Integrated GSFLOW-MODSIM for Russian River Basin

Simulated Water Use in Hydrology Models

Rely on water law/governance to dictate water distribution

-logistical issues of water distribution make it imperfect but does it work generally?

e.g., “first in time, first in right” – allows for the orderly use of water resources by granting priority to senior water rights in times of shortage

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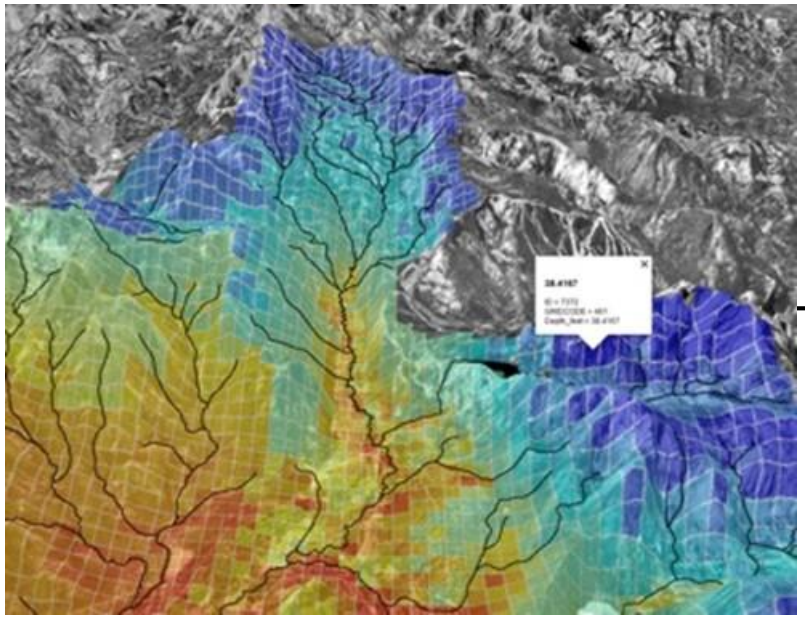
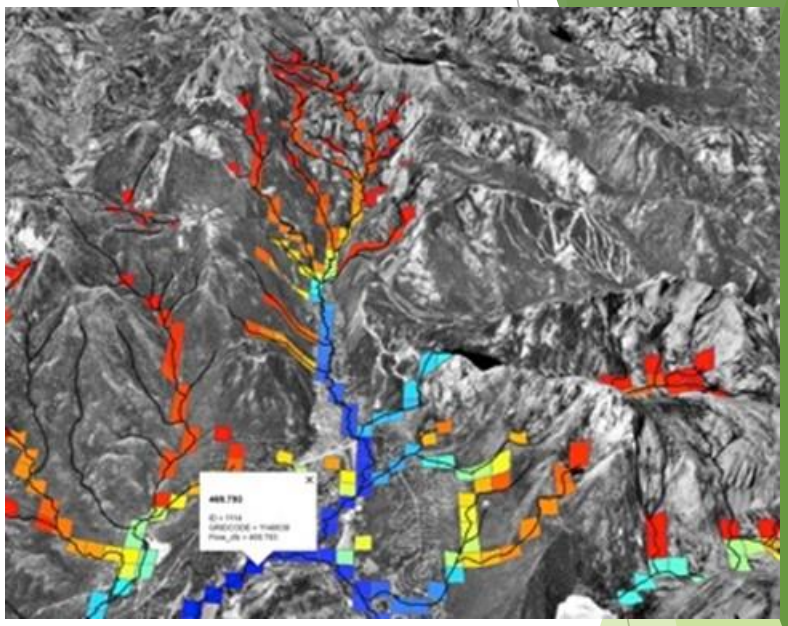
Components of Water Supply and Consumption



