



# Fox Canyon Groundwater Management Agency

5-Year GSP Evaluation for the OPV: Numerical Modeling and Projects



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**DUDEK**

APRIL 2024

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# Stakeholder Involvement

5-Year Evaluation Timeline



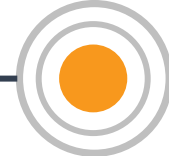
August 2023

Kickoff Meeting

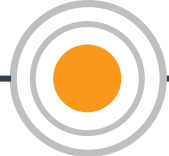


Modeling Approach Presented to FCGMA Board

September 2023



October 2023



- Plan Area and Background Review
- Model Scenario Development
- Current Groundwater Conditions
- Monitoring Network Review
- Actions Taken by FCGMA
- GSP Implementation Progress

April 2024

Public Workshop



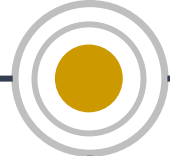
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- Draft Reports

Public Workshop (GSP Amendments)

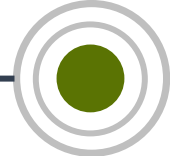


Public Workshop

Submittal to DWR



FCGMA Board Review of 5-Year Evaluations



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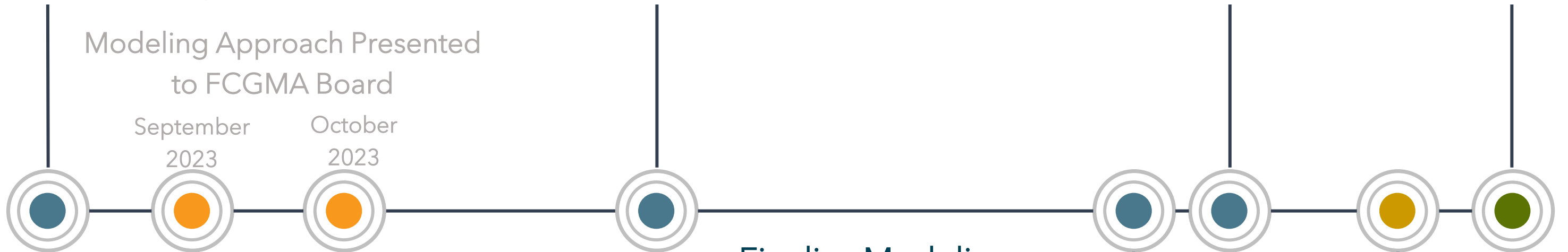
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# Background Information – Undesirable Results in the OPV

Previous GSP Modeling

## SUSTAINABILITY INDICATORS

 Groundwater Elevation

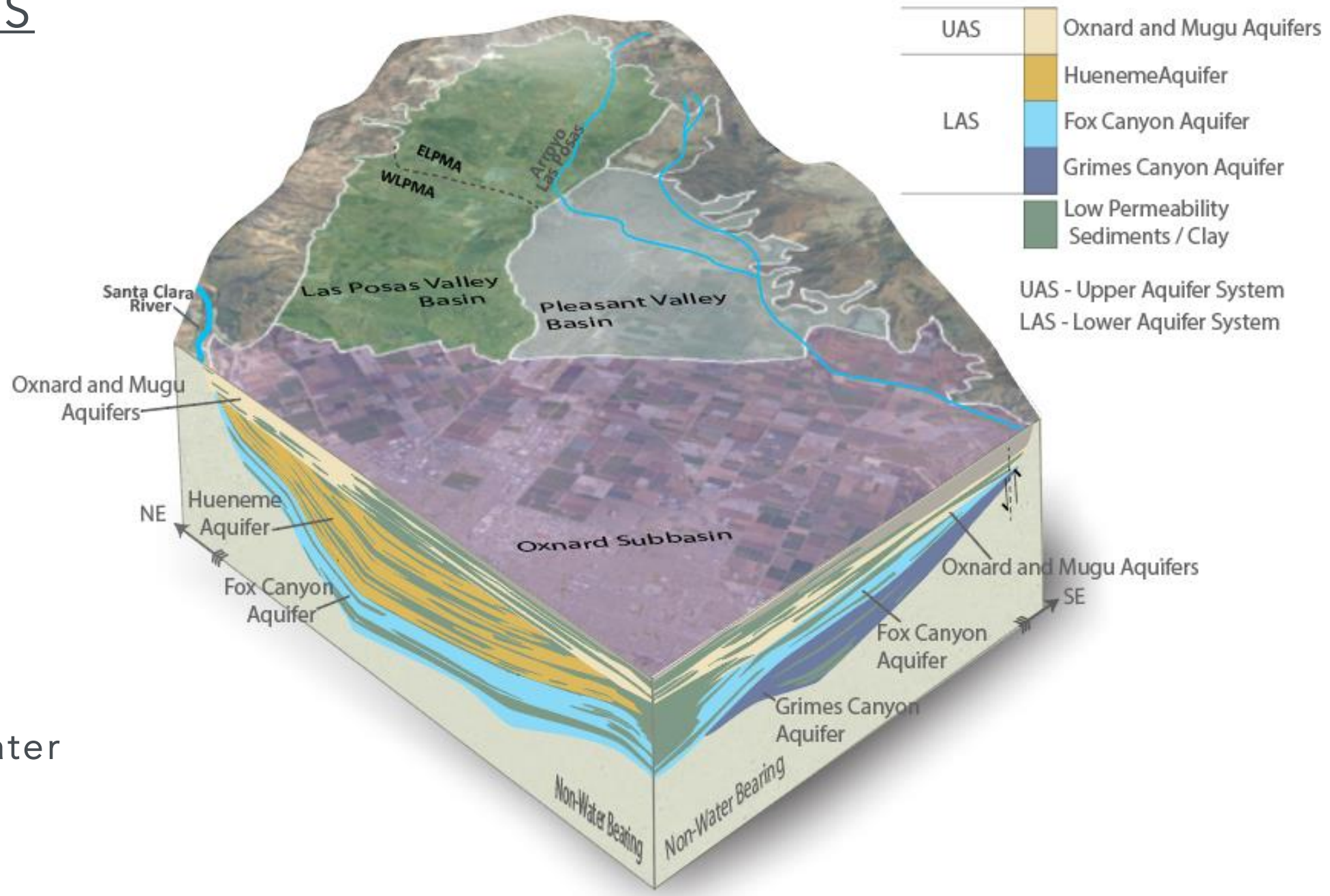
 Groundwater in Storage

 Seawater Intrusion

 Groundwater Quality

 Land Subsidence

 Interconnected Surface Water and Groundwater



# Background Information - GSP Modeling

Previous GSP Modeling

## Ventura Regional Groundwater Flow Model

- Numerical groundwater flow model developed and maintained by United Water Conservation District (UWCD 2018)
- Calibrated to groundwater elevations measured between 1985 and 2015
- Used to characterize groundwater budgets, forecast future groundwater conditions, and estimate the sustainable yield
- Independent peer reviews characterized model uncertainty and appropriate use for the GSP

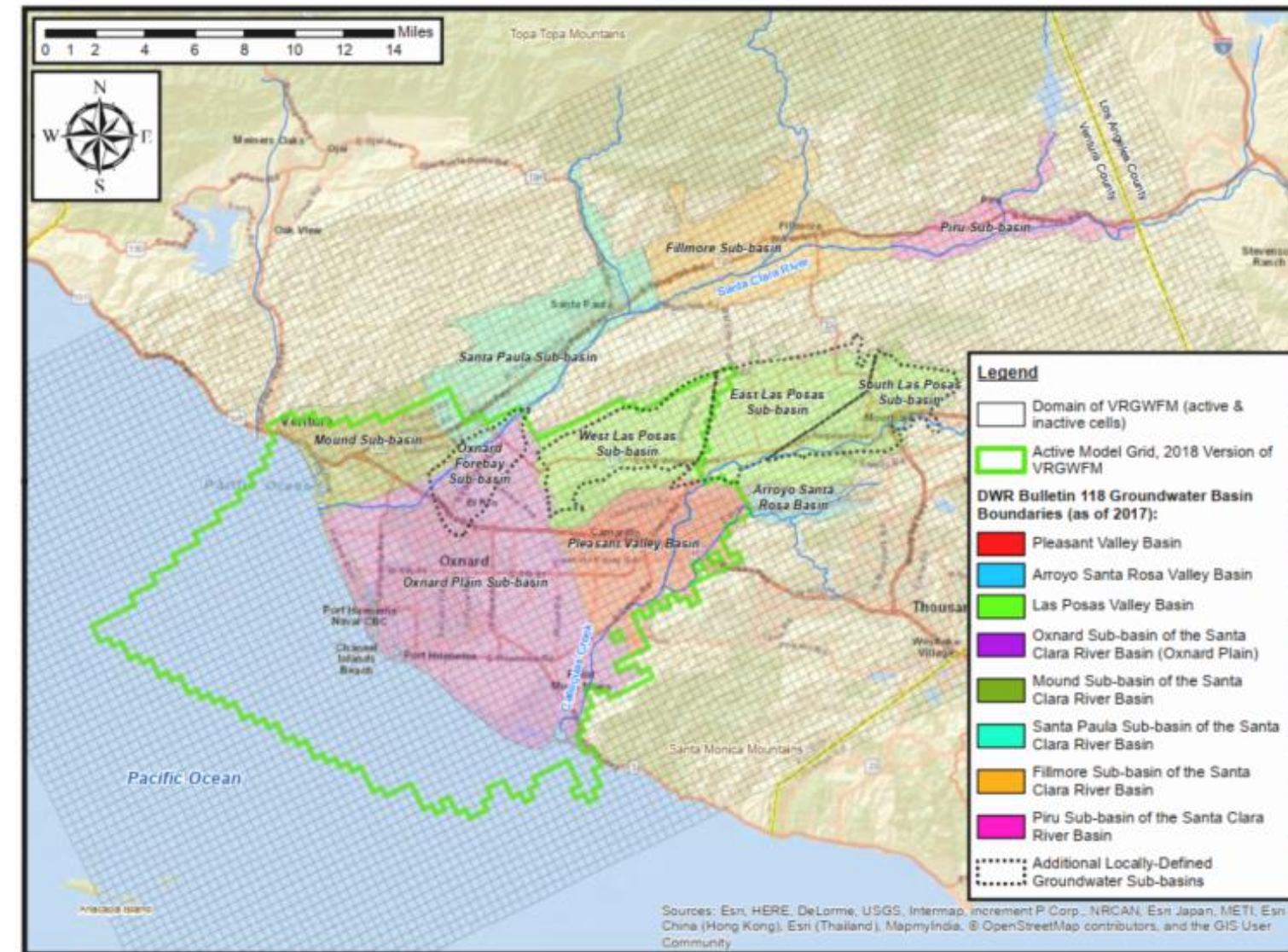


Figure 1-2. Ventura Regional Groundwater Flow Model (VRGWF) Domain

UWCD (United Water Conservation District). 2018. Ventura Regional Groundwater Flow Model and Updated Hydrogeologic Conceptual Model: Oxnard Plain, Oxnard Forebay, Pleasant Valley, West Las Posas, and Mound Groundwater Basins. Open-File Report 2018-02. July 2018.

