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Meeting Date: September 23, 2015  
Staff Contact: John M. Stomp III, Chief Operating Officer

**TITLE: OB-15-10 - Water Resources Management Strategy Presentation**

**SUMMARY:**

The Water Authority adopted the Water Resources Management Strategy (Strategy) in 2007 following the original City Council adopted Strategy in 1997. The Strategy is a policy document that provides direction and guidance on water resources and other water related projects and programs. Many of the projects and policies in the 2007 Strategy have been completed and an updated Water Resources Management Strategy is being developed by staff and a technical team of consultants working with the Technical Customer Advisory Committee (TCAC).

This presentation was developed to begin the public process of informing the Water Authority Board on the progress and development of important water resources information and planning tools being used to identify possible future demand and water supply gaps using the best scientific data available. To date, about 15% of the work that is needed to analyze potential demand scenarios and water supply gaps has been completed and this presentation is intended to inform the Water Authority Board about the progress.

As the work continues over the next year or so, the Water Authority Board will be provided quarterly or more frequent reports as to the progress of the Strategy development along with critical policy decisions that are to be determined by the Board. The staff and technical team will continue to meet with and obtain input from the TCAC.

In the future, the plan includes additional public meetings and Town Hall(s) where the Strategy will be presented formally to the public following approval from the Water Authority Board. We anticipate that the Water Authority Board will be requested to formally adopt the new Strategy at the end of Calendar Year 2016.

**FISCAL IMPACT:**

None

# Water Resources Management Strategy 2017 Update

**September 23, 2015**

# Need for Updated Strategy

- **2007 Strategy policies/projects complete**
- **Need to update existing data**
- **Need to incorporate new technical information – aquifer rising, climate change, etc.**
- **Consider a 100-year planning horizon**
- **Strategy will be updated every 10 years if new information becomes available**



# WRMS Update Process

• Technical Team

• Board Updates

• Public Meetings

• Town Halls

• Board Adoption

Technical Customer Advisory Committee

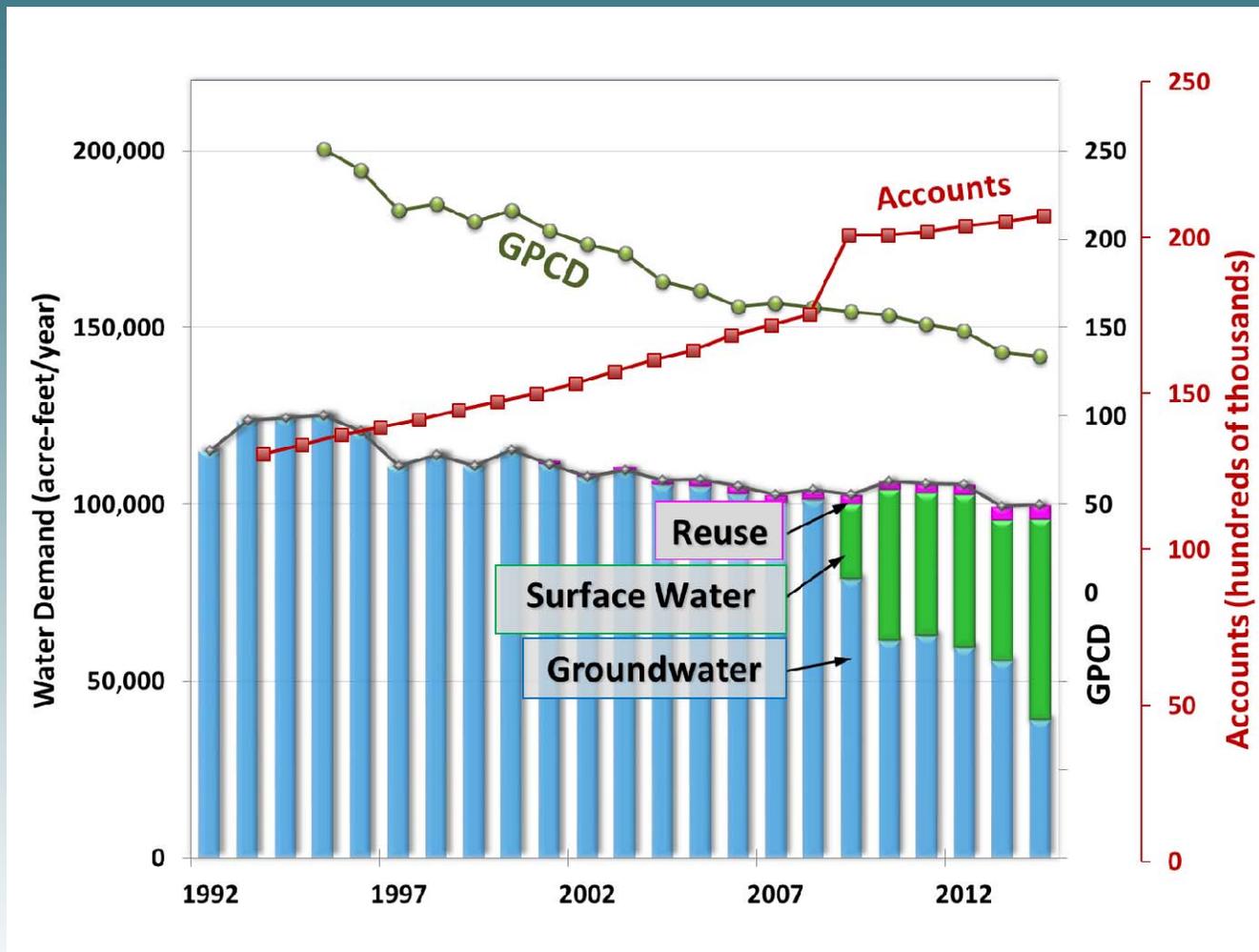
2015

2016

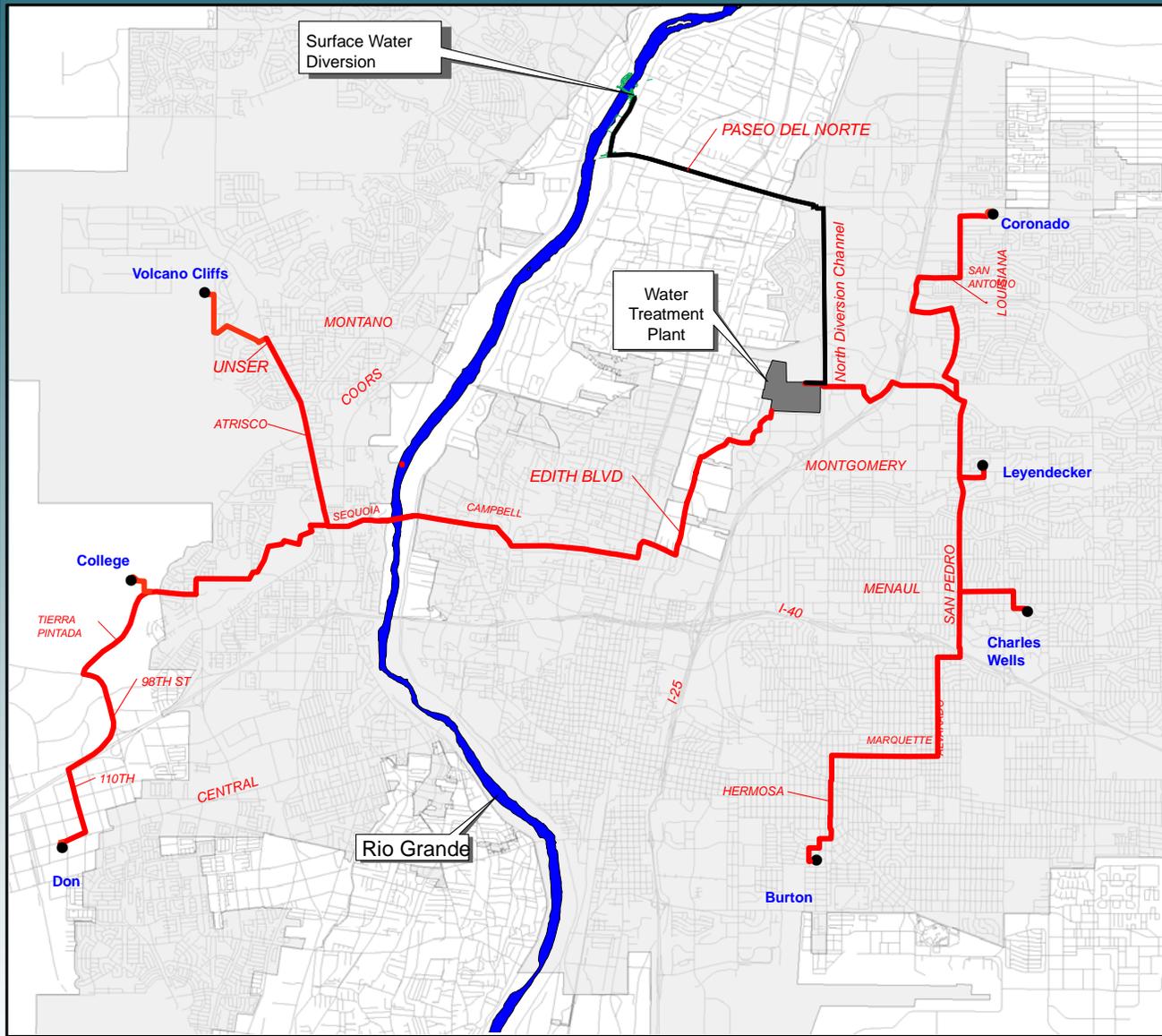
# 2007 WRMS Status Report

- **Accomplishments**
  - **Water conservation has decreased demand significantly since 1995, even while population has grown**
  - **The Drinking Water Project has been implemented**
  - **Re-use is being implemented**
  - **ASR is being implemented**
  - **Groundwater monitoring network was established**
- **Results**
  - **Aquifer levels are rising due to decreased groundwater pumping**
  - **Consumptive use has declined**
  - **River depletions from groundwater pumping are declining**
  - **Overall supply resiliency has increased**

# Water Usage is Decreasing Even as the System has Grown



# Drinking Water Project Implemented



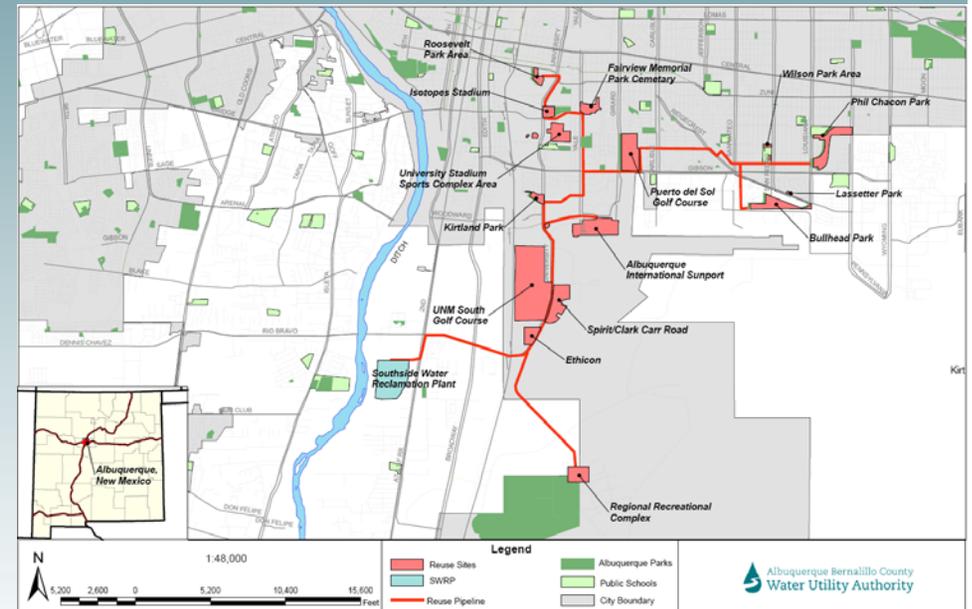
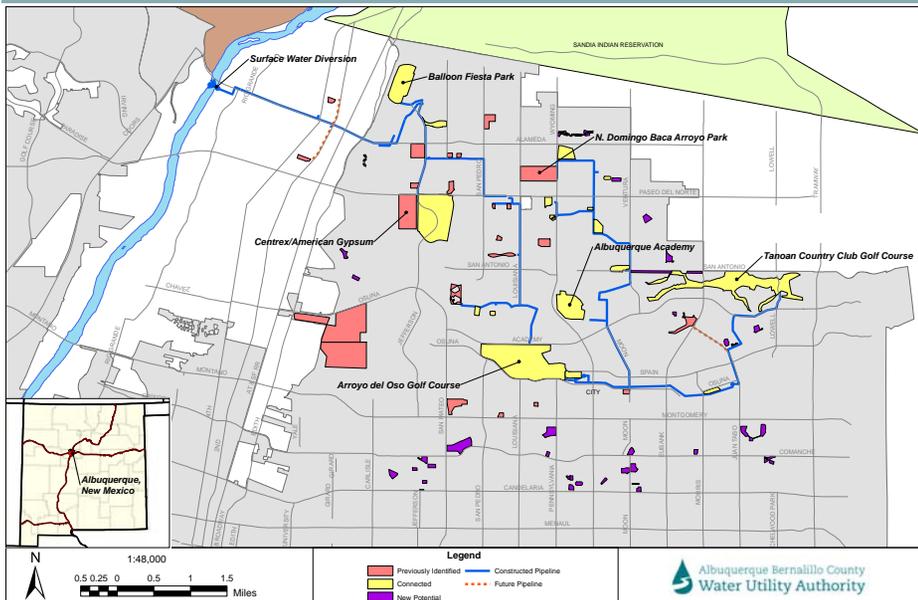
## Multiple Benefits

- Co-locate wells near transmission pipelines for ASR
- New infrastructure can move supply throughout the system
- Reduced need for arsenic treatment

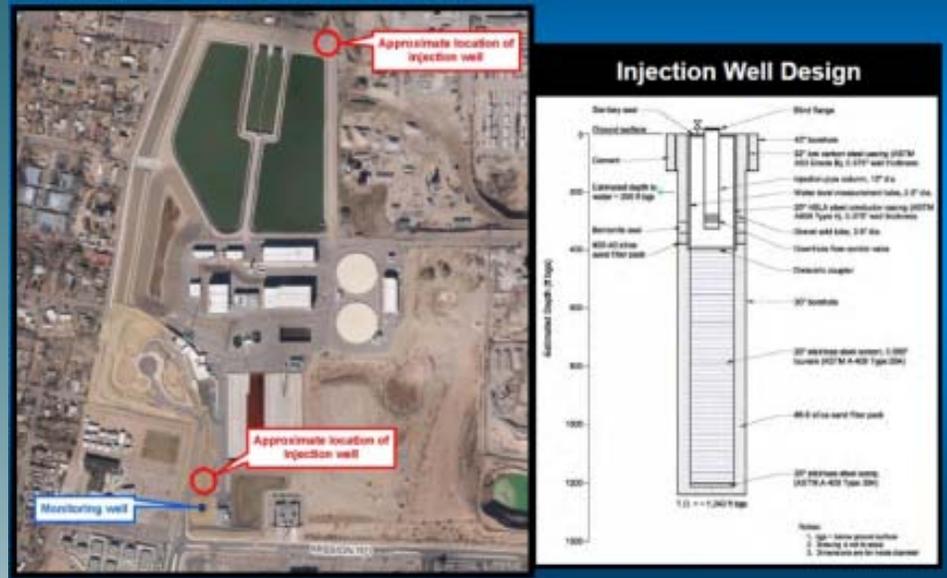
# Re-Use Continues to be Implemented

## Current projects and supply

- Industrial recycling ~300 ac-ft/yr
- North I-25 non-potable project ~ 2,500 ac-ft/yr
- Southside effluent reuse ~1,300 ac-ft/yr