Snowpack, rain, river, and groundwater storage forecast

Runoff to rivers



Water allocations for agricultural, municipal, and industrial uses

Photo credit: Republic Manufacturing

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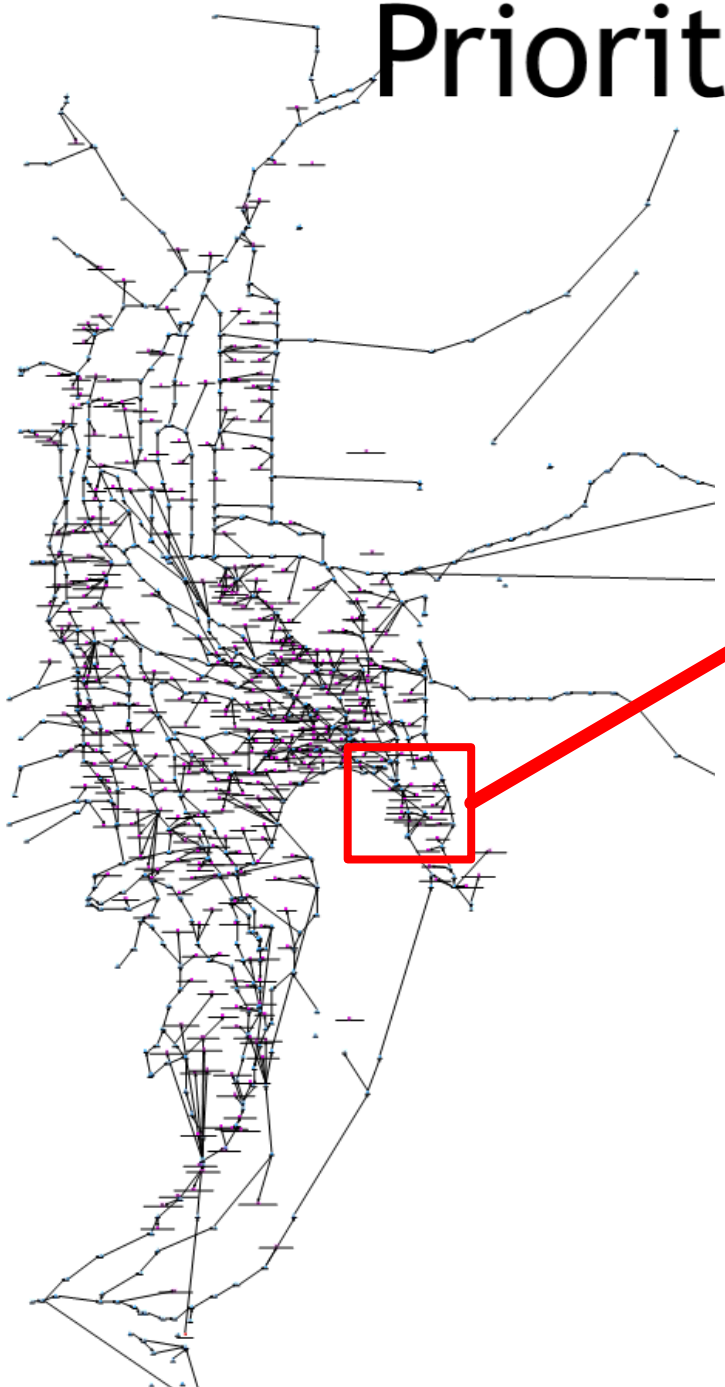
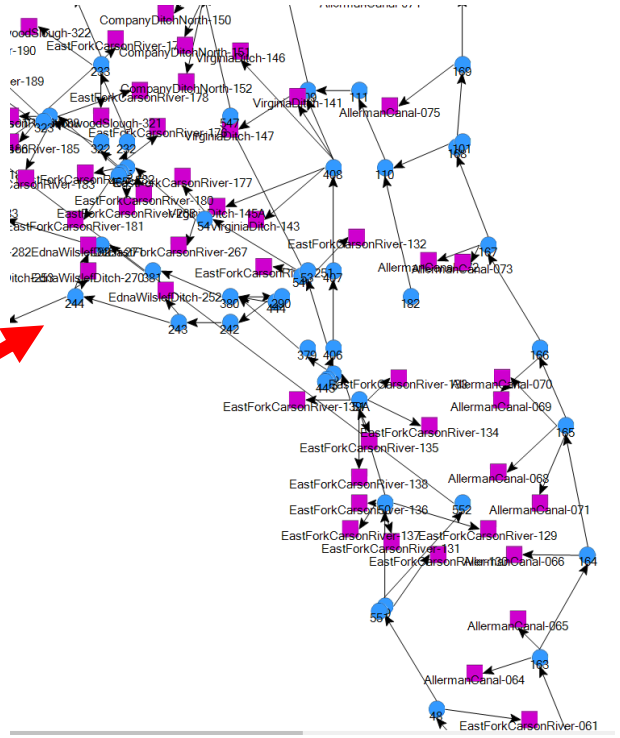
Priority/Rule Based Network-Flow Models





