Hazen

ZONE 7 WATER AGENCY

Flexible Modeling for Future Reliability

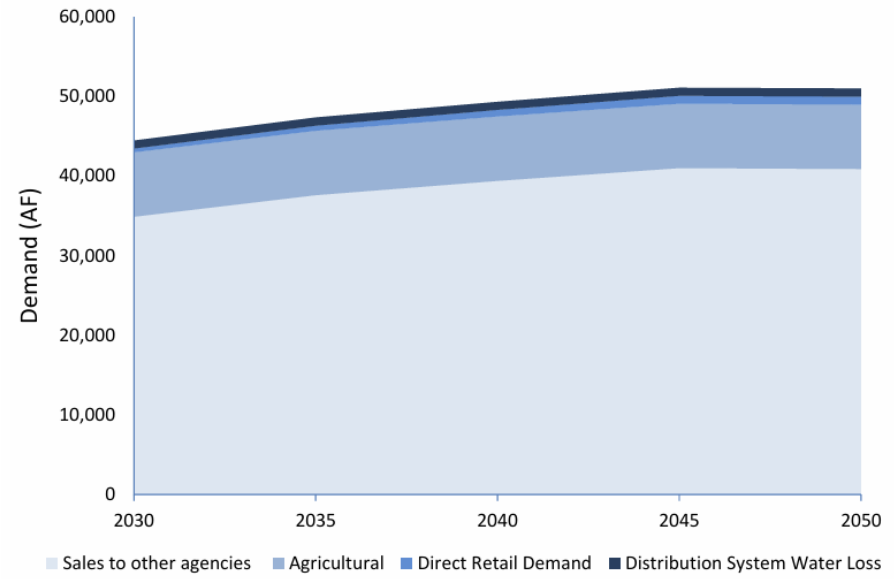
Zone 7's Water Supply Portfolio Model

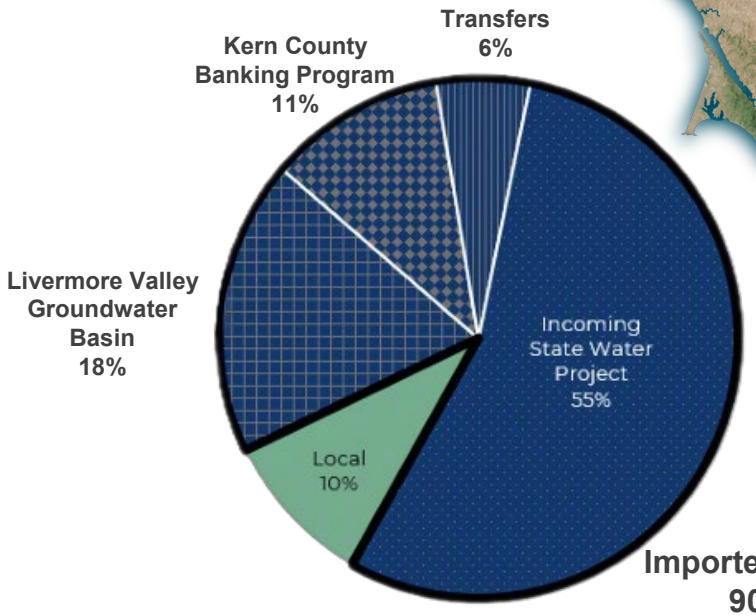
Agenda

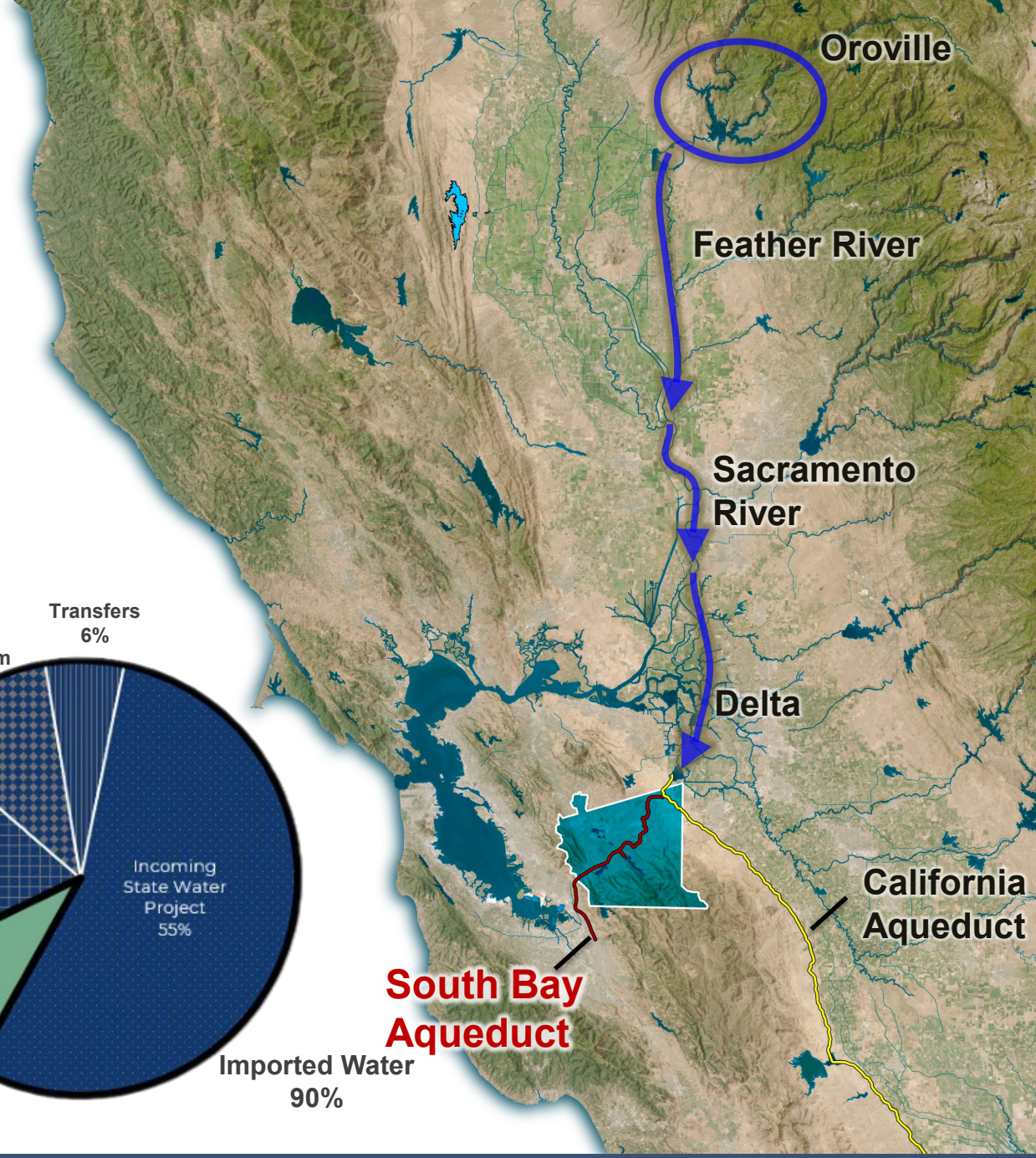
- Zone 7 Water Agency
- Challenges for Zone 7 and other California water agencies
- Zone 7's RiverWare model
- Flexible prioritization framework
- Hydrologic risk representation
- From Modeling to decision support
- Takeaways and future applications

Zone 7 Water Agency

- Northern California wholesale water supplier
- 90% of supply is imported from the Sacramento-San Joaquin River Delta via State Water Project (SWP)



