Tulare Lake Subbasin GSP Public Outreach Meeting

El Rico GSA • Mid-Kings River GSA • South Fork Kings GSA • Southwest Kings GSA • Tri-County Water Authority

Wednesday, October 9, 2019 – Lakeside Community Church, Hanford

Tuesday, October 15, 2019 – Lemoore Civic Auditorium

Tonight's Presentation

- SGMA Overview
- Tulare Lake Subbasin Overview
- GSP Development and Organization
- Key Chapters and Findings
- Public Review Process
- Questions/Answers

SGMA Overview

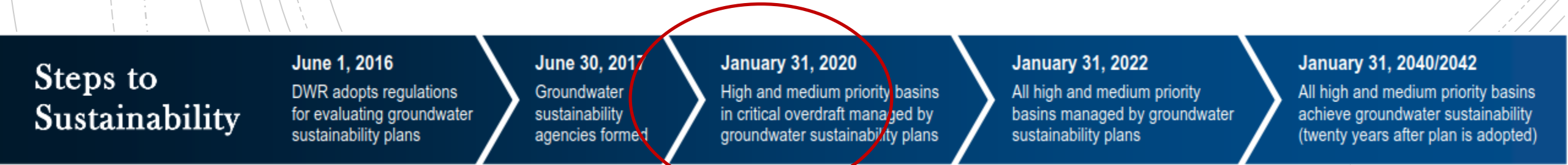
Background

- SGMA = *Sustainable Groundwater Management Act*
- Created through a combination of 3 bills passed by the State Legislature and signed into law by California Governor Jerry Brown in September 2014
- Provides local water use agencies with the framework and authority to manage groundwater basins in a sustainable manner *at the local level*

SGMA Overview

Timeline

- Establish Groundwater Sustainability Agencies (GSAs) by June 2017
- The GSAs must adopt and submit a Groundwater Sustainability Plan (GSP) to the State by January 2020 – *implementation of the GSP then begins*
- Annual Reports are due every April 1, starting in 2020, and GSP updates are due every 5 years
- SGMA goal = achieve groundwater sustainability by 2040



SGMA Overview

Key Concepts

- Sustainable Groundwater Management
  - *The management and use of groundwater in a manner that can be maintained without causing "undesirable results."*
  - Undesirable results occur when conditions related to one or more "*sustainability indicators*" causes significant and unreasonable impacts.
- Sustainability Indicators
  - Chronic lowering of groundwater levels
  - Reduction of groundwater in storage
  - Seawater intrusion
  - Degraded water quality
  - Land subsidence
  - Depletions of interconnected surface water

SGMA Overview

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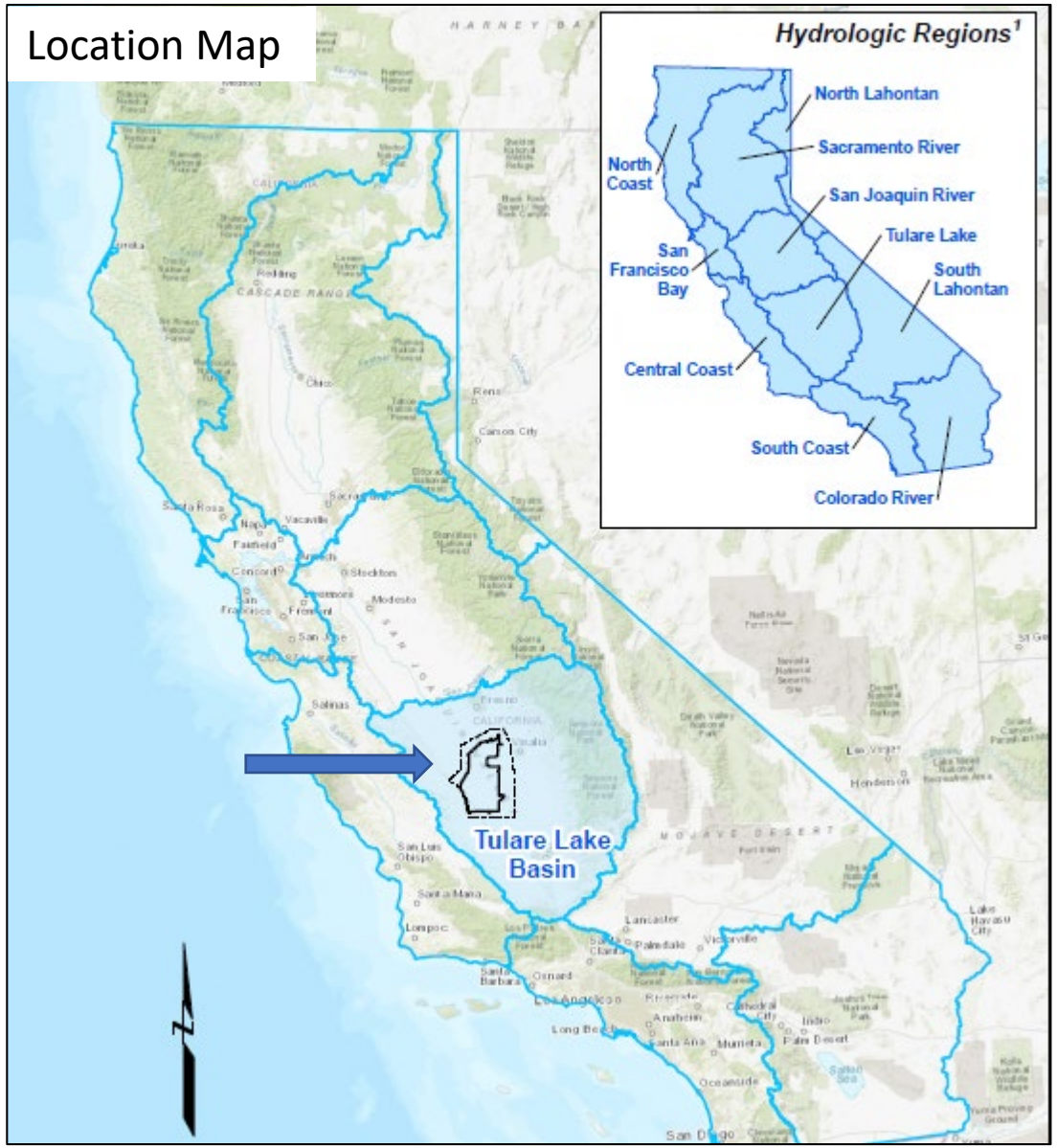
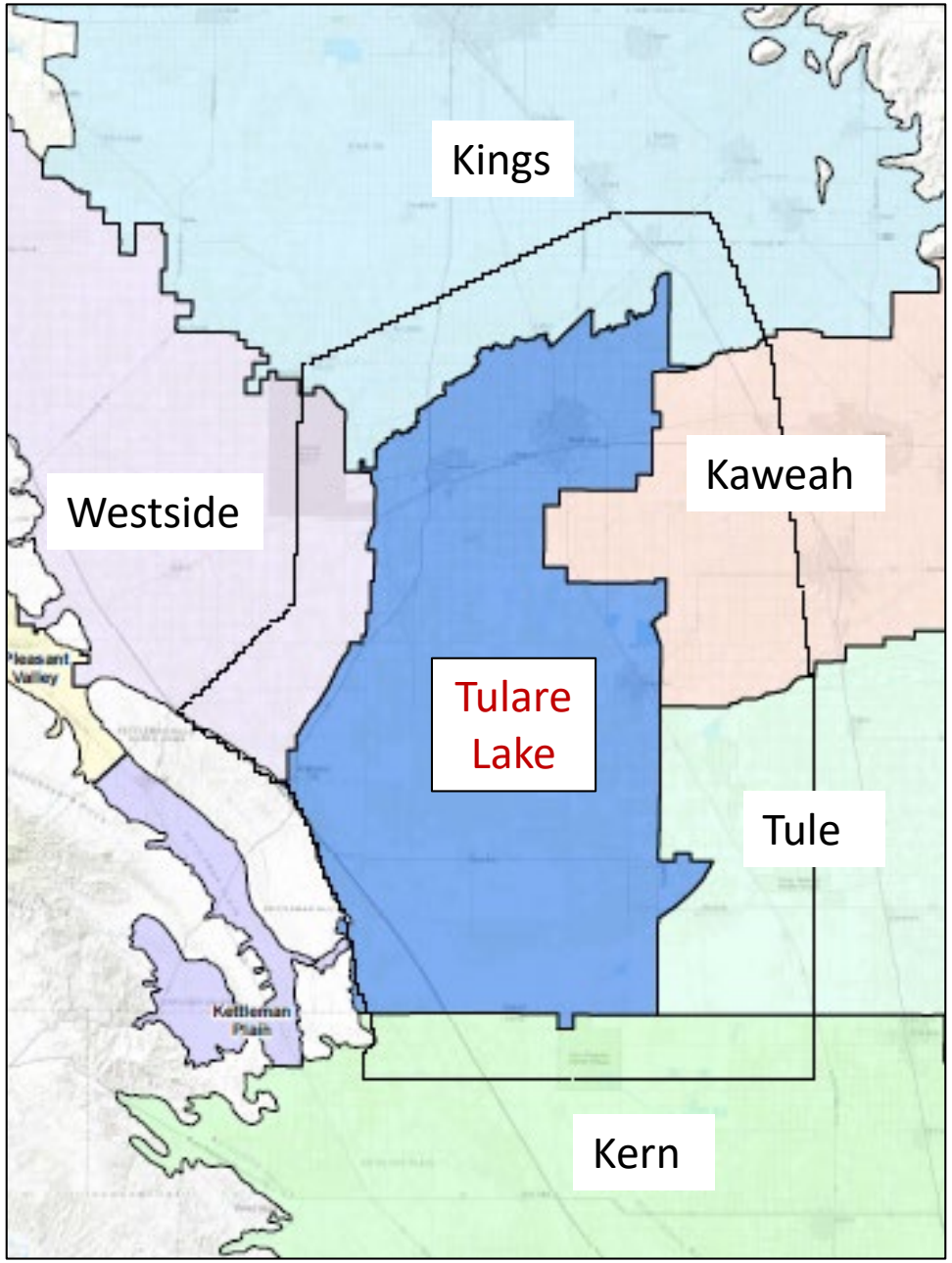
Tulare Lake Subbasin

Surrounded by 5 other (important) subbasins…….





Tulare Lake Subbasin

Overview and Groundwater Usage

- 840 square miles (536,000 acres)
- Population 130,000
- Water wells 3,900
- Irrigated acres 370,000
- Groundwater = 1/3 of water supplies

