

“Water: Too Much, Too Little” Panel

**ULI Fall Meeting
October 22, 2014**

**Steve Betts
President, Chanen
Development**

Watering the Sun Corridor

Managing Choices in Arizona's Sun Corridor

'Water Scarcity a Bond Risk, Study Warns'

The New York Times

Water Scarcity a Bond Risk, Study Warns

By FELICITY BARRINGER and DIANA B. HENRIQUES October 20, 2010



Jim Watson/The New York Times

On Sunday, Lake Mead, which supplies cities in the Southwest, dropped to its lowest point yet; a ring on its walls shows the decline.

The municipal bonds that help finance a major portion of the nation's water supply may be riskier than investors realize because their credit ratings do not adequately reflect the growing risks of water shortages and legal battles over water supplies, according to a new study.

As a result, investors may see their bonds drop in value when these risks become apparent, and water and electric utilities may find it more expensive to raise money to cope with supply problems, the study warned.

Looking at significant water bond issuers across the southern part of the country, the report concluded that Wall Street's rating agencies had given similar ratings to utilities with secure sources of water and to those whose water sources were dwindling or were threatened by legal battles with neighboring utilities.

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Water Risk in the Municipal Bond Market



The Ripple Effect:

WATER RISK IN THE MUNICIPAL BOND MARKET

A Ceres Report
October 2010

Authored by
Sharlene Leurig, Ceres

Analysis by
WATER ASSET
MANAGEMENT



A FRAMEWORK FOR ASSESSING WATER & ELECTRIC UTILITIES

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Population, Immigration, and the Drying of the American Southwest

Backgrounder

November 2010

Population, Immigration, and the Drying of the American Southwest

By Kathleene Parker

This *Backgrounder* offers an historical overview of the critical issue of water in the American Southwest, where the water situation is becoming increasingly dire during a prolonged — but not uncharacteristic — drought in the arid region. We also examine the demographic trends that drive high rates of U.S. and, as a result, Southwest population growth. We present evidence that indicates there is insufficient water for the region's current population, much less the larger future populations that will result if immigration continues at its present high rate.

Key findings include:

- The Southwest is the fastest growing region in the United States, the world's fourth-fastest-growing nation.
- The United States is one of the world's most populous nations, joining China and India as the only nations with more than 300 million people.
- Immigration is responsible for virtually all of the population growth in California. In other states of the Southwest, immigration has caused between 30 and 60 percent of population growth.
- Immigration has been responsible for more than half the population growth in the American Southwest in this decade.
- If current trends — especially immigration — continue, the U.S. population could approach 500 million by mid-century, and one billion by the end of this century or shortly thereafter. The United States is one of just eight nations that will fuel half of all population growth through 2050, with major implications for the United States and for the global environment.
- This growth occurs despite the recommendations of two presidential commissions that the United States should move toward population stabilization, limiting immigration is key to their recommendations.
- The nation's high growth rate has continued despite a roughly replacement-level birth rate since 1972.
- The Southwest has been hit by a prolonged drought, although one of far less severity than others common to the region in the past. Global warming likely will increase the frequency and severity of droughts.
- When the critical water lifeline to the Southwest, the Colorado River, was divided up among the region's states under the 1922 Colorado River Compact, more water was apportioned than exists most years. These numbers have grown worse with drought, which could become the norm with global warming.
- Reservoirs "bank" the region's limited water supplies for use in drought. Lake Mead and Lake Powell — the Colorado River reservoirs that are the major water banking accounts on which most of the Southwest is dependent — are rapidly drawing down their water principal and could run dry early this century.

Kathleene Parker is a former journalist and editor specializing in environmental and water issues, and a fifth-generation native of the American Southwest, now living near Albuquerque.

Center for Immigration Studies



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The Last Drop: Climate Change and the Southwest Water Crisis

The Last Drop:
Climate Change and the Southwest Water Crisis



Frank Ackerman
Elizabeth A. Stanton
Stockholm Environment Institute-U.S. Center

February 2011

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ENVIRONMENT
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'Water Use in the Southwest Heads for a Day of Reckoning'

The New York Times

Water Use in Southwest Heads for a Day of Reckoning

By FELICITY BARRINGER September 27, 2010



Jim Wilson/The New York Times

The Southern Nevada Water Authority is tunneling under Lake Mead to install an intake valve that could continue operating until water levels dropped below 1,000 feet.

LAKE MEAD NATIONAL RECREATION AREA, Nev. — A once-unthinkable day is looming on the Colorado River.

Barring a sudden end to the Southwest's 11-year drought, the distribution of the river's dwindling bounty is likely to be reordered as early as next year because the flow of water cannot keep pace with the region's demands.

For the first time, federal estimates issued in August indicate that Lake Mead, the heart of the lower Colorado basin's water system — irrigating lettuce, onions and wheat in reclaimed corners of the Sonoran Desert, and lawns and golf courses from Las Vegas to Los Angeles — could drop below a crucial demarcation line of 1,075 feet.

If it does, that will set in motion a temporary distribution plan approved in 2007 by the seven states with claims to the river and by the federal Bureau of Reclamation, and water deliveries to Arizona and Nevada would be reduced.

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Managing Choices in Arizona's Megapolitan Area

