Gila-San Francisco Decision Support Tool

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Geohydrology Department
Albuquerque, New Mexico

Southwestern New Mexico Water Planning Workshop
Deming
October 26-27, 2007

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Objective

- Our goal is to create an ***interactive***, ***real-time*** decision support tool to explore:
  - Water availability relative to CUFA and ESA constraints.
  - Alternative approaches to utilizing water and funding.
- We want to de-mystify the complexity of the settlement language so that stakeholders and decision-makers are better informed.

Create an informed basis for decision making.

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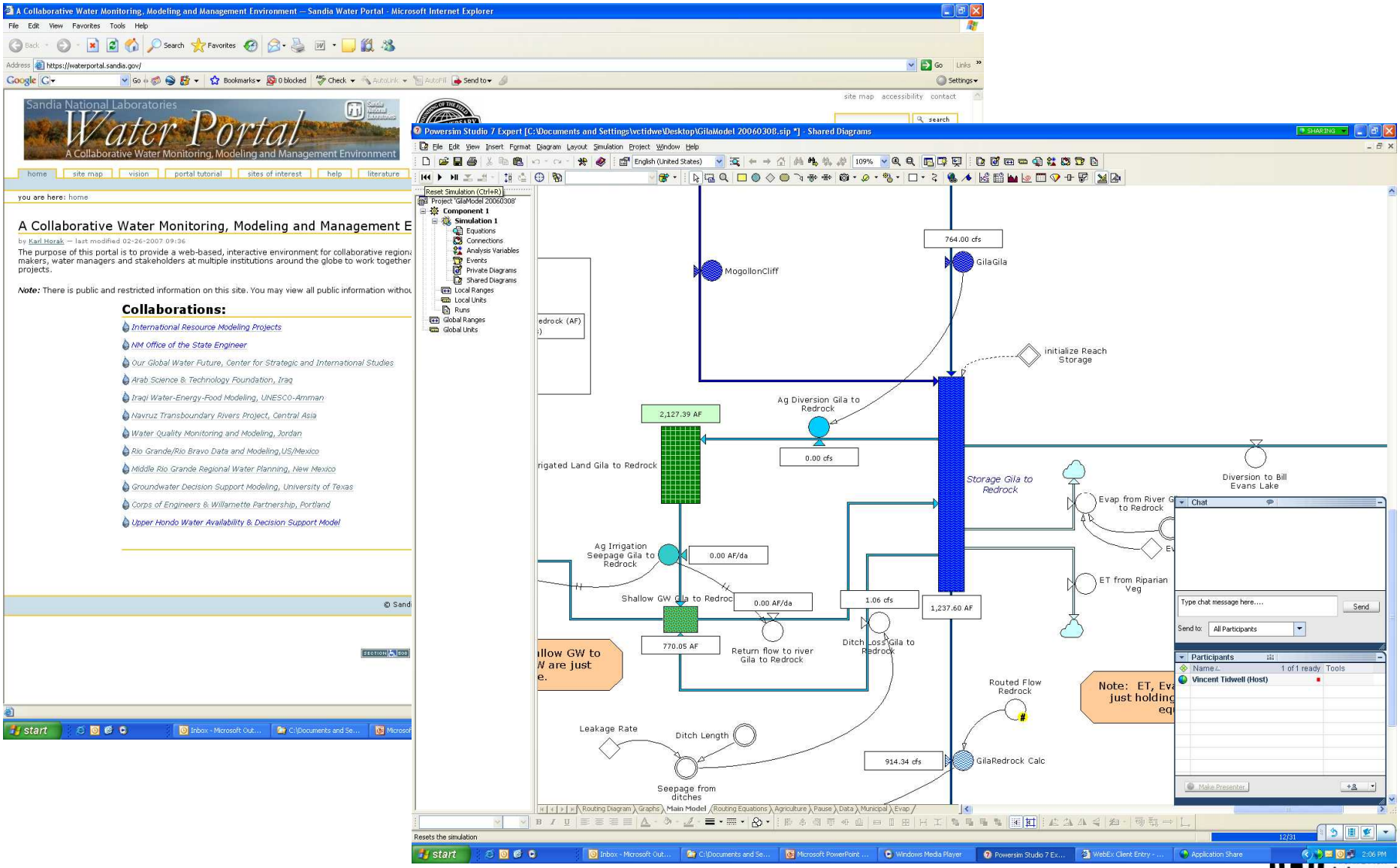
Collaborative Modeling Team

- Implemented an open and transparent model development process.
- Team began meeting in October 2005.
- Team met biweekly for roughly two hours.
- Model development process:
  - Team develops causal structure of model
  - Team identifies data
  - Sandia develops model
  - Team reviews model and output