# Background Information – GSP Modeling

Previous GSP Modeling

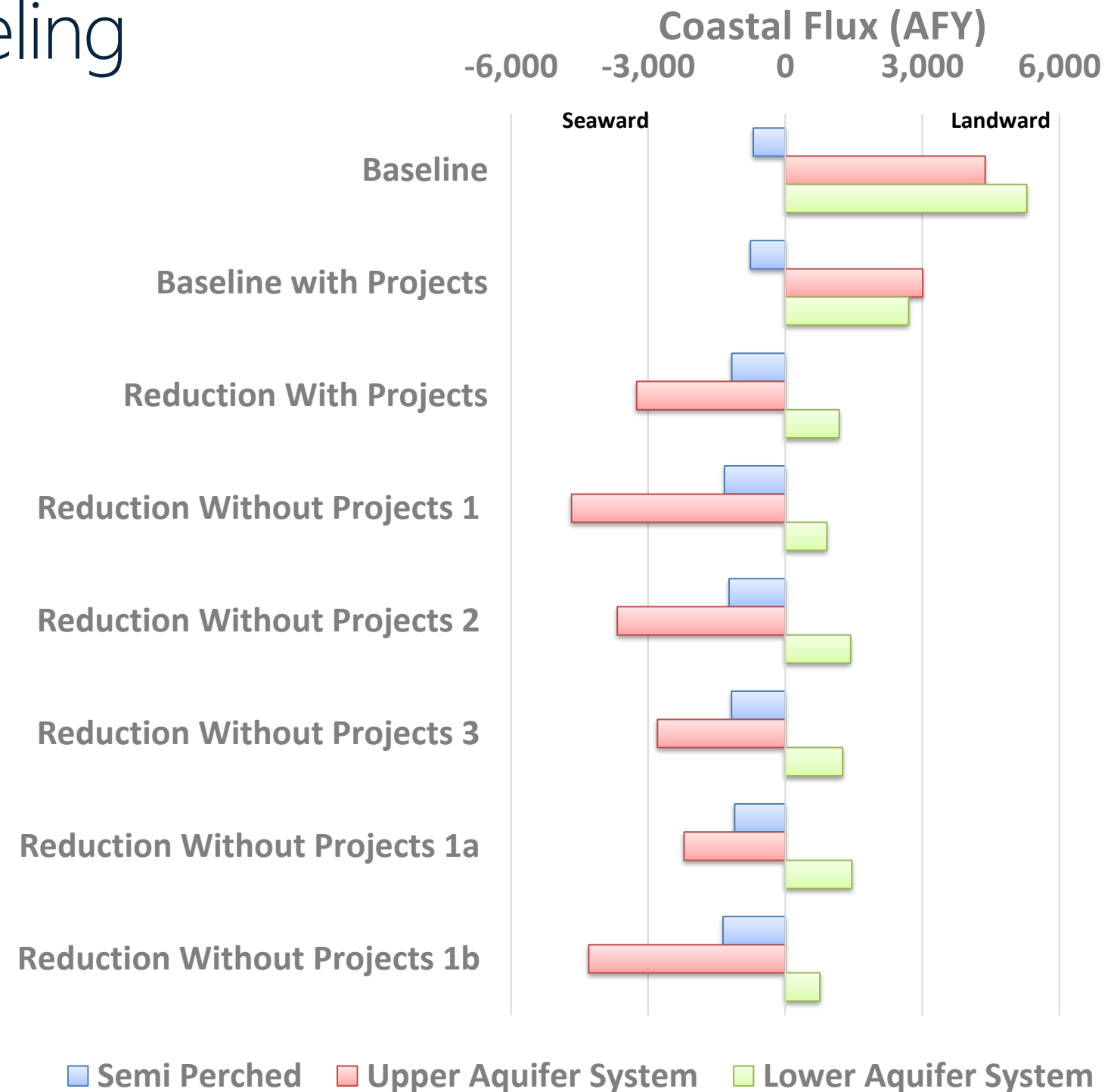
## GSP Modeling Scenarios

Model Scenario	Groundwater Extractions (Acre-Feet)		
	Oxnard Subbasin	Pleasant Valley Basin	Total
Future Baseline	68,000	14,000	82,000
Future Baseline With Projects	66,000	12,000	78,000
Reduction With Projects	40,000	10,000	50,000
Reduction Without Projects 1	39,000	8,000	47,000
Reduction Without Projects 2	30,000	10,000	40,000
Reduction Without Projects 3	30,000	14,000	44,000

### Sustainable Yield Estimates:

$$\text{Oxnard Subbasin} = \begin{cases} UAS = 32,000 \pm 6,000 \text{ AFY} \\ LAS = 4,000 \pm 2,300 \text{ AFY} \end{cases}$$

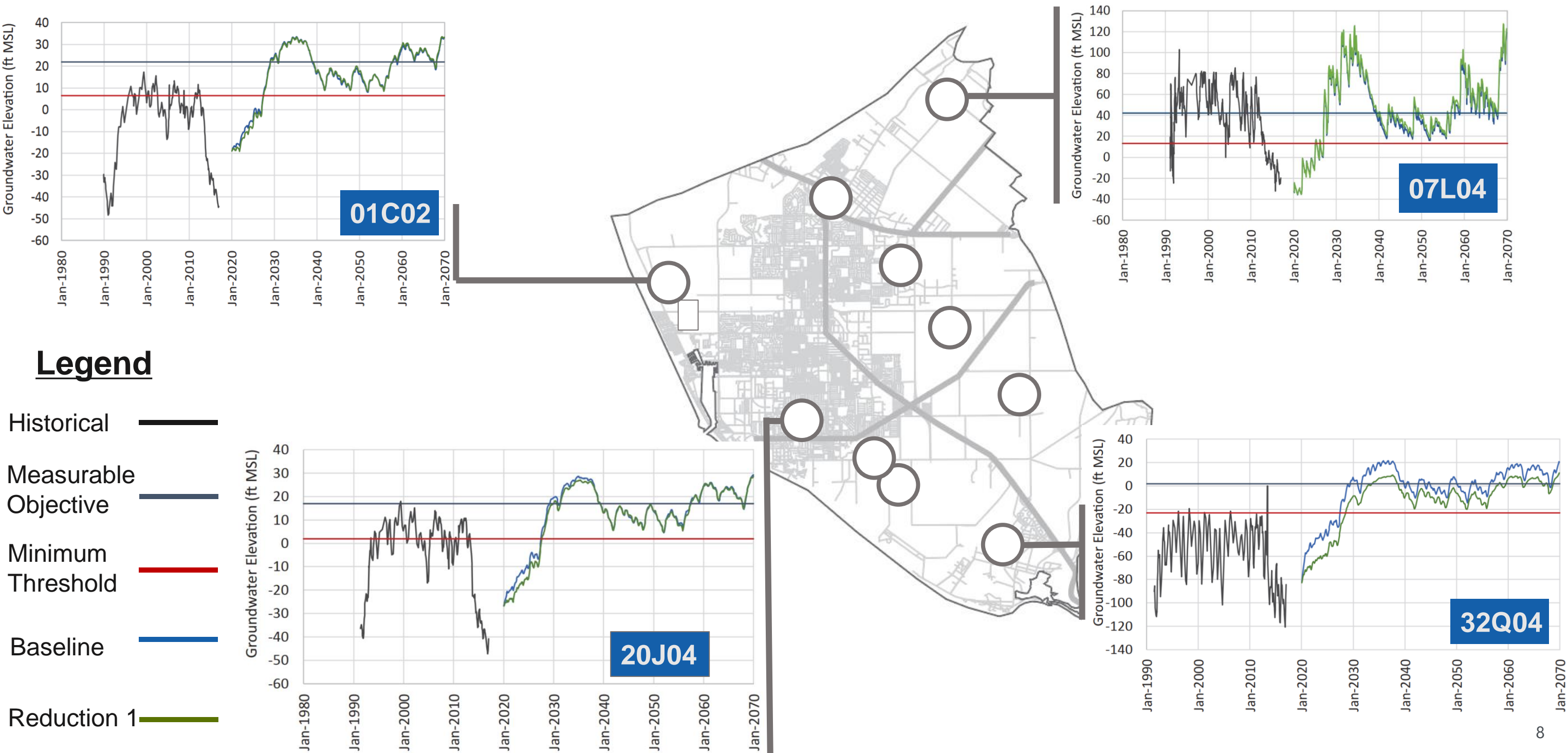
$$\text{Pleasant Valley Basin} = \begin{cases} \text{Older Alluvium} = 4,400 \pm 500 \text{ AFY} \\ LAS = 7,200 \pm 700 \text{ AFY} \end{cases}$$



AFY = Acre-Feet per Year

# Background Information - GSP Modeling

## Previous GSP Modeling





# Modeling for the OPV 5-Year GSP Evaluations



## Update Numerical Model

- Evaluate the numerical model's ability to simulate current conditions
- Integrate newly collected / available data to improve predictions



## Update Model Scenarios

- Incorporate new and updated project information
- Update hydrology
- Forecast groundwater conditions through the end of water year 2069



## Re-evaluate key metrics

- Directly estimate sustainable yield under different future basin management scenarios
- Re-evaluate the minimum thresholds, measurable objectives, and interim milestones

# Numerical Model Update

Modeling for the 5-Year GSP Evaluation

## Ventura Regional Groundwater Flow Model

- Numerical groundwater flow model developed and maintained by United Water Conservation District
- Updates since adoption of the GSP:
  - Expanded to encompass the Santa Paula, Filmore, and Piru Basins
  - Revised stratigraphic layering along the coast, near Port Hueneme and Point Mugu, based on additional geologic data
  - Updated coastal boundary conditions to better simulate groundwater elevations along the coastline
- Extended to simulate groundwater conditions through water year 2022