# ASR is Being Implemented

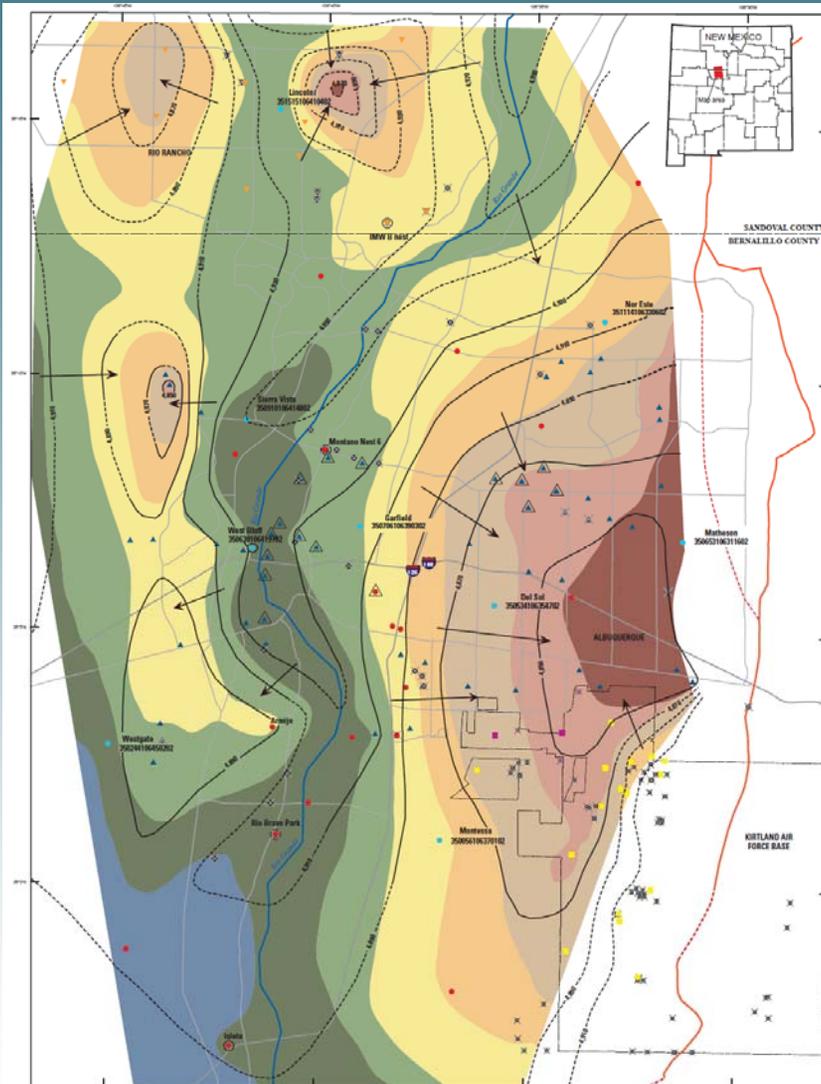


- Bear Canyon is operational, using North I-25 non-potable water
- Demonstration project for Large-scale ASR

# Why ASR is Important – Top Ten

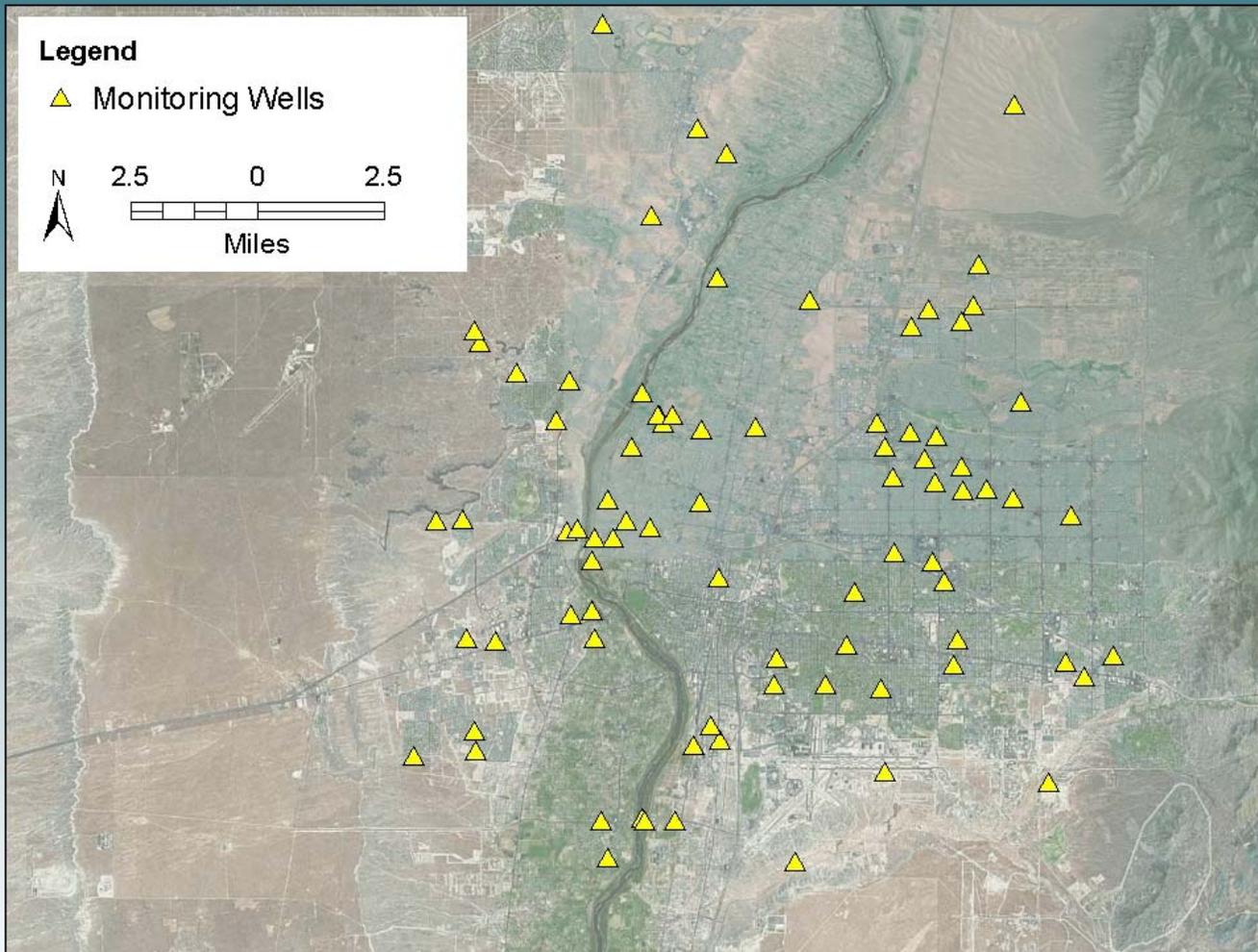
1. **Complies with Policies B, C, F and G of the 2007 WRMS**
2. **Preserves and protects the aquifer**
3. **Reduces our impact on the river**
4. **Promotes good water resources management**
5. **Reduces evaporation losses**
6. **Storage of water in separate private account**
7. **Later recovery does not require water rights offsets**
8. **Allows for full implementation of the DWP**
9. **Reduces groundwater pumping in the summer months**
10. **Reduces the need for additional reservoirs**

# Past Groundwater Pumping Caused Significant Water-Table Declines



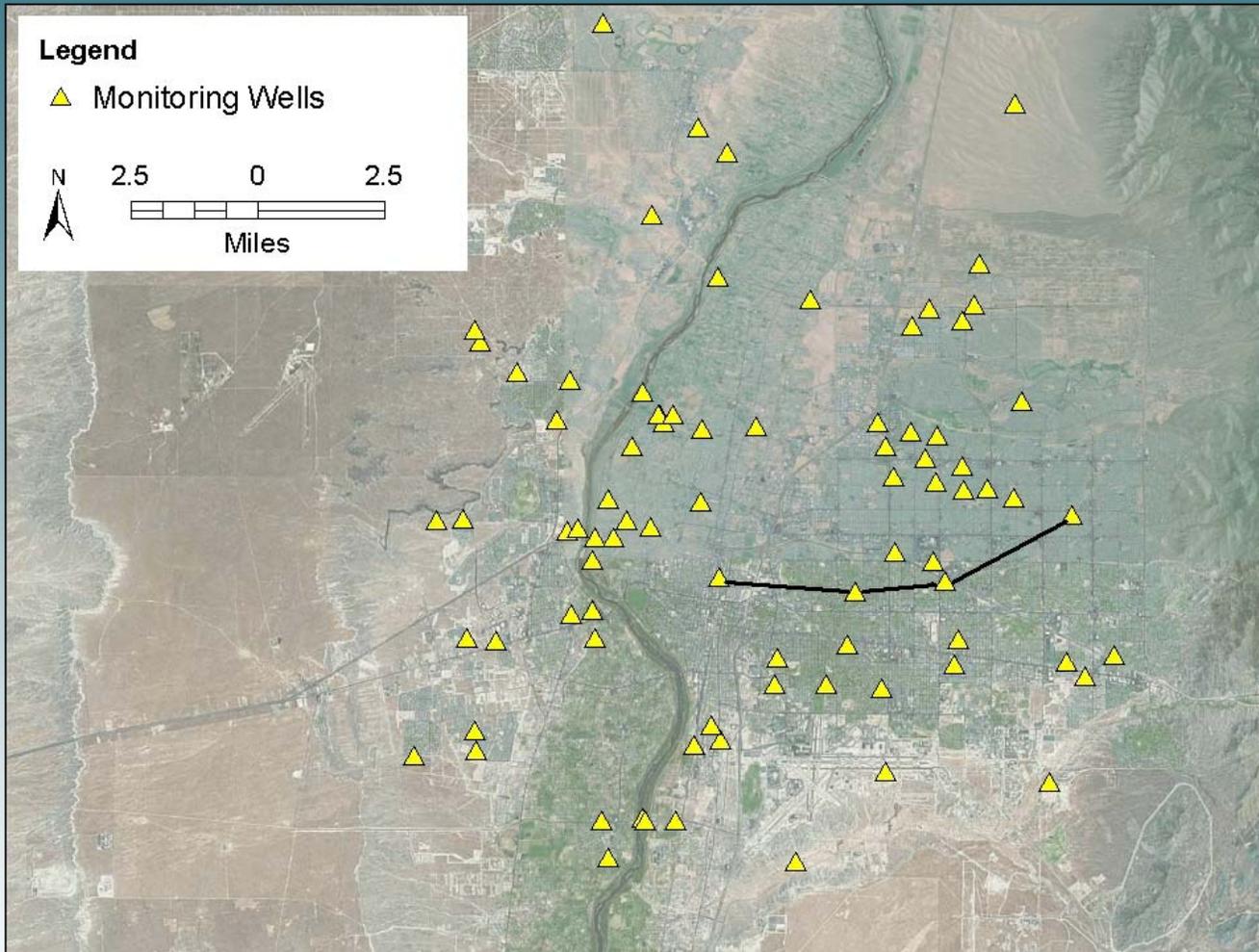
- **Historical pumping resulted in drawdowns**
  - Up to 160 feet from pre-development by 2008
- **A monitoring network was established with USGS that covers the Albuquerque area**

# The USGS Monitors Water Levels throughout the Albuquerque Basin

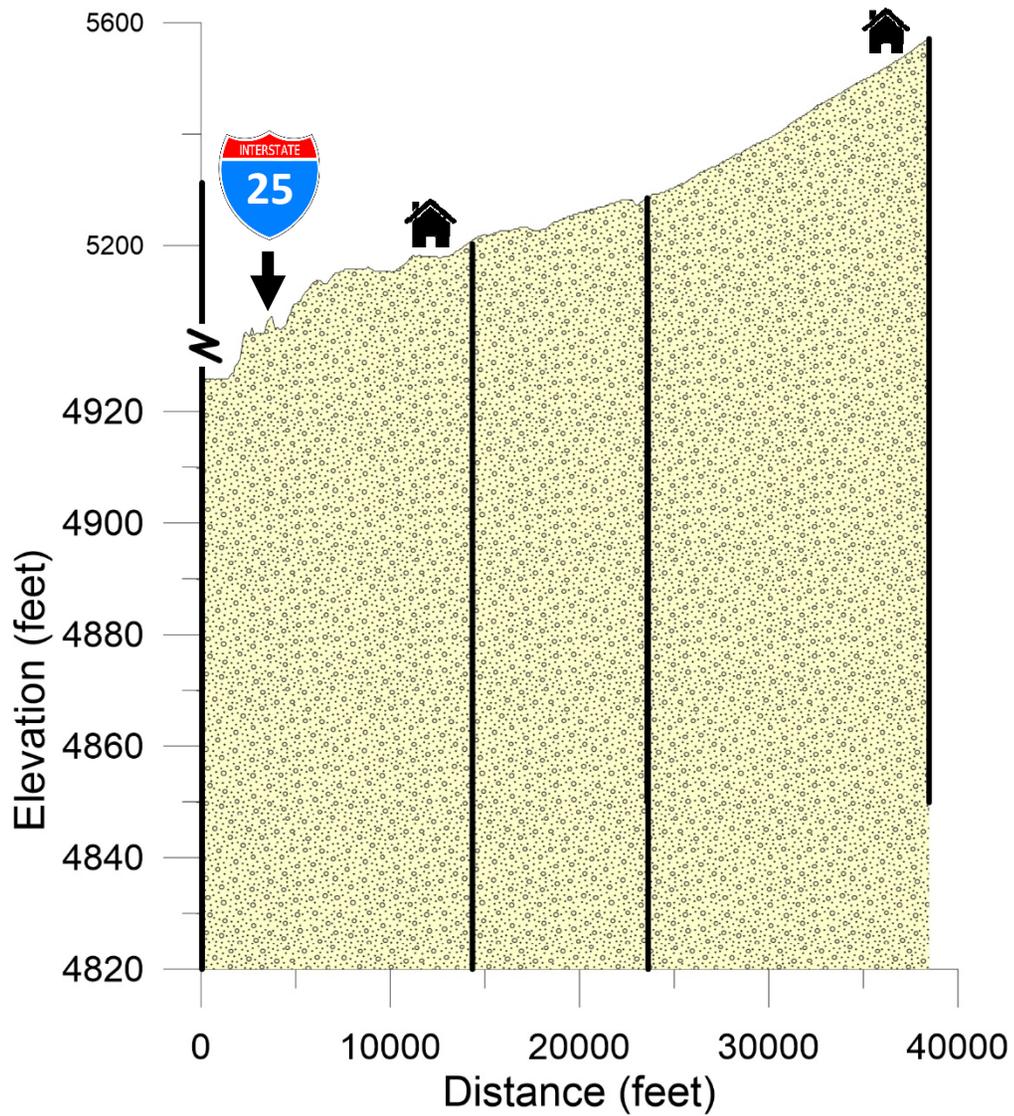


- **Monitoring network will be used to manage the aquifer**
- **The Water Authority has invested ~\$20M in the monitoring network with USGS**

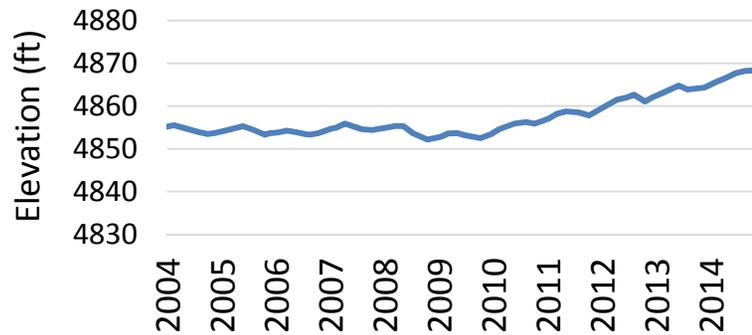
# The USGS Monitors Water Levels throughout the Albuquerque Basin



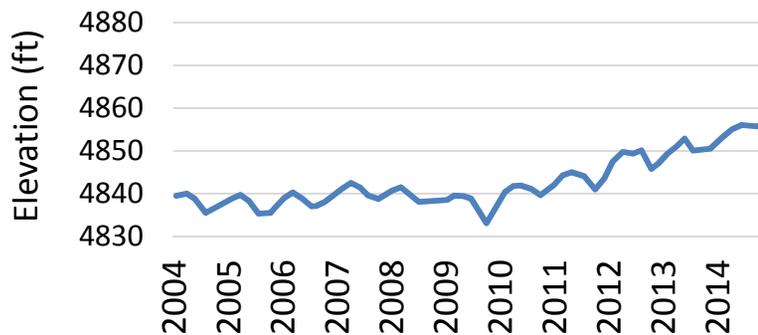
- **Groundwater levels are rising as a result of implementation of the DWP**



