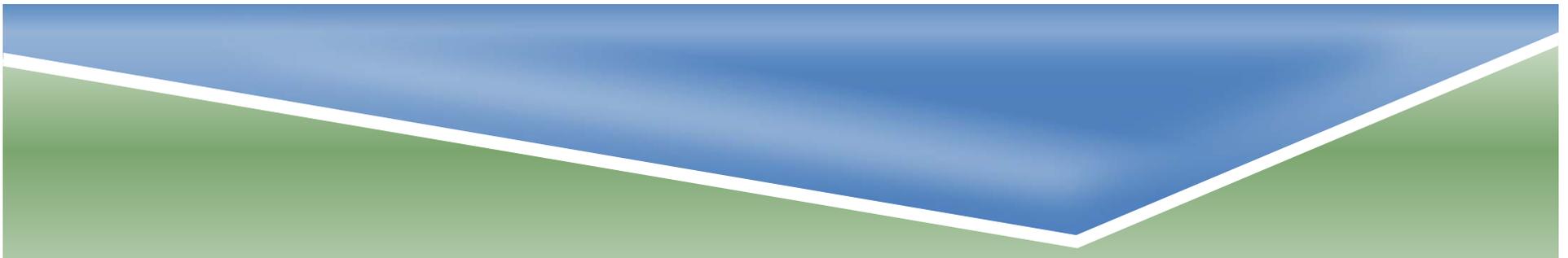


ARIZONA DEPARTMENT OF WATER RESOURCES



**Enhanced Aquifer Management
Stakeholder Meeting #2
November 13, 2013**

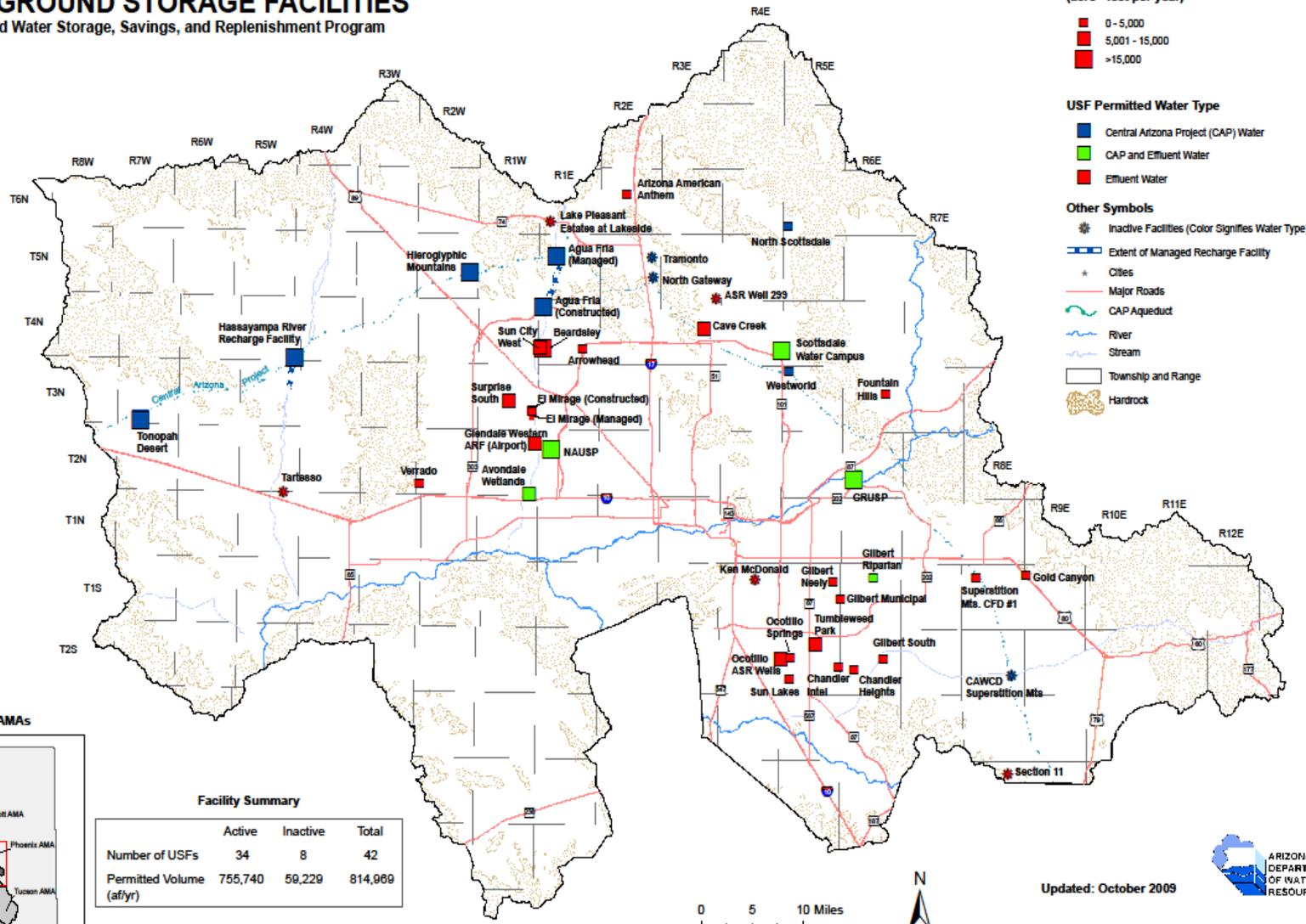


Enhanced Aquifer Management Background

- ▶ **The underground water storage program has been beneficial for storage of renewable supplies for future use**
 - ▶ **Flexibility**
 - ▶ **Storer can potentially store in one location, recover in a different location/subbasin within same AMA**
 - ▶ **Drawbacks**
 - ▶ **Recovery at locations far from storage (or replenishment far from pumping) can create problems**

PHOENIX ACTIVE MANAGEMENT AREA UNDERGROUND STORAGE FACILITIES

Underground Water Storage, Savings, and Replenishment Program



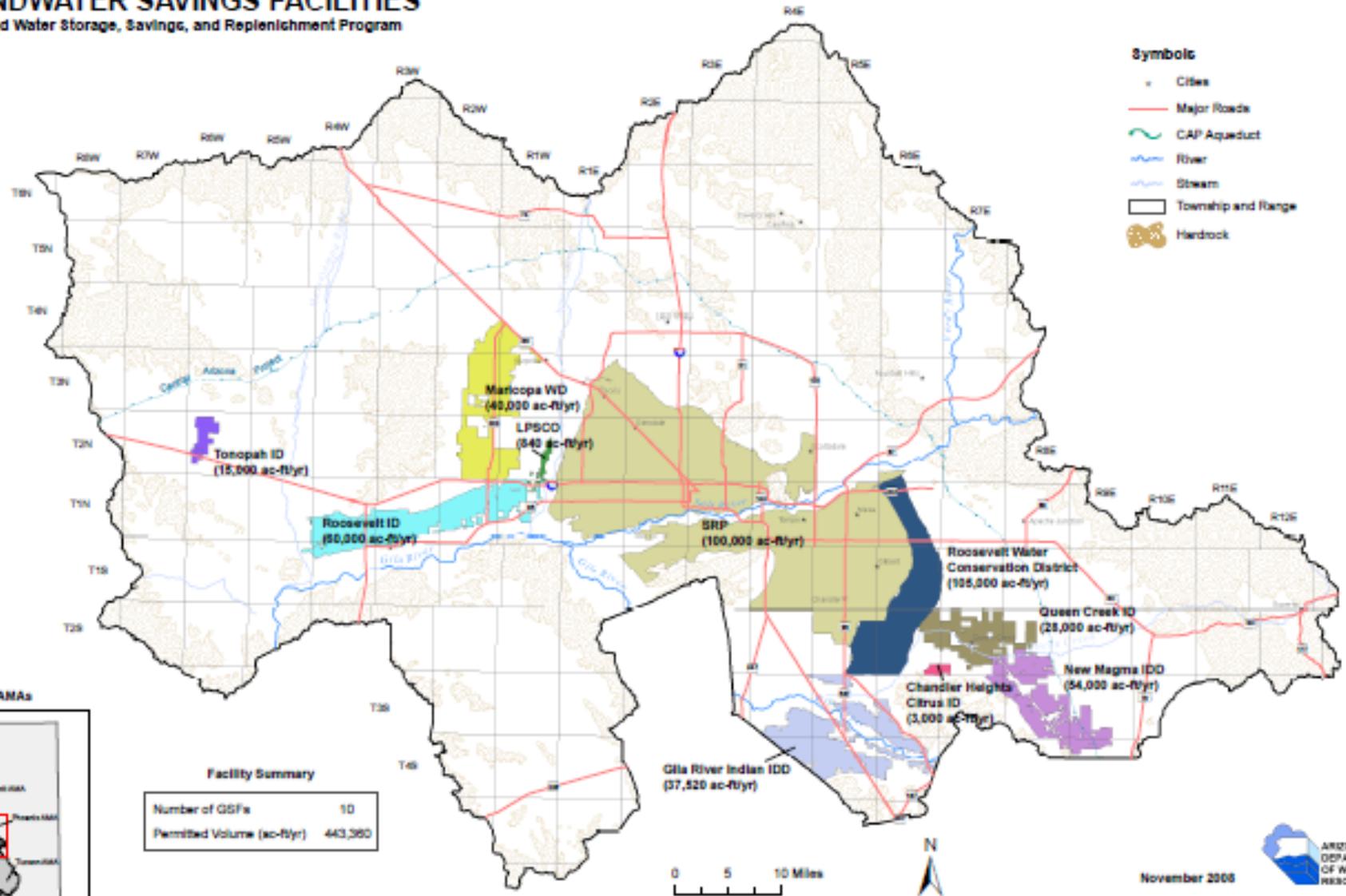
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Updated: October 2009

