Sustainable Water Use in the Ventura River Watershed

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Who are we?

- Bren School of Environmental Science & Management
  - University of California, Santa Barbara
- Master of Environmental Science & Management Program
- Specific Interests: Water Resource Management, Conservation Planning, Economics
- Our Advising Professor: Dr. Arturo Keller
  - PhD, MS, Civil (Environmental) Engineering; BA, Chemistry, Cornell University

Project Objectives

1. Create a comprehensive watershed model.

2. Determine levels of water use to meet both human and ecosystem needs.

3. Evaluate the effects of climate change and land use change.

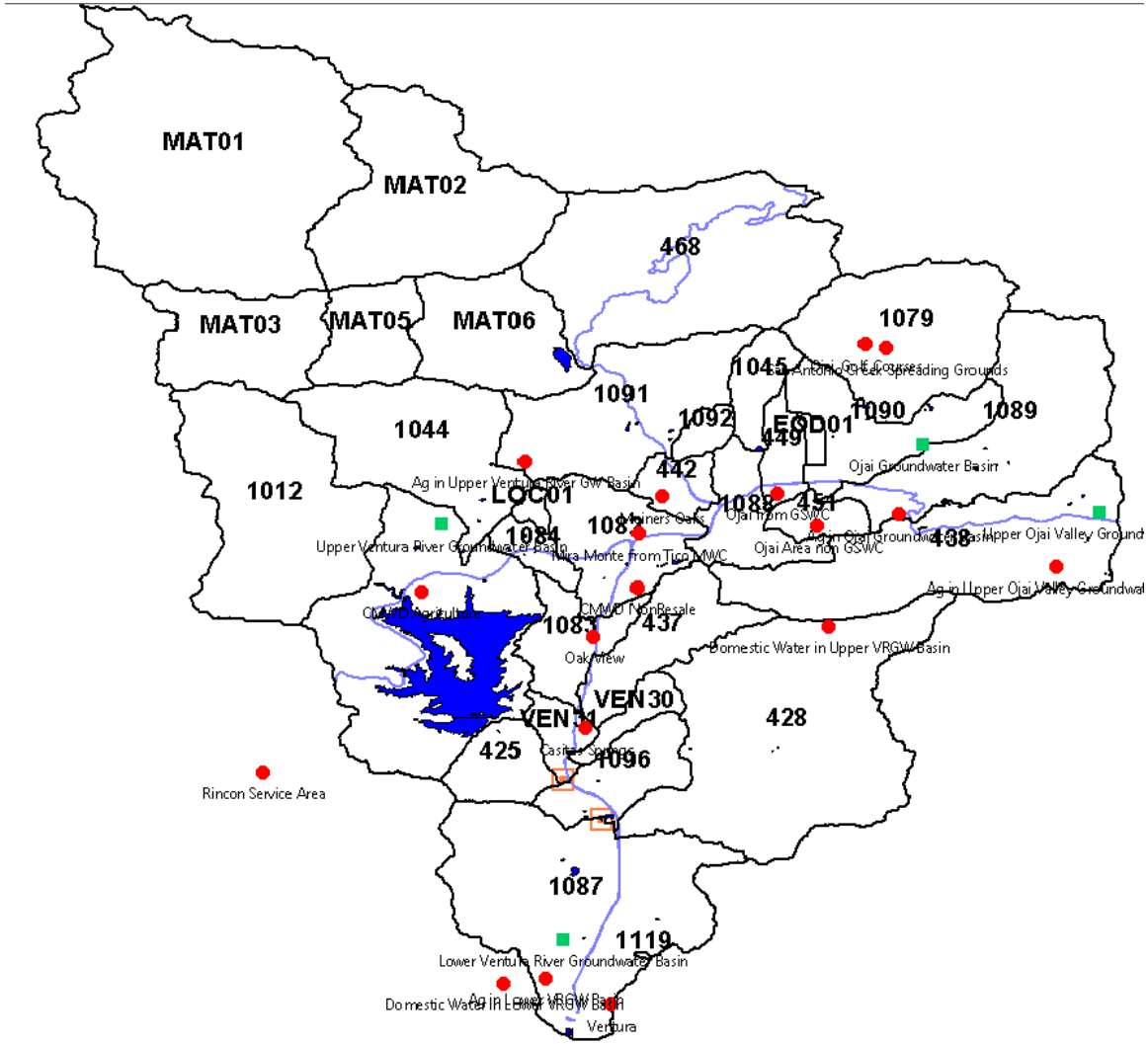
4. Identify actionable water resource projects.

5. Propose a set of recommendations relevant to securing Proposition 84 funding, increasing water availability, and improving ecosystem function.

