

PHOENIX WATER RESOURCE AND DEMAND MANAGEMENT

Blue Ribbon Panel on Water Sustainability

Conservation/Reuse/Energy Subcommittee

May 6, 2009



**City of Phoenix
Water Services Department**

Phoenix : Arizona



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What Phoenix is like for active adults

The city of Phoenix, Arizona has long been a popular retirement community for active adults 55+. In the last 50 years this warm weather, desert community has leaped beyond its borders to become the 5th largest city in the U.S. Fortunately, although it has developed some large city problems like crime and traffic, its weather and proximity to the beautiful Arizona environment is unchanged. Phoenix, a

What is not special about this retirement community

- Traffic is intense at times, mass transit is poor
- Summers are really hot
- life
- Big City life
- Will there always be enough water

as are the budget ranges. Retirees considering the area should come here and visit to get a feel for the many different communities and neighborhoods. There is undoubtedly one that is right for you.

Median sales price of a home in the Phoenix metro sunk to \$142,700 in the 3rd quarter of 2009, a decline of 23% from the previous year. Phoenix is one of the 3 hardest hit markets in the U.S. For more information go to [Retire in Phoenix](#). For detailed information about Arizona taxes and retirement issues go to [retire in Arizona](#).

Why We're Here

Prescott : Arizona



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What Prescott is like for active adults

Located at an elevation of 5400 feet in the mountains of north central Arizona, the City of Prescott (population almost 43,000 in 2008) was the original territorial capital of the Arizona Territory. This old mining town and now popular active adult retirement community borders the Prescott National Forest to the south and west. Prescott and the nearby towns of Chino Valley and Prescott Valley form what is known locally as the Tri-City area.

Carrying the nickname, "Everybody's Hometown," Prescott is home to the downtown Courthouse Plaza, famous Whiskey Row, World's Oldest Rodeo, Prescott Fine Arts Association, Sharlot Hall Museum, and the Phippen Art Museum. The State of Arizona has been officially designated Prescott as "Arizona's Christmas City". Prescott is home to several colleges including Yavapai, Prescott College, Emory-Riddle Aeronautical University, plus other specialty campuses.

What is not special about this retirement community

- There are a lot of tourists
- Colder winters than the rest of Arizona
- Watering restrictions

housing choices keeps increasing to meet the demands of baby boomers who would like to retire here. You can choose to live in town or outside in an active adult community, many of which are gated and golf-oriented (see link at top right to Prescott Active Communities).

Overview

- BRP goals and “end game” considerations
- Phoenix water resource goals and objectives
- The water resource context
- Demand trends, strategies and initiatives
- Reclaimed considerations

Blue Ribbon Panel on Water Sustainability

Goals and Objectives (Paraphrased)

Propose statutes, rules and or policy changes to facilitate and promote, by 2020:

1. **Increased use of reclaimed water** (wastewater based)
2. **Increased use of recycled or impaired waters** (non-wastewater based)
3. **Increased water use efficiency** (for agricultural, industrial, residential, commercial and power generation purposes)
4. **Increased energy efficiency** (for water production and transmission facilities)

What is the end game?

End Game Examples

One size *does not* necessarily fit all

- **Private Utility growing largely on groundwater:**
 - High efficiency and reuse = maximizing growth potential;
 - Present focus: enhance value of the utility asset;
 - Long term: need for sustainable replacement base supply;
- **Young, high growth municipality largely on surface water:**
 - High efficiency and reuse = deferring supply acquisitions;
 - Present focus: accommodating growth;
 - Long term: managing risk of cyclical shortage (drought);
- **Mature municipality largely on surface water:**
 - High efficiency and reuse = insurance for economic base;
 - Present focus: managing risk of cyclical shortage (drought);
 - Long term: manage risk of systemic (climate change) impacts.