August 2011

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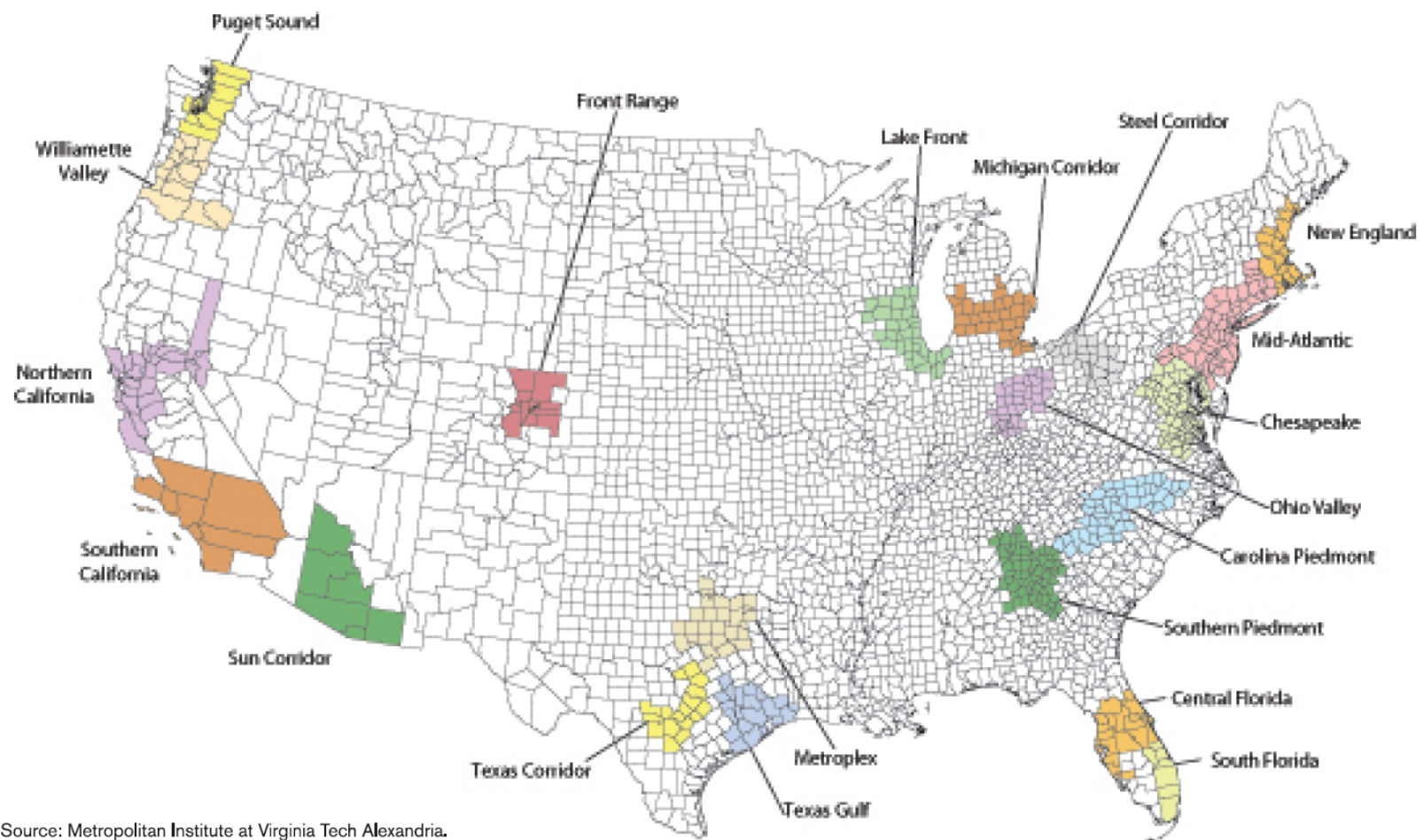
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A Megapolitan is Taking Shape



Source: Metropolitan Institute at Virginia Tech Alexandria.

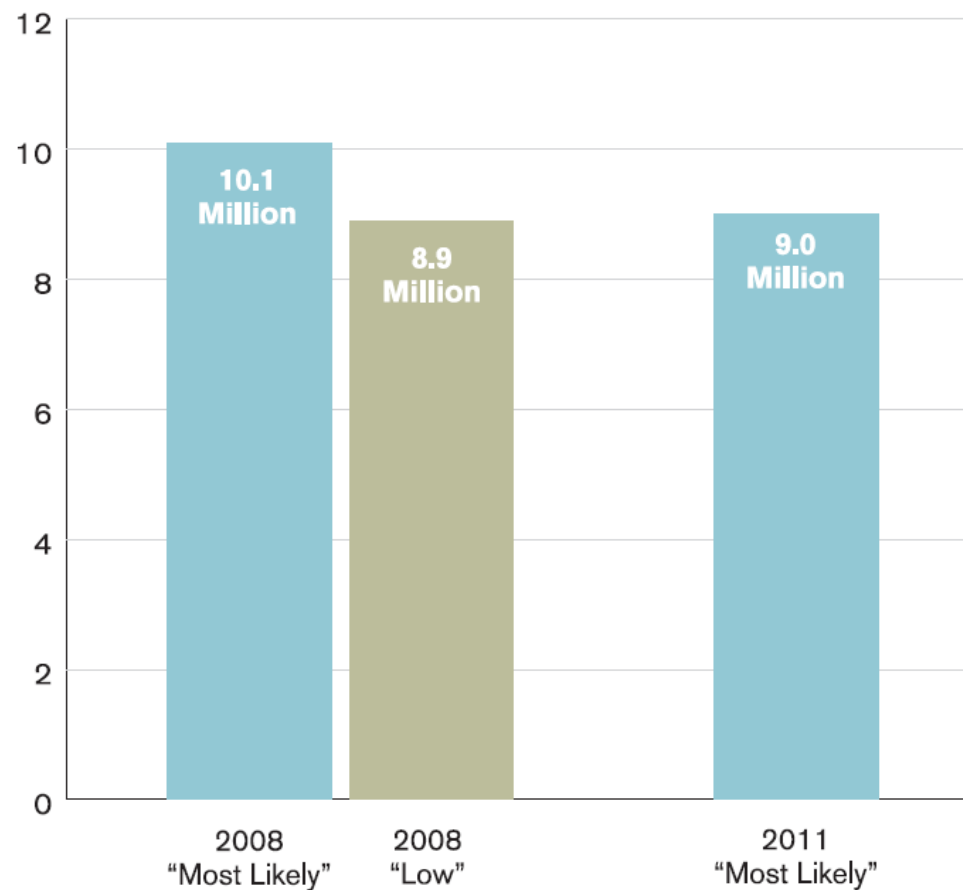
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9 MILLION PERSON SUN CORRIDOR BY 2040 REMAINS MOST LIKELY POPULATION PROJECTION