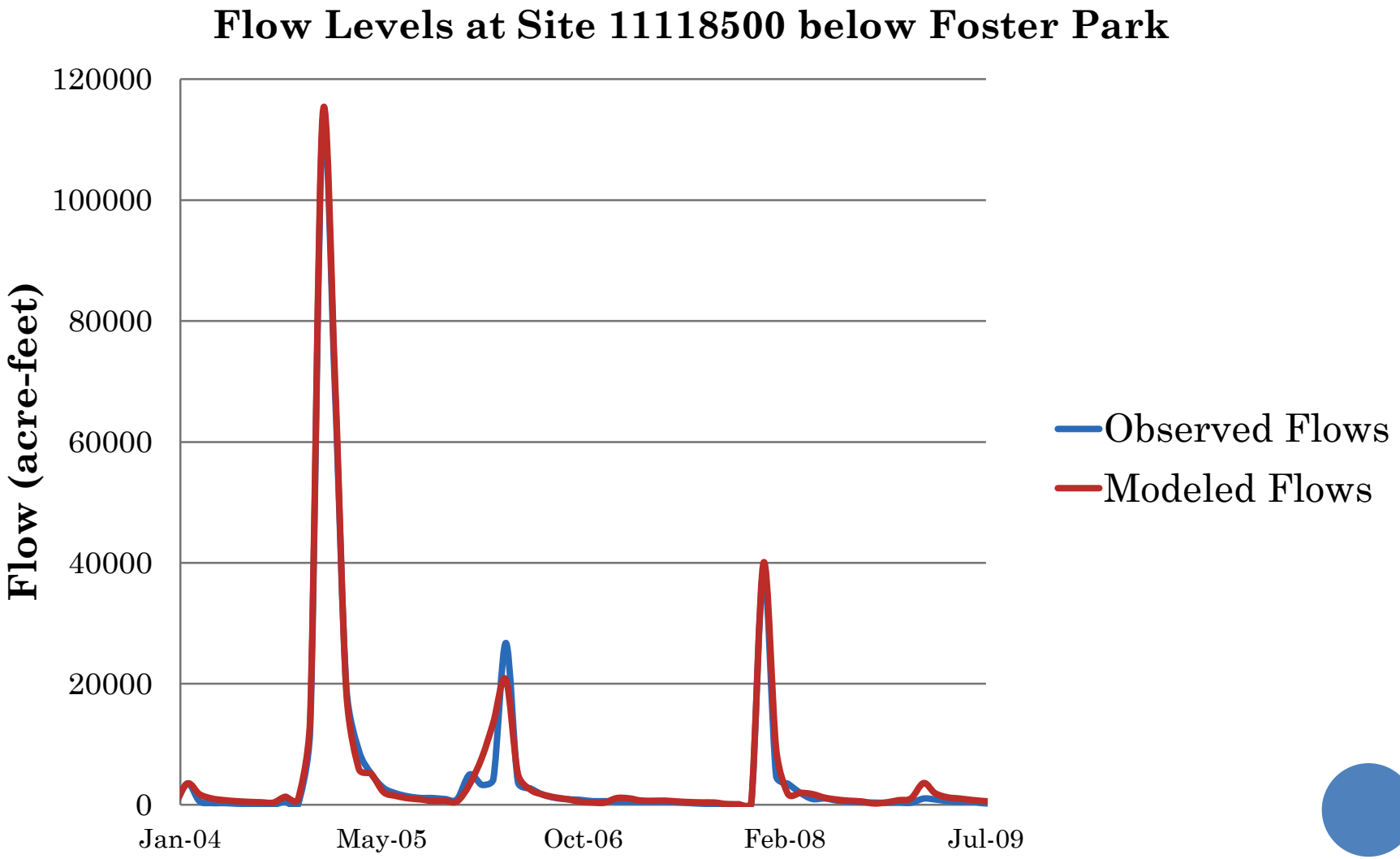
What have we accomplished so far?

- Performed extensive literature review
- Created model of watershed using WEAP System
- Calibrated WEAP model using streamflow data from 2004-2009