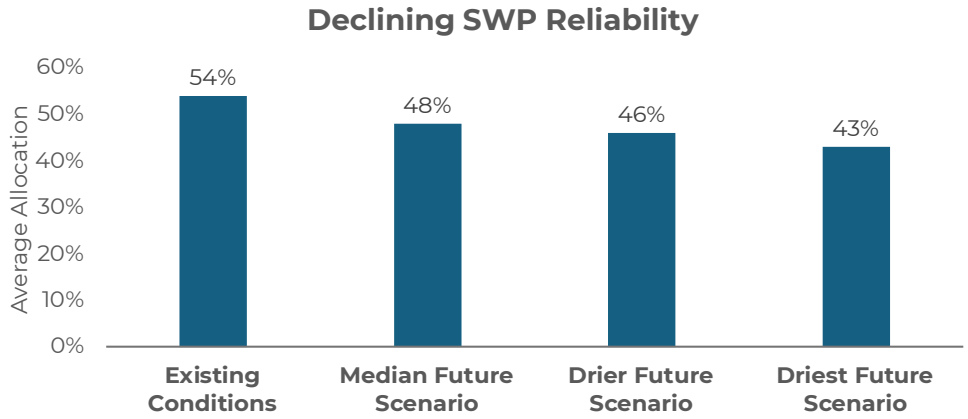




Challenges for Zone 7 & Other California Water Agencies

- Reliability of SWP
- Regulatory constraints
- Climate impacts to water supply & demands
- Development and increasing demands

Increasing water supply uncertainty;
Potential future dry-year supply shortages



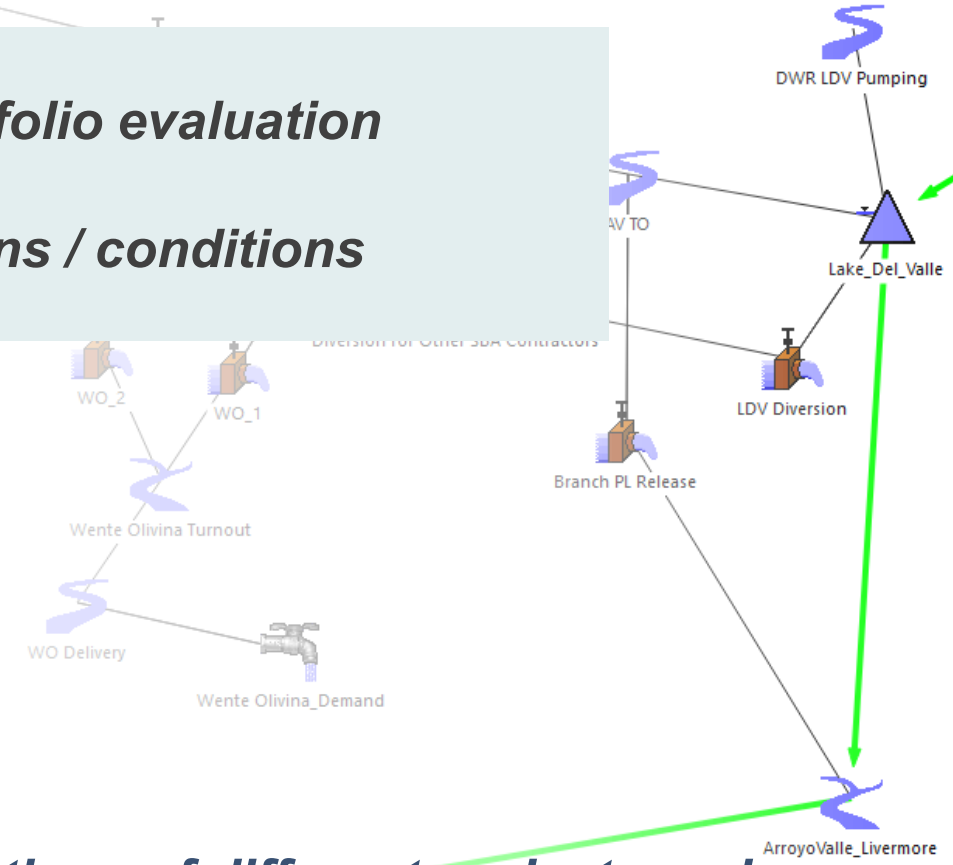
Source: DWR 2025 DRAFT Delivery Capability Report. Median, Drier, and Driest correspond to the 50%, 75%, and 95% Level of Concern scenarios published by DWR.