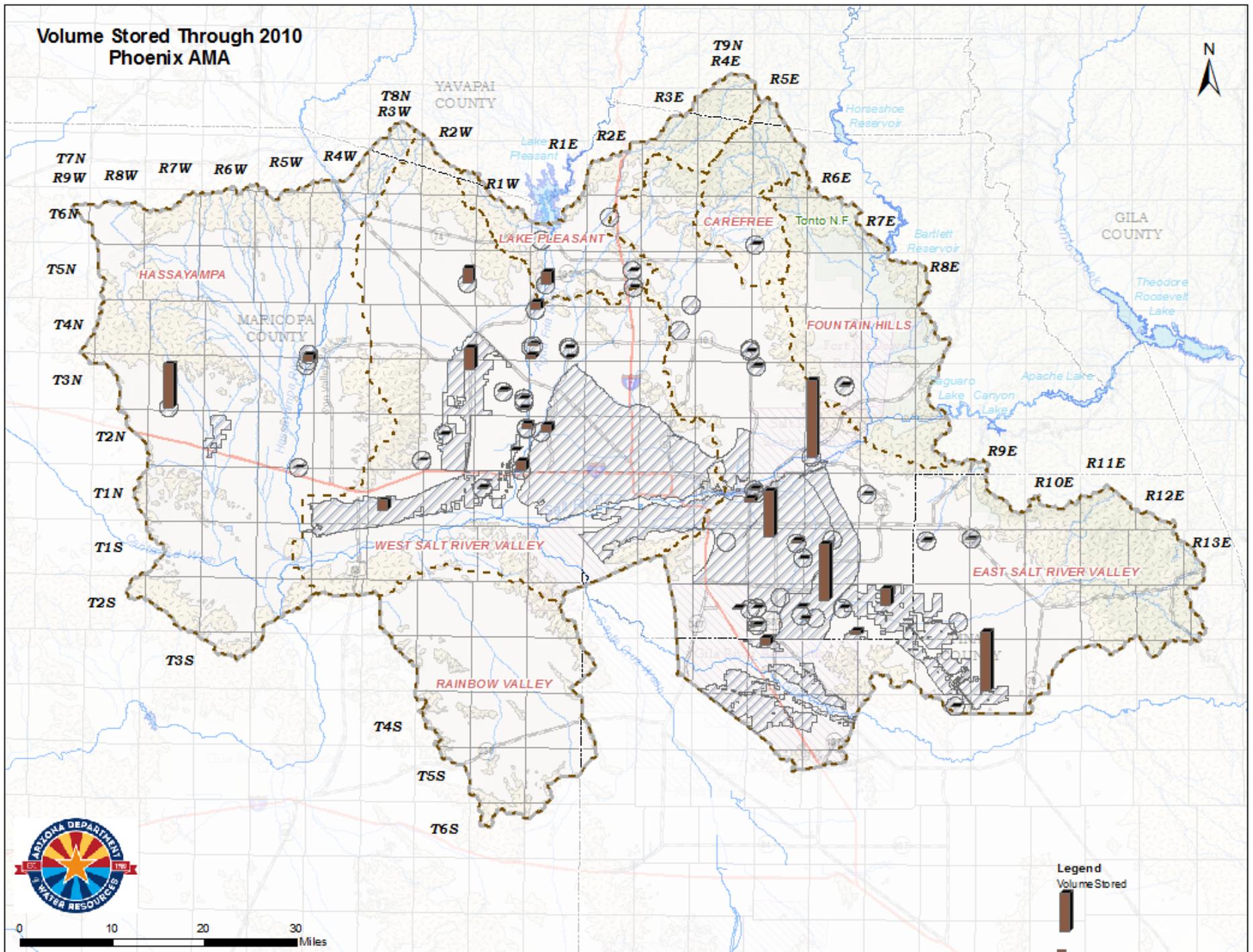
PHOENIX ACTIVE MANAGEMENT AREA GROUNDWATER SAVINGS FACILITIES

Underground Water Storage, Savings, and Replenishment Program

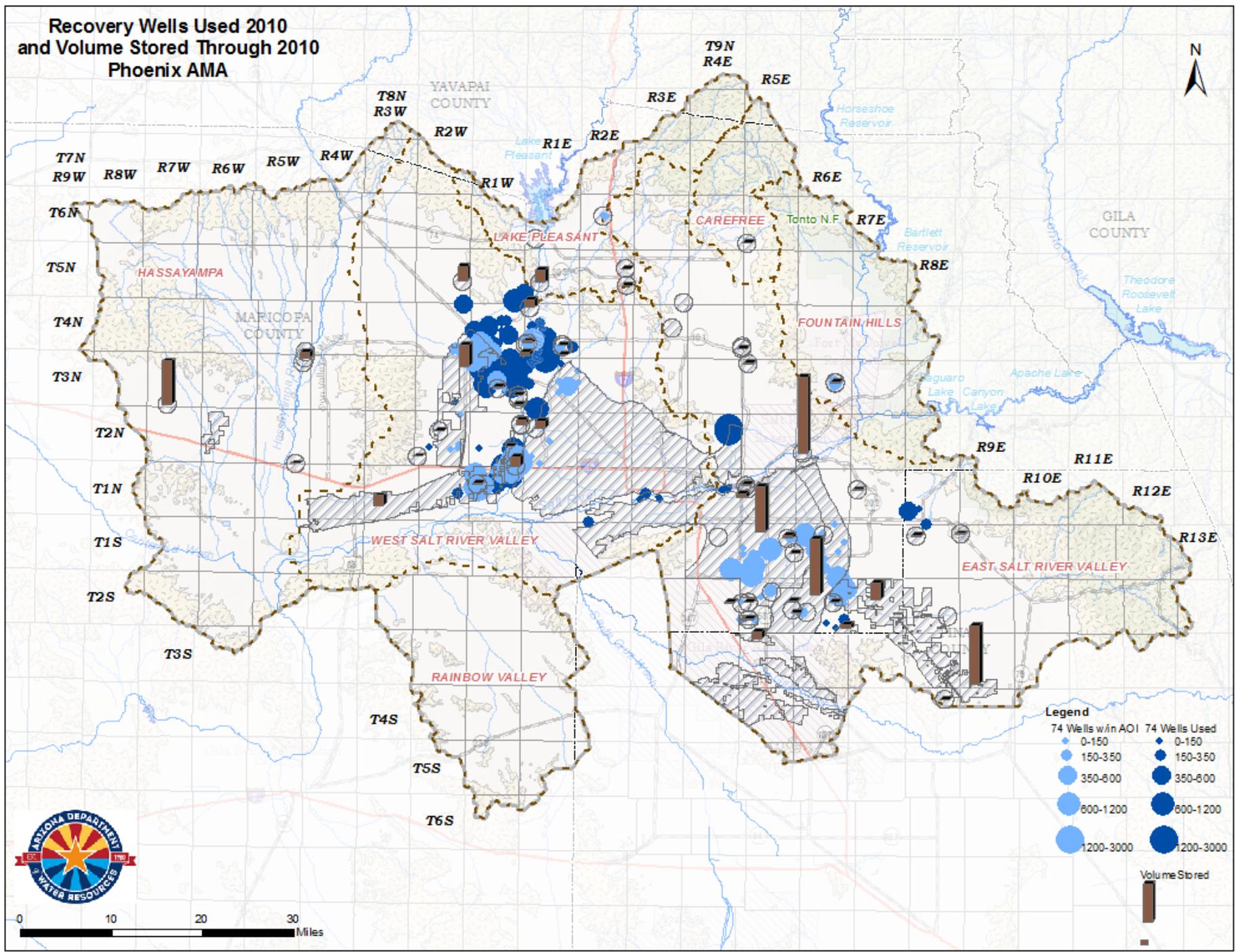


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Volume Stored Through 2010 Phoenix AMA



