



**EASTERN SAN JOAQUIN  
GROUNDWATER AUTHORITY**

**Inter-Basin Coordination  
July 10, 2019**

# Agenda



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- I. Overview of Current Basin Conditions
- II. ESJ Model & Available Information
- III. Boundary Flows
- IV. Sustainable Management Criteria
- V. Next Steps



# Overview of Current Basin Conditions

# Where is the Eastern San Joaquin Subbasin Boundary?



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ESJ Subbasin boundaries:

- North – Dry Creek
- West – San Joaquin River
- South – Stanislaus River
- East – Sierra Nevada Bedrock Outcrop

1,207 square miles

# ESJ Subbasin: 15 GSAs, One GSP



15 GSAs are working collaboratively to develop a single GSP

The GSAs formed the Eastern San Joaquin Groundwater Authority (GWA) to jointly develop and implement the Eastern San Joaquin GSP

# Current Basin Conditions

What is the current status of Subbasin across each of the six sustainability indicators under SGMA?



Chronic  
lowering of  
groundwater  
levels



Degraded water  
quality



Reduction of  
groundwater  
storage



Land subsidence



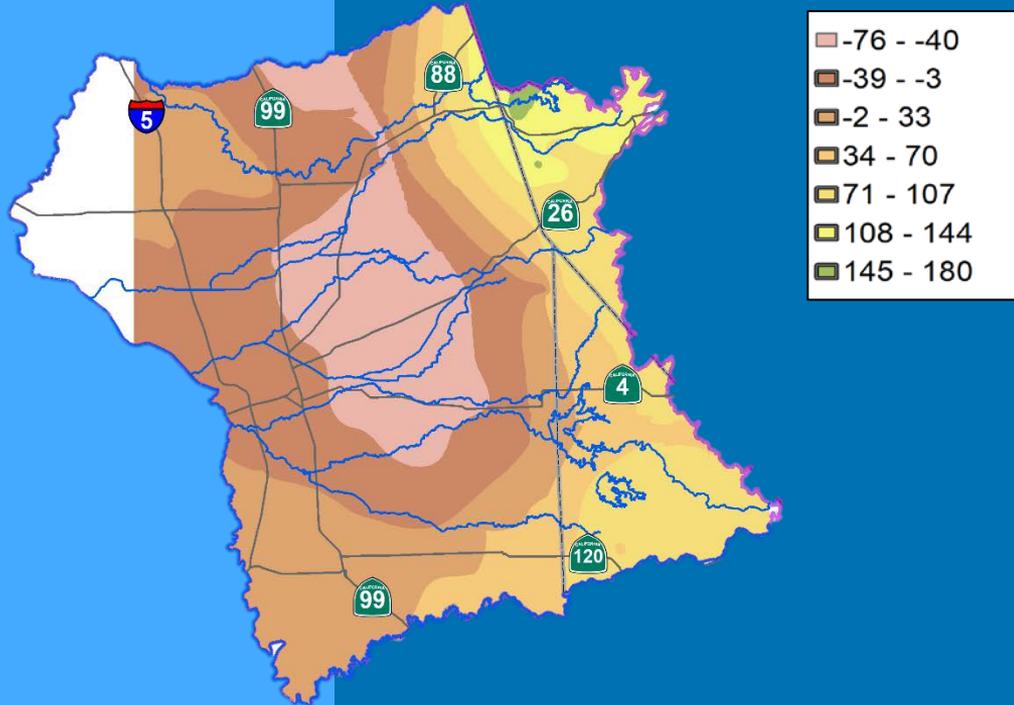
Seawater  
intrusion



Depletions of  
interconnected  
surface waters

# 1) Groundwater Elevations

## 4<sup>th</sup> Quarter 2017 Groundwater Elevation (ft.)



Groundwater elevations have declined in past decades due to increased pumping activity. However, over the last couple decades, the rate of decline has reduced.

## 2) Groundwater Storage

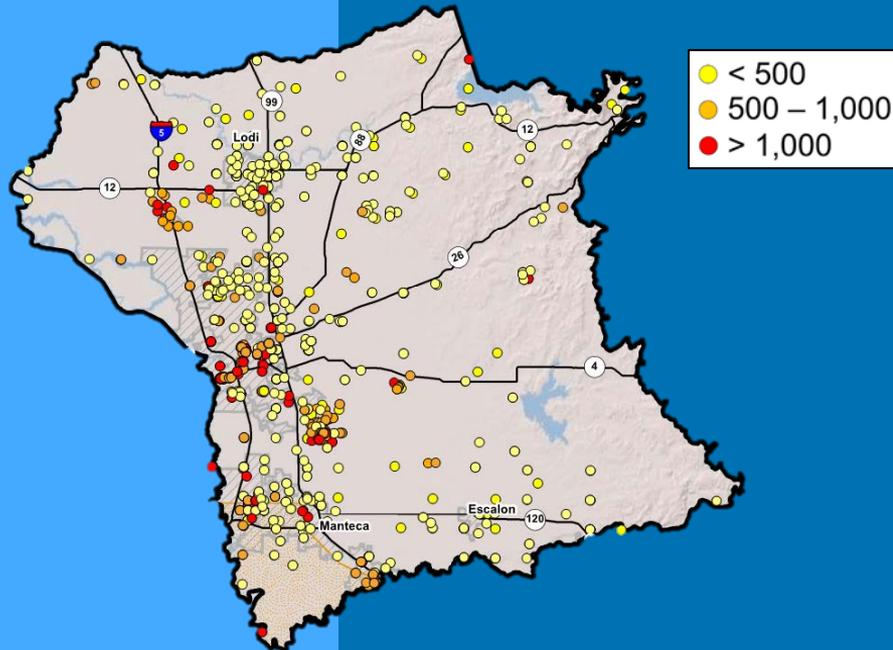


The Eastern San Joaquin Subbasin has large amounts of fresh groundwater stored in its aquifers – over 50 million acre-feet.

However, as groundwater elevations decline, it will become increasingly difficult and expensive to reach this water.

# 3) Water Quality

## Maximum Total Dissolved Solids (TDS) 2008-2018 (mg/L)



Salinity contamination of freshwater wells is a concern in some areas of the Subbasin. These areas are primarily located in the western portions of the Subbasin.

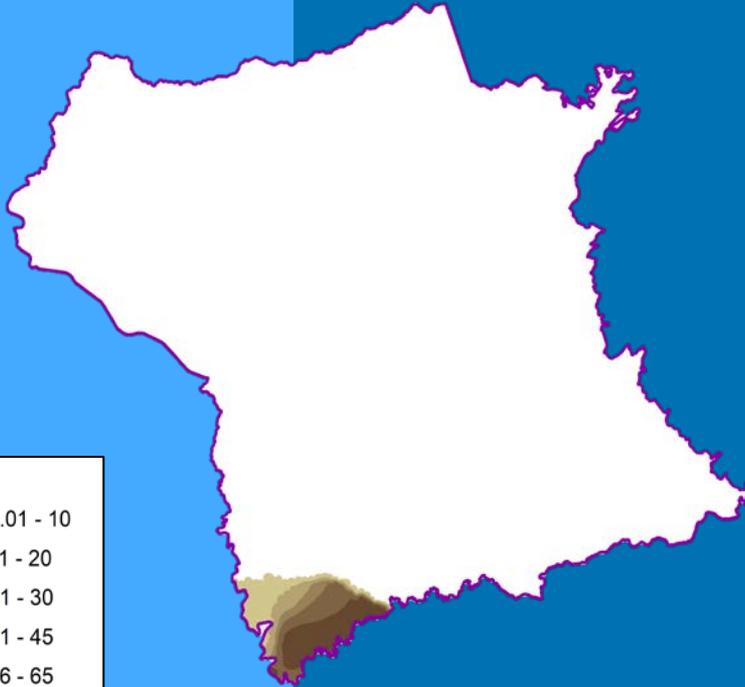
## 4) Seawater Intrusion



Direct seawater intrusion does not occur in the Subbasin. The potential for seawater intrusion under climate change/sea level rise scenarios may be considered for future conditions.

# 5) Land Subsidence

## Corcoran Clay Thickness (ft.)



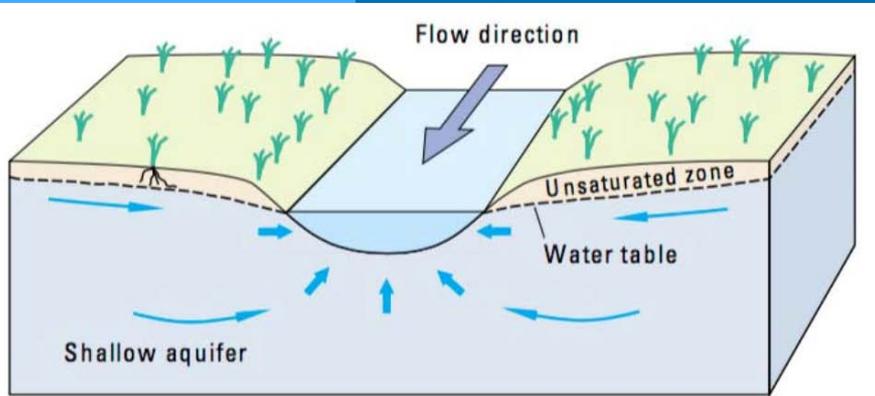
Subsidence potential exists in a small portion of the Subbasin where there is pumping from below the Corcoran Clay layer.

Groundwater elevations in this area are typically high compared to the rest of the basin, and land subsidence has not been experienced historically and is not likely to occur.

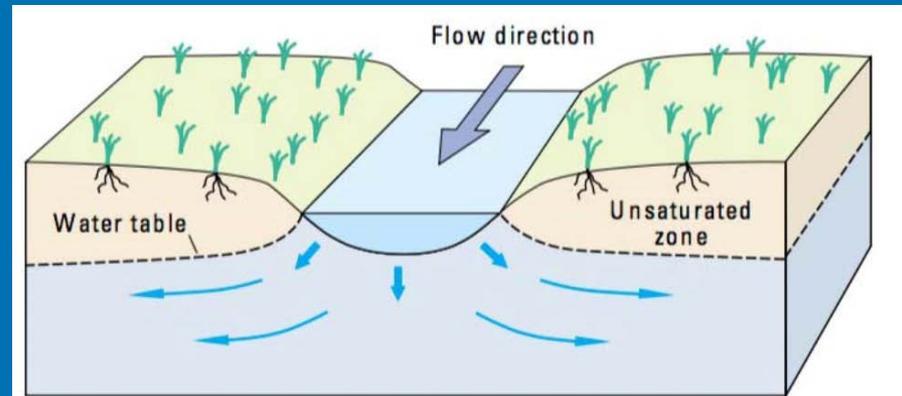
# 6) Depletion of Interconnected Surface Waters

Streams identified as hydraulically connected to groundwater and losing will be managed to protect against significant and unreasonable stream depletion.

**Gaining Stream**



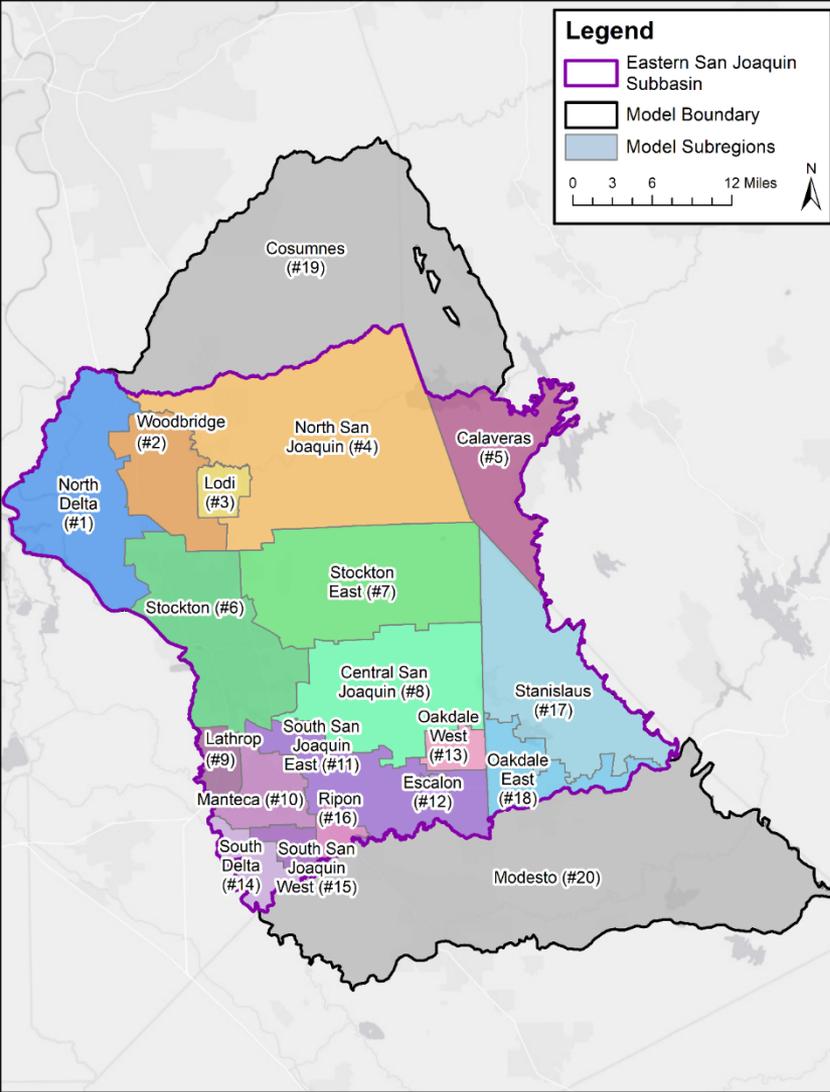
**Losing Stream**





# ESJ Model & Available Information

# ESJWRM Basics



- Model extends to 3 groundwater subbasins: Cosumnes, Eastern San Joaquin, and Modesto
- Hydrologic Period: Water Years 1969-2018
- Calibration Period: Water Years 1996-2015
- Model Time Step: Monthly
- 20 Subregions (~17 in ESJ Subbasin) for data collection and preparation of model input files

# Available Information



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- Model Report available for download at:  
<http://www.esjgroundwater.org/Stay-Informed/Resources>
- Historical Model available by request:  
email [info@esjgroundwater.org](mailto:info@esjgroundwater.org)
- Draft: Hydrogeologic Conceptual Model, Water Budget, Current & Historical Conditions, Sustainable Management Criteria Chapters available for download  
[www.esjgroundwater.org](http://www.esjgroundwater.org)
- Draft GSP available July 10, Informational Meeting July 18, 5-8pm County Agricultural Center

# Data through DMS Available

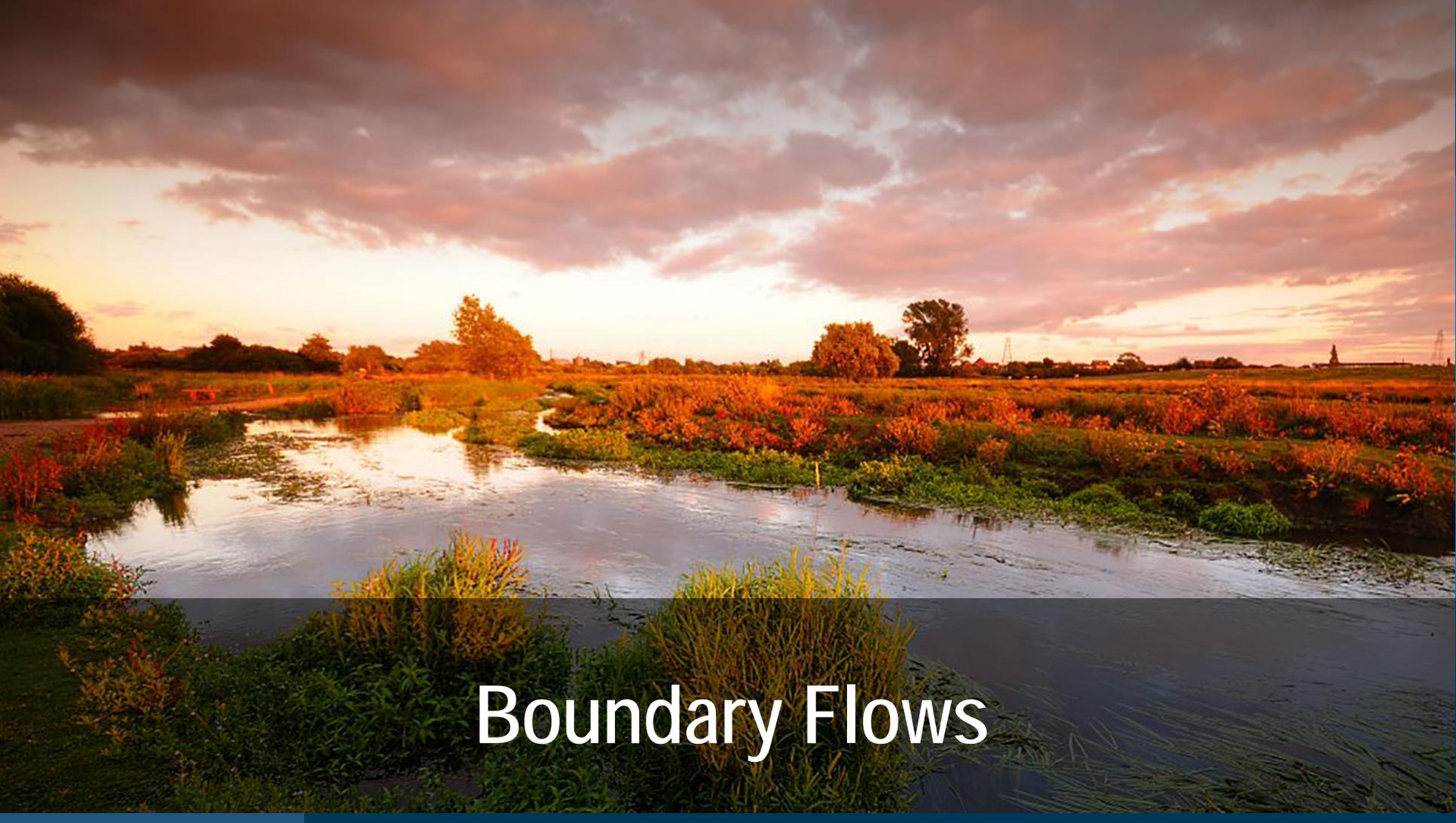


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- DMS is live – contains spatial information about water levels and water quality. Additional data will be added as collected.

Access DMS here: <https://opti.woodardcurran.com/esj>

(use guest login)



# Boundary Flows

# Boundary Flow Assumptions



- Simulate boundary flows using general head boundary conditions (i.e., model calculates gradient between groundwater levels)
- All Eastern San Joaquin Subbasin boundaries are also streams, which have stream-aquifer interaction simulated

# Eastern San Joaquin Water Budget

- Boundary Flows into Eastern San Joaquin Subbasin from Surrounding Subbasins:

Groundwater Subbasin	Historical Calibration (AF/year) (20 year average)	Projected Conditions (AF/year) (50 year average)
Cosumnes	14,000	19,000
Modesto	5,300	7,400
South American	3,400	2,900
Solano	11,100	8,800
East Contra Costa	4,400	5,300
Tracy	25,900	32,500

**Note:** All flows are rounded annual averages in acre-feet per year (AFY)





# Sustainable Management Criteria

# Sustainable Management



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- ESJ and neighboring subbasins operate in a similar manner and same scale under sustainable groundwater management
- Constant flow boundary condition– assume flows in the future will be similar to what has occurred in the past
- Sustainable yield: 715,000 AFY (+/- 10%)
- Pumping offset: 78,000 AFY

# Undesirable Results Assumptions



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- Along Modesto Subbasin boundary – no undesirable results identified based on operations of ESJ under sustainable groundwater management

# Using GW Levels as a Proxy



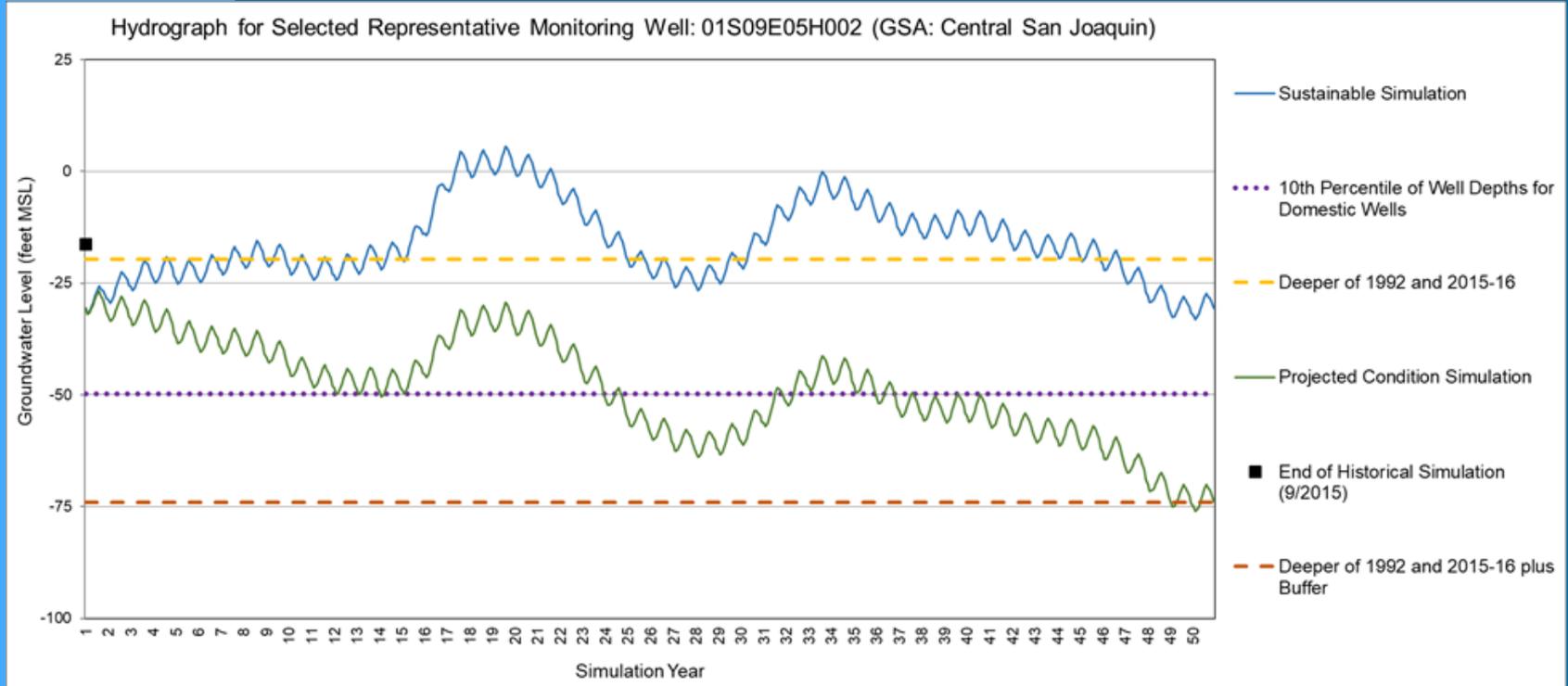
- **Storage:** Sustainability in the ESJ Subbasin related to groundwater volume is driven by the groundwater level indicator, which relates to the ability of infrastructure to economically access groundwater and the sustainability of groundwater dependent ecosystems, to the extent connected to the aquifer accessed for water supplies. Groundwater elevation levels will be protective of significant and unreasonable depletion of groundwater storage.

# Using GW Levels as a Proxy



- **Land Subsidence:** The use of groundwater levels as a proxy metric for this sustainability indicator is justified by the significant correlation between groundwater levels and land subsidence and is reasonable given the lack of extensive monitoring for land subsidence.
- **Interconnected SW-GW:** Proposed groundwater level minimum thresholds and undesirable results have an associated level of additional depletions. Further depletions are not likely, as groundwater levels below minimum thresholds would be required.

# GWL Min Threshold: Shallower of historical drought low w/ buffer or 10<sup>th</sup>% domestic well depth



# Identified Concerns for Water Quality – Addressed in the GSP



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## What we've heard from the Advisory Committee:

- Salinity



- Arsenic



- Nitrates

- Point-source contamination

- 1,2,3 TCP

- Historic WQ concern

- Can be feasibly managed by a GSP/GSA

- Measured using TDS as a proxy (most widely available data)

- Min Threshold: 1,000mg/L TDS at identified wells

- Naturally occurring

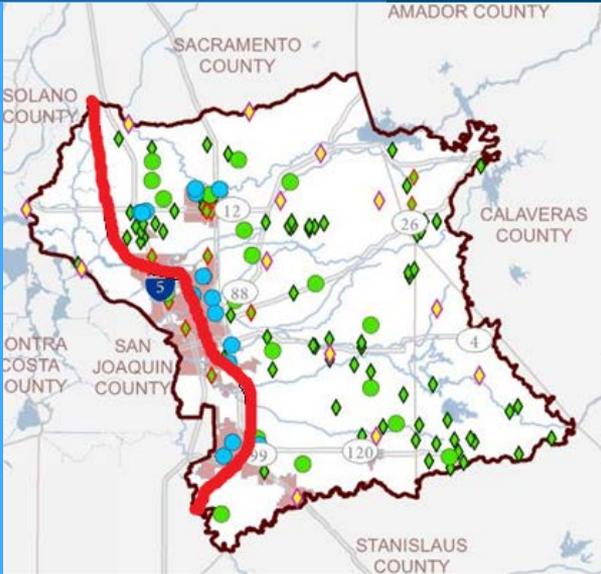
- Doesn't result from unsustainable groundwater extraction activities

- No thresholds set

# Seawater Intrusion: Developing an Isocontour Line



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- 2,000 mg/L chloride isocontour between the westernmost monitoring points and the next most-westerly points, to serve as a sentinel.



Next Steps

# Next Steps



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- Draft GSP Finalize
- Monitoring & Reporting
- Implement GSP Elements



# Thank You!

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