Network flow model

- Allocate water based on priorities/rules
- Each node (WR) has associated demand and priority
- Ability to simulate reservoir releases and minimum flow requirements

MODSIM

John Labadie

http://modsim.engr.colostate.edu/

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Fully distributed
3D groundwater flow
SW-GW interactions

GSFLOW (PRMS+MODFLOW)

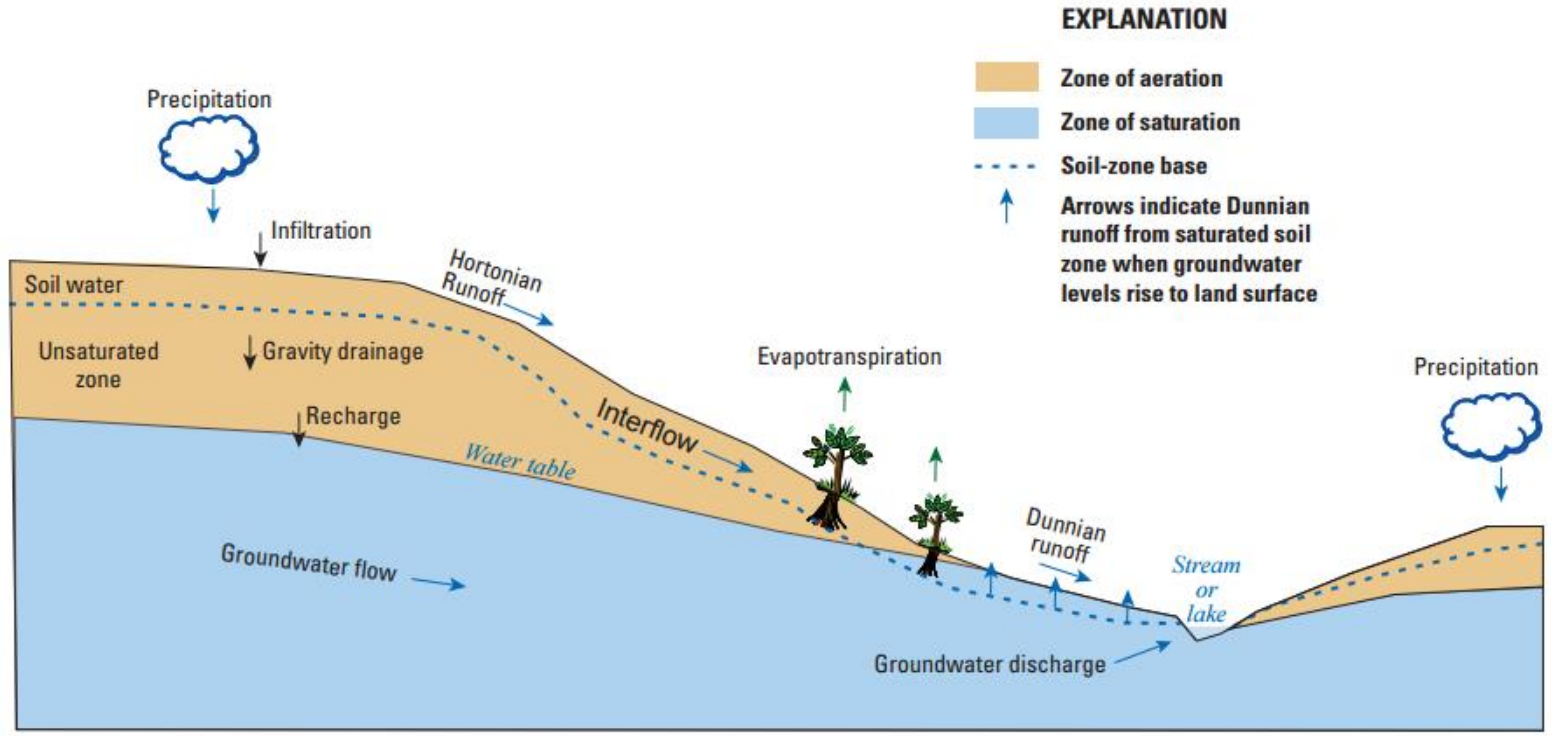
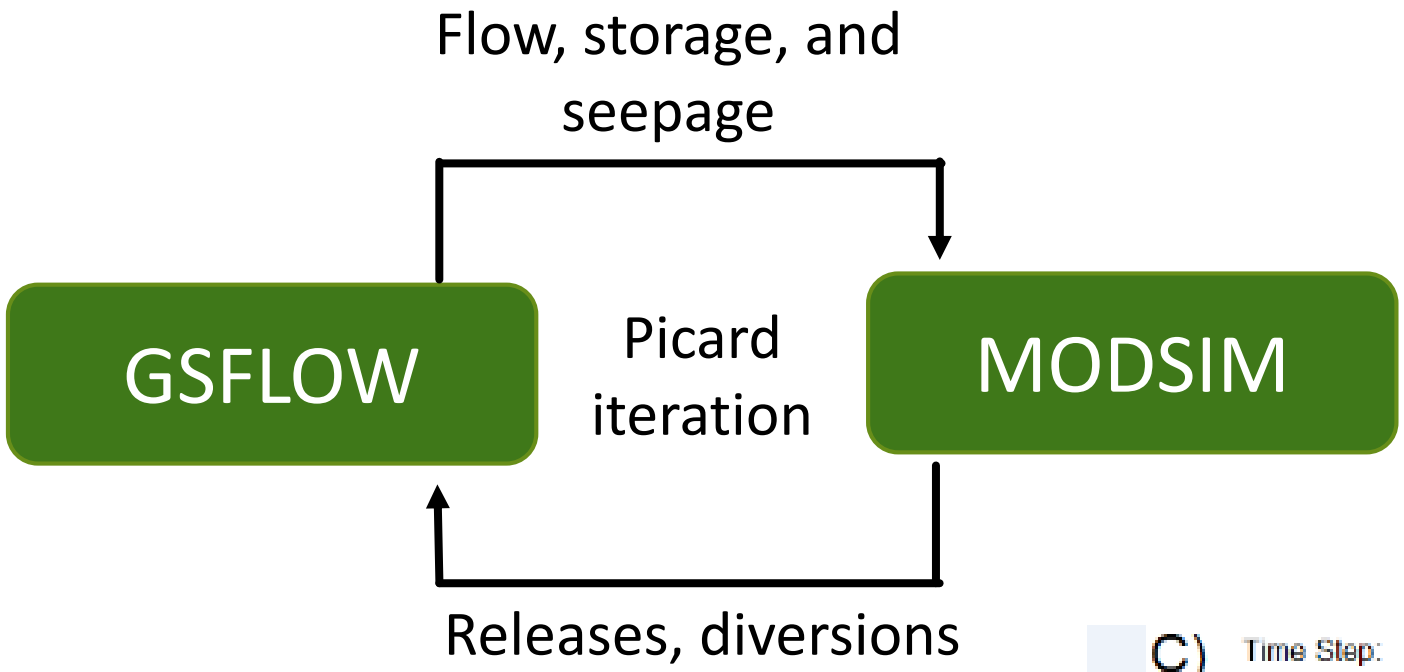
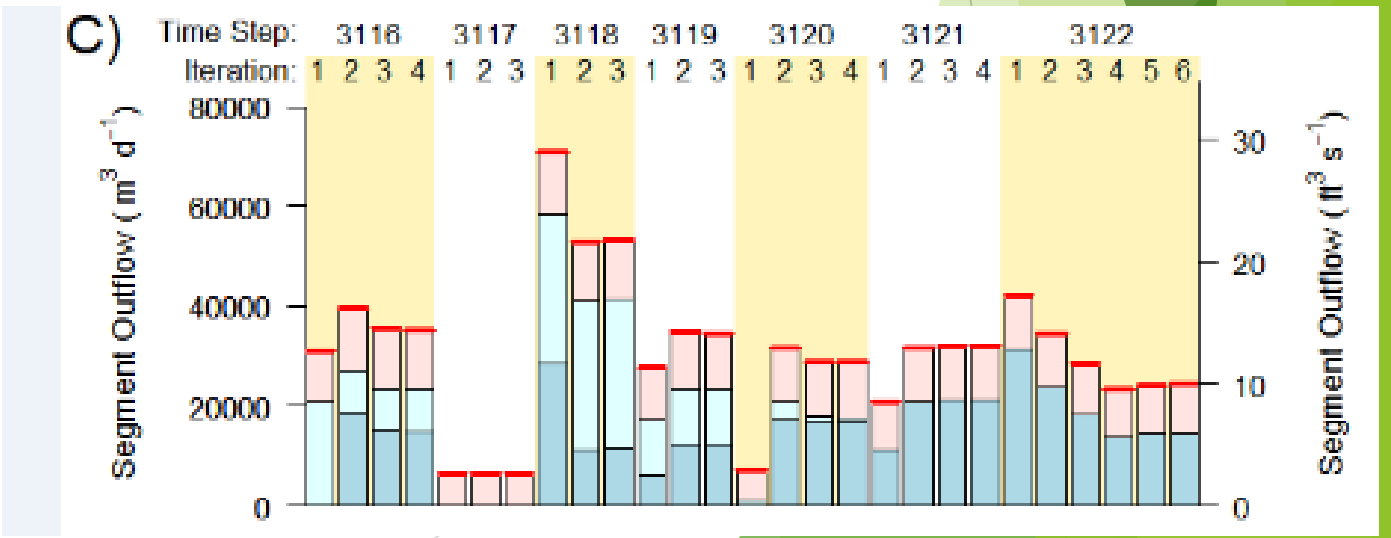


