Water Resources Research Center

College of Agriculture and Life Sciences, The University of Arizona

Water Management in Arizona: An Introduction

League of Arizona Cities and Towns

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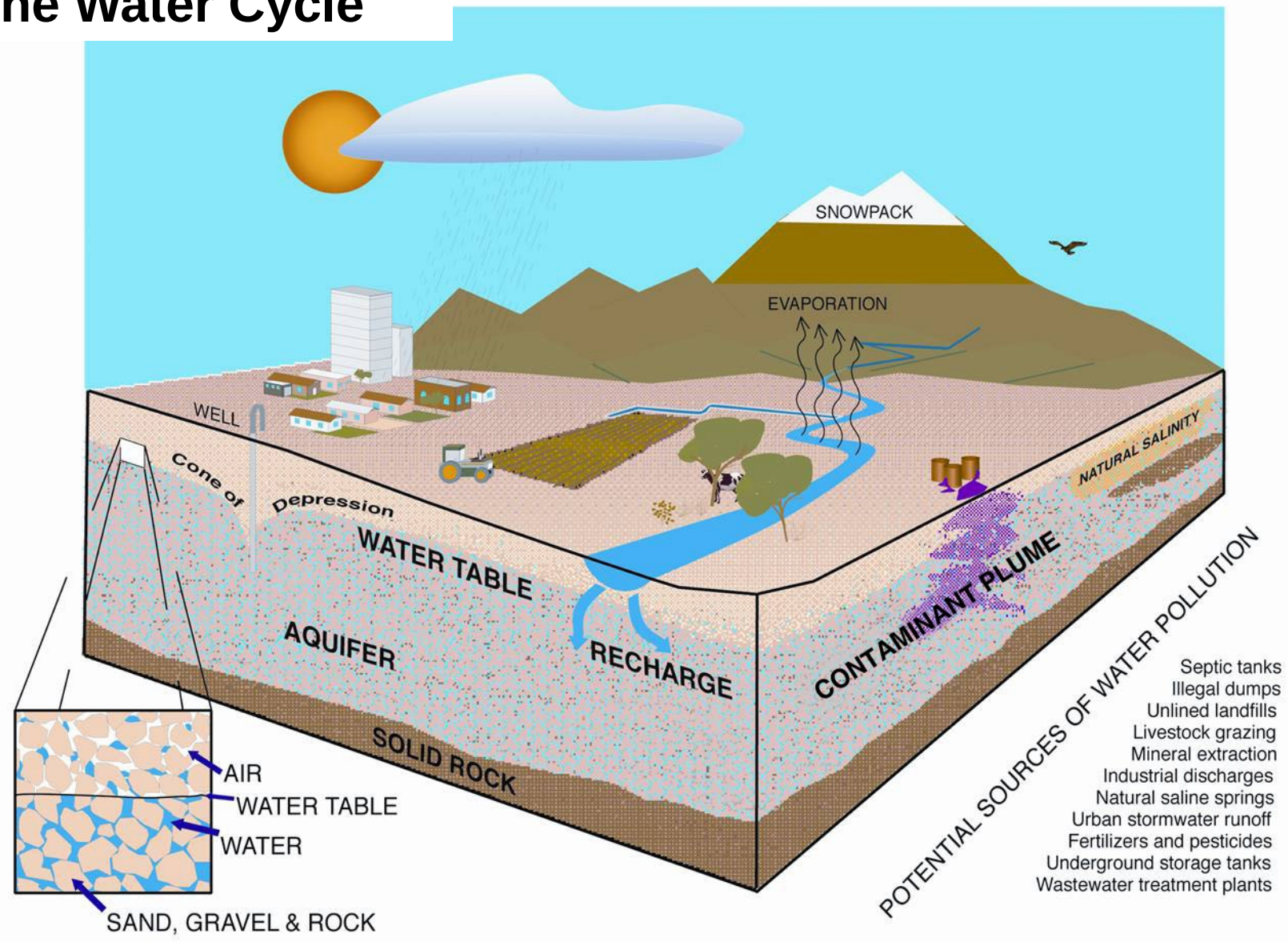
Sharon B. Megdal, Director
Water Resources Research Center
350 N. Campbell
Tucson, AZ 85721
520-792-9591, ext 21
fax 520-792-8518
email smegdal@ag.arizona.edu
web site: www.ag.arizona.edu/azwater/

Arizona's Use of Water

- Arizonans use over 7 million acre feet of water per year. Good estimates of water use for certain parts of the state and/or certain sectors are hard to obtain. Also, some water withdrawn from the Colorado River is stored for future use.
- An acre foot of water is 325,851 gallons. How many people served by one acre foot?
- Article in the Arizona Republic (3/12/2004) reported Arizonans use over 6.7 billion gallons of water daily.
- Over 40% of Arizona water use is **Groundwater**

