

URGWOM

**Simulation of Surface-water /
Ground-water Interaction in the
Middle Rio Grande Basin**

URGWOM

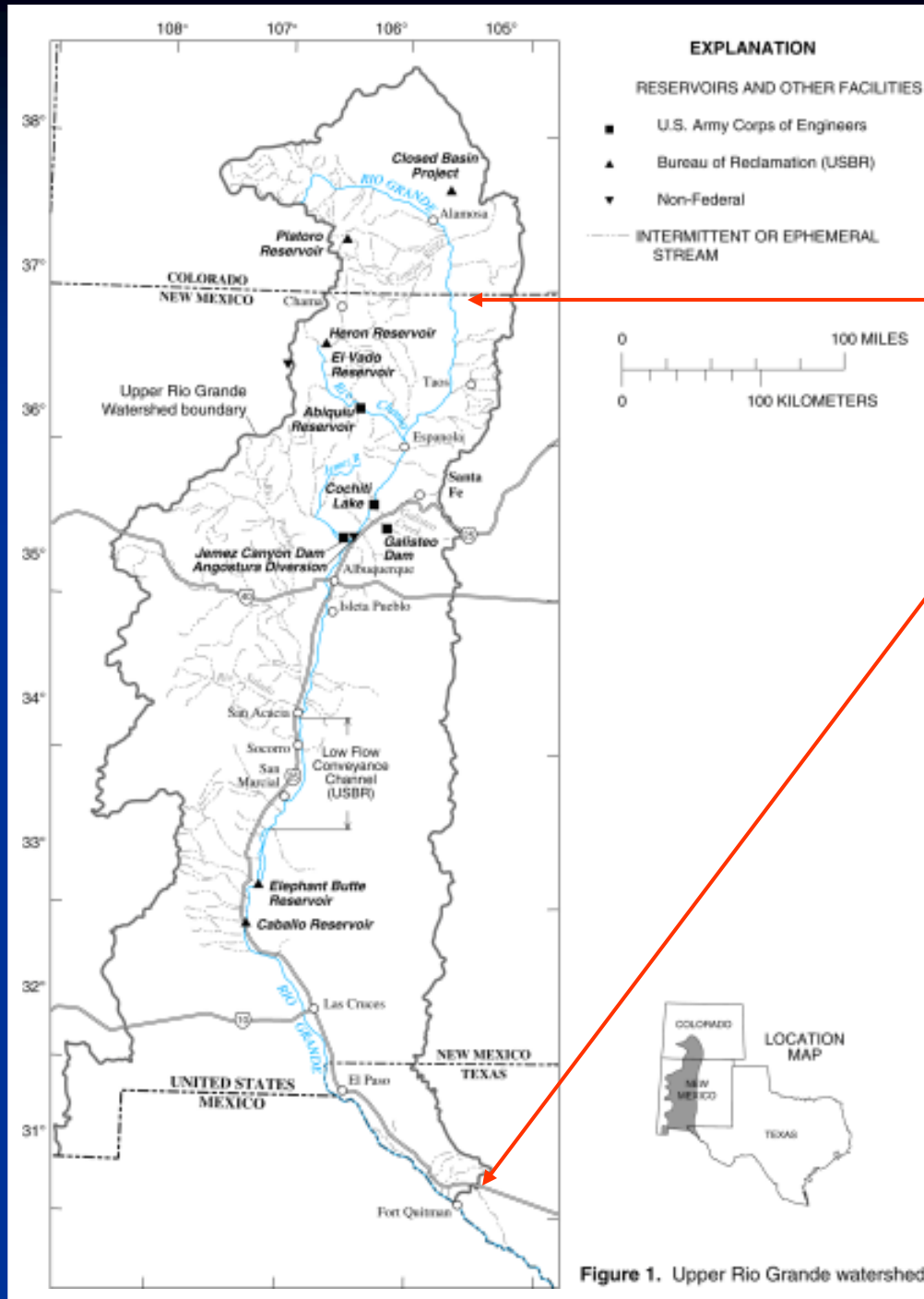
Contributors

- D. Michael Roark, USGS
- Nabil Shafike, New Mexico Interstate Stream Commission
- Michael Gabora, New Mexico Interstate Stream Commission