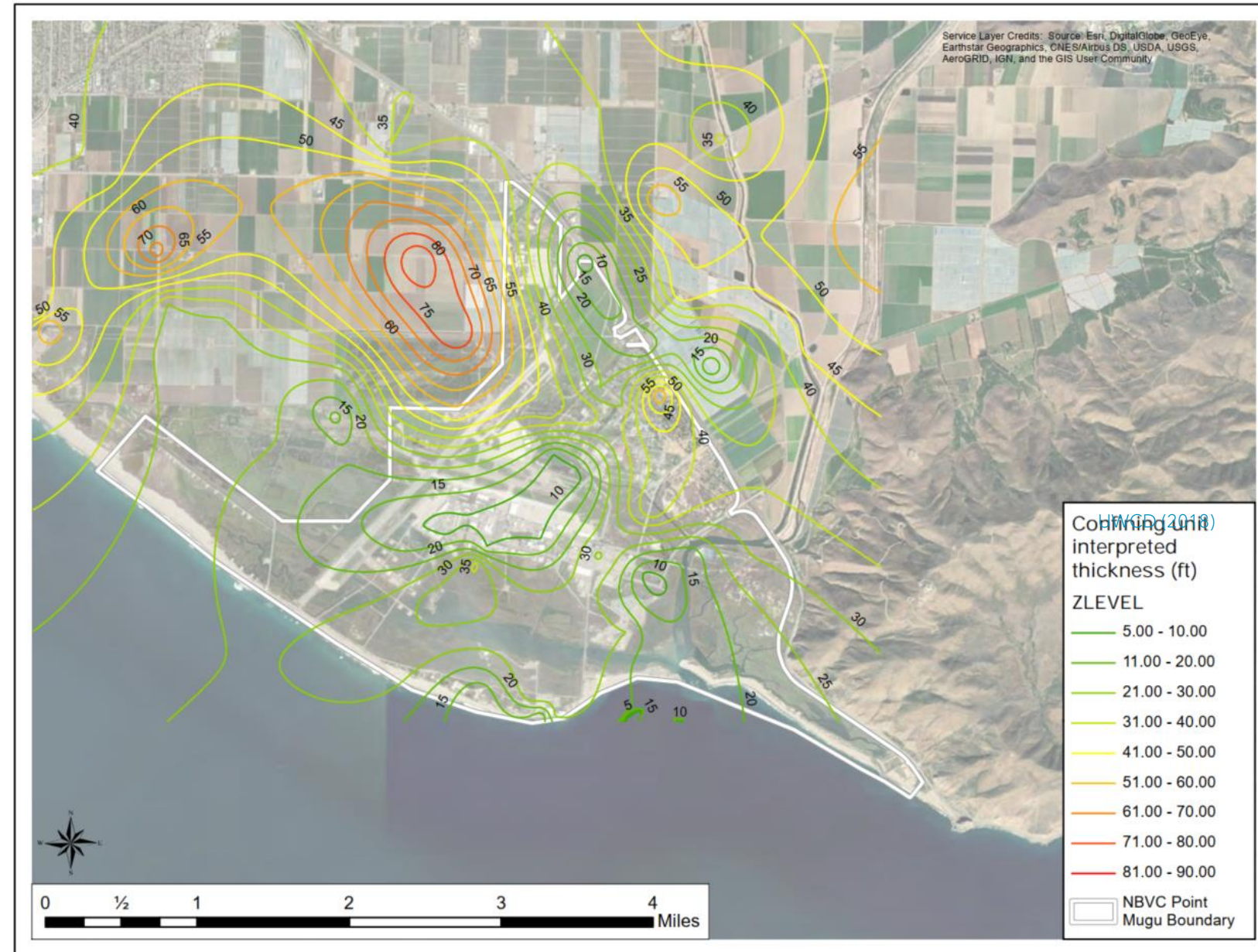
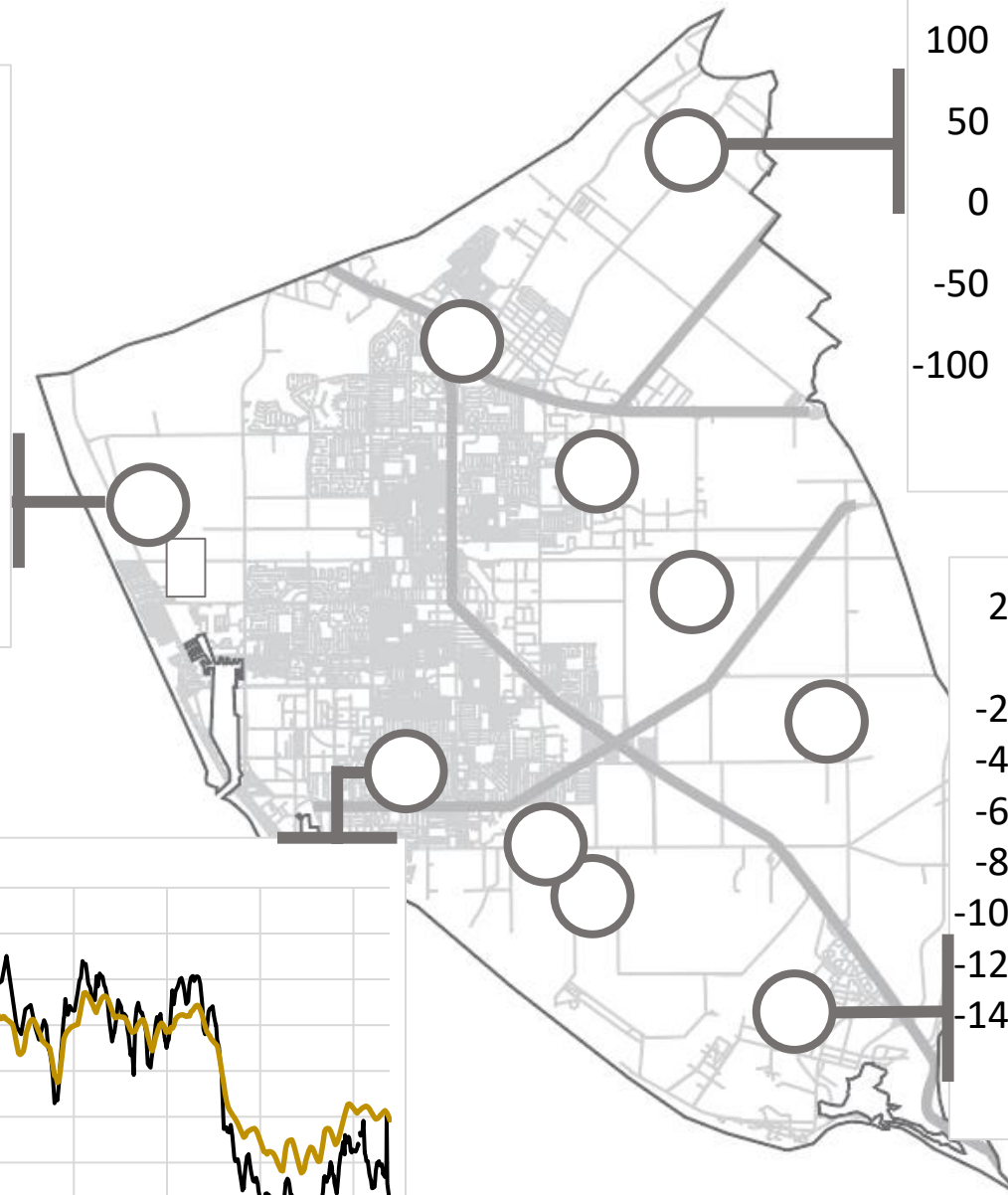
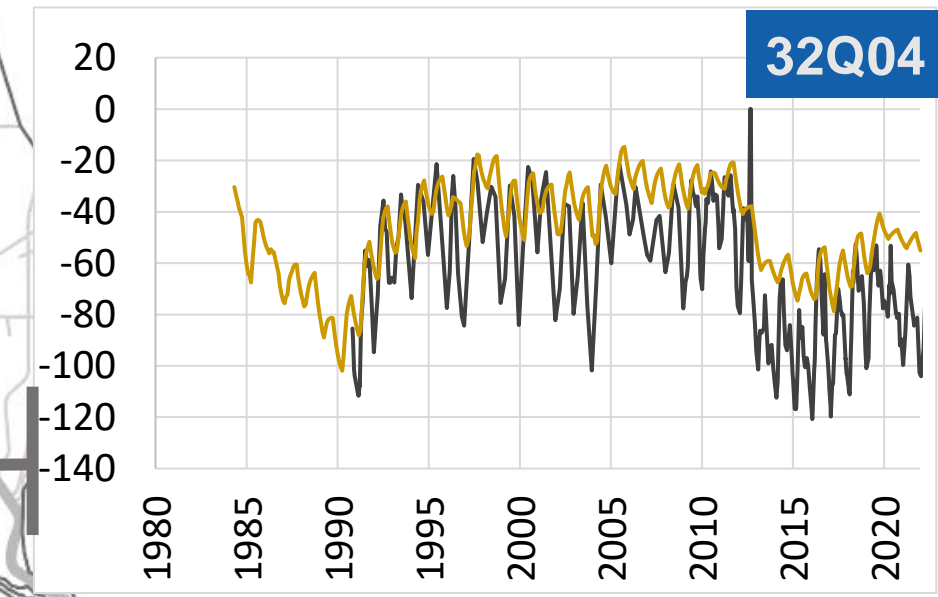
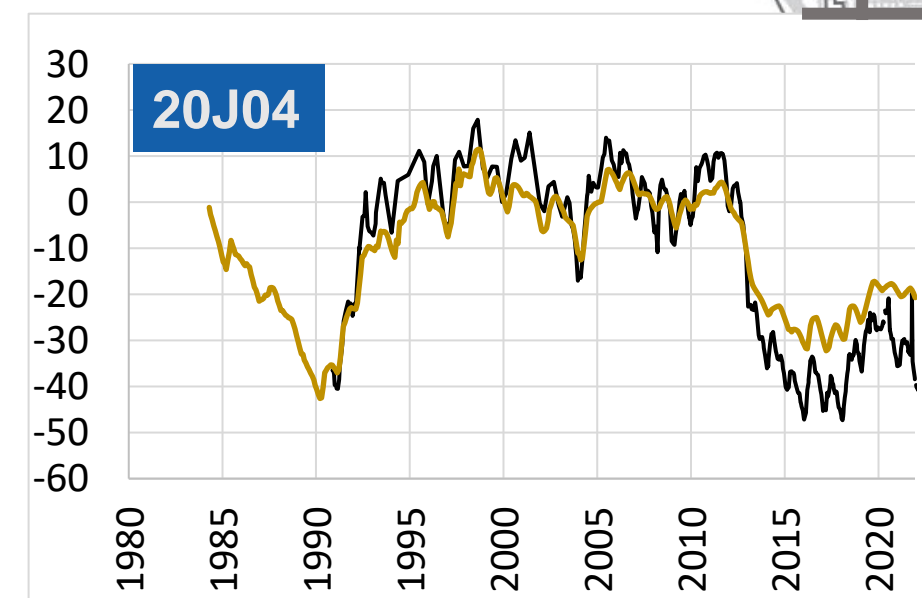
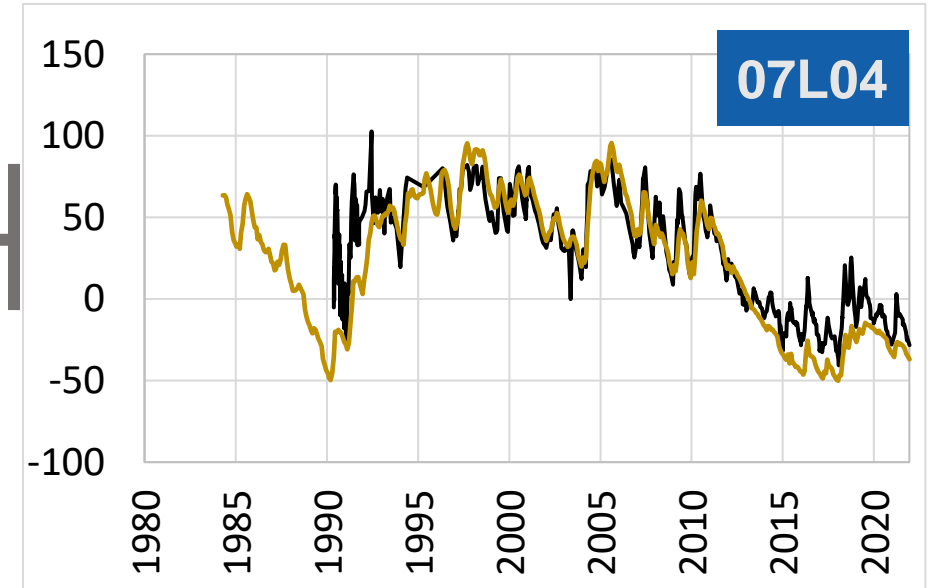
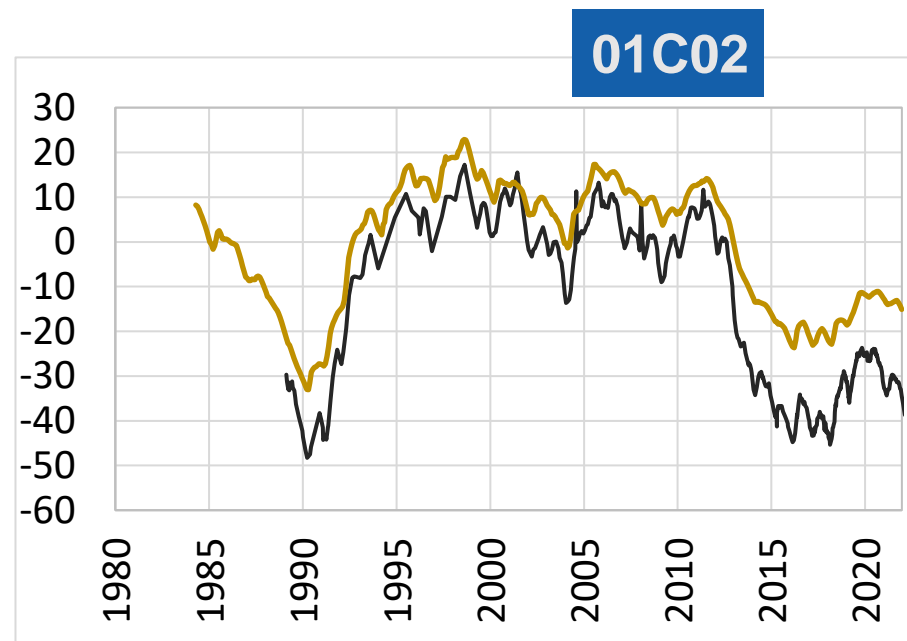