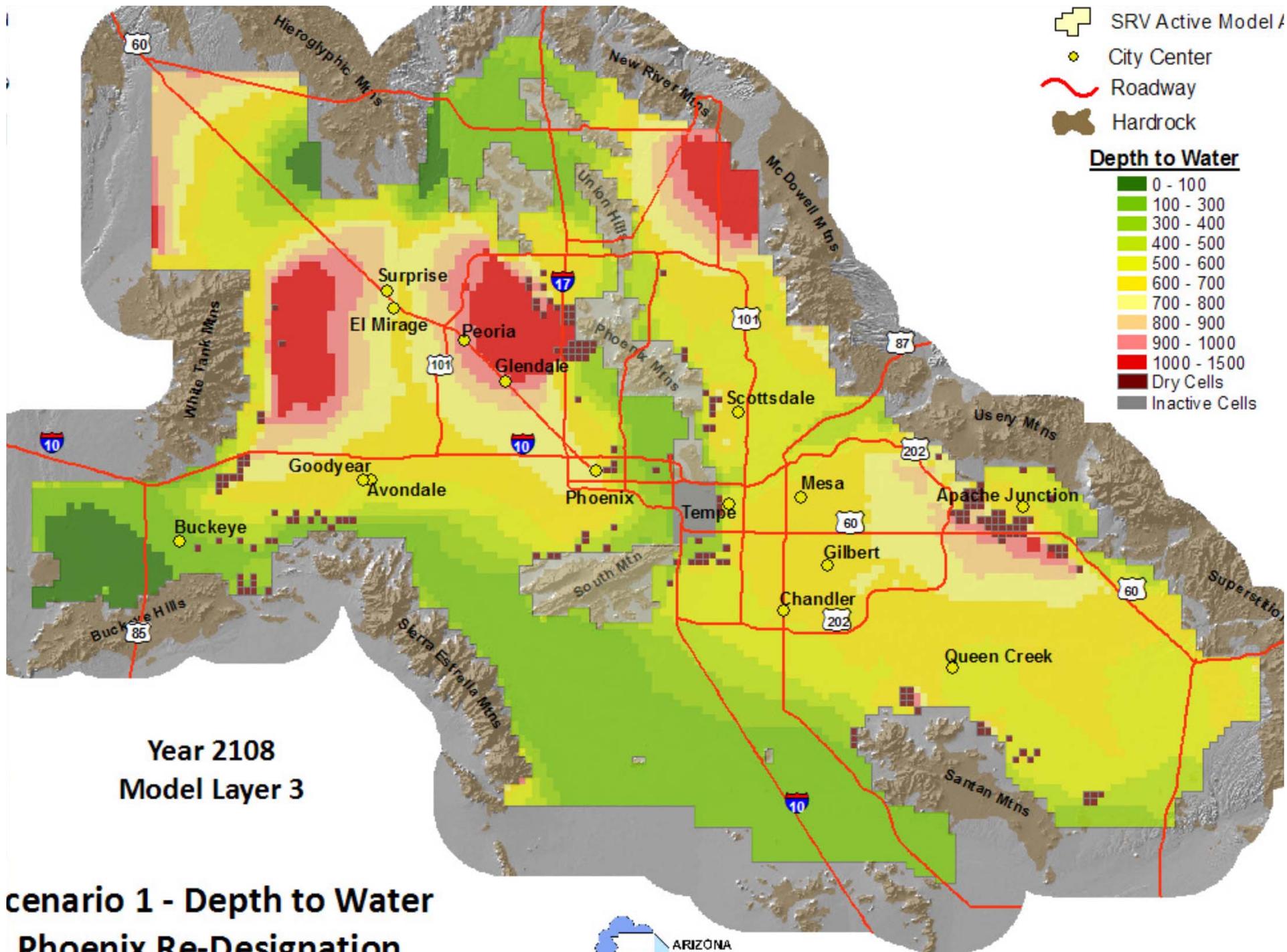
Recovery Wells Used 2010 and Volume Stored Through 2010 Phoenix AMA



- Legend**
- 74 Wells w/in AOI
 - 74 Wells Used
 - 0-150
 - 150-350
 - 350-600
 - 600-1200
 - 1200-3000
 - 0-150
 - 150-350
 - 350-600
 - 600-1200
 - 1200-3000

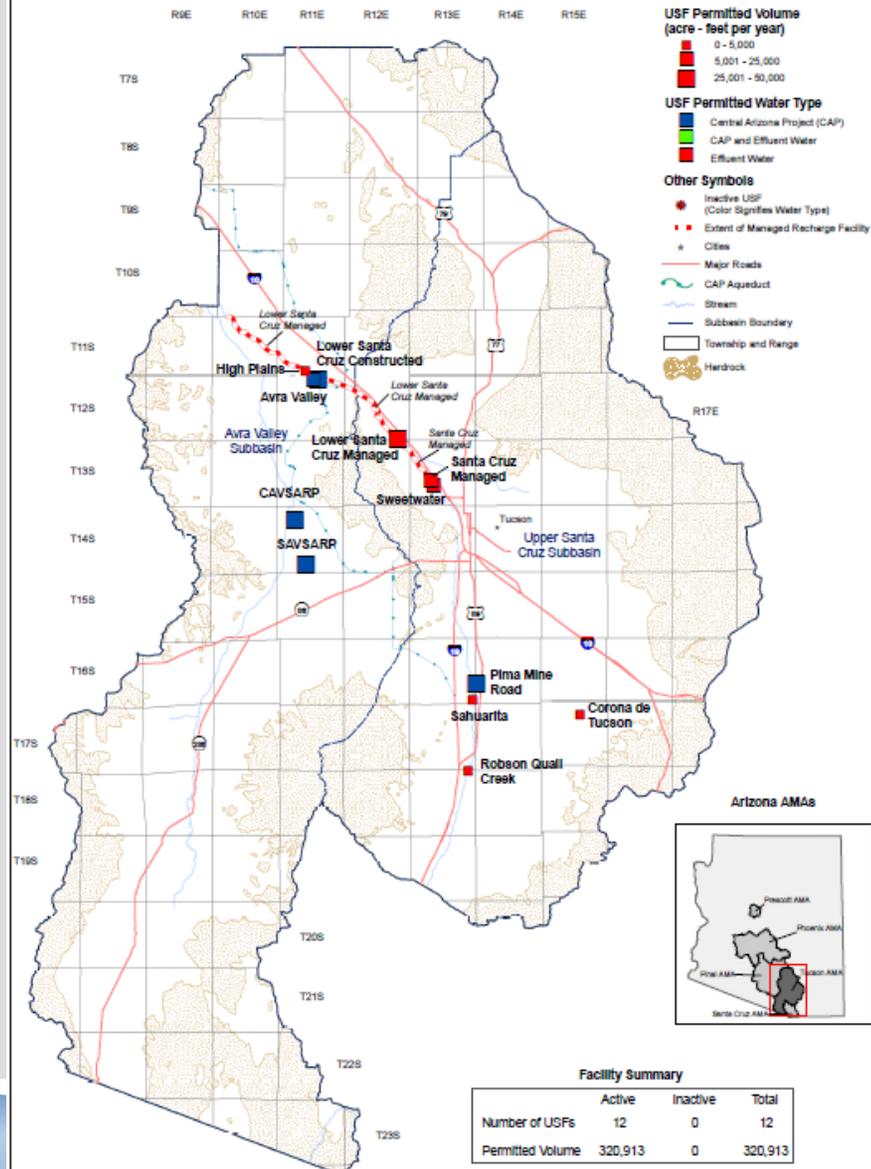
Volume Stored





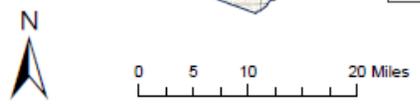
TUCSON ACTIVE MANAGEMENT AREA UNDERGROUND STORAGE FACILITIES

Underground Water Storage, Savings, and Replenishment Program



Facility Summary

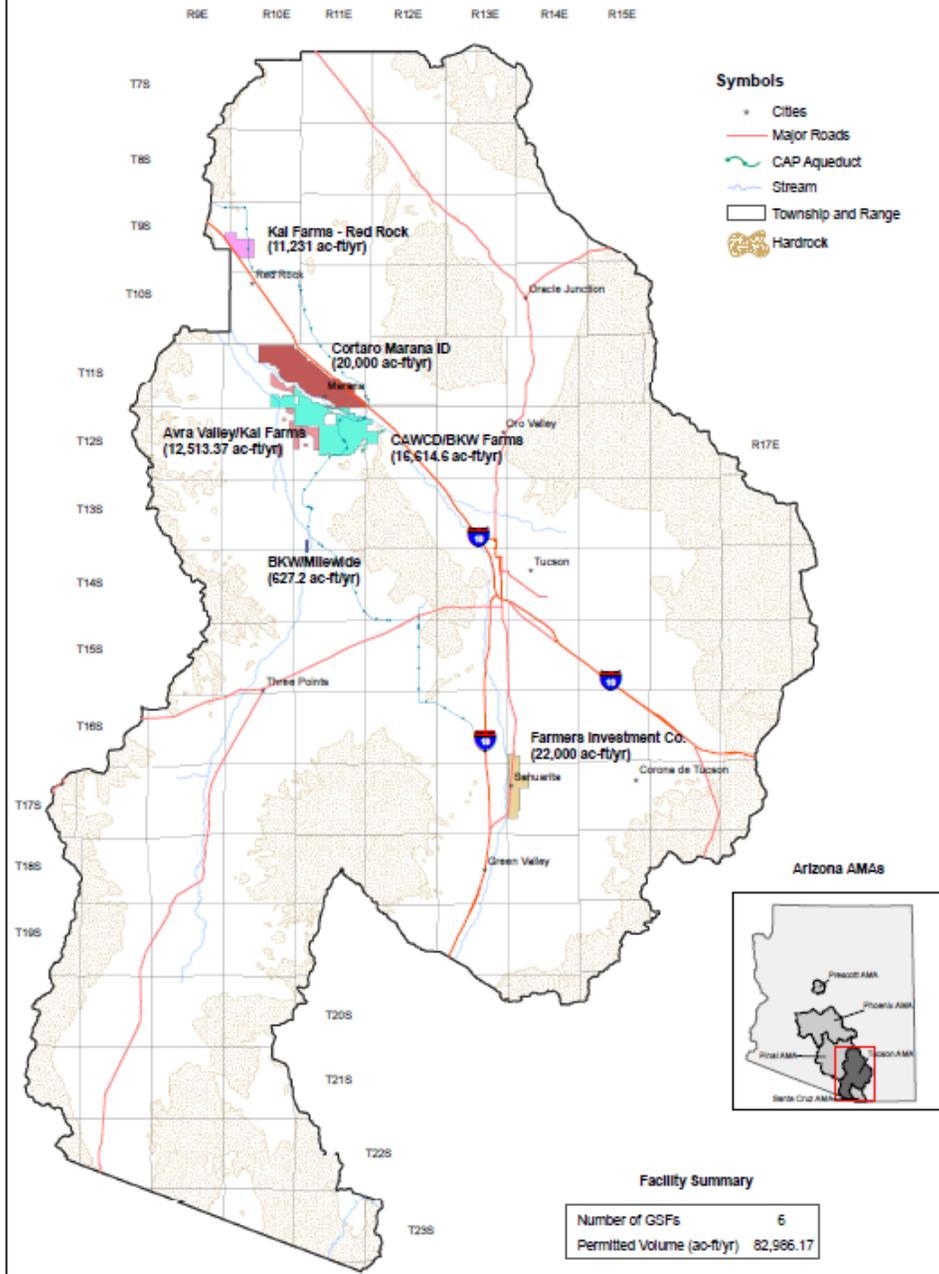
	Active	Inactive	Total
Number of USFs	12	0	12
Permitted Volume	320,913	0	320,913