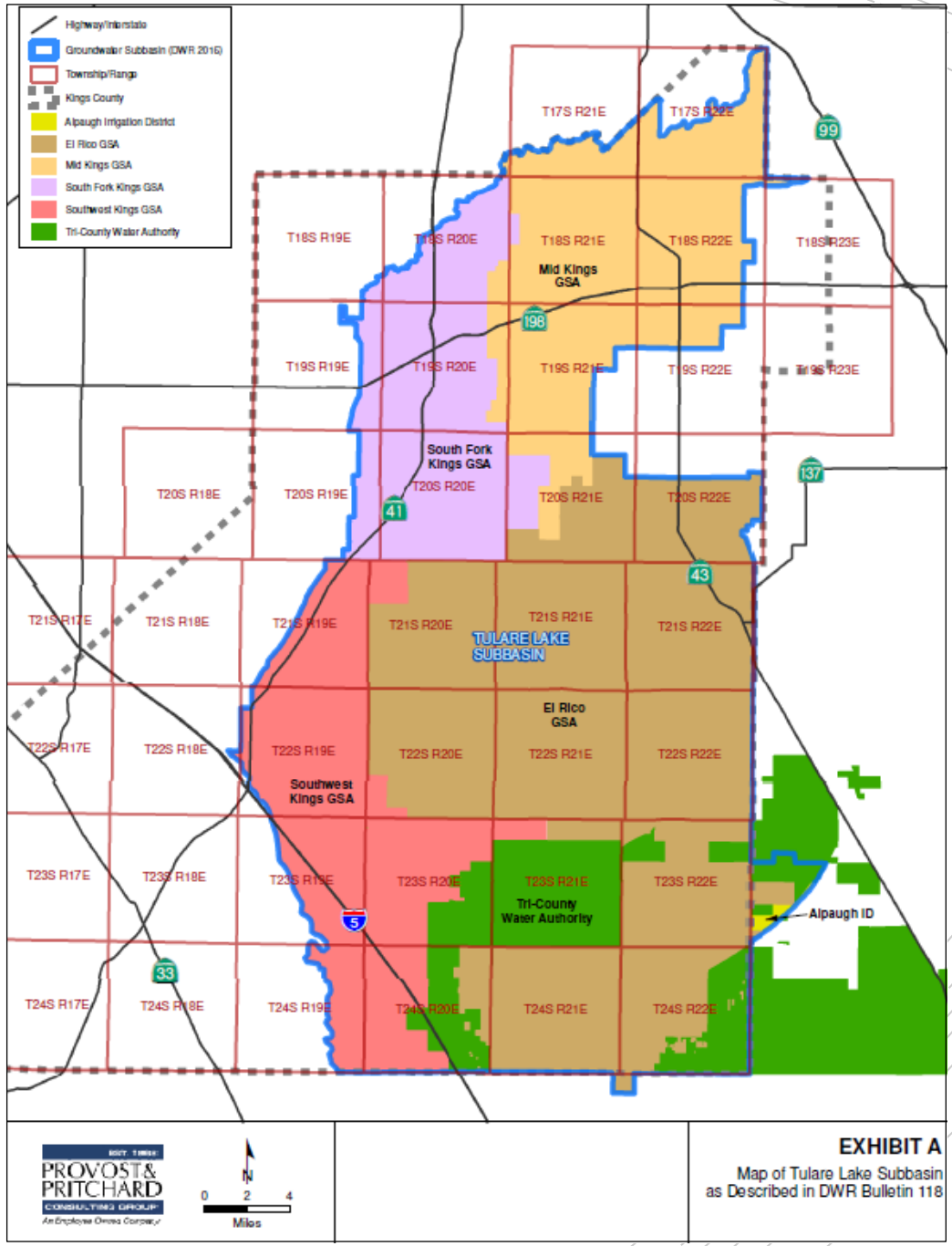
Groundwater Usage

Tulare Lake Subbasin

GSAs

Tulare Lake Subbasin GSAs

- El Rico GSA
- Mid-Kings River GSA
- South Fork Kings GSA
- Southwest Kings GSA
- Tri-County Water Authority GSA



GSP Development

Overview

- The five GSAs are collaborating to develop one GSP for the subbasin, rather than one plan per GSA
- A Technical Consultant Team was engaged to prepare the GSP
- Developed a computer-based groundwater model for the entire subbasin and surrounding areas
- The GSAs have been meeting regularly since 2017 to prepare the GSP
- Goal = SGMA compliance while minimizing the impacts to groundwater users

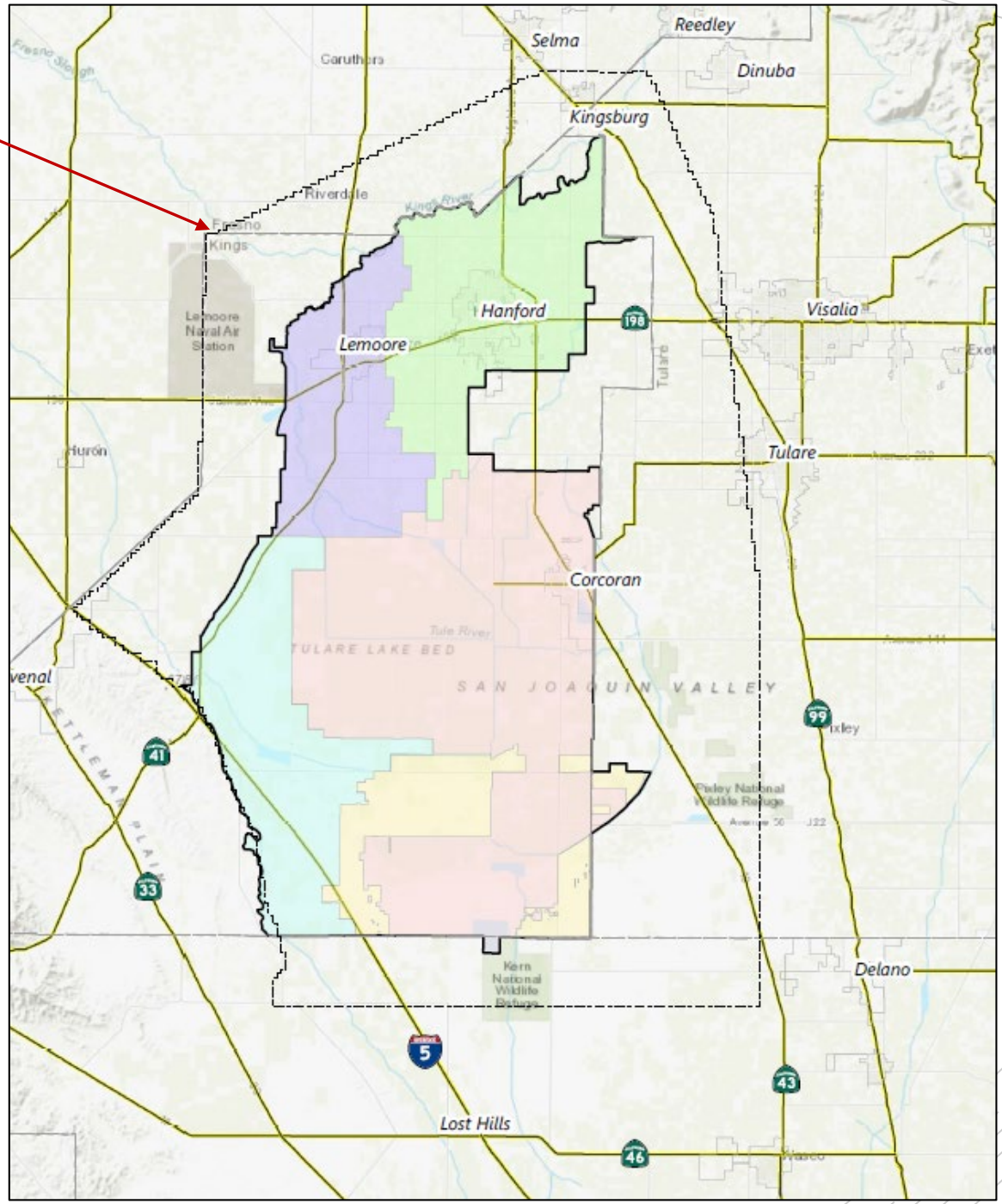
GSP Development

Groundwater Model

- The model is based on the Hydrogeologic Conceptual Model (HCM) developed for the basin and simulates groundwater flow under varying conditions
- The model is calibrated to the 1990-2016 time period - model forecasts have been run for the period 2017 to 2070
- Model results have been used in the GSP to:
  - Understand the water budget of the basin
  - Develop Sustainable Management Criteria
  - Identify projects and management actions that will help achieve sustainability

GSP Development

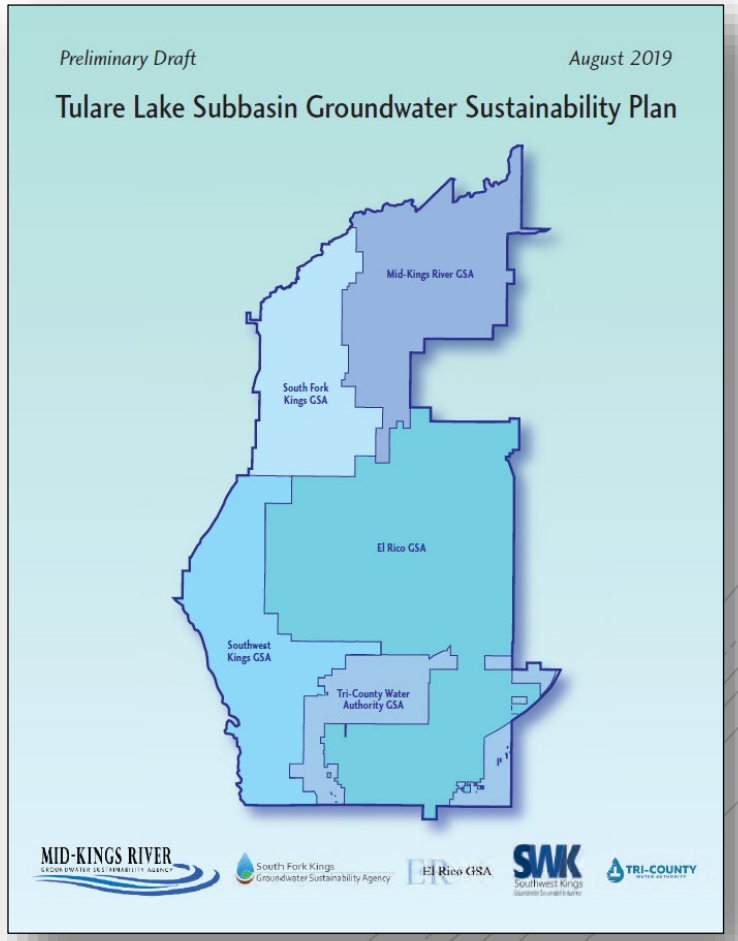
Groundwater Model



GSP Document

Main Chapters

1. Introduction
2. Plan Area
3. Basin Setting
4. Sustainable Management Criteria
5. Monitoring Network
6. Projects & Management Actions
7. Plan Implementation



GSP Content

Section 1: Introduction

Section 1: Introduction

- Subbasin Overview
- Purpose of the GSP
- Sustainability Goal
- GSAs Organization & Management
- GSP Organization

GSP Content

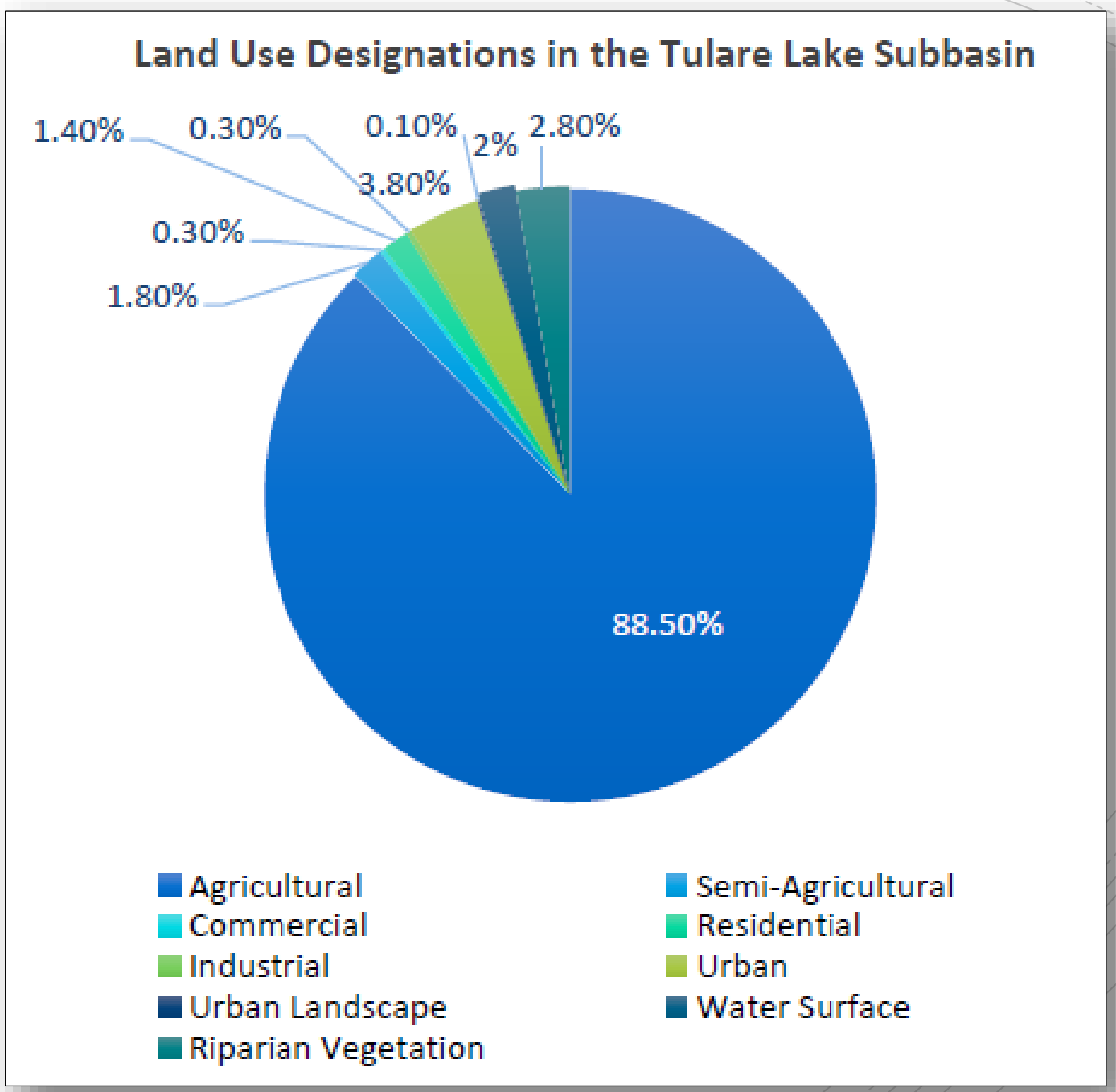
Section 2: Plan Area

Section 2: Plan Area

- Description of each GSA's area
- Relation to General Plans/Other Land Use Plans
- Notice & Communication
  - ✓GSP Development
  - ✓Public Engagement