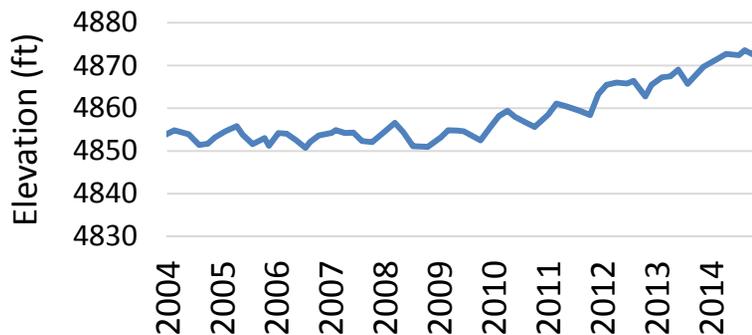
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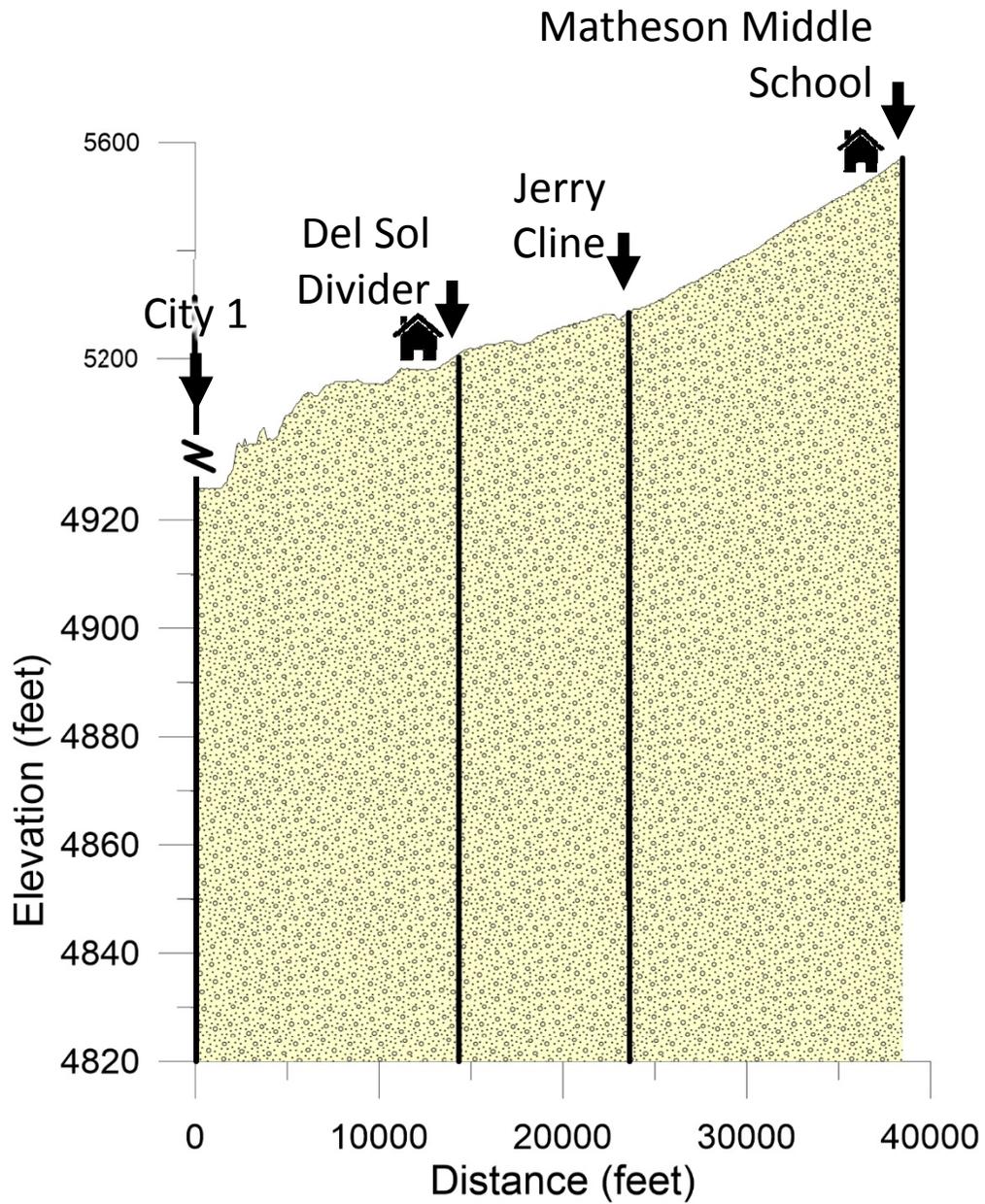


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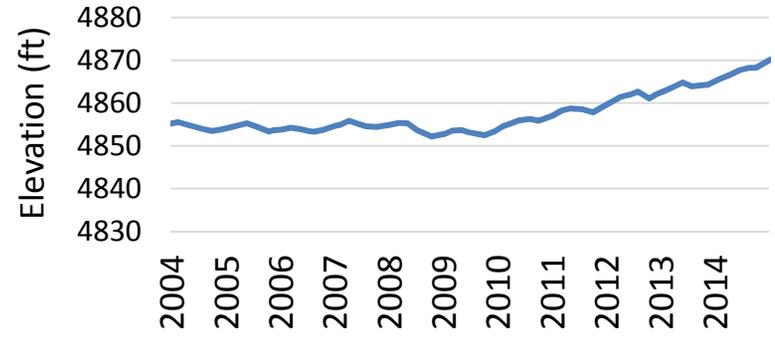


10N.04E.09.214A MATHESON MIDDLE

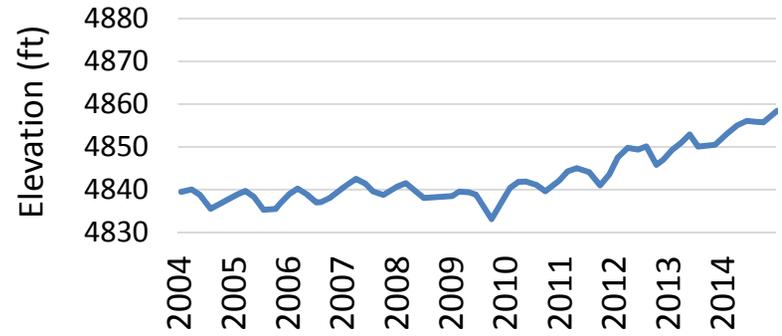




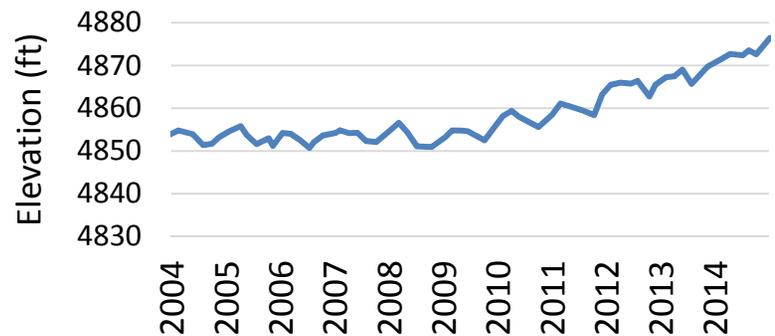
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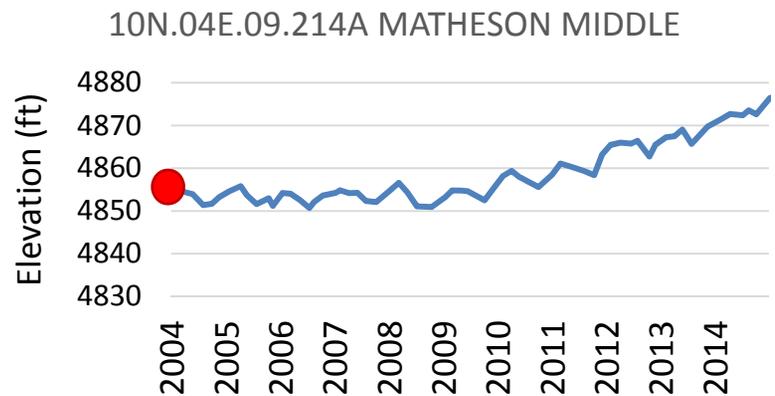
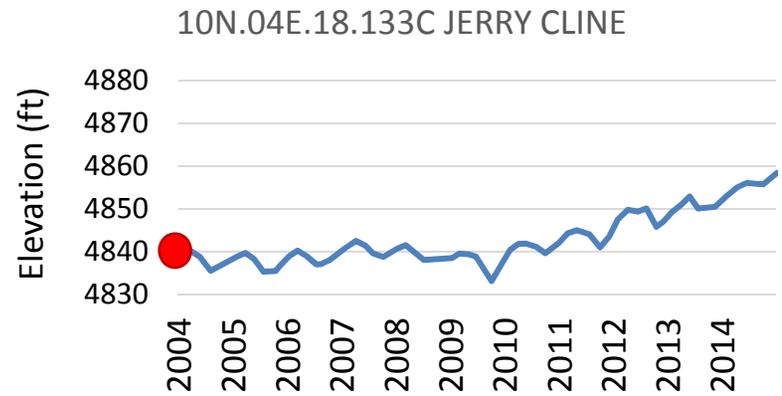
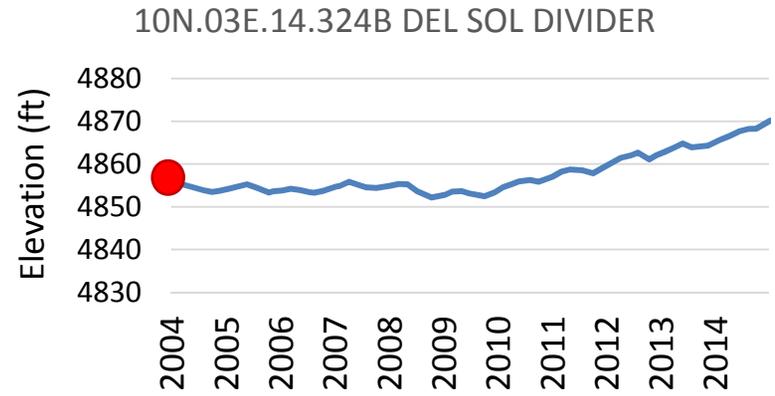
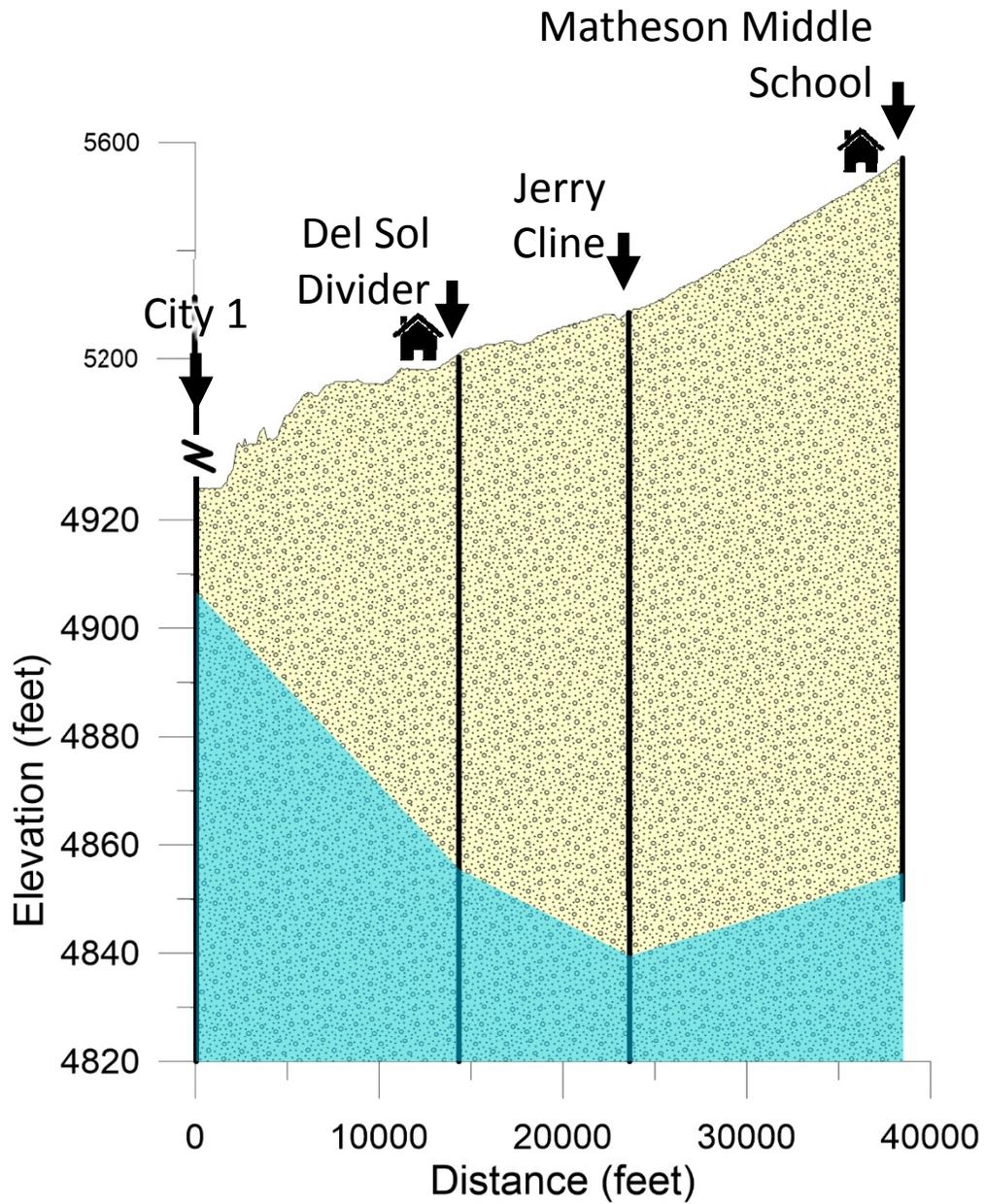


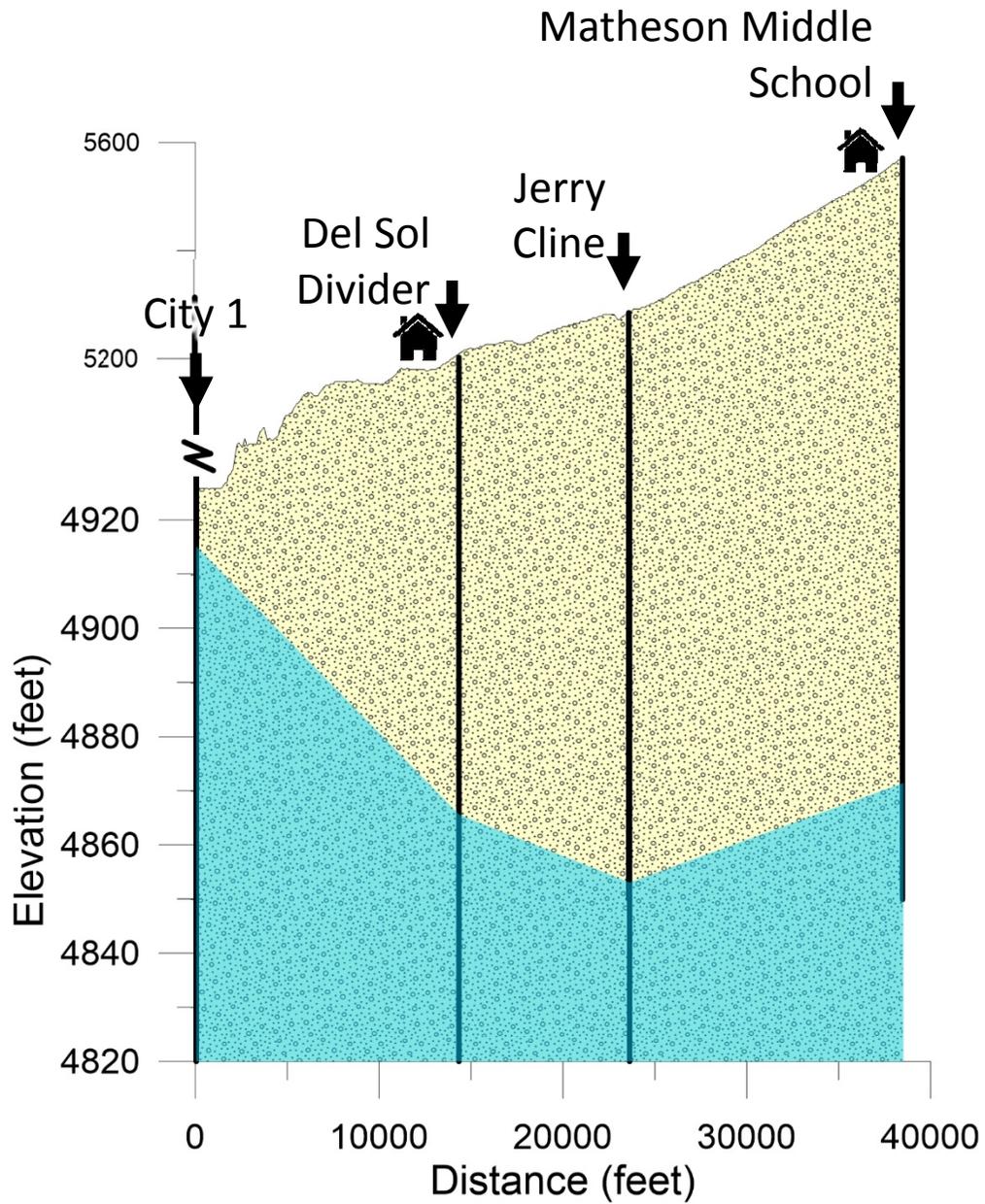
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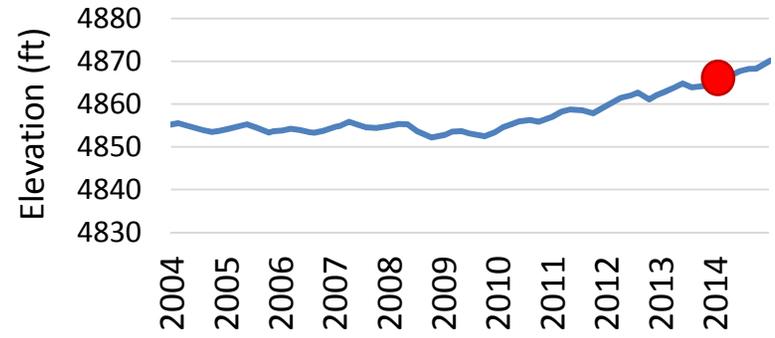
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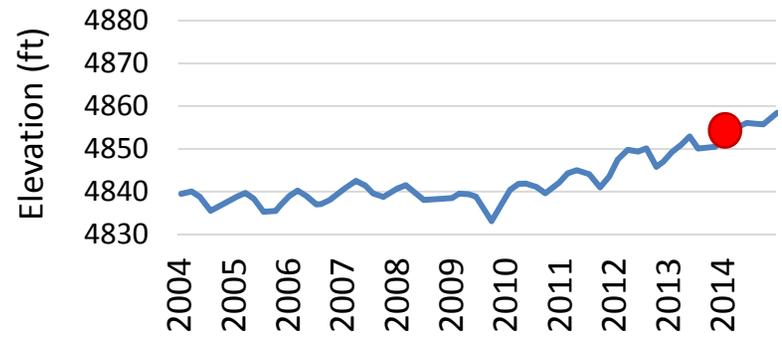