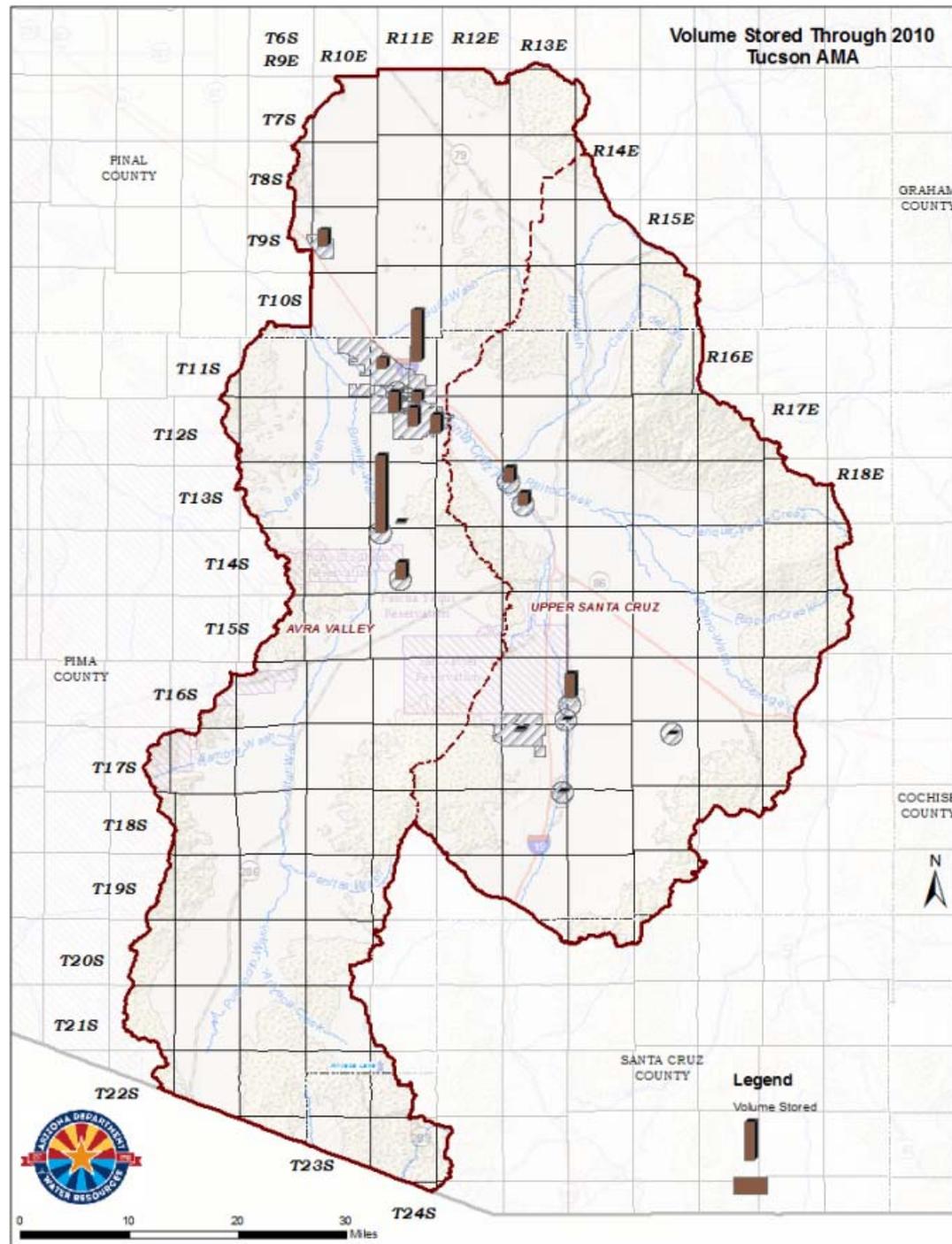


Updated: October 2005

TUCSON ACTIVE MANAGEMENT AREA GROUNDWATER SAVINGS FACILITIES

Underground Water Storage, Savings, and Replenishment Program





Recovery Wells Used 2010 and Volume Stored Through 2010 Tucson AMA

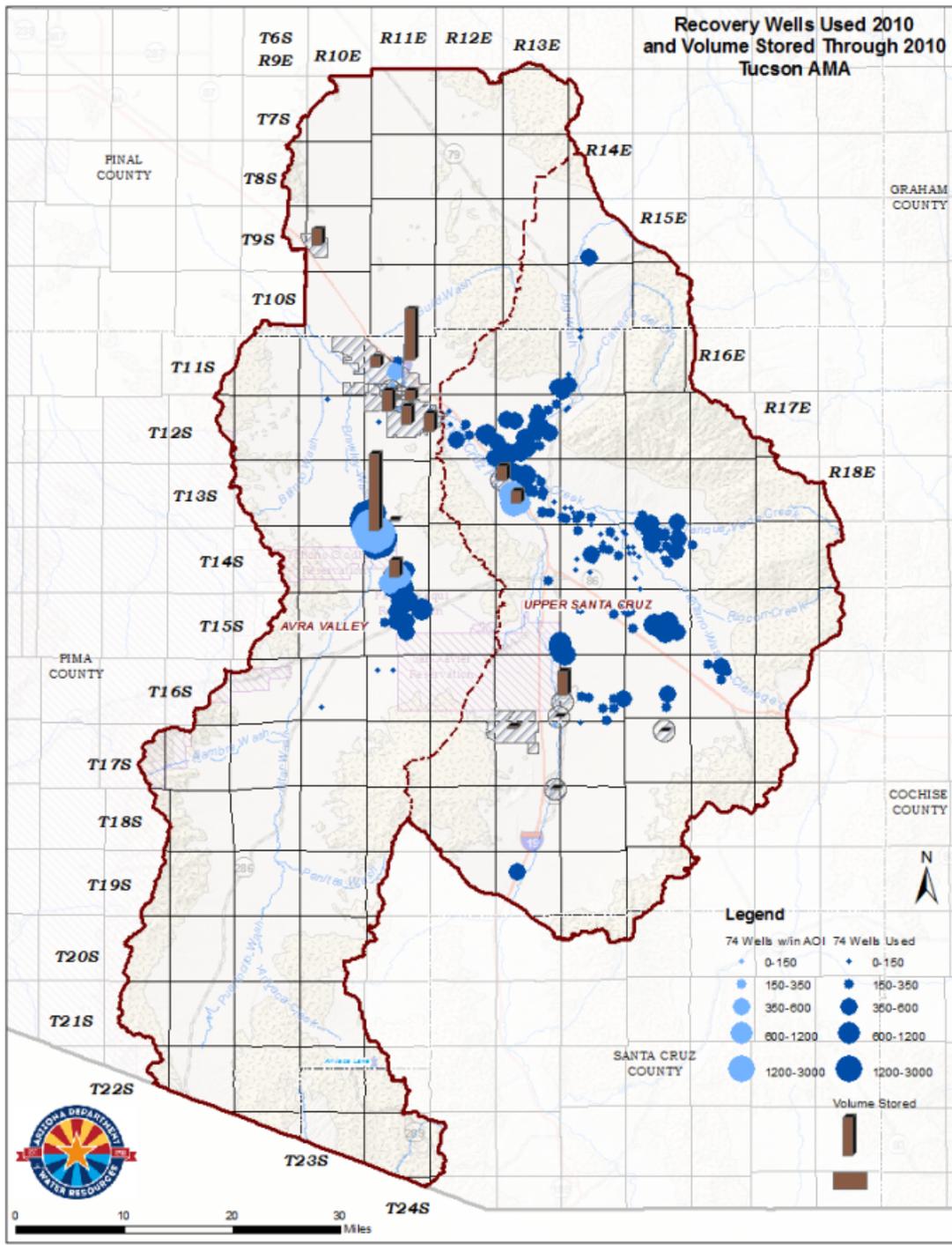
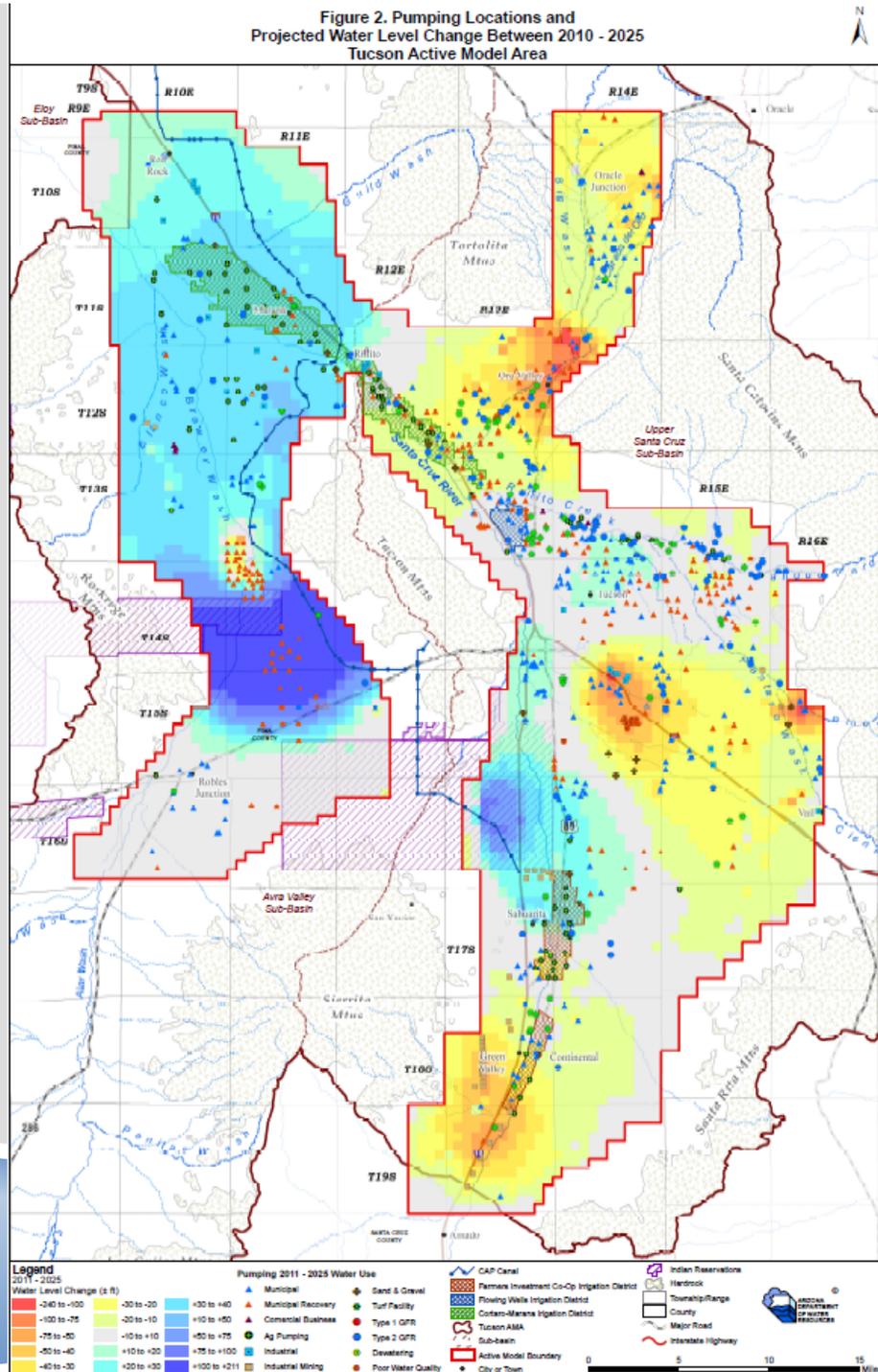
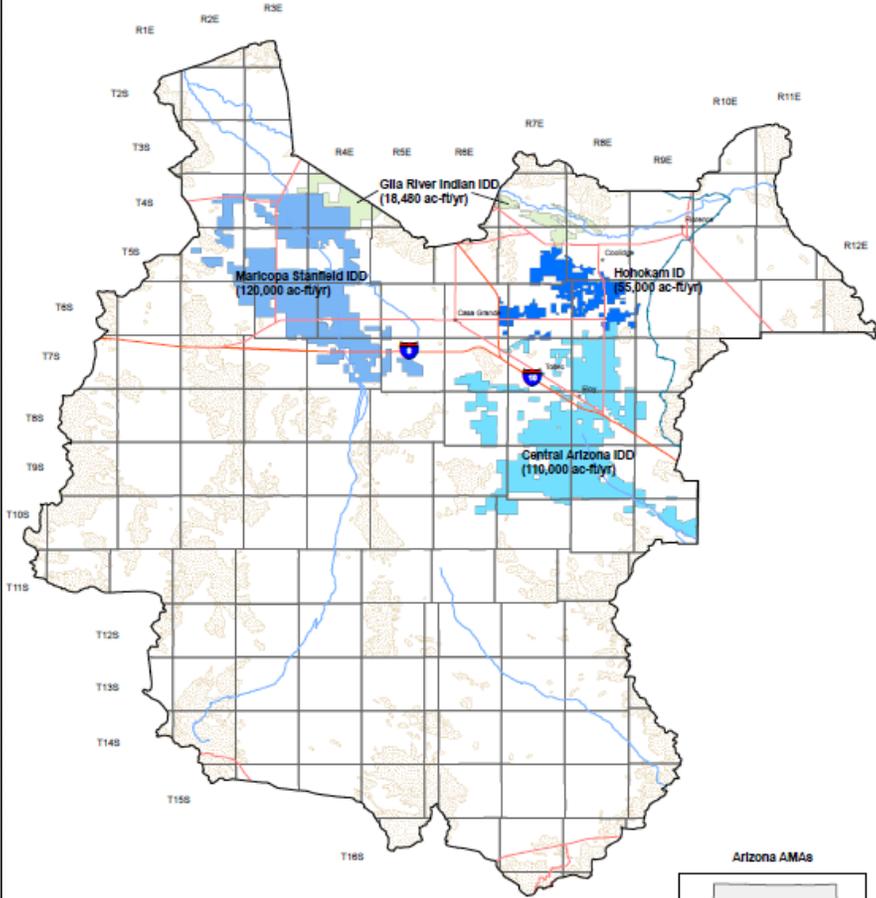


Figure 2. Pumping Locations and Projected Water Level Change Between 2010 - 2025 Tucson Active Model Area