GSP Content

Section 2: Plan Area



GSP Content

Section 3: Basin Setting

Section 3: Basin Setting

- Provides hydrogeologic basis for the GSP technical elements
- 4 main subsections:
  - 3.1 Hydrogeologic Conceptual Model (HCM)
  - 3.2 Groundwater Conditions
  - 3.3 Water Budget Information
  - 3.4 Management Areas

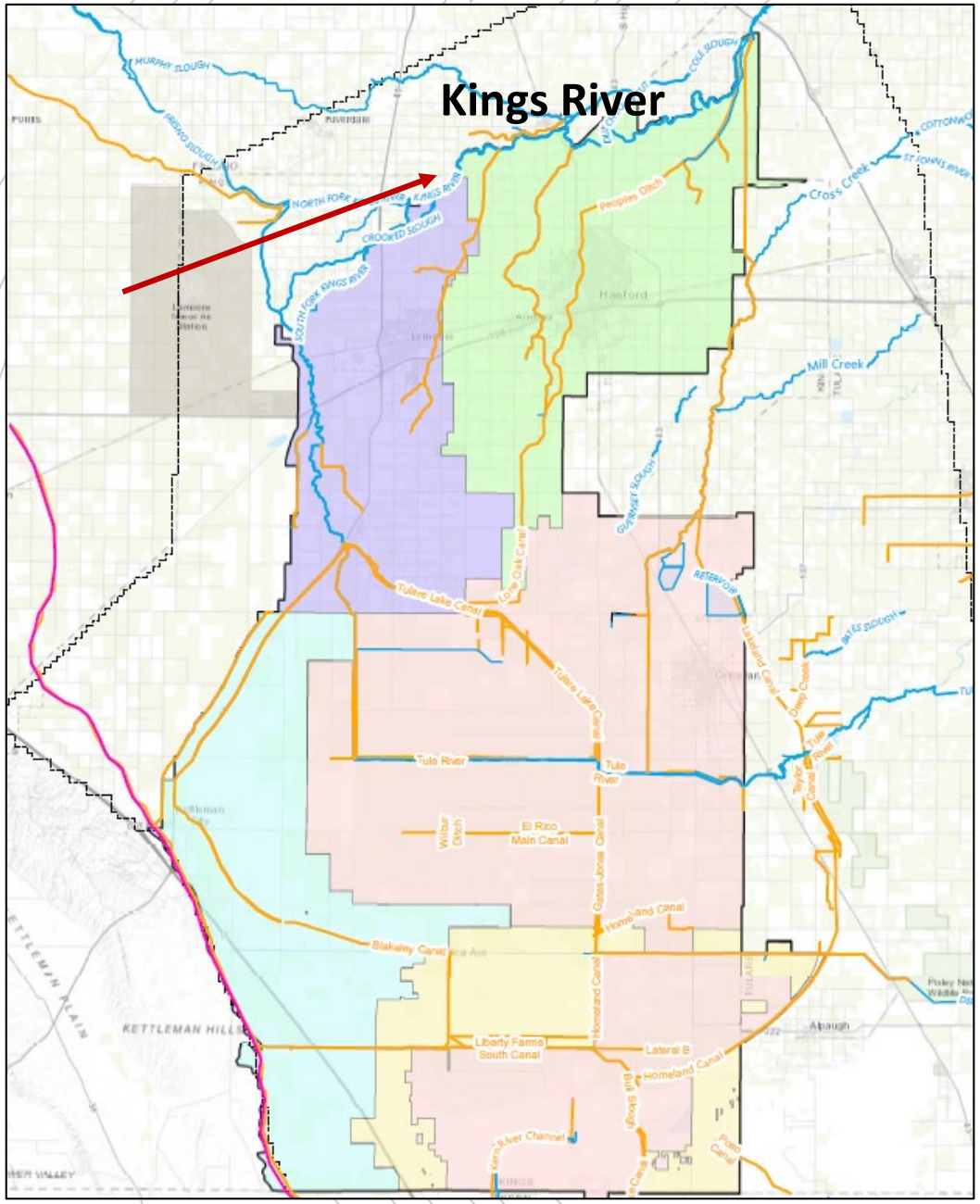
GSP Content

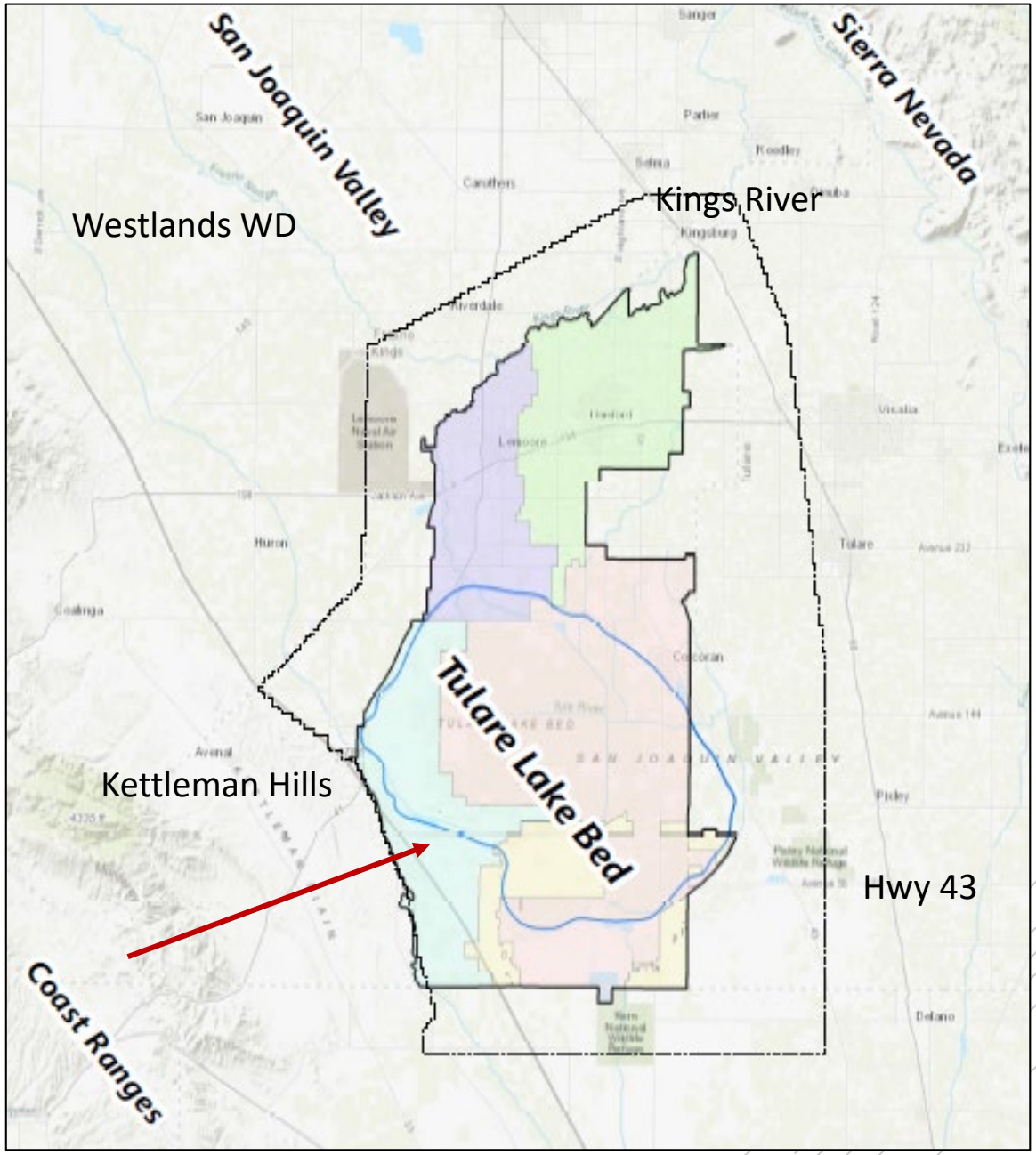
Section 3: Basin Setting

3.1 Hydrogeologic Conceptual Model

- Provides a general understanding of the physical setting and the characteristics and processes that govern groundwater occurrence and movement, including:
  - Geographic setting
  - Geology
  - Basin geometry and features affecting groundwater flow
  - Principal aquifers
  - Hydraulic parameters
  - Groundwater recharge and discharge

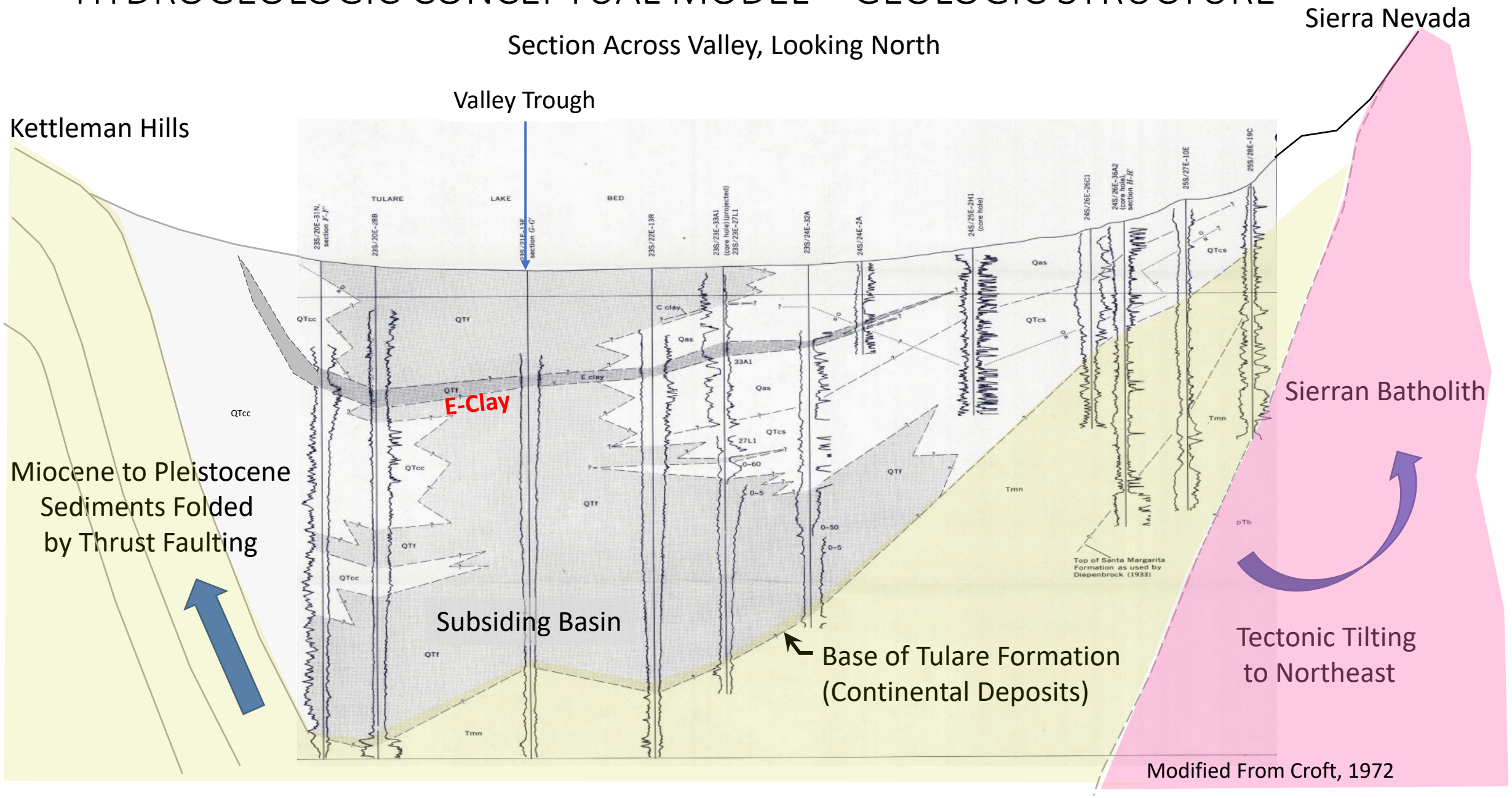
Two key features dominate the hydrogeology of the subbasin….





