

# ***South Central Texas Regional Water Planning Group***

## **Water Conservation in the 2006 South Central Texas Regional Water Plan**



**November 1, 2007**



# ***Basic Water Planning Requirements***

- ❑ Water Code amended in 2001 to require water conservation and drought management strategies in Regional Water Plans;**
- ❑ Water Planning Groups must include water conservation strategies for each water user group with a need (projected shortage);**
- ❑ Water Planning Groups must also consider drought management strategies for each identified need and must include strategies for each water user group with a need;**
- ❑ If a Water Planning Group does not adopt a water conservation strategy for an identified need, it must document the reason;**
- ❑ If a drought management strategy is not selected as a water management strategy, the reasons must be documented.**

## ***Water Conservation Water Management Strategies in the South Central Texas Regional Water Plan***

- The SCTRWPG decided to recommend water conservation for all WUGs, regardless of projected needs for additional water supply;**
- Water Conservation Goals for Municipal WUGs are:**
  - WUGs with water use of 140 gpcd and greater in 2000 —reduce per capita water use by one percent per year until the level of 140 gpcd is reached, after which, the goal is to reduce per capita water use by one-fourth percent per year for the remainder of the planning period; and**
  - WUGs having year 2000 water use of less than 140 gpcd — the goal is to reduce per capita water use by one-fourth percent per year (0.25% per year).**
- Water Conservation for Industry, Steam-Electric Power Generation, Irrigation, Mining, and Livestock is based upon “best management practices” and computed from information available.**

# ***Water Conservation Data and Information Used in the South Central Texas Regional Water Plan***

- In 1991 the Texas Legislature established minimum standards for plumbing fixtures sold in Texas (SB 587):

<b><u>Fixture</u></b>	<b><u>Standard</u></b>
Wall-mounted Flushometer Toilets	2.00 gallons per flush
All Other Toilets	1.60 gallons per flush
Shower Heads	2.75 gpm at 80 psi
Urinals	1.00 gallon per flush
Faucet Aerators	2.20 gpm at 80 psi

The TWDB has estimated that the new plumbing fixtures can reduce per capita water use by 18 gallons per capita per day (gpcd):

<i>Plumbing Fixture</i>	<i>Water Savings (gpcd)</i>
<i>Toilets – 1.6 gallons per flush</i>	<i>11.5</i>
<i>Shower Heads – 2.75 gallons per minute</i>	<i>4.0</i>
<i>Faucet Aerators – 2.2 gallons per minute</i>	<i>2.0</i>
<i>Urinals – 1.0 gallon per minute</i>	<i>0.3</i>
<i>Drinking Fountains (self-closing)_</i>	<i><u>0.1</u></i>
<i>Total</i>	<i><u>17.9 (18 gpcd)</u></i>

The Water Conservation Implementation Task Force identified and described 21 Best Management Practices (BMPs) and provided a BMP Guide for use by Regional Water Planning Groups in the development of the 2006 Regional Water Plans.



## ***The list of BMPs for municipal water users is as follows:***

- 1. System Water Audit and Water Loss;**
- 2. Water Conservation Pricing;**
- 3. Prohibition on Wasting Water;**
- 4. Showerhead, Aerator, and Toilet Flapper Retrofit;**
- 5. Residential Ultra-Low Flow Toilet Replacement Programs;**
- 6. Residential Clothes Washer Incentive Program;**
- 7. School Education;**
- 8. Water Survey for Single-Family and Multi-Family Customers;**
- 9. Landscape Irrigation Conservation and Incentives;**
- 10. Water-Wise Landscape Design and Conversion Programs;**
- 11. Athletic Field Conservation;**
- 12. Golf Course Conservation;**
- 13. Metering of all New Connections and Retrofitting of Existing Connections;**
- 14. Wholesale Agency Assistance Programs;**
- 15. Conservation Coordinator;**
- 16. Reuse of Reclaimed Water;**
- 17. Public Information;**
- 18. Rainwater Harvesting and Condensate Reuse;**
- 19. New Construction Graywater;**
- 20. Park Conservation; and**
- 21. Conservation Programs for Industrial, Commercial, and Institutional Accounts.**

***A Texas Water Development Board Report, "Quantifying the Effectiveness of Various Water Conservation Techniques in Texas," provided estimates of quantities saved and costs of water conservation measures.\****

Costs of municipal water conservation in the 2006 regional water plan are as follows:

**Plumbing fixture and clothes washer retrofit**

- Rural areas.....\$588 per acre-foot;
- Suburban areas.....\$520 per acre-foot; and
- Urban areas.....\$458 per acre-foot.

**Lawn watering and landscape water conservation... \$400 per acre-foot.**

\* GDS Associates, Appendix VI, Region L, Austin, Texas, July 2003,



***The Water Conservation Implementation Task Force list of Best Management Practices (BMPs) for irrigation is as follows:***

- 1. Irrigation Scheduling;**
- 2. Volumetric Measurement of Irrigation Water Use;**
- 3. Crop Residue Management and Conservation Tillage;**
- 4. On-farm Irrigation audit;**
- 5. Furrow Dikes;**
- 6. Land Leveling;**
- 7. Contour Farming;**
- 8. Conservation of Supplemental Irrigated Farmland to Dry-Land Farmland;**
- 9. Brush Control/Management;**
- 10. Lining of On-Farm Irrigation ditches;**
- 11. Replacement of On-/farm Irrigation Ditches with Pipelines;**
- 12. Low Pressure Center Pivot Sprinkler Irrigation Systems;**
- 13. Drip/Micro-Irrigation System;**
- 14. Gated and Flexible Pipe for Field Water Distribution Systems;**
- 15. Surge Flow Irrigation for Field Water Distribution Systems;**
- 16. Linear Move Sprinkler Irrigation Systems;**
- 17. Lining of District Irrigation Canals;**
- 18. Replacement of District Irrigation canals and Lateral canals with Pipelines;**
- 19. Tailwater Recovery and Use System; and**
- 20. Nursery Production Systems.**

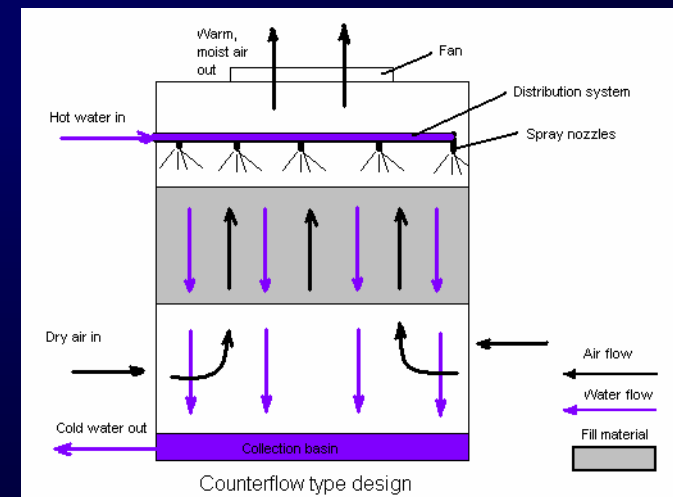
## ***Principal methods of irrigation water conservation on irrigation farms of Region L are:***

- ❑ (1) low-pressure sprinklers (LESA);**
- ❑ (2) low-energy precision application systems (LEPA); and**
- ❑ (3) irrigation scheduling.**



# **The Water Conservation Implementation Task Force list of Best Management Practices (BMPs) for industry is as follows:**

1. Industrial Water Audit;
2. Industrial Water Waste Reduction;
3. Industrial Submetering;
4. Cooling Towers;
5. Cooling Systems Other than Cooling Towers;
6. Industrial Alternative Sources and Reuse of Process Water;
7. Rinsing/Cleaning;
8. Water Treatment;
9. Boiler and Steam Systems;
10. Refrigeration (including Chilled Water);
11. Once-through Cooling;
12. Management and Employee Programs;
13. Industrial Landscape; and
14. Industrial Site Specific Conservation.



# ***Region L Water Conservation Calculations***

- ❑ The Municipal Water Demand Projections were made with estimated effects of low Flow Plumbing Fixtures phased in over time as remodeling and new housing and business construction installs the Low Flow Plumbing Fixtures (the TWDB provided estimates of the reductions in per capita water use for each Municipal WUG).
- ❑ The Municipal Water Conservation WMS incorporated additional Low Flow Plumbing Fixtures at an accelerated rate to reach the maximum of 18 GPCD by 2020; and then used clothes washer retrofit and lawn watering to accomplish the municipal water conservation goals established by the SCTRWPG.
- ❑ The Irrigation Water Conservation WMS calculations included implementation of LEPA Systems with Furrow Dikes. Acreages were adequate to meet projected irrigation water needs in Atascosa, Bexar, and Medina Counties, however, total projected irrigation needs could not be met in Kendall and Zavala Counties.

# **Water Conservation Effects Upon Municipal Water Demand**

	Units	2000	2010	2020	2030	2040	2050	2060
<b>Population</b>	No.	2,042,221	2,460,599	2,892,933	3,292,970	3,644,661	3,984,258	4,297,786
<b>Municipal Water Demand with Low Flow Plumbing Fixtures</b>	acft	340,030	395,996	451,111	503,375	547,136	592,344	637,236
<b>Water Conservation Water Management Strategies*</b>	acft							
Low flow Plumbing Fixtures and Clothes Washer Retrofit	acft		12,013	13,734	15,231	14,961	15,083	19,163
Lawn Watering	acft		1,218	9,008	16,386	25,567	38,842	53,407
<b>Total</b>	acft		13,231	22,742	31,617	40,528	53,925	72,570
<b>Municipal Water Demand with Water Conservation Water Management Strategies</b>	acft	340,030	382,765	428,369	471,758	506,608	538,419	564,666
<b>Per Capita Water Use</b>								
Regional Plan with Low Flow Plumbing Fixtures	gpcd	149	144	139	136	134	133	132
Water Conservation Water Management Strategies (WMSs)	gpcd		5	7	9	10	12	15
Regional Plan with Water Conservation WMSs	gpcd	149	139	132	127	124	121	117

acft means acre-feet, and gpcd means gallons per person per day.

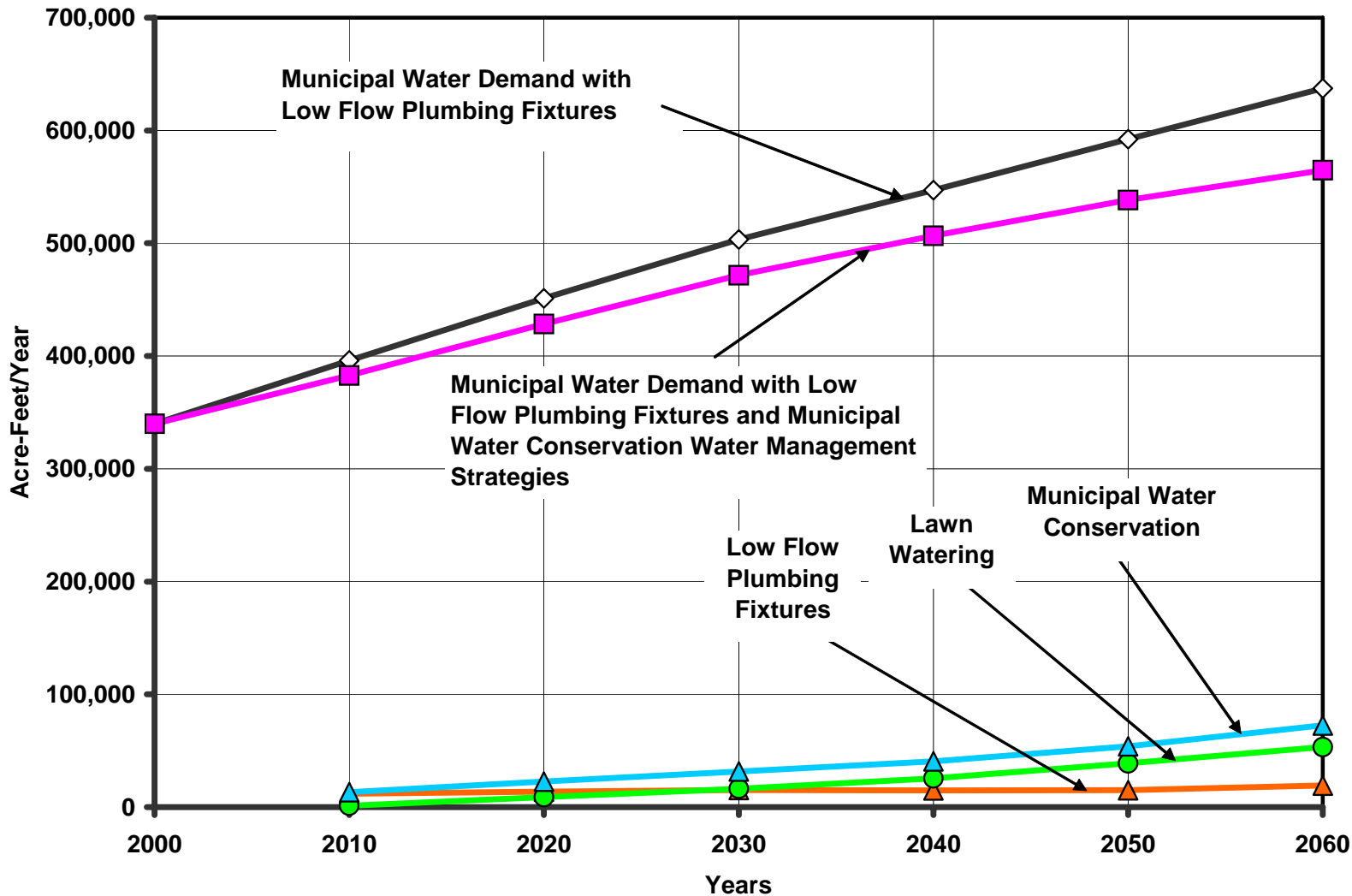
\* 2006 Water Conservation Goals:

\* For Water User Groups (WUGs) with per capita water use in year 2000 of 140 gpcd and greater, reduce gpcd by 1 % per year until reach 140 gpcd, and then continue reduction of gpcd at rate of 0.25% per year thereafter.

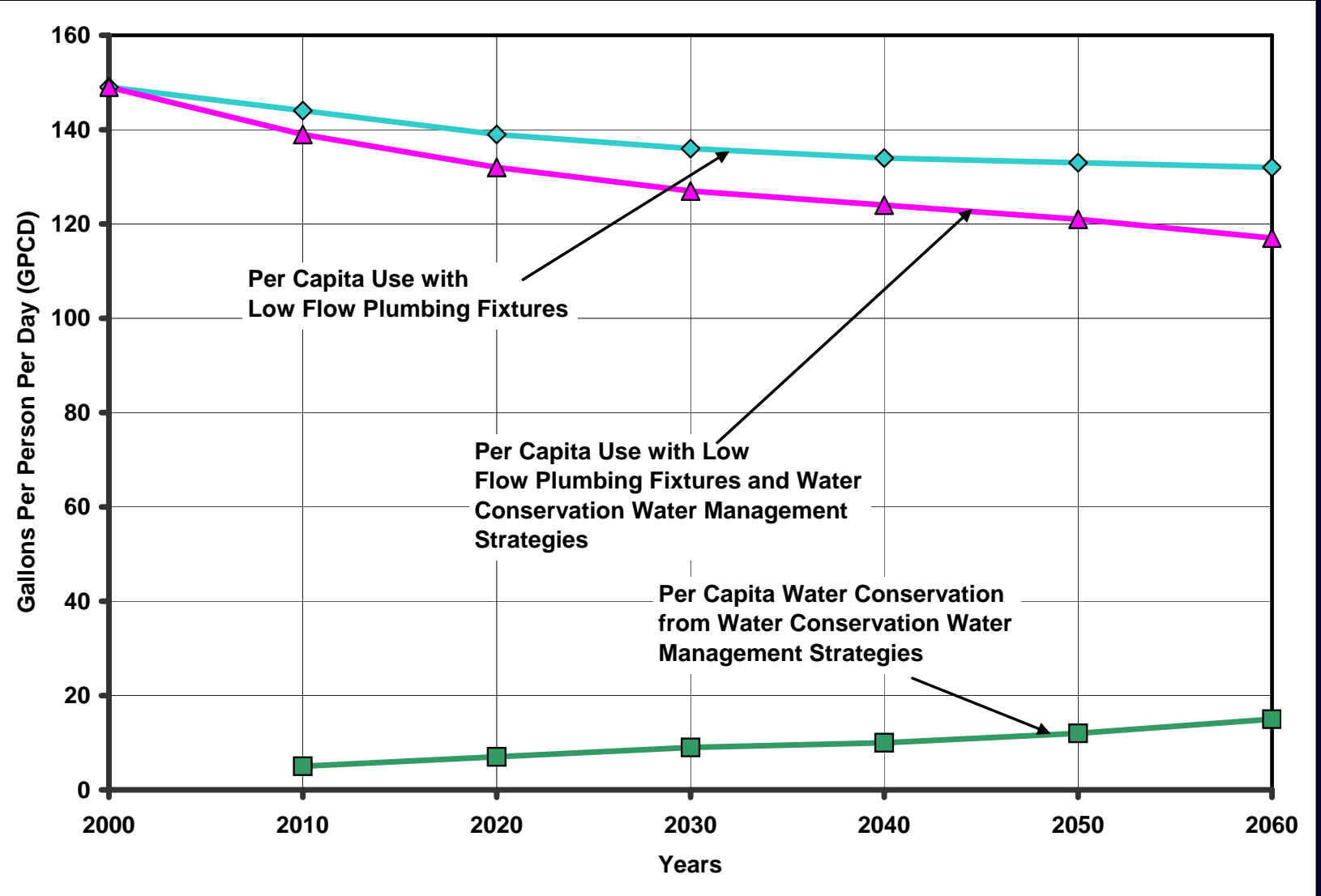
\* For Water User Groups (WUGs) with per capita water use in year 2000 less than 140 gpcd, reduce gpcd by 0.25 % per year throughout planning period.

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# Projected Municipal Water Demand and Water Conservation Estimates of the 2006 Region L Water Plan



# Projected Municipal Per Capita Water Use



# **Estimated Costs of Municipal Water Conservation in Region L**

		2010	2020	2030	2040	2050	2060
<b>Water Conservation Water Management Strategies</b>							
Low Flow Plumbing Fixtures and Clothes Washers	acft	12,013	13,734	15,231	14,961	15,083	19,163
Lawn Watering	acft	1,218	9,008	16,386	25,567	38,842	53,407
<b>Total</b>		<b>13,231</b>	<b>22,742</b>	<b>31,616</b>	<b>40,528</b>	<b>53,925</b>	<b>72,570</b>
<b>Water Conservation Water Management Strategies</b>							
Low Flow Plumbing Fixtures and Clothes Washers	\$/yr	6,054,278	6,859,314	7,546,424	7,444,681	7,694,605	9,976,317
Lawn Watering	\$/yr	487,240	3,603,020	6,554,251	10,226,875	15,536,793	21,362,786
<b>Total</b>	\$/yr	<b>6,541,518</b>	<b>10,462,334</b>	<b>14,100,675</b>	<b>17,671,556</b>	<b>23,231,398</b>	<b>31,339,103</b>
<b>Costs Per Acre Foot</b>							
Low Flow Plumbing Fixtures and Clothes Washers	\$/acft	504	499	495	498	510	521
Lawn Watering	\$/acft	400	400	400	400	400	400
<b>Total</b>	\$/acft	<b>494</b>	<b>460</b>	<b>446</b>	<b>436</b>	<b>431</b>	<b>432</b>

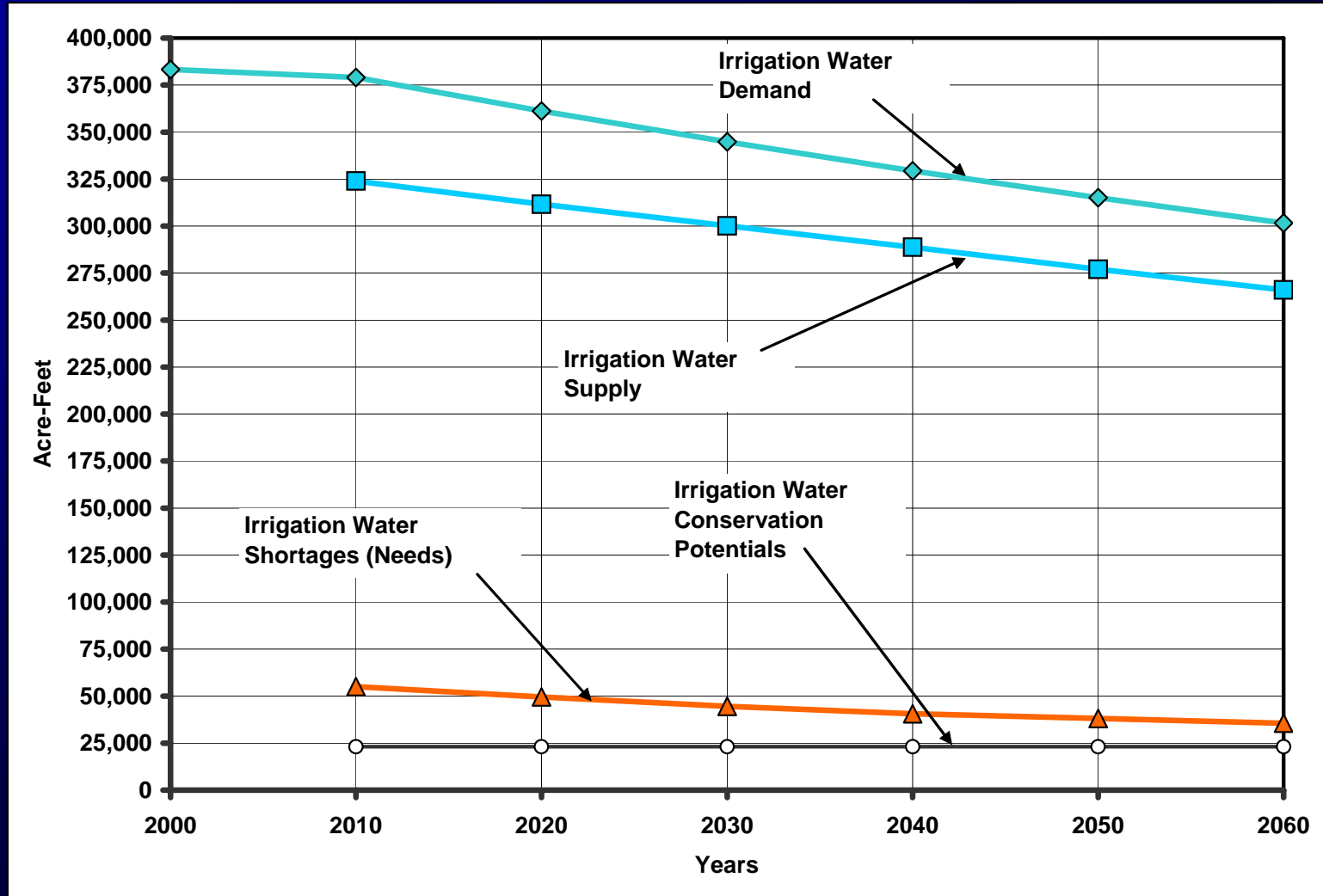
# **Region L: Irrigation Water Demands, Supplies, Shortages, and Conservation**

Topic		2000	2010	2020	2030	2040	2050	2060
Irrigation Water Demand	acft	383,332	379,026	361,187	344,777	329,395	315,143	301,679
Irrigation Water Supply	acft	383,332	323,917	311,639	300,175	288,763	277,056	266,044
Irrigation Water Shortages (Needs)	acft	0	55,109	49,548	44,602	40,632	38,087	35,635
Irrigation Water Conservation Potentials	acft		23,074	23,074	23,074	23,074	23,074	23,074
Irrigation Water Conservation Costs *	\$/yr		2,559,868	2,559,868	2,559,868	2,559,868	2,559,868	2,559,868
Irrigation Water Conservation Costs	\$/acft		113	113	113	113	113	113

\* Total Capital Costs are \$35,810,854



# Region L: Irrigation Water Demands, Supplies, Shortages, and Conservation



## ***Industrial, Steam-Electric Power and Mining Water Conservation***

- ❑ In industry, steam-electric power generation, and mining activities water is used for several different purposes, including as an integral part of manufactured products, cleaning and waste removal, waste heat removal, dust control, and landscaping.
- ❑ The projected need (shortage) of water for manufacturing, steam-electric power generation and mining is 8,493 acft/yr in 2010 and is projected to increase to 70,465 acft/yr in 2060;
- ❑ BMPs, such as air cooling in electric power generation, collection of runoff at mining sites, and treatment and reuse of municipal and industrial wastewater can perhaps meet a part of the projected needs for these industries;
- ❑ Data are not available with which to compute estimates of quantities and costs of these measures.

## ***Additional Water Conservation Water Management Strategies of 2006 Regional Water Plan***

- The following water conservation practices are in use within Region L and, in the 2006 plan, are recommended to be expanded as quantities of municipal wastewater increase with population growth:
  - Recycle water use for non-potable purposes to meet 20 percent of SAWS projected municipal and industrial water demands, including additional quantities of 18,700 acft/yr in 2010 and 36,250 acft/yr in 2060 at estimated cost of \$434 per acft/yr;
  - Recycle water use for non-potable purposes to meet part of demands in Comal, Guadalupe, and Hays Counties;
  - Rainwater Harvesting for domestic (County Other) uses, especially by households located in Kendall, Comal, and Hays Counties of Region L;

# ***Water Conservation Water Management Strategies of 2006 Plan Needing Further Study***

- The following water conservation water management strategies need further research to determine location and optimum scale, quantity of supply available during drought, cost of implementation, and environmental effects:
  - **Brush Management and Land Stewardship;**
  - **Small Aquifer Recharge Dams;**
  - **Drought Management;**
  - **Recycle Water for Non-Potable Uses:**
    - **Irrigation of Golf Courses, Parks, and Open Spaces of cities,**
    - **Landscape Irrigation of Office and Business Complexes,**
    - **Cooling of Office and Business Complexes,**
    - **Steam-Electric Power Plant Cooling,**
    - **Process and Wash Water for Mining Operations,**
    - **Irrigation of Farms that Produce Livestock Feed and Forage Crops,**
    - **Irrigation of Farms that Produce Sod, Ornamentals and Landscape Plants, and**
    - **Instream Uses for Riverwalks and Urban and Rural Waterways.**

# ***Water Conservation and Drought Management Evaluations for Region L 2011 Regional Water Plan (In Progress)***

- Review and refinement of recommendations of 2006 Regional plan:**
  - Condensate collection and use,**
  - Rainwater harvesting,**
  - Drought Management, and**
  - Land Stewardship.**
  
- Assessment of overlapping elements of water conservation and potential drought management practices focusing on lawn watering.**

# ***Quantification and Evaluation of Drought Management as a Water Management Strategy for Region L 2011 Regional Water Plan (In Progress)***

- ❑ Excerpt information from 2006 Plan regarding drought management and drought contingency planning.
- ❑ From drought contingency plans of representative municipal WUGs in each county determine quantities of water expected to be saved from implementation of stages of such plans.
- ❑ Obtain and plot historical (10 or more years) water use data for representative municipal WUGs and compare to projected drought of record water use in order to quantify difference between actual use during “normal” and “drought” weather conditions.
- ❑ From results of comparison mentioned above, calculate quantities of water needed during drought conditions, shift projected municipal demand curve downward to eliminate quantity of water “saved” by implementation of “Drought Water Management Strategy,” and adjust other water management strategies accordingly.
- ❑ Describe and express effects of potential Drought Management Strategy upon water management strategies for representative WUGs of Region L in terms of quantities of water needed, time of need, cost of strategies eliminated and/or delayed, and environmental effects.

***To  
Be  
Continued...***