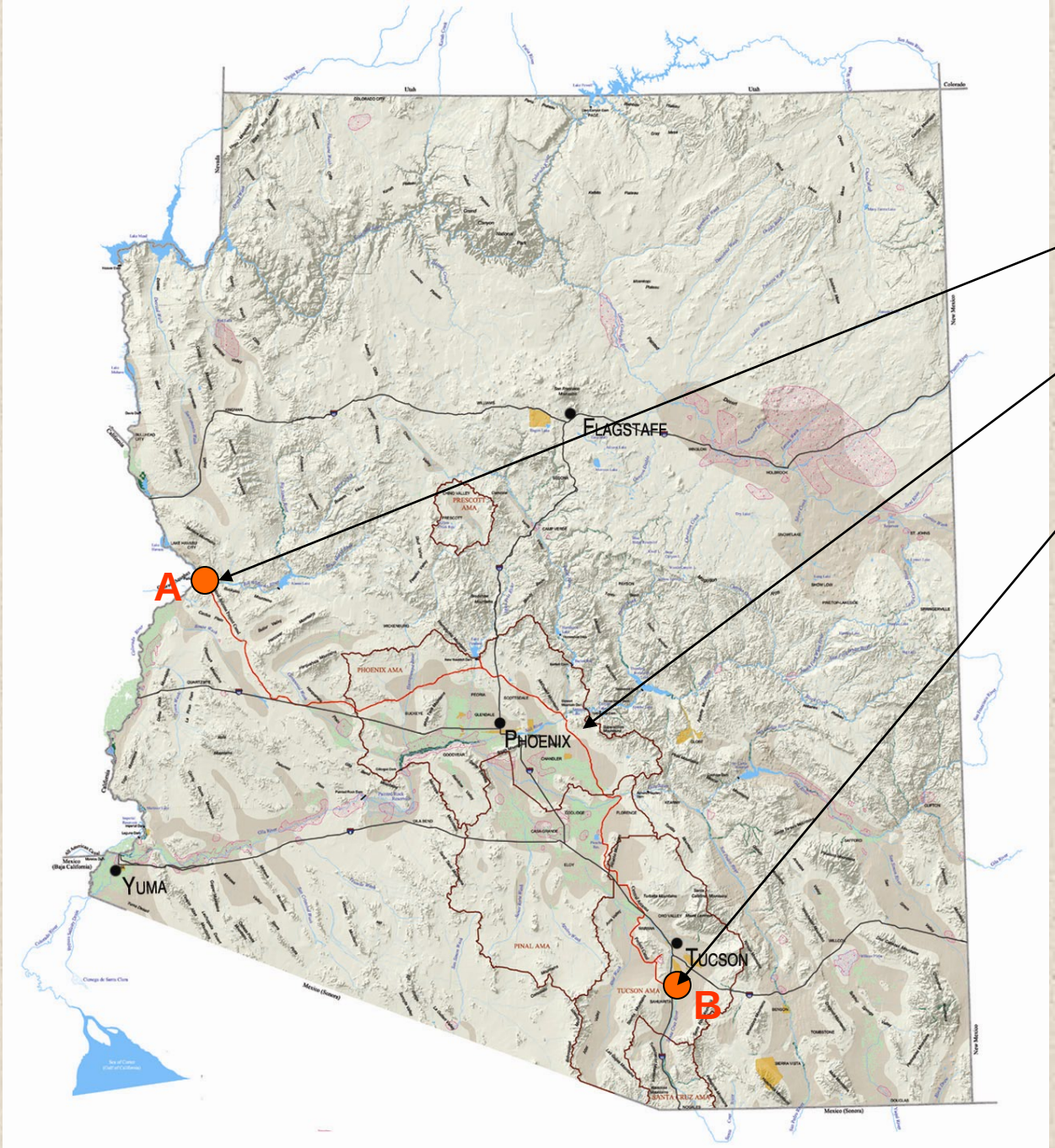
The Water Cycle



Arizona Water Budget

Water Source	Million Acre-Feet	% of Total
SURFACE WATER		
Colorado River	**2.8**	**39 %**
CAP ***1.5***		
On-River ***1.3***		**21**
In-State Rivers	**1.4**	**19**
Salt-Verde ***1***		**13.8**
Gila & others ***0.4***		**5.2**
GROUNDWATER	**2.9**	**40**
RECLAIMED WATER	**0.14**	**2**
Total	***7.24 MAF***	

