

GILA-SAN FRANCISCO DECISION SUPPORT TOOL

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Outline

- Collaborative Modeling Team
- Decision Support Tool
- Demonstration

Motivation for Modeling

- **Drivers**

- **NM Consumptive Use and Forbearance Agreement**

- additional 140,000 AF of Gila Basin water can be diverted in any ten-year period.
 - \$66 and \$128 million to be used for efforts related to meeting water demand.

- **Lower Colorado River Compact.**

- **Unique ecology in the region.**

- **Co-existence of agricultural, mining, and human demands.**

- **Objectives**

- **Create decision support tool to address the following questions:**

- Given various constraints, how much water is available from where, when and to what purpose?
 - Given various constraints, how much water is in demand from where, when and to what purpose?
 - What are the tradeoffs among various approaches to managing this water?

- **Provide a medium for communicating with decision-makers and the public.**

Collaborative Modeling Team

- Implemented an open and transparent model development process:

*Membership is voluntary.
Participation is required.
Team develops causal structure of model.
Team identifies data.
Sandia develops model.
Team reviews model and output.*

- Team met between October 2005 and July 2007.
- Team met every other week for roughly two hours via WebEx. <https://waterportal.sandia.gov>
- Face-to-face every quarterly.
- May, June, July 2007 workshops.
- GOAL => Public software

Team Composition

- Bureau of Reclamation
- New Mexico Interstate Stream Commission
- US Fish and Wildlife Service
- Gila-San Francisco Water Commission
- Municipalities of Silver City and Deming
- Soil and Water Commission representatives from Grant, Catron, and Luna Counties
- The Nature Conservancy
- Gila Conservation Coalition
- Concerned citizens
- Cliff/Gila Farm Bureau
- Sandia National Laboratories

Work-In-Progress

2008 – 4-County area

↑ NMSBA approved

2007 – User Interface, workshops, calibration

↑ FY2007 Earmark not approved, work slowed to a halt.

2006 – CUFA model, Hydrology model, Causal Loops, Calibration, Input/Output defined, Data collection

