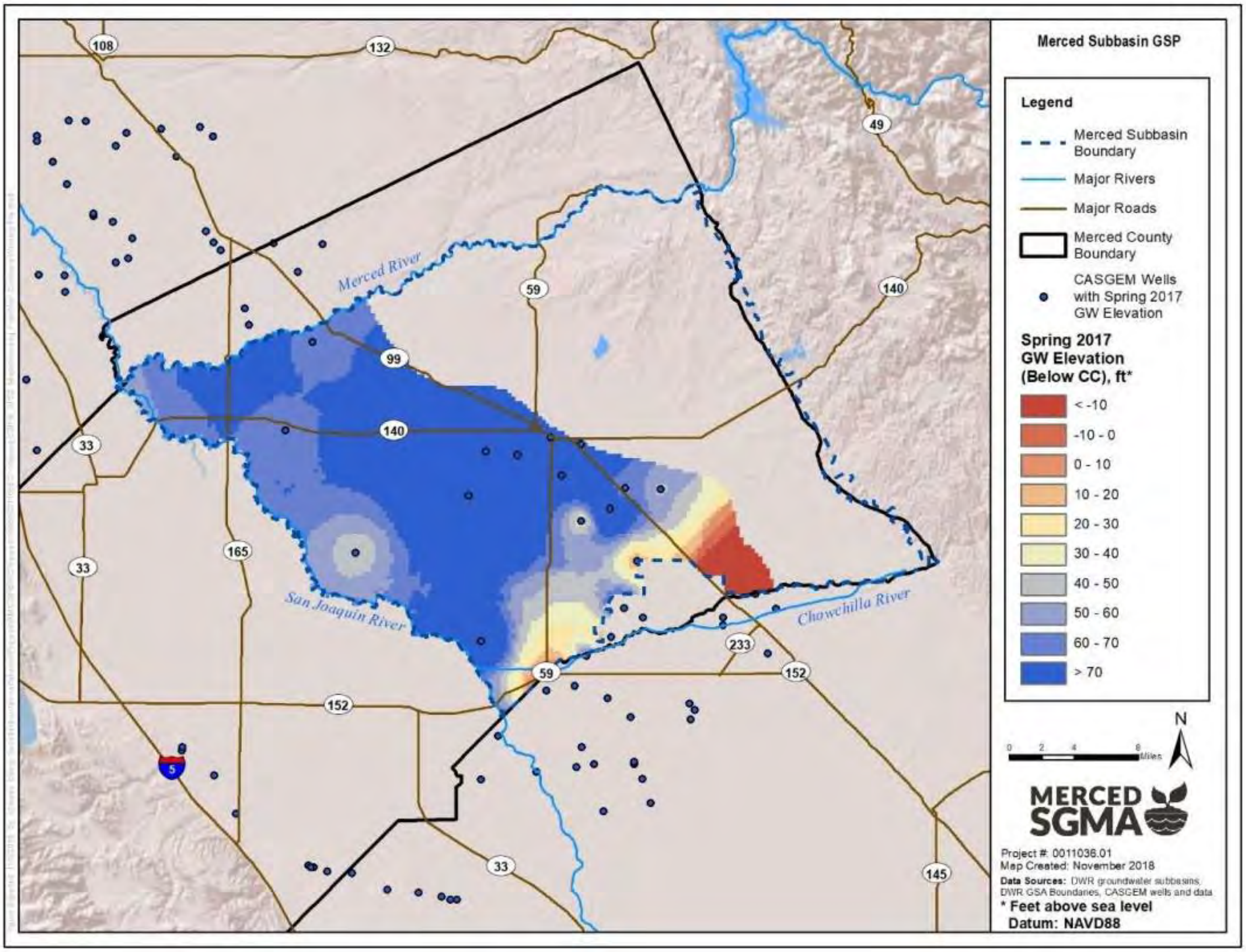


Figure 2-46: Spring 2017 Groundwater Elevation, Principal Aquifer: Outside Corcoran Clay

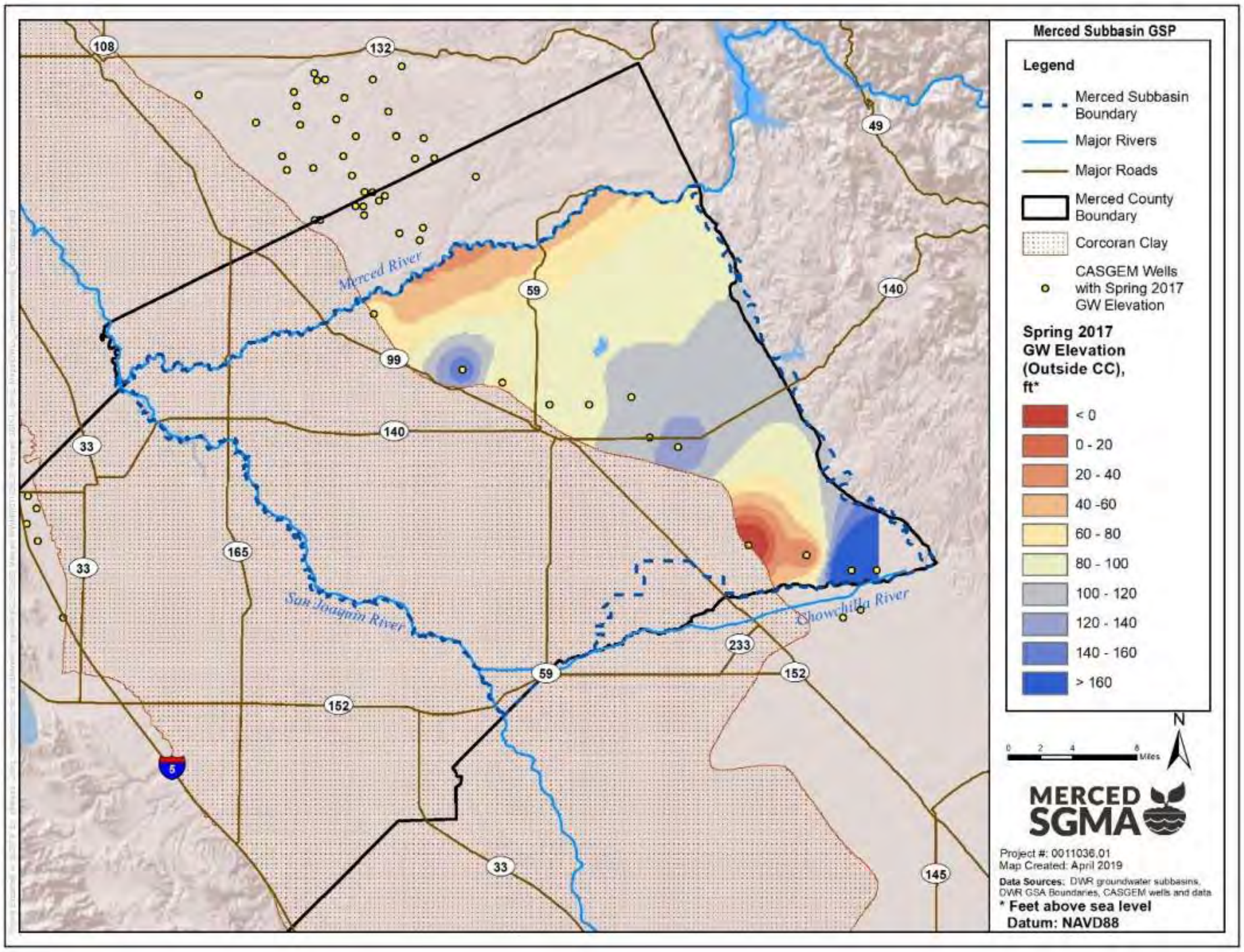


Figure 2-47: Fall 2017 Groundwater Elevation, Principal Aquifer: Above Corcoran Clay

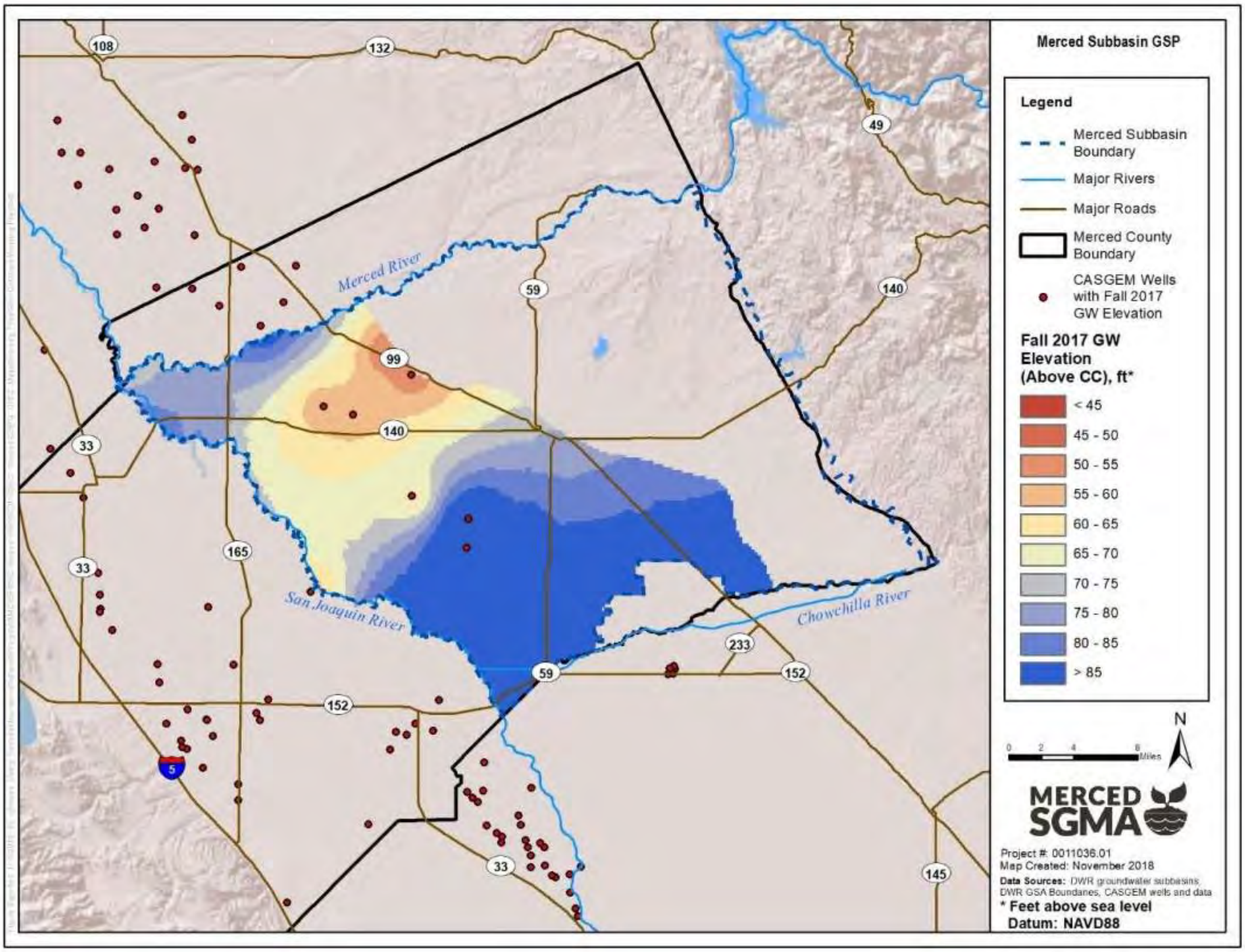


Figure 2-48: Fall 2017 Groundwater Elevation, Principal Aquifer: Below Corcoran Clay

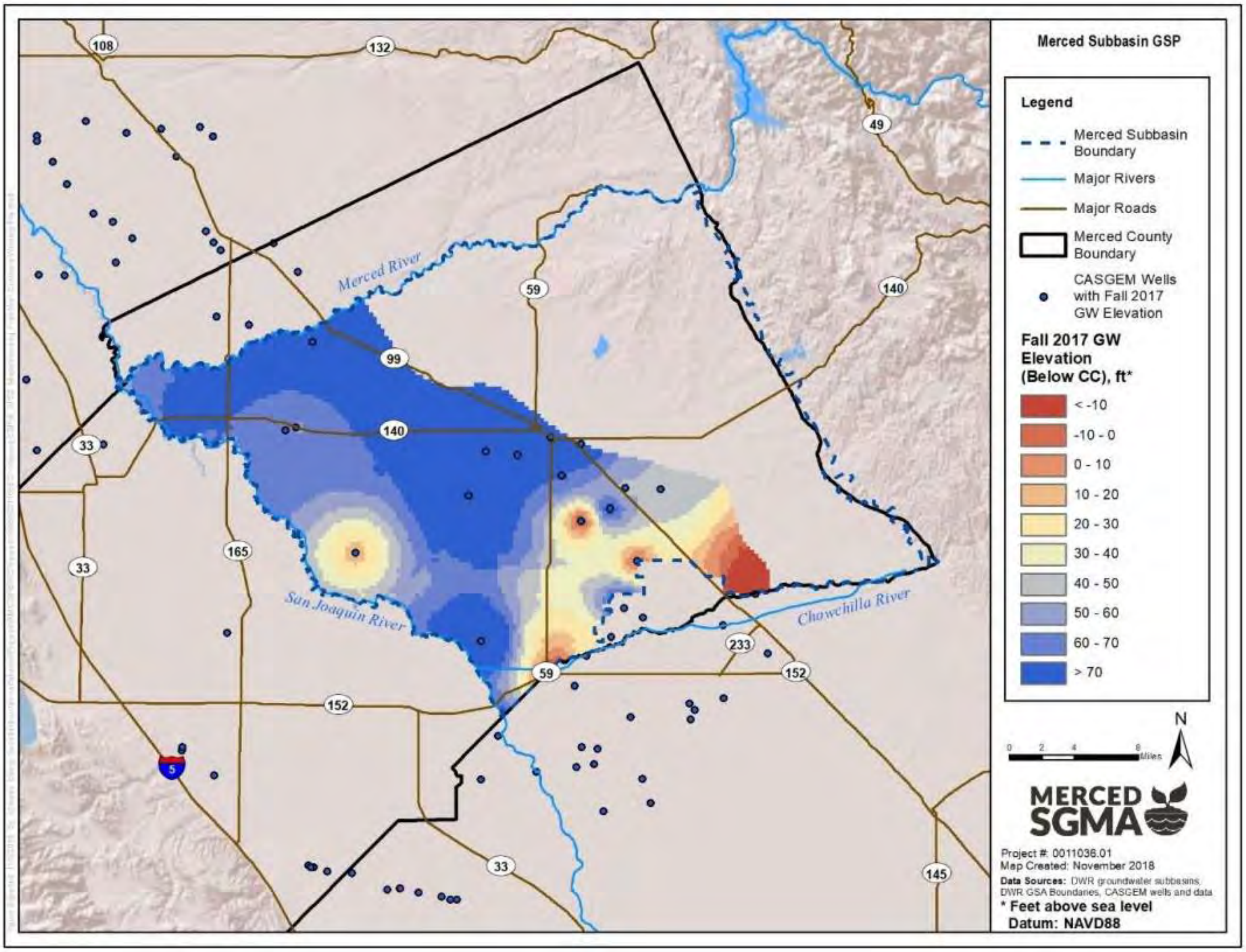
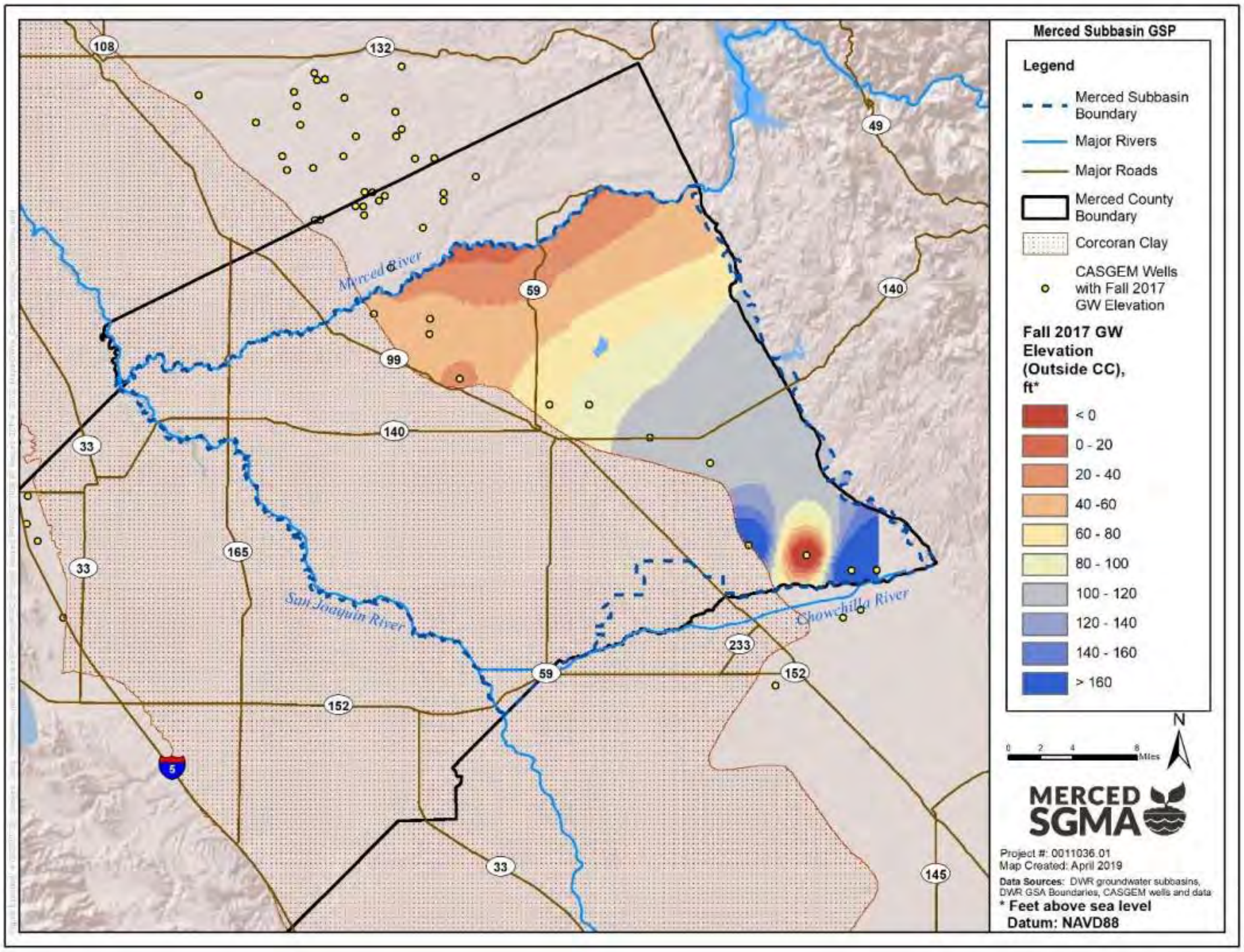


Figure 2-49: Fall 2017 Groundwater Elevation, Principal Aquifer: Outside Corcoran Clay



2.2.1.3 Vertical Gradients

A vertical gradient describes the movement of groundwater perpendicular to the ground surface and is typically measured by comparing the elevations of groundwater in a well with multiple completions that are of different depths. If groundwater piezometric elevations in the shallower completions are higher than in the deeper completions, the gradient is identified as a downward gradient. A downward gradient is one where groundwater is moving downward through the subsurface. If groundwater piezometric elevations in the shallower completions are lower than in the deeper completions, the gradient is identified as an upward gradient. An upward gradient is one where groundwater is moving upward through the subsurface. If groundwater elevations are the same throughout the completions, there is no vertical gradient. Knowledge about vertical gradients is required by regulation and is useful for understanding how groundwater moves in the Subbasin.

There are six multiple completion wells located in the Merced Subbasin, all of which are monitored through the CASGEM program. The locations of the multiple completion wells are shown in Figure 2-50. Hydrographs with groundwater elevations for each respective set of completion wells are shown in Figure 2-51 through Figure 2-54. The four sets of multiple completion wells in the Below and Outside Corcoran Clay Principal Aquifers are owned and operated by the City of Merced primarily for municipal water quality monitoring. There are no known recent studies dedicated to vertical gradients using groundwater elevations recorded at these wells.

One of the two sets of multiple completion wells in the Below Corcoran Clay Principal Aquifer shows an upward gradient (see Figure 2-52). The other shows a slight indication of an upward gradient but is not significant across all screened intervals (see Figure 2-51). These wells are located right at the edge of the extent of the Corcoran Clay where it is most shallow and thin and the level of confinement is not as well understood. The top of the Corcoran Clay is approximately 55 feet below ground surface (bgs) and 15 feet thick (extending to a depth of approximately 70 feet bgs), while the shallowest wells have screened intervals 60-110 feet or 89-170 feet bgs.

One of the two sets of multiple completion wells in the Outside Corcoran Clay Principal Aquifer shows evidence of a downward gradient (see Figure 2-54) which is consistent with previous studies (Elliott, 1984), as referenced by (AMEC, 2008). The other set of wells shows a slight indication of a downward gradient (see Figure 2-53) but is not significant across all screened intervals. Consequently, in the Outside Corcoran Clay, degradation of shallow groundwater can potentially affect deeper water supply wells if downward flow is significant and if dilution and chemical/biological processes are insufficient to adequately reduce the concentrations of constituents of concern (AMEC, 2008).

Both sets of multiple completion wells in the Above Corcoran Clay Principal Aquifer show no strong gradient (see Figure 2-55 and Figure 2-56).

Figure 2-50: CASGEM Multiple Completion Wells

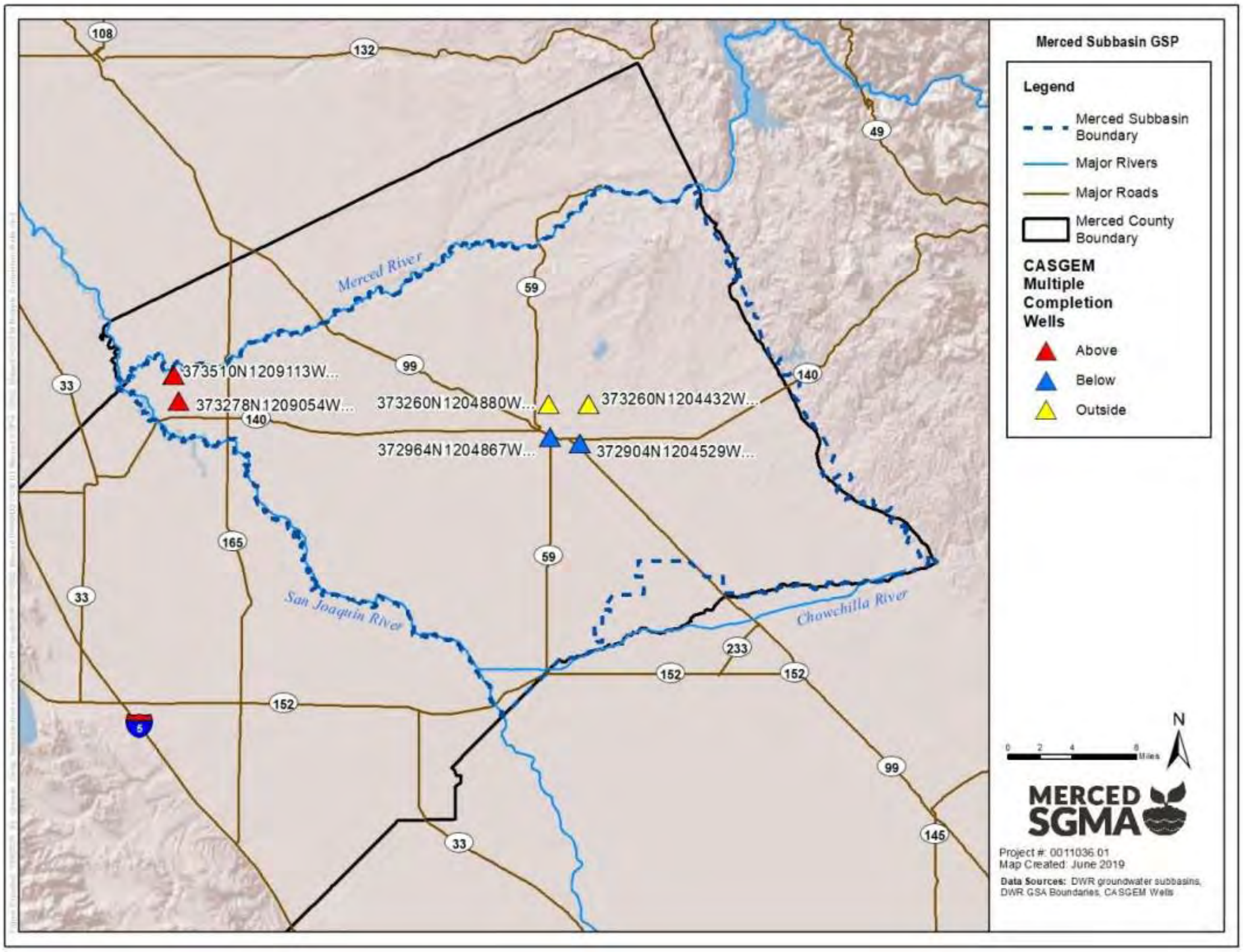


Figure 2-51: Vertical Gradient at Wells with Site Code Beginning 372964N1204867 (Below Corcoran Clay)

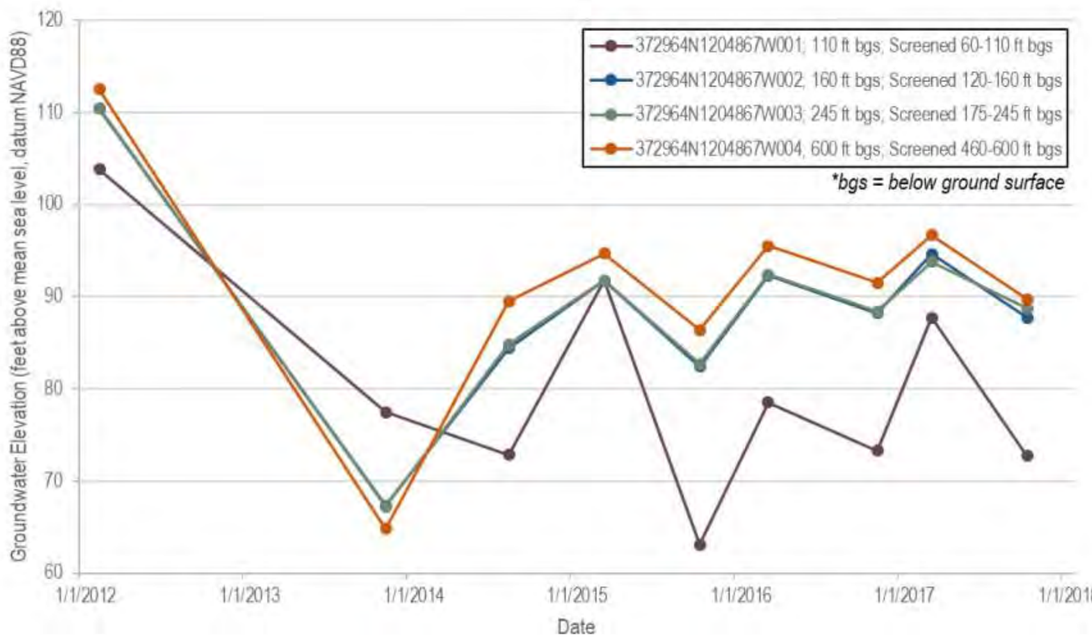


Figure 2-52: Vertical Gradient at Wells with Site Code Beginning 372904N1204207 or 372904N1204529 (Below Corcoran Clay)

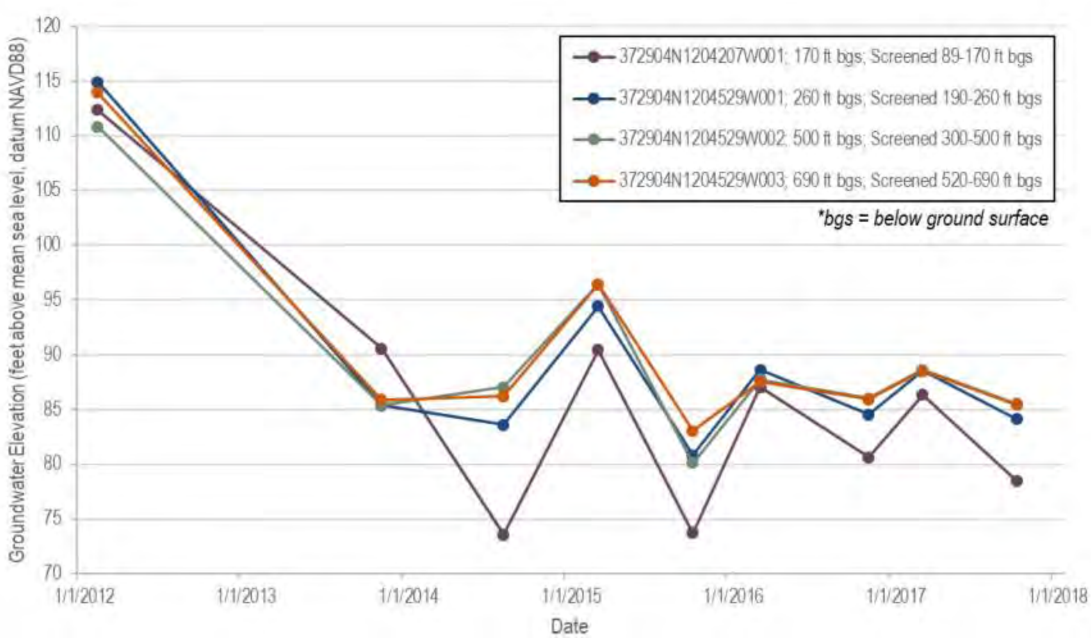


Figure 2-53: Vertical Gradient at Wells with Site Code Beginning 373260N1204432 (Outside Corcoran Clay)

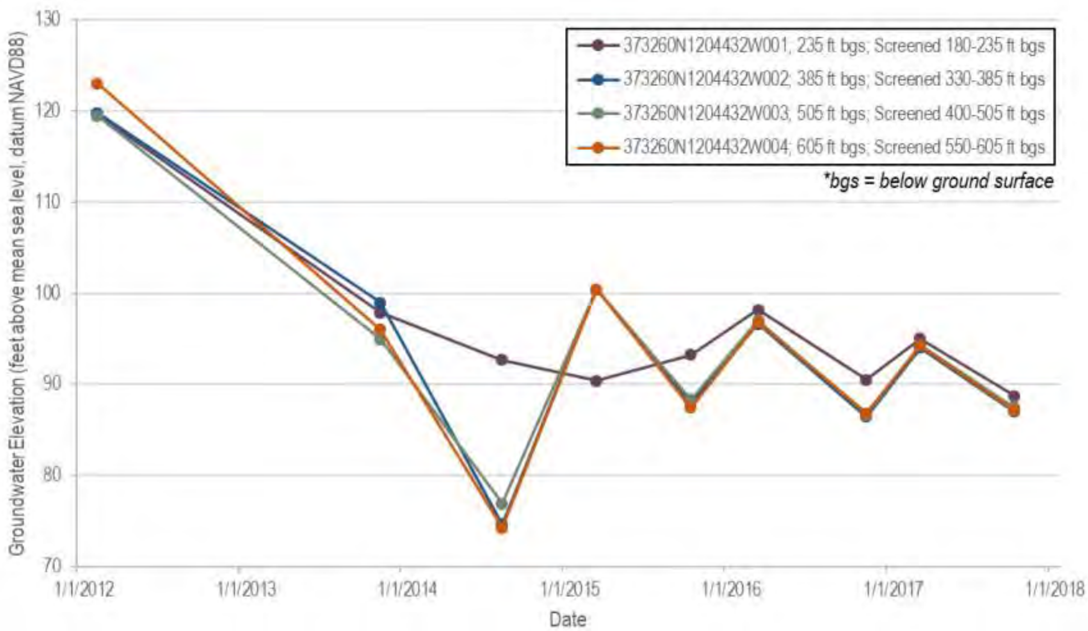


Figure 2-54 Vertical Gradient at Wells with Site Code Beginning 373260N1204880 (Outside Corcoran Clay)

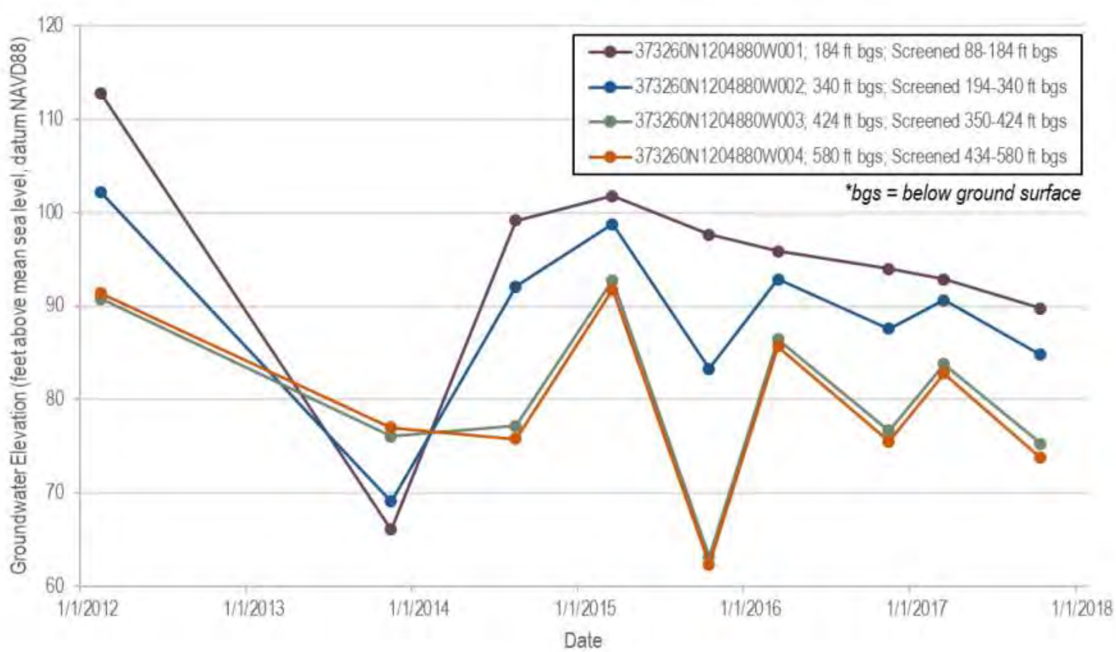


Figure 2-55: Vertical Gradient at Wells with Site Code Beginning 373278N1209054 or 373277N1209054 (Above Corcoran Clay)

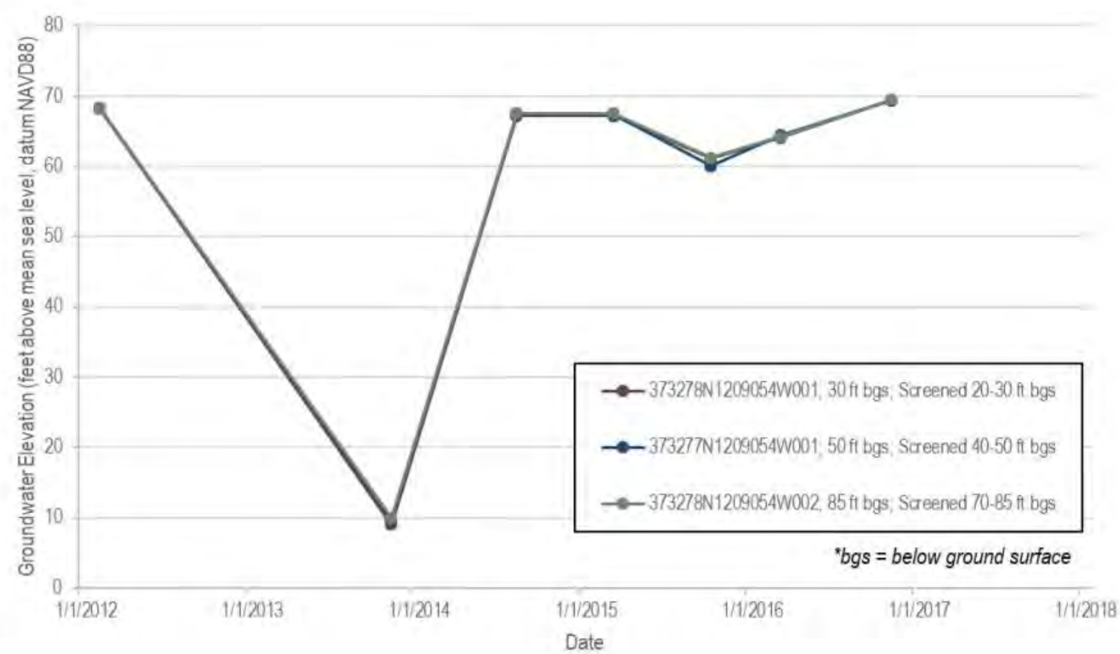
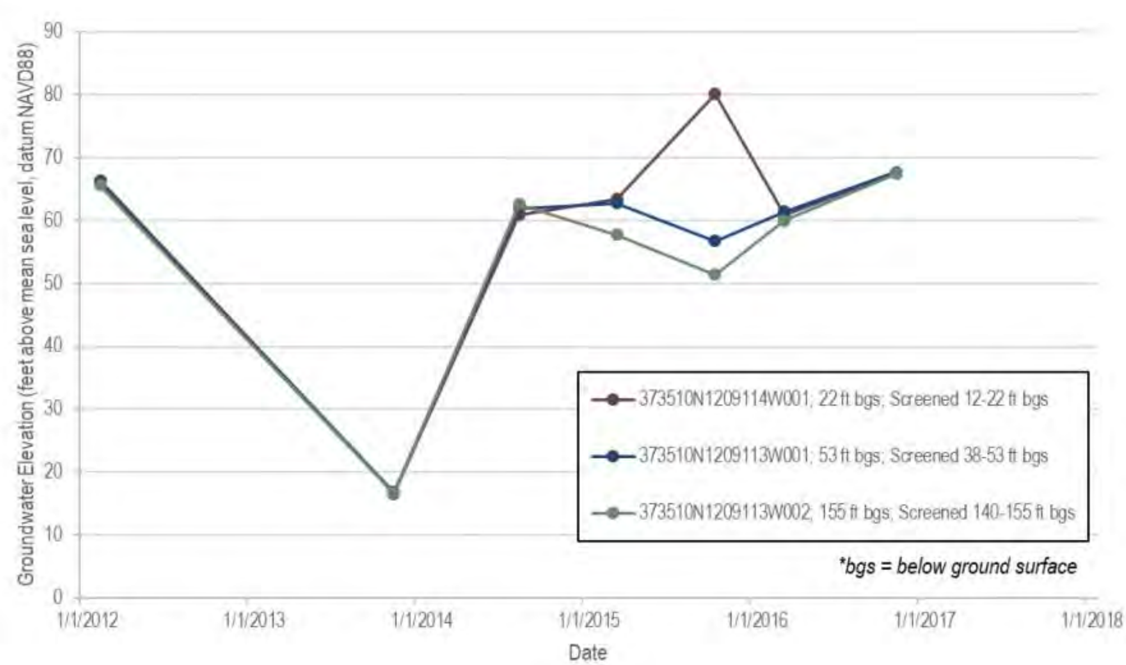


Figure 2-56: Vertical Gradient at Wells with Site Code Beginning 373510N1209114 or 373510N1209113 (Above Corcoran Clay)



2.2.2 Groundwater Storage

The MercedWRM was used to estimate historical change in storage of the Merced Subbasin from 1995-2015. Figure 2-57 shows annual total storage for each MercedWRM layer (not including the deep layer of relative higher salinity) as well as the cumulative change in storage. In 2015, the total fresh groundwater storage was estimated as 45.3 million acre-feet (MAF) and the cumulative change in storage from 2006-2015 was estimated as -1.92 MAF, or 192 TAF per year. An additional 72 MAF in Layer 6 of the model (not pictured) is a water body of relatively higher salinity. More information about the layers of the MercedWRM and calculation of storage changes can be found in Appendix D. Figure 2-58 shows the same cumulative change in storage against budgeted groundwater uses and water year type.

Figure 2-57: Historical Modeled Change in Storage by MercedWRM Layer

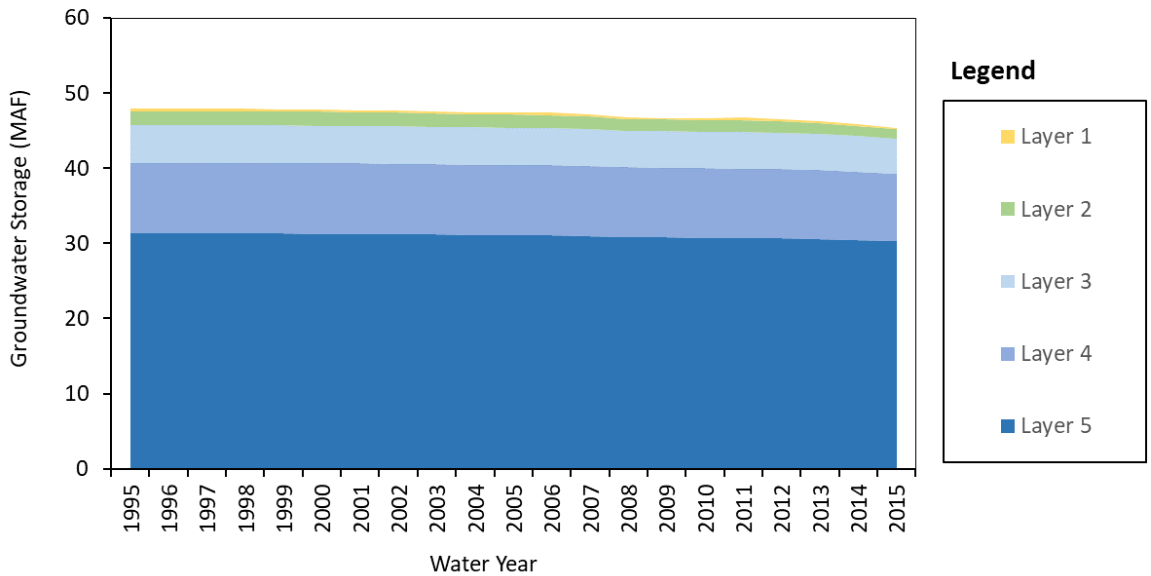
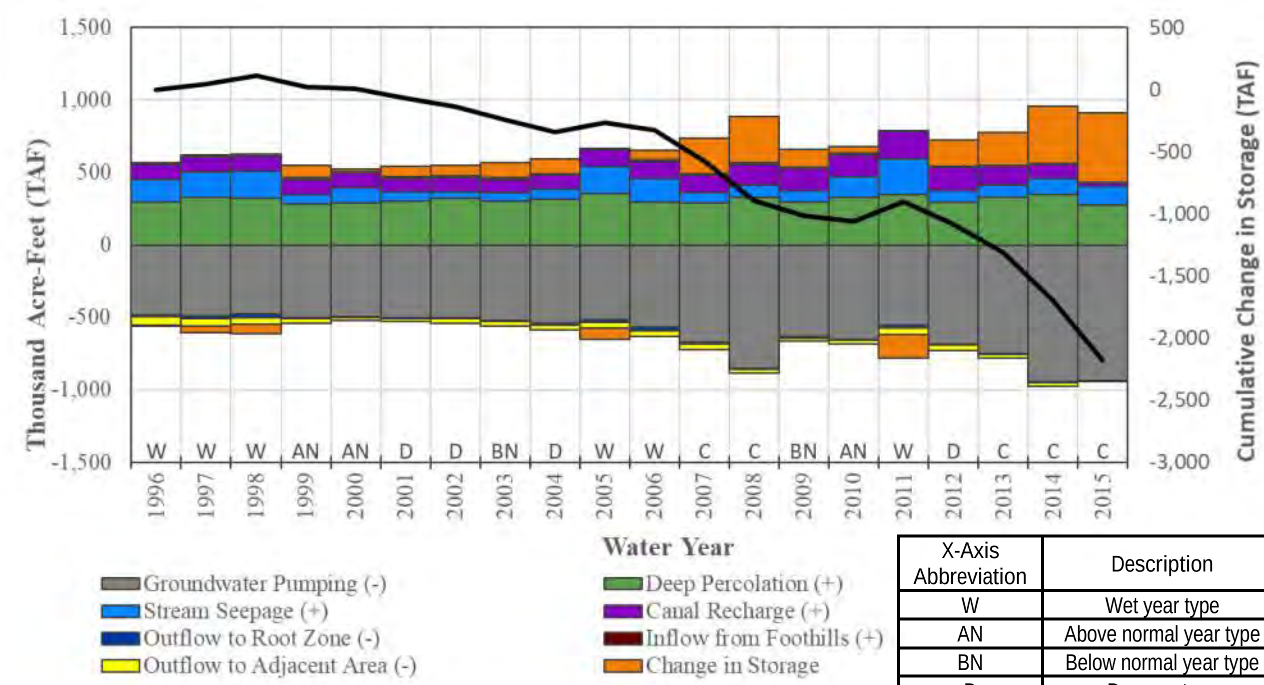


Figure 2-58: Historical Modeled Change in Storage with Groundwater Use and Water Year Type



X-Axis Abbreviation	Description
W	Wet year type
AN	Above normal year type
BN	Below normal year type
D	Dry year type
C	Critical year type

[1] "Change in Storage" is placed on the chart to balance the water budget. For instance, if annual outflows (-) are greater than inflows (+), there is a decrease in storage, and this is shown on the positive side of the bar chart to balance out the increased outflows on the negative side of the bar chart.

Source: Water year types based on San Joaquin Valley Water Year Index (DWR, 2017c)

2.2.3 Seawater Intrusion

Seawater intrusion is not a potential risk in the Merced Subbasin, as the Subbasin is not near any seawater source. However, groundwater quality conditions related to salinity are described in the following section.

2.2.4 Groundwater Quality

Groundwater in the Merced Subbasin contains both anthropogenic and naturally occurring constituents. While groundwater quality is often sufficient to meet beneficial uses, some of these constituents either currently impact groundwater use within the Subbasin or have the potential to impact it in the future. Depending on the water quality constituent, the issue may be widespread or more of a localized concern.

The primary naturally-occurring water quality constituents of concern are arsenic and uranium. There are also aesthetic issues related to iron and manganese.

The primary water quality constituents of concern related to human activity include salinity, nitrate, hexavalent chromium, petroleum hydrocarbons (such as benzene and MTBE), pesticides (such as DBCP, EDB, 1,2,3 TCP), solvents (such as PCE, TCE), and emerging contaminants (such as PFOA, PFOS). Of these issues, nitrate is the most widespread issue with a direct impact on public health. Salinity is also an issue due to the widespread nature of the problem and difficulty of management given increases in salinity as a result of both urban and agricultural use.

The Merced County Department of Public Health, Division of Environmental Health maintains a list of areas of known adverse water quality in the County, shown below in Table 2-9.

Table 2-9: Adverse Groundwater Quality by Area

Region	Parameters
Atwater	Nitrates, DBCP[2], EDB[2], TCE[3] and 1,2,3 TCP[2&3]
Cressey	Nitrates & DBCP
El Nido	Nitrates, Arsenic, Sodium, & TDS[4]
Le Grand	Hard Water[1]
Livingston	Nitrates, Arsenic, DBCP, EDB, TCE and 1,2,3 TCP
McSwain Area	Nitrates, DBCP, EDB, TCE and 1,2,3 TCP
Merced	Nitrates & Hard Water
Planada	DBCP & Hard Water
Stevinson	Arsenic, Sodium, TDS[4], Manganese, Chlorides, Hard Water, & Tannins
Winton	Nitrates, DBCP, EDB, TCE and 1,2,3 TCP

Source: (Merced County Department of Public Health, Division of Environmental Health, 2018)

1 Hard Water = Total hardness > 150 mg/L (mg/L = milligrams per liter = parts per million)
2 Dibromochlopropane (DBCP), Ethylene Dibromide (EDB) and 1,2,3 Trichloropropane (1,2,3 TCP) are soil fumigants, use of DBCP and EDB was banned in 1977.
3 TCE and 1,2,3 TCP are solvent/degreases.
4 TDS refers to the total dissolved solids in water.

General Notes from the Merced County Department of Public Health, Division of Environmental Health:

a. Chlorides, manganese, hard water, iron, tannins, TDS, and sodium in drinking water are, of themselves, not known causes of health problems.
b. The water quality information above refers to private wells in unincorporated areas and does not necessarily apply to the municipal water supply of the towns and cities.

The sections below provide information on the historical and current groundwater quality conditions for constituents grouped by (1) salinity and nutrient constituents (Section 2.2.4.1), (2) metals (Section 2.2.4.2), (3) pesticides (Section 2.2.4.3), and (4) point-source contamination (Section 2.2.4.4), which includes petroleum hydrocarbons, solvents, and emerging contaminants. Salinity and nitrate data from 2008-2018 are described in the section below for each of the Principal Aquifers. Water quality data for the remaining constituents are based on a more limited range of data collected 2007-2012, largely without depth, that were analyzed for the 2013 Salt and Nutrient Study as part of the Merced Integrated Regional Water Management Plan (IRWMP). These data limitations have been identified as a data gap, and it is expected that additional water quality monitoring will be developed as part of this GSP which will further inform the understanding of current water quality conditions in the Subbasin, particularly as they pertain to depth and the characterization of the three Principal Aquifers.

The Merced IRWMP Salt and Nutrient Study collected 61,543 periodic water quality measurements from Merced County Department of Public Health, Division of Environmental Health as well as the State Water Board's GeoTracker and USGS GAMA Program. The 5-year average distribution map views were prepared using kriging or natural neighbor methods as implemented in SURFER© software by Golden Software and displayed in ArcGIS© software by Esri. These map views have been included directly in the GSP sections below (2.2.4.1.3 through 2.2.4.4.10) along with a discussion of each constituent. Time concentration plots of each constituent are included in Appendix E.

2.2.4.1 Salinity and Nutrient Constituents

As part of the comprehensive Salt and Nutrient Management Plan (SNMP) for the Central Valley, developed by the Central Valley Salinity Alternatives for Long Term Sustainability (CV-SALTS) program, detailed water quality analysis was conducted for salinity (represented by total dissolved solids [TDS]) and nitrates measured in wells across multiple agencies from 2000-2016. Supporting documents contain summary information about these constituents by subbasin, including Merced (Luhdorff and Scalmanini Consulting Engineers, 2016). Within the Central Valley, several aquifer zones were established in which to categorize well depths and segregate summary statistics. These zones are summarized below:

- Upper Zone
  - Includes the depth from the bottom of the vadose zone to the top of the Lower Zone
  - Where the Corcoran Clay is present, the Upper Zone does not extend below the Corcoran Clay
- Lower Zone
  - Includes the depth from the bottom of the Upper Zone to the depth of the bottom of the Lower Zone
  - Within the Corcoran Clay area, the Lower Zone is bounded at the bottom by the top of the Corcoran Clay layer
- Production Zone
  - Combination of Upper Zone and Lower Zone
- Lower Part of the Aquifer System (Below the Corcoran Clay)
  - This refers to the groundwater beneath the Corcoran Clay, where present, and groundwater at greater depths than most municipal well depths where the Corcoran Clay is not present

The two subsections below provide more detail and analysis specific to nitrates and salinity.

2.2.4.1.1 Nitrates

Nitrate (NO_3) occurs from both natural and anthropogenic sources and is widespread in groundwater in many parts of the San Joaquin Valley. High nitrate concentrations in groundwater are often associated with the use of fertilizers (commercial/animal waste) and onsite wastewater treatment systems (OWTS or septic systems).

Table 2-10 shows a summary of the number of wells with nitrate results, broken down by CV-SALTS aquifer category and agency type. Nitrate statistical summary information by aquifer category is shown in Table 2-11. These values are presented "as Nitrogen" which has an MCL of 10 mg/L. Generally, nitrate concentrations were found to be higher, on average, in the Upper Zone than in the Below Corcoran Clay Zone.

Table 2-10: Wells with Nitrate Results (Merced Subbasin)

Aquifer Well Source	Number of Wells	Wells with Construction Information[1]	Wells Without Construction Information[1]
Upper	355	52	303
California Department of Public Health (CDPH)	6	6	0
Domestic	226	0	226
Environmental monitoring (wells)	111	36	75
United States Geological Survey (USGS) (Unknown well type)	12	10	2
Upper and Lower	15	15	0
CDPH	13	13	0
USGS (Unknown well type)	2	2	0
Lower	108	37	71
Agricultural	38	0	38

Aquifer Well Source	Number of Wells	Wells with Construction Information[1]	Wells Without Construction Information[1]
CDPH	59	34	25
USGS (Unknown well type)	3	3	0
Water supply (wells)	8	0	8
Below Corcoran Clay	191	55	136
Agricultural	109	0	109
CDPH	64	44	20
Environmental monitoring (wells)	4	4	0
USGS (Unknown well type)	7	7	0
Water supply (wells)	7	0	7
Too Deep[2]	1	1	0
CDPH	1	1	0
Total	670	160	510

[1] Construction information means information is available about the depth(s) of well screens which indicates which aquifer the well is drawing from. With absent well construction information, water quality data is more difficult to interpret.

[2] Indicates a small number of wells uncharacteristically deep for the region in which they are located.

Source: CV-SALTS (Luhdorff and Scalmanini Consulting Engineers, 2016)

Table 2-11: Average Well Nitrate Concentration (mg/L as N) Statistics (Merced Subbasin)

Aquifer Zone	Number of Wells	Minimum	Average	Median	Maximum
Upper Zone	355	0.10	11.30	5.20	179.61
Upper and Lower Zone	15	0.98	5.26	5.26	12.66
Lower Zone	108	0.23	4.58	3.40	24.60
Below Corcoran Clay Zone	191	0.10	7.52	3.00	71.00

Source: CV-SALTS (Luhdorff and Scalmanini Consulting Engineers, 2016)

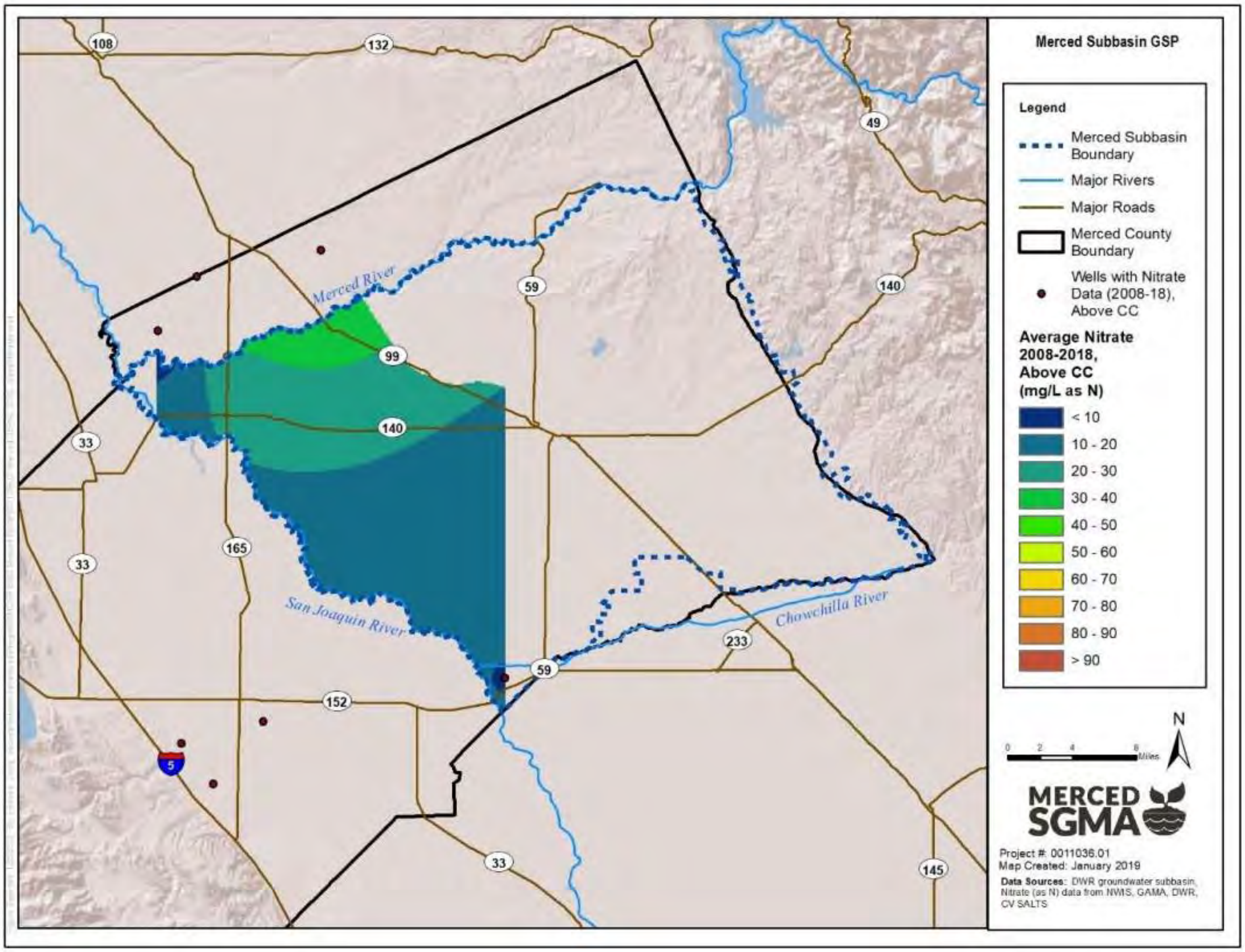
For the purpose of mapping nitrate concentration separately for each principal aquifer, nitrate data was collected from several data sources including National Water Information System (NWIS), Groundwater Ambient Monitoring Assessment (GAMA), DWR, and CV-SALTS. Nitrate data is presented “as nitrogen”, with an MCL of 10 mg/L. Wells located within the boundary of the extent of the Corcoran Clay were sorted into their respective Above (see Figure 2-59) or Below (see Figure 2-60) Corcoran Clay Principal Aquifer if depth information was available. Wells with nitrate data but without depth information were mapped as “Unknown Aquifer” (see Figure 2-61). Wells located outside of the Corcoran Clay (regardless of availability of depth information) were mapped as Outside Corcoran Clay (see Figure 2-62). Nitrate concentrations at each well were averaged over a period of 2008-2018.

Nitrate data availability for wells with depth information is very limited. For both the Above and Below Corcoran Clay Principal Aquifers, the limited number of data points for 2008-2018 mean that spatial interpolation across the aquifer areas produces results with expected low accuracy.

In the northwest quadrant (Figure 2-61 for Unknown Aquifer), there are several small areas where nitrate concentrations exceed 40 mg/L and several larger areas where nitrate concentrations range from 20 to 40 mg/L. The elevated nitrate concentration in these areas may be associated with animal confinement facilities and other agricultural non-point sources (AMEC, 2013). Elevated nitrate in groundwater exists in small areas northeast of Merced and southwest of Atwater among areas where high density OWTS occur (Figure 2-62 for Outside Corcoran Clay). The primary Maximum Contaminant Level (MCL) for nitrate is 45 mg/L (SWRCB, 2018). Identifying the exact sources of nitrates in these areas would require additional study.

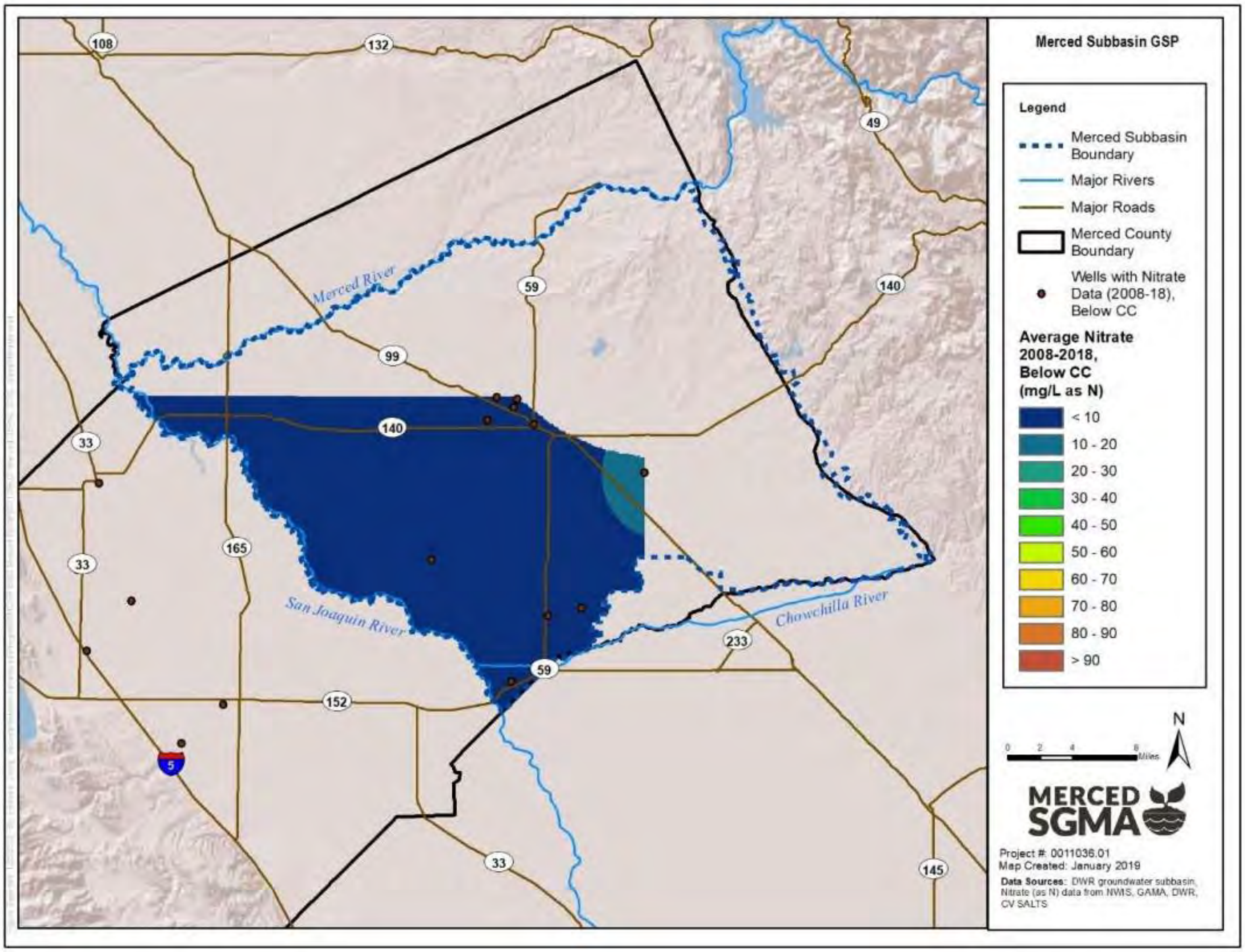
Time concentration plots of nitrate from 2007-2012 are shown in Appendix E.

Figure 2-59: Average Nitrate (as N) Concentration 2008-2018, Above Corcoran Clay[1]



[1] Nitrate data availability for wells with depth information is very limited. The Above Corcoran Clay Principal Aquifer contains only one confirmed data point for average nitrate 2008-2018 within the Subbasin, meaning that spatial interpolation across the aquifer area produces results with expected low accuracy.

Figure 2-60: Average Nitrate (as N) Concentration 2008-2018, Below Corcoran Clay[1]



[1] Nitrate data availability for wells with depth information is very limited. The Below Corcoran Clay Principal Aquifer contains only ten confirmed data points for average nitrate 2008-2018 within the Subbasin, meaning that spatial interpolation across the aquifer area produces results with expected low accuracy.

Figure 2-61: Average Nitrate (as N) Concentration 2008-2018, Unknown Aquifer

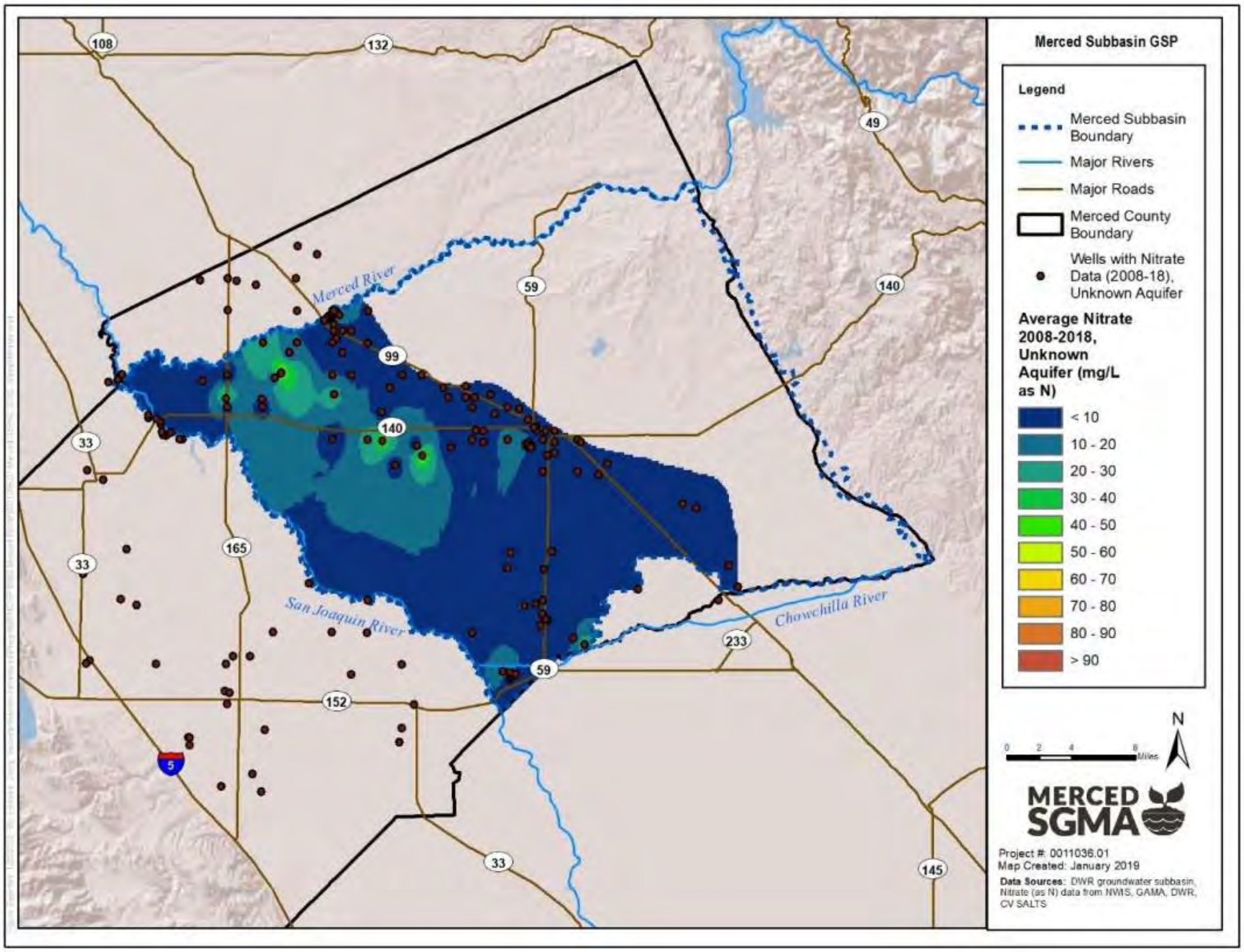
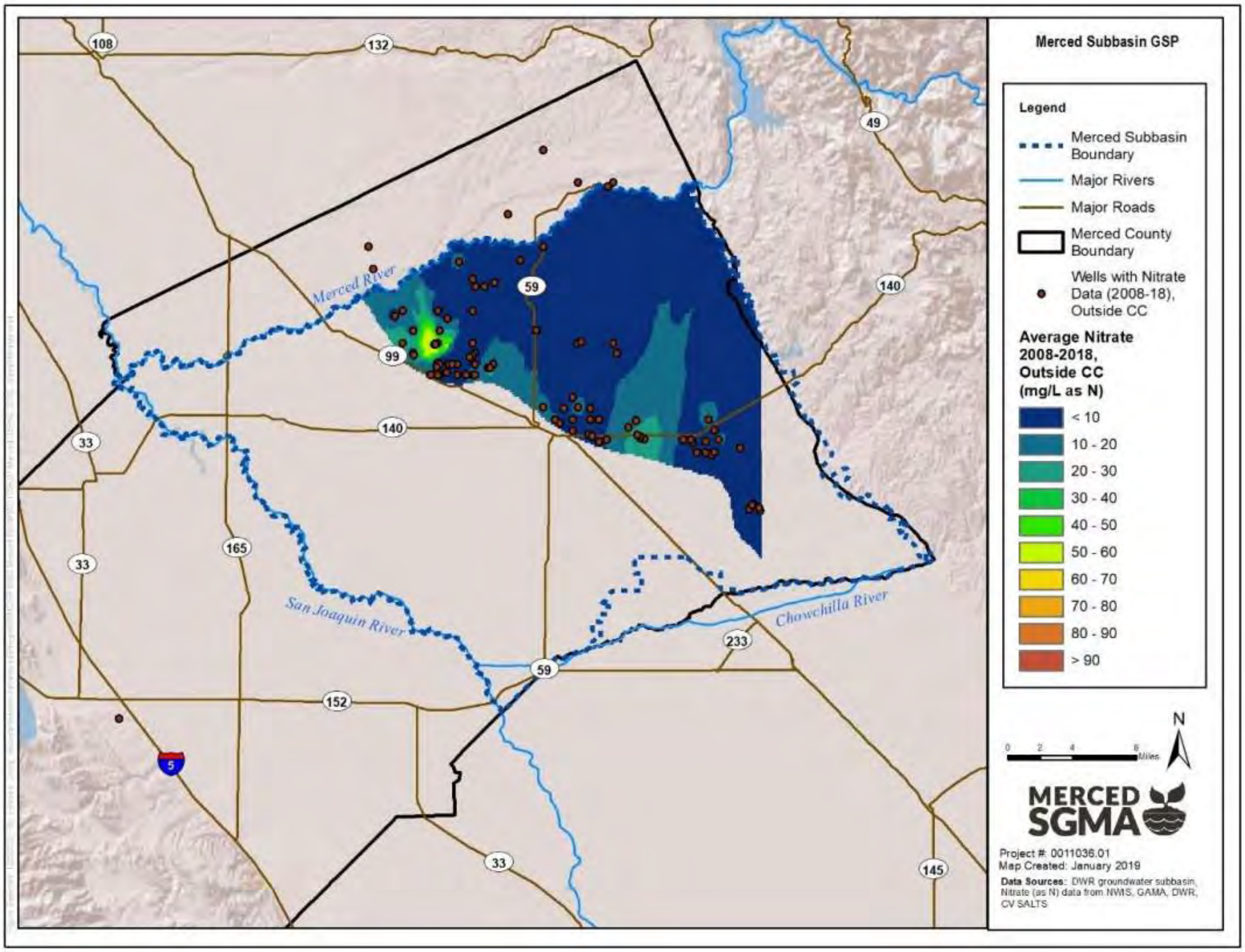


Figure 2-62: Average Nitrate (as N) Concentration 2008-2018, Outside Corcoran Clay



2.2.4.1.2 Salinity

Salinity levels within the Merced Subbasin range from less than 90 to greater than 3,000 mg/L as measured by TDS. The recommended drinking water secondary MCL for TDS is 500 mg/L, with an upper secondary MCL of 1,000 mg/L and a short-term second MCL[6] of 1,500 mg/l (SWRCB, 2006). The secondary MCL is established by the USEPA and then adopted by the SWRCB. The secondary MCL is a Secondary Drinking Water Standard that is established for aesthetic reasons such as taste, odor, and color and is not based on public health concerns. For agricultural uses, salt tolerance varies by crop, with common crops within the Merced Subbasin tolerant of irrigated water with TDS below 640 mg/L (Ayers & Westcot, 1985). TDS in the northern portion of the Subbasin is slightly elevated beneath the Atwater and Winton areas. Otherwise, TDS in the eastern two-thirds of the Subbasin is generally less than 400 mg/L. TDS in

[6] Short-term secondary MCLs are acceptable only for existing community water systems on a temporary basis pending construction of treatment facilities or development of acceptable new water sources (California Code of Regulations Title 22 § 64449).

groundwater increases westward and southwestward towards the San Joaquin River and southward towards the Chowchilla River. In these areas, high TDS water is found in wells deeper than 350 feet (AMEC, 2008).

Better quality groundwater (less than 1,000 mg/L) in these western and southwestern areas is generally found at shallower depths. Groundwater with high TDS concentrations in the Merced Subbasin is principally the result of the migration of a deep water body with relative higher salinity which originates in regionally deposited marine sedimentary rocks that underlie the San Joaquin Valley. The depth of this water body with relative higher salinity within the Merced Subbasin boundaries is shallow compared to other parts of the San Joaquin Valley (AMEC, 2008).

Groundwater with high concentrations of TDS is present beneath the entire Merced Subbasin at depths from about 400 feet in the west to over 800 feet in the east. The shallowest high TDS groundwater occurs in zones 5 to 6 miles wide adjacent and parallel to the San Joaquin River and the lower part of the Merced River west of Hilmar, where high TDS groundwater is upwelling (AMEC, 2008).

Under natural pressure, the groundwater body of relative higher salinity is migrating upward. Brines move up through permeable sedimentary rocks and also through wells, faults, and fractures. The chemistry of groundwater in the Merced Subbasin indicates that mixing is occurring between the shallow fresh groundwater and the brines, which produces the high TDS groundwater observed. Pumping of deep wells in the western and southern parts of the Merced Subbasin may be causing these saline brines to upwell and mix with ~~fresh water~~freshwater aquifers more rapidly than under natural conditions (AMEC, 2008).

The Corcoran Clay has provided a natural impediment to the migration of high TDS groundwater from the confined aquifer into the unconfined aquifer. High permeability pathways through the clay from the confined to the unconfined aquifer may be created by wells perforated in both the unconfined and confined aquifers (AMEC, 2008), even though this practice is prohibited by Merced County's well standards.

Table 2-12 shows a summary of the number of wells with TDS results, broken down by CV-SALTS aquifer category and agency type. TDS statistical summary information by aquifer category is shown in Table 2-13. Generally, TDS concentrations were found to average higher in the Upper Zone than the Below Corcoran Clay Zone.

For the purpose of mapping TDS concentration separately for each principal aquifer, TDS data was collected from several data sources including NWIS, GAMA, DWR, and CV-SALTS within all of Merced County. Wells located within the boundary of the extent of the Corcoran Clay were sorted into their respective Principal Aquifer. There was only one well with TDS measurements within the Above Corcoran Clay Principal Aquifer (located in the very southern tip of the Subbasin), and so a contour map could not be developed due to lack of data. Wells completed within the Below Corcoran Principal Aquifer are shown in Figure 2-63. Wells with TDS data but without depth information were mapped as "Unknown Aquifer" (see Figure 2-64). Wells located outside of the Corcoran Clay (regardless of availability of depth information) were mapped as Outside Corcoran Clay (see Figure 2-65). TDS concentrations at each well were averaged over a period of 2008-2018.

TDS data availability for wells with depth information is very limited. For both the Above and Below Corcoran Clay Principal Aquifers, the limited number of data points for 2008-2018 means that spatial interpolation across the aquifer areas produces results with expected low accuracy.

Time concentration plots of TDS from 2007-2012 are shown in Appendix E.

Table 2-12: Wells with TDS Results (Merced Subbasin)

Aquifer Well Source	Number of Wells	Wells with Construction Information[1]	Wells Without Construction Information[1]
Upper	80	39	41
CDPH	4	4	0
Environmental monitoring (wells)	55	20	35
USGS (Unknown well type)	21	15	6
Upper and Lower	13	13	0
CDPH	9	9	0
USGS (Unknown well type)	4	4	0
Lower	62	32	30
CDPH	40	29	11
USGS (Unknown well type)	3	3	0
Water supply (wells)	19	0	19
Below Corcoran Clay	74	49	25
CDPH	48	37	11
USGS (Unknown well type)	12	12	0
Water supply (wells)	14	0	14
Too Deep[2]	2	2	0
CDPH	1	1	0
USGS (Unknown well type)	1	1	0
Total	231	135	96

[1] Construction information means information is available about the depth(s) of well screens which indicates which aquifer the well is drawing from. With absent well construction information, water quality data is more difficult to interpret.
[2] Indicates a small number of wells uncharacteristically deep for the region in which they are located.

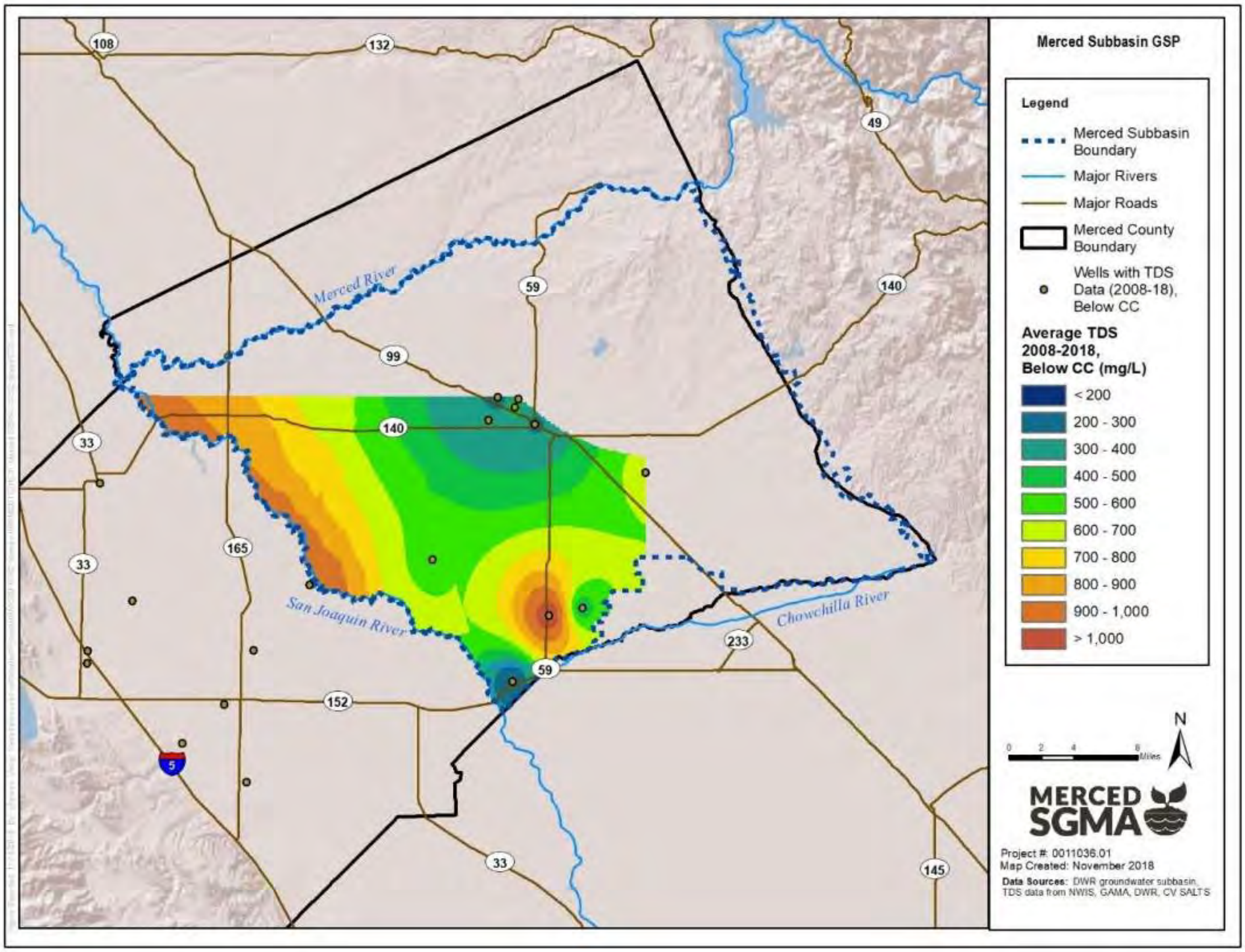
Source: CV-SALTS (Luhdorff and Scalmanini Consulting Engineers, 2016)

Table 2-13: Average Well TDS Concentration (mg/L) Statistics (Merced Subbasin)

Aquifer Zone	Number of Wells	Minimum	Average	Median	Maximum
Upper Zone	80	111	498	392	1,951
Upper and Lower Zone	13	125	249	236	354
Lower Zone	62	111	289	211	2,005
Below CC Zone	74	90	268	224	1,035
Below Production Zone	2	246	280	280	314

Source: CV-SALTS (Luhdorff and Scalmanini Consulting Engineers, 2016)

Figure 2-63: Average TDS Concentration 2008-2018, Below Corcoran Clay[1]



[1] TDS data availability for wells with depth information is very limited. The Below Corcoran Clay Principal Aquifer contains only ten confirmed data points for average TDS 2008-2018 within the Subbasin, meaning spatial interpolation across the aquifer area produces results with expected low accuracy.

Figure 2-64: Average TDS Concentration 2008-2018, Unknown Aquifer

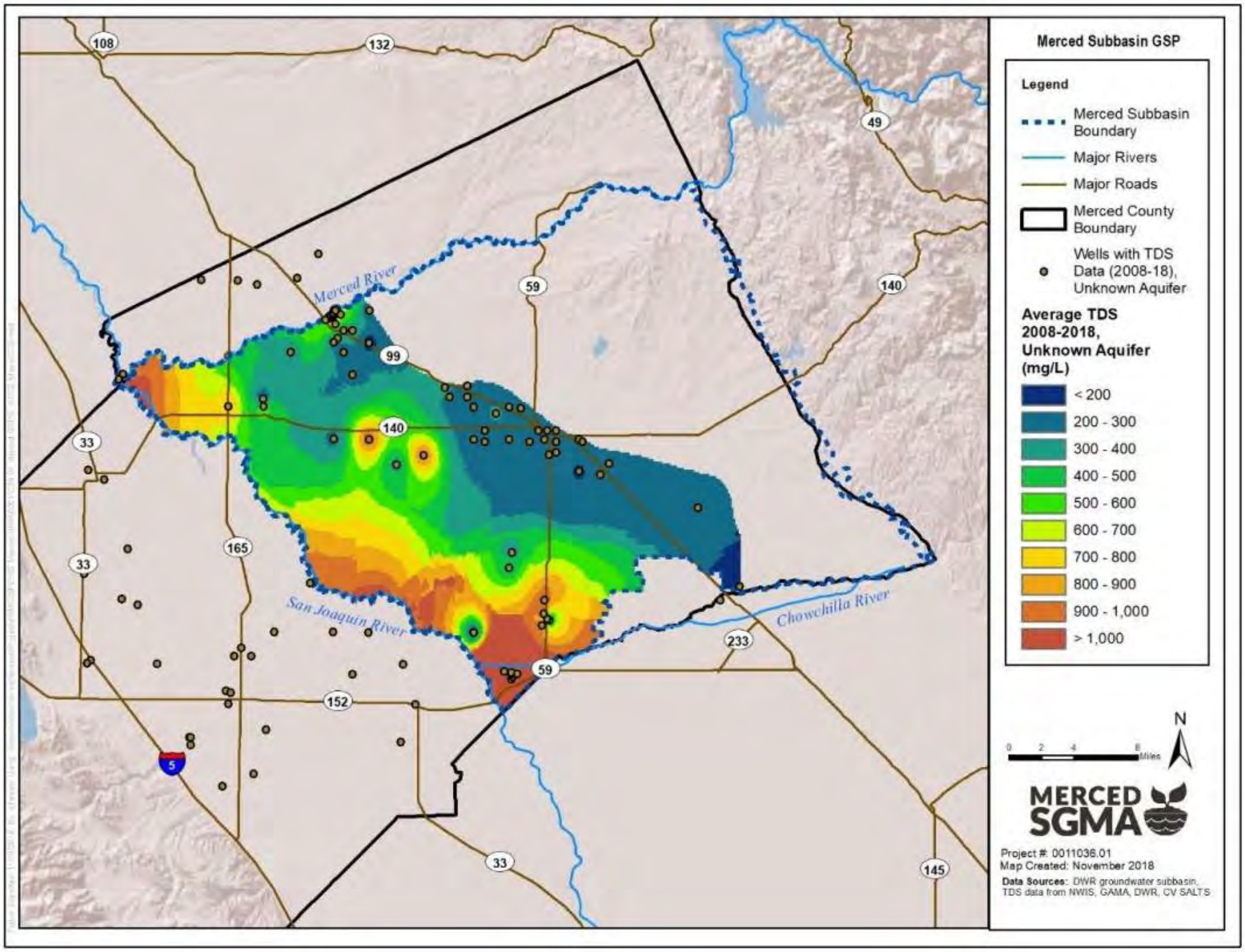
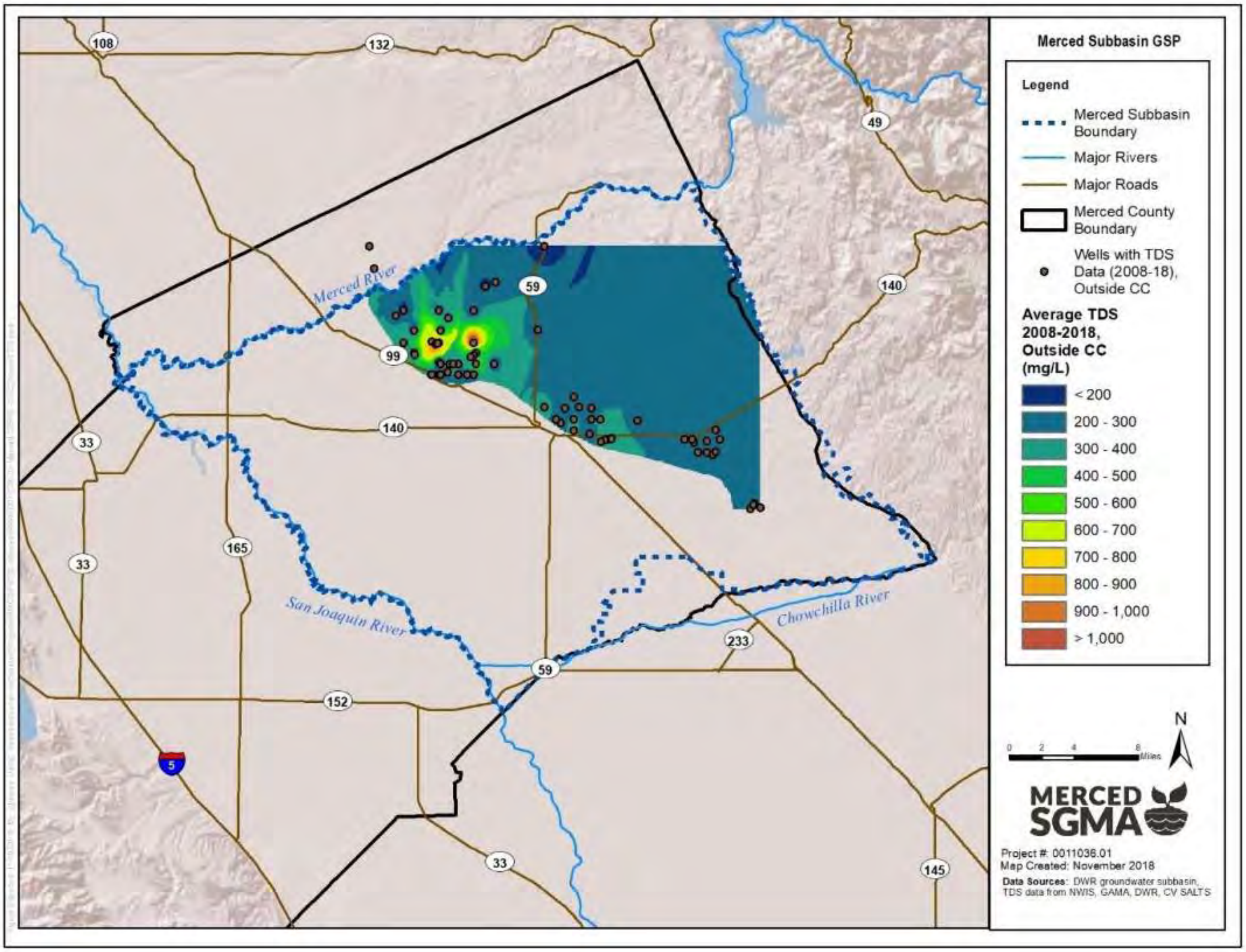


Figure 2-65: Average TDS Concentration 2008-2018, Outside Corcoran Clay

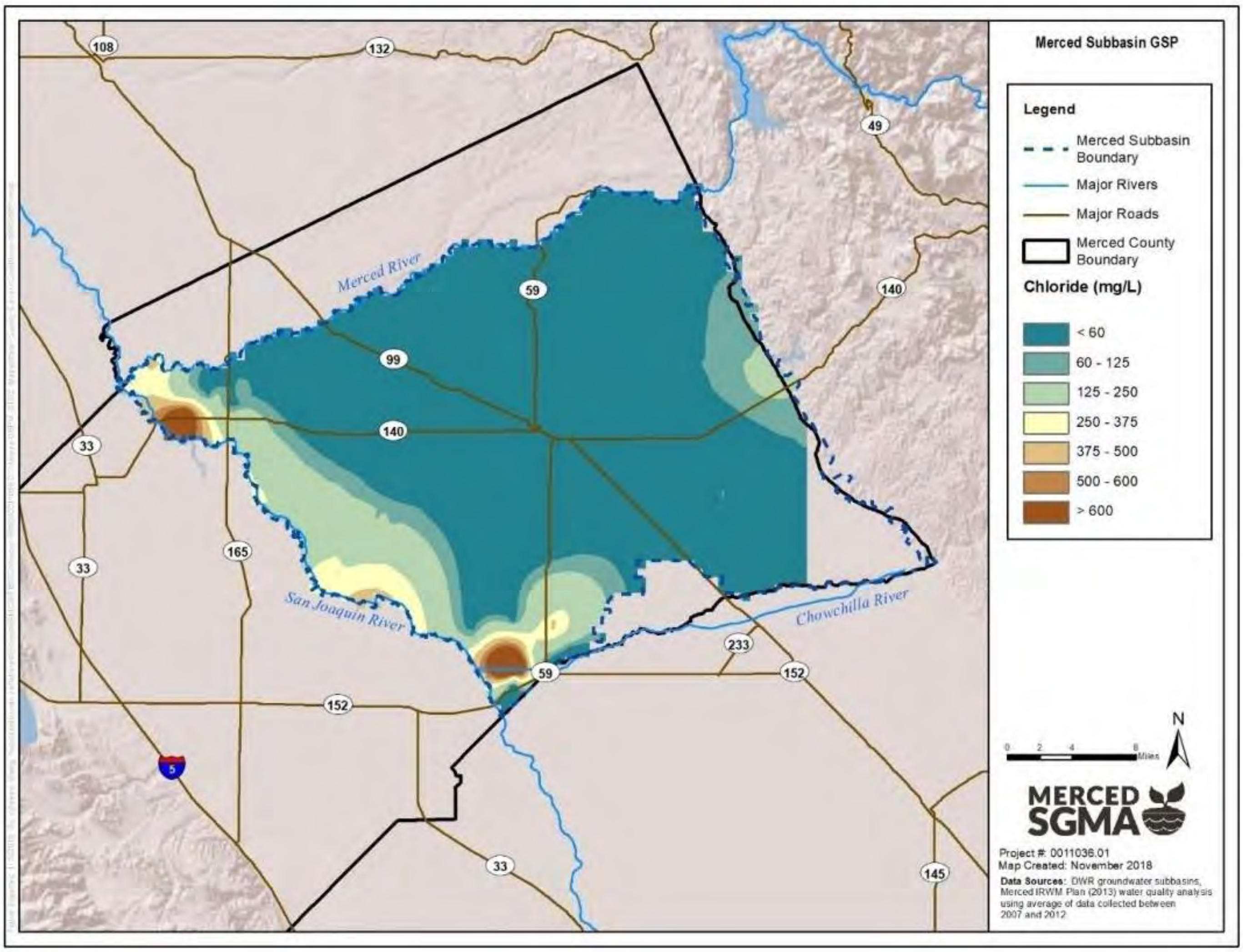


2.2.4.1.4 Chloride

Chloride (Cl) is a dissolved salt commonly associated with saline groundwater. Within the Merced Subbasin area, chloride concentrations range from non-detect (typically less than 2 mg/L) to as much as 1,850 mg/L. The recommended secondary MCL for Cl is 250 mg/L and the upper secondary MCL is 500 mg/L (SWRCB, 2006). The secondary MCL is established by the USEPA and then adopted by the SWRCB. The secondary MCL is a Secondary Drinking Water Standard that is established for aesthetic reasons such as taste, odor, and color and is not based on public health concerns. The 5-year average (2007-2012) Cl concentration in groundwater in the northern two quadrants of the Merced Subbasin area is generally less than 50 mg/L (Figure 2-66). Like TDS, Cl in groundwater increases in the southern quadrants towards the San Joaquin River to as much as 500 mg/L.

Time concentration plots of Cl are shown in Appendix E.

Figure 2-66: 5-Year Average Distribution of Chloride in Groundwater (2007-2012)



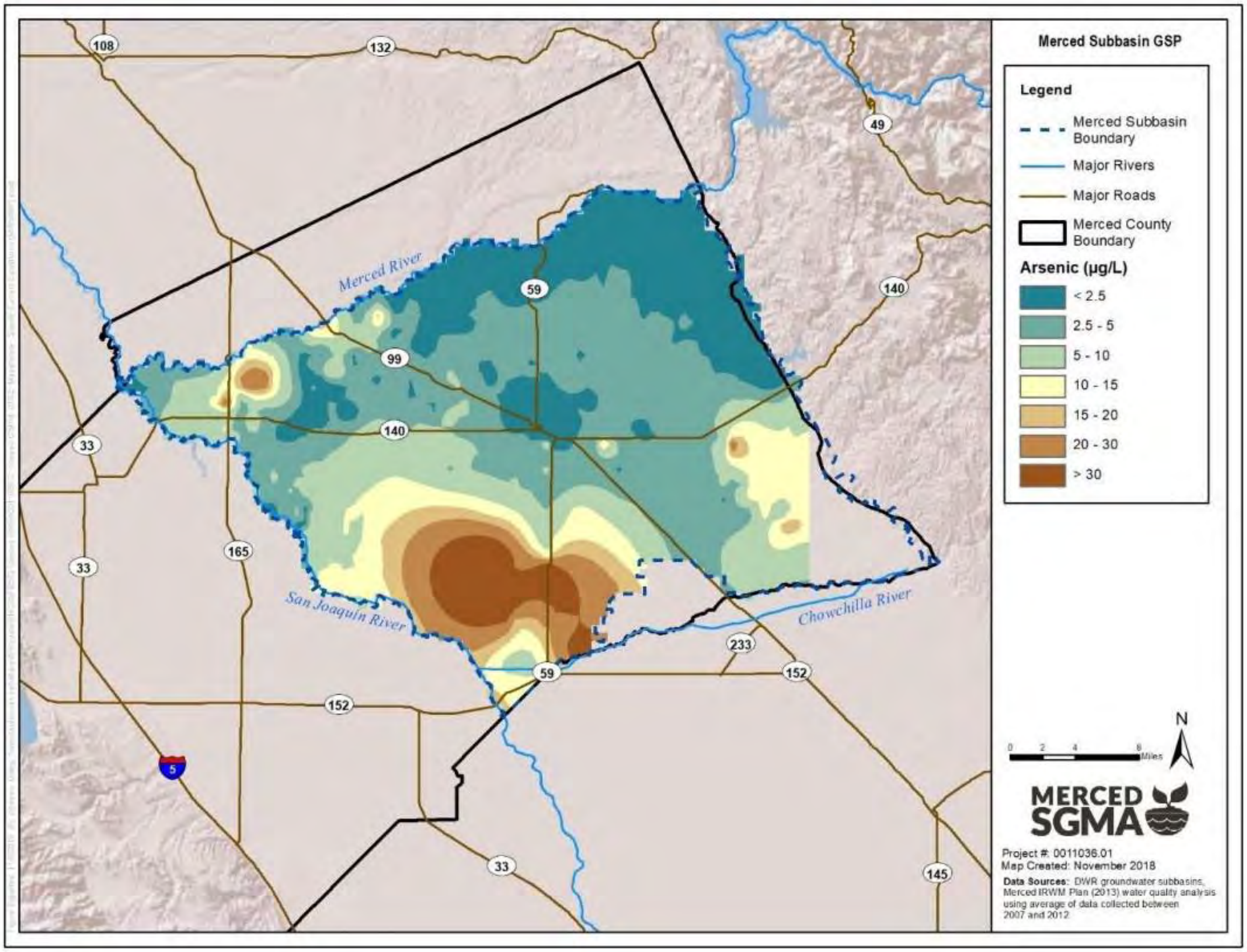
2.2.4.2 Metals

2.2.4.2.1 Arsenic

Arsenic (As) is a dissolved metal found in many bedrock formations which can have human health impacts. Within the Merced Subbasin area, As concentrations range from non-detect (less than 1 microgram per liter [µg/L]) to as much as 800 µg/L. The primary MCL for As is 10 µg/L (SWRCB, 2018). The 5-year average (2007-2012) As concentration in groundwater in the northern two quadrants of the Merced Subbasin area is generally less than 10 µg/l (Figure 2-67). There are localized areas where the average As concentrations in shallow groundwater range between 20 and 50 µg/L northeast of Atwater, near Stevinson, and in the southwest Merced Subbasin area near the intersection of Sandy Mush Road and Highway 59. The City of Livingston also has wells with As levels at or above the MCL. The City has constructed groundwater treatment systems at multiple wells to reduce As concentrations below the MCL (City of Livingston, 2016).

Time concentration plots of As are shown in Appendix E.

Figure 2-67: 5-Year Average Distribution of Arsenic in Groundwater (2007-2012)

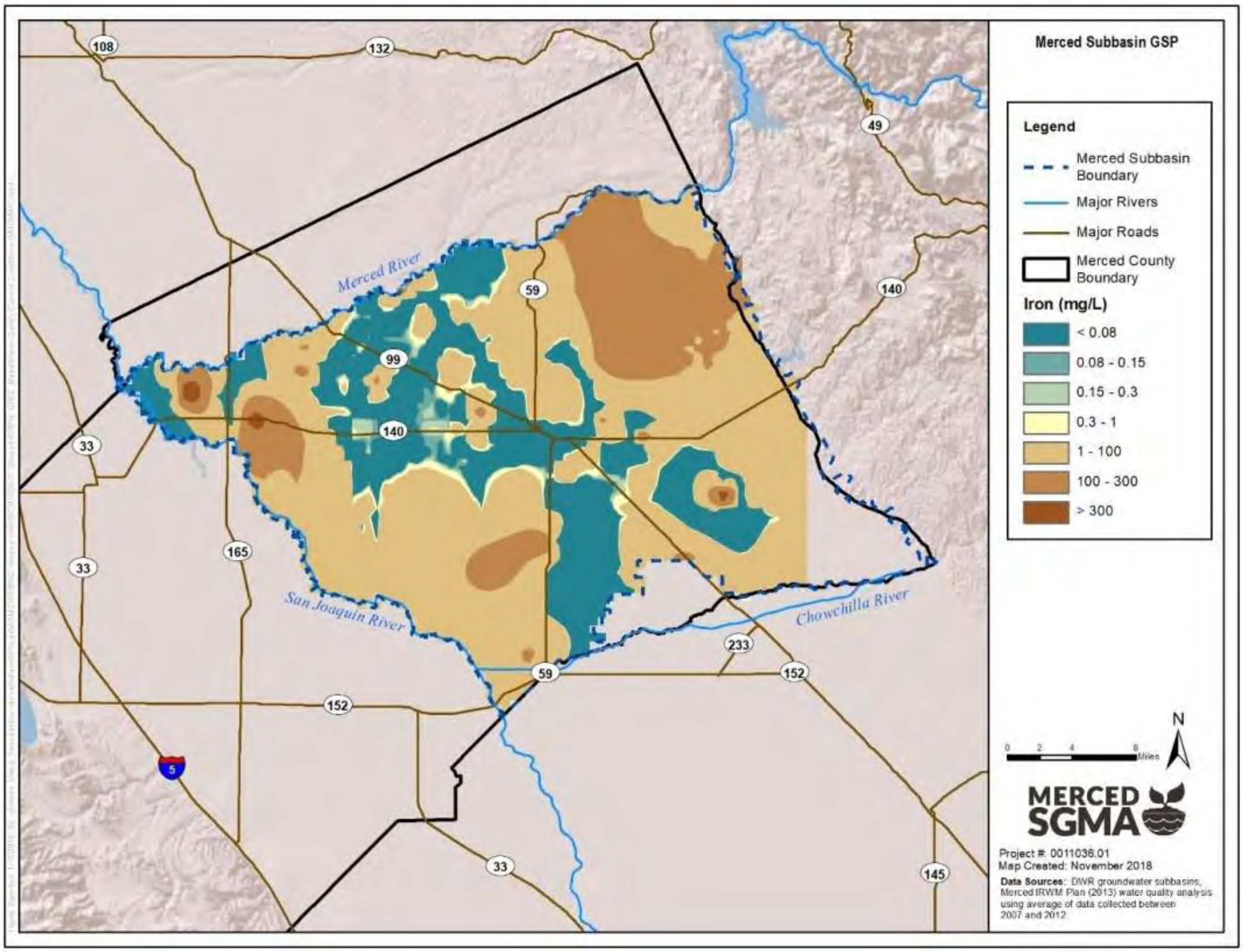


2.2.4.2.3 Iron

Iron (Fe) is a dissolved metal commonly associated with mineralized groundwater. Within the Merced Subbasin area, Fe concentrations range from non-detect (less than 1 mg/L) to as much as 600 mg/L. The secondary MCL for Fe is 0.3 mg/L (SWRCB, 2006). The secondary MCL is established by the USEPA and then adopted by the SWRCB. The secondary MCL is a Secondary Drinking Water Standard that is established for aesthetic reasons such as taste, odor, and color and is not based on public health concerns. The 5-year average (2007-2012) Fe concentration in groundwater in the eastern two quadrants of the Merced Subbasin area ranges from non-detect to over 300 mg/L (Figure 2-68), while the Fe concentration in groundwater in the western two quadrants is generally between 1 and 100 mg/L in most areas. The elevated Fe concentration in the eastern portion of the Merced Subbasin area is a result of leaching of Fe from the subsurface materials in the source area. The Fe in groundwater oxidizes and precipitates as the groundwater moves west towards the San Joaquin River (AMEC, 2013).

Time concentration plots of Fe are shown in Appendix E.

Figure 2-68: 5-Year Average Distribution of Iron in Groundwater (2007-2012)

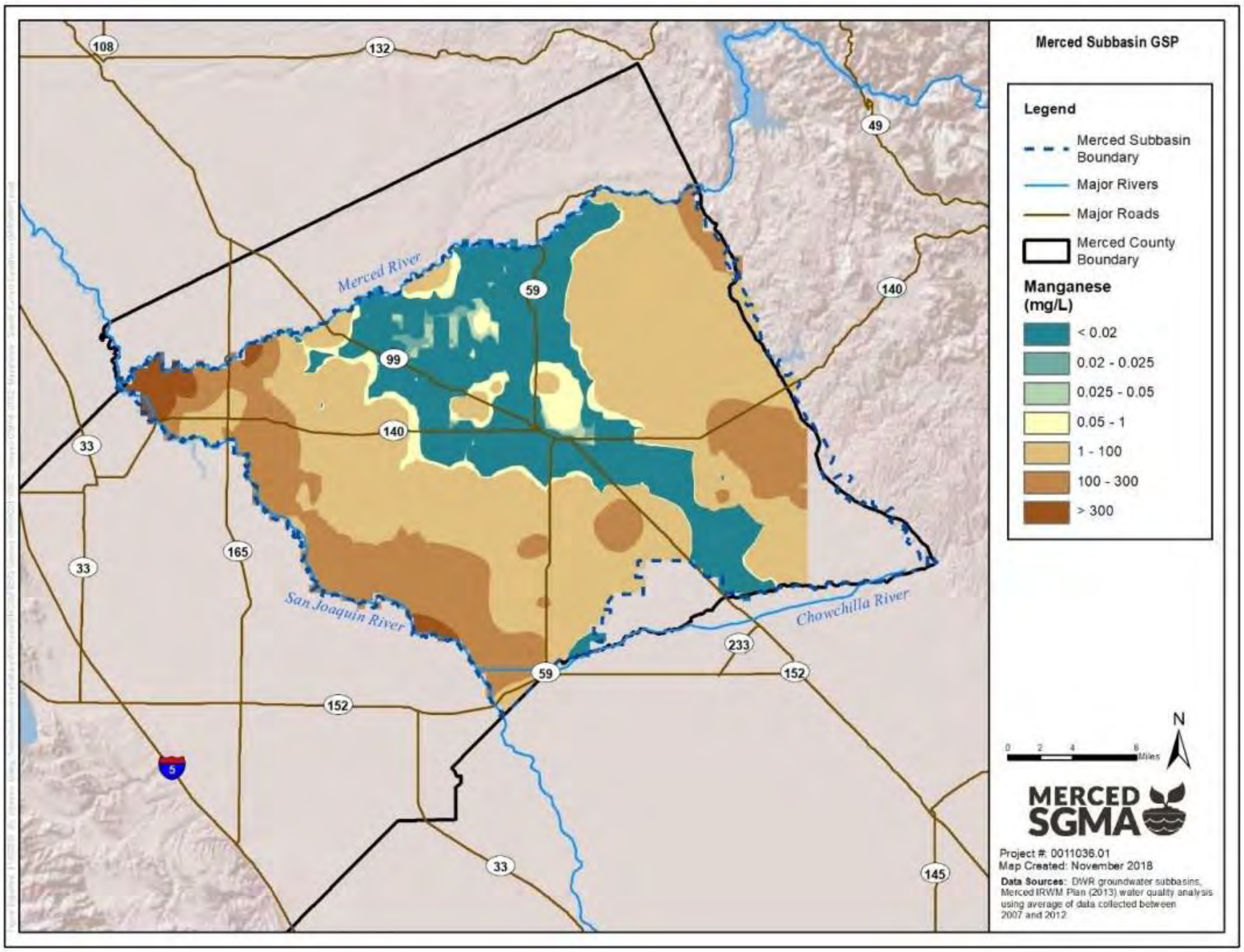


2.2.4.2.4 Manganese

Manganese (Mn) is a dissolved metal commonly associated with mineralized groundwater. Within the Merced Subbasin area, Mn concentrations range from non-detect (less than 1 µg/L) to as much as 1,300 mg/L. The secondary MCL for Mn is 0.05 mg/L (SWRCB, 2006). The 5-year average (2007-2012) Mn concentration in groundwater beneath most of the center of the Subbasin is below 0.05 mg/L, with elevated levels from 0.05 mg/L to over 300 mg/L along the eastern and western portions of the Subbasin (Figure 2-69). Like TDS, the Mn concentration in groundwater increases towards the San Joaquin River to as much as 500 mg/L.

Time concentration plots of Mn are shown in Appendix E.

Figure 2-69: 5-Year Average Distribution of Manganese in Groundwater (2007-2012)

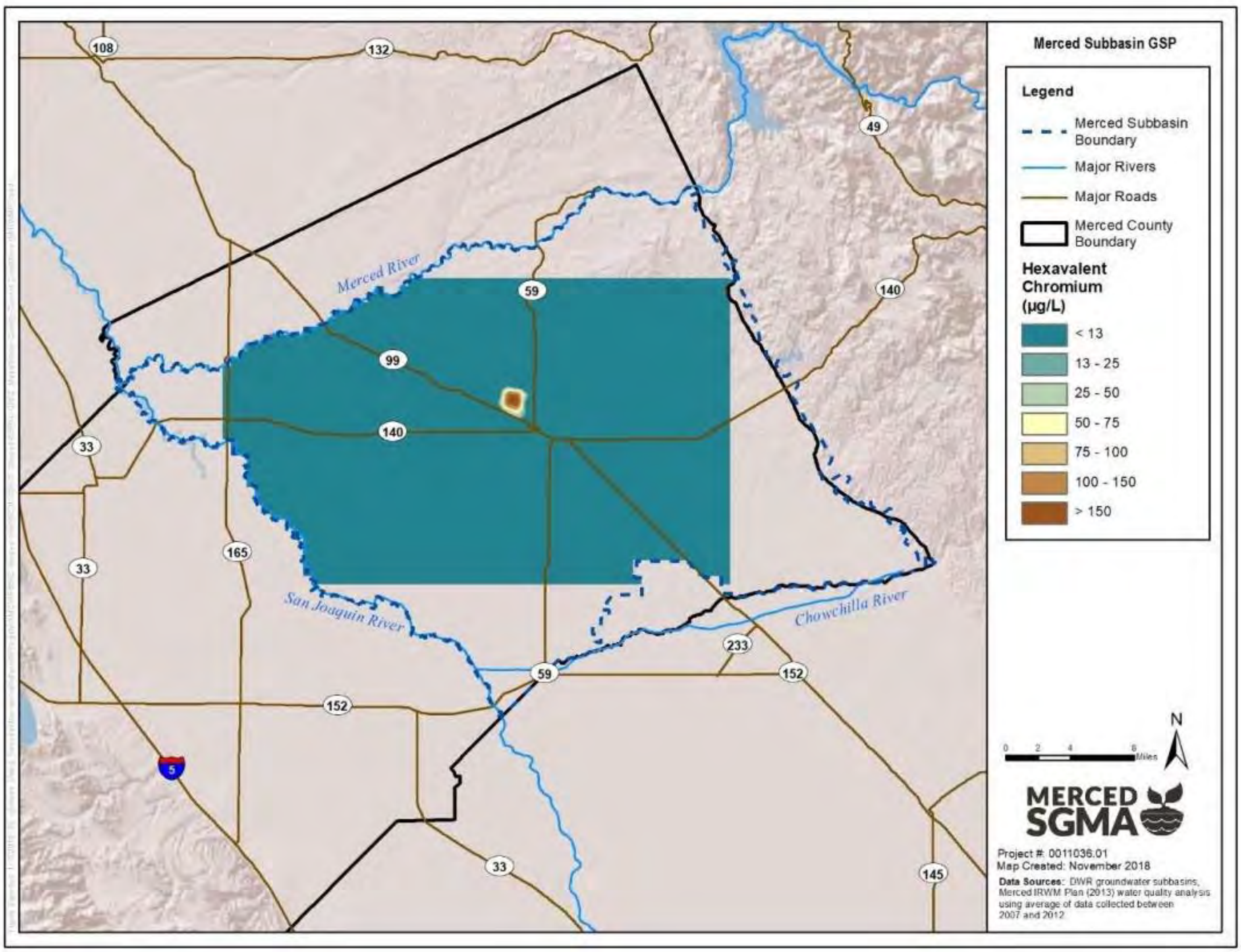


2.2.4.2.5 Hexavalent Chromium

Hexavalent Chromium (Cr^6) is a dissolved metal that rarely occurs naturally and is usually associated with industrial contamination in groundwater. Within the Merced Subbasin area, Cr^6 concentrations range from non-detect (less than 0.01 µg/L) to as much as 370 µg/L. The SWRCB established an MCL for Cr^6 of 10 µg/L in 2014, but it was withdrawn in August 2017 due to a state court ruling. The 5-year average (2007-2012) Cr^6 concentration in groundwater in the Merced Subbasin area is generally less than 1 µg/L, except for a small area of over 100 µg/L in the northwest quadrant (Figure 2-70) due to a point source in the Beachwood subdivision (Central Valley RWQCB, 2011).

Time concentration plots of Cr^6 are shown in Appendix E.

Figure 2-70: 5-Year Average Distribution of Hexavalent Chromium in Groundwater (2007-2012)



2.2.4.3 Pesticides

The following information on pesticides includes subsections for Dibromochloropropane (DBCP) and 1,2,3-Trichloropropane (123-TCP).

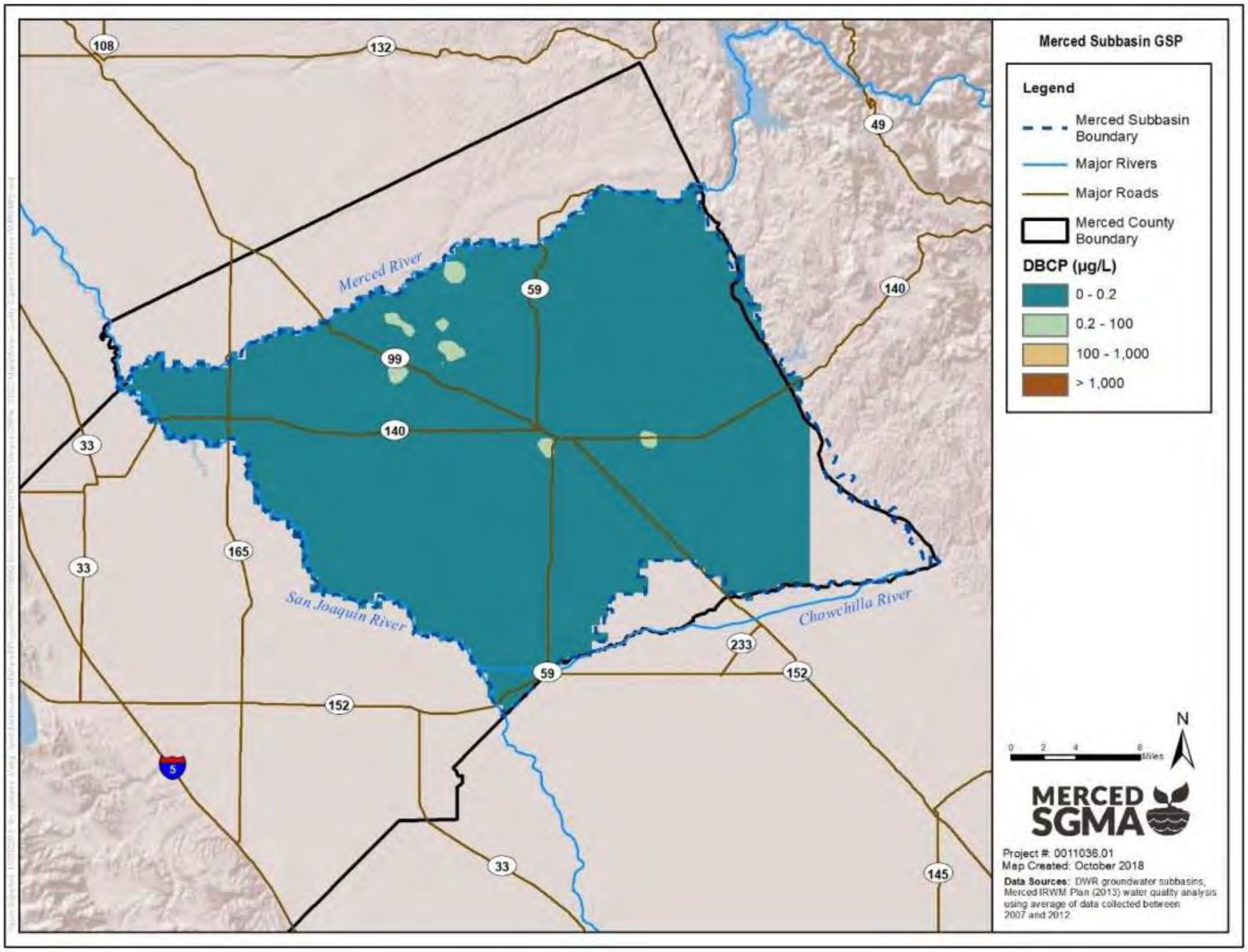
2.2.4.3.1 Dibromochloropropane (DBCP)

The pesticide DBCP was a common pesticide used to control nematodes in vineyards prior to 1977. DBCP concentrations in groundwater in the Merced Subbasin range from non-detect (variable, but typically 0.2 µg/L) to 335 µg/L. The primary MCL for DBCP is 0.2 µg/L (SWRCB, 2018). The 5-year average (2007-2012) DBCP concentration in groundwater in the Merced Subbasin is generally less than 0.2 µg/L (

Figure 2-71), with elevated concentrations found in localized areas near the Cities of Atwater, Delhi, Le Grand, Livingston, Merced, Planada, and Winton.

Time concentration plots of DBCP are shown in Appendix E.

Figure 2-71: 5-Year Average Distribution of DBCP in Groundwater (2007-2012)

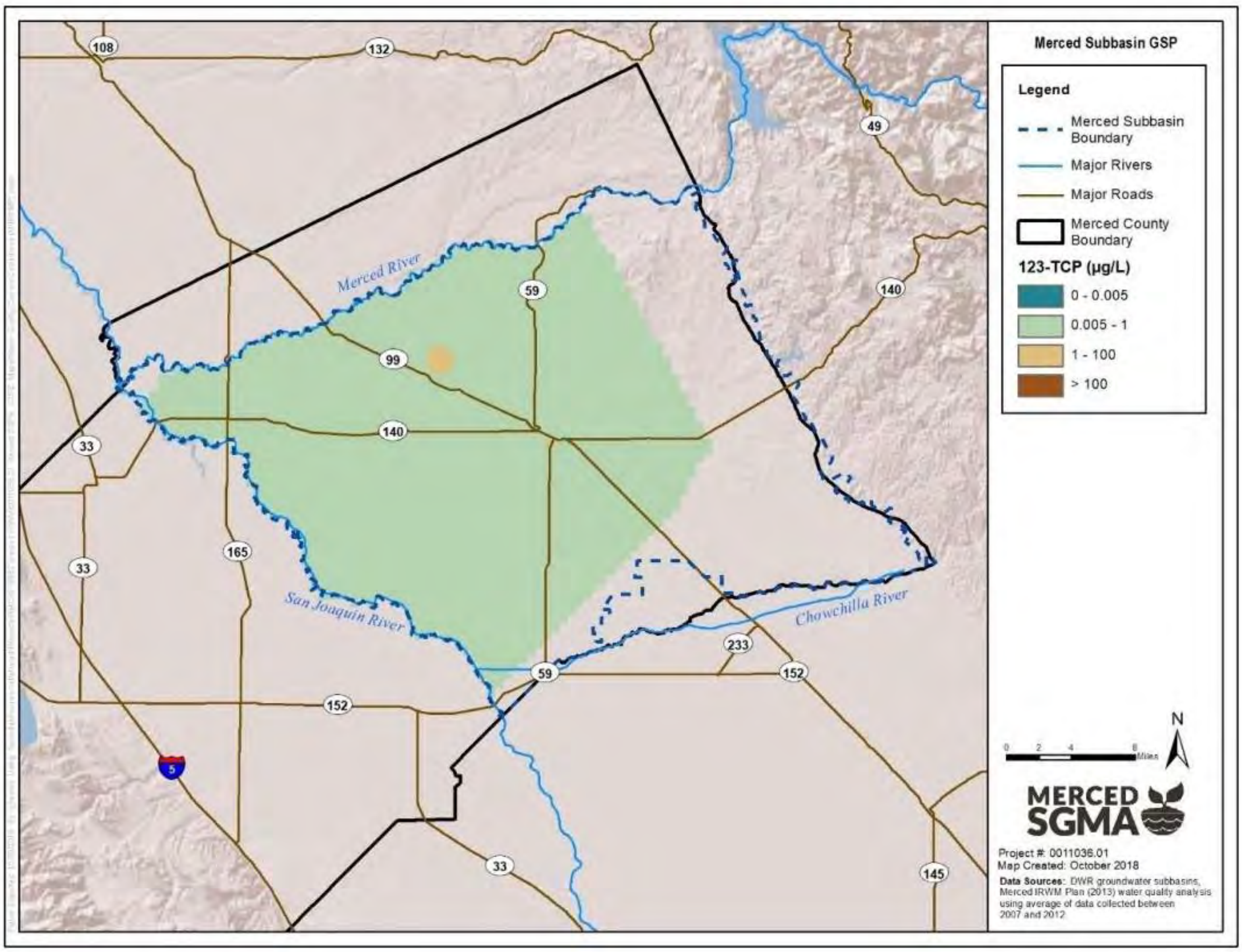


2.2.4.3.3 1,2,3-Trichloropropane (123-TCP)

The volatile organic compound (VOC) 123-TCP is a commonly used solvent in manufacturing facilities and as a carrier solvent for DBCP and other pesticides. 123-TCP concentrations in groundwater in the Merced Subbasin range from non-detect (variable, but typically 0.5 µg/L) to over 300 µg/L. The primary MCL for 123-TCP is 0.005 µg/L (SWRCB, 2018). The 5-year average (2007-2012) 123-TCP concentration in groundwater in the Merced Subbasin is generally between 0.005 µg/L and 1 µg/L (Figure 2-72), with elevated concentrations found in localized areas in the northwest quadrant and beneath the City of Merced. Note, however, that the typical detection limit of 0.5 µg/L is greater than the 0.005 µg/L MCL, meaning that non-detects could still indicate MCL exceedances. This indicates better lab analysis is needed for detection of 123-TCP at lower concentrations.

Time concentration plots of 123-TCP are shown in Appendix E.

Figure 2-72: 5-Year Average Distribution of 123-TCP in Groundwater (2007-2012)

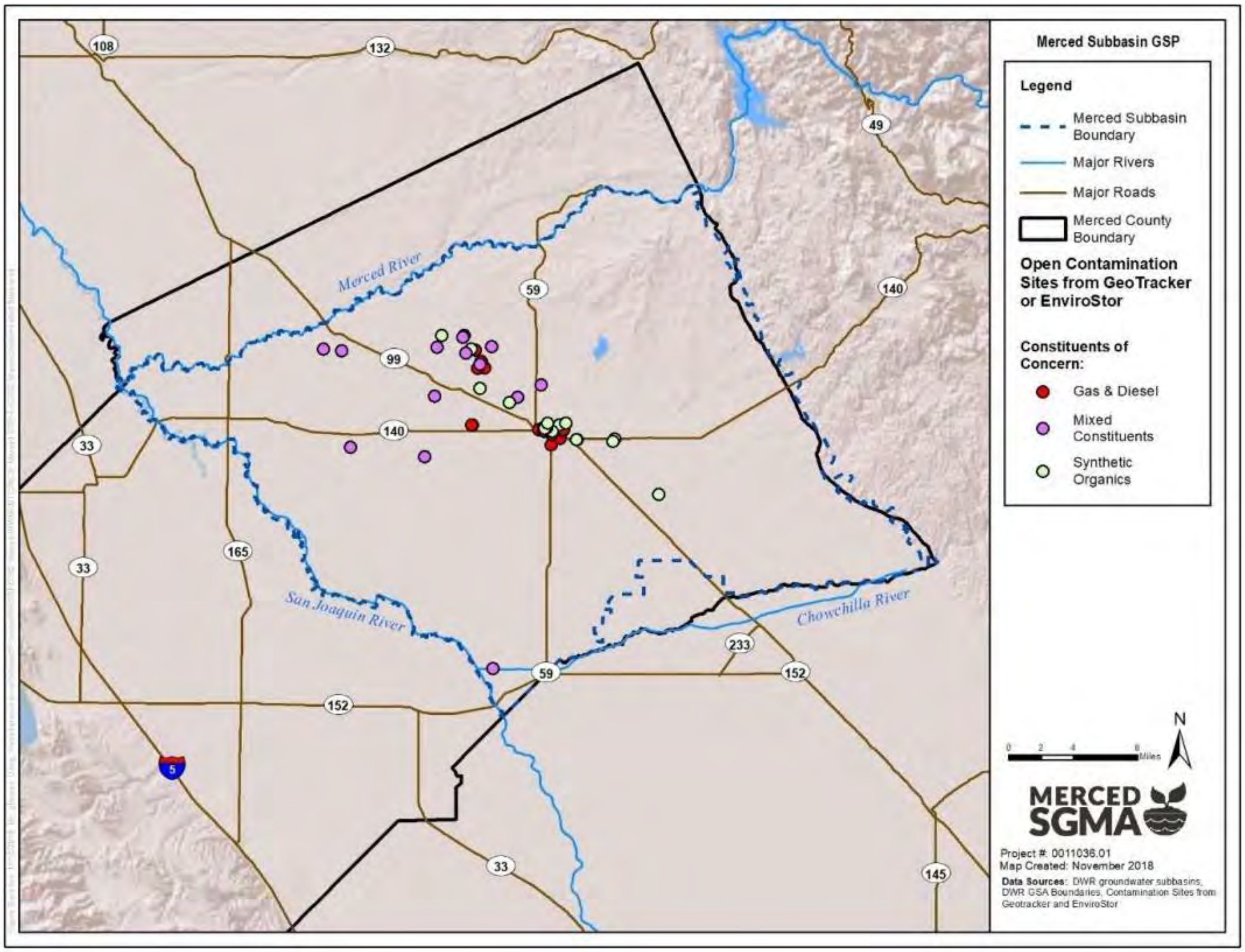


2.2.4.4 Point-Source Contamination

Data collection activities also take place in the Merced Subbasin in response to known or potential sources of groundwater contamination. These sources include areas in and around Castle Air Force Base, leaking underground storage tanks, landfills, and others. Groundwater has been monitored and evaluated at Castle Air Force Base since the 1980s and has resulted in the removal of contaminant sources and the implementation of remedial activities such as the installation of groundwater treatment facilities (SWRCB - GeoTracker).

The Regional Water Quality Control Board's (RWQCB) GeoTracker GAMA database shows 31 open Leaking Underground Storage Tank (LUST) or other cleanup sites with potential or known groundwater contamination located within the Merced Subbasin. The California Department of Toxic Substances Control (DTSC) EnviroStor database shows 21 additional open cleanup sites with potential or known groundwater contamination located within the Merced Subbasin. Figure 2-73 shows the location of the combined sites from GAMA and EnviroStor, color-coding the sites based on groupings of constituents of concern: gas and diesel, synthetic organics (pesticides, herbicides, etc.), or mixed constituents (multiple categories, such as heavy metals and pesticides).

Figure 2-73: Contaminated Sites (GeoTracker and EnviroStor)



2.2.4.4.1 Petroleum Hydrocarbons

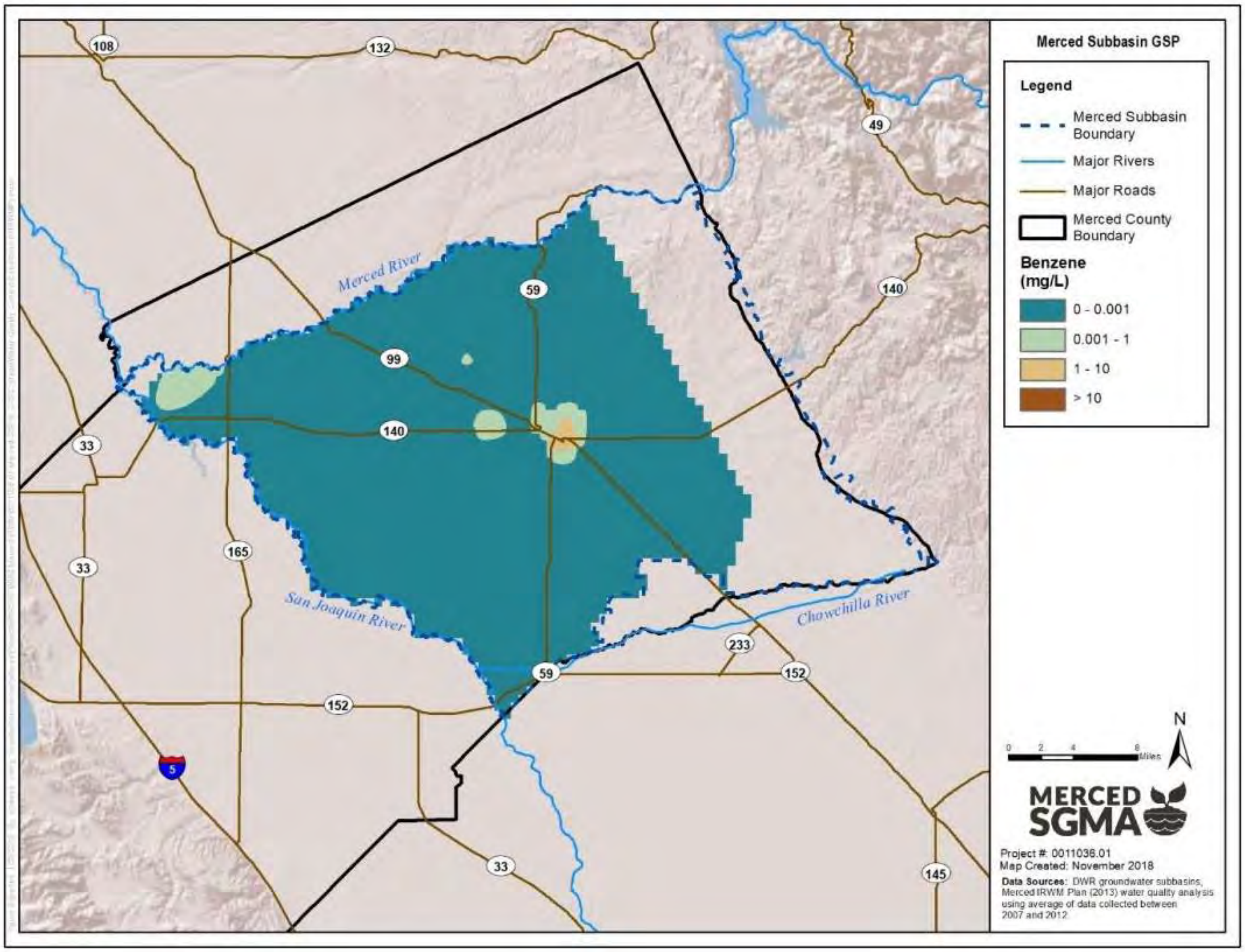
More than 150 unauthorized releases of petroleum hydrocarbons from underground storage tanks have occurred in the Merced Subbasin, according to the SWRCB GeoTracker database. The primary hydrocarbons of concern are benzene and MTBE, both of which are suspected carcinogens.

2.2.4.4.3 Benzene

Benzene concentrations in groundwater in the Merced Subbasin range from non-detect (variable, but typically less than 0.5 mg/L) to greater than 15,000 mg/L (Figure 2-74). The primary MCL for benzene is 0.001 mg/L (SWRCB, 2018). The 5-year average (2007-2012) benzene concentration in groundwater in the Merced Subbasin is generally less than 0.001 mg/L, with elevated concentrations found in localized urban areas along transportation corridors, including Highway 99 and Highway 140.

Time concentration plots of benzene are shown in Appendix E.

Figure 2-74: 5-Year Average Distribution of Benzene in Groundwater (2007-2012)

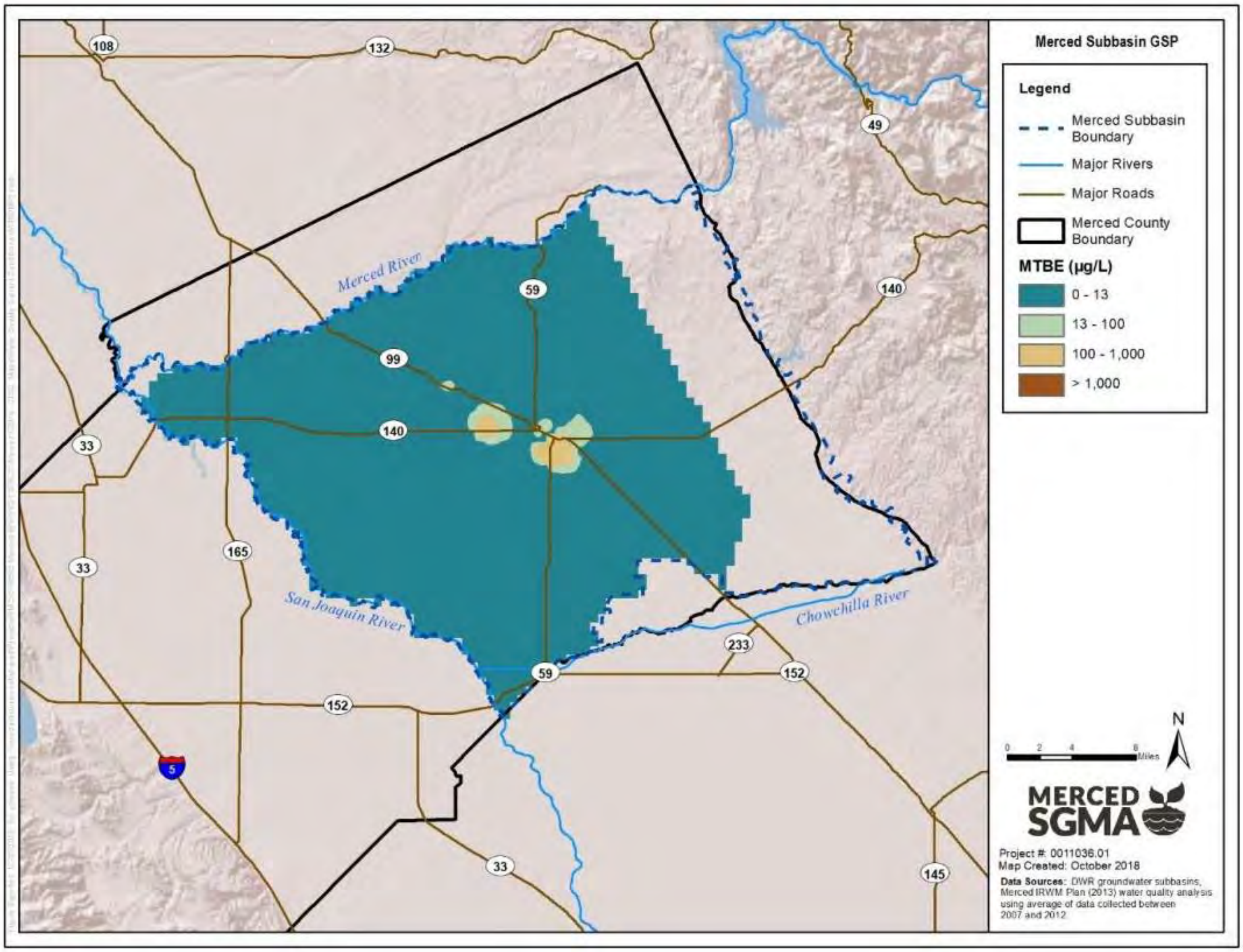


2.2.4.4.5 Methyl Tertiary Butyl Ether (MTBE)

MTBE concentrations in groundwater in the Merced Subbasin range from non-detect (variable, but typically less than 0.2 µg/L) to greater than 440,000 µg/L. The primary MCL for MTBE is 13 µg/L (SWRCB, 2018). The 5-year average (2007-2012) MTBE concentration in groundwater in the Merced Subbasin is generally less than 5 µg/L (Figure 2-75), with elevated concentrations generally found in localized urban areas along Highway 99.

Time concentration plots of MTBE are shown in Appendix E.

Figure 2-75: 5-Year Average Distribution of MTBE in Groundwater (2007-2012)



2.2.4.4.6 Solvents

Solvents includes subsections for 1,1,1-Trichloroethane (111-TCA), Tetrachloroethylene (PCE), and Trichloroethylene (TCE).

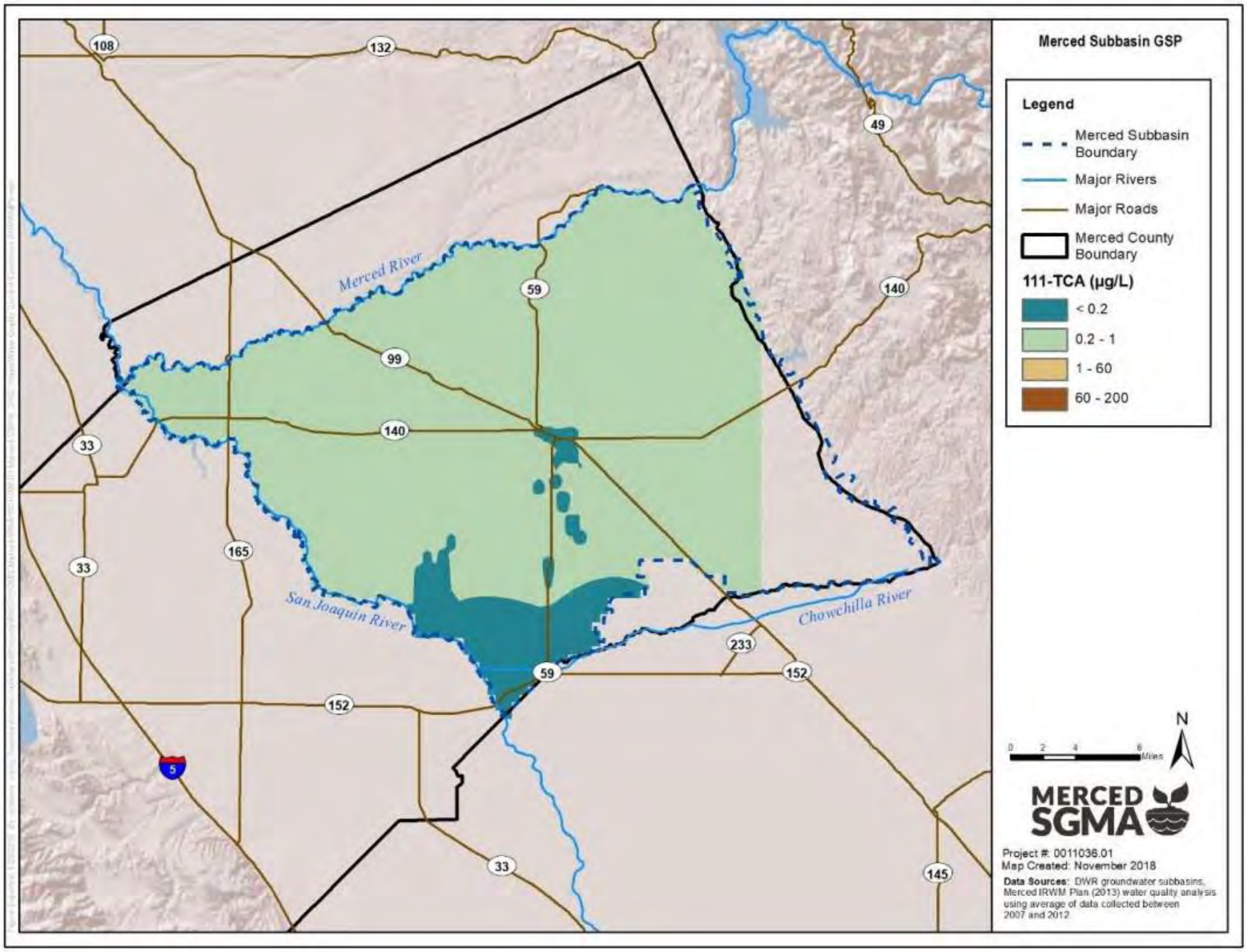
2.2.4.4.7 1,1,1-Trichloroethane (111-TCA)

The VOC 111-TCA is a commonly used solvent utilized in manufacturing facilities, auto repair shops, and various other uses within the Merced Subbasin. 111-TCA concentrations in groundwater in the Merced Subbasin range from non-detect (variable, but typically 0.2 µg/L) to 60 µg/L. The primary MCL for 111-TCA is 200 µg/L (SWRCB, 2018). The 5-year average (2007-2012) 111-TCA concentration in groundwater in the Merced Subbasin is generally less than 1 µg/L (

Figure 2-76).

Time concentration plots of 111-TCA are shown in Appendix E.

Figure 2-76: 5-Year Average Distribution of 111-TCA in Groundwater (2007-2012)

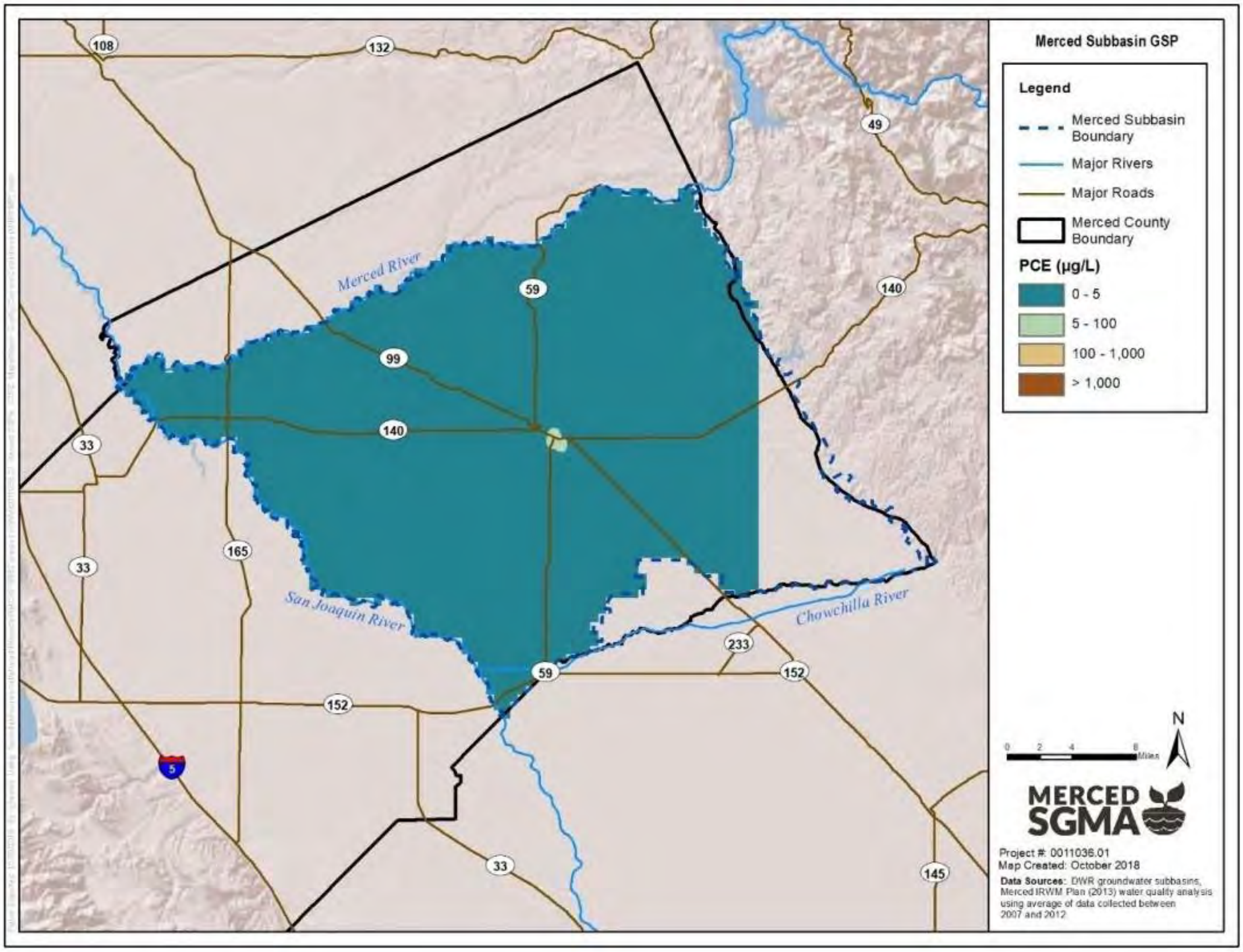


2.2.4.4.8 Tetrachloroethylene (PCE)

The VOC PCE is a commonly used solvent in manufacturing facilities and dry cleaners. PCE concentrations in groundwater in the Merced Subbasin range from non-detect (0.5 µg/L) to over 500 µg/L. The primary MCL for PCE is 5 µg/L (SWRCB, 2018). The 5-year average (2007-2012) PCE concentration in groundwater in the Merced Subbasin is generally less than 5 µg/L (Figure 2-77), with elevated concentrations found in localized areas in the northwest quadrant, beneath the City of Merced.

Time concentration plots of PCE are shown in Appendix E.

Figure 2-77: 5-Year Average Distribution of PCE in Groundwater (2007-2012)

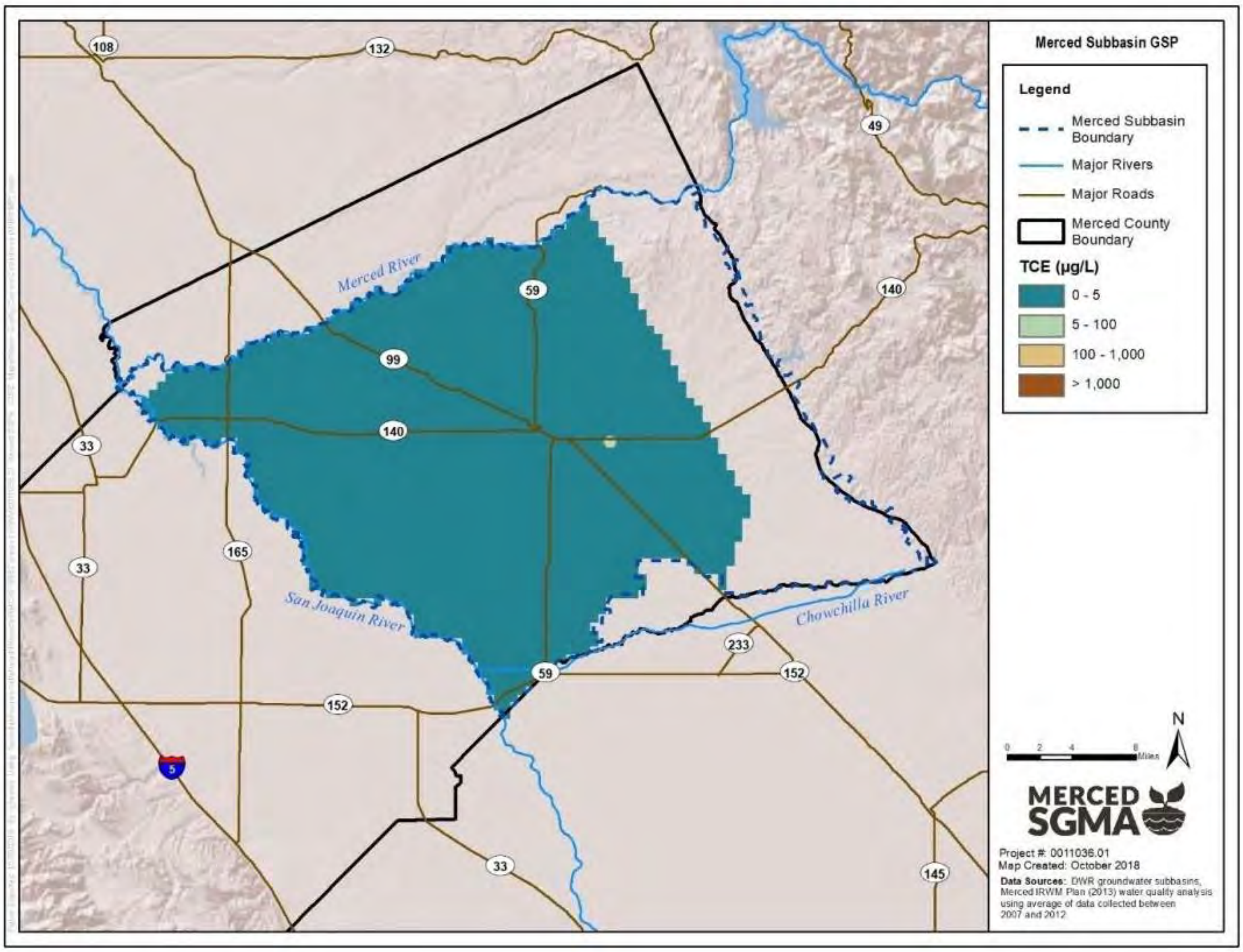


2.2.4.4.9 Trichloroethylene (TCE)

The VOC TCE is a commonly used solvent in manufacturing facilities. TCE concentrations in groundwater in the Merced Subbasin range from non-detect (0.5 μg/L) to over 800 μg/L. The primary MCL for TCE is 5 μg/L (SWRCB, 2018). The 5-year average (2007-2012) TCE concentration in groundwater in the Merced Subbasin is generally less than 5 μg/L (Figure 2-78). While not shown directly in the figure, the Merced IRWMP indicates that elevated concentrations can be found in localized areas in the northwest quadrant and along Highway 140 beneath a point source (RMC Water and Environment, 2013a).

Time concentration plots of TCE are shown in Appendix E.

Figure 2-78: 5-Year Average Distribution of TCE in Groundwater (2007-2012)



2.2.4.4.10 Emerging Contaminants

Many chemical and microbial constituents that have not historically been considered as contaminants are occasionally, and in some cases with increasing frequency, detected in groundwater. These newly recognized (or emerging) contaminants are commonly derived from municipal, agricultural, industrial wastewater, and domestic wastewater sources and pathways. These newly recognized contaminants are dispersed to the environment from domestic, commercial, and industrial uses of common household products and include caffeine, artificial sweeteners, pharmaceuticals, cleaning products, and other personal care products. Residual waste products of genetically modified organisms are also of potential concern. A recently completed survey for pharmaceuticals at dairies in the Merced Subbasin area by UC Davis and the USGS detected pharmaceuticals in shallow groundwater (Watanabe, Harter, and Bergamaschi, 2008 as cited by (AMEC, 2013)).

Perfluorooctanesulfonic acid (PFOS) and perfluorooctantoic acid (PFOA) are organic chemicals synthesized for water and lipid resistance, used in a wide variety of consumer products as well as fire-retarding foam and various industrial processes. These chemicals tend to accumulate in groundwater, though typically in a localized area in association with a specific facility, such as a factory or airfield (California Water Boards, 2018). There are currently no MCLs for PFOS or PFOA.

Currently, data on PFOS and PFOA is limited in the Merced Subbasin since these are emerging contaminants. However, according to the Geotracker database, both PFOA and PFOS have been detected at the Castle Air Force Base military cleanup sites. In 2004, USEPA and the State of California concurred that the Air Force was suitably implementing plume capture and cleanup which is still underway (SWRCB - GeoTracker).

2.2.5 Land Subsidence

Land subsidence is a significant issue in the southwestern portion of the Subbasin and in the neighboring Delta-Mendota and Chowchilla Subbasins. While there are no extensometers in the area to provide data on the depths at which compaction is occurring, the subsidence is thought to be caused by groundwater extraction below the Corcoran Clay and compaction of clays below the Corcoran Clay (DWR, 2017b).

The transition from pasture or fallowed land to row and permanent crops adjacent to the San Joaquin River is thought to have created an increased groundwater pumping demand in an area that is not, at this time, serviced by an irrigation district or alternate surface water supply (Reclamation, 2016). This demand is thought to have resulted in recent increases in land subsidence along the river. The subsidence poses difficulties for local, state, and federal agencies with existing or planned infrastructure in the area (Reclamation, 2016).

The San Joaquin River Restoration Program's *2020 Channel Capacity Report* analyzed the impacts of future subsidence on the flow capacity of the Middle Eastside Bypass, which is located in the southwest corner of the Merced Subbasin. The analysis projected total subsidence from 2016 through 2031 by extrapolating average subsidence measured 2011-2018. It estimated that by 2031, three reaches will encroach upon or exceed the maximum allowable water surface elevation under 2,500 cfs conditions (see Figure 2-79), with indirect impacts on a fourth reach upstream (DWR, 2020). The flowrate is based on a SJRRP goal of having 2,500 cfs channel capacity by the end of 2024. In 2020, levee improvements were implemented in one of the three reaches to resolve flow capacity concerns which also eliminated the projected 2031 subsidence impacts in this particular reach (DWR & Reclamation, 2022). The *2022 Channel Capacity Report* stated that "…capacities through the Middle Eastside Bypass are equal to or greater than 2,600 cfs. However, because subsidence continues, the capacity will continue to be reduced over time" (DWR & Reclamation, 2022).

Figure 2-79: 2020 Channel Capacity Report Subsidence and Flow Capacity Analysis Findings

Source: (DWR, 2020)

Subsidence rates are variable, and highest during the drought period. Annual subsidence averaged up to 0.45 feet per year from December 2011 to December 2017, as shown in Figure 2-80 based on data from USBR's SJRRP~~)~~ (see description of program in Section 1.2.2.3 - Land Subsidence Monitoring). This relatively long period averages years of drought and years of normal or wet precipitation. Noting that these measurements incorporate both elastic and inelastic subsidence, the highest maximum annual rate of subsidence reported in Reclamation's regular mapping program was -0.67 feet per year, seen from December 2012 to December 2013 (see Figure 2-81), closely followed by -0.65 feet per year from December 2014 to December 2015. The lowest maximum annual rate of subsidence reported in Reclamation's regular mapping program was -0.18 feet per year, seen from December 2016 to December 2017 (see Figure 2-82).

Figure 2-80: Average Land Subsidence December 2011 – December 2017

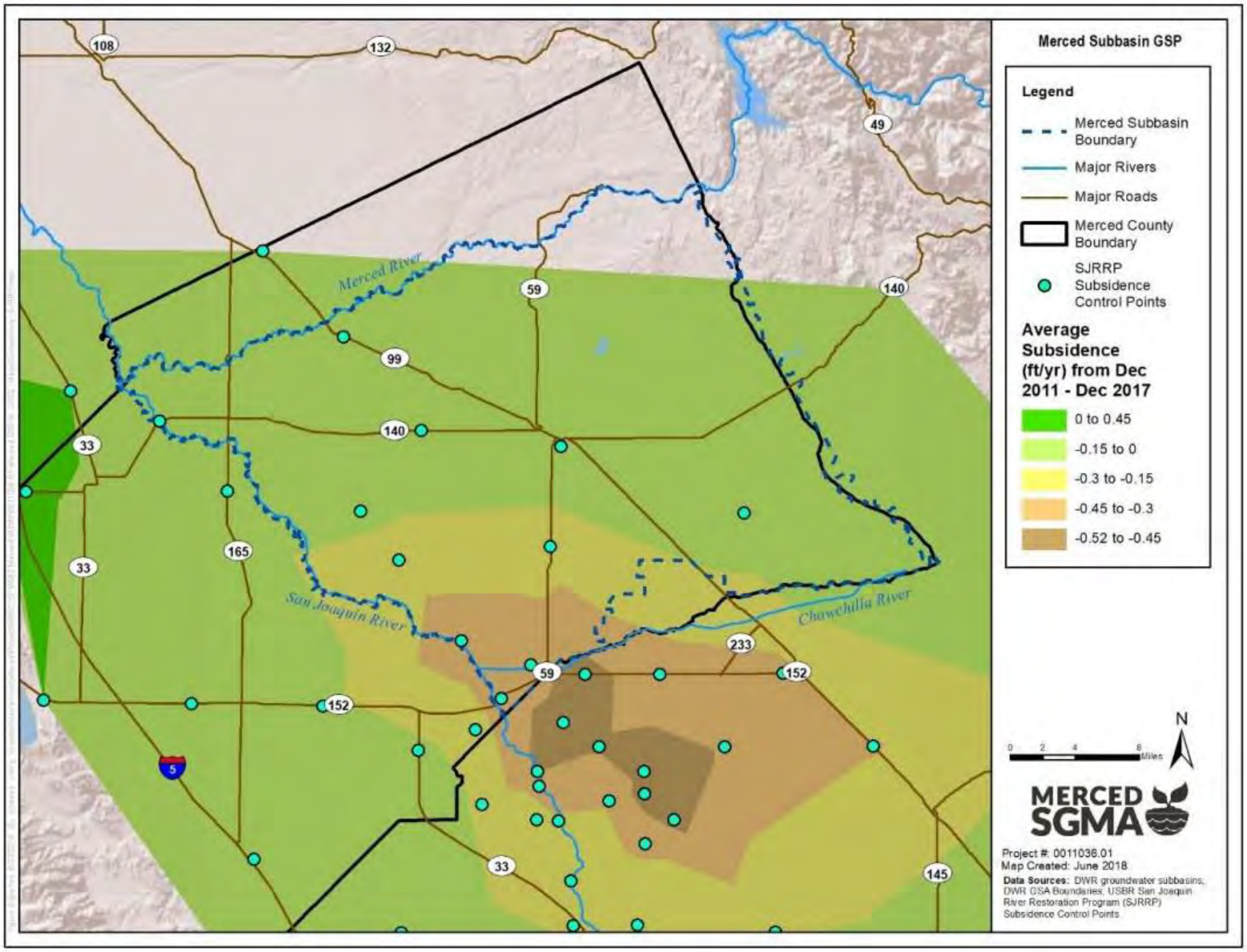


Figure 2-81: Land Subsidence December 2012 – December 2013

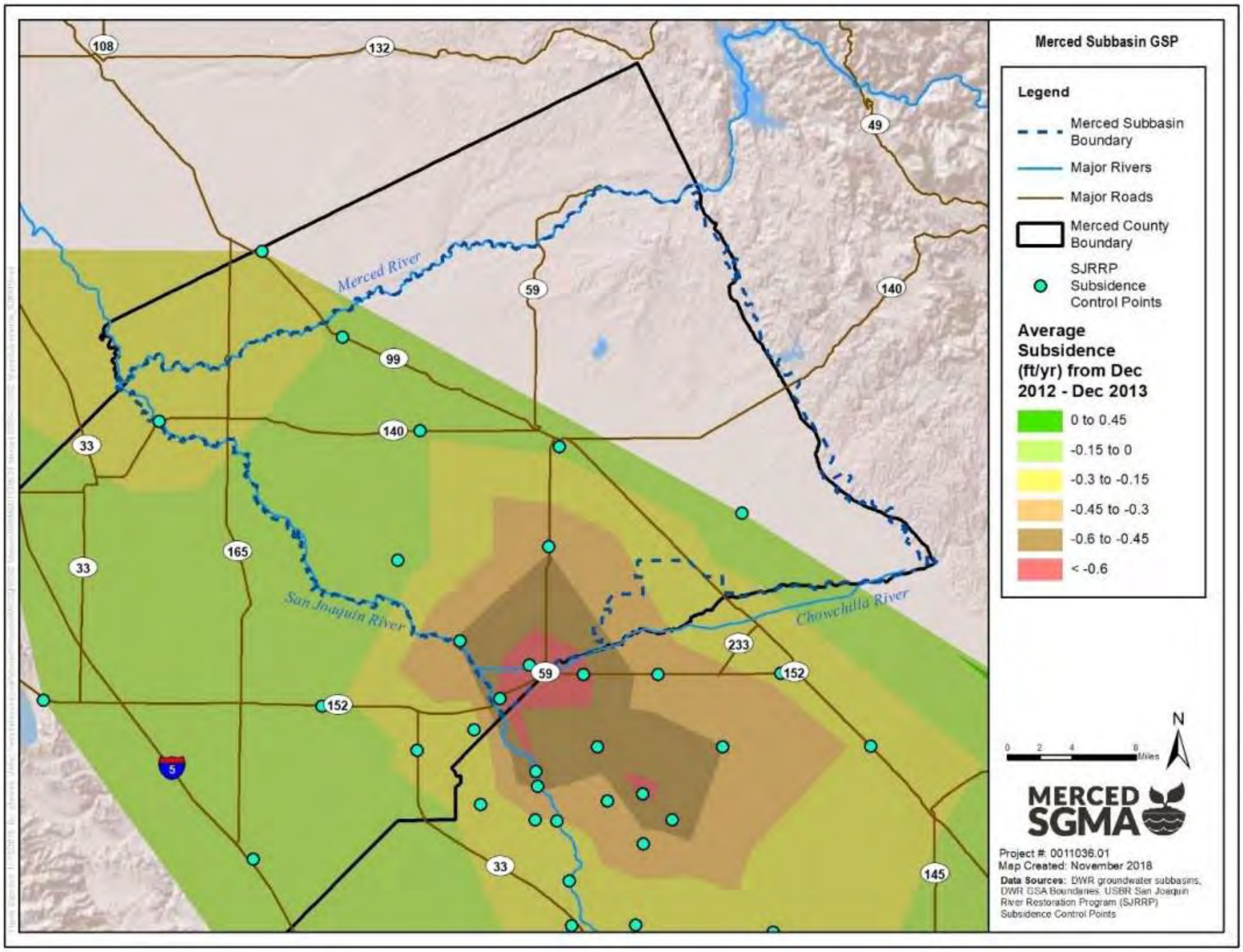
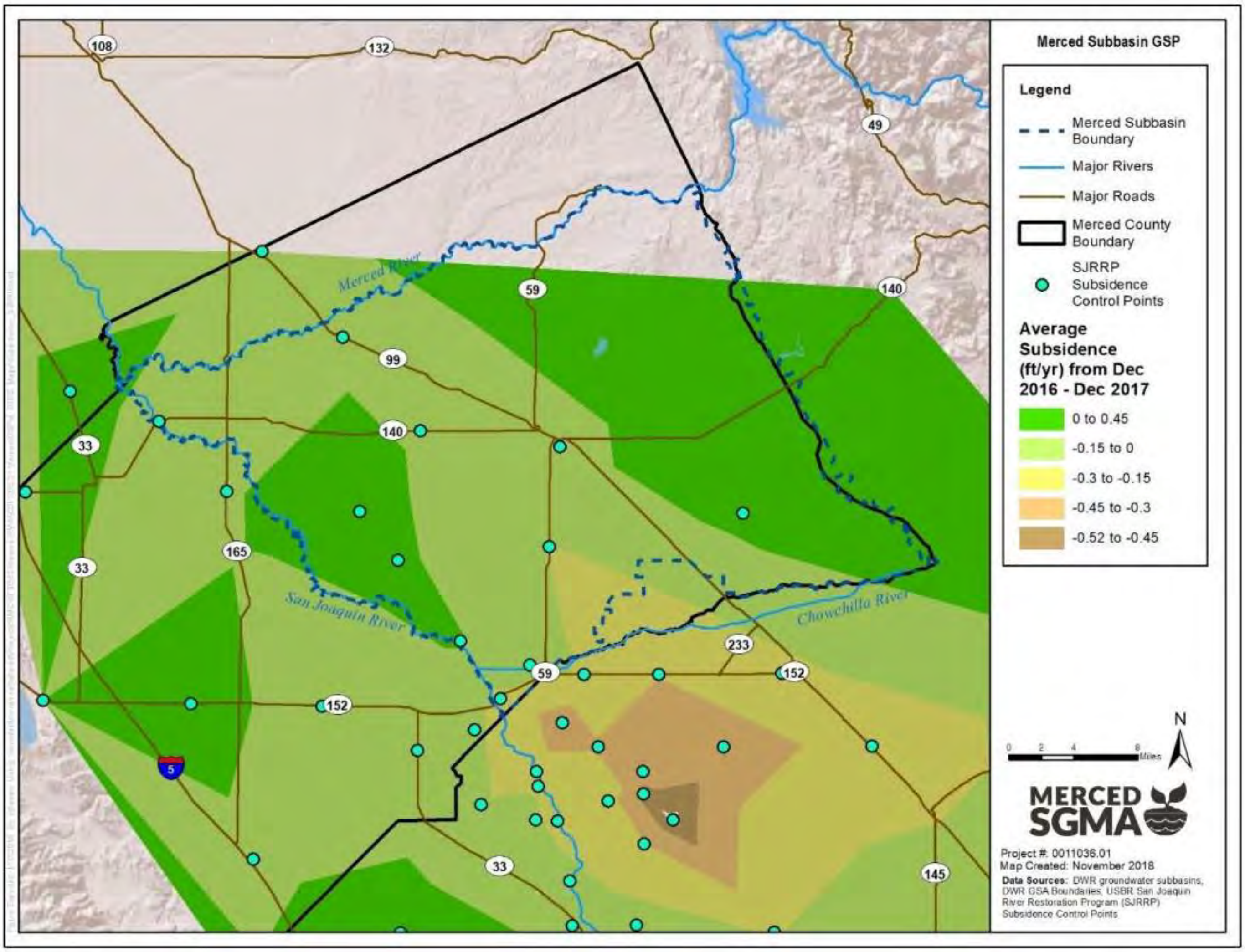


Figure 2-82: Land Subsidence December 2016 – December 2017



Subsidence in the southern corner of the Subbasin was compared against groundwater levels measured in the Below Corcoran Clay principal aquifer. Subsidence locations and historical land surface elevations measurements were obtained from two control points in the San Joaquin River Restoration Program. Historical groundwater elevations were obtained from two wells in the CASGEM program. Figure 2-83 shows a map of the four locations.

Figure 2-84 shows that at SJRRP point 156, subsidence has continued at a relatively steady pace from December 2011 until December 2016 where the decline in land surface elevation paused between December 2016 and December and 2017. At CASGEM well 371130N1205654W001, groundwater elevation increased during the same time period where subsidence halted. In this case, rising groundwater levels appear to have stabilized land subsidence.

Figure 2-85 shows that at SJRRP point 2065, subsidence has continued at a relatively steady pace from December 2011 through the most recent data point in December 2017. At CASGEM well 371852N1203899W001, groundwater elevation decreased from December 2011 through December 2015, showing a small net increase between December 2016 and December 2017. In this case, rising groundwater levels do not appear to have an impact on land subsidence, though groundwater levels fluctuated (i.e., was not a steady increase) during this time.

There are no additional available wells located in the Below Corcoran Clay Principal Aquifer with historical groundwater elevation data for further comparisons against SJRRP land subsidence data.

Figure 2-83: Map of Subsidence and Groundwater Well Comparison Points

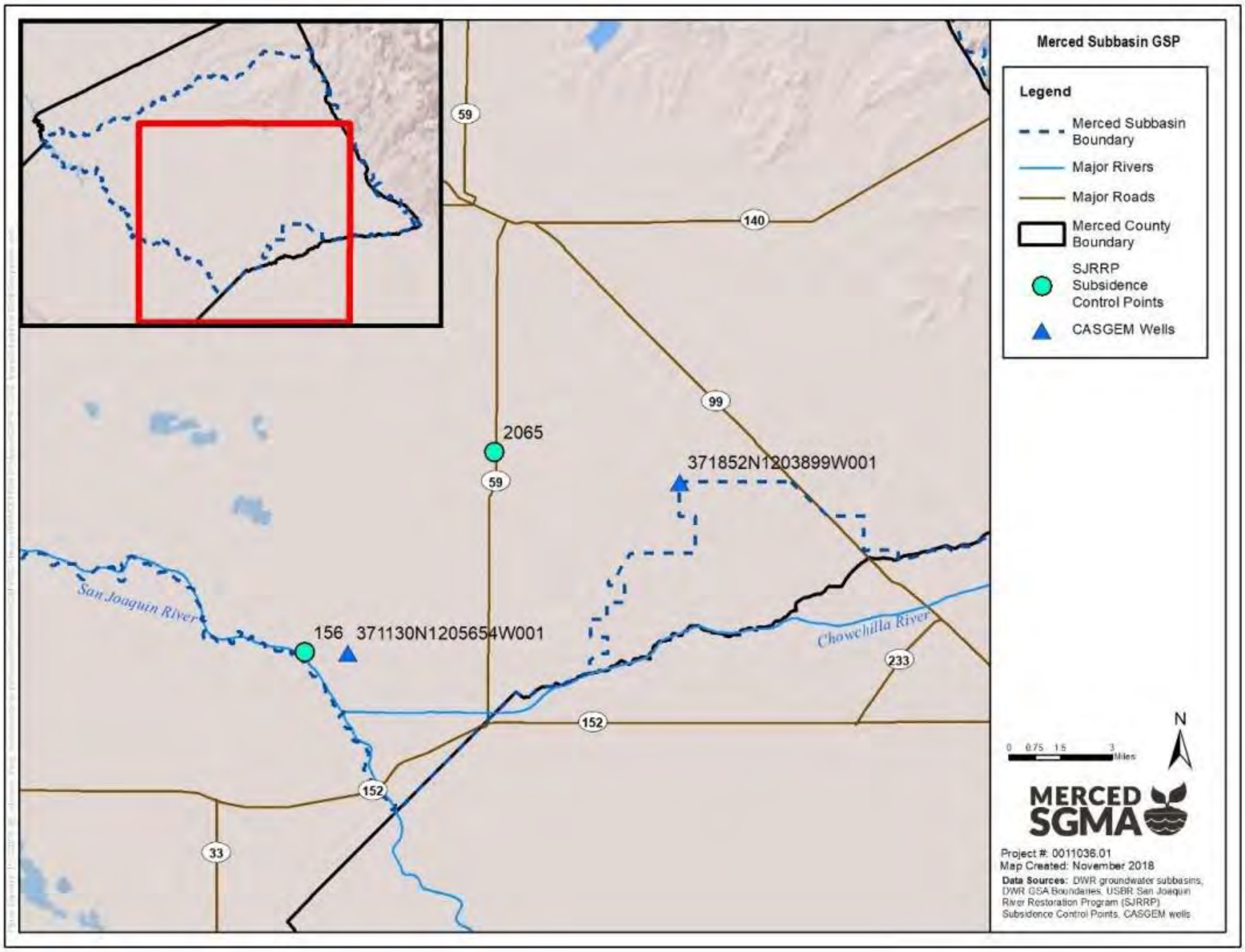


Figure 2-84: Subsidence vs Groundwater Elevation Comparison #1

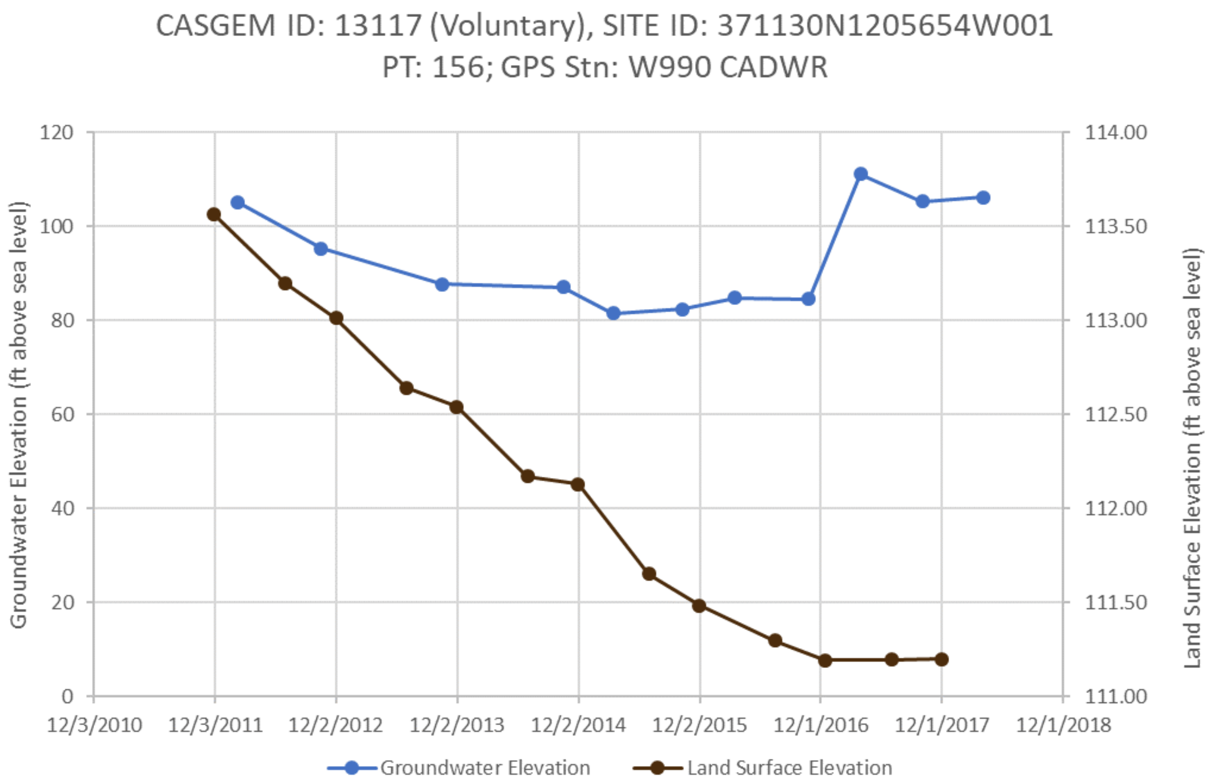


Figure 2-85: Subsidence vs Groundwater Elevation Comparison #2

2.2.6 Interconnected Surface Water Systems

Interconnected surface waters are surface water features that are hydraulically connected by a saturated zone to the groundwater system. In other words, where water table elevations and surface water features intersect at the same elevations and locations. Interconnected surface waters may be either gaining or losing, wherein the surface water feature is either gaining water from the aquifer system or losing water to outflowing into the aquifer system.

