



Santa Ynez River Valley Groundwater Basin  
Western Management Area  
Groundwater Sustainability Agency

# **November 2020**

# **Groundwater Conditions**

# **Stakeholder Workshop**



engineers | scientists | innovators

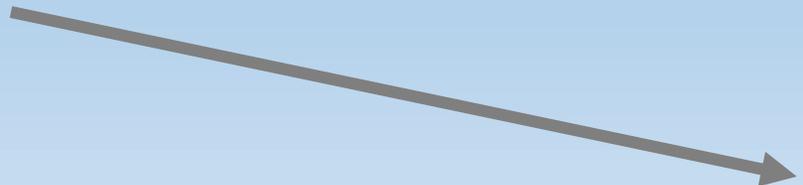
# Housekeeping

- Recording the meeting for the purpose of capturing public feedback
- Recording can be made available upon request
- Opportunities for public feedback and questions throughout the workshop
- Public comments on the GCTM should be submitted to the website:



[www.santaynezwater.org](http://www.santaynezwater.org)

- Slide numbers in lower right



# Agenda

1. Introduction to Sustainable Management Criteria (SMC)
  - Six SGMA Sustainability Indicators
2. Groundwater Conditions Technical Memo
  - Review and discussion
3. The Way Ahead
  - Water Budget
  - Groundwater Model
  - Continued discussion of Sustainability Management Criteria

# **Introduction to Sustainable Management Criteria**

Management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.

Undesirable results categorized by six sustainability indicators (next two slides).

Avoidance of undesirable results is thus critical to the success of a GSP.

**Objective horizon = sustainable management of the basin within 20 years from the date of GSP adoption.**

**Planning and implementation horizon = 50 years from date of GSP adoption, including 5-year GSP implementation reviews.**

# Six SGMA Sustainability Indicators

Undesirable results are categorized in SGMA by these six sustainability indicators.



Lowering Groundwater Levels



Reduced Groundwater Storage



Land Subsidence



Impaired Water Quality



Seawater Intrusion



Surface water depletion

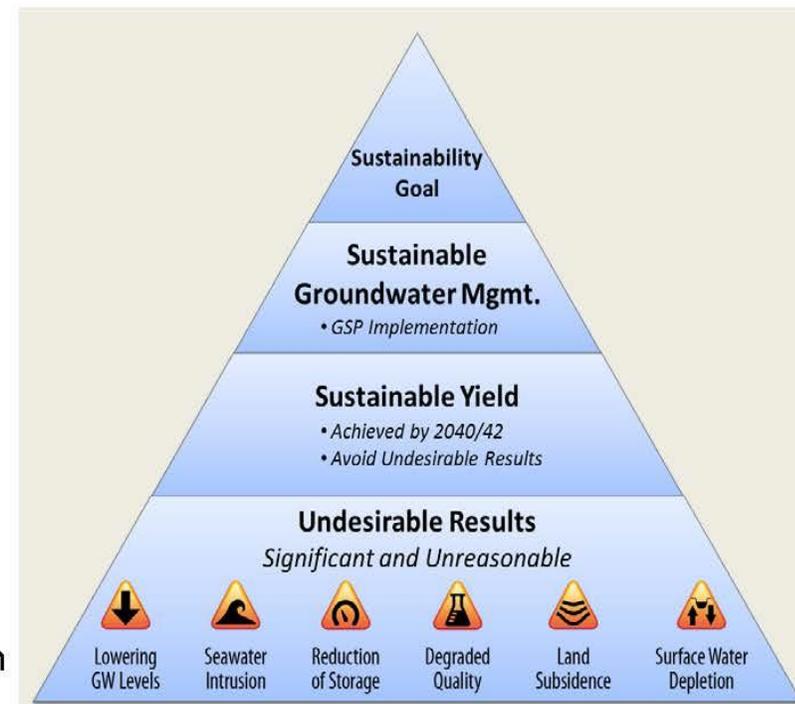


# Undesirable Results and Sustainability Indicators

## What does "Undesirable Results" mean?

When conditions related to any of the **six sustainability indicators** become significant and unreasonable, **as determined by the GSA committee, with consideration of input received from the CAG and the public.**

- ⚠️ Chronic **lowering of groundwater levels** indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon....
- ⚠️ Significant and unreasonable **reduction of groundwater storage**
- ⚠️ Significant and unreasonable **seawater intrusion**
- ⚠️ Significant and unreasonable **degraded water quality**, including the migration of contaminant plumes that impair water supplies
- ⚠️ Significant and unreasonable **land subsidence** that substantially interferes with surface land uses
- ⚠️ **Depletions of interconnected surface water** that have significant and unreasonable adverse impacts on beneficial uses of the surface water

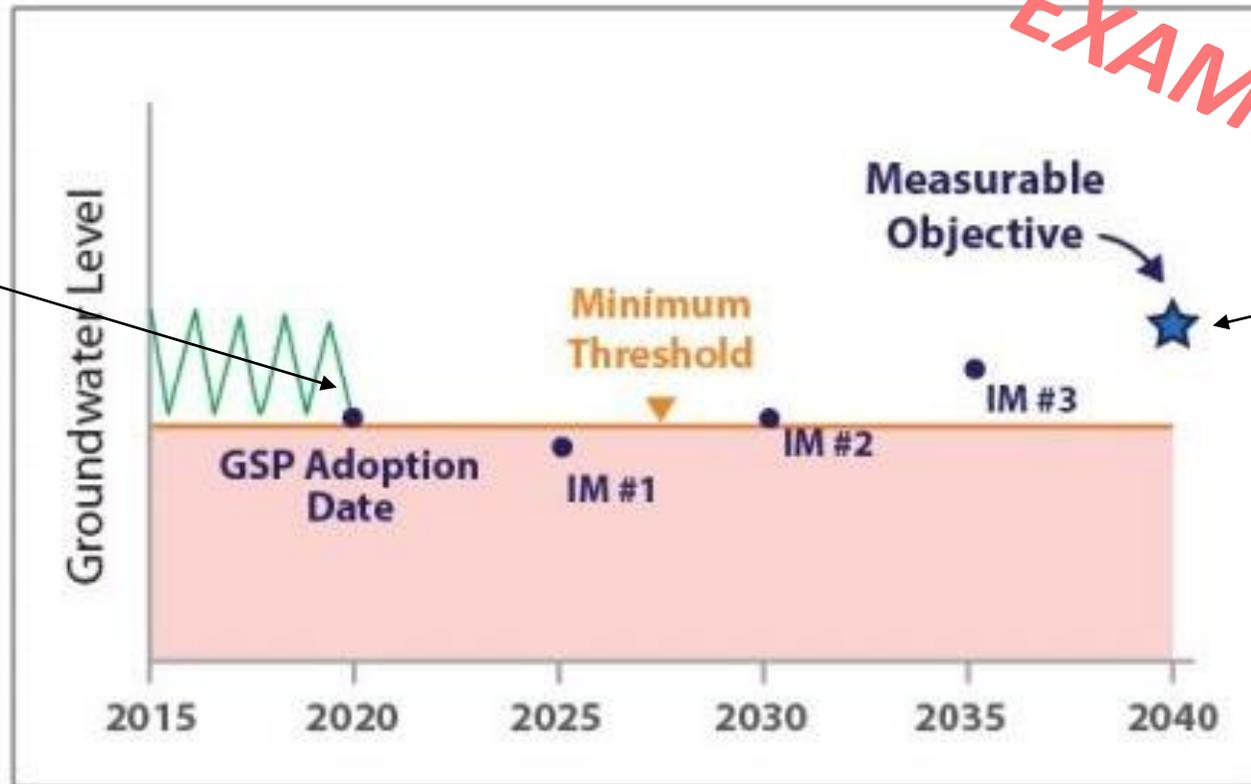


# Sustainable Management Considerations

- Technical Assessment of Current Conditions: Where are we currently?
  - What does the data say?
- Public engagement: What are undesirable results for the WMA?
  - Look at data and current conditions. Are we trending toward an undesirable result?
  - GSA decides what undesirable results are, based on assessment of current conditions, considering input from the CAG and public.
- Plans for Sustainability:
  - Establish undesirable results thresholds for the six sustainability indicators, in the WMA.
  - Identify projects and management actions for sustainable management.

# EXAMPLE FOR DISCUSSION

Current groundwater level trend



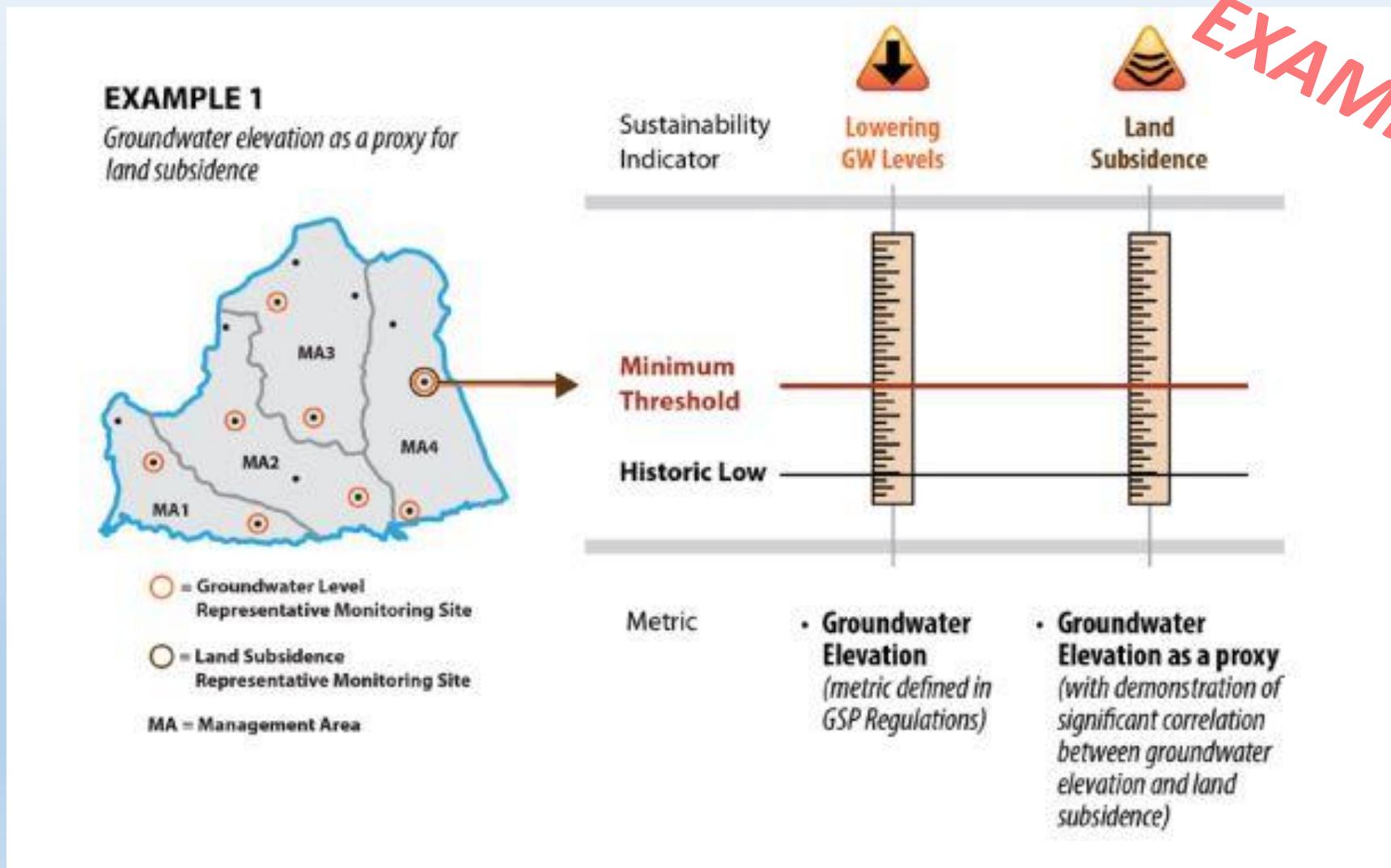
Set objective, achievable through sustainable management

Example Minimum Threshold, Interim Milestones (IM), and Measurable Objective

# EXAMPLE FOR DISCUSSION



# EXAMPLE FOR DISCUSSION



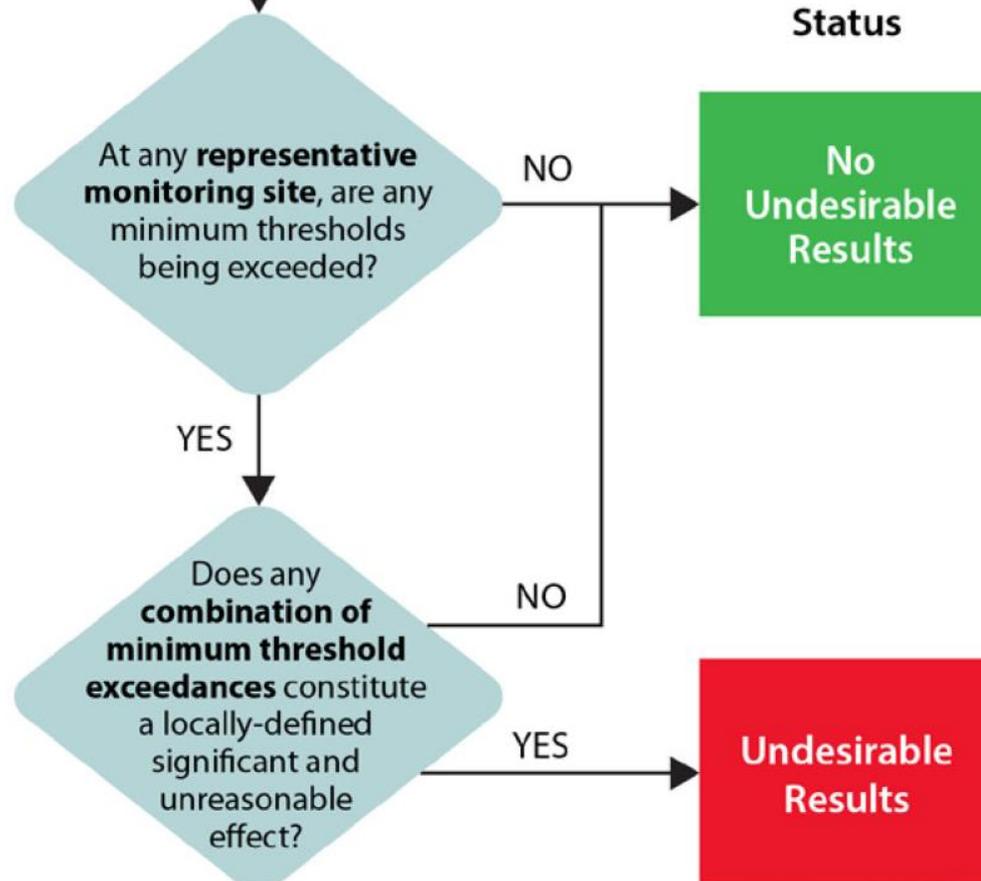
EXAMPLE

## Sustainability Indicators



## Apply Sustainable Management Criteria

- Review data
- Consider beneficial uses and users of groundwater
- Review specific metrics for each sustainability indicator



## Process for Determining Undesirable Results

- Six indicators
- Review data and beneficial uses
- Locally-defined significant and unreasonable effect
- Minimum Thresholds
- Monitoring

# **Sustainability Indicators and Undesirable Results**

*Questions?*

# ***Groundwater Conditions Technical Memo (GCTM)***

*Describes groundwater conditions within the WMA*

*Presents WMA status for each of the Six SGMA  
Sustainability Indicators*

- Lowering Groundwater Levels
- Reduced Groundwater Storage
- Land Subsidence
- Impaired Water Quality
- Seawater Intrusion
- Surface water depletion

# Groundwater Conditions Memo Requirements

*SGMA Regulations, Six SGMA indicators, and document align.*

## DWR Checklist Requirements for GC

### 2.2.2 Current and Historical Groundwater Conditions (Reg. § 354.16)

- 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
  - Including potentially related factors such as instream flow requirements, threatened and endangered species, and critical habitat.



DWR (2016) Groundwater Sustainability Plan (GSP) Annotated Outline. Guidance Document for the Sustainable Management of Groundwater. 7



The DWR Checklist is a summary of some key requirements for Groundwater Conditions, as written in the SGMA regulations

These are the SGMA regulations which describe the full list of requirements for preparing Groundwater Conditions.



## SGMA Regulations § 354.16. Groundwater Conditions

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

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

(1) Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.

(2) Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.

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

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

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

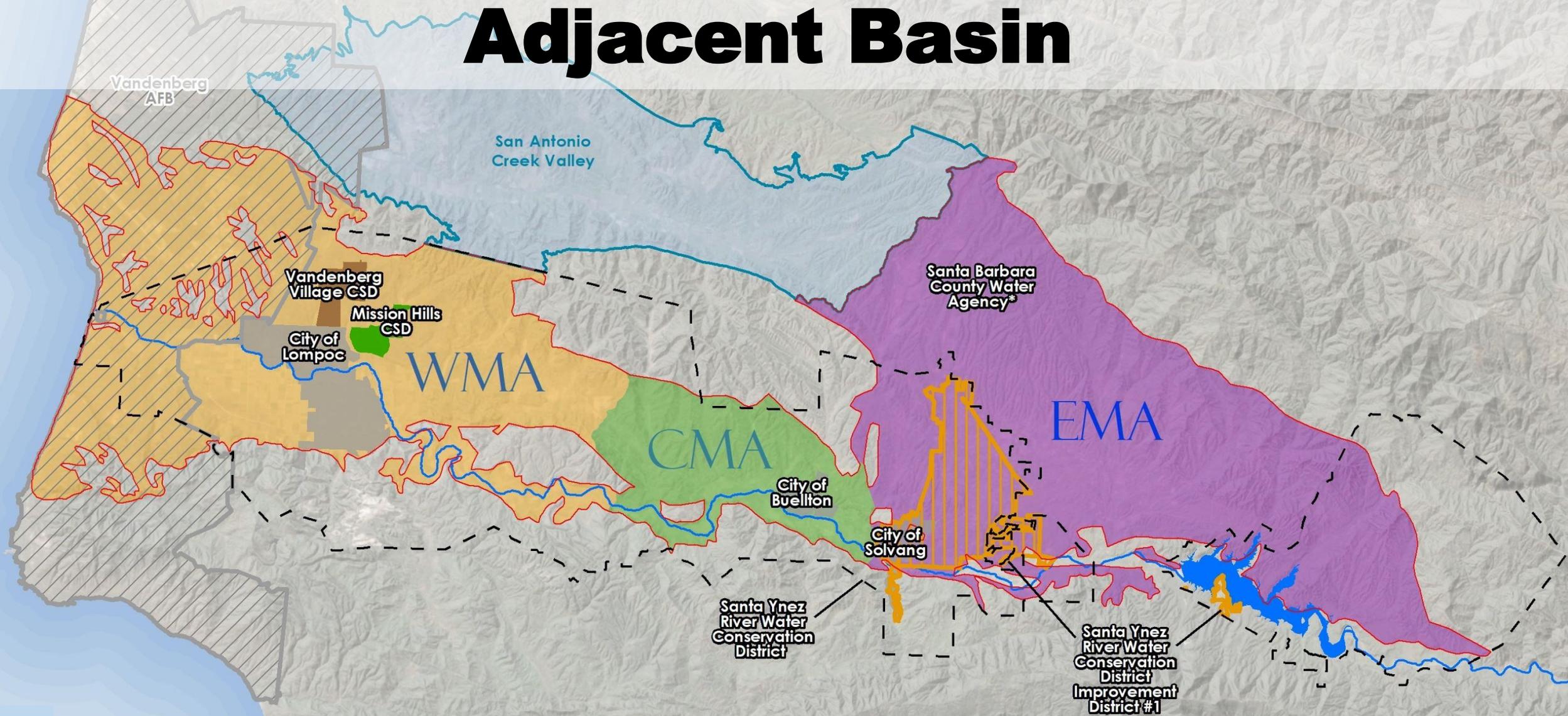
(e) The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.

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

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



# Basin, Management Areas, & Adjacent Basin



# ***GCTM Section 1: Groundwater Elevations***

- Groundwater elevations for the WMA are presented in hydrographs (Appendix A)
  - Seasonal fluctuations (seasonal high and seasonal low), and
  - Long term trends
- Measured groundwater elevations are used to plot and evaluate:
  - Seasonal High and Seasonal Low conditions
  - Groundwater flow directions throughout the WMA,
  - Lateral (horizontal) and vertical groundwater gradients (direction of groundwater flow), and
  - Regional groundwater pumping patterns within the WMA



Groundwater Elevations



# Groundwater Elevations Upper and Lower Aquifers

**DRAFT**

**Upper Aquifer**

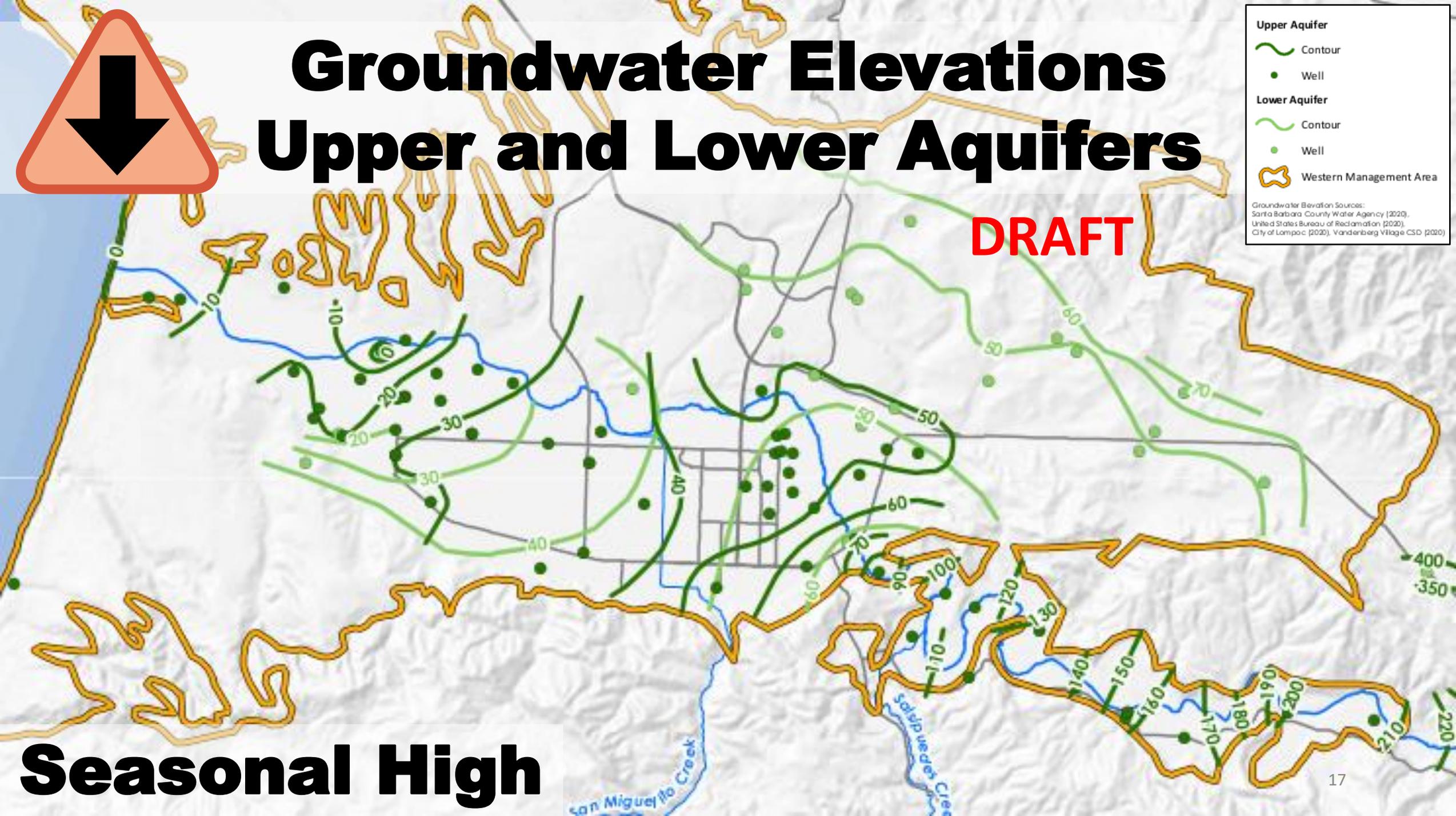
- Contour
- Well

**Lower Aquifer**

- Contour
- Well

Western Management Area

Groundwater Elevation Sources:  
Santa Barbara County Water Agency (2020),  
United States Bureau of Reclamation (2020),  
City of Lompoc (2020), Vandenberg Village CSD (2020)



**Seasonal High**



# Groundwater Elevations Upper and Lower Aquifers

**Upper Aquifer**

- Contour
- Well

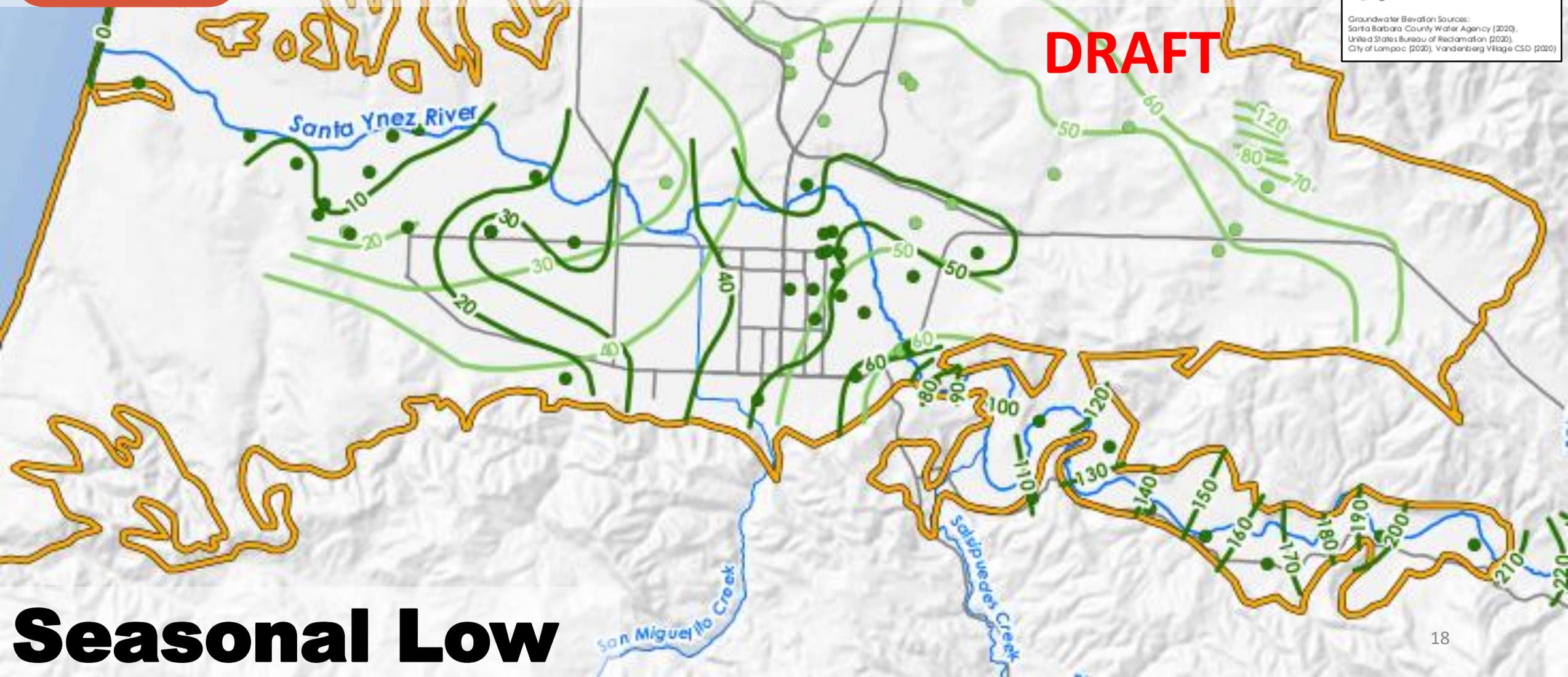
**Lower Aquifer**

- Contour
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**DRAFT**



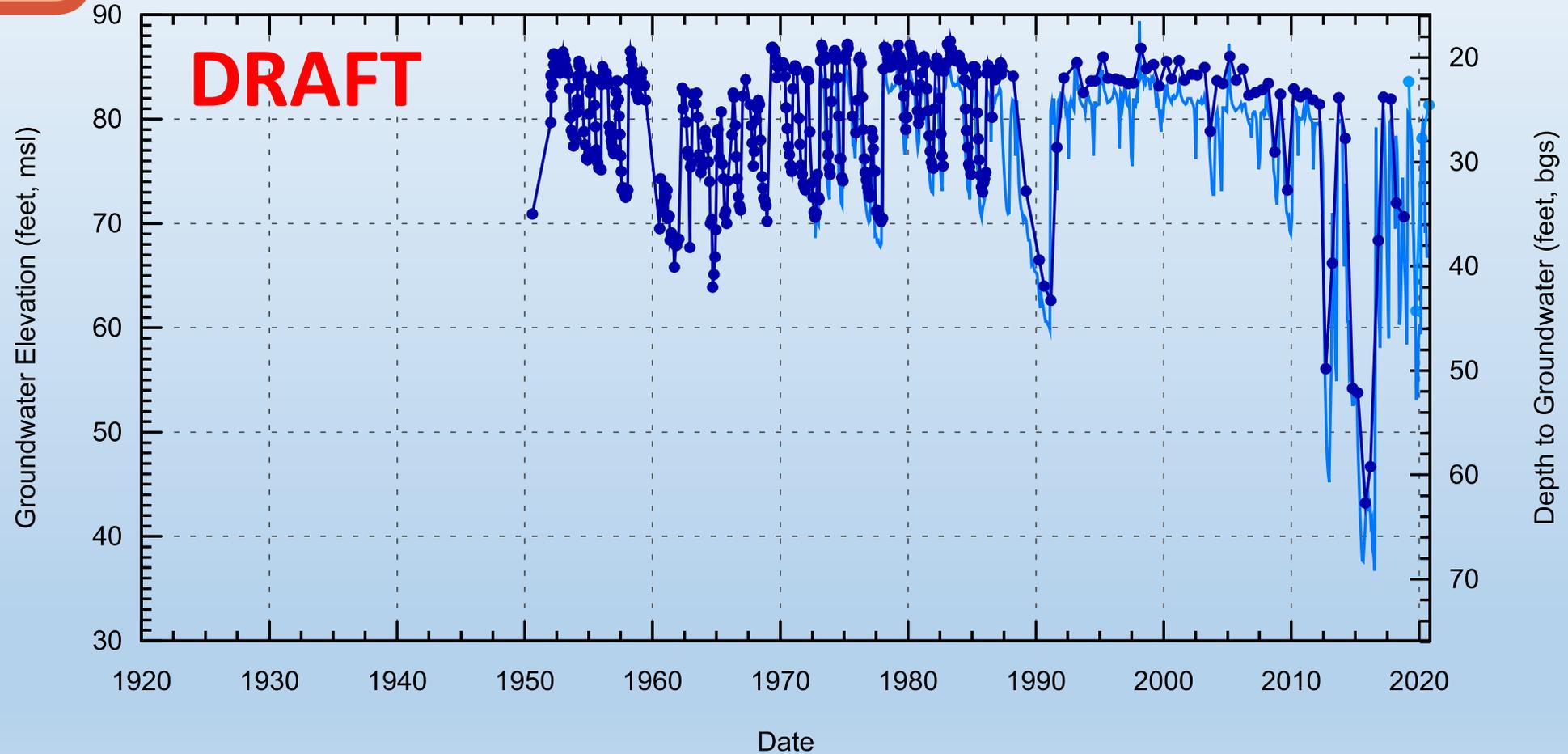
**Seasonal Low**



# Hydrograph

7N/34W-35K9 (DBID 32)

Alluvium - Layer 2



Land Surface (105.9 +/- 0.03 ft, msl) —  
Well Depth (124 ft, bgs) —  
County of Santa Barbara WL —

Reclamation WL —  
USGS WL (343840120254701) —

# ***GCTM Section 1: Groundwater Elevations***

*Questions?*

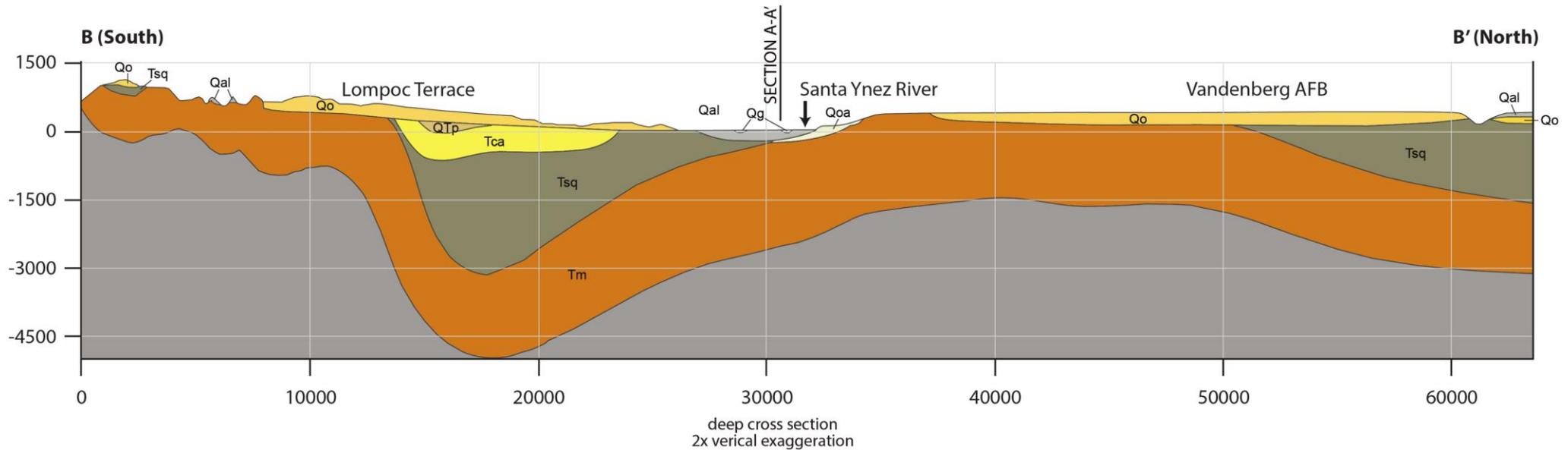
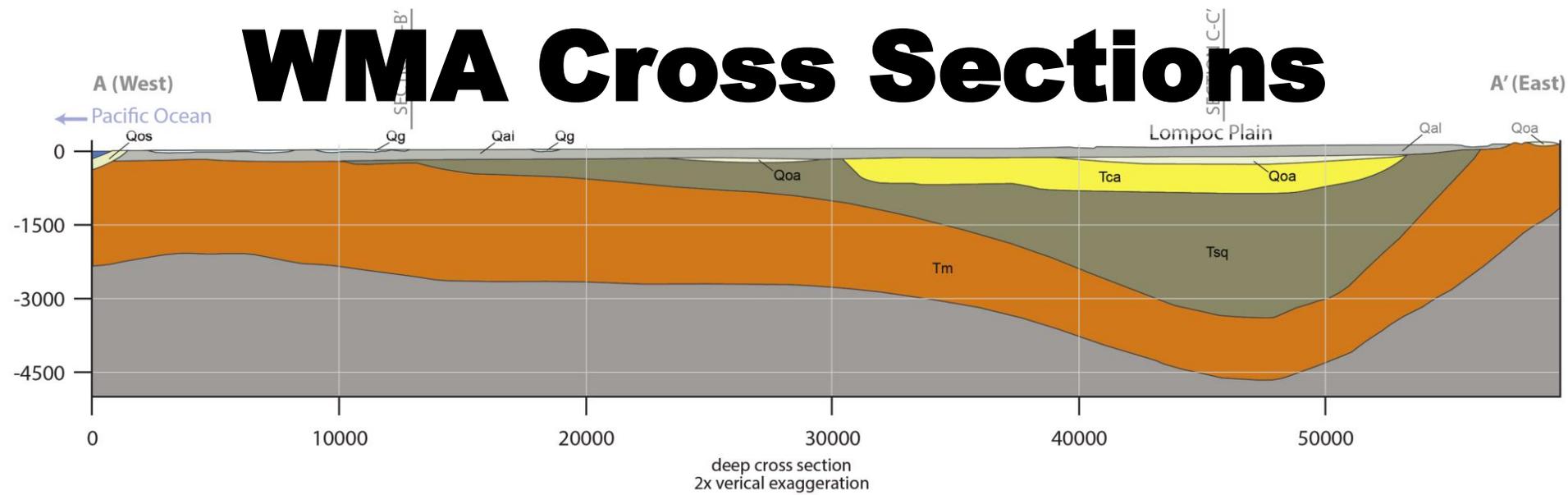
# ***GCTM Section 2: Groundwater Storage***

- Recall there are two principal aquifers within the WMA (cross sections on next slide).
- Groundwater storage is the volume of water those aquifers can hold.
- Section 2 quantifies changes in groundwater storage over the period of record within the WMA.



Groundwater Storage

# WMA Cross Sections



**Model Geology**

River-Channel Deposits (Qg)	Orcutt Sand (Qo)	Sisquoc Formation (Tsq)
Younger Alluvium (Qal)	Paso Robles Formation (QTP)	Monterey Formation (Tm)
Older Dune Sands (Qos)	Careaga Sandstone (Tca)	Tertiary - Older than Monterey
Older Alluvium (Qoa)	Foxen Formation (Tf)	



# Groundwater Storage

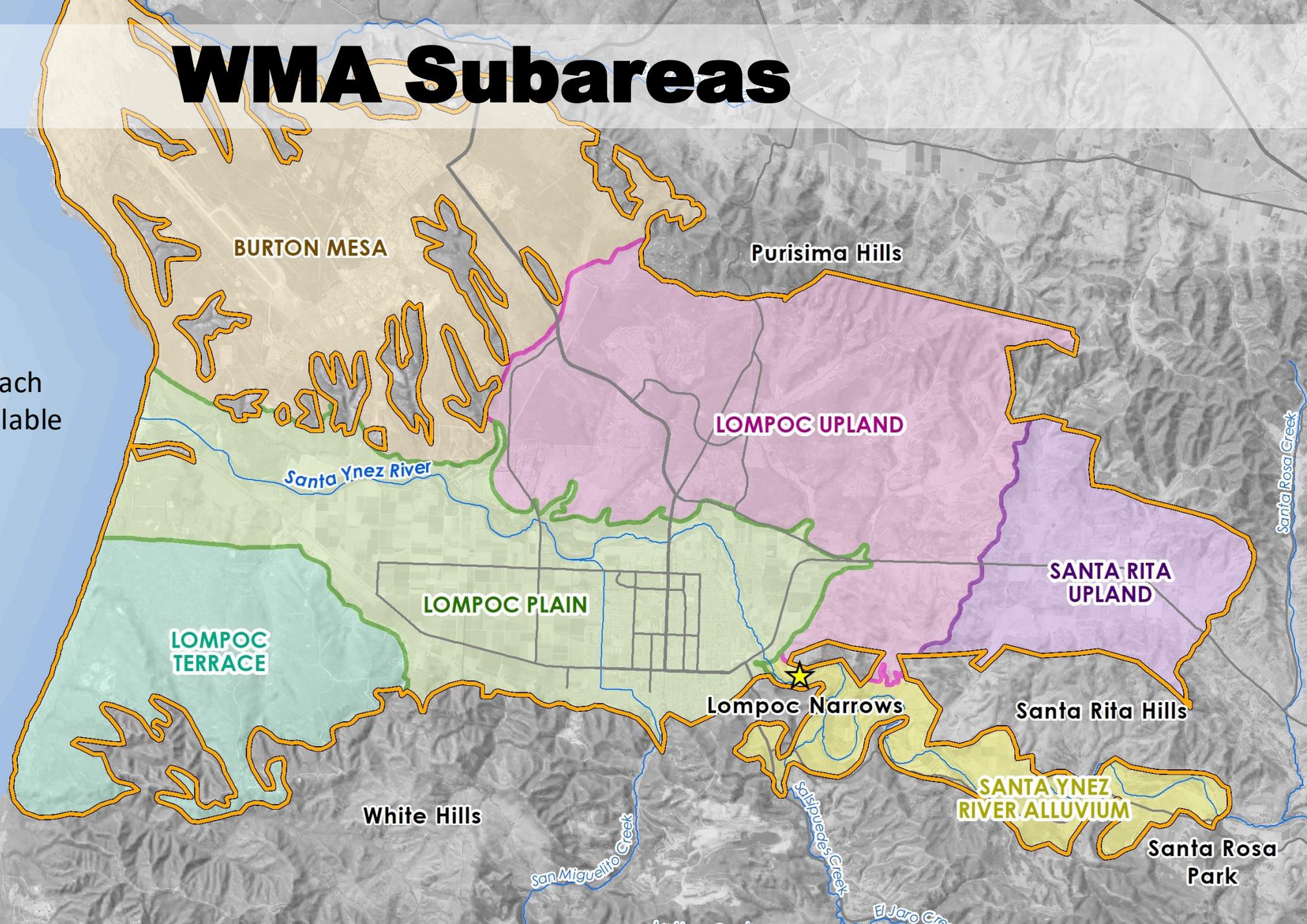
- Data utilized from SYRWCD and USBR reports.
- These reports quantified groundwater storage since 1980.



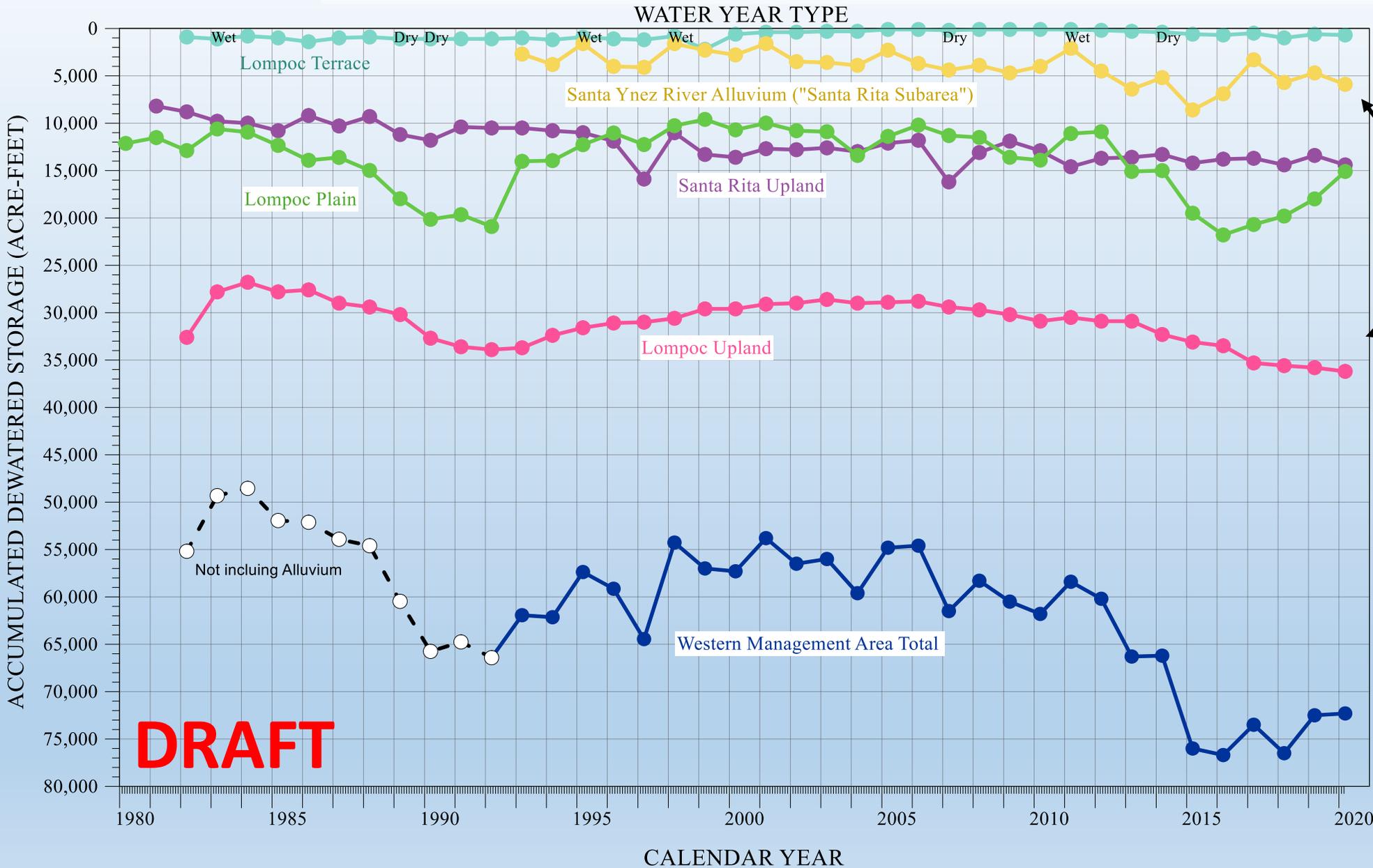


# WMA Subareas

Principal aquifers presence/absence in each subarea relates to available storage



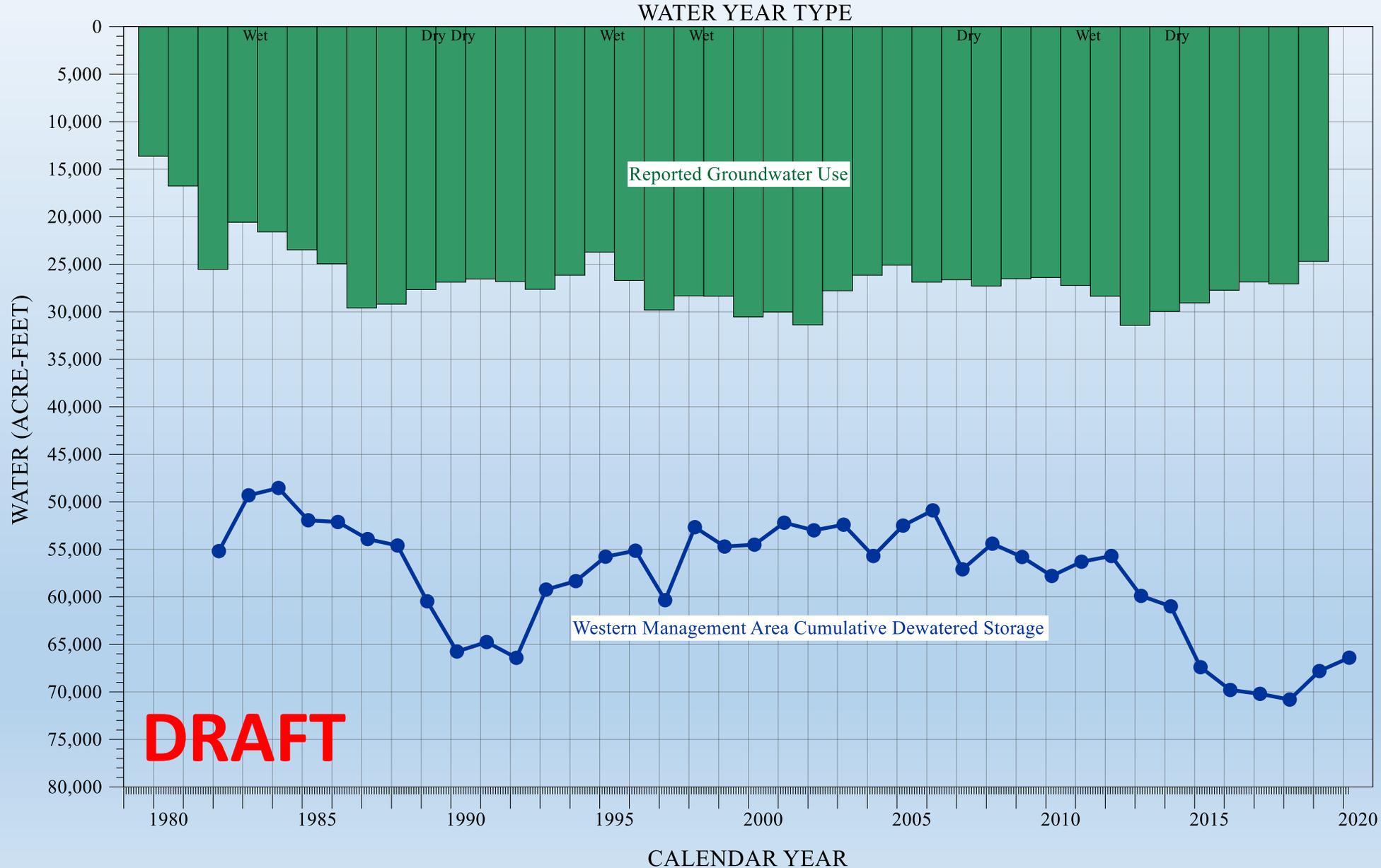
# Groundwater Storage Changes



Subareas

Total

# Groundwater Use and Storage Changes



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# ***GCTM Section 2: Groundwater Storage***

*Questions?*

# ***GCTM Section 3: Groundwater Quality***

Changes to groundwater elevations, flow directions, storage, pumping and recharge have potential to affect groundwater quality (chemistry).

Groundwater quality will be evaluated accordingly based on the various beneficial uses within the WMA.



Groundwater Quality

# ***GCTM Section 3: Groundwater Quality***

*Questions?*

# ***GCTM Section 4: Seawater Intrusion***

- Seawater intrusion may occur in areas where basins meet the ocean.
- Over-pumping is a common reason for seawater intrusion.
- Data from the WMA indicate seawater intrusion is not occurring and over-pumping is not a current condition.



Seawater Intrusion

**DRAFT**

- Base of Aquifer (500ft interval)
- - - Base of Aquifer (100ft interval)
- 📍 Western Management Area

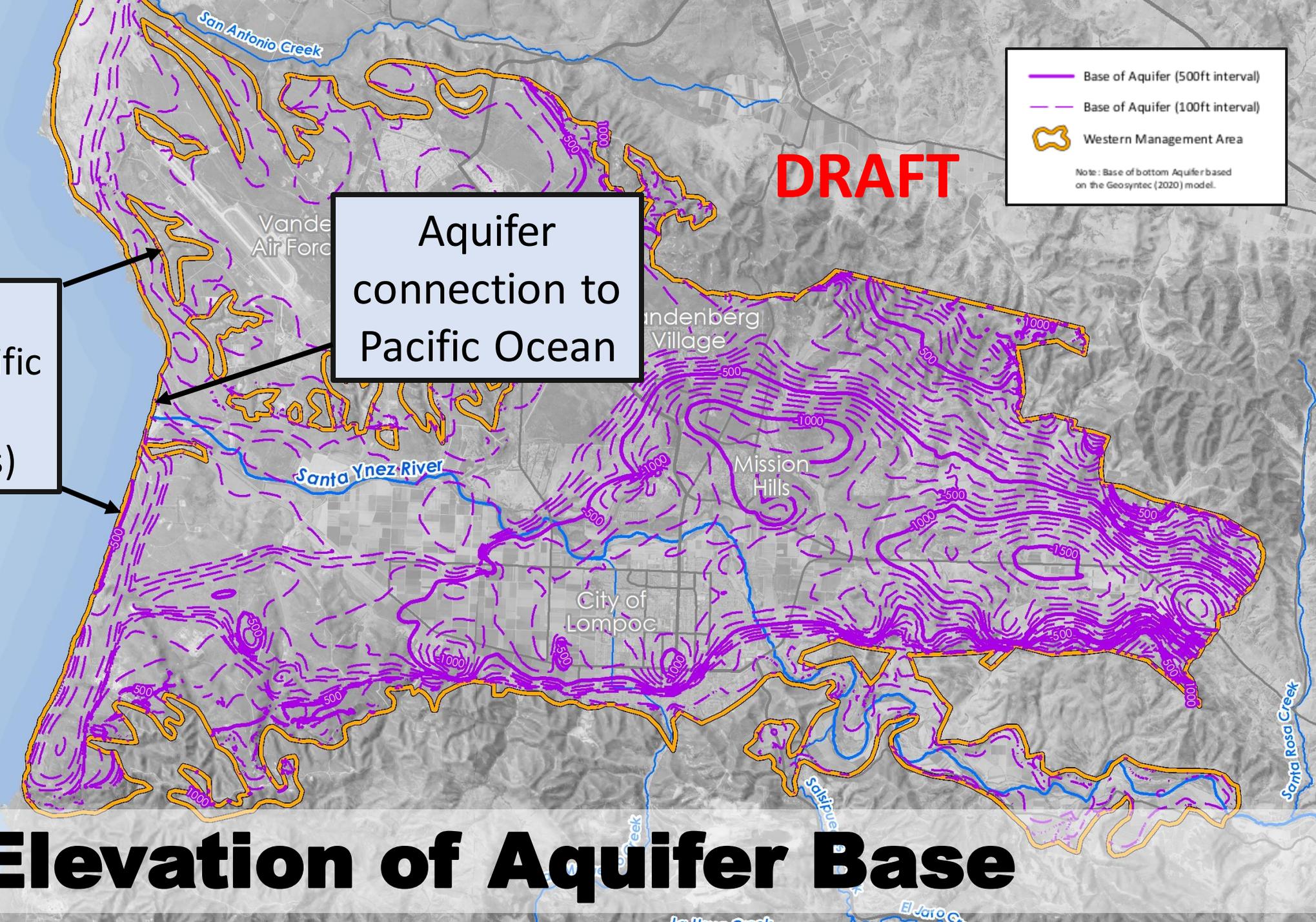
Note: Base of bottom Aquifer based on the Geosyntec (2020) model.

Aquifer connection to Pacific Ocean

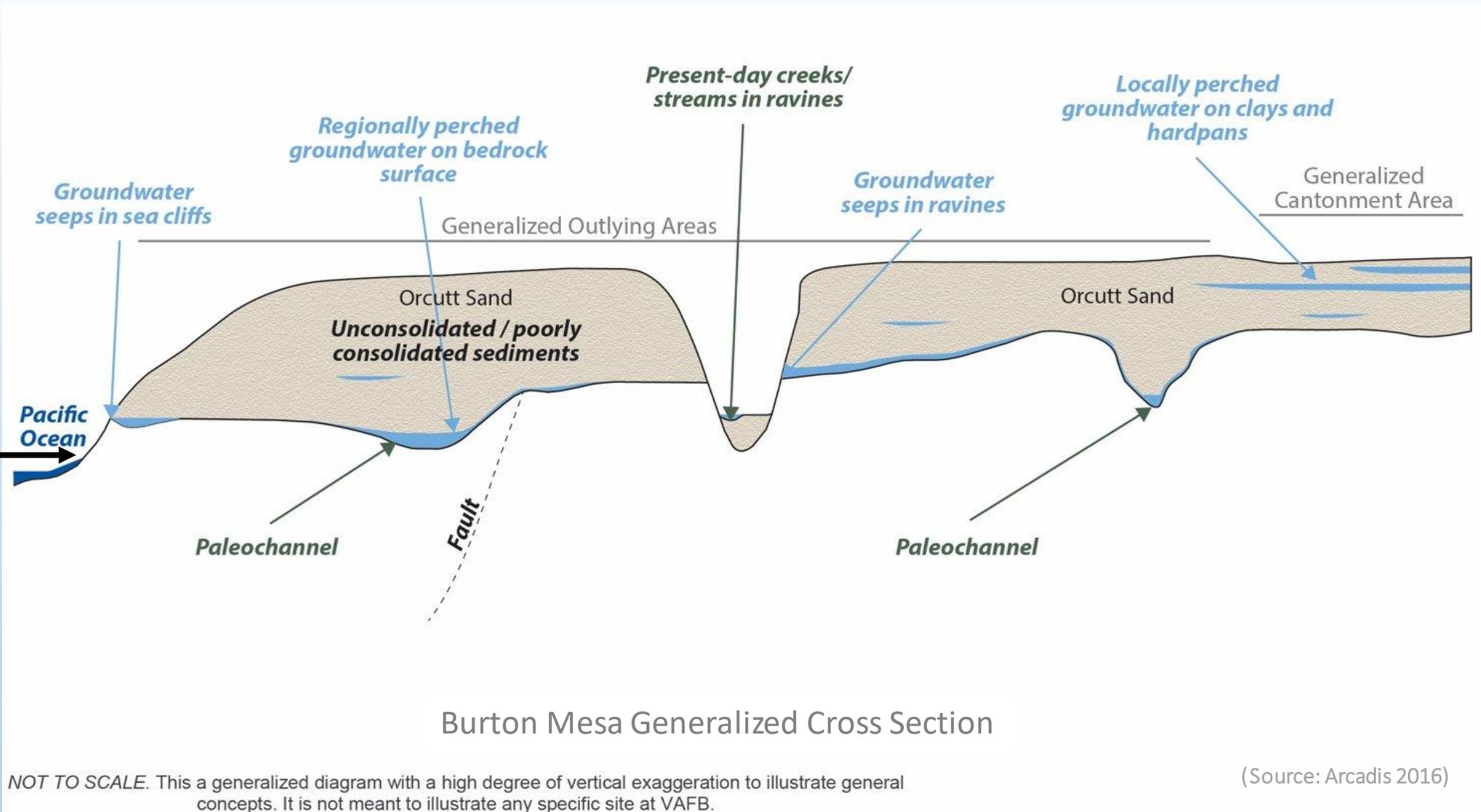
No aquifer connection to Pacific Ocean (uplifted terraces)



# Elevation of Aquifer Base



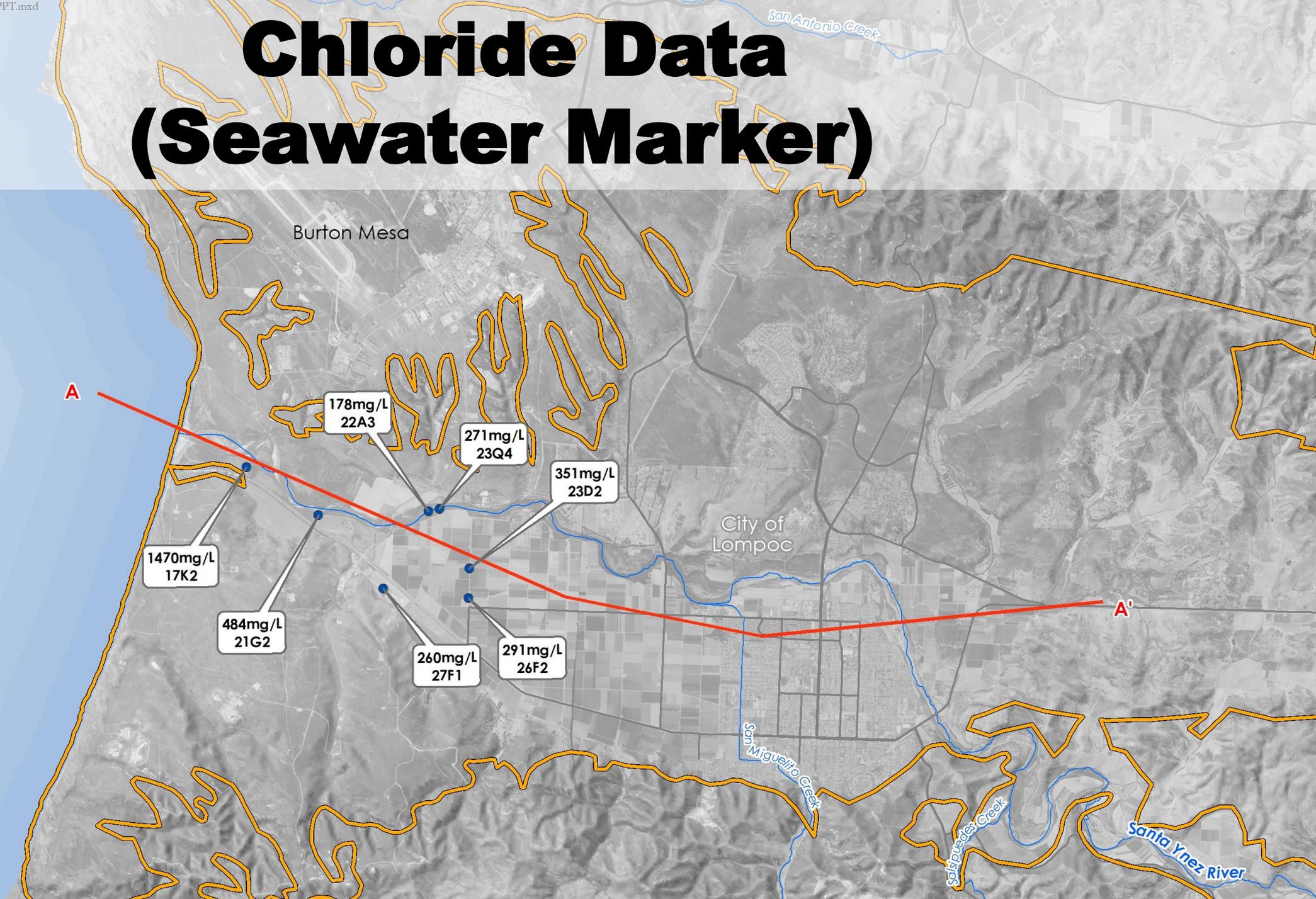
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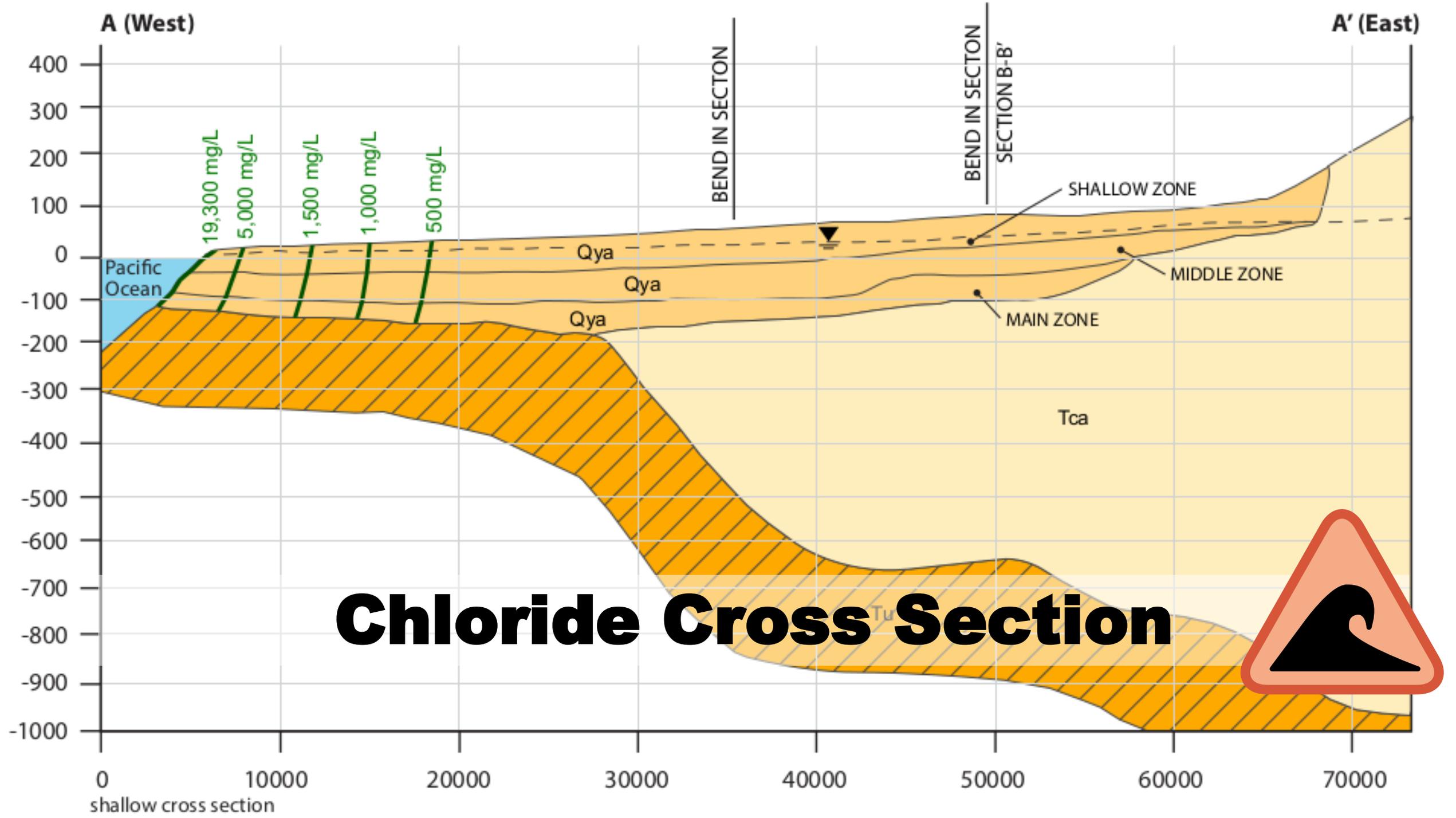


# Areas of No Connection



# Chloride Data (Seawater Marker)





# ***GCTM Section 4: Seawater Intrusion***

*Questions?*

# ***GCTM Section 5: Land Subsidence***

Land subsidence is the collapse of the land surface due to groundwater removal and collapse of the aquifer.

- Caused by reduced water levels and undesirable effects include reduced groundwater storage capacity.
- Section summarizes review of historical land surface elevations, with respect to land surface elevations measured today.
- Estimate potential changes in groundwater storage and predict potential for future land subsidence and /or groundwater storage changes.

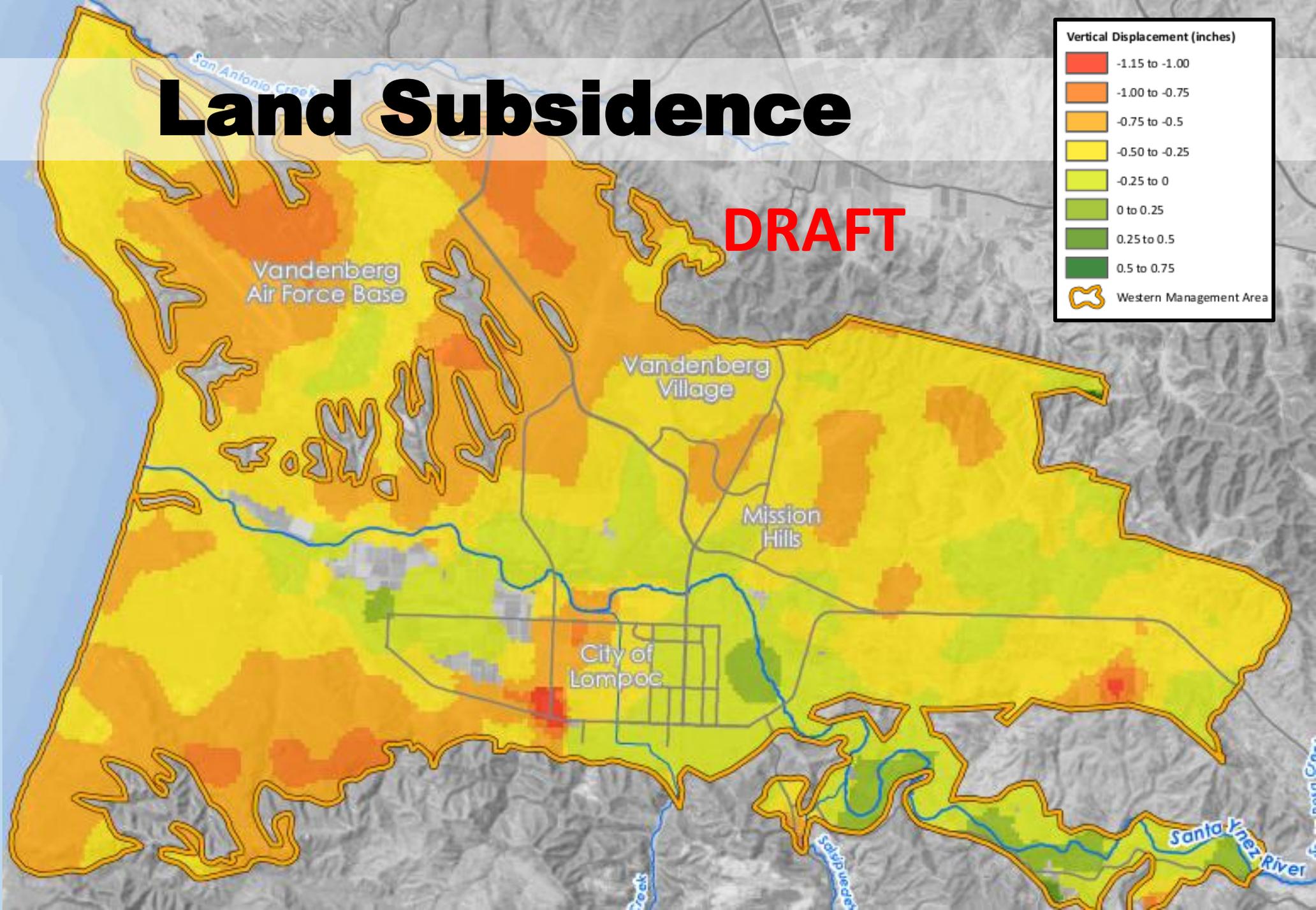
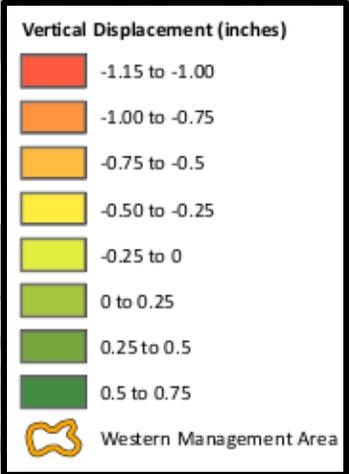


Land Subsidence



# Land Subsidence

**DRAFT**



Satellite Derived  
Jan 2015-Jan 2019

# ***GCTM Section 5: Land Subsidence***

*Questions?*

# ***GCTM Section 6: Interconnected Surface Water Systems and Groundwater Dependent Ecosystems***

Goal of Groundwater Conditions Assessment:

1. Identify Interconnected Surface Water Systems
2. Determine quantity and timing of surface water depletion
3. Identify Groundwater Dependent Ecosystems



Surface Water Depletion

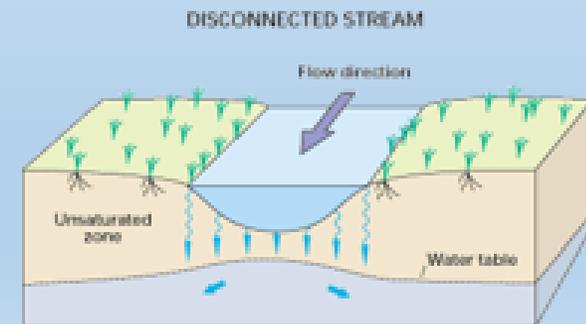
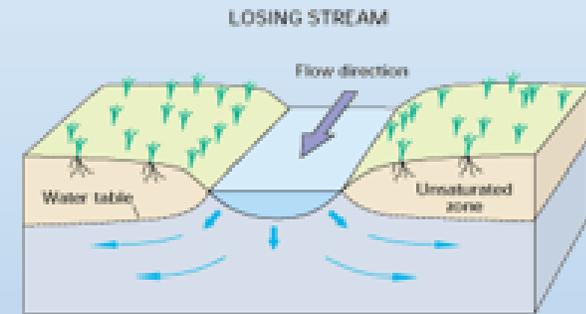


# Interconnected Surface Water

Defined as “Surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted” (DWR, GSP Regulations 2016)

Summary:

1. Continuous saturation
2. Surface water is not completely depleted





# Streamflow Gaging Stations

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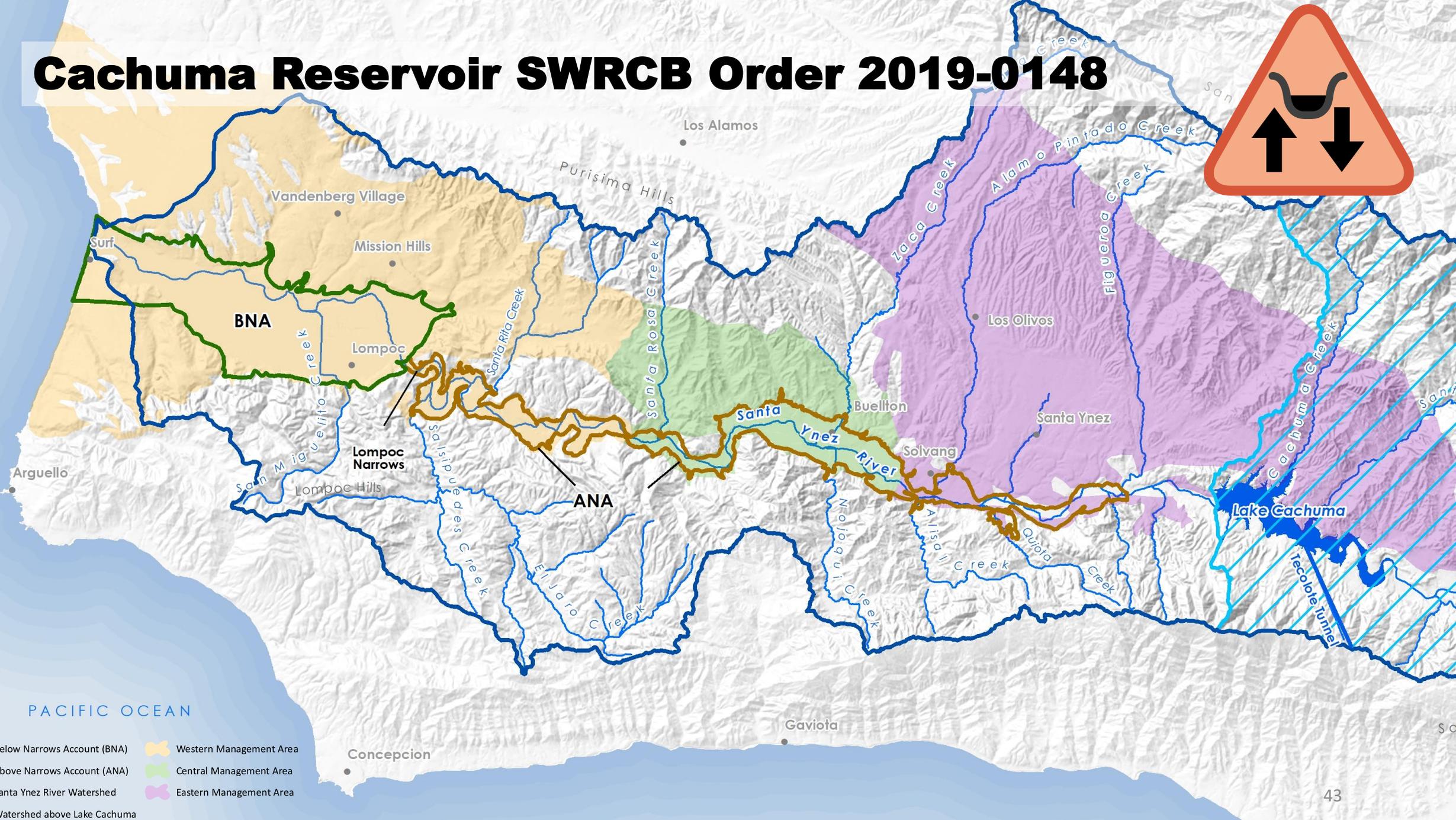
- Active USGS Gage
- ⊕ Inactive USGS Gage
- 🔗 Western Management Area



# Santa Ynez River

Water Year	Minimum Flow at Lompoc Narrows (USGS Gage 11133000) cfs	Minimum Flow at H Street (USGS Gage 11134000) cfs	Spill from Cachuma Reservoir acre-feet/year	Hydrologic Year Type
2010	0	0	0	Above Normal
2011	1.8	0	85,755	Wet
2012	0	0	0	Dry
2013	0	0	0	Critical
2014	0	0	0	Critical
2015	0	0	0	Critical
2016	0	0	0	Dry

# Cachuma Reservoir SWRCB Order 2019-0148



PACIFIC OCEAN

-  Below Narrows Account (BNA)
-  Western Management Area
-  Above Narrows Account (ANA)
-  Central Management Area
-  Santa Ynez River Watershed
-  Eastern Management Area
-  Watershed above Lake Cachuma

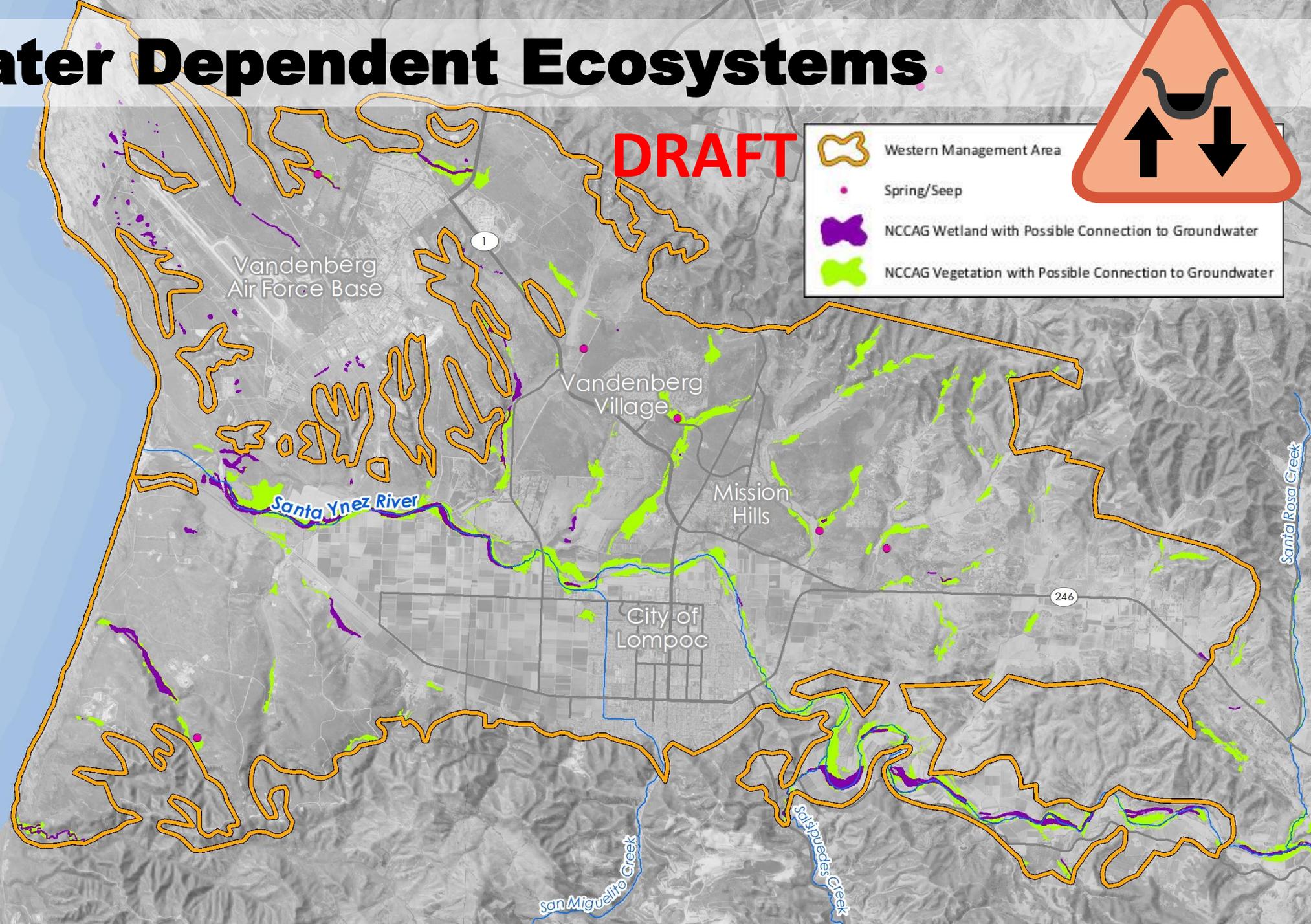
# Groundwater Dependent Ecosystems

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	Western Management Area
	Spring/Seep
	NCCAG Wetland with Possible Connection to Groundwater
	NCCAG Vegetation with Possible Connection to Groundwater

PACIFIC OCEAN



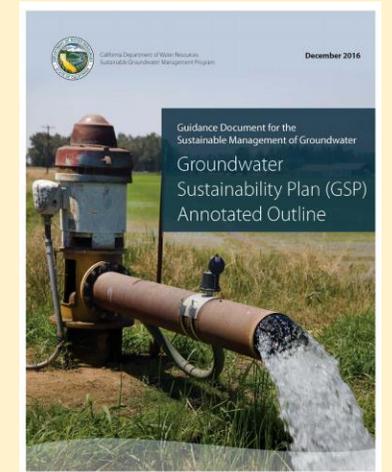
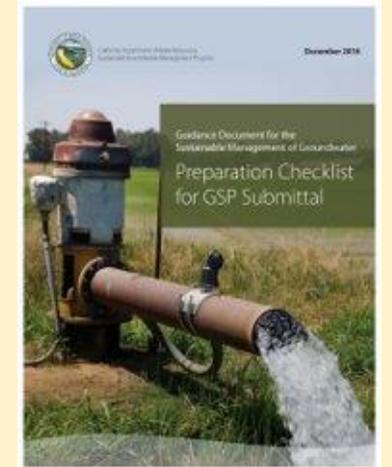
***GCTM Section 6: Interconnected Surface Water  
Systems and Groundwater Dependent Ecosystems***

***Questions?***

# DWR Checklist Requirements for GCTM

## 2.2.2 Current and Historical Groundwater Conditions (*Reg. § 354.16*)

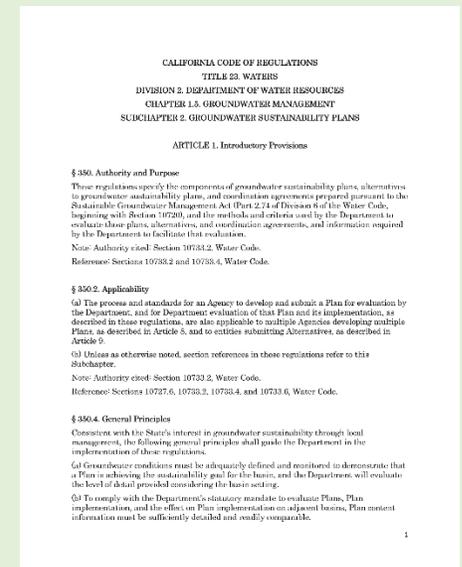
- ✓ Groundwater elevation data
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  - (e) ✓ The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.
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# Next Steps

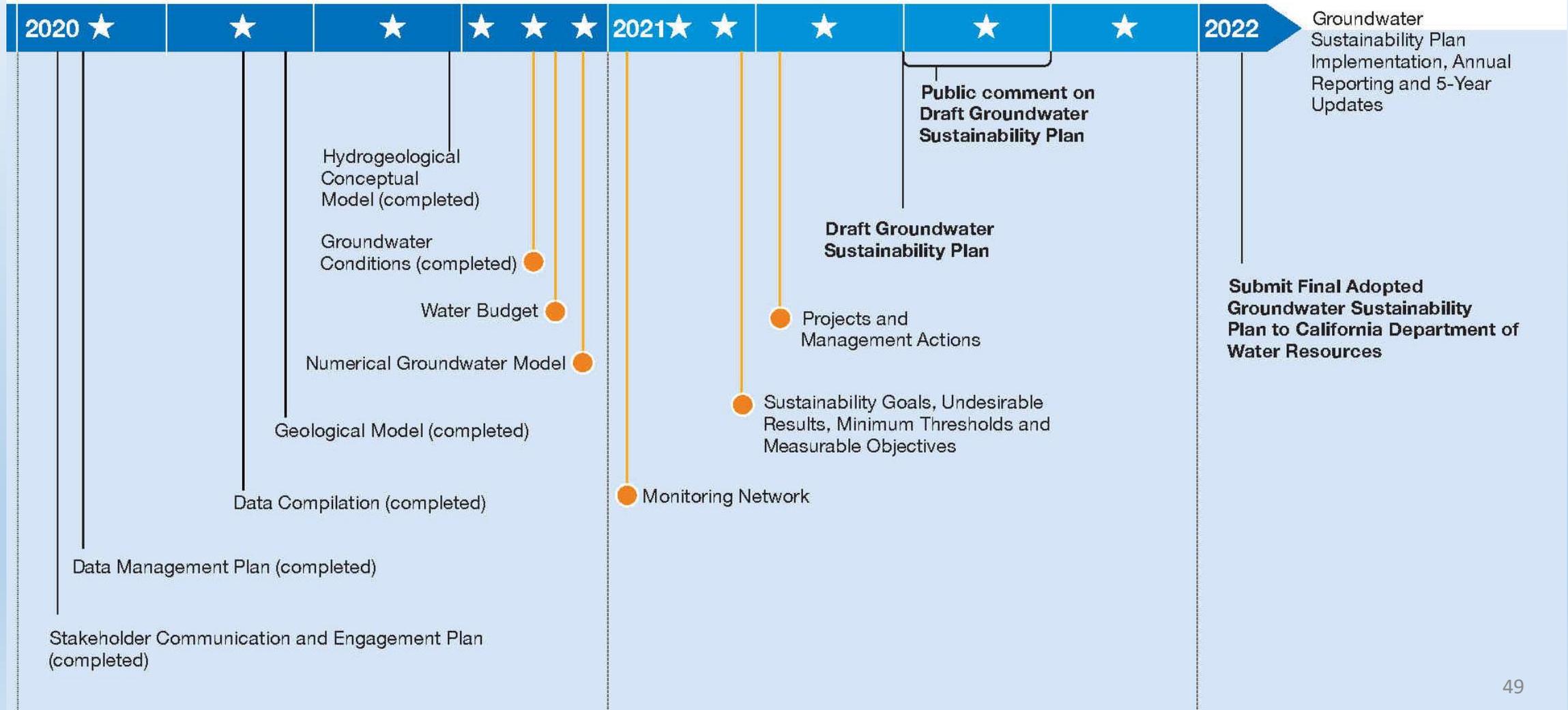
## *Future Workshops in coming months to review:*

- Water Budget Technical Memo
- Groundwater Model
- Groundwater Monitoring Network
- Continued discussions of Sustainable Management Criteria

# The Way Ahead

## Groundwater Sustainability Plan Development Milestones

★ Groundwater Sustainability Agency Committee Public Meeting      ● Technical Memorandum



# Questions?

Comments can be submitted to the website:



[www.santaynezwater.org](http://www.santaynezwater.org)