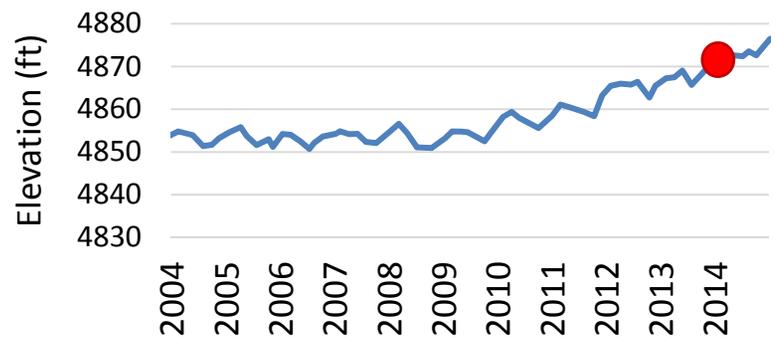
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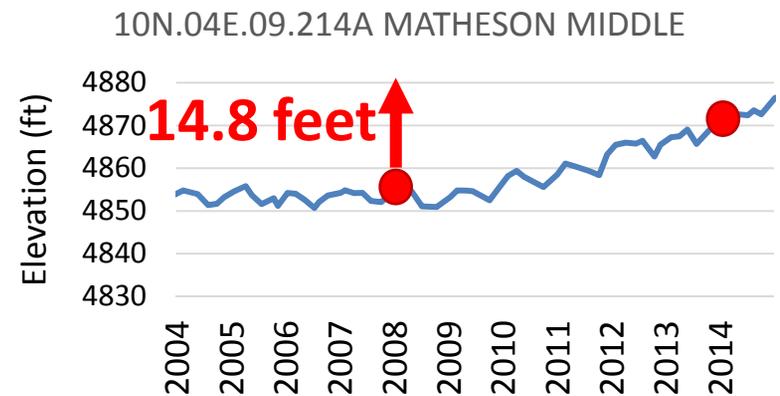
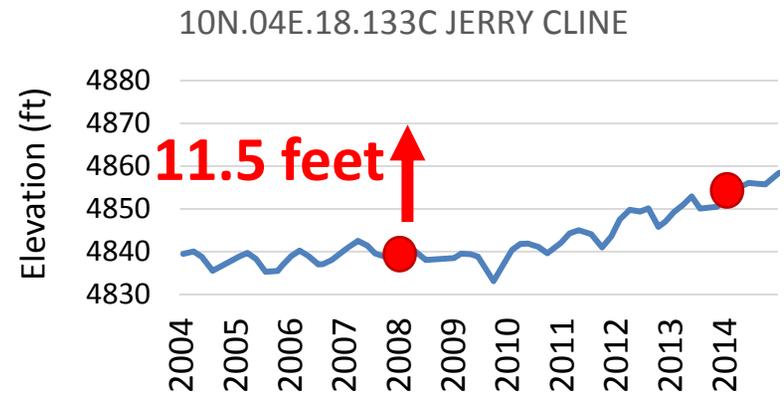
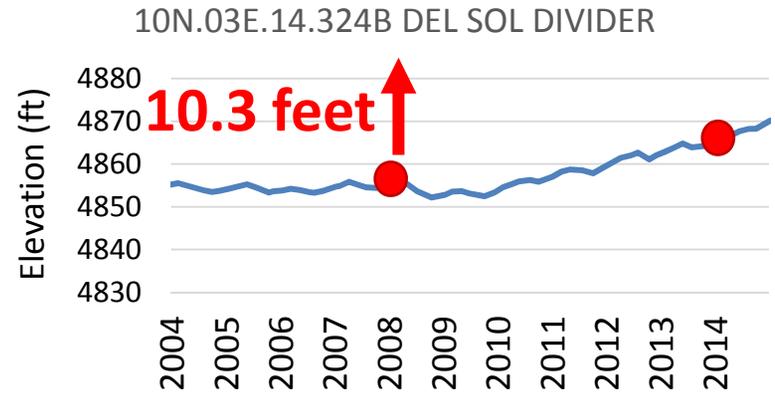
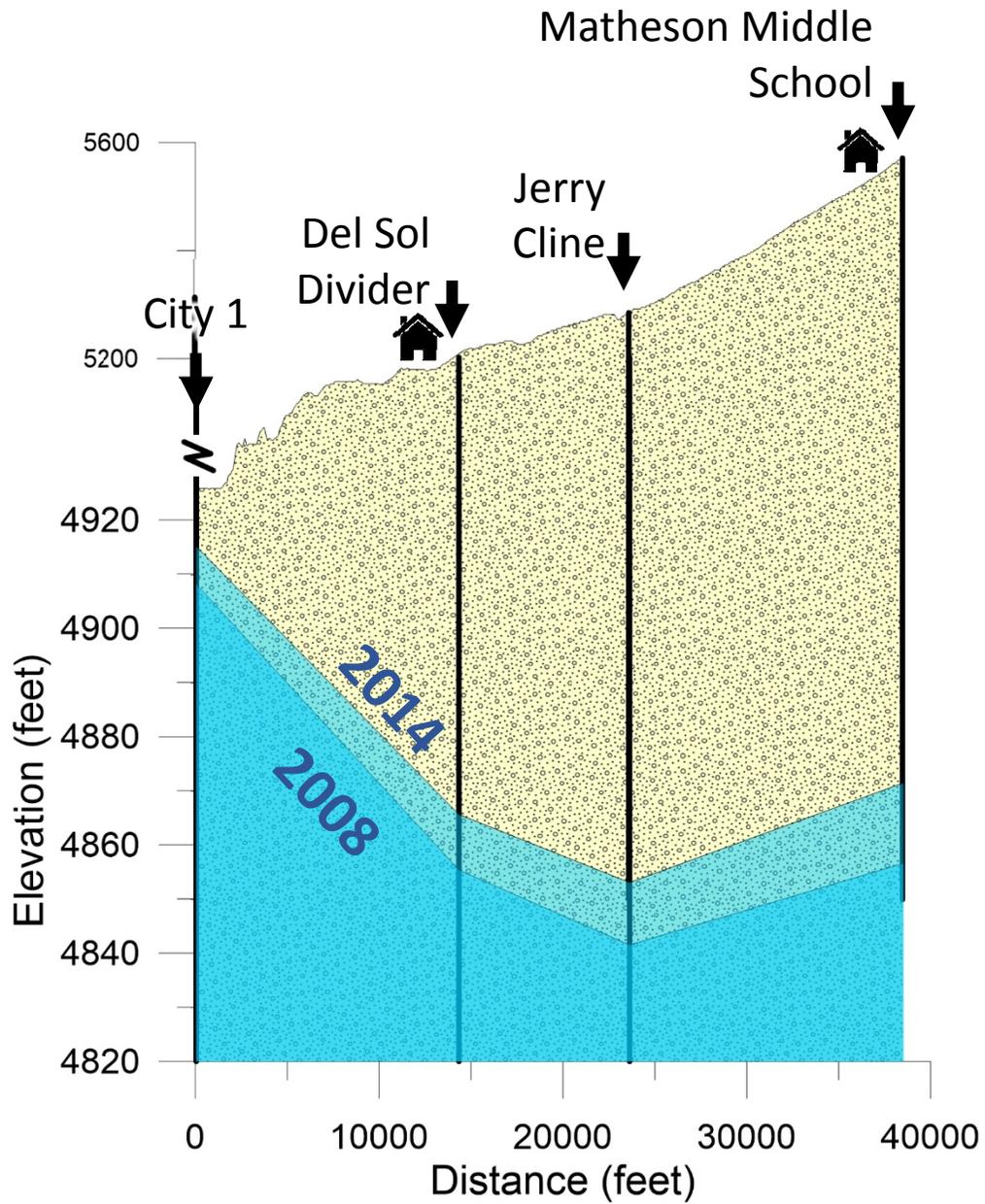


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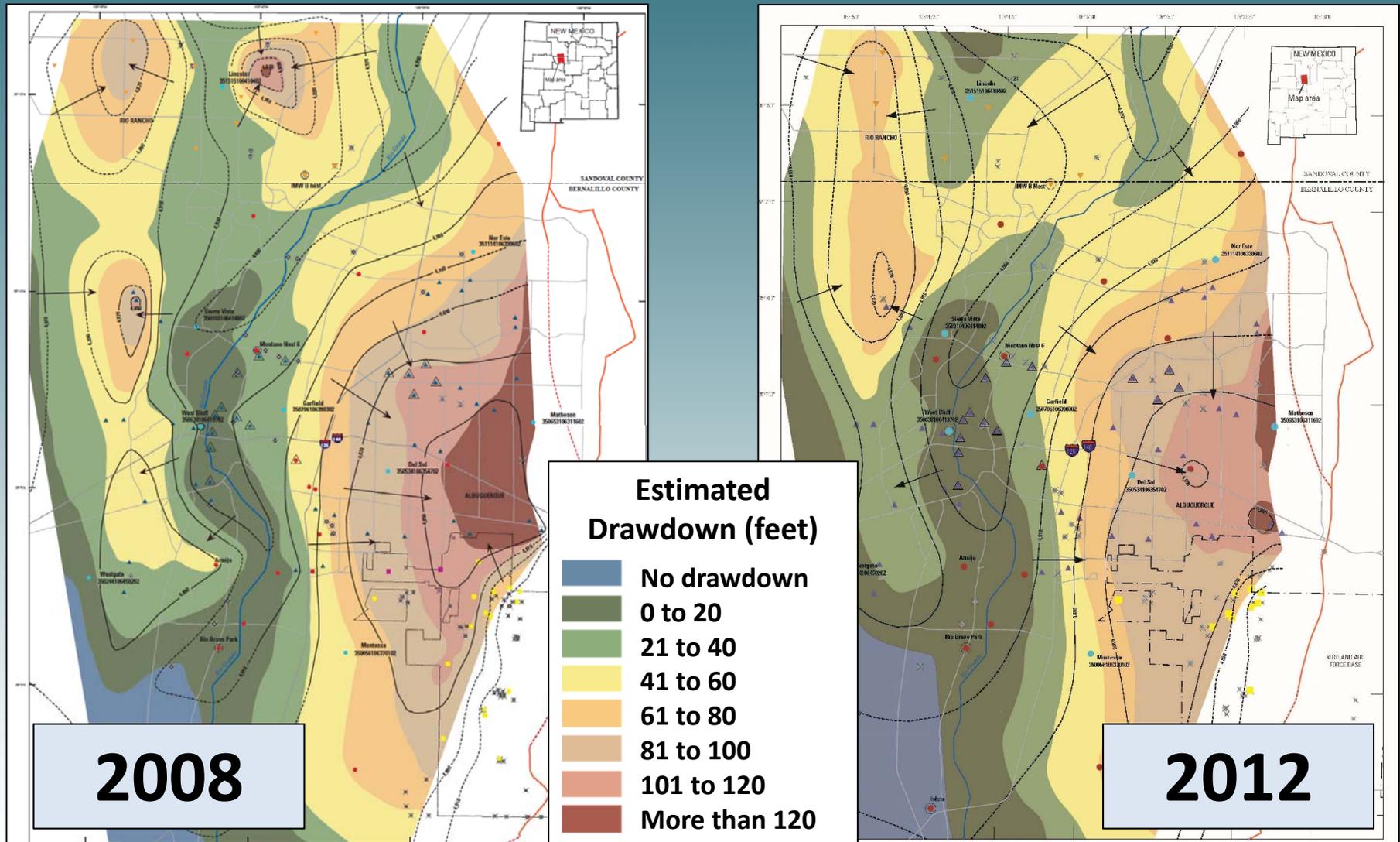


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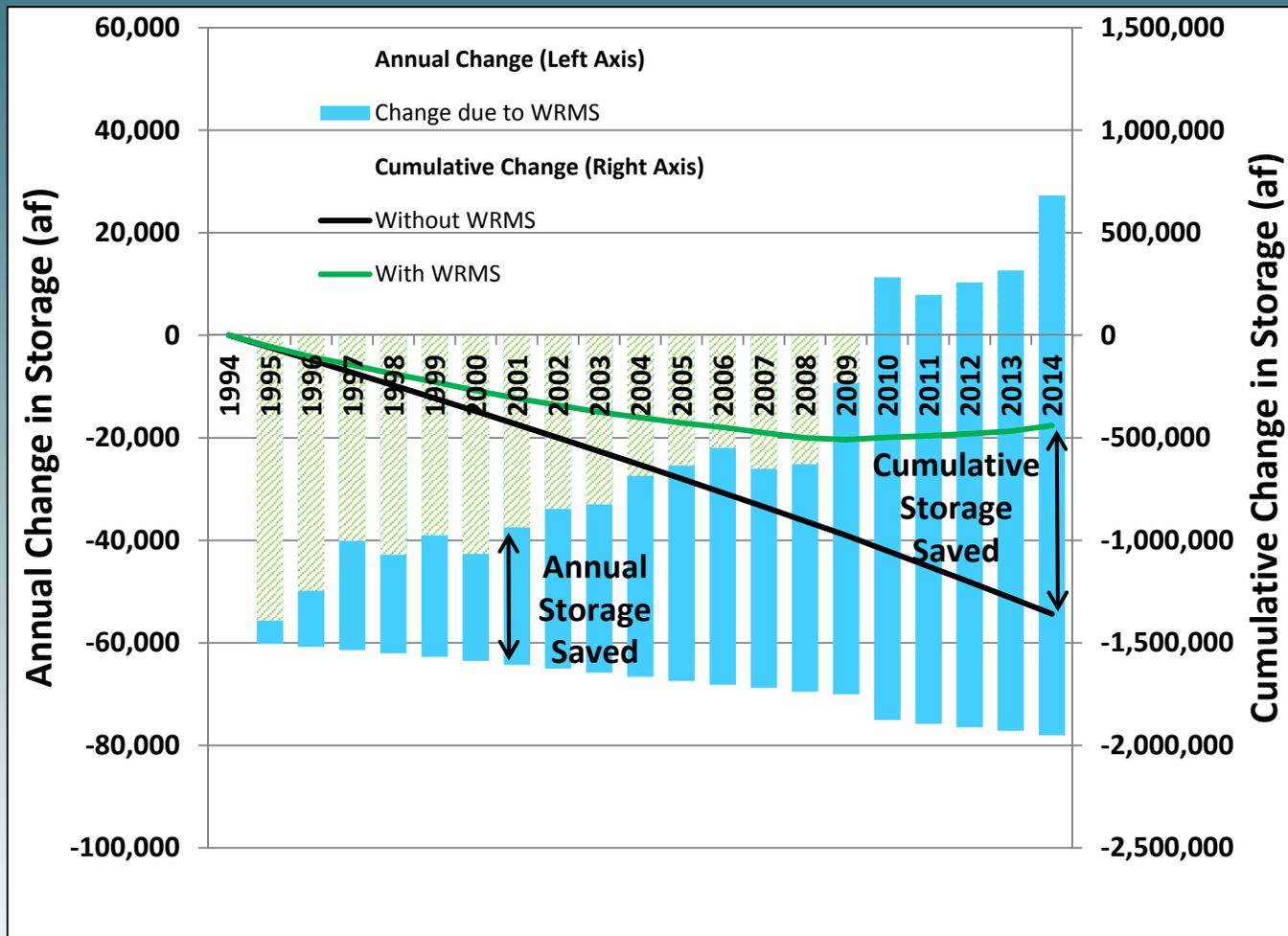