See Section 2.1.3.5 - Groundwater Recharge and Discharge Areas for identification of Interconnected/Disconnected streams (Figure 2-10) and Gaining/Losing streams (Figure 2-9). Increased losses or decreased gains (to either groundwater or stream systems) can be expected due to groundwater pumping adjacent to streams, but this is difficult to quantify. While the MercedWRM has been used to identify connections and disconnections (Figure 2-10) between the groundwater system and streams, depletions have not yet been calculated. There are no known field studies of interconnected surface water systems within the Subbasin.

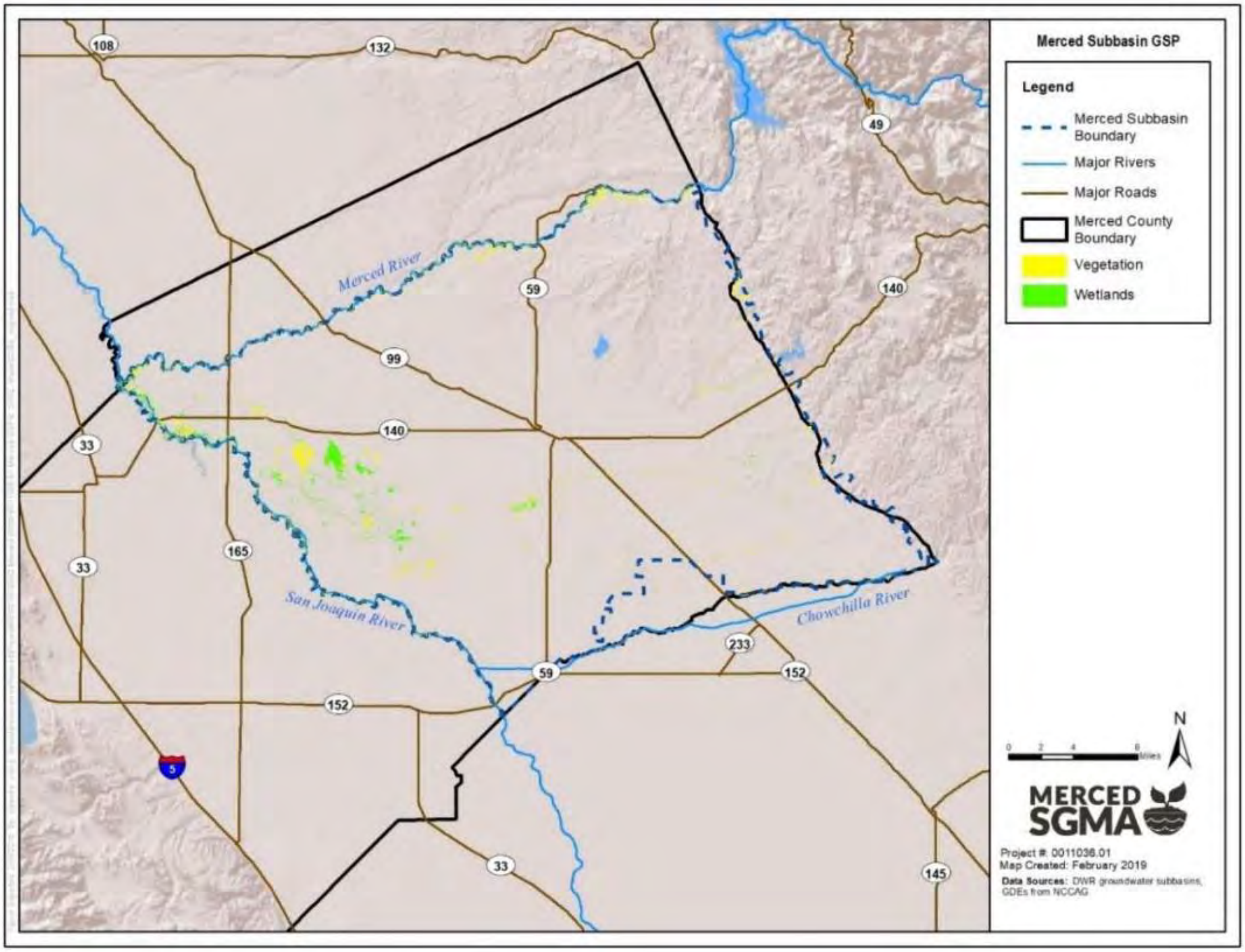
2.2.7 Groundwater-Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) are defined in the SGMA regulations as "ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface". GDEs exist within the Merced Subbasin largely where vegetation accesses shallow groundwater for survival; without the access to shallow groundwater, these plants would die. GDEs were identified within the Merced Subbasin as areas dependent on groundwater.

Certain species of plants are commonly associated with groundwater use. However, the presence of these plants does not necessarily indicate that these are also GDEs. The identification of GDEs was performed by first identifying the types of plants that are often associated with accessing groundwater, then by identifying if those plants are dependent on groundwater, or if they can access alternate water supplies.

The Natural Communities Commonly Associated with Groundwater (NCCAG) database was used to identify plants commonly associated with groundwater use. The NCCAG database was developed by a working group comprised of DWR, California Department of Fish and Wildlife (CDFW), and The Nature Conservancy (TNC) by reviewing publicly available state and federal agency datasets that mapped California vegetation, wetlands, springs, and seeps and by conducting a screening process to retain types and locations commonly associated with groundwater. The results were compiled into the NCCAG database with two habitat classes defined. The first class includes wetland features commonly associated with the surface expression of groundwater under natural, unmodified conditions. The second class includes vegetation types commonly associated with the sub-surface presence of groundwater (phreatophytes). Figure 2-86 shows the locations identified by the NCCAG database within the Merced Subbasin.

Figure 2-86: Natural Communities Commonly Associated with Groundwater (NCCAG)



The next step in identifying GDEs was to analyze each GDE for groundwater dependence. This was performed by identifying NCCAG locations that are likely to have access to alternate water supplies. In the Merced Subbasin, areas with alternate water supplies are substantial, partly due to the fact that groundwater levels are already deep in most portions of the Subbasin, but also due to the availability of other water supplies that ecosystems are often able to access. Figure 2-87 shows the locations of NCCAG identified as not likely to be GDEs due to the presence of alternate water supplies and thus a lack of dependence on groundwater.

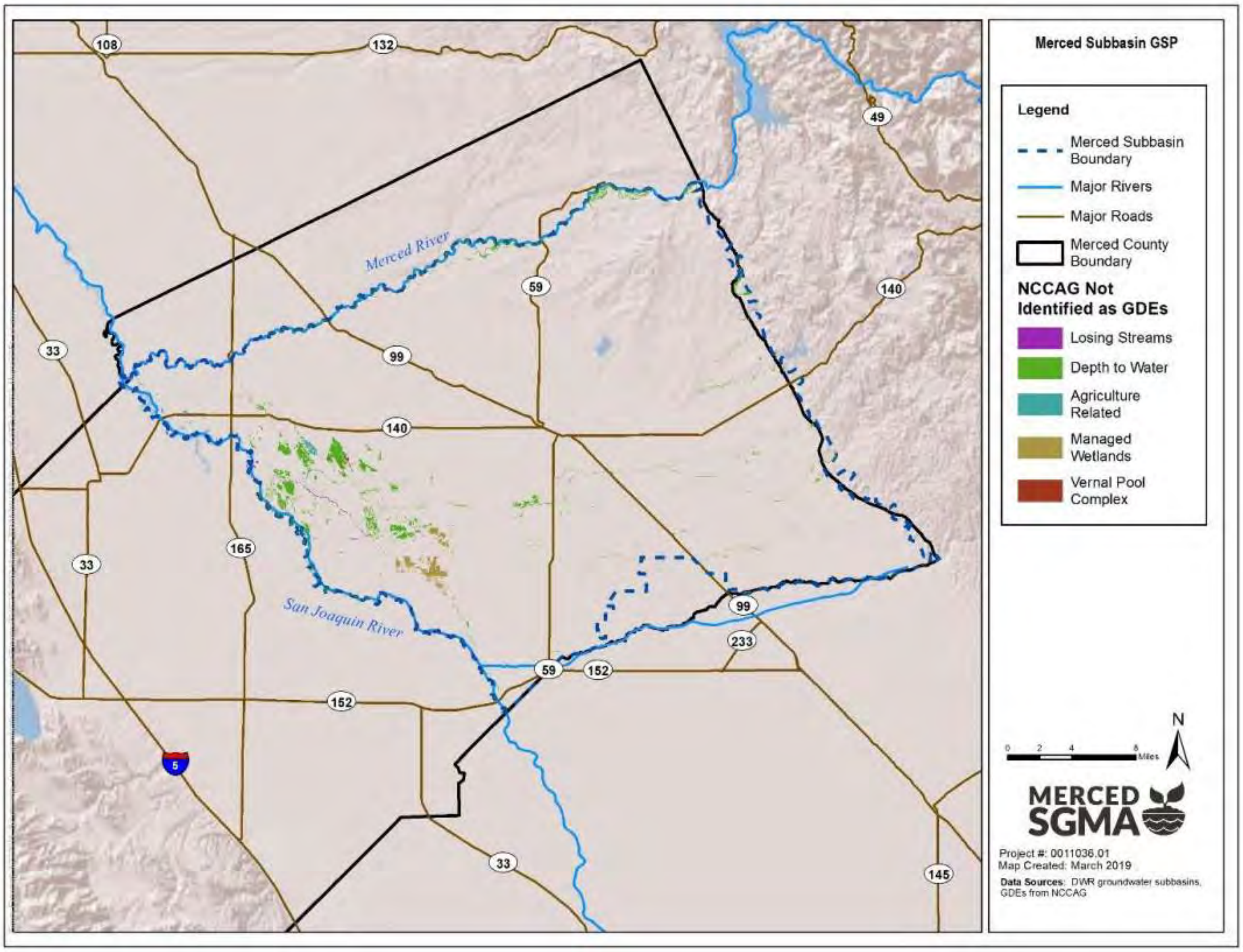
Noting that no land use protections are conveyed on GDEs or NCCAG through this document or other documents, the distinction between GDEs and NCCAG that are not GDEs is important from a management perspective. While NCCAG may have ecological value, management of groundwater may not be the most appropriate way to allow those communities to thrive. Instead, management of NCCAG may require more focus on changing land use or irrigation efficiencies more so than groundwater management. The rigorous analysis to identify GDEs was developed to focus groundwater management activities on the most appropriate areas.

The analysis was conducted by thorough review of aerial photographs from several sources across multiple years for all GDE areas as well as comparison against external databases, such as vernal pool complexes published by the California Department of Fish and Game. While many NCCAG areas were identified as not being GDEs, several GDEs not captured in the NCCAG database were digitized where a likely GDE was observed through this additional analysis.

NCCAG areas not identified as GDEs can be categorized as follows. The locations are shown in Figure 2-87 to support improved understanding of ecosystems in the Merced Subbasin.

1. Areas with a depth to groundwater greater than 30 feet in Spring 2015 – Oak trees are considered the deepest-rooted plant in the region with a root zone of roughly 25 feet, and zones where the depth to water was deeper than 30 feet were excluded because they are unlikely to support vegetative growth. The 25-foot value is considered conservative, as this depth is unlikely to support recruitment of new oak seedlings. These areas are assumed to be accessing other water sources rather than groundwater that is inaccessibly deep. Thus, they are not identified as GDEs; these areas are represented as “Depth to Water” in Figure 2-87.
2. Habitat areas with supplemental water – Managed wetlands were identified and reviewed with local water managers to verify supplemental water deliveries. These areas are assumed to be accessing supplemental water deliveries and not reliant on groundwater. Thus, they are not identified as GDEs; these areas are represented as “Managed Wetlands” in Figure 2-87. A substantial portion of this area overlaps with the Merced National Wildlife Refuge which receives an average 11,000 AFY of surface water (2009-2013), with reduced deliveries during drought (100 to 4,000 AFY during 2014-2016).
3. Areas adjacent to irrigated fields – Agricultural lands are dependent on reliable water supplies to ensure a successful harvest and substantial surface water or deeper groundwater is used to irrigate crops in the Merced Subbasin. Such irrigation benefits not only the crops, but also surrounding vegetation. These areas are assumed to be accessing irrigation water. Thus, they are not identified as GDEs. Aerial photography was used to examine and determine if vegetated areas were adjacent to irrigated fields or drainage canals. These areas are identified as “Agriculture Related” in Figure 2-87.
4. Areas depending on adjacent losing surface water bodies – Losing streams are streams that recharge the groundwater system. This requires groundwater levels that are lower than stage in the stream and that are progressively lower away from the stream. These areas are assumed to be accessing water flowing out of the stream. Areas with losing streams were identified using the MercedWRM (see Section 2.1.3.5 - Groundwater Recharge and Discharge Areas); NCCAG within 300 feet of losing stream areas were assumed to not be GDEs. Areas depending on adjacent losing surface water are represented as “Losing Streams” in Figure 2-87.
5. Areas of vernal pool complexes – Vernal pools are shallow, intermittently flooded wetlands. They typically appear in winter due to rainfall and evaporate completely by summer and fall. Vernal Pool Complexes were identified based on the “Vernal Pool Complexes – Central Valley, 1989-1998” dataset published by the California Department of Fish and Game. Vernal pools are dependent on rainfall-fed, extremely shallow groundwater conditions not directly connected with the deeper aquifer system, thus these areas are not dependent on groundwater and are not identified as GDEs. These areas are represented as “Vernal Pool Complexes” in Figure 2-87.

Figure 2-87: NCCAG Not Identified as GDEs



Based on the analysis, areas were identified as likely GDEs. These areas are shown "Likely GDEs – NCCAG Vegetation" and "Likely GDEs - NCCAG Wetland" in two regions within the Subbasin. Figure 2-88 shows likely GDEs at the confluence of the Merced and San Joaquin Rivers while Figure 2-89 shows likely GDEs in the region of the southern portion of the San Joaquin River within the Merced Subbasin.

Figure 2-88: Likely GDEs – Confluence of Merced and San Joaquin Rivers

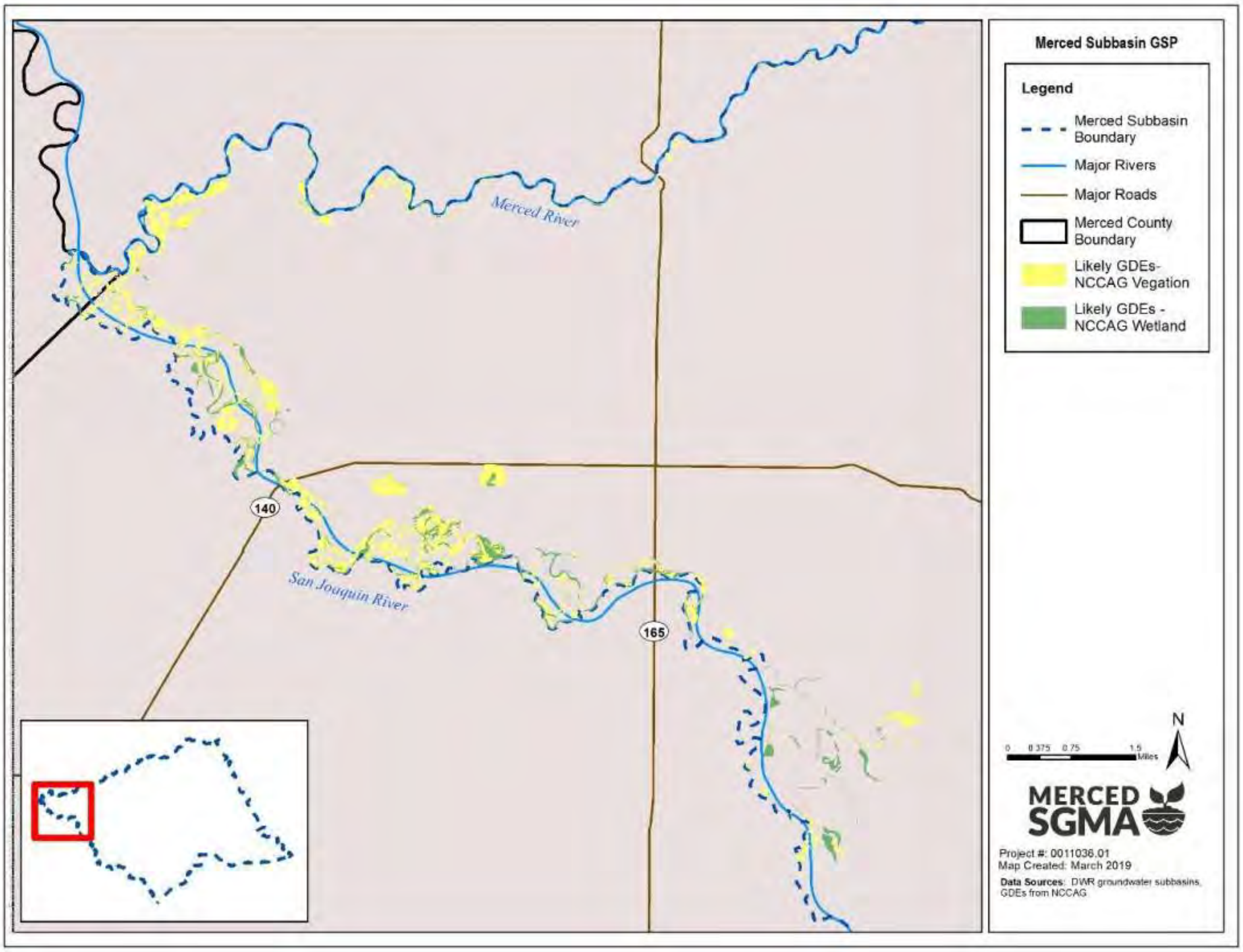
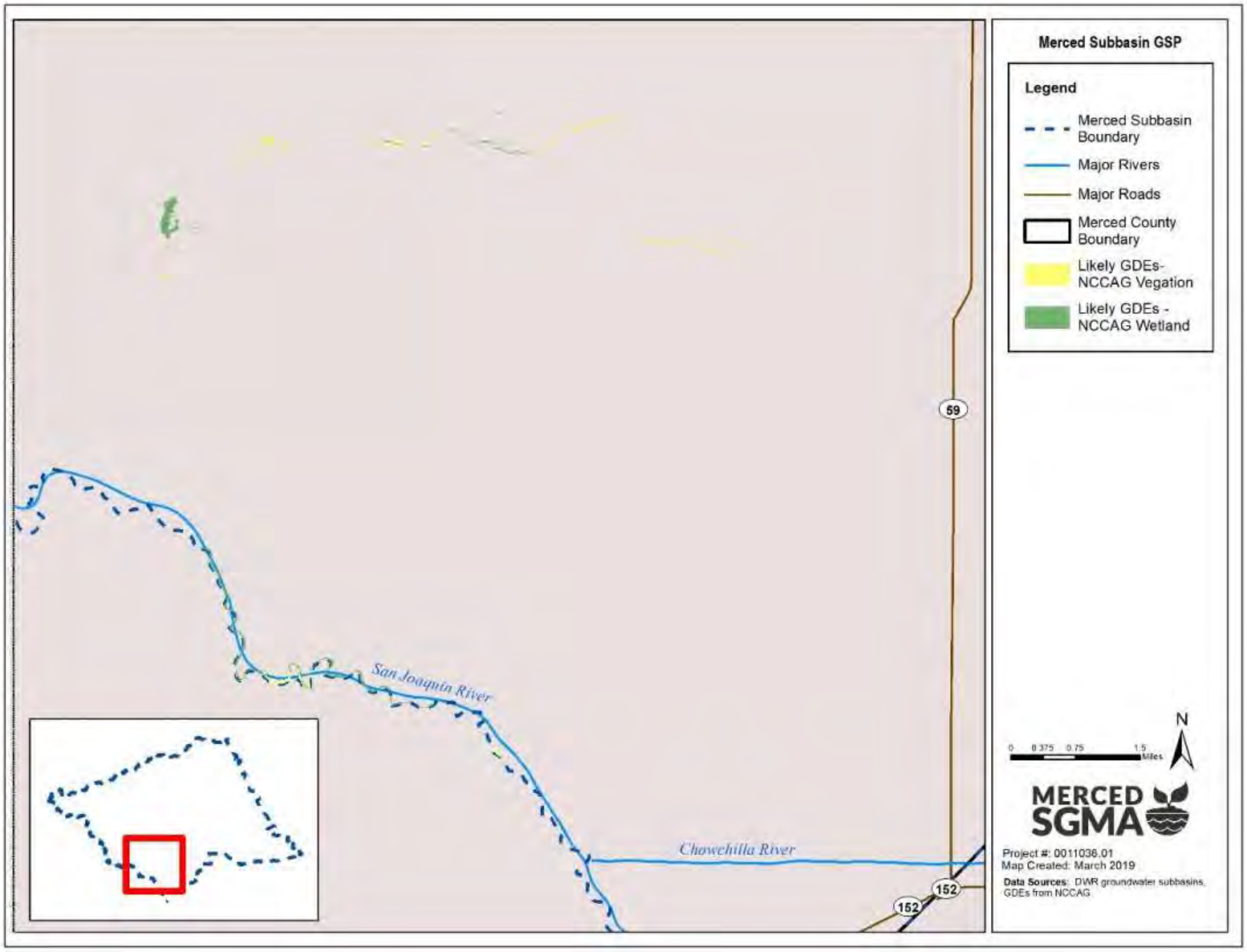


Figure 2-89: Likely GDEs – South Region of San Joaquin River

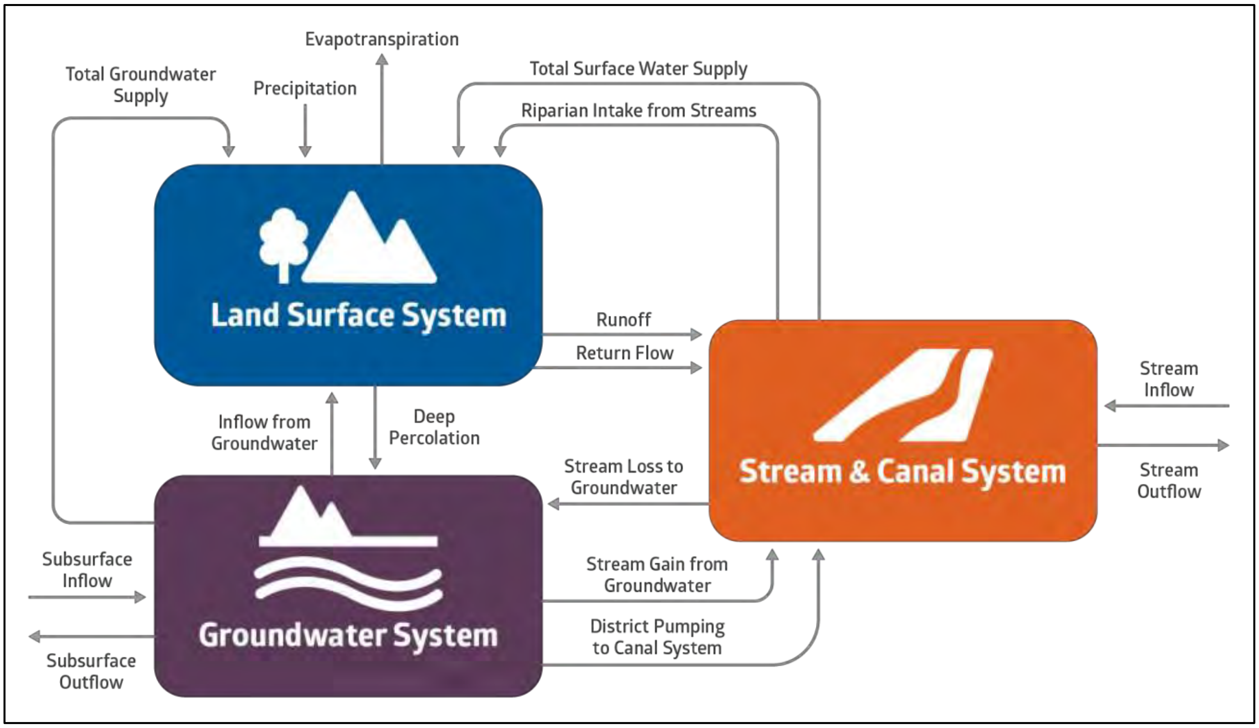


2.3 WATER BUDGET INFORMATION

Water budgets were developed to provide a quantitative account of water entering and leaving the Merced Subbasin. Water entering the Subbasin includes water entering at the surface and through the subsurface. Similarly, water leaving the Subbasin leaves at the surface and through the subsurface. Water enters and leaves naturally, such as precipitation and streamflow, and through human activities, such as pumping and recharge from irrigation. Figure 2-90 highlights the interconnectivity of stream, surface, and groundwater components of the natural and human related hydrologic system used in this analysis.

The values presented in the water budget provide information on historical, current, and projected conditions as they relate to hydrology, water demand, water supply, land use, population, climate change, sea level rise (not applicable in the Merced Subbasin), groundwater and surface water interaction, and subsurface groundwater flow. This information can assist in management of the Subbasin by identifying the scale of different uses, highlighting potential risks, and identifying potential opportunities to improve water supply conditions, among others.

Figure 2-90: Generalized Water Budget Diagram



Water budgets can be developed on different scales. In agricultural use, water budgets may be limited to the root zone, improving irrigation techniques by estimating the inflows and outflows of water from the upper portion of the soil accessible to plants through their roots. In a pure groundwater study, water budgets may be limited to water flow within the subsurface, aiding in understanding how water flows beneath the surface. Global climate models simulate water budgets that incorporate atmospheric water, allowing for simulation of climate change conditions. In this document, consistent with the Regulations (California Code of Regulations), the water budgets investigate the combined land surface, stream, and groundwater systems, specifically for the Merced Subbasin.

Water budgets can also be developed at different temporal scales. Daily water budgets may be used to demonstrate how evaporation and transpiration increase during the day and decrease at night. Monthly water budgets may be used to demonstrate how groundwater pumping increases in the dry, hot summer months and decreases in the cool, wet winter months. In this document, consistent with the Regulations, water budgets are represented based on water year (WY), with some consideration to monthly variability.

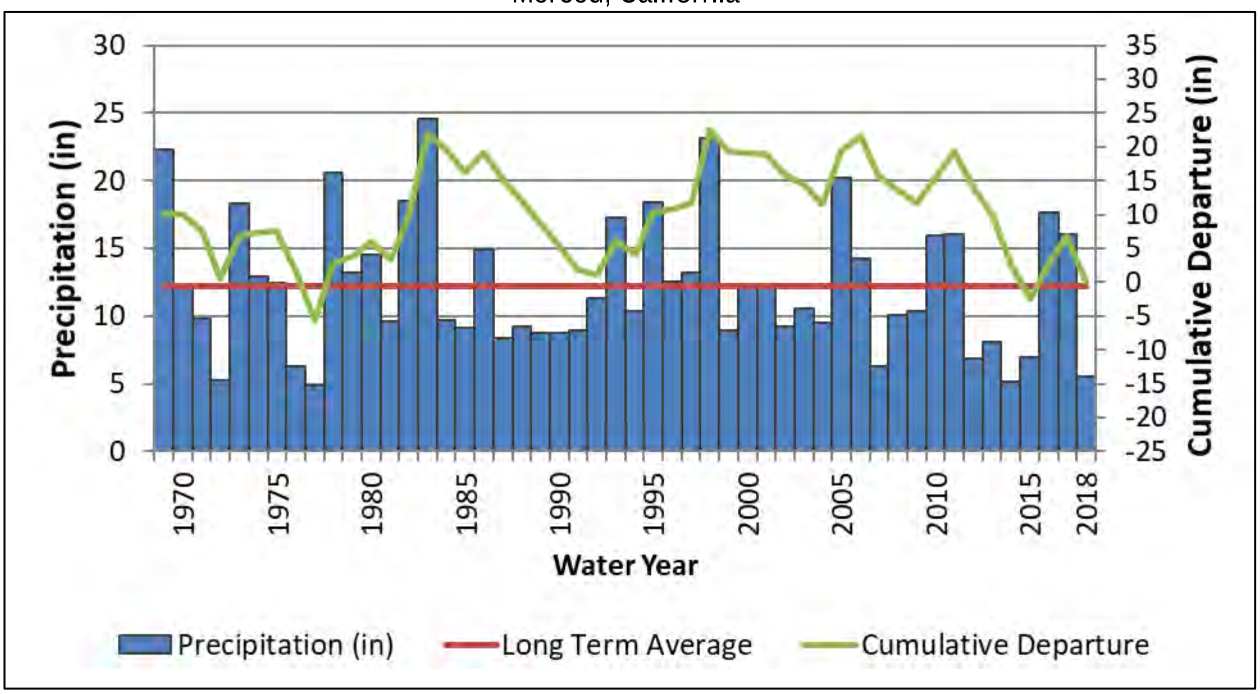
The Regulations require the annual water budgets be based on three different levels of development: historical, current, and projected conditions. Budgets are developed to capture typical conditions during these time periods. Typical conditions are developed through averaging hydrologic conditions that incorporate droughts, wet periods, and normal periods. By incorporating these varied conditions within the budgets, analysis of the system under certain hydrologic conditions, such as drought, can be performed along with analysis of long-term averages. Information is provided in the following subsections on the hydrology dataset used to identify time periods for budget analysis, the usage of the MercedWRM and associated data in water budget development, and on the budget estimates.

2.3.1 Identification of Hydrologic Periods

Hydrologic periods were selected to meet the needs of developing historical, current, and projected water budgets. The Regulations require that the projected water budget incorporate a 50-year hydrologic period, in order to reflect long-term average hydrologic conditions. Precipitation for the Merced Subbasin was used to identify hydrologic periods that would provide a representation of wet and dry periods and long-term average conditions needed for water budget analyses.

Rainfall data for the Subbasin is derived from the PRISM (Precipitation-Elevation Regressions on Independent Slopes Model) dataset of the DWR's California Simulation of Evapotranspiration of Applied Water (CALSIMETAW) model. Identification of periods with a balance of wet and dry periods was performed by evaluating the cumulative departure from mean precipitation. Under this method, the long-term average precipitation is subtracted from annual precipitation within each water year to develop the departure from mean precipitation for each water year. Wet years have a positive departure and dry years have a negative departure; a year with exactly average precipitation would have zero departure. Starting at the first year analyzed, the departures are added cumulatively for each year. So, if the departure for Year 1 is 5 inches and the departure for Year 2 is -2 inches, the cumulative departure would be 5 inches for Year 1 and 3 inches (5 plus -2) for Year 2. A chart is used to graphically illustrate the cumulative departure from mean precipitation within the Merced Subbasin (Figure 2-91). The chart includes bars displaying annual precipitation for each water year from 1969 through 2018 and a horizontal line representing the mean precipitation of 12.3 inches which varies only slightly from the full period of record (1922-2018) average of 12.0 inches. The cumulative departure from mean precipitation is displayed as a line that starts at zero and highlights wet periods with upward slopes and dry periods with downward slopes. More severe events are shown by steeper slopes and greater changes. Thus, the period from 1976 to 1977 illustrates a short period with dramatically dry conditions (13-inch decline in cumulative departure over 2 years).

Figure 2-91: 50-Year Historical Precipitation and Cumulative Departure from Mean Precipitation, Merced, California



2.3.2 Usage of the MercedWRM and Associated Data in Water Budget Development

Water budgets were developed utilizing the MercedWRM, a fully integrated surface and groundwater flow model covering approximately 1,500 square miles of the Merced Groundwater Region (Region), which fully encompasses the Merced Subbasin plus the Dry Creek watershed North of the Merced River and the section of~~–~~ Chowchilla Water District north of the Chowchilla River. The MercedWRM, a quasi-three-dimensional finite element model, was developed using the Integrated Water Flow Model (IWFM) 2015 software package to simulate the relevant hydrologic processes prevailing in the Region. The MercedWRM integrates the groundwater aquifer with the surface hydrologic system and land surface processes and operations. Using data from federal, state, and local resources, the MercedWRM was calibrated for the hydrologic period of October 1995 to September 2015 by comparing simulated evapotranspiration, groundwater levels, and streamflow records with historical observed records. Development of the model involved the study and analyses of hydrogeologic conditions, agricultural and urban water demands, agricultural and urban water supplies, and an evaluation of regional water quality conditions (Woodard & Curran, 2019). Additional information on the data used to develop the MercedWRM are included as Appendix D.

All groundwater models contain assumptions and some level of uncertainty. They are decision support tools used to better understand complex interactive systems. Sources of model uncertainty include heterogeneity in hydrogeologic properties and stratigraphy, quality of historical data, projections of future land use, hydrology, and climate. The MercedWRM model has been calibrated and validated. Inputs for GSP-related modeling runs used the best available data and science. Projections of future land use and water demands were based on the most recent planning documents prepared by agencies in the Subbasin. The model in its current form represents the best available representation of the basin. As additional information is collected during GSP implementation, the model will be updated to reflect the newly available data.~~–~~ Efforts to address basin data gaps will improve information available for the model.

With the MercedWRM as the underlying framework, model simulations were developed to allow for the estimation of water budgets. Three model simulations were used to develop the water budgets for historical, current, and projected conditions, which are discussed in detail below:

- The historical water budget is based on a simulation of historical conditions in the Merced Subbasin.
- The current water budget is based on a simulation of current (2015) land and water use over historical hydrologic conditions, assuming no other changes in population, water demands, land use, or other conditions.
- The projected water budget is based on a simulation of future land and water use over the historical hydrologic conditions.

2.3.3 Water Budget Definitions and Assumptions

Definitions and assumptions for the historical, current, and projected water budgets are provided below.

2.3.3.1 Historical Water Budget

The historical water budget is intended to evaluate availability and reliability of past surface water supply deliveries, aquifer response to water supply, and demand trends relative to water year type. The historical calibration of the MercedWRM was last updated to reflect the historical conditions in the Merced Subbasin through WY 2015. The hydrologic period of WY 2006 through 2015 is selected for the GSP historical water budget based on input from the stakeholder and coordinating committees, because it provides a period of representative hydrology, while capturing recent Subbasin operations, particularly the 2005 consolidation of El Nido Irrigation District into the MID service area. The period WY 2006 through 2015 has an average annual precipitation of approximately 10.0 inches, compared to the long-term average of 12.2 inches and includes the recent 2012-2015 drought, the wetter years of 2010-2011, and periods of normal precipitation.

As WYs 1996-2015 were used to develop and calibrate the MercedWRM, along with being a longer period of hydrology, a 20-year period is also included in the detailed tables below for comparative purposes. Additional details of the data used in the development of the historical calibration model are included in Appendix D.

2.3.3.2 Current Water Budget

While a budget indicative of current conditions could be developed using the most recent historical conditions, like the historical water budget (1996-2015), such an analysis would be difficult to interpret due to the drought conditions of the 2012-15 and its effect on local agricultural operations. Instead, in order to analyze the long-term effects of current land and water use on groundwater conditions and to accurately estimate current inflows and outflows for the basin, a Current Conditions Baseline scenario is developed using the MercedWRM. This baseline applies current land and water use conditions to historical hydrology over a 50-year period of 1969-2018.

The Current Conditions Baseline includes the following conditions:

- Hydrologic period:
    - WY 1969-2018 (50-year hydrology)
- River flow is based on:
    - Merced River: MercedSIM releases from New Exchequer under the 2018 Federal Energy Regulatory Commission (FERC) Requirements
    - San Joaquin River and Local Tributaries: historical records from USGS, CDEC, MID stream gauges, and the simulation of small-stream watersheds
- Land use is based on:
    - 2013 USDA CropScape Cropland Data Layer (CDL), which reflects the pre-drought conditions
    - Local ground truthing and refinement
- Urban water demand is based on:
    - 2015 demands as reported in the 2015 Urban Water Management Plans (UWMPs)
        - For regions outside of the UWMP boundaries, population (by US Census tract) was multiplied by the average 2015 per-capita demands across all UWMP regions. For example, the average gallons per capita per day (GPCD) for Merced (276 GPCD), Atwater (300 GPCD), and Livingston (467 GPCD) were averaged to 348 GPCD for non-city regions.
    - Municipal pumping records
- Agricultural water demand is based on:
    - The IWFM Demand Calculator (IDC) in conjunction with historical remote sensing technology, Mapping Evapotranspiration at High Resolution and Internalized Calibration (METRIC)
- Surface water deliveries are based on data from:
    - Merced Irrigation District (MID)
    - Stevinson Water District (SWD)

- Merquin County Water District (MCWD)
- Turner Island Water District (TIWD)
- Lone Tree Mutual Water Company (LTMWC)

2.3.3.3 Projected Water Budget

The projected water budget is intended to assess the conditions of the Subbasin under estimates of projected water supply, agricultural demand and urban demand, including quantification of uncertainties in the projected water budget components. The Projected Conditions Baseline applies future land and water use conditions to the 50-year hydrologic period of WY 1969-2018. The first twenty-five years of the Projected Conditions Baseline is assumed to be the early implementation period of the GSP, and is represented using current conditions; years 2040 and beyond are represented using projected population (General Plans), land use (General Plans), and water demand and supply projections (AWMP/UWMPs).

The Projected Conditions Baseline includes the following conditions:

- Hydrologic period:
  - WY 1969-2018 (50-year hydrology)
- River flow is based on:
  - Merced River: MercedSIM releases from New Exchequer under FERC Final Environmental Impact Statement (FEIS) Requirements
  - San Joaquin River and Local Tributaries: historical records from USGS, CDEC, MID stream gauges, and the simulation of small-stream watersheds
- Land use is based on:
  - 2013 USDA CDL
  - 2015 Agricultural Water Management Plan projections
  - Direct communication on future projections with local agencies and farmers
  - MID Water Resources Management Plan – Summary Report (Draft)
- Urban water demand is based on:
  - Decadal population projections from 2015 Urban Water Management Plans (UWMPs)
    - For regions outside of the UWMP boundaries, population (by US Census tract) was increased at an average of the rate of growth projected for the UWMP regions, and then multiplied by the average projected per-capita demands across all UWMP regions.
  - Projected gallons per capita per day (GPCD) calculated from historical pumping records with conservation reductions according to the state's 20% mandated conservation reduction by 2020 (Senate Bill SB X7-7).
    - For regions outside of the UWMP boundaries, population was multiplied by the average projected per-capita demands across all UWMP regions.
- Agricultural water demand is based on:
  - The IDC in conjunction with historical remote sensing technology, METRIC

- Surface water deliveries are based on data from:
    - o 2040 estimates provided by Merced Irrigation District (MID)
    - o 2040 estimates provided by Stevinson Water District (SWD)
    - o 2040 estimates provided by Merquin County Water District (MCWD)
    - o 2040 estimates provided by Turner Island Water District (TIWD)
    - o 2040 estimates provided by Lone Tree Mutual Water Company (LTMWC)

Table 2-14: Summary of Groundwater Budget Assumptions

Water Budget Type	Historical	Current	Projected
Tool	MercedWRM	MercedWRM	MercedWRM
Scenario	Historical Simulation	Current Conditions Baseline	Projected Conditions Baseline
Hydrologic Years	WY 2006-2015	WY 1969-2018	WY 1969-2018
Level of Development	Historical	Current	General Plan buildout
Agricultural Demand	Historical Records	Current Conditions	Projected based on local AWMP data
Urban Demand	Historical Records	Current Conditions	Projected based on local UWMP data
Water Supplies	Historical Records	Current Conditions	Projected based on local reservoir operations model

2.3.4 Water Budget Estimates

The primary components of the stream and canal system are:

- Inflows:
    - o Stream inflows
    - o Stream gain from the groundwater system
    - o Surface runoff to the stream system
    - o Return flow to stream system
    - o Groundwater pumping to canal systems
- Outflows:
    - o San Joaquin River outflows
    - o Stream losses to groundwater
    - o Surface water deliveries
    - o Groundwater delivery via canal system
    - o Riparian uptake from streams

The primary components of the land surface system are:

- Inflows:
    - Precipitation
    - Surface water supplies
    - Groundwater supplies
    - Riparian uptake from streams
    - Inflow from the groundwater system
- Outflows:
    - Evaporation
    - Surface runoff to the stream system
    - Return flow to the stream system
    - Deep percolation

The primary components of the groundwater system are:

- Inflows:
    - Deep percolation
    - Stream losses to the groundwater system
    - Subsurface inflow
- Outflows:
    - Stream gain from the groundwater system
    - Groundwater production (pumping)
    - Subsurface outflow
- Change in groundwater storage

The estimated water budgets are provided below in Table 2-15 through Table 2-17 for the historical, current, projected, sustainable yield, and climate change water budgets. Background on the sustainable yield water budget analysis and assumptions is provided in Section 2.3.5 and for climate change water budget in Section 2.4.

Table 2-15: Average Annual Water Budget – Stream and Canal Systems, Merced Subbasin (AFY)

Component	Historical Condition Water Budget	Historical Condition Water Budget	Current Condition Water Budget	Projected Condition Water Budget	Sustainable Condition Water Budget
Hydrologic Period	WY 1996- 2015	WY 2006- 2015	WY 1969 - 2018	WY 1969 - 2018	WY 1969 - 2018
Inflows					
Stream Inflows	2,050,000	1,731,000	2,480,000	2,480,000	2,480,000
Merced River	980,000	892,000	981,000	981,000	981,000
Eastside Bypass	644,000	442,000	773,000	773,000	773,000
San Joaquin River	300,000	295,000	581,000	581,000	581,000
Chowchilla River	59,000	54,000	72,000	72,000	72,000
Local Tributaries[1]	67,000	48,000	74,000	74,000	74,000
Stream Gain from Groundwater	49,000	42,000	51,000	49,000	50,000
Merced Subbasin	30,000	26,000	31,000	29,000	29,000
Merced River	7,000	6,000	10,000	9,000	9,000
Eastside Bypass	1,000	1,000	1,000	1,000	1,000
San Joaquin River	9,000	8,000	7,000	7,000	7,000
Chowchilla River	1,000	2,000	2,000	2,000	2,000
Local Tributaries[1]	11,000	10,000	11,000	11,000	11,000
Other Subbasins[2]	20,000	17,000	21,000	20,000	20,000
Merced River	9,000	7,000	11,000	10,000	11,000
San Joaquin River	8,000	7,000	6,000	6,000	6,000
Chowchilla River	3,000	3,000	3,000	3,000	3,000
Runoff to the Stream System	322,000	244,000	355,000	357,000	353,000
Merced Subbasin	188,000	147,000	204,000	206,000	207,000
Other Subbasins[2]	133,000	97,000	151,000	151,000	147,000
Return Flow to Stream System	102,000	106,000	126,000	143,000	139,000
Merced Subbasin	75,000	74,000	63,000	79,000	77,000
Other Subbasins[2]	27,000	32,000	62,000	64,000	62,000
Groundwater Pumping to Canals	49,000	61,000	45,000	45,000	44,000
Other[3]	62,000	85,000	33,000	32,000	33,000
Total Inflow	2,634,000	2,270,000	3,090,000	3,105,000	3,099,000

Component	Historical Condition Water Budget	Historical Condition Water Budget	Current Condition Water Budget	Projected Condition Water Budget	Sustainable Condition Water Budget
Hydrologic Period	WY 1996- 2015	WY 2006- 2015	WY 1969 - 2018	WY 1969 - 2018	WY 1969 - 2018
Outflows					
San Joaquin River Outflows	1,946,000	1,603,000	2,341,000	2,360,000	2,350,000
Stream Losses to Groundwater	332,000	349,000	389,000	401,000	406,000
Merced Subbasin	260,000	272,000	312,000	318,000	321,000
Merced River	45,000	48,000	37,000	42,000	43,000
Eastside Bypass	28,000	29,000	39,000	44,000	47,000
San Joaquin River	23,000	25,000	34,000	36,000	36,000
Chowchilla River	2,000	2,000	2,000	2,000	2,000
Local Tributaries[1]	45,000	40,000	50,000	52,000	52,000
Canal Recharge	116,000	129,000	149,000	141,000	141,000
Other Subbasins[2]	72,000	77,000	77,000	83,000	84,000
Merced River	45,000	48,000	37,000	42,000	43,000
San Joaquin River	26,000	27,000	38,000	39,000	39,000
Chowchilla River	1,000	1,000	2,000	2,000	2,000
Surface Water Deliveries	282,000	232,000	290,000	274,000	275,000
Groundwater Delivery via Canals	49,000	61,000	45,000	45,000	44,000
Riparian Uptake from Streams	25,000	25,000	25,000	25,000	25,000
Merced Subbasin	18,000	16,000	15,000	14,000	13,000
Other Subbasins	6,000	9,000	10,000	11,000	11,000
Total Outflow	2,634,000	2,270,000	3,090,000	3,105,000	3,099,000

[1] Local Tributaries include Bear Creek, Black Rascal Creek, Deadman Creek, Duck Slough, Dutchman Creek, Mariposa Creek, Miles Creek, and Owens Creek. Additional smaller creeks exist~~,~~ but were not modeled due to minimal natural flows.

[2] Other Subbasins include the Turlock, Chowchilla, and Delta-Mendota Subbasins. As supporting data was not available, modeling inputs such as curve number and return flow fractions were assumed to be similar to those used in the Merced Subbasin.

[3] Other flows is a closure term that captures the stream and canal system including gains and losses not directly measured or simulated within IWFM. Some of these features include but may not be limited to direct precipitation, evaporation, unmeasured riparian diversions and return flow, temporary storage in local lakes and regulating reservoirs, and inflow discrepancies resulting from simulating impaired flows.

Table 2-16: Average Annual Water Budget – Land Surface System, Merced Subbasin (AFY)

Component	Historical Condition Water Budget	Historical Condition Water Budget	Current Condition Water Budget	Projected Condition Water Budget	Sustainable Condition Water Budget
Hydrologic Period	WY 1996- 2015	WY 2006- 2015	WY 1969 - 2018	WY 1969 - 2018	WY 1969 - 2018
Inflows[1]					
Precipitation	475,000	404,000	506,000	506,000	506,000
Total Surface Water Supply	282,000	232,000	290,000	274,000	275,000
Surface Water - Local	235,000	187,000	244,000	229,000	229,000
Surface Water - Riparian	47,000	45,000	46,000	46,000	46,000
Total Groundwater Supply	612,000	723,000	598,000	660,000	570,000
Agricultural - Agency	49,000	61,000	45,000	45,000	44,000
Agricultural - Private	484,000	580,000	490,000	526,000	442,000
Urban - Municipal	44,000	44,000	36,000	50,000	47,000
Urban - Domestic	34,000	37,000	28,000	39,000	37,000
Riparian Uptake from Streams	18,000	16,000	15,000	14,000	13,000
Inflow from Groundwater System	12,000	11,000	12,000	12,000	10,000
Total Inflow	1,399,000	1,386,000	1,420,000	1,466,000	1,374,000
Outflows[1]					
Evapotranspiration	821,000	847,000	834,000	853,000	798,000
Agricultural	641,000	683,000	661,000	682,000	613,000
Municipal and Domestic	41,000	42,000	31,000	37,000	43,000
Refuge, Native, and Riparian	139,000	122,000	142,000	134,000	142,000
Runoff to the Stream System	188,000	147,000	204,000	206,000	207,000
Return Flow to the Stream System	75,000	74,000	63,000	79,000	77,000
Agricultural	28,000	25,000	25,000	26,000	27,000
Municipal and Domestic	47,000	49,000	38,000	54,000	50,000
Deep Percolation	314,000	316,000	318,000	327,000	293,000
Precipitation	76,000	67,000	81,000	79,000	76,000
Surface Water	75,000	60,000	78,000	73,000	70,000
Surface Water - Local	62,000	49,000	65,000	61,000	59,000
Surface Water - Riparian	12,000	12,000	12,000	12,000	12,000
Groundwater	163,000	188,000	160,000	175,000	146,000
Agricultural - Agency	13,000	16,000	12,000	12,000	11,000
Agricultural - Private	129,000	151,000	131,000	139,000	113,000

Component	Historical Condition Water Budget	Historical Condition Water Budget	Current Condition Water Budget	Projected Condition Water Budget	Sustainable Condition Water Budget
Hydrologic Period	WY 1996- 2015	WY 2006- 2015	WY 1969 - 2018	WY 1969 - 2018	WY 1969 - 2018
Urban - Municipal	12,000	12,000	10,000	13,000	12,000
Urban - Private	9,000	10,000	7,000	10,000	9,000
Other[2]	1,000	1,000	1,000	1,000	0
Total Outflow	1,399,000	1,386,000	1,420,000	1,466,000	1,374,000

[1] Managed wetlands and habitat areas are recognized as additional areas that have unique water use characteristics, often using both delivered surface water and pumped groundwater. The values for applied surface water and applied groundwater, as well as deep percolation, for private wetland/habitat areas are aggregated into larger categories (e.g., "Local" or "Riparian" or "Agricultural") due to a lack of information for demands from these private wetlands/habitat areas. Demands were estimated based on DWR land use categorizations of native vegetation or agricultural land. Furthermore, the MercedWRM was calibrated to remote sensing of evapotranspiration data (METRIC) which is expected to result in a net accurate model result for consumptive use for these aggregated categories, even if the individual wetland components couldn't be tabulated separately. Surface water and groundwater supplied to the Merced Wildlife Refuge are known values and are included in the aggregated categories.

[2] Other flows is a closure term that captures the gains and losses due to land expansion and seasonal storage in the root-zone.

Table 2-17: Average Annual Water Budget – Groundwater System, Merced Subbasin (AFY)

Component	Historical Condition Water Budget	Historical Condition Water Budget	Current Condition Water Budget	Projected Condition Water Budget	Sustainable Condition Water Budget
Hydrologic Period	WY 1996- 2015	WY 2006- 2015	WY 1969 - 2018	WY 1969 - 2018	WY 1969 - 2018
Inflows					
Deep Percolation	314,000	316,000	318,000	327,000	293,000
Precipitation	76,000	67,000	81,000	79,000	76,000
Surface Water	75,000	60,000	78,000	73,000	70,000
Surface Water - Local	62,000	49,000	65,000	61,000	59,000
Surface Water - Riparian	12,000	12,000	12,000	12,000	12,000
Groundwater	163,000	188,000	160,000	175,000	146,000
Agricultural - Agency	13,000	16,000	12,000	12,000	11,000
Agricultural - Private	129,000	151,000	131,000	139,000	113,000
Urban - Municipal	12,000	12,000	10,000	13,000	12,000
Urban - Private	9,000	10,000	7,000	10,000	9,000
Stream Losses to Groundwater	260,000	272,000	312,000	318,000	321,000
Merced River	45,000	48,000	37,000	42,000	43,000
Eastside Bypass	28,000	29,000	39,000	44,000	47,000
San Joaquin River	23,000	25,000	34,000	36,000	36,000
Chowchilla River	2,000	2,000	2,000	2,000	2,000
Local Tributaries[1]	45,000	40,000	50,000	52,000	52,000
Canal Recharge	116,000	129,000	149,000	141,000	141,000
Subsurface Inflow	70,000	75,000	69,000	79,000	87,000
Total Inflow	643,000	663,000	700,000	723,000	702,000
Outflows					
Stream Gain from Groundwater	30,000	26,000	31,000	29,000	29,000
Merced River	7,000	6,000	10,000	9,000	9,000
Eastside Bypass	1,000	1,000	1,000	1,000	1,000
San Joaquin River	9,000	8,000	7,000	7,000	7,000
Chowchilla River	1,000	2,000	2,000	2,000	2,000
Local Tributaries	11,000	10,000	11,000	11,000	11,000
Groundwater Production	612,000	723,000	598,000	660,000	570,000
Agricultural - Agency	49,000	61,000	45,000	45,000	44,000
Agricultural - Private	484,000	580,000	490,000	526,000	442,000

Component	Historical Condition Water Budget	Historical Condition Water Budget	Current Condition Water Budget	Projected Condition Water Budget	Sustainable Condition Water Budget
Hydrologic Period	WY 1996- 2015	WY 2006- 2015	WY 1969 - 2018	WY 1969 - 2018	WY 1969 - 2018
Urban - Municipal	44,000	44,000	36,000	50,000	47,000
Urban - Private	34,000	37,000	28,000	39,000	37,000
Subsurface Outflow	96,000	92,000	110,000	103,000	93,000
Outflow to Land Surface System	12,000	11,000	12,000	12,000	10,000
Other[2]	2,000	3,000	1,000	1,000	-1,000
Total Outflow	752,000	855,000	752,000	805,000	702,000
Change in Storage	-109,000	-192,000	-52,000	-82,000	0

1 Local Tributaries include Bear Creek, Black Rascal Creek, Deadman Creek, Duck Slough, Dutchman Creek, Mariposa Creek, Miles Creek, and Owens Creek. Additional smaller creeks exist~~,~~ but were not modeled due to minimal natural flows.

3 Other flows within the groundwater system including temporary storage in the vadose zone, and root water uptake from the aquifer system.

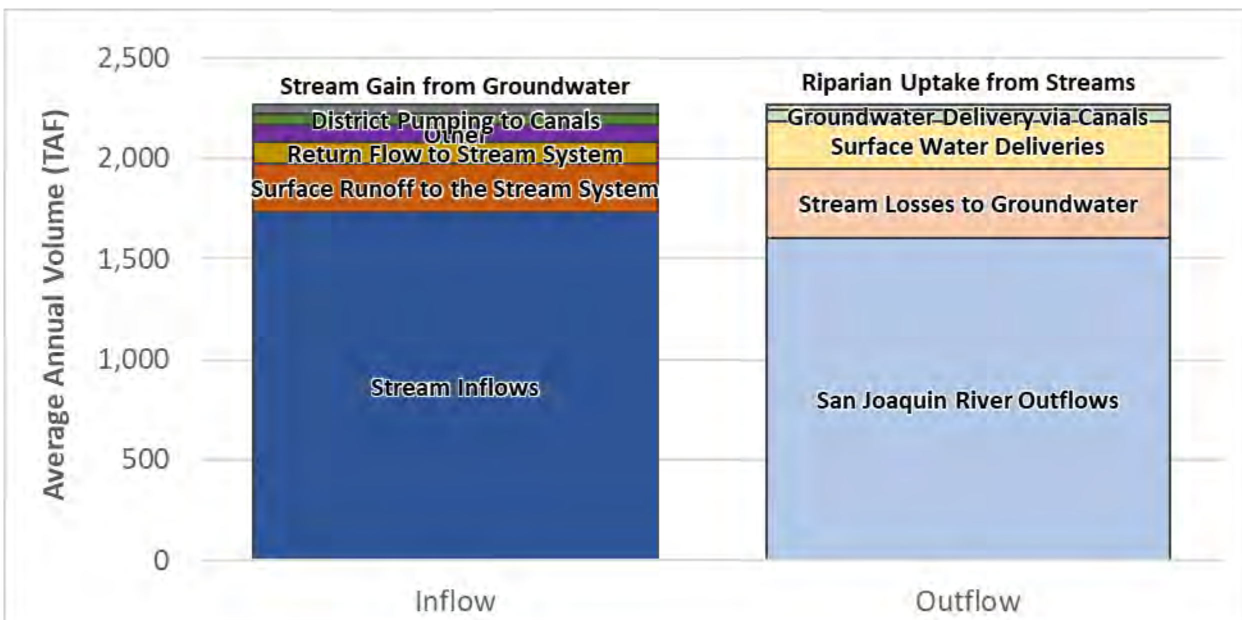
2.3.4.1 Historical Water Budget

The historical water budget is a quantitative evaluation of the historical surface and groundwater supply covering the 10-year period from WY 2006 to 2015. This period was selected as the representative hydrologic period as it reflects the most recent basin operations, particularly the annexation of the El Nido area into MID. The goal of the water budget analysis is to characterize the supply and demand, while summarizing the hydrologic flow within the Subbasin, including the movement of primary sources of water such as rainfall, irrigation, streamflow, and subsurface flows.

The existing stream and canal network supplies multiple water users and agencies in the Merced Groundwater Subbasin, including MID, SWD, MCWD, TIWD, and LTMWC. When analyzing the stream and canal system, it is important to note potentially significant effects resulting from the natural interactions and managed operations of adjacent groundwater subbasins. Because of this, the water budget in Table 2-14 and Figure 2-92 below attempt to not only quantify surface and canal system flows within the Merced Subbasin, but also estimate contributions from adjoining areas.

Average annual surface water inflows of 2,270,000 AF travel through or along the Subbasin boundary. The majority of these flows enter the Subbasin through inflows from natural streams and the Eastside Bypass (1,731,000 AF) and are supplemented by surface runoff (244,000 AF), return flow (106,000 AF), natural groundwater contributions (42,000 AF), and groundwater pumping from local water agencies (61,000 AF). Outflows of the Merced Subbasin stream and canal system total 2,270,000 AF and include downstream flow from the San Joaquin River (1,603,000 AF), stream losses to the aquifer system (349,000 AF), surface water deliveries (232,000 AF), groundwater delivered via local canal systems (61,000 AF), and riparian uptake (25,000 AF).

Figure 2-92: Historical Average Annual Water Budget – Stream and Canal Systems, Merced Subbasin



The land surface system of the Merced Subbasin, shown below in Figure 2-93, experiences 1,386,000 acre-feet of inflows each year, a combination of precipitation (404,000 AF), surface water deliveries (232,000 AF), groundwater pumping (723,000 AF), riparian uptake from the stream system (16,000 AF), and natural inflow from the aquifer system (11,000 AF). Equivalent to the inflows in magnitude, outflows from the land surface system are comprised of evapotranspiration (847,000 AF), surface runoff (147,000 AF) and return flow (74,000 AF) to the stream and canal system, and deep percolation (316,000 AF). Figure 2-94 shows the annual change in the land surface water budget through the simulation period. Note the surface water supply in this water budget is reflective of the volume available to the grower, and thus does not include operational spills, canal seepage, or canal evaporative losses.

Figure 2-93: Historical Average Annual Water Budget – Land Surface System, Merced Subbasin

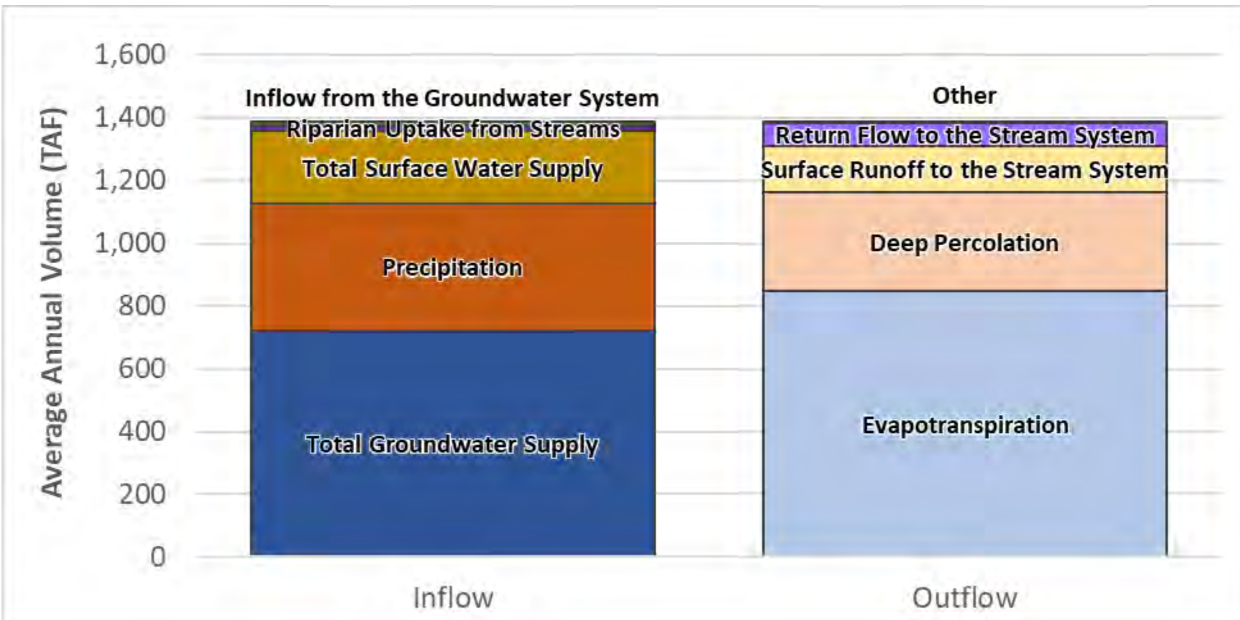
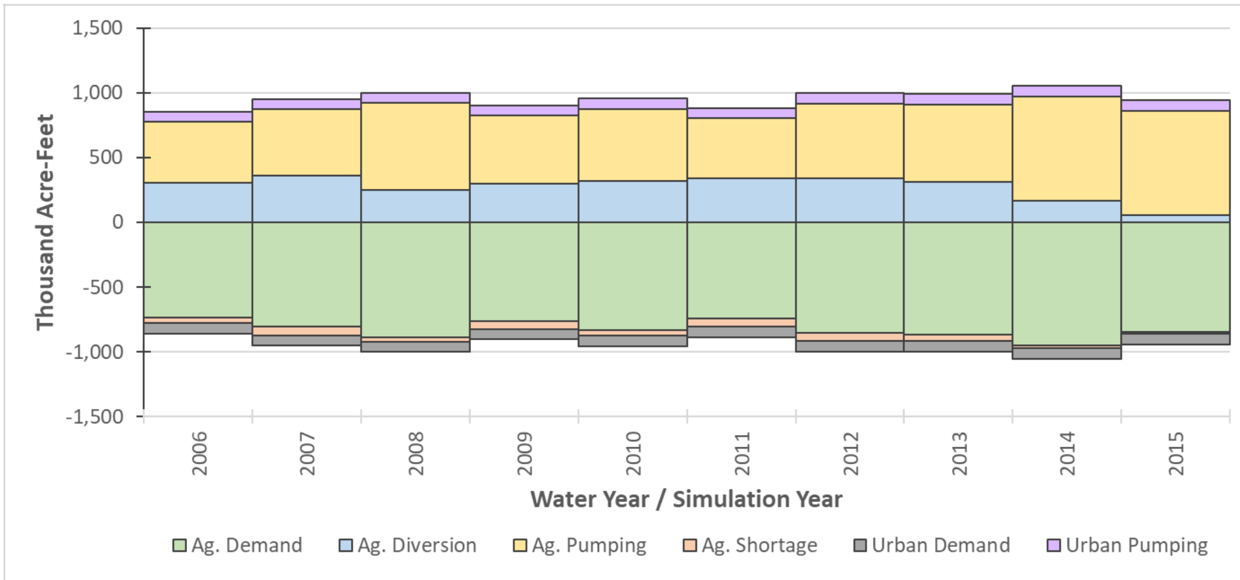


Figure 2-94: Historical Annual Water Budget – Land Surface System, Merced Subbasin



The groundwater system of the Merced Subbasin experiences over 663,000 acre-feet of inflows each year, of which 316,000 AF is surface infiltration.— There is also recharge from rivers, streams, and canals (272,000 AF), and subsurface inflows (75,000 AF) from the Sierra Nevada foothills and the neighboring subbasins of Turlock, Delta-Mendota, and Chowchilla.

On average, the inflows exceed outflows. The largest outflow of the groundwater system is pumping (723,000 AF), followed by subsurface flow into neighboring subbasins (92,000 AF) and losses due to local stream-groundwater interaction (26,000 AF).

The greater outflows than inflows leads to an average annual decrease in groundwater storage of 192,000 acre-feet. Figure 2-95 summarizes the average historical groundwater inflows and outflows in the Merced Subbasin. Figure 2-96 shows the annual change in the groundwater budget components, as well as cumulative storage, through the 1996 to 2015 period.

Figure 2-95: Historical Average Annual Water Budget – Groundwater System, Merced Subbasin

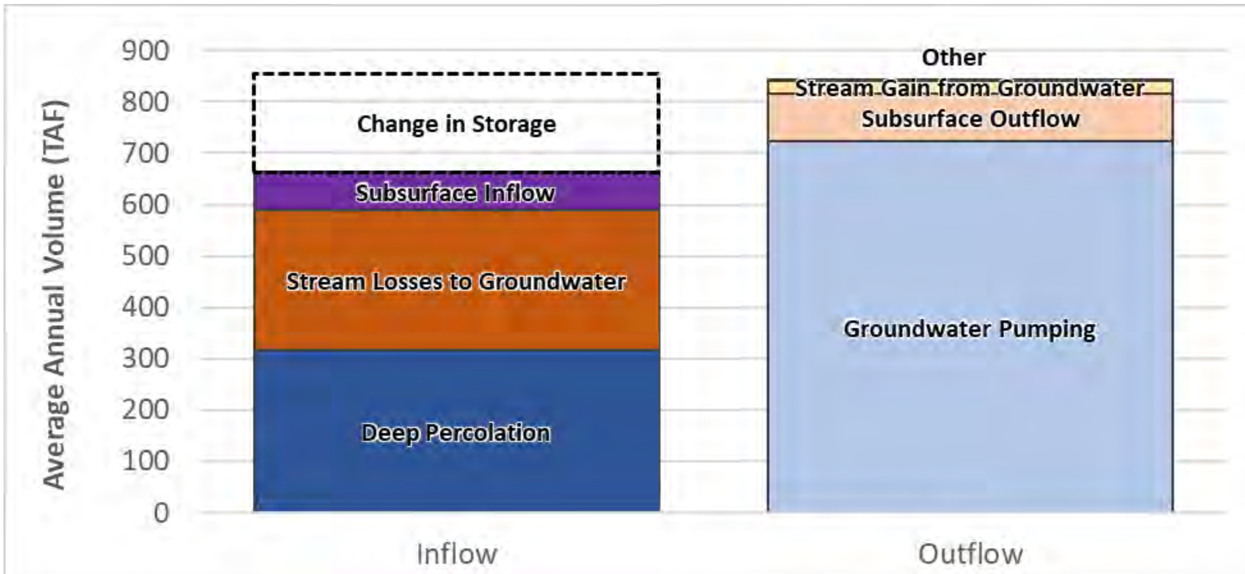
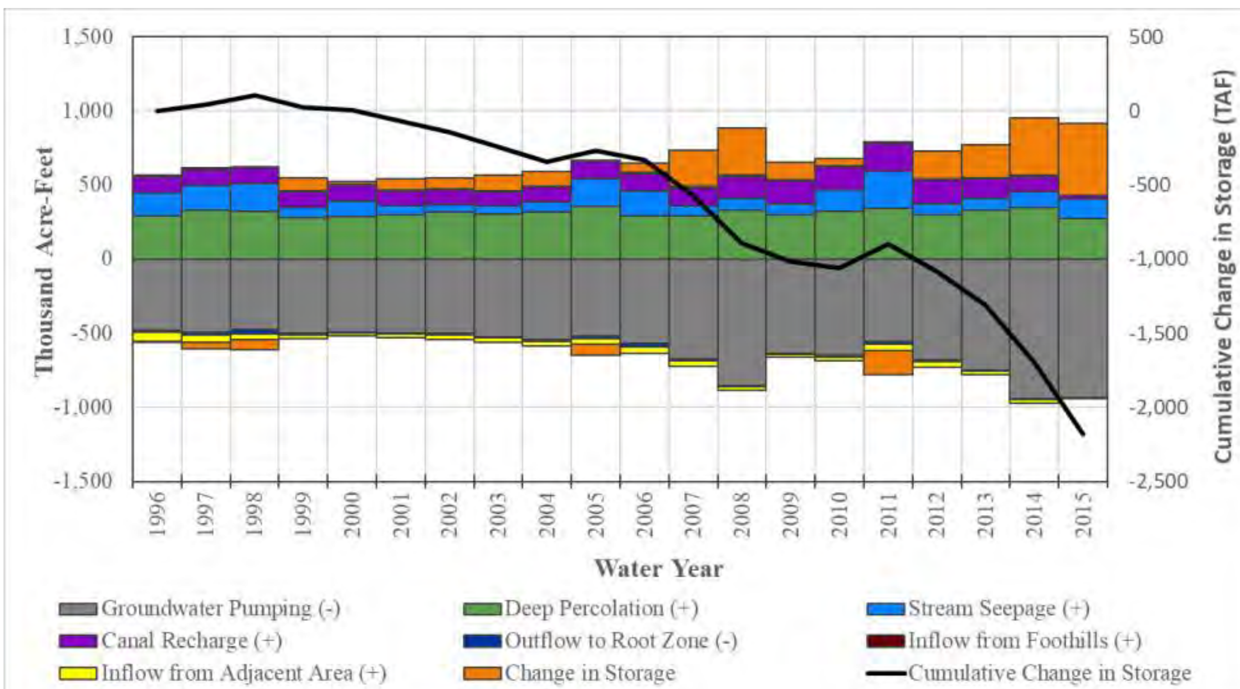


Figure 2-96: Historical Annual Water Budget – Groundwater System, Merced Subbasin



The historical inflows and outflows change by water year type. In wet years, precipitation meets more of the water demand, and greater availability of surface water reduces the need for groundwater. However, in dry years, more groundwater is pumped to meet the agricultural demand not met by surface water or precipitation. This leads to an increase in groundwater storage in wet years and a decrease in dry years. While demand of applied water increases in dry years due to lack of precipitation, surface water supply remains consistent in most non-critical years. Table 2-18 breaks down the average historical water supply and demand by water year type.

Table 2-18: Average Annual Values for Key Components of the Historical Water Budget by Year Type (AFY)

Component	Water Year Type (San Joaquin River Index)					
	Wet	Above Normal	Below Normal	Dry	Critical	10-Year Average WY 2005-15
Water Demand						
Agricultural Demand	790,000	873,000	824,000	917,000	907,000	873,000
Urban Demand	81,000	82,000	80,000	83,000	82,000	82,000
Total Demand	871,000	955,000	904,000	1,000,000	990,000	955,000
Water Supply						
Total Surface Water Supply	309,000	306,000	269,000	319,000	161,000	232,000
Local	263,000	262,000	217,000	266,000	118,000	186,000
Riparian	46,000	44,000	52,000	53,000	42,000	45,000
Total Groundwater Supply	562,000	649,000	634,000	681,000	829,000	723,000
Agricultural - Agency	29,000	32,000	46,000	41,000	87,000	61,000
Agricultural - Private	452,000	535,000	509,000	557,000	659,000	580,000
Urban - Municipal	44,000	45,000	44,000	45,000	45,000	44,000
Urban - Domestic	37,000	37,000	36,000	38,000	37,000	37,000
Total Supply	871,000	955,000	904,000	1,000,000	990,000	955,000
Change in GW Storage	49,000	-46,000	-121,000	-185,000	-333,000	-192,000

2.3.4.2 Current Water Budget

The current water budget quantifies inflows to and outflows from the basin using 50-years of hydrology in conjunction with 2015 water supply, demand, and land use information. These conditions are incorporated in the Current Conditions Baseline simulation of the MercedWRM.

The stream and canal system in the Current Conditions Baseline supplies agricultural users with an average of 290,000 ~~-~~AF in surface water diversions from local streams with an additional 45,000 AF of pumping by local surface water purveyors supplementing their conveyance system. In addition to these volumes, on average, 2,341,000 AFY leaves the Subbasin's surface water features as downstream flow in the San Joaquin River, 389,000 AFY is lost to the groundwater system, and 25,000 AFY is used by riparian vegetation as direct-uptake.

Inflows to the stream and canal system include 2,480,000 AFY of local stream inflow, 355,000 AFY of surface runoff, 126,000 of return flow, 51,000 AFY of groundwater contributions, 45,000 AFY of district pumping, and 33,000 AFY of uncategorized flows. Figure 2-97 summarizes the average annual inflows and outflow of the Current Conditions Baseline in the Merced Subbasin surface water network.

Figure 2-97: Current Conditions Average Annual Water Budget – Stream and Canal Systems, Merced Subbasin

Based on pre-drought cropping patterns and 2015 urban buildout, over the simulation period, the Current Conditions land surface water budget simulates annual inflows of 1,420,000 AF, including 506,000 AF of precipitation, 880,000 -AF of applied water (290,000 AF of surface water and 598,000 AF of groundwater), 15,000 AF of riparian uptake from the stream system, and 12,000 AF of inflow from the groundwater system. The 1,420,000 of outflows include evapotranspiration (834,000 AF), surface runoff to the stream system (204,000 AF), return flow to the stream system (63,000 AF), deep percolation (318,000 AF), and other flows (1,000 AF). Figure 2-98 summarizes the average annual current condition inflows and outflows in the land surface budget for the Merced Subbasin. Figure 2-99 shows the annual change in the land surface water budget components through the simulation period.

Figure 2-98: Current Conditions Average Annual Water Budget – Land Surface System, Merced Subbasin

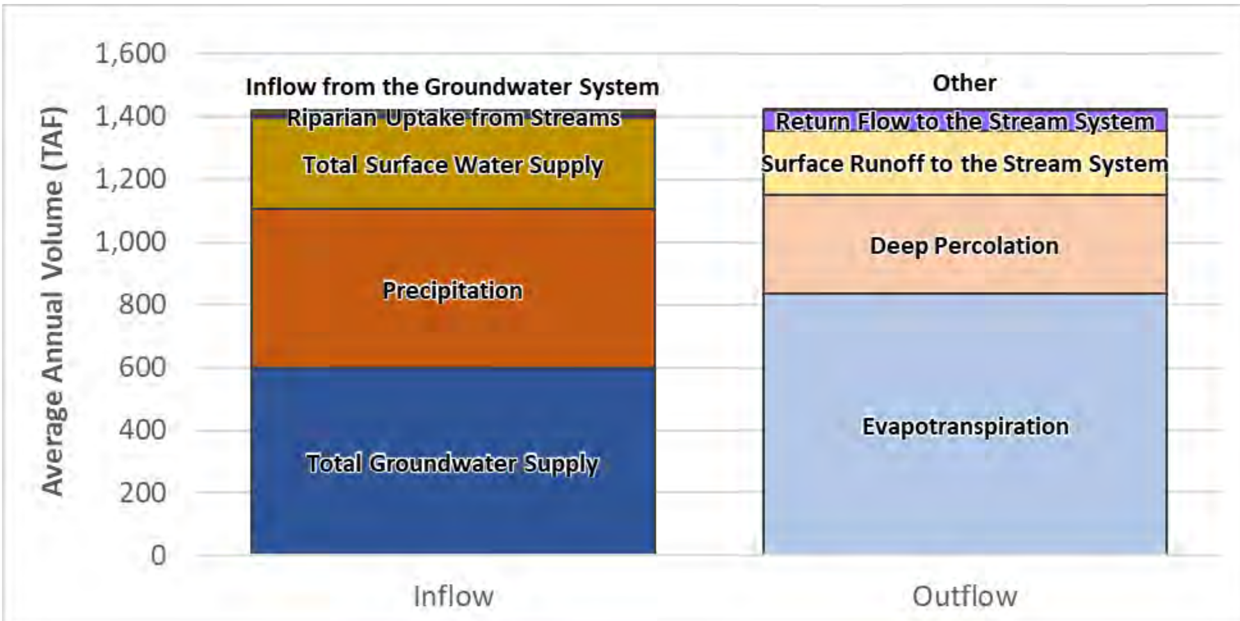
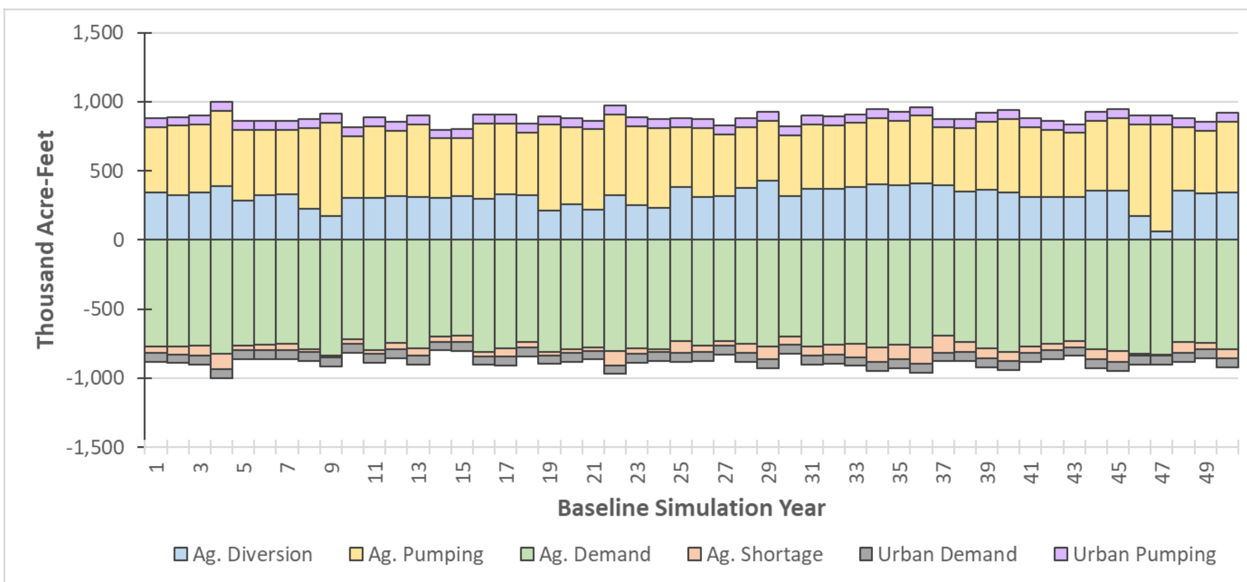


Figure 2-99: Current Conditions Annual Water Budget – Land Surface System, Merced Subbasin



The Current Conditions Baseline simulates 50 years of hydrology whose initial conditions are reflective of the start of WY 2016. Over the simulation period, the Current Conditions groundwater water budget simulates annual inflows of 700,000 AF, including 318,000 AF of deep percolation, 312,000 AF of stream and canal seepage, and subsurface inflows totaling 69,000 AF.

Similar to the historical water budget, average aquifer outflows exceed the inflows under current conditions. Groundwater production (598,000 AF) remains the largest point of aquifer discharge, with subsurface outflow

(110,000 AF), losses to the local stream system (31,000 AF), and other flows (13,000 AF) bringing the total system outflows to 752,000 acre-feet annually.

The Merced Subbasin current conditions groundwater budget has greater outflows than inflows, resulting in an average annual deficit in groundwater storage of 52,000 acre-feet. Figure 2-100 summarizes the average current conditions groundwater inflows and outflows in the Merced Subbasin. Figure 2-101 shows the annual change in the groundwater budget components, as well as cumulative storage, through the 50-year simulation period.

Figure 2-100: Current Conditions Average Annual Water Budget – Groundwater System, Merced Subbasin

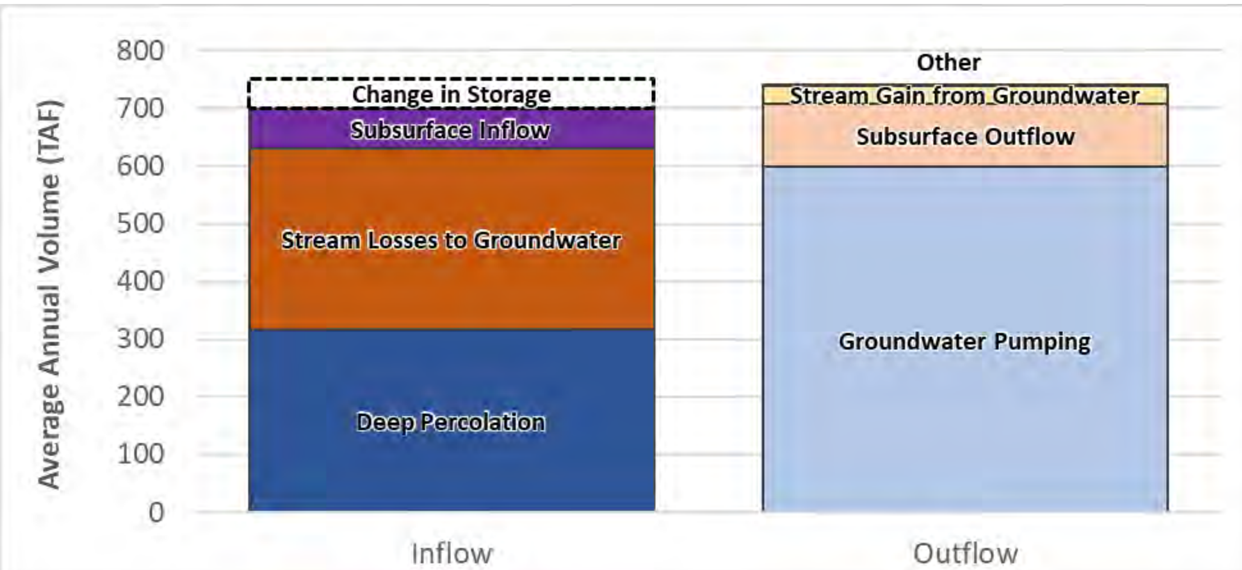
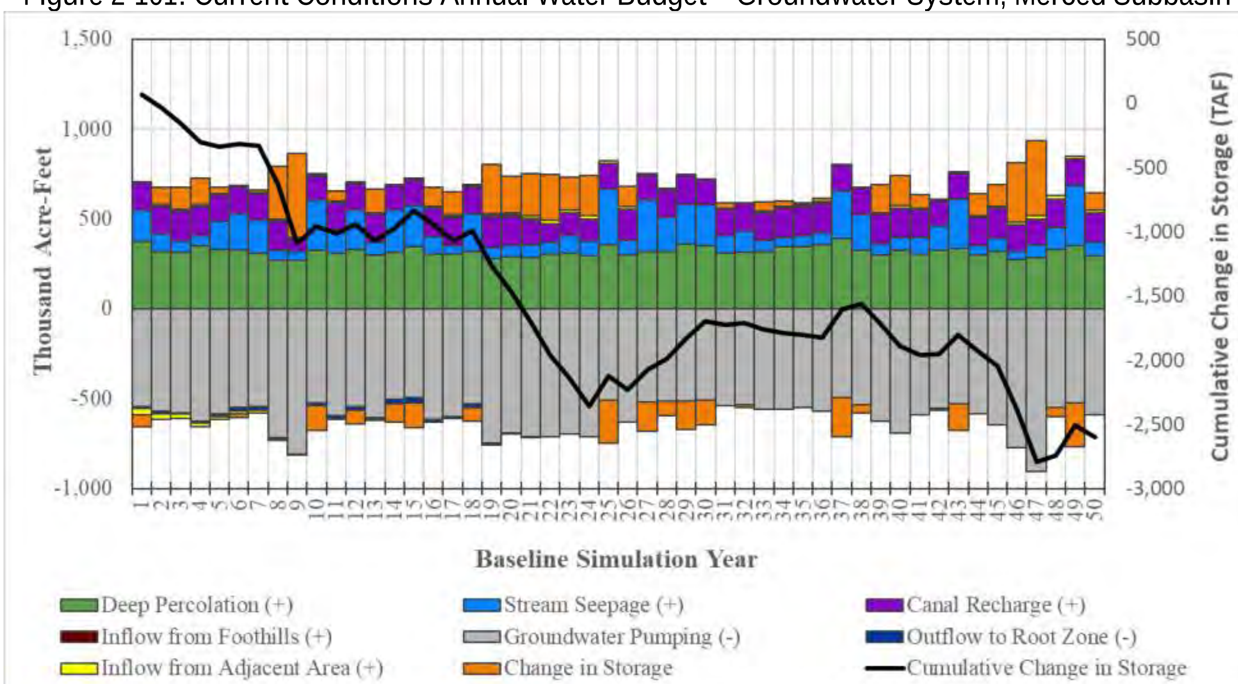


Figure 2-101: Current Conditions Annual Water Budget – Groundwater System, Merced Subbasin



2.3.4.3 Projected Water Budget

The projected water budget is used to estimate future baseline conditions of supply, demand, and aquifer response to plan implementation. The Projected Conditions Baseline simulation of the MercedWRM is used to evaluate the projected conditions of the water budget using hydrology from 1969 to 2018. As previously discussed, this represents a hydrologic period of at least 50 years and has average precipitation similar to the long-term average.

Development of the projected water demand is based on the population growth trends reported in the 2015 UWMPs, and land use, evapotranspiration, and crop coefficient information from the 2015 AWMP. This data has been adjusted based on projected growth identified in general, agricultural, and urban water management plans to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate. Similarly, projected surface water supplies were determined through analysis of MercedSIM, Merced Irrigation District's reservoir and surface water operations model, and accounts for the FERC's operations schedule under their FEIS for the 2018 licensing of the Lake McClure Reservoir.

Average annual surface water inflows to the Merced Subbasin's stream and canal system total an average of 3,105,000 AF. Under projected conditions, local water district pumping will supplement surface water supplies with 45,000 AF of groundwater production. Of these volumes, it is anticipated that 319,000 AF will be distributed to local growers to meet agricultural demand (274,000 AF of surface water deliveries and 45,000 AF of groundwater deliveries) and the remaining amount will leave the system in the form of San Joaquin River outflow (2,360,000 AF), aquifer recharge (401,000 AF), or riparian uptake (25,000 AF). Figure 2-102 summarizes the average projected inflows and outflows in the Merced Subbasin surface water network.

Figure 2-102: Projected Conditions Average Annual Water Budget – Stream and Canal Systems, Merced Subbasin

The land surface water budget for the Projected Conditions Baseline has annual average inflows and outflows of 1,466,000 AF. Inflows comprise precipitation (506,000 AF), applied surface water (274,000 AF), applied groundwater (660,000 AF), riparian uptake from streams (14,000 AF), and inflow from the aquifer system (12,000 AF). The balance of this is the summation of average annual evapotranspiration (853,000 AF), surface runoff (206,000 AF) and return flow (79,000 AF) to the stream system, deep percolation (327,000 AF), and other flows (1,000 AF). A summary of these flows can be seen below in Figure 2-103. Figure 2-104 shows the annual change in the land surface water budget components through the simulation period.

Figure 2-103: Projected Conditions Average Annual Water Budget – Land Surface System, Merced Subbasin

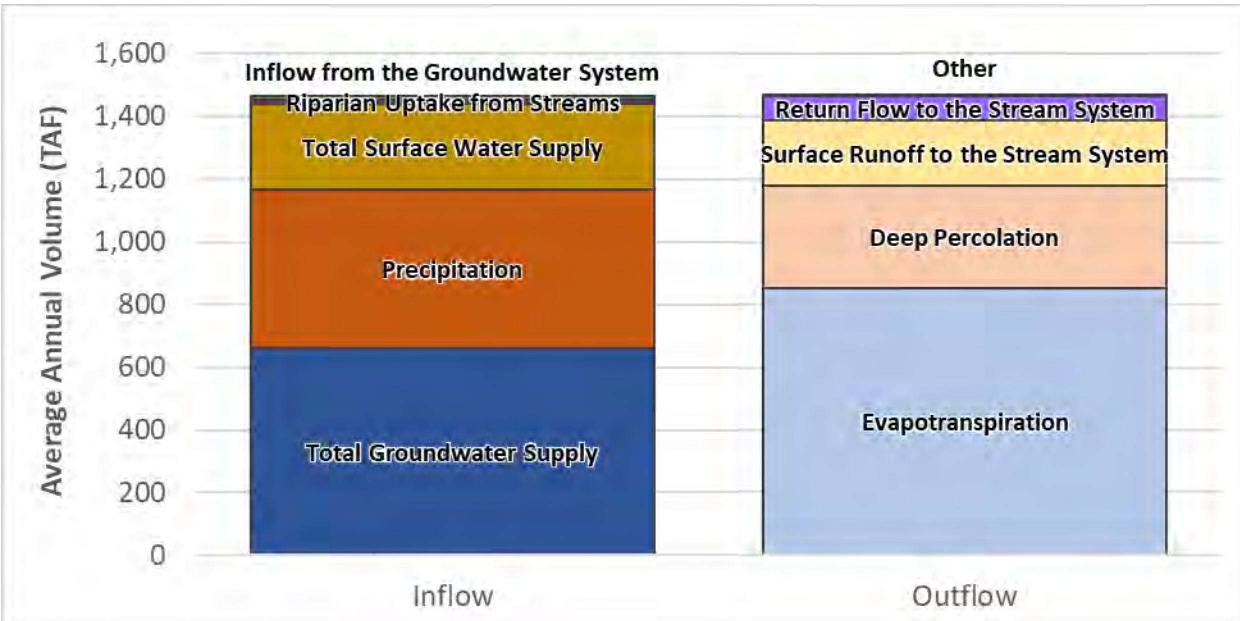


Figure 2-104: Projected Conditions Annual Water Budget – Land Surface System, Merced Subbasin

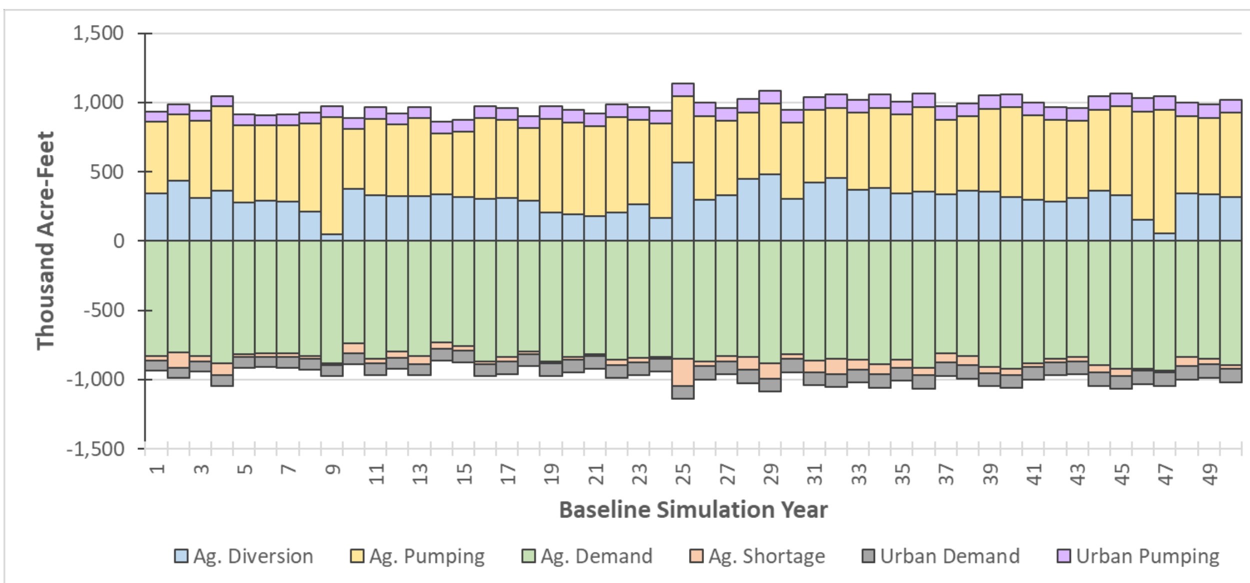


Figure 2-105 below shows how anticipated growth in the Projected Conditions Baseline is reflected in increases to groundwater production (660,000 AF) across the Subbasin. Subsurface outflow to neighboring subbasins (103,000 AF), stream gain from groundwater (29,000 AF), and other flows (13,000 AF) bring the total Subbasin discharges to 805,000 AFY.

Under projected conditions, the groundwater system of the Merced Subbasin experiences an average of 723,000 AF of inflows each year, of which 327,000 AF is deep percolation. There is also recharge from rivers, streams, and canals (318,000 AF), and subsurface inflows (79,000 AF) from the Sierra Nevada foothills and the neighboring subbasins of Turlock, Delta-Mendota, and Chowchilla.

The Projected Conditions Baseline has greater outflows than inflows, resulting in an average annual deficit in groundwater storage of 82,000 AF. Figure 2-105 summarizes the average projected groundwater inflows and outflows in the Merced Subbasin. Figure 2-106 shows the annual change in the groundwater budget, as well as cumulative storage, through the simulation period.

Figure 2-105: Projected Conditions Average Annual Water Budget – Groundwater System, Merced Subbasin

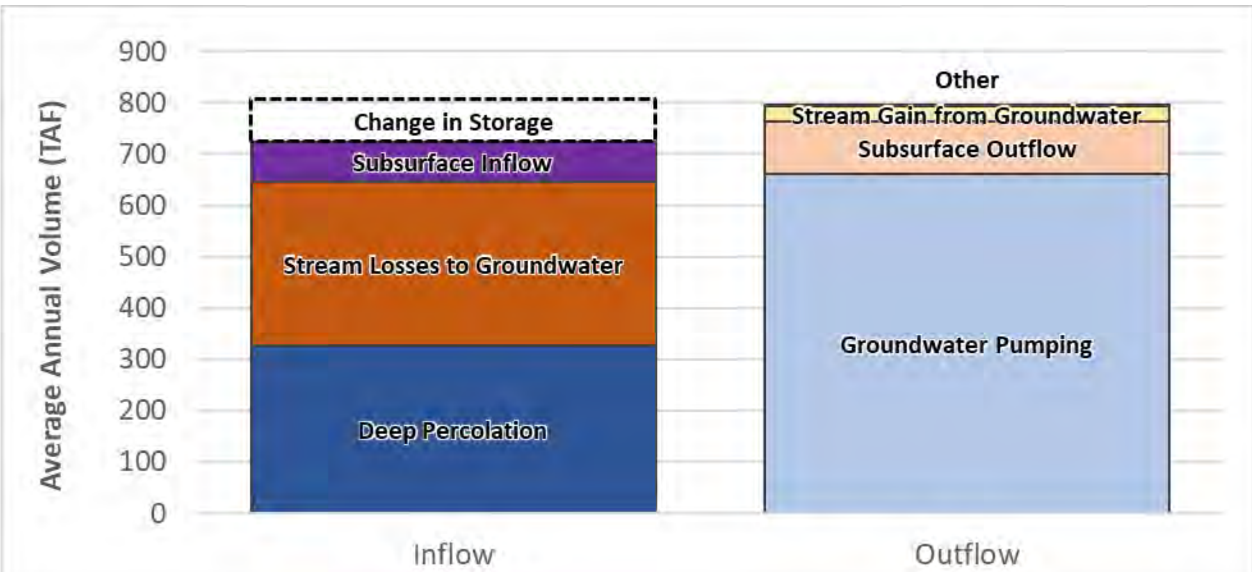
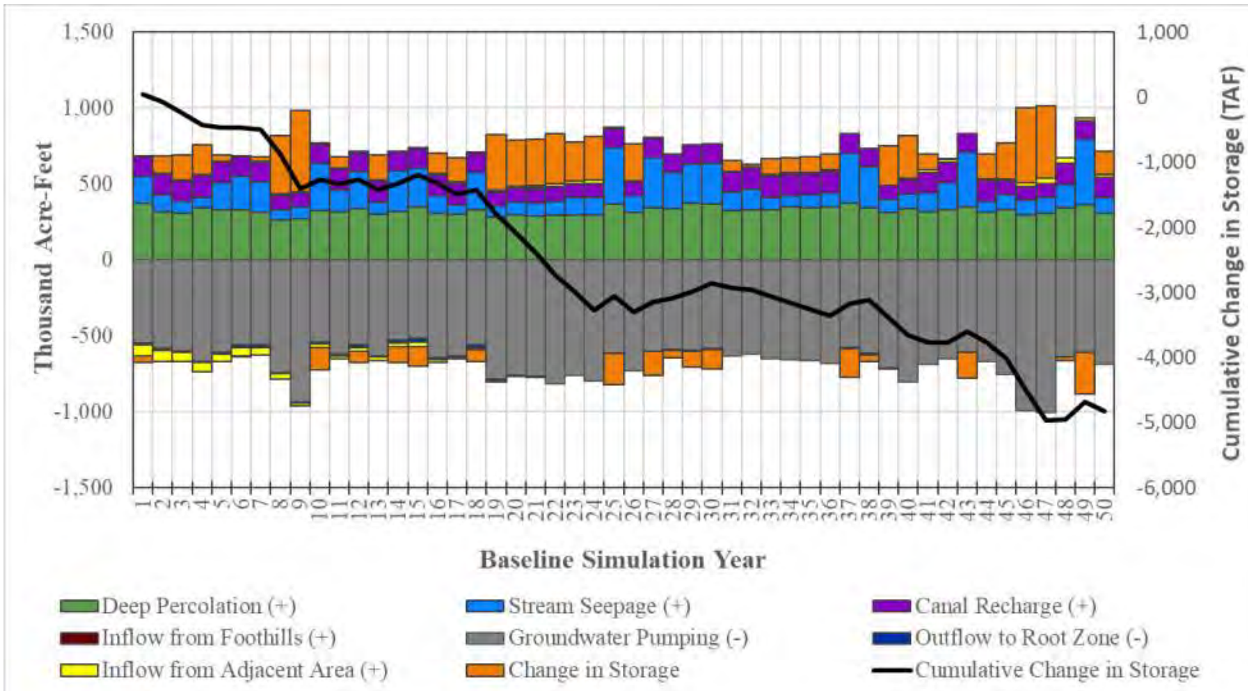


Figure 2-106: Projected Conditions Annual Water Budget – Groundwater System, Merced Subbasin



2.3.5 Sustainable Yield Estimate

Sustainable yield is defined for SGMA purposes as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result." (CWC §10721(w)). Sustainable yield for the Merced Subbasin was calculated through development of a MercedWRM scenario in which the long-term (50-year) change in Subbasin storage is zero. In order to account for the challenges of implementation, it was assumed the projected operations will remain consistent for a 25-year period and groundwater levels may continue to decline until 2040, at which point the basin will operate sustainably. The sustainable yield water budget is based on the Projected Conditions Baseline and is modified by lowering groundwater production through reduced agricultural and urban demand across the model domain.

The Sustainable Yield Scenario varies from the Projected Conditions Baseline in the following ways:

- Planning Period: WYs 2041-2090 (1969-2018 hydrologic period)
- Agricultural Water Demand: Reductions in agricultural water demand are implemented through a reduction in agricultural land use by globally reducing the projected 2040 cropped acreage at the element level.
- Urban Water Demand: Reductions in urban water use are implemented through a percent reduction in the per-capita water use equal to the percent reduction in agricultural use.
- The sustainable yield water budget is intended to estimate future conditions of supply, demand, and aquifer response to implementation of sustainable conditions in the Subbasin. The sustainable yield water budget is estimated using the sustainable conditions scenario for MercedWRM. In order to achieve a net-zero change in groundwater storage over a 50-year planning period, agricultural and urban groundwater demand in the Merced Subbasin would need to be reduced by approximately ten percent, absent implementation of any new supply-side projects. The methodology for reducing basinwide pumping to estimate sustainable yield is

developed solely for the purpose of estimating basinwide sustainable yield and is not intended to prescribe or describe how pumping would actually be reduced in the basin during GSP implementation to achieve sustainability. The implementation of pumping reductions to achieve sustainability will be done by the GSAs and take into account multiple considerations including water rights, beneficial uses, needs, human right to water, etc. The status of plans for implementing management actions related to pumping reductions is further discussed in Chapter 6 - Projects and Management Actions to Achieve Sustainability Goal.

Because of the reduction of agricultural supply and demand, the sustainable groundwater management condition scenario simulates reductions in evapotranspiration (reduced to 798,000 AF) and groundwater production (reduced to 570,000 AF) across the Subbasin. Subsurface outflow to neighboring subbasins (93,000 AF), stream discharge (29,000 AF), and other flows (10,000 AF) bring the total Subbasin discharges to 702,000 AFY.

Under sustainable groundwater management conditions, the groundwater system of the Merced Subbasin maintains inflows equal to its outflow volume of 702,000 AF each year, of which 293,000 AF is deep percolation. There is also recharge from rivers, streams, and canals (321,000 AF), and subsurface inflows (87,000 AF) from the Sierra Nevada foothills and the neighboring subbasins of Turlock, Delta-Mendota, and Chowchilla.

The sustainable groundwater management scenario results in groundwater outflows equal to groundwater inflows, bringing the long term (50-year) average change in groundwater storage to a net-zero. Figure 2-107 summarizes the average projected groundwater inflows and outflows in the Merced Subbasin. Based on this analysis, the sustainable yield of the basin is approximately 570,000 AFY. Figure 2-108 shows the annual change in the groundwater budget components, as well as cumulative storage, through the simulation period.

Under the July 2022 update to this GSP, the minimum thresholds for groundwater levels were revised (made shallower). To avoid undesirable results under the revised minimum thresholds, the GSAs have identified a need for an estimated 175,000 AFY of additional recharge or reduced groundwater pumping. The reduced volume of pumping, however, is not the revised sustainable yield, as the large volume is necessary to sufficiently raise groundwater levels prior to 2040. Once desired groundwater levels are achieved, pumping will likely be able to be increased somewhat to achieve stable, sustainable groundwater levels. This volume of pumping, which avoids undesirable results for groundwater levels and other sustainability indicators, would be the revised sustainable yield. The sustainable yield will be revised as part of the GSAs' 2025 GSP evaluation, with the GSAs focused in the near-term on the more aggressive estimated 175,000 AFY target for additional recharge or reduced groundwater pumping.

Figure 2-107: Groundwater Water Budget under Sustainable Groundwater Management Conditions Long-Term (50-Year) Average Annual

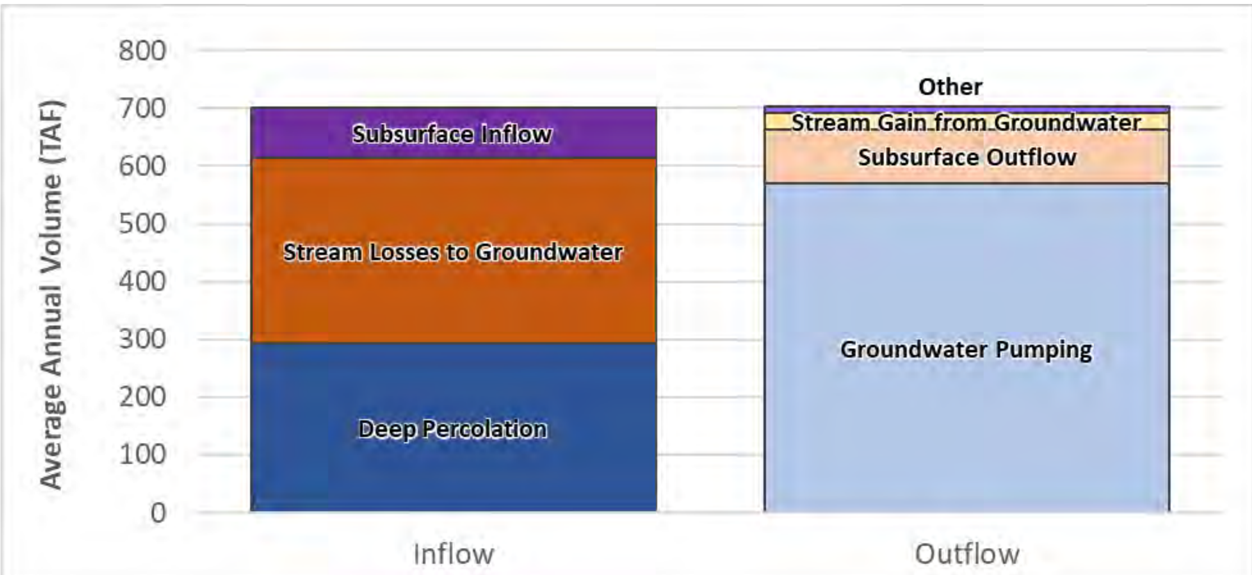
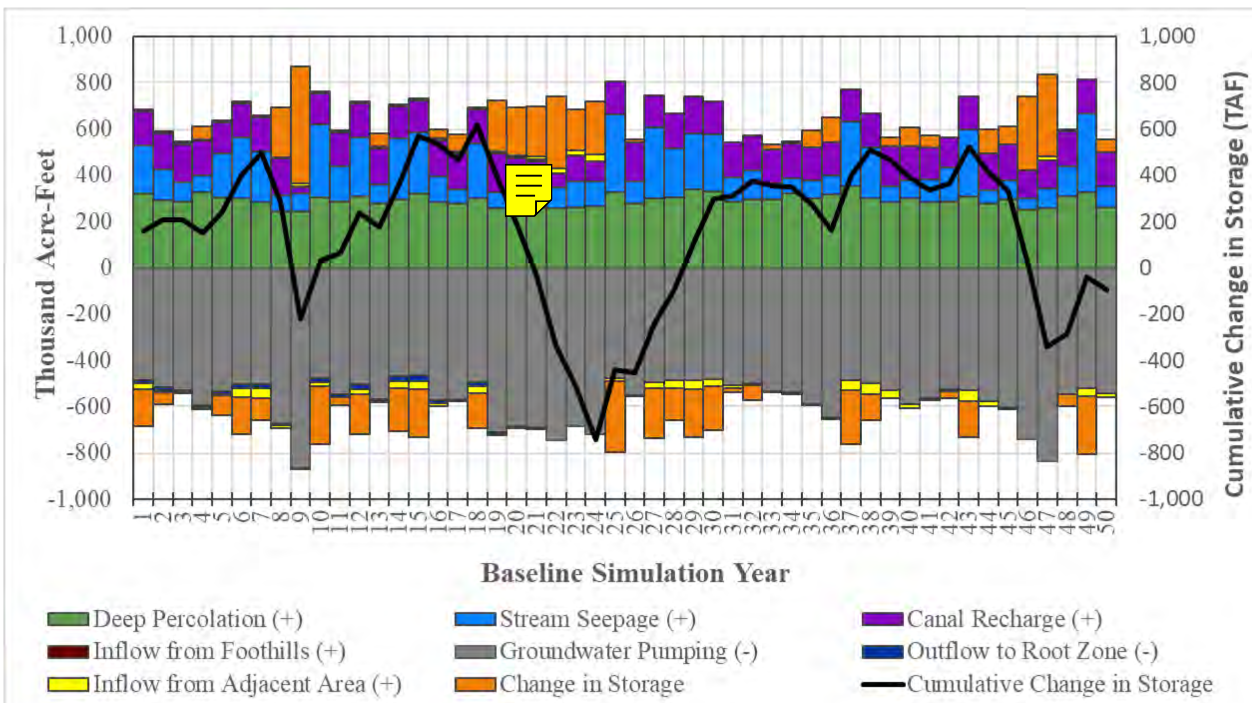


Figure 2-108: Groundwater Water Budget under Sustainable Groundwater Management Conditions Long-Term (50-Year) Annual



2.4 CLIMATE CHANGE ANALYSIS

2.4.1 Regulatory Background

SGMA requires taking into consideration uncertainties associated with climate change in the development of GSPs.

Consistent with §354.18(d)(3) and §354.18(e) of the SGMA Regulations, analyses for the Merced GSP evaluated the projected water budget with and without climate change conditions.

2.4.2 DWR Guidance

Climate change analysis is an area of continued evolution in terms of methods, tools, forecasted datasets, and the predictions of greenhouse gas concentrations in the atmosphere. The approach developed for this GSP is based on the methodology in DWR's guidance document (DWR, 2018a). Similarly, the "best available information" related to climate change in the Merced Subbasin was deemed to be the information provided by DWR combined with basin-specific modeling tools. The following resources from DWR were used in the climate change analysis:

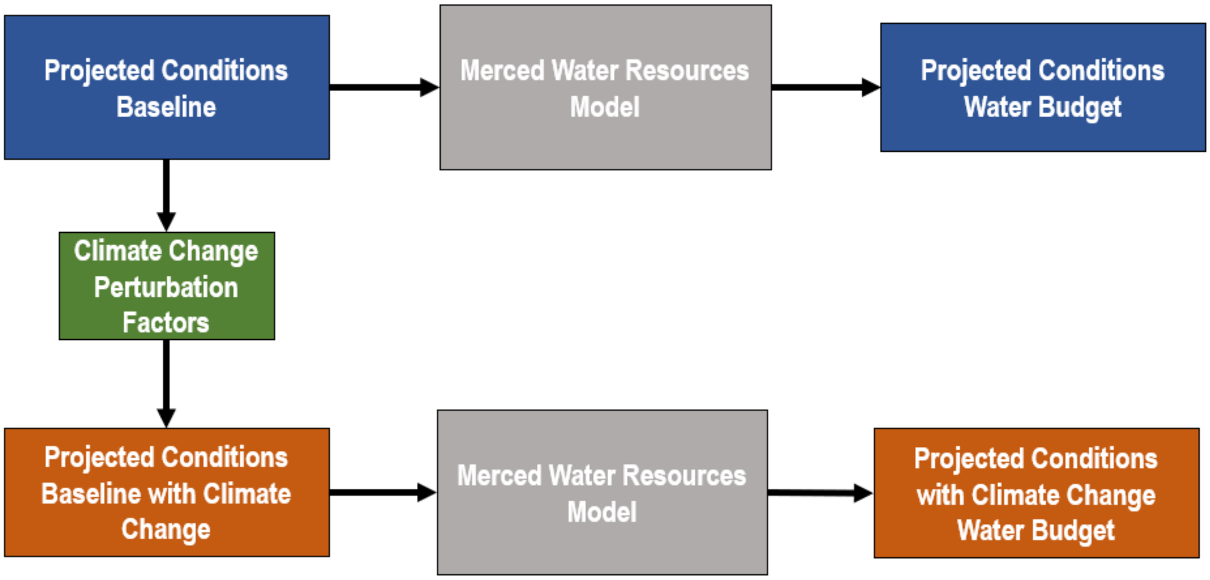
- SGMA Data Viewer
- Guidance for Climate Change Data Use During Sustainability Plan Development and Appendices (Guidance Document)
- Water Budget BMP
- Desktop IWFM Tools

SGMA Data Viewer provides the location for which the climate change forecasts datasets[7] were downloaded for the Merced Subbasin (DWR, 2019). The guidance document details the approach, development, applications, and limitations of the datasets available from the SGMA Data Viewer (DWR, 2018a). The Water Budget BMP describes in greater detail how DWR recommends projected water budgets be computed (DWR, Best Management Practices for the Sustainable Management of Groundwater Water Budget, 2016a). The Desktop IWFM Tools are available to calculate the projected precipitation and evapotranspiration inputs under climate change conditions (DWR, 2018b).

The methods suggested by DWR in the above resources were used, with modifications where needed, to ensure the resolution would be reasonable for the Merced Subbasin and align with the assumptions of the Merced Water Resources Model (MercedWRM). Figure 2-109 shows the overall process developed for the Merced GSP consistent with the Climate Change Resource Guide (DWR, 2018a) and describes workflow beginning with baseline projected conditions to perturbed 2070 conditions for the projected model run.

[7] In the industry, climate change impacted variable forecasts are sometimes referred to as "data" and their collections are called "datasets." Calling forecasted variable values "data" can be misleading so this document tries to be explicit about when we are referring to data (historical data) vs. forecasts or model outputs.

Figure 2-109: Merced GSP Climate Change Analysis Process



The process described in Figure 2-109 of developing a projected conditions water budget with and without climate change was discussed with DWR staff[8] and is consistent with the regulations. Further, it enables the analysis to account for variability in demand and supply separate from climate change uncertainty.

Table 2-19 below summarizes the forecasted variable datasets provided by DWR that were used to carry out the climate change analysis (DWR, 2019). The "VIC" model (Variable Infiltration Capacity) referred to in Table 2-19 is the fully mechanistic hydrologic model used by DWR to derive hydrographs under baseline and climate change conditions. "Impaired" streamflow referred to in Table 2-19 is DWR's terminology for streams whose flow is impacted by ongoing water operations, such as diversions, deliveries, and storage. Flows on these streams are simulated using the CalSim II model. Conversely, "unimpaired" streamflow refers to the natural streamflow produced by a watershed, not impacted by ongoing operations. All time series shown in Table 2-19 use a monthly timestep. Section 2.4.3 includes further description of the model and other tools and datasets.

Table 2-19: DWR-Provided Climate Change Datasets

Input Variable	DWR Provided Dataset
Unimpaired Streamflow	Combined VIC model runoff and baseflow to generate change factors, provided by HUC 8 watershed geometry
Impaired Streamflow (Ongoing Operations)	CalSim II time series outputs in .csv format
Precipitation	VIC model-generated GIS grid with associated change factor time series for each cell
Reference ET	VIC model-generated GIS grid with associated change factor time series for each cell

2.4.3 Climate Change Methodology

[8] Pers. Comm. 4/4/2019 meeting with DWR staff.

For climate change impacts on groundwater, accepted methods are based on the assessment of impacts on the individual water resource system elements that directly link to groundwater. These elements include precipitation, streamflow, evapotranspiration and, for coastal aquifers, sea level rise as a boundary condition. For the Merced Subbasin, sea level is not relevant.

The method for perturbing the streamflow, precipitation, and evapotranspiration input files is described in the following sections. The late-century, 2070 central tendency climate scenario was evaluated in this analysis, consistent with DWR guidance (DWR, 2018a).

DWR combined 10 global climate models (GCMs) for two different representative climate pathways (RCPs) to generate the central tendency scenarios in the datasets used in this analysis. The “local analogs” method (LOCA) was used to downscale these 20 different climate projections to a scale usable for California (DWR, 2018a). DWR provides datasets for two future climate periods: 2030 and 2070. For 2030, there is one set of central tendency datasets available. For 2070, DWR has provided one central tendency scenario and two extreme scenarios: one that is drier with extreme warming and one that is wetter with moderate warming.

The 2070 central tendency among these projections serves to assess impacts of climate change over the long-term planning and implementation period. For this reason, it was chosen as the most appropriate scenario to assess in the Merced GSP.

2.4.3.1 Streamflow under Climate Change

Hydrological forecasts for streamflow under various climate change scenarios are available from DWR as either a flow-based timeseries or a series of perturbation factors applicable to local data. DWR simulated volumetric flow in most regional surface water bodies by utilizing The Water Resource Integrated Modeling System (WRIMS, formally named CalSim II). While river flows and surface water diversions in the Merced, Chowchilla, and San Joaquin rivers are simulated in CalSim II, there are significant variations when compared to local historical data. Due to the uncertainty in reservoir operations, flows from CalSim II provided by the state are not used directly in the Merced GSP climate change analysis. Instead, as explained later in this section, relative perturbation factors were used to derive surface water inflows and diversions for analysis with the MercedWRM.

Local tributaries and smaller streams within Merced Subbasin are not simulated in CalSim II and must be simulated using adjustment factors developed by DWR for unregulated stream systems. While not all of these local tributaries are completely unregulated, most control structures are minor in operation, do not significantly impair natural flow when simulated on a monthly timestep, and are considered unimpaired for this analysis. Resolution of these perturbation factors are available at the HUC 8 watershed scale and include Bear Creek, Owens Creek, and Mariposa Creek. The remaining streams simulated in the MercedWRM utilize the IWFM small-watershed package, whose climate change impacts are dynamically calculated using the Curve Number Method and soil moisture routing.

Table 2-20 presents which streams, modeled by the MercedWRM for the Merced GSP, are considered impaired or unimpaired in this analysis.

Table 2-20: Merced Stream Inflows

Stream	Impaired	Unimpaired
Merced River	X	
Bear Creek		x
Owens Creek		x
Mariposa Creek		x
Chowchilla River	X	
San Joaquin River	X	

2.4.3.1.1 Unimpaired Flows

Change factors for unimpaired streams were downloaded from SGMA Data Viewer and multiplied by the projected conditions baseline. Perturbed flows on Bear Creek, Owens Creek, and Mariposa Creek were calculated in this way. DWR provided change factors are available through 2011. However, the model period runs from 1969 through 2018. Flows for the remaining seven water years between 2012 and 2018 were synthesized using the change factor from the most recent water year type in the available dataset. Water year types are designated for each year based on the San Joaquin Valley Runoff WY year type index (DWR, 2017c). DWR uses five WY type designations: Critical, Dry, Below Normal, Above Normal, and Wet. Table 2-21 below shows the year type designations used to synthesize the remaining years (2011-2018). A "Critical" year type represents the driest designation.

Table 2-21: DWR San Joaquin Valley Water Year Type Designations

Water Year	Year Type
2003	Below Normal
2004	Dry
2005	Wet
2006	Wet
2007	Critical
2008	Critical
2009	Below Normal
2010	Above Normal
2011	Wet
2012	Dry
2013	Critical
2014	Critical
2015	Critical
2016	Dry
2017	Wet
2018	Below Normal

Source: Water year types based on San Joaquin Valley Water Year Index (DWR, 2017c)

The hydrograph in Figure 2-110 shows the perturbed time series against the model baseline time series for Bear Creek. Results for the other unimpaired streams present a similar trend where the changes in stream flows are relatively small compared to the magnitude of flows in the baseline. The x-axis represents the period of record from which the future conditions simulation is made. Figure 2-111 through Figure 2-113 present the exceedance probability curves[9] for Bear Creek, Owens Creek, and Mariposa Creek, respectively. The exceedance curves are provided because they more clearly show the differences between the baseline scenario and the climate change scenario. Generally, flows under the climate change scenario selected are only slightly higher, and almost unperceivable.

[9] Exceedance probability describes the probability that streamflow or precipitation will be greater than (or "exceed") a certain value. An exceedance probability curve shows how the probability changes over a range of streamflow or precipitation values.

Figure 2-110: Bear Creek Hydrograph

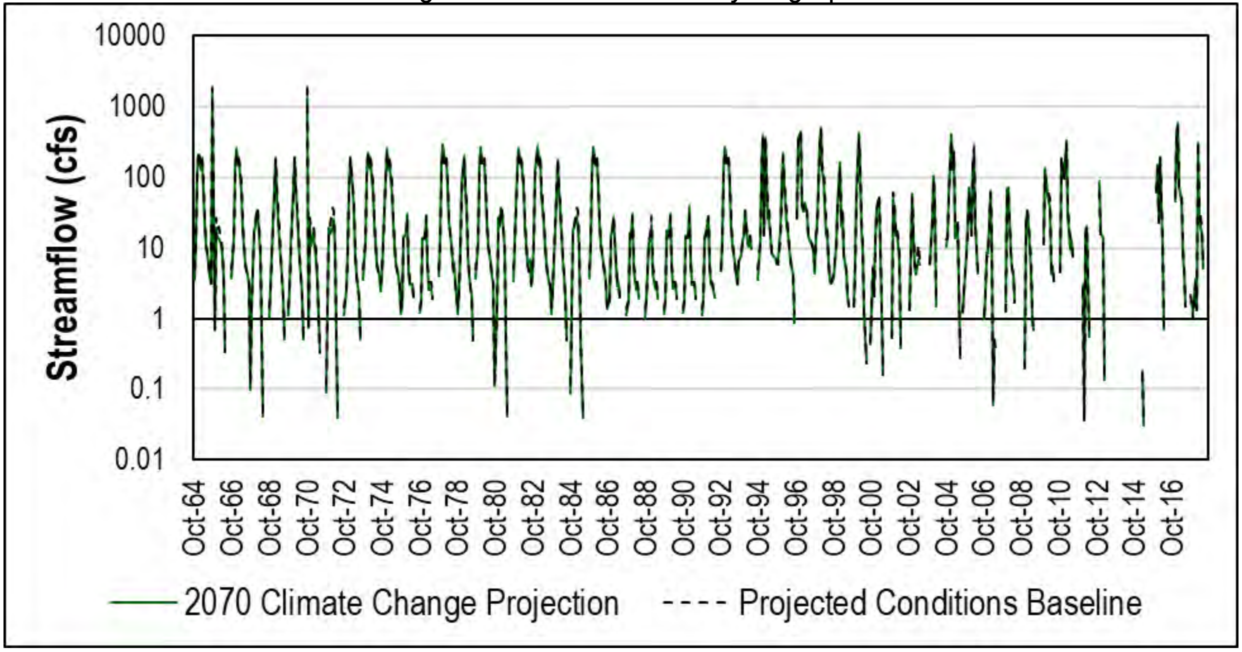


Figure 2-111: Bear Creek Exceedance Curve

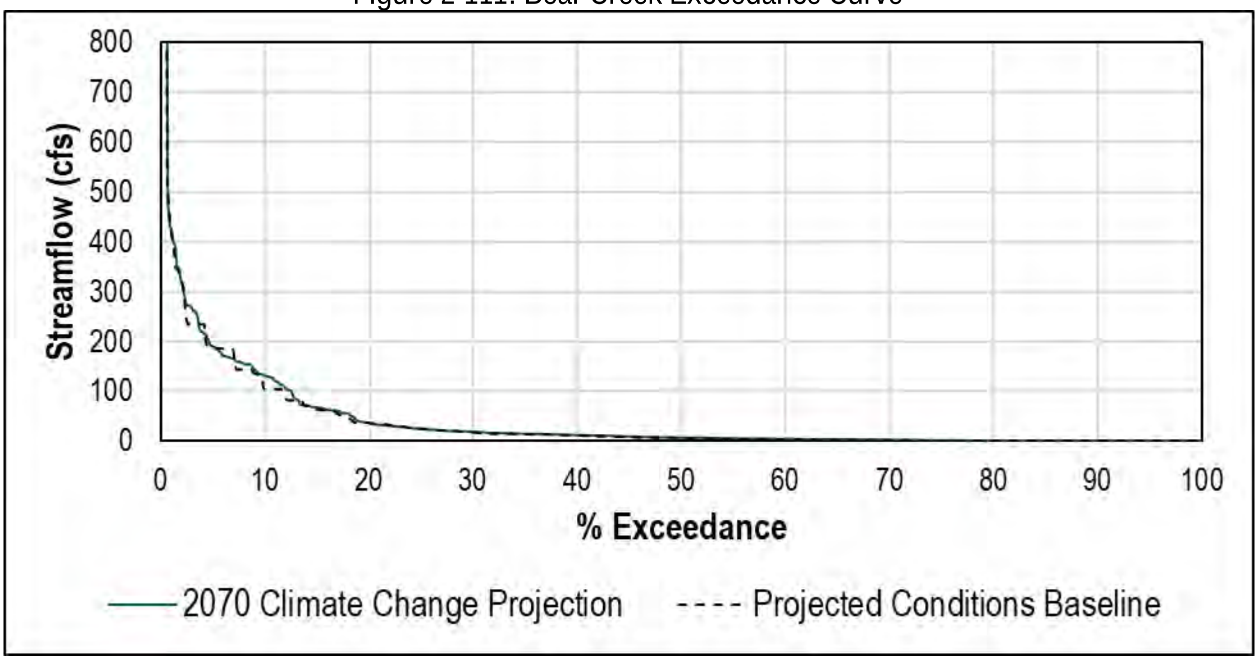


Figure 2-112: Owens Creek Exceedance Curve

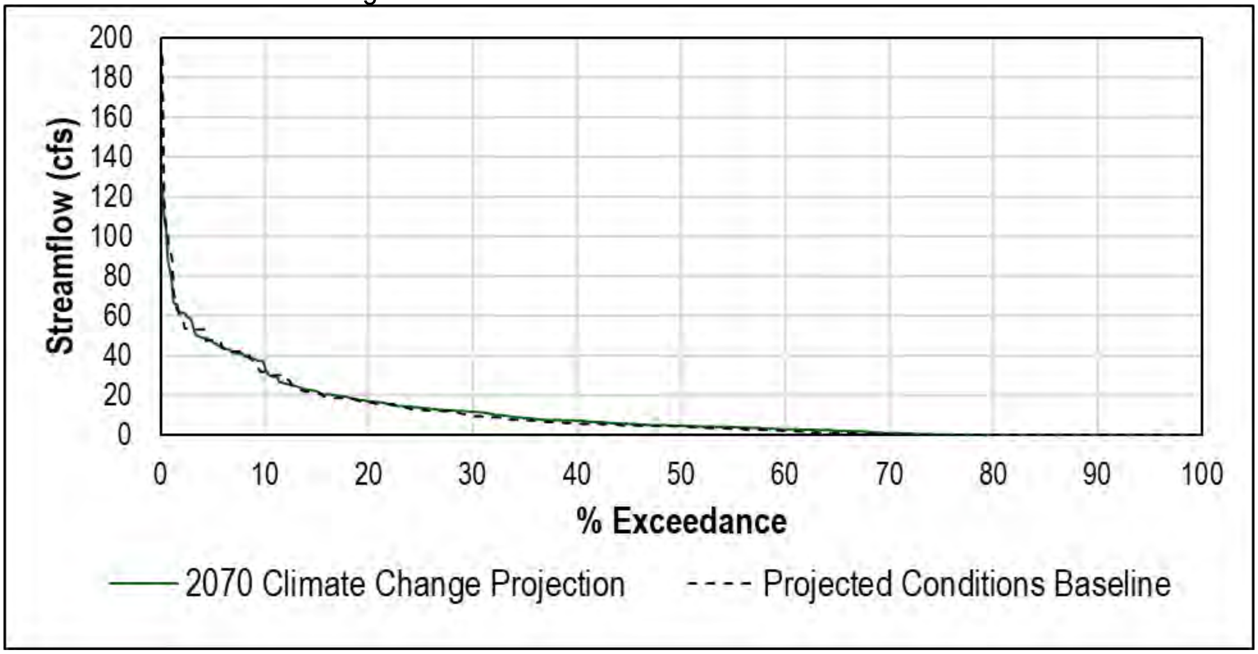
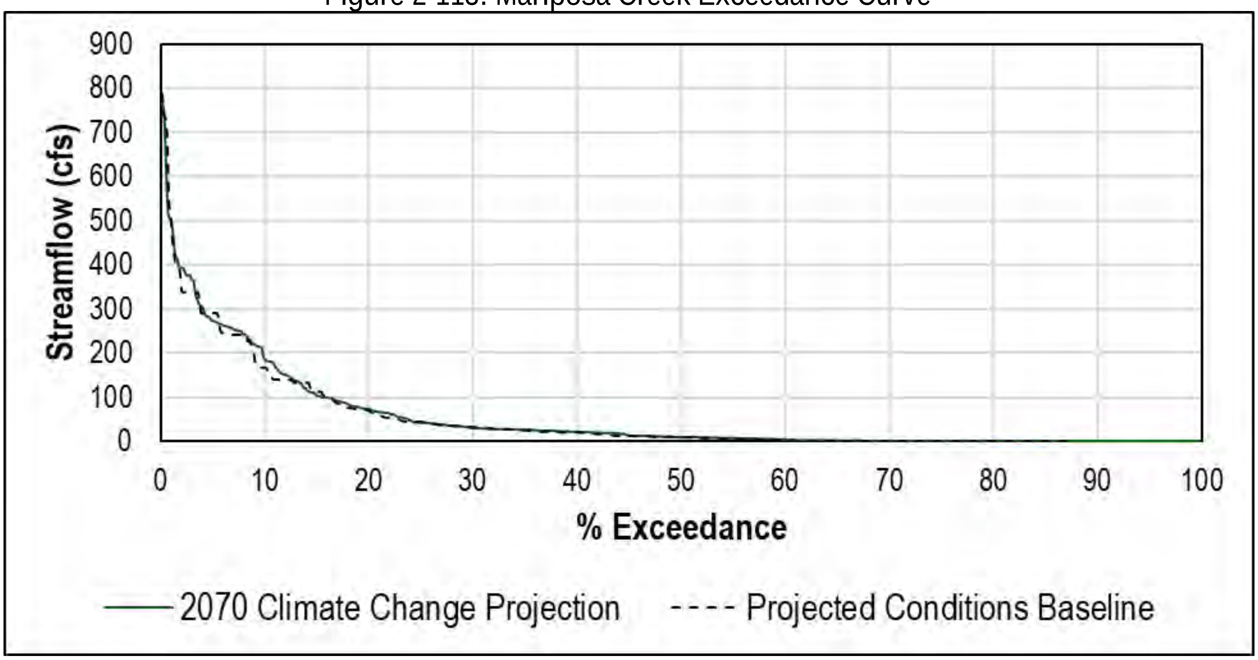


Figure 2-113: Mariposa Creek Exceedance Curve



2.4.3.1.2 Impaired Flows

CalSim II estimated flows for point locations on the Merced River, Chowchilla River, and the San Joaquin River were downloaded from DWR. The three key flows obtained from CalSim II include:

- Merced River: Lake McClure Outflow
- Chowchilla River: Eastman Lake Outflow
- San Joaquin River: San Joaquin River below Mendota Pool

These flows represent projected hydrology with climate change based on reservoir outflow, operational constraints, and diversions and deliveries of water for the State Water Project and the Central Valley Project. CalSim II data from WY 1965 to WY 2003 was available. For WY 2004 to WY 2018, streamflow was synthesized based on flows from WY 1965 to WY 2003 and the DWR San Joaquin Valley water year type index. Table 2-21 indicates the water year types that were used for the years with synthesized streamflow (DWR, 2017c). For example, the total monthly streamflow for October 2003 would be calculated as the average of the monthly streamflow from October 1966 and October 1971 because they are the same year type.

In order to verify the relative accuracy of CalSim II simulated flows on the local scale, simulated flows were compared with those generated using the DWR-provided unimpaired perturbation factors. As expected, streamflow simulated in CalSim II and those derived using the unimpaired adjustment factors did not present similar trends, particularly in dry years. Because they are indicative of reservoir operations, CalSim II outputs are considered more appropriate for regulated streams given that downstream flow is driven by surface water demand rather than natural flow. DWR-provided unimpaired change factors do not account for variations in the operation of the reservoirs that would result from climate change conditions. The CalSim II flows, however, were also not considered completely appropriate for local conditions so a method was derived to compute change factors from CalSim II flows, as described below.

Using DWR's method of deriving the precipitation and evapotranspiration factors as a guide, the team explored a hybrid approach to improve upon the discrepancy between the CalSim II and local models while accounting for some change in reservoir operations. In this approach, change factors are generated from the difference between each simulated future climate change CalSim II scenario (i.e., 2070) and the "without climate change" baseline CalSim II run. This "without climate change" baseline run is the CalSim II 1995 Historical Detrended simulation run provided through personal communication from DWR. The generated change factors are then used to perturb the regulated river inflows simulated in the MercedWRM Projected Conditions Baseline. For the purposes of simplicity, this method is referred to throughout the rest of the document as CalSim II Generated Perturbation Factors (CGPF). The CGPF method presents limitations given that the resulting flows are not directly obtained from an operations model. The actual mass balance on the reservoirs is not tracked in the estimates of the flows and, instead, the method relies on CalSim II tracking that storage and managing the reservoir based on the appropriate rule curves.

Figure 2-114 through Figure 2-119 provide a comparison of projected conditions baseline and the CGPF method described above. Exceedance curves are included for each of the CGPF flows against the projected conditions baseline. It should be noted that the CalSim II 1995 Historical Detrended simulation appears to have an erroneous value for Merced River inflow[10] into the subbasin on 9/30/1988, as it is 2 orders of magnitude smaller than the rest. This explains the high peaks or low troughs in the hydrographs above for this month.

[10] Identified in the dataset as "Lake McClure Outflow".

Figure 2-114: Merced River Hydrograph

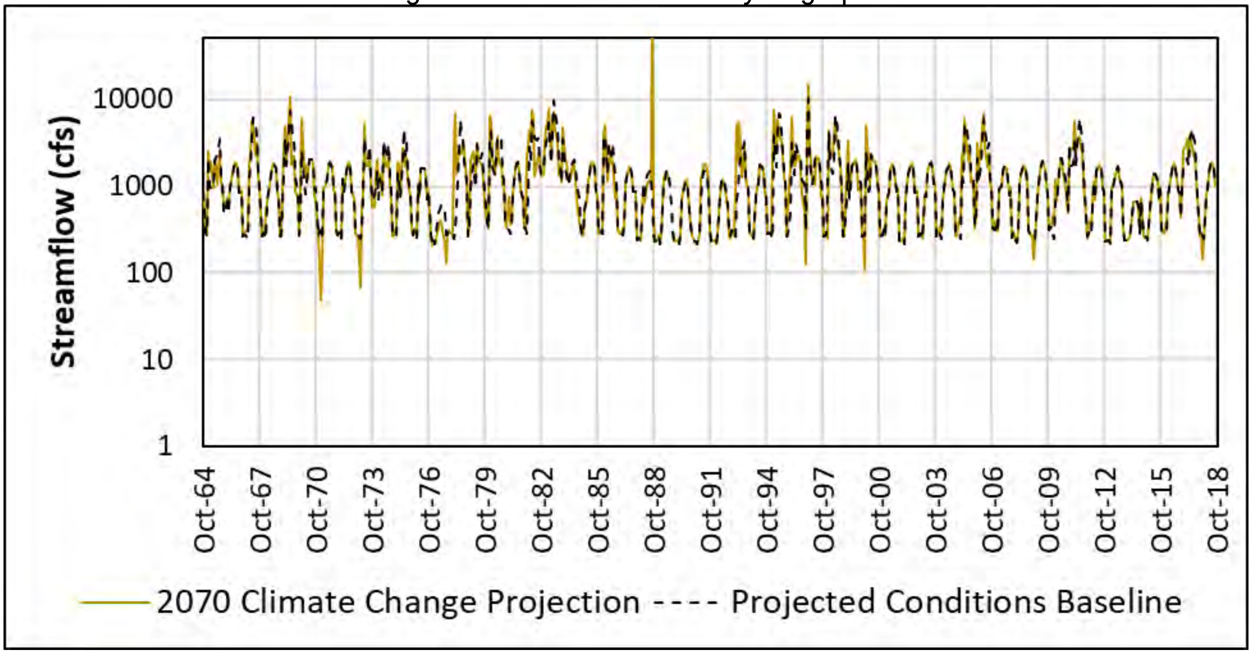


Figure 2-115: Merced River Exceedance Curve

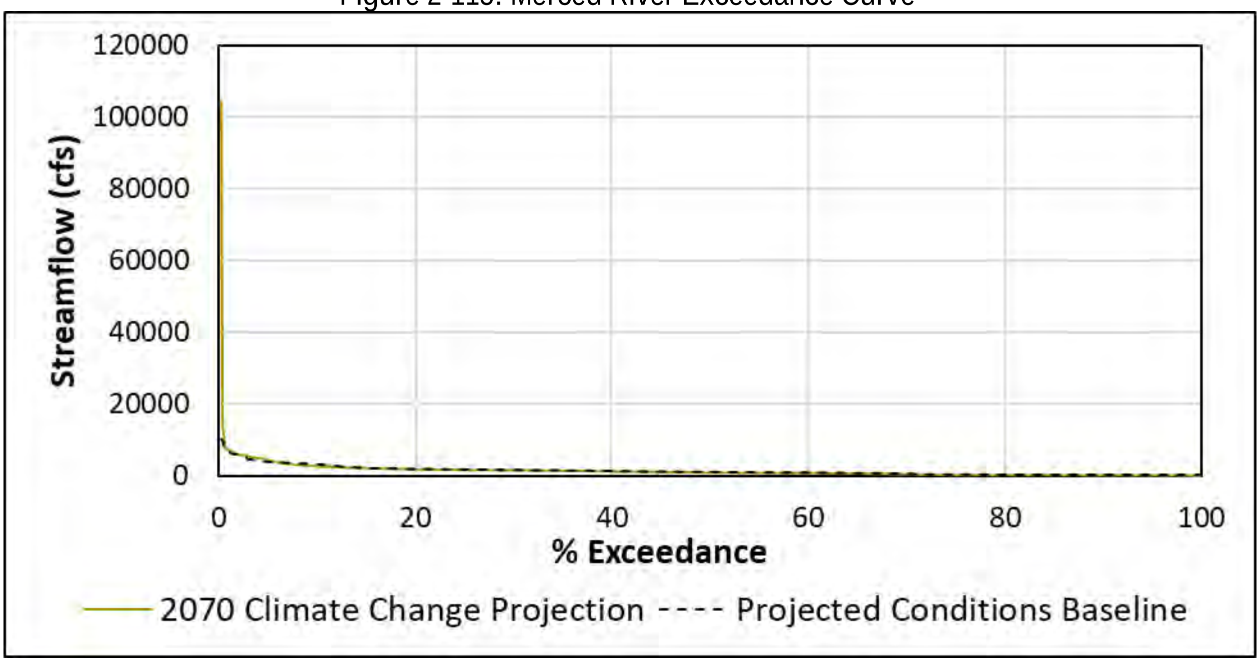


Figure 2-116: Chowchilla River Perturbed Hydrograph

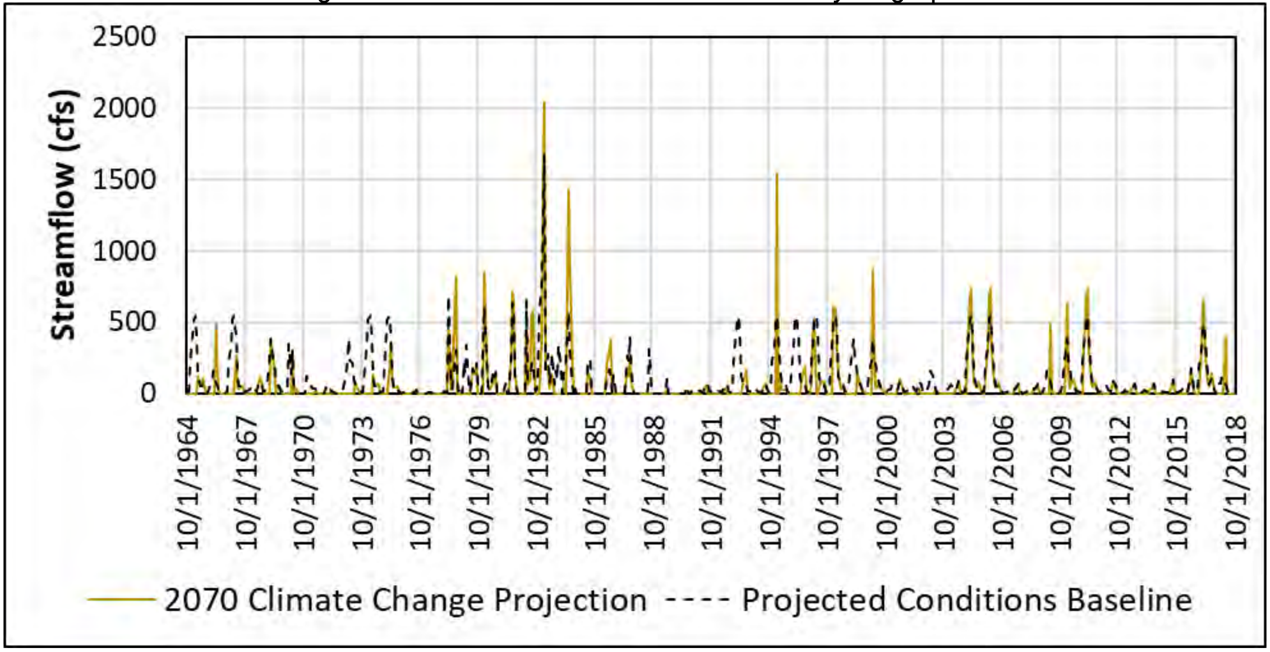


Figure 2-117: Chowchilla Exceedance Curve

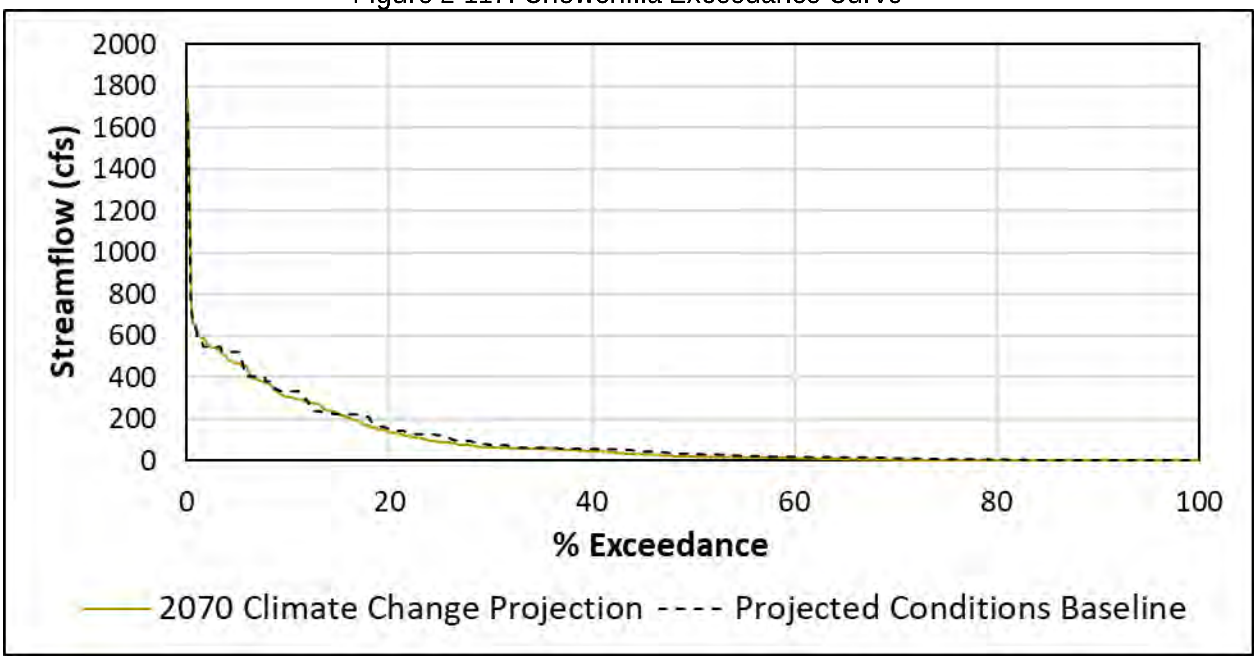


Figure 2-118: San Joaquin River Hydrograph

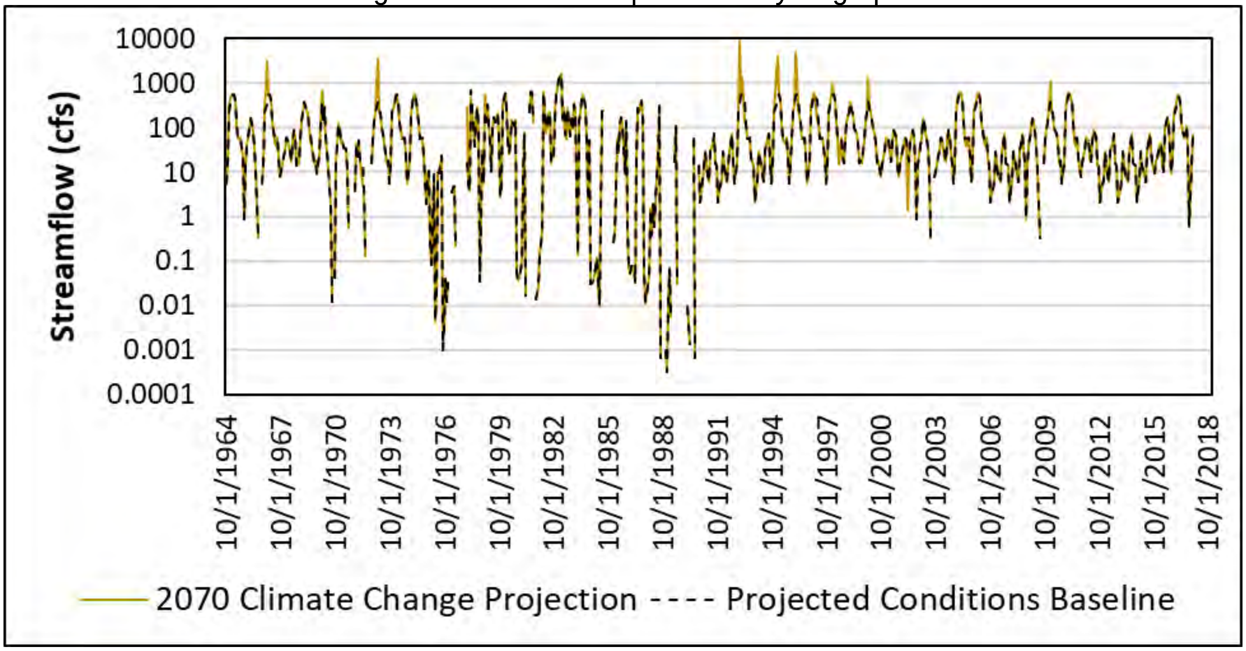
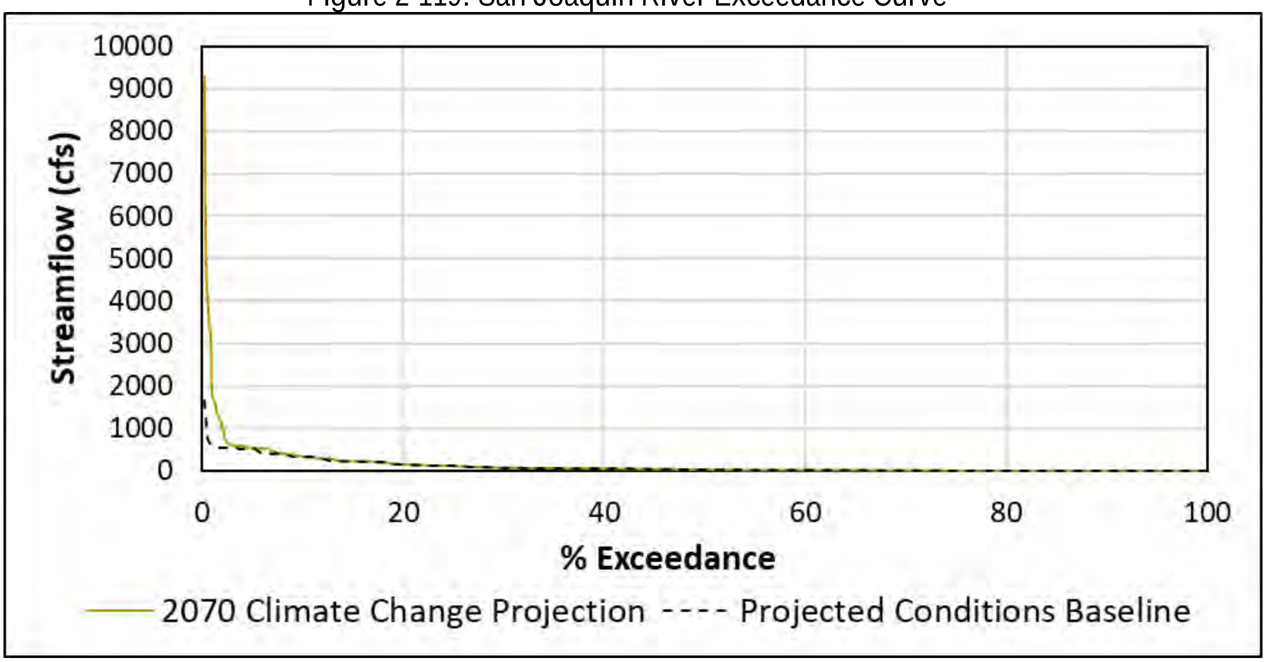


Figure 2-119: San Joaquin River Exceedance Curve



2.4.3.2 Precipitation and Evapotranspiration under Climate Change

Projected precipitation and evapotranspiration (ET) change factors provided by DWR were calculated using a climate period analysis based on historical precipitation and ET from January 1915 to December 2011 (DWR, 2018a). The Variable Infiltration Capacity (VIC) hydrologic model was used by DWR to simulate land-surface atmosphere exchanges of moisture and energy on a six-kilometer grid. Model output includes both precipitation and reference evapotranspiration whose change factors provided by DWR were calculated as a ratio of the value of a variable under a “future scenario” divided by a baseline. The baseline data is the 1995 Historical Template Detrended scenario by the VIC model through GCM downscaling. The “future scenario” corresponds to VIC outputs of the simulation of future conditions using GCM forecasted hydroclimatic variables as inputs. These change factors are thus a simple perturbation factor that corresponds to the ratio of a future with climate change divided by the past without it. Change factors are available on a monthly time step and spatially defined by the VIC model grid. Supplemental tables with the time series of perturbation factors are available by DWR for each grid cell. DWR has made accessible a Desktop GIS tool for both IWFM and MODFLOW to process these change factors (DWR, 2018b).

2.4.3.2.1 Applying Change Factors to Precipitation

DWR change factors were multiplied by projected conditions baseline precipitation to generate projected precipitation under the 2070 central tendency future scenario using the Desktop IWFM GIS tool (DWR, 2018b). The tool calculates an area weighted precipitation change factor for each model grid geometry. This model grid geometry was generated based on polygons built around the PRISM nodes that are within the model area.

However, the DWR tool only includes change factors through 2011. The remaining seven years of the time series were synthesized according to historically comparable water years. The perturbation factor from the corresponding month of the comparable year was applied to the baseline of the missing years (2012-2018) to generate projected values. Months with no precipitation in the baseline were assumed a monthly precipitation of 1 mm under climate change to account for increased precipitation that cannot be calculated from a baseline of 0 mm for these synthesized years. The comparable years that were used can be found in Table 2-22.

Table 2-22: Comparable Water Years (Precipitation)

Missing Water Year	Comparable Water Year
2012	1968
2013	2007
2014	2002
2015	1971
2016	1981
2017	1993
2018	1987

The resulting perturbed precipitation values and the baseline precipitation values for the representative historical period can be found in Figure 2-120 below. The exceedance plot for these two times series can be found in Figure 2-121.

Figure 2-120: Perturbed Precipitation Under Climate Change

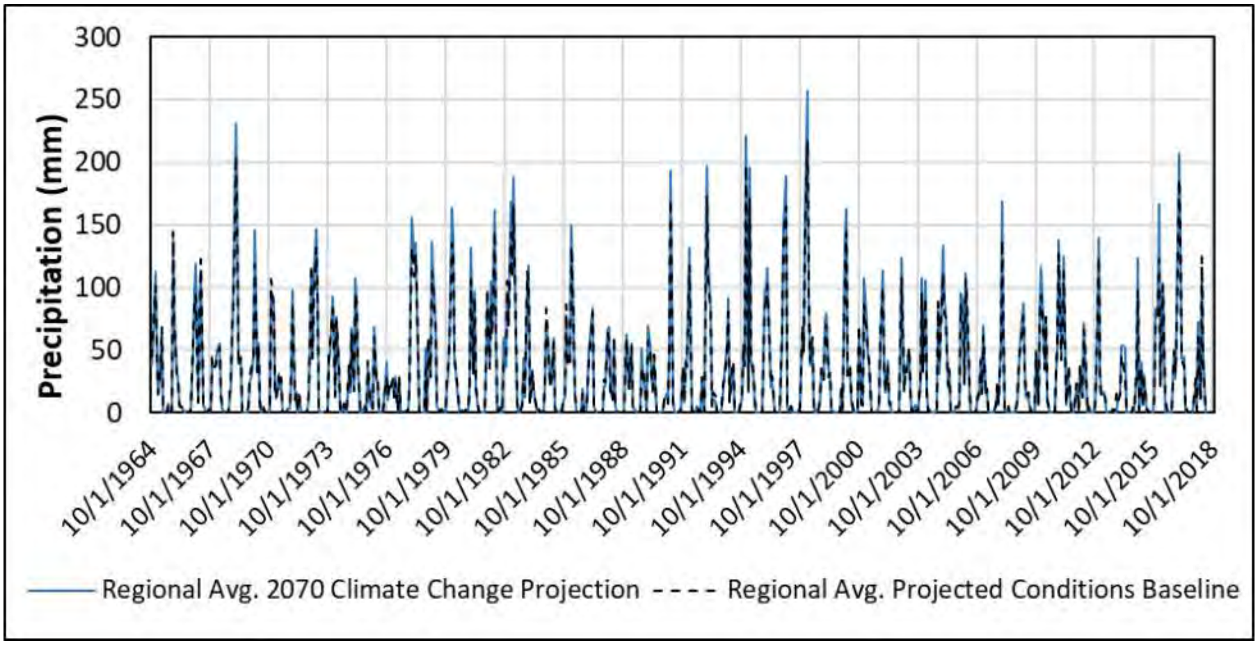


Figure 2-121: Perturbed Precipitation Exceedance Curve

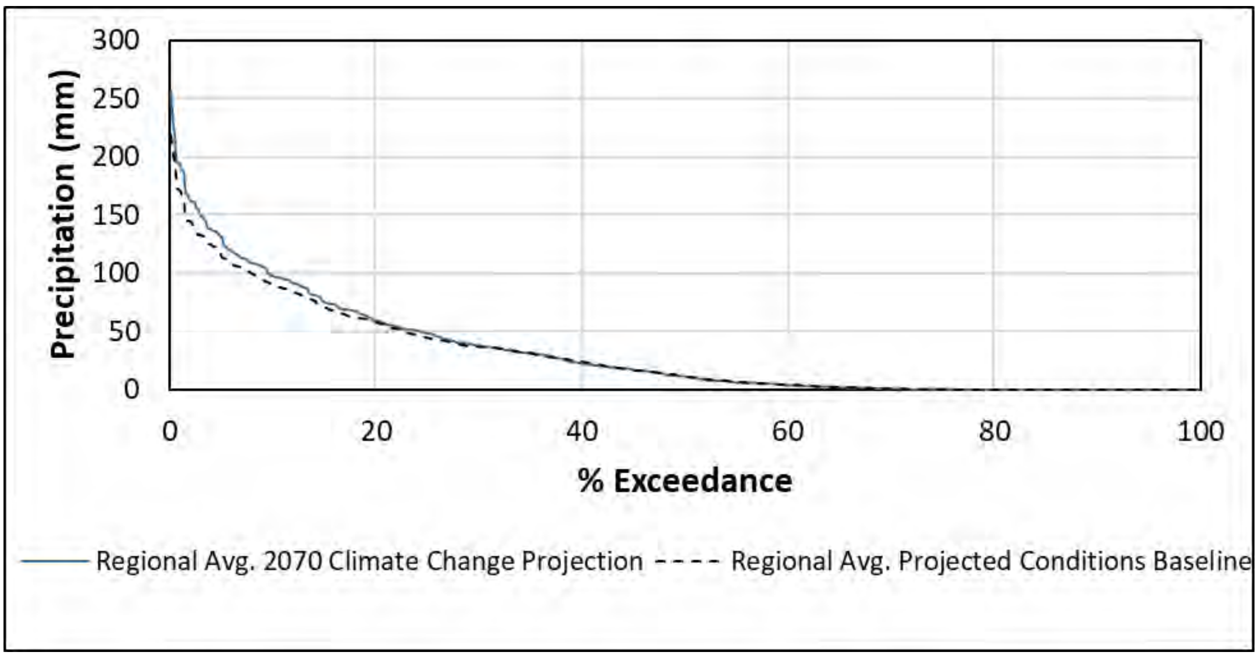
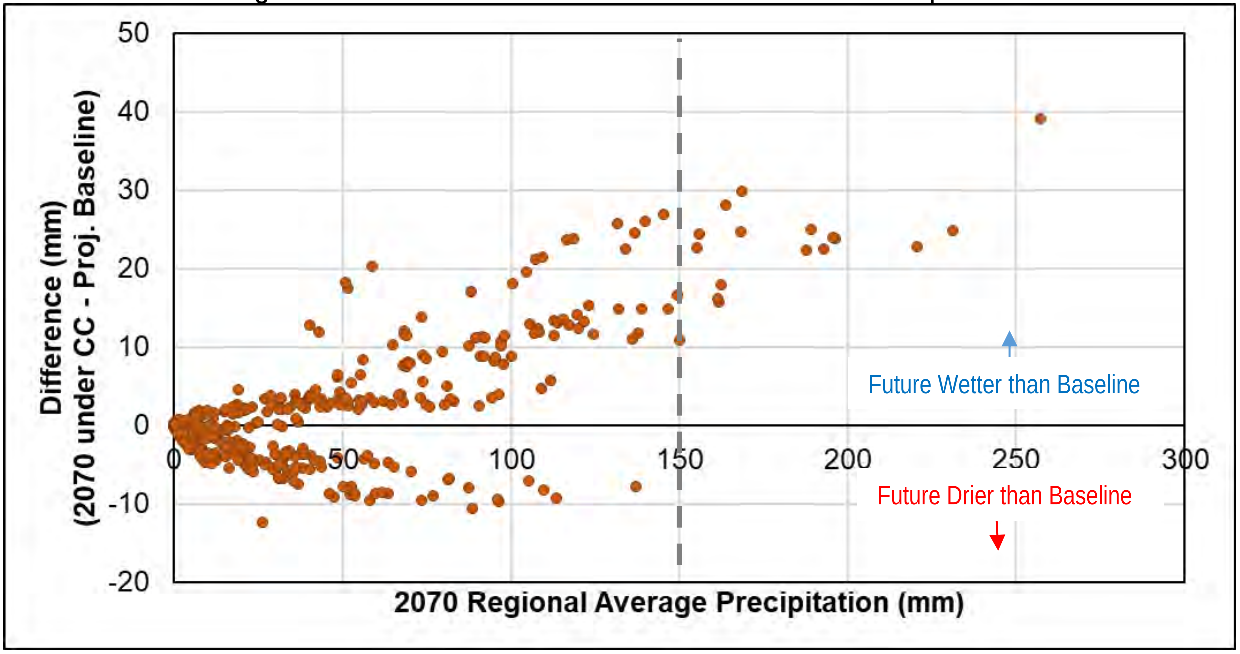


Figure 2-122 shows the difference between the regional average under 2070 climate change conditions and the regional average under projected conditions baseline plotted against different amounts of projected monthly precipitation. The average was taken across the area of the Merced Subbasin.

Figure 2-122: Variation from Baseline of Perturbed Precipitation

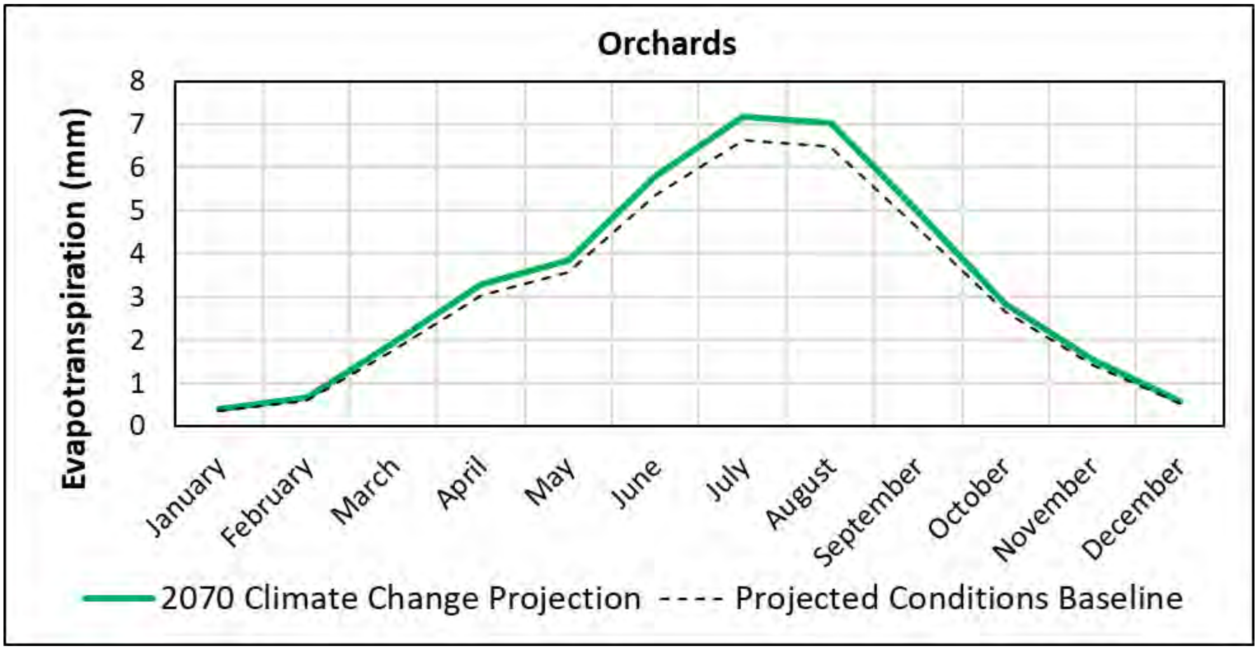


This plot (Figure 2-122) demonstrates that in 2070 with climate change added, in low precipitation months, there is approximately equal probability that the month will be wetter or drier than projected conditions baseline. However, under climate change, the 2070 conditions will be wetter in months with precipitation above approximately 150mm, indicated by the vertical gray dashed line. Therefore, under climate change conditions (in the scenario selected for the GSP), we can see that the occurrence of low precipitation months will likely not change significantly, but the higher precipitation months are predicted to be wetter overall than the projected conditions baseline.

2.4.3.2.2 Applying Change Factors to Evapotranspiration

Potential ET is in the Merced Subbasin is aggregated to one of seventeen land use categories but does not vary spatially. DWR provides change factors for ET in the same spatially distributed manner as precipitation, as described above. However, to match the level of discretization with the Merced model, an average ET change factor was calculated across all VIC grid cells within the Merced Subbasin boundary. Therefore, the tool to process ET provided by DWR was not needed or used. Change factors provided by DWR for November 1, 1964 through December 1, 2011 were averaged. This average ET change factor was then applied to the baseline ET time series for each crop type. Because the same ET change factor was applied over the entire baseline, no synthesis was required in this analysis. Refinement to the simulated evapotranspiration of orchards under 2070 climate conditions is shown in Figure 2-123 below. For 2070, the average change factor is 1.08.

Figure 2-123: Monthly ET for Sample Crops



2.4.3.3 Merced Subbasin Water Budget Under Climate Change

A climate change scenario was developed for the MercedWRM to evaluate the hydrological impacts under these conditions. The analysis was based on the projected conditions baseline with climate change perturbed inputs for streamflow, precipitation, and ET. Tabular results are presented below in Table 2-23, Table 2-24, and Table 2-25. Under the climate change scenario, the average annual volume of evapotranspiration is seven percent higher than the projected conditions baseline, increasing to 916,000 AFY from 853,000 AFY. Due to changes to local hydrology, the average annual surface water availability was projected to increase 4 percent from 274,000 AFY to 286,000 AFY.[11] The simulated increase in surface water supply is not enough to meet the increased water demands under the climate change scenario. As a result, private groundwater production is simulated to increase approximately 7 percent, from 536,000 AFY to 565,000 AFY. Under climate change conditions, depletion in aquifer storage is expected to increase by about 60 percent to an average annual rate of 130,000 AFY, from 82,000 AFY in the projected conditions baseline. A graphical representation of simulated changes to evapotranspiration, surface deliveries, and groundwater pumping are presented in Figure 2-124 though Figure 2-126, below, and complete water budgets for the climate change scenario are shown in Figure 2-127 and Figure 2-128.

[11] There are various approaches to estimating the effects of climate change on local hydrology. The 2070 Central Tendency used in this GSP according to DWR guidelines for GSP submittal may differ from local studies or certain Flood-MAR scenarios.