Team Composition

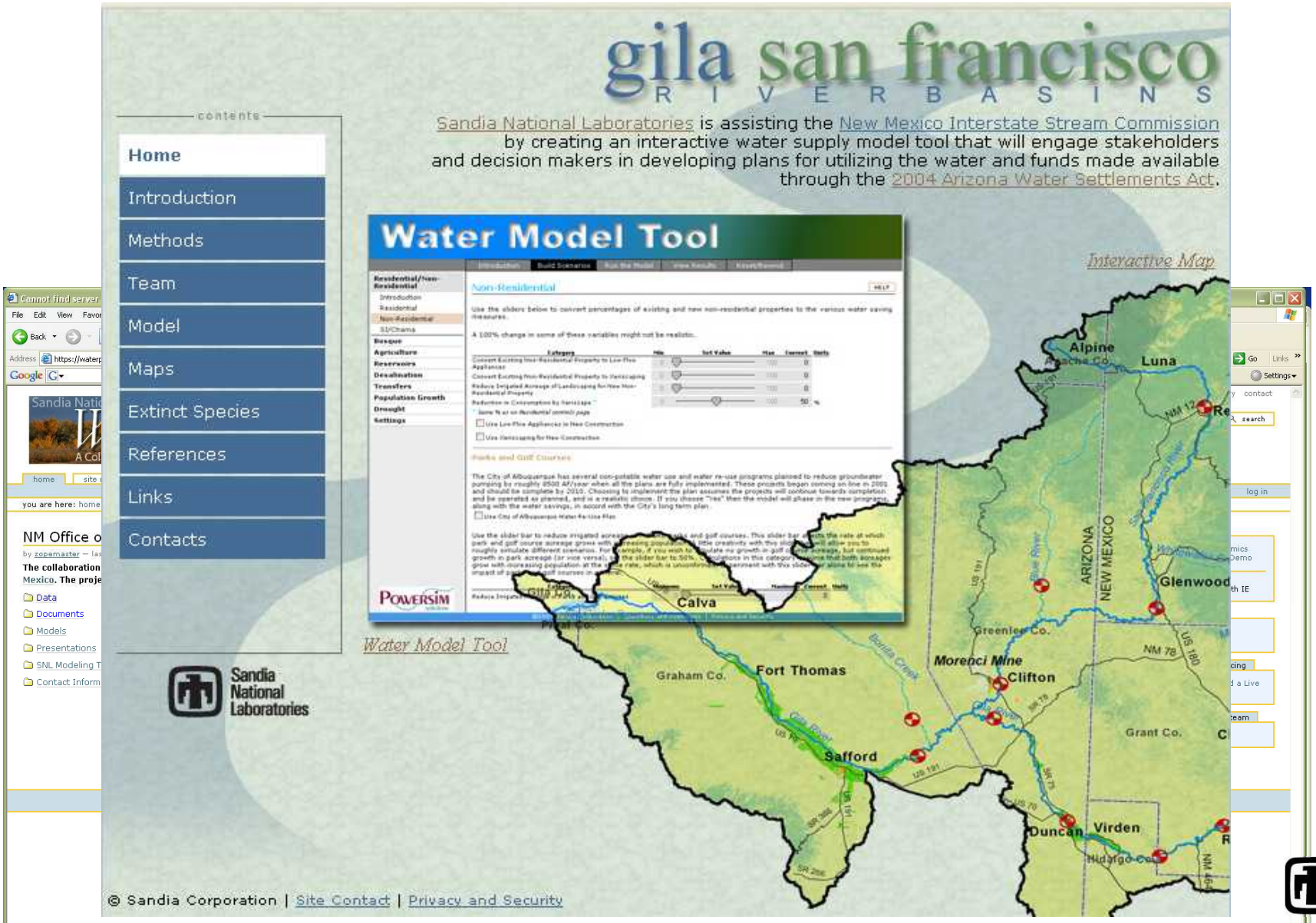
- Bureau of Reclamation
- New Mexico Interstate Stream Commission
- US Fish and Wildlife Service
- Municipalities of Silver City and Deming
- Soil and Water Commission representatives from Grant, Catron, and Luna Counties
- The Nature Conservancy
- Gila Conservation Coalition
- Concerned Citizens
- Sandia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

Meeting Venue
http://waterportal.sandia.gov



Information Sharing

http://www.sandia.gov/gilasanfrancisco/index.html



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Model Components

- Surface water hydrology
- Ground water hydrology

- Water demand
  - *Residential/commercial*
  - *Industrial/mining*
  - *Agricultural/livestock*
  - *Evaporative/riparian*
- Institutional constraints
  - *CUFA*
  - *Minimum Flow*

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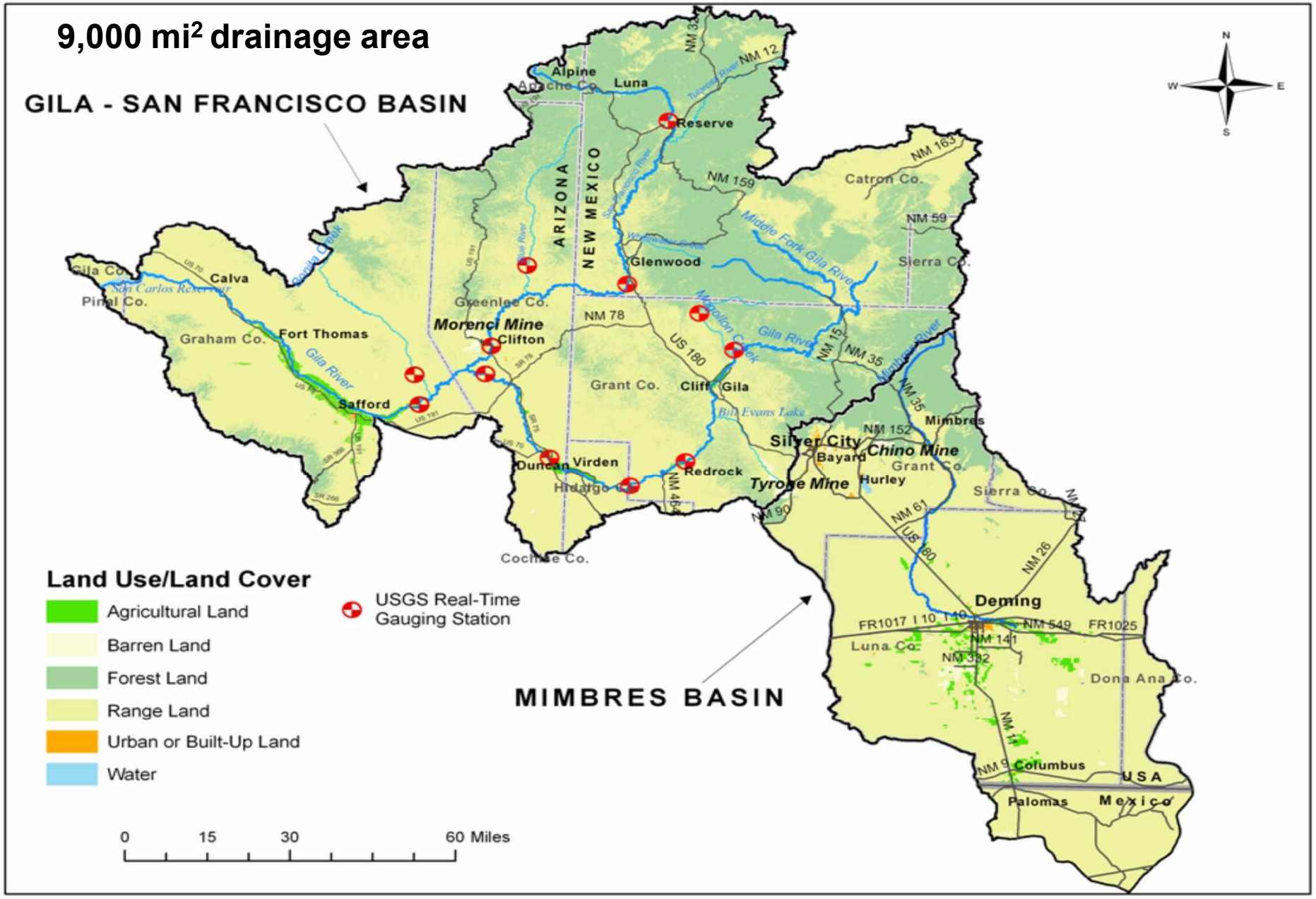