# Groundwater Levels Rising as a Result of Implementation of the DWP



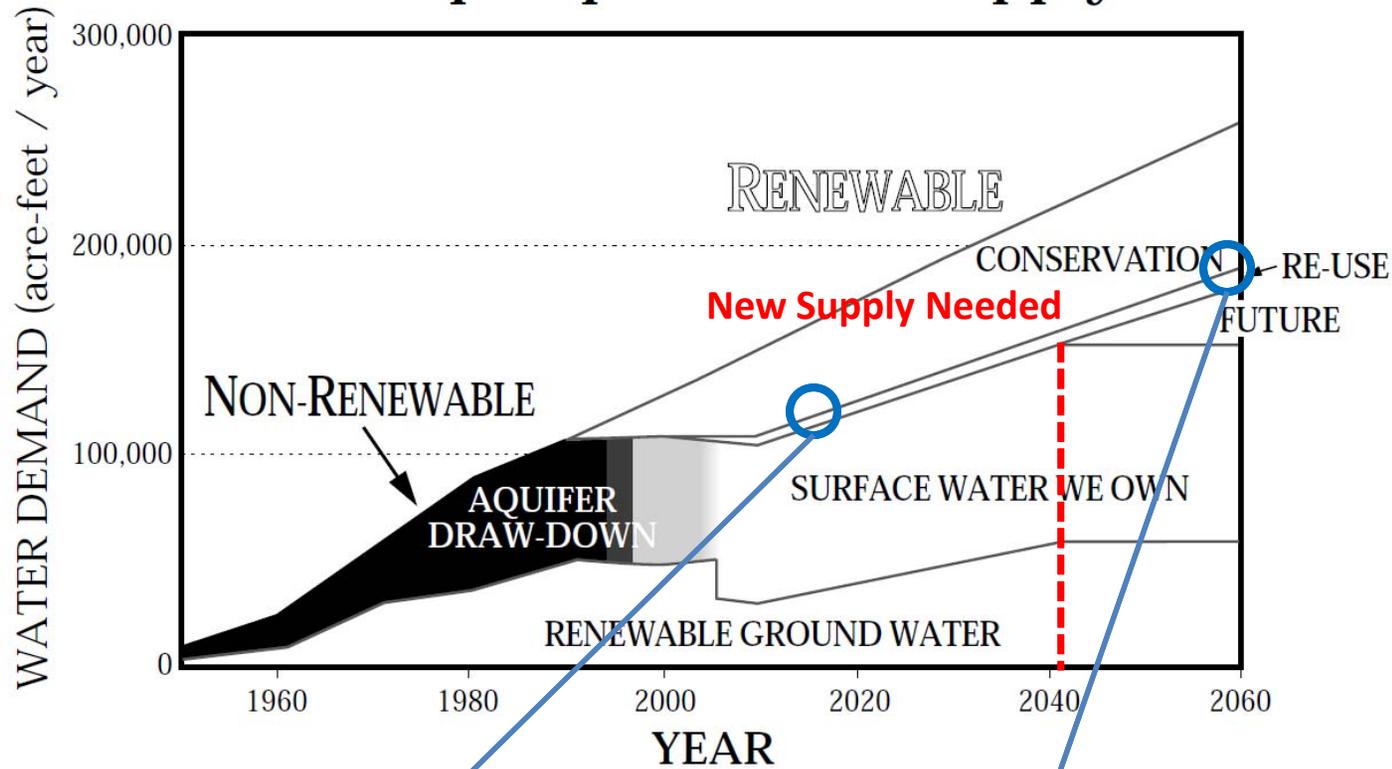
# Groundwater Storage has Increased as a Result of the ongoing WRMS



**Increase of  
~1,000,000  
ac-ft since  
the mid-  
1990s**

# The 1997 WRMS

## Albuquerque's Water Supply

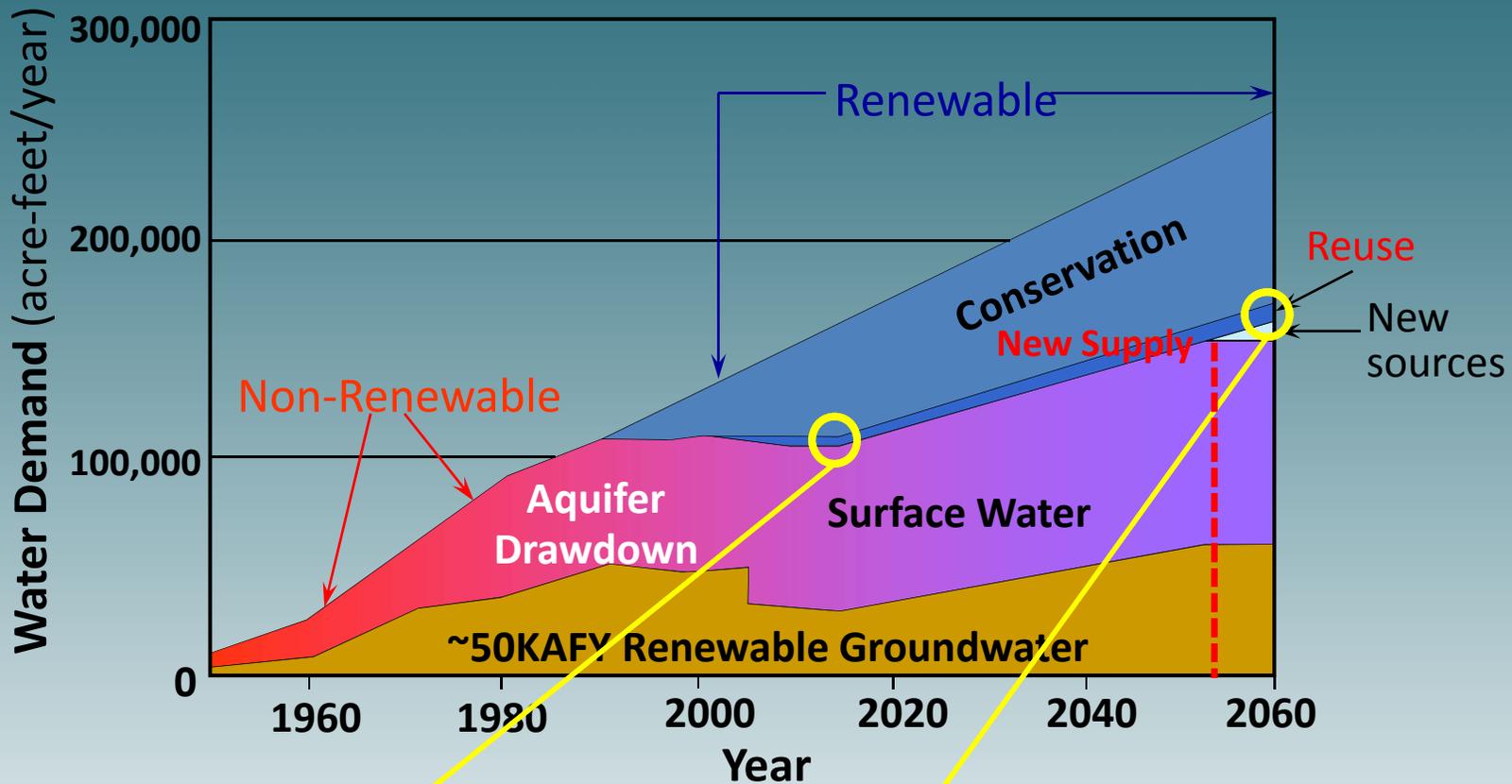


2015 projected demand  
~125,000 ac-ft @ 175 gpcd

2060 projected demand  
~200,000 ac-ft @ 175 gpcd

2015 actual demand ~100,000 ac-ft

# The 2007 WRMS

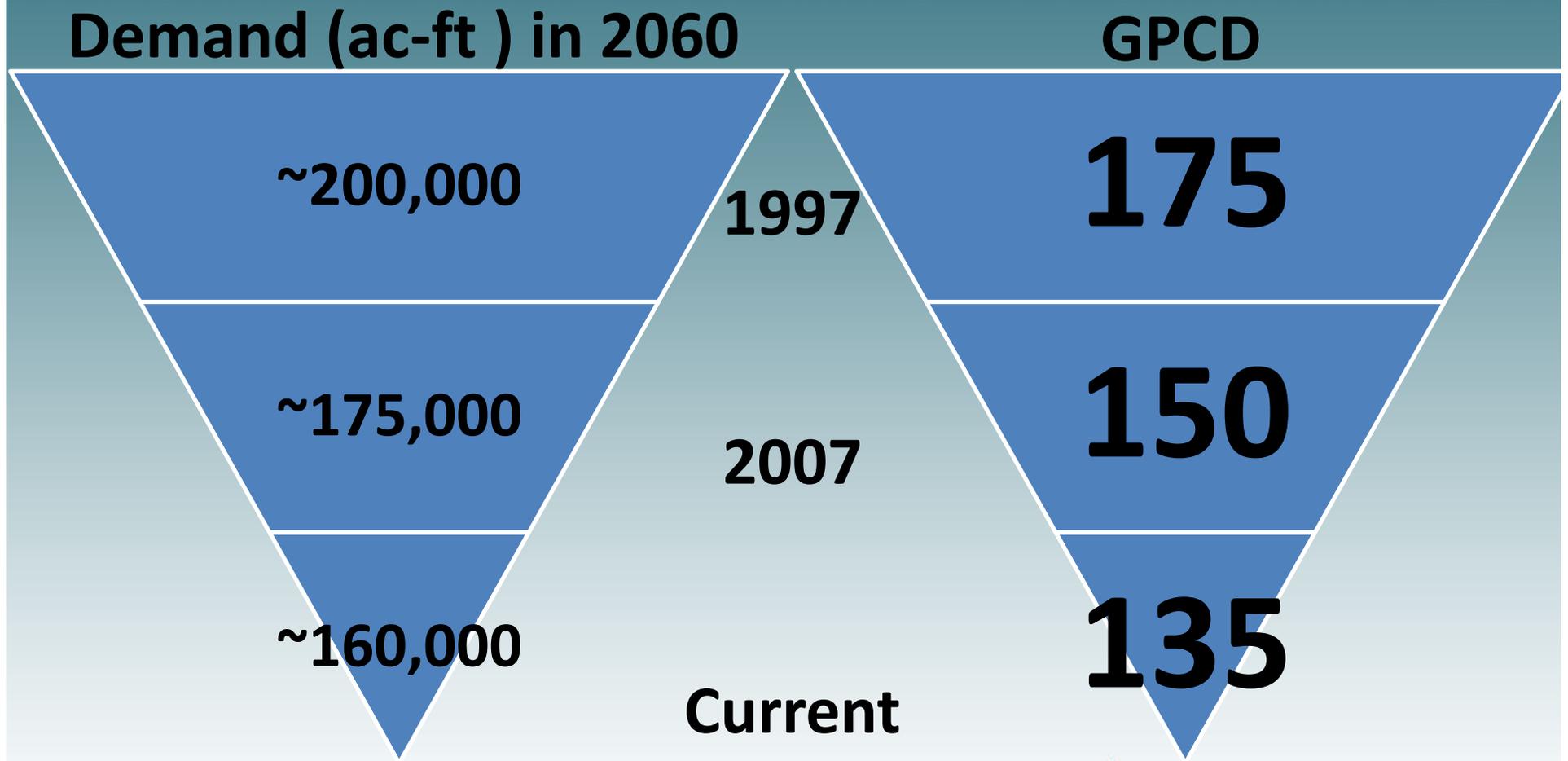


2015 projected demand  
~110,000 ac-ft @150 gpcd

2060 projected demand  
~175,000 ac-ft @ 150 gpcd

2015 actual demand ~100,000 ac-ft

# Demand Projections Have Decreased Since 1997 along with GPCD



# Where are we Now?

- **Implementation of the 1997 and 2007 strategies has put us in a good position and mitigated past issues**
- **Projects such as the DWP, Re-Use, and ASR have diversified and strengthened our water supply portfolio**
- **We need to update the strategy and continue working towards a more sustainable future**

# Status of Recent Water Planning in the West

## RECLAMATION *Managing Water in the West*

SECURE Water Act  
Section 9503(c) – Reclamation  
Climate Change  
2011

### Santa Fe Basin Study

Adaptations to Projected Changes in  
Water Supply and Demand

Santa Fe E



U.S. Department of the Interior  
Bureau of Reclamation  
Upper Colorado Region  
Albuquerque Area Office

## RECLAMATION *Managing Water in the West*

### West-Wide Climate Risk Assessment: Upper Rio Grande Impact Assessment



U.S. Department of the Interior  
Bureau of Reclamation  
Upper Colorado Region  
Albuquerque Area Office

December 2013

## RECLAMATION *Managing Water in the West*

### Colorado River Basin Water Supply and Demand Study

Executive Summary



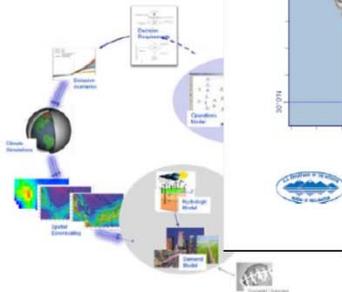
U.S. Department of the Interior  
Bureau of Reclamation

December 2012

## RECLAMATION *Managing Water in the West*

Technical Memorandum No. 86-68210-2011

### West-Wide Climate Risk Assessments: Bias-Correction and Spatially Downscaled Surface Water Projections



U.S. Department of the Interior  
Bureau of Reclamation

# How do we stack up?

## RECLAMATION

*Managing Water in the West*

Executive Summary

Colorado  
Water S  
Executive Summ

FIGURE 1  
The Study Area - the hydrologic boundaries of the Basin within the United States, plus the adjacent areas of the Basin States that receive Colorado River water



2

## Planning for the future

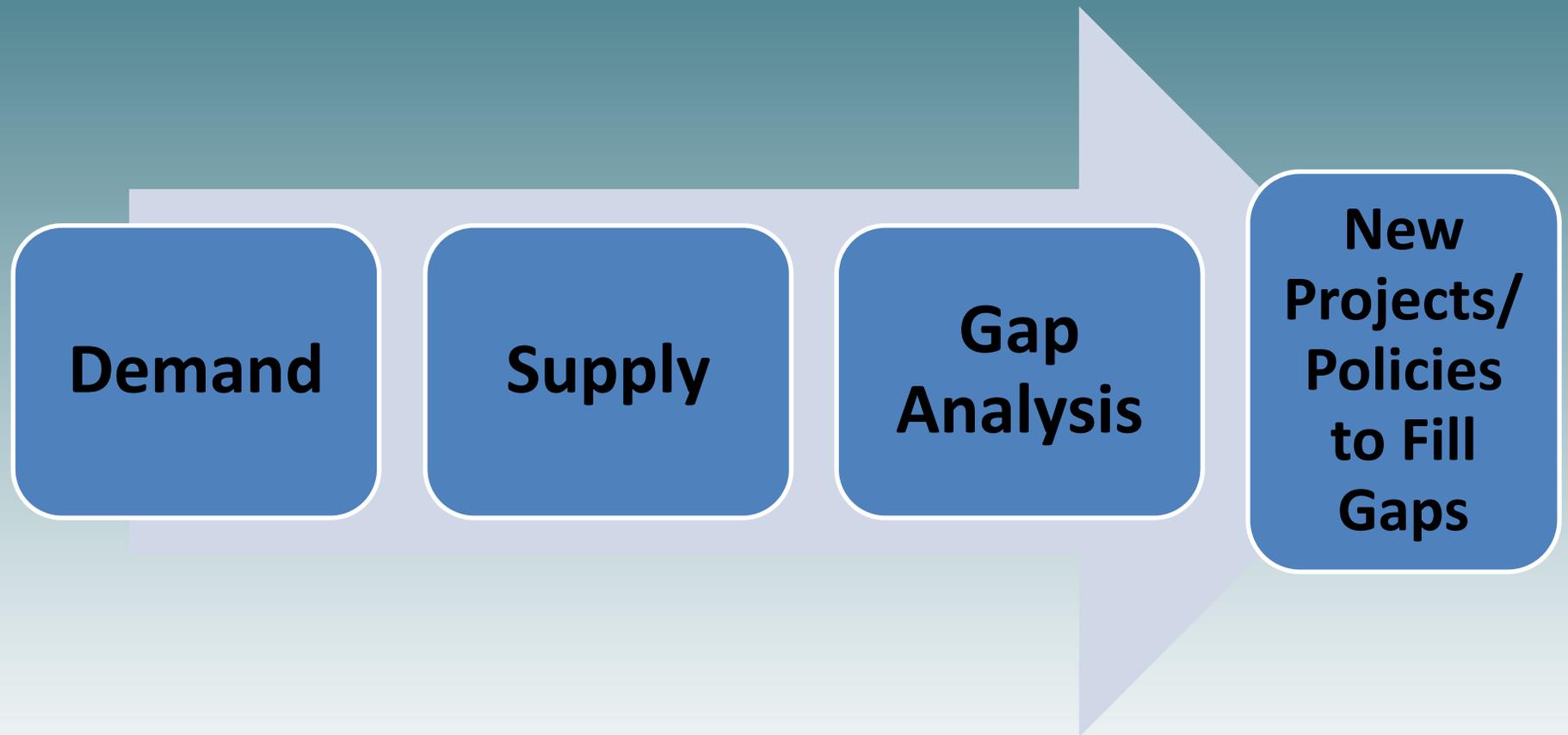
- Drought
- Subsidence
- Conservation

# How do we stack up?

**TABLE 3-5**  
5-Year Annual Average, 2008-2012: Water Use and Trend for Major Metropolitan Areas

Major Metropolitan Area	Population Served	Annual Water Delivery (AF)	Percent Colorado River Water (%)	Climate Index: Potential Evapotranspiration minus Precipitation (inches)	GPCD (% reduction from 1990, 2000)	Residential <sup>1</sup> (%)	CII <sup>1</sup> (%)
Front Range	2,461,600	491,300	46	28	178 (22%, 18%)	79.4	14.6
Wasatch Front	978,600	245,200	27	29	224 (NA, 15%) <sup>2</sup>	70.6 <sup>3</sup>	21.3 <sup>3</sup>
Middle Rio Grande	685,800	117,000	36 <sup>4</sup>	43	152 (38%, 24%)	68.8	22.2
Southern Nevada	1,932,900	493,400	91	86	228 (33%, 26%)	55.7	25.5
Central Arizona	4,725,100	1,029,800	46	68	195 (14%, 15%)	60.0	30.4
Coastal Southern California	17,983,400	3,422,200	34	34	170 (11%, 10%)	70.2	26.0
Salton Sea Basin	464,000	166,300	NA	65	314 (15%, 24%)	NA	NA

