Fox Canyon Groundwater Management Agency

5-Year GSP Evaluation for the OPV: Technical Workshop

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DUDEK

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5-Year GSP Evaluation Modeling Scenarios

5-Year Evaluation Modeling Scenario Review

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 fallowing

Projects With EBB

Shifts the management framework

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

5-Year GSP Evaluation Modeling Scenarios: Revisions

5-Year Evaluation Modeling Scenario Review

Future Baseline

Baseline Demands

- Revised to account for use of Conejo Creek water during the 2016 – 2022 period

No New Projects

- No revisions

Projects

Freeman Diversion

- Santa Clara River water availability description revised based on simulated hydrology
- 5,000 AFY of additional Santa Clara River water, compared to Future Baseline scenario

Projects With EBB

Delivery of treated water

- Approximately 3,500 AFY of treated EBB water simulated as being delivered to the Forebay for recharge

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Data Provided for Public Review

Summary of Data Provided for Review

- **Scenarios:**
  - **Future Baseline:** Results from the simulations that use DWR's 2070 and 2030 central tendency climate change factors
  - **No New Projects:** Results from three (3) separate No New Project scenario runs
  - **Projects:** Preliminary results from one (1) Project scenario run, with pumping constrained by the Future Baseline demands
- **Monthly Groundwater Budgets** for the Oxnard Subbasin, Pleasant Valley Basin, and WLPMA of the Las Posas Valley Basin
  - Groundwater budget components are summarized by aquifer system
- **Simulated Groundwater Elevations at all Key Wells** in the Oxnard Subbasin, Pleasant Valley Basin, and WLPMA of the Las Posas Valley Basin
- **Surface Water Delivery and Recharge Projections**
  - Critical component of simulated future groundwater extractions and implementation of future projects

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- **Surface Water Delivery and Recharge Projections**
  - Critical component of simulated future groundwater extractions and implementation of future projects

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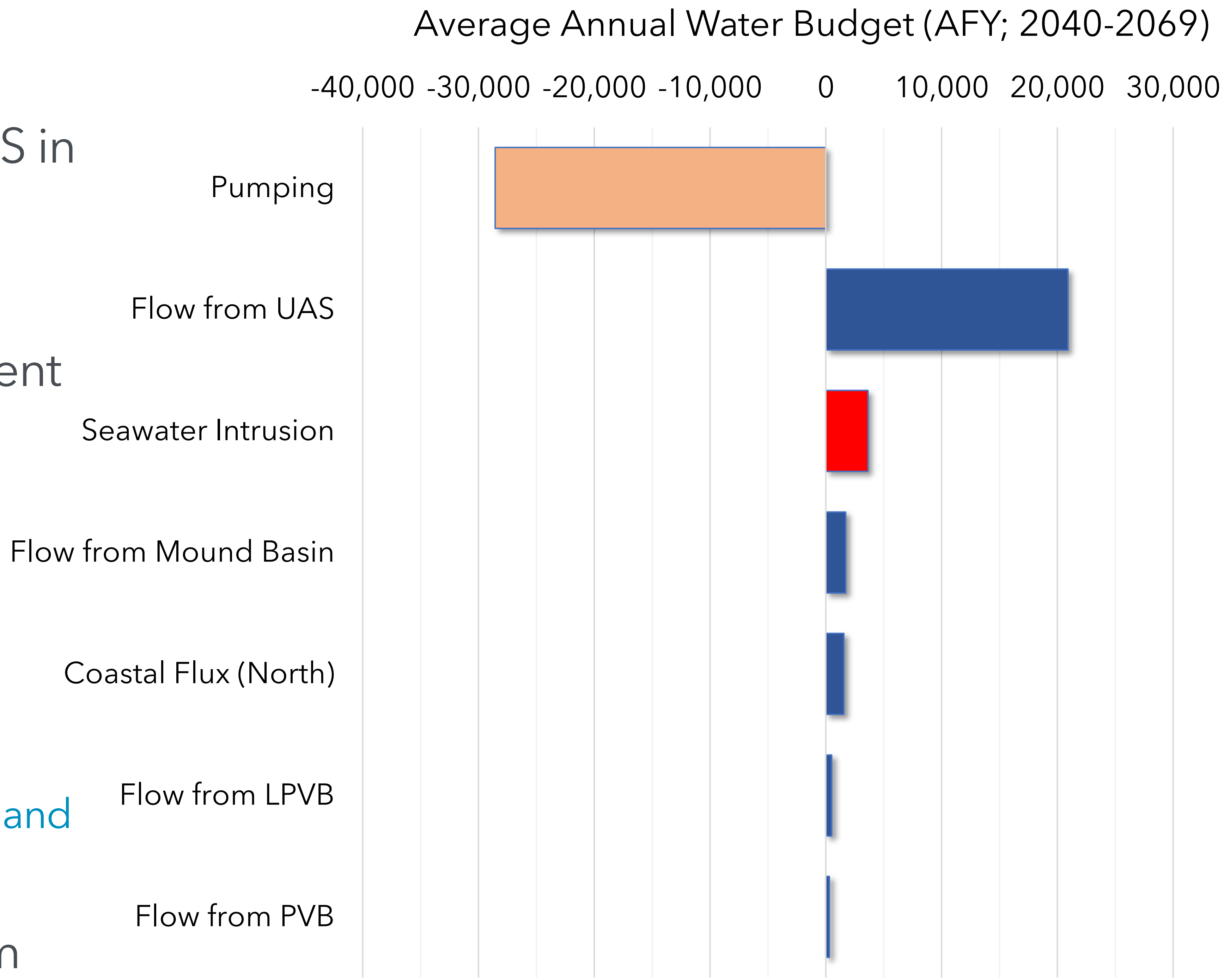
Baseline Scenario: LAS Water Budget

Modeling for the 5-Year GSP Evaluation

- Updated since April 2024 Workshop
- Pumping is the only outflow from the LAS in Oxnard:
  - ~28,600 AFY
- Interactions between Oxnard and adjacent basins:
  - Underflows from LPV: ~500 AFY
  - Underflows from PV: ~300 AFY
- Coastal Flux:
  - Saline Intrusion: ~3,600 AFY
  - Flow from to the ocean north of Channel Island Harbor: ~1,600 AFY
- Pumping from the LAS induces flow from UAS