WEAP Model Schematic



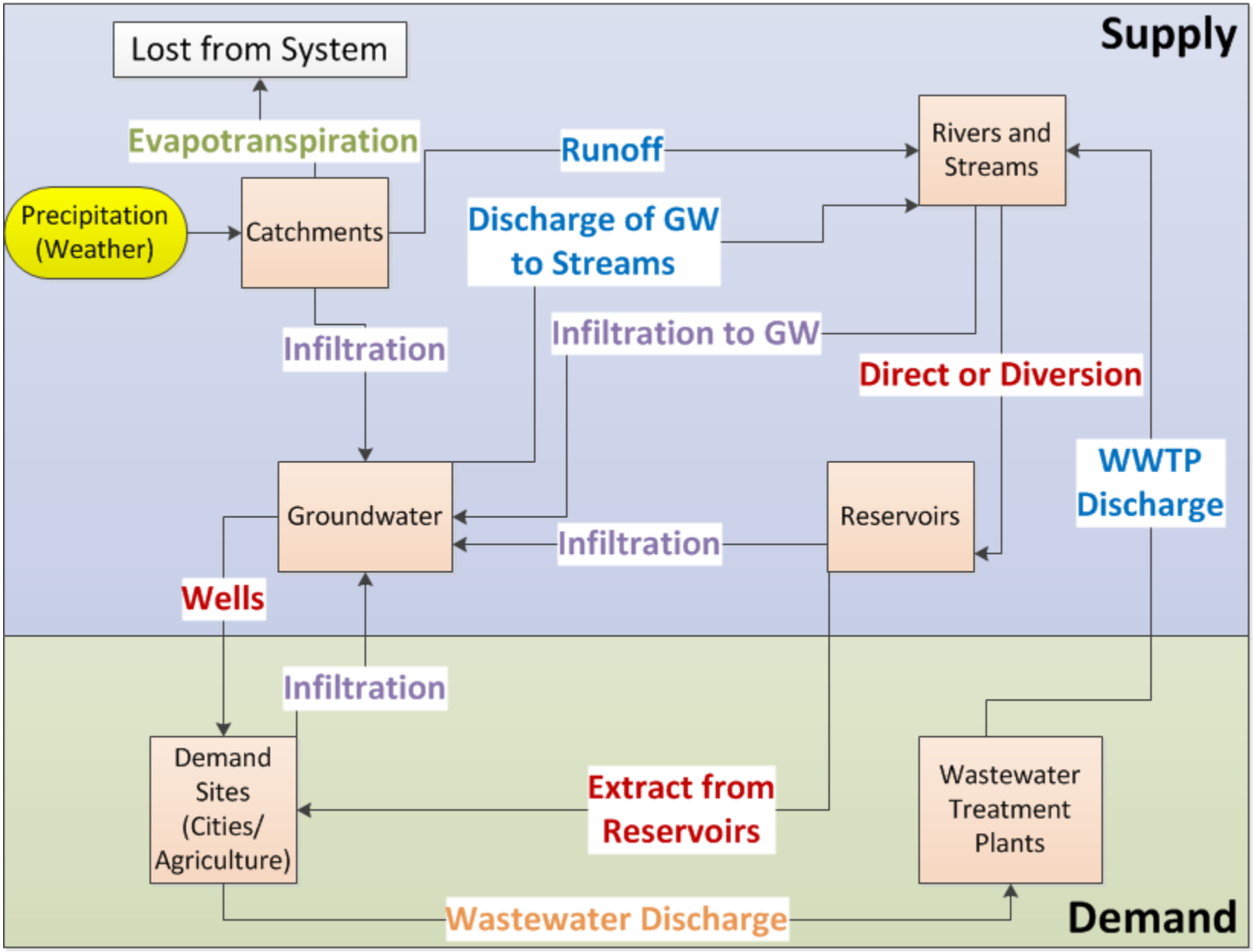
WEAP Model Calibration



What have we accomplished so far?

- Currently creating/running scenarios in WEAP model
- Beginning to conduct analysis and write final report

