

This presentation premiered at WaterSmart Innovations

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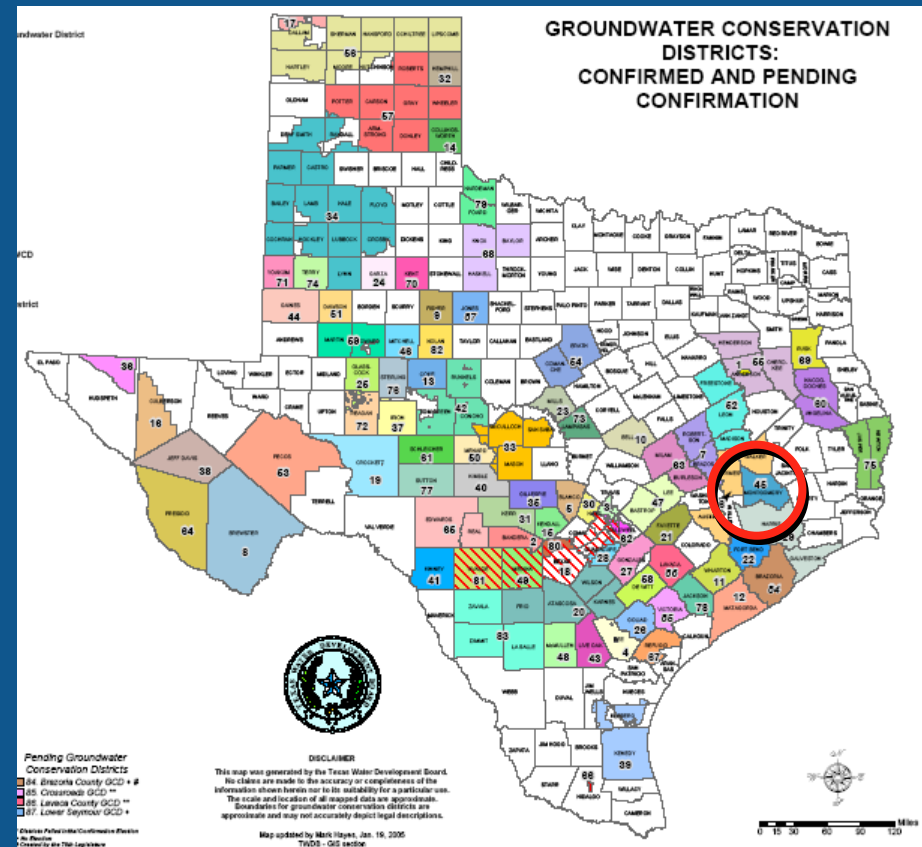
Appropriate Use of Demand Management versus Source Augmentation in Providing Future Water Supplies





Lone Star Groundwater Conservation District

- Authorized by 77th Legislature in 2001 by HB 2362
- Geographic boundaries encompass ALL of Montgomery County
- Creation confirmed by popular vote on Nov 6, 2001 with 73.85 % approval
- Governed by 9 member board



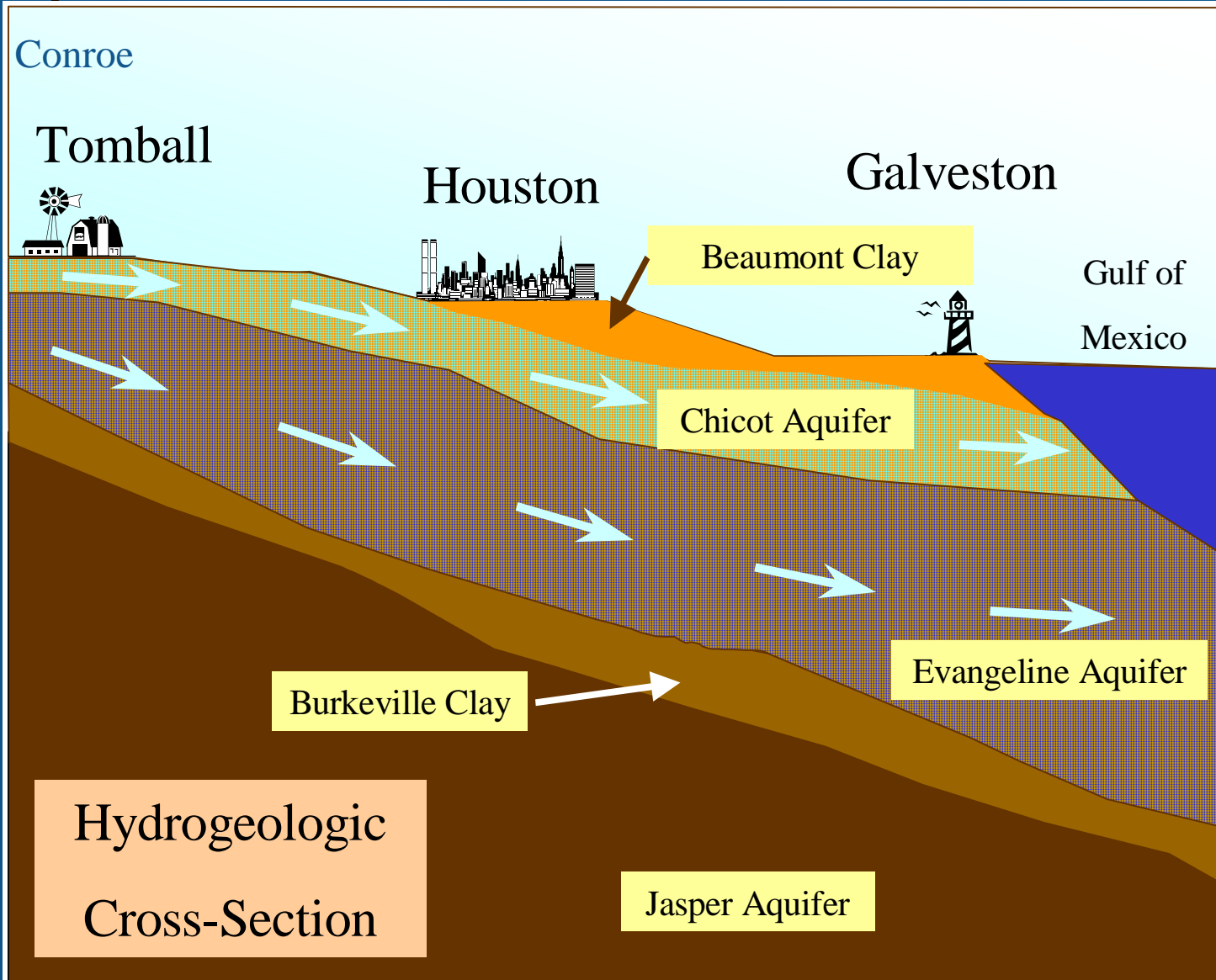
Role of the Lone Star Groundwater District

- **Conserve and Protect groundwater resources in Montgomery County**
- **Control land subsidence**
- **Develop rules and regulations as necessary to meet these objectives**
- **Establish well registration and permit system**
- **Work with Federal Government to monitor groundwater levels**
- **Participate in joint planning with GMA 14**

Discussion of the Fundamental Issue Facing Montgomery County

- Part of Houston MSMA
- 13 cities and 163 Special Water Districts
- 26th fastest growing county in the United States
- 5th fastest growing county in Texas
- To date, entire water supply originates as groundwater from Gulf Coast Aquifer
- Current usage is ~~approaching~~ (exceeding) sustainable yield of the aquifer