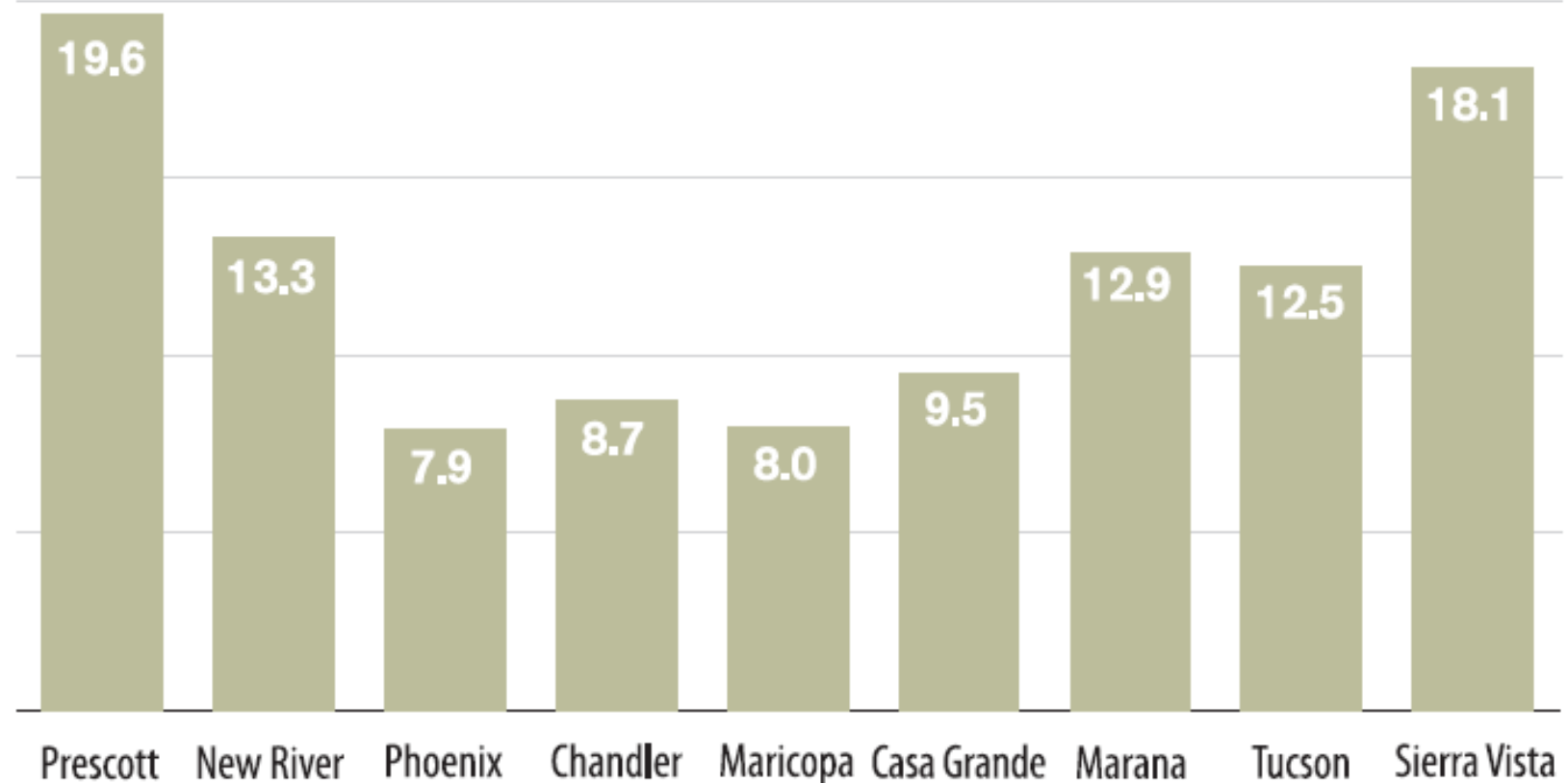


Source: Morrison Institute for Public Policy, ASU.

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AVERAGE ANNUAL RAINFALL IN INCHES



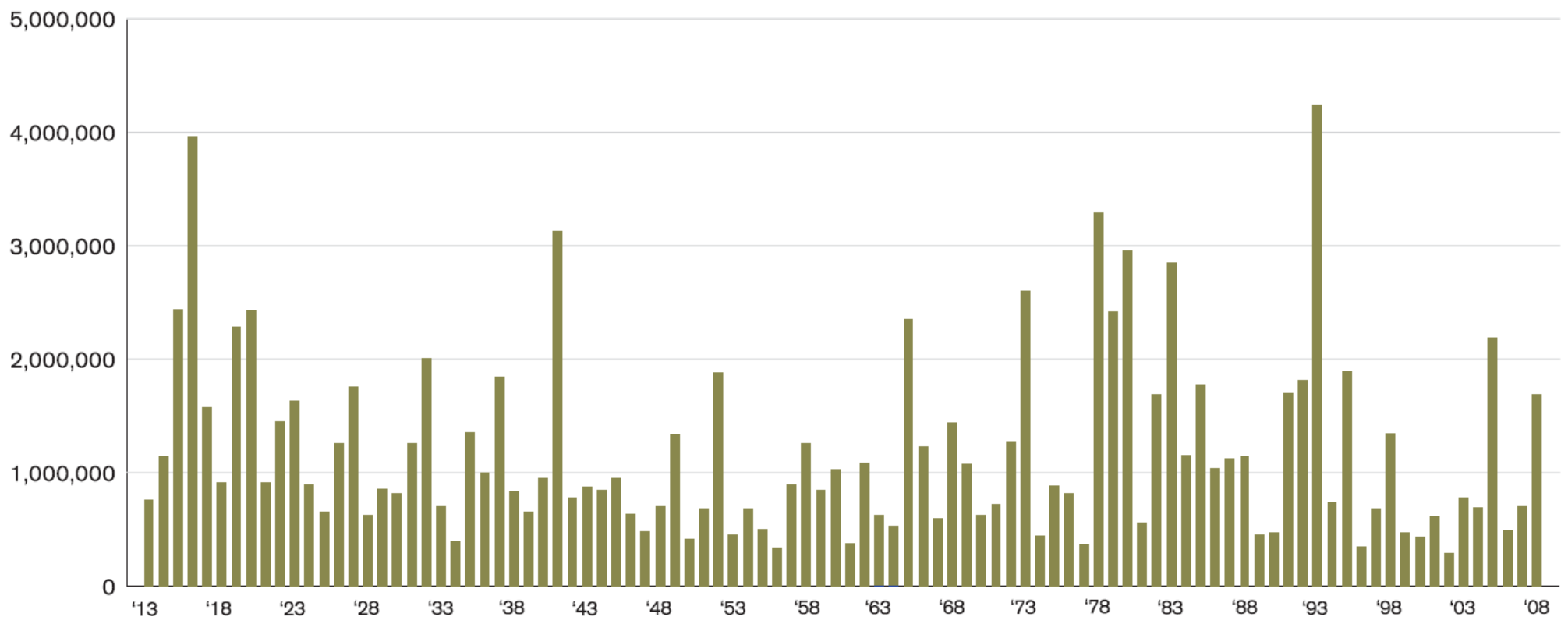
Source: Federal Research Division, Library of Congress, Country Studies-Arizona Weather.