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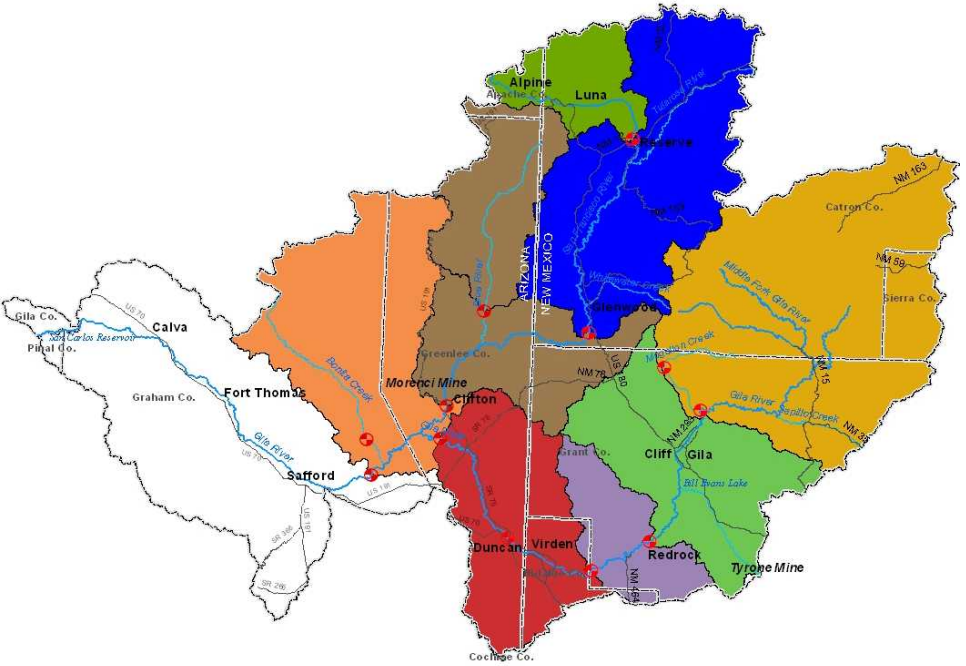
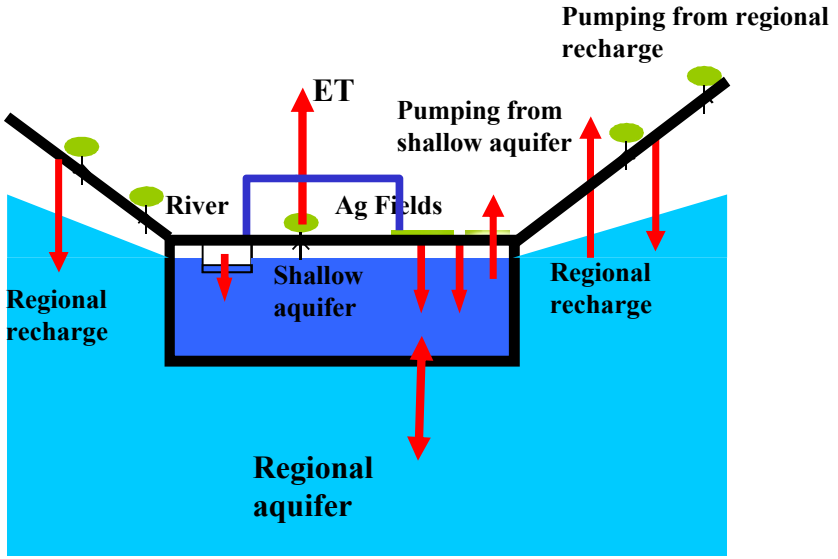
Surface and Ground Water Modules

- **Basin is broken up into 8 "reaches" defined by stream gauges in the Gila Basin**



- **The ground water component is broken up into a regional and fluvial aquifer per reach**



- Daily model with routed flows
- Calculated flows and river stage are "average" over that reach
- Model also can look at flows over sub-reach "critical regions"
- The model can account for:
  - Evaporative losses
  - Irrigation diversions and returns
  - Aquifer interaction
  - River leakage or gains

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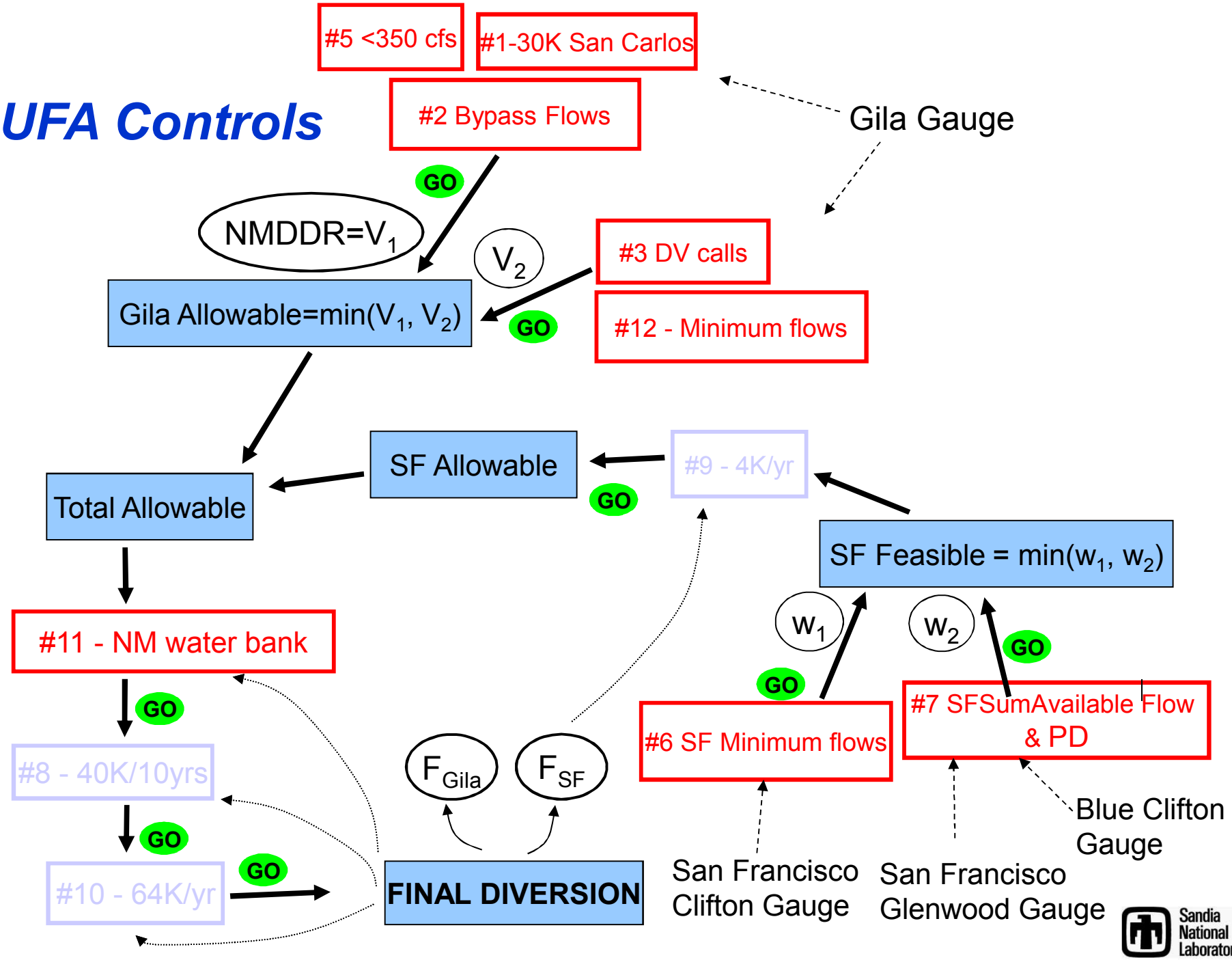
CUFA Controls