Figure 14. Confining Unit (Layer 2) thickness contours (feet)

UWCD (United Water Conservation District). 2021. Geologic Refinements Near Naval Base Ventura County Point Mugu, Ca. Technical Memorandum 2021-02. September 2021.

# Oxnard Subbasin Select Hydrographs Through WY 2022

Modeling for the 5-Year GSP Evaluation



## Legend

- Measured 
- Simulated 

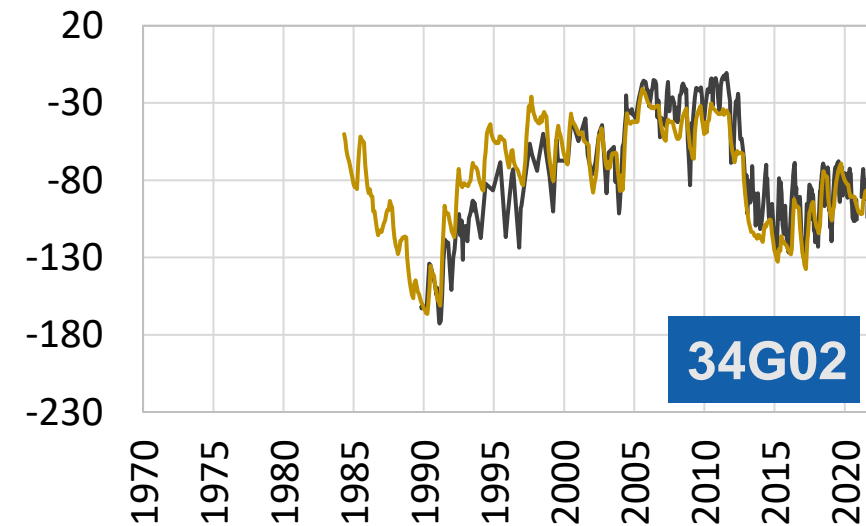
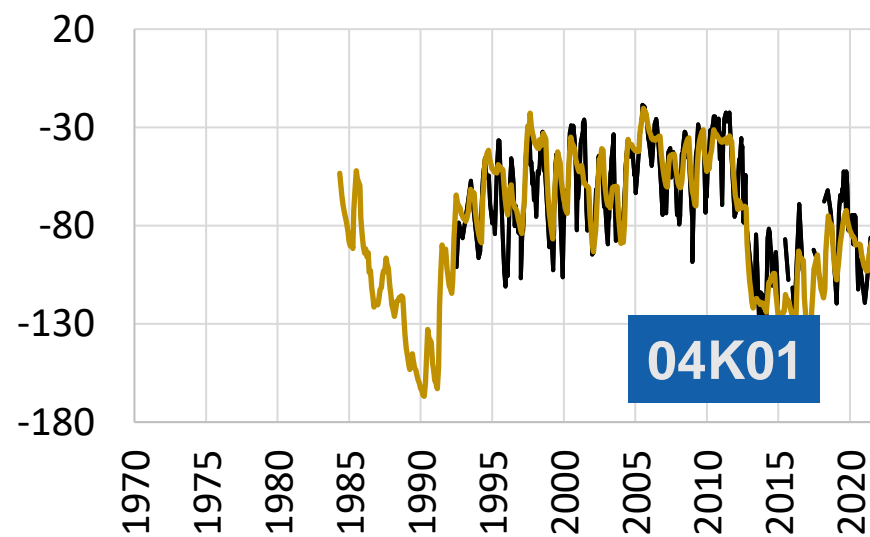
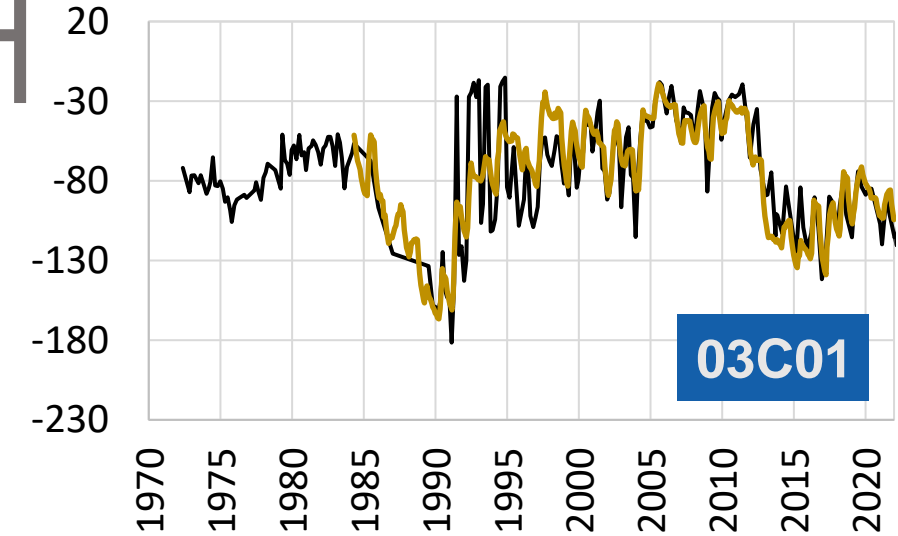
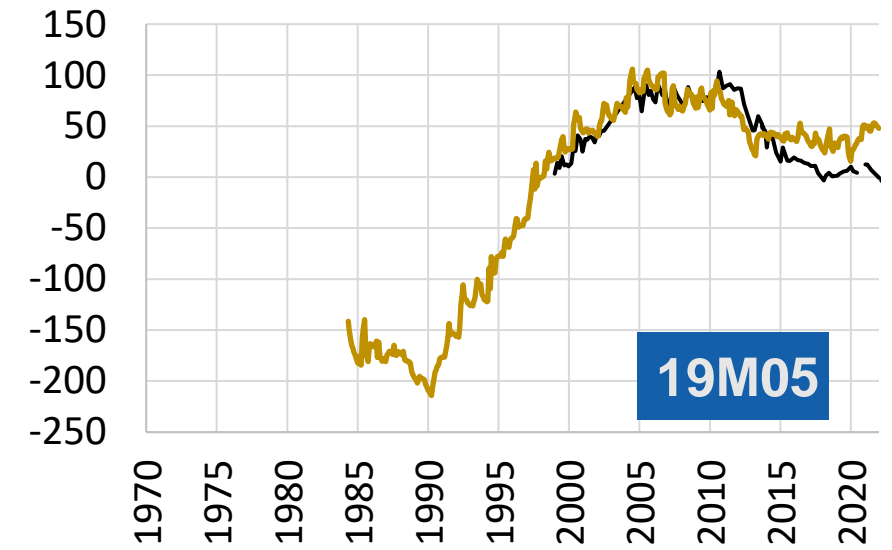
# Pleasant Valley Basin Select Hydrographs Through WY 2022

Modeling for the 5-Year GSP Evaluation

## Legend

Measured 

Simulated 



# Updating the GSP Modeling Scenarios

Modeling for the 5-Year GSP Evaluation



## Future Baseline

### Updated pumping and expanded suite of projects

- Reflects recent pumping trends
- Includes projects that are currently funded and under construction in the OPV



## No New Projects

### Sustainable pumping rate

- Includes projects currently funded and under construction in the OPV



## Projects

### Integrates Management Actions and New Projects

- Adds future projects that are likely to be implemented
- Evaluates the impacts of demand reduction through voluntary temporary following



## Projects With EBB

### Shifts the management framework

- Operation of UWCDs Extraction Barrier Brackish (EBB) water project

# Updating the GSP Modeling Scenarios: Time Period and Hydrology

Modeling for the 5-Year GSP Evaluation

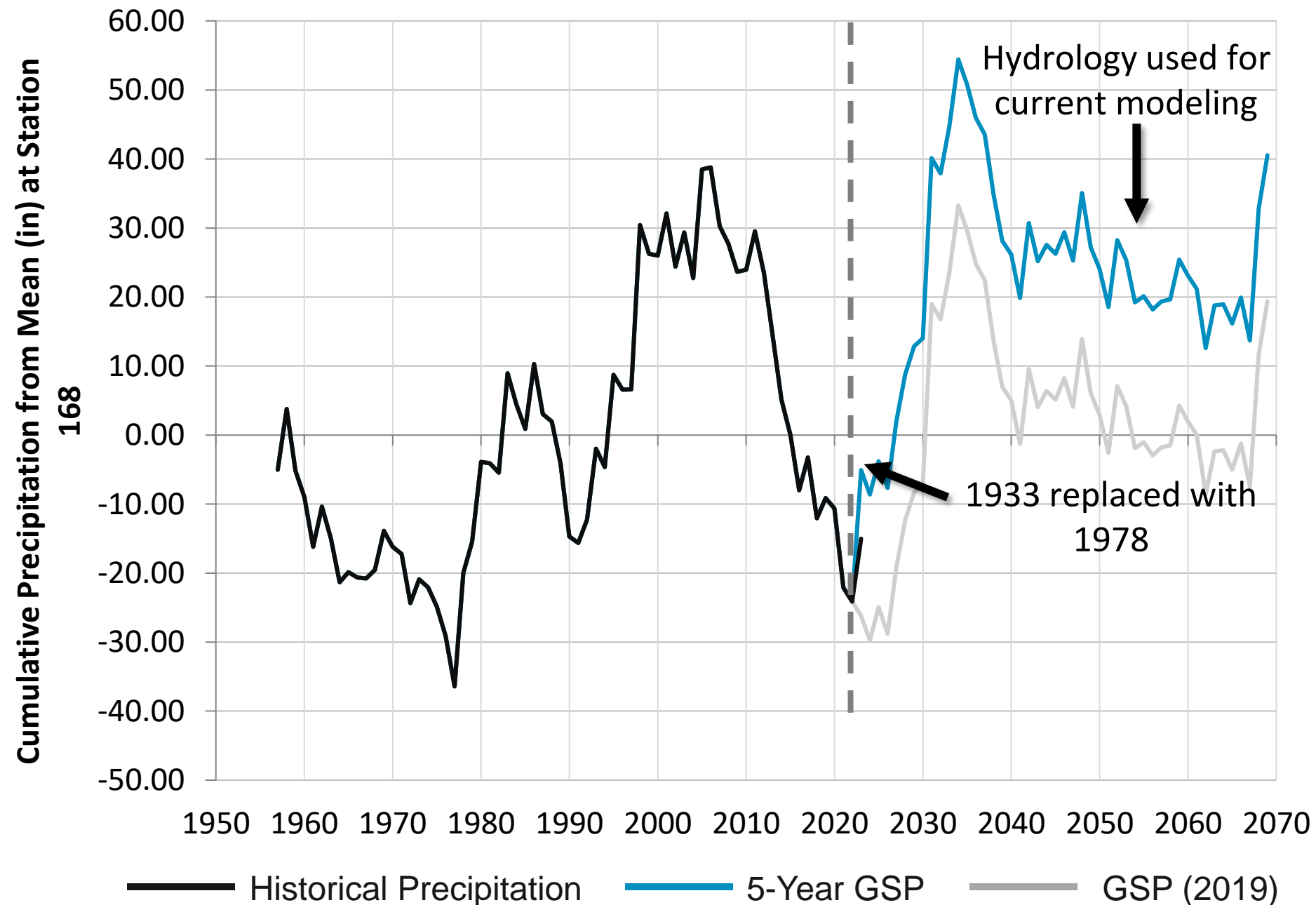
## What was done for the GSP?