Fall 2005 – Team Formed, Groundrules, Objectives

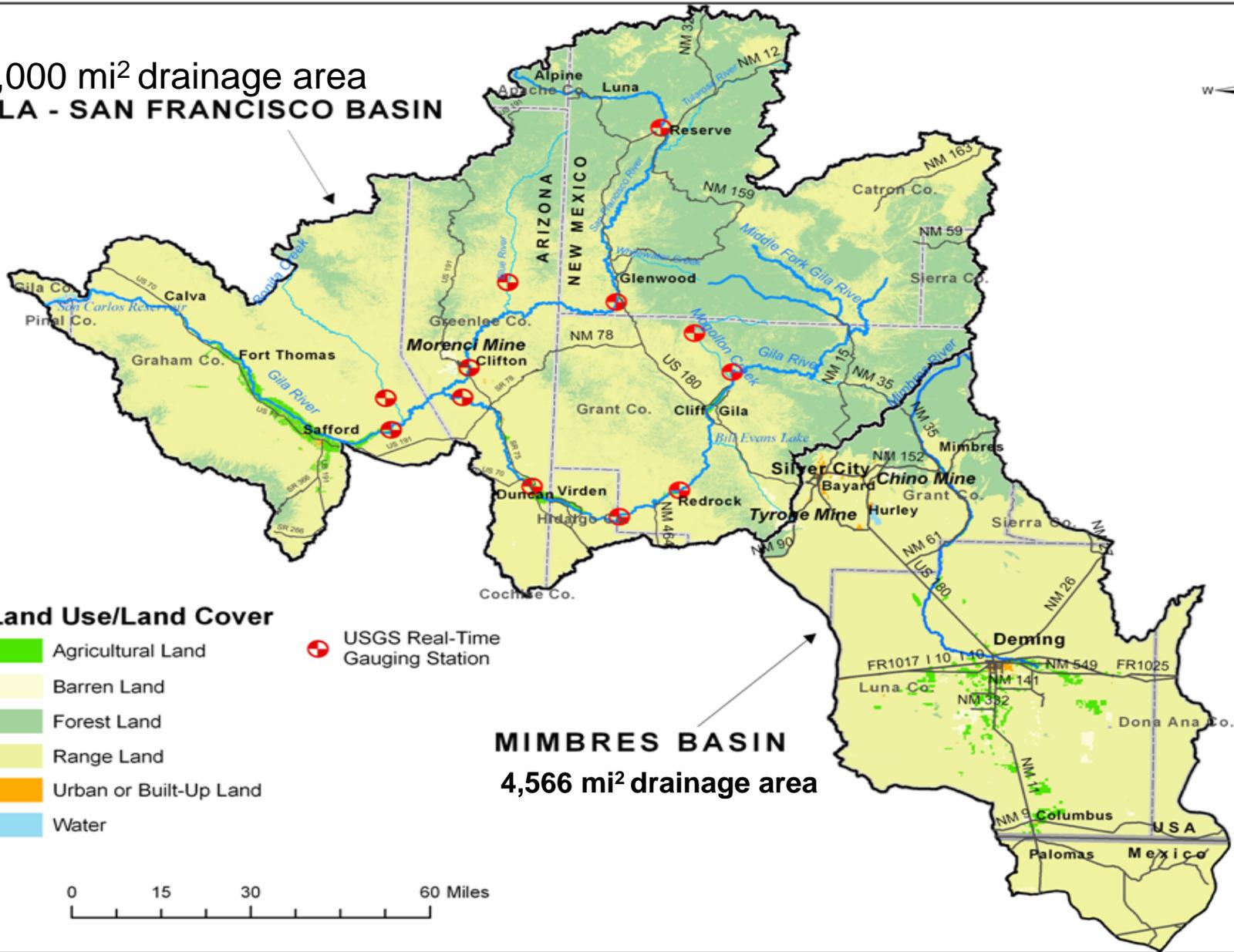
↑ FY2005 Earmark awarded

Meeting Venue

<http://waterportal.sandia.gov>

The image shows a screenshot of a computer desktop with two main windows open. The background window is a Microsoft Internet Explorer browser displaying the Sandia National Laboratories Water Portal website. The website header includes the text "Sandia National Laboratories Water Portal A Collaborative Water Monitoring, Modeling and Management Environment". The main content area features a navigation menu and a section titled "A Collaborative Water Monitoring, Modeling and Management Environment" with a sub-header "Collaborations:" and a list of project links. The foreground window is PowerSim Studio 7 Expert, displaying a complex simulation diagram for a water system. The diagram includes various components such as "MogollonCliff", "GilaGila", "Ag Diversion Gila to Redrock", "Irrigated Land Gila to Redrock", "Ag Irrigation Seepage Gila to Redrock", "Shallow GW Gila to Redrock", "Return flow to river Gila to Redrock", "Ditch Loss Gila to Redrock", "Storage Gila to Redrock", "Evap from River to Redrock", "ET from Riparian Veg", "Routed Flow Redrock", "GilaRedrock Calc", "Leakage Rate", "Ditch Length", and "Seepage from ditches". Numerical values are shown in boxes throughout the diagram, such as "764.00 cfs", "2,127.39 AF", "0.00 cfs", "0.00 AF/da", "0.00 AF/da", "1.06 cfs", "1,237.60 AF", "770.05 AF", "914.34 cfs", and "764.00 cfs". A chat window is open on the right side of the PowerSim Studio window, showing a "Participants" list with "Vincent Tidwell (Host)" and a "Type chat message here..." input field. The Windows taskbar at the bottom shows the Start button and several open applications including Inbox, Microsoft Office, and PowerSim Studio 7 Expert.

9,000 mi² drainage area
GILA - SAN FRANCISCO BASIN



Land Use/Land Cover

- Agricultural Land
- Barren Land
- Forest Land
- Range Land
- Urban or Built-Up Land
- Water

