# GSF Decision Support Tool Update

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Technical Committee Meeting
Silver City, NM

Amy Sun
Geohydrology
Sandia National Laboratories

# Gila-San Francisco Modeling Team

- Formed in 9/2005, team has endured despite various political and funding changes.
- Team is comprised of concerned citizens, local, state, and federal organizations.
- Decision support tool has been conceptualized and built based on System Dynamics.

  *So-called "GSF Decision Support Tool"*
- The tool is being tested and modified accordingly.

# *"GSF Decision Support Tool"*

## Input

- Daily temperature
- USGS daily gauge reading (historical=>future)
- New Mexico CUFA constraints
- *Surface water demand*
- *Groundwater demand*
- *Instream Flow Requirement*
- *Growth trends*

## Output

- Consumptive use
- Non-Ag demand by sector
- New Mexico Potential Diversion per 2004 AWSA

adjustable by users to study different scenarios

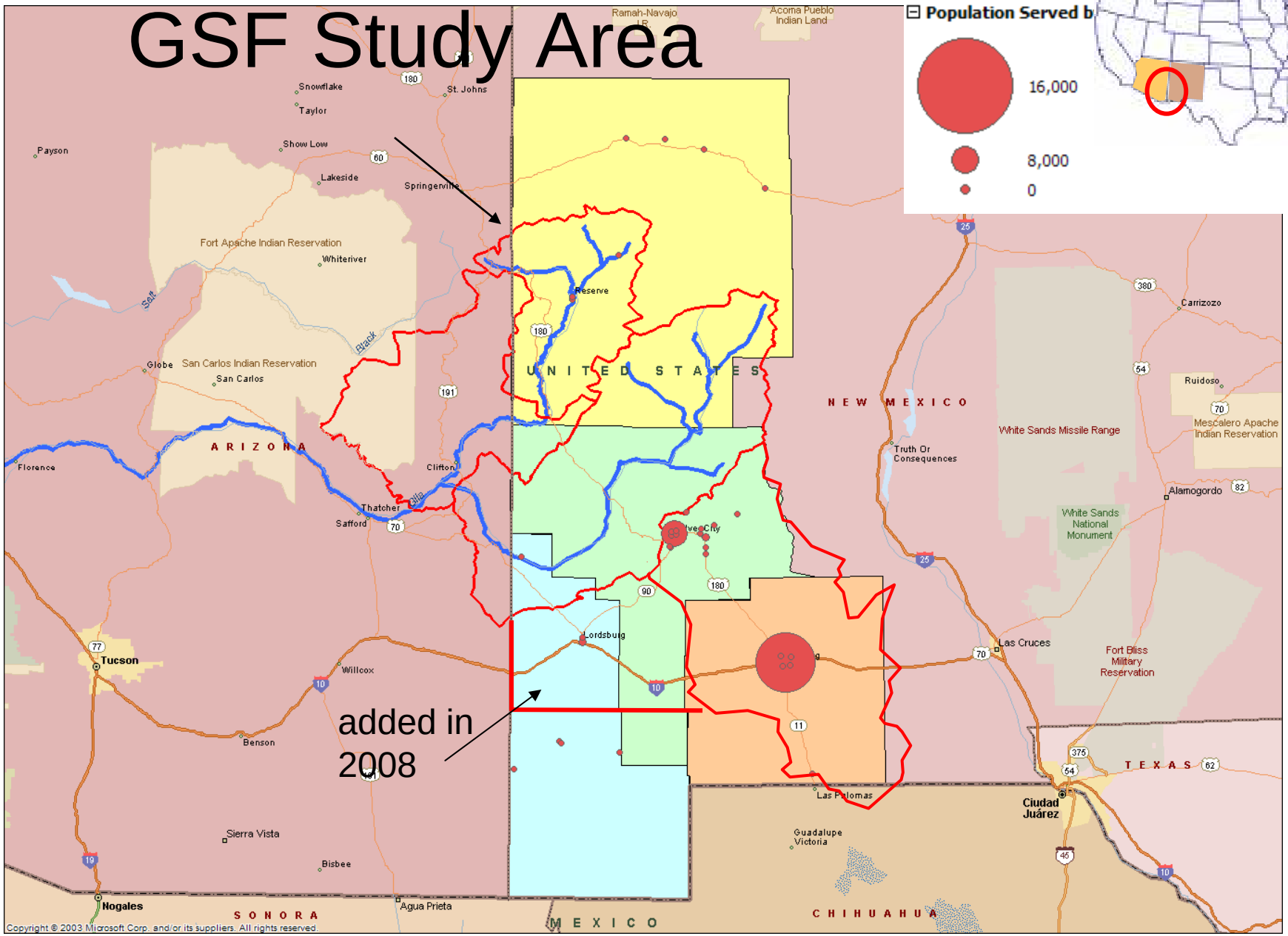
# Team Composition

- 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

# *“GSF Decision Support Tool”*

- Address these 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.