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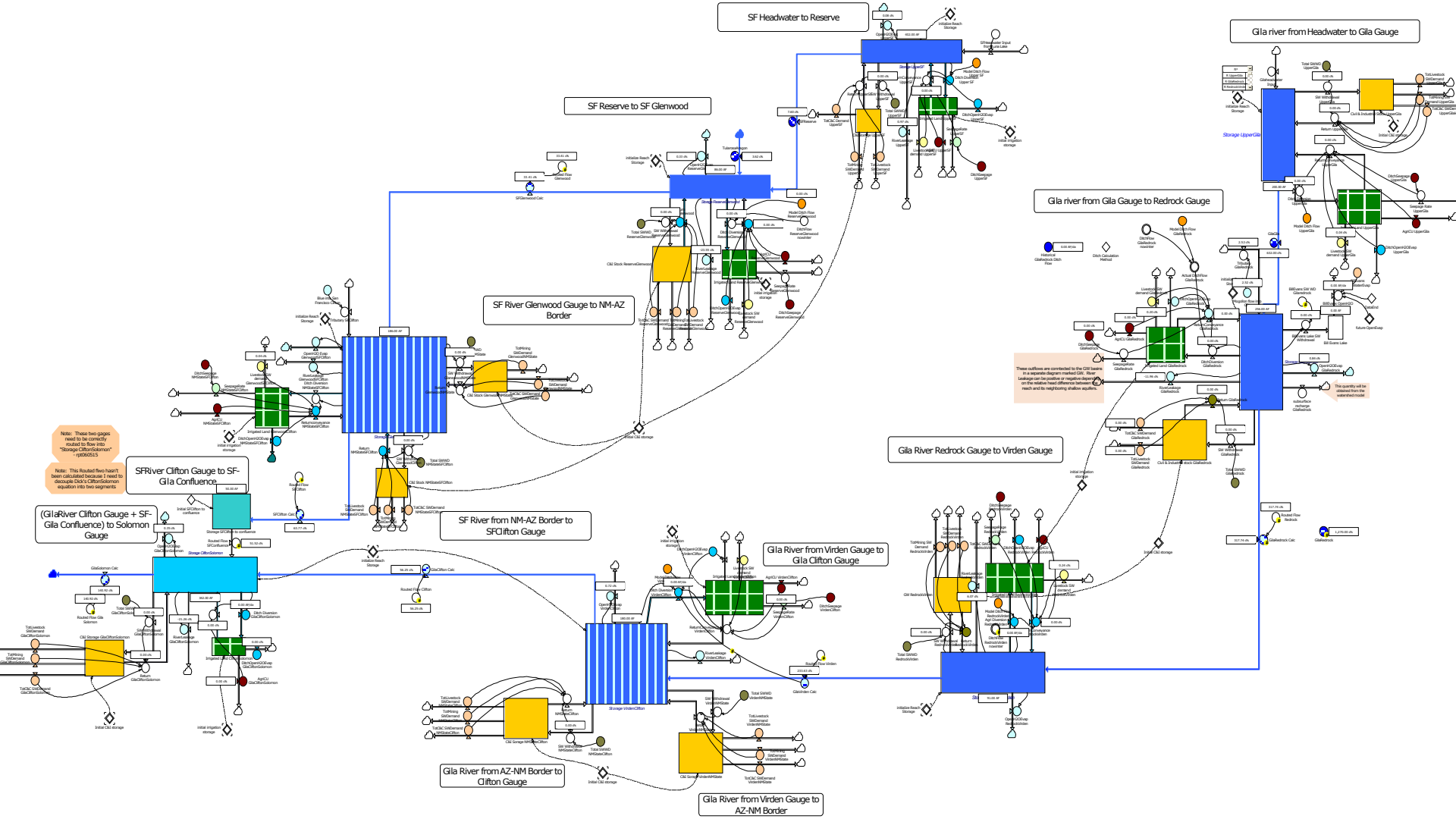
System Dynamics Model