Figure 1. Many of the hydrologic processes simulated by the coupled Groundwater and Surface-Water Flow (GSFLOW) model.

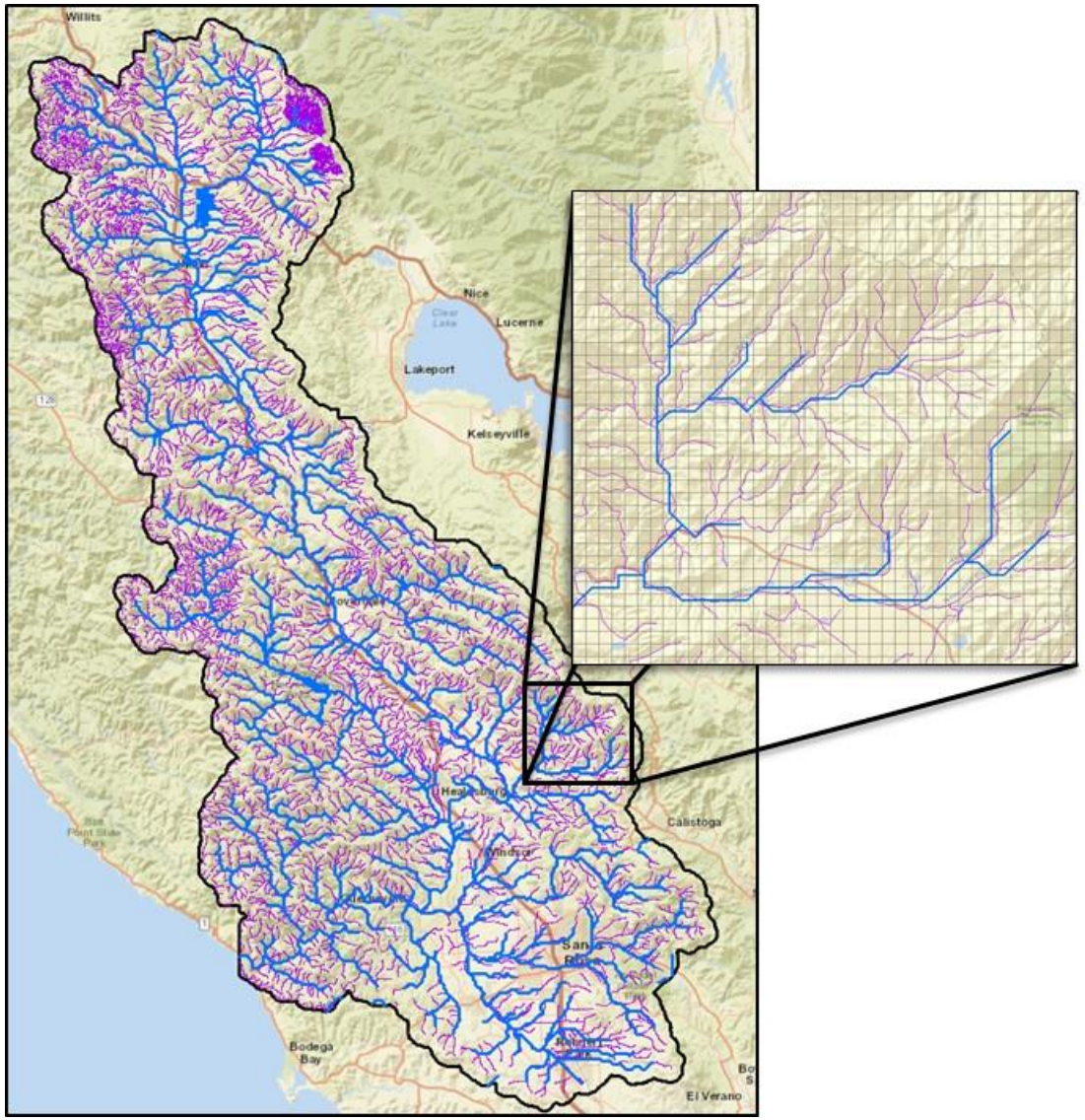
Integrated Operations-Hydrology Model

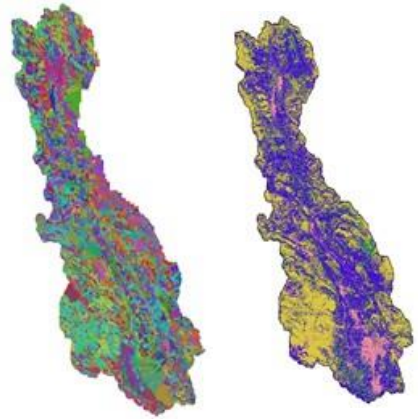




Morway, Niswonger, Triana (2016)