Figure 2-124: Simulated changes in Evapotranspiration due to Climate Change (Scenario minus Baseline)

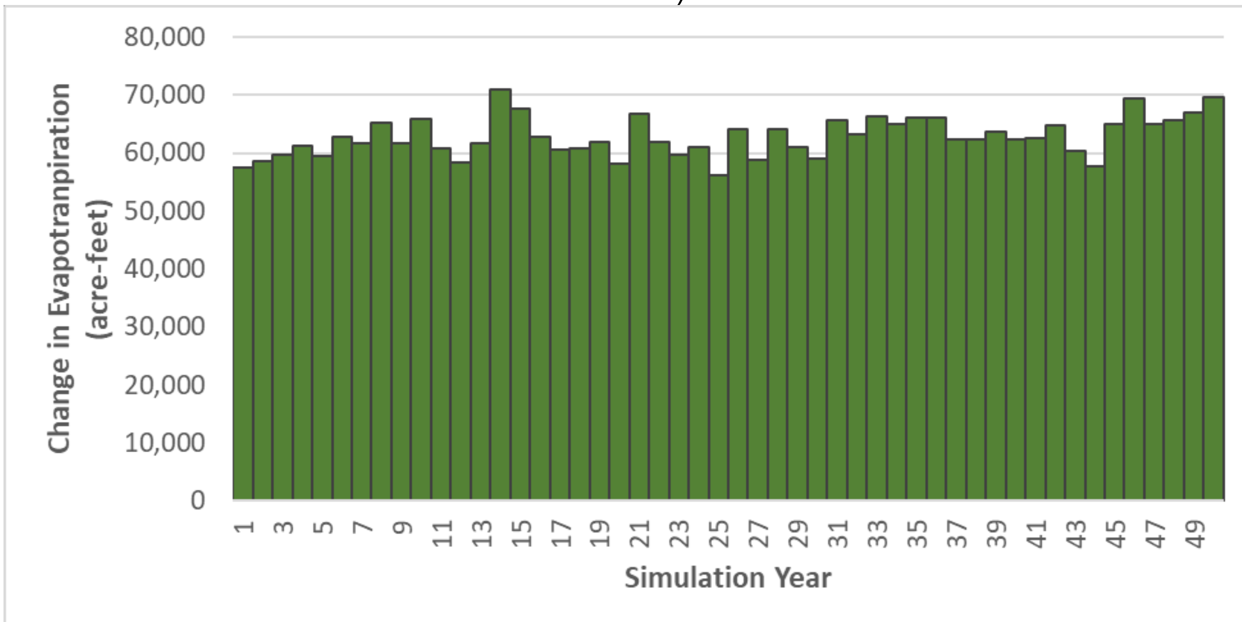


Figure 2-125: Simulated Changes in Surface Water Supplies due to Climate Change (Scenario minus Baseline)

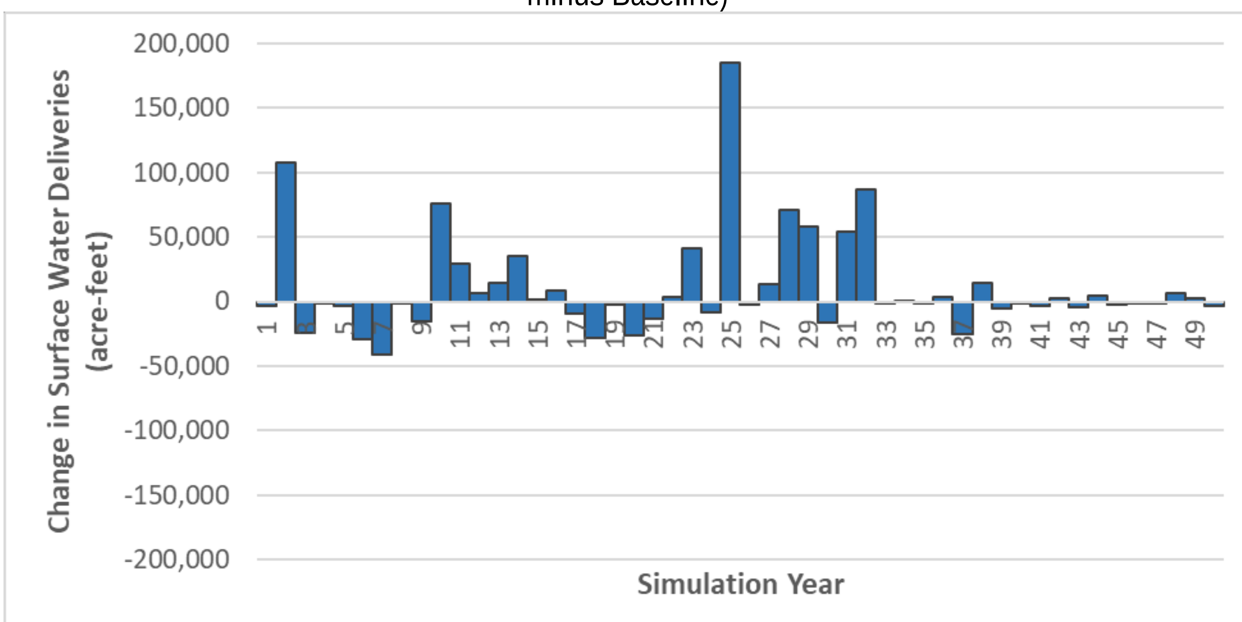


Figure 2-126: Simulated Changes in Groundwater Production due to Climate Change (Scenario minus Baseline)

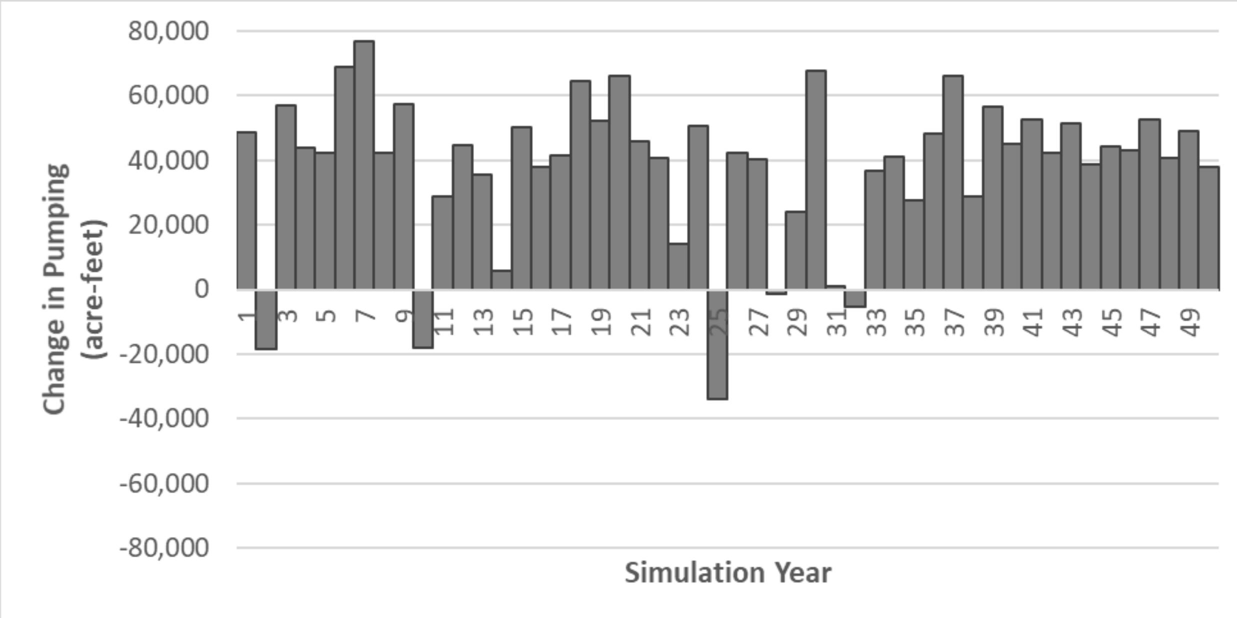


Figure 2-127: Land and Water Use Budget - MercedWRM Climate Change Scenario

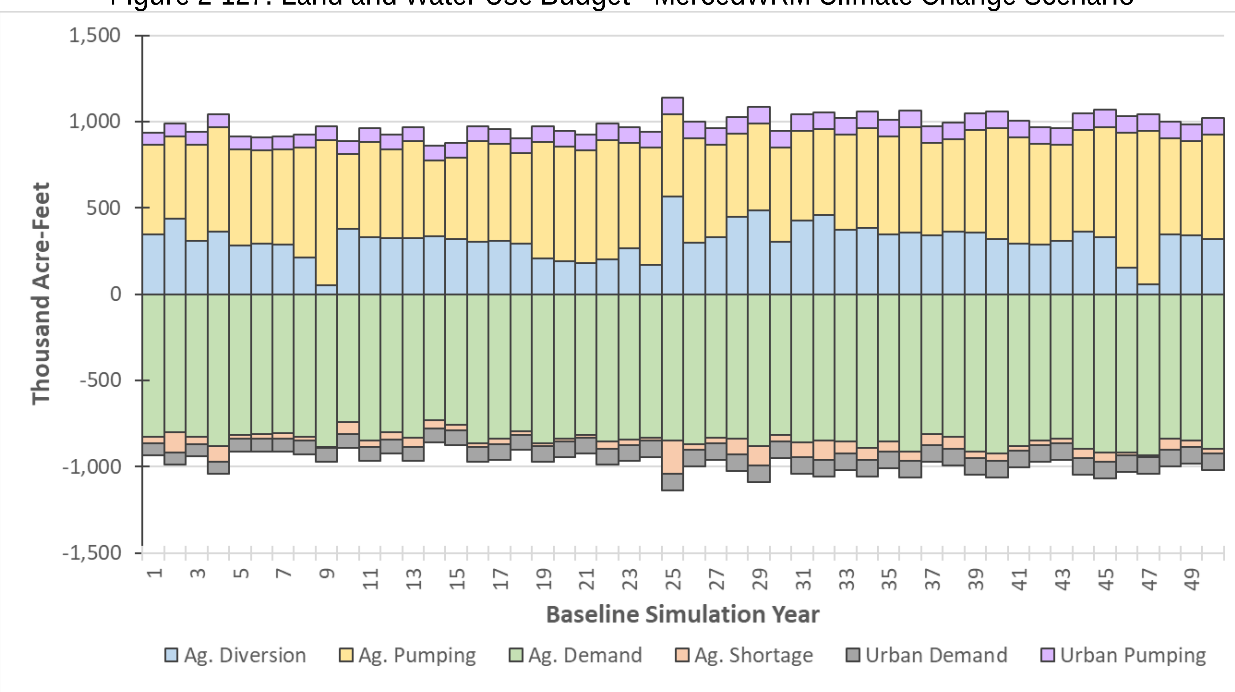


Figure 2-128: Groundwater Budget - MercedWRM Climate Change Scenario

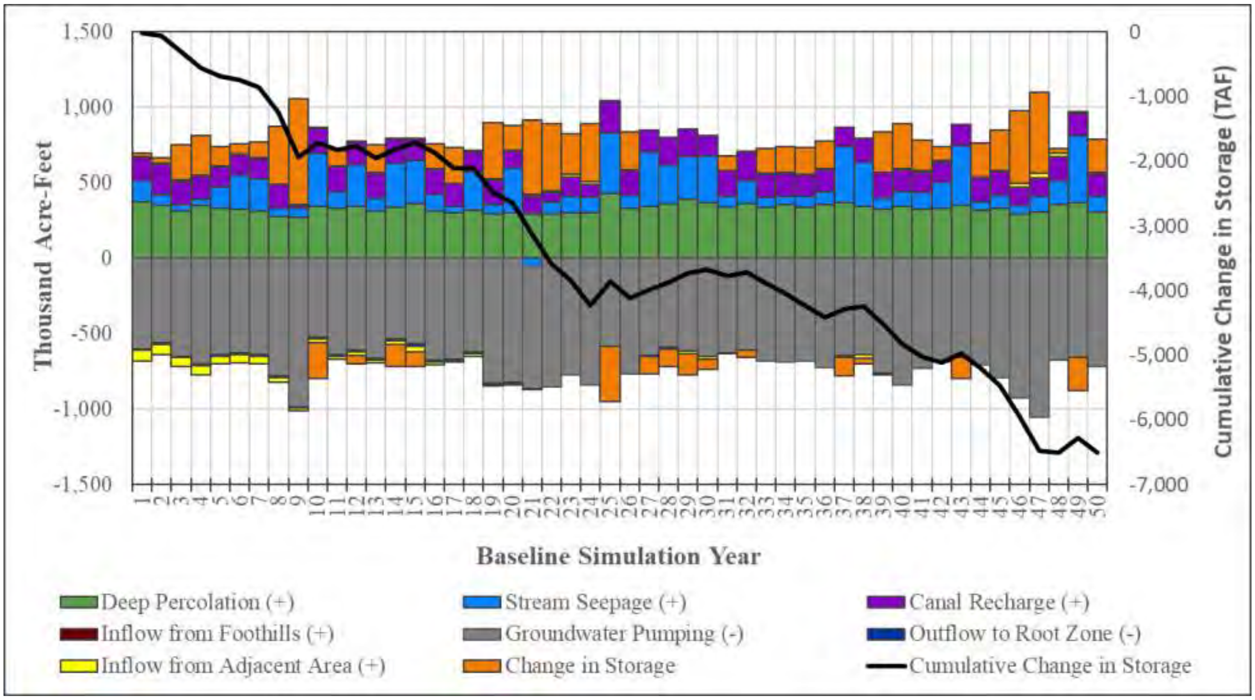


Table 2-23: Average Annual Water Budget Under Climate Change – Stream and Canal Systems, Merced Subbasin (AFY)

Component	Projected Condition Water Budget	Climate Change Water Budget
Hydrologic Period	WY 1969 - 2018	WY 1969-2018
Inflows[1]		
Stream Inflows	2,480,000	2,138,000
Merced River	981,000	1,140,000
Eastside Bypass	773,000	773,000
San Joaquin River	581,000	103,000
Chowchilla River	72,000	49,000
Local Tributaries[1]	74,000	73,000
Stream Gain from Groundwater	49,000	60,000
Merced Subbasin	29,000	29,000
Merced River	9,000	16,000
Eastside Bypass	1,000	17,000
San Joaquin River	7,000	9,000
Chowchilla River	2,000	4,000
Local Tributaries[1]	11,000	-18,000
Other Subbasins[2]	20,000	31,000
Merced River	10,000	17,000
San Joaquin River	6,000	9,000
Chowchilla River	3,000	6,000

Component	Projected Condition Water Budget	Climate Change Water Budget
Hydrologic Period	WY 1969 - 2018	WY 1969-2018
Runoff to the Stream System	357,000	553,000
Merced Subbasin	206,000	290,000
Other Subbasins[2]	151,000	262,000
Return Flow to Stream System	143,000	146,000
Merced Subbasin	79,000	81,000
Other Subbasins[2]	64,000	66,000
Groundwater Pumping to Canals	45,000	45,000
Other[3]	32,000	28,000
Total Inflow	3,105,000	2,970,000
Outflows[1]		
San Joaquin River Outflows	2,360,000	2,245,000
Stream Losses to Groundwater	401,000	371,000
Merced Subbasin	318,000	337,000
Merced River	42,000	16,000
Eastside Bypass	44,000	18,000
San Joaquin River	36,000	9,000
Chowchilla River	2,000	5,000
Local Tributaries[1]	52,000	142,000
Canal Recharge	141,000	145,000
Other Subbasins[2]	83,000	34,000
Merced River	42,000	17,000
San Joaquin River	39,000	10,000
Chowchilla River	2,000	7,000
Surface Water Deliveries	274,000	286,000
Groundwater Delivery via Canals	45,000	45,000
Riparian Uptake from Streams	25,000	25,000
Merced Subbasin	14,000	15,000
Other Subbasins	11,000	10,000
Total Outflow	3,105,000	2,970,000

[1] Local Tributaries include Bear Creek, Black Rascal Creek, Deadman Creek, Duck Slough, Dutchman Creek, Mariposa Creek, Miles Creek, and Owens Creek. Additional smaller creeks exist~~,~~ but were not modeled due to minimal natural flows.

[2] Other Subbasins include the Turlock, Chowchilla, and Delta-Mendota Subbasins. As supporting data was not available, modeling inputs such as curve number and return flow fractions were assumed to be similar to those used in the Merced Subbasin.

[3] Other flows is a closure term that captures the stream and canal system including gains and losses not directly measured or simulated within IWFM. Some of these features include but may not be limited to direct precipitation, evaporation, unmeasured riparian diversions and return flow, temporary storage in local lakes and regulating reservoirs, and inflow discrepancies resulting from simulating impaired flows.

Table 2-24: Average Annual Water Budget Under Climate Change – Land Surface System, Merced Subbasin (AFY)

Component	Projected Condition Water Budget	Climate Change Water Budget
Hydrologic Period	WY 1969 - 2018	WY 1969-2018
Inflows		
Precipitation	506,000	612,000
Total Surface Water Supply	274,000	286,000
Surface Water - Local	229,000	229,000
Surface Water - Riparian	46,000	46,000
Total Groundwater Supply	660,000	699,000
Agricultural - Agency	45,000	45,000
Agricultural - Private	526,000	565,000
Urban - Municipal	50,000	50,000
Urban - Domestic	39,000	39,000
Riparian Uptake from Streams	14,000	15,000
Inflow from Groundwater System	12,000	10,000
Total Inflow	1,466,000	1,621,000
Outflows		
Evapotranspiration	853,000	916,000
Agricultural	682,000	738,000
Municipal and Domestic	37,000	39,000
Refuge, Native, and Riparian	134,000	138,000
Runoff to the Stream System	206,000	290,000
Return Flow to the Stream System	79,000	81,000
Agricultural	26,000	27,000
Municipal and Domestic	54,000	54,000
Deep Percolation	327,000	333,000
Precipitation	79,000	82,000
Surface Water	73,000	73,000
Surface Water - Local	61,000	61,000
Surface Water - Riparian	12,000	12,000
Groundwater	175,000	178,000
Agricultural - Agency	12,000	11,000
Agricultural - Private	139,000	144,000
Urban - Municipal	13,000	13,000
Urban - Private	10,000	10,000
Other[1]	1,000	1,000
Total Outflow	1,466,000	1,621,000

[1] Other flows is a closure term that captures the gains and losses due to land expansion and seasonal storage in the root-zone.

Table 2-25: Average Annual Water Budget Under Climate Change – Groundwater System, Merced Subbasin (AFY)

Component	Projected Condition Water Budget	Climate Change Water Budget
Hydrologic Period	WY 1969 - 2018	WY 1969-2018
Inflows		
Deep Percolation	327,000	333,000
Precipitation	79,000	82,000
Surface Water	73,000	73,000
Surface Water - Local	61,000	61,000
Surface Water - Riparian	12,000	12,000
Groundwater	175,000	178,000
Agricultural - Agency	12,000	11,000
Agricultural - Private	139,000	144,000
Urban - Municipal	13,000	13,000
Urban - Private	10,000	10,000
Stream Losses to Groundwater	318,000	337,000
Merced River	42,000	16,000
Eastside Bypass	44,000	18,000
San Joaquin River	36,000	9,000
Chowchilla River	2,000	5,000
Local Tributaries[1]	52,000	142,000
Canal Recharge	141,000	145,000
Subsurface Inflow	79,000	73,000
Total Inflow	723,000	743,000
Outflows		
Stream Gain from Groundwater	29,000	29,000
Merced River	9,000	16,000
Eastside Bypass	1,000	17,000
San Joaquin River	7,000	9,000
Chowchilla River	2,000	4,000
Local Tributaries	11,000	-18,000
Groundwater Production	660,000	699,000
Agricultural - Agency	45,000	45,000
Agricultural - Private	526,000	565,000
Urban - Municipal	50,000	50,000
Urban - Private	39,000	39,000
Subsurface Outflow[2]	103,000	134,000
Outflow to Land Surface System	12,000	10,000
Other[3]	1,000	1,000
Total Outflow	805,000	873,000
Change in Storage	-82,000	-130,000

1 Local Tributaries include Bear Creek, Black Rascal Creek, Deadman Creek, Duck Slough, Dutchman Creek, Mariposa Creek, Miles Creek, and Owens Creek. Additional smaller creeks exist~~,~~ but were not modeled due to minimal natural flows.

2 The goal of projecting interbasin flows is to maintain a reasonable balance between the neighboring Subbasins. The results are within 10-12%, which is within the reasonable range, given the availability of projected land use, population, surface water delivery, and groundwater production data from areas outside of the Merced Subbasin.

3 Other flows within the groundwater system including temporary storage in the vadose zone, and root water uptake from the aquifer system.

2.4.3.4 Opportunities for Future Refinement

The climate change approach developed for this GSP is based on the methodology in DWR's guidance document (DWR, 2018a) and uses "best available information" related to climate change in the Merced Subbasin. There are limitations and uncertainties associated with the analysis. One important limitation is that Calsim II does not fully simulate local surface water operations. Thus, the analysis conducted for this GSP may not fully reflect how surface and groundwater basin operations would respond to the changes in water demand and availability caused by climate change. For this first GSP iteration, use of a regional model and the perturbation factor approach were deemed appropriate given the uncertainties in the climate change analysis.

A recommendation for future refinements of this analysis is utilization of the local surface water operations model, the Merced Irrigation District Hydrologic and Hydraulic Operations Model (MIDH2O). Use of this model would allow for greater resolution in the simulation of Merced River flows and surface water supply based on local management. Additionally, utilization of MIDH2O will allow for analysis of the localized climate conditions effecting snow-pack and its implications on reservoir operations and streamflow. Further monitoring and adaptive management should be considered for the next update if the GSP along with improvements in DWR's climate change data.

3 SUSTAINABLE MANAGEMENT CRITERIA

This section presents the sustainable management criteria developed for the Merced Subbasin GSP. GSP regulations consolidate several requirements of GSPs under the heading of "Sustainable Management Criteria." These criteria include:

- Sustainability Goal
- Undesirable Results
- Minimum Thresholds
- Measurable Objectives

The development of these criteria for the Merced GSP relied upon information about the Subbasin developed in the hydrogeologic conceptual model (Section 2.1), current and historical groundwater conditions (Section 2.2), and the water budget (Section 2.3), and input from stakeholders during the GSP development process. The sustainable management criteria were discussed at multiple coordinating committee and stakeholder committee meetings between March 2018 and August 2018 and revisited in Spring 2019 as additional progress was made on the water allocation framework and sustainable yield analysis.

This GSP considers the six sustainability indicators defined by SGMA in the development of sustainable management criteria. SGMA allows several pathways to meet the distinct local needs of each basin, including development of sustainable management criteria, usage of groundwater levels as a proxy, and identification as not being applicable to the Subbasin.

3.1 SUSTAINABILITY GOAL

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*" [CWC §10721(v)]. Each GSP is required to include a sustainability goal, defined by SGMA as "*the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield*" [CWC §10721(u)]. SGMA requires the GSP to define a succinct sustainability goal statement.

The Merced Subbasin sustainability goal succinctly states Subbasin objectives and desired conditions as defined by the GSAs and other beneficial users of groundwater in the Subbasin. The Merced Subbasin is heavily reliant on groundwater, and users recognize the basin has been in overdraft for a long period of time. As discussed in greater detail below, the Subbasin has experienced historical lowering of water levels, land subsidence, and wells going dry.

The sustainability goal for the Merced Subbasin is to:

Achieve sustainable groundwater management on a long-term average basis by increasing recharge and / or reducing groundwater pumping, while avoiding undesirable results.

This goal will be achieved by allocating a portion of the estimated Subbasin sustainable yield to each GSA and coordinating the implementation of programs and projects to increase both direct and in-lieu groundwater recharge, which will, in turn, increase the groundwater and / or surface water available to each GSA.

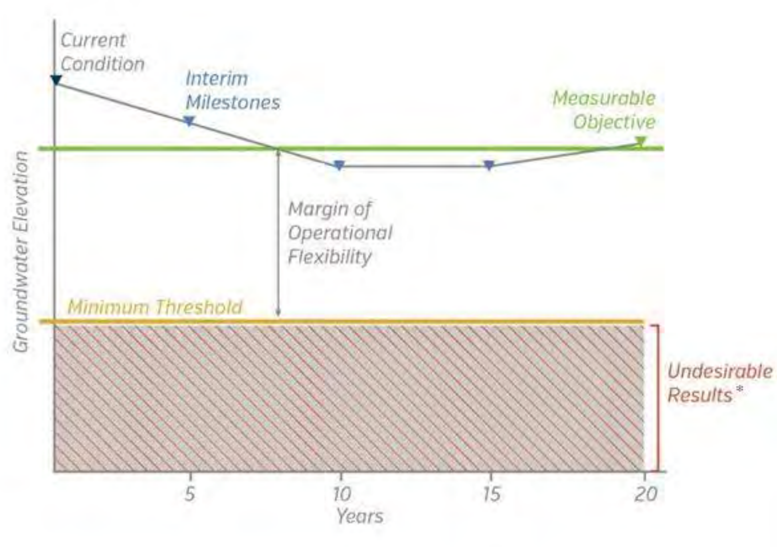
This sustainability goal is supported by the locally-defined minimum thresholds that sufficiently prevent undesirable results, presented later in this section. Achievement of the goal will be demonstrated by ~~documentation of stable groundwater elevations by 2040 (on a long-term average basis, recognizing that fluctuations will continue to occur related to annual variations in hydrology), combined with~~ the ~~absence~~ avoidance of undesirable results as defined in this GSP. This will confirm that the basin is operating within its sustainable yield without experiencing undesirable results, and thus that the sustainability goal has been achieved.

Sustainable Management Criteria Definitions

- Undesirable Results – Significant and unreasonable negative impacts for each sustainability indicator that are used to guide development of GSP components
- Minimum Thresholds – "*A numeric value for each sustainability indicator used to define undesirable results" [*CCR Title 23, Division 2, §351(t)]
- Measurable Objectives – Quantitative targets that establish points above the minimum thresholds that allow for a range of active management in order to achieve the sustainability goal for the basin. Defined in the CCR as "*Specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin"* [CCR Title 23, Division 2, §351(r)]
- Interim Milestones – "*Target values representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan"* [CCR Title 23, Division 2, §351(q)]
- Margin of Operational Flexibility: The space between the measurable objective and the minimum threshold

See Figure 3-1 for a graphic that illustrates the conceptual relationship between the Sustainable Management Criteria terms.

Figure 3-1: Sustainable Management Criteria Conceptual Graphic (Groundwater Levels Example*)



** Note that exceeding the minimum threshold at one representative well does not necessarily trigger an undesirable result. Undesirable results are defined for each sustainability indicator in the sections below.*

3.2 MANAGEMENT AREAS

SGMA provides the option for GSAs to define management areas for portions of basins to facilitate groundwater management and monitoring. A management area is defined in SGMA as an "*area within a basin for which the [GSP] may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors*" [CCR Title 23, Division 2, §351(r)].

For example, GSAs may establish management areas where they desire a higher level of monitoring or wish to set more stringent minimum thresholds relative to the rest of the basin. Per DWR Guidance:

> *Management areas may be defined by natural or jurisdictional boundaries, and may be based on differences in water use sector, water source type, geology, or aquifer characteristics. Management areas may have different minimum thresholds and measurable objectives than the basin at large and may be monitored to a different level. However, GSAs in the basin must provide descriptions of why those differences are appropriate for the management area, relative to the rest of the basin.* (DWR, 2017a, p. 6)

Management Areas have been discussed in the Merced GSP Stakeholder and Coordinating Committee Meetings, as well as GSA Board Meetings. At this time, there are no management areas established for the purposes of defining sustainability criteria for the Subbasin.

3.3 GROUNDWATER LEVELS

3.3.1 Undesirable Results

Description of Undesirable Results

The undesirable result related to groundwater levels is defined in SGMA as:

> *Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods. [CWC §10721(x)(1)]*

The undesirable result for chronic lowering of groundwater levels in the Merced Subbasin is sustained groundwater elevations that are too low to satisfy beneficial uses within the basin over the planning and implementation horizon of this GSP. During development of the GSP, potential undesirable results identified by stakeholders included:

- Significant and unreasonable unusable and stranded groundwater extraction infrastructure
- Significant and unreasonable reduced groundwater production
- Significant and unreasonable increased pumping costs due to greater lift and deeper installation or construction of new wells
- Significant and unreasonable number of shallow domestic wells going dry

Identification of Undesirable Results

For the Merced Subbasin, an undesirable result for declining groundwater levels is considered to occur during GSP implementation when November groundwater levels at greater than 25% of representative monitoring wells (at least ~~7~~6 of 2~~5~~1) fall below their minimum thresholds for two consecutive years~~ where both years are categorized~~

~~hydrologically as below normal, above normal, or wet[12]. Groundwater levels that fall below the minimum threshold during hydrologically dry or critically dry years are not considered to be an undesirable result, unless the groundwater levels fail to return to levels above the minimum threshold following the non-dry/critical years.~~

The GSAs recognize that water levels may continue to decline during GSP implementation and that dewatering of a single domestic well is not considered significant and unreasonable and is not considered an undesirable result. Nonetheless, the GSAs recognize the importance of access to safe drinking water for all users in the basin and will evaluate during the first five years of the GSP establishing mitigation for ~~shallow~~ domestic wells that might be dewatered by regional declines in grounding water levels ~~during the GSP implementation period~~ (see Section 6.2.3 – Management Action for Domestic Well Mitigation Program).

Potential Causes of Undesirable Results

The Subbasin is currently considered to be in a state of critical overdraft per the DWR Bulletin 118 Interim 2016 Update. Projections of water levels based on the GSP implementation plan do not show groundwater levels triggering undesirable results. However, the chronic lowering of groundwater levels could cause localized or basin-wide undesirable results if GSP implementation does not achieve sufficient pumping reductions. In addition, regulatory, permitting, and funding constraints may influence implementation timing for groundwater management programs and projects in the Subbasin.

Other potential causes could be external factors such as increased groundwater outflow from the Merced Subbasin to adjacent groundwater subbasins as a result of imbalances in groundwater pumping between the subbasins. Additionally, state- or federally-driven regulatory programs could dedicate surface water resources to environmental uses in the San Joaquin River or in downstream waterbodies such as the Sacramento-San Joaquin Delta, thus reducing water available to the Merced Subbasin. For example, increased flow requirements described by the Substitute Environmental Document (SED) for the Lower San Joaquin River and Southern Delta Bay-Delta Plan Update would likely cause impacts to groundwater levels.

Potential Effects of Undesirable Results

If groundwater were to reach levels that cause undesirable results, effects could include: de-watering of a subset of the existing groundwater infrastructure, starting with the shallowest wells (which are generally domestic wells) and adverse effects on groundwater dependent ecosystems. Lowering levels to this degree could necessitate drilling deeper wells for drinking water and agricultural irrigation supplies, which could cause adverse effects to property values and the regional economy. Additionally, undesirable results for groundwater levels could adversely affect current and projected municipal uses, which rely on groundwater in the Subbasin, increasing costs for potable water supplies.

3.3.2 Minimum Thresholds

Minimum Threshold Background

The minimum threshold definition for the chronic lowering of groundwater levels was developed to represent water levels that are ~~just~~ above conditions that could generate significant and unreasonable undesirable results in the Merced Subbasin, to the extent possible given available information. Future data may allow for refinement of this threshold.

The Subbasin, as described in the Section 2.1 - Hydrogeologic Conceptual Model, is composed of three principal aquifers: Above, Below, and Outside of the Corcoran Clay. The minimum threshold definition was applied to each of

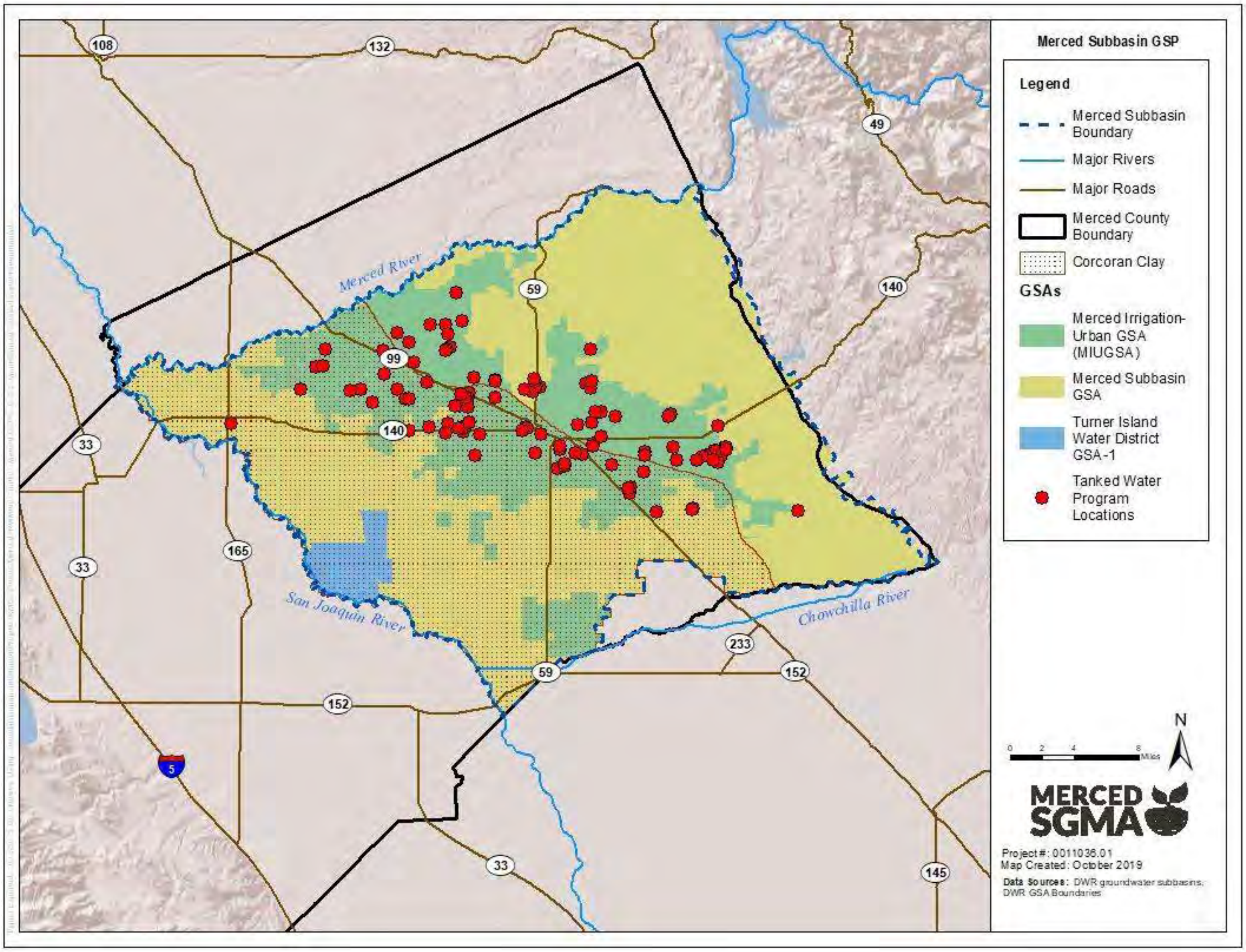
~~[12] Water year types based on San Joaquin Valley Water Year Index (DWR, 2017c)~~

these areas by selecting monitoring wells considered representative within each principal aquifer and establishing a threshold groundwater elevation for each well.

~~Domestic wells were used during the analysis of developing the thresholds at monitoring wells, as they are generally shallower than agricultural and municipal wells and thus more protective for applying the threshold. Additionally, a domestic well going dry would generally have potential to cause health and safety impacts resulting from a loss of water for consumption, cooking, and sanitary purposes, in addition to the financial burden associated with finding alternative water sources or deepening wells.~~

Within the Merced Subbasin, groundwater levels have been declining for several years (see Section 2.2 - Current and Historical Groundwater Conditions). Groundwater levels during the ~~recent~~ 2012-2016 drought declined at a faster rate, especially in the region designated as the Outside Corcoran Clay Principal Aquifer which is just east of the City of Merced, causing ~~many~~ approximately 130 domestic wells to go dry. As an emergency measure during the drought, Merced County facilitated a State of California tanked water program to make potable water available to ~~approximately 130~~ domestic users whose wells had gone dry. ~~This program ended in 2018.~~ Figure 3-2 shows a map with the location of the tanked water program deliveries. Of the participants in this program, those who were not removed from the program due to non-compliance with program requirements had new wells installed, with the exception of one who was connected to a city water system. Some participants sold their property; the current status of those properties is unknown.

Figure 3-2~~3~~ ~~2~~: Merced Subbasin Tanked Water Program Locations (through 2018)



Minimum Threshold Selection

The minimum threshold for groundwater levels ~~was~~ is defined as the ~~construction depth of the shallowest domestic well within a 2-mile radius.~~ fall 2015 groundwater level measurement (November 2015, or October 2015 or December 2015 when November data are unavailable) recorded at each representative monitoring well. This threshold keeps groundwater levels generally above levels that have been experienced in the past. In this way, impacts to shallow well users and other beneficial users of groundwater will generally not exceed what has historically been experienced in the Subbasin ~~prior to SGMA~~. In some areas, groundwater levels could be lower without resulting in significant and unreasonable impacts, notably due to limited domestic wells or to generally deeper domestic wells. Further, thresholds are set at fall 2015 levels to also be consistent with the other sustainability indicators. The groundwater level minimum threshold is consistent with the avoidance of significant and unreasonable impacts to subsidence, water quality, and depletions of interconnected surface water, as described later in this Plan. ~~Based on the undesirable results described in Section 3.3.1, dewatering of domestic wells is considered the most protective indicator, since domestic wells are expected to be the most shallow groundwater-accessing infrastructure.~~

To evaluate the impact of a fall 2015 minimum threshold, Merced County's electronic well permitting database was used to determine the shallowest domestic or Public Water System well depth within ~~two~~ five miles of each representative monitoring well (defined as a circle around the monitoring well with radius of ~~2~~5 miles). The Merced County well permitting database includes domestic and Public Water System wells permitted by the county since the early- to mid-1990s. While DWR's Online System for Well Completion Reports (OSWCR) contains additional wells permitted before the 1990s, the Merced County well permitting database was assumed to provide a reliable current representation of active domestic wells in the Subbasin. Additionally, it provides more specific information about these wells such as detailed location from latitude/longitude coordinates, address, or APN, as well as well status as part of the county's permit approval workflow process. The Merced County well permitting database was filtered to omit known inactive wells~~, wells that do not meet county annular seal requirements (depth of 50 feet or less)~~, resulting in approximately 3,010 wells with locations that could be plotted geographically within the Subbasin and that had a total well depth reported. 2,996 of these wells (99.5%) are located within five~~5~~ miles of one of the representative monitoring wells.- Additional analysis resulted in the filtering out of additional wells from the subset of 2,996, as described in the bullets below. However, it is ~~still~~ likely~~possible~~ that the resulting dataset still includes wells that have become inactive but are not flagged in the county's database.

- 8 wells reviewed manually and confirmed to be associated with a later well destruction record
- 8 wells that do not meet county domestic well annular seal requirements (depth of 50 feet or less)
- 11 wells ~~and a small number of other~~ flagged as other outliers[13]~~.~~

Total well depths were compared to the minimum threshold. ~~In the case of one representative monitoring well (CASGEM ID 28392),~~ At three out of 21 representative monitoring wells, fall 2015 elevation data are lower than the shallowest domestic well depth[14], indicating that these domestic well(s) may already have been dewatered and replaced. The three station IDs are 28392 (9 wells, equivalent to 45% of nearby wells), 38884 (1 well, equivalent to 2% of nearby wells), and 47575 (1 well, equivalent to 1% of nearby wells). Again, it is expected that these wells have likely since been deepened or abandoned and replaced given that groundwater levels have declined to this level in the past. Thus, returning to this level would not be expected to dewater these wells again. Recall that available datasets often include wells that are no longer in use for a variety of reasons. ~~In this case, the minimum threshold was moved to match the minimum groundwater elevation recorded at that location prior to January 1, 2015.~~

Representative Monitoring Wells for Minimum Threshold

A subset of CASGEM wells serve as the representative monitoring wells. Minimum threshold groundwater elevations were developed for 2~~5~~1 out of 50 CASGEM wells in the Subbasin and are considered the best representation of the Subbasin using best available information[15]. CASGEM wells were selected as they are actively managed and have

[13] Outliers that were statistically significant (much shallower than surrounding wells). Outlier Analysis: at each representative monitoring well, the interquartile range of domestic wells was calculated (75th percentile depth minus 25th percentile depth). Domestic wells were flagged as outliers and excluded from the threshold analysis if they had a depth that was shallower than: (25th percentile domestic well depth) – 1.5 * (Interquartile Range)

[14] It is acknowledged that domestic or Public Water Supply wells need additional water depth above the bottom of the well for the pump to functioning, but without information about pump settings, this was not considered in the analysis.

[15] Between November 2019 when the GSP was originally published and this July 2022 update, four representative groundwater leevel monitoring wells were removed from the network because it was discovered they either were completed in more than one aquifer or were located adjacent to nearly constant pumping operations and thus did not meet the SGMA requriements for monitoring wells. These are described in more detail in the Merced GSP Annual Reports.

previously been identified as appropriate for regional monitoring activities. Not all CASGEM wells were selected to be representative. For instance, only one well per unique set of multiple completion wells was considered for representative monitoring.

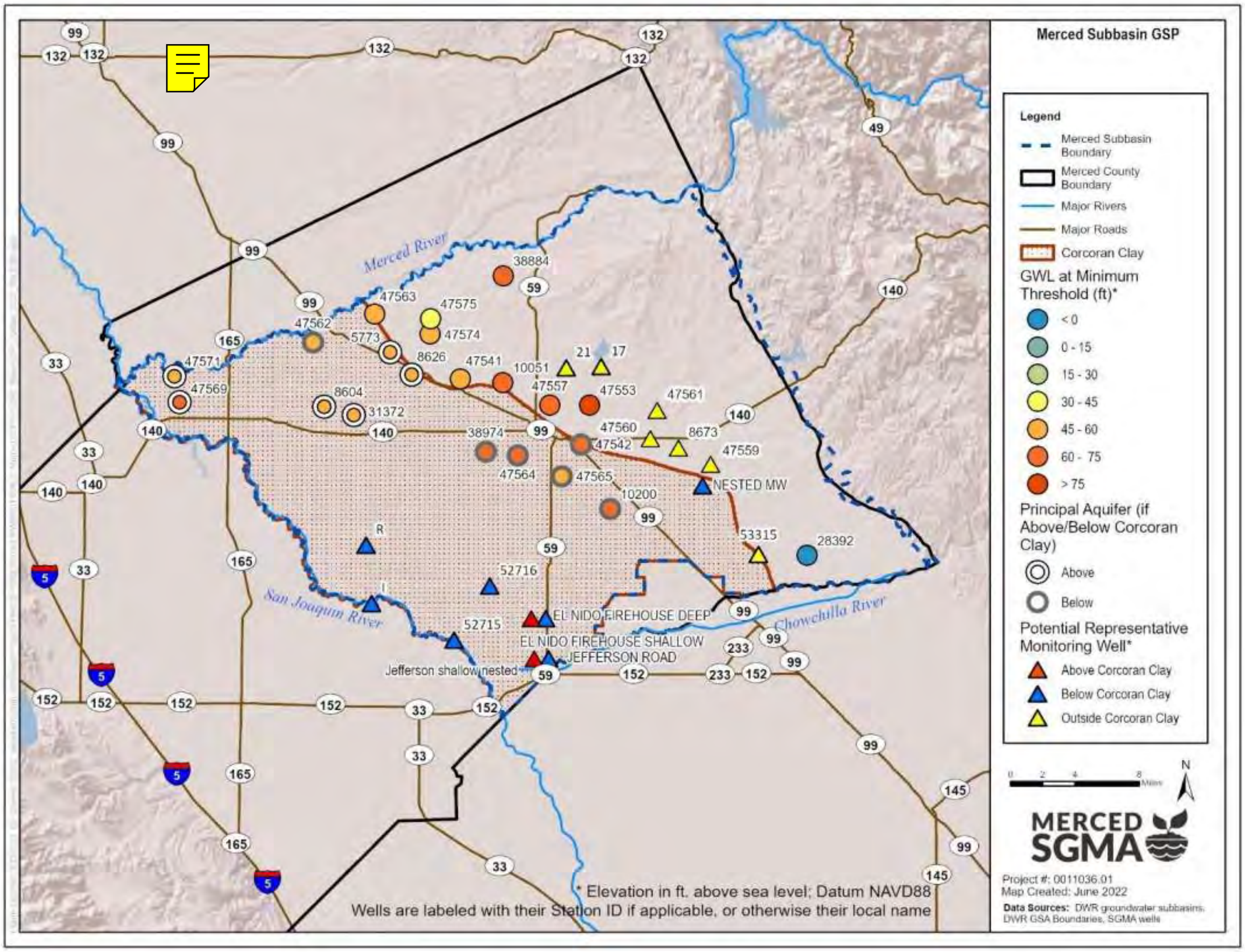
A data gap has been identified for the western portion of the Subbasin, and this is described in more detail in Section 4.5.6 - Data Gaps.

An additional 16 wells have been identified as potential representative monitoring wells, most of which came online or began recording measurements very recently between 2018-2021. Sustainable management criteria have not yet been established at these wells because most do not have a historical record from which to select a fall 2015 elevation.

As additional wells are added to the monitoring network, they will be considered for inclusion as representative monitoring wells based on their ability to contribute to characterization and management of groundwater conditions in the Subbasin. In the future, should representative wells be developed in areas of the Subbasin where there ~~are no domestic wells within a 2-mile radius and/or there are~~ is no or limited historical data available ~~for pre-2015 groundwater levels~~, the GSAs will need to consider developing a new minimum threshold definition; however, this is not anticipated to occur until the five-year GSP update, if at all. At that time, the Subbasin may consider including projected groundwater levels from the MercedWRM as part of the minimum threshold definition.

Figure 3-3 shows the minimum threshold groundwater elevations for all the representative monitoring wells. Additional information about the minimum threshold and associated groundwater elevations can be found in Table 3-1 following the discussion of measurable objectives. The 16 potential representative monitoring wells are shown in Figure 3-3 with a different symbol to show where some data gaps will eventually be filled once sustainable management criteria are developed at these additional wells.

Figure 3-3: Minimum Threshold Groundwater Elevations at Representative Monitoring Well Sites



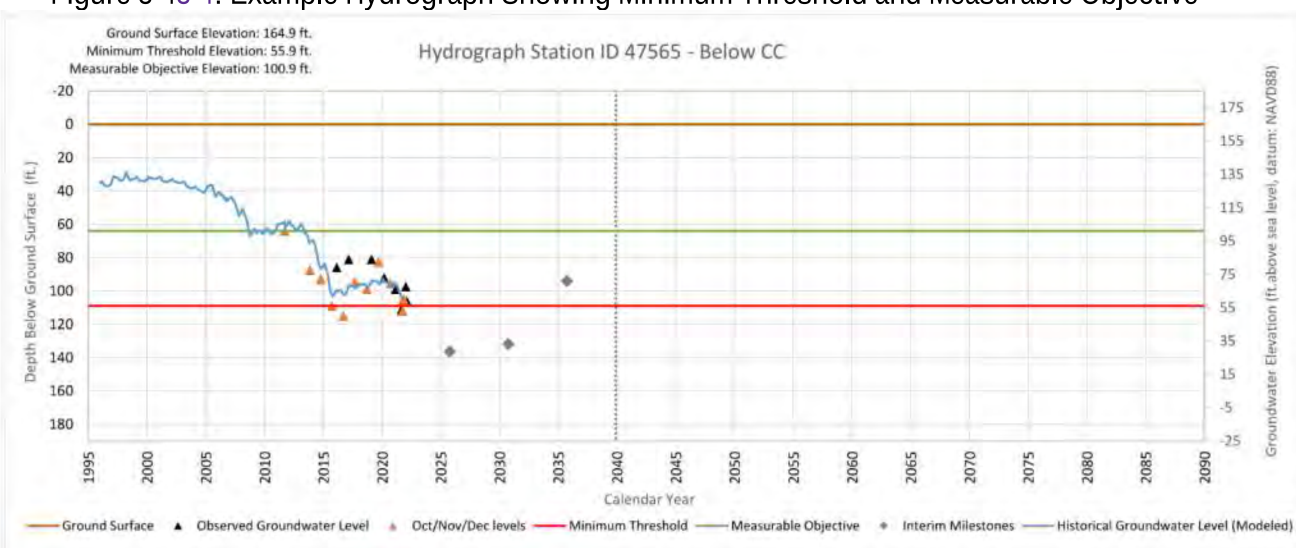
Groundwater levels are also used as a proxy indicator for depletion of interconnected surface water in Section 3.8.

3.3.3 Measurable Objectives and Interim Milestones

Measurable objectives are quantitative targets that establish a point above the minimum threshold that allow for a range of active management of the basin in order to achieve the sustainability goal for the basin. The condition between the measurable objective and the minimum threshold is known as the margin of operational flexibility. The margin of operational flexibility is intended to accommodate droughts, climate change, conjunctive use operations, or other groundwater management activities.

The measurable objective is set at the elevation of November 2011 groundwater levels for representative monitoring wells with historical measurements available. This represents relatively high groundwater levels prior to the declines seen during the 2012-2016 drought. For representative monitoring wells without available November 2011 measurements, October or December 2011 measurements were used, as available. For representative monitoring wells without November, October, or December 2011 measurements, a value has been calculated using estimates of historical groundwater levels in November 2011 from the MercedWRM historical conditions simulation. MercedWRM groundwater levels were adjusted vertically based on the average distance between observed and simulated levels before querying the November 2011 estimation. ~~projected average future groundwater level from 2040-2090, which was developed under the MercedWRM sustainable yield simulation described in Section 2.3 - Water Budget Information. In cases in which the average sustainable yield groundwater level was projected to be within 25 feet of the minimum threshold groundwater level or below the minimum threshold groundwater level, the measurable objective was set at a level 25 feet above the minimum threshold groundwater level. The value of 25 feet was based on a 10-year decline of -2.4 ft/yr in the Below Corcoran Clay Principal Aquifer in historical groundwater elevations discussed in Section 2.2.1.1 (Historical Groundwater Elevations), and was intended to provide a reasonable margin of operational flexibility.~~ Table 3-1 shows the measurable objective for each representative monitoring well. Figure 3-4 contains an example hydrograph, showing the relationship between historical groundwater elevations, simulated groundwater levels, ~~the shallowest domestic well within a 2-mile radius,~~ the minimum threshold groundwater level, ~~and~~ the measurable objective, and the interim milestones. Appendix F contains the full set of hydrographs, one for each representative monitoring well in Table 3-1.

Figure 3-4~~3-4~~: Example Hydrograph Showing Minimum Threshold and Measurable Objective



Interim milestones (IM) have been established ~~To~~ to facilitate the Subbasin reaching its measurable objectives for groundwater levels. The GSAs expect some level of continued groundwater level decline in much of the Subbasin while projects and management actions are developed and implemented. Further, many representative monitoring wells are currently below their minimum threshold. Thus, the IMs for groundwater levels allow for temporary further groundwater level decline below the minimum threshold. IMs are defined in 5-year increments, for 2025, 2030, and 2035.~~Where historical groundwater levels are consistently higher than the measurable objective, interim milestones were set equal to the measurable objective. When at least one historical groundwater level is below the measurable objective, t~~

The interim milestones are developed by first calculating a range for each of the 5-year increments. The range of IMs is developed so that wet conditions are generally represented by the upper value and dry conditions are generally represented by the lower value. The final IM for each of the 5-year increments is then based on a percentage between the upper and lower values.

The range of ~~interim milestones~~ IMs were developed as follows:

- Year 5 (2025)~~ and Year 10 (2030):~~
    - Low value: Calculated the average annual slope between the MT (based on 2015 levels) and MO (based on 2011 levels), then projected the 2025 measurement using the average slope from the most recently recorded October or November measurement (all but Station ID 28392 last had a valid measurement recorded October 2021).~~set at the lowest groundwater level in the past 5 years (2014-2018). For three sites without groundwater level data 2014-2018, the most recent groundwater level from 2012 or 2013 was used instead.~~
    - High value: Calculated the average annual slope in October through December groundwater levels from 2015 through 2019 (a relatively wet period), then projected the 2025 measurement using the average slope from the most recently recorded October or November measurement (all but Station ID 28392 last had a valid measurement recorded October 2021). If the resulting value was greater than 25% of the distance from the MT to the MO, then it was placed at 25% of the way from the MT to the MO.
- Year 10 (2030):
    - Low value: Calculated the average annual slope between the MT (based on 2015 levels) and MO (based on 2011 levels), then projected the 2030 measurement using half the average slope from the 2025 IM low end.
    - High value: Calculated the average annual slope in October through December groundwater levels from 2015 through 2019 (a relatively wet period). If the slope was negative, then maintained the 2025 IM high end. If the slope was positive, then projected the 2030 measurement using the average slope from the 2025 IM high end. If the resulting value was greater than 50% of the distance from the MT to the MO, then it was placed at 50% of the way from the MT to the MO.
- Year 15 (2035): ~~set at the midpoint between the recent historical low and the measurable objective.~~
    - Low value: Set at one third of the way between the 2030 IM and the MO. If the resulting value is greater than the MT, then it was set at the MT.
    - High value: Set at one third of the way between the 2030 IM and the MO.

The final interim milestone per representative monitoring well were developed and were calculated as follows:

- Year 5 (2025): *[2025 IM low value] + 25% * ([2025 IM high value] – [2025 IM low value])*
- Year 10 (2030): *[2030 IM low value] + 50% * ([2030 IM high value] – [2030 IM low value])*
- Year 15 (2035): *[2035 IM low value] + 75% * ([2035 IM high value] – [2035 IM low value])*

The percentage between the low value and high value increases with later years in recognition of reduced chances of predominantly dry conditions (higher potential to occur within short time periods) rather than more long-term normal conditions (higher potential to occur over longer time periods). Interim milestones are shown on Table 3-1.

Many representative monitoring wells have limited data, and many of these also show high levels of variability that make analysis difficult. Sustainable management criteria have been set using the best available data, including in some cases additional information from the MercedWRM groundwater model. In several cases, there may be influences of nearby production wells that would need to be considered when setting and monitoring for sustainable management criteria; influences that are difficult to discern from the limited data. Wells that exhibit groundwater levels that are highly variable or difficult to explain will be a focus for the installation of pressure transducers to better understand the variability, to the extent feasible. One such well is well ID 47541. Installations may be temporary or permanent. Sustainable management criteria may be modified based on future data collection and analysis.

Table 3-1: Groundwater ~~Elevations~~ Levels at Minimum Threshold, ~~and~~ Measurable Objective, ~~2015 Groundwater Elevations,~~ and Interim Milestones for Representative Wells

State Well ID	Well ID	Minimum Threshold[1]		Measurable Objective[1]			Interim Milestones[1]		
		Fall 2015 GW Level	Date of 2015 GWL	Fall 2011 GW Level[2]	Date of Fall 2011[2]	Measurable Objective[2]	2025	2030	2035
373496N1205890W001	47541	56.1	10/14/2015	-	-	66.4	29.9	25.6	39.5
370000N1200000W001	47574	56.0	10/1/2015	80.0	12/28/2011	80.0	40.0	36.7	56.4
373457N1205429W001	10051	73.7	10/12/2015	92.6	10/3/2011	92.6	48.1	45.8	65.7
373260N1204432W004	47553	87.4	10/8/2015	-	-	118.1	56.8	54.2	83.3
373243N1207424W001	8604	59.0	10/15/2015	67.0	10/3/2011	67.0	55.9	55.1	61.0
372904N1204207W001	47542	73.7	10/8/2015	-	-	112.6	38.3	35.6	71.6
373166N1207091W001	31372	50.8	10/15/2015	75.6	10/3/2011	75.6	33.9	34.6	55.9
373260N1204880W004	47557	62.4	10/8/2015	-	-	102.1	37.4	38.3	71.7
373532N1206432W001	8626	48.9	10/12/2015	78.0	10/3/2011	78.0	15.5	18.4	48.2
373278N1209054W002	47569	61.2	10/14/2015	68.2	10/15/2011	68.2	59.4	59.3	64.1
373510N1209113W001	47571	56.8	10/14/2015	66.3	11/15/2011	66.3	53.8	53.8	60.5
373732N1206679W001	5773	46.5	10/15/2015	-	-	73.8	26.8	30.6	54.8
372335N1204199W001	10200	67.2	10/29/2015	145.2	10/3/2011	145.2	11.5	13.9	81.8
372806N1205241W001	47564	70.2	10/12/2015	108.7	10/3/2011	108.7	53.5	55.1	84.4
370000N1200000W002	47575	45.0	10/1/2015	89.0	12/28/2011	89.0	26.1	27.8	61.3
374074N1206859W001	47563	50.5	10/15/2015	81.0	10/3/2011	81.0	33.1	35.7	60.8
373821N1207551W001	47562	58.8	10/15/2015	-	-	75.3	48.8	50.4	64.2
372838N1205602W001	38974	73.9	10/12/2015	104.4	10/3/2011	104.4	61.8	62.6	85.4
372617N1204747W001	47565	55.9	10/15/2015	100.9	10/3/2011	100.9	28.5	32.9	70.7
371902N1201985W001	28392	-94.5	10/14/2015	47.5	10/14/2011	47.5	-169.7	-159.4	-45.1
374421N1205407W001	38884[3]	70.7	N/A[3]	100.4	10/3/2011	100.4	40.4	38.1	66.7

Table 3-1 Notes:

1. *The Minimum Threshold~~s~~, Measurable Objective~~s~~, ~~2015 Elevations,~~ and Interim Milestones are reported as groundwater elevations in feet above sea level, datum: NAVD88.*
2. *For representative monitoring wells without observed fall 2011 measurements, a value has been calculated using estimates of historical groundwater levels in November 2011 from the MercedWRM historical conditions simulation. MercedWRM groundwater levels were adjusted vertically based on the average distance between observed and simulated levels before querying the November 2011 estimation.*
3. *~~1.~~3. Well ID 38884 does not have measurements recorded for 2012-2017. A 2015 estimate was calculated based on looking at the average difference between fall 2021 and fall 2015 measurements at representative monitoring wells in the Outside Corcoran Clay in the northern half of the Subbasin (e.g. in the region of well 38884). This average factor was applied to the 2021 measurement at 38884 to estimate the 2015 value and MT.*
4. ~~*2. "2015 Elevations" are shown for the most recent elevation recorded before 1/1/2015. For most wells, this is fall 2014. A handful of wells show a most recent elevation prior to 1/1/2015 that is in 2012 or 2013.*~~
5. ~~*3. CASGEM ID 47541 does not have groundwater elevations recorded prior to 1/1/2015, so the earliest elevation in 2015 is reported.*~~

3.4 REDUCTION OF GROUNDWATER STORAGE

Reduction of groundwater storage is not an applicable sustainability indicator because significant and unreasonable reduction of groundwater storage is not present and not likely to occur in the Subbasin, as described below.

The Merced Subbasin has approximately 45 million acre-feet (MAF) of fresh (non-saline) groundwater storage as of 2015 (see Section 2.2.2 - Groundwater Storage in Current and Historical Groundwater Conditions), and analysis of groundwater storage has shown a cumulative change in storage of less than -3 MAF over the 20-year period of 1995-2015. This cumulative change in storage, which includes both representative dry and wet years, reflects a rate of overdraft of approximately 0.3% per year. It is not reasonable to expect that the available groundwater in storage would be exhausted.

3.5 SEAWATER INTRUSION

Seawater intrusion is not an applicable sustainability indicator, because seawater intrusion is not present and is not likely to occur due to the distance between the Subbasin and the Pacific Ocean (and Sacramento-San Joaquin Delta).

3.6 DEGRADED WATER QUALITY

3.6.1 Undesirable Results

Description of Undesirable Results

The undesirable result related to degraded water quality is defined in SGMA as:

> *Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies. [CWC §10721(x)(4)]*

Undesirable results for degraded water quality would be impacts caused by groundwater extractions and other SGMA groundwater management activities in the Subbasin that cause significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

In identifying undesirable results for the Subbasin, the GSAs sought input from beneficial users through multiple venues including the stakeholder advisory committee and public workshops held in locations specifically selected to provide access to disadvantaged communities. The protection of water quality for drinking and for agricultural use was identified as a priority for users in the basin. Degraded water quality is unique among the six sustainability indicators because it is already the subject of extensive federal, state, and local regulations carried out by numerous entities and SGMA does not directly address the role of GSAs relative to these other entities (Moran & Belin, 2019). The GSAs also sought input from the Merced County Division of Environmental Health as to which constituents of concern in the Subbasin could be tied to groundwater management activities and therefore managed through SGMA. While the Division of Environmental Health has identified several constituents of concern in the Subbasin (see Section 2.2.4 - Groundwater Quality in Current and Historical Groundwater Conditions), this GSP focuses on only those constituents where groundwater management activities have the potential to cause undesirable results. The GSAs and Subbasin stakeholders, in consultation with the Division of Environmental Health, determined that salinity is the only constituent of concern currently known to be directly tied to groundwater management activities and therefore appropriate to include in the GSP.

Identification of Undesirable Results

An undesirable result is considered to occur during GSP implementation when at least 25% of representative monitoring wells (6~~5~~ of ~~19~~22 sites) exceed the minimum threshold for degraded water quality for two consecutive years[16].

Potential Causes of Undesirable Results

Groundwater in the Merced Subbasin contains both anthropogenic and naturally-occurring constituents. While groundwater quality is typically sufficient to meet beneficial uses, some of these constituents either currently impact groundwater use within the Subbasin or have the potential to impact it in the future. Depending on the water quality constituent, the issue may be widespread or more of a localized concern. The focus of this GSP is on constituents that are exacerbated or ameliorated due to groundwater management activities.

Salinity was identified by the GSAs based on stakeholder input and the recommendation of the Merced County Division of Environmental Health as the only constituent with sustainability management criteria to monitor in the GSP because the causal nexus between salinity concentrations and groundwater management activities has been established (see Section 3.6.2 - Minimum Thresholds). Relatively high salinity groundwater in the basin has been shown to migrate due to groundwater extraction activities. These areas of relatively high salinity groundwater are primarily located along the west side of the Subbasin, adjacent to the San Joaquin River and in urban use areas such as the cities of Livingston and Atwater. High salinity groundwater is principally the result of the migration of a deep saline water body which originates in regionally-deposited marine sedimentary rocks that underlie the San Joaquin Valley. Groundwater pumping can cause the upwelling of saline brines originating from naturally-occurring marine sedimentary rocks. Though the Corcoran Clay naturally impedes high TDS groundwater, high permeability pathways through the clay from the Below Corcoran Principal Aquifer to the Above Corcoran Principal Aquifer may be created by perforated wells. In addition, this poorer-quality water can migrate across the Subbasin from the west to the east (AMEC, 2008). Better quality groundwater (less than 1,000 mg/L) in these western and southwestern areas is generally found at shallower depths (AMEC, 2008), generally in the Below Corcoran Principal Aquifer .

Note that accumulation of salts due to agricultural activities, urban wastewater, or other land use activities do not have an established causal nexus with groundwater management activities.

Potential Effects of Undesirable Results

If groundwater quality were degraded to levels causing undesirable results, the effect could potentially cause a reduction in usable supply to groundwater users, with domestic wells being most vulnerable as treatment or access to alternate supplies may be unavailable or at a high cost for small users. Water quality degradation could cause potential changes in irrigation practices, crops grown, crop productivity, adverse effects to property values, and other economic effects. Degraded water quality could have impacts on native vegetation or managed wetlands. Additionally, reaching undesirable results levels for groundwater quality could adversely affect current and projected municipal uses, and users could have to install wellhead treatment systems or seek alternate supplies.

3.6.2 Minimum Thresholds

Minimum Threshold Applicability

[16] Between November 2019 when the GSP was originally published and this July 2022 update, three representative groundwater quality monitoring wells were added to the network because they were added by ESJWQC in their GQTM program specifically within the Merced Subbasin.

Degraded water quality is unique among the six sustainability indicators because it is already the subject of extensive federal, state, and local regulations carried out by numerous entities, and SGMA does not directly address the role of GSAs relative to these other entities (Moran & Belin, 2019). SGMA does not specify water quality constituents that must have minimum thresholds. Groundwater management is the mechanism available to GSAs to implement SGMA. Establishing minimum thresholds for constituents that cannot be managed by increasing or decreasing pumping was deemed inappropriate by the GSAs and basin stakeholders. Other water quality concerns are being addressed through various water quality programs (e.g., CV-SALTS and ILRP) and agencies (e.g., RWQCB, EPA) that have the authority and responsibility to address them. The GSAs will abide by any future local restrictions that may be implemented by the agencies or coalitions managing these programs. These water quality issues without a causal nexus in the Merced Subbasin include:

- Naturally occurring constituents such as arsenic, uranium, iron, and manganese: the GSAs do not have control over the presence of these constituents in aquifer materials. Thresholds are not set for these constituents as there is no demonstrated local correlation between fluctuations in groundwater elevations and/or flow direction and concentrations of these constituents at wells.

- Constituents from human activities that are not managed under SGMA: pesticides, herbicides, and fertilizers may be present from agricultural and, to a lesser degree, urban uses. Existing programs, including CV-SALTS, ILRP, and regulation by the California Department of Pesticide Regulation, are designed to address these concerns. Thresholds are not set for these constituents as the GSAs have no authority to limit the loading of nutrients or agrochemicals. However, as mentioned above, the GSAs will abide by any future local restrictions that may be implemented by agencies managing such programs.

- Constituents from human activities at contaminated sites managed under other regulatory authority: constituents at the former Castle Air Force Base and other smaller contaminated sites are under cleanup orders set by state or federal agencies. The potentially responsible parties are required to contain contaminants and remediate the groundwater. Data collected as part of GSP monitoring will be provided to regulators upon request. Thresholds are not set for these constituents as the GSAs are not responsible and do not have authority for containment or cleanup of these sites.

The major water quality issue being addressed by sustainable groundwater management is the migration of relatively higher salinity water into the freshwater principal aquifers. The nexus between water quality and water supply management exists for the pumping-induced movement of low-quality water from the west and northwest to the east.

The GSAs sought input from the Merced County Division of Environmental Health (Division) during the development of water quality minimum thresholds. The Division agrees that salinity is a good indicator for water quality issues and trends that are related to Subbasin groundwater management activities. In addition, the Division recommended that the GSAs make use of resources like GeoTracker and EnviroStor and to closely coordinate with agencies that already monitor contamination plumes.

While the GSP does not set thresholds for the types of constituents described above, current conditions in the Subbasin are summarized in Section 2.2.4 (Groundwater Quality), monitoring of these constituents is included in ongoing monitoring efforts listed below, and results will be summarized in future GSP updates. The GSAs will conduct the following ongoing water quality coordination activities:

- Monthly review of data submitted to the Department of Pesticide Regulation (DPR), Division of Drinking Water (DDW), Department of Toxic Substances Control (EnviroStor), and GeoTracker as part of the Groundwater Ambient Monitoring and Assessment (GAMA) database.

- Quarterly check-ins with existing monitoring programs, such as CV-SALTS and ESJWQC GQTM.

- Annual review of annual monitoring reports prepared by other programs (such as CV-SALTS and ILRP)

- GSAs will invite representative(s) from the Regional Water Quality Control Board, Merced County Division of Environmental Health, and ESJWQC to attend an annual meeting of the GSAs to discuss constituent trends and concerns in the Subbasin in relation to groundwater pumping.

- GSAs will consider potential beneficial and adverse effects on groundwater quality in siting groundwater recharge projects and other management actions.

The purpose of these reviews will be to monitor and summarize the status of constituent concentrations throughout the Subbasin with respect to typical indicators such as applicable MCLs or SMCLs. The Merced Subbasin GSP Annual Report and 5-Year Update will include a summary of the coordination and associated analyses of conditions. The GSP 5-year updates may include evaluation of whether minimum thresholds for additional constituents are needed.

The GSAs have selected a minimum threshold for groundwater levels that corresponds with 2015 elevations. One potential concern with water quality is that declines in groundwater levels can dewater additional portions of the aquifer impacting the migration of low-quality groundwater, resulting in low-quality groundwater entering from dewatering clays or other aquifer zones, or resulting in changes in aquifer chemistry. While the interim milestones for groundwater levels allow for temporary further groundwater level decline below 2015 elevations, it is expected that groundwater levels will be above 2015 elevations by 2040. As a result of the short-term nature of potential limited declines below 2015 elevations and the desire to operate at the measurable objective rather than the minimum threshold, groundwater quality degradation due to groundwater level declines below 2015 elevations is not expected in the long-term. In the meantime, the groundwater quality minimum threshold for salinity and other groundwater quality monitoring coordination activities described above will function to monitor for groundwater quality impacts.

Minimum Threshold Selection

Salinity is a measure of the amount of dissolved particles and ions in water. Salinity can include several different ions, but the most common are chloride, sodium, nitrate, calcium, magnesium, bicarbonate, and sulfate. While there are several different ways to measure salinity, the two most frequently used are Total Dissolved Solids (TDS) and Electrical Conductivity (EC). TDS is a measure of all dissolved substances that can pass through a very small filter (typically with 2-micrometer pores) and is typically reported in milligrams per liter (mg/L). EC measures the ability of an electric current to pass through water because conductivity is proportional to the amount of dissolved salts in the water. It is generally reported in microSiemens/cm. Salinity throughout this GSP is reported in terms of TDS.

The minimum threshold for salinity is defined based on the potential impact of salinity on drinking water and agricultural beneficial uses, as aligned with state and federal regulations. The recommended drinking water secondary MCL for TDS is 500 mg/L with an upper limit of 1,000 mg/L and a short-term limit[17] of 1,500 mg/L (SWRCB, 2006). The secondary MCL was established by the USEPA and then adopted by the SWRCB. The secondary MCL is a secondary drinking water standard established for aesthetic reasons such as taste, odor, and color and is not based on public health concerns. For agricultural uses, salt tolerance varies by crop, with common crops in the Merced Subbasin (almonds, sweet potatoes, tomatoes, alfalfa, corn, and grapes (Merced County Department of Agriculture, 2017)) tolerant of irrigated water with TDS below about 1,200 mg/L at a 90% crop yield potential (Ayers & Westcot, 1985).[18]

[17] Short-term limits are acceptable only for existing community water systems on a temporary basis pending construction of treatment facilities or development of acceptable new water sources (California Code of Regulations Title 22 § 64449).
[18] An average value of 1.8 dS/m was converted using University of California Agriculture and Natural Resources salinity unit conversion formula of TDS (mg/L) = Electrical Conductivity (dS/m) * 640 (applicable for electrical conductivity ranging 0.1 to 5 ~~-~~dS/m).

Salinity levels within the Merced Subbasin have historically ranged from less than 90 mg/L to greater than 3,000 mg/L as TDS. Generally, similar to other basins in the eastern San Joaquin Valley, TDS tends to increase from the foothills to the trough of the Valley. TDS in the eastern two-thirds of the Subbasin is generally less than 400 mg/L. TDS increases westward and southwestward towards the San Joaquin River and southward towards the Chowchilla River. In these areas, high TDS water is found in wells deeper than 350 feet (AMEC, 2008). TDS is slightly elevated in certain urban portions of the northern Subbasin, such as beneath the Atwater and Winton areas (AMEC, 2008).

Most recent 2000-2016 TDS concentrations in the Merced Subbasin, as analyzed by the CV-SALTS program, ranged widely from 90 mg/L to 2,005 mg/L. In the northwest area of the Above Corcoran Clay, average TDS is greater than 751 mg/L. Average TDS concentration in the Below Corcoran Clay is lowest in the North (less than 501 mg/L) and increases in the Southwest to over 1,000 mg/L (Luhdorff and Scalmanini Consulting Engineers, 2016). In pockets of the Subbasin with elevated TDS (greater than 1,000 mg/L), water use behaviors have already shifted to accommodate these concentrations. For example, agriculture has focused on more salt-tolerant crops, and more saline water supplies are blended with less saline water supplies. As a result, TDS concentrations in excess of 1,000 mg/L where currently experienced are not considered to be undesirable. There is, however, a desire on the part of Subbasin stakeholders to limit increases in salinity in parts of the Subbasin where TDS is below 1,000 mg/L to prevent undesirable results such as requirements to change cropping, blending supplies, etc.

Given these conditions, the minimum threshold for salinity was defined as 1,000 mg/L as TDS to be protective against undesirable results related to elevated salinity.

Representative Monitoring Wells for Minimum Threshold

The East San Joaquin Water Quality Coalition (ESJWQC) is a group of agricultural interests and growers formed to represent dischargers who own or operate irrigated lands east of the San Joaquin River within Madera, Merced, Stanislaus, Tuolumne, and Mariposa Counties, as well as portions of Calaveras County. The ESJWQC has developed a Groundwater Quality Trend Monitoring workplan (GQTM) as part of the Irrigated Lands Regulatory Program (ILRP), which includes a targeted set of domestic wells (denoted as principal wells) supplemented by public water system wells (denoted as complementary wells) (ESJWQC, 2018). All ESJWQC GQTM program principal and complementary monitoring wells in the Merced Subbasin are used as representative monitoring wells for this GSP. Additional information about minimum thresholds can be found in Table 3-2 following the discussion of measurable objectives. More information about these representative monitoring wells and plans to fill data gaps are included in Section 4.8 - Groundwater Quality Monitoring Network.

3.6.3 Measurable Objectives and Interim Milestones

The measurable objective is a TDS concentration of 500 mg/L, which aligns with the recommended Secondary MCL for TDS. The margin of operational flexibility is 500 mg/L TDS, the difference between the measurable objective of 500 mg/L and the minimum threshold of 1,000 mg/L.

In the case of degraded water quality, specifically for salts, there is a natural tendency for salt concentrations to increase over time due to agricultural and urban uses of water, which add salts either directly or increases concentrations through evapotranspiration. As previously noted, such increases are not due to a causal nexus with groundwater management activities and would not constitute an undesirable result under this GSP. Continued monitoring data will be analyzed for trends, and future increasing trends will be analyzed for evidence of the sources of the trends, such as upward migration of relatively higher salinity water due to overpumping or due to continued agricultural and urban uses. If caused by upward migration, GSAs will respond accordingly due to the causal nexus with groundwater pumping.

Table 3-2 shows the measurable objective for each representative monitoring well. Interim milestones are set at the same concentrations as the measurable objectives.

Table 3-2: Groundwater Quality Minimum Threshold & Measurable Objective Concentrations

ESJWQC GQTM Well ID	Complementary or Principal?[1]	Principal Aquifer	TDS Concentration at Minimum Threshold (mg/L)	TDS Concentration at Measurable Objective (mg/L)
P06	Principal	Outside	1,000	500
P07	Principal	Below	1,000	500
P08	Principal	Outside	1,000	500
P09	Principal	Below	1,000	500
P10	Principal	Below	1,000	500
ESJQC00019	Principal	Below	1,000	500
ESJQC00022	Principal	Above	1,000	500
ESJQC00030	Principal	Below	1,000	500
C35	Complementary	Above	1,000	500
C41	Complementary	Above	1,000	500
C45	Complementary	Above	1,000	500
C38	Complementary	Below	1,000	500
C44	Complementary	Below	1,000	500
C40	Complementary	Outside	1,000	500
C42	Complementary	Outside	1,000	500
C43	Complementary	Outside	1,000	500
C46	Complementary	Outside	1,000	500
C47	Complementary	Outside	1,000	500
C39	Complementary	Outside	1,000	500
C48	Complementary	Outside	1,000	500
C49	Complementary	Unknown	1,000	500
C50	Complementary	Unknown	1,000	500

1. *Complementary and Principal wells are defined in Section 4.8.1 - Monitoring Wells Selected for Monitoring Network.*

3.7 LAND SUBSIDENCE

3.7.1 Undesirable Results

Description of Undesirable Results

The undesirable result related to land subsidence is defined in SGMA as:

> *Significant and unreasonable land subsidence that substantially interferes with surface land uses. [CWC §10721(x)(5)]*

An undesirable result for land subsidence would be significant and unreasonable reduction in the viability of the use of infrastructure over the planning and implementation horizon of this GSP. Land subsidence that substantially interferes with surface land uses causes damage to public and private infrastructure (e.g., roads and highways, flood control, canals, pipelines, utilities, public buildings, residential and commercial structures).

The largest conveyance facility that has the potential to be damaged or have reduced flood conveyance capacity due to subsidence is the Eastside Bypass, located in the southwest corner of the Merced Subbasin. Additionally, because most subsidence in the Subbasin has occurred in the vicinity of El Nido (see Figure 2-80), community infrastructure in El Nido has the potential to be damaged by subsidence.

Identification of Undesirable Results

Exceedances of minimum threshold rates of land subsidence at three or more monitoring sites out of four for two consecutive years~~, where both years are categorized hydrologically as below normal, above normal, or wet[19], ~~will quantitatively indicate that the Subbasin has reached undesirable results for land subsidence.

Potential Causes of Undesirable Results

Land subsidence can be the direct result of over extraction of groundwater in the Subbasin. Subsidence has been observed in the southwestern portion of the Subbasin and encompasses areas included in all three GSAs. Subsidence in the Subbasin is thought to be caused by groundwater extraction below the Corcoran Clay and compaction of clays below the Corcoran Clay (DWR, 2017b). The transition from pasture or fallowed land to row and permanent crops adjacent to the San Joaquin River is thought to have created an increased groundwater pumping demand in an area that is not, at this time, provided with significant alternate surface water supplies (Reclamation, 2016).

Potential Effects of Undesirable Results

Compaction of subsurface materials can lead to land subsidence, which changes the ground surface and potentially impacts existing infrastructure and land use. Changes in land surface gradients due to land subsidence could impact the integrity of conveyance structures, which are typically gravity-driven. Subsidence could result in the need for higher dams or pumps to move surface water. Similarly, the capacity of flood conveyance systems can be reduced due to subsidence, resulting in a need for higher levees or other flood control infrastructure. As a result, negative impacts of land subsidence could include potential increases in the conveyance costs of irrigation water and in a decrease in ability to convey floodwater.

3.7.2 Minimum Threshold

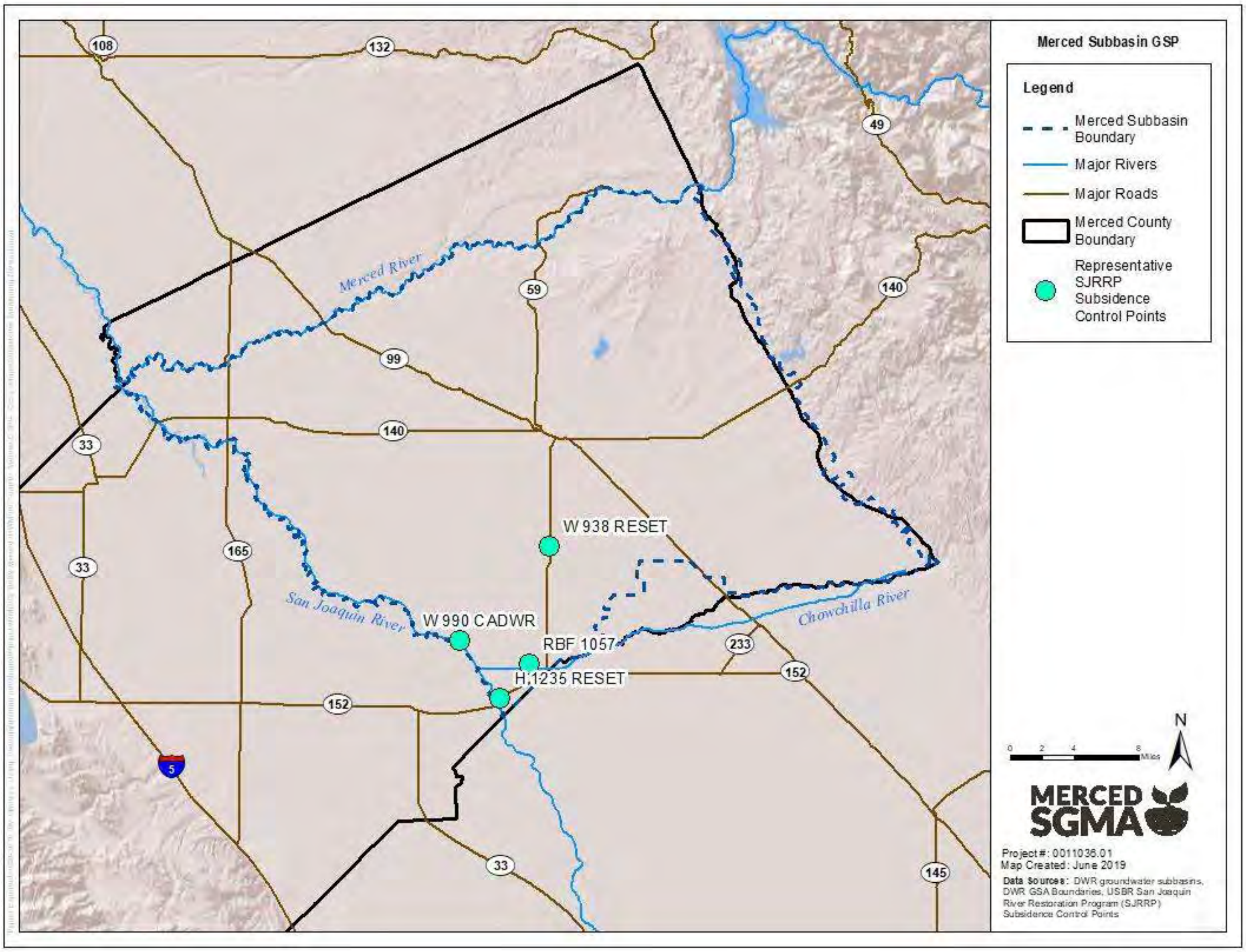
The minimum threshold for land subsidence was selected to prevent undesirable results. While the sensitivity of local infrastructure to land subsidence is not well understood, the ability to convey water supplies and flood water, including the ability to maintain levees, are currently observed to be the most sensitive to land subsidence. ~~Should additional information be developed on vulnerability to subsidence, this minimum threshold may be refined.~~

The minimum threshold is applied at four locations within the area of subsidence risk which are monitored for land subsidence by the US Bureau of Reclamation (USBR) on a semi-annual basis since 2011 as part of its San Joaquin River Restoration Program. These locations, and their maximum single year (December-to-December) subsidence rates recorded during USBR's monitoring period of 2011 to 2018, are listed below. A map of the locations is shown in Figure 3-5.

~~[19] Water year types based on San Joaquin Valley Water Year Index (DWR, 2017c)~~

* W 990 CADWR: maximum recent subsidence of -0.65 ft/year (December 2014 – December 2015)
* RBF 1057: maximum recent subsidence of -0.67 ft/year (December 2012 – December 2013)
* H 1235 Reset: maximum recent subsidence of -0.61 ft/year (December 2012 – December 2013)
* W 938 Reset: maximum recent subsidence of -0.58 ft/year (December 2014 – December 2015)

Figure 3-5: Minimum Threshold Subsidence Locations



Within the Merced Subbasin, while subsidence has been recognized by the GSAs as an area of concern, it is not considered to have caused a significant and unreasonable reduction in the viability of the use of infrastructure. However, it is noted that subsidence has caused a reduction in freeboard of the Middle Eastside Bypass over the last 50 years and has caused problems in neighboring subbasins, highlighting the need for ongoing monitoring and management in the Merced Subbasin.

Despite wetter conditions, subsidence in the Merced Subbasin between December 2017 and December 2018 was approximately -0.17 ft/yr and -0.32 ft/year, depending on the location. Subsidence is a gradual process that takes time to develop and time to halt, particularly with thick, fine-grained sediments. Depending on the thickness and the hydraulic properties of a thick clay unit, inelastic compaction (and thus subsidence) can require decades or centuries to approach completion (Sneed, Brandt, & Solt, 2018) (Lees, Knight, & Smith, 2022).~~.~~ As a result, some level of future subsidence, ~~likely~~ potentially at rates similar to those currently experienced, is likely to be underway already and will not be able to be fully prevented, although recovery of groundwater levels may reduce the rate of subsidence.

Given the lack of historical undesirable results experienced in the Subbasin, combined with the expectation that some level of future subsidence is already underway due to continued compaction of historically dewatered subsurface materials, interim milestones are set to manage subsidence during GSP implementation. These interim milestones are described in the next section.

The land subsidence minimum threshold ~~was~~ is set at a rate of 0 ft/year. However, compliance with this threshold will take into consideration the level of uncertainty in the measurements. ~~-0.75 ft/year.~~ The survey measurements have a vertical accuracy of ~~This rate is~~ +/-2.5 centimeters (Reclamation, 2011). With two measurements (before and after), the total uncertainty in the subsidence value is 5 centimeters, or approximately -0.16 ft/year. Subsidence of less than -0.16 ft/year (values that are less negative) are within the uncertainty of the measurement and would be considered compliant with the minimum threshold of 0 ft/year. ~~slightly higher than actual subsidence rates experienced between 2011 and 2018, which did not result in significant and unreasonable effects within the Merced Subbasin.~~

This minimum threshold is set recognizing the interconnectedness of the Merced Subbasin with surrounding subbasins, and the ability to meet this objective is dependent on the successful management of all nearby subbasins. This minimum threshold is also consistent with the sustainable management criteria for groundwater levels which seeks to keep levels above 2015 conditions. Keeping groundwater levels at or above 2015 conditions is consistent with limited or no subsidence. In addition to the minimum threshold, the Above Corcoran Sustainable Management Criteria Adjustment Consideration Management Action, described in Section 6.2.4, is developed to avoid declines in storage below historical levels. This further reduces the risk of subsidence.

This threshold may require modification in the future if residual subsidence continues to be seen approaching the 20-year GSP implementation period. Further,

~~T~~the minimum threshold subsidence rate may be reconsidered if additional information becomes available on the sensitivity of existing infrastructure on subsidence and for consistency with neighboring subbasins.

The Merced GSP will continue to coordinate efforts with surrounding subbasins to develop regional and local solutions to subsidence occurring in the Merced, Chowchilla, and Delta-Mendota Subbasins (described further in Section 4.9.7 - Plan to Fill Data Gaps, Subsidence Monitoring Network). The County of Merced is currently funding a project to study the potential impacts of moving pumping from below the Corcoran Clay to above the Corcoran Clay. This analysis is intended to facilitate relocating pumping to above the Corcoran Clay layer while meeting the requirements of Merced County's Groundwater Ordinance and is described further in the Projects and Management Actions section. The Projects and Management Actions section also discusses installation of monitoring stations to better characterize subsidence and the relationship of subsidence to groundwater pumping activities.

3.7.3 Measurable Objectives and Interim Milestones

The measurable objective for subsidence is based on the long-term avoidance of land subsidence~~recent subsidence rates, which are believed to be reflective of subsidence due to historical dewatering~~: 0~~-0.25~~ ft/year, on a long-term average. This measurable objective is set recognizing the interconnectedness of the Merced Subbasin with surrounding subbasins, and the ability to meet this objective is dependent on the successful management of all nearby subbasins~~. Interim milestones are also set at -0.25 ft/year~~.

~~The GSAs have also defined a locally-derived, non-regulatory level of -0.50 ft/yr of subsidence that will act as an adaptive management threshold. If subsidence rates are observed at or beyond this level at representative monitoring sites, then the GSAs may consider additional actions in an effort to avoid continued increase in subsidence rates prior to reaching the minimum threshold.~~

Interim milestones are set in 5-year increments in recognition of the likely continuing compaction of aquifer materials from historical dewatering and to provide adequate time for the GSAs to address an issue that is technically complex, not well understood, and that has the potential to result in negative socioeconomic impacts depending on the ultimate solution. The interim milestones are defined as:

- 2025: -0.75 ft/year
- 2030: -0.5 ft/year
- 2035: -0.25 ft/year

The land subsidence interim milestone for 2025 was at a rate of -0.75 ft/year. This rate is slightly higher than actual subsidence rates experienced between 2011 and 2018. The subsequent interim milestones have reduced subsidence values as projects and management actions are implemented to address groundwater levels and subsidence. These interim milestones are set recognizing the interconnectedness of the Merced Subbasin with surrounding subbasins, and the ability to meet this objective is dependent on the successful management of all nearby subbasins.

3.8 DEPLETIONS OF INTERCONNECTED SURFACE WATER

Depletions of interconnected surface water are a reduction in flow or levels of surface water caused by groundwater use. This reduction in flow or levels, at certain magnitudes or timing, may have adverse impacts on beneficial uses of the surface water and may lead to undesirable results. Quantification of depletions is relatively challenging and requires significant data on both groundwater levels near streams and stage information supported by groundwater modeling.

3.8.1 Undesirable Results

Description of Undesirable Results

Undesirable results related to depletions of interconnected surface water are defined in SGMA as:

> *Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water. [CWC §10721(x)(6)]*

Undesirable results for depletions of interconnected surface water in the Merced Subbasin could include depletions that result in reductions in flow or levels of major rivers and streams that are hydrologically connected to the basin such that the reduced surface water flow or levels have a significant and unreasonable adverse impact on beneficial uses of the surface water within the Subbasin over the planning and implementation horizon of this GSP.

Major rivers and streams that potentially have a hydraulic connection to the groundwater system in certain reaches are the Merced and San Joaquin Rivers. Many of the smaller creeks and streams are used for conveyance of irrigation water and generally surface water depletions (of irrigation water) would not impact natural flows in these systems; thus, these systems have not been considered in the analysis of depletions. However, future GSP updates may include considerations of these systems in the analysis of depletions. Hydraulic connection may occasionally be associated with perched water tables which are discussed further in Section 2.1.3.5 (Groundwater Recharge and Discharge Areas) in the Hydrogeologic Conceptual Model.

Identification of Undesirable Results

As chronic lowering of groundwater levels is used as a proxy for depletions of interconnected surface water, the identification of undesirable results for the depletion of interconnected surface water sustainability indicator is performed through the identification of undesirable results for the chronic lowering of groundwater levels sustainability indicator (see Section 3.3.1).

Potential Causes of Undesirable Results

As chronic lowering of groundwater levels is used as a proxy for depletions of interconnected surface water, the potential causes of undesirable results are the same as those for groundwater levels, e.g. groundwater pumping that lowers groundwater levels in areas where rivers and streams are hydrologically connected (see Section 3.3.1).

Potential Effects of Undesirable Results

If depletions of interconnected surface water were to reach levels causing undesirable results, effects could include reduced flow and stage within rivers and streams in the Subbasin to the extent that insufficient surface water would be available to support diversions for agricultural uses or to support regulatory environmental requirements. This could result in increased groundwater pumping, changes in irrigation practices and crops grown, and could cause adverse effects to property values and the regional economy. Reduced flows and stage, along with potential associated changes in water temperature, could also negatively impact aquatic species in the rivers and streams. Such impacts are tied to the inability to meet minimum flow requirements, which are defined for both the Merced River, and San Joaquin River, which, in turn, are managed through operations at New Exchequer Dam and other reservoirs.

Justification of Groundwater Levels as a Proxy

Because of the challenges associated with directly measuring streamflow depletions and because of the significant correlation between groundwater levels and depletions, this GSP uses groundwater levels as a proxy for the depletion of interconnected surface water sustainability indicator. Additionally, since the Merced Subbasin shares riverine borders with multiple other subbasins, additional complex inter-basin coordination will be involved in understanding and monitoring stream depletions directly. As such, the minimum thresholds for the interconnected surface water sustainability indicator are consistent with the minimum thresholds for the chronic lowering of groundwater levels sustainability indicator.

GSP regulations §354.36 allow GSAs to use groundwater levels as a proxy metric for any sustainability indicator, provided the GSP demonstrates that there is a significant correlation between groundwater levels and the other metrics. The following approach from DWR is used to justify the proxy metric:

- *Demonstrate that the minimum thresholds and measurable objectives for chronic declines of groundwater levels are sufficiently protective to ensure significant and unreasonable occurrences of other sustainability indicators will be prevented. In other words, demonstrate that setting a groundwater level minimum threshold satisfies the minimum threshold requirements for not only chronic lowering of groundwater levels but other sustainability indicators at a given site.* (DWR, 2017a)

To use the minimum thresholds for chronic lowering of groundwater levels as a proxy for depletions of interconnected surface water, the depletions that would occur when undesirable results for groundwater levels are reached must not be significant and unreasonable. In this way, the groundwater level minimum thresholds are sufficiently protective to ensure significant and unreasonable occurrences of depletions will be prevented. The analysis was performed by first considering historical depletions and then considering potential increases in depletions under conditions that are estimated to cause undesirable results for groundwater levels.

Historical depletions of interconnected surface water in the Subbasin are not considered significant and unreasonable. Therefore, the depletions in MercedWRM's historical simulation are assumed to have no associated undesirable results. If groundwater levels were to decline to the minimum threshold levels, a corresponding increase in surface water depletions would occur, above those seen historically.

Groundwater modeling results were analyzed to estimate the volume of depletions associated with groundwater levels that would constitute an undesirable result (wet, below normal, or above normal year pairings where 25% or more representative wells fall below the groundwater level minimum threshold). A hypothetical scenario was simulated to select groundwater levels that would constitute an undesirable result based on the groundwater level minimum threshold (described above in Section 3.3.2). To do this, the model simulated an 8% increase in evapotranspiration as compared to the existing conditions baseline. The additional stream losses (or decreased gains) that occurred under this scenario compared to the historical simulation are estimates of depletions, as they can be linked largely to simulated increases from existing groundwater pumping.

Model results estimate an additional 16,000 AFY of depletions on the Merced River, 10,000 AFY on the San Joaquin River, and 12,000 AFY on the combined system of canals and smaller streams. The additional depletions under this hypothetical scenario (38,000 AFY measured at the San Joaquin River) are about 1.6% of average annual surface water outflow from the Subbasin. A small percentage increase in stream depletions above historical depletion levels is not considered a significant and unreasonable amount of stream depletions. Depletions greater than this level would only occur under a condition which would create undesirable results for the groundwater level sustainability indicator. As a result, the groundwater level minimum threshold is expected to be protective against undesirable results for depletions of interconnected surface water.

The "combined system of canals and smaller streams" described above is primarily used for conveyance of irrigation water. There is an increased level of uncertainty in values calculated for this system due to many estimated model input values for certain unknown characteristics, such as bank material properties or streambed geometry. These input values are known with more certainty for the Merced River and San Joaquin River.

3.8.2 Minimum Thresholds and Measurable Objectives

As chronic lowering of groundwater levels is used as a proxy for depletions of interconnected surface water, the measurable objective and interim milestones for the depletion of interconnected surface water sustainability indicator are the measurable objective and interim milestones for the chronic lowering of groundwater levels sustainability indicator.

3.9 COORDINATION WITH ADJACENT BASINS

Adjacent subbasins are Turlock, Chowchilla, and Delta-Mendota.

A formal Memorandum of Understanding (MOU) has been finalized between the Merced and Chowchilla Subbasin GSAs (see Appendix G). Inter-subbasin modeling coordination with Chowchilla was performed to provide the basis for consistency in the way minimum thresholds are determined; however, future coordination must continue to confirm consistency. In addition, the technical approach for the sustainability analysis and its relationship to inter-basin coordination is intended to result in minimum thresholds that do not negatively impact adjacent basins.

A memorandum of intent to coordinate (MOI) has been finalized between each of the GSAs in the Turlock and Merced Subbasins (see Appendix H). The MOI outlines the intention to share data and coordinate GSPs in the Merced and Turlock Subbasins without adversely impacting the adjacent basin. The MOI also recognizes that the Turlock Subbasin is on a different timeline and will not have a GSP complete until 2022; thus, the GSAs intend to work together to develop and refine common knowledge and understanding over time.

Coordination meetings with Delta-Mendota continue and an MOU was also under development at the time of preparation of this document.

4 MONITORING NETWORKS

This section discusses the monitoring networks identified to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan. Monitoring networks are established for each sustainability indicator relevant to monitoring in the Merced Subbasin: groundwater levels, groundwater storage, groundwater quality, subsidence, and depletions of interconnected surface waters. While undesirable results related to groundwater storage are not present and are not likely to occur in the Subbasin, a monitoring network based on groundwater levels is still developed to support development of groundwater budgets, including an estimate of the change in annual groundwater in storage, and to support overall characterization of the Subbasin. Similarly, while groundwater levels are used as a proxy for the sustainable management criteria for depletions of interconnected surface water, a monitoring network is still developed to allow for continued characterization of the system. Of the six sustainability indicators under SGMA, only seawater intrusion is not covered by a monitoring network in this plan, as undesirable results related to seawater intrusion are not present and are not likely to occur in the Subbasin (see Section 3.5 - Seawater Intrusion).

This section includes the monitoring network objectives, the existing monitoring networks, the rationale for monitoring, details on representative monitoring, and a description of a monitoring network for each applicable sustainability indicator. Data gaps and a plan to fill them are provided for each monitoring network.

4.1 MONITORING NETWORK OBJECTIVES

The primary objective of these monitoring networks is to allow for evaluation of the effects and effectiveness of Plan implementation, including detection of undesirable results using the minimum thresholds described in Chapter 3 of this Groundwater Sustainability Plan (GSP). Other related objectives of the monitoring network as defined in the Sustainable Groundwater Management Act (SGMA) regulations include:

- Demonstrating progress toward achieving measurable objectives
- Monitoring impacts to the beneficial uses or users of groundwater
- Monitoring changes in groundwater conditions relative to measurable objectives and minimum thresholds
- Quantifying annual changes in water budget components

4.2 EXISTING SUBBASIN MONITORING

The monitoring networks described in this section were designed by first evaluating available data and existing monitoring in the Subbasin, to leverage the substantial historical and ongoing monitoring activities. Existing monitoring programs were previously described in Section 1.2.2 - Water Resources Monitoring and Management Programs.

4.3 MONITORING RATIONALES

The Merced Subbasin GSP monitoring networks were developed to meet the objectives described above. This will allow for the detection of changes in Subbasin conditions so the GSAs can adaptively manage the Subbasin to meet sustainability goals.

Monitoring networks were developed from existing wells, or other facilities, that were selected specifically to provide an adequate amount of temporal frequency and spatial density to detect short-term, seasonal, and long-term trends in groundwater conditions. This data is necessary to evaluate the effectiveness of projects and management actions undertaken by the GSAs.

Data gaps, where additional monitoring information is necessary, were also identified. Plans or projects to install additional monitoring sites to fill these data gaps are included as a management action or project in the Implementation Section of the GSP.

Additional details on the monitoring rationales are described within each monitoring network.

4.4 REPRESENTATIVE MONITORING

Representative monitoring sites are a subset of the Subbasin's total monitoring network specifically selected to represent groundwater conditions in the Subbasin and track sustainability. Minimum thresholds and measurable objectives are defined only at representative monitoring locations. Representative monitoring locations are selected by evidence that the site reflects typical conditions in the area, can provide monitoring data that are representative of that area, and has access suitable for long-term monitoring. By selecting specific monitoring locations that reflect the Subbasin's typical conditions and monitoring established parameters, the GSAs can monitor the sustainability indicators and collect targeted data.

Additional monitoring facilities are included in the monitoring network to characterize conditions at a more detailed level across the Subbasin and to verify that the representative monitoring locations continue to be representative of typical conditions. This information can be used to inform the 5-year GSP updates and can support other groundwater management needs, such updates and refinements to the groundwater model. Note that, in some cases, these monitoring facilities are not designated as representative because they do not meet minimum criteria, such as known construction information or adequate historical data to develop minimum thresholds and measurable objectives.

Should additional monitoring sites be added to a particular monitoring network in the future, each may be evaluated against the criteria or methodology used to develop existing minimum thresholds to determine if the additional site is applicable as a representative monitoring site in addition to providing value to the monitoring network as a whole.

4.5 GROUNDWATER LEVEL MONITORING NETWORK

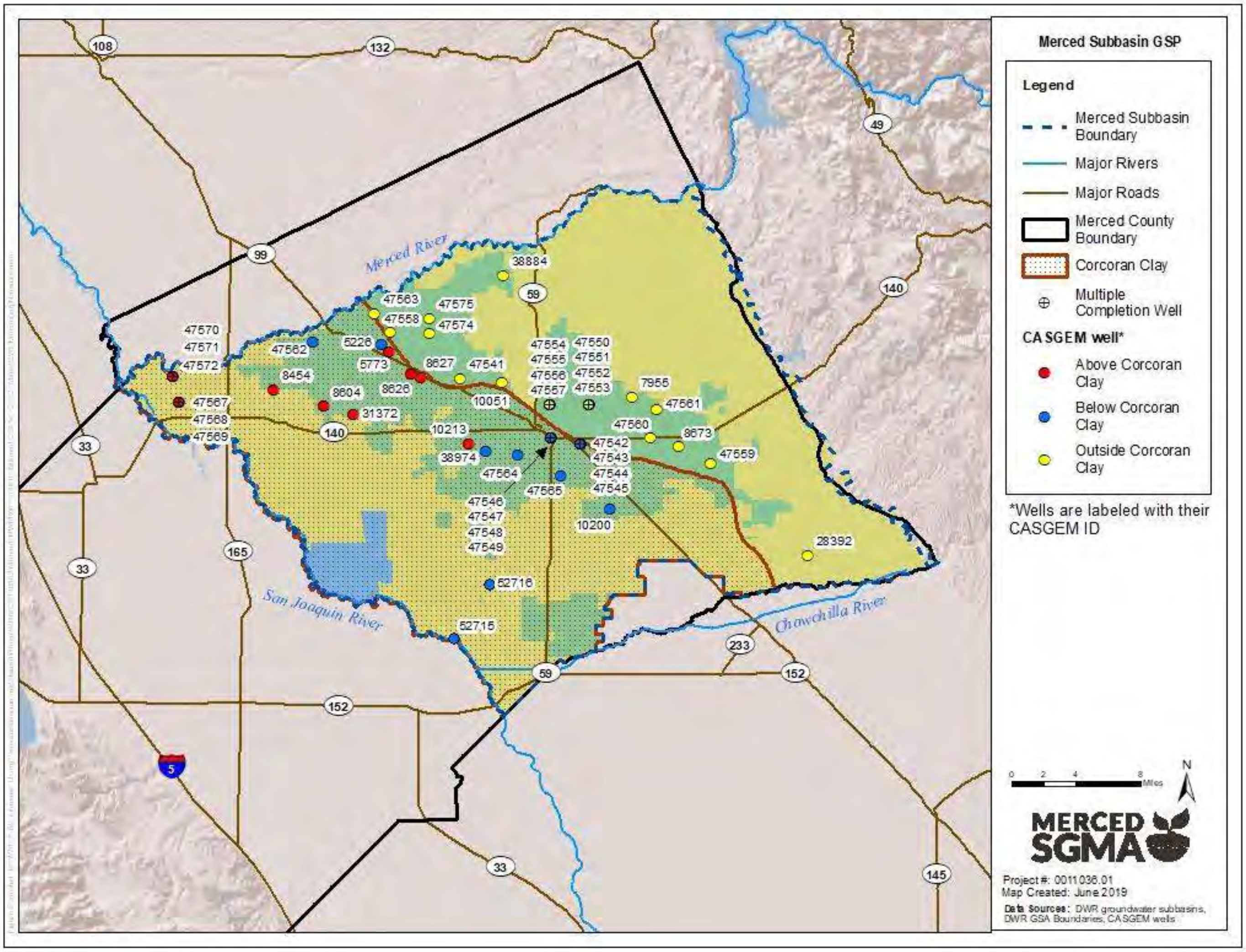
Groundwater level monitoring is conducted through a groundwater well monitoring network. The network allows for demonstration of groundwater occurrence, general flow directions, and hydraulic gradients between the principal aquifers and surface water features. Further, the network allows for characterization of the groundwater table or potentiometric surface of each of the three principal aquifers.

4.5.1 Monitoring Wells Selected for Monitoring Network

Wells for the monitoring network were selected as the entirety of the existing California Statewide Groundwater Elevation Monitoring (CASGEM) network within the Subbasin. CASGEM was established by the State of California and implemented locally to develop a permanent, locally-managed program of regular and systematic monitoring in all of California's alluvial groundwater basins. With regards to groundwater level monitoring, CASGEM has many similarities with the requirements of SGMA. While there are gaps in the overall coverage for the CASGEM network, it is appropriate for the existing monitoring network in the Merced Subbasin to be the nucleus of a comprehensive network for this GSP.

The Merced Subbasin GSP groundwater level monitoring network totals 50 wells from the CASGEM program. This includes 13 wells in the Above Corcoran Clay Principal Aquifer, 16 wells in the Below Corcoran, and 21 wells in the Outside Corcoran. 22 out of 50 CASGEM wells are grouped into six sets of multiple completion wells. Figure 4-1 shows the well locations.

Figure 4-1: Merced Subbasin GSP Groundwater Level Monitoring Network Wells



4.5.2 Monitoring Frequency

The monitoring frequency is selected to allow the monitoring network to adequately interpret short and long-term groundwater level trends and conditions. These fluctuations may be the result of seasonality, pumping, or climatic variations such as storm events and drought. According to SGMA regulations, monitoring frequency must occur, at a minimum, at the Subbasin's seasonal high and low. In the Merced Subbasin these seasonal peaks generally occur during March and October.

DWR's *Monitoring Networks and Identification of Data Gaps BMP* provides non-regulatory guidance for monitoring frequency based on based on aquifer properties and degree of use, as shown in Table 4-1.

Table 4-1: Summary of DWR Guidance on Monitoring Frequency

Aquifer Type	Nearby Long-Term Aquifer Withdrawals		
	Small Withdrawals	*Moderate Withdrawals*	*Large Withdrawals*
Unconfined Aquifer			
"low" recharge (<5 inches/year)	Quarterly	Quarterly	Monthly
"high" recharge (>5 inches/year)	Quarterly	Monthly	Daily
Confined Aquifer			
"low" hydraulic conductivity (<200 feet/day)	Quarterly	Quarterly	Monthly
"high" hydraulic conductivity (>200 feet/day)	Quarterly	Monthly	Daily

Source: (DWR, 2016c)

According to Table 4-1, the three Merced Subbasin Principal Aquifers fall under two categories:

- Above Corcoran Clay Principal Aquifer: unconfined, low recharge where unirrigated, high recharge where irrigated, moderate to large withdrawals.
- Below Corcoran Clay Principal Aquifer: confined, low hydraulic conductivity, moderate to large withdrawals.
- Outside Corcoran Clay Principal Aquifer: unconfined, low recharge where unirrigated, high recharge where irrigated, moderate to large withdrawals.

While existing CASGEM monitoring currently records groundwater levels biannually at the seasonal peaks (typically March and October) as well as December, ~~the Department of Water Resource's' (~~DWR's~~)~~ best management practice (BMP) suggests all three principal aquifers should be monitored at least quarterly, potentially monthly, and daily in some situations.

Monitoring will occur on or near the second week of each month for all CASGEM wells, with re-assessment of the frequency at the 5-year update, or sooner, if needed. At that time, the frequency may be changed, particularly if quarterly sampling can be shown to adequately capture the variability or if irrigation-season measurements are shown to be too impacted by nearby groundwater pumping to be useful.

4.5.3 Spatial Density

A sufficient density of monitoring wells is necessary to characterize the groundwater table or potentiometric surface for each principal aquifer. DWR's *Monitoring Networks and Identification of Data Gaps BMP* (DWR, 2016b) provides multiple sources to guide monitoring network well density, as shown in Table 4-2.

Table 4-2: Monitoring Well Density Considerations

Reference	Monitoring Well Density (wells per 100 miles^2)
Heath (1976)	0.2-10
Sophocleous (1983)	6.3
Hopkins (1994)	
Basins pumping more than 10,000 AFY per 100 square miles	4.0
Basins pumping between 1,000 and 10,000 AFY per 100 square miles	2.0
Basins pumping between 250 and 1,000 AFY per 100 square miles	1.0
Basins pumping between 100 and 250 AFY per 100 square miles	0.7

Source: (DWR, 2016b)

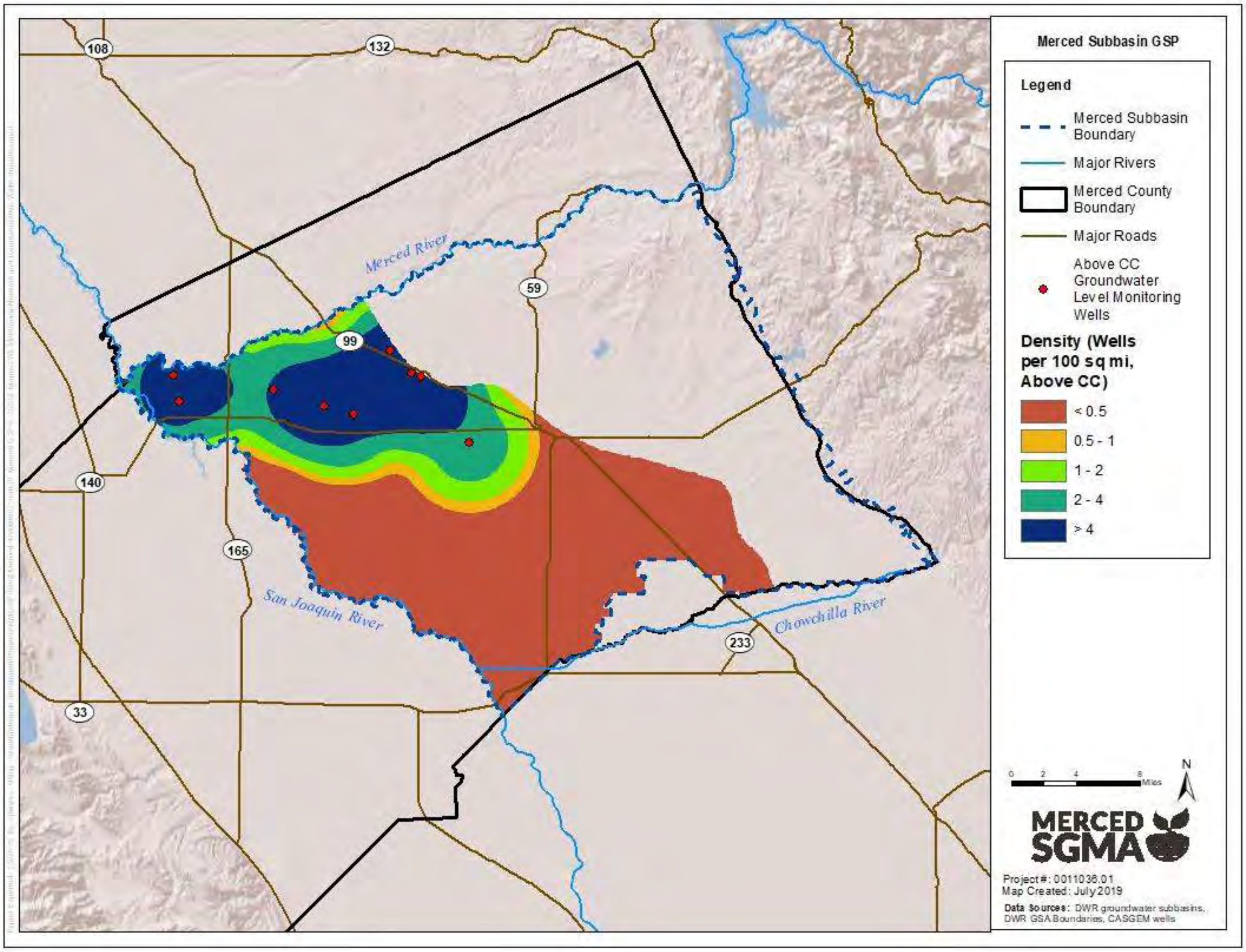
According to the Historical Conditions Water Budget (WYs 2006-2015), the Subbasin pumps approximately 723,000 AF annually. The Subbasin has an area of 801 square miles of area which leads to approximately 90,000 AF pumped per 100 square miles. Based on Hopkins (1994) well density estimate guidelines, the Subbasin should have 4 monitoring wells per 100 square miles. Based on Sophocleous (1983) well density estimate guidelines, the Subbasin should have 6.3 monitoring wells per 100 square miles. Based on Heath (1976), the Subbasin should have between 0.2 and 10 monitoring wells per 100 square miles.

The well density is within the ranges presented in DWR's guidance. Table 4-3 shows the density of wells by principal aquifer, with three following figures showing the variability in well density across the Subbasin: Figure 4-2 for the Above Corcoran Clay Principal Aquifer, Figure 4-3 for the Below Corcoran Clay Principal Aquifer and Figure 4-4 for the Outside Corcoran Clay Principal Aquifer. The density of wells in the Above Corcoran Clay Principal Aquifer (2.1 wells/100 mi^2) and Below Corcoran Clay (2.3 wells/100 mi^2) are roughly half of the density of wells in the Outside Corcoran Clay (4.1 wells/100 mi^2). These densities are lower than those recommended by Sophocleous (1983) and Hopkins (1994) but are within the ranges of Heath (1976) and are considered sufficient to characterize conditions in most of the Subbasin. Spatial data gaps are acknowledged and described further in Section 4.5.6.

Table 4-3: Density of Groundwater Level Monitoring Wells by Principal Aquifer

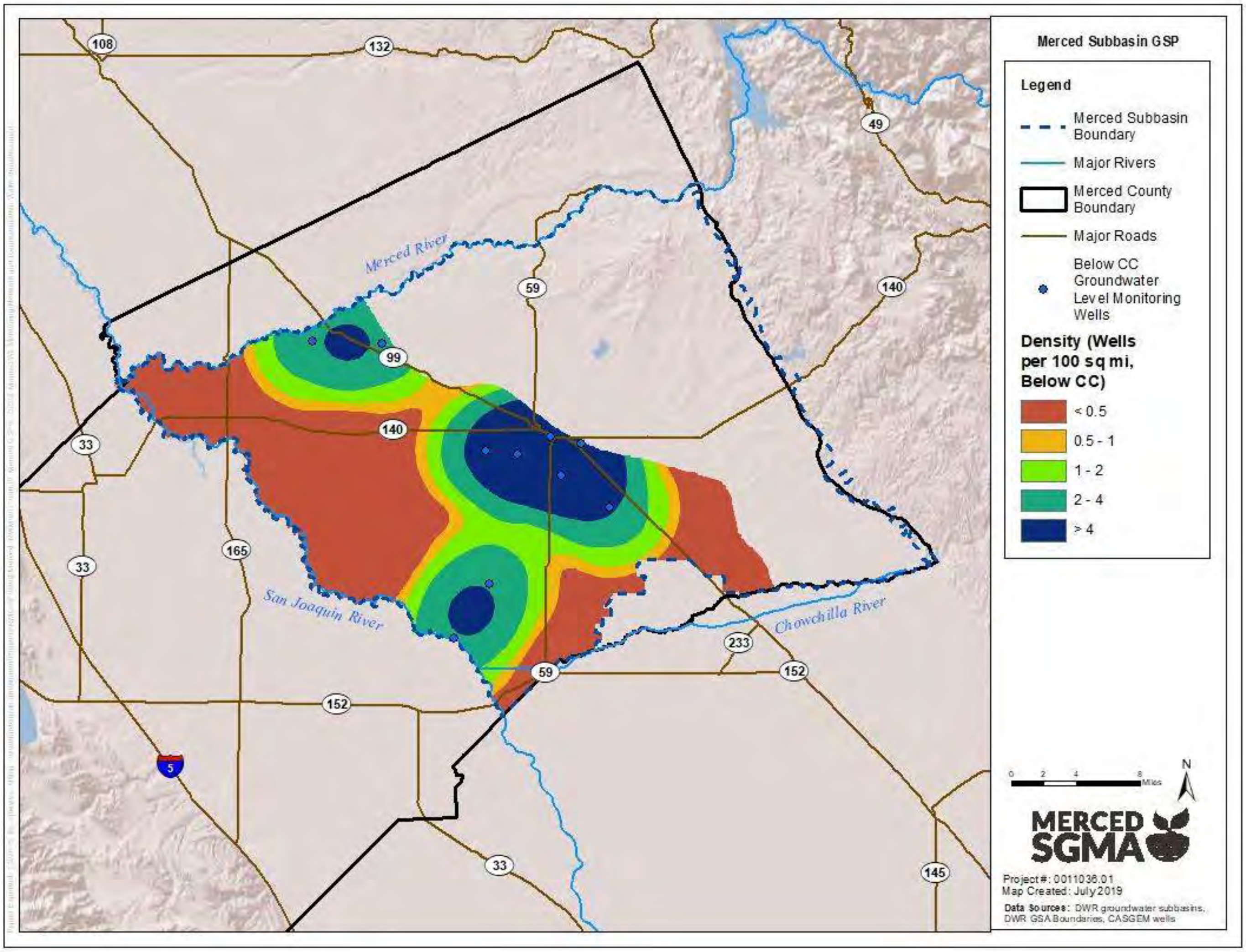
	Principal Aquifer			Total
	Above Corcoran Clay (Figure 4-2)	Below Corcoran Clay (Figure 4-3)	Outside Corcoran Clay (Figure 4-4)	
Total Number of Unique Well IDs	13	16	21	50
Subset of Total That Are Multiple Completion Wells	6	8	8	22
Total Number of Geographically Unique Well Locations	9	10	15	34
Area of Principal Aquifer (mi^2)	437	437	364	801
Density (number of wells per 100 mi^2)	2.1	2.3	4.1	4.2

Figure 4-2: Density of Groundwater Level Monitoring Network – Above Corcoran Clay Principal Aquifer



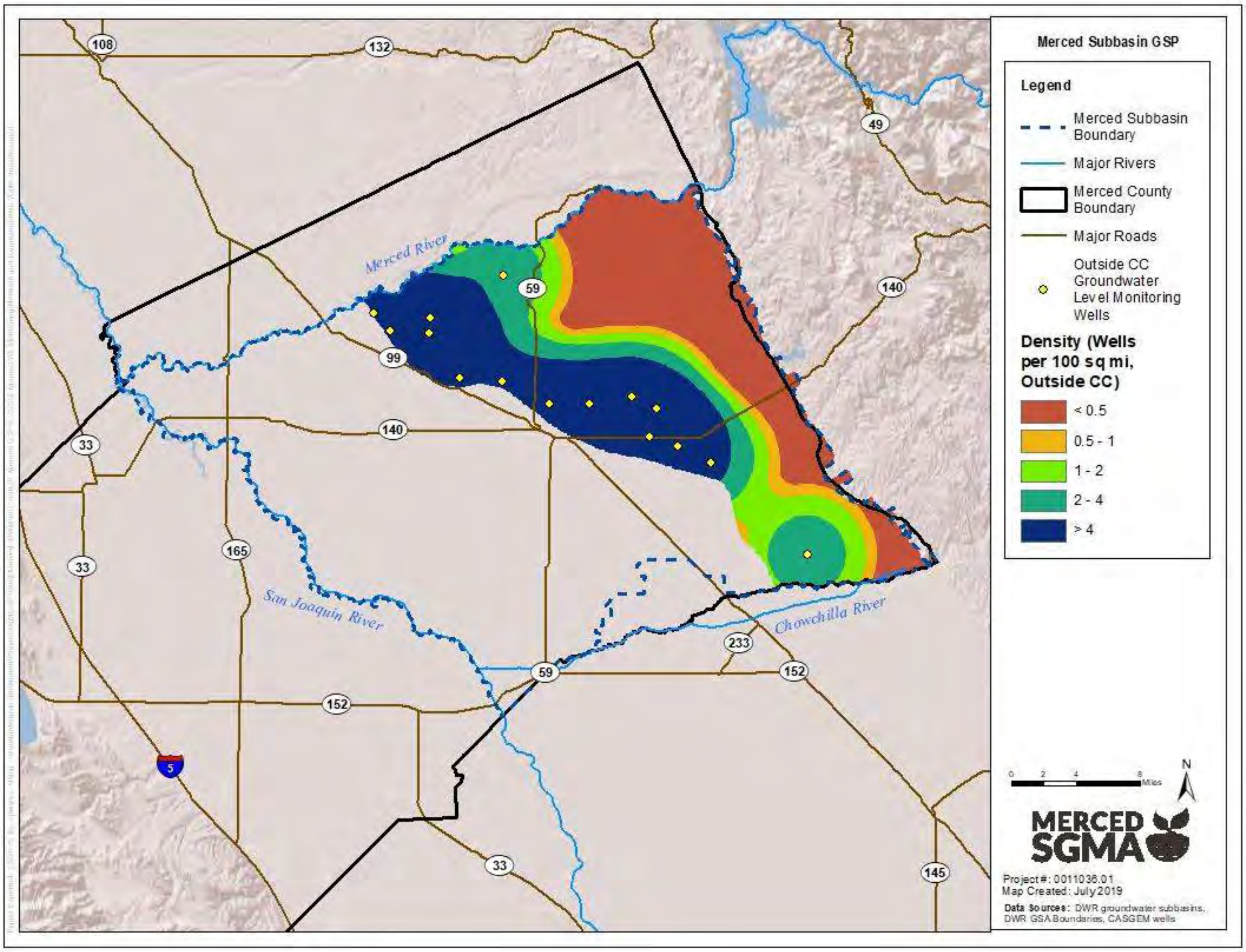
Note – voluntary wells without construction information (e.g., not sorted into a Principal Aquifer) are not shown.

Figure 4-3: Density of Groundwater Level Monitoring Network – Below Corcoran Clay Principal Aquifer



Note – voluntary wells without construction information (e.g., not sorted into a Principal Aquifer) are not shown.

Figure 4-4: Density of Groundwater Level Monitoring Network – Outside Corcoran Clay Principal Aquifer



4.5.4 Representative Monitoring

The Merced Subbasin GSP groundwater levels monitoring network totals 50 wells, 2~~5~~1 of which are designated as representative wells. Representative monitoring wells were selected specifically in conjunction with the minimum threshold selection methodology described in Section 3.3.2. Wells included are CASGEM wells that are screened within the portion of the principal aquifer typically accessed for groundwater production and that are reflective of typical aquifer conditions, based on information from the Merced Water Resources Model (MercedWRM).

Figure 4-5 shows the locations of the groundwater level monitoring network monitoring and representative wells.

Table 4-4 details the groundwater level monitoring network monitoring and representative wells, with Table 4-5 showing locations in a tabular format. Representative wells are identified with an asterisk (*) next to their State Well Number.

Figure 4-5~~4-5~~: Merced Subbasin GSP Groundwater Level Monitoring Network Monitoring and Representative Wells

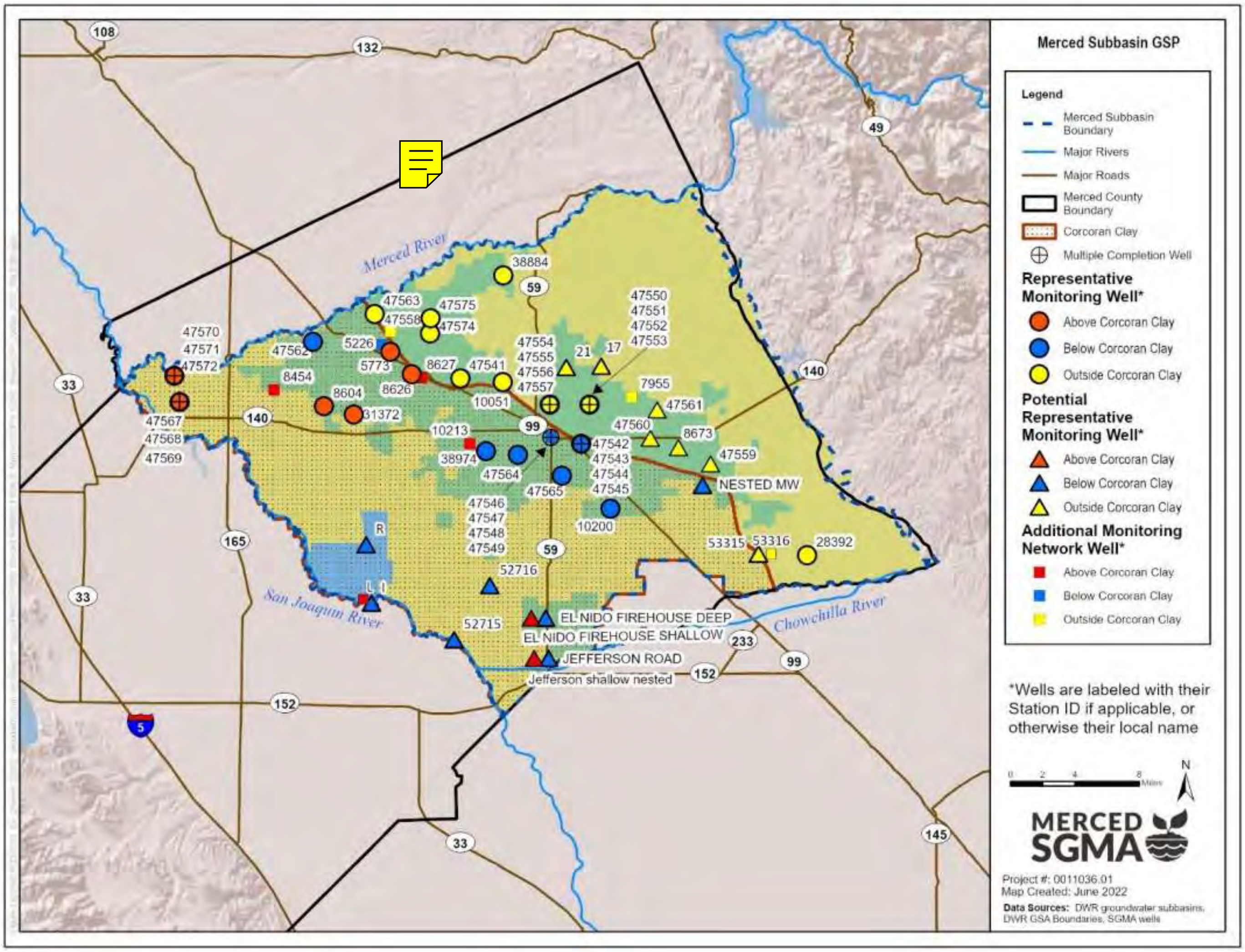


Table 4-4: Merced Subbasin GSP Groundwater Level Monitoring Network Well Details

State Well Number	CASGEM ID	Principal Aquifer	Well Depth (ft bgs)	Top of Screen Interval (ft bgs)	Bottom of Screen Interval (ft bgs)	First Measure-ment Date	Last Measure-ment Date	Measure-ment Period (Years)	Measure-ment Count[1]
06S11E27F001M*	47562	Below	127	108	127	10/16/2014	10/5/2018	4	16
06S12E17M001M*	47563	Outside	202	192	202	10/3/2011	3/9/2018	6	20
06S12E21M001M	47558	Outside	140	58	84	10/3/2011	3/21/2016	4	2
06S12E23C001M*	47575	Outside	930	660	680	12/28/2011	10/17/2018	7	18
06S12E23P001M*	47574	Outside	368	220	270	12/28/2011	10/17/2018	7	18
06S12E29L002M*	5226	Below	237	56	115	11/1/1974	3/1/2012	37	36
06S12E33D001M*	5773	Above	111	66	111	11/1/1974	10/8/2018	44	108
06S13E04H001M*	38884	Outside	574	-	-	11/1/1974	10/1/2018	44	37
07S10E06K002M*	47571	Above	53	38	48	11/15/2011	10/15/2018	7	16
07S10E06K003M	47572	Above	155	140	150	10/15/2011	10/15/2018	7	16
07S10E11A001M	47570	Above	22	12	22	10/15/2011	10/15/2018	7	16
07S10E17D001M	47567	Above	30	20	30	10/15/2011	10/15/2018	7	16
07S10E17D002M	47568	Above	50	40	50	10/15/2011	10/15/2018	7	16
07S10E17D003M*	47569	Above	85	70	80	10/15/2011	10/15/2018	7	16
07S11E07H001M*	8454	Above	232	40	57	11/1/1974	12/1/2013	39	36
07S11E15H001M*	8604	Above	105	90	105	11/1/1974	10/3/2018	44	63
07S11E24A001M*	31372	Above	87	1	60	11/1/1974	10/3/2018	44	54
07S12E03F001M*	8626	Above	183	62	95	11/1/1974	10/8/2018	44	66
07S12E03J001M	8627	Above	100	1	100	3/1/2011	3/18/2016	5	0
07S12E07C001M*	47541	Outside	450	425	440	10/1/2014	3/15/2018	3	13
07S13E09A001M*	10051	Outside	139	128	136	11/1/1974	10/1/2018	44	58
07S13E13H001M	47554	Outside	184	88	184	2/15/2012	10/26/2018	7	20
07S13E13H002M	47555	Outside	340	194	340	2/15/2012	10/26/2018	7	20
07S13E13H003M	47556	Outside	424	350	424	2/15/2012	10/26/2018	7	20
07S13E13H004M*	47557	Outside	580	434	580	2/15/2012	10/26/2018	7	20
07S13E30R002M*	10213	Above	150	30	60	11/1/1974	12/1/2013	39	47
07S13E32H001M*	38974	Below	412	132	137	11/1/1974	10/1/2018	44	50
07S13E34G001M*	47564	Below	394	230	394	10/3/2011	10/2/2018	7	22

State Well Number	CASGEM ID	Principal Aquifer	Well Depth (ft bgs)	Top of Screen Interval (ft bgs)	Bottom of Screen Interval (ft bgs)	First Measure-ment Date	Last Measure-ment Date	Measure-ment Period (Years)	Measure-ment Count[1]
07S14E12N001M	7955	Outside	341	196	341	11/1/1974	3/8/2018	43	69
07S14E16F001M	47550	Outside	235	180	235	2/15/2012	10/26/2018	7	20
07S14E16F002M	47551	Outside	385	330	385	2/15/2012	10/26/2018	7	20
07S14E16F003M	47552	Outside	505	400	505	2/15/2012	10/26/2018	7	20
07S14E16F004M*	47553	Outside	605	550	605	2/15/2012	10/26/2018	7	20
07S14E30R001M*	47546	Below	110	60	110	2/15/2012	10/30/2018	7	20
07S14E30R002M	47547	Below	160	120	160	2/15/2012	10/30/2018	7	20
07S14E30R003M	47548	Below	245	175	245	2/15/2012	10/30/2018	7	20
07S14E30R004M	47549	Below	600	460	600	2/15/2012	10/30/2018	7	20
07S14E35E001M*	47542	Below	170	89	170	2/15/2012	10/26/2018	7	20
07S14E35E002M	47543	Below	260	190	260	5/15/2012	10/26/2018	6	20
07S14E35E003M	47544	Below	500	300	500	2/15/2012	10/23/2018	7	20
07S14E35E004M	47545	Below	690	520	690	2/15/2012	10/26/2018	7	20
07S15E15N001M	47559	Outside	510	165	343	10/20/2014	10/15/2018	4	10
07S15E18G001M	47561	Outside	550	84	550	10/3/2011	12/1/2013	2	6
07S15E30D001M	47560	Outside	642	80	188	10/3/2011	10/3/2018	7	21
07S15E32A001M	8673	Outside	650	52	76	1/2/1958	10/1/2018	61	80
08S14E06G001M*	47565	Below	225	148	225	10/3/2011	10/4/2018	7	17
08S14E15R002M*	10200	Below	265	230	240	11/1/1974	10/2/2018	44	65
08S16E34J001M*	28392	Outside	639	50	639	12/11/1961	3/15/2018	56	83
-	52715	Below	812	770	806	10/23/2018	10/23/2018	0	1
-	52716	Below	500	360	480	10/24/2018	10/24/2018	0	1

1. Count of measurements excludes any measurements with a data quality flag.
* indicates representative monitoring well
ft bgs: feet below ground surface

Table 4-5: Merced Subbasin GSP Groundwater Level Monitoring Network Locations

State Well Number	CASGEM ID	Latitude	Longitude
06S11E27F001M*	47562	37.38207	-120.75511
06S12E17M001M*	47563	37.40737	-120.68591
06S12E21M001M	47558	37.39134	-120.66778
06S12E23C001M*	47575	37.40341	-120.62281
06S12E23P001M*	47574	37.38973	-120.62316
06S12E29L002M*	5226	37.37970	-120.67740
06S12E33D001M*	5773	37.37326	-120.66816
06S13E04H001M*	38884	37.44218	-120.54066
07S10E06K002M*	47571	37.35102	-120.91133
07S10E06K003M	47572	37.35103	-120.91128
07S10E11A001M	47570	37.35101	-120.91138
07S10E17D001M	47567	37.32781	-120.90538
07S10E17D002M	47568	37.32772	-120.90538
07S10E17D003M*	47569	37.32776	-120.90538
07S11E07H001M*	8454	37.33880	-120.79882
07S11E15H001M*	8604	37.32412	-120.74238
07S11E24A001M*	31372	37.31670	-120.70898
07S12E03F001M*	8626	37.35311	-120.64383
07S12E03J001M	8627	37.35001	-120.63260
07S12E07C001M*	47541	37.34955	-120.58897
07S13E09A001M*	10051	37.34607	-120.54089
07S13E13H001M	47554	37.32603	-120.48801
07S13E13H002M	47555	37.32603	-120.48801
07S13E13H003M	47556	37.32603	-120.48801
07S13E13H004M*	47557	37.32603	-120.48801
07S13E30R002M*	10213	37.29077	-120.57812
07S13E32H001M*	38974	37.28390	-120.56008
07S13E34G001M*	47564	37.28060	-120.52411
07S14E12N001M	7955	37.33278	-120.39575
07S14E16F001M	47550	37.32603	-120.44316
07S14E16F002M	47551	37.32603	-120.44316
07S14E16F003M	47552	37.32603	-120.44316
07S14E16F004M*	47553	37.32603	-120.44316
07S14E30R001M*	47546	37.29639	-120.48671
07S14E30R002M	47547	37.29639	-120.48671
07S14E30R003M	47548	37.29639	-120.48671
07S14E30R004M	47549	37.29639	-120.48671
07S14E35E001M*	47542	37.29038	-120.45288
07S14E35E002M	47543	37.29038	-120.45288
07S14E35E003M	47544	37.29038	-120.45288
07S14E35E004M	47545	37.29038	-120.45288
07S15E15N001M	47559	37.27332	-120.30705
07S15E18G001M	47561	37.32199	-120.36716
07S15E30D001M	47560	37.29644	-120.37487
07S15E32A001M	8673	37.28800	-120.34320
08S14E06G001M*	47565	37.26173	-120.47461
08S14E15R002M*	10200	37.23238	-120.42003
08S16E34J001M*	28392	37.19020	-120.19850
-	52715	37.11533	-120.59578
-	52716	37.16396	-120.55557

* indicates representative monitoring well

4.5.5 Groundwater Level Monitoring Protocols

Groundwater monitoring protocols are essential to producing quality data measurements and protecting the water quality of monitoring wells. Existing protocol resources include DWR's *Groundwater Elevation Monitoring Guidelines* (DWR, 2010) and United States Geological Survey's (USGS's) *National Field Manual* (Wilde, 2015). Protocols are established to improve consistency in data and ensure comparable methodologies.

Typical groundwater level measurement equipment used by agencies include electric sounders, data loggers, steel tapes, and air gauges. Regardless of the instrumentation used in the field, each groundwater level data measurement must include: well identification number, measurement date, reference point and land surface elevation, depth to water, method of measuring water depth, and measurement quality codes.

DWR released a BMP for monitoring protocols in the Best Management Practices for the Sustainable Management of Groundwater - Monitoring Protocols, Standards, and Sites, included as Appendix I. The monitoring protocols described in DWR's BMP recommend that groundwater level measurements are taken in a manner to ensure data are:

- Taken from the correct location, well ID, and screen interval depth
- Accurate and reproducible
- Representative of conditions that inform appropriate basin management data quality objectives
- Recorded with all salient information to correct, if necessary, and compare data
- Handled in a way that ensures data integrity.
- Taken using a CASGEM-approved water-level measurement methods to ensure consistency across measurements. Methods include:
  - Establishing a reference point
  - Using one of four approved methods (steel tape, electric sounding tape, sonic water-level meter, or pressure transducer) to measure groundwater levels

Additionally. if monitoring wells are also production wells, monitoring should occur after at least 48 hours of no extraction activities.

Existing wells, monitored under the CASGEM program, already use these procedures in the collection of groundwater level data. The protocols included in Appendix I will also be used for monitoring under this GSP.

4.5.6 Data Gaps

Data gaps can be the result of poor spatial (horizontal and/or vertical) distribution of the monitoring wells or a lack of well construction information needed for accurate monitoring data collection.

DWR has identified the data gap areas described below and identified in Figure 4-6 as part of the CASGEM program compliance (Merced Area Groundwater Pool Interests (MAGPI), 2014).

1. Data Gap #1: Located northwest of Merced and northeast of Atwater, this area contains relatively fewer existing wells, which often have limited construction information, and the wells are generally privately owned and require coordination with well owners to obtain permission and data.
2. Data Gap #2: Located along the western edge of the Subbasin, this area has virtually no known wells; overall well coverage needs to be enhanced through outreach to well owners to identify wells that can be used for monitoring purposes.

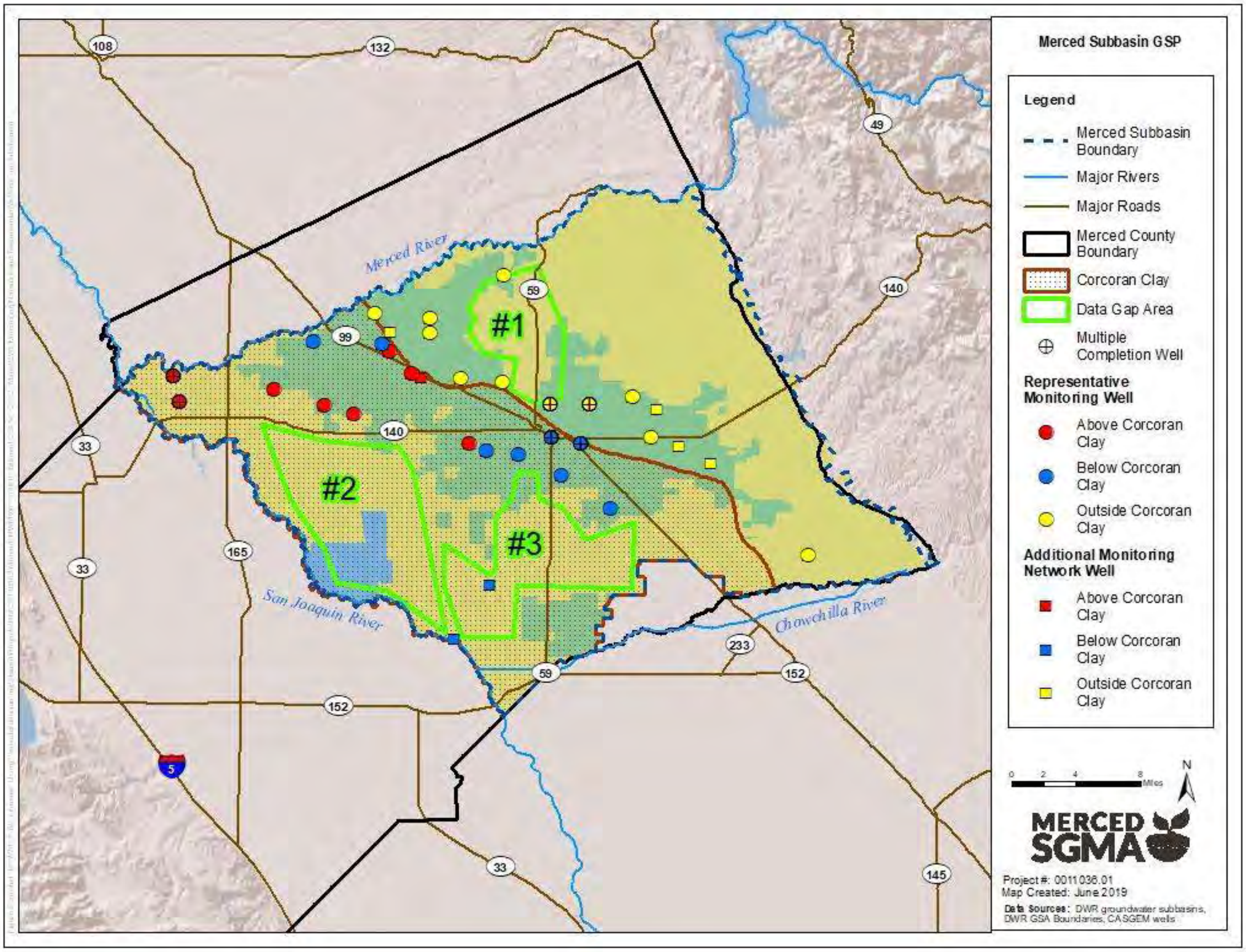
3. Data Gap #3: Located along the southern portion of the Subbasin just east of Data Gap #2, there are known potential wells to monitor but acquiring data from these wells is associated with technical or funding issues. These wells are primarily located within a federal wildlife refuge.

Overall, there is a data gap of monitoring wells for groundwater levels along the western edge of the Subbasin (see spatial density maps in Figure 4-2 and Figure 4-3). In addition to providing valuable groundwater elevation data, wells along this area would help improve the understanding of subsurface groundwater flow between adjacent subbasins, depletions of interconnected surface waters, subsidence, and connection between principal aquifers.

Note that data gaps associated with depth-discrete groundwater elevation data near rivers, streams, and Natural Communities Commonly Associated with Groundwater (NCCAGs) are discussed in Section 4.10.6.

Finally, many representative monitoring wells have limited data, and many of these also show high levels of variability that make analysis difficult. Sustainable Management Criteria have been set using that best available data, including in some cases additional information from the MercedWRM groundwater model. In several cases, there may be influences of nearby production wells that would need to be considered when setting and monitoring for sustainable management criteria; influences that are difficult to discern from the limited data. Wells that exhibit groundwater levels that are highly variable or difficult to explain will be a focus for the installation of pressure transducers to better understand the variability, to the extent feasible. One such well is 47541. Installations may be temporary or permanent. Sustainable management criteria may be modified based on future data collection and analysis.

Figure 4-6~~4-6~~: Merced Subbasin GSP Groundwater Level Monitoring Network Data Gaps



4.5.7 Plan to Fill Data Gaps

The GSAs are currently evaluating opportunities to address the data gaps. Initial progress has been made to site one well within Data Gap #3 and another between Data Gaps #2 and #3. Additionally, two monitoring wells are nearing the completion of permitting and planning and will be constructed soon in the El Nido area, adjacent to Data Gap #3. The GSAs are evaluating other existing wells for additional construction information (where missing) and/or permission for access to wells to collect data. Additionally, the GSAs are seeking funding to construct additional monitoring wells, which are preferred to active wells due to shorter screened intervals and lack of groundwater production to interfere with measurements.

The GSAs will strive towards the following initial priority enhancements of the groundwater level monitoring network:

- Add representative wells in the Above and Below Corcoran Principal Aquifers in the southwesterly portion of the Subbasin.

- Except for two wells in the Stevinson area, there are no monitoring wells within the current monitoring network located in the northwest area of the Subbasin along the basin boundary. Integrating new wells in these areas will be crucial in obtaining fair and a meaningful basin management given the likely changes in subsurface groundwater flow between adjacent subbasins and their impact on sustainability.

The GSAs will introduce a comprehensive plan for filling gaps two years from the time the GSP is approved by DWR, based on the data gaps discussed above. The plan will prioritize areas for priority implementation and identify a timeline for filling gaps.

4.6 GROUNDWATER STORAGE MONITORING NETWORK

While undesirable results related to groundwater storage are not present and are not likely to occur in the Subbasin, a monitoring network is developed to support development of groundwater budgets, including an estimate of the change in annual groundwater in storage, and to support overall characterization of the Subbasin. The monitoring network is the same as that developed for groundwater levels, as groundwater storage is a function of groundwater levels and aquifer properties.

4.7 SEAWATER INTRUSION MONITORING NETWORK

The Merced Subbasin is geographically and geologically isolated from the Pacific Ocean and any other large source of seawater. Thus, the Subbasin is not at risk for seawater intrusion and does not require an associated monitoring network.

4.8 GROUNDWATER QUALITY MONITORING NETWORK

Groundwater quality monitoring is conducted through a groundwater well monitoring network. While the sustainable management criteria established in Section 3.6 (Degraded Water Quality) focuses on salinity (by total dissolved solids [TDS]), the water quality monitoring network is established for a broader spectrum of constituents to characterize water quality conditions throughout the basin, regardless of relevance to management under this GSP. This broader focus allows for documentation of issues which could then be resolved through the appropriate program, such as this GSP, Irrigated Lands Regulatory Program (ILRP), Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS), Regional Water Quality Control Board (RWQCB), or others (see Section 1.2.2.2 - Groundwater Quality Monitoring). Within that broad focus is monitoring for salinity (by TDS) to determine trends and provide representative information about groundwater conditions as necessary to evaluate GSP implementation.

4.8.1 Monitoring Wells Selected for Monitoring Network

The Merced Subbasin GSP groundwater quality monitoring network totals 287~~4~~ wells, with 8~~5~~ wells from the East San Joaquin Water Quality Coalition (ESJWQC) Groundwater Quality Trend Monitoring (GQTM) program and 279 wells sourced from Public Water System (PWS) wells that report data to the State Water Resources Control Board (SWRCB), Division of Drinking Water (DDW).

Groundwater quality monitoring network wells are opportunistically selected, in that they both meet the needs of GSP monitoring for the Subbasin and are being actively monitored for other purposes. The selected wells (e.g., wells from which data are collected in the future for reporting) are not necessarily the specific wells listed in the following subsections, but rather the wells that continue to be monitored under the ESJWQC and DDW programs. Thus, monitoring would not continue if wells were removed from the ESJWQC program or if wells were not sampled for DDW compliance. Additionally, wells added to the ESJWQC program or wells newly sampled for DDW compliance would be added to the monitoring network.

Each group is described in the subsection below.

4.8.1.1 ESJWQC GQTM Principal Wells

ESJWQC was formed in response to the adoption of the ILRP by the Central Valley RWQCB in 2003. The ILRP was initiated to regulate discharges from irrigated agriculture to surface waters and groundwater. To comply with this new regulation, owners or operators of irrigated cropland in the Central Valley could either obtain an individual permit for each farming operation or join a group that represents farmers across a specific geographic region. ESJWQC was formed to give growers an option for complying with ILRP. The ESJWQC encompasses the lower Stanislaus, Tuolumne, and Merced River watersheds and includes the irrigated farmland in Stanislaus and Merced counties. Through this designation the ESJWQC monitors the Merced Subbasin along with the Turlock and Chowchilla Subbasins (ESJWQC, 2018).

ESJWQC's GQTM Phase III workplan is the final part of a multi-phase approach to establish a network of wells to use for the GQTM program. ESJWQC initially selected five principal wells within the Merced Subbasin which meet the requirements of the waste discharge requirements (WDRs) and can be accessed for annual sampling. These are all domestic wells owned by ESJWQC members that have been vetted for construction details, accessibility, and condition. An additional three principal wells have been added within the Merced Subbasin in subsequent ESJWQC GQTM annual reports.

4.8.1.2 PWS Wells That Report to DDW

The SWRCB DDW requires monitoring of PWS wells for Title 22 requirements (such as organic and inorganic compounds, metals, microbial, and radiological analytes). Data is available for active and inactive drinking water sources for water systems that serve the public: defined as serving 15 or more connections or more than 25 people per day. Wells are monitored for Title 22 requirements, including pH, alkalinity, bicarbonate, calcium, magnesium, potassium, sulfate, barium, copper, iron, zinc, and nitrate.

There are 279 PWS wells within the Merced Subbasin that report water quality data to DDW. Out of these 279, 14 are classified as complementary wells in the ESJWQC's GQTM Phase III workplan. These 14 wells are expected to add substantial value to the GQTM program due to availability of historical data, but they may not satisfy the criteria for principal wells (ESJWQC, 2018).

The remaining 265 PWS wells also report water quality data to DDW but are not included in the group of complementary wells selected by the ESJWQC GQTM program.

4.8.1.3 Overall Monitoring Network

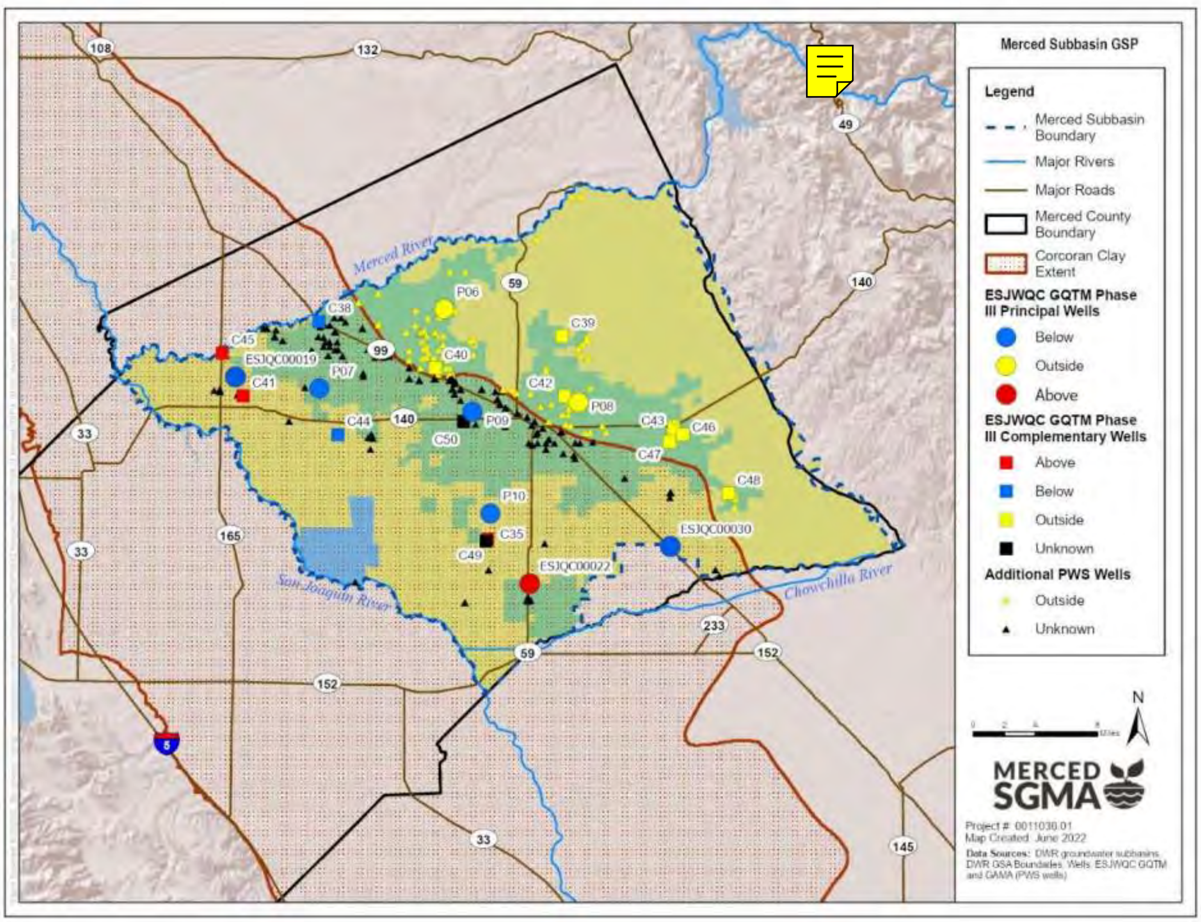
Table 4-6 lists the monitoring sites selected for the groundwater quality monitoring network by category and principal aquifer. The monitoring network is composed of ~~3~~4 wells located within the Above Corcoran Clay Principal Aquifer, 7~~5~~ wells within the Below Corcoran Clay Principal Aquifer, 131 wells within the Outside Corcoran Clay Principal Aquifer, and 145 wells in an unknown principal aquifer (either Above Corcoran Clay or Below Corcoran Clay, unknown due to lack of depth information).

Figure 4-7 shows the Merced Subbasin GSP Groundwater Quality Monitoring Network.

Table 4-6: Merced GSP Groundwater Quality Monitoring Well Selection by Principal Aquifer

Category	Principal Aquifer				Total Wells
	Above Corcoran Clay	Below Corcoran Clay	Outside Corcoran Clay	Unknown	
ESJWQC GQTM Principal Wells	1~~0~~	~~3~~5	2	0	~~5~~8
ESJWQC GQTM Complementary Wells	3	2	7	2	14
Other PWS Wells	0	0	122	143	265
Total	4~~3~~	~~5~~7	131	145	287~~4~~

Figure 4-7~~4-7~~: Merced Subbasin GSP Groundwater Quality Monitoring Network Wells



4.8.2 Monitoring Frequency

Sampling of GQTM principal wells will be conducted by ESJWQC at approximately the same time each year, per the WDRs, and will occur in the fall (ESJWQC, 2018). The GSAs will coordinate with ESJWQC to obtain the necessary TDS results for GSP reporting.

PWS wells are sampled according to DDW requirements which will vary by well and by constituent.

4.8.3 Spatial Density

DWR's *Monitoring Networks and Identification of Data Gaps BMP* states "The spatial distribution [of the groundwater quality monitoring network] must be adequate to map or supplement mapping of known contaminants" (DWR, 2016b). The selected groundwater quality monitoring network wells provide adequate coverage of the Outside Corcoran Clay Principal Aquifer for purposes of mapping salinity. The lack of depth information for many wells located in the Above and Below Corcoran Clay Principal Aquifers is a significant data gap described further in Section 4.8.7.

Various spatial considerations were considered in designing the GQTM network (ESJWQC, 2015). These considerations focused on where and how to representatively monitor groundwater quality trends relative to agricultural activities. Spatial factors relating to the GQTM design include:

- Prioritization of high vulnerability areas. High vulnerability areas are monitoring areas where physical conditions make groundwater more vulnerable to impacts from overlying land use activities
- Well characteristics (pumping rate and depth) and the aquifer properties in the area. Larger-capacity (higher pumping rates) wells such as irrigation wells and public water supply wells provide a better representation of regional groundwater conditions because these wells have relatively larger groundwater captures zones drawing groundwater from a greater contributing area and minimizing the degree to which a well reflects highly localized groundwater conditions.
- Well construction characteristics (e.g., well completion reports), the accessibility of wells and willing cooperation of well owners for inclusion in the monitoring program, and the desired spatial distribution and adequacy to provide the information needed to fulfill the objectives of the GQTM.

PWS wells that report to DDW are located throughout the Subbasin but are concentrated in urban areas where water suppliers have wells for municipal uses.

4.8.4 Representative Monitoring

The Merced Subbasin GSP groundwater quality monitoring network totals 28~~4~~7 wells, ~~five~~ eight of which are designated as representative wells. The ~~five~~ eight GQTM principal wells are the ~~five~~ eight wells where minimum thresholds have been established, and they are committed to annual sampling and reporting. The remaining GQTM complementary wells and other PWS wells all report to DDW on a variety of schedules and serve as general trend monitoring wells for the GSP.

Figure 4-7 shows the locations of the groundwater quality monitoring network monitoring and representative wells. Table 4-7 details additional information about the ~~19~~22 GQTM program wells that are part of the groundwater quality monitoring network. The ~~five~~ eight representative wells (GQTM principal wells) are identified with an asterisk (*) next to the ESJWQC ID. The additional 265 PWS wells are shown in Table 4-8.

Table 4-7: Merced Subbasin GSP Groundwater Quality Monitoring Network GQTM Well Details

Principal or Complementary?[1]	ESJWQC ID	Owner	Principal Aquifer	Well Depth (ft)	Depth to Top of Screen Interval (ft)	Depth to Bottom of Screen Interval (ft)	Latitude	Longitude
Principal	P06*	(domestic)	Outside	185	215	235	37.40480	-120.58900
Principal	P07*	(domestic)	Below	195	220	230	37.33080	-120.73500
Principal	P08*	(domestic)	Outside	150	170	180	37.31780	-120.43200
Principal	P09*	(domestic)	Below	150	170	180	37.30920	-120.55600
Principal	P10*	(domestic)	Below	Unknown	Unknown	180	37.21440	-120.53500
Principal	ESJQC00019*	(domestic)	Below	162	142	162	37.34129	-120.833
Principal	ESJQC00022*	(domestic)	Above	124	112	122	37.14877	-120.489
Principal	ESJQC00030*	(observation)	Below	290	105	280	37.18317	-120.325
Complementary	C35	Sandy Mush Detention Center d.b.a. John	Above	140	100	140	37.19042	-120.53781
Complementary	C41	Stevinson Ranch Golf Club	Above	115	95	115	37.32350	-120.82392
Complementary	C45	Hagaman County Park (MCDPW)	Above	138	113	138	37.36339	-120.84869
Complementary	C38	City of Livingston	Below	233	160	233	37.39336	-120.73563
Complementary	C44	Foster Farms Fertilizer Plant	Below	268	248	268	37.28760	-120.71300
Complementary	C40	City of Atwater	Outside	146	86	146	37.35009	-120.59938
Complementary	C42	Black Rascal Water Company	Outside	154	124	154	37.32372	-120.44803

Complementary	C43	Planada CSD	Outside	180	130	180	37.29125	-120.32081
Complementary	C46	Planada CSD	Outside	Unknown	140	170	37.28806	-120.30972
Complementary	C47	Oasis Ranch (closed)	Outside	230	115	135	37.28104	-120.32534
Complementary	C39	Merced Golf & Country Club	Outside	Unknown	Unknown	Unknown	37.37980	-120.45101
Complementary	C48	Le Grand Community Services District	Outside	304	234	304	37.23290	-120.25738
Complementary	C49	Sandy Mush Detention Center d.b.a. John	Unknown	Unknown	Unknown	Unknown	37.18858	-120.53975
Complementary	C50	McSwain Elementary School	Unknown	Unknown	Unknown	Unknown	37.30021	-120.56643

[1] Principal and Complementary wells in the ESJWQC GQTM Program are defined in Section 4.8.1 - Monitoring Wells Selected for Monitoring Network.

Table 4-8: PWS Wells Not Part of GQTM Program

Global ID	Well ID	Principal Aquifer	Latitude	Longitude
W0602410010	2410010-007	Outside	37.38333	-120.63333
W0602410010	2410010-006	Outside	37.38333	-120.61667
W0602410001	2410001-013	Outside	37.36458	-120.60758
W0602410001	2410001-017	Outside	37.36007	-120.60114
W0602410001	2410001-003	Outside	37.35000	-120.60000
W0602400084	2400084-001	Outside	37.38017	-120.59571
W0602410001	2410001-019	Outside	37.36693	-120.59526
W0602400010	2400010-002	Outside	37.36000	-120.57000
W0602410009	2410009-048	Outside	37.32665	-120.50420
W0602410009	2410009-049	Outside	37.31611	-120.46333
W0602410009	2410009-022	Outside	37.32476	-120.44327
W0602400114	2400114-003	Outside	37.37618	-120.42206
W0602400315	2400315-001	Outside	37.29604	-120.40428
W0602410011	2410011-004	Outside	37.22722	-120.24833
W0602400128	2400128-001	Outside	37.41087	-120.68957
W0602400011	2400011-001	Outside	37.36605	-120.63034
W0602400069	2400069-001	Outside	37.38000	-120.61000
W0602410001	2410001-011	Outside	37.35000	-120.58333
W0602400182	2400182-011	Outside	37.43971	-120.58267
W0602410700	2410700-010	Outside	37.36603	-120.57631
W0602400344	2400344-001	Outside	37.29762	-120.44728
W0602400151	2400151-001	Outside	37.51000	-120.44000
W0602400047	2400047-001	Outside	37.51000	-120.43000
W0602400230	2400230-001	Outside	37.33156	-120.41886
W0602410007	2410007-003	Outside	37.30000	-120.31667
W0602400067	2400067-001	Outside	37.22000	-120.25000
W0602400013	2400013-003	Outside	37.39166	-120.66542
W0602410010	2410010-003	Outside	37.38333	-120.61667
W0602400143	2400143-001	Outside	37.37193	-120.59045
W0602410001	2410001-016	Outside	37.35758	-120.58588
W0602400117	2400117-001	Outside	37.34350	-120.57929
W0602400136	2400136-001	Outside	37.35000	-120.47000
W0602410009	2410009-019	Outside	37.33110	-120.46667
W0602410009	2410009-009	Outside	37.30000	-120.46667
W0602410009	2410009-054	Outside	37.30639	-120.45083
W0602410009	2410009-014	Outside	37.32456	-120.44398
W0602400114	2400114-002	Outside	37.37236	-120.42708
W0602410007	2410007-007	Outside	37.28722	-120.32641
W0602400013	2400013-002	Outside	37.39009	-120.66547
W0602400011	2400011-012	Outside	37.36605	-120.63112
W0602400011	2400011-011	Outside	37.35713	-120.62988
W0602410010	2410010-012	Outside	37.39006	-120.62322
W0602410010	2410010-015	Outside	37.40367	-120.62256
W0602410010	2410010-005	Outside	37.38333	-120.61667

Global ID	Well ID	Principal Aquifer	Latitude	Longitude
W0602410010	2410010-008	Outside	37.38333	-120.61667
W0602410001	2410001-014	Outside	37.35865	-120.61438
W0602410001	2410001-004	Outside	37.35000	-120.60000
W0602410010	2410010-010	Outside	37.38333	-120.60000
W0602410001	2410001-012	Outside	37.35000	-120.58333
W0602410001	2410001-021	Outside	37.37593	-120.55440
W0602410009	2410009-016	Outside	37.32610	-120.48792
W0605000433	5000433-008	Outside	37.47022	-120.48009
W0602400046	2400046-001	Outside	37.32025	-120.44492
W0602400176	2400176-001	Outside	37.31196	-120.44300
W0602410009	2410009-017	Outside	37.28972	-120.41861
W0602410007	2410007-001	Outside	37.28917	-120.32419
W0602410007	2410007-004	Outside	37.28981	-120.31499
W0602410011	2410011-003	Outside	37.23151	-120.25492
W0602410011	2410011-002	Outside	37.22723	-120.24856
W0602410010	2410010-019	Outside	37.37464	-120.61543
W0602400234	2400234-001	Outside	37.36803	-120.61289
W0602400061	2400061-001	Outside	37.36000	-120.61000
W0602410010	2410010-001	Outside	37.38333	-120.60000
W0602410001	2410001-009	Outside	37.34418	-120.59608
W0602400149	2400149-001	Outside	37.39728	-120.59471
W0602410001	2410001-018	Outside	37.34958	-120.58724
W0602410700	2410700-002	Outside	37.36333	-120.57222
W0602410700	2410700-004	Outside	37.36278	-120.57111
W0602410700	2410700-003	Outside	37.36278	-120.57056
W0602410700	2410700-006	Outside	37.37472	-120.55972
W0602410009	2410009-013	Outside	37.32448	-120.44418
W0602400112	2400112-011	Outside	37.28000	-120.32000
W0602400152	2400152-001	Outside	37.30000	-120.32000
W0602400013	2400013-004	Outside	37.39022	-120.66602
W0602400011	2400011-013	Outside	37.36605	-120.63032
W0602410001	2410001-002	Outside	37.35000	-120.61667
W0602410001	2410001-001	Outside	37.35000	-120.61667
W0602410010	2410010-013	Outside	37.39580	-120.60839
W0602410010	2410010-002	Outside	37.38333	-120.60000
W0602400203	2400203-001	Outside	37.36000	-120.59000
W0602400117	2400117-014	Outside	37.34403	-120.58270
W0602410700	2410700-007	Outside	37.35944	-120.57639
W0602410700	2410700-005	Outside	37.37528	-120.55861
W0602400130	2400130-001	Outside	37.33000	-120.52000
W0602410009	2410009-001	Outside	37.31445	-120.47598
W0602410009	2410009-002	Outside	37.31429	-120.47572
W0602400114	2400114-014	Outside	37.36856	-120.43252
W0602400031	2400031-001	Outside	37.29000	-120.40000
W0602400240	2400240-002	Outside	37.29697	-120.35523

Global ID	Well ID	Principal Aquifer	Latitude	Longitude
W0602400112	2400112-001	Outside	37.28000	-120.32000
W0602400162	2400162-001	Outside	37.41087	-120.68957
W0602400307	2400307-001	Outside	37.41960	-120.66652
W0602410001	2410001-007	Outside	37.35000	-120.61667
W0602410010	2410010-009	Outside	37.38333	-120.61667
W0602410010	2410010-004	Outside	37.38333	-120.61667
W0602410010	2410010-011	Outside	37.38472	-120.61222
W0602400159	2400159-001	Outside	37.37000	-120.61000
W0602410001	2410001-008	Outside	37.35000	-120.60000
W0602410001	2410001-010	Outside	37.35000	-120.60000
W0602400059	2400059-001	Outside	37.36000	-120.58000
W0602410010	2410010-014	Outside	37.40323	-120.57577
W0602400010	2400010-003	Outside	37.36000	-120.57000
W0602400111	2400111-001	Outside	37.33000	-120.51000
W0602400148	2400148-001	Outside	37.31779	-120.44311
W0602400219	2400219-001	Outside	37.29641	-120.44126
W0602410009	2410009-043	Outside	37.36144	-120.43006
W0602400114	2400114-004	Outside	37.37926	-120.42189
W0602400212	2400212-001	Outside	37.36000	-120.42000
W0602400340	2400340-001	Outside	37.29461	-120.32531
W0602410007	2410007-014	Outside	37.29917	-120.32503
W0602410007	2410007-006	Outside	37.28436	-120.32268
W0602410001	2410001-005	Outside	37.35000	-120.60000
W0602400021	2400021-001	Outside	37.38000	-120.59000
W0602400009	2400009-001	Outside	37.36097	-120.58305
W0602400010	2400010-001	Outside	37.36000	-120.57000
W0602400071	2400071-001	Outside	37.43944	-120.56431
W0602410700	2410700-012	Outside	37.36245	-120.55520
W0602410009	2410009-003	Outside	37.31411	-120.47622
W0602410009	2410009-042	Outside	37.34703	-120.46995
W0602400327	2400327-001	Outside	37.30675	-120.44400
W0602410009	2410009-018	Outside	37.28944	-120.42438
W0602410011	2410011-001	Outside	37.23333	-120.25000
W0602400169	2400169-022	Unknown	37.38656	-120.79612
W0602400190	2400190-001	Unknown	37.30000	-120.77000
W0602400331	2400331-001	Unknown	37.36471	-120.74270
W0602410004	2410004-013	Unknown	37.37885	-120.73622
W0602410004	2410004-009	Unknown	37.38945	-120.72261
W0602400097	2400097-001	Unknown	37.35219	-120.71900
W0602410004	2410004-006	Unknown	37.38333	-120.71667
W0602410004	2410004-004	Unknown	37.38333	-120.71667
W0602400206	2400206-002	Unknown	37.28791	-120.67396
W0602400104	2400104-002	Unknown	37.34000	-120.63000
W0602400052	2400052-002	Unknown	37.33816	-120.61802
W0602400138	2400138-003	Unknown	37.34000	-120.60000

Global ID	Well ID	Principal Aquifer	Latitude	Longitude
W0602400034	2400034-011	Unknown	37.33047	-120.57905
W0602400134	2400134-001	Unknown	37.32569	-120.57706
W0602400003	2400003-001	Unknown	37.33000	-120.57000
W0602410008	2410008-005	Unknown	37.33003	-120.54522
W0602410008	2410008-001	Unknown	37.32097	-120.52637
W0602400007	2400007-002	Unknown	37.31597	-120.52411
W0602400007	2400007-012	Unknown	37.31594	-120.52383
W0602410008	2410008-004	Unknown	37.32815	-120.52263
W0602400053	2400053-002	Unknown	37.13261	-120.49133
W0602400103	2400103-001	Unknown	37.28000	-120.49000
W0602410009	2410009-010	Unknown	37.30000	-120.48333
W0602400248	2400248-001	Unknown	37.18627	-120.47135
W0602410009	2410009-007	Unknown	37.28333	-120.46667
W0602410009	2410009-023	Unknown	37.28997	-120.45246
W0602400065	2400065-001	Unknown	37.23358	-120.32453
W0602410004	2410004-003	Unknown	37.38333	-120.71667
W0602400027	2400027-001	Unknown	37.36000	-120.66000
W0602400052	2400052-001	Unknown	37.33840	-120.61816
W0602400138	2400138-002	Unknown	37.34000	-120.60000
W0602400135	2400135-001	Unknown	37.33000	-120.58000
W0602400005	2400005-001	Unknown	37.33548	-120.57731
W0602400015	2400015-001	Unknown	37.33000	-120.57000
W0602400172	2400172-013	Unknown	37.19044	-120.53694
W0602400153	2400153-001	Unknown	37.31282	-120.51708
W0602400140	2400140-001	Unknown	37.31282	-120.51708
W0602400053	2400053-001	Unknown	37.13278	-120.49028
W0602400186	2400186-001	Unknown	37.24699	-120.37804
W0602400065	2400065-002	Unknown	37.23333	-120.32500
W0602410004	2410004-015	Unknown	37.38822	-120.73409
W0602410004	2410004-010	Unknown	37.37838	-120.72994
W0602410004	2410004-012	Unknown	37.37392	-120.72326
W0602410004	2410004-001	Unknown	37.38333	-120.71667
W0602400024	2400024-001	Unknown	37.36000	-120.67000
W0602400110	2400110-001	Unknown	37.36108	-120.65328
W0602400104	2400104-001	Unknown	37.34000	-120.63000
W0602410001	2410001-015	Unknown	37.33970	-120.60093
W0602400227	2400227-002	Unknown	37.29760	-120.55214
W0602410008	2410008-003	Unknown	37.32989	-120.54517
W0602400033	2400033-001	Unknown	37.29391	-120.47374
W0602400139	2400139-001	Unknown	37.26850	-120.43750
W0602410009	2410009-020	Unknown	37.28002	-120.43593
W0602400300	2400300-001	Unknown	37.22893	-120.32553
W0602400064	2400064-001	Unknown	37.32861	-120.85781
W0602400215	2400215-001	Unknown	37.32350	-120.82392
W0602400169	2400169-016	Unknown	37.38517	-120.78578

Global ID	Well ID	Principal Aquifer	Latitude	Longitude
W0602410004	2410004-028	Unknown	37.37376	-120.72826
W0602400249	2400249-002	Unknown	37.36151	-120.72452
W0602400333	2400333-001	Unknown	37.36995	-120.72289
W0602400113	2400113-014	Unknown	37.38650	-120.68466
W0602400138	2400138-004	Unknown	37.34000	-120.60000
W0602400036	2400036-001	Unknown	37.32000	-120.57000
W0602400160	2400160-001	Unknown	37.13120	-120.56470
W0602400075	2400075-002	Unknown	37.13325	-120.48805
W0602410009	2410009-008	Unknown	37.29638	-120.48643
W0602410009	2410009-006	Unknown	37.28333	-120.46667
W0602400139	2400139-011	Unknown	37.26560	-120.43607
W0602400101	2400101-001	Unknown	37.28000	-120.43000
W0602400250	2400250-001	Unknown	37.15592	-120.26774
W0602400082	2400082-001	Unknown	37.32715	-120.85080
W0602400169	2400169-017	Unknown	37.38626	-120.80024
W0602400169	2400169-004	Unknown	37.37840	-120.78717
W0602400122	2400122-001	Unknown	37.35221	-120.71902
W0602410004	2410004-002	Unknown	37.36667	-120.71667
W0602410004	2410004-007	Unknown	37.37389	-120.71389
W0602400336	2400336-001	Unknown	37.36715	-120.71305
W0602400255	2400255-002	Unknown	37.35321	-120.70358
W0602400174	2400174-011	Unknown	37.15000	-120.69254
W0602410001	2410001-020	Unknown	37.33831	-120.58296
W0602400156	2400156-001	Unknown	37.33000	-120.57000
W0602400079	2400079-012	Unknown	37.30203	-120.56837
W0602410009	2410009-021	Unknown	37.29529	-120.51748
W0602410009	2410009-015	Unknown	37.30801	-120.50360
W0602410009	2410009-011	Unknown	37.30417	-120.49220
W0602400053	2400053-013	Unknown	37.13318	-120.49173
W0602400102	2400102-001	Unknown	37.28000	-120.47000
W0602400223	2400223-001	Unknown	37.16147	-120.27222
W0602400326	2400326-001	Unknown	37.36130	-120.74053
W0602400127	2400127-001	Unknown	37.36000	-120.74000
W0602400025	2400025-001	Unknown	37.37000	-120.73000
W0602410004	2410004-008	Unknown	37.39660	-120.71777
W0602410004	2410004-005	Unknown	37.38333	-120.71667
W0602400328	2400328-001	Unknown	37.36099	-120.70770
W0602400113	2400113-013	Unknown	37.38669	-120.68462
W0602400232	2400232-002	Unknown	37.34237	-120.68359
W0602400334	2400334-001	Unknown	37.36722	-120.67821
W0602400206	2400206-001	Unknown	37.28484	-120.67785
W0602400206	2400206-004	Unknown	37.27421	-120.67524
W0602700592	2700592-001	Unknown	37.13120	-120.56470
W0602410008	2410008-010	Unknown	37.32097	-120.52658
W0602400053	2400053-014	Unknown	37.13365	-120.49200

Global ID	Well ID	Principal Aquifer	Latitude	Longitude
W0602400211	2400211-012	Unknown	37.27799	-120.48603
W0602400030	2400030-001	Unknown	37.28000	-120.46000
W0602410009	2410009-004	Unknown	37.29035	-120.45244
W0602410009	2410009-005	Unknown	37.29048	-120.45244
W0602410009	2410009-041	Unknown	37.28081	-120.41505
W0602400077	2400077-001	Unknown	37.32947	-120.85127
W0602400169	2400169-002	Unknown	37.37933	-120.78710
W0602400191	2400191-001	Unknown	37.30000	-120.77000
W0602400118	2400118-001	Unknown	37.39000	-120.73000
W0602400081	2400081-001	Unknown	37.39000	-120.73000
W0602410004	2410004-025	Unknown	37.39663	-120.70962
W0602410004	2410004-014	Unknown	37.39278	-120.70467
W0602400129	2400129-001	Unknown	37.37056	-120.67444
W0602400206	2400206-003	Unknown	37.28430	-120.67212
W0602400114	2400114-001	Unknown	37.36108	-120.65328
W0602400138	2400138-001	Unknown	37.34000	-120.60000
W0602400001	2400001-001	Unknown	37.34000	-120.58000
W0602400320	2400320-001	Unknown	37.33750	-120.57646
W0602400222	2400222-001	Unknown	37.16147	-120.53686
W0602400007	2400007-001	Unknown	37.31592	-120.52344
W0602400116	2400116-001	Unknown	37.28000	-120.48000
W0602400099	2400099-001	Unknown	37.36339	-120.84869
W0602400215	2400215-011	Unknown	37.32426	-120.83073
W0602400169	2400169-018	Unknown	37.38661	-120.79704
W0602400169	2400169-014	Unknown	37.37522	-120.77818
W0602400337	2400337-001	Unknown	37.33155	-120.75172
W0602400331	2400331-002	Unknown	37.36601	-120.74422
W0602400323	2400323-001	Unknown	37.32783	-120.74053
W0602400232	2400232-003	Unknown	37.34514	-120.68349
W0602400146	2400146-001	Unknown	37.35000	-120.63000
W0602400117	2400117-011	Unknown	37.33958	-120.58188
W0602400001	2400001-002	Unknown	37.34000	-120.58000
W0602400079	2400079-002	Unknown	37.29995	-120.56646
W0602400175	2400175-001	Unknown	37.19042	-120.53781
W0602410008	2410008-002	Unknown	37.32804	-120.52938
W0602400318	2400318-001	Unknown	37.13659	-120.49135
W0602410009	2410009-012	Unknown	37.28794	-120.48125
W0602400054	2400054-001	Unknown	37.29000	-120.48000
W0602410009	2410009-057	Unknown	37.27389	-120.47028
W0602400144	2400144-001	Unknown	37.27000	-120.45000
W0602400075	2400075-001	Unknown	37.23358	-120.32453

4.8.6 Groundwater Quality Monitoring Protocols

Sampling protocols for the ESJWQC GQTM principal wells will follow the guidelines presented in the ESJWQC GQTM Phase I Workplan, consistent with requirements specified in the WDRs and detailed in the Quality Assurance Protection Plan which is still pending review by the RWQCB and State Board QA Officer (MLJ Environmental, 2019) (see Appendix J which includes both the draft Central Valley Groundwater Monitoring Collaborative Quality Assurance Program Plan and the draft Quality Assurance Project Plan specific to the ESJWQC GQTM Program).