Courtesy, Arizona Dept. of Water Resources



Arizona Water Map

Central Arizona Project shown in orange

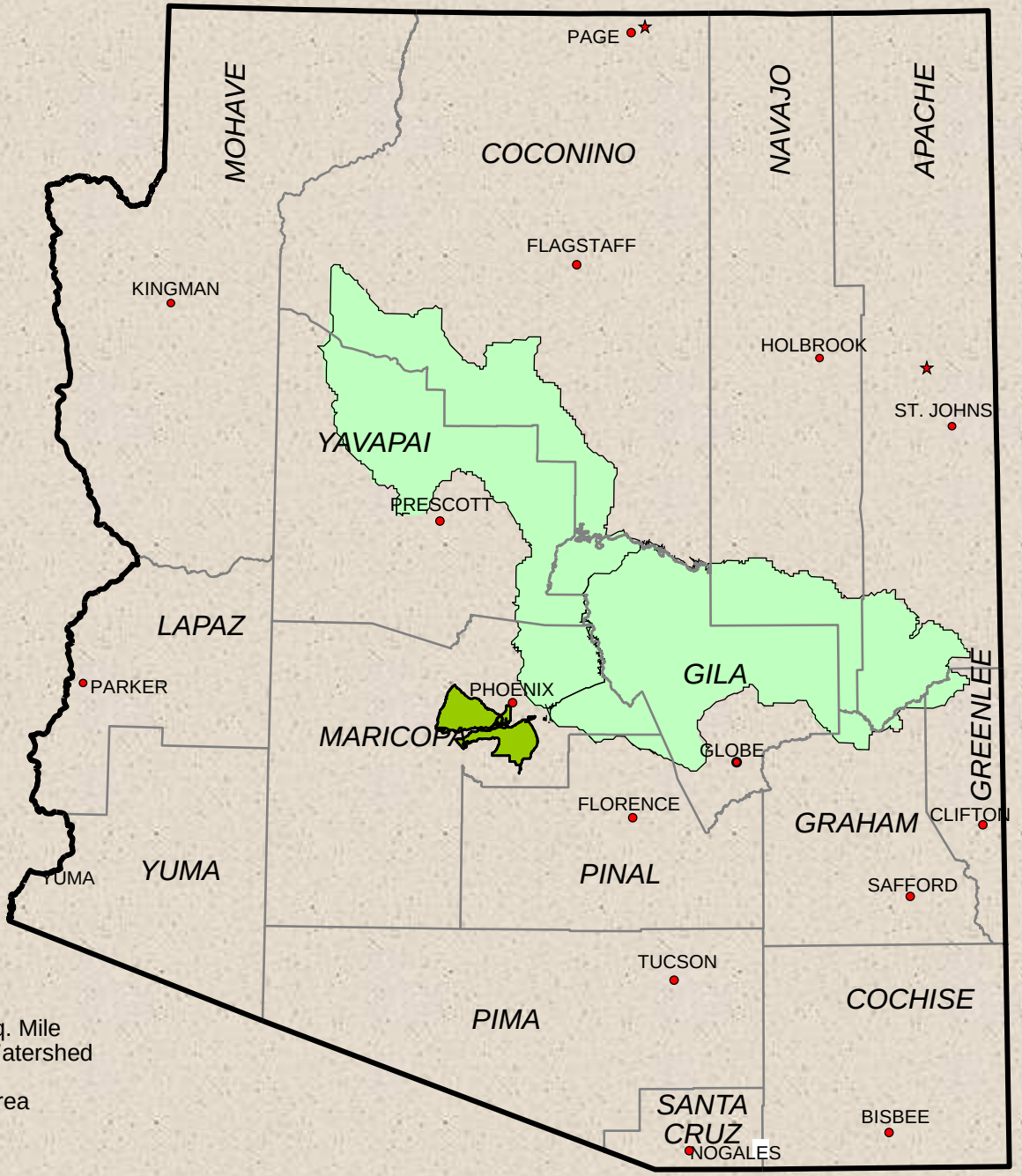
336 Miles

Cost over $4 billion

Pumps water from Point A, at sea level, to Point B, to a maximum elevation near Tucson of about 2,800 feet

Built to transport 1.5 million acre feet of water annually

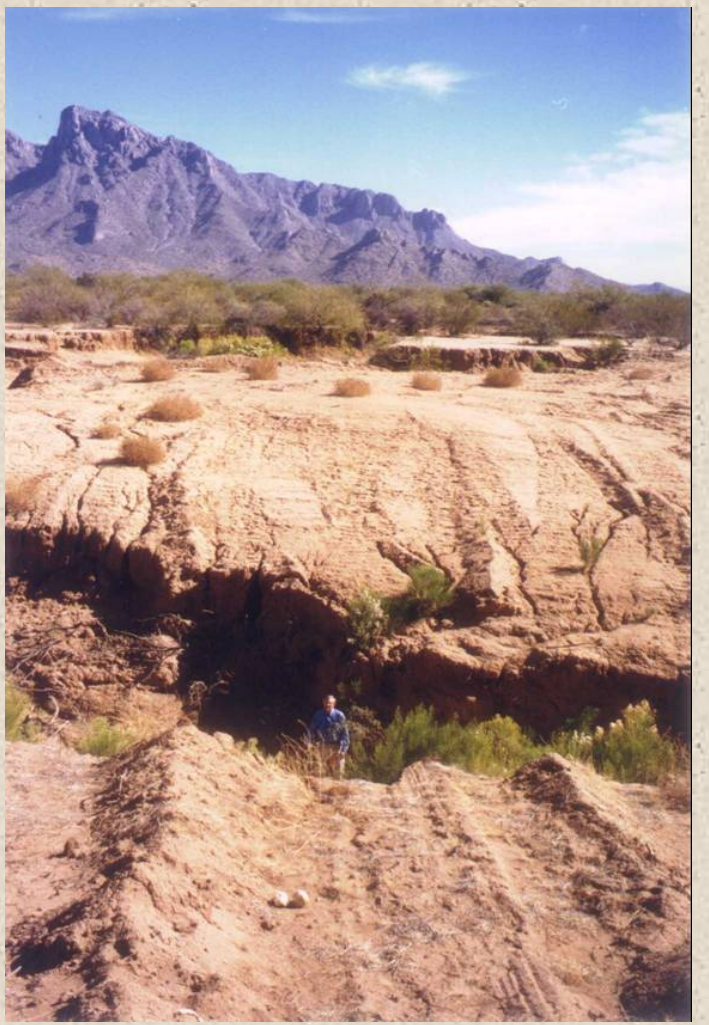
Salt River Project Watershed



Water Resources Research Center – University of Arizona

Growth in People and Economic Activity Resulted in Groundwater Overdraft Problem in some parts of Arizona

- Groundwater pumped from aquifers faster than it is replenished by nature
- Problem: declining water tables, with numerous associated implications: water quality, cost of pumping, land subsidence and fissuring.