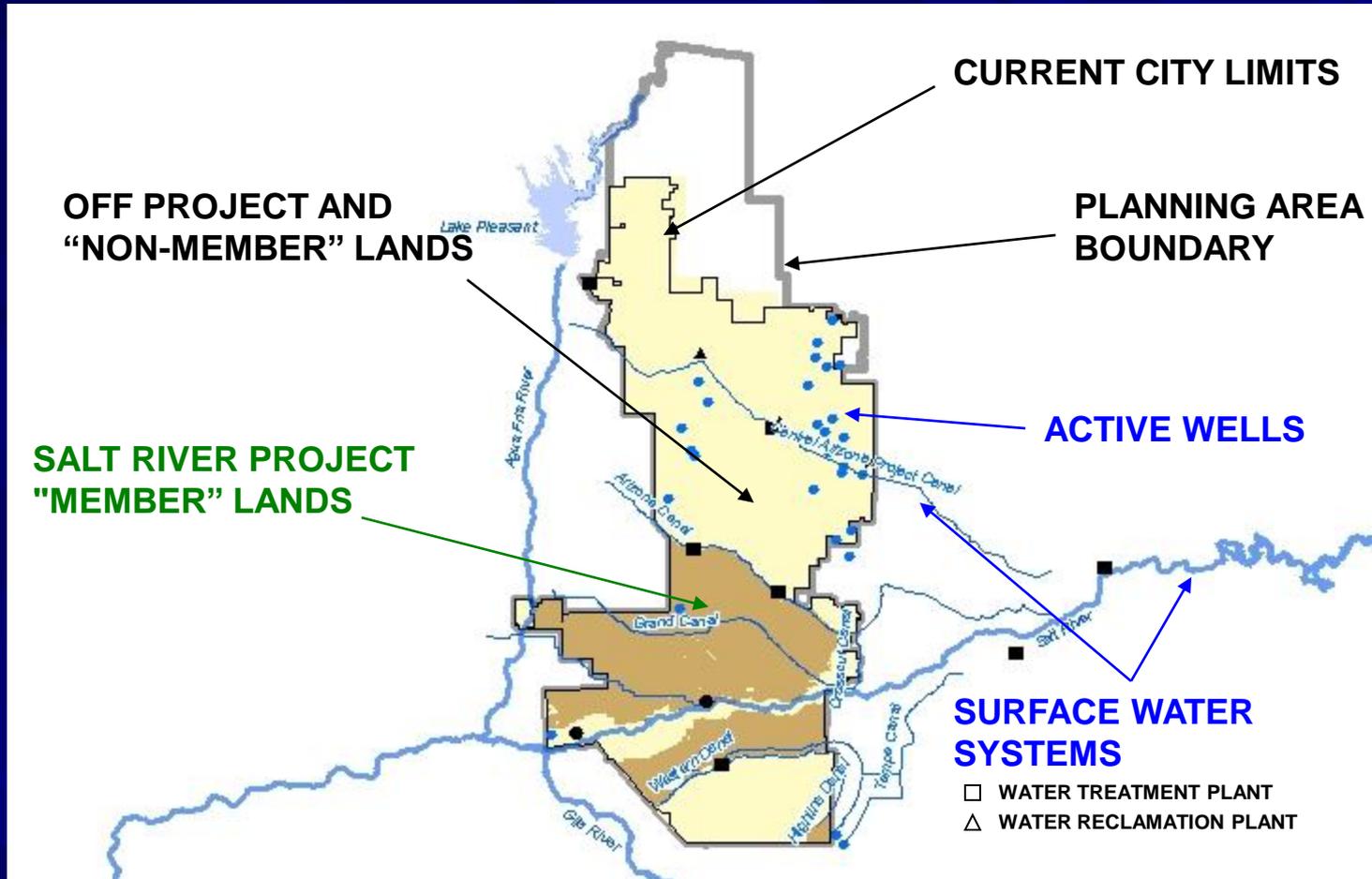
Water Resource Planning Goal

Ensure availability of sustainable and reliable water supplies sufficient to meet the City's 2060 demand under anticipated shortage and climate-impacted conditions

Phoenix Objectives

- *Water Supply Acquisition and Development*
 - Structured, financially sustainable water portfolio to maximize availability during cyclical shortages while considering climate-affected “new normal” conditions.
- *Demand Management:*
 - Increased water use efficiency to minimize curtailment-induced impacts to commerce and customer lifestyle during shortages

Phoenix Water Planning Boundaries

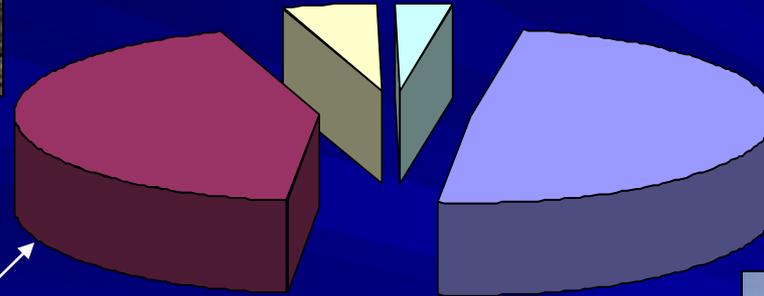


Current Water Supplies Typical Year

Reclaimed Water - 4%



Groundwater - 3%

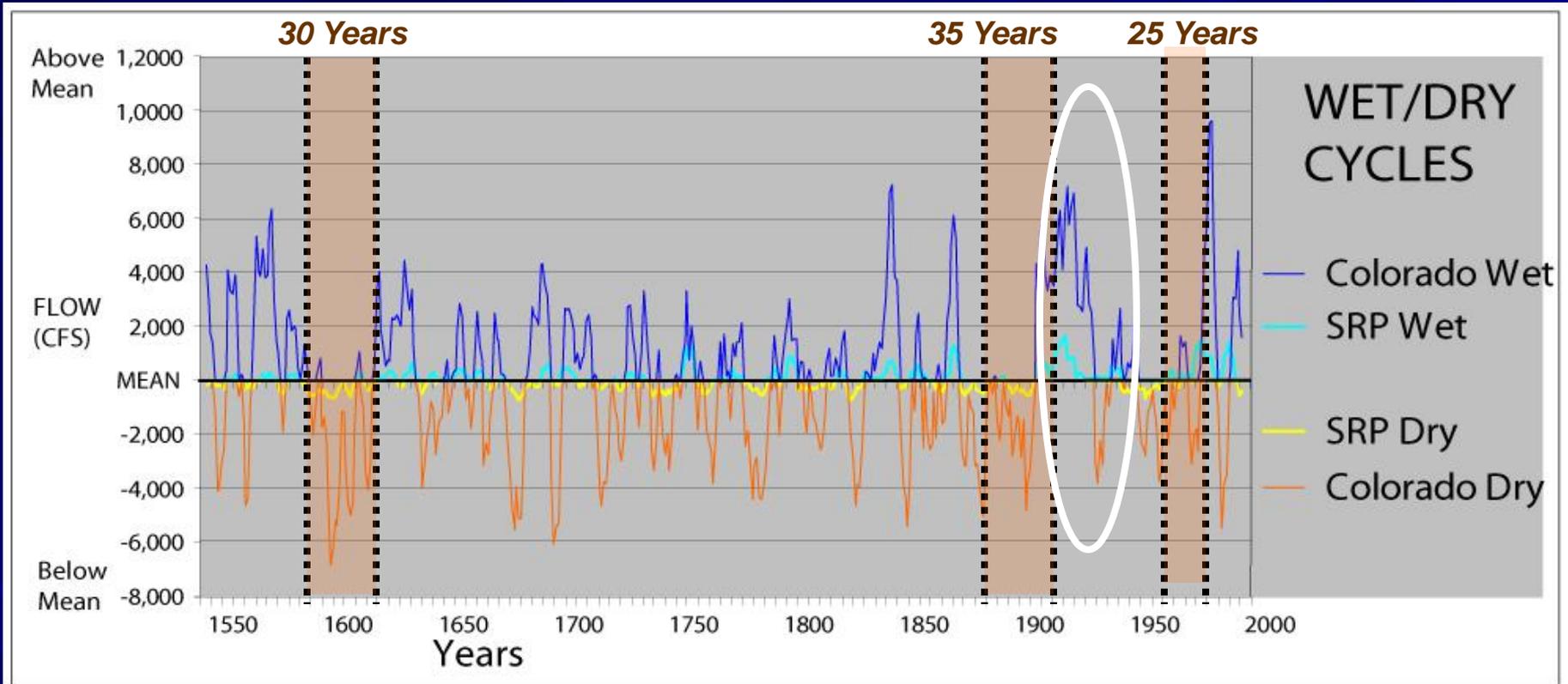


**Salt/Verde River
Surface Water - 47%**

Colorado River - 46%



Colorado and Salt River Watersheds Historic Droughts (from paleo records)