Oxnard Subbasin

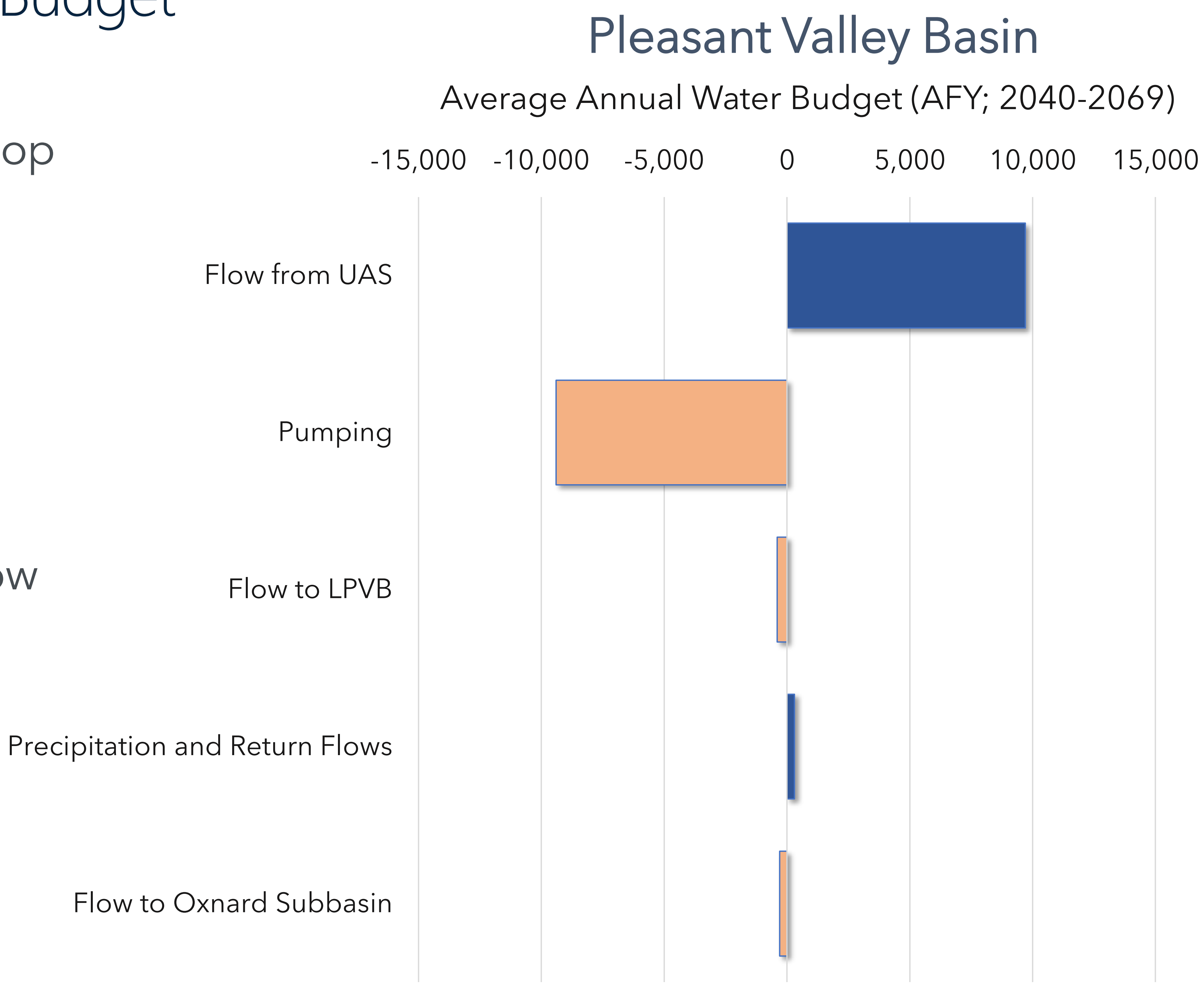


Preliminary Model Results Subject to Change

Baseline Scenario: LAS Water Budget

Modeling for the 5-Year GSP Evaluation

- Updated since April 2024 Workshop
- Outflows from the LAS in the PVB consist of:
  - Pumping (~9,400) AFY
  - Underflows to Oxnard (~300 AFY)
  - Underflows to LPV (~400 AFY)
- Pumping from the LAS induces flow from UAS in the PVB

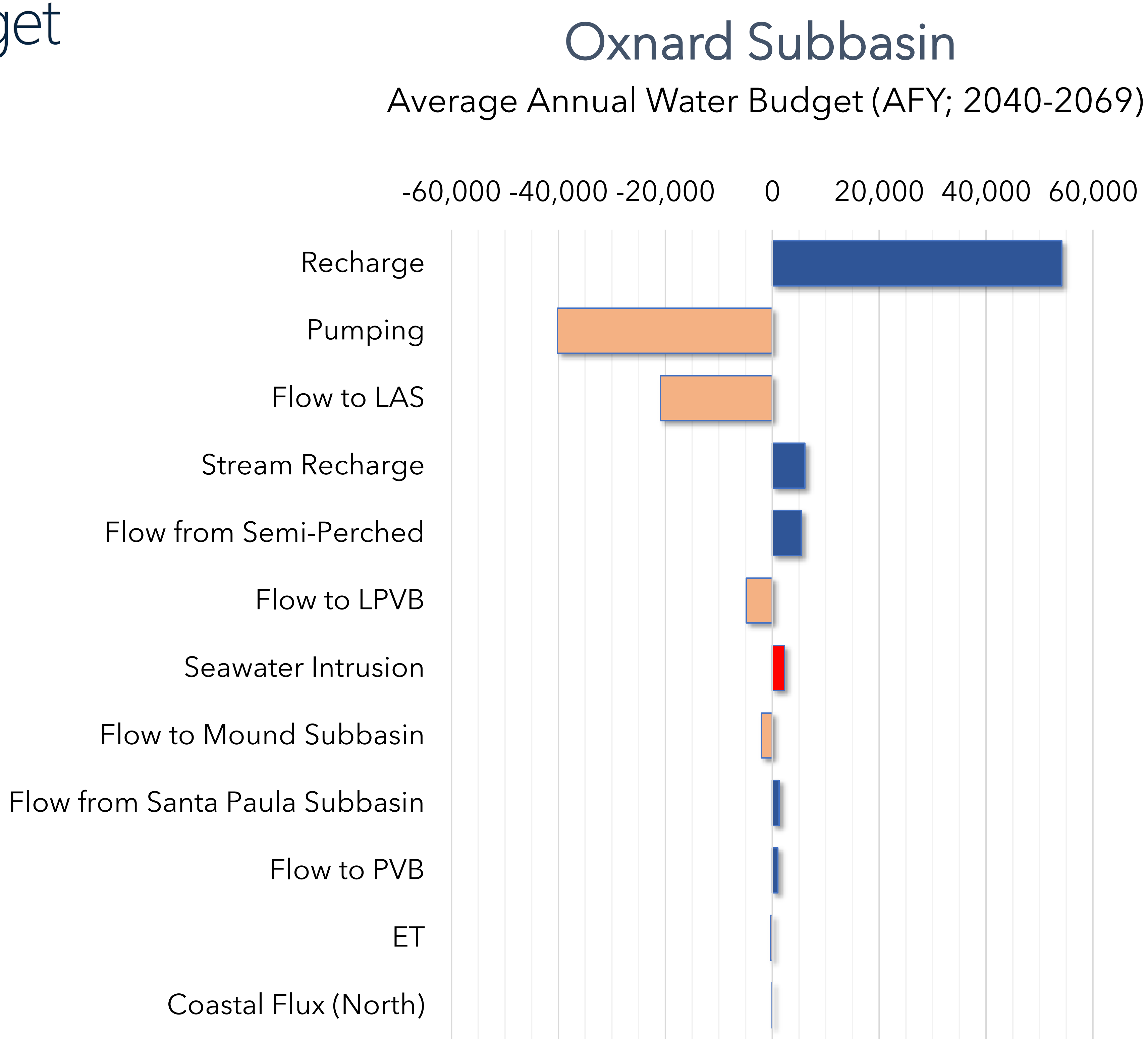


Preliminary Model Results Subject to Change

Baseline Scenario: UAS Water Budget

Modeling for the 5-Year GSP Evaluation

- Updated since April 2024 Workshop
- Largest outflows:
  - Pumping: ~40,200 AFY
  - Flow form UAS to LAS: ~20,900 AFY
- Interactions between Oxnard and adjacent basins:
  - Underflows to LPV: ~4,800 AFY
  - Underflows from PV: ~1,000 AFY
- Coastal Flux:
  - Saline Intrusion: ~2,300 AFY
  - Flow out to the ocean north of Channel Island Harbor: ~100 AFY