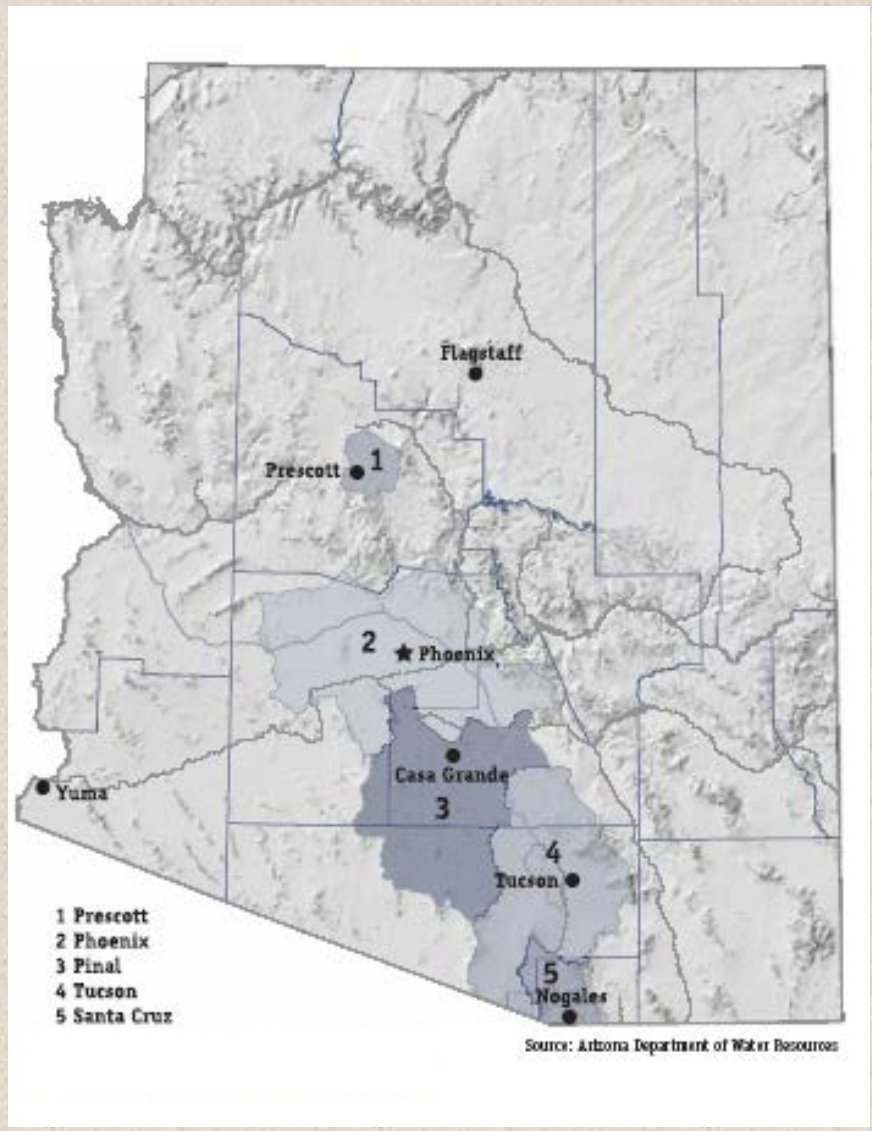


State's Response: 1980 State of Arizona Groundwater Management Act (GMA)

- Established areas where groundwater management was required – **Active Management Areas**, each with a statutory **management goal**
- GMA required the adoption of **Assured Water Supply Rules**, which require municipal growth to depend primarily on renewable supplies.
- **Conservation** programs for each water using sector and management plans are developed by the Arizona Department of Water Resources every 10 years.
- **No expansion of agricultural land** beyond what was irrigated during the late 1970s.

- Statutes and Management Plans establish regulatory framework, but the decisions how to meet the regulations are made by the water user/water supplier.

