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CENTER FOR WATERSHED SCIENCES

CALifornia Value Integrated Network: Model Updates
Mustafa S. Dogan, Karandev Singh, Josue Medellin-Azuara and Jay R. Lund
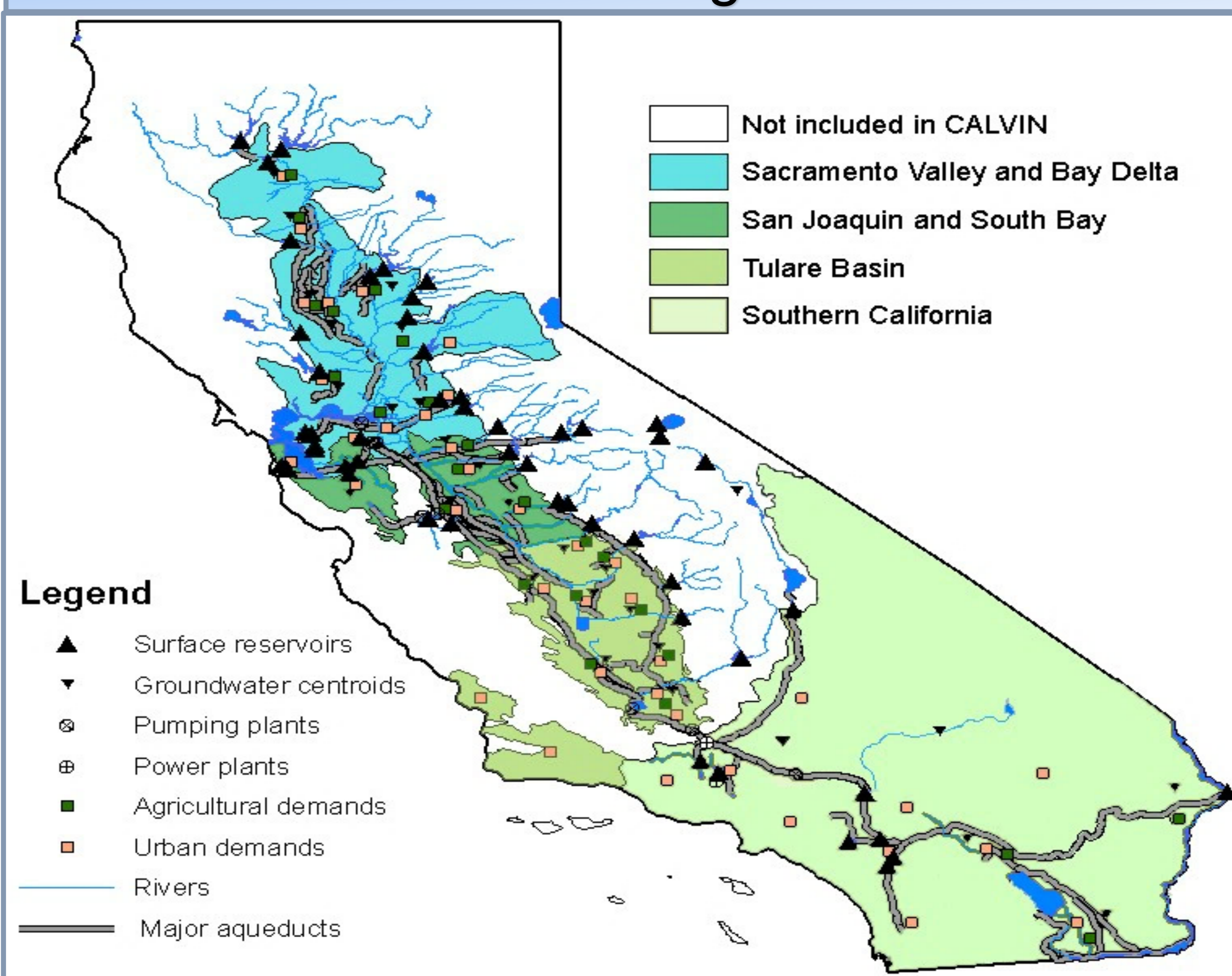### University of California Davis, Davis, CA, United States