# Road Map for the Process

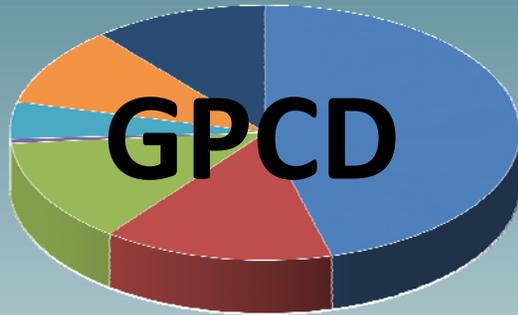


# Tools in the Toolbox



- **URGSIM** – dynamic simulation model developed by Sandia National Laboratories, based on Reclamation data, and used to simulate potential climate change impacts to surface-water supply
- **NM OSE Groundwater Model** – MODFLOW model originally developed by USGS, used to simulate the aquifer
- **Water Budget Model** – currently under development by the Water Authority, used to evaluate potential supply and demand

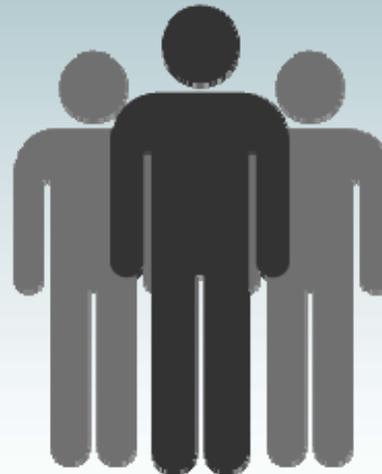
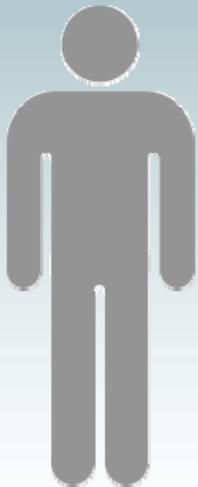
# Demand Forecasting



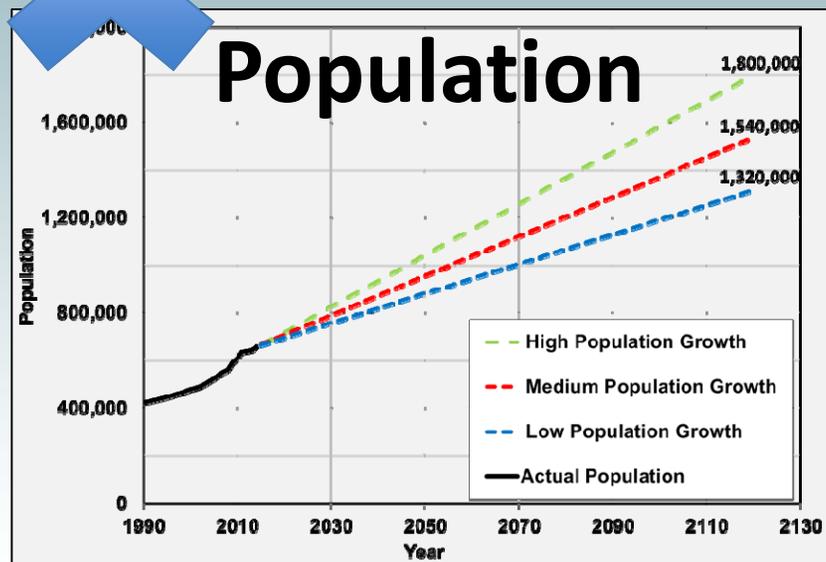
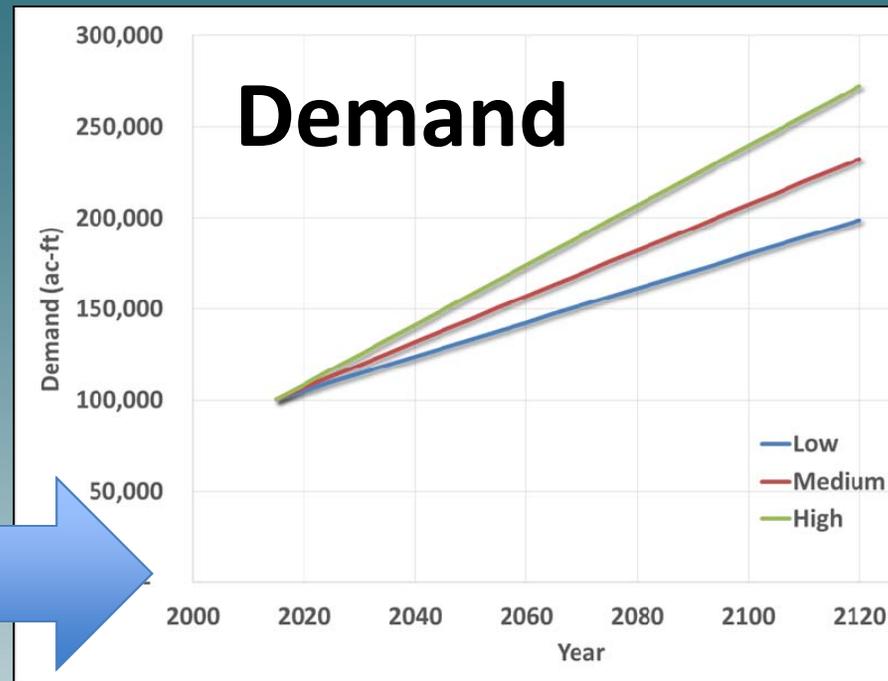
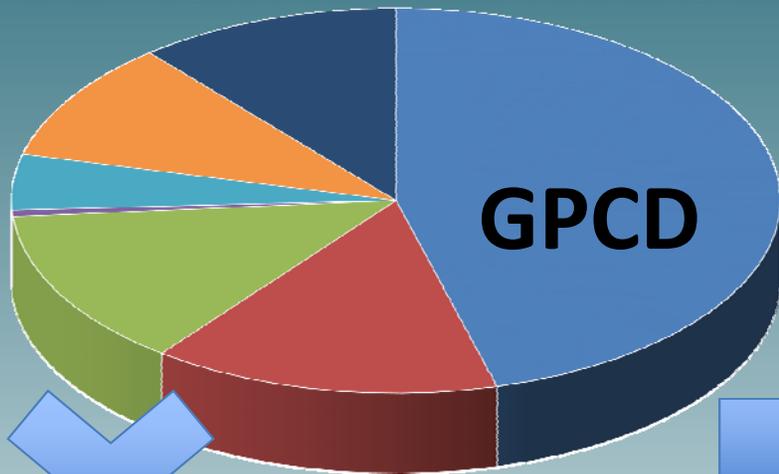
## Population

Based on:

- Historical system growth
- BBER 2008
- BBER 2012
- MRCOG 2035/2040

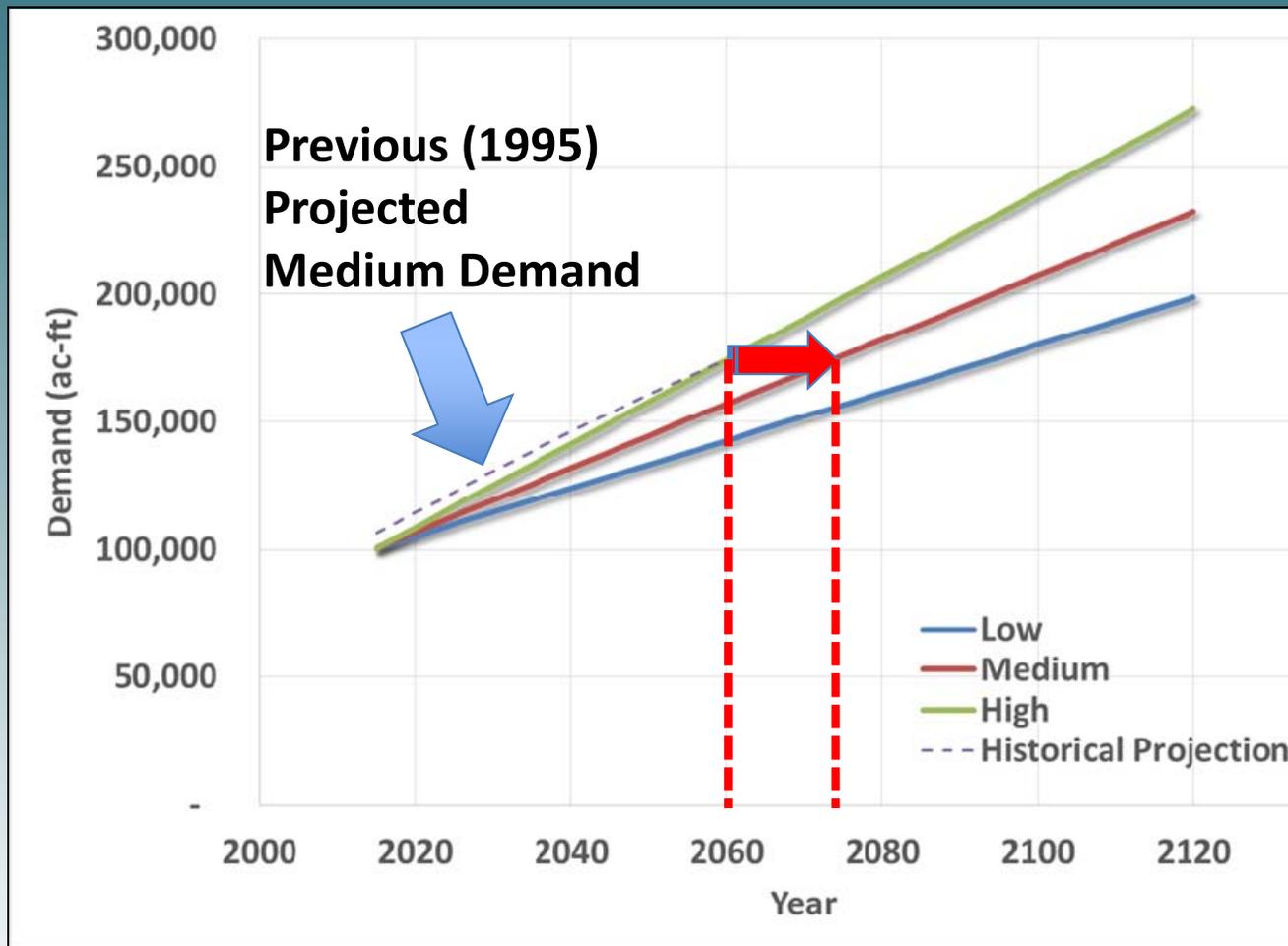


# Calculating Demand: Low, Medium, High



- We assume as a baseline that GPCD remains the same in the future

# Demand Projections – Low, Medium, High



**1997 medium demand projected to be 175,000 ac-ft in 2060**

**Revised medium projection moves that to ~2075 due to conservation**

# Current Supply

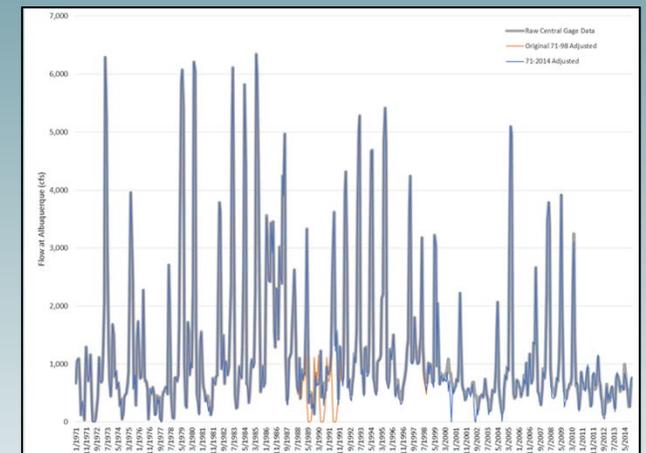
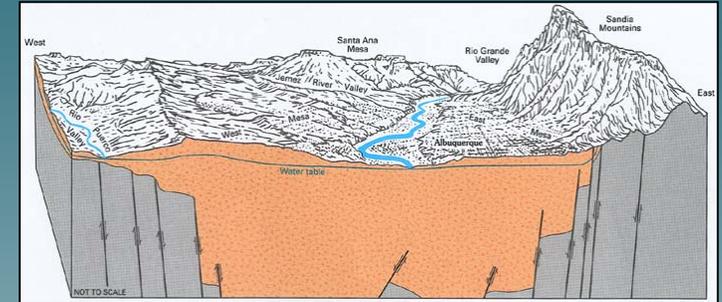
## Five Sources of Supply

- Ground Water
- Surface Water for Drinking Water Purposes
- Surface Water for Non-potable Uses
- Purified Industrial Effluent for Non-potable Uses
- Treated Municipal Effluent for Non-potable Uses

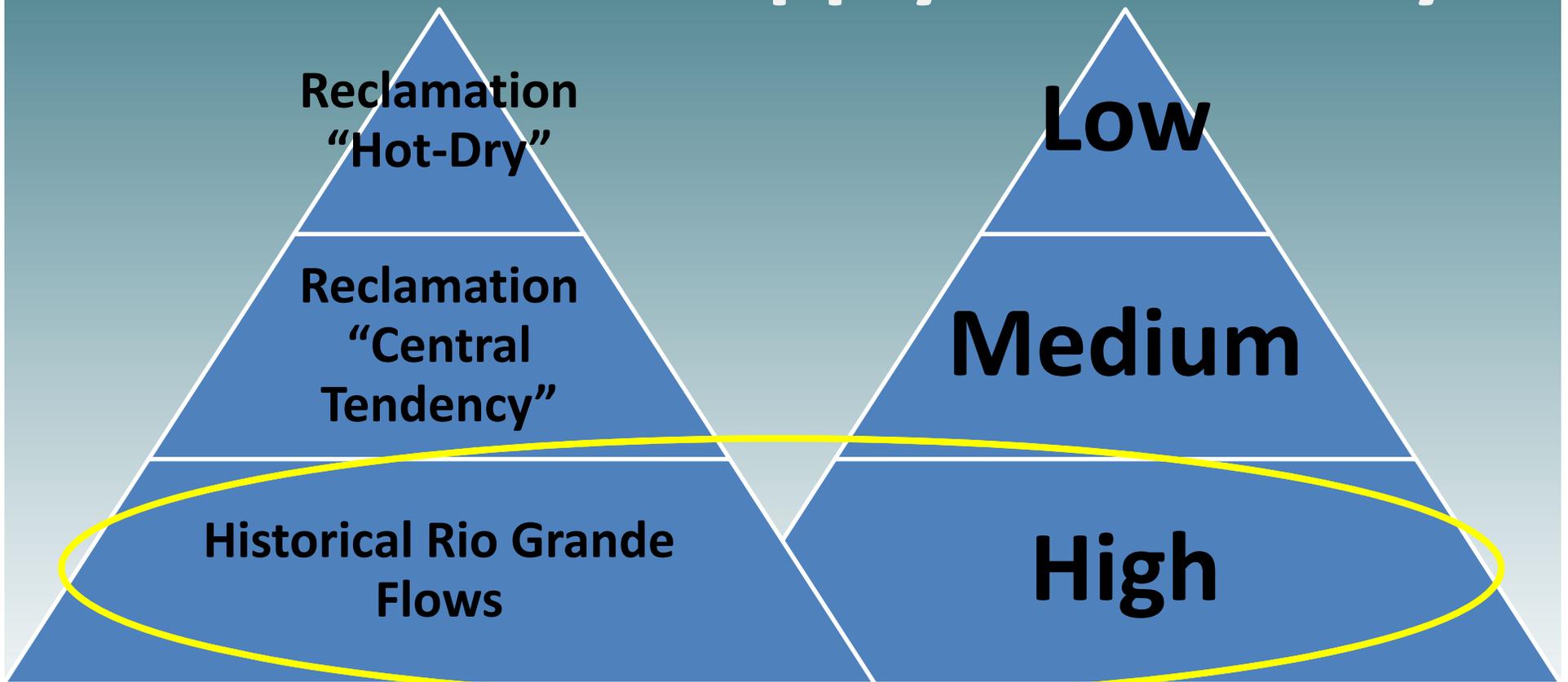


# New Information on Supply

- **Water levels are known with relatively high certainty**
- **We need time series of flows for low, medium, and high surface water supply – highly variable**
- **We considered the observed record, as well as potential climate variability**



# Historic Rio Grande Flows are Considered Representative of High Surface-Water Supply Availability



# Climate Change Data

The climate-change data were derived by Reclamation from base data first developed as part of the West-Wide Climate Risk Assessment