WEAP Conceptual Model

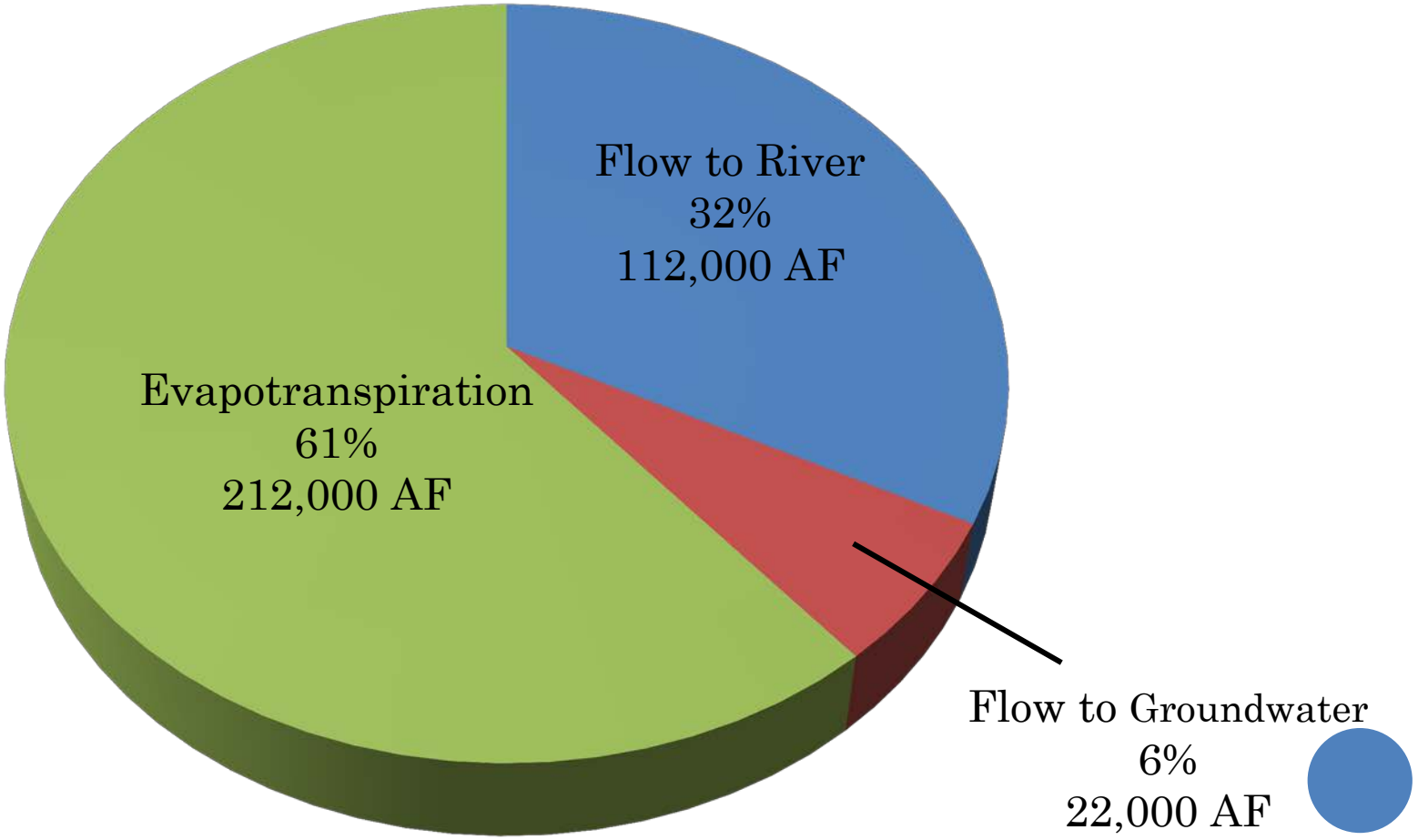


What can we do with WEAP?

- Build water budget
- Model the effects of 'scenarios' on the water budget for the Ventura River watershed
  - Surface Flows
  - Groundwater Storage
  - Lake Casitas Storage
- Scenarios include: water management strategies, climate change scenarios, land use change scenarios, etc.

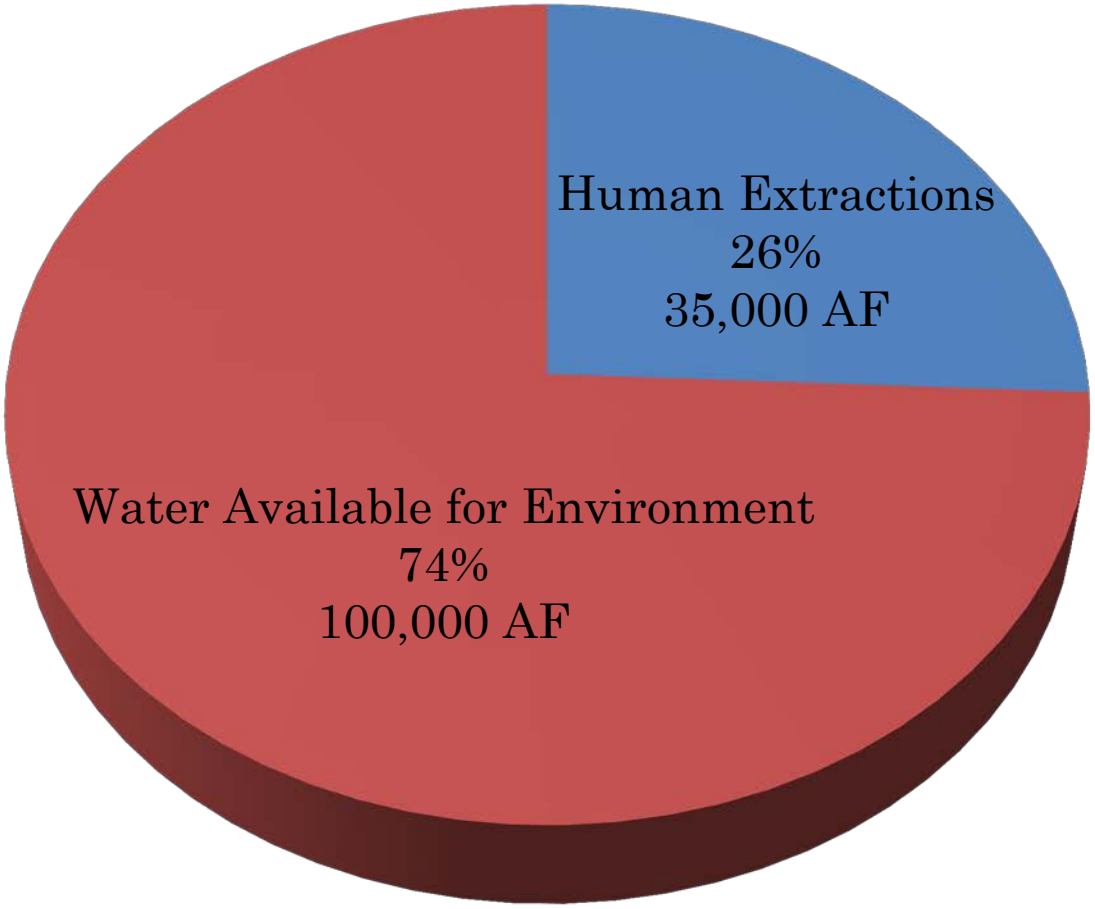
Average Annual Water Budget for the Ventura River Watershed