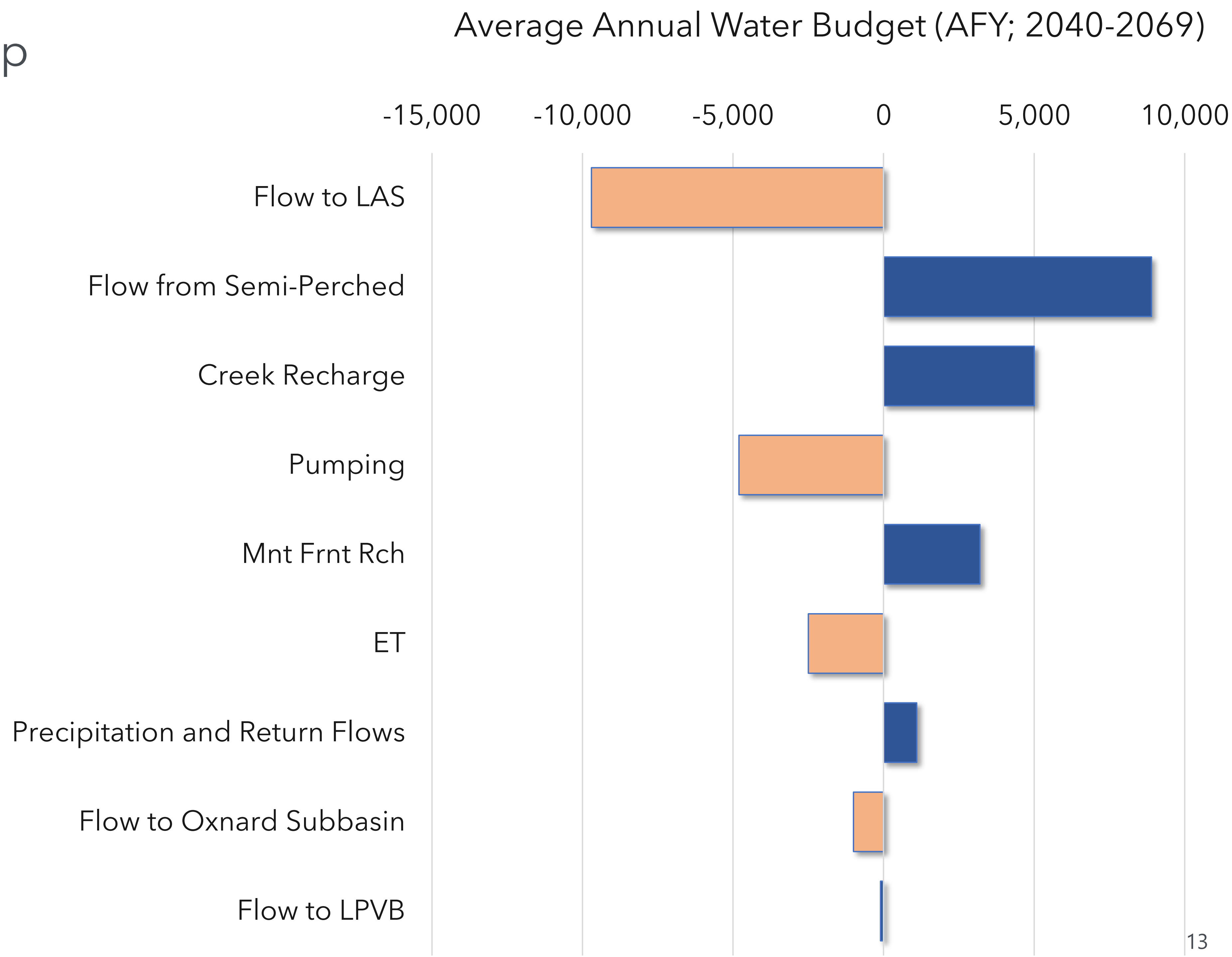
Preliminary Model Results Subject to Change

Baseline Scenario: UAS Water Budget

Modeling for the 5-Year GSP Evaluation

- Updated since April 2024 Workshop
- Largest outflows:
  - Flow form UAS to LAS: ~9,700 AFY
  - Pumping: ~4,800 AFY
- Interactions between Oxnard and adjacent basins:
  - Underflows to Oxnard: ~1,800 AFY
  - Underflows to LPV: ~100 AFY

Pleasant Valley Basin

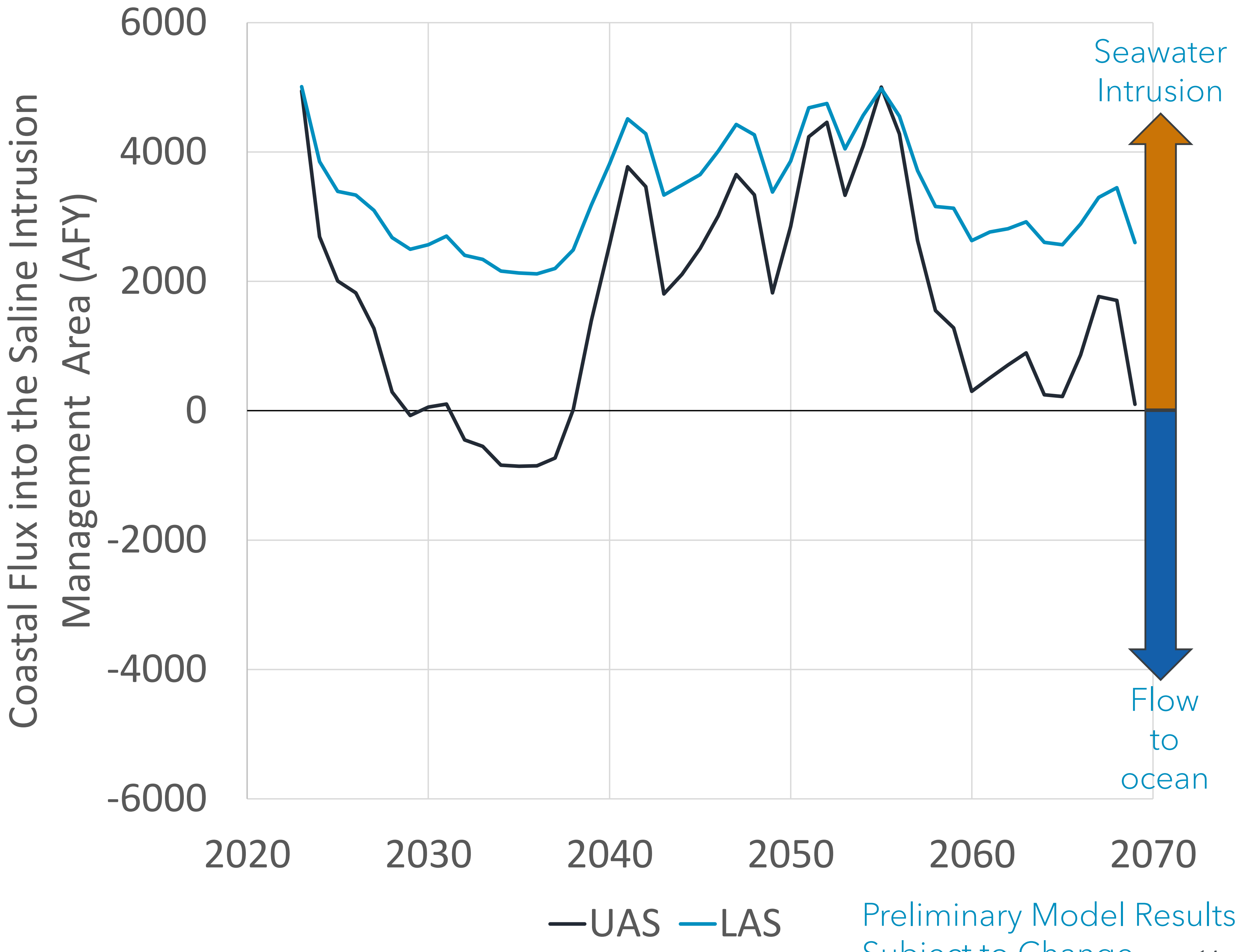


Preliminary Model Results Subject to Change

Oxnard Subbasin – Estimates of Seawater Intrusion

Modeling for the 5-Year GSP Evaluation

- Seawater Intrusion into the UAS
  - 2040 – 2070 Average = 2,300 AFY
  - Periods of groundwater outflow to the Pacific Ocean during the wet 2029 – 2039 period
- Seawater Intrusion into the LAS
  - 2040 – 2070 Average = 3,600 AFY
  - No periods of groundwater outflow to the Ocean
- Sustainability Goal
  - No net intrusion into the UAS and LAS over the 2040 – 2070 period