HYDROGEOLOGIC CONCEPTUAL MODEL – GEOLOGIC STRUCTURE

Section Across Valley, Looking North

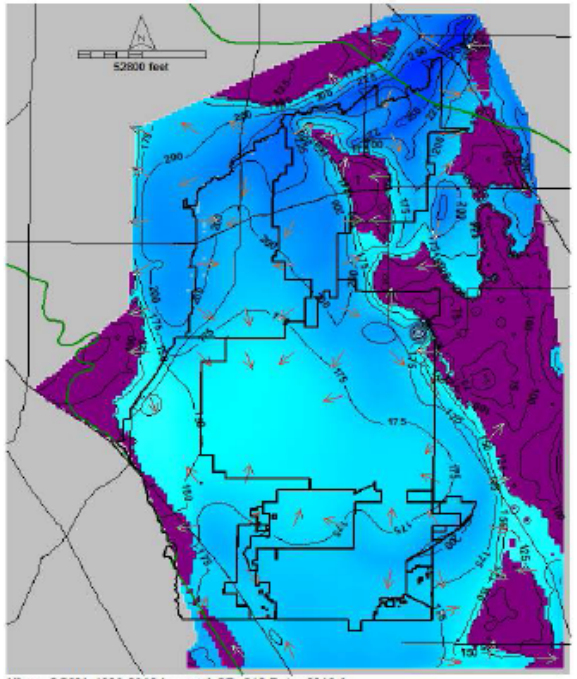


GSP Content

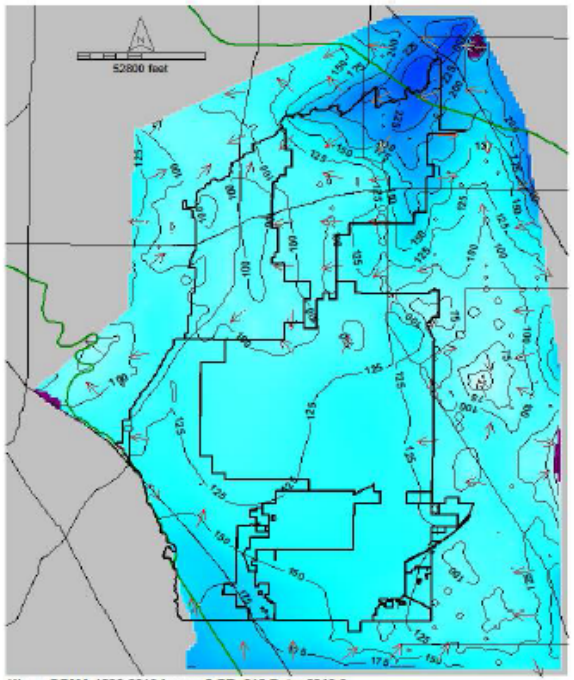
Section 3: Basin Setting

3.2 Groundwater Conditions

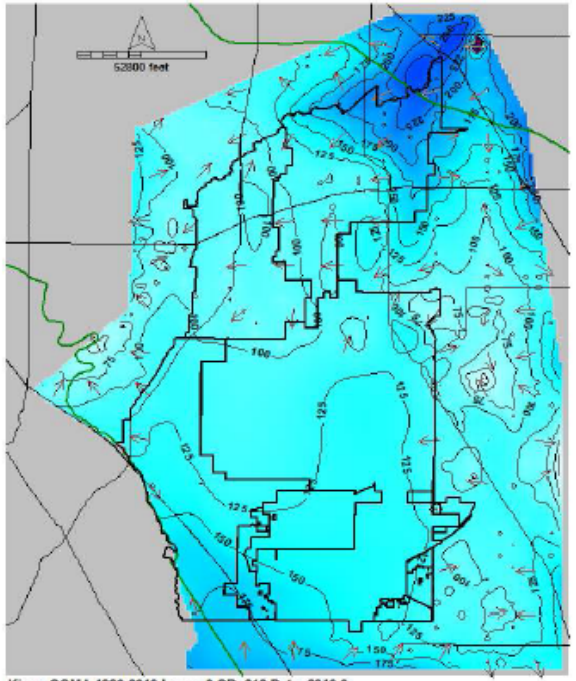
- Describes the historical and current groundwater conditions necessary to understand groundwater flow within the subbasin, groundwater quality, and the water budget
- Also discusses:
  - Subsidence
  - Surface and groundwater interactions
  - Groundwater dependent ecosystems (GDEs)



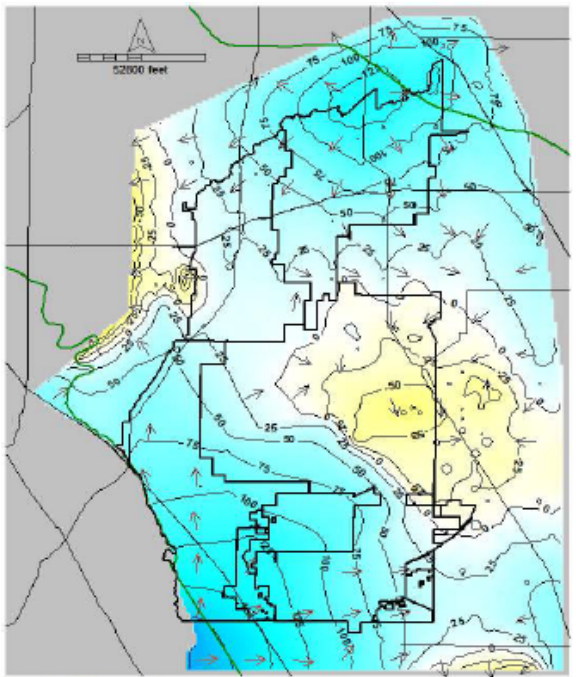
Kings SGMA 1990-2016 Layer: 1 SP: 312 Date: 2016.0



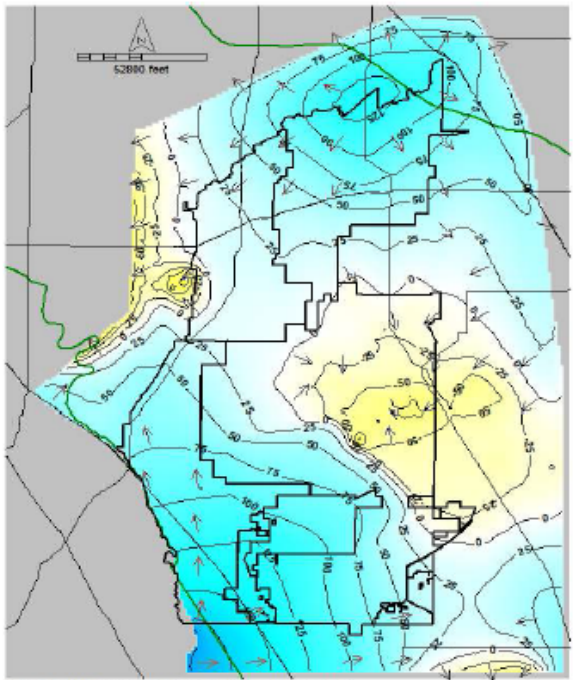
Kings SGMA 1990-2016 Layer: 2 SP: 312 Date: 2016.0