Average Annual Precipitation on Ventura River Watershed = ~346,000 AF



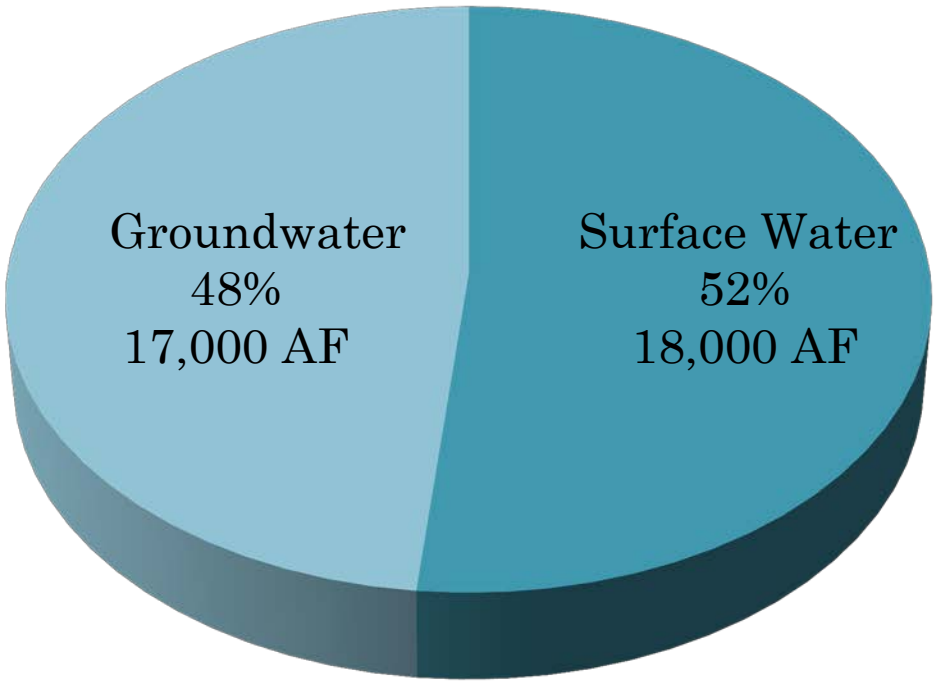
Average Annual 'Available' Water for the Ventura River Watershed

Flow to River + Flow to Groundwater = ~134,000 AF



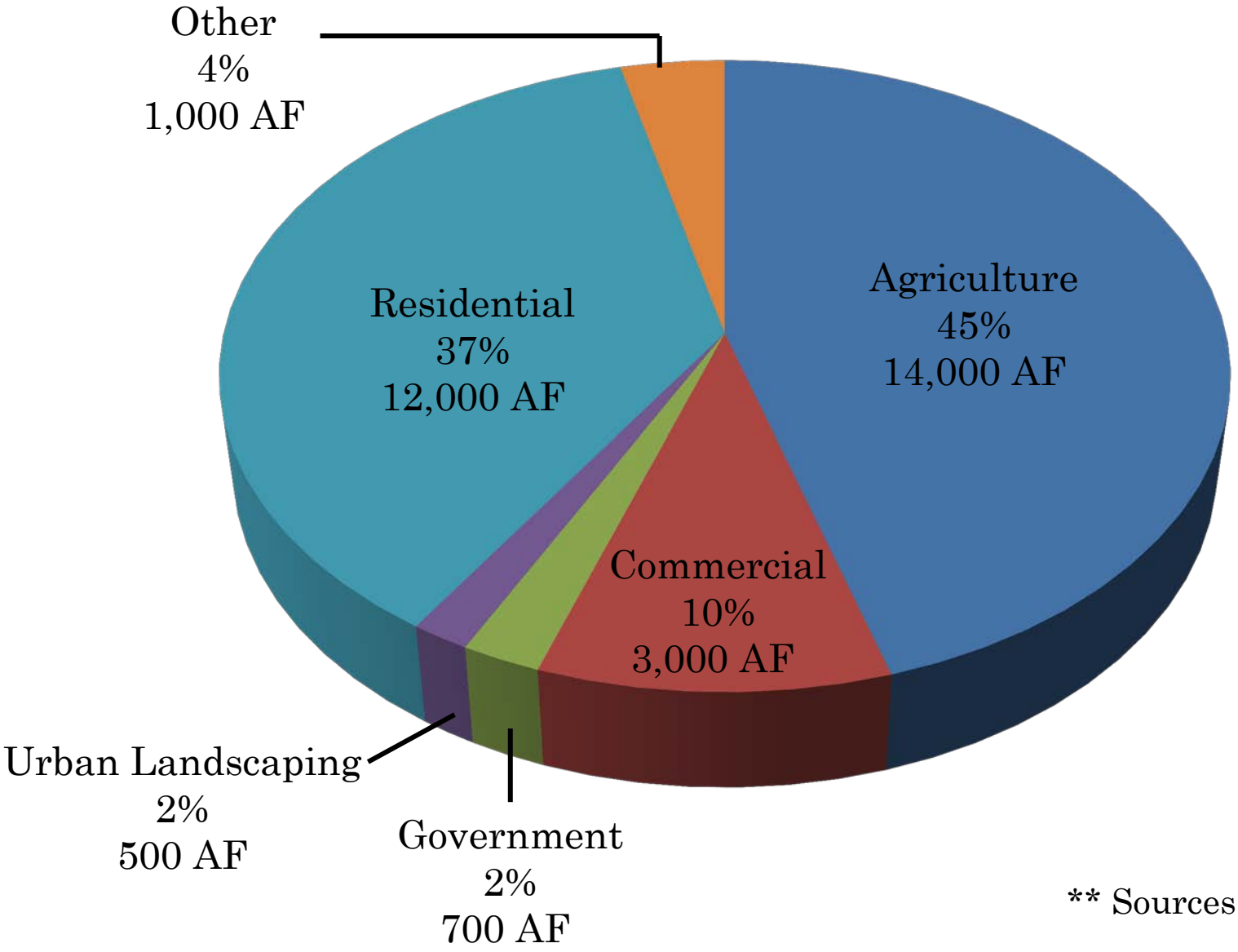
Average Annual Human Water Use for the Ventura River Watershed