Preliminary Model Results Subject to Change

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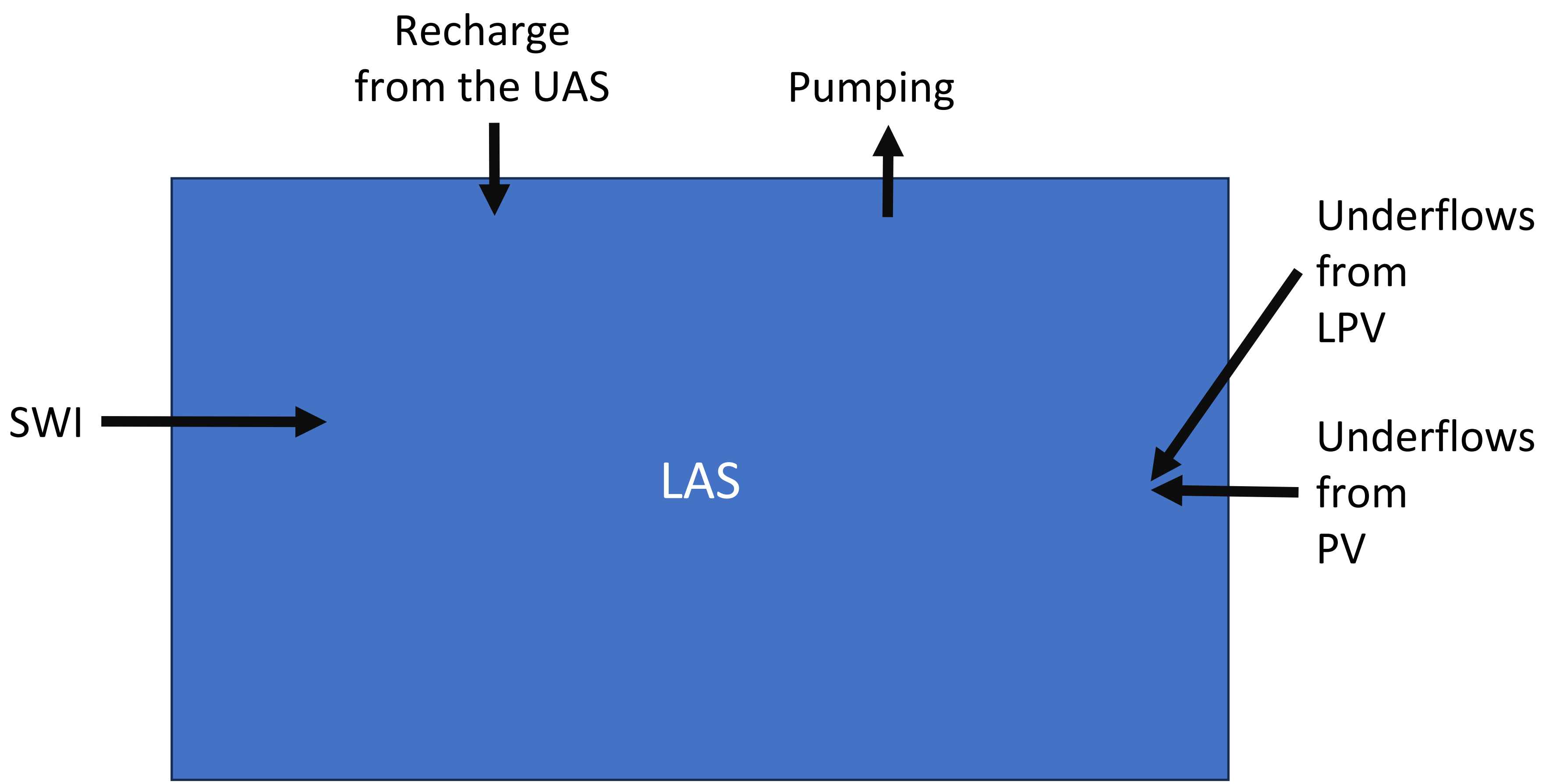
No New Projects: General Approach

Modeling for the 5-Year GSP Evaluation

- **Goal:**
  - Simulate pumping from the Oxnard Subbasin, PVB, and LPVB that results in no net seawater intrusion
- **Considerations:**
  - Underflow between basins
  - Flow between aquifer systems
- **Methods:**
  - Relate generalized water budget components to pumping in each system



No New Projects: Initial Scenario Design

Modeling for the 5-Year GSP Evaluation

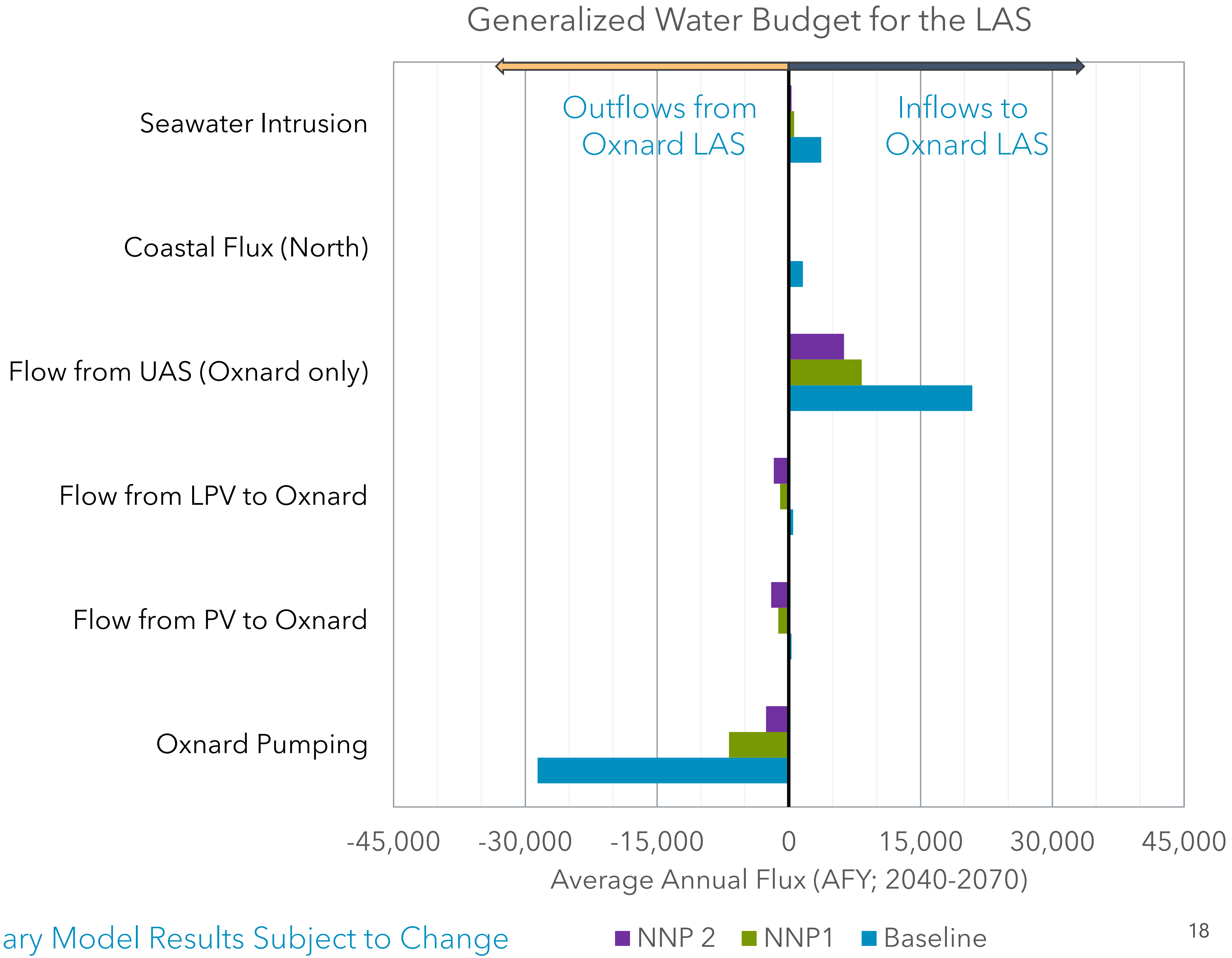
- **No New Projects 1:**
  - Operate at sustainable yield values presented in the GSPs
- **No New Projects 2:**
  - Evaluate the impact of pumping in the PVB and LPV on LAS seawater intrusion.
  - No pumping in the LAS of the Oxnard Subbasin

Scenario	Simulated Reduction	Simulated Pumping (AFY; 2040-2070)						
		Oxnard		PV		LPV		Total
		UAS	LAS	UAS	LAS	Shallow	LAS	
Baseline	-	-40,200	-28,600	-4,800	-9,400	-400	-13,000	-96,400
No New Projects (NNP) 1	Oxnard: 20% UAS; 80% LAS LPV: 20% PVB: 20%	-30,800	-6,800	-2,900	-9,200	-300	-10,900	-60,900
No New Projects (NNP) 2	Oxnard: 10% UAS; 100% LAS LPV: 0% PVB: 0%	-34,300	-2,600	-3,100	-10,100	-400	-13,100	-63,600