Kings SGMA 1990-2016 Layer: 3 SP: 312 Date: 2016.0



Kings SGMA 1990-2016 Layer: 5 SP: 312 Date: 2016.0



Kings SGMA 1990-2016 Layer: 6 SP: 312 Date: 2016.0

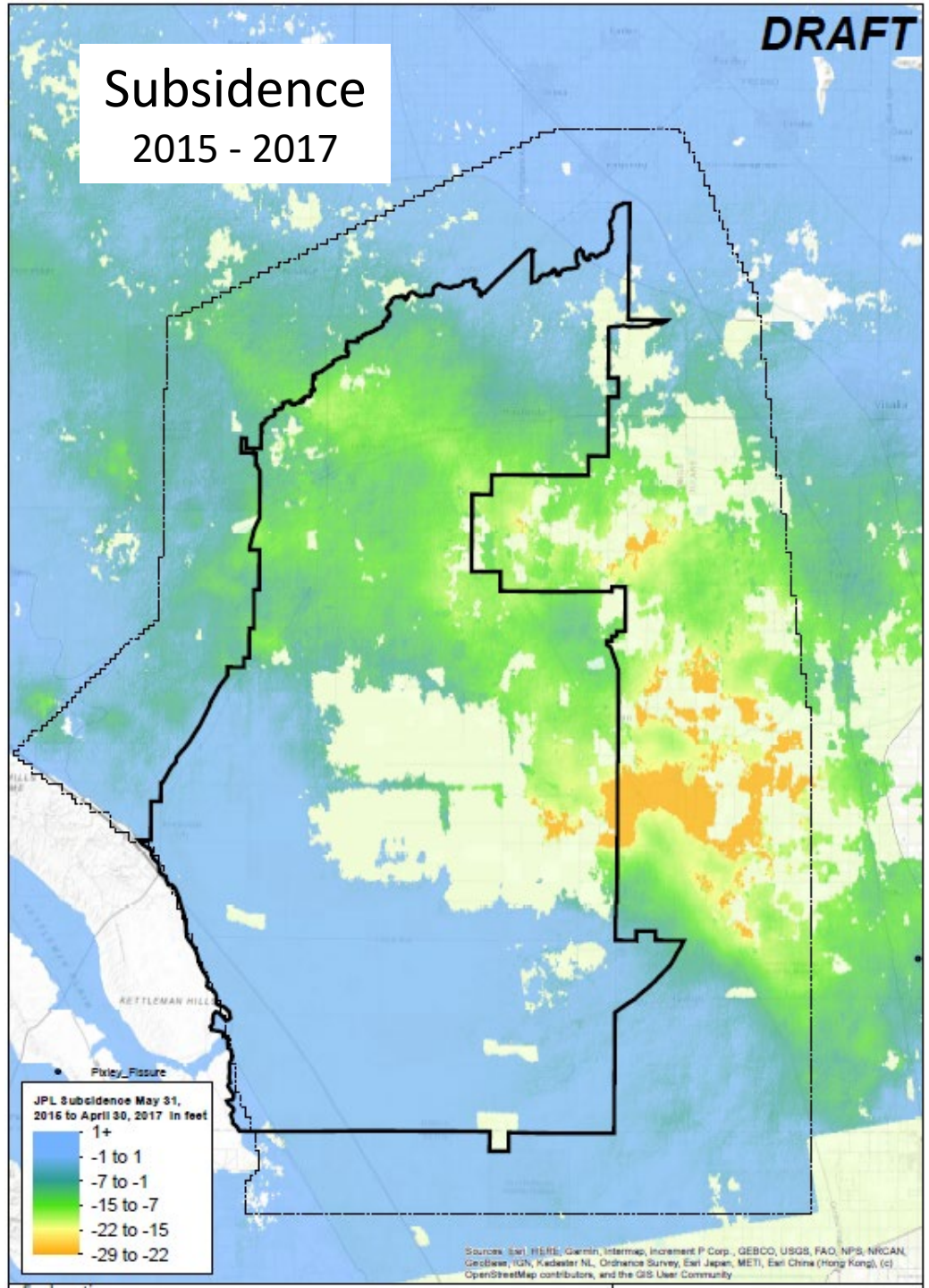
Groundwater flow direction

Simulated December 2015 Groundwater Elevations and Groundwater Flow Vectors

Tulare Lake Subbasin Groundwater Sustainability Plan

Kings County, California

By: dmb	Date: 07/30/19	Project No.: FR18161220
		Figure **D5-3**

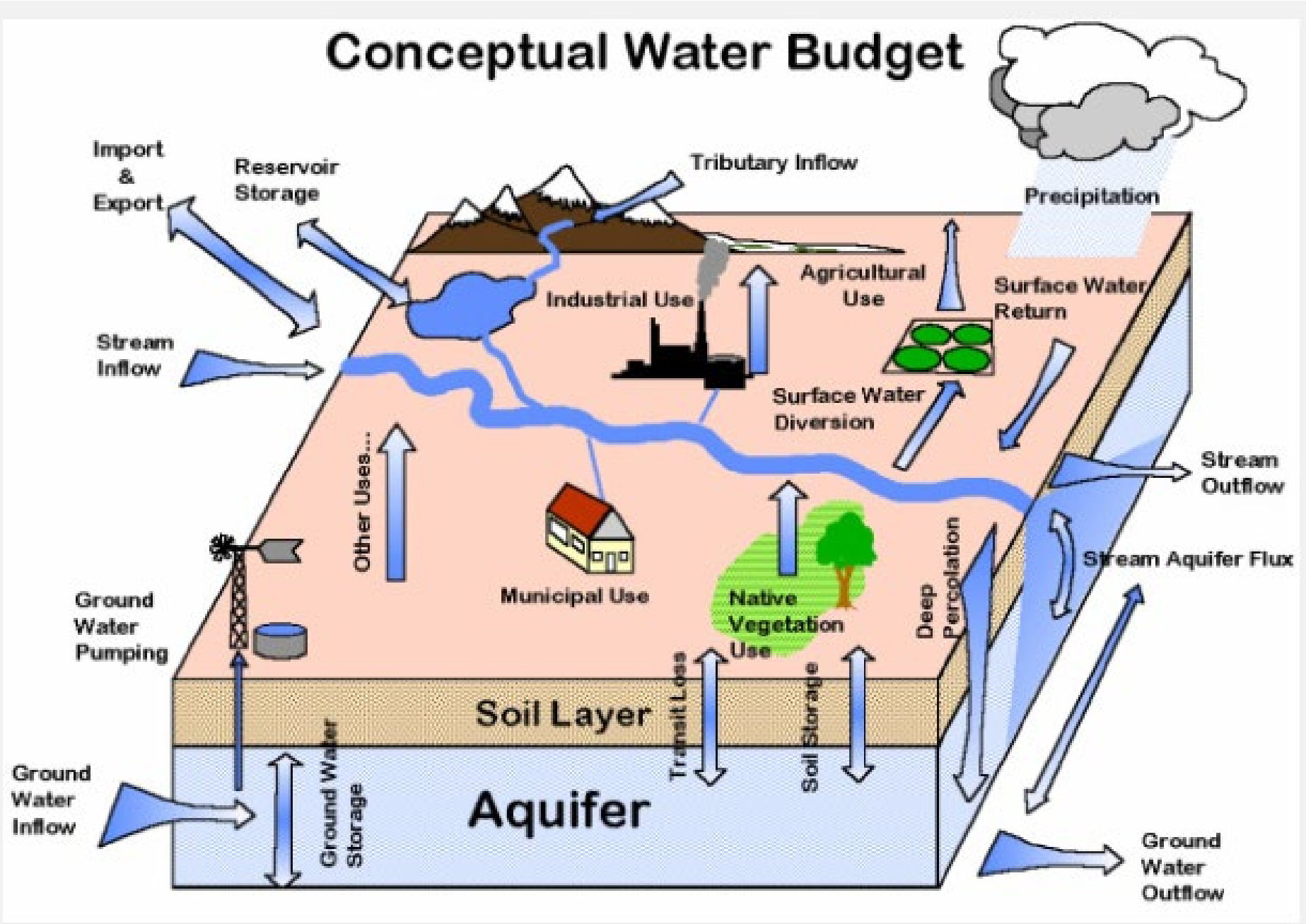

DRAFT
Subsidence
2015 - 2017
Pixley_Fissure
JPL Subsidence May 31, 2016 to April 30, 2017 in feet
1+
-1 to 1
-7 to -1
-15 to -7
-22 to -15
-29 to -22
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

GSP Content

Section 3: Basin Setting

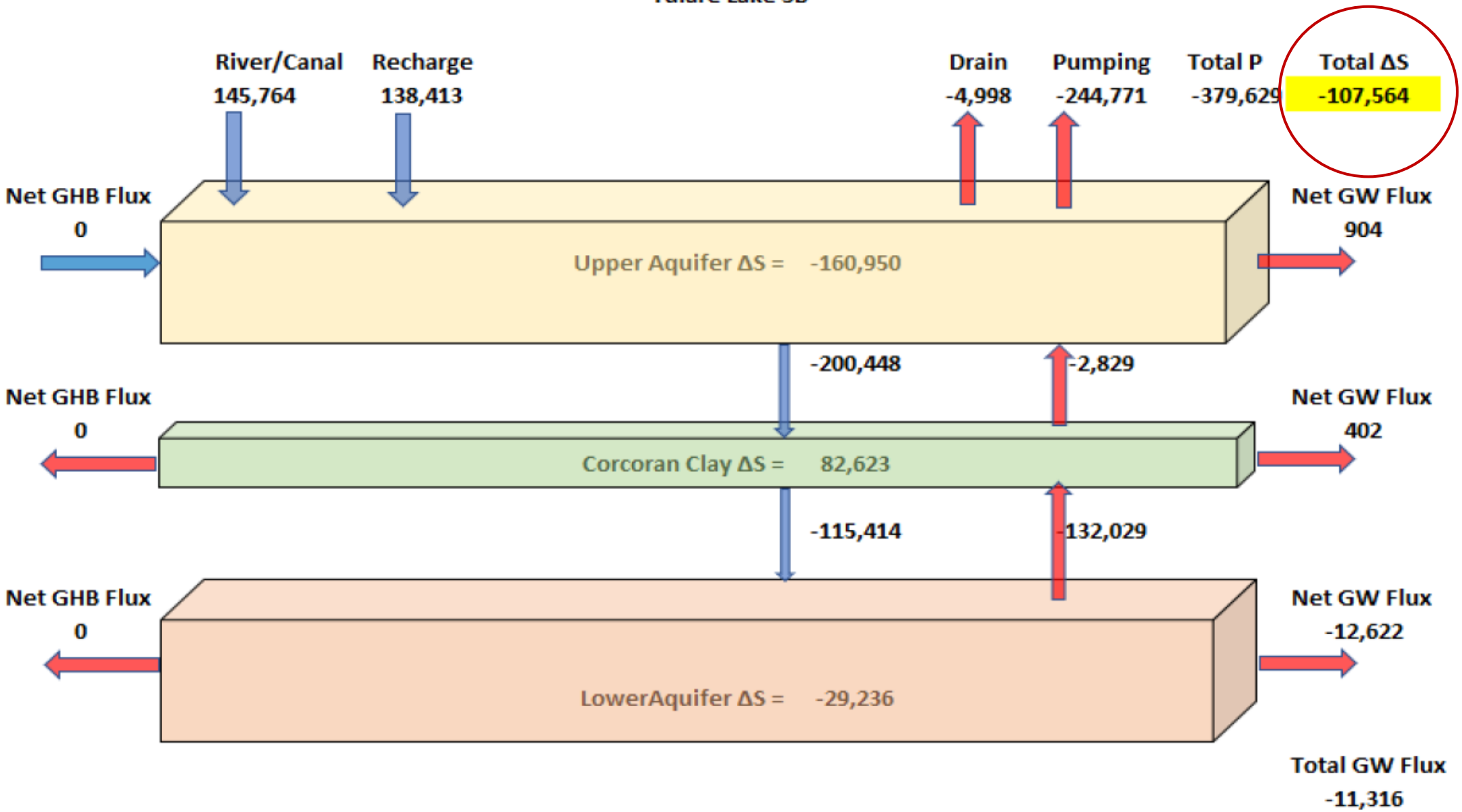
3.3 Water Budget

- Accounts for all of the inflows, outflows, and changes in storage in the Tulare Lake Subbasin groundwater system over time
- Ideal situation: a balanced budget


Conceptual Water Budget
Import & Export
Reservoir Storage
Tributary Inflow
Precipitation
Agricultural Use
Surface Water Return
Industrial Use
Stream Inflow
Surface Water Diversion
Stream Outflow
Other Uses...
Municipal Use
Native Vegetation Use
Deep Percolation
Stream Aquifer Flux
Ground Water Pumping
Soil Layer
Transit Loss
Soil Storage
Ground Water Storage
Aquifer
Ground Water Inflow
Ground Water Outflow

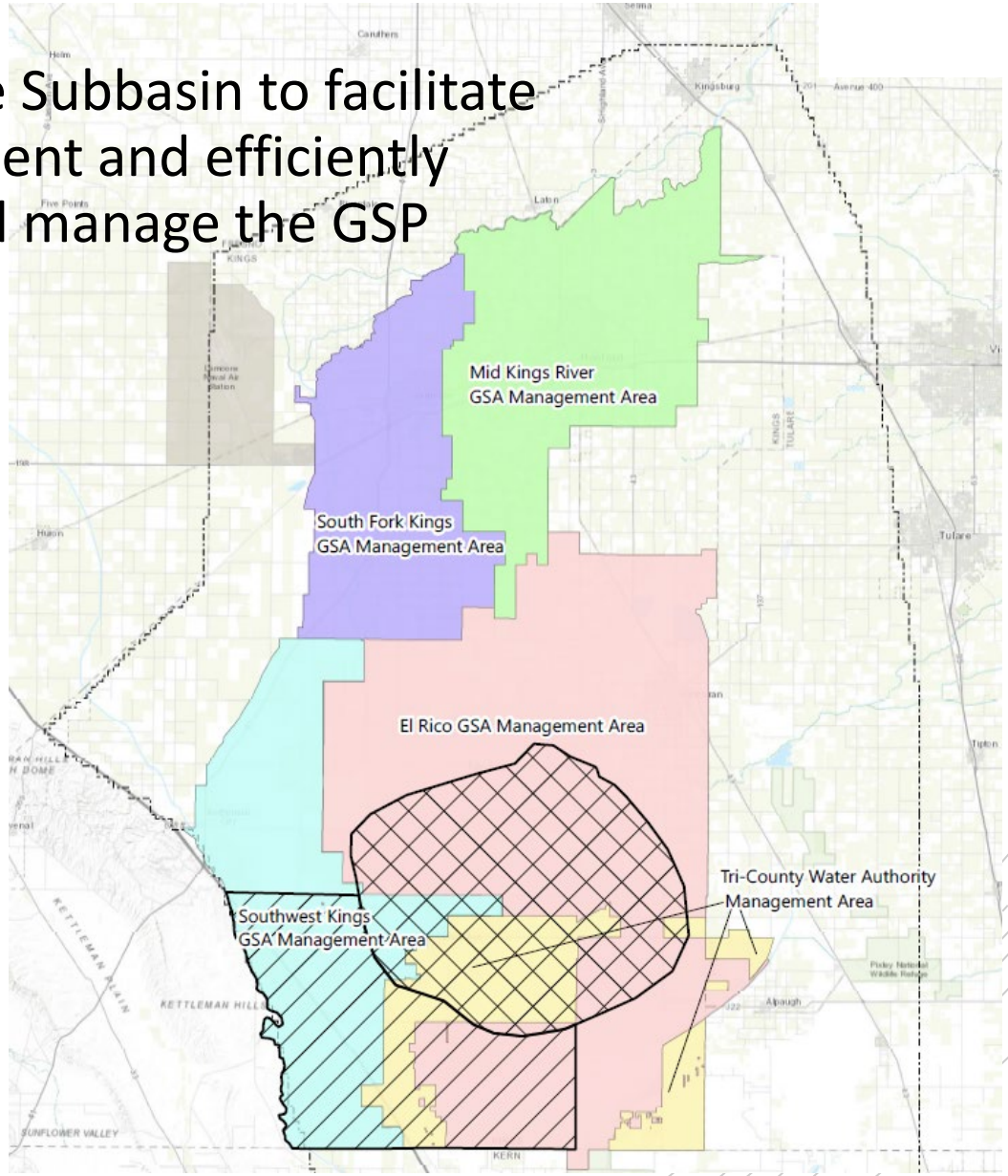
1990-2016 Average
Calibration Model Period
Tulare Lake SB

Average annual change in groundwater in storage



3.4 Management Areas

- Created for the Subbasin to facilitate data management and efficiently implement and manage the GSP



GSP Content

Section 3:
Basin Setting

Section 4.1: Sustainability Goal

GSP Content

Section 4: Sustainable Management Criteria

"The goal of the GSP is to manage groundwater resources in the Tulare Lake Subbasin to continue to provide an adequate water supply for beneficial uses and users in accordance with county and city general plans while meeting established measurable objectives (MOs) to maintain a sustainable yield."