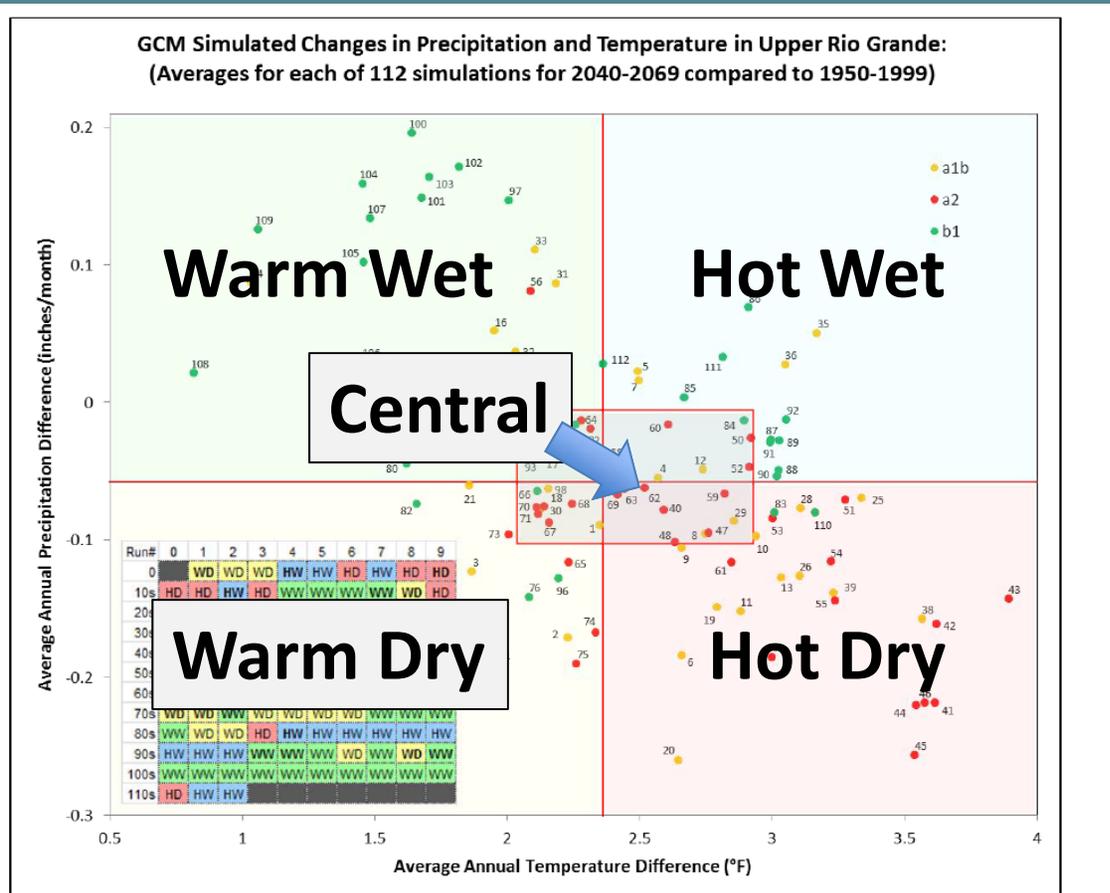
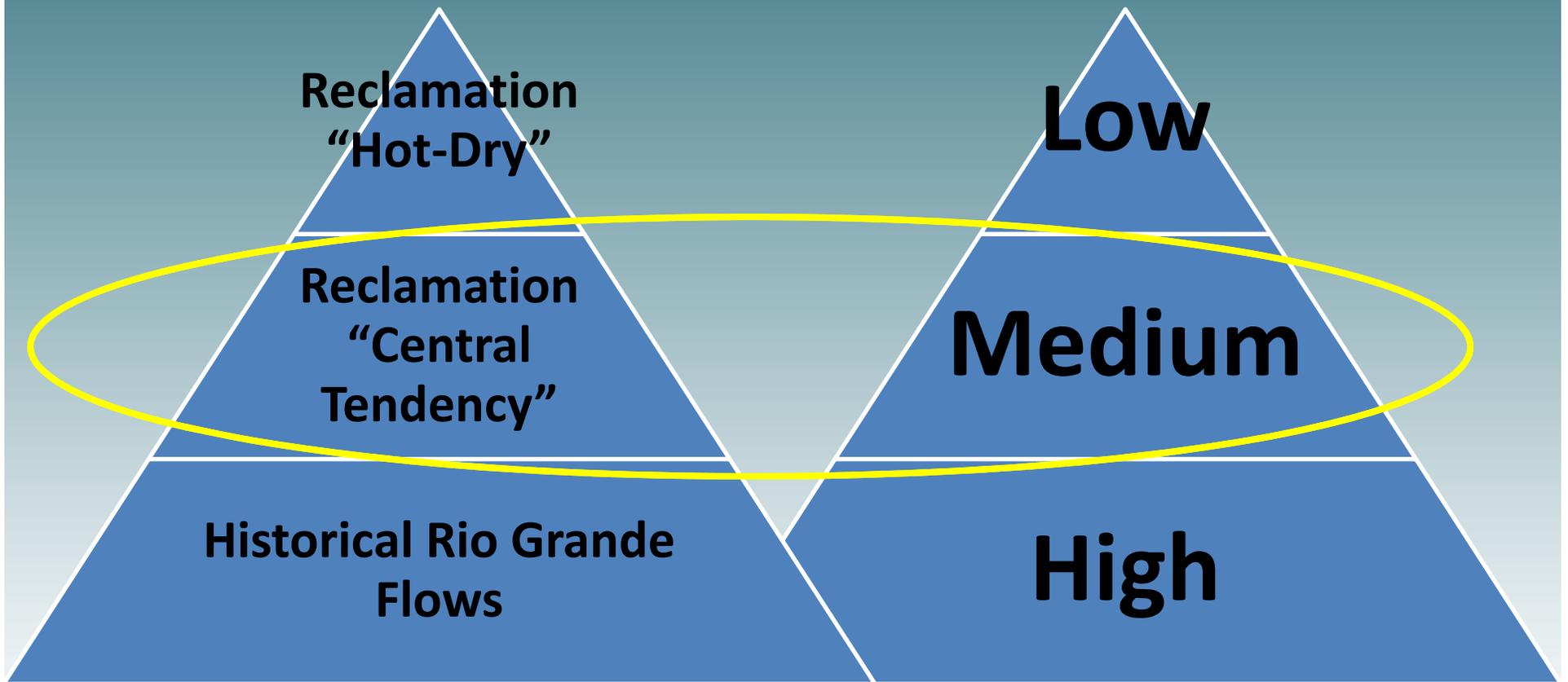
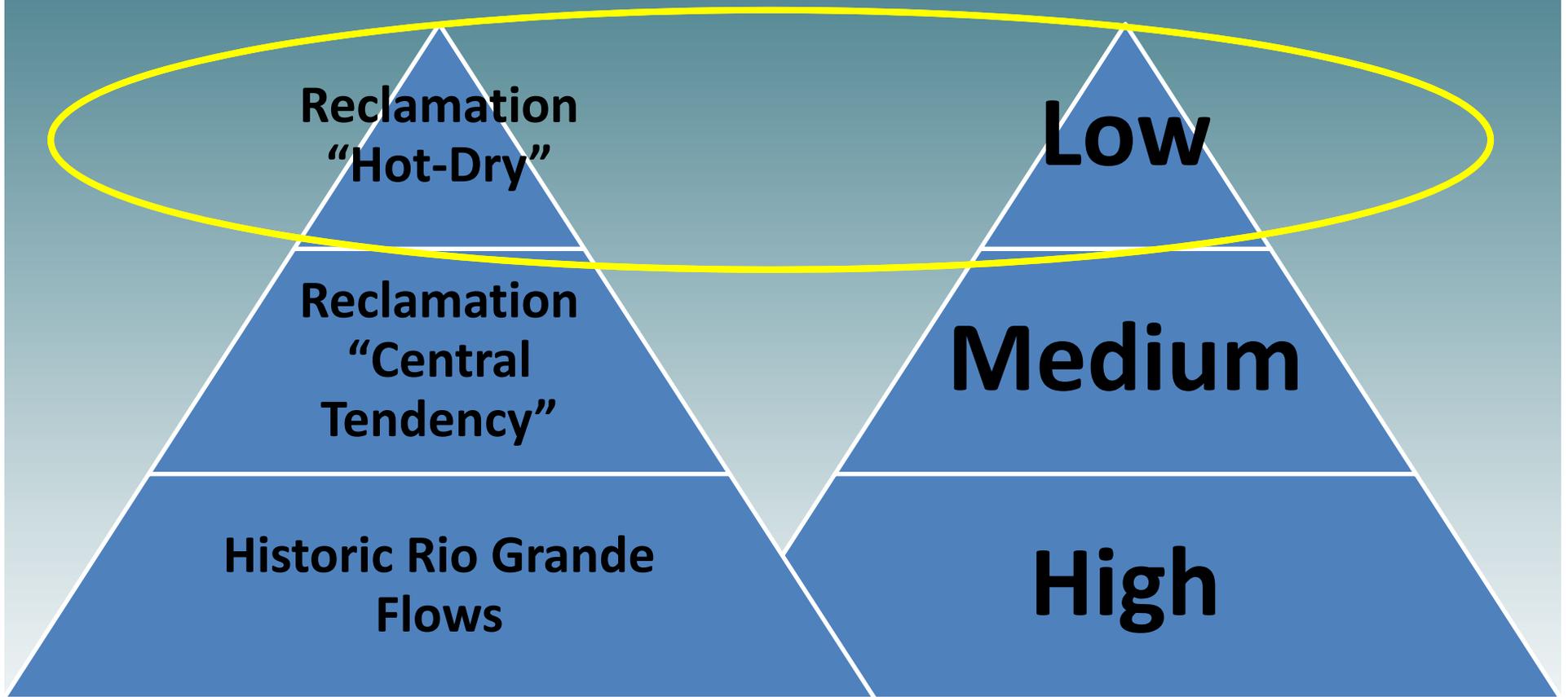


Figure 2: Plotting the temperature delta (X axis) against the precipitation delta (Y axis) to group the 112 GCMs into ensembles. The red lines represent the 50% values for each, and the red bounding square encompasses the 25% to 75% values.

# Central Tendency Provides a Reasonable “Middle Ground” Alternative



# Hot-Dry Represents a Potential Low Surface-Water Supply Future



# What Does a Potential Future Look Like?

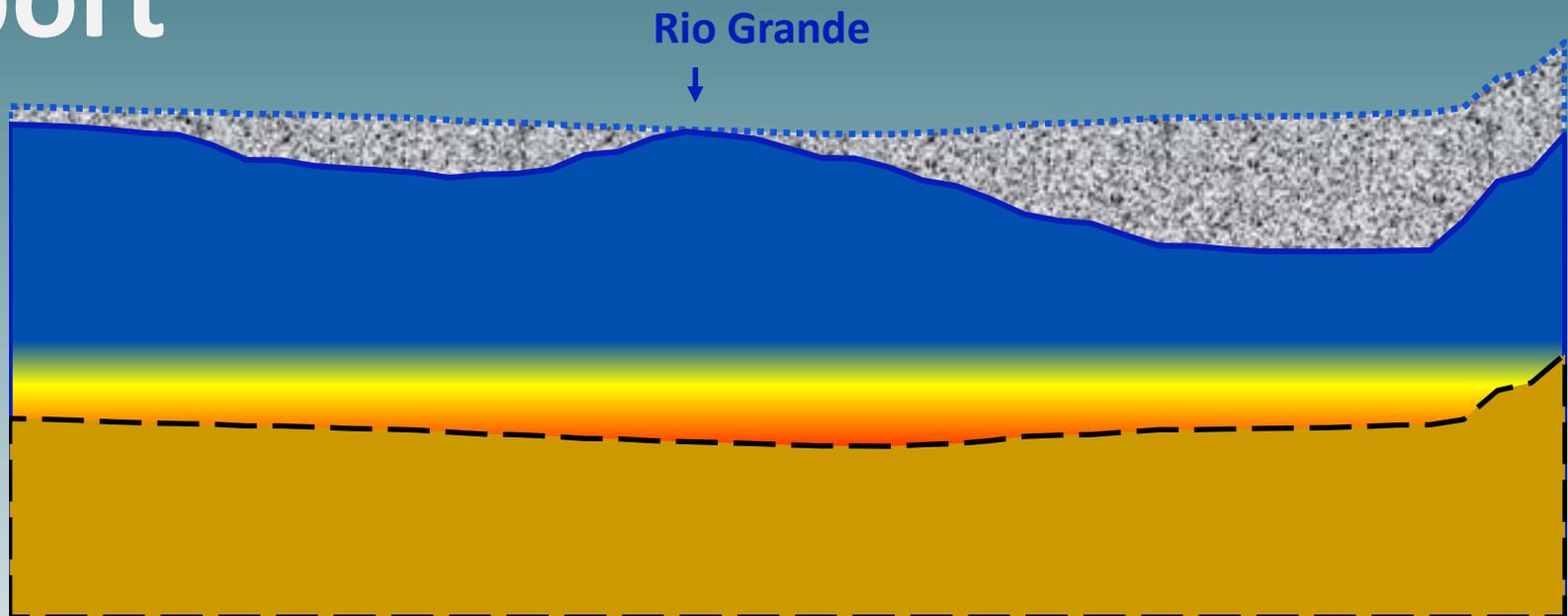
Period	Simulations w Full SJC Allocation	Average Total SJC Allocation
1951-1999	99%	99.95%
2020s	85%	94%
2050s	72%	88%
2090s	61%	81%



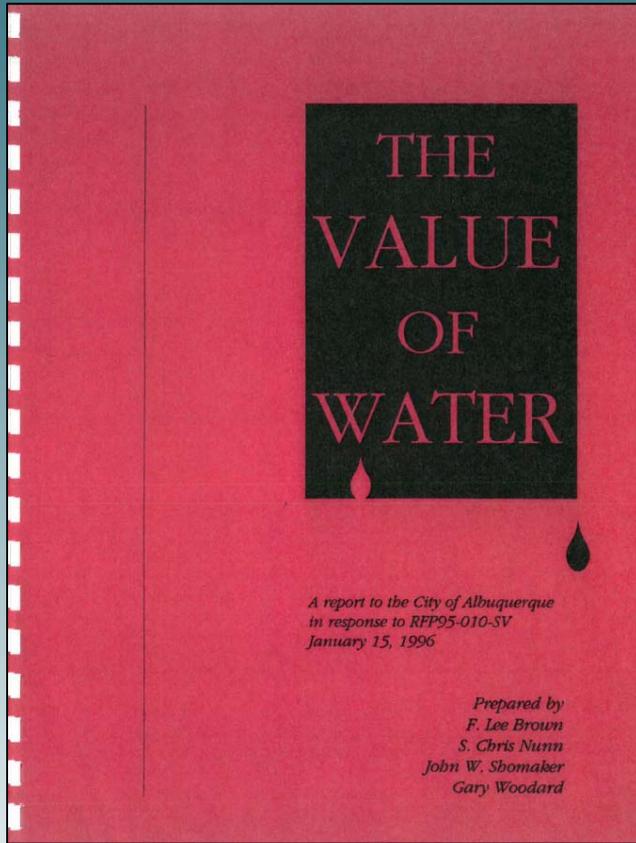
**Full SJC Deliveries are made 6 out of 10 years in the 2090s (partial deliveries in other years)**

From Roach and Llewellyn, 2013  
Sandia National Laboratories/Bureau of Reclamation

# Current and Future Groundwater Management: Value of Water Report



# Value of Water Report

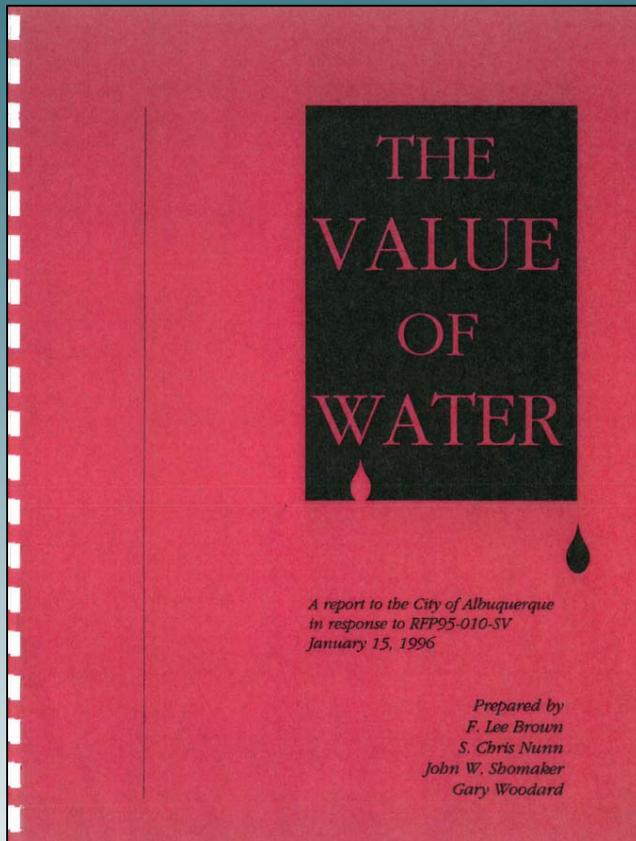


**1996 Report Commissioned by the City of Albuquerque**

**Developed “key concepts” as referenced by the 1997 Water Resources Management Strategy (WRMS)**

**2007 WRMS: “update the analysis in the Value of Water Study...”**

# Value of Water Report



## Critical Aquifer Services:

1. Prevention of irreversible subsidence
2. Protection against unforeseen events
  - A. Catastrophic Drought
  - B. Institutional Conflict, e.g. litigation
  - C. Watershed Fires
  - D. Surface Spills
  - E. Damage to Diversion Facilities
3. Provides a Working Reserve