No New Projects: Generalized Water Budgets for the Oxnard LAS

Modeling for the 5-Year GSP Evaluation

- **Seawater Intrusion:**
  - Reduced 85-90%
- **Recharge from the UAS:**
  - Pumping in the LAS controls recharge from the UAS
    - 12,000 – 14,000 AFY reduction in recharge from the UAS
- **Interbasin Flows:**
  - Reductions in Oxnard pumping results in a reversal of net flow across basin boundaries
    - 2,200 – 3,700 AFY flows to LPV and PVB



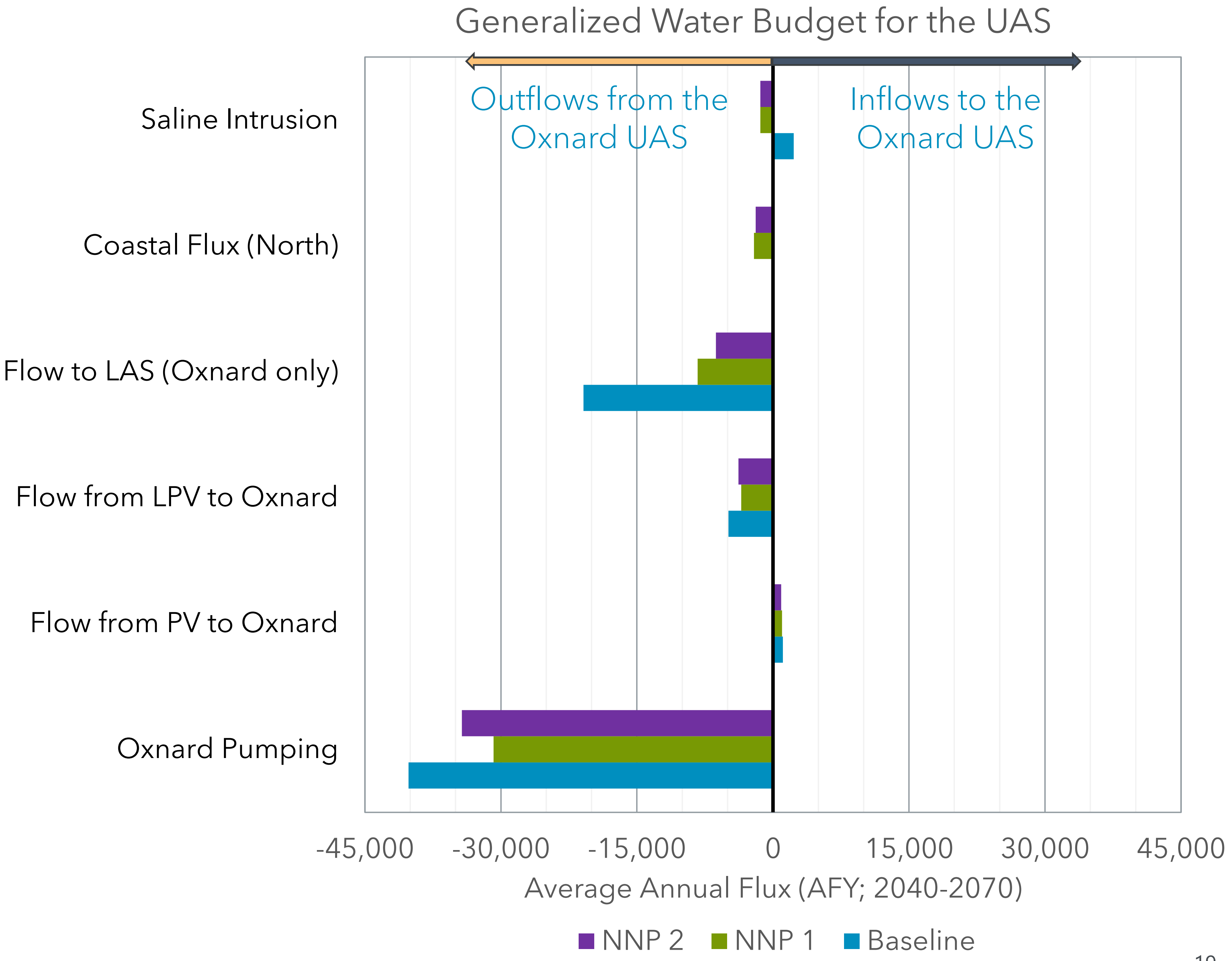
Preliminary Model Results Subject to Change

No New Projects: Generalized Water Budgets for the Oxnard UAS

Modeling for the 5-Year GSP Evaluation

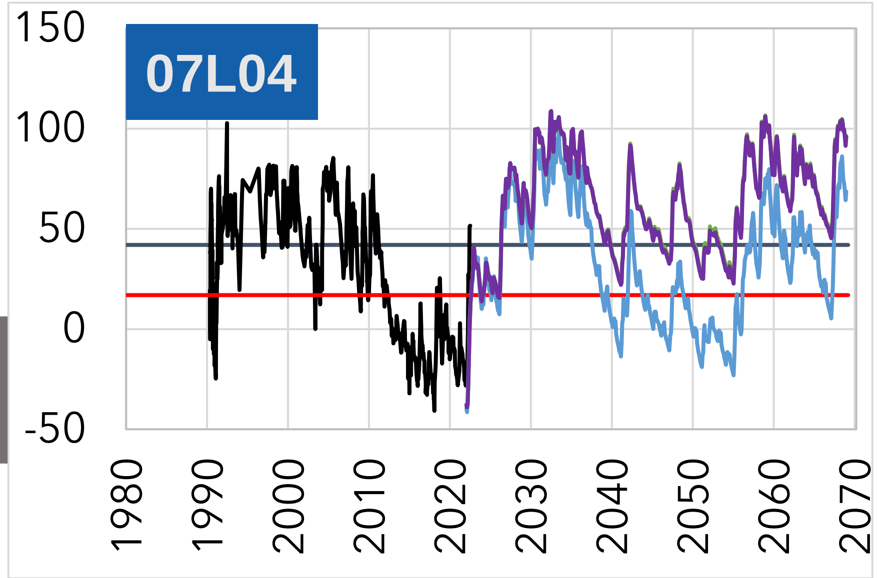
Preliminary Model Results Subject to Change

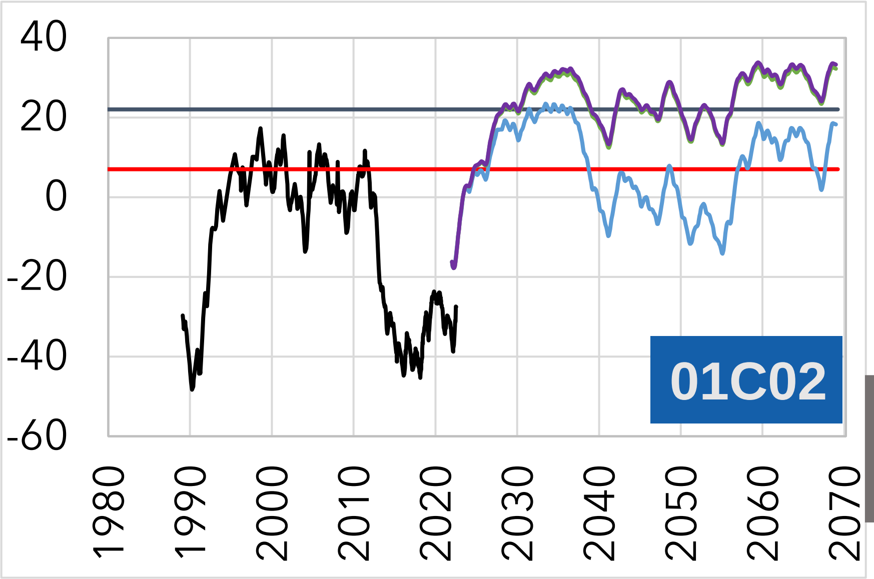
- **Seawater Intrusion:**
  - Groundwater in the UAS, on average, flows to the Pacific Ocean in both scenarios
  - Both scenarios result in the same estimate of flow to the ocean
- **Flow to the LAS:**
  - 12,000 – 14,000 AFY reduction in recharge from the UAS
  - Results in groundwater flow to the ocean through the UAS
- **Inter-basin Flows:**
  - Less than sensitive to pumping in UAS than the LAS
  - Driven by Forebay operations