- Calendar Year 2020 through Calendar Year 2069
- 1930 - 1979 Hydrology, adjusted by DWR's 2070 climate change factors

## What is being simulated for the 5-year evaluation?

- Water Year 2023 through Water Year 2069
- 1933 - 1979 Hydrology, adjusted by DWR's 2070 climate change factors
  - 1933 replaced with 1978 to reflect the wet 2023 water year conditions

### Oxnard Plain Precipitation



# Baseline Model Scenario: Pumping in the Oxnard Subbasin

Modeling for the 5-Year GSP Evaluation

## What was done for the GSP?

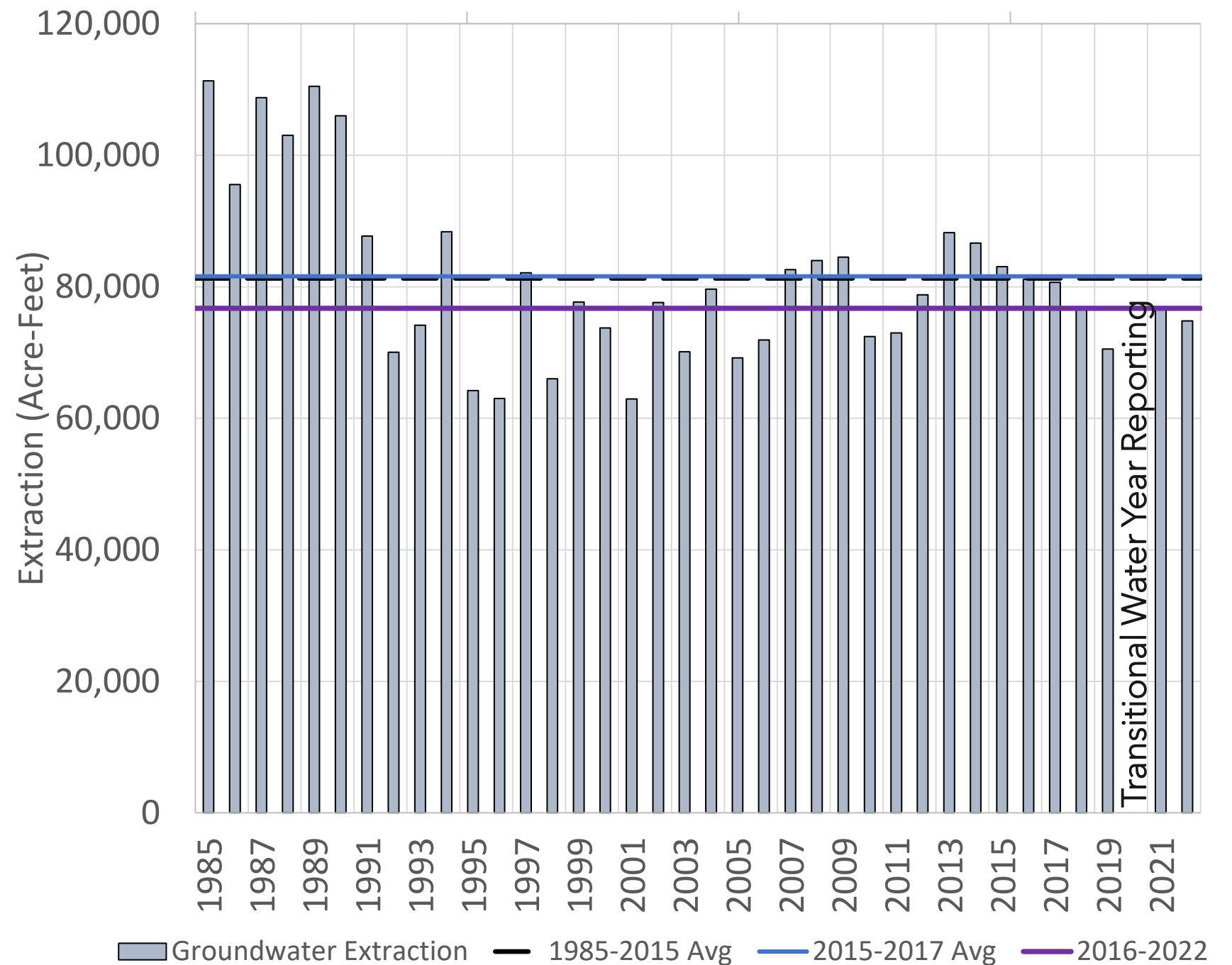
- Pumping held constant at average 2015-2017 rates

## What is being simulated for the 5-year evaluation?

- Pumping held constant at average 2016-2022 rates
- Reflects ~5% reduction in pumping compared to 2015-2017 period
- Similar to total Oxnard Subbasin allocation

## What is the same between the GSP and 5-Year evaluation?

- Monthly pumping adjusted based on projected surface water, recycled water, and imported water availability



# Baseline Model Scenario: Pumping in the Pleasant Valley Basin

Modeling for the 5-Year GSP Evaluation

## What was done for the GSP?

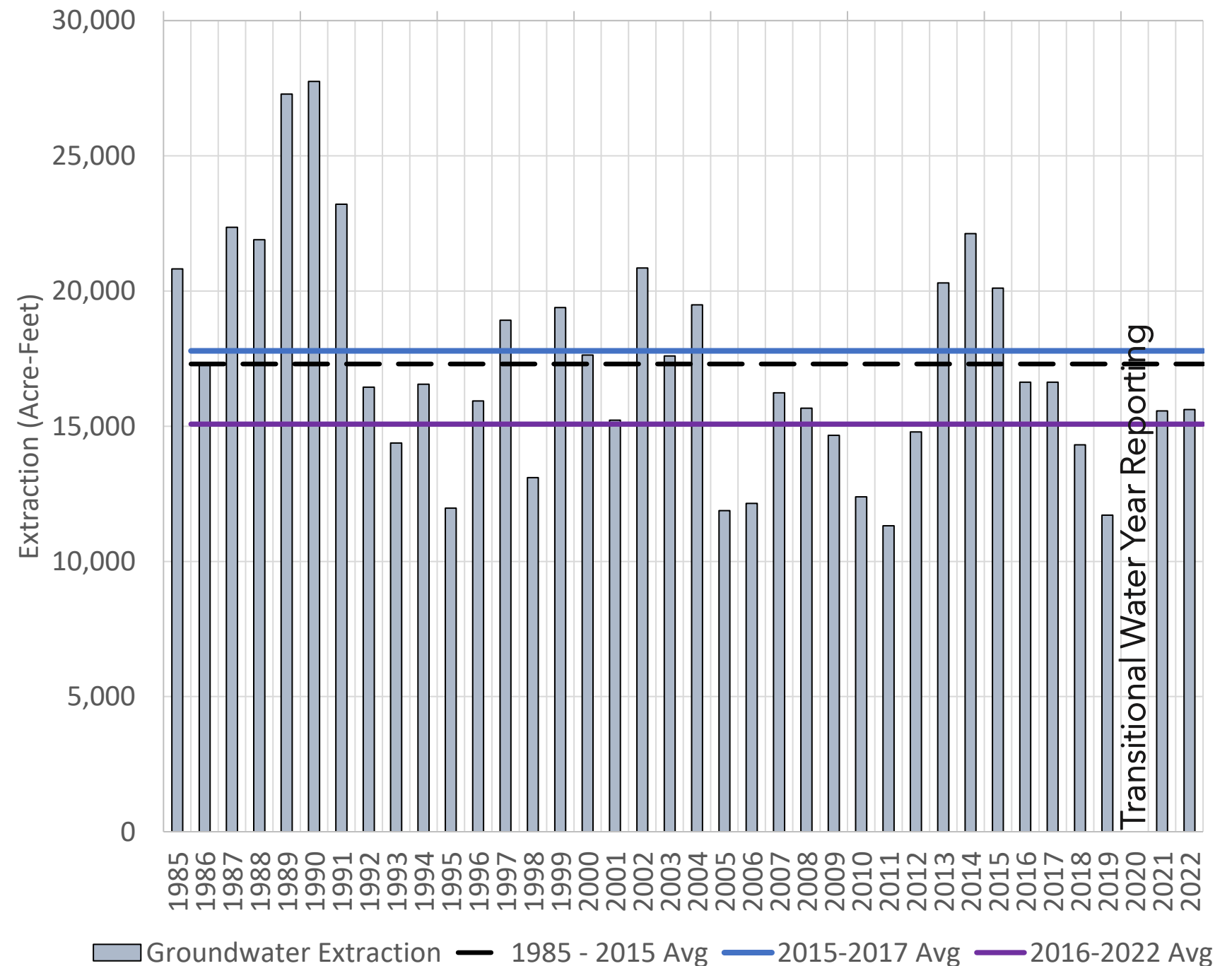
- Pumping held constant at average 2015-2017 rates

## What is being simulated for the 5-year evaluation?

- Pumping held constant at average 2016-2022 rates
- Reflects ~15% reduction in pumping compared to 2015-2017 period
- Similar to total Pleasant Valley Basin allocation

## What is the same between the GSP and 5-Year evaluation?

- Monthly pumping adjusted based on projected surface water, recycled water, and imported water availability





# Baseline Model Scenario

Modeling for the 5-Year GSP Evaluation

## Projects simulated in the GSP:

- Conejo Creek Project
- North Pleasant Valley Desalter Project
- AWPf Deliveries for AG