Planning Questions and Motivations	*What new supply investments provide the greatest benefit?* *Representing and planning for future uncertainty* *Communication of results to management and decision-makers*

Zone 7's RiverWare Model

Modeling Objectives

Capital investment planning / portfolio evaluation
Operational strategy testing
Adaptable to changing assumptions / conditions



- Monthly timestep
- Historical hydrology 1922-2015
  - **SWP availability**
  - **Local supplies: Gauge data, groundwater modeling**
- Representation of existing and planned facilities
  - **Surface water treatment plants**
  - **Well fields**
  - **Local surface water storage**
  - **Regional groundwater banks**

Many combinations of different projects and operating rules

Flexible Prioritization Framework

Planning Need

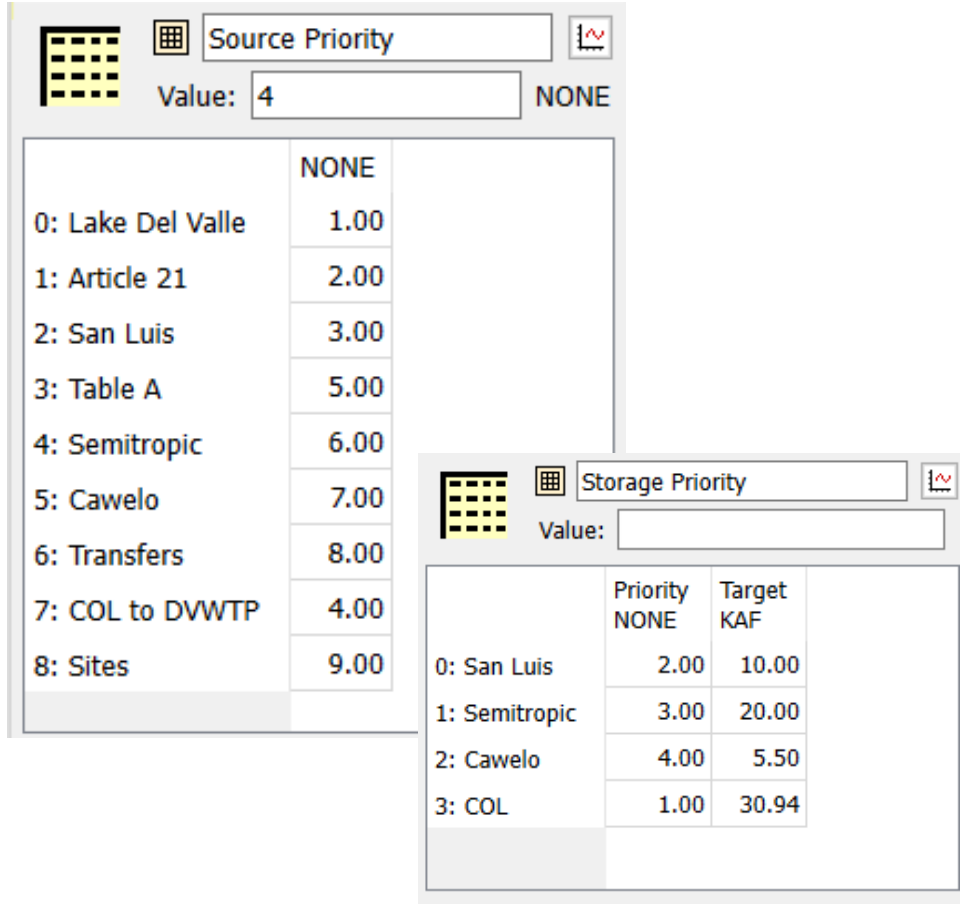
- Portfolio and operating priorities change between planning scenarios