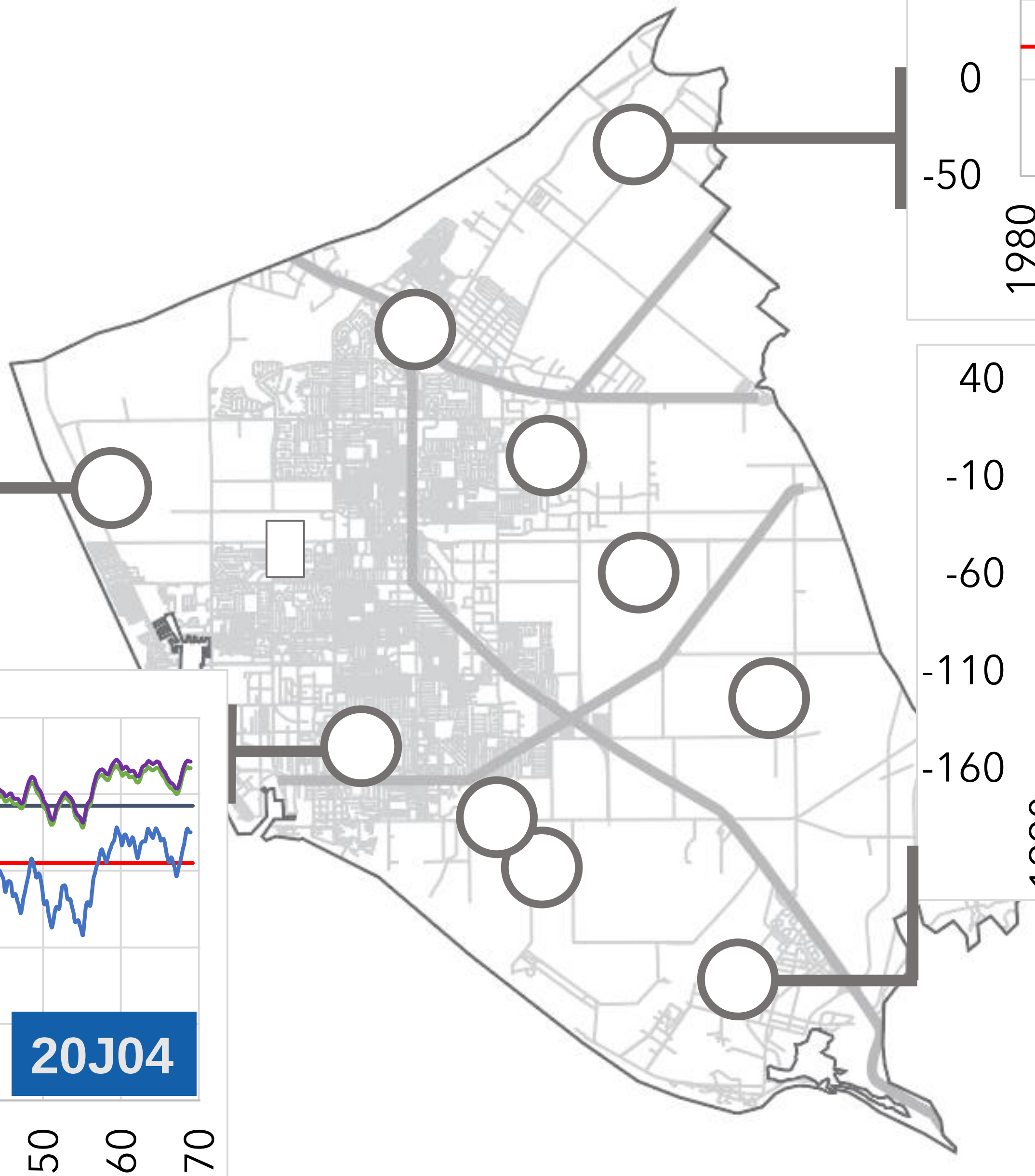


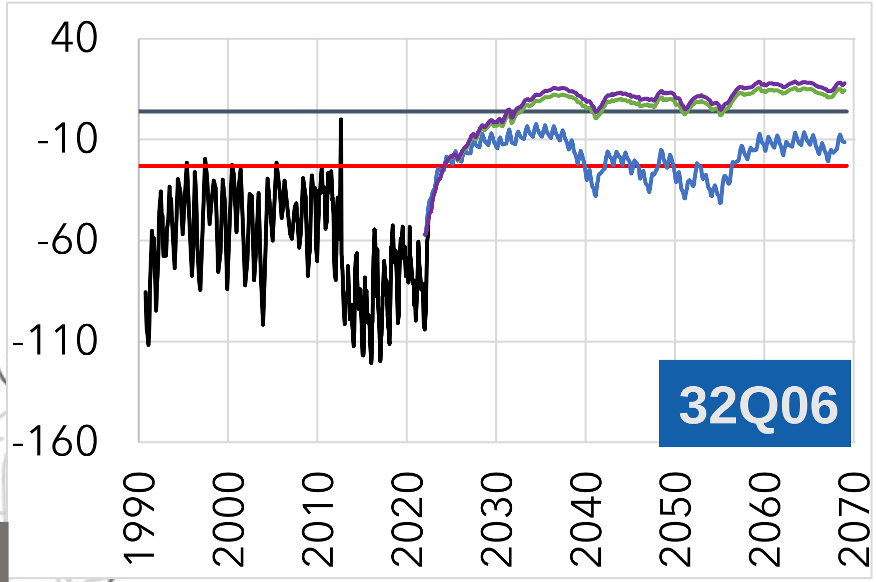
Oxnard Subbasin – Fox Canyon Aquifer

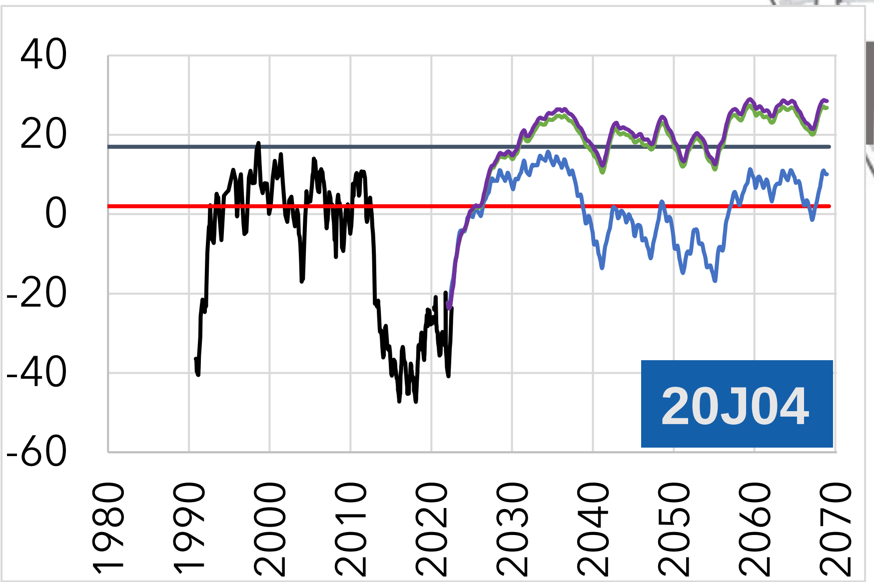
Modeling for the 5-Year GSP Evaluation











Legend

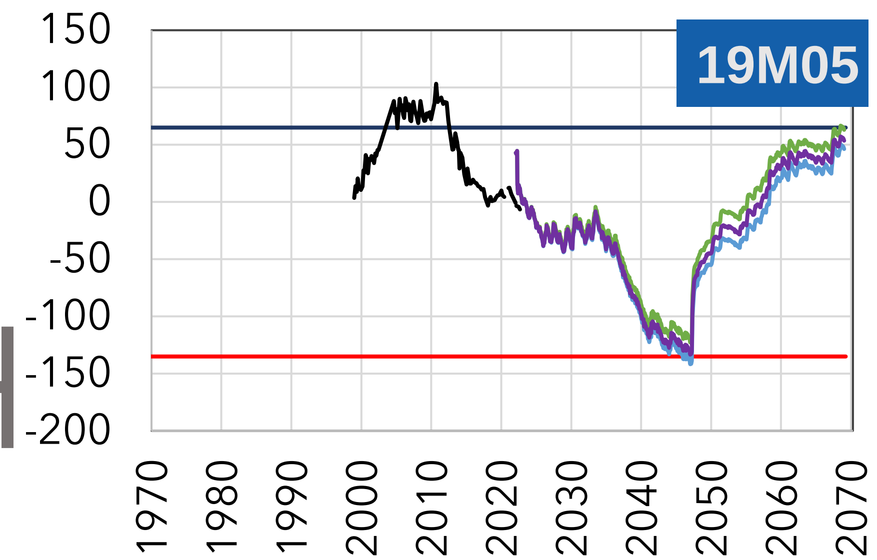
Measured	Baseline
Measurable Objective	No New Projects
Minimum Threshold	Scenario 1
	Scenario 2

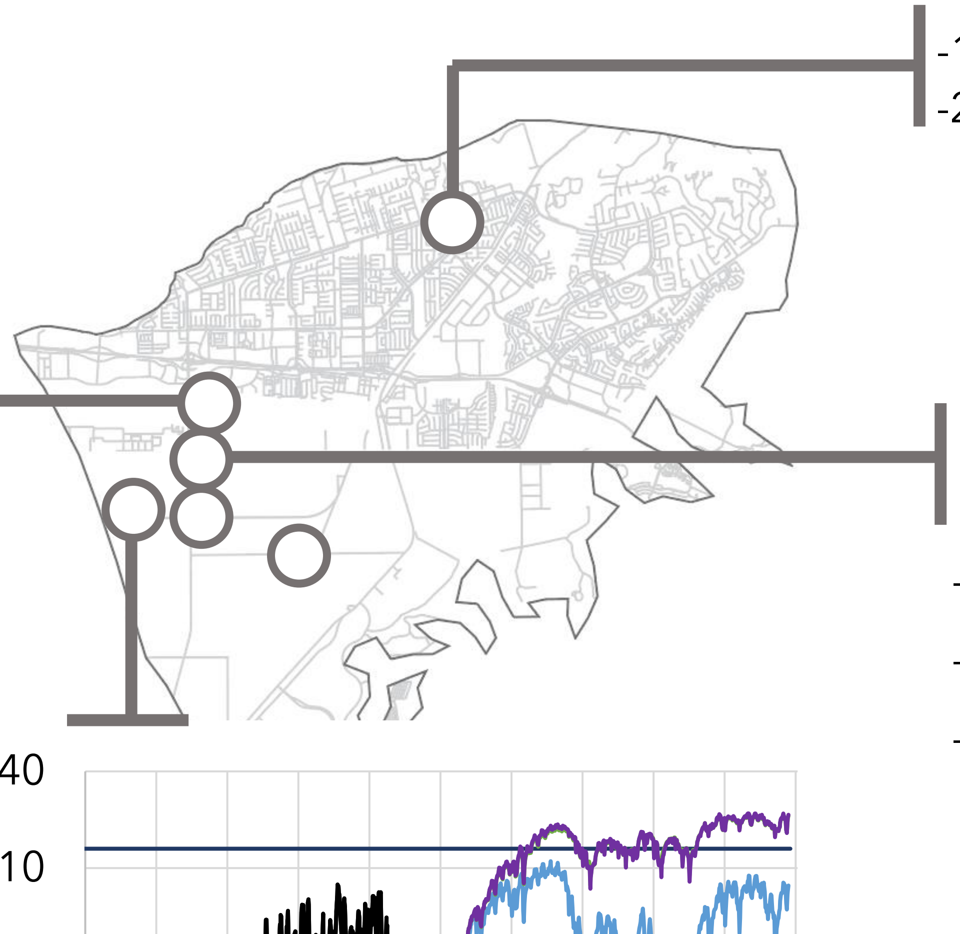
Preliminary Model Results
Subject to Change