## Total increase in projected water supply

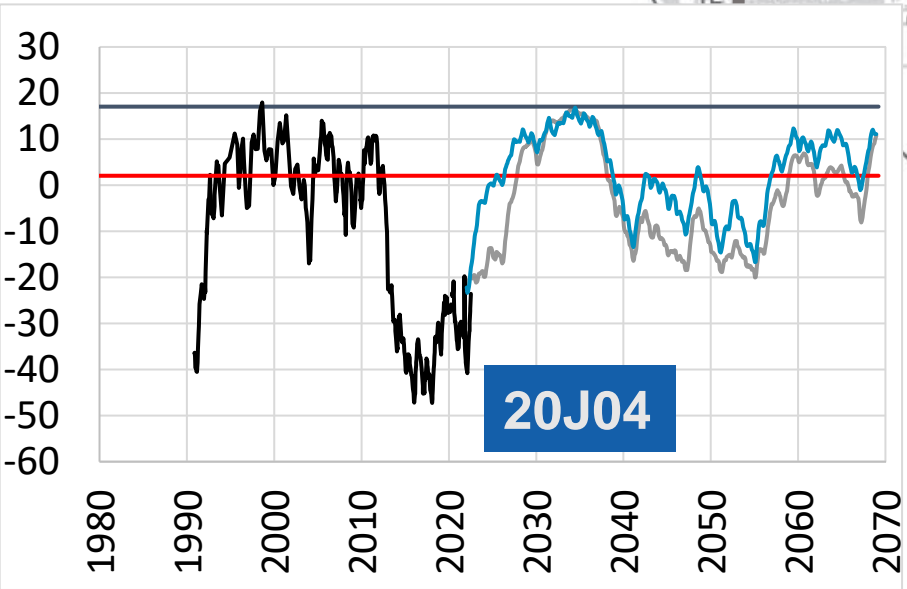
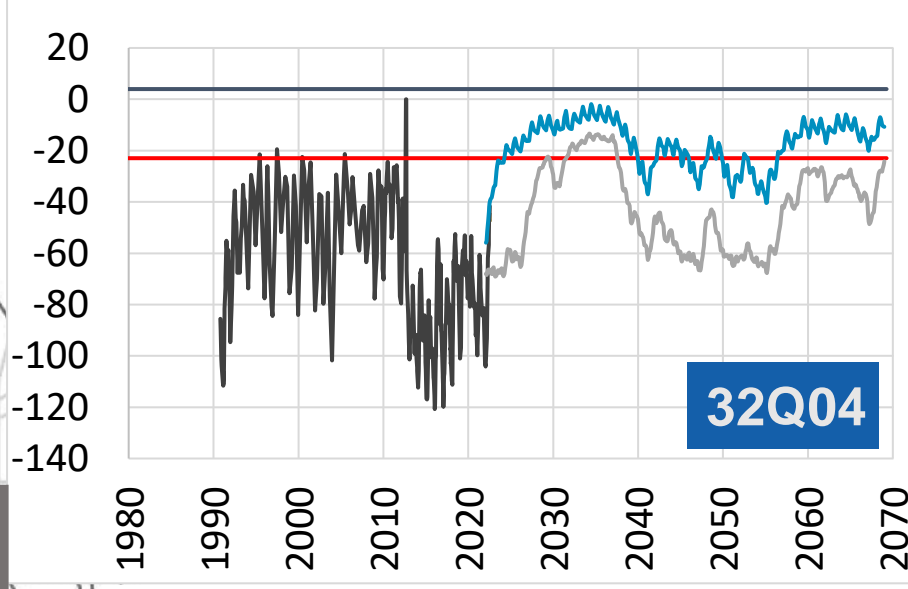
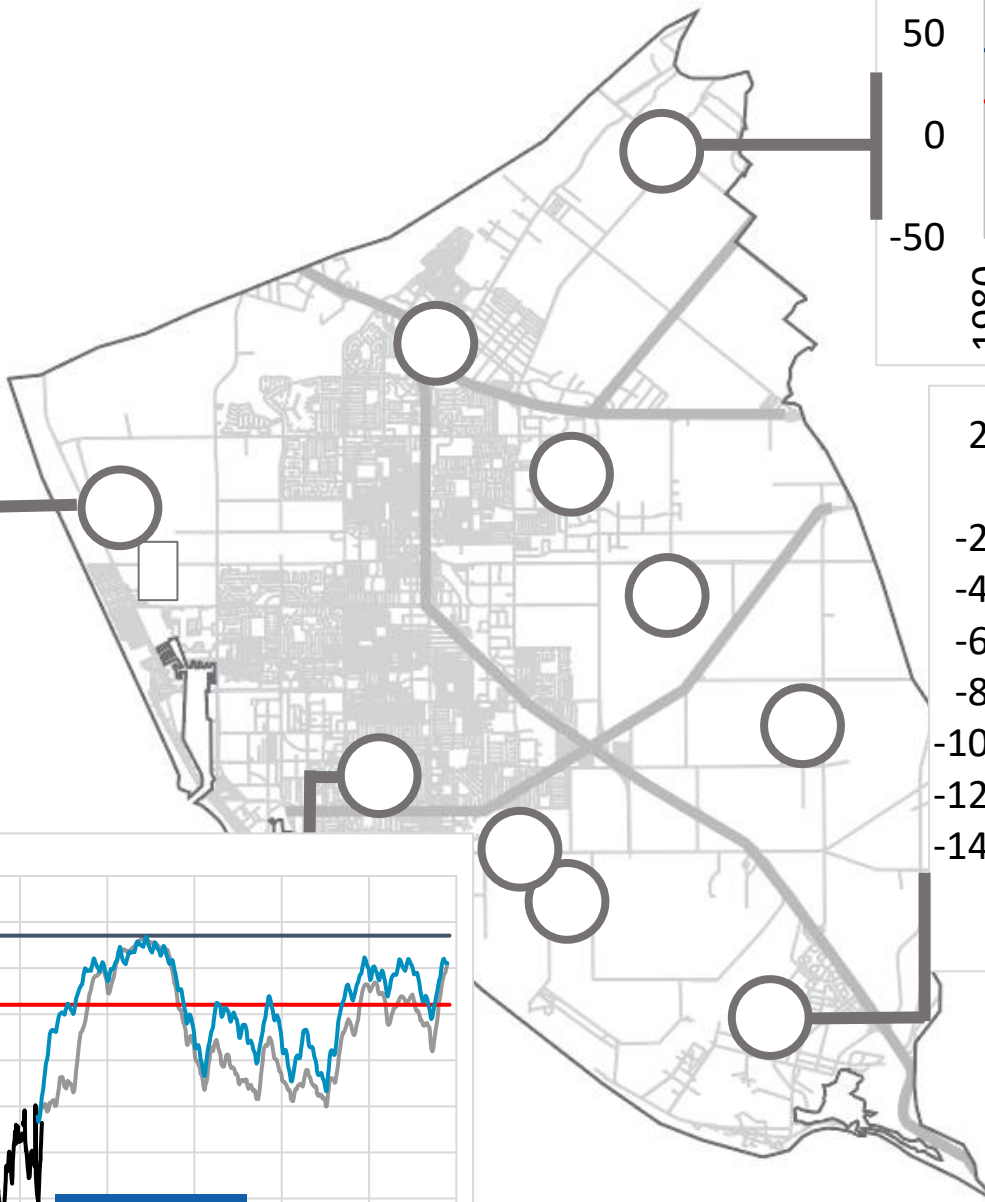
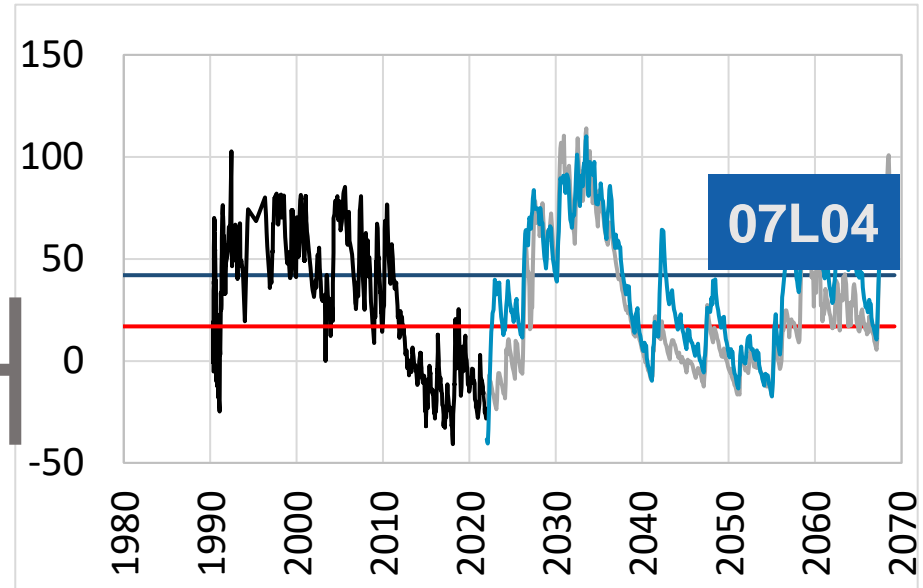
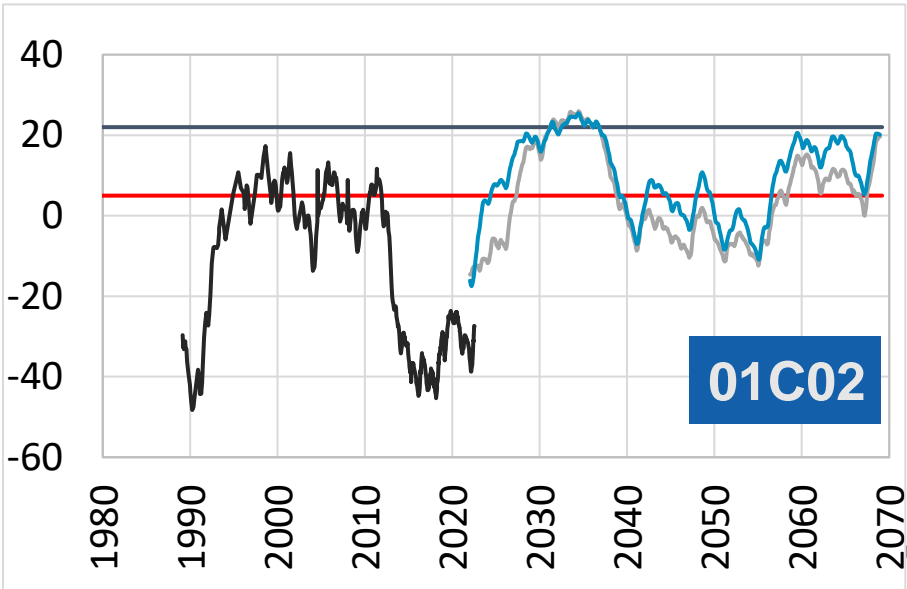
- New projects increase total water supply in the OPV up to an average of approximately 6,800 AFY

# New Baseline Projects

Project Name	Project Proponent	Anticipated Water Supply (AFY)	Projected Offset Pumping Reduction (AFY)
Ferro-Rose Recharge Basin	UWCD	2,500	Variable
Supplemental State Water Project water purchase	UWCD	6,000	Variable
Camarillo Recycled Water Deliveries to PVCWD	City of Camarillo	1,300	1,300
Laguna road recycled water interconnect	UWCD	0 - 1,500	0

# Oxnard Subbasin Select Hydrographs

Modeling for the 5-Year GSP Evaluation



## Comparison to GSP Baseline Scenario

- Simulated groundwater elevations in the Fox Canyon aquifer are 5 to 25 feet higher than the baseline results from the GSP