# GSF Study Area



# How Boundaries are Defined in the Tool

- Hydrogeology
  - Surface Water ***"reach"***: SF river (3) and Gila river (4)
  - Groundwater ***"basin"***: Mimbres, Gila-SF, and Animas
- Political
  - ***County***: Grant, Luna, Hidalgo, and Catron
  - ***Municipality***: SC, Deming, Columbus, Lordsburg, Bayard, Hurley, Glenwood, Reserve, Cliff-Gila, Santa Clara.
  - ***Rural*** = (Country – Municipality)
- Water Rights
  - Domestic consumptive use
  - Domestic Non-consumptive use (DNC)
  - Sector-based: Mining, Commercial, Agriculture, Livestock

# Unique features

- Dynamic simulation: daily time step
- Interactions between SW and GW
- Addresses New Mexico CUFA concerns
- User Interface for scenario building

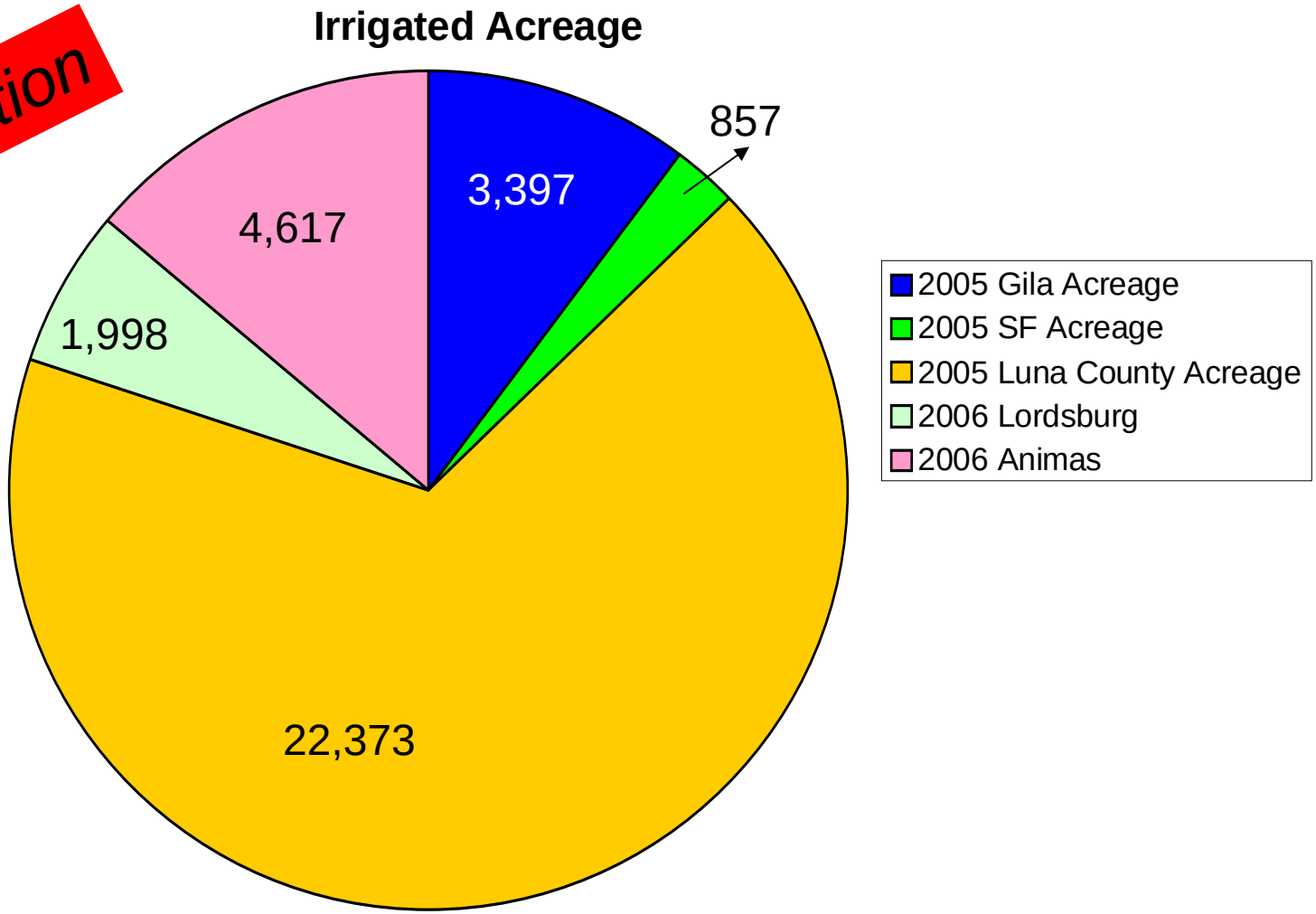
**Key Data Resources**
GIS Watershed Mapping
USGS data
Southwest New Mexico Regional Water Plan (01/2005)
OSE WATERS database
OSE annual hydrographic survey for Ag and non-Ag use
Balleau GW Assessment (2/2006)
Luna County Irrigation survey