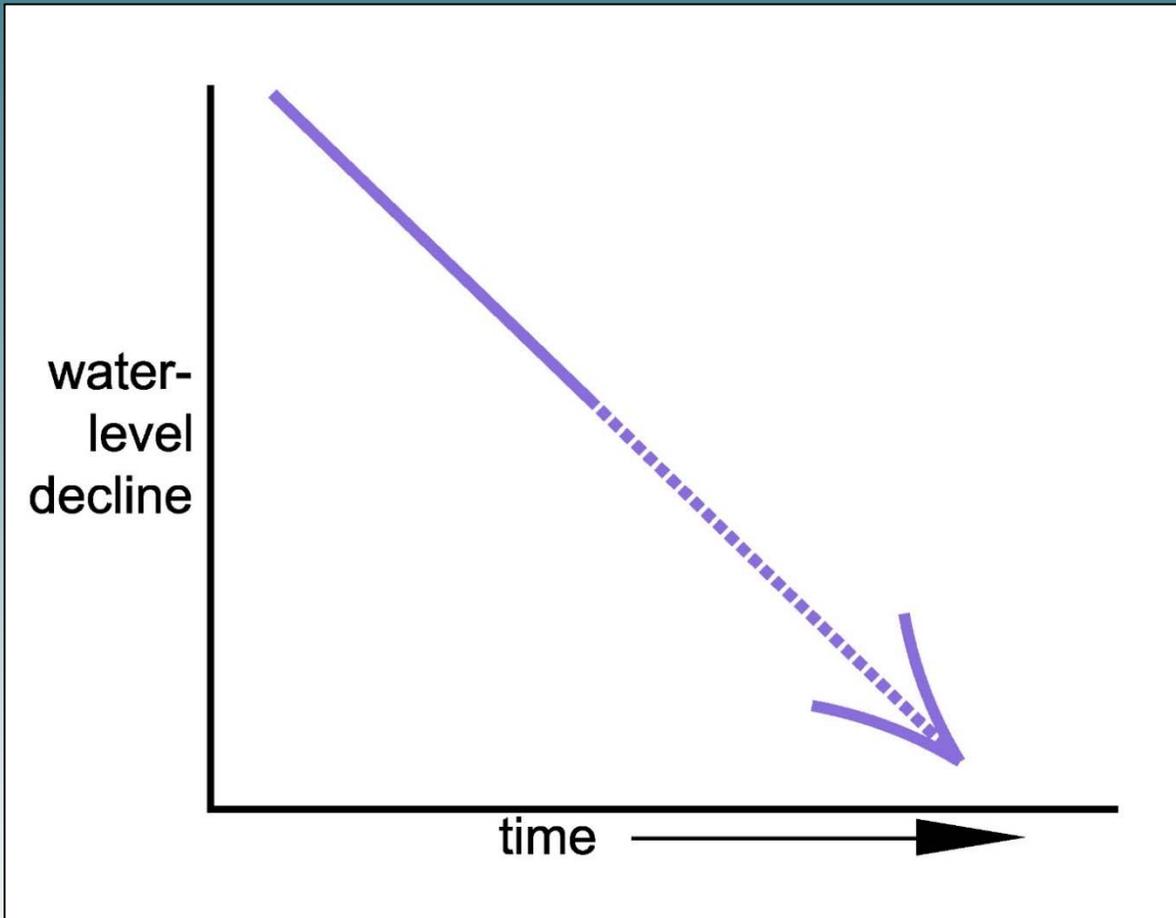
# Proposed 2017 Groundwater Management Policy

## Partition ABCWUA Accessible Aquifer into Three Parts

1. Below Subsidence Threshold: No Pumping
2. Safety Reserve: Pumping Only in Emergency
3. Working Reserve: Pump with Restoration Plan

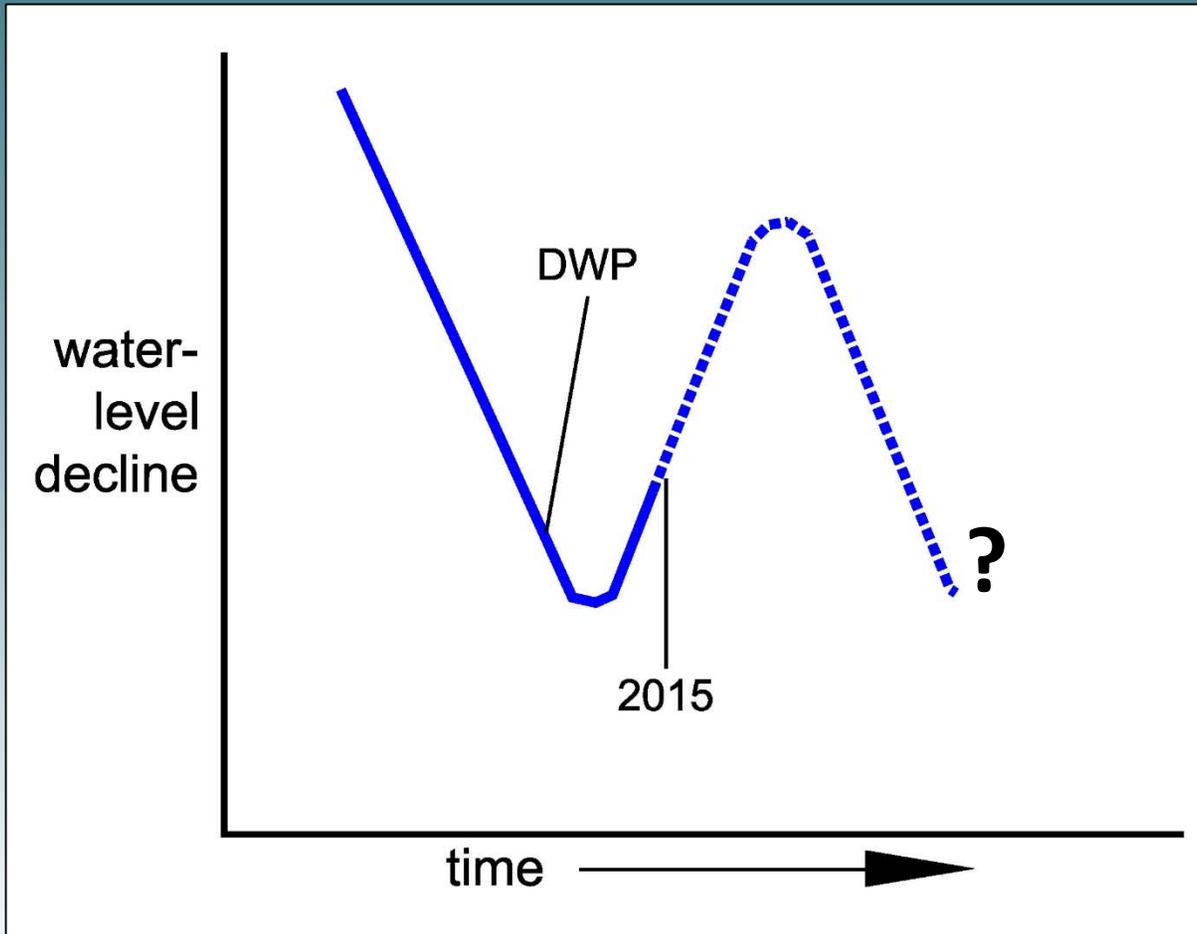
**Seek New Supplies when Necessary**

# Pre-DWP Groundwater Management



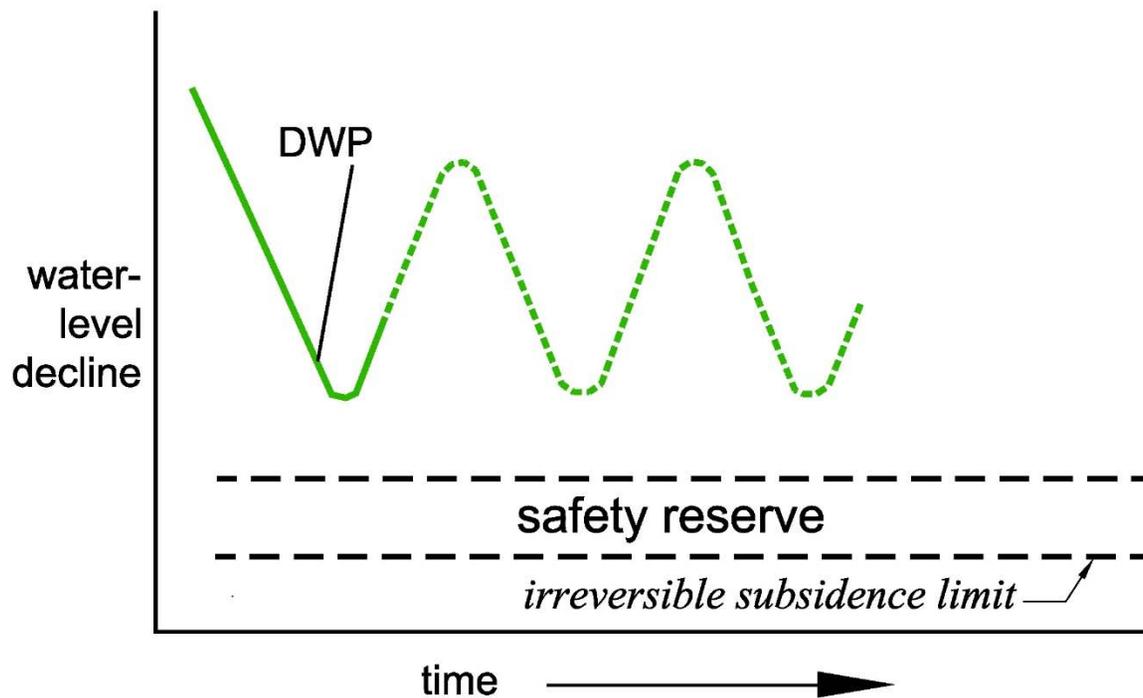
- Sole reliance on groundwater
- Poor understanding of the system
- No NM OSE Critical Management Areas

# Current Groundwater Management



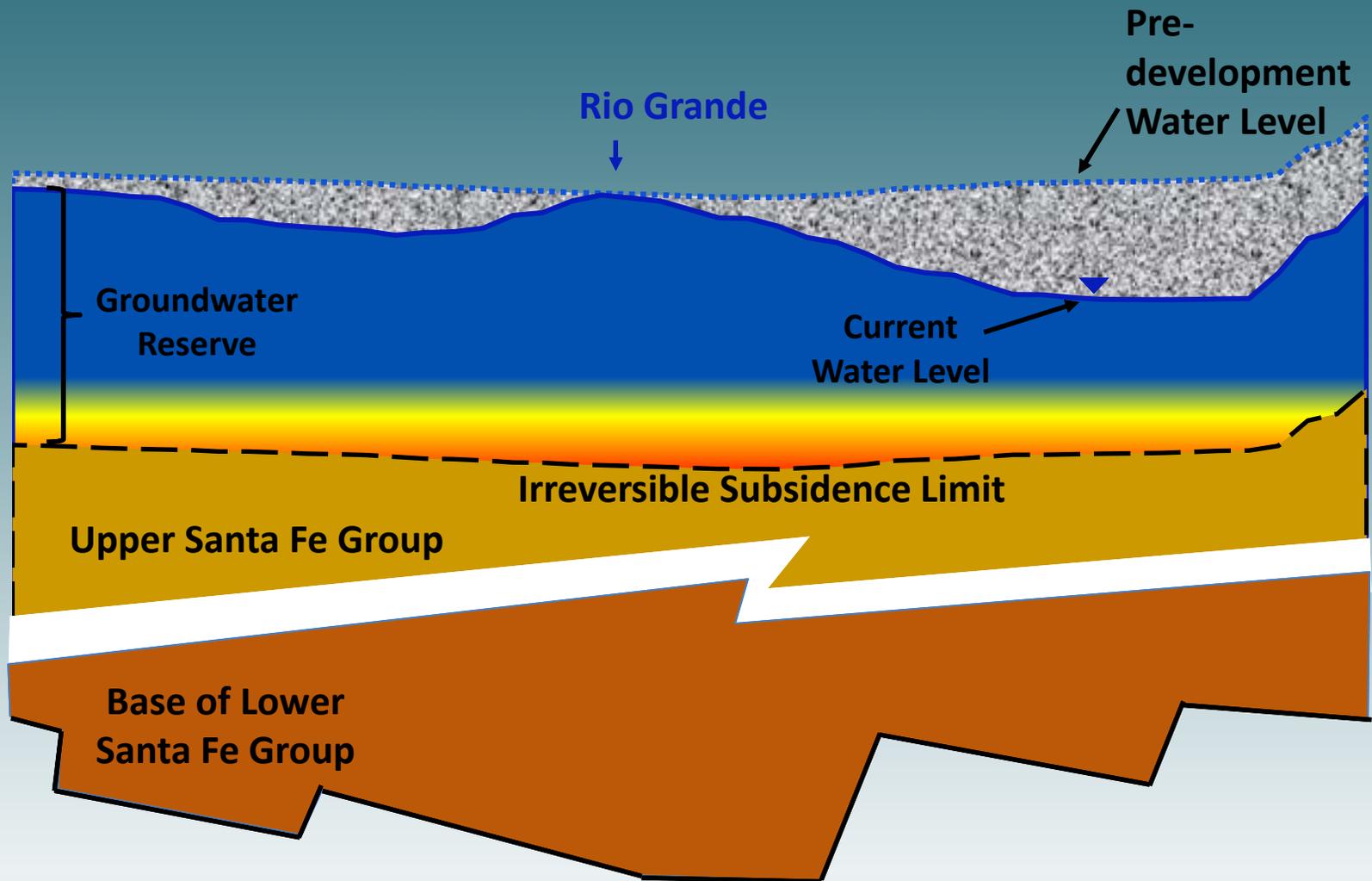
- Water levels are expected to continue to rise over the next decade
- These will be monitored via the USGS-ABCWUA monitoring network
- Proposed new approach to groundwater management

# Proposed Groundwater Management Policy



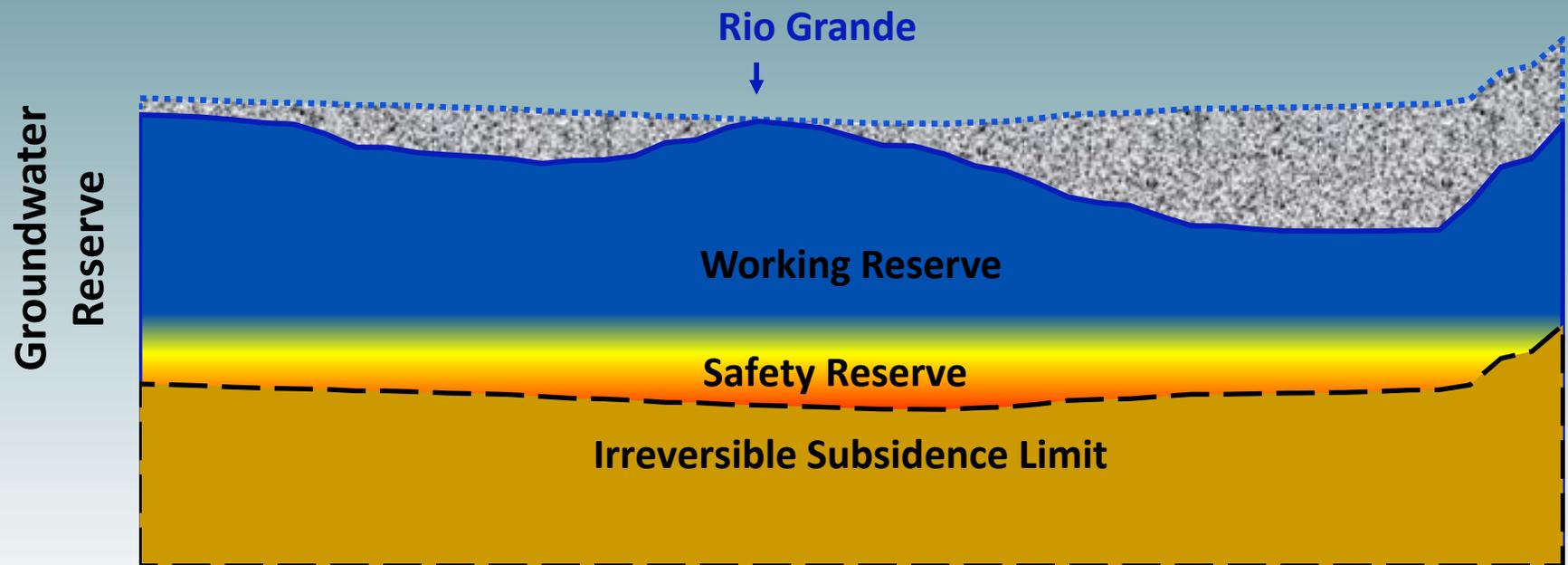
- Future management scheme will be pump and restore, pump and restore...
- The concept is to never pump from the Safety Reserve
- Irreversible subsidence limit is the base of the Safety Reserve

# Current Conditions



# Working Reserve

**Working Reserve = Groundwater Reserve – Safety Reserve**



# Questions?

• Technical Team

• Board Updates

• Public Meetings

• Town Halls

• Board Adoption

Technical Customer Advisory Committee

2015

2016