Need For Updates

- Better representation of California's water system.
- Maintain the applicability with changing conditions and demands.
- Integration to other models, such as CALSIM II, C2VSim and SWAP.
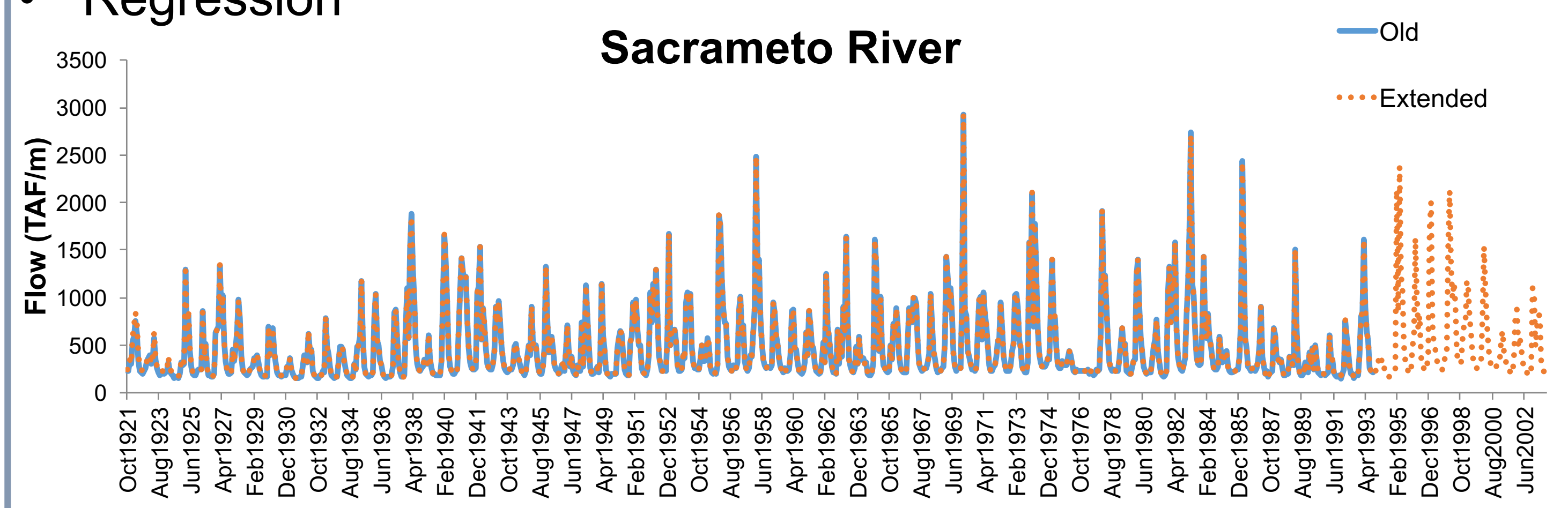
CALVIN Overview

- CALVIN represents California's entire inter-tied water infrastructure.
- Hydro-economic engineering optimization model.
- 82 years of monthly prescribed operations.
- Economic values for agricultural and urban uses.
- Flow constraints for environmental uses.
- Covers 92% of state's urban demand and 88% of agricultural demand.

CALVIN Regions

Legend
- ▲ Surface reservoirs
- ▼ Groundwater centroids
- Pumping plants
- Power plants
- ■ Agricultural demands
- □ Urban demands
- Rivers
- Major aqueducts