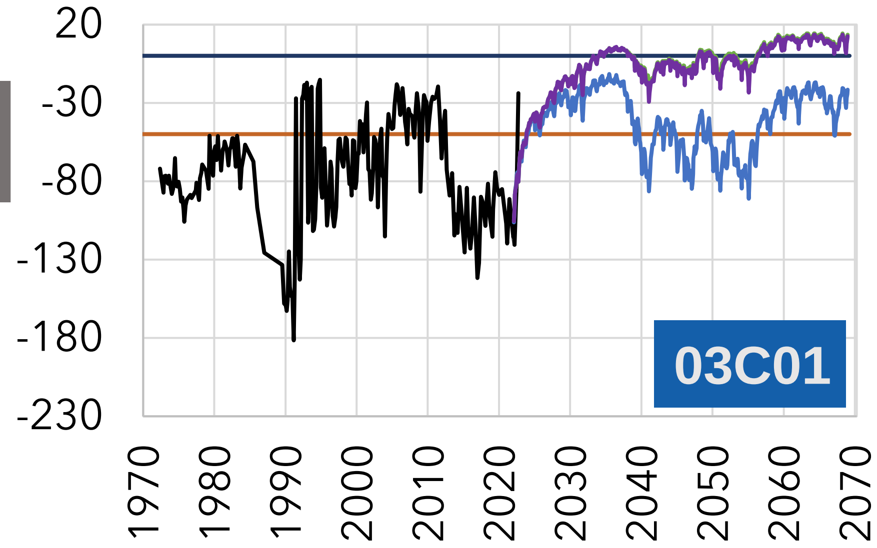
Pleasant Valley Basin – Fox Canyon Aquifer

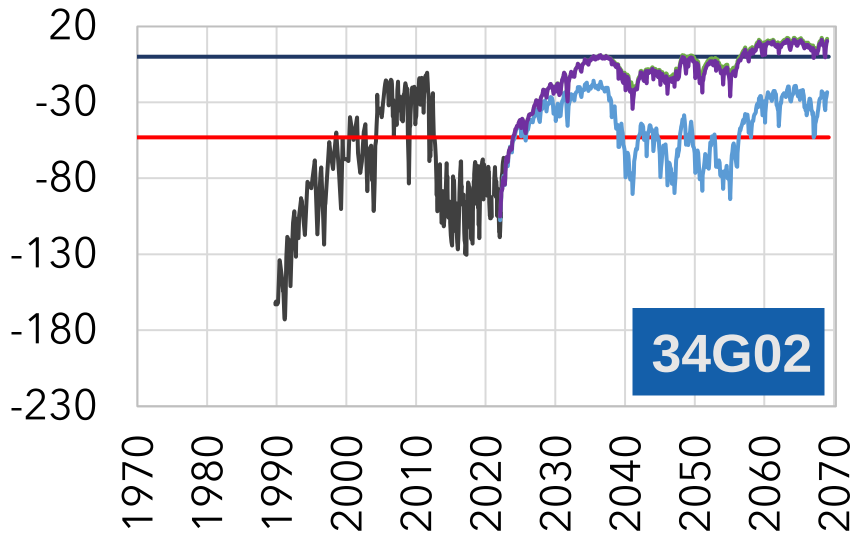
Modeling for the 5-Year GSP Evaluation

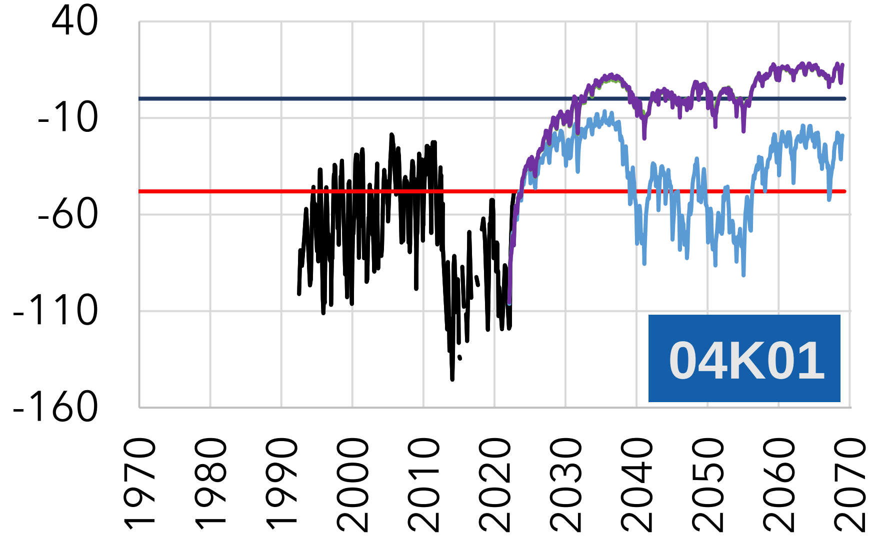
- Groundwater elevations in the PVB in the two No New Projects scenarios fluctuate around the measurable objectives
- No New Projects water levels in the PVB benefit from an additional 1,500 – 2,300 AFY of underflows from Oxnard