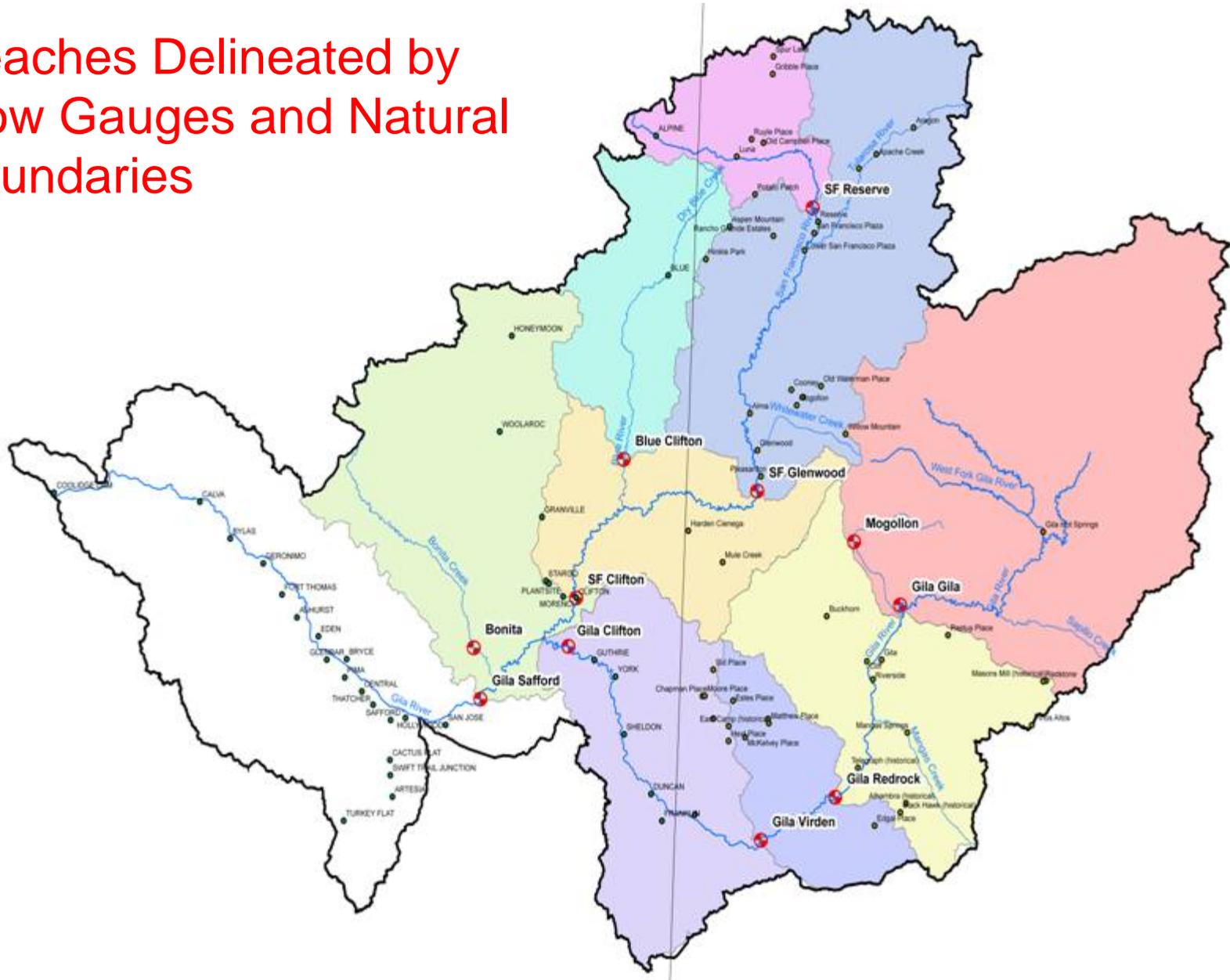
USGS Real-Time Gauging Station

MIMBRES BASIN
 4,566 mi² drainage area

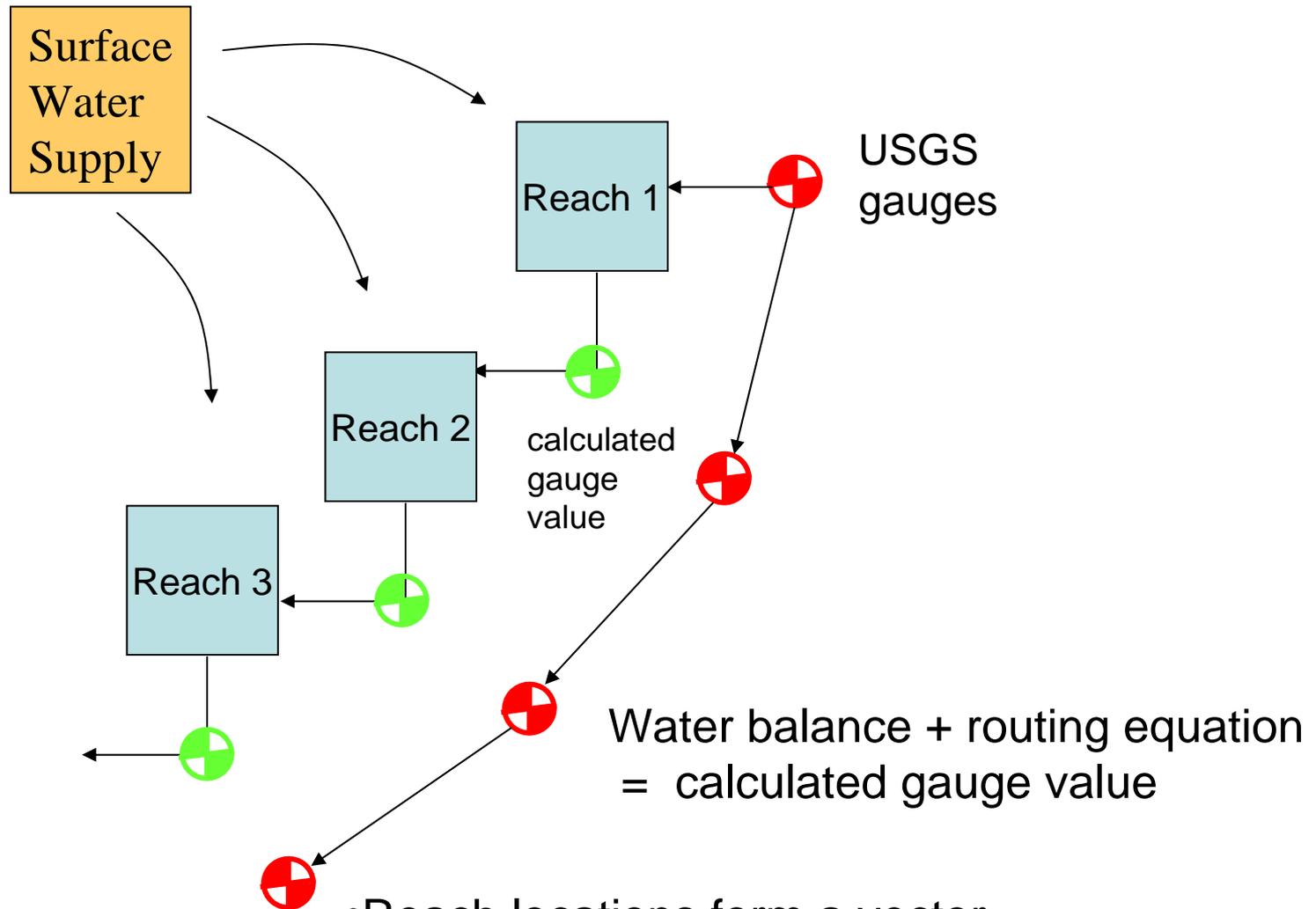


SW Structure Follows A Coarse-Grained Physical Description

Reaches Delineated by