Map legend:
- Not included in CALVIN
- Sacramento Valley and Bay Delta
- San Joaquin and South Bay
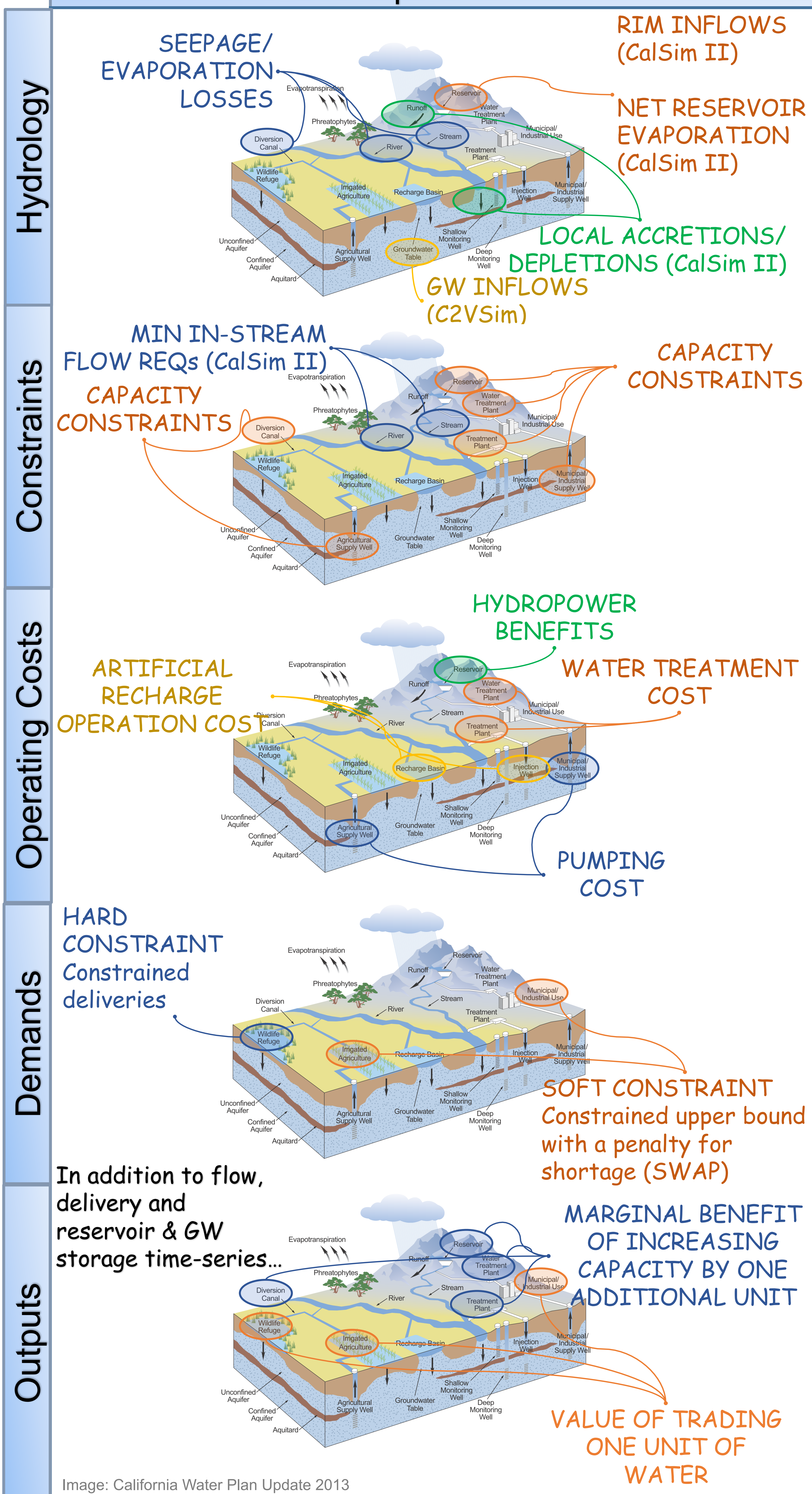