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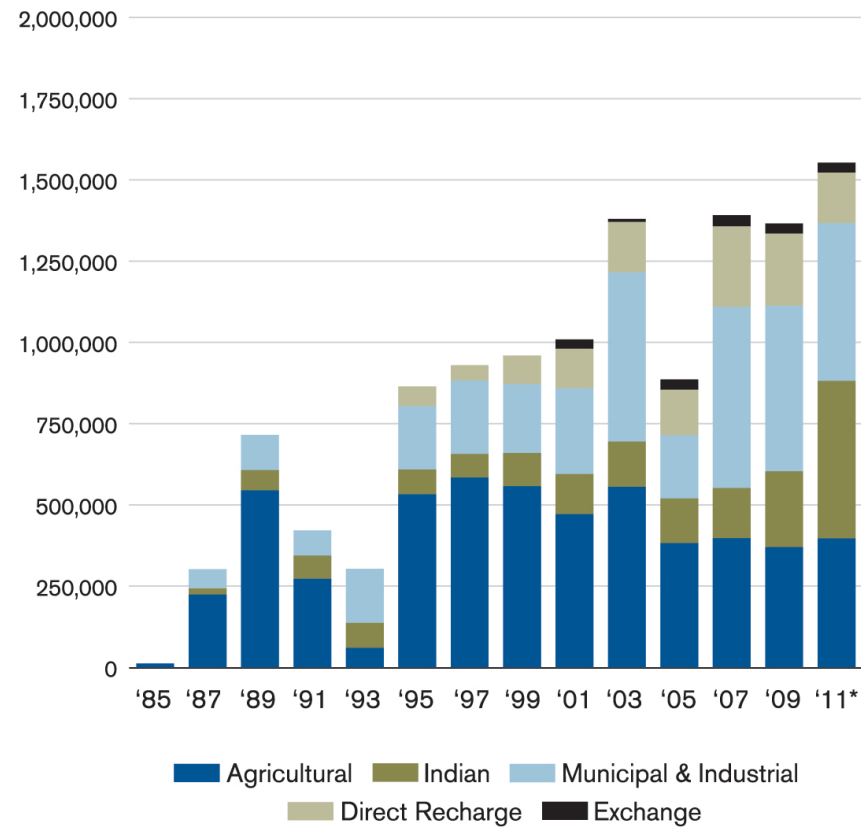
SALT RIVER, TONTO CREEK, AND VERDE RIVER COMBINED ANNUAL INFLOW, IN ACRE FEET 1913-2008



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**CAP DELIVERIES BY END USER
IN VOLUME OF ACRE FEET, 1985-2011**



* Forecasted.

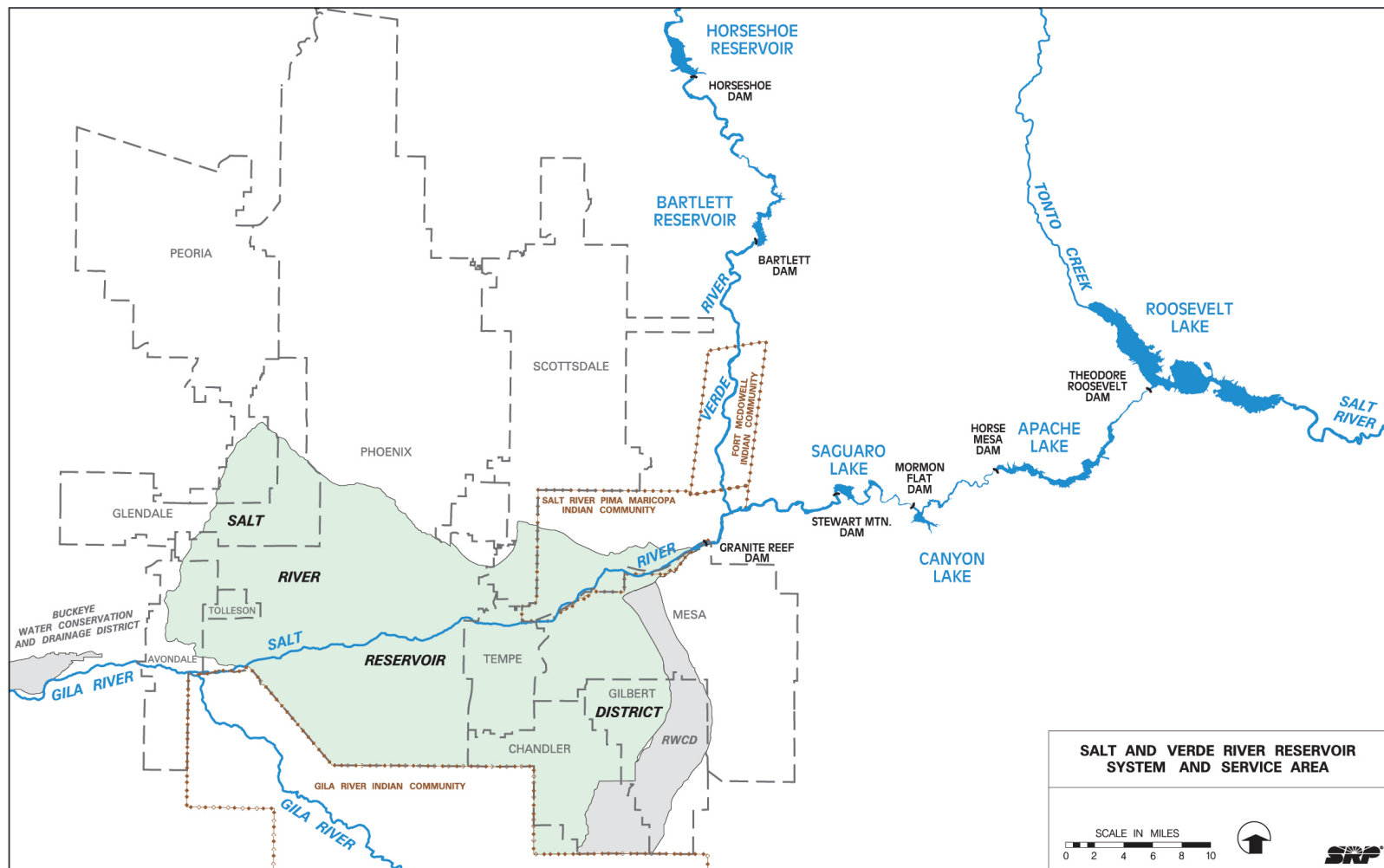
Source: Central Arizona Project.