PINAL ACTIVE MANAGEMENT AREA UNDERGROUND STORAGE FACILITIES

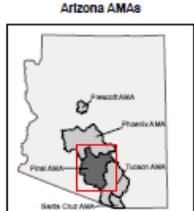
Underground Water Storage, Savings, and Replenishment Program



Facility Summary

Number of USFs	4
Permitted Volume (ac-ft/yr)	303,480

- Symbols**
- Cities
 - Major Roads
 - CAP Aqueduct
 - Stream
 - Township and Range
 - Hardrock

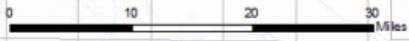
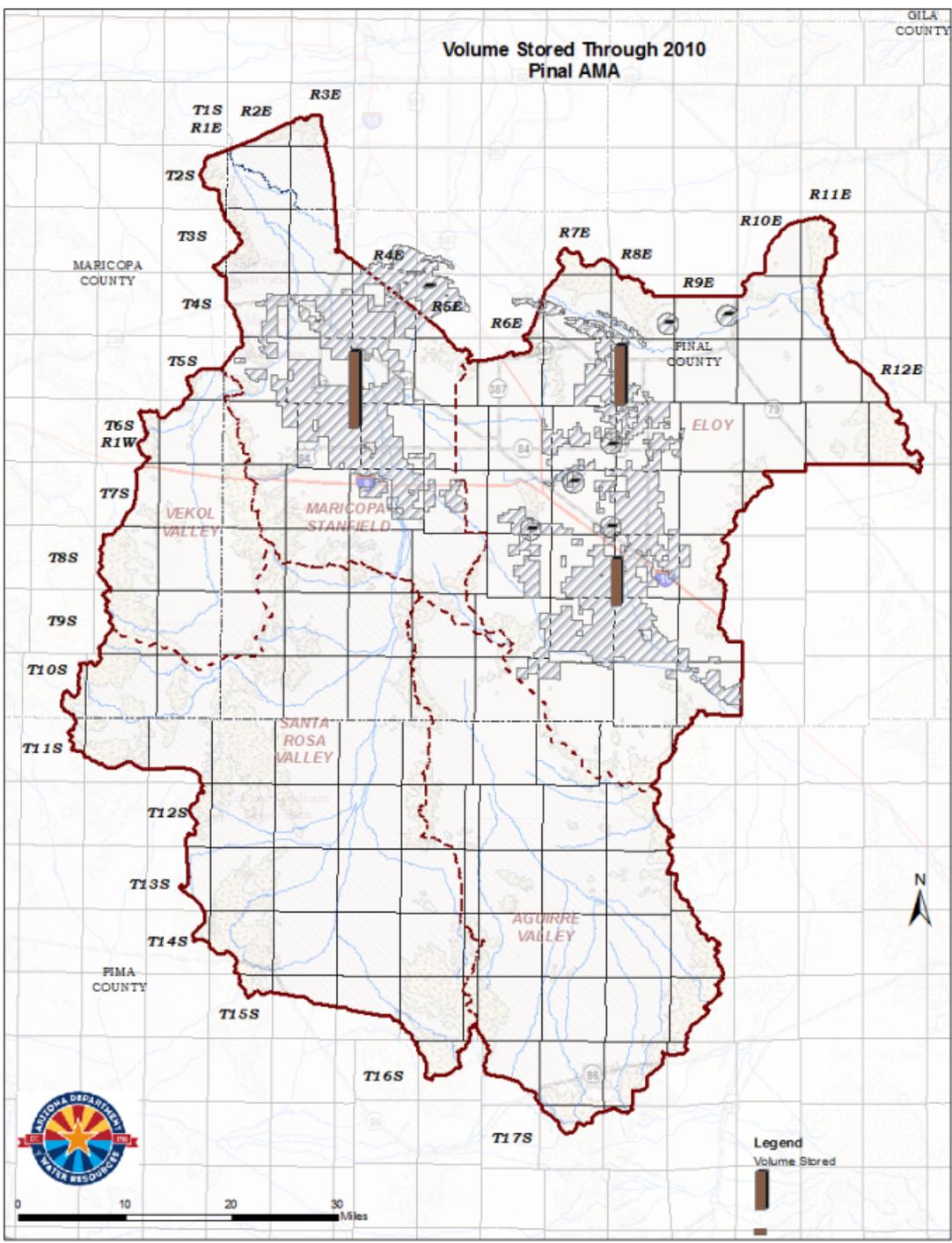