Aquifer Characteristics

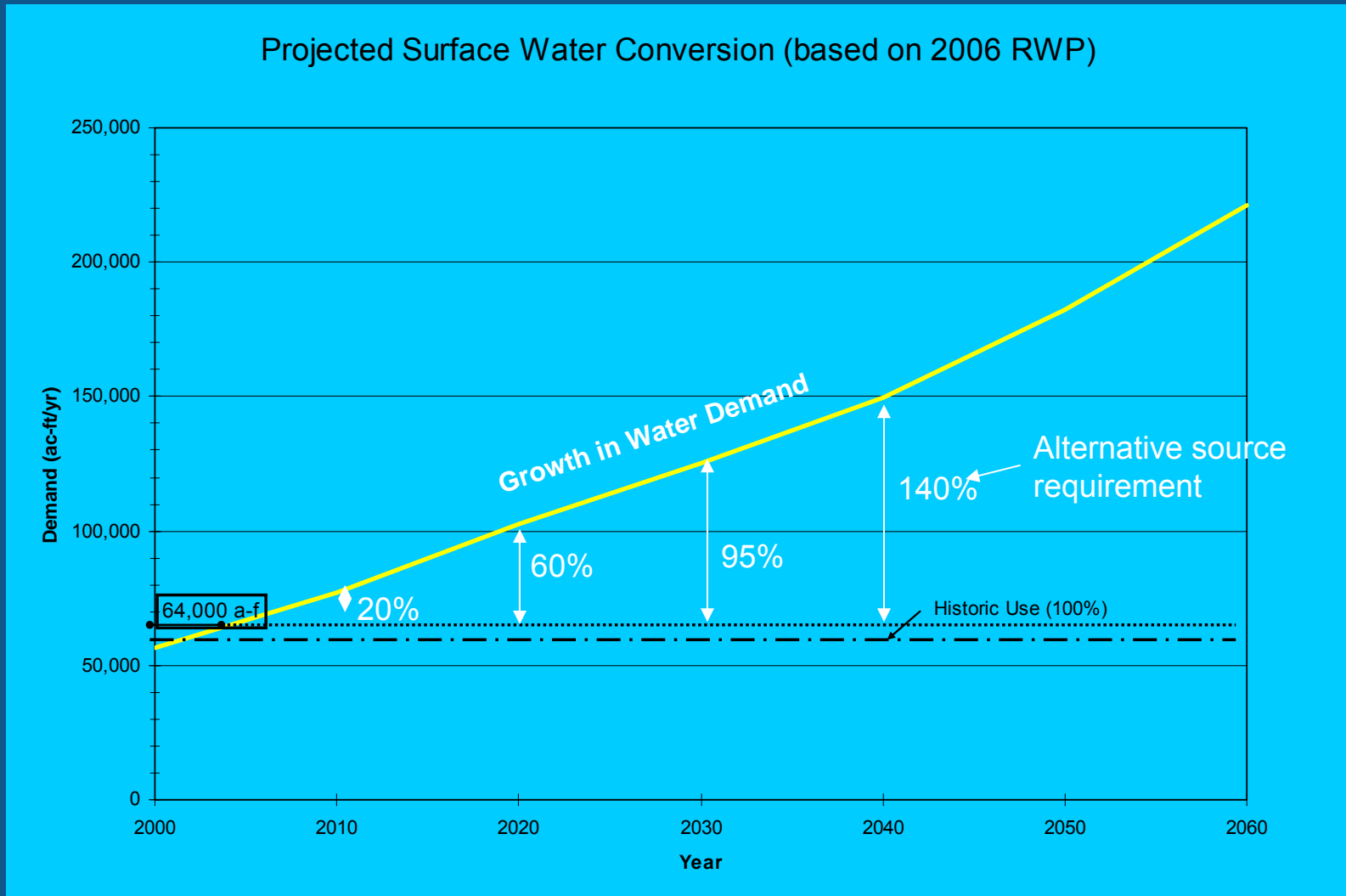


Summary of the Problem

Texas Water Development Board Projections of Available Groundwater in Montgomery County (per approved plan)	64,000 a-f /year
Current GW Permit Requests	78,000 a-f/year
Projected water demand by 2040	154,000 a-f /year
Shortage	90,000 a-f/year

Note: 97% of the water used is for public water supply

Projected groundwater Demand (based on 2006 RWP)



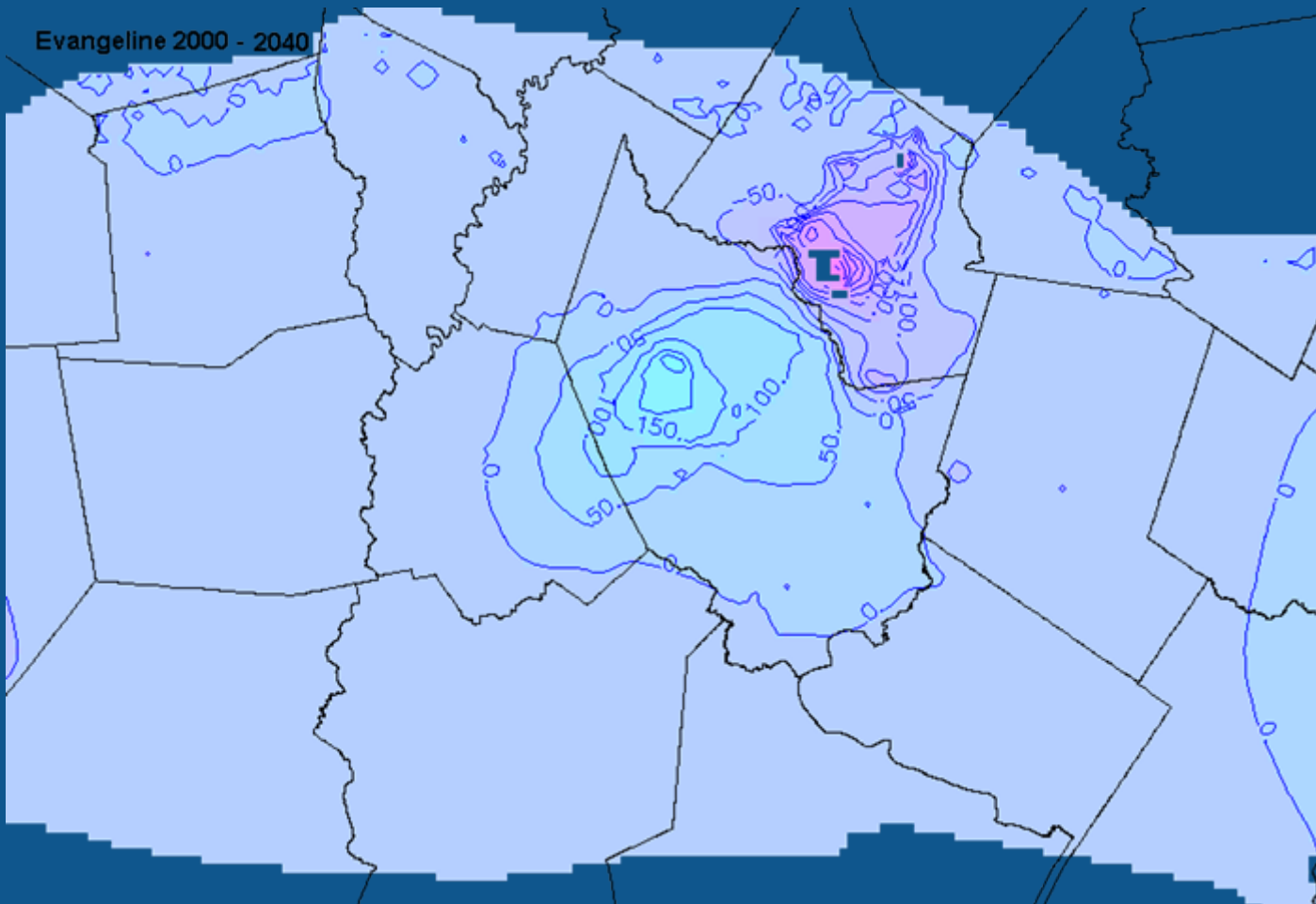
Studies Conducted on behalf of LSGCD, SJRA and TWDB to Identify Problem and Solutions

- Regulatory Program and Facilities Plan
 - Developed regulatory plan
 - Determined whether there was a feasible solution to the problem
 - Proved solution existed so regulation okay
- Waterline Transmission Routing Study
 - Conducted because a partnership with SJRA was being considered
 - Primarily to establish route for reservation of rights of way