GQTM data will be compiled in a database. ~~–~~ Data will be compiled and used to develop five-year update reports, beginning January 2019 (ESJWQC, 2018). GQTM workplans Phase I (ESJWQC, 2015) and Phase II (ESJWQC, 2016) describe the annual reporting, data analysis, and presentations that will be submitted annually and on five-year intervals.

Water quality monitoring performed for PWS wells that report to DDW will be performed to DDW protocols which are specific based on the contaminant being sampled.

4.8.7 Data Gaps

Two significant data gaps exist:

- There are relatively few monitoring wells closer to the San Joaquin River and closer to Mariposa County.
- Many wells used for monitoring do not have construction information, which notably limits the ability to distinguish whether wells are below or above the Corcoran Clay.

4.8.8 Plan to Fill Data Gaps

The ESJWQC GQTM plan already includes a plan to add additional principal wells, stating that "[t]he spatial representation and statistical validity of the GQTM well network will be evaluated on an annual basis with respect to the objectives of the program" (ESJWQC, 2018). The Phase III Workplan design approach recognizes the importance for the monitoring program to adapt based on consideration of data derived through continuous evaluation of program implementation. Some additional goals discussed in the GQTM plan's network refinement section include:

- Verification of construction information for complementary wells.
- Locating wells in the Chowchilla region where domestic and public supply wells are less common or most often deeper than expected for Upper Zone wells (this region overlaps with the very southern corner of the Merced Subbasin).
- Identification of network wells in "lower vulnerability agricultural areas, especially in the more eastern portions of the Coalition region" (ESJWQC, 2018) through focused outreach efforts to Coalition members, which includes the eastern portion of the Merced Subbasin.

The GSAs plan to obtain additional construction information for at least 20 PWS wells located throughout the Subbasin to determine the completion information for these wells so they can be assigned to Above or Below Corcoran Clay for the purpose of analyzing salinity. Additionally, the GSAs will work with the ESJWQC to identify monitoring opportunities and associated funding opportunities in the data gap areas.

Within two years after the approval of the GSP by DWR, the GSAs will provide a plan to fill identified gaps, with a timeline for priorities of implementation.

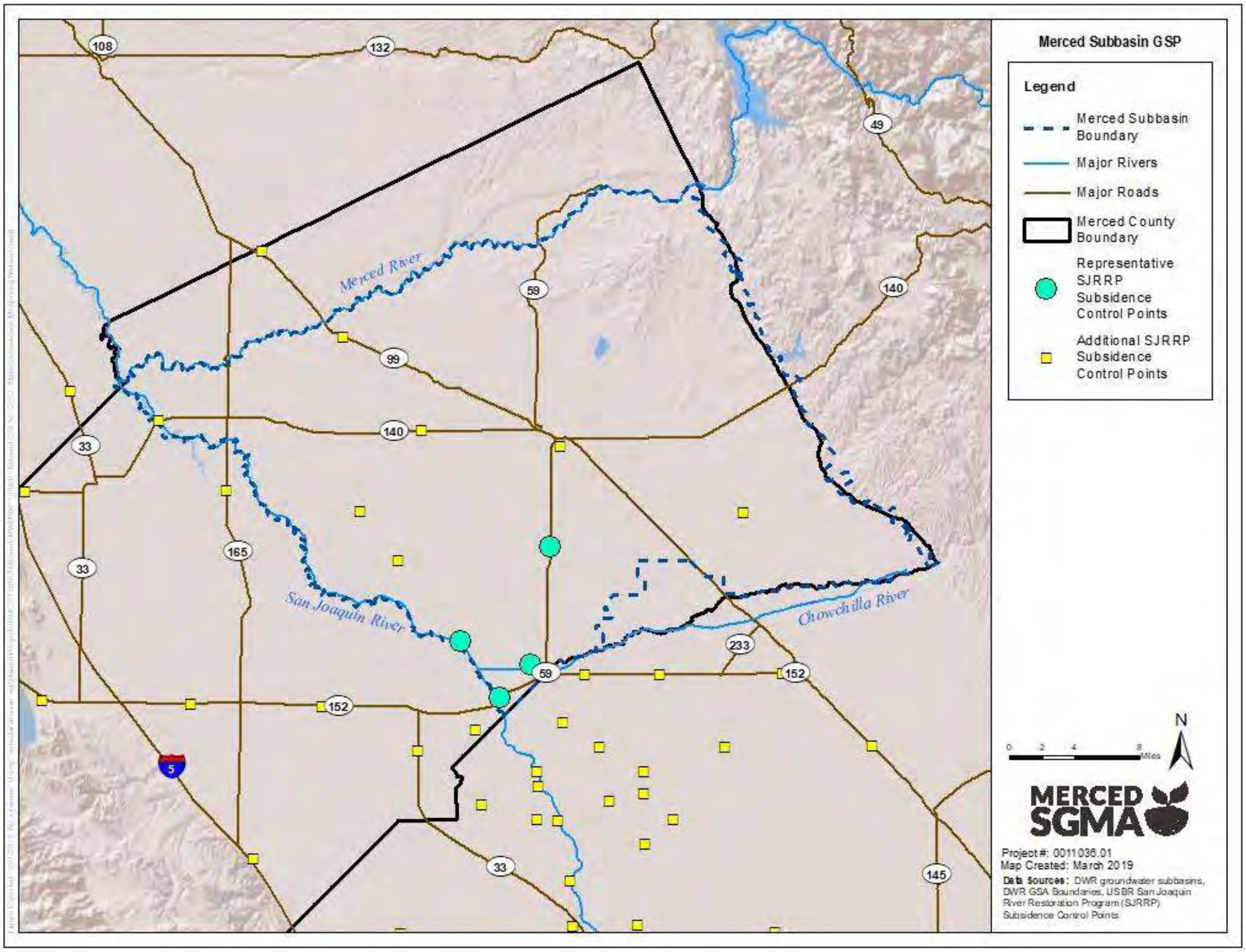
4.9 SUBSIDENCE MONITORING NETWORK

4.9.1 Monitoring Sites Selected for Monitoring Network

The Merced Subbasin GSP subsidence monitoring network includes all 71 subsidence control points monitored by the United States Bureau of Reclamation (USBR) as part of the ~~San Joaquin River Restoration Program (~~SJRRP~~)~~, noting that many of these are outside of the Subbasin, but provide regional context. The control points outside the Subbasin are opportunistically selected, in that they both meet the needs of GSP monitoring for the Subbasin and are being actively monitored for other purposes. The selected sites are not necessarily the specific sites shown and listed below, but rather the sites that continue to be monitored under SJRRP monitoring program. Thus, monitoring would not continue if sites were removed from the program. Additionally, sites added to the program would be added to the monitoring network.

Figure 4-8 shows the Merced Subbasin GSP Subsidence Monitoring Network sites.

Figure 4-8: Merced Subbasin GSP Subsidence Monitoring Network Sites



4.9.2 Monitoring Frequency

USBR conducts subsidence measurements on a semiannual basis. Measurements are recorded in the middle of July and the middle of December as part of the SJRRP.

4.9.3 Spatial Density

DWR's *Monitoring Networks and Identification of Data Gaps BMP* does not provide specific spatial density guidelines for subsidence monitoring networks and thus relies on professional judgment on site identification. The subsidence monitoring network stations provide an adequate spatial coverage of the Subbasin, being specifically developed to characterize regional subsidence in support of the SJRRP. However, the locations provide only information on the elevation of the land surface and do not provide information on the depths at which compaction is occurring. Depth of compaction is an important consideration when managing groundwater elevations to avoid dewatering of sensitive clays. Extensometers are needed within the basin and in the nearby portions of neighboring subbasins to provide this information.

4.9.4 Representative Monitoring

The Merced Subbasin GSP subsidence monitoring network includes four representative monitoring sites at which minimum thresholds and measurable objectives were defined. Representative monitoring sites were selected for the subsidence monitoring network because of their proximity to the region of known subsidence in the southern corner of the Subbasin. Other subsidence control points within and outside of the Merced Subbasin will be used to construct maps of regional subsidence rates for ongoing monitoring, tracking, and analysis.

Figure 4-8 (above) shows the locations of the land subsidence monitoring network monitoring and representative sites in the vicinity of the Merced Subbasin. Additional SJRRP subsidence control points are located as far south as Fresno County.

Table 4-9 details the land subsidence monitoring network sites. Representative sites are identified with an asterisk (*) next to the SJRRP ID and Local ID.

Table 4-9: Merced Subbasin GSP Subsidence Monitoring Network and Representative Site Details

SJRRP ID	Local ID	Elevation (ft above MSL)	Latitude	Longitude
119	109.28	111.03	37.46356	-120.81269
121	375 USE	127.64	36.98302	-120.50087
170	4S3	97.9	37.22997	-120.70143
HS2494	57.95 USBR	183.31	37.24608	-121.07802
120	604.164	606.63	36.99646	-119.70152
122	ALEX 5	167.37	36.77005	-120.39230
2160	BLYTHE	232.29	36.53247	-119.87233
2147	BURNSIDE	195.1	36.48785	-120.15206
124	D 158 RESET	146.55	37.08372	-120.44936
125	DWIGHT	183.51	36.82226	-120.50180
2362	DWR 154.33	146.69	37.01822	-120.43325
126	E1420	167.16	37.28817	-120.47662
2076	F 158 RESET 1967	178.59	37.08358	-120.36555
128	F 928	619.26	36.62403	-120.65904
129	FIREPORT	145.42	36.85731	-120.46284
130	FREMONT	73.14	37.31065	-120.92791
131	G 706 RESET	242.93	37.22833	-120.27055
132	G 990	124.4	36.99616	-120.50295
133*	H 1235 RESET*	119.82	37.06187	-120.54345
2348	HARMON	112.54	37.01497	-120.63602
2562	HETFIELD	131.82	36.95189	-120.47907
62	HPGN 06 06	288.74	36.69844	-119.75773
63	HPGN 06 07	328.99	36.50107	-120.35386
135	HPGN CA 06 03	234.65	37.08448	-120.22755
137	HPGN CA 10 01	100.37	37.05472	-120.74308
138	HPGN CA 10 04	238.97	37.46425	-121.17791

SJRRP ID	Local ID	Elevation (ft above MSL)	Latitude	Longitude
139	HPGN D CA 06 NF	185.65	36.59009	-120.06086
141	HPGN D CA 06 RF	284.97	36.88701	-119.98165
142	HPGN D CA 06 RG	430.37	36.97544	-119.79378
143	HPGN D CA 06 SG	1107.13	37.09489	-119.75237
144	HPGN D CA 10 BK	314.06	36.91701	-120.82034
AA4259	HPGN D CA 10 FP	1289.23	37.42909	-120.10257
GU0278	J 1074	704.59	36.78119	-120.81158
145	J 1233	494.09	36.86675	-119.56149
146	K 361	285.34	37.05889	-121.05689
GT1871	KAKTUS	506.69	36.71553	-119.35207
147	KELLIE	123.28	36.96627	-120.56499
GU0492	L 928	1103.55	36.53750	-120.56144
104	LIFESON	179.59	36.77410	-120.28436
148	LIVINGSTON RESET	134.13	37.38675	-120.72109
2107	MARTIN 2008	174.89	36.58926	-120.16264
DH6665	MATTHEW	189.6	36.85084	-120.65533
2378	MELISSA	179.76	37.01834	-120.29259
2149	MURIETTA	164.61	36.63206	-120.31785
150	NEWMAN NW BASE	97.26	37.33715	-121.02848
29	NOTARB	277.64	37.01818	-120.12660
DH6671	PEYTON	233.37	36.70719	-120.45965
1108	R940 RESET	123.59	37.30241	-120.63321
1007R	RBF 1007 RESET	145.34	36.93077	-120.38222
1009	RBF 1009	127.84	36.95265	-120.50342
159	RBF 1027	150.99	36.82490	-120.37284
160R	RBF 1047 RESET	215.34	36.82212	-120.14185
1053R	RBF 1053 RESET	151.35	36.97609	-120.38301
1054R	RBF 1054 RESET	149.15	36.99620	-120.38328
1055R	RBF 1055 RESET	124.96	37.04002	-120.47373
162*	RBF 1057*	119.54	37.09215	-120.51025
158	RBF1026	149.65	36.85772	-120.39088
152	SALT RM1	84.04	37.19244	-120.83978
153	SHAWN	154.1	36.81757	-120.43339
154	SPEAK AZ MK	229.61	36.72608	-120.02468
108	SSH	78.63	37.24767	-120.85146
155	T 987 CADWR	109.39	37.18612	-120.65872
127	USHER	181.93	36.85100	-120.23693
2448	V513	197.46	36.48511	-120.00531
2065*	W 938 RESET*	144.43	37.19818	-120.48807
156*	W 990 CADWR*	111.2	37.11342	-120.58833
123	WES	159.71	36.95263	-120.35004
157	WILLIAM 3	113.61	37.03363	-120.57226
101	X 989	140.54	36.89757	-120.46509
AC5729	X1235	137.94	37.05653	-120.89083
2062	Y 549	139.42	36.96987	-120.42216

* indicates representative monitoring site

Source: ~~–~~ San Joaquin River Restoration Program subsidence control points.

4.9.5 Monitoring Protocols

Subsidence monitoring will continue to be performed by USBR in accordance with agency protocols (Appendix K).

4.9.6 Data Gaps

As noted in Section 4.9.3, data gaps exist regarding an understanding of the depth at which subsidence is occurring. It is recommended that one or more extensometers be installed to collect this type of data in or near the Merced Subbasin.

4.9.7 Plan to Fill Data Gaps

The GSAs recognize the importance of managing pumping volumes below the Corcoran Clay, as this is the depth range believed to be causing subsidence. The Projects and Management Actions section includes a project designed to study the potential impacts of moving pumping from below the Corcoran Clay to above the Corcoran Clay. This analysis is intended to facilitate moving pumping within the requirements of Merced County's Groundwater Ordinance. To help inform this study, the Projects and Management Actions section also discusses installation of additional subsidence monitoring that may include installation of extensometers or other measurement methods to help characterize the magnitude, extent, and depth of subsidence and the relationship of subsidence to groundwater pumping activities.

The number and location of extensometers or other measurement methods will be developed in coordination with the SJRRP, the USGS, and other entities associated with subsidence studies, such as the State Water Project, Central Valley Project, California High Speed Rail Authority, and the Central Valley Flood Protection Board. Interbasin coordination will include efforts to coordinate on subsidence monitoring in the Chowchilla and Delta-Mendota Subbasins to better understand trends and any potential correlation to groundwater levels in the different principal aquifers across all subbasins. Subsidence monitoring located nearby but outside of the Subbasin may still fill the existing data gap.

Given the expense of extensometers and some other measurement methods, they may be installed in a phased manner, as funding is available. Funding of a collective effort will be a major component in proceeding with these installations.

Within two years after the approval of the GSP by DWR, the GSAs will provide a plan to fill identified gaps, with a timeline for priorities of implementation.

4.10 DEPLETIONS OF INTERCONNECTED SURFACE WATER MONITORING NETWORK

Sustainable management criteria for depletions of interconnected surface waters are monitored by proxy through the measurement of groundwater levels (see Section 3.8 for rationale), and the same monitoring network is used to support overall characterization of the Subbasin. The monitoring network is intended 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 is developed to characterize the following:

- Flow conditions including surface water discharge, surface water head, and baseflow contribution.
- Temporal change in depletions due to variations in stream discharge and regional groundwater extraction.
- Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.

Based on current understanding, ephemeral or intermittent flowing streams are largely located in the eastern portions of the Subbasin and are not thought to be interconnected with the groundwater system (see Figure 2-10 in Section 2.1.3.5 - Groundwater Recharge and Discharge Areas). So, characterization of the date and location at which they cease to flow has been deemed not associated with groundwater conditions and not applicable for monitoring.

4.10.1 Monitoring Sites Selected for Monitoring Network

Monitoring sites include the groundwater level sites identified in Section 4.5 and the stream gage locations described in 1.2.2.4. The stream gage sites are opportunistically selected, in that they both meet the needs of GSP monitoring for the Subbasin and are being actively monitored for other purposes. The selected sites are not necessarily these specific sites, but rather the sites that continue to be monitored under the DWR, USGS, Merced Irrigation District (MID), and United States Army Corps of Engineers (USACOE) monitoring programs. Thus, monitoring would not continue if sites were removed from one of these programs. Additionally, sites added to one of these agency programs would be added to the monitoring network.

Figure 4-9 shows the locations of the stream gages. Table 4-10 shows details about the stream gages.

Figure 4-9: Merced Subbasin GSP Interconnected Surface Water Depletions Monitoring Network Sites

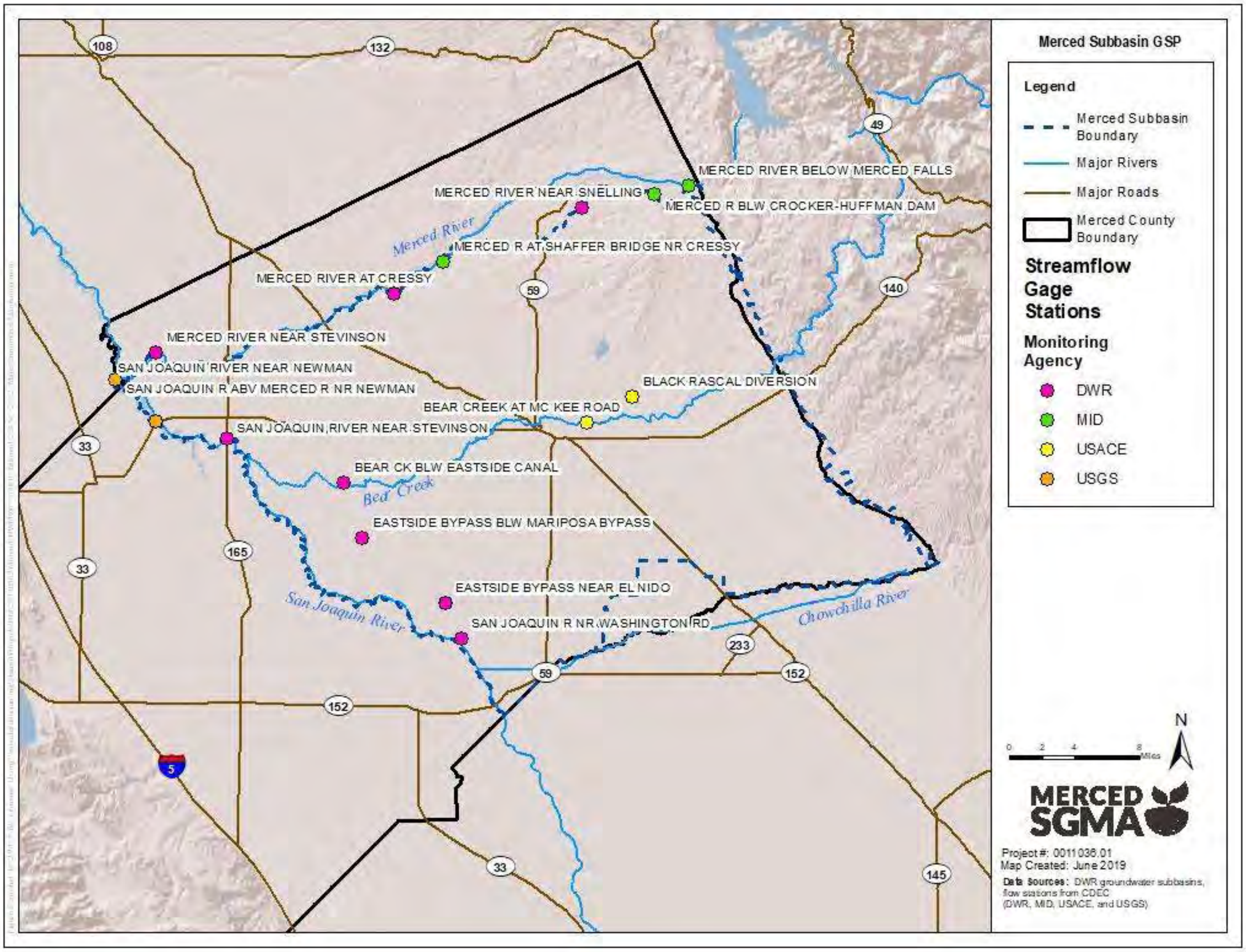


Table 4-10: Merced Subbasin GSP Interconnected Surface Water Depletions Monitoring Network Site Details

Station Code	Station Name	Latitude	Longitude	Monitoring Agency
BSD	BEAR CK BLW EASTSIDE CANAL	37.25470	-120.71940	DWR
MCK	BEAR CREEK AT MC KEE ROAD	37.30920	-120.44560	USACOE
BDV	BLACK RASCAL DIVERSION	37.33280	-120.39440	USACOE
EBM	EASTSIDE BYPASS BLW MARIPOSA BYPASS	37.20500	-120.69810	DWR
ELN	EASTSIDE BYPASS NEAR EL NIDO	37.14750	-120.60530	DWR
MBN	MERCED R AT SHAFFER BRIDGE NR CRESSY	37.45417	-120.60778	MID
MBH	MERCED R BLW CROCKER-HUFFMAN DAM	37.51500	-120.37000	MID
CRS	MERCED RIVER AT CRESSY	37.42500	-120.66300	DWR
MMF	MERCED RIVER BELOW MERCED FALLS	37.52200	-120.33100	MID
MSN	MERCED RIVER NEAR SNELLING	37.50200	-120.45100	DWR
MST	MERCED RIVER NEAR STEVINSON	37.37100	-120.93100	DWR
SMN	SAN JOAQUIN R ABV MERCED R NR NEWMAN	37.34721	-120.97618	USGS
FFB	SAN JOAQUIN R AT FREMONT FORD BRIDGE	37.30994	-120.93104	USGS
SWA	SAN JOAQUIN R NR WASHINGTON RD	37.11532	-120.58700	DWR
NEW	SAN JOAQUIN RIVER NEAR NEWMAN	37.35049	-120.97715	USGS & DWR
SJS	SAN JOAQUIN RIVER NEAR STEVINSON	37.29500	-120.85100	DWR

4.10.2 Monitoring Frequency

Groundwater level data are collected at the frequency noted in Section 4.5.2. Streamflow data is collected on a more frequent basis, with daily measurement relevant for use in depletion analyses.

4.10.3 Spatial Density

DWR's *Monitoring Networks and Identification of Data Gaps BMP* does not provide specific spatial density guidelines for networks monitoring depletions of interconnected surface water and thus relies on professional judgment on site identification. The depletion monitoring network stations provide an adequate spatial coverage of the Subbasin, allowing for development and calibration of a numerical model to support analysis.

4.10.4 Representative Monitoring

As depletions are managed via a proxy, representative monitoring is completed through the groundwater level sustainability indicator.

4.10.5 Monitoring Protocols

Groundwater level monitoring protocols are discussed in Section 4.5.5. Streamflow monitoring protocols will be followed according to the agencies that implement monitoring. DWR and USGS both follow protocols published in USGS Water Supply Paper 2175 (Rantz, Measurement and Computation of Streamflow: Volume 1. Measurement of Stage and Discharge., 1982a) and (Rantz, Measurement and Computation of Streamflow: Volume 2. Computation of Discharge., 1982b).

4.10.6 Data Gaps

The understanding of depletions of interconnected surface water could be improved through additional depth-discrete groundwater elevation data near some rivers and streams.

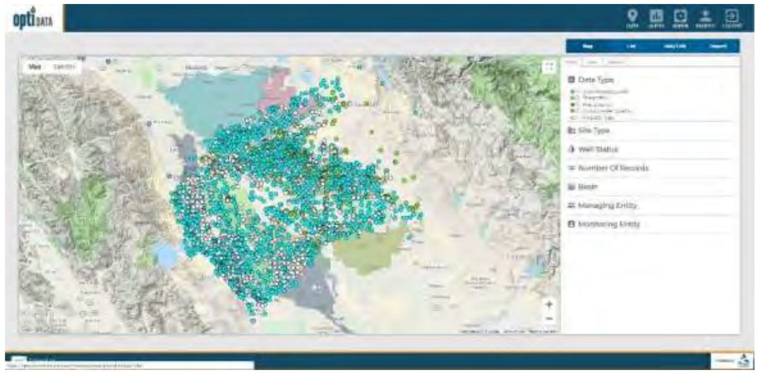
4.10.7 Plan to Fill Data Gaps

Multi-level monitoring wells may be developed to better characterize conditions near rivers and streams, subject to funding availability.

Within two years of the acceptance of the GSP by DWR, the GSAs will develop a plan to address potential data gaps with a timeline for implementation based on priority and funding availability.

5 DATA MANAGEMENT SYSTEM

5.1 OVERVIEW OF THE MERCED SUBBASIN DATA MANAGEMENT SYSTEM



The Merced Subbasin Data Management System (DMS) is implemented using the Opti platform. The DMS serves as a data sharing portal to enable utilization of the same data and tools for visualization and analysis to support sustainable groundwater management and transparent reporting of data and results.

The DMS is web-based and publicly accessible using common web browsers including Google Chrome, Firefox, and Microsoft Edge. It is a flexible and open software platform that utilizes familiar Google maps and charting tools for analysis and visualization. The site may be accessed here: https://opti.woodardcurran.com/merced

5.2 FUNCTIONALITY OF THE DATA MANAGEMENT SYSTEM

The DMS is a modular system that includes numerous tools to support Groundwater Sustainability Plan (GSP) development and ongoing implementation, including:

- User and Data Access Permissions
- Data Entry and Validation
- Visualization and Analysis
- Query and Reporting

The DMS can be configured for additional tools and functionality as the needs of the Groundwater Sustainability Agencies (GSAs) change over time. The following sections briefly describe the currently configured tools. For more detailed instructions on the usage of the DMS, please refer to the Opti User Guide (see Appendix L).

5.2.1 User and Data Access Permissions

User access permissions are controlled through several user types that have different roles in the DMS as summarized in Table 5-1 below. These user types are broken into three high-level categories:

- System Administrator users manage information at a system-wide level, with access to all user accounts and entity information. System Administrators can set and modify user access permissions when an entity is unable to do so.
- Managing Entity (Administrator, Power User, User) users are responsible for managing their entity's site/monitoring data and can independently control access to this data. Entity users can view and edit their entity's data and view (not edit) shared or published data of other entities. An entity's site information (wells, gages, etc.) and associated data may only be edited by Administrators and Power Users associated with the entity. Note: "Merced Subbasin GSAs", which represents all three GSAs in the Subbasin, is currently configured as the Managing Entity for all datasets.

- Public users may view data that is published but may not edit any information. These users may access the DMS using the Guest Login feature on the login screen.

Monitoring sites and their associated datasets are added to the DMS by Managing Entity Administrators or Power Users. In addition to the user permissions, access to the monitoring datasets is controlled through three options:

- Private data is monitoring data that is only available for viewing, depending on user type, by the entity's associated users in the DMS.
- Shared data is monitoring data that is available for viewing by all users in the DMS (excludes Public Users).
- Public data is monitoring data that is available publicly and can be viewed by all user types in the DMS and may be published to other sites or DMSs as needed.

The Managing Entity Administrators have the ability to set and maintain the data access options for each dataset associated with their entity.

Table 5-1: Data Management System User Types

Modules/Submodules	System Administrators	Entity			Public
		Admin	Power User	User	
Data: Map	●	●	●	●	○
Data: List	●	●	●	●	○
Data: Add/Edit	●	●	●		
Data: Import	●	●	●		
Query	●	●	●	●	○
Admin	●				
Profile	●	●	○	○	○

● Indicates access to all functionality, ○ Indicates access to partial functionality (see explanations in following sections)

5.2.2 Data Entry and Validation

To encourage agency and user participation in the DMS, data entry and import tools are easy to use, accessible over the web, and help maintain data consistency and standardization. The DMS allows Entity Administrators and Power Users to enter data either manually via easy-to-use interfaces, or through an import tool utilizing Excel templates, ensuring data may be entered into the DMS as soon as possible after collection. The data is validated by Managing Entity's Administrators or Power Users using a number of quality control checks prior to inclusion in the DMS.

5.2.2.1 Data Collection Sites

Site information is input for groundwater wells, stream gages, and precipitation meters manually either through the Data Entry tool or when prompted in the Import tool. In the Data Entry tool, new sites may be added by clicking on New Site. Existing sites may be updated using the Edit Site tool. During data import, the sites associated with imported data are checked by the system against the existing site list in the DMS. If the site is not in the existing site list, the user is prompted to enter the information via the New Site tool before the data import can proceed.

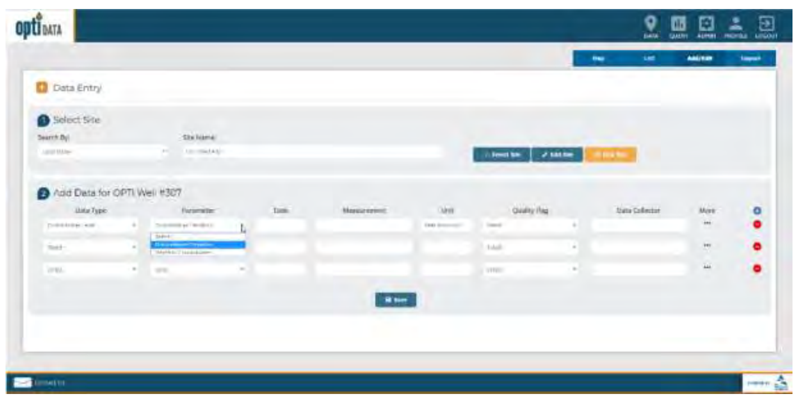
The information that is collected for sites is shown in Table 5-2. Required fields are indicated with an asterisk.

Table 5-2: Data Collection Site Information

Basic Info	Well Info	Construction Info
Site Type*	State Well ID	Total Well Depth
Local Site Name*	CASGEM ID	Borehole Depth
Local Site ID	Ground Surface Elevation	Casing Perforations
Latitude/Longitude*	Reference Point	Casing Diameter
Description	Reference Point Elevation	Casing Modifications
County	Reference Point Location	Well Capacity
Managing Entity*	Reference Point Description	Well Completion Report Number
Monitoring Entity*	Well Use	Comments
Type of Monitoring	Well Status	
Type of Measurement	Well Type	
Monitoring Frequency	Aquifers Monitored	
	Groundwater Basin Name/Code	
	Comments	
	Upload File	

* Required fields; all other fields are optional

5.2.2.2 Monitoring Data Entry



Monitoring data, including but not limited to groundwater elevation, groundwater quality, streamflow, and precipitation, may be input either manually through the Data Entry tool or using templates in the Import tool. The Data Entry tool allows users to select a site and add data for the site using a web-based tool. The following information is collected:

- Data Type (e.g., groundwater elevation, groundwater quality, streamflow, or precipitation)
- Parameter for selected Data Type; units populate based on selection
- Date of Measurement
- Measurement Value
- Quality Flag (e.g., quality assurance description for the measurement such as “Pumping”, “Can’t get tape in casing”, etc., as documented by the Data Collector)
- Data Collector
- Supplemental Information based on Data Type (e.g., Reference Point Elevation, Ground Surface Elevation, etc.)

Data import templates include the same data entry fields and are available for download from the DMS. The Excel-based templates contain drop-down options and field validation similar to the data entry interface.

5.2.2.3 Data Validation

Quality control helps ensure the integrity of the data added to the DMS. The entities that maintain the monitoring data that were loaded into the DMS may have performed previous validation of that data; no effort was made to check or correct that previous validation and it was assumed that all data provided was valid. While it is nearly impossible to determine complete accuracy of the data added to the DMS since the DMS cannot detect incorrect measurements due to human error or mechanical failure, it is possible to verify that the data input into the DMS meets some data quality standards. This helps promote user confidence in the data stored and published for visualization and analysis.

Upon saving the data in the data entry interface or importing the data using the Excel templates, the following data validation checks are performed by the DMS:

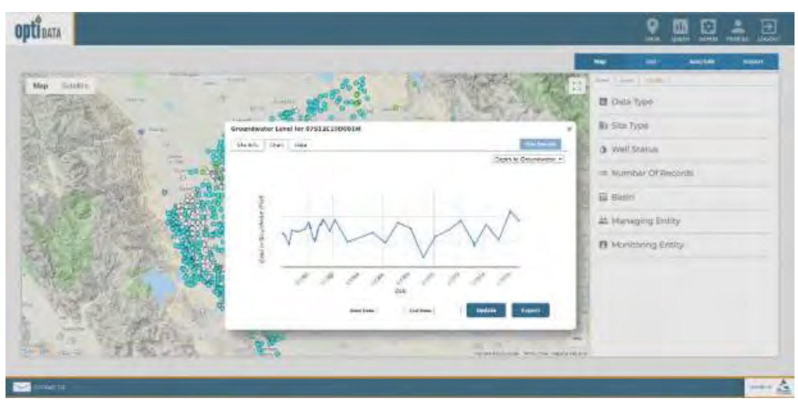
- <u>Duplicate measurements</u>: The database checks for duplicate entries based on the unique combination of site, data type, date, and measurement value.
- <u>Inaccurate measurements</u>: The database compares data measurements against historical data for the site and flags entries that are outside the historical minimum and maximum values.
- <u>Incorrect data entry</u>: Data field entries are checked for correct data type (e.g., number fields do not include text, date fields contain dates, etc.)

Users are alerted to any validation issues and may either update the data entries or accept the values and continue with the entry/import. Users may access partially completed import validation through the import logs that are saved for each data import. The partially imported data are identified in the Import Log with an incomplete icon under the Status field. This allows a second person to also access the imported data and review prior to inclusion in the DMS.

5.2.3 Visualization and Analysis

Transparent visualization and analysis tools enable utilization of the same data and methodologies, allowing stakeholders and neighboring GSAs to use the same data and methods for tracking and analysis. In the Merced DMS, data visualization and analysis are performed in both Map and List views.

5.2.3.1 Map View



The Map view displays all sites (groundwater wells, stream gages, precipitation meters, etc.) in a map-based interface. The sites are color coded based on associated data type and may be filtered by different criteria such as number of records or monitoring entity. Users may click on a site to view the site detail information and associated data. The monitoring data is displayed in both chart and table formats. In these views, the user may select to view different parameters for the data type. The chart and table may be updated to display selected date ranges, and the data may be exported to Excel.

5.2.3.2 List View

The List view displays all sites (groundwater wells, stream gages, precipitation meters, etc.) in a tabular interface. The sites are listed according to site names and associated entities. The list can be sorted and filtered by different criteria such as number of records or monitoring entity. Similar to the Map view, users may click on a site to view the site detail information and associated data. The monitoring data is displayed in both chart and table formats. In these views, the user may select to view different parameters for the data type. The chart and table may be updated to display selected date ranges, and the data may be exported to Excel.

5.2.3.3 Analysis Tools

The Toolbox is available in the Map view and offers Administrative and Entity users access to the Well Tiering tool to support monitoring plan development. The flexibility of the DMS platform allows for future analysis tools, including contouring, total water budget visualization, and management area tracking.

5.2.4 Query and Reporting

The DMS has the ability to format and export data and analysis at different levels of aggregation, and in different formats, to support local decision making and for submission to various statewide and local programs (i.e., Sustainable Groundwater Management Act [SGMA], California Statewide Groundwater Elevation Monitoring Program [CASGEM], Groundwater Ambient Monitoring and Assessment [GAMA], etc.).

5.2.4.1 Ad-hoc Query

The data in the DMS can be queried and reported using the Query Tool. The Query Tool includes the ability to build ad-hoc queries using simple options. The data can be queried by:

- Monitoring or Managing Entity
- Site Name
- Data Type

Once the type of option is selected, the specific criteria may be selected (e.g., groundwater elevation greater than 100 ft.) Additionally, users may include time periods as part of the query. The query options can build upon each other to create reports that meet specific needs. Queries may be saved and will display in the saved query drop-down for future use.

The query results are displayed in a map format and a list format. In both the map and list views, the user may click on a well to view the associated data. The resulting data of the query may be exported to Excel.

5.2.4.2 Standard Reports

The DMS can be configured to support wide-ranging reporting needs through the Reports Tool. Standard report formats may be generated based on a predetermined format and may be created at the click of a button. These report formats may be configured to match state agency requirements for submittals, including annual reporting of monitoring data that must be submitted electronically on forms provided by the Department of Water Resources (DWR).

5.3 DATA INCLUDED IN THE DATA MANAGEMENT SYSTEM

Many monitoring programs exist at both the local and state/federal levels. A cross-sectional analysis was conducted within the basin to document and assess the availability of data within the basin, as well as statewide or federal databases that provide data relevant to the Basin.

The DMS can be configured to include a wide variety of monitoring data types and associated parameters. Based on the analysis of existing datasets within the basin and the GSP needs, the data types shown in Table 5-3 below were identified and are currently configured in the DMS.

Table 5-3: Data Types and Their Associated Parameters Configured in the DMS

Data Type	Parameter	Units	Currently Has Data in DMS
Groundwater Elevation	Depth to Groundwater	Feet	Yes
	Groundwater Elevation	Feet above MSL	Yes
Groundwater Quality	1,1,1-Trichloroethane	µg/L	Yes
	1,1,2,2-Tetrachloroethane	µg/L	Yes
	1,1,2-Trichloroethane	µg/L	Yes
	1,1-Dichloroethylene	µg/L	Yes
	1,2-Dibromo-3-chloropropane	µg/L	Yes
	1,2-Dichloroethane	µg/L	Yes
	1,2-Dichloropropane	µg/L	Yes
	Alachlor	µg/L	Yes
	Aluminum	mg/L	Yes
	Antimony	µg/L	Yes
	Arsenic	µg/L	Yes
	Atrazine	µg/L	Yes
	Barium	mg/L	Yes
	Barium	µg/L	Yes
	Benzene	µg/L	Yes
	Beryllium	µg/L	Yes
	Bicarbonate	mg/L	Yes
	Cadmium	µg/L	Yes
	Calcium	mg/L	Yes
	Carbofuran	µg/L	Yes
	Carbon tetrachloride	µg/L	Yes
	Chloride	mg/L	Yes
	Dicamba	µg/L	Yes
	Dinoseb	µg/L	Yes
	Endrin	µg/L	Yes
	Fluoride	mg/L	Yes
	Glyphosate	µg/L	Yes
	Heptachlor	µg/L	Yes

Data Type	Parameter	Units	Currently Has Data in DMS
Groundwater Quality (Continued)	Heptachlor epoxide	µg/L	Yes
	Magnesium	mg/L	Yes
	Manganese	µg/L	Yes
	MBAS	mg/L	Yes
	Methoxychlor	µg/L	Yes
	Molinate	µg/L	Yes
	Nitrate	mg/L	Yes
	Pentachlorophenol	µg/L	Yes
	Picloram	µg/L	Yes
	Potassium	mg/L	Yes
	Sodium	mg/L	Yes
	Sulfate	mg/L	Yes
	Thiobencarb	µg/L	Yes
	Toxaphene	µg/L	Yes
	Dissolved Nitrate	mg/L as N	Yes
	Dissolved Nitrate	mg/L as NO_3	Yes
	1,1-Dichloroethane	TON	Yes
	1,2,4-Trichlorobenzene		Yes
	1,2-Dibromoethane (EDB)	µg/L	Yes
	1,3-Dichloropropene (Total)	mg/L	Yes
	1,4-Dichlorobenzene	µg/L	Yes
	2,4,5-TP (Silvex)	µg/L	Yes
	2,4'-D	µg/L	Yes
	Aluminum - Total	µg/L	Yes
	Antimony - Total	µg/L	Yes
	Apparent Color		Yes
	Arsenic - Total	µg/L	Yes
	Atrazine (Aatrex)	µg/L	Yes
	Barium - Total	µg/L	Yes
	Bentazon	µg/L	Yes
	Benzo(a)pyrene	µg/L	Yes
	Beryllium - Total	µg/L	Yes
	Bicarbonate Alkalinity	µg/L	Yes
	Boron - Total	µg/L	Yes
	Cadmium - Total	µg/L	Yes
	Calcium	NTU	Yes
	Calcium - Total	mg/L	Yes
	Carbonate Alkalinity	µg/L	Yes
	Chloride	µg/L	Yes

Data Type	Parameter	Units	Currently Has Data in DMS
Groundwater Quality (Continued)	Chromium - Total	µg/L	Yes
	Chromium (Total)	pCi/L	Yes
	Chromium (VI)	µg/L	Yes
	cis-1,2-Dichloroethylene	pCi/L	Yes
	Copper - Total	µg/L	Yes
	Cyanide, Total	µg/L	Yes
	Dalapon	µg/L	Yes
	DBCP	µg/L	Yes
	Di(2-ethylhexyl)adipate	µg/L	Yes
	Di(2-Ethylhexyl)phthalate	µg/L	Yes
	Diquat	µg/L	Yes
	EDB	µg/L	Yes
	Endothall	µg/L	Yes
	gamma-BHC (Lindane)	µg/L	Yes
	Hexachlorobenzene	µg/L	Yes
	Hexachlorocyclopentadiene	µg/L	Yes
	Iron - Total	µg/L	Yes
	Lab Turbidity	NTU	Yes
	Lead - Total	µg/L	Yes
	Magnesium - Total	mg/L	Yes
	Manganese - Total	µg/L	Yes
	Mercury - Total	µg/L	Yes
	Nickel - Total	µg/L	Yes
	Nitrate - N	mg/L	Yes
	Nitrate (as N)	mg/L	Yes
	Nitrate (as N)	µg/L	Yes
	Odor Threshold	TON	Yes
	Oxamyl (Vydate)	µg/L	Yes
	pH		Yes
	Potassium - Total	mg/L	Yes
	Radium 228	mg/L	Yes
	Selenium - Total	µg/L	Yes
	Silica - Total	mg/L	Yes
	Silver - Total	µg/L	Yes
	Simazine (Princep)	µg/L	Yes
	Sodium - Total	mg/L	Yes
	Specific Conductance	umhos/cm	Yes
	Specific Conductance	mg/L	Yes
	Strontium - Total	µg/L	Yes

Data Type	Parameter	Units	Currently Has Data in DMS
Groundwater Quality (Continued)	TDS	mg/L	Yes
	Technical Chlordane	µg/L	Yes
	Thallium - Total	µg/L	Yes
	Total Alkalinity	mg/L	Yes
	Total Hardness	mg/L	Yes
	Total PCBs	µg/L	Yes
	Uranium - Total	µg/L	Yes
	Vanadium - Total	µg/L	Yes
	Zinc - Total	µg/L	Yes
	TDS	tons/acre-foot	Yes
	NO_3N	mg/L	Yes
	NO_3-N	mg/L	Yes
	Total Nitrate	mg/L as NO_3	Yes
	Total Nitrate	mg/L as N	Yes
	1,2-Dichlorobenzene	µg/L	Yes
	Dissolved Nitrate	mg/L	Yes
	Various Parameters	Various	
Surface Water Quality	Various Parameters	Various	
Streamflow	Streamflow	cfs	Yes
Precipitation	Precipitation	inches	Yes
	Reference Evapotranspiration (ETo)	inches	Yes
	Average Air Temperature	Degrees F	Yes

Additional data types and parameters can be added and modified as the DMS grows over time.

The data was collected from a variety of sources, as shown in Table 5-4 below. Each dataset was reviewed for overall quality and consistency prior to consolidation and inclusion in the database.

The groundwater wells shown in the DMS are those that are included in data sets provided by the monitoring data sources shown below for groundwater elevation and quality. These do not include all wells currently used for production and may include wells historically used for monitoring that do not currently exist. Care was taken to minimize duplicative wells in the DMS. As datasets were consolidated, sites were evaluated based on different criteria (e.g., naming conventions, location, etc.) to determine if the well was included in a different dataset. Datasets for the wells were then associated with the same well, where necessary.

After the data was consolidated and reviewed for consistency, it was loaded into the DMS. Using the DMS data viewing capabilities, the data was reviewed for completeness and consistency to ensure the imports were successful.

Table 5-4: Sources of Data Included in the DMS

Data Source	Datasets Collected	Date Collected	Activities Performed
CV-SALTS (includes data from CDPH, DWR, CVDRMP, GAMA, and USGS)	Well Location Well Type (Limited) Well Depth (Limited) Groundwater Quality	8/13/2018	• Removed duplicate records • Matched existing records with other data sources (GAMA, DWR) • Determined if well was screened above, below, or outside of Corcoran Clay (for wells with depth data)
Central Valley Dairy Representative Monitoring Program (CVDRMP)	Well Location Well Type Groundwater Quality	9/14/2018	• Converted well addresses to Lat/Long • Matched records to wells in CV-SALTS
Department of Water Resources (DWR)	Well Location Well Type Groundwater Quality	9/2018	• Removed duplicate records
HydroDMS	Well Location Well Type Well Depth (Limited) Groundwater Elevation Groundwater Quality	Data collected as part of the 2015 IRWMP	• Determined if well was screened above, below, or outside of Corcoran Clay
Groundwater Ambient Monitoring and Assessment (GAMA) (includes data from DHS, DWR, and USGS)	Well Type Well Location Well Depth (Limited) Groundwater Quality	9/10/2018	• Removed duplicate records • Determined if well was screened above, below, or outside of Corcoran Clay (for wells with depth data)
Local Data (Le Grand CSD, Meadowbrook Water Company, Santa Nella Water District)	Well Type Well Depth Well Location Groundwater Quality	5/2017 - 7/2017	• Tabulated lab results
National Water Information System (NWIS)	Well Type Well Depth (Limited) Well Relation to Corcoran Clay (Limited) Well Location Groundwater Quality	9/2018	• Removed duplicate records • Determined if well was screened above, below, or outside of Corcoran Clay (for wells with depth data)

6 PROJECTS AND MANAGEMENT ACTIONS TO ACHIEVE SUSTAINABILITY GOAL

6.1 INTRODUCTION

This chapter of the Merced Subbasin Groundwater Sustainability Plan (GSP) includes relevant Management Actions and Projects information to satisfy §354.42 and §354.44 of the Sustainable Groundwater Management Act (SGMA) regulations.[20] The first several sections of this chapter focus on Management Actions and describe the framework under discussion for the initial basinwide groundwater pumping allocation. The allocation framework will be established by the Groundwater Sustainability Agencies (GSAs) as a first step in establishing limits on groundwater extraction for the Subbasin that will eventually be implemented and enforced by authority granted under SGMA to the GSAs. The framework also helps establish a clearer understanding of the gap that projects and management actions should fill in balancing supply and demand. Management actions will also include rewarding GSAs based on their extracted volumetric groundwater extraction, since 2015, proportioned to other GSAs in the basin. The Projects and Management Actions described in this chapter will help achieve the Merced Subbasin Sustainability Goal.

6.2 MANAGEMENT ACTIONS

Management Actions are generally administrative, locally implemented actions that the Merced GSAs or member agencies could take that affect groundwater sustainability. Typically, Management Actions do not require outside approvals, nor do they involve capital projects.

6.2.1 Initial Groundwater Allocation Framework

Description: As described in Chapter 1 (Introduction and Plan Area) and Chapter 2 (Basin Setting) of this GSP, the Basin is in overdraft conditions. While the projects identified in later sections of this chapter would increase the water available to users in the Basin, they are not expected to reduce the groundwater overdraft sufficiently to achieve the Basin's sustainability goals. Given these circumstances, the Merced GSAs plan to allocate the sustainable yield of native groundwater in the basin to each GSA and establish groundwater extraction limits. This section describes the initial framework currently under discussion by the GSAs which will be further refined and developed prior to implementation.

Legal Authority: Under SGMA, GSAs have authority to establish groundwater extraction allocations. Specifically, SGMA authorizes GSAs to control groundwater by regulating, limiting, or suspending extractions from individual wells or extractions in the aggregate.[21] ~~–~~ SGMA and GSPs adopted under SGMA cannot alter water rights. With input from multiple Stakeholder and Coordinating Committee meeting discussions, the GSAs agreed to use the framework described below as the initial basis for establishing allocations to each GSA with the understanding that work remains to fill data gaps, refine and document sustainable yield and developed supply estimates, and develop the details of implementation for each GSA.

How the Action Will Be Accomplished: The water allocation framework is intended to generally align with water rights concepts and provide an equitable and transparent means to share the Basin's[22] Sustainable Yield. The framework described below outlines a process that deals exclusively with water allocations and does not affect water rights. The steps of the framework are:

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[20] SGMA requirements for GSPs can be read here: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/GSP_Emergency_Regulations.pdf

[21] California Water Code § 10726.4(a)(2)

[22] The terms "basin" and "subbasin" are used interchangeably in this GSP chapter (and are interchangeable under the definition in SGMA).

1. Determine the Sustainable Yield of the Basin
2. Subtract groundwater originating from Developed Supply to obtain Sustainable Yield of Native Groundwater
3. Allocate Sustainable Yield of Native Groundwater to GSAs (the specifics of how this will be done, taking into account land area, historical use, appropriative use, and other considerations are still being worked out by the GSAs)

Each step of the framework is described in greater detail below:

1. Determine the Sustainable Yield of the Basin

Per SGMA, Sustainable Yield is "the maximum quantity of water, calculated over a base period representative of long-term conditions in the Basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result."[23] As the first step in the allocation framework, the Sustainable Yield for the Basin was estimated by using the Merced Water Resources Model (MercedWRM) simulations for projected basin conditions and reducing pumping until the long-term average change in storage was zero. This analysis is further described in the Water Budget Information Section, in Section 2.3 of this GSP. Based on this analysis, the Sustainable Yield of the Basin is approximately 570,000 acre-feet per year (AFY).

2. Subtract groundwater originating from Developed Supply to obtain Sustainable Yield of Native Groundwater

A portion of the groundwater in the Merced Subbasin originates as surface water supplies imported from outside the Subbasin. This water belongs to the entities that developed the surface supplies and is referred to in this GSP as "Developed Supply."

> *"Water for which a credit is derived is water from outside the watershed or water which is captured that would have been otherwise lost to the subbasin and which is recharged into the groundwater basin…Assuming no prescriptive rights have attached to imported water used to recharge a basin, the imported water generally belongs solely to the importer, who may extract it (even if the basin is in overdraft) and use or export it without liability to other basin users. There are well defined rules regarding leave behinds to address migration of water necessary to keep the subbasin whole."*[24]

In this step of the framework, the portion of Developed Supply that reaches the groundwater basin is estimated and subtracted from the Sustainable Yield estimate. This results in an estimate of the Sustainable Yield of Native Groundwater available for allocation to Basin users.

For this GSP, the Developed Supply reaching the groundwater basin was estimated based on seepage from unlined canals conveying surface water. There are other potential sources of developed supply to the groundwater basin including deep percolation of applied surface water and leakage from lined/piped conveyance.

However, given current available information it is not possible to estimate these flows with confidence at this time. Future refinements of GSP estimates of the developed supplies reaching the groundwater basin may include these and other additional considerations. ~~–~~ The full definition and ownership of developed water needs to be agreed upon by GSAs after GSP adoption, future work needed includes developing, refining and documenting estimates of developed supply and determining rights to confirmed estimates of developed supply.

23 California Water Code §10721(v)

24 Groundwater Pumping and Allocations under California's Sustainable Groundwater Management Act. 2018. Environmental Defense Fund and New Current Water and Land LLC. Page 3

The agencies that import developed surface water into the Basin and experience seepage due to conveyance via unlined canals are: Merced Irrigation District (MID), Stevinson Water District (SWD), and Turner Island Water District (TIWD). The estimate of Developed Supply reaching the Basin aquifer via seepage from unlined conveyance canals was based on information provided by MID, TIWD, and SWD in early 2019 as shown in Table 6-1.

Table 6-1: Estimated long-term annual average seepage from developed supplies

Water Purveyor	Unlined Canals	Stream Diversions	Seepage Estimate	Data Source
Merced Irrigation District	593 miles	393,000 AFY	121,000 AFY	MID AWMP (2013&2015)
Stevinson Water District	18 miles	17,200 AFY	6,000 AFY	TM prepared by GEI
Turner Island Water District	24 miles	20,600 AFY	3,000 AFY	Email/PDF by LSCE
Total Estimated Seepage of Developed Supply Reaching Groundwater			130,000 AFY	

The long-term annual average seepage shown in the seepage estimate column is used in this chapter to illustrate the water allocation framework.

3. Allocate Sustainable Yield of Native Groundwater to GSAs (the specifics of how this will be done, taking into account land area, historical use, appropriative use, and other considerations are still being worked out by the GSAs)

SGMA does not alter water rights. The process for sharing the Basin's Sustainable Yield was developed to align with water rights concepts to achieve fairness and transparency. While there is no legal determination of overdraft for the Merced Subbasin, DWR has classified the Subbasin as critically overdrafted.

The types of groundwater use being considered in the allocation framework can generally be described as:

<u>Overlying Use (Overlying Rights)</u>

> *"Overlying rights are used by the landowner for reasonable and beneficial uses on land they own overlying the subbasin from which the groundwater is pumped."*[25]

<u>Appropriative Use</u>

> *"…Any party that 1) does not own land overlying the basin, 2) owns overlying land but uses the water on nonoverlying land, or 3) sells the water to another party, or to the public, generally is considered an "appropriator" and not an overlying user….…If a pumper extracts water for a non-overlying use… from an overdrafted basin, the right may ripen into a prescriptive right if the basin overdraft is notorious and continuous for at least five years."*[26]

<u>Prescriptive Rights</u>

> *"A prescriptive right (a groundwater right acquired adversely by appropriators) is acquired by taking*

[25] Groundwater Pumping and Allocations under California's Sustainable Groundwater Management Act. 2018. Environmental Defense Fund and New Current Water and Land LLC. Page 2

[26] Groundwater Pumping and Allocations under California's Sustainable Groundwater Management Act. 2018. Environmental Defense Fund and New Current Water and Land LLC. Page 2 and 3

groundwater adverse to existing right holders for a period of normally 5 years). Prescriptive rights do not accrue until a condition of overdraft exists….If a pumper extracts water for a non-overlying use(i.e., pursuant to an appropriative right) from an overdrafted basin, the right may ripen into a prescriptive right if the basin overdraft is notorious and continuous for at least five years."[27]

The Sustainable Yield of Native Groundwater available for allocation to groundwater users would be approximately:

- Sustainable Yield: ~570,000 AFY
- Developed Supply Reaching Basin: ~130,000 AFY
- **"Native Groundwater" Available for Allocation:** ~440,000 AFY

Some of the next steps needed in first five years of GSP to begin implementation of allocations include:

- Agreeing upon details of how allocations to each GSA will be established
- Developing, refining, and documenting estimates of developed supply and determining rights to confirmed estimates of developed supply
- Determining how pumping will be measured through metering program or equivalent
- Establishing sustainable allocation trading and crediting rules
- Implementation schedule and timing
- Conducting outreach and communications

Time-Table for Initiation and Completion: The time-table for implementation of the basinwide allocation framework is identified in Table 6-2 below.

[27] Groundwater Pumping and Allocations under California's Sustainable Groundwater Management Act. 2018. Environmental Defense Fund and New Current Water and Land LLC. Page 2 and 3.

Table 6-2: GSP Implementation Timeline

2020	2025	2030	2035	2040

Monitoring and Reporting	Preparation for Allocations and Low Capital Outlay Projects	Prepare for Sustainability	Implement Sustainable Operations
• Establish monitoring network • Install new monitoring wells • Reduce/fill data gaps	• Conduct 5-year evaluation/update • Monitoring and reporting continue	• Conduct 5-year evaluation/update • Monitoring and reporting continue	• Conduct 5-year evaluation/update • Monitoring and reporting continue
• GSAs allocated initial allocations • GSAs establish their allocation procedures and demand reduction efforts • Develop metering program	• As-needed demand reduction to reach Sustainable Yield allocation • Metering program continues	• As-needed demand reduction to reach Sustainable Yield allocation	• Full implementation demand reduction as needed to reach Sustainable Yield allocation by 2040
• Funded and smaller projects implemented	• Planning/ design/ construction for small to medium sized projects	• Planning/ design/ construction for larger projects begins	• Project implementation completed
• Extensive public outreach regarding GSP and allocations	• Outreach regarding GSP and allocations continues	• Outreach continues	• Outreach continues

The allocation programs for each GSA are expected to be developed in the first 5 years of the GSP. A phase-in between the 2025 - 2035 time horizon is anticipated for all GSAs, with full implementation and enforcement in place by 2040. Implementation of the allocation framework within each GSA is expected to address all relevant sustainability indicators. The framework also provides a basis from which GSAs can better manage groundwater extractions and plan for and implement recharge projects. Evaluation of expected benefits is expected to occur during the 5-year evaluation and updates. The Merced Subbasin GSA will be implementing demand reduction approaches, including early voluntary actions, to ensure its demand reduction goals are achieved by 2040 (see Section 6.2.2).

6.2.2 Merced Subbasin GSA Groundwater Demand Reduction Management Action

Description: To balance with the Sustainable Yield of Native Groundwater in the basin, the Merced Subbasin GSA's consumptive use from current pumping will need to decrease substantially. The Merced Subbasin GSA (MSGSA) has evaluated their ability to meet demands within the basinwide Sustainable Yield of Native Groundwater and has recognized there is an annual deficit when compared to current groundwater use. To remedy this deficit and work toward sustainability, the MSGSA plans to implement a demand reduction program to gradually reduce pumping at a consistent annual rate during the 20-year implementation period in order to reach the Native Groundwater allocation objective by 2040. The MSGSA will immediately begin with outreach and educational efforts in 2020 to begin achieving voluntary reductions. Formalized methods to achieve the desired GSA-wide reductions may be in place by 2025. The MSGSA anticipates reductions will incrementally increase annually for the entire MSGSA area, until the total annual reduction achieves the needed balance. Further information on the framework for allocation to each GSA will provide additional data for the MSGSA to determine an approximate annual deficit and necessary demand reductions. Achieving these reductions will likely require the MSGSA to utilize available methods, which may include: establishing a per-acre pumping allocation for water users in the MSGSA, possibly with a trading market; establishing fee structures tied to extracted volumes; and establishing easement or contract programs to pay for reduced groundwater use. During the first years of implementation, the MSGSA Governing Board will evaluate options and adopt necessary approaches. In order to implement a demand reduction program, the MSGSA will be required to develop a mechanism for reporting, monitoring and enforcement of demand reduction actions, likely on a parcel-by-parcel basis.

The potential demand reduction program will be complemented by water supply enhancement projects and efficiency projects conducted within the management area of the MSGSA that seek to increase the available water supply (see "Projects" discussed in the following subsection 6.3).

Measurable Objective: This program would have measurable benchmarks throughout the 20-year implementation horizon. ~~–~~ The program may be adaptively managed to reflect the progress of water supply enhancement projects in the MSGSA area, which may result in a recalculation of the estimated reduction target necessary to balance groundwater use.

Public Noticing: This demand reduction program has been considered at public meetings of the MSGSA Governing Board and discussed at meetings of the Merced Groundwater Sustainability Agency Technical and Advisory Committees. ~~–~~ The Merced Subbasin GSA anticipates that public outreach and education on the potential structure of the program, as well as feasible monitoring and enforcement mechanisms, would be necessary to enable a successful program. ~~–~~ Outreach may include public notices, meetings, potential website presence and email announcements. Initial program implementation will focus on voluntary compliance while the MSGSA considers the necessary elements to begin enforcing the program by 2025.

Permitting and Regulatory Process: Development of a demand reduction program is not a project as defined by the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) and would therefore not trigger either. Reducing pumping over time is also not expected to trigger CEQA or NEPA because it does not meet the definition of a CEQA or NEPA project.

Time-Table for Initiation and Completion: This demand reduction program would start with education and outreach to landowners on the necessary reduction in demand starting in 2020. Voluntary reduction may start in 2020, anticipating reducing demand in the MSGSA area annually by increments. The development of enforcement mechanisms is anticipated to start in 2020, in order to be in place for mandatory reductions starting in 2025. Mandatory reductions may include per-acre groundwater allocations that incrementally decrease as necessary to achieve the MSGSA area reduction target.

Expected Benefits and Evaluation: A demand reduction program is one component of how the MSGSA will achieve sustainable pumping in the GSA's area of the Merced Basin. Implementation and enforcement of a demand reduction program would directly reduce groundwater pumping and reduce consumptive use of the pumped groundwater. Benefits would be measured by the reduction in the total volume of groundwater used within the MSGSA area.

How Project Will Be Accomplished: Desired reductions in groundwater use may be accomplished through the development of a demand reduction program which may include a per-acre groundwater allocation or other tools, fees, reporting, monitoring, enforcement, and management to comply with the anticipated reduction of demand within the MSGSA area. The development of the demand reduction program may include outreach and feedback from stakeholders and MSGSA member agencies, creation of policies and procedures, and establishment of accounting and record-keeping tools.

Legal Authority: The Merced Subbasin GSA has the authority to develop a demand reduction program and may perform implementation and enforcement of potential allocations through metering or other methods to quantify groundwater use, implement annual water accounting, and implement pumping fees. Mechanisms for enforcement would be outlined in the demand reduction program and are expected to be enforced by the MSGSA and/or member agencies.

Estimated Costs and Plans to Meet Costs: Development and initiation of a demand reduction program is expected to cost about $500,000 to conduct the analysis, adopt policies and procedures, establish monitoring and reporting tools, and conduct outreach. This estimate does not include the potential cost to install and maintain meters or other plausible methods to collect necessary groundwater use data. Costs to implement the program would depend on the level of enforcement required to achieve demand reduction and the level of outreach required annually to remind users of their potential allocation for a given year. Annual management of the program is estimated to cost about $200,000 per year.

6.2.3 Domestic Well Mitigation Program

Description: The GSAs will lead the development of a domestic well mitigation program to respond to adverse impacts experienced by domestic well users where regional overdraft conditions occurring after 2015 are causing declining groundwater levels that interfere with groundwater production or quality. Note that the program is not intended to mitigate well issues not caused by regional groundwater conditions nor is it intended to resolve issues related to normal wear and tear.

Based upon the modeling analysis using the determined minimum thresholds, there currently is no indication that a domestic well mitigation program would be necessary in the Merced Subbasin. Regardless, the MSGSA is establishing a fund for this program and will begin coordinating with the other GSAs on its formulation. It is likely that well owners would be required to sign up for the program and a board, committee, or agency staff would review and approve domestic well mitigation claims. The mitigation plan will define the purpose, objectives, roles, responsibilities, requirements, and potential outcomes of the program and will be coordinated with the Merced County SB 552 Drought Plan that is also under development. Any preliminary studies or assessments will be conducted and documented to support development of the mitigation plan. Potential mitigation measures in the plan may include, but are not limited to:

- Short-term solutions in emergencies, such as delivery of bottled water and/or water tanks
- Establishing of threshold triggers to avoid future groundwater production or quality impacts
- Setting well pump at deeper depths, replacement of well pump, or well replacement
- Residence water treatment equipment
- Connection to or development of public water systems to serve impacted communities
- Municipal service connections

- Other relevant projects

Measurable Objective: This management action is expected to benefit the measurable objectives established for the chronic lowering of groundwater levels and degraded water quality sustainability indicators. Anticipated activities will result in avoiding undesirable results for domestic well users as beneficial users of groundwater.

Public Noticing: A domestic well mitigation program would be discussed at public meetings of the MSGSA, MIUGSA, and TIWD GSA-#1 governing boards; relevant GSA committees; and the Subbasin's Stakeholder Advisory Committee and Coordination Committee. It is anticipated that public outreach and education would be necessary for a successful program and to receive input from domestic well users. Outreach may include public notices, meetings, potential website presence, and email announcements.

Permitting and Regulatory Process: Development of a domestic well mitigation program is not a project as defined by the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) and would therefore not trigger either. Required permits and will be obtained and environmental documentation prepared as necessary for wells or other relevant projects related to bringing pressurized groundwater of suitable quality to residences.

Timetable for Initiation and Completion: The GSAs will coordinate on the basic roles and responsibilities of a potential program within the first 5 years of GSP implementation (by 2025), although initiation of a domestic well mitigation program will not occur until there is demonstrated need. Through a current Proposition 218 election that will occur on July 19, 2022, the MSGSA is establishing a fund with a maximum annual collection of $200,000 and a total maximum of $800,000. If approved, this will provide a portion of the near-term funding for the to-be-defined mitigation program. The number of domestic wells dewatered during implementation of the GSP (prior to 2040) is heavily dependent on precipitation and snowpack during that time period. Wet conditions may result in few dewatered wells. However, substantial numbers of domestic wells may be dewatered if prolonged drought occurs during early implementation of the GSP, while project and management actions are still being developed and implemented. The attributes of this management action will be evaluated as monitoring continues through GSP implementation to determine if undesirable results are present. It is not anticipated a domestic well mitigation program will be necessary beyond the GSP implementation period, as the Subbasin is expected to reach sustainability (absence of undesirable results) by 2040.

Expected Benefits and Evaluation: A domestic well mitigation program is expected to benefit domestic well users, including disadvantaged communities, who are experiencing adverse impacts (including financial and/or both water supply and/or quality) as a result of overdraft conditions. In the event this management action is necessary, expected benefits include improved groundwater supply conditions (including water quantity and quality). Benefits would be evaluated by the number of shallow wells impacted and successfully mitigated under this management action.

How Project Will Be Accomplished: Details of how this management action will be accomplished have yet to be determined, though the MSGSA is creating a fund and will be coordinating on this action with the other GSAs. The three GSAs will perform outreach and collect feedback from stakeholders (particularly domestic well users) to develop this program. Program details will be documented in a transparent manner so all interested parties have access to program objectives and requirements.

Legal Authority: The three GSAs have the legal authority per SGMA to perform any act necessary or proper to implement SGMA regulations, thereby allowing the adoption of rules, regulations, ordinances, and resolutions necessary for SGMA implementation (California Water Code § 10725.2).

Estimated Costs and Plans to Meet Costs: Costs to develop and implement a domestic well mitigation program are still being determined, and will depend on the design of the program. Potential funding sources include grants, technical support services, low interest loans, fees, or general funds of the GSAs. The MSGSA intends to approve a new landowner fee in July 2022 that will begin to fund a domestic well mitigation program. Although the roles and responsibilities of MSGSA, MIUGSA, and TIWD GSA-#1 are still being discussed, the program will place the burden of sharing liability proportionately to the effects of the impact of yet-to-be-determined cumulative volumetric overdraft since January 1, 2015, or other more direct causes if they can be demonstrated to be independent from long term overall groundwater level depletion since January 1, 2015.

6.2.4 Above Corcoran Sustainable Management Criteria Adjustment Consideration

Description: This management action would consider an adjustment to the groundwater level sustainable management criteria for all or a portion of the Above Corcoran Clay Principal Aquifer. The Above Corcoran Clay Principal Aquifer has traditionally seen lower levels of use for water supply. As a result, minimum thresholds in this area are likely to be relatively high, as they are based on fall 2015 levels. A large component of the selection of fall 2015 as the minimum threshold was to limit impacts to domestic well users and to limit impacts of subsidence. Much of the Above Corcoran Clay Principal Aquifer has few domestic wells, and the Above Corcoran Clay Principal Aquifer is not thought to contribute to subsidence.

At the same time, a potential approach to mitigating subsidence impacts in the Below Corcoran Clay Principal Aquifer is to move pumping from below the clay to above the clay.

This management action would consider how the sustainable management criteria could be modified in all or a portion of the area, with consideration of GDEs and depletions of interconnected surface water, among others. Recharge projects may be considered for pairing with increased pumping from above the clay.

Measurable Objective: If undertaken, this management action is expected to benefit the measurable objectives established for the subsidence sustainability indicator. Revised sustainable management criteria could allow for more aggressive actions to address subsidence concerns more rapidly.

Public Noticing: Modifications to sustainable management criteria would be discussed at public meetings of the three GSA governing boards, relevant GSA committees, and the Subbasin's Stakeholder Advisory Committee and Coordination Committee.

Permitting and Regulatory Process: Modifications to sustainable management criteria is not a project as defined by the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) and would therefore not trigger either. No permits would be required.

Timetable for Initiation and Completion: If undertaken, it is likely that the effort would take place prior to 2025, to allow for the development of additional projects to address subsidence.

Expected Benefits and Evaluation: Modifications to sustainable management criteria could allow for more aggressive actions to address subsidence more rapidly, which could result in reduced damage to infrastructure. The value of this would depend on the level of additional action that would ultimately be taken.

How Project Will Be Accomplished: Modifications to sustainable management criteria would be accomplished through modifications to the GSP. This may include establishment of management areas or other approaches to accomplish the desired management within the SGMA framework.

As with the development of the GSP, these modifications would be made through a stakeholder process. The revised GSP would ultimately be adopted by the governing boards of the three GSAs following a public hearing. Ninety days prior to adoption, Merced County and the Cities of Atwater, Merced, and Livingston will be provided notice and the GSAs will review and consider comments received.

Legal Authority: The three Merced Subbasin GSAs have the legal authority per SGMA to amend a groundwater sustainability plan. (California Water Code § 10728.4).

Estimated Costs and Plans to Meet Costs: Costs are anticipated to be approximately $50,000 to $100,000, with the lower range of costs associated with analysis without GSP amendments and the higher range of costs associated with analysis with GSP amendments. Potential funding sources include grants or general funds of the GSAs.

6.3 PROJECTS

Projects were identified through a several month process involving Stakeholder and Coordinating Committees and the general public. This process included a public solicitation process. A template for project submission was created, posted online for the public, and sent to the Stakeholder and Coordinating Committees. This project submission template was also advertised during several committee meetings and remained online for public download on the Merced SGMA website. Project information was received from committee members and interested members of the public. The consulting team additionally reviewed local city plans and projects from the Merced Integrated Regional Water Management Plan Opti database for potentially relevant projects. Project information was compiled into a draft list. This list was discussed and presented during the January and February 2019 committee meetings. Input received from committee members and members of the public was integrated and used to refine the project list into a shortlist of projects for inclusion in the GSP. This shortlist was created on the basis of priorities identified by the public and committee members.

Priorities identified are listed as follows (in no particular order):

- Project addresses Disadvantaged Communities (DACs) and or Severely Disadvantaged Communities (SDACs)
- Project addresses areas with known data gaps (sometimes referred to by Basin stakeholders as the "white areas" as they appear "white" or blank on maps of data)
- Project provides basinwide benefit (i.e., benefits all GSAs)
- Project addresses a subsidence area
- Project focuses on recharge
- Project focuses on conveyance
- Project addresses and or prioritizes drinking water
- Project addresses and or prioritizes water for habitat
- Project focuses on monitoring, reporting, and data modeling activities for data collection to be gathered in first 5 years
- Project provides incentives to reduce pumping and to capture surface water (e.g., including flood flows)
- Project is beyond planning phase
- Project already has a dedicated funding mechanism
- Project identified as priority project by at least one GSA

An additional screening for whether the projects had a "Fatal Flaw" was conducted. A "Fatal Flaw" was defined as a case in which the implementing agency or agency upon whom the project may rely on for surface water identified an overriding issue with the project that would deem it infeasible (e.g., cost ineffectiveness, detrimental to existing surface water supply operations). Projects with Fatal Flaws were eliminated from further consideration and removed from GSP project lists.

These priorities were given equal weight and used as a filter for determining the shortlist. Projects addressing three or more of the above priorities were kept within the shortlist (see Section 6.4), while other projects were put in a current running list to be kept for reference upon request of Stakeholder Committee members and GSA staff (see Section 6.5).

6.4 PROJECTS SHORTLIST

The projects shortlist contains the priority projects as identified using the process described above. This subsection of the GSP satisfies the requirements of California Water Code §354.44, reiterated in the DWR Preparation Checklist for GSP Submittal Guidance. Consistent with SGMA requirements, the project descriptions for short-listed projects contain information regarding:

- the measurable objective that is expected to benefit,
- public noticing,
- permitting and regulatory processes,
- time-table for initiation and completion,
- expected benefits,
- how the project will be accomplished,
- legal authority,
- estimated costs and plans to meet costs
- circumstances for implementation, and
- management of groundwater extractions and recharge.

Table 6-3 provides a summary of the shortlisted projects. Full descriptions are included below.

Table 6-3: Projects Shortlist for Merced Subbasin Groundwater Sustainability Plan*

Project Name	Measurable Objective Expected to Benefit	Expected Benefits (as prioritized by stakeholders)	Current Status	Time-Table (initiation and completion)	Estimated Cost	Permitting and Regulatory Process
Project 1: Planada Groundwater Recharge Basin Pilot Project	Mitigation of chronic lowering of groundwater levels through monitoring & recharge	Basinwide Benefit, Benefit to DACs Recharge, First 5 Years, Beyond Planning Phase, Funded	Planning, to be implemented with DWR Grant Funding	01/01/2020-12/17/2023	$395,292	Requires permit from Merced County Environmental Health
Project 2: El Nido Groundwater Monitoring Wells	Mitigation of chronic lowering of groundwater levels and subsidence through monitoring, and potential water quality improvement	Basinwide Benefit, Benefit to DACs Subsidence, First 5 Years, Beyond Planning Phase, Funded	Planning, to be implemented with DWR Grant Funding	09/01/2018-12/31/2019	$400,000	Requires permit from Merced County Environmental Health
Project 3: Meadowbrook Water System Intertie Feasibility Study	Mitigation of chronic lowering of groundwater levels through surface water use, potential applicability to all sustainability indicators through alternatives evaluation	Basinwide Benefit, Benefit to DACs First 5 Years, Beyond Planning Phase, Funded	Planning	08/2019-06/2020	$100,588	No permitting or regulatory process required (feasibility study)
Project 4: Merquin County Water District Recharge Basin	Mitigation of chronic lowering of groundwater levels through monitoring & recharge	Benefit to DACs, GSA Priority, Recharge, First 5 Years, Beyond Planning Phase	Planning/Initial Study	08/07/2018-12/15/2021	$1,400,000	Initial study to determine CEQA compliance and
Project 5: Merced Irrigation District to Lone Tree Mutual Water Company Conveyance Canal	Mitigation of chronic lowering of groundwater levels and subsidence through in lieu recharge	White Areas, Subsidence, Conveyance, Water for Habitat	Conceptual	05/19-11/2020	$3-6,000,000	No permitting or regulatory process anticipated outside of County Encroachment and potential Streamed Alteration Permit
Project 6: Merced IRWM Region Climate Change Modeling	Supports all sustainability indicators through enhanced data availability	Basinwide Benefit, White Areas, First 5 Years	Design	06/01/2019-4/30/2021	$250,000	None required.
Project 7: Merced Region Water Use Efficiency Program	Supports all sustainability indicators through reduced water demand	Basinwide Benefit, Benefit to DACs, White Areas	Design	06/01/2019-12/31/2020	$500,000	None required.
Project 8: Merced Groundwater Subbasin LIDAR	Supports all sustainability indicators through enhanced data availability	Basinwide Benefit, White Areas, First 5 Years	Planning/Initial Study	08/2019-12/2020	$150,000	None required.
Project 9: Study for Potential Water System Intertie Facilities from MID to LGAWD and CWD	Mitigation of chronic lowering of groundwater levels through enhanced surface water supply	Benefit to DACs, Conveyance, GSA Priority, First 5 Years	Design Complete	06/01/2019-06/01/2020	$100,000	Environmental Impact Report will be required in addition to various permits from Merced County for construction phase
Project 10: Vander Woude Dairy Offstream Temporary Storage	Mitigation of chronic lowering of groundwater levels through enhanced surface water supply and potential recharge	Recharge, First 5 Years, Beyond Planning Phase	Planning/Initial Study & Conceptual Design	05/2018-05/2020	$750,000	None required. Private land with water right and outlet
Project 11: Mini-Big Conveyance Project	Mitigation of chronic lowering of groundwater levels through enhanced surface water supply	Conveyance, Recharge, GSA Priority	Planning	06/2022-06/2026	$ 6-8,000,000	Initial study for CEQA. County permitting for encroachment, construction, and other building permits
Project 12: Streamlining Permitting for Replacing Sub-Corcoran Wells	Mitigation of chronic lowering of groundwater levels through monitoring	Basinwide Benefit, First 5 Years, Subsidence	Planning	8/01/20190-01/31/2020	$75,000	None required.

*Information provided by project proponents.

Note from MID:~~-~~ Local project sponsors (e.g., LTMWC, LGAWD, etc.) anticipate that surface water sourced from the Merced Irrigation District may be available through temporary water purchase and sale agreements and may serve as a water supply for the project(s). It is understood that the Board of Directors for the Merced Irrigation District has and shall retain full and absolute discretion regarding whether and when it will enter into temporary water purchase and sale agreement(s), if any, and further, nothing contained in this document creates in any party or parties any right to water controlled by the Merced Irrigation District whether it be surface water or groundwater. Any transferred water made available by MID shall be limited by the terms and conditions contained in any respective temporary water purchase and sale agreement.

Project 1: Planada Groundwater Recharge Basin Pilot Project

Description: The Planada Groundwater Recharge Basin Pilot Project is a three-year pilot project to construct a groundwater recharge basin in the Planada area, an SDAC that is completely reliant on groundwater. The project addresses a demonstrated need for greater groundwater monitoring and data collection for potential recharge projects, particularly within this SDAC area.

A nested multiple depth monitoring well will be installed on the pilot site. The wells will be designed and installed to meet multiple purposes of monitoring groundwater benefits from recharge activities as well as serving as long-term monitoring locations for CASGEM and the GSP. A flow meter will also be installed on the MID delivery assembly to enable the amount of water reaching the recharge basin to be quantified. An evapotranspiration pan and precipitation gage will be installed to account for these components of the water budget when estimating recharge.

Measurable Objective: This project works toward the mitigation of chronic lowering of groundwater levels in the Merced Subbasin by enhancing monitoring efforts and investigating opportunities for recharge basin development.

Public Noticing: As part of disseminating information to the general public, MID will post project updates to its website. These updates will also be provided to the other Basin GSAs and ultimately the GSP webpage so that they may also publish updates on appropriate websites. Additional noticing for the public will take consistent with permitting requirements.

Permitting and Regulatory Process: The project is categorically exempt for purposes of compliance with CEQA. An application for the State General Permit for low threat discharges to land will also be submitted. It is also anticipated the project will need a Merced County well construction permit for the cone penetration test at both sites and the monitoring well at the site of the recharge basin. Permit applications for the cone tests will be prepared and submitted to the Merced County Department of Environmental Health along with the associated fees prior to conducting these tests. Once the preliminary site investigation is complete, a permit application for the monitoring well will be prepared and submitted to the Merced County Department of Environmental Health along with the associated fees. No well drilling or installation activities will begin prior to receipt of the permit for the monitoring well.

Time-Table for Initiation and Completion: The project is funded and currently in permitting. The 3-year study is expected to start by 2020.

Expected Benefits and Evaluation: Groundwater basin recharge will be an important component of the GSP; this pilot program will provide information critical to establishing long-term Basin sustainability, while directly benefitting an SDAC that needs a sustainable groundwater supply.

How Project Will Be Accomplished: The responsible agency for the project is MID with funding from DWR. The project examines two candidate sites for the pilot recharge basin and will conduct two to four cone penetration tests (CPTs) to examine subsurface materials suitable for recharge. The selected site will be excavated to reach a suitable layer of material for recharge. The site currently receives MID surface water deliveries.

Legal Authority: The three Merced Subbasin GSAs (Merced Irrigation-Urban Groundwater Sustainability [MIUGSA], MSGSA, and Turner Island Water District Groundwater Sustainability Agency #1 [TIWD GSA-1]) have the authority to develop recharge projects and will perform implementation and monitoring within this project through metering and water accounting.

Estimated Costs and Plans to Meet Costs: The estimated cost for this project is $395,000. Costs for this project are met through Proposition 1 Funding through DWR.

Project 2: El Nido Groundwater Monitoring Wells

Description: The El Nido Groundwater Monitoring Wells project is comprised of installing monitoring wells in and near the community of El Nido that will improve the understanding of stratigraphy and groundwater conditions in the area and improve ongoing monitoring of water elevation and water quality. Two sites will each have up to three monitoring wells installed in the same borehole, to allow monitoring at different depth intervals. Aquifer-specific information provided by the project is important for understanding the three-dimensional movement of water and understanding the causes of land subsidence, a key driver for the implementation of this project. Monitoring wells installed in this project will greatly assist data collection and developing an enhanced understanding of causes of subsidence and movement of groundwater. This information helps improve management and reevaluation of extraction and recharge activities.

Measurable Objective: The project addresses measurable objectives for water level and subsidence by enhancing monitoring efforts, especially for areas prone to subsidence. To the extent the project improves understanding of groundwater movement three-dimensionally in the Basin, it will also help address measurable objectives for water quality.

Public Noticing: As part of disseminating information to the general public, MID will post project updates to its website. These updates will also be provided to the other Basin GSAs and ultimately the GSP webpage so that they may also publish updates on appropriate websites. A draft technical memorandum (TM) will be prepared describing the location and design of the observation wells, well cluster installation, and groundwater monitoring activities including the data gathered during the monitoring event. The draft will be circulated to MID and the GSAs in the Subbasin for review and comment. Based on comments received, the final TM will be prepared. The final document will be made available to all stakeholders and the general public via MID's website and distributed to the Department of Water Resources (DWR) and GSAs within the Merced, Chowchilla, and Delta-Mendota Subbasins.

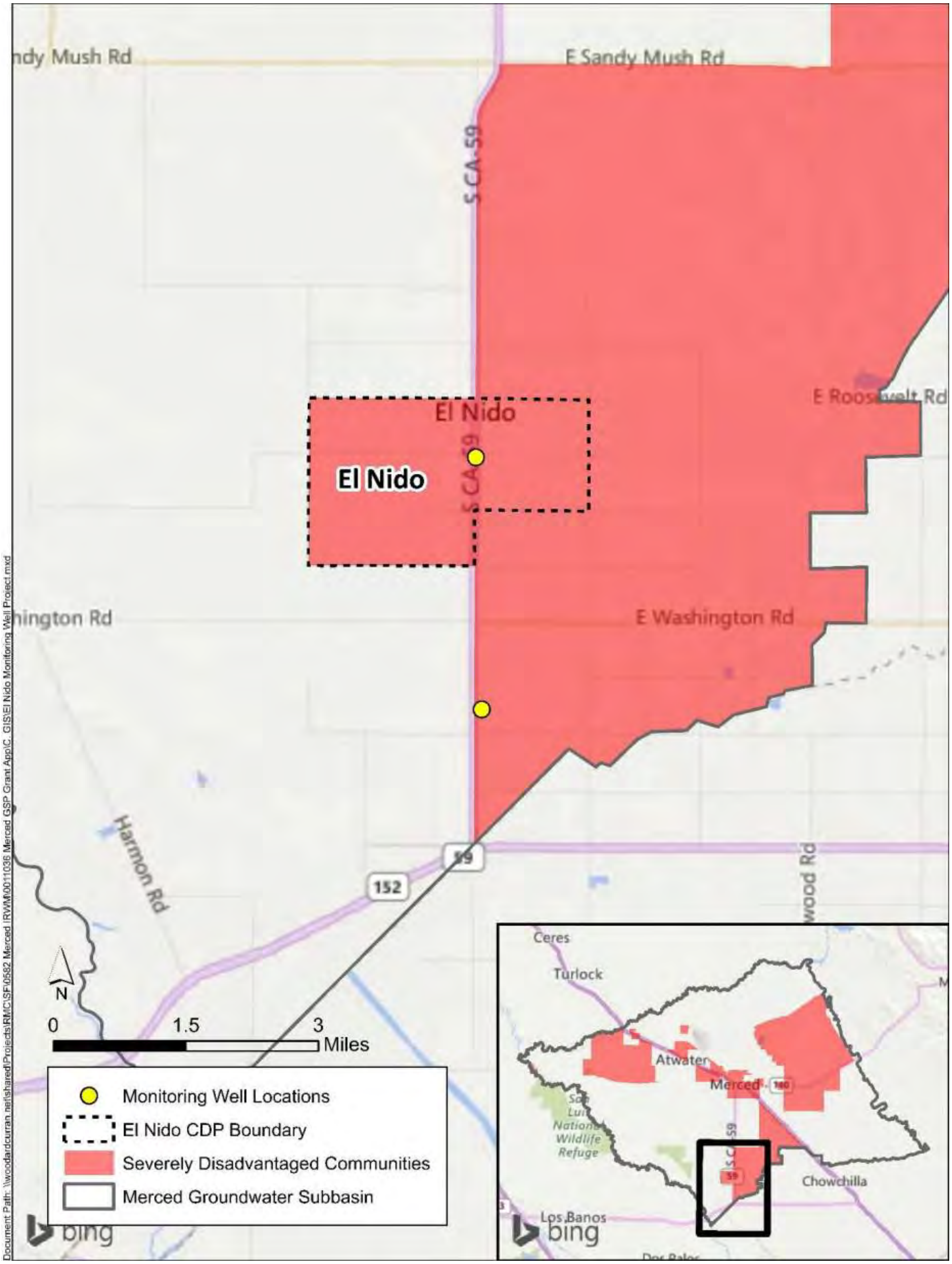
Permitting and Regulatory Process: Permit applications will be prepared and submitted to the Merced County Department of Environmental Health along with the associated fees. A CEQA Notice of Exemption may be prepared and filed with the County Clerk/Recorder's Office and the State Clearinghouse as a Class 6 Categorical Exemption pursuant to State CEQA Guidelines Section 15306 (Information Collection).

Time-Table for Initiation and Completion: The project is expected to start by 1 September 2019 and end December 2019.

Expected Benefits and Evaluation: The project will provide crucial information to better understand water movement and causes of land subsidence in this area. The project also directly benefits a SDAC.

How Project Will Be Accomplished: MID has identified two sites for the monitoring wells and has gained approval to use the sites. Two areas within the El Nido area have been identified for monitoring (Figure 6-1): Fire Station (located in the center of the El Nido community) and Vander Dussen (located in the southern portion of the community, between the community and the center of nearby subsidence).~~–~~ These sites are located approximately 2.3 miles apart, which is consistent with the monitoring well densities identified in DWR's *Monitoring Networks and Identification of Data Gaps BMP*, which indicated monitoring well densities between 0.2 and 10 wells per 100 square miles.~~–~~ Monitoring wells spaced on a grid 2.3 miles apart would result in a density of 19 wells per 100 square miles. This density is slightly above the DWR guidance but is appropriate for the El Nido area due to the groundwater subsidence and other issues in the area. This project does not rely on water provided from outside the jurisdiction of the agency.

Figure 6-1: Location of Proposed Monitoring Well Clusters



Legal Authority: The three Merced Subbasin GSAs (MIUGSA, MSGSA, and TIWD GSA-1) have the authority per SGMA to develop monitoring projects.

Estimated Costs and Plans to Meet Costs: The estimated cost for this project is $400,000. Costs for this project are met through Proposition 1 Funding through DWR.

Project 3: Meadowbrook Water System Intertie Feasibility Study

Description: The Meadowbrook Water System Intertie Feasibility Study includes activities necessary to complete a feasibility study for an intertie between the water systems of the Cities of Atwater and Merced, and the Meadowbrook Water System (Meadowbrook), an SDAC that relies entirely on groundwater. This Intertie Feasibility Study will consider potential connection between the water systems of Meadowbrook, the City of Atwater, and the City of Merced for use in emergencies or for future potential connections to serve or supplement demands for Meadowbrook customers. Data collection and review of alternatives will support use of surface water to replace groundwater use, reducing reliance on and overall extraction of groundwater resources.

Measurable Objective: This project addresses direct needs of SDAC areas, specifically ensuring emergency supplies for the Meadowbrook Water System. The feasibility study supports establishing and improving surface water connections to these areas, which would relieve pressure on groundwater resources that currently serve as the only supply source. Evaluation of alternatives that could reduce reliance on groundwater supplies benefits the sustainable groundwater management of the Basin and helps in meeting measurable objectives for all sustainability indicators (water level, water quality, subsidence, and depletion of interconnected surface waters.)

Public Noticing: Three stakeholder outreach meetings will be held during development of the Intertie Feasibility Study to inform stakeholders about project progress and solicit feedback. A draft TM will be circulated to MID, the City of Merced, the City of Atwater, Meadowbrook, and the other Basin GSAs for review and comment. Based on comments received, the consultant will prepare the final TM. The final document will be made available to all stakeholders and the general public via MID's website. The Draft Intertie Feasibility Study will be made available to stakeholders, including groundwater users and the general public, for review and comment through MIUGSA website and the anticipated GSP website. ~~–~~ A 30-day public comment period will begin with the third public meeting. Comments on the Draft Intertie Feasibility Study received from stakeholders during the 30-day public review period will be incorporated to produce a Screencheck Final Intertie Feasibility Study. The Final Feasibility Study will be made available to all stakeholders and the general public via the MIUGSA and the anticipated GSP websites and will be distributed to DWR and GSAs within the Merced, Chowchilla, and Delta-Mendota Subbasins.

Permitting and Regulatory Process: This project does not require any permits or other regulatory approvals.

Time-Table for Initiation and Completion: This project is expected to start in August 2019 and end in June 2020.

Expected Benefits and Evaluation: Meadowbrook relies solely on groundwater to serve its customers, which are also categorized as an SDAC. This Intertie Feasibility Study will consider potential connection between the water systems of Meadowbrook, the City of Atwater, and the City of Merced for use in emergencies or for future potential connections to serve or supplement demands for Meadowbrook customers. MID is the applicant for this project.

How Project Will Be Accomplished: The needs and potential uses for the intertie, including emergency supply, system redundancy, fire suppression needs, and potential future connections will be evaluated. Based on this evaluation and in coordination with the City of Atwater, City of Merced, and Meadowbrook, MID will select the preferred purpose of the intertie. Up to five options including the identification of potential connection sites, pipeline alignments and sizes, and high-level preliminary cost estimates and a TM will be prepared. Once the preferred alternative is selected an Administrative Draft Intertie Feasibility Study that includes this alternatives analysis will be prepared.

The Feasibility Study will provide additional background information, develop a more detailed cost estimate, and conduct a preliminary environmental evaluation of potential impacts that may be used to determine the potential environmental compliance documentation that may be required for implementation of the intertie. A list of potential permits, as well as challenges to implementation will be included, along with a preliminary funding plan that identifies opportunities to fund implementation. The Intertie Feasibility Study will also include recommended next steps to move towards implementation.

Legal Authority: The three Merced Subbasin GSAs (MIUGSA, MSGSA, and TIWD GSA-1) have the authority per SGMA to develop feasibility projects.

Estimated Costs and Plans to Meet Costs: The estimated costs for this project are valued at $100,588. Costs for this project are met through Proposition 1 Funding through DWR.

Project 4: Merquin County Water District Recharge Basin

Description: The Merquin County Water District (MCWD) recharge basin would be constructed in the northeastern portion of the District to enhance the groundwater levels in the area. The MCWD relies on its existing irrigation wells during short water years and during the off season when surface flows are not available to meet demand from the customers of the District. Given these circumstances, a recharge basin is proposed for an area that is at the intersection of 1st Street and Van Cliff Road.~~–~~ There are open parcels at this location and the parcels can receive water for the Pump Ditch that is connected to the Eastside Canal.~~–~~ The parcels in this location are presently receiving irrigation water and have soil types of Delhi loamy sand (DdA) and Hilmar loamy sand (HhA), both soils have good infiltration rates. These suitable soils potentially provide opportunity for increasing recharge in the Subbasin.

Measurable Objective: This project helps address chronic lowering of groundwater levels in the Merced Subbasin by creating new recharge basins and installing monitoring wells.

Public Noticing: The MSGSA anticipates that public outreach would include multiple public workshops and meetings, potential website presence or email announcements, along with other public notices for the workshops.

Permitting and Regulatory Process: Project proponents anticipate that an initial study will be conducted for purposes of compliance with CEQA. The project may require a grading permit from Merced County for the excavation of the basin.

Time-Table for Initiation and Completion: The time-table below describes the dates for the different project phases.

Table 6-4: Time-table for Merquin County Water District Recharge Basin

Schedule Phase	Start Date	End Date
Planning	08/07/2018	01/16/2019
Design/Engineering	06/10/2019	08/30/2019
Environmental Documentation	07/16/2019	01/24/2020
Permitting	11/20/2019	03/31/2019
Acquisition of Rights-of-Way	03/31/2020	05/15/2020
Development of Financing	11/15/2019	04/15/2020
Construction/Implementation	05/15/5050	09/15/2020
Environmental Mitigation Efforts	05/15/2020	11/16/2020
Post Project Monitoring	11/16/2020	12/15/2021

Expected Benefits and Evaluation: The project will benefit direct recharge to the Subbasin and enhance monitoring networks through the installation of monitoring wells. The benefit to the Basin will be the injection of surface waters into the aquifer to help raise groundwater levels and improve or maintain the water quality of the Basin. The community of

Stevinson does not have a central water distribution system and both residential and agricultural needs use groundwater to meet their annual water demands. There is surface water that comes into the region that is used for part of the year by agriculture. The maintenance of the groundwater Basin to continue the accessible supply at a reasonable cost with the required water quality is important to the community to meet their needs within the available costs range for the DAC. The recharge basin will provide new water to the Basin through the capture and recharge of storm water, this will aid in the areas ability to maintain the groundwater Basin levels during dry years. The flows into the Basin will also reduce the volume of runoff flows.

How Project Will Be Accomplished: Prior to construction of the basin in MCWD will get permission for access to a parcel and conduct preliminary infiltration tests to determine if the parcel is suitable for a recharge basin. Pending testing, the parcel will be acquired by MCWD and then the construction of the recharge basin will begin. The parcels in the area are mostly 20 acre parcels, basin size approximately 18 acres in surface area. The basin would be filled when surface water is available in wet years or during storm flows in the winter from the drainage flow in the Eastside Canal. Monitoring wells would be installed to monitor the groundwater levels.

Note from MID:~~–~~ Local project sponsors (e.g., Lone Tree Mutual Water Company [LTMWC], Le Grand Athlone Water District [LGAWD], etc..) anticipate that surface water sourced from the MID may be available through temporary water purchase and sale agreements and may serve as a water supply for the project(s). It is understood that the Board of Directors for the MID has and shall retain full and absolute discretion regarding whether and when it will enter into temporary water purchase and sale agreement(s), if any, and further, nothing contained in this document creates in any party or parties any right to water controlled by the MID whether it be surface water or groundwater. Any transferred water made available by MID shall be limited by the terms and conditions contained in any respective temporary water purchase and sale agreement.

Legal Authority: The Merced Subbasin GSA has authority per SGMA to develop and support projects for groundwater recharge.

Estimated Costs and Plans to Meet Costs: The estimated costs for this project are valued at $1,400,000. Costs for this project are expected to be met through pursuit of further grant funding, private funding, and funding raised through MSGSA.

Project 5: Merced Irrigation District to Lone Tree Mutual Water Company Conveyance Canal

Description: LTMWC is seeking to establish a new 2.25 mile long canal connection from an existing MID canal to an existing canal within the LTMWC system. The capacity of the canal to be constructed would be 60 cubic feet per second (cfs) and the potential delivery would be 20-24,000 AFY. The project would benefit 1020 acres in the Sandy Mush Mutual Water Company service area that are entirely dependent on ground water by providing access to surface water from the canal which would cross the acreage in route to LTMWC. LTMWC has 11,574 acres which are significantly dependent on groundwater in all but above average rainfall years. In addition, LTMWC is situated on the northern border of acreage being annexed into the Clayton Water District and said acreage is entirely dependent upon groundwater. Given these circumstances, LTMWC could implement the project to wheel surface water into Clayton Water District for usage in lieu of groundwater use, or for groundwater recharge. The project addresses management of groundwater extraction and recharge through in lieu recharge by switching groundwater demand to surface water in a white area of the Subbasin.

Measurable Objective: The project supports mitigation of chronic lowering of groundwater levels through in lieu recharge, and also benefits reduction of subsidence through reduced groundwater pumping.

Public Noticing: The MSGSA and LTMWC anticipate that public outreach would include multiple public workshops and meetings, potential website presence or email announcements, along with other public notices for the workshops.

Permitting and Regulatory Process: The project proponents anticipated permitting requirements to be unlikely outside of a Merced County encroachment permit for crossing Sandy Mush Road. A potential additional permit is a Streamed Alteration Permit at Deadman Creek.

Time-Table for Initiation and Completion: The project is anticipated to run from May 2019 through November 2020. The project will be in planning and design phase from May through ~~mid summer~~mid-summer 2019 with the preliminary engineering of two potential routes and subsequent selection of one route. This is followed by negotiation with landowners for easements, which is expected to be complete before end of 2019. Construction is anticipated to be complete by November 2020.

Expected Benefits and Evaluation: This project has several benefits including supporting reduction of groundwater pumping by providing in lieu recharge opportunities. Benefits also include support for flood control, specifically for the Lower San Joaquin Flood control project. Subsidence reduction is addressed due to reduced groundwater pumping in an area that has exhibited significant subsidence to date. This addresses public safety due to the Lower San Joaquin Flood control project running through the area to be serviced by the canal. The flood systems' capacity has been severely reduced by subsidence to date and projections by DWR forecast further losses in capacity. This system is also being utilized by the San Joaquin River Restoration Program for the return of salmon to the San Joaquin River. The subsidence affects the flow characteristics of the channel, slowing the flow and resulting in warmer water which is a negative impact on salmon survivability. In addition, the new conveyance frees up more capacity in MID's existing El Nido system which is capacity impacted at the present time for other white area users.

How Project Will Be Accomplished: LTMWC is the submitting agency working in cooperation with the Merced Subbasin GSA. Other participating agencies include MID (water source), Sandy Mush MWC (possible recipient) and Clayton W.D (possible recipient). LTMWC would create a 2.25 mile long canal connection from an existing MID canal to an existing canal within the LTMWC system. The project begins at the junction of the Benedict Canal and Deadman Creek on Gurr Road and proceeds south for slightly over 2 miles to the boundary of LTMWC (1.5 miles south of Sandy Mush Road and ¾ mile west of Combs Road).

Note from MID: Local project sponsors (e.g., LTMWC, LGAWD, etc..) anticipate that surface water sourced from the Merced Irrigation District may be available through temporary water purchase and sale agreements and may serve as a water supply for the project(s). It is understood that the Board of Directors for the MID has and shall retain full and absolute discretion regarding whether and when it will enter into temporary water purchase and sale agreement(s), if any, and further, nothing contained in this document creates in any party or parties any right to water controlled by the MID whether it be surface water or groundwater. Any transferred water made available by MID shall be limited by the terms and conditions contained in any respective temporary water purchase and sale agreement.

Legal Authority: The Merced Subbasin GSA has authority per SGMA to develop and support projects for conveyance and potential in lieu recharge, as well as projects which reduce subsidence in the Subbasin.

Estimated Costs and Plans to Meet Costs: The estimated costs for this project are between \$3,000,000 - \$6,000,000. Costs for this project are expected to be met through pursuit of further grant funding, private funding, and funding raised through MSGSA.

Project 6: Merced IRWM Region Climate Change Modeling

Description: This project will link the existing MIDH2O (Merced Irrigation District Hydrologic and Hydraulic Optimization) planning model, developed by the MID, with models developed by DWR's Flood-MAR (Flood-Managed Aquifer Recharge) program, to models developed by the NASA's ASO (Airborne Snow Observatory) for the Merced Basin, and to the Merced's IWFM groundwater model. The MIDH2O model will explore the potential range of climate change impacts to the Merced Region including impacts to water supply, groundwater yield, and the effectiveness of various alternatives designed to help the region adapt to those anticipated changes. By linking the models, the Region can examine alternative water development and management options under a variety of climate change conditions to facilitate and efficiently evaluate multiple future scenarios. Several potential future scenarios will be assembled to the MIDH2O model and simulate a range of future climate changes. These scenarios will be simulated with different potential alternatives of water projects to evaluate the effectiveness in adapting to the climate changes. The results will help fill data gaps and inform the Region as to which projects can perform best in terms of adaptive management. Results will also identify areas where additional or different projects should be recommended to meet future needs. This project includes funding to complete a groundwater well survey for MID.

Measurable Objective: Supports all sustainability indicators through enhanced data availability for the entire Merced Subbasin area and beyond.

Public Noticing: There are no public noticing requirements for this project.

Permitting and Regulatory Process: Environmental documentation is not required for this project. No permits are required for this project.

Time-Table for Initiation and Completion: ~~–~~ The project is expected to run from 1 June 2019 to 30 April 2021.

Expected Benefits and Evaluation: This project primarily addresses availability of water supply and climate conditions for projected future scenarios to assist project portfolio effectiveness. The project will inform the Region of the best methods and approaches for land use planning and management in response to climate change, promoting natural resource protection and improvement.

How Project Will Be Accomplished: This project links existing the MID developed Merced River MIDH2O model with the Flood-MAR system model. The purpose of this linkage is to explore the range of climate change impacts the Region may experience. This project does not rely on water provided from outside the jurisdiction of the agency.

Legal Authority: The three Merced Subbasin GSAs (MIUGSA, MSGSA, and TIWD) have the authority per SGMA to develop data collection projects to the benefit of the Subbasin and in working toward achieving the sustainability goal.

Estimated Costs and Plans to Meet Costs: Estimated costs for this project are $250,000. Cost are anticipated to be met through IRWM grant funding or through other grants.

Project 7: Merced Region Water Use Efficiency Program

Description: The Merced Subbasin, the Merced Region Water Use Efficiency Program will be implemented by multiple water purveyors in the Region to increase the level of water conservation & ensure long-term water use efficiency by the regions urban and agricultural users. The program promotes water management strategies that support the state’s goal of a 20 percent reduction in urban per-capita water use by 2020 and will do so in a way that is beneficial to DACs in the region. This program will assist management of groundwater extractions through reducing overall water demand.

Measurable Objective: Reducing water demand should reduce the amount of groundwater pumped, thereby helping mitigate chronic overdraft of groundwater.

Public Noticing: The project will involve conducting water surveys throughout the Region, which will engage and enable maintaining effective communication among water resource stakeholders in the Region. Notification processes with the public will also be dependent upon the implementing water purveyors and agencies.

Permitting and Regulatory Process: No permitting or regulatory processes are anticipated for this project.

Time-Table for Initiation and Completion: The time-table below describes the dates for the different project phases.

Table 6-5: Time-table for Merced Regional Water Use Efficiency Program

Schedule Phase	Start Date	End Date
Design/Engineering	06/01/2019	12/31/2020
Development of Financing	06/01/2019	12/31/2020
Construction/Implementation	06/01/2019	12/31/2020
Post Project Monitoring	06/01/2019	12/31/2020

Expected Benefits and Evaluation: Implementing water conservation measures will help reduce water demands, offsetting potable water supplies and helping ensure water demands are met in the future. The project will help address climate change adaptation and mitigation by reducing water demands and offsetting existing potable water supplies and reducing energy use in treating and delivering water supplies to existing users. Reducing water consumption will effectively leave water in the Basin (rather than being diverted or pumped to meet water user demands), improving surface and groundwater quality. A portion of the project will target DACs.

How Project Will Be Accomplished: The Program consists of four components: (1) interior water efficiency fixture retrofits, primarily targeted at DACs; (2) exterior single family water use surveys & upgrades; (3) exterior water use surveys & upgrades for large landscapes, including CII & residential agriculture landscapes; and (4) the preparation of water use budgets for accounts with dedicated landscape meters. The retrofits for households located in DACs are subsidized because DACs are often unable to afford the upfront capital to participate in rebate-based conservation programs. This project does not rely on water provided from outside the jurisdiction of the agency.

Legal Authority: The submitting agency is Merced Integrated Regional Water Management Authority (MIRWMA) as well as the following project proponents: City of Merced, Merced Irrigation District, City of Atwater, City of Livingston, Meadowbrook Water Company, Le Grand CSD, Planada CSD, Stevinson Water District, Winton Water & Sanitary District, Turner Island Water District, Merquin County Water District, Chowchilla Water District. Legal authority is granted within the powers of the local agencies to implement the Water Use Efficiency Program at their local level (within their respective jurisdiction).

Estimated Costs and Plans to Meet Costs: Estimated costs for this project are $250,000. Cost are anticipated to be met through individual implementing purveyor or agency funds as well as seeking of grant funding.

Project 8: Merced Groundwater Subbasin LIDAR

Description: This project consists of Light Detection and Ranging (LIDAR) data of the Merced Groundwater Subbasin. This data will be used in conjunction with weather forecast data to predict local stormflows from rainfall events. The data will be tied to MID's proposed real time modeling of Bear, Black Rascal, and Burns Creeks. Accurate forecasting of local storm flows in the groundwater Basin is critical to prevent localized flooding, which has occurred with regularity throughout the Basin. Given this circumstance and the many potential benefits identified in the expected benefits section below, this project will prove useful in providing critically needed data for the Subbasin. It will also be used for implementation of future Flood-MAR projects, which work to improve overall management of groundwater recharge in the Subbasin.

Measurable Objective: Supports all sustainability indicators through enhanced data availability for the entire Merced Subbasin area and beyond.

Public Noticing: Outreach for this project will span flood emergency agencies such as the Merced County Office of Emergency Services and farmers or landowners in the Merced Subbasin. Interested communities and water users interested in recharge will work through their respective service districts, and groundwater sustainability agencies in the process of communicating with MID.

Permitting and Regulatory Process: No permitting or regulatory processes are anticipated for this project.

Time-Table for Initiation and Completion: The anticipated timeline for this project is August 2019 to December 2020.

Expected Benefits and Evaluation: Improved forecasting of localized storms will allow maximization of Flood-MAR projects, promoting direct recharge and correcting groundwater overdraft conditions. Accurate prediction of local storm flow (which are predicted to intensify with climate change) can be used to protect public safety as dangerous flow forecast information can be shared with public safety officials. This project would help public safety officials and planners in determining what areas are threatened by forecasted storms and take the necessary precautions to prevent damage and flooding. Flooding of urban areas often results in trash, sewage, oil, and other pollutants being discharged into the creek system. Additionally, this will help manage storm flows for recharge. This project will assist in management of runoff from agricultural areas, urban areas, and undeveloped areas as well as provide recharge for the benefit of all groundwater users. Flood-MAR projects supported by this project can also create habitat for waterfowl and thereby promote associated recreation.

How Project Will Be Accomplished: LIDAR data would be collected through standard procedures including flyby using remote sensing technology. This information would be shared with submitting agencies. This project does not rely on water provided from outside the jurisdiction of the agency.

Legal Authority: The three Merced Subbasin GSAs (MIUGSA, MSGSA, and TIWD GSA-1) have the authority per SGMA to develop data collection projects to the benefit of the Subbasin and in working toward achieving the sustainability goal.

Estimated Costs and Plans to Meet Costs: Estimated costs for this project are $150,000. Costs are anticipated to be met through pursuit of regional level grant funding. Mariposa County Resource Conservation District is putting together a LIDAR grant for through Cal Fire, some of this area is in the Merced Subbasin. Project proponents are coordinating with Mariposa County Resource Conservation District in contributing to these efforts and to provide LIDAR coverage for the rest of the Subbasin. Cost are anticipated to be met through IRWM grant funding or through other grants.

Project 9: Study for Potential Water System Intertie Facilities from MID to LGAWD and CWD

Description: Under this project MID, LGAWD and Chowchilla Water District (CWD) would investigate the feasibility of improving and constructing water conveyance facilities to allow the temporary transfer of water from MID to LGAWD and CWD.

Measurable Objective: This project addresses mitigation of chronic lowering of groundwater levels through enhanced surface water supply.

Public Noticing: An Initial Study or other appropriate document may be prepared for purposes of compliance with CEQA at the appropriate time.

Permitting and Regulatory Process: ~~–~~ Project proponents do not anticipate the need for permitting or other regulatory approvals at this time. Permits/approvals will be obtained, if needed.

Time-Table for Initiation and Completion: The project is anticipated to begin 1 June 2019 and be complete by 1 June 2020.

Expected Benefits and Evaluation: This project will allow CWD to deliver surface water to its water users and to recharge the groundwater by percolating it in planned CWD groundwater recharge basins. The project would provide for diversion of flood waters to the canal, reducing flooding and providing surface water to reduce groundwater overdraft in the area. The project would help alleviate drought impacts. Specifically, because in-lieu and direct groundwater recharge would elevate groundwater levels within the Merced and Chowchilla Subbasins, it would address the risk of not meeting existing drinking and agricultural water demands once the project is constructed. The project will improve groundwater conditions impacting the SDAC communities of Le Grand and Planada.

How Project Will Be Accomplished: A study was performed by Tolladay, Fremming & Parson (TFP) for the Bureau of Reclamation (USBR) in 2001 in conjunction with Friant Water Users Authority/NRDC litigation settlement efforts to determine the feasibility, at a reconnaissance level, of increasing the capacity of some of MIDs distribution system and constructing a conveyance system from MIDs system to CWD, based on the ability to deliver alternative volumes of 7,500 AF and 15,000 AFY. The TFP study outlined six alternatives, as well as investigating a few combinations of alternatives. Chowchilla Water District is the submitting agency. A preliminary topographic survey would be performed to gather data on portions of two of the proposed alignments south of the Planada Canal and one south of the Fancher Lateral. A hydraulic analysis of the conveyance system utilizing HEC-RAS computer software would be utilized to bring alternative amounts of water to the districts. A cost analysis for the various options would be prepared.

Local project sponsors (e.g., LTMWC, LGAWD, etc.) anticipate that surface water sourced from the Merced Irrigation District may be available through temporary water purchase and sale agreements and may serve as a water supply for the project(s). It is understood that the Board of Directors for the Merced Irrigation District has and shall retain full and absolute discretion regarding whether and when it will enter into temporary water purchase and sale agreement(s), if any, and further, nothing contained in this document creates in any party or parties any right to water controlled by the Merced Irrigation District whether it be surface water or groundwater. Any transferred water made available by MID shall be limited by the terms and conditions contained in any respective temporary water purchase and sale agreement.

Note from MID: Local project sponsors (e.g., Lone Tree MWC, Le Grande-Athlone WD, etc..) anticipate that surface water sourced from the Merced Irrigation District may be available through temporary water purchase and sale agreements and may serve as a water supply for the project(s). It is understood that the Board of Directors for the Merced Irrigation District has and shall retain full and absolute discretion regarding whether and when it will enter into temporary water purchase and sale agreement(s), if any, and further, nothing contained in this document creates in any party or parties any right to water controlled by the Merced Irrigation District whether it be surface water or groundwater. Any transferred water made available by MID shall be limited by the terms and conditions contained in any respective temporary water purchase and sale agreement.

Legal Authority: The MIUGSA and Merced Subbasin GSA have authority per SGMA to develop and support projects for enhancing surface water supply to reduce groundwater extraction.

Estimated Costs and Plans to Meet Costs: Estimated costs for this project are $100,000. Costs are anticipated to be met through pursuit of grant funding opportunities, and potentially relevant GSA operating funds.

Project 10: Vander Woude Dairy Offstream Temporary Storage

Description: This project proposes to take a 50-acre field out of production and build a reservoir on that site. It will be approximately two feet below grade with 10-foot embankment built above grade. The reservoir would be used for temporary off-stream storage of irrigation water. and recharge.

Measurable Objective: This project addresses mitigation of chronic lowering of groundwater levels through enhanced surface water supply and potential recharge.

Public Noticing: No public noticing procedure is anticipated for this project.

Permitting and Regulatory Process: No permitting or regulatory process required. Project sits on private land (Merced County APN 065-110-032) with existing water right (A005386) and diversion outlet on Duck Slough.

Time-Table for Initiation and Completion: The project is anticipated to run for a duration of two years from May 2018 to May 2020 and has already started.

Expected Benefits and Evaluation: The project will improve storage capacity and to reduce reliance on groundwater resources for irrigation purposes. The project also provides opportunity for possible recharge.

How Project Will Be Accomplished: The project will be located North of Duck Slough (aka Mariposa Creek) approximately ¼ mile west of Highway 59. A soil investigation will be completed shortly to determine suitability. All water in and out of the reservoir will be metered. It is anticipated that the project will enable utilization of 500 to 1,000 AF of surface water to offset pumping.

Note from MID: Local project sponsors (e.g., Lone Tree MWC, Le Grande-Athlone WD, etc..) anticipate that surface water sourced from the MID may be available through temporary water purchase and sale agreements and may serve as a water supply for the project(s). It is understood that the Board of Directors for the MID has and shall retain full and absolute discretion regarding whether and when it will enter into temporary water purchase and sale agreement(s), if any, and further, nothing contained in this document creates in any party or parties any right to water controlled by the MID whether it be surface water or groundwater. Any transferred water made available by MID shall be limited by the terms and conditions contained in any respective temporary water purchase and sale agreement.

Legal Authority: SMMWC under the Merced Subbasin GSA has authority per SGMA to develop and support projects for enhancing storage of surface water to reduce groundwater use, and for projects that provide opportunities for groundwater recharge.

Estimated Costs and Plans to Meet Costs: Estimated costs for this project are $750,000. Costs have been met within the first year through private funding. Private funding will continue, although opportunities for grant funding are anticipated to be pursued.

Project 11: Mini-Big Conveyance Project

Description: LGAWD is currently working with Cal Poly's Irrigation Training & Research Center to assess the feasibility of constructing a conveyance facility from MID's Booster 3 Lateral to Deadman, Little Deadman, and Dutchman Creeks in the eastern portion of LGAWD. The initial feasibility and economic analysis indicate that the project is viable. The project could provide up to ~150 cfs of surface water to approximately 15,000-acres within LGAWD. Research with Cal Poly will provide an evaluation of MID's upstream system to identify flow constraints that LGAWD may be able to remedy through this project. This project would be a separate improvement district within LGAWD. It is expected that the water conveyed through this project would be delivered primarily during the early and late shoulder seasons (off-peak).

Measurable Objective: This project would address mitigation of chronic lowering of groundwater levels through enhanced surface water supply.

Public Noticing: Project proponents anticipate that public outreach may include potential public workshops and meetings, potential website presence or email announcements, along with other public notices for the workshops. Public noticing will also comply with requirements of the applicable permitting and regulatory processes.

Permitting and Regulatory Process: Project proponents anticipate that an initial study will be conducted for purposes of compliance with CEQA. The project will require the acquisition of land and easements. It is also anticipated that the project will be subject to potential County permits for encroachment, among other construction and building permits.

Time-Table for Initiation and Completion: It is anticipated that time will be needed for discussion and negotiations with MID. The project would likely begin in mid-~~–~~2022 (June 2022), with the first year focused on acquiring permits. The project build out is anticipated to be completed within 3 years of acquiring proper permitting, bringing estimated end date to approximately June 2026.

Expected Benefits and Evaluation: Enhanced conveyance and surface water availability, which is anticipated to reduce reliance on groundwater resources.

How Project Will Be Accomplished: The canal or pipeline would start east of Le Grand and attach near the Mitchell Lateral by MID's Booster Lateral 3. The canal would require major capacity enhancements to the existing MID conveyance system. The conveyance system would serve the upper and middle portions of LGAWD, along with the eastern data gap areas of the Subbasin. The project would be comprised of three legs. The project would place in-lieu recharge at the head waters of the Subbasin. The system would intersect two areas conducive to recharge. This includes one recharge opportunity at Mariposa Creek and an additional portion of land about 200-500 ft. by approximately three miles long. The latter recharge option is comparable to a retention basin close by, which has proven successful. Constructing a single leg would feature a flow rate of 37 to 50 cfs per day (with maximum water at 27,000 to 35,000 AF). Practical consumption is 9,000 to 13,000 AF off-peak. Supply is estimated at 6,000 acres at 1.5 AF/acre. The project would supply surface water to LGAWD, Plainsburg Irrigation District, Sandy Mush Mutual Water Company and other lands currently without an adequate surface water supply.

Note from MID: Local project sponsors (e.g., Lone Tree MWC, Le Grande-Athlone WD, etc.) anticipate that surface water sourced from the Merced Irrigation District may be available through temporary water purchase and sale agreements and may serve as a water supply for the project(s). It is understood that the Board of Directors for the MID has and shall retain full and absolute discretion regarding whether and when it will enter into temporary water purchase and sale agreement(s), if any, and further, nothing contained in this document creates in any party or parties any right to water controlled by the MID whether it be surface water or groundwater. Any transferred water made available by MID shall be limited by the terms and conditions contained in any respective temporary water purchase and sale agreement.

Legal Authority: LGAWD under the Merced Subbasin GSA has authority per SGMA to develop and support projects for enhancing surface water supplies to reduce groundwater use.

Estimated Costs and Plans to Meet Costs: Estimated costs for this project range between $6,000,000 to $8,000,000. Costs are anticipated to be met through grant funding and an improvement district with LGAWD.

Project 12: Streamlining Permitting for Replacing Sub-Corcoran Wells

Description: Subsidence is a major issue of concern in the southern parts of the Merced Subbasin. In order to combat subsidence, local stakeholders are considering shifting groundwater production from deeper wells below the Corcoran Clay, to the shallower, unconfined aquifer. Current understanding of subsidence suggests that such relocation of groundwater pumping to the shallower aquifer would contribute to reducing the amount of subsidence in the area. However, it is not currently known if such a relocation would result in other impacts to groundwater or beneficial users of groundwater.

Under the Groundwater Mining and Export Ordinance of Merced County, Ordinance No. 1930, drilling a new well and moving production between aquifer systems requires a new well permit from the county. The permitting process and associated environmental process requires an understanding of impacts from the well, including the possibility that the well may have a significant effect on the environment. Cumulative effects of past, present, and reasonably foreseeable probable future wells must also be understood. The purpose of this project is to provide technical information on cumulative impacts of the shifting of groundwater production from below the Corcoran Clay to above the Corcoran Clay to support Merced County's permitting and environmental processes.

<u>Measurable Objective:</u> This project works toward meeting the measurable objective for the chronic lowering of groundwater levels sustainability indicator by moving pumping from the stressed deeper aquifer into the shallower, unconfined aquifer, which can be more readily managed through recharge projects. The project also works towards reducing subsidence, helping the subbasin achieve the measurable objective for the land subsidence sustainability indicator.

<u>Public Noticing:</u> The MSGSA anticipates that this project would result in a technical memorandum available to the public upon request.

<u>Permitting and Regulatory Process:</u> This project streamlines the required permitting of groundwater wells under the Merced County Ordinance No. 1930, Groundwater Mining and Export Ordinance.

<u>Time-Table for Initiation and Completion:</u> The technical analysis is expected to take approximately three to five months and may be completed and available for use in evaluating groundwater well permits as soon as early 2020.

<u>Expected Benefits and Evaluation:</u> The project will benefit impacts to subsidence by shifting groundwater production from the lower aquifer to the shallow aquifer in the Subsidence Area. The project will also benefit groundwater levels by moving production from the deeper aquifer to the shallower aquifer, in that the deeper aquifer is more stressed and more difficult to recharge because of the Corcoran Clay and the shallower aquifer is less stressed and easier to recharge.

<u>How Project Will Be Accomplished:</u> Merced County will work with an engineering firm to conduct an analyses to evaluate the potential impacts of moving groundwater production wells from below the Corcoran Clay to above the Corcoran Clay. The analysis will include the delineation of the portion of the county to be identified as the Subsidence Area for use in the analysis,~~–~~ data review including the evaluation of existing information, reports, and other materials to support the analysis, review of the available groundwater models to determine the suitability for scenario development and impact analysis, groundwater extraction impact analysis, including groundwater modeling with a multi-layer model simulation of both confined (below the Corcoran Clay) and unconfined (above the Corcoran Clay) aquifers, along with groundwater-surface water interaction, and the development of a technical memorandum to describe the work performed and results.

<u>Legal Authority:</u> The County of Merced holds the permitting authority for groundwater wells in the unincorporated portion of Merced County under the Groundwater Mining and Export Ordinance of Merced County, Ordinance No. 1930.

<u>Estimated Costs and Plans to Meet Costs:</u> The estimated costs for this project are valued at $70,000 to complete a technical analysis of the cumulative impacts.~~–~~ The estimated duration of the project is three to five months. The County of Merced may assume the costs of this project.

6.5 PROJECTS RUNNING LIST

At the request of GSA board members and stakeholders, the Merced Subbasin GSP also contains a running list of potential projects to be revisited on an as-needed basis. These are not intended to be taken directly as projects submitted to DWR as part of the official list of GSP projects. This list only provides a reference for potential future projects, should GSP priorities and available funding mechanisms align. The running list of projects is provided in Table 6-6 below.

Table 6-6: Projects Running List for Reference

Project Name	Submitting Agency	GSA	Brief Description	Current Status	Estimated Cost
Project 13: Planada Northwest 2019 Water System Improvement Project	Planada Community Services District (2018 IRWMP)	MIUGSA	The proposed project focuses on upgrades to the Planada Community Service District's (District) water distribution system to ensure consistent water delivery to residents of the community. Improvements include: replacement of undersized water lines in the northwestern part of town, with current thin-wall plastic 2", 3" and 4" diameter water lines upsized to 8" diameter Class 900 PVC pipe; upgrading old-style water meters to radio-read meters that have better leak-detection capabilities and can better track water usage and water wasting in the community; replacement of water main valves that are beyond their useful life and no longer operate or do not open and close all the way.	Design	$ 2,184,198
Project 14: Water Efficiencies Rebate Program	City of Merced (2018 IRWMP)	MIUGSA	This proposal's goals are to save water and energy by awarding rebates to customers for upgrading to water efficient appliances. Water efficient new appliances will be rebated as follows: $100 per dish washer, $100 per clothes washer, $50 for converting toilets to ultra-low flow models of 1.6 gpf or less and new pool covers will also be rebated at $50 or 50% of the purchase price, whichever is less. Water conservation is needed to meet state mandates for 20% reduction by 2020. Many older homes have large water consuming appliances and this benefit will help our community to upgrade. By upgrading old appliances to water conserving devices, the customer can reduce water consumption and save energy without changing habits. This project will aid water users in the disadvantaged community of the City of Merced.	Conceptual	$ 100,000
Project 15: Merced Irrigation Flood-MAR Canal Automation	Merced Irrigation District (2018 IRWMP)	MIUGSA	Merced Irrigation District is proposing automation of certain facilities to enhance Flood-MAR capabilities and expand areas which can be recharged with stormwater events. The project consists of automating certain facilities including but not limited to the Washington Lateral, Northside Canal, Livingston Canal, Le Grand Canal, Caton Lateral, Escaladian Canal, Hammett Lateral, Atwater Canal, Cressey Lateral, and Arena Canal. Currently these canals have manual structures which require frequent human adjustment and inputs to safely manage flows. By automatizing these facilities, the district will be able to safely accommodate volatile and unpredictable storm flows while keeping canal levels high enough for Flood-MAR purposes. Additionally, this project will better manage surface water diversions and increase distribution efficiency by reducing spills.	Conceptual	$ 6,500,000
Project 16: Livingston Canal Lining Project	Merced Irrigation District (2018 IRWMP)	MIUGSA	The project will line a portion of the canal section of the Livingston Canal through the City of Atwater. The Livingston Canal is both a stormwater facility and irrigation facility.	Construction	$ 3,100,000
Project 17: Well 20 TCP Treatment	City of Atwater (2018 IRWMP)	MIUGSA	Redesign and install treatment for 1,2,3-TCP at Well 20 in the City of Atwater. Currently Well 20 has been drilled but nothing else has been done since there was found to be high levels of 1,2,3-TCP during pump testing. Well 20 used to be the second highest producing well in the city until high levels of manganese and iron were found due to the well being drilled too deep. A new hole was drilled on the same lot but needs additional money to cover cost of installing water treatment. City suffers from poor water pressure during summer at peak usage hours due to well not being online.	Conceptual	$ 3,000,000
Project 18: Cash for Grass Pilot Program to Eliminate Wasteful Pollution Containing Water Run-off	City of Merced (2018 IRWMP)	MIUGSA	Purpose of project is to educate about storm drains carrying pollution to creeks and begin a pilot program in the City of Merced to rebate water customers for converting their grass landscape into water efficient xeriscape with water efficient changes to their irrigation systems to eliminate pollution containing run-off. Xeriscape refers to landscaping in ways that reduce or eliminate the need for supplemental water from irrigation. Polluted run-off from urban landscapes goes into storm gutters and drains which flow to creeks; primarily Bear Creek and Black Rascal Creek. Excess irrigation of turf leads to increased water consumption, increased costs, it depletes our water supply and its run-off pollutes creeks. The program will serve to educate the public about storm water pollution and rebate them for converting grass and old irrigation systems into qualifying xeriscape with water efficient drip irrigation systems that will pollute less and save more water. Pollution in our creeks is a threat to public health, enjoyment, and the natural beauty of our urban waterways. In 1993, the City of Merced passed a water conservation ordinance and allows only limited irrigation along with prohibitions on wasting water and causing harmful pollution containing run-off. This pilot program will help eliminate pollution containing run-off from entering into local creeks and serve to beautify the community and promote water conserving irrigation practices. The City of Merced is an economically disadvantaged community and with the stimulus these rebates provide the water customers can add value to their property with landscape/xeriscape upgrades and via the conversion to water saving drip irrigation systems. The project will ultimately lead to decreased polluted storm water and trash flowing into our urban waterways. Additionally, the water customers will benefit by the rebate and the long-term benefits will be decreased water consumption. (addresses DACs and water quality)	Design	$ 65,680
Project 19: Black Rascal Creek Flood Control Project	Merced Streams Group (County of Merced, City of Merced, Merced Irrigation District) (2018 IRWMP)	MIUGSA, MSGSA	Construction of a regulating reservoir on the Black Rascal Creek Watershed. Project location is immediately north of Yosemite Avenue and Arboleda Drive in northeast Merced. Project will provide protection against a 200-year storm event and will provide much needed flood control on the currently unprotected Black Rascal Creek Watershed. Project will be beneficial to the project area and also to all downstream areas. The reservoir will maintain a deadpool for wildlife purposes. During the flood season, the reservoir will act primarily as a flood control retarding basin. During the irrigation season, the reservoir will regulate irrigation flows thereby increasing Merced Irrigation District system water efficiency without impacting power generation scheduling at New Exchequer Dam with the Independent System Operator (ISO).	Design	$ 35,761,703
Project 20: Black Rascal Creek Flood Control Bypass/ Supplemental Groundwater Supply Improvements	Merced Streams Group (County of Merced, City of Merced, Merced Irrigation District) (2018 IRWMP)	MIUGSA, MSGSA	This project proposes a set of gates in MID's Le Grand Canal to replace the breach, which is installed annually, allowing MID to redirect and control flood flows. The Le Grand Canal contributes up to 600 CFS of floodwater to Black Rascal creek. This proposed control structure can also be utilized to send flood flows on alternate, longer routes creating an artificial offset to the timing of peak storm flows as well as permit storm flows to be directed to alternate creeks and artificial groundwater recharge areas.	Planning	$ 1,000,000

Project Name	Submitting Agency	GSA	Brief Description	Current Status	Estimated Cost
Project 21: Study or a pilot recharge basin project on Canal Creek	Amsterdam Water District	MSGSA	Amsterdam Water District, a new district in the MSGSA, has a project for either a study or a pilot recharge basin project on Canal Creek. This project is still in an early phase.	Planning	NA
Project 22: Permitting and Characterization of Merced River Water for Potable Water Supply	City of Livingston (2018 IRWMP)	MIUGSA	This project is for the City of Livingston. This project consists of obtaining sufficient year-round water quality information to determine the feasibility of using Merced River Water to augment the City's groundwater domestic water supply. The project will also include preparing the required environmental documentation to obtain the necessary permits to obtain water from the Merced River. The City prepared a feasibility study to construct a horizontal collector well. The report concluded that a horizontal collector well would produce adequate water quantity.	Conceptual	$ 325,000
Project 23: Weather Based Irrigation Controllers	City of Merced (2018 IRWMP)	MIUGSA	This project is for the purchase and installation of Toro Sentinel Controllers for parks irrigation systems in the City of Merced. The Toro Sentinel Controllers are weather based irrigation controllers. The City began to use the Toro Sentinel Controllers in 2011 and currently has 68 units in the parks and maintenance districts. This powerful, yet simple-to-use controller software is ideal for large sites such as cities as it allows a user to control up to 999 field satellites from a remote location with a desktop or laptop computer. The City has a need for approximately 100 more units. The controllers can remotely shut off water, change irrigation times, days, and set alarms for stations if malfunctions occur such as power outages or extreme flows. Having the Toro Sentinel Controllers reduces manual labor and travel time from controller to controller and most importantly aids in water efficiency as the controller automatically adjusts for changes in weather.	Ongoing Program	$ 540,000
Project 24: Brasil Recharge Project	Bob Kelley, Merced Subbasin GSA/Stevinson Water District	MSGSA	Project would consist of pumping station and conveyance piping 8500' from existing canal to upgradient lands on property owned by Mike Brasil, 18246 1st Ave. Stevinson, CA 95374. Existing lands are leveled to accept recharge water in a 35-acre dedicated basin and networked into existing irrigation pipelines to allow flood irrigation on 360 acres of adjacent contiguous land both east and west of Van Clief Rd. and north of 1st Ave. and west of Griffith Rd. Water would be received in wet years (not dry years) Project Owner is Mike Brasil. Other Participating Agencies (if applicable) include Stevinson Water District. Project Location is 18246 1st Ave. Stevinson, CA 95374 and includes 35-acre Recharge Basin and 360 acres of adjacent land owned by Mike Brasil east and west of Van Clief Rd. north of 1st Ave. and west of Griffith Rd. Phase details: Planning and Initial Study complete. Conceptual Design and Design in process. Existing canal facilities and pumping stations are in place. Upgrading to size of pumps and motor upon completion of design. Determination of size of conveyance piping upon completion of design. NOE for environmental review as project is and will continue existing use as dairy farming land. Funding: Should grant funding be available fine, otherwise private funding. Timing: Likely to be implemented in 2023.	Conceptual Design	$ 300,000
Project 25: Mariposa Reservoir Enlargement and Downstream Levee and Channel Improvements	Merced Streams Group (County of Merced, City of Merced, Merced Irrigation District) (2018 IRWMP)	MIUGSA	The enlargement of Mariposa Reservoir and downstream levee and channel improvements would increase the level of flood protection to Planada and Le Grand, both of which are DAC's in Merced County. Mariposa Reservoir was originally constructed to provide protection for up to a 50-year storm event. The State of California has adopted legislation that calls for a minimum of 200-year flood protection for urbanized areas. This project would meet the requirements of the new flood control legislation.	Planning	$ 15,000,000
Project 26: Owens Reservoir Enlargement and Downstream Levee and Channel Improvements	Merced Streams Group (County of Merced, City of Merced, Merced Irrigation District) (2018 IRWMP)	MIUGSA	Owens Reservoir was constructed in the early 1950's as an element of the Merced Streams Group Project authorized by Congress's 1944 Flood Control Act. The Flood Control Act of 1970 called for three additional flood control reservoirs, enlargement of existing reservoirs, and 52 miles of levee and channel modifications. To date only one additional reservoir has been built (Castle Dam). The enlargement of Owens Reservoir and downstream levee and channel improvements would increase the level of flood protection to Planada and Le Grand, both DAC's. Owens Reservoir was originally constructed to provide protection for up to a 50-year storm event. The State of California has adopted legislation that calls for a minimum of 200-year flood protection for urbanized areas. This project would meet the requirements of the new flood control legislation.	Planning	$ 15,000,000
Project 27: Atwater-McSwain Regulating/Recharge Basin	Merced Irrigation District (2018 IRWMP)	MIUGSA	The project entails construction of a regulating/recharge basin. The basin will be excavated, and automated inlet and outlet gates will be constructed along with the necessary flow measurement and control. The overall footprint of the project site is estimated at 20 acres, and the basin will occupy approximately 15 acres. The project will provide groundwater recharge in the area to increase supply and also serve as a regulating reservoir to be use by MID operations personnel.	Planning	$ 3,300,000
Project 28: Rice Field Pilot Study Monitoring Wells	Merced Irrigation District (2018 IRWMP)	MIUGSA	This Project entails construction of at least 3 groundwater monitoring wells to evaluate the efficacy of MID's rice field recharge pilot project.	Planning	$ 250,000
Project 29: Water Meter Conservation Project	City of Atwater (2018 IRWMP)	MIUGSA	Install water meters at connections that feed the biggest lots in the City of Atwater. Currently the City of Atwater has 1/3 of their connections on water meters. Most of these our homes built after 1992 and have smaller lot sizes. The homes with bigger lot sizes are currently not charged based on their water consumption, just on a flat rate. The City would like to install meters on these lots to assist with better billing and better water conservation. It would also help the City with their annual report for water loss.	Design	$ 800,000
Project 30: Real Time Simulation Flood Control Modeling - Bear Creek	Merced Irrigation District (2018 IRWMP)	MIUGSA	This project consists of modeling Bear, Black Rascal, and Burns Creeks. These three creeks (or the confluence of them) run through the City of Merced and have historically caused flooding to the area. The real time simulation model (RTS) would utilize HEC-RAS and HEC-HMS modeling software. The ability to run real time simulations will improve the ability to forecast flood flows and flood events. This forecasting will be critical in utilizing flood flows for FLOOD-MAR projects in the area. Additionally, it will enable MID to be better prepared for flood flows which happen during the irrigation season. Excess surface water is often conservatively spilled in anticipation of a rain event that occurs during the irrigation season due to lack of forecasting information.	Conceptual	$ 100,000

Project Name	Submitting Agency	GSA	Brief Description	Current Status	Estimated Cost
Project 31: Crocker Dam Modification	Merced Irrigation District (2018 IRWMP)	MIUGSA, MSGSA	This project encompasses installation of automatic gates at MID's Crocker Dam, located just west of Merced at the bifurcation of Black Rascal Creek and Bear Creek. The automatic gates would allow for MID to remotely operate the dam and adaptively manage the flows in Bear Creek/Black Rascal Creek. This would provide improved flood control downstream, water storage, and be a supply for groundwater recharge from stormwater (Flood-MAR).	Conceptual	$ 1,240,000
Project 32: East Pike Recharge Basin	GBRK LLC & Stevinson Water District	MSGSA	Submitting Entity is GBRK LLC, PO Box 818 Newman, CA 95360. Other Participating Agencies include Stevinson Water District. Project includes a 35-acre dedicated basin and networked into existing irrigation facilities to allow flood irrigation on 360 acres of adjacent contiguous land. Water conservation measures including drip irrigation are planned as a part of irrigation efficiencies programs. District incentive programs available. 600 AF/Y of captured storm event run off in above average rainfall year from SWD distribution facilities, East Side Canal. Project will require a low lift pump station of 10 cfs design capacity. Project location is on SWD lateral, Highline. Only requirement is pump station and construction of recharge basin. Landowner currently experiences significant seepage loss of surface water and would like to increase water efficiencies and use groundwater in dry season or during periods of insufficient surface water. Project location: 781 Lander Ave. Stevinson, CA 95374 within the Stevinson Water District. The 35-acre dedicated recharge basin is located 1500' west of Hwy 165 and 2000' north of San Joaquin River in Stevinson. APN No 055-250-006. Financing: project will secure private financing.	Planning/Initial Study & Conceptual Design	$ 50,000
Project 33: East Purdy Recharge Basin	Flying H Partners LLC & Stevinson Water District	MSGSA	Submitting Entity is Flying H Partners LLC. Other Participating Agencies include Stevinson Water District. Project includes 35-acre dedicated basin and networked into existing irrigation facilities to allow flood irrigation on 360 acres of adjacent contiguous land. Water conservation measures including drip irrigation are planned as a part of irrigation efficiencies programs. District incentive programs available. 600 AF/Y of captured storm event run off in above average rainfall year from SWD distribution facilities, East Side Canal. Project will require a low lift pump station of 10 cfs design capacity. Project location is on SWD lateral, Highline. Only requirement is pump station and construction of recharge basin. Landowner currently experiences significant seepage loss of surface water and would like to increase water efficiencies and use groundwater in dry season or during periods of insufficient surface water. Project location 1232 S. Van Clief Rd. Stevinson CA 95374. 20 acre dedicated recharge basin located 2600' east of Sixth Ave. and Van Clief Rd. in Stevinson, CA 95374. APN 055-238-049. Financing: project will secure private financing	Planning/Initial Study & Conceptual Design	$ 50,000
Project 34: TIWD GSA-1 Merced GSP Projects Reservoir	Larry Harris, TIWD GSA-1	TIWD GSA-1	Evaluate the construction of a reservoir to hold excess waters that arrive in our area during the rainy season for later use during the irrigation season. TIWD GSA-1 is working with MID on this. Estimation of footprint 600 acres. Banks less than 12ft. (7 or 8ft bank). Flood flows and flows from MID would be captured. (catch winter, off season flows to use during the summer). Estimated Project Life (Years): 40. Funding: Grants and internal funding	Planning/Initial Study	$ 1,500,000
Project 35: University of California Merced Surface Water Augmentation	Merced Irrigation District and the University of California Merced (2018 IRWMP)	MIUGSA	The University of California Merced is in the process of developing sustainable water strategies that include the optimization of water resources. Currently, the only source of UCM Campus water is the city well (aquifer), which provides 100% of water used by the campus. Irrigation accounts for 50% percent of the total potable water used by UCM. The Merced Irrigation District and the University of California Merced are partnering to support the interconnection of the University's irrigation water supply to the Fairfield Canal. Lake Yosemite which the Fairfield Canal originates from will charge the University's Little Lake through a delivery gate located adjacent to Scholars Lane Bridge. This non-potable water source will be used in lieu of ground water for irrigation, leaving groundwater in the Basin for potable uses while optimizing the use of surface water.	Planning	$ 800,000
Project 36: Surface Water for City Park Irrigation	City of Livingston (2018 IRWMP)	MIUGSA	This project would provide surface water for the irrigation of the City's two largest Parks: Gallo Park and Arakelian Park. Water would be obtained from the nearby canals, filtered, and pressurized to irrigate the parks. The combined area of the two proposed parks is almost 15 acres. Most of the park's surface area is turf. The project is estimated to reduce groundwater pumping by almost 100 ac-ft per year. (City of Livingston) The City of Livingston's water supply is solely groundwater. Groundwater levels decline sharply during the spring and summer months and rise during the fall and winter months. In the last five years, the overall year to year groundwater levels have been declining. The groundwater contains arsenic, manganese and TCP which require the City to utilize costly treatment processes to remove them. The cost of producing potable water in the City has been increasing due to the presence of these constituents. Non-potable uses such as irrigation don't require treated groundwater and surface water could reduce the cost of irrigation at the City parks.	Planning	$ 350,000
Project 37: Exchange Recycled Water for Surface Water in Parks	City of Merced (2018 IRWMP)	MIUGSA	This project would take parks off municipal groundwater and replace the irrigation with surface water. The City would provide recycled water to the irrigation district in exchange for the surface water that would be used to water the parks. Initially it would be a demonstration project at a single project and could be expanded to other city parks as a water exchange program.	Conceptual	$ 80,000
Project 38: Marguerite Water Retention Facility	Brad Robson	MSGSA	This project includes up to 13,000 AF off-site storage for possible early season MID water, flood control, migratory waterfowl/wildlife habitat and irrigation water. The project would capture seasonal creek water. Project Owner: Le Grand Athlone District. Location: Between Deadman and Dutchman Creek. Based on report Merced county streams flood control by Army Corp Engineers March 1980.	Planning/Initial Study	NA
Project 39: Le Grand-Athlone Water District Surface Water Extension	2018 IRWMP	MSGSA	This project includes building a conveyance infrastructure from MID's booster 3 or another facility southeast, eventually connecting to Chowchilla Water District facilities near the intersection of the Madera Canal and the Chowchilla River. The connection would allow flexibility in distributing flood and other types of water in the Exchequer and Friant systems. Surface water would be available to Merced SOI growers, Plainsburg Irrigation District, LeGrand-Athlone Water District, Sandy Mush Mutual Water Company and others that predominantly use groundwater only.	Conceptual	$ 20,000,000
Project 40: Bear Reservoir Enlargement and Downstream Levee and Channel Improvements	Merced Streams Group (County of Merced, City of Merced, Merced Irrigation District) (2018 IRWMP)	MIUGSA	Bear Reservoir was constructed in the early 1950's as an element of the Merced Streams Group Project authorized by Congress's 1944 Flood Control Act. The Flood Control Act of 1970 called for three additional flood control reservoirs, enlargement of existing reservoirs, and 52 miles of levee and channel modifications. To date only one additional reservoir has been built (Castle Dam). The enlargement of Bear Reservoir and downstream levee and channel improvements would increase the level of flood protection to the most populated areas of Merced County. Bear Reservoir was originally constructed to provide protection for up to a 50-year storm event. The State of California has adopted legislation that calls for a minimum of 200-year flood protection for urbanized areas. This project would meet the requirements of the new flood control legislation.	Planning	$ 20,000,000

Project Name	Submitting Agency	GSA	Brief Description	Current Status	Estimated Cost
Project 42: Lake Yosemite Booster Pump Station	Merced Irrigation District (2018 IRWMP)	MIUGSA	Lake Yosemite receives inflows from MID's Main Canal. It has four primary outlets; the Tower Lateral, the Sells Lateral, the Fairfield Canal, and the Le Grand Canal. During winter operations, the lake level is so low that only the Tower Lateral can be used for outflow (unless a major storm event occurs) due to the other 3 canal headgates having a higher invert. This project entails installation of booster pump station to allow for full utilization of Lake Yosemite's storage capacity and diversion facilities. The Booster pump would permit MID to move Lake Yosemite water to other portions of the district and be a key tool in implementing Flood-MAR projects.	Conceptual	$ 100,000
Project 43: Various Storm Basin Improvements	City of Livingston (2018 IRWMP)	MIUGSA	This project would include improving the City of Livingston's storm water basin pump stations. The City relies on storm water pumping stations to control storm water runoff. Several storm water pumping stations need repair. Without these pump stations the City's ability to handle large storm water flows is reduced.	NA	$ 650,000
Project 44: Burns Reservoir Enlargement and Downstream Levee and Channel Improvements	Merced Streams Group (County of Merced, City of Merced, Merced Irrigation District) (2018 IRWMP)	MIUGSA, MSGSA	Burns Reservoir was constructed in the early 1950's as an element of the Merced Streams Group Project authorized by Congress's 1944 Flood Control Act. The Flood Control Act of 1970 called for three additional flood control reservoirs, enlargement of existing reservoirs, and 52 miles of levee and channel modifications. To date only one additional reservoir has been built (Castle Dam). The enlargement of Burns Reservoir and downstream levee and channel improvements would increase the level of flood protection to the most populated areas of Merced County. Burns Reservoir was originally constructed to provide protection for up to a 50-year storm event. The State of California has adopted legislation that calls for a minimum of 200-year flood protection for urbanized areas. This project would meet the requirements of the new flood control legislation.	Planning	$ 15,000,000
Project 45: Fairfield Canal/ El Nido Superhighway	2018 IRWMP	MIUGSA, MSGSA	This project will consist of flood flow capacity improvements and canal automation, which is essential for implementing Flood-MAR projects and conveying water to MID's existing El Nido Groundwater Recharge Basin. The Fairfield and El Nido Canal system conveys water to over 52,000 acres. This project would open that acreage up to potential groundwater recharge and flood control projects. Additionally, it will assist in better management of flood flows which are anticipated to be higher intensity due to climate change. During the irrigation season, canal automation will also help to reduce operational spill and conserve water. This project will be a key component in implementing Flood-MAR to the Merced area providing critical groundwater recharge.	Conceptual	$3,000,000
Project 46: Mariposa Dam Gate Modification	Brad Robson	MSGSA	The Mariposa Dam provides flood control during rain events. It has an open pipe at the bottom of the dam and meters out the storm water. The proposed project is comprised of installing a gate to slow the release of the water when possible. This would provide opportunity for ground water recharge. Mariposa creek traverses an area that has great recharge potential due to its natural soil properties. The project would also benefit stream habitat and the DAC of Le Grand. LGAWD is the submitting agency under the Merced Subbasin GSA and would need to work with the Army Corps of Engineers who currently manages the Mariposa Dam site. The project would benefit DACs and provide opportunities for recharge. Additional benefits include water for habitat. This project supports mitigation of chronic lowering of groundwater levels through recharge.	Planning	NA
Project 47: Infiltration Basin, Clayton Water District	Clayton Water District	MSGSA	The infiltration basin size is proposed to be 100 acres and able to recharge 0.35 acre-feet per day yielding 3,500 AF of annual average storage. Recovery of the stored water will be above the E-Clay, in what is called a shallow zone. There are 3 Recovery wells proposed for this project as well as the utilization of 4 existing wells in and around the area to recover the stored water. Location of the infiltration basin will be defined once funding becomes available. Project is in Planning/Initial Study phase. Project is expected to take 3 years to complete. This includes environmental permitting and compliance. Capital costs are approx. $3.25M. Annual O&M costs are $25K annually. The wells are expected to be replaced every 20 years. Estimated Project Life in years is 60 years. Costs are based on 2019 dollars. Cost estimate was developed using previous projects and water developed at the planning level of the project. First order of funding will be Grant Assistance, second order of funding will be a Prop 218 Election.	Planning/Initial Study	$3,250,000
Project 48: Storage Basin, Clayton Water District	Clayton Water District	MSGSA	The storage basins are proposed to total 1,000 acres at 10 feet deep will yield 10,000 AF plus the demand reduction of 350 AF for a total of 10,350 AF average annual supply. The basins will be designated as storage basins and will not be cropped. Location of the infiltration basin will be defined once funding becomes available. Project is in Planning/Initial Study phase. Project is expected to take 3 years to complete. This includes environmental permitting and compliance. Capital costs are approx. $10M. Annual O&M costs are $50K annually. The recovery pumps are expected to be replaced every 20 years. Costs are based on 2019 dollars. Estimated Project Life in years is 60 years. Cost estimate was developed using previous projects and water developed at the planning level of the project. First order of funding will be Grant Assistance, second order of funding will be a Prop 218 Election.	Planning/Initial Study	$10,000,000
Project 49: Lateral Recharge, Clayton Water District	Clayton Water District	MSGSA	Lateral Recharge project include the placement of lateral leach lines within a permanent crop field (in between the rows) at a depth of at least 4 feet, assuming a 150 acre block there are 58 rows (almonds) 10 AF/day can be recharged and over the course of 100 days, 1,000 AF can be recharge in an average annual basis. Project proposed to find four 150 blocks of participating landowners, yielding 4,000 AF. Location of the infiltration basin will be defined once funding becomes available. Project is in Planning/Initial Study phase. Project is expected to take 2 years to complete, environmental process is assumed to be minimal. Capital cost is $2M per 600-acre block. Annual O&M costs are $25K annually. Leach lines are expected to be replaced every 20 years. Estimated Project Life in years is 20 years. Costs are based on 2019 dollars. Cost estimate was developed using best engineering judgement at the planning level of the project. First order of funding will be Grant Assistance, second order of funding will be a Prop 218 Election.	Planning/Initial Study	$2,000,000 (per acre block)
Project 50: Eastside By-Pass Diversions, Clayton Water District	Clayton Water District	MSGSA	The Clayton Water District is proposing 8 additional diversion in the Eastside By-Pass north of State Route 152, with a capacity of 20 cfs each for a total of 320 AF/day. The project will be to submit a Temporary Appropriative Water Right Application for the use of flood flows in the Eastside bypass, utilizing temporary diversion facilities (to be placed by landowner at their cost). Where water will be diverted for direct use as well as for temporary underground storage, which can be extracted later. Yield in 50 days is 16,000 AF averaged over 4 years totals 4,000 AF of annual average surface water. Location of the diversion points vary along the Eastside Bypass. This project is in Conceptual Design phase. Capital costs are approx. $200K. No annual O&M costs. There are no replacement costs associated with this project. Application for this project is to be renewed yearly. Costs are based on 2019 dollars. Cost estimate was developed using previous projects and was developed at the conceptual level of the project. First order of funding will be Grant Assistance, second order of funding will be a Prop 218 Election.	Conceptual Design phase	$200,000
Project 51: Merced Groundwater Basin Subsidence Area and	Clayton Water District	MSGSA	This project consists of an irrigation conveyance facility that connects the Central California Irrigation District's Riverside/Poso Canal to Clayton Water District (including lands to be annexed). The facility would provide supplemental water to an area which is severely impacted by subsidence. The project would be split into two phases; Phase 1 consisting of a feasibility study which would include alternative conceptual designs with Phase 2 consisting of Construction. Conceptually this facility would be approximately 2-3 miles in length and	Planning	$100,000

Project Name	Submitting Agency	GSA	Brief Description	Current Status	Estimated Cost
Supplemental Supply - Phase 1			cross the San Joaquin River and East Side Canal to send water from West to East. Total cost for project is $100K. Latitude 37.112065 and Longitude -120.590162. Areas along portion of the San Joaquin River in Merced and Madera Counties have been identified by DWR and the USGS as areas subject to subsidence. In 2013, the project area subsided between 0.5 and 0.75 feet in just 12 months. The subsidence may be attributed, along with other potential factors, to groundwater extraction. Below the surface, subsidence may result in greater depths to groundwater and decreased storage volume within the aquifer. Above the surface, it may lead to infrastructure challenges necessitating canal modifications and road improvements as well as increasing areas that are susceptible to flooding which could include an elementary school, the City of Dos Palos, Highway 152, and many acres of farmland. This project would assist in correcting and/or slowing the rate of subsidence by providing supplemental water to the area and thereby providing both direct and in-lieu recharge to the underlying aquifer and benefits the overall Merced GW Basin sustainability. The California Central Valley is crisscrossed by similar water conveyance projects consisting of canals, pipelines, and pumps. This type of project is typical in water conveyance. MIUGSA is listed as a project partner in the Merced IRWMP Opti database. Objectives of project include: - Correct groundwater overdraft conditions, promote direct and in-lieu recharge, and identify supplemental water. Suppress potential subsidence through reduced groundwater pumping. This project promotes in-lieu recharge by providing a supplemental surface water supply to the area. Additionally, the proposed facility could be utilized for direct recharge. - Manage flood flows and stormwater runoff (including those caused by climate change) for public safety, water supply, recharge, and natural resource management. This project would increase the acreage which could benefit from Flood Management Aquifer Recharge (Flood-MAR) projects. Flood-MAR projects in the area would help reduce flood flows in the San Joaquin River system, which has historically caused flood events downstream and threatened public safety and the environment. - Meet demands for all uses, including agriculture, urban, and environmental resource needs. The supplemental supply would directly serve agriculture but the benefits of the in-lieu recharge would be reaped by all groundwater users including urban, agriculture, and the environment. - Improve coordination of land use and water resources planning. This project facilitates augmentation of local water supplies to enhance the sustainability of the groundwater basin as directed by SGMA. - Effectively address climate change adaptation and/or mitigation in water resource management and infrastructure. This project would help mitigate climate change in the following ways;1. Provide surface water to Clayton Water District offsetting the need to pump groundwater thereby reducing energy consumption (Diesel or Electricity) 2. Subsidence is forcing multiple infrastructure projects to be redesigned, including canals which have historically been gravity conveyance systems. If subsidence continues, large energy guzzling pump stations will be necessary to continue to provide historical water deliveries - Maximize water use efficiency, including expanding in-lieu recycled water projects where feasible. This project expands the footprint that Flood-MAR projects could reach thereby allowing otherwise "Lost" water to benefit the groundwater basin, improving basin water efficiency. - Protect and improve water quality for all beneficial uses, consistent with the Basin Plan. The lower San Joaquin river has historically flooded (recently 1997, 2006, 2011, 2017). Each time this flooding occurs, it introduces pollutants, debris, oil, and potentially sewage into the environment. These San Joaquin River Flood-MAR projects would reduce these events (or lessen the extent) thereby improving water quality. - Protect, restore, and improve natural resources. The lower San Joaquin river has historically flooded (recently 1997, 2006, 2011, 2017). Each time this flooding occurs, it introduces pollutants, debris, oil, and potentially sewage into the environment. These San Joaquin River Flood-MAR projects would reduce these events (or lessen the extent) thereby protecting natural resources. - Address water-related needs of disadvantaged communities (DACs). The DAC of El Nido is severely disadvantaged and faces substantial subsidence issues. This project would benefit the area of El Nido. Additionally, it would benefit the entire Merced Groundwater Subbasin including all the DACs within it, by providing in-lieu and direct recharge to the basin, benefiting every user. - Establish and maintain effective communication among water resource stakeholders in the Region. This project would bring multiple water users together as it interconnects multiple irrigation conveyance systems. Effective communication would be established and maintained for proper project operations. This communication includes farmers, water districts, state and federal agencies, irrigation districts, and other interested parties. - Enhance public understanding of water management issues and needs. This project could be utilized as an example of reducing subsidence and mitigating declining groundwater levels to the public. Furthermore, the concept could be reproduced elsewhere. Project benefits all DAC's in the subbasin by the in-lieu and direct recharge provided. Cost estimates are provided in 2018 dollars.		

Note from MID: Local project sponsors (e.g., Lone Tree MWC, Le Grande-Athlone WD, etc.) anticipate that surface water sourced from the Merced Irrigation District may be available through temporary water purchase and sale agreements and may serve as a water supply for the project(s). It is understood that the Board of Directors for the Merced Irrigation District has and shall retain full and absolute discretion regarding whether and when it will enter into temporary water purchase and sale agreement(s), if any, and further, nothing contained in this document creates in any party or parties any right to water controlled by the Merced Irrigation District whether it be surface water or groundwater. Any transferred water made available by MID shall be limited by the terms and conditions contained in any respective temporary water purchase and sale agreement.

6.6 POTENTIAL AVAILABLE FUNDING MECHANISMS

The State Water Resources Control Board (SWRCB) identified some potential funding mechanisms that can be used toward the planning, construction, and implementation of GSP projects. Several funding types may be applicable to the current short list and potential future projects for the Merced GSP including: projects included in an Integrated Water Resource Management Plan (IRWM) Plan, projects addressing drinking water, stormwater recharge, water recycling projects, wastewater and system improvement projects, and projects that focus on DAC or SDAC areas.

The range of applicable projects, per SWRCB Funding Opportunities fact sheet and per Water Code §10727.4(h), include recharge projects, groundwater contamination remediation, water recycling projects, in-lieu use, diversions to storage, conservation, conveyance, and extraction projects. Additional Projects or Management Actions outside of this list that a GSA determines will help achieve the sustainability goal for the Basin may also be applicable (see GSP Regulations §354.44). Many of the available funding mechanisms accept applications on a continuing basis. Table 6-7 provides a brief overview of the project types and available funding and programs as well as important dates to consider for implementation.

Table 6-7: Overview of Project Types and Available Funding Mechanisms

Project Type and Purpose	Funding Type	Program	Important Dates
Water recycling projects	Planning and construction grants and financing	Water Recycling Funding Program (Prop 1 and 13)	Planning applications accepted on continuous basis. Construction applications received by December 31st each year will be used to develop a priority score. Projects which receive a priority score equal to or greater than the yearly fundable list cutoff score will be placed on the fundable list for the upcoming fiscal year
Wastewater treatment for DAC & SDAC projects	Planning and construction grants and financing	Small Community Grant Fund (Prop 1 and CWSRF)	Applications accepted on continuous basis
Drinking Water	Planning and implementation grants	Sustainable Groundwater Management Grant Program (Round 3 - Prop 68)	Round 3 Solicitation November 2019, Awards March 2020
Public water system improvements	Planning and construction grants and financing	Drinking Water Grants (Prop 1 and 68, and DWSRF)	Applications accepted on continuous basis
Stormwater recharge projects	Implementation grants	Storm Water Grant Program (Prop 1)	Solicitation Period Spring 2020
IRWM projects (included and implemented in an adopted IRWM Plan)	Implementation Grant	IRWM Implementation Grant Program (Prop 1)	Solicitation planned for release spring 2019. Round 1 applications due fall 2019. Round 2 solicitation in 2020.

Many of the projects listed within the Merced GSP are pulled from the most recent Merced IRWMP, making them applicable to the IRWM Implementation Grant Program (Prop 1) funding. Funding options are explained in greater detail in Chapter 7 (Plan Implementation) of this GSP.

7 PLAN IMPLEMENTATION

The Merced Irrigation-Urban GSA (MIUGSA), Merced Subbasin GSA (MSGSA), and Turner Island Water District GSA #1 (TIWD GSA-1) will work together cooperatively to implement the Merced Groundwater Sustainability Plan (GSP) in compliance with the Sustainable Groundwater Management Act (SGMA). Implementation of the GSP will be a substantial undertaking that will include implementation of the projects and management actions included in Chapter 6, as well as the following:

- Merced GSP implementation program management
- Merced GSAs administration
- Public outreach
- Implementation of the monitoring programs
- Development of annual reports
- Development of 5-year update and report

Chapter 7 (Plan Implementation) provides a description of the above, including contents of the annual and five-year reports that will be provided to the Department of Water Resources (DWR) as required under SGMA regulations.

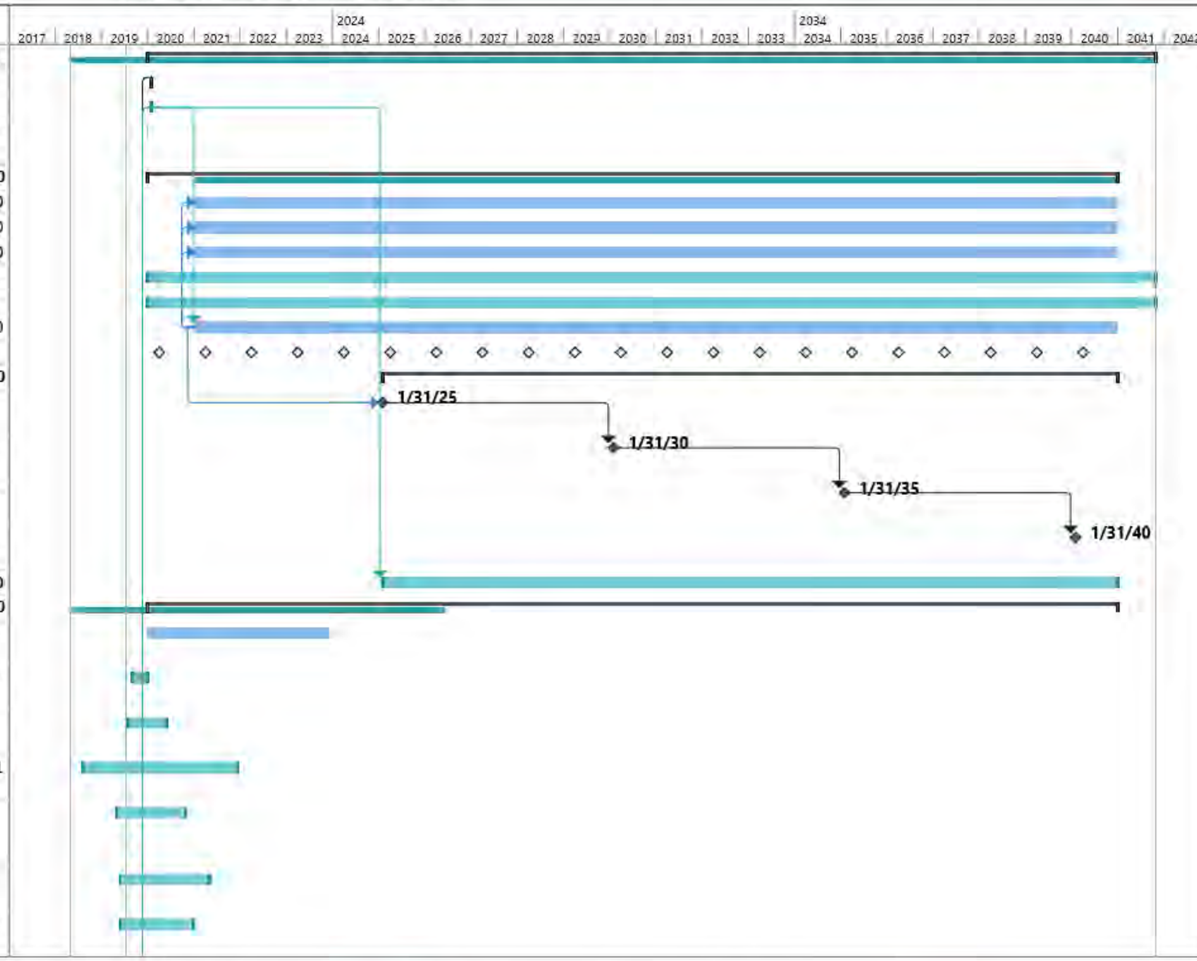
7.1 IMPLEMENTATION SCHEDULE

A detailed implementation schedule through 2041 is provided in Figure 7-1 which contains information on the GSP Implementation Program management, GSA administration, public outreach, GSP implementation program management, monitoring, Annual and Five-Year Evaluation Reports, monitoring, and implementing GSP-related projects and management actions.

Figure 7-1: GSP Implementation Schedule

Merced Subbasin GSP Implementation Schedule

ID	Task Name	Start	Finish
1	**Merced GSP Implementation**	**Tue 12/31/19**	**Tue 10/29/41**
2	**Plan Implementation**	**Fri 1/31/20**	**Fri 1/31/20**
3	Plan submittal to the State	Fri 1/31/20	Fri 1/31/20
4	**GSP Implementation Program Management**	Tue 12/31/19	Tue 12/31/19
5	**GSA Administration**	**Tue 12/31/19**	**Mon 12/31/40**
6	Merced Irrigation-Urban GSA	Thu 12/31/20	Mon 12/31/40
7	Merced Subbasin GSA	Thu 12/31/20	Mon 12/31/40
8	Turner Island Water District GSA-1	Thu 12/31/20	Mon 12/31/40
9	**Stakeholder/GSA Board Engagement**	Tue 12/31/19	Tue 10/29/41
10	**Public Outreach**	Tue 12/31/19	Tue 10/29/41
11	**Monitoring**	Thu 12/31/20	Mon 12/31/40
12	**Annual Reports**	**Wed 4/1/20**	**Sun 4/1/40**
34	**Five-Year Evaluation Reports**	**Fri 1/31/25**	**Mon 12/31/40**
35	Five Year Report/Interim Target Evaluation 1	Fri 1/31/25	Fri 1/31/25
36	Five Year Report/Interim Target Evaluation 2	Thu 1/31/30	Thu 1/31/30
37	Five Year Report/Interim Target Evaluation 3	Wed 1/31/35	Wed 1/31/35
38	Five Year Report/Interim Target Evaluation 3	Tue 1/31/40	Tue 1/31/40
39	Plan Updates (as needed)	Fri 1/31/25	Mon 12/31/40
40	**Project Implementation**	**Tue 12/31/19**	**Mon 12/31/40**
41	Project 1: Planada Groundwater Recharge Basin Pilot Project	Wed 1/1/20	Sun 12/17/23
42	Project 2: El Nido Groundwater Monitoring Wells	Sun 9/1/19	Tue 12/31/19
43	Project 3: Meadowbrook Water System Intertie Feasibility Study	Thu 8/1/19	Mon 6/1/20
44	Project 4: Merquin County Water District Recharge Basin	Tue 8/7/18	Wed 12/15/21
45	Project 5: Merced Irrigation District to Lone Tree Mutual Water Company Conveyance Canal	Wed 5/1/19	Sun 11/1/20
46	Project 6: Merced IRWM Region Climate Change Modeling	Sat 6/1/19	Fri 4/30/21
47	Project 7: Merced Region Water Use Efficiency Program	Sat 6/1/19	Thu 12/31/20



GSP Implementation Schedule
Merced Subbasin

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

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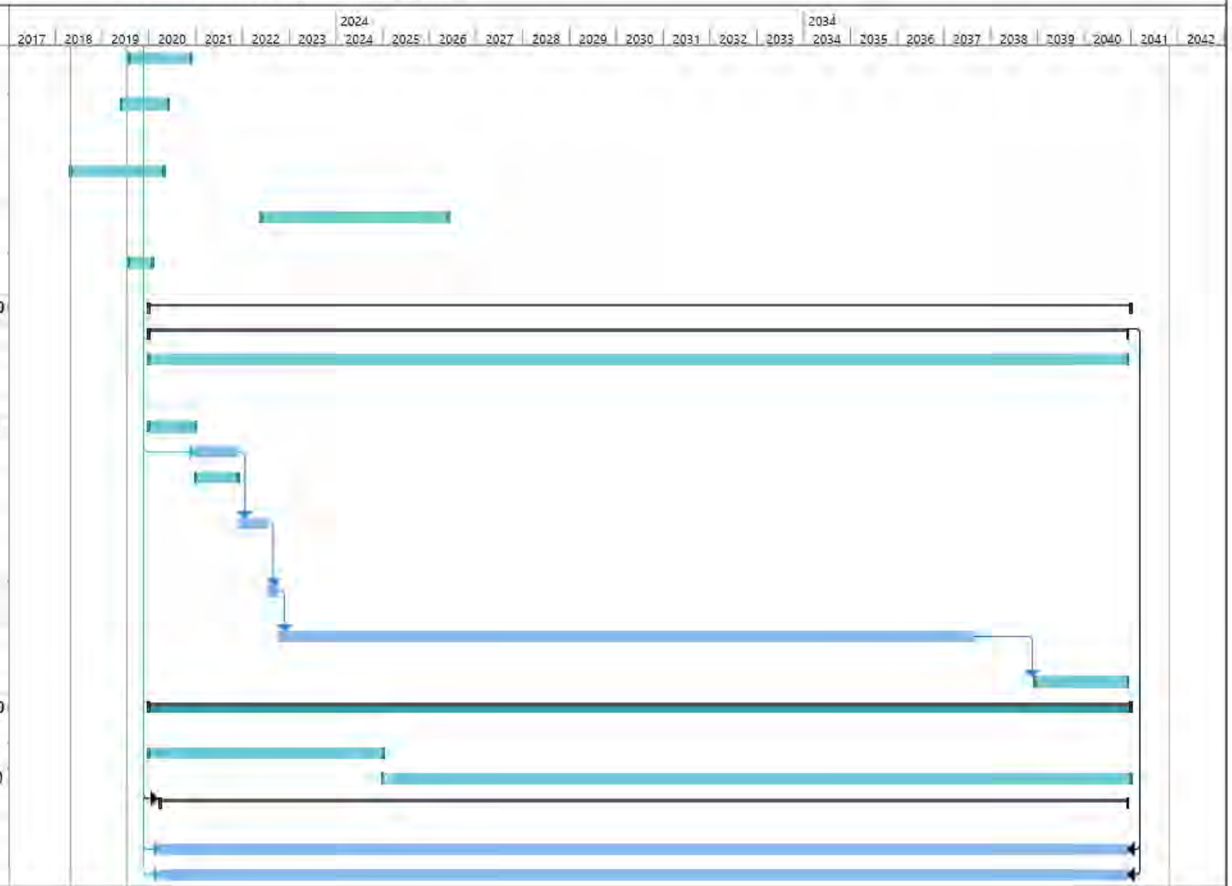
Merced Subbasin GSP Implementation Schedule

ID	Task Name	Start	Finish
48	Project 8: Merced Groundwater Subbasin LIDAR	Thu 8/1/19	Tue 12/1/20
49	Project 9: Study for Potential Water System Intertie Facilities from MID to LGAWD and CWD	Sat 6/1/19	Mon 6/1/20
50	Project 10: Vander Woude Dairy Offstream Temporary Storage	Tue 5/1/18	Fri 5/1/20
51	Project 11: Mini-Big Conveyance Project	Wed 6/1/22	Mon 6/1/26
52	Project 12: Streamlining Permitting for Replacing Sub-Corcoran Wells	Thu 8/1/19	Fri 1/31/20
53	**Management Action Implementation**	**Wed 1/1/20**	**Mon 12/31/40**
54	**1. Pumping Allocations for GSAs**	**Wed 1/1/20**	**Fri 12/7/40**
55	Public outreach/education about allocation framework implementation	**Wed 1/1/20**	**Fri 12/7/40**
56	Fill Data Gaps	Wed 1/1/20	Thu 12/31/20
57	Finalize Allocation Method	Fri 1/1/21	Thu 12/2/21
58	Document Developed Supply Estimates	Fri 1/1/21	Thu 12/2/21
59	Determine Allocation of New Water Supplies & Review Water Rights	Fri 12/3/21	Thu 7/14/22
60	Develop Timeline for Pumping Reduction	Fri 7/15/22	Thu 10/6/22
61	Implement Annual Pumping Reductions	Fri 10/7/22	Thu 8/20/37
62	Maintain Pumping Allocations	Mon 12/13/38	Fri 12/7/40
63	**2. MSGSA Demand Reduction Program**	**Wed 1/1/20**	**Mon 12/31/40**
64	Voluntary Reductions	Wed 1/1/20	Wed 1/1/25
65	Mandatory Reductions	Wed 1/1/25	Mon 12/31/40
66	**Adaptive Management Action Implementation (as-needed)**	**Mon 3/30/20**	**Fri 12/7/40**
67	Evaluate Unimplemented Projects	Mon 3/30/20	Fri 12/7/40
68	Revisit Projects not included in GSP	Mon 3/30/20	Fri 12/7/40



GSP Implementation Schedule
Merced Subbasin

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

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7.2 GSP IMPLEMENTATION PROGRAM MANAGEMENT

The GSP Implementation Program Management will primarily consist of oversight of the implementation of the projects and management actions described in Chapter 6 of this GSP and general GSP administration. This includes coordination of technical activities associated with GSP implementation and project management of activities implemented through the GSP across GSAs. The GSP Implementation Program Management would also include grant administration for funding awarded for regional projects or programs or potential Plan updates.

GSP administration includes the joint coordination activities of the three GSAs necessary to implement the GSP. GSP development was guided by a Coordinating Committee and the GSAs intend to continue to use the Coordinating Committee to guide implementation of the GSP. Administrative activities include managing quarterly in-person Coordinating Committee meetings and on-going email updates from MIUGSA, MSGSA, and TIWD GSA-1 to the Coordinating Committee related to the statewide SGMA program and Merced GSP activities. It also includes oversight of consultants or contractors that may be retained by the GSAs in support of joint GSP activities (including but not limited to, GSP updates, annual reporting, and monitoring), and administration of the Merced GSAs Coordination MOU.