Active Management Areas in Arizona

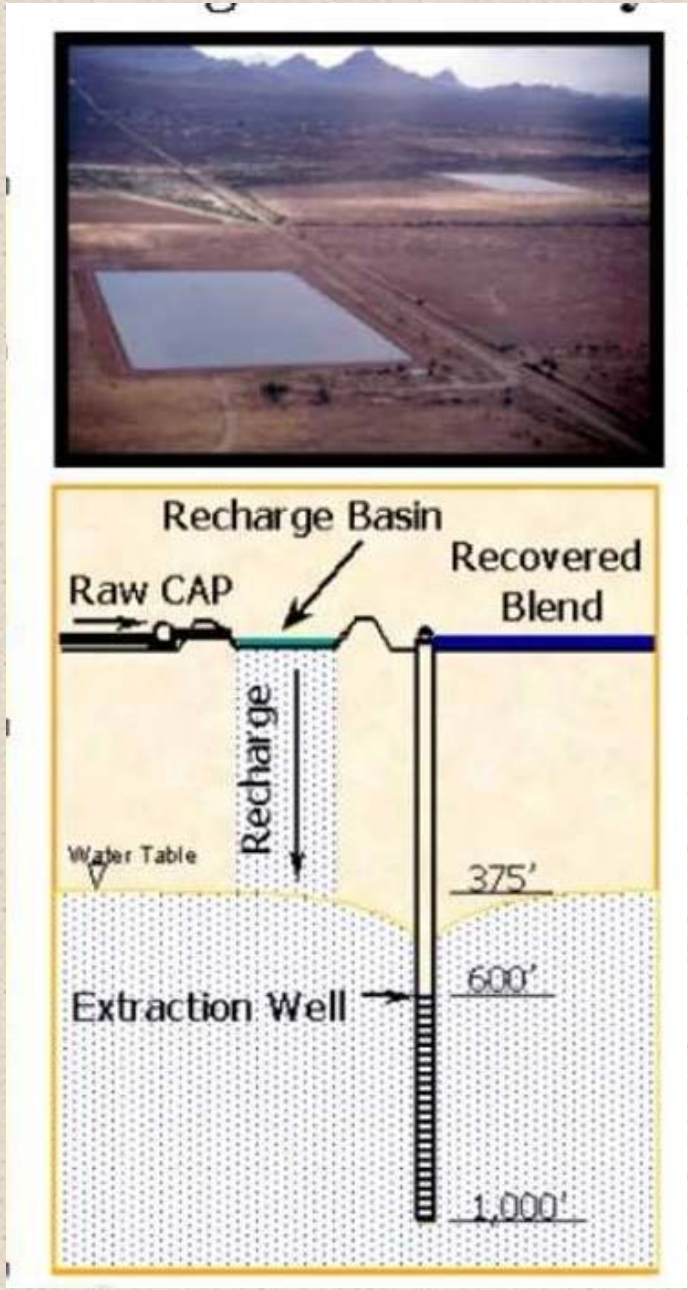


Note: Management goals may differ by AMA

GMA has withstood the test of time, but improvements have been made. Arizona has been an innovator in water storage and recovery programs: water some times is not where it is needed spatially or in time

- Recharge and Recovery Program (late 1980s – 1990s)
  - Underground Storage
  - Groundwater Savings
- Central Arizona Groundwater Replenishment District (1993)
- Arizona Water Banking Authority (Since 1996, over 2 million af stored)
  - Intrastate storage
  - Interstate storage

Underground Storage Facilities (USF): Storage through infiltration Water delivered to basins or riverbeds



Graphic courtesy of
Tucson Water

Credits are accrued for water stored at underground storage facilities. This graphic shows how the water infiltrates the ground and makes its way to the aquifer, where it mixes with ambient groundwater. A well recovers the water from the aquifer. In the early years of this particular recharge and recovery program, the chemical composition of the recovered water is similar to groundwater. Over time, more and more CAP water mixes with the groundwater, changing the chemical composition of the recovered water.

Groundwater Savings Facilities (GSF): Instead of using groundwater, agriculture substitutes CAP water or effluent.

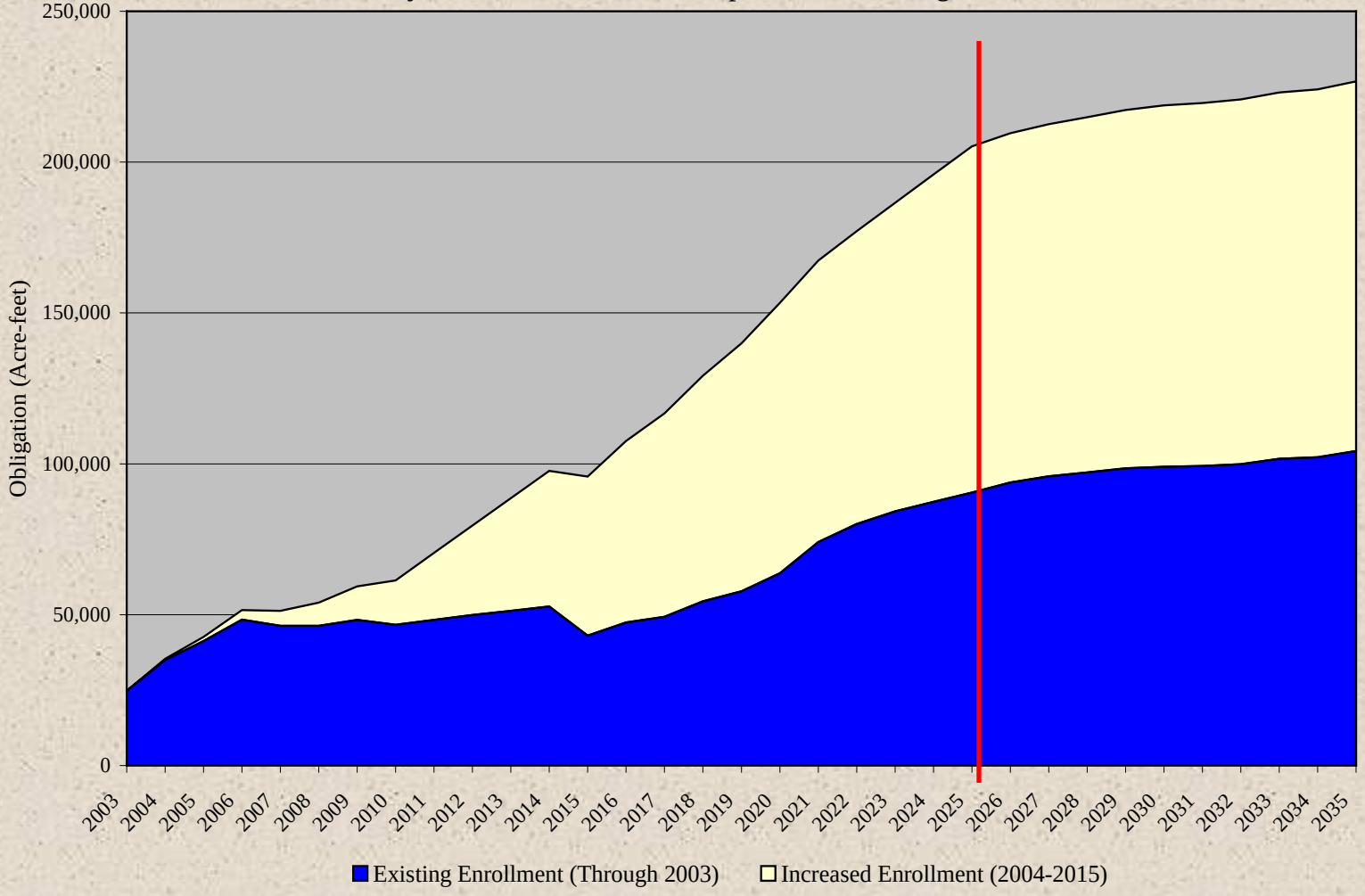
CAGRD Water Status Capability Plan - October 2000