Annual Demand = ~35,000 AF



* Sources: Appendix I

Average Annual Water Use by Sector for the Ventura River Watershed



** Sources: Appendix I

Example Scenarios

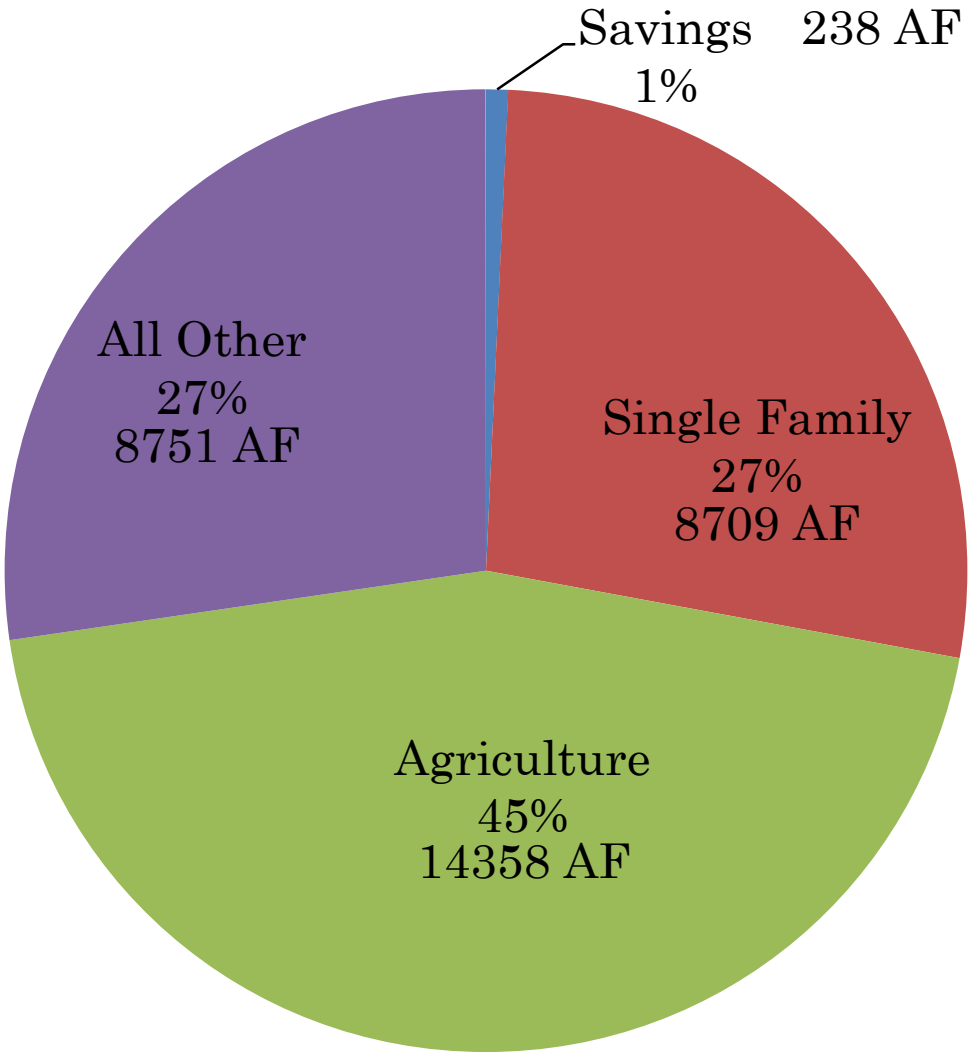
- **Decentralized Wastewater Treatment**: Installation of a scalping plant to irrigate 2 Ojai golf courses with reclaimed water
- **Stormwater Retention Basins**: Construction of retention basins to capture stormwater runoff in urban areas
- **Climate Change**: 8 climate change scenarios investigating changes in temperature and precipitation
- **Policy Changes**: Water rate and structure changes
- **Urban Water Use Efficiency**: Conversion of 25% - 100% of lawns in entire watershed to Ocean Friendly Gardens resulting in 70% - 100% outdoor water use reduction