Reconstructed 500 Year Stream Flow Analysis

**5 year running average based on University of Arizona's tree ring research*

Phoenix Water Demand Sliced and Diced

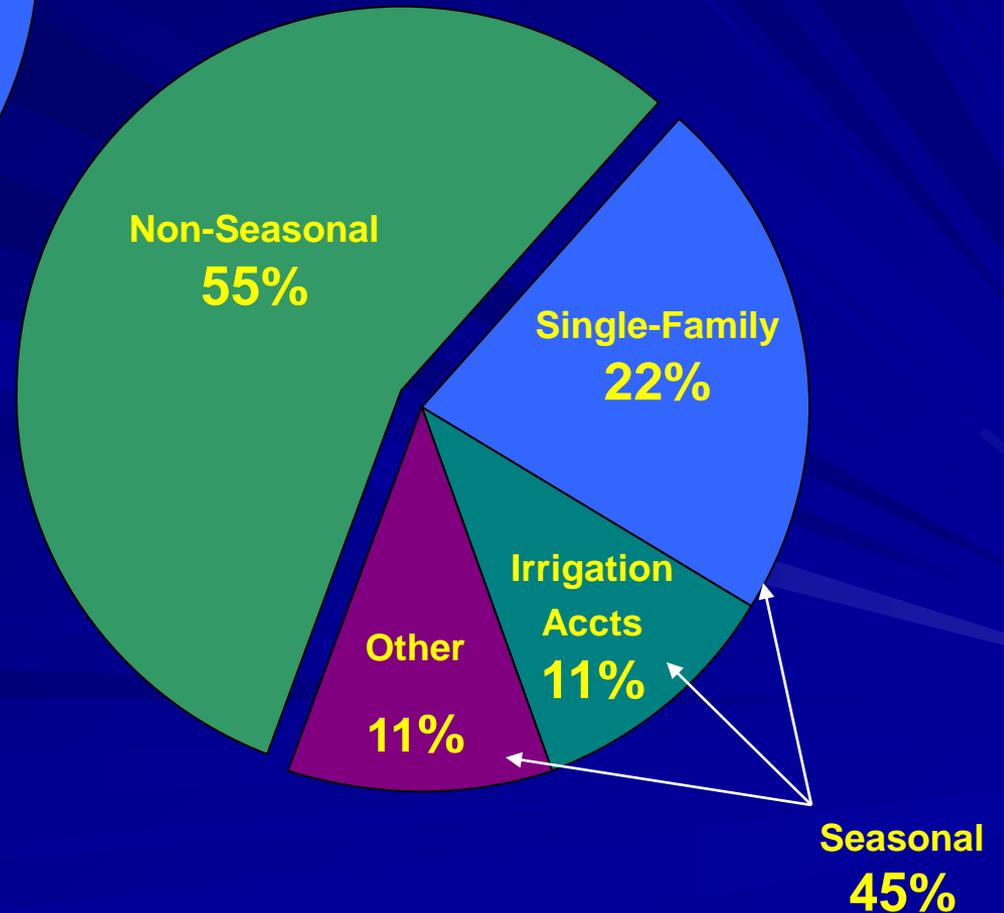
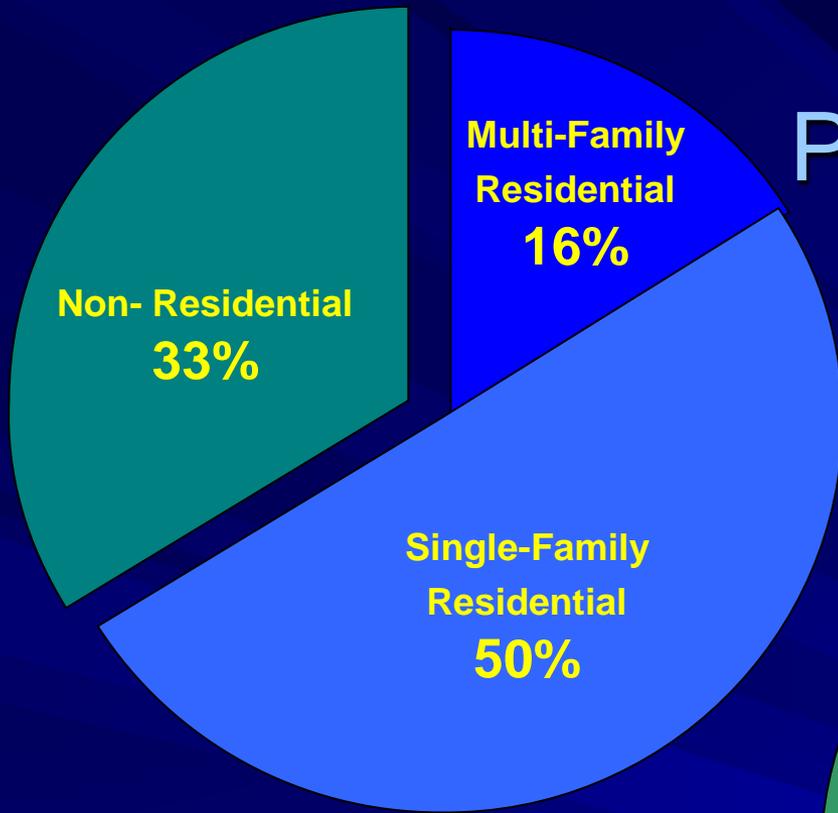
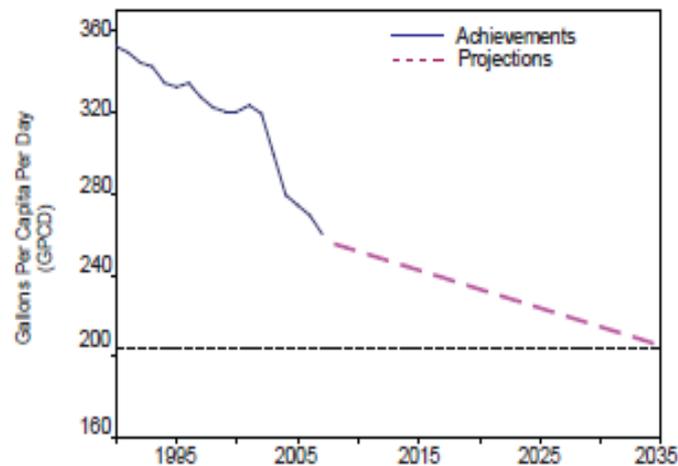


Figure 11 illustrates the results of past conservation efforts, reducing water use from approximately 350 gallons per capita per day (GPCD) in 1990 to approximately 250 GPCD in 2008.