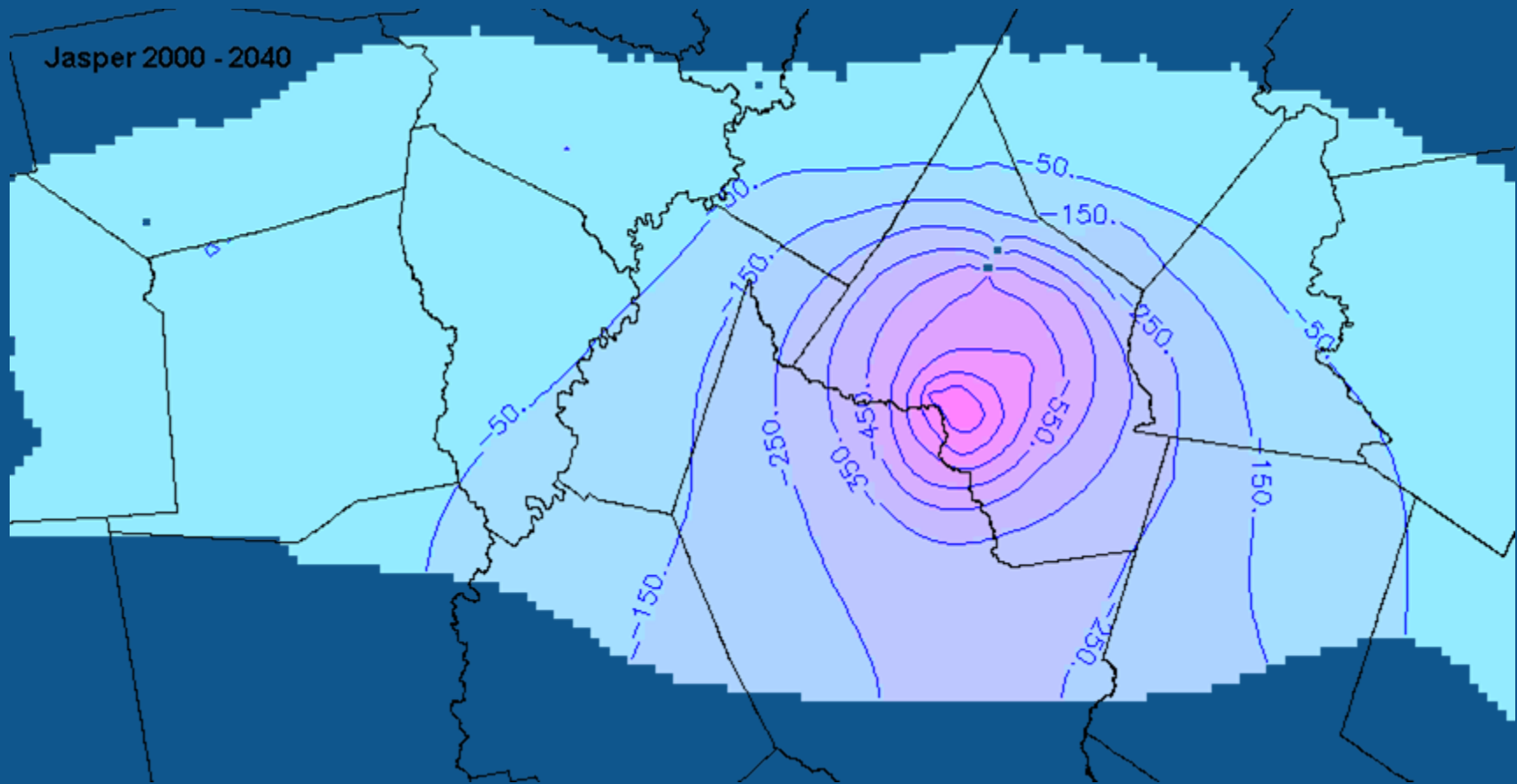
Studies and Recommendations (cont.)

- Water Reuse Study
 - Gave estimation based on current development trends in Mont. Co how effective reuse could be
 - Identified specific projects
 - Made recommendations for incentives both from the regulator and implementer side
- Consumption by Connection Study
 - Determined the per connection usage for the water utilities in the county
 - Data to be used for future regulatory issues

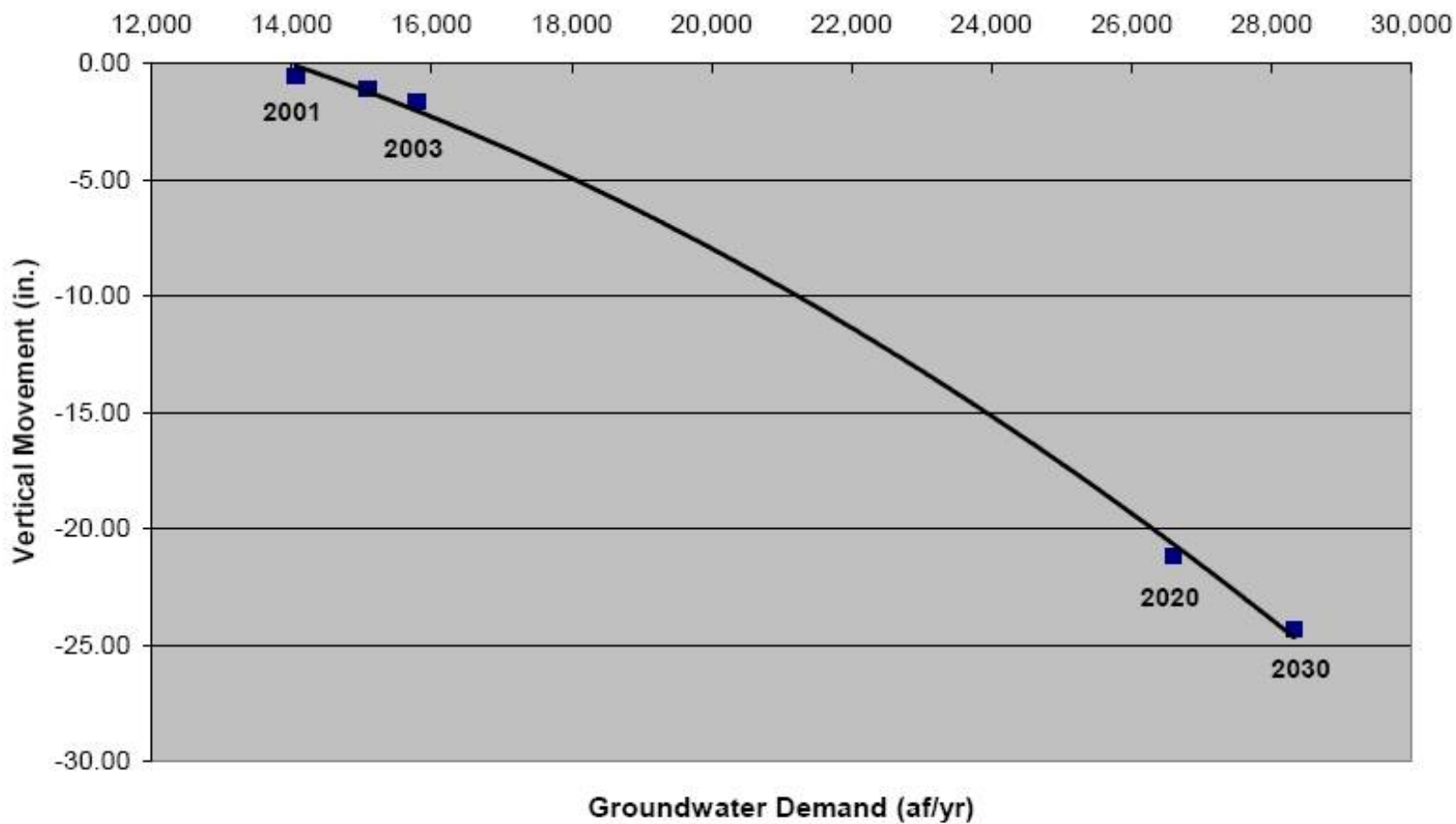
Projected Decline in Water Levels (Evangeline 2000-2040)