# What are the Baseline Settings?

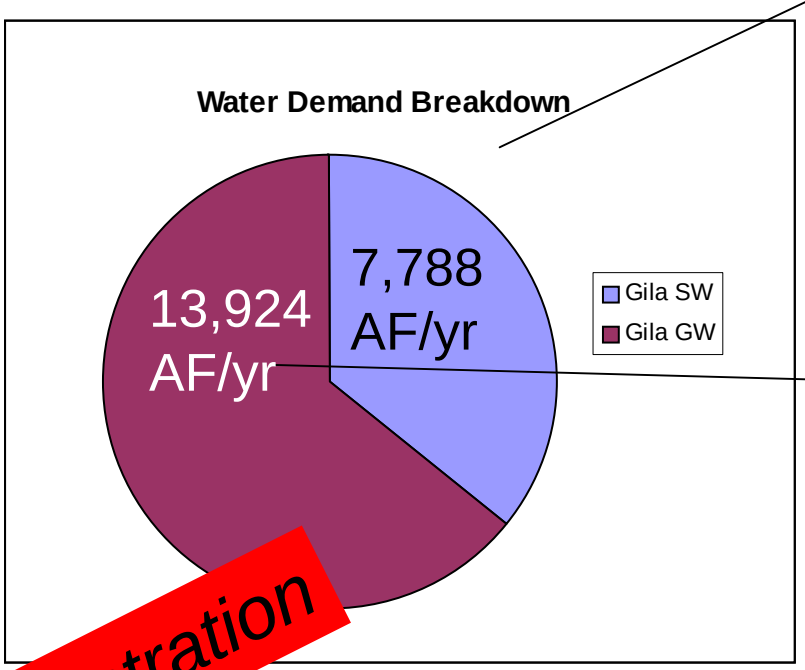
| SCENARIO | BASELINE (SYSTEM DEFAULT) SETTING |
|---|---|
| Temperature Change | Historical |
| Max Ag Water Rights | 2005 Irrigated Land % Adjudicated Total |
| Mining Leased $H_2O$ Rights | 2006 Data |
| Max Adjudicated Domestic CU Rights | 50% 2005 Adjudicated Rights |
| Population in Basin Change | BBER Low |
| CUFA Diversion and Minimum Flows | Both rivers ON, Stream Flow is calculated,<br><br>Ag Demand ON, Bypass Multiplier set to 0.80 for Winter and 0.75 Summer. All reaches are set to 150 cfs Minimum Flow. |
| Silver City | Basin Distribution is 30%, no new Hookups, CU = 140 gal/da/person |