November 2008



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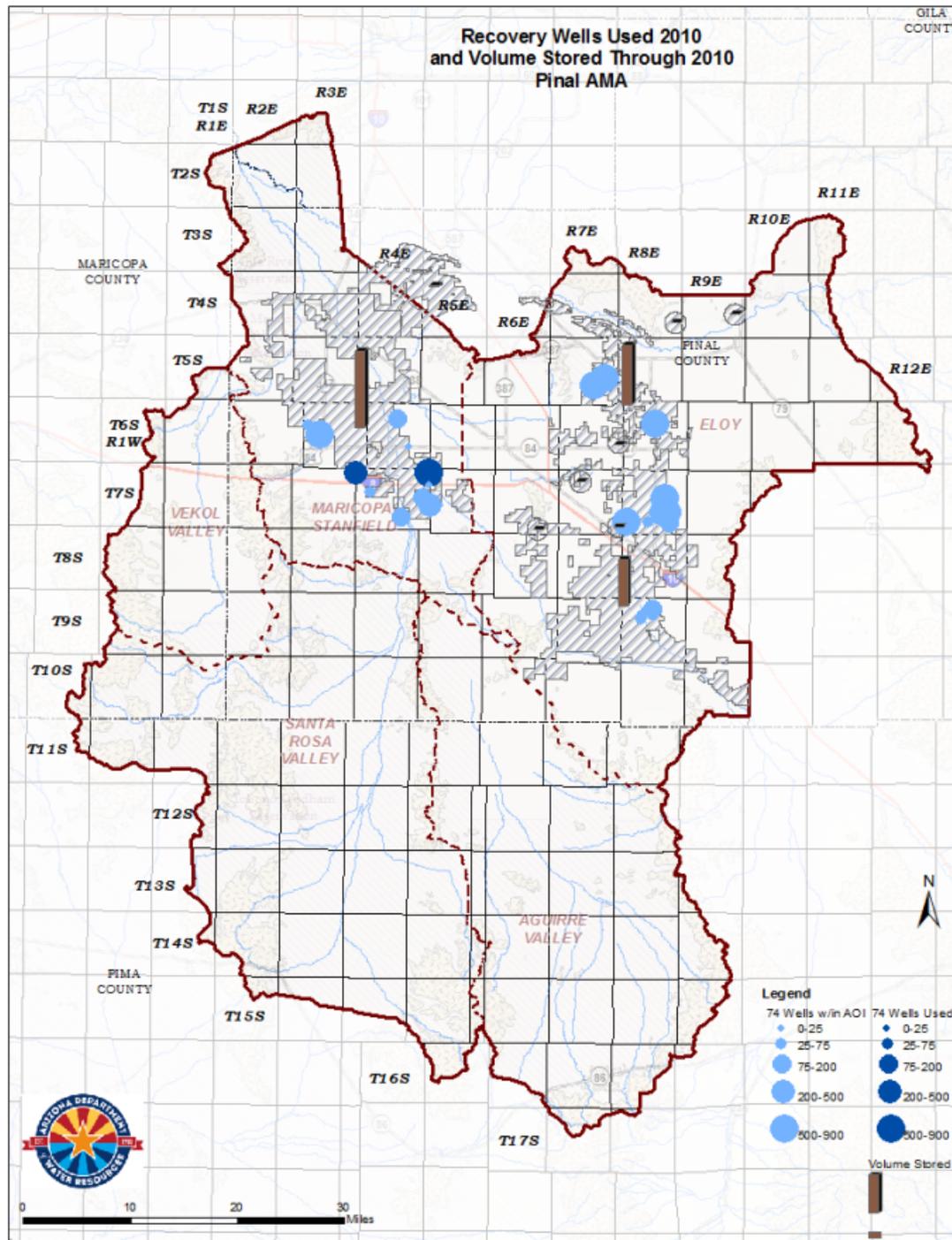
Volume Stored Through 2010 Pinal AMA