Projected Decline in Water Levels (Jasper 2000-2040)



Vert. movement of GPS-PAM 13 subsidence monitor site (Woodlands) vs pumpage projected to year 2030





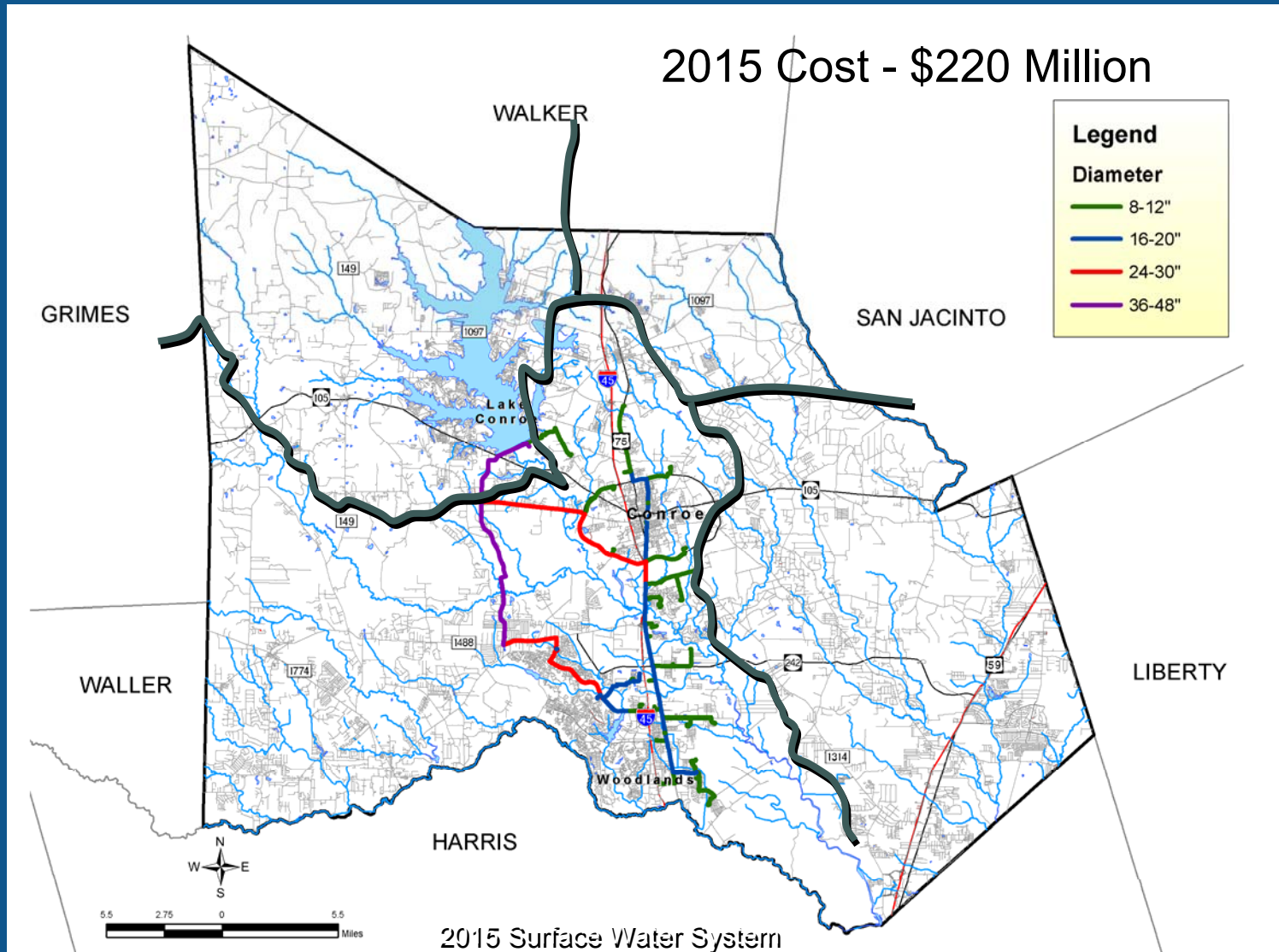
Groundwater Regulatory Program Development



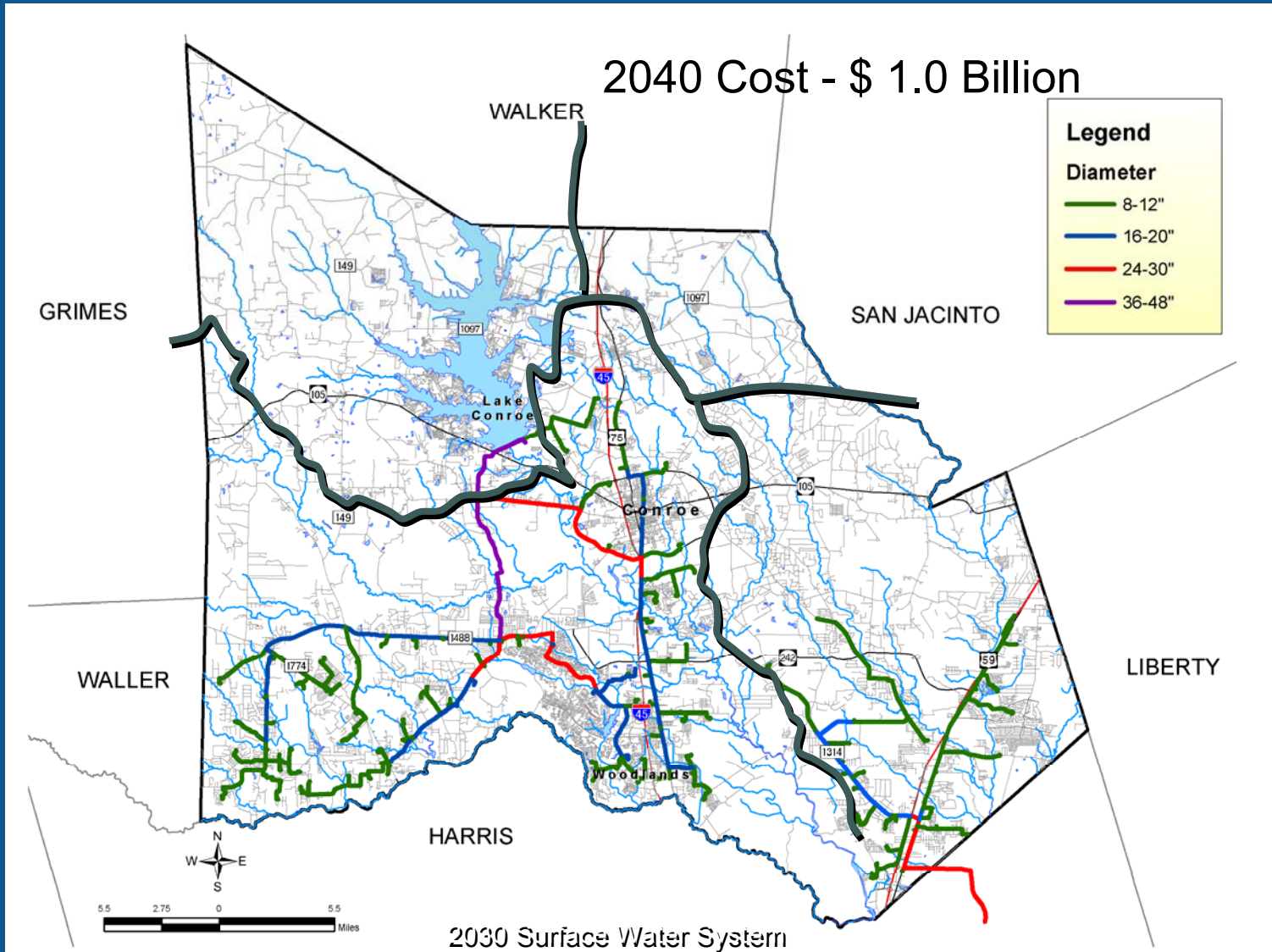
District Regulatory Plan (Phase I) – Dec 2006