Legend

Measured

Measurable Objective

Minimum Threshold

Baseline

No New Projects

Scenario 1

Scenario 2

Preliminary Model Results Subject to Change

No New Projects: Scenario 3

Modeling for the 5-Year GSP Evaluation

- **No New Projects 3:**

Balance pumping in the LAS of the Oxnard subbasin to:

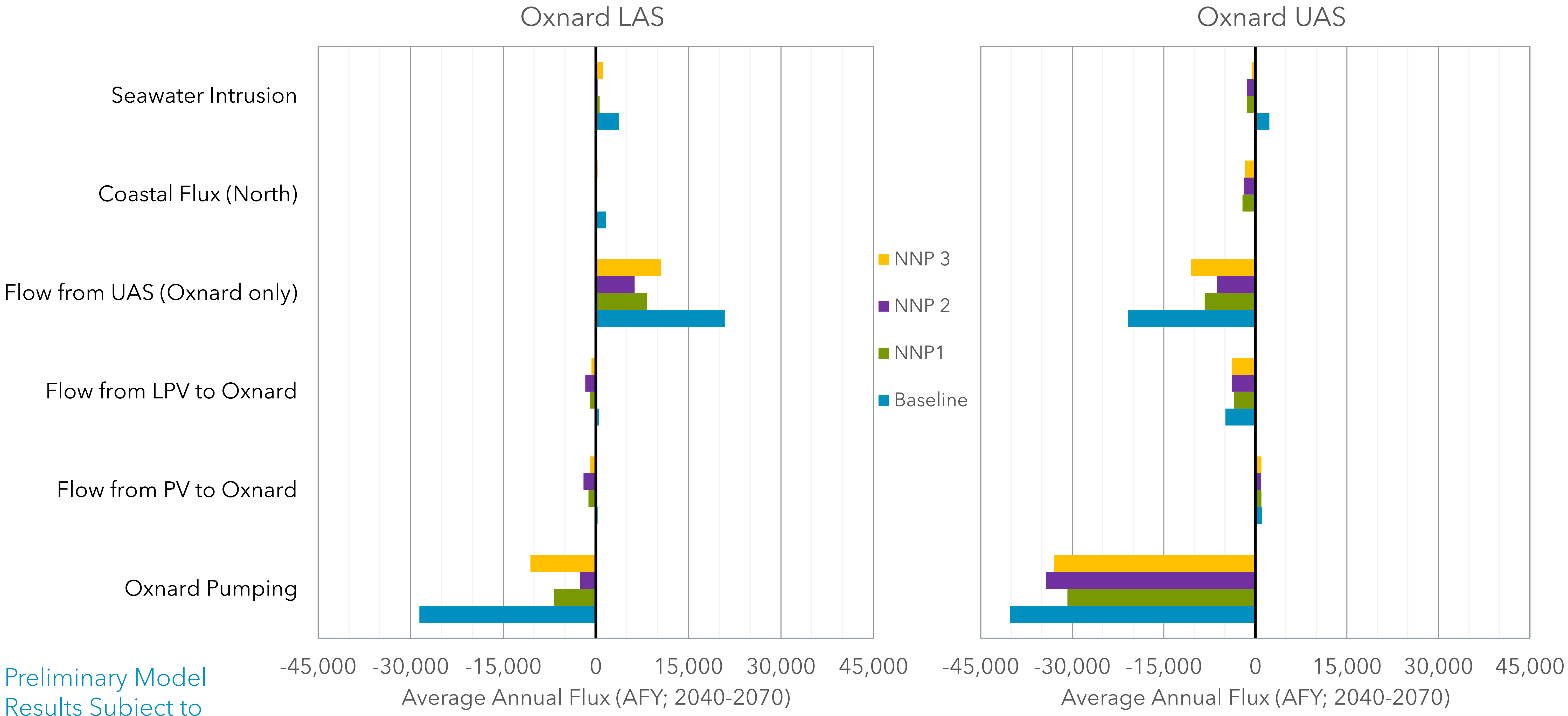
- Reduce the flow of groundwater to LPV and PVB
- Reduce loss of fresh groundwater to the Pacific Ocean in the UAS

Scenario	Simulated Reduction	Simulated Pumping (AFY; 2040-2070)						
		Oxnard		PV		LPV		Total
		UAS	LAS	UAS	LAS	Shallow	LAS	
Baseline	-	-40,200	-28,600	-4,800	-9,400	-400	-13,000	-96,400
No New Projects (NNP) 1	Oxnard: 20% UAS; 80% LAS LPV: 20% PVB: 20%	-30,800	-6,800	-2,900	-9,200	-300	-10,900	-60,900
No New Projects (NNP) 2	Oxnard: 10% UAS; 100% LAS LPV: 0% PVB: 0%	-34,300	-2,600	-3,100	-10,100	-400	-13,100	-63,600
No New Projects (NNP) 3	**Oxnard: 15% UAS; 65% LAS LPV: 15% PV: 15%**	-33,000	-10,600	-3,200	-9,300	-300	-11,100	-67,500

Preliminary Model Results Subject to Change

No New Projects: Generalized Water Budgets

Modeling for the 5-Year GSP Evaluation



Preliminary Model Results Subject to Change

No New Projects: Summary of Results

Modeling for the 5-Year GSP Evaluation

Scenario	Simulated Reduction	Simulated Pumping (AFY; 2040-2070)							Simulated Seawater Intrusion (AFY; 2040 – 2070)	
		Oxnard		PV		LPV		Total	UAS	LAS
		UAS	LAS	UAS	LAS	Shallow	LAS			
Baseline	-	-40,200	-28,600	-4,800	-9,400	-400	-13,000	-96,400	2,300	3,700
No New Projects (NNP) 1	Oxnard: 20% UAS; 80% LAS LPV: 20% PVB: 20%	-30,800	-6,800	-2,900	-9,200	-300	-10,900	-60,900	-1,400	600
No New Projects (NNP) 2	Oxnard: 10% UAS; 100% LAS LPV: 0% PVB: 0%	-34,300	-2,600	-3,100	-10,100	-400	-13,100	-63,600	-1,400	300
No New Projects (NNP) 3	Oxnard: 15% UAS; 65% LAS LPV: 15% PV: 15%	-33,000	-10,600	-3,200	-9,300	-300	-11,100	-67,500	-600	1,200

Preliminary Model Results Subject to Change

Key Takeaways

- Inter-basin flows reverse directions as pumping in the LAS of Oxnard is reduced
  - 2,200 – 3,700 AFY of groundwater flows from the Oxnard Subbasin to PVB and LPVB
- The UAS is the primary source of recharge to the LAS
- The sustainable yield of the LAS and UAS cannot be evaluated independently
  - Pumping in the LAS directly influences recharge from the UAS and seawater intrusion in the UAS
- The pumping distributions that lead to operating at the sustainable yield are not unique
  - Model results show that different pumping distributions result in the same estimate of seawater intrusion and very similar groundwater elevations across the OPV

Open Discussion