FIGURE 11 – GPCD Reduction from Conservation

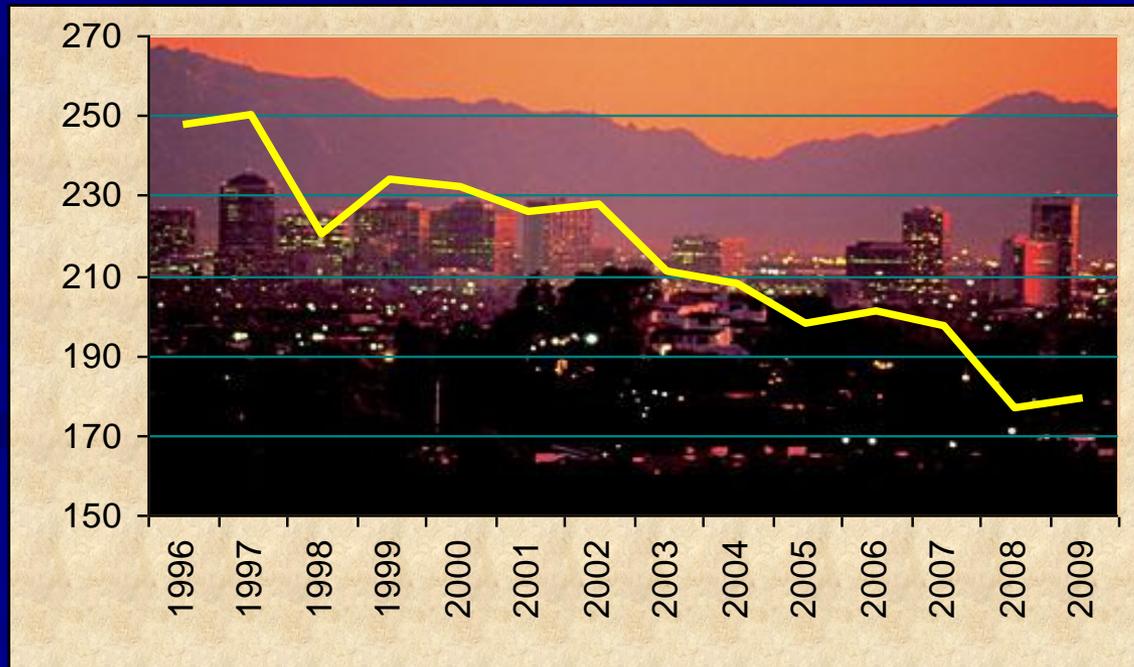


In an effort to maintain and build upon the community's response to calls for greater water conservation, the SNWA and its member agencies established a new conservation goal in early 2009 to reduce water use to 199 GPCD by 2035. Chapter 3



Phoenix Water Consumption: 1996-2009

Phoenix Per-Capita Use: 1996-2009



Metrics:

Is GPCD the best indicator of relative efficiency given variations in:

Population estimation methods? Weather? Quality of life/lifestyle?
Water rates? Economic conditions?
Densities? Climatic zone (ET/Rainfall)?
Proportion of new construction? Economic base?
Income levels? Water source and delivery entity?

■ Other possible metrics:

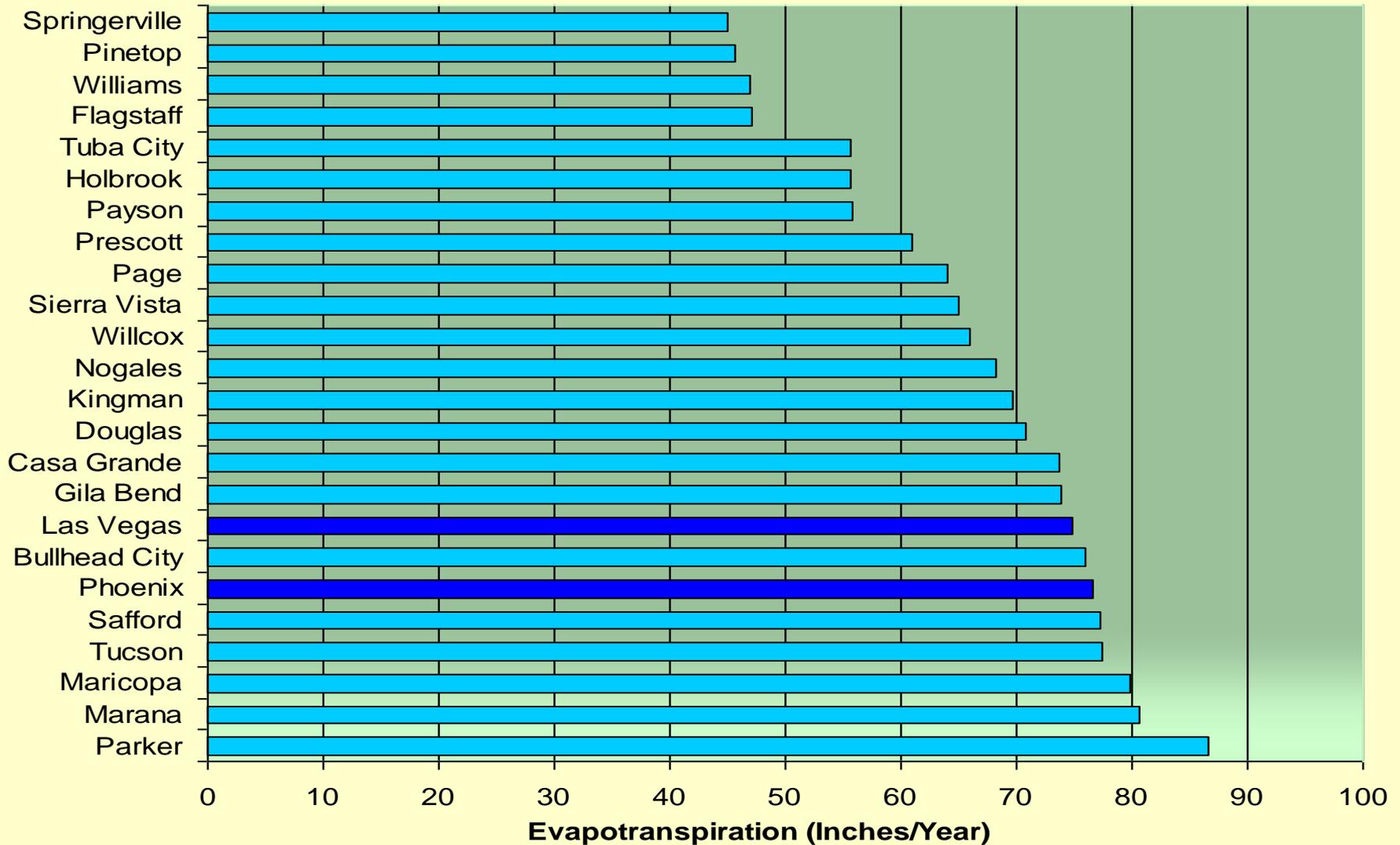
- Billed consumption per account (or equivalent account)
- Indoor use per single family/multi-family unit
- Outdoor use per single family/multi-family unit - ratio to ET
- Tax revenues generated per AF by user or user class