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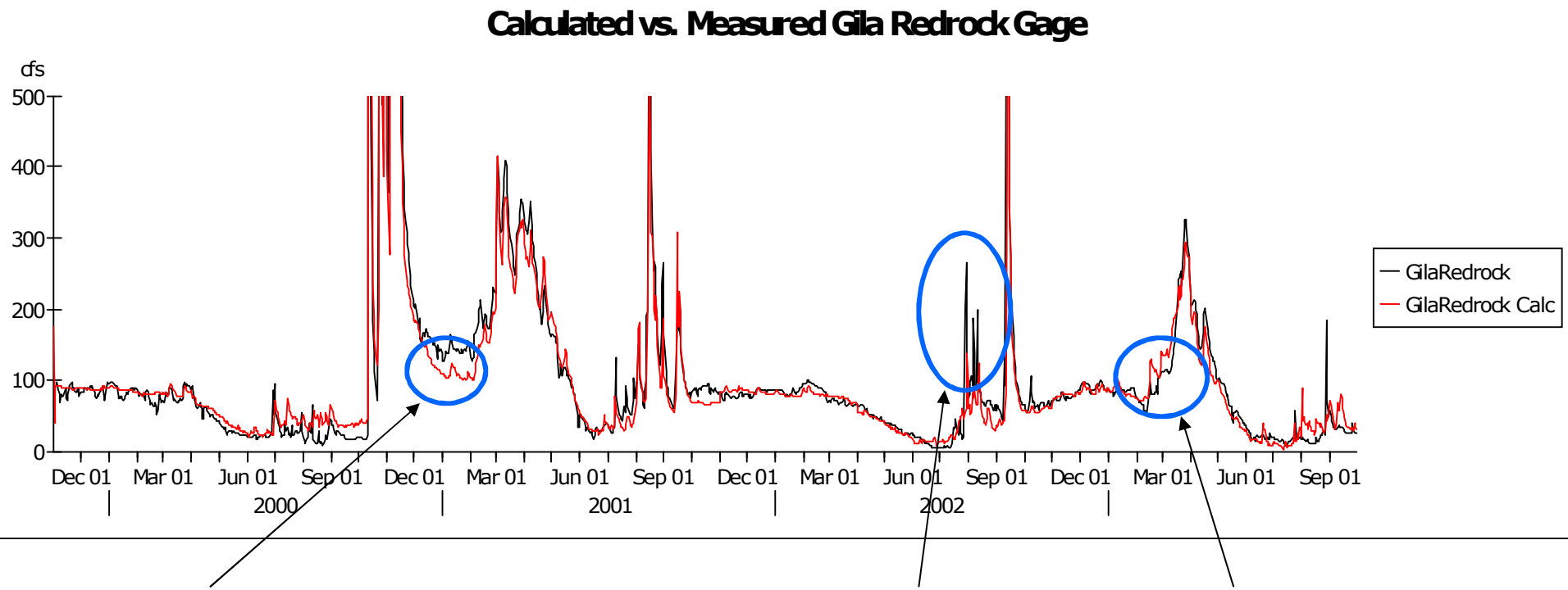
Model Calibration



- Dynamics between fluvial and regional aquifers may be causing this discrepancy

- Tributary contributions from summer monsoon events and snowmelt are missed

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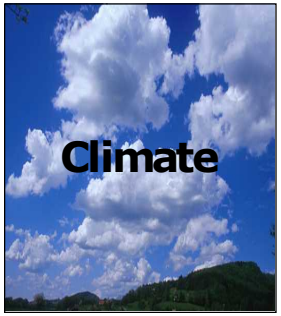
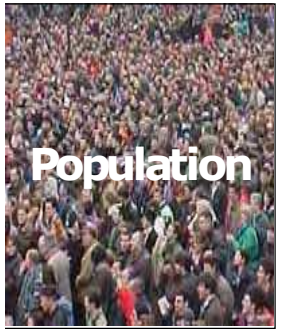
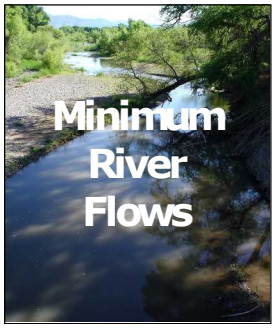
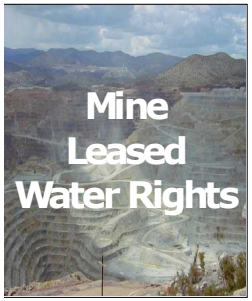
User Control





Executive Summary





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Model Homepage

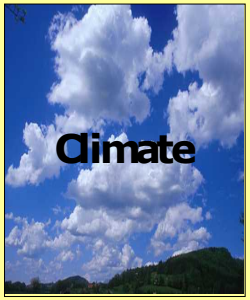
GSF Decision Support Tool

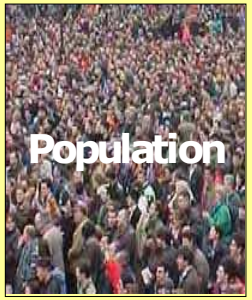
Gila-San Francisco Decision Support Tool

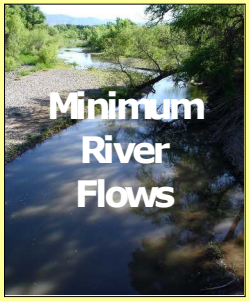
DRAFT
Version:
20071016
Sandia National Laboratories

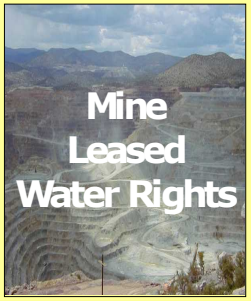
About this Model | Background | Maps

Executive Summary









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

20-year Summary – SF Diversion OFF

GSF Decision Support Tool

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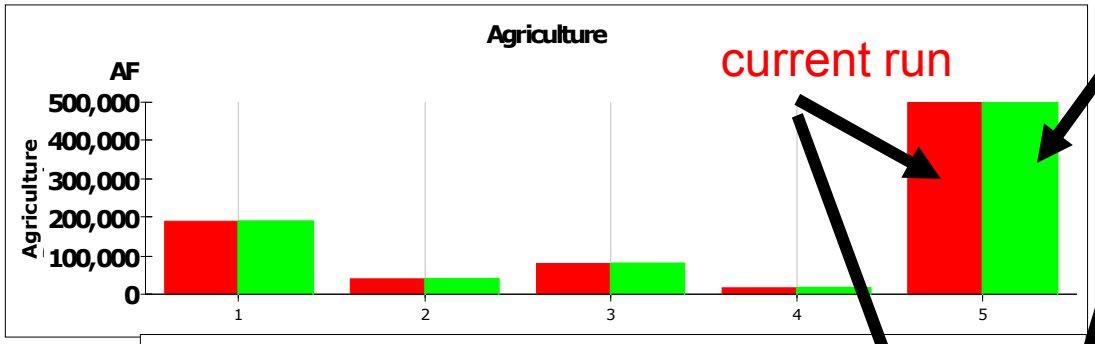
Projections of Water Supply & Demand