Russian River Model

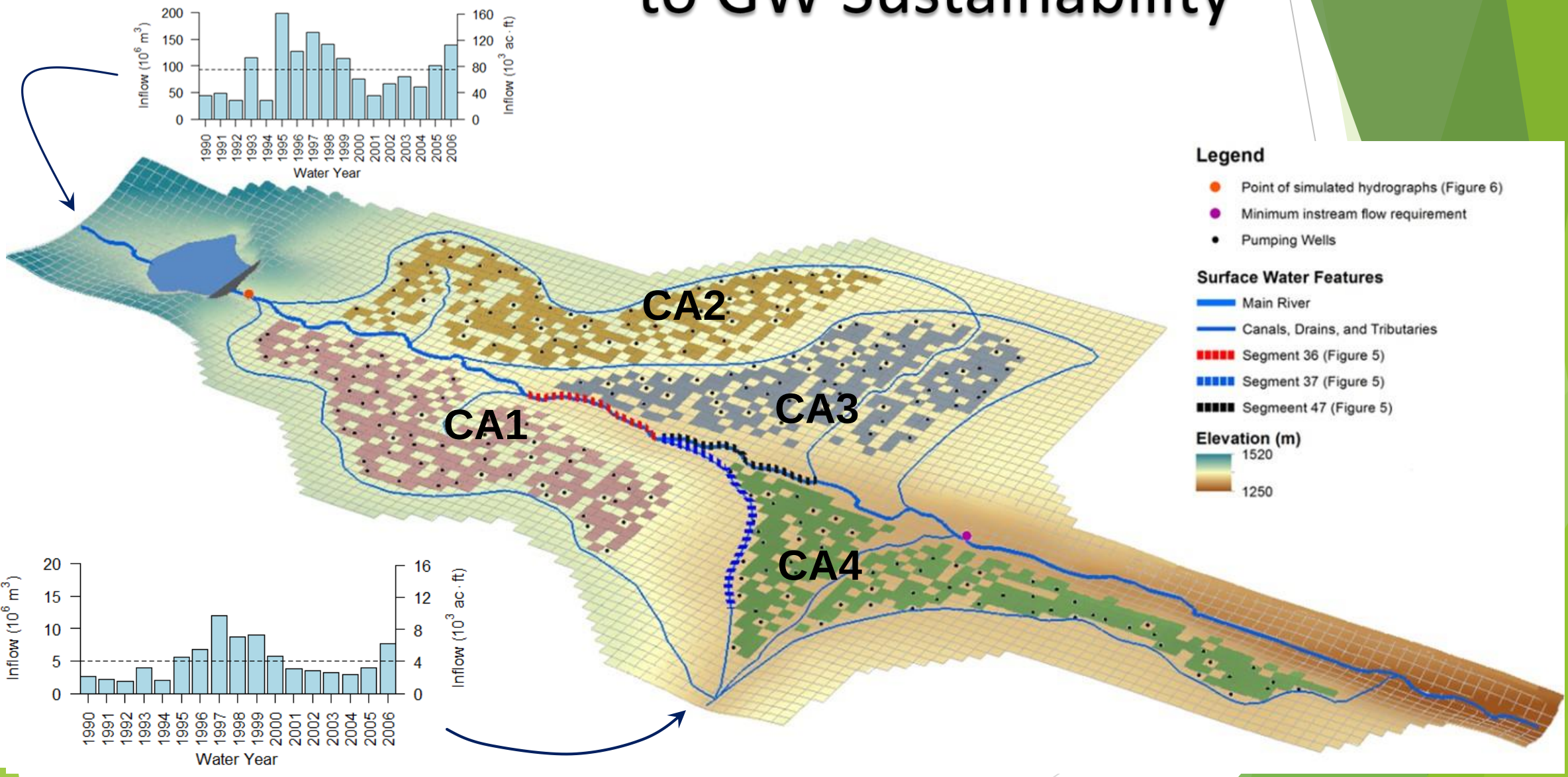




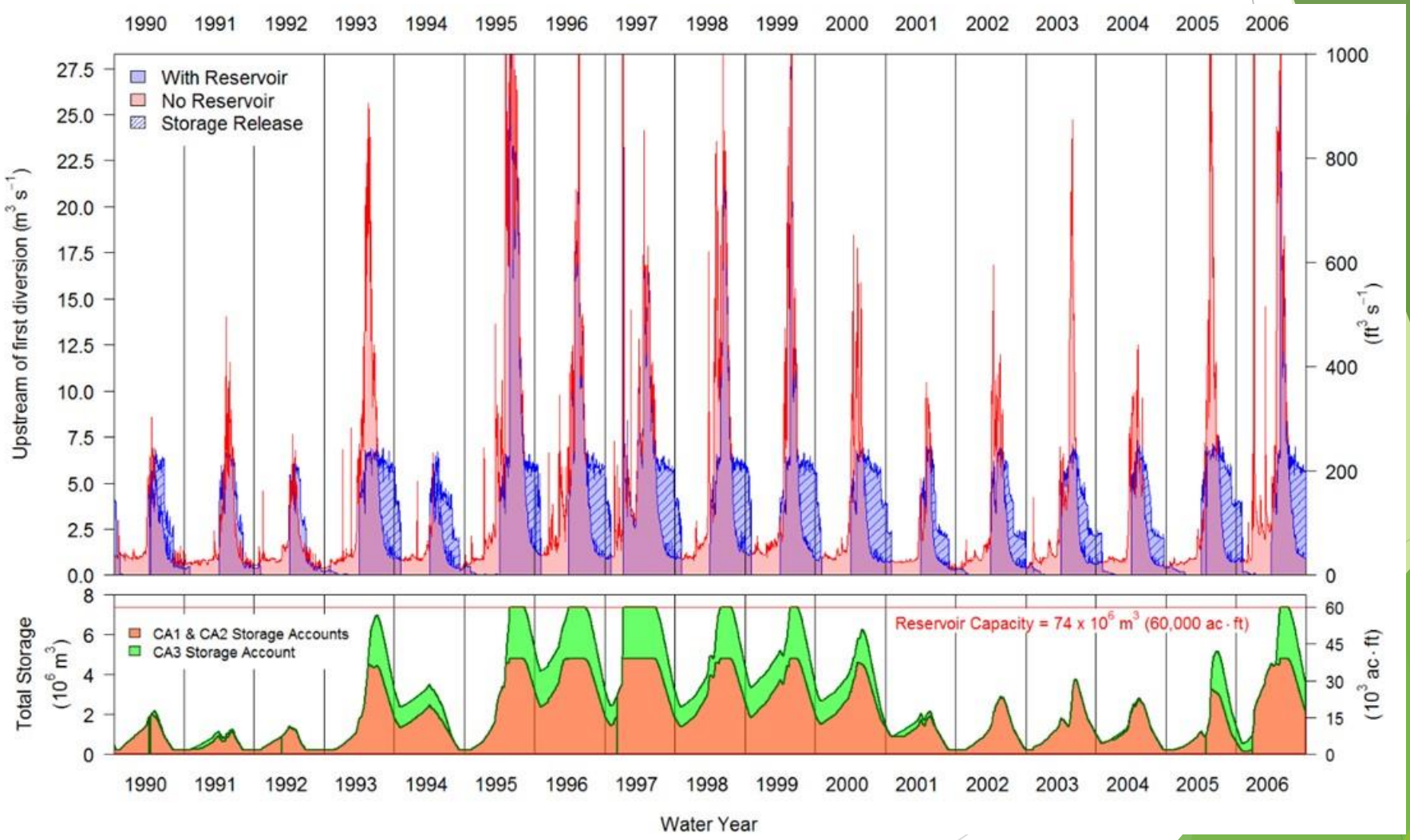
- 300 m grid cells
- Daily time steps
- Station based climate distribution combined with PRISM
- Sub-basin/correlation distance used to define station for each grid cell