Total Projected Groundwater Replenishment Obligations Through 2025 – The following table summarizes the CAGRD's projected groundwater replenishment obligations for all of its existing members and applicants through 2025.

AMA	Replenishment Type	Groundwater Replenishment Obligation (Acre-feet)						
		1999	2000	2005	2010	2015	2020	2025
Phoenix - West	Parcel	1,498	3,125	7,252	8,440	8,440	8,440	8,440
	Service Area	169	366	6,370	15,666	15,702	15,702	15,702
Phoenix - East	Parcel	906	2,458	5,029	5,892	5,892	5,892	5,892
	Service Area	174	349	1,223	2,096	2,096	2,096	2,096
Pinal	Parcel	0	20	62	62	62	62	62
	Service Area	0	0	0	0	0	0	0
Tucson	Parcel	44	99	314	464	609	754	869
	Service Area	2,950	5,880	13,228	10,808	13,458	14,296	14,296
Total		5,742	12,298	33,477	43,427	46,258	47,241	47,356

FIGURE 1

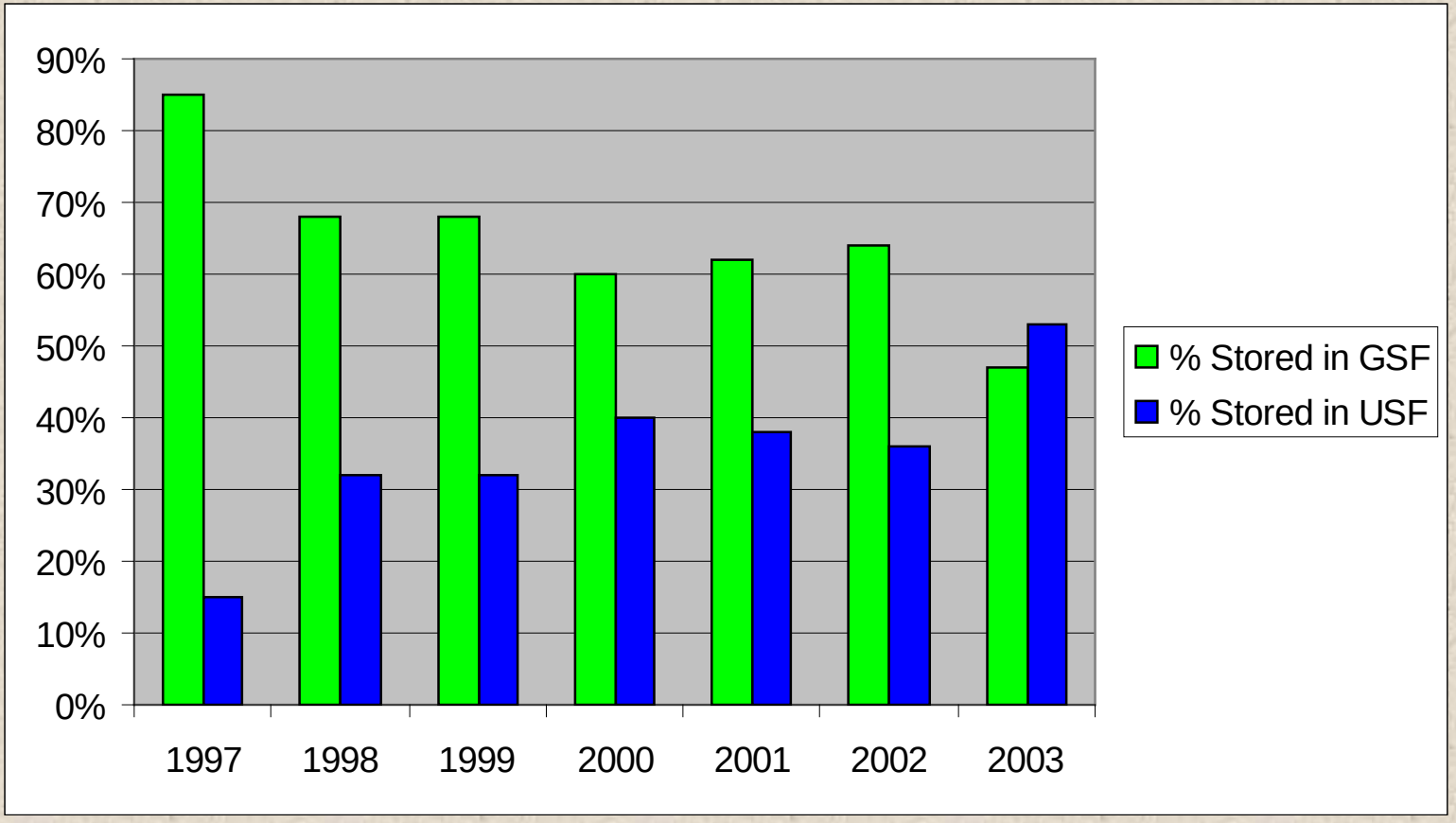
Projected CAGRD Annual Replenishment Obligations