baseline run

current run

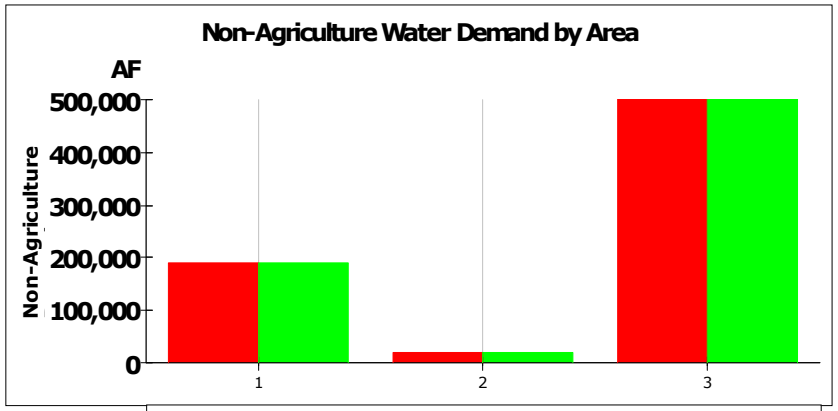


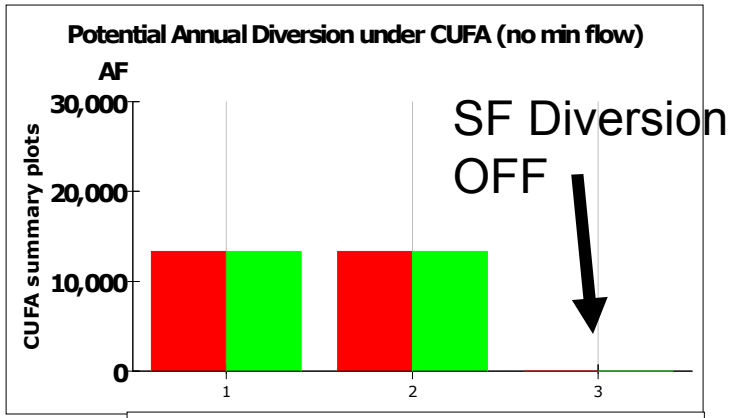
- GSF Basin SW Hydrology
- GSF SW Irrigation Summary
- GSF GW Summary
- Mimbres GW Summary
- CUFA Summary

BASELINE SUMMARY

Gila SW Ag	SF SW Ag	Gila GW Ag	SF GW Ag	Mimbres GW
188,475 AF	41,428 AF	81,525 AF	18,193 AF	559,504 AF
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.





BASELINE SUMMARY

Gila Non-Ag	SF Non-Ag	Mimbres Non-Ag
189,532 AF	20,169 AF	608,663 AF
189,532 AF	20,169 AF	608,663 AF

Baseline Summary

Total	Potential Gila	Potential SF
13,333 AF	13,333 AF	0 AF
13,333 AF	13,333 AF	0 AF

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20-year Summary – SF Diversion ON

GSF Decision Support Tool

Projections of Water Supply & Demand

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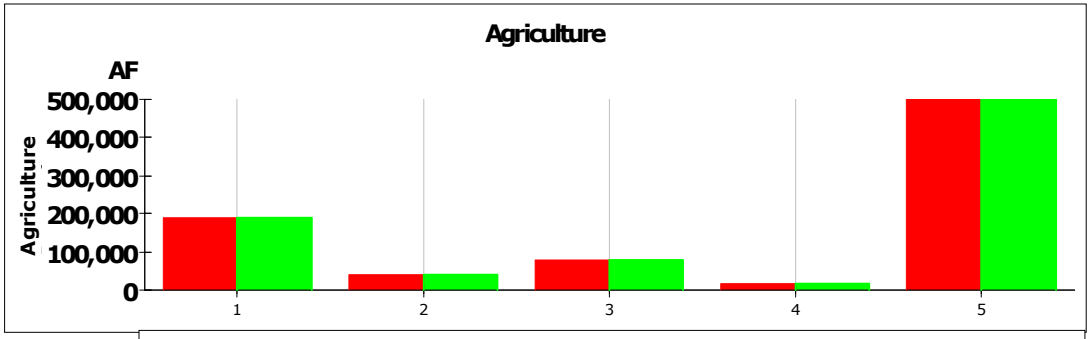

	Gila SW Ag	SF SW Ag	Gila GW Ag	SF GW Ag	Mimbres GW
	188,475 AF	41,428 AF	81,525 AF	18,193 AF	559,504 AF
BASELINE SUMMARY	188,475 AF	41,428 AF	81,525 AF	18,193 AF	559,504 AF

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

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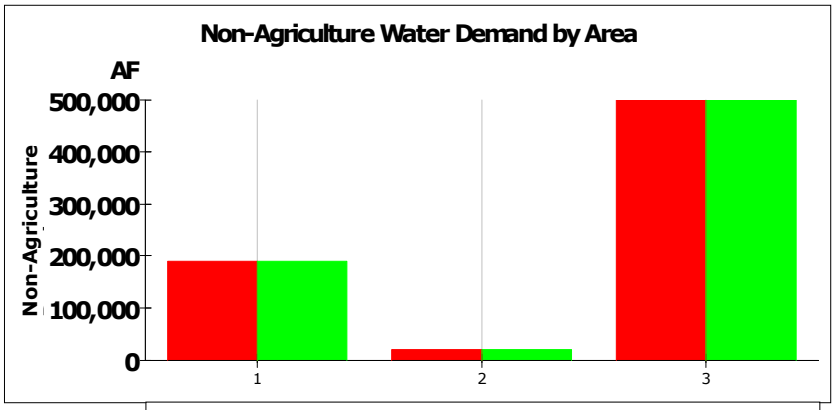
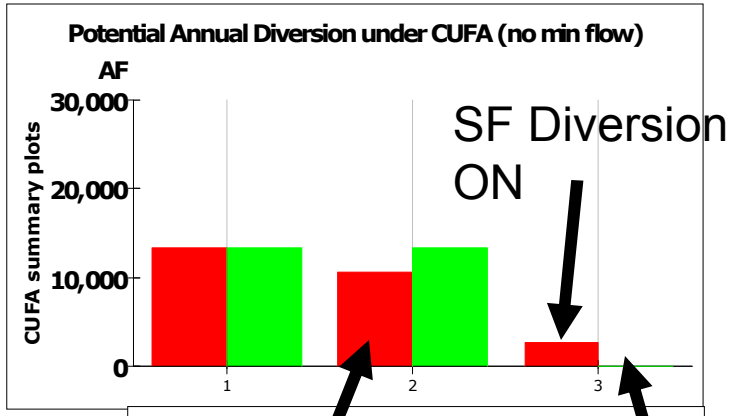
- GSF SW Irrigation Summary
- GSF GW Summary
- Mimbres GW Summary
- CUFA Summary





	Gila Non-Ag	SF Non-Ag	Mimbres Non-Ag
	189,532 AF	20,169 AF	608,663 AF
BASELINE SUMMARY	189,532 AF	20,169 AF	608,663 AF