**Legend**

Measured		Measurable	
5-Year Evaluation		Objective	
GSP (2019)		Minimum Threshold	

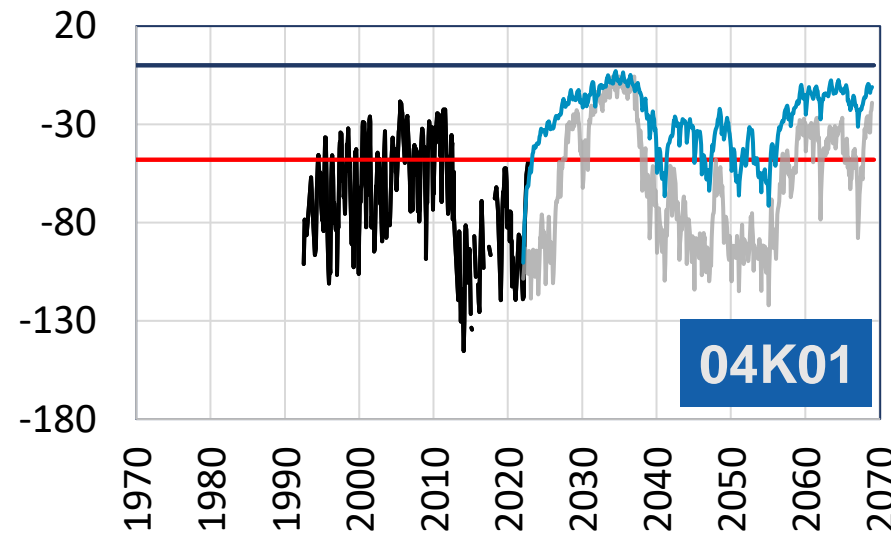
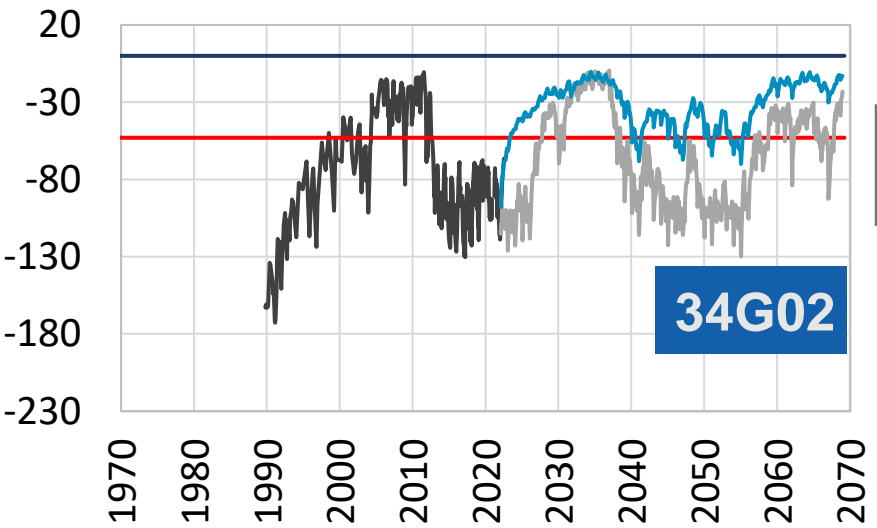
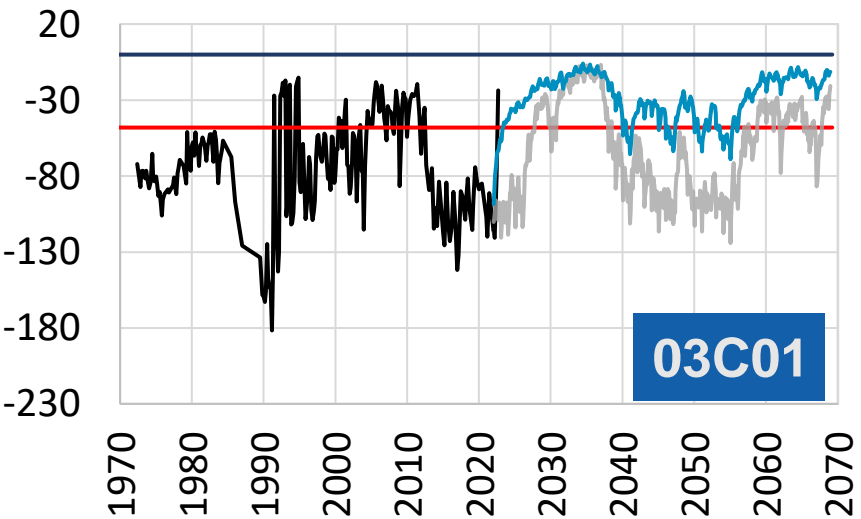
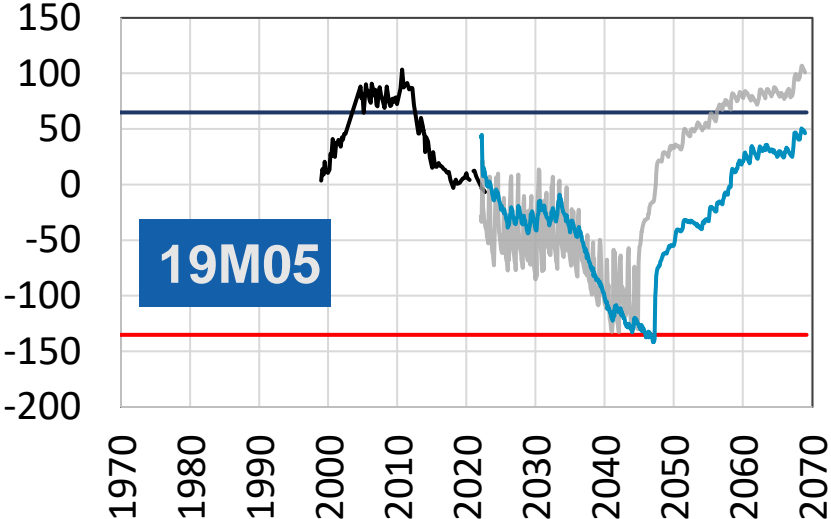
Preliminary Model Results  
Subject to Change

# Pleasant Valley Select Hydrographs

Modeling for the 5-Year GSP Evaluation

## Comparison to GSP Baseline Scenario

- Simulated groundwater elevations in the Fox Canyon aquifer are approximately 30 feet higher than the baseline results from the GSP, except for the far northern part of the PVB



### Legend

Measured		Measurable	
5-Year Evaluation		Objective	
GSP (2019)		Minimum Threshold	

Preliminary Model Results Subject to Change

# Baseline Model Scenario: Preliminary Results

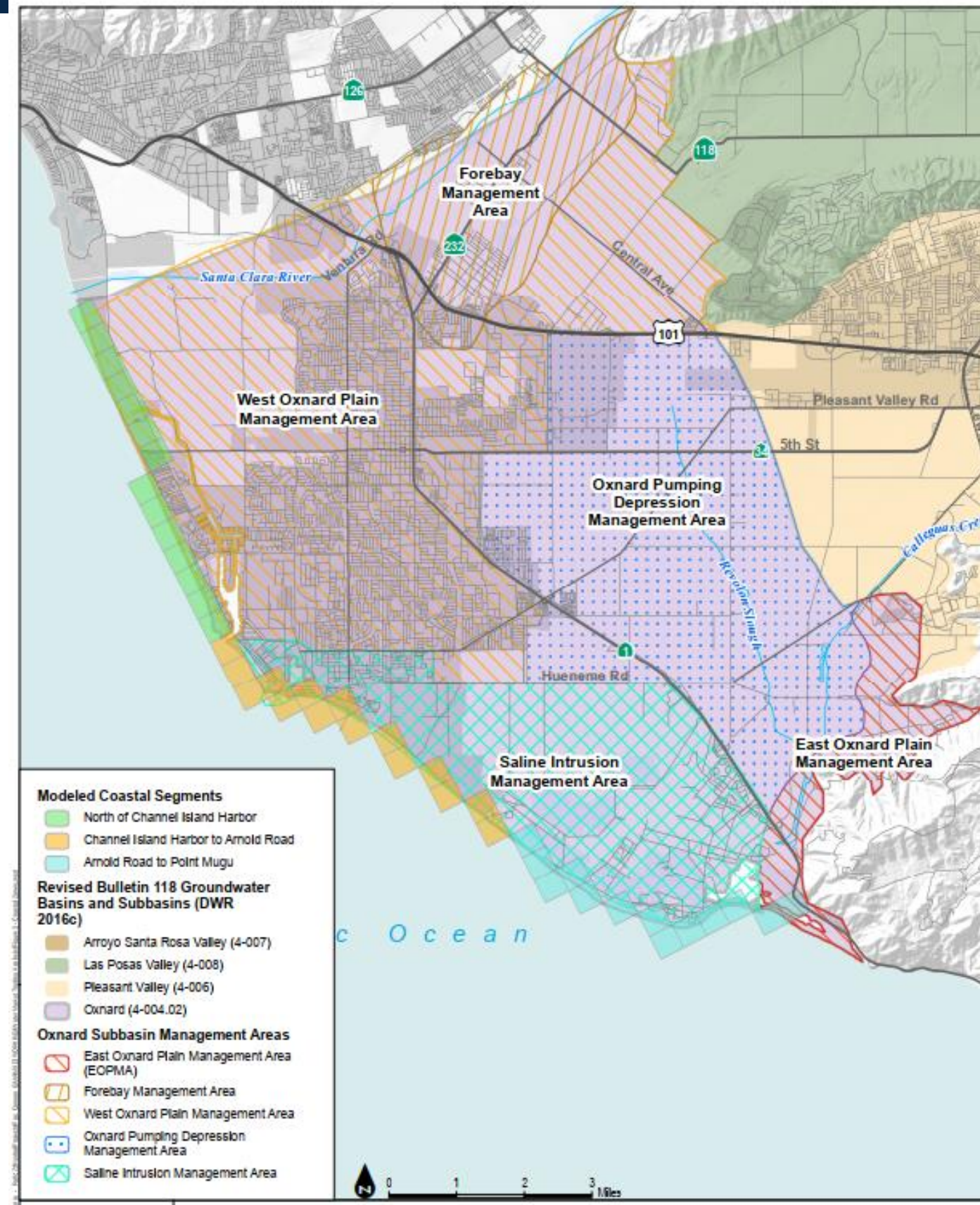
Modeling for the 5-Year GSP Evaluation

## Simulated Coastal Flux

- 1,600 AFY into the Saline Intrusion Management Area in the UAS
- 3,200 AFY into the Saline Intrusion Management Area in the LAS

## Comparison to GSP Baseline Scenario

- 50% reduction in estimated coastal flux into the UAS
- 5% reduction in estimated coastal flux to the LAS