Flow Gauges and Natural
Boundaries

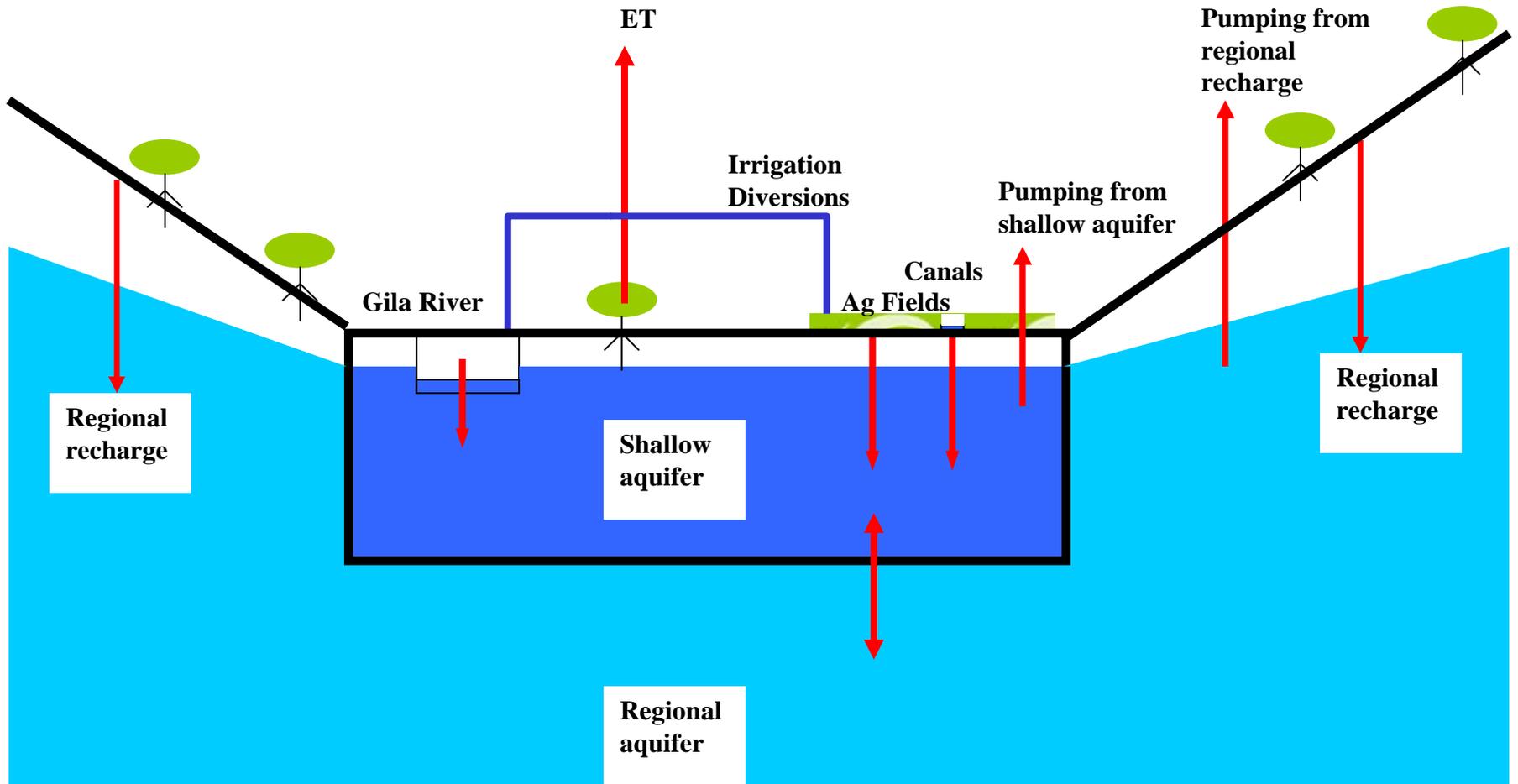


Spatial representation within PowerSim

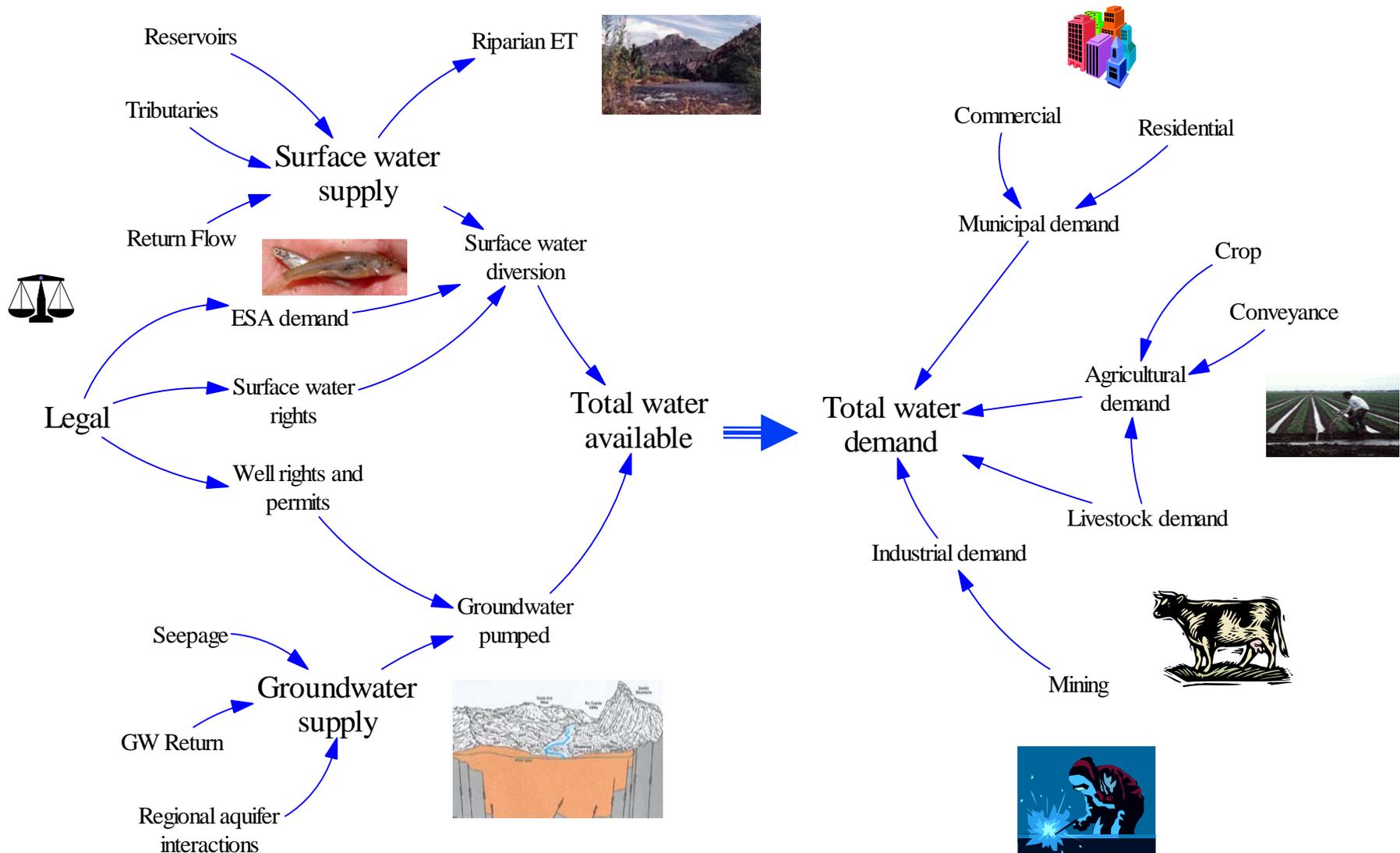


- Reach locations form a vector.
- Gauge uncertainty propagates in the model.