Activities under GSP Implementation Program Management also include stakeholder engagement through the Stakeholder Advisory Committee (SC). The SC will be maintained as a non-voting body, with the intent to provide input and an exchange amongst a broad range of stakeholder perspectives This body will meet quarterly to discuss GSP and GSA activities, provide input to the Coordinating Committee, and present on items of interest related to the basin. These meetings are to be staggered in a way that allows two weeks to one month's time before the Coordinating Committee. This will enable a formal summary of input to be generated and provided to the Coordinating Committee. The focus and frequency of these meetings may be revised depending upon what topics need to be discussed. It is expected that Stakeholder Committee input and discussion will be especially important in the first several years of GSP Implementation, as these initial years will involve key decision-making and project implementation. For the purpose of providing input and encouraging exchange with the Coordinating Committee, a liaison position may be created among the members of the SC. The liaison will report at the Coordinating Committee meetings and serve as a direct representative for the SC body. The Stakeholder Committee meetings are held in-person and are generally two hours long. A facilitator may be selected and funded by the GSAs for these meetings. There are currently 23 SC members, each of whom serve an indefinite term. Opportunities for new members to join the Stakeholder Committee will occur prior to each GSP update.[28]

Coordinating Committee meetings will be held quarterly, generally staggered with respect to the SC meeting. The Coordinating Committee is responsible for steering the Merced GSP Implementation Program, including review of internal drafts of the GSP and subsequent updates along with the annual reports. As described in Chapter 1 (Introduction and Plan Area), the Coordinating Committee is responsible for developing recommendations for basin management and considering input from the SC and the public before presenting recommendations to the GSA Boards. The Coordinating Committee will work closely with GSP and GSA staff to manage the Merced GSP Implementation Program. In addition to quarterly meetings, the Coordinating Committee will participate in calls and emails as necessary and may meet more frequently during development of annual reports, GSP updates or as needed.

7.3 GSA ADMINISTRATION

Each of the three GSAs are administered independently and involve coordination and oversight of individual GSA projects and programs. Chapter 1 (Introduction and Plan Area) describes the governance and member agencies of each of the GSAs. GSA administration would include: regular coordination meetings within each GSA; regular email communications to update GSA members on on-going basin activities; coordination activities with the other GSAs; and

[28] For further information on Stakeholder Committee structure and involvement, please see Chapter 1 (Introduction and Plan Area)

other activities necessary for GSA operations. GSA staff meetings are assumed to occur more frequently during Five-Year Update years than during non-Five-Year Update years, with other oversight and administration activities occurring as needed and on an on-going basis. GSA administration is also expected to require additional effort during GSP updates, and during Annual Report and Five-Year Evaluation Report development.

Although staff from the GSAs and GSA member agencies will be meeting regularly as part of GSA administration, their individual GSA's Board of Directors will meet in accordance with each GSA's Board Calendar or bylaws. Joint calls with the Boards of each GSA for basin-wide updates and coordination activities will be held in alternating months from individual GSA Board of Director meetings. The Coordinating Committee will be responsible for developing agendas and recommendations for joint Board meetings, while the Coordinating Committee members from each GSA will be responsible for providing updates and presenting recommendations to their respective GSA's Board.

7.4 PUBLIC OUTREACH

During GSP development, the Merced GSP Program used multiple forms of outreach to communicate SGMA-related information and solicit input. The GSAs intend to continue public outreach and provide opportunities for engagement during GSP implementation. This will include providing opportunities for public participation, especially from beneficial users, at public meetings, providing access to GSP information online, and continued coordination with entities conducting outreach to DAC communities in the Basin. Announcements will continue to be distributed via email prior to public meetings (e.g., Stakeholder Committee meetings, Coordinating Committee meetings, public workshops, and GSA Board meetings). Emails will also be distributed as specific deliverables are finalized, when opportunities are available for stakeholder input and when this input is requested, or when items of interest to the stakeholder group arise, such as relevant funding opportunities. The Merced SGMA website, managed as part of GSP Administration, will be updated a minimum of monthly, and will house meeting agendas and materials, reports, and other program information. The website may be updated to add new pages as the program continues and additional activities are implemented. Additionally, public workshops will be held semi-annually, or more frequently if necessary, to provide an opportunity for stakeholders and members of the public to learn about, discuss, and provide input on GSP activities, progress towards meeting the Sustainability Goal of this GSP, and the SGMA program.

7.5 MONITORING PROGRAMS

The GSP identifies the need for ongoing monitoring and filling of data gaps. The monitoring programs are a critical element of GSP implementation. The GSAs intend to implement the monitoring programs described in Chapter 4 (Monitoring Networks) to track conditions for the applicable sustainability indicators discussed in Chapter 3 (Sustainable Management Criteria). The GSP has identified monitoring networks for groundwater levels, water quality, and subsidence; representative monitoring sites have been selected and minimum thresholds have been established. Monitoring Network data will be collected and used to determine whether Undesirable Results are occurring, to better characterize basin conditions, to identify trends, and to determine if adaptive management is necessary. Monitoring data will be managed using the Merced Data Management System (DMS) developed during GSP preparation specifically for this purpose. The GSP Monitoring Networks make use of existing monitoring programs and develop further monitoring to continue characterization of the Subbasin. As described in Chapter 4 (Monitoring Networks), key components involved in the implementation of the Monitoring Network activities for the Merced GSP by relevant Sustainability Indicator include:

Groundwater Levels

The monitoring program for groundwater levels will utilize existing CASGEM wells in the Subbasin. Additional efforts to fill data gaps will include:

- Evaluation of other existing wells for additional construction information (where missing) and/or permission for access to wells to collect data.

- Seeking funding to construct additional monitoring wells, which are preferred to active wells due to shorter screened intervals and lack of groundwater production to interfere with measurements. New monitoring well sites should include a very shallow well at the same location for areas near GDEs, to the extent funding and logistics allow.

- Installation of pressure transducers at representative wells that exhibit groundwater levels that are highly variable or difficult to explain to better understand the variability, to the extent feasible. Installations may be temporary or permanent.

The GSAs will introduce a comprehensive plan for filling data gaps within two years of acceptance of the GSP by DWR. The plan will include the qualitative data gaps discussed above along with DWR recommendations for the CASGEM plan. The plan will identify most sensitive areas for priority of implementation of the plan, and a timeline for filling all identified gaps.

Water Quality

The water quality monitoring program for the GSP will utilize monitoring wells and data from existing programs such as the East San Joaquin Water Quality Coalition Groundwater Quality Trend Monitoring and Public Water System wells, and includes the following key activities:

- Active coordination with existing monitoring programs:
  - Monthly review of data submitted to the Department of Pesticide Regulation (DPR), Division of Drinking Water (DDW), Department of Toxic Substances Control (EnviroStor), and SWRCB (GeoTracker as part of the Groundwater Ambient Monitoring and Assessment [GAMA] database).
  - Quarterly check-ins with existing monitoring programs, such as CV-SALTS and ESJWQC GQTM.
  - Annual review of annual monitoring reports prepared by other programs (such as CV-SALTS and ILRP).
  - GSAs will invite representative(s) from the Regional Water Quality Control Board, Merced County Division of Environmental Health, and ESJWQC to attend an annual meeting of the GSAs to discuss constituent trends and concerns in the Subbasin in relation to groundwater pumping.
- Exploratory efforts in obtaining construction information for at least 20 DDW PWS wells in the Corcoran Clay region

Subsidence

The subsidence monitoring program for the GSP will utilize monitoring data from the ~~San Joaquin River Restoration Program's (~~SJRRP's~~)~~ subsidence control points. Installation of extensometers has been recommended to help understand the depth at which subsidence is occurring. This will involve coordination with the SJRRP, the USGS, and other entities associated with subsidence studies, as well as interbasin coordination efforts with Chowchilla and Delta-Mendota Subbasin on the funding and installation of additional subsidence monitoring that may include extensometers or other measurement methods to better understand trends and any potential correlation to groundwater levels in the different principal aquifers across all subbasins.

Depletion of Interconnected Surface Waters

The GSP will rely on groundwater level monitoring and streamflow monitoring to support characterization of 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. Efforts for coordination and monitoring methods development include:

- Contacting state, federal, and environmental organizations to determine interest in developing a method of tracking the date and location where ephemeral or intermittent flowing streams and rivers cease to flow.
- Seeking funding for development of multi-level monitoring wells to better characterize very shallow groundwater conditions near rivers and streams as well as near other deeper monitoring wells.

7.6 DEVELOPING ANNUAL REPORTS

As required under California Code of Regulations §356.2 (SGMA regulations), annual reports must include three key sections: 1) General Information, 2) Basin Conditions, and 3) Plan Implementation Progress. Report information requirements are detailed below and would be completed in a manner and format consistent with the SGMA regulations. As annual reporting continues, it is possible that this outline will change to reflect basin conditions, the priorities of Merced GSAs, and applicable requirements from DWR.

7.6.1 General Information

General information will include an executive summary that highlights the key content of the annual report. As part of the executive summary, this section will include a description of the sustainability goals, provide a description of GSP projects and their progress as well as an annually updated implementation schedule and map of the Subbasin. Key components as required by SGMA regulations include an Executive Summary and a Map of the Basin.

7.6.2 Basin Conditions

Basin conditions will describe the current groundwater conditions and monitoring results. This section will include an evaluation of how conditions have changed in the Subbasin over the previous year and compare groundwater data for the year to historical groundwater data. Pumping data, effects of project implementation (e.g., recharge data, conservation, if applicable), surface water flows, total water use, and groundwater storage will be included. The GSAs will also evaluate the use of the GDE Pulse tool to help assess GDEs. This tool was developed by The Nature Conservancy and ties together satellite (Landsat), rainfall, and groundwater data. Key components to the Annual Report as required by SGMA regulations include:

- Groundwater elevation data from the monitoring network
- Hydrographs of elevation data
- Groundwater extraction data
- Surface water supply data
- Total water use data
- Change in groundwater storage, including maps

7.6.3 Plan Implementation Progress

Progress towards successful plan implementation would be included in the annual report. This section of the annual report would describe the progress made towards achieving interim milestones as well as implementation of projects and management actions. Key components as required by SGMA regulations include Plan Implementation Progress and Sustainability Progress.

7.7 DEVELOPING FIVE-YEAR EVALUATION REPORTS

SGMA requires that GSPs be evaluated regarding their progress towards meeting the approved sustainability goals at least every five years, and to provide a written assessment to DWR. An evaluation must also be made whenever the

GSP is amended. A description of the information that will be included in the five-year report is provided below and would be prepared in a manner consistent with §356.4 of the SGMA regulations.

7.7.1 Sustainability Evaluation

This section will contain a description of current groundwater conditions for each applicable sustainability indicator and will include a discussion of overall Subbasin sustainability. Progress towards achieving interim milestones and measurable objectives will be included, along with an evaluation of groundwater elevations (being used as direct measure for water level and proxy measure surface water depletions), groundwater quality, and subsidence in relation to minimum thresholds.

7.7.2 Plan Implementation Progress

This section of the five-year report will describe the current status of project and management actions since the previous five-year report. An updated project implementation schedule will be included, along with any new projects that were developed to support the goals of the GSP and identification of any projects that are no longer included in the GSP. The benefits of projects that have been implemented will be included, and updates on projects and management actions that are underway at the time of the five-year report will be reported.

7.7.3 Reconsideration of GSP Elements

Part of the five-year report will include a reconsideration of GSP Elements. As additional monitoring data is collected during GSP implementation, land uses and community characteristics change over time, and GSP projects and management actions are implemented, it may become necessary to revise the GSP. This section of the five-year report will reconsider the basin setting, management areas, undesirable results, minimum thresholds, and measurable objectives.~~-~~ If appropriate, the five-year report will recommend revisions to the GSP. Revisions would be informed by the outcomes of the monitoring network, and changes in the basin, including but not limited to, changes to groundwater uses or supplies and outcomes of project implementation.

7.7.4 Monitoring Network Description

A description of the monitoring network will be provided in the five-year report. Data gaps, or areas of the basin that are not monitored in a manner consider with the requirements of §352.4 and §354.34(c) of the regulations will be identified.~~-~~ An assessment of the monitoring network's function will be provided, along with an analysis of data collected to-date. If data gaps are identified, the GSP will be revised to include a program for addressing these data gaps, along with an implemented schedule for addressing gaps and how the GSAs will incorporate updated data into the GSP.

7.7.5 New Information

New information that has become available since the last five-year evaluation or GSP amendment will be described and the GSP evaluated in light of this new information. If the new information would warrant a change to the GSP, this would also be included.

7.7.6 Regulations or Ordinances

The five-year report will include a summary of the regulations or ordinances related to the GSP that have been implemented by DWR or others since the previous report and address how these may require updates to the GSP.

7.7.7 Legal or Enforcement Actions

Enforcement or legal actions taken by the GSAs or their member agencies in relation to the GSP will be summarized in this section of the five-year report, along with how such actions support sustainability in the basin.

7.7.8 Plan Amendments

A description of amendments to the GSP will be provided in the five-year report, including adopted amendments, recommended amendments for future updates, and amendments that are underway during development of the five-year report.

7.7.9 Coordination

The Merced GSP will be implemented by the MIUGSA, MSGSA, and TIWD GSA-1. These GSAs will coordinate as appropriate with GSAs in adjacent basins, specifically: The Delta-Mendota Subbasin, the Chowchilla Subbasin, and the Turlock Subbasin. The GSAs have executed or are in the process of executing interbasin agreements or memorandum of intent to coordinate with each neighboring basin.

7.7.10 Schedule for 5-Year Periods

Development and adoption of a GSP by January 31, 2020 was a large task, and during GSP development, the GSAs identified key areas that would need to be further developed as part of five-year updates. Table 7-1 illustrates the Merced GSP's schedule for implementation from 2020 to 2040, highlighting the high-level activities anticipated for each five-year period. A more detailed schedule is included in Figure 7-1. These activities are necessary for ongoing Plan monitoring and updates, as well as tentative schedules for projects and management actions. Additional details on the activities included in the timeline are provided in these activities' respective chapters of this Plan.

Table 7-1: GSP Schedule for Implementation 2020 to 2040

2020 2025 2030 2035 2040

Monitoring and Reporting	Preparation for Allocations and Low Capital Outlay Projects	Prepare for Sustainability	Implement Sustainable Operations
• Establish Monitoring Network • Install New Groundwater Wells • Reduce/Fill Data Gaps	• GSAs conduct 5-year evaluation/update • Monitoring and reporting continue	• GSAs conduct 5-year evaluation/update • Monitoring and reporting continue	• GSAs conduct 5-year evaluation/update • Monitoring and reporting continue
• GSAs allocated initial allocations • GSAs establish their allocation procedures and demand reduction efforts • Develop Metering Program	• As-needed demand reduction to reach Sustainable Yield allocation • Metering program continues	• As-needed demand reduction to reach Sustainable Yield allocation	• Full implementation demand reduction as needed to reach Sustainable Yield allocation by 2040
• Funded and smaller projects implemented	• Planning/ Design/ Construction for small to medium sized projects	• Planning/ Design/ Construction for larger projects begins	• Project implementation completed
• Extensive public outreach regarding GSP and allocations	• Outreach regarding GSP and allocations continues	• Outreach continues	• Outreach continues

7.8 FIRST FIVE YEAR UPDATE – 2020-2025

The first five years of GSP implementation will be critical in setting the basin on a path toward sustainability. Several key tasks were identified during development of the first GSP that need to be further developed or resolved in the five-year GSP update. These are special studies or issues that need resolution but could not be resolved during initial GSP development. These include:

Establishing Metering Program

In order to implement allocations as part of the GSP and to confirm basin water use and water budgets, it is necessary to measure how much groundwater is being extracted from the basin. The Coordinating Committee has agreed on the need to develop a program to measure this extraction in the first five years of the GSP. In discussing a potential metering program, the SC and CC highlighted the need to take a flexible approach. There are many considerations that would need to be taken into account in establishing a metering and telemetry program, including:

- Costs and challenges associated with different extraction/metering programs—broader approaches through methods using remote sensing, focused monitoring through metering, or a combination.
- There are different types of architecture (set ups) for metering and different types of meters that vary in terms of: cost, pressure loss, flow range, and accuracy
- Challenges for installation such as remote locations, limited available straight segments of pipe, different pipe diameters between sites, and availability of power
- There can be inconsistency between well sites where sites might not be able to have the same meter type
- Well site data transmitters will also need to be installed at the well sites (this can include frequency radios, cellular data radios, or a landline connection)

High-level cost estimates generated based on a Metering and Telemetry Technical Memo are summarized as below. A memo with further detail is provided in Appendix M.

- High-level estimate per well site: ~~–~~ $6,000 - $10,000 for installation and first year operating costs (per well)
- Network Communication Factors: High-level network communications estimate (not a hosted service): $3,000 -- $15,000 for first year (for entire system)
- Data Collection, Storage, and Access Factors: High-level central collection host estimate (not a hosted service): one-time cost of $20,000 -- $27,000 (for entire subbasin system). Overall per well cost depends on how much data we want to store.
- Maintaining cost of hosting data each year: roughly estimated as $8,000 per year.

Finalizing Allocation Framework

Beginning the implementation of the Management Action Water Allocation Framework will require completion of several steps listed below. The allocation framework was the subject of much discussion by the Stakeholder and Coordinating Committees during GSP development. The GSAs intend to allocate water to each GSA and have not yet reached agreement on allocations or how they will be implemented. Additional description of the Water Allocation Framework is provided in Chapter 6 (Projects and Management Actions to Achieve Sustainability Goal).

Some of the next steps needed in first five years of GSP to begin implementation of allocations include:

- Agreeing upon details of how allocations to each GSA will be established
- Developing, refining, and documenting estimates of developed supply and determining rights to confirmed estimates of developed supply

- Determining how pumping will be measured through metering program or equivalent
- Establishing sustainable allocation trading and crediting rules
- Implementation schedule and timing
- Conducting outreach and communications

Implementation of the Water Allocation Framework is expected to be developed in the first five years of the GSP with full implementation and enforcement by GSAs by 2040.

Developing Methodology for establishing Minimum Thresholds at New Wells

The Sustainable Management Criteria chapter of this GSP describes a methodology for establishing minimum thresholds for groundwater levels at representative wells. That methodology requires having some historical data at a well in order to establish the threshold. The GSAs anticipate installing new wells, particularly in the MSGSA portions of the Subbasin to fill data gaps. The GSAs will need to develop a methodology for establishing minimum thresholds at future representative wells that may be added to the monitoring network and do not have sufficient historical data. This could include using MercedWRM projections to establish projected water levels for those wells as the basis for MTs or using historical well data from nearby wells.

Refining and Improving MercedWRM Model Calibration

Efforts are anticipated to refine and improve calibration of the MercedWRM especially for the eastern portion of basin where the tanked water program occurred (see Section 3.3.2). This is due in part to the specific geological formations in this area. It is anticipated that the model will need to be refined to more accurately reflect groundwater elevations for this area.

Refinements to Climate Change Analysis to Better Reflect Local Surface Water Operations

The approach developed for this GSP was based on the methodology in DWR's guidance document (DWR, 2018a) and uses best available information related to climate change in the Merced Subbasin. There are limitations and uncertainties associated with the analysis. One important limitation is that CalSim II does not fully simulate local surface water operations. Thus, the analysis conducted for this GSP may not fully reflect how surface and groundwater basin operations would respond to the changes in water demand and availability caused by climate change. For this first GSP iteration, use of a regional model and the perturbation factor approach (see Section 2.4 [Climate Change Analysis] within Chapter 2 [Basin Setting]) were deemed appropriate given the uncertainties in the climate change analysis.

It is anticipated that future refinements of the analysis would utilize the local surface water operations model, the Merced Irrigation District Hydrologic and Hydraulic Operations Model (MIDH2O). Use of this model will allow for greater resolution in the simulation of Merced River flows and surface water supply based on local management.

Mitigation for Possible Future Domestic Well Dewatering

The GSAs recognize that water levels may continue to decline during GSP implementation and do not consider a single domestic shallow well being dewatered to be significant and unreasonable. Nonetheless, the GSAs recognize the importance of access to safe drinking water for all users in the basin and will evaluate during the first five years of the GSP establishing mitigation for shallow domestic wells that might be dewatered by declining water levels during the GSP implementation period.

Creating a Data Gaps Plan

It is anticipated that within two years of the acceptance of the GSP by DWR, the GSAs will develop a plan to address identified data gaps with a timeline for implementation based on priority.

Pursuing Funding Opportunities

Funding will be pursued in the form of grant applications, loans, GSA operational funds, and private funds in order to fulfil and implement the different components of the GSP. This includes funding to install extensometers or other measurement methods for subsidence monitoring, create and implement metering programs, and fund projects and management actions. Further detail is provided in Sections 7.9 - 7.11 of this Chapter.

7.9 IMPLEMENTATION COSTS

In implementing the Merced GSP, the GSAs will incur costs which will require funding. The primary activities that will incur costs are listed and summarized in Table 7-2.

Table 7-2: Costs to GSAs and GSP Implementation Costs

Activity	Estimated Cost[1]	Assumptions
GSP Implementation and Management for GSAs		
GSP Implementation Program Management	$120,000 annually	Assumes annual costs of grant administration for regional projects or programs, or potential Plan updates. Also includes professional services to support the joint activities of the three GSAs such as costs for coordination & facilitation of SC & CC meetings.
GSA Administration	Approx. $1M annually for all GSAs combined[3]	Costs for MIUGSA and MSGSA estimated at $400K per year each, TIWD estimated at $140K per year. These include general GSA operating costs, professional services, and costs for coordination of GSA Board meetings.
Public Outreach	$75,000 annually	Assumes costs for creating communication materials, website updates (incl. maintenance and hosting), and conducting 2 public workshops per year.
Monitoring Program	$85,000 annually for all but the first year $175,000 for first year due to one-time cost items for initial set up.	Assumes costs for GW levels, evaluation of existing water level wells for additional construction information and/or permission for access to wells to collection data, coordination with existing programs[4], obtaining additional construction information for PWS wells, and data management. Does not include costs for new well installation.
Developing Annual Reports	$50,000 annually (FY23-FY40) Additional costs during initial years ($50,000-$75,000 for FY20 – FY22)	Includes data compiling and reporting on 1) General Information, 2) Basin Conditions, and 3) Plan Implementation Progress.
Developing Five-Year Evaluation Reports	$800,000 every 5 years (across 2 fiscal years)	Includes data compiling and reporting on progress for each relevant sustainability indicator, plan implementation progress and updates, monitoring network updates and progress in addressing data gaps, description of new information, amendments, and coordination.
Implementing GSP-Projects and Management Actions		
Project 1: Planada Groundwater Recharge Basin Pilot Project	$395,292	Costs spread over 5 years.
Project 2: El Nido Groundwater Monitoring Wells	$400,000	Costs occurred in first year.
Project 3: Meadowbrook Water System Intertie Feasibility Study	$100,588	Costs spread over 1-2 years.
Project 4: Merquin County Water District Recharge Basin	$1,400,000	Costs spread over 3 years.

Activity	Estimated Cost[1]	Assumptions
Project 5: Merced Irrigation District to Lone Tree Mutual Water Company Conveyance Canal	$3-6,000,000	Costs spread over 1-2 years.
Project 6: Merced IRWM Region Climate Change Modeling	$250,000	Costs spread over 3 years.
Project 7: Merced Region Water Use Efficiency Program	$500,000	Costs spread over 1-2 years.
Project 8: Merced Groundwater Subbasin LIDAR	$150,000	Costs spread over 1-2 years.
Project 9: Study for Potential Water System Intertie Facilities from MID to LGAWD and CWD	$100,000	Costs spread over 1-2 years.
Project 10: Vander Woude Dairy Offstream Temporary Storage	$750,000	Costs spread over 1-2 years.
Project 11: Mini-Big Conveyance Project	$ 6-8,000,000	Costs spread over 5 years.
Project 12: Streamlining Permitting for Replacing Sub-Corcoran Wells	$75,000	Costs spread over 1-2 years.
Management Action 1 – Water Allocation Framework	TBD[2]	TBD
Management Action 2 – MSGSA Demand Reduction Program	$500,000 initial year cost $200,000 annual cost	First year costs to include development and initiation of demand reduction program. Does not include well installation costs. Does include analysis, policies and procedures adoption, establishing monitoring and reporting tools, conducting outreach. Costs to implement the program depend on level of enforcement required to meet allocation each year. Annual cost estimate includes program management.

[1] Estimates are rounded and based on full implementation years (FY2021 through FY2040). Different costs may be incurred in FY 2020 as GSP implementation begins. Costs are presented in year 2019 dollars.

[2] Costs of implementing the Water Allocation Framework will depend on how the framework is implemented and are too speculative to estimate until management action is further developed.

[3] This estimate will be updated once input from GSA staff received for anticipated GSA administrative and operating costs. (Merced cost estimate based on Prop 218 staff report estimate of GSA Operating costs.

[4] Existing programs include those identified in Chapter 4 Monitoring Networks, particularly monitoring programs for additional water quality, depletion of interconnected surface water, and subsidence.

7.10 IMPLEMENTING GSP-RELATED PROJECTS AND MANAGEMENT ACTIONS

Costs for the Projects and Management Actions are described in Chapter 6 of this GSP. Financing of the projects and management actions would vary depending on the activity. Potential financing for projects and management actions are provided in Table 7-3. though other financing may be pursued as opportunities arise or as appropriate. In future plan updates, the GSAs may develop additional management actions and revisit projects not included on the shortlist for this GSP. This includes projects on the running list described in Chapter 6.

Projects considered for implementation will also be evaluated for potential water quality impacts during the selection and implementation process.

Table 7-3: Funding Mechanisms for Proposed Projects and Management Actions

Project/Management Action Title and Type		Responsible Agency	Potential Funding Mechanism
Project 1: Planada Groundwater Recharge Basin Pilot Project	Recharge	All GSAs	DWR Grant Funding (grant awarded)
Project 2: El Nido Groundwater Monitoring Wells	Monitoring Water Quality	All GSAs	DWR Grant Funding (grant awarded)
Project 3: Meadowbrook Water System Intertie Feasibility Study	Conveyance	All GSAs	DWR Grant Funding (grant awarded)
Project 4: Merquin County Water District Recharge Basin	Recharge	MSGSA	IRWM Implementation Grant Program (Prop 1) Storm Water Grant Program (Prop 1)
Project 5: Merced Irrigation District to Lone Tree Mutual Water Company Conveyance Canal	Conveyance	MSGSA	MSGSA Operating Funds & Lone Tree Mutual Water Company Operating Funds Loans
Project 6: Merced IRWM Region Climate Change Modeling	Data Modelling	All GSAs	IRWM Implementation Grant Program (Prop 1) Storm Water Grant Program (Prop 1)
Project 7: Merced Region Water Use Efficiency Program	Conservation	All GSAs	IRWM Implementation Grant Program (Prop 1)
Project 8: Merced Groundwater Subbasin LIDAR	Data Modelling	All GSAs	IRWM Implementation Grant Program (Prop 1) Storm Water Grant Program (Prop 1)
Project 9: Study for Potential Water System Intertie Facilities from MID to LGAWD and CWD	Conveyance	MIUGSA, MSGSA	IRWM Implementation Grant Program (Prop 1)
Project 10: Vander Woude Dairy Offstream Temporary Storage	Recharge Storage	MSGSA	Private Funding Grants
Project 11: Mini-Big Conveyance Project	Conveyance	MSGSA	Grants
Project 12: Streamlining Permitting for Replacing Sub-Corcoran Wells	Regulatory	MSGSA	MSGSA Operating Funds
Management Action 1: Water Allocation Framework	Regulatory	All GSAs	Operating Funds per GSA
Management Action 2: MSGSA Demand Reduction Program	Reduced Groundwater Use	MSGSA	Operating Funds per GSA

7.11 GSP IMPLEMENTATION FUNDING

Implementation of the GSP is projected to range between $1.2M and $1.6M per year. Costs for projects and management actions are estimated to be an additional $22.9M in total, with costs for individual projects or management actions ranging between $75K to $8M in total. It is anticipated that most of these projects will be implemented within the first five years of GSP implementation. Development of this GSP was substantially funded through a Proposition 1 Sustainable Groundwater Planning Grant. The implementation of the GSP and future SGMA compliance will be a substantial and costly undertaking that will likely require GSAs to collect fees as well as seek additional outside funding. The Merced GSAs will develop a financing plan for the overall implementation of the GSP. Costs for GSP project implementation will be shared based on project beneficiaries. Costs of overall GSP administration are expected to be shared by the three GSAs consistent with the cost share in the MOU (Appendix A). Financing options under consideration include pumping fees, assessments, loans, and grants.

Prior to implementing any fee or assessment program, the GSAs would complete a rate assessment study or other analysis consistent with the regulatory requirements. On July 23, 2019, the Merced Subbasin GSA Governing Board adopted a Prop 218 landowner fee for all lands within the management area of the Merced Subbasin GSA in order to fund its administrative activities necessary for SGMA compliance.

8 REFERENCES AND TECHNICAL STUDIES

AMEC. (2008, July 29). Merced Groundwater Basin Groundwater Management Plan Update. *Merced Groundwater Basin Groundwater Management Plan Update, Merced County, CA*.

AMEC. (2013). *Salt and Nutrient Study (from MIRWMP).*

Ayers, R. S., & Westcot, D. W. (1985). *Water Quality for Agriculture.* Food and Agriculture Organization of the United Nations . Retrieved January 23, 2019, from http://www.fao.org/docrep/003/T0234E/T0234E00.htm#TOC

Bartow, J. A. (1985). *Map Showing Tertiary Stratigraphy and Structure of the Northern San Joaquin Valley, California.* Retrieved December 18, 2018, from https://pubs.er.usgs.gov/publication/mf1761

Bartow, J. A. (1991). *The Cenozoic Evolution of the San Joaquin Valley, California (USGS Professional Paper 1501).* USGS.

California Code of Regulations. (n.d.). Title 23, Divions 2, Chapter 1.5, Subchapter 2, Article 1 Section 354.18 (a).

California Geological Survey. (2010). Fault Activity Map of California. Retrieved from http://maps.conservation.ca.gov/cgs/fam/

California Water Boards. (2018, July 13). Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS). Retrieved October 29, 2018, from https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/PFOA_PFOS.html

Central Valley RWQCB. (2011). Order No. R5-2011-0006 Soil Remediation Waste Discharge Requirements for Track Four, Inc. (a Wholly Owned Subsidiary of Amsted Industries Inc.), and Merck & Co., Inc., Former Baltimore Aircoil Company Facility. Retrieved February 7, 2019, from https://www.waterboards.ca.gov/rwqcb5/board_decisions/adopted_orders/merced/r5-2011-0006.pdf

Central Valley RWQCB. (2016, July). The Water Quality Control Plan (Basin Plan) - Sacramento River Basin and San Joaquin River Basin.

City of Livingston. (2016). *2015 Urban Water Management Plan.*

City of Merced. (2017). *2015 Urban Water Management Plan.*

City of Merced Development Services Department. (2011). *Merced Vision 2030 General Plan.*

City of Merced. (n.d.). Code of Ordinances: Chapter 8.12 - Water Wells. Retrieved April 5, 2018

County of Madera. (2016, March 29). Chowchilla Subbasin - Modified Boundary Description.

Davis, G. H., Green, J. H., Olmsted, F. H., & Brown, D. W. (1959). *Ground-Water Conditions and Storage Capacity in the San Joaquin Valley California (USGS Water Supply Paper 1469).* USGS.

DWR & Reclamation. (2022). *Channel Capacity Report 2022 Restoration Year.* Retrieved from https://www.restoresjr.net/?wpfb_dl=2621

DWR. (2003). *California's Groundwater Bulletin 118.*

DWR. (2004). *Bulletin 118: San Joaquin Valley Groundwater Basin Merced Subbasin.*

DWR. (2010, December). Groundwater Elevation Monitoring Guidelines. Retrieved from https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/CASGEM/Files/CASGEM-DWR-GW-Guidelines-Final-121510.pdf

DWR. (2016a). *Best Management Practices for the Sustainable Management of Groundwater Water Budget.*

DWR. (2016b, December). *Best Management Practices for the Sustainable Management of Groundwater: Monitoring Networks and Identification of Data Gaps.*

DWR. (2016c). Groundwater Sustainability Agency Frequently Asked Questions. Retrieved May 3, 2018, from https://www.water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Groundwater-Sustainability-Agencies/Files/GSA-Frequently-Asked-Questions.pdf

DWR. (2016d). *Groundwater Sustainability Plan (GSP) Annotated Outline.* Sacramento, CA.

DWR. (2016e). *Preparation Checklist for GSP Submittal.* Sacramento, CA.

DWR. (2017a, November). *Best Management Practices for the Sustainable Management of Groundwater: Sustainable Management Criteria (Draft).*

DWR. (2017b). California Aqueduct Subsidence Study. Retrieved October 30, 2017, from https://water.ca.gov/LegacyFiles/groundwater/docs/Aqueduct_Subsidence_Study-FINAL-2017.pdf

DWR. (2017c). *Chronological Reconstructed Sacramento and San Joaquin Valley Water Year Hydrologic Classifications Indices.* Retrieved from http://cdec.water.ca.gov/reportapp/javareports?name=WSIHIST

DWR. (2018a). *Guidance for Climate Change Data Use During Groundwater Sustainability Plan Development.*

DWR. (2018b). *SGMA Climate Change Resources*. Retrieved from https://data.cnra.ca.gov/dataset/sgma-climate-change-resources

DWR. (2019). *SGMA Data Viewer*. Retrieved from https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

DWR. (2020). *Channel Capacity Report, 2020 Restoration Year, Appendix B - Evaluation of the Effects of Future Subsidence on Capacity up to 2,500 cfs in Reach 4A and Middle Eastside Bypass.* Retrieved from https://www.restoresjr.net/wp-content/uploads/2020/02/Appendix-B_508.pdf

DWR. (2022). *Statement of Findings Regarding the Determination of Incomplete Status of the San Joaquin Valley – Merced Subbasin Groundwater Sustainability Plan.* Sacramento. Retrieved January 28, 2022, from https://sgma.water.ca.gov/portal/service/gspdocument/download/7782

DWR California Data Exchange Center. (n.d.). Retrieved February 2, 2019, from https://cdec.water.ca.gov/

Elam, T. (2012, August 1). *The San Joaquin Valley Through Time*. Retrieved from Buena Viesta Museum of Natural History & Science, Bakersfield: http://www.sharktoothhill.org/index.cfm?fuseaction=news_full_view&news_id=7

Elliott, A. L. (1984, August). Groundwater Conditions and Shallow Test-Well Information in the Eastern Half of Merced County, California 1967-82. *U.S. Geological Survey Water Resources Investigations (Report 83-4081)*.

ESJWQC. (2015, June). Groundwater Quality Trend Monitoring Workplan: Phase I, Monitoring Design Approach.

ESJWQC. (2016, January). Groundwater Quality Trend Monitoring Program: Phase II, Preliminary Determination of Specific Wells for GQTM.

ESJWQC. (2018, February). Groundwater Quality Trend Monitoring Workplan: Phase III. *Specific Network Wells*. East San Joaquin Water Quality Coalition. Retrieved from https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/water_quality/coalitions_submittals/east_sanjoaquin/ground_water/2018_0302_esj_gqtmp_ph3.pdf

FERC. (2015). *Final Environemntal Impact Statement for Hydropower Licenses 0259 (Merced River Hydroelectric Project—FERC Project No. 2179-043–California and Merced Falls Hydroelectric Project—FERC Project No. 2467-020–California).*

Lees, M., Knight, R., & Smith, R. (2022). Development and application of a 1D compaction model to understand 65 years of subsidence in the San Joaquin Valley. *Water Resources Research, 58*(6), 25. doi:10.1029/2021WR031390

Luhdorff and Scalmanini Consulting Engineers. (2016). *Region 5: Updated Groundwater Quality Analysis and High Resolution Mapping for Central Valley Salt and Nitrate Management Plan.*

Madera County. (1995). *Madera County General Plan.*

Merced Area Groundwater Pool Interests (MAGPI). (2014). *CASGEM Monitoring Plan.*

Merced County. (2013). *2030 Merced County General Plan.*

Merced County. (2015). *Well Construction, Destruction, Mining, and Export Application/Permit User Guide.* Retrieved April 5, 2018, from http://www.co.merced.ca.us/DocumentCenter/View/10905

Merced County Department of Agriculture. (2017). *2017 Report on Agriculture.* Retrieved April 18, 2019, from https://www.co.merced.ca.us/ArchiveCenter/ViewFile/Item/785

Merced County Department of Public Health, Division of Environmental Health. (2018). *Adverse Groundwater Quality by Area in Merced County.*

Merced County. (n.d.). Merced County Code. *Chapter 9.28 - Wells*. Retrieved April 5, 2018, from http://www.qcode.us/codes/mercedcounty/view.php?topic=9-9_28&frames=on

Merced Subbasin GSA, MIUGSA, Turner Island Water District GSA-#1. (2017, October 13). Memorandum of Understanding.

Merced Subbasin GSA, MIUGSA, Turner Island Water District GSA-#1. (2018, January 8). Notification of Intent to Develop a Groundwater Sustainability Plan for Merced Subbasin.

MID. (2013). *Agricultural Water Management Plan.*

MID. (2016, July 5). *Agricultural Water Management Plan.* Retrieved from http://www.water.ca.gov/wateruseefficiency/sb7/docs/2016/Merced%20ID%202015%20AWMP.pdf

MIUGSA. (2017). Memorandum of Understanding Forming the Merced Irrigation-Urban Groundwater Sustainability Agency.

MLJ Environmental. (2019, April 1). Quality Assurance Project Plan for Groundwater Monitoring by the ESJWQC in Compliance with the Central Valley Monitoring Collaborative QAPrP.

Moran, T., & Belin, A. (2019). A guide to Water Quality Requirements Under the Sustainable Groundwater management Act. Retrieved from https://purl.stanford.edu/dw122nb4780

MSGSA. (2016). Joint Powers Agreement Creating the Merced Subbasin Groundwater Sustainability Agency.

Pacific Municipal Consultants. (2000). City of Atwater General Plan. Retrieved April 6, 2018, from http://www.atwater.org/dept_communitydevelopment.html#5

Page, R. W. (1977). *Appraisal of Ground-Water Conditions in Merced, California, and Vicinity.* USGS Open-File Report 77-454.

Page, R. W. (1986). *Geology of the Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections.* USGS Professional Paper 1401-C.

Page, R. W., & Balding, G. O. (1973). *Geology and Quality of Water in the Modesto-Merced Area, San Joaquin Valley, California, with a Brief Section on Hydrology.* USGS Water-Resources Investigations Report 73-6.

Quad Knopf, Inc. (1999, December). Livingston General Plan.

Rantz, S. (1982a). Measurement and Computation of Streamflow: Volume 1. Measurement of Stage and Discharge. Retrieved from https://pubs.usgs.gov/wsp/wsp2175/pdf/WSP2175_vol1a.pdf

Rantz, S. (1982b). Measurement and Computation of Streamflow: Volume 2. Computation of Discharge. Retrieved from https://pubs.usgs.gov/wsp/wsp2175/pdf/WSP2175_vol2a.pdf

Reclamation. (2011). *San Joaquin River Restoration Project - Geodetic Network; GPS Survey Report.* Sacramento. Retrieved from https://www.restoresjr.net/?wpfb_dl=1331

Reclamation. (2016). *Draft Environmental Assessment/Initial Study: Water Year 2016-2026 Transfer and Exchange from Madera Irrigation District and Chowchilla Water District to the Red Top Area.*

RMC Water and Environment. (2013a). *Merced Integrated Regional Water Management Plan.*

RMC Water and Environment. (2013b). *Groundwater Recharge Feasibility Study (part of MIRWMP).*

RMC Water and Environment. (2015). *Creating and Opportunity: Groundwater Recharge through Winter Flooding of Agricultural Land in the San Joaquin Valley.*

Sneed, M., Brandt, J. T., & Solt, M. (2018). *Land Subsidence along the California Aqueduct in West-Central San Joaquin Valley, California, 2003-10.* U.S. Geological Survey Scientfic Investigations Report 2018–5144. Retrieved December 28, 2021, from https://doi.org/10.3133/sir20185144.

SWRCB - GeoTracker. (n.d.). CASTLE AIR FORCE BASE (T0604719389). Retrieved October 30, 2018

SWRCB. (2006, May). CCR Title 22 Division 4 Chapter 15 Article 16: Secondary Water Standards. State Water Resources Control Board.

SWRCB. (2017, November). Groundwater Information Sheet: Hexavalent Chromium. Retrieved January 29, 2019, from https://www.waterboards.ca.gov/gama/docs/coc_hexchromcr6.pdf

SWRCB. (2018, October). Maximum Contaminant Levels and Regulatory Dates for Drinking Water U.S. EPA vs California. Retrieved from https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/ccr/MCLsEPAvsDWP-2018-10-02.pdf

Appendices with updates include:
>Appendix B - new meeting minutes appended
>Appendix F - replaced in entirety with updated figures

USGS. (2017, January 19). Central Valley Extensometer Data (Excel). Retrieved June 8, 2018, from https://ca.water.usgs.gov/land_subsidence/california-subsidence-measuring.html

Wilde, F. (2015). *National Field Manual for the Collection of Water-Quality Data.* USGS. Retrieved from https://water.usgs.gov/owq/FieldManual/compiled/NFM_complete.pdf

Woodard & Curran. (2018a). Merced Basin Groundwater Sustainability Stakeholder Engagement Strategy.

Woodard & Curran. (2018b, March 23). *Model Update Technical Memorandum.*

Woodard & Curran. (2019, September). Merced Water Resources Model (MercedWRM).

APPENDIX A: MERCED SUBBASIN GSAS MEMORANDUM OF UNDERSTANDING

APPENDIX B: COMBINED MEETING MINUTES FROM COORDINATING COMMITTEE, STAKEHOLDER ADVISORY COMMITTEE, AND PUBLIC MEETINGS

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: March 26, 2018 at 9:30 AM

LOCATION: Merced County Admin Building – 2222 M St, 3rd Floor Conference Room 310, Merced, CA

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☐	Daniel Chaves	Merced Irrigation-Urban GSA
☐	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☒	Rodrigo Espinoza	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Overview of Sustainable Groundwater Management Act (SGMA) Groundwater Sustainability Plan (GSP) requirements
   - Woodard & Curran (consultant) provided a review of SGMA GSP requirements and discussed coordination with adjacent basins.
2. Overview of work completed to date and the scope of work for the Merced GSP development
   - Woodard & Curran provided an update on work completed to date, including modeling work that was completed as part of SGMA Readiness and Stressed Basins efforts. The basin groundwater model has been validated and calibrated.
   - DWR recommended full funding for Merced's GSP preparation and 3 Severely Disadvantaged Communities (SDAC) projects. Recommendations are currently out for public comment.
     i. Next Step: DWR expected to finalize recommendation soon and begin contracting.
3. GSP development process / timeline / roadmap
   - Woodard & Curran provided an overview of the GSP roadmap and timeline. The GSP needs to be finished in 18 months because the 3 GSAs need to adopt by Jan 31, 2020.

The meeting handout (Roadmap) and slides provide details on 13 scope tasks and anticipated process for plan development.

4. Discuss the stakeholder outreach approach
    - About 45 applications were received for the Stakeholder Committee. Draft committee list was formed by working with staff from each of GSAs.
    - ACTION: CC unanimous recommendation to approve the Stakeholder Committee; each GSA will take this list back to their board to approve.
5. Discuss DWR's SGMA Technical Support Services (TSS) opportunity
    - Woodard & Curran provided a summary of the TSS opportunity. The types and locations of monitoring will need to be identified to request services from DWR. The group discussed multiple options and criteria for potential well locations. The goal is to develop 2-3 ideas to discuss with DWR and move forward with the most appealing option.
    - ACTION: CC unanimous approval to pursue TSS funds with caveat team will come back to CC with specifics, time permitting.
6. Confirm Coordinating Committee schedule for in-person meetings and calls
    - The Committee agreed to set a standing meeting time for the fourth Monday of the month from 1:30pm to 3:30pm. The next meeting would be April 23, 1:30pm to 3:30pm (Note: the May meeting would be moved to May 29 from 1:30pm to 3:30pm due to the Memorial Day holiday).
7. Opportunity for public comment on items not on agenda
    - There was a request for information on the grant application for the 3 SDAC projects. Grant information is available through the DWR website and a link will be added to the Merced SGMA website (www.MercedSGMA.org)
8. Next steps and adjourn

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: April 23, 2018 at 1:30 PM

LOCATION: Sam Pipes Room, Civic Center/City Hall, 678 W 18th Street, 1st Floor, Merced, CA

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☐	Daniel Chaves	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Approval of minutes for March 26, 2018 meeting
   - Minutes were unanimously approved
2. Stakeholder Committee Progress and Update
   - First Stakeholder Committee Meeting will be 5/29/2018
3. Overview of work completed to date related to basin conditions
   - Woodard & Curran provided additional information on work completed to date as part of SGMA Readiness and Stressed Basins efforts:
     i. Merced Water Resources Model
     ii. Monitoring Plan – Merced County
4. Introduction to Terminology:
   - Woodard & Curran provided an overview of the key terminology for SGMA, including the relationships between Sustainability Indicators, Undesirable Results, Minimum Thresholds, Measurable Objectives, Interim Milestones, Margin of Operational Flexibility, and Monitoring Network
5. Preliminary Discussion on Undesirable Results

The group brought up the following potential undesirable effects to consider for each of the Sustainability Indicators:

- Chronic Lowering of Groundwater Levels
    i. Groundwater levels were noted to be an important indicator for several other Sustainability Indicators due to interconnectedness and easier visibility
    ii. Reduced specific pumping capacities at deeper wells
    iii. Question for technical team: how much emphasis will there be on recording or differentiating between static levels vs pumping levels?
- Reduction in Groundwater Storage
    i. Groundwater storage was noted to be less important due to a relatively large storage capacity – undesirable effects from reduced storage will be measured primarily in chronic lowering of groundwater levels
    ii. Might need to consider storage changes above vs below the Corcoran Clay separately
- Seawater Intrusion
    i. Does not apply to the Subbasin; salinity will be considered in degraded water quality
- Degraded Water Quality
    i. Crop impacts
    ii. Nonpoint sources, e.g. contaminant plumes in the cities
    iii. Water quality above vs below the Corcoran Clay
    iv. Groundwater pumping may be a positive action if trying to contain a specific localized groundwater quality concern
- Land Subsidence
    i. Increased conveyance costs of irrigation water
    ii. Possible changes in direction of flow in unconfined aquifer
    iii. Cost of injecting water as a tool to slow subsidence
    iv. Look into research on lagging effect of subsidence after groundwater pumping
- Depletion of Interconnected Surface Water
    i. CC members had no additions to list presented in slide

Other discussion points included:

- Substitute Environmental Document (SED) for Bay-Delta Plan unlikely to be finalized during GSP development; GSP will be developed according to current requirements but changes can be incorporated later if needed
- Shallow domestic wells are unlikely to be useful for groundwater level measurements
- The LeGrand area was identified as a key indicator region that has historically been more sensitive to groundwater level changes, but may have limited monitoring data available (additional investigation needed)

6. Discuss DWR's SGMA Technical Support Services (TSS) opportunity

    - Woodard & Curran provided an update on the TSS opportunity based on the 4/20/18 conference call with DWR

- Likely that Delta-Mendota Subbasin will site a monitoring well on their side of the Subbasin boundary which will be beneficial for Merced Subbasin as well, leaving Merced Subbasin with an opportunity to request a monitoring well in a different location in the Subbasin (potentially in the LeGrand region)

7. Discuss Leadership Counsel for Justice and Accountability Request for Letter of Support

   - Leadership Council for Justice & Accountability has applied for SGMA funding for DAC outreach in the San Joaquin Valley, and DWR has requested Leadership Counsel obtain letter of support from the GSPs in those areas (including Merced)
   - CC chose to take no action until additional information is provided by the group on their workplan and how it will be coordinated with the work Self Help Enterprises will conduct in the subbasin

8. Opportunity for public comment on items not on agenda

   - No questions

9. Next steps and adjourn

   - CC members were provided with maps of monitoring wells in 1992, 2015, and present for their respective GSA and given an assignment to indicate wells or regions of wells known to experience undesirable effects for each of the six Sustainability Indicators

   - Hicham ElTal provided an update on the first interbasin meeting between Turlock and Merced, with a next meeting tentatively June 18, 2018

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: May 29, 2018 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☒	Rodrigo Espinoza	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Approval of minutes for April 23, 2018 meeting
   - Minutes were unanimously approved
2. Stakeholder Committee (SC) Update
   - Unanimous approval to add City of Livingston representative Alex McCabe to the SC (was left off initial list due to administrative error)
   - Samantha Salvia provided an update on the first SC meeting, held earlier in the day.
     i. First SC Meeting was held morning of 5/29/2018, attended by 20 members.
     ii. SC members expressed interest in regular updates on interbasin coordination as well as meeting time allocated for educational topics including water quality related to SGMA and Bay Delta Plan. These items will be worked into future meetings on an ongoing basis.
     iii. SC members requested ability to designate alternates when they are unable to attend a meeting. CC members were open to alternates provided they represent the same interests as the SC member. Consultant team was directed to put together a

proposal for Stakeholder Committee procedures for attendance and designation of alternates.

- Hicham ElTal reported that UC Merced has offered to present on effective communication of water topics.
    i. CC group agreed to direct consultant team to schedule an optional "brown bag" lunchtime presentation for both SC and CC members in June or July.

3. Presentation by Woodard & Curran on GSP Development

- Charles Gardiner (Catalyst Group) provided an update on the Stakeholder Outreach Plan
    i. This is envisioned as a living document and will be updated roughly quarterly.
    ii. Any additional comments are requested from CC members by June 8.
- Dominick Amador (Woodard & Curran) gave a presentation on the Merced Water Resources Model (MercedWRM).
    i. The MercedWRM historical and existing conditions baseline was developed through the MAGPI group and is available to support GSP implementation.
    ii. W&C is currently incorporating additional data from Turner Island WD.
    iii. Additional discussion by the CC is needed to refine the assumptions required for development a projected conditions baseline.
    iv. Bob Kelley (Stevinson Water District) requested the committee consider extending the hydrologic period though the 2017 water year to capture the effects of drought recovery.
- Samantha Salvia (Woodard & Curran) provided a summary of feedback on the Undesirable Results Exercise from the CC members of all 3 GSAs

4. Update on DWR's SGMA Technical Support Services (TSS) opportunity

- Hicham ElTal (Merced Irrigation District) reported that discussions with Chris White (Central California Irrigation District) have continued re: installing a monitoring well in the southwest corner of the Subbasin. A landowner has volunteered a site but is requesting well characteristics information which Hicham is working on providing.
- Next steps include locating a site for the desired monitoring well in the Le Grand area.
- Amanda Peisch from DWR attended the 5/29/2018 SC meeting and indicated that limited funds are available in this first TSS round. More funds may be available in the future and will be dependent on state budget because source is the General Fund.

5. Discuss Leadership Counsel for Justice and Accountability Request for Letter of Support

- Amanda Monaco (Water Policy Coordinator at Leadership Counsel for Justice and Accountability) provided a description of her organization's work with Disadvantaged Communities and how it fits into GSP development in the Merced Subbasin.
- CC directed staff to write a letter of support for Leadership Counsel.

6. Opportunity for public comment on items not on agenda
   - No questions
7. Next steps and adjourn

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: June 25, 2018 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Approval of minutes for May 29, 2018 meeting.
   - Minutes were unanimously approved
2. Stakeholder Committee (SC) Update
   - Alyson Watson (Woodard & Curran) provided an update on the second SC meeting held earlier in the day. SC members were provided a background on sustainability terms and had open discussion about the definition of sustainability and how it applies to the Subbasin.
3. Plan Area and Authority
   - Alyson Watson provided an overview of what the Plan Area and Authority chapter includes, which will be provided for review by Coordinating Committee (CC) members at the end of June to return with comments by July 23 meeting.
4. Minimum Thresholds
   - MID likely has 1 well in area in eastern portion of the Subbasin that could be added to analysis., with 1 additional possibly near Fahrens Creek. Identified need to work with Planada CSD and others to get additional data in this eastern area.

- Some dry wells in 2015 were only 25 feet deep, but it may not be reasonable to say the threshold is 25 ft in these spots.

- Ron Meyers was identified as a pump tester who may have more detailed well completion information than some of the agencies for areas with private wells. Nic Marchini will provide Ron's contact info.

- Nic Marchini will look at static water level records back to 2012 and try to put together a summary spreadsheet to fill some data gaps.

- Hicham ElTal noted that in the McSwain area, some water is being produced from below a hardpan (not related to Corcoran Clay). In 2008, some wells dropped 40-50 feet. This one example out of several other special situations where shallow groundwater wells may not be useful for regional measurement and analysis.

- Hicham ElTal indicated that agencies in neighboring Subbasin may have more information about trucked water program and should be contacted.

- CC members discussed the definition of Groundwater Dependent Ecosystems (GDEs) and the need for ground-truthing the dataset provided by The Nature Conservancy (TNC)/DWR.

5. Current Conditions Baseline

- Ali Taghavi (Woodard & Curran) gave a presentation on current conditions baseline assumptions and results so far.

- Hicham ElTal and Ken Elwin indicated the possibility of using the latest 2012 MID dataset in the Water Resources Management Plan, prepared by CH2, for Merced and McSwain area to inform assumptions for parks, cemeteries, backyards, etc. within City of Merced boundary.

- Bob Kelley requested to rename "Change in Storage" to "Deficit" or "Overdraft" in Groundwater Budget graphics.

- A table summarizing average rainfall and example hydrologic years will be provided to CC members as a data request for suggested changes/updates.

	Average rainfall	Sample Years
Wet year		
Above normal		
Below normal		
Dry		
Critical		

6. Future Conditions

- Woodard & Curran shared that there is a need for additional information about future baseline assumptions from CC members.

- Bob Kelley shared that there is some information available about dairies, but it is not very detailed.

- Ken Elwin and Justin Vison will provide assumptions about other future conditions.
- Three assumption areas were identified for additional input:
    i. Urban: 2013 level of water usage (Will conservation measures last long-term? What can each municipality tolerate?)
    ii. Agriculture Surplus Water (Same cropping pattern with less water? What future cropping mix changes will increase or decrease water usage?)
    iii. Interbasin Coordination (How much water is escaping from Merced Subbasin to other subbasins?)
- CC members were requested to review and provide comments on projected water supply and demand information, agricultural land use, and industrial users on private wells.
- Woodard & Curran will summarize for Bob Kelley the historical information that has already been provided.

7. Coordination with Neighboring Basins Update
    - Staff have provided edits on Interbasin agreement back to Chowchilla Subbasin.
    - 2 meetings have been held so far with representatives from Turlock Subbasin to coordinate on GSP development status, data, etc.
    - Staff are trying to schedule a meeting with Delta-Mendota Subbasin, with preference to coordinate with GSAs preparing GSPs adjacent to Merced Subbasin.
    - CC members directed staff to represent them at the Interbasin Coordination meetings.
8. Update DWR's SGMA Technical Support Services (TSS) opportunity
    - Hicham ElTal (Merced Irrigation District) is still coordinating with CCID on federal and state funding for monitoring wells for subsidence. He is also still coordinating with a potential landowner to site an additional monitoring well south of LeGrand.
    - Amanda Peisch (Department of Water Resources) provided a brief update that four other TSS applications have been submitted so far. The $2-3M drilling contract is open, but DWR is hoping some other application requests outside of drilling would be handled through services provided by existing DWR staff. While funding is not exactly first-come first-serve, it is still limited and will be decreasing soon.
9. Opportunity for public comment on items not on agenda
    - A question was raised about whether GDEs will be included in future water budget projections:
        i. Not explicitly, but they are included in evapotranspiration (ET) from future land use.

- Water demand for for maintenance of natural spaces will be included through UWMPs (for city-supplied spaces) with some already in model. Refuge water release requirements from MID are already built into the model.

10. Next steps and adjourn

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: July 23, 2018 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Approval of minutes for June 25, 2018 meeting.
   - Minutes were unanimously approved
2. Stakeholder Committee (SC) Update
   - Alyson Watson (Woodard & Curran) provided an update on the third SC meeting held earlier in the day. SC members had questions, discussion, and clarifications on assumptions for the groundwater model
   - The Coordinating Committee (CC) gave feedback on the Stakeholder Communication Workshop with UC Merced
     - Framing of the content was interesting, but how questions were posed could be improved
     - Good points were made by participants on key basin issues
3. Presentation by Woodard & Curran on GSP development
   - Plan area and authority
     - Some comments were received via email. CC members were asked to please let the Woodard & Curran team know if they plan to provide comments
   - Minimum thresholds

- Alyson Watson (Woodard & Curran) provided an overview. Technical work feeds into the policy decisions and informs what the basin will try to accomplish: identifying Undesirable Results (URs), Minimum Thresholds, and Measurable Objectives
- Groundwater Elevations
  - A list of the 6 sustainability indicators was provided. As previously discussed, seawater intrusion and storage are not considered relevant for the Merced Subbasin. Minimum thresholds are to be set where URs occur (e.g. lowest groundwater levels without UR)
  - Establishing what is undesirable/unreasonable is a policy decision. If a decision is made that an issue is significant and unreasonable that is occurring now, we can use as a 2015 data point
- Alyson Watson described the Minimum thresholds approach analysis for Corcoran clay. The approach is based on the information available for above, below, and outside the Corcoran clay. The consultant team's proposed approach looked at the CASGEM monitoring wells that are also located above the Corcoran clay and took into account the Tanked Water Program area. During the drought there were domestic wells that went dry in this area, which could be indicative of an undesirable result unless those wells have been deepened and the issues that occurred at those groundwater elevations have been addressed
- Alyson Watson also explained the minimum thresholds approach for outside the Tanked Water Program impacted area
  - An initial 20% buffer was established for the model to give an example of what this would look like in terms of thresholds. It is not suggested to have a threshold for every well, but to consider where the Tanked Water Program is and if there are some negative, undesirable results there
- Discussion and comments on the minimum thresholds approach were as follows:
  - Comment from Woodard & Curran (W&C): the question that must be asked is what undesirable results are occurring? For example, if all of the Tanked Water Program wells have been replaced, does this represent an undesirable result?
  - Comment from CC: there is not much data, nor many wells in the foothills of the Subbasin
  - Comment from CC: in selecting monitoring wells, it will be important to consider the age of the well and its anticipated additional life in terms of compliance
    - Comment from W&C: the CASGEM wells were selected because they have recorded dates that can be checked
  - Clarification given for question on adaptive management: a buffer is applied for operational flexibility. This process first considers well water for the lowest domestic wells and then looks at what happens when applying a 20% buffer
  - Comment from CC: there should be more substantiation behind the 20% buffer selection
  - Comment from W&C: the next step is to look at a 10% or 20% buffer, compare this to the data that the GSAs have, and figure out what is reasonable
- Water Quality

        - Question was asked whether there are levels that could trigger issues with water quality. Response from W&C: this is very site-specific, and requires further work with staff from local agencies to understand this
        - Alyson Watson (W&C) gave a brief introduction to the CV-SALTS (the Central Valley Salinity Alternatives for Long-Term Sustainability) initiative and the ILRP (Irrigated Lands Regulatory Program).
        - Comment from CC: a data point on the TDS (Total Dissolved Solids) map "Average TDS Concentration BELOW Corcoran Clay (2000 – 2016)" was identified as surprising
        - There was a brief discussion on salinity issues. Input from Alyson Watson (W&C): the challenge is that relatively few actions can be taken to address migration of salinity. The priority for the GSP is to identify undesirable results and how these are happening and prevent further impacts
        - Input from Jim Blanke (W&C): there are some water quality issues that cannot be control (e.g. naturally occurring constituents). There are also existing programs that address some of these constituents
    - Land subsidence
        - GW levels can be used as a proxy, or the GSP can use a rate of subsidence. However, even if all groundwater users in basin stopped pumping it is not known whether subsidence will continue. It is recommended by the consultant team to use this proxy and to ensure the GSP uses the same measurement approach as neighboring subbasins
        - Comment from CC: in the 1960s there was subsidence, but fewer wells and a high water table. The reasons for this are not well understood. Therefore, the GW level proxy might be a safer option
    - Interconnected Surface Water
        - Alyson Watson and Dominick Amador (W&C) provided a brief overview of the interconnected surface water modelling
        - The model shows a segment north west of San Joaquin River and Merced River as an area of interest. The model will need to be adjusted to consider additional parameters for dry conditions
        - It is possible to look at how shallow wells have changed over time relative to stream losses. However, there are not many wells and there is fluctuation
        - The next step is to consider what are the undesirable results. Further work with be needed to determine GW conditions that are influencing low flows

a. Hydrogeologic conceptual model overview
    - This item was tabled to the next meeting due to lack of time

b. Current conditions baseline, projected water budget, and sustainable yield
    - Alyson Watson (Woodard & Curran) described how continued water use over 50 years will affect the water budget. The underlying assumptions are being refined
    - The sustainable yield is also being developed for discussion at the next meeting

4. Public Outreach update

- Plans for upcoming August 2 Public Meeting were discussed. Meeting materials are on the website

5. Coordination with Neighboring Basins
   - Hicham ElTal (Merced Irrigation District) reported there are upcoming meetings to sign agreements with Chowchilla and he is still working to set up a meeting with Delta-Mendota
6. Update DWR's SGMA Technical Support Services (TSS) opportunity
   - Hicham ElTal (Merced Irrigation District) provided an update. For Delta-Mendota, it might be possible to have two monitoring wells. He might be able to reach out to Chowchilla as well. Hicham also contacted DWR regarding Grant Agreement funding. DWR are not as concerned about whether the GSAs will receive funds, but that it might take longer for funds to be received
7. Public comment
8. Next steps and adjourn
   - Reminder given that Aug. 2nd is next Public meeting

Next Regular Meeting
August 27, 2018 at **1:30 p.m.**
Merced, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org

Action may be taken on any item
Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: August 27, 2018 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☐	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
2. Approval of minutes for July 23, 2018 meeting.
   a) Minutes were unanimously approved
2. Stakeholder Committee (SC) update
   a) Alyson Watson (Woodard & Curran) provided an update on the fourth SC meeting held earlier in the day. SC members had questions, discussion, and clarifications on methodology for setting minimum thresholds, particularly for groundwater elevations.
3. Presentation by Woodard & Curran on GSP development
   a) Minimum Thresholds for Groundwater Elevations
      i. Alyson Watson (Woodard & Curran) presented the updated proposed methodology for calculating minimum thresholds for groundwater elevations at existing CASGEM wells.
      ii. Coordinating Committee members thought the updated methodology made sense. DWR data on domestic wells is likely to be poor, so using a 25th percentile shallow value sounds appropriate.
      iii. Public Comment: Timing of spring/fall measurement of CASGEM wells may not align with seasonal peak domestic well pumping (e.g. domestic wells may be temporarily dewatered in August, which wouldn't be caught by March/October monitoring).

iv. The “buffer”/”total range” for the elevation threshold analysis is including the impacts of seasonality and may want to consider fall to fall or spring to spring comparison.

v. Question: Should we use threshold setting results to directly identify additional monitoring locations? Answer: Our approach will be to determine storage changes through the sustainable yield process and then use the results to evaluate minimum thresholds and monitoring needs.

vi. In the gap area(s), Woodard & Curran will be evaluating other non-CASGEM wells in the database to identify any with (1) enough historical data and also that (2) meet requirements to be used (have completion depth, etc.). A separate challenge is that thresholds for newly constructed monitoring wells may take several years to determine a threshold (e.g. time needed to develop historical data).

1. Marco Bell (Merced Irrigation District [MID]) indicated that an update will be available in approximately 1-2 months about additional monitoring wells MID is working on adding or selecting from existing wells to fill CASGEM gap areas as identified in the Merced Subbasin CASGEM monitoring plan.

2. Request: Hicham ElTal (MID) requested standing agenda time to be added to future meetings to provide an update on CASGEM program status.

vii. Shallow school district wells were identified as a potential additional indicator for the groundwater threshold analysis. Woodard & Curran will start by contacting the Office of Education to obtain information about these wells for incorporation into the analysis.

b) Hydrogeologic Conceptual Model (HCM)

i. Alyson Watson (Woodard & Curran) provided an overview of the HCM section of the GSP and some example maps that will be included in the section writeup that will be provided for CC member review in the next few months.

ii. CC Comment: 3D renderings or cross sections need to include both a vertical and horizontal scale to distinguish vertical exaggeration or include a non-exaggerated version.

c) Projected Water Budget and Sustainable Yield

i. Alyson Watson (Woodard & Curran) provided an update to assumptions and results of the projected conditions baseline groundwater budget and sustainable yield groundwater budget.

ii. Question: On the projected conditions baseline budget, why does net deep percolation not change significantly? Answer: Right now, it doesn’t take into account efficiency changes since it is a baseline under projected conditions, but we would expect some decrease under other scenarios.

iii. Question: What are main assumptions in first 25 years (2015-2040) of the sustainable yield groundwater budget? Answer: No specific decisions on assumptions were made on how we will get to sustainable conditions in 2040, but for the purposes of modeling the end-result or goal, reducing agricultural land was used as a model input.

iv. Question: Under the 25-year projected sustainable yield, were assumed model condition changes modeled as front- or back-loaded in the timeline? Answer: This discussion and decision for implementation of projects and management actions will come later in the GSP process. Likely we will design it to be a smooth or back-loaded process to account for expected changes from SED or other factors.

d) Data Management Approach and DMS Demo

i. Jeanna Long (Woodard & Curran) provided a description of the data management system (Opti), including a short demo of the existing tool.

ii. Question: Will data be available to the public? Answer: The GSAs will decide, but the flexibility is there to make certain or all parts publicly available.

4. Public Outreach Update

   a. Alyson Watson (Woodard & Curran) provided a summary of discussion and comments recorded during the August 2 public workshop presentation.

5. Coordination with neighboring basins

   a) No update on Turlock right now, but meetings continue to coordinate on milestones. (Reminder: Turlock is on a different SGMA schedule that has a completion deadline 2 years after Merced).

   b) Debbie Liebersbach (Turlock Irrigation District) has met with Delta-Mendota representatives to start coordination efforts. Currently Turlock and Delta-Mendota Subbasin are discussing development of a resolution or similar document which will be shared with Merced when ready.

      i. Woodard & Curran will be setting up a meeting with Delta-Mendota soon to start coordination with the two GSPs adjoining the Merced Subbasin.

   c) A preliminary meeting was held with Chowchilla staff to begin coordination on modeling.

6. Update DWR's SGMA Technical Support Services (TSS) opportunity

   a) Hicham ElTal (MID) is waiting for a meeting to be set up by DWR to discuss timing of expected funding for Merced Subbasin project(s). Woodard & Curran continues to move the contract agreement forward with DWR and is currently waiting to hear back from DWR on the latest round of comments.

7. Public comment

   a) No comments.

8. Next steps and adjourn

Next Regular Meeting
September 24, 2018 at 1:30 p.m.
Merced, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org

Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: September 24, 2018 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☒	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
2. Approval of minutes for August 27, 2018 meeting.
   a) Minutes were unanimously approved
3. Stakeholder Committee (SC) update
   b) Alyson Watson (Woodard & Curran) provided an update on the fifth SC meeting held earlier in the day. SC members had questions, discussion, and clarifications on updated methodology for groundwater elevation minimum elevations, plus projected water budget and sustainable yield.
4. Presentation by Woodard & Curran on GSP development
   a) Minimum Thresholds Update
      i. Groundwater Elevations
         1. Alyson Watson (Woodard & Curran) provided an update to the methodology of setting minimum thresholds for groundwater elevations (primarily the addition of CASGEM voluntary monitoring well locations and use of Merced County domestic well database related to undesirable results).
         2. Public question: What are the ranges of domestic well depths beyond the shallowest? Are there outliers for other domestic wells if the minimum threshold is the same as the shallowest domestic well? Answer: This is something we'll be

looking at more closely when we get farther into the process of selecting a smaller number of monitoring locations.

3. Question: How did you choose a 3-mile radius for domestic wells? Answer: This is a balance between being locally representative and capturing enough domestic wells per monitoring location to be statistically representative.

ii. Water Quality

1. Alyson Watson (Woodard & Curran) provided an overview of data analysis in progress for TDS and contaminated sites, demonstrating that there are large data gaps for TDS with depth.
2. Public comment: Try interviewing drillers in the area – they tend to have a good sense of at what depth high salinity is found.

b) Projected Water Budget and Sustainable Yield

i. Alyson Watson (Woodard & Curran) provided a reminder on the assumptions and results of the projected conditions baseline groundwater budget and update to the results of sustainable yield groundwater budget.

ii. Public question: Why was a 25 year implementation period used? Answer: The model's historical period is from 1995-2015 and SGMA compliance is required in 2040, so the implementation period ends up being 2015-2040 (25 years).

iii. Public question: What happens if there's a long-term drought immediately and something like 30% of domestic wells go dry (out of ordinary)? Answer: The Minimum Thresholds are generally set at levels where we do not expect this to occur. The regulations for violations are meant to be based on long-term average and we expect there to be an allowance for unusually dry year periods.

iv. Dominick Amador (Woodard & Curran) walked through GSA-specific water budget summary tables based on sustainable yield conditions.

v. Question: How was urban demand estimated outside of municipal service providers (e.g. domestic wells)? Answer: Urban demand was calculated based on population and per-person usage; outside of the cities, the population was based on census data.

vi. Alyson Watson (Woodard & Curran) provided a description of what water levels would look like under sustainable yield conditions in the subsidence area in the southern end of the Subbasin.

vii. Question: Have you considered using subsidence rates as an indicator? Answer: Yes, but this is more difficult to predict with high accuracy compared to groundwater levels. It is difficult to control subsidence rates directly, and we need to be ready to coordinate with neighboring subbasins on a similar methodology.

viii. Question: How can you go back to 2015 levels (per SGMA regulation) for subsidence if we decided to choose to use groundwater levels as a proxy for subsidence levels/rates? Answer: Probably only through an injection program or similar program designed to increase water levels.

c) Projects and Management Actions

i. Alyson Watson (Woodard & Curran) provided a description of projects and management actions and provided example categories that projects might fall into.

ii. Question: How do projects get credited to a particular GSA/landowner/etc.? Answer: It will largely depend who funds the project.

iii. The project team solicited initial project ideas from CC members and the following were brought up:

1. Reach out to the private growers for additional input.
2. Meter private irrigation wells.

5. CASGEM Update
   a. No updates provided – was tabled for next month.
6. Public Outreach Update
   a. Alyson Watson (Woodard & Curran) expressed the intention to hold a public workshop in first 1-2 weeks of December.
7. Coordination with neighboring basins
   a. Preliminary discussion was held with Delta-Mendota Subbasin: found that Delta-Mendota is slightly behind the Merced Subbasin in terms of data efforts and the project team will likely continue coordination efforts in early 2019.
8. Public comment
   a. Question: Do municipalities have overlying water rights? Answer: Individual landowners have overlying rights; rights of municipalities would be prescriptive.
   b. A request was made to post the PowerPoint slides before the next meeting in case printed copies run out.
9. Next steps and adjourn

Next Regular Meeting
October 22, 2018 at 1:30 p.m.
Merced, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org

Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: October 22, 2018 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
2. Approval of minutes for September 24, 2018 meeting
    a. Meeting minutes were approved.
    b. A request was made and approved to have the Self-Help Enterprises and the Leadership Counsel for Justice and Accountability as the next agenda item.
3. Update from Self-Help Enterprises (SHE) and Leadership Counsel for Justice and Accountability (Leadership Counsel)
    a. Maria Herrera (SHE) and Amanda Monaco (Leadership Counsel) provided an overview of their organizations' outreach activities in the Merced Subbasin DACs and the funding received from DWR for reaching disadvantaged communities.
    b. Leadership Counsel works mostly within unincorporated communities and low-income communities that often lack basic infrastructure. Their work includes: outreach and education, GSP development assistance, identification of community water projects, and procurement of professional services.
    c. Funding for Leadership Counsel's SGMA-related work has come from the DWR Prop 1 grant and the Water Foundation.
    d. Leadership Counsel activities conducted in the Merced Subbasin included presentations to Neighbors United for a Better South Merced and to a community group in Delhi. Work has also included a GSP Workshop in April together with SHE and the Union of Concerned Scientists.

e. Maria Herrera (SHE) provided an overview of SHE activities. SHE works in outreach and education, direct community assistance, and GSP development assistance. Their work in the Merced Subbasin includes the SGMA Workshop held in August, outreach to 5 different communities, and support for development of workshop materials including translation.

   i. SHE's outreach also provides information on concerns voiced by local communities (e.g. including concerns for having large wells permitted near their communities).

   ii. SHE will continue to coordinate with Woodard & Curran and Catalyst in preparation for the upcoming public workshops.

4. Stakeholder Committee update

   a. Update from October 22 morning meeting was provided. There was a slightly smaller turn out than normal, but good discussion. Many questions were asked about groundwater rights. A CASGEM update was provided. There was a brief discussion of discuss projects and management actions.

5. Presentation by Woodard & Curran on GSP development

   a. Next Steps in GSP Development

      i. Alyson Watson (Woodard & Curran) gave an overview of the GSP development timeline.

      ii. The path for sustainability requires overcoming the challenge of reducing groundwater pumping while minimizing how much reduction has to be made in total use.

      iii. There are three steps to this process: 1) determine extent of groundwater pumping that is sustainable, 2) determine available surface water, and 3) identify potential deficit between demand and available resources.

      iv. Water budgets and modeling that has gone into these estimates are being refined. The initial estimates do not yet reflect changes to flow projections resulting from FERC relicensing.

      v. Two areas should be addressed to achieve sustainability: reducing groundwater pumping (e.g. though an allocation framework); and identifying projects and management actions (e.g. recharge groundwater, enhance surface water availability, and reduce demand).

      vi. Question asked by Alyson whether the information provided is understandable and provides committee members with enough and adequate information to be able to answer questions and talk about this issue with others. Members agree that content is understandable.

   b. Groundwater Rights Primer

      i. Brad Herrema (Brownstein Hyatt Farber Schreck) provided an informational presentation on groundwater rights and allocation frameworks. A brief list of key points is provided below (see full presentation on Merced SGMA website):

         1. In California, a water right is a usufructuary right in which there is a prohibition against waste and unreasonable use.

         2. California has a dual system of riparian rights and appropriative rights for both surface water and groundwater.

         3. Overlying rights: these rights have the highest priority and are analogous to riparian rights for surface water. All overlying land owners have the right to pump, but this is a correlative right (limited to reasonable use).

         4. Appropriative rights: non-overlying owners are allowed to extract surplus water not being used by overlying owners. It is a first in time, first in right use (whoever has

the right first, has priority over other appropriative right users). These can be subject to loss for non-use.

5. If water is imported into the basin this is covered by a “developed water” theory: those who develop means to import the water are entitled to use it.
6. Prescriptive rights: water right acquired through adverse possession of someone else’s water right. There are several required elements. Often this is a result of someone taking someone else to court.
7. SGMA does not alter and is not determinative of water rights.
8. Brad Herrema recommends reviewing the Environmental Defense Fund paper on groundwater rights and the pros and cons for different allocation methods (link here).
    a. The comprehensive allocation method has the best chance of surviving judicial challenge but can be highly stakeholder engagement intensive.
    b. Allocation based on Fraction of Historic Pumping does not take into account the correlative nature of groundwater rights, and it can be difficult to get data for this.
9. Question: do you see much of the Central Valley undergoing adjudication in the future? Answer: Brad would not be surprised, but the GSP process does a lot of relevant work.
10. Clarification provided that water rights and allocation are two different things. Example provided by Alyson Waterson (W&C): your correlative water right is the straw (your ability to take water), how much you take (your allocation) is the amount you are using.

c. Projects and Management Actions

i. Alyson Watson (W&C) gave a high-level overview for the projects and management actions section to enable adequate time for the CASGEM update. This will be revisited in the next meeting. An overview was given of what background work has been conducted and what projects information has been collected. The list presented provided information on projects the consultant team knows currently exist.

ii. A request made to the committee to contact Woodard & Curran regarding any individuals or groups that should be contacted to collect information on more projects.

iii. An example list of criteria was given for assessing projects.

iv. Alyson Watson (W&C) asked the committee whether there are other criteria that should be considered. Several responses from the committee members were provided as follows:

1. Have specific environmental benefits listed out individually.
2. Question: if someone already has a project and it is completed how is this taken into account for allocation? Answer: will have to determine how to take this into account and determine if/how this will be credited.

d. Other Updates

i. Groundwater Data templates and instructions for submitting data have been updated and are available on the MercedSGMA homepage.

6. CASGEM Update provided by Matt Beaman (MID)
    a. Merced Area Groundwater Pool Interests (MAGPI) collects data and submits this to the California Statewide Groundwater Elevation Monitoring program (CASGEM). CASGEM facilitates between DWR and the public.
    b. Data is used to established and create contour maps in groundwater elevations on a seasonal and long-term basis.
    c. DWR determines if Merced is in compliance with groundwater elevation reporting.
    d. CASGEM is still in effect and GSAs need to be in compliance with CASGEM to receive funding and loans. DWR provides monitoring guidelines (e.g. number of wells per area, how often monitoring, and what kind of wells). These guidelines are posted on the Merced SGMA website under the "Guidelines for Submitting Groundwater Data" on the homepage.
    e. The previous plan provided ways to minimize gap areas. Several maps are shown highlighting how wells have been filling gap areas. There are new wells from MID and 4 of the 5 wells are CASGEM wells.
    f. Stevinson Water District has some private wells that could be monitored. Hicham ElTal (MID) stated that these could be included within the datum created with upcoming grant funding for all public wells.
7. Public Outreach update
    a. Charles Gardiner (Catalyst) provided information on the two public workshops that will take place in December:
        i. Dec. 4th Community Workshop – Planada
        ii. Dec. 13th Community Workshop – Franklin-Beechwood
    b. Topics anticipated to include water budgets, where we are with the project, and a brainstorming of projects and management actions.
8. Coordination with neighboring basins
    a. Chowchilla and Delta-Mendota Subbasins will be ready early next year to continue coordination.
9. Public comment
    a. No public comments.
    b. Hicham ElTal offered that MID can provide a presentation on Flood-MAR during the next meeting.
10. Next steps and adjourn
    a. Several GSP development items anticipated to be discussed in the next meeting including: water budgets and documented assumptions, the Hydrogeological Conceptual Model (HCM) GSP section, sustainable yield analysis, and assessment of projects and management actions.

Next Regular Meeting
November 26, 2018 at 1:30 p.m.
Merced, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org

Action may be taken on any item
Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: November 26, 2018 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☐	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
2. Approval of minutes for October 22, 2018 meeting
    a. Meeting minutes were approved.
3. Stakeholder Committee update
    a. Update from the November 26 morning meeting was provided. W&C staff gave a presentation on the Data Management System (DMS). Comments were requested on the draft Hydrogeologic Conceptual Model (HCM). Some SC members provided some verbal comments. Additional review time was requested and document was re-sent to SC with comments requested by Nov 30. SC comments on the Projects and Management Actions will be discussed during the discussion portion of the Coordinating Committee (CC) meeting.
4. Presentation by Woodard & Curran on GSP development
    a. Next Steps in GSP Development
        i. Alyson Watson (Woodard & Curran) provided a brief overview of the GSP development timeline and what will be covered during the meeting.
        ii. The HCM was sent out to the CC group in early November. This is part of a larger document (the GSP) with other sections. Deadline for comments is November 30th. However, if more time is needed to provide comments, CC members are asked to inform the W&C team.

iii. Water budgets have been updated with inclusion of FERC flows. Sustainable yield for the Merced Subbasin is estimated to be approximately 500,000 TAF per year. Projections that account for FERC flows indicate a need for about a 25% reduction in groundwater use for the subbasin. This percentage reduction is similar to previous estimated without updated FERC flows.

iv. Alyson Watson (W&C) explained the different inflows and outflows of the projected conditions groundwater budget and changes in cumulative storage.

b. Water Allocation Frameworks

i. Alyson Watson (W&C) described different water allocation frameworks possible under SGMA.

ii. The allocation framework chosen will also need to address and connect back to avoiding undesirable results. Projects and management actions will be revisited to address impacts to thresholds. When the GW allocation approach, projects and management actions, and consideration for impacts on thresholds and objectives are combined, the creation of management areas may be considered for specific issues.

iii. Alyson Watson (W&C) reviewed the proposed decision-making timeline for the GSP. November will focus on discussing allocation approaches as well as projects and management actions. Under SGMA, GSAs have broad authority to implement the allocations. In December the CC will discuss making a recommendation to the GSA Boards as to which allocation approach is best for the subbasin. The GSA Boards will consider the approach in January. The CC will review projects and management actions benefits along with the SC in January.

iv. Question: How will we know what impacts these different allocation approaches have? Answer from W&C: We will be doing the technical work to determine these impacts and will discuss this together.

v. Question: How will this impact thresholds? Answer from W&C: The thresholds are driven by undesirable results, which can be addressed by projects and management actions.

vi. Implementation of the GSP will be phased and include monitoring. Updates can be made to the thresholds and the allocation approach every 5 years.

vii. Question: When would we discuss management areas? Answer from W&C: This is planned for February.

viii. Alyson Watson (W&C) explained the different kinds of allocation methods.

1. Pro Rata Approach: Sustainable yield is divided total basin acreage. Advantages are that it is simple, and it recognizes the correlative (everyone has a right to access the basin) nature of groundwater rights. However, this does not account for appropriators/prescriptive rights, and does not differentiate between irrigated and unirrigated acres.

2. Pro Rata Irrigated Areas Approach: This divides the sustainable yield by irrigated and urban areas. It is simple and acknowledges existing pumping. However, the approach does not account for unexercised groundwater rights nor account for appropriators/prescriptive rights.

3. Historical Pumping Approach: This is based on historical use. This is less likely to result in conflict and accounts for appropriators and prescriptive rights. However, it requires more data and if unirrigated acres are excluded this also does not account for unexercised groundwater rights.

4. Comprehensive Approach: The advantages include less likelihood of conflict and an accounting of appropriative use and prescriptive rights. However, this approach requires data not that is currently available, and does not account for unexercised groundwater rights. The approach requires significant outreach and engagement.
5. Key differences between approaches were discussed. Some comments from the SC morning meeting were:
    a. Questions and comments on whether to have a water market.
    b. May need to limit water market access only to those who are in the basin.
    c. Maybe take a hybrid approach with different tiers (e.g. if you are not irrigating you may be in a different tier).
6. Comments from the CC group on allocation approaches:
    a. Prescriptive rights should be taken into account in calculations.
    b. It does not make sense to allocate groundwater where historically it was not used. However, people have the ability to exercise their rights to pump water.
    c. Input from Alyson Watson (W&C): Allocations can be adjusted as people exercise their rights.
    d. CC comment: Monitoring and enforcement will be important. How are we going to monitor what comes online?
    e. Input from Alyson Watson (W&C): GSAs have the authority to enforce.
    f. CC comment: If you allocate by acre, the surface water dependent folks will get less. In the commenter's experience working with surface water it is possible to prohibit the movement of water out of the basin.
    g. Comment: There is concern that people will buy useless land just for the water right.
    h. Question: Can you really do a pro rata allocation approach? Answer (W&C): GSAs cannot affect rights but can check that fees are fair.
    i. Comment: What are the enforcement actions available to GSAs? Answer (W&C): We will bring information to next meeting.
    j. Question: What if an irrigator comes online and decides to pump, but has not historically been pumping?
    k. Comment: With the County Ordinance that has been put into effect, there may likely be fewer new pumpers that will come online.
    l. Input from Alyson Watson (W&C): If there is not a question of substantial change from irrigated to non-irrigated lands, then the question is whether or not rights holders who are not irrigating (and do not intend to irrigate) will be able to sell their rights to others.
    m. Comment: It would not be a bad idea to look at other adjudicated basins and how this worked. Input from W&C: The example from the Mojave Adjudication which used a transferable allocations setup can be presented next meeting.

n. Comment: There will need to be significant outreach especially related to monitoring and data collection for the wells for people to understand this and what is needed.

o. It would be useful to have the per capita usage for the cities per day.

p. Request made to CC members from W&C: Consider the allocation approaches discussed for next meeting.

c. Projects and Management Actions

i. Alyson Watson (W&C) provided an update from the SC meeting discussion.

ii. Question asked about criteria to assess projects: What are they being assessed for? Answer (W&C): The subbasin should be able to show what projects and what potential funding avenues are in the implementation plan for the GSP.

iii. Comment: It could be useful to have a high-level cost/benefit ratio for projects.

iv. Input from Alyson Watson (W&C): The subbasin should determine what to target and identify areas of greatest need, and then determine projects that help best address these.

d. Other Updates

i. Monitoring Networks and the DMS sections of the GSP are underway.

5. Flood-MAR

a. This item was tabled to next meeting.

6. Public Outreach update

a. There are two upcoming Public Workshops: Dec. 4th in Planada, and Dec. 13th in Franklin.

7. Coordination with neighboring basins

a. Chowchilla and Delta-Mendota Subbasins will be ready early next year to continue coordination.

8. Public comment

a. Bill Nicholson from the Local Agency Formation Commission (LAFCo), which regulates boundary changes, gave in input on relevant boundary applications. There is an application for an Owen's Creek Water District, which is on the edge of the basin on the San Joaquin River. There is an annexation for Le Grand-Athelone Water District. This is currently in the sphere of influence for MID but will need to be removed. This might have some impacts to TIWD. Bill will send information out to individual districts and will be looking for input on these applications as they move forward.

9. Next steps and adjourn

a. Summary memo on the water budgets in progress.

b. Merced Subbasin GSA Board took place and the MIUGSA and TIWD Joint Meeting is upcoming.

Next Regular Meeting
December 17, 2018 at 1:30 p.m.
Merced, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org

Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: December 17, 2018 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☐	Bob Kelley	Merced Subbasin GSA
☐	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
2. Approval of minutes for November 26, 2018 meeting
    a. Meeting minutes were approved.
3. Stakeholder Committee update
    a. Update from December 17 morning meeting was provided. Alyson Watson (Woodard & Curran) provided an update on what was discussed in the morning SC meeting.
4. Presentation by Woodard & Curran on GSP development
    a. Next Steps in GSP Development presented by Alyson Watson (W&C). The focus of the meeting is on water allocation frameworks.
    b. Water Allocation Frameworks
        i. Question: Does a violation have to be determined by the Superior Court? Answer (W&C): No, the GSAs have the authority to determine violations.
        ii. Alyson Watson (W&C) provided a brief review of the two different type of groundwater rights that will be discussed during the meeting: prescriptive and overlying (correlative) rights.
        iii. Alyson Watson (W&C) provided a recap of the different allocation methods discussed at the last meeting. The W&C team started from the comments received during the last meetings and worked these into different examples of allocation frameworks.

iv. The W&C team found and corrected a discrepancy in the sustainable yield analysis, which brings the sustainable total yield for the Subbasin to 530,000 acre feet per year.

v. Alyson Watson (W&C) explained that Water that is imported and seeps into the basin through unlined conveyance canals and distribution system belongs to the entity that developed the water. W&C team is working with entities in the basin (e.g. MID and others) to develop estimates of canal seepage.

vi. W&C provided an explanation for the breakdown of different historical use calculations presented over 10-year historical periods.

vii. The SC recommends using historical use rather than projected use as the basis for allocating sustainable yield.

viii. Comment: It would be good to have the baseline set on historical use from a city perspective and look at this in terms of per capita use.

ix. Comment: Cities are going to need to use alternatives, specifically conservation. Cities are also expected to further densify rather than spread, so a per capita use is a better estimation.

x. Alyson Watson (W&C) provided a brief overview of the input from the SC:

   1. There is concern for outside investors coming into water markets
   2. It is recommended to base allocations on historical use
   3. Will need to decide how to handle non-irrigated lands
   4. Several comments voiced a spirit of trying to be inclusive and work out solutions together in a fair way.

xi. Mojave Adjudication Example:

   1. There was a final judgement in 1996, for an area with 5 subbasins. Each year the Watermaster conducts a review and adjustment. This determines the amount that is allocated to each pumper
   2. Comment: Request made to look up how the amount pumpers can have is determined.

xii. A discussion was held on the general allocation approach. Comments and questions are summarized as follows:

   1. Question from W&C: Should there be an allocation for non-irrigated lands?
   2. Comment: They should have an allocation, although it is unclear what the most appropriate number for the allocation should be.
   3. There was a brief discussion on the amounts of irrigated and non-irrigated acres. About a third of the Subbasin's acres could be non-irrigated lands.
   4. Question: Why do we not have other appropriators in the prescriptive use estimates? Answer (W&C): It is a matter of time needed in putting together a more detailed example. If we choose to go this route, more information would be needed.
   5. Question from W&C: Does the Subbasin want to look at historical or projected or look at a hybrid? And should this consider a percentage reduction in GCPD?
   6. Comment: Look at projected use as a baseline.

7. Input from Charles Gardiner (Catalyst): The SC thought numbers for population expansion as stated in the plans (e.g. Urban Water Management Plans) might be too generous to be used for our estimates.
8. The SC wanted to see what the historical baseline would look like using different ranges of years. Question from W&C: Is there another way to do this? Potentially by using different years?
9. Comment (W&C): If a historical baseline is used, a range of years will need to be determined.
10. Comment: The allocation approach has to address overlying water rights.
11. Comment: A partial allocation could be determined for non-irrigated lands through the use of scenarios to see what that looks like.
12. Comment: A structure should be created and regulated for transferring allocations. It could be useful to have some examples of permutations to show what this would look like.

xiii. Alyson Watson (W&C) illustrated a timeline for the implementation of an allocation program from 2020 to 2040, with milestones for every 5-year period.

1. Feedback from CC:
    a. Comment: This seems to make sense, but there will need to be a lot of education.
    b. Comment: It is important to avoid having people think there is a lot of lead time and a general concern that the Subbasin will need to keep up momentum.
    c. Comment: The chosen approach will have to be reasonable and practical. Without metering implementation will be impossible.

c. Other Updates: The beta link requested for the Data Management System is still in progress with an estimated completion time in January.

5. Public Outreach update
    a. There were two public workshops held in December, both with good conversational input and good attendance. The next public workshop will be in late February.
6. Coordination with neighboring basins
    a. There is a memorandum of intent with six concepts with Turlock Basin. In December, the West Turlock GSA approved the MOI. This will go to the Merced Subbasin and East Turlock GSA.
7. Public comment
    a. There were no public comments.
8. Next steps and adjourn
    a. Water Budget Technical Memo and Water Allocation Framework development.

Next Regular Meeting
January 28, 2018 at 1:30 p.m.
Merced, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org

Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: January 28, 2019 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)*	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☐	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1
	*Leah Brown attended for Ken Elwin	

Meeting Notes

1. Call to order
    a. Alyson Watson called the meeting to order and gave a brief overview of agenda items and content.
2. Approval of minutes for December 17, 2018 meeting
    a. Meeting minutes were approved.
3. Stakeholder Committee update
    a. Update from January 28 morning meeting
    b. SC meeting had good turnout with many different viewpoints. Big questions arose when discussing appropriative use and selection of historical period to use as baseline for allocation, and how to address overlying users not currently pumping. Comments ranged from 0% allocation for unirrigated lands to a partial allocation of either a 25 or a 50%. Several SC members stated there should be a process to address these lands in the future, especially if they start at a 0% allocation.
4. Flood-Managed Aquifer Recharge (Flood-MAR)
    a. Hicham ElTal (MID) provided an explanation of Flood-MAR activities in Merced Subbasin and why this is important for Merced. Benefits were identified.
    b. Hicham (MID) explained what must align to have a good Flood-MAR system including hydrology, land availability, recharge potential, and water rights.

c. Current plans and activities include work MID is conducting with DWR. This involves using the MID watershed model to look at precipitation, snowpack and snowmelt.

d. Hicham provided a map of soils where the land has high recharge potential. MID works with DWR on the GRAT (Groundwater Recharge Assessment Tool) which helps determine where recharge is best done, when, how much surface water can be captured, costs, and how much groundwater overdraft can be addressed through this recharge.

e. Hicham explained a good Flood-MAR system must consider water rights with knowledge of water sources and favorable land options. It also must make use of storms. The SWRCB allows taking water in Dec., Jan., and Feb., and only when capacity of the creek is at least 90% of flow that day. There are around 5 storms per year in California that we can try to use.

f. MID is trying to get funding from FEMA for a project on the Grand Canal that goes all the way down to Le Grand.

g. Question: What is the cost of the project? Answer from Hicham: Estimate is between $600,000-$700,000.

h. Hicham explained the configuration of custom analysis that relies on several models including some for irrigation systems, groundwater, upstream watershed, Merced River, etc.

i. MID will engage more with the Merced Streams group, especially in looking for funding.

j. It will be best for the GSAs to determine who is going to take the water when a storm comes.

k. Question: Does the GRAT assess the suitability of areas for recharge? Hicham: Yes. This helps determine what areas are best for recharge and compare areas to help GSAs determine where to prioritize recharge areas.

l. Comment: It would be good for individual landowners to follow this closely. Hicham: The landowners will have to look at it and decide for themselves if this works for them also economically. Yes, they should pay attention closely as information becomes available.

m. Question: It doesn't have to be on a crop area? Hicham: Correct, it can also be a fallowed area, or an area that does not have crops.

n. Question: During the winter times, could water be diverted to Livingston? Hicham: Yes, with some conveyance projects that could be put in place, water could be taken year-round.

o. Question: If there are farmers that have surface water and are in an area for recharge, could they apply? Hicham: Yes, you can buy the water (e.g. Livingston) even if you don't have a water right.

p. Question: Does the flooding affect the NPDES permitting? Hicham: The Irrigated lands Regulatory Program (ILRP) needs to be followed.

5. Temporary and long-term State Water Resources Control Board Permits for Flood Water

   a. Hicham ElTal introduced discussion and recommended the Merced Subbasin submit one long term permit to the SWRCB. One, collective permit assists more efficient flood flow decisions during a storm.

   b. Question: How would you figure out the fees? Don't they do this on a per acre basis? Hicham: This depends on how much water you want to pay for. You pay one fee for the water you take.

   c. Question & clarification: Hicham asked during the meeting for a single permit for all diversions in the subbasin. These do not have to be for a project that is already existing.

   d. Comment: One public audience member thinks this is a great idea.

   e. Comment: Committee member recommended GSA legal counsels investigate this and give advice.

f. Reply from Hicham: The SWRCB would rather have one permanent permit.

g. Clarification: Hicham states based on his past experience with discussions in Southern California recharge will never be considered for beneficial use.

h. Comment: Suggestion made permanent permit it preferred because it is harder to take this away as opposed to the temporary permit.

i. General consensus: Would like to bring this to the three GSAs and seek legal counsel and research.

j. Decision: GSAs to get legal counsel on board.

k. Question: What is the timeline for this permit? Hicham: Likely in 2020.

6. Presentation by Woodard & Curran on GSP development

   a. Next Steps in GSP Development

      i. Alyson Watson (Woodard & Curran) reviewed the decision-making timeline and focus of today. The main goal is to agree upon a recommendation for an allocation framework to determine allocation at the GSA level. A preliminary direction for the allocation framework is needed to meet the 2020 deadline. Additional information will refine modeling and allocations prior to implementation. Monitoring and reporting should be the focus for 2020-2025. This timeframe requires outreach on a broad level. There are five-year updates for the plan.

      ii. Hicham (MID) input: Thinks it makes sense not much is complete prior to 2025, but if we wait until 2030 some areas may be racing to hit their undesirable results thresholds. The Subbasin will have monitoring wells and will want to avoid hitting thresholds.

      iii. Comment: It is possible to can wait until 2030, but another 3-year drought occurs so do risks for undesirable results. Response from Alyson (W&C): Once framework is in place, we can determine specific actions be taken once certain thresholds reached. Focus is to determine an approach and use this to determine if there are areas that will have undesirable results.

      iv. Question: What is the guidance on timing for subsidence zones? Answer (W&C): There is no specific guidance in getting to 2015 conditions. Subsidence is what we will look at once we have a framework agreed upon.

   b. Water Allocation Framework

      i. Alyson Watson (W&C) presented the follow ups from the last meeting and the updated allocation framework development. She reviewed steps in determining the allocation methodology which include: determining sustainable yield, subtracting seepage and developed supply, and then allocating the sustainable native yield to overlying and appropriative users.

      ii. W&C did analyses to look at different historical averaging periods including spans of 20, 10, 15, and 5 years (and a 5, 10, and 15 year that exclude drought). Drought increases overlying users' usage.

      iii. The SC recommended using the 10-year period with the drought (2006-2015). There was a question of whether a 40-year period would be feasible. However, there is not adequate data to use 2040.

      iv. Question from Alyson (W&C): How does the CC feel about 10-year period? Answer from CC members: This time period is appropriate.

v. In addressing unirrigated lands at a minimum there should be a process outlined for how to bring in folks who have unirrigated lands into the allocation framework.

vi. Alyson (W&C) provided illustration for partial allocation estimations given to unirrigated lands. These were set up and estimated for 100%, 50%, or 25% or no allocation.

vii. There is a substantially higher number of unirrigated lands in Merced Subbasin GSA than the other GSAs. This can influence the total allocation to the GSAs depending on what partial allocation is given to unirrigated lands.

viii. Comments relayed from the SC meeting:

1. 1.25 AF/A is difficult to have even for operating a dairy.
2. However, folks who have pasture lands/unirrigated lands would like to be a part of the conversation.

ix. Comment: There is concern that the GSAs might not be aware of potential legal actions moving forward.

x. Question: Could we provide an example of what types of allocations would look like for the dry and wet years? Alyson (W&C): This is possible. We want to make sure that we are first getting a clear understanding and ensure the SC and CC have a clear understanding of the average year.

xi. General request: Concern about understanding the allocation framework expressed. W&C will set up separate calls to review and answer questions of content presented.

xii. Question: What about the seepage estimates, where do the numbers for this come from? Alyson (W&C): Seepage numbers come from estimates from MID and Stevinson Water District. W&C is still getting other information from other water conveyors.

xiii. Alyson explained the goal is to have a 2020 GSP that can be approved and is based on the information that we have, which is going to be updated and addresses data needs.

xiv. Question: What is the net loss flow to the Chowchilla? Dominick (W&C): The net value of loss is about 10,000 AF.

xv. Clarification: Numbers presented are to give an estimate based of the best data we have available with the knowledge that the numbers will change. What is presented is a proportional reduction.

xvi. Comment: What will be important is to consider the GSP as a living plan, so that as additional data come in and as questions are answered, these are integrated.

xvii. Comment from Hicham: Hicham asked MIDAC for an opinion, and MIDAC (growers) said they would like to go for a 0% allocation of unirrigated lands.

xviii. Alyson (W&C): With regard to legal challenges, we are not affecting GW rights. If someone wants to pump, we can avert some of this with a challenge process.

xix. W&C will schedule individual meetings with each GSA to discuss further and revisit this next month at CC meeting.

c. Data Management System

i. Reminder that beta link for DMS has been created and sent out to the committees.

d. Other Updates

i. Projects are being reviewed. There are currently 40 in the draft list as of this meeting. These will be reviewed in more detail in the next meeting.

7. Public Outreach update
    a. Flyer for February public workshop was posted and sent out to committees.
8. Coordination with neighboring basins
9. Public comment
    a. None
10. Next steps and adjourn
    a. Water Budget TM – revise TM based on input from GSA staff
    b. Assessing projects and management actions

Next Regular Meeting
March 25, 2018 at 1:30 p.m.
Merced, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org

Action may be taken on any item
Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: February 25, 2019 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☐	Ken Elwin (alternate)*	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
    a. Alyson Watson (Woodard & Curran) called the meeting to order.
2. Approval of minutes for January 28, 2019 meeting
    a. Meeting minutes approved with no changes.
3. Stakeholder Committee update
    a. Alyson Watson (W&C) provided an update from the February 25 morning meeting. The SC reviewed feedback received from the GSA discussions of allocation frameworks. The SC discussed priorities for projects and management actions to send to the CC. These will be summarized for next meeting for discussion.
4. Presentation by Woodard & Curran on GSP development
    a. Alyson reviewed the decision-making timeline and explained that the CC will be trying to reach an agreement on a framework recommendation to provide to the GSA boards.
    b. Question: Will the plan include the terms required to demonstrate the allocations are being demonstrated/adhered to? Answer: This is up to the GSAs. What would be in the plan is the framework including: the sustainable yield, how this is allocated to the GSAs, and what should be refined and considered in more detail.

c. Clarification: It is anticipated that plan will need to have a process for determining how to handle classification for duck clubs, refuge lands, etc.

d. Comment: It will be important that we have some clarity and a clear expectation of exactly what these allocations are and how they are estimated. Response (W&C): There will need to be a process for verification, especially for seepage.

e. Comment: The plan should include an expectation of how to quantify allocation based on existing water rights.

f. Alyson Watson (W&C) explained the Merced Subbasin Memorandum of Understanding (MOU) requires the CC have unanimous decision on a recommendation to the GSA Boards.

g. Alyson (W&C) provided a brief explanation on state intervention and what this mean in terms of potential fees. *De minimus* users (pumpers using 2AF/Y or less for domestic purposes) are subject to SGMA but not required to be metered.

h. Alyson reviewed the conceptual GSP implementation timeline. Within the first 5 years the GSAs may want to focus on metering and monitoring and implementing projects that already have funding. Outreach is another key component. By 2040 have planned projects online and allocation framework in place.

   i. Comment: The conceptual timeline should include a bullet for triggers for exceeding minimum thresholds up through 2025.

i. Water Allocation Frameworks

   i. Alyson (W&C) reviewed the framework steps 1-4 which include: 1) determining the sustainable yield, 2) estimating developed supply, 3) determine allocation of sustainable yield to appropriators and overlying users, 4) use as basis for allocations to GSA.

   ii. Alyson (W&C) summarized the comments from both the previous SC discussions on the allocation framework and from the GSA review meetings. SC points were:

      1. Important to consider drought years in historical baseline period.
      2. Having a 10-year period seems to make sense.
      3. In general, not in favor of 100% allocation unirrigated lands. Somewhere between 25-50% is a good starting point. Need direction on how this can be used and sold.
      4. Need mechanism to later include these lands if start at a 0% allocation.
      5. Metering is important but should also keep in mind *de minimus* users are not required to be metered under SGMA.

   iii. Alyson summarized feedback from individual GSA review meetings:

      1. Metering should be a priority in first 5 years.
      2. General consensus to review allocation annually, and review seepage potentially every 5 years.
      3. Cities are concerned about potential infill in the future. Keeping allocation at a fixed volume will lower the per capita per day. This needs to be reasonable.
      4. 2020-2030 should not be free-for-all to pump. People are not going to benefit from pumping more and might consequently end up needing to reduce pumping even more. Need to have clear triggers during this time to ensure we avoid any situations where we are in violation.

5. Need to ensure there is a verification method for seepage estimates.
6. Need to consider how to address rangeland, including partial allocations, and will need to be clear on rules for this in case of a water market. (e.g. who and how to sell/buy water in market).

iv. Summary of CC Water Allocation Framework Discussion:

1. Comment: We will have to be open and listen through this process to maintain the big picture of sustainability. We have a limited supply we are trying to allocate, and the allocation methodology is complex. To understand allocation, we must put this into context of water law. SGMA does not allow GSAs to alter water law, but GSAs can control groundwater by regulating it. Within description of sustainable yield, have seepage estimate off the top of the total sustainable yield. Question: is there a seepage credit for the applied surface water on the lands?
2. Answer from Hicham (MID): MID has gone through this situation with rice lands. The water applied to the lands is lost water in his opinion. This is different than seepage estimates which are decidedly directed as developed water.
3. Comment: This would depend on the crop types.
4. Comment from W&C: W&C can ask Brad Herrema, attorney from Brownstein, Hyatt, Farber, and Schreck about this question.
5. Comment from W&C: Accounting for applied water would reduce the 400K AF amount that is considered at the basin scale and is rolled back up to GSA level, but does not mean that it affects the general allocation framework. The question of applied water is something that can be refined later and allow us to still move forward.
6. Question: What about a break down by agencies for the appropriative and prescriptive water use? Answer: The only appropriative users in this group are the cities within MIUGSA.
7. Comment: Suggestion of a 75% allocation for unirrigated lands made by Merced Subbasin GSA (MSGSA).
8. Comment from Hicham (MID): There are no appropriators in MIDAC (MID Advisory Committee). This group is made up of growers. The decision on allocation for unirrigated lands has to consider that there is not an existing financial impact to grazing grounds, but there is a financial impact to those who are pumping now. Hicham will relay the MSGSA suggestion to MIDAC.
9. Comment: We do not know what it will be like in 2040. We do know that MID will be a significant surface water supplier. The lands that are in the MSGSA just have one source. We have the most unexercised (unirrigated) users in our GSA and must to consider them. We are still going to need preserve the ability to produce food.
10. Clarification from Hicham (MID): If we have a GW market, this will be more active in the MSGSA. There will be more financial impact on the growers.
11. Comment: If the subbasin has a water market, need an understanding that there should be no transfers outside the basin.
12. Comment from public: Need to look at permanent crops and how these areas are impacted in wet and dry years.

13. General consensus from CC: The subbasin should have a water market and have 5-year updates.
14. Question: How is this going to effect individual home owners? Answer: You would likely be a *de minimus* user who extracts 2AF/Y or less. The GSAs could charge a fee depending on how they try to fund the GSP implementation. Over time, the benefit is that the groundwater should stabilize.

v. Partial allocation for unirrigated lands discussion:

1. Comment: Need to start somewhere with partial allocation for unirrigated lands.
2. Comment: Reiterates suggestion for 75% allocation for unirrigated lands.
3. Hicham ElTal (MID) will bring the suggestion back to MIDAC.
4. Larry Harris (TIWD) will talk to folks at TIWD about the suggestion.
5. Bob Kelley (MSGSA) to look into how this 75% number could move depending on the response from other GSAs.
6. Question: have we looked at industrial use (e.g. commodity processing facilities) outside the cities? Answer (W&C): Not yet, but W&C can look into this.

vi. Consensus reached for the water allocation framework on the following:

1. Agreement on overall framework steps.
2. General support for developing a water market and addressing important considerations that should be included.
3. Agreement on historical averaging period of 10 years using 2006-2015.
4. Agreement on review of allocation every 5 years.

vii. Comment on applied water: There could be a credit for return flows using example of adjudications which have attributed these flows to the importing agency. If there's a desire for that type of credit, it is possible to develop a process for determining flows.

viii. Comment from W&C: This could be added to a list of what needs to be refined and addressed in terms of seepage within GSP. Currently, this data is not available.

ix. Comment: People who have grazing land have not contributed to the problem and feel are being punished unfairly.

j. Next Steps in GSP Development

i. Alyson Watson (W&C) reviewed the overall timeline for draft GSP development.

ii. Hicham ElTal (MID) states that MID has talked internally about using groundwater elevation levels as a proxy for other indicators with DWR. They could set up a meeting within the next couple of months and talk about the overall methodology in how we are building our GSP.

k. Other Updates

i. Reminder that the beta test link is available for the Merced GSP data management system.

5. Public Outreach update

a. The public workshop is scheduled to take place this evening in Livingston.

6. Coordination with neighboring basins

a. Continuing communication with Turlock. More coordination in the next couple of months.

7. Long Term SWRCB Permits for Flood Water

    a. The Long Term Permits presentation is tabled to next month. Alyson confirmed with CC members that the meeting will extend to 4pm for March 25th.

8. Public comment

    a. None.

9. Next steps and adjourn

    a. Water Allocation Framework

    b. Review projects and management actions

Next Regular Meeting
March 25, 2019 at 1:30 p.m.
Atwater, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org

Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: March 25, 2019 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☒	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	Rodrigo Espinoza	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
   a. Alyson Watson (Woodard & Curran) welcomed and called meeting to order.
2. Approval of minutes for February 25, 2019 meeting
   a. Meeting minutes from February 25th approved.
   b. CC members found no issue in having this meeting available for listen-in only in the future.
3. Stakeholder Committee update
   a. Update from March 25 morning meeting provided by Alyson Watson (W&C).
4. Presentation by Woodard & Curran on GSP development
   a. Water Allocation Frameworks
      i. Alyson Watson (W&C) reviewed what the group will try to accomplish today, the decision-making timeline, and the conceptual GSP timeline.
      ii. Comment: The Merced Subbasin should start to implement monitoring activities and have a countdown between 2020-2025.
      iii. Alyson (W&C) explained next month's meeting will return to Undesirable Results and Minimum Thresholds.

iv. Comment: If there are projects people can already implement, then they should start to implement or at least be able to implement.

v. Comment: It is important to understand what the loss of recharge water is in the Subbasin.

vi. Response and clarification (W&C): There may be recharge operations on a small scale that are already in place where someone should have an allocation credit that should be taken into account. There needs to be time for that process of reaching out and conducting public outreach.

vii. Comment: A recharge water loss estimation could be done for areas where projects would be implemented.

viii. Response (W&C): To conduct the loss estimation, need to gather enough information for the losses to determine whether an area is worth investing in for recharge. This could be done via scenarios as projects come up.

ix. Comment: This estimation should be done on a case by case basis.

x. Comment: The estimation could produce a map of contours of percentage loss.

xi. Response (W&C): W&C team to discuss internally potential approach for loss estimation.

xii. Comment: In looking at the previous Water Budget technical memo, it would be easier to understand the memo contents if we had the breakdown of the historical water budget numbers. For overlying use, it looks like there are federal lands and *de minimus* users. Where and how do both of these factor into the overlying use?

xiii. Response (W&C): We cannot force the federal lands to comply because they are exempt from SGMA. These acres and water use are pulled out of the analysis, the analysis is conducted, and then these lands and associated water use are put back. *De minimus* users are not exempt, they just cannot be required to meter under SGMA. The W&C team is also verifying the number of acres for federal lands.

xiv. Comment: Overlying user allocation is a critical part of the process going forward, especially with Merced Subbasin GSA being primarily overlying users. The MSGSA is concerned that overlying rights be considered and respected. The MSGSA has to manage the white areas and liability for their lack of surface water connection.

xv. Alyson (W&C): We would like to get to an agreement on a partial allocation during this meeting.

xvi. Comment: MSGSA would propose a geographic designation for the basin. Totals would be 327K AF for MSGSA, 151K AF for MIUGSA, and 12K AF for TIWD.

xvii. Alyson (W&C): To clarify, that proposal would reflect a 100% allocation for unirrigated lands.

xviii. Comment: MIUGSA recommends holding off on groundwater credits until we have the allocation finalized. Why not wait until we can fill those data gaps? We want to address the data gaps to better understand what the implications are of our allocation framework.

xix. Comment: MIUGSA is ok with a 100% allocation, as long as the Subbasin does not allow credits to be exchanged until the GSAs have more data.

xx. Comment: We need to clean up our assumptions before we make this kind of policy decision.

xxi. Both MSGSA and MIUGSA representatives reiterate that there is likely less water out there than we think there is.

xxii. Alyson (W&C): For GSP contents, we can have a preliminary framework, which includes how much water we have and how we are considering undeveloped and developed acres.

xxiii. General clarification and agreement on allocation framework: Agreement reached on a 100% allocation to unirrigated lands, but with the caveat that GSAs will not allow transfer of credits until all three GSAs agree on parameters for trading and fill in data gaps / finalize the allocations.

xxiv. Clarification: W&C can run sustainable yield scenario under this condition and see how that impacts undesirable results.

xxv. Water Allocation Framework Agreement:

1. Determine sustainable yield
2. Subtract groundwater originating from developed supply to obtain sustainable yield of native groundwater
3. Allocate sustainable yield of native groundwater to Overlying Users and Appropriative Users based on proportion of historical use
    a. Use 2006 through 2015 as the averaging period for historical use
    b. Appropriative user allocations based on fraction of historical use among appropriators
    c. Allocation to overliers will be based on acreage. All developed and undeveloped acreage (not including federal lands) to receive an allocation initially. GSAs agree that no water supply credits can be exchanged until and unless all three GSAs agree on parameters for trading and key data gaps are filled.
4. Use this framework to establish total allocations to each GSA. GSAs can modify implementation and allocations within their own boundaries.

xxvi. The above agreement was summarized as the Coordinating Committee recommendation and sent to GSA Board staff.

xxvii. Question: How long will it take for GSP approval?

xxviii. Response (MID and W&C): Estimate is that DWR may need to take the full time of two or more years. Review of only the critically overdrafted basins would take two years.

b. Projects and Management Actions

i. Review of revised project handout and current draft list of projects including short list provided by W&C team. Follow ups for gathering additional project information will be conducted in preparation for next meeting.

c. Climate Change Analysis

i. Alyson (W&C) explained W&C team is following the DWR guidance and moving forward on the climate change analysis. A section summary is anticipated for next meeting.

ii. Question: Do the climate change analyses seem to provide drier or wetter future conditions?

iii. Response (MID): From analysis conducted for DWR Flood-MAR, future conditions look slightly drier.

d. Next Steps in GSP Development

i. Alyson (W&C) reviewed the section schedule, including release dates for admin and SC & CC section drafts in preparation for GSP public draft.

e. Other Updates

i. Alyson Watson (W&C) provided overview of Undesirable Results including what these would be described as under a sustainable yield run. The W&C team is currently working on the implementation and the sustainable yield period for this analysis. Information on annual production numbers and relevant slides can be provided.

5. Public Outreach update

a. The next public workshop is anticipated to take place in May, and likely within the McSwain area.

6. Coordination with neighboring basins

a. W&C team will circle back with Chowchilla and Delta-Mendota and are also setting up a meeting with DWR to review methodology for sustainability indicators.

7. Long Term SWRCB Permits for Flood Water

a. Darren Cordova (MBK Engineers) provided a presentation on Groundwater Recharge/Extraction Permits. Topics for discussion included background & beneficial use, standard permit, temporary permit, potential alternative options. Purpose of presentation is to provide information on permitting from the state. MBK has worked previously with MID. For details, please see presentation which will be posted to the Merced SGMA website.

b. Standard Permit process includes preparation and submission of application to Appropriate Water and Underground Storage Supplement, which takes about a month or two to put this application together and submit. Submittal includes water availability analysis to demonstrate “reasonable likelihood” that water is available for appropriation. Also have to undergo environmental documentation needed for CEQA compliance. Cost for this estimated at $150K but would not include CEQA.

c. Question: What kind of information would be needed? Answer (MBK): Need to have information on the groundwater basin as a whole.

d. Comment: There will be a place in the GSP where we will talk about supplemental water.

e. Comment: For cost would need a couple more zeros for the estimates of associated cost if you are included in an Environmental Impact Report.

f. Question: If you get a temporary permit, when can you use it? Answer: Have to use the within the 180 days, otherwise can ask for extension.

g. Comment: If you file again, you will have to justify need for both permit requests.

h. Comment: The state board is starting to watch larger flows a little more closely and are starting to want permits for that in the future. The subbasin might need something to get the ball moving.

i. Alternative Options: SWRCB considering an expedited standard permit process for applicants diverting high flows for groundwater recharge/extraction. If you have an existing post 1914 water right, you can submit a Change Petition. Estimated to take between 3-5 years. Filing fees up to $6,710 per water right.

j. Comment: Have to prove that you are not initiating a new right.

k. Comment: When you do the flood control capture and recharge, you cannot count this as beneficial use under your water right, but you can put this in your GSP. You can put in a recharge basin to capture flood water and are therefore diverting/mitigating a nuisance for the entire basin.

l. Question: What about a permit for specific streams?

m. Answer (W&C): We have talked in this group about submitting a single long term permit for the subbasin.

n. Comment: We have to have the projects first to be able to have the diversion points you will need to identify in the application.

o. Comment: If we want to exercise pre-1914 rights, we should identify projects and people who are able to recharge.

p. Question: Who would hold the water right on someone else's land? Answer (MID): Good question, may need to investigate this.

q. Comment: All of the GSAs could hold the water right. Response from MID: That would be preferred.

r. Alyson (W&C): If the CC were to move forward with a recommendation on this, we would need to have a project put in the GSP.

s. Comment: We could say that for the GSP could have one recharging water right identified under one project.

t. Comment: It would be helpful if we show a map that provides all areas where we would like to be able to implement recharge.

u. Comment: Something similar was done in another subbasin using a site specific approach. In this case, had to get specific sites and provide this data to the state board.

v. Comment: We could look at getting a cost estimate on a programmatic EIR? And an estimate on the overall acreage that could benefit from this?

w. Comment: First task is to come up with a project, and work on the 90% permit establishing which streams are we talking about and where are we able to move the water.

x. Comment: This can be seen as two different things. There's the GSP – including the projects we are thinking about implementing for the basin. Second, is what streams and what waters can be used to pursue implementation.

y. Comment: We should try to pursue this permit process now, at least to set up a study.

z. Alyson (W&C): Would we need to have a fee and scope of work for this?

aa. Comment: We can come up with an add hoc committee to discuss this.

bb. Group agreement: Ad hoc committee will be established to determine a fee and scope for pursuing a Long Term Permit. Members of the committee will include Hicham ElTal, Larry Harris, and Nic Marchini

cc. Clarification: It is possible to include both surface water and groundwater within this permitting process. This does make it more complicated for the SWRCB folks. However, the process is similar.

8. Public comment
    a. None.
9. Next steps and adjourn
    a. Focus for April will be on Minimum Thresholds and Measurable Objectives

Next Regular Meeting
April 22, 2019 at 1:30 p.m.

Atwater, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org
Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: April 22, 2019 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☐	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☐	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
    a. Alyson Watson (Woodard & Curran) called meeting to order. Members introduced themselves. A new member, Mike Gallo, for Merced Subbasin GSA has been added to the Coordinating Committee and replaced Rodrigo Espinoza.
2. Approval of minutes for March 25, 2019 meeting
    a. Meeting minutes from March 25th are approved with one abstention from Mike Gallo and one change. One sentence was added to include that the Water Allocation Framework Agreement was summarized as a Coordinating Committee recommendation and sent to GSA Board staff.
3. Stakeholder Committee update
    a. Update from April 22 morning meeting provided by Alyson Watson (W&C).
4. Presentation by Woodard & Curran on GSP development
    a. Climate Change Analysis
        i. Alyson Watson (W&C) described the regulations that apply for the climate change analysis and described the overall process used for Merced GSP.
        ii. The approach is consistent with the Department of Water Resources (DWR) recommended approach. A change factor from DWR is applied to the Projected Data Baseline to simulate the impact of climate change. This creates the Climate Change Baseline, which is put into the

Merced model. The output is the Climate Change Water Budget. The change (or perturbed) variables include streamflow, precipitation, and evapotranspiration (ET).

iii. Question: What are the modifications and how are they determined? Answer (W&C): We followed the DWR guidance, which provides the modifications (or change factors) and how they are determined.

iv. Alyson Watson (W&C) provided an example of precipitation using the Climate Change Analysis. The dark line is the regional average baseline. The blue line is the changed, or perturbed precipitation using factors from DWR. Generally, precipitation during a typical event is projected to be similar to the baseline conditions, but under climate change peak rain events are projected to be higher.

v. Similar DWR factors are used for ET. An example given from orchards shows a seasonal pattern of peaking in the summer months and a projected average increase in these months of 8%.

vi. Question: Is the climate change over 50 years, or over 1 year? Answer (W&C): We are applying a 2070 scenario and applying 50 years of hydrology.

vii. Question: Is this assuming the same cropping pattern? Answer (W&C): We met with GSAs to talk about changes to cropping pattern. We assumed 2040 conditions in urban build out. The projected water budget has many assumptions (e.g. assumptions on population change, etc.). We are doing the analysis to get an order of magnitude understanding of how potentially significant this can be for the basin, and see how we can adaptively manage.

viii. For surface water supplies, projections indicate that in wetter years (wetter season) there would be greater surface water, and in drier years (drier seasons) there would be less surface water.

ix. For groundwater production it is assumed there will be a change in groundwater pumping. The graph shows the difference in groundwater pumping with the climate change scenario. In general, there is an increase in groundwater demand as result of climate change conditions.

x. Summary of climate change scenario: Changed storage depletion is projected to increase from 82K AFY to 130K AFY. This analysis did not rerun the MIDH2O model to see how operations would change. The purpose of analysis was to get an order of magnitude understanding of how climate change might affect the basin.

xi. Clarification from W&C: This analysis does not include management actions and projects.

xii. Question: Is this going to be implemented in the plan? Will the budget reflect these climate changes? Or stay as it is? Answer (W&C): This is up to the group. It is not recommended to take and plan for this directly because there is so much uncertainty. However, we can revise our planning target if we find we are on this trajectory. We are going to do an update in 2025 and could update our targets then if needed.

b. Undesirable Results & Minimum Thresholds

i. Alyson Watson (W&C) explained Undesirable Results (URs) and Minimum Thresholds (MTs), provided definitions and reviewed what was discussed in previous meetings.

ii. The purpose is to try to bring the basin into balance. The GSP will need to define what is significant and unreasonable for URs. It is important to prevent these URs, because if they are violated there can be state intervention.

iii. Sustainable Management Criteria Definitions: There may be a specific groundwater condition where wells went dry and enough wells went dry that we determine this should not happen again. This could be defined as an UR. An MT can be set at a depth at which this is not going to happen. Our Measurable Objective (MO) will be set at a shallower depth (this is a depth we are trying to reach). We want to work between these two (the MO and the MT) within the Margin of Operational Flexibility. There are no triggers for meeting the MOs. A violation occurs if URs occur. MTs are set to avoid URs. One well being in violation once is not significant and unreasonable, but a certain percentage going dry could be. Specifications can be established for dry years. The goal is to identify a way to prevent URs.

iv. Chronic Lowering of Groundwater Levels: This was discussed qualitatively for URs and needs to be quantified. Methods used for this include two levels of monitoring wells. This does not include the broader monitoring network, but is the subset used to establish MTs. CASGEM wells were used as a starting point for these monitoring wells because they follow closely to SGMA requirements. There should be monitoring wells in all three aquifers (above, below and outside Corcoran Clay). W&C looked at domestic wells and used the Merced County database. W&C looked at the depth of the shallowest domestic well and removed statistical outliers. The shallowest domestic well within a 2-mile radius buffer from each CASGEM well was compared against MTs. An example hydrograph was provided to show MTs, observed data, and a run from 2040 with 50 years of hydrology get to 2090 for Sustainable Yield.

v. Clarification: Other basins have used a method to say that if 25% of wells with MTs have surpassed MTs then this is UR. Individual wells may have different MTs.

vi. Alyson Watson (W&C) explained there is an area (identified by a red circle) on the slide with a high level of uncertainty for determining MTs. Some CASGEM wells are new, some do not have enough historical data to calibrate for the model. Alyson asks the group what are there issues in this area? Are you aware of areas where wells are not deep enough? Or have been dug deeper?

vii. W&C also looked at the distribution of domestic well depths. There are a significant number of 125 ft wells (about 70 at this depth). Are these wells still there, have they been replaced?

viii. Feedback from CC group:

    1. Comment: Have not seen any domestic wells that are dry but have seen trucked water going around.
    2. Comment (from public): In Meadowbrook area with California American Water Company they have a contract with a trucked water entity, which is required to stay within the company’s jurisdiction.

ix. Alyson (W&C) explained there are a few options for moving forward including: identifying this area as a data gap and include in the GSP how this will be addressed, or establish this as an official Management Area.

x. Comment (MID): Interim thresholds and monitoring wells could be set up in that area.

xi. Alyson (W&C) asked group for input on how to approach URs. Should a certain percentage be used to determine what constitutes a UR?

xii. Comment (MID): SGMA allows room for flexibility in continuous drought. Establishing a percentage to determine URs is a good idea.

xiii. Comment (TIWD): In the SC meeting this morning, we discussed that we can set up mitigation plans in areas where we going to surpass meet MTs.

xiv. Comment (MID): Suggests to start with all of these ideas.

xv. Storage: Alyson (W&C) explained change in storage is about 0.3% per year. In terms of total water available, we do not anticipate significant and unreasonable URs occurring in the future. Therefore, no MTs are needed. Another approach is to take groundwater elevation (GWE) levels as a proxy and state that GWE levels are protective. A third approach is to say URs do not occur until a reduction by 10MAF is reached, and then report on this over time. W&C has suggested not to set thresholds and to provide an explanation for this. We are still waiting to hear back from DWR on this approach.

xvi. Seawater Intrusion: This indicator is not applicable for the Merced GSP, as it is not present and not likely to occur for the subbasin. Salinity is addressed as an MT under "Degraded Water Quality".

xvii. Degraded Water Quality: Thresholds should be based on our actions, where groundwater extractions effect groundwater quality. Existing cleanup sites have been previously mapped, which can ensure that new recharge sites are not put in these places and potentially cause water quality issues (e.g. extension of plumes). Where contaminants are regulated under existing programs, communication will be established with these programs. It is not necessary to take responsibility for these contaminants when they are regulated under existing mechanisms and frameworks. However, the Merced GSP will be addressing salinity.

xviii. Alyson (W&C) requested input from the group on proposed MTs for salinity. A current limit of 1000mg/L TDS is proposed for discussion. Does this sound reasonable? From a drinking water perspective as well as for agriculture?

xix. Feedback from CC group:

1. Comment (MID): There are some areas where it is already 1000mg/L. Response (W&C): In some areas where this is occurring we would not need to assign MTs if this is not posing an UR (e.g. blending, or use of salt-tolerant crops are currently employed as solutions).
2. Comment (MSGSA): They are receiving salinity intruding from the west, might be from the San Joaquin River.
3. Comment: There are sources of salinity. For example, upwelling brine. There could be trigger points where you can manage these primary sources like upwelling through saline sources and migration of water from the west. Options are to change the extraction process and take actions to prevent this.
4. Comment (public): Could look at a percentage change from ambient as one option. Or could look at difference from baseline number or use another indicator as a proxy such as acres of production affected as a proxy. Response (W&C): The only proxy allowed under SGMA is GWE.

xx. Question: What are risks are associated with a scenario where an investment fund purchases property and then violates their pumping allocation and violates an MT? Response (W&C): The GSA would be in charge of managing the extraction and enforcement through penalties (e.g. fines). MTs are not defined at every well in the basin. MTs are set on specific monitoring wells.

xxi. Land Subsidence: W&C is in communication with DWR regarding the current approach for the Merced Subbasin.

xxii. Depletion of Interconnected Surface Water: URs, MTs for this indicator are challenging. What can be measured or estimated in the modeling is streamlosses. The greatest losses actually occur in wet years because there is a lot more water in the stream channel. There is also not a clear UR. The consulting team has tried to come up with a threshold that would keep within the historical range of depletions. We have taken out wet years, looked at historical losses, and considered the 5-year average within this range. The goal is to not exceed historical losses.

xxiii. Question: How does the Supplemental Environmental Document play into this? Answer (W&C): This is not included in the analysis. It is assumed that the SED would impact the analysis but will not be included.

c. Approach and Timing For Implementing Allocations

  i. Alyson (W&C) provided review of Conceptual GSP Implementation Timeline. The CC group discussed general ideas regarding the approach and timing for implementing allocations. No agreements or formal recommendations were reached.

d. Next Steps in GSP Development

  i. Alyson (W&C) reviewed the section schedule, including release dates for admin and SC & CC section drafts in preparation for GSP public draft.

  ii. Alyson also reviewed the proposed GSP review and submission timeline, which includes the public review period and proposed meetings prior to GSP approval and submittal. There is a 90-day requirement that goes effect after the notice of intent to adopt. The GSP may be adopted at 90 days after the notice of intent to adopt is made. The goal with release administrative drafts to GSA staff and sections to the SC and CC is to allow additional input and time to review content prior to the complete draft.

e. Other Updates

  i. Alyson (W&C) gave an update on the status of several GSP sections sent or anticipated for administrative draft release.

5. Public Outreach update

  a. The next public workshop will take place May 29th at the Atwater Community Center. Notices and additional information will be posted on the Merced SGMA website.

6. Coordination with neighboring basins

  a. For interbasin agreements, W&C team has been reaching out to Delta-Mendota and has been looking at Chowchilla and the Turlock agreements as models for potential agreement structure and content.

7. Public comment

  a. None.

8. Next steps and adjourn

  a. Focus for May will be on Minimum Thresholds and Measurable Objectives and Implementation Planning.

Next Regular Meeting
May 29, 2019 at 1:30 p.m.
Atwater, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org
Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: May 29, 2019 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☒	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☐	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
    a. Alyson Watson (Woodard & Curran) called meeting to order. Members introduced themselves.
2. Approval of minutes for April 22, 2019 meeting
    a. Meeting minutes from April 22th were approved.
3. Stakeholder Committee update
    a. Update from May 29 morning meeting provided by Alyson Watson (W&C).
4. Presentation by Woodard & Curran on GSP development
    a. Management Areas
        i. Alyson Watson (W&C) defined Management Areas and how and why they might be implemented.
        ii. Comment: Haven't come up with specific areas besides the subsidence area. Follow-up: may not need to call out a separate management area if there isn't subsidence in another part of the Subbasin – in this case, the same standards apply across the whole Subbasin.
    b. Sustainable Management Criteria
        i. Alyson Watson (W&C) walked through the sustainable management criteria for each of the sustainability indicators.

ii. Question: For purposes of setting thresholds for groundwater levels, what is the difference between CASGEM wells and domestic wells? Answer: CASGEM wells are used for representative monitoring as they meet strict SGMA monitoring requirements. Domestic wells were used to define location-specific minimum thresholds and undesirable results (e.g. finding the shallowest domestic well within a 2-mile radius of each CASGEM well).

iii. Comment: Need to come up with GWL threshold methodology for future additional monitoring wells where (1) there may not be domestic wells located within 2 miles or (2) there won't be historical groundwater record to help determine a minimum threshold since it is a new monitoring well.

iv. Question: Certain areas of the Subbasin (e.g. West side, near San Joaquin River) already have high salinity above minimum threshold. How do we bring this into the discussion? Answer: The proposed minimum threshold for degraded water quality is 1,000 mg/L TDS but in areas where it's already higher, it's not considered significant and unreasonable because high salinity is already being managed.

v. Lacey Kiriakou will check with Merced County Environmental Health for any feedback about constituents effected by groundwater pumping that we should consider setting thresholds beyond TDS.

vi. Feedback from Amanda Peisch-Derby (DWR): Suggestion provided to review example of Paso Robles Draft GSP which is publicly available. For degraded water quality, the GSP picked a set of common contaminants and used MCLs for setting Minimum Thresholds. Areas with existing exceedances of the MCLs were not selected for representative monitoring (e.g. MT was not developed for these areas). Elsewhere, the definition of undesirable results was set so that multiple wells had to exceed the MT.

vii. Comment: For about 10 years, Eric Swenson managed groundwater assessment and cleanup regulations for Merced County. Most of the concerns are in urban areas in domestic wells and large municipal wells. Practice was to carefully monitor constituents for exceedances of MCLs. Only 2 example wells where plume migration was observed.

viii. Question: How come we don't have specificity on the year type for definition of undesirable results for land subsidence, though we do for groundwater levels? Answer: In part, land subsidence doesn't respond as quickly as groundwater levels, but this also doesn't allow much flexibility in extended drought.

    1. CC group requested that consultant team update the definition of undesirable results for land subsidence to apply only in non-dry/critically dry years, similar to groundwater levels.

ix. Clarification on Interconnected Surface Waters: The MercedWRM model was used to determine what level of surface water flow reduction would be expected using the existing groundwater level minimum thresholds; the analysis did not determine a new set of minimum thresholds that meet known exact undesirable results for this sustainability indicator.

x. Comment: Moving forward, should consider whether there is an opportunity to directly measure stream depletions so when five year update comes we can re-evaluate. May need to involve additional monitoring wells along streams as well.

xi. Public question: Merced River floods ranch and water is seen as being wasted. Can the water be used to recharge aquifer and credited to the landowner? Answer: CC group has previously discussed possibility of having a permit for multiple diversion locations, identifying places of use, etc. that would mean ability to have credits would exist in the future.

c. Implementation Plan

   i. Alyson Watson (W&C) gave a brief outline on implementation planning steps for the GSP that are currently underway, as well as a schedule for future implementation of the GSP.

      1. Hicham ElTal (MIUGSA): Suggestion to invite Irrigation Training & Research Center (ITRC) from Cal Poly in to talk about one way we might implement one mechanism for incentives and groundwater tracking.

         a. CC interest was expressed from multiple members.

      2. Suggestion: it would good to come up with other creative ideas for incentivizing better groundwater use, e.g. a funding mechanism establishing a dollar amount per year to incentivize people to fallow land.

         a. Eastside Water District has a program like this. Alternatively, a program could work to incentivize recharge, too. Could bring member of Eastside to present, too, in addition to ITRC above.

      3. Hicham ElTal (MIUGSA) proposed writing a letter re: Prop 68 to DWR requesting that the previously funded projects for SDAC funding shouldn't be counted against the ~$2M funding cap.

         a. CC group approved a motion to direct Lacey and Hicham to write and submit a letter.

      4. Hicham ElTal (MIUGSA) shared some proposed changes to DWR Technical Support Services (TSS) application, originally for monitoring well and extensometer funding for Merced/Delta-Mendota shared set of monitoring wells along southwest side. Since Subbasin is moving away from using groundwater levels as proxy for subsidence, proposal is to focus only on funding a continuous GPS station for subsidence monitoring which will be cheaper and easier to implement overall.

         a. CC members approved motion to submit TSS application based on this updated proposal.

      5. Recommendation from SC to implement policy in GSP to limit/exclude exporting of water from the Subbasin (albeit maybe with little authority to enforce).

         a. CC response: legally complicated to include in the GSP, probably not necessary to include since the County has the existing Ordinance. Proposed allocation framework has measures for limiting export of water from the Subbasin.

d. Water Allocation Framework

   i. Hicham ElTal (MIUGSA) shared a proposed clarification on Item #4 in 4/2/2019 water allocation framework update TM to GSA staff "Use framework above to establish total allocations to each GSA. GSAs can modify the implementation and allocations within their GSA Boundary."; To avoid a perverse incentive of groundwater mining prior to implementation, MIUGSA would like to modify text so that internal GSA management is allowed except transfer of groundwater from non-developed to developed lands. However, groundwater credit exchange for in-lieu recharge (recharge, surface water, FloodMAR, etc.) would still exist.

ii. Discussion ensued about various rules under this proposed scenario and other clarifications.

iii. Public Comment and Suggestion: What does this updated scenario mean for several different landowners? E.g. rangeland, 1000 acres owner, 5000 acres large property owner who wants to pipe 2 miles down road from allocations, etc.; Response: it is possible to come up with some examples for this in a future meeting.

iv. Public comment: Difficult to follow the overall conversation about framework modifications. Response: Team provided commitment to provide additional information in packet for next meeting with reference on framework memo discussion.

e. Next Steps in GSP Development

   i. Included a summary of upcoming section review drafts to expect, as well as a review of steps for submission (e.g. notice of intent to adopt).

f. Other Updates

   i. Included a summary of upcoming section review drafts to expect

5. Public Outreach update

   a. The next public workshop will take place May 29th at the Atwater Community Center. Notices and additional information are posted on the Merced SGMA website.

6. Coordination with neighboring basins

   a. A meeting with Turlock was just held. Also developing a draft agreement on how to coordinate in the future with Delta-Mendota (which is on a tight timeline and does not expect to be able to coordinate on data sharing unless there has been sufficient time for internal review).

7. Public comment

   a. Question: Is Merced annexing property near UC Merced? Response: Not sure of details.

   b. Question: Geologists say we are past due for a big earthquake. What would it do to our basin and is there any potential effect on sustainability of groundwater? Answer: See Hydrogeologic Conceptual Model for more information about the faults. We have not considered dam failure (while not required by SGMA, MID has been working on this separately).

   c. Question: How many more meetings will be held? Answer: We will talk about this at the next meeting. Will be meeting in June and most likely in July as well. August we will likely spend discussing comments and how to support adoption as well as what additional meetings are required.

8. Next steps and adjourn

   a. Focus for June will be on comments on draft sections and process for GSP Adoption and next steps.

Next Regular Meeting
June 24, 2019 at 1:30 p.m.
Atwater, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org
Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Special Session

DATE/TIME: June 18, 2019 at 1:00 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance*:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☐	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☐	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1
	Others:	
	Leah Brown (non-member)	MIUGSA, City of Merced
	Bryan Kelly	MIUGSA, MID
	Hicham ElTal	MIUGSA, MID

*Some attendees participated via phone.

Meeting Notes

1. Call to order
    a. Alyson Watson (Woodard & Curran) calls to order the Special Session of the Coordination Committee.
2. Discussion of Allocation Framework Issue
    a. Issue
        i. The Allocation Framework is discussed in the Projects and Management Actions section of the GSP. MIUGSA provided written comments on the administrative draft of this section,
        ii. The quantification of developed supply, included in the GSP for illustrative purposes, includes only seepage of surface water from unlined canals.
        iii. There are other potential sources of developed supply in groundwater that are not quantified in the current GSP, including deep percolation of applied surface water and leakage from piped conveyance.

iv. MIUGSA comments on GSP admin draft requested definition of "developed supply" in GSP text be expanded to include deep percolation of applied surface water.

b. Prior Discussions

i. Have discussed that sources other than seepage exist and may be refined later. A possible approach is that the GSP could state that there are other sources and that these could be investigated and the definition of "developed supply" could be refined moving forward.

c. Discussion:

i. Comment (MSGSA): We talked about deep percolation of applied surface waters. It is difficult to quantify, and difficult to ensure that this is not impacting the native groundwater.

ii. Comment (MIUGSA): Developed water is any water brought into the basin that is not natural. Scenario: If overirrigation occurs and this goes to groundwater for recharge. Developed water is something people should be able to bank on, it is not part of the allocation, it is outside of this. MIUGSA is not requesting to change the current Sustainable Yield estimated numbers.

iii. Comment (MSGSA): We have no issue with recharge. However, trend is not in the direction of overirrigating. The trend is to have less and less applied surface water.

iv. Comment (MIUGSA): People are using less water to irrigate their plants. There are two systems, one irrigation system in wet and one in dry years. Need to have a water balance. and we have to agree on the numbers. These are changing all the time, e.g., we have updates every 5 years. All that we are talking about today is the concept: developed water.

v. Comment (MSGSA): Could the number that came out of the MID Agricultural Water Management Plan used in the Water Budget Technical Memo be higher? (potential additional deep percolation).

vi. Comment (MIUGSA): This could increase, but we would need to do a water balance and have a good definition for developed water.

vii. Clarification (W&C): Yes, MIUGSA is asking to define "developed supply" and acknowledge that there are other sources of supply that can be investigated in the future.

viii. Comment (MSGSA): In defining "developed supply" is it the person who purchases the developed water the entity who receives credit for this water?

ix. Clarification (W&C): In adjudications in other basins, that water was considered the agency's property and not the person who purchased the water. We are not at the point of setting up a water credit system.

x. Comment (MSGSA): Would think that this should be the property of the person who purchased it.

xi. Clarification (W&C): For today what we are trying to clarify is whether this water would be part of the developed supply estimate.

xii. Comment (MSGSA): For continue progress of the GSP, we are going to need to hold out on additional details of the allocation framework. Do not see being able to get our boards to approve greater detail in the time that we have.

xiii. Comment (MIUGSA): In order to have an exchange system in the basin, we have to agree on how to account for the water. For today, we are discussing whether there are other sources that should be reviewed and investigated. We should have something now that encourages people to start thinking and working together to look into having a robust water exchange market, a monitoring network, and so on.

xiv. Comment (W&C): Once we estimate the amounts, we need to look at who has the right to this water.

xv. Comment (MSGSA): We would want to ensure that intent to recapture is documented.

xvi. Comment (MSGSA): How can we prevent people from overpumping?

xvii. Comment (MSGSA): We would like to make sure that not all applied surface water is pulled out of sustainable yield. The rights will need to be determined. A portion of that percolation would go to the overlying bucket, but that is either going to the agency or the person who purchased and applied it.

xviii. Clarification (W&C): Where we are with the definition: We are underscoring the importance of future work needed. We will use the conceptual definition that "developed supply" is supply that is brought into the basin. It would not be limited to the definition in the plan. We may be required to have documentation of intent to recapture and can have a description of future work that would be needed. This includes estimates from seepage, refining conveyance losses, addressing rights to developed supply, and documenting developed supplies. We currently do not specifically talk about managed recharge.

xix. Comment (MSGSA): It is hard to prove deep percolation.

xx. Comment (MIUGSA): Common law says that this is once the water passes the root zone it is lost to the grower. However, this has to be accepted by the GSAs.

xxi. Comment (MSGSA): We should have a certification process if there is going to be additional documentation of deep percolation of applied surface water. It should be approved with a public process.

3. Public comment

   a. Question on the allocation: In April, GSAs agreed that all parcel's (including rangeland and undeveloped) would have equal allocation. Wasn't an agreement made that MSGSA would have full allocation.

   b. Clarification (W&C): That is more related to the developed land. What we are talking about is developed water.

   c. Comment (Public): Should do sooner rather than later, the subbasin should develop a credit system.

   d. Comment (MSGSA): Agree, would like to see this developed in the first year.

   e. Comment (MIUGSA): This should not be rushed. First should complete gaps in data, then complete metering, and then work on how we are going to move water and use the models to maximize how we use this.

   f. Comment (Public): It seems legally ambiguous whether the water lost to the growers goes back to the agency.

   g. Clarification (W&C): Developed supply includes supplies that are brought into the basin which would not otherwise reach the GW basin. Ownership would have to be determined. This definition would be included and not limited to definition in the plan. This could come online, with intent to recapture. This would include documenting, developing, and refining developed supply, and determining rights to this supply.

   h. Comment (Public): We can add the caveat that the water should be put to beneficial use.

i. Comment (W&C): Is the group ok with the consultant team revising the definition and then sending this to GSA staff.

j. Comment (MIUGSA): Would be good to include Bryan Kelly while Hicham is out.

k. Question (Public): Do the Sustainable Yield buckets change?

l. Clarification (W&C): No, buckets stay the same. In the future if there's additional supply then it goes in that current developed supply bucket. It would be cleaner to have developed surface supply with an asterix that it will be refined later with future steps.

m. Comment (MSGSA): still some lack of clarity for how we are going to estimate deep percolation.

n. Comment (TIWD): The current definition is fine, but we also agree that it will be very difficult to come up with estimates for deep percolation.

o. Comment (MIUGSA): Estimates are based on as much information as we have. Everything has to be approved by the GSAs.

p. Comment (MSGSA): Each GSA should be able to manage its Sustainable Yield of GW within its boundaries. However, when we were talking about overlying and underlying users in the basin, we agreed we'd determine allocation by acreage. Transferring credits within GSAs respective basins should be enabled if it's transferring among developed acres.

q. Comment (MIUGSA): We would like to put a hold on creating a credit system until we ensure we fill data gaps. We are ok with developed acres moving water to developed acres.

r. Comment (MSGSA): We want dormant overlying users to be able to have credits, but need to have a system to enable that process. This can be done down the road.

s. Clarification (W&C): We have said both developed and undeveloped land are at full allocation. If undeveloped land starts using their water, it is not going to reduce allocation for developed lands. What Bob is suggesting that the GSA has X TAF that they can administer the full amount for developed or undeveloped lands.

t. Comment (MIUGSA): We have to see how the cities are going to survive in looking to work toward sustainability. At this point, we would like to have time to get a better understanding to resolve ambiguity. We're not saying that we will not agree to this, but that we need time and more information, and do not need to make a decision today.

u. Clarification (W&C): MIUGSA had some concerns initially. We all agree that the Sustainable Yield estimates will need to be refined. We need to hold off on issuing credits and establish credit system. MSGSA agrees but also states that MSGSA would allocate within their own boundaries.

v. Comment (MSGSA): We are saying that each GSA can determine how the allocation works within their area.

w. Clarification (W&C): We are not going to set up an allocation framework. Options are to go to the GSA level split and allow each GSA to administer their amount of water in their GSA in the interim, or this can be limited to developed land.

x. Comment (MIUGSA): We can see how we divvy up undeveloped land across the basin. We have no reason to reach a decision on that today. This is a GSA decision, not GSP decision.

y. Clarification (W&C): There was agreement to use 0.7 AF/acre to come up with the GSA allocation numbers. However, GSAs have the ability to use the full amount for their developed and undeveloped parcels. This was a good faith agreement, but there may have been some miscommunication. Both MSGSA and MIUGSA gave some compromise, but there may have been a misunderstanding. What we can do for the plans for now is state what has been estimated for the Sustainable Yield for the basin, this is how discussed, and how credits could be used and worked out at a later time.

z. Comment/ (Public): The 440K AF should be the native water. We do not need to talk about developed or undeveloped land for the purpose of GSP.

aa. Clarification (W&C): The assumption is that there are about 200K acres that could be using water but are not. From previous discussions, before we allow transferring, we need to get more information. For purpose of the GSP, we can take the suggestion not to discuss developed or undeveloped lands for the GSP.

bb. Comment (MIUGSA): Everything done on our side is done to avoid adjudication in the basin. (In these cases, grazing grounds do not often get anything, have to pay to put in a well, etc.). We want to have a fair system and be good example through our GSA and have good cooperation.

cc. Comment (MSGSA): Our GSA echoes those comments and feels very positively about ability to communicate and resolve issues. We think we have the ability to make a difference long term. Having this discussion and working through these issues is very positive.

4. Next steps and adjourn

    a. Adjourned to the next regular meeting.

Next Regular Meeting
June 24, 2019 at 1:30 p.m.
Atwater, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org
Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: June 24, 2019 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☒	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
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☒	Mike Gallo	Merced Subbasin GSA
☐	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
   a. Alyson Watson (Woodard & Curran) called meeting to order. Members introduced themselves.
2. Approval of minutes for May 29, 2019 meeting
   a. Meeting minutes from May 29th were approved.
3. Stakeholder Committee update
   a. Update from May 29 morning meeting provided by Alyson Watson (W&C). SC group would like to remain involved and be able to give input. The agenda for SC followed closely to content with CC's agenda. Input from the SC will be provided as each item is gone through during today's CC meeting.

   b. Leadership Counsel provided a comment and letter to the Merced Subbasin GSAs. Representatives attending CC meeting communicated some of the recommendations including recommendation to set minimum thresholds based on the anti-degradation policy at the state level (per Bill 1968), with level set at best water quality since 2015. Where minimum threshold exceeds public health goals, the GSP should include a policy to strive for water quality improvements to meet relevant public health goals.
4. Presentation by Woodard & Curran on GSP development
   a. Next Steps in GSP Development

i. Alyson (W&C): We are taking more time to get through the administrative reviews. However, should still be on schedule for July 19th estimated Public Draft release date. July 22nd CC meeting will go through contents/allow discussion for comments. Are looking at Aug./Sept. to provide review and comments on the draft GSP.

ii. Sustainable Management Criteria will be released to SC and CC June 28th, rest of chapters to be available for comment with Public Draft.

b. Sustainable Management Criteria

i. Alyson reviewed summary of sustainable management criteria MOs, URs, and MTs per sustainability indicator.

ii. For water quality, the takeaway from May 2019 from both forums and from LC and the public was to consider including more constituents. The GSAs circled back with Merced County Division of Environmental Health and received the feedback that SGMA does not specify constituents to be set with MTs, GSAs do not have tools, responsibility, or resources to monitor and clean up water quality contamination, or other programs are tasked with that. The Division support the proposed MT rationale.

iii. Comment: Public agencies already have to comply with water quality requirements.

iv. Clarification: Can usually find contamination sites on Geotracker.

v. Comment: There are not that many currently active monitoring wells. That's a concern because we've set an upper limit of 1000 mg/L, but we don't have more information. Response: General concentrations for those selected wells for the network are on order of 300 mg/L.

vi. Clarification: Need to confirm we know where these areas are that are already over this threshold[1]

vii. Alyson (W&C) explained the current minimum threshold methodology for declining groundwater levels and issues with areas in which the model does not fit well due to a shallow geological issue.

viii. Suggestion/clarification from MSGSA: Add third element to methodology for groundwater elevation Minimum Threshold— use simulated GWLs where historical data shows GWLs may have already dewatered shallowest domestic wells or where modeling shows GWL may drop below the 2015 level. Much discussion occurred over this suggestion and the complications of the two wells with a model fit issue. Ultimately the group decided:

1. Not to include these 2 wells as representative wells (what is included is the best representation for the Subbasin)

2. Acknowledge that GSAs will need to develop a methodology (like this third option suggested by MSGSA) in the next GSP update and model will need to be calibrated for this (new methodology to be developed once model calibrated).

c. Monitoring Networks & Addressing Data Gaps

i. Alyson Watson (W&C) reviewed the status of the monitoring networks and data gaps for each sustainability indicator.

[1] Information on TDS concentrations across the basin are provided in maps containing the average 2008-2018 TDS concentrations in the Current and Historical Conditions section of the Water Budget chapter of the Merced GSP.

ii. Comments regarding the metering program:

1. Heard from SC in morning session that they want a very flexible metering program. Received feedback that folks do not want to have to replace their meters (they are good to go out and continue gathering their own data). There are different types of set ups for metering, and different types of meters.
2. Question: Has that white paper on metering been released? A: No, it will be part of of projects and management actions chapter, which will be available for SC & CC around July 19th.[1]
3. Clarification: Telemetry is a method where you can get the metering information sent, e.g., to your cell phone.
4. Comment: Could get a few subbasins to work together to get satellite imagery in lieu of metering. If we could get the state to provide annual numbers – this could be huge.
5. Alyson: Hicham mentioned getting ITRC to attend a CC meeting. This is still in progress and will be revisited when Hicham comes back from vacation.

d. Plan Implementation

i. Request for input on assumptions:

1. We are assuming existing MOU will remain in place.
2. Interbasin coordination will continue.
3. We are reaching out to understand cost for GSA operating/administrative costs.
4. Much discussion was held about the role and frequency of the SC in the future during GSP implementation and CC consensus was reached:
    a. It is important to have continued input from the SC, particularly as the first few years of the GSP implementation will require crucial decisions for the Subbasin.
    b. SC and CC meetings would be staggered. (stagger can be a couple weeks, not a whole month, so as to have enough time for documentation of input from SC meeting to CC meeting and vice versa). These meetings would occur quarterly. It was agreed a liaison position for a member of the SC could be created by decision of the GSAs.
5. Also agreed that assumed 2 public outreach workshops per year.
6. Comment: Would be good to have public comment come as first agenda item.
7. CC agreed that if a GSA implements a project that they are expanding their allocation. Can start at the GSA level and be clear that there is a basinwide option.
8. People on the SC communicated they want to continue on the committee to provide input.

e. Water Allocation Framework

[1] Correction: this is a technical memorandum that will be added as an appendix to the Plan Implementation Chapter of the Merced Draft GSP.

i. Alyson (W&C) recounted the content and purpose of the Special Session of the CC.

    1. Purpose was to discuss language in the draft GSP on Developed Supply and Water Allocation Framework. General agreement that the numbers in draft GSP (allocation estimates) will remain for the Draft GSP. Miscommunication identified in agreement on whether GSAs can determine allocation within their own boundaries between developed and undeveloped lands.

ii. Recommendation and follow up from meeting:

    1. Include working definition of developed supply.
    2. Note that the full definition and ownership of developed water would need to be agreed upon by GSAs after adoption. Groundwater originating from developed supply could include seepage from unlined surface water conveyance, deep percolation of applied surface water, leakage from surface water infrastructure, and potentially other sources.
    3. Add footnote that developed supply in this GSP was calculated based on estimated seepage from unlined conveyance and will be refined and further documented in the future.
    4. Identify future work needed for GSP updates including: develop, refine, and document estimates of developed supply and determine rights to confirmed estimates of developed supply

iii. Clarification (W&C): Exchange system will not be discussed in the GSP.

iv. Question: The layout of steps would be in the GSP? Answer (W&C): The GSP is not going to document how GSAs are managing their allocation because we do not have that information yet.

v. Question: What are the management practices needed other than an exchange system if we want to agree on an estimated number that we want to use to actively manage? MSGSA Reply: All lands under each GSA receive water.

vi. MIUGSA: If we have not confirmed what the allocation is at a GSA level, what would MSGSA put into place to manage the allocation? We have mechanisms to manage this in a city and can document steps to achieve a concrete path to management. If MSGSA wants local control, everyone needs to know that there are mechanisms for management.

vii. MSGSA: We would manage this as a total, whatever the total allocation is for sustainable yield of overlying water – this is the "bucket" that would be managed.

viii. MIUGSA: To clarify, if MSGSA reaches that allocation number, folks would be asked to stop drawing water? MSGSA: Yes, by 2040.

ix. Clarification discussion:

    1. MSGSA: It is not our understanding that we would have undeveloped lands already transfer credits.
    2. Agreement: All GSAs agree that allocations to developed acres can be shared with other developed acres.
    3. Question: If the County has to issue the well permit, how are you going to adjust allocations each year based on the new permits? We want to prevent the type of management where land changing from not developed to developed gets an allocation without some kind of accounting system.

x. Clarification from W&C: The initial approach was developed with understanding that GSAs would have discretion to allocate within their boundaries. It is important to consider that, if we do not allow usage to undeveloped land, we are telling MSGSA that they have to reduce by half.

xi. MIUGSA: We gave on the 80% because this was requested by MSGSA, with agreement that there not be a credit system. We think we need to bring this back and establish whether and why some areas have not had historical use.

xii. Continued back and forth discussion with agreement that continued discussion is needed to clarify areas of disagreement and find solution. Request made to review past discussion and get everyone up to speed on development of allocation framework discussion.

xiii. Alyson (W&C): Continued discussion can also include how often these allocations should be updated, and how new wells come online each year.

5. Public Outreach update
   a. Public workshop summary is posted.
6. Coordination with neighboring basins
   a. Currently in process of scheduling a meeting with Delta-Mendota for late July.
7. Public comment
   a. Letter presented by Leadership Counsel. This letter has been attached as an appendix to the meeting minutes.
8. Next steps and adjourn
   a. Be on lookout for Sustainable Management Criteria draft on June 28th.
   b. Adjourn to next meeting on July 22.

Next Regular Meeting
July 22, 2019 at 1:30 p.m.
Atwater, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org
Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

Larry Harris, Turner Island Water District GSA #1
Mike Gallo, Merced Subbasin GSA
Nic Marchini, Merced Subbasin GSA
Bob Kelley, Merced Subbasin GSA
Daniel Chavez, Merced Irrigation-Urban GSA
Justin Vinson, Merced Irrigation-Urban GSA
Stephanie Dietz, Merced Irrigation-Urban GSA

June 21st, 2019

Re: Concerns and Recommendations to Ensure that Merced Subbasin GSP Protects Vulnerable Drinking Water Users

Dear Merced Groundwater Sub-basin Coordinating Committee members,

Our organization works alongside low income communities of color in the San Joaquin Valley and the Eastern Coachella Valley to advocate for local, regional and state government entities to address their communities' needs for the basic elements that make up a safe and healthy community, including clean, safe, reliable and affordable drinking water, affordable housing, effective and safe transportation, efficient and affordable energy, green spaces, clean air, and more. We have been engaged in the Sustainable Groundwater Management Act (SGMA) implementation process because many of the communities with whom we work are dependent on groundwater for their drinking water supplies, and often have already experienced groundwater quality and supply issues. Historically, communities we work with have not been included in decision-making about their previous water resources, and their needs have not been at the forefront of such decisions. In 2012, California recognized the Human Right to Drinking Water as a statewide goal. Now, because of SGMA's requirements for a transparent and inclusive process, groundwater management under the new law has the opportunity to include disadvantaged communities in decision-making and create groundwater management plans that understand their unique vulnerabilities and are sensitive to their drinking water needs.

We are concerned that drinking water impacts and disadvantaged community input have not been adequately analyzed and incorporated into the draft GSP, and recommend the following actions to ensure that drinking water is protected, especially for the communities whose drinking water is severely at risk from groundwater management activities, and who are the least able to pay for solutions for clean and reliable drinking water.

Development of Sustainable Management Criteria

In order to “consider the interests of”[1] disadvantaged communities in developing sustainable management criteria, GSAs must address the impacts of the six sustainability indicators, engage residents of disadvantaged communities to understand their groundwater issues and needs and get input on how to shape sustainable management criteria, and analyze the impact of preliminary minimum thresholds on drinking water users before establishing minimum thresholds.

Under SGMA, ***all sustainable management criteria must be based on the GSA’s determination of what will cause a “significant and unreasonable” impact on each of the six sustainability indicators.*** [2] This determination of what is “significant and unreasonable” must be based on the needs of all beneficial users.[3] Without first consulting beneficial users, including disadvantaged communities, to understand what groundwater impacts those individuals and communities want to avoid, the GSA cannot make a valid determination of what is “significant and unreasonable”, and thus cannot set valid sustainable management criteria.

In the Merced subbasin, GSAs and consultants had initial discussions at the first few stakeholder committee meetings about the general impacts that stakeholders on the committee wanted to avoid as they developed the GSP. On August 27th, 2018, consultants began more concrete conversations on the minimum thresholds, proposing groundwater levels minimum thresholds at the lowest historical elevation, plus a buffer, unless this would dewater no more than 25% or the shallowest nearby domestic wells. Consultants also proposed a second methodology that could protect more wells by establishing the minimum threshold at the level of the shallowest well, or the 25th percentile level, whichever was higher. For groundwater quality, consultants proposed only doing a minimum threshold for total dissolved solids and not other contaminants despite their knowledge that the subbasin has water quality issues from nitrates, DBCP, 123-TCP and other contaminants[4], and that their groundwater management activities could impact the concentration and location of those contaminants. Our organization and Self-Help Enterprises both voiced concerns with these thresholds, both in their substance and also because they were not based on a participatory determination of what stakeholders in the subbasin consider to be “significant and unreasonable” impacts from the sustainability indicators.

Subsequently, the Merced Subbasin GSAs hosted several workshops at which they asked the public for feedback on what they considered to be significant and unreasonable impacts. Our organization and Self-Help Enterprises worked with GSA consultants to ensure that workshops were accessible to disadvantaged communities, and that the presentations would go beyond presenting updates and be geared towards soliciting meaningful feedback. After the workshops and several more conversations with the Stakeholder Committee in April and May 2019, at which Leadership Counsel and Self-Help Enterprises stressed the importance of protecting drinking water for disadvantaged communities, consultants are now proposing that groundwater levels minimum thresholds be set at the depth of the shallowest well in the 2-mile radius around each monitoring well, or if the water levels are already below that level then setting

[1] Water Code sec. 10723.2
[2] CCR sec. 352.28(a), 354.30(b), 354.26(a)
[3] CCR sec. 352.28(b)(4)
[4] Merced Subbasin Groundwater Sustainability Plan Current and Historical Groundwater Conditions

the minimum threshold at 2015 levels. We believe public and stakeholder feedback on "significant and unreasonable" impacts to drinking water informed the improvements to the groundwater levels minimum threshold have come from, but it is still not clear what impact the 2015 levels will have on nearby drinking water users, or how many wells will not be taken into account that are outside the 2-mile radius around monitoring wells. For groundwater quality, despite our feedback that consultants look at addressing all contaminants, the GSAs still only propose a minimum threshold for total dissolved solids. There has been no meaningful discussion with the public or stakeholders about whether this will cause "significant and unreasonable" impacts to drinking water resources for beneficial users.

In order to effectively "consider the interests of" all beneficial users, GSA committees must analyze how preliminary sustainable management criteria will affect drinking water users before reaching proposed final sustainable management criteria.[5] Our experience demonstrates that once recommendations are made at the committee level, it is difficult to reassess those recommendations once they reach the governing board, so such a decision cannot overlook impacts on the most vulnerable groundwater users. Before asking committees to make recommendations to GSA staff, committees must be equipped with information about how potential minimum thresholds will impact access to drinking water for domestic well owners and communities on small community water systems. To date and to the best of our knowledge, the Merced subbasin GSAs have not conducted an analysis of how drinking water will be impacted by the groundwater quality and groundwater levels minimum thresholds proposed by consultants. Specifically, we request that the GSAs ensure that an analysis be done of the impact to domestic well users and small community water systems from the proposed minimum thresholds for groundwater quality and groundwater levels. With this drinking water impact analysis, the stakeholder committee can be equipped with the necessary information to determine whether impacts from these proposed minimum thresholds will be "significant and unreasonable."

The GSP development process must be representative of the interests of all beneficial users named in the Act. When board members do not come from disadvantaged communities or understand the unique groundwater needs of such communities, as is the case more often than not, ***it is imperative for the agency to reach out to disadvantaged community members for input*** before making key decisions such as recommending or proposing draft sustainable management criteria. The Merced GSAs' consultants have worked with Leadership Counsel and Self-Help to do outreach to disadvantaged communities for workshops, and have regular calls with our organizations to coordinate outreach to disadvantaged communities. At GSA meetings, to which community residents' schedules prevent them from coming, Leadership Counsel and Self-Help Enterprises helps provide feedback on GSP development on behalf of community residents. We are grateful that the GSA consultants actively reach out to us for suggestions on how to do such outreach, and hope that our organizations have been able to help the GSAs and

[5] California Department of Water Resources, Sustainable Management Criteria Best Management Practices, p. 9. The GSP must discuss how groundwater conditions at a selected minimum threshold could affect beneficial uses and users. This information should be supported by a description of the beneficial uses [of] groundwater and identification of beneficial uses, which should be developed through communication, outreach, and/or engagement with parties representing those beneficial uses and users, along with any additional information the GSA used when developing the minimum threshold.

consultants learn how to do more effective outreach to disadvantaged communities in the area. As the GSAs develop their sustainable management criteria and projects and management actions, they must ***show that they are meaningfully implementing the input*** that they are receiving from disadvantaged communities and disadvantaged community advocates regarding their drinking water needs.

Groundwater Quality Minimum Threshold Recommendation

Groundwater quality has been a particularly complex issue for GSAs. In determining how they will set their sustainable management criteria for groundwater quality, GSAs have considered many factors, including the state Maximum Contaminant Levels (MCLs), other agencies monitoring and regulating groundwater contaminants in the region, areas where MCLs are already exceeded, and ways that groundwater management could impact the concentration and movement of groundwater contaminants.

We understand the complexity of setting groundwater quality SMC that are accurate, attainable and measurable, and we are eager to work with the Merced subbasin GSAs to ensure that groundwater management does not increase groundwater contamination, especially where groundwater is being used as a drinking water source. Consultants for the Merced subbasin GSAs have stated they would only be monitoring for total dissolved solids. Given the need for a concrete minimum threshold that strongly protects the human right to drinking water, we recommend that the Merced subbasin GSAs instead implement the following minimum thresholds:

- Minimum thresholds for water quality should be set at the best water quality since 2015 for each constituent.
- Where the minimum threshold exceeds the public health goal for any constituent, the GSP should, at a minimum, include a policy to strive for improvements to water quality to the point of meeting the relevant public health goal(s).

The reasoning behind these minimum thresholds is that the GSA is tasked with avoiding any undesirable results, and contamination of groundwater and other drinking water sources is a “significant and unreasonable” impact to the resource that we all need to drink, cook, bathe, grow food, and more. Accordingly, minimum thresholds must ensure protection from and prevention of contamination of groundwater and other drinking water sources. DWR instructs GSAs to look to existing groundwater regulatory programs and water quality standards.[6] Many GSAs have proposed incorporating the existing MCLs into their minimum thresholds, however reliance on an MCL is not sufficiently protective of drinking water sources, and does not prevent contamination of our critical resources. An appropriate standard in the context of groundwater protections is the state’s anti-degradation policy, which is used by the SWRCB and regional water boards, and does not allow for further contamination of groundwater based on the best quality of the water since 1968.[7] In the SGMA context, it is key to prevent further

[6]California Department of Water Resources, Sustainable Management Criteria Best Management Practices, p. 15.
[7] *Asociacion de Gente Unida por el Agua v. Central Valley Regional Water Quality Control Bd.* (2012) 210 Cal.App.4th 1255, 1268.

degradation of groundwater quality to protect drinking water. We are asking the GSA to specifically look at protecting the highest quality of groundwater achieved since 2015, based on the year that SGMA was passed. Another rule commonly used in environmental law is the precautionary principle, which prohibits activities that could cause harm when the amount of potential harm is unknown. We urge the GSA to use these two rules, combined with seeking to remediate groundwater to the public health goal, as laid out above, to ensure that groundwater management does not cause degradation of groundwater quality.

GSAs should monitor all primary drinking water contaminants, as well as chrome-6[8], which is known has significant health effects but is undergoing a new process to set the MCL because of procedural flaws. It is widely known that the San Joaquin Valley experiences widespread water quality issues from nitrates[9], DBCP[10] [11], 123-TCP[12] and other contaminants, and the GSA's groundwater management activities could impact the concentration and location of those contaminants. Where relevant, GSAs should also consider monitoring for PFOA and PFOS as the EPA has established a Lifetime Health Advisory for them due to their potential impacts on drinking water systems.[13] This should especially be considered in the Merced Subbasin as they have they have identified these as emerging contaminants in their "Current and Historical Groundwater Conditions" Draft GSP Chapter. GSAs should also monitor contaminants that are proven to increase from groundwater management, such as arsenic and uranium,[14] increased contamination from recharge,[15] movement of contaminant plumes from groundwater pumping, and other groundwater management activities.[16]

Water Quality Considerations for Groundwater Management Actions

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[8] Hausladen, Debra M., et al. "Hexavalent chromium sources and distribution in California groundwater." *Environmental science & technology* 52.15 (2018): 8242-8251.

[9] *Addressing Nitrate in California's Drinking Water: With a Focus on Tulare Lake Basin and Salinas Valley Groundwater: Report for the State Water Resources Control Board Report to the Legislature*. Center for Watershed Sciences, University of California, Davis, 2012.

[10] Peoples, S. A., et al. "A study of samples of well water collected from selected areas in California to determine the presence of DBCP and certain other pesticide residues." *Bulletin of environmental contamination and toxicology* 24.1 (1980): 611-618.

[11] Loague, Keith, et al. "A case study simulation of DBCP groundwater contamination in Fresno County, California 2. Transport in the saturated subsurface." *Journal of Contaminant Hydrology* 29.2 (1998): 137-163.

[12] Burow, Karen R., Walter D. Floyd, and Matthew K. Landon. "Factors affecting 1, 2, 3-trichloropropane contamination in groundwater in California." *Science of The Total Environment* 672 (2019): 324-334.

[13] "Drinking Water Health Advisories for PFOA and PFOS." *EPA*, Environmental Protection Agency, www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos.

[14] Jurgens, Bryant C., et al. "Effects of groundwater development on uranium: Central Valley, California, USA." Groundwater48.6 (2010): 913-928.; *also see* "Groundwater Quality in the Sustainable Groundwater Management Act (SGMA): Scientific Factsheet on Arsenic, Uranium, and Chromium," found at https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328800/Groundwater_Quality_in_SGMA_Scientific_factsheet_on_arsenic__uranium__and_chromium.pdf?1559328800

[15] Ground Water Recharge Using Waters of Impaired Quality (1994) https://www.nap.edu/read/4780/chapter/3

[16] Moran, T., & Belin, A. (2019). *A GUIDE TO WATER QUALITY REQUIREMENTS UNDER THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT*. Retrieved from https://purl.stanford.edu/dw122nb4780.

To establish causality between groundwater management activities and groundwater contamination, GSAs should look to (1) whether there has been a correlation in groundwater management activities and an increase in contamination that could result from groundwater management activities, (2) relevant scientific studies that show proven mechanisms by which causation can be established between groundwater management activities and groundwater contamination, and (3) data and samples collected showing a causal nexus in the case at hand.

Finally, in order to effectively protect drinking water resources, GSAs should establish Management Areas in areas that are more vulnerable to groundwater contamination, such as communities with many shallow wells and communities that cannot afford to install drinking water filters or treatment facilities.

Groundwater Levels Minimum Threshold Recommendation

GSAs must protect drinking water, and must consider the needs of disadvantaged communities and domestic well users in creating their GSPs. The California legislature has stated that the use of water for domestic purposes is the highest use of water,"[17] and passed the Human Right to Drinking Water in 2012.[18] After the passage of SGMA, GSAs now have the responsibility to protect drinking water through groundwater management. If they choose to allow individuals to keep pumping at the expense of severe drinking water impacts, that is a groundwater management decision that violates their obligation to protect drinking water resources. GSAs must therefore have strong minimum thresholds that protect all drinking water wells from dewatering.

Minimum thresholds are the most pivotal measure for how a GSA will prevent impacts from a sustainability indicator. This is the point that a GSA must avoid, and could necessitate state intervention. There is some flexibility, however; for groundwater levels, DWR shows in its Sustainable Management Criteria Best Management Practices guide that it will allow a GSA to dip below its minimum threshold for groundwater levels in some cases, as long as its GSP will ensure that it comes back up and towards its measurable objective. Therefore, GSAs should strive to set minimum thresholds at levels that they seek to avoid.

GSAs should set minimum thresholds for groundwater levels at the level of the shallowest existing wells in use, with a buffer above the depth depth of the top of the screen. If GSAs choose not to do so, they must take on the responsibility for the wells that do go dry from this policy choice. If proposed minimum thresholds allow wells to go dry, a GSA must conduct a drinking water impact analysis to evaluate how many drinking water wells will go dry, set management areas for shallower minimum thresholds where there are more concentrated shallow domestic wells, and ensure that drinking water is protected by implementing preventive actions such as digging deeper wells and assisting with

[17] Water Code sec. 106.
[18] Water Code sec. 106.3

consolidation projects. It is important to note that prevention, not mitigation, is the only way to effectively protect drinking water resources.

Consultants for the Merced subbasin GSAs are currently proposing that the groundwater levels minimum thresholds be set at the depth of the shallowest well within a 2-mile radius of monitoring wells, or if the water levels are already above that level then setting the minimum threshold at 2015 levels. We request that the GSAs set all minimum thresholds at a level to provide a buffer above the depth of the top of the screen of the shallowest well. The buffer must be adequate to ensure that the shallowest well does not go dry due to a short or medium-term exceedance of the minimum threshold. The GSAs should only disregard wells that they can prove are not in use.