URGWOM

Goals

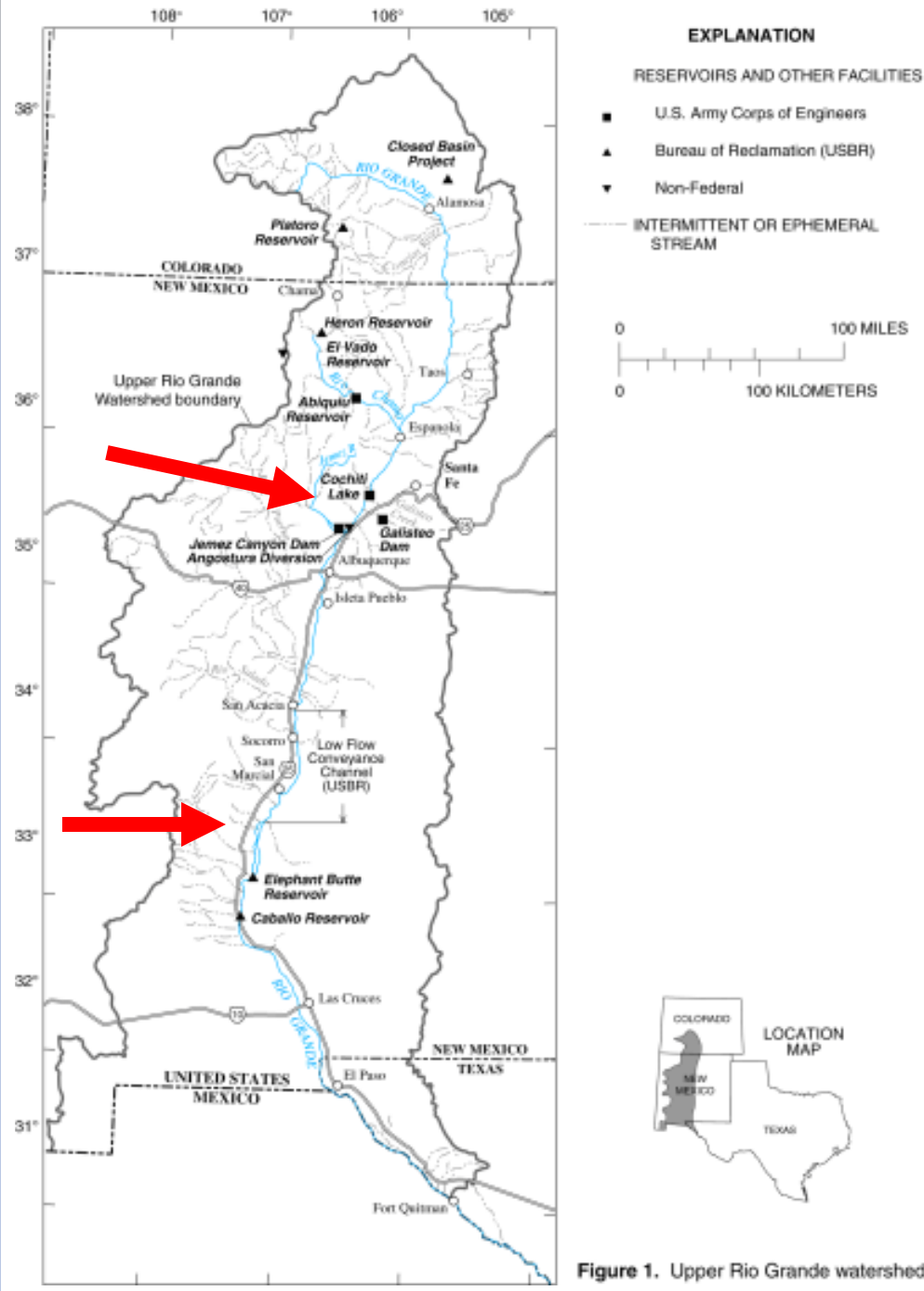
- Goal: Develop unified water operations model for the Upper Rio Grande Basin
 - Common water operations tool within the Rio Grande Basin to coordinate diverse entities / interests
 - Decision-making tool to address contemporary water management needs
 - Capable of representing the physical, accounting, and operational complexities of the Rio Grande Basin