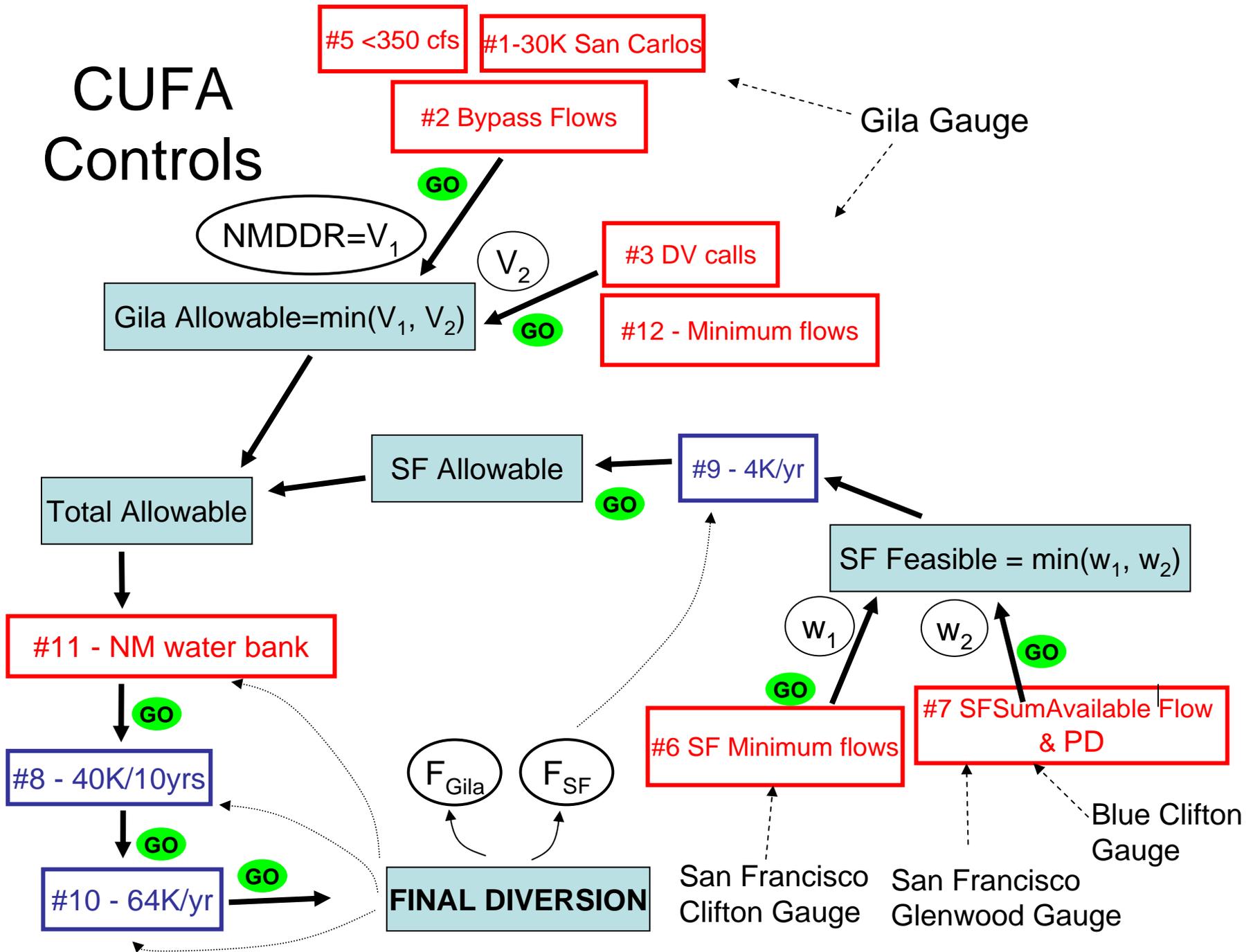
SW/GW Interaction Within Each Reach



System dynamics sets the framework for modeling intricate coupling between physical and social systems