Important Water Storage Agency: The Arizona Water Banking Authority

- Established in 1996
- Purposes
  - Assist state in making full utilization of Arizona's Colorado River Water
  - Storage for times of shortage or outages on the canal
  - Groundwater Management
  - Indian Settlements
- Very successful – to date over 2 million acre feet of water has been stored

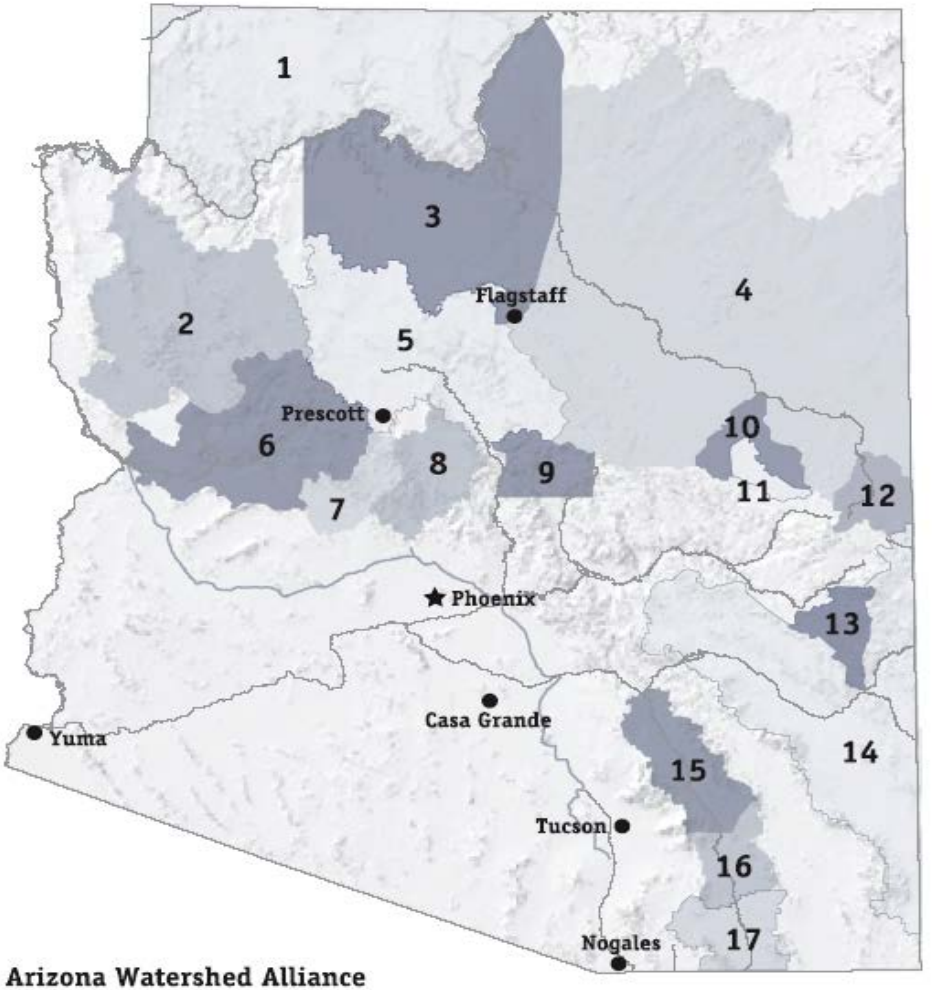
AWBA Long-term Water Credits Comparison of Percentage USF vs. GSF Credits.



In the non-Active Management Areas, watershed groups and others are actively involved in water resources planning.

These efforts recognize the differences across regions of the state. Different circumstances may require different solutions.

Why are these efforts so important?