Example Scenario: Ocean Friendly Gardens

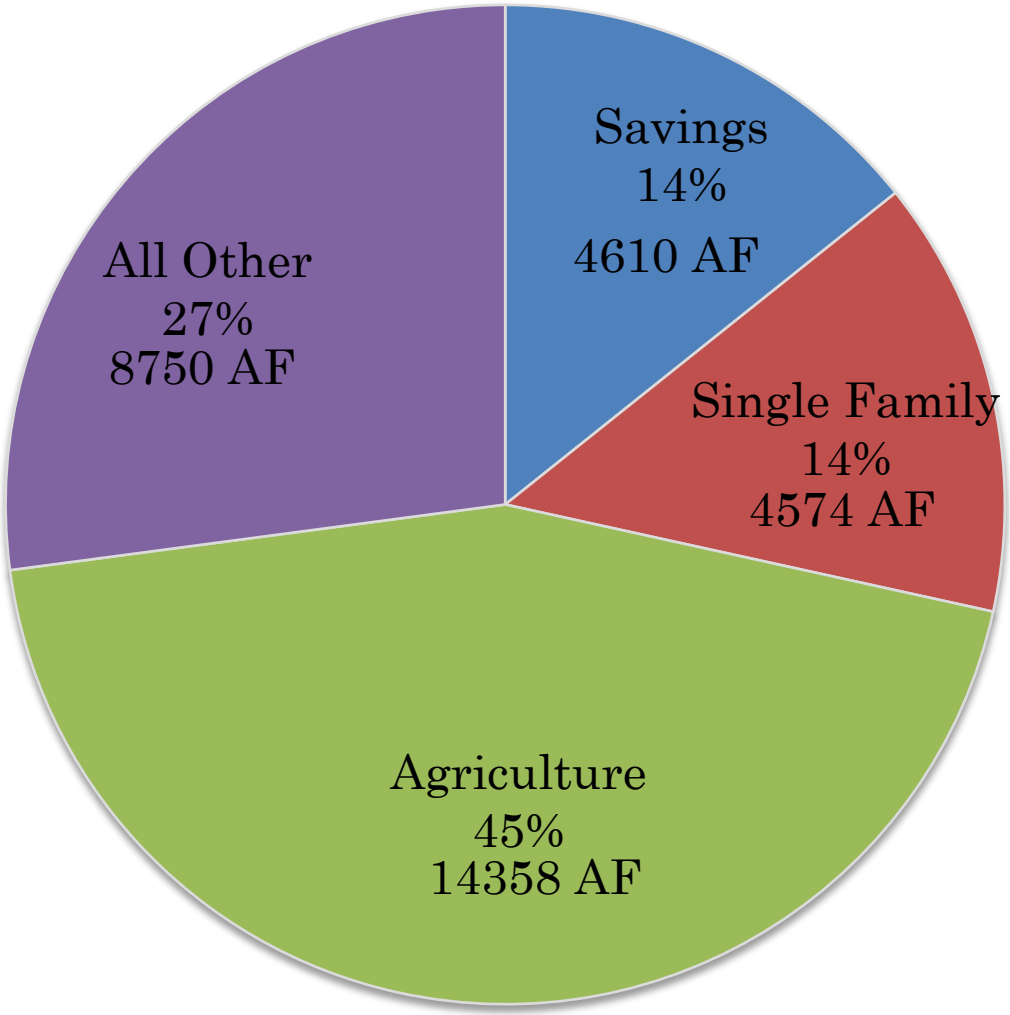
- Ocean friendly gardens consist of native plants which use less water than lawns, capture rain and reduce runoff

- Parameters include:
  - % of households who convert
  - % of lawn converted
  - % of water reduced within the converted area