URGWOM Model Area

Colorado – New Mexico state line to Ft. Quitman, Texas

- 3 Rio Chama reservoirs
- 3 Rio Grande main stem reservoirs
- Several other tributary reservoirs



Area of Significant GW/SW Interaction

Middle Valley - from Dam at Cochiti Lake to the upper end of Elephant Butte Reservoir

Lower Valley – from Dam at Caballo Reservoir to El Paso, TX

URGWOM

Physical Simulation GW/SW Interaction?

- Current Model
 - Uses regression relations for river seepage
 - Feedback loop to correct for too much or too little water in river and drains
 - Model needs flow input in each reach
- Many alternatives explored

URGWOM

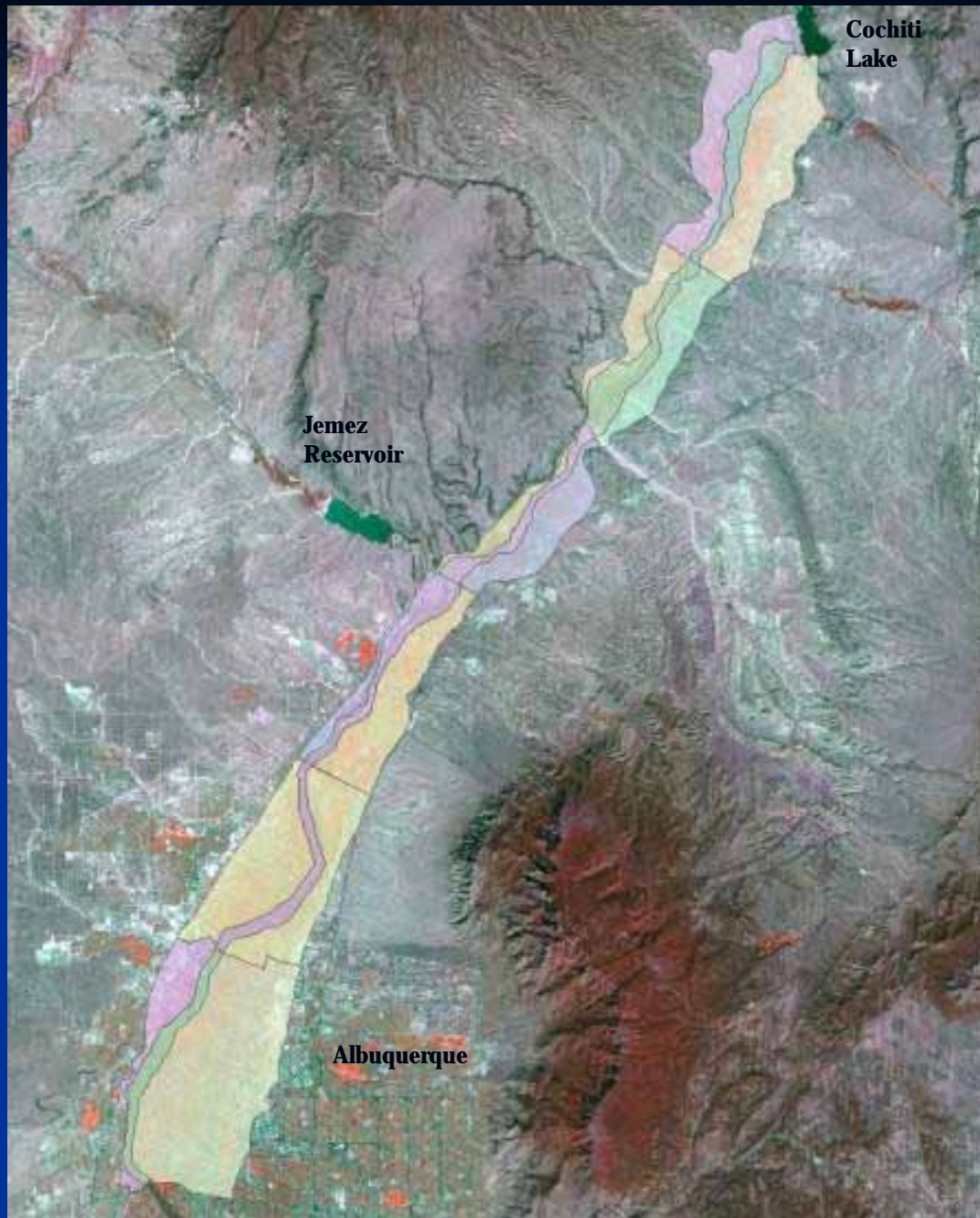
Proposed methods for SW/GW interaction

- Simulation of physical system
- Simulation of GW/SW interaction using
 - RiverWare only (GW-object)
 - Dynamic interface between RiverWare and MODFLOW

URGWOM

Proof of Concept Model

- Using RiverWare only for simulation
 - Testing of new RiverWare Methods
 - Testing coarse discretization
- Test reach chosen from gages Rio Grande below Cochiti to Rio Grande at Albuquerque
 - Complexity
 - River both loses and gains