- Tulare Basin
- Southern California
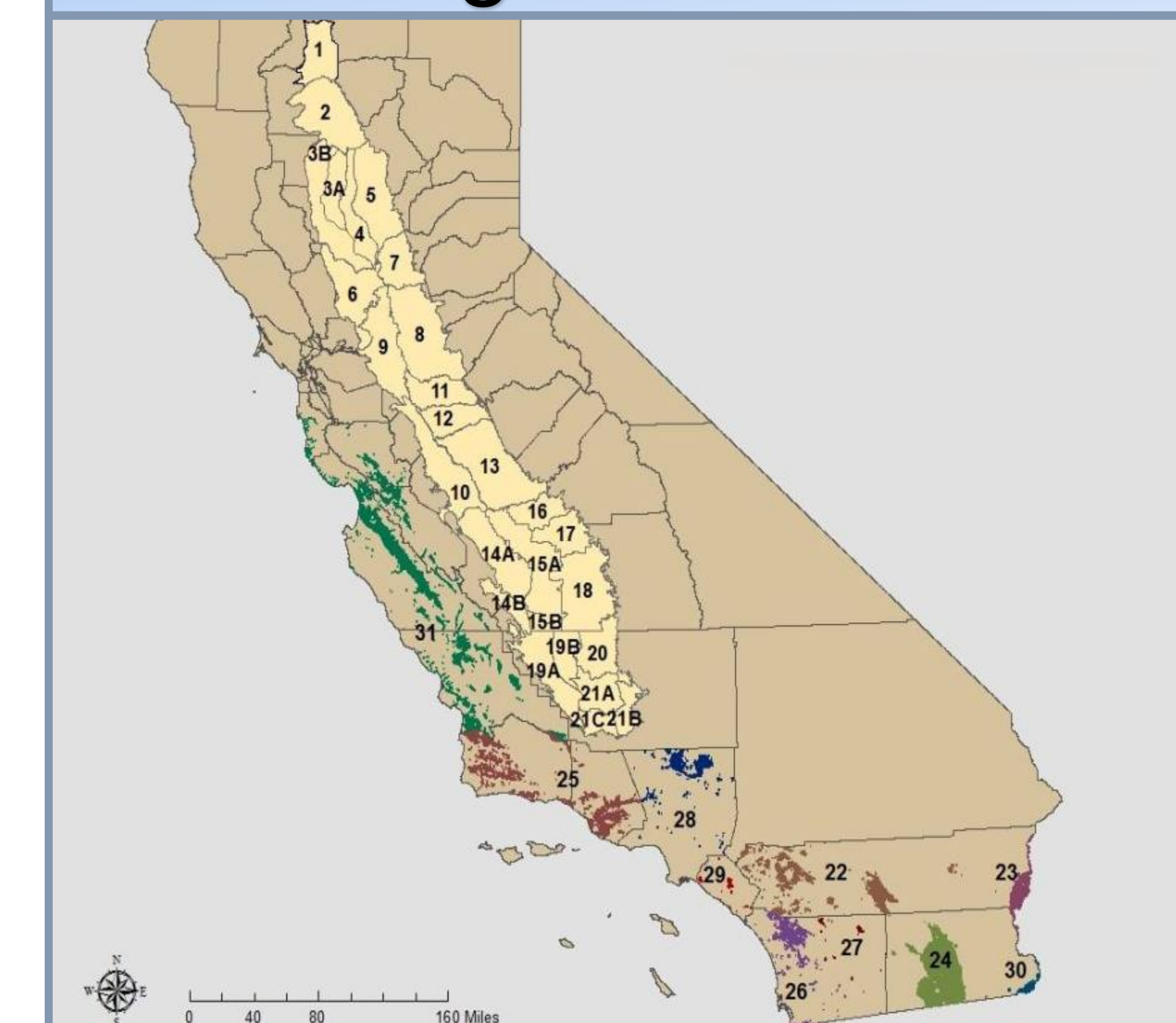
Time-series Extension

