South Central Texas Regional Water Planning Area

Regional Water Plan

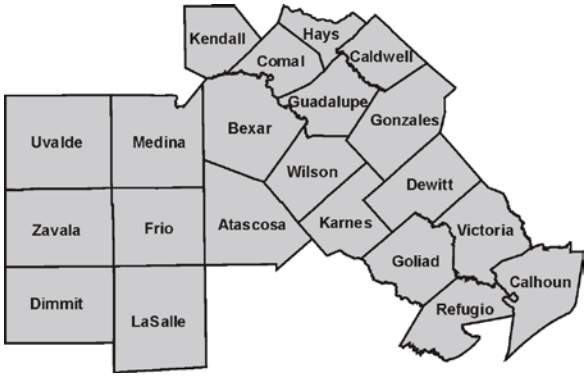
Volume II — Technical Evaluations of Alternative Regional Water Plans

Prepared by:

South Central Texas Regional Water Planning Group

With administration by:

San Antonio River Authority



With technical assistance by:

HDR Engineering, Inc.
Moorhouse Associates, Inc.
Open Forum

In association with:

Paul Price Associates, Inc.
LBG-Guyton Associates
R.J. Brandes Company
The Wellspec Company

January 2001

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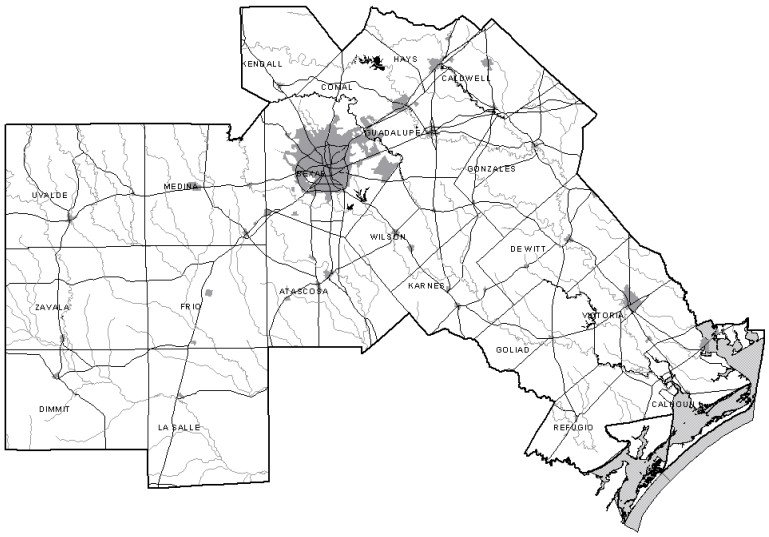
Prepared for

San Antonio River Authority

for

South Central Texas Regional Water Planning Group



Prepared by

HDR Engineering, Inc.

June 13, 2000

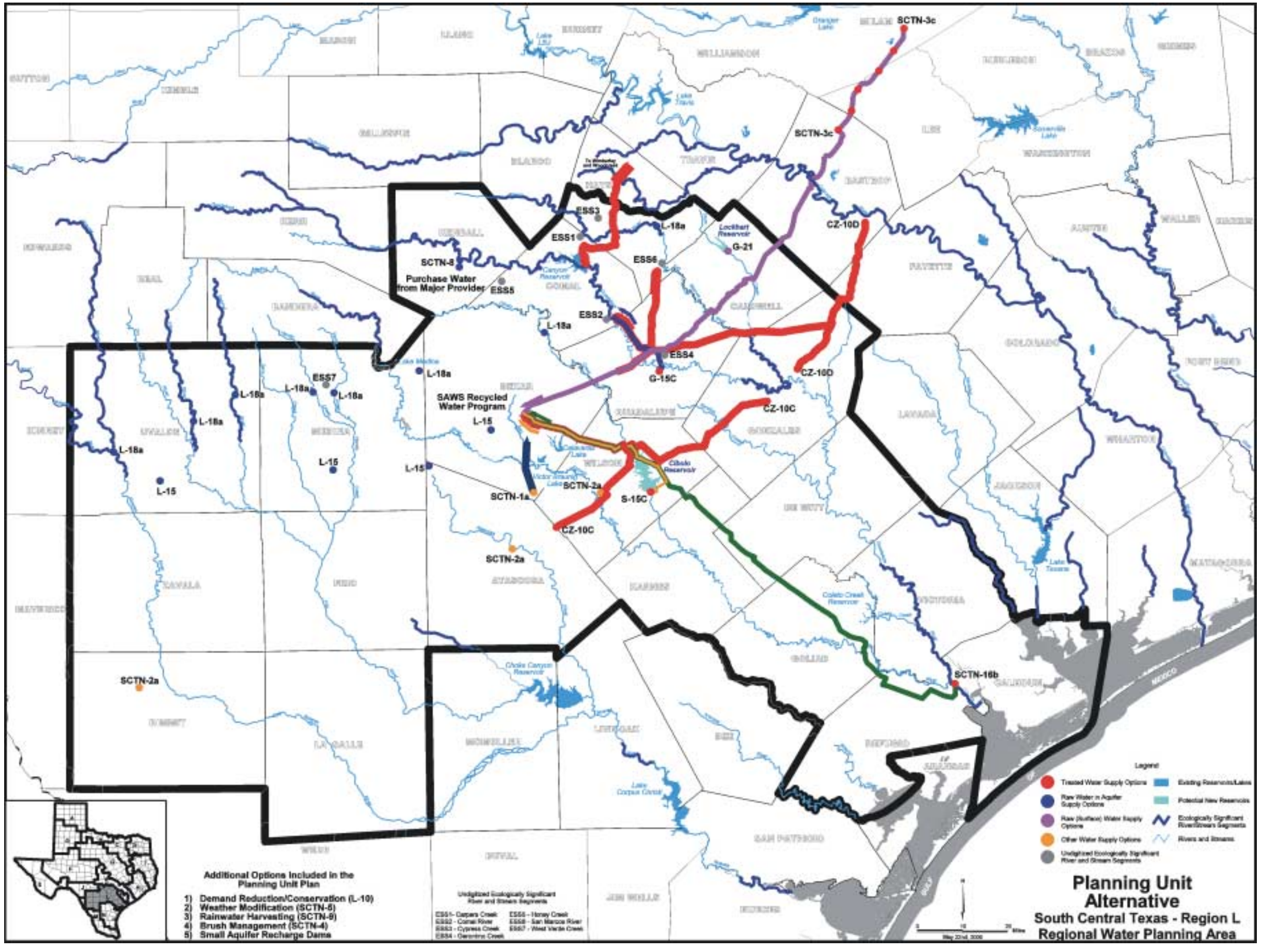
"Planning Unit" Regional Water Management Alternative Plan

South Central Texas Regional Water Planning Group

San Antonio River Authority

HDR Engineering, Inc.

June 13, 2000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SCTN-3c
ESS3
ESS1
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Lake Texana
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2) Weather Modification (SCTN-6)
3) Rainwater Harvesting (SCTN-9)
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Undigitized Ecologically Significant River and Stream Segments
ESS1- Calpers Creek
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Undigitized Ecologically Significant River and Stream Segments
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Potential New Reservoirs
Ecologically Significant River/Stream Segments
Rivers and Streams
Planning Unit Alternative
South Central Texas - Region L
Regional Water Planning Area
May 22nd, 2006

South Central Texas Region Alternative Water Plans

Alternative Name: **Planning Unit Regional Water Management Alternative Plan**

Alternative ID: **PU Approach (PUA)**

Alternative Description: *The Planning Unit Approach (PUA) includes water management strategies (options) that have been identified by water supply entities as acceptable to meet projected water needs. Major water providers and water supply entities providing documented input into this alternative regional plan included the San Antonio Water System (SAWS), the Bexar Metropolitan Water District (BMWD), the Edwards Aquifer Authority (EAA), the Guadalupe-Blanco River Authority (GBRA), and Canyon Regional Water Authority (CRWA). Also, water plan information provided to the SCTRWPG by other water suppliers of the South Central Texas Water Planning Region was included, as appropriate. From the lists of options/strategies provided by the entities mentioned above, options/strategies were selected for inclusion in this alternative regional plan that would meet the projected needs in a timely manner, and without duplication of options/strategies suggested by others. The PUA options/strategies are organized by county. In cases of projected need where no local entity has identified water management strategies, the nearest available option/strategy of the South Central Texas Regional Water Planning Group (SCTRWPG) were selected for inclusion in the Planning Unit Plan. The following water supply options/strategies are included in the Planning Unit Plan (in no particular order):*

1. *Demand Reduction / Conservation (L-10)*
2. *Edwards Irrigation Transfers (L-15)*
3. *Regional Aquifer Storage & Recovery (SCTN-1a)*
4. *Edwards Recharge – Type 2 Projects (L-18a)*
5. *Simsboro Aquifer (SCTN-3c)*
6. *Carrizo Aquifer – Wilson and Gonzales Counties (CZ-10C)*
7. *Carrizo Aquifer – Gonzales and Bastrop Counties (CZ-10D)*
8. *Carrizo Aquifer – Bexar County (BMWD)*
9. *Lower Guadalupe River Diversions (SCTN-16b)*
10. *Cibolo Reservoir (S-15C)*
11. *Carrizo Aquifer – Local Supply (SCTN-2a)*
12. *Trinity Aquifer – Bexar County (BMWD)*
13. *Canyon Reservoir (G-15C)*
14. *SAWS Recycled Water Program*
15. *Wimberley and Woodcreek - Canyon (G-24)*
16. *Lockhart Reservoir (G-21)*
17. *Trinity Aquifer Optimization (SCTN-8)*
18. *Rainwater Harvesting (SCTN-9)*
19. *Weather Modification (SCTN-5)*
20. *Brush Management (SCTN-4)*

Planning Unit Alternative Regional Water Plan
Summary of Key Information for
South Central Texas Regional Water Planning Group

Quantity, Reliability, and Cost

- Plan includes management supplies to meet projected needs, ensure reliability, and maintain springflow, resulting in a quantity of additional water supplies sufficient to meet projected needs for municipal, industrial, steam-electric power, and mining uses through the year 2050.
- Cost is greater than the average for the five alternative plans under consideration.

Environmental Factors

- Increased median annual streamflows in the San Antonio River.
- Most concerns with Endangered & Threatened Species, Vegetation & Wildlife Habitat, and Water Quality & Aquatic Habitat among the five alternative plans under consideration.

Impacts on Water Resources

- No unmitigated reductions in water available to existing water rights.
- Long-term reductions in water levels in the Carrizo Aquifer. Drawdown would be greater than the average for the five alternative plans under consideration.

Impacts on Agriculture and Natural Resources

- Major commitment to municipal and irrigation water Demand Reduction (Conservation) (L-10).
- Includes Brush Management (SCTN-4) and Weather Modification (SCTN-5).
- Inclusion of water supply options to meet projected irrigation needs in full is estimated to be economically infeasible at this time. Weather Modification (SCTN-5) assists irrigation and dry-land agriculture (crops and ranching).
- Includes maximum potential voluntary transfer of Edwards Aquifer irrigation permits to municipal permits through lease or purchase.

Other Relevant Factors per SCTRWPG

Comparison of Strategies to Meet Needs

- Selection of water supply options comprising the alternative plan based on preferences expressed by planning units or on closest available supply.

Interbasin Transfer Issues

- Projected non-irrigation needs in basin(s) of origin are met throughout the planning period.
- Plan includes only one potential interbasin transfer from the Saltwater Barrier at the confluence of the Guadalupe and San Antonio Rivers (SCTN-16b) to Bexar County.

Third-Party Impacts of Voluntary Redistribution of Water

- Potential positive or negative effects of Edwards Irrigation Transfers (L-15).
- Lower water levels in some portions of the Carrizo Aquifer.

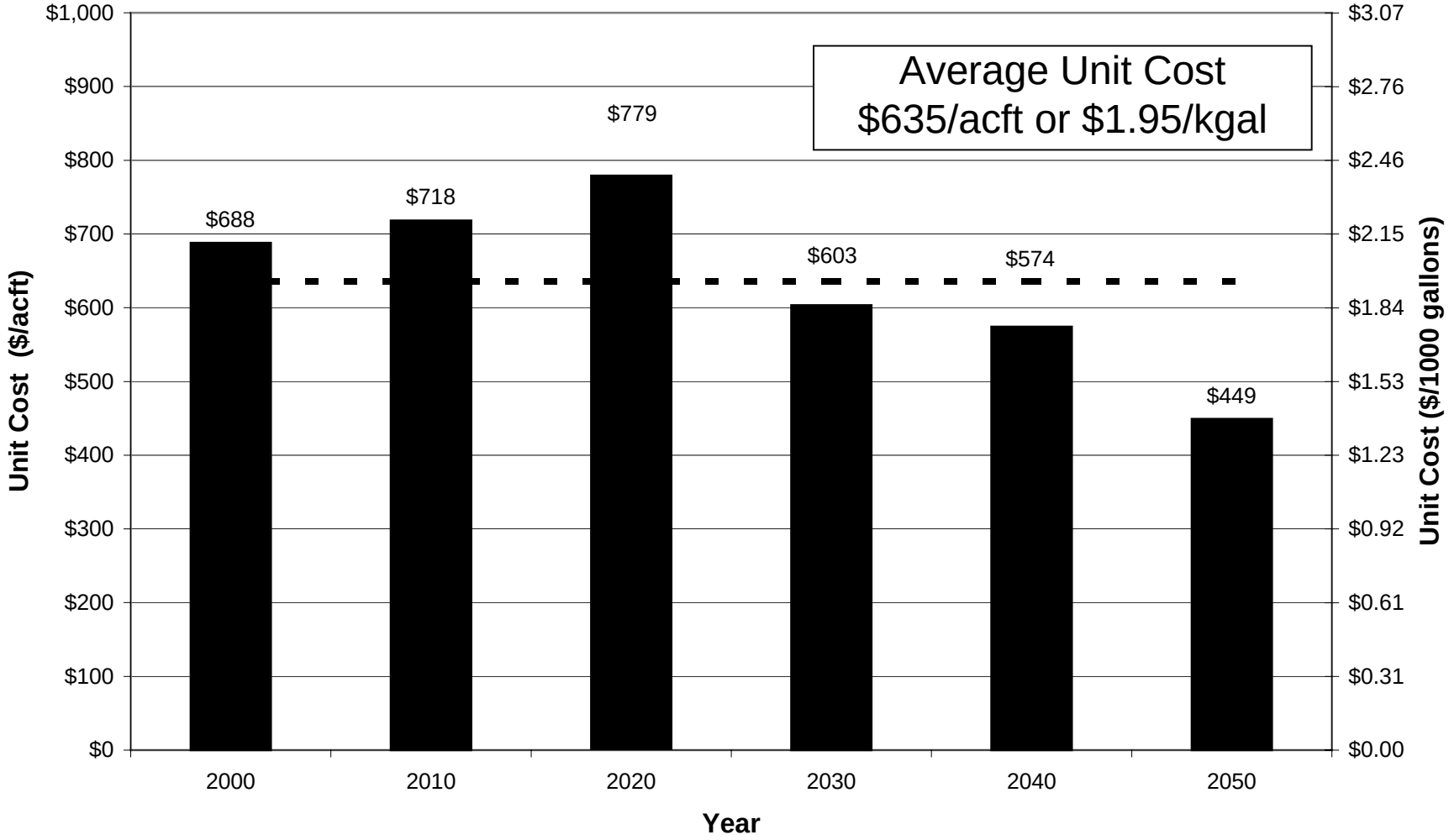
Regional Efficiency

- Edwards Irrigation Transfers (L-15) require no new facilities. Transferred water would likely be available at or very near locations having projected municipal, industrial, steam-electric power, and mining needs in Uvalde, Medina, Atascosa, and Bexar Counties.
- Terminal storage and regional water treatment facilities in Bexar County increase efficiency, improve reliability, and reduce unit cost.
- San Antonio Water System Regional Aquifer Storage & Recovery System (SCTN-1a) substantially reduces peak summer pumpage from the Edwards Aquifer.
- Consider reduced storage capacity for Cibolo Reservoir or include diversions from the San Antonio River to increase supply and moderate unit cost.

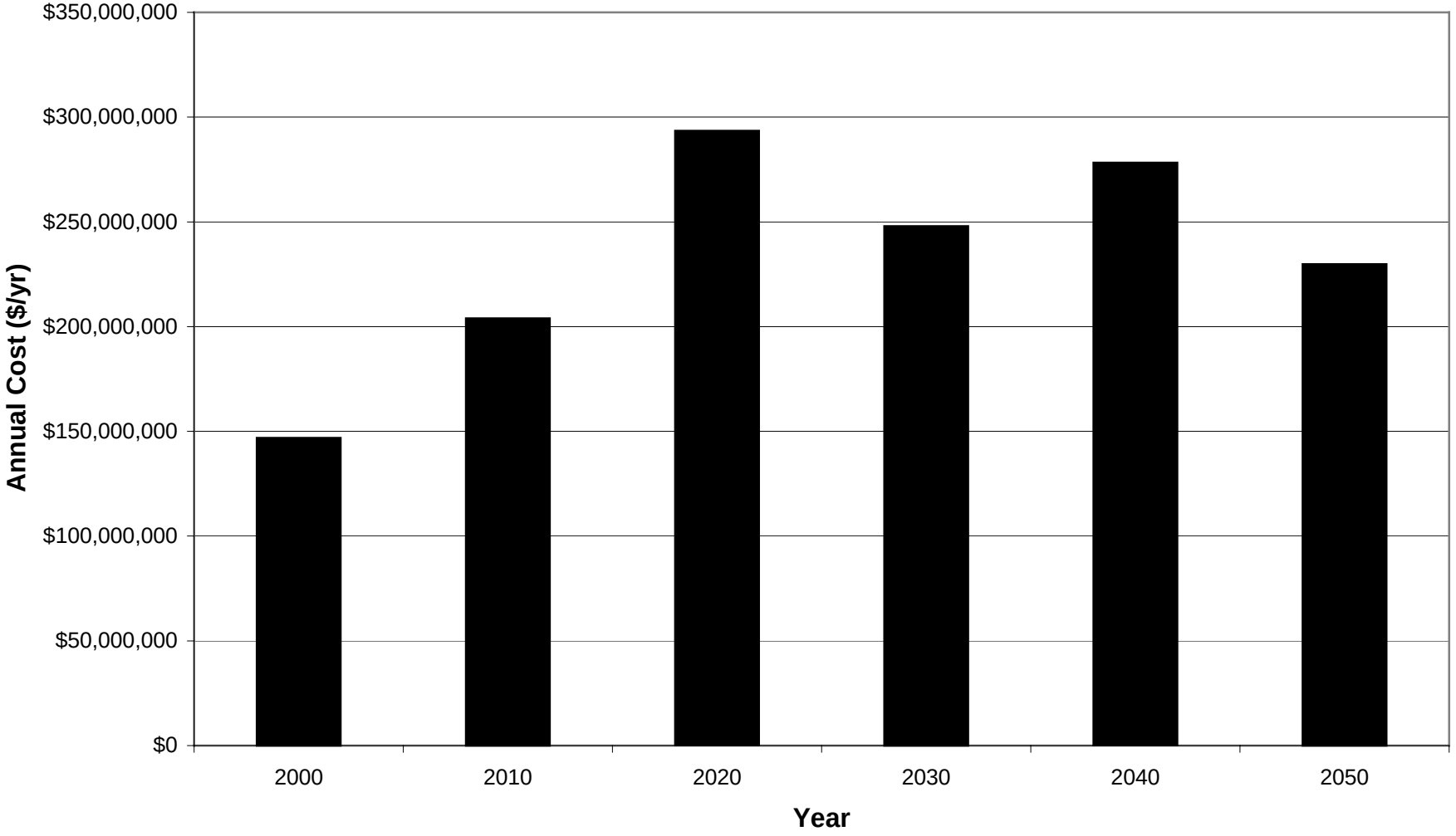
Effect on Navigation

- Not applicable.

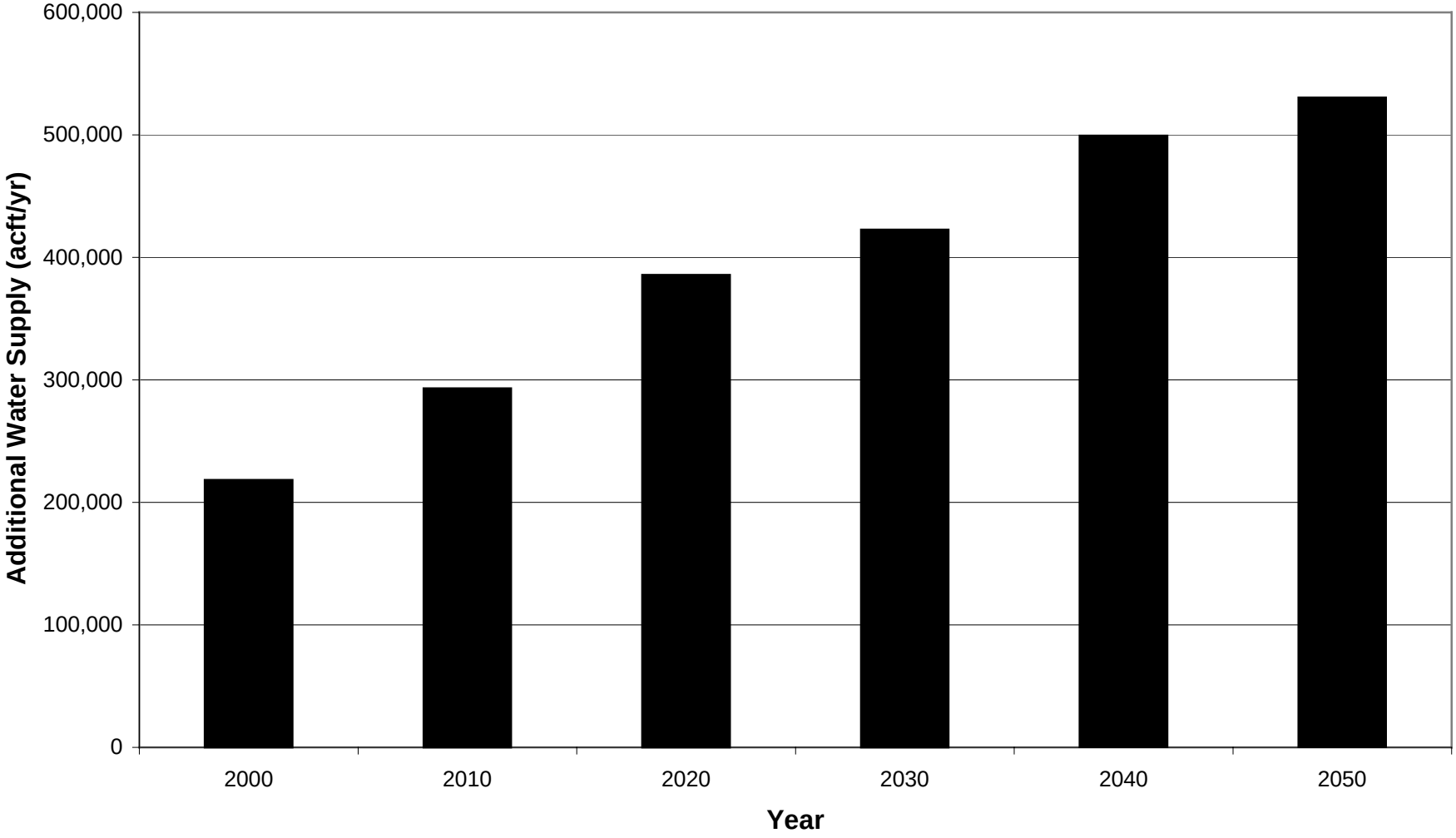
Planning Unit Alternative Regional Water Plan
Unit Cost of Cumulative Additional Water Supply

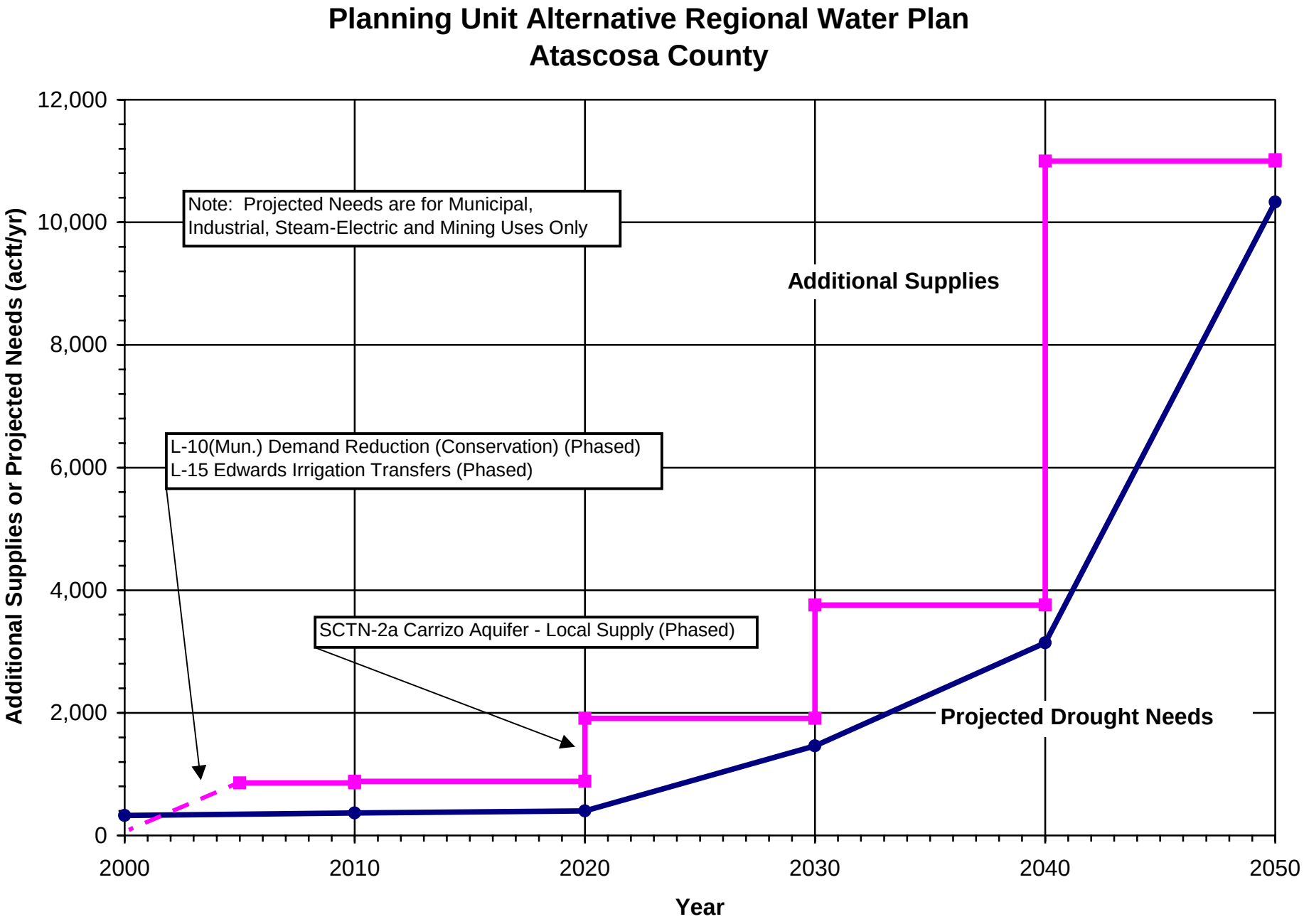


Planning Unit Alternative Regional Water Plan
Annual Cost of Cumulative Additional Water Supply



Planning Unit Alternative Regional Water Plan
Cumulative Additional Water Supply

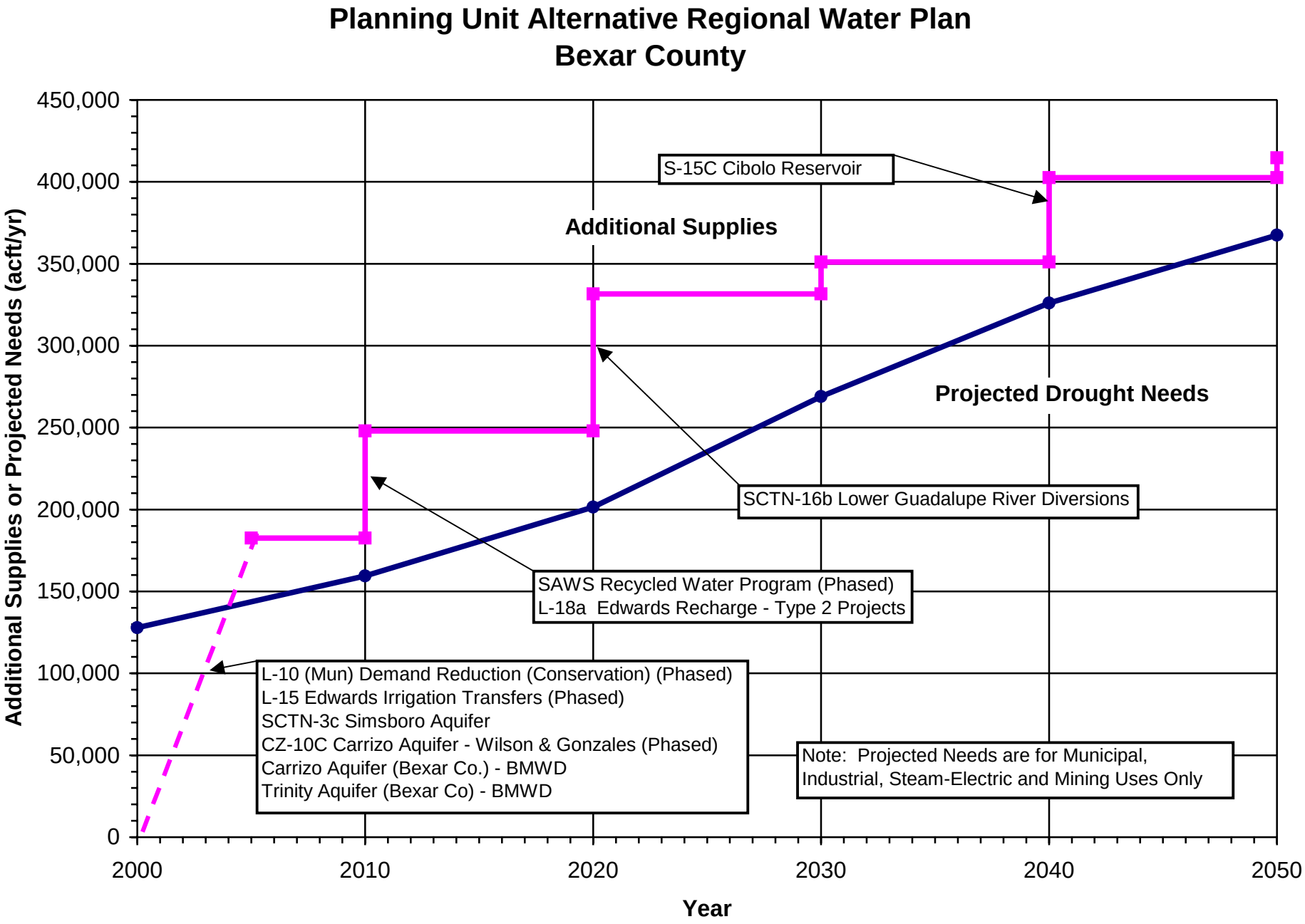



Planning Unit Alternative Regional Water Plan
Atascosa County
Additional Supplies or Projected Needs (acft/yr)
12,000
10,000
8,000
6,000
4,000
2,000
0
2000
2010
2020
2030
2040
2050
Year
Note: Projected Needs are for Municipal, Industrial, Steam-Electric and Mining Uses Only
L-10(Mun.) Demand Reduction (Conservation) (Phased)
L-15 Edwards Irrigation Transfers (Phased)
SCTN-2a Carrizo Aquifer - Local Supply (Phased)
Additional Supplies
Projected Drought Needs

Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Atascosa	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	325	366	401	468	530	587	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	1,504	8,504	
	Mining	0	0	0	995	1,109	1,239	
	Irrigation	38,418	36,718	35,170	43,726	42,190	40,713	
	Total Needs	**38,743**	**37,084**	**35,571**	**45,189**	**45,333**	**51,043**	
	Mun, Ind, S-E, & Min Needs	**325**	**366**	**401**	**1,463**	**3,143**	**10,330**	
	Irrigation Needs	**38,418**	**36,718**	**35,170**	**43,726**	**42,190**	**40,713**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		356	384	411	259	300	319	1
L-15	Edwards Irrigation Transfers	81,000	500	500	500	500	700	700	2, 3, 4
SCTN-2a	Carrizo Aquifer - Local Supply					1,000	3,000	10,000	5, 6
SCTN-4	Brush Management								7
SCTN-5	Weather Modification								7
SCTN-9	Rainwater Harvesting								7
	Small Aquifer Recharge Dams								7
L-10 (Irr.)	Demand Reduction (Conservation)		3,692	3,692	3,692	3,692	3,692	3,692	8
	Total New Supplies		**4,548**	**4,576**	**4,603**	**5,451**	**7,692**	**14,711**	
	Total System Mgmt. Supply / Deficit		**-34,195**	**-32,508**	**-30,968**	**-39,738**	**-37,641**	**-36,332**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**531**	**518**	**510**	**296**	**857**	**689**	
	Irrigation System Mgmt. Supply / Deficit		**-34,726**	**-33,026**	**-31,478**	**-40,034**	**-38,498**	**-37,021**	

Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Additional Edwards supply is for City of Lytle.
5	Additional Carrizo supply is for Steam-Electric and Mining use.
6	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
7	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
8	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation
	application rate.

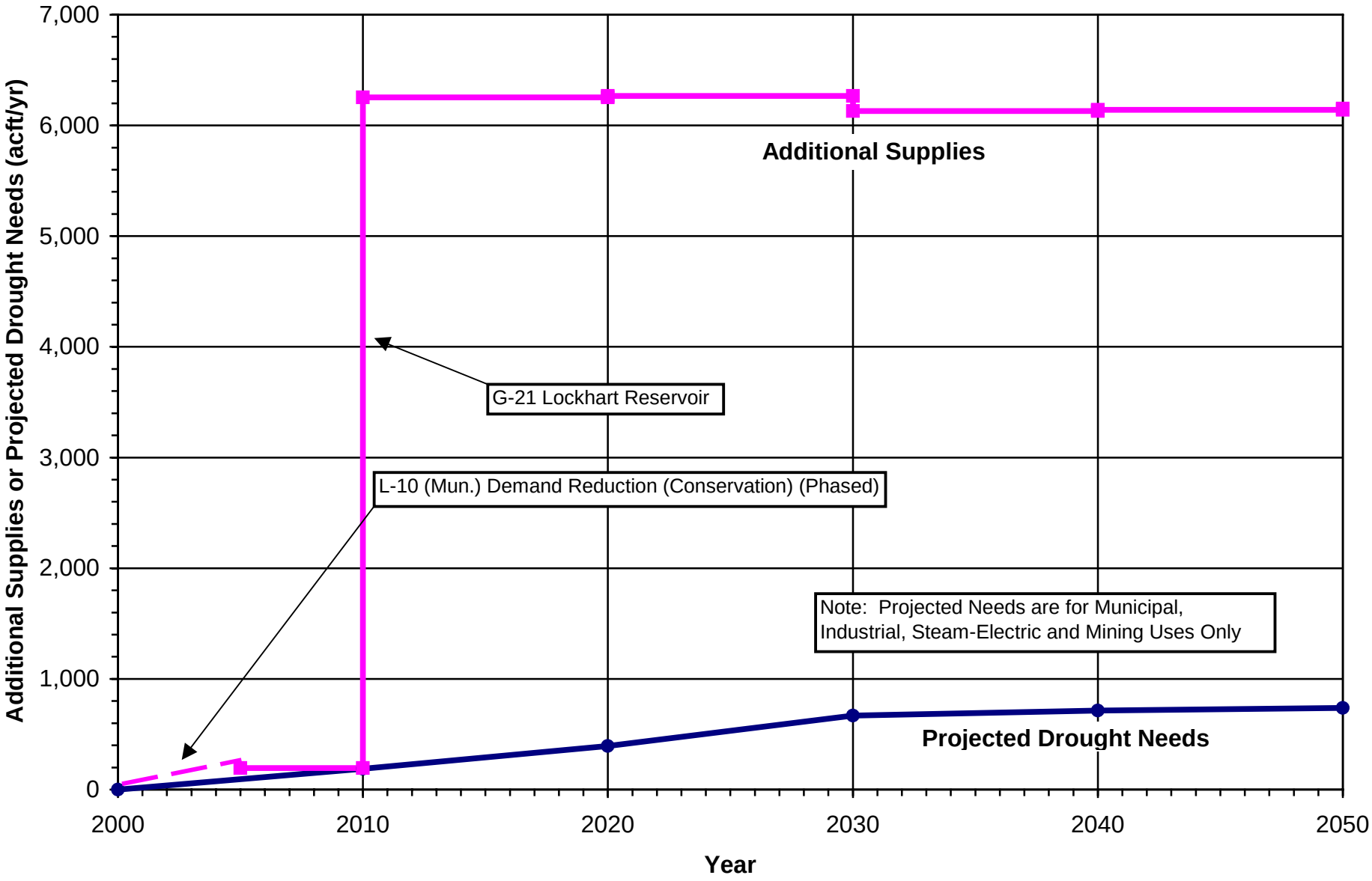

Planning Unit Alternative Regional Water Plan
Bexar County
Additional Supplies or Projected Needs (acft/yr)
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
2000
2010
2020
2030
2040
2050
Year
S-15C Cibolo Reservoir
Additional Supplies
Projected Drought Needs
SCTN-16b Lower Guadalupe River Diversions
SAWS Recycled Water Program (Phased)
L-18a Edwards Recharge - Type 2 Projects
L-10 (Mun) Demand Reduction (Conservation) (Phased)
L-15 Edwards Irrigation Transfers (Phased)
SCTN-3c Simsboro Aquifer
CZ-10C Carrizo Aquifer - Wilson & Gonzales (Phased)
Carrizo Aquifer (Bexar Co.) - BMWD
Trinity Aquifer (Bexar Co) - BMWD
Note: Projected Needs are for Municipal,
Industrial, Steam-Electric and Mining Uses Only

Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Bexar	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		122,867	154,495	196,301	262,070	315,633	353,309	
Industrial		0	0	0	1,430	4,759	8,192	
Steam-Electric		0	0	0	0	0	0	
Mining		4,963	4,936	5,201	5,406	5,645	5,962	
Irrigation		22,575	20,374	19,585	19,015	18,385	17,368	
Total Needs		**150,405**	**179,805**	**221,087**	**287,921**	**344,422**	**384,831**	
Mun, Ind, S-E, & Min Needs		**127,830**	**159,431**	**201,502**	**268,906**	**326,037**	**367,463**	
Irrigation Needs		**22,575**	**20,374**	**19,585**	**19,015**	**18,385**	**17,368**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		33,528	42,509	41,210	36,533	38,834	40,934	1
L-15 Edwards Irrigation Transfers	81,000	50,000	55,000	60,000	65,000	70,000	71,300	2, 3
SCTN-3c Simsboro Aquifer	55,000	55,000	55,000	55,000	55,000	55,000	55,000	4
CZ-10C Carrizo Aquifer - Wilson & Gonzales	75,000	40,000	50,000	60,000	70,000	75,000	75,000	4, 5
Carrizo Aquifer (Bexar Co.) - BMWD	3,000	3,000	3,000	3,000	3,000	3,000	3,000	6
Trinity Aquifer (Bexar Co) - BMWD	1,000	1,000	1,000	1,000	1,000	1,000	1,000	6
SAWS Recycled Water Program			19,826	26,737	35,824	43,561	52,215	7, 8
L-18a Edwards Recharge - Type 2 Projects	21,577		21,577	21,577	21,577	21,577	21,577	
SCTN-16b Lower Guadalupe River Diversions	63,177			63,177	63,177	63,177	63,177	
S-15C Cibolo Reservoir	31,500					31,500	31,500	
SCTN-1a Aquifer Storage & Recovery - Regional								9
SCTN-4 Brush Management								10
SCTN-5 Weather Modification								10
SCTN-9 Rainwater Harvesting								10
Small Aquifer Recharge Dams								10
L-10 (Irr.) Demand Reduction (Conservation)		4,521	4,521	4,521	4,521	4,521	4,521	11
Total New Supplies		**187,049**	**252,433**	**336,222**	**355,632**	**407,170**	**419,224**	
Total System Mgmt. Supply / Deficit		**36,644**	**72,628**	**115,135**	**67,711**	**62,748**	**34,393**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**54,698**	**88,481**	**130,199**	**82,205**	**76,612**	**47,240**	
Irrigation System Mgmt. Supply / Deficit		**-18,054**	**-15,853**	**-15,064**	**-14,494**	**-13,864**	**-12,847**	

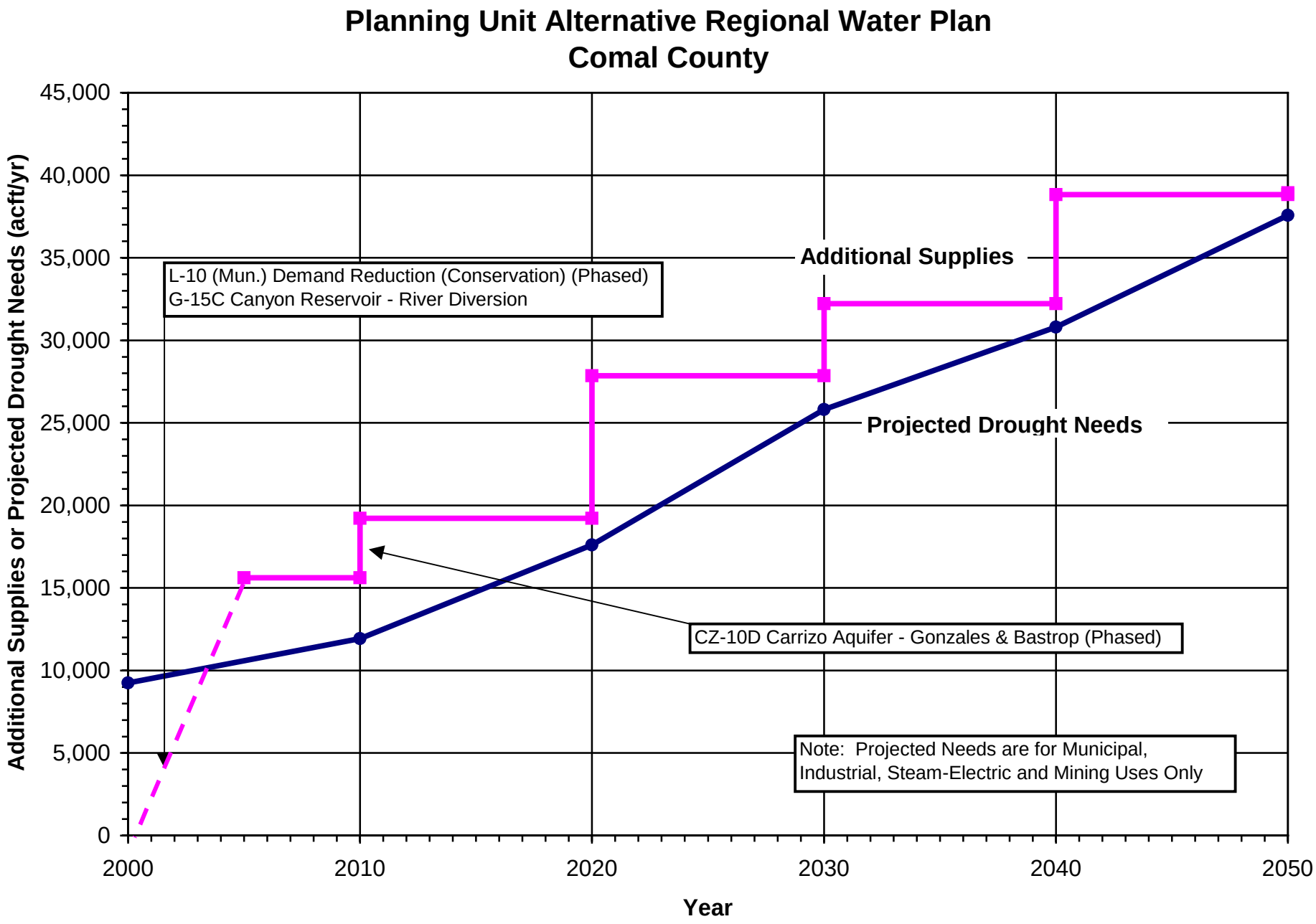
Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Effects on regional aquifer levels to be quantified.
5	Includes non-interruptible supplies identified by BMWD in Water Supply Program of 1/31/2000.
6	Non-interruptible supplies identified by BMWD in Water Supply Program of 1/31/2000.
7	Current SAWS Recycled Water Program is included in the 24,941 acft/yr (consumptive reuse) in estimated needs.
8	Future use of recycled water for non-potable uses and based on goal of meeting 20 percent of SAWS projected water demand.
9	SAWS ASR program in southern Bexar County increases reliability of Edwards Aquifer supply and reduces seasonal aquifer demands.
10	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
11	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.

Planning Unit Alternative Regional Water Plan
Caldwell County



Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =		Caldwell	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =		all	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		0	188	393	668	714	737	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		0	0	0	0	0	0	
	Total Needs		**0**	**188**	**393**	**668**	**714**	**737**	
	Mun, Ind, S-E, & Min Needs		**0**	**188**	**393**	**668**	**714**	**737**	
	Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		195	206	218	82	93	104	1
G-21	Lockhart Reservoir			6,048	6,048	6,048	6,048	6,048	2
	Small Aquifer Recharge Dams								3
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**195**	**6,254**	**6,266**	**6,130**	**6,141**	**6,152**	
	Total System Mgmt. Supply / Deficit		**195**	**6,066**	**5,873**	**5,462**	**5,427**	**5,415**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**195**	**6,066**	**5,873**	**5,462**	**5,427**	**5,415**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Water supply for City of Lockhart and/or other users downstream.								
3	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

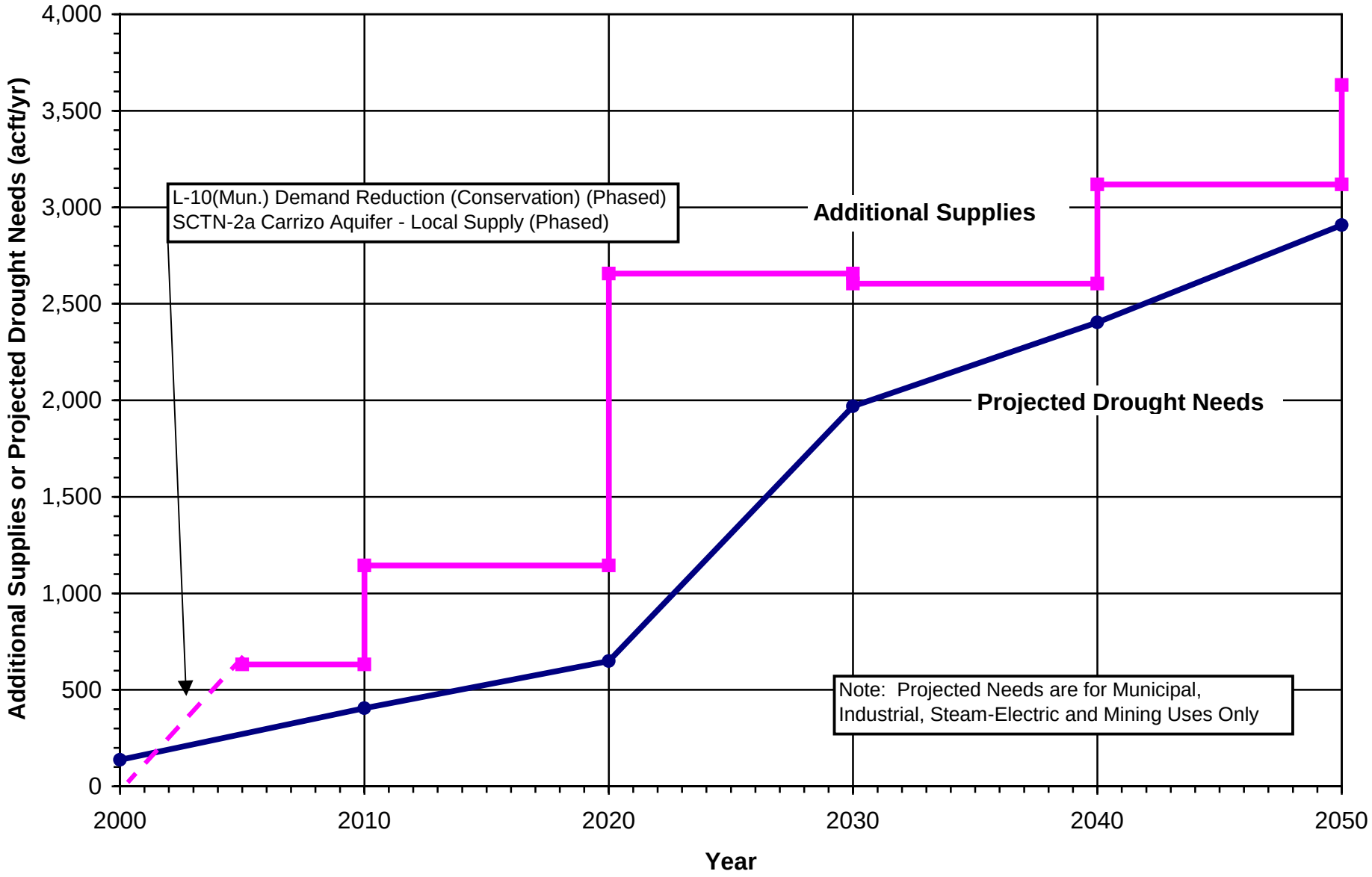

Planning Unit Alternative Regional Water Plan
Comal County
Additional Supplies or Projected Drought Needs (acft/yr)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
Projected Drought Needs
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
G-15C Canyon Reservoir - River Diversion
CZ-10D Carrizo Aquifer - Gonzales & Bastrop (Phased)
Note: Projected Needs are for Municipal,
Industrial, Steam-Electric and Mining Uses Only

Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Comal	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	2,289	5,049	10,487	18,282	25,205	33,062	
	Industrial	1,388	1,425	1,486	1,737	2,009	2,289	
	Steam-Electric	0	0	0	0	0	0	
	Mining	5,570	5,464	5,628	5,796	3,590	2,224	
	Irrigation	30	14	0	0	0	0	
	Total Needs	**9,277**	**11,952**	**17,601**	**25,815**	**30,804**	**37,575**	
	Mun, Ind, S-E, & Min Needs	**9,247**	**11,938**	**17,601**	**25,815**	**30,804**	**37,575**	
	Irrigation Needs	**30**	**14**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		616	718	848	718	824	942	1
G-15C	Canyon Reservoir - River Diversion	15,000	15,000	15,000	15,000	15,000	15,000	15,000	2
CZ-10D	Carrizo Aquifer - Gonzales & Bastrop	90,000			3,500	12,000	16,500	23,000	3, 4, 5
	Small Aquifer Recharge Dams								6
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**15,616**	**15,718**	**19,348**	**27,718**	**32,324**	**38,942**	
	Total System Mgmt. Supply / Deficit		**6,339**	**3,766**	**1,747**	**1,903**	**1,520**	**1,367**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**6,369**	**3,780**	**1,747**	**1,903**	**1,520**	**1,367**	
	Irrigation System Mgmt. Supply / Deficit		**-30**	**-14**	**0**	**0**	**0**	**0**	

Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Portion of Canyon firm yield (with amendment) diverted below Seguin.
3	Candidate New Supply to be shared among Comal, Guadalupe, and Hays Counties. Effects on regional aquifer levels to be quantified.
4	Portion of 90,000 acft/yr available from northern Gonzales and southern Bastrop Counties under CZ-10D.
5	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
6	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.

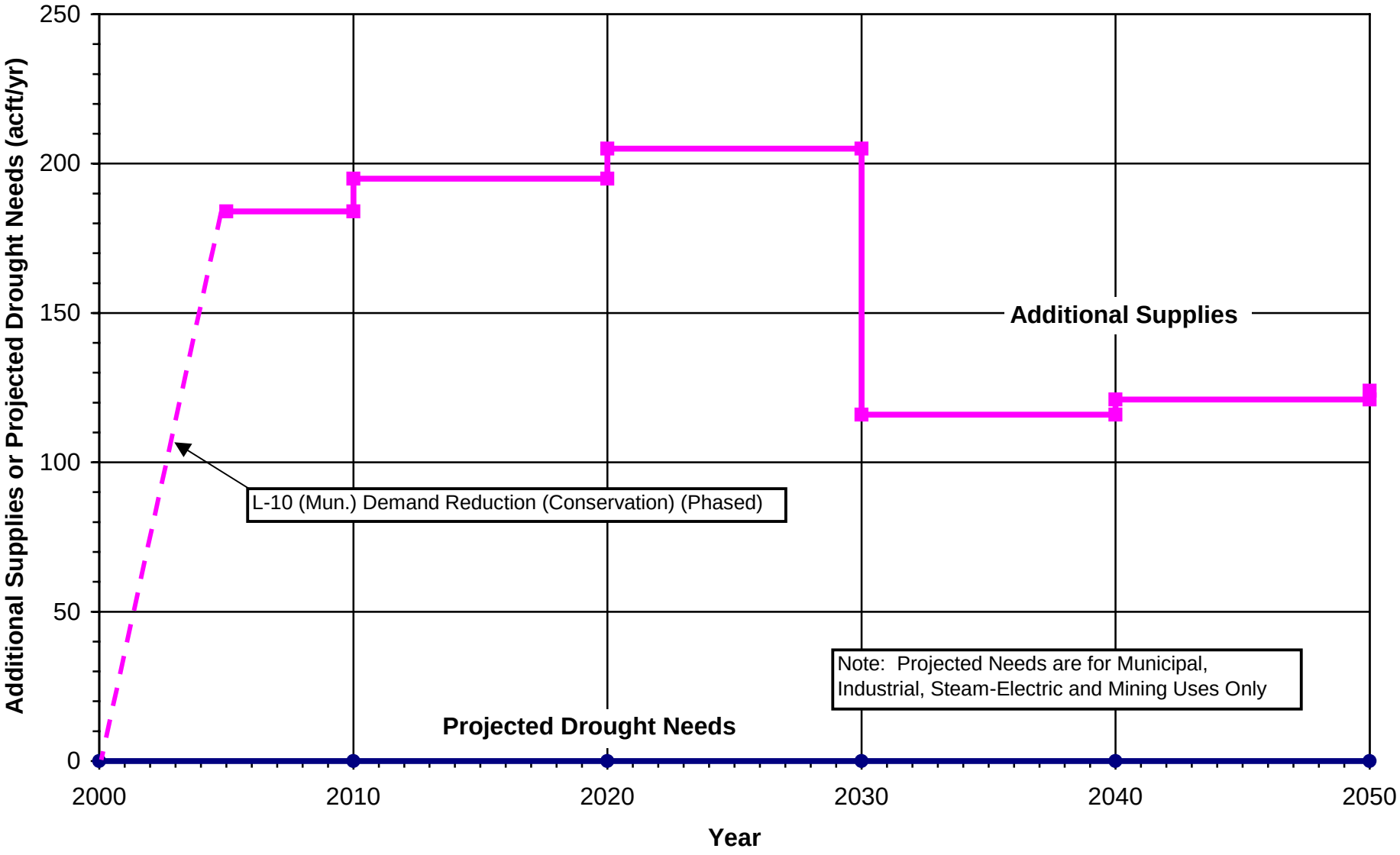
Planning Unit Alternative Regional Water Plan
Dimmit County



Planning Unit Regional Water Management Alternative Plan

South Central Texas Region							County =	Dimmit	
County Summary of Projected Water Needs and Water Supply Options							User Group(s) =	all	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		138	405	649	1,054	1,479	1,959	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	915	925	949	
	Irrigation		0	0	0	2,133	1,737	1,331	
	Total Needs		**138**	**405**	**649**	**4,102**	**4,141**	**4,239**	
	Mun, Ind, S-E, & Min Needs		**138**	**405**	**649**	**1,969**	**2,404**	**2,908**	
	Irrigation Needs		**0**	**0**	**0**	**2,133**	**1,737**	**1,331**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		131	144	156	104	118	133	1
SCTN-2a	Carrizo Aquifer - Local Supply		500	1,000	1,000	2,500	3,000	3,500	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**631**	**1,144**	**1,156**	**2,604**	**3,118**	**3,633**	
	Total System Mgmt. Supply / Deficit		**493**	**739**	**507**	**-1,498**	**-1,023**	**-606**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**493**	**739**	**507**	**635**	**714**	**725**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**-2,133**	**-1,737**	**-1,331**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Carrizo Springs and Mining supply.								
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

Planning Unit Alternative Regional Water Plan
Frio County

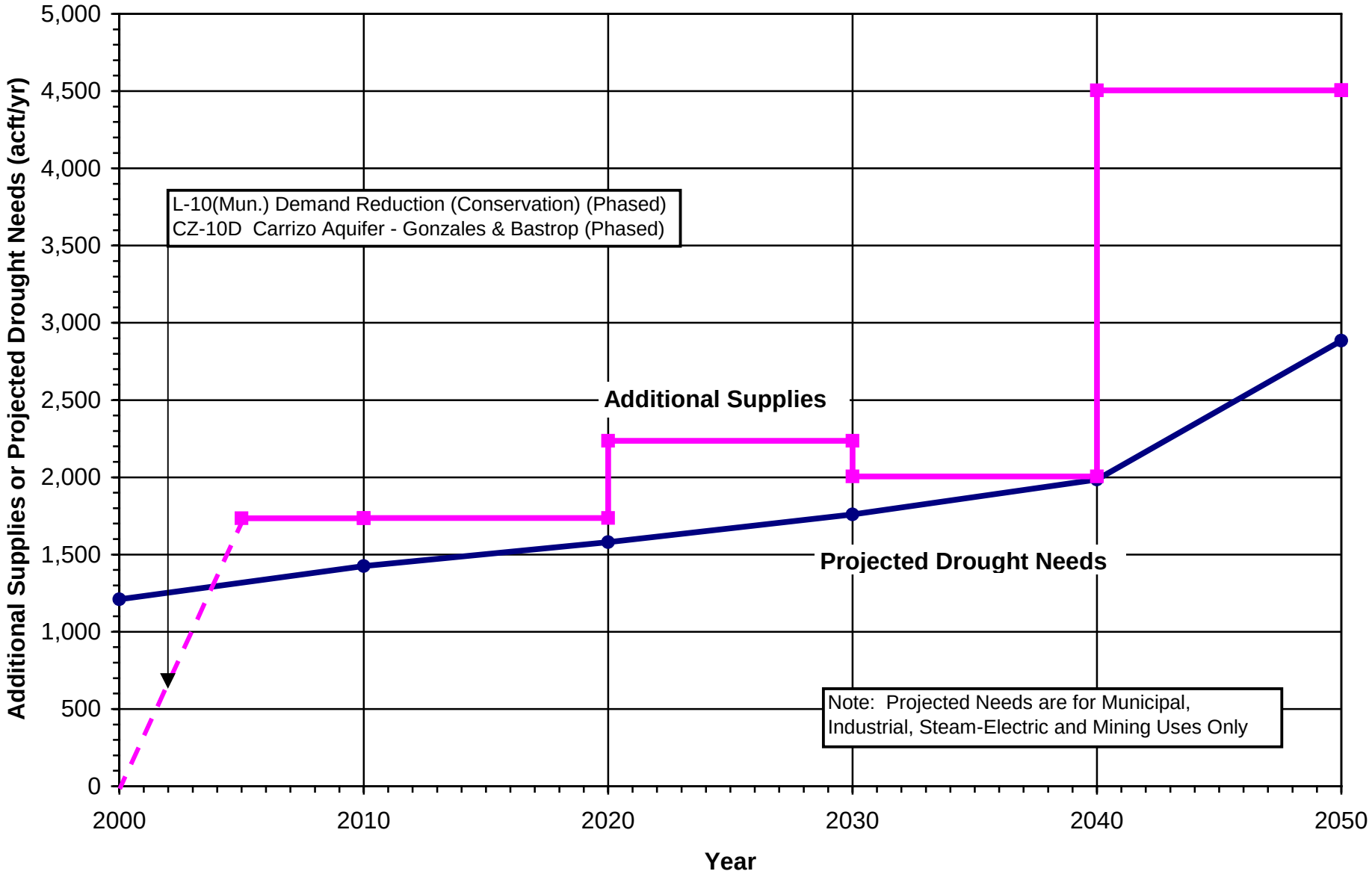


Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Frio	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	0	0	0	0	0	0	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	71,126	67,646	64,365	76,505	73,519	70,662	
	Total Needs	**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
	Mun, Ind, S-E, & Min Needs	**0**	**0**	**0**	**0**	**0**	**0**	
	Irrigation Needs	**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		184	195	205	116	121	124	1
SCTN-4	Brush Management								2
SCTN-5	Weather Modification								2
SCTN-9	Rainwater Harvesting								2
	Small Aquifer Recharge Dams								2
L-10 (Irr.)	Demand Reduction (Conservation)		5,947	5,947	5,947	5,947	5,947	5,947	3
	Total New Supplies		**6,131**	**6,142**	**6,152**	**6,063**	**6,068**	**6,071**	
	Total System Mgmt. Supply / Deficit		**-64,995**	**-61,504**	**-58,213**	**-70,442**	**-67,451**	**-64,591**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**184**	**195**	**205**	**116**	**121**	**124**	
	Irrigation System Mgmt. Supply / Deficit		**-65,179**	**-61,699**	**-58,418**	**-70,558**	**-67,572**	**-64,715**	

Notes:	
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation application rate.

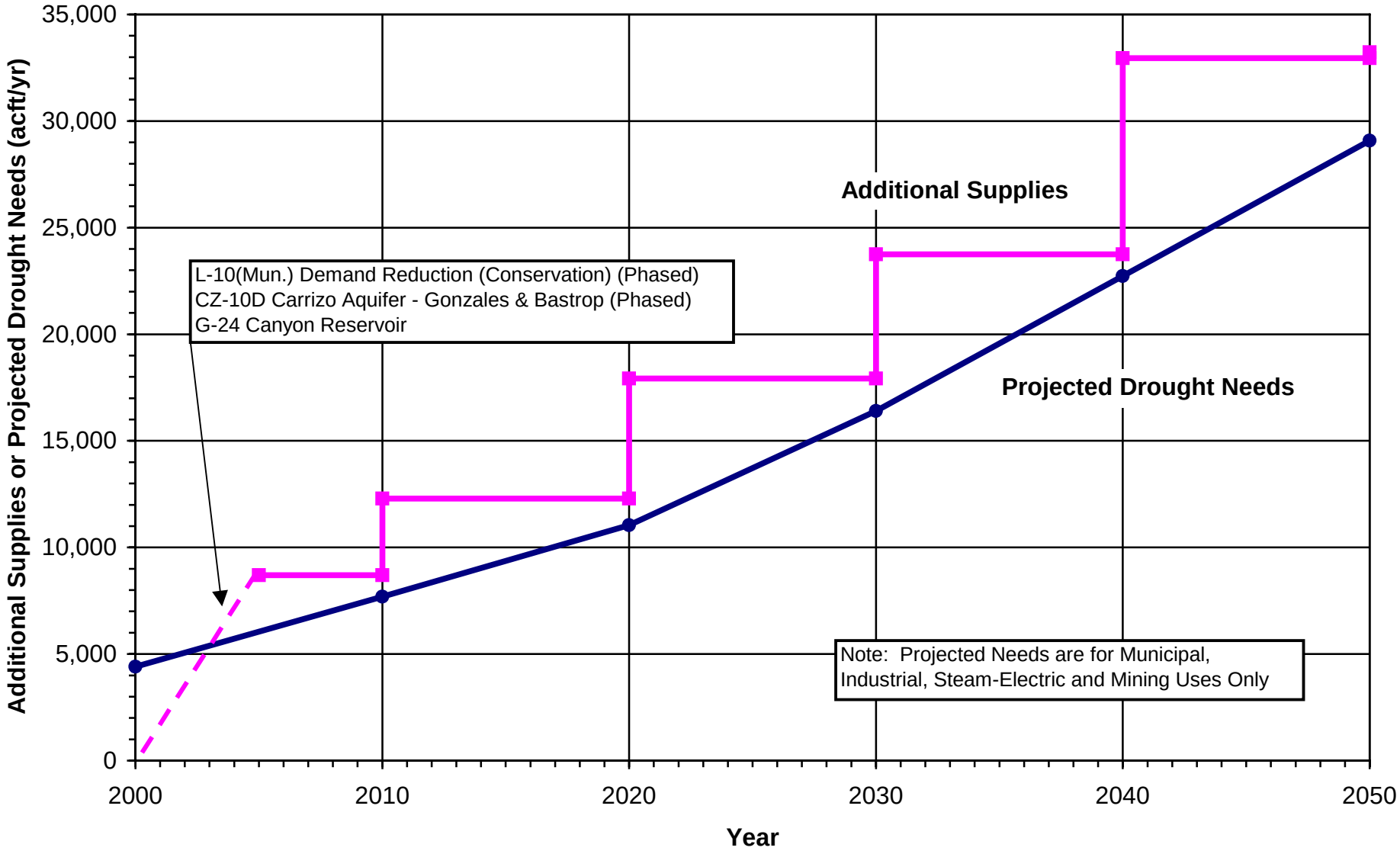
Planning Unit Alternative Regional Water Plan
Guadalupe County



Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Guadalupe	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	29	23	30	71	87	773	
	Industrial	985	1,204	1,350	1,487	1,692	1,899	
	Steam-Electric	0	0	0	0	0	0	
	Mining	196	198	200	202	207	213	
	Irrigation	985	879	779	684	594	508	
	Total Needs	**2,195**	**2,304**	**2,359**	**2,444**	**2,580**	**3,393**	
	Mun, Ind, S-E, & Min Needs	**1,210**	**1,425**	**1,580**	**1,760**	**1,986**	**2,885**	
	Irrigation Needs	**985**	**879**	**779**	**684**	**594**	**508**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		235	236	236	5	5	6	1
CZ-10D	Carrizo Aquifer - Gonzales & Bastrop	90,000	1,500	1,500	2,000	2,000	2,500	4,500	2, 3, 4
	Small Aquifer Recharge Dams								5
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**1,735**	**1,736**	**2,236**	**2,005**	**2,505**	**4,506**	
	Total System Mgmt. Supply / Deficit		**-460**	**-568**	**-123**	**-439**	**-75**	**1,113**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**525**	**311**	**656**	**245**	**519**	**1,621**	
	Irrigation System Mgmt. Supply / Deficit		**-985**	**-879**	**-779**	**-684**	**-594**	**-508**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Comal, Guadalupe, and Hays Counties. Effects on regional aquifer levels to be quantified.								
3	Portion of 90,000 acft/yr available from northern Gonzales and southern Bastrop Counties under CZ-10D.								
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

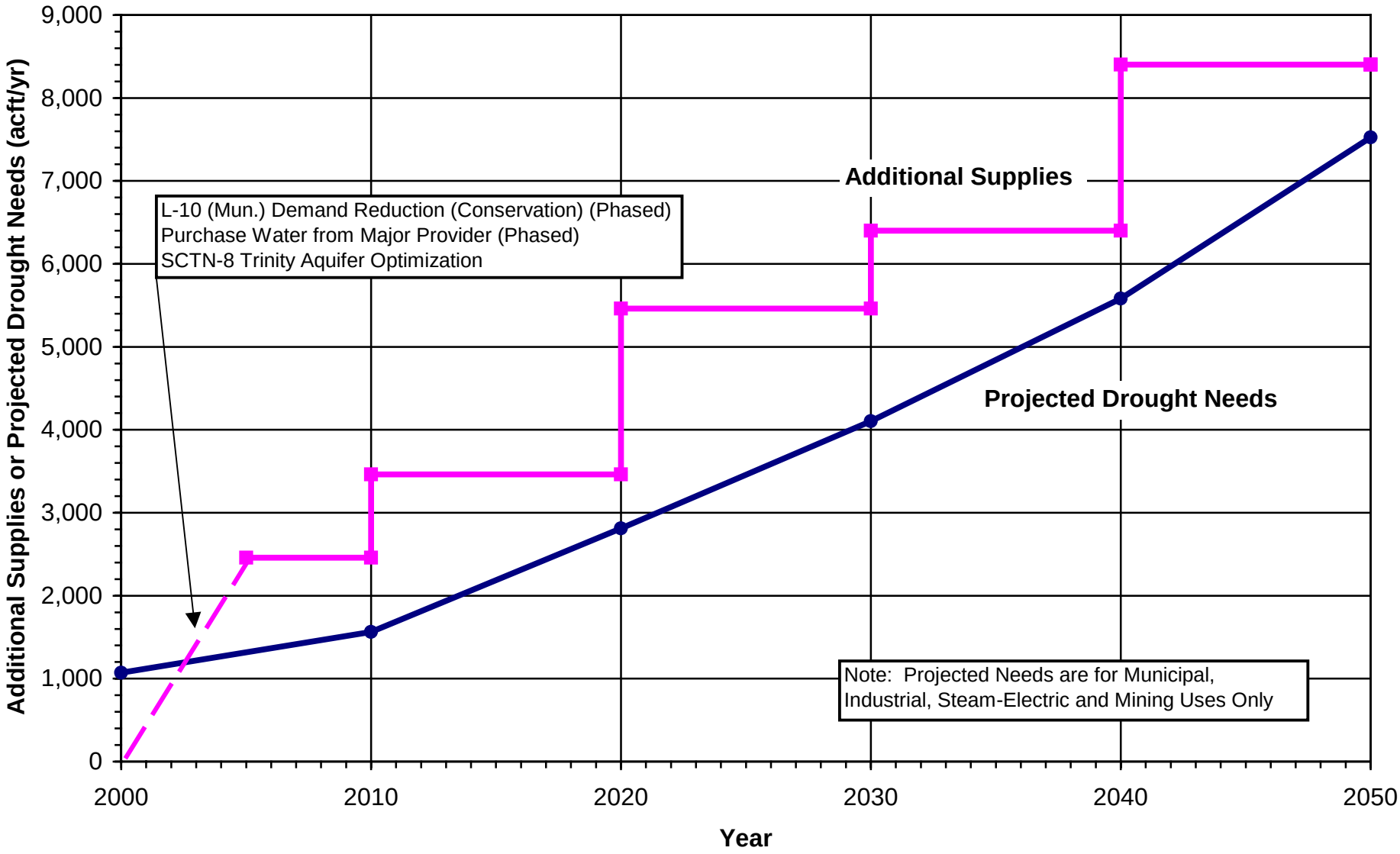
Planning Unit Alternative Regional Water Plan
Hays County



Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Hays	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	4,325	7,609	10,980	16,349	22,696	29,059	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	84	82	68	55	37	28	
	Irrigation	0	0	0	0	0	0	
	Total Needs	**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
	Mun, Ind, S-E, & Min Needs	**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
	Irrigation Needs	**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		647	747	873	699	906	1,174	1
CZ-10D	Carrizo Aquifer - Gonzales & Bastrop	90,000	4,000	7,000	10,500	16,000	22,000	31,000	2, 3, 4
G-24	Canyon Reservoir	1,048	1,048	1,048	1,048	1,048	1,048	1,048	5
	Small Aquifer Recharge Dams								6
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**5,695**	**8,795**	**12,421**	**17,747**	**23,954**	**33,222**	
	Total System Mgmt. Supply / Deficit		**1,286**	**1,104**	**1,373**	**1,343**	**1,221**	**4,135**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,286**	**1,104**	**1,373**	**1,343**	**1,221**	**4,135**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Comal, Guadalupe, and Hays Counties. Effects on regional aquifer levels to be quantified.								
3	Portion of 90,000 acft/yr available from northern Gonzales and southern Bastrop Counties under CZ-10D.								
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
5	Candidate New Supply for Wimberley and Woodcreek.								
6	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

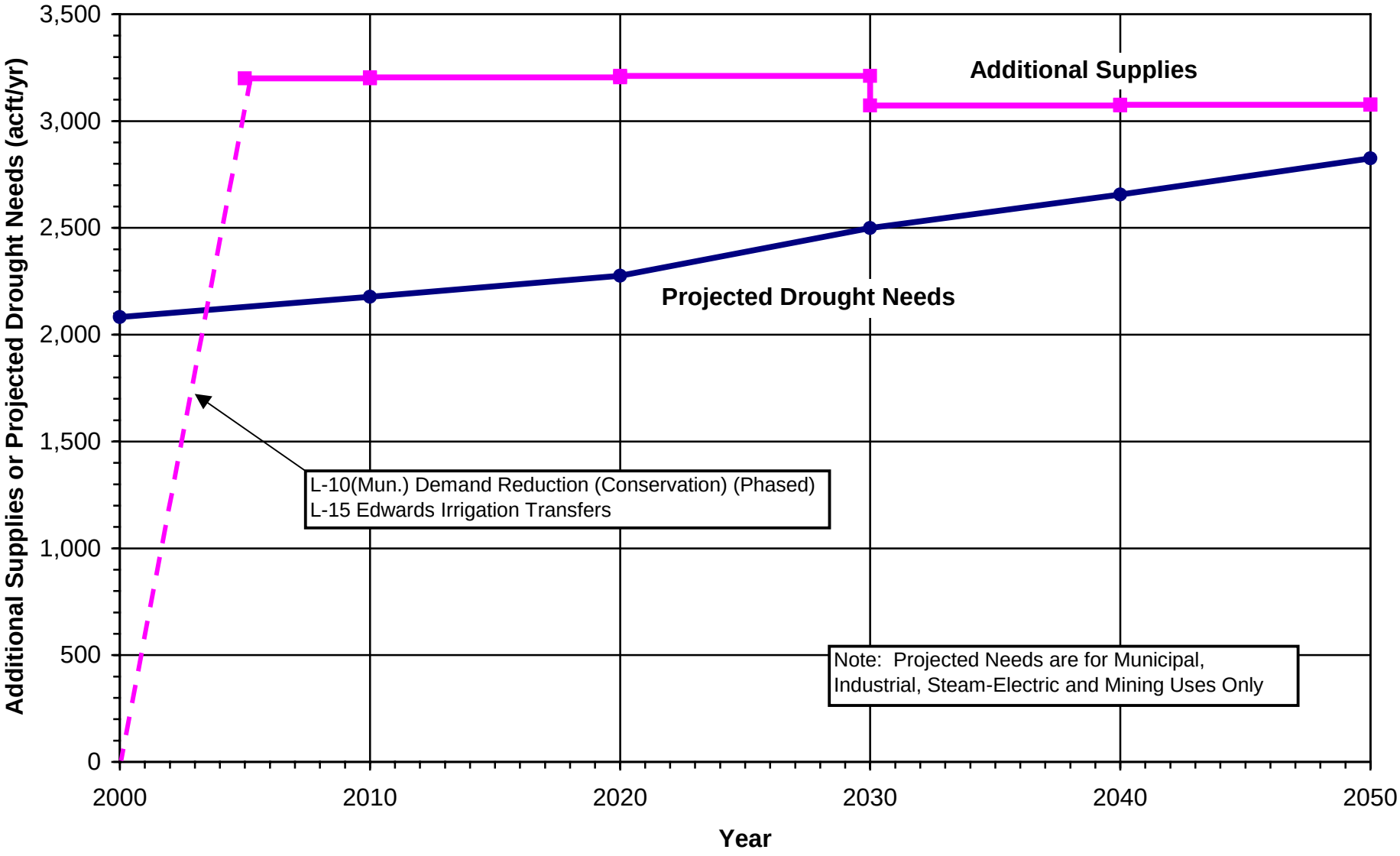
Planning Unit Alternative Regional Water Plan
Kendall County



Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Kendall	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	1,070	1,560	2,808	4,099	5,578	7,518	
	Industrial	2	3	4	4	5	6	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	0	0	0	0	0	0	
	Total Needs	**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
	Mun, Ind, S-E, & Min Needs	**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
	Irrigation Needs	**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		67	71	71	11	11	11	1
	Purchase Water from Major Provider		2,000	2,000	3,000	5,000	6,000	8,000	2, 3
SCTN-8	Trinity Aquifer Optimization	390	390	390	390	390	390	390	
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**2,457**	**2,461**	**3,461**	**5,401**	**6,401**	**8,401**	
	Total System Mgmt. Supply / Deficit		**1,385**	**898**	**649**	**1,298**	**818**	**877**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,385**	**898**	**649**	**1,298**	**818**	**877**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Assumed purchase from Bexar County major provider. Kendall County water needs are not reflected in Bexar County table.								
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

Planning Unit Alternative Regional Water Plan
Medina County

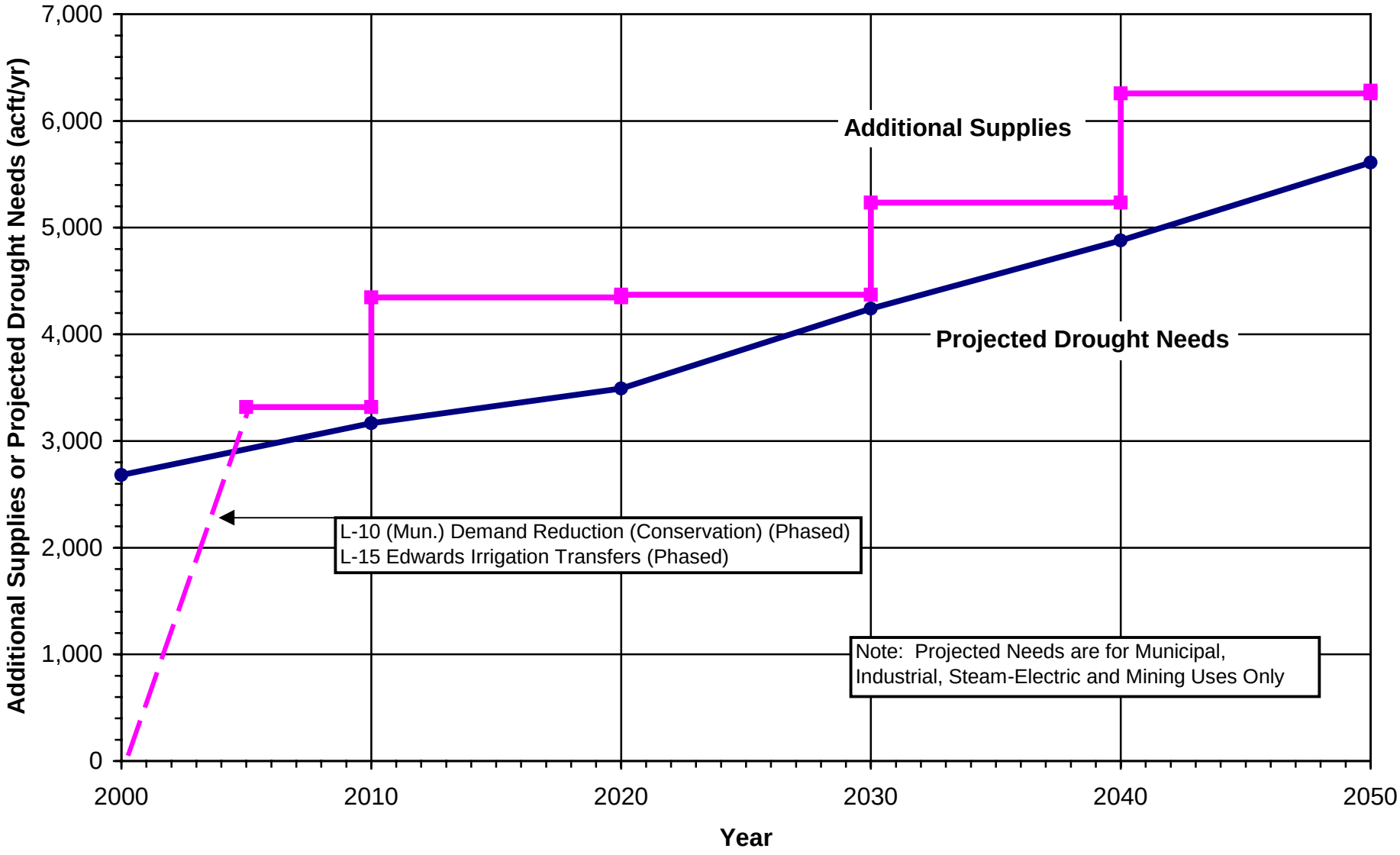


Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Medina	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	2,015	2,110	2,206	2,427	2,582	2,750	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	68	68	70	72	74	76	
	Irrigation	98,916	65,268	91,320	92,320	88,925	84,692	
	Total Needs	**100,999**	**67,446**	**93,596**	**94,819**	**91,581**	**87,518**	
	Mun, Ind, S-E, & Min Needs	**2,083**	**2,178**	**2,276**	**2,499**	**2,656**	**2,826**	
	Irrigation Needs	**98,916**	**65,268**	**91,320**	**92,320**	**88,925**	**84,692**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		200	205	211	73	76	78	1
L-15	Edwards Irrigation Transfers	81,000	3,000	3,000	3,000	3,000	3,000	3,000	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)		11,867	11,867	11,867	11,867	11,867	11,867	5
	Total New Supplies		**15,067**	**15,072**	**15,078**	**14,940**	**14,943**	**14,945**	
	Total System Mgmt. Supply / Deficit		**-85,932**	**-52,374**	**-78,518**	**-79,879**	**-76,638**	**-72,573**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,117**	**1,027**	**935**	**574**	**420**	**252**	
	Irrigation System Mgmt. Supply / Deficit		**-87,049**	**-53,401**	**-79,453**	**-80,453**	**-77,058**	**-72,825**	

Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
5	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.

Planning Unit Alternative Regional Water Plan
Uvalde County



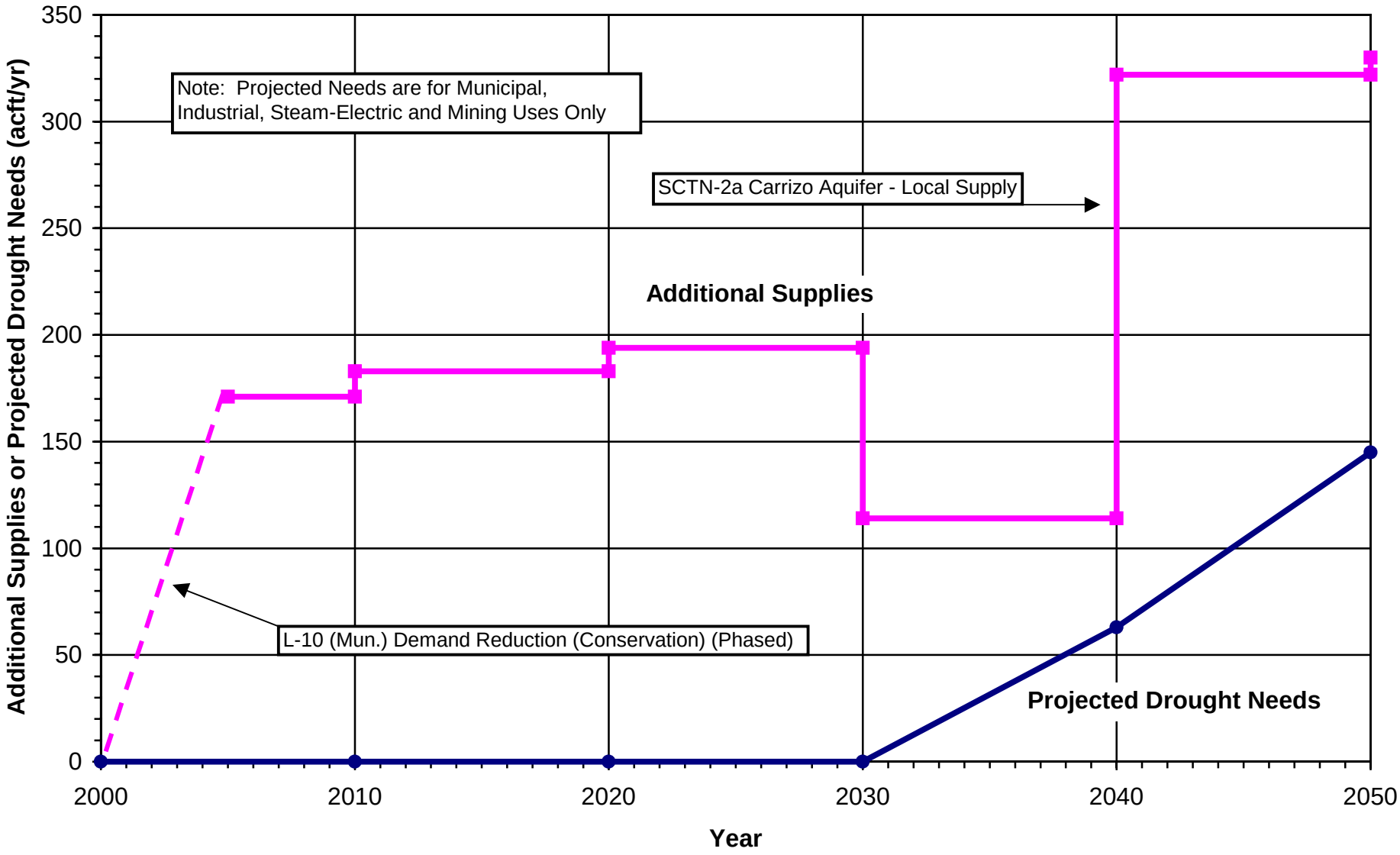
Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Uvalde	
County Summary of Projected Water Needs and Water Supply Options						**User Group(s) =**	**all**	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	2,682	3,166	3,493	4,241	4,880	5,609	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	75,263	72,798	70,154	71,022	68,880	65,676	
	Total Needs	**77,945**	**75,964**	**73,647**	**75,263**	**73,760**	**71,285**	
	Mun, Ind, S-E, & Min Needs	**2,682**	**3,166**	**3,493**	**4,241**	**4,880**	**5,609**	
	Irrigation Needs	**75,263**	**72,798**	**70,154**	**71,022**	**68,880**	**65,676**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		318	346	371	235	258	283	1
L-15	Edwards Irrigation Transfers	81,000	3,000	4,000	4,000	5,000	5,000	6,000	2, 3, 4
SCTN-4	Brush Management								5
SCTN-5	Weather Modification								5
SCTN-9	Rainwater Harvesting								5
	Small Aquifer Recharge Dams								5
L-10 (Irr.)	Demand Reduction (Conservation)		14,143	14,143	14,143	14,143	14,143	14,143	6
	Total New Supplies		**17,461**	**18,489**	**18,514**	**19,378**	**19,401**	**20,426**	
	Total System Mgmt. Supply / Deficit		**-60,484**	**-57,475**	**-55,133**	**-55,885**	**-54,359**	**-50,859**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**636**	**1,180**	**878**	**994**	**378**	**674**	
	Irrigation System Mgmt. Supply / Deficit		**-61,120**	**-58,655**	**-56,011**	**-56,879**	**-54,737**	**-51,533**	

Notes:

*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
6	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.

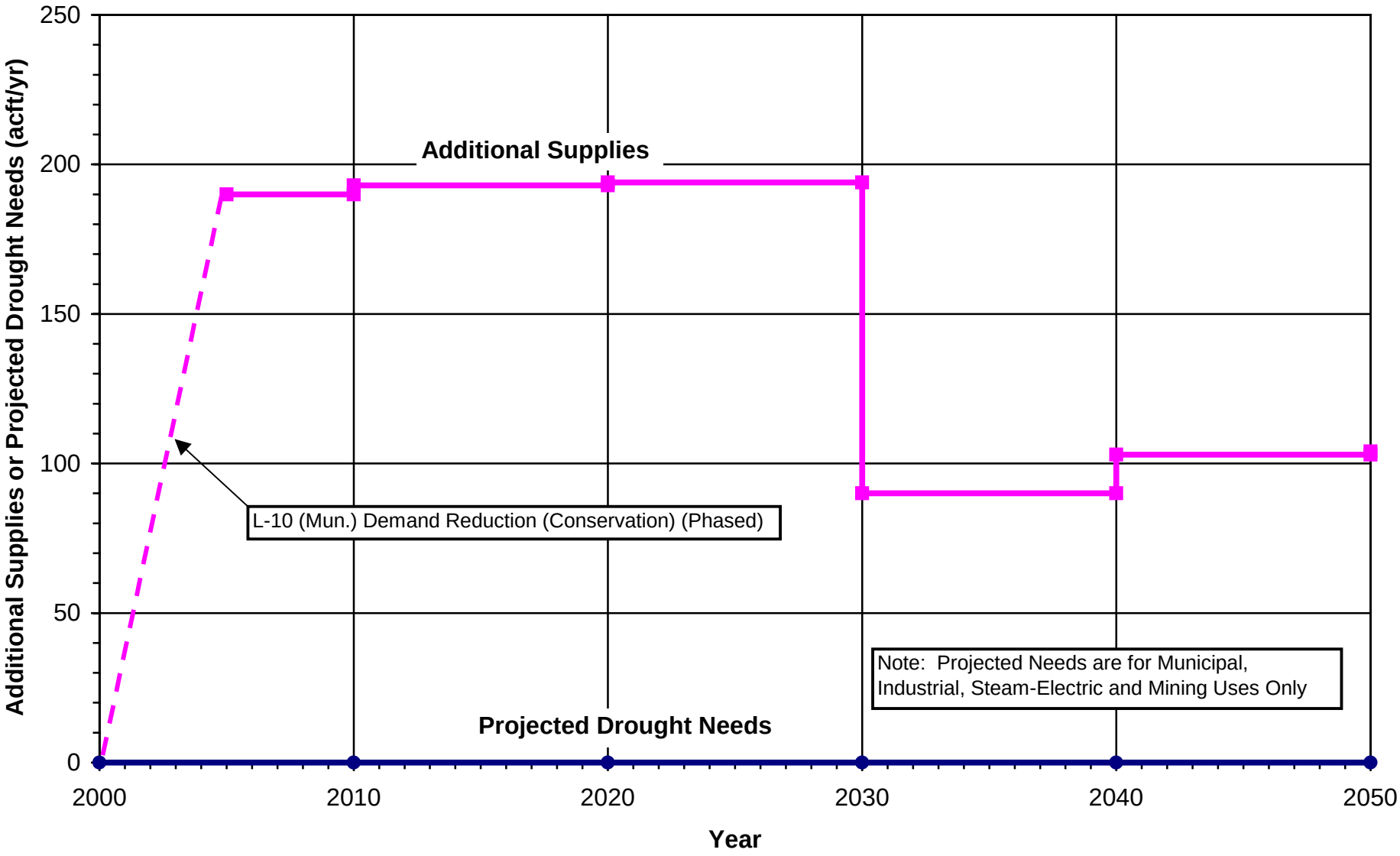
Planning Unit Alternative Regional Water Plan
Wilson County



Planning Unit Regional Water Management Alternative Plan

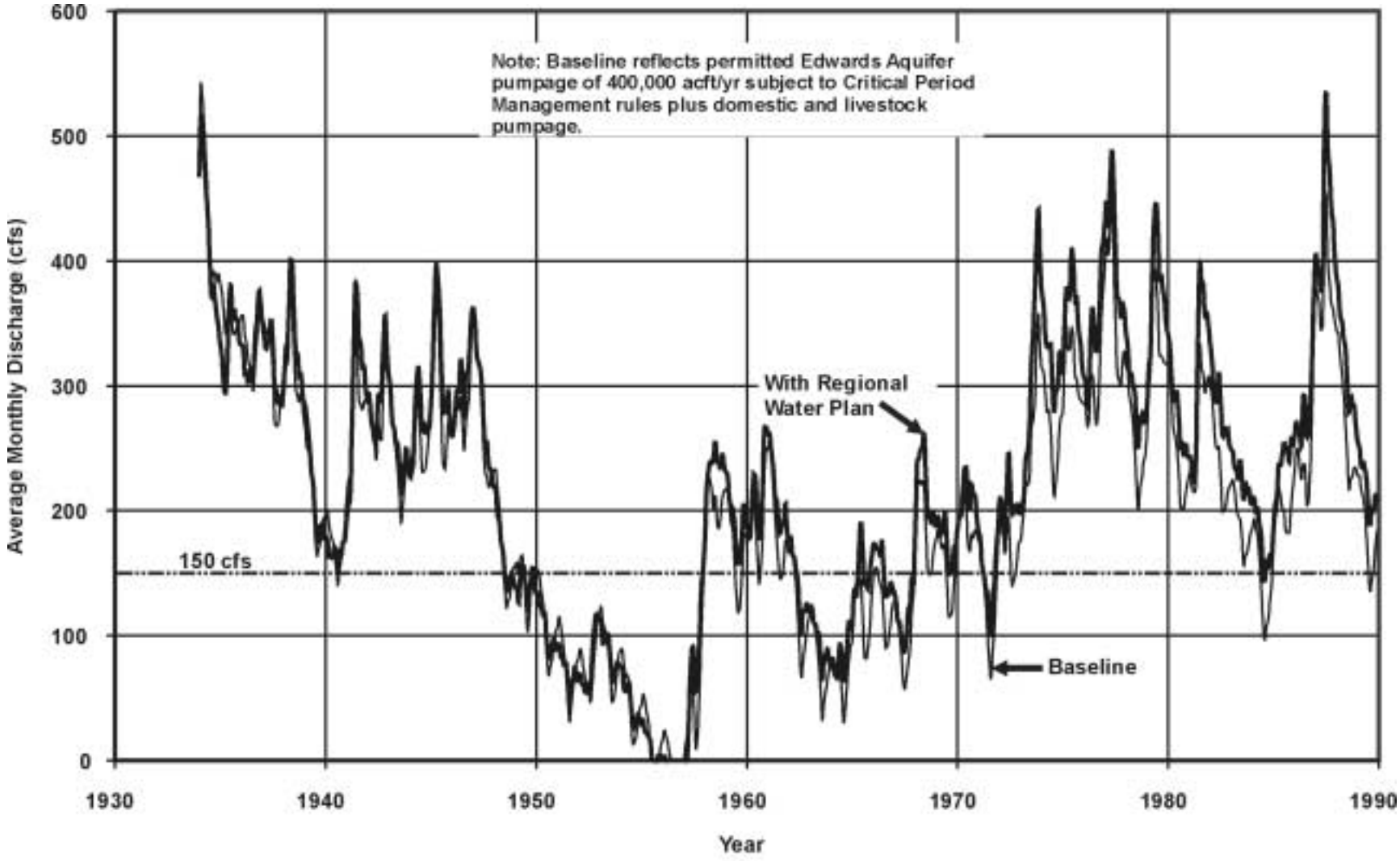
South Central Texas Region						County =	Wilson	
County Summary of Projected Water Needs and Water Supply Options					User Group(s) =		all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	0	0	0	0	63	145	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	0	0	0	0	0	0	
	Total Needs	**0**	**0**	**0**	**0**	**63**	**145**	
	Mun, Ind, S-E, & Min Needs	**0**	**0**	**0**	**0**	**63**	**145**	
	Irrigation Needs	**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		171	183	194	114	122	130	1
SCTN-2a	Carrizo Aquifer - Local Supply						200	200	2
SCTN-4	Brush Management								3
SCTN-5	Weather Modification								3
SCTN-9	Rainwater Harvesting								3
	Small Aquifer Recharge Dams								3
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**171**	**183**	**194**	**114**	**322**	**330**	
	Total System Mgmt. Supply / Deficit		**171**	**183**	**194**	**114**	**259**	**185**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**171**	**183**	**194**	**114**	**259**	**185**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Floresville.								
3	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

Planning Unit Alternative Regional Water Plan
Zavala County

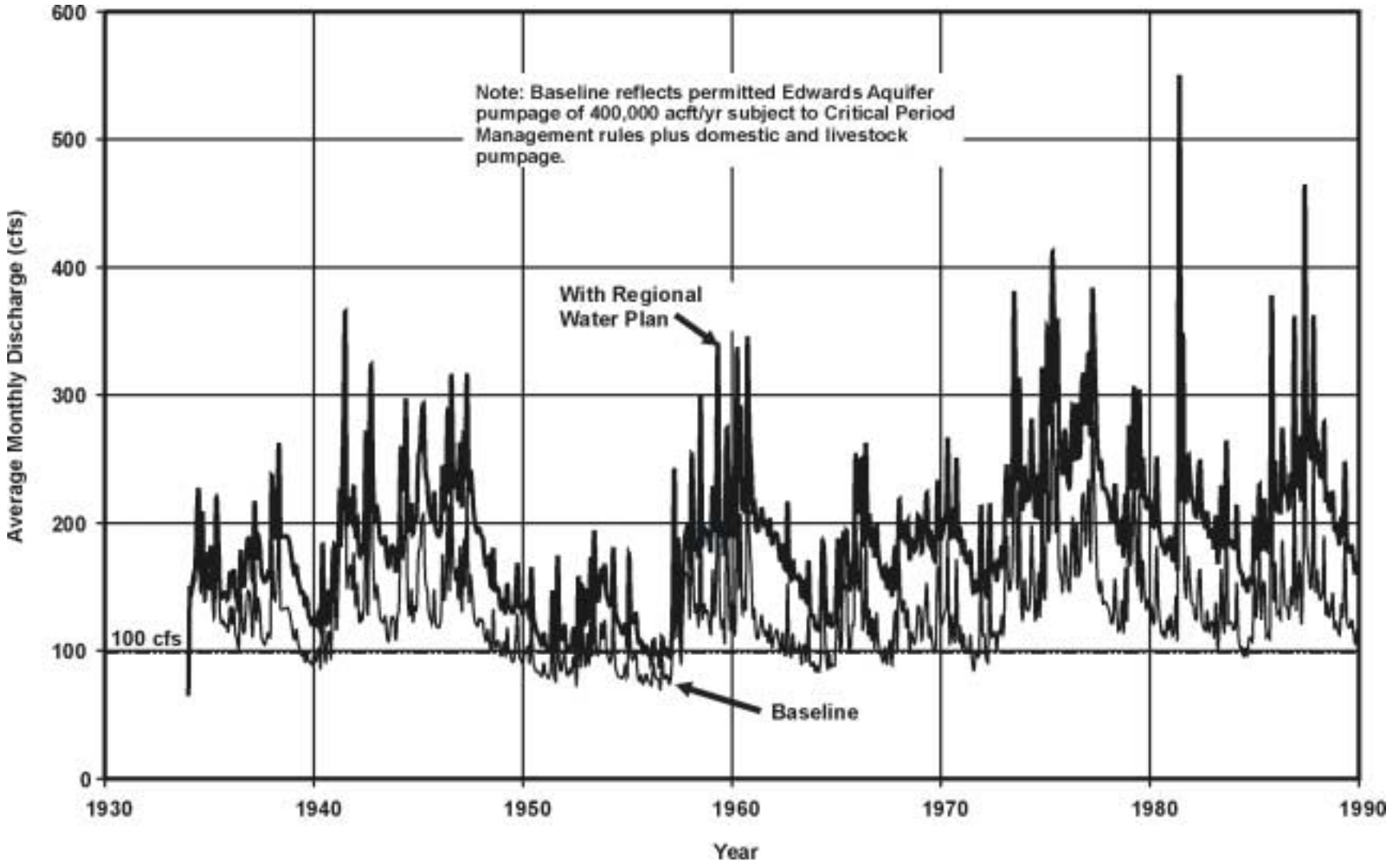


Planning Unit Regional Water Management Alternative Plan

South Central Texas Region						County =	Zavala	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	0	0	0	0	0	0	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	80,722	76,589	72,655	88,293	84,673	81,200	
	Total Needs	**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
	Mun, Ind, S-E, & Min Needs	**0**	**0**	**0**	**0**	**0**	**0**	
	Irrigation Needs	**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		190	193	194	90	103	104	1
SCTN-4	Brush Management								2
SCTN-5	Weather Modification								2
SCTN-9	Rainwater Harvesting								2
	Small Aquifer Recharge Dams								2
L-10 (Irr.)	Demand Reduction (Conservation)		6,401	6,401	6,401	6,401	6,401	6,401	3
	Total New Supplies		**6,591**	**6,594**	**6,595**	**6,491**	**6,504**	**6,505**	
	Total System Mgmt. Supply / Deficit		**-74,131**	**-69,995**	**-66,060**	**-81,802**	**-78,169**	**-74,695**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**190**	**193**	**194**	**90**	**103**	**104**	
	Irrigation System Mgmt. Supply / Deficit		**-74,321**	**-70,188**	**-66,254**	**-81,892**	**-78,272**	**-74,799**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation								
	application rate.								

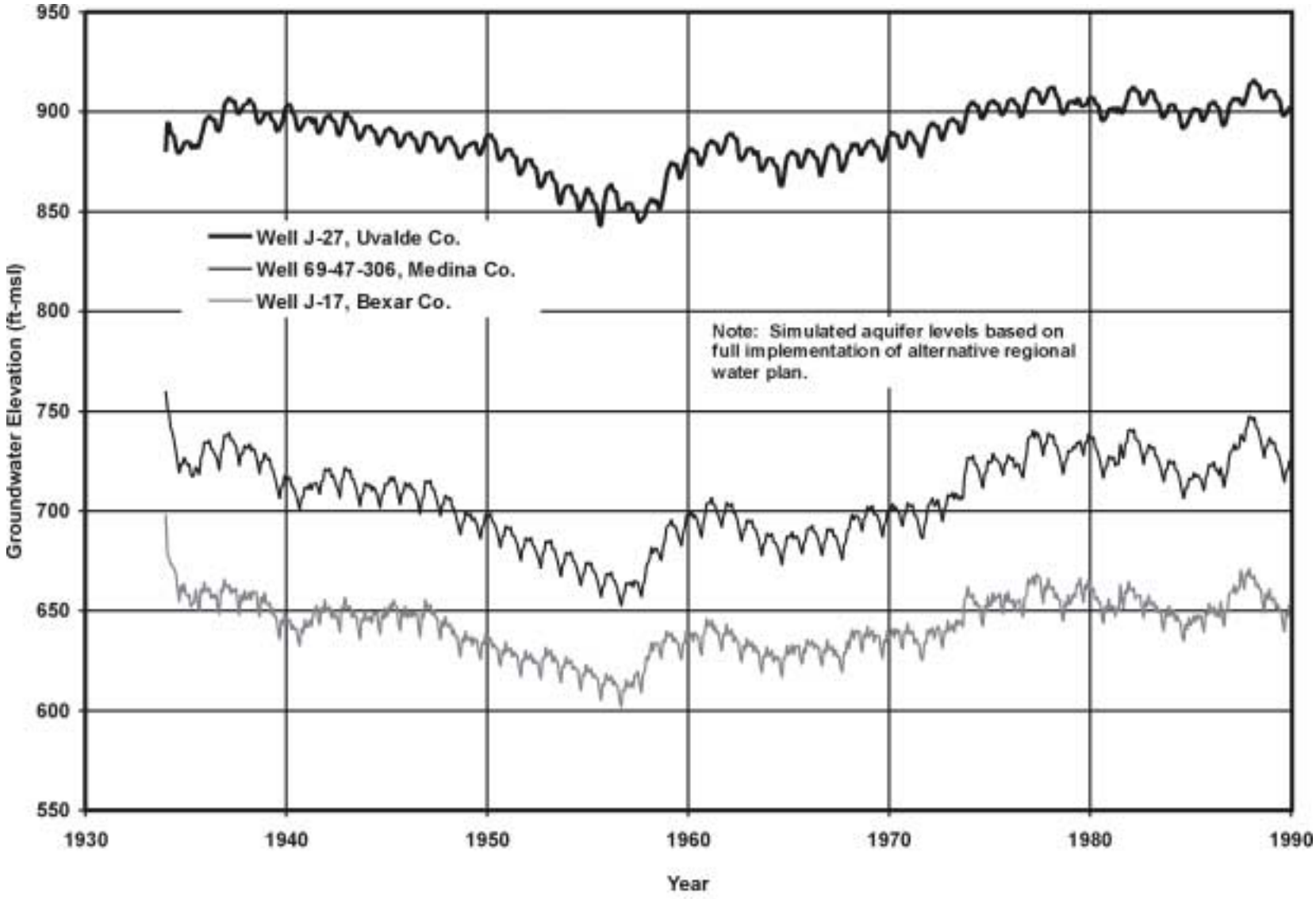


Planning Unit Alternative Regional Water Plan
Simulated Comal Springs Discharge

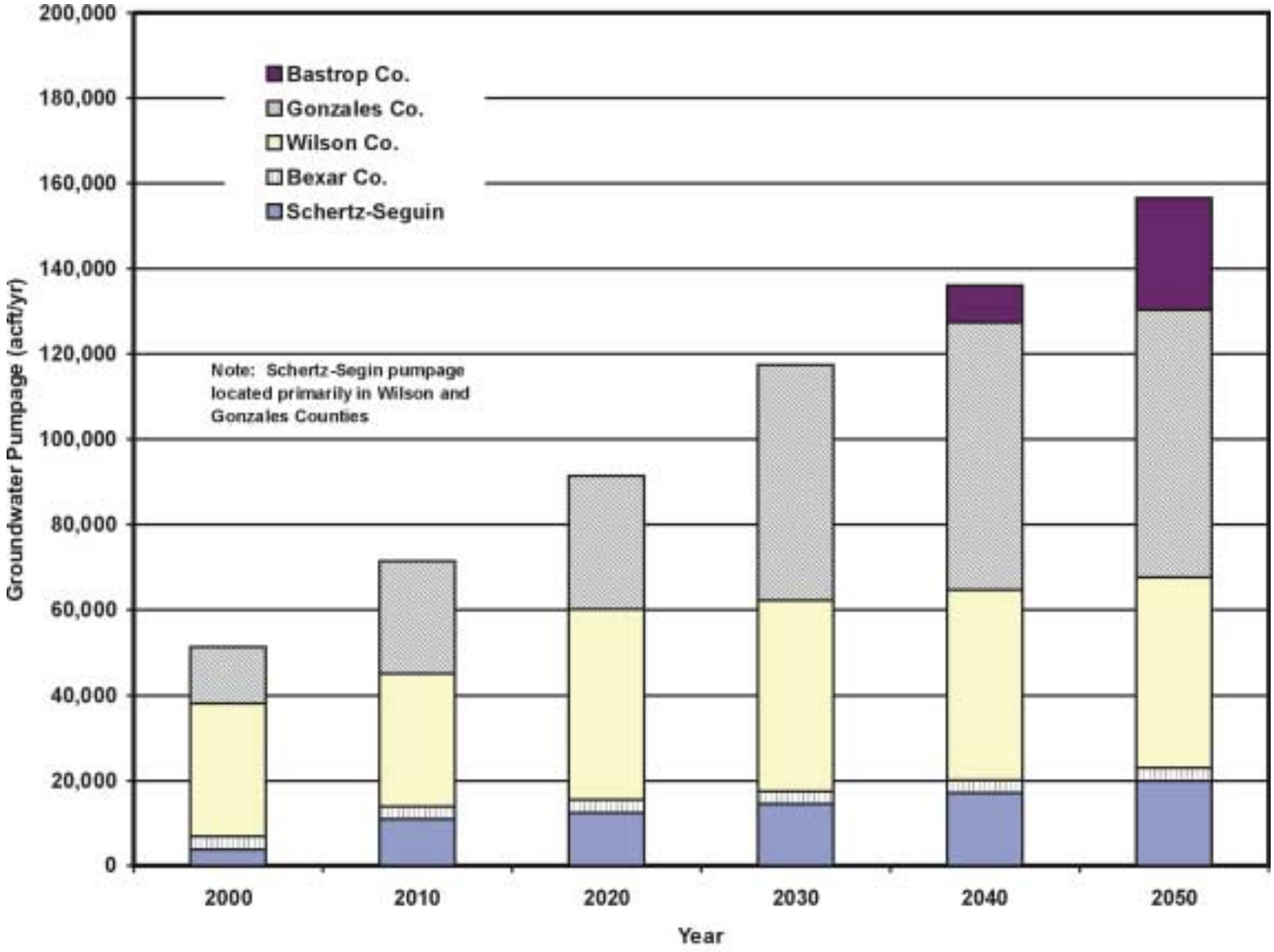


Planning Unit Alternative Regional Water Plan
Simulated San Marcos Springs Discharge

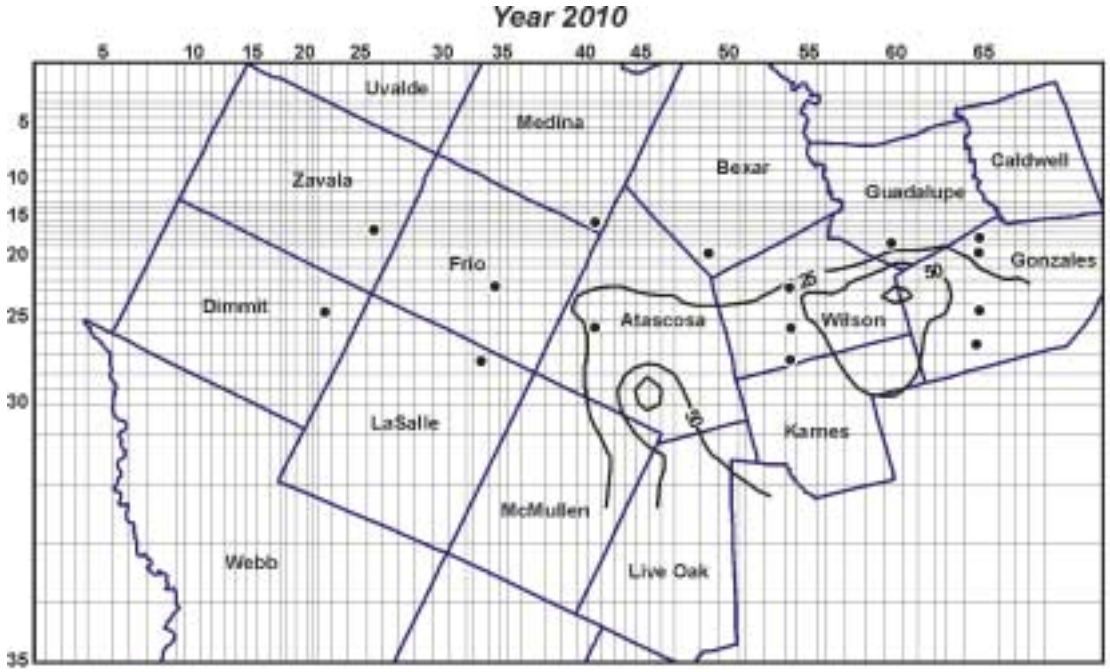
Planning Unit Alternative Regional Water Plan
Simulated Edwards Aquifer Pumpage

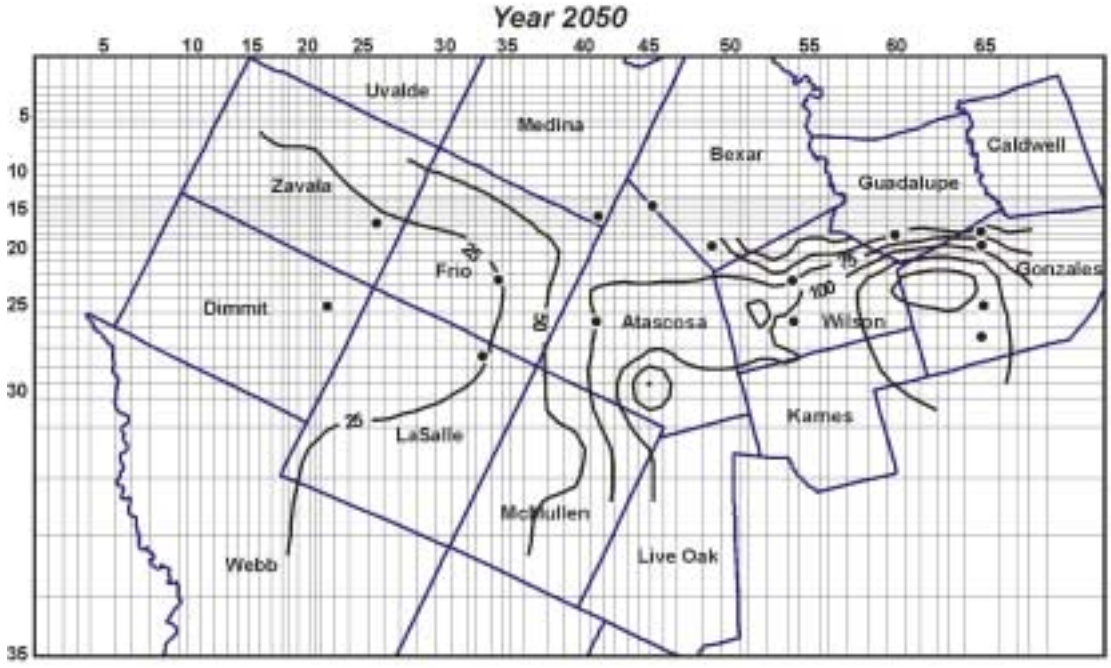


Planning Unit Alternative Regional Water Plan
Simulated Edwards Aquifer Levels



Planning Unit Alternative Regional Water Plan
Additional Carrizo Groundwater Pumpage

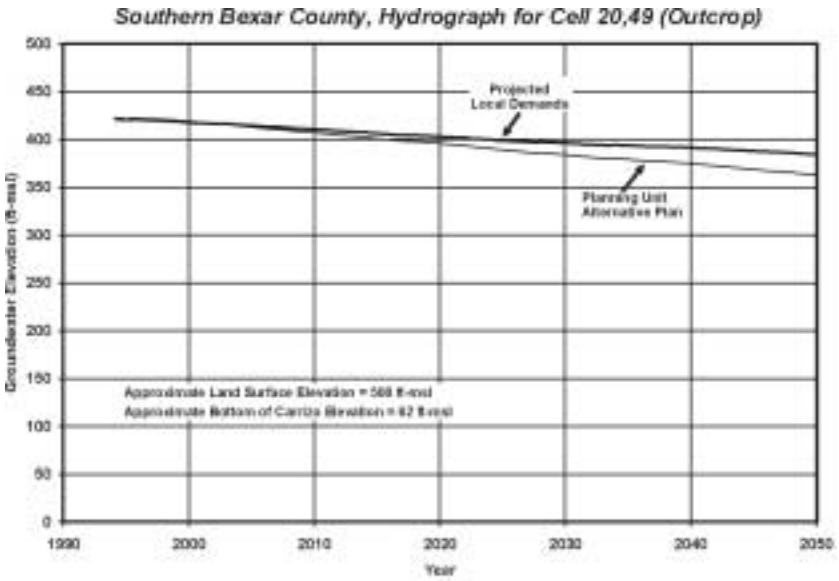


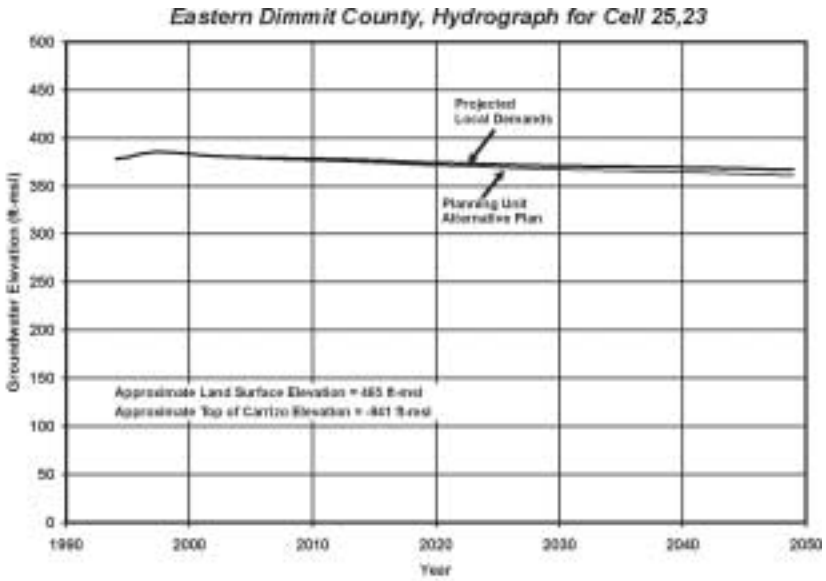


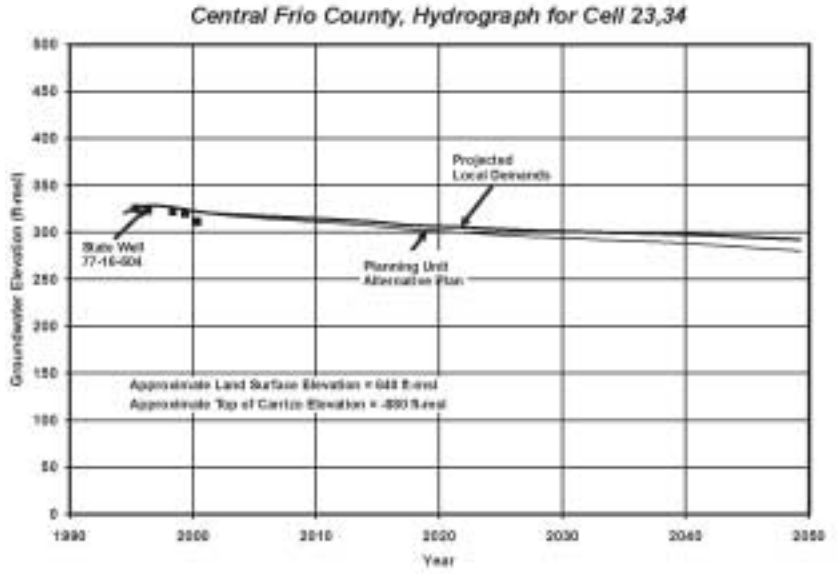
Note: Drawdown is referenced to simulated 1994 aquifer levels and includes both projected local demands and development of water supply options in this alternative regional water plan.

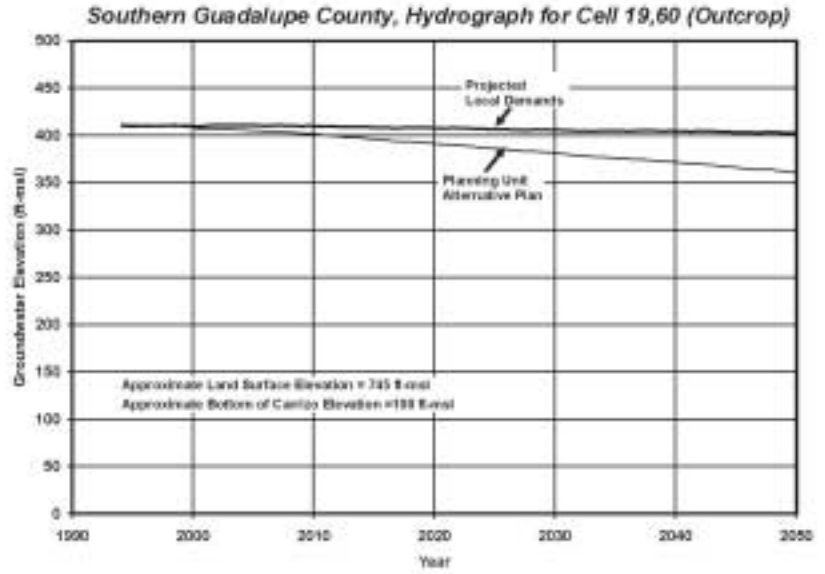
● Monitoring Well Location

Planning Unit Alternative Regional Water Plan
Simulated Carrizo Aquifer Drawdown



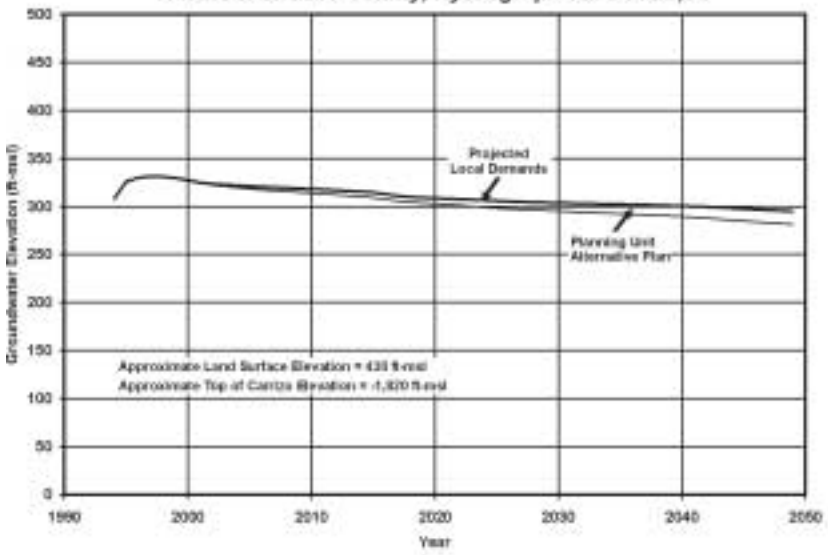




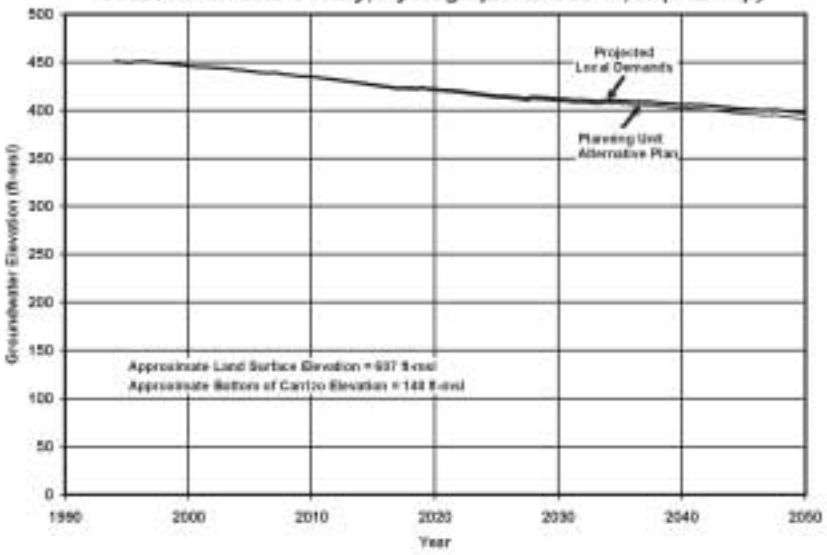


Planning Unit Alternative Regional Water Plan - Carrizo Aquifer

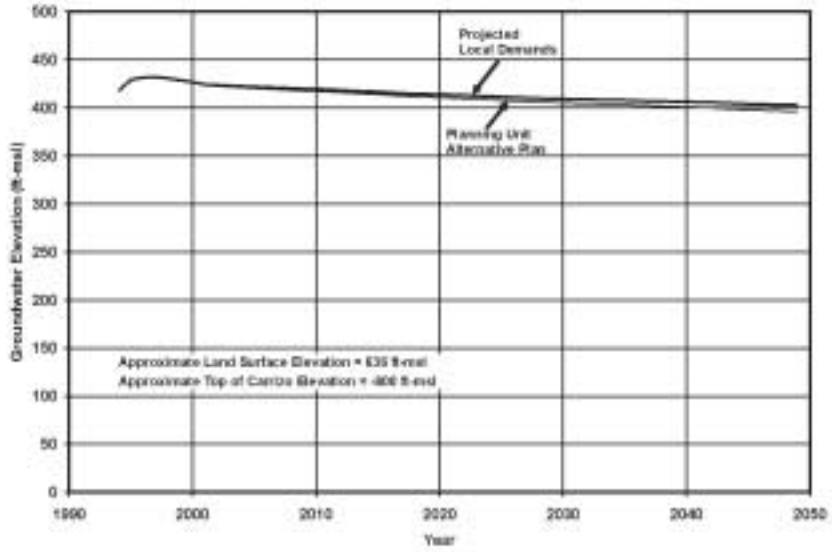
Northern LaSalle County, Hydrograph for Cell 28,33



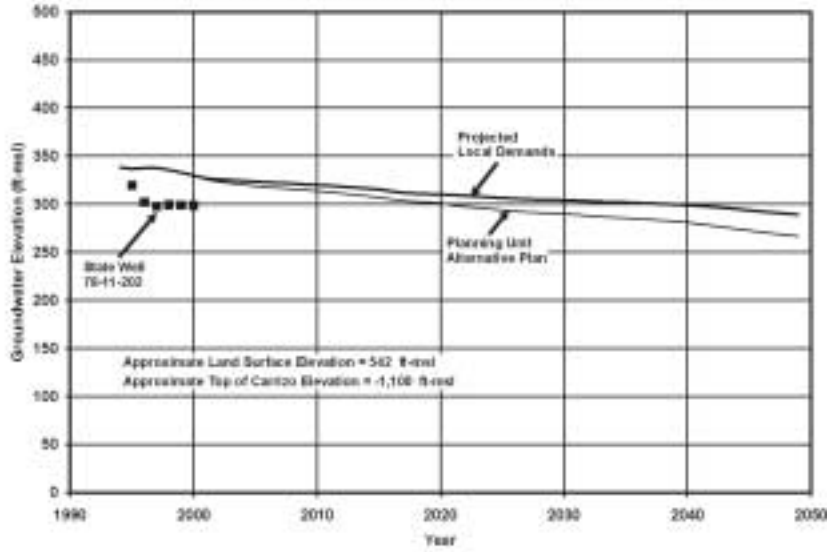
Southern Medina County, Hydrograph for Cell 16,41 (Outcrop)



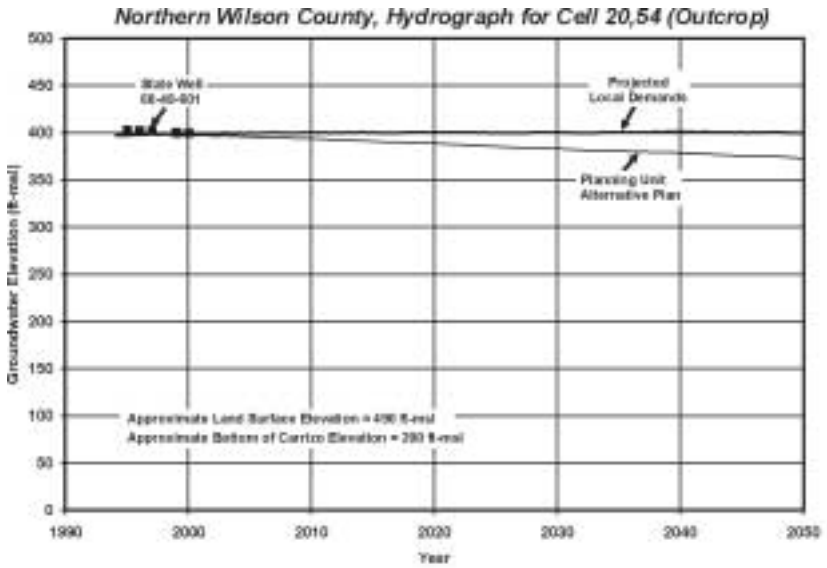
Eastern Zavala County, Hydrograph for Cell 17,26

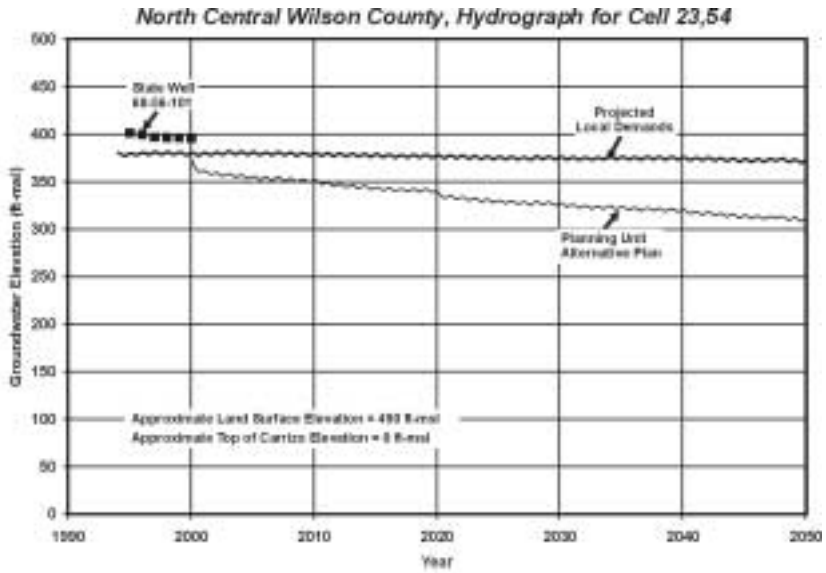


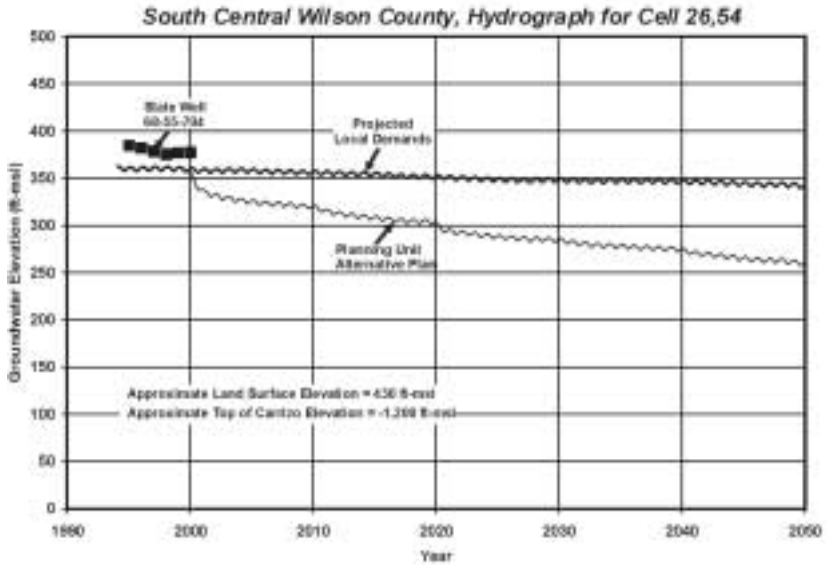
Central Atascosa County, Hydrograph for Cell 26,41

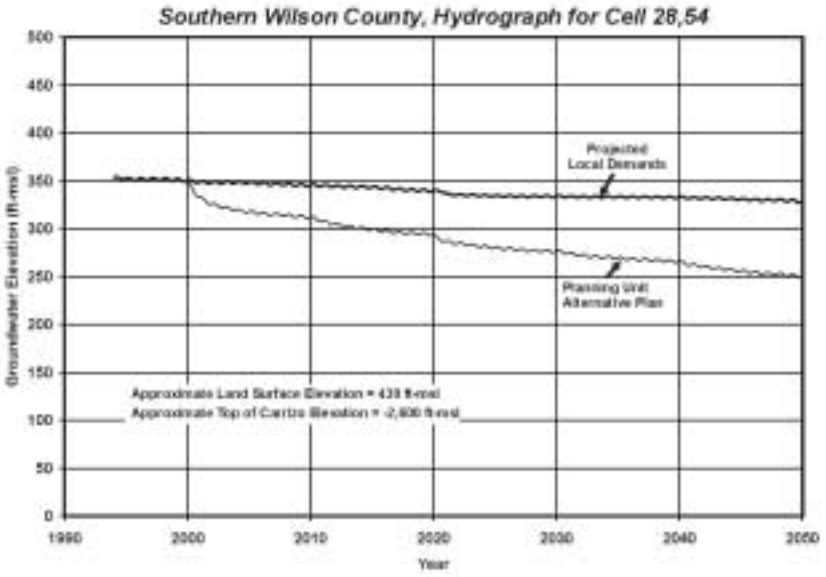


Planning Unit Alternative Regional Water Plan - Carrizo Aquifer

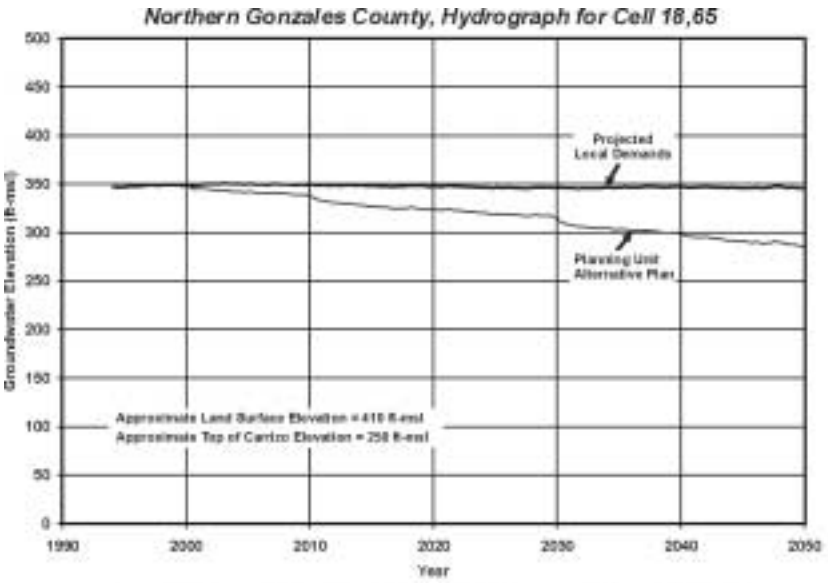


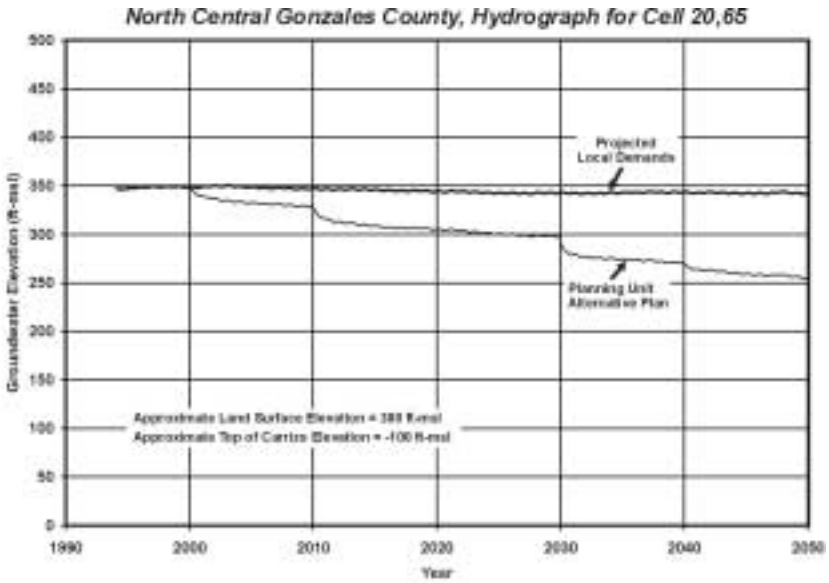


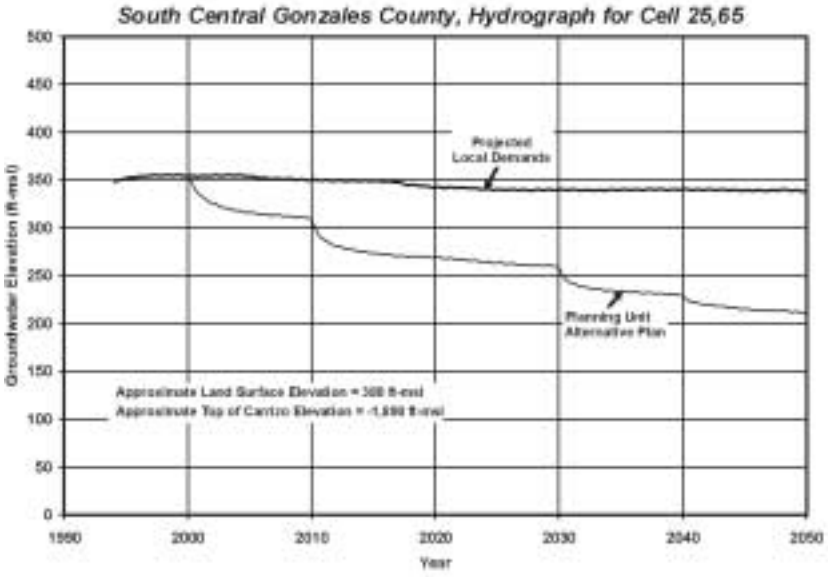


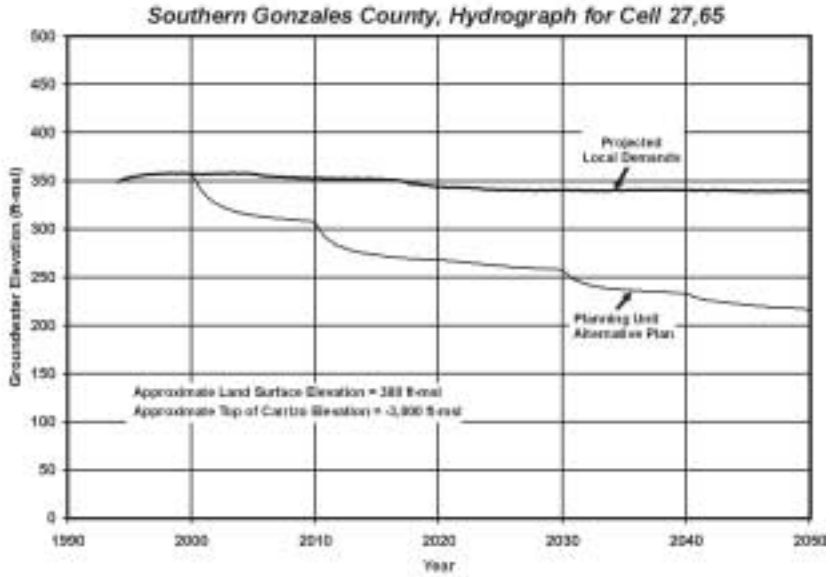


Planning Unit Alternative Regional Water Plan - Carrizo Aquifer



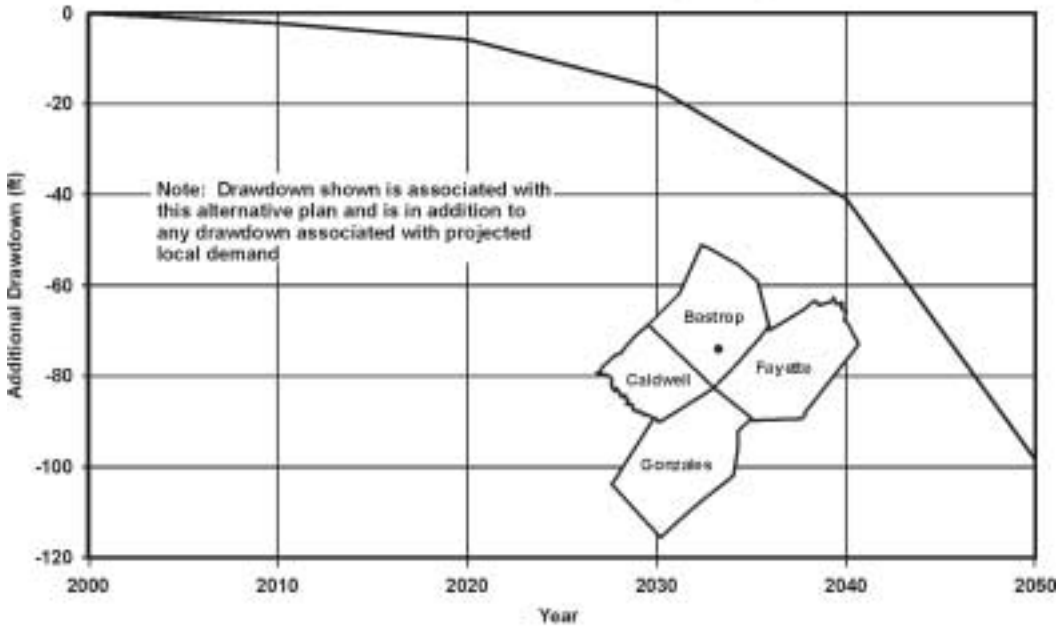




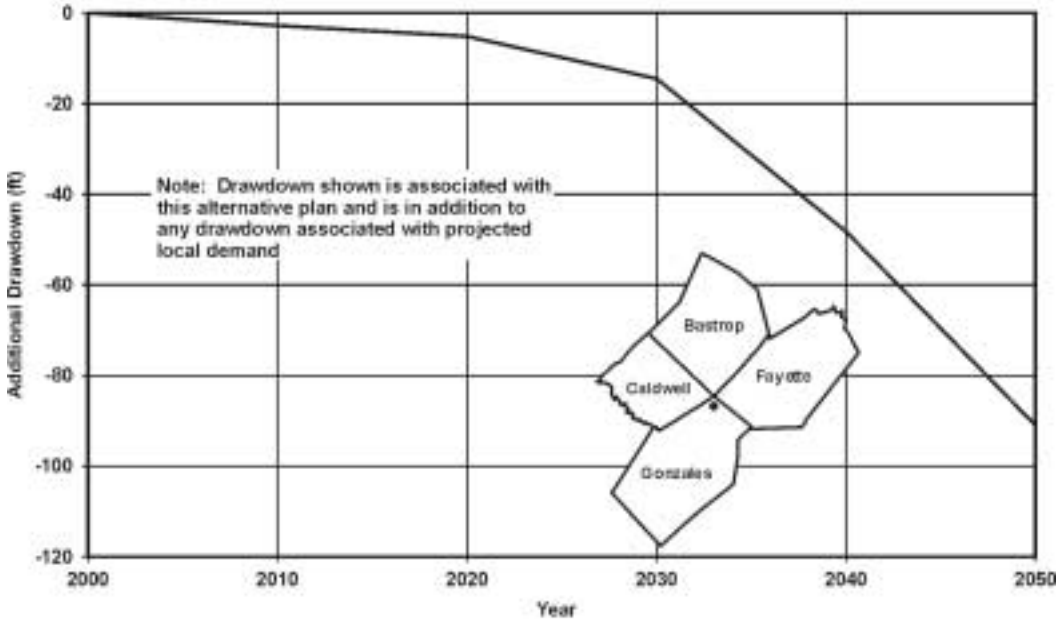


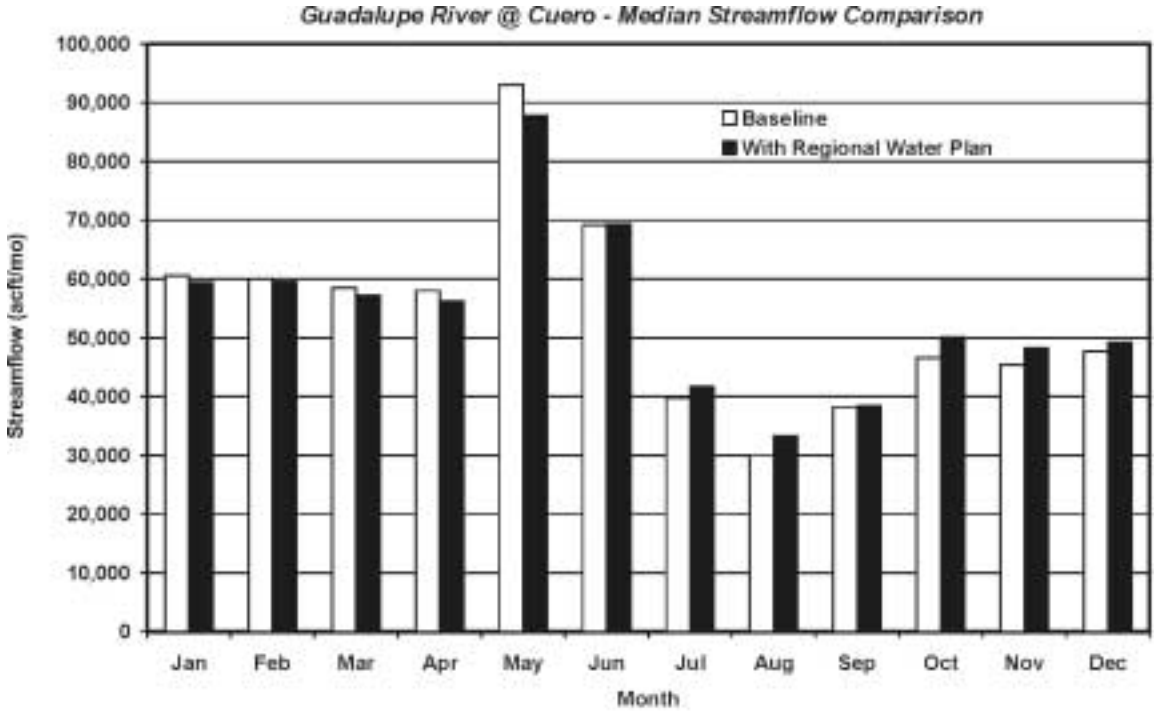
Planning Unit Alternative Regional Water Plan - Carrizo Aquifer

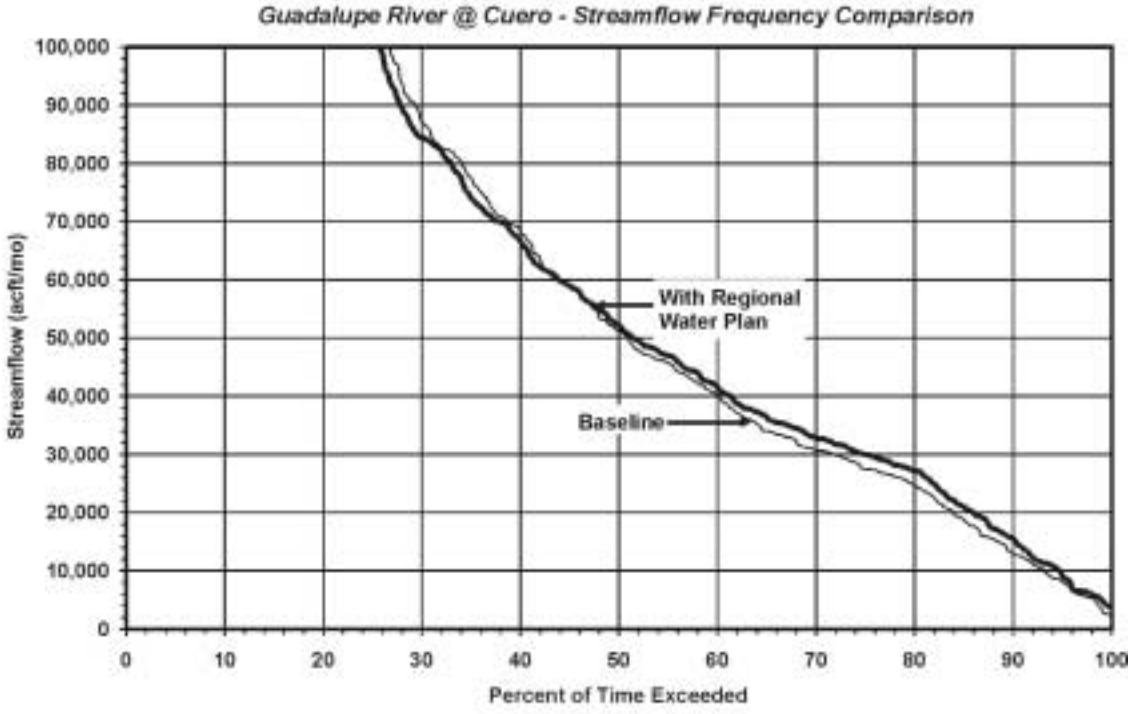
Drawdown in Southern Bastrop County



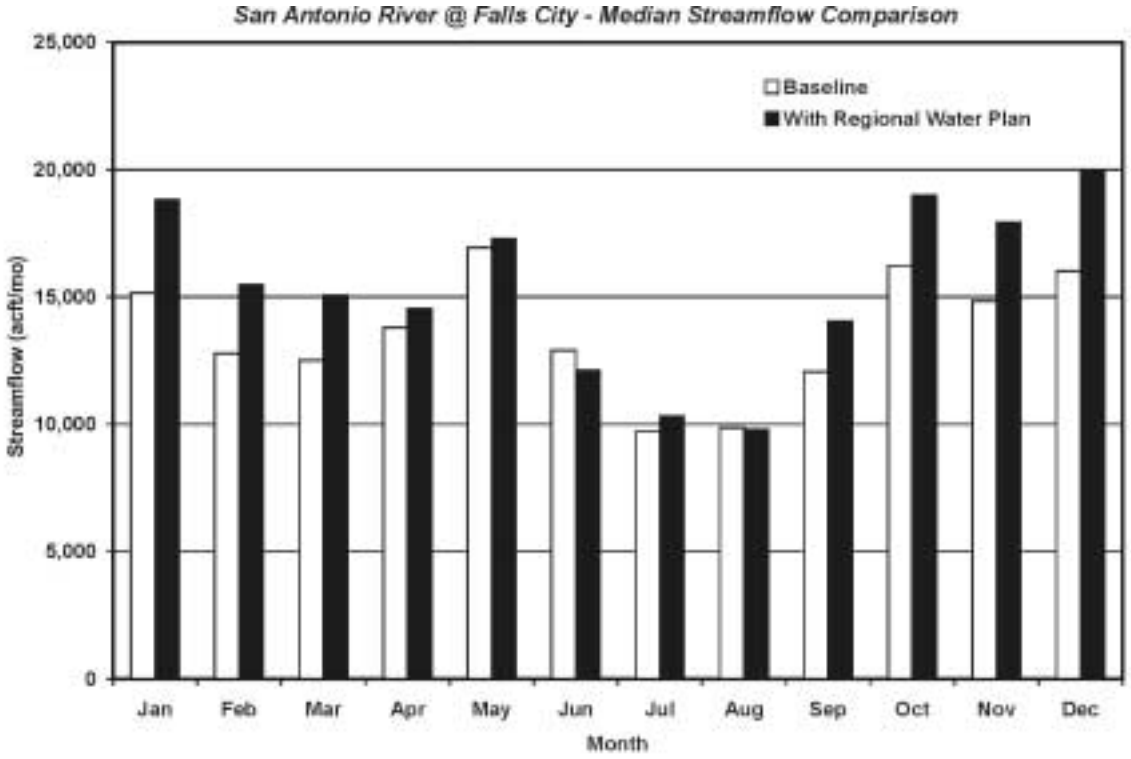
Drawdown in Northern Gonzales County

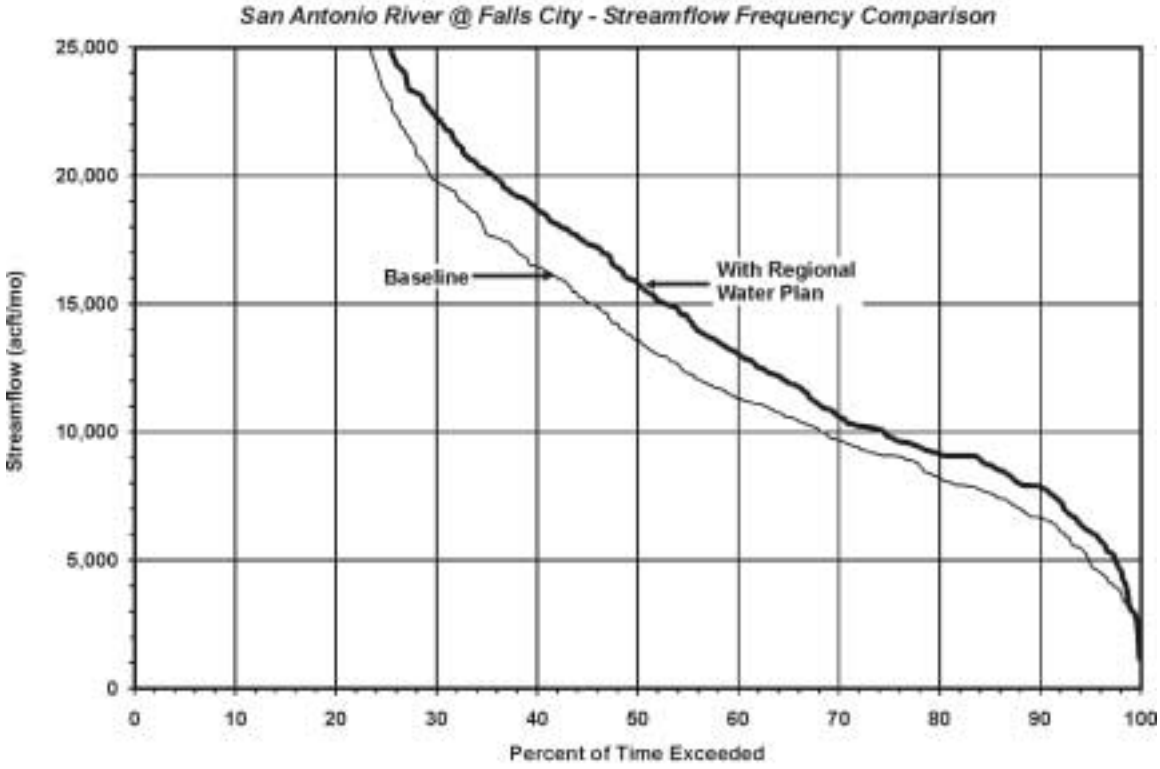




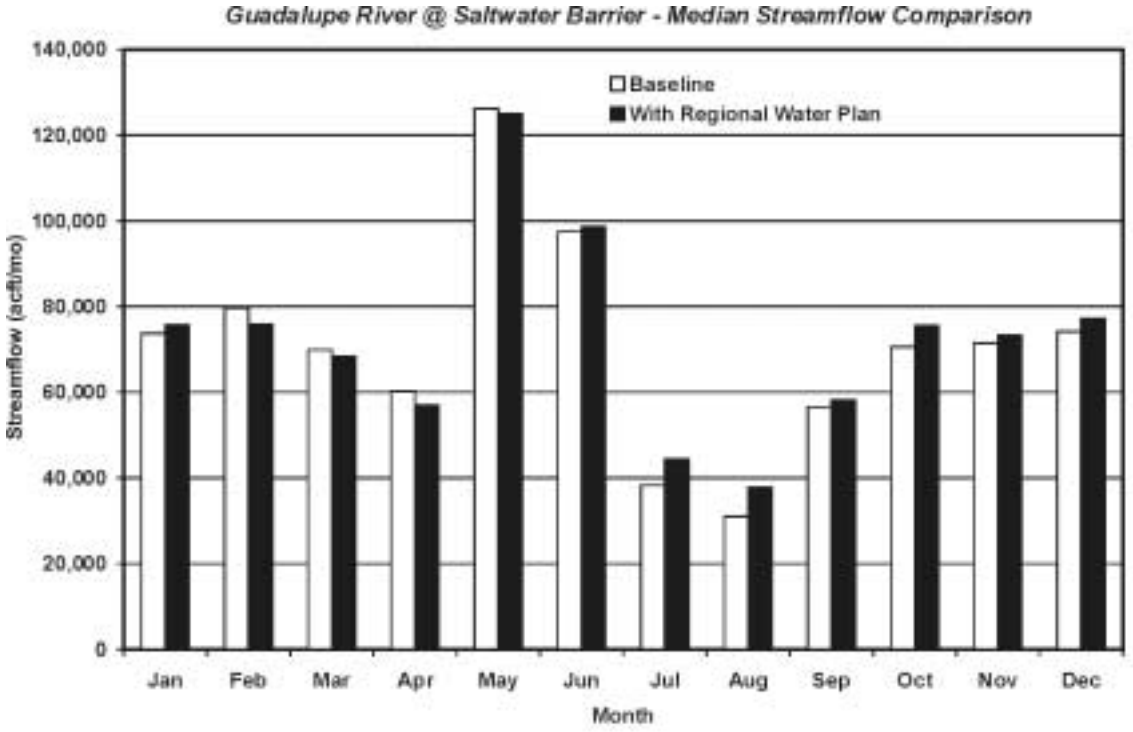


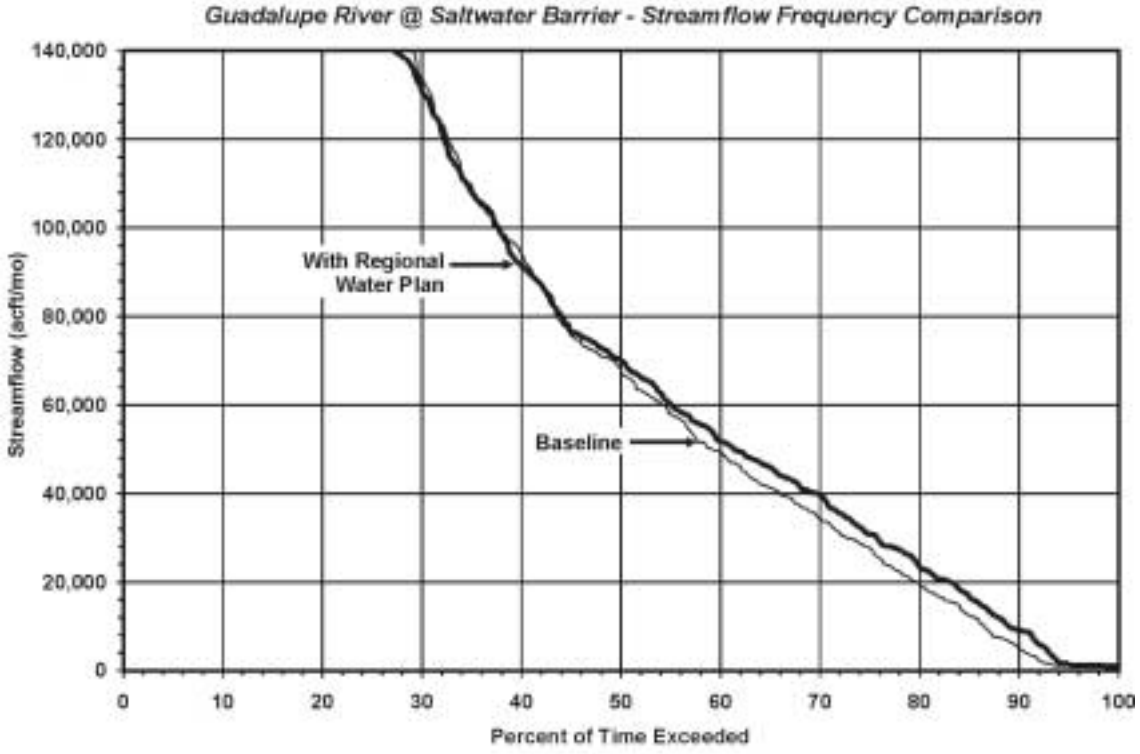
Planning Unit Alternative Regional Water Plan
Streamflow Comparisons





Planning Unit Alternative Regional Water Plan
Streamflow Comparisons





Planning Unit Alternative Regional Water Plan
Streamflow Frequency Comparisons

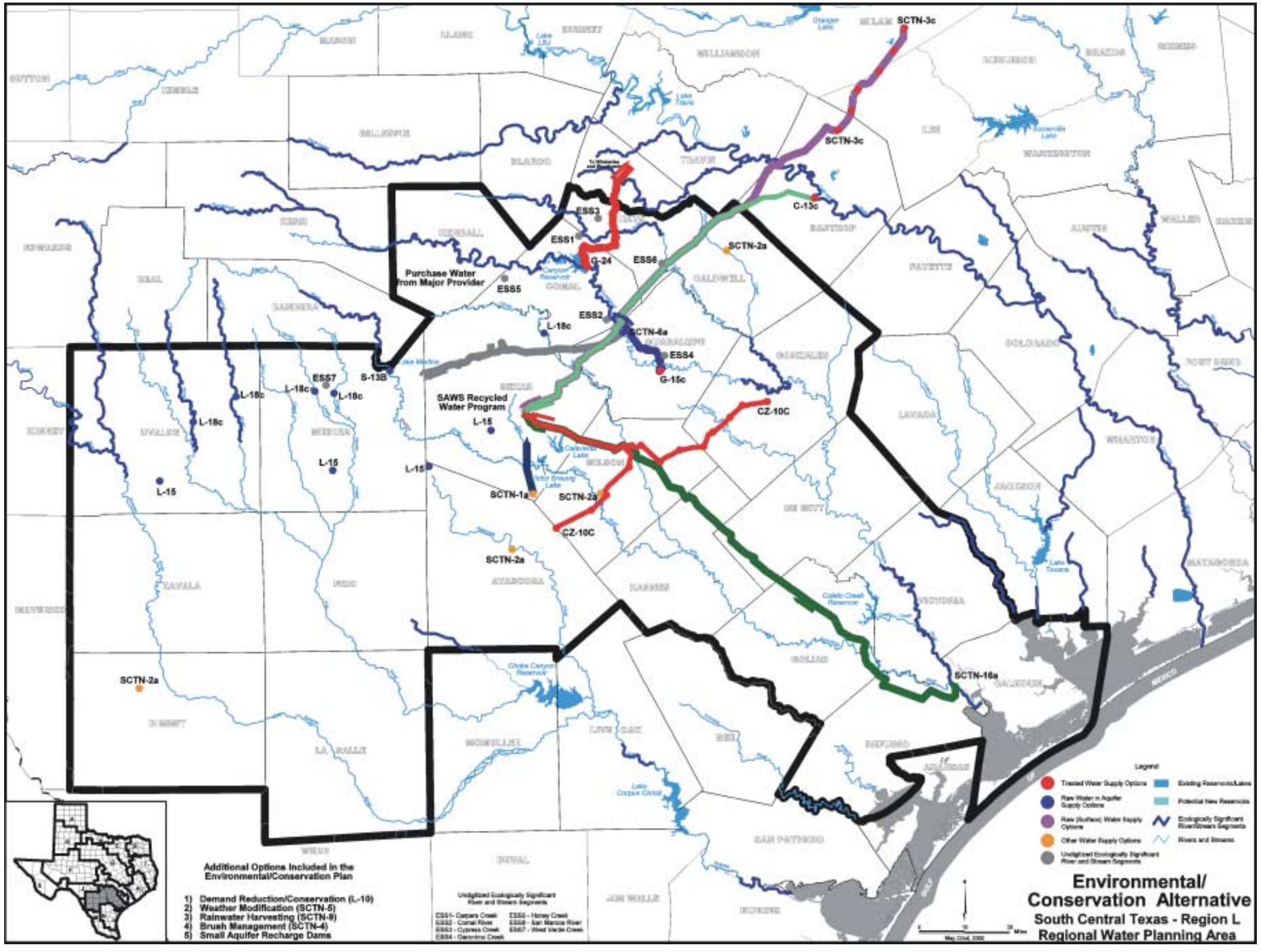
“Environmental/Conservation” Regional Water Management Alternative Plan

South Central Texas Regional Water Planning Group

San Antonio River Authority

HDR Engineering, Inc.

June 13, 2000


SCTN-3c
SCTN-3c
C-13c
ESS3
ESS1
G-24
ESS6
SCTN-2a
Purchase Water from Major Provider
ESS5
ESS2
L-18c
SCTN-4a
ESS4
G-15c
ESS7
S-13B
L-18c
L-18c
L-18c
L-18c
SAWS Recycled Water Program
L-15
CZ-10C
L-15
L-15
L-15
SCTN-1a
SCTN-2a
CZ-10C
SCTN-2a
SCTN-16a
Additional Options Included in the Environmental/Conservation Plan
1) Demand Reduction/Conservation (L-10)
2) Weather Modification (SCTN-5)
3) Rainwater Harvesting (SCTN-9)
4) Brush Management (SCTN-4)
5) Small Aquifer Recharge Dams
Undigitized Ecologically Significant River and Stream Segments
ESS1- Dapers Creek
ESS2 - Comal River
ESS3 - Cypress Creek
ESS4 - Geronimo Creek
ESS5 - Honey Creek
ESS6 - San Marcos River
ESS7 - West Verde Creek
Legend
Treated Water Supply Options
Raw Water in Aquifer Supply Options
Raw (Surface) Water Supply Options
Other Water Supply Options
Undigitized Ecologically Significant River and Stream Segments
Existing Reservoirs/Lakes
Potential New Reservoirs
Ecologically Significant River/Stream Segments
Rivers and Streams
Environmental/ Conservation Alternative
South Central Texas - Region L
Regional Water Planning Area

South Central Texas Region Alternative Water Plans

Alternative Name: **Environmental/Conservation**

Alternative ID: **E/C**

Alternative Description: *The Environmental/Conservation Alternative Regional Water Plan is predicated on the development of water supply options having the least expected environmental impacts and on the implementation of advanced conservation measures as assumed in the water demand projections adopted for the South Central Texas Region. Potential environmental impacts of various water supply options were assessed in a qualitative manner through consideration of endangered species, unique stream segments, bays & estuaries, instream flows, riparian forests, cultural resources, size/habitat, water quality, and sustainability. Efficiency, as reflected in unit cost, is considered as a secondary criterion for selection of water supply options for inclusion in this alternative regional water plan.*

The following water supply options are included in the Environmental/Conservation Alternative Regional Water Plan (in no particular order):

1. *Demand Reduction / Conservation (L-10)*
2. *Edwards Irrigation Transfers (L-15)*
3. *Medina Lake Recharge Enhancement (S-13B)*
4. *SAWS Recycled Water Program*
5. *Colorado R. @ Bastrop – LCRA Stored Water (C-13C)*
6. *Carrizo Aquifer – Wilson & Gonzales Counties (CZ-10C)*
7. *Lower Guadalupe River Diversions (SCTN-16a)*
8. *Edwards Recharge – Type 2 Projects (L-18c)*
9. *Edwards Recharge – Guadalupe R. Diversions (SCTN-6a)*
10. *Simsboro Aquifer (SCTN-3c)*
11. *Canyon Reservoir (G-15C)*
12. *Carrizo Aquifer – Local Supply (SCTN-2a)*
13. *Wimberley & Woodcreek – Canyon (G-24)*
14. *Regional Aquifer Storage & Recovery (SCTN-1a)*
15. *Weather Modification (SCTN-5)*
16. *Rainwater Harvesting (SCTN-9)*
17. *Brush Management (SCTN-4)*

Environmental/Conservation Alternative Regional Water Plan
Summary of Key Information for
South Central Texas Regional Water Planning Group

Quantity, Reliability, and Cost

- Plan includes management supplies to meet projected needs, ensure reliability, and maintain springflow, resulting in a quantity of additional water supplies sufficient to meet projected needs for municipal, industrial, steam-electric power, and mining uses through the year 2050.
- Cost is below the average for the five alternative plans under consideration.

Environmental Factors

- Greatest increase in median annual streamflow in the San Antonio River and least decrease in median annual freshwater inflow to the Guadalupe Estuary among the five alternative plans under consideration.
- Above average concerns with Endangered & Threatened Species and Cultural Resources among the five alternative plans under consideration.

Impacts on Water Resources

- No unmitigated reductions in water available to existing water rights.
- Long-term reductions in water levels in the Carrizo Aquifer. Drawdown would be less than the average for the five alternative plans under consideration.

Impacts on Agriculture and Natural Resources

- Major commitment to municipal and irrigation water Demand Reduction (Conservation) (L-10).
- Includes Brush Management (SCTN-4) and Weather Modification (SCTN-5).
- Inclusion of water supply options to meet projected irrigation needs in full is estimated to be economically infeasible at this time. Weather Modification (SCTN-5) assists irrigation and dry-land agriculture (crops and ranching).
- Includes maximum potential voluntary transfer of Edwards Aquifer irrigation permits to municipal permits through lease or purchase.
- Includes Medina Lake - Recharge Enhancement (S-13B) which reduces or eliminates water supplies from the Medina Lake System for irrigation in Bexar, Medina, and Atascosa Counties.

Other Relevant Factors per SCTRWPG

Comparison of Strategies to Meet Needs

- Selection of water supply options comprising the alternative plan based on implementation of advanced conservation measures and minimization of environmental impacts.

Interbasin Transfer Issues

- Projected non-irrigation needs in basin(s) of origin are met throughout the planning period.
- Plan includes two interbasin transfers: 1) Edwards Recharge – Guadalupe River Diversions (SCTN-6a) from the Guadalupe River near Lake Dunlap to the outcrop of the Edwards Aquifer in the San Antonio River Basin; and 2) LCRA Stored Water (C-13C) from the Colorado River at Bastrop to Bexar County.
- Plan includes one potential interbasin transfer from the Saltwater Barrier at the confluence of the Guadalupe and San Antonio Rivers (SCTN-16a) to Bexar County.

Third-Party Impacts of Voluntary Redistribution of Water

- Potential positive or negative effects of Edwards Irrigation Transfers (L-15).
- Lower water levels in some portions of the Carrizo Aquifer.

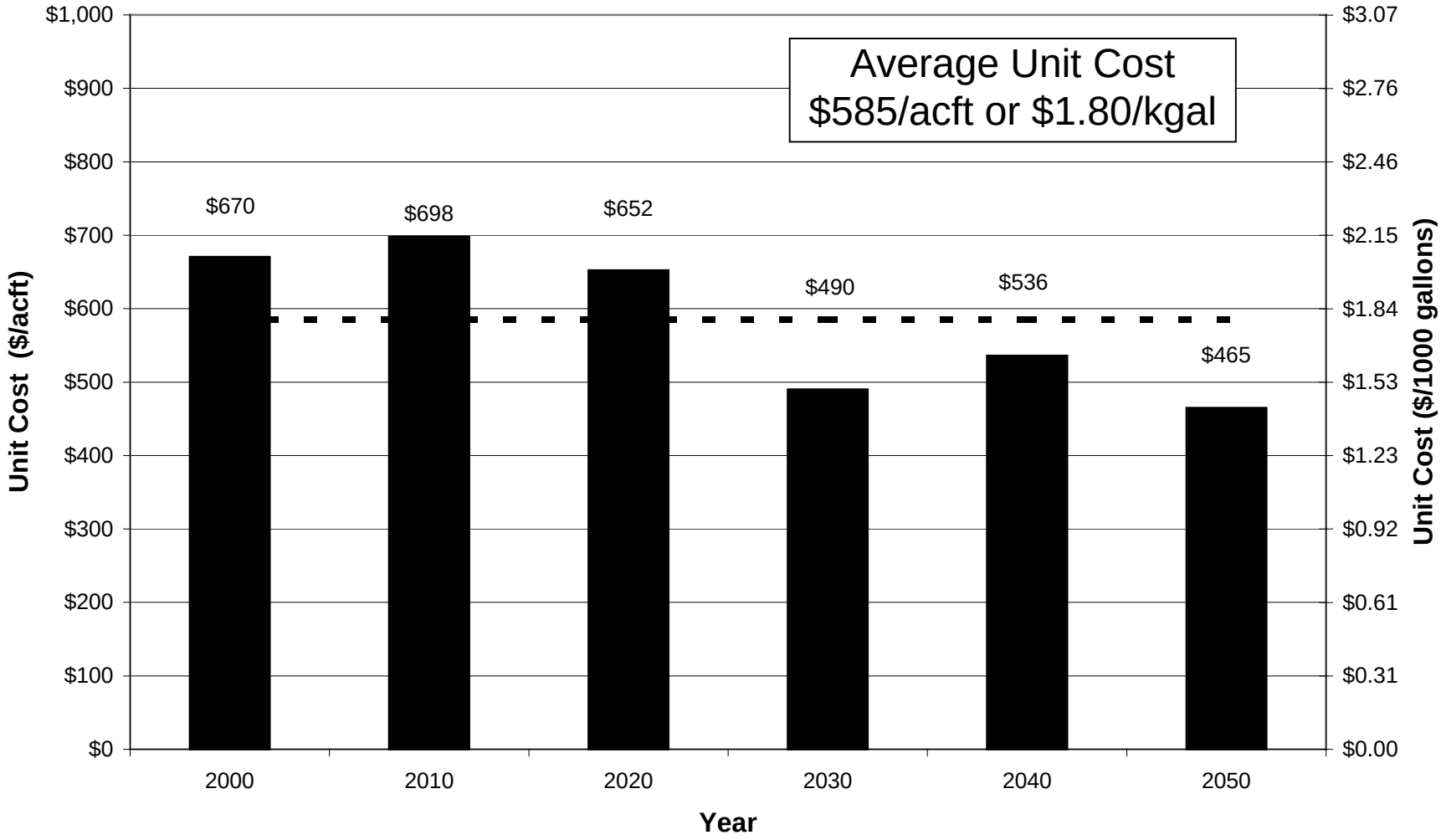
Regional Efficiency

- Edwards Irrigation Transfers (L-15) require no new facilities. Transferred water would likely be available at or very near locations having projected municipal, industrial, steam-electric power, and mining needs in Uvalde, Medina, Atascosa, and Bexar Counties.
- Terminal storage and regional water treatment facilities in Bexar County increase efficiency, improve reliability, and reduce unit cost.
- San Antonio Water System Regional Aquifer Storage & Recovery System (SCTN-1a) substantially reduces peak summer pumpage from the Edwards Aquifer.
- Edwards Recharge – Guadalupe River Diversions (SCTN-6a) provides for recovery and recirculation of enhanced Comal springflow resulting from implementation of Edwards Recharge – Type 2 Projects (L-18c).

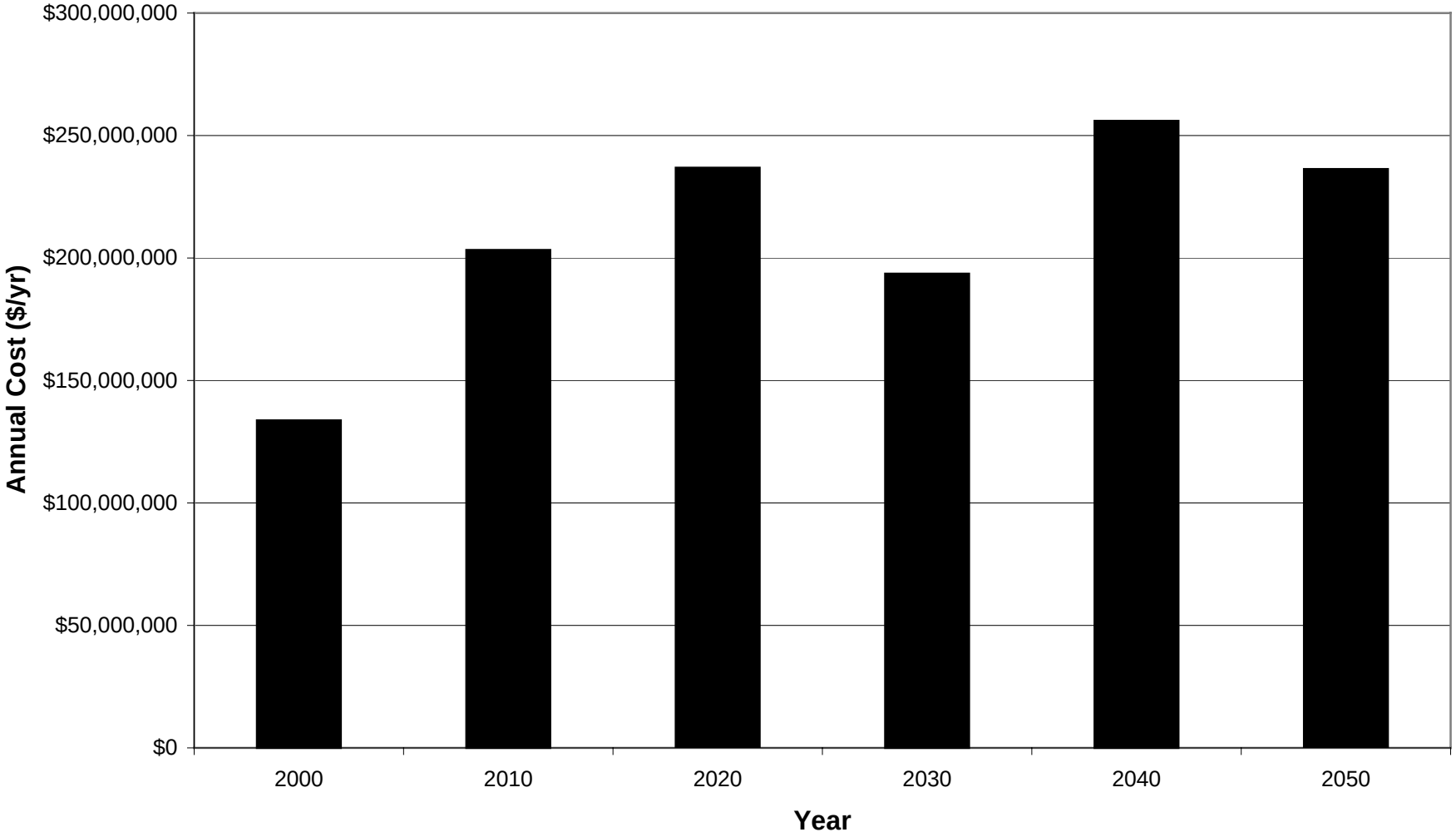
Effect on Navigation

- Not applicable.

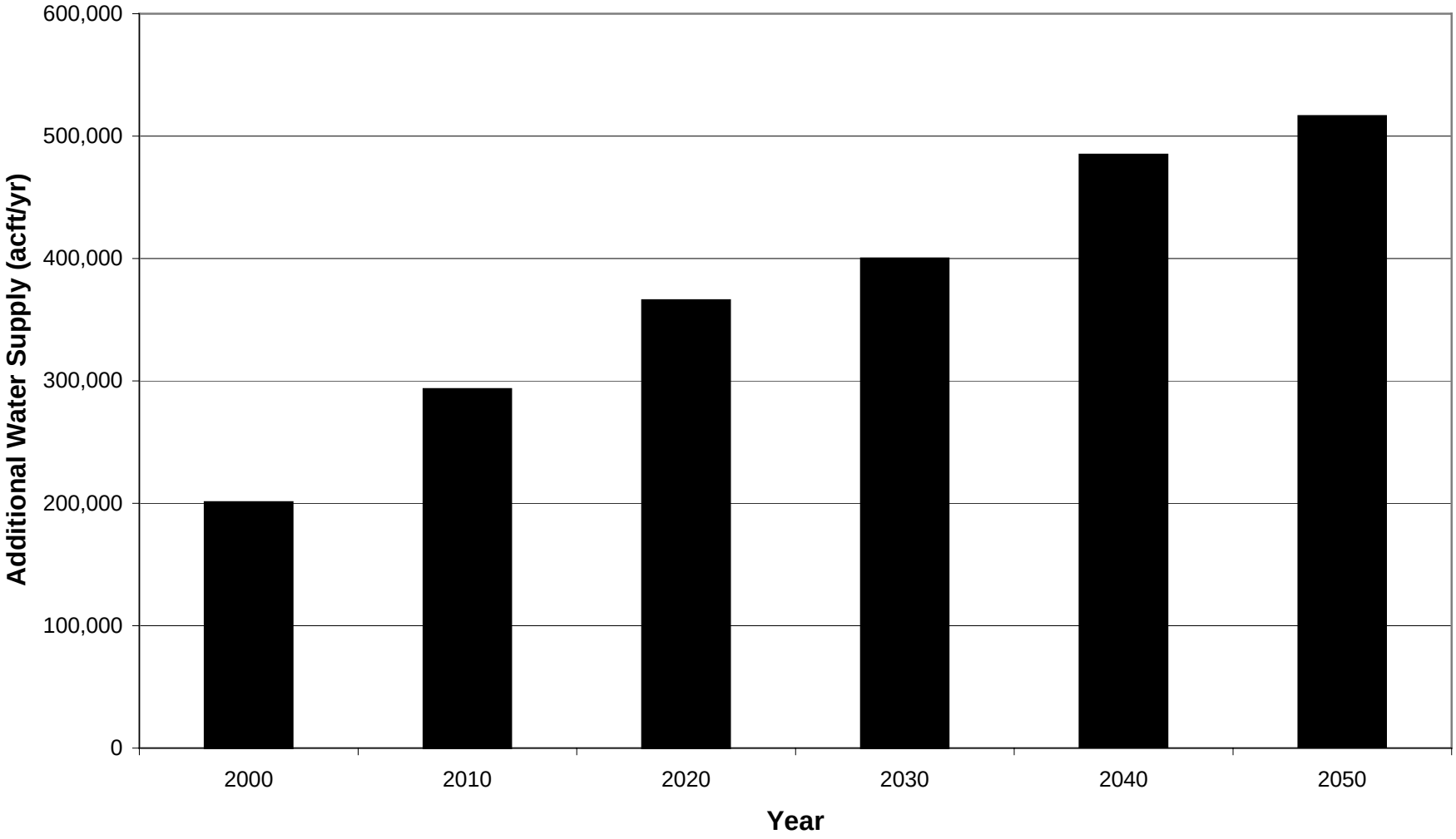
Environmental/Conservation Alternative Regional Water Plan
Unit Cost of Cumulative Additional Water Supply



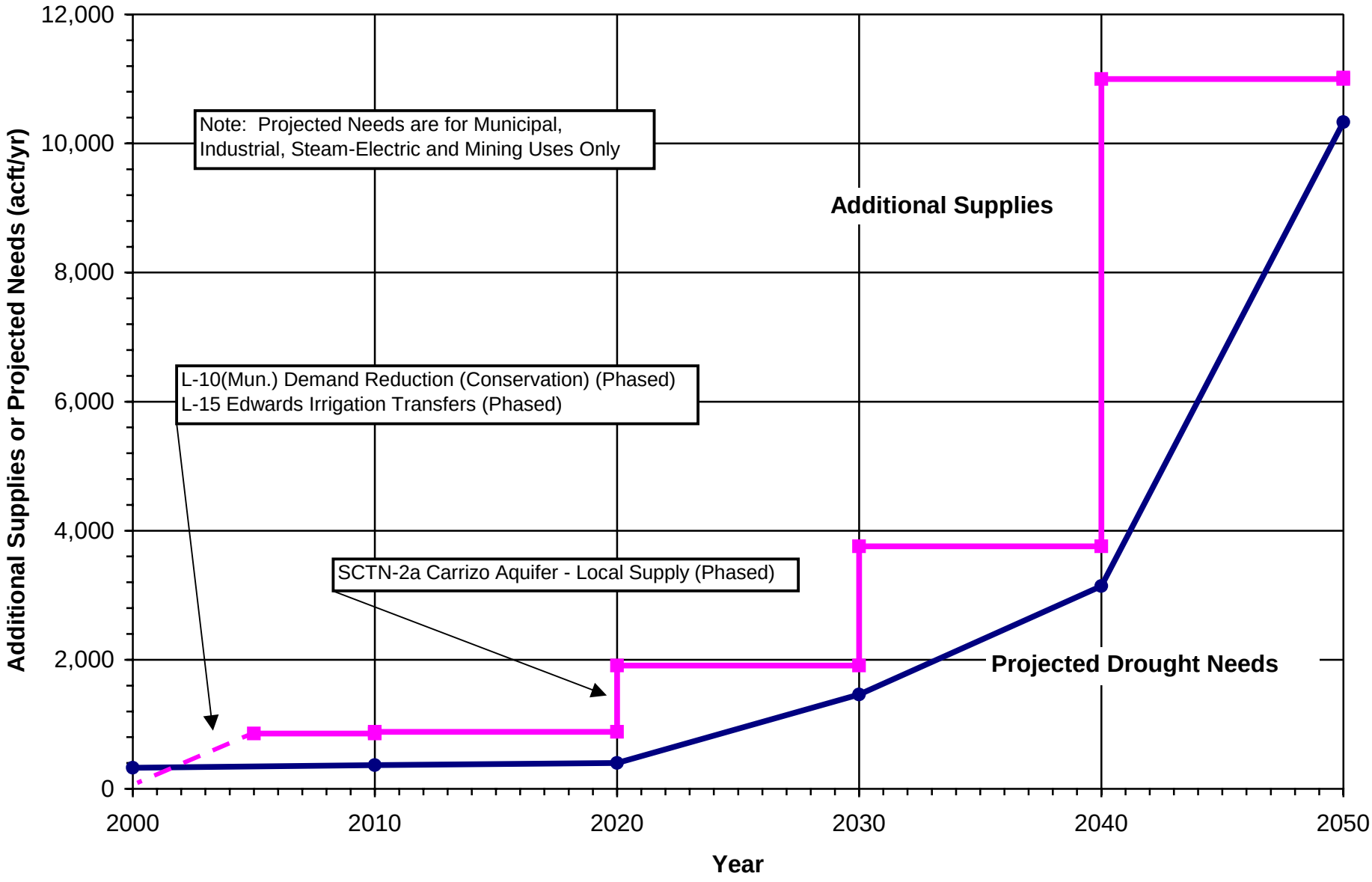
Environmental/Conservation Alternative Regional Water Plan
Annual Cost of Cumulative Additional Water Supply



Environmental/Conservation Alternative Regional Water Plan
Cumulative Additional Water Supply



Environmental/Conservation Alternative Regional Water Plan
Atascosa County

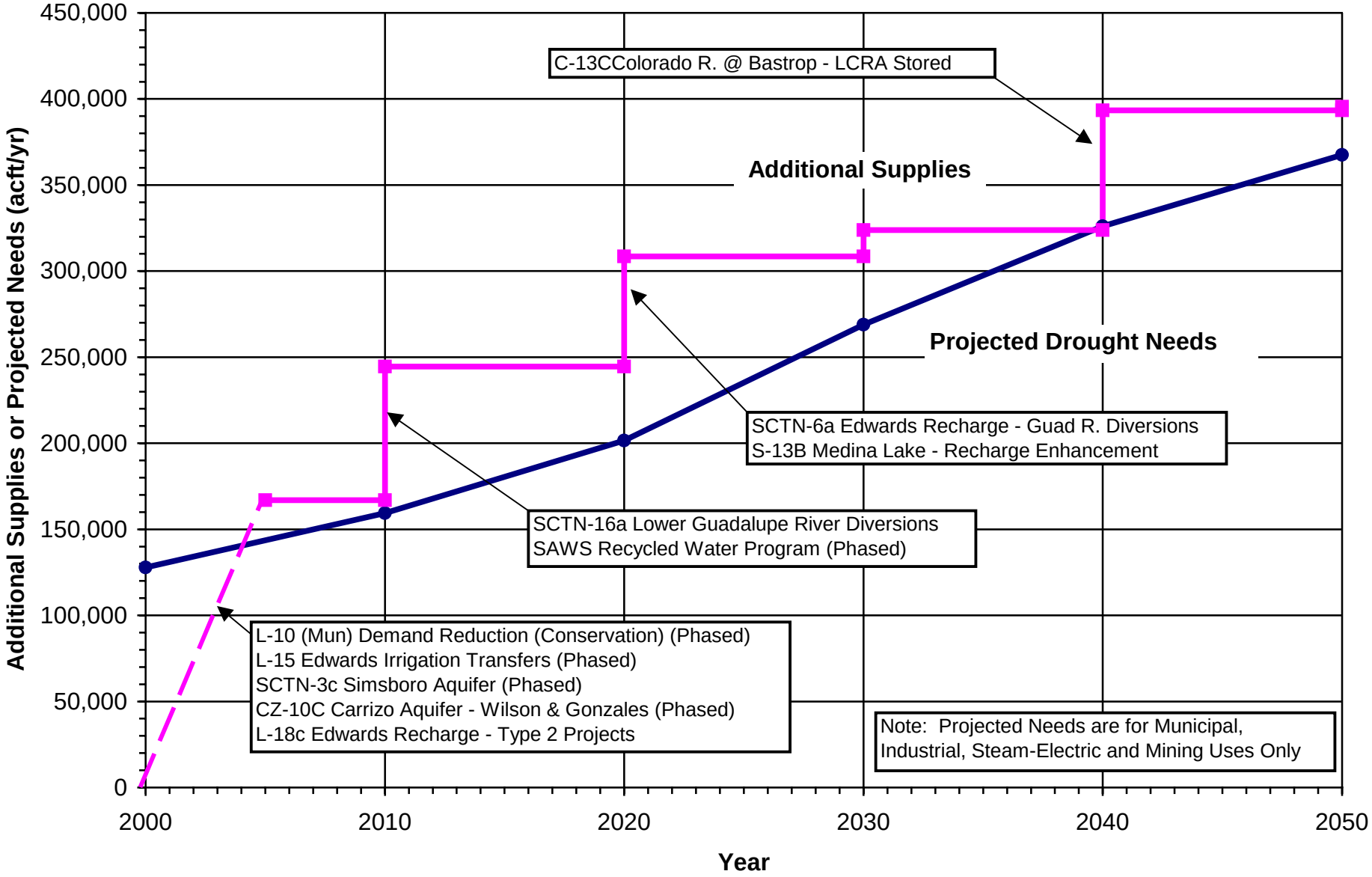


Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						County =	Atascosa	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	325	366	401	468	530	587	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	1,504	8,504	
	Mining	0	0	0	995	1,109	1,239	
	Irrigation	38,418	36,718	35,170	43,726	42,190	40,713	
	Total Needs	**38,743**	**37,084**	**35,571**	**45,189**	**45,333**	**51,043**	
	Mun, Ind, S-E, & Min Needs	**325**	**366**	**401**	**1,463**	**3,143**	**10,330**	
	Irrigation Needs	**38,418**	**36,718**	**35,170**	**43,726**	**42,190**	**40,713**	
Water Supply Options (acft/yr)	**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		356	384	411	259	300	319	1
L-15	Edwards Irrigation Transfers	81,000	500	500	500	500	700	700	2, 3, 4
SCTN-2a	Carrizo Aquifer - Local Supply					1,000	3,000	10,000	5, 6
SCTN-4	Brush Management								7
SCTN-5	Weather Modification								7
SCTN-9	Rainwater Harvesting								7
	Small Aquifer Recharge Dams								7
L-10 (Irr.)	Demand Reduction (Conservation)		3,692	3,692	3,692	3,692	3,692	3,692	8
	Total New Supplies		**4,548**	**4,576**	**4,603**	**5,451**	**7,692**	**14,711**	
	Total System Mgmt. Supply / Deficit		**-34,195**	**-32,508**	**-30,968**	**-39,738**	**-37,641**	**-36,332**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**531**	**518**	**510**	**296**	**857**	**689**	
	Irrigation System Mgmt. Supply / Deficit		**-34,726**	**-33,026**	**-31,478**	**-40,034**	**-38,498**	**-37,021**	

Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Additional Edwards supply is for City of Lytle.
5	Additional Carrizo supply is for Steam-Electric and Mining use.
6	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
7	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
8	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation
	application rate.

Environmental/Conservation Alternative Regional Water Plan
Bexar County

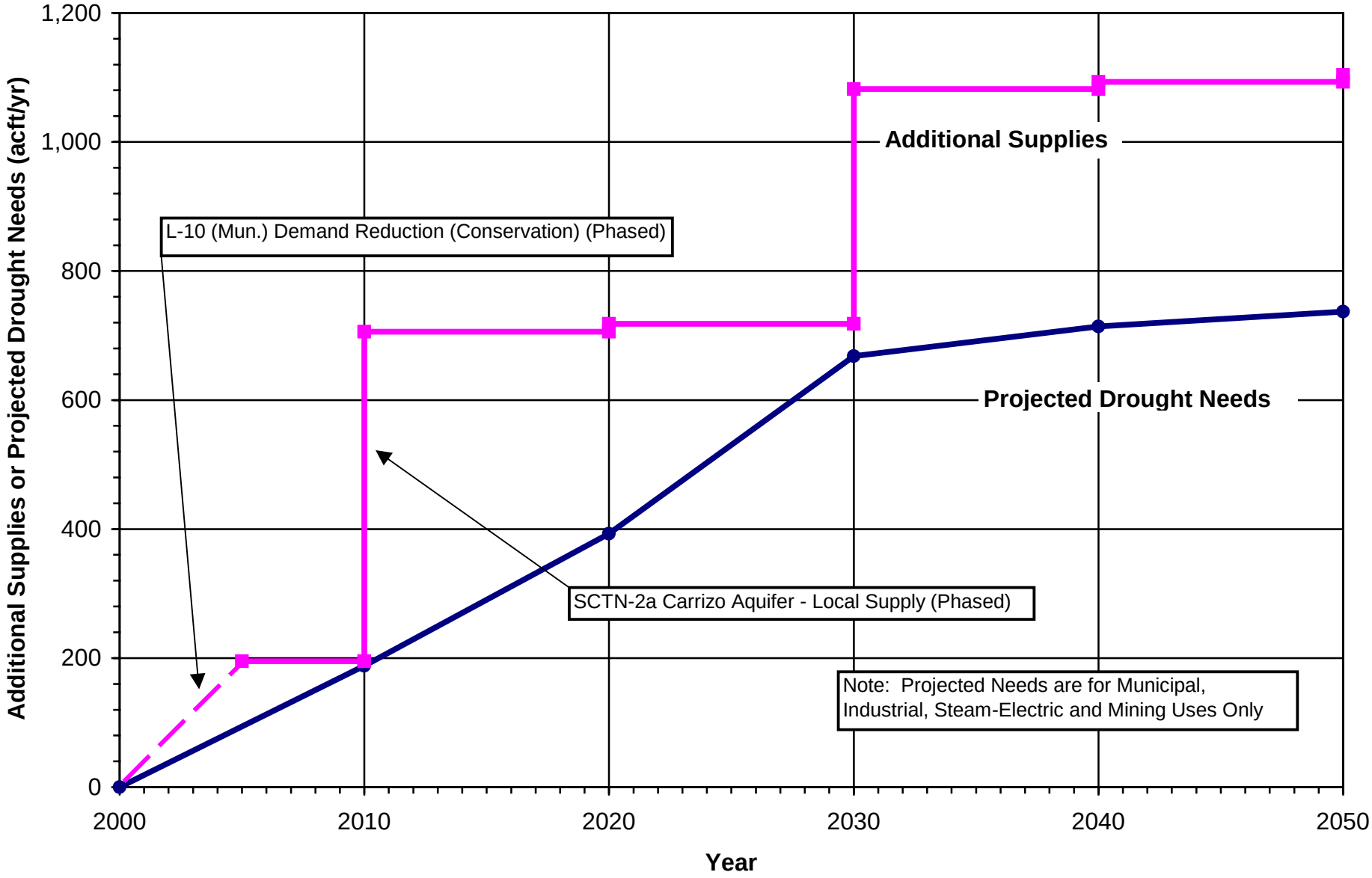


Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						County =	Bexar	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		122,867	154,495	196,301	262,070	315,633	353,309	
Industrial		0	0	0	1,430	4,759	8,192	
Steam-Electric		0	0	0	0	0	0	
Mining		4,963	4,936	5,201	5,406	5,645	5,962	
Irrigation		22,575	20,374	19,585	19,015	18,385	17,368	
Total Needs		**150,405**	**179,805**	**221,087**	**287,921**	**344,422**	**384,831**	
Mun, Ind, S-E, & Min Needs		**127,830**	**159,431**	**201,502**	**268,906**	**326,037**	**367,463**	
Irrigation Needs		**22,575**	**20,374**	**19,585**	**19,015**	**18,385**	**17,368**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		33,528	42,509	41,210	36,533	38,834	40,934	1
L-15 Edwards Irrigation Transfers	81,000	50,000	55,000	60,000	65,000	70,000	71,300	2, 3
SCTN-3c Simsboro Aquifer	55,000	51,000	48,000	41,000	27,000	16,500	0	4
CZ-10C Carrizo Aquifer - Wilson & Gonzales	75,000	19,000	19,000	29,000	49,000	64,000	70,500	5
L-18c Edwards Recharge - Type 2 Projects	13,451	13,451	13,451	13,451	13,451	13,451	13,451	
SCTN-16a Lower Guadalupe River Diversions	46,813		46,813	46,813	46,813	46,813	46,813	
SAWS Recycled Water Program			19,826	26,737	35,824	43,561	52,215	6, 7
SCTN-6a Edwards Recharge - Guad. R. Diversions	42,121			42,121	42,121	42,121	42,121	
S-13B Medina Lake - Recharge Enhancement	8,136			8,136	8,136	8,136	8,136	
C-13C Colorado R. @ Bastrop - LCRA Stored	50,000					50,000	50,000	8
SCTN-1a Aquifer Storage & Recovery - Regional								9
SCTN-4 Brush Management								10
SCTN-5 Weather Modification								10
SCTN-9 Rainwater Harvesting								10
Small Aquifer Recharge Dams								10
L-10 (Irr.) Demand Reduction (Conservation)		4,521	4,521	4,521	4,521	4,521	4,521	11
Total New Supplies		**171,500**	**249,120**	**312,989**	**328,399**	**397,937**	**399,991**	
Total System Mgmt. Supply / Deficit		**21,095**	**69,315**	**91,902**	**40,478**	**53,515**	**15,160**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**39,149**	**85,168**	**106,966**	**54,972**	**67,379**	**28,007**	
Irrigation System Mgmt. Supply / Deficit		**-18,054**	**-15,853**	**-15,064**	**-14,494**	**-13,864**	**-12,847**	

Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Candidate New Supply to be shared among Bexar, Comal, and Hays Counties. Effects on regional aquifer levels to be quantified.
5	Candidate New Supply to be shared among Bexar and Guadalupe Counties. Effects on regional aquifer levels to be quantified.
6	Current SAWS Recycled Water Program is included in the 24,941 acft/yr (consumptive reuse) in estimated needs.
7	Future use of recycled water for non-potable uses and based on goal of meeting 20 percent of SAWS projected water demand.
8	Supply dependent upon future water needs in Region K and/or interbasin transfer issues.
9	SAWS ASR program in southern Bexar County increases reliability of Edwards Aquifer supply and reduces seasonal aquifer demands.
10	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
11	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.

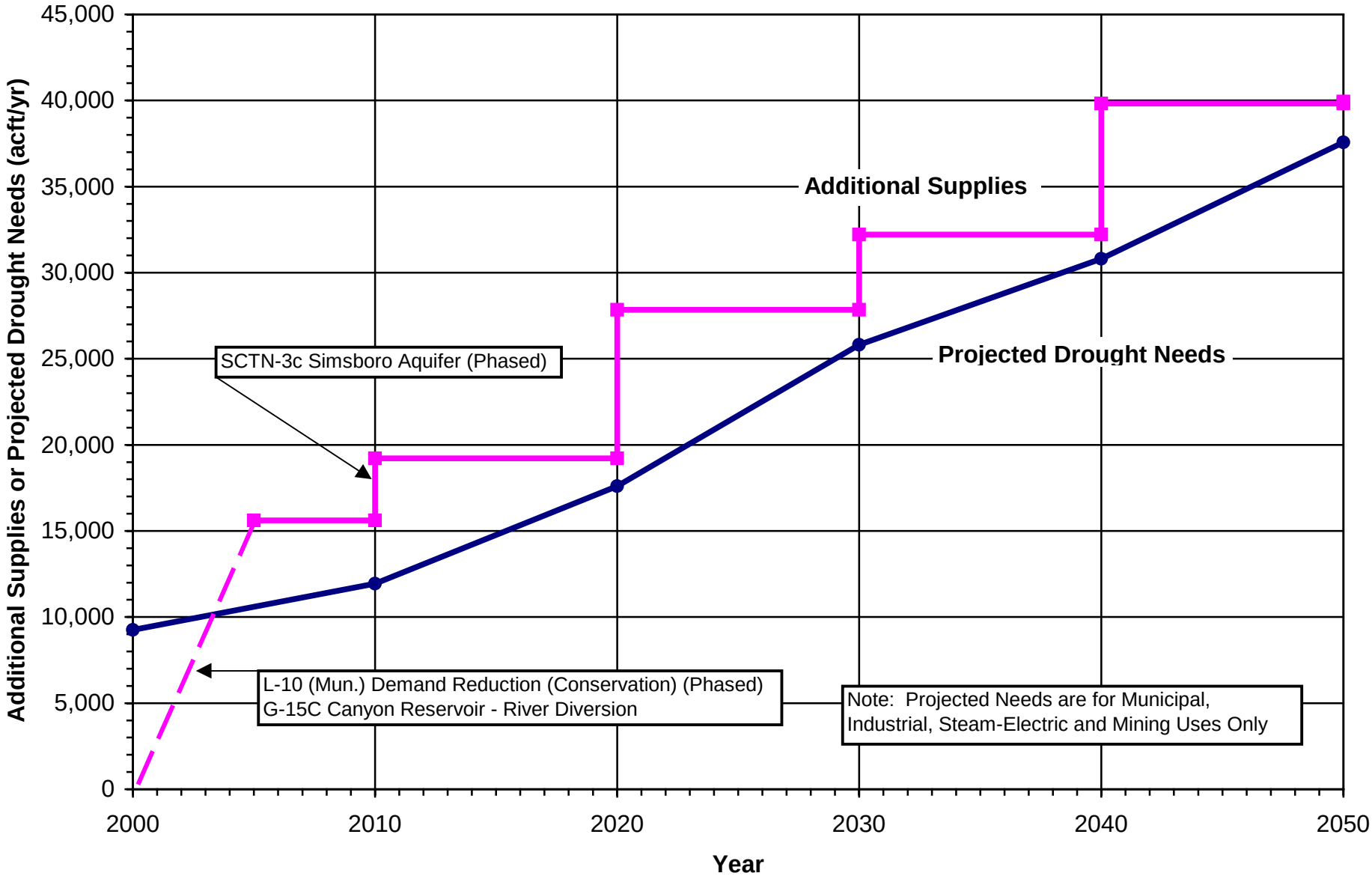
Environmental/Conservation Alternative Regional Water Plan
Caldwell County



Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						County =	Caldwell		
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all		
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		0	188	393	668	714	737	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		0	0	0	0	0	0	
	Total Needs		**0**	**188**	**393**	**668**	**714**	**737**	
	Mun, Ind, S-E, & Min Needs		**0**	**188**	**393**	**668**	**714**	**737**	
	Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		195	206	218	82	93	104	1
SCTN-2a	Carrizo Aquifer - Local Supply			500	500	1,000	1,000	1,000	2
	Small Aquifer Recharge Dams								3
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**195**	**706**	**718**	**1,082**	**1,093**	**1,104**	
	Total System Mgmt. Supply / Deficit		**195**	**518**	**325**	**414**	**379**	**367**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**195**	**518**	**325**	**414**	**379**	**367**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Lockhart.								
3	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

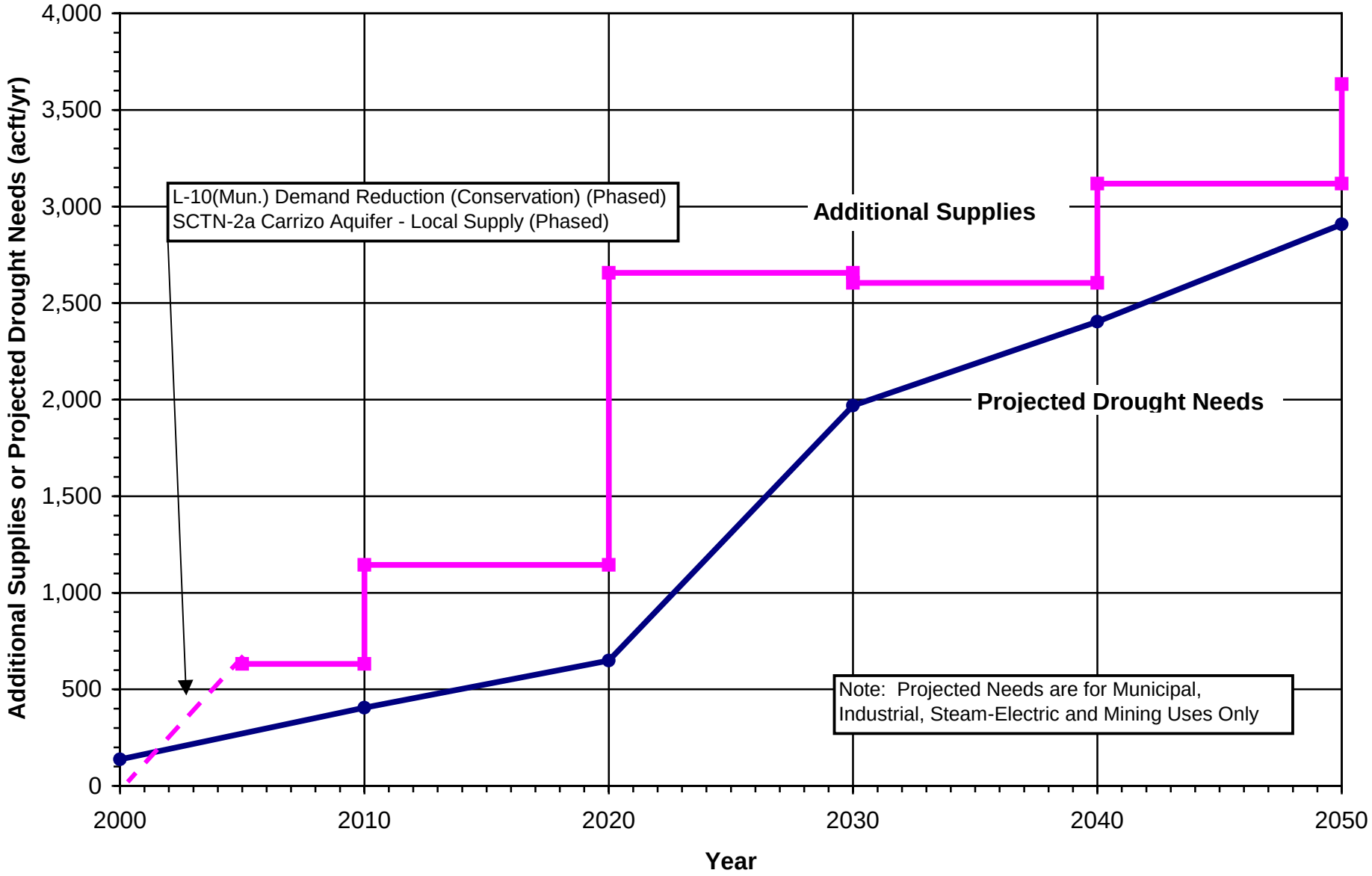
Environmental/Conservation Alternative Regional Water Plan
Comal County



Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						**County =**	**Comal**		
County Summary of Projected Water Needs and Water Supply Options						**User Group(s) =**	**all**		
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		2,289	5,049	10,487	18,282	25,205	33,062	
	Industrial		1,388	1,425	1,486	1,737	2,009	2,289	
	Steam-Electric		0	0	0	0	0	0	
	Mining		5,570	5,464	5,628	5,796	3,590	2,224	
	Irrigation		30	14	0	0	0	0	
	Total Needs		**9,277**	**11,952**	**17,601**	**25,815**	**30,804**	**37,575**	
	Mun, Ind, S-E, & Min Needs		**9,247**	**11,938**	**17,601**	**25,815**	**30,804**	**37,575**	
	Irrigation Needs		**30**	**14**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		616	718	848	718	824	942	1
G-15C	Canyon Reservoir - River Diversion	15,000	15,000	15,000	15,000	15,000	15,000	15,000	2
SCTN-3c	Simsboro Aquifer	55,000			3,500	12,000	16,500	24,000	3, 4
	Small Aquifer Recharge Dams								5
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**15,616**	**15,718**	**19,348**	**27,718**	**32,324**	**39,942**	
	Total System Mgmt. Supply / Deficit		**6,339**	**3,766**	**1,747**	**1,903**	**1,520**	**2,367**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**6,369**	**3,780**	**1,747**	**1,903**	**1,520**	**2,367**	
	Irrigation System Mgmt. Supply / Deficit		**-30**	**-14**	**0**	**0**	**0**	**0**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Portion of Canyon firm yield (with amendment) diverted below Seguin.								
3	Candidate New Supply to be shared among Bexar, Comal, and Hays Counties. Effects on regional aquifer levels to be quantified.								
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

Environmental/Conservation Alternative Regional Water Plan
Dimmit County



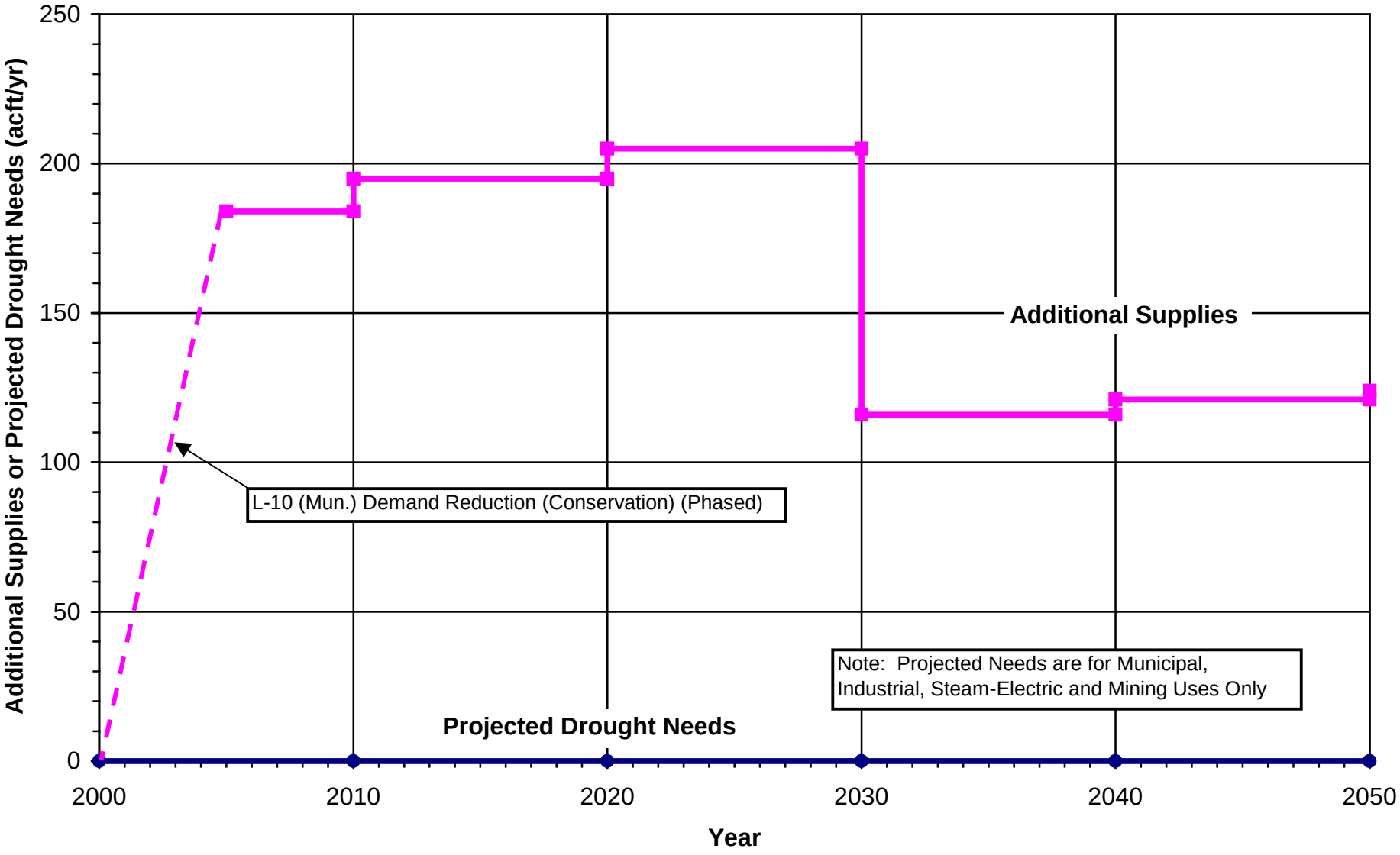
Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						County =	Dimmit	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		138	405	649	1,054	1,479	1,959	
Industrial		0	0	0	0	0	0	
Steam-Electric		0	0	0	0	0	0	
Mining		0	0	0	915	925	949	
Irrigation		0	0	0	2,133	1,737	1,331	
Total Needs		**138**	**405**	**649**	**4,102**	**4,141**	**4,239**	
Mun, Ind, S-E, & Min Needs		**138**	**405**	**649**	**1,969**	**2,404**	**2,908**	
Irrigation Needs		**0**	**0**	**0**	**2,133**	**1,737**	**1,331**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		131	144	156	104	118	133	1
SCTN-2a Carrizo Aquifer - Local Supply		500	1,000	1,000	2,500	3,000	3,500	2, 3
SCTN-4 Brush Management								4
SCTN-5 Weather Modification								4
SCTN-9 Rainwater Harvesting								4
Small Aquifer Recharge Dams								4
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**631**	**1,144**	**1,156**	**2,604**	**3,118**	**3,633**	
Total System Mgmt. Supply / Deficit		**493**	**739**	**507**	**-1,498**	**-1,023**	**-606**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**493**	**739**	**507**	**635**	**714**	**725**	
Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**-2,133**	**-1,737**	**-1,331**	

Notes:

*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Additional well(s) for Carrizo Springs and Mining supply.
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.

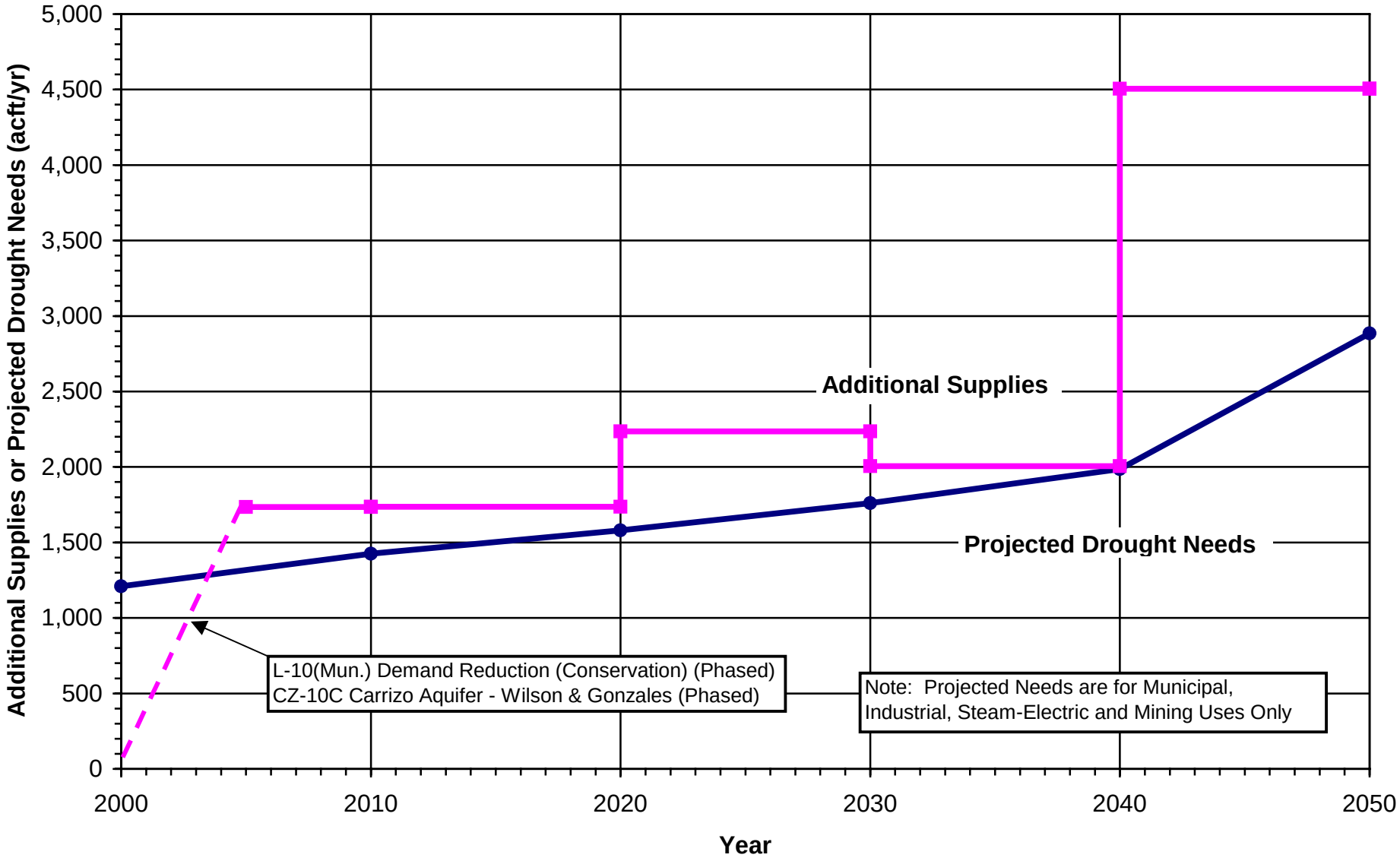
Environmental/Conservation Alternative Regional Water Plan
Frio County



Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						**County =**		**Frio**	
County Summary of Projected Water Needs and Water Supply Options						**User Group(s) =**		**all**	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		0	0	0	0	0	0	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		71,126	67,646	64,365	76,505	73,519	70,662	
	Total Needs		**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
	Mun, Ind, S-E, & Min Needs		**0**	**0**	**0**	**0**	**0**	**0**	
	Irrigation Needs		**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		184	195	205	116	121	124	1
SCTN-4	Brush Management								2
SCTN-5	Weather Modification								2
SCTN-9	Rainwater Harvesting								2
	Small Aquifer Recharge Dams								2
L-10 (Irr.)	Demand Reduction (Conservation)		5,947	5,947	5,947	5,947	5,947	5,947	3
	Total New Supplies		**6,131**	**6,142**	**6,152**	**6,063**	**6,068**	**6,071**	
	Total System Mgmt. Supply / Deficit		**-64,995**	**-61,504**	**-58,213**	**-70,442**	**-67,451**	**-64,591**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**184**	**195**	**205**	**116**	**121**	**124**	
	Irrigation System Mgmt. Supply / Deficit		**-65,179**	**-61,699**	**-58,418**	**-70,558**	**-67,572**	**-64,715**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation								
	application rate.								

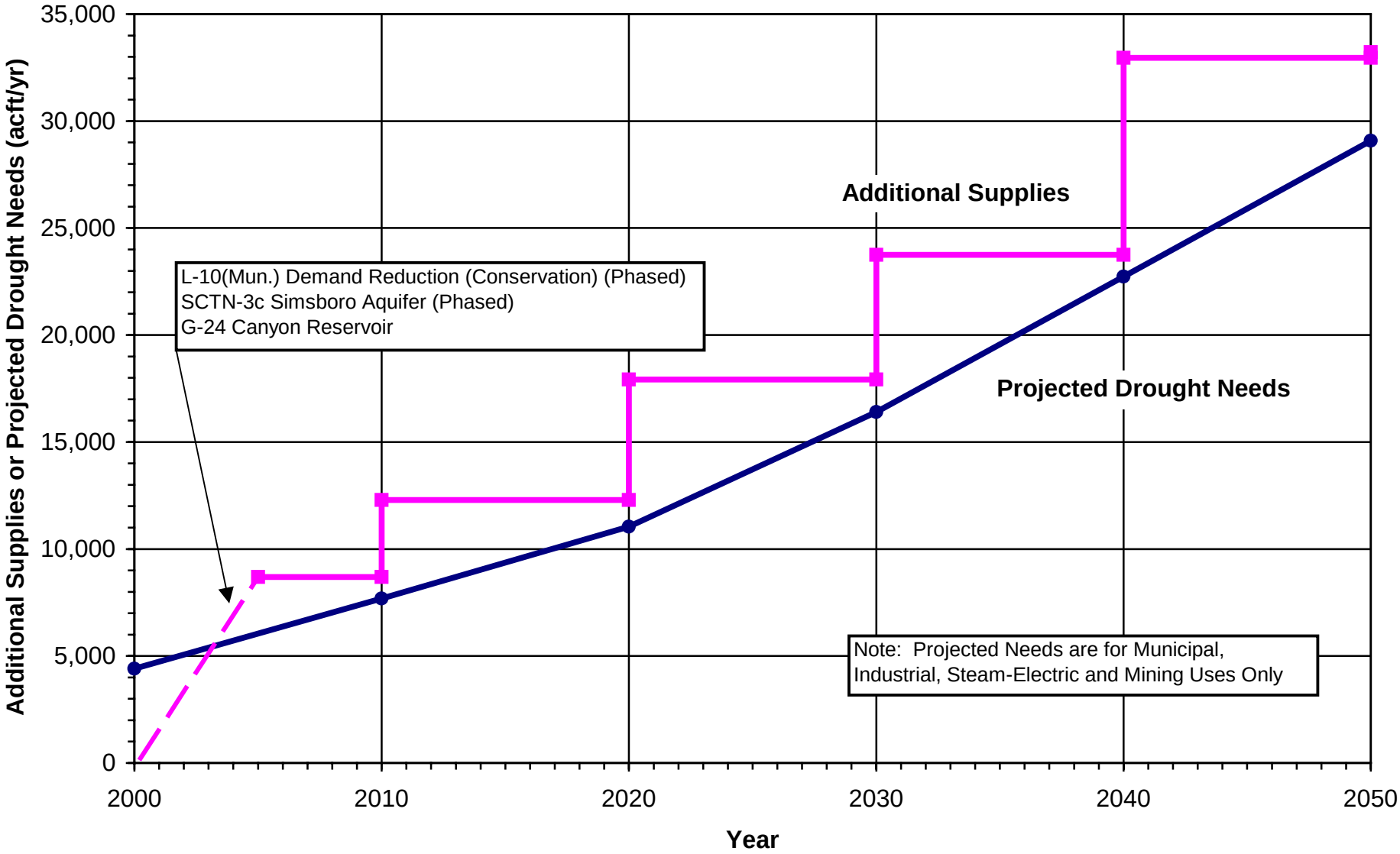
Environmental/Conservation Alternative Regional Water Plan
Guadalupe County



Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						County =	Guadalupe		
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all		
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		29	23	30	71	87	773	
	Industrial		985	1,204	1,350	1,487	1,692	1,899	
	Steam-Electric		0	0	0	0	0	0	
	Mining		196	198	200	202	207	213	
	Irrigation		985	879	779	684	594	508	
	Total Needs		**2,195**	**2,304**	**2,359**	**2,444**	**2,580**	**3,393**	
	Mun, Ind, S-E, & Min Needs		**1,210**	**1,425**	**1,580**	**1,760**	**1,986**	**2,885**	
	Irrigation Needs		**985**	**879**	**779**	**684**	**594**	**508**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		235	236	236	5	5	6	1
CZ-10C	Carrizo Aquifer - Wilson & Gonzales	75,000	1,500	1,500	2,000	2,000	2,500	4,500	2, 3
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**1,735**	**1,736**	**2,236**	**2,005**	**2,505**	**4,506**	
	Total System Mgmt. Supply / Deficit		**-460**	**-568**	**-123**	**-439**	**-75**	**1,113**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**525**	**311**	**656**	**245**	**519**	**1,621**	
	Irrigation System Mgmt. Supply / Deficit		**-985**	**-879**	**-779**	**-684**	**-594**	**-508**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate new supply to be shared by Bexar and Guadalupe Counties. Effects on regional aquifer levels to be quantified.								
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

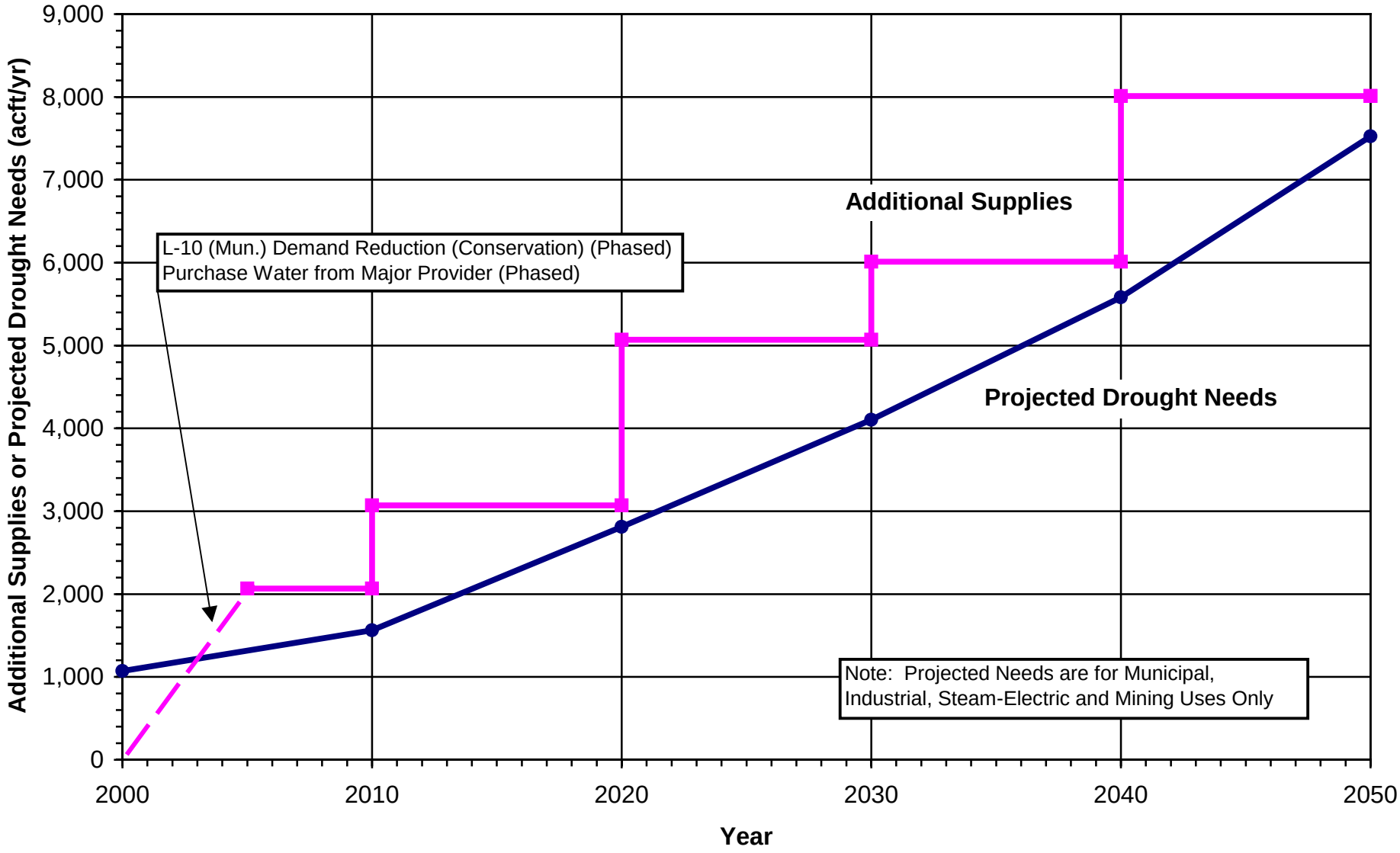
Environmental/Conservation Alternative Regional Water Plan
Hays County



Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						County =	Hays	
County Summary of Projected Water Needs and Water Supply Options					User Group(s) =		all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		4,325	7,609	10,980	16,349	22,696	29,059	
Industrial		0	0	0	0	0	0	
Steam-Electric		0	0	0	0	0	0	
Mining		84	82	68	55	37	28	
Irrigation		0	0	0	0	0	0	
Total Needs		**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
Mun, Ind, S-E, & Min Needs		**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		647	747	873	699	906	1,174	1
SCTN-3c Simsboro Aquifer	55,000	4,000	7,000	10,500	16,000	22,000	31,000	2, 3
G-24 Canyon Reservoir	1,048	1,048	1,048	1,048	1,048	1,048	1,048	4
Small Aquifer Recharge Dams								5
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**5,695**	**8,795**	**12,421**	**17,747**	**23,954**	**33,222**	
Total System Mgmt. Supply / Deficit		**1,286**	**1,104**	**1,373**	**1,343**	**1,221**	**4,135**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,286**	**1,104**	**1,373**	**1,343**	**1,221**	**4,135**	
Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:								
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.							
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.							
2	Candidate New Supply to be shared among Bexar, Comal, and Hays Counties. Effects on regional aquifer levels to be quantified.							
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.							
4	Candidate New Supply for Wimberley and Woodcreek.							
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.							

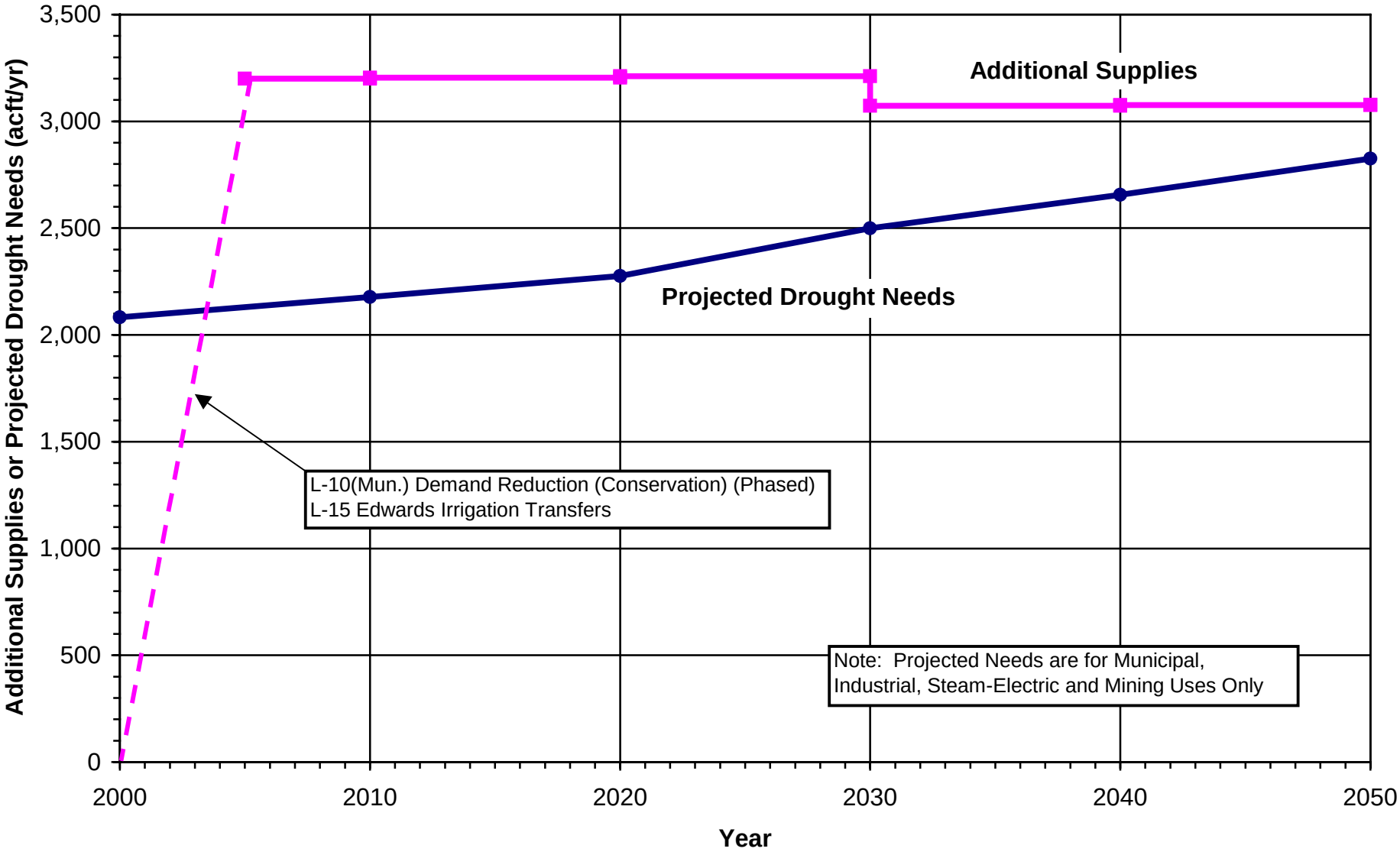
Environmental/Conservation Alternative Regional Water Plan
Kendall County



Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						County =	Kendall	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	1,070	1,560	2,808	4,099	5,578	7,518	
	Industrial	2	3	4	4	5	6	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	0	0	0	0	0	0	
	Total Needs	**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
	Mun, Ind, S-E, & Min Needs	**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
	Irrigation Needs	**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		67	71	71	11	11	11	1
	Purchase Water from Major Provider		2,000	2,000	3,000	5,000	6,000	8,000	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**2,067**	**2,071**	**3,071**	**5,011**	**6,011**	**8,011**	
	Total System Mgmt. Supply / Deficit		**995**	**508**	**259**	**908**	**428**	**487**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**995**	**508**	**259**	**908**	**428**	**487**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Assumed purchase from Bexar County major provider. Kendall County water needs are not reflected in Bexar County table.								
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

Environmental/Conservation Alternative Regional Water Plan
Medina County

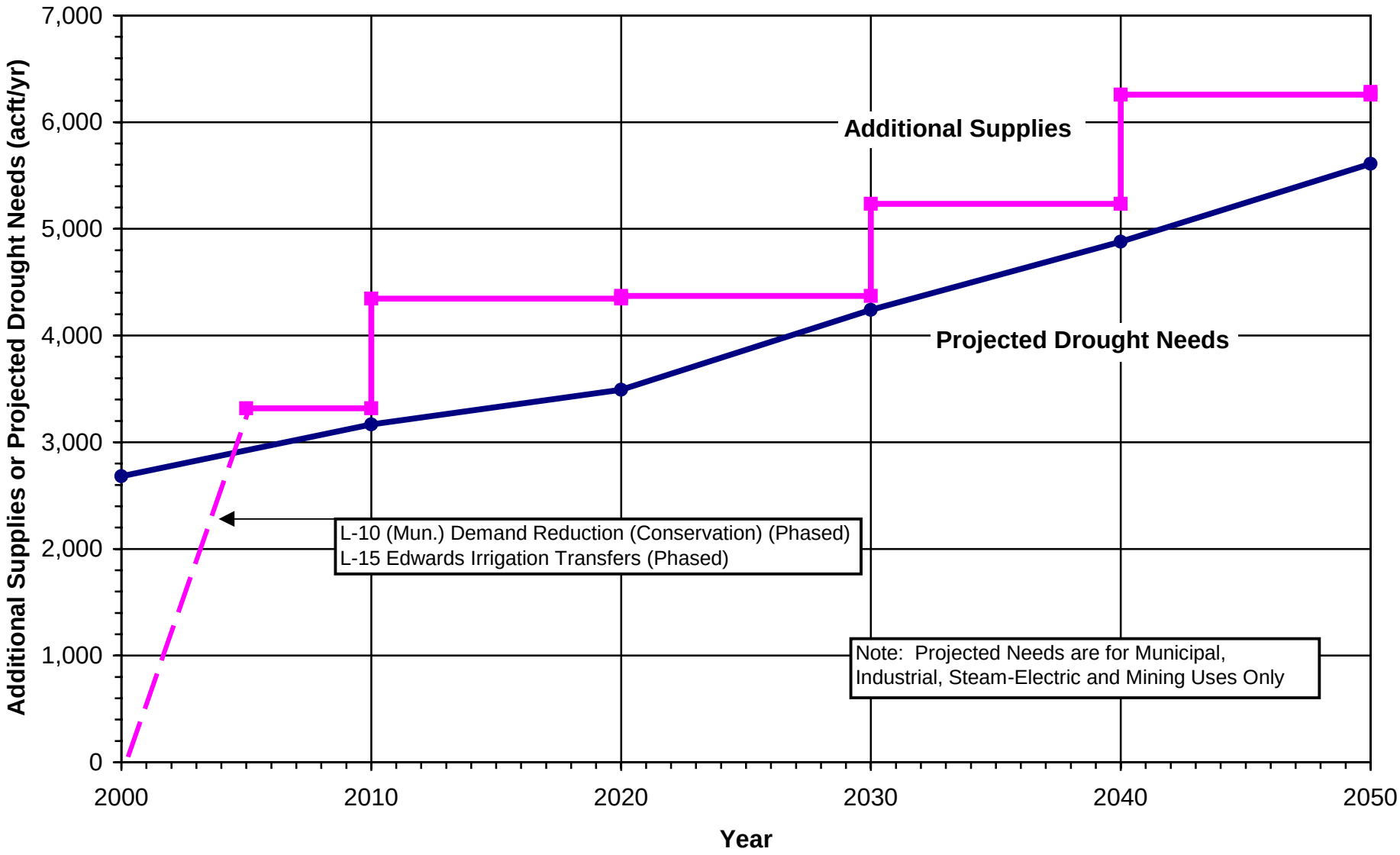


Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						County =	Medina	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	2,015	2,110	2,206	2,427	2,582	2,750	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	68	68	70	72	74	76	
	Irrigation	98,916	95,268	91,320	92,320	88,925	84,692	
	Total Needs	**100,999**	**97,446**	**93,596**	**94,819**	**91,581**	**87,518**	
	Mun, Ind, S-E, & Min Needs	**2,083**	**2,178**	**2,276**	**2,499**	**2,656**	**2,826**	
	Irrigation Needs	**98,916**	**95,268**	**91,320**	**92,320**	**88,925**	**84,692**	
Water Supply Options (acft/yr)	**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		200	205	211	73	76	78	1
L-15	Edwards Irrigation Transfers	50,000	3,000	3,000	3,000	3,000	3,000	3,000	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)		11,867	11,867	11,867	11,867	11,867	11,867	5
	Total New Supplies		**15,067**	**15,072**	**15,078**	**14,940**	**14,943**	**14,945**	
	Total System Mgmt. Supply / Deficit		**-85,932**	**-82,374**	**-78,518**	**-79,879**	**-76,638**	**-72,573**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,117**	**1,027**	**935**	**574**	**420**	**252**	
	Irrigation System Mgmt. Supply / Deficit		**-87,049**	**-83,401**	**-79,453**	**-80,453**	**-77,058**	**-72,825**	

Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
5	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.

Environmental/Conservation Alternative Regional Water Plan
Uvalde County



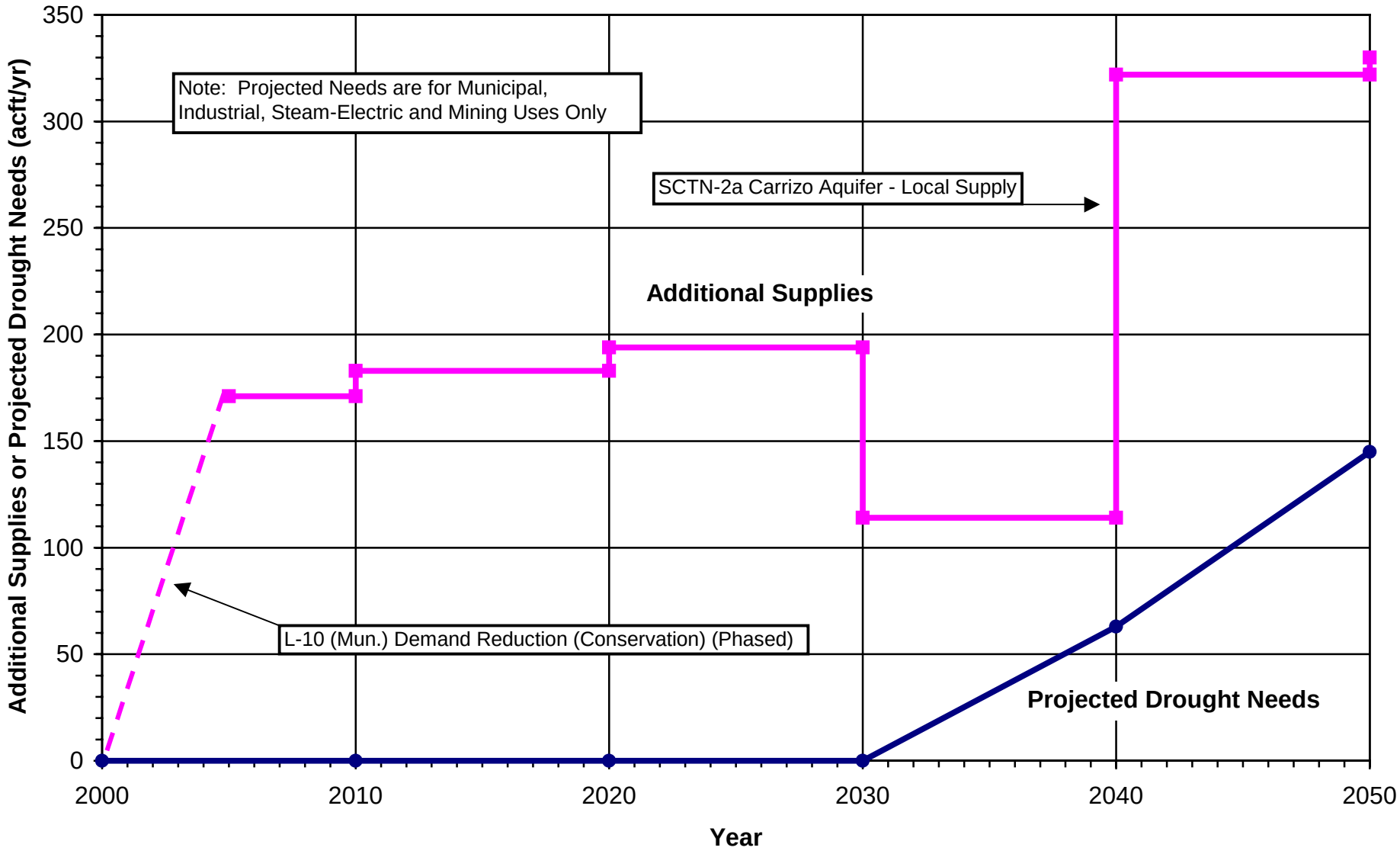
Environmental/Conservation Regional Water Management Alternative Plan

South Central Texas Region						County =	Uvalde	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	2,682	3,166	3,493	4,241	4,880	5,609	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	75,263	72,798	70,154	71,022	68,880	65,676	
	Total Needs	**77,945**	**75,964**	**73,647**	**75,263**	**73,760**	**71,285**	
	Mun, Ind, S-E, & Min Needs	**2,682**	**3,166**	**3,493**	**4,241**	**4,880**	**5,609**	
	Irrigation Needs	**75,263**	**72,798**	**70,154**	**71,022**	**68,880**	**65,676**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		318	346	371	235	258	283	1
L-15	Edwards Irrigation Transfers	81,000	3,000	4,000	4,000	5,000	5,000	6,000	2, 3, 4
SCTN-4	Brush Management								5
SCTN-5	Weather Modification								5
SCTN-9	Rainwater Harvesting								5
	Small Aquifer Recharge Dams								5
L-10 (Irr.)	Demand Reduction (Conservation)		14,143	14,143	14,143	14,143	14,143	14,143	6
	Total New Supplies		**17,461**	**18,489**	**18,514**	**19,378**	**19,401**	**20,426**	
	Total System Mgmt. Supply / Deficit		**-60,484**	**-57,475**	**-55,133**	**-55,885**	**-54,359**	**-50,859**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**636**	**1,180**	**878**	**994**	**378**	**674**	
	Irrigation System Mgmt. Supply / Deficit		**-61,120**	**-58,655**	**-56,011**	**-56,879**	**-54,737**	**-51,533**	

Notes:

*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
6	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.

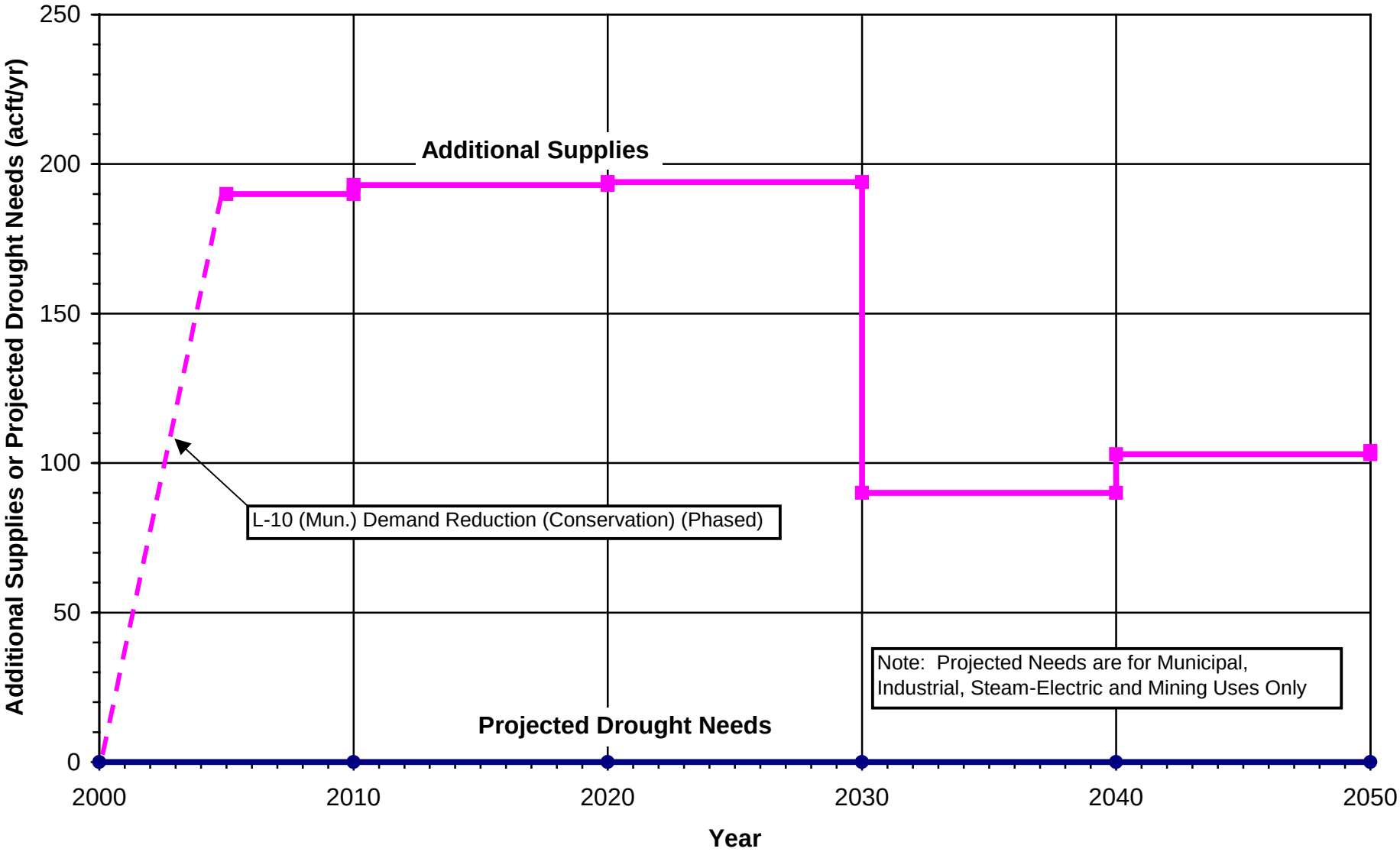
Environmental/Conservation Alternative Regional Water Plan
Wilson County



Environmental/Conservation Regional Water Management Alternative Plan

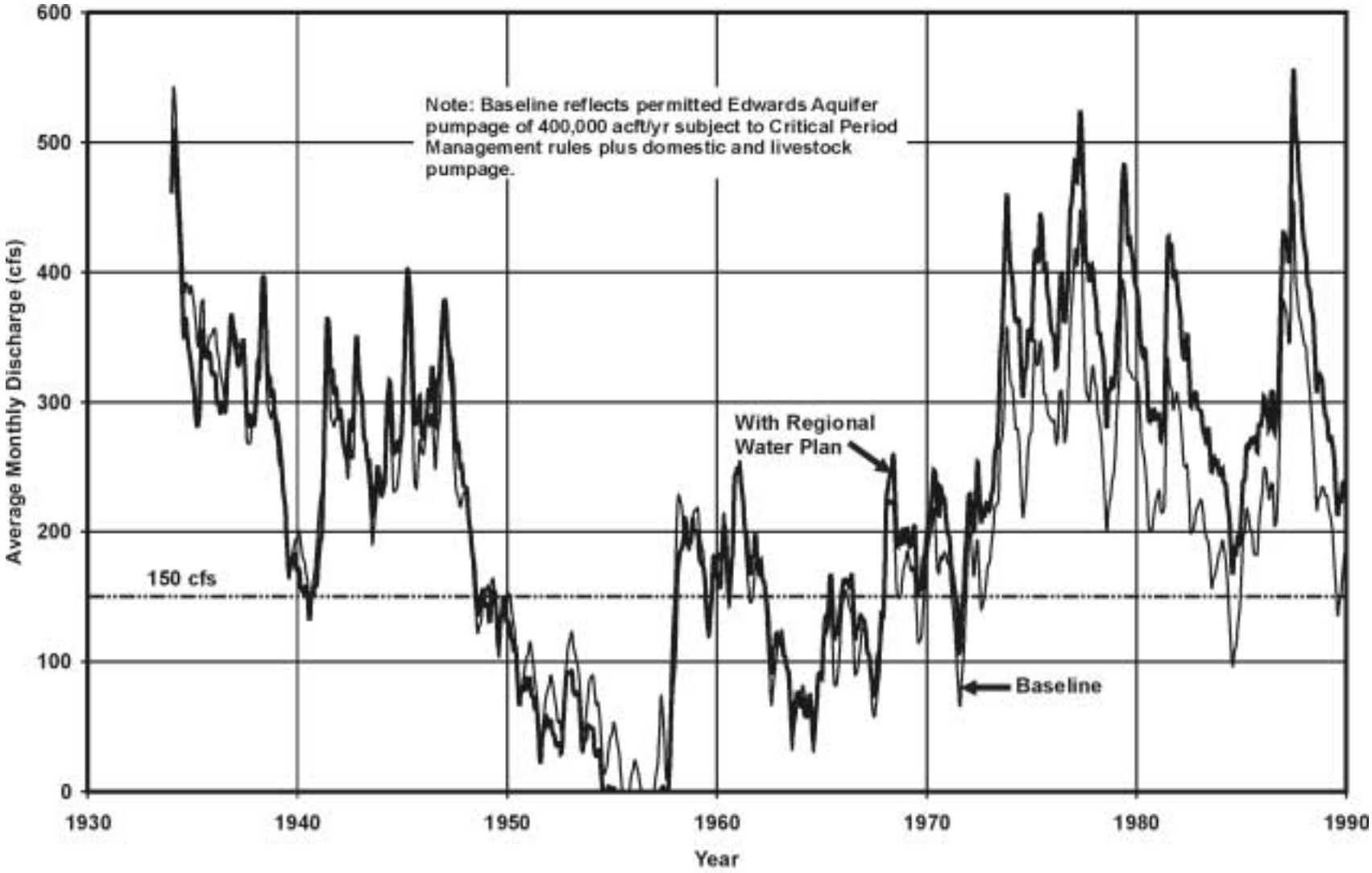
South Central Texas Region						County =	Wilson	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		0	0	0	0	63	145	
Industrial		0	0	0	0	0	0	
Steam-Electric		0	0	0	0	0	0	
Mining		0	0	0	0	0	0	
Irrigation		0	0	0	0	0	0	
Total Needs		**0**	**0**	**0**	**0**	**63**	**145**	
Mun, Ind, S-E, & Min Needs		**0**	**0**	**0**	**0**	**63**	**145**	
Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		171	183	194	114	122	130	1
SCTN-2a Carrizo Aquifer - Local Supply						200	200	2
SCTN-4 Brush Management								3
SCTN-5 Weather Modification								3
SCTN-9 Rainwater Harvesting								3
Small Aquifer Recharge Dams								3
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**171**	**183**	**194**	**114**	**322**	**330**	
Total System Mgmt. Supply / Deficit		**171**	**183**	**194**	**114**	**259**	**185**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**171**	**183**	**194**	**114**	**259**	**185**	
Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.							
2	Additional well(s) for Floresville.							
3	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.							

Environmental/Conservation Alternative Regional Water Plan
Zavala County

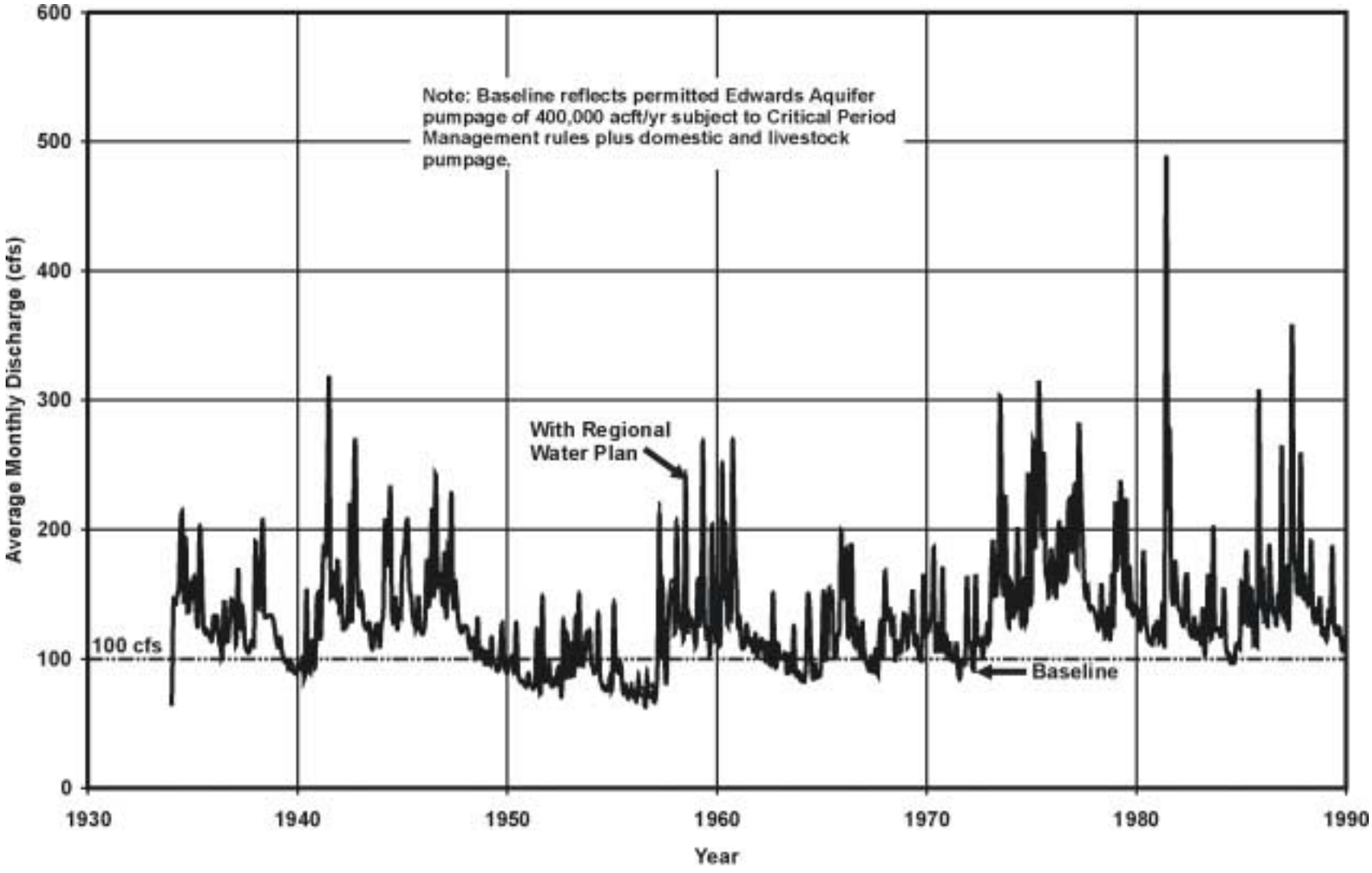


Environmental/Conservation Regional Water Management Alternative Plan

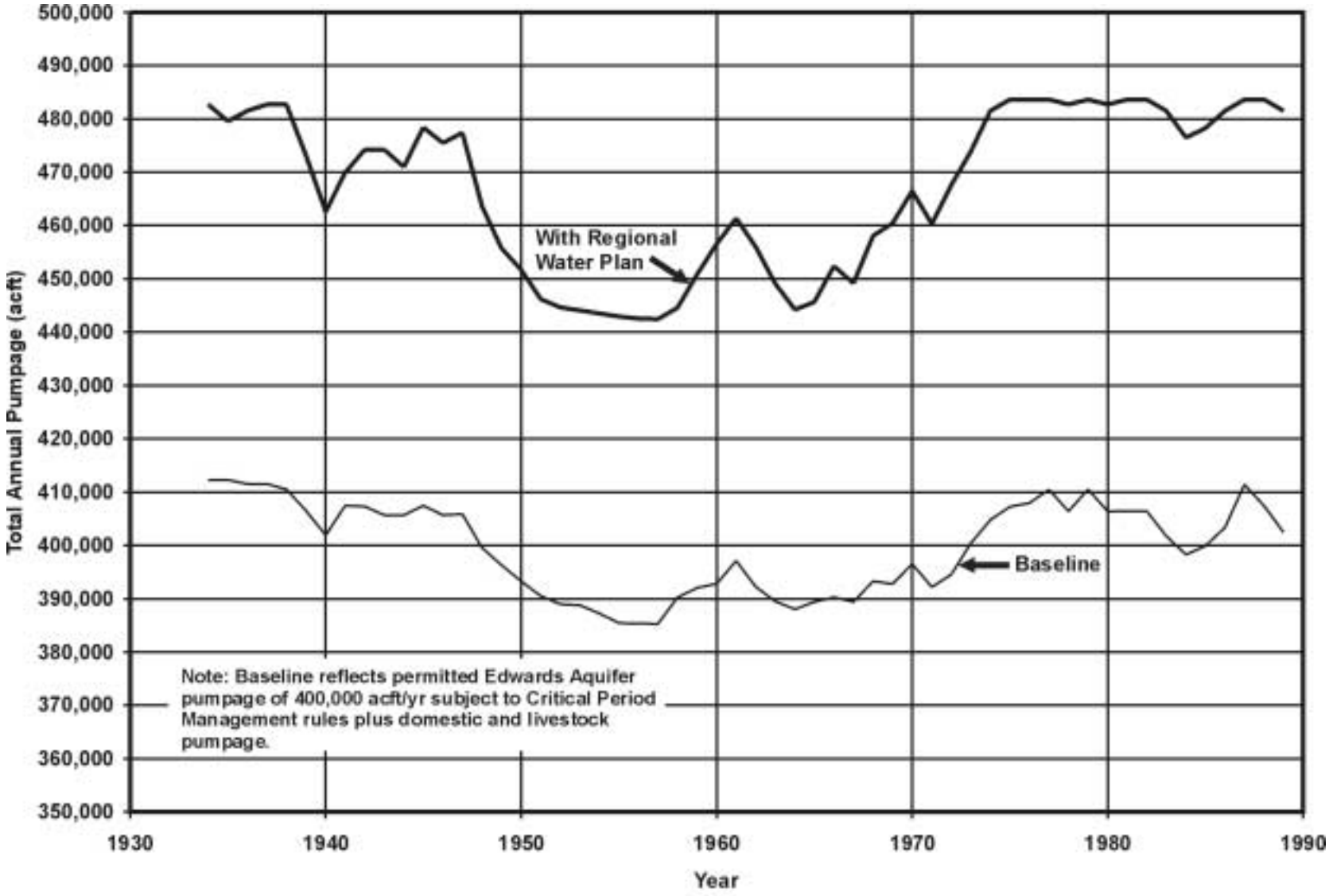
South Central Texas Region						County =	Zavala	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		0	0	0	0	0	0	
Industrial		0	0	0	0	0	0	
Steam-Electric		0	0	0	0	0	0	
Mining		0	0	0	0	0	0	
Irrigation		80,722	76,589	72,655	88,293	84,673	81,200	
Total Needs		**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
Mun, Ind, S-E, & Min Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Irrigation Needs		**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		190	193	194	90	103	104	1
SCTN-4 Brush Management								2
SCTN-5 Weather Modification								2
SCTN-9 Rainwater Harvesting								2
Small Aquifer Recharge Dams								2
L-10 (Irr.) Demand Reduction (Conservation)		6,401	6,401	6,401	6,401	6,401	6,401	3
Total New Supplies		**6,591**	**6,594**	**6,595**	**6,491**	**6,504**	**6,505**	
Total System Mgmt. Supply / Deficit		**-74,131**	**-69,995**	**-66,060**	**-81,802**	**-78,169**	**-74,695**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**190**	**193**	**194**	**90**	**103**	**104**	
Irrigation System Mgmt. Supply / Deficit		**-74,321**	**-70,188**	**-66,254**	**-81,892**	**-78,272**	**-74,799**	
Notes:								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.							
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.							
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation							
	application rate.							



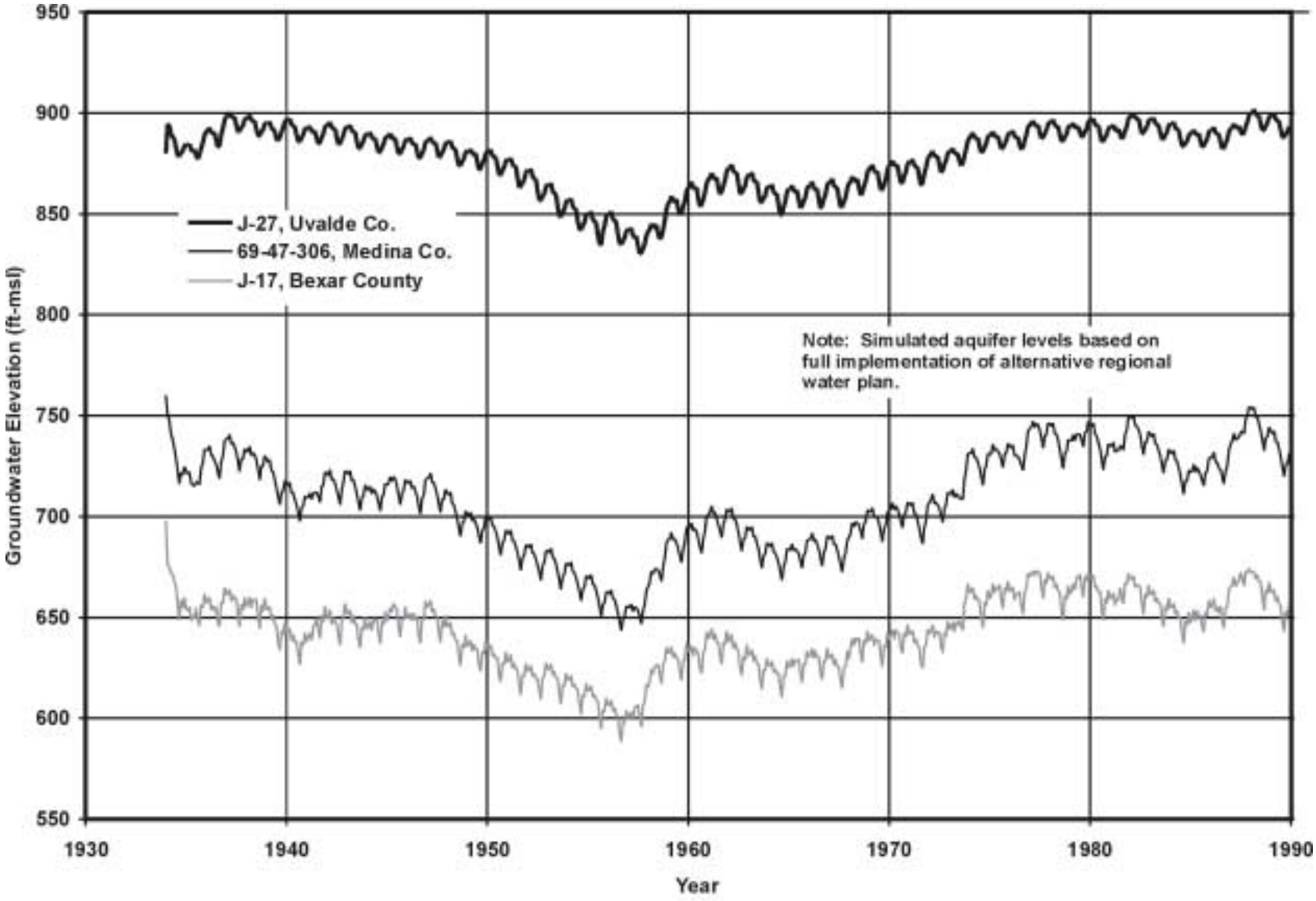
Environmental/Conservation Alternative Regional Water Plan
Simulated Comal Springs Discharge



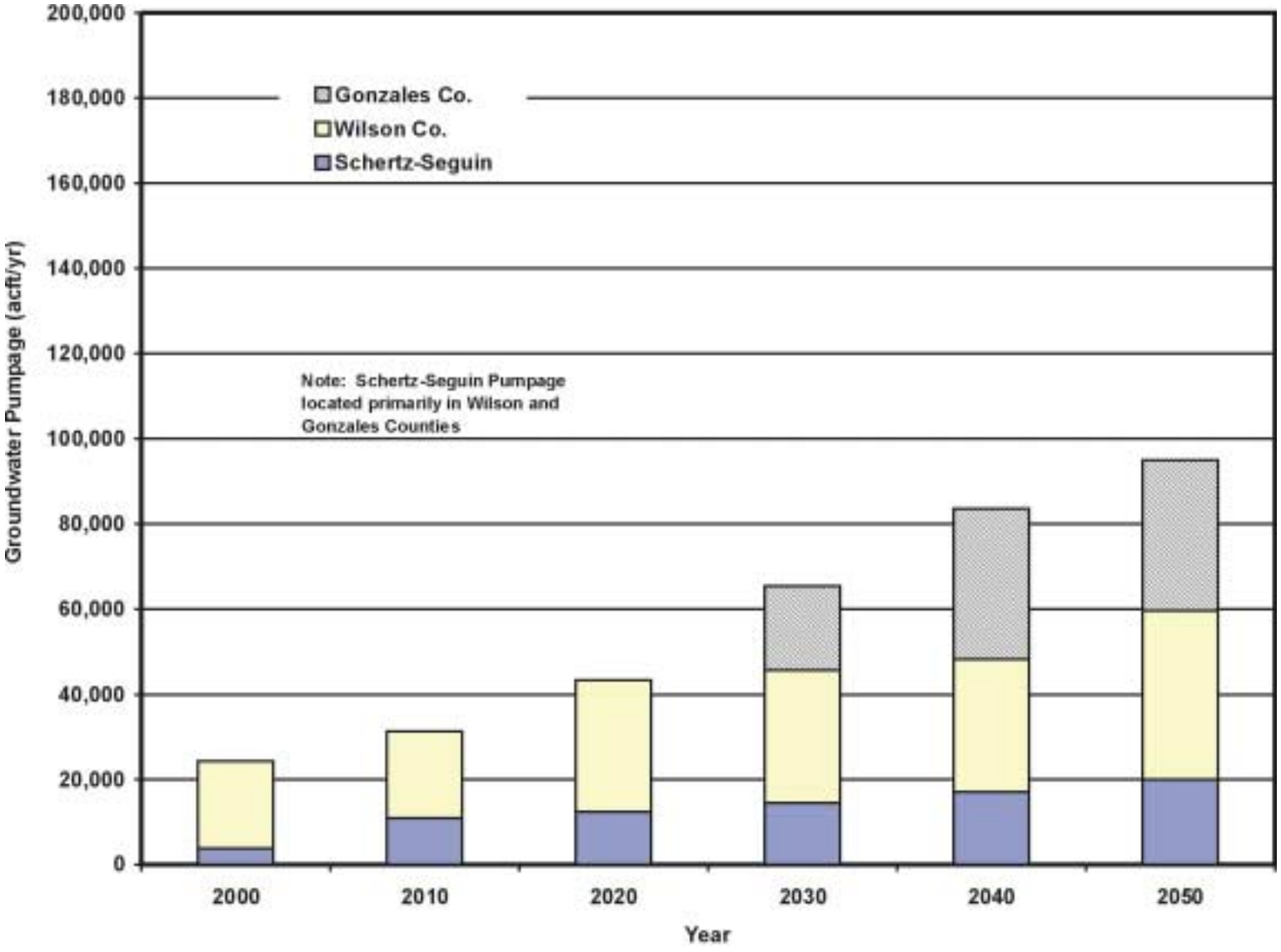
Environmental/Conservation Alternative Regional Water Plan
Simulated San Marcos Springs Discharge



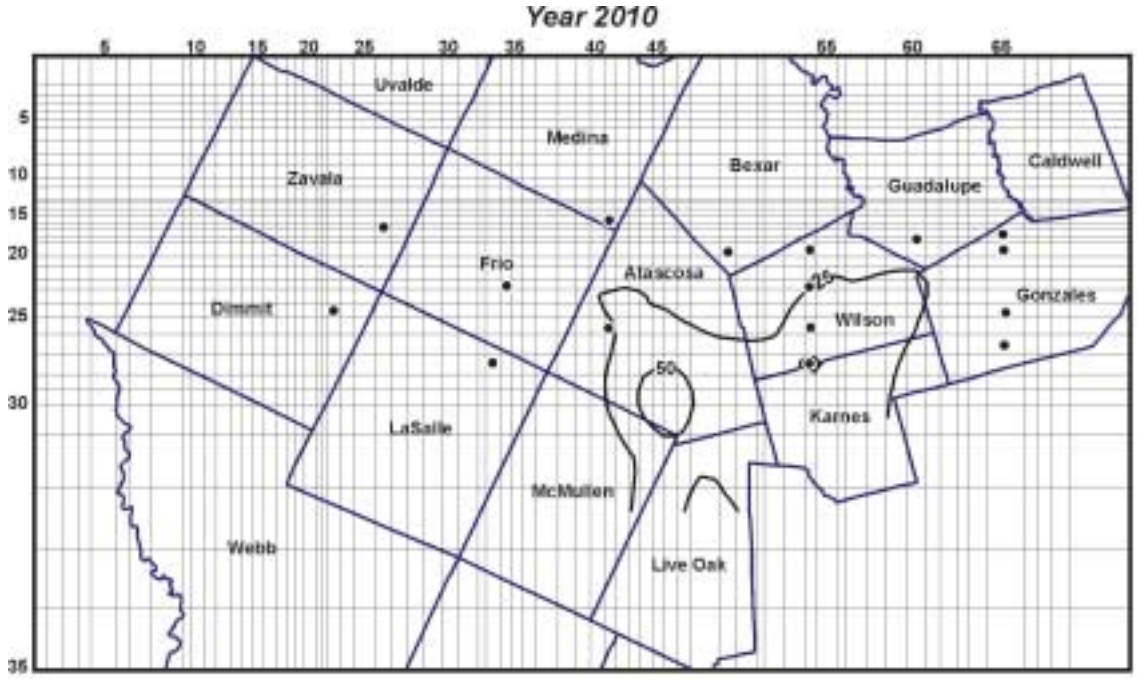
Environmental/Conservation Alternative Regional Water Plan
Simulated Edwards Aquifer Pumpage

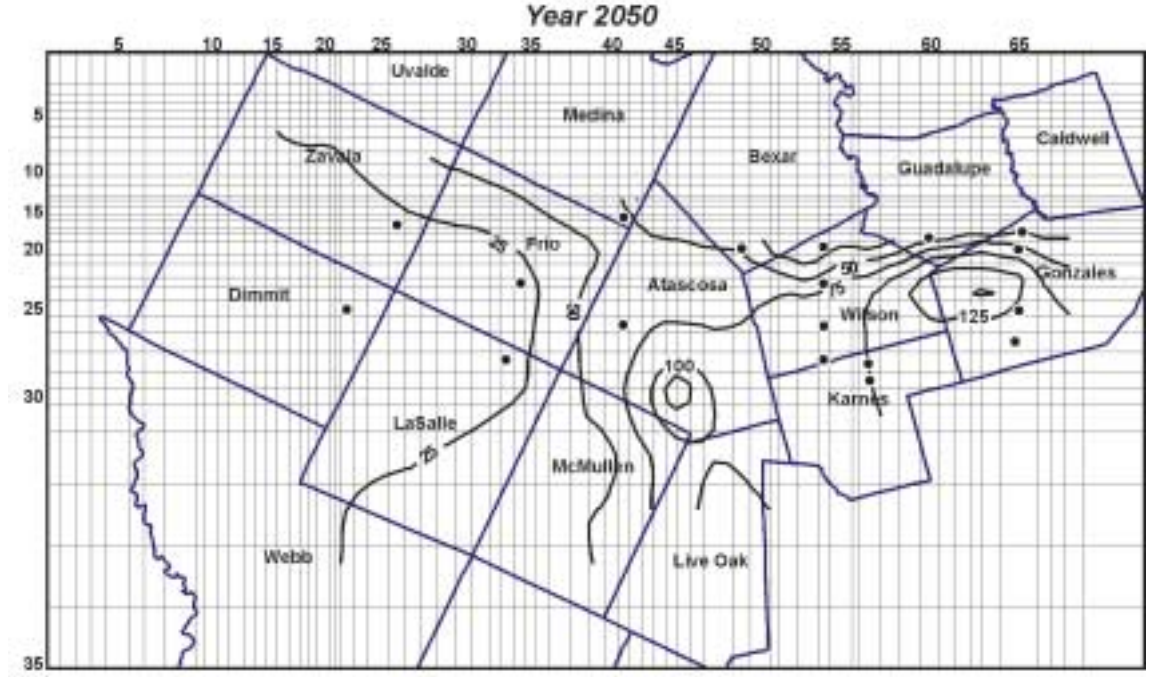


Environmental/Conservation Alternative Regional Water Plan
Simulated Edwards Aquifer Levels



Environmental/Conservation Alternative Regional Water Plan
Additional Carrizo Groundwater Pumpage

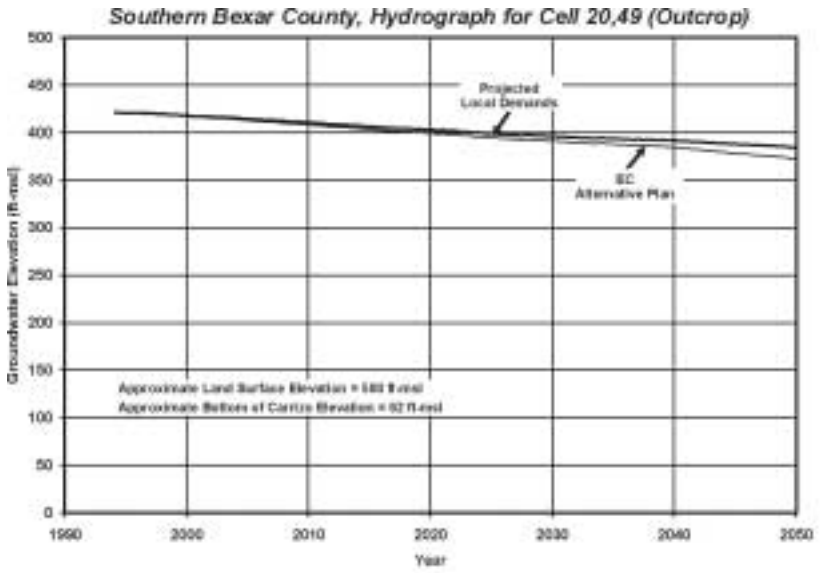


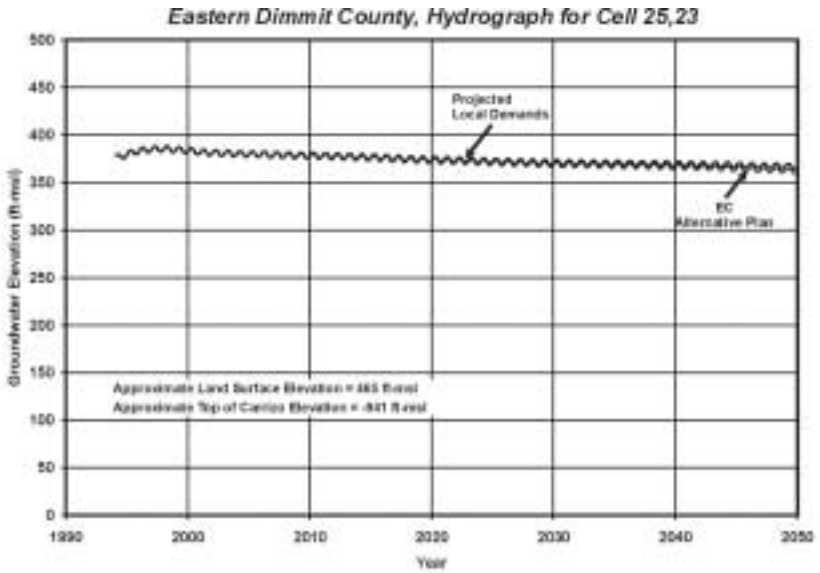


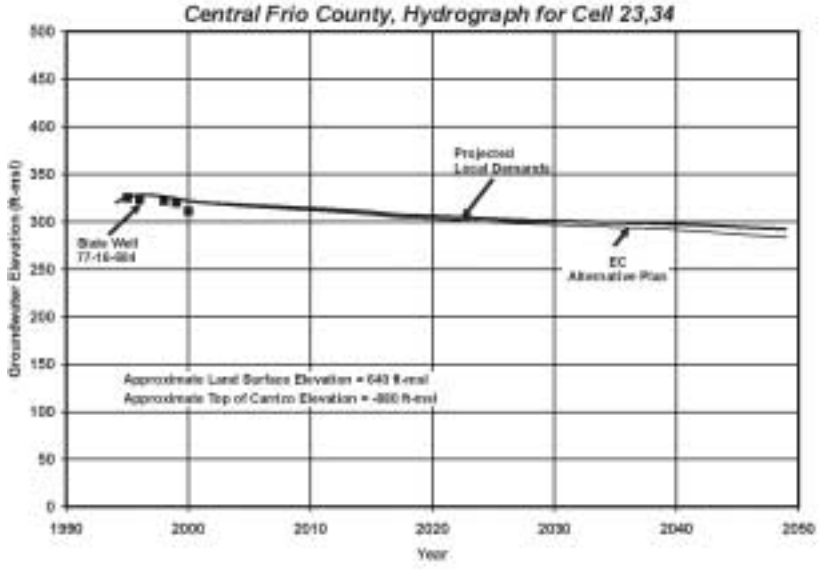
Note: Drawdown is referenced to simulated 1994 aquifer levels and includes both projected local demands and development of water supply options in this alternative regional water plan.

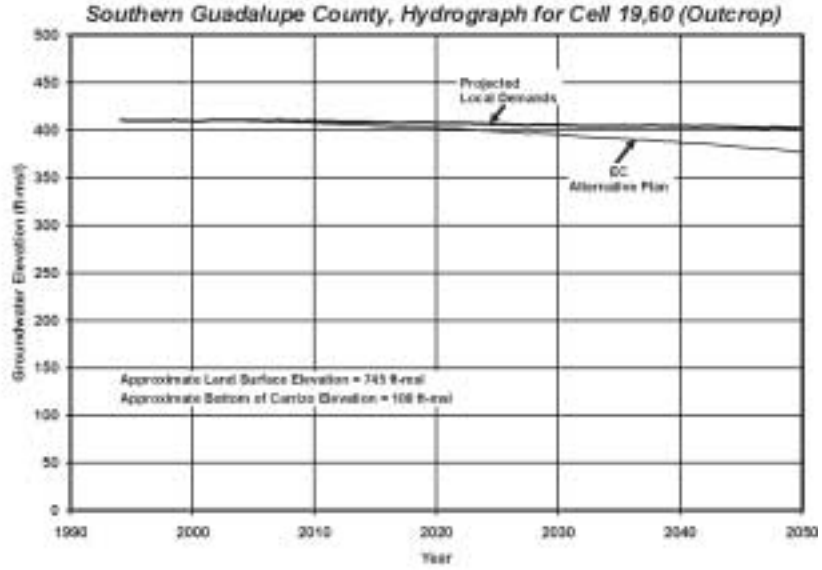
● Monitoring Well Location

Environmental/Conservation Alternative Regional Water Plan
Simulated Carrizo Aquifer Drawdown

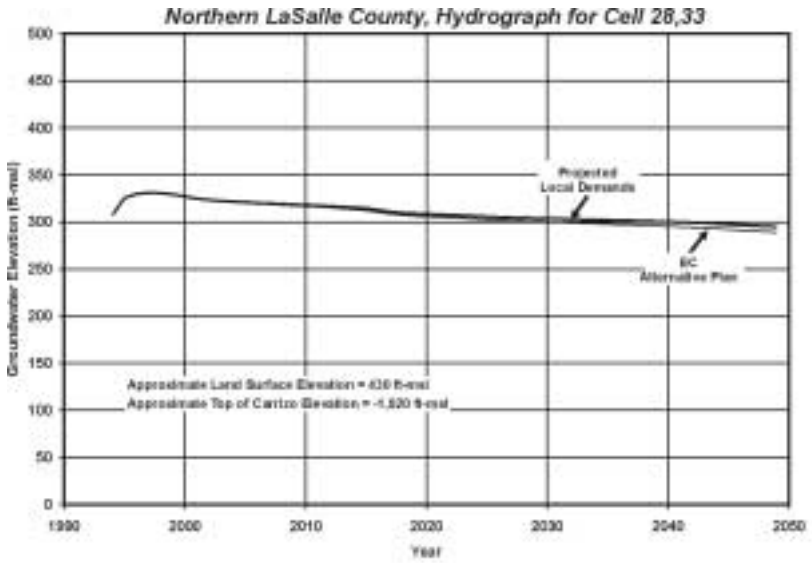


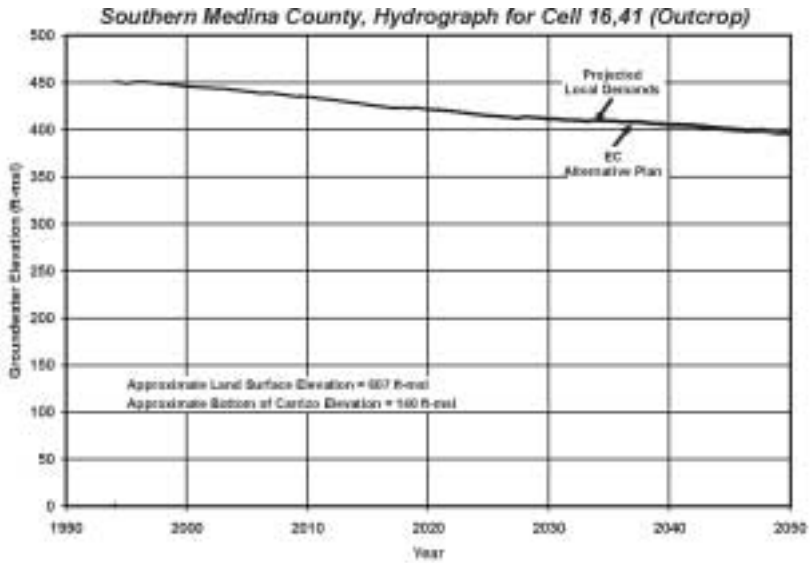


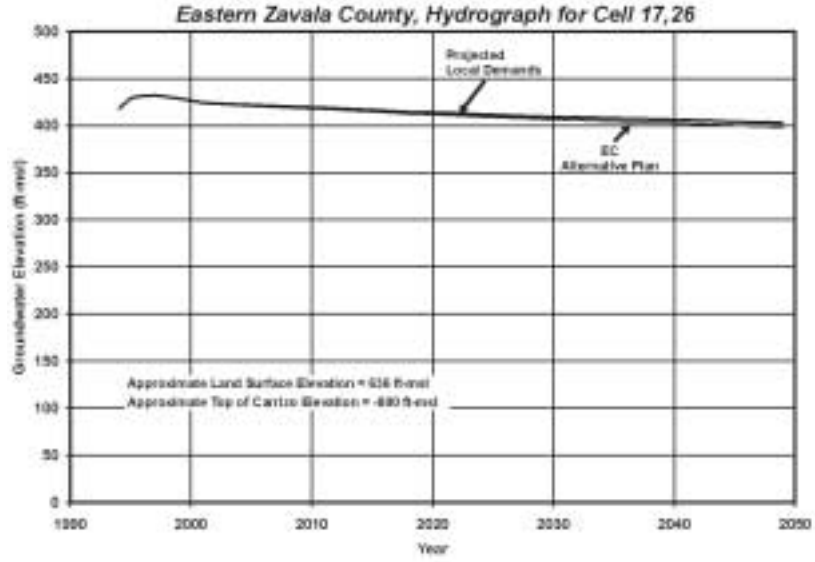


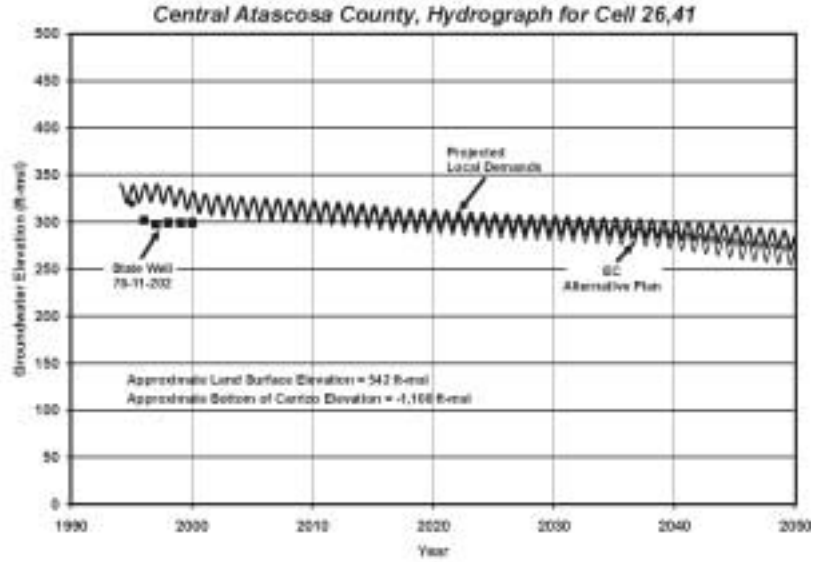


Environmental/Conservation Alternative Regional Water Plan - Carrizo Aquifer

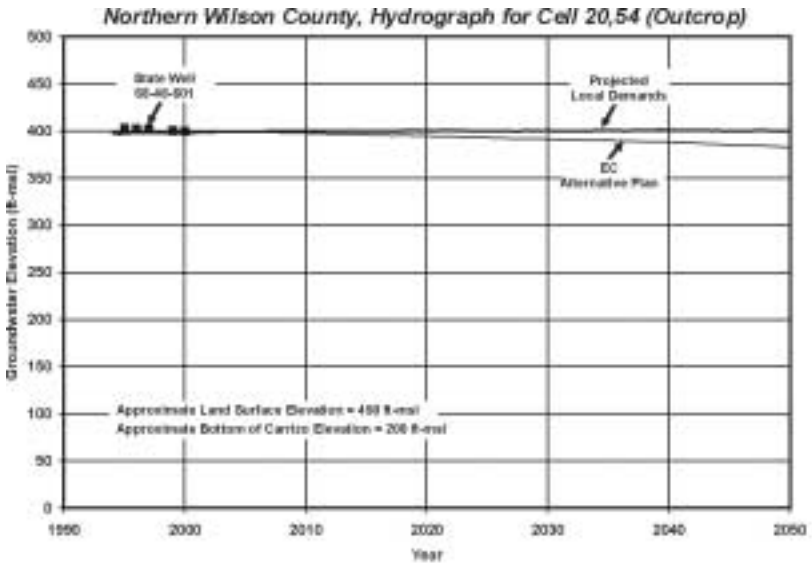


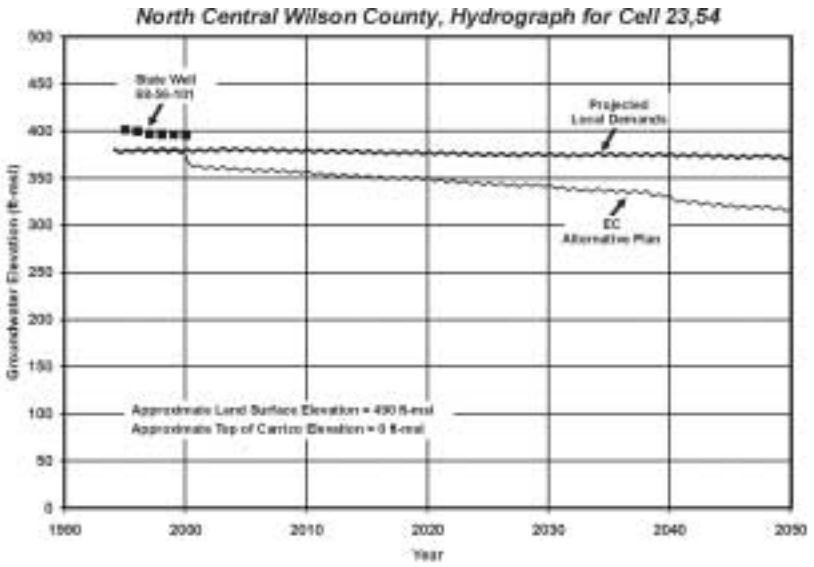


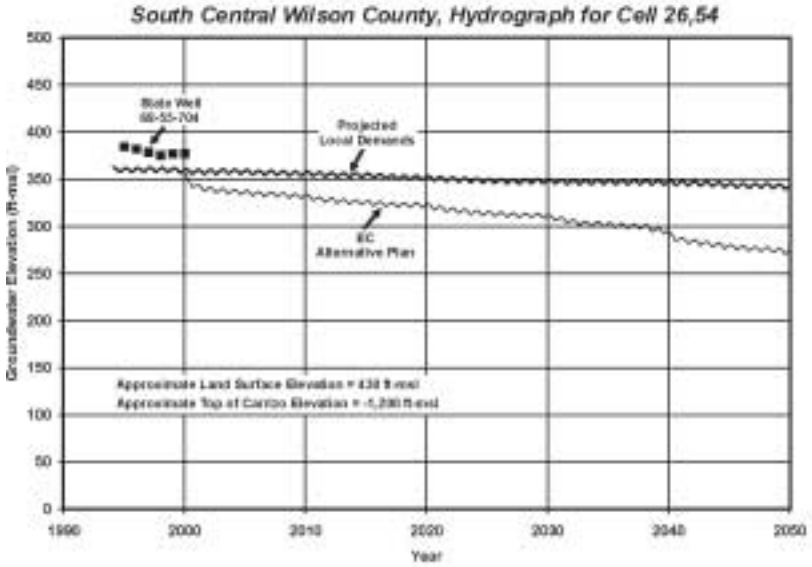


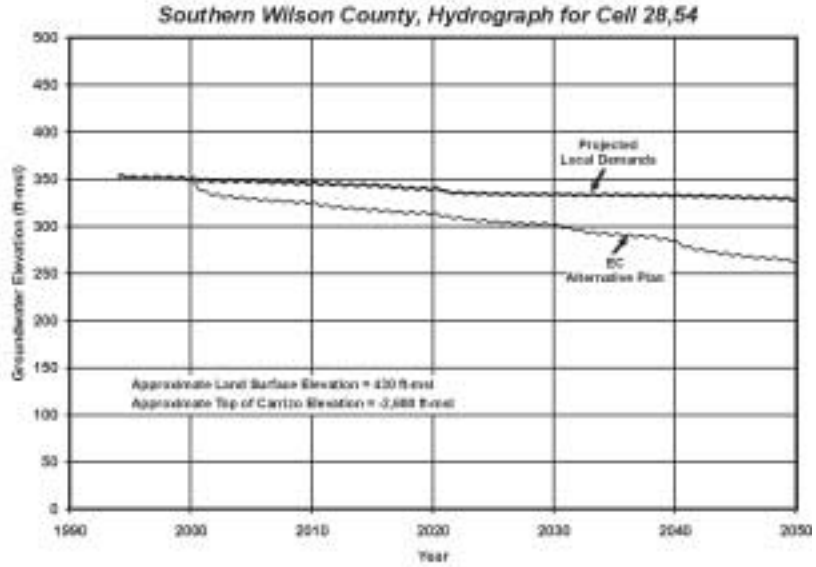


Environmental/Conservation Alternative Regional Water Plan - Carrizo Aquifer

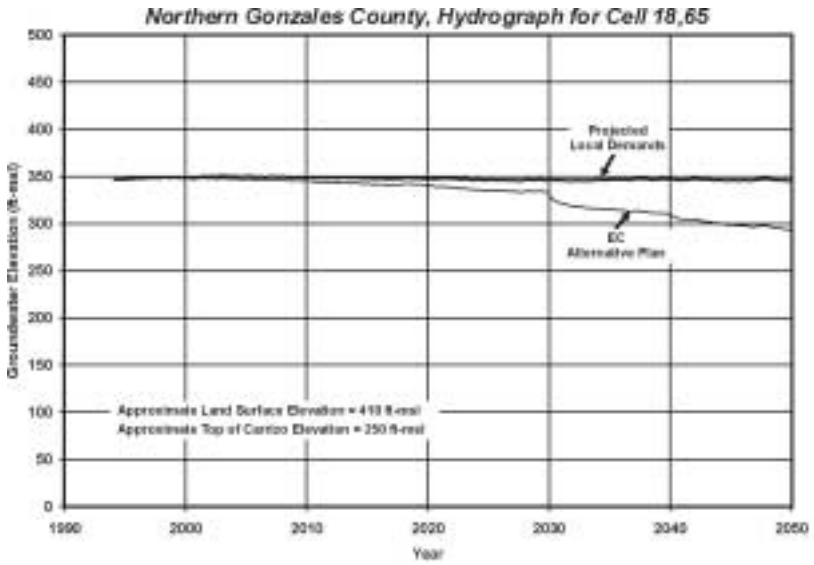


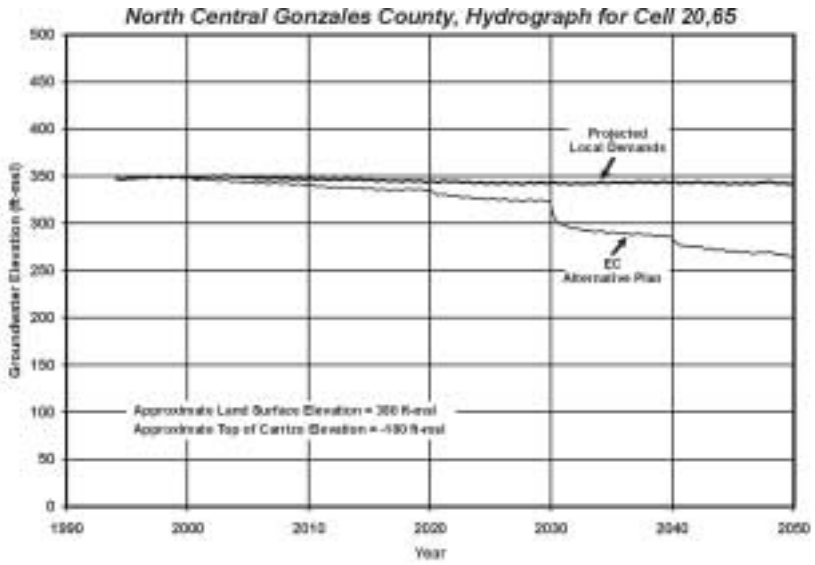


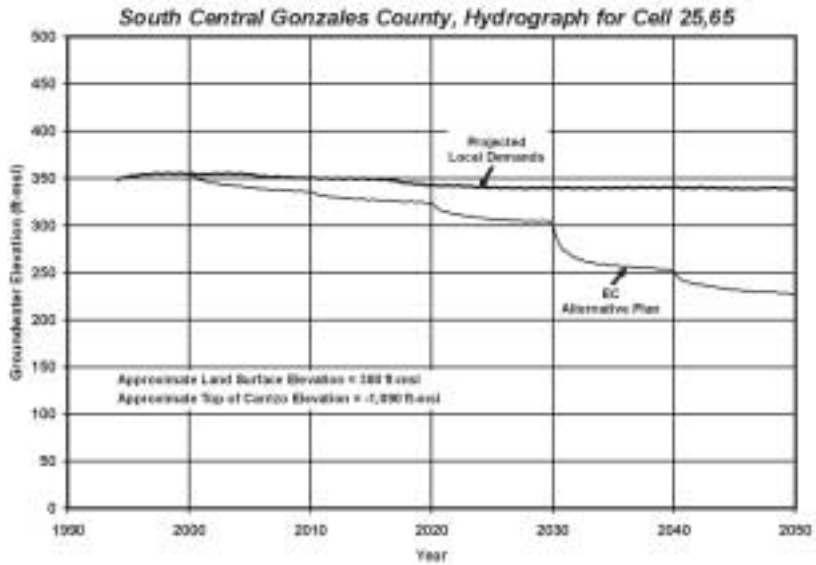


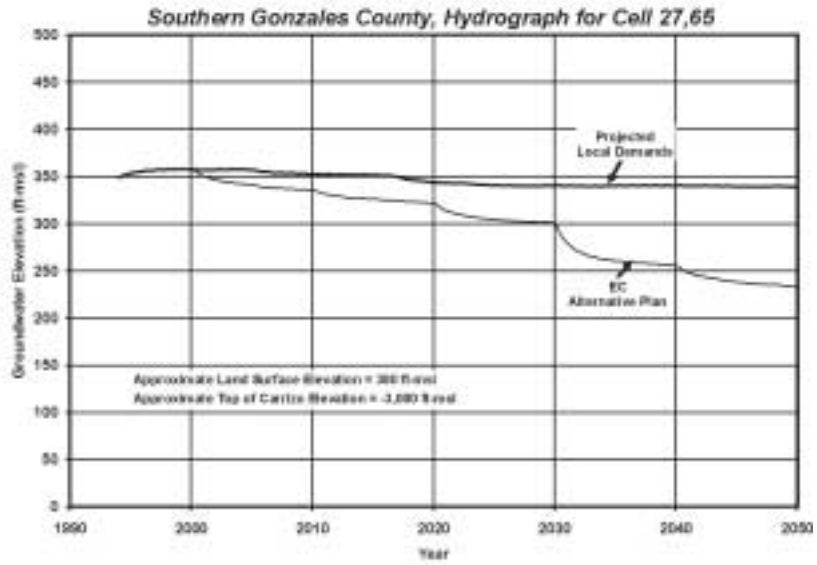


Environmental/Conservation Alternative Regional Water Plan - Carrizo Aquifer

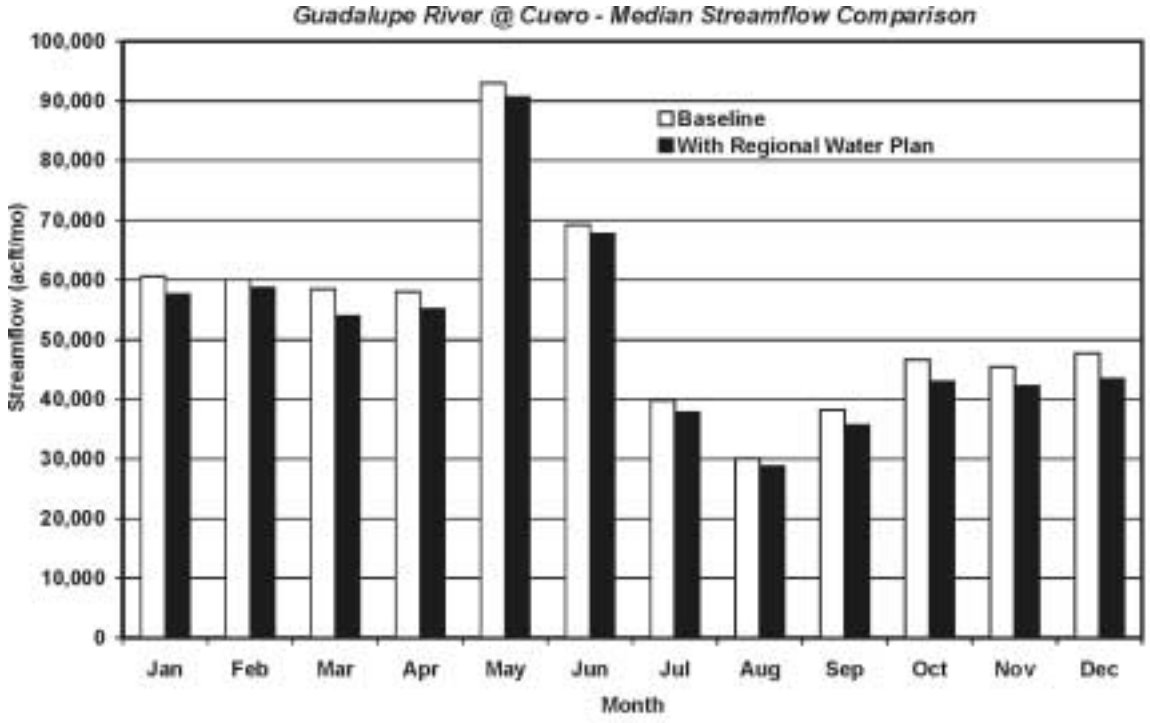


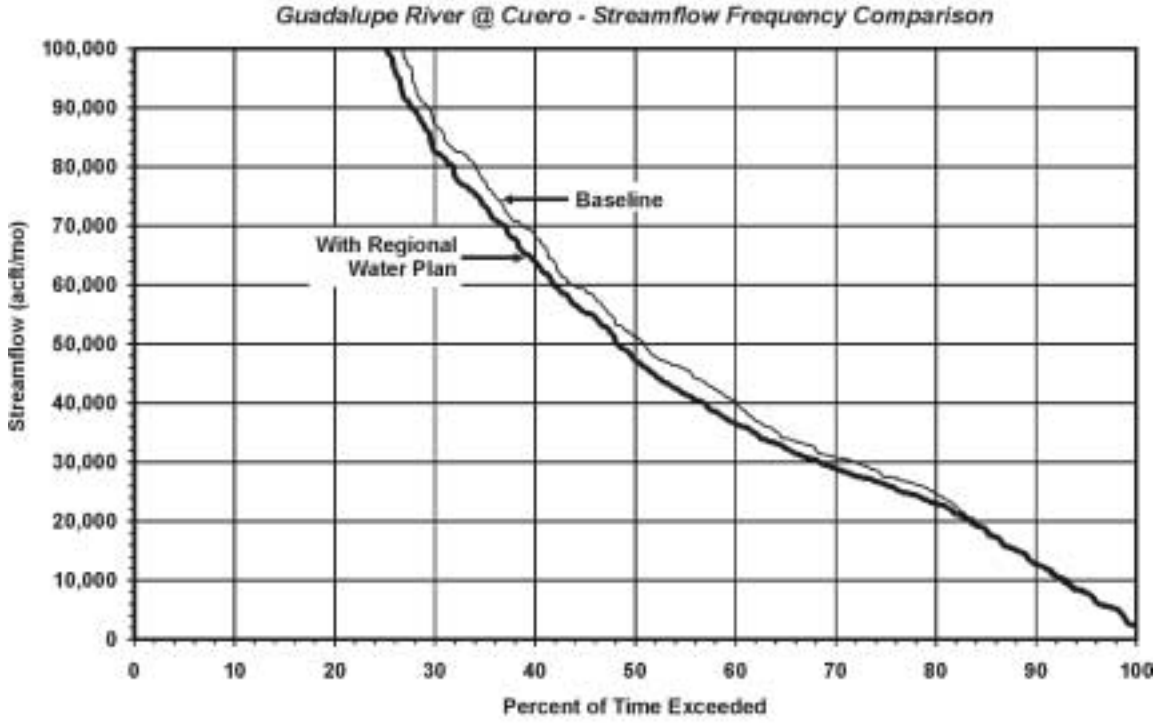




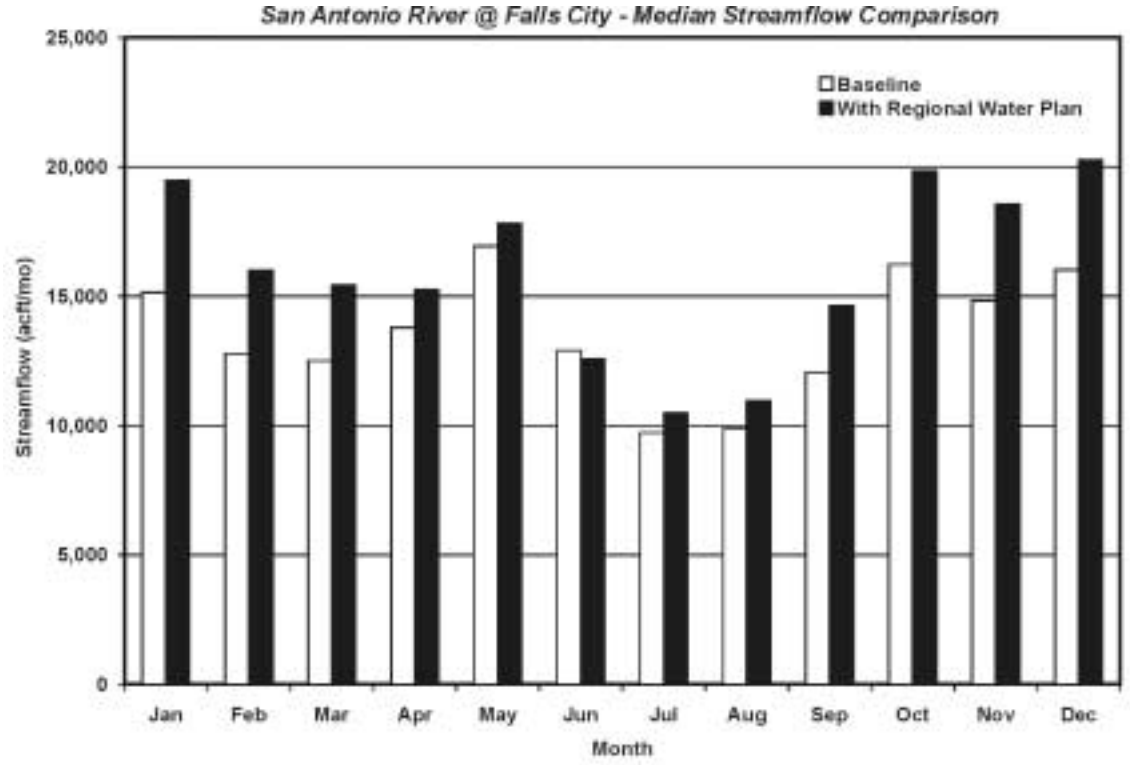


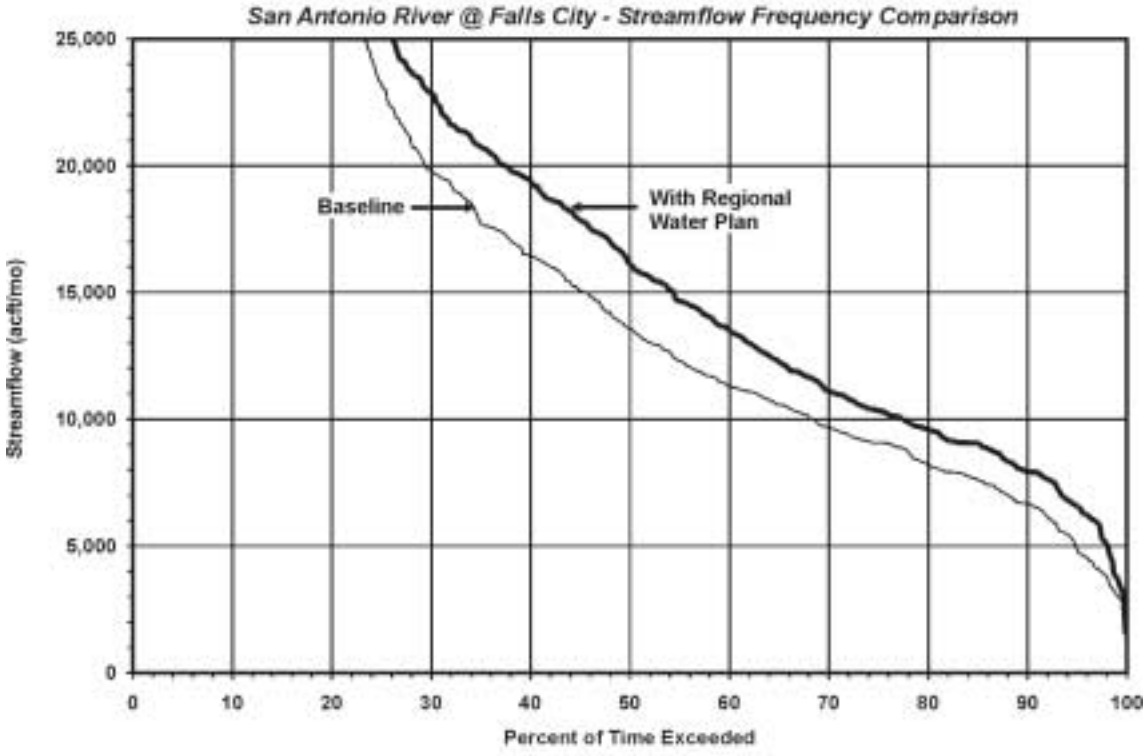
Environmental/Conservation Alternative Regional Water Plan - Carrizo Aquifer



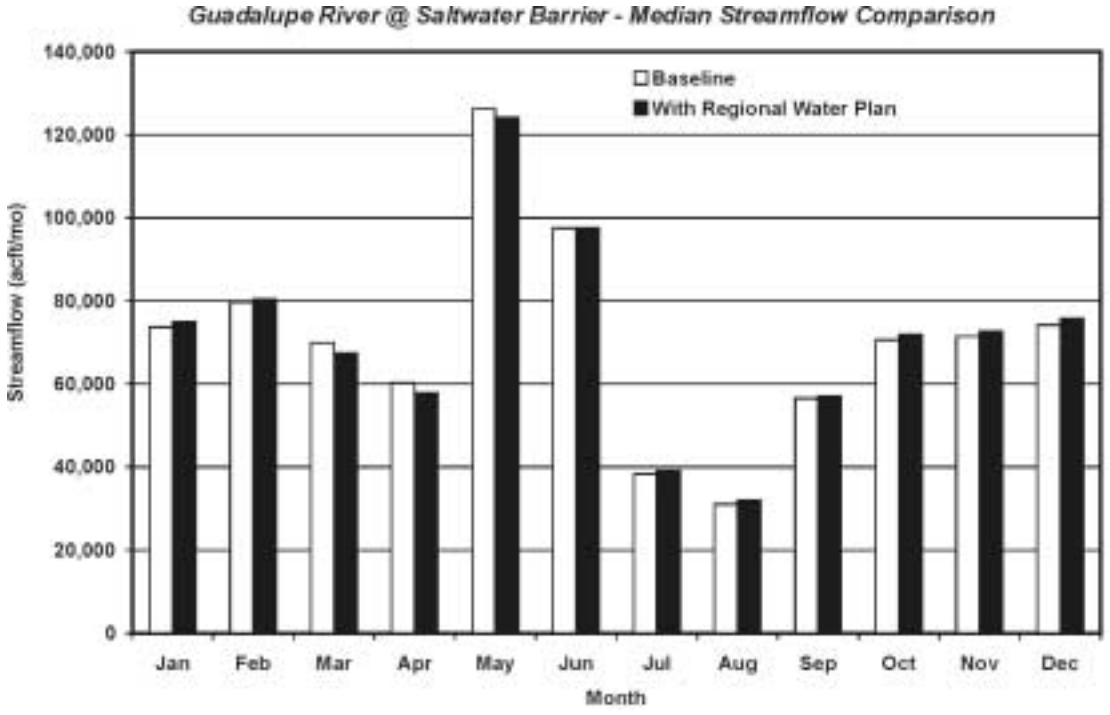


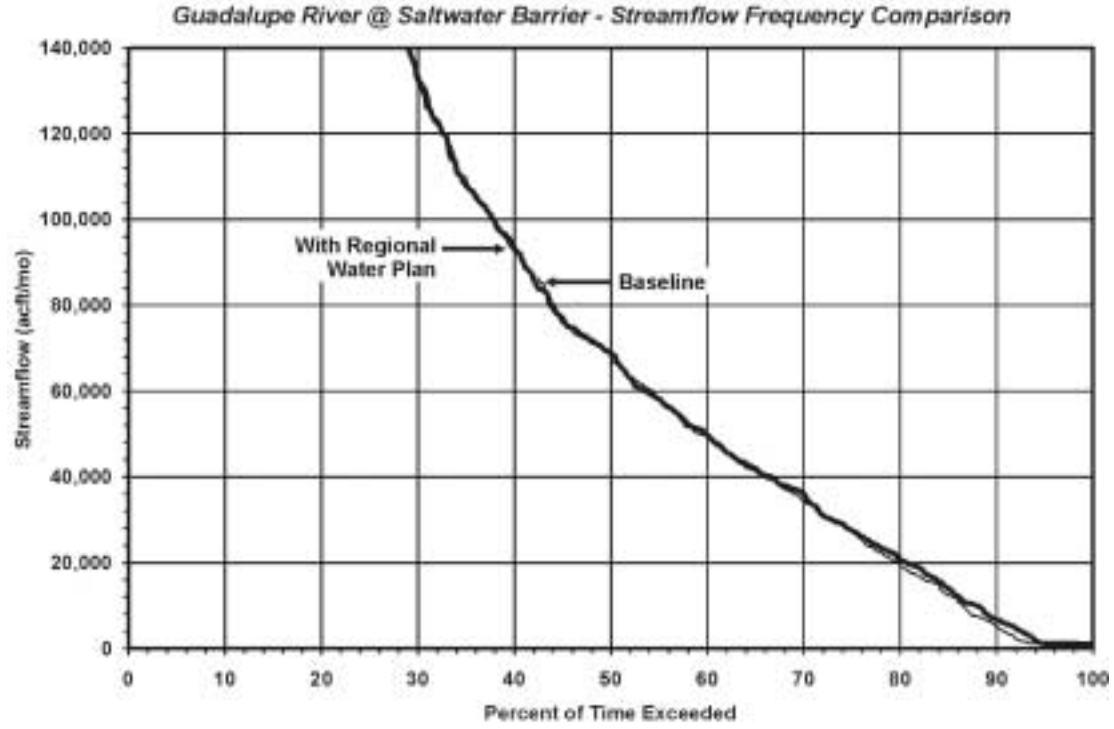
Environmental/Conservation Alternative Regional Water Plan
Streamflow Comparisons





Environmental/Conservation Alternative Regional Water Plan
Streamflow Comparisons





Environmental/Conservation Alternative Regional Water Plan
Streamflow Frequency Comparisons

South Central Texas Region
Water Supply Option Summary
Environmental Matrix (SORTED BY ENVIRONMENTAL COMPOSITE AVERAGE)

Row No.	Section	Option No.	Water Supply Options	Type of Water Supply Option	Type of Water Supply	Qualitative Measures of Environmental Impacts (High=3; Medium=2; Low=1)									Environmental Composite Average	Efficiency / Unit Cost ($/acft)	Quantity of Water (acft/yr)	Time to Implement (years)	Land Impacted (acres)
						Endangered Species	Unique Stream Segment	Bays & Estuaries	Instream Flows	Riparian Forests	Cultural Resources	Size / Habitat	Water Quality	Sustainability					
			Treated Water Supply Options																
15	1.10	SCTN-17	Desalination of Brackish Groundwater	Local/Conservation/Reuse/Exchange	Treated Water Delivered	1	1	1	1	1	1	1	1	1	1.0	564	476	1 to 5	0
36	4.1	G-15C	Canyon Reservoir Water Released to Lake Nolte - Treated Water to Distribution System or Recharge Zone	Existing Reservoirs	Treated Water Distributed	1	1	1	1	1	1	1	1	1	1.0	672	15,000	1 to 5	151
33	3.3	C-17A	Colorado River in Colorado County - Buy Stored Water and Irrigation Rights; Firm Yield	River Diversion with Storage	Treated Water Distributed	1	1	1	1	1	1	1	1	1	1.0	677	125,000	5 to 15	749
29	3.1	G-39C	Guadalupe River Diversion at Gonzales to Mid-Cities and/or Major Water Providers, with Regional Water Treatment Plant	River Diversion with Storage	Treated Water Delivered	1	1	1	1	1	1	1	1	1	1.0	736	29,217	1 to 5	644
40	4.4	C-13C	Colorado River at Bastrop - Purchase of Stored Water - Firm Yield	Existing Reservoirs	Treated Water Distributed	1	1	1	1	1	1	1	1	1	1.0	768	50,000	5 to 15	440
37	4.2	G-24	Wimberley and Woodcreek Water Supply from Canyon Reservoir, 2030 Demands	Existing Reservoirs	Treated Water Delivered	1	1	1	1	1	1	1	1	1	1.0	1,595	1,048	1 to 5	119
62	6.1	CZ-10C	Carrizo-Wilcox Aquifer between San Marcos and Frio Rivers (75,000 acft/yr)	Carrizo and Other Aquifers	Treated Water Distributed	1	1	1	1	1	1	1	1	2	1.1	590	75,000	1 to 5	429
30	3.2a	SCTN-16a	Lower Guadalupe River Diversions	River Diversion with Storage	Treated Water Distributed	1	1	1	1	1	1	2	1	1	1.1	670	56,276	1 to 5	1,884
34	3.4	C-17B	Colorado River in Wharton County - Buy Irrigation Rights and Groundwater; Firm Yield	River Diversion with Storage	Treated Water Distributed	1	1	1	1	1	1	2	1	1	1.1	974	69,000	5 to 15	2,216
38	3.5	SCTN-11	Purchase/Lease Surface Water Irrigation Rights for Municipal/Industrial Use	River Diversion with Storage	Treated Water Delivered	1	1	1	1	1	1	2	1	1	1.1	1,007	40,000	5 to 15	3,260
66	6.3	SCTN-3c	Simsboro Aquifer - Bastrop, Lee, and Milam Counties with Delivery to Major Municipal Demand Center	Carrizo and Other Aquifers	Treated Water Distributed	1	1	1	2	1	1	1	1	2	1.2	707	75,000	1 to 5	671
35	4.3a	SCTN-14a	Joint Development of Water Supply with Corpus Christi - Firm Yield	Existing Reservoirs	Treated Water Distributed	1	1	1	1	1	1	1	3	1	1.2	1,015	79,000	1 to 5	810
14	1.10	SCTN-17	Desalination of Seawater (100 MGD)	Local/Conservation/Reuse/Exchange	Treated Water Distributed	1	1	2	1	1	1	1	2	1	1.2	1,333	112,016	1 to 5	704
13	1.10	SCTN-17	Desalination of Seawater (75 MGD)	Local/Conservation/Reuse/Exchange	Treated Water Distributed	1	1	2	1	1	1	1	2	1	1.2	1,407	84,012	1 to 5	694
12	1.10	SCTN-17	Desalination of Seawater (50 MGD)	Local/Conservation/Reuse/Exchange	Treated Water Distributed	1	1	2	1	1	1	1	2	1	1.2	1,447	56,008	1 to 5	684
11	1.10	SCTN-17	Desalination of Seawater (25 MGD)	Local/Conservation/Reuse/Exchange	Treated Water Distributed	1	1	2	1	1	1	1	2	1	1.2	1,621	28,004	1 to 5	678
63	6.2	CZ-10D	Carrizo-Wilcox Aquifer between Colorado and Frio Rivers	Carrizo and Other Aquifers	Treated Water Distributed	1	1	1	1	1	1	2	1	3	1.3	632	220,000	1 to 5	1,437
32	3.2c	SCTN-16c	Lower Guadalupe River Diversions	River Diversion with Storage	Treated Water Distributed	1	3	2	1	1	1	2	1	1	1.4	755	94,000	1 to 5	2,040
31	3.2b	SCTN-16b	Lower Guadalupe River Diversions	River Diversion with Storage	Treated Water Distributed	1	3	2	1	1	1	2	1	1	1.4	788	74,000	1 to 5	1,888
39	4.3b	SCTN-14b	Joint Development of Water Supply with Corpus Christi - Firm Yield	Existing Reservoirs	Treated Water Distributed	1	1	2	2	1	1	1	3	1	1.4	869	148,200	1 to 5	958
41	5.1	S-15C	Cibolo Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	1	1	1	2	3	3	3	1	1	1.8	975	33,200	5 to 15	16,700
48	5.5	S-14D	Applewhite Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	1	1	1	2	2	3	2	3	1	1.8	3,192	4,032	5 to 15	2,500
61	5.16	B-10C	Allens Creek Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	3	3	1	2	2	1	3	1	1	1.9	1,016	57,800	5 to 15	9,039
60	5.15	SCTN-15	Cummins Creek Off-Channel Reservoir (Colorado River Basin)	Potential New Reservoirs	Treated Water Distributed	1	3	2	2	2	2	3	1	1	1.9	1,111	45,712	5 to 15	7,274
43	5.2b	S-15Db	Cibolo Reservoir with Imported Water from the San Antonio and Guadalupe Rivers - Firm Yield	Potential New Reservoirs	Treated Water Distributed	1	1	2	2	3	3	3	3	1	2.1	773	91,942	5 to 15	17,160
42	5.2a	S-15Da	Cibolo Reservoir with Imported Water from the San Antonio River - Firm Yield	Potential New Reservoirs	Treated Water Distributed	1	1	2	2	3	3	3	3	1	2.1	779	69,925	5 to 15	16,960
45	5.3a	S-15Ea	Cibolo Reservoir with Imported Water from the Guadalupe River Saltwater Barrier - Firm Yield	Potential New Reservoirs	Treated Water Distributed	1	3	2	2	3	3	3	1	1	2.1	993	68,688	5 to 15	17,396
59	5.14	C-18	Shaws Bend Reservoir - Firm Yield (Colorado River Basin)	Potential New Reservoirs	Treated Water Distributed	1	3	2	2	3	3	3	1	1	2.1	1,176	51,576	5 to 15	13,023
46	5.3b	S-15Eb	Cibolo Reservoir with Imported Water from the Guadalupe River Saltwater Barrier and the Colorado River near Bay City	Potential New Reservoirs	Treated Water Distributed	1	3	2	2	3	3	3	1	1	2.1	1,365	79,090	5 to 15	17,787
55	5.12	G-16C1	Cuero Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	3	1	3	3	3	3	3	1	1	2.3	718	152,606	> 15	41,500
44	5.2c	S-15Dc	Cibolo Reservoir with Imported Water from the San Antonio, Guadalupe, and Colorado Rivers - Firm Yield	Potential New Reservoirs	Treated Water Distributed	1	3	2	2	3	3	3	3	1	2.3	965	106,482	5 to 15	17,493
47	5.4	S-16C	Goliad Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	2	1	3	3	3	3	3	3	1	2.4	856	99,687	> 15	28,272
54	5.11	G-17C1	Sandies Creek Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	3	1	2	3	3	3	3	3	1	2.4	865	80,836	> 15	26,875
			Raw Water in Aquifer Water Supply Options																
24	2.3	S-13B	Medina Lake - Existing Rights and Contracts with Irrigation Use Reduction for Recharge Enhancement	Edwards Aquifer Recharge	Raw Water in Aquifer	1	1	1	1	1	1	1	1	1	1.0	159	9,873	1 to 5	0
23	2.2	L-18c	Edwards Aquifer Recharge from Natural Drainage - Type 2 Projects (Program 2C)	Edwards Aquifer Recharge	Raw Water in Aquifer	1	2	1	1	1	1	2	1	1	1.2	486	13,451	5 to 15	2,595
27	2.6	SCTN-6a	Edwards Aquifer Recharge Enhancement with Guadalupe River Diversions at Lake Dunlap (SCTN-6a)	Edwards Aquifer Recharge	Raw Water in Aquifer	2	1	1	2	1	1	1	1	1	1.2	534	42,121	5 to 15	443
2	1.2	L-11	Exchange Reclaimed Water for Edwards Irrigation Water	Local/Conservation/Reuse/Exchange	Raw Water in Aquifer	1	1	1	1	1	1	1	3	1	1.2	743	10,300	1 to 5	827
74	6.10	SCTN-8	Trinity Aquifer Optimization	Carrizo and Other Aquifers	Raw Water in Aquifer	2	2	1	1	1	1	1	1	1	1.2	1,886	390	5 to 15	480
68	6.4	SCTN-7a	Wintergarden Carrizo Recharge Enhancement (Nueces River Alternative)	Carrizo and Other Aquifers	Raw Water in Aquifer	1	1	1	3	1	1	2	1	1	1.3	511	11,000	5 to 15	1,633
67	6.4	SCTN-7b	Wintergarden Carrizo Recharge Enhancement (Atascosa River Alternative)	Carrizo and Other Aquifers	Raw Water in Aquifer	1	1	1	2	1	1	2	2	1	1.3	627	7,200	5 to 15	1,210
26	2.6	SCTN-6b	Edwards Aquifer Recharge Enhancement with Guadalupe River Diversions near Gonzales (SCTN-6b)	Edwards Aquifer Recharge	Raw Water in Aquifer	2	1	2	2	1	1	1	1	1	1.3	1,941	51,133	5 to 15	893
25	2.4	G-30	Guadalupe River Diversion near Comfort to Recharge Zone via Medina Lake	Edwards Aquifer Recharge	Raw Water in Aquifer	2	3	1	2	1	1	1	1	1	1.4	2,079	3,902	1 to 5	256
28	2.5	G-32	Diversion of Canyon Reservoir Flood Storage to Recharge Zone via Cibolo Creek - Long-Term Average	Edwards Aquifer Recharge	Raw Water in Aquifer	2	3	1	1	1	2	1	1	1	1.4	6,198	2,088	1 to 5	535
22	2.2	L-18b	Edwards Aquifer Recharge from Natural Drainage - Type 2 Projects (Program 2B)	Edwards Aquifer Recharge	Raw Water in Aquifer	2	3	1	1	2	2	3	1	1	1.8	800	15,980	5 to 15	4,186
21	2.2	L-18a	Edwards Aquifer Recharge from Natural Drainage - Type 2 Projects (Program 2A)	Edwards Aquifer Recharge	Raw Water in Aquifer	2	3	1	1	2	2	3	1	1	1.8	1,087	21,577	5 to 15	8,448
20	2.1	L-17a	Edwards Aquifer Recharge from Natural Drainage - Type 1 Projects (Program 1B)	Edwards Aquifer Recharge	Raw Water in Aquifer	2	3	1	1	3	3	2	1	1	1.9	2,557	1,958	5 to 15	1,340
19	2.1	L-17b	Edwards Aquifer Recharge from Natural Drainage - Type 1 Projects (Program 1A)	Edwards Aquifer Recharge	Raw Water in Aquifer	2	3	1	1	3	3	3	3	1	2.2	3,309	5,654	5 to 15	4,042
			Raw (Surface) Water Supply Options																
9	1.9	SCTN-12b	Exchange of Groundwater from the Gulf Coast Aquifer for Irrigation Surface Water Rights (Colorado River Basin)	Local/Conservation/Reuse/Exchange	Raw Water at Source	1	1	1	1	1	1	1	1	1	1.0	518	10,748	1 to 5	656
64	6.3	SCTN-3a	Simsboro Aquifer - Bastrop, Lee, and Milam Counties with Delivery to Colorado River	Carrizo and Other Aquifers	Raw Water Delivered	1	1	1	1	1	1	1	2	1	1.1	203	75,000	1 to 5	78
65	6.3	SCTN-3b	Simsboro Aquifer - Bastrop, Lee, and Milam Counties with Delivery to Plum Creek	Carrizo and Other Aquifers	Raw Water Delivered	1	1	1	1	1	1	1	2	1	1.1	290	75,000	1 to 5	269
10	1.9	SCTN-12b	Exchange of Groundwater from the Gulf Coast Aquifer for Irrigation Surface Water Rights (Guadalupe-San Antonio River Ba	Local/Conservation/Reuse/Exchange	Raw Water at Source	1	1	1	1	1	1	2	1	1	1.1	437	13,200	1 to 5	1,015
51	5.8	G-21	Lockhart Reservoir - Raw Water at the Reservoir	Potential New Reservoirs	Raw Water at Reservoir	1	1	1	2	1	1	2	1	1	1.2	764	5,627	5 to 15	2,910
4	1.4	L-20	Transfer of SAWS Reclaimed Water to Coleto Creek Reservoir (Exchange for CP&L Rights and GBRA Canyon Contract)	Local/Conservation/Reuse/Exchange	Raw Water at Source	2	1	1	1	1	1	1	3	1	1.3	79	17,000	1 to 5	24
5	1.5	L-14	Transfer of Reclaimed Water to Corpus Christi through Choke Canyon Reservoir	Local/Conservation/Reuse/Exchange	Raw Water at Reservoir	1	1	1	2	1	1	1	3	1	1.3	297	23,903	1 to 5	240
56	5.13	SCTN-13	Palmetto Bend Stage II Reservoir (Delivery to Corpus Christi)	Potential New Reservoirs	Raw Water Delivered	1	1	2	1	2	1	3	1	1	1.4	431	38,200	5 to 15	4,701
58	5.13	SCTN-13	Palmetto Bend Stage II Reservoir (Delivery to Bay City)	Potential New Reservoirs	Raw Water Delivered	1	1	2	1	2	1	3	1	1	1.4	580	30,200	5 to 15	4,902
57	5.13	SCTN-13	Palmetto Bend Stage II Reservoir (Delivery to Saltwater Barrier)	Potential New Reservoirs	Raw Water Delivered	1	1	2	1	2	1	3	1	1	1.4	585	28,100	5 to 15	4,891
	5.17	SCTN-18	Cotulla Reservoir - Raw Water at the Reservoir	Potential New Reservoirs	Raw Water at Reservoir	2	1	2	2	2	1	3	1	1	1.7	299	57,000	> 15	31,410
52	5.9	G-22	Dilworth Reservoir - Raw Water at the Reservoir	Potential New Reservoirs	Raw Water at Reservoir	1	1	1	3	2	1	3	2	1	1.7	446	19,705	> 15	15,400
50	5.7	G-20	Gonzales Reservoir - Firm Yield	Potential New Reservoirs	Raw Water at Reservoir	3	3	2	2	2	3	3	1	1	2.2	260	69,897	> 15	21,370
53	5.10	G-40	Cloptin Crossing Reservoir - Raw Water at the Reservoir	Potential New Reservoirs	Raw Water at Reservoir	2	3	1	3	3	3	3	1	1	2.2	473	32,458	> 15	6,060
49	5.6	G-19	Guadalupe River Dam No. 7 - Firm Yield	Potential New Reservoirs	Raw Water at Reservoir	3	3	1	2	3	3	3	1	1	2.2	732	30,890	> 15	12,830
			Other Water Supply Options																
1	1.1	L-10 (Mun.)	Demand Reduction (Water Conservation) - Municipal	Local/Conservation/Reuse/Exchange		1	1	1	1	1	1	1	1	1	1.0	-400	-43,000	1 to 5	
	1.1	L-10 (Irr.)	Demand Reduction (Water Conservation) - Irrigation	Local/Conservation/Reuse/Exchange		1	1	1	1	1	1	1	1	1	1.0	-54	-80,000	1 to 5	
3	1.3	L-15	Purchase or Lease of Edwards Irrigation Water for Municipal and Industrial Use	Local/Conservation/Reuse/Exchange	Raw Water in Aquifer	1	1	1	1	1	1	1	1	1	1.0	51	95430 Max	1 to 5	N/A
7	1.7	SCTN-5	Weather Modification	Local/Conservation/Reuse/Exchange		1	1	1	1	1	1	1	1	1	1.0	Undetermined	Undetermined	1 to 5	Undetermined
8	1.8	SCTN-9	Rainwater Harvesting	Local/Conservation/Reuse/Exchange		1	1	1	1	1	1	1	1	1	1.0	16,176	057/household	1 to 5	0
69	6.5	SCTN-2a	Groundwater Supplies for Municipal Water Systems in the Carrizo-Wilcox Aquifer	Carrizo and Other Aquifers		1	1	1	1	1	1	1	1	1	1.0	N/A	N/A	1 to 5	N/A
70	6.6	SCTN-2b	Groundwater Supplies for Municipal Water Systems in the Gulf Coast Aquifer	Carrizo and Other Aquifers		1	1	1	1	1	1	1	1	1	1.0	N/A	N/A	1 to 5	N/A
71	6.7	SCTN-2c	Groundwater Supplies for Municipal Water Systems in the Trinity Aquifer	Carrizo and Other Aquifers		1	1	1	1	1	1	1	1	1	1.0	N/A	N/A	1 to 5	N/A
72	6.8	SCTN-1a	Aquifer Storage and Recovery (ASR) - Regional Option	Carrizo and Other Aquifers		1	1	1	1	1	1	1	1	1	1.0	2428 to 1009	2,792	1 to 5	288
73	6.9	SCTN-1b	Aquifer Storage and Recovery (ASR) - Local Option	Carrizo and Other Aquifers		1	1	1	1	1	1	1	1	1	1.0	2,088	279	1 to 5	3
16	1.11	SCTN-10	Off-Channel Local Storage (Guadalupe River near Victoria)	Local/Conservation/Reuse/Exchange	Treated Water Delivered	1	1	1	1	2	1	1	1	1	1.1	597	10,000	1 to 5	481
6	1.6	SCTN-4	Brush Management	Local/Conservation/Reuse/Exchange		2	1	1	1	1	1	2	1	1	1.2	Undetermined	Undetermined	> 15	Undetermined
18	1.11	SCTN-10	Off-Channel Local Storage (Medina River near Von Ormy)	Local/Conservation/Reuse/Exchange	Treated Water Delivered	1	1	1	1	1	1	1	3	1	1.2	1,190	5,000	1 to 5	595
17	1.11	SCTN-10	Off-Channel Local Storage (Guadalupe River near Boerne)	Local/Conservation/Reuse/Exchange	Treated Water Delivered	2	3	1	2	1	1	1	1	1	1.4	2,681	1,500	1 to 5	595

Notes:
1) Size / Habitat Environmental Impact measure based on estimates of Land Impacted (High > 4000 ac; 4000 ac > Medium > 1000 ac; Low < 1000 ac)
2) Environmental Impacts (with the exception of Size / Habitat) are rated "Low" when source(s) of water are existing water rights.
3) Water Quality Rank is an indication of the relative water quality in the stream segment: 1 has no impairment of stream use, 2 has impairment with low priority for TMDL, & 3 has impairment with medium or high priority for TMDL.
4) Sustainability: 1 = High, Renewable resource, no mining; 2 = Medium, Limited mining (<200 ft additional drawdown); and 3 = Low, Mining (>200 ft additional drawdown).

"EREPA"

Economic / Reliability / Environmental / Public Acceptance

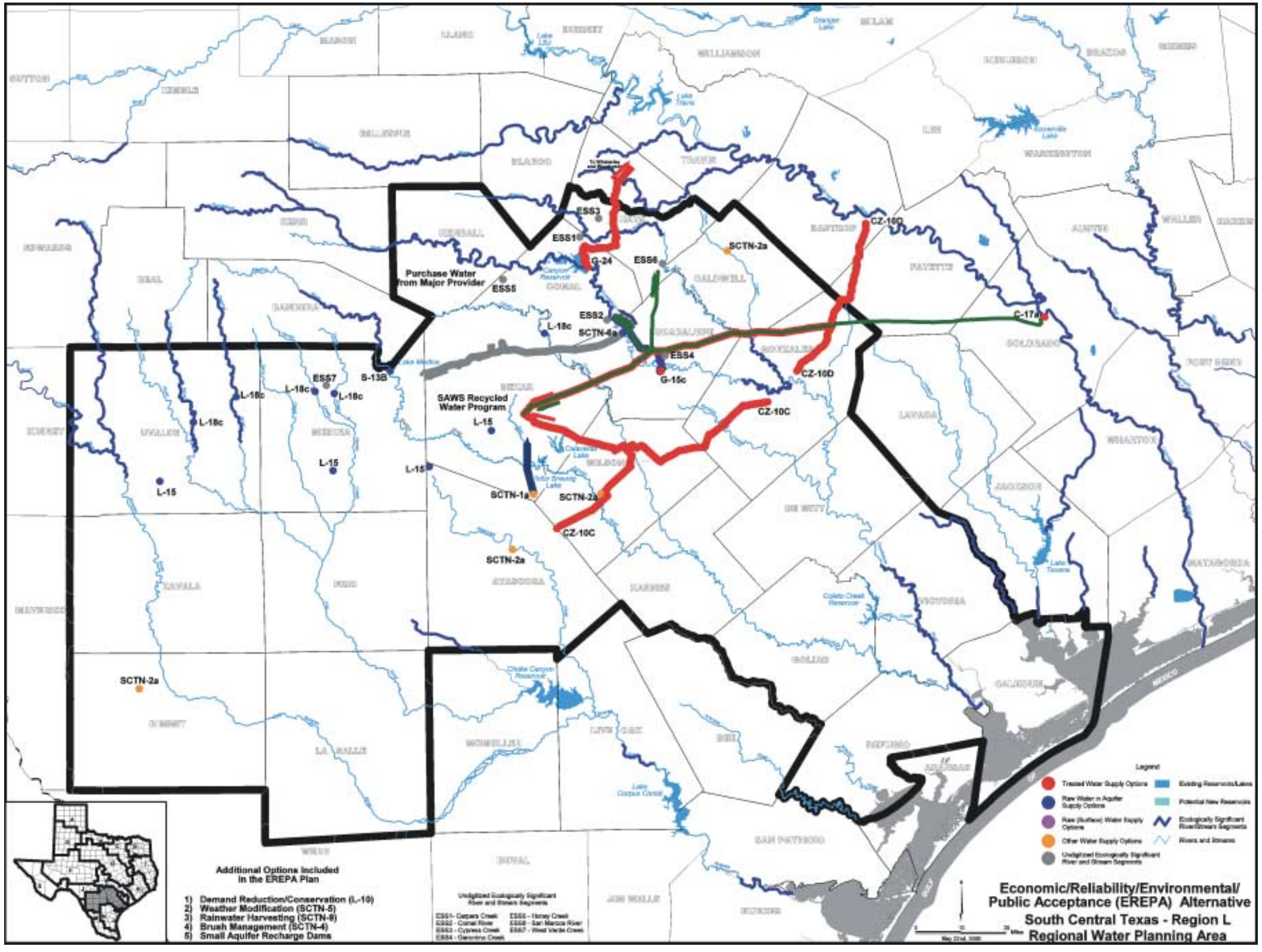
Regional Water Management Alternative Plan

South Central Texas Regional Water Planning Group

San Antonio River Authority

HDR Engineering, Inc.

June 13, 2000


ESS3
ESS1
G-24
ESS6
SCTN-2a
CZ-10D
Purchase Water from Major Provider
ESS5
ESS2
L-18c
SCTN-4a
C-17a
ESS4
G-15c
CZ-10D
ESS7
S-13B
L-18c
L-18c
L-18c
SAWS Recycled Water Program
L-15
CZ-10C
L-15
L-15
L-15
SCTN-1a
SCTN-2a
CZ-10C
SCTN-2a
SCTN-2a
Additional Options Included in the EREPA Plan
1) Demand Reduction/Conservation (L-10)
2) Weather Modification (SCTN-5)
3) Rainwater Harvesting (SCTN-9)
4) Brush Management (SCTN-4)
5) Small Aquifer Recharge Dams
Undigitized Ecologically Significant River and Stream Segments
ESS1- Calpers Creek
ESS2 - Comal River
ESS3 - Cypress Creek
ESS4 - Geronimo Creek
ESS5 - Honey Creek
ESS6 - San Marcos River
ESS7 - West Verde Creek
Legend
Treated Water Supply Options
Raw Water in Aquifer Supply Options
Raw (Surface) Water Supply Options
Other Water Supply Options
Undigitized Ecologically Significant River and Stream Segments
Existing Reservoirs/Lakes
Potential New Reservoirs
Ecologically Significant Riverstream Segments
Rivers and Streams
Economic/Reliability/Environmental/ Public Acceptance (EREPA) Alternative
South Central Texas - Region L
Regional Water Planning Area
May 22nd, 2008

South Central Texas Region Alternative Water Plans

Alternative Name: **Economic/Reliability/Environmental/Public Acceptance**

Alternative ID: **EREPA**

Alternative Description: *The Economic / Reliability / Environmental / Public Acceptance Alternative Regional Water Plan is predicated on the development of water supply options having the least expected annual unit cost of water. Environmental considerations are incorporated using the same qualitative measures employed for the Environmental / Conservation (E/C) Alternative Regional Water Plan. Public acceptance at the source location and reliability in drought conditions are also considered in this alternative regional water plan.*

The following water supply options are included in the Economic / Reliability / Environmental / Public Acceptance Alternative Regional Water Plan (in no particular order):

1. *Demand Reduction / Conservation (L-10)*
2. *Edwards Irrigation Transfers (L-15)*
3. *Medina Lake Recharge Enhancement (S-13B)*
4. *Edwards Recharge – Type 2 Projects (L-18c)*
5. *Edwards Recharge – Guadalupe R. Diversions (SCTN-6a)*
6. *Carrizo Aquifer – Wilson and Gonzales Counties (CZ-10C)*
7. *Carrizo Aquifer – Atascosa, Gonzales, and Bastrop Counties (CZ-10D)*
8. *Colorado R. @ Columbus – LCRA Irrigation & Stored Water (C-17A)*
9. *Canyon Reservoir (G-15C)*
10. *Wimberley & Woodcreek – Canyon (G-24)*
11. *Carrizo Aquifer – Local Supply (SCTN-2a)*
12. *Brush Management (SCTN-4)*
13. *Weather Modification (SCTN-5)*
14. *Rainwater Harvesting (SCTN-9)*

EREPA Alternative Regional Water Plan
Summary of Key Information for
South Central Texas Regional Water Planning Group

Quantity, Reliability, and Cost

- Plan includes management supplies to meet projected needs, ensure reliability, and maintain springflow, resulting in a quantity of additional water supplies sufficient to meet projected needs for municipal, industrial, steam-electric power, and mining uses through the year 2050.
- Cost is the least among the five alternative plans under consideration.

Environmental Factors

- Increased median annual streamflows in the San Antonio River.
- Below average concerns with respect to all environmental factors evaluated for the five alternative plans under consideration.
- Least concerns with Vegetation & Wildlife Habitat and Ecologically Significant Stream Segments among the five alternative plans under consideration.

Impacts on Water Resources

- No unmitigated reductions in water available to existing water rights.
- Long-term reductions in water levels in the Carrizo Aquifer. Drawdown would be the greatest for the five alternative plans under consideration.

Impacts on Agriculture and Natural Resources

- Major commitment to municipal and irrigation water Demand Reduction (Conservation) (L-10).
- Includes Brush Management (SCTN-4) and Weather Modification (SCTN-5).
- Inclusion of water supply options to meet projected irrigation needs in full is estimated to be economically infeasible at this time. Weather Modification (SCTN-5) assists irrigation and dry-land agriculture (crops and ranching).
- Includes maximum potential voluntary transfer of Edwards Aquifer irrigation permits to municipal permits through lease or purchase.
- Includes Medina Lake - Recharge Enhancement (S-13B) which reduces or eliminates water supplies from the Medina Lake System for irrigation in Bexar, Medina, and Atascosa Counties.

Other Relevant Factors per SCTRWPG

Comparison of Strategies to Meet Needs

- Selection of water supply options comprising the alternative plan based primarily on least unit cost.

Interbasin Transfer Issues

- Projected non-irrigation needs in basin(s) of origin are met throughout the planning period.
- Plan includes two interbasin transfers: 1) Edwards Recharge – Guadalupe River Diversions (SCTN-6a) from the Guadalupe River near Lake Dunlap to the outcrop of the Edwards Aquifer in the San Antonio River Basin; and 2) LCRA Irrigation & Stored Water (C-17A) from the Colorado River at Columbus to Bexar, Comal, Guadalupe, and Hays Counties.

Third-Party Impacts of Voluntary Redistribution of Water

- Potential positive or negative effects of Edwards Irrigation Transfers (L-15).
- Lower water levels in some portions of the Carrizo Aquifer.

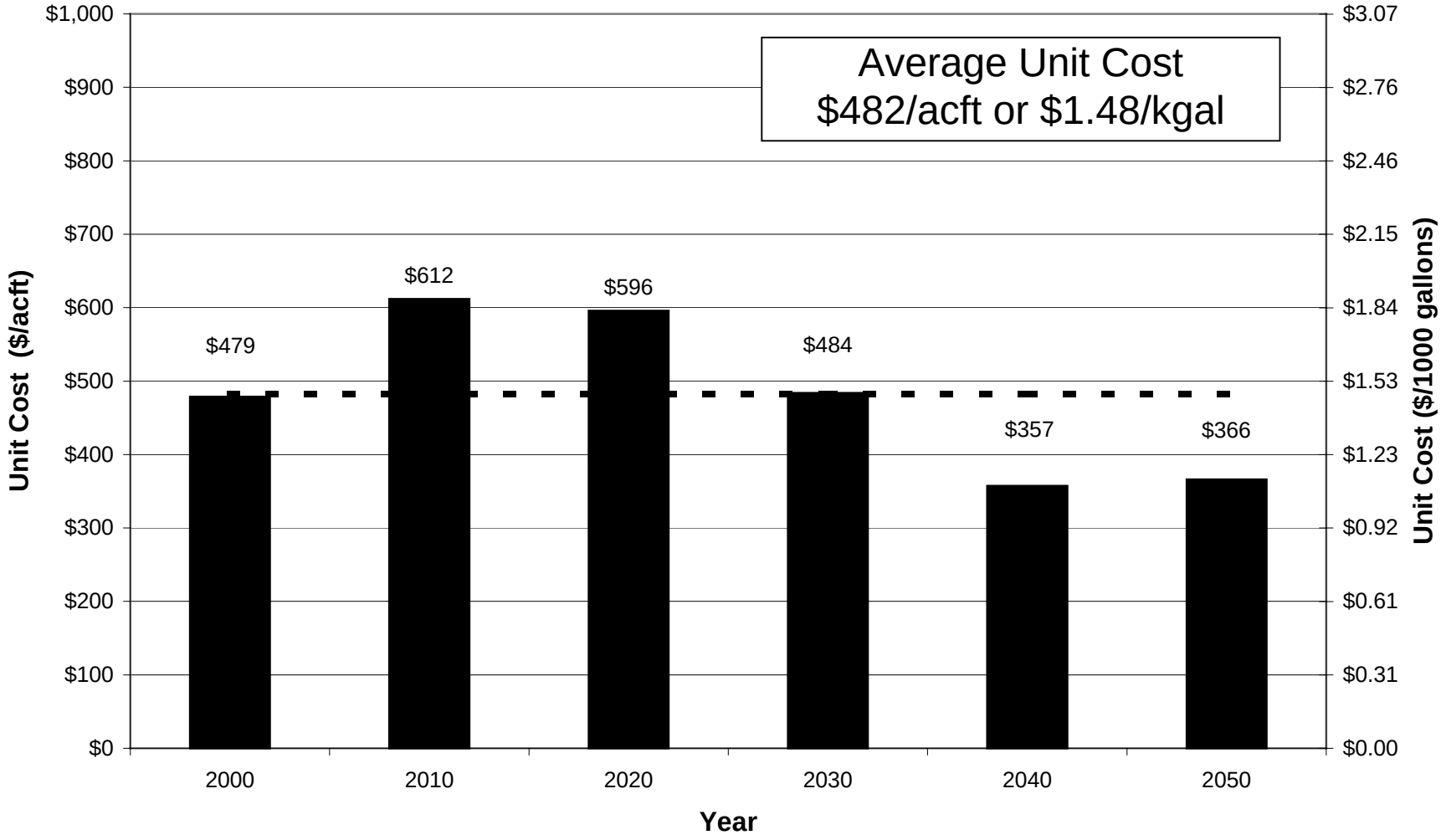
Regional Efficiency

- Edwards Irrigation Transfers (L-15) require no new facilities. Transferred water would likely be available at or very near locations having projected municipal, industrial, steam-electric power, and mining needs in Uvalde, Medina, Atascosa, and Bexar Counties.
- Terminal storage and regional water treatment facilities in Bexar and Guadalupe Counties increase efficiency, improve reliability, and reduce unit cost.
- Shared transmission facilities for Colorado River (C-17A), Carrizo Aquifer (CZ-10D), and Guadalupe River (G-15C) supplies reduce cost.
- San Antonio Water System Regional Aquifer Storage & Recovery System (SCTN-1a) substantially reduces peak summer pumpage from the Edwards Aquifer.
- Edwards Recharge – Guadalupe River Diversions (SCTN-6a) provides for recovery and recirculation of enhanced Comal springflow resulting from implementation of Edwards Recharge – Type 2 Projects (L-18c).

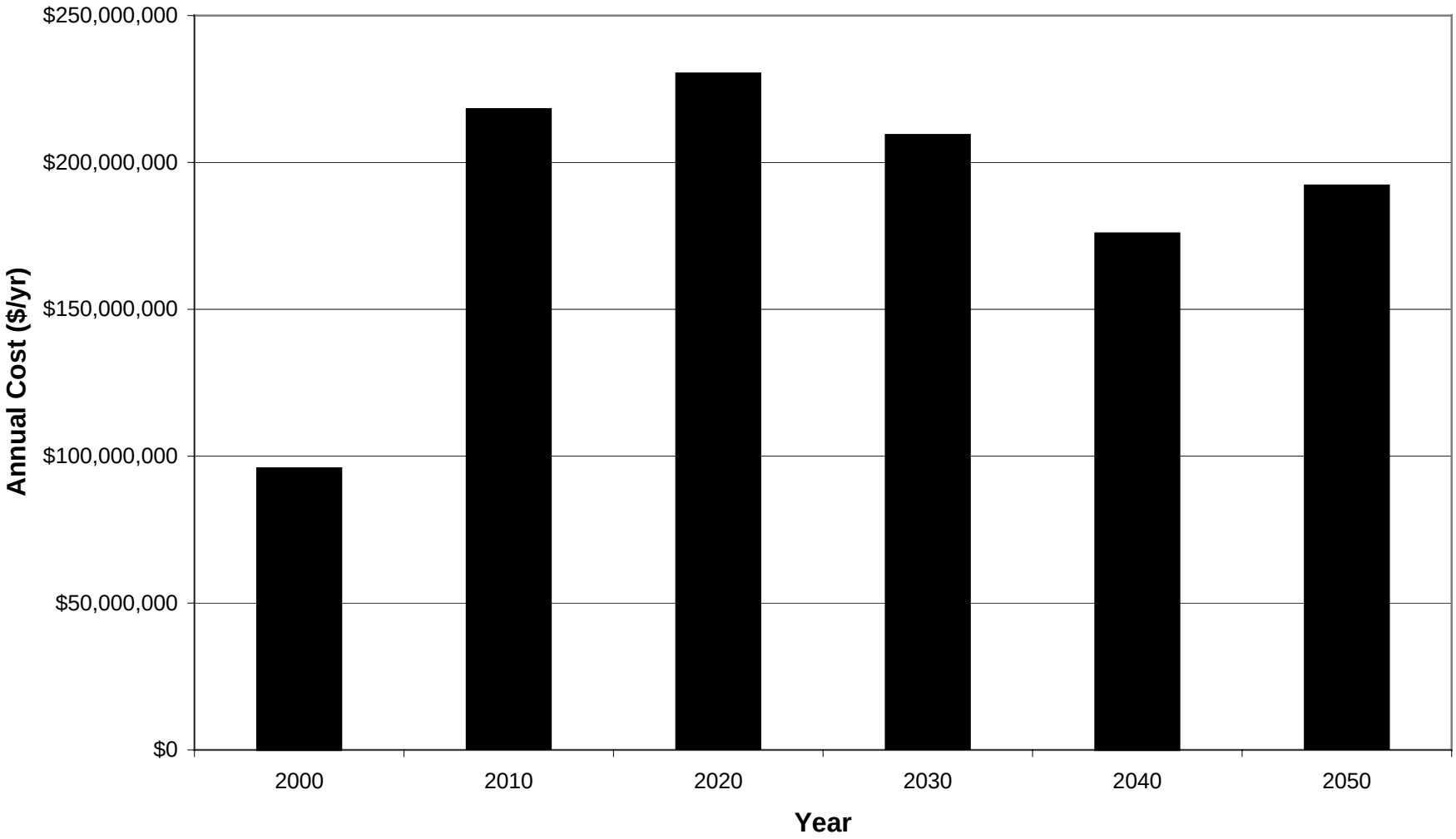
Effect on Navigation

- Not applicable.

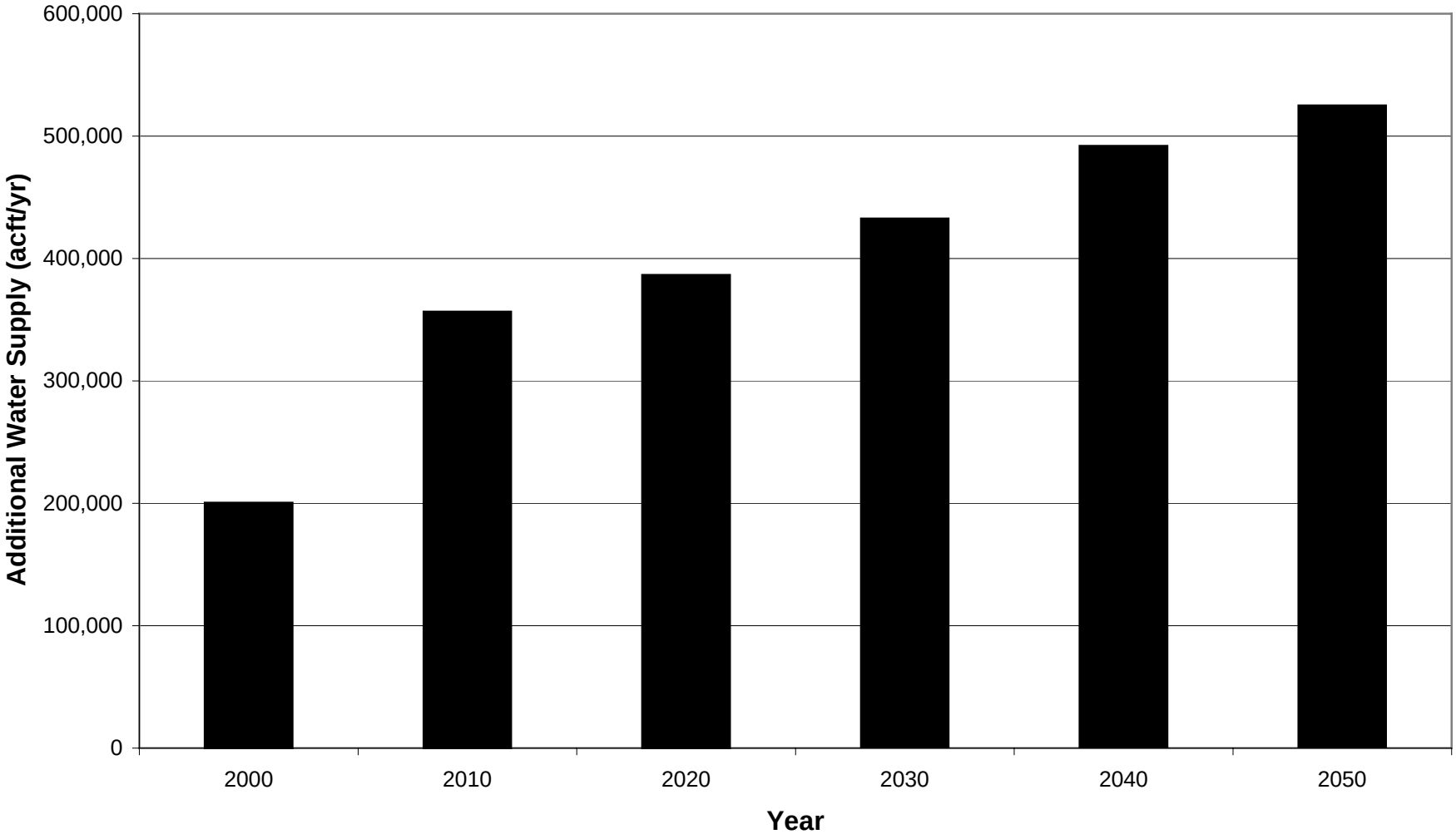
EREPA Alternative Regional Water Plan
Unit Cost of Cumulative Additional Water Supply

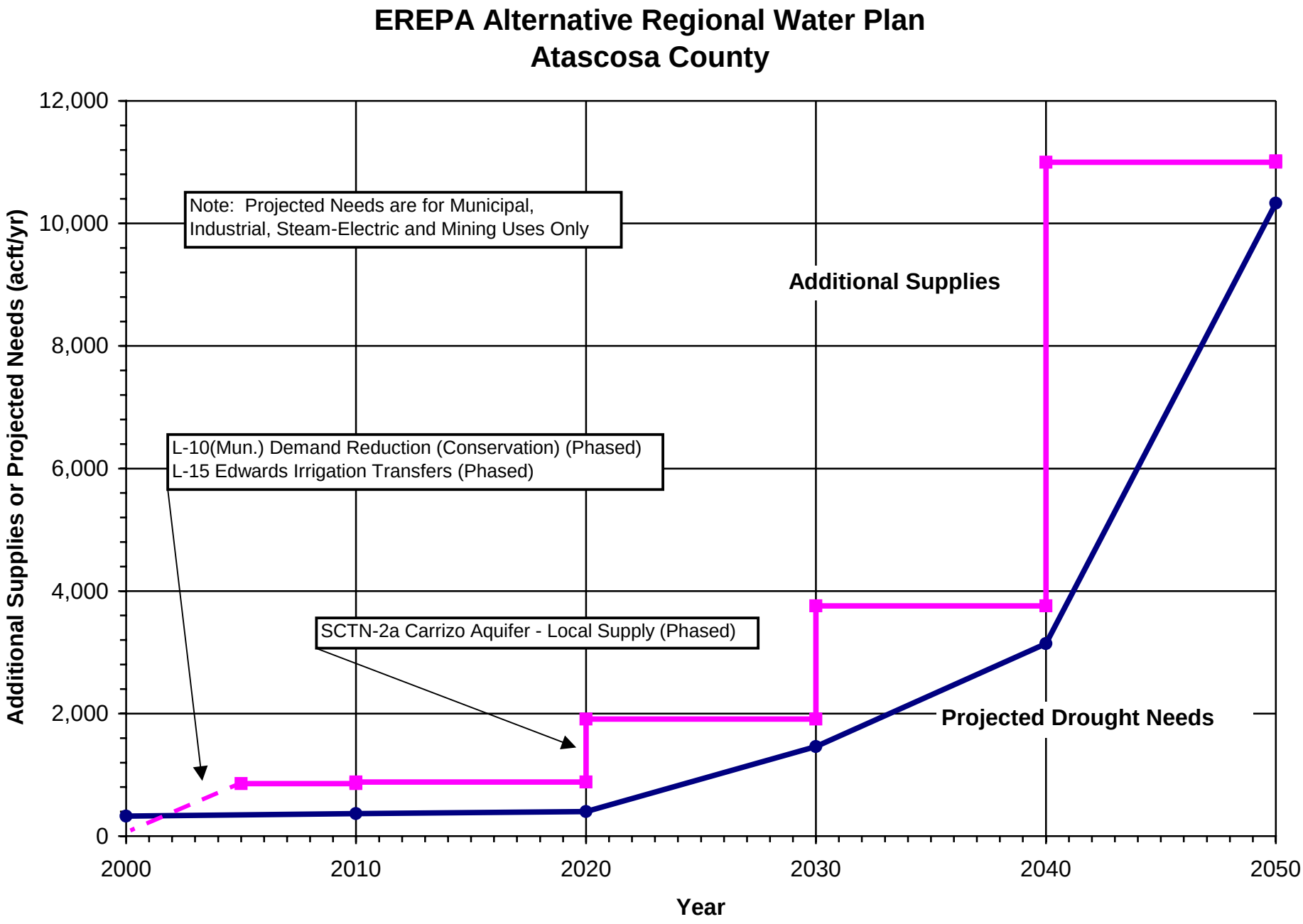


EREPA Alternative Regional Water Plan
Annual Cost of Cumulative Additional Water Supply



EREPA Alternative Regional Water Plan
Cumulative Additional Water Supply




EREPA Alternative Regional Water Plan
Atascosa County
Additional Supplies or Projected Needs (acft/yr)
12,000
10,000
8,000
6,000
4,000
2,000
0
2000
2010
2020
2030
2040
2050
Year
Note: Projected Needs are for Municipal, Industrial, Steam-Electric and Mining Uses Only
L-10(Mun.) Demand Reduction (Conservation) (Phased)
L-15 Edwards Irrigation Transfers (Phased)
SCTN-2a Carrizo Aquifer - Local Supply (Phased)
Additional Supplies
Projected Drought Needs

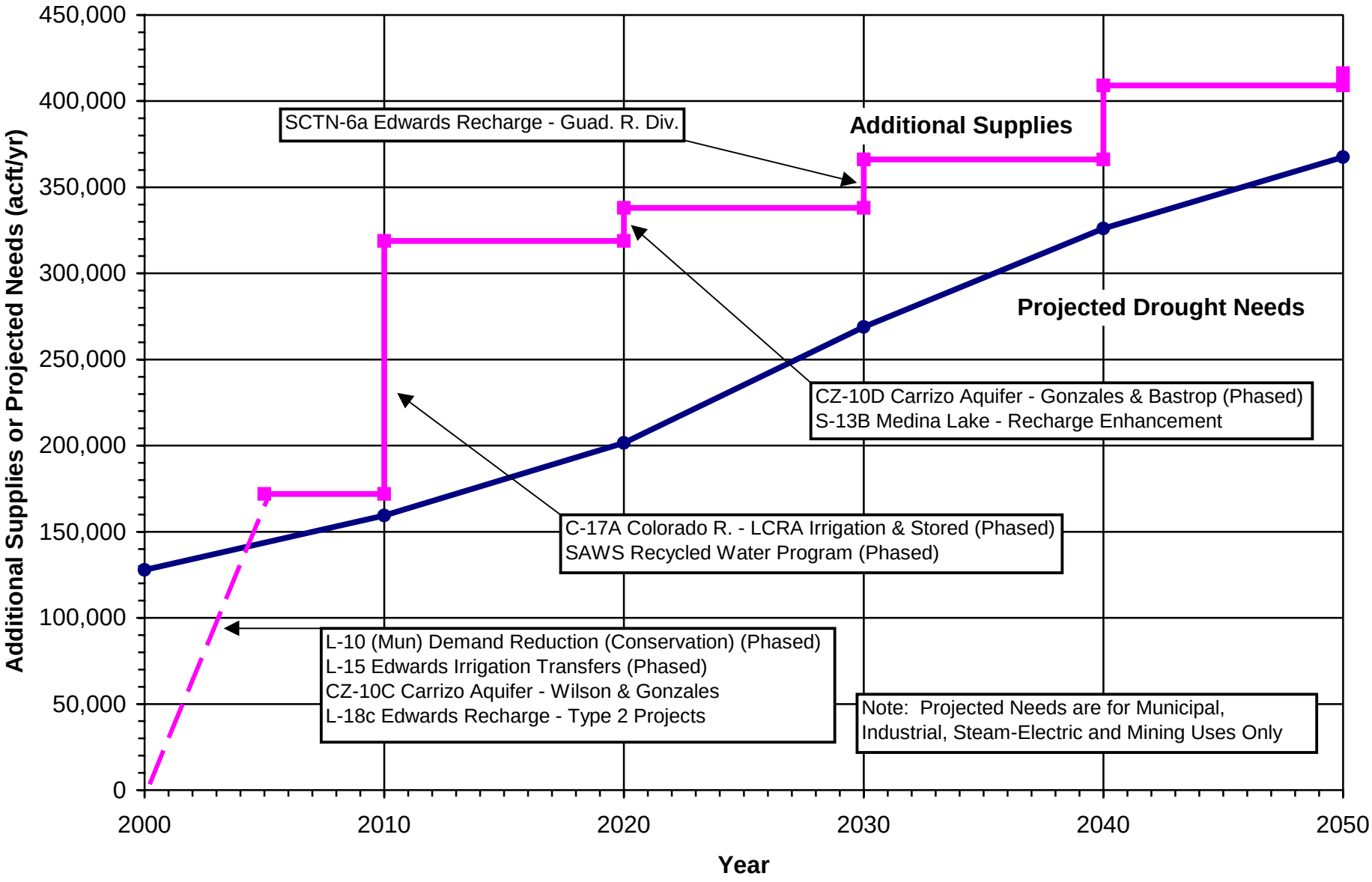
EREPA Regional Water Management Alternative Plan

South Central Texas Region						County =	Atascosa	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		325	366	401	468	530	587	
Industrial		0	0	0	0	0	0	
Steam-Electric		0	0	0	0	1,504	8,504	
Mining		0	0	0	995	1,109	1,239	
Irrigation		38,418	36,718	35,170	43,726	42,190	40,713	
Total Needs		**38,743**	**37,084**	**35,571**	**45,189**	**45,333**	**51,043**	
Mun, Ind, S-E, & Min Needs		**325**	**366**	**401**	**1,463**	**3,143**	**10,330**	
Irrigation Needs		**38,418**	**36,718**	**35,170**	**43,726**	**42,190**	**40,713**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		356	384	411	259	300	319	1
L-15 Edwards Irrigation Transfers	81,000	500	500	500	500	700	700	2, 3, 4
SCTN-2a Carrizo Aquifer - Local Supply					1,000	3,000	10,000	5, 6
SCTN-4 Brush Management								7
SCTN-5 Weather Modification								7
SCTN-9 Rainwater Harvesting								7
Small Aquifer Recharge Dams								7
L-10 (Irr.) Demand Reduction (Conservation)		3,962	3,962	3,962	3,962	3,962	3,962	8
Total New Supplies		**4,818**	**4,846**	**4,873**	**5,721**	**7,962**	**14,981**	
Total System Mgmt. Supply / Deficit		**-33,925**	**-32,238**	**-30,698**	**-39,468**	**-37,371**	**-36,062**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**531**	**518**	**510**	**296**	**857**	**689**	
Irrigation System Mgmt. Supply / Deficit		**-34,456**	**-32,756**	**-31,208**	**-39,764**	**-38,228**	**-36,751**	

Notes:

*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Additional Edwards supply is for City of Lytle.
5	Additional Carrizo supply is for Steam-Electric and Mining use.
6	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
7	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
8	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation
	application rate.

EREPA Alternative Regional Water Plan
Bexar County

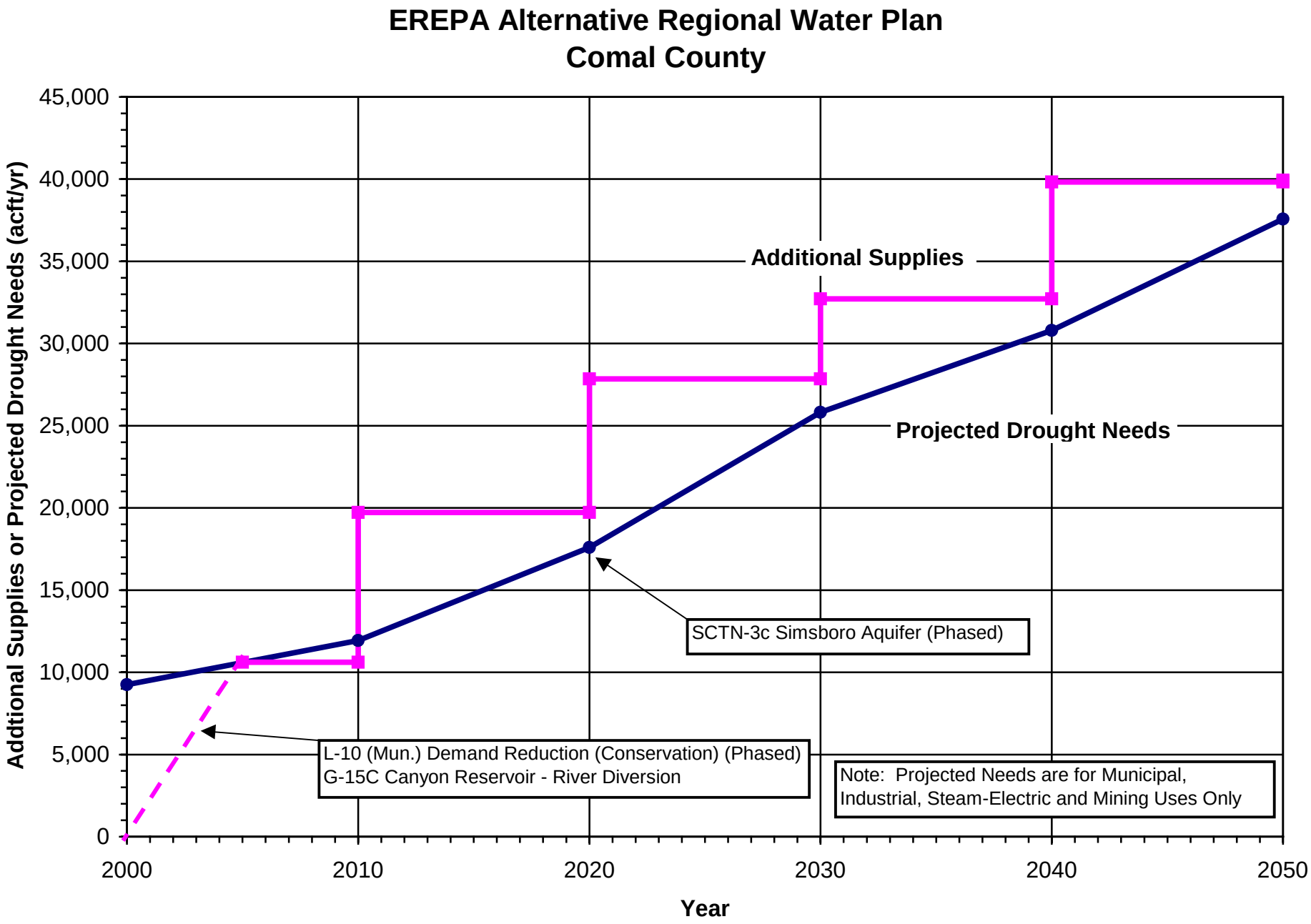


EREPA Regional Water Management Alternative Plan

South Central Texas Region						County =	Bexar	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		122,867	154,495	196,301	262,070	315,633	353,309	
Industrial		0	0	0	1,430	4,759	8,192	
Steam-Electric		0	0	0	0	0	0	
Mining		4,963	4,936	5,201	5,406	5,645	5,962	
Irrigation		22,575	20,374	19,585	19,015	18,385	17,368	
Total Needs		**150,405**	**179,805**	**221,087**	**287,921**	**344,422**	**384,831**	
Mun, Ind, S-E, & Min Needs		**127,830**	**159,431**	**201,502**	**268,906**	**326,037**	**367,463**	
Irrigation Needs		**22,575**	**20,374**	**19,585**	**19,015**	**18,385**	**17,368**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		33,528	42,509	41,210	36,533	38,834	40,934	1
L-15 Edwards Irrigation Transfers	81,000	50,000	55,000	60,000	65,000	70,000	71,300	2, 3
CZ-10C Carrizo Aquifer - Wilson & Gonzales	75,000	75,000	75,000	75,000	75,000	75,000	75,000	4
L-18c Edwards Recharge - Type 2 Projects	13,451	13,451	13,451	13,451	13,451	13,451	13,451	
C-17A Colorado R. - LCRA Irrigation & Stored	125,000		113,000	93,500	70,000	48,000	23,000	5, 6
SAWS Recycled Water Program			19,826	26,737	35,824	43,561	52,215	7, 8
CZ-10D Carrizo Aquifer - Gonzales & Bastrop	145,000			20,000	20,000	70,000	90,000	4, 9, 10
S-13B Medina Lake - Recharge Enhancement	8,136			8,136	8,136	8,136	8,136	
SCTN-6a Edwards Recharge - Guad. R. Div.	42,121				42,121	42,121	42,121	
SCTN-1a Aquifer Storage & Recovery - Regional								11
SCTN-4 Brush Management								12
SCTN-5 Weather Modification								12
SCTN-9 Rainwater Harvesting								12
Small Aquifer Recharge Dams								12
L-10 (Irr.) Demand Reduction (Conservation)		4,521	4,521	4,521	4,521	4,521	4,521	13
Total New Supplies		**176,500**	**323,307**	**342,555**	**370,586**	**413,624**	**420,678**	
Total System Mgmt. Supply / Deficit		**26,095**	**143,502**	**121,468**	**82,665**	**69,202**	**35,847**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**44,149**	**159,355**	**136,532**	**97,159**	**83,066**	**48,694**	
Irrigation System Mgmt. Supply / Deficit		**-18,054**	**-15,853**	**-15,064**	**-14,494**	**-13,864**	**-12,847**	

Notes:

*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Effects on regional aquifer levels to be quantified.
5	Supply dependent upon future water needs in Region K and/or interbasin transfer issues (120 Kacft/yr decreasing to 80 Kacft/yr).
6	Candidate New Supply to be shared among Bexar, Comal, Guadalupe, and Hays Counties.
7	Current SAWS Recycled Water Program is included in the 24,941 acft/yr (consumptive reuse) in estimated needs.
8	Future use of recycled water for non-potable uses and based on goal of meeting 20 percent of SAWS projected water demand.
9	Portion of 220,000 acft/yr considered under CZ-10D in Gonzales & Wilson Counties which is not included in CZ-10C.
10	90,000 acft/yr from Gonzales and Bastrop Counties by 2040.
11	SAWS ASR program in southern Bexar County increases reliability of Edwards Aquifer supply and reduces seasonal aquifer demands.
12	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
13	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.

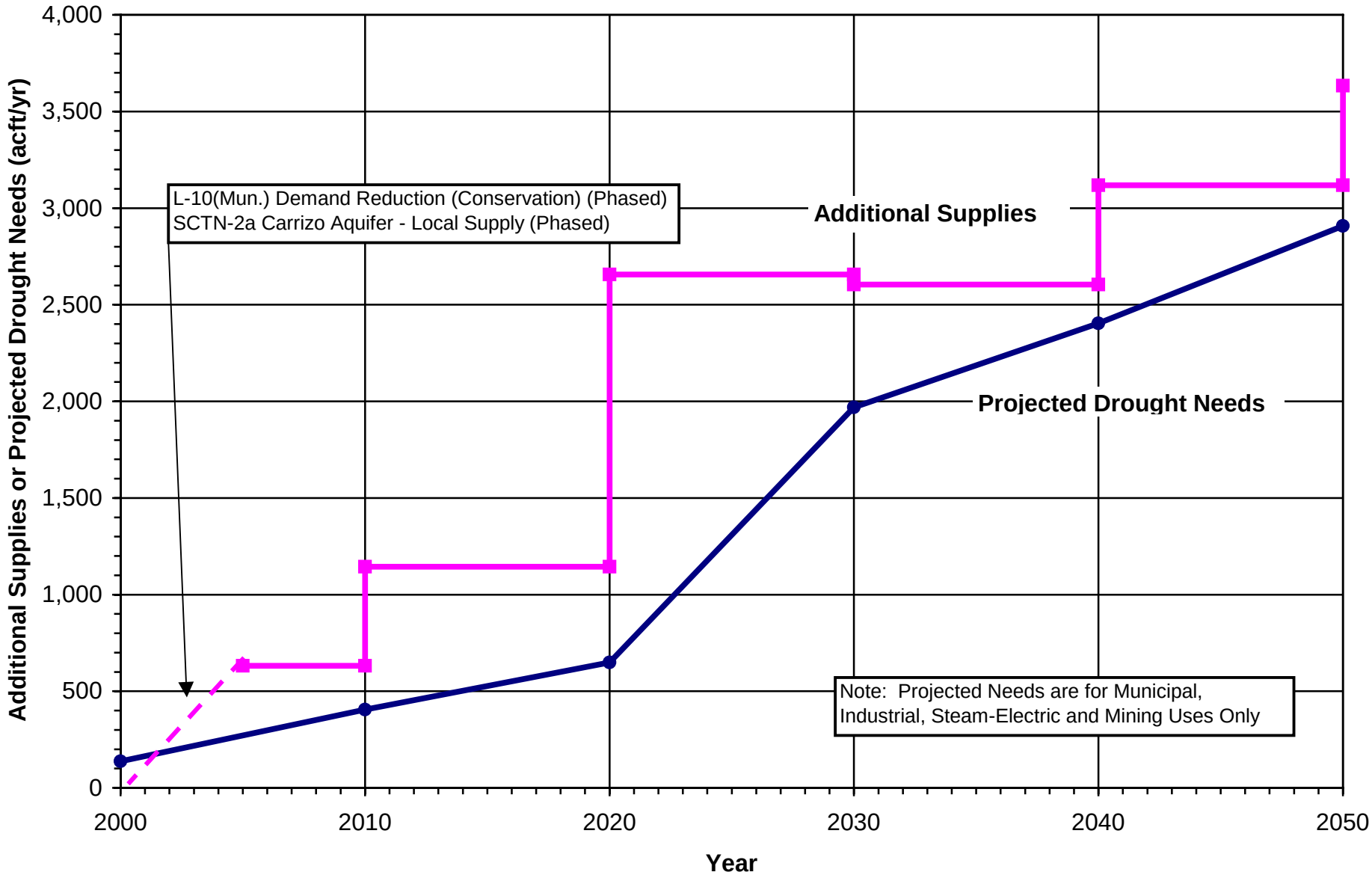

EREPA Alternative Regional Water Plan
Comal County
Addtional Supplies or Projected Drought Needs (acft/yr)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
Projected Drought Needs
SCTN-3c Simsboro Aquifer (Phased)
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
G-15C Canyon Reservoir - River Diversion
Note: Projected Needs are for Municipal,
Industrial, Steam-Electric and Mining Uses Only

EREPA Regional Water Management Alternative Plan

South Central Texas Region						County =	Comal	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		2,289	5,049	10,487	18,282	25,205	33,062	
Industrial		1,388	1,425	1,486	1,737	2,009	2,289	
Steam-Electric		0	0	0	0	0	0	
Mining		5,570	5,464	5,628	5,796	3,590	2,224	
Irrigation		30	14	0	0	0	0	
Total Needs		**9,277**	**11,952**	**17,601**	**25,815**	**30,804**	**37,575**	
Mun, Ind, S-E, & Min Needs		**9,247**	**11,938**	**17,601**	**25,815**	**30,804**	**37,575**	
Irrigation Needs		**30**	**14**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		616	718	848	718	824	942	1
G-15C Canyon Reservoir - River Diversion	15,000	10,000	10,000	10,000	10,000	10,000	10,000	2, 3
C-17A Colorado R. - LCRA Irrigation & Stored	125,000		3,000	9,000	17,000	22,000	29,000	4, 5, 6
Small Aquifer Recharge Dams								7
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**10,616**	**13,718**	**19,848**	**27,718**	**32,824**	**39,942**	
Total System Mgmt. Supply / Deficit		**1,339**	**1,766**	**2,247**	**1,903**	**2,020**	**2,367**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,369**	**1,780**	**2,247**	**1,903**	**2,020**	**2,367**	
Irrigation System Mgmt. Supply / Deficit		**-30**	**-14**	**0**	**0**	**0**	**0**	

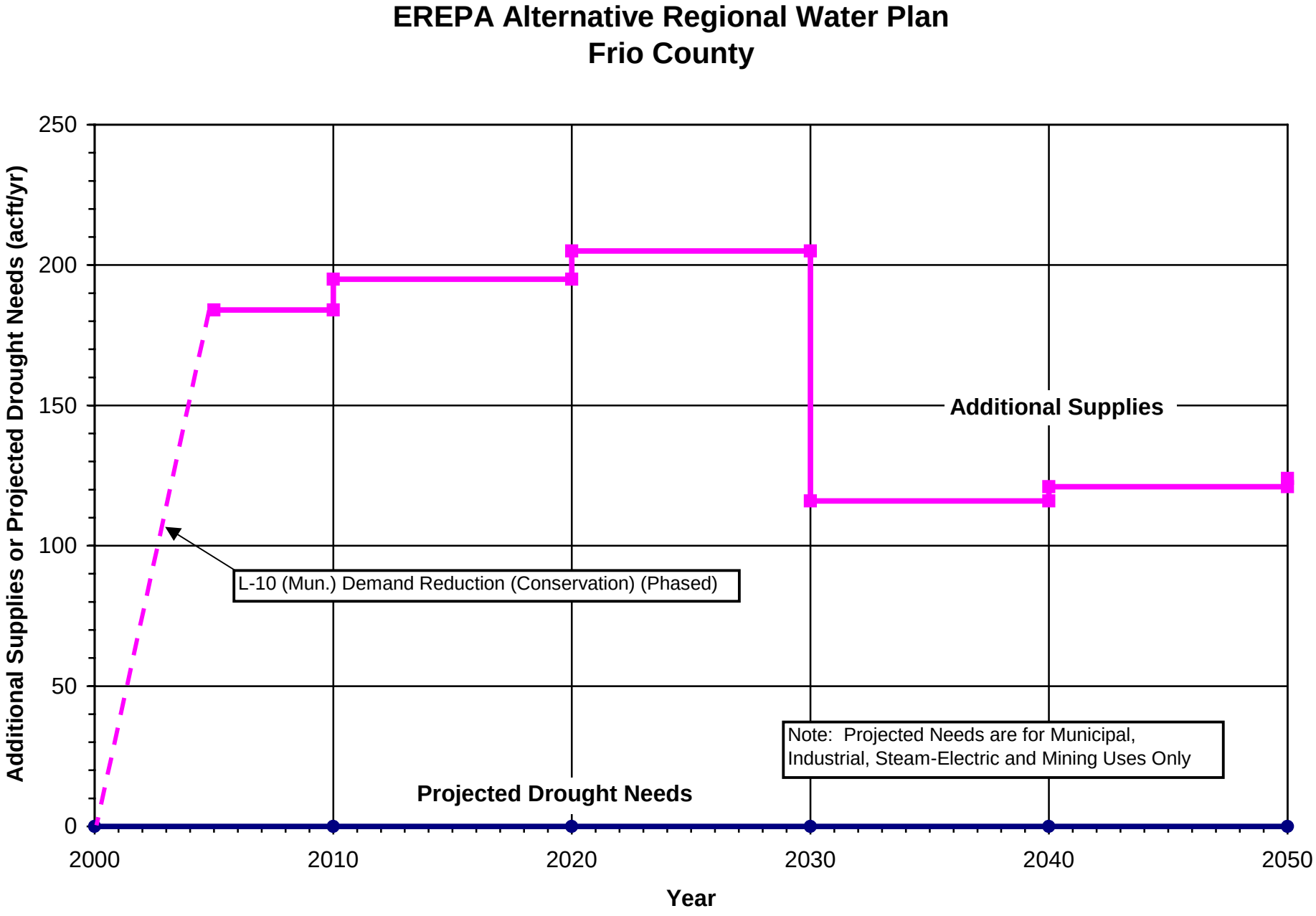
Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but may not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Portion of Canyon firm yield (with amendment) diverted below Seguin.
3	Candidate New Supply shared among Comal, Guadalupe, and Hays Counties.
4	Supply dependent upon future water needs in Region K and/or interbasin transfer issues (120 Kacft/yr decreasing to 80 Kacft/yr).
5	Candidate New Supply to be shared among Bexar, Comal, Guadalupe, and Hays Counties.
6	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
7	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.

EREPA Alternative Regional Water Plan
Dimmit County



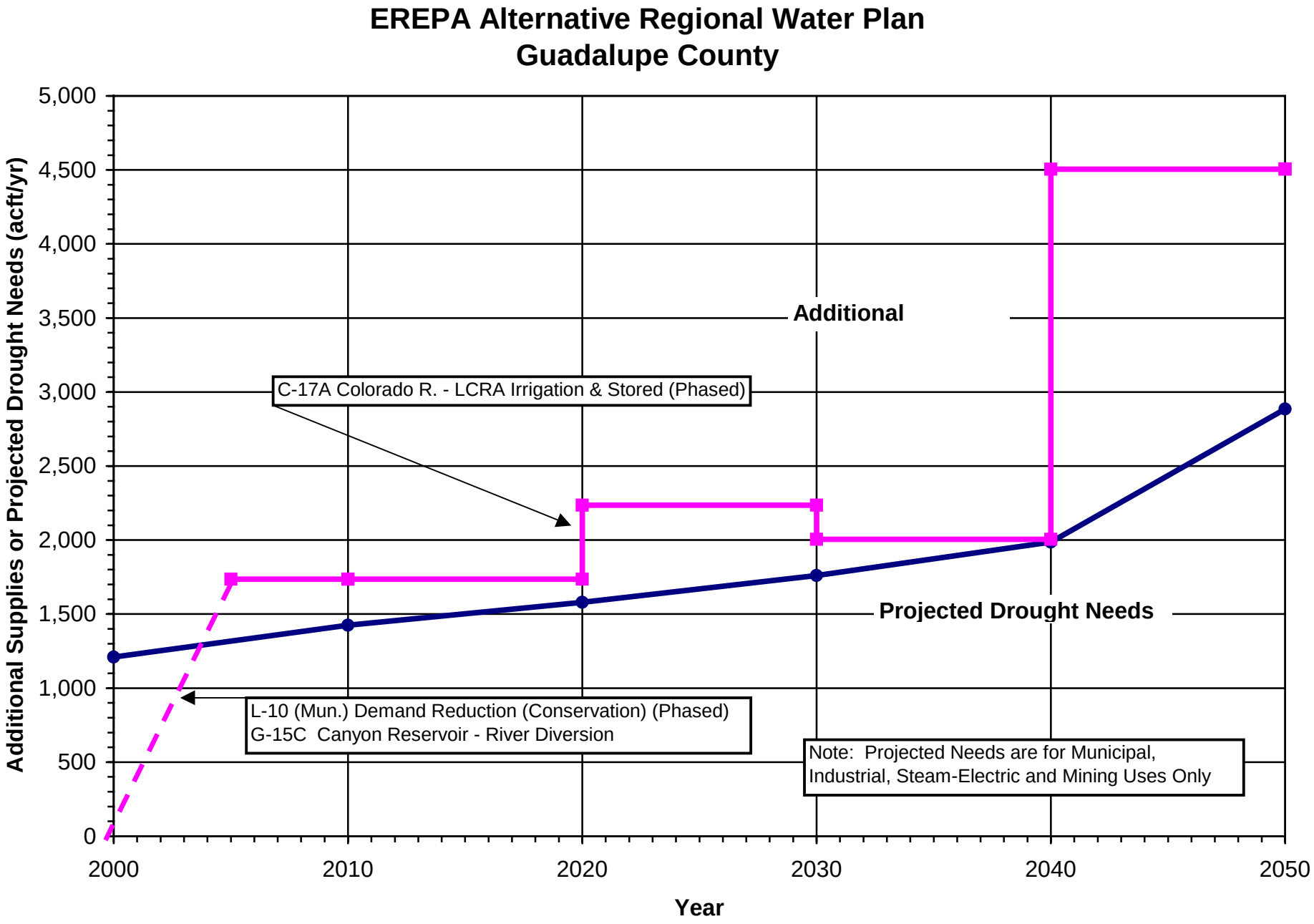
EREPA Regional Water Management Alternative Plan

South Central Texas Region							County =	Dimmit	
County Summary of Projected Water Needs and Water Supply Options							User Group(s) =	all	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		138	405	649	1,054	1,479	1,959	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	915	925	949	
	Irrigation		0	0	0	2,133	1,737	1,331	
	Total Needs		**138**	**405**	**649**	**4,102**	**4,141**	**4,239**	
	Mun, Ind, S-E, & Min Needs		**138**	**405**	**649**	**1,969**	**2,404**	**2,908**	
	Irrigation Needs		**0**	**0**	**0**	**2,133**	**1,737**	**1,331**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		131	144	156	104	118	133	1
SCTN-2a	Carrizo Aquifer - Local Supply		500	1,000	1,000	2,500	3,000	3,500	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**631**	**1,144**	**1,156**	**2,604**	**3,118**	**3,633**	
	Total System Mgmt. Supply / Deficit		**493**	**739**	**507**	**-1,498**	**-1,023**	**-606**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**493**	**739**	**507**	**635**	**714**	**725**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**-2,133**	**-1,737**	**-1,331**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Carrizo Springs and Mining supply.								
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								


EREPA Alternative Regional Water Plan
Frio County
Additional Supplies or Projected Drought Needs (acft/yr)
250
200
150
100
50
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
Projected Drought Needs
Note: Projected Needs are for Municipal, Industrial, Steam-Electric and Mining Uses Only

EREPA Regional Water Management Alternative Plan

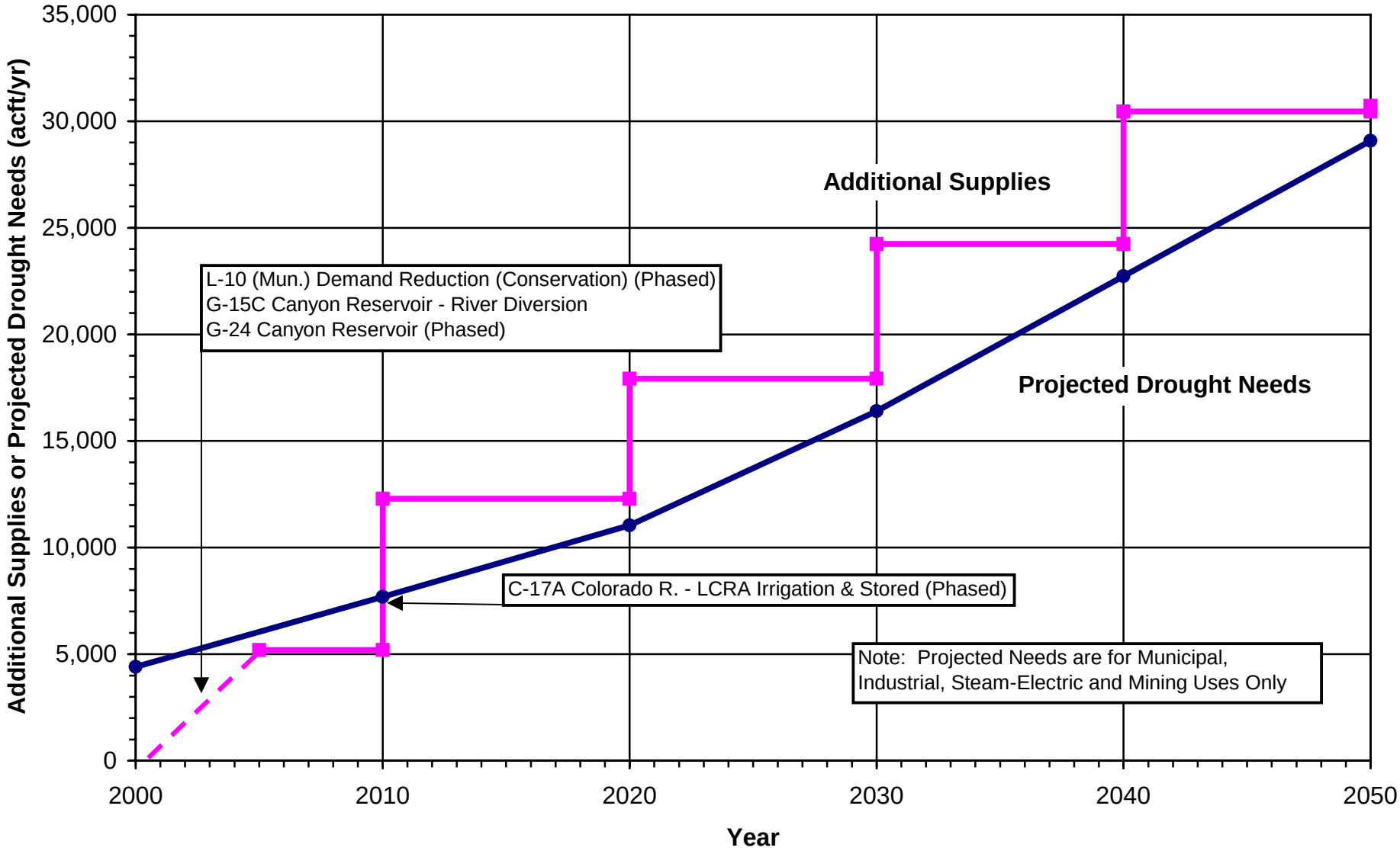
South Central Texas Region						County =	Frio	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	0	0	0	0	0	0	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	71,126	67,646	64,365	76,505	73,519	70,662	
	Total Needs	**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
	Mun, Ind, S-E, & Min Needs	**0**	**0**	**0**	**0**	**0**	**0**	
	Irrigation Needs	**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		184	195	205	116	121	124	1
SCTN-4	Brush Management								2
SCTN-5	Weather Modification								2
SCTN-9	Rainwater Harvesting								2
	Small Aquifer Recharge Dams								2
L-10 (Irr.)	Demand Reduction (Conservation)		5,947	5,947	5,947	5,947	5,947	5,947	3
	Total New Supplies		**6,131**	**6,142**	**6,152**	**6,063**	**6,068**	**6,071**	
	Total System Mgmt. Supply / Deficit		**-64,995**	**-61,504**	**-58,213**	**-70,442**	**-67,451**	**-64,591**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**184**	**195**	**205**	**116**	**121**	**124**	
	Irrigation System Mgmt. Supply / Deficit		**-65,179**	**-61,699**	**-58,418**	**-70,558**	**-67,572**	**-64,715**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation								
	application rate.								


EREPA Alternative Regional Water Plan
Guadalupe County
Additional Supplies or Projected Drought Needs (acft/yr)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2000
2010
2020
2030
2040
2050
Year
Additional
C-17A Colorado R. - LCRA Irrigation & Stored (Phased)
Projected Drought Needs
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
G-15C Canyon Reservoir - River Diversion
Note: Projected Needs are for Municipal,
Industrial, Steam-Electric and Mining Uses Only

EREPA Regional Water Management Alternative Plan

South Central Texas Region						County =	Guadalupe	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		29	23	30	71	87	773	
Industrial		985	1,204	1,350	1,487	1,692	1,899	
Steam-Electric		0	0	0	0	0	0	
Mining		196	198	200	202	207	213	
Irrigation		985	879	779	684	594	508	
Total Needs		**2,195**	**2,304**	**2,359**	**2,444**	**2,580**	**3,393**	
Mun, Ind, S-E, & Min Needs		**1,210**	**1,425**	**1,580**	**1,760**	**1,986**	**2,885**	
Irrigation Needs		**985**	**879**	**779**	**684**	**594**	**508**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		235	236	236	5	5	6	1
G-15C Canyon Reservoir - River Diversion	15,000	1,500	1,500	1,500	1,500	1,500	1,500	2, 3
C-17A Colorado R. - LCRA Irrigation & Stored	125,000			500	500	1,000	3,000	4, 5, 6
Small Aquifer Recharge Dams								7
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**1,735**	**1,736**	**2,236**	**2,005**	**2,505**	**4,506**	
Total System Mgmt. Supply / Deficit		**-460**	**-568**	**-123**	**-439**	**-75**	**1,113**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**525**	**311**	**656**	**245**	**519**	**1,621**	
Irrigation System Mgmt. Supply / Deficit		**-985**	**-879**	**-779**	**-684**	**-594**	**-508**	
Notes:								
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.							
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.							
2	Portion of Canyon firm yield (with amendment) diverted below Seguin.							
3	Candidate New Supply shared among Comal, Guadalupe, and Hays Counties.							
4	Supply dependent upon future water needs in Region K and/or interbasin transfer issues (120 Kacft/yr decreasing to 80 Kacft/yr).							
5	Candidate New Supply to be shared among Bexar, Comal, Guadalupe, and Hays Counties.							
6	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.							
7	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.							

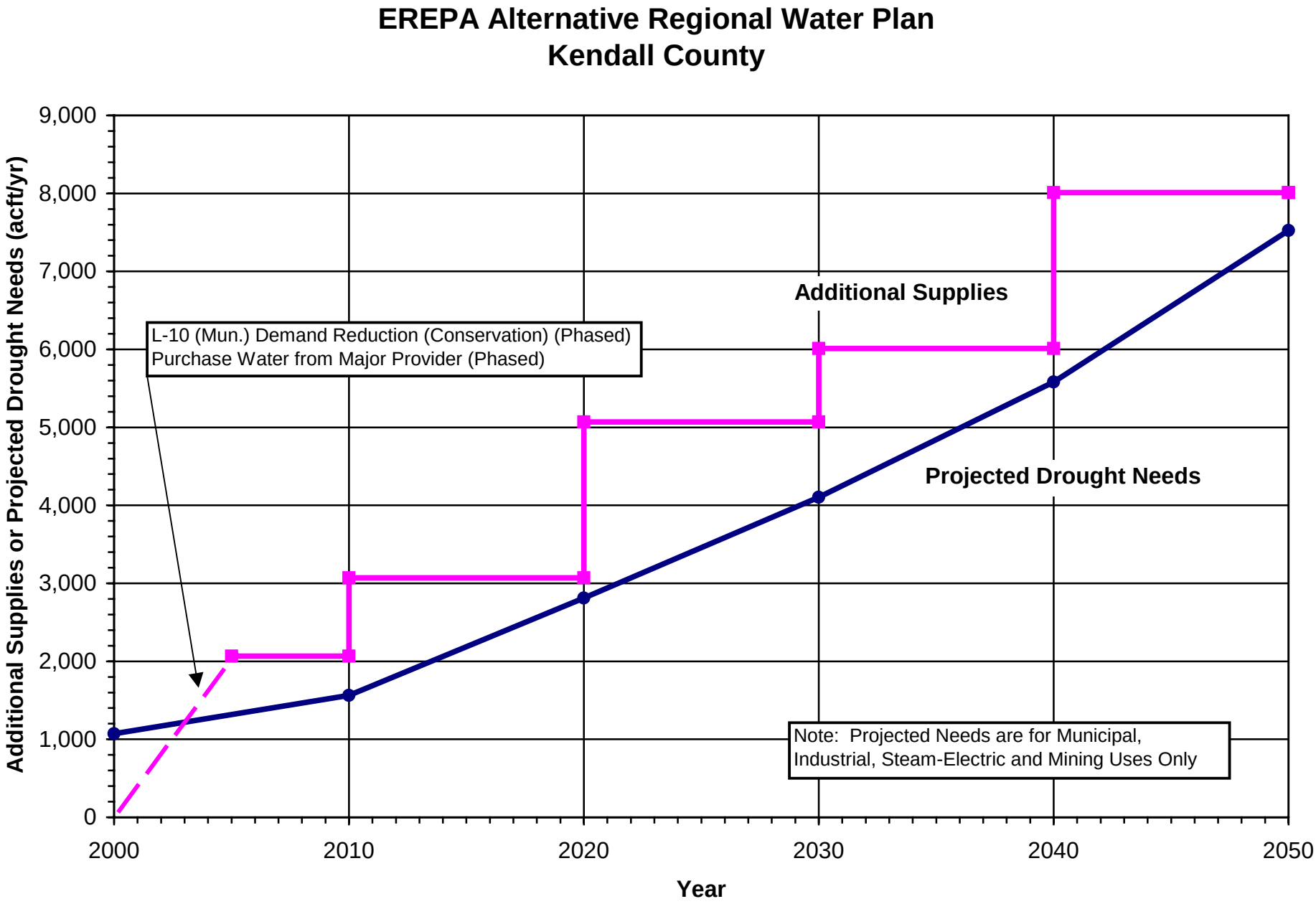
EREPA Alternative Regional Water Plan
Hays County



EREPA Regional Water Management Alternative Plan

South Central Texas Region						County =	Hays	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		4,325	7,609	10,980	16,349	22,696	29,059	
Industrial		0	0	0	0	0	0	
Steam-Electric		0	0	0	0	0	0	
Mining		84	82	68	55	37	28	
Irrigation		0	0	0	0	0	0	
Total Needs		**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
Mun, Ind, S-E, & Min Needs		**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		647	747	873	699	906	1,174	1
G-15C Canyon Reservoir - River Diversion	15,000	3500	3500	3500	3500	3500	3500	2, 3
G-24 Canyon Reservoir	1,048	1,048	1,048	1,048	1,048	1,048	1,048	4
C-17A Colorado R. - LCRA Irrigation & Stored	125,000		4,000	7,000	12,500	19,000	25,000	5, 6, 7
Small Aquifer Recharge Dams								8
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**5,195**	**9,295**	**12,421**	**17,747**	**24,454**	**30,722**	
Total System Mgmt. Supply / Deficit		**786**	**1,604**	**1,373**	**1,343**	**1,721**	**1,635**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**786**	**1,604**	**1,373**	**1,343**	**1,721**	**1,635**	
Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	

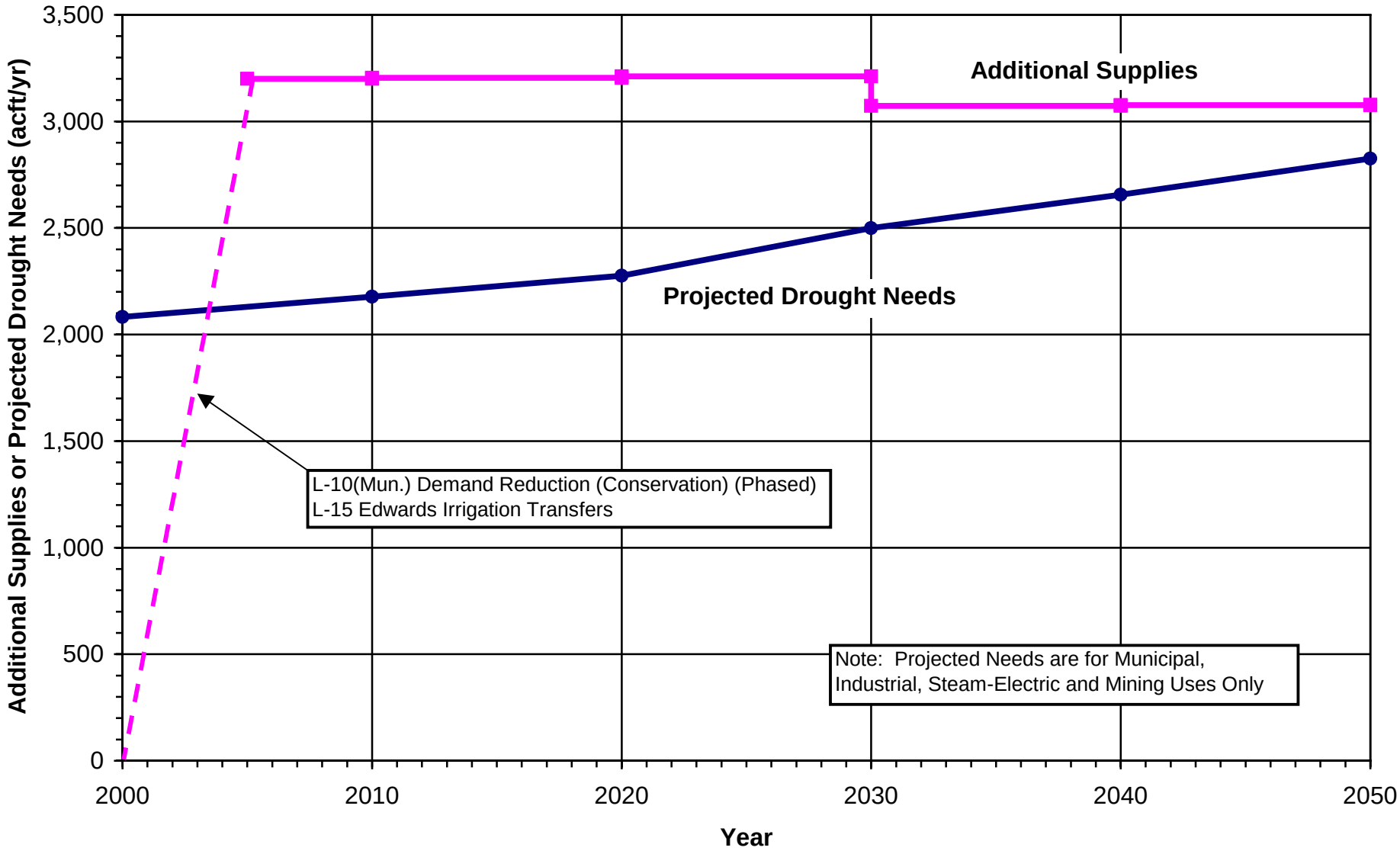
Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Portion of Canyon firm yield (with amendment) diverted below Seguin.
3	Candidate New Supply shared among Comal, Guadalupe, and Hays Counties.
4	Candidate New Supply for Wimberley and Woodcreek.
5	Supply dependent upon future water needs in Region K and/or interbasin transfer issues (120 Kacft/yr decreasing to 80 Kacft/yr).
6	Candidate New Supply to be shared among Bexar, Comal, Guadalupe, and Hays Counties.
7	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
8	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.


EREPA Alternative Regional Water Plan
Kendall County
Additional Supplies or Projected Drought Needs (acft/yr)
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
Purchase Water from Major Provider (Phased)
Projected Drought Needs
Note: Projected Needs are for Municipal,
Industrial, Steam-Electric and Mining Uses Only

EREPA Regional Water Management Alternative Plan

South Central Texas Region						County =	Kendall	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		1,070	1,560	2,808	4,099	5,578	7,518	
Industrial		2	3	4	4	5	6	
Steam-Electric		0	0	0	0	0	0	
Mining		0	0	0	0	0	0	
Irrigation		0	0	0	0	0	0	
Total Needs		**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
Mun, Ind, S-E, & Min Needs		**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		67	71	71	11	11	11	1
Purchase Water from Major Provider		2,000	2,000	3,000	5,000	6,000	8,000	2, 3
SCTN-4 Brush Management								4
SCTN-5 Weather Modification								4
SCTN-9 Rainwater Harvesting								4
Small Aquifer Recharge Dams								4
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**2,067**	**2,071**	**3,071**	**5,011**	**6,011**	**8,011**	
Total System Mgmt. Supply / Deficit		**995**	**508**	**259**	**908**	**428**	**487**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**995**	**508**	**259**	**908**	**428**	**487**	
Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:								
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.							
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.							
2	Assumed purchase from Bexar County major provider. Kendall County water needs are not reflected in Bexar County table.							
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.							
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.							

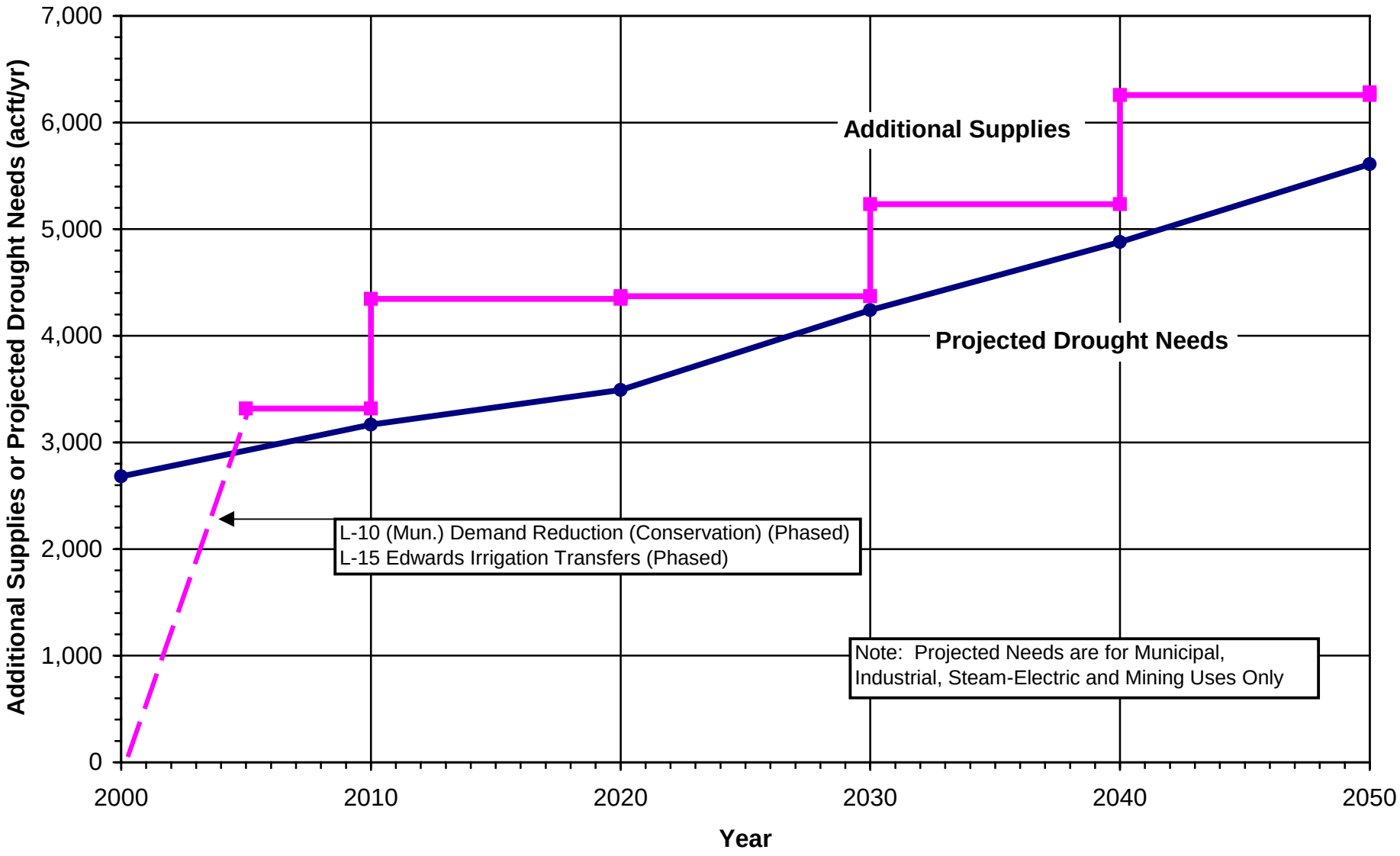
EREPA Alternative Regional Water Plan
Medina County



EREPA Regional Water Management Alternative Plan

South Central Texas Region						County =		Medina	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =		all	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		2,015	2,110	2,206	2,427	2,582	2,750	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		68	68	70	72	74	76	
	Irrigation		98,916	95,268	91,320	92,320	88,925	84,692	
	Total Needs		**100,999**	**97,446**	**93,596**	**94,819**	**91,581**	**87,518**	
	Mun, Ind, S-E, & Min Needs		**2,083**	**2,178**	**2,276**	**2,499**	**2,656**	**2,826**	
	Irrigation Needs		**98,916**	**95,268**	**91,320**	**92,320**	**88,925**	**84,692**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		200	205	211	73	76	78	1
L-15	Edwards Irrigation Transfers	81,000	3,000	3,000	3,000	3,000	3,000	3,000	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)		11,867	11,867	11,867	11,867	11,867	11,867	5
	Total New Supplies		**15,067**	**15,072**	**15,078**	**14,940**	**14,943**	**14,945**	
	Total System Mgmt. Supply / Deficit		**-85,932**	**-82,374**	**-78,518**	**-79,879**	**-76,638**	**-72,573**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,117**	**1,027**	**935**	**574**	**420**	**252**	
	Irrigation System Mgmt. Supply / Deficit		**-87,049**	**-83,401**	**-79,453**	**-80,453**	**-77,058**	**-72,825**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.								
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of								
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
5	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation								
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.								

EREPA Alternative Regional Water Plan
Uvalde County

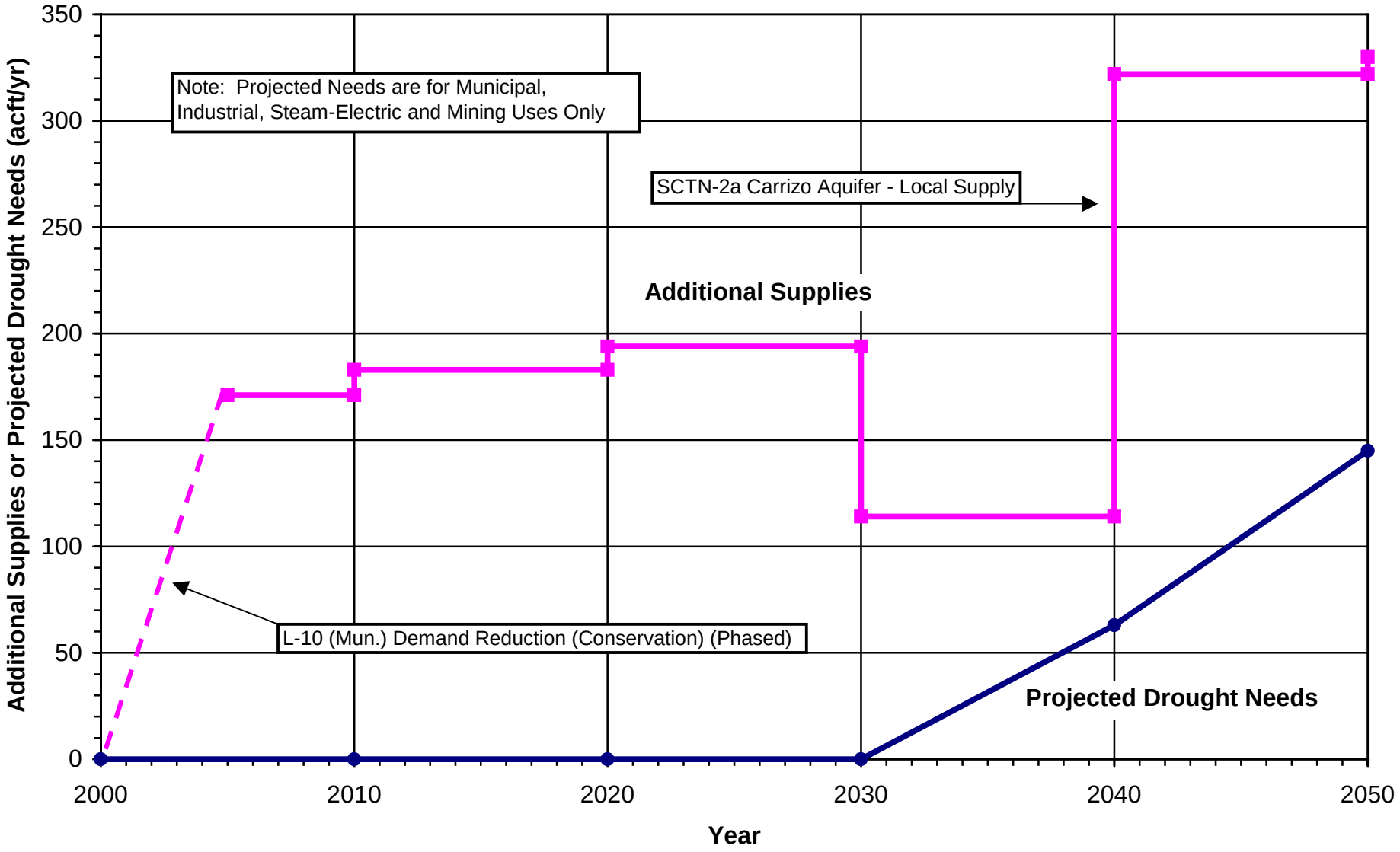


EREPA Regional Water Management Alternative Plan

South Central Texas Region						County =	Uvalde	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	2,682	3,166	3,493	4,241	4,880	5,609	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	75,263	72,798	70,154	71,022	68,880	65,676	
	Total Needs	**77,945**	**75,964**	**73,647**	**75,263**	**73,760**	**71,285**	
	Mun, Ind, S-E, & Min Needs	**2,682**	**3,166**	**3,493**	**4,241**	**4,880**	**5,609**	
	Irrigation Needs	**75,263**	**72,798**	**70,154**	**71,022**	**68,880**	**65,676**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		318	346	371	235	258	283	1
L-15	Edwards Irrigation Transfers	81,000	3,000	4,000	4,000	5,000	5,000	6,000	2, 3, 4
SCTN-4	Brush Management								5
SCTN-5	Weather Modification								5
SCTN-9	Rainwater Harvesting								5
	Small Aquifer Recharge Dams								5
L-10 (Irr.)	Demand Reduction (Conservation)		14,143	14,143	14,143	14,143	14,143	14,143	6
	Total New Supplies		**17,461**	**18,489**	**18,514**	**19,378**	**19,401**	**20,426**	
	Total System Mgmt. Supply / Deficit		**-60,484**	**-57,475**	**-55,133**	**-55,885**	**-54,359**	**-50,859**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**636**	**1,180**	**878**	**994**	**378**	**674**	
	Irrigation System Mgmt. Supply / Deficit		**-61,120**	**-58,655**	**-56,011**	**-56,879**	**-54,737**	**-51,533**	

Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
6	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.

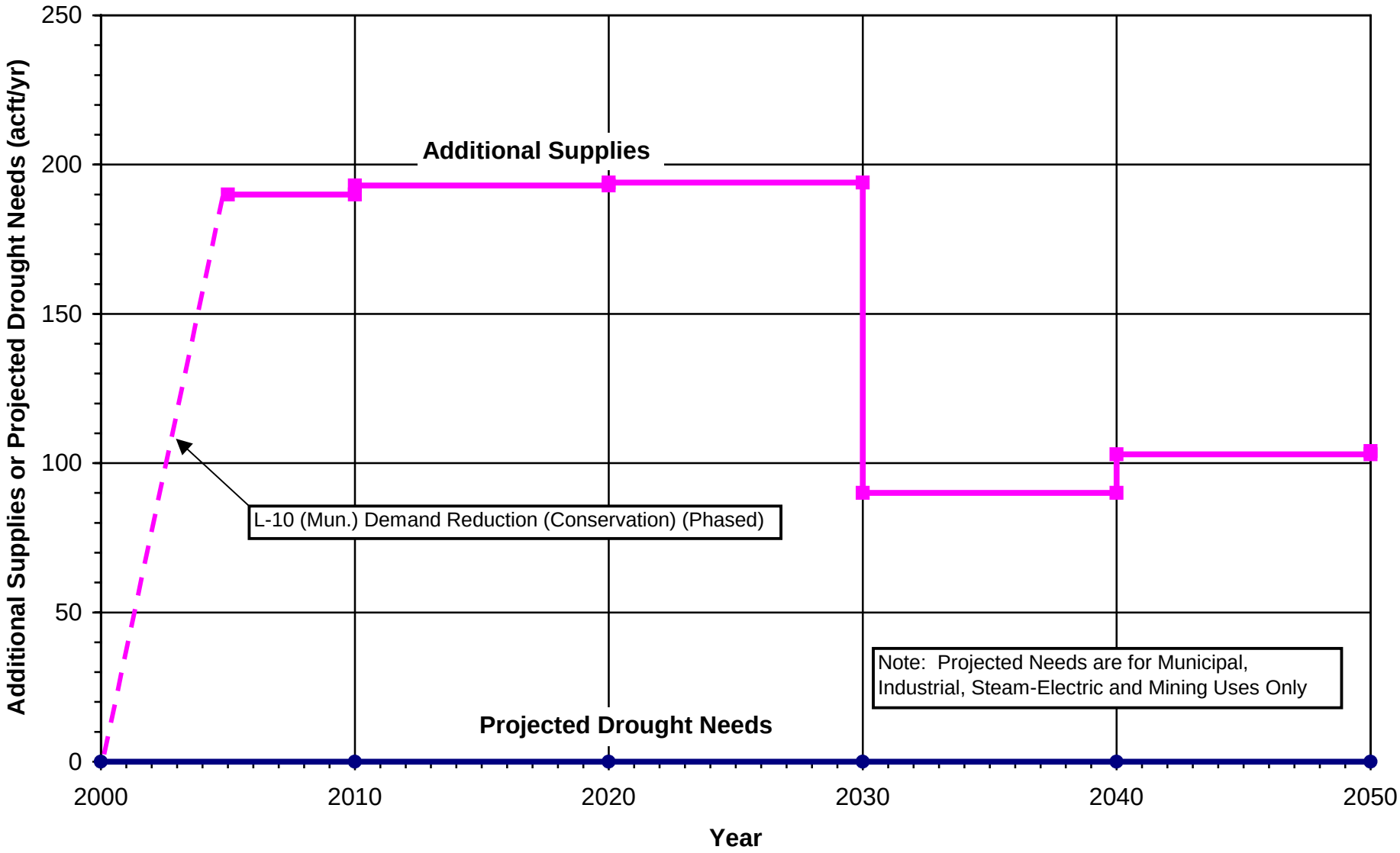
EREPA Alternative Regional Water Plan
Wilson County



EREPA Regional Water Management Alternative Plan

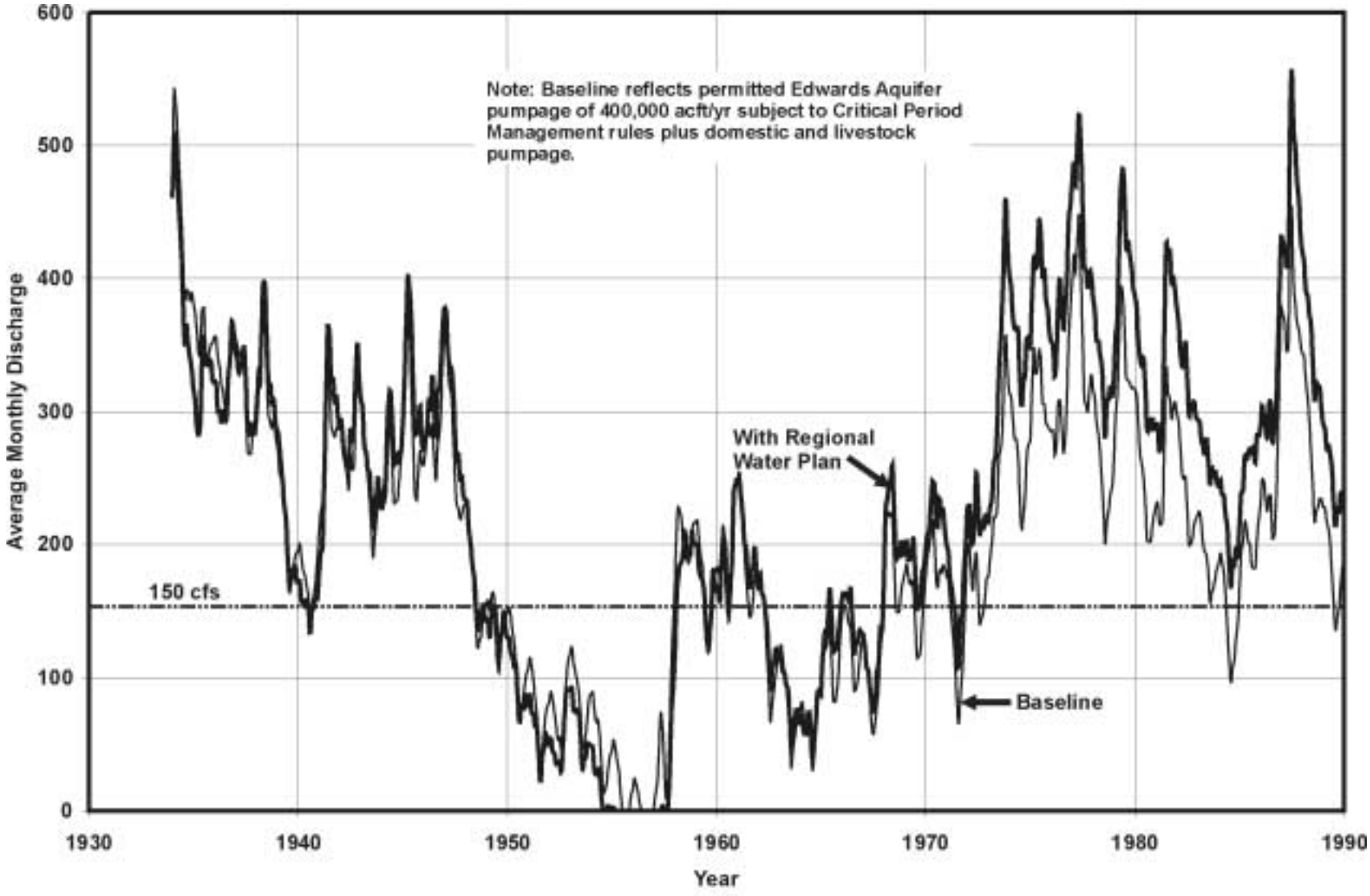
South Central Texas Region						County =	Wilson	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	0	0	0	0	63	145	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	0	0	0	0	0	0	
	Total Needs	**0**	**0**	**0**	**0**	**63**	**145**	
	Mun, Ind, S-E, & Min Needs	**0**	**0**	**0**	**0**	**63**	**145**	
	Irrigation Needs	**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		171	183	194	114	122	130	1
SCTN-2a	Carrizo Aquifer - Local Supply						200	200	2
SCTN-4	Brush Management								3
SCTN-5	Weather Modification								3
SCTN-9	Rainwater Harvesting								3
	Small Aquifer Recharge Dams								3
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**171**	**183**	**194**	**114**	**322**	**330**	
	Total System Mgmt. Supply / Deficit		**171**	**183**	**194**	**114**	**259**	**185**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**171**	**183**	**194**	**114**	**259**	**185**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Floresville.								
3	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

EREPA Alternative Regional Water Plan
Zavala County

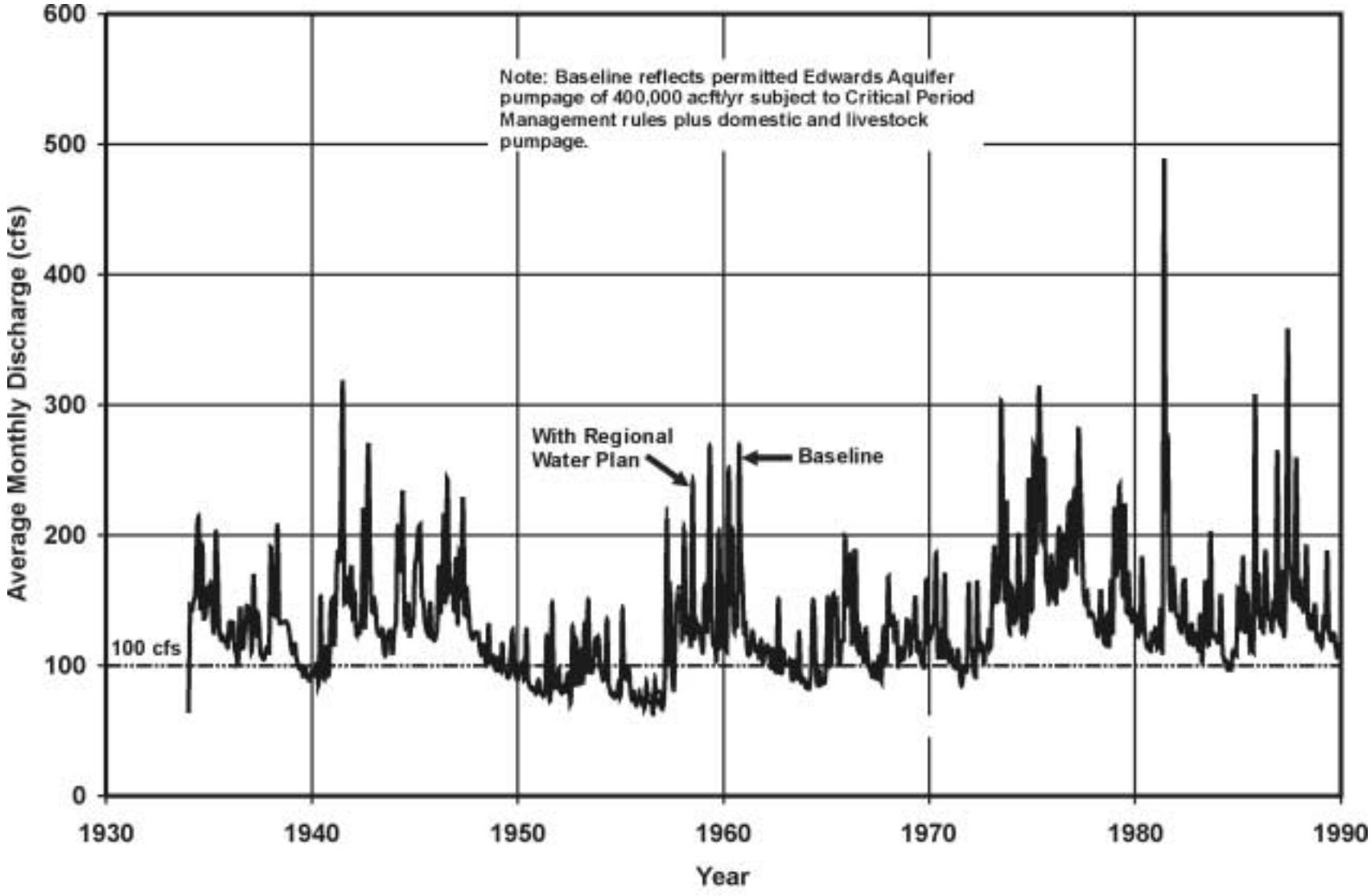


EREPA Regional Water Management Alternative Plan

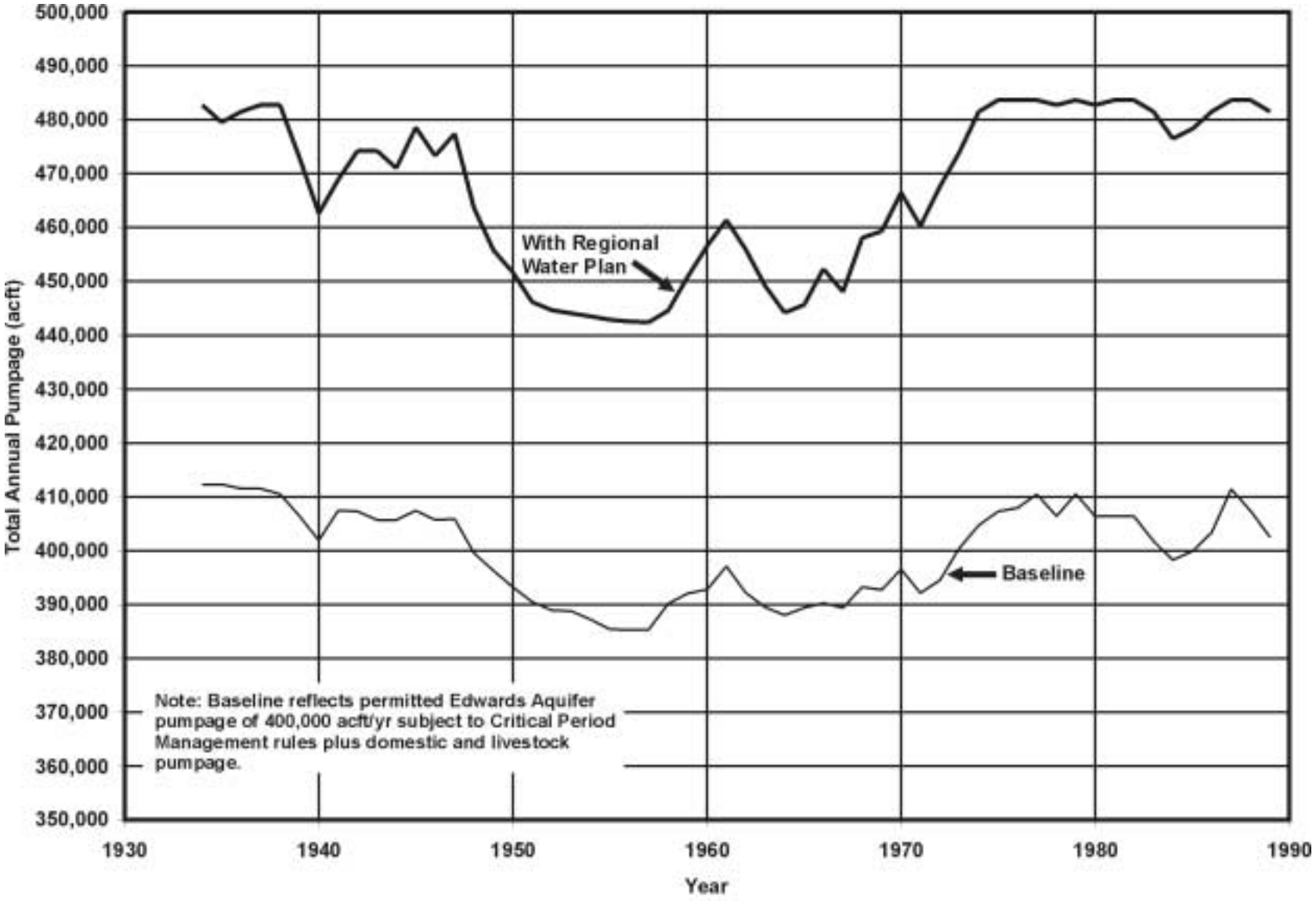
South Central Texas Region						County =	Zavala		
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all		
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		0	0	0	0	0	0	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		80,722	76,589	72,655	88,293	84,673	81,200	
	Total Needs		**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
	Mun, Ind, S-E, & Min Needs		**0**	**0**	**0**	**0**	**0**	**0**	
	Irrigation Needs		**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		190	193	194	90	103	104	1
SCTN-4	Brush Management								2
SCTN-5	Weather Modification								2
SCTN-9	Rainwater Harvesting								2
	Small Aquifer Recharge Dams								2
L-10 (Irr.)	Demand Reduction (Conservation)		6,401	6,401	6,401	6,401	6,401	6,401	3
	Total New Supplies		**6,591**	**6,594**	**6,595**	**6,491**	**6,504**	**6,505**	
	Total System Mgmt. Supply / Deficit		**-74,131**	**-69,995**	**-66,060**	**-81,802**	**-78,169**	**-74,695**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**190**	**193**	**194**	**90**	**103**	**104**	
	Irrigation System Mgmt. Supply / Deficit		**-74,321**	**-70,188**	**-66,254**	**-81,892**	**-78,272**	**-74,799**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation								
	application rate.								



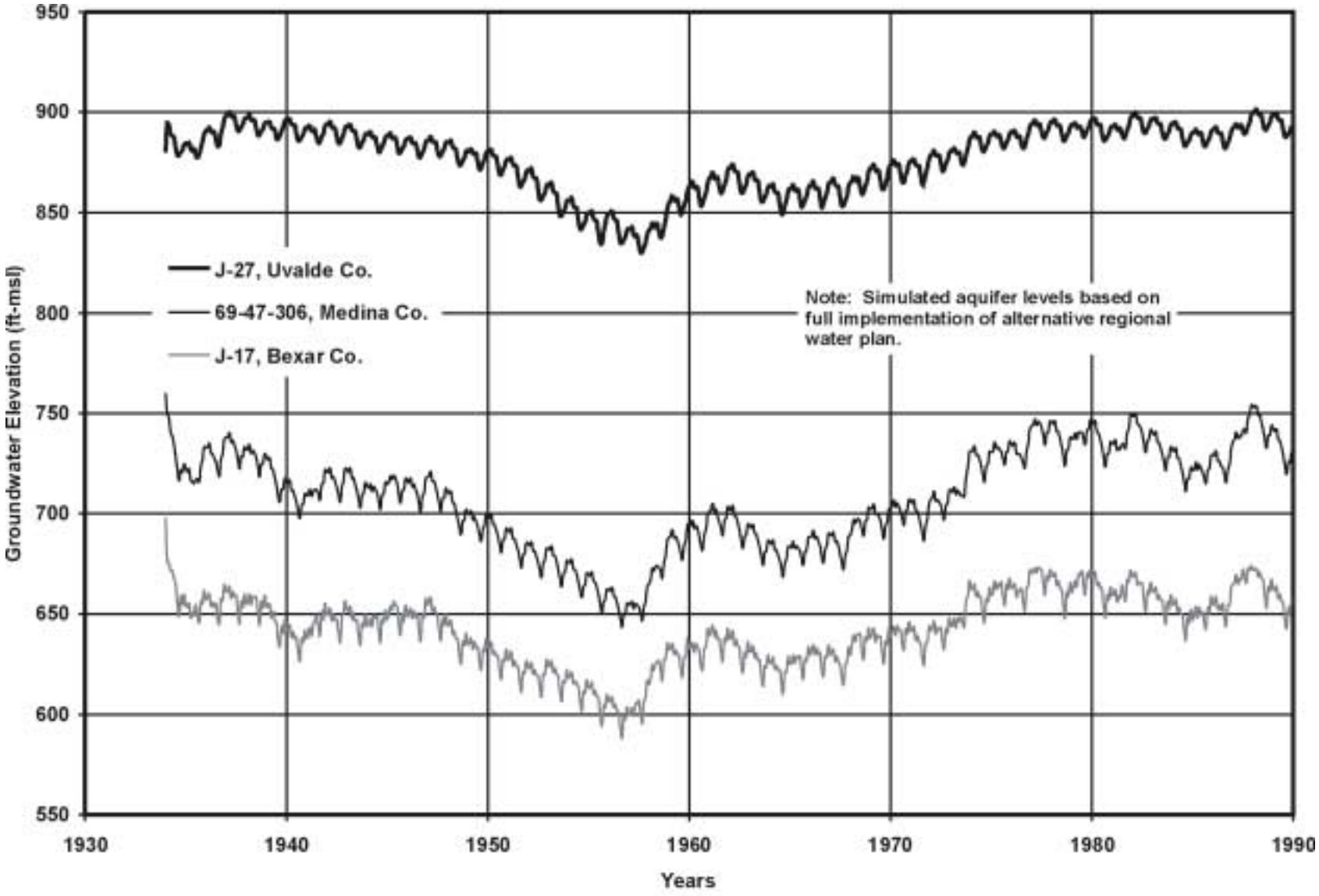
EREPA Alternative Regional Water Plan
Simulated Comal Springs Discharge



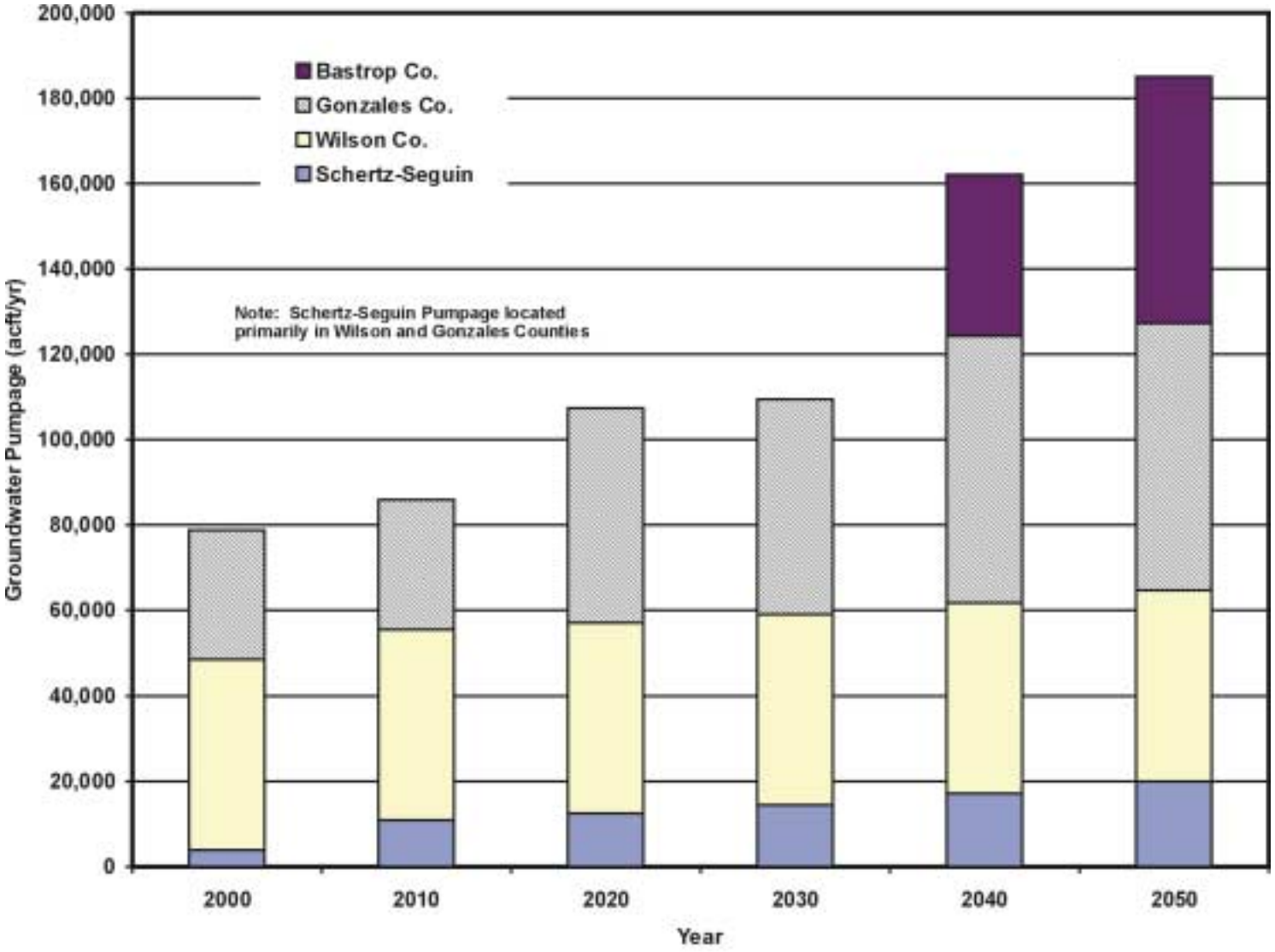
EREPA Alternative Regional Water Plan
Simulated San Marcos Springs Discharge



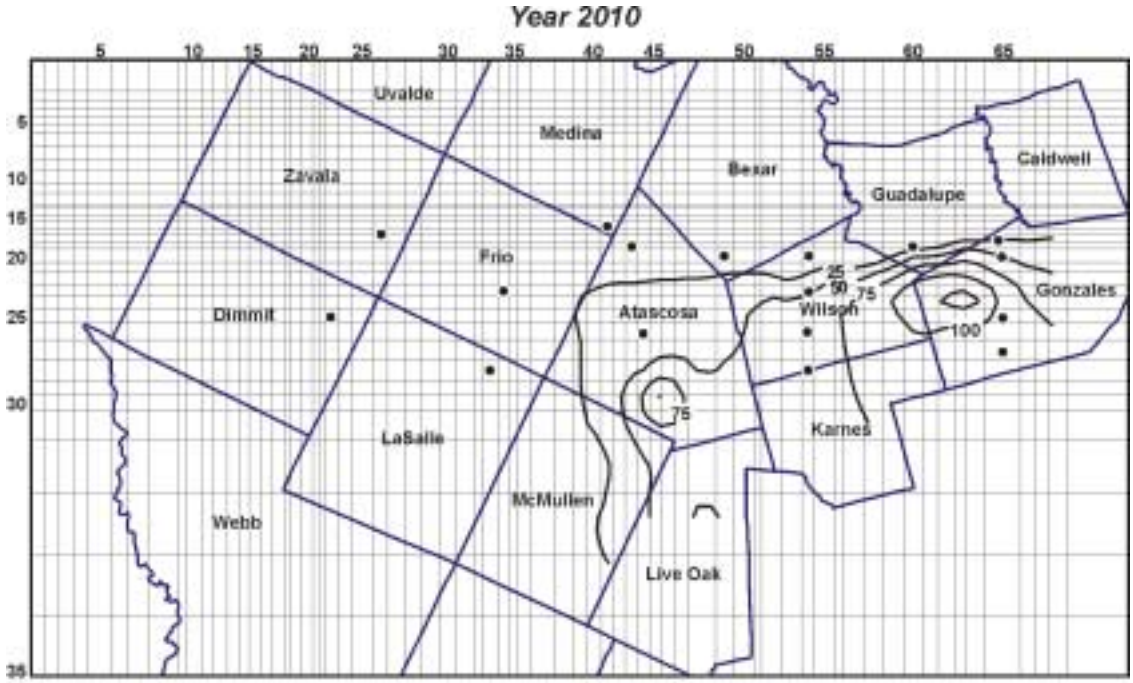
EREPA Alternative Regional Water Plan
Simulated Edwards Aquifer Pumpage

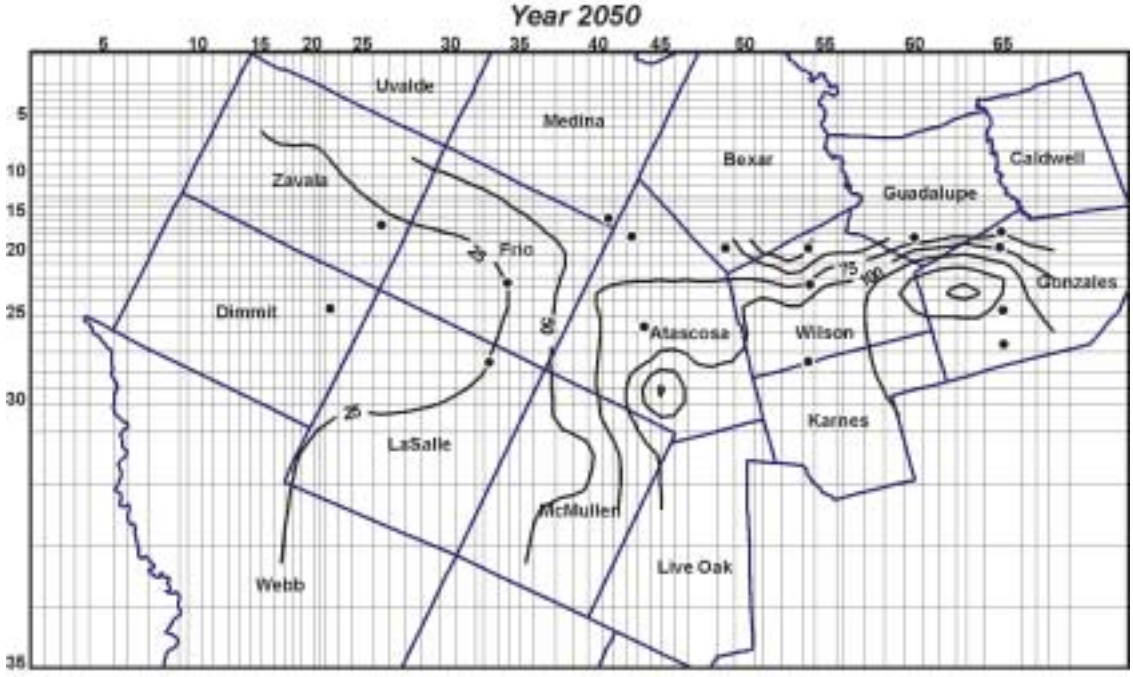


EREPA Alternative Regional Water Plan
Simulated Edwards Aquifer Levels



EREPA Alternative Regional Water Plan
Additional Carrizo Groundwater Pumpage

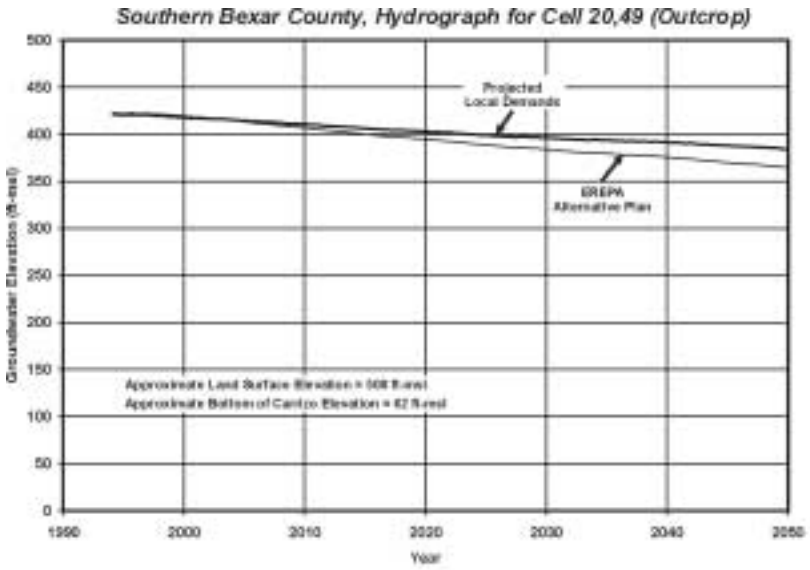


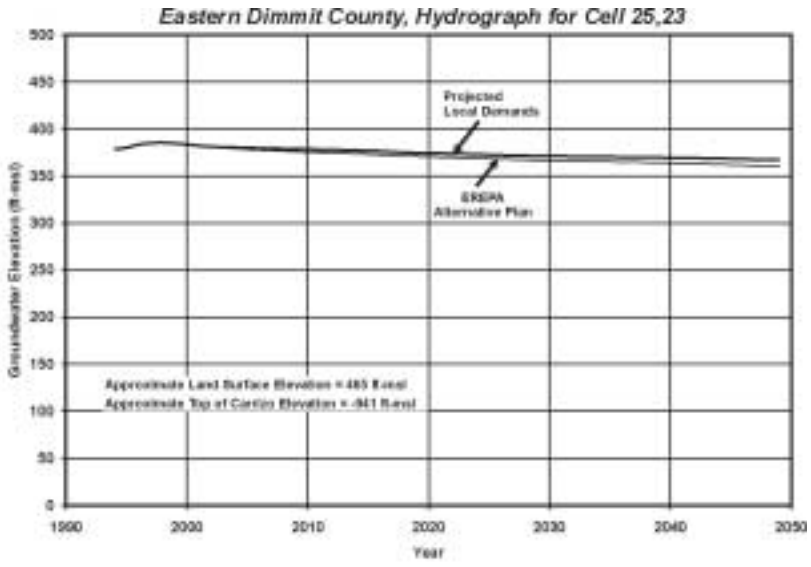


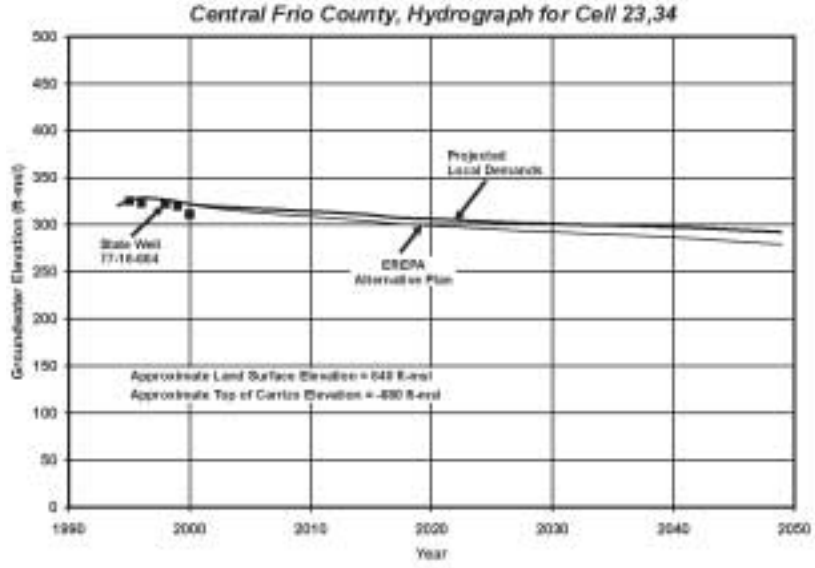
Note: Drawdown is referenced to simulated 1994 aquifer levels and includes both projected local demands and development of water supply options in this alternative regional water plan.

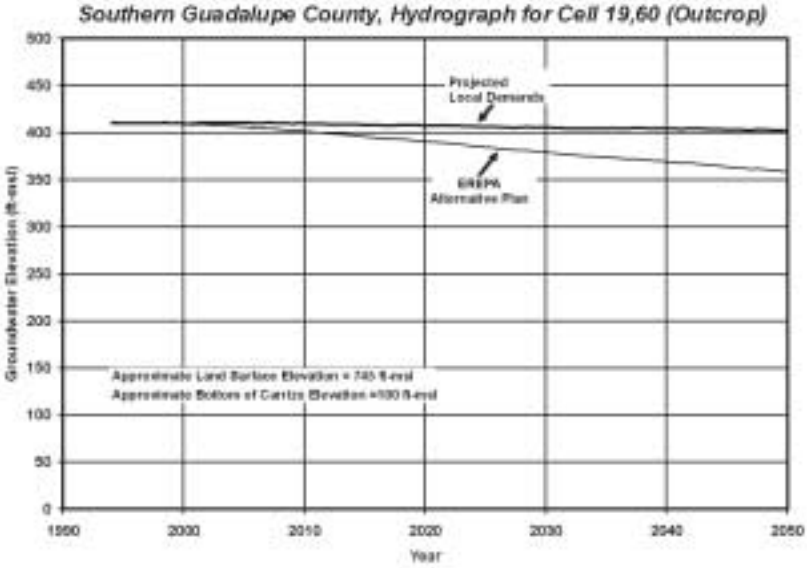
● Monitoring Well Location

EREPA Alternative Regional Water Plan
Simulated Carrizo Aquifer Drawdown



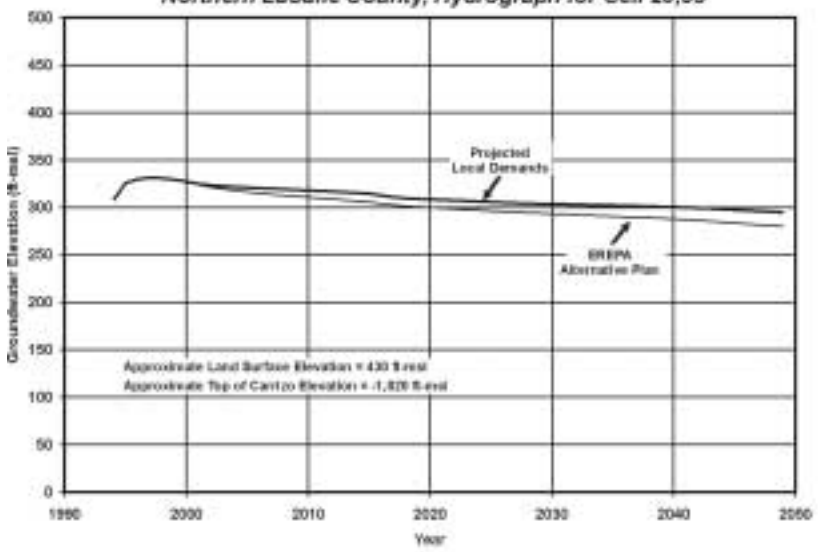




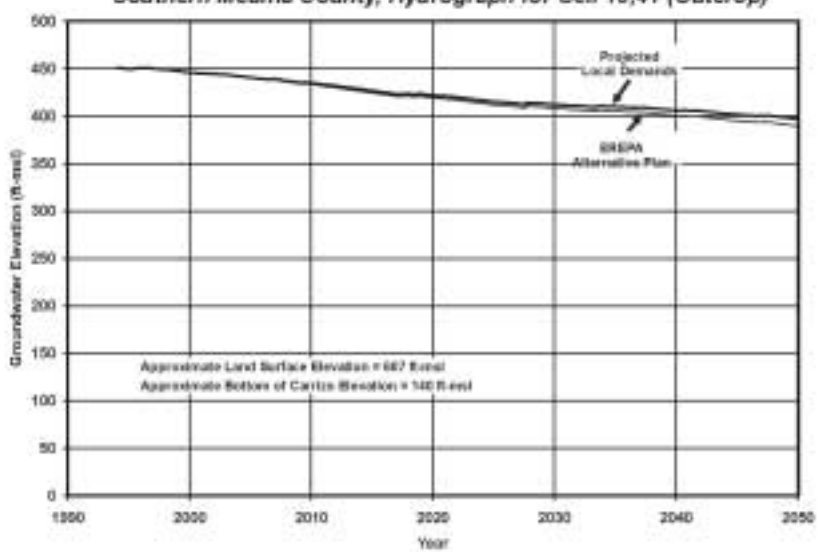


EREPA Alternative Regional Water Plan - Carrizo Aquifer

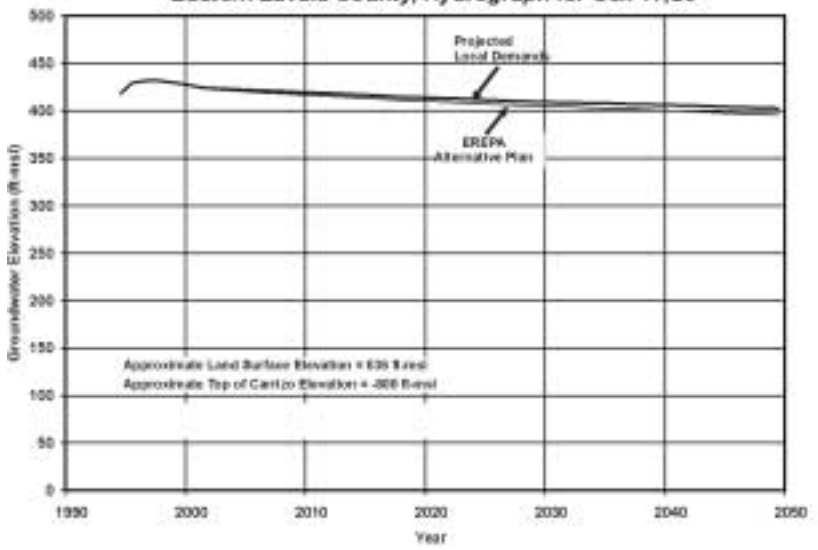
Northern LaSalle County, Hydrograph for Cell 28,33



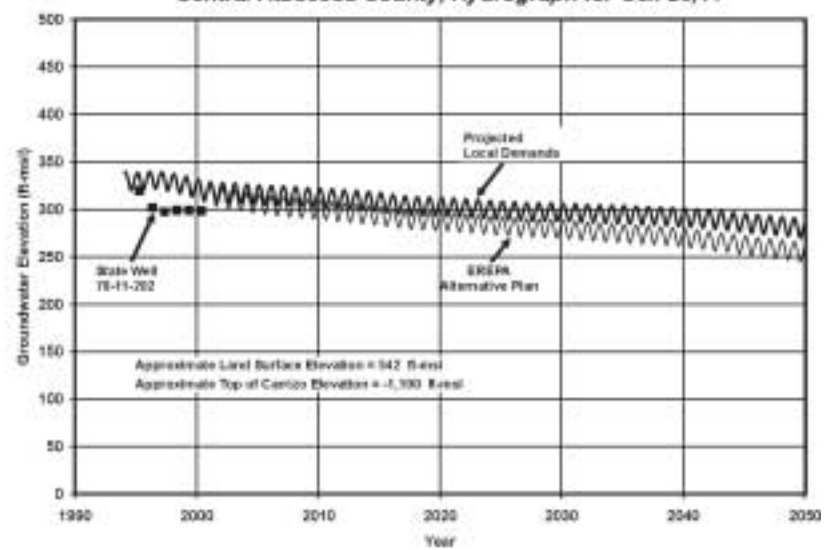
Southern Medina County, Hydrograph for Cell 16,41 (Outcrop)



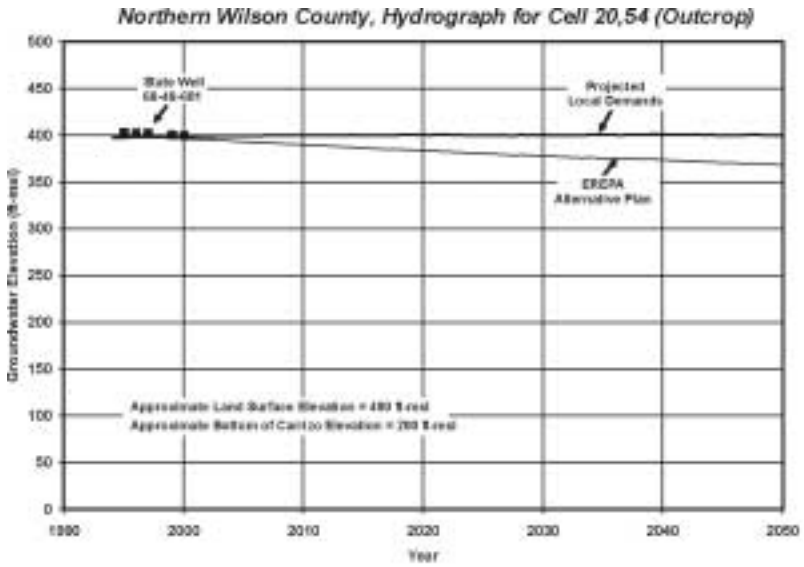
Eastern Zavala County, Hydrograph for Cell 17,26

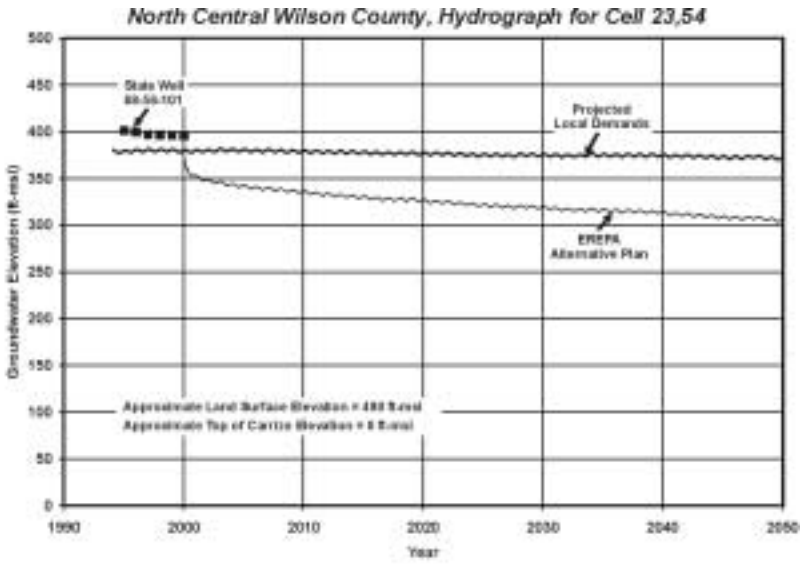


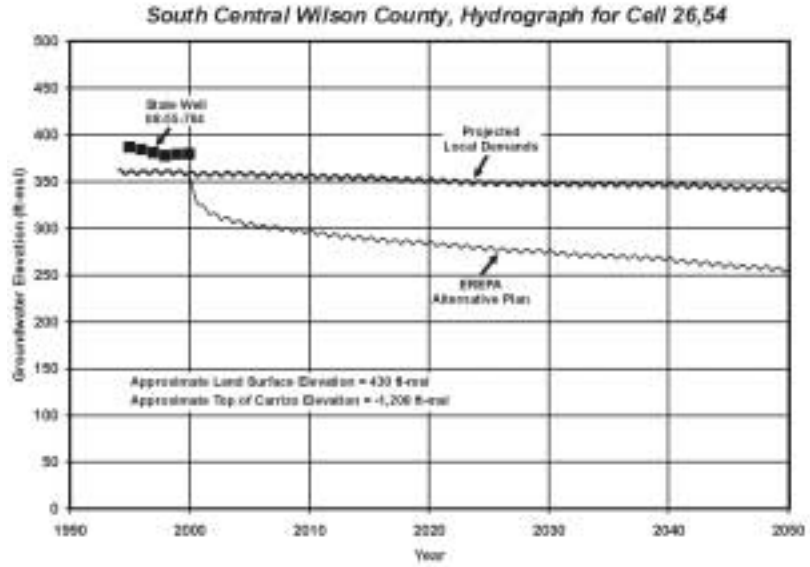
Central Atascosa County, Hydrograph for Cell 26,41

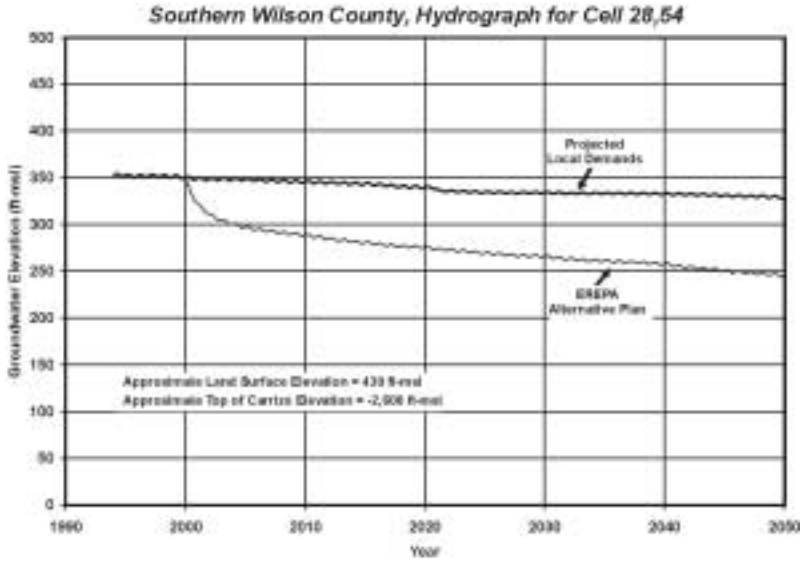


EREPA Alternative Regional Water Plan - Carrizo Aquifer

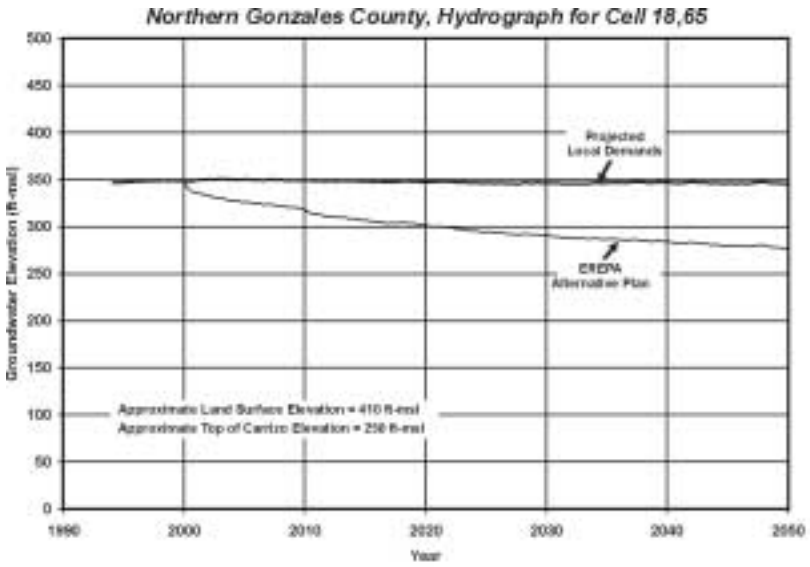


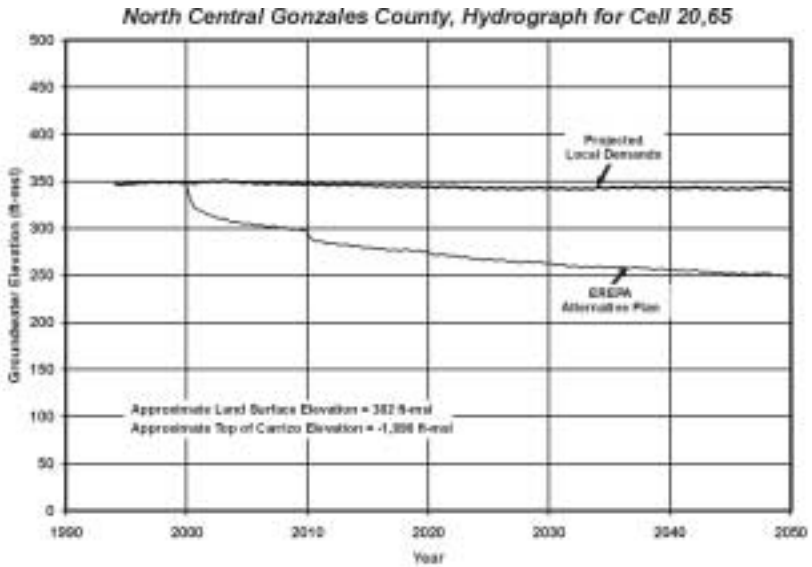


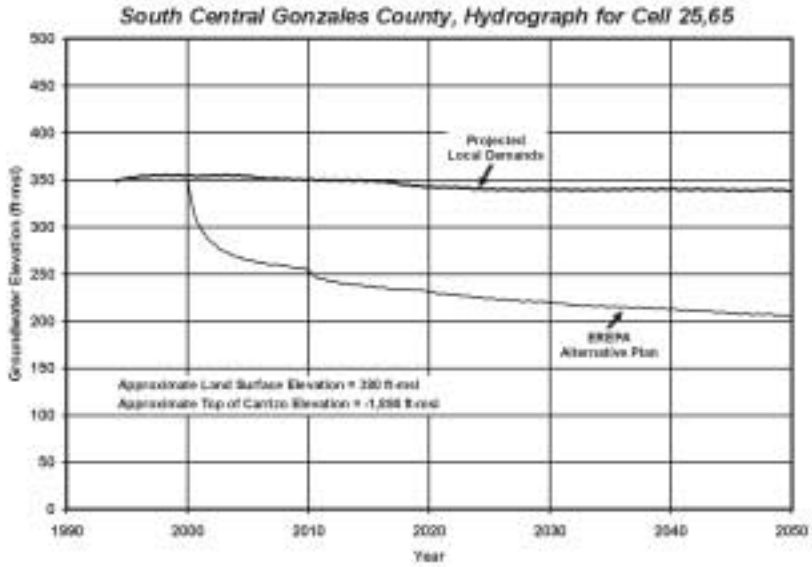


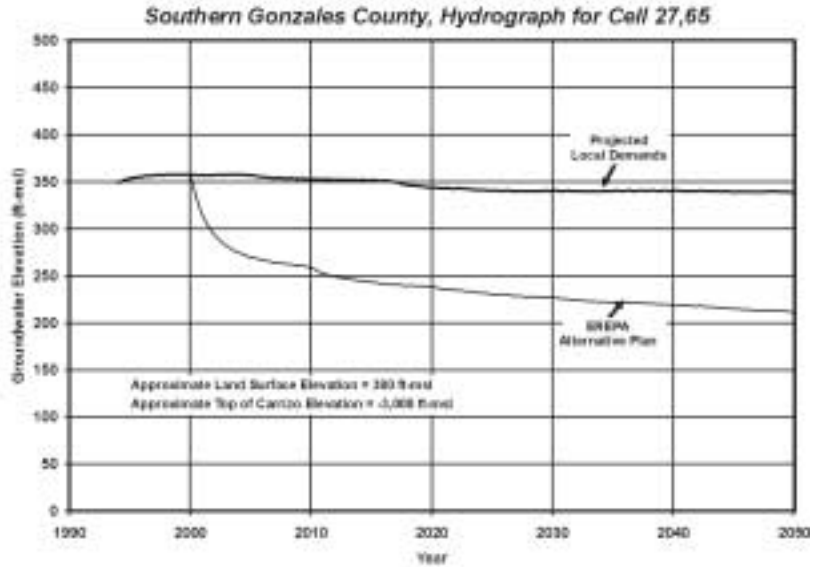


EREPA Alternative Regional Water Plan - Carrizo Aquifer

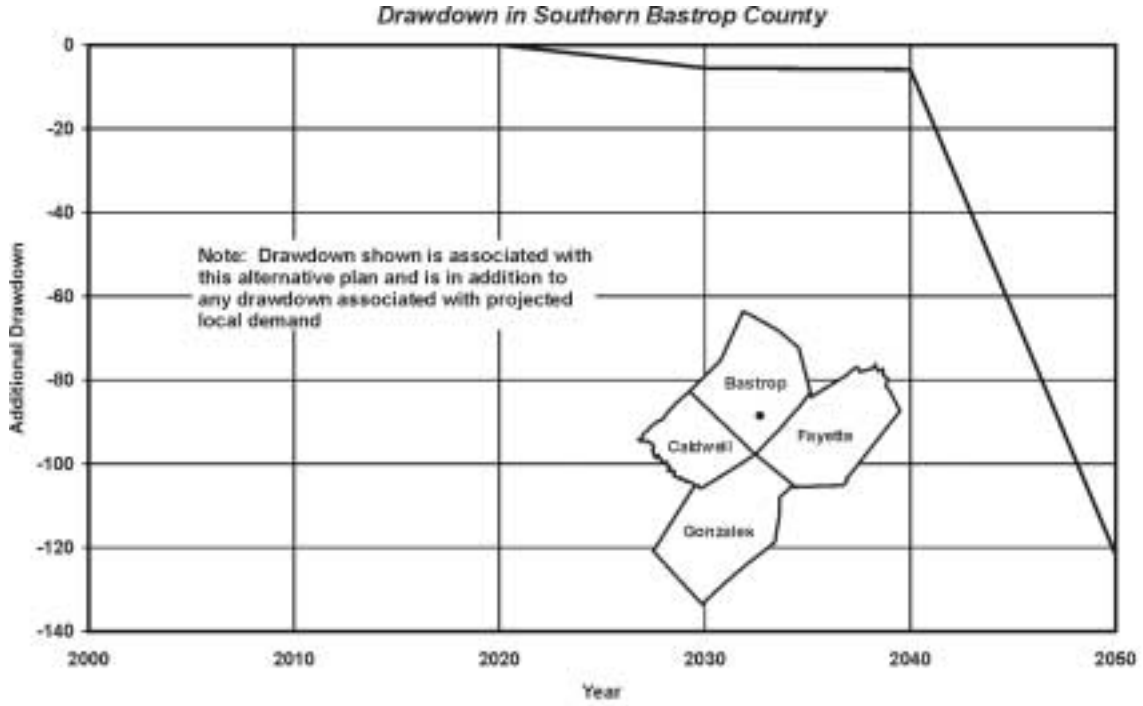


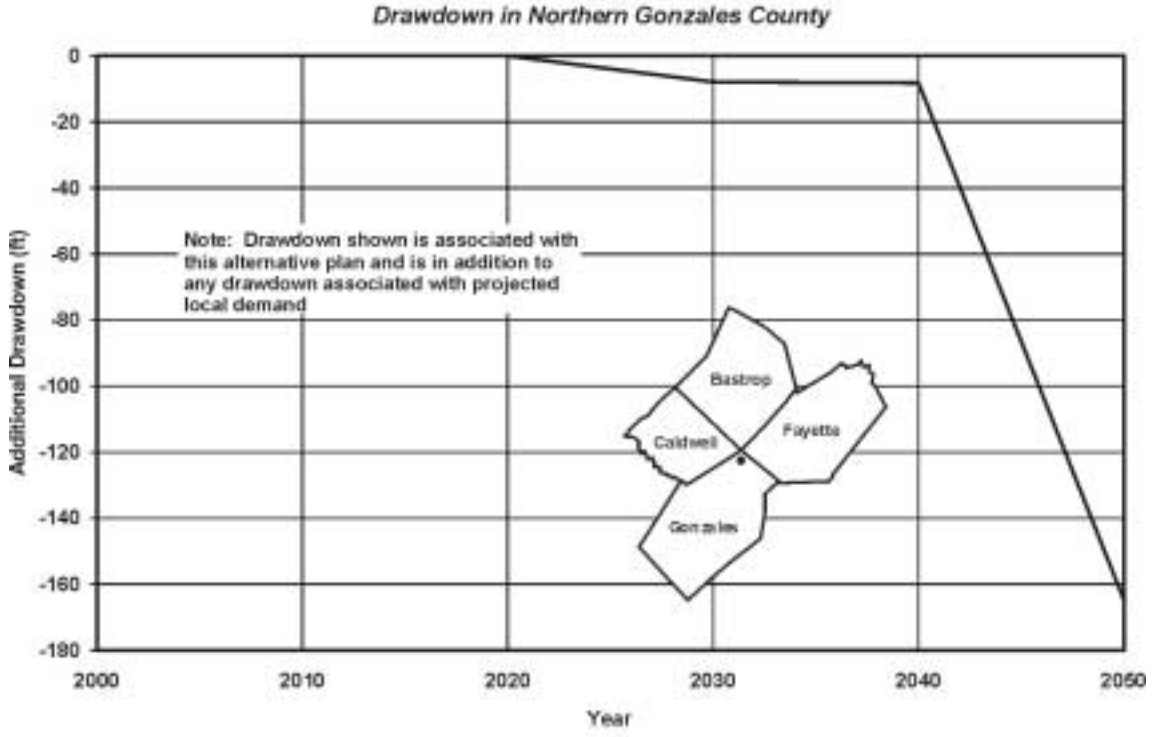


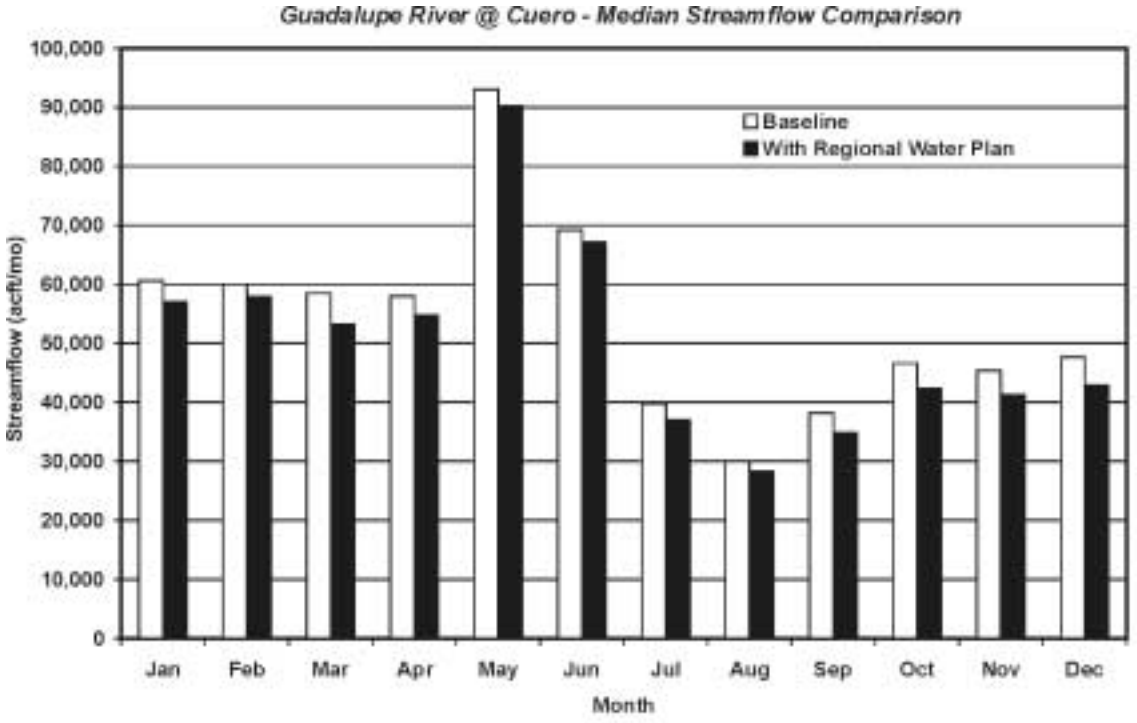


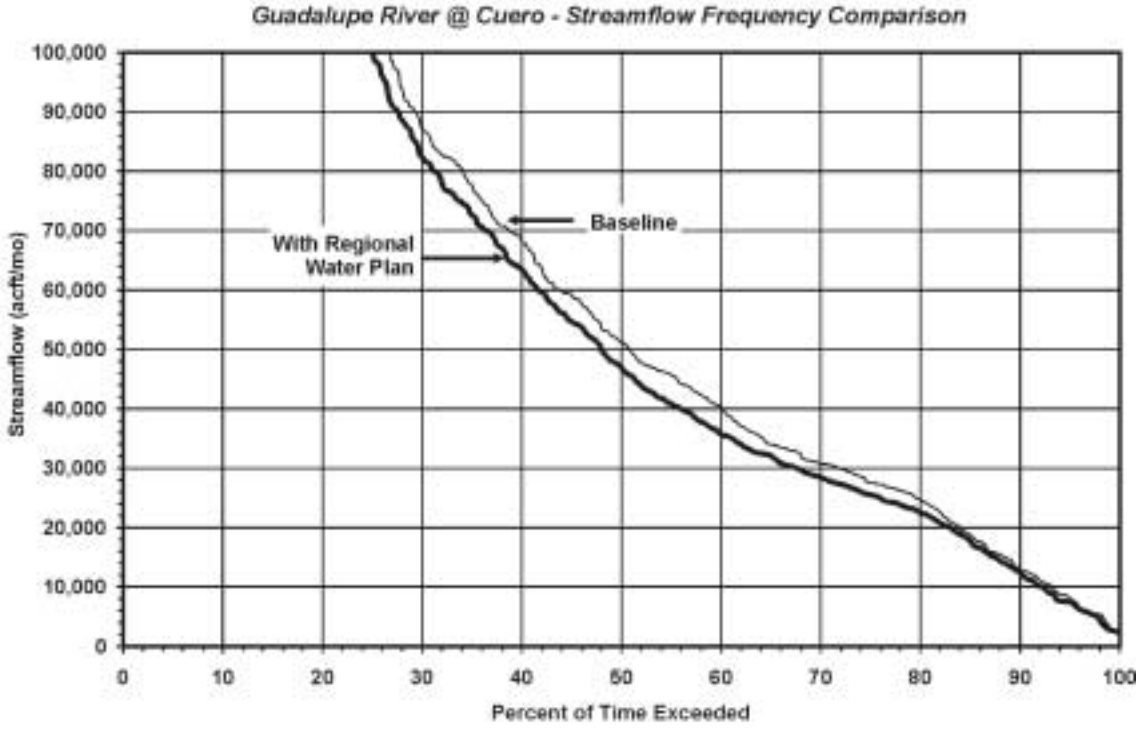


EREPA Alternative Regional Water Plan - Carrizo Aquifer

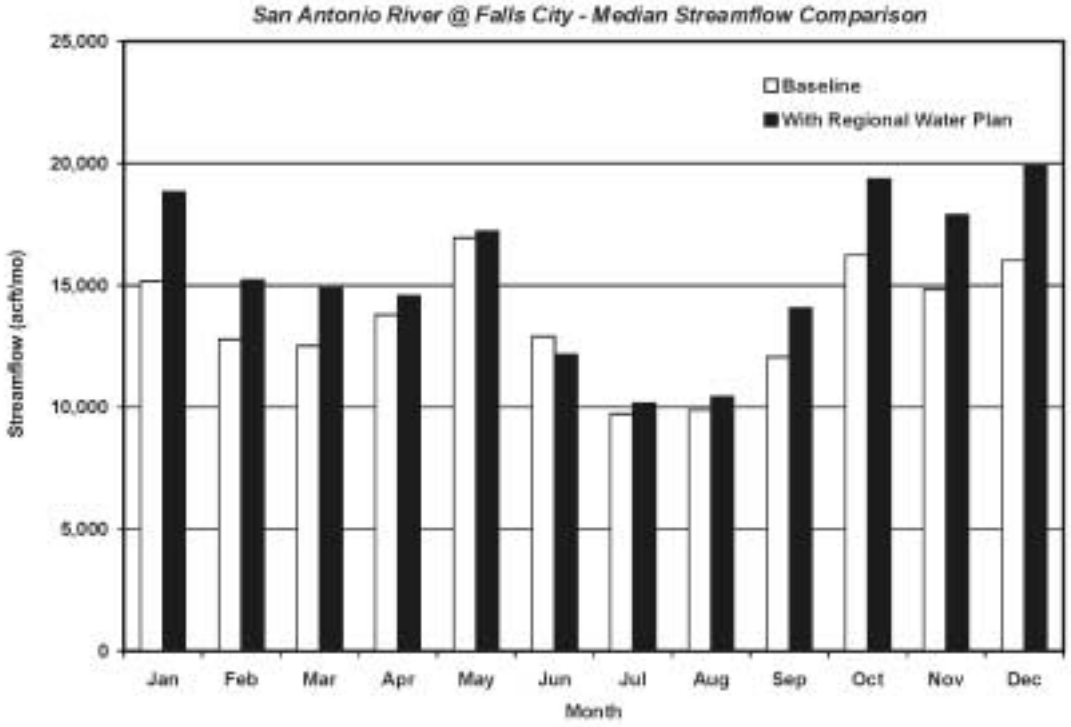

Drawdown in Southern Bastrop County
Additional Drawdown
0
-20
-40
-60
-80
-100
-120
-140
Note: Drawdown shown is associated with this alternative plan and is in addition to any drawdown associated with projected local demand
Bastrop
Caldwell
Fayette
Gonzales
2000
2010
2020
2030
2040
2050
Year

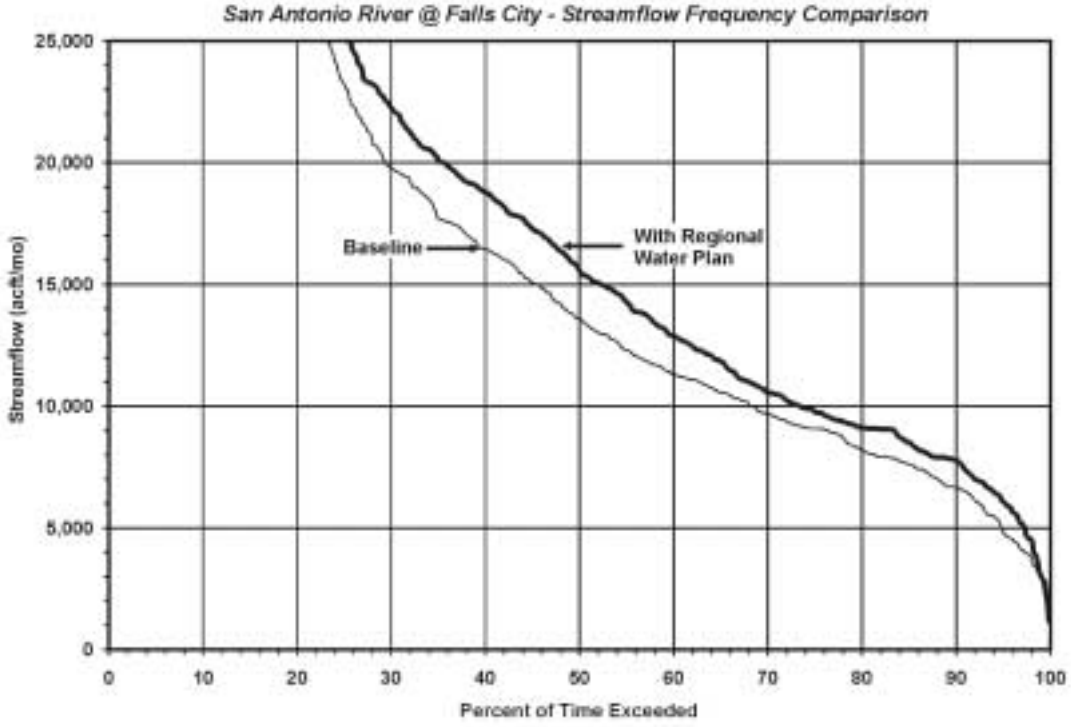

Drawdown in Northern Gonzales County
Additional Drawdown (ft)
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
Note: Drawdown shown is associated with this alternative plan and is in addition to any drawdown associated with projected local demand
Bastrop
Caldwell
Fayette
Gonzales
2000
2010
2020
2030
2040
2050
Year



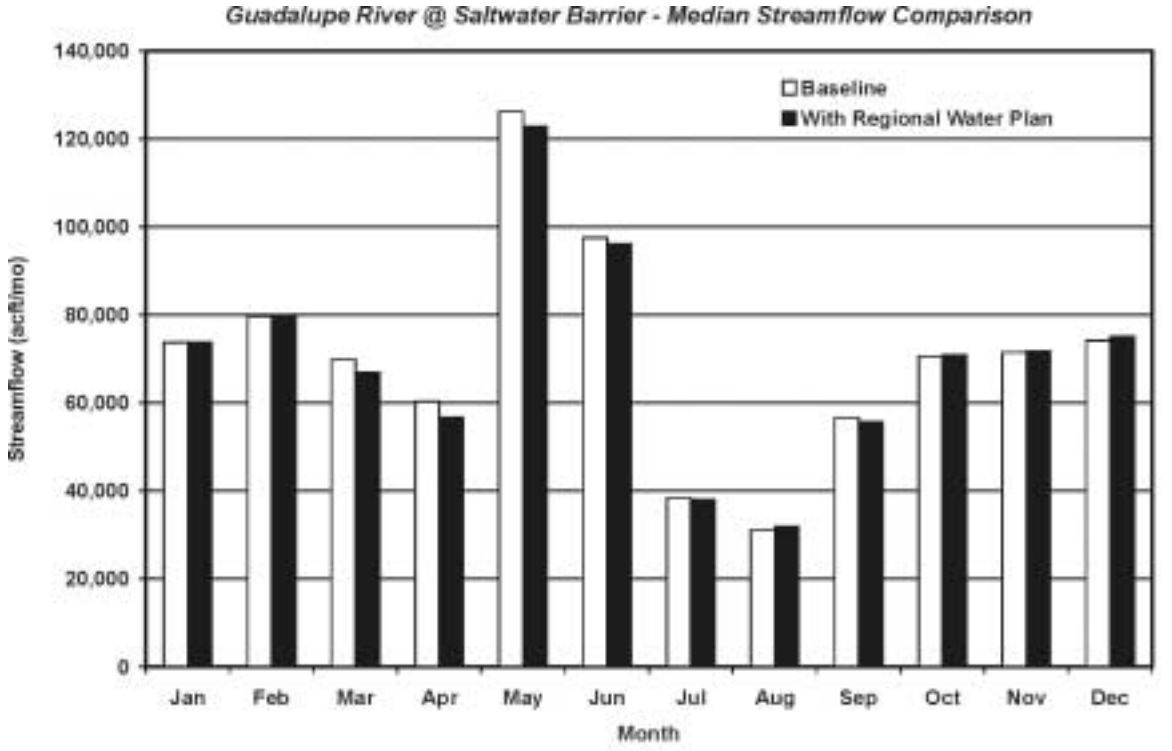


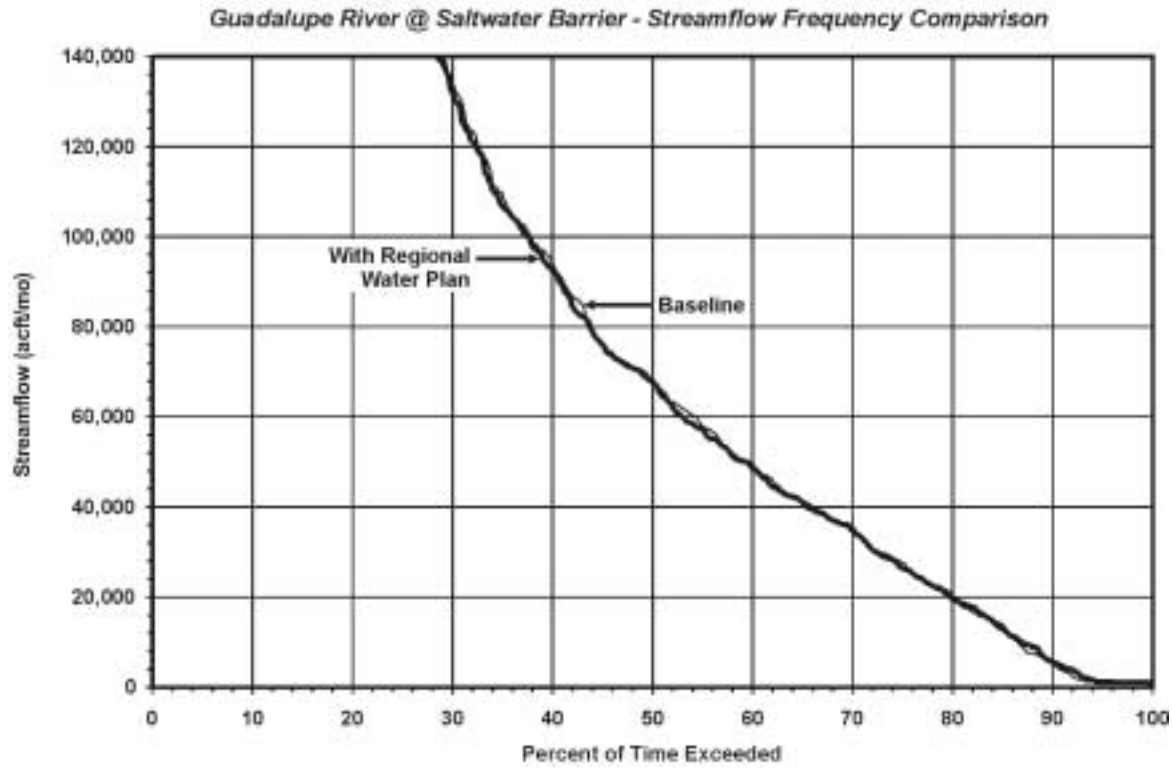
EREPA Alternative Regional Water Plan
Streamflow Comparisons





EREPA Alternative Regional Water Plan
Streamflow Comparisons





EREPA Alternative Regional Water Plan
Streamflow Frequency Comparisons

South Central Texas Region
Water Supply Option Summary (SORTED BY UNIT COST)
Economic / Reliability / Environmental / Public Acceptance (EREPA) Regional Water Management Alternative Plan

Row No.	Section	Option No.	Water Supply Options	Type of Water Supply Option	Type of Water Supply	Efficiency / Unit Cost ($/acft)	Quantity of Water (acft/yr)	Environmental Composite Average[1]	Public Acceptability[2]	Reliability[3]	Time to Implement (years)	Land Impacted (acres)
			Treated Water Supply Options									
15	1.10	SCTN-17	Desalination of Brackish Groundwater	Local/Conservation/Reuse/Exchange	Treated Water Delivered	564	476	1.0	1.0	1.0	1 to 5	0
62	6.1	CZ-10C	Carrizo-Wilcox Aquifer between San Marcos and Frio Rivers (75,000 acft/yr)	Carrizo and Other Aquifers	Treated Water Distributed	590	75,000	1.1	2.0	1.0	1 to 5	429
63	6.2	CZ-10D	Carrizo-Wilcox Aquifer between Colorado and Frio Rivers	Carrizo and Other Aquifers	Treated Water Distributed	632	220,000	1.3	2.0	1.0	1 to 5	1,437
36	4.1	G-15C	Canyon Reservoir Water Released to Lake Nolte - Treated Water to Distribution System or Recharge Zone	Existing Reservoirs	Treated Water Distributed	672	15,000	1.0	1.0	1.0	1 to 5	151
33	3.3	C-17A	Colorado River in Colorado County - Buy Stored Water and Irrigation Rights; Firm Yield	River Diversion with Storage	Treated Water Distributed	677	125,000	1.0	3.0	1.0	5 to 15	749
66	6.3	SCTN-3c	Simsboro Aquifer - Bastrop, Lee, and Milam Counties with Delivery to Major Municipal Demand Center	Carrizo and Other Aquifers	Treated Water Distributed	707	75,000	1.2	3.0	1.0	1 to 5	671
55	5.12	G-16C1	Cuero Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	718	152,606	2.3	3.0	1.0	> 15	41,500
29	3.1	G-38C	Guadalupe River Diversion at Gonzales to Mid-Cities and/or Major Water Providers, with Regional Water Treatment Plant	River Diversion with Storage	Treated Water Delivered	736	29,217	1.0	1.0	1.0	1 to 5	644
32	3.2c	SCTN-16c	Lower Guadalupe River Diversions	River Diversion with Storage	Treated Water Distributed	755	94,000	1.4	1.0	1.0	1 to 5	2,040
40	4.4	C-13C	Colorado River at Bastrop - Purchase of Stored Water - Firm Yield	Existing Reservoirs	Treated Water Distributed	769	50,000	1.0	3.0	1.0	5 to 15	440
43	5.2b	S-15Db	Cibolo Reservoir with Imported Water from the San Antonio and Guadalupe Rivers - Firm Yield	Potential New Reservoirs	Treated Water Distributed	773	91,940	2.1	3.0	1.0	5 to 15	17,160
42	5.2a	S-15Da	Cibolo Reservoir with Imported Water from the San Antonio River - Firm Yield	Potential New Reservoirs	Treated Water Distributed	779	69,925	2.1	3.0	1.0	5 to 15	16,960
31	3.2b	SCTN-16b	Lower Guadalupe River Diversions	River Diversion with Storage	Treated Water Distributed	788	74,000	1.4	1.0	1.0	1 to 5	1,886
47	5.4	S-16C	Goliad Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	856	99,687	2.4	3.0	1.0	> 15	28,272
54	5.11	G-17C1	Sandies Creek Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	865	80,836	2.4	3.0	1.0	> 15	26,875
39	4.3b	SCTN-14b	Joint Development of Water Supply with Corpus Christi - Firm Yield	Existing Reservoirs	Treated Water Distributed	869	148,200	1.4	1.0	1.0	1 to 5	968
30	3.2a	SCTN-16a	Lower Guadalupe River Diversions	River Diversion with Storage	Treated Water Distributed	870	56,276	1.1	1.0	1.0	1 to 5	1,884
44	5.2c	S-15Dc	Cibolo Reservoir with Imported Water from the San Antonio, Guadalupe, and Colorado Rivers - Firm Yield	Potential New Reservoirs	Treated Water Distributed	965	106,482	2.3	3.0	1.0	5 to 15	17,493
34	3.4	C-17B	Colorado River in Wharton County - Buy Irrigation Rights and Groundwater, Firm Yield	River Diversion with Storage	Treated Water Distributed	974	69,000	1.1	3.0	1.0	5 to 15	2,216
41	5.1	S-15C	Cibolo Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	975	33,200	1.8	3.0	1.0	5 to 15	16,700
45	5.3a	S-15Ea	Cibolo Reservoir with Imported Water from the Guadalupe River Saltwater Barrier - Firm Yield	Potential New Reservoirs	Treated Water Distributed	993	68,688	2.1	3.0	1.0	5 to 15	17,396
35	3.5	SCTN-11	Purchase/Lease Surface Water Irrigation Rights for Municipal/Industrial Use	River Diversion with Storage	Treated Water Delivered	1,007	40,000	1.1	2.0	1.0	5 to 15	3,260
38	4.3a	SCTN-14a	Joint Development of Water Supply with Corpus Christi - Firm Yield	Existing Reservoirs	Treated Water Distributed	1,015	79,000	1.2	1.0	1.0	1 to 5	810
61	5.16	B-10C	Allens Creek Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	1,016	57,800	1.9	1.0	1.0	5 to 15	9,036
60	5.15	SCTN-15	Cummins Creek Off-Channel Reservoir (Colorado River Basin)	Potential New Reservoirs	Treated Water Distributed	1,111	45,712	1.9	3.0	1.0	5 to 15	7,274
59	5.14	C-18	Shaws Bend Reservoir - Firm Yield (Colorado River Basin)	Potential New Reservoirs	Treated Water Distributed	1,178	51,576	2.1	3.0	1.0	5 to 15	13,023
14	1.10	SCTN-17	Desalination of Seawater (100 MGD)	Local/Conservation/Reuse/Exchange	Treated Water Distributed	1,333	112,016	1.2	1.0	1.0	1 to 5	704
46	5.3b	S-15Eb	Cibolo Reservoir with Imported Water from the Guadalupe River Saltwater Barrier and the Colorado River near Bay City	Potential New Reservoirs	Treated Water Distributed	1,355	79,090	2.1	3.0	1.0	5 to 15	17,787
13	1.10	SCTN-17	Desalination of Seawater (75 MGD)	Local/Conservation/Reuse/Exchange	Treated Water Distributed	1,407	84,012	1.2	1.0	1.0	1 to 5	684
12	1.10	SCTN-17	Desalination of Seawater (50 MGD)	Local/Conservation/Reuse/Exchange	Treated Water Distributed	1,447	56,008	1.2	1.0	1.0	1 to 5	684
37	4.2	G-24	Wimberley and Woodcreek Water Supply from Canyon Reservoir; 2030 Demands	Existing Reservoirs	Treated Water Delivered	1,595	1,048	1.0	1.0	1.0	1 to 5	119
11	1.10	SCTN-17	Desalination of Seawater (25 MGD)	Local/Conservation/Reuse/Exchange	Treated Water Distributed	1,621	28,004	1.2	1.0	1.0	1 to 5	678
48	5.5	S-14D	Applewhite Reservoir - Firm Yield	Potential New Reservoirs	Treated Water Distributed	3,192	4,032	1.8	3.0	1.0	5 to 15	2,500
			Raw Water in Aquifer Water Supply Options									
24	2.3	S-13B	Medina Lake - Existing Rights and Contracts with Irrigation Use Reduction for Recharge Enhancement	Edwards Aquifer Recharge	Raw Water in Aquifer	159	9,873	1.0	3.0	1.0	1 to 5	0
23	2.2	L-18c	Edwards Aquifer Recharge from Natural Drainage - Type 2 Projects (Program 2C)	Edwards Aquifer Recharge	Raw Water in Aquifer	486	13,451	1.2	1.0	1.0	5 to 15	2,595
68	6.4	SCTN-7a	Wintergarden Carrizo Recharge Enhancement (Nueces River Alternative)	Carrizo and Other Aquifers	Raw Water in Aquifer	511	11,000	1.3	1.0	1.0	5 to 15	1,633
27	2.6	SCTN-6a	Edwards Aquifer Recharge Enhancement with Guadalupe River Diversions at Lake Dunlap (SCTN-6a)	Edwards Aquifer Recharge	Raw Water in Aquifer	534	42,121	1.2	1.0	1.0	5 to 15	443
67	6.4	SCTN-7b	Wintergarden Carrizo Recharge Enhancement (Atascosa River Alternative)	Carrizo and Other Aquifers	Raw Water in Aquifer	627	7,200	1.3	1.0	1.0	5 to 15	1,210
2	1.2	L-11	Exchange Reclaimed Water for Edwards Irrigation Water	Local/Conservation/Reuse/Exchange	Raw Water in Aquifer	743	10,300	1.2	1.0	1.0	1 to 5	827
22	2.2	L-18b	Edwards Aquifer Recharge from Natural Drainage - Type 2 Projects (Program 2B)	Edwards Aquifer Recharge	Raw Water in Aquifer	800	15,980	1.8	1.0	1.0	5 to 15	4,186
21	2.2	L-18a	Edwards Aquifer Recharge from Natural Drainage - Type 2 Projects (Program 2A)	Edwards Aquifer Recharge	Raw Water in Aquifer	1,087	21,577	1.8	1.0	1.0	5 to 15	8,448
74	6.10	SCTN-8	Trinity Aquifer Optimization	Carrizo and Other Aquifers	Raw Water in Aquifer	1,886	390	1.2	1.0	1.0	5 to 15	460
28	2.6	SCTN-6b	Edwards Aquifer Recharge Enhancement with Guadalupe River Diversions near Gonzales (SCTN-6b)	Edwards Aquifer Recharge	Raw Water in Aquifer	1,941	51,133	1.3	1.0	1.0	5 to 15	893
25	2.4	G-30	Guadalupe River Diversion near Comfort to Recharge Zone via Medina Lake	Edwards Aquifer Recharge	Raw Water in Aquifer	2,079	3,902	1.4	1.0	1.0	1 to 5	256
20	2.1	L-17a	Edwards Aquifer Recharge from Natural Drainage - Type 1 Projects (Program 1B)	Edwards Aquifer Recharge	Raw Water in Aquifer	2,557	1,958	1.9	1.0	1.0	5 to 15	1,340
19	2.1	L-17b	Edwards Aquifer Recharge from Natural Drainage - Type 1 Projects (Program 1A)	Edwards Aquifer Recharge	Raw Water in Aquifer	3,309	5,554	2.2	1.0	1.0	5 to 15	4,042
26	2.5	G-32	Diversion of Canyon Reservoir Flood Storage to Recharge Zone via Cibolo Creek - Long-Term Average	Edwards Aquifer Recharge	Raw Water in Aquifer	6,198	2,088	1.4	1.0	1.0	1 to 5	518
			Raw (Surface) Water Supply Options									
4	1.4	L-20	Transfer of SAWS Reclaimed Water to Coleto Creek Reservoir (Exchange for CP&L Rights and GBRA Canyon Contract)	Local/Conservation/Reuse/Exchange	Raw Water at Source	79	17,000	1.3	1.0	1.0	1 to 5	24
64	6.3	SCTN-3a	Simsboro Aquifer - Bastrop, Lee, and Milam Counties with Delivery to Colorado River	Carrizo and Other Aquifers	Raw Water Delivered	203	75,000	1.1	3.0	1.0	1 to 5	78
50	5.7	G-20	Gonzales Reservoir - Firm Yield	Potential New Reservoirs	Raw Water at Reservoir	260	69,897	2.2	1.0	1.0	> 15	21,370
65	6.3	SCTN-3b	Simsboro Aquifer - Bastrop, Lee, and Milam Counties with Delivery to Plum Creek	Carrizo and Other Aquifers	Raw Water Delivered	290	75,000	1.1	3.0	1.0	1 to 5	269
5	1.5	L-14	Transfer of Reclaimed Water to Corpus Christi through Choke Canyon Reservoir	Local/Conservation/Reuse/Exchange	Raw Water at Reservoir	297	23,903	1.3	1.0	1.0	1 to 5	240
	5.17	SCTN-18	Cotulla Reservoir - Raw Water at the Reservoir	Potential New Reservoirs	Raw Water at Reservoir	299	57,080	1.7	1.0	1.0	> 15	31,410
56	5.13	SCTN-13	Palmetto Bend Stage II Reservoir (Delivery to Corpus Christi)	Potential New Reservoirs	Raw Water Delivered	431	28,200	1.4	1.0	1.0	5 to 15	4,701
10	1.9	SCTN-12b	Exchange of Groundwater from the Gulf Coast Aquifer for Irrigation Surface Water Rights (Guadalupe-San Antonio River Ba	Local/Conservation/Reuse/Exchange	Raw Water at Source	437	13,200	1.1	1.0	1.0	1 to 5	1,015
52	5.9	G-22	Dilworth Reservoir - Raw Water at the Reservoir	Potential New Reservoirs	Raw Water at Reservoir	446	19,705	1.7	1.0	1.0	> 15	15,400
53	5.10	G-40	Cloptin Crossing Reservoir - Raw Water at the Reservoir	Potential New Reservoirs	Raw Water at Reservoir	473	32,458	2.2	1.0	1.0	> 15	6,060
9	1.9	SCTN-12b	Exchange of Groundwater from the Gulf Coast Aquifer for Irrigation Surface Water Rights (Colorado River Basin)	Local/Conservation/Reuse/Exchange	Raw Water at Source	518	10,748	1.0	1.0	1.0	1 to 5	656
58	5.13	SCTN-13	Palmetto Bend Stage II Reservoir (Delivery to Bay City)	Potential New Reservoirs	Raw Water Delivered	560	30,200	1.4	1.0	1.0	5 to 15	4,902
57	5.13	SCTN-13	Palmetto Bend Stage II Reservoir (Delivery to Saltwater Barrier)	Potential New Reservoirs	Raw Water Delivered	585	28,100	1.4	1.0	1.0	5 to 15	4,891
49	5.6	G-19	Guadalupe River Dam No. 7 - Firm Yield	Potential New Reservoirs	Raw Water at Reservoir	732	30,890	2.2	1.0	1.0	> 15	12,830
51	5.8	G-21	Lockhart Reservoir - Raw Water at the Reservoir	Potential New Reservoirs	Raw Water at Reservoir	764	5,627	1.2	1.0	1.0	5 to 15	2,910
			Other Water Supply Options									
1	1.1	L-10 (Mun.)	Demand Reduction (Water Conservation) - Municipal	Local/Conservation/Reuse/Exchange		-400	-43,000	1.0	1.0	1.0	1 to 5	
	1.1	L-10 (Irr.)	Demand Reduction (Water Conservation) - Irrigation	Local/Conservation/Reuse/Exchange		-54	-80,000	1.0	1.0	1.0	1 to 5	
3	1.3	L-15	Purchase or Lease of Edwards Irrigation Water for Municipal and Industrial Use	Local/Conservation/Reuse/Exchange	Raw Water in Aquifer	51	95430 Max.	1.0	1.0	3.0	1 to 5	N/A
6	1.6	SCTN-4	Brush Management	Local/Conservation/Reuse/Exchange		Undetermined	Undetermined	1.2	1.0	3.0	> 15	Undetermined
7	1.7	SCTN-5	Weather Modification	Local/Conservation/Reuse/Exchange		Undetermined	Undetermined	1.0	1.0	3.0	1 to 5	Undetermined
8	1.8	SCTN-9	Rainwater Harvesting	Local/Conservation/Reuse/Exchange		16,178	.057/household	1.0	1.0	3.0	1 to 5	0
16	1.11	SCTN-10	Off-Channel Local Storage (Guadalupe River near Victoria)	Local/Conservation/Reuse/Exchange	Treated Water Delivered	587	10,000	1.1	1.0	3.0	1 to 5	481
17	1.11	SCTN-10	Off-Channel Local Storage (Guadalupe River near Boerne)	Local/Conservation/Reuse/Exchange	Treated Water Delivered	2,681	1,500	1.4	1.0	3.0	1 to 5	595
18	1.11	SCTN-10	Off-Channel Local Storage (Medina River near Von Ormy)	Local/Conservation/Reuse/Exchange	Treated Water Delivered	1,190	5,000	1.2	1.0	3.0	1 to 5	595
69	6.5	SCTN-2a	Groundwater Supplies for Municipal Water Systems in the Carrizo-Wilcox Aquifer	Carrizo and Other Aquifers		N/A	N/A	1.0	1.0	1.0	1 to 5	N/A
70	6.6	SCTN-2b	Groundwater Supplies for Municipal Water Systems in the Gulf Coast Aquifer	Carrizo and Other Aquifers		N/A	N/A	1.0	1.0	1.0	1 to 5	N/A
71	6.7	SCTN-2c	Groundwater Supplies for Municipal Water Systems in the Trinity Aquifer	Carrizo and Other Aquifers		N/A	N/A	1.0	1.0	3.0	1 to 5	N/A
72	6.8	SCTN-1a	Aquifer Storage and Recovery (ASR) - Regional Option	Carrizo and Other Aquifers		2428 to 1009	2,792	1.0	1.0	1.0	1 to 5	286
73	6.9	SCTN-1b	Aquifer Storage and Recovery (ASR) - Local Option	Carrizo and Other Aquifers		2,089	279	1.0	1.0	1.0	1 to 5	3

Notes:

1 **Environmental Composite Average based on eight Qualitative Measures of Environmental Impacts (High = 3; Medium = 2; Low = 1) and one measure of Sustainability (High = 1; Medium = 2; Low = 3).**

2 **Public Acceptability based on present existence of organized local opposition to the water supply option at the source of water (Yes = 3, Limited = 2, No = 1).**

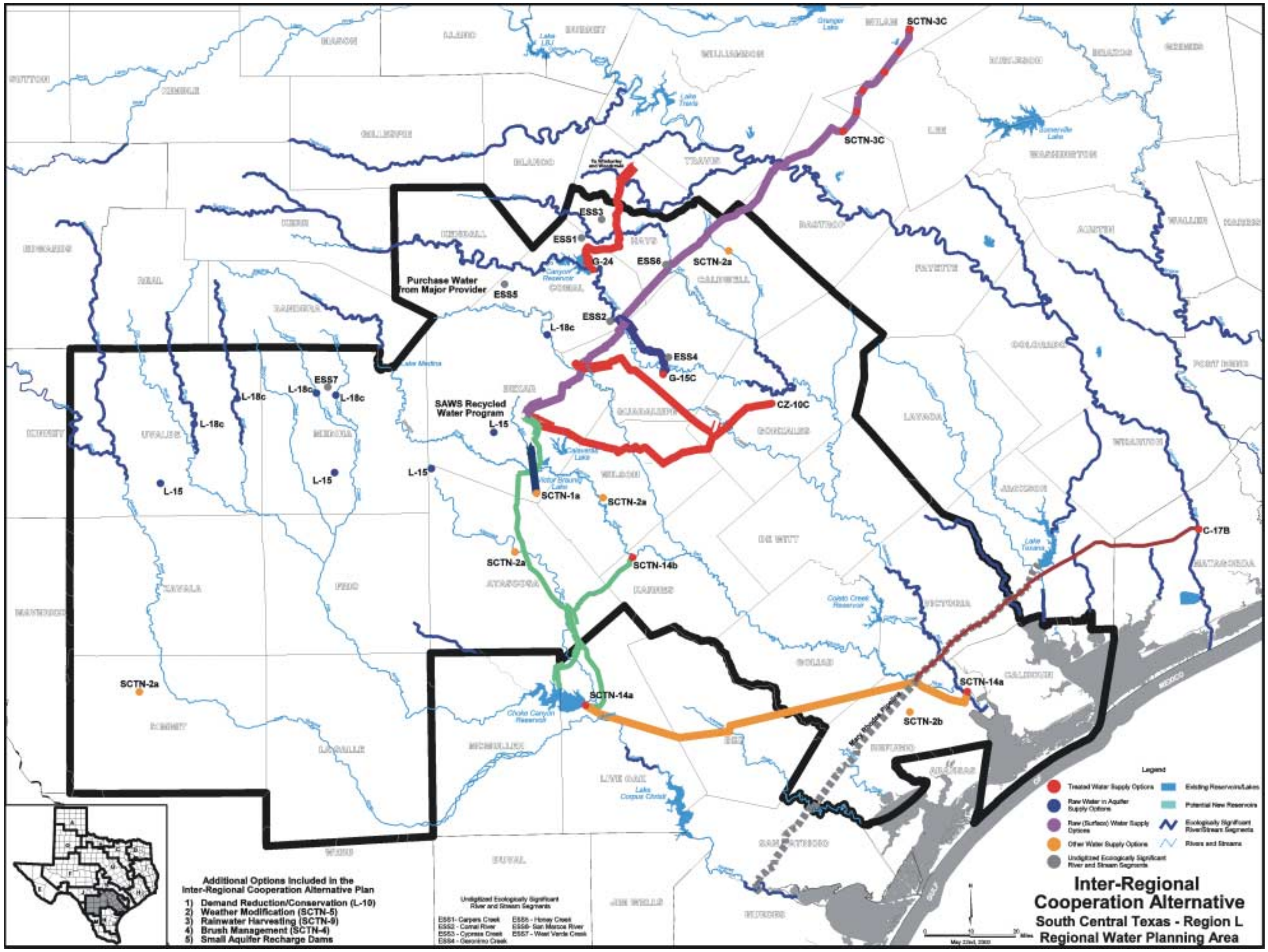
3 **Reliability based on availability of supply during drought of record (Yes = 1, No/Uncertain = 3)**

“Inter-Regional Cooperation” Regional Water Management Alternative Plan

South Central Texas
Regional Water Planning Group

San Antonio River Authority

HDR Engineering, Inc.
June 13, 2000


SCTN-3C
SCTN-3C
ESS3
ESS1
G-24
ESS6
SCTN-2a
Purchase Water From Major Provider
ESS5
ESS2
L-18c
ESS4
G-15C
CZ-10C
ESS7
L-18c
L-18c
L-18c
L-18c
SAWS Recycled Water Program
L-15
L-15
L-15
L-15
L-15
SCTN-1a
SCTN-2a
SCTN-2a
SCTN-14b
C-17B
SCTN-2a
SCTN-14a
SCTN-14a
SCTN-2b
Additional Options Included in the Inter-Regional Cooperation Alternative Plan
1) Demand Reduction/Conservation (L-10)
2) Weather Modification (SCTN-5)
3) Rainwater Harvesting (SCTN-9)
4) Brush Management (SCTN-4)
5) Small Aquifer Recharge Dams
Undigitized Ecologically Significant River and Stream Segments
ESS1- Carpers Creek
ESS2 - Comal River
ESS3 - Cypress Creek
ESS4 - Geronimo Creek
ESS5 - Honey Creek
ESS6- San Marcos River
ESS7 - West Verde Creek
Legend
Treated Water Supply Options
Raw Water in Aquifer Supply Options
Raw (Surface) Water Supply Options
Other Water Supply Options
Undigitized Ecologically Significant River and Stream Segments
Existing Reservoirs/Lakes
Potential New Reservoirs
Ecologically Significant River/Stream Segments
Rivers and Streams
Inter-Regional Cooperation Alternative
South Central Texas - Region L
Regional Water Planning Area

South Central Texas Region Alternative Water Plans

Alternative Name: **Inter-Regional Cooperation**

Alternative ID: **IRC**

Alternative Description: *The Inter-Regional Cooperation Alternative Regional Water Plan is based on the cooperative development of water supplies by Regions L, N, P, and K. This plan provides significant additional water supply to Region L without development of new reservoirs. The primary approach involves diversion and delivery of enhanced water supply in the Choke Canyon Reservoir / Lake Corpus Christi (CCR/LCC) System from Choke Canyon Reservoir to the major municipal demand center of the South Central Texas Region without impact to the water supply available to Corpus Christi. Enhanced water supply for Corpus Christi is created by purchase and delivery of water to Lake Corpus Christi from the Guadalupe River at the Saltwater Barrier under existing water rights, the delivery of groundwater from the Gulf Coast Aquifer near Refugio, and the purchase and delivery of unappropriated streamflow and treated effluent to Choke Canyon Reservoir from the San Antonio River near Falls City. Additional inter-regional supply for Region L is created by the purchase and delivery of Colorado River water diverted in Matagorda County and the delivery of groundwater pumped from the Simsboro Aquifer in Bastrop, Lee, and Milam Counties. The inter-regional supplies are augmented by pipeline linkage of Lake Corpus Christi and Choke Canyon Reservoir, pumpage of the Carrizo Aquifer in Wilson and Gonzales Counties, aquifer storage and recovery in Atascosa County, voluntary transfer of Edwards Aquifer irrigation rights to municipal use, and enhanced recharge of the Edwards Aquifer.*

The following water supply options are included in the Inter-Regional Cooperation Alternative Regional Water Plan (in no particular order):

1. *Demand Reduction / Conservation (L-10)*
2. *Joint Development of Water Supply with Corpus Christi (SCTN-14b)*
3. *Gulf Coast Aquifer near Refugio (SCTN-2b)*
4. *Carrizo Aquifer – Wilson & Gonzales Counties (CZ-10C)*
5. *Aquifer Storage & Recovery (SCTN-1a)*
6. *Carrizo Aquifer – Local Supply (SCTN-2a)*
7. *Simsboro Aquifer (SCTN-3c)*
8. *Colorado River in Matagorda County (C-17B)*
9. *Edwards Irrigation Transfers (L-15)*
10. *Edwards Recharge – Type 2 Projects (L-18c)*
11. *SAWS Recycled Water Program*
12. *Canyon Reservoir (G-15C)*
13. *Wimberley & Woodcreek – Canyon (G-24)*
14. *Weather Modification (SCTN-5)*
15. *Rainwater Harvesting (SCTN-9)*
16. *Brush Management (SCTN-4)*

Inter-Regional Cooperation Alternative Regional Water Plan
Summary of Key Information for
South Central Texas Regional Water Planning Group

Quantity, Reliability, and Cost

- Plan includes management supplies to meet projected needs, ensure reliability, and maintain springflow, resulting in a quantity of additional water supplies sufficient to meet projected needs for municipal, industrial, steam-electric power, and mining uses through the year 2050.
- Cost is the greatest among the five alternative plans under consideration.

Environmental Factors

- Increased median annual streamflows in the Guadalupe River and decreased median annual streamflows in the San Antonio River.
- Least concerns with Endangered & Threatened Species and greatest concerns with Water Quality & Aquatic Habitat and Cultural Resources among the five alternative plans under consideration.

Impacts on Water Resources

- No unmitigated reductions in water available to existing water rights.
- Long-term reductions in water levels in the Carrizo Aquifer. Drawdown would be less than the average for the five alternative plans under consideration.

Impacts on Agriculture and Natural Resources

- Major commitment to municipal and irrigation water Demand Reduction (Conservation) (L-10).
- Includes Brush Management (SCTN-4) and Weather Modification (SCTN-5).
- Inclusion of water supply options to meet projected irrigation needs in full is estimated to be economically infeasible at this time. Weather Modification (SCTN-5) assists irrigation and dry-land agriculture (crops and ranching).
- Includes limited potential voluntary transfer of Edwards Aquifer irrigation permits to municipal permits through lease or purchase.

Other Relevant Factors per SCTRWPG

- Negotiation of agreement(s) between the City of Corpus Christi, Nueces River Authority, Guadalupe-Blanco River Authority, San Antonio Water System, U.S. Bureau of Reclamation, and others.

Comparison of Strategies to Meet Needs

- Selection of water supply options comprising the alternative plan based on cooperative development and utilization of resources by the South Central Texas and Coastal Bend Regions as well as preferences expressed by planning units.

Interbasin Transfer Issues

- Projected non-irrigation needs in basin(s) of origin are met throughout the planning period.
- Plan includes four interbasin transfers that are integral to Joint Development with Corpus Christi (SCTN-14b). These interbasin transfers deliver water: 1) From the Guadalupe River Saltwater Barrier to Corpus Christi and Choke Canyon Reservoir; 2) From Choke Canyon Reservoir to Bexar County; 3) From the San Antonio River @ Falls City to Choke Canyon Reservoir; and 4) From the Colorado River @ Bay City to Corpus Christi.

Third-Party Impacts of Voluntary Redistribution of Water

- Potential positive or negative effects of Edwards Irrigation Transfers (L-15).
- Lower water levels in some portions of the Carrizo Aquifer.

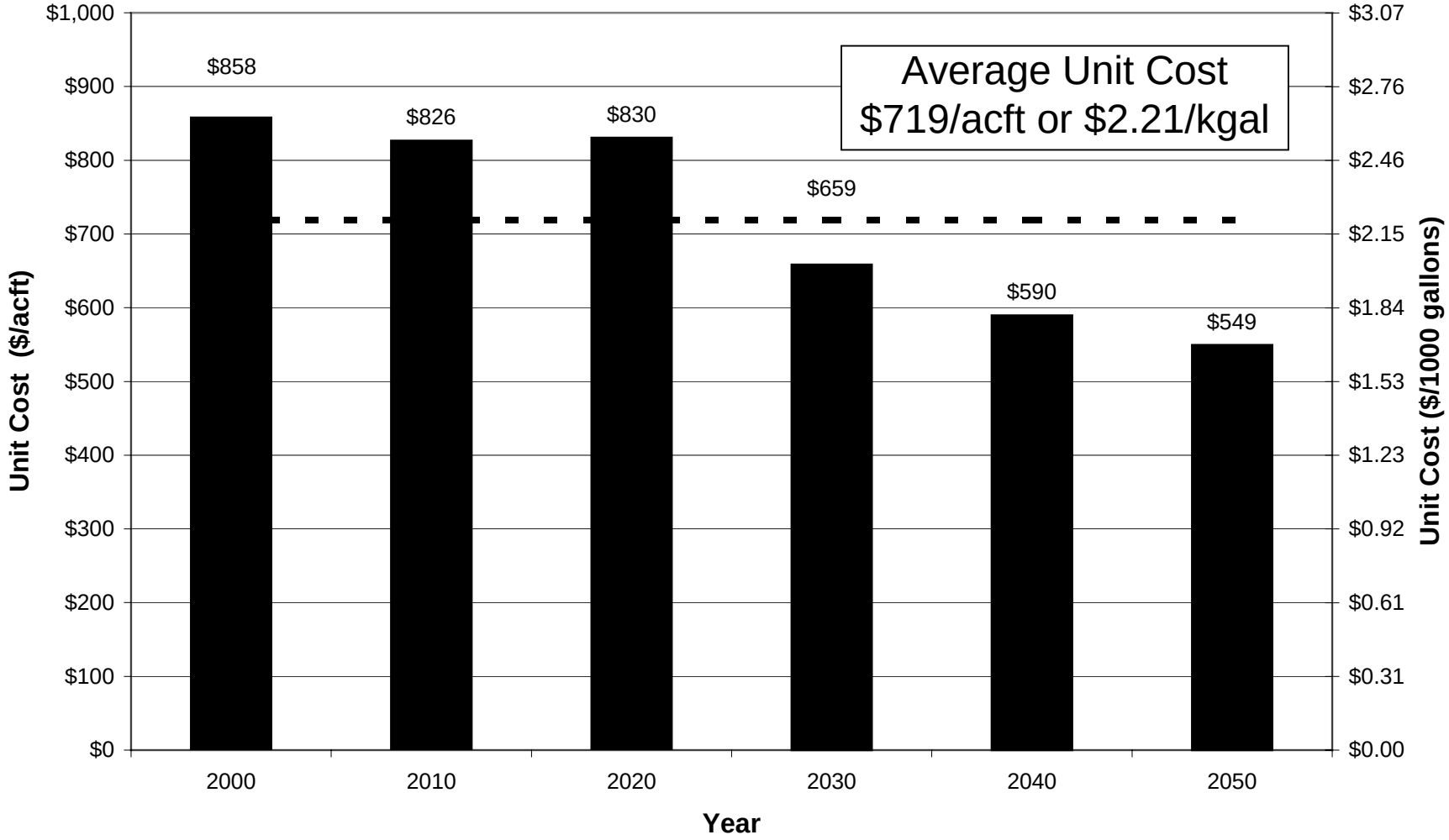
Regional Efficiency

- Edwards Irrigation Transfers (L-15) require no new facilities. Transferred water would likely be available at or very near locations having projected municipal, industrial, steam-electric power, and mining needs in Uvalde, Medina, Atascosa, and Bexar Counties.
- Terminal storage and regional water treatment facilities in Bexar County and aquifer storage and recovery in Atascosa County increase efficiency, improve reliability, and reduce unit cost.
- San Antonio Water System Regional Aquifer Storage & Recovery System (SCTN-1a) substantially reduces peak summer pumpage from the Edwards Aquifer.

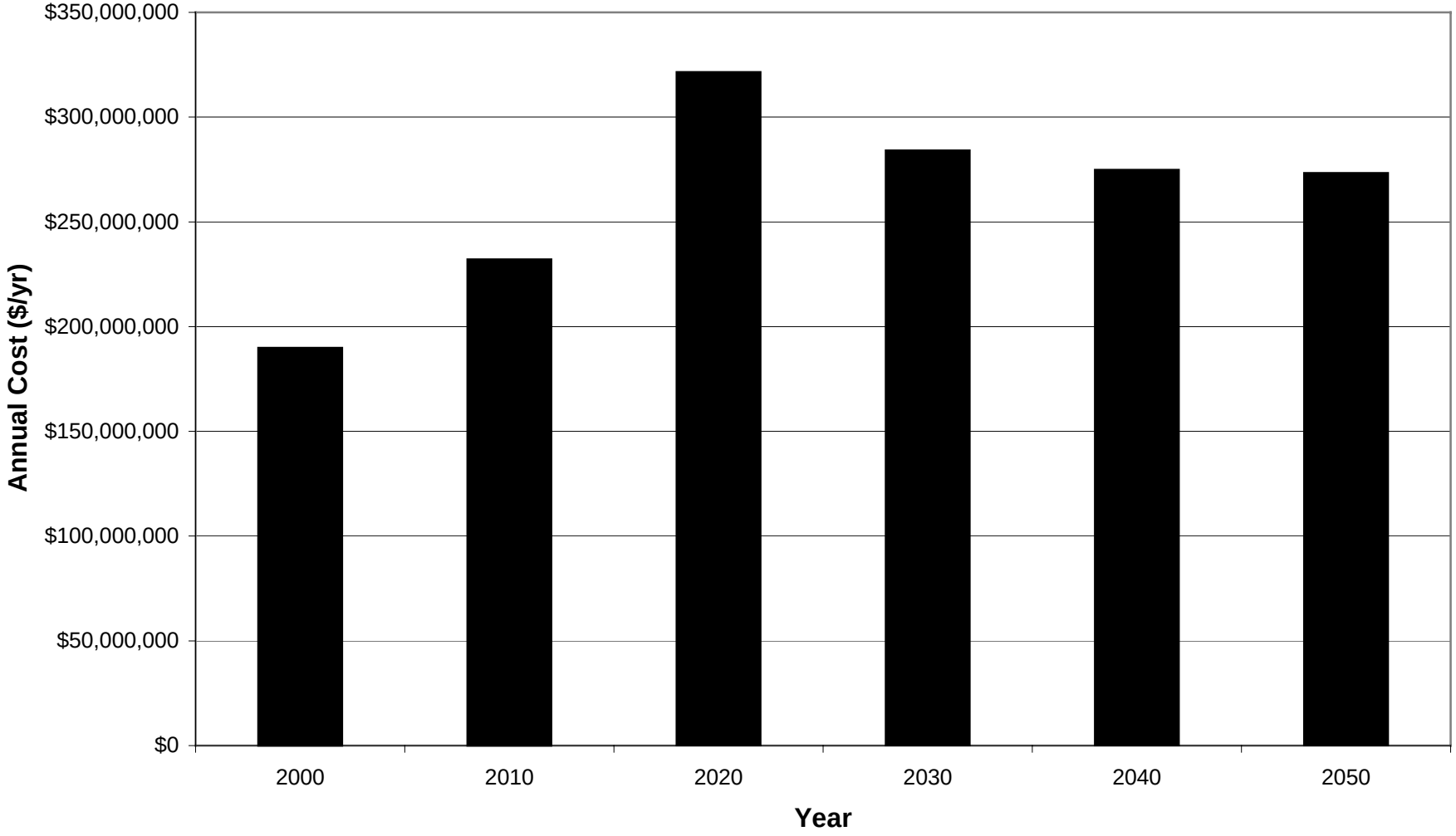
Effect on Navigation

- Not applicable.

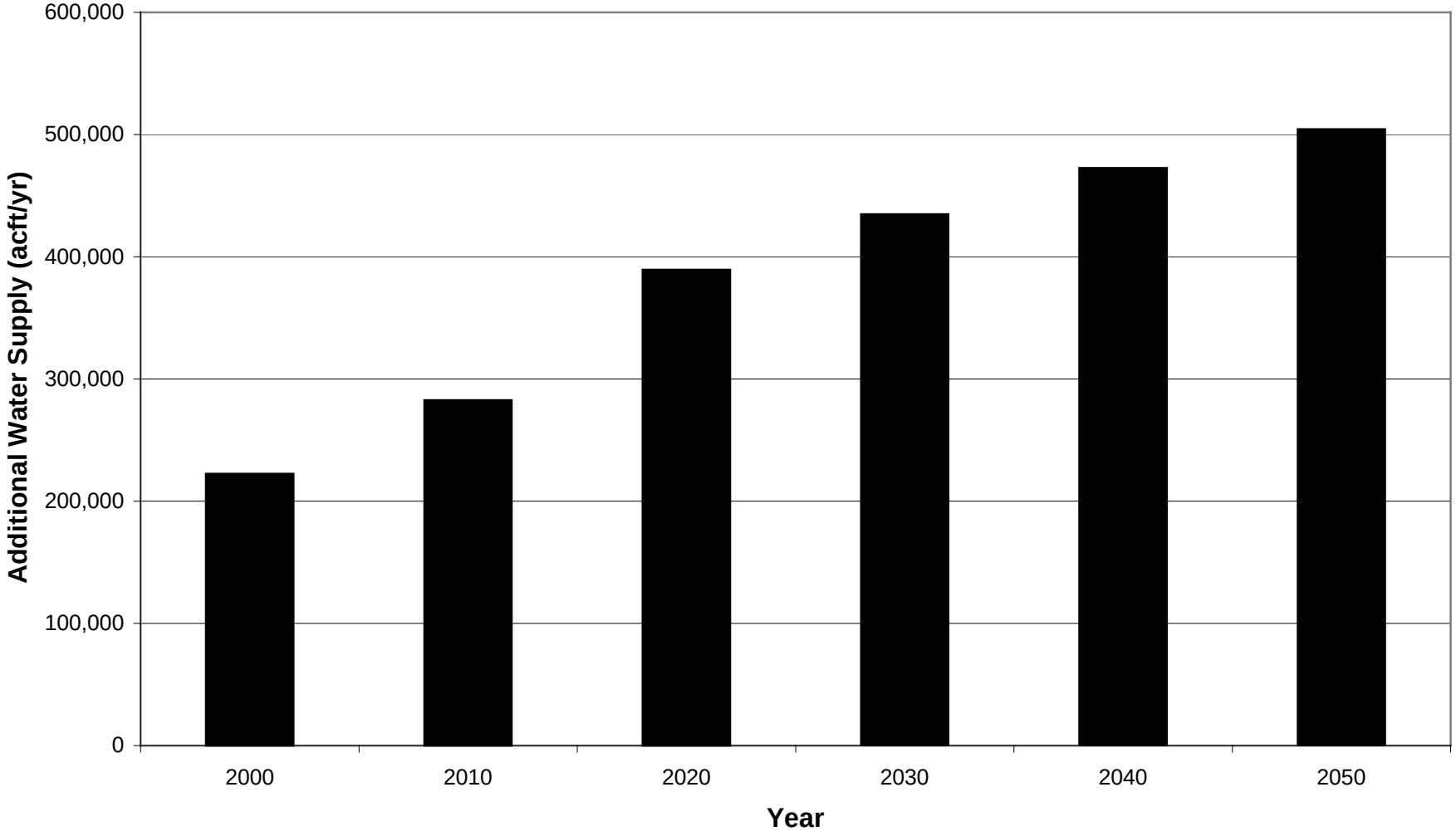
Inter-Regional Cooperation Alternative Regional Water Plan
Unit Cost of Cumulative Additional Water Supply



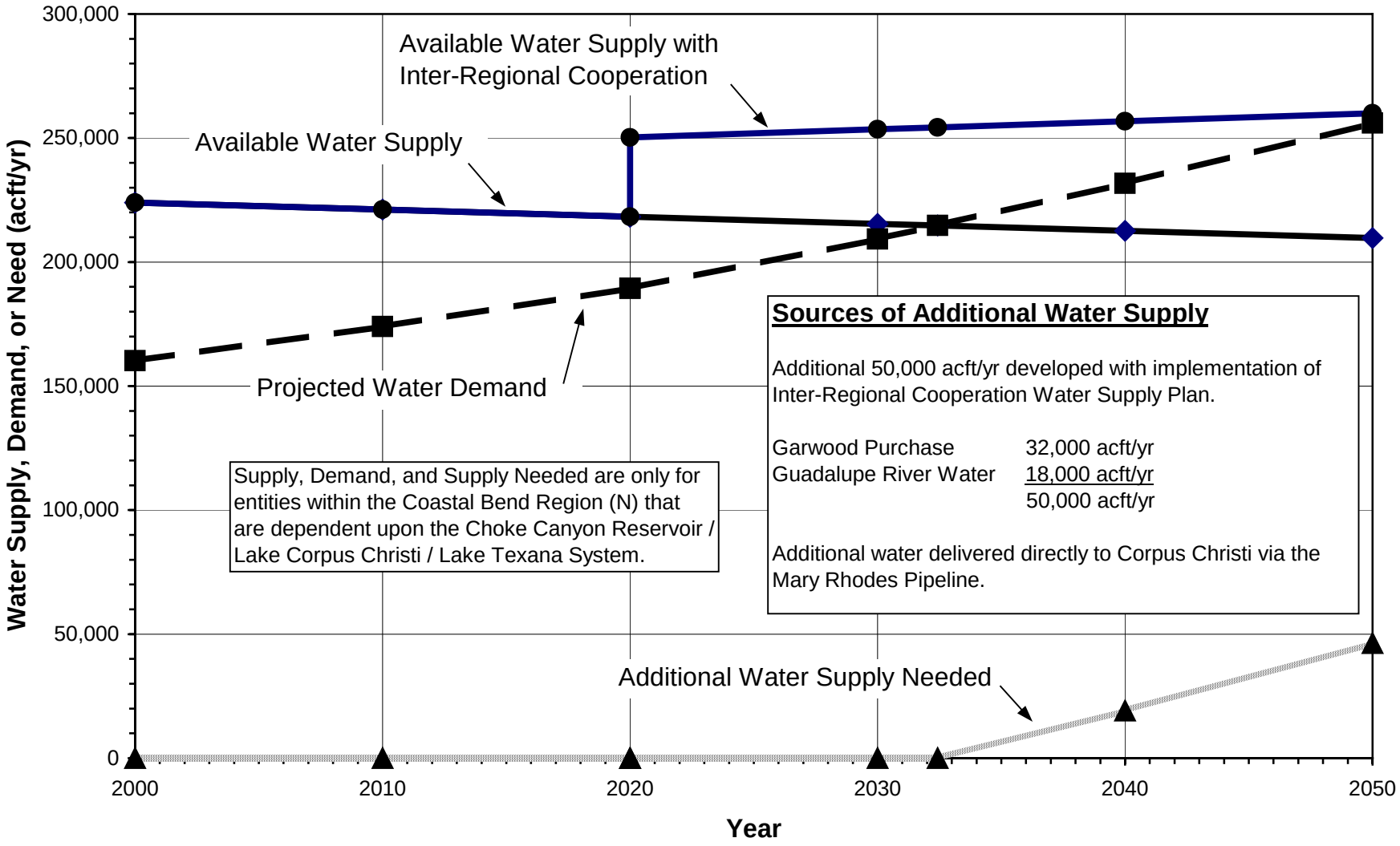
Inter-Regional Cooperation Alternative Regional Water Plan
Annual Cost of Cumulative Additional Water Supply



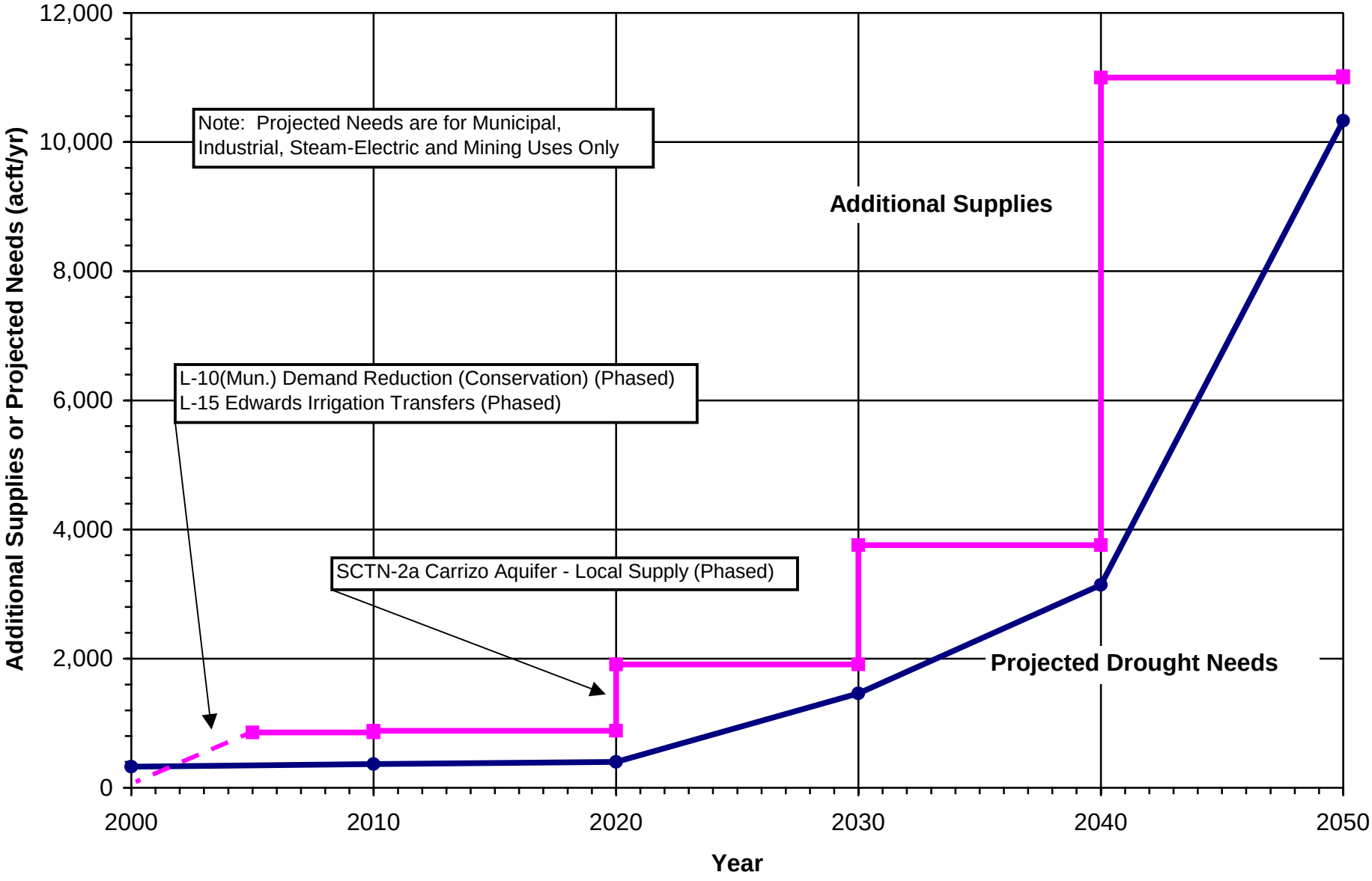
Inter-Regional Cooperation Alternative Regional Water Plan
Cumulative Additional Water Supply



Choke Canyon Reservoir / Lake Corpus Christi / Lake Texana System



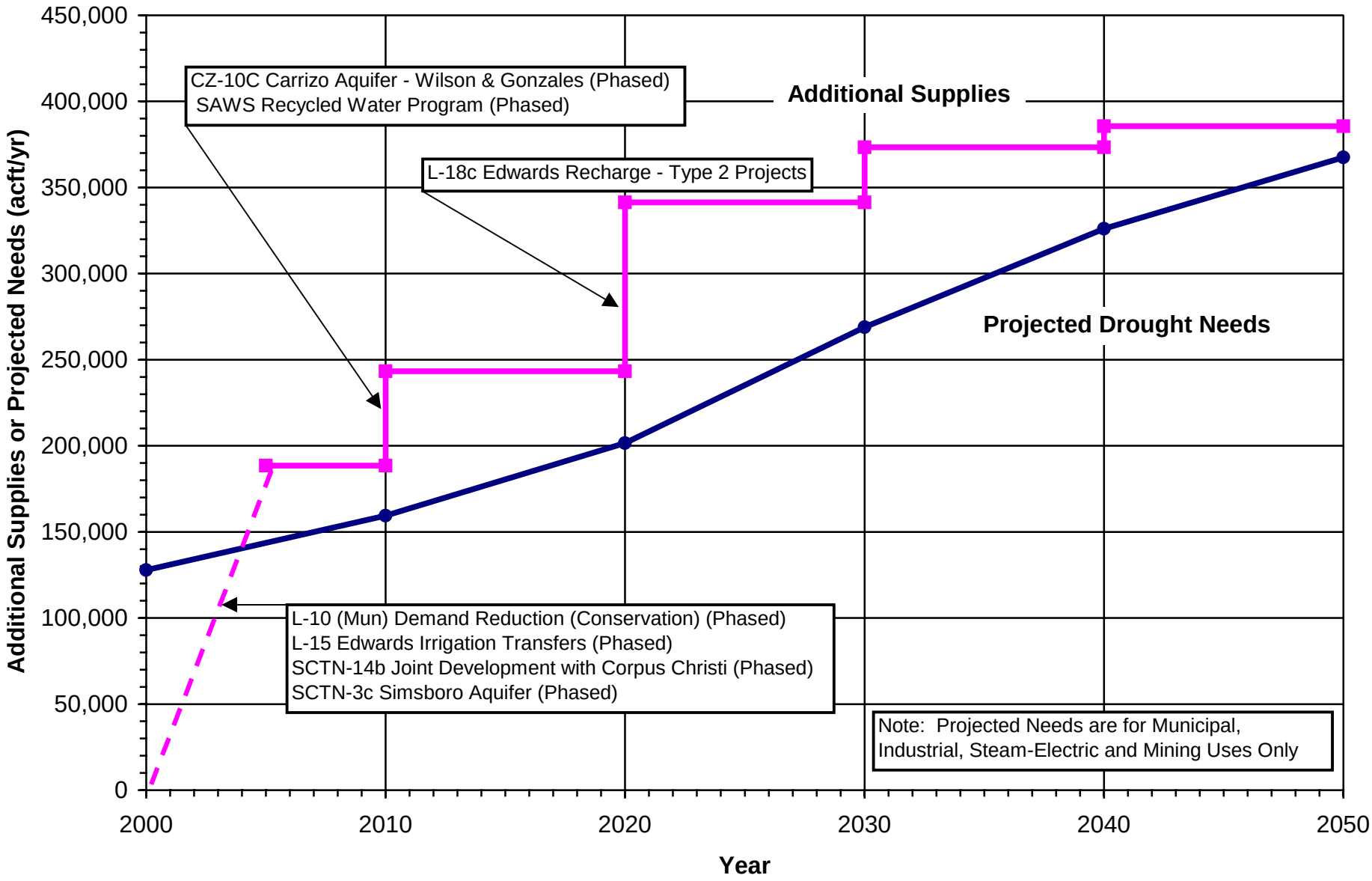
Inter-Regional Cooperation Alternative Regional Water Plan
Atascosa County



Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						County =	Atascosa		
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all		
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		325	366	401	468	530	587	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	1,504	8,504	
	Mining		0	0	0	995	1,109	1,239	
	Irrigation		38,418	36,718	35,170	43,726	42,190	40,713	
	Total Needs		**38,743**	**37,084**	**35,571**	**45,189**	**45,333**	**51,043**	
	Mun, Ind, S-E, & Min Needs		**325**	**366**	**401**	**1,463**	**3,143**	**10,330**	
	Irrigation Needs		**38,418**	**36,718**	**35,170**	**43,726**	**42,190**	**40,713**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		356	384	411	259	300	319	1
L-15	Edwards Irrigation Transfers	42,500	500	500	500	500	700	700	2, 3, 4
SCTN-2a	Carrizo Aquifer - Local Supply					1,000	3,000	10,000	5, 6
SCTN-4	Brush Management								7
SCTN-5	Weather Modification								7
SCTN-9	Rainwater Harvesting								7
	Small Aquifer Recharge Dams								7
L-10 (Irr.)	Demand Reduction (Conservation)		3,692	3,692	3,692	3,692	3,692	3,692	8
	Total New Supplies		**4,548**	**4,576**	**4,603**	**5,451**	**7,692**	**14,711**	
	Total System Mgmt. Supply / Deficit		**-34,195**	**-32,508**	**-30,968**	**-39,738**	**-37,641**	**-36,332**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**531**	**518**	**510**	**296**	**857**	**689**	
	Irrigation System Mgmt. Supply / Deficit		**-34,726**	**-33,026**	**-31,478**	**-40,034**	**-38,498**	**-37,021**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.								
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of								
	an estimated potential annual transfer of 50,000 acft based on Proposed Permits prorated to 400,000 acft/yr.								
4	Additional Edwards supply is for City of Lytle.								
5	Additional Carrizo supply is for Steam-Electric and Mining use.								
6	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
7	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
8	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation								
	application rate.								

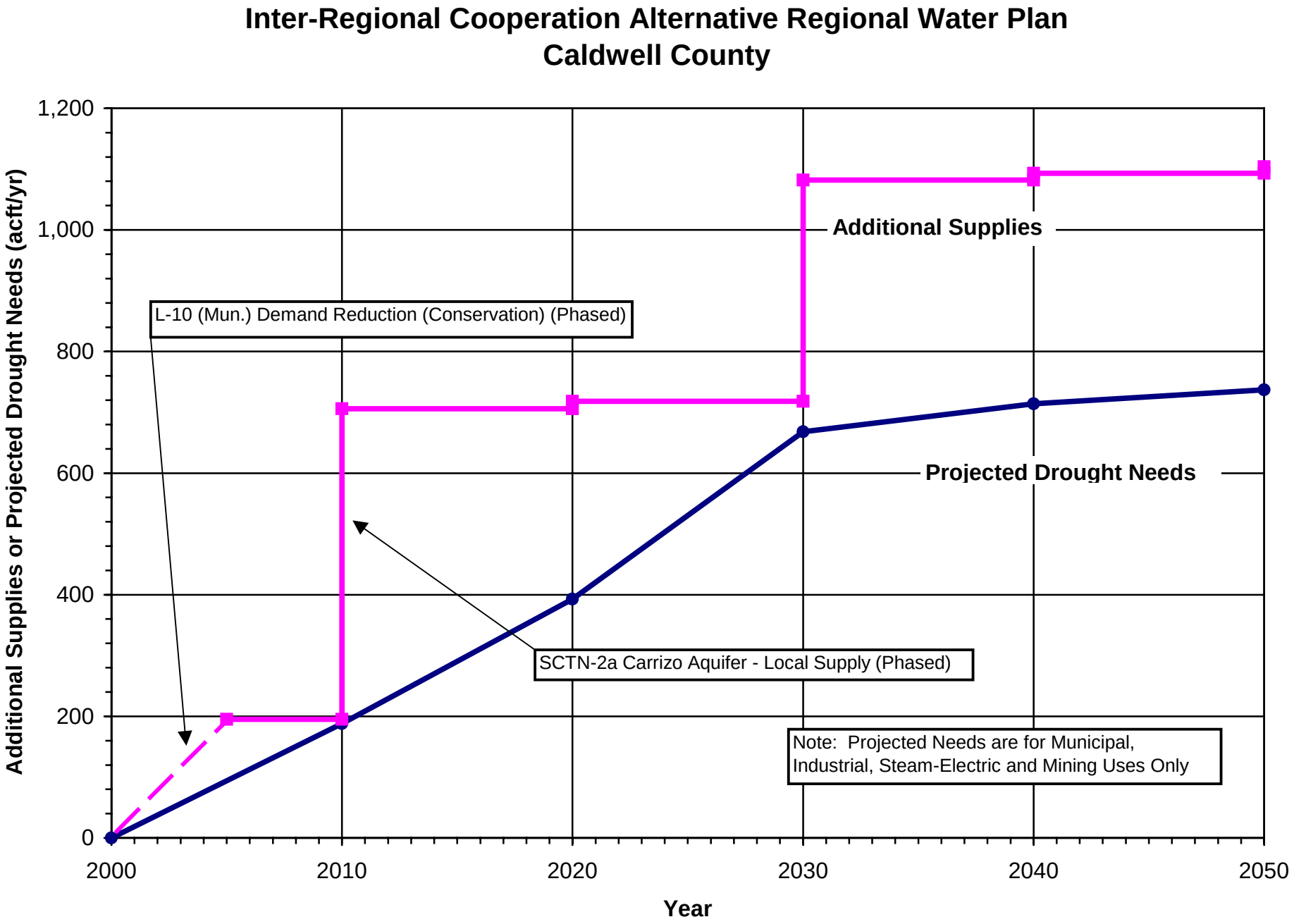
Inter-Regional Cooperation Alternative Regional Water Plan
Bexar County



Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						County =	Bexar	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	122,867	154,495	196,301	262,070	315,633	353,309	
	Industrial	0	0	0	1,430	4,759	8,192	
	Steam-Electric	0	0	0	0	0	0	
	Mining	4,963	4,936	5,201	5,406	5,645	5,962	
	Irrigation	18,728	17,297	15,738	14,245	12,815	11,444	
	Total Needs	**146,558**	**176,728**	**217,240**	**283,151**	**338,852**	**378,907**	
	Mun, Ind, S-E, & Min Needs	**127,830**	**159,431**	**201,502**	**268,906**	**326,037**	**367,463**	
	Irrigation Needs	**18,728**	**17,297**	**15,738**	**14,245**	**12,815**	**11,444**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		33,528	42,509	41,210	36,533	38,834	40,934	1
L-15	Edwards Irrigation Transfers	42,500	25,000	35,000	35,000	34,000	33,800	32,800	2, 3
SCTN-14b	Joint Development with Corpus Christi	218,000	79,000	79,000	155,000	191,000	204,000	218,000	4, 5
SCTN-3c	Simsboro Aquifer	55,000	51,000	48,000	41,000	27,000	16,500	0	6
CZ-10C	Carrizo Aquifer - Wilson & Gonzales	40,000		19,000	29,000	35,500	35,500	35,500	7
	SAWS Recycled Water Program			19,826	26,737	35,824	43,561	52,215	8, 9
L-18c	Edwards Recharge - Type 2 Projects	13,451			13,451	13,451	13,451	13,451	
SCTN-1a	Aquifer Storage & Recovery - Regional								10
SCTN-4	Brush Management								11
SCTN-5	Weather Modification								11
SCTN-9	Rainwater Harvesting								11
	Small Aquifer Recharge Dams								11
L-10 (Irr.)	Demand Reduction (Conservation)		4,521	4,521	4,521	4,521	4,521	4,521	12
	Total New Supplies		**193,049**	**247,856**	**345,919**	**377,829**	**390,167**	**397,421**	
	Total System Mgmt. Supply / Deficit		**46,491**	**71,128**	**128,679**	**94,678**	**51,315**	**18,514**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**60,698**	**83,904**	**139,896**	**104,402**	**59,609**	**25,437**	
	Irrigation System Mgmt. Supply / Deficit		**-14,207**	**-12,776**	**-11,217**	**-9,724**	**-8,294**	**-6,923**	

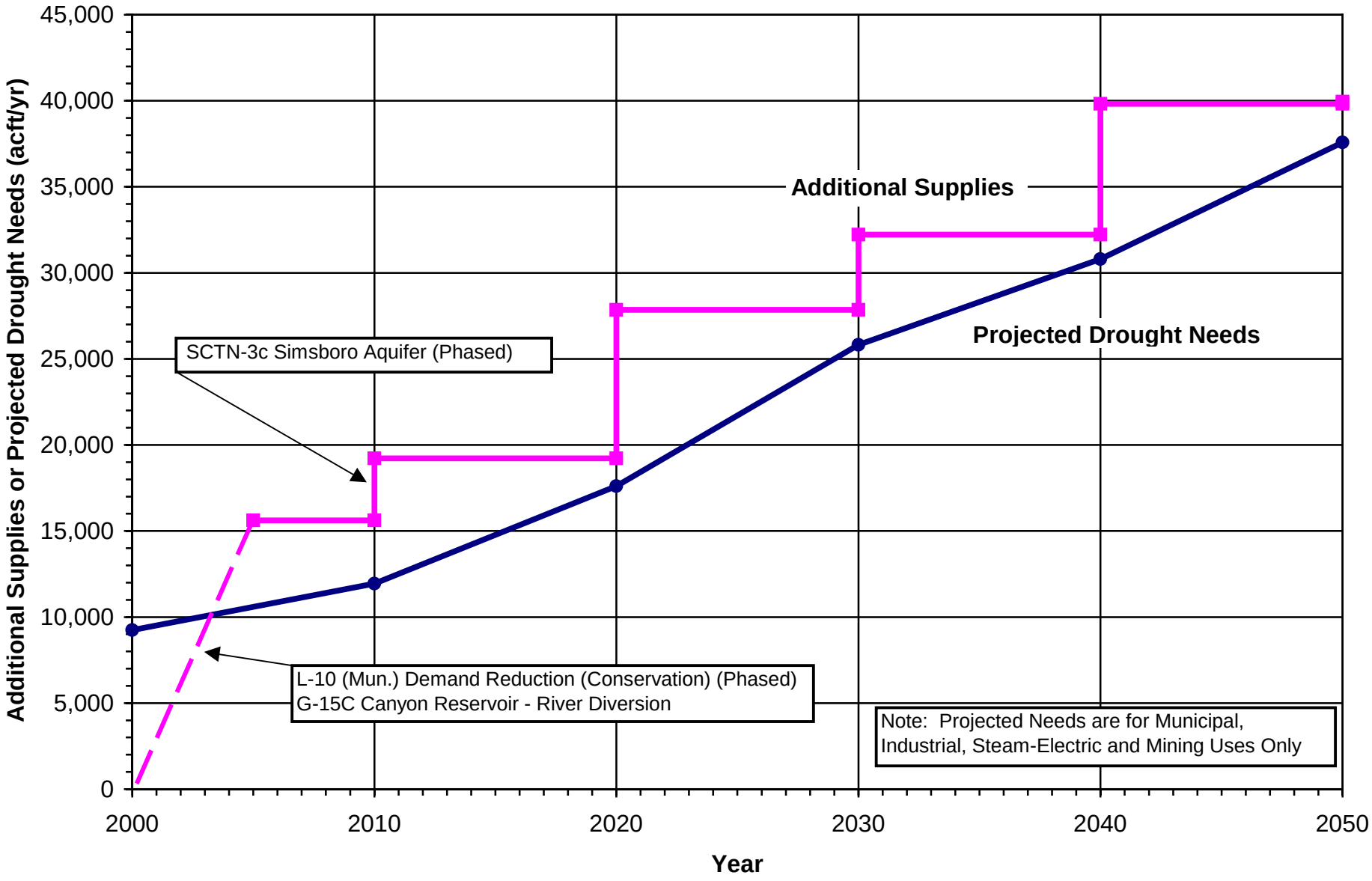
Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	an estimated potential annual transfer of 50,000 acft based on Proposed Permits prorated to 400,000 acft/yr.
4	Candidate New Supply requires cooperative agreement(s) with City of Corpus Christi, Nueces River Authority, & USBR.
5	Requires delivery of 32,000 acft/yr of Colorado River water (Garwood) to Corpus Christi in 2020 and development of Gulf Coast
	Aquifer (SCTN-2b) at long-term average supply of 21,000 acft/yr.
6	Candidate New Supply shared by Bexar, Hays, and Comal Counties. Effects on regional aquifer levels to be quantified.
7	Candidate New Supply shared by Bexar and Guadalupe Counties. Effects on regional aquifer levels to be quantified.
8	Current SAWS Recycled Water Program is included in the 24,941 acft/yr (consumptive reuse) in estimated needs.
9	Future use of recycled water for non-potable uses and based on goal of meeting 20 percent of SAWS projected water demand.
10	SAWS ASR program in southern Bexar County increases reliability of Edwards Aquifer supply and reduces seasonal aquifer demands.
11	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
12	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.


Inter-Regional Cooperation Alternative Regional Water Plan
Caldwell County
Additional Supplies or Projected Drought Needs (acft/yr)
1,200
1,000
800
600
400
200
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
Projected Drought Needs
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
SCTN-2a Carrizo Aquifer - Local Supply (Phased)
Note: Projected Needs are for Municipal, Industrial, Steam-Electric and Mining Uses Only

Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						County =	Caldwell		
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all		
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		0	188	393	668	714	737	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		0	0	0	0	0	0	
	Total Needs		**0**	**188**	**393**	**668**	**714**	**737**	
	Mun, Ind, S-E, & Min Needs		**0**	**188**	**393**	**668**	**714**	**737**	
	Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		195	206	218	82	93	104	1
SCTN-2a	Carrizo Aquifer - Local Supply			500	500	1,000	1,000	1,000	2
	Small Aquifer Recharge Dams								3
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**195**	**706**	**718**	**1,082**	**1,093**	**1,104**	
	Total System Mgmt. Supply / Deficit		**195**	**518**	**325**	**414**	**379**	**367**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**195**	**518**	**325**	**414**	**379**	**367**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Lockhart.								
3	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

Inter-Regional Cooperation Alternative Regional Water Plan
Comal County

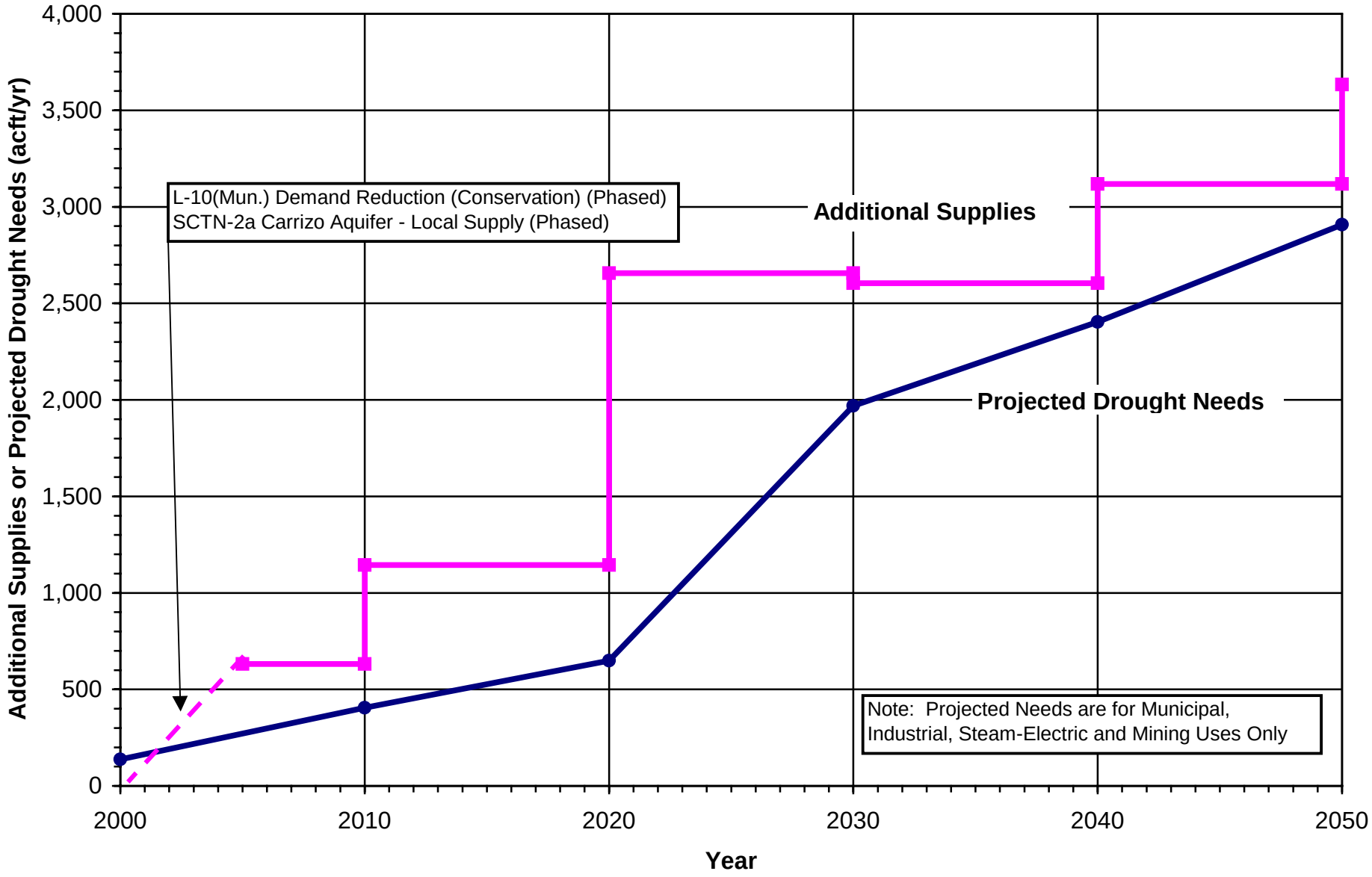


Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						County =		Comal	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =		all	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		2,289	5,049	10,487	18,282	25,205	33,062	
	Industrial		1,388	1,425	1,486	1,737	2,009	2,289	
	Steam-Electric		0	0	0	0	0	0	
	Mining		5,570	5,464	5,628	5,796	3,590	2,224	
	Irrigation		30	14	0	0	0	0	
	Total Needs		**9,277**	**11,952**	**17,601**	**25,815**	**30,804**	**37,575**	
	Mun, Ind, S-E, & Min Needs		**9,247**	**11,938**	**17,601**	**25,815**	**30,804**	**37,575**	
	Irrigation Needs		**30**	**14**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		616	718	848	718	824	942	1
G-15C	Canyon Reservoir - River Diversion	15,000	15,000	15,000	15,000	15,000	15,000	15,000	2
SCTN-3c	Simsboro Aquifer	55,000			3,500	12,000	16,500	24,000	3, 4
	Small Aquifer Recharge Dams								5
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**15,616**	**15,718**	**19,348**	**27,718**	**32,324**	**39,942**	
	Total System Mgmt. Supply / Deficit		**6,339**	**3,766**	**1,747**	**1,903**	**1,520**	**2,367**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**6,369**	**3,780**	**1,747**	**1,903**	**1,520**	**2,367**	
	Irrigation System Mgmt. Supply / Deficit		**-30**	**-14**	**0**	**0**	**0**	**0**	

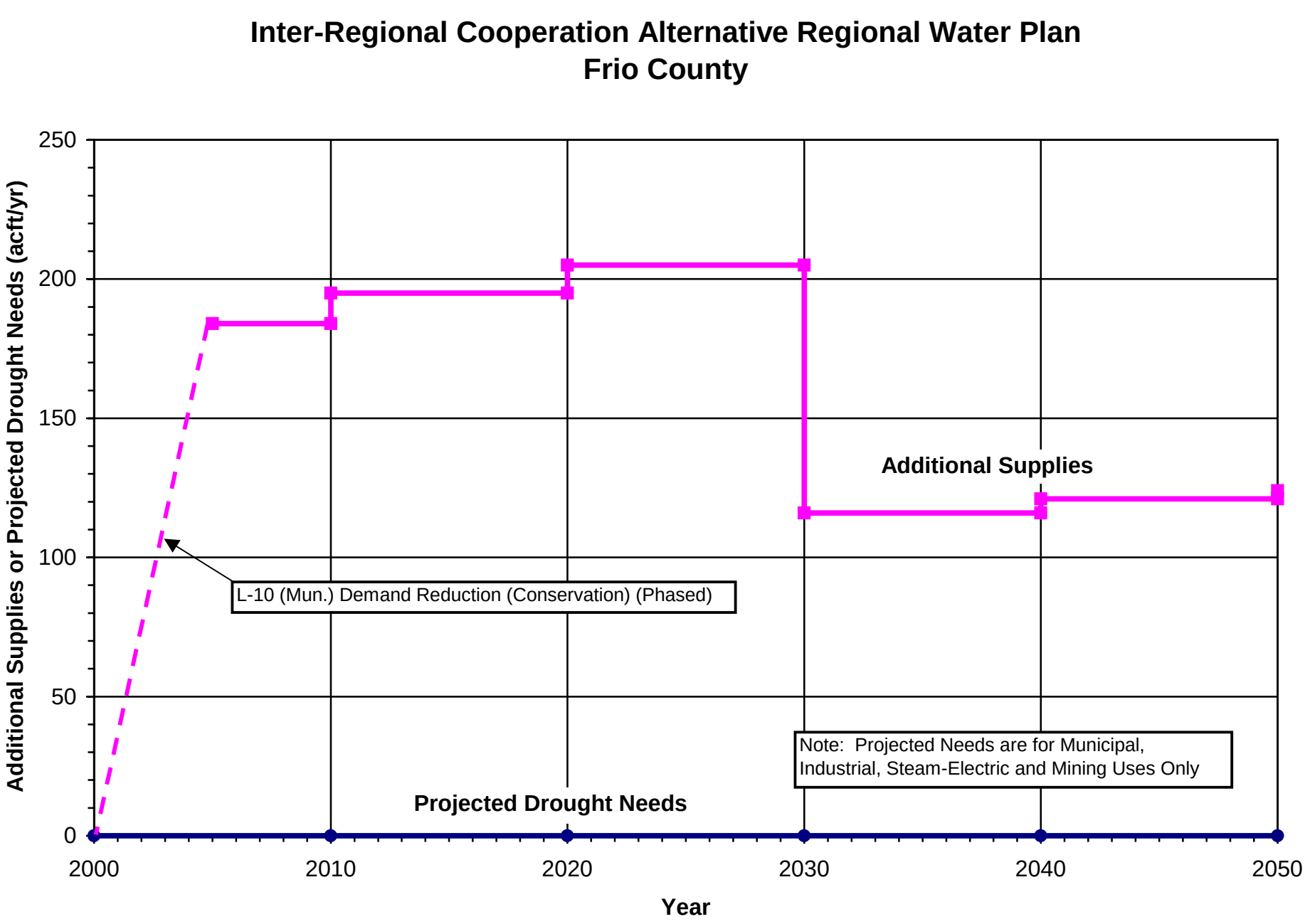
Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Portion of Canyon firm yield (with amendment) diverted below Seguin.
3	Candidate New Supply shared by Bexar, Hays, and Comal Counties. Effects on regional aquifer levels to be quantified.
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.

Inter-Regional Cooperation Alternative Regional Water Plan
Dimmit County



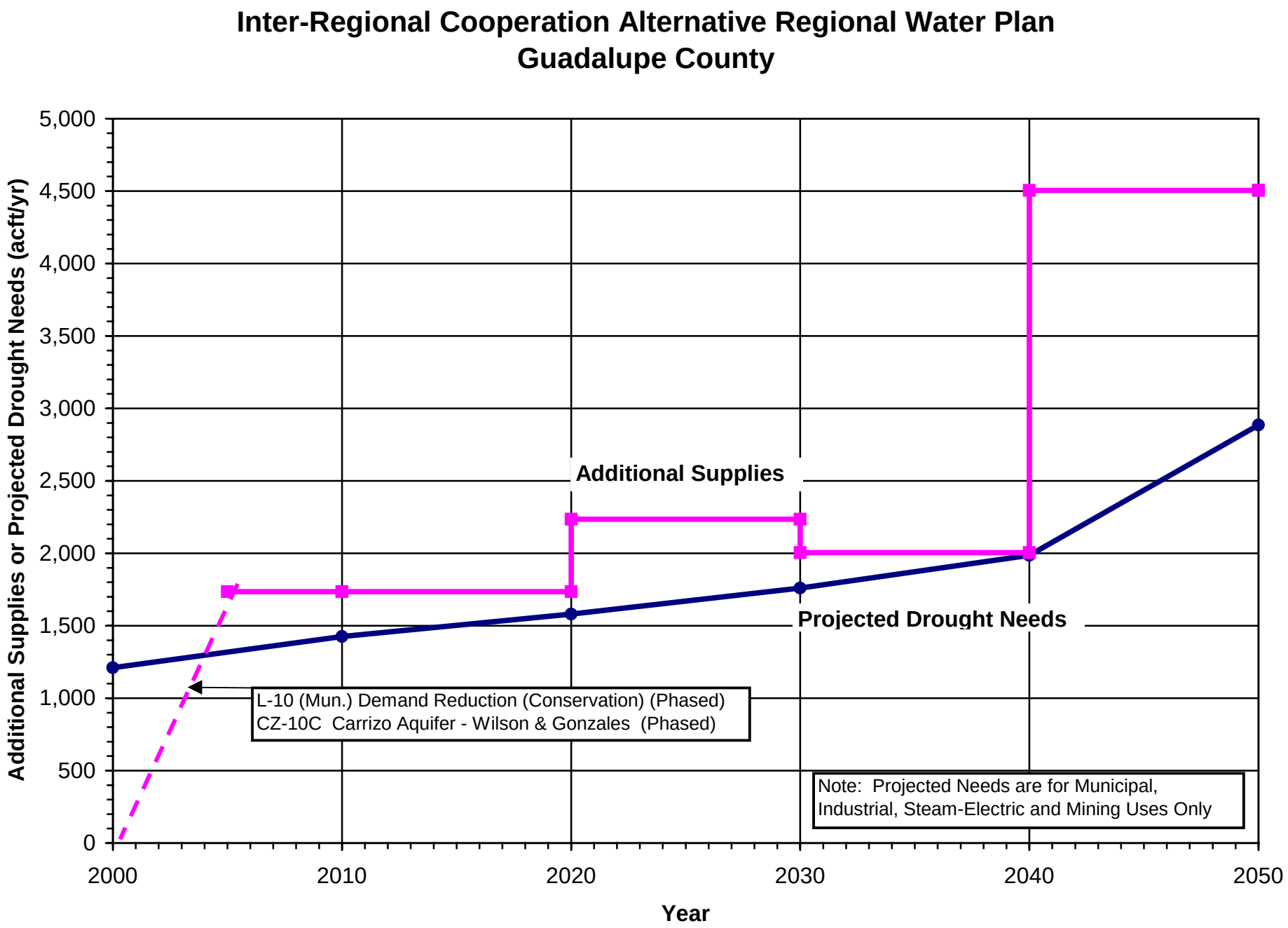
Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						**County =**	**Dimmit**	
County Summary of Projected Water Needs and Water Supply Options						**User Group(s) =**	**all**	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	138	405	649	1,054	1,479	1,959	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	915	925	949	
	Irrigation	0	0	0	2,133	1,737	1,331	
	Total Needs	**138**	**405**	**649**	**4,102**	**4,141**	**4,239**	
	Mun, Ind, S-E, & Min Needs	**138**	**405**	**649**	**1,969**	**2,404**	**2,908**	
	Irrigation Needs	**0**	**0**	**0**	**2,133**	**1,737**	**1,331**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		131	144	156	104	118	133	1
SCTN-2a	Carrizo Aquifer - Local Supply		500	1,000	1,000	2,500	3,000	3,500	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**631**	**1,144**	**1,156**	**2,604**	**3,118**	**3,633**	
	Total System Mgmt. Supply / Deficit		**493**	**739**	**507**	**-1,498**	**-1,023**	**-606**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**493**	**739**	**507**	**635**	**714**	**725**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**-2,133**	**-1,737**	**-1,331**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Carrizo Springs and Mining supply.								
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								


Inter-Regional Cooperation Alternative Regional Water Plan
Frio County
Additional Supplies or Projected Drought Needs (acft/yr)
250
200
150
100
50
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
Projected Drought Needs
Note: Projected Needs are for Municipal, Industrial, Steam-Electric and Mining Uses Only

Inter-Regional Cooperation Regional Water Management Alternative Plan

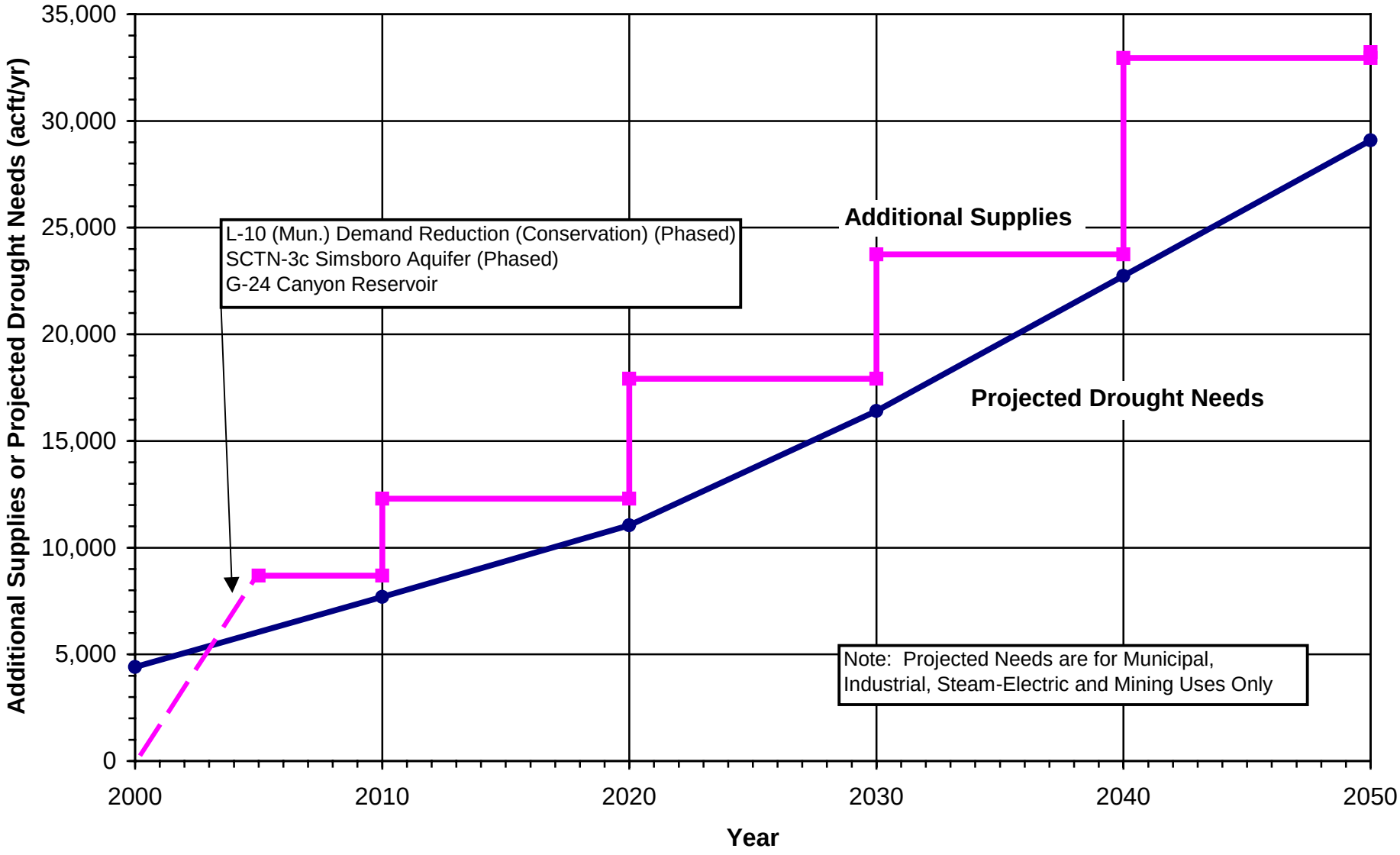
South Central Texas Region						County =		Frio	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =		all	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		0	0	0	0	0	0	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		71,126	67,646	64,365	76,505	73,519	70,662	
	Total Needs		**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
	Mun, Ind, S-E, & Min Needs		**0**	**0**	**0**	**0**	**0**	**0**	
	Irrigation Needs		**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		184	195	205	116	121	124	1
SCTN-4	Brush Management								2
SCTN-5	Weather Modification								2
SCTN-9	Rainwater Harvesting								2
	Small Aquifer Recharge Dams								2
L-10 (Irr.)	Demand Reduction (Conservation)		5,947	5,947	5,947	5,947	5,947	5,947	3
	Total New Supplies		**6,131**	**6,142**	**6,152**	**6,063**	**6,068**	**6,071**	
	Total System Mgmt. Supply / Deficit		**-64,995**	**-61,504**	**-58,213**	**-70,442**	**-67,451**	**-64,591**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**184**	**195**	**205**	**116**	**121**	**124**	
	Irrigation System Mgmt. Supply / Deficit		**-65,179**	**-61,699**	**-58,418**	**-70,558**	**-67,572**	**-64,715**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation application rate.								


Inter-Regional Cooperation Alternative Regional Water Plan
Guadalupe County
Additional Supplies or Projected Drought Needs (acft/yr)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
Projected Drought Needs
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
CZ-10C Carrizo Aquifer - Wilson & Gonzales (Phased)
Note: Projected Needs are for Municipal,
Industrial, Steam-Electric and Mining Uses Only

Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						County =	Guadalupe		
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all		
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		29	23	30	71	87	773	
	Industrial		985	1,204	1,350	1,487	1,692	1,899	
	Steam-Electric		0	0	0	0	0	0	
	Mining		196	198	200	202	207	213	
	Irrigation		985	879	779	684	594	508	
	Total Needs		**2,195**	**2,304**	**2,359**	**2,444**	**2,580**	**3,393**	
	Mun, Ind, S-E, & Min Needs		**1,210**	**1,425**	**1,580**	**1,760**	**1,986**	**2,885**	
	Irrigation Needs		**985**	**879**	**779**	**684**	**594**	**508**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		235	236	236	5	5	6	1
CZ-10C	Carrizo Aquifer - Wilson & Gonzales	40,000	1,500	1,500	2,000	2,000	2,500	4,500	2, 3
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**1,735**	**1,736**	**2,236**	**2,005**	**2,505**	**4,506**	
	Total System Mgmt. Supply / Deficit		**-460**	**-568**	**-123**	**-439**	**-75**	**1,113**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**525**	**311**	**656**	**245**	**519**	**1,621**	
	Irrigation System Mgmt. Supply / Deficit		**-985**	**-879**	**-779**	**-684**	**-594**	**-508**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply shared by Bexar and Guadalupe Counties. Effects on regional aquifer levels to be quantified.								
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

Inter-Regional Cooperation Alternative Regional Water Plan
Hays County

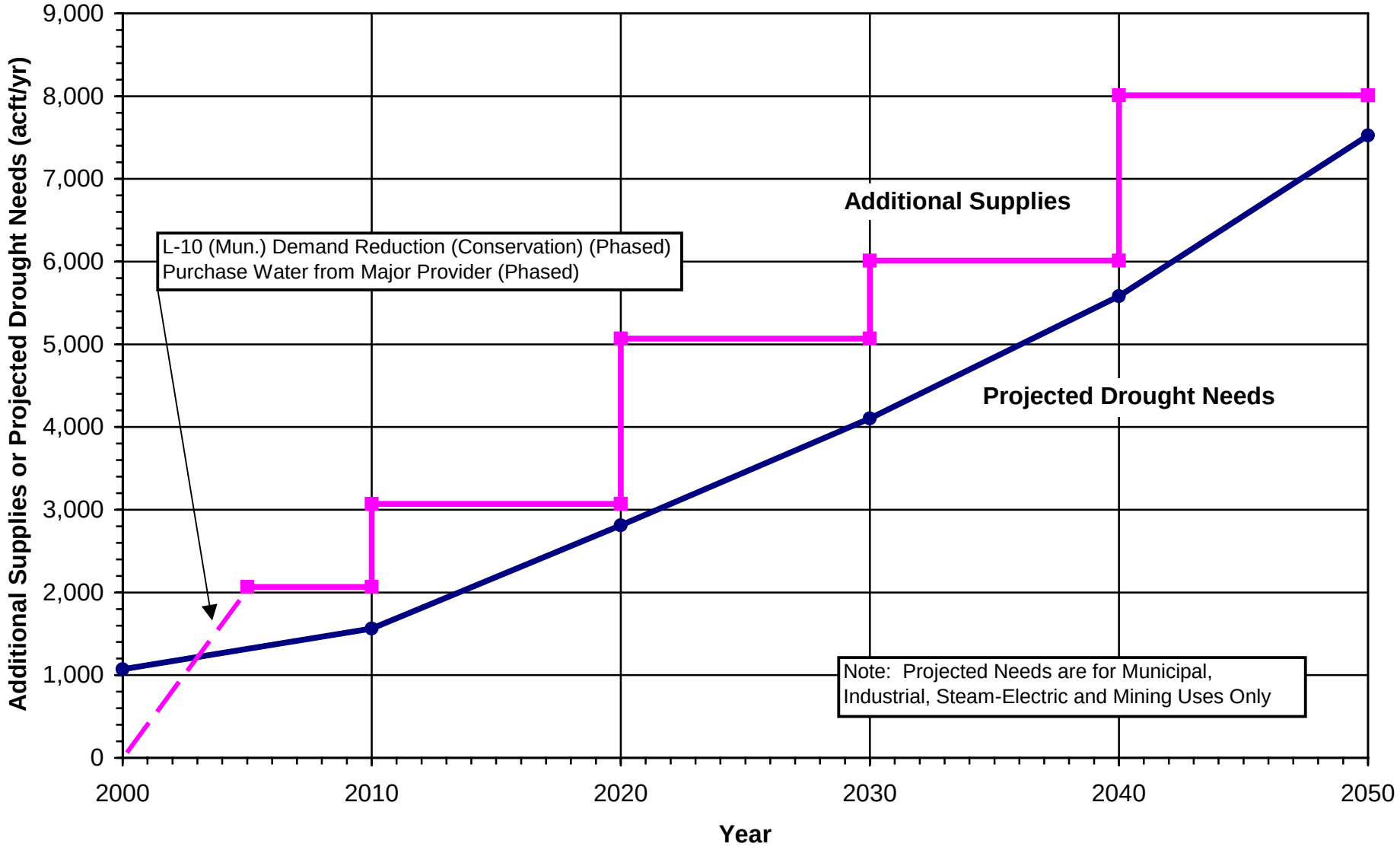


Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						**County =**	**Hays**	
County Summary of Projected Water Needs and Water Supply Options						**User Group(s) =**	**all**	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	4,325	7,609	10,980	16,349	22,696	29,059	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	84	82	68	55	37	28	
	Irrigation	0	0	0	0	0	0	
	Total Needs	**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
	Mun, Ind, S-E, & Min Needs	**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
	Irrigation Needs	**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		647	747	873	699	906	1,174	1
SCTN-3c	Simsboro Aquifer	55,000	4,000	7,000	10,500	16,000	22,000	31,000	2, 3
G-24	Canyon Reservoir	1,048	1,048	1,048	1,048	1,048	1,048	1,048	4
	Small Aquifer Recharge Dams								5
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**5,695**	**8,795**	**12,421**	**17,747**	**23,954**	**33,222**	
	Total System Mgmt. Supply / Deficit		**1,286**	**1,104**	**1,373**	**1,343**	**1,221**	**4,135**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**1,286**	**1,104**	**1,373**	**1,343**	**1,221**	**4,135**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	

Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply shared by Bexar, Hays, and Comal Counties. Effects on regional aquifer levels to be quantified.
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
4	Candidate New Supply for Wimberley and Woodcreek.
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.

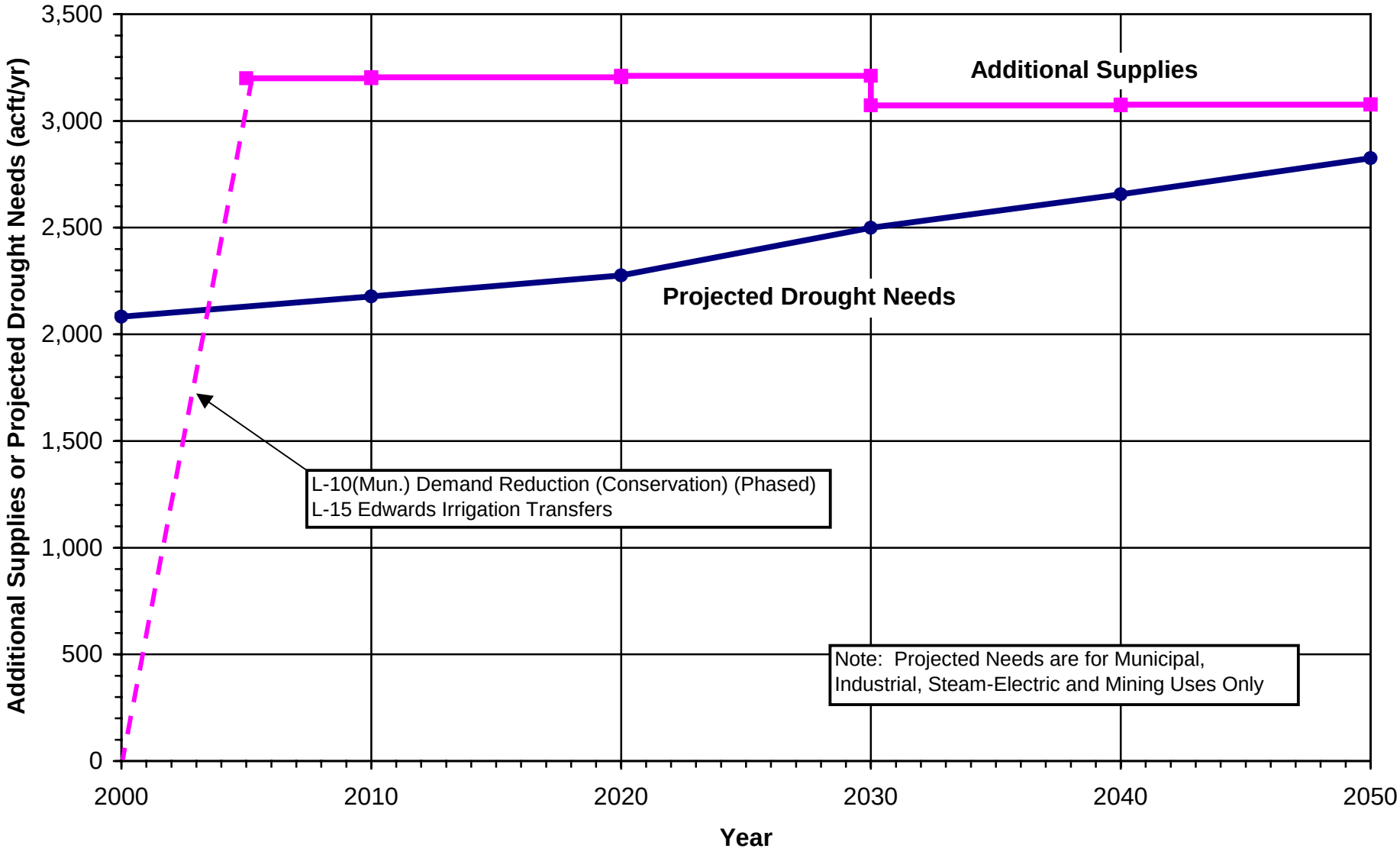
Inter-Regional Cooperation Alternative Regional Water Plan
Kendall County



Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						County =	Kendall	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		1,070	1,560	2,808	4,099	5,578	7,518	
Industrial		2	3	4	4	5	6	
Steam-Electric		0	0	0	0	0	0	
Mining		0	0	0	0	0	0	
Irrigation		0	0	0	0	0	0	
Total Needs		**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
Mun, Ind, S-E, & Min Needs		**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		67	71	71	11	11	11	1
Purchase Water from Major Provider		2,000	2,000	3,000	5,000	6,000	8,000	2, 3
SCTN-4 Brush Management								4
SCTN-5 Weather Modification								4
SCTN-9 Rainwater Harvesting								4
Small Aquifer Recharge Dams								4
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**2,067**	**2,071**	**3,071**	**5,011**	**6,011**	**8,011**	
Total System Mgmt. Supply / Deficit		**995**	**508**	**259**	**908**	**428**	**487**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**995**	**508**	**259**	**908**	**428**	**487**	
Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:								
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.							
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.							
2	Assumed purchase from Bexar County major provider. Kendall County water needs are not reflected in Bexar County table.							
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.							
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.							

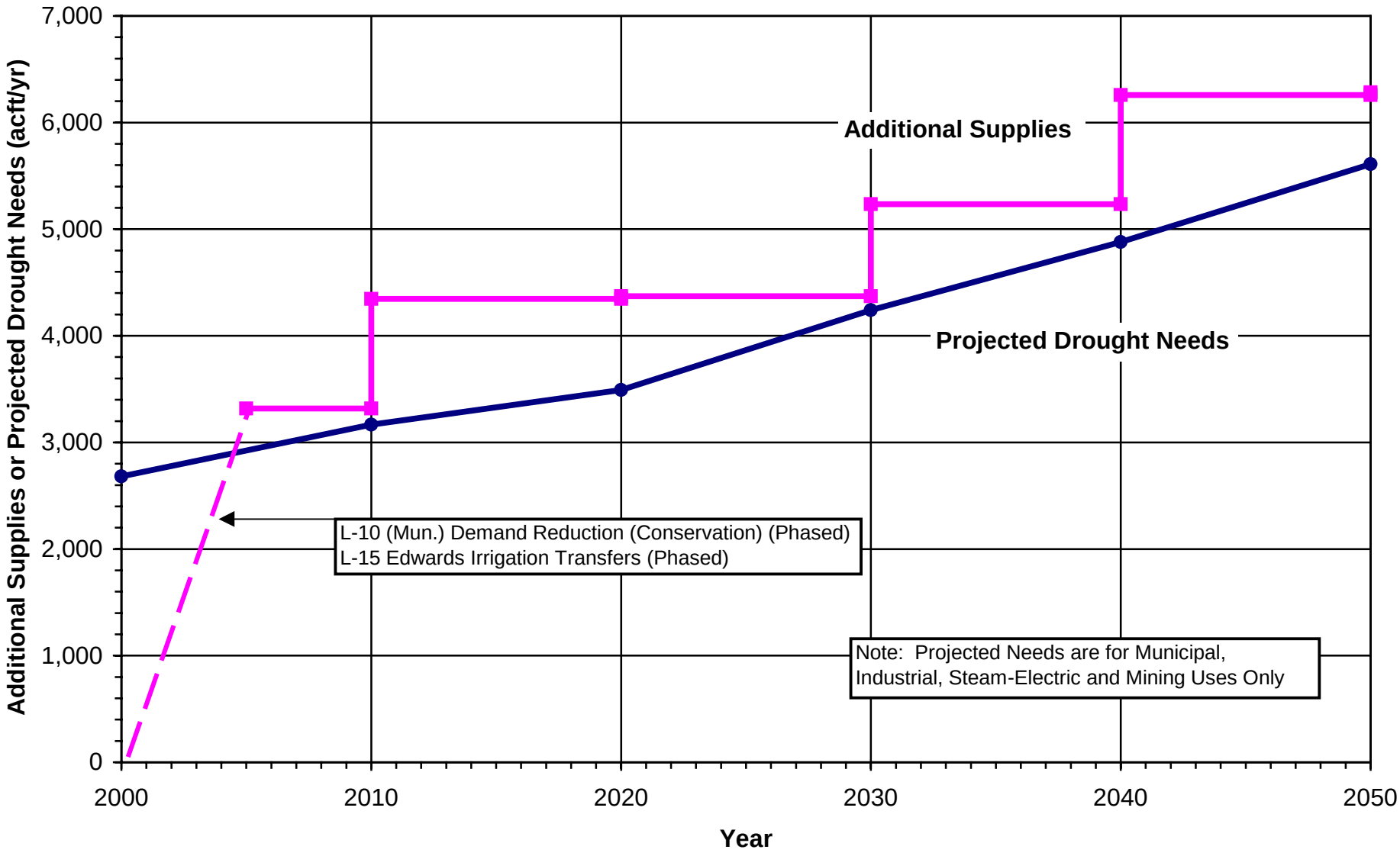
Inter-Regional Cooperation Alternative Regional Water Plan
Medina County



Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						**County =**	**Medina**	
County Summary of Projected Water Needs and Water Supply Options						**User Group(s) =**	**all**	
Projected Water Needs (acft/yr)								
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		2,015	2,110	2,206	2,427	2,582	2,750	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		68	68	70	72	74	76	
	Irrigation		89,757	87,941	82,161	80,963	75,663	70,587	
	Total Needs		**91,840**	**90,119**	**84,437**	**83,462**	**78,319**	**73,413**	
	Mun, Ind, S-E, & Min Needs		**2,083**	**2,178**	**2,276**	**2,499**	**2,656**	**2,826**	
	Irrigation Needs		**89,757**	**87,941**	**82,161**	**80,963**	**75,663**	**70,587**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		200	205	211	73	76	78	1
L-15	Edwards Irrigation Transfers	42,500	3,000	3,000	3,000	3,000	3,000	3,000	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)		11,867	11,867	11,867	11,867	11,867	11,867	5
	Total New Supplies		**15,067**	**15,072**	**15,078**	**14,940**	**14,943**	**14,945**	
	Total System Mgmt. Supply / Deficit		**-76,773**	**-75,047**	**-69,359**	**-68,522**	**-63,376**	**-58,468**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,117**	**1,027**	**935**	**574**	**420**	**252**	
	Irrigation System Mgmt. Supply / Deficit		**-77,890**	**-76,074**	**-70,294**	**-69,096**	**-63,796**	**-58,720**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.								
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of								
	an estimated potential annual transfer of 50,000 acft based on Proposed Permits prorated to 400,000 acft/yr.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
5	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation								
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.								

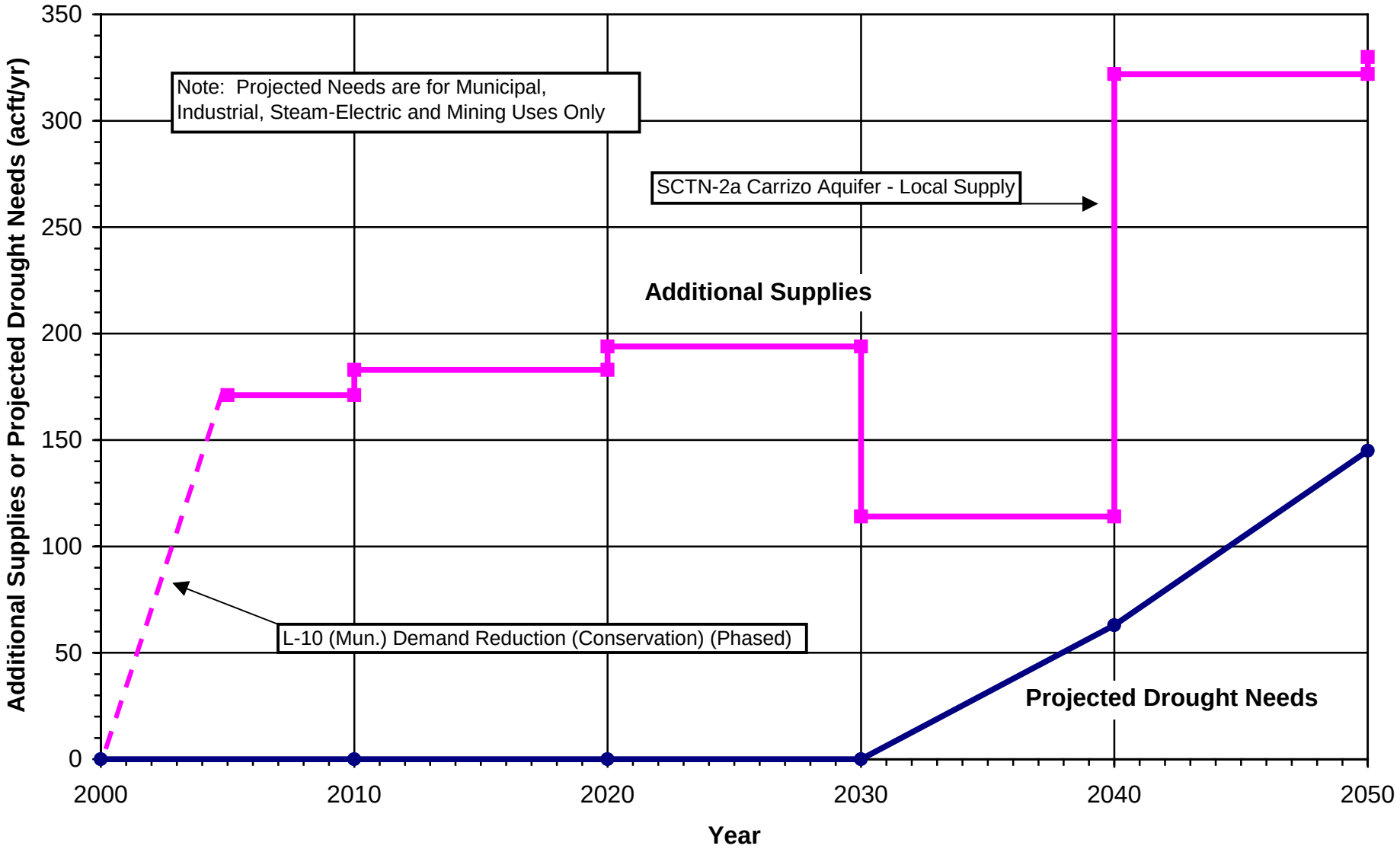
Inter-Regional Cooperation Alternative Regional Water Plan
Uvalde County



Inter-Regional Cooperation Regional Water Management Alternative Plan