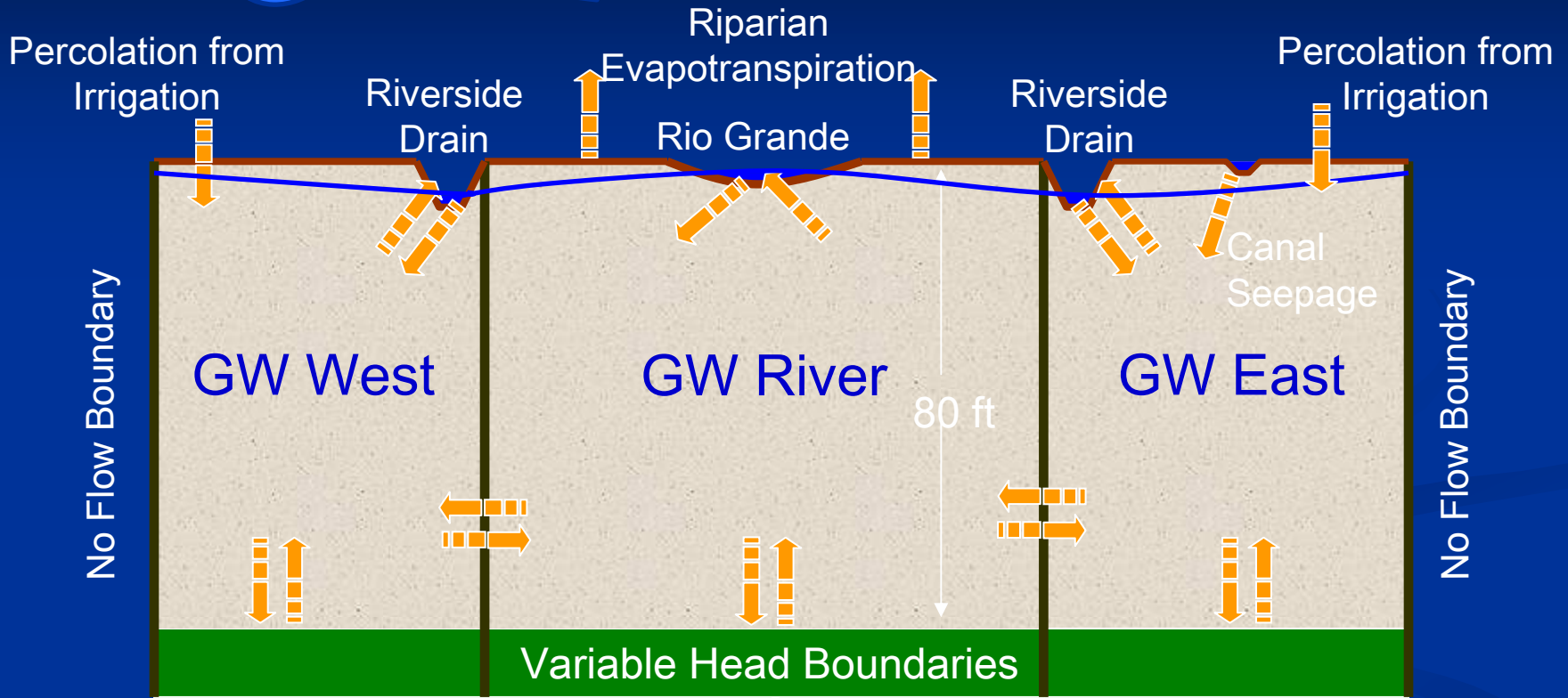


Discretization of the POC Model Area

1. Six GW reaches
2. Three areas in each reach
3. Each area simulated with a RiverWare ground-water object

URGWOM

Discretization of the POC Model Area

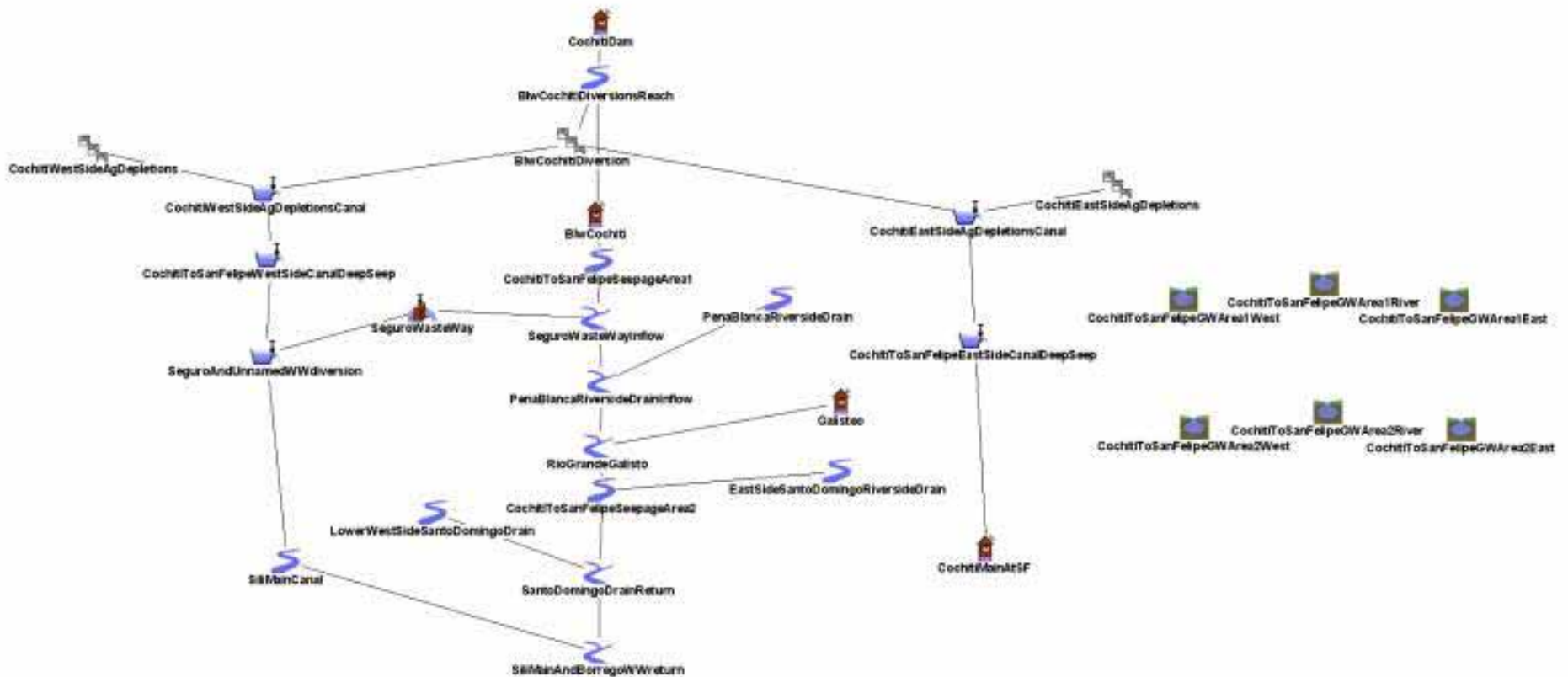