In setting groundwater levels minimum thresholds, GSAs should also set minimum thresholds high enough as to avoid groundwater contamination from overpumping. They should also set minimum thresholds that ensure that rural communities have equitable access to groundwater resources, and have enough for current needs and future growth. GSAs must also factor in the increased costs of pumping and installing new wells if groundwater levels decrease, and avoid additional costs in groundwater access for low income communities dependent on groundwater for drinking water resources. GSAs should also set minimum thresholds for groundwater levels that will prevent subsidence from occurring and disrupting infrastructure that is critical to the health and safety of vulnerable communities, such as private wells, roads, and homes.

Monitoring Network

Broadly, the GSAs must develop actionable steps to fill data gaps and monitor groundwater levels and groundwater quality. In order to protect drinking water resources, monitoring networks should be closely monitoring impacts on drinking water. In particular to water quality, GSAs should monitor for contaminant concentrations quarterly, and increase monitoring to every month if a water quality test detects higher contamination concentration than the previous water quality test. Testing should also robustly monitor plume migration especially given the high number of water users in the Merced subbasin.

As a result, the GSP should fund a water quality testing program for strategically identified domestic wells to complement data from small water systems and disadvantaged communities in order to fill existing data gaps as well as begin to identify contaminant plumes. To track these concerns the GSA should place monitoring wells near DACs and clusters of domestic wells.

We look forward to providing further recommendations on the monitoring network in the future.

Transparency and Inclusivity

As public agencies, GSAs are subject to the requirements of the Ralph M. Brown Act, which requires transparency of public agencies through notice of meetings and prior posting of agendas, posting of meeting minutes after meetings, and public access to meeting materials upon request by a member of the public. In addition to Brown Act requirements, GSAs must also adhere to the specific public participation and inclusivity requirements for GSP development laid out in SGMA. SGMA expands the public participation requirements of GSAs to also "*encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin prior to and during the development and implementation of the groundwater sustainability plan*." (Water Code sec. 10727.8) To assist in GSAs complying with this requirement, DWR has published guidance on public notice and engagement, highlighting good practices for effective engagement. Both the letter and spirit of SGMA communicate that GSAs must conduct GSP development in an open and inclusive way.

A best practice to ensure authentic, meaningful input as required by SGMA is to post meeting materials before the meeting, so that these materials are available to the public for feedback and engagement. The Brown Act requires these materials to be made available after the meeting upon written request of the public. Paired with SGMA's requirements for robust community engagement, the most effective way to ensure that the public is aware of what will be talked about at meetings, and to access critical GSP development information despite not being able to attend one meeting, is to post all meeting materials online before the meeting. The Merced Subbasin GSAs send out meeting notices with an agenda, and have an easily navigable website that contains meeting agendas, presentations and minutes for each meeting. However, the GSAs would facilitate more effective public engagement at the meetings if they were to post meeting presentations ahead of time, so that attendees could view the discussion items and data before the meeting.

GSAs should also ***dedicate sufficient funding to ensure meaningful, effective, and accessible engagement of the public***. We, along with Self-Help Enterprises, have worked with the Merced subbasin GSAs' consultants to improve outreach to disadvantaged communities. We have helped give input on several workshops, and have helped conduct outreach for those workshops. We have also kept community residents informed about GSP developments at community meetings. Self-Help has conducted translation and interpretation at meetings to ensure that Spanish-speaking residents can meaningfully engage at GSA workshops. However, we note that the Merced subbasin GSAs' consultants said that there was not enough funding for translation. Having food at evening meetings is also key to ensuring that residents who have worked all day can come to meetings, so the GSAs should allocate funding for food at public workshops. Given the type of outreach that is necessary in order to engage disadvantaged communities, the GSAs should also hire bilingual staff or consultants who can help conduct door-to-door outreach, attend community meetings, translate materials, and interpret at all GSA meetings. In creating annual operating budgets, GSAs should prioritize funding for these necessary outreach activities.

Projects and Management Actions

Projects and Management Actions are a crucial part of the GSP, since they demonstrate how the GSA plans on attaining the sustainability goals that they have set out. Therefore, GSAs should set specific timelines and triggers for projects.

We look forward to commenting further on recommendations for projects and management actions that will protect drinking water for the most vulnerable groundwater users.

Groundwater Markets

We have engaged in many discussions around the state about groundwater markets, and continue to warn against them. Commoditizing precious drinking water resources is dangerous and inequitable, since it lets those with more purchasing power have access to more water, and more likely than not will lead to concentrations of over-pumping by large agribusinesses, leaving nearby communities without drinking water. Furthermore, given all GSAs' severe lack of data on domestic wells and water use in their service areas, and our region's lack of understanding of how a market could impact groundwater use and subsurface groundwater flows, implementing groundwater markets now would be precipitous and reckless.

We know that Merced subbasin GSAs are considering doing a groundwater market, and consultants have communicated at meetings that they will be taking at least five years to collect the data and understand the impacts of a groundwater market for the Merced subbasin. We encourage the GSAs to take time to gather extensive data on existing groundwater resources and drinking water needs and analyze the potential impacts to drinking water before considering implementation of a groundwater market. We look forward to giving more feedback on the potential of developing a groundwater market in the Merced subbasin in the future if the subbasin decides to consider such an action.

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We look forward to speaking more in depth with consultants and the coordinating committee about our recommendations. We hope that the Merced subbasin GSAs will consider the above recommendations, and hope to collaborate with the GSAs to ensure that the GSP protects the subbasin's most vulnerable drinking water users.

We are also in communication with the Department of Water Resources about current GSP development activities in the San Joaquin Valley, and hope to successfully work with GSAs, communities and DWR to ensure that groundwater management is equitable and sufficiently protective of vital drinking water resources.

Sincerely,

Leadership Counsel for Justice and Accountability

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: August 26, 2019 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☐	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
    a. Alyson Watson (Woodard & Curran) called the meeting to order. Committee members introduced themselves.
2. Approval of minutes for July 22, 2019 meeting
    a. Minutes from July 22nd were approved.
3. Presentation by Woodard & Curran on GSP development
    a. Update on Public Comments Received on draft GSP
        i. Alyson (W&C) reviewed the GSP draft timeline.
    b. Plans for September 18 Joint GSA Boards Meeting
        i. Discussion will be focused on the Draft GSP comments and how to incorporate.
4. Prop 68 Funding Opportunity
    a. Alyson (W&C) presented a summary of the Prop 68 Funding Opportunity as well as a summary of the implementation activities that could be included in the funding application.
    b. Staff recommended assembling a small working group to decide what to include in grant application and requesting authorization from GSA Boards to fund preparation of the application itself.

c. CC members expressed concern that there may need to be additional meetings beyond September Joint Board Meeting to finish preparation and finalization of the GSP that would require use of the contingency, so it would be wise to request additional funding for the grant application preparation.

d. CC voted and unanimously approved that the consultants should start working on the Prop 68 grant application and bill to the contract contingency while the GSAs discuss with their boards to authorize an amendment by September 18.

e. Working group volunteers are: Hicham ElTal, Lacey Kiriakou, and Dena Traina (Provost & Pritchard)

5. Water Allocation Framework Discussion

   a. Alyson (W&C) provided a summary of previous discussions and provided some clarification and distinction between several sets of numbers that have been presented previously.

   b. Q: How do the sustainable yield values compare to what we've seen before? The current overall value doesn't appear to match some of the values presented previously in different regions. A: The number is 90,000 AFY for the entire Basin as a whole. Depending on where you are in the basin, it could be more or less compared to where your pumping is compared to the average.

   c. Q: Is the 2040 projected conditions the best baseline for comparison? A: It's based on SGMA compliance being needed by 2040, which would be the Projected Conditions. We should focus on the Sustainable Yield which is the same at all years.

   d. Q: Does 2040 projected conditions include implementation of GSP projects? A: No.

   e. Q: Is urban water use reduction included in the model of the 2040 projected conditions? A: It includes projected water use in 2040 which includes water use efficiency improvements but also population increases largely based on Urban Water Management Plan projections. Cropping patterns were generally based on current cropping patterns per direction from the GSAs.

   f. Q: How is the planned significant growth in UC Merced, City of Merced, etc. accounted for in the model? A: It's already included in the projected conditions scenario as part of the City's own projections for its water use.

   g. Alyson (W&C) summarized inter-GSA coordination efforts agreed on and what next steps are needed. Also shared that an ad-hoc committee is recommended to work in parallel with the GSP to develop.

   h. Q: What role do you see for the Stakeholder Committee in the ad-hoc allocation committee? A: This ad-hoc committee is intended to be more for GSA staff, but some items need to be put in the GSP vs others are too soon to discuss and won't be part of the GSP.

   i. CC supported development of an ad-hoc committee for development of an allocation framework, with the following members: Hicham ElTal, Ken Elwin, Mike Gallo, Larry Harris, and Bob Kelley.

6. Public Outreach update

   a. Charles (Catalyst) provided an update on public outreach activities, including community meetings put on by SHE and Leadership Council, the public September 18 Joint Board meeting, and the Adoption Hearings in Fall 2019.

   b. Comment: SHE and Leadership Council are spread thin and are concerned that the 30-day comment period was too short for full engagement with their communities and thus now encourage GSAs to consider ways to extend time and find ways to fund future additional DAC outreach. Also to consider expanding the Prop 68 working group to include a voice for DAC communities or to quantify benefits to DACs.

7. Coordination with neighboring basins

a. Hicham ElTal (MIUGSA) described a comment letter received from Delta-Mendota Subbasin representatives about subsidence and highlighted need to coordinate on objectives and thresholds between subbasins.

b. Comment: If we stopped pumping and everyone still farmed, the ground will still sink (subsidence continues), so setting a goal of 0 does not make sense.

8. Informational Item - Groundwater Tracking with Remote Sensing – Presentation by Dan Howes, ITRC
    a. Dan Howes was invited by the Coordinating Committee to talk about the technology for using remote sensing to measure groundwater use in lieu of metering which is potentially being considered for GSP implementation.
    b. (see separate PDF with PowerPoint slides)
    c. General costs of the remote sensing services would be $40,000/yr service for agencies with surface deliveries. More like $25,000/yr (due to simpler setup) if surface water deliveries are not used. Cost can vary with level of riparian areas that need more investigation/setup.

9. Public comment

    a. No comments.

10. Next steps and adjourn

    a. Next public meeting is September 18 @ 6PM Joint GSA Board Meeting to review and discuss public comments on draft GSP.

Next Regular Meeting
September 18 @ 6PM
Sam Pipes Meeting Room, Merced, CA (subject to change)
Information also available online at mercedsgma.org

Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

DRAFT

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordinating Committee Meeting

DATE/TIME: October 28, 2019 at 1:30 PM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Coordinating Committee Members In Attendance:

	Representative	GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☐	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☐	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to order
    a. Alyson Watson (Woodard & Curran) called the meeting to order.
    b. Minutes from previous meeting were approved.
2. Stakeholder Committee update
    a. Alyson (W&C) provided a summary from the October 28 Stakeholder Committee (SC) morning meeting. The meeting included discussion of the next steps in finalizing the GSP and the sustainable management criteria for water quality and subsidence. The SC also discussed the role of the SC during the implementation phase. The SC wants to continue to meet if their input will be used by the CC and suggested the schedule for future SC meetings be based on topics that need to be discussed. The group expressed an interest in potentially meeting jointly for some discussions or otherwise having an opportunity for direct input to the CC.
3. Finalizing Merced Subbasin GSP
    a. Alyson (W&C) reviewed the timeline for finalizing the GSP. The draft response to comments is posted on the MercedSGMA.org website. It includes a redline of the GSP showing edits based on comments and a master response to comments organized by 20 topics (see slide for full list). Master response and comment letters will be included as an Appendix to the GSP.
    b. Joint GSA Boards Meeting September 18, 2019

i. Alyson noted that SGMA does not require GSAs hold a public comment period. The Merced GSAs decided to hold the 30-day public comment period as a good faith effort to gather additional public input. Comments were also received at the Joint GSA Boards Meeting on Sept. 18th.This is an addition to the 60-day public comment period that DWR will hold once the GSP is submitted.

c. Concurrence with response to Public Comments Received on draft GSP

   i. The responses to comments on the draft GSP come in a couple of forms: There is a redline version of the GSP that contains all of the suggested changes in redline. There is also a master response to comments by topic. The GSP Appendix will include all of the letters that were received. There were comments received on a wide range of topics for the draft GSP. The Master Response to Comments is up on the website. Two topics are the focus of today's meeting and discussion: the sustainable management criteria for subsidence and water quality.

   ii. Subsidence:

      1. Alyson provided some background information on subsidence in the basin: it is a gradual process that takes time to develop and time to halt. Subbasin may not be able to fully stop subsidence but can slow it and reduce impacts. She noted that despite wetter conditions 2017-2018, there was still between -0.17 ft/yr and -0.32 ft/yr observed in the portion of the subbasin.

      2. Alyson compared the sustainable management criteria that are included in the Merced GSP and in the neighboring basins of Chowchilla and Delta-Mendota.

         a. Merced GSP management criteria based on historical subsidence rates observed.

         b. Chowchilla is using GWLs as a proxy for subsidence in the lower aquifer only (they are using this for both MT and MO). They are using an adaptive management approach with a trigger of -0.25 ft/yr for 3 years in Eastern main aquifer.

         c. In Delta-Mendota they have measurable objectives that vary by GSP and region, but most are between -0.01 to -0.1 ft/yr. For minimum threshold, they (again various by GSP) but have between -0.1 to -0.2 ft/yr. San Joaquin River Exchange Contractors: The MT is narrative: "that which doesn't reduce SJREC's conveyance capacity without appropriate mitigation."

      3. Alyson further described Merced GSP approach. MT and MO set based on historical subsidence rates. Some level of future subsidence, likely at similar rates, likely to be underway already and will not be able to be prevented. GSAs will continue coordinate efforts with Chowchilla & Delta-Mendota to develop regional and local solutions to regional subsidence

      4. The five-year update can look at options to utilize additional data sets including using DWR's Interferometric Synthetic Aperture Radar (InSAR) data.

      5. Clarification (W&C): We don't expect zero subsidence. It may continue at rates that we've seen. We also know that we will have to continue coordination.

      6. Question from CC member: Have we asked the state about the different guidance given to Chowchilla from DWR? Answer (W&C): We found out Chowchilla received different guidance than the Merced Subbasin received in our conversations with

DWR only today. There is nothing in SGMA that says each neighboring basin must use the same measure for subsidence.

7. Comment from CC member: We need to be coordinated with the neighboring basins. Different basins should not be taking different approaches. It appears we are allowing for more subsidence than D-M. In 2006, there was a very heavy flood year. In this year the lower SJ Flood District near highway 152 and north of this, was within 6 inches of breaking. Since that time, we've lost 5 feet, maybe more. With that levee system, if that fails, we'd be hard pressed to build it again, let alone the damage the water would do especially if it went out to the east sides (would decimate some of the earthen canal system in this location). Would like to see an arrest to subsidence as soon as possible. It is difficult to put a target minimal amount out there. However, we have to do something along those lines. What we would like to see is that there is a plan to get subsidence to a certain number.
8. Response from CC member: This means we would be watching levels below the Corcoran. We had a recommendation from a hydrogeologist for what they need to do to get an understanding of what is happening and is it stabilizing below the Corcoran. This might not be something we can put in the plan now but could be something for the plan update.
9. Alyson (W&C): The map provided on the slides shows the ranges of rates of subsidence. To give a little context, using data from USBR from 2011-2017 can see that Chowchilla has seen more subsidence. The MTs and MOs they have established are less than the historical subsidence shown on this map.
10. Input from member of Public: (Individual is involved with the Triangle T GSA in the Chowchilla Subbasin). There are two management areas in the Chowchilla Subbasin, including in Chowchilla Water District to the west. The way that it is being managed is above and below Corcoran. Above the Corcoran the MT is at the top of the Corcoran Clay. This is about managing the upper aquifer. The lower aquifer uses GWL from 2012 as a proxy unless it's already below that. Water levels cannot be taken any lower than they already are. There is going to quickly be an allocation system within that management area (within a year or two). In Chowchilla, Western below Corcoran areas will be managed via allocation. This involves the County GSA, and Triangle T GSA, and Clayton Water District (lattermost is not a GSA).
11. Alyson (W&C): Our options with respect to finalizing the GSP are to 1) leave SMC for subsidence as it is, 2) we could change the MT or MO if we thought there was a good reason to do this, or 3) we could follow the suggestion provided and focus on a management program without changing the numbers.
12. Feedback from CC members:
    a. Comment: It makes sense to coordinate the effort.
    b. Comment: For the GWLs to make sense for us, we need to tie it to our local issues. If we are doing what we are supposed to be doing, rather than pumping, the pumping below the Corcoran in some areas outside of the subsidence area will have less impact on areas where there is subsidence.
    c. Comment: What is your suggestion (asking consulting team), about whether to have both GWLs and surface measures?

i. Alyson (W&C): We are currently using both measures in the monitoring framework.

d. Comment: We as GSAs need to see what's happening around the subsidence area.

e. Alyson (W&C): In summary and in updating the draft GSP contents, we should at least update in the response to comments to be clearer that the GSAs intend to close the data gaps around subsidence and the subsidence area itself.

f. Comment: There's a need to coordinate. Response (W&C): Exactly, we need to get the plans out and then continue coordination. Because of current timeframe, will need to do further coordination with the other GSAs who are also (at the same time) trying to get their plans out.

g. Question: Did we have a buffer on the numbers used from historical data? Clarification from W&C: These numbers (for subsidence historical data) were rounded up slightly – no specific percentage buffer added.

h. Comment: We want to make sure that GWLs are not dropping because of neighboring basins.

i. Alyson (W&C): We can also note in the response to comments that the County has a project that would also streamline the process for environmental permitting to better enable conversion of wells from below to above Corcoran Clay.

j. Comment from CC: If we do not fully understand the extent of subsidence, and we set too low a threshold, this will not help us. Should not lower this threshold.

k. CC Recommendation: The CC recommended adding additional information about closing data gaps and the County project to the master response to comments and adding additional language around the GSAs intent to continue coordination with neighboring basins to the GSP. No change to the MTs or MOs.

13. Water Quality:

a. Alyson provided an explanation of Merced GSP water quality sustainable management criteria. The MT is set at 1,000mg/L for TDS (Total Dissolved Solids, measurement of salinity). This is drinking water standard. There are numerous other authorities governing and monitoring drinking WQ and contaminants. There is a summary of the response to comments for WQ on the Merced SGMA website.

b. Alyson provided summary of response to WQ comments. Salinity is selected as an indicator. GSAs recognize the importance of protecting drinking water quality. There is a desire to coordinate with agencies and their ongoing efforts to avoid duplication of efforts and efficiently use limited resources. Coordination activities include: (see list on PPT).

c. Comment/input from CC member: A CC member expressed concern that some areas of the subbasin already exceed the MT in part due to salinity migrating from marine soils underlying portions of the subbasin and wanted to ensure this would not cause a problem for these areas of the basin later.

d. Alyson (W&C) reply: The CC has discussed that some areas have salinity greater than 1000 mg/l TDS currently, but that this is not an Undesirable Result (UR). It is not related to GW extraction and is an existing condition that has been adapted to by agricultural users by blending with higher quality water.

e. Clarification from Alyson (W&C): The MTs are set for specific areas in the basin (not basinwide) and are well specific. Currently all wells with MTs are domestic wells.

f. Charles Gardiner (Catalyst): The SC was generally comfortable with this. However, it is important to pay attention to domestic well users.

g. CC Recommendation: No change to MTs or MOs for water quality.

d. Dates for Adoption Hearings for GSA Boards – still being scheduled. Tentative dates below:

  i. TIWD GSA-1 Nov. 19th

  ii. MSGSA is TBD

  iii. MIUGSA Dec. 11th

4. GSP Implementation Planning

  a. Prop 68 funding opportunity (deadline Nov. 1, 2019)

    i. Alyson (W&C) described the Prop 68 grant application. DWR has made development a higher priority for funding over GSP implementation for this funding round. DWR's priority is funding activities that help develop GSPs, including data gathering and addressing data gaps. The grant application contains three components. The first is grant administration portion of work, the second is work to address data gaps. This is focused on developing a data gaps plan and figuring out how to address those gaps. The third is to develop a remote sensing decision support tool to estimate groundwater use.

    ii. Comment from CC member: METRIC™ (evapotranspiration data) looks backwards – it looks at who is using water and understanding general use. Could use conventional processes to develop a tool to look to the future (there are other options and we may use different remote sensing methods to achieve our objectives).

    iii. Comment from CC member: It sounds like these are things we need to do anyway regardless of funding. We need them.

    iv. Comment from CC member: if we want to do GW credits, we need to have a good enough water budget and accounting system to do something like this.

    v. Comment from CC member: Please add that Lone Tree Mutual Water Co. has also provided a letter of support for the Prop 68 grant application.

  b. Annual report preparation proposal from Woodard & Curran

    i. The first annual report is due to DWR on April 1st. At staff request, W&C prepared a proposal to prepare the first annual report. The proposal includes optional tasks for program management, preparing stakeholder engagement plan update, and evaluation of the GDE pulse tool.

    ii. Alyson (W&C) asked if there is any input on this and on the optional tasks:

        1. Comment from CC member: MID is working on a Prop 218 process to fund GSP related costs.
    iii. Recommendation to authorize funding for W&C to prepare GSP First Annual Report consistent with consultant proposal is approved by the CC.
  c. Water Allocation Framework discussion
    i. There is an ad hoc group working on this and this work will continue.
        1. Comment from CC member: The sustainable yield is the most important thing to come out of the GSP. Some items will have to be worked on at the GSA level.

5. Public Outreach update
    a. Charles (Catalyst) reviewed input from the SC. The SC would like to have a roadmap of key implementation issues and get an understanding of the progress. We did not have the folks in the SC this morning who are normally more vocal about water quality issues. We received a suggestion from staff that a way to structure this is to organize topics as a workshop of the SC and CC together. That way we have everybody sitting around the table discussing the issues. The next step would be to flesh out the roadmap and the structure. We also have had a few resignations from the SC and we may want to re-evaluate the balance of interests we have represented on this committee. We may need to see if we need to replace some people. Any questions or comments?
    b. Comment from CC member: Not sure about having workshops on regular basis, what is meant by this? Charles (Catalyst): This could be workshops on specific key topics – perhaps jointly at the beginning of a CC meeting with the SC and then after the joint discussion, the CC meeting would move onto its other business. We could also structure them as separate meetings as it is done now.
    c. Comment from CC member: I think we are getting the information from the SC. Concern if this is too much.
    d. Comment from CC member: For some of these topics, such as projects, this can be done in a workshop together. However, some issues that get very technical are not suited to a workshop format.
    e. Comment from CC member: For certain issues, like subsidence, it will be important to have SC input.
6. Coordination with neighboring basins
    a. The consulting team and GSA staff reached out to the three neighboring basins for letters of support for the Prop 68 grant application. All three basins provided letters of support to the Merced Subbasin Prop 68 application. The GSAs provided reciprocal letters of support to the neighboring basins in return.
    b. Question from CC: Are we coordinating with all members of the GSAs in Delta-Mendota? Alyson (W&C): No, Delta-Mendota is coordinating with their members internally. We will be focused on working with Delta-Mendota GSAs on interbasin flows and subsidence.
    c. Comment from CC member: We put together a plan and met with their consultants (from other GSAs). With Turlock we've had two big meetings and some small meetings.
        i. Have not had a chance to do this in detail with Delta-Mendota and Chowchilla. We've had one call with Delta-Mendota, but not to the same level of formal review as with Turlock.
7. Public comment
    a. None.
8. Next steps and adjourn

a. Prop 68 due Nov. 1st

b. GSA adoption hearings for the GSP are coming up. These will be published on website.

c. Adjourned and date for next meeting to be decided at later time and published accordingly.

Next Regular Meeting
TBD at 1:30 p.m.
Atwater, CA – Castle Conference Center at Castle Airport (subject to change)
Information also available online at mercedsgma.org
Action may be taken on any item

Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: November 2, 2020 at 10:00 AM

LOCATION: Online - Microsoft Teams Meeting

Coordination Committee Members In Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☐	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. CALL TO ORDER AND WELCOME
   a. Alyson Watson (Woodard & Curran) called the meeting to order.
2. ROLL CALL
   a. Coordination Committee members in attendance are shown in table above. The Committee had a quorum.
3. CONSENT CALENDAR
   a. Meeting notes from previous meeting (October 28, 2019) were approved.
4. REPORTS
   a. Update on Submittal of Groundwater Sustainability Plan and First Annual Report – Alyson Watson (Woodard & Curran) provided an update about GSP related submittals and reviewed GSP related commitments and timelines. The GSP and First Annual Report were submitted on time in early 2020. DWR is now in a 2-yr review of plans and expects GSAs to start implementation in interim. The next Annual Report due April 1, 2021.
      i. Hicham ElTal (MIUGSA) recommended that work on the second annual report should begin soon and the CC directed Woodard & Curran to prepare a timeline for the GSA representatives to review.

b. Severely Disadvantaged Communities Grant Status Update

   i. Matt Beaman (MID) provided a status update on the three grant-funded SDAC Projects: Planada Recharge Basin Pilot Project, El Nido Groundwater Monitoring Wells, and Meadowbrook Water System Intertie Feasibility Study, describing location, funding status, and details about projects and ongoing steps.

c. Coordination with neighboring basins

   i. Hicham ElTal provided updates:

      1. The Merced Subbasin has 3 neighboring basins (Turlock, Chowchilla, and Delta-Mendota). The GSAs have a formal cooperative MOU and an agreements with Turlock and Chowchilla, respectively.

      2. Ongoing coordination is occurring with Turlock Subbasin as that basin develops their GSP (not critically overdrafted, so on a later completion schedule than Merced).

      3. Subsidence is the main issue of concern for coordination with the Delta-Mendota and Chowchilla subbasin.

d. GSA Reports - Updates were provided from each GSA on activities they are undertaking in their own jurisdiction:

   i. Merced Subbasin GSA - Bob Kelly provided an update on past year activities, including:

      1. MSGSA joined the coordinated right to water application

      2. MSGSA is considering sustainability zones for GSP implementation, for example for subsidence. Outside consultant will be working on developing a summary of likely areas and reasons for development of separate sustainability zones within the GSA.

      3. Added Amsterdam Water District as a non-voting member to the GSA's Joint Powers Agreement. Set a board meeting schedule and continued to engage in the ad-hoc committee for implementation measures.

   ii. MIUGSA - Hicham ElTal provided an updated on recent activities, including:

      1. Generally keeping busy on technical work and now catching up on administration to build up capacity for MIUGSA.

      2. The coordinated effort towards a basin-wide water right to flood water application has been a key item and is described later in the meeting notes.

      3. On behalf of the basin, have been working on SDAC projects (also described later in meeting notes).

      4. Executed agreement with DWR for Prop 68 Planning Grant (described later in meeting notes)

   iii. TIWD GSA #1 - Larry Harris (TIWD) provided an update on recent activities, including:

      1. Joined in the coordinated water right application

      2. Completed the groundwater metering programs (all active wells are now metered).

      3. Current focus of attention is on locating some storage reservoirs to capture flood waters.

5. ACTIONS

a. Water Level and Water Quality Monitoring Networks – Approve RFQ for Monitoring Support Services

i. Matt Beaman (MID) gave a background on historical monitoring

1. Reviewed existing groundwater elevation (CASGEM) and water quality monitoring program

2. DWR has asked whether the voluntary wells from the CASGEM will continue to be reported. The voluntary wells are not part of the required reporting group for various reasons (questionable data results or don't meet construction requirements). A recommendation was made to discontinue reporting on these wells for CASGEM purposes.

3. Q: Monitoring well installed with telemetry as dedicated monitoring ~1 year ago (east end of MCWD/SWD area). Currently updates to DWR telemetry website. Should it be part of the GSP network? A: MID will take a look and if it meets the construction requirements, consider adding it to the network.

ii. Matt Beaman (MID) gave a background on current and future monitoring.

1. Q: In GSP, monitoring entities were sending information into data management system (DMS). What is different in what is being proposed? A: MIUGSA is assigned to submit the data for all monitoring wells throughout the basin (not per agency or well-owner). Measurements were submitted March and October (and December measurement coming up). But to meet GSP commitment, wells needs to start being measured more frequently (monthly instead of 2-3 times per year).

2. Q: How many wells are dedicated monitoring vs active production for irrigation/drinking water? A: The number in current monitoring network is 4 or 5 dedicated. 2 from SWD and 2 City of Merced and 1 from City of Atwater, plus 2 from MID former production but currently no pumps; rest are production.

   a. Follow-up Q: What concerns are there about moving to monthly monitoring for production wells (pumping impacts)? A: Many MID wells are dormant much of the time. For the most part, these wells need to be included to provide a complete subbasin picture.

3. Q: Nic Marchini has been taking elevations for several years in 12 wells that aren't necessarily part of CASGEM. Should these be included? A: It depends on Corcoran Clay and other CASGEM requirements for time between pumping. These would need to be reviewed individually.

4. Public Comment via chat: "Hello, my name is Jovana with Leadership Counsel. I have a question regarding the monitoring network. Our concern is that vulnerable communities will be overlooked, how is the monitoring network going to detect impacts to drinking water users, particularly for vulnerable communities?"

   a. MIUGSA: As we work on data gaps, we'll be looking at these issues, however the majority of these communities are served drinking water as part of community service districts that conduct routine water quality monitoring and meet all applicable drinking water regulations.

5. Q: What would it take to bring marginal/voluntary wells up to the technical standards to be able to consider them for the monitoring network? A: Most of the voluntary wells were production wells screened in multiple aquifers. It would

require a large level of effort to modify those to meet monitoring requirements. This is, however, an evaluation task under the Prop 68 planning grant work.

iii. ACTION approved by CC: Direct MID to prepare and issue a Request for Qualifications (RFQ) for the purpose of hiring one or more firms to conduct groundwater elevation monitoring, data compilation, reporting, general monitoring site maintenance, and other associated activities as needed. Selection of firm(s) and preparation of the scope of work subject to subsequent conversations among the GSAs prior to issuance of any contracts.

b. Proposition 68 Planning and Implementation Grants

i. Prop 68 Planning Grant: The scope for the $500,000 Planning Grant work was developed by a committee of GSA and stakeholder reps in Fall 2019. The GSAs were awarded the grant in early 2020. MID, as the GSAs' authorized rep, executed a grant agreement with DWR in May 2020. The grant scope includes 3 components: Developing a plan to address Data Gaps in the subbasin, field work to upgrade existing wells and potentially install new wells to augment the monitoring network, and development of a decision support tool.

1. Matt Beaman (MID) provided an overview of the work that needs to be started and recommended the GSAs request a scope/budget from Woodard & Curran for the Data Gaps Plan and Remote-sensing Tool, and issue an RFQ for the field work component.

2. Hicham ElTal (MID) suggested additional items that should be considered as part of data gaps plan development: assessment of CIMIS station for reliable location if considering satellite information in future, also add subsidence recommendations.

3. Bob Kelley (MSGSA) confirmed that work under the grant would be coordinated with all 3 GSAs since all will benefit.

4. ACTION approved: Direct Woodard & Curran to provide a scope and budget consistent with Prop 68 Grant Workplan to complete Data Gaps Plan and Remote Sensing components for review by GSAs.

5. ACTION approved: Direct MID to prepare and issue a Request for Qualifications (RFQ) for the purpose of hiring one or more firms to for well installation, well inspection, and other activities associated with Proposition 68 Grant Workplan. Selection of firm(s) and preparation of the scope of work subject to subsequent conversations among the GSAs prior to issuance of any contracts.

ii. Prop 68 Implementation Grant: DWR is releasing a solicitation for proposal for Prop 68 Implementation Grant funds. Matt Beaman (MID) provided an update on latest information on Prop 68 Implementation Grant Proposal Solicitation Package.

1. The three Merced Subbasin GSAs submitted a joint letter to DWR requesting an extension of the deadline to March 2021. DWR publicized the January 2021 deadline last week and is not expected to extend it.

2. MID recommended that the GSAs ask W&C to prepare a scope to prepare the grant application and the 3 GSAs would review the scope and decide how to move forward with grant application preparation and work with stakeholders to select most likely projects to compete for limited funds.

3. Q: Will projects need to be identified and scoped out before the grant app is submitted? A: Yes, W&C will have to come up with some assumptions about number of projects which will need to happen in parallel to grant preparation.

4. Public Comment: What actions will be taken to make sure funding for disadvantaged communities is appropriately allocated/addressed? A: GSAs will consider whether projects will benefit under-represented communities (URCs) during project selection. DWR will give preference to projects that meet requirements and benefit URCs so the basin has incentive to move those projects forward. Furthermore, most of the subbasin meets the definition of disadvantaged community or under-represented community.

5. ACTION approved: Direct W&C to prepare a scope for grant application preparation and for MID to serve as the subbasin representative in submitting the grant application and eventual contracting with DWR.

c. DWR Technical Support Services General Application

i. Matt Beaman provided an update on the status of the application. The three Merced Subbasin GSAs have coordinated on initial development of the General Application to DWR (effort primarily led by Lacey McBride (MSGSA)), and discussed the next steps for applying for DWR Technical Support Services.

ii. ACTION approved: Assign Groundwater Subbasin Coordinator (Hicham ElTal) to finalize and submit DWR Technical Support Services application and associated materials requesting various field activities. Application and submittal are subject to subsequent coordination among the GSAs.

6. Public Comment

a. No additional comments submitted besides the two noted earlier that were submitted during discussion of the monitoring network and Prop 68 agenda items.

7. Informational Items

a. Matt Beaman (MID) presented a brief summary of the Domestic Well Inventory project administered by Merced Integrated Regional Water Management Authority (MIRWMA), funded by DWR's Disadvantaged Community Involvement Grant

b. Hicham ElTal (MID) provided a summary of the Coordinated Water Right Application which has to do with use of periodic floodwater from most streams in the Subbasin.

  i. Application was submitted December 2019. It then took about five additional months to revise per State Water Resources Control Board staff feedback. Currently waiting for results of the review.

c. Other information items

  i. No items were raised.

8. Next steps and adjourn

a. Meeting frequency for Coordination Committee and Stakeholder Committee

  i. Hicham ElTal (MID) suggested some agenda items that could be discussed in future meeting(s):

    1. Establishing thresholds and sustainability criteria in areas without historical monitoring data or not monitored in past or without domestic wells.
    2. Meeting frequency and composition of stakeholder committee
    3. Consider changing general interest email address mercedsgma@woodardcurran.com to something that doesn't include a consultant or agency name like: mercedsgma@mercedsgma.org.
       a. W&C will look into this and report back.

  ii. GSP indicated CC and SC would meet quarterly.

1. The group expressed interest in CC meeting more frequently in the near term given pressing issues like the Prop 68 Implementation Grant application. The group agreed to schedule a meeting in early December and also consider a meeting in early January as well.

b. Confirm next meeting date
   i. Woodard & Curran will work on scheduling an early December meeting.

c. Meeting adjourned at 12:17 PM

Next Regular Meeting
TBD (expected early December)
Meeting to be conducted virtually (subject to change)
Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: December 1, 2020 at 9:00 – 11:00 AM

LOCATION: Online - Microsoft Teams Meeting

Coordination Committee Members In Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☐	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Bob Kelley	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. CALL TO ORDER AND WELCOME
   a. Samantha Salvia (Woodard & Curran) called the meeting to order.
2. ROLL CALL
   a. Coordination Committee members in attendance are shown in table above. The Committee had a quorum.
3. CONSENT CALENDAR
   a. Meeting notes from previous meeting (November 2, 2020) were approved.
4. PUBLIC COMMENT
   a. Lou Myers (Merced Grasslands Coalition) provided public comment on the Stakeholder Committee reengagement agenda item. Lou represents a coalition of farmers and ranchers in the Merced Subbasin. Lou has reached out to members of the GSA and has submitted letters to DWR. The Merced Grasslands Coalition would like to be part of GSP discussions moving forward potentially through the stakeholder committee.
5. REPORTS
   a. <u>Coordination with neighboring basins</u>

i. Hicham ElTal (MIUGSA) provided updates:

1. More information will be coming from the Turlock Subbasin including about their water budget.
2. There is a new proposed timeline for coordination between Delta-Mendota, Merced, and possibly Chowchilla Subbasins.

b. GSA Reports - Updates were provided from each GSA on activities they are undertaking in their own jurisdiction:

i. TIWD GSA #1 - Larry Harris indicated no updates since the last CC meeting.

ii. MIUGSA - Hicham ElTal expressed concern that this appears to be a dry year and it's uncertain how this may impact the GSP.

iii. Merced Subbasin GSA - Bob Kelly reported that MSGSA is working with Provost & Pritchard to determine potential sustainability zones in the GSA that may be used for management, monitoring, or projects in the future. The MSGSA's Technical Advisory Committee will be discussing these at ongoing meetings.

6. ACTIONS

a. Water Year 2020 Annual Report

i. Samantha Salvia (W&C) provided a brief background on the first annual report submitted for Water Years 2016-2019 and the requirement to submit a Water Year 2020 report by 4/1/2021 to DWR.

ii. Hicham ElTal and Bob Kelly indicated they'd like to start work on the annual report as soon as possible.

iii. Ken Elwin asked what is the total budget for this effort. Woodard & Curran confirmed it is about $85,000.

iv. Nic Marchini asked: will recent monitoring data be reported and what locations will be included? Matt Beaman and Hicham ElTal (MIUGSA) confirmed monitoring data was collected and submitted in March and MID is now finalizing data to submit to DWR from October for the whole monitoring network.

v. Bob Kelly (MSGSA) asked if agencies could be notified if there's data not received. Matt Beaman confirmed that data from all agencies were received for all of 2020 thus far.

vi. ACTION approved by CC: Recommend GSA Boards approve a contract amendment with Woodard & Curran to complete the Second Annual Report including data collection, analysis, report writeup, and submittal to DWR by April 1, 2021.

b. Proposition 68 Planning Grant Work

i. Basin awarded a $500,000 Prop 68 Planning Grant in early 2020

ii. MID has contracted with DWR for the grant and is ready to begin work

iii. At November meeting, CC requested Woodard & Curran prepare a scope and budget consistent with grant agreement for Data Gaps Plan and Remote-Sensing Tool part of grant scope.

iv. Hicham ElTal (MIUGSA) clarified that the work Woodard & Curran will be doing is the planning work for the data gaps plan and remote sensing and not the "field work" components which make up most of the grant amount.

1. Hicham indicated he'd like Woodard & Curran to determine DWR's direction for remote sensing data sources. The GSAs would like to be in alignment with the data source DWR is likely to consider standard.

v. Q: Will there be additional coordination on the Remote Sensing Decision Support Tool and its development? A: Yes. The scope includes stakeholder engagement and GSA coordination and input.

vi. Q: Will the Data Gaps Plan be used to update/refine the Subbasin's model? A: Modeling work is not directly part of the Data Gaps Plan, but down the road it's likely the model will be updated once additional monitoring locations are identified and data is collected.

vii. Q: Will the Data Gaps Plan be complete by end of February? A: Woodard & Curran will confirm a more detailed schedule, but likely will require more than two months to prepare a detailed plan with outreach.

viii. Hicham ElTal would like Woodard & Curran to connect with each GSA individually as the Data Gaps Plan is developed for locally-specific information.

ix. ACTION approved by CC: Recommend GSA Boards approve a contract amendment with Woodard & Curran to conduct Prop 68 Planning Grant work associated with Data Gaps Plan and Remote Sensing components as described in scope provided by Woodard & Curran.

7. DISCUSSION ITEMS

a. Prop 68 Implementation Grant Opportunity

i. Samantha Salvia (W&C) provided an overview of the Prop 68 Grant Implementation opportunity.

ii. Lacey McBride (MSGSA) reported that a group of GSA representatives have had several discussions about potential projects as well as posed some questions to DWR representatives about competitiveness of the grant. The small group has a shortlist of projects: recharge basins, El Nido improvement, and LeGrand Athlone intertie. Recommend that the CC direct the GSA representatives to select projects scoped to have a combined value within the $2-$5M grant requirements.

1. Black Rascal Creek flood control project was also identified but probably more appropriate for round 2 of implementation funding and won't be included in the project list for this grant application.

iii. Brad Samuelson provided a description of the LeGrand Athlone intertie project: a canal that links MID through Le Grand-Athlone Water District on southeast side of Subbasin, then continues to connect to Chowchilla River. Phase 1 would be connecting MID's booster 3 lateral to several creeks and would be just under $5M budget, but grant app could be adjusted to only include certain components. Overall the project is envisioned to bring floodwater into the Subbasin that otherwise would continue in Merced River or MID's service area. A feasibility study was completed in June 2020 and Summers Engineering is currently developing 30% drawings.

1. Brad Samuelson confirmed he should be able to pull together required project information for the grant on the intertie project. He can provide starting information to W&C. He also has information about the recharge basins and KMZ maps.

iv. Brad Samuelson provided background on the potential La Paloma recharge basin project: a wetland area that can be flooded by local supplies. The area is already used for some recharge. There's a good environmental enhancement at this site as a mutual benefit. There is an existing diversion point. The project budget is about $750K but could be scaled back if needed.

v. Hicham ElTal (MIUGSA) provided a description of the El Nido improvements project ($400-$500K).

1. El Nido is on the tail end of MID's service area and moving water there and beyond is particularly challenging. The improvements would be in areas of major flow restrictions (e.g. increasing capability of moving water down El Nido system on the order of 1,000 AF). This would help MID move water to lower end of El Nido area during the flood event using existing floodwater licensing.
2. MID could provide details on project in 2 days if group were to move forward with this. Woodard & Curran confirmed it will be tight but doable in this case.
3. Also a plus from a grant app perspective is that this is in the subsidence area and supports a Disadvantaged Community.

vi. Hicham ElTal (MIUGSA) clarified that CC should make a decision today on whether to pursue round 1 funding and generally what project(s) should be in the application (with a little room for edit in next few days).

vii. Hicham ElTal (MIUGSA) requested that the cost for application preparation can be taken on by the GSA for which the proposed project benefits.

viii. Bob Kelly (MSGSA) expressed concern that project details, budget, etc. aren't refined enough and won't be in time for round 1 application due date. Discussion ensued on schedule feasibility.

ix. MIUGSA and MSGSA to provide project info by end of Thursday 12/3 for El Nido Improvements and scaled back versions of La Paloma recharge basin and Le Grand-Athlone Intertie project.

x. ACTION approved by CC: Authorize W&C to start working on and complete an application for Prop 68 Implementation grant funding, providing that the GSAs forward project descriptions, costs, and project benefits to W&C by Thursday 12/3/2020 and also that the GSAs benefiting from awarded (funded) projects would be burdened proportionally for the cost of preparing the application and not the whole Subbasin's typical GSA split.

b. Stakeholder Committee re-engagement (meeting frequency, review of member composition)

i. Samantha Salvia (W&C) provided a description of the Stakeholder Committee function and original formation. The committee was formed for development of the GSP through a public application process. The CC reviewed applications and recommended a stakeholder committee list to the GSA boards. The GSA boards approved the stakeholder committee. The committee met monthly prior to coordination committee meetings for the duration of GSP development.

ii. Q: how long are these members asked to serve? A: Original expectation was through the development of the GSP (end of 2019).

1. Mike Gallo suggested the potential for implementing a term limit with option to renew to be in alignment with other committees (e.g. avoid asking for indefinite membership length).

iii. Additional Public Comment – the committee took additional public comment on this item:

1. Angela (Self-Help Enterprises): Previous manager Maria Herrera has left but SHE continues to engage with the Merced Subbasin and would like to continue to do so through the Stakeholder Committee.
2. Lou Myers: Suggested that future stakeholder participation should be explicitly for GSP implementation. Roughly 50% of the landmass is rangeland and roughly 3% of the interested parties represent that so the CC should consider this given the potential for recharge on rangeland.

iv. Hicham ElTal (MIUGSA) suggested that if virtual meeting attendance continues to be an option, it may make it easier for stakeholders to be involved.

v. Bob Kelly (MSGSA) indicated the MSGSA Technical Advisory Committee is meeting 12/2 and will discuss this. He agreed with a quarterly meeting frequency.

vi. Samantha Salvia (W&C) suggested staggering SC meetings so they occur before the corresponding CC meeting to provide time to consolidate feedback and transmit to CC.

vii. Hicham ElTal (MIUGSA) suggested reaching out to existing SC list to solicit interest in continued participation and defining responsibilities and requirements. MID has done something similar in the Integrated Regional Water Management (IRWM) process.

viii. W&C will start with the previous SC application description and update then pass to the CC for feedback.

c. Update the MercedSGMA general contact inbox from mercedsgma@woodardcurran.com to contact@mercedsgma.org and route messages to the three GSAs.

i. CC agreed this is a good idea and the GSAs will each provide points of contact.

d. Approach for establishing thresholds and sustainability criteria in areas without historical monitoring data or not monitored in past or without domestic wells.

i. Hicham ElTal (MIUGSA) is interested in identifying abandoned wells and thinks they might provide information on development of the aquifer over time. Also interested in shallow wells in Above Corcoran Clay that have been abandoned to be drilled deeper into the Below Corcoran Clay to give an idea of shallow aquifer health.

ii. Q: If individual person has been taking historical groundwater elevations, how should they go about voluntarily submitting that data? (e.g. in Le Grand area, fairly regular elevation data has been collected, might be useful to fill data gaps). A: We can circle back on where those wells might be and data available. Per Matt Beaman (MIUGSA), there is a form to submit level data on MercedSGMA website. Official representative wells are required to meet state guidelines for the wells (e.g. construction and commitment to monitoring frequency) and would be up to CC or GSAs to incorporate if they can be demonstrated to meet the requirements.

iii. Greg Young (MSGSA) noted that in model calibration there were wells in data gap areas and those can be valuable for understanding what might be representative wells and historical conditions in the area.

iv. Hicham requested that W&C send a list of the options/venues to use to try to estimate or develop a threshold/sustainability criteria for CC feedback and further investigation.

1. Example, PG&E had historical wells with significant data that were used previously.

8. Next steps and adjourn

a. Confirm next meeting date

i. Woodard & Curran will schedule a February 22 meeting from 1:15-3:15pm.

ii. Request was made to add standing item near end of future agendas for committee member thoughts/suggestions, etc.

b. Meeting adjourned at 10:57 AM

Next Regular Meeting
February 22 at 1:15-3:15 PM
Meeting to be conducted virtually (subject to change)
Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: February 22, 2021 at 1:15 – 3:15 PM

LOCATION: Online – Zoom Meeting

Coordination Committee Members In Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☐	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Eric Swenson	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. CALL TO ORDER AND WELCOME
    a. Samantha Salvia (Woodard & Curran) called the meeting to order.
2. ROLL CALL
    a. Coordination Committee members in attendance are shown in table above. The Committee had a quorum.
3. CONSENT CALENDAR
    a. Meeting notes from previous meeting (December 1, 2020) were approved.
4. PUBLIC COMMENT
    a. No public comments.
5. REPORTS
    a. <u>Coordination with neighboring basins</u>
        i. Hicham ElTal (MIUGSA) provided updates:
            1. There is an ongoing effort to schedule a coordination meeting between the Merced, Chowchilla, Delta-Mendota, and Madera Subbasins. This will be scheduled with GSA representatives soon.

2. Ongoing coordination is occurring with the Turlock Subbasin including about their water budget.

b. GSA Reports - Updates were provided from each GSA on activities they are undertaking in their own jurisdiction:

   i. Merced Subbasin GSA – Lacey McBride shared that the MSGSA Board had a January meeting where proposed sustainability zones were discussed; more information is available on MSGSA website (https://www.co.merced.ca.us/2799/Merced-Subbasin-GSA). A Board workshop (2/24 at 2pm, open to the public) is upcoming to talk about goals and options for demand reductions.

      1. Question (Hicham ElTal): What are the unique characteristics considered for identifying sustainability zones? Answer: Many factors, but they include hydrologic/hydrogeologic differences, land use, and jurisdictional boundaries.

   ii. MIUGSA - Hicham ElTal shared that MIUGSA is administering various pieces of grant work (e.g. SDAC grants for well installations), the Meadowbrook Water System Intertie Feasibility Study is nearly complete, and MID is considering installing dry wells in the Planada area (recharge effort). MIUGSA is also working on setting policies related to the management framework discussed in GSP.

      1. Request: Hicham ElTal requested that a standing agenda item be added to future CC meetings on current groundwater conditions, similar to updates that used to be provided at Merced Area Groundwater Pool Interest (MAGPI) meetings.

   iii. TIWD GSA #1 - Larry Harris shared that now that monitoring/metering programs are completed, TIWD GSA #1 will be focusing on telemetry for some metering systems. Another focus in the next few months will be developing additional reservoirs for surface water storage.

6. ACTIONS

a. Stakeholder Advisory Committee Recommendation

   i. Samantha Salvia (W&C) provided a brief background on the recent process for soliciting and reviewing applications for re-establishing the Stakeholder Advisory Committee during the GSP implementation process. 30 committee members were recommended by the GSA staff, with 5 alternates.

   ii. Question: How long are the terms of the Stakeholder Advisory Committee? Answer: The application stated it should be considered a 2-year term.

   iii. Question: If members were to drop from the Committee, is the list reviewed annually to fill vacant positions? Answer: In the past, when this happened, it was dealt with on an individual basis and often an alternate was filled in the position.

   iv. Public Question: Is there an opportunity to still be a part of this committee? Answer: The application process has closed but Stakeholder Advisory Committee meetings are open to the public and have an option for public comment and input (as do Coordination Committee meetings).

   v. Question: How many people on this list are representing disadvantaged communities and primarily drinking water interests? Answer: Multiple, some representatives include Planada, Livingston, and Winton.

   vi. Question: What is the structure of the group? Answer: It is an advisory committee that will meet quarterly. There aren't any appointed positions or hierarchy – it provides input to the Coordination Committee.

vii. ACTION approved by CC: Recommend the GSA boards appoint the staff recommended applicants (shown on slide) to the Stakeholder Advisory Committee.

b. GSP Well Monitoring RFQ

i. Lacey McBride (MSGSA) provided a brief background on the GSP Well Monitoring Request for Qualifications (RFQ). Two submissions were received by the deadline. The GSAs coordinated the review of submissions and provided a recommendation of QK. Input was requested from the Coordination Committee on the amount of the contract and who would administer.

ii. Question: What kind of contract is this? Answer: This is up for discussion; a rate was provided in the RFQ response but a scope would need to be developed for each project. One thought is to have a Not to Exceed amount for a period longer than one year.

iii. Public Comment (Eric Swenson): "I would recommend that the Merced Subbasin administer the groundwater monitoring contract due to much of work being needed will be in the Merced Subbasin."

iv. Hicham ElTal noted that most monitoring currently is located in the MIUGSA portion of the Merced subbasin.

v. Mike Gallo (MSGSA) shared that during previous discussion he thought it made sense for contracting to go through MIUGSA so that one group pays and there's one bill, with a cost share separately on the backend (like with GSP development contracting).

vi. Lacey McBride (MSGSA) confirmed that all three GSAs will be involved from a technical standpoint of monitoring effort regardless of who is coordinating the administration of the contract.

vii. Garth Pecchenino (QK) agreed that a defined scope should be developed so a specific cost can be provided for purpose of contracting. Exact wells would need to be identified to develop read routing plan.

1. Hicham ElTal (MIUGSA) clarified that additional scope/budget should be considered for additional projects, such as installation/siting of a CIMIS station.

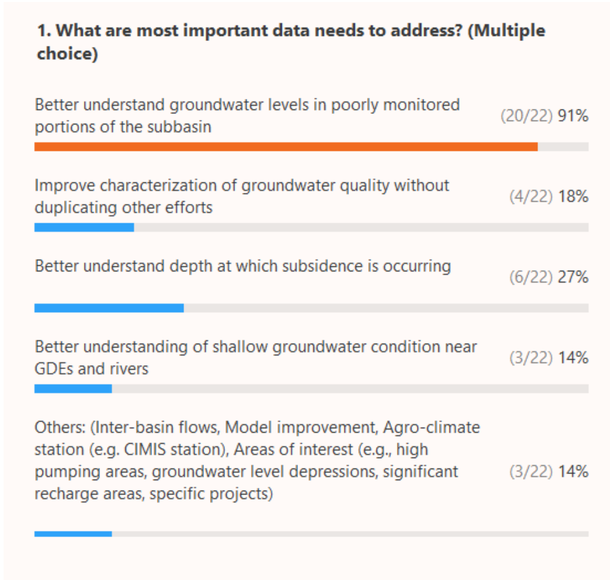
viii. Question: Do the GSAs do WQ monitoring at CASGEM wells? Answer: As described in the GSP, the GSAs review monitoring data collected by other monitoring programs. It could be part of the monitoring contract if identified as a need in the future.

ix. ACTION approved by CC: Recommend GSAs select QK as consultant for monitoring work under SGMA for Merced Subbasin. Authorize MIUGSA to enter into an agreement with QK. Provide QK with initial budget of $10,000 to conduct spring monitoring.

7. DISCUSSION ITEMS

a. Data Gaps Plan (Prop 68 Planning Grant funded work)

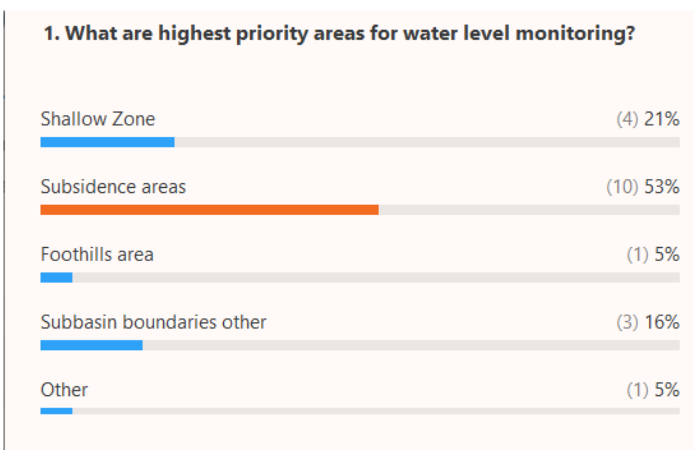
i. Jim Blanke (W&C) shared the approach and schedule for Data Gaps Plan development along with the results of the initial assessment and facilitated a discussion with the CC on priorities, including polls (results shared in screenshots below).

ii. 

iii. Question from Amanda Monaco: A big data gap is where domestic wells are and how deep they are. Are the GSAs going to fill in this data gap? Answer: Work funded by IRWM is evaluating locations and depths of domestic wells in key areas of the Subbasin.

iv. Public Comment (Eric Swenson): "I believe that existing production wells should be used when possible to provide additional SWL (static water level) monitoring in zones with data gaps. Short screened monitor wells may not provide the data desired."

v. Hicham ElTal (MIUGSA) shared that other basins are looking at what Merced Subbasin is doing. If Merced were to install monitoring wells along the Merced River, the Turlock Subbasin would be interested and likely reciprocate with additional well installations. He also brought up that there's an issue about the location of the groundwater ridgeline (e.g. where it slopes to southwest San Joaquin River vs sloping to the Merced River).

vi. 

vii. Hicham ElTal (MIUGSA) asked when a recommendation (e.g. the Data Gaps Plan) will be ready. Answer: A draft plan is expected to be presented at a public meeting in the April/May time period.

viii. Ken Elwin (MIUGSA) saw some empty locations in the map of monitoring well density in the Outside Corcoran Clay Principal Aquifer (UC Merced and another site) and suggested that some known wells could be available or useful to add to the monitoring network.

ix. Hicham ElTal (MIUGSA) shared that MID has a well near Fahrens Creek that may be able to be incorporated into the network.

x. George Park (MSGSA) said it would be useful to know what completion information and characteristics of wells would be ideal for identifying production wells that could be useful for filling data gaps, so well owners know what to look for in inventory.

   1. Jim Blanke (W&C) responded that a key requirement is that wells need to be screened only in one aquifer.

b. Remote-sensing tool development (Prop 68 Planning Grant funded work)

   i. Dominick Amador (W&C) described the approach and schedule for developing the tool, including a background on how crop evapotranspiration is estimated from remote sensing data, the various data products available, and the next analysis steps.

   ii. Hicham ElTal (MIUGSA) shared that both METRIC and SEABAL depend on CIMIS data. The existing CIMIS station surrounding land use has changed and the station is no longer reliable.

   iii. Public comment (Geoff Vanden Heuvel): "The GSA's that have adopted Land iQ like Semitropic, Lower Tule GSA, Pixley GSa all put in multiple weather stations to assure accuracy of the ETC data. It doesn't require all that much investment"

c. Sustainability Criteria Approaches for Additional Representative Monitoring Wells

   i. At the December CC meeting, the CC requested that W&C return to the group with some information about potential approaches to use for setting sustainability criteria for wells that lack historical data. Chris Hewes (W&C) described two potential approaches.

   ii. Question (Hicham ElTal): Will Sustainable Management Criteria methodology be part of the data gaps plan? Answer: No, but the Data Gaps plan can help inform the methodology and provide an opportunity to test the different methods in real world situations given the actual location of new wells.

   iii. Public Comment (Eric Swenson): "Older domestic wells are typically those at highest risk of running out of water. New domestic wells not so much. Criteria in the Merced Subbasin should likely be by Sustainability Zone."

d. Prop 68 Implementation Grant

   i. Samantha Salvia (W&C) provided a brief background on the grant application which was submitted on January 8, 2021 and seeks $5,000,000 in funding for two groundwater recharge related projects in the southern portion of the basin. Release of the draft funding list for Round 1 expected mid-March 2021, with final grant awards in May 2021.

8. Next steps and adjourn

   a. Confirm next meeting date

      i. Woodard & Curran will schedule an April 26 meeting from 1:15-3:15pm, shifting meetings to quarterly 4th Monday of January, April, July, and October.

   b. Meeting adjourned at 3:26 PM

Next Regular Meeting
April 26 at 1:15-3:15 PM
Meeting to be conducted virtually (subject to change)
Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: April 26, 2021 at 1:15 – 3:15 PM

LOCATION: Online – Zoom Meeting

Coordination Committee Members In Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☐	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
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☒	George Park (alternate)	Merced Subbasin GSA
☒	Larry Harris	Turner Island Water District GSA #1
☐	Scott Skinner (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. CALL TO ORDER AND WELCOME
    a. Samantha Salvia (Woodard & Curran) called the meeting to order.
2. ROLL CALL
    a. Coordination Committee members in attendance are shown in table above. The Committee had a quorum.
3. CONSENT CALENDAR
    a. Meeting notes from previous meeting (February 22, 2021) were approved with one correction to note a missing committee member in the attendance table (Mike Gallo motions, Ken Elwin seconded, none opposed or abstained).
4. PUBLIC COMMENT
    a. Dennis Evans: Dennis shared that he emailed a report to contact@mercedsgma.org from the EPA about green infrastructure to help decision-makers assess the potential value of investment in green infrastructure and encourages committee members to read it. Dennis provided additional follow-up information via chat:
        i. Please check out two links concerning Green Stormwater Infrastructure (GSI) epa.gov/smartgrowth and Enhancing sustainable communities with green infrastructure

epa.gov/green-infrastructure. The report was prepared by the U.S. Environmental Protection Agency's Office of Sustainable Communities. The report Links and valuation tools will help guide community leaders' decision makers to potential cost saving in Merced.

The examples of how cost savings can be compared in Merced County please See (page 9-Exhibit 6), Supportive Strategies (page 20)

5. REPORTS

a. Current basin conditions

   i. Chris Hewes (Woodard & Curran) presented hydrographs for each principal aquifer to highlight new Spring 2021 groundwater measurements.

   ii. Hicham ElTal (MIUGSA) suggests considering in future GSP updates to move to quarterly monitoring instead of monthly monitoring.

b. Coordination with neighboring basins

   i. Hicham ElTal (MIUGSA) provided updates:

      1. Turlock Subbasin – Coordination is occurring through Merced Irrigation District (MID) and Merced County's involvement as member agencies in the East Turlock GSA during the Turlock Subbasin GSP Development process. Current discussions are focused on interconnected surfaces water and chronic lowering of groundwater levels. This is particularly relevant to flows into and out of the Merced Subbasin. A draft GSP is not expected for public review until a July timeframe.

      2. Chowchilla Subbasin – a meeting was sponsored by DWR for Chowchilla, Merced, Madera, and Delta-Mendota Subbasins to discuss subsidence. An additional meeting is expected (date TBD) to talk about the history of subsidence.

c. GSA Reports - Updates were provided from each GSA on activities they are undertaking in their own jurisdiction:

   i. Nic Marchini and Eric Swenson (MSGSA) provided updates:

      1. At the April 8 meeting, the MSGSA Board moved forwarded with sustainability zones for groundwater management. For now, they are not permanent and may be further refined. It will help MSGSA analyze subareas.

      2. The MSGSA Board also formed a demand reduction committee to explore options for implementing this management action in the GSA.

      3. The MSGSA Board has moved from quarterly to monthly meetings.

   ii. Hicham ElTal (MIUGSA) provided updates:

      1. MIUGSA is still looking to put forward several policies (similar to what was shared in February CC meeting).

      2. DWR has officially awarded the Merced Subbasin $4,999,800 for two projects under the Proposition 68 implementation grant program (DWR finalized a draft awards list released a couple months ago). MID will move forward with executing a contract with DWR.

   iii. Larry Harris (TIWD GSA-#1) provided updates:

      1. TIWD GSA-#1 is still focused on a telemetry project for metering and storage projects (permitting, financing, etc.).

6. DISCUSSION ITEMS

a. Meadowbrook Water System Intertie Feasibility Study

i. Mark Reitz (AECOM) provided an overview of the Meadowbrook Water System Intertie Feasibility Study. The feasibility study evaluated possible connections to the City of Atwater and to the City of Merced systems. Details are presented in the separate slide deck.

ii. Q: City of Merced has a nominal pressure of 44 psi, plus some various pressure drops, so does the cost estimate include a booster pump? A: Not yet, would need to check some of the observed pressures in the potential connection areas.

b. Stakeholder Advisory Committee update

i. Samantha Salvia (Woodard & Curran) presented a summary of the first meeting of Stakeholder Advisory Committee for GSP Implementation, held on 4/12. Engagement was good (25/30 members in attendance). The meeting provided an overview of GSP commitments and the annual reports, and sought input on priorities for the Data Gaps Plan.

1. Link to meeting minutes from 4/12: https://www.mercedsgma.org/assets/pdf/meeting-materials/2021-04-12-SC-Meeting-Minutes-final.pdf

c. Data Gaps Plan (Prop 68 Planning Grant funded work)

i. Jim Blanke (W&C) shared the approach and draft results/recommendations from the data gaps plan effort.

ii. Comment (Hicham ElTal): it would be nice to have wells near the Merced River stream gauging stations to correlate surface water and groundwater measurements. It would also be nice to have similar wells on the Turlock side of the basin.

iii. Comment (Hicham ElTal): East of City of Merced along Bear Creek, MID installed gauging stations and put in two sets of wells (50 and 100 feet deep). It is possible we could add one of these wells to the network, though the gauging stations are not maintained.

iv. Q: Numerous folks have offered up monitoring sites sourced from existing production wells. Are these included in the draft results? A: Yes, some have been included where depth information or recent monitoring data were available.

v. Comment (Eric Swenson): Hard to review maps without roads or latitude/longitude coordinates.

1. Woodard & Curran will generate some PDFs with a different basemap where you can zoom in on locations with more detail.

vi. Comment (Eric Swenson): The intersection of Baxter and Buchanan Hollow roads is a suggested location for a new well that is a County dirt road.

vii. Comment (Eric Swenson): Another tool for subsidence is looking at casing failures for production wells (vertical and lateral shear fractures). Depth at which this is occurring may shed light on compaction depth. If you can identify locations, the next question would be outreach to the landowners.

viii. Comment (Hicham ElTal): Have looked at extensometers in the past and confirmed they are very expensive.

ix. Comment (Eric Swenson): Thinks there are some consistent cropping areas in the Subbasin that might be good candidates for a new CIMIS station.

x. Comment (Hicham ElTal): Hoping the data gaps plan can look at topography and wind patterns to suggest a representative location for a new CIMIS station. Not sure if we need to talk to DWR or other weather forecasters. Wind is an important factor to consider.

    1. Next steps for additional siting evaluation will be outlined in the data gaps plan.

xi. Q: Why can't the CIMIS station be installed in an alfalfa field? Does it need to be grass? A: Hicham's understanding is that it could be, but would require some kind of adjustment factor.

xii. Q: Will the plan look at how many wells needed to look at interconnected surface waters? A: The preferential monitoring layer takes into account distance to stream boundaries and included some suggested well sites along both Merced and San Joaquin Rivers.

xiii. Woodard & Curran will consider putting out some draft maps for Committee members to provide input before the draft plan is published.

xiv. Q (Dennis Evans): Is Aquifer recharge monitored? A: It depends on the context of the question – some artificial recharge is measured directly while other measurements (e.g. rainfall, etc.) are used to help model and estimate recharge.

7. Next steps and adjourn
    a. Confirm next meeting date – July 26
    b. Meeting adjourned at 3:13 PM

Next Regular Meeting
July 26 at 1:15-3:15 PM
Meeting to be conducted virtually (subject to change)
Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: July 26, 2021 at 1:15 – 3:15 PM

LOCATION: Online – Zoom Meeting

Coordination Committee Members In Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Eric Swenson	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☐	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☐	Kel Mitchel	Turner Island Water District GSA #1
☒	Tim Allan (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. CALL TO ORDER AND WELCOME
    a. Samantha Salvia (Woodard & Curran) called the meeting to order.
2. ROLL CALL
    a. Coordination Committee members in attendance are shown in table above. The Committee had a quorum.
3. CONSENT CALENDAR
    a. Meeting notes from previous meeting (April 26, 2021) were approved. (Mike Gallo motioned, Tim Allan seconded, all voted in favor.)
4. PUBLIC COMMENT
    a. No public comment. (comments and questions from the public were accepted during the meeting on agenda items)
5. REPORTS
    a. <u>Current basin conditions</u>

i. Matt Beaman (MIUGSA) presented hydrographs for each principal aquifer to highlight recent new monthly groundwater measurements recorded since the last review of data collected in March 2021.

ii. Public Q: Is there anything in that data that is a reason for concern? A: Nothing concerning at this point. It's typical to see during summer irrigation season that levels trend lower and recover into the fall and winter.

b. <u>Coordination with neighboring basins</u>

i. Hicham ElTal (MIUGSA) provided updates:

1. Chowchilla, Delta-Mendota, Merced, and Turlock subbasins have held several coordination meetings on subsidence over the last few months. The agencies are sharing information on impacts and also defining the region of subsidence.

2. Hicham noted that it will be important for the State to recognize that subsidence is chronic and was a problem before SGMA. He noted the Merced started coordinating with Chowchilla subbasin as early as 2015.

c. <u>GSA Reports</u> - Representatives from each GSA provided updates on activities they are undertaking in their own jurisdiction:

i. Lacey McBride (MSGSA) provided updates:

1. At the MSGSA July 2021 meeting, the GSA adopted a Water Year 2025 target of 15,000 AFY reduction in groundwater use. The GSA Board wanted to formalize a target to help communicate to stakeholders that actions need to start soon.

2. MSGSA formed an ad-hoc committee on demand reductions and has been meeting regularly and reporting to the GSA Board.

3. MSGSA has a Technical Advisory Committee meeting on 7/29 to start discussing strategies for land repurposing.

4. Public Q: MSGSA is 330,000 acres total, correct? A: About 337,000 ac.

5. Public Q: Are the Merced Subbasin GSA meetings public? A: Yes (meeting in person but also remote Zoom access is available).

ii. Hicham ElTal (MIUGSA) provided updates:

1. A Stakeholder Guidance Committee meeting for MIUGSA is coming up to discuss policies for implementation of the GSP.

2. MIUGSA is evaluating financing options, whether basin-wide or GSA-wide projects.

3. MIUGSA expressed interest in Merced County providing a workshop to key staff of different GSAs in the County to discuss transferring of groundwater well permitting process oversight to the GSAs within their respective boundaries.

a. Lacey McBride clarified that the proposal to the County for this process has no hard implementation deadline at this point. The County is also planning on offering such a workshop for GSAs possibly in August.

iii. Tim Allan (TIWD GSA-#1) Tim Allan introduced himself and was welcomed by the group to the Coordination Committee.

6. ACTION ITEMS

   a. <u>GSP Well Monitoring</u>

      i. Matt Beaman (MIUGSA) provided background on the contract for technical support related to monitoring and presented main elements of the proposed full contract for the next 12 months.

      ii. Q: Is the current cover crop around the existing CIMIS station compliant with DWR guidance? A from MIUGSA: No – MIUGSA plans to work with DWR to identify locations and get recommendation for an additional site.

      iii. Lacey McBride (MSGSA) clarified that today's action is for the Coordination Committee to agree to recommend to their respective GSA Boards to approve this monitoring contract.

      iv. <u>ACTION (motioned by Hicham ElTal, seconded by Eric Swenson, approved by committee):</u> Recommend GSAs authorize Merced Irrigation-Urban GSA to enter into an agreement, on behalf of the GSAs, with QK for monitoring work and other technical support, as presented.

         1. Duration 12 months, with opportunity to extend.

         2. Not to Exceed $136,050.00

         3. Share cost according to existing MOU

7. DISCUSSION ITEMS

   a. <u>Remote Sensing Decision Support Tool</u> (Prop 68 Planning Grant funded work) – Dominick Amador (Woodard & Curran) presented an update on the remote sensing decision support tool development. The goal is to utilize satellite technology to estimate monthly Et at a parcel level and combine this with information on precipitation and surface water deliveries to provide a better understanding of net groundwater use at higher resolution than currently available. Dominick described the work to date, conducted utilizing previously purchased Et data from approximately 2008 through 2013 He provided a mockup of the dashboard the tool will provided for end users. Next steps include collecting parcel-level surface water delivery data from local irrigation districts as an input to the accounting steps of the tool.

      i. Prior to opening up for committee discussion, Samantha Salvia reminded committee members that this tool is being developed under grant funding from DWR. Woodard & Curran is scoped to develop the tool itself and a technical support document summarizing the tool's capabilities and limitations. How the GSAs decide to use the tool is a policy matter – it may be used to identify trends in groundwater use, to support allocation framework discussions, or for other information purposes to help with basin management activities.

      ii. <u>Committee Member Discussion</u>

         1. Q: What is difference between ET_{actual} and $ET_{Applied\ Water}$? `A: ET_{actual} provided directly from METRIC independent of any other factors. $ET_{Applied\ Water}$ is essentially the evapotranspiration after processing (accounting for root storage, precipitation, etc.)

         2. Comment (Eric Swenson): The real world won't be as neat and clean as this tool. For Merquin County Water District, the measured deliveries to individual parcels are a mix of surface and groundwater and hard to disaggregate. Some users have unusual water supplies like wastewater treatment plant effluent where data may not be readily available. Monthly data will likely be challenging and annual is probably more possible. Need to think about how to accurately measure in the

future moving forward. Suggest the tool have options for reporting on monthly, quarterly, and annual basis.. Getting the satellite data will be the easiest part, sorting out the other water use will be more challenging.

3. Comment (Hicham ElTal): METRIC data is good, especially for identifying trends – but have to understand its limitations. The method is as strong as the information used to calculate evapotranspiration (applied) and depends on a number of factors such as the quality of the CIMIS data.

iii. Public Questions Submitted Via Chat – a number of questions were submitted into the chat and are captured below. Due to time constraints, not all questions could be answered during the meeting.

1. Public Q: What are Metric rasters? A: A tool that uses satellite infrared imagery to get a heat signature off the land surface. Once it goes through a modelling process and account for solar radiation and other climatic data – the satellite image is transformed into a layer describing where there is crop evapotranspiration. They cover a large area at a 30m resolution. Overall – it uses satellite imagery to determine evapotranspiration on a high-resolution basis.

2. Public Q: What about sub-surface drip? A: The method of irrigation is independent of this method – it's measuring the crop evapotranspiration and thus generally operational methods don't matter.

3. Public Q: Applied water is different right? applied water includes ET and deep percolation and runoff which would need to be measured with meters…correct?

4. Public Q: Won't ET be elevated if the picture is taken while someone is irrigating?

5. Public Q: How is precipitation going to be measured from parcel to parcel? CC Q: How is precipitation measured and how does is variability incorporated? A: We use PRISM (from University of Oregon) which takes into account many factors to interpolate point data to provide a spatially complete (30m resolution) precipitation on a daily basis.

6. Public Q: How many ground based weather stations are going to be used to inform the satellite etc information.

7. Public Q: How will riparian water application be calculated? By that I mean surface water used that is not being provided by MID (e.g. creek lift pumps).

8. Public Q: What will be the procedure if the remote-sensing consumption numbers are not consistent with the numbers calculated by growers from a parcel-level… and they have data from meters, etc to support?

b. Stakeholder Advisory Committee update – Samantha Salvia (Woodard & Curran) presented a brief summary of the July 26 Stakeholder Advisory Committee meeting. She noted it was the second meeting of this group, listed topics covered, and summarized the group's discussion on moving to in-person meetings.

i. Lacey McBride (MSGSA) recommended keeping legal counsels involved when scheduling the next meeting because it's possible the Governor's Executive Order altering Brown Act requirements (e.g. allowing Zoom meetings) may expire at the end of September 2021.

ii. Hicham ElTal (MIUGSA) pointed out that the previous Merced IRWM stakeholder meeting process invited stakeholder input online at the same time as the agenda (e.g. ranking of issues, providing comment ahead of time) and asked if this could be considered for future Merced GSP stakeholder meetings.

c. Data Gaps Plan (Prop 68 Planning Grant funded work) – Samantha Salvia and Chris Hewes (Woodard & Curran) presented the findings and recommendations from the Data Gaps Plan. The goal of the plan is to identify and rank priority areas for the installation of monitoring wells or subsidence monitoring stations to support basin characterization and future GSP refinement. The Plan priorities were developed based on feedback from the SAC and CC April meetings and GSA staff review. The Plan will be finalized and sent to the GSAs this week.

  i. Hicham ElTal (MIUGSA) confirmed that reaching out to the Turlock Subbasin for coordination on planned monitoring adjacent to the Merced River is a good idea.

  ii. Hicham ElTal (MIUGSA) suggested additional consideration on areas outside the Corcoran relative to DACs

  iii. Eric Swenson (MSGSA): Suggested deprioritizing monitoring in areas that are unlikely to be pumped (e.g. because water may be saltier than typically used for ag)

d. Minimum Thresholds in Areas Lacking Historical Monitoring Data – Samantha Salvia (Woodard & Curran) described that the GSP adopted in January 2020 includes minimum thresholds set for 25 representative wells based on a methodology that utilizes historical data and proximity to domestic wells. The GSP acknowledged that during implementation the GSAs would need to develop a methodology for new representative wells that may lack historical data or are not within 2 miles of a domestic well. Samantha summarized recent discussion and analysis with GSA staff and recommendations on how to proceed with establishing MTs in areas lacking historical monitoring or domestic wells. The recommendation so far is to use the GSP methodology where possible, and to address others on a case-by-case basis. New minimum thresholds should be set as interim while additional data are collected.

  i. Hicham ElTal (MIUGSA) clarified that this is an ongoing process and it hasn't been figured out entirely yet. As a next step, it would be beneficial to evaluate some real-world examples (e.g. new monitoring wells in TIWD or El Nido).

e. Insights from DWR Comment Letter on Other GSPs – Samantha Salvia (Woodard & Curran) summarized DWR input on four GSPs it has reviewed so far and their potential relevance to the Merced GSP.

f. Legislation Update – Hicham ElTal (MIUGSA) provided a summary of SWRCB latest emergency rules/notices affecting surface water diversions and their potential implications for the basin.

  i. SWRCB recently published emergency rules due to the drought, including restrictions to both pre- and post-1914 diversion licenses in the San Joaquin River watershed. The priority date threshold for rights was set to 1883 in the previous drought (~2012-2016) but no priority date threshold has been determined this time for the San Joaquin Valley watershed (e.g. affects all rights). MID expects to have a normal diversion this year due to storage prior to the emergency rules. MID and the cities coordinated on a letter to the SWRCB urging them to consider establishing a priority date that would help MID and not prevent them from capturing next year's storms due to lack of storage space in their reservoir.

  ii. Lacey McBride (MSGSA) reported that AB 252 (Department of Conservation: Multibenefit Land Repurposing Incentive Program) is in the California legislature now and would create a Department of Conservation funding program. MSGSA signed a letter of support for the bill. The Governor put ~$500M aside for this land repurposing but the legislature may not approve it. MSGSA supports such a program because they anticipate they will need to utilize land repurposing as a strategy to reduce groundwater use in the GSA to meet sustainability goals.

g. Allocation Framework Update – With only a few minutes left in the meeting, there was not time for much discussion on this item. At a future meeting, the ad-hoc group will provide an update on the development of the allocation framework.

   i. Hicham ElTal (MIUGSA) quickly summarized several concerns related to MSGSA's 5 yr objective:

      1. What is the baseline from which MSGSA will measure their 15,000 AFY reduction goal for Water Year 2025? The difference between wet and dry year pumping is more than the 15TAF goal.

      2. MSGSA's goal is stated in terms of consumptive use. GSP water budget is based on groundwater pumping. Need to be on the same page re consumptive use vs pumping as basin moves forward.

      3. MSGSA has claimed the groundwater budget in the GSP indicates wetlands do not use groundwater, but they do.

      4. No progress has been made on the issues of final allocation and accounting for imported surface water.

   ii. Hicham agreed to type up a list of the concerns and send them out to assist in future discussions.

8. Next steps and adjourn
   a. Confirm next meeting date – TBD based on identification of a meeting space and status of Brown Act requirements.
   b. Meeting adjourned at 3:22 PM

Next Regular Meeting
TBD, expected in October 2021
Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: October 25, 2021 at 1:15 – 3:15 PM

LOCATION: Online – Zoom Meeting

Coordination Committee Members In Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Eric Swenson	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Kel Mitchel	Turner Island Water District GSA #1
☐	Tim Allan (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. CALL TO ORDER AND WELCOME
    a. Samantha Salvia (Woodard & Curran) called the meeting to order.
2. ROLL CALL
    a. Coordination Committee members in attendance are shown in table above. The Committee had a quorum.
3. CONSENT CALENDAR
    a. Approval of meeting notes from the previous meeting (July 26, 2021) was deferred to allow the committee more review time.
4. PUBLIC COMMENT
    a. No public comment (comments and questions from the public were accepted during the meeting on agenda items).

5. REPORTS

   a. Current basin conditions

      i. Matt Beaman (MIUGSA) reported that the most recent basin conditions report (July to October 2021) was delayed due to technical issues with the data. The report will be sent out to the Coordination Committee by the end of this week.

   b. Coordination with neighboring basins

      i. Chowchilla-Madera-Delta Mendota:

         1. Hicham ElTal (MIUGSA) reported that coordination with the Chowchilla and Delta-Mendota Subbasins is continuing and current work is focused on developing water budgets for each basin. The meeting facilitator sent out a questionnaire that Merced Subbasin has not yet responded to. Hicham noted the importance of ensuring the same baselines and datums in comparing basin information.

         2. Lacey McBride (MSGSA) noted that recent work has included providing a list of Merced Basin projects and discussing how to determine sub-Corcoran pumping in the subsidence-focused area. No activity since last meeting in September

      ii. Turlock

         1. Hicham reported that some of the Turlock GSP chapters are out for public comment. A later agenda item will cover this.

   c. GSA Reports - Representatives from each GSA provided updates on activities they are undertaking in their own jurisdiction:

      i. MSGSA

         1. Lacey McBride reported that MSGSA has been developing a two-phase approach to implementation of the GSP and the Board is set to take action on the approach at their November meeting.

            a. Phase 1 – now through end of WY2025 – focused on meeting the target of reducing groundwater consumption by 15,000 AF annually through land repurposing and fallowing, importing surface water, and capturing flood waters. Other Phase 1 work will include the development of parcel-level water year budgets for growers, Prop 218 process for funding, and initiating discussions with stakeholders and the public regarding allocations (which are not anticipated to be adopted until Phase 2).

            b. Phase 2 – WY2026 through 2040 – includes adopting and implementing an allocation plan with continued land repurposing, fallowing, and securing surface supplies.

         2. MSGSA plans a public workshop (hybrid Zoom/in person) tentatively for November 18, with details to be released shortly.

         3. Eric Swenson noted that MSGSA is also looking at whether the Prop 218 process should fund filling data gaps and a well mitigation program

      ii. MIUGSA:

         1. Hicham ElTal reported that MIUGSA has held three Stakeholder Guidance Committee meetings to receive feedback from constituents related to the types of policies they would like to see for implementing the GSP. A fourth meeting is expected and will most likely be the final meeting. MIUGSA hopes to start policy

development in February 2022 and receive multiple iterations of public before publishing the policy, likely in the form of a rules and regulations guidebook. The main emphasis has been on agricultural uses, but conversations around urban use and their accelerated efficiency standards have continued.

iii. TIWD GSA-#1

1. Kel Mitchell reported that although WY2021 was difficult due to extended lack of surface water, the District had a 15-20% reduction in water use relative to WY2020 largely due to growers making crop changes. Data indicate that they met their target of 1.5 AF per acre during WY2021. Kel observed it was good to know that even in one of the most challenging years the District has experienced, they were able to meet the target.

d. <u>Data Gaps Plan Update</u> – Samantha Salvia (Woodard & Curran) reported that the Data Gaps Plan has been developed and will be modified as new information is collected. She noted that the grant the basin received to address data gaps includes funding for identifying and upgrading existing wells, and/or installing new wells which must be used by the end of 2022.

i. Matt Beaman (MIUGSA) added that the Data Gaps work has been slightly delayed to due to parallel work on developing a methodology for setting minimum thresholds for areas that don't have domestic wells. He also clarified that approximately $270K is remaining in the grant to support the Data Gaps work and MID will contract for this additional work. Matt noted that they have a proposal from QK and are going to review the cost estimate and perform their due diligence to ensure cost effectiveness.

6. ACTION ITEMS

a. None.

7. DISCUSSION ITEMS

a. <u>Well Consistency Policy for Groundwater Well Permits</u> – The Coordination Committee discussed options coordinating on well consistency determination policies.

i. Lacey McBride summarized the existing well permitting process. Well applications come into the County's Environmental Health Department, which permits all new wells. GSPs are in place in three of out four basins in Merced County and GSAs have been managing groundwater for the last two years. The County wants to shift determination of whether a well application is consistent with a GSP to the GSAs. Domestic wells would still be exempt, and the County would review and approve those permits.

1. New wells within GSA boundaries will be required to obtain a letter of consistency from a GSA after a consistency determination is made. Then, the applicant will file a permit with the County, who will review construction standards and inspect the well.

2. The proposed timeline for implementation is tentatively set for the end of 2021. Requires Board of Supervisors adoption.

3. Lacey requested the committee discuss the potential for consistency among the three GSAs' policies and potential development of a joint CEQA document

ii. <u>Committee Member Discussion</u>

1. Hicham ElTal (MIUGSA) noted it would be interesting to see what other basins are doing and agreed that consistency within the basin would be very helpful.

2. Eric Swenson (MSGSA) added that MSGSA is considering establishing allocations of sustainable yield and transition allocations to reach sustainability by 2040. He expects these numbers would be established by 2025 and asked what other GSAs timelines were.
    a. Hicham ElTal (MIUGSA) responded that MIUGSA hopes to establish allocations next year, although they will be subject to changes as the GSP is implemented and more data become available.
3. Lacey McBride (MSGSA) asked how MIUGSA will handle consistency determinations in the time between when the County adopts the updates in early 2022 and the development of their own policy.
    a. Hicham ElTal (MIUGSA) responded that MIUGSA will likely follow what the County has been doing until they have their own policy in place, but will need to discuss further with their legal counsel.
4. Eric Swenson (MSGSA) recommended that each GSA designate points of contact to continue coordination on this topic before the next Coordination Committee meeting.

iii. Public Questions Submitted Via Chat

1. Public Q: Is CEQA required for the development of an allocation or cap on groundwater extraction? A: Lacey clarified that the meeting discussion so far was related to CEQA coverage for well consistency determinations. Each GSA's legal counsel would need to advise on whether making a consistency determination on an individual well is a discretionary action.

b. Proposal Solicitation Package (PSP) for SGMA Implementation Grants

i. Matt Beaman (MIUGSA) presented the latest Draft Guidelines and PSP. Approximately $152M is made available for critically overdrafted basins in Round 1 (not competitive between basins, but it is competitive within basins); funds are divided equally at $7.6M for each basin.

1. $3.7M must be used for geophysical investigations, implementation of existing regional flood management plans that incorporate groundwater recharge, or projects that complement efforts of local GSP for floodplain expansion to benefit groundwater recharge or habitat; the remaining $3.9M can be used for a wide variety of projects, such as data gaps, long-term planning, annual reports, coordination activities, or installation of monitoring wells.
2. The Merced Basin is eligible for funding and would need to prepare a spending plan by Jan 31, 2022. The spending plan consists of developing a project list and evaluating and scoring projects using a process provided by the California Department of Water Resources (DWR). DWR will then review the spending plan and check the eligibility of the projects before developing a draft agreement.

ii. Discussion

1. Jim Blanke (Woodard & Curran) noted that in order to be eligible for grant funding, projects must be in an adopted GSP. He has reached out to DWR to find out how projects can be added and suggested the group consider commenting to request they allow projects that help meet the goals of the GSP and provide more flexibility.
2. It was recommended by the Coordination Committee that the following steps be taken:

a. Attend the public workshop hosted by DWR on November 16, 2021 from 2-4pm to learn more and ask questions.

b. Provide a single comment letter to DWR (signed by the three GSAs) requesting an extended deadline to allow for review of DWR comments on the Merced GSP and allowing projects that help meet the goals of the GSP be eligible for funding, not solely those listed in the GSP.

i. Eric Swenson (MSGSA) offered to draft the comment letter and provide it to the GSAs for review.

c. Start identifying projects, select representatives to score projects, and begin preparation of the spending plan.

c. Turlock Subbasin GSP – The Coordination Committee discussed the draft Turlock Subbasin GSP and options for commenting.

i. Matt Beaman (MIUGSA) provided a summary of the Turlock GSP and provided comparisons to the Merced GSP. He noted that 6 of 9 chapters are now available for public review and there are also opportunities for the Basin to comment during the 60-day public comment period that begins after the GSP is submitted (due by January 31, 2022). He suggested the basin might be most interested in commenting on the sustainable management criteria and projects & management actions.

ii. Committee Member Discussion

1. The group discussed Turlock's water budget which indicates the Merced River could lose additional water to the subbasin (budget indicates losses from Merced River could increase from 17 TAF/yr to 60 TAF/yr). It appears improvements in the subbasin's overdraft are partially the result of stream depletion, an undesirable result.

2. The group discussed forum and timing for comments. The group agreed to continue to use informal comment mechanisms, including the County and MID's participation on Turlock's technical advisory committee, and to wait to submit formal written comments until DWR comments are received on the Merced GSP, so that the comments on the Turlock GSP would be more comprehensive.

d. Insights from DWR Comment Letter on Other GSPs – The Coordination Committee discussed the comments made by DWR on other GSPs and the recent SWRCB comment letter to the Merced GSP.

i. Samantha Salvia (Woodard & Curran) summarized the status of DWR review of submitted GSPs. They have approved two GSPs and provided comments on two others (Cuyama and Paso Robles). DWR reports they will complete review of all submitted GSPs within their two-year deadline. Samantha expects the basin will receive comments requesting some corrective actions and have 180 days to respond.

ii. Samantha presented a brief summary of the DWR comments provided on two GSPs with potential relevance to other Central Valley GSPs. Relevant comments were:

1. Better justification for how minimum thresholds are consistent with avoiding undesirable results

2. Concern about use of groundwater levels as a proxy for the Depletions of Interconnected Surface Water sustainability indicator

3. Request to add sustainable management criteria and a monitoring network for nitrates and arsenic (the Cuyama GSP only has criteria for salinity)

iii. Samantha gave a brief summary of the SWRCB comment letter, which was received substantially after the public comment period, noting the GSAs have previously decided not to respond to comments submitted to DWR, but rather to wait to receive DWR's comments.

8. Next steps and adjourn
   a. The next Stakeholder Advisory Committee meeting is November 8, 2021.
   b. The next Coordination Committee meeting date is TBD, but expected virtually in January 2022, based on identification of a meeting space and status of Brown Act requirements.
   c. Meeting adjourned at 2:59 PM

Next Regular Meeting

TBD, but expected to be in January 2022 (later scheduled for December 22, 2021)

Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: December 22, 2021, 1:00 to 3:00 PM

LOCATION: Online – Zoom Meeting

Coordination Committee Members in Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☐	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Eric Swenson	Merced Subbasin GSA
☒	~~Mike Gallo~~ By MSGSA Board resolution, Kole Upton is standing in for Mike Gallo for the 12/22 CC meeting and subsequent project scoring	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Kel Mitchel	Turner Island Water District GSA #1
☐	Tim Allan (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to Order and Welcome
    a. Jim Blanke (Woodard & Curran) called the meeting to order at 1:03 pm.
2. Roll Call
    a. Coordination Committee members in attendance are shown in table above. The Committee reached a quorum.
3. Consent Calendar
    a. Nic Marchini motioned to approve all consent calendar items, Kel Mitchel seconded. All present voted in favor.

4. Public Comment

    a. Jeff, a fairly new farmer in the Merced Subbasin located in the MIUGSA, introduced himself and raised the topic of recharging the aquifer with treated wastewater and desalinated brackish water. Eric Swenson (MSGSA) responded that the economics of this type of recharge are more difficult in agricultural areas. Matt Beaman (MID) encouraged Jeff to contact MID to initiate further discussion and suggestions.

5. Reports

    a. None

6. Actions

    a. None

7. Discussion Items

    a. Overview of Round 1 SGM Implementation Planning and Projects Grant Application Process

        i. Jim Blanke (Woodard & Curran) discussed funding availability, project type considerations, and timeline for the Round 1 SGM Implementation grant.

    b. Informational item: Overview of Round 2 IRWM Implementation Grant Program

        i. Jim Blanke (Woodard & Curran) provided an overview of the IRWM implementation grant. There are projects already lined up from Merced IRWM Authority to apply for the available funding.

        ii. Public Question: Is Clayton Water District part of Merced Subbasin? Answer from Lacey McBride (MSGSA): Clayton Water District was annexed in 2019 and 7,000 to 10,000 acres are part of Merced County. One project they are pursuing is to bring water from the Eastside Bypass into the Merced portion of the District.

        iii. Public Question: When is the next IRWM meeting? Answer from Matt Beaman (MID): February, with additional information to be available on the website: http://www.mercedid.com/index.cfm/water/groundwater1/mirwma-merced-integrated-water-management-authority/

    c. Scoring Criteria Review for Round 1 SGM Implementation Planning and Projects Grant

        i. Liz DaBramo (Woodard & Curran) presented on the updated evaluation criteria, maps of Underrepresented Communities, and the Excel project scoring workbook.

        ii. Lacey McBride (MSGSA) requested that the technical team send the evaluation criteria to the project proponents so they can modify their project descriptions accordingly.

        iii. Question from Hicham ElTal (MIUGSA): Does DWR include anything about water rights in their evaluation criteria? Answer: Not explicitly, but the project must show quantifiable benefits and be reasonably accomplished.

        iv. Question from Kel Mitchel (TIWD GSA-#1): Can private agencies submit projects? Answer: No, public agencies must sponsor projects.

        v. Question from Eric Swenson (MSGSA): Which projects have specially funded projects for flagged DWR funds (e.g., AEM, etc.). Answer: Project proponents discussed their projects and verbally mentioned if the project incorporated an activity specially flagged. It was further noted that the requirement for certain project types included in the draft proposal solicitation package is not part of the final proposal solicitation package.

d. Review Projects to Be Scored for Round 1 SGM Implementation Planning and Projects Grant

   i. Jim Blanke (Woodard & Curran) discussed the project sources for initial scoring: GSP shortlist projects (3), GSP running project list (3), and new projects (14) – totaling 20 projects for grant consideration.

   ii. Question from Lacey McBride (MSGSA) to the Coordination Committee: How should we allocate funding – fully fund projects or partial fund a higher quantity of projects?

      1. Hicham ElTal (MIUGSA): Focus on projects that can receive benefits soon.

      2. Eric Swenson (MSGSA): Ask project proponents if partial funding is an option.

      3. Kole Upton (MSGSA): Focus on areas hardest hit by subsidence.

   iii. The following projects were briefly presented by project proponents and CC members asked intermittent questions:

      1. Amsterdam Water District Surface Water Conveyance and Recharge Project

         a. Question from Hicham ElTal (MIUGSA): What are the water rights for this project: Answer: Based on existing water rights and temporary permits until permanent water right is granted.

      2. Filling Data Gaps Identified in Data Gaps Plan

      3. Merced Water Resources Model Enhancement

      4. Merced Subbasin Recharge Project Decision-Support and Implementation Tool

      5. Merced Subbasin Integrated Managed Aquifer Recharge Evaluation Tool (Merced MAR)

         a. Project #3-#5 are complimentary and together update the basinwide modeling tool set.

      6. Buchanan Hollow Mutual Water Company Floodwater Recharge Project

         a. Question: Where is the basin located and have there been recharge tests yet? Answer: The basin will be located a few hundred feet from a creek. No investigations yet.

      7. Purdy Project (E. Purdy, W. Purdy, and Kevin Recharge Basins) (Project No. 38)

         a. The project will utilize existing water rights.

      8. Purdy Project (East Pike Recharge Basin) (Project No. 37)

      9. G Ranch Groundwater Recharge, Habitat Enhancement & Floodplain Expansion Project

         a. Question from Eric Swenson (MSGSA): Is there data that the water table is dropping in this location? Answer from Brad Samuelson: He can provide information that the water table is dropping, although that information is not included in the project description.

      10. LeGrand-Athlone Water District Intertie Canal – Phase 2

         a. Kole Upton expresses support for this project.

      11. Deadman Creek Canal Off Stream Storage and Recharge

a. Questions from Hicham ElTal (MIUGSA): Could this project proceed with partial funding? What is the acreage? Answer from Lacey: 250 acres of previously double-cropped land. Partial funding is okay.

b. Comment from Hicham ElTal (MIUGSA): They are looking for another surface water storage location to replace Black Rascal Creek for FloodMAR application. There is potential alignment with this project.

12. Merquin County Water District (MCWD) Sustainable Yield Management Plan and Plan Implementation

13. Project 31: Crocker Dam Modification

    a. Question from Eric Swenson (MSGSA): Have you estimated the quantity of water that could be saved from this project? Answer from Hicham ElTal (MIUGSA): Yes, 100,000 AF down Bear Creek is not unusual, and he will provide those number in the project application.

    b. Question from Eric Swenson (MSGSA): Does this project bring MID closer to charging canals in winter? Answer from Hicham ElTal (MIUGSA): Yes.

14. MIUGSA Groundwater Extraction Measurement Program

    a. The project will include 200 private wells.

15. Tri City's Water Recharge/Underground Storage Feasibility

    a. Comment from Hicham ElTal (MIUGSA): There is potential to revise the state's AEM survey pathway if there are locations that would support local underground/recharge investigations.

16. Vander Woude Storage Reservoir

    a. Question: What is the water right for this project? Answer: Flood water rights off of Mariposa Creek listed in the water rights application under review.

17. Vander Dussen Subsidence Priority Area Flood-MAR Project

    a. Eric Swenson (MSGSA) requested that the project proponents show quantities/probability of flooding in their project write up.

18. Turner Island Water District (TIWD) Water Conservation

    a. Question from Eric Swenson (MSGSA): Do you have a property already? Answer from Kel Mitchel (TIWD GSA-#1): Yes, would be on private property in TIWD – he has some locations in mind.

    b. Question from Hicham ElTal (MIUGSA): What are the water rights for this project? Answer from Kel Mitchel (TIWD GSA-#1): Contracted water from neighboring agencies.

19. TIWD Surplus Water Conveyance

20. TIWD Shallow Well Drilling

    a. Question from Eric Swenson (MSGSA): What is the source of the cost per well? Eric volunteered to share cost estimates and recommends a lower target flow rate with more wells to reduce drawdown. Response from Kel Mitchel (TIWD GSA-#1): The contractor included pump bowls, etc. in the cost estimate and he will follow up offline.

8. Next steps and adjourn

a. Jim Blanke (Woodard & Curran) adjourned the meeting at 3:08 pm.

Next Regular Meeting
February 7, 2022
Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: February 7, 2022, 10:00 AM to 12:00 PM

LOCATION: Online – Zoom Meeting

Coordination Committee Members in Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☐	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Eric Swenson	Merced Subbasin GSA
☒	Mike Gallo By MSGSA Board resolution, Kole Upton is standing in for Mike Gallo for SGM grant-related agenda items.	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Kel Mitchel	Turner Island Water District GSA #1
☐	Tim Allan (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to Order and Welcome
    a. Jim Blanke (Woodard & Curran) called the meeting to order at 10:10 am.

2. Roll Call
    a. Coordination Committee members in attendance are shown in table above. The Committee reached a quorum.

3. State of Emergency Teleconference Findings

    <u>ACTION (motioned by Eric Swenson (MSGSA), seconded by Mike Gallo (MSGSA), all present voted in favor):</u> The Coordination Committee considered the circumstances of the State of Emergency and made the following findings per AB 361:

    a. The State of Emergency continues to directly impact the ability of the members to meet safely in person and/or

    b. State or Local Officials continue to impose or recommend measures to promote social distancing.

4. Approval of December 22, 2021 Meeting Minutes

   a. <u>ACTION (motioned by Kel Mitchel (TIWD-GSA#1), seconded by Mike Gallo (MSGSA), all present voted in favor):</u> The Coordination Committee approves the December 22, 2021 Coordination Committee meeting minutes.

5. Public Comment

   a. Geoff Vanden Heuvel (via chat): "If a discussion is had about future meetings, as an member of the public, I would respectfully request that a remote option continue to be available."

6. Reports

   a. <u>GSA Reports</u>

      i. *Merced Subbasin GSA.* Lacey McBride (MSGSA) reported that the MSGSA is working on multi-benefit land repurposing initiatives. They will be discussing land repurposing and Prop 218 at their upcoming Board meeting. They would like to have a plan for voting by summer 2022. Eric Swenson (MSGSA) added that the MSGSA has also been working on project selection for the SGM grant.

      ii. *MIUGSA.* Hicham ElTal (MIUGSA) described that the GSA has been working on policies, rules, and stakeholder input for the GSA's Stakeholder Guidance Committee. Additionally, MIUGSA has continued to administer grant funding.

      iii. *TIWD GSA #1*. Kel Mitchel (TIWD-GSA#1) has also been working on project selection for the SGM grant.

   b. <u>Current Basin Conditions</u>

      i. Matt Beaman (MIUGSA) illustrated the monthly groundwater levels for each monitoring well by principal aquifer (Above the Corcoran Clay, Below the Corcoran Clay, and Outside of the Corcoran Clay) to better understand how the Subbasin behaves on monthly basis (not just biannually). Over the last year, groundwater levels have been relatively consistent. Groundwater levels Below and Outside of the Corcoran Clay have dropped between approximately 5 and 15 feet over the course of the last year. There are some groundwater level anomalies, perhaps due to pumping or measurement issues.

      ii. At several newly installed monitoring sites, pressure transducers have been recently calibrated, so more groundwater level data will be available with additional processing.

      iii. Recent measurements available from representative monitoring wells appear to be above Minimum Thresholds (MTs). Two representative monitoring wells are within 25 feet of the MTs – one far east in the Subbasin and one in the City of Atwater.

7. Comments on Groundwater Sustainability Plan by the Department of Water Resources

   a. Jim Blanke (Woodard & Curran) provided an overview of DWR comments on the GSP in the preliminary consultation letter (11/18/2021) and final determination (1/28/2022).

   b. DWR outlined three primary GSP deficiencies:

      i. *Non-consecutive dry years.* Drought-period declines do not apply to stream depletions, which currently rely on groundwater levels as a proxy.

      ii. *Groundwater level sustainable management criteria (SMC).* DWR noted that NGO and other agency analyses suggested that the SMC for groundwater levels could potentially dewater domestic wells. Further investigation into data sources and studies will be conducted. Woodard & Curran will present current groundwater levels compared to other potential MTs (e.g., 2015 groundwater levels) at upcoming GSA technical meetings.

iii. *Subsidence.* The GSP currently allows for some level of continued subsidence, while DWR is looking to minimize or stop subsidence under sustainable conditions. Also, DWR noted that more work is needed to identify what is significant and unreasonable (for flood control and water supply infrastructure, etc.) and how differential subsidence between basins will play a role.

c. DWR did not criticize the GSPs' groundwater quality approach.

d. Response to DWR

i. GSAs have 180 days to respond (by 7/27/22) and address deficiencies. If deficiencies are not satisfactorily addressed, management is assumed by the SWRCB.

ii. The GSA representatives met with DWR on 1/10/2022 to review DWR's comments

iii. A likely deliverable to DWR will be an updated, redline version of the GSP

iv. Hicham ElTal (MIUGSA) described that GSAs will have only a few chances to work with DWR to appropriately address the deficiencies, so caution is advised for final determination of GSP updates.

e. <u>ACTION (motioned by Hicham ElTal, seconded by Eric Swenson, all present voted in favor):</u> Recommend GSA Boards approve a contract amendment with Woodard & Curran to develop modifications to the GSP in response to comments from DWR, as described in scope provided by Woodard & Curran

f. Kel Mitchel (TIWD-GSA#1) and Hicham ElTal (MIUGSA) recommend that Coordination Committee meetings be held monthly and that meetings could be cancelled if not needed.

8. Potential future funding opportunity

a. Mike Gallo (MSGSA) discussed a potential future funding opportunity from DWR. Mike Gallo is working with Karla Nemeth (DWR) to identify funding for projects that are ready to implement, can provide benefits quickly, and are scalable.

b. Eric Swenson (MSGSA) suggested using extra funding opportunity to fill gap of projects with lowered requested grant funding for SGM grant.

c. There are other funding opportunities through the federal government's Infrastructure Bill.

d. For those interested in participating in follow up conversations with DWR, contact Mike Gallo (MSGSA) within the next week or two to coordinate.

9. Round 1 SGM Implementation Planning and Projects Grant

a. Jim Blanke (Woodard & Curran) provided an overview of the project scoring and selection process, including the process and rationale for reranking. Coordination Committee members scored each project based on DWR evaluation criteria. GSA representatives reviewed the aggregate scores and recommended modifications to the ranking and funding request amounts based on other considerations including water rights, cost per acre-foot, project location, among other factors.

b. Project proponents will be notified of the revised grant request for each project to ensure they can proceed with the project with local/other funding sources.

c. Kole Upton (MSGSA) encourages GSAs to prioritize projects that keep water within Merced County. This may be discussed further at upcoming GSA meetings.

d. Project proponents will need to provide additional information including shapefiles and backup documentation, as well as prove eligibility (e.g., Agricultural Water Management Plans). GSAs need to provide resolutions authorizing MIUGSA to provide apply for the grant on the Subbasin's behalf.

Liz DaBramo (Woodard & Curran) will follow up with individual project proponents to provide required information.

e. <u>ACTION (motioned by Eric Swenson, seconded by Hicham ElTal, all present voted in favor):</u> Recommend GSA Boards direct staff to submit grant application for the projects, and share costs for preparation of grant application, as described in the presentation, incorporating $100,000 for grant administration.

10. Next steps and adjourn

a. Kel Mitchel (TIWD-GSA#1) motion to adjourn, Hicham ElTal (MIAGSA) seconded. Adjourned at 11:59 am.

Next Regular Meeting
TBD, but expected to be in March 2022
Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: March 21, 2022, 10:00 AM to 12:00 PM

LOCATION: Hybrid meeting with physical location: County of Merced, Livingston Room, 2222 M Street, Merced, CA 95340 and on Zoom

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Coordination Committee Members in Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson[1]	Merced Irrigation-Urban GSA
☐	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Eric Swenson	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Kel Mitchel	Turner Island Water District GSA #1
☐	Tim Allan (alternate)	Turner Island Water District GSA #1

1. *Justin Vinson arrived at Item #6 below.*

Meeting Notes

1. Call to Order and Welcome

a. Jim Blanke (Woodard & Curran [W&C]) called the meeting to order at 10:10 am.

2. Roll Call

a. Coordination Committee members in attendance are shown in table above. The Committee did not reach a quorum until later in the meeting, so approval of meeting minutes and Emergency Teleconference Findings were moved to later in the agenda.

3. Public Comment

a. None received.

4. Reports

a. GSA Reports

i. *Merced Subbasin GSA.* Lacey McBride reported updates to the land repurposing program (short-term with 3-5 year contracts) being planned for implementation by the GSA. California Department of Conservation multi-benefit land repurposing grants are being pursued for later 10+ year projects. The GSA is also working on a Prop 218 proceeding may happen later in the summer to fund first phase of the two-phase approach. Workshops will be coming up in the next few weeks. A well consistency determination draft policy document has been made public (https://mercedsubbasingsa.org/wp-content/uploads/2022/03/MSGSA-Well-Consistency-Policy-Public-Draft-Clean-v2-03.16.22.pdf). Comments are due back by April 7.

ii. *MIUGSA*. Matt Beaman shared that MIUGSA has been holding MIUGSA-specific Stakeholder Guidance Committee meetings (3 meetings in late 2021 and a 4th meeting in March 2022). Recommendations have come from that Committee on general implementation rules, policies, and guidelines for the GSA implementation, including addressing terms for allocations (recommended that the MIUGSA board allocate on a 3-year term of 1.1 AFY/ac average – water could be used any time within that 3-year period). The recommendation also included some options for pooling between common landowners, carryover, and potential trading. A report is being provided (in draft now), soon to be publicized.

1. Q (Eric Swenson): What year will this allocation program be implemented? A: If not 2022, then 2023.
2. Q (Mike Gallo): How does an allocation work in a year where irrigation water allocation is 1.1 AF/ac? A: The grower has an option to use all or some of their allocated 3.3 AF of groundwater that they have available to them over the next 3 years. If they use all of that 3.3 AF, then they would not have the ability to pump groundwater for the next two years.

iii. *TIWD GSA #1*. Kel Mitchel (TIWD-GSA#1) had no updates.

b. Current Basin Conditions – no updates were generated for this meeting due timing and also the Annual Report presentation later in the agenda which includes a fall 2021 conditions update; a spring 2022 conditions updates is expected to be provided at a later Coordination Committee meeting.

c. Report on plan(s) to address changes to the Merced County Groundwater Ordinance

i. Lacey McBride (MSGSA) provided an overview of the updated Groundwater Mining and Export ordinance approved by the Board of Supervisors Feb 8, 2022 but not in effect until May 1, 2022.

ii. Hicham ElTal (MIUGSA) shared some concerns from MIUGSA that most of the wells will be looked at as a project requiring a lead agency, e.g. for potential linkage to CEQA. He expressed that no individual GSA should not be considered the lead agency. MIUGSA's approach has not been fully developed, but will make sure in response to the county on draft policy to make sure the lead agency issue is clear plus require certain well construction requirements, e.g. recommendation per MIUGSA Stakeholder Guidance Committee to install meters on new wells. The intention is that GSP policies will guide use of well(s) in the future.

1. Stanislaus County for instance passed a Programmatic EIR as a potential option.

iii. Kel Mitchell (ITWD GSA-#1) has the same major concern as MIUGSA about lead agency, e.g. high cost (money and time) of performing CEQA for each new well installation.

iv. Lacey McBride (MSGSA) has had an ad-hoc meeting working on this and it's been discussed at public board meetings as well.

1. The gist of the MSGSA policy is that it includes ways to find a consistency determination for replacement wells that are within the GSA and locating replacement wells on historical parcels served by original well. The MSGSA policy also includes a section for backup wells. It includes a section for wells that don't meet earlier criteria – then can go through a CEQA process to show the GSA that the proposed well doesn't have impacts. Purpose of the policy is to allow growers to maintain farming when needing to replace wells.
2. For the Corcoran Clay, there's a section addressing this; if a well currently exists in both layers and needs to be replaced, it allows flexibility in replacing in one or the other principal aquifer (or otherwise install two separate wells, one per aquifer) in recognition of potential that in future, there could be limitations in Sub-Corcoran pumping.
3. If landowner chose to do CEQA evaluation, landowner funds the work but the GSA would be the lead agency.
4. Policy is intended to be a bridge to get the GSA to when an allocation program is in place for long-term SGMA implementation. MSGSA expects that allocation program to have CEQA requirements.
5. Q: With exemption for replacement backup/replacement wells, will the GSA file the official exemption? A: Not determined yet, will be brought up with legal counsel.
6. Q: What happens to portion of Chowchilla basin that falls within the Merced Subbasin but is in Merced County? A: Subject to the county ordinance – will have to have a consistency determination with application package submitted to Merced County.

5. Grants

a. Round 1 SGM Implementation Planning and Projects Grant Update

i. Jim Blanke (W&C) described that the application was submitted and DWR has since shared that they do expect to fund the whole $7.6 million requested.

b. Prop 68 Round 3 Planning

i. Lacey McBride (MSGSA) shared that staff level conversations have been occurring on the second phase of the Data Gaps Plan to fund 2 shallow or 1 deep well plus some other activities to incorporate existing wells. Surrounding subbasins are also using Technical Support Services and the Merced GSAs would like to pursue this funding source as well. The GSAs have talked to the Stakeholder Advisory Committee as well as their Boards about potential additional wells. There's a running list of wells to be considered. Conversations are continuing.

ii. Jim Blanke (W&C) shared that the Remote Sensing Decision Support Tool development is ongoing, largely based on what kind of data is available. Time has been spent looking for accurate and cost-effective data. OpenET has been the latest focus, but the data is not quite available yet, though a preliminary copy has been obtained for initial review.

iii. Q: What's the status of the new CIMIS station? A: MID needs to meet with landowner and coordinate an agreement. MID has met with DWR to identify several candidate locations for the station on the parcel. Unsure of online date.

iv. Q: What other remote sensing options have you looked into? A: Formation and LandIQ.

1. TIWD GSA-1 has looked into LandIQ and found it to be more robust than OpenET. OpenET does not match up more with irrigation records.

v. Public Comment (Greg Young): "Just a note about OpenET…they have designed the platform to continue to refine and obtain more consistency between various remote sensing methods, which would get things closer to very specific analysis like LandIQ. This just may take time (a few years)."

c. 2020 SGM Implementation Grant

i. Matt Beaman (MID) shared the latest information on the two funded projects, both of which are in progress and on track (LGAWD Intertie and Recharge Project & El Nido Conveyance System Improvements).

1. Q: When is LGAWD construction expected to finish? A: Nic Marchini shared that he thinks it may be completed in late 2023.

d. SDAC Grant

i. Matt Beaman (MID) provided an update on a 2019 grant agreement covering 3 projects serving underrepresented communities.

ii. Q: Over time, do recharge basins have diminishing returns for volume recharged? A: Depends basin to basin on soil type and how it's maintained. It's like a natural log where you might see a drop in effectiveness over the first 2-3 years, but then should remain more consistent.

1. Under FLOOD-MAR, it is challenging when it comes to recharge basins because floodwater includes silt and other materials that can over time reduce recharge capability. But if you're taking (flood) water out of a reservoir, it's likely to be better quality.

iii. Q: When is Planada basin going into service? A: 2 sites with cone penetration tests found shallow clay, so moving to install dry wells at one site. Permitting is on schedule to be done over next 3-4 months and dry wells will be installed in summer 2022. Dry wells will be screened at 50 and 90-110 feet deep. Water is 190 feet deep. Water quality testing will be involved, as well as a settling tank.

6. State of Emergency Teleconference Findings

a. Motioned by Nic Marchini and seconded by Hicham ElTal. Motion passed unanimously.

7. Approval of February 7, 2021 Meeting Minutes

a. Motioned by Kel Mitchel and seconded by Hicham ElTal. Minutes were approved unanimously.

8. WY2021 Annual Report

a. Chris Hewes (W&C) provided key highlights from the recently drafted WY 2021 Annual Report that will be submitted to DWR by April 1.

b. Comment (Hicham ElTal): It would be interesting to look at change in storage per aquifer.

9. Comments on Groundwater Sustainability Plan by the Department of Water Resources

a. Jim Blanke (W&C) provided an overview of the schedule for the response to comments from the DWR on the Merced GSP, as well as an overview of the comments. He also presented some information on the technical analysis for the groundwater levels sustainability indicator, including potential options being considered for updated minimum thresholds.
b. Q: Did DWR also recommend looking at domestic wells? A: Yes, they noted the need to investigate domestic wells further to understand potential impacts.
c. Comment (Hicham ElTal): Expressed support for Option 1 (2015 GWLs) with interim milestones because the basin may run into issues with regulatory agencies in the future for levels below 2015 (e.g. such as a mitigation requirement), even though this is a harder option to implement.
d. Comment (Kel Mitchel): The GSAs need to consider balancing the need to be responsive to DWR's comment and reasoning for the comment against practicality – don't want to see the GSP do a hard pivot to a more restrictive threshold without careful consideration.
e. Comment (Eric Swenson) Don't think MSGSA can meet the 2015 levels scenario.
f. Q (Eric Swenson): Could the GSAs approach things differently within their regions? A from Hicham ElTal: Providing there can be a handshake in areas that influence MIUGSA, that's possible. Thinks 2015 levels are achievable if pumping reduces, but there are some areas that may need more careful attention.
    i. Kel Mitchel cautioned that other GSPs had comments from DWR about differences in policies between GSAs in the same GSP. Need to consider that as a potential secondary issue to avoid.
g. Eric Swenson proposed writing up an MT policy and discussing it in next 20 days to come to a consensus on minimum threshold approach, while W&C continues to develop the technical analysis to support. Hicham ElTal and Kel Mitchel supported the idea.
h. The Committee agreed on the need to put together questions for DWR and meet with the agency soon.
    i. Coordination Committee requested W&C to develop questions and send out for Coordination Committee review and input.
i. Q (Kel Mitchel): If groundwater levels were to decline to minimum threshold for option 3, what would be the impact to domestic users? Even if not dewatering, are there electricity or pump-resetting issues? A: Dataset doesn't exist to answer all those questions, per Eric Swenson. Pump companies have that kind of data, but doesn't exist in the county dataset and isn't typically made available.

10. Next steps and adjourn

a. Meeting adjourned 12:09 pm.

Next Regular Meeting
TBD, but expected to be April 25, 2022
Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: April 25, 2022, 3:00 PM to 5:00 PM

LOCATION: Hybrid meeting with physical location at Merced Irrigation District, Franklin Yard Facility, 3321 North Franklin Road, Merced, CA 95348 and online via Zoom

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Coordination Committee Members in Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☒	Stephanie Dietz[1]	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☒	Daniel Chavez	Merced Irrigation-Urban GSA
☐	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Eric Swenson	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☐	George Park (alternate)	Merced Subbasin GSA
☒	Kel Mitchel	Turner Island Water District GSA #1
☐	Tim Allan (alternate)	Turner Island Water District GSA #1

1. Stephanie Dietz joined around item 7(e) in the minutes below.

Meeting Notes

1. **Call to Order and Welcome**
    a. Jim Blanke (Woodard & Curran [W&C]) called the meeting to order at 3:00 pm.

2. **Roll Call**
    a. Coordination Committee members in attendance are shown in table above.

3. **State of Emergency Teleconference Findings**
    a. Motioned by Nic Marchini and seconded by Kel Mitchel. Motion passed unanimously.

4. **Approval of March 21, 2022 Meeting Minutes**
    a. Motioned by Kel Mitchel and seconded by Mike Gallo. Minutes were approved unanimously.

5. Public Comment

a. None received.

6. Reports

a. <u>GSA Reports</u>

i. *Merced Subbasin GSA*. Adriel Ramirez shared that the MSGSA adopted 4/14/22 well consistency determination policy. Also contacted by Department of Conservation to interview for application for multibenefit land repurposing program.

ii. *MIUGSA*. Hicham ElTal shared that the GSA is working on comments to the County updated groundwater ordinance. Working on setting up for future management of the GSA, e.g. software for water trades which will include accounting for surface water. Monitoring SWRCB curtailments and potential impact on basin sustainability.

iii. *TIWD GSA #1*. Kel Mitchel working through well consistency determination comments with GSA board.

b. <u>Current Basin Conditions</u> – Matt Beaman (MIUGSA) presented some figures showing groundwater levels recently recorded at monitoring wells, including some continuous pressure transducers at newer SGMA monitoring wells, others measured by QK, or others measured by City of Merced. He noted that not all wells are dedicated to monitoring and may be in use, or otherwise influenced by groundwater pumping by a nearby active well. Wells 53315 and 53316 have had some measurement challenges.

i. Q (public): Is the El Nido Firehouse well a dry or monitoring well? A: Monitoring well.

ii. Q (Nic Marchini): Where are stations 53315 and 53316 located? A: Off of Buchanan Hollow Rd, they are private wells.

7. Potential Revisions to the Groundwater Sustainability Plan

a. Jim Blanke (W&C) reviewed the three comments from DWR on the GSP which was determined “incomplete”. He also refreshed the group on SGMA terminology related to sustainable management criteria.

b. Jim Blanke (W&C) reminded the group about several options that have been evaluated for different minimum thresholds (MTs), including (1) 2015 levels, (2) historical low, (3) deeper of historical low or shallowest domestic well + 10 ft, or (4) a combination of #2 in the area of subsidence and #3 elsewhere in the Subbasin.

i. Q (Eric Swenson, MSGSA): How would we respond to someone who says their well has been dewatered going forward because we didn’t have information on it or wasn’t covered by a representative well? A: Mitigation component is not something being discussed today. The GSAs can decide if a mitigation program is needed and what that should look like.

ii. Q (Joseph Angulo): Are all domestic wells considered in the minimum threshold, regardless of date installed or quality of water withdrawn? A: The domestic well data source starts from mid-1990s based on electronic well permitting database from Merced County. We've included nearly all domestic wells except statistically-defined outliers.

c. Jim Blanke (W&C) shared that we've expanded the domestic well search radius from 2 miles to 5 miles and included public water supply wells.
d. Jim Blanke (W&C) expanded on some additional considerations incorporated into the latest round of modeling for ongoing/future subsidence, including no cumulative change in storage (to avoid additional subsidence) over the long term, as well as no cumulatively negative storage in any year (e.g. dry years). These criteria are generally more protective than the MTs that take into consideration groundwater levels only.
    i. Q (Kel Mitchel, TIWD GSA-#1): How does the subsidence map look for 2015-2021 instead of 2012-2021? Should we consider expanding the "subsidence area" to the whole Below Corcoran Clay area because it could occur elsewhere in the future? A: W&C has not looked at that specifically and could consider expanding the region.
e. Jim Blanke (W&C) walked the group through the model results table.
    i. Q (Hicham ElTal, MIUGSA): Does the pumping reduction column include developed supply? A: Yes.
    ii. Q (Hicham ElTal, MIUGSA): Between modeling scenarios A, B, and C, could you add the stream depletions from the Merced River? A: Yes, W&C can do that.
    iii. Comment (Hicham ElTal, MIUGSA): From MIUGSA perspective, if the updated GSP uses any scenario that isn't 2015 groundwater levels, MIUGSA doesn't want to be responsible for mitigation. But, if using 2015 levels, then can look at scale of depletions between GSAs to share cost of mitigation that might occur.
        1. MIUGSA has comments to share later on expanded 5-mile radius used for domestic wells and for comparison to historical lows.
    iv. Q (Eric Swenson, MSGSA): What is the baseline gross extraction that the groundwater reductions are starting from? A: Around 620,000 AF.
    v. Jim Blanke (W&C) shared highlights of comments on the results table from the Stakeholder Advisory Committee earlier on 4/25. They ranged from support for 2015 levels and higher groundwater levels vs others concerned about economic impacts on the County with support for scenario C, potentially with projects or management actions to address dry year negative cumulative storage change.
        1. Kel Mitchel (TIWD GSA-#1) shared that he thought he heard that there was more interest in having a strong response (over-response) early on and then readjust later (rather than the opposite of not going far enough now and needing to be reactive later on).
    vi. Q (Kel Mitchel, TIWD GSA-#1): Where are the reductions occurring geographically? A: Modeling was based on reduced crop acreage. In the subsidence area, pumping reductions were focused primarily in the Below Corcoran, with less reductions in the Above Corcoran. Note that planned

supply side projects will reduce what is needed for magnitude of demand reductions, but not enough to fully offset.

vii. Public comment (from chat): It would be helpful to see what the specifics of the mitigation strategy to get the -40,000 [*AF shown in modeling scenario C*] to positive.
    1. Response: Likely, the strategy would primarily include land fallowing because there are limited water supplies to bring in those very dry conditions.

viii. Q (Kel Mitchel, TIWD GSA-#1): DWR's letter was specific about evaluating subsidence impacts on beneficial uses and users in the subbasin – anything we can do to think about that or address is more directly? A: W&C contacted USBR and reviewed some of their published Channel Capacity reports to see how subsidence would impact the Middle Eastside Bypass and its ability to convey flood flows. For instance, USBR Channel Capacity Report (2019, Appendix B) suggested impacts by 2031 for ability to meet goals for flood flow conveyance. We also know Delta-Mendota has had issues with conveyance through infrastructure.

ix. Jim (W&C) clarified that modeling scenario C involves historical low in Below Corcoran Clay in subsidence area, but shallowest domestic well (+10ft) everywhere else (including the Above Corcoran Clay aquifer in the subsidence area).

x. Q (Stephanie Dietz, MIUGSA): What are the impacts of pumping reductions on municipal wells? A: Hard to answer directly, but all these reductions will need to go through a process of allocation between the GSAs and then within each individual GSAs before it gets to individual wells.

xi. Q (Adriel Ramirez, MSGSA): What if we choose 2015 levels and don't get there at 2040? Can we address in a 5-year update to be less restrictive? A: The GSP is a living document and can be updated through a stakeholder process and with DWR approval.

xii. Public Question (in chat): Can you explain why the GSP scenario which reduces pumping 66,000 AFY has a -36,000 AF Minimum Annual change in storage below Corcoran and Scenario C which reduces pumping more at 70,000 AFY results in -40,000. What is going on in the model to make this result? A: There a few factors: the pumping reductions are not uniform throughout the Subbasin but also there are a series of revisions since the GSP model version was developed, so there are some model behavior differences.

xiii. Comment (Adriel Ramirez, MSGSA): Majority of pumping reductions are in MSGSA. They might be able to meet pumping reductions, but if can't get to 2015 levels, there's concern about negative impacts on the economy and not meeting goal. Might be too restrictive, too fast.

xiv. Comment (Kel Mitchel, TIWD GSA-#1): In comparing modeling scenarios B and C, there is a 45,000 AFY difference in pumping reductions. If an additional 45,000 AFY would need to be reduced from just the Below Corcoran aquifer, that's a huge volume of water for that area.

xv. Comment (Greg Young, MSGSA): If we go to 2015 levels, sounds like it would remove mitigation challenges, but there's a chance that 2015 levels might not be achievable by 2040 even if demand reductions are achieved. MSGSA is open to taking on some of the responsibility of mitigation (especially domestic wells) so MIUGSA isn't burdened for something that is not MIUGSA's responsibility.

Thinks modeling scenarios B or C are more implementable if we tie with another solution (e.g. mitigation program to be designed and shared).

1. Hicham ElTal (MIUGSA) replied:
    a. MIUGSA technically not looking at reduced pumping today, but it could happen in future because of SED and Bay Delta Plan.
    b. Concerned that groundwater levels below 2015 levels could be a slippery slope, even with consideration for mitigation responsibility by MSGSA. But willing to consider modeling scenario B or C if other GSAs serious about taking on mitigation responsibility (would need to be better defined).
    c. Concerned about recent observed declines in groundwater in MIUGSA's west side, which historically has been more resilient .

xvi. Kel Mitchel (TIWD GSA-#1) confirmed that in the case of 2015 groundwater levels goal, these don't need to be achieved in 2023 – the goal is 2040.

xvii. Hicham ElTal (MIUGSA) would like MSGSA to share more information on how they'll commit to 100% mitigation responsibility for domestic wells (if want to deviate from 2015 groundwater levels).

xviii. Jim Blanke (W&C) shared another option where 2015 levels could be the new measurable objective (MO), but set the MTs lower to reduce risk of violation. MIUGSA shared they're open to this and other creative solutions.

xix. Q (Adriel Ramirez, MSGSA): What happens to wells that go dry during implementation as we ramp down pumping to go for 2015 levels? A from Hicham ElTal (MIUGSA): Willing to do a proportional cost share based on the percentage of pumping percentage over the native yield.

xx. Q (Kel Mitchel, TIWD GSA-#1): How should we think about a goal for 2015 levels in Above Corcoran considering it was pretty high in 2015 and not pumped heavily? A: It would have a benefit to subsidence. However, we would need to look to impacts on groundwater dependent ecosystems (GDEs) and stream depletions due to increased pumping likely to occur in Above Corcoran.

1. Kel suggested that we would need a Below Corcoran Clay MT which would be 2015 or historical low. Then Above Corcoran Clay can't be tied to 2015.
    a. Hicham ElTal (MIUGSA) agreed with this.
    b. One additional suggestion could be 2015 levels minus some buffer. Hicham requested that Woodard & Curran look into this.

xxi. Comment (Eric Swenson, MSGSA): Has designed pumps for Above Corcoran wells in previous work; pumping rate for above wells is much smaller than Below Corcoran. Might need twice as many wells to meet same pumping volume. This could be complicated under well permitting, but addressable.

xxii. Adriel Ramirez (MSGSA) confirmed that they need direction from the MSGSA Board as next step on mitigation program responsibility; the next meeting will occur in the second week of May.

xxiii. Q (Nic Marchini, MSGSA): Are there any scenarios that are protective of domestic wells and address the other categories? A: Option C is lowest pumping value that is still protective in terms of domestic wells (meets minimum threshold definition, though may still allow some dewatering). But Option C doesn't address subsidence.

xxiv. Q (Nic Marchini, MSGSA): Would replacement of a very shallow well be part of a mitigation program? A: It will be up to the Committee and GSAs to put together a mitigation program, e.g. how to determine whether dewatering is due to GSP vs other conditions.

xxv. Q (Eric Swenson, MSGSA): How much detail would the updated GSP need to have about mitigation? A: Need to include an open and transparent impact of MTs on beneficial uses and users of groundwater in the Subbasin. Up to the GSAs to include or not include a mitigation program, but not necessarily required. For example, several other GSPs included a plan for how to consider development of a mitigation program. There's some flexibility.

f. Jim Blanke (W&C) described the schedule for incorporating edits into the GSP by end of July to address DWR's comments.

8. Next steps and adjourn

a. Meeting adjourned 4:45 pm.

Next Regular Meeting
TBD, but expected to be late May 2022
Information also available online at mercedsgma.org

MEETING NOTES – Merced GSP

SUBJECT: Merced GSP Coordination Committee Meeting

DATE/TIME: June 1, 2022, 1:00 PM to 3:00 PM

LOCATION: Hybrid meeting with physical location at Merced Irrigation District, Franklin Yard Facility, 3321 North Franklin Road, Merced, CA 95348 and online via Zoom

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Coordination Committee Members in Attendance:

	Representative	GSA
☒	Hicham ElTal	Merced Irrigation-Urban GSA
☐	Stephanie Dietz	Merced Irrigation-Urban GSA
☒	Justin Vinson	Merced Irrigation-Urban GSA
☐	Daniel Chavez	Merced Irrigation-Urban GSA
☒	Ken Elwin (alternate)	Merced Irrigation-Urban GSA
☒	Eric Swenson	Merced Subbasin GSA
☒	Mike Gallo	Merced Subbasin GSA
☒	Nic Marchini	Merced Subbasin GSA
☒	George Park (alternate)	Merced Subbasin GSA
☒	Kel Mitchel	Turner Island Water District GSA #1
☐	Tim Allan (alternate)	Turner Island Water District GSA #1

Meeting Notes

1. Call to Order and Welcome

a. Jim Blanke (Woodard & Curran [W&C]) called the meeting to order at 1:02 pm.

2. Roll Call

a. Coordination Committee members in attendance are shown in table above.

3. State of Emergency Teleconference Findings

a. The Coordination Committee considered the circumstances of the State of Emergency and determine whether to make the findings that any of the circumstances exist per AB 361: that the State of Emergency continues to directly impact the ability of the members to meet safely in person and/or State or Local Officials continue to impose or recommend measures to promote social distancing.

b. Action: Motion made, seconded, and carried

4. Approval of April 25, 2022 Meeting Minutes

a. Action: Motion made, seconded, and carried

5. Public Comment

a. None received.

6. Reports

a. GSA Reports

i. *Merced Subbasin GSA.* Adriel Ramirez shared that MSGSA applied for a multibenefit land repurposing grant program, but was unsuccessful in this funding round. As an additional $60 million may be added as a part of the Governor's proposed budget, the GSA is working to strengthen the application. Holding a public meeting on July 19 that, if successful, will fund their land repurposing program and fund the GSA executive director and domestic well mitigation program.

ii. *MIUGSA.* Hicham ElTal shared that MIUGSA approved 3.3. AF per acre for the period of April 1, 2023 through December 31, 2025 (equivalent to 1.1 AF/Ac annually) as sustainable native number for pumping allocations. MIUGSA is currently working through details of monitoring and enforcement and their Board will be approving certain numbers for recharge on a farm-by-farm basis. Matt Beaman shared that MIUGSA received the draft Grant Agreement with DWR for the SGM Implementation grant of $7.6 million; Mr. Beaman anticipates sending data requests to the respective project proponents to finalize the work plan, schedule, and budget. Hicham ElTal and Matt Beaman shared a presentation regarding an analysis of groundwater levels and pumping from 2016 to 2021 assuming pumping allocations at 1.1 AF per developed acre. Results show differences in the groundwater storage balance among the three GSAs. MIUGSA has a positive groundwater balance, even as groundwater levels have declined. Further, Mr. ElTal stated that MIUGSA believes that setting the minimum thresholds lower than 2015 levels may expose the GSAs to additional liability for impacts that may occur. Mr. ElTal stated that MIUGSA believes it should not bear mitigation or liability for setting minimum thresholds at historical lows and language in the GSP will need to reflect this.

1. Q: MSGSA has allocated funds for a domestic well mitigation program. What other mitigation measures may be included?
    a. Mr. ElTal responded that mitigation and liability are the two different issues. MIUGSA desires language broad enough to protect themselves at levels below 2015 levels, as all cities are in their GSA area. If the GSAs move forward with MTs set at 2015 levels, then MIUGSA does not require this language.
    b. Jim Blanke (W&C) added that the average pumping reduction between minimum thresholds set at historical lows (115 TAF) and those set at 2015 levels (175 TAF).
2. A question was raised about whether mitigation is required. Jim Blanke (W&C) clarified that the GSP must provide transparency around the impacts anticipated at minimum thresholds. Potential for state intervention could be triggered by missing an interim milestone.
3. MSGSA and MIUGSA discussed potential impacts of SWRCB intervention if consensus regarding mitigation/responsibility language could not be reached before the GSP revision deadline.
4. MSGSA requested MIUGSA provide the minimum thresholds options and related language for sharing liability for the MSGSA Board to consider.

MIUGSA committed to drafting language to provide to MSGSA and TIWD GSA #1 for review prior to next MSGSA Board meeting.

5. Jim Blanke (W&C) clarified that the GSAs will need to set measurable objectives and interim milestones based on a similar methodology of the selected minimum threshold.

iii. *TIWD GSA #1*. No update provided.

7. Potential Revisions to the Groundwater Sustainability Plan

a. Groundwater levels
   i. Jim Blanke (W&C) shared progress on revising groundwater level minimum thresholds. GSAs have decided to pursue historical lows as the minimum threshold approach. Once pumping reductions are implemented through projects and management actions (ramping up after 2025), groundwater levels are projected to increase. Measurable objectives will be developed to provide operational flexibility (approach being evaluated at this time is to use fall 2011 groundwater levels) and interim milestones will be defined by anticipated GSP implementation and model simulated response. Meeting discussion included incorporating a domestic well mitigation program, with primary financial responsibility with MSGSA, and a management action to explore different levels above Corcoran in the subsidence area for more flexibility in responding to subsidence issues.
   ii. Q (Kel Mitchel): Can interim milestones go below minimum thresholds?
      1. A (Jim Blanke): Based on BMPs from DWR, yes, this is allowed.

b. Subsidence
   i. Jim Blanke (W&C) presented the subsidence minimum threshold (and measurable objective) option under consideration by the GSAs: 0 feet per year, with condition of uncertainty. Other options include total subsidence (rather than rate) or the stipulation of a 5-year rolling average. USBR measurement issue is approximately +/- 1 inch and will be discussed with DWR. The final option is to set groundwater levels as a proxy for subsidence, which would involve extensive rework of the subsidence section. Interim milestones will assume some level of subsidence through 2040, both residual and new.
   ii. Jim Blanke (W&C) introduced the proposed management action for the subsidence area: goal is to target pumping reduction (or recharge activities) within Subsidence Focus Area (defined by region with 2015-2021 average less than -0.15 ft/yr) to achieve positive annual storage change. Noted that exact details will be developed as part of the management action determined after GSP is updated.
   iii. Comment (Hicham ElTal): Believes that the GSAs should accept DWR's position of 0 ft/yr for minimum threshold at this point and perform studies prior to 2040 to demonstrate that subsidence occurs in neighboring subbasins and argue that this is not a Merced Subbasin-specific problem.
   iv. Comment (Kel Mitchel): Could be explicit in the GSP that the MTs for GWLs are protective of subsidence, since set at historical lows.

c. Domestic well mitigation
   i. Jim Blanke (W&C) explained that, while identification of the need for a domestic well mitigation program will occur during GSP implementation, it is envisioned that a board or committee will review claims (which would need to be tied to

regional groundwater conditions), with the primary financial responsibility coming from MSGSA, through negotiations.

ii. Mr. ElTal reiterated that MIUGSA should not be responsible for mitigation for minimum thresholds set lower than 2015, and restated the commitment to prepare options and language for other GSAs to review.

d. Adoption / public input opportunities

i. Jim Blanke (W&C) shared that, by next Coordination Committee meeting in late June, consensus on the minimum thresholds, measurable objectives, and interim milestones should be reached and the redline GSP should be drafted for Board review and adoption.

ii. Comment (Hicham ElTal): Propose to combine committee meetings in late June to incorporate revisions from Stakeholder Advisory Committee members live and reduce need to respond to comments multiple times.

8. Next steps and adjourn

a. Charles Gardiner (Catalyst) shared an update from the SAC meeting that most of group was content with the GSAs direction to select historical lows as minimum threshold, but some wanted to see 2015 levels as the minimum threshold.

b. Greg Young (MSGSA) requested MIUGSA to share analysis details from their table of estimated groundwater use and allocations included in their presentation under Item 6(ii).

i. Hicham ElTal (MIUGSA) agreed to share the analysis.

c. Meeting adjourned at 2:49 pm.

Next Regular Meeting
Tentatively scheduled for a joint meeting of the Stakeholder Advisory Committee and the Coordination Committee on June 27, 2022, 1pm
Information also available online at mercedsgma.org

DRAFT

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting

DATE/TIME: May 29, 2018 at 9:30 AM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☒	Arlan Thomas	MIDAC, growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☒	Brian Carter	D&S Farms, growers
☒	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☒	Frenchy Meissonnier	Rice Farmer, rice growers
☐	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☒	Greg Olzack	City of Atwater resident
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☒	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☐	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Notes

1. Welcome, Introductions, and Agenda Review

- GSP outreach consultant Charles Gardiner (Catalyst Group) started the meeting
- Introductions were given for Charles, the GSP technical consultant Samantha Salvia with Woodard & Curran, and members of GSA leadership attending the meeting, as well as audience members
- Attending GSA leadership included: Larry Harris, Turner Island GSA, Governing Board; Hicham ElTal, Merced Irrigation-Urban Groundwater Sustainability Agency, Governing Board; Lacey Kiriakou, Merced Subbasin GSA, Water Resource Coordinator; Nic Marchini, Plainsburg Irrigation District and Merced Subbasin GSA, Vice Chair Governing Board

2. Stakeholder Outreach Approach and Committee Purpose

- Lacey Kiriakou (Merced Subbasin GSA) reviewed the requirements of GSP Outreach and provided information on approach and committee purpose
    - i. The website is www.mercedsgma.org and information will be posted as it becomes available
    - ii. Each of the GSAs will be the final decision makers and the Coordinating Committee (CC) is formed by agreement among all three GSAs
    - iii. The role of the Stakeholder Committee (SC) is to provide community feedback to the Coordinating Committee
- Charles Gardiner (Catalyst Group) reviewed the SC Meeting Agreements and Guidelines for Successful Meetings
    - i. The technical team will bring ideas to the SC to test ideas, see how they work, and seek input
    - ii. SC members should bring information and input to meetings from their constituents and help educate constituents about SGMA and groundwater management
    - iii. Discussion and recommendations from the SC will go to the CC and from there to the three GSAs

3. Overview of Sustainable Groundwater Management Act (SGMA) and Groundwater Sustainability Planning

- SGMA purpose and timeline
    - i. Samantha Salvia (Woodard & Curran) reviewed: common language used, SMGA fundamentals, a map showing the high priority basin and critical overdrafted basins in California, and a map showing the Merced Subbasin as one of the high priority and critically overdrafted basins in California
    - ii. Hicham ElTal (MIUGSA) reviewed that SGMA allows local management of groundwater basins with oversight from two agencies - DWR and State Water Resource Control Board and approval of a GSP by both agencies is needed to maintain local control
- Elements of a Groundwater Sustainability Plan

i. Samantha Salvia (Woodard & Curran) reviewed: GSP requirements; six undesirable results that are addressed during the development of the GSP; what the Basin Setting includes; what areas of the Merced Subbasin are either designated as a disadvantaged community or severely disadvantaged community; neighboring GSAs (Chowchilla, Delta-Mendota, and Turlock); options for the basin management approach and Merced Subbasin chosen approach (three GSAs to adopt one GSP for Merced Subbasin)

4. Pre-SGMA Groundwater Understanding

- Hicham ElTal (MIUGSA) reviewed what work has been done to date in the Merced Subbasin including data compilation and gaps, monitoring plans, model updates, and key findings

5. SGMA Grants, Scope, and Timeline of Planning Activities

- Lacey Kiriakou (Merced Subbasin GSA) reviewed where the funding was coming from to develop the GSP, with most of it coming from grant funding and reviewed grant funded projects that will assist Planada, El Nido, and Meadowbrook.

- Samantha Salvia (Woodard & Curran) reviewed the progress made on the GSP to date and Samantha and Charles (Catalyst Group) reviewed the GSP Roadmap

6. Stakeholder Committee Schedule and Decision-Making

- Charles Gardiner (Catalyst Group) reviewed the stakeholder committee decision-making options

- Charles suggested the SC develop consensus agreements or comments to share with the CC and three GSAs explained how the committee may want to define and reach consensus

- Samantha Salvia (Woodard & Curran) asked whether there was other feedback from the SC that can be presented to the CC in the afternoon meeting

- Lacey Kiriakou (Merced Subbasin GSA) asked if the meetings should be accessible by phone for members and the public to listen-in if these persons cannot participate

- The group discussed preferred meeting location and the Airdrome Conference Center was identified as comfortable and accessible

7. Public Comment on Items not on the Agenda

- No comments on public items not on the agenda.

8. Next Steps and Next Meeting

- The next two SC meeting are June 25th and July 23rd at 9:30 am.

- Items for Coordinating Committee:

    i. A request was made to receive regular updates from CC on interbasin coordination between the GSAs and for an alternate attend on a member's behalf be presented to CC for decision

- Topics for Future Discussions:

i. Water Quality and how it will be addressed in the Merced Subbasin GSP

ii. Bay Delta Plan impact on the water and the Merced Subbasin GSP

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting

DATE/TIME: June 25, 2018 at 9:30 AM

LOCATION: Castle Conference Center at Castle Airport, 1900 Airdrome Entry, Atwater, CA 95301

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☒	Alex McCabe	City of Livingston
☒	Arlan Thomas	MIDAC, growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☒	Brian Carter	D&S Farms, growers
☒	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☒	Darren Olguin	McSwain MAC
☒	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☒	Greg Olzack	City of Atwater resident
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☒	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Notes

1. GSP Development Elements and Approach

    - Alyson Watson (Woodard & Curran) provided an overview of the schedule of components that will be used to develop the GSP, broken into three categories: Technical Work, Policy Decisions, and Management Actions

2. Stakeholder Outreach and Engagement Strategy

    - Charles Gardiner (Catalyst Group) provided an overview of Outreach and Engagement Activities, including targeting of the first week of August for first public workshop.

3. Merced Subbasin Overview

    - Plan Area Information

        i. Alyson provided an overview of the "Plan Area and Authority" chapter of the GSP.
        ii. A request was made to view the land use/crop map in greater detail, as well as a high-level, order of magnitude summary of total acreage by crop type. Maps are being prepared separately per GSA and the presentation slides will be posted online at www.mercedsgma.org

    - Historical Groundwater Conditions

        i. Alyson provided an overview of the six groundwater sustainability indicators, with some specific examples and maps that help explain each. Groundwater elevations are a good indicator of several sustainability indicators since they are all related.

4. Groundwater Sustainability Goals

    - Purpose and Overview

        i. Alyson introduced the sustainability terms: Undesirable Results, Minimum Thresholds, and Measurable Objectives.

    - Initial Committee Perspectives and Input on Sustainability

        i. The Committee was asked to provide input on their definition of sustainability. Below are the notes recorded on a flipchart during the conversation. Sustainability is:

            - The amount of groundwater depletion allowed during two, three, and four-year droughts.
            - Whatever the State Water Board wants to see for sustainability.
            - Stable groundwater levels.
            - Improving groundwater quality.
            - No adverse economic effects.
            - Not running out of water.
            - No restricted use that would affect the economy.
            - Enough water for the uses – agriculture, community, and environment – with a healthy reserve.
            - Significant water quality issues in the Valley improve over time.
            - Balancing surface and groundwater use.
            - Increased acreage in production and crop shift.

        - Maintain a balance of agriculture, human right to water, and safe drinking water.
        - Reduce the environmental impact (groundwater basin and water quality) while maintaining things of value.
        - Shared understanding of water budget so everyone knows how much water is used and replaced in every year.
        - Doing what needs to be done so you can keep doing what you are doing but better.
        - Need to plan for wet years – what to do with surplus water.
        - Storage would help fix the problem.
    - A DWR representative provided some background information about DWR and State Water Board roles in reviewing and approving GSPs as well as annual and five-year reporting.
        - A request was made to review the criteria that DWR will be using the evaluate the GSP. These criteria will be provided to SC members.

5. Stakeholder Committee Procedures

    - Based on feedback from the Coordinating Committee, Alternates for Stakeholder Committee members are allowed, but they need to represent the same interest as the SC member for whom they are substituting. Members of the SC are responsible for keeping their respective alternate current on the meeting topics.

    - The group reaffirmed their understanding that the Stakeholder Committee is subject to the Brown Act.

    - A suggestion made to flag in meeting agendas where Stakeholder Committee members are requested to make recommendations or achieve consensus on an item to help make the line of communication clearer with the Coordinating Committee.

    - The group reached consensus on Procedures and Commitments (see Attachment A).

6. Interbasin Coordination Update

    - Staff have provided edits on Interbasin agreement back to Chowchilla Subbasin.

    - 2 meetings have been held so far with representatives from Turlock Subbasin to coordinate on GSP development status, data, etc.

    - Staff are trying to schedule a meeting with Delta-Mendota Subbasin, with preference to coordinate with GSAs preparing GSPs adjacent to Merced Subbasin.

7. Public Comment on Items not on the Agenda

    - No comments on public items not on the agenda.

8. Next Steps and Adjourn

Attachment A – Stakeholder Committee Procedures and Commitments

Purpose

- Advise the Coordinating Committee and GSA Governing Bodies

Membership

- Diverse representation of interests in the Merced Subbasin
- Coordinating Committee identifies and appoints members, with GSA approval

Member Terms and Responsibilities

- Through development of GSP
- Participate, represent interests, and educate communities

Alternate Members

- Alternates selected by members
- Should represent the same interest/perspective as the member
- Member is responsible for keeping alternate current

Decision-making

- Consensus approach for joint recommendations

Meetings

- Brown Act compliance
- Consistent participation: don't miss 3 in a row or 5 in a year

Consensus

Polling the committee to assess and confirm consensus. Consensus is all members present voting in categories 1 through 4.

1. I can say an unqualified 'yes' to the decision. I am satisfied that the decision is an expression of the wisdom of the group.

2. I find the decision perfectly acceptable. It is the best of the real options we have available to us.

3. I can live with the decision. However, I'm not especially enthusiastic about it.

4. I do not fully agree with the decision and need to register my view about it. However, I do not choose to block the decision and will stand aside. I am willing to support the decision because I trust the wisdom of the group.

5. I do not agree with the decision and feel the need to block the decision being accepted as consensus.

6. I feel that we have no clear sense of unity in the group. We need to do more work before consensus can be achieved.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #3

DATE/TIME: July 23, 2018 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☒	Alex McCabe	City of Livingston
☒	Arlan Thomas	MIDAC, growers
☐	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☒	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☒	Darren Olguin	McSwain MAC
☐	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☐	Greg Olzack	City of Atwater resident
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☐	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Minutes

1. Welcome, Introductions, and Agenda Review

    a. Introduction and overview of agenda items given by Alyson Watson (Woodard & Curran)

    b. There were no comments for the past meeting minutes. Comments and questions from past meeting minutes and further input can be sent via email to Woodard & Curran

    c. Alyson Watson (Woodard & Curran) provided an explanation on GSP Development addressing what we are trying to do, what we are trying to avoid, and how to establish our management objectives

2. Merced Subbasin Water Resources Model and Water Budget
    - Baseline overview
        - Alyson Watson (Woodard & Curran) presented the most recent work on the groundwater modeling tool and talked about the model's progress. Input on clarifications and questions were given by Jim Blanke (Woodard & Curran) and Dominick Amador (Woodard & Curran)
        - The following points and questions were addressed:
            - How we intend to use the model: the model will help us talk about stream/aquifer interaction, water quality, subsidence, GW levels, etc. and how to quantify this
            - A clarification was given regarding that we are discussing the Merced Subbasin, which is part of the larger San Joaquin Basin
            - Alyson Watson (Woodard & Curran) explained the grid criteria for the model and that there are models the state has developed. However, we are developing a smaller scale model which is needed for the projects we would like to talk about implementing
        - Question: how many wells are we using? Answer: there are over 200 wells operated by various agencies.
        - Question: if we are light on the data in the Eastern part of the subbasin, could there be inaccuracies in the model? Answer: where we have more data, we are more confident that the data is simulating more accurately. Where we don't have data, we do the best we can
        - Question: what kind of wells were utilized for this? Answer: there are 200 calibration wells, and over 200,000 were taken into consideration including urban and agricultural wells

3. Undesirable Results

    a. Alyson Watson (Woodard & Curran) provided a review of SGMA requirements and guidelines, including that we have to use 50 years of hydrology and must consider three important baselines

    b. Alyson Watson (Woodard & Curran) clarified we used 2013 as a pre-drought starting point with good land use data

    c. Merced Subbasin conditions were explained by Alyson Watson (Woodard & Curran) with input by Jim Blanke (Woodard & Curran) and Dominick Amador (Woodard & Curran). Contents included an explanation of historic use and groundwater budget in the Merced Subbasin

    d. Several questions were asked and clarifications given as follows:

        i. Question: does the model show change in GW levels? Answer: where the change occurs varies from area to area and is very site specific. The model has capacity to show this change including the rate of decline across the basin

        ii. Comment from Stakeholder Committee member: nothing is going to look as bad as 2014 and 2015. Response: we are going to look at both historical and current conditions and are also looking at urban water use, land use, and river flows. From 2015-2060, we are simulating up to 2060 using the historical data

iii. Question: how do the three (2015-2018) years of actual data compare with what we are using? Answer: we are using the historical data in covering these years
iv. Comment: we should recharge in wet years, use our surface water, and rest the deep wells
v. Question: are updates made every 5 years? Answer: Per SGMA updates are every 5 years
vi. Question: are we going to account for population change? Answer: yes, this will be part of the projected budget
vii. Question: how are we checking the data? Answer: data is checked with each of the GSAs
viii. Question: is there a 600 AFY overdraft? (referring to slide) Answer: this is still a best estimate with the assumption that everything stays the same except hydrology. Eventually we will get to the projects we might want to implement and how these impact overdraft
ix. Comment: cities will (and have) projected higher population growth than actual growth, and this will make a huge difference on our water budget. Response: we are working with the GSAs to establish what they think will happen with land use change, population growth, etc.
x. Question: do we have a map with the projected changes throughout the basin? Answer: yes, we do have this can present next time
xi. Question: do we have a map with the 200 wells? Answer: this can be provided next meeting
xii. Question what well information do you need? Answer: Any well that has data, we can use
xiii. Question are you looking for more wells? Answer: Yes, especially in gap areas
xiv. Question: can you use data that the growers are keeping track of? Answer: we would take that information into consideration, although it might not go into the model
xv. Question: can we list what kind of well data we need on the website? Answer: yes
xvi. Comment: is a well with no historical data useful? Answer: we currently need historical data, but other data will be helpful going forward
xvii. Question: the Mariposa Basin is not included in the model? Answer: no, the other 3 directions have more complexity. However, at other boundaries we want to look at boundary interactions with the other basins
xviii. Question: when would we have a number for overdraft to plan with? Answer: there are many assumptions built into this number. However, using the projected baseline will be our best measure for future planning
xix. Question: does the Coordinating Committee make the decisions on this? Answer: the Coordinating Committee makes recommendations to the GSAs, who make decisions.
xx. Question: are we going to include the SED (Substitute Environmental Document) into the baseline? Answer: that will be a policy decision, and our recommendation is to not build it into the baseline until it is adopted

e. Alyson Watson (Woodard & Curran) explains for storage the challenge is in getting to the groundwater. The subbasin does not have a substantial issue in terms of total volume (storage)
f. Alyson Watson (Woodard & Curran) described what are significant and unreasonable undesirable results (types of negative impacts we want to avoid), minimum thresholds (what we are going to measure), and measurable objectives
g. Discussion was held focusing on undesirable results for the different sustainability indicators, addressing what members and attendees have seen, what is critical and most important based on their experience in the basin. Results of that discussion were put on a whiteboard as follows:
    i. Subsidence
        1. Loss of storage
        2. Infrastructure impacts
        3. Irreversible system impacts
        4. Flood flow impacts
        5. Planned projects impacts
    ii. Interconnected Surface Water
        1. SED impacts
        2. Environmental quality + habitat

        iii. Degraded water quality
            1. Human consumption
            2. Reduced crop yields
            3. Soil impacts
            4. Public health + sanitation
        iv. Groundwater Elevation
            1. Cost of pumping water
            2. Harder to recharge (with decline in levels)
            3. Energy requirements increasing
            4. Shallow wells going dry
            5. Well replacement costs
            6. Decline in yields
    h. Economic impacts from groundwater issues impact everyone and span across all issues because everyone in the Subbasin is connected financially. This includes property value impacts and public health impacts

4. Stakeholder Outreach and Engagement Strategy

    a. The First Public Meeting will be August 2, 6:00pm to 8:30pm. Woodard & Curran will send out a notice. There will be Spanish translation provided. Committee members and attendees are encouraged to help get the word out about this event

5. Interbasin Coordination Update

    a. Hicham ElTal (MIUGSA) gave an update. We have met with Turlock and have an interbasin agreement with Chowchilla which is going to the GSAs for approval and signing. This is for agreeing to work together on the subsidence area and to share information and to agree on how we manage this area. There is a meeting with the technical staff in August to coordinate that information sharing. We are also setting up coordination the Delta-Mendota

    b. Question asked whether this means that one basin will adversely affecting another. Answer: There are different ways to develop goals and thresholds. We are going to coordinate now to avoid a position where one basin negatively affects another in the future

6. Public Comment on Items not on the Agenda

    a. Question was asked about what is the "SED". Answer: the "Substitute Environmental Document". This looks at in stream flow requirements for the Delta but has not been adopted yet

7. Next Steps and Next Meeting (will be Aug. 27th)

    a. Historical Water Budget
    b. Undesirable Results Continued (working toward sustainable thresholds)

Next Regular Meeting
August 27, 2018 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #4

DATE/TIME: August 27, 2018 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☒	Arlan Thomas	MIDAC, growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☒	Brian Carter	D&S Farms, growers
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☒	Gino Pedretti III	Sandy Mush Mutual Water Company
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☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☐	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☐	Simon Vander Woude*	Sandy Mush Mutual Water Company, dairies

* Nate Ray (Sandy Mush Mutual Water Company) was present as an alternate for Simon Vander Woude

Meeting Minutes

1. Welcome, Introductions, and Agenda Review

    a. Introduction and overview of agenda items given by Charles Gardiner (Catalyst Group)

    b. There were no comments for the past meeting minutes. Comments and questions from past meeting minutes and further input can be sent via email to Woodard & Curran.

2. Minimum Thresholds

    a. Alyson Watson (Woodard & Curran) provided an overview of sustainability criteria, a summary of the comments provided last month on undesirable results related to each criteria, and a description of how setting minimum thresholds will be an iterative approach.

    b. Chronic Lowering of Groundwater Levels

        i. Question: How will the state evaluate the basin's minimum thresholds? Answer: The state doesn't have its own threshold methodology by which a comparison will be made. They will be evaluated based on the GSP's rationale of setting thresholds based on describing undesirable results.

        ii. Question: How will coordination of threshold-setting work with neighboring basins? Answer: Through our Interbasin coordination efforts with an understanding of different deadlines for SGMA for different basins.

        iii. Question: Is there a breakdown of location of all the CASGEM wells (to help identify which ones are under particular jurisdiction)? Answer: Yes, we can provide that information from DWR's CASGEM database and map with locations. This was sent out to all SC members on 9/5/2018.

        iv. Question: Have you taken into account historical cropping patterns in the basin? Answer: No, not explicitly, but whatever has been pumped at a particular location is most likely tied to crop history and is reflected in historical groundwater elevations.

        v. Question: How do you take into account previous droughts or future droughts? Answer: Droughts are seen in the historical groundwater levels and we're going to define violations to thresholds in the future (e.g. could be based on number of wells below threshold in a normal year, % of wells in a dry year, etc.)

        vi. Question: How far back does the DWR completion well database go back? Answer: In a review of the DWR database records for the Merced Subbasin, the "Date Work Ended" field (assumed to be well construction date) has entries as far back as 1941, though about 12% of all records have no date available.

        vii. Concern was expressed by several Stakeholder Committee (SC) members and the Leadership Council for Justice and Accountability that having a threshold near the shallowest domestic well depth (25th percentile or higher) may not be protective enough.

            1. Members requested seeing the threshold analysis using the shallowest well instead of 25th percentile for reference purposes.

viii. Question: Will thresholds be set for the whole basin vs areas of the basin? Answer: Thresholds are set at a specific monitoring well only but are meant to be representative of the entire basin in total.

ix. Question: Why aren't we using elevation thresholds to inform management areas? Answer: Thresholds are for measuring implementation of the plan and not a direct management tool.

x. Public Comment: Timing of spring/fall measurement of CASGEM wells may not align with seasonal peak domestic well pumping (e.g. domestic wells may be temporarily dewatered in August, which wouldn't be caught by March/October monitoring).

xi. Question: Does domestic well data show where the pumps are? Answer: No, it's not consistently part of the dataset.

xii. Question: Were disadvantaged communities overlaid or incorporated in the spatial portion of the analysis? Answer: No, we included <u>all</u> confirmed CASGEM wells, but disadvantaged community locations can be something we use when actually selecting the wells that will be used for regulatory purposes.

xiii. Marco Bell (Merced Irrigation District [MID]) noted that MID does record biannual measurements from production wells (e.g. not dedicated monitoring wells) as long as they're not actively running (e.g. static conditions) and meet other CASGEM program requirements.

c. Degraded Water Quality

i. Alyson Watson (Woodard & Curran) provided an overview of constraints on measuring and setting thresholds for groundwater quality constituents. SGMA will involve a focus on understanding issues and coordinating with other agencies who are managing water quality efforts.

ii. Questions: If GW elevations decline to a certain point, there may be drinking WQ issues, so how do we plan to handle this? Answer: This is going to be covered under setting minimum thresholds for groundwater elevations based on undesirable results.

iii. Comment: Growers require high quality water, so if growers encounter a saline well, it doesn't get used. Thus it's been somewhat of a self-regulating issue. Areas of high salinity will see crops that are salt-tolerant.

d. Land Subsidence

i. Question: Why don't we use actual subsidence values or rates (e.g. ft/yr) as a threshold? Answer: It is hard to accurately predict subsidence rates in order to develop our threshold and the Subbasin has no way to correct inelastic subsidence should a violation occur, but a related way to measure would be to use groundwater elevations as a surrogate with 1/1/2015 levels as a goal.

e. Depletion of Interconnected Surface Water

i. Comment: The areas where connectedness exists are very sandy and have a high salt content.

ii. Hicham ElTal (MID) noted that the Merced River is a gaining river (groundwater provides to the river) and when wells pump along the river, the river level goes down. Additionally, MID has recently added two groundwater elevation measuring points along the lower portion of the Merced River.

iii. Question: Can the Merced GSP emphasize that the San Joaquin River needs more water to help groundwater levels? Answer: Potentially yes, if we can link river flows to undesirable results for groundwater.

3. Projected Water Budget

    a. Multiple comments related to sustainable yield assumptions will change a lot of depending on State Water Board decision on the Substitute Environmental Document (SED) for Lower San Joaquin River and Southern Delta. (ability to manage flood flows and recharge as much as possible is important)

    b. Question: How much will we be including snowpack changes in future (different beyond historical hydrology)? Answer: We'll be including a climate change analysis, though it inherently considers a longer timescale beyond our 25 year regulatory horizon.

4. Public Outreach Update

    a. Charles Gardiner (Catalyst Group) provided a summary of discussion and comments recorded during the August 2 public workshop presentation.

    b. Comment: Having this workshop was valuable and important to inform the public about the process.

    c. Comment: We can bring more people to workshops by coordinating with Municipal Advisory Councils (MACs)

    d. Self-Help Enterprises will be using some of their DWR grant funding in Merced to continue door-to-door outreach before workshops as well as neighborhood meetings.

5. Interbasin Coordination Update

    a. A preliminary meeting was held with the Chowchilla Subbasin to facilitate information sharing.

    b. The Turlock Subbasin meeting series is ongoing but it was noted that Turlock has a SGMA deadline 2 years behind Merced.

    c. Preliminary Delta-Mendota Subbasin discussions have started and formal meetings will be scheduled soon.

6. Public Comment on Items not on the Agenda

    a. No comments were made.

7. Next Steps and Next Meeting

Next Regular Meeting
September 24, 2018 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #5

DATE/TIME: September 24, 2018 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☒	Arlan Thomas	MIDAC, growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☒	Brian Carter	D&S Farms, growers
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☐	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☒	Greg Olzack	City of Atwater resident
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☐	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Minutes

1. Welcome, Introductions, and Agenda Review

    a. Introduction and overview of agenda items given by Charles Gardiner (Catalyst Group)

    b. There were no comments for the past meeting minutes. Comments and questions from past meeting minutes and further input can be sent via email to Woodard & Curran.

2. Minimum Thresholds Update

    a. Alyson Watson (Woodard & Curran) provided a review of the sustainability criteria and an update on the methodology used for developing minimum thresholds for groundwater levels.

    b. Clarifying questions were asked about the data source and characteristics of the Voluntary CASGEM wells and Domestic Wells from Merced County Database.

    c. Question: How does a well get populated in the Merced County Database? Answer: Well drilling requires a permit and has been required for several decades. The electronic version of the database includes all permitted domestic wells installed from the mid-1990s onward.

    d. Question: Are there a sufficient number of wells to set minimum thresholds around vulnerable communities? Answer: There are still gaps in certain areas, but if there isn't a history of monitoring in that area, then it is difficult to set thresholds there. There is good coverage overall but part of the GSP will involve developing additional monitoring locations in these types of areas.

    e. Question: Do minimum thresholds and a 3-mile radius around monitoring wells end up translating to individual management areas? Answer: The monitoring wells are meant to be indicative of the entire Subbasin. The 3-mile radius is used to select nearby domestic wells for analyzing undesirable results. We will be selecting a subset of monitoring wells to ultimately report long-term to the State for SGMA compliance.

    f. Question: Will SGMA compliance be determined based on seasonal measurements reported to CASGEM (e.g. March and October measurements influenced by seasonality)? Answer: Each GSP defines its compliance/violation standards and it will vary year-to-year as there are wet/dry cycles. Criteria will be developed that account for seasonal and year-to-year variations.

    g. A concern was raised that on the minimum thresholds map for groundwater elevations, the "white area" (unincorporated) on east side of Subbasin has no wells representation. Answer: At the next meeting, we can put together a map of all the wells used in the Merced Water Resources Model (MercedWRM) in that area.

    h. Question: Agricultural wells are much deeper than domestic wells (typically), so will they be included in the analysis? Answer: Because they're typically deeper, they're expected to be covered by this methodology which is protecting the shallowest wells.

    i. Public comment: Hitting thresholds may be economically infeasible and a future iteration may need to include ways to deliver water to shallow domestic users as a more efficient way of mitigating undesirable results.

    j. Question: How many monitoring wells are there in total and how many are driven by the domestic well depth for the minimum threshold? Answer: There are 65 monitoring wells total and 25 of them (38%) are driven by the shallowest domestic well to set the minimum threshold.

3. Hydrogeologic Conceptual Model

    a. Alyson Watson (Woodard & Curran) provided an overview of the HCM section of the GSP and some example maps that will be included in the section writeup that will be provided for SC member review in the next few months.

    b. Question: Will the plan be periodically updated to account for new information/data on water quality Constituents of Concern (COCs) in the future? Answer: Yes.

4. Projected Water Budget and Sustainable Yield

    a. Alyson Watson (Woodard & Curran) provided a reminder on the assumptions and results of the projected conditions baseline groundwater budget, as well as a presentation of the initial results of sustainable yield groundwater budget.

    b. Public Question: Has the City of Merced possible use of surface water for drinking water been included in projected water budget? Answer: No, but it may be considered as a future project and we'd need more details/parameters on that use.

    c. Question: Why does net deep percolation show as very similar across all 50 years (would expect to see large variation due to hydrology)? Answer: Net deep percolation comes primarily from agricultural use and not precipitation, since the sum of agriculture and precipitation will be roughly the same regardless of hydrology.

    d. Additional clarifying questions were asked about basin inflow from Sierra Nevada Mountains, which is largely seen in gain from streams (surface water) and less so from boundary inflow (long-term migration of groundwater from the eastern boundary).

    e. Public question: If you reduced pumping by an amount equal to the "Change in Storage" number, will we be in balance? Answer: Not exactly – there are a lot of interrelated complicating factors that respond to one another, such that reducing pumping has multiple different effects on other items in the balance.

    f. Question: Will the recent public trust doctrine court case (*Environmental Law Foundation vs. State Water Resources Control Board*) affect our "Gain from Streams" inflow value? Answer: No, because it's a natural system where inflow happens naturally. We will need to look at if pumping has a negative impact on stream level.

    g. Question: A localized project will help a localized area, but how do our geographically spaced projects help the whole Subbasin? Answer: A local project will still have an impact on the basin-wide water budget. It will also have localized impacts on groundwater elevations.

    h. Several clarifying questions were asked about what the basin-average sustainable yield allocation means and what it applies to (e.g. it is based on gross acres across the entire basin, since some landowners may have rights to pump even if they're not pumping now) and where the reductions in pumping occurred in the modeled scenario (across all uses on all acres). It was explained that the 1AF/ac is simply a calculation of the projected sustainable yield of the basin divided by gross acres and is not meant as a suggested management action allocation.

5. Public Outreach Update

    a. Charles Gardiner (Catalyst Group) provided an update to public outreach efforts, including planning for a public meeting in early December.

6. Interbasin Coordination Update

    a. The project team held an initial meeting with Delta-Mendota Subbasin representatives, but it looks like further coordination efforts won't begin until early 2019 as the Delta-Mendota Subbasin is farther behind Merced Subbasin's efforts due to a complex organizational structure of multiple GSAs and GSPs.

7. Substitute Environmental Document (SED) Update

    a. Hicham ElTal (Merced Irrigation District) provided an explanation of what SED is and some associated details about how it was developed and some potential impacts it may have on surface water flows to the San Joaquin River.

8. Public Comment on Items not on the Agenda

    a. No public comments were raised.

9. Next Steps and Next Meeting

Next Regular Meeting
October 22, 2018 at 9:00 a.m.
Please note the ½ hour earlier start time for special topics
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #6

DATE/TIME: October 22, 2018 at 9:00 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☒	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☒	Ben Migliazzo	Live Oak Farms, growers
☐	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☐	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☐	Breanne Ramos	Merced County Farm Bureau
☒	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☐	Darren Olguin	McSwain MAC
☒	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☐	Gino Pedretti III	Sandy Mush Mutual Water Company
☒	Greg Olzack	City of Atwater resident
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☐	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☐	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☐	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Minutes

1. Welcome, Introductions, and Agenda Review

    a. Charles Gardiner (Catalyst) welcomed the group and gave an overview of the meeting agenda.

2. CASGEM Update

    a. Matt Beaman (MID) gave overview of the California Statewide Groundwater Elevation Monitoring program (CASGEM) and an introduction to the Merced Area Groundwater Pool Interests (MAGPI).

    b. CASGEM coordinates between DWR, the State Board, and the public. Elevation data is submitted to DWR, made public, and then DWR draws contours based on this data. DWR has created guidelines for CASGEM.

    c. Question: what does it mean to be in compliance? Answer: groundwater data is submitted to the satisfaction of DWR.

    d. Question: Could pumping above the Corcoran clay layer cause subsidence? What about water quality above this layer? Answer from Hicham ElTal (MID): recharge and pumping above the Corcoran clay layer are very unlikely to cause subsidence. Water quality above the Corcoran is generally not an issue, though there are some saline issues closer to the San Joaquin River.

    e. The CASGEM monitoring plan work from MID is nearly complete. Next steps include expanding coverage, continuing data compliance, instrumenting additional monitoring wells, and finalizing the updated monitoring plan.

3. Presentation by Woodard & Curran on GSP development

    a. Next Steps in GSP Development

        i. Alyson Watson (Woodard & Curran) provided an overview of the GSP Development overall timeline. Current focus is on sustainability goals and projects and management actions.

        ii. SGMA has two focus areas: to halt overdraft and to establish and monitor thresholds over time (i.e. avoid undesirable results). SGMA does not alter surface or groundwater rights.

        iii. The challenge for the Merced Subbasin is to reduce groundwater pumping while minimizing how much total water use must be reduced. Steps to reach sustainable yield are: 1) determine extent of groundwater pumping that is sustainable, 2) determine available surface water, and 3) identify potential deficit between demand and available resources.

        iv. Two areas should be addressed to achieve sustainability: reducing groundwater pumping (e.g. though an allocation framework); and identifying projects and management actions (e.g. that recharge groundwater, enhance surface water availability, and reduce demand).

        v. Question asked about what FERC (Federal Energy Regulatory Commission) flows are and how are these being accounted for. Answer: FERC is explained by Hicham ElTal (MID). This is a dam licensing and relicensing process. Every time a license is renewed considerations related to flows must be taken. With FERC relicensing MID will have to increase water released into the Merced River. MID is still waiting on a final answer for FERC flow. However, an estimate will be incorporated into GSP water budgets.

        vi. Discussion on Subbasin Sustainability:

1. A discussion was held on whether the problem framing and the approach to achieving sustainability is understood. A few key points from committee members are as follows:

    a. It would be good to have public meetings again in the eastern "white area" (gap areas) with a focus on communicating the current problem and creating a sense of urgency to start conserving now.

    b. Messages should be conducted continuously. Advertising can include via social media and media interviews. Simple talking points could be created to give to people and use in interviews. It would also be good to have a one-pager on SGMA and why people should get involved.

    c. People will be interested once we have rules set up for allocation.

    d. It would be good to have a further simplification of terms.

    e. Having a number to quantify how much overall use should be reduced is helpful in understanding the magnitude of the problem.

    f. There will always be demand, and solutions for achieving sustainability will need to consider surface water. Everyone seems to understand that the Subbasin needs groundwater recharge.

    g. UC Merced can also conduct further outreach.

b. Groundwater Rights Primer

    i. Water Rights Attorney Brad Herrema (Brownstein Hyatt Farber Schreck) gave an informational presentation on groundwater rights and potential allocation frameworks under SGMA. (see full presentation details on Merced SGMA website) Questions from group noted below:

    ii. Question regarding the recent Public Trust Doctrine case. Answer: Groundwater extractions can be regulated by SGMA if pumping is affecting neighboring streams. However, SGMA did not preempt the Public Trust Doctrine in applying to groundwater extractions.

    iii. Question asked about impacts to Pre-1914 rights. Answer: pre-1914 water rights only apply to surface water. There are no exemptions from SGMA except for some adjudicated basins. SGMA does not alter water rights.

    iv. Question: How does a basin become adjudicated? Answer: someone has to start the adjudication process. There are some streamlined adjudication processes, but some can last 20 years. What often starts as a one-one case becomes a full basin process.

    v. Clarification provided on dryland pastures and overlying water rights: There's a concept of subordination where the overlying water right could be lost. In Antelope Valley, they were able to pump if they found water (e.g. they purchased a groundwater right or can lease out a right to use during a particular year).

    vi. Question: What have you seen regarding a water credit system? How does that work out? Answer: each basin is different, and this depends on the adjudication.

vii. Question: What about water markets? Answer: There are examples of a portal where people can see what water is available (e.g. water pricing, how much is available). In Chino Basin a portal was not needed because the basin was small.

viii. Question: how will changes in efficiencies of water use be taken into account, especially differences in return flows? Answer from Woodard & Curran: TBD, is something CC will need to consider.

c. Projects and Management Actions

i. Alyson Watson (Woodard & Curran) provided an introduction to projects and management actions. The goal is to implement projects to help achieve sustainability and minimize impacts to groundwater users.

ii. Woodard & Curran has looked through specific plans, contacted GSAs, and reached out to individual land owners as a starting point to gather information on existing projects for discussion. An initial list of these projects was provided.

iii. Committee members recommend looking into the list of grant reports from the Water Resources Control Board maintains for water quality projects.

iv. Committee members also recommended looking into past projects from the Army Corps of Engineers.

v. It is likely that several projects will develop in DAC areas.

vi. Alyson Watson (W&C) gave examples of criteria for assessing projects and invited discussion asking committee members what additional criteria should be considered. Responses included: benefits to DACs, eligibility for funding for DACs, and projects that help with CV-SALTs.

vii. Alyson Watson (W&C) asked committee members to think about whether there are projects we are missing in the initial list. She also asks what other criteria should be used to assess projects. This information should be brought to the next meeting.

viii. DWR representative states that Prob 68 will have funding for SGMA projects.

d. Other Updates

i. Groundwater Data templates and instructions for submitting data have been updated and are available on the MercedSGMA homepage.