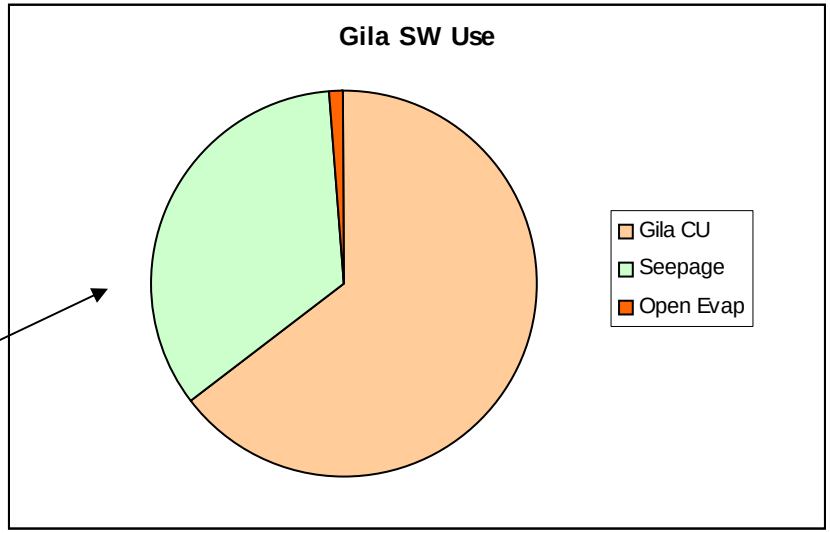
Illustration

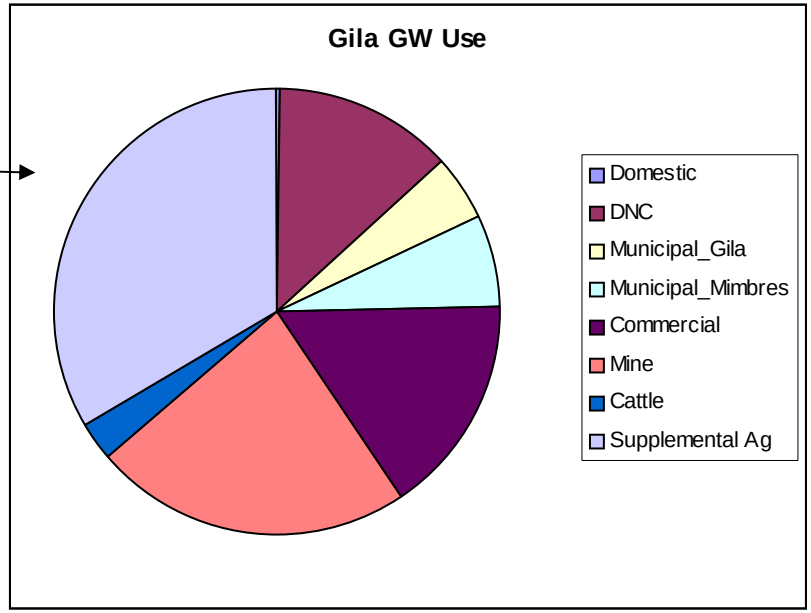
Illustration



# Gila Water Demand

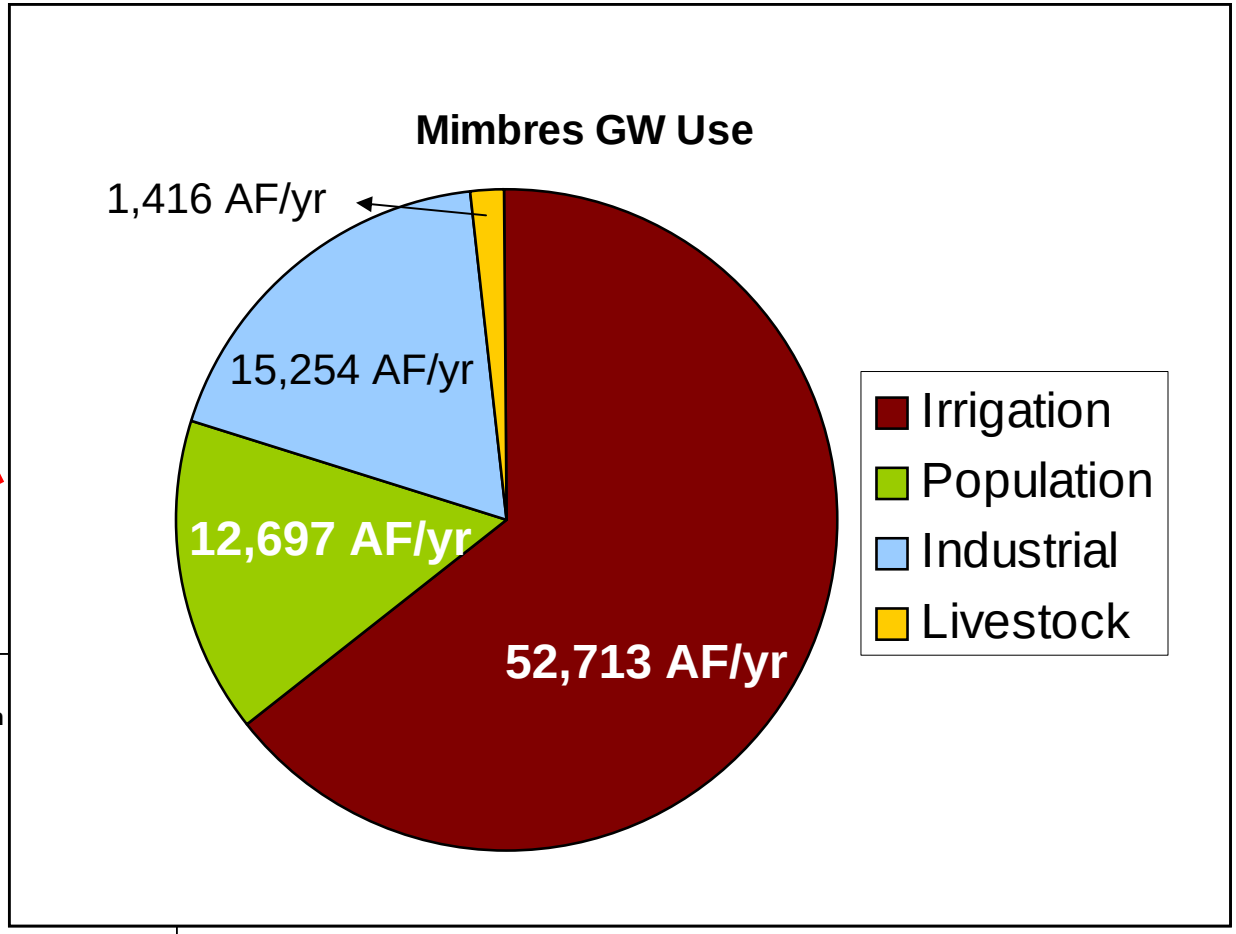


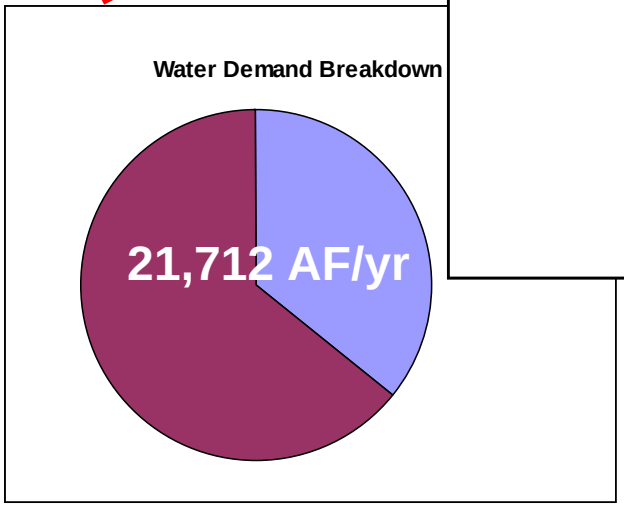



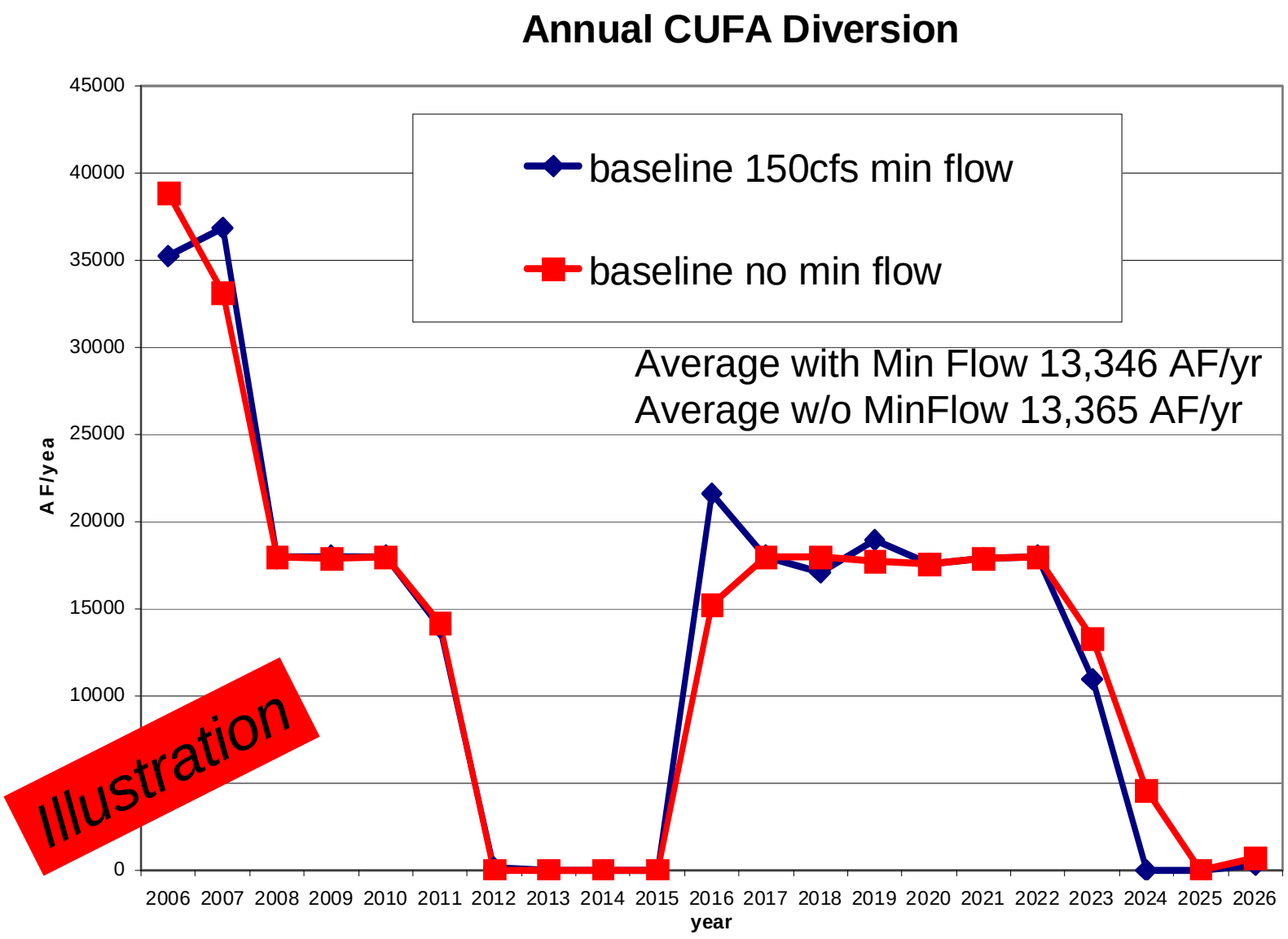