Summary of Existing Sun Corridor Supplies

Salt/Verde	800,000 Average Af/Yr
Other Surface Water	250,000 Average Af/Yr
Natural Groundwater Recharge	260,000 Average Af/Yr
Colorado River	1,500,000 Af/Yr
TOTAL	2,810,000 Average Af/Yr

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SRP RESERVOIR SYSTEM, SALT RIVER RESERVOIR DISTRICT, AND CITY BOUNDARIES

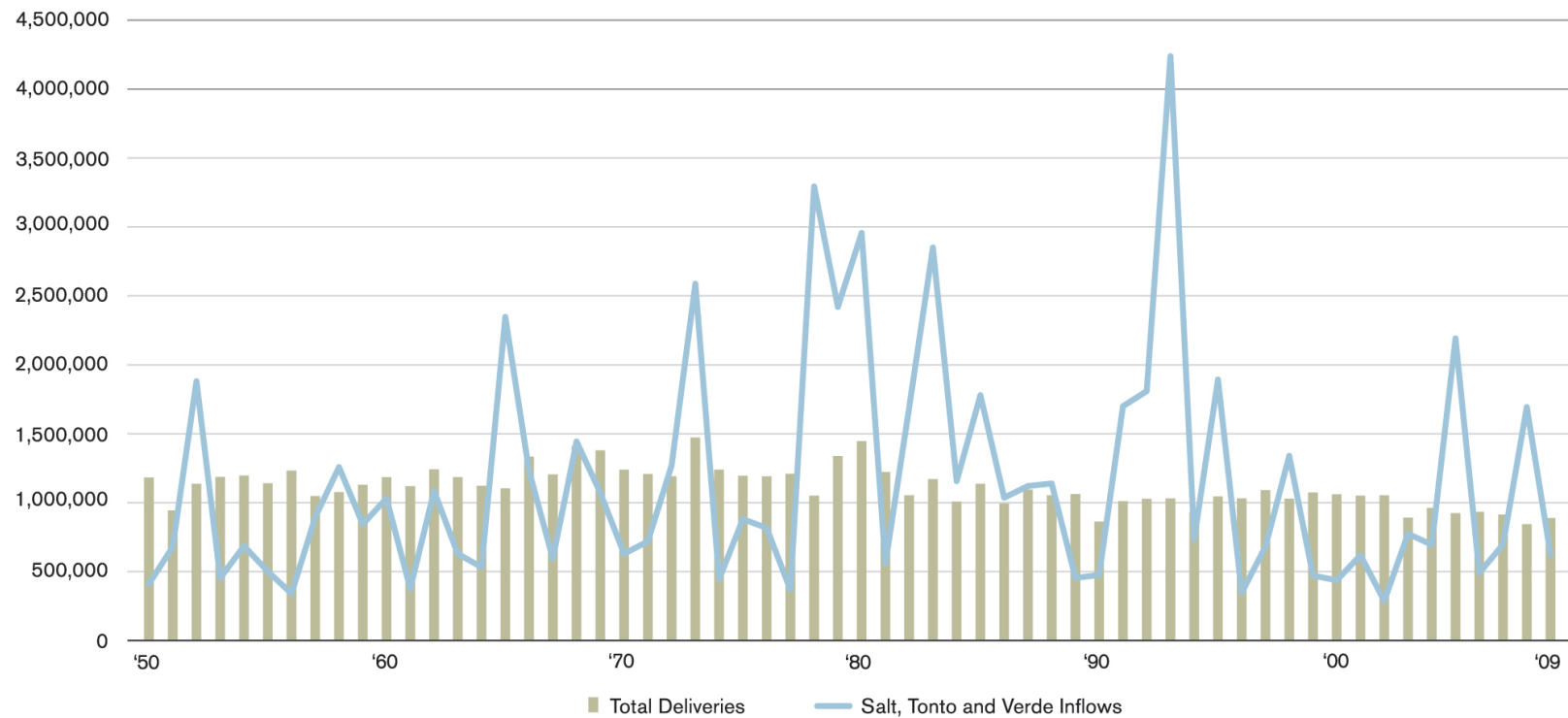


Source: Salt River Project.

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SRP DELIVERIES FROM COMPLETION OF HORSESHOE DAM THROUGH THE PRESENT



Source: Salt River Project.