Legend
Volume Stored



Recovery Wells Used 2010 and Volume Stored Through 2010 Pinal AMA



GILA COUNTY

MARICOPA COUNTY

PINAL COUNTY

FIMA COUNTY

ELOY

VEKOL VALLEY

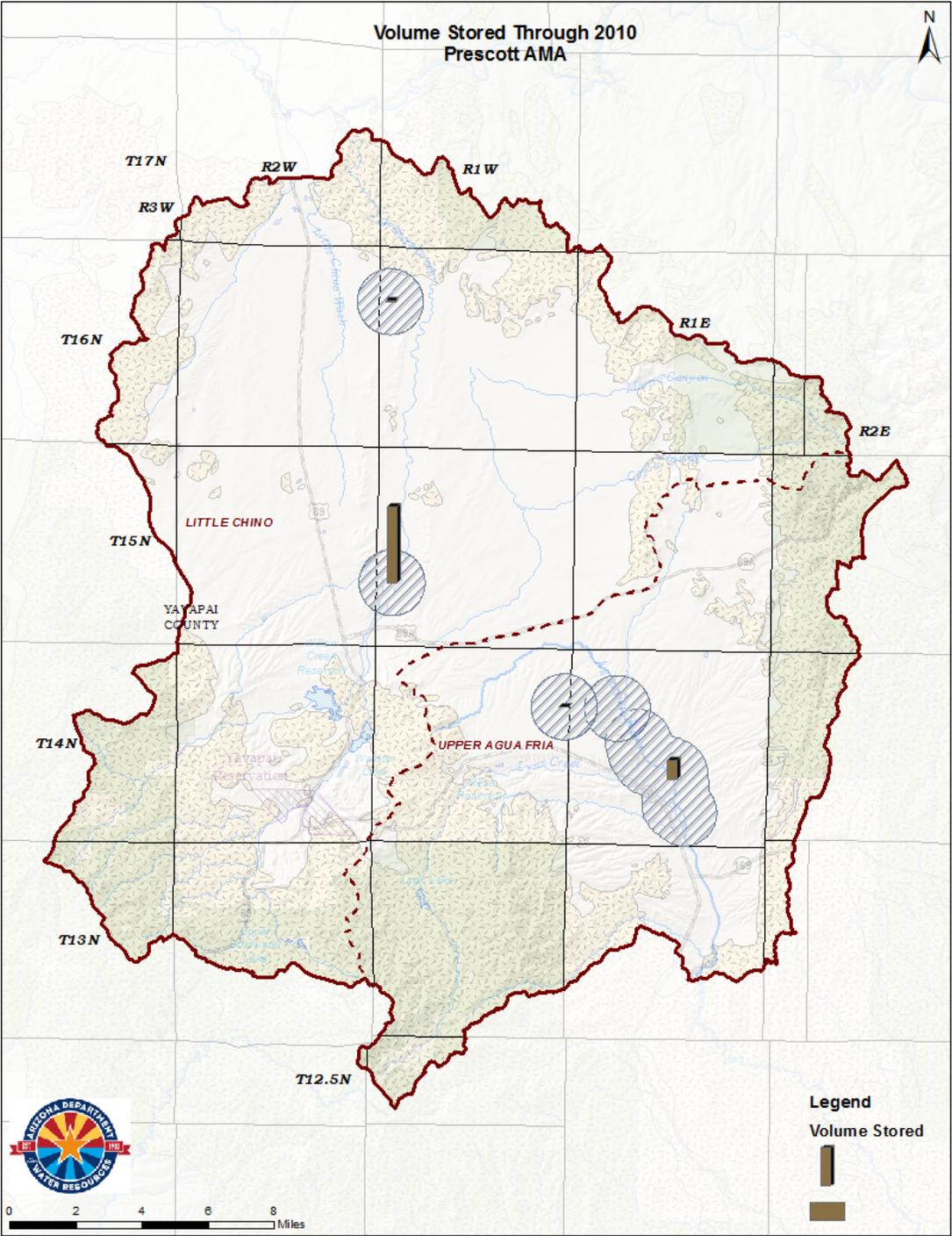
MARICOPA STANFIELD

SANTA ROSA VALLEY

AGUIRRE VALLEY

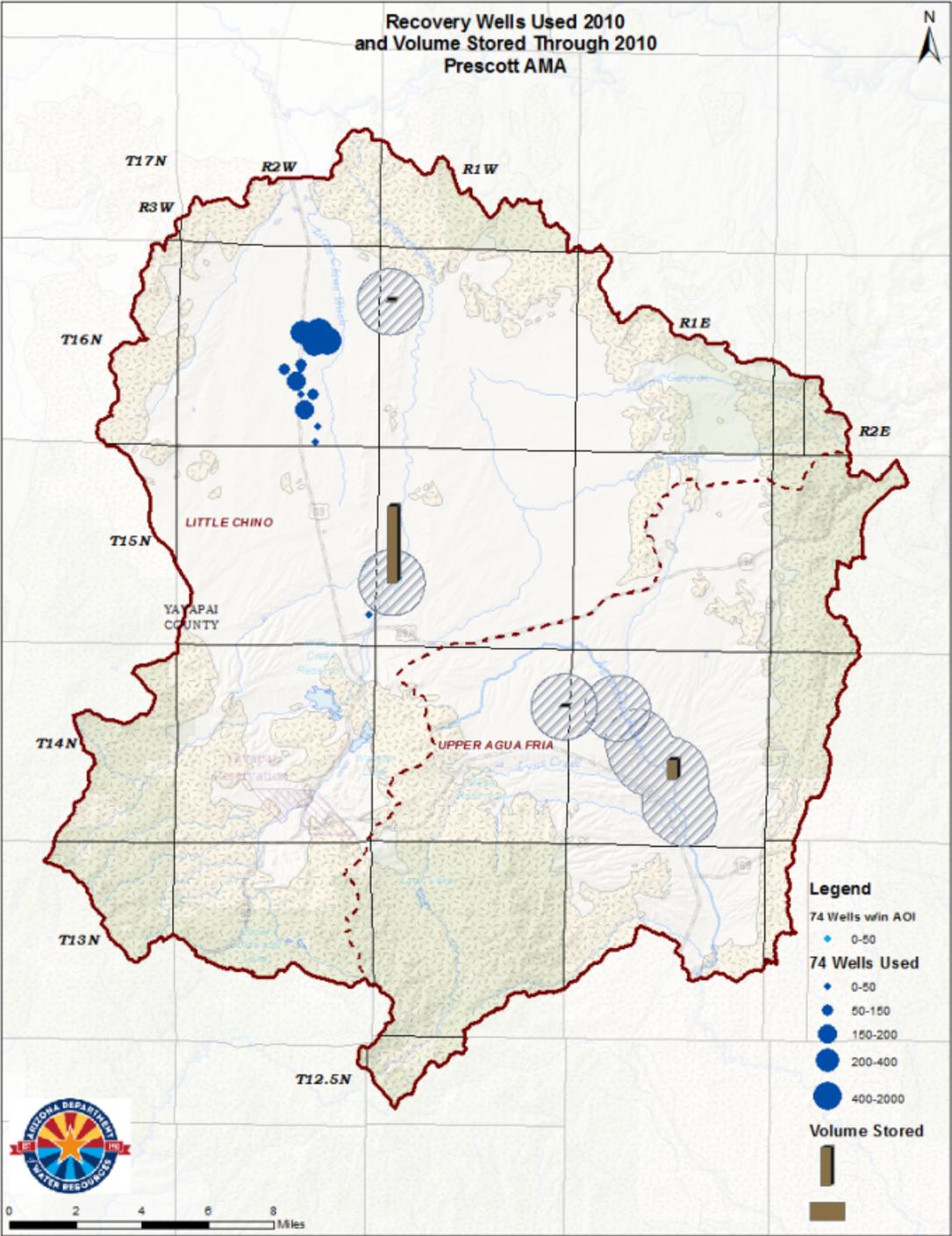
T1S R2E R3E
R1E
T2S
T3S
T4S
T5S
T6S R1W
T7S
T8S
T9S
T10S
T11S
T12S
T13S
T14S
T15S
T16S
T17S
R4E R5E R6E R7E R8E R9E R10E R11E R12E

Volume Stored Through 2010
Prescott AMA



Legend
Volume Stored

Recovery Wells Used 2010
and Volume Stored Through 2010
Prescott AMA



- Legend**
- 74 Wells w/in AOI
 - ◆ 0-50
 - 74 Wells Used
 - 0-50
 - 50-150
 - 150-200
 - 200-400
 - 400-2000
 - Volume Stored
 -

Enhanced Aquifer Management

- ▶ **To help deal with the problem of hydrologic disconnect, there has been thought given toward providing incentives for recharge and recovery in same location, and/or disincentives to recover farther from the location of storage.**

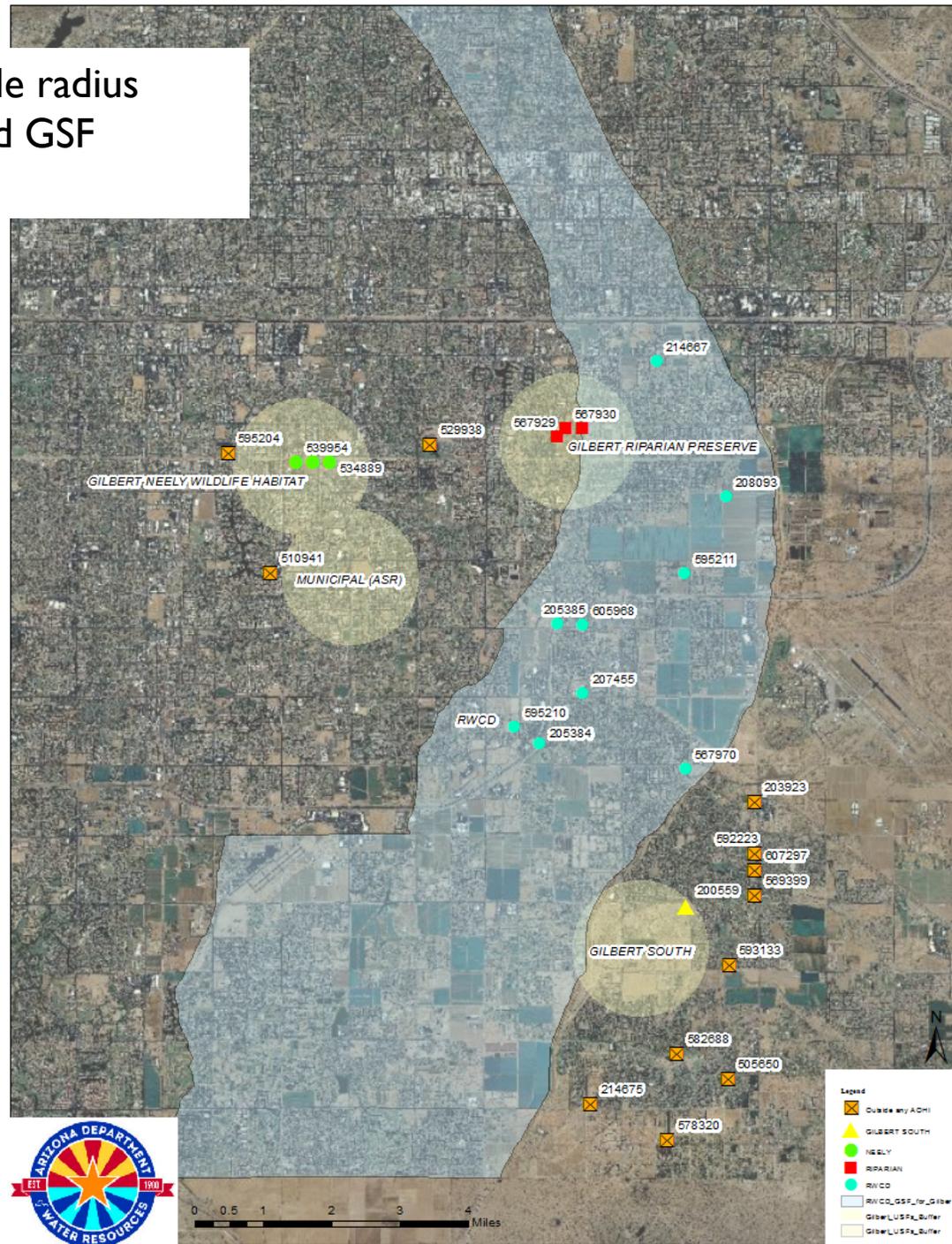
Cuts to the Aquifer - Currently

- ▶ **Long-Term Storage Credits - Currently 5%**
- ▶ **No cut for annual storage and recovery**
- ▶ **No cut for storage of effluent at constructed facilities**
- ▶ **50% cut for storage of effluent at managed (in-stream) facilities**

Enhanced Aquifer Management

- ▶ **ADWR Concept Paper October 2012**
 - ▶ **0% cut to aquifer if recovery within 1 mile of underground storage facility (USF), or inside boundaries of Groundwater Savings Facility (GSF)**
 - ▶ **10% cut if recovery outside 1 mile of USF or outside boundaries of GSF, but within same sub-basin**
 - ▶ **20% cut if recovery in different sub-basin than where recharge occurred**
 - ▶ **ADWR may consider granting greater than 100% credit for water recharged in areas that will uniquely benefit from recharge (e.g. areas of water level declines)**
 - ▶ **Would apply to future storage/recovery activities; credits currently in place would not be affected**

Example of 1-mile radius
around USFs, and GSF
boundary



Enhanced Aquifer Management

- ▶ **General Questions/Comments**
 - ▶ **What types of storage to be included**
 - ▶ **What types of water to be included**
 - ▶ **Which permitted entities to be included**

Enhanced Aquifer Management

- ▶ **General Questions/Comments cont'd**
 - ▶ **May need different palette of solutions for each AMA**
 - ▶ **Concern about unintended consequences**
 - ▶ **Uncertainty about value of credits until recovery occurs**