Low Savings Scenario – 238 AF



High Savings Scenario – 4610 AF



Costs and ROI for Ocean Friendly Gardens

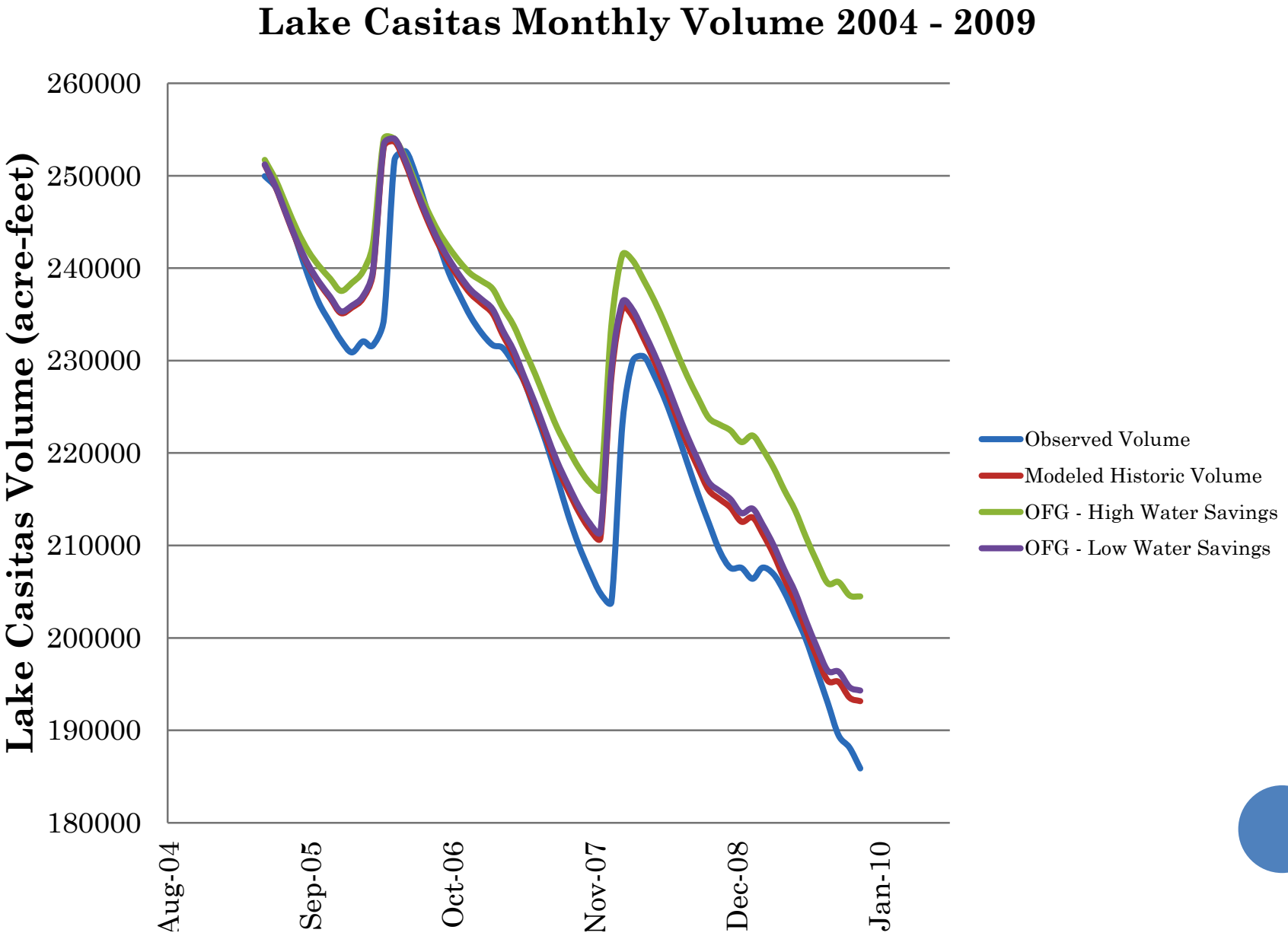
Low Water Savings (25% of Yard)

	Water Savings ($)	Water and Maintenance Savings ($)		Installation Cost ($)
Water Company		Self	Gardener	Self-Installed
Golden State (Ojai)	$19.88	$105.48	$260.73	$ 2,275.00
Ventura	$13.14	$98.74	$253.49	$ 2,275.00
Casitas	$6.82	$92.43	$247.17	$ 2,275.00

High Water Savings (100% of Yard)

	Water Savings ($)	Water and Maintenance Savings ($)		Installation Cost ($)
Water Company		Self	Gardener	Self-Installed
Golden State (Ojai)	$444.62	$ 787.02	$1,406.01	$ 9,100.00
Ventura	$210.77	$ 553.17	$1,172.17	$ 9,100.00
Casitas	$155.54	$ 497.94	$1,116.94	$ 9,100.00

Effects on Watershed Using WEAP



Criteria for Evaluating Water Management Strategies

- Ability to increase water-use efficiency
- Ability to improve water quality
- Effects on ecosystems and endangered species
- Cost effectiveness
- Suitability for Proposition 84 funding

WEAP Model Strengths and Weaknesses

- Strengths
  - Integrated supply and demand model
  - Evaluating scenarios and combinations of scenarios
  - Ability to connect to other models (e.g. MODFLOW)
- Weaknesses
  - Monthly time step
  - Groundwater modeling
- Data Gaps
  - Groundwater extraction data

Questions? Comments? Suggestions?

- We need your input to ensure that our work is useful and relevant!

- Contact: **VenturaRiver@lists.bren.ucsb.edu**

Appendix I

* DB Stevens. 2010. Table 9. Pg 82 (These values are averages from period of 2000-2007)
  Wells: Foster Park, VRCWD, Casitas, Meiners Oaks

  DB Stevens. 2010. Table 10. Pg 83 (No dates given on these values, estimates only)
  Wells: Domestic

  DB Stevens. 2010. Table 11. Pg 84 (No dates given on these values, estimates only)
  Wells: Agricultural (Lower Ventura & Upper Ventura East Basin)

  Casitas. 2010. UWMP. Table 8. Pg 26 (These are 2008 values, a somewhat dry year for precipitation)
  Wells: Senior Canyon, Tico, Sisar, Hermitage, Siete Robles

  Ojai Basin Groundwater Management Agency. 2010. Annual Report. Pg 8. (These values are averages from a
  period of 1985-2010; Agricultural value was based on average total extractions times 48.6% see report pg9)
  Wells: Golden State, Agricultural (Ojai Basin)

  California's Groundwater Bulletin 118. Update 2/27/2004. South Coast Hydrologic Region Upper Ojai Valley
  Groundwater Basin. Department of Water Resources
  Wells: Agricultural (Upper Ojai Basin)