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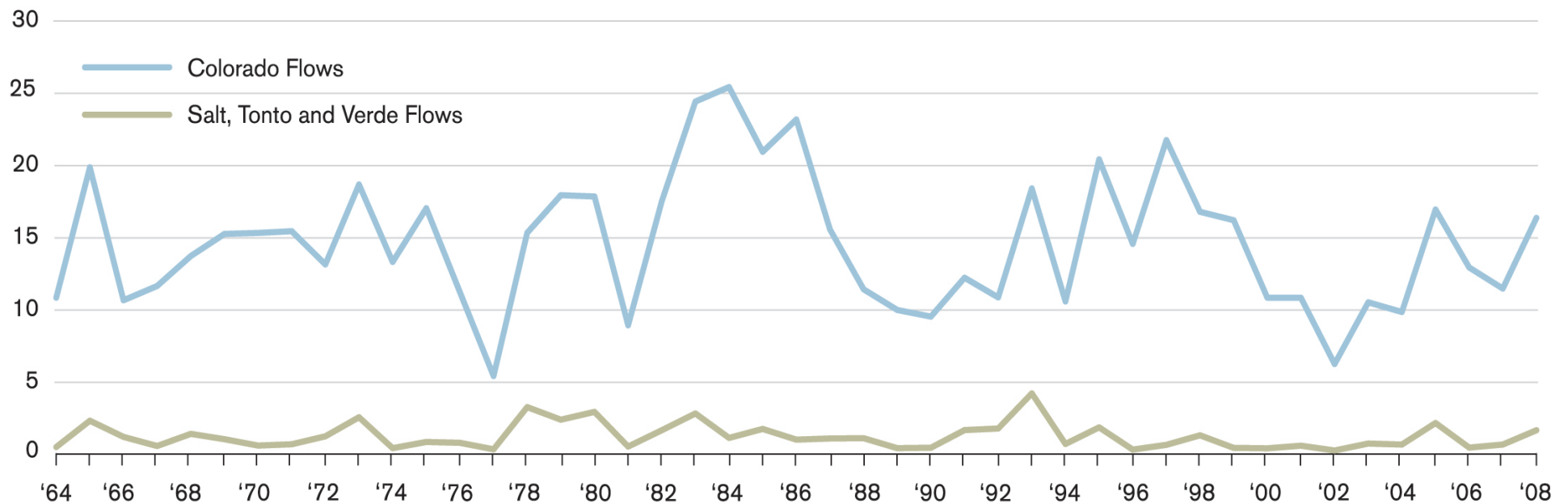
SUMMARY OF REDUCTIONS IN COLORADO RIVER FOR ARIZONA AND CAP

Year-End Lake-Level Elevation (Feet above Sea Level)	Reduction in Acre-Feet
Below 1075 but Above 1050 Feet	333,000 Arizona's Share: 320,000 CAP's Estimate Share: 288,000
Between 1050 and 1025 Feet	417,000 Arizona's Share: 400,000 CAP's Estimate Share: 360,000
Below 1025 Feet	500,000 Arizona's Share: 480,000 CAP's Estimate Share: 432,000
Below 1000 Feet	Secretary Consults with Basin States

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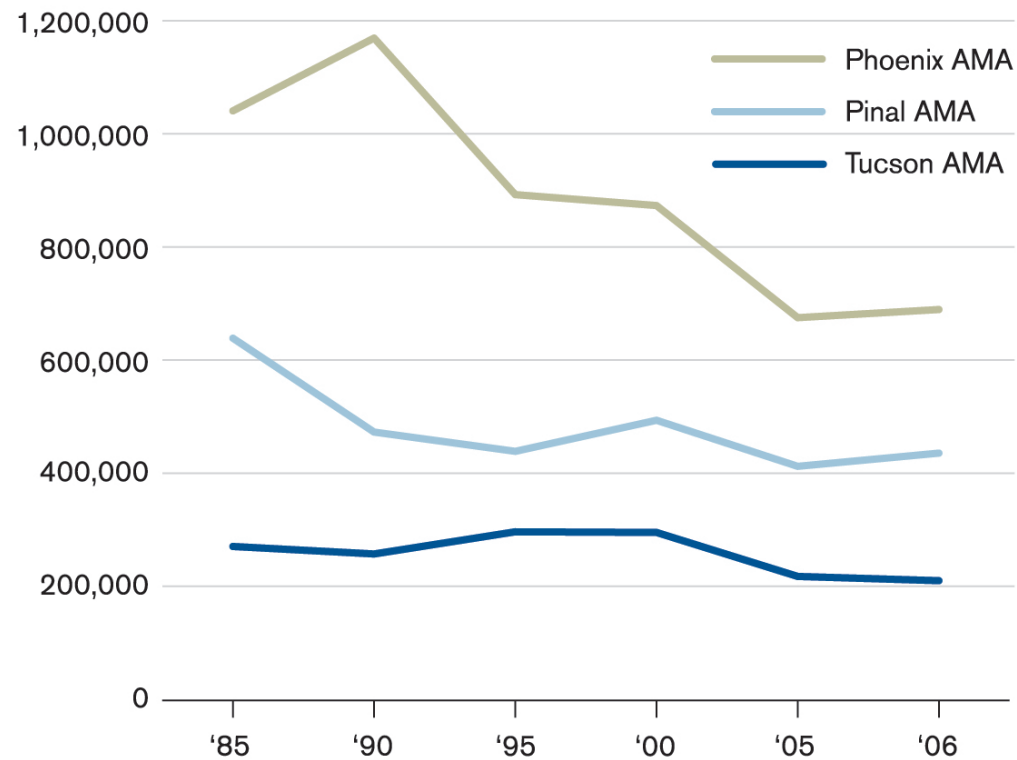
COLORADO AND SALT, TONTO AND VERDE FLOWS, IN MILLION ACRE FEET



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CHANGE IN THE RATE OF GROUNDWATER WITHDRAWAL FOR THE THREE COUNTIES SINCE PASSAGE OF THE GMA, IN ACRE FEET