Heads from Regional MODFLOW Model

← Head Dependant Flow

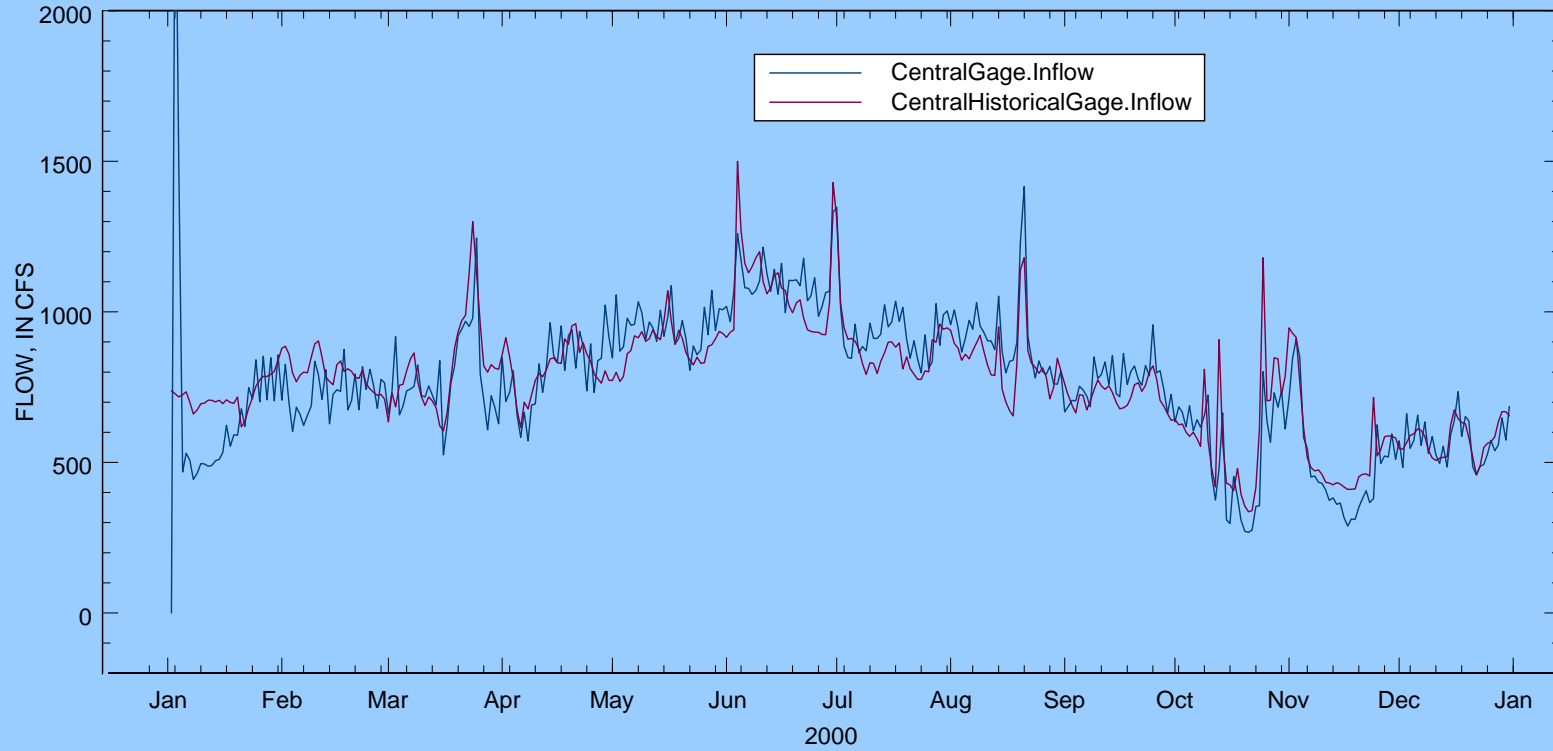
URGWOM

Cochiti to San Felipe part of POC Model



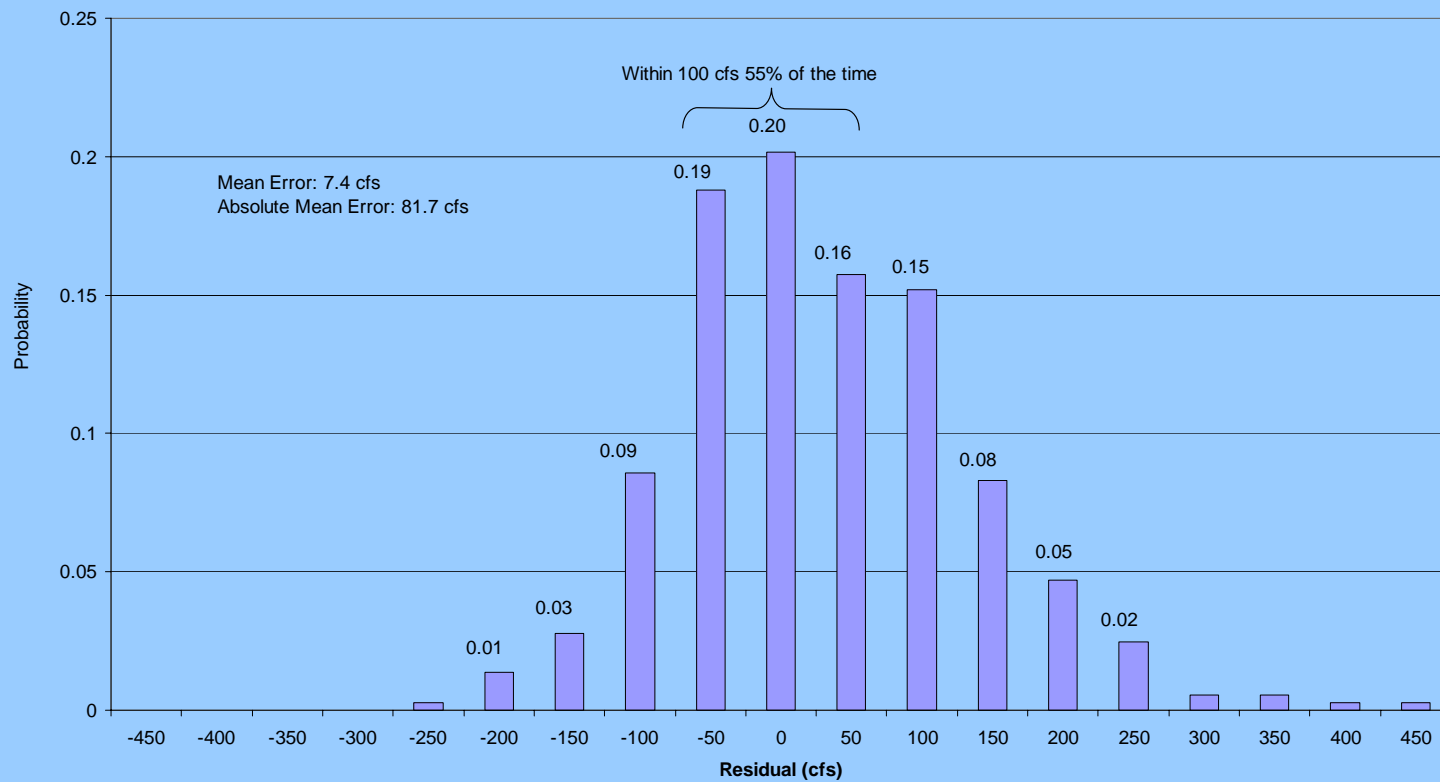
URGWOM

Preliminary Calibration River Flow at Rio Grande at Albuquerque



URGWOM

Probability density function of residual (historical - simulated) at Central Ave. gage for the reach San Felipe to Albuquerque, Year 2000



URGWOM

Conclusions

- Using the ground-water object, Pros and Cons
 - Pros:
 - Improving the physical representation of surface-water / ground-water interaction in the middle valley.
 - Simulating the impact of deep aquifer pumping on surface water.
 - Cons:
 - Requires more data about the physical system.
 - Many more objects
- Continued development of simulation of middle valley