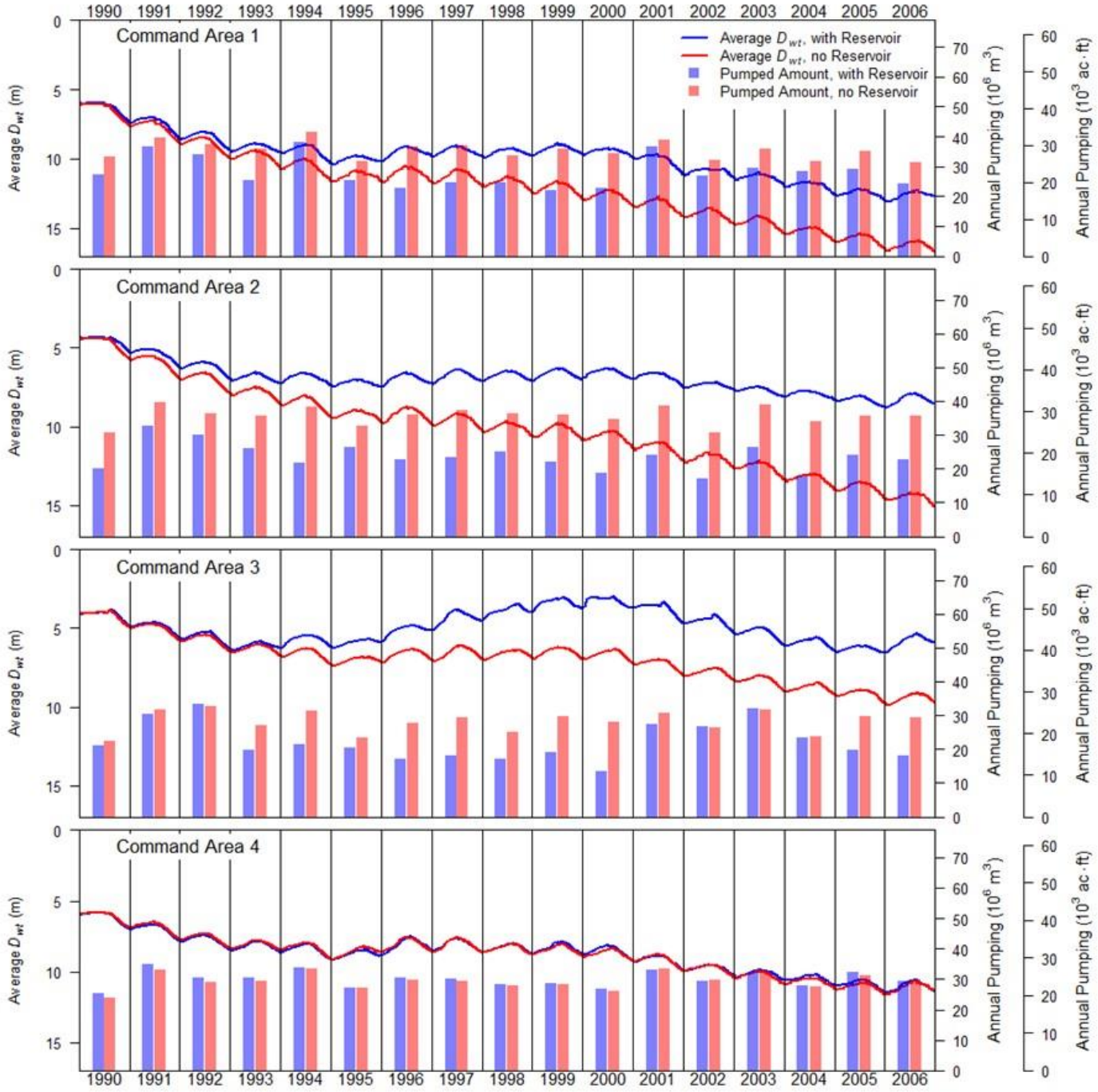
- Funded by California Water Board and Sonoma County Water Agency and sister agencies

Connecting Reservoir Operations to GW Sustainability



Connecting Reservoir Operations to GW Sustainability





Connecting Reservoir Operations to GW Sustainability