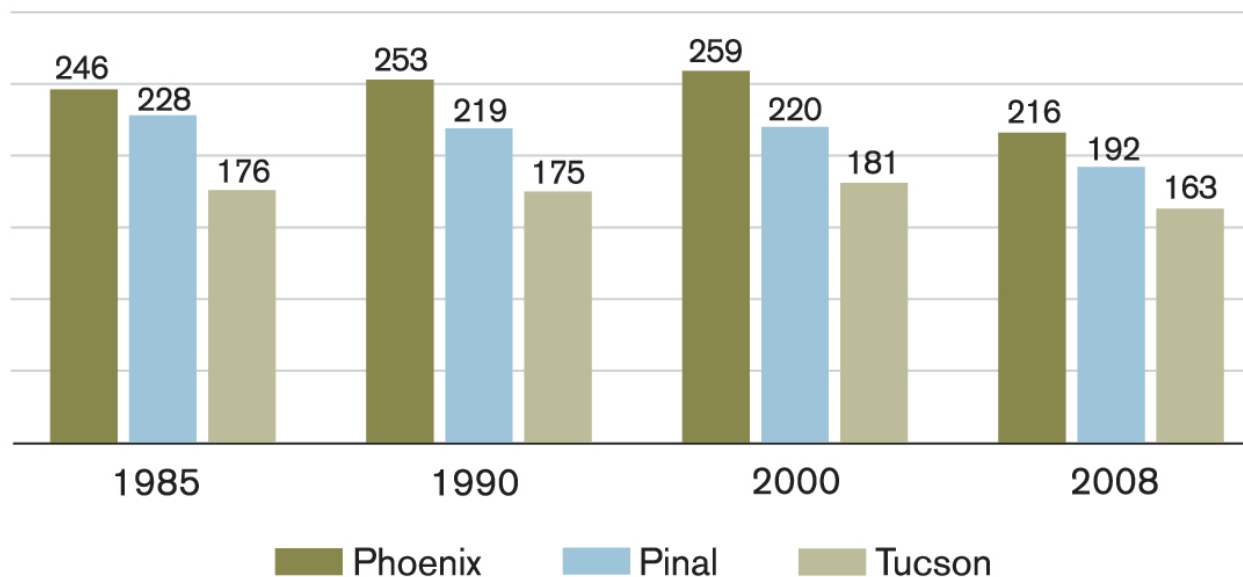


Source: ADWR.

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GALLONS PER CAPITA PER DAY RATES FOR CENTRAL ARIZONA AMAS

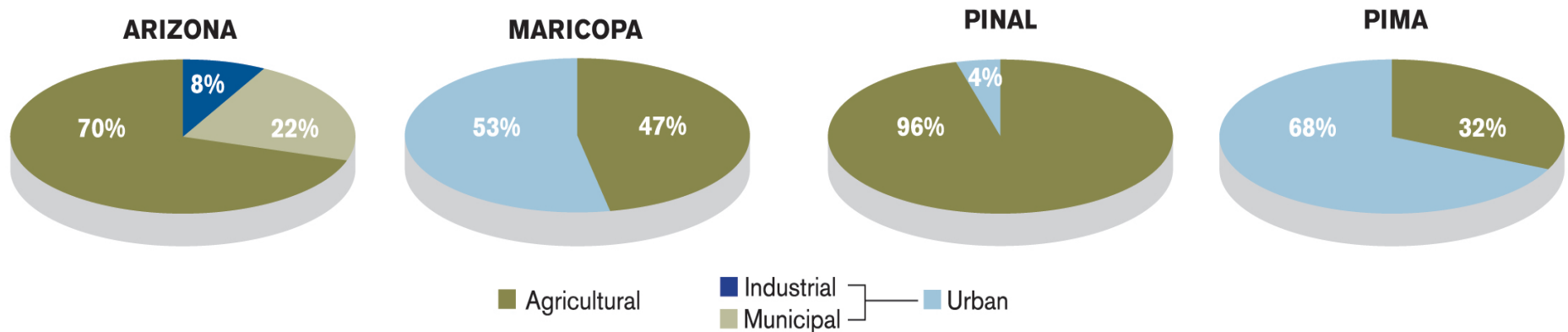


Source: ADWR.

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WATER USE PROFILES FOR ARIZONA AND THREE COUNTIES

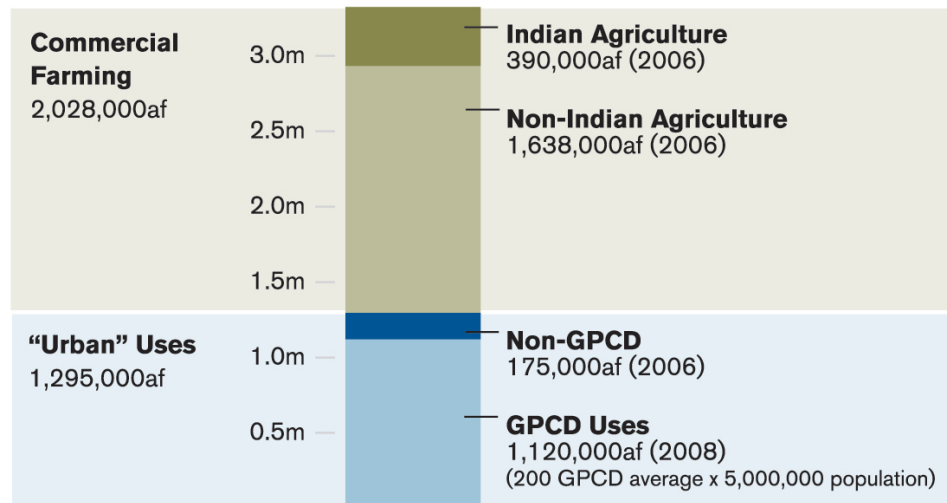


Source: *Arizona Water Atlas*, Vol. 8 (2010). Arizona Department of Water Resources.