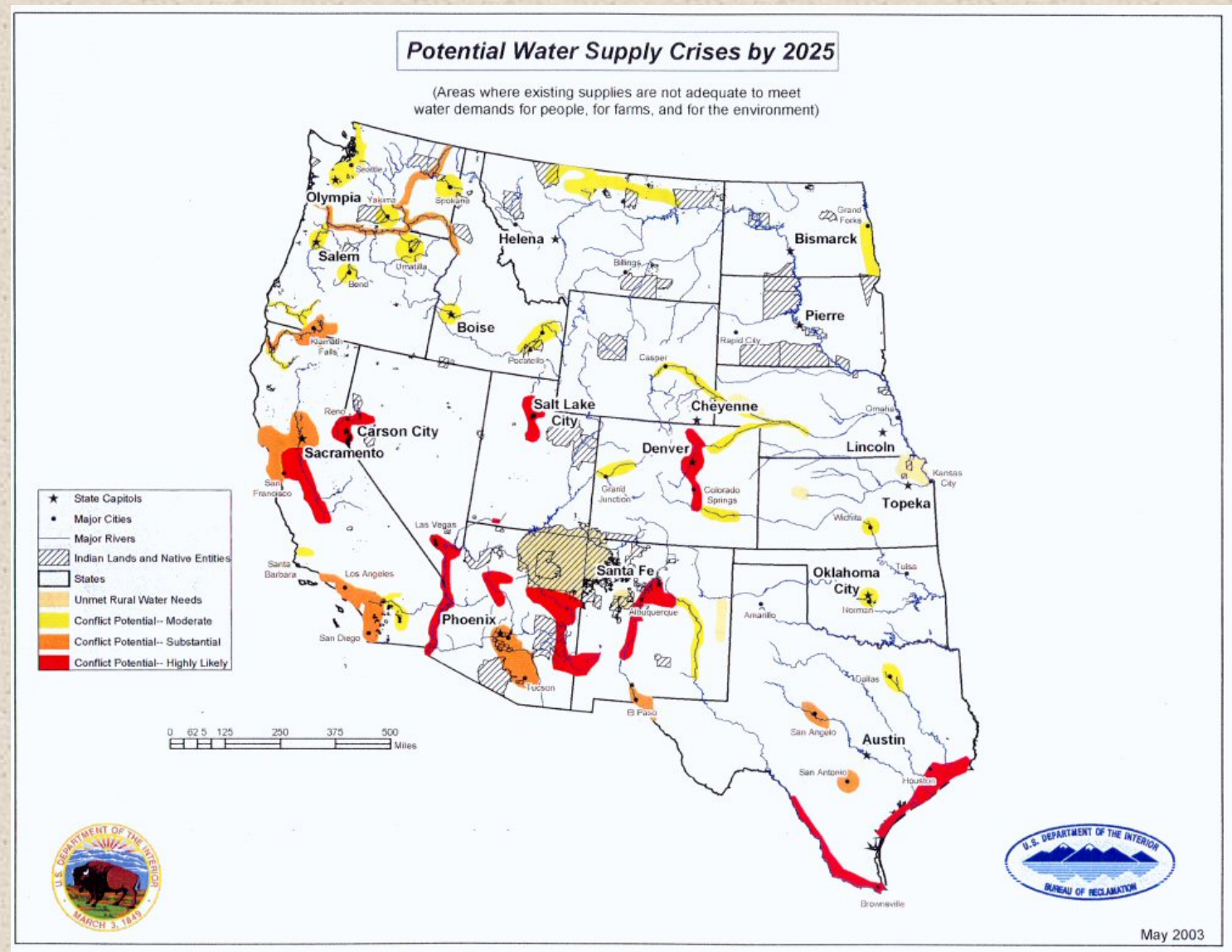
Arizona Watershed Alliance

1 Arizona Strip
2 Northwest Arizona Watershed Council
3 Coconino Plateau Regional Water Study
4 Little Colorado Multi-Objective Management
5 Upper Verde and Middle Verde Studies
6 Upper Bill Williams
7 Upper Hassayampa
8 Upper Agua Fría
9 Northern Gila County Water Plan Alliance
10 Silver Creek
11 Show Low Creek
12 Upper Little Colorado River Partnership
13 Eagle Creek
14 Upper Gila
15 Lower San Pedro
16 Middle San Pedro
17 Upper San Pedro Partnership

Source: Arizona Department of Water Resources

Water 2025

"Crisis management is not an effective solution for addressing long-term, systematic water supply problems." Interior Secretary Gale Norton



Much water resources work remains to be done by policy makers, water providers and citizens – and university personnel. Some examples…

- Water management outside the AMAs, including water quantity assessments
- Access to and utilization of renewable supplies, including water marketing
- Interstate and cross-border water issues
- Long-term water supplies for CAGRD
- The surface water/groundwater interface

More Examples

- Indian Settlements
- Water quality
- Riparian areas and other environmental issues
- Optimal utilization of effluent
- Implications of long term water storage
- Recovery of stored water
- Drought planning and climate implications of supply dependability

Our Distinguished Panel

- From a non-AMA City that is serious about water conservation: Council Member Art Babbott, Flagstaff
- From a small, non-AMA town in the Verde Watershed: Council Member Tony Gioia, Campe Verde
- From a town in an AMA, which has transitioned from agriculture to homes: Vice-Mayor Herb Kai, Marana
- From the largest city in the state and the largest AMA: Council Member Claude Mattox, Phoenix
- From a non-AMA city in the Upper San Pedro Watershed: Council Member Bob Strain, Sierra Vista
- From a non-AMA city in an area where both agriculture and the number of people are increasing: Mayor Larry Nelson, Yuma

Closing Thoughts

- When the well's dry, we know the worth of water. – *Benjamin Franklin, Poor Richard's Almanac, 1746*

•The frog does not drink up the pond in which he lives. – *American Indian Proverb*