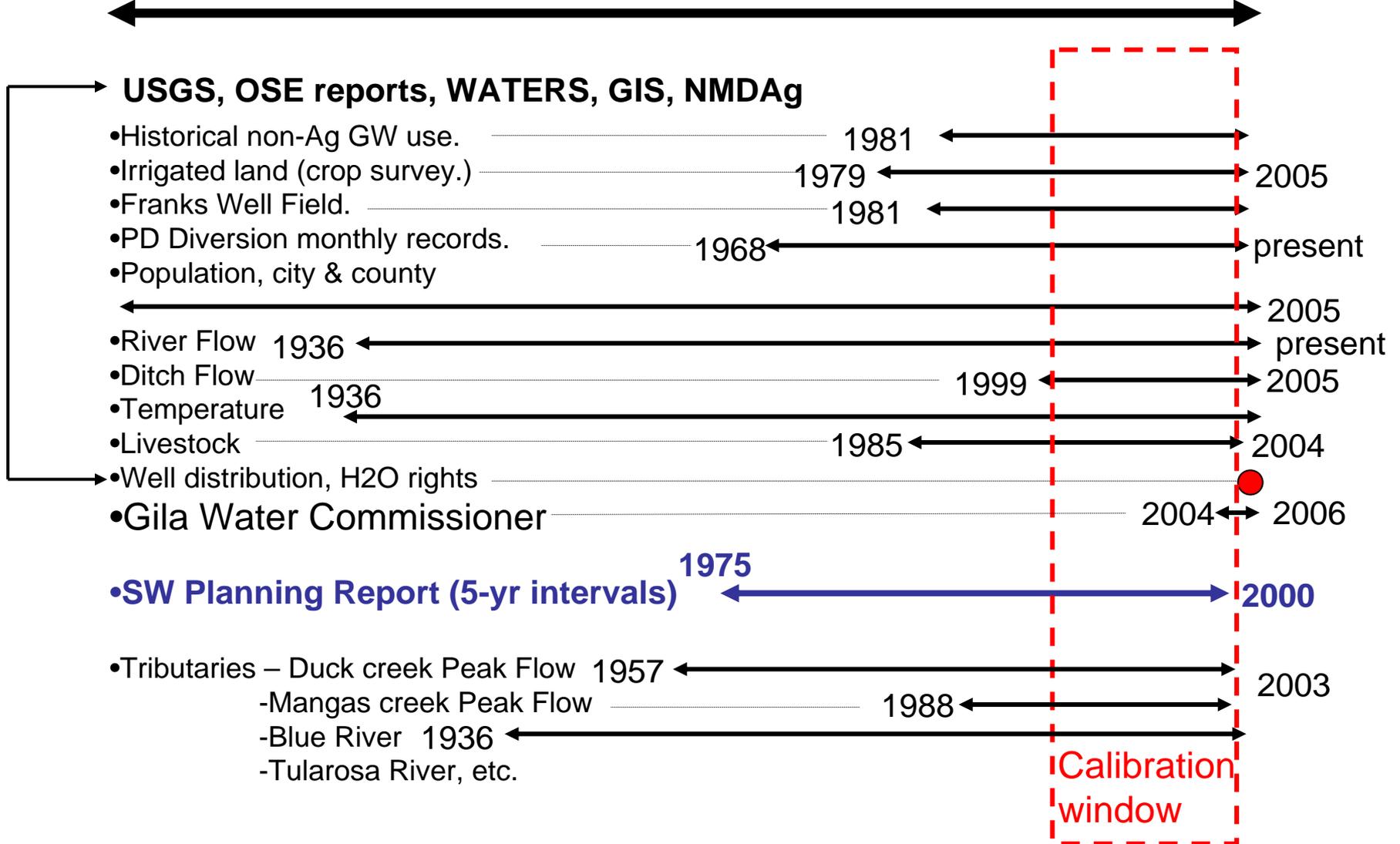
CUFA Controls



Available Historical Data

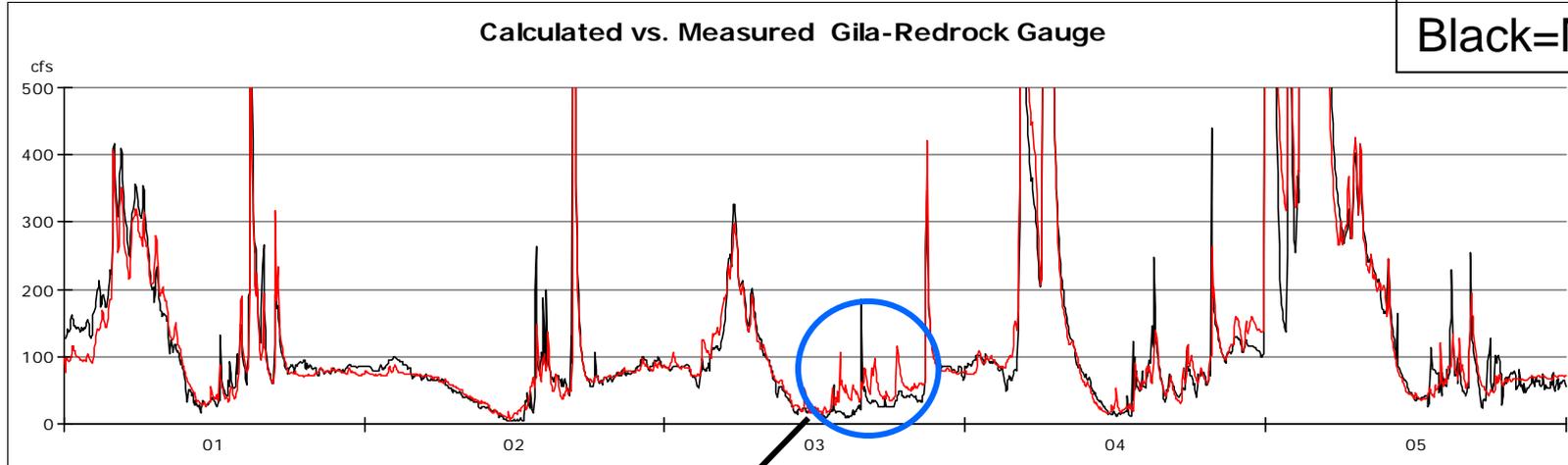
1910

2006

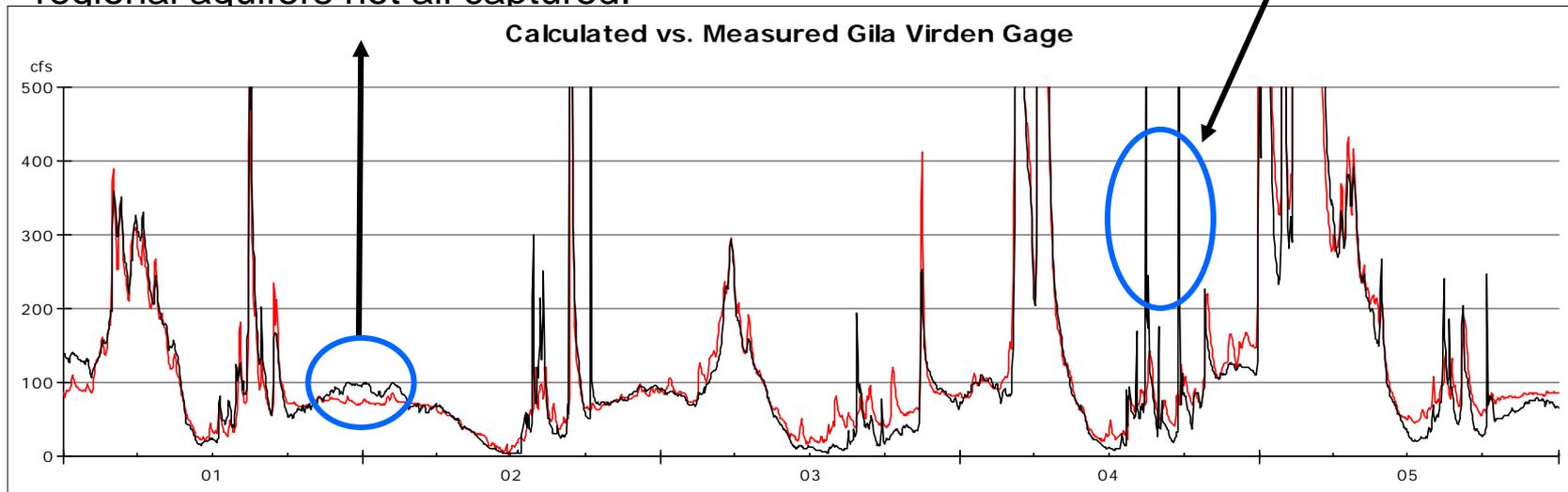


Model Calibration

RED=Calculated
Black=Measured



- Dynamics between fluvial and regional aquifers not all captured.
- Upstream peaks may be attenuated downstream.
- Tributary contributions from summer monsoon events and snowmelt are missed