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CURRENT APPROXIMATE TOTAL WATER USE IN THE SUN CORRIDOR

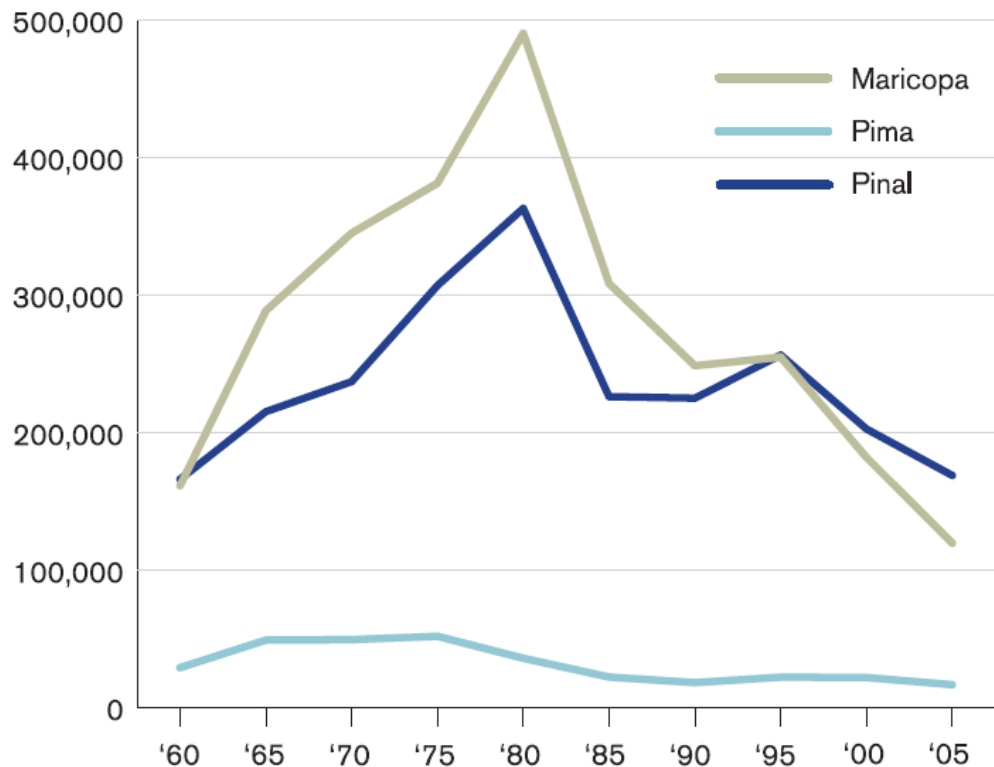


Water Supply	1,800,000af	2,000,000af	2,200,000af
Per Capita Use	Approximate Population		
200 GPCD (.22 af/yr)	8,182,000	9,100,000	10,000,000
150 GPCD (.17 af/yr)	10,588,000	11,765,000	12,941,000

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TOTAL NUMBER OF ACRES PLANTED FOR ALL AGRICULTURAL PURPOSES BY COUNTY

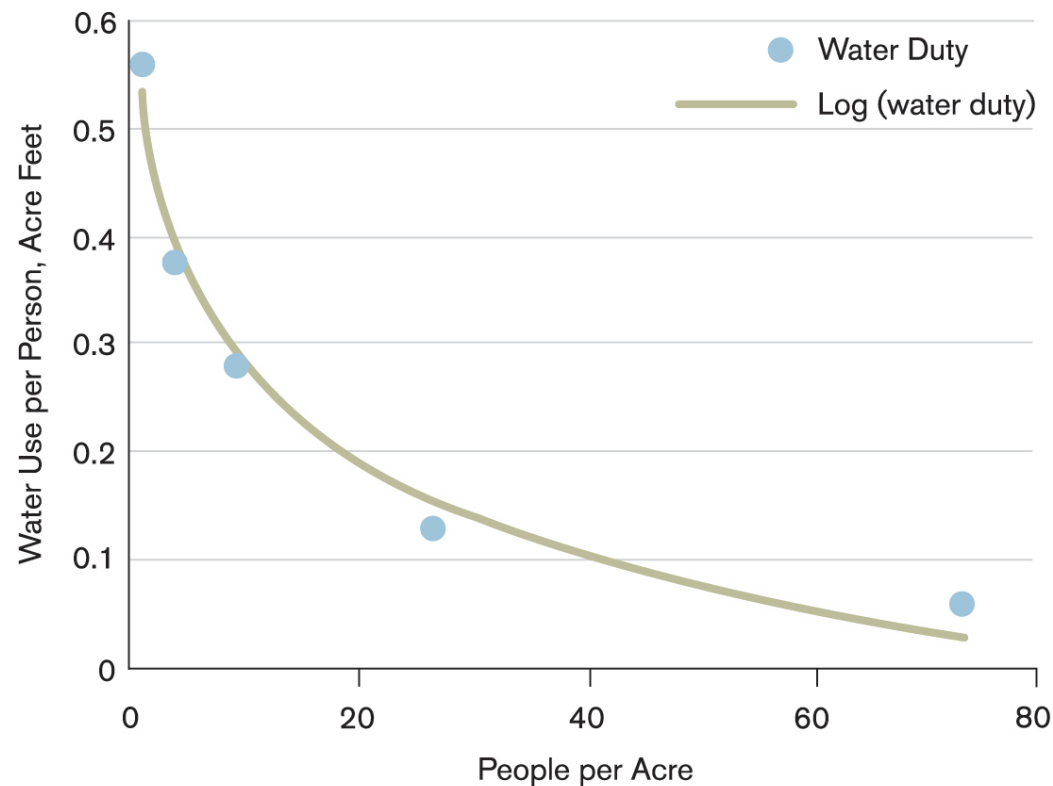


Source: Morrison Institute for Public Policy, ASU; data from the U.S. Department of Agriculture, National Agriculture Statistics Service, 2007.

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WATER USE IS RELATED TO RESIDENTIAL DENSITIES



Source: DCDC. Water duties from Salt River Project (2003) Canal Available Capacity Report, Table 2, 1995 Urban Water Duties in AF/Acre. Population densities based on land use classifications from Maricopa Association of Governments 1995 Land Use Classifications, <http://www.mag.maricopa.gov/>.



Thank you

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