- Full Replacement from other models (CALSIM II, C2VSim)
- CDEC Full Natural Flow data
- Sacramento and San Joaquin Valleys year type indices
- DWR Central Valley Unimpaired Flow study
- Regression

Sacrameto River

Different Components of CALVIN

Hydrology
- SEEPAGE/EVAPORATION LOSSES
- RIM INFLOWS (CalSim II)
- NET RESERVOIR EVAPORATION (CalSim II)
- LOCAL ACCRETIONS/DEPLETIONS (CalSim II)
- GW INFLOWS (C2VSim)

Constraints
- MIN IN-STREAM FLOW REQS (CalSim II)
- CAPACITY CONSTRAINTS
- CAPACITY CONSTRAINTS

Operating Costs
- HYDROPOWER BENEFITS
- WATER TREATMENT COST
- ARTIFICIAL RECHARGE OPERATION COS
- PUMPING COST

Demands
- HARD CONSTRAINT Constrained deliveries
- SOFT CONSTRAINT Constrained upper bound with a penalty for shortage (SWAP)

Outputs
In addition to flow, delivery and reservoir & GW storage time-series...
- MARGINAL BENEFIT OF INCREASING CAPACITY BY ONE ADDITIONAL UNIT
- VALUE OF TRADING ONE UNIT OF WATER
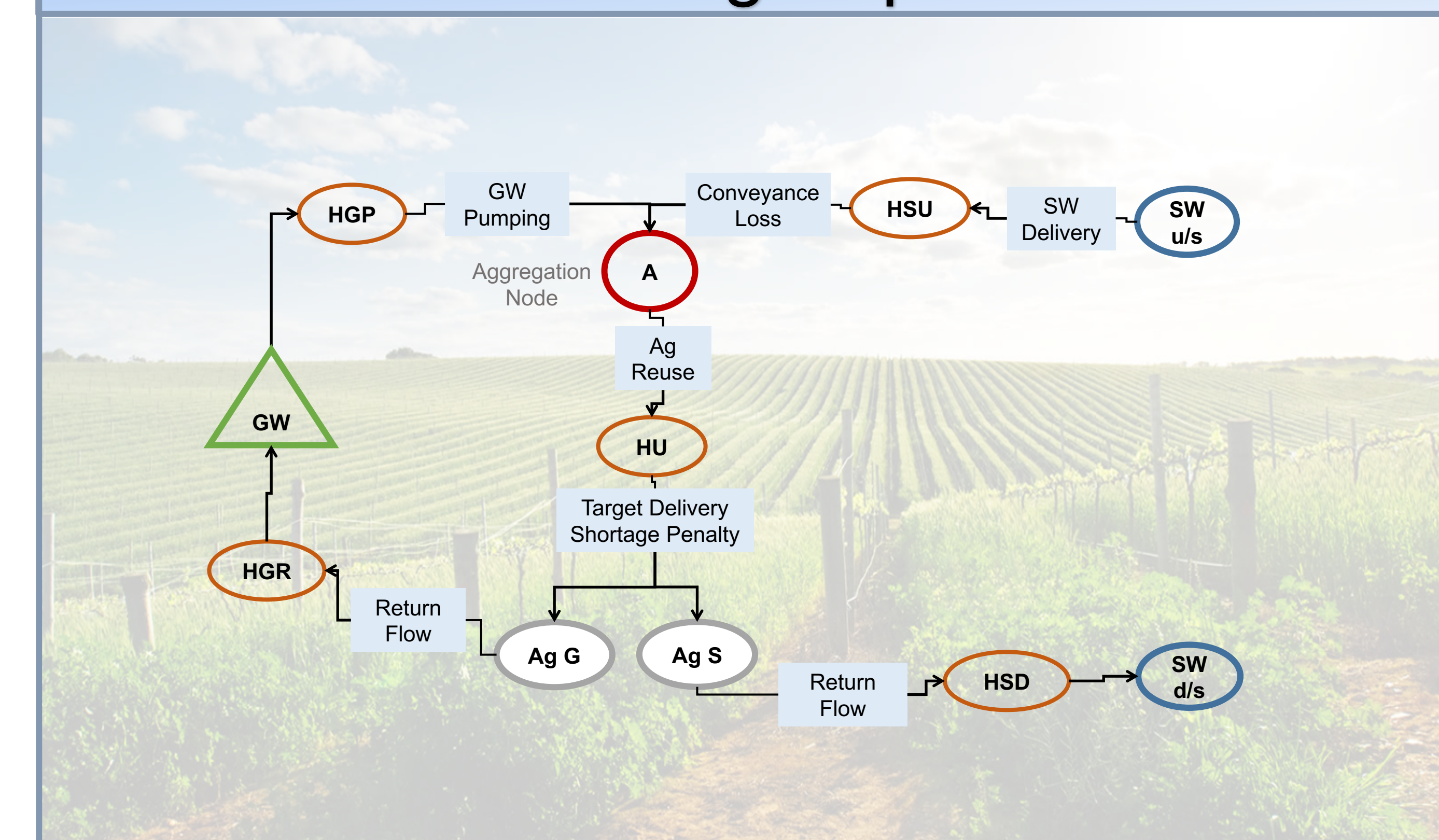

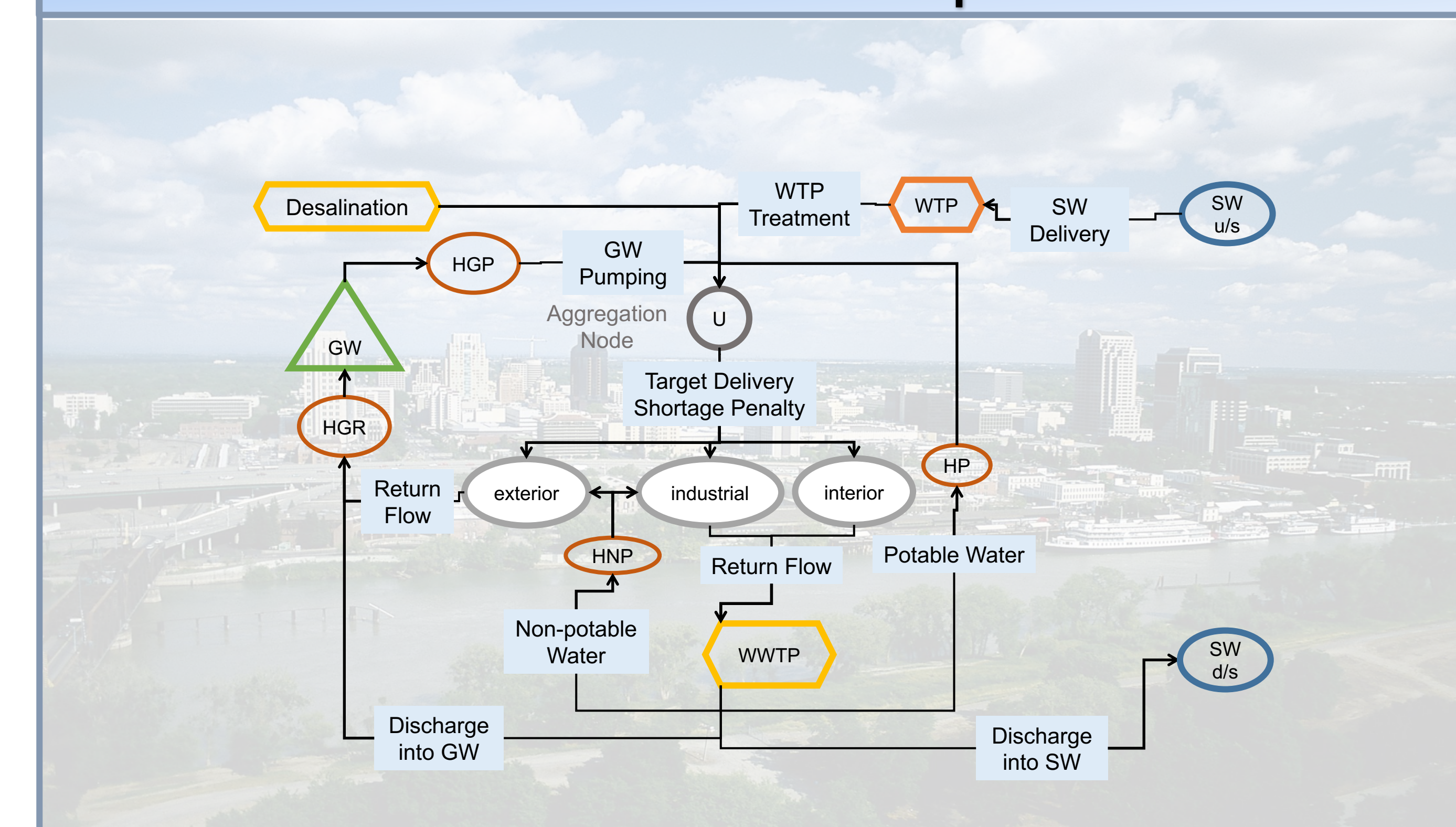Image: California Water Plan Update 2013

Agricultural Demand Areas

Split Ag Areas:
- 3 -> 3A & 3B
- 14 -> 14A & 14B
- 15 -> 15A & 15B
- 19 -> 19A & 19B
- 21 -> 21A, 21B & 21C

New Demand Area:
- Bard WD

Standardized Ag Representation

Standardized Urban Representation

- Aggregated surface and ground water
- Aggregated groundwater pumping and return flows
- Updated agricultural consumptive use
- Updated groundwater pumping cost
- Improved potable & non-potable water use representation
- New agricultural target delivery and shortage penalties