GSP Content

Section 4: Sustainable Management Criteria

Sustainability Indicators

Groundwater Level

Groundwater Storage

Land Subsidence

Water Quality

Interconnected Surface Waters

Seawater Intrusion

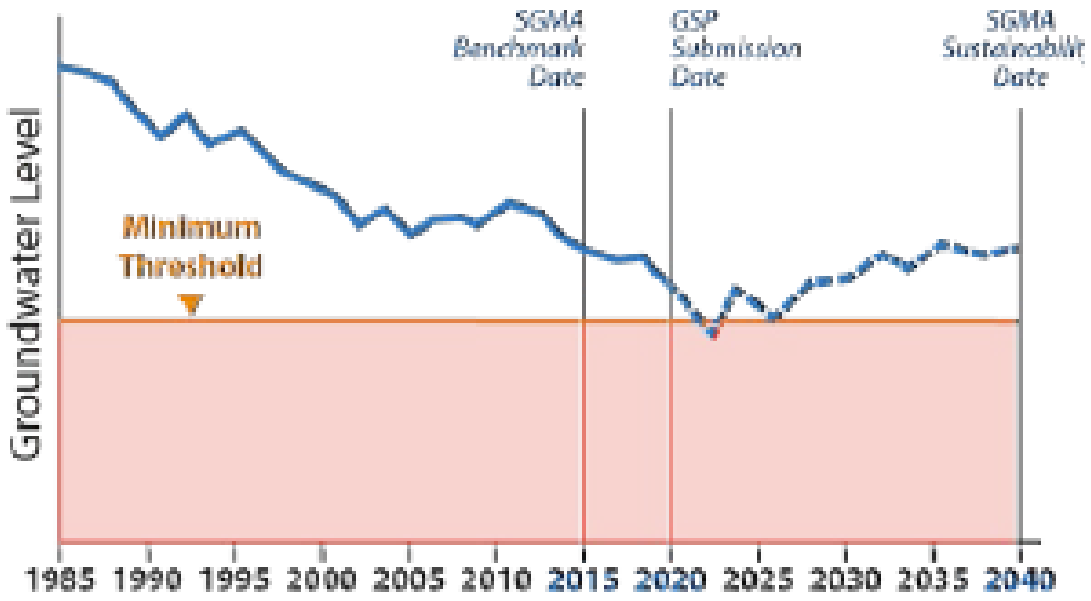
- Sustainable Management Criteria
  - Minimum Thresholds
  - Undesirable Results
  - Measurable Objectives

GSP Content

Section 4: Sustainable Management Criteria

Minimum Threshold

- The quantitative value that represents the groundwater conditions at a representative monitoring site that, when exceeded individually or in combination with minimum thresholds at other monitoring sites, causes an undesirable result(s) in the basin.



GSP Content

Section 4: Sustainable Management Criteria

Undesirable Results

- Occur when conditions related to any of the sustainability indicators become significant and unreasonable.

Measurable Objectives

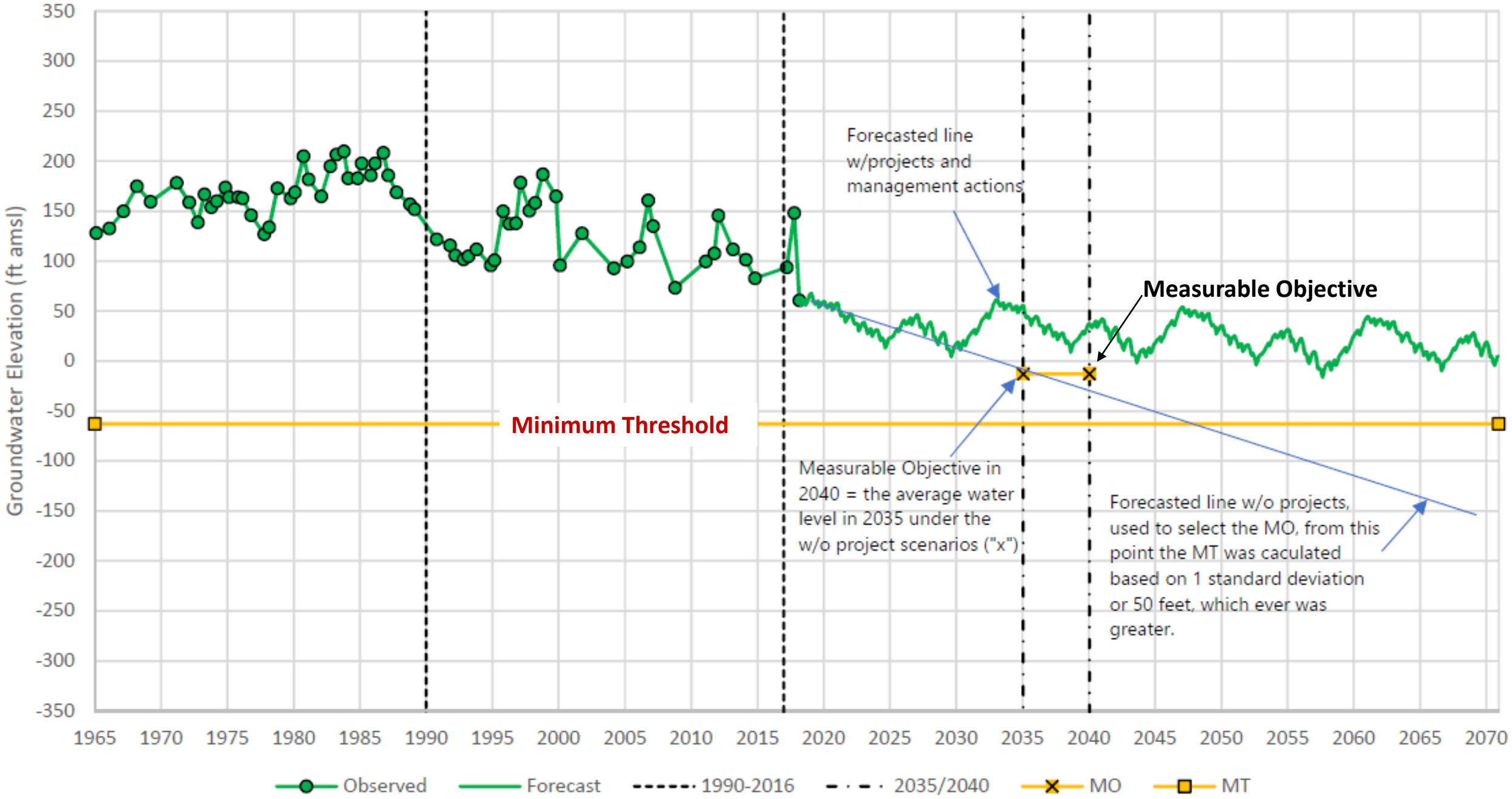
- The quantitative goals that reflect the basin's desired groundwater conditions and allow the GSA to achieve the sustainability goal within 20 years.

GSP Content

Section 4: Sustainable Management Criteria

Process

- Perform forecast runs using the groundwater model – plot future water levels at each Representative Monitoring Site
- Develop project and management actions that when implemented, water level decline ceases and water levels stabilize by 2040
- Measurable objectives in 2040 = the 2035 water level under the no-project scenario model forecast run
- Minimum Threshold = 1 standard deviation below the 2040 Measurable Objective or 50 feet, whichever is greater


Groundwater Elevation (ft amsl)
350
300
250
200
150
100
50
0
-50
-100
-150
-200
-250
-300
-350
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Forecasted line w/projects and management actions
Measurable Objective
Minimum Threshold
Measurable Objective in 2040 = the average water level in 2035 under the w/o project scenarios ("x")
Forecasted line w/o projects, used to select the MO, from this point the MT was caculated based on 1 standard deviation or 50 feet, which ever was greater.
Observed
Forecast
1990-2016
2035/2040
MO
MT

GSP Content

Section 4: Sustainable Management Criteria

Metrics Indicating Criteria Exceedance

- Groundwater Levels

  Groundwater levels decline to below the Minimum Thresholds at 45% of the Representative Monitoring Sites for 3 consecutive years

- Groundwater in Storage

  Use groundwater levels metric

- Subsidence

  Combination of groundwater levels metric and Minimum Threshold for subsidence (16 ft)

- Groundwater Quality

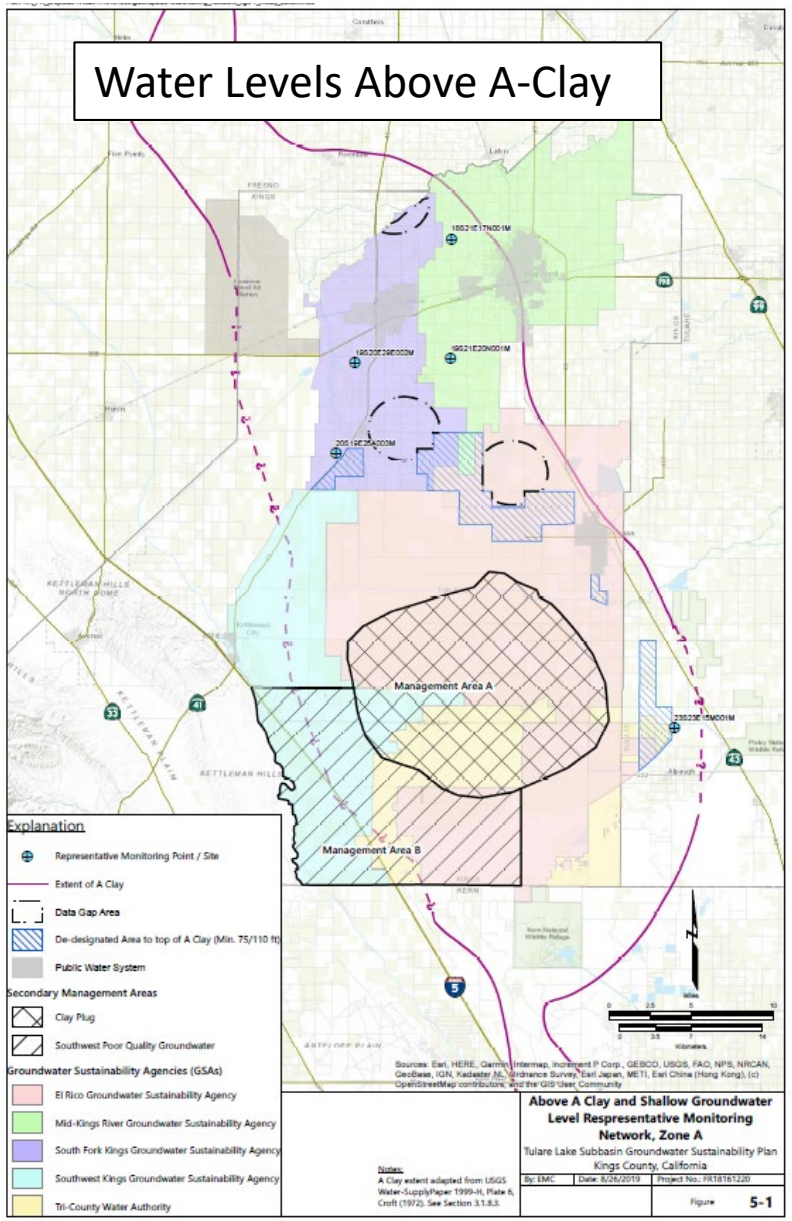
  Specific actions taken through GSP implementation degrades groundwater quality – GSAs will work with existing groundwater quality programs to monitor and evaluate (RWQCB, ILRP, GAMA, CV-SALTS, etc.)