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

current run

baseline run

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Tables

Gila GW	Avg Annual Rate	Total Volume
Domestic Wells	20 AF/year	413 AF
DNC Wells	1,818 AF/year	35,483 AF
Municipality	657 AF/year	14,241 AF
GW to Mimbres	951 AF/year	17,865 AF
Commercial	2,183 AF/year	
Livestock	3,206 AF/year	
Mining	392 AF/year	
Supplemental Ag	4,692 AF/year	

	Avg Annual Rate	Total Volume
SF Acreage	857 acre	
SF Ag CU	1,471 AF/year	31,165 AF
SF Ag Seepage	454 AF/year	9,620 AF
SF Ag Open Evap	30 AF/year	643 AF
SF Diversion Rights	2,315 AF/year	48,614 AF

Mimbres GW	Avg	
Mimbres Irrigation	24,	
Mimbres Population	13,929 AF/year	258,596 AF
Mimbres Industrial	15,254 AF/year	320,316 AF
Mimbres Livestock	1,416 AF/year	29,752 AF

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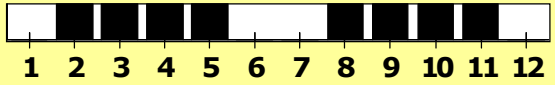
Tests

Days: 7,671

Tests – ON or OFF



Test	Test	# False	% True
Test 1	San Carlos >= 30K AF	766	90 %
Test 2	Sum of Flows > DDB	4,410	43 %
Test 3	GilaVirden > 120% Call for DV	335	96 %
Test 4	Sum of Diversions < DD Right	0	100 %
Test 5	Allowable Diversion < 350 cfs	860	89 %
Test 6	SF Clifton >= SF Minimum Flow	5,100	34 %
		491	94 %
		0	100 %
		0	100 %
		0	100 %
		2,645	66 %
		5,242	32 %

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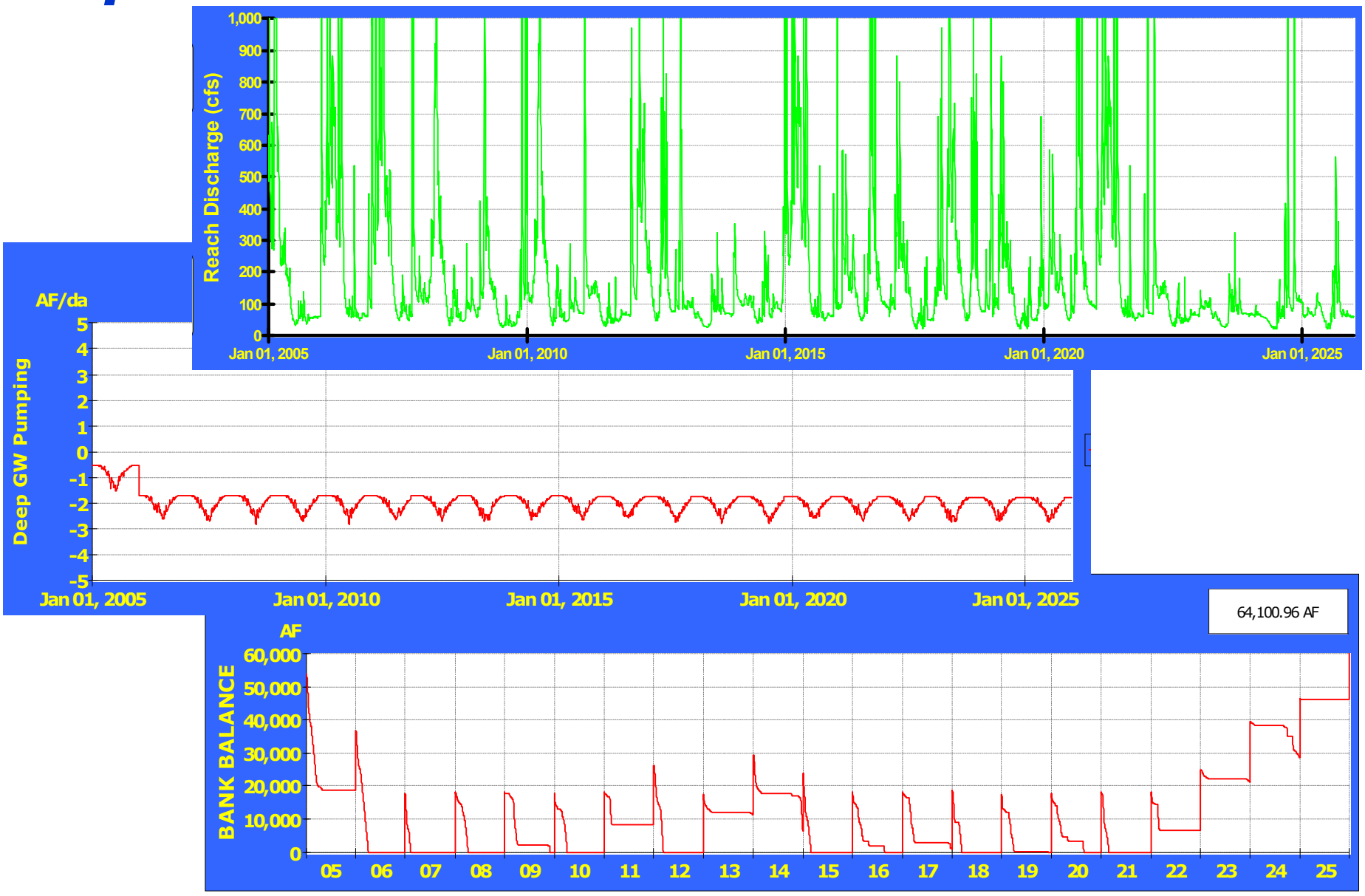
Graphs