4. Public Outreach Update

a. Charles Gardiner (Catalyst) reported that two public workshops will take place in December and will be in two different locations to make sure we are covering different areas of the Subbasin.

5. Interbasin Coordination Update

a. Hicham ElTal has been in contact with Chowchilla regarding subsidence discussions.

6. Public Comment on Items not on the Agenda

a. No public comments.

7. Next Steps and Next Meeting

   a. Several GSP development items anticipated to be discussed in the next meeting including: water budgets and documented assumptions, the data management system, the Hydrogeological Conceptual Model (HCM) GSP section, sustainable yield analysis, and assessment of projects and management actions.

Next Regular Meeting
November 26, 2018 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #7

DATE/TIME: November 26, 2018 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☒	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☐	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☐	Daniel Machado	Machado Backhoe Inc., construction industry
☒	Darren Olguin	McSwain MAC
☒	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☒	Greg Olzack	City of Atwater resident
☐	James (Jim) Marshall	City of Merced
☐	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☐	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Minutes

1. Welcome, Introductions, and Agenda Review
    a. Charles Gardiner (Catalyst) welcomed the group and gave an overview of the meeting agenda.
    b. There were no changes nor comments to the past meeting minutes.
2. Presentation by Woodard & Curran on GSP development
    a. Jeanna Long (Woodard & Curran) presented on the Data Management System (DMS)
        i. Jeanna Long (Woodard & Curran) provided an introduction to what a DMS is and how this is used. Questions and discussion from the Stakeholder Committee (SC) were as follows:
            1. Question: How long has this system been used or has been in place? Answer (W&C): Since 2010. This has also been used in Sacramento to manage their water resources data. This tool has been customized for the SGMA program and helps enable collection of data from multiple agencies into one place.
            2. Question: Is there a program or effort in place to enable something statewide like this? Answer (W&C): No, not for this data. Comment from committee member: There is, however, statewide data used for emergency management. This may be something the state can pull together based on the information they have.
            3. Jeanna Long (W&C) demonstrated the different filters that can be viewed in the Opti tool, e.g. to zoom in on a well and see the data for that well.
            4. Question: Where is the data from that are currently in the system? Answer (W&C): Much of this is from the previous Integrated Water Resources Management Plan and from SGMA Readiness work for Merced and CASGEM data.
            5. Clarification on well information collected: This information is collected for monitoring and data reporting requirements according to SGMA.
            6. Question: Do we have a way to track where the data came from? Answer (W&C): Data source, importing, and modifications are tracked within the DMS.
            7. Question: How would this help with e.g. if I want to increase fire flows in the City of Atwater? Answer (W&C): it is a matter of scale. Comment from committee member: We did this before and it worked out well as a planning tool.
            8. Comment from Hicham ElTal (MID): Data collected for canals is water quality data.
            9. Jeanna Long (W&C) demonstrated the functionalities of the DMS. Data is still being imported. W&C will send you the link and a user guide for accessing and using the portal once this is complete.
            10. Jeanna (W&C) explained how this will be used for meeting SGMA requirements. It provides participating agencies and entities access to data collected. It enables tracking of thresholds and supports decision making for management actions.
    b. Next Steps in GSP Development

i. Alyson Watson (Woodard & Curran) provided an overview of the GSP Development overall timeline and roadmap plan.

ii. Several comments were provided on the Hydrogeologic Conceptual Model (HCM). However, the majority of SC committee members needed more time to review. Comments provided included:

1. On page 26 determine if fault line is significant for subsidence.

2. Do the maps on pages 38-39 need units?

3. On page 41 clarify what the depth means.

4. Comment for page 50: We have low recharge potential in the Eastern part of the basin.

5. There did not seem to have much information on land use and who depends on this water. Clarification from W&C given that this section is intended to provide the hydrogeologic basin settings. There are other sections that will address land use and water users.

6. Request made for a clarification on the losing and gaining streams interconnection section. This should be provided either via email or next meeting.

7. Request was made to resent the links to the HCM. These were resent during the meeting to the SC.

iii. Alyson Watson (W&C) provided an update on the water budgets and sustainable yields. This update shows the new water budgets that account for the FERC flows. Clarification was given that this is an estimate. The Subbasin will need to reduce pumping by approximately 25% according to the estimates. This is similar to the previous calculations that did not account for updated FERC flows.

c. Water Allocation Frameworks

i. Under SGMA, GSAs have authority to establish groundwater extraction allocations. SGMA and GSPs adopted under SGMA cannot alter water rights. Alyson Watson (W&C) gave a brief overview of the different allocation frameworks to allocate the basin's sustainable yield, their pros and cons, and potential implications for gw users in the basin.

ii. Question: what about management areas? Answer (W&C): GSAs can determine if management areas are needed.

iii. Alyson explained the proposed decision-making timeline. Potential allocation approaches and values to consider are discussed in November. This would continued in December, with a goal of recommending a preliminary allocation approach to the GSA Boards. In January, projects and management actions will be further discussed by the SC and CC.

iv. Question: Where are the undesirable results? And are these clearly defined? Answer (W&C): This is an iterative approach. These were discussed previously but have not been finalized or formalized. These were discussed by sustainability indicator in prior meetings, and they will need to be revisited, finalized, and written up in tandem with consideration of what allocation approaches and projects and management actions are available.

v. Pro Rata Approach: This divides sustainable yield by total basin acreage. Advantages are that this is simple and that it acknowledges existing pumping. Disadvantages include not explicitly accounting for appropriators/prescriptive rights and does not account for unexercised groundwater rights.

vi. Pro Rata Irrigated Areas Approach: Divides the sustainable yield by irrigated and urban areas. It is simple and acknowledges exiting pumping. However, it does not account for unexercised groundwater rights nor account for appropriators/prescriptive rights.

vii. Historical Pumping Approach: This is based on historical use. This is less likely to result in conflict and accounts for appropriators and prescriptive rights. However, it requires more data and if unirrigated acres are excluded this also does not account for unexercised groundwater rights.

1. Comment from CC: we will need to determine our historical reference point.

2. Question: this assumes everyone is metered? Answer (W&C): This would require having a way to measure and could result in extensive metering.

viii. Comprehensive Approach: The advantages include less likelihood of conflict and an accounting of appropriative use and prescriptive rights. However, this approach requires data not that are currently available, and does not account for unexercised groundwater rights. The approach requires significant outreach and engagement.

ix. Alyson Watson (W&C) provided key differences. Some approaches do not address prescriptive rights (e.g. pro-rata approach). Some do not consider all acres (pro-rata with irrigated acres, historical or comprehensive based on historical use).

x. SGMA and GSPs adopted under SGMA cannot alter water rights. The group discussed the types of groundwater rights in the basin – overlying users (correlative) rights, prescriptive rights, and developed/imported supplies.

xi. Comment: Can look at historical use to find the ratios of what is used by cities vs agriculture.

xii. Comment: Would be interesting to look into what we can do with a water credit system.

xiii. Discussion comments on allocation frameworks from SC members:

1. One consideration is to look at the estimates for allocations and see if they will impact cities' abilities to meet public health and safety needs. Water quality is also something that must be considered as some places have a single source.

2. Who can participate in the market and how this affects disadvantaged communities is also important.

3. We need to be aware of what happened in the Australian water rights credit system – external firms have come in and are driving up the price of water.

4. Question: What about management areas? Answer (W&C): Projects and management actions and undesirable results will be revisited to address whether management areas will be needed. This will occur in February next year.

5. If groundwater is not being banked, it should be possible to store this water and be able to use it later. If we can only use 500,000 TAF a year, can we bank it? I

would be best to save groundwater until it is absolutely needed. If someone doesn't want to credit it, they should be able to bank it. Should not be a use it or lose it.

6. Comment from Hicham ElTal (MID): We will also be making adjustments as we monitor. We can implement an allocations framework and then find later on that this needs to be adjusted.
7. If crop allocation or historical allocation is used, an equitable amount should be determined (e.g. how many acre feet does it take to grow almonds). However, this is not cut and dry, and depends on soil type and water quality.
8. When looking at historical use, the subbasin should avoid rewarding inefficient use.
9. Having numbers with allocation scenarios will help us to know which allocation frameworks are best.

d. Projects and Management Actions (Discussion)

i. Projects and Management Actions were discussed with a series of questions. The following are the general responses from the SC. Many of which were relevant for several questions:

1. Idea suggested of why not spend the first 5 years on enhancing supply (all supply) and then look at allocation frameworks?
2. Use of purple/recycled water can be increased.
3. There is funding from the United States Bureau of Recreation for recycled water projects that could be pursued.
4. General agreement that the supply side should be targeted more than demand.
5. However, demand must be reduced because the subbasin is in overdraft. Projects take a long time to achieve, and there are many variables and high uncertainty (e.g. climate change). There are still families relying on tanked water right now.
6. Improving water treatment especially in areas that do not have adequate clean water sources is an important consideration.
7. Quantifiable goals should be set. For example, "the subbasin will increase groundwater recharge by X% in the next 5 years".
8. Clarification on projects and criteria for assessment: It will be necessary to identify funding sources and pathways. The process started with a wide net for a range of projects. At a certain point, we will need to compare projects.

e. Other Updates

i. Monitoring Networks and the DMS sections of the GSP are underway.

3. Public Outreach Update

a. There are two upcoming Public Workshops: Dec. 4th in Planada, and Dec. 13th in Franklin.

4. Interbasin Coordination Update

   a. Chowchilla and Delta-Mendota Subbasins will be ready early next year to continue coordination.

5. Public Comment on Items not on the Agenda

   a. Public comment given by Jeff Denham in printed form. This input will be scanned and sent out to the group.

   b. Question asked: Is there excess surface water available in a regular rain year or when we have extra rain? Answer from Hicham ElTal (MID): This depends on a number of factors, including inflows from streams that have to be taken into account.

6. Next Steps and Next Meeting

Next Regular Meeting
December 17, 2018 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MERCED SGMA

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #8

DATE/TIME: December 17, 2018 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☒	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☐	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☐	Daniel Machado	Machado Backhoe Inc., construction industry
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☒	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
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☐	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☐	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Minutes

1. Welcome, Introductions, and Agenda Review
    a. Alyson Watson (Woodard & Curran) welcomed the group and went over ground rules.
2. Presentation by Woodard & Curran on GSP development
    a. Alyson Watson (W&C) discussed the GSP timeline and next steps in GSP development. The focus of the meeting is on the groundwater accounting framework and allocation. This will flow back into projects and management actions.
    b. Comments on the hydrogeologic conceptual model (HCM) were received and will be tracked with the GSP section drafts.
    c. Water Allocation Frameworks
        i. The goal will be to get the Coordinating Committee to the point where the Committee can make a preliminary recommendation to the GSA Boards. The goal for the Stakeholder Committee is to provide feedback and an input to the Coordinating Committee.
        ii. Key points from the previous CC meeting included: A need to address prescriptive rights, and an approach to how to bring in users that are not currently exercising rights but might in the future; agreement on a date range for historical and prescriptive periods; a timeline for implementation; and identification of remedies GSAs have for enforcing allocations.
        iii. Alyson Watson (W&C) provided a brief overview of what authority GSAs have under SGMA.
        iv. Question: Will implementation be monitored? How would GSAs be able to enforce allocations? Answer (W&C): Yes, there will be monitoring, and this is something we will be revisiting.
        v. Question: Where does the GSAs' authority come from? Answer (W&C): This comes from SGMA, which is state law.
        vi. Alyson Watson (W&C) provided an overview of prescriptive and overlying groundwater rights.
        vii. Question: What about those who are pumping water and taking this out of the basin? Answer (W&C): There is a Merced County Ordinance that prevents this. Lacey Kiriakou (County of Merced) confirmed there are no existing permits with the County to pump water out of the basin. A contract that previously permitted this has now expired.
        viii. Question: Will all GSAs be able to have the same enforcement mechanisms? Answer (W&C): Each GSA can determine individually how to enforce allocations, which must be approved by the GSA board (e.g. fees). Each GSA has the discretion to create their own rules.
        ix. Additional comments were provided and recorded via flipchart paper. These are summarized as follows:
            1. Comment: There should be a single structure in place to have a uniform fee structure across GSAs (should have consistency across GSAs).

2. Comment: Within the Merced Irrigation District (MID) area, there are those who pump and those who don't. Commentator does not see MID permitting a rate structure to some areas.

3. Revised previous comment: There should be a single structure as much as possible, but some areas may require a different structure.

4. Comment: Population projections seem a little high and might need to be adjusted.

5. Clarification (W&C): The money collected from fees established by the GSAs goes to the GSAs.

6. Comment (summary): Examples of potential different timeframes for allocation calculations include 2006-2015, 2006-2010, 1995-2015.

7. Clarification from MID: MID seepage is reserved for MID because this is developed water, and the rest is available for the allocation framework.

x. Rights to groundwater imported to a Subbasin:

1. Alyson Watson (W&C) clarifies that developed water is water that is imported into the Subbasin. This includes seepage of conveyed surface water that reaches the groundwater basin. It is the property of those who have brought that water into the basin.

2. Clarification (W&C): Seepage from developed water will have to be accounted for within sustainable yield/water budget calculations. This information will have to be monitored and the amounts agreed upon.

3. Question: This explanation is in existing state water law? Answer (W&C): Yes, this is consistent with CA groundwater law. The source of information from today's presentation and a good summary of CA groundwater rights law and SGMA is: *Groundwater Pumping and Allocations under California's Sustainable Groundwater Management Act*, Environmental Defense Fund, July 2018

xi. Alyson Watson (W&C) provided examples of allocation methods. The goal is to see how close the Subbasin can get to a comprehensive approach for allocation. There is not adequate time or data resources to do a full comprehensive approach.

xii. Alyson Watson (W&C) explained revisions made to the sustainable yield analysis. There were some discrepancies with the estimations of flows from the San Joaquin River. This has been recalculated and the outcome is updated estimate of basin sustainable yield is 530,000 af.

xiii. Alyson Watson (W&C) provided a review of the different potential allocation distributions and an example based on historical use is presented. Prescriptive use allocation tables are presented showing two 10-year historical periods and the projected demand in 2040.

1. Comment: Estimations should include a breakdown showing the individual CSDs and mutual water companies.

2. Clarification (W&C): the values shown for Prescriptive Use reflect water use and projected use with projected demand. These are based on Urban Water Management Plans.

3. Question: Where do the numbers for population come from? Answer (W&C): Population for projected conditions of Urban Water Use come from the 2040 projections of available Urban Water Management Plans.

4. Comment: We are going to have growth. It is normal to have an estimation of increased population. Cities as they grow need to have more rigorous conservation efforts. This will come down to household level.

xiv. Alyson Watson (W&C) gave an explanation of a modified application of the comprehensive allocation approach for Merced Subbasin.

1. Question: What about in a water market? If someone does not have an allocation, would they have no skin in the game? Answer (W&C): If there was a water market in place, then potentially yes. However, the GSAs would have to establish a water credit/trading system.

xv. Quantified and Transferable Rights

1. Alyson Watson (W&C) described some details of the Mojave Adjudication process.

2. Questions were asked that will be followed up by the W&C team as follows: What is the process for a new pumper to be added and what is the current status of the lawsuit on Mojave?

3. Comment: We do not want speculators coming into the subbasin.

4. Clarification (W&C): The CC in the last meeting did not say that we cannot do a water market or credit system. They were concerned with outside speculators purchasing land, not using the water on this land, and instead using it for profit elsewhere.

5. Comment: If the Subbasin does a credit system with irrigated lands that can trade back and forth, then this puts non-irrigated acres at a disadvantage.

6. Comment: If a trading system is developed then a discussion about dry range land will be needed.

7. Comment: Yes, if a credit system is pursued, then non-irrigated acres must be taken into account. A partial credit for the non-irrigated acres could be considered.

8. Comment: Non-irrigated lands should be able to have the opportunity to have a partial allocation. When this land is later changed to irrigated lands, allocation would change to a 100% allocation.

9. Comment: It will also be important to consider what happens if land is on more than one GSA.

xvi. Prescriptive based on Historical Use

1. Comment: Using historical data for calculating prescriptive use is more accurate, but the projected calculations will change. Response: This can be updated over time and a selected time period will be needed.

2. Comment: The historical period should use a 20-year time frame, and the Subbasin should consider looking at other adjudication examples.

3. Comment from W&C: The longer the time period, the greater potential change. We can look into shorter and longer timeframes, and can look at the full 95-2015, and 90-2010 periods as examples.

4. Question: Are we including the drought years? Answer (W&C): Yes.

5. Comment: Will have to keep in mind that the years after the drought tend to require more pumping because the water is lower.

6. Question: What does the State Water Regional Control Board decision for Substitute Environmental Document (SED) mean for the Merced Subbasin? Answer Hicham ElTal (MID): On Wednesday the SWRCB adopted the SED. Daniel Chavez found an article in the MercedSunstar that provides some information. This article was sent in electronic form to the committee members.

xvii. Alyson Waterson (W&C) reviewed the conceptual GSP implementation draft timeline and requested feedback from the SC. The feedback and discussion are summarized as follows:

1. Comment: The timeframe seems appropriate, especially considering that we will have to install and create the metering and monitoring networks we're going to use.

2. Comment: What do we need to show in the plan? Answer (W&C): We will need to show milestones into the plan and will need to put our allocation framework into the plan.

3. Question: How detailed should the plan be? Answer (W&C): Details should be included on how to implement the allocation. It is also possible to have a footnote with a "subject to change" clause that communicates the update process.

4. Clarification (W&C): Properties of under 2AF/year of domestic use are considered de minimus users and are not required to be metered according to SGMA.

5. General comment from the group: this is a reasonable timeframe, but we will need to eventually vet with thresholds.

6. Comment: What would be helpful in assisting the SC to think about and provide a recommendation is a quantification of acreages (pastures, etc.), and how many acres are in MID and other service areas.

7. Comment: It will be important to balance between the agricultural and urban users.

8. Question asked about status of projects and management actions. Answer (W&C): There is a current potential projects list. However, once the allocation is further along, this will enable us to identify which projects to target.

9. Question asked about funding mechanisms for projects. Answer (W&C): The W&C team has been looking into some preliminary options and will continue to identify these options as we get closer to our projects discussion.

10. Question: Could installing monitoring systems create opportunity to connect areas that are not currently connected to the system. Answer (W&C): Yes. Comment: Would like to see this put into the 20-year plan.

11. Question: Is there anything that mentions clean drinking water. Answer (W&C): Yes, there will be thresholds related to clean drinking water in the water quality thresholds.

d. Other Updates: A beta link for the Data Management System will be sent out in January.

3. Public Outreach Update

a. Daniel Chavez asked Merced County to have Merced MACs help set up future public meetings.

b. The next public workshop will likely occur in February.

4. Interbasin Coordination Update

a. January and February are expected to have more interbasin coordination activities.

b. There is an agreement with Turlock. They are on the 2022 timeline and are interested in keeping up with Merced.

5. Public Comment on Items not on the Agenda

a. There were no comments.

6. Next Steps and Next Meeting

a. Water Budgets memo to be provided to GSA staff for initial review.

b. Provide follow-up on questions regarding allocation frameworks for next meeting.

Next Regular Meeting
January 28, 2019 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #9

DATE/TIME: January 28, 2019 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☒	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☐	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☒	Darren Olguin	McSwain MAC
☒	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☐	Greg Olzack	City of Atwater resident
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☐	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☐	Maria Herrera	Self-Help Enterprises
☐	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☐	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

1. Welcome, Introductions, and Agenda Review
   a. Alyson Watson (Woodard & Curran) welcomed the group and went over ground rules.
2. Flood-Managed Aquifer Recharge (Flood-MAR)
   a. Hicham ElTal (MID) gave a presentation on Flood-MAR. The presentation included an explanation of public benefits of Flood-MAR and what is required for Flood-MAR to be put into place. He explained current plans and activities for Flood-MAR.
      i. Hicham described the components of the MIDH2O Model (Res-SIM & RAS), as well as the analysis conducted to investigate favorable recharge areas. This analysis included consideration of hydrology and favorable soils. Many areas are already built as residential. Some favorable areas exist around Planada.
      ii. Hicham explained that MID is working with DWR on a tool that the GSAs could own that puts all of these components together. This is called a GRAT (Groundwater Recharge Assessment Tool). This is initially funded by DWR, and then maintained via funding through GSAs. The tool helps determine where are the best areas for recharge, when and how much surface water can be recharged, and costs.
      iii. Water Rights for both surface and groundwater must also be considered. Hicham explained that South of Bear Creek MID has licenses received with the annexation of El Nido, but this is restricted water. State regulation says you can take water if the flow is 90% range of the flow for that day. For example, if you have a creek with capacity of 1000 cfs, can only take water when this is above 900 cfs.
      iv. Hicham explained that there are difficulties including: 1) if water is put on someone's parcel it is difficult to determine whether water is it getting to the groundwater or not, and 2) it is difficult to forecast storm events. Having good forecasting is important because there are a limited number of strong storms during the year, and the Subbasin should use good forecasting to get best use of these storms.
      v. Question: How does Flood-MAR work in practice? Answer from Hicham (MID): The typical scenario is that a storm comes in, flood control dams are put to use, and there is a window of time to notify folks as the water backs up. MID contacts those who are part of Flood-MAR and asks who needs this water. This can be on a rotation basis. The GSAs would have to agree on the diversion. 800-900 cfs can happen often from a storm.
      vi. Question: how would this (Flood-MAR) work as a project on the GSP? Answer from Hicham (MID): this might be hard to quantify but looking at the Merced Study is a good start.
      vii. Question: Is there a Merced streams group now? Answer from Hicham: Yes, there is. However, it does not extend to Deadman and Dutchman, but does go to Sandy Mush.
      viii. Question: Is there a way to make the capacity higher during wet seasons and store water? Reply from Hicham: The Army Corps of Engineers owns the dams. The flood control dams are small. The Mariposa Flood Control Dam near Le Grand may be an option to forecast and store 5,000 AF. The cost of making the other dams larger might not be worth it.

ix. Question: What about the project like the Margarita Dam? Answer from Hicham: This was a very expensive project with very small acreage. More efficient projects should be sought.

3. Presentation by Woodard & Curran on GSP development

   a. Next Steps in GSP Development

      i. Alyson Watson (Woodard & Curran) reviewed the development and the decision-making timeline. Alyson explained that the goal is to discuss and determine an allocation framework and have the CC make a recommendation for the GSA boards. The SC should come up with recommendations to take to the CC group in the afternoon.

      ii. With the allocation framework, the Subbasin attempts to divide the sustainable yield amongst the GSAs. The GSAs will need to determine projects and management actions. The allocations are not likely to take place within the first 10 years of the GSP implementation because there are many technical analyses that will need to take place before the allocations are officially implemented.

      iii. Alyson (W&C) explained that within the first 5 years, the GSP will be focused mostly on monitoring and reporting. Alyson explained a further breakdown of potential activities including project implementation over time periods leading up to 2040.

      iv. Question: Has DWR seen this potential timeline breakdown? Answer from Alyson (W&C): No, this was brought to the CC last week. SGMA legislation allows GSAs to determine how to implement and over what timeframe.

      v. Question: How do we incentivize farmers to not aggressively pump? Answer (W&C): The GSAs will have to determine how to handle this. As allocations are discussed and drafted, there could be a maximum set for how much people are drafting to avoid aggressive pumping, but not penalize inappropriately.

   b. Water Allocation Frameworks

      i. Alyson (W&C) reviewed the list of requests and follow ups from the last meetings with respect to considerations for allocation. She also provided a brief overview of the definition of overlying and prescriptive water rights.

      ii. Question: Is prescriptive a stronger right? A: No, the prescriptive rights are junior to overlying rights.

      iii. Alyson (W&C) explained the meaning of developed water and that the entity that has created the canals to import water into the basin are the owners of that supply.

      iv. Water for the Subbasin comes from 3 buckets: overlying use, appropriation of groundwater, and recovery of seepage of developed surface water supply. These cannot be double-counted.

      v. Alyson (W&C) explained the process for the allocation framework. This includes determining the sustainable yield, subtracting developed supply, and allocating remaining sustainable yield to overlying and appropriative users. The end goal is to come up with a framework for basin-wide management.

      vi. Alyson (W&C) provided an illustration of the allocation framework using numbers estimated from the current analysis.

vii. Alyson explained potential allocation between overlying and appropriative allocations using an analysis of different historical averaging periods.

viii. Question: What are the implications for the GSAs? Answer (W&C): There are slides with this information. Choosing different historical averaging periods results in slightly different allocations between overlying and prescriptive users which would result in different allocations to GSAs depending on their proportion of types of users. This is a policy decision, there is no “right” answer.

ix. Several comments from the SC were provided and are summarized as follows:

1. The drought really influences the overlying more than the appropriative. If we have to pick one would this should be the 10-year period 2006-2015.

2. This is important for the cities as appropriators and for city planning. We will want to think about how this impacts growth of cities.

3. The farther out the time period, the less impact on the drought. A 40-year time frame would be possible. Response (W&C): Yes, but the issue is data, especially for land use change.

4. There should be have more than one drought in the calculation if we consider that these might become more frequent. Response (W&C): True, but again the issue is lack of data to support that analysis.

x. At the end of discussion, the general consensus was that a 10-year period 2006-2015 seems to make sense and will enable including the drought. This can be adjusted later.

xi. Question: For the seepage credit, what if the canal is over some else’s (not MID’s) property? Answer (W&C): The water itself is still MID’s property as the creator of the developed water, it does not matter where on the surface the seepage enters the basin.

xii. Alyson (W&C) explained that in addressing unirrigated lands there is no consistent legal precedent or formal guidance. These lands may have “sleeping” or dormant water rights.

xiii. Alyson (W&C) provided a brief follow up on the Mojave Adjudication example. An individual who was involved in the Chino adjudication stated that millions of dollars are spent on the adjudications. He does not recommend pursuing an adjudication. Suggests if possible, to avoid it.

xiv. Question: What about all of the landowners who have riparian rights? Is there seepage that should be taken into account? Answer (W&C): Not unless they have a developed supply that we can quantify. They are exercising their overlying right and are not an appropriative user. Follow up comment: They could give you what they have submitted to the state board? Answer (W&C): Yes, but the percolation for the conveyance would need to be accounted for as the losses.

xv. Comment: Diagrams would be helpful to better understand seepage and conveyance (how this works).

xvi. Previously, the group had requested an illustration of how partial allocations to currently unirrigated lands would affect overall allocations. W&C provided an illustration based on available data showing partial allocations of 0, 25%, 50%, and 100%. There are roughly 300,000 acres of developed/irrigated acres, and 200,000 acres of undeveloped in the basin.

Key questions are: should there be an allocation for acres that have not historically used groundwater? If so, what is appropriate for a partial allocation? And how can future pumpers be added at a later time?

xvii. Comment from Hicham (MID): The MID Advisory Committee (MIDAC) which is made up of growers is in favor of a 0% allocation for grazing/pasture lands.

xviii. Question: How do management areas work into this? Answer (W&C): We will be looking at these as a next step, after we are able to determine where to look for specific reasons such as avoiding undesirable results.

xix. Question: Are the CSDs included in these breakdowns? Answer (W&C): Some of the CSDs are included, but we are still gathering data for the remaining CSDs.

xx. Question: What about refuge land? Answer (W&C): They are counted within the undeveloped lands. If they have had historical use, they have prescriptive rights.

c. Question and Discussion for Water Allocation Framework recommendations to CC:

i. Clarification (W&C): We are trying to determine if there should be an allocation given to the acres that currently don't use groundwater.

ii. Comment: Some SC members in favor of not giving an allocation (following MIDAC's recommendation). But we should keep the conversation going.

iii. Question: If you own an irrigated acre and a non-irrigated acre – can you transfer this between your properties. Response (W&C): This is something needs to be considered.

iv. Comment: If you have non-irrigated water allocation, there should be language to direct how this water can be used (e.g. how this can be sold and used).

v. Question: How can overlying rights be taken away for undeveloped land? And how can these lands be added for allocation? Answer (W&C): There will need to be a process for how to add these lands. If there is a water market, the undeveloped land owner would stand to lose their ability to sell water allocation.

vi. Comment: Can see the undeveloped land as banking water for irrigated lands. If undeveloped lands don't use it or sell it, they can bank this for use later when irrigated users have greater need and have this be available on a transfer basis. Does not see 100% allocation as feasible but likes the 50%.

vii. Comment: The long term goal should be that we are not worried about allocation, because we have managed sustainably and have implemented projects.

viii. Question: Of the acreage within MID, how much of that acreage is farmed? Answer from Hicham (MID): There is very little undeveloped land left.

ix. Question: Irrigated and non-irrigated land has to be defined. Are drip systems with trees counting as irrigated? Answer from Hicham (MID): Yes. There are a lot of nuances with what is irrigated, or not. We will have to agree on definition of this.

x. Clarification: Fallowed acreage should maintain its allocation

xi. Comment: Along with allocation, we still need to know what we are actually pumping.

xii. Comment: We need to come up with a recommendation, an idea, but this is going to be changed. More importantly, we need meters.

xiii. Comment: 100% allocation is never going to be true for grasslands. It's going to have to be between 50% and 25%.

xiv. Comment: There are MID land owners that pump but could use surface water.

xv. Comment: There should be a starting point for non-irrigated in the middle, not 0%. There should also be language to add non-irrigated lands in the future.

xvi. Comment: Concern that the water for irrigators is a "live or die by water" situation. Should have a 1.25 AF/A amount allocation for irrigated lands.

4. Data Management System

   a. Alyson Watson (W&C) gave a brief introduction to the beta link for the DMS. This has been sent out to the group via email.

5. Other Updates

   a. Projects are being reviewed. There are currently 40 in the draft list as of this meeting. These will be reviewed in more detail in the next meeting.

6. Public Outreach Update

   a. Feedback provided from the SC that the summary of the workshops is done well.

7. Interbasin Coordination Update – none.

8. Public Comment on Items not on the Agenda

   i. Breanne Ramos gave information on the Water Symposium Hosted by the Merced County Farm Bureau.

9. Next Steps and Next Meeting

Next Regular Meeting
February 25, 2019 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #10

DATE/TIME: February 25, 2019 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☐	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☒	Ben Migliazzo	Live Oak Farms, growers
☐	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☐	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☒	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☒	Darren Olguin	McSwain MAC
☐	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☐	Greg Olzack	City of Atwater resident
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☒	Ladi Asgill*	East Merced Resource Conservation District / Sustainable Conservation
☒	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies
	*Jean Okuye attended as alternate for Ladi Asgill	

Meeting Minutes

1. Welcome, Introductions, and Agenda Review

    a. Charles Gardiner (Catalyst) welcomed the group and went over ground rules.

2. Presentation by Woodard & Curran on GSP development

    a. Alyson Watson (Woodard & Curran) communicated goal of SC meeting is to provide input to the CC on the draft list of projects for the first iteration of the 2020 GSP.

    b. Alyson Watson (W&C) briefly described the state intervention that would be triggered if there is no adopted GSP by the deadline. Several questions were asked as follows:

        i. Question: Will our GSP have a *de minimus* fee? Answer (W&C): This will need to be determined by the GSAs.

        ii. Question: What happens if we have something adopted and then 5 or 10 years down the road, we are not compliant? Answer (W&C): W&C will follow up on confirming specifics for this process.

        iii. Clarification on *de minimus* users (W&C): These users who extract 2 AF or less per year for domestic purposes are subject to SGMA but cannot be required to meter. These are generally private users.

    c. Water Allocation Framework

        i. Alyson Watson (W&C) briefly reviewed the water allocation framework under consideration by the CC and explained that it is a framework to allocate the sustainable yield of the basin to each of the GSAs. The GSAs have discretion to determine how they allocate to their users.

        ii. Alyson (W&C) provided a summary of feedback from the GSAs. Main points included: making metering a priority in the first 5 years, recommendation for a 10-year historical baseline, consider population growth and infill for cities, and establishing thresholds during period 2020-2030 to prevent over pumping.

        iii. Clarification given (W&C) that GSAs will have the ability to enforce allocations through fees.

        iv. Clarification given (W&C) that the water allocation framework will not go into effect immediately once the GSP is approved. There is a lead time including an outreach period to help ensure users are categorized correctly.

        v. Comment from SC member: Member disagreed with not metering residential acres. Stated this would be good for planning.

        vi. Clarification given on conceptual timeline for allocation framework: The allocation framework is established first, followed by consideration for projects. The goal is to investigate how both will avoid undesirable results.

        vii. Question: Will these results be made available to SC? Answer (W&C): Yes, but these are not complete yet.

viii. Question: Will the team run the project list through the model? Answer (W&C): Not all projects. The point of today is to look at priorities that help narrow the project list.

ix. Comment: We should consider areas like the ranches in Mcswain that have landscape that can use a lot of water. Specifically consider whether they will be metered.

x. Comment: A policy for *de minimus* users should be developed. Other basins have done this based on an analysis of what these users are extracting and on knowledge of the region.

xi. Input from W&C: Yes, and there will also need to be a mechanism for people to have an opportunity to contest this policy.

xii. Comment: The City of Merced is 100% metered. Residential usage is generally half an AF/Y. Agricultural use is significantly higher than urban use on a per acre basis.

xiii. Question: Are high density houses included in this estimate for City of Merced? Answer (commentator): Yes, and these use even less AF/Y.

xiv. Question: What is meant by determining partial allocations for rangeland? Answer (W&C): GSAs have to decide how to determine what this allocation should be and consider assumptions of what to do in the case of water market. For example, what must be considered in trying to prevent outside investment.

d. Projects and Management Actions

i. Alyson reviewed the conceptual implementation timeline with respect to projects. Outreach will be important throughout this process. Updates will be every 5 years.

ii. Comment: The allocation program should be phased in during the 2025-2030 time period.

iii. Comment: SC should and is ready to start groundwater recharge projects. Projects should be started as soon as possible. Everyone in the basin needs to contribute in some way. Cities can set up their projects individually. This has been explored for a long time – need temporary use of working farmland. Details will have to be worked out by the governing bodies once we get that point.

iv. Comment: Need to be working on securing grant funding to implement projects as soon as possible because this will take time.

v. Comment: Projects for demand management will be painful. Should focus on recharge and supply projects first.

vi. Alyson Watson (W&C) briefly explained the number of projects by GSA and their allocation.

vii. The group discussed the permitting constraints around storing riparian water and flood flows. MID has proposed applying for a single Long Term Permit for Flood flows from the SWRCB. MBK will be providing a presentation to the CC next month on this topic.

viii. Alyson Watson (W&C) asked the SC several questions including: What projects, programs, or actions do you see as the highest priority for the basin? What further questions or concerns do you have in considering projects? Which projects should be in a short list vs. a general running list of potential projects? Are there additional projects that can help the GSP address groundwater quality issues? Input from the SC discussion on projects & management actions is summarized as follows:

1. Projects that already have funding should be prioritized.
2. It is important to understand what permits or regulatory requirements are applicable for each project.
3. Projects that result in direct GW recharge should be prioritized.
4. Go BIG project would address basin issues.
5. Projects should help address areas where there is the greatest need.
6. The Environmental Quality Incentives Program (EQIP) is a USDA funding program that can be used to for meters. This is a very good program.
7. The subbasin should also consider water quality projects from the SWRCB.
8. GSAs will also have responsibility to ensure continued pumping and access for areas needing water. This should be tied to minimum thresholds and avoiding undesirable results. Creating a fund for mitigation will be important to address needs arising between now and next 10 years. The sooner revenue is collected for that the better the state of the subbasin.
9. There are water treatment facilities, e.g. ponds in the Franklin-Beechwood area, that are antiquated and need to be addressed.
10. Addressing water quality is a part of any recharge program.
11. Comment from Hicham (MID): Have to consider with in lieu recharge, you are saving groundwater so that you can pump it when you need it. States he is not in favor of recycled water recharge because there are risks in introducing pathogens or poor water quality. It is better to keep groundwater where it needs to be. We can look at conveyance facilities that have an issue moving the water currently. This has the best cost/benefit ratio.
12. The subbasin will need to address the subsidence issue because this is part of why we were identified as a critically overdrafted basin.
13. Comment from Hicham (MID): MID is doing a study now with the El Nido Canal improvement project. The intent is to move water to subsidence areas and assist monitoring.
14. The subbasin should have near-term actions when it comes to projects.
15. Groundwater recharge, whether in lieu or direct, is important. Understanding permitting and regulatory permitting process is critical. Everyone should participate in finding a solution, including e.g. school districts.
16. Suggestion to limit outdoor watering to two days as general policy.
17. If the governor declares a drought emergency, then a 2 days policy is enforced. Per current ordinance, existing policy is 3 days for City of Merced.

18. Everyone should contribute. However, the way in which they contribute (e.g. pay) also depends on the user (e.g. ability to pay). Some people are going to benefit more than others.

19. General consensus from SC group: If you are a groundwater user then you will have to pay or contribute somehow to the solution for the subbasin.

20. Priority should go to those projects which are in planning and funding stages.

21. The Go Big Super-Connect project would cover the most area with the most recharge potential.

22. Comment from Charles Gardiner (Catalyst): The subbasin could look at conveyance projects that are not as large and are near-term.

23. Comment from Hicham (MID): MID's Main Canal has been under the purview of Amy Corps Engineers for flood control. MID could move water outside of MID starting March onward, but no one wants it then (e.g. could move 2,000 cfs from Bear Creek). Automation and capacity would be the first things to target. These could be one of the projects. We know what is in MID and where we could recharge, but outside MID we need to work with folks in the basin and see how we can move that water.

24. Question: Could the SC suggest to the GSAs that constant drought conditions regulations be put in place? (e.g. in restaurants water given when requested) Answer (W&C): Municipalities have the authority to enforce conservation, but the GSAs could work with the cities to encourage this. GSAs could apply for funding for the cities to implement a conservation program.

25. Question: Are there areas within our basin we know have the greatest need – is there a way to determine where these areas are? Answer: There are areas where undesirable results have occurred in the past. The area serviced by the Trucked Water Program is an example.

26. Comment: The areas with potentially greatest need are located along the eastern side of the subbasin.

27. Comment from Hicham (MID): There may be $5-10M in funds for implementing projects. This is a rough estimate.

e. Next Steps in GSP Development

   i. Alyson Watson (W&C) reviewed the timeline for draft GSP development.

f. Other Updates

   i. Beta test link is available for the Merced GSP data management system.

3. Public Outreach Update

   a. The next public workshop takes place in Livingston this evening.

4. Interbasin Coordination Update

a. None. Interbasin coordination is expected to pick up in the next couple of months.

5. Public Comment on Items not on the Agenda

   a. None.

6. Next Steps and Next Meeting

   a. Projects and Management Actions review

   b. Minimum Thresholds and Measurable Objectives

Next Regular Meeting
March 25, 2019 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #10

DATE/TIME: March 25, 2019 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☒	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☒	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☒	Darren Olguin	McSwain MAC
☐	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☐	Greg Olzack	City of Atwater resident
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☒	Ladi Asgill*	East Merced Resource Conservation District / Sustainable Conservation
☐	Maria Herrera	Self-Help Enterprises
☒	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☐	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies
	*Jean Okuye attended as alternate for Ladi Asgill	

Meeting Minutes

1. Welcome, Introductions, and Agenda Review
    a. Charles Gardiner (Catalyst) welcomed the group and reviewed the agenda items for the meeting.
2. Presentation by Woodard & Curran on GSP development
    a. Projects and Management Actions
        i. Alyson Watson (Woodard & Curran) provided a brief overview of the GSP Conceptual Timeline.
        ii. Tess Sprague (Woodard & Curran) gave description of the work to date on updating the Projects and Management Actions lists and reviewed the handout contents. Handouts contained the draft shortlist and running list of current potential projects for consideration in the GSP.
        iii. General input from Stakeholder Committee members and interested public:
            1. Water for habitat should be considered in the priorities for shortlisted projects.
            2. The importance of recharge and conveyance projects stressed, especially in the early phases of GSP implementation.
            3. Projects to be implemented in the first five years should include projects related to monitoring, reporting, data modeling, and studies that assist in gathering needed data.
            4. Priority should also be given for projects addressing subsidence.
            5. A "fatal flaw" filter should be applied, whereby a project should be removed from the list if the relevant implementing agency has already indicated it will not support the project.
            6. Drinking water should be a priority for shortlisted projects.
            7. Priority should also be given to projects that provide incentives to reduce pumping and to capture surface water, especially those that encourage capture of flood flows and purchasing of out of district water).
    b. Climate Change Analysis
        i. Alyson Watson (W&C) gave an introduction to the climate change analysis. Merced Subbasin GSA is using DWR provided climate change factors and is following the DWR approach.
        ii. Question: DWR has projected increase in evapotranspiration? Answer (W&C): Yes.
        iii. Question: Can you explain evapotranspiration? Answer (W&C): Evapotranspiration is essentially the water demand of the crop. This can also be influenced by precipitation.

- iv. Question for follow up: Is DWR updating the climate change modeling? (Every 5 years?) Answer: We assume that this data is will not stay the same up until 2040. It is likely subject to change. There is a guidance document from DWR that provides further information. (Link to guidance document here)
- v. Comment: With the 2020 deadline we should use the DWR data and hopefully get enough data after this point to make the output more locally relevant.
- vi. Comment: There is no harm in including climate change in the GSP analyses, but there are more pressing issues until 2020.
- vii. Question: What is the order of magnitude difference with the perturbation (change) factors? Answer: W&C to follow up and get this information from the analysis and DWR data.

c. Next Steps in GSP Development

- i. Alyson Watson (W&C) reviewed the anticipated timeline and release of chapters for the Merced Subbasin GSP.
- ii. Question: Where are the GSAs at with approving these parts? Answer (W&C): Major sections and particularly the water budget has been sent out to the GSA staff for review and comment as technical memos.

d. Other Updates

- i. Alyson Watson (W&C) gave an overview of the preliminary work completed for Undesirable Results and addressed the Sustainability Goal. These will be revisited in the next meeting with greater focus on the Undesirable Results.
- ii. Alyson explained what thresholds are in general and what does it mean to violate a threshold. Alyson gave a brief description for each sustainability indicator and what an Undesirable Result could be for each.
- iii. Question: Are subsidence and loss storage the same thing? Answer (W&C): Storage is about whether there is sufficient storage to meet the needs of the users, whereas land subsidence is whether land subsidence is occurring because of a depleted aquifer and is causing changes to land elevation.
- iv. For depletions of interconnected surface water, potential Undesirable Results may include effects on operations of upstream reservoirs and or reduction in viability of agriculture, fishery production, riparian habitat, and recreation usage.
- v. Alyson provided an example of the approach that is in progress for next steps: To generate analysis under the sustainable yield scenario and consider groundwater elevations to set Minimum Thresholds.
- vi. Question: Is this analysis done by your (W&C) modelers? Answer: Yes, we took the cumulative storage run, pulled the well data, and conducted the modelling analysis.
- vii. Question: Are we confident that the Minimum Thresholds aren't too low? Answer: No, and this is the purpose of the continuing the analysis to get clarity on appropriate threshold levels.

viii. Question and clarification on what is in the example shown on slide 25: The example shows whether the well would be dewatered (a potential Undesirable Result) over time. It shows historical data, depth to ground water, and the projected levels with the Sustainable Yield scenario.

ix. The analysis helps determine what is an Undesirable Result, and where the Minimum Threshold should be. For example, a threshold can be set to the level at which you are up to the point of not dewatering the wells. The next step is to analyze how this works with sustainable yield and see if Undesirable Results still occur with Minimum Thresholds.

x. Question: Will there be a model run completed that includes projects? Answer (W&C): There are a few ways to do this. This is a later step in the analysis process.

xi. Question: What is the policy background for the Minimum Thresholds? Answer (W&C): The policy pursued is to take the historical variation, doubled this and check if dewatered wells occur within a three-mile radius of the CASGEM monitoring wells. We have to determine minimum thresholds and how these are violated.

xii. Question: Are there conceptual monitoring wells? Answer (W&C): CASGEM wells are used for monitoring and compliance. Wells outside of the CASGEM network generally do not have adequate historical data. If outside wells are used, it is important to consider wells that have sufficient data because these can be used for a regulatory trigger if their Minimum Thresholds are exceeded. Thresholds have to be representative of basin conditions.

xiii. Comment: What about the subsidence area? Do we have wells in these areas? Answer (W&C and MID): Additional monitoring wells will likely be needed for these areas.

xiv. Comment: Could the El Nido monitoring wells be used to address this issue? Answer (MID): This could be an option.

xv. Question: How do we deal with thresholds for wells above and below the Corcoran Clay? Answer (W&C): We need to look at Undesirable Results for the above, below and beside the Corcoran Clay layer. How this relates to the subsidence area is a complex issue.

xvi. Comment: Chowilla is having the same issue in the Triangle T area. They are paying, and their neighbors are pumping from the deep aquifer. They are basically already trading credits above and below within a water district.

xvii. Comment: In the example chart provided for Undesirable Results and Minimum Thresholds, it would be helpful to flip the left and right axis.

3. Public Outreach Update

   a. The February public workshop summary is available on the website. The next public workshop is anticipated to take place in May.

4. Interbasin Coordination Update

   a. The W&C team has been coordinating with the Chowchilla Madera and Turlock teams. Calls took place to exchange and coordinate on technical data needs. Additional meetings are planned in the next two months.

5. Public Comment on Items not on the Agenda

a. Comment: The policy in setting Minimum Thresholds is very interesting. What about the level of communication between consultants throughout the valley for different subbasins? The observation of the commentator is that policy approaches are very consultant driven. At the consultant level, to what extent is the Merced team coordinating with others. Kern and others seem to be setting very low thresholds that are likely not ever going to be exceeded.

b. Answer (W&C): The Merced team is following the BMPs from DWR. The folks at DWR who wrote the BMPs will be the people evaluating whether these have been followed and whether requirements have been met. Ethically, we would not support setting thresholds as low as we can go, but the threshold level is up to the basin. Interbasin flows are important, SGMA states you cannot impact interbasin flows. The challenge is that we are all on the same schedule. All basins are having to set up processes.

c. Comment: DWR should have a closed door, very highly recommended workshop on approach and methods for minimum thresholds with all of the hydrogeologists. It is not fair to have stakeholders sort this out.

d. Question: Have we looked at other places in the county, e.g. the Ogallala Aquifer area and see what they are doing? Answer: No, but we are modeling outside of the basin.

e. The W&C team is also reaching out to DWR to set up a discussion on Minimum Thresholds and Undesirable Result methods.

f. Question: Interbasin flows are taken into consideration in our analysis? Answer (W&C): Yes.

6. Next Steps and Next Meeting

a. The focus of the next meeting will be primarily on Undesirable Results and Minimum Thresholds.

b. W&C will send out a Doodle poll to find an alternate date for the May Stakeholder and Coordinating Committee meetings. These meetings are currently scheduled to take place on Memorial Day.

Next Regular Meeting
April 22, 2019 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #12

DATE/TIME: April 22, 2019 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☐	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☐	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☐	Brian Carter	D&S Farms, growers
☒	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☒	Darren Olguin	McSwain MAC
☐	Frenchy Meissonnier	Rice Farmer, rice growers
☐	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☐	James (Jim) Marshall	City of Merced
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☒	Ladi Asgill*	East Merced Resource Conservation District / Sustainable Conservation
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☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies
	*Jean Okuye attended as alternate for Ladi Asgill	

Meeting Minutes

1. Welcome, Introductions, and Agenda Review
    a. Charles Gardiner (Catalyst) welcomed the group and reviewed the agenda items for the meeting.
2. Presentation by Woodard & Curran on GSP development
    a. Climate Change Analysis
        i. Alyson Watson (W&C) described the regulations that apply for the climate change analysis and described the overall process used for Merced GSP.
        ii. The approach is consistent with the Department of Water Resources (DWR) recommended approach. A change factor from DWR is applied to the Projected Data Baseline to simulate the impact of climate change. This creates the Climate Change Baseline, which is put into the Merced model. The output is the Climate Change Water Budget. The change (or perturbed) variables include streamflow, precipitation, and evapotranspiration (ET).
        iii. Alyson Watson (W&C) provided an example of precipitation using the Climate Change Analysis. The dark line is the regional average baseline. The blue line is the changed, or perturbed precipitation using factors from DWR. Generally, precipitation during a typical event is projected to be similar to the baseline conditions, but under climate change peak rain events are projected to be higher.
        iv. Similar DWR factors are used for ET. An example for orchards shows a seasonal pattern of peaking in the summer months and a projected average increase in these months of 8%.
        v. For surface water supplies, projections indicate that in wetter years (wetter season) there would be greater surface water, and in drier years (drier seasons) there would be less surface water.
        vi. For groundwater production, the graph shows the difference in groundwater pumping with the climate change scenario. In general, there is an increase in groundwater demand as result of climate change conditions.
        vii. Summary of climate change scenario: Changed storage reduction is projected to increase from 82K AFY to 130K AFY. This analysis did not rerun the MIDH2O model to see how operations would change. The purpose of analysis was to get an order of magnitude understanding of how climate change might affect the basin.
        viii. Comment: Suggestion to use the same units as some units for precipitation and ET are in mm and others are in inches.
        ix. Question: Regarding the precipitation example, is this the actual data and climate change is applied to this? Answer (W&C): We are taking the baseline and applying the DWR change (or perturbation) factors. What is visualized is a snapshot of 20 years. We have looked at the historical streamflow and actual deliveries to calibrate the model to gain an order of magnitude analysis for climate change. Analysis based on DWR guidance and DWR factors applied to see what this looks like for the basin and to help us understand in the future if the basin is trending a certain way.
    b. Undesirable Results & Minimum Thresholds
        i. Alyson Watson (W&C) explained Undesirable Results (URs) and Minimum Thresholds (MTs), provided definitions and reviewed what was discussed in previous meetings.

ii. The GSP goal is to try to bring the basin into balance. The GSP will need to define what is significant and unreasonable for URs. It is important to prevent these URs, because if they are violated there can be state intervention.

iii. Sustainable Management Criteria Definitions: There may be a specific groundwater condition where wells went dry and enough wells went dry that we determine this should not happen again. This could be defined as an UR. An MT can be set at a depth at which this is not going to happen. Our Measurable Objective (MO) will be set at a shallower depth (this is a depth we are trying to reach). We want to work between these two (the MO and the MT) within the Margin of Operational Flexibility. There are no triggers for meeting the MOs. A violation occurs if URs occur. MTs are set to avoid URs. One well being in violation once is not significant and unreasonable, but a certain percentage going dry could be. Specifications can be established for dry years. The goal is to identify a way to prevent URs.

iv. Alyson (W&C) explained each well has its own location and levels. There are 20 locations we are looking at for establishing wells with MTs, but when are there significant and unreasonable URs? Alyson asked the group for input on what is significant and unreasonable. Comments for this are provided after further presentation of slide content.

v. Chronic Lowering of Groundwater Levels: This was discussed qualitatively for URs and needs to be quantified. MTs will be established for a representative subset of wells that are part of the monitoring network. CASGEM wells were used as a starting point for these monitoring wells because they follow closely to SGMA requirements. There should be monitoring wells in all three aquifers (above, below and outside Corcoran Clay). W&C looked at domestic wells and used the Merced County database. W&C looked at the depth of the shallowest domestic well and removed statistical outliers. The shallowest domestic well within a 2-mile radius buffer from each CASGEM well was compared against MTs. An example hydrograph was provided to show MTs, observed data, and a run from 2040 with 50 years of hydrology get to 2090 for Sustainable Yield.

vi. Question: Was the process described conducted for all CASGEM wells? Answer (W&C): Yes.

vii. Question: The wells are all different. If some are dry, does that throw the entire basin out of compliance. Answer (W&C): Good question. The basin (GSAs) have to decide first how this should be approached. The basin can decide if one well goes dry that this is significant and unreasonable. If the basin violates whatever if has self-defined, then there can be state intervention. There is no trigger for violating Measurable Objectives. However, if URs are violated this triggers state intervention.

viii. Alyson Watson (W&C) explained there is an area (identified by a red circle) on the slide with a high level of uncertainty for determining MTs. Some CASGEM wells are new, some do not have enough historical data to calibrate for the model. Alyson asks the group what are there issues in this area? Are you aware of areas where wells are not deep enough? Or have been dug deeper?

ix. Comments from the SC group and public:

    1. Comment (MSGSA staff): The current status for the wells in the Trucked Water Program is uncertain. There are about six wells that did not have a solution for how to move forward at the end of the program. They are looking into what has happened in these cases.

    2. Comment (SC): Member is currently decommissioning a 300ft well, and is now punching through a 1000ft well.

3. Input from W&C: In looking at the distribution of the domestic well depths, the ones driving the issues are the 125ft depth wells.
4. Alyson (W&C) asks the group: Are there a significant number of wells in this area that are dry or cannot access groundwater? And is this significant and unreasonable?
5. Comment (SC): Member states in his area have had five wells that have gone dry and been replaced.
6. Comment (SC): There are many folks who are helping their neighbors and connecting to their neighbors water sources. Some areas to consider for this are Planada and Le Grand.
7. General response from SC group: Yes, there are wells that have gone dry. There are issues in the highlighted red area on the map.
8. Alyson (W&C) asks group: Are these issues described significant and unreasonable?
9. Comment (public): There could be a management area set up for this area. We could gather data now and get data from locals as we figure out who has gone dry and who is connected to their neighbors or Community Service Districts.
10. Comment (SC): We could identify the data gaps and what we are doing in lead up to our five year plan update.
11. Question: How flexible can this language be? Answer (W&C): We have seen flexibility with other basins. For example, with the use of a percentage of wells to indicate an URs. However, we need to be able to justify and make a case for why this is significant and unreasonable up to this point (or when this percentage of wells is reached). We have also seen exceptions for dry years from other basins.
12. Alyson (W&C) explained that this area could be carved out as a management area. However, there will still be similar challenges. It is possible to say that more monitoring is needed. Some basins use a twice a year frequency, which is a potential minimum because SGMA requires consideration of seasonal variability.
13. Comment (public): Some areas in the Subbasin will have potentially more, or easier, access to gravity flow source while other areas might require more pumping. This is something to consider in future planning and implementation.
14. General understanding from SC group: This area needs to be addressed and identified as a gap area in the GSP. More investigation is required, which will likely need to take place during GSP implementation due to current time constraints.
15. Alyson (W&C) suggested that the pathway forward is to still use the CASGEM wells, and to set thresholds for those that are appropriate (not all CASGEM wells would require setting MTs at this moment).
16. Comment (MID): There is a need for more monitoring wells on the ground. Response (W&C): We expect to have a broader monitoring network than the subset of wells we are currently focusing on.

x. Storage: Alyson (W&C) explained change in storage is about 0.3% per year. In terms of total water available, we do not anticipate significant and unreasonable URs occurring in the future. Therefore, no MTs are needed. Another approach is to take groundwater elevation (GWE) levels as a proxy and state that GWE levels are protective. A third approach is to say URs do not occur until a reduction by 10MAF is reached, and then report on this over time. W&C has suggested not to set thresholds and to provide an explanation for this. We are still waiting to hear back from DWR on this approach.

xi. Comment: Thinks that this approach might not be approved by DWR.

xii. Comment: If the science is sound, this approach should be fine.

xiii. Clarification (W&C): For each sustainability indicator, including storage, the basin has to determine if URs are not an issue.

xiv. Seawater Intrusion: Alyson (W&C) explained that this indicator is not applicable for the Merced GSP, as it is not present and not likely to occur for the subbasin. Salinity is addressed as an MT under "Degraded Water Quality".

xv. Degraded Water Quality: Thresholds should be based on our actions, where groundwater extractions effect groundwater quality. Existing cleanup sites have been previously mapped, which can ensure that new recharge sites are not put in these places and potentially cause water quality issues (e.g. extension of plumes). Where contaminants are regulated under existing programs, communication will be established with these programs. It is not necessary to take responsibility for these contaminants when they are regulated under existing mechanisms and frameworks. However, the Merced GSP will be addressing salinity.

xvi. Alyson (W&C) requested input from the group on proposed MTs for salinity. A current limit of 1000mg/L TDS is proposed for discussion. Does this sound reasonable? From a crop perspective is using this limit appropriate?

1. Feedback from SC group:

   a. Comment: For pistachio's this would be fine, but for peaches and almonds this could be an issue over a long time period.

   b. Question (MID): How is this managed currently for almonds? Response (SC): In the western parts of the Subbasin they use blending to manage salinity levels.

   c. Comment: Generally for 90% of the group this would not be a problem.

xvii. Subsidence: Alyson (W&C) explained the current approach for subsidence. The approach has been to not measure land subsidence directly, but to measure using groundwater levels as a proxy for future subsidence.

xviii. Comment: There is another basin who tried to use groundwater levels for all sustainability indicators, but have to change this after discussions with DWR. This basin also had more issues with subsidence than Merced Subbasin.

xix. Question: Why not have prevention of further subsidence as a goal? Answer (W&C): We would not want to set this as a goal because even if pumping stopped, there would still be further subsidence from prior pumping.

xx. Depletion of Interconnected Surface Water: URs, MTs for this indicator are challenging. What can be measured or estimated in the modeling is streamlosses. The greatest losses actually occur in wet years because there is a lot more water in the stream channel. There is also not a clear UR. The consulting team has tried to come up with a threshold that would keep within the historical range of depletions. We have taken out wet years, looked at historical losses, and considered the 5-year average within this range. The goal is to not exceed historical losses.

xxi. Comment: Commentator is hesitant to bring in rivers with fisheries with major reservoirs into the analysis.

c. Next Steps in GSP Development

i. Alyson Watson (W&C) reviewed the anticipated timeline and release of chapters for the Merced Subbasin GSP.

ii. Question: Where are the GSAs at with approving these parts? Answer (W&C): Major sections and particularly the water budget has been sent out to the GSA staff for review and comment as technical memos.

d. Other Updates

i. No additional updates at this time.

3. Public Outreach Update

a. The next public workshop will take place May 29th at the Atwater Community Center. Notices and additional information will be posted on the Merced SGMA website.

4. Interbasin Coordination Update

a. For interbasin agreements, W&C team has been reaching out to Delta-Mendota and has been looking at Chowchilla and the Turlock agreements as models for potential agreement structure and content.

5. Public Comment on Items not on the Agenda

a. Comment provided: There is still some money available for disadvantaged communities through government funds. These should be taken advantage of.

b. Comment from SC member: It would be good for the SC group to receive an update of what occurred in the most recent CC meetings to stay up to date.

6. Next Steps and Next Meeting

a. Focus for May will be on Minimum Thresholds and Measurable Objectives and Implementation Planning.

Next Regular Meeting
May 29, 2019 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #13

DATE/TIME: May 29, 2019 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☒	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
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☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☒	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Maria Herrera	Self-Help Enterprises
☐	Mark Maxwell	University of California, Merced
☐	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☐	Rick Drayer	Drayer Ranch, Merced cattlemen
☐	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

*Jean Okuye attended as alternate for Ladi Asgill

Meeting Minutes

1. Welcome, Introductions, and Agenda Review
    a. Charles Gardiner (Catalyst) welcomed the group and reviewed the agenda items for the meeting.
2. Coordinating Committee Update
    a. Hicham ElTal (MIUGSA) provided an update on the Coordinating Committee meeting in April, including a summary of the climate change presentation, sustainable management criteria (broken down by individual sustainability indicator), as well as the implementation timeline.
    b. Hicham also provided a quick update on the Santa Clara Valley Water District proposal to buy 5,000 acres located in the Merced Subbasin to use as a water bank.
        i. Point was raised that Merced County would need to provide a permit to export groundwater per Ordinance. SCVWD would need to go through CEQA. An exemption for water districts does not apply as this exemption is only for water districts within the County.
        ii. SC reached consensus to provide recommendation to CC that GSP should incorporate a policy statement about intent of GSP to encourage land use ordinances, but noting that GSP doesn't necessarily have the authority to enforce. CC might be able to take that to their individual GSAs if it is groundwater being exported (not necessarily for surface water).
        iii. Comment: Concern that there is no surface water in this land region and poor percolation. Not sure how it can be used as a water bank. Might be information we're missing, so intent is to gather more information.
3. Presentation by Woodard & Curran on GSP development
    a. Management Areas
        i. Alyson Watson (W&C) defined Management Areas and how and why they might be implemented. Charles Gardiner (Catalyst) provided an example where faults located in the center of a different basin interrupt water flows and it was selected as a management area where conditions were different than other areas.
        ii. Question: Have management areas been defined in the Merced Subbasin? Answer: Not yet, the team has been focusing on building an understanding and framework for the whole Subbasin, and then evaluate the need for management areas. Now we're at that evaluation point, e.g. maybe the subsidence area is one example of a possible management area.
        iii. Question: Do we have a model of groundwater levels and flow directions? Answer: Yes, this is contained within the MercedWRM and also described in the Hydrogeologic Conceptual Model section of the GSP.
        iv. Question: Should we be looking at urban vs rural in terms of different thresholds, recharge and reuse of treated water, and converting to surface water? Answer: We can implement different projects in different areas of the Subbasin regardless of management areas.
        v. Comment: Management areas have been used in other Subbasins to focus on more stringent thresholds to protect vulnerable areas. Response: We have focused on shallow water areas via groundwater levels all over the Subbasin and set conservative thresholds based on shallow domestic wells; the limitation on setting more thresholds in these areas are that there are not wells in all these areas.

vi. Comment: Poorer water quality on the West side of the Subbasin may necessitate different management areas on the east vs west but not sure how to implement. Recharge in areas with lower water quality would help water quality. Response: A more restrictive threshold can still apply to the whole Subbasin even though it's developed based on just the lower water quality area.

b. Sustainable Management Criteria

i. Alyson Watson (W&C) walked through the sustainable management criteria for each of the sustainability indicators.

ii. Question: Is there science that quantifies the delay factor of subsidence due to previous pumping? 2 consecutive years used for the definition of undesirable results for land subsidence may not be sufficient or realistic. Answer: We've tried to address this by avoiding exceeding historical rates of subsidence by maintaining current rate or less. We are also not trying to achieve 0 subsidence because this is likely unreasonable.

iii. Comment/concern: Not sure if we have decided if Jan 1, 2015 is representative if historical groundwater levels indicate that the shallowest domestic well(s) may have been dewatered already. As-is, we might be restricting ourselves and need to select a deeper minimum threshold in these cases.

iv. Question: Why don't we have thresholds in the southern area of the Subbasin? Answer: No CASGEM wells currently available (data record limitations or no construction information: ultimately do not meet CASGEM monitoring requirements), but will be able to use the same methodology to implement new wells in future (as described in data gaps section of GSP). Goal to implement additional wells in the first five years of GSP implementation.

v. Question: How much funding do we have for monitoring wells? Answer: 2 monitoring wells in El Nido have been applied and received. The Subbasin is changing the request for Technical Support Services (TSS) from a monitoring well to a continuous GPS station for a number of reasons.

vi. Question: The GSAs are not establishing minimum threshold for contaminants besides salinity – why wouldn't we to set additional thresholds for these other contaminants and meet them by coordination with other agencies? Answer: The GSAs could choose to set minimum thresholds for other contaminants, but there are challenges for making any change or impact on the issue if a threshold was to be exceeded, for example due to natural arsenic increases or due to a commercial user with a toxic contaminant. It's difficult for GSAs to assume responsibility because there's no control over many of these contaminants. Salinity is an issue where changes in pumping can have an impact.

1. One thing to look at would be having an annual review process internal to look at other agency data. Ultimately, project implementation is where we have control.

vii. Question: What are the water quality challenges as of 2015? Answer: We've met with SC, CC, GSAs, and Merced County Environmental Health to identify these issues. They have been laid out in the Current and Historical Conditions section.

viii. Comment: CV-SALTS is about to go before the State in August to adopt new basin plan. Prioritization and optimization study with deep dive on data analysis to identify hotspots of salts, with results coming out over next 10 years. Nitrate control plans are already in place for ILRP, but additional nitrate control efforts have started in Chowchilla, Turlock, and Modesto Subbasins.

ix. Amanda Peisch-Derby (DWR): DWR cautions against an approach that simply references other water quality programs for addressing other water quality parameters. Amanda shared that she was not clear on how the GSP will become aware of issues and track. Additionally, exceedances of an MT don't have to mean undesirable results are immediately applicable.

x. Alyson framed that many of the suggestions provided for addressing additional contaminants are good basin management actions that should likely be implemented. However, this is different than self-imposed regulatory requirements (minimum thresholds) that include responsibility for managing the problem.

xi. Comment: Other GSAs appear to be doing a more thorough analysis of water quality constituents against MCL/SMCL levels and impacts of pumping on historical water quality and they are thinking about ways to deal with them. Response: Other subbasins are implementing thresholds but adding a disclaimer specifically "as impacted by groundwater pumping". The difference there is that they need to pay for monitoring wells that meet the standards and also back it up with analysis in every reporting cycle to prove whether it was or wasn't due to groundwater pumping on likely a regular basis.

xii. Lots of discussion ensued about what does a coordination program look like, what is enforceable, what does the Subbasin want.

xiii. Public Comment: Need to figure out how to reduce pumping so that total water volume increases and thus improves water quality. Water quality is a trigger.

c. Implementation Plan

i. Alyson Watson (W&C) gave a brief outline on implementation planning steps for the GSP that are currently underway, as well as a schedule for future implementation of the GSP.

ii. Comment: GSP needs to consider economics of the region in setting the implementation time period while balancing the need to avoid perverse incentives for single users to exploit supplies.

d. Next Steps in GSP Development

i. Included a summary of upcoming section review drafts to expect.

e. Other Updates

i. Included a summary of upcoming section review drafts to expect.

4. Public Outreach Update

a. The next public workshop will take place May 29th at the Atwater Community Center. Notices and additional information will be posted on the Merced SGMA website.

5. Interbasin Coordination Update

a. A meeting with Turlock was just held. Also developing a draft agreement on how to coordinate in the future with Delta-Mendota (which is on a tight timeline and does not expect to be able to coordinate on data sharing unless there has been sufficient time for internal review).

6. Public Comment on Items not on the Agenda
    a. Comment provided:
        i. What is the status of the Castle Air Force Base groundwater quality cleanup? Answer: Lots of progress has been made in recent decades, but it is ongoing.
7. Next Steps and Next Meeting
    a. Focus for June will be on comments on draft sections and process for GSP Adoption and next steps.

Next Regular Meeting
June 24, 2019 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #14

DATE/TIME: June 24, 2019 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☐	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☒	Ben Migliazzo	Live Oak Farms, growers
☒	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☐	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☒	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☐	Darren Olguin	McSwain MAC
☒	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☐	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Jean Okuye (alternate to Ladi Asgill)	
☐	Maria Herrera	Self-Help Enterprises
☐	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Minutes

1. Welcome, Introductions, and Agenda Review

    a. Charles Gardiner (Catalyst) welcomed the group and reviewed the agenda items for the meeting.

2. Coordinating Committee Update

    a. Alyson Watson (Woodard & Curran) provided a summary of the previous Coordinating Committee (CC) meeting in May 2019:

        i. CC discussed and decided not to have management areas.

        ii. When looking to fill data gaps, identified that a new methodology to determine minimum thresholds may be needed for representative wells with limited or no historical data and/or no domestic wells within a 2-mile radius.

        iii. Discussed minimum threshold for salinity, such as in areas where TDS is higher, it is not currently considered an undesirable result due to blending and current management practices.

        iv. Discussion on water quality and additional constituents beyond TDS: decision was to circle back to Merced County Division of Environmental Health. The Sustainable Management Criteria chapter has been updated accordingly.

        v. For depletions of interconnected surface water, GSAs will be developing a methodology in the next few years before the 2025 update. In the interim, groundwater level thresholds will be used.

        vi. Discussed the management action in the water allocation framework section of the projects chapter and discovered a misunderstanding and a need for clarification on transferring water between developed and undeveloped land.

        vii. A Special Session of the CC was called to discuss the definition of developed supply. The estimate of canal seepage is the only item used in estimated developed supply. MIUGSA requested not to change the numbers, but consider other sources in the future, such as leaking pipes/canals. The CC agreed to update the working definition.

        viii. Question: Is recharge part of developed supply? Answer (W&C): It would be in the future, but this would be part of the other items to be investigated in the future.

        ix. Comment: SC wants to make sure can get comments and input. Response (W&C): Should have meetings in parallel. CC are looking to SC for input. Right now, need to look at what critical input is needed to get to a Plan. Some issues will have to be delay to get draft completed and approved.

        x. Question: For developed supply, if I overwater my almonds who does that water belong to? Answer (W&C): That is the question at hand. In some other basins undergoing adjudication, this has been determined in a way that recharge for beneficial use has been awarded back as developed supply. Otherwise, the questions are to whom (the agency or the person who purchased the water) does the credit go, how, and how to determine how much.

        xi. Question: Does that mean we need to look at a crop level? Answer (W&C): We could set up a documentation process that considers this for establishing credit.

xii. Comment: There's a lot more developed supply than Stevinson and MID; there are hundreds of riparian farmers from Merced creeks that are not being accounted for. Answer (W&C): What we have talked about is whether the supply can be measured. Will need to be able to measure this to count it.

    1. Question: What happens if a farmer has a riparian right and has a ditch and conveyance, and they have losses? Answer (W&C): This could be considered recharge, but there needs to be a mechanism to have participants estimate and document their losses.

xiii. Comment: SC will need to be involved in who gets the water that is lost to deep percolation.

xiv. Confirmation from group: The SC should continue meeting separately while CC is continuing planning. This will be especially important in the first few years of plan implementation as this period involves crucial decision-making topics.

3. Presentation by Woodard & Curran on GSP development

    a. Next Steps in GSP Development

        i. July 22nd for next meeting, will have a Notice of Intent (NOI) that says the GSAs will consider for adoption a GSP at least 90 days following NOI (will be publishing NOI around July 19).

        ii. Schedule plan:

            1. Aug/early Sept: walk through comments from public with the GSAs
            2. Oct: putting together final draft
            3. Nov/Dec: adoption hearings
                a. TIWD will adopt, MSGSA will adopt, and MIUGSA has an MOU (individual agencies will adopt)
            4. Jan: deadline for submitting GSP to DWR but have a small amount of buffer for this.

        iii. Question: Is the NOI a legal requirement? Answer (W&C): The GSAs do have to notify. This is similar to noticing public workshops. Each agency will also go through their notification processes in the fall.

        iv. Question: Are all GSAs about at this stage? Answer (W&C): Consultant team has only seen one GSP that is out and complete (Paso Robles).

    b. Sustainable Management Criteria

        i. Alyson Watson (Woodard & Curran) reviewed current summary of sustainable management criteria MOs, URs, and MTs per sustainability indicator.

        ii. Comment: Have heard from other basins about the subsidence and a consultant from Chowchilla-Madera thought the subsidence MT in Merced was too high. Answer (W&C): We have an agreement that we are on a parallel track and that we need to continue coordination with adjacent basins, but Delta-Mendota GSAs are still coordinating internally.

1. Comment: Another Subbasin is using groundwater level (GWL) as a proxy for subsidence. Response (W&C): DWR feedback provided to Merced team indicated the need for direct subsidence measure instead.

iii. Comment/question: Surprised that subsidence minimum threshold is not 0. Answer (W&C): The subsidence minimum threshold cannot be 0, as the Subbasin will continue to experience subsidence because this has already been set in motion (though it's expected to decrease over time).

iv. Water Quality: Comment was received to add minimum thresholds for more constituents. The GSAs can choose to add constituents but need feedback from SC group. GSAs circled back with Division of Environmental Health and got their feedback, which was consistent with the proposed minimum threshold approach. SGMA does not specify which WQ constituents must have MTs.

v. Question: Will other constituents be considered? Winton and Atwater have been identified as having water quality issues. Response (W&C): In the 2025 update, the GSAs will review all of the indicators and can update.

    1. Charles Gardiner (Catalyst): If there is an identified WQ problem, are you suggesting the GSAs take actions to manage this? Self-Help Enterprises (SHE): We would like GSAs to take this into account for indicators.

vi. Leadership Counsel comment: Wondering if would be important to take into account nitrates, etc. because recharge could increase contaminants.

    1. Comment: With new domestic well testing, now all new wells have to be tested for nitrates. This could answer that question.
    2. Comment: State Water Board and DWR are going to have to figure out if it's more valuable to put more water in the ground and potentially more (prev. existing) nitrates, which comes back to the impacts and benefits of recharge. Really this occurs at the level of the state. As for what the SC and GSAs can do, they can notify, can model and show what can happen. Not sure what you can do other than notify.
        a. Additional comment: If applicable, projects will have to go through CEQA.
    3. Comment: Who determines who gets to decide what the acceptable risk is for increased nitrates with groundwater recharge? Someone needs to figure out those policy issues. However, right now our only solution is to dilute our aquifers.

vii. Suggestion from MSGSA: Add third element to methodology for groundwater elevation Minimum Threshold OR remove wells that may have suspect data/conditions. Third element would be to use simulated GWLs where historical data shows GWLs may have already dewatered shallowest domestic wells or where modeling shows GWL may drop below the 2015 level.

    1. Alyson Watson explained the distribution of calibration wells.
    2. Clarification from MSGSA: Did not want to be limited to factors of shallowest domestic well in 2 mile radius or the 2015 level. A third element would give more flexibility, especially if we don't know what it's going to look like. MSGSA has talked about linear demand reduction. It could be that wells continue to drop and could drop below the 2015 level. Many of the wells are occurring in the MSGSA area.
        a. Comment: We need to include that third element, because we are limiting ourselves with the current method. Response (W&C): If there is concern

in using the model in these locations, we could instead remove these 2 wells.

3. Question and clarification from Marco at MID: MercedWRM is set up on quarter mile basis. Have already looked at existing data. Problem is that there are some stratigraphy issues in a particular area and the model results do not match some existing data. We have data analysis in the model, done in 3 dimensions, and have calibrated with adjacent wells. There are areas where we need some refinements. Funding is the issue, and we have not been allowed to charge to complete this refinement. We have done what we can for now. Model has the capacity, but we don't have the data to do that data analysis. Would be closer to a ~$100k effort to refine the model.
4. General consensus after discussion: Use the methodology as originally proposed but remove these two wells from representative wells and highlight need for future refinement.

c. Monitoring Networks & Addressing Data Gaps

i. Alyson Watson (Woodard & Curran) reviewed the status of the monitoring networks and data gaps for each sustainability indicator.

ii. Comment: The Rail Authority has some data/work for subsidence. We could refer to some of that.

iii. Comment/clarification for follow up: We could look at whether additional SJRRP control points could be added.

iv. Comments regarding the metering program:

1. Comment: Should connect with ITRC to get input.
2. Comment: Electric magnetic meters – not as expensive, have to get data myself and is accurate.
3. Comment: Want to have flexibility in what meters can be used.
4. Comment: Would be cheaper to be able to use existing meters and have folks go out to monitor, rather than replacing them with other meters.
5. Comment: Always in favor of the lowest level of tech, and in favor of lowest maintenance cost.
6. Comment: At minimum, have a minimum of "You have to have a meter. And if you don't have one, you need to get someone to go out there" (those are the people who should pay fines that pay for the staff to go out for meters).
7. Comment: There are some subbasins down south that are not doing any metering but are using satellite data. Response: You are in that case estimating crop demand and not use, and it is not as accurate and is difficult to ground truth (have looked into and discussed).

v. Other issues/comments:

1. Comment: On depleted streamflow, it's a little more complicated. Answer (W&C): We're using GWLs as a proxy. Given the location of our wells, we recognize more work needs to be done.

d. Plan Implementation

i. Comment: The GSP Implementation costs should have a careful thought process.

ii. Assumptions made when estimating implementation costs:

    1. Consultant team is reaching out to GSAs on administrative costs.
    2. Assume CC would continue meeting quarterly and boards to meet bi-monthly.
    3. SC: Keep meeting? Quarterly? Term limits?

iii. Comment: Have SC meet every other month and on the "off" month without SC, have members attend a CC meeting.

iv. Question: What do the first few years look like? Answer (W&C): There are a lot of significant open items that will need to get refined right away.

v. Comment: These are huge decisions that may need input soon rather than next quarter. We may want to focus on setting recurring meetings based on important topics.

vi. Comment: Up to this point, we've tried to set the table and the important stuff and in the next 5 years you'll need folks that are on the ground to provide an opinion on whether things are working.

vii. Comments: If we meet quarterly, have to look at how many hours. Also, farmers cannot commit to an all-day meeting.

viii. Alyson (W&C): There has to be a commitment at the CC to take input from this meeting.

ix. Comment: Still think we're duplicating too much by having separate SC and CC meetings. Might be better to have full scope of what everyone is thinking/perspective.

    1. Clarification: the SC group is not set up as a voting body, but with intent to get broad range of input.

x. Feedback: What has been seen is that this feedback from the SC is presented well to the CC and is taken into consideration.

xi. Comment: Could have SC meeting staggered to occur with a few days in between SC and CC so that this provides a window to incorporate and make a more formal giving of feedback to the CC.

xii. Clarification from Alyson (W&C): For projects and management actions: If a GSA raises funds for a project this can increase their allocation. Assumption is that GSAs will have own financing plan.

    1. Clarification: MSGSA not implementing Prop 218 process for projects. Instead, it is a per-acre fee for GSP development, implementation, and GSA administration.

4. Public Outreach Update

    a. Charles Gardiner (Catalyst) provided a summary of the May 2019 public workshop: good discussions, not a large turnout, also provided local perspective of what was occurring in Atwater and Winton.

    b. Confirmed: Would not do a meeting in August, would have a combined GSAs meeting that we are currently scheduling with GSAs.

5. Interbasin Coordination Update

    a. Currently scheduling a meeting with Delta-Mendota for late July.

6. Public Comment on Items not on the Agenda

    a. Leadership Counsel provided a comment and letter to the Merced Subbasin GSAs. Representatives attending CC meeting communicated some of the recommendations including recommendation to set minimum thresholds based on the anti-degradation policy at the state level (per Bill 1968), with level set at best water quality since 2015. Where minimum threshold exceeds public health goals, the GSP should include a policy to strive for water quality improvements to meet relevant public health goals. This letter has been attached as an appendix to the meeting minutes.

    b. Public Comment: Need more public to show up and attend meetings. Fox26 had a program that featured the Friant Dam entities – camera panned to audience and there was no audience. No one was there. Has to be a means to get people to care.

        i. Leadership Counsel: Really good point to get more people to attend. Have heard from folks that should have more meetings in the evenings so working folks can attend.

    c. Additional comment/input from Breanne Ramos: Secretary Sonny Purdue from the USDA will be at the Los Banos Fairgrounds in the Germino Building Town Hall from 12:30-1:30pm, June 28th.

7. Next Steps and Next Meeting

    a. Sustainable Management Criteria draft chapter expected on the 28th to the SC group, everything else in Public Draft July 19th

    b. Shared focus of July meeting (see slide).

    c. Adjourn to next meeting.

Next Regular Meeting
July 22, 2019 at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP

SUBJECT: Merced GSP Stakeholder Committee Meeting #15

DATE/TIME: July 22, 2019 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☐	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☒	Ben Migliazzo	Live Oak Farms, growers
☐	Bill Spriggs	City of Merced, Merced Irrigation District
☒	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☒	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☐	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☐	Daniel Machado	Machado Backhoe Inc., construction industry
☒	Darren Olguin	McSwain MAC
☐	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☒	Gino Pedretti III	Sandy Mush Mutual Water Company
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☐	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☒	Jean Okuye (alternate to Ladi Asgill)	
☒	Maria Herrera	Self-Help Enterprises
☐	Mark Maxwell	University of California, Merced
☒	Maxwell Norton	Retired agricultural researcher
☐	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☒	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Minutes

1. Welcome, Introductions, and Agenda Review
    a. Charles Gardiner (Catalyst) welcomed the group and reviewed the meeting agenda content. There was a brief round of introductions of attendees.
    b. Alyson Watson (Woodard & Curran) reviewed and provided an update on the last Coordination Committee. The CC had a similar agenda to the SC meeting. Leadership Council (LC) provided a letter focused on water quality issues (please see June 2019 minutes). Last meeting reviewed how to address issues for monitoring and representative wells. Acknowledged that the GSP in the next update will address getting additional information. Decision was to remove two problem wells. Discussed data gaps and heard comments related to the metering program. Discussed role of SC and that this will continue to be important and CC will continue to provide input. Decision was made to have quarterly meetings that are staggered so that there is adequate time to summarize decisions and information from one meeting to the next (e.g. for SC to the CC and vice versa). The CC discussed the water allocation framework. The CC recommended to include in the GSP the working definition of developed supply, and that this will be further refined during Plan implementation. How allocation will be distributed will also need to be further refined.
2. Presentation by Woodard & Curran on GSP development
    a. Public Draft GSP
        i. Alyson (W&C) reviewed the GSP draft timeline and the availability of the public draft. The release of the Public Draft GSP was 19 July 2019. A Notice of Intent to Adopt is being sent to Cities and Counties on 22 July 2019.
        ii. There are 30 days for public review. A list of public locations for hard copies provided is provided in the slide handout (and on the Merced SGMA website) and was sent out to the email distribution lists.
    b. Highlights of key sections for review
        i. Alyson (W&C) reviewed the Sustainable Yield (SY), including the main components that went into calculating SY. This number also includes the items that need to be refined (e.g. the seepage and conveyance estimates).
        ii. Climate Change was reviewed. The climate change water budget starts with projected conditions baseline. A change factor (or perturbation factor) from DWR is applied to the Projected Data Baseline to simulate the impact of climate change. This creates the Climate Change Baseline, which is put into the Merced model. The output is the Climate Change Water Budget. This can be refined in the future to include the Merced Irrigation District (MID) operations model.
            1. Question: Where does the 4% on the slide come from? And are we using the 7% evapotranspiration (ET) forecast in our plan? Answer (W&C): The plan includes the study, but SY does not include climate change projections. We are using the 2070 information from DWR. The uncertainty is large, but the climate change analysis gives us a broader understanding of potential level of impact. DWR requires us to have an analysis. However, W&C recommends refining numbers to be more locally specific prior to using numbers to plan on local scale.
            2. Comment: We should get the plan done and submitted to the state, but the local governing bodies need to immediately insert climate change factors for planning.

3. Comment: For our projects, we also need to work toward the big number of what we need to reduce by in AFY overall for the Subbasin.
4. Agreement from SC: Need to stay aggressive on projects.
5. Comment/question: We should have a plan moving forward to include climate change into how we are managing the Subbasin.
6. Agreement from SC: In the update, we should identify that the plan should include the climate change analysis and a way to manage the Subbasin with this. Need to focus on recharge and consider climate change when working toward sustainability and meeting future demand needs.

iii. Sustainable Management Criteria

1. Alyson (W&C) reviewed what is in the draft GSP and each of the sustainability indicators including how Minimum Thresholds are determined. A summary slide containing information for all indicators was provided.
2. Question: What does this look like in dry years? Answer (W&C): Violations of MTs are not projected to occur during dry years according to model simulations.
3. Comment/question: For Depletions of Interconnected Surface Water, are we using groundwater levels as a proxy because measuring depletions directly is so difficult? Direct measurements are near impossible. Answer (W&C): Yes, but this is identified as something that can be refined.

iv. Water Level and Protecting Domestic Wells

1. Alyson (W&C) explained that groundwater level MTs are the depth of shallowest domestic well in a 2-mile radius of each representative well (24 representative wells), or the minimum level pre-January 2015 (1 representative well). There are 25 representative wells total. The domestic wells are usually shallower than agricultural wells. A single domestic well going dry is not considered an Undesirable Result (UR). An UR is triggered if > 25% of representative wells fall below MTs in two consecutive wet, above normal, or below normal years.
2. Alyson (W&C) asked the SC group for input on what we should be doing if a well is dewatered? And what do we do if an individual representative well reaches an MT but does not trigger an UR?
3. Alyson (W&C) reviewed hydrographs to show the results of 50 years of modelled hydrology. Two of the wells out of the 25% of representative wells would reach MTs during a 6-year drought condition. This does not trigger an UR, and consequential state intervention. However, there is a possibility that we could be dewatering domestic wells.
4. Question/comment: Need to define what we think are significant and unreasonable impacts and how to address these for disadvantaged communities. Concern is that we don't know what the impacts for the communities will be because we don't have representative wells in these areas.
5. Comment: The state is asking for a plan. We know it is not going to be perfect. There are some projects that try to address issue (e.g. El Nido). If we focus on recharge, this can address/mitigate these issues.
6. Comment: There should be a mitigation strategy given that it will take 5 years to get the data and install a monitoring well in these areas.

7. Clarification (W&C): The analysis does not project a potential reach of MTs to occur except once in a 50 year timeframe.
8. Comment: We could reach out to communities to see what kind of data they might have. Response (W&C): We can't establish MT wells now because there are currently no wells in those areas that meet reporting criteria. However, we could work toward this, including through projects.
9. Clarification (W&C): We have to wait until the 5 year update to adjust MTs.
10. Comment: We also have to consider the age of the wells. For example, if a well is 50+ years old, it might be nearing end of life use.
11. Question: What about monitoring in areas that currently have no monitoring wells? Answer (W&C): The CC can work on establishing new monitoring wells, but the approach for this needs to be agreed on. This is important for areas that do not have domestic wells, and especially wells with no historical data. Suggestions have been made at last CC but are not approved yet.
12. Water Quality
    a. Alyson (W&C) explained the MTs and what these are based on. Also received guidance from Merced County Division of Environmental Health. Leadership Counsel provided a letter and follow up letter to the GSAs.
    b. Comment: The Department of Pesticide Regulation already has several programs for the use of pesticides. We are not allowed to make changes that impact these programs. Response (W&C): We have focused on known areas where there are GW and salinity issues. However, we've heard concern over a variety of parameters. We are coordinating with existing programs to understand potential impacts. Depending on what is causing the issue, this may or may not fall within jurisdiction of SGMA.
    c. Comment: The recent approval of SB200, provides $200M per year fund that could be a potential resource for funding (e.g. for projects).
    d. Comment: If you are requesting funding, you need to show that the plan is working toward improving water quality. Otherwise, may have difficulty in getting funding.
    e. Comment: Coordination with DPR and DWR is the best avenue for water quality.
    f. Comment: Protecting water quality for drinking purposes has been discussed. Commentator would like to see more that can be done in the plan.
    g. Comment: It is good to look at coordinating with water quality monitoring groups and agencies.
13. Projects and Management Actions
    a. Alyson (W&C) reviewed the requirements from DWR for project information, the criteria used in the GSP as a filter to prioritize projects, and the list of 12 priority projects.
    b. Question: What are the funding sources for those that have funding: Project #10 is partially privately funded, Projects #1-3 are Prop1 DWR funded (the SDAC projects), Project #12 uses Merced County funding.

c. For Management Actions, there is a basin-wide allocation framework, and then the MSGSA allocation management action.

14. Plan Implementation

a. Alyson (W&C) reviewed the timeline for the GSP implementation from 2020-2040, the components needed for first 5 years, and the estimated costs for plan implementation and projects.

b. Comment: Report for the Prop 218 Landowner Fee pursued by MSGSA is available on the Merced County website (see link here: https://www.co.merced.ca.us/3253/Proposition-218-Landowner-Fee)

c. Alyson (W&C) reviewed potential funding sources including what GSAs are enabled to do to raise funds through SGMA. This included funding authority given for extraction fees. Information included a brief review of options and process, with examples given of extraction fee and acreage-based assessment and fees.

d. Question: How many wells are there for the Indian Wells Valley Groundwater Authority? Answer (W&C): Not certain but can look this up.

e. Comment: Fee break out when looking at total costs to implement and total acreage would be around $4 or more per acre. Commentator thinks this is not bad.

f. Comment: It was communicated in previous meetings that everyone who has a straw in the ground needs to contribute. Landowners should have a per acre fee, maybe for institutions or organization can use an extraction fee.

g. Comment: There is not enough information to make a recommendation on which approach of fee to use, especially on behalf of disadvantaged communities.

3. Water Allocation Framework

a. Alyson (W&C) reviewed the timeline of the initial discussions of the water allocation framework from Oct. 2018 to present. In summary: recently (in 2019) in March we discussed how allocate to overlying acres. In April there was a recommendation from the CC to the GSA boards. In May some disagreements in interpretation were identified. In June had Special CC session to discuss developed supply. For the Plan, the water allocation framework section is kept at a high level and further discussion with the CC is needed to agree on further detail.

b. Alyson (W&C) went through an initial roadmap for continuing discussions. This included data gaps for allocation framework implementation, definition of developed supply, final allocation by GSA, procedure for new wells, and water credits & trading.

c. Comment: Shouldn't it be that each GSA gets their allocation and should manage in a way that's tailored to their areas? Answer (W&C): The GSAs will have that discretion, it's just the process of getting there and agreeing on how.

d. Question: Isn't there a project on streamlining well permitting? Answer from Merced County: This is a county project that is focused on above Corcoran wells. It involves an analysis of removing wells from below to above the Corcoran Clay layer, assists in removing the CEQA regulatory barrier, and should help protect against further subsidence.

4. Public Outreach Update

a. Charles explained the public review process. There is a 30-day public comment period, ending August 19th.

b. Public can provide comments also via Merced SGMA email address (see Contact Us page on Merced SGMA website).

c. A Joint GSA Board Public meeting to take place in September to review comments received. The location of the Joint GSA Board meeting will likely be the Merced County Building.

d. Adoption hearings to be held in Fall 2019.

5. Interbasin Coordination Update

   a. Merced Subbasin team have an Interbasin Coordination call with Delta-Mendota tomorrow, July 23rd.

6. Public Comment on Items not on the Agenda

   a. Comment: The GSAs' job is to address groundwater overdraft and related water quality needs. Response from SC member: To strengthen our communities, we should address and have GSAs take responsibility in addressing WQ issues.

   b. Comment: We could potentially have the SC and CC meet together to discuss this issue and reach decisions.

   c. Comment: 30 days for public review period is aggressive to try to reach communities. Are the GSAs going to have further public outreach? Also, to the point made about joining the two committees, we should consider how this will impact decision making and who is able to make decisions.

   d. Question/request from SC: Request to have the number of AFY the Subbasin needs to reduce by to reach sustainability on the first slide for future meetings.

7. Next Steps and Next Meeting

   a. Next meeting is currently to be determined. Once next regular or special meeting date confirmed, notices will be issued and outreach pursued.

Next Regular Meeting
TBD at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP Stakeholder Committee

SUBJECT: Stakeholder Committee Meeting #16

DATE/TIME: October 28, 2019 at 9:30 AM

LOCATION: Castle Conference Center, 1900 Airdrome Entry, Atwater, CA

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Alex McCabe	City of Livingston
☐	Arlan Thomas	Merced Irrigation District Advisory Committee (MIDAC), growers
☐	Ben Migliazzo	Live Oak Farms, growers
☐	Bill Spriggs	City of Merced, Merced Irrigation District
☐	Bob Salles	Leap Carpenter Kemps Insurance, insurance industry and natural resources
☐	Brad Robson	Buchanan Hollow Nut Co. Le Grand-Athlone Water District, growers
☒	Breanne Ramos	Merced County Farm Bureau
☐	Brian Carter	D&S Farms, growers
☐	Carol Bonin	Winton M.A.C.
☒	Daniel Machado	Machado Backhoe Inc., construction industry
☐	Darren Olguin	McSwain MAC
☐	Frenchy Meissonnier	Rice Farmer, rice growers
☒	Galen Miyamoto	Miyamoto Farms
☐	Gino Pedretti III	Sandy Mush Mutual Water Company
☐	James (Jim) Marshall	City of Merced
☒	Joe Scoto	Scoto Bros Farms / McSwain Union School District
☐	Ladi Asgill	East Merced Resource Conservation District / Sustainable Conservation
☐	Jean Okuye (alternate to Ladi Asgill)	
☐	Maria Herrera	Self-Help Enterprises
☐	Mark Maxwell	University of California, Merced
☐	Maxwell Norton	Retired agricultural researcher
☒	Parry Klassen	East San Joaquin Water Quality Coalition, growers
☐	Rick Drayer	Drayer Ranch, Merced cattlemen
☒	Simon Vander Woude	Sandy Mush Mutual Water Company, dairies

Meeting Minutes

1. Welcome, Introductions, and Agenda Review
    a. Charles Gardiners (Catalyst) welcomed the group. Attendees introduced themselves.
2. Finalizing Merced Subbasin GSP
    a. Alyson Watson (W&C) provided an update on the status of responding to comments and finalizing the GSP. The CC will discuss the revisions to the GSP this afternoon and adoption hearings are being scheduled for late November/early December.
    b. The consultant team worked with GSA staff on addressing comments that were received. The redline of the revised draft GSP and the master responses to comments are posted on the Merced SGMA website. The comment letters are also posted on the website. SGMA requires documenting public comments received.
    c. Master response to comments was organized by 20 topics (see slide for full list). Master response and comment letters will be included as an Appendix to the GSP.
    d. Alyson noted that SGMA does not require GSAs hold a public comment period. The Merced GSAs decided to hold the 30-day public comment period. This is an addition to the 60-day public comment period that DWR will hold once the GSP is submitted.
    e. Alyson highlighted two topics for more discussion today based on topics CC will also be discussing: subsidence sustainable management criteria and water quality sustainable management criteria.
        i. Subsidence discussion:
            1. Alyson provided some background information on subsidence in the basin: it is a gradual process that takes time to develop and time to halt. Subbasin may not be able to fully stop subsidence but can slow it and reduce impacts. She noted that despite wetter conditions 2017-2018, there was still between -0.17 ft/yr and -0.32 ft/yr observed in the portion of the subbasin.
            2. Alyson compared the sustainable management criteria that are included in the Merced GSP and in the neighboring basins of Chowchilla and Delta-Mendota.
                a. Merced GSP management criteria based on historical subsidence rates observed
                b. Chowchilla is using GWLs as a proxy for subsidence in the lower aquifer only (they are using this for both MT and MO). They are using an adaptive management approach with a trigger of -0.25 ft/yr for 3 years in Eastern main aquifer.
                c. In Delta-Mendota they have measurable objectives that vary by GSP and region but most are between -0.01 to -0.1 ft/yr. For minimum threshold, they (again various by GSP) but have between -0.1 to -0.2 ft/yr. San Joaquin River Exchange Contractors: The MT is narrative: "that which doesn't reduce SJREC's conveyance capacity without appropriate mitigation."
            3. Question from SC: Did Delta-Mendota use a different method for coming up with their numbers? Alyson: Yes, what was used to determine this is site specific. What they use cannot necessarily be used in Merced.

4. Clarification: we expect that DWR will expect that we have a continued coordination for subsidence. But we do not expect that they will require neighboring basins to have the exact same measurements.
    a. The consulting team and GSA staff were given direction by DWR that using groundwater level as proxy was not preferred. Neighboring subbasins got different input from DWR. (Chowchilla and Delta-Mendota).
    b. SGMA is very specific that the Subbasins will come up with their own approach to creating MTs and MOs. We are not allowed to impact our neighboring basins adversely. However, we do not have to have the same measurements/mechanisms for measurement in order to get our plan approved.
5. Question: DWR will see the response to comments and comments themselves? A: Yes, these are in GSP appendix and response to comments and comments are on the MercedSGMA.org website.
6. Alyson further described Merced GSP approach. MT and MO set based on historical subsidence rates. Some level of future subsidence, likely at similar rates, likely to be underway already and will not be able to be prevented. GSAs will continue coordinate efforts with Chowchilla & Delta-Mendota to develop regional and local solutions to regional subsidence
7. Alyson explained the subsidence map, showing varying degrees of subsidence in the southern part of the basin.
8. Question to the group: thoughts? Is Merced GSP approach reasonable?
    a. Comment: this is a good educated guess. The other basins are doing the same thing.
    b. Question: is there an overall system or data system that is watching this? A: the Bureau (USBR) is likely the best current data system for this. We are using this data.
    c. Hicham: DWR says they would like to see surface water stations used in our analysis. They were not as excited about using GWL, but we are in a good place to keep moving forward.
9. Question from public: what are you using for a standard measurement unit? Where are we right now and how are we compared to the other areas around us? Have to ask why how much is sinking over that time period in that particular location. A: When there's groundwater pumping and you have permeable clay layers, you are creating these holes in the clay layers and these can compact and the ground can drop. And we can see this in the change in topography and that's where the map is from (using data from USBR). We're looking at directly how much the ground surface is changing. Moving forward we have to work with our neighbors to improve how we are managing this.
10. Comment from public: can you coordinate the GWL data and the subsidence (surface change) data together? A: That's the plan. Think of this as step one. There will need to be more coordination and more data. More monitoring wells are being proposed for the future as well as more monitoring points for subsidence. There needs to be a consistency across the basins. Both sides have GWL and subsidence data, but will need to continued coordination. Next step is to look at

GSPs together and look at potentially regional plans and adjust. Confirmed: we are taking a big picture view.

11. Question: how much are we going to make specific points influence… is there going to be a blanket assessment? A: the MTs are location specific. You can have something greater or less than this at another location in the basin. However, the CC and the Boards can decide there is an issue somewhere and decide to do something there. Part of the reason for this is because of how site specific the issues might be.
12. Comment (Hicham Eltal MID): What we are saying is to look at the most drastic locations to ensure other areas also ok (measuring to the worst case in order to be protective).
13. Comment (Alyson Watson): we are using an approach that is protective of domestic wells in the subbasin.
14. Comment from public: when talking about El Nido, southeast side is very different than other areas. Drastic difference even within El Nido with difference of 3-5 miles.
15. Comment (Hicham): unless your areas become as bad as the other areas, will not be impacted by the restrictions.
16. Comment from public: worried about being lumped into another area and then having to be required to implement demand management actions/restrictions.
17. Clarification on whether GWL vs. subsidence surface measures as being more important: there is nothing in the plan that says there are demand management for areas of subsidence (e.g. for El Nido area). The plan will also be updated every 5 yrs.
18. Clarification from Hicham: you could still (according to discussion from DWR) have an increase in GWLs but still have subsidence.
19. Comment from public: basically, they don't (DWR) know what is going on with subsidence? A: right, we do not know the extent to which this will continue and severity.
20. Question: in the brown area of the map, is there a plan to put folks in that area (where subsidence is worst) on surface water?
    a. Response from SC: there are no cities in that area, and the farmers in that area have procured surface water supplies
    b. Clarification from Charles: we also have GWL objectives and thresholds in that area as well.
    c. Clarification from Alyson: MID has also been doing work to get SW to these areas.
    d. Hicham: folks in these areas have purchased meters. These folks are also getting water outside the district. MID Board has approved most of the time (not all the time) to move water outside the district. Previously has been the case 7 out of 10 years. In MID WRP also recognizes efforts outside the basin.
    e. Comment: Madera, Chowchilla, and others have all been trying to get SW out to these areas.

f. Question: is MID interested in that? Hicham: yes, depends on system capacity. The SW has to go through El Nido first. (El Nido is in district)

ii. Water Quality:

1. Alyson provided an explanation of Merced GSP water quality sustainable management criteria. The MT is set at 1,000mg/L for TDS (Total Dissolved Solids, measurement of salinity). This is drinking water standard. There are numerous other authorities governing and monitoring drinking WQ and contaminants. There is a summary of the response to comments for WQ on the Merced SGMA website.
2. Alyson provided summary of response to WQ comments. Salinity is selected as an indicator. GSAs recognize the importance of protecting drinking water quality. There is a desire to coordinate with agencies and their ongoing efforts to avoid duplication of efforts and efficiently use limited resources. Coordination activities include: (see list on PPT).
3. Comment from SC: we discussed previously that there are all of these other agencies who are doing this work.
4. Comment from Charles: there is some concern for residential users who might not be on these systems that are being monitored by existing agencies
5. Comment from SC: two weeks ago, State Board approved CVSALTS. (there will be data on nitrates becoming available.
6. Comment from Charles: the permittees develop together a collective nitrates program. The management zone is a collaborative effort kind of like a GSA. It might take a couple of years for this to develop and implement this kind of monitoring and planning.
7. Comment from SC: the program will be monitoring the domestic wells. Who is actually going to do the work will be determined by the regional board?
8. Comment: anything we could change in the plan to satisfy commenters?
9. Alyson: we could add more MTs, but there's not much else we can do with the plan. What SGMA requires sets a basin standard, you can have projects, but from a thresholds perspective this is not the most effective way to address these issues for these communities.
10. Charles: the groups who are advocating for these communities are in the process of conducting a study and assessment of the specific needs and issues in DACs throughout the basin
11. Comment: SB1 is going in this direction as well (targets disadvantaged communities and groundwater levels)
12. Clarification: will not have additional specific requirements to dairies, will be subbasin wide.
13. Comment from Charles: the program (CVSALTS) brought up earlier monitor and have regulations.
14. Comment from public: that's what we're hoping that if we are already adhering to the current regulations, that we are not creating a new agency we have to report to.

f. Dates for Adoption Hearings for GSA Boards – still being scheduled. Tentative dates below:

i. TIWD GSA-1 is anticipated for Nov. 19th

ii. MSGSA is TBD

iii. MIUGSA is anticipated Dec. 11th

3. GSP Implementation Planning

   a. Prop 68 funding opportunity (deadline Nov. 1, 2019)

      i. Alyson briefly summarized Prop 68 grant contents. These were developed by the ad-hoc working group.

      ii. We are submitting for the total amount we are eligible which is $500K. Expected to be competitive. DWR has indicated they are prioritizing GSP development activities over implementation projects.

      iii. Contents include three components, 1) grant administration, 2) Addressing GSP data gaps, and 3) Developing a remote sensing decision support tool

      iv. The objectives include: prioritizing data gaps, increasing the number of wells in the monitoring network, monitoring gw use, and stakeholder outreach.

      v. We are soliciting letters of support and currently have 14 letters from various groups in the basin. We have also received letters from all three neighboring subbasins and provided them with letters of support.

   b. Annual report preparation proposal from Woodard & Curran

      i. Alyson explained that W&C was asked by GSA staff to prepare a proposal for preparing the first annual report. The first annual report is due April 1, 2020 and must cover water years 2015-2019. The proposal includes optional tasks for project management, stakeholder engagement plan update, and evaluation of GDE Pulse Tool

   c. Water Allocation Framework update

      i. Alyson explained that the GSAs are continuing to discuss this issue. The GSP does not include an allocation. It states that GSAs intend to allocate water to each GSA but have not yet reached agreement on allocations or how they will be implemented. Estimates of basin-wide sustainable yield and developed supply are included in the GSP for illustrative purposes.

   d. Implementation and Stakeholder Committee Involvement

      i. Discussion: What topics are of most interest to the stakeholder committee?

         1. Funding: How and who will pay for this? MSGSA has done a Prop 218, MIUGSA is underway with this.

         2. Monitoring and reporting: SC members report hearing concerns in the community that someone will try to turn off their wells. Comment: Biggest question I get, who's turning my pump off? Nobody is going to tell me to turn off my wells.

         3. Allocation: What's the allocation and how is it enforced?

         4. Projects

         5. First 4 bullets (allocation framework, monitoring and reporting GW use, funding, and projects) are the key topics

         6. Water Quality – comment: there are 5 government agencies watching that. Do not think this plan needs to get specific about this.

ii. Composition of Stakeholder Committee

1. Charles suggested they may want to discuss who wants to stay on and whether have the right representation. He noted there have been two resignations from the committee during the course of GSP development and that we are at a natural milestone to confirm who wants to stay on committee and what committee's role moving forward will be.
2. Group discussed wanting to stay involved if input is used and valuable. Some members expressed desire to interact directly with the CC committee. Charles suggested possibility of holding joint discussions with CC around key topics.
3. Group wanted to meet no more than needed. Agreement that mapping out topics would be useful. Having summary of what was previously discussed also useful.

e. Integrated Regional Water Management Plan (IRWMP)

i. This effort is continuing and there was a second call for projects. These are all available online.

4. Public Outreach Update

a. GSA Adoption hearings will be coming up in late November/early December.

5. Interbasin Coordination Update

a. Coordination with neighboring basins will continue, especially for topics like subsidence.

6. Public Comment on Items not on the Agenda

a. Question: are we still trying to keep the water in the GSAs? Reply: the GSAs will need to agree together with how to split up the water allocation amongst the GSAs. Then there is also a requirement in SGMA to not adversely impact your neighboring basins. There is a general framework that has been laid out in the plan. However, the big question is how to allocate in a fair manner the water amongst the three GSAs.

b. Public comment submitted: member of public provided letter they received from Department of the Air Force concerning groundwater sampling for PFOS/PFOA. (attached)

7. Next Steps and Next Meeting

a. Will be submitting the Prop 68 grant application

b. Dates for adoption hearings will be posted on the website.

Next Regular Meeting
TBD at 9:30 a.m.
Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP Stakeholder Advisory Committee

SUBJECT: Stakeholder Advisory Committee Meeting
DATE/TIME: April 12, 2021 at 1:00 PM
LOCATION: Zoom Virtual Meeting

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Arlan Thomas	MIDAC member
☒	Ben Migliazzo (alternate)	Live Oak Farms
☒	Bob Kelley	Stevinson Representative
☒	Breanne Ramos	MCFB
☒	Craig Arnold	Arnold Farms
☒	Darren Olguin	Resident of Merced County
☒	Dave Serrano	Serrano Farms - Le Grand
☒	David Belt	Foster Farms
☒	Emma Reyes	Martin Reyes Farm/Land Leveling
☒	Gil Cardon	Merced Co. Hispanic Chamber of Commerce
☐	Greg Olzack	Atwater Resident
☒	Jean Okuye	E Merced RCD
☒	Joe Sansoni	Sansoni Farms/MCFB
☐	Joe Scoto	Scoto Brothers/McSwain School Dist.
☒	Jose Moran	Livingston City Council
☒	Lacy Carothers	Cal Am Water
☒	Lisa Baker	Clayton Water District
☒	Lisa Kayser-Grant	Sierra Club
☐	Mark Maxwell	UC Merced
☒	Maxwell Norton	Unincorporated area
☒	Nav Athwal	TriNut Farms
☒	Olivia Gomez	Community of Planada
☒	Parry Klassen	ESJWQC
☐	Reyn Akinoa	River Partners
☒	Rick Drayer	Merced/Mariposa Cattlemen
☐	Robert Weimer	Weimer Farms
☒	Simon Vander Woude	Sandy Mush MWC
☒	Susan Walsh	City of Merced
☒	Thomas Dinwoodie	Master Gardener/McSwain
☒	Trevor Hutton	Valley Land Alliance
☒	Wes Myers	Merced Grassland Coalition

Meeting Minutes

1. Call to Order and Welcome
    a. Charles Gardiners (Catalyst) welcomed the group.
2. Introductions and Roll Call
    a. Stakeholder Advisory Representatives for the Merced Subbasin GSP introduced themselves (see attendance record above).
    b. Representatives from the three GSAs introduced themselves (Lacey McBride with Merced Subbasin GSA, Larry Harris with Turner Island Water District GSA-#1, and Matt Beaman for Merced Irrigation-Urban GSA [MIUGSA]) as well as the consultant team from Woodard & Curran (Samantha Salvia, Chris Hewes, and Ali Taghavi).
3. Merced GSP Overview
    a. GSP Highlights/Commitments
        i. Samantha Salvia (Woodard & Curran) provided an overview of the Sustainable Groundwater Management Act (SGMA), the development of the GSP and two annual reports, and key elements of the GSP.
        ii. Matt Beaman (MIUGSA) provided an update on the status of priority projects identified in the GSP.
        iii. Q: Why did the initial Planada recharge project not work out? A: The grant application identified two potential areas to construct a recharge basin based on some preliminary studies looking at soils and available well completion reports. At both sites, there are shallow clay layers (~10 feet) that impede infiltration. The dry wells are the next alternative.
        iv. Q: Historically, what percentage is the volume of overdraft compared to current pumping? (or what is the volume of annual sustainable yield relative to water pumped historically) A: It's not a simple answer as pumping can change annually and the solution is not going to be as simple as an across the board cut to pumping. The long-term change in storage published in the Water Year 2020 Annual Report shows an average reduction of 132,000 Acre-feet per year (based on 2006-2020).
        v. Q: Did DWR have any noteworthy comments on the GSP? A: DWR has provided no feedback on any GSP thus far. The regulations provide DWR two years to review GSPs.
        vi. Q: In making projection for sustainable yield in the future, did the model include the likelihood of precipitation/runoff being less in the future than in last 100 years due to drought or climate change? A: The GSP includes model sensitivity runs for the effect of climate change which was identified and acknowledged as an uncertainty.
        vii. Public Question: Why hasn't green water infrastructure been mentioned in the sustainability plan? The cost and overall benefit seems like a win-win proposition. e.g. rainwater harvesting. What are the barriers to getting a discussion about green water infrastructure? Not just Flood-MAR which is one tool in the toolbox – there are other tools under the umbrella of green infrastructure that benefit communities. Many micro-projects can help enhance the water table. A: While the GSP does not use the term "green infrastructure," much of the analysis of how to reach sustainability has focused on capturing stormwater for recharge purposes. This is a component of several priority GSP projects. Our website has a place (on the Contact Us page) to submit ideas for additional projects.
        viii. Public Question: Does it make it any more urgent to have demand reduction be a focus rather than supply augmentation given that we potentially may not have surface water supplies that the GSP relies on, and recharge projects? A: The GSAs are currently evaluating 5-year objectives to move toward to the sustainability goal. The Merced Subbasin GSA already has a demand reduction management action from the GSP and is

thinking about this as well – it will be balanced between both demand reduction and supply augmentation.

b. GSP Implementation Progress
    i. Lacey McBride (Merced Subbasin GSA) provided an updated on GSP implementation since the GSP was submitted in January 2020, including Proposition 68 grant funded projects.

c. WY2020 Annual Report Summary
    i. Chris Hewes (Woodard & Curran) provided an overview of the Water Year 2020 Annual Report, including sustainable management criteria, groundwater level changes, and groundwater storage change.

d. Comments and questions
    i. Comment (Susan Walsh): As someone who has lived in Merced and has paid attention to growth in the valley in the last 30 years, feeling some cognitive dissonance in talking about limiting pumping yet City of Merced is about to annex a large acreage of land for new development. At what point is growth in the valley going to be collapsed into planning with groundwater? At meetings about safety, housing, etc., rarely do people mention the fact that groundwater is such an important and scarce commodity.
    ii. Comment (Maxwell Norton): The Monterey/Salinas area has some of the most expensive urban water in North America. There seems to be a lot of planning efforts and documents in San Joaquin Valley, but long-term water security doesn't seem to be merged with long-term growth projections.
    iii. Comment (Susan Walsh): Cities and suburban areas in Merced County have made efforts to reduce impacts on water systems, e.g. turf replacement/removal. Have we ever measured that or quantified how different landscapes look between 1980 and now? (some has been mandated for new development requirements). It would be helpful to measure what has been done in the past to apply to the future.
        1. Answer from Leah Brown (City of Merced): Every urban supplier has different information about what's happened in their area. The City of Merced doesn't have tracking of turf conversion projects. But it does have all kinds of data from the metering system. In 2015, a large scale metering project resulted in more complete metering in the City. Between July 2013 drought and July 2018, there was a 39% reduction in use. This urban water use reduction has maintained since then and is a cumulative 28% reduction as of the current Urban Water Management Plan effort.
    iv. Comment (David Serrano): Concerned that foothills in Madera and Merced have been developed from previously native pasture. Impact of reduced natural foothill recharge and increased draw on groundwater resources. With surface water prices increasing, concerned about being priced out of agricultural livelihood/legacy.
    v. Comment (Olivia Gomez): Hearing that California is going into drought again. There was a lot of education in the previous drought but it has stopped. This education is important to keep up because everyone's in it together – it's important to share perspectives. Going to start metering which will help conservation efforts. Education about conservation and preservation is key.
    vi. Comment (Gil Cardon): How have the wildfires affected soil conditions? A: We are not sure – it has not come up in GSA discussions. But we know that UC Merced faculty have been doing research in this area.
    vii. Comment (Joe Sansoni): As family farmers with small operations, water issues and availability are critical. We understand overdraft is an issue that needs solutions. Have spent a lot of effort to be more efficient already. Yields per acre and AF pumped are significantly more efficient than in the past and continuing to improve. This stands for most growers regardless of crop type and growers don't always get a lot of public credit for that.

This is also costly to implement. Something that has become an unfortunate reality in agriculture is big production investment agriculture – for instance, almond industry had several good years, thus thousands of acres were installed in last decade. If there's a downturn, investment agriculture can take a multi-year hit which would hurt smaller farmers. It feels like the large drawdowns are driven by investment agriculture.

viii. Q (Wes Myers): Some monitoring data is iffy, e.g. hatched areas. What opportunities or mechanisms exist to audit the model? GSPs are moving forward based on one assumption, but how do we know that it's correct? Does the state audit or a third party consultant come in and do this? A: Most Annual Report figures are based on actual monitoring data, not modeled data. The model is also informed by historical data. The model has been calibrated based on monthly records from 20-30 years. During the development and calibration process, there was an involved technical advisory panel including UC Merced, USGS, and DWR representation. The GSP includes some writeup about model uncertainty as well.

ix. Comment (Nav Athwal): One way to reduce overdraft is potentially the use of more efficient technology when it comes to irrigation of crops. Many folks have moved to drip irrigation and it's very efficient. But wondering if as a group and GSAs, has there been work in adopting better irrigation technology as a way to reduce demand without requiring fallowing and other negative consequences that come with that? In addition, thoughts about how to use water from parcels that would rather not irrigate (e.g. commodities with less demand) vs those who need the water to meet minimum ET – like a groundwater credits market to meet irrigation demand. Is there thought to fund resource conservation projects at a grower level?

1. Lacey McBride (Merced Subbasin GSA): The GSA is looking at and considering many different tools in the toolbox as options outside of fallowing land. One challenge is that you need to consider that efficiency should reduce overall groundwater use and not end up increasing it beyond historical due to more efficient use and less percolation. The Merced Subbasin GSA doesn't have a program (or funding now) to do something like funding a resource conservation project. Another future discussion will be how will the GSA generate revenue to pay for these types of programs.

x. Comment (Jean Okuye): With less than 20 years before we are to have balance and sustainable management it seems we need to address the demand. Are we looking at Sustainable Agricultural Lands Conservation? Award those doing the right thing, keep our water in our county, be sure we don't take from Peter to pay Paul, be sure the small farmers and communities can afford water? Who owns the water? Look at what Madera County is doing as they have received grant to help them manage water.

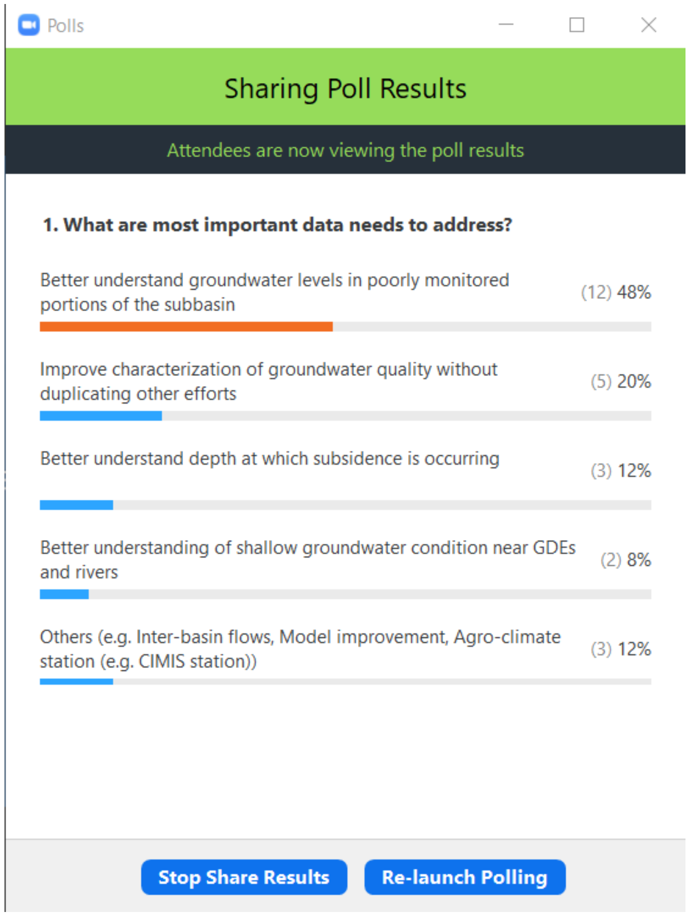
xi. Comment (Maxwell Norton): There's been a wide assortment of cost-sharing and straight funding through NRCS and others. Programs come and go based on the latest Farm Bill. Most improvements that are possible in production agriculture have been achieved.

4. What's Next?

a. Data Gaps Plan

i. Samantha Salvia (Woodard & Curran) provided an overview of the Data Gaps Plan effort and encouraged stakeholders to explore the slides in detail after the meeting as time was running short at this point in the meeting.

ii. Poll results:



iii.

iv. Amanda Monaco: Are the GSAs going to use the data gaps grant to fill in missing info about the location and vulnerability of domestic wells, so we can better understand potential impacts on their drinking water supply? A: Ongoing Integrated Regional Water Management (IRWM) work funded by DWR is evaluating locations and depths of domestic wells in key areas of the Subbasin.

1. Matt Beaman (MIUGSA): Report will be presented to Merced IRWM region likely in May and made public later.

b. Future Stakeholder Advisory Committee Meetings

i. Charles Gardiner (Catalyst) talked through options for the next meeting, likely July 6 or 12. A poll will go out to committee members to schedule this.

5. Public Comment

a. No comments.

6. Next steps and adjourn

Next Regular Meeting
July 12, 2021 from 1-3pm
Information also available online at mercedsgma.org

Note: If you need disability-related modification or accommodation to participate in this meeting, please contact Merced County, Community and Economic Development staff at 209-385-7654 at least 48 hours prior to the start of the meeting.

MEETING MINUTES – Merced GSP Stakeholder Advisory Committee

SUBJECT: Stakeholder Advisory Committee Meeting
DATE/TIME: July 12, 2021 at 1:00 PM
LOCATION: Zoom Virtual Meeting

Stakeholder Committee Members In Attendance:

	Representative	Community Aspect Representation
☐	Arlan Thomas	MIDAC member
☒	Ben Migliazzo (alternate)	Live Oak Farms
☒	Bob Kelley	Stevinson Representative
☒	Breanne Ramos	MCFB
☒	Craig Arnold	Arnold Farms
☐	Darren Olguin	Resident of Merced County
☒	Dave Serrano	Serrano Farms - Le Grand
☒	David Belt	Foster Farms
☒	Emma Reyes	Martin Reyes Farm/Land Leveling
☐	~~Gil Cardon~~ (has left committee, replacement TBD)	~~Merced Co. Hispanic Chamber of Commerce~~
☐	Greg Olzack	Atwater Resident
☒	Jean Okuye	E Merced RCD
☐	Joe Sansoni	Sansoni Farms/MCFB
☒	Joe Scoto	Scoto Brothers/McSwain School Dist.
☒	Jose Moran	Livingston City Council
☒	Lacy Carothers	Cal Am Water
☒	Lisa Baker	Clayton Water District
☒	Lisa Kayser-Grant	Sierra Club
☒	Mark Maxwell	UC Merced
☒	Maxwell Norton	Unincorporated area
☒	Nav Athwal	TriNut Farms
☒	Olivia Gomez	Community of Planada
☒	Amanda Monaco (alternate)	Leadership Counsel
☒	Parry Klassen	ESJWQC
☐	Reyn Akinoa	River Partners
☐	Rick Drayer	Merced/Mariposa Cattlemen
☒	Robert Weimer	Weimer Farms
☒	Simon Vander Woude	Sandy Mush MWC
☒	Susan Walsh	City of Merced
☒	Thomas Dinwoodie	Master Gardener/McSwain
☒	Trevor Hutton	Valley Land Alliance
☒	Wes Myers	Merced Grassland Coalition

Meeting Minutes

1. Call to Order and Welcome
    a. Charles Gardiners (Catalyst) welcomed the group.
2. Introductions and Roll Call
    a. Stakeholder Advisory Representatives for the Merced Subbasin GSP introduced themselves (see attendance record above).
    b. Charles Gardiners (Catalyst) provided a summary of responses to a survey of committee members conducted online ahead of the meeting (25 responses) about resuming in-person meetings.
        i. Comments ranged from wanting in person to desire for hybrid approach (both in person and option for virtual); the major limitation to a hybrid system is confirming a meeting space and the available technology.
        ii. Concern was raised over losing the voices of people who can't attend in-person if there's not a way to include them remotely.
        iii. Emma Reyes shared that vaccination status can be requested or can be stated as part of a policy, but participants don't need to provide that information as it is private medical information.
        iv. The Merced County Farm Bureau is working to upgrade their conference room for remote integration over the next several months which may be a possibility for future hybrid meetings.
        v. GSAs and W&C will explore technology and room availability to see if hybrid option is possible for October meeting.
3. Review of Topics Covered at April Stakeholder Advisory Committee Meeting
    a. Samantha Salvia (Woodard & Curran) briefly listed the topics covered at the April meeting and reminded the group all slides and meeting notes are posted on the www.MercedSGMA.org website. Topics covered:
        i. Overview of Merced GSP (sustainable management criteria, sustainability goal, etc.)
        ii. GSP Implementation Progress (grants, monitoring, projects)
        iii. Annual Report Summary (changes in gw levels in WY 2020)
        iv. Data Gaps Plan Development (gaps identified in GSP and grant funded work to prepare a plan to prioritize and address)
4. SGMA Overview
    a. Samantha Salvia (Woodard & Curran) explained that given the group only meets quarterly and the GSP is a large document, the GSAs want to start each meeting with some context. She provided a brief explanation of SGMA's purpose emphasizing that SGMA is meant to foster local management of groundwater and that SGMA gives GSAs authority to establish groundwater extraction allocations and collect fees. SGMA and GSPs adopted under SGMA cannot alter water rights.
    b. Lacey McBride (MSGSA) provided an informational update about how Merced County is considering updating the Groundwater Ordinance for well permitting (staff proposal currently being developed). The proposal would shift determination of consistency with GSPs from the County to the appropriate GSA. Lacey pointed out that under current conditions, the County is making a determination of whether well permit applications are consistent with GSPs they did not directly develop.
        i. Q: What about existing well replacement? A: Under the current staff proposal, well replacement would fall under the GSAs the same as for new wells. Existing exemptions would be pre-empted by the fact that the applicant is within jurisdiction of a GSA managing under a GSP.
        ii. Q: What about hardship such as replacement of a domestic well? A: That is something the GSAs will need to consider as they develop their policies if the proposal moves forward.

iii. Lisa Kayser-Grant: How many GSAs are considered under this policy? A: Merced County-wide has 17 GSAs across portions of several subbasins, but the Merced Subbasin only has 3 GSAs (and 1 GSP).
iv. Q: What is the level of oversight on consistency between GSPs? A: DWR reviews GSPs for consistency across each individual basin, and each GSP has to adhere to SGMA requirements as well.

5. Merced GSP Overview
   a. Samantha Salvia (Woodard & Curran) provided more information specific to the Merced GSP and ongoing review by DWR. She outlined what DWR has shared about its 3 review pathways for GSPs (approved, incomplete with corrective actions, inadequate). She described the feedback DWR has provided on the plans it has released public information on so far (2 approvals, and 2 “internal consultation”). She reiterated that DWR expects GSAs to be implementing their GSPs during the review process.
      i. Q: If there are questions from DWR’s review, does this put us back to “zero” for Committees and decision-making? A: DWR feedback is more likely to be specifically targeted to areas of the GSP where DWR wants more information or support for analyses. Not so much a “redo” as a “refinement”.
      ii. Q: Are the Plans that have already received feedback due to lack of documentation or weak implementation? A: Santa Cruz was approved while two others (Cuyama and Paso Robles) have started a more informal “internal consultation” with DWR (this information consultation avoids triggering the formal 180 day period for GSAs to address deficiencies, not fully declared “incomplete”). DWR’s initial feedback is published publicly in the SGMA Portal.
      iii. Comment (Amanda Monaco): One takeaway from Leadership Counsel is that in addition to comments on sustainable management criteria and linkage to undesirable results, DWR wants to see as part of undesirable results that GSAs are looking at potential drinking water impacts and whether there will be impacts, as well as whether or not a mitigation program is required. .
   b. Samantha Salvia (Woodard & Curran) walked the group through the Merced GSP’s estimates of water budgets, calculation of sustainable yield, and the development of the framework for allocation of the sustainable yield among the GSAs. The Merced GSP contains an explanation that GSAs intend to allocate water to each GSA but have not yet reached agreement on allocations or how they will be implemented. As the GSAs continue to work on basin-wide allocations, they are evaluating GSA-specific 5 yr targets to make immediate progress towards sustainability while allocation framework discussions are ongoing. Samantha invited each GSA rep to describe their 5 yr target.
   c. Matt Beaman (MIUGSA) described MIUGSA’s tentative target as a goal of reducing pumping of native groundwater to 1.5AF/AC by 2025. He further explained that a public process is underway within the GSA to develop principles and guideline for GSP implementation within MIUGSA (meetings expected to start August). He said MIUGSA recognizes that the ultimate sustainable number might be lower (than 1.5 AF/AC) but they wanted to set an aggressive intermediate target. Info available at http://mercedgroundwater.org/
   d. Lacey McBride (MSGSA) shared that MSGSA adopted via resolution on 7/8/21 a 5 yr target of 15,000 AFY reduction in consumptive use of groundwater in MSGSA by 2025. She acknowledged that greater reductions will be needed, but that this target puts the GSA on a glidepath to allow time for programs and projects to get into place in the first five years, and then additional reductions in years afterward will need to be steeper.
   e. Kel Mitchell (TIWD GSA #1) confirmed that all wells in TIWD GSA#1 are metered and that 1.5 AF/AC is a likely achievable 5 yr target but nothing has gone to the TIWD GSA#1 board formally yet. He stated that 1.5 AF/AC will be subject to additional discussions and collaboration at the Coordination Committee level.

f. Q: MIUGSA to reduce to 1.5 AF/AC by when? Will the MSGSA target eventually include AF/AC limit to users? Any ideas on when that clarification will be made public?
    i. A (MIUGSA): MIUGSA board has not taken specific action on this. Additional technical work and the public process are ongoing.
    ii. A (MSGSA): There's no single silver bullet for MSGSA to reduce consumptive use – it will be accomplished through a variety of projects and programs. The GSA has a technical advisory committee that is looking at this. Land repurposing will likely be part of a solution because it can provide multiple benefits (habitat, protection of domestic wells around DACs, etc.) along with allocations.
g. Q: So is the thought is we'll reduce pumping by 1.5 acre feet and then to meet the rest of the gap, we'll come up with additional surface water sources or establish a trading market?
    i. A (MIUGSA): There is no set schedule beyond the five-year target at this time.
    ii. A (MSGSA): Similar to MIUGSA, not sure exactly when bigger discussion about trading/markets/etc. will happen down the road because there are more near-term framework discussions to be had. The intent of the 5 yr targets is to help us make progress while we figure out what sustainability ultimately looks like for this basin.
h. Q: How many wells are metered in the Subbasin? A: The GSAs do not have data on how many are metered currently, except for TIWD GSA-#1. Requiring metering on wells is one management option available to the GSAs.

6. Summary of April Coordination Committee Meeting
    a. Chris Hewes (Woodard & Curran) provided a summary of current basin conditions that were presented at the April Coordination Committee meeting, including spring 2021 measurements of groundwater levels.
    b. Samantha Salvia (Woodard & Curran) provided a summary of the April presentation to the Coordination Committee about the Meadowbrook Intertie Feasibility Study. The goal of the grant funded study was to evaluate the needs and feasibility of connecting the Meadowbrook water system to either the Atwater or Merced city water system. The study found that interties to both Merced and Atwater systems are feasible with costs ranging from $1M to $2.5M depending on location.
    c. Chris Hewes (Woodard & Curran) provided a summary of the methodology and progress to date on the Data Gaps Plan. The Data Gaps Plan is grant funded and with a goal of developing a plan that identifies and ranks priority areas for the installation of monitoring wells or subsidence monitoring stations to support basin characterization and future GSP refinement. Chris shared the results of the SAC's April meeting poll on priorities for data gaps to fill. The Plan is currently drafted and being reviewed by GSA staff. Chris shared preliminary results of the spatial analysis tool showing areas recommended for additional monitoring.
        i. Q: Can private well owners be compelled to have their wells participate in the GSP monitoring network? A: No.
        ii. Comment from Bob Kelley: I have let WC know that we have installed a dedicated internet item in monitoring well on the east portion of the Stevinson Area. It is close to an orange area you cite in your tool methodology. Contact Betty Lindeman for inclusion of this real time information. I'm sure you have her email address.
        iii. Q: Will there be outreach to well owners to encourage participation in the monitoring program? A: Yes, the next step in the implementation of the Data Gaps Plan will be to conduct outreach. There is currently a standing call for monitoring data on the MercedSGMA website.
        iv. Q: Is the alternate to volunteering for groundwater level monitoring to be expensive remote sensing? A: For groundwater levels, it is more likely that new dedicated monitoring wells would need to be installed in right-of-ways or by finding willing landowners. . Note: A Remote-sensing tool is also being developed under grant funding as a potential alternative to *metering*, which is very expensive.

v. Q: Do volunteered wells need construction information to be part of the network? A: SGMA doesn't necessarily require construction information but we do need to know which aquifer it is completed in; there's the possibility of running a camera down the well to determine this.
    1. Follow-up comment from Parry Klassen: ESJWQC asked well owners to volunteer wells for their Groundwater Quality Trend Monitoring program and were amazed at the number of owners who volunteered, but most didn't qualify as they didn't have construction information. The ESJWQC Board might agree to provide information previously collected for volunteers in the data gap areas to approach them to be part of the network.

vi. Written Comment in chat: I thought USGS was doing a lot of monitoring of the zone below Corcoran Clay. *Follow-up response in chat:* USGS has been in Stanislaus and Merced Counties monitoring domestic wells. 60-80 wells is planned I understand

7. Drought Preparedness
    a. Matt Beaman (MIUGSA) provided a description of drought-related resources as California continues to experience an extreme drought.
    b. Lacey McBride (MSGSA): MSGSA's Technical Advisory Committee met in May and discussed drought and domestic wells. The committee's recommendation was to gather better information about domestic well locations before considering a mitigation program (data from the County about post-1996 permitted domestic wells may overcount because it doesn't include records for destroyed wells.) For now the best resource for emergency water is Self Help Enterprises (SHE). They are the administrator of state funds to provide tanked water or help drill new wells.
8. Public Comment
    a. Ursula Stock (via email):
        i. Attached is a very good article on the status of water in California, and I hope it will be referenced when making decisions, and included with my public comment,
        https://thevalleycitizen.com/valley-water-belongs-to-the-people/
        The water of Merced County needs to stay in Merced County. The natural system of the entire valley is an "ecosystem" onto itself. Low snowpack is constantly blamed on global warming, but our handling of valley water is crucial to snowpack. Over 95% of the Valley wetlands have been drained, cutting evapotranspiration. As we divert surface water, reducing recharge and the health of valley biomes, we further impact snowpack. As we lower or dry out the groundwater basin, that has a on the snowpack too. The less moisture in the valley, the less there is to evaporate, form clouds and rain/snow in the mountains- to flow back down our rivers. It is all interconnected.
        For example, lowered groundwater tables become too deep for the tap roots of indiginois trees to reach, causes the death of the tree, stops the huge movement of water it transpires, and reduces soil biomes that are tree dependent. The loss of these biomes result in the loss of water retention around the tree. In the early spring, you can easily see this water retention due to trees, when green encircles the trunks, while surrounding treeless areas remain brown. The Tule Fog is impacted as ground water recedes, which stone fruits and many local plants "mine' for water, further reducing evapotranspiration. Water is a finite resource, and as we remove the water from the valley, and reduce the flow of that water, we impact its availability to snowpack and to the valley.
        Like the human body, which can sustain a sudden loss of up to 14% of its blood in a short incident, and at 15% begins to suffer dire consequences, our watersheds have a tipping point. That tipping point is desertification, and humans have done this all over the world. Will we do it here too, as we fuss about water rights, versus the viability of the entire valley and delta ecosystem upon which we depend?
        Keep the water of Merced County in Merced County, and work to find nature based solutions to " living within the means" provided by this magnificent Valley.
        Ursula Stock, Merced

    b. No other public comment during the meeting.

9. Next steps and adjourn
    a. Q: Could we change time of meetings from 1pm to 1:30PM? A: GSAs and consultants will consider this along with evaluating options for hybrid meeting location.

Next Regular Meeting
TBD mid-October 2021
Information also available online at mercedsgma.org

MEETING MINUTES – Merced GSP Stakeholder Advisory Committee

SUBJECT: Stakeholder Advisory Committee Meeting
DATE/TIME: November 8, 2021 at 1:00 PM
LOCATION: Zoom Virtual Meeting

Stakeholder Committee Members in Attendance:

	Representative	Community Aspect Representation
☐	Arlan Thomas	MIDAC member
☒	Bob Kelley	Stevinson Representative
☐	Breanne Ramos	MCFB
☒	Craig Arnold	Arnold Farms
☒	Darren Olguin	Resident of Merced County
☒	Dave Serrano	Serrano Farms - Le Grand
☒	David Belt	Foster Farms
☒	Emma Reyes	Martin Reyes Farm/Land Leveling
☐	Greg Olzack	Atwater Resident
☐	Jean Okuye	E Merced RCD
☐	Joe Sansoni	Sansoni Farms/MCFB
☒	Joe Scoto	Scoto Brothers/McSwain School Dist.
☐	Jose Moran	Livingston City Council
☐	Lacy Carothers	Cal Am Water
☒	Lisa Baker	Clayton Water District
☒	Lisa Kayser-Grant	Sierra Club
☐	Mark Maxwell	UC Merced
☒	Maxwell Norton	Unincorporated area
☒	Nav Athwal	TriNut Farms
☐	Olivia Gomez	Community of Planada
☒	Amanda Monaco (alternate)	Leadership Counsel
☒	Parry Klassen	ESJWQC
☒	~~Reyn Akinoa~~ Darcy Brown	River Partners
☐	Rick Drayer	Merced/Mariposa Cattlemen
☐	Robert Weimer	Weimer Farms
☒	Simon Vander Woude	Sandy Mush MWC
☒	Susan Walsh	City of Merced
☒	Bill Spriggs (alternate)	Merced resident
☐	Thomas Dinwoodie	Master Gardener/McSwain
☒	Trevor Hutton	Valley Land Alliance
☒	Wes Myers	Merced Grassland Coalition

Meeting Minutes

1. Call to Order and Welcome
    a. Charles Gardiners (Catalyst) welcomed the group.
2. Roll Call
    a. Stakeholder Advisory Representatives for the Merced Subbasin GSP introduced themselves (see attendance record above).
3. GSA Reports
    a. Jim Blanke (Woodard & Curran) provided a brief overview of the 10/25/21 Coordination Committee (CC) meeting:
        i. Discussion items covered at both CC and today's SAC meeting: GSA updates, data gaps plan, new grant funding, and insights from DWR on other GSPs.
        ii. Interbasin coordination is ongoing with the Chowchilla and Delta-Mendota Subbasins, with focused discussions around subsidence and developing a uniform method to understand pumping by the various subbasins (e.g., water budgets) and impacts on subsidence.
        iii. The CC discussed options for coordinating on a Well Consistency Policy. Currently the County's Environmental Health Department intakes and reviews all new well permits but wants to shift determination of whether a well application is consistent with the GSP to the various GSAs. Domestic wells would still be exempt and the County would review & approve those permits. Discussions on this are ongoing.
        iv. The Committee discussed the draft Turlock Subbasin GSP and options for commenting on it – they agreed to continue using informal comment mechanisms like existing participation on a technical advisory committee, and wait to submit formal comments until DWR comments are received on the Merced GSP in order to be more comprehensive.
    b. Lacey McBride provided an update for the Merced Subbasin GSA:
        i. Over the past few months, the GSA Board has worked through a two-phased approach to GSP implementation.
            1. Phase 1 – now through end of WY2025 – focused on meeting the target of reducing groundwater consumption by 15,000 AF annually through land repurposing and fallowing, importing surface water, and capturing flood waters. Other Phase 1 work will include the development of parcel-level water year budgets for growers, Prop 218 process for funding, and initiating discussions with stakeholders and the public regarding allocations (which are not anticipated to be adopted until Phase 2).
            2. Phase 2 – WY2026 through 2040 – includes adopting and implementing an allocation plan with continued land repurposing, fallowing, and securing surface supplies.
            3. The GSA Board is going to consider a resolution to adopt the above phased approach at a meeting on 11/12 at 10AM.
            4. A public workshop is planned for 11/18 at 6PM in Merced College Business Resource Center (630 W 19th St in Merced) for landowners, growers, and the public in the GSA to kick off Phase 1 of the implementation approach.
    c. Matt Beaman provided an update for the Merced Irrigation-Urban GSA:
        i. The GSA has been holding several stakeholder guidance committee meetings that include representatives from agricultural, municipal, environmental, and DAC sectors – discussions have been focused on agricultural reductions. Have found that growers supplementing groundwater use with surface water are using about 1 AF/ac – but there are significant users relying only on groundwater.
        ii. Input from stakeholders about how the allocation method should work indicated interest in "high certainty" of what the allocation was going to be ahead of time with moderate flexibility in how to operate the allocation program; this would mean a relatively low initial

allocation (to prevent State intervention) but some flexibility in pooling water, longer allocation period, and potential for trading.

iii. Next steps: MIUGSA is drafting policies and intends to come back to their stakeholder committee next spring 2022 to review draft policies for implementing the GSP within its boundaries. At this point, no allocation volume has been set but MIUGSA's stakeholder committee is expressing a desire for high certainty (e.g., low allocation) while still providing some flexibility.

iv. Question (in chat): How can we find out about MIUGSA meetings to participate in discussions about projects and management actions? We would like to attend and participate in those stakeholder committee meetings. Answer: Meetings have been posted on www.mercedgroundwater.org and https://www.miugsa.org/ – projects page has the past presentations and minutes.

d. Kel Mitchel provided an update for the Turner Island Water District GSA #1:
   i. Previously had shared a soft target of 1.5 AF/ac – despite the difficulties with meeting irrigation demands in the last dry year, they were able to meet and exceed that (averaged around 1 AF/ac of use).
   ii. Kel provided some background about the May 2021 Renewable Resources Group acquisition of about 7,000 acres in TIWD; two out of five GSA board members stepped down and were replaced with Kel Mitchell and Tim Allen. Kel shared that Renewable Resources Group does not intend to operate the public agency (TIWD) as if it was an extension of the private firm.
   iii. To help operate TIWD, the board has retained an outside accounting service and hired a manager for the district, among other efforts, to maintain the public agency as a distinct entity, without co-mingled operations from a private firm.

e. SAC questions and discussion
   i. None.

4. DWR GSP Review
   a. Samantha Salvia (Woodard & Curran) provided an update on DWR review of other GSPs.
      i. DWR has reviewed and approved 2 GSPs (Santa Cruz and Salinas) and has communicated that they plan to complete reviews for others submitted in 2020 by January 2022. She shared some potential comments that Merced might expect based on what was observed in the two existing letters.
         1. Amanda Peisch-Derby (DWR) shared that DWR has hired a lot of new staff and Craig Altare (lead of GSP review) is following a plan to meet the deadline for providing comments. Amanda encouraged interested parties to sign up for the SGM newsletter to keep up to date with DWR news:
            a. https://listservice.cnra.ca.gov/scripts/wa.exe?SUBED1=DWR_SGMP&A=1
   b. Samantha also shared news about upcoming DWR grant funding, $152 million of which is designated for critically overdrafted basins like Merced.
      i. Jim Blanke added that DWR is expected to perform a relatively coarse scale airborne electromagnetic (AEM) survey of the Merced Subbasin in spring of 2022, as part of a statewide effort. There is opportunity to coordinate a local geophysical survey effort under the grant with the statewide AEM survey.
      ii. Question: What is AEM? Answer: It stands for Airborne Electromagnetic (AEM) and provides additional information about soils and groundwater. More information is available at: https://water.ca.gov/programs/SGMA/AEM.

5. Data Gaps Plan
   a. Review of results and status, Chris Hewes (Woodard & Curran) provided a brief overview of the first phase of the Data Gaps Plan effort and reviewed the results and latest status.
      i. The Data Gaps Plan was published in July 2021 (http://mercedsgma.org/resources#data-gaps-plan).

   ii. Appendix B has detailed maps showing recommended monitoring sites for each principal aquifer, along with known existing wells within the Subbasin that aren't already part of the monitoring network: https://www.mercedsgma.org/assets/pdf/reports/Data-Gaps-Plan_Appendix-B_Results-of-groundwater-Monitoring-Network-Analysis-Tools.pdf. Additions to the monitoring network should be focused in or near those recommended areas.
   iii. Phase 2 of the data gaps plan includes using approximately $270,000 of remaining grant funding to upgrade and incorporate existing wells into network as well as install new wells in critical locations.

b. Lacey McBride (Merced Subbasin GSA) pointed out that many of the identified data gaps and recommended new monitoring locations are within the Merced Subbasin GSA.
   i. She made a request to the SAC to help identify additional wells in these areas.
   ii. SAC committee members are encouraged to reach out to Lacey (Lacey.McBride@countyofmerced.com). If there's a potential monitoring site in the MIUGSA area, stakeholders can reach out to Matt Beaman (mbeaman@mercedid.org).
   iii. Maps showing the locations of recommended new monitoring sites can be found here: https://www.mercedsgma.org/assets/pdf/reports/Data-Gaps-Plan_Appendix-B_Results-of-groundwater-Monitoring-Network-Analysis-Tools.pdf

c. SAC discussion
   i. Question: What are the advantages to participating in the monitoring program? Answer: None of the wells in the monitoring program are being used in any way to penalize or target landowners for specific areas. The Subbasin has very diverse groundwater conditions - by building up the monitoring network, this builds a better understanding of the Subbasin and informs management actions that reflect the existing conditions rather than a guess. Data collected at the well can be shared with the well owner.
   ii. Jim Blanke added that this is intended to be a cost-efficient effort to avoid costly spending by the GSAs. He further noted that efficiencies of using existing wells can only happen with volunteers.
   iii. Question (in chat): What is the pipeline when integrating data from these new wells for the whole GSA (e.g., following current pipeline, new ones, etc.) or are these new wells just to help refine management locally/near to the new wells? Answer: Groundwater level data feeds into many different aspects of GSP management both local and regional, including Annual Reports where hydrographs and groundwater elevation maps are generated every year, Subbasin modeling, water budgets, calculation of Subbasin change in storage, etc.
   iv. Question: What are the criteria for using an existing well as monitoring well? Answer: MSGSA has generally been looking to identify wells that are not continuous production wells (or don't run for multiple months of the year). For the first pass, it would be ideal to know which aquifer the well is completed in (e.g., what depth and what screened interval depths) but there is funding to potentially video that well and determine that information if a well construction log is not available.
      1. Maxwell Norton added that irrigation wells are on a use program with PG&E or MID which means they're not being used during peak power periods each day.
      2. Jim Blanke added that there needs to be an access port for measuring groundwater levels and also would be ideal to avoid excessive oil – both of these items can be checked if well owner is not sure.
      3. Well owners were further encouraged to reach out to the GSAs if interested.

6. Drought Update
   a. Samantha Salvia (Woodard & Curran) provided an update on regional and statewide drought conditions. Precipitation is not the only component of drought – the state has seen some of the hottest temperatures this last water year, which further exacerbated conditions. Even a year of above average precipitation may not be enough to resolve the situation.

i. The latest state reservoir conditions were shared and can be found here: https://cdec.water.ca.gov/resapp/RescondMain
ii. Link to DWR's September drought presentation: https://cwc.ca.gov/-/media/CWC-Website/Files/Documents/2021/09_September/September2021_Item_9_Attach_1_DroughtPowerPoint_Final.pdf

b. Lacey McBride (MSGSA) shared more information about local actions being taken, including 9 tanked water supplies installed by Self-Help Enterprises (Jul-Oct 2021) and 33 "out of water" domestic well permits issued in the Merced Subbasin (Apr-Oct 2021). She also shared a list of emergency water resources in Merced County.
   i. Question (in chat): How do these numbers compare with earlier years? Answer: Merced County 2015 drought saw more like 100 tanked water locations county-wide, which covered a larger area and longer time period.
c. SAC discussion
   i. Joe Scoto: Without surface water, next year is going to be a challenge. Already trying to factor in what crops can be planted where there are known good wells.
   ii. Wes Myers: Less impact on grazing lands, but still a tough year.
   iii. Simon Vander Woude: Surface water helped this year; different ranches, especially in Le Grand it was tougher. In Merced area, Above Corcoran Clay wells are doing better – but without use of surface water in the winter, it will be a different story next year.
   iv. Bob Kelly: Echoes what the panelists have said.
   v. Amanda Monaco: Most folks she works with are on community water systems – more specifics may be available from the Merced representative of Leadership Counsel.
   vi. Dave Serrano: Heard that someone drilled a 21" well (full perforation) and going into bypassed strata and picking up shallower water in the El Nido area. This is making it more difficult for surrounding wells to access groundwater.

7. Public Comment
   a. Susan Walsh shared a thank you to Lacey McBride and City of Merced Leah Brown who gave an excellent presentation to the League of Women Voters and Sierra Club about SGMA and the GSP. Often, Susan hears that people don't understand the issues, but Lacey and Leah did a great job of describing groundwater issues and next steps.
8. Next steps and adjourn
   a. Lacey McBride (MSGSA) shared that the 11/16 County Board of Supervisors will be hearing a public presentation on the proposed changes to the groundwater ordinance which may be of interest to stakeholders.
   b. Samantha Salvia (Woodard & Curran) requested that the stakeholders provide feedback as desired on content for future meetings (this can be done by emailing Chris Hewes at cjhewes@woodardcurran.com or Charles Gardiner at Charles@catalystgroupca.com).
   c. Meeting was adjourned at 2:32 PM.

Next Regular Meeting
TBD January 2022
Information also available online at mercedsgma.org

MERCED SGMA

MEETING MINUTES – Merced GSP Stakeholder Advisory Committee

SUBJECT: Stakeholder Advisory Committee Meeting
DATE/TIME: January 31, 2022, 1:00 to 3:00 PM
LOCATION: Zoom Virtual Meeting

Stakeholder Committee Members in Attendance:

	Representative	Community Aspect Representation
☐	Arlan Thomas	MIDAC member
☒	Ben Migliazzo (alternate)	MIDAC member
☒	Bob Kelley	Stevinson Representative
☐	Blake Nervino	Stevinson/Merquin
☒	Breanne Ramos	MCFB
☐	Craig Arnold	Arnold Farms
☒	Darren Olguin	Resident of Merced County
☒	Dave Serrano	Serrano Farms - Le Grand
☐	David Belt	Foster Farms
☐	Emma Reyes	Martin Reyes Farm/Land Leveling
☐	Greg Olzack	Atwater Resident
☒	Jean Okuye	E Merced RCD
☐	Joe Sansoni	Sansoni Farms/MCFB
☒	Joe Scoto	Scoto Brothers/McSwain School Dist.
☐	Jose Moran	Livingston City Council
☒	Lacy Carothers	Cal Am Water
☒	Lisa Baker	Clayton Water District
☒	Lisa Kayser-Grant	Sierra Club
☒	Mark Maxwell	UC Merced
☒	Maxwell Norton	Unincorporated area
☒	Nav Athwal	TriNut Farms
☒	Olivia Gomez	Community of Planada
☒	Nataly Escobedo Garcia (alternate)	Leadership Counsel
☒	Parry Klassen	ESJWQC
☒	Darcy Brown	River Partners
☐	Rick Drayer	Merced/Mariposa Cattlemen
☐	Robert Weimer	Weimer Farms
☒	Simon Vander Woude	Sandy Mush MWC
☒	Susan Walsh	City of Merced
☐	Bill Spriggs (alternate)	Merced resident
☐	Thomas Dinwoodie	Master Gardener/McSwain
☒	Trevor Hutton	Valley Land Alliance
☒	Wes Myers	Merced Grassland Coalition
☐	Lou Myers (alternate)	Benjamin Land LP

Meeting Minutes

1. Call to Order and Welcome
    a. Charles Gardiner (Catalyst) welcomed the group.
2. Introductions and Roll Call
    a. Charles Gardiner (Catalyst) reviewed the agenda and meeting guidelines, conducted roll call, and reminded attendees that past meeting materials are available online at mercedsgma.org.
3. SGMA Implementation Grant Application
    a. Jim Blanke (Woodard & Curran) provided an overview of the existing projects and new projects considered, the project selection approach, application status, and next steps.
        i. $171 million is available in Round 1 grant funding and is not competitive between basins; therefore, funding will be split evenly between critically overdrafted basins, including Merced, at $7.6 million per basin. The $7.6 million may be reduced depending on the types of projects submitted in the San Joaquin Valley, due to complexities of DWR's funding sources.
            1. Round 2 is expected in 2023 and will be open to all medium and high priority basins not receiving money in Round 1.
        ii. Merced is considering 18 existing and new projects, including 11 storage and recharge projects and 7 interties and monitoring/management projects.
            1. Amsterdam Water District Surface Water Conveyance and Recharge Project
            2. Buchanan Hollow Mutual Water Company Floodwater Recharge Project
            3. Crocker Dam Modification (GSP Project 31)
            4. Deadman Creek Canal Off Stream Storage and Recharge
            5. G Ranch Groundwater Recharge, Habitat Enhancement & Floodplain Expansion Project - Planning
            6. G Ranch Groundwater Recharge, Habitat Enhancement & Floodplain Expansion Project - Implementation
            7. Purdy Project (East Pike Recharge Basin) (Project No. 37)
            8. Purdy Project (E. Purdy, W. Purdy, and Kevin Recharge Basins) (Project No. 38)
            9. Tri City's Water Recharge/Underground Storage Feasibility
            10. Vander Dussen Subsidence Priority Area Flood-MAR Project
            11. Vander Woude Storage Reservoir
            12. Filling Data Gaps Identified in Data Gaps Plan
            13. LeGrand-Athlone Water District Intertie Canal - Phase 2
            14. Merced Water Resources Model Enhancement
            15. Merquin County Water District Sustainable Yield Management Plan and Plan Implementation
            16. MIUGSA Groundwater Extraction Measurement Program
            17. Turner Island Water District (TIWD) Water Conservation
            18. TIWD Shallow Well Drilling
        iii. The funds requested by the 18 projects total approximately $27.4 million. In order to select the projects that will be submitted within the application to DWR, each project will be scored using 10 evaluation criteria defined by the state.
            1. Projects are currently being scored by the Coordination Committee, which will be compiled into a ranking.
            2. Modifications to the final rankings may be recommended by the SAC.

a. Modifications should “document and justify why a lower scoring project was included within the Spending Plan versus a higher scoring project.” (from the grant’s Proposal Solicitation Package)
b. Several factors may drive modifications, including:
i. Feasibility (water rights, realistic recharge potential, project proponent ability to provide materials and meet grant requirements)
ii. Location (subsidence, areas with declining groundwater, areas surrounded by domestic wells, priority areas according to the sustainability indicators, GSAs / geographic distribution)
iii. Others as deemed important by the subbasin
3. GSA staff will review the scores and make recommendations, if any, to address specific, justifiable needs.
4. Lastly, the Coordination Committee will receive the aggregated scores and recommended modifications, and identify projects for submittal as part of the grant application due on February 28. Projects not selected will be retained for future funding opportunities.

b. SAC discussion
i. Parry Klassen: If everything goes according to plan, when can we expect these projects to be implemented?
1. Simon Vander Woude: Our project is designed and ready for construction within the next year.
2. Bob Kelley: Our project is in environmental permitting phase.
3. Matt Beaman: Our project is undergoing review and design; construction likely in next three years.
4. Jim Blanke: Generally, implementation projects will be required to be completed in the next three years to utilize grant funding.
ii. Charles Gardiner: SAC, are these appropriate projects? Are there other projects that should be added for future consideration?
1. Susan Walsh: Is the scoring rubric based on state or local priorities? How can we balance state and county priorities in funding?
a. Jim Blanke: Scoring criteria are set by the state. As long as projects are eligible for funding, the basin is given freedom to select projects that are deemed most beneficial.
b. Matt Beaman: State gave initial preference to select project types (including geotechnical, floodplain enhancement, etc.), but the list of eligible project types is extensive and includes the projects presented today.
iii. Susan Walsh: Are ‘Underrepresented Communities’, ‘Small Water Systems’, and ‘Human Right to Water’ terms defined by the state?
1. Jim Blanke: Yes, there are definitions for each of these terms provided by the state in the grant Proposal Solicitation Package and Guidelines. For example, Underrepresented Communities are mapped by the state using census tract and community boundaries.
iv. Jim Blanke: SAC, what criteria are reasonable for changing rankings or modifying funding amounts?
1. Dave Serrano: Will projects in the northern and northeastern portions of the basin be ranked high due to groundwater aquifers flowing to the rest of the basin?

a. Jim Blanke: Groundwater flow could be considered as part of potential modifications to scores if desired.

2. Jean Okuye: Can we prioritize projects where recharge could get into the aquifer the fastest and those that benefit underrepresented communities and small water systems? Could we explore other projects to more quickly inject water into aquifers?
    a. Jim Blanke: While there are not any active injection projects under consideration for this grant proposal, there are some similar projects being explored by TIWD and MID. The application gives higher scores to projects that benefit underrepresented communities and small water systems.
3. Darcy Brown: River Partners has worked with Rosemary Knight at Stanford in other basins and data provided by her lab team has been very insightful. Similar geophysical investigations in Merced could be a great addition to this slate of projects.
4. Parry Klassen: Noted that surface water injections may exceed strict drinking water quality standards and, after a few years, well casings can become blocked with biological and mineral accumulation.
5. Maxwell Norton: Be sure to consider, from an engineering perspective, that projects are feasible, not just desirable.
6. Reyn Akiona: Of the $7.6 million, are some projects required to address a few specific criteria (geophysical investigations, groundwater recharge, and floodplain expansion)?
    a. Jim Blanke: When the draft PSP was released, that was a requirement, but the requirements have since been made more broad and such requirements are no longer basin-specific.
7. Maxwell Norton: How realistic is it for the state to grant water rights to the projects?
    a. Matt Beaman: MID and other parties applied for a floodwater right at the end of 2019, but the SWRCB has not yet accepted the application. MID expects to hear somewhat soon, but timeline will depend on drought curtailment activities.
8. Lisa Kayser-Grant: When looking at the TIWD diversion proposal, will there be any impact or assessment of impact to westside seasonal wetlands? If rights are given to stormwater, how will that impact wetlands in the future? Want to ensure that health of wetlands is being considered.
    a. Kel Mitchel: TIWD has no intention of applying for stream diversion applications. As it stands, the project simply manages the TIWD’s existing resources.
9. Trevor Hutton: Does any of the scoring take into account the possibility of continued drought? Which projects will be most effective in that case? I keep hearing mention of "wet years", but wet years may well be rarer in the near future.
    a. Jim Blanke: Scoring criteria provided by state doesn’t consider duration of drought, but we can add that to list of potential modifications to rankings, if desired.

4. DWR GSP Comments
    a. Jim Blanke (Woodard & Curran) provided an update on DWR comments on the GSP and requested that SAC Representatives review the final determination letter ahead of the next meeting when potential solutions will be presented.
        i. The GSP was developed in a collaborative stakeholder environment, completed in November 2019, adopted in January 2020, and is currently being implemented.
        ii. Initial comments from DWR were provided in a consultation letter dates November 2021 and a final determination was released on January 28, 2022. The final determination identifies three potential deficiencies and potential corrective actions.
        iii. The three deficiencies were summarized.
        iv. The GSAs held a meeting with DWR staff on January 10, 2022 to discuss the potential deficiencies and pathways to approval. A technical team is currently evaluating new data and approaches to respond to the comments, focused on groundwater level thresholds and subsidence, and drafting approaches to be developed and shared with CC and SAC.
            1. Likely endpoint will be an updated version, with redline, for all or certain portions of the GSP that will be adopted by GSAs by late July 2022.
    b. SAC discussion
        i. Bob Kelley: Has the GSAs looked at the other studies cited by DWR regarding minimum thresholds?
            1. Jim Blanke: The GSAs are in the process of reviewing these studies and will incorporate relevant findings as necessary when revisiting the sustainable management criteria.
        ii. Susan Walsh: Finds the language posed by the state challenging; wants to thank those who thoughtfully worked on the GSP, including the SAC. It can be difficult to interpret the criticism provided by the state.
        iii. Bob Kelley: Seems that the most difficult deficiency to address will be subsidence, especially as it continues. In absence of other information, the state suggests zero subsidence, which will be a challenge to achieve without immediately addressing sub-Corcoran pumping.
5. Drought Update
    a. Jim Blanke (Woodard & Curran) provided an update on the drought.
        i. The Merced subbasin is still in a severe drought, but precipitation is slightly above the 1991-2020 average for the water year. Forecast is for continued dry conditions, however.
        ii. Self-Help Enterprises and the California Partnership for the San Joaquin Valley developed a map (https://arcg.is/WqOGD) of tanked water locations in the San Joaquin Valley.
    b. SAC discussion
        i. Maxwell Norton: There appears to be less tanked water locations than last year, maybe suggests that some wells have been drilled deeper?
            1. Lacey McBride: Between November and this meeting, no new tanked water participants were added in Merced County. Self-Help is now receiving applications to fund drilling of deeper wells.
6. GSA Reports
    a. Jim Blanke (Woodard & Curran) provided a brief overview of the 12/21/21 Coordination Committee (CC) meeting:

        i. Focused on identifying projects to consider for inclusion in the SGM grant application and on the scoring process.

b. Lacey McBride provided an update for the Merced Subbasin GSA:
    i. The GSA has been working on Phase 1 of their two-phase GSP implementation, which seeks to achieve reductions in groundwater consumption.
        1. Phase 1 focuses on land repurposing and fallowing. The GSA is working through elements of the program to eventually achieve 15,000 AF annually in groundwater reduction.
        2. A public workshop was held in November 2021 to kick off Phase 1 of the implementation approach.
        3. Proposition 218 will be used to fund Phase 1. The target date for a public hearing and election is summer 2022 and a subcommittee is currently making recommendations for the fee structure.
            a. Next meeting is February 10, both virtual and in-person
    ii. The GSA is also developing a well consistency determination policy to address potential changes from the County of Merced Department of Environmental Health, which would require GSAs to ensure that wells are consistent with the goals of the GSP.

c. Matt Beaman provided an update for the Merced Irrigation-Urban GSA:
    i. The GSA has been holding several stakeholder guidance committee meetings to discuss agricultural reductions. At this point, no allocation volume has been set, but stakeholders are expressing a desire for high certainty (e.g., low allocation) while still providing some flexibility. The GSA is currently considering the stakeholder committee's feedback and preparing a recommendations document that will be presented at a meeting in March.

d. Kel Mitchel provided an update for the Turner Island Water District GSA #1:
    i. The GSA is currently preparing for the for 2022 irrigation season. Most recent work pertains to the water conservation project (discussed today), which is emblematic of what TIWD wants to achieve moving forward. Both the GSA Board and staff are working closely with other GSAs on collective plans to achieve these goals.

e. SAC discussion
    i. None.

7. Public Comment
    a. None.

8. Next steps and adjourn
    a. Meeting was adjourned at 2:56 PM.

Next Regular Meeting
TBD March 2022
Meeting to be conducted virtually (subject to change)
Information also available online at mercedsgma.org

MEETING MINUTES – Merced GSP Stakeholder Advisory Committee

SUBJECT: Stakeholder Advisory Committee Meeting

DATE/TIME: March 21, 2022, 1:00 to 3:00 PM

LOCATION: Hybrid meeting with physical location at Merced Irrigation District, Franklin Yard Facility, 3321 North Franklin Road, Merced, CA 95348 and online via Zoom

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Stakeholder Committee Members in Attendance:

	Representative	Community Aspect Representation
☒	Arlan Thomas	MIDAC member
☒	Ben Migliazzo (alternate)	MIDAC member
☐	Bob Kelley	Stevinson Representative
☐	Blake Nervino	Stevinson/Merquin
☒	Breanne Ramos	MCFB
☐	Craig Arnold	Arnold Farms
☐	Darren Olguin	Resident of Merced County
☒	Dave Serrano	Serrano Farms - Le Grand
☐	David Belt	Foster Farms
☐	Emma Reyes	Martin Reyes Farm/Land Leveling
☐	Greg Olzack	Atwater Resident
☒	Jean Okuye	E Merced RCD
☐	Joe Sansoni	Sansoni Farms/MCFB
☒	Joe Scoto	Scoto Brothers/McSwain School Dist.
☐	Jose Moran	Livingston City Council
☒	Lacy Carothers	Cal Am Water
☐	Lisa Baker	Clayton Water District
☒	Lisa Kayser-Grant	Sierra Club
☐	Mark Maxwell	UC Merced
☒	Maxwell Norton	Unincorporated area
☒	Nav Athwal	TriNut Farms
☐	Olivia Gomez	Community of Planada
☐	Nataly Escobedo Garcia (alternate)	Leadership Counsel
☐	Parry Klassen	ESJWQC
☐	Darcy Brown	River Partners
☐	Rick Drayer	Merced/Mariposa Cattlemen
☐	Robert Weimer	Weimer Farms
☒	Simon Vander Woude	Sandy Mush MWC
☒	Susan Walsh	City of Merced
☐	Bill Spriggs (alternate)	Merced resident
☒	Thomas Dinwoodie	Master Gardener/McSwain
☒	Trevor Hutton	Valley Land Alliance
☒	Wes Myers	Merced Grassland Coalition
☐	Lou Myers (alternate)	Benjamin Land LP

Meeting Minutes

1. Call to Order and Welcome
    a. Charles Gardiner (Catalyst) welcomed the group.
2. Introductions and Roll Call
    a. Charles Gardiner (Catalyst) reviewed the agenda and meeting guidelines, conducted roll call, and reminded attendees that past meeting materials are available online at mercedsgma.org. Attendees were also reminded that we're planning to meet again in April, May, and June.
3. Grants Updates
    a. SGM Implementation Planning and Projects Grant Update
        i. Jim Blanke (Woodard & Curran [W&C]) described the completed grant application and shared that DWR has recently approved the $7.6 million of requested project funding.
        ii. Q: How soon will grant agreements be in place? A: Likely a few months.
    b. Prop 68 Round 3 Planning
        i. Lacey McBride (MSGSA) shared that staff-level conversations have been occurring on the second phase of the Data Gaps Plan to fund 2 shallow or 1 deep well, plus some other activities to incorporate existing wells. Surrounding subbasins are also using Technical Support Services funding available from DWR and the Merced GSAs plan to make use of this funding as well. There's a running list of wells to be considered and conversations are continuing.
        ii. Jim Blanke (W&C) shared that the Remote Sensing Decision Support Tool is ongoing, largely based on what kind of data is available. Time has been spent looking for accurate and cost-effective data. OpenET has been the latest focus, but the data is not quite available yet, though a preliminary copy has been obtained for initial review.
            1. The Committee discussed CIMIS stations vs meters vs remote sensing.
            2. Madeline Harris (Leadership Counsel) provided comments and asked a question:
                a. Leadership Counsel has doubts about accuracy of remotely sensed evapotranspiration (ET) data. Strongly recommends basinwide metering. ET is OK to use as validation, but not primary source of measurement.
                b. Q: What is the timeline for the GSAs to start measuring GW use? A: Waiting for OpenET dataset finalization in next few months. Tool will be wrapped up by October 2022.
    c. 2020 SGM Implementation Grant
        i. Matt Beaman (Merced Irrigation District [MID]) shared the latest information on the two funded projects, both of which are in progress and on track (Le Grand-Athlone Water District [LGAWD] Intertie and Recharge Project & El Nido Conveyance System Improvements).
        ii. Comment (Dave Serrano) : Complications with LGAWD project. At a meeting held last Thursday, the Proposition 218 election was discussed which is coming up at end of March 2022. There is a land classification issue that has been noted where some parcels aren't registered in the right land use category.
    d. SDAC Grant

i. Matt Beaman (MID) provided an update on a 2019 grant agreement covering three projects serving underrepresented communities.

1. Q: What is the result/action coming out of the Meadowbrook Study? A: The study does not prescribe any particular recommendation option.
2. Q: Based on the Meadowbrook Study, what about wastewater treatment for agriculture or recharge? A: Hasn't been talked about yet. Lacey Carothers (Cal Am) shared that she's interested in talking about it more offline.
3. Q (Susan Walsh): Is the plan for Planada now to put in dry wells instead of a recharge basin? A: Yes. Matt Beaman provided some more technical information about the results of the recharge tests done at the site and the follow-up decision-making.
4. Q (Susan Walsh): For LGAWD, would City of Atwater or City of Merced need to vote? Are there potential political complications? A: MID is not one of those agencies, but shared that the intent of the study was to assess feasibility of intertie connection(s) for emergency and drought purposes. The grant funding only covered the feasibility study.

4. Water Year 2021 Annual Report

a. Chris Hewes (W&C) provided key highlights from the recently drafted WY 2021 Annual Report that will be submitted to DWR by April 1.

i. Comment (Arlan Thomas): The sub-Corcoran subsidence area has always been a problem.

1. Response: Yes, it may always have been a problem, but the question here is if it is better or worse than last year.

ii. Q: What are the estimated data points on the groundwater level change maps? A: These represent where Fall 2020, Fall 2021, or both were not recorded (or had a quality control issue noted), and an estimate was made based on historical and surrounding trends. It is anticipated that future mapping will require fewer estimates with better data collection.

iii. Q: Does DWR read and provide comments on the annual report? A: The reports are available for public comment on the SGMA data portal, but typically haven't received comments from public or DWR.

iv. Q: Will the Annual Report be on the website? Can it be emailed to the Committee? A: Yes, it will be published to Merced SGMA website and SGMA portal website. W&C will email a copy to the Committee once published.

5. Sustainable Management Criteria refresher

a. Jim Blanke (W&C) walked the Committee through a description of the SGMA terminology for sustainable management criteria, including minimum thresholds, undesirable results, measurable objectives, etc.

6. Comments on Groundwater Sustainability Plan by the Department of Water Resources

a. DWR comments overview

i. Jim Blanke (W&C) reviewed the three comments from DWR on the GSP which was determined "incomplete".

b. Groundwater levels

i. Jim Blanke (W&C) walked through some options that are being evaluated for different minimum thresholds, including (1) 2015 levels, (2) historical low, or (3) deeper of historical low or shallowest domestic well + 10 ft. He also described the pros and cons (challenges) of each potential option. It's challenging to know what DWR will accept. It's likely that all options are workable. There is more risk of disapproval by DWR with options 2 and 3, but they are harder to achieve.
ii. Comment (Arlan Thomas): 2015 groundwater levels are not achievable, even with several flood years.
iii. Public comment: "ET is incomplete, because it only measures evapo-transpiration, but would not measure water being sold out of area. ET also does not account for the water moving in the opposite direction, from soil to ground water because of plants. Cover-cropping, riparian buffers (native plants and trees bordering waterways), and trees all promote increased soil moisture, decrease rain water runoff and help carry water to the ground aquifers. Habitat restoration, and keeping cover crops on ag land (no bare soil) are necessary to restore water retention in both our soils and groundwater. This does not solve the abuse of the past decades but these practices do begin to address the issues we face with predicted, more severe and further spaced severe weather events such as droughts and precipitation."
iv. Q: When will you have extraction rates associated with each option? A: Next SAC meeting in April.
v. Q: Do we know what's happening in other areas of the Valley for these kinds of GSP comments? Are the methodologies similar or different for other basins? Can you give a quick rundown of how GSPs have been kicked back? A: North & South Yuba Subbasins and a few coastal aquifers have been approved but rest are not. The DWR comments have varied for other Central Valley GSPs. There is some level of coordination occurring between basins, but limited due to short timeframe to respond. Some interbasin coordination is occurring with subsidence.
vi. Q (Madeline Harris from Leadership Counsel): With the different options, such as #3 – is shallowest domestic well based on data available in 2015? Want the most protective option for drinking water. A: Updated domestic well data comes from the County and runs through December 2021.
vii. Q: When you get a permit to drill a well in Merced County, is other information recorded other than the construction depth? A: Information on the pump setting or water level after the well was constructed are not available in the permit record.
viii. Jim Blanke (W&C) provided an update on the domestic well analysis and other technical components related to the minimum threshold analysis. He also shared some options for managing Undesirable Results for groundwater levels and asked the SAC for their input on whether these are the right management considerations. Various questions and comments included:
    1. Q: Are there are areas where pumping levels aren't declining at the same rate? A: Likely yes, such as near rivers.
    2. A SAC member who is also a ranch owner shared that their ranch's Above Corcoran wells don't have much year-to-year variation in levels while Below Corcoran wells do have noticeable declines.
    3. This all seems to boil down to the need to reduce pumping and use more surface water.
    4. Group agreed that pumping reductions have to start ASAP with a sloping ramp down.