Enhanced Aquifer Management

▶ **AMWUA proposal**

- ▶ **Different cuts depending on:**
 - ▶ **Location – does recovery/replenishment occur in same or different sub-basin**
 - ▶ **Type of water stored**
 - ▶ **Annual Storage/Recovery vs. Long Term Storage**
- ▶ **Special Enhancement Areas (SEAs) designated by ADWR, reviewed periodically**
- ▶ **Restrictions on wells drilled/used with Type 2 rights within service areas**

Enhanced Aquifer Management

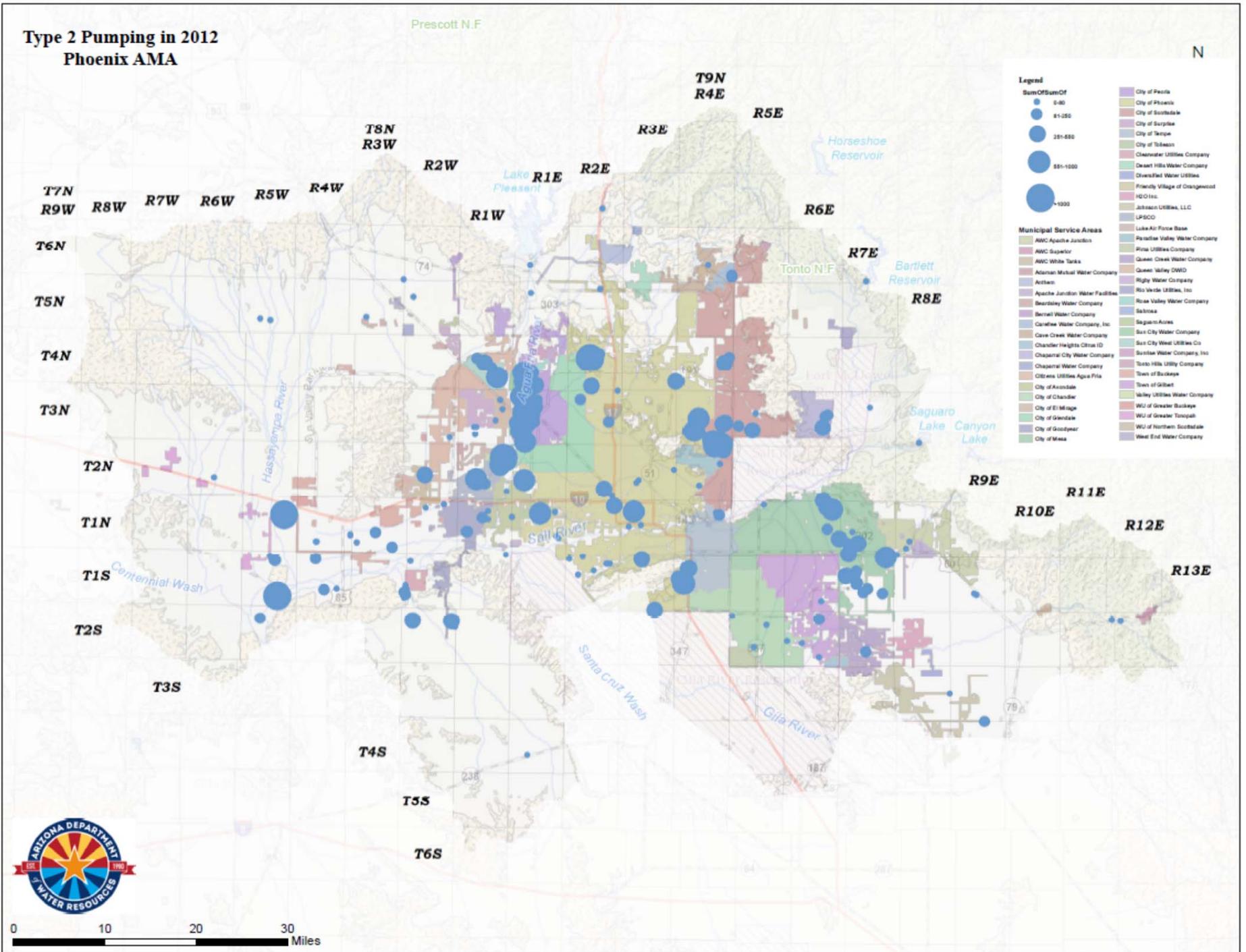
▶ Issues for Discussion:

- ▶ Location of areas of concern in AMAs
- ▶ Discussion of location of pumpage/recharge/replenishment – incentives and disincentives
 - ▶ Cuts to Aquifer (disincentives)
 - ▶ Location: **Within GSF Boundary / 1-mile of USF vs. sub-basin**
 - ▶ Types of water stored
 - ▶ Levels of cut to aquifer
 - ▶ Additional credits earned for storage in areas of concern (incentives)
 - ▶ Areas that would uniquely benefit from recharge
 - ▶ SEAs
 - ▶ Reward for storage (credits, other benefits)

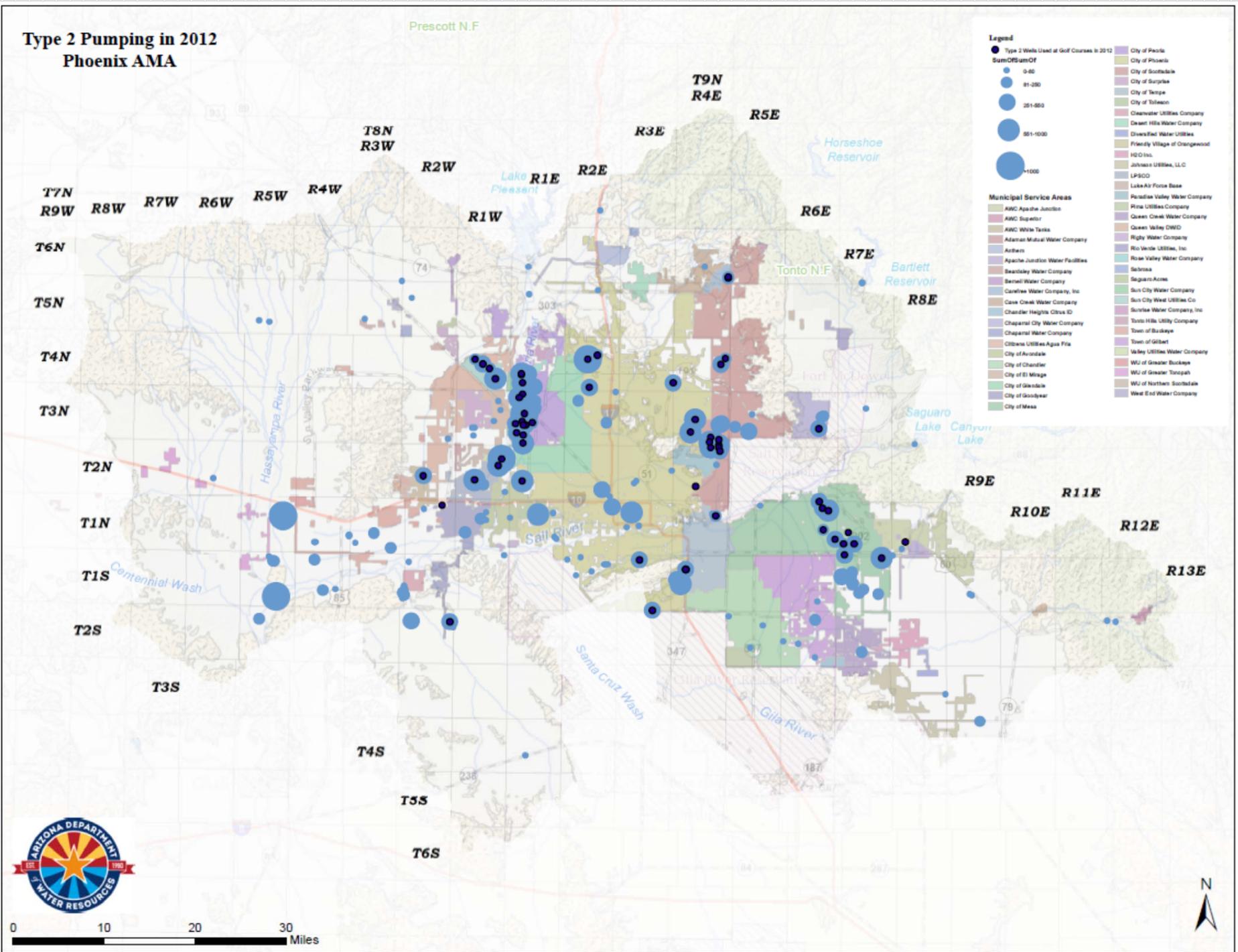
Enhanced Aquifer Management

- ▶ **Issues for Discussion (cont'd):**
 - ▶ **Types of storage/recovery to be included in proposal:**
 - ▶ **Long-Term Storage Credits**
 - ▶ **Annual Storage/Recovery**
 - ▶ **Central Arizona Groundwater Replenishment District (CAGR) activities**
 - ▶ **Arizona Water Banking Authority (AWBA) Storage/Recovery**
 - ▶ **Types of water that would be considered**
 - ▶ **Effluent**
 - ▶ **Sources other than effluent**

Type 2 Pumping in 2012 Phoenix AMA



Type 2 Pumping in 2012 Phoenix AMA



0 10 20 30 Miles