■ Metrics MUST consider:

- Economic value generated by water use
- Community lifestyle preferences (which can be modified)

There is NO universally optimal metric, though disaggregation will lead to better results.

ET Variations



Promoting Enhanced Efficiency

Economic considerations

■ Regulations?

- Emphasize industry standards versus customer-directed regulations (WaterSense model; GA, TX, CA examples)

■ Incentives?

- Purely based on economics (cost of permanently retired demand + banking costs vs. cost of supplemental supply)

■ Pricing?

- Rate and acquisition fee structures must consider costs of service under normal *and* shortage conditions while protecting revenue stream

NOTE: One size *does not* fit all!!!

Phoenix Demand Management Directions

Initiatives to address the changing conservation paradigm

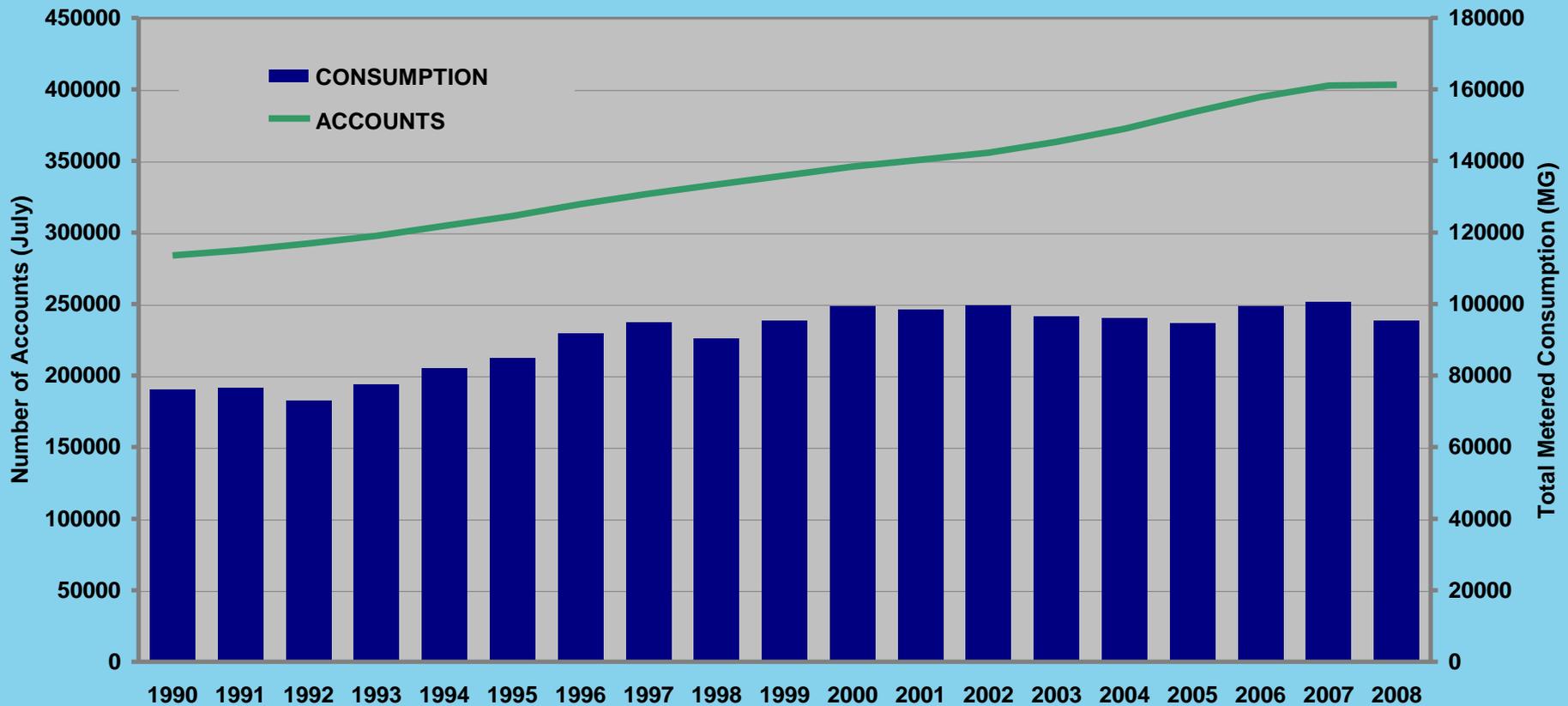
- Research – trends/characteristics/opportunities
 - Residential
 - Commercial/Industrial/Institutional/Irrigation
- Audits – water system and end user
- Direct and leveraged assistance/outreach
- Support for technological advancements
- Support for improved standards
- “Banking” of conservation savings
- “Structured curtailment” planning
- Alternative rate and fee structures