5. We may not ultimately know how much total pumping reduction is required until incremental reductions have been occurring for some time, like 10 years, and observations through time inform what the ultimate total should be.
6. If we make recharge projects viable, that mitigates a lot of the groundwater pumping reductions.
7. Waiting until 2040 is not an option.
8. 2024-2027 is too short of a time period for reduction implementations. Needs to be minimum 5 years of a ramping as long as it can be done without undesirable results.
    a. Others thought 5-year check-ins would be ideal over a 10 year ramp-down period.
    b. Ideal to get some results by 2035 for last GSP update before 2040.
    c. The Stakeholder Advisory Committee recommended faster cuts to hit goal by 2035 to be able to evaluate results before the Basin arrives at 2040.
9. Bay Area legislator is suggesting speeding up of SGMA implementation.
10. Recharge projects should be sooner than later and more the better.
11. Implementation of reductions in response to drought years – open to opportunities, but unsure how to evaluate against that given the number of variables.
12. Q: Have you looked at Madera for their ramp-down? A: A little, but not in great detail.

c. Subsidence
    i. Jim Blanke (W&C) shared information about the subsidence comment from DWR and some context for subsidence in the basin.
    ii. The group discussed about delayed subsidence occurring even after pumping reductions.
    iii. Comment: There is a hazard of setting the subsidence goal at 0 ft/yr: risk to have the SWRCB come in and take over control of the subbasin.
    iv. Q: Can the geographic discussion be brought into subsidence as well as for groundwater levels? And are there considerations for interbasin issues? A: Probably can't have a differing geographic area for minimum thresholds for subsidence, but SGMA does indicate that neighboring subbasins can't interfere with our ability to meet our sustainability goals.

d. Schedule
    i. Jim Blanke (W&C) described the schedule for incorporating edits into the GSP by end of July to address DWR's comments.
    ii. In April, W&C will be presenting some updated potential pumping reduction numbers to meet the different minimum threshold levels.
    iii. A request was made to focus on the topic of pumping reductions and not additional topics at the April SAC meeting.

7. GSA Reports
    a. Lacey McBride provided an update for the Merced Subbasin GSA:
        i. A land repurposing program is being developed (short-term 3-5 years) to achieve phase 1 goal that will be funded through a Proposition 218 effort. Public workshops will be coming up in the next several weeks.
        ii. MSGSA is looking to apply for Department of Conservation long-term 10+ year land repurposing funding.

   iii. Lacey also provided an update on the well consistency policy that is being developed by the GSA.

   b. Matt Beaman provided an update for the Merced Irrigation-Urban GSA: the MIUGSA stakeholder guidance committee met four times and has made recommendations for implementation of an allocation program, with a 1.1 AFY/ac that is averaged over a 3-year period, so that MIUGSA would allocated 3.3 AF/AC to be used over a 3 year allocation period.
   c. Kel Mitchel did not have an update for the Turner Island Water District GSA #1.
   d. SAC discussion
      i. Q (Joe Scoto): Has there been any interest in voluntary land repurposing? A (Lacey McBride): While the Nov 2021 survey response was low, what was heard was that there was more interest in short-term programs for a portion of any individual parcel, which will also depend on the incentive provided by the GSA.

8. Public Comment
   a. None.
9. Next steps and adjourn
   a. Lacey McBride requested that the Stakeholder Advisory Committee meeting should be scheduled to occur before the Coordination Committee.
   b. Meeting was adjourned at 3:17pm.

Next Regular Meeting
TBD in late April 2022
Meeting to be conducted hybrid (physical + virtual; subject to change)
Information also available online at mercedsgma.org

MEETING MINUTES – Merced GSP Stakeholder Advisory Committee

SUBJECT: Stakeholder Advisory Committee Meeting

DATE/TIME: April 25, 2022, 1:00 to 3:00 PM

LOCATION: Hybrid meeting with physical location at Merced Irrigation District, Franklin Yard Facility, 3321 North Franklin Road, Merced, CA 95348 and online via Zoom

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Stakeholder Committee Members in Attendance:

	Representative	Community Aspect Representation
☒	Arlan Thomas	MIDAC member
☒	Ben Migliazzo (alternate)	MIDAC member
☐	Bob Kelley	Stevinson Representative
☐	Blake Nervino	Stevinson/Merquin
☐	Breanne Ramos	MCFB
☒	Craig Arnold	Arnold Farms
☐	Darren Olguin	Resident of Merced County
☒	Dave Serrano	Serrano Farms - Le Grand
☐	David Belt	Foster Farms
☐	Emma Reyes	Martin Reyes Farm/Land Leveling
☐	Greg Olzack	Atwater Resident
☒	Jean Okuye	E Merced RCD
☐	Joe Sansoni	Sansoni Farms/MCFB
☒	Joe Scoto	Scoto Brothers/McSwain School Dist.
☐	Jose Moran	Livingston City Council
☐	Lacy Carothers	Cal Am Water
☒	Lisa Baker	Clayton Water District
☒	Lisa Kayser-Grant	Sierra Club
☐	Mark Maxwell	UC Merced
☒	Maxwell Norton	Unincorporated area
☒	Nav Athwal	TriNut Farms
☒	Olivia Gomez	Community of Planada
☐	Nataly Escobedo Garcia (alternate)	Leadership Counsel
☒	Parry Klassen	ESJWQC
☐	Darcy Brown	River Partners
☐	Rick Drayer	Merced/Mariposa Cattlemen
☐	Robert Weimer	Weimer Farms
☒	Simon Vander Woude	Sandy Mush MWC
☒	Susan Walsh	City of Merced
☐	Bill Spriggs (alternate)	Merced resident
☒	Thomas Dinwoodie	Master Gardener/McSwain
☐	Trevor Hutton	Valley Land Alliance
☒	Wes Myers	Merced Grassland Coalition
☐	Lou Myers (alternate)	Benjamin Land LP

Meeting Minutes

1. Call to Order and Welcome
    a. Charles Gardiner (Catalyst) welcomed the group.
2. Introductions and Roll Call
    a. Charles Gardiner (Catalyst) reviewed the agenda and meeting guidelines, conducted roll call, and reminded attendees that past meeting materials are available online at mercedsgma.org.
    b. Jim Blanke (W&C) reminded the group that we are meeting again in May and June to stay up to date on the GSP update in response to DWR comments.

3. Potential Revisions to the Groundwater Sustainability Plan

a. DWR comments overview
    i. Jim Blanke (W&C) reviewed the three comments from DWR on the GSP which was determined "incomplete". He also refreshed the group on SGMA terminology related to sustainable management criteria.

b. Groundwater levels minimum threshold
    i. Jim Blanke (W&C) reminded the group about several options that have been evaluated for different minimum thresholds (MTs), including (1) 2015 levels, (2) historical low, (3) deeper of historical low or shallowest domestic well + 10 ft, or (4) a combination of #2 in the area of subsidence and #3 elsewhere in the Subbasin.
        1. Jim clarified that option 1 (2015 levels) is based on the year delineated by SGMA before which the basin is not responsible for responding to undesirable results (e.g. for conditions prior to 2015).
    ii. Q (Thomas Dinwoodie): Do you have depths for each of these three choices? Want to be able to put numbers to each of the depths. A: It varies for ~30 representative wells; we have the information and can share it, but it's not easy to show visually because of the variability throughout the Subbasin.
    iii. Q (Susan Walsh): Are the historical domestic well levels estimates? A: No, they are based on well permit records kept by Merced County.
    iv. Q (Thomas Dinwoodie): What do the colors on the map mean? A: The colors represent Above, Below, or Outside Corcoran Clay principal aquifer associated with each representative monitoring well.
    v. Q (Lisa Kayser-Grant): If a well went dry in 2015, are you removing them from the dataset? A: Not directly, no, as we don't have access to that level of information. If regional groundwater levels declined below the shallowest domestic well in a particular area, there is an assumption that it has been dewatered and the destruction was not recorded. The assumption is that shallowest domestic well has been replaced.
    vi. Comment (Lisa Kayser-Grant): If the GSP takes longer to finish updating and implement, does that mean groundwater levels can get deeper and the threshold can be deepened? That seems unreasonable as a process. For residential wells, it's not hard to figure out when they were replaced because they hook up to City water. Well destruction takes time but doesn't take time to have City water hookup and those records should be available.
    vii. Q (Nav Athwal): When you say options, what do you mean? Would all of these options pass muster with DWR? Why not choose the one that gives most flexibility? A: Generally shallower levels are more likely to be accepted, but we'll get into this in a little more detail in the next steps.
    viii. Q (Matt Beaman): Should we be comfortable with assigning a 5 mile radius laterally vs considering depth and location of principal aquifer? A: Shallow domestic wells completed within the Above Corcoran Clay tend to be located up

in the northwest of the Subbasin where there are more Above Corcoran Clay principal aquifer representative monitoring wells. There just aren't a lot of shallow domestic wells in the southern portion of the Subbasin. This can be something we look into a little more.

   ix. Q (Kel Mitchel): For MT option 3's component of historical low, is it similar to the historical low used exclusively in option 2 where it could be a more recent Fall 2021 GWL? Would the measurable objective need to be revisited with MT options 1 and 2? A: It's the same historical low as option 2. The figure on the slide was just a schematic, but yes generally the MO would probably need to be revisited to make sure it's got some buffer above the MT.
   x. Q (Thomas Dinwoodie): Would it be useful to share that domestic wells aren't located in the foothills in the GSP? A: Yes, that's a good idea to include percentage of map to confirm some numbers.

c. Jim Blanke (W&C) shared that we've expanded the domestic well search radius from 2 miles to 5 miles and included public water supply wells. He also shared that the GSAs are working on filling data gaps to add new representative wells, particularly in Merced Subbasin GSA.
   i. Q (Arlan Thomas): Doesn't that make the representative wells more general with an expanded representative area? A: Yes, to some extent. It's a tradeoff between including consideration of more domestic wells within that radius to be protective vs having values that represent a larger area and could be a little less meaningful.

d. Jim Blanke (W&C) expanded on some additional considerations incorporated into the latest round of modeling for ongoing/future subsidence, including no cumulative change in storage (to avoid additional subsidence) over the long term, as well as no cumulatively negative storage in any year (e.g. dry years). These criteria are generally more protective than the MTs that take into consideration groundwater levels only.
   i. Q (Lisa Kayser-Grant): It sounds like instead of reducing groundwater lost, criteria are being added that average it out over an area so subsidence may occur? A: We'll still be looking at the representative monitoring wells in the subsidence area. There's some averaging across the subsidence region, but it helps to focus on this region separately from rest of the Subbasin.
   ii. Q (Wes Myers): For the eastern side of Merced where there are data gaps, is there a grant program where there can be a cost-share for installing wells that can be used for both ranching and monitoring purposes? (e.g. solar pumps for cattle?) This is specifically for punching in new wells because there are old wells going dry. A: For existing wells, always open to folks who think they have a suitable well. Matt Beaman (MIUGSA) clarified that pretty much all monitoring has been volunteering to date so the GSAs welcome additional volunteers. Jim clarified that grant funding usually requires the well to be fully dedicated to monitoring, but ranching usually has low volume usage so that is worth exploring further if there is interest in volunteering a well.
   iii. Q (Thomas Dinwoodie): Thomas has seen good forecasts of climate data from a Nebraska data source. Has the GSP team looked at projections of hydrology and basin conditions under climate change? A: As part of the GSP, the GSP included an evaluation of climate change impacts on future conditions. Both higher evapotranspiration and changes in precipitation in the Central Valley, and also changes in snowpack in the mountains and associated impacts on reservoir systems. What we don't know (additional uncertainty), is when the droughts are going to occur and how frequent or how long.

e. Jim Blanke (W&C) walked the group through the model results table.

i. Q (Matt Beaman): Does the sustainable yield scenario include developed supply as extractions? A: Yes, it does include it.
    1. In the GSP, there's a bucket of water called "developed supply" and the bulk sourced by Merced Irrigation District (MID), ~120,000 AF. The GSP describes that this isn't available for allocation to the GSAs. This volume needs to be subtracted from the sustainable yield number. Once you take that out, you end up with a larger magnitude pumping reduction number. This developed supply is reallocated back to the entity that brings in the supply.

ii. Comment in chat (Nav Athwal): Downside of 2015 levels MT option is that it has a large negative impact on the economy and job market.

iii. Q (Simon Vander Woude): Do you think the DWR will have a problem with option C and the single-year cumulative change in storage of -40,000 AF? As a farmer and considering economic sustainability of farming, that's our best option. A: Yes, the DWR would have an issue with -40,000 AF shown as-is for single-year cumulative storage change in the subsidence area, but it might be possible to craft a project or management action that can address it with some different actions.
    1. Has the model taken into account the Prop 68 funded supply-side projects? A: No, but these can fairly interchangeably be used with demand reductions (e.g. reduce the reported demand reductions in the table by the amount of supply side projects).

iv. Comment (Arlan Thomas) – going to have to run closer to Option B, maybe starting with Option C. If stay at 70,000 AF pumping reduction, the basin condition will continue to worsen.

v. Comment (Wes Myers): Seconded comments that support Option C. Projections won't be right in 50 years. Issues with Option C might be addressed with region-specific pumping.

vi. Q (Nav Athwal): The sustainable yield scenario that we have is what DWR rejected and now we're coming up with a new threshold? Or how do these options correspond to the Sustainable Yield? A: Yes, but DWR rejected the GSP for several reasons besides just groundwater level minimum thresholds. The new pumping reduction scenario(s) take into account several additional factors beyond long-term basin-wide storage.

vii. Q (Lisa Kayser-Grant): Where does the 2- vs 5-mile radius come into the modeling results? A: The domestic well depths are considered in Options "GSP", C, and D. Options A and B are based on groundwater levels only.

viii. Q (Lisa Kayser-Grant): Highly concerned about happy-looking green colors in the table. 2015 groundwater level were a bad (dry) year. Given lack of snowpack and disappearance of glacial water sources, we would have to be extremely optimistic to expect developed supply numbers to continue as-is. To what extent is that factored in? A: Green colors are because groundwater levels today are well below 2015 levels. Future scenarios would have to involve dramatic reductions in pumping to return to previous conditions.
    1. Comment: 2015 levels aren't enough – can't wait longer to continue using 2015 dry year as a goal, especially when we know that the produced water supply is dwindling.

ix. Q (Susan Walsh): Am I hearing this right, that the scenario we are discussing will have substantially altered numbers next time we see it because as it is, it will not pass DWR review?? A: If group wanted to pursue Option C, there might need to be a project or management action included to address single year cumulative negative storage, but otherwise the modeling results are probably similar.

x. Comment in chat (Nav Athwal): Agreed… The cost of putting up a little fight with DWR will be a fraction of the economic cost to the region if we limit more pumping than we have to. Filling data gaps in the next few years will paint a much different picture.

xi. Comment (Susan Walsh): DWR has accessed past reports and discussions – can't do "just" anything. Has to be based on something solid. Has similar concerns that we can't wait to get to a bad year; have to talk about finding a place between 11% and 28% reductions.

xii. Q (Thomas Dinwoodie): Will DWR take into account that we will have good or bad 5-year reports in the GSP Updates? A: Based on today's information, in order to have a complete GSP, we shouldn't have a GSP that includes a negative single-year cumulative storage change below zero. DWR is flexible and amendable to management strategies that are backed up to address actions that would be taken to avoid this situation.

xiii. Q (Joe Scoto): Stakeholders are working now to install recharge basins that use floodwaters. Are these taken into account in the modeling? A: They're not directly included in the model, but you can put them into place instead of the demand reductions (e.g. supply-side efforts offset pumping reduction).

xiv. Comment (Arlan Thomas): Suggestion to modify between modeled scenarios B & C – probably not optimistic to get all the demand reductions offset by recharge projects.

xv. Q (Thomas Dinwoodie): Is there a short-term forecast (like 5- to 10-year projection in the modeling) instead of 50 years? e.g. restructure GSP to be just a 5-year plan. A: It is a 5-year plan to some extent in that there are 5-year evaluations, and it is a living document open to changes. But it has to focus on the long-term goal of sustainable conditions by 2040.

xvi. Comment (Susan Walsh): If DWR is open to adaptive management caveats in the plan, including the supply side efforts currently underway, that may be the way to go.

xvii. Comment (Jean Okuye): We have 18 years until 2040. We have developed supply. Climate change is real. We've really got to address demand reductions. Need to choose A or B. Concerned because supply won't be enough.

xviii. Q (Wes Myers): Is there anywhere in the model where all four categories are green? Until we have data gaps figured out, we don't have the hydrology of the area. Assuming there's certain geology in areas without eyes on it. So can we say we want to move for Option C and we'll fill in data down the road in a few years? e.g. model shows green conditions through 2026 and then re-evaluate. Thinks too much too early in earlier options. A: Model scenario B is the one where everything is green. Option C is likely green until there's a drought. Likely would need reduced pumping or temporary fallowing after some kind of drought trigger.

xix. Comment (Arlan Thomas): Problem with modeling scenario C is that if there's extreme drought weather, then pumping reductions would need to be reduced significantly. Moderate years can be increased pumping.

xx. Comment (Lisa Kayser-Grant): Adjustments to the baseline period for groundwater levels or pumping reductions are not ideal.

xxi. Comment (Ben Migliazzo): Economically in the area, drastically stopping pumping right now would be very negative. Need to ramp up to reductions. Lots of impacts on employment.

xxii. Q (Jean Okuye): Do we know how much reduction has occurred (maybe in other counties) because they don't have the water? Fallowing that has occurred more frequently elsewhere.

1. Because of surface water, several farming folks confirmed they have been fallowing this year.

xxiii. Comment from chat (Susan Walsh): I agree we need to be more aggressive that 11% but there is room to discuss middle options. the ramp up should be steeper as time goes on and data looks worse. This may support economic issues today but the speed at which we get to the cliff's edge is much faster.

xxiv. Q (Thomas Dinwoodie): When do the pumping reductions for the modeling scenarios go into place? A: 2025-2035 as a 10-year implementation/rampdown period.

1. Jim clarified that the basin-wide pumping reduction doesn't necessarily translate directly to individual farms – there are a lot of intervening factors like allocation between and within the GSAs and consideration of developed supply, etc.
2. Jim also clarified that the model is extended hydrologically through 2021 per the last Annual Report, but then starts on a 50-year projected hydrology because we don't know what's going to happen next year.

xxv. Comment from chat (Nav Athwal): I think a vote is in order so we can see where folks stand. We're almost at 11:30. Maybe a follow up survey so we can get responses in writing.

xxvi. Matt Beaman (MIUGSA): Mitigation for domestic well impacts (lowered groundwater levels, but maybe also electrical costs) is a concern. MIUGSA supports the modeling scenario A (2015 groundwater levels), primarily to avoid domestic well mitigation and water quality impacts.

xxvii. Comment (Thomas Dinwoodie): By the time we get to 2025, scenario A may be the only option because we're continuing to experience and contribute to subsidence.

xxviii. Q (Thomas Dinwoodie): Does the state have the ability to come in immediately and make changes? A (Matt Beaman, MIUGSA): Yes if the plan is not accepted, and also in the future if an initially-accepted plan violates minimum thresholds.

xxix. Comment (Lisa Kayser-Grant): Recommendation to make clear in future presentations/plans that the ramp-down occurs over 10 years (2025-2035) and that these percentage reductions shown in the model results table are not immediate reductions in 2025 (less of a shock to stakeholders).

xxx. Comment (Craig Arnold): Bounce between model scenarios C and A. Tends to be a little more cautious.

xxxi. Comment (Lisa Baker): Farmer in El Nido area, and would lean towards modeling scenario C.

xxxii. Q (Thomas Dinwoodie): If the delay in 3-4 years is for agencies to get plans together, could you in 2025 look at what's happened and make adjustments immediately between C and A? A: 2025 is first GSP update and is a first chance to course-correct.

xxxiii. Q (Ben Migliazzo): When the is the next plan update due? A: We'll have to check, either Jan 2025 or Jan 2026.

f. Schedule

i. Jim Blanke (W&C) described the schedule for incorporating edits into the GSP by end of July to address DWR's comments.

4. GSA Reports

a. Adriel Ramirez provided an update for the Merced Subbasin GSA: Department of Conservation invited MSGSA to interview for land repurposing grant application (long-term program), along with several partners on application. This is separate and in addition to the shorter-term Prop 218 land repurposing effort.

b. Matt Beaman provided an update for the Merced Irrigation-Urban GSA: Stakeholder Guidance Committee on May 4 from 1-3pm at MID Franklin Yard (specific to MIUGSA policies and the County's amended well ordinance impacts). Will be posted to the MIUGSA website.

c. Kel Mitchel provided an update for Turner Island Water District GSA #1: Recent Board meeting was held to discuss ongoing groundwater sustainability issues similar to what was discussed today.

5. Public Comment

a. None.

6. Next steps and adjourn

a. Meeting was adjourned at 11:49am.

Next Regular Meeting
TBD in late May 2022
Meeting to be conducted hybrid (physical + virtual; subject to change)
Information also available online at mercedsgma.org

MEETING MINUTES – Merced GSP Stakeholder Advisory Committee

SUBJECT: Stakeholder Advisory Committee Meeting

DATE/TIME: June 1, 2022, 9:30 to 11:30 AM

LOCATION: Hybrid meeting with physical location at Merced Irrigation District, Franklin Yard Facility, 3321 North Franklin Road, Merced, CA 95348 and online via Zoom

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Stakeholder Committee Members in Attendance:

	Representative	Community Aspect Representation
☒	Arlan Thomas	MIDAC member
☒	Ben Migliazzo (alternate)	MIDAC member
☐	Bob Kelley	Stevinson Representative
☐	Blake Nervino	Stevinson/Merquin
☒	Breanne Vandenberg	MCFB
☒	Craig Arnold	Arnold Farms
☐	Darren Olguin	Resident of Merced County
☒	Dave Serrano	Serrano Farms - Le Grand
☐	David Belt	Foster Farms
☐	Emma Reyes	Martin Reyes Farm/Land Leveling
☐	Greg Olzack	Atwater Resident
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☐	Joe Sansoni	Sansoni Farms/MCFB
☒	Joe Scoto	Scoto Brothers/McSwain School Dist.
☐	Jose Moran	Livingston City Council
☐	Lacy Carothers	Cal Am Water
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☐	Olivia Gomez	Community of Planada
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☐	Darcy Brown	River Partners
☒	Rick Drayer	Merced/Mariposa Cattlemen
☐	Robert Weimer	Weimer Farms
☒	Simon Vander Woude	Sandy Mush MWC
☒	Susan Walsh	City of Merced
☐	Bill Spriggs (alternate)	Merced resident
☒	Thomas Dinwoodie	Master Gardener/McSwain
☒	Trevor Hutton	Valley Land Alliance
☒	Wes Myers	Merced Grassland Coalition
☐	Lou Myers (alternate)	Benjamin Land LP

Meeting Minutes

1. **Call to Order and Welcome**
    a. Charles Gardiner (Catalyst) welcomed the group.
2. **Introductions and Roll Call**
    a. Charles Gardiner (Catalyst) reviewed the agenda and meeting guidelines, conducted roll call, and reminded attendees that past meeting materials are available online at mercedsgma.org.
3. **Drought Check-in**
    a. Allocation started at 13 inches and is now at 27 inches due to series of late storms and demand remaining low.
    b. Merced Farm Bureau: Newsom administration has put out materials for land purchasing, pending final budget.
4. **Potential Revisions to the Groundwater Sustainability Plan**
    a. Jim Blanke (W&C) reminded the group that DWR's comments focused on chronic lowering of groundwater levels, impacts to beneficial users, and land subsidence.
    b. Groundwater levels
        i. Jim Blanke (W&C) shared that, after considering input from the committees, the GSAs have decided to pursue historical lows (Option B, as presented at the April meeting) as the minimum threshold approach. The GSAs are also incorporating a domestic well mitigation program, with primary financial responsibility with MSGSA, and a management action to explore different levels above Corcoran in the subsidence area for more flexibility in responding to subsidence issues.
        ii. Jim Blanke (W&C) reiterated that the GSA decision was based on balancing two competing interests (protecting beneficial uses and users and using available water resources) and noted that all sustainable management criteria can be reevaluated during the 5-year update if needed.
            1. Comment (Jean Okuye): Believe the Subbasin should go with 2015 groundwater levels (Option A) to get state approval. The GSAs should review Madera's Sustainable Agricultural Land Conservation (SALC) grant application and pull ideas and coordination techniques. The GSP should focus more on demand and land repurposing and less on supply. The GSAs should also consider the effects of climate change in the modeling scenarios.
            2. Comment (Nataly Escobedo Garcia): I second Jean's comments.
            3. Public Comment (Stacie Ann Silva): CDFW/WCB also have funding available for another Regional Conservation Investment Strategy which is a non-regulatory program which identifies areas for redevelopment and allows landowners to engage in the process to garner mitigation dollars.
            4. *Additional comments were provided, but details were lost due to technical issues.*
        iii. Jim Blanke (W&C) reviewed the modifications of measurable objectives and interim milestones to retain consistency with the revised minimum thresholds. The measurable objective will be developed to provide operational flexibility, while interim milestones will be developed based on phasing in of projects and management actions (which hope to stabilize and increase groundwater levels).
    c. Comments were provided, but details were lost due to technical issues. Subsidence
        i. Jim Blanke (W&C) presented the subsidence minimum threshold option under consideration by the GSAs: 0 feet per year, with condition of uncertainty. Other options include total subsidence (rather than rate) or the stipulation of a 5-year rolling average. USBR measurement issue is approximately +/- 1 inch and will be

discussed with DWR. The final option is to set groundwater levels as a proxy for subsidence, which would involve extensive rework of the subsidence section.

1. Public Q (Geoff Vanden Heuvel): How do you explain the zero subsidence demand in light of the language of the SGMA law that talks about an undesirable result being damage to infrastructure of statewide importance. The undesirable result is what SGMA requires us to avoid, confused as to why working toward zero subsidence now. Suggest not conceding to DWR at this point.
    a. A: Clarified that DWR is leaning heavily on the legislative intent of SGMA and, in particular for Merced, concerns about Eastside bypass and impacts to this critical infrastructure.
    b. Wes Myers: Agreed. "0" Subsidence is an impossible objective considering residual subsidence/geology/etc. We should push back on DWR.
2. Name not given: How will residual subsidence be accounted for in the minimum threshold?
    a. A: Interim milestones will assume some level of subsidence through 2040, both residual and new.
3. Public Comment (Stacie Ann Silvia): If the IM are going to assume subsidence through 2040 it would seem that MT need to be rethought to include consideration that subsidence can occur without violating a Minimum Threshold over the implementation period.
4. Additional comments were provided, but details were lost due to technical issues.

ii. Jim Blanke (W&C) introduced the proposed management action for the subsidence area: goal is to target pumping reduction (or recharge activities) within Subsidence Focus Area (defined by region with 2015-2021 average less than -0.15 ft/yr) to achieve positive annual storage change. Noted that exact details will be developed as part of the management action determined after GSP is updated.

1. Hicham ElTal (MIUGSA) clarified that the area with maximum subsidence is within the Chowchilla Subbasin. Noted that GSAs and neighboring Subbasins will need to work together to ensure all are working to prevent subsidence.

d. Domestic well mitigation

i. Jim Blanke (W&C) provided an overview of the management action for a domestic well mitigation program. Explained that, while identification of the need for such a program will occur during GSP implementation, it is envisioned that a board or committee will review claims (which would need to be tied to regional groundwater conditions), with the primary financial responsibility coming from MSGSA, through negotiations. Details to be developed.

e. Adoption / public input opportunities

i. Jim Blanke (W&C) provided an overview of the remaining GSP revision process, which includes a meeting with DWR to review proposed changes and continued development of MOs/IMs to complete the redline GSP for Board review and adoption.

5. GSA Reports

a. Adriel Ramirez provided an update for the Merced Subbasin GSA: Applied for land repurposing grant funding (long-term program); unsuccessful in first round, but future funds may be available from the Department of Conservation next year. Committed to working with both the Department of Conservation and partners to strengthen application.

b. Matt Beaman provided an update for the Merced Irrigation-Urban GSA: MIUGSA performed a water balance analysis for 2016 to 2021. In the scenario used, pumping was set at 1.1 AF per developed acre; results show a large discrepancy in groundwater storage balance among the three GSAs. MIUGSA has been a positive contributor to the basin, even as groundwater levels have declined.
    i. Hicham ElTal stated that MIUGSA believes that setting the minimum thresholds lower than 2015 levels may expose the GSAs to additional liability for those impacts, and the need for additional liability for impacts that may occur. MIUGSA should not bear mitigation or liability for setting minimum thresholds at historical lows.

c. No update provided for Turner Island Water District GSA #1.

d. SAC questions and discussion
    i. Q (Jean Okuye): How does Merced River compare to Stanislaus and Tuolumne Rivers as to low groundwater levels?
        1. Hicham ElTal (MIUGSA) noted that all have similar issues depending on the groundwater levels modelled.
    ii. Comment (Jean Okuye): Think we should stick with 2015 GWLs as MTs.

6. Public Comment

a. None.

7. Next steps and adjourn

a. Meeting was adjourned at 11:53am.

Next Regular Meeting
Tentatively scheduled as a joint meeting of the Stakeholder Advisory Committee and the Coordination committee at 1:00pm June 27, 2022
Meeting to be conducted hybrid (physical + virtual; subject to change)
Information also available online at mercedsgma.org

DEPARTMENT OF THE AIR FORCE
AIR FORCE CIVIL ENGINEER CENTER

October 11, 2019

AFCEC/CIBE
2261 Hughes Avenue, Suite 155
JBSA Lackland TX 78236-9853

[redacted]

[redacted]

The Air Force is currently investigating whether perfluorooctane sulfonate (PFOS) and/or perfluorooctanoic acid (PFOA) is present in the groundwater near the former Castle Air Force Base (Castle AFB) in Atwater, California. Samples of groundwater on the former Castle AFB have confirmed the presence of PFOS and/or PFOA. The next steps in the Air Force investigation are to determine whether PFOS/PFOA are present in the water from private drinking water wells near Castle AFB.

While PFOS and PFOA are not regulated under the Safe Drinking Water Act, the United States Environmental Protection Agency (EPA) has issued Lifetime Health Advisories (LHA) and is continuing to study PFOS/PFOA to determine if regulation is needed. Please see the attached Fact Sheet for further information on these substances.

A review of the water well record databases maintained by the Air Force, the California Department of Water Resources, the City of Winton, and the City of Atwater indicates you may have drinking water wells on your property. If you do, the Air Force requests permission to take water samples from your drinking water wells. The Air Force will sample your wells at no cost to you and will share any information obtained from the well sampling.

To that end, we would very much appreciate it if you could take a few minutes to complete the enclosed Private Well Survey form and allow us to take samples from your wells at a mutually agreeable time. The Air Force, through its authorized agent, Wood Environment & Infrastructure Solutions, Inc. (Wood), will contact you soon to schedule the sampling and discuss the procedure and requirements. Please return the Private Well Survey form in the enclosed self addressed, postage paid envelope or email a copy to Ms. Mary Jo Heassler at maryjo.heassler@woodplc.com.

If you have any questions or concerns, please contact Roy Willis at 210-395-9452 or roy.willis@us.af.mil.

Merced Irrigation-Urban GSA
Merced Subbasin GSA
Turner Island Water District GSA #1

Summary of Merced Subbasin Groundwater Sustainability Plan Community Workshop #1

Issued August 20, 2018

Overview

The first Merced Subbasin Community Workshop was held on August 2, 2018 in the Sam Pipes Room, 678 W. 18th Street, Merced, CA from 6 pm to 8:30 pm. The total attendance was approximately 35 of which 8 were members of the GSP Coordinating Committee, Stakeholder Committee, or staff from the County, City, or Merced Irrigation District (MID).

The workshop goals included the following:

1. Provide an introduction to:
    a. What are the requirements of the Sustainable Groundwater Management Act (SGMA),
    b. What are the roles of the three Groundwater Sustainability Agencies (GSAs), and
    c. What is the schedule and requirements for the Groundwater Sustainability Plan (GSP) being prepared for the Merced Subbasin.
2. Provide an overview of the Merced Subbasin conditions.
3. Encourage attendees to share their knowledge and experiences with groundwater in the Merced Subbasin and to talk about what groundwater sustainability means for them.

The workshop presentations covered the following topics:

1. What is SGMA -- what is required, who is responsible, and how will the GSP be developed?
2. Current Merced Subbasin groundwater conditions.
3. What are the undesirable effects of overuse of groundwater?
4. What does groundwater sustainability mean to people?

The workshop was publicized using a number of methods including:

1. Press Release was issued to the Merced Sun Times and posted on the GSP website.
2. Display Advertisement/Notice was placed in the Merced Sun Times.
3. Workshop Notices (in English and Spanish) were widely distributed by partner organizations to their email distribution lists and were posted on the three GSA websites as well as several partner websites.

4. SelfHelp Enterprises also distributed a workshop notice in several communities within the Merced Subbasin.

Questions about SGMA, GSAs, and the GSP

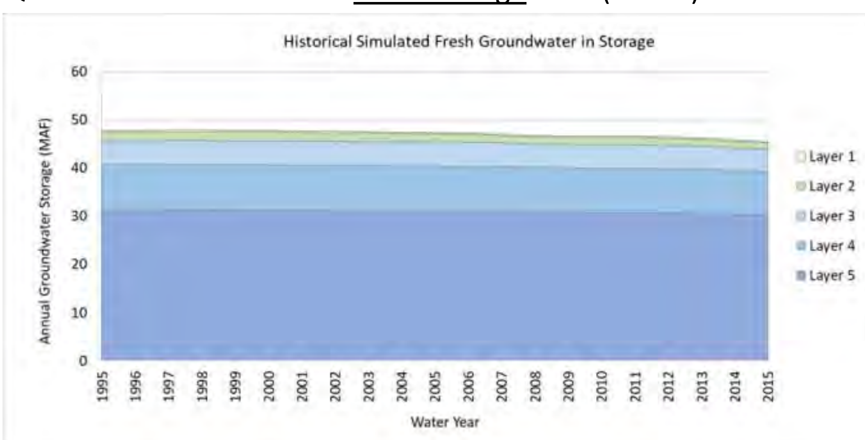
After a presentation about what is SGMA, the formation of the three GSAs and their roles, and the decision for all three GSAs to work together to develop one GSP for the Merced Subbasin, the following questions were asked:

1. What is the approval process from the State?
2. How many other GSPs are being prepared now in California?
3. Does the public get to review the draft GSP?
4. What will the process be for the public to get to review the draft GSP?
5. What is the website to go to for information about the Merced Subbasin GSP?
6. Who hired the consultants to prepare the GSP?

Questions about Current Merced Subbasin Groundwater Conditions

After a presentation about current Merced Subbasin groundwater conditions, the following questions were raised:

1. Is it possible to capture water from Bear Creek as the water flows to the ocean?
2. What is the definition of a Disadvantaged Community (DAC)?
3. Questions asked when the Total Storage slide (below) was discussed:



a) What is the significance of the "brackish water" layer?

b) Is there a correlation between the levels shown and depth in feet?

c) Is the lower water level from the High Sierras and the top level from recent events like rain?

d) Are there water quality differences in the levels shown?

4. When it comes to measuring well depths, will it be the responsibility of each individual to recharge their own well if the elevation drops? Are people going to have to track their individual well water usage?
5. Will there be a loss in storage in areas with land subsidence?
6. Is there a lot of data on interconnected surface water?
7. For the groundwater model being used, will there be "ground truthing" or validation of the model with real time well data? If so, how is it done?
8. Will there be any monitoring wells that can measure a number of different elements including groundwater levels, direction of flow, and flow rate?

Discussion about Undesirable Effects

In the initial workshop presentation, it was explained that under SGMA, sustainability is the management of groundwater to prevent significant and unreasonable undesirable results. There are six undesirable results defined under SGMA. They include: Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply; significant and unreasonable degraded water quality; significant and unreasonable reduction of groundwater storage; significant and unreasonable land subsidence; significant and unreasonable seawater intrusion; and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

Attendees were asked "What Do You See as the Undesirable Effects of Groundwater Use?" and the following responses were shared:

Responses Related to Land Use Planning and Groundwater Use

<u>Improved Land Use Planning is Important.</u> In the Merced General Plan, when new ground is broken for a project, water use parameters need to be established. A grading ordinance is needed when changing the function of the land use. Changes in land use when irrigation is added should be addressed or regulated in some way.

<u>Consider Using Recycled Water for Urban Use</u>. An example was provided that in Salt Lake City, a dual piping system is used where water goes to houses as two water supplies: one for recycled water used for lawns and other non-potable (non-drinking water) uses, and one for drinking water.

<u>Coordination of Private Well Groundwater Use</u> is needed between Suburban Areas and Agricultural Areas. What are the depth of the wells, and how can the water use be coordinated? When comparing water use between a subdivision and agricultural use, which uses more?

Responses about Educational Needs for Efficient Use of Water

<u>More Education about Water Use Efficiency is Needed.</u> An attendee asked about the allowable watering schedule in Merced County as he observed people watering their lawns during the day

and kids' pools overflowing, with no way to capture that water. Can the GSP include water efficiency actions and education? It was mentioned that some examples of efficiency and educational tools can be found and have been implemented in the City of Merced.

Responses Related to Surface and Ground Water Use
Land Subsidence Creates Loss of Water Storage. These areas are no longer able to be recharged as the soils will no longer hold water.

More Surface Water is Needed. The Proposed Temperance Flat Dam Project was voiced as a potential solution.

With Water Cutbacks, Water for Trees and Landscaping is Reduced. There needs to be a balanced approach.

Lower Groundwater Levels Negatively Affects Drinking Water Supplies for Rural Schools. There are areas around Merced where the elementary schools have come close to not having drinking water because of wells drying up.

No Water Transfers out of Merced
What prevents someone from buying land, putting in high capacity pumps, and pumping groundwater and selling it southern CA? This has happened. There should be no transfers out of the area but with surface water, water districts can transfer between water districts. There is, however, a County ordinance that prevents an individual from purchasing land, pumping the water, and selling it elsewhere.

Responses Related to Water Quality
Water Shortages Increase Contamination. In Planada, the contaminants from whatever is sprayed on the fields is getting into water that is available.

Monitoring Movement of Contaminant Plumes. With the groundwater modeling, can there be plumes of contaminants? How are they monitored? Plumes worsening or moving is the undesirable result.

Responses Related to Water and Economics
Smaller farmers are not able to afford deeper wells.

Responses Related to How Specific Items of Concern will be Addressed in the GSP
How will the GSP address groundwater being used at water bottling plants?

How will the GSP address population growth and crop changes?

Discussion about Sustainability

Following the discussion about undesirable results, attendees were asked for their thoughts and ideas about what sustainability means to them. They were asked to share about "What do you see as sustainability goals for you? What does sustainability mean to you, what does sustainability look like for you? The following input was received.

Responses Related to Sustainability Solutions

- Use conservation techniques.
- Water is required to be recharged, so increase recharge in wet years.
- Increase groundwater banking.
- Harvest water in urban areas.
- Use the groundwater model for land use decisions.
- Capture Merced River flood flows.
- Consider use of groundwater credits.
- Secure reliable surface water supply for recharge.
- In wet years, turn water into fields for recharge.
- Capture water from creeks in the Merced Subbasin for recharge.
- Provide equitable access to whatever the water resources are for all. If good, then good for everyone. If bad, then bad for everyone.
- Identify subsidence areas and focus recharge efforts there.
- Capture and retain storm water from Owens Creek.
- Merced Irrigation District (MID) Canal draining to recharge lands.

Responses Related to Economics and Sustainability

- Farming and economics -- need to keep the economy healthy, water is the driver of the whole area.
- What protects the value of the land?

Responses Related to Funding

- Is Department of Water Resources funding the GSP?
- What constraints on management actions or projects are anticipated such as funding? Are there others?

Responses Related to Other Ideas

- If more water retention is the only answer, how do we carry that message forward?
- Consider climate change factors.
- SED (the Substitute Environmental Document) if approved and implemented would be devastating as it will reduce San Joaquin River flows.

Discussion about Additional Concerns about Land Subsidence

1. Identify subsidence areas and have recharge areas put in.
2. Supply surface water to subsidence areas.
3. Capture urban runoff in subsidence areas.

4. Federal funding needed [for management actions and projects].
5. Appropriate monitoring of layers is needed to understand where subsidence occurs.
6. Flood benefits – flood and storm waters should be used for recharge.

Roles and Responsibilities for Developing the Merced Subbasin GSP

Governing Boards

Consistent with the requirements of SGMA, water management and land management agencies in Merced Subbasin formed three Groundwater Sustainability Agencies (GSAs): the Merced Irrigation-Urban Groundwater Sustainability Agency, the Merced Subbasin Groundwater Sustainability Agency, and the Turner Island Water District Groundwater Sustainability Agency. The three GSAs are collaborating on developing one Groundwater Sustainability Plan (GSP) for the entire Merced Groundwater Subbasin by January 2020. To develop the Plan, the GSAs will review groundwater conditions and identify means to ensure the long-term sustainability of the Merced Groundwater Subbasin.

Coordinating Committee

The three GSAs for the Merced Groundwater Subbasin have formed a Coordinating Committee of senior staff and governing board members to coordinate day-to-day planning activities and public outreach. Meetings of the Coordinating Committee will be noticed and open to the public and are held the fourth Monday of the month.

Stakeholder Committee

The three GSAs have also approved the formation of a Stakeholder Committee. The Stakeholder Committee serves as community representatives to advise the Coordinating Committee and the GSA governing boards on groundwater conditions, management issues and needs, and projects and management actions to improve sustainability in the basin. Meetings of the Stakeholder Committee are open to the public and are held on the fourth Monday of the month.

General Public, Landowners, Farmers, Ranchers in the Merced Subbasin

Your role is to provide input as the GSP is developed. You can submit comments through the GSP website: www.mercedsgma.org. Consider attending a Board meeting, Coordinating Committee meeting, or Stakeholder Committee meeting, or a Community Workshop to learn more, ask questions, and provide input.

Merced Irrigation-Urban GSA
Merced Subbasin GSA
Turner Island Water District GSA #1

Summary of Merced Subbasin Groundwater Sustainability Plan Community Workshops in Planada and Franklin

December 4 and 13, 2018

Overview

A second round of Merced Subbasin Community Workshops were held in Planada and Franklin in December 2018.

Tuesday, December 4, 2018
6 p.m. to 8 p.m.
Planada Community Center
Main Hall
9167 Stanford Ave., Planada, CA 95365

Thursday, December 13, 2018
6 p.m. to 8 p.m.
Franklin Elementary School
Multipurpose Room
2736 Franklin Rd, Merced, CA 95348

The goals for the public workshops included the following:

1. Provide information about options for sustainable management for the Merced Subbasin Groundwater and obtain participant feedback including input on preliminary ideas for projects and management actions.
2. Encourage attendees to share their knowledge and experiences with groundwater in the Merced Subbasin.

Both workshops were publicized using the following methods:

1. Press Release was issued to the Merced Sun-Star, Merced County Times, and posted on the GSP website. The workshops were mentioned by Mike Jenkins, Merced Irrigation District (MID) during a Merced radio station interview several days prior to the first workshop.
2. Workshop Notices (in English and Spanish) were widely distributed by partner organizations to their email distribution lists and were posted on the three GSA websites as well as several partner websites.
3. Self-Help Enterprises and The Leadership Counsel for Justice and Accountability assisted with outreach by distributing flyers and calling contacts that they have in Planada, South Merced, and Franklin.

The attendance at the December 4, 2018, Planada workshop included approximately 30 members of the public. The December 11, 2018 Franklin workshop was attended by approximately 24 members of the public. Self-Help Enterprises (SHE) provided a communications system at both workshops to support simultaneous Spanish translation. At the

Planada workshop two people took advantage of translation; no one utilized the translation option at the Franklin workshop.

The presentations for both workshops included the following topics with discussion questions (included below) asked of the participants after each presentation:

1. **Project Overview** – This presentation provided a review of the Sustainable Groundwater Management Act, the Groundwater Management Agencies involved and the Groundwater Sustainability Plan.
2. **Sustainable Management for the Merced Subbasin** – This presentation covered both reducing water use and allocating groundwater pumping as well as options for increasing water supplies and groundwater recharge.
3. **Groundwater Conditions –** This presentation was tailored for each workshop to include groundwater information relative to each area.

Presentation 1 - Project Overview

The following three questions were asked of the participants following the presentation.

1. Do you have any questions and discussion about what SGMA requires and the agencies preparing the Groundwater Sustainability Plan?
2. Do you have any questions and discussion about the Merced Subbasin groundwater conditions?
3. What thoughts do you have about current or future conditions?

There were no questions from the participants at the Planada workshop and at the Franklin workshop, two questions were asked:

Question: What is the projected acre-feet (amount of water) that will be allowed for pumping and will that vary across the Merced Subbasin?

> Answer: This question was answered during the second portion of the presentation. On average, a reduction of 25% in pumping is estimated as needed to achieve sustainability over time. The goal is to halt overdraft and get to a sustainable condition. The estimate of future pumping is 660 thousand acre feet (TAF) per year. The estimated amount of pumping for a sustainable groundwater basin is 500 TAF. The difference is what is needs to be reduced in pumping, which could be achieved looking at options for increasing supply, increasing groundwater recharge, or decreasing demand. The Coordinating Committee (CC) and the Stakeholder Committee (SC) are looking at possible approaches for allocating groundwater pumping. The team will be developing projects and management actions including options such as groundwater recharge projects and surface water projects for consideration by the CC and SC. The availability and benefits of these actions vary across the basin.

Question: What is the current status of connections at Meadowbrook?

> Answer: There are 3 groundwater wells that range from 300 to 500 feet deep to provide water to 1,730 connections.

Presentation 2 - Sustainable Management for Merced Subbasin Groundwater

Four questions were posed to participants at each workshop. The comments and questions received are summarized by workshop location.

1. What do you see as the most important issues related to groundwater pumping and water use? For residents and businesses? For agriculture?

Planada Workshop Questions and Comments

Question: Are there or will there be more projects beyond the Planada area? There must be other areas where there can be recharge projects.

> Answer: Yes. Merced Irrigation District (MID) is working with farmers on this now. Le Grand and Livingston have good soil for recharge. Recharge projects in the eastern side of the basin, such as LeGrand and Planada have the potential to benefit the entire basin (groundwater generally flows from east to west).

Question: Is the land subsidence in the El Nido area due to pumping? What can be done about it?

> Answer: There is land subsidence in the El Nido area. Generally, land subsidence is caused by pumping below the Corcoran clay layer (a layer of clay that separates upper and lower groundwater aquifers in the western portion of the basin). Pumping can lower groundwater levels, which dewaters the clay layer, which in turn compresses, lowering the ground levels. It cannot necessarily be reversed, but it can be slowed. If there is recharge in El Nido, it will take a long time to be able to raise the level of groundwater to reduce the subsidence.

Question: Will Planada recharge benefit Planada or flow to El Nido?

> Answer: This is the purpose of doing a feasibility study—to evaluate how much water can be infiltrated into the groundwater, how it moves, and where the benefits would be. There is an MID recharge basin in El Nido putting water into the ground to benefit that area.

Question: Can forest management (e.g., tree thinning) help with groundwater recharge and groundwater levels by allowing more water to flow into the groundwater?

> Answer: UC Merced conducted studies of forest management in the foothills and headwaters areas. The studies had difficulties getting measurement equipment installed on federal lands (including concerns about impacts to endangered species in the area).

Franklin Workshop Questions and Comments

Question: How many acre feet of water can be stored in the ground? Is there a model that can tell us how much storage we have?

> Answer: In terms of total storage, the model estimates a capacity of 50 million acre-feet of water. The challenge is access. As the storage is depleted, groundwater levels decline, potentially dewatering wells, which is one of the undesirable results the plan seeks to avoid. The goal is to increase recharge and storage in wet years, when there is additional supply. The challenge is finding locations where flooding is occurring and where floodwaters can be stored to help the Merced Subbasin.

Question: What does recharge represent in terms of bringing the Merced Subbasin to sustainability?

> Answer: Recharge is one important component of management actions and projects that can be effective.

Question: There a number of dry creeks like Bear Creek, as well as canals that have dried up. Where is that water going?

> Answer: The creeks and canals provide recharge to the groundwater when there is water flowing in them. When the rain stops, there is not a constant flow of water in these areas. The flow of water depends on seasonal rainfall.

Question: Recharge projects involve a lot of time, available ground, planning, and approvals to put the infrastructure in place. The State requires a permit and that process is challenging. Will the State make the permit process easier?

> Answer: All water has to be used for beneficial use. Recharge by itself is not consider a beneficial by the State Water Resources Control Board (State Board). The State Water Board prefers projects that show additional benefits, such as reducing subsidence, assistance to Disadvantaged Communities (DACs), or improved water quality. Recharge projects should be combined with benefits to other uses. MID is working on Flood-MAR (using flood water for managed aquifer recharge) with the Department of Water Resources (DWR).

Question: The participant had recently purchased property with several 80-foot irrigation wells that have gone dry. They sought a permit for a new, deeper well, but they can't drill below the Corcoran Clay layer. How will the GSP development process take into account the Corcoran Clay layer when considering management actions and projects, e.g. recharge projects. We need to understand the Corcoran Clay layer.

> Answer: When drilling you can only go so deep until you hit the Corcoran Clay, then you would have to drill below the clay layer. However, additional pumping below the Corcoran Clay can increase land subsidence, therefore, the County restricts new wells

below the Corcoran Clay. The GSP will be looking at issues below, above, and outside of the Corcoran Clay. Some areas above Corcoran Clay layer have lower groundwater levels, but not all. The plan will consider approaches for getting groundwater in balance above and below the Corcoran Clay. Some other basins have abandoned the upper layer (above Corcoran), but we will not.

Comment: Corcoran Clay is located in the west and southwest portion of the basin.

Question: We should try to know where we can recharge. Can recharge go below the Corcoran Clay layer?

Answer: There are two other types of possible recharge: (1) Dry wells can recharge below the Corcoran Clay, but this might not be in the best area for recharge; (2) Aquifer storage and recovery (ASR) wells are another possibility. ASR wells are used to recharge deep aquifers and form a "bubble" of recharged water. The approach is often used in areas where existing groundwater quality is poor.

Question: Will there be incentives offered for recharge projects including stormwater capture?

Answer: If people want to self-recharge, this may be able to be worked into a credit system that provides an additional pumping allowance for those that recharge groundwater to the basin.

Question: Why is there more subsidence when pumping occurs below the Corcoran Clay layer?

Answer: Below the Corcoran Clay layer, the water could be considered pressurized. If water is pumped out, the pressure is removed, and land subsides. The same process doesn't occur above the Corcoran Clay layer.

Question: When the GSP is implemented, can people purchase additional pumping allocations?

Answer: It is likely that an allocation system would be implemented around 2030, but it is up to the three GSAs to adopt the GSP and implementation plan. Initial discussions by the Coordinating Committee have included ideas for a water market to allow people to purchase available groundwater pumping allocations from others in the basin.

Question: For MID recharge projects that exists now, what is their impact on the aquifers?

Answer: Currently MID has 40 acres being used for recharge including areas in El Nido, in Winton). By current estimates, MID recharges approximately 100,000 acre-feet per year to the basin through the canals and recharge basins.

Question: What about the sustainable yield estimate? How do we have this projected until 2040?

Answer: The sustainable yield estimate assumes that there is a transition period between now and 2040. Once we have identified projects and management actions and the timing for implementation (including pumping allocation), we can forecast the water budget more specifically for the period between now and 2040.

Comment: Hard decisions and investment will be needed going forward to reduce pumping.

Question: With a growing population, where will the water come from to reach sustainability unless we include more surface water storage? It doesn't seem solvable.

> Answer: Estimated population growth has been included in the model. Additional surface storage options will also be evaluated.

Question: Do we have any data on how the Fresno storage basins are working, and if this is a good example to follow for our subbasin?

> Answer: The storage basins in Fresno have experienced several issues and are using surface water.

Question: A participant's well is only at 65 feet, yet his neighbor has had to drill to 110 feet to get to water. Why is there a difference?

> Answer: This comes back to what undesirable results we want to avoid. We have about 40 CASGEM (California Statewide Groundwater Elevation Monitoring) wells. The plan will include groundwater level thresholds to prevent domestic wells within a 3-mile radius of these wells from going dry.

Question: When it comes to cutting back, how do you view cutting back groundwater use for agriculture versus targeting cuts in other uses?

> Answer: Groundwater pumping allocations would reduce water use for all users. For recharge and water supply projects, we are looking at all possible sources, stormwater recharge, recycled water, etc.

Question: Is climate change included in the modeling?

> Answer: Climate change will be factored into the GSP. For 2040, significant change is not expected but climate change analysis will continue and be a part of the GSP updates.

Question: Can urban stormwater recharge projects be considered?

> Answer: Yes.

Comment: We need to see more conservation in the urban/city areas. Municipalities have to educate residents more and come up with plans to limit the water use. It would be good to have incentives and rebates for dry landscape in communities.

Comment: Generally, people in cities do not understand how precious water is. There needs to be more education for people to understand this. Farmers are using a third less water now than they used to as they understand what a precious resource it is.

Question: Is there a way for the public to see/access the hydrogeologic model (HCM) online?

> Answer: There is a report on the hydrogeologic model available online at the Merced SGMA website.

2. How can groundwater pumping be allocated fairly across the basin for all users?

Planada Workshop Questions and Comments

Comment: Allocation cannot be historical. Certain trees take more water than others. The allocated amounts should be left to each grower as they know best what to do. Growers aren't wasting water.

Comment: Drip irrigation is good for trees but not as cost effective for crops such as tomatoes.

Comment: There is a stereotype that farmers want to use a lot of water. This is not true as most farmers put a lot of care into what they put on their plants.

Comment: We all have to take part in achieving groundwater sustainability, not just farmers. Every individual is going to have to take a part in recharging the Merced Subbasin. We need to work together to figure out a way to do this. Education is important. Doing little changes in every area might help (an example from Santa Barbara was cited).

Comment: Given the human right to drinking water (law in California), the GSP projects and management actions need to consider the effect on access to safe drinking water.

Comment: In 20 years, the water situation will get worse.

Comment: Climate is changing.

Franklin Workshop Questions and Comments

There were no comments on this question at the Franklin workshop.

3. How can the GSP help address groundwater quality issues?

Planada Workshop Questions and Comments

Comment: El Nido has a salinity problem in the water.

Comment: In Stevinson, there is potential for Aquifer Storage and Recovery (ASR) wells to allow both pumping and recharge.

Comment: South Merced is on domestic wells and some are contaminated. This area should be connected to the Merced municipal water system.

Comment: Shallow wells are accessing perched water with more contamination. In some areas, a solution may be to re-drill wells.

Franklin Workshop Questions and Comments

There were no comments on this question at the Franklin workshop.

4. What projects and actions could increase groundwater recharge and available water supplies?

Planada Workshop Questions and Comments

Comment: Farmers have spent millions of dollars putting in efficient irrigation systems. This could be part of the problem as flood irrigation used to help recharge the aquifer. In the past, flood irrigation was cheap and now it's expensive. Flood irrigation should be allowed again as it would help recharge the aquifers.

Question: Are injection wells being considered?

> Answer: Water has to be treated before injecting which makes this option too costly.

Comment: Another Merced Irrigation District (MID) big lake/reservoir and more canals are needed to address climate change impacts.

Comment: MID is doing some recharge in rice growing areas, which is resulting in limited recharge.

Comment: Explore further the benefits of forest management for improving recharge of the aquifers.

Franklin Workshop Questions and Comments

See the comments and questions under question #1 as there was significant input about recharge projects during the discussion of that question.

Additional Written Comments Received Via Comment Forms Available at the Workshops

Question: Do we know how much water Safeway/Lucerne Foods is bottling up from the Merced River? Is this information considered proprietary?

> Answer: The team can see if this information is available.

Comment: Have the State Water Resource Control Board (SWRCB) explain to the public how the public, undergoing sustainability actions to undertake recharge projects,…at least how to avoid being faced with restrictions to stormwater recharge.

Comment: I am going to retire, then I don't have to worry about water for farming.

Merced Irrigation-Urban GSA
Merced Subbasin GSA
Turner Island Water District GSA #1

Summary of Merced Subbasin Groundwater Sustainability Plan Community Workshop in Livingston, CA

February 25, 2019

Overview

The fourth Merced Subbasin Groundwater Sustainability Plan community workshop was held in Livingston, CA on Monday, February 25, 2019 in the City Hall Conference Room from 6 p.m. to 8 p.m. The workshop was attended by approximately 25 community members.

The goals for the workshop included the following:

1. Provide information about options for sustainable groundwater management for the Merced Subbasin
2. Obtain participant feedback, including input on the various projects and management actions under consideration.
3. Encourage attendees to share their knowledge and experiences with groundwater in the Merced Subbasin.

The workshop was publicized using the following methods:

1. Press Release was issued to the Merced Sun-Star, Merced County Times, and posted on www.mercedsgma.org.
2. Display Ad was published in the main news section of the Merced Sun-Star on February 22 and February 23.
3. Workshop Notices (English and Spanish) were widely distributed by partner organizations to their email distribution lists and were posted on the three GSA websites as well as several partner websites.
4. Self-Help Enterprises (SHE) and The Leadership Counsel for Justice and Accountability assisted with outreach by distributing workshop notices.

SHE provided a Spanish translator and communications system that supports simultaneous translation. No one utilized the translation option at this workshop.

Summary of Presentations and Discussions

Presentation 1 - Groundwater in the Livingston Area

Jose Ramirez, City Manager, Livingston, CA provided an overview of some of the challenges faced relative to water supply and water quality. He noted that there had been contaminants in Livingston wells causing them to be shut down. To meet the demand, the City was able to connect several wells and establish centralized treatment. He noted that Livingston is 100% metered and that the City is planning to diversify its water supply portfolio to include surface water from the Merced River. Questions included the following:

1. Question: The Merced River was noted as a source, are you talking about taking water from Merced River?

    Answer: Yes, but the permit process is very long. The plan includes installing horizontal wells below the river to access Merced River water.

2. Question: What is the per person water consumption in Livingston?

    Answer: An estimate is about half acre foot (AF) per household.

3. Question: Is Gallo on the Livingston water system?

    Answer: No, Gallo has asked to be connected to the water system, but it would require a large capital investment.

Presentation 2 – SGMA Overview and Current and Projected Groundwater Conditions

Alyson Watson, Woodward & Curran, provided a review of the Sustainable Groundwater Management Act (SGMA and the three Groundwater Management Agencies involved in the development of the Merced Subbasin Groundwater Sustainability Plan (GSP)). She also explained what a GSP is and what it includes. This presentation concluded with an overview of the current and projected groundwater conditions for the Merced Subbasin.

The following questions were asked by participants:

1. Question: Is the "critical overdraft" designation applied to entire Merced Subbasin; is any area excepted from this?

    Answer: This designation applies to entire basin, but there can be areas within the basin where recharge is occurring.

2. Question: Does the Merced Subbasin boundary complement or follow the groundwater aquifer boundaries?

    Answer: Loosely. Three of the four boundaries are generally located along rivers with one generally following the county boundary.

3. Question: Do minimum thresholds apply to private wells?

    Answer: Private wells will not have minimum thresholds. This also includes private businesses that have wells. There are specific criteria for establishing groundwater monitoring wells. Private wells often do not meet these criteria to capture what is needed for reporting.

4. Question: What is CASGEM?

    Answer: It is the California Statewide Groundwater Elevation Monitoring Program. It was established before SGMA to monitor groundwater levels across the state. For the GSP, we will use existing wells from the CASGEM network and add monitoring wells where needed.

5. Question: What is the status of the technical work? Where can we see the technical work?

    Answer: As draft GSP sections are prepared, they will be posted to the website for review in the Resources section. Currently, one chapter is available, Basin Settings - Hydrogeologic Conceptual Model (HCM).

6. Question: How do the new statewide domestic use goals (50 gallons per person per day by 2030) relate to SGMA?

   Answer: The urban water agencies will be working to achieve those goals for their service areas, which will help cities reduce their groundwater pumping. The goals do not apply to private domestic groundwater wells. These users are called de minimus users when they extract more than two acre feet per year. They are subject to SGMA, but the GSAs cannot require them to be metered.

7. Question: How does the GSP account for the SED (Substitute Environmental Document) for the Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary? Would the state be charged for taking water from the Merced River?

   Answer: The groundwater modeling for the Merced Subbasin does not assume approval of the SED. If it is approved it would change surface water availability. It is not likely that the region could charge the state for water dedicated to instream flows.

8. Question/Comment: Referring to presentation slide titled "The Groundwater Model Estimates Flows Into and Out of the Groundwater Basin," this is all theory, right?

   Answer: The technical team is using the model to develop a projection for future groundwater use for the three GSAs.

9. Question: Who has to approve the GSP?

   Answer: The three GSAs have to approve the GSP. By January 31, 2020 the GSAs will submit the approved GSP to the Department of Water Resources (DWR). The DWR will then have to approve the GSP. If the DWR does not approve the GSP, the Merced Subbasin GSAs would be forwarded to the State Water Resources Control Board for enforcement or intervention.

10. Question: Is there no discussion with DWR after the GSP is submitted to them?

    Answer: DWR and the State Water Board have not fully described the process after submittal. However, we anticipate that there will be some back and forth if DWR identifies deficiencies in the GSP.

11. Question: When looking at the 50-year forecast, how would it change if there were more dams for water storage?

    Answer: A dam might not change the water budget (referring to the water projection graph presented) but it could increase seepage or change pumping depending on how it is used – for example, if more surface water were used instead of groundwater.

12. Question: What is the baseline for the model?

    Answer: The model uses a 50-year hydrology (rainfall and runoff from the last 50 years) and estimates of future population and land use in 2040.

13. Question/Comment: So the graph (referring to the graph of groundwater model estimates) is saying we need projects?

    Answer: Yes, projects to increase groundwater recharge and surface water supplies.

14. Clarification requested: Snowpack affects our groundwater. What is the impact to our groundwater from the snowpack in the Sierras?

Answer: Snowpack does affect the Merced Subbasin groundwater, but it is not more significant than the local pumping/use. We are using state estimates of future changes in snowpack.

15. Question: Are you doing isotope dating of the groundwater?

    Answer: UC Merced did some isotope dating. Previous pumping was estimated to be 1000-year water, and now it's 50- to 100-year water.

Presentation 3 – Sustainable Management for Merced Subbasin Groundwater

Alyson Watson, Woodward & Curran, explained that the goal of the GSP is to try to balance groundwater over the long term. The term "Sustainable Yield" was explained generally as how much groundwater can be pumped without causing undesirable results. The Sustainable Yield can be estimated using the model and then conditions can be modified to balance stored groundwater over time. Once the sustainable yield is developed, then the "Groundwater Allocation Framework" describes an approach for allocating the sustainable yield among the three GSAs within the Merced Subbasin. The Allocation Framework includes three "buckets" of water that are accounted for in the allocation: 1) overlying use, 2) appropriative use and 3) recovery of seepage of developed water. Alyson also discussed how to address unirrigated lands that may never have been pumped – should the allocation be the same? She explained the possibility of partial allocations and how that might relate to a water market.

1. Question: I'm an agricultural water user. I buy water from MID and then it seeps in on my land. Whose water is that?

    Answer: We are looking at an allocation of 400,000 AF and working now to sort out seepage considerations. Currently, this would not be considered seepage of a developed water supply.

2. Question: What about water banking?

    Answer: When we get to the discussion about projects and management actions, recharge projects (to bank water in the ground) are a type of project being considered.

3. Question: Shouldn't there be a credit for this (water recharge)?

    Answer: Yes, the owner of a recharge project would receive credit for developing the water supply.

4. Question: Say someone has a piece of land and they don't use it. If we have wet year, would they get credit for recharge on these lands?

    Answer: This gets to the practical implementation – you don't get credit for the water that falls on your land; the allocation is for the entire Merced Subbasin.

5. Question: Are there farmers in these groups (referring to the Coordinating Committee and Stakeholder Committee)?

    Answer: Yes.

6. Question: If you are only using part of your land, can you apply your full allocation to part of your land? You should also be able to carry over some part of what you have not used into the previous year.

    Answer: The GSAs have to determine how these types of situations will be handled.

7. Question: If a person hasn't used irrigation, they are paying the standby fee?

   Answer: In the case of Merced Irrigation District (MID), yes, and that allows you to contact MID whenever you want to start receiving the water again.

8. Question: What about farmers who have no access to surface water?

   Answer: In some cases, farmers may be able to purchase surface water (depending on location and water rights for the surface water rights holder). If you have been using surface water, you are not considered a dormant user.

9. Question: Do the allocation estimate numbers reflect sustainable yield?

   Answer: Yes, and these could be adjusted, for example the allocation could be increased if projects are implemented that are effective in increasing water supplies.

10. Question: What do you anticipate would be the relationship between an allocation for dormant users and the county process for issuing permits to drill a well.

    Answer: The process to permit a new well is cumbersome. The intent of the allocation process would be to avoid making the process more cumbersome by adding additional steps.

11. Comment: The consultant team and the GSAs will need to be very clear about what a dormant water right is. Also, when considering the allocation framework, it is important to consider the "climate" of the land (e.g., topography/geography).

12. Comment: You have growers on different types of soil. Some areas are very sandy, and others are not. The allocation should be done by soil type. Different soil types have different percolation rates and use different amounts of water to grow.

13. Comment: The trees (e.g., almonds) need a lot of water, the allocation could devastate people who grow trees. The allocation should take into consideration what people have already invested in developing their trees.

14. Comment: It would be helpful to have a crop map to see where you have permanent or seasonal crops.

15. Comment: It is really important to do a lot of public relations for people to not over pump before the allocation is implemented.

16. Comment: A lot of people in this basin feel like their water is being stolen by the state when it is their water, connected to their land and to their freedom as Americans.

Presentation 4 – Projects and Management Actions

Alyson Watson, Woodward & Curran, explained that there are 47 different projects being evaluated. There are three categories of projects: recharge projects, surface water projects, and actions to reduce water demand. Examples of projects in each category were provided.

1. Question: What about looking at the recharge efforts in Fresno?

   Answer: Hicham ElTal, MID, noted that there are a lot of opportunities for putting water on the ground for a few months (during the rainy season) and allowing recharge to happen. MID has two pilot recharge projects east and south of Planada underway now. MID also has landowners in El Nido who are interested in recharge projects. There are lots of opportunities, but the big question is funding, identifying lands that could be used, and timing.

2. Comment: One difficulty in implementing recharge projects is that many of the systems that deliver water to these areas are damaged or destroyed. This sounds good in concept, but it is difficult to implement because ability to get the water to the systems is difficult.

3. Question: Can the main MID canal be used for recharge?

   Answer: Hischam ElTal, MID, explained that there are liability exposures with potential flood flows for MID that have to be overcome before this could happen.

4. Question: What does MID do with reclaimed water?

   Answer: Hicham ElTal, MID, noted that reclaimed water is a possible source of supply, but it can be expensive and may not be acceptable for some crops (e.g., almonds). The reclaimed water goes to refuges and duck clubs. From a basin wide perspective, it does not account for a lot of water supply - about 3,000 AF from the City of Merced.

5. Comment: The commenter has heard that the state is going to declare that all of the water belongs to the state.

   Response: Hicham ElTal, MID clarified that, if the region is not successful in reaching sustainability by 2040, the state will come in and manage the water for the Subbasin.

Merced Irrigation-Urban GSA
Merced Subbasin GSA
Turner Island Water District GSA #1

Summary of Merced Subbasin Groundwater Sustainability Plan Community Workshop in Atwater, CA

May 29, 2019

Overview

The fifth Merced Subbasin Groundwater Sustainability Plan community workshop was held in Atwater, CA on Wednesday, May 29, 2019 at the Atwater Community Center from 6 p.m. to 8 p.m. The workshop was attended by 8 community members, a representative from the City of Atwater, a representative from the Winton Water and Sanitary District, and three staff from the Groundwater Sustainability Agencies.

The goals for the workshop included the following:

1. Provide information about the status the Groundwater Management Plan under development for the Merced Subbasin.
2. Obtain participant feedback.
3. Encourage attendees to share their knowledge and experiences with groundwater in the Merced Subbasin.

The workshop was publicized using the following methods:

1. Press Release was issued to the Merced Sun-Star, Merced County Times, and posted on www.mercedsgma.org.
2. Display Ad was published in the main news section of the Atwater Signal on May 18, 2019 and the Merced Sun-Star on May 22, 2019.
3. Workshop Notices (English and Spanish) were widely distributed by partner organizations to their email distribution lists and were posted on the three GSA websites and several partner websites.
4. Self-Help Enterprises (SHE) and The Leadership Counsel for Justice and Accountability assisted with outreach by distributing workshop notices.

SHE provided a Spanish translator and communications system that supports simultaneous translation. No one utilized the translation option at this workshop.

Summary of Presentations and Discussions

Presentation 1 - Sustainable Groundwater Management Act and Groundwater Sustainability Plan, and Current and Projected Groundwater Conditions

Alyson Watson, Woodard & Curran, provided a review of the Sustainable Groundwater Management Act (SGMA) and the three Groundwater Sustainability Agencies (GSAs) developing the Merced Subbasin Groundwater Sustainability Plan (GSP). She also explained what a GSP is and what it includes. Alyson presented an overview of the hydrologic water modeling for current and projected groundwater conditions in the Merced Subbasin.

Brenda Wey, Winton Water and Sanitary District, provided a brief overview of some of the water supply and water quality challenges in Winton. Winton currently has a moratorium on new water connections. Winton experienced a small drop in water levels during the most recent drought, but is situated near a shallow/high aquifer and has been relatively fortunate compared to surrounding communities.

Brian Shaw, City of Atwater, provided a brief overview of some of the water supply and water quality challenges in Atwater. He noted that public groundwater wells had to be deepened during the recent drought, but the City fared better than some other surrounding areas. Groundwater levels have continued to rebound during the recent wet years. The City has continued conservation restrictions since the drought. One of the City's wells is being treated for 1,2,3-TCP with carbon filters, and all wells are expected to need to be treated. Water quality in Atwater is good.

The following questions and comments were offered by participants:

1. <u>Question</u>: What hydrologic model are you using?

   <u>Answer</u>: A custom model developed on the IWFM (Integrated Water Flow Model) platform developed by the Department of Water Resources. It is the same platform as C2VSIM, more refined than the fine-grid C2VSIM that is being developed now.

2. <u>Question</u>: On Slide 17 titled "The Groundwater Model Estimates Flows Into and Out of the Groundwater Basin", what is the black line?

   <u>Answer</u>: Cumulative change in storage, a sum of all the net "ins" and "outs" from the Merced Subbasin storage over time.

3. <u>Question</u>: Does Slide 17 titled "The Groundwater Model Estimates Flows Into and Out of the Groundwater Basin" include projected land uses?

   <u>Answer</u>: Yes, it assumes 2040 water demands and General Plan buildout. It uses the latest crop type data with small minor updates based on specific feedback/projections from each of the three GSAs.

4. <u>Question</u>: Is the Merced Subbasin being drawn down more than is being replaced?

   <u>Answer</u>: Yes

5. <u>Comment</u>: Tree orchards are being planted now. These won't be able to be changed to a different crop that would use less water any time soon.

6. <u>Comment</u>: We need to conserve water and keep our neighbors in mind when using water. Water is a resource for everyone.

Presentation 2 – Sustainable Management for the Merced Subbasin Groundwater

Alyson Watson, Woodard & Curran, provided an overview of sustainable management criteria, what "sustainable yield" means, what an allocation framework is, what the allocation scheme for the Merced Subbasin is, how projects and management activities will provide additional water.

1. Question: How will the GSA handle groundwater users that can afford to pay and pump as much as they want to?

   Answer: An allocation plan is being developed that will address this possibility.

2. Question: How does agricultural water get allocated based on acreage; won't that continue the shortages that we have had in the past?

   Answer: The GSAs will be developing the allocation system in the first five years. The allocations will be based on the estimated sustainable yield of the basin. It is expected that some of the water could be traded in the future once a system is devised to be protective of the Subbasin.

3. Question: How will the allocation fee structure work for those that develop new water supplies or for those that decide they want to irrigate their land in the future?

   Answer: Pumping fees collected could be used to enable development of new supplies.

4. Question: How do de minimus users get included in allocation framework? How do you figure out their allocation?

   Answer: This is yet to be determined. GSAs can decide to include or exclude de minimus users from the allocation. GSAs cannot require monitoring of de minimus users.

5. Question: Community water systems may not be considered de minimus users, so how do they fit into the allocation framework?

   Answer: They generally are considered overlying users and would get an allocation per acre.

6. Question: Will cities be allocated based on historical uses and not future projections?

   Answer: Yes, and this is based on what is typically done for appropriative rights. The GSP team worked closely with the Coordinating Committee and Stakeholder Committee to look at several options for what historical period to use. There was only a small variation in amounts with different time periods. The current plan uses 1995 to 2015.

7. Question: How would City of Merced accommodate their planned growth and be allocated?

   Answer: Reduce per capita use or find new sources of supply to meet increased demand.

8. Question: Where can we find a description of the possible projects?

   Answer: The section of the GSP that includes the projects will be posted June 7. We'll post the draft project list on May 30.

9. Question: Where is the funding coming from?

   Answer: Current work is funded from Proposition 1. There are some funds available for future projects from Proposition 68.

10. Question: Is there a specific timeline for projects or triggers for implementation (e.g. allocation not being met)?

    Answer: At this point, the main management action is the allocation framework. Other projects have estimated timelines. Some are "more ready" (with timelines already), but implementation depends on funding. Projects that increase water supply would increase the allocations. The allocation will be phased in until 2040. As projects are implemented the allocations can be updated.

11. Question: Has there been discussion about replenishment beyond individuals to a regional basis?

Answer: The Coordinating Committee is applying for a long-term permit for stream diversion of flood flows. The permit would identify as many as possible diversion points along surface water conveyances so multiple landowners could opt to divert water to flood fields and manage recharge on a large scale. Currently, diversions are on an emergency basis and less reliable.

12. Question: Has the team or the GSAs talked to landowners about flooding for recharge purposes?

    Answer: Merced Irrigation District (MID) has done some flood management and recharge activities on rice fields. MID holds a water right off of Mariposa Creek that is designated for El Nido. There is a project included in the Integrated Regional Water Management Plan to automate an existing check structure on Mariposa Creek to move floodwater safely.

13. Question: Will the fee structure be used to pay for projects?

    Answer: Generally, the water users who benefit from a project will pay for the project.

14. Question: For groundwater levels (GWLs), with the minimum threshold set at 2015 levels, how many wells dewatered?

    Answer: The minimum threshold for GWLs is set at the shallowest domestic well within a 2-mile radius. Only a small number of wells where GWLs historically appear to be below shallowest domestic well have the 2015 GWL used as the minimum threshold. We haven't specifically analyzed the number of domestic wells dewatered by minimum threshold selections, but we can develop that information.

15. Question: For SGMA, GSAs are supposed to look at the full range of water quality contaminants that could be affected by groundwater management (pumping). Is the GSP doing this for contaminants other than salinity?

    Answer: There's a difference between monitoring and setting thresholds. Thresholds are set for salinity, which is the constituent where pumping could affect the movement of salinity. For other constituents, we don't have evidence that undesirable results are caused by pumping and will continue to monitor and review.

16. Comment: The GSAs should look at a number of constituents such as arsenic being released from the soil into the groundwater and monitor for more than salinity. Another Subbasin is looking at the percent change of the constituent as the minimum threshold rather than a set concentration of the contaminant.

17. Question: Are you working with other GSAs?

    Answer: Both Woodard & Curran and Catalyst are working with several other Subbasins in different capacities (outreach, modeling only, full planning, etc.).

18. Question: Are GSAs talking about uniform formats for data?

    Answer: Yes, we've developed a Data Management System specifically for the Merced Subbasin GSP. We'll tailor the DMS further to align with DWR standardized reporting when it is defined.

19. Question: Is data being coordinating throughout the Central Valley?

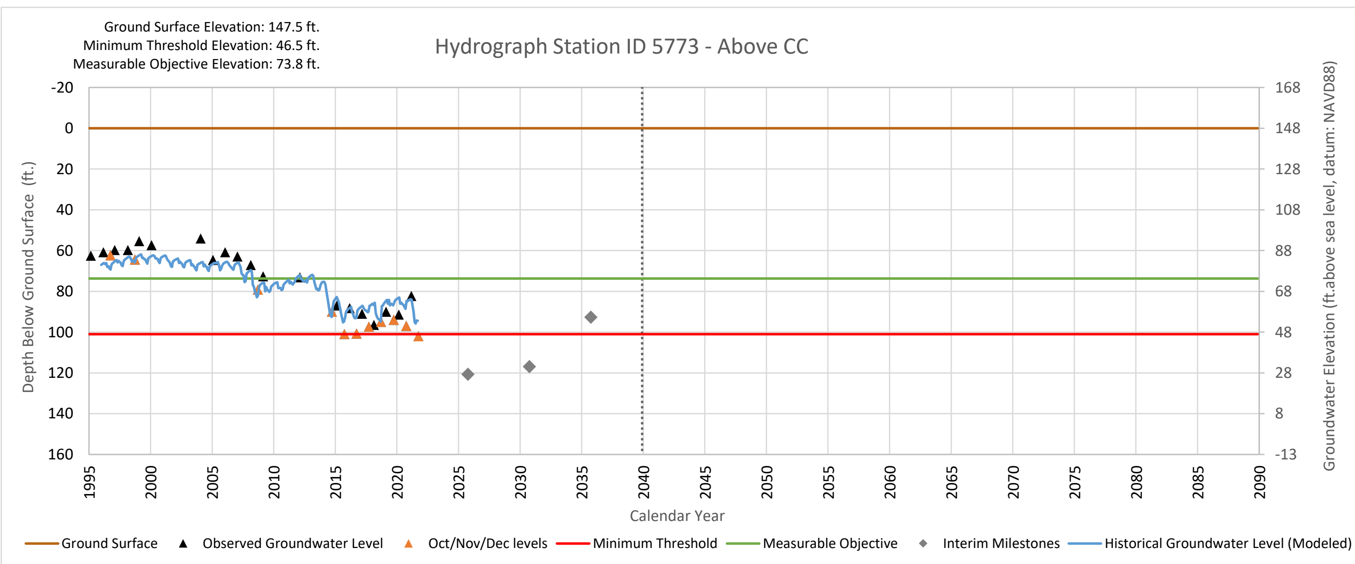
    Answer: This would be the responsibility of the Department of Water Resources.

APPENDIX C: GEOLOGIC TIME SCALE

APPENDIX D: MERCEDWRM MODEL DOCUMENTATION

APPENDIX E: WATER QUALITY CONSTITUENT CONCENTRATION PLOTS

APPENDIX F: SUSTAINABLE MANAGEMENT CRITERIA HYDROGRAPHS FOR DECLINING GROUNDWATER LEVELS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Measurable Objective Elevation: 73.8 ft.
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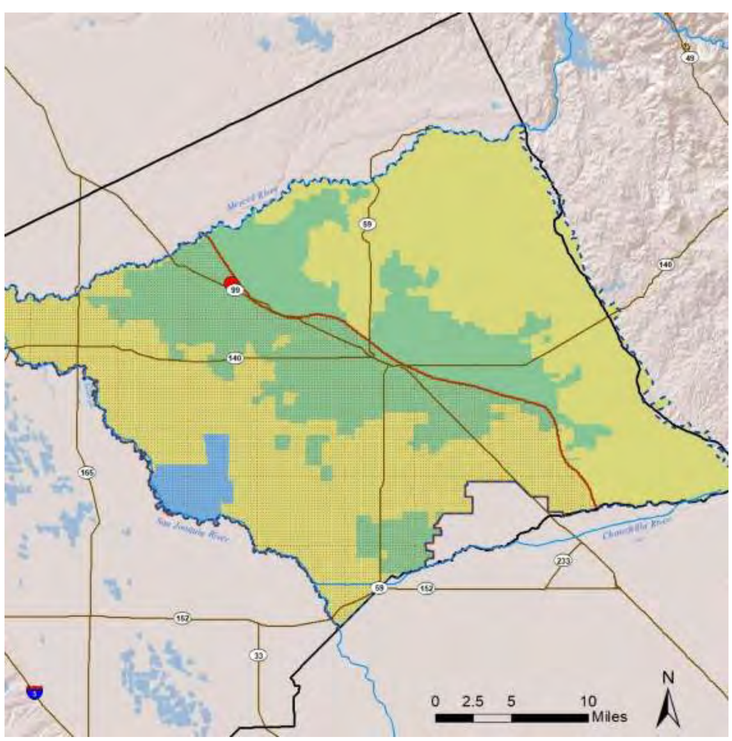
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)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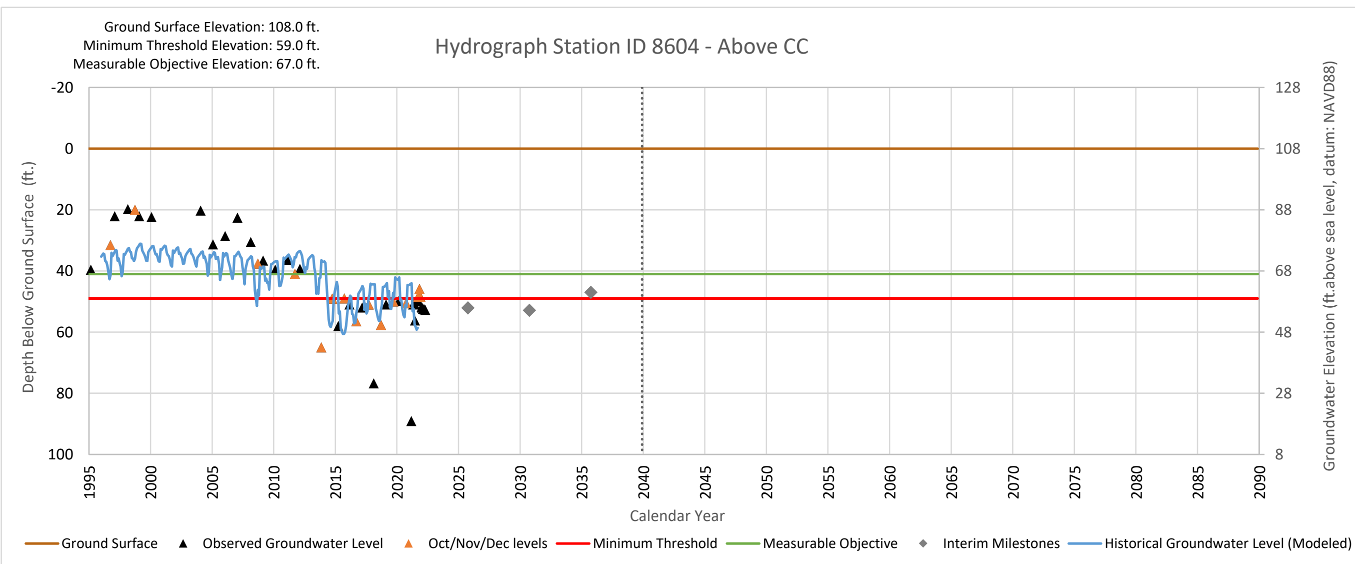
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Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
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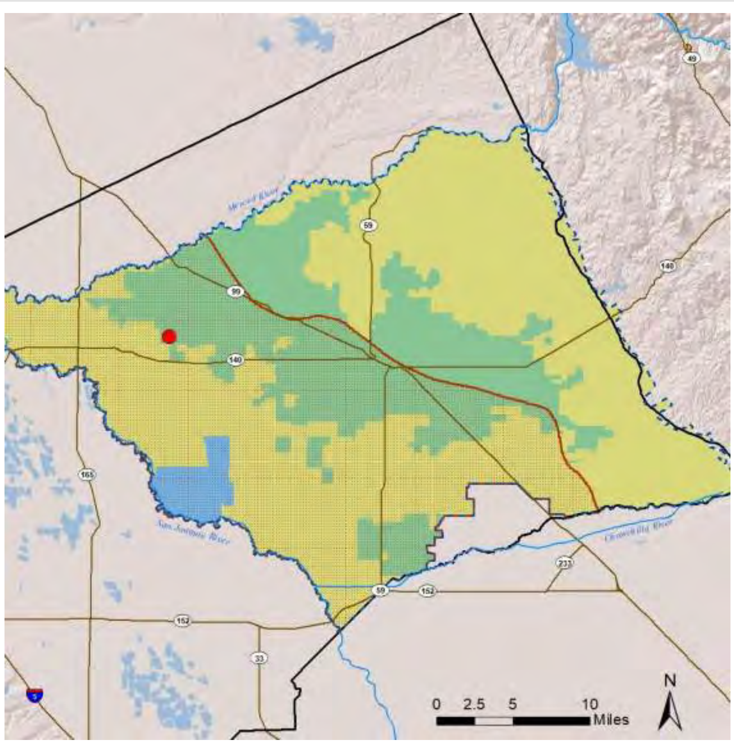
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)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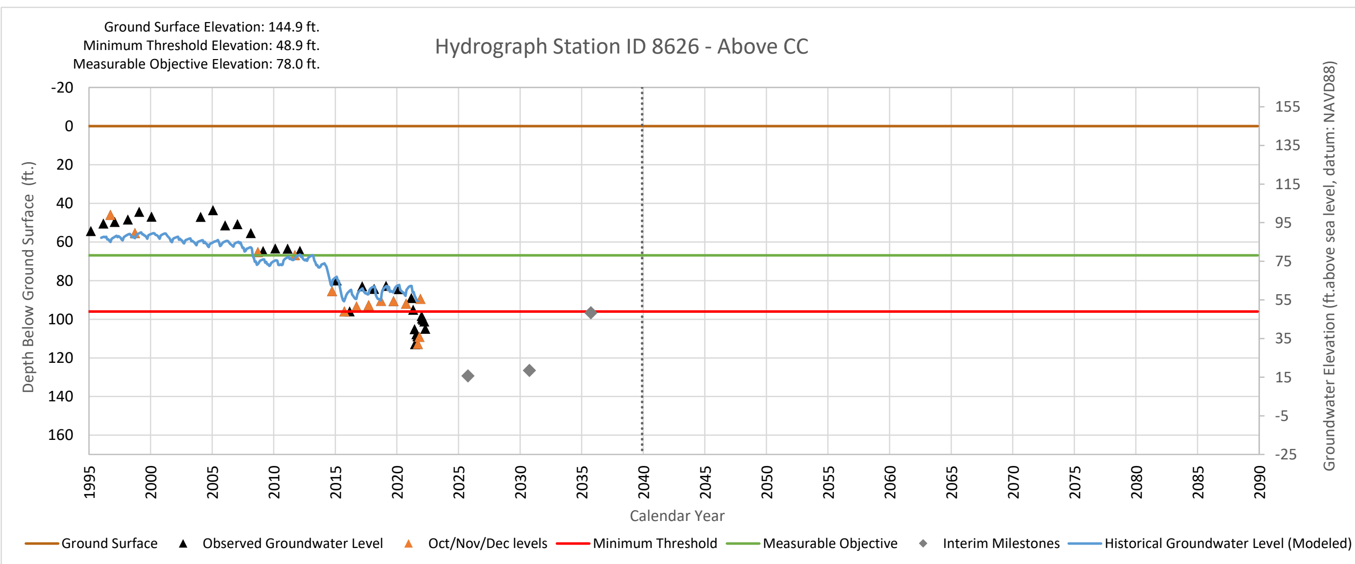
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Measurable Objective Elevation: 78.0 ft.
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Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
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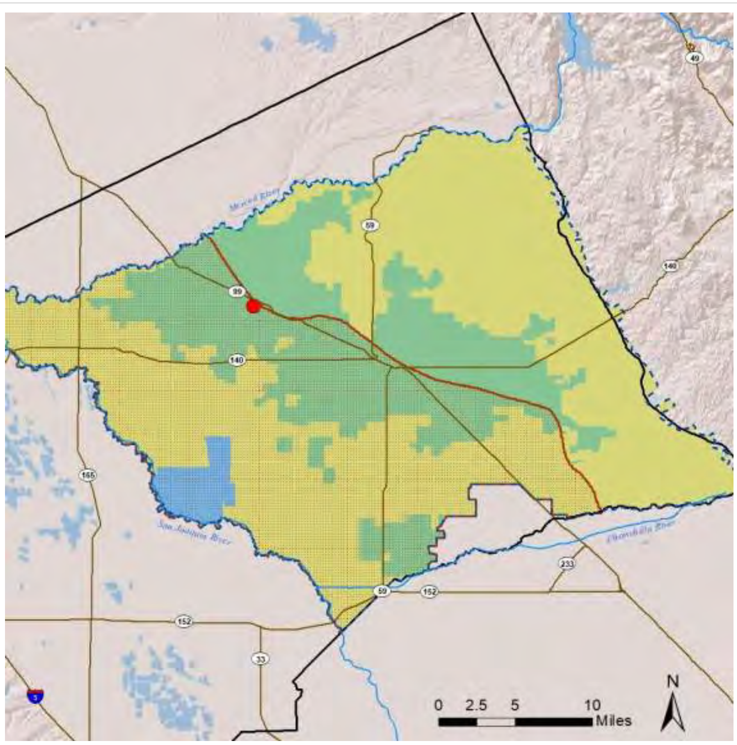
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)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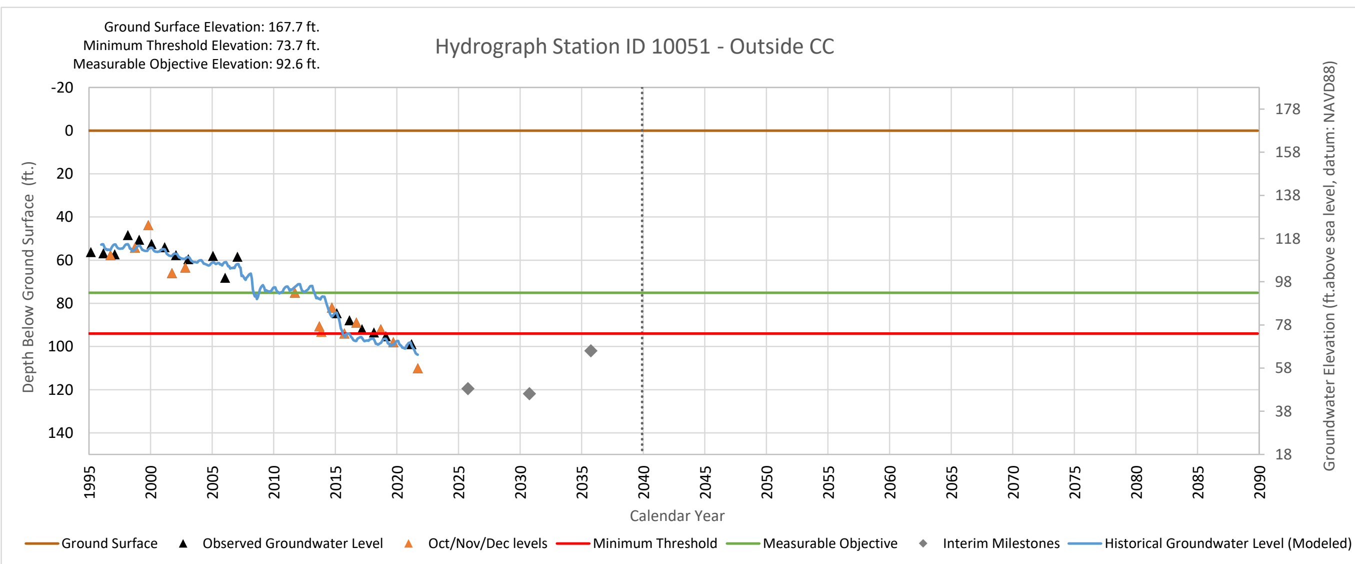

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Minimum Threshold Elevation: 73.7 ft.
Measurable Objective Elevation: 92.6 ft.
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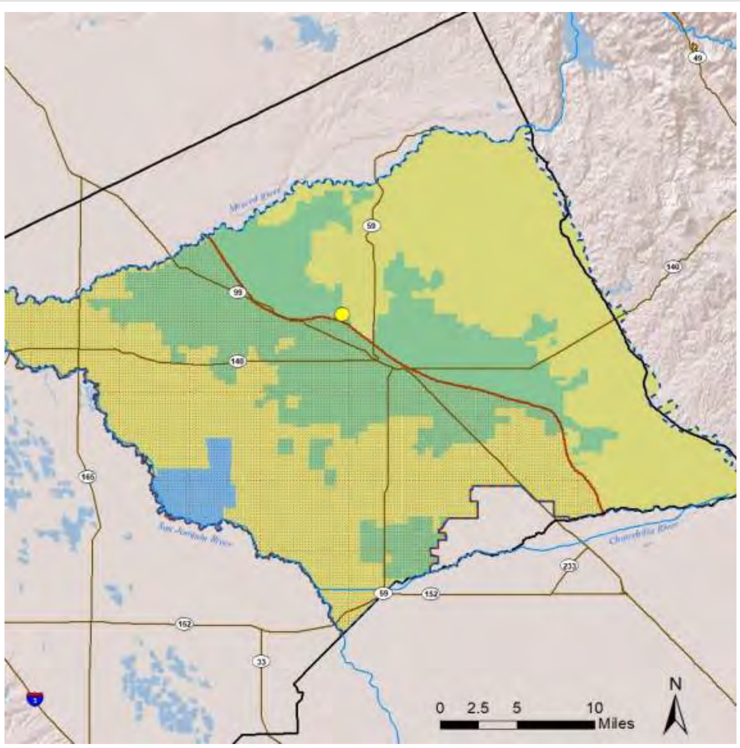
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)



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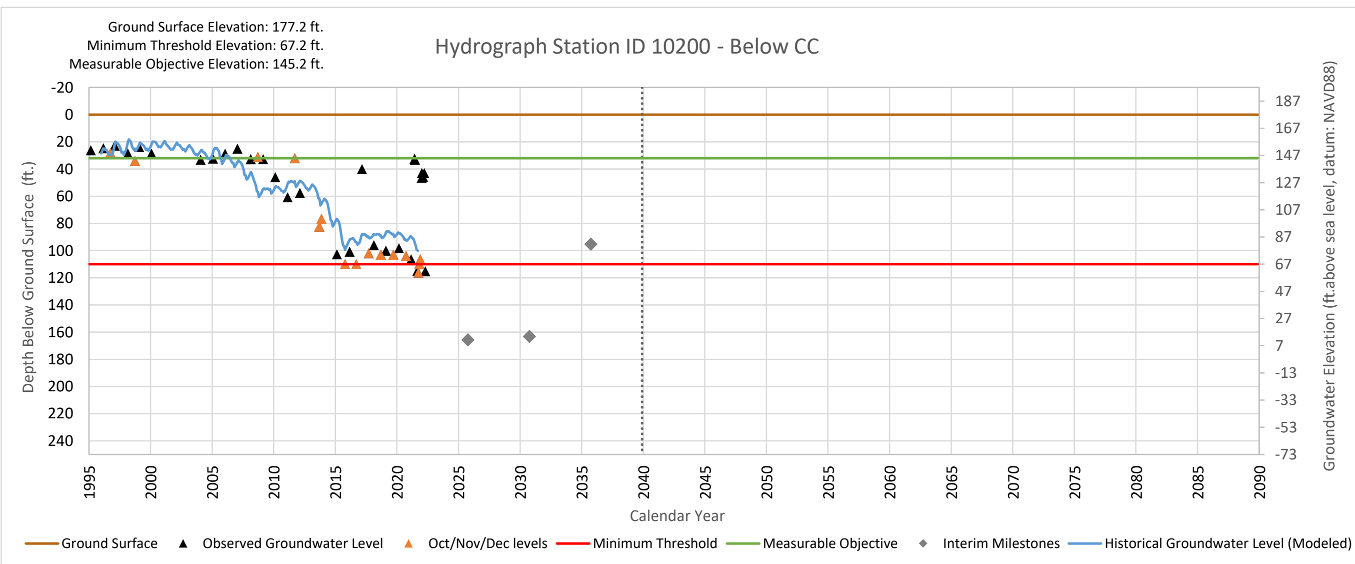

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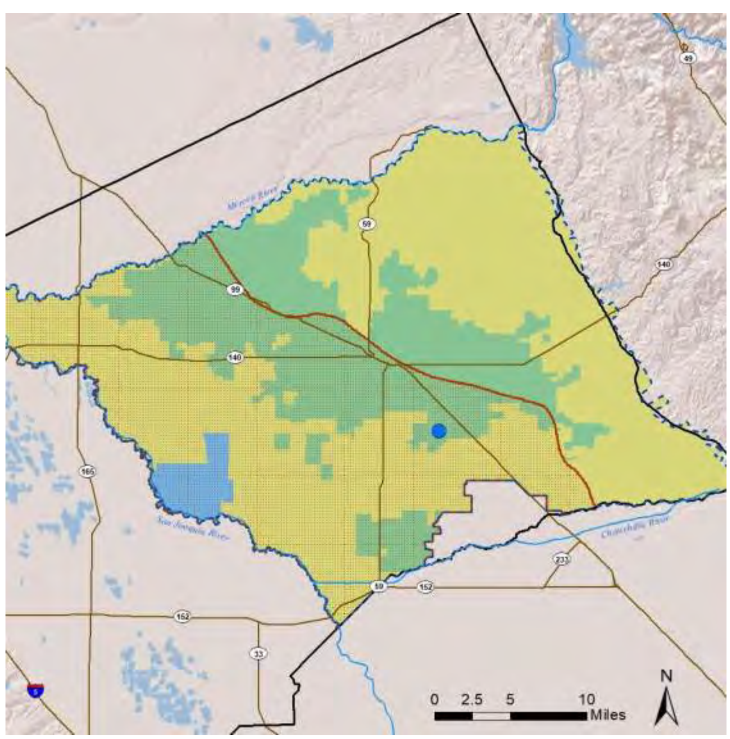
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)



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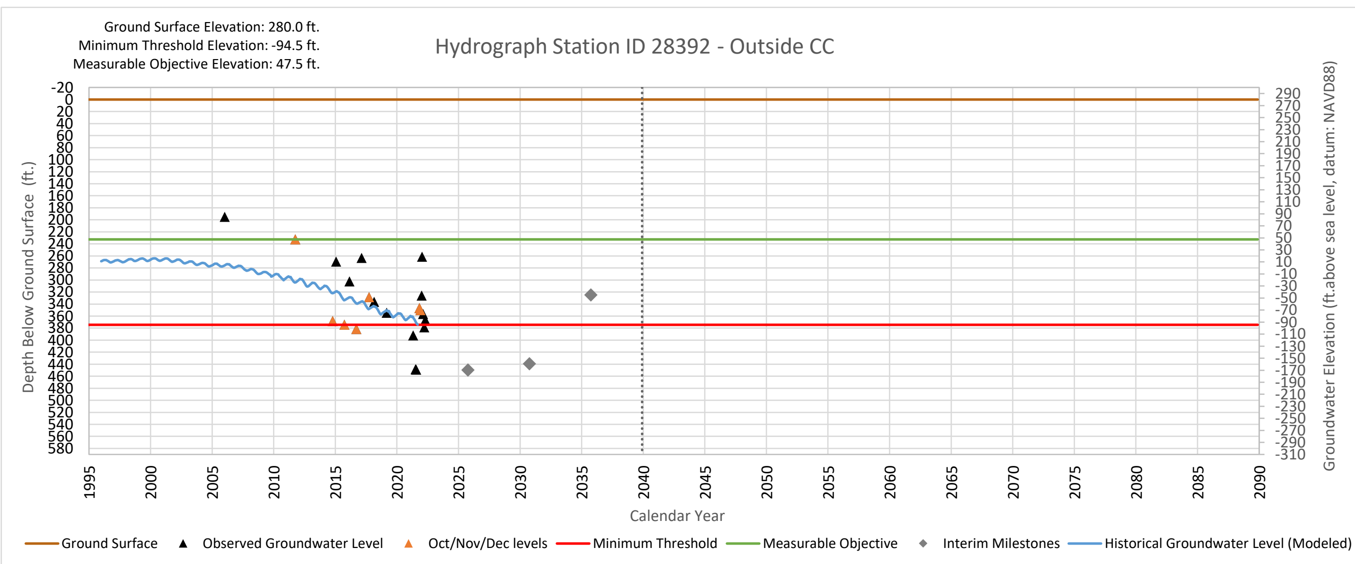
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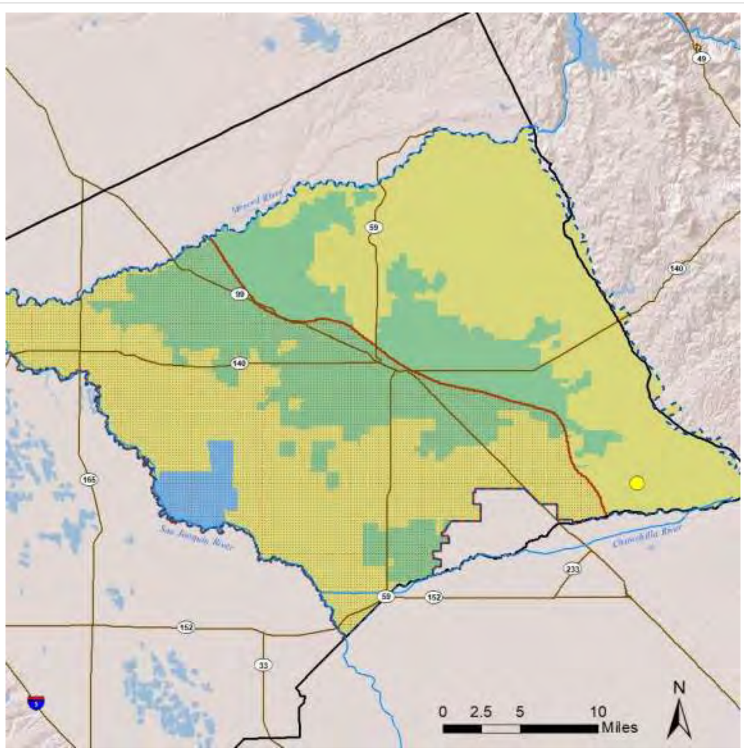
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)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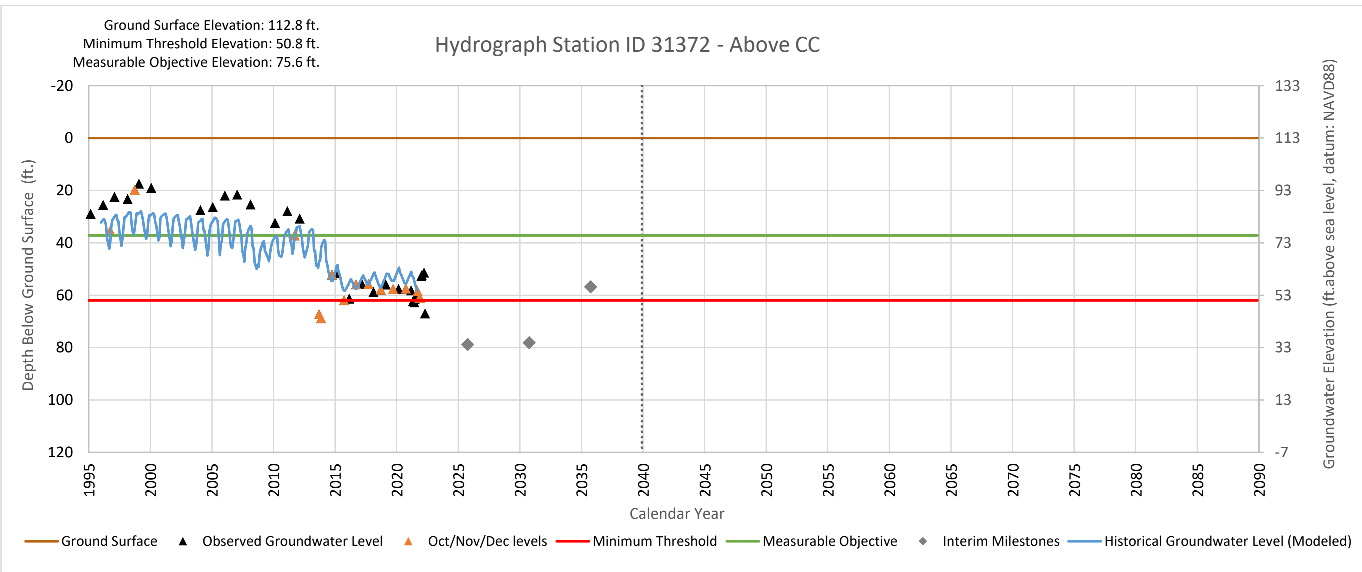

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Minimum Threshold Elevation: 50.8 ft.
Measurable Objective Elevation: 75.6 ft.
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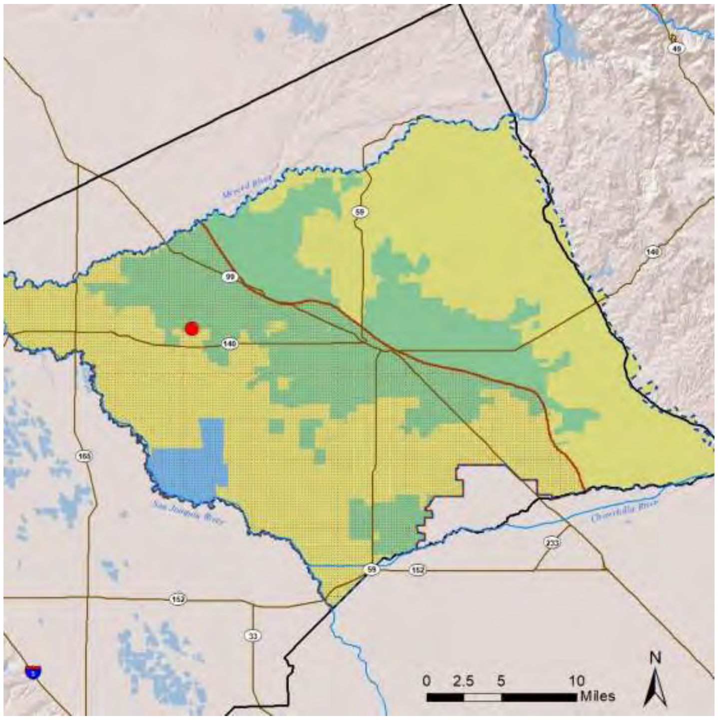
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)



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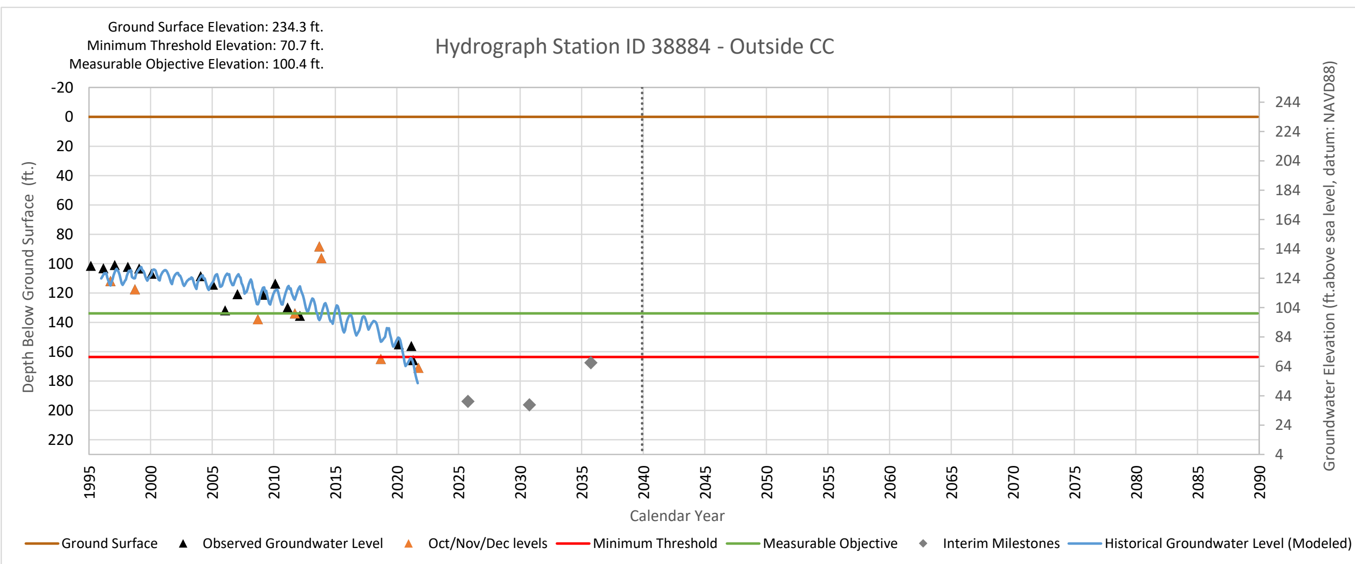

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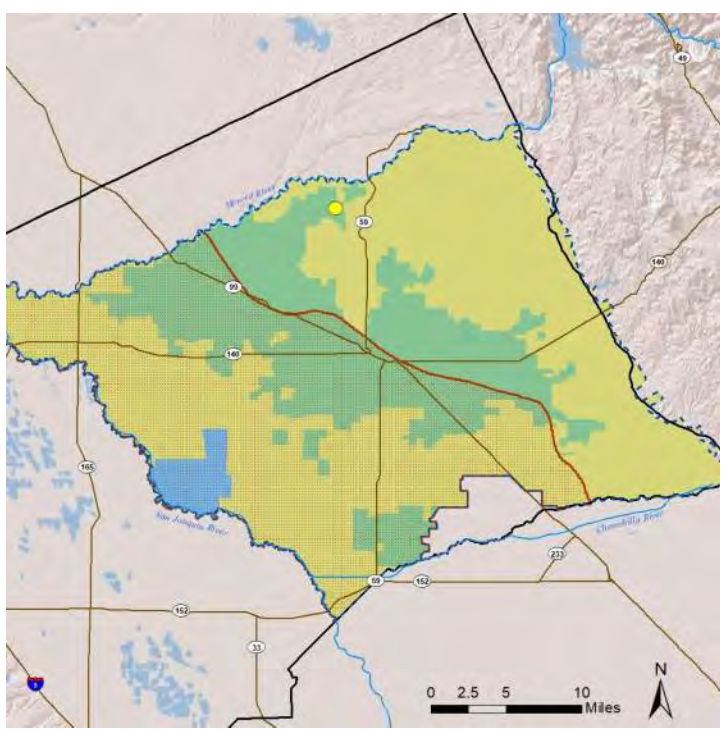
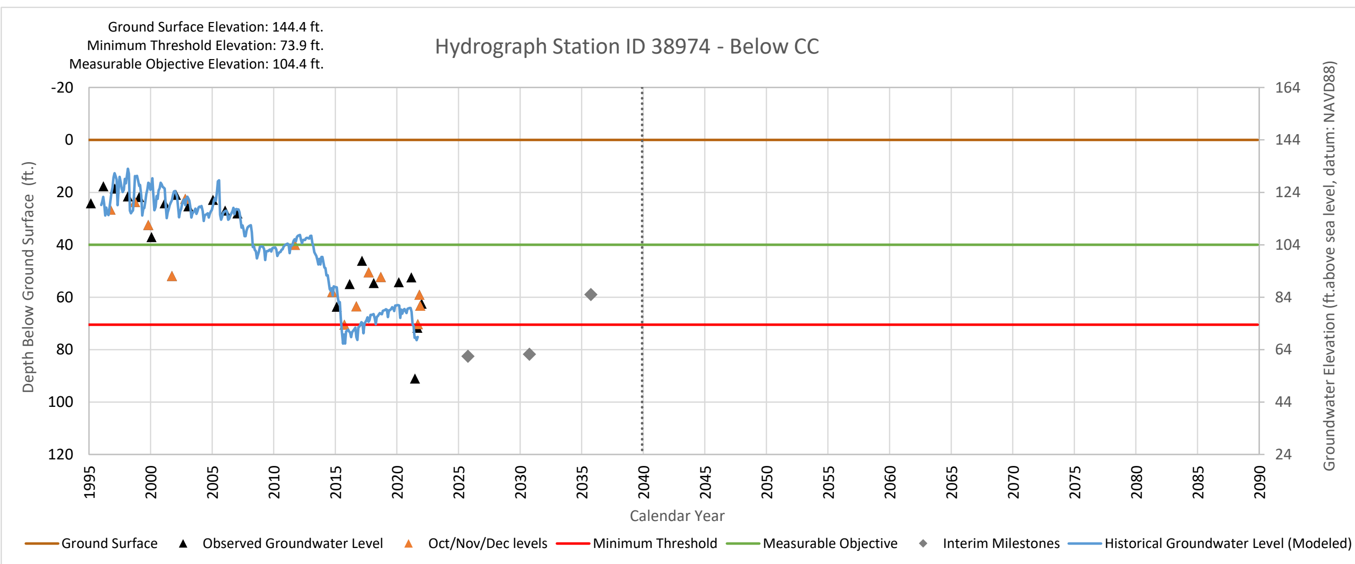
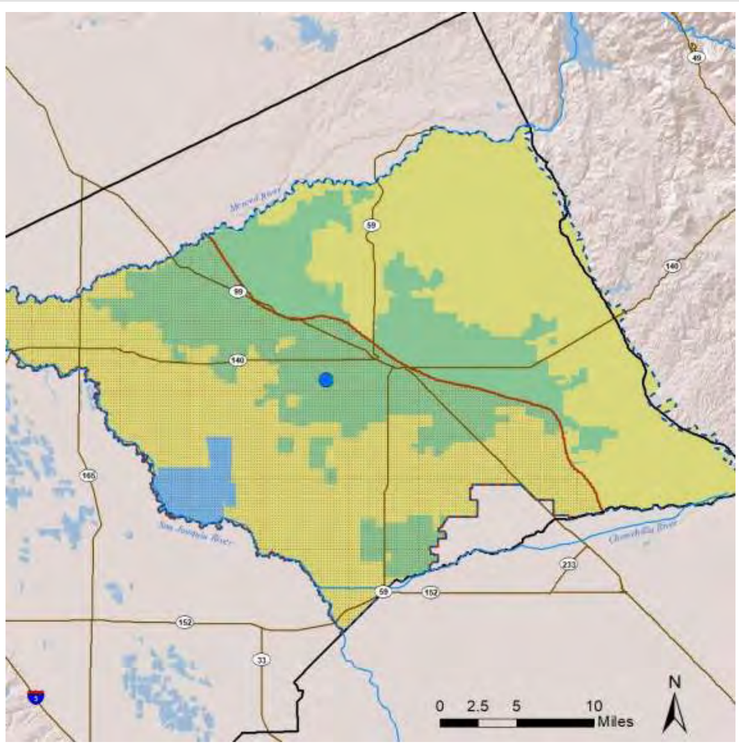
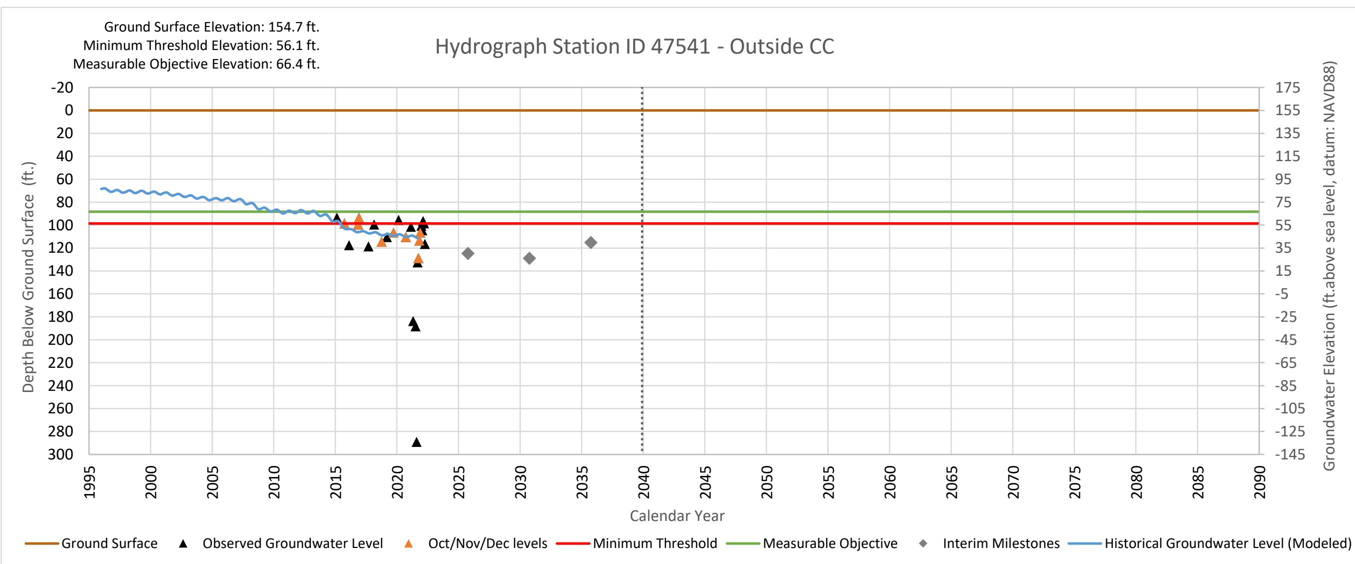
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)



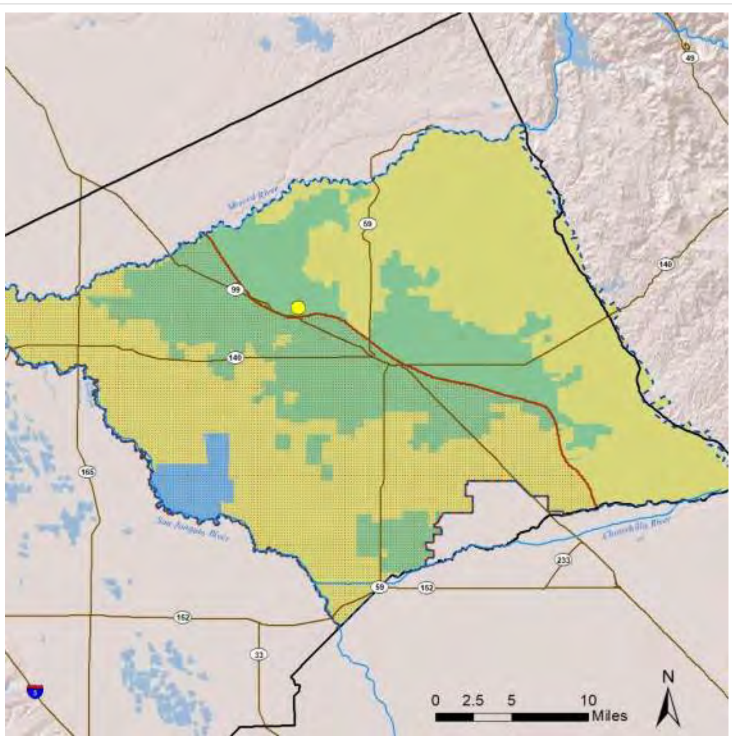
0 2.5 5 10
Miles
N


Ground Surface Elevation: 144.4 ft.
Minimum Threshold Elevation: 73.9 ft.
Measurable Objective Elevation: 104.4 ft.
Hydrograph Station ID 38974 - Below CC
Depth Below Ground Surface (ft.)
-20
0
20
40
60
80
100
120
Groundwater Elevation (ft.above sea level, datum: NAVD88)
164
144
124
104
84
64
44
24
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)

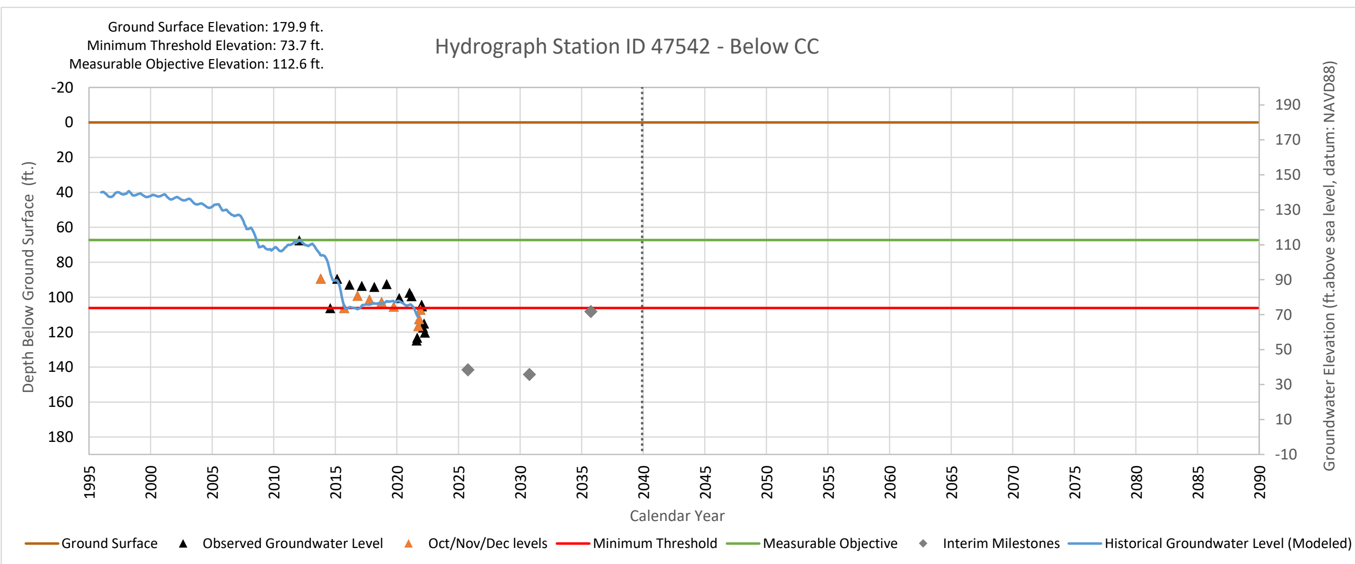

0
2.5
5
10
Miles
N



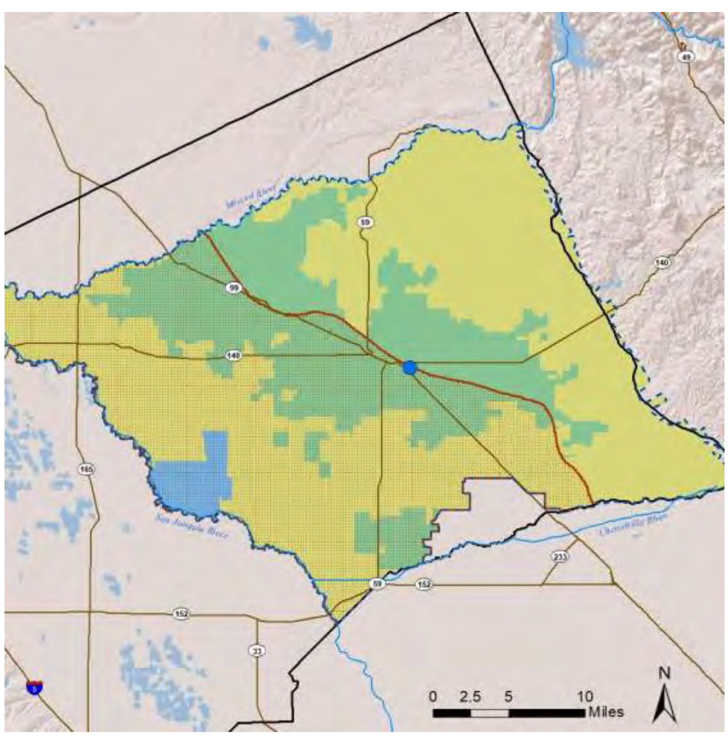
Ground Surface Elevation: 154.7 ft.
Minimum Threshold Elevation: 56.1 ft.
Measurable Objective Elevation: 66.4 ft.
Hydrograph Station ID 47541 - Outside CC
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)



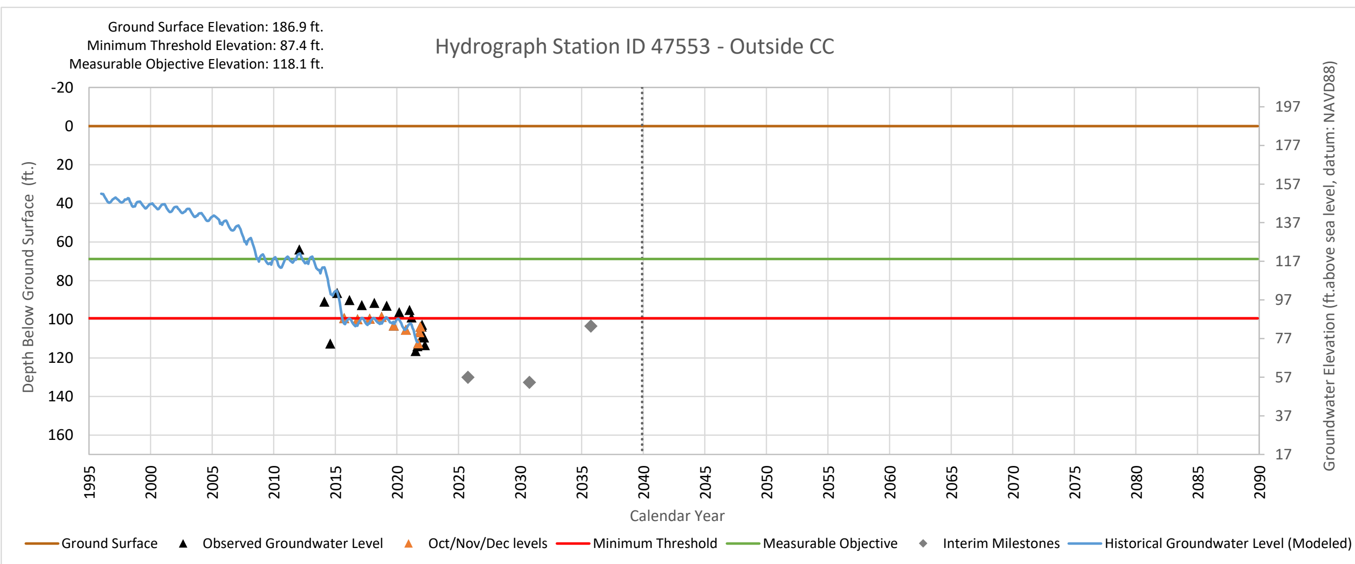
0 2.5 5 10
Miles
N

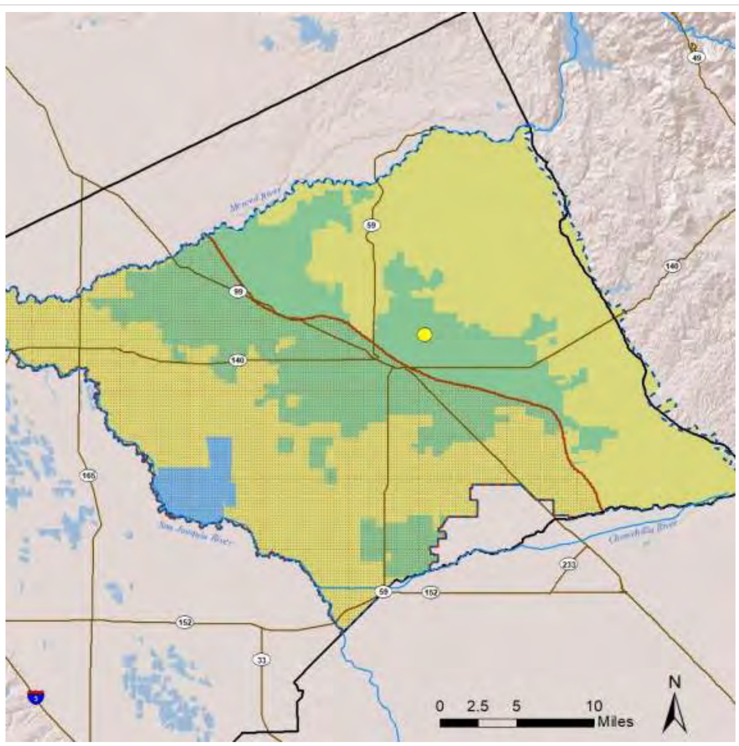


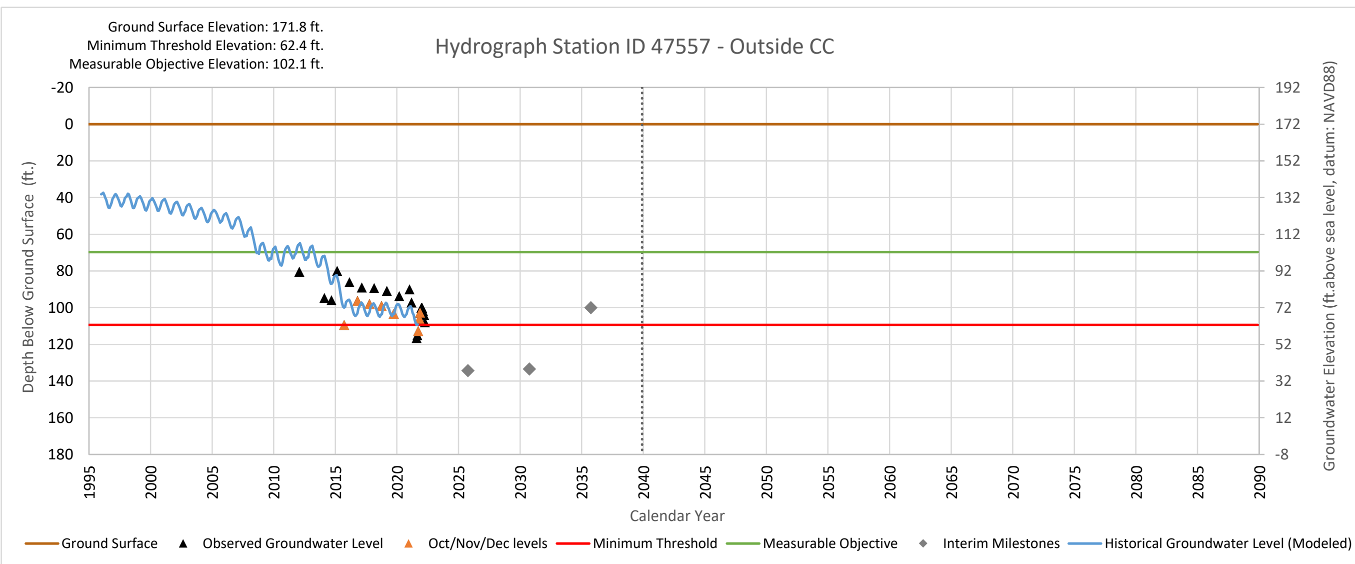
Ground Surface Elevation: 179.9 ft.
Minimum Threshold Elevation: 73.7 ft.
Measurable Objective Elevation: 112.6 ft.
Hydrograph Station ID 47542 - Below CC
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)



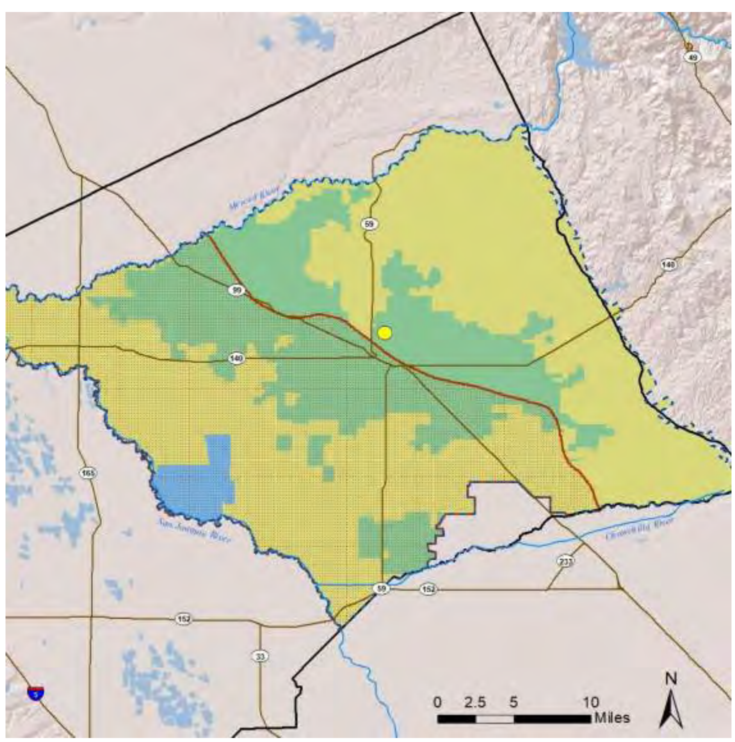
0 2.5 5 10
Miles
N


Ground Surface Elevation: 186.9 ft.
Minimum Threshold Elevation: 87.4 ft.
Measurable Objective Elevation: 118.1 ft.
Hydrograph Station ID 47553 - Outside CC
Depth Below Ground Surface (ft.)
-20
0
20
40
60
80
100
120
140
160
Groundwater Elevation (ft.above sea level, datum: NAVD88)
197
177
157
137
117
97
77
57
37
17
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)

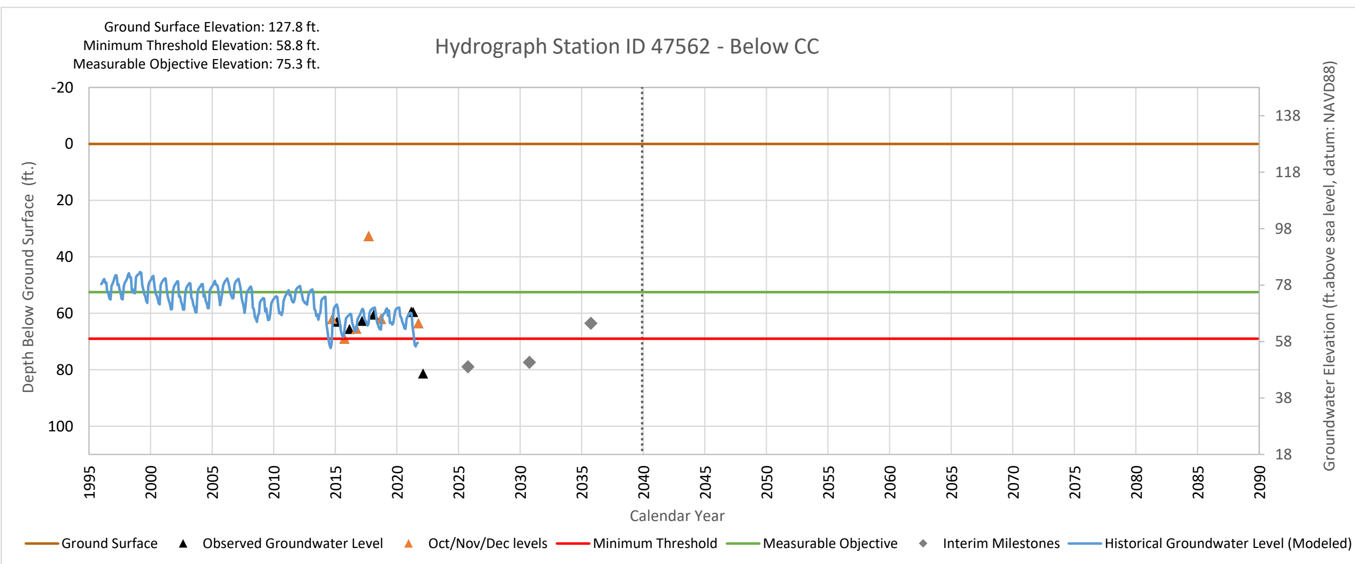

0
2.5
5
10
Miles
N

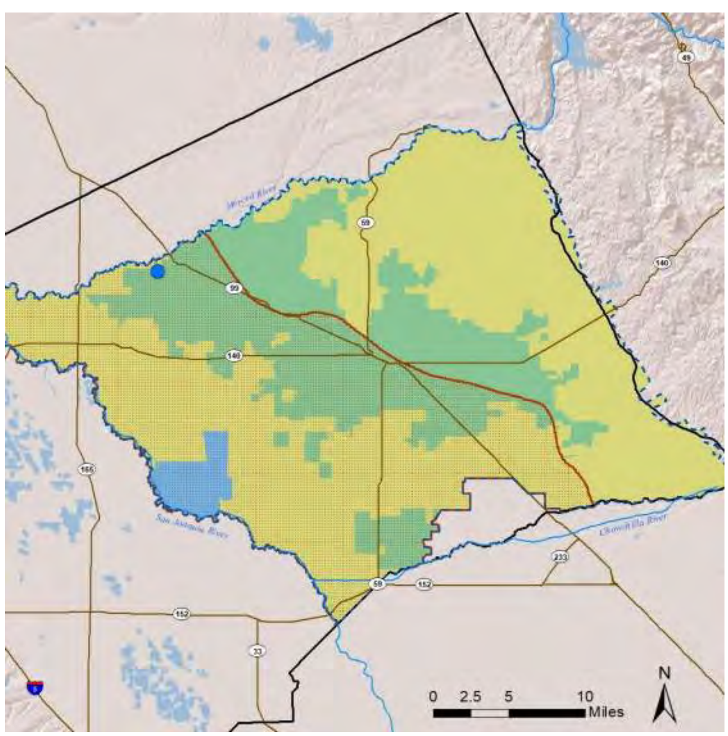


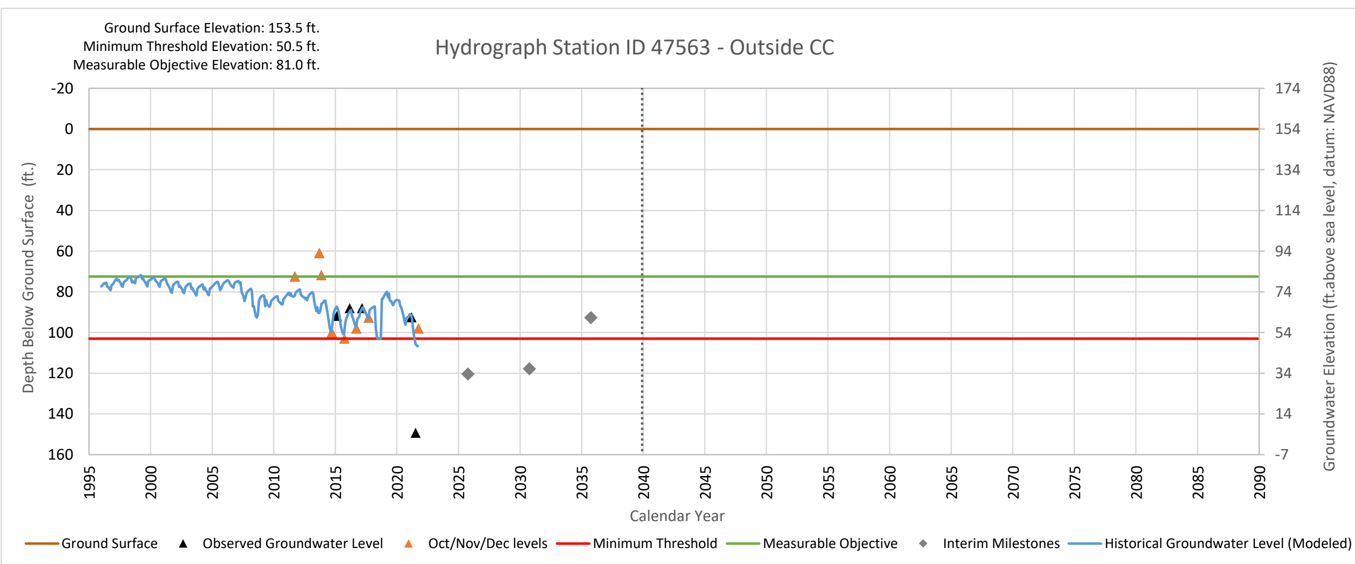
Ground Surface Elevation: 171.8 ft.
Minimum Threshold Elevation: 62.4 ft.
Measurable Objective Elevation: 102.1 ft.
Hydrograph Station ID 47557 - Outside CC
Depth Below Ground Surface (ft.)
-20
0
20
40
60
80
100
120
140
160
180
Groundwater Elevation (ft.above sea level, datum: NAVD88)
192
172
152
132
112
92
72
52
32
12
-8
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)

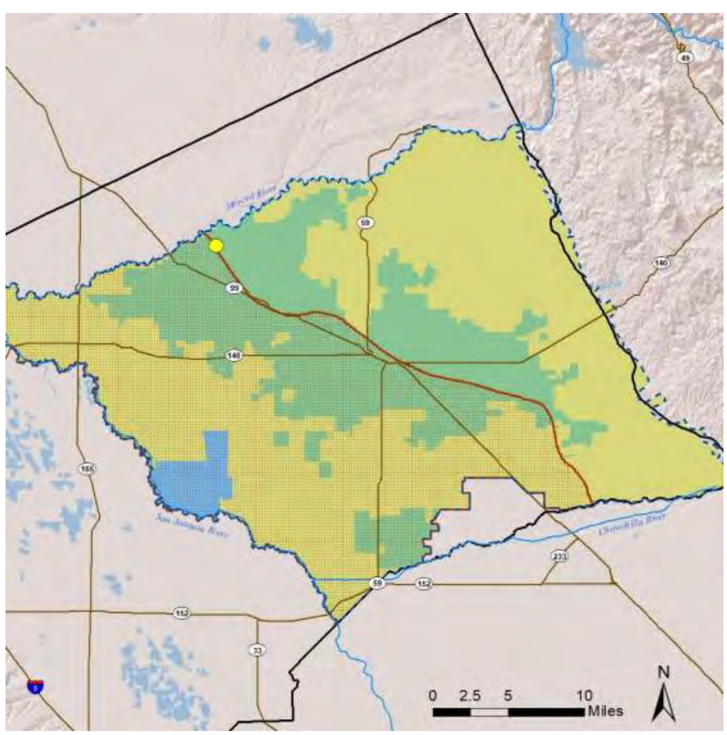


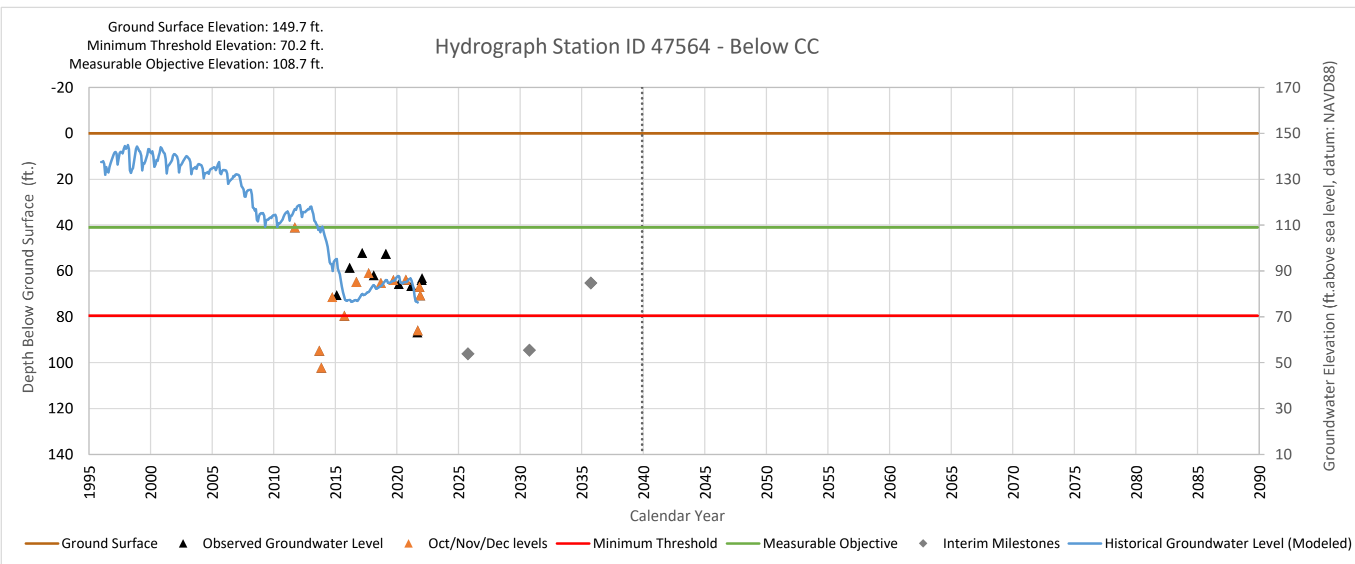
N
0
2.5
5
10
Miles

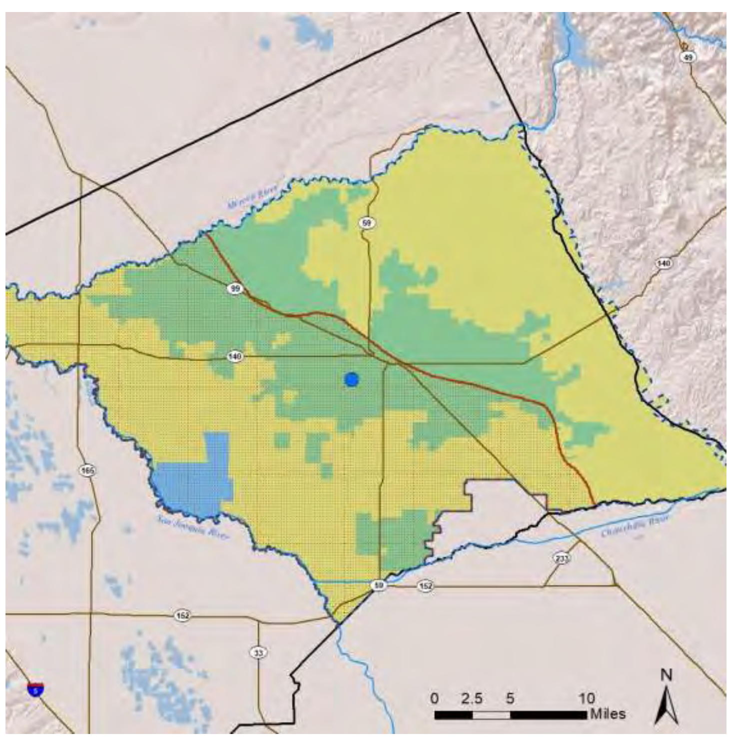

Ground Surface Elevation: 127.8 ft.
Minimum Threshold Elevation: 58.8 ft.
Measurable Objective Elevation: 75.3 ft.
Hydrograph Station ID 47562 - Below CC
Depth Below Ground Surface (ft.)
-20
0
20
40
60
80
100
Groundwater Elevation (ft.above sea level, datum: NAVD88)
138
118
98
78
58
38
18
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)

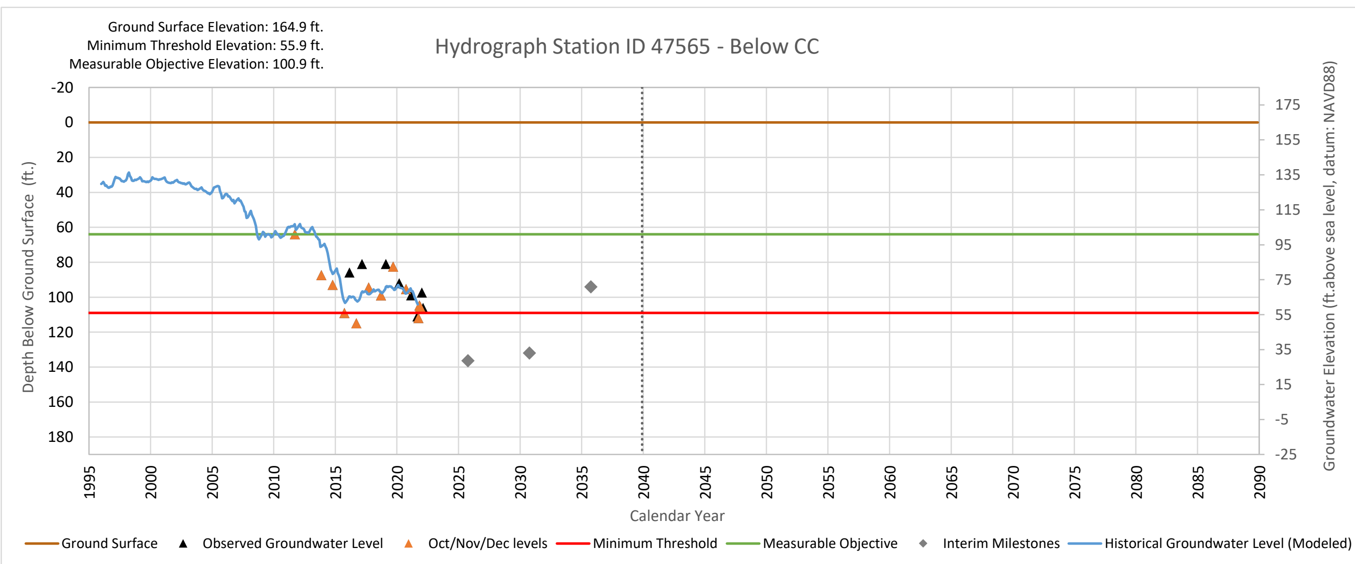

0
2.5
5
10
Miles
N

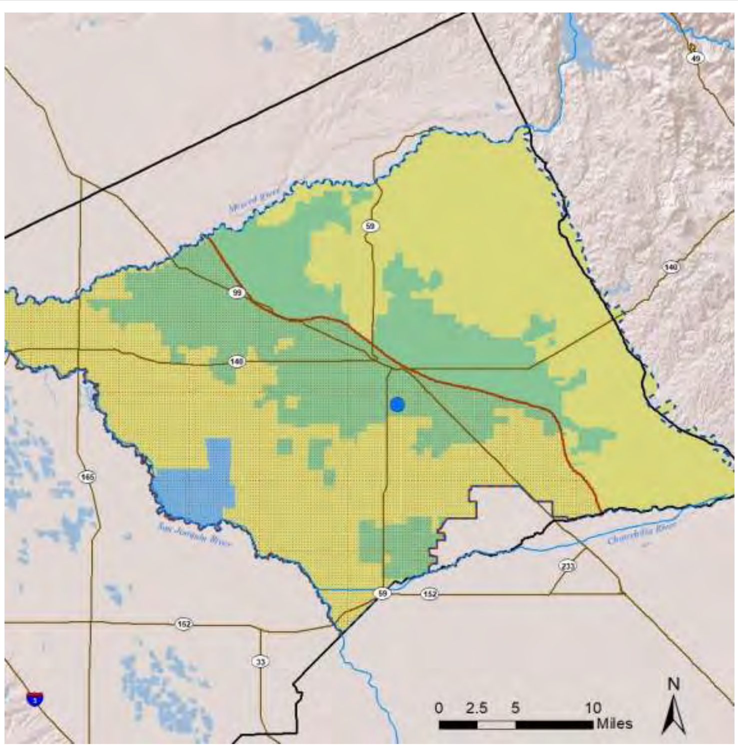

Ground Surface Elevation: 153.5 ft.
Minimum Threshold Elevation: 50.5 ft.
Measurable Objective Elevation: 81.0 ft.
Hydrograph Station ID 47563 - Outside CC
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)

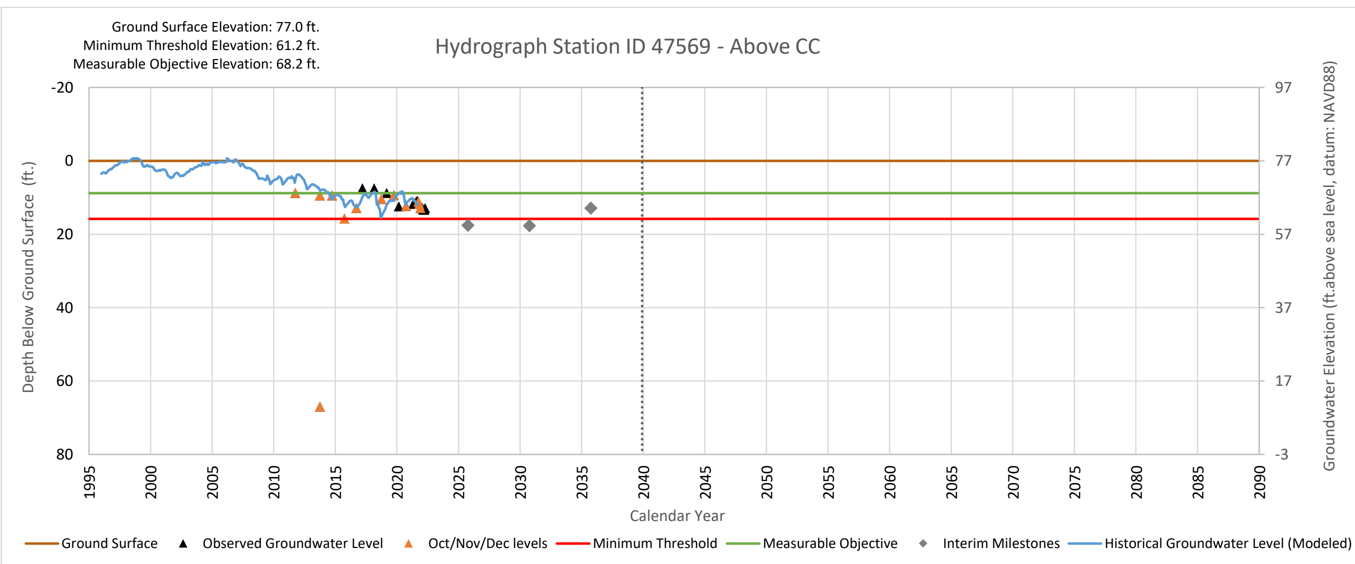

0 2.5 5 10
Miles
N

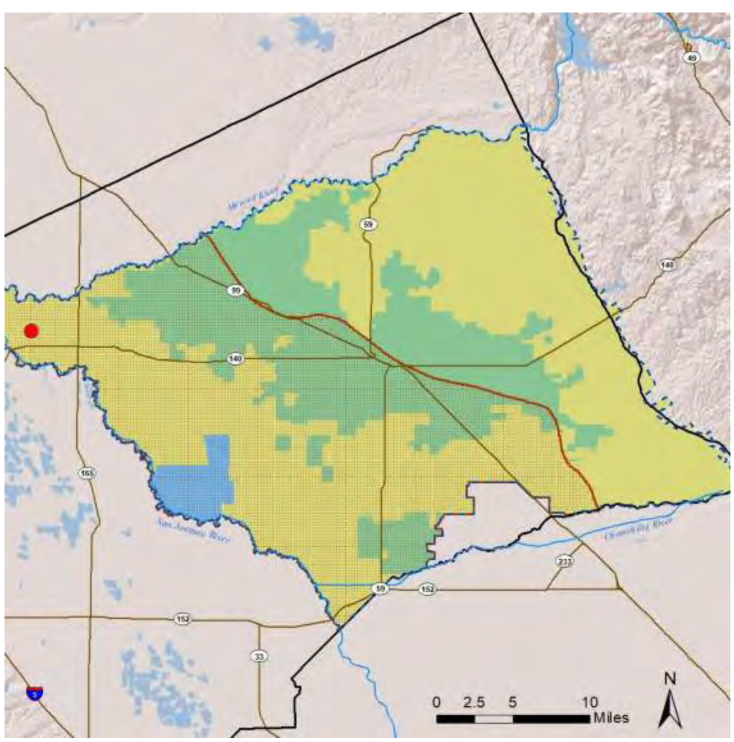

Ground Surface Elevation: 149.7 ft.
Minimum Threshold Elevation: 70.2 ft.
Measurable Objective Elevation: 108.7 ft.
Hydrograph Station ID 47564 - Below CC
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
-20
0
20
40
60
80
100
120
140
170
150
130
110
90
70
50
30
10
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)

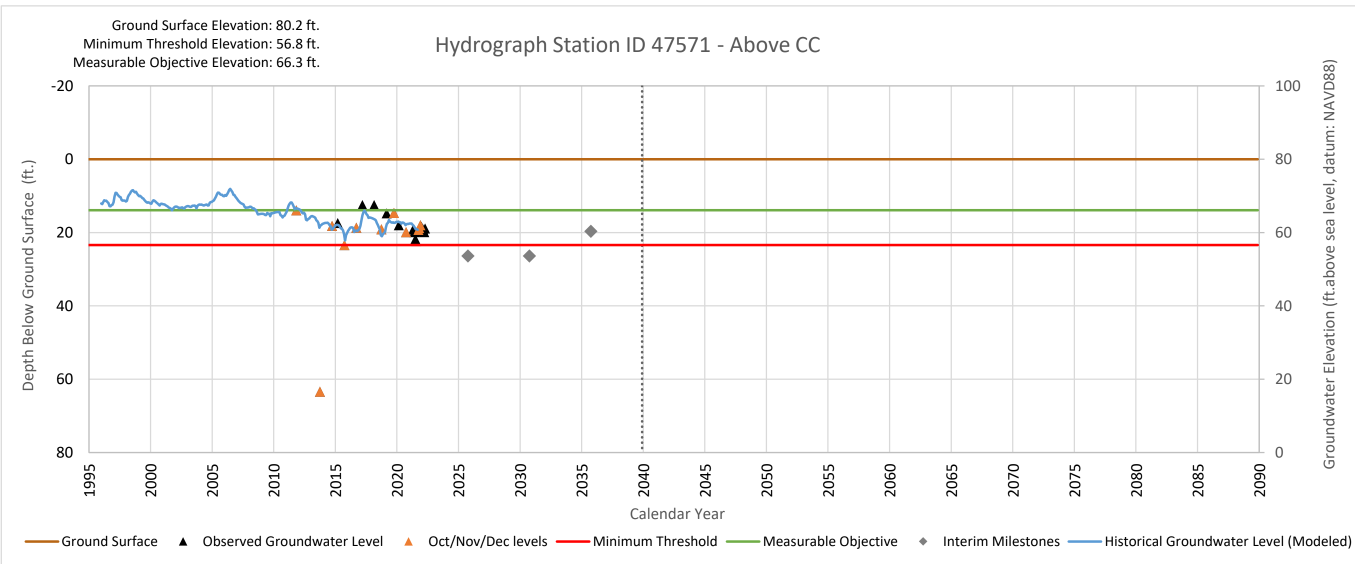

0 2.5 5 10
Miles
N

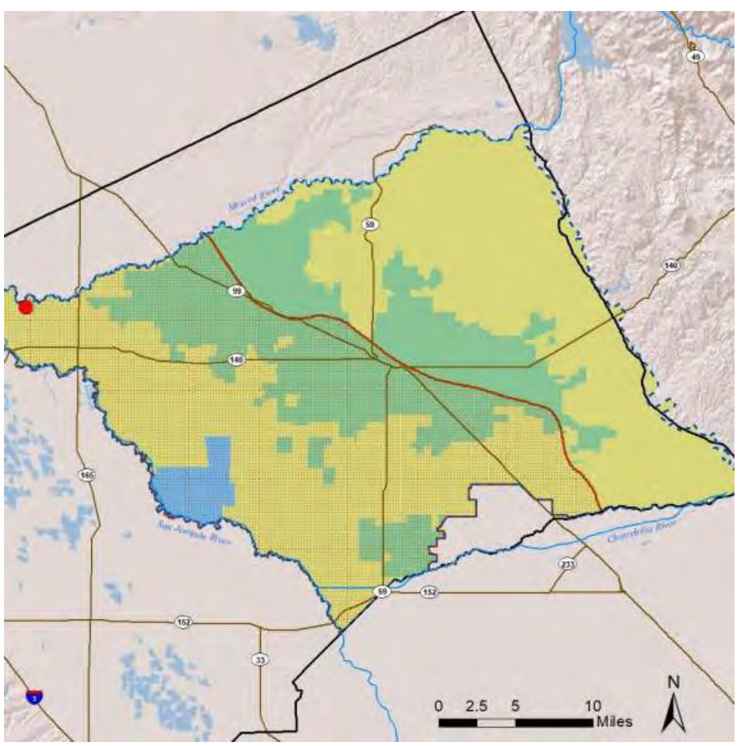

Ground Surface Elevation: 164.9 ft.
Minimum Threshold Elevation: 55.9 ft.
Measurable Objective Elevation: 100.9 ft.
Hydrograph Station ID 47565 - Below CC
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
-20
0
20
40
60
80
100
120
140
160
180
175
155
135
115
95
75
55
35
15
-5
-25
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)

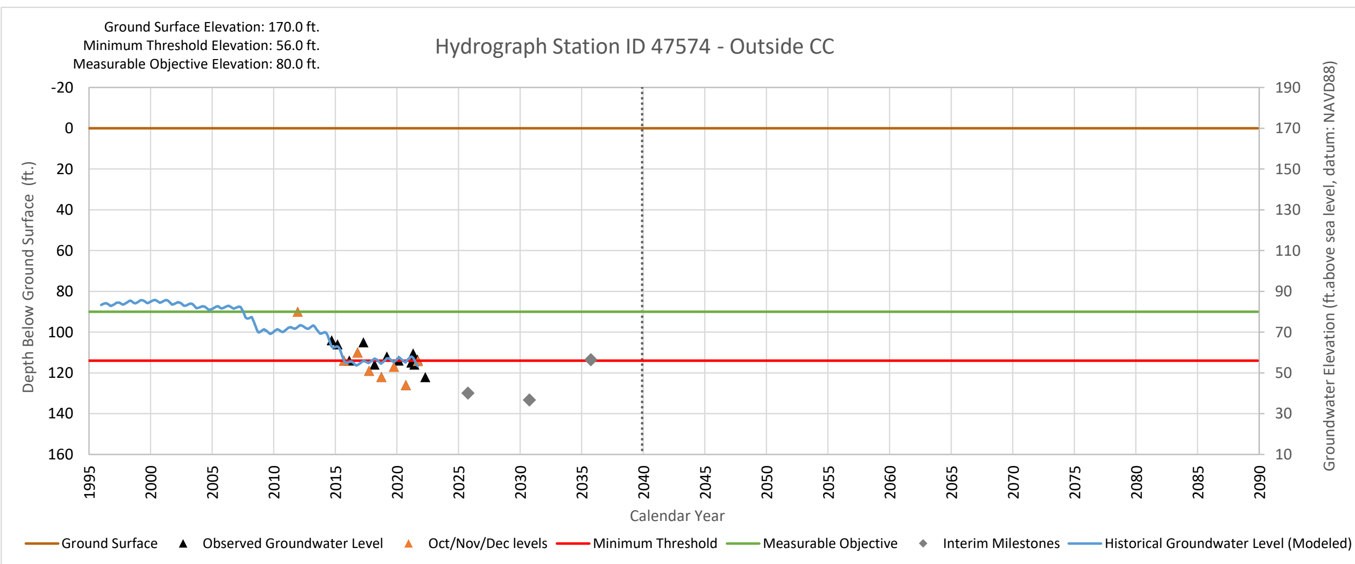

N
0
2.5
5
10
Miles

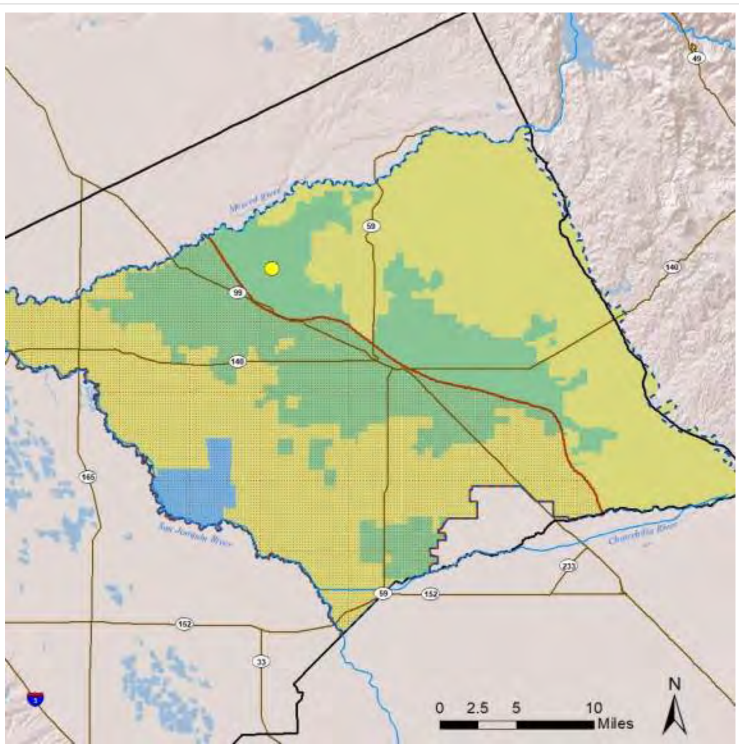

Ground Surface Elevation: 77.0 ft.
Minimum Threshold Elevation: 61.2 ft.
Measurable Objective Elevation: 68.2 ft.
Hydrograph Station ID 47569 - Above CC
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
-20
0
20
40
60
80
97
77
57
37
17
-3
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)

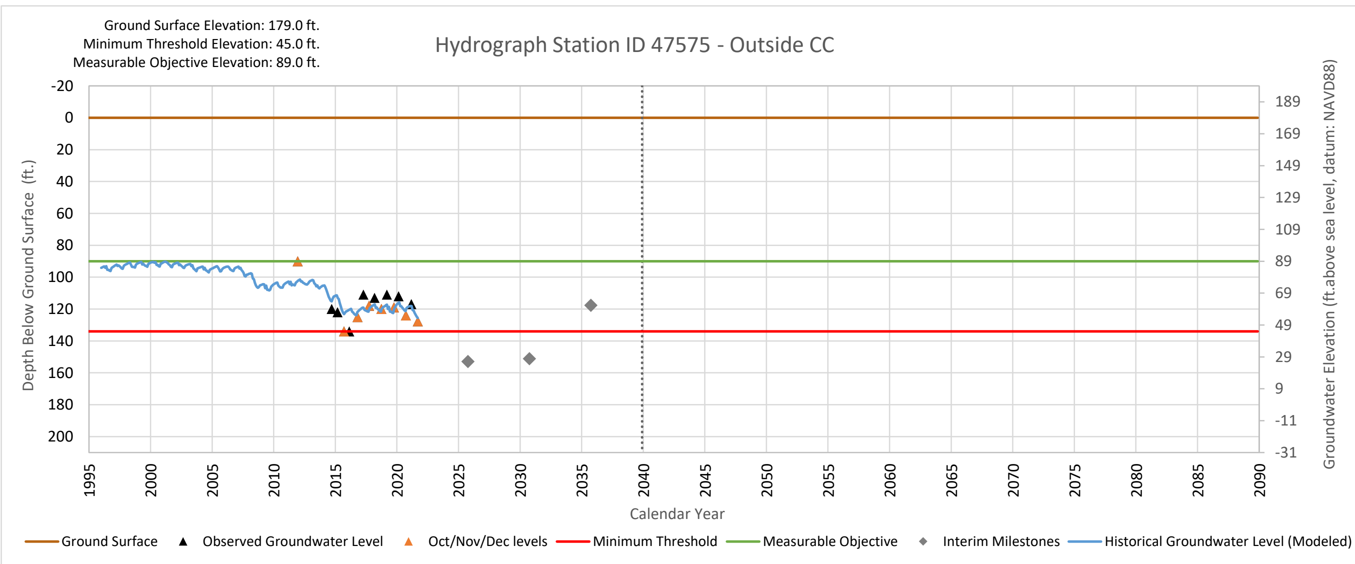

59
99
140
165
152
33
233
0 2.5 5 10
Miles
N


Ground Surface Elevation: 80.2 ft.
Minimum Threshold Elevation: 56.8 ft.
Measurable Objective Elevation: 66.3 ft.
Hydrograph Station ID 47571 - Above CC
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)

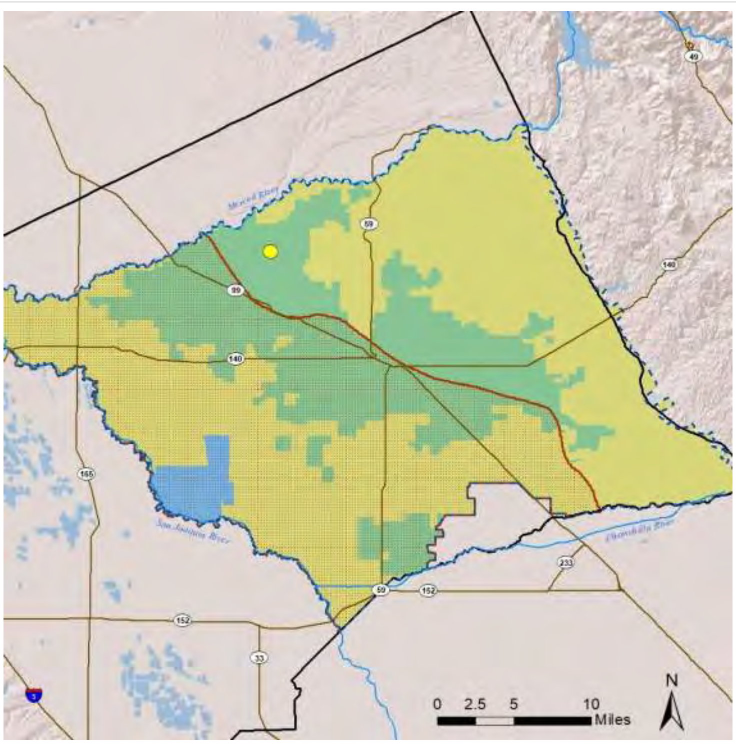

0 2.5 5 10
Miles
N


Ground Surface Elevation: 170.0 ft.
Minimum Threshold Elevation: 56.0 ft.
Measurable Objective Elevation: 80.0 ft.
Hydrograph Station ID 47574 - Outside CC
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)


0 2.5 5 10
Miles
N



Ground Surface Elevation: 179.0 ft.
Minimum Threshold Elevation: 45.0 ft.
Measurable Objective Elevation: 89.0 ft.
Hydrograph Station ID 47575 - Outside CC
Depth Below Ground Surface (ft.)
Groundwater Elevation (ft.above sea level, datum: NAVD88)
Calendar Year
Ground Surface
Observed Groundwater Level
Oct/Nov/Dec levels
Minimum Threshold
Measurable Objective
Interim Milestones
Historical Groundwater Level (Modeled)



0 2.5 5 10
Miles
N

APPENDIX G: MERCED CHOWCHILLA INTERBASIN AGREEMENT

APPENDIX H: MERCED TURLOCK INTERBASIN AGREEMENT

APPENDIX I: MONITORING PROTOCOLS – GROUNDWATER LEVELS (DWR BMP)

APPENDIX J: MONITORING PROTOCOLS – GROUNDWATER QUALITY (CVGM QAPRP & ESJWQC QAPP)

APPENDIX K: MONITORING PROTOCOLS – SUBSIDENCE (USBR SJRPP)

APPENDIX L: MERCED OPTI DATA USER GUIDE

APPENDIX M: METERING AND TELEMETRY TECHNICAL MEMORANDUM

APPENDIX N: MERCED BASIN GROUNDWATER SUSTAINABILITY STAKEHOLDER ENGAGEMENT STRATEGY

APPENDIX O: PUBLIC COMMENTS AND RESPONSE

Woodard & Curran

woodardcurran.com