Illustration

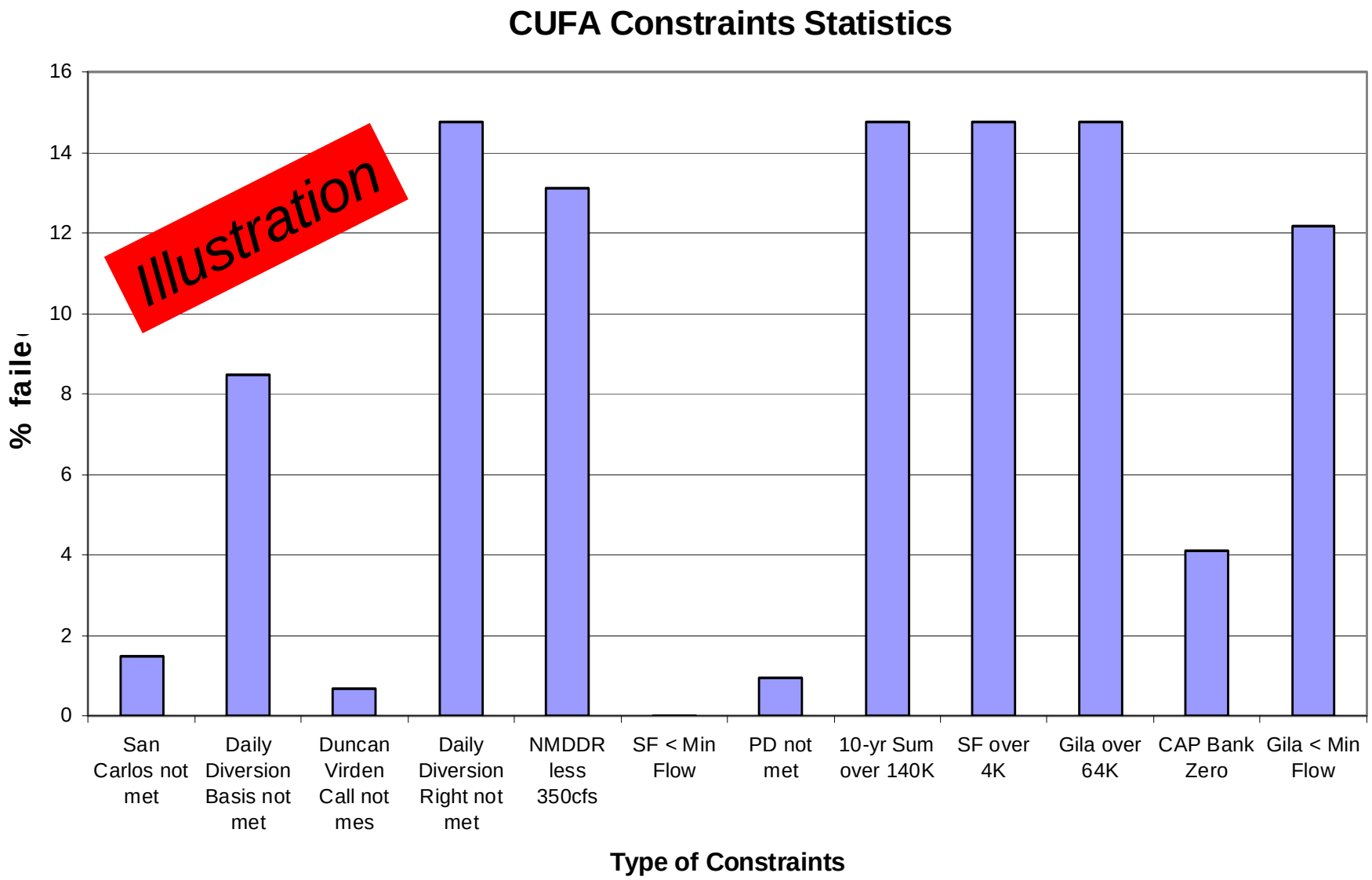
# Mimbres Water Demand

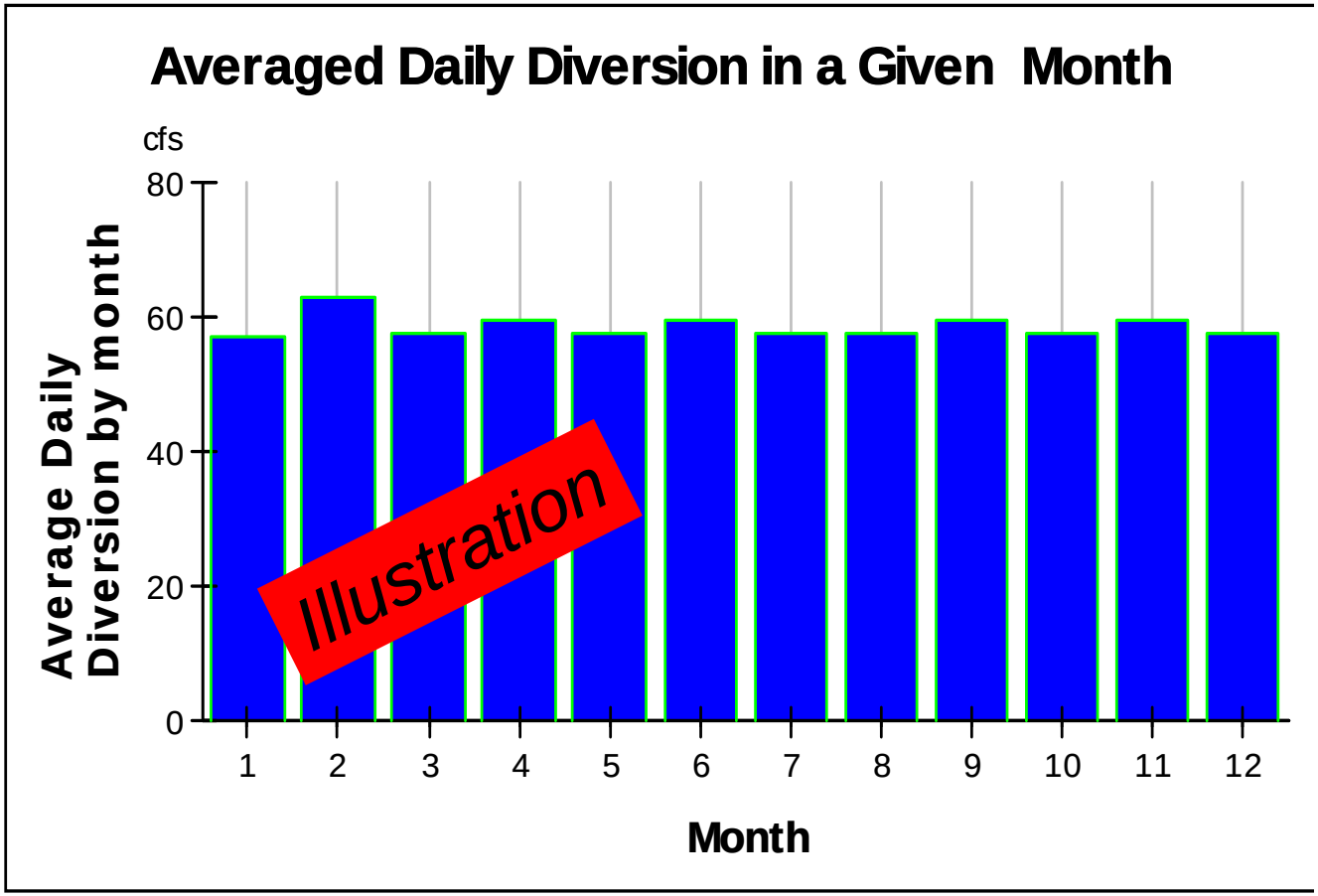



Illustration

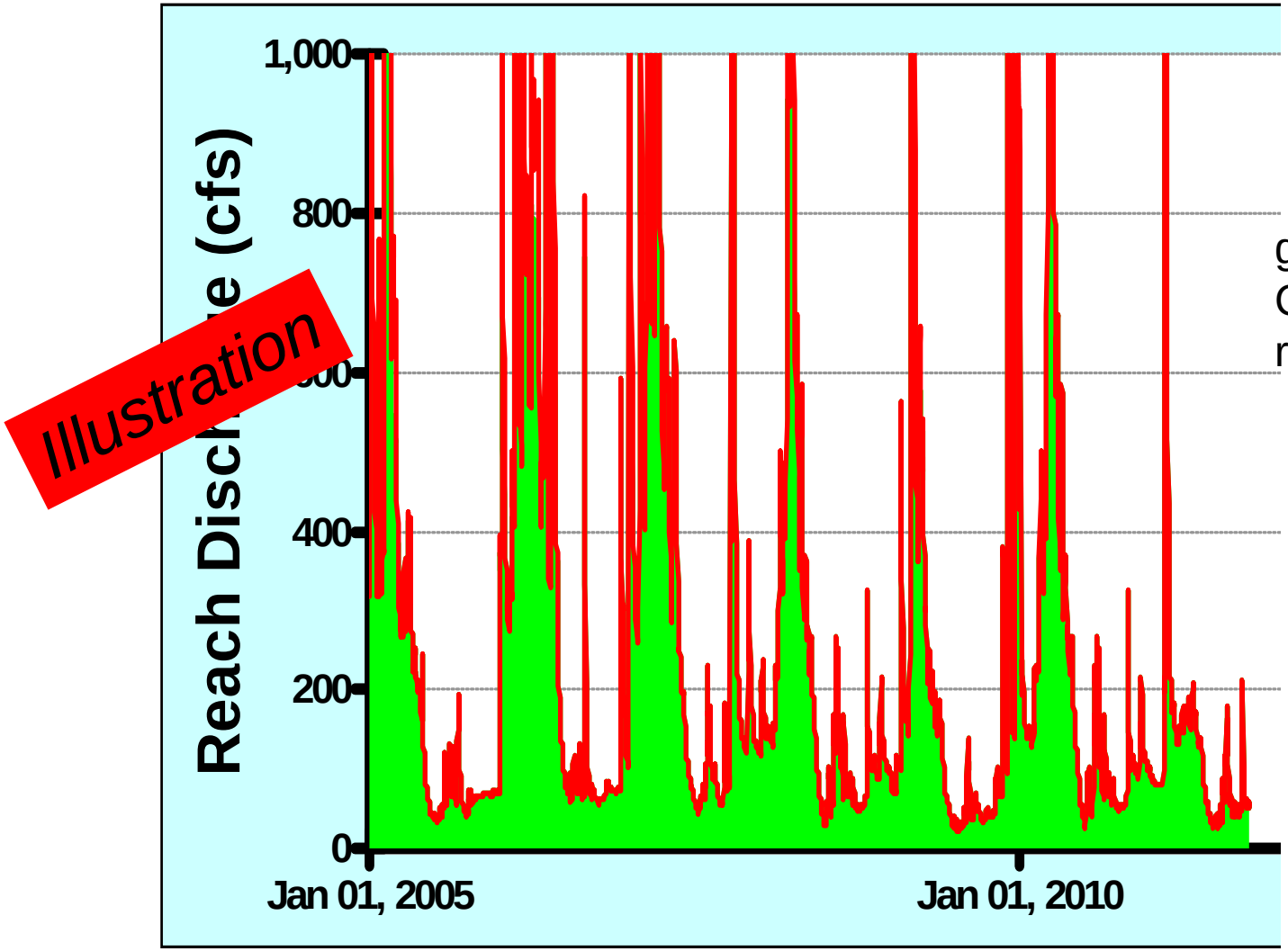



Annual CUFA Diversion
baseline 150cfs min flow
baseline no min flow
Average with Min Flow 13,346 AF/yr
Average w/o MinFlow 13,365 AF/yr
Illustration
A F/yea
year
45000
40000
35000
30000
25000
20000
15000
10000
0
2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026


CUFA Constraints Statistics
Illustration
% failed
16
14
12
10
8
6
4
2
0
San Carlos not met
Daily Diversion Basis not met
Duncan Virden Call not mes
Daily Diversion Right not met
NMDDR less 350cfs
SF < Min Flow
PD not met
10-yr Sum over 140K
SF over 4K
Gila over 64K
CAP Bank Zero
Gila < Min Flow
Type of Constraints