Ongoing Demand-Related Studies

- In-home surveys (single and multi-family)
- Data logging
- Sewer flow metering
- Price elasticity
- Rates and revenues
- Water loss management
- “Structured curtailment”

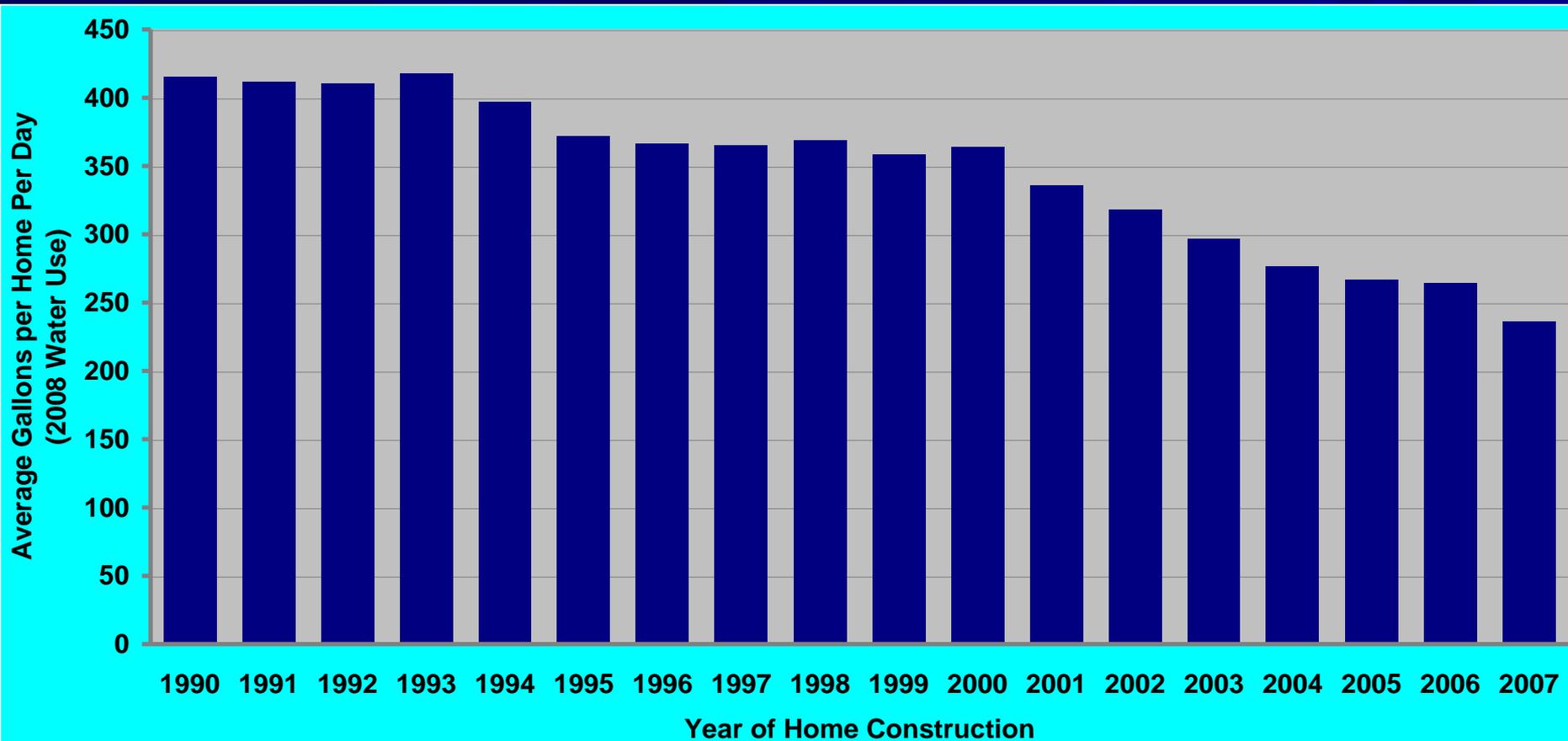
Growth and Water Demand

Account Growth and Total Water Consumption



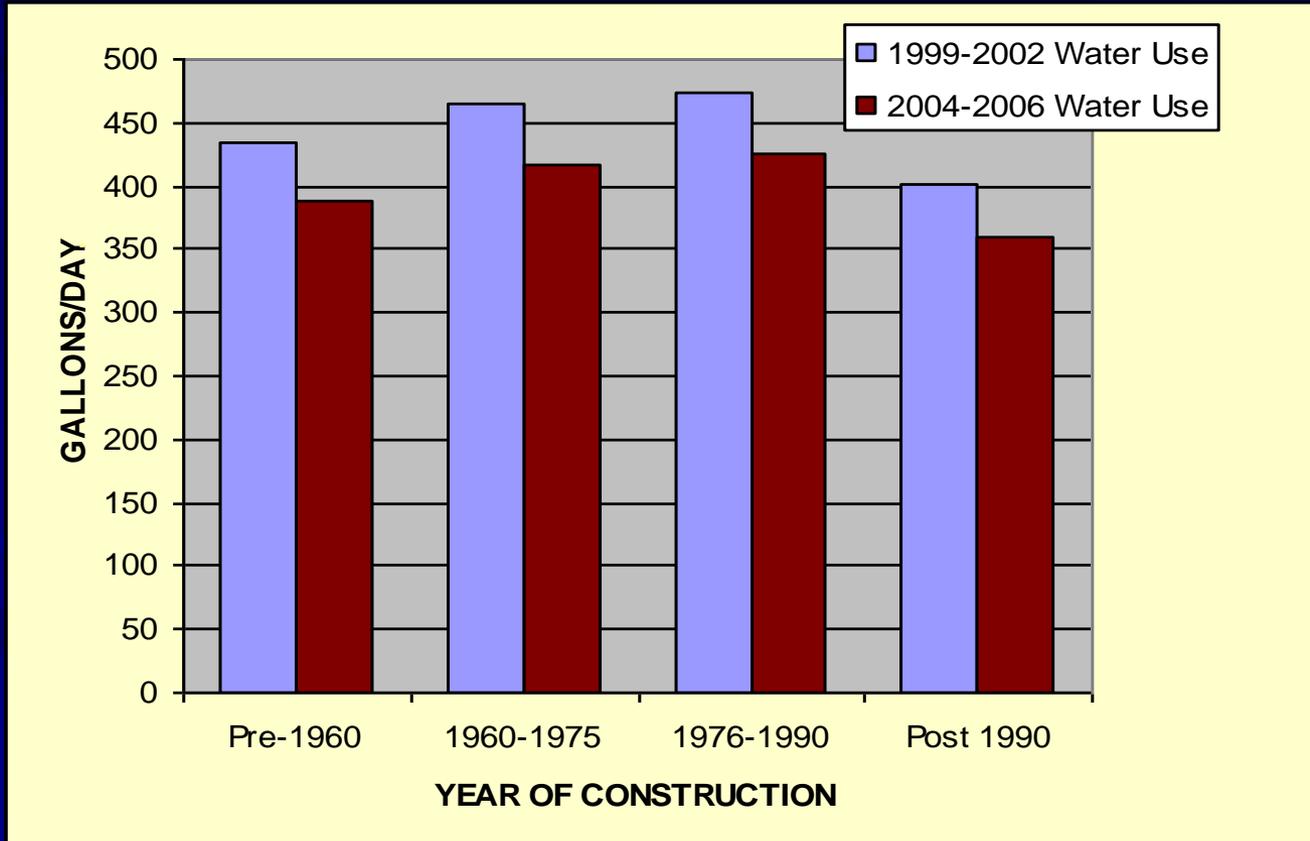
Trends in Water Use of New Construction

Average Daily Water Use (2008) by Year of Home Construction



Water Use for Phoenix Homes

Change in Water Use by Period of Home Construction



KEY OBSERVATIONS

- New development has been progressively more efficient
 - Efficient appliance and plumbing fixtures
 - Smaller lots and landscape area
 - Trend toward desert adapted landscaping
 - Fewer pools
- Passive measures contribute to declining water use
 - Integration of more efficient replacement plumbing fixtures and appliances
 - Response to rising water rates
 - Landscape conversions to reduce maintenance and to conform to evolving “norm”
 - Environmental awareness

OTHER CONSIDERATIONS

- Reduced indoor demand = decreased sewer flows = less reclaimed and more operational issues with wastewater collection;
- Outdoor demand appears to have declined more significantly than indoor demand;
- Lower demands = less revenue = challenges in meeting capital/O&M commitments = pressure to increase rates = lower demands =

Demand Management Models

For a Surface Water Dominated System

A. Promote efficiency, allocate savings to development (traditional/AWS)

- Growth funds efficiency program through acquisition fees
- Increases vulnerability to shortage (through demand hardening)
- Lower water sale revenues may require higher rate increases

B. Plan only for curtailment during shortages

- Maintain current use rate
- Deep cutbacks during shortages would affect lifestyles/local economy
- Costs: planning for and enforcing curtailment
- Maintain water sales revenues, enhance with drought surcharge

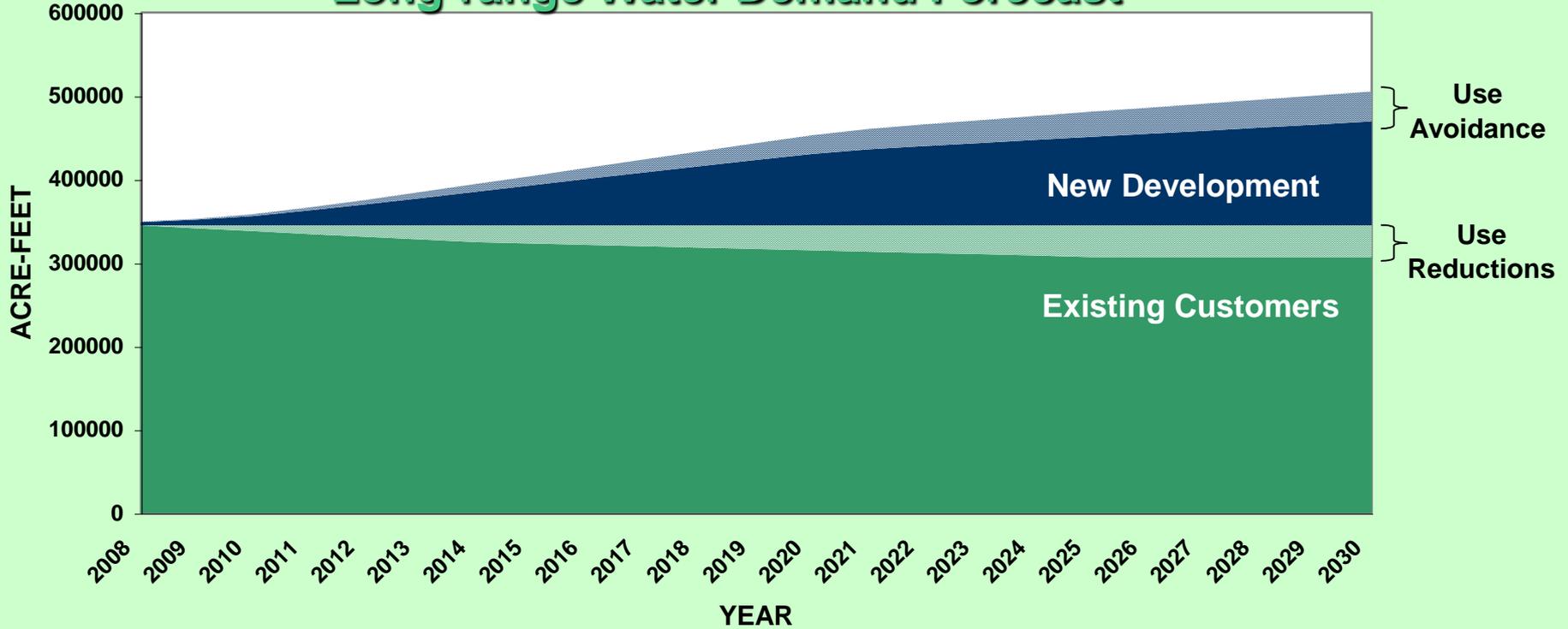
C. Promote efficiency, bank savings (preferred)

- Bank savings (to degree possible) to offset shortages
- Better maintains lifestyle and economic base during shortage
- Costs: efficiency programs (promotion, incentives) and banking
- Reduced water sale revenues may require higher rate increases

Phoenix Planning Framework

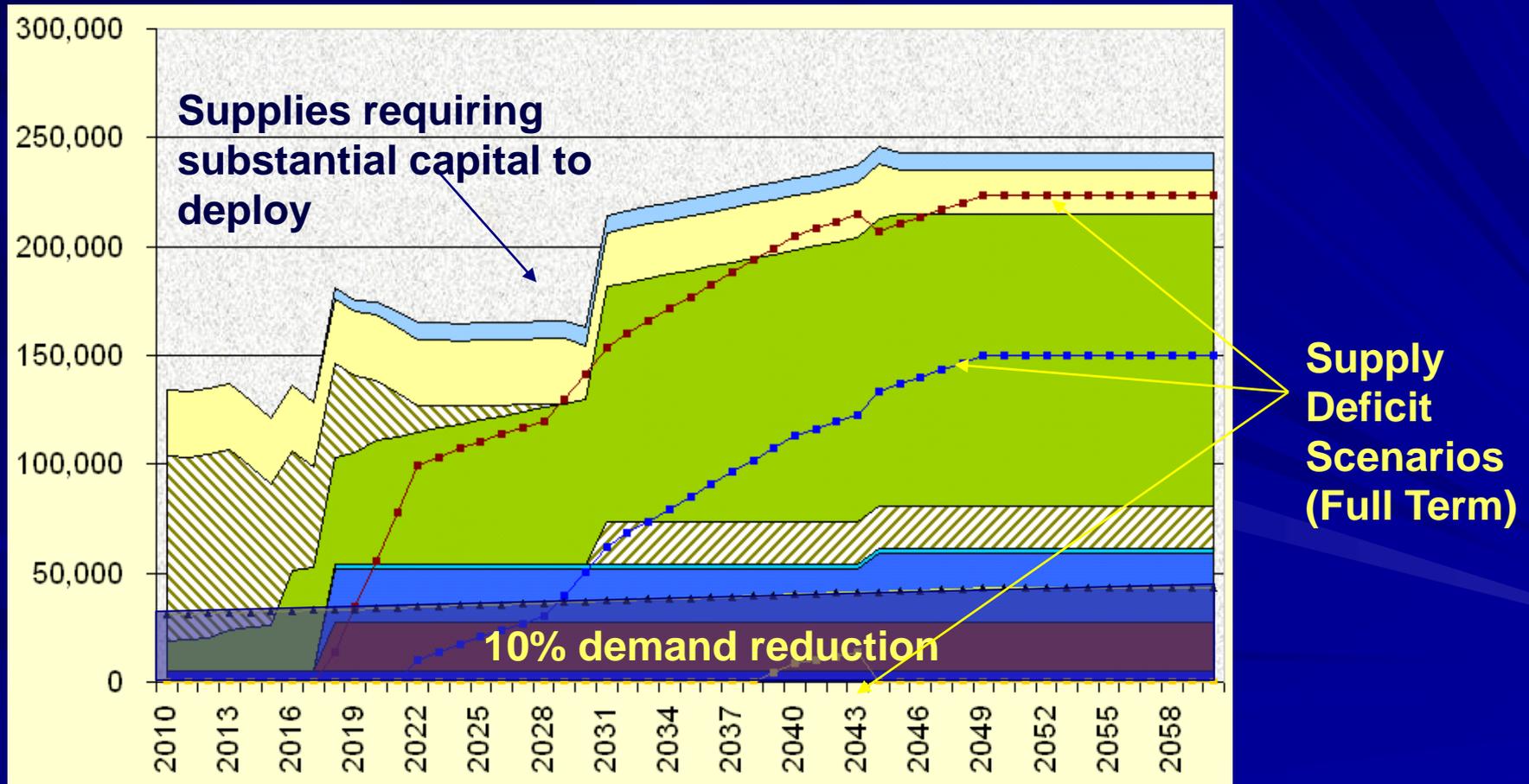
Long-Term Savings from Efficiency

Long-range Water Demand Forecast



Role of Efficiency in Shortage Management

Phoenix Planning Example



Water Resource Acquisition Fee

Phoenix's Conservation Credit Program

- Partially offsets development fee for water acquisition and infrastructure costs;
- Credit for installing certain fixtures and appliances that *exceed* standards;
- EXAMPLE – Credit for High Efficiency Toilet (HET):
 - HET savings = 2,453 gals/household/year = 0.75% AF;
 - Off-project water acquisition cost = \$3,505 per af = \$1,430 per new residential connection;
 - Credit Value = \$26 against \$1,430 acquisition fee
- Plan review and enforcement considerations;
- Periodically update qualifying fixtures and appliances based on increasing standards.

Promoting Enhanced Re-use

Economic considerations

■ Regulations?

- Must ultimately reflect technological advancements which allow for direct potable use to avoid “shell game” costs;

■ Incentives?

- Economics-driven based on costs of alternative supplies and the value of growth

■ Pricing?

- “Blend to blend” – Higher cost of reclaimed treatment for potable can be recovered more effectively by incorporating costs into primary rate base.

The Reclaimed Conundrum

Water is Water

- Clear benefits to serving non-potable water to suitable customers where the need can be economically met. However:
- “Purple pipe” (and our PR efforts) work against long term objective:
 - Telegraphs that “its different” than other raw water sources and must be used with caution.
 - Cost of service for reclaimed (capital/O&M) typically exceeds what can be practically recovered through rates directed toward reclaimed users; Economics are worse with small scale users.
- Long term?....*MUST* consider the more favorable economics of direct or indirect potable use

The Future: Water is Water

Excerpt from "VoiceofSanDiego.org 4/11/10 (Rob Davis):

....But business leaders, environmental groups and ratepayer advocates question whether reclaimed water has any long-term future in San Diego. They say it makes little economic sense to build a second set of purple pipes throughout the city. ***Instead, they say, the city should use its sewage to boost drinking water supplies.***

San Diego's City Council is currently evaluating a strategy that would purify its sewage to be clean enough for human consumption -- not just irrigation -- and use it to augment the San Vicente Reservoir, a drinking water source.