Model Homepage



Gila-San Francisco Decision Support Tool



About this
Model

Background

Maps

Executive
Summary

Climate

CUFA

Population

Agriculture

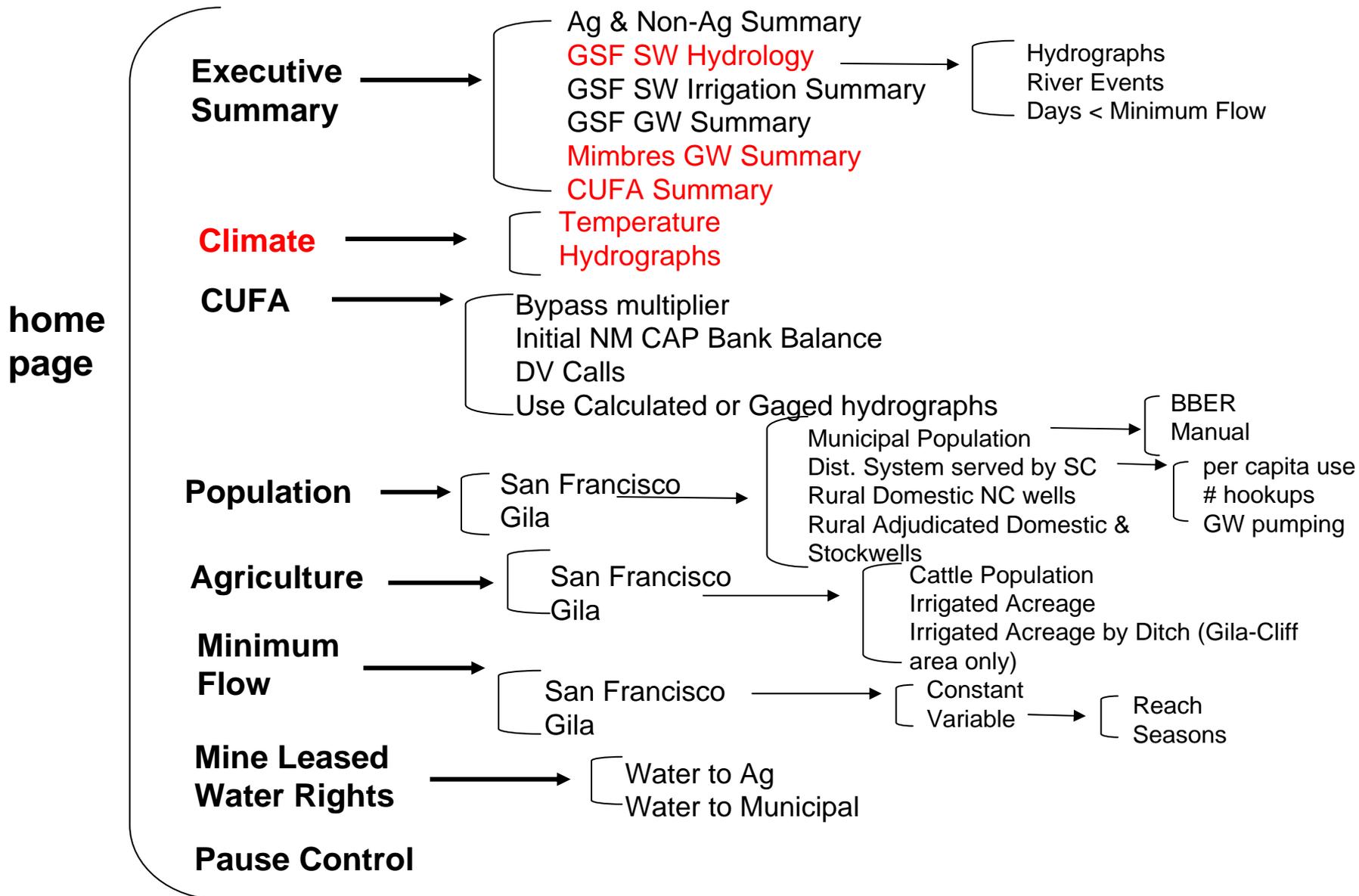
Minimum
River
Flows

Mine
Leased
Water Rights

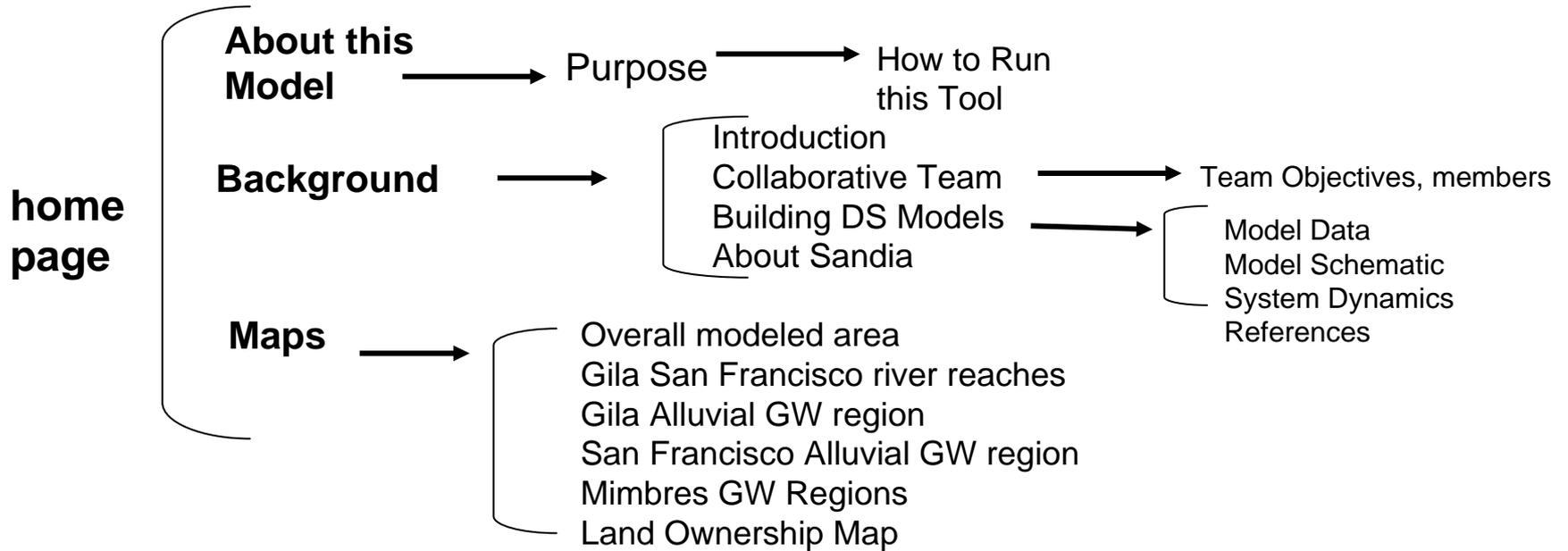
Pause
the
Model

The Gila San Francisco Decision Support Tool is a draft model that can not be used, disseminated, and applied without the consent of the Gila San Francisco Collaborative Modeling Team. It is a research tool that is intended for educating stakeholders, the interested public, and the modeling team. If you have any questions regarding the use of this tool, please contact Vince Tidwell, vctidwe@sandia.gov

User Interface Structure



User Interface (cont'd)



20-year Summary – SF Diversion ON



GSF Basin SW Hydrology

GSF SW Irrigation Summary

GSF GW Summary

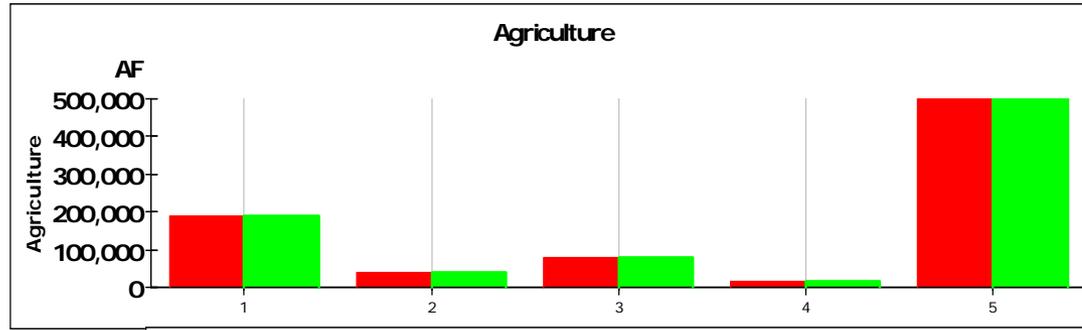
Mimbres GW Summary

CUFA Summary

Return to Top

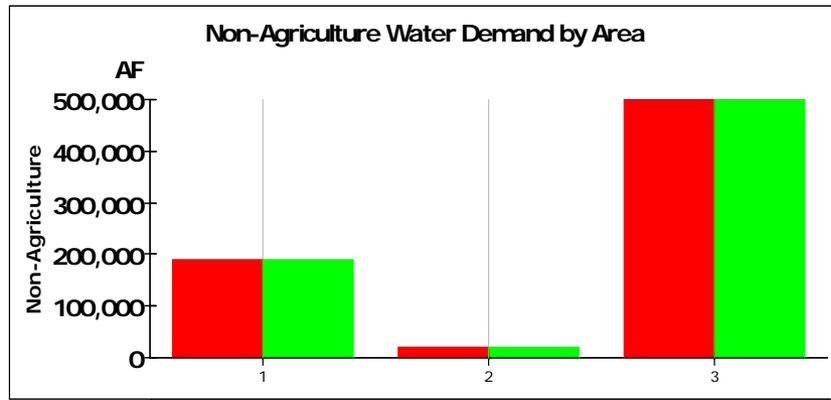
Projections of Water Supply & Demand

DRAFT
Version:
20071016
Sandia National Laboratories

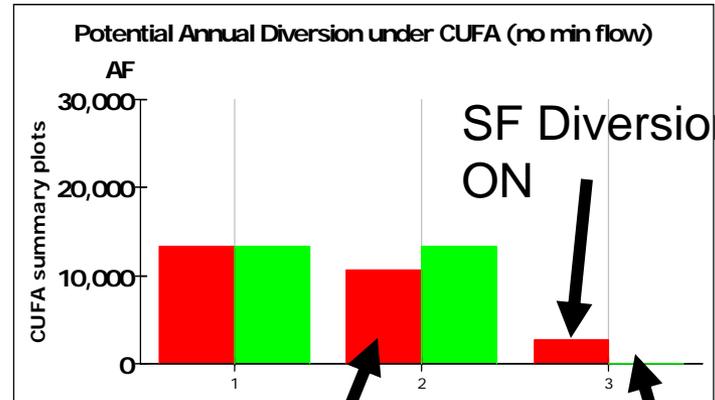


	Gila SW Ag	SF SW Ag	Gila GW Ag	SF GW Ag	Mimbres GW
Baseline Summary	188,475 AF	41,428 AF	81,525 AF	18,193 AF	559,504 AF
Current Run	188,475 AF	41,428 AF	81,525 AF	18,193 AF	559,504 AF

Baseline Summary is the 20-year summary based on default values of input parameters.



	Gila Non-Ag	SF Non-Ag	Mimbres Non-Ag
Baseline Summary	189,532 AF	20,169 AF	608,663 AF
Current Run	189,532 AF	20,169 AF	608,663 AF

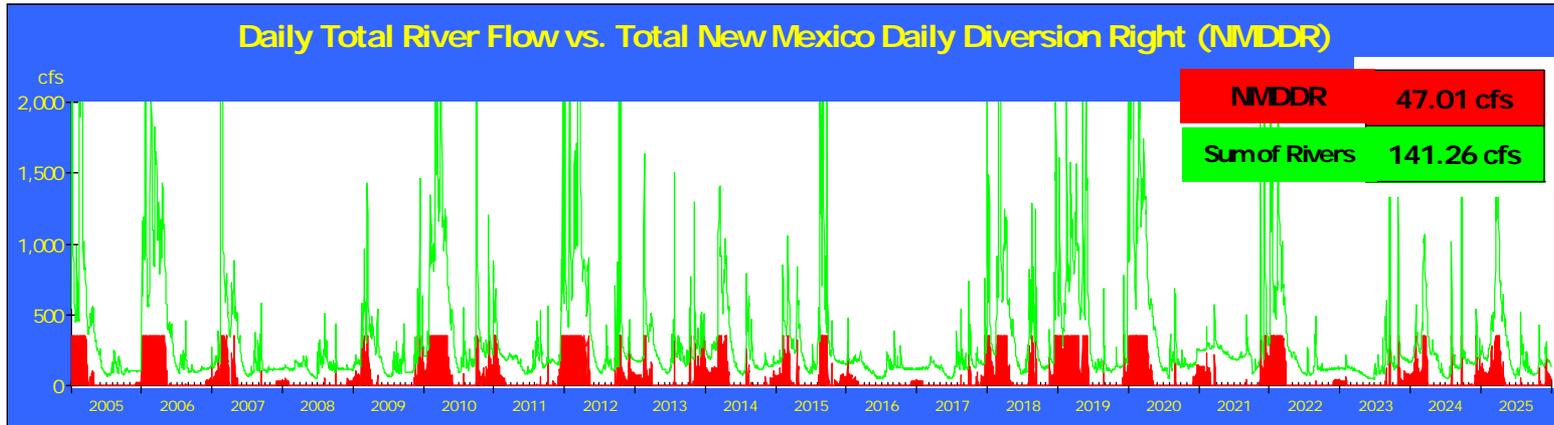


	Total	Potential Gila	Potential SF
Baseline Summary	13,333 AF	10,558 AF	2,773 AF
Current Run	13,333 AF	13,333 AF	0 AF

current run

baseline run

20-year Summary Baseline



CUFA Model
DRAFT
Version:
20080122

Location with Min Flow
Gila-Redrock
Plotted in Red

i minimum flow control is set at CONSTANT, there is no differentiation amongst diversion locations.

Location with Min Flow
Gila-Redrock
Plotted in Red

Return