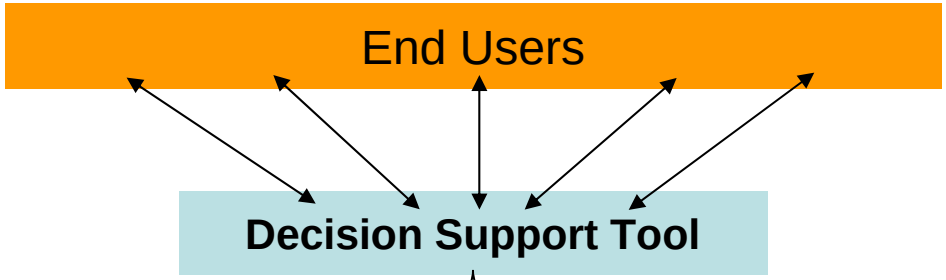

Averaged Daily Diversion in a Given Month
cfs
80
60
40
20
0
Average Daily Diversion by month
1
2
3
4
5
6
7
8
9
10
11
12
Month
Illustration

# Hydrograph alteration




green = with CUFA diversion
red = baseline

## CURRENT




DEMAND

2004 AWSA

population

industry

minimum flow

agriculture

GEOHYDROLOGY

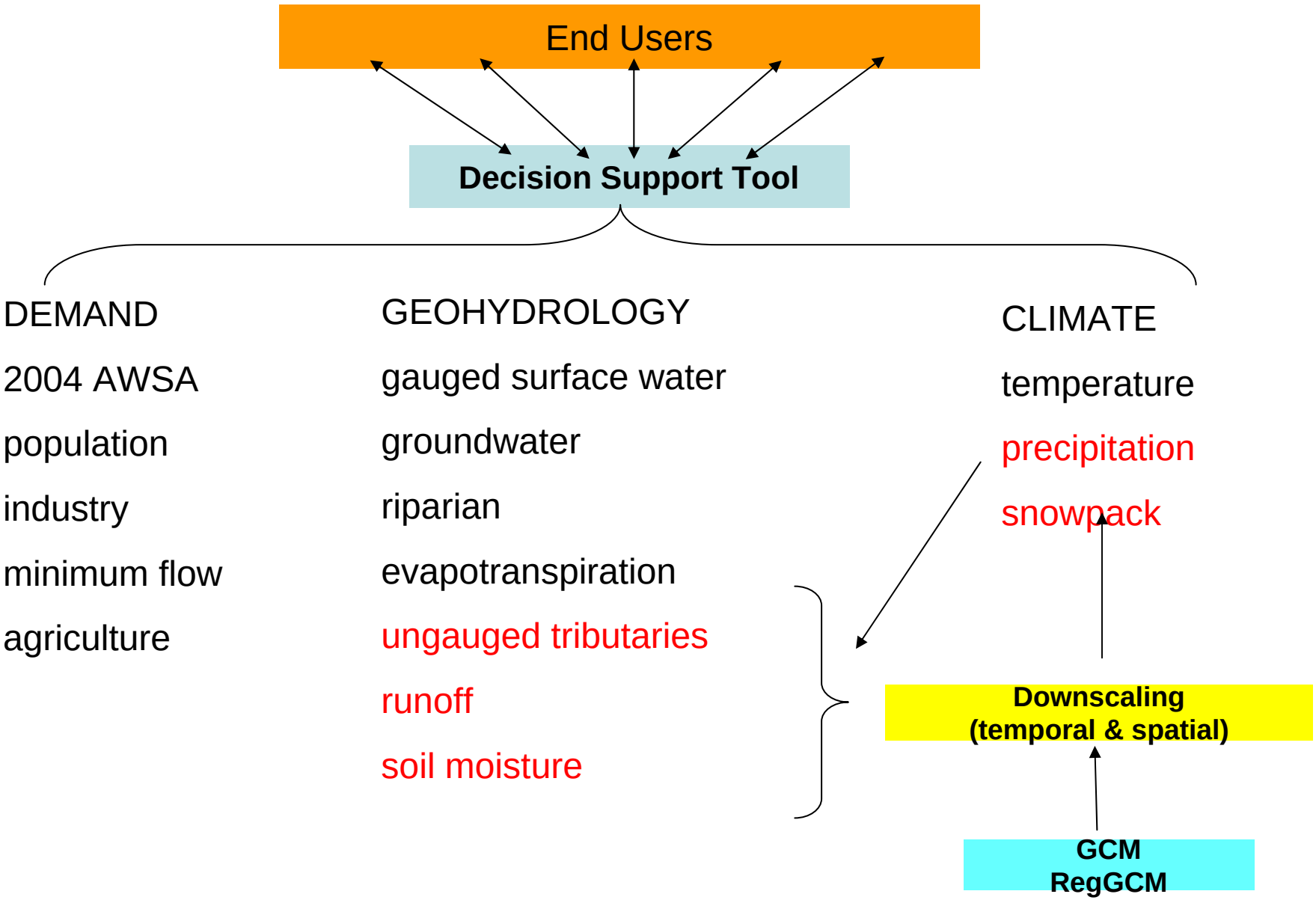
gauged surface water

groundwater

riparian

evapotranspiration

CLIMATE

temperature

## PROPOSED for NASA grant