- Established a single management zone coincident with the boundaries of the District
- Established 64,000 a-f as the amount of recharge in accordance with rule 4.2(a)
- Established January 1, 2015 as the date by which the District will require groundwater production to be limited to no more than 64,000 a-ft
- Set guidelines for how permittees submit information for compliance

Wholesale Surface Water Delivery System



Wholesale Surface Water Delivery System



Unit Rate of Surface Water Supply

	2015	2040
50% Value of Un-depreciated Asset (\$M)*	\$ 18	\$ 54
Water System Cost (\$M)	\$199.9	\$1,031
Total Cost (\$M)	\$217.9	\$1,085
Annual Cost (\$M) **	\$ 17.5	\$ 95.5
Annual SW Treated (\$M)	6,570 mg	29,324
Surface Water Cost / 1000g (\$\$)	\$ 2.66	\$ 3.25
Less savings for GW pumping (\$\$)	(\$ 0.40)	(\$ 0.40)
Plus O&M for SW operation (\$\$)	\$ 0.26	\$0.26
Total Cost of Water (\$\$)	\$2.52	\$3.11

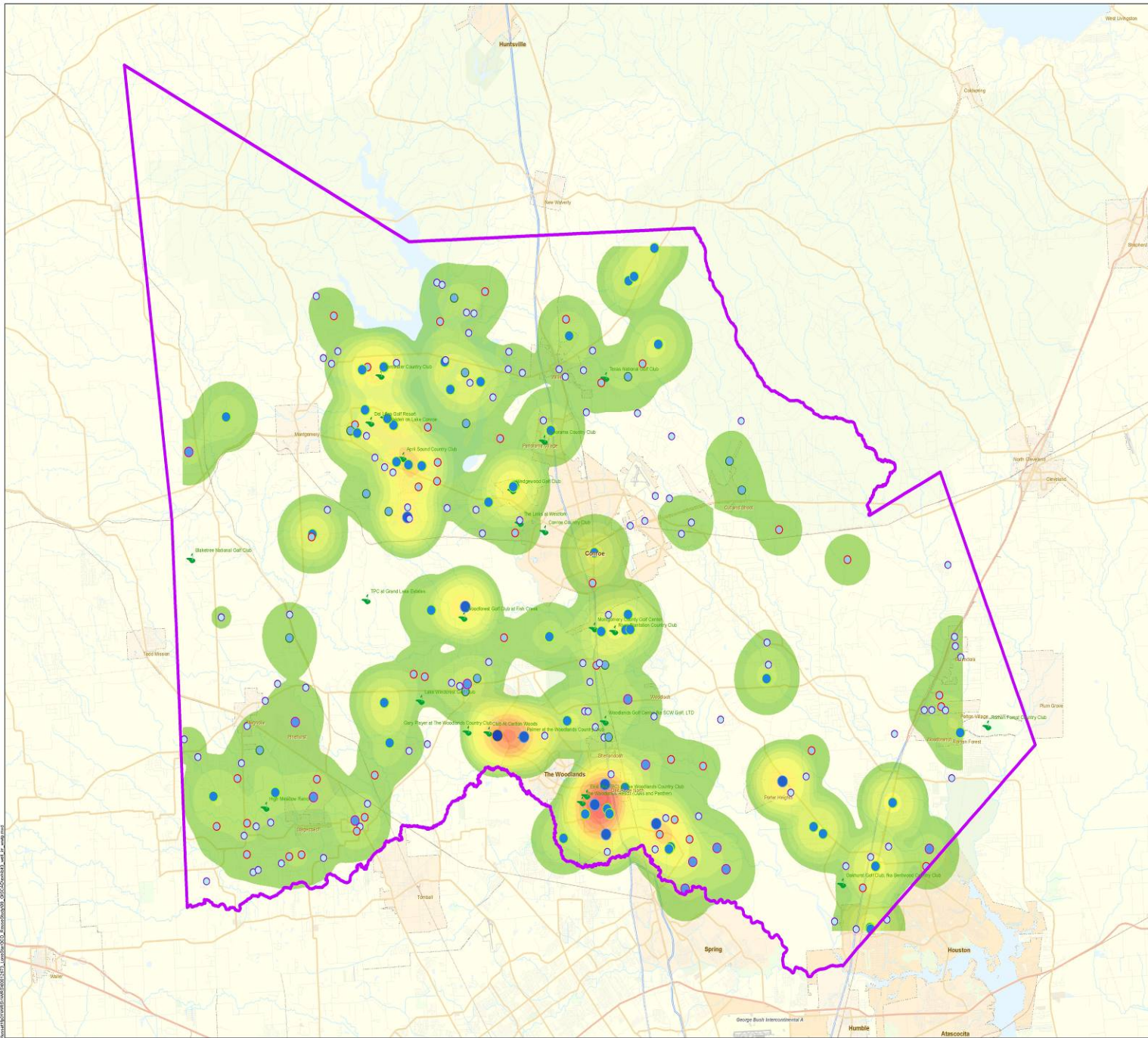
* Based on a 30 year active life of a well and an average cost of \$1.2 million per well

** Assuming 5% interest and 20 year payment



Water Reuse Study





Legend

Lone Star GCD
 Lone Star GCD

Reuse Demand Density

Annual Potential Reuse Water Demand

- 0 - 0.5 MG
- 0.5 MG - 2 MG
- 2 MG - 4 MG
- 4 MG - 6 MG
- 6 MG - 10 MG
- 10 MG - 15 MG
- 15 MG - 20 MG
- 20 MG - 25 MG
- 25 MG - 30 MG
- 30 MG - 35 MG
- 35 MG - 40 MG
- 40 MG - 45 MG

Potential Reuse Water Demand from Well Conversion

Estimated Annual Pumpage for Irrigation

- 0.5 MG - 2.5 MG
- 2.5 MG - 5.0 MG
- 5.0 MG - 7.5 MG
- 7.5 MG - 10.0 MG
- 10 MG - 50 MG
- 50 MG - 100 MG
- 100 MG - 500 MG
- 500 MG - 1000 MG
- 1000 MG - 5000 MG

Notes:
 Only Wells with Estimated Annual Reuse Demand values greater than 0.5 MG as well as readily available location information are included on this map.
 Assumptions about well locations were made for wells without readily available location data.



Lone Star GCD Reuse Study
Estimated Well Reuse Demand Density

TCB | AECOM
 Turner Collier & Braden
 8800 Park Ten Blvd, Suite 1805
 San Antonio, Texas 78210
 www.tcb.aecom.com

Reuse Potential in Montgomery County

106 individual wastewater treatment plant permits issued with a capacity of 6.5 BGY (~20,000 ac-ft)

230 groundwater well permits list irrigation as a use of water
6 studies in greater Houston Metropolitan Region

Costs range from \$ 0.57 - \$ 2.35 per 1000 gal

9 Projects immediately feasible

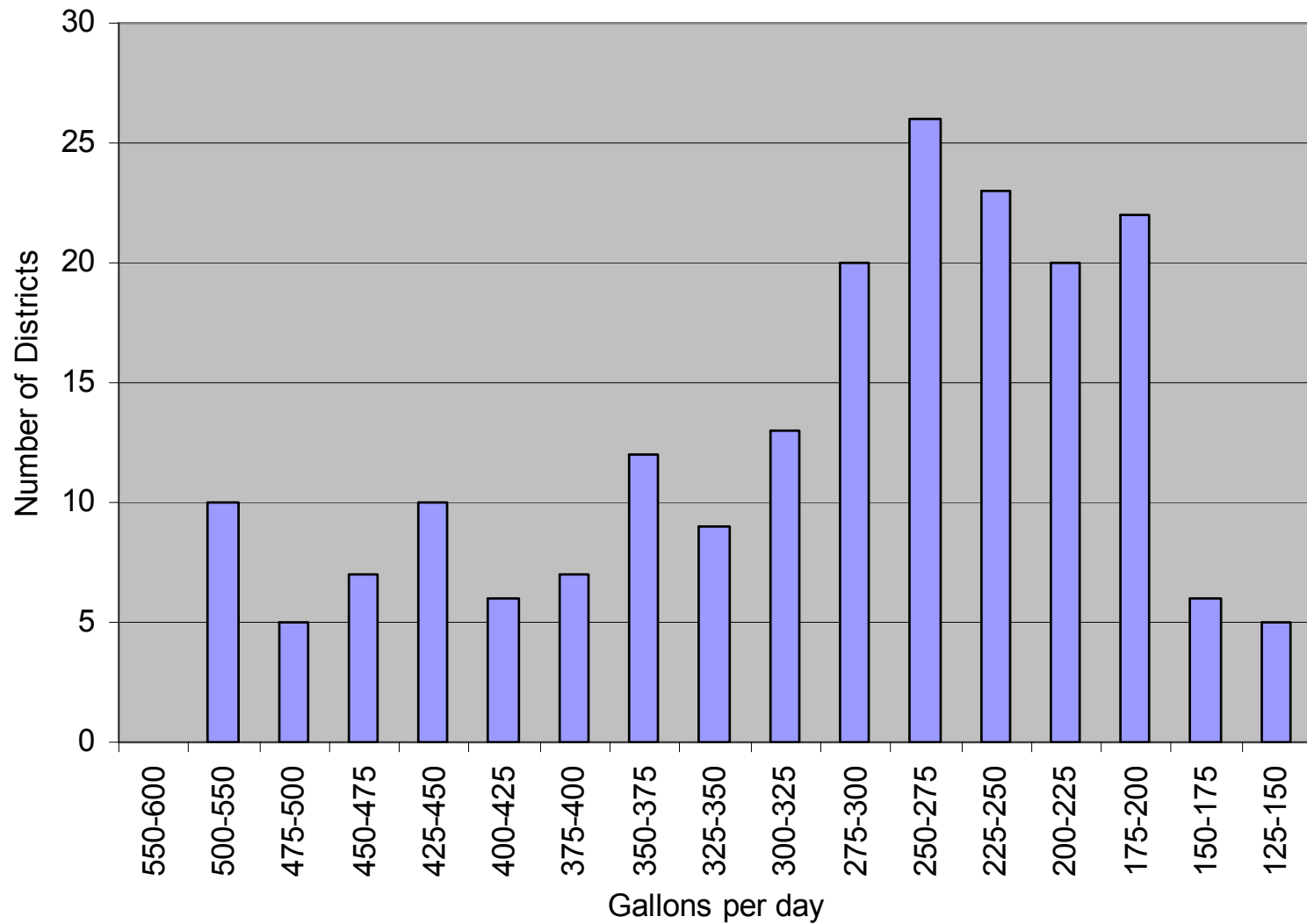
Practical application of reuse ~ 1.6 BGY (~5,000 ac-ft). This is about 7% of the water demand

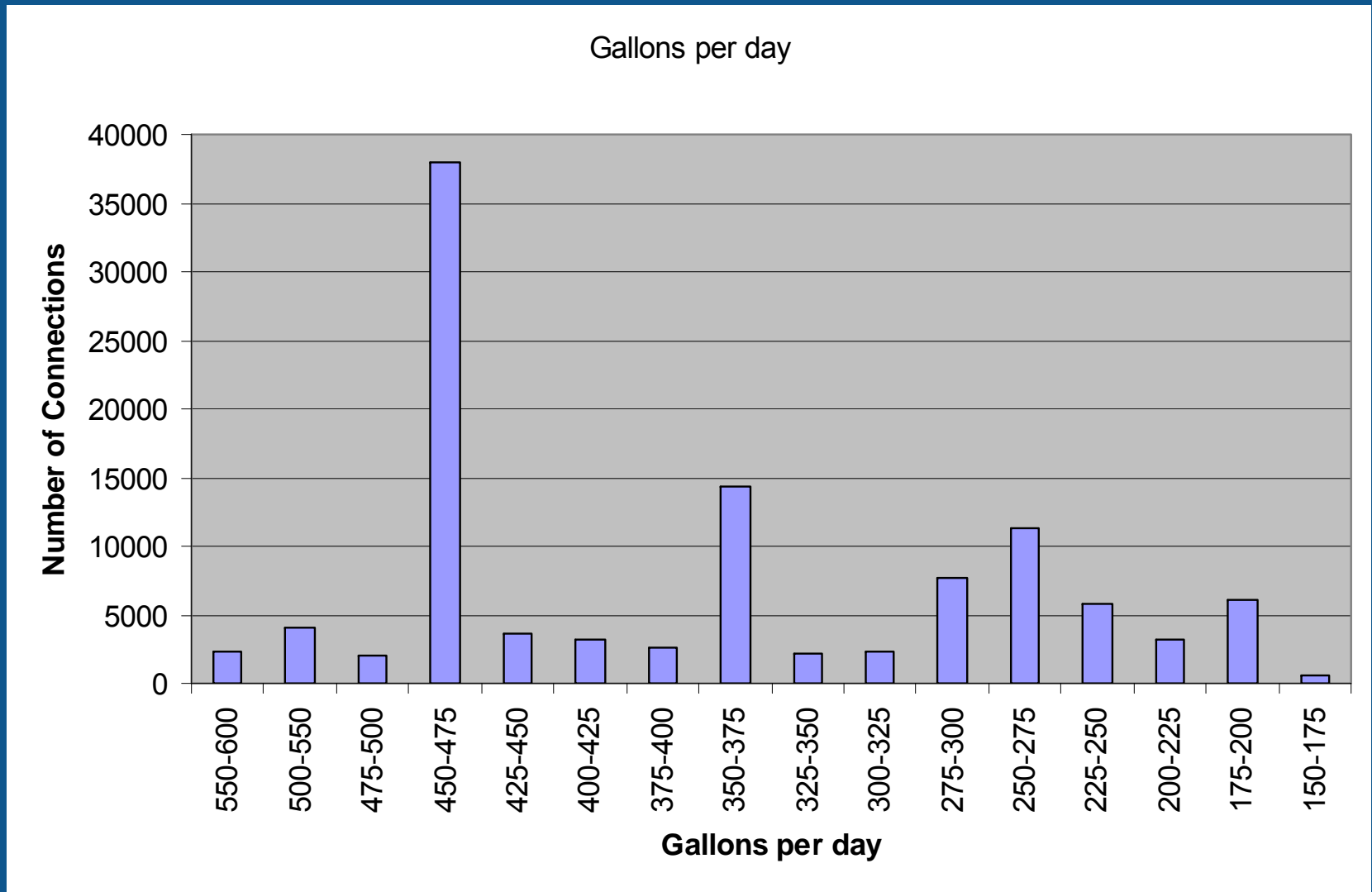
Economics and incentives will dictate advancement of reuse



Water Demand by Connection

Gallons per Connection







Benefits from Water Conservation



Roles of Regulator vs Implementer

Regulator

- Sets Permit//Water Use Fee
- Sets Limit on GW production
- Set rules for compliance
- Monitors adherence
- Sets penalty for non-compliance
- Designs incentives to exceed compliance

Facilitator/Implementer

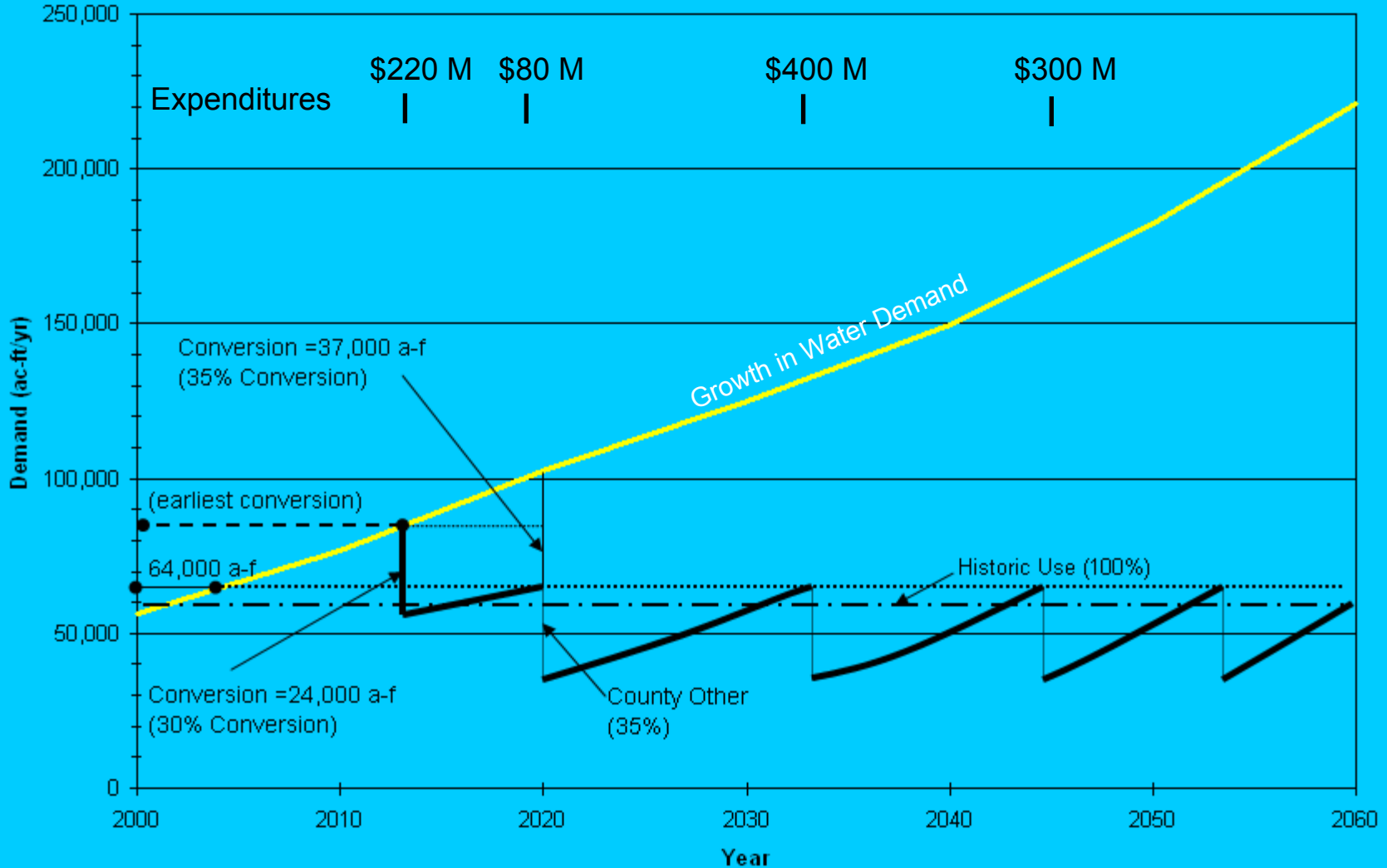
- Designs solution
- Sets pumpage fee
- Sets surface water fee
- Sets reuse fee
- Gives financial credits for alternatives
- Develops and maintains solution

What are the Benefits of Conservation?

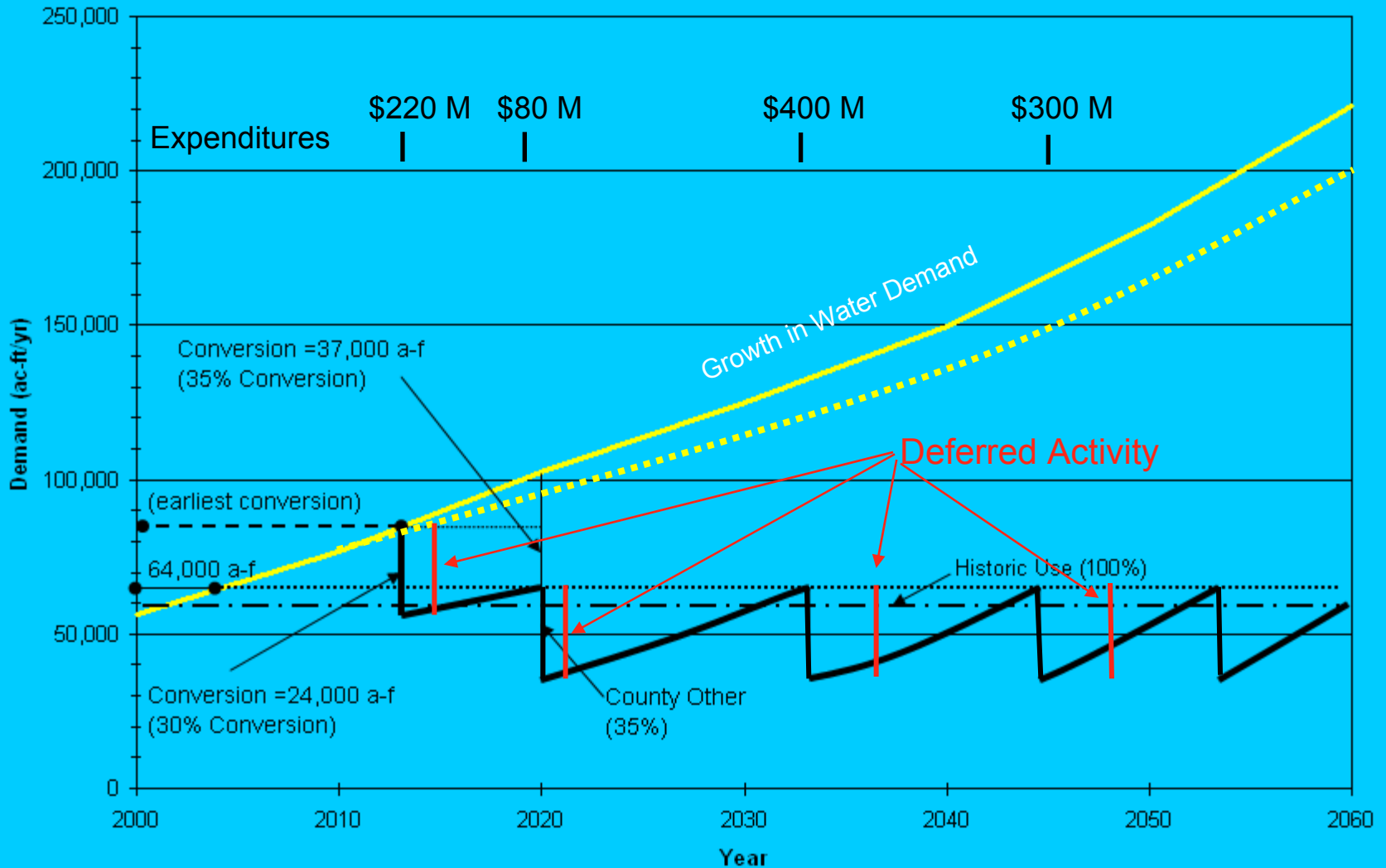
- Cost savings from delayed implementation of costly alternatives
- Savings to individual homeowners in both water and energy bills and possibly wastewater charges
- Potential Reduction in physical size of surface water alternative facilities
- Reduction in peak demands, which reduces size of the least utilized portion of capacity.

Cost savings accrue to the implementer, the homeowners, and the water utilities, but not to the regulator

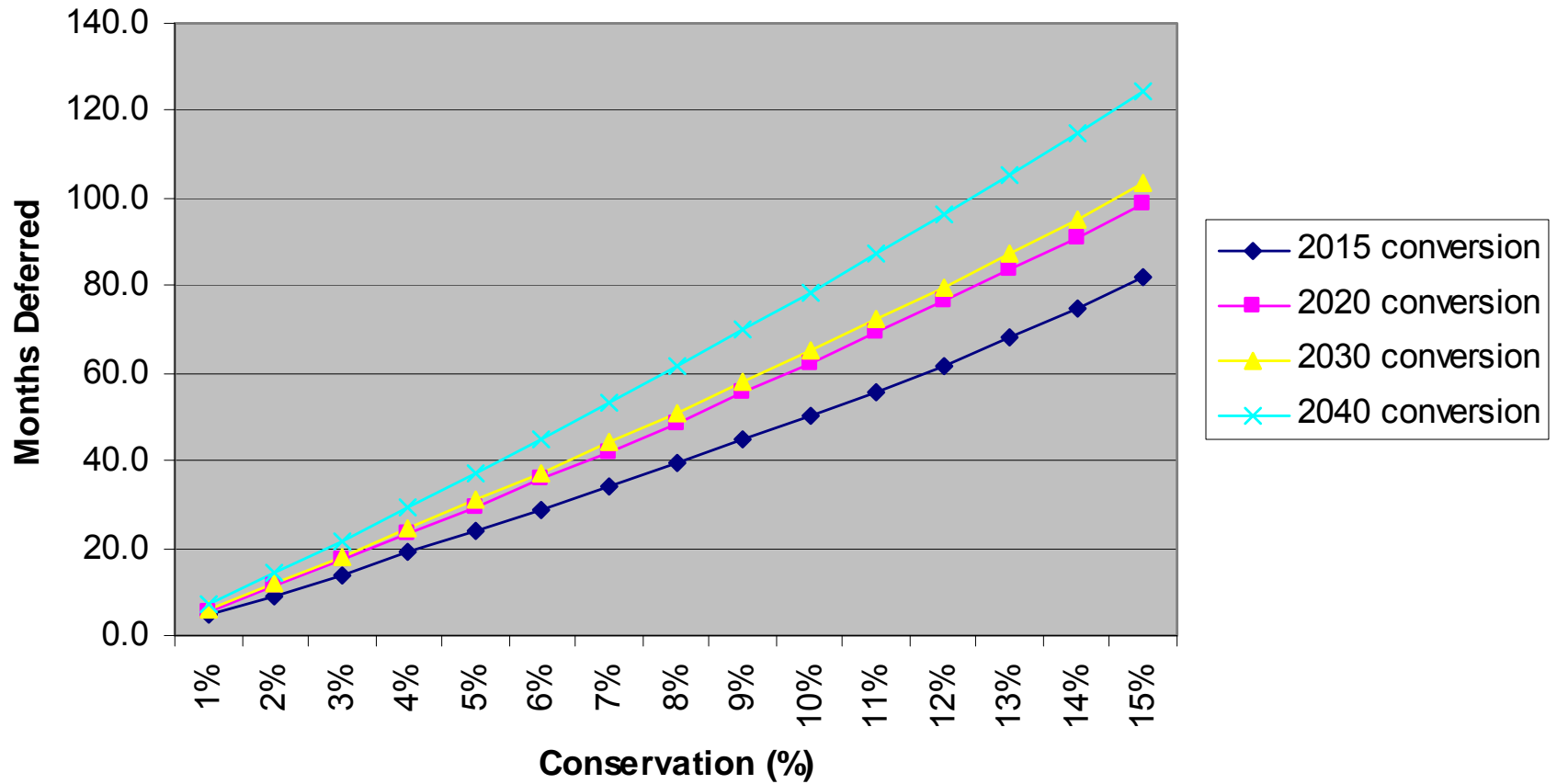
Projected Surface Water Conversion (based on 2006 RWP)



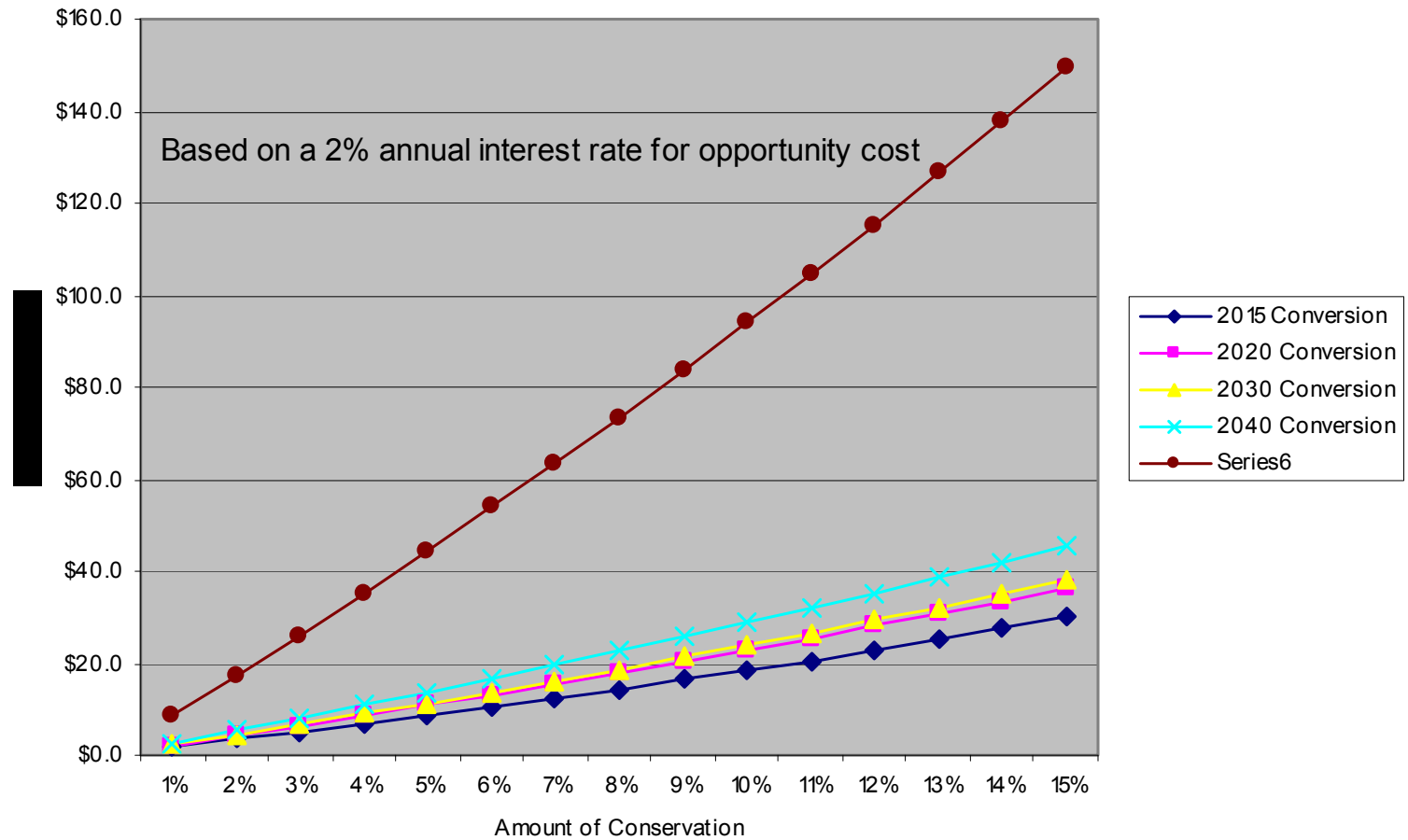
Impact of reducing Demand on Conversion Strategy



Impact of Conservation on Conversion Dates



Cost Savings Associated with Conservation



Potential ways for LSGCD to Encourage Conservation

- Implement Inclining block rates for permit fees:
 - Develop baseline amounts for the various water uses on a per connection or per acre basis
 - Permit amounts \leq base rate pay base amount
 - Permits in excess of this pay heavy surcharge
 - Discourage use of groundwater for amenity purposes though heavy usage fees
 - Use excess funds as financial incentive for new conservation measures

Conservation Education

- LSGCD could expand their lead role in Conservation Education
 - Establish staff position for Conservation Coordinator
 - **Modify message to focus on actual dollar savings from conservation both from water and energy savings as well as deferred capital**
 - Develop conservation materials with Montgomery County background
 - Coordinate conservation efforts with water utilities
 - Continue support for activities such as rainwater harvesting, and other demonstration projects
 - **Perform or subsidize irrigation audits for outdoor water usage in high usage systems**



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