Model Implementation

- Configurable supply and storage prioritization tables
- Operational logic separated from scenario assumptions

Benefits

- Faster testing of alternative portfolios without repeatedly rewriting rules



Model Input Tables Controlling Supply Prioritization and Storage Preferences

Addressing Hydrologic Uncertainty

Use of Consistent Industry Datasets

- DWR planning outputs and local supply information
- Climate change data developed specific to SWP and local watershed

Preserves the conditions that drive risk

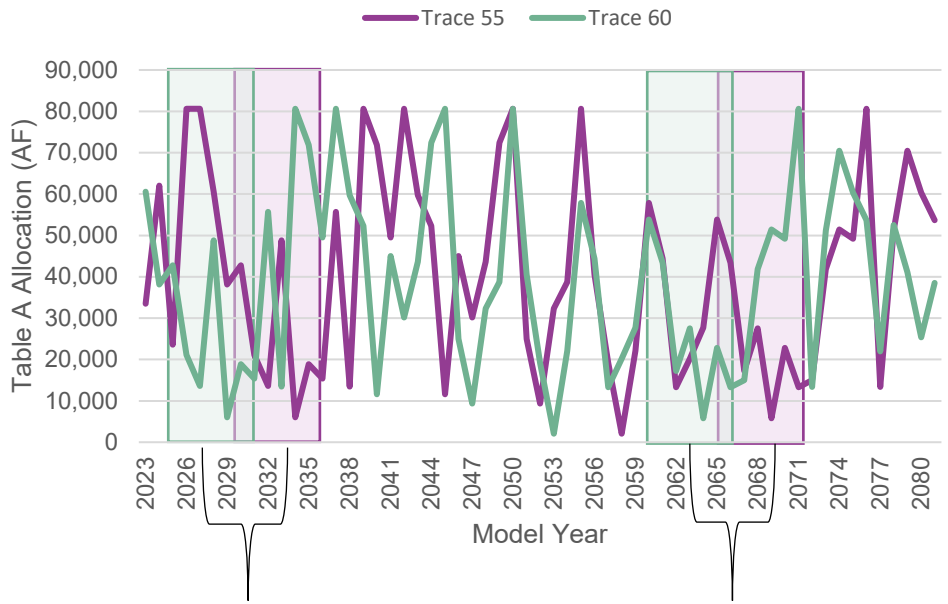
- Hydrologic persistence
- Multiyear drought sequences
- Storage depletion and recovery

Planning benefit

- Defensible comparisons of reliability and capital investments
- Evaluation of probabilistic output that directly addresses agency's Reliability Policy

Example of ISM Methodology

Model Year	2023	2024	2025	→	2081
Trace 1	1922	1923	1924	→	1980
Trace 2	1923	1924	1925	→	1981
Trace 3	1924	1925	1926	→	1982
↓	↓	↓	↓	→	
Trace 93	2015	1922	1923	→	1979



Example drought, shifts with timeseries

From Modeling to Decision Support

How the model informs decisions

- Reliability metric generation
- Power BI visualization platform
- Comparing portfolios and communicating results to decision makers

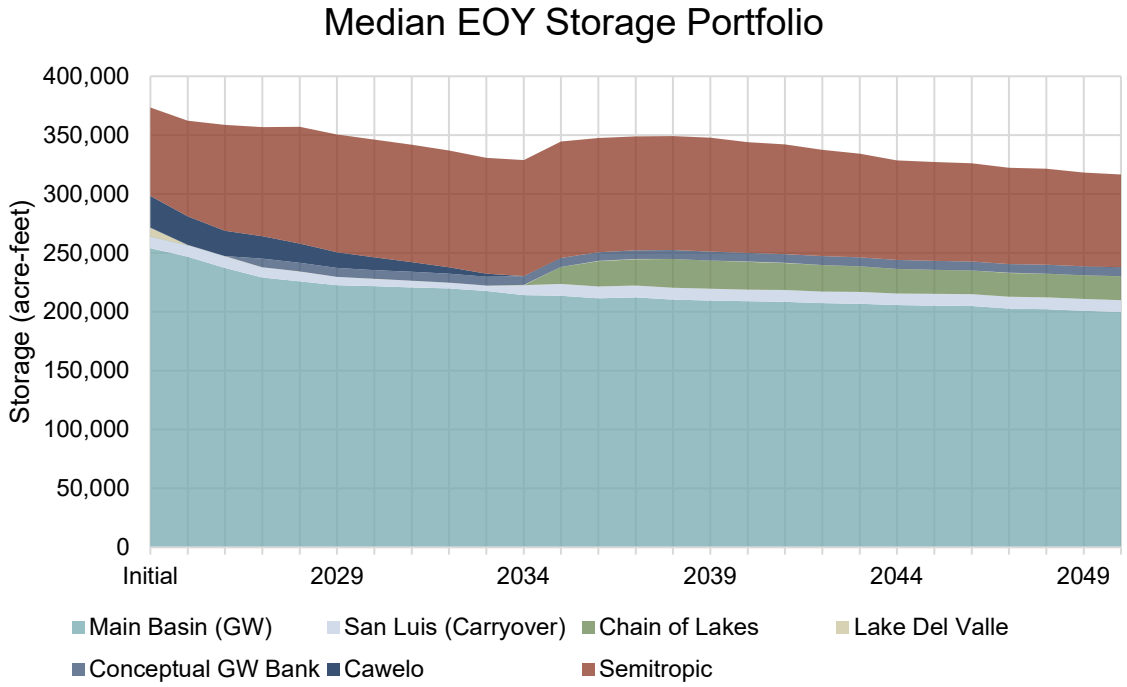


Table 7-11 Five Consecutive Dry Years Supply and Demand Comparison (DWR Table 7-4)

		2030	2035	2040	2045	2050 (Opt)
First year	Supply totals	72,600	89,500	94,500	90,500	90,500
	Use totals	44,500	47,300	49,300	51,100	51,000
	Surplus/(shortfall)	28,100	42,200	45,200	39,400	39,500
Second year	Supply totals	69,400	92,800	95,800	90,300	90,400
	Use totals	45,000	47,700	49,600	51,000	51,000
	Surplus/(shortfall)	24,400	45,100	46,200	39,300	39,400
Third year	Supply totals	93,900	111,800	113,300	106,900	82,000
	Use totals	45,600	48,100	50,000	51,000	51,000
	Surplus/(shortfall)	48,300	63,700	63,300	55,900	31,000
Fourth year	Supply totals	57,900	65,900	65,500	58,600	58,600
	Use totals	46,200	48,500	50,400	51,000	51,000
	Surplus/(shortfall)	11,700	17,400	15,100	7,600	7,600
Fifth year	Supply totals	58,900	57,900	50,700	44,100	40,700
	Use totals	46,700	48,900	50,700	51,000	51,000
	Surplus/(shortfall)	12,200	9,000	0	(6,900)	(10,300)

NOTES:
(a) Volumes are in units of AF and are rounded to the nearest hundred.

Example: *Model supported Z7's water supply reliability forecast for 2025 UWMP.*

Key Takeaways and Future Applications

- RiveWare is a key part of a larger decision support framework that guides:
  - **Supply diversification strategies**
  - **System operations optimization**
  - **Capital investment planning**

- Ultimately supports actionable insights for water management in an increasingly uncertain future

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