Preliminary Model Results Subject to Change

# Baseline Model Scenario: Preliminary Results

Modeling for the 5-Year GSP Evaluation

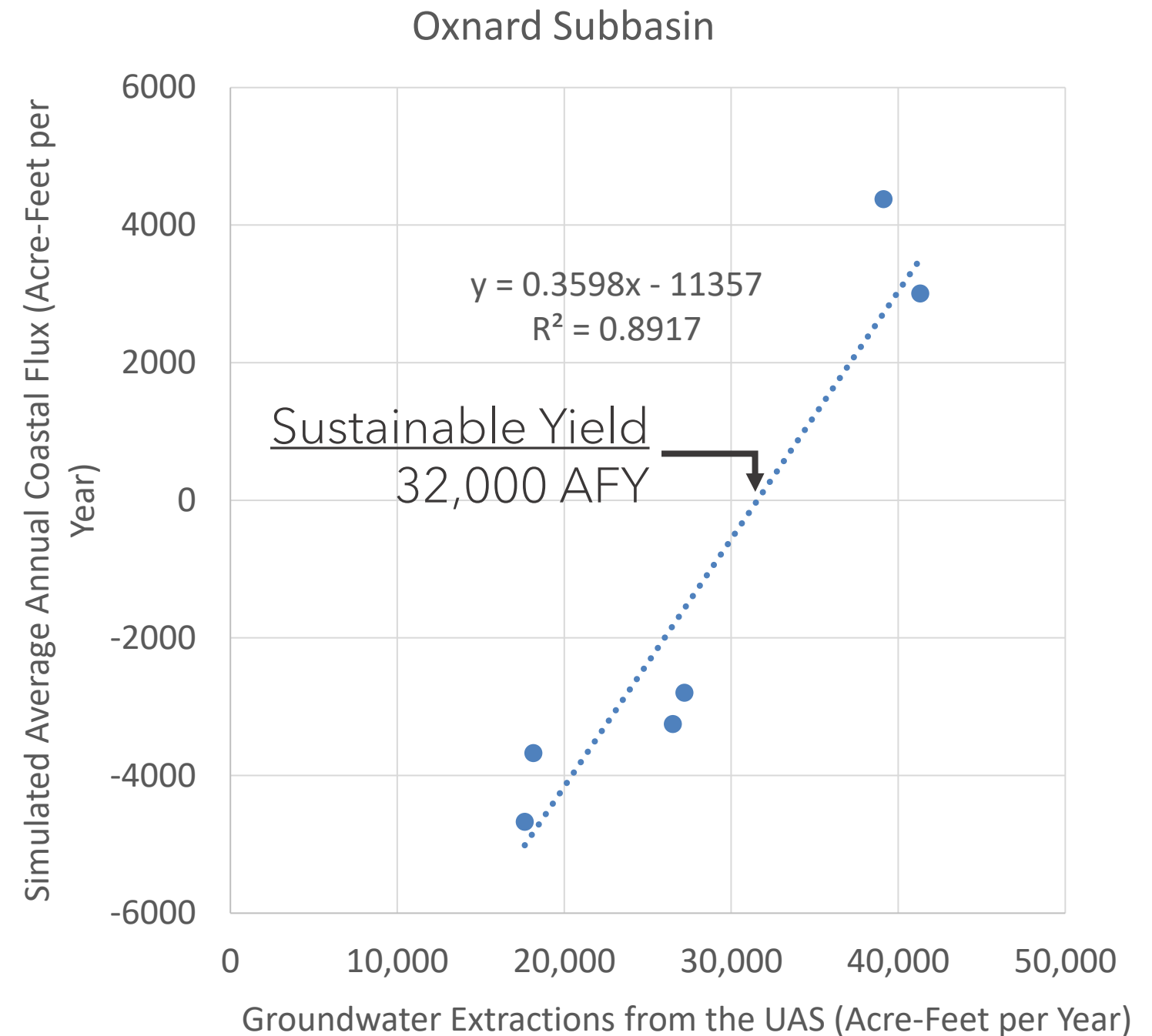
## Summary of Baseline Results

- Landward migration of the 2015 saline water impact front after 2040 is an undesirable result for the Oxnard Subbasin
- Estimated Landward Coastal Flux (Seawater Intrusion, 2040-2070):
  - Approximately 1,600 AFY in the UAS
  - Approximately 3,200 AFY in the LAS
- Projected future groundwater elevations are below the minimum threshold elevation in 20 of the 34 Key Wells in the OPV
- While groundwater elevations are higher than the 2019 GSP modeling, preliminary results indicate that Baseline conditions are not sustainable

# No New Projects Scenario

Modeling for the 5-Year GSP Evaluation

- Projects, simulation period, and hydrology are consistent with the Baseline Scenario
- Groundwater extractions will be incrementally adjusted until average annual flux into the Saline Intrusion Management Area is zero
- Improves on previous estimate of sustainable yield through direct simulation rather than regression



# Projects Scenario

Modeling for the 5-Year GSP Evaluation

## Projects and Management Actions in the GSP:

- Voluntary Temporary Fallowing
- North Pleasant Valley Desalter Project

## Sustainable Yield:

- Iterative adjustments to simulate pumping at the sustainable yield

# New Future Projects

Project Name	Project Proponent	Anticipated Water Supply (AFY)	Projected Offset Pumping Reduction (AFY)
Freeman Expansion	UWCD	10,000	Variable
AWPF Phase II Expansion	City of Oxnard	7,500 - 15,000	Unknown
Recycled Water Pipeline	PVCWD	Unknown*	Unknown
City of Oxnard ASR Project	City of Oxnard	Unknown*	Unknown
City of Oxnard Injection Barrier Project	City of Oxnard	Unknown*	Unknown

\*Depends on AWPF Operations

# Projects with EBB Scenario

Modeling for the 5-Year GSP Evaluation

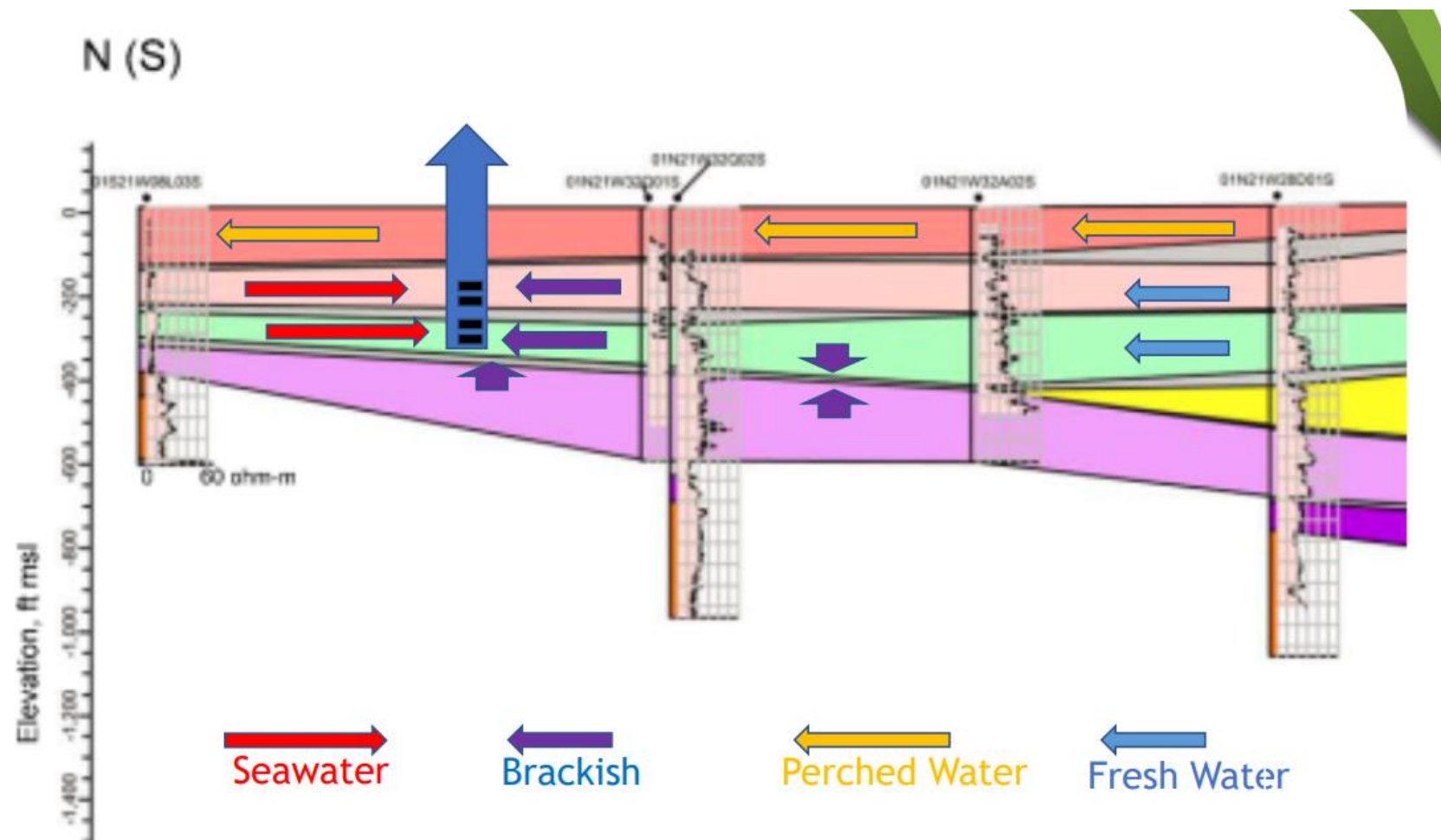
## EBB Design:

- Extraction of 10,000 AFY near Point Mugu
- 5,000 AFY of treated product water
  - 1,500 AFY delivered to Navy
  - 3,500 AFY delivered to AG operators in the OPV

## Sustainable Yield and Management Criteria

- Revised method for tracking landward seawater intrusion
- Revised Minimum thresholds and measurable objective

Project Name	Project Proponent	Anticipated Water Supply (Acre-Feet per Year)	Projected Offset Pumping Reduction
Extraction Barrier Brackish Water Project	UWCD	5,000	3,500 - 5,000



[https://www.unitedwater.org/wp-content/uploads/2022/10/UWCD\\_WSSIII-EBB-Water-Treatment-Project-2022-10-19.pdf](https://www.unitedwater.org/wp-content/uploads/2022/10/UWCD_WSSIII-EBB-Water-Treatment-Project-2022-10-19.pdf)



# Updating the GSP Modeling Scenarios

Modeling for the 5-Year GSP Evaluation



## Future Baseline

### Status

- Preliminary Results Complete

### Results

- Projected future seawater intrusion into Oxnard

## No New Projects

### Status

- Simulations are underway

### Results

- Preliminary results anticipated end of April/May 2024

## Projects

### Status

- Simulations are under development

### Results

- Preliminary results anticipated May 2024

## Projects With EBB

### Status

- Simulations have not started

### Results

- Preliminary results anticipated June 2024

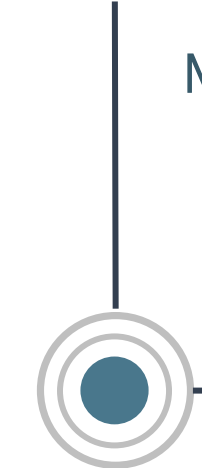
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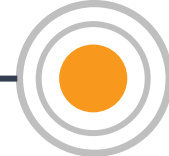
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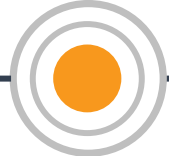


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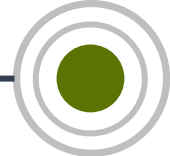
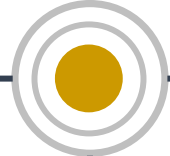
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# Questions & Answers