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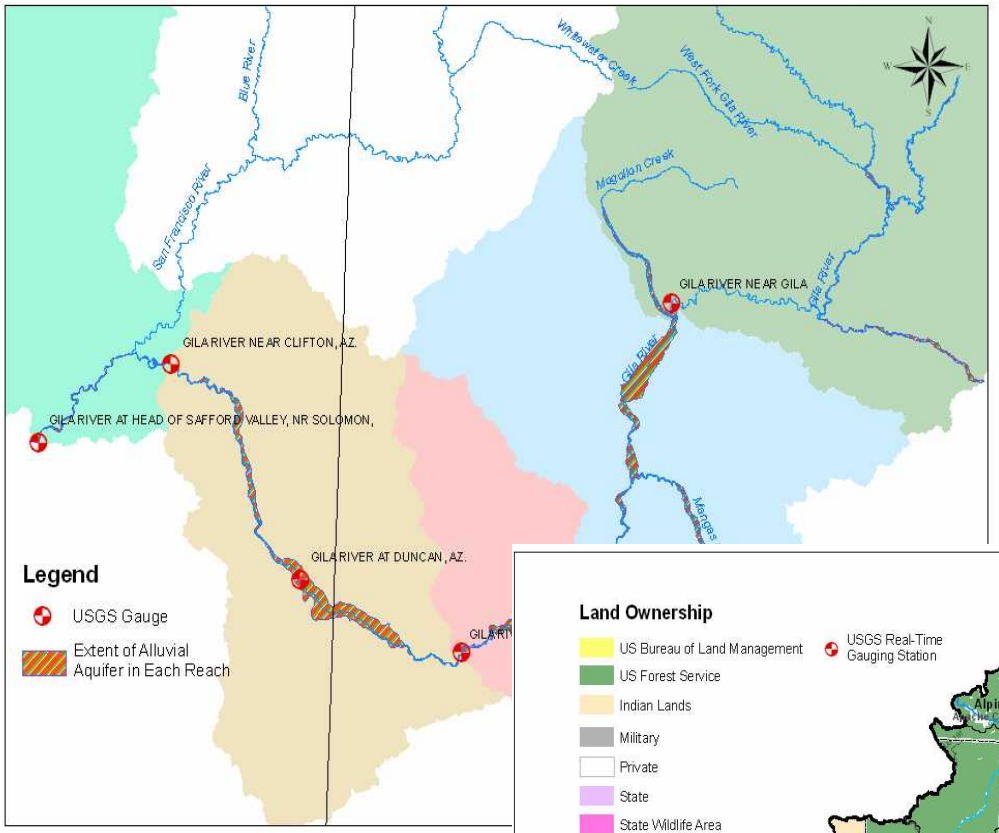
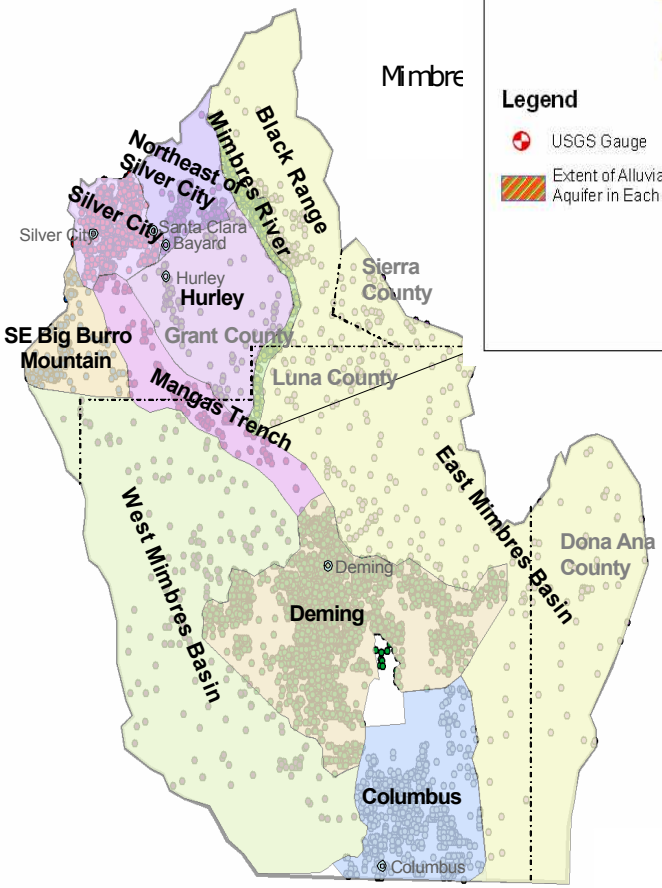
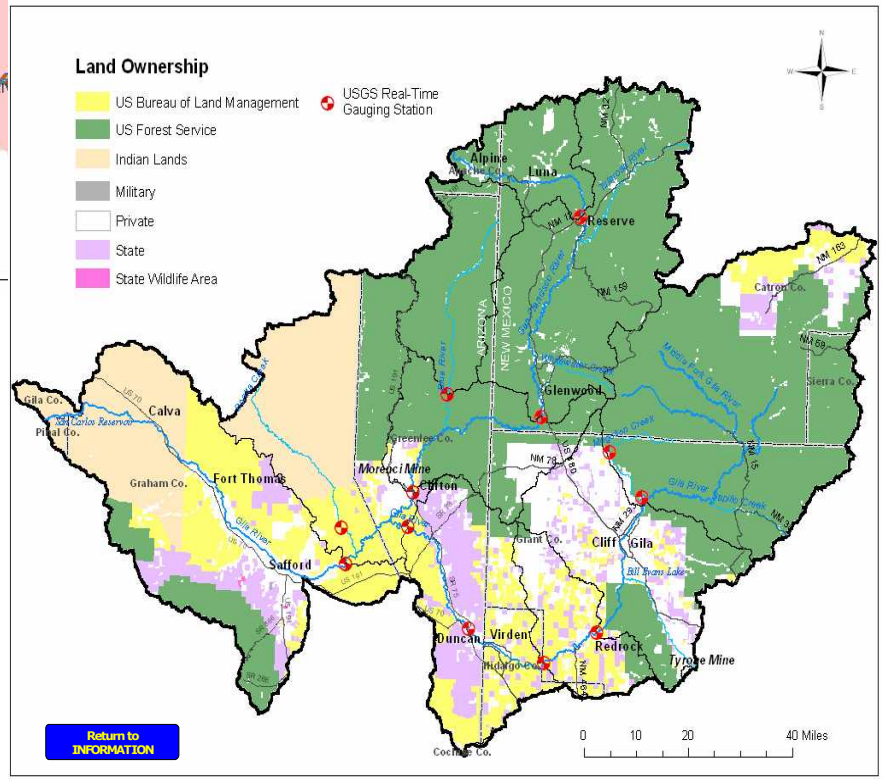
Maps







Laboratories

NM Small Business Assistance Program

- Allows Sandia to spend a portion of New Mexico gross receipts tax on projects that support New Mexico Small Businesses.

- Requires small businesses to “sign-on” to project as a sponsor. It costs the business nothing.

- Projects are up to 3 years in duration.

Join The Collaborative Modeling Team!

- **Membership is voluntary.**
- **Participation is mandatory once joined.**
- **Meeting frequency is currently on an as-needed basis pending additional funding.**

Questions? **Amy Sun acsun@sandia.gov**
Vince Tidwell vctidwe@sandia.gov