GSP Content

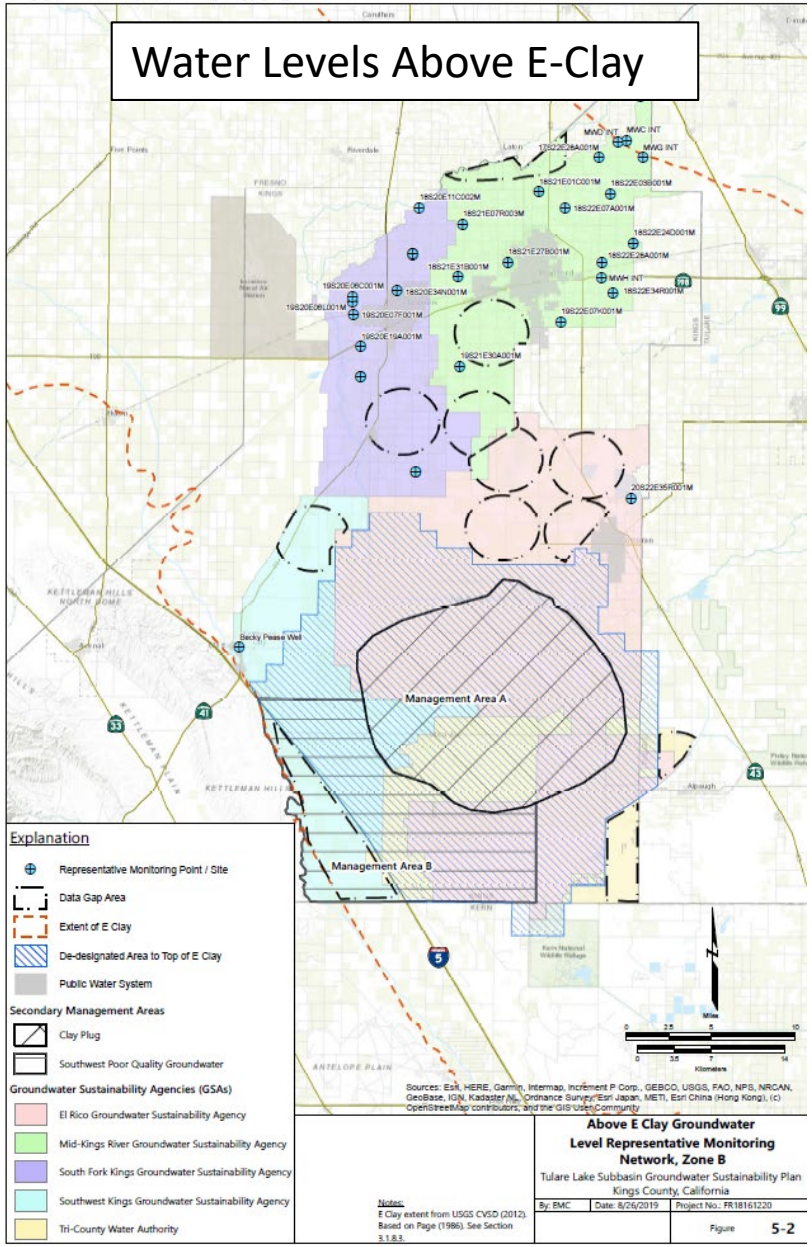
Section 5: Monitoring Network

- Based on existing and proposed monitoring programs and facilities
- Monitoring data will be collected and evaluated for short-term, seasonal, and long-term trends for the 4 sustainability indicators
- 5 monitoring programs will be implemented
  1. Groundwater levels above the A-Clay
  2. Groundwater levels above the E-Clay
  3. Groundwater levels below the E-Clay
  4. Subsidence
  5. Groundwater quality

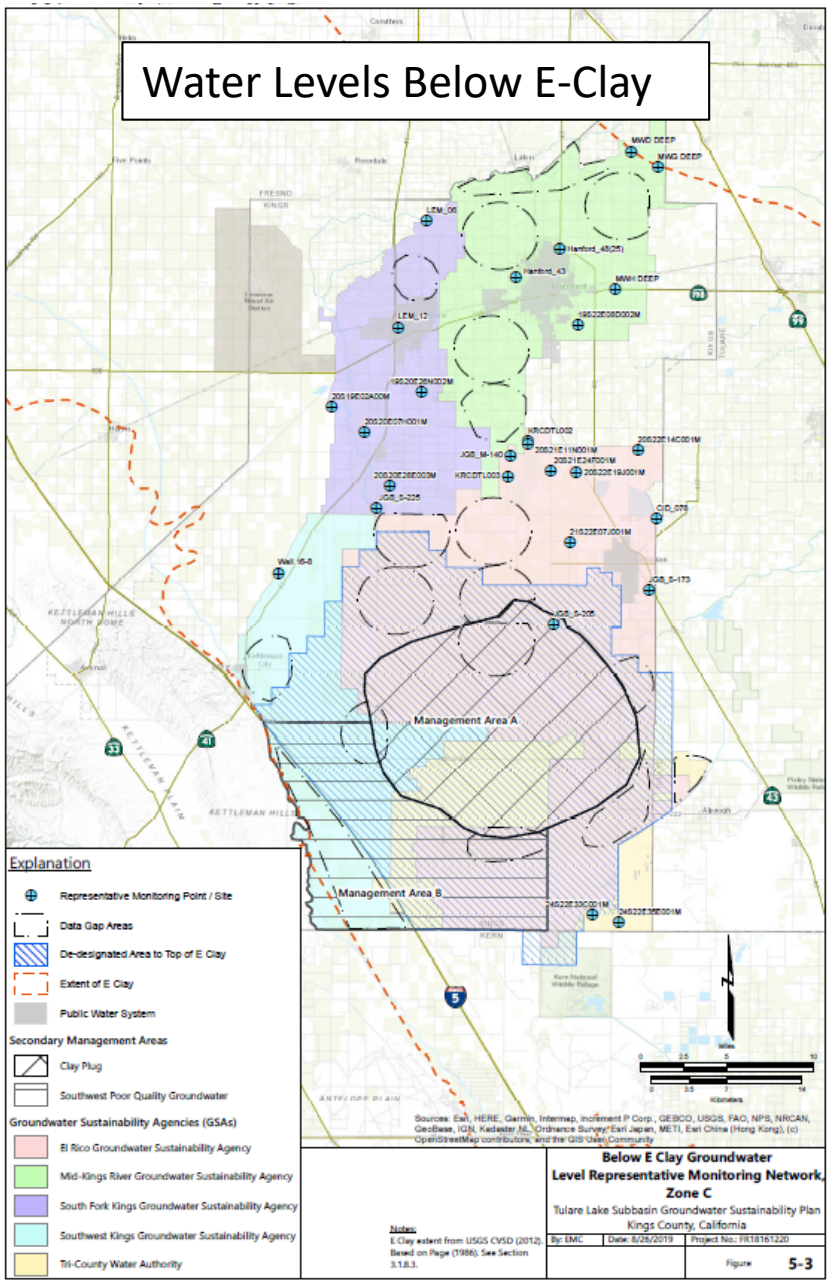
Water Levels Above A-Clay



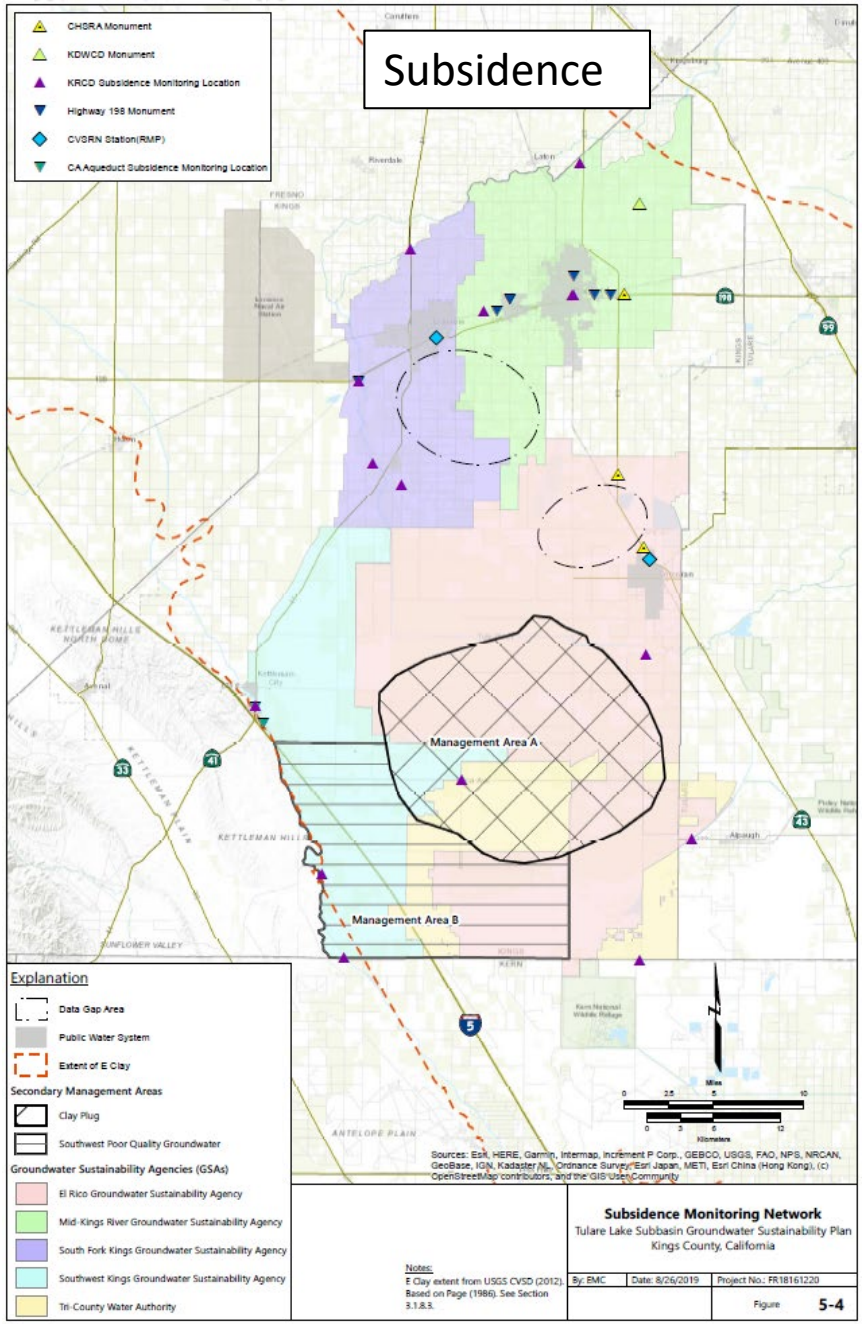
Water Levels Above E-Clay



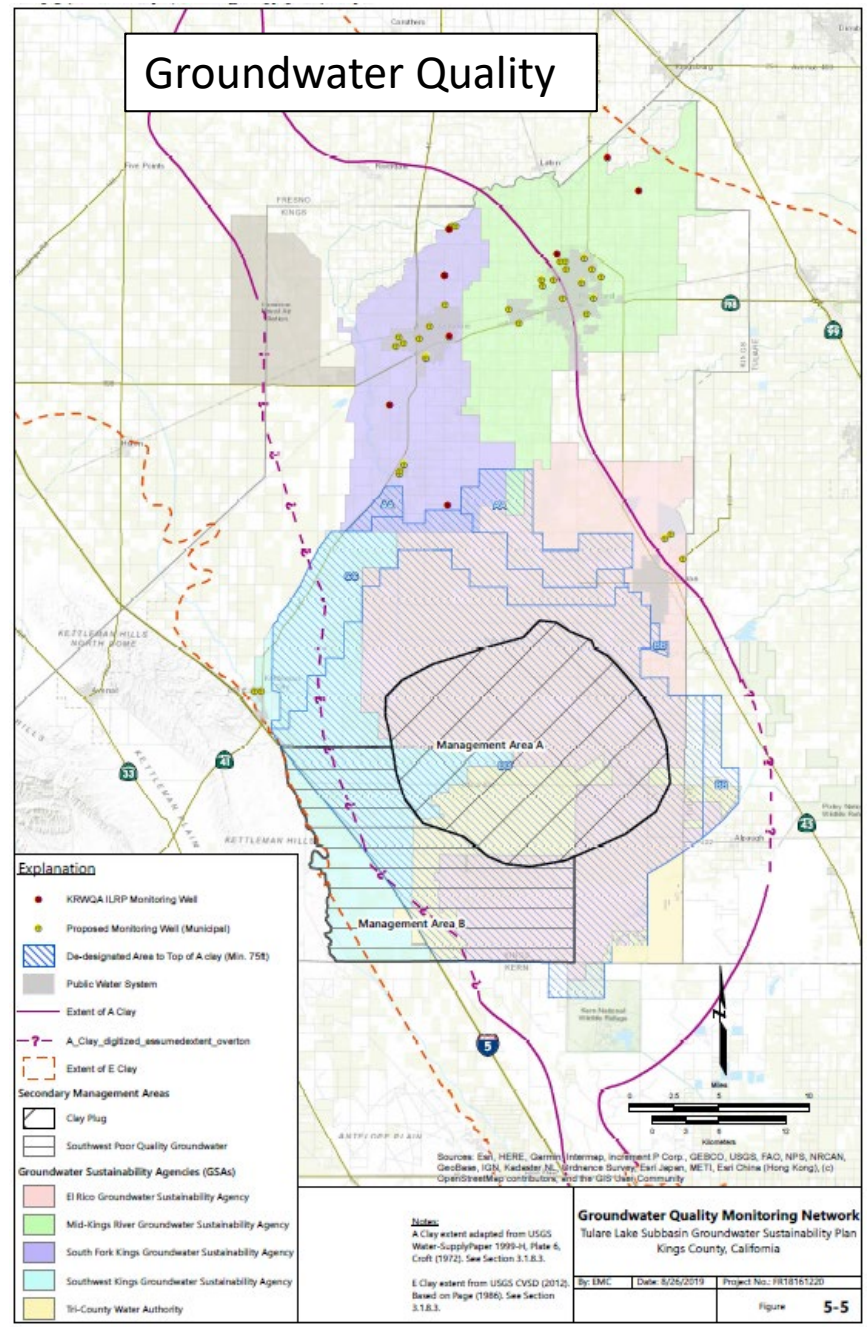
Water Levels Below E-Clay



Subsidence



Groundwater Quality



GSP Content

Section 6: Projects & Management Actions

- Projects and management actions will be implemented by GSAs or their member agencies to help achieve sustainability
- *Projects* generally are designed to increase water supply
  - ✓ *Ex: recharge basins*
- *Management actions* generally are designed to reduce demand
  - ✓ *Ex: improved water use efficiencies*

GSP Content

Section 6: Projects & Management Actions

- Rehab of existing recharge basins
- Construction of new recharge basins
- Conveyance improvements
- Construction of new conveyance
- Land Fallowing
- GW measurement and reporting
- On-farm improvements
- Cropping changes
- Surface storage
- Aquifer storage and recovery

A Path to Sustainability – *Projects & Management Actions*

Mid-Kings River GSA – Land Retirement & Recharge Basins

- Build out 1,350 acres of ponds on 1,500 acres of land
- Build out 4 phases every 5 years starting 2020
- Reduce Ag Demand by 4,500 AF/Y, 200,000 AF flood water percolation in flood years

El Rico GSA – Intermittent SW Ponds

- Build out 6,400 acres of SW ponds
- Reduce Ag Demand ~20,000 AF/Y in flood years
- Make 40,000 AF available for SW supply following flood years starting 2030

South Fork Kings GSA – Land Retirement & SW Ponds

- Build out 10,000 acres of SW ponds – 6.25 feet deep
- Reduce Ag Demand by 15,000 AF/Y (about ½ area fallow)
- Make 60,000 AF available for surface water supply following flood years starting 2030
- Aquifer Storage and Recovery (ASR) projects

Tri-County Water Authority GSA – SW Ponds

- Build out 13,440 acres of surface water ponds – 6.25 feet deep on Retired Lands
- Make 80,000 AF available for surface water supply following flood years starting 2030

All GSAs - Programmatic Ag Demand Reduction

- Develop program to reduce groundwater demand by 2%/year starting in 2025 until 25% reduction in demand is achieved
- Program fully implemented by 2037 (12 years)

GSP Content

Section 7: Implementation

- GSP Implementation costs
  - Ongoing Administrative and Project Costs
  - Cost Sharing TBD
- Projects schedule and priority TBD
- Data Management System (DMS)
  - Coordinated with Subbasin GSAs
- Annual Reporting
  - First report due April 2020

Potential Issues re Groundwater Usage and SGMA in the Tulare Lake Subbasin

SGMA and You

- Economic impacts – phased implementation over 20 years
- Government regulations and involvement – regular reporting will document progress and SGMA compliance
- Long-term water quantity and quality affects – increased supplies will offset
- Crop rotation and land idling – will use adaptive management
- Legal rights to groundwater – SGMA should not impact
- Water usage (surface water vs. groundwater) – increase surface supply when available
- Costs of SGMA implementation on the groundwater user – yet to be determined, but will be shared among users

Tulare Lake Subbasin GSP

Public Review Process

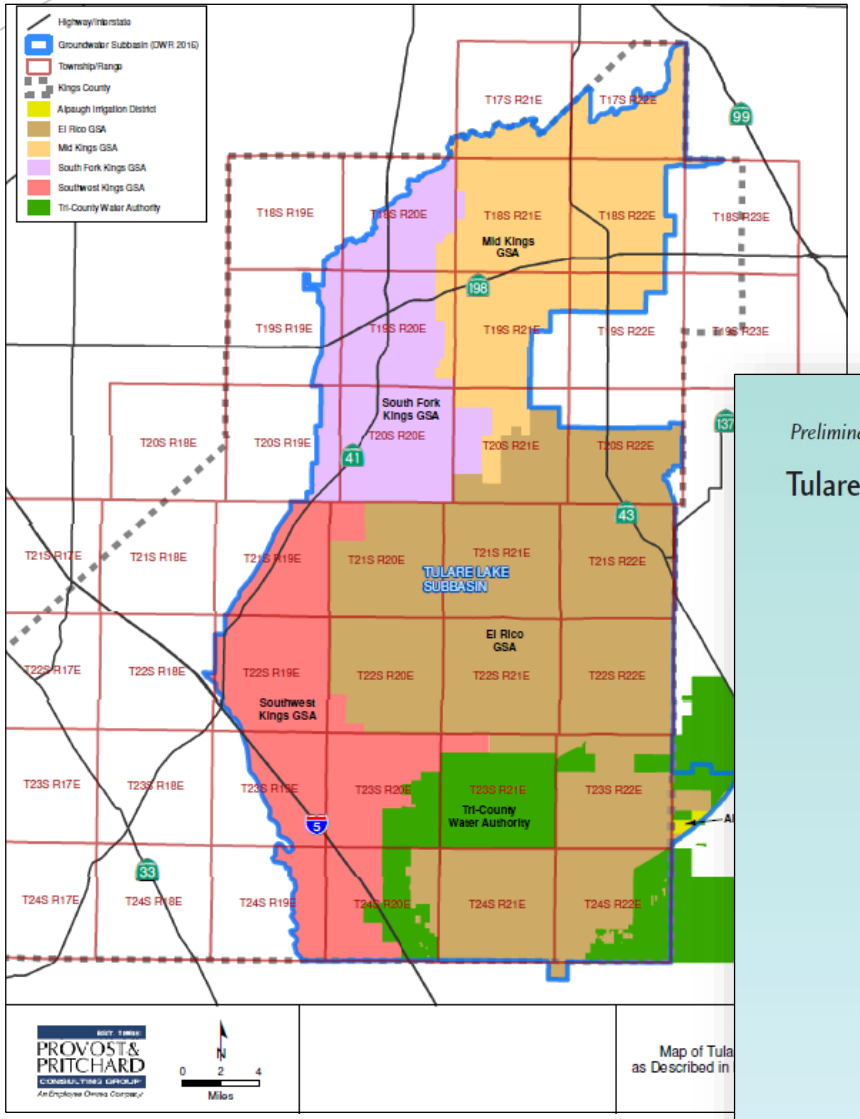
- The GSAs are accepting written comments on the GSP through December 2, 2019
  - Review a hard copy of the GSP at any of the five GSA offices or download from one of the GSAs' websites:
    - www.midkingsrivergsa.org
    - www.southforkkings.org
    - www.swkgsa.org
    - www.tcwater.org
- Public Hearing: 10 a.m., Monday, December 2, 2019, Kings County Board of Supervisors Chambers – will accept oral comments

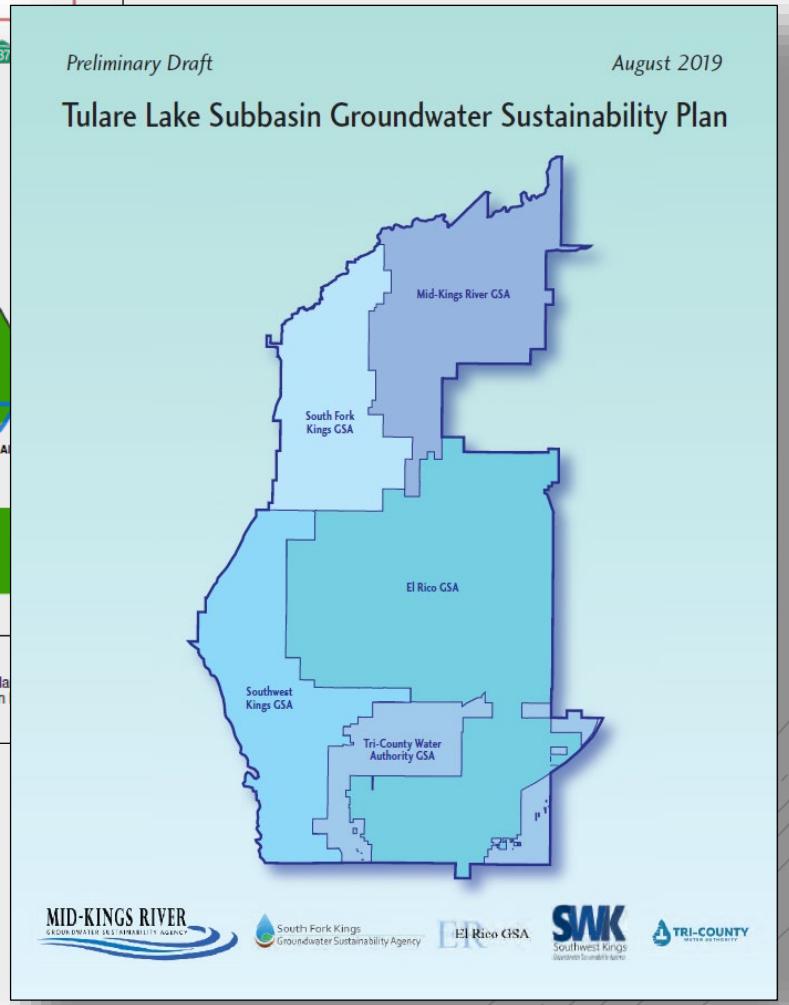
Tulare Lake Subbasin GSP

Public Review Process

- Written comments regarding the Groundwater Sustainability Plan may be submitted up to the Public Hearing
  - Mail or email to your GSA
  - Provide oral and/or written comments at the public hearing

Questions?


Highway/Interstate
Groundwater Subbasin (DWR 2016)
Township/Range
Kings County
Alpaugh Irrigation District
El Rico GSA
Mid Kings GSA
South Fork Kings GSA
Southwest Kings GSA
Tri-County Water Authority
Mid Kings GSA
South Fork Kings GSA
El Rico GSA
Southwest Kings GSA
Tri-County Water Authority
TULARE LAKE SUBBASIN
PROVOST& PRITCHARD
Miles


Preliminary Draft
August 2019
Tulare Lake Subbasin Groundwater Sustainability Plan
Mid-Kings River GSA
South Fork Kings GSA
El Rico GSA
Southwest Kings GSA
Tri-County Water Authority GSA
MID-KINGS RIVER
South Fork Kings Groundwater Sustainability Agency
El Rico GSA
SWK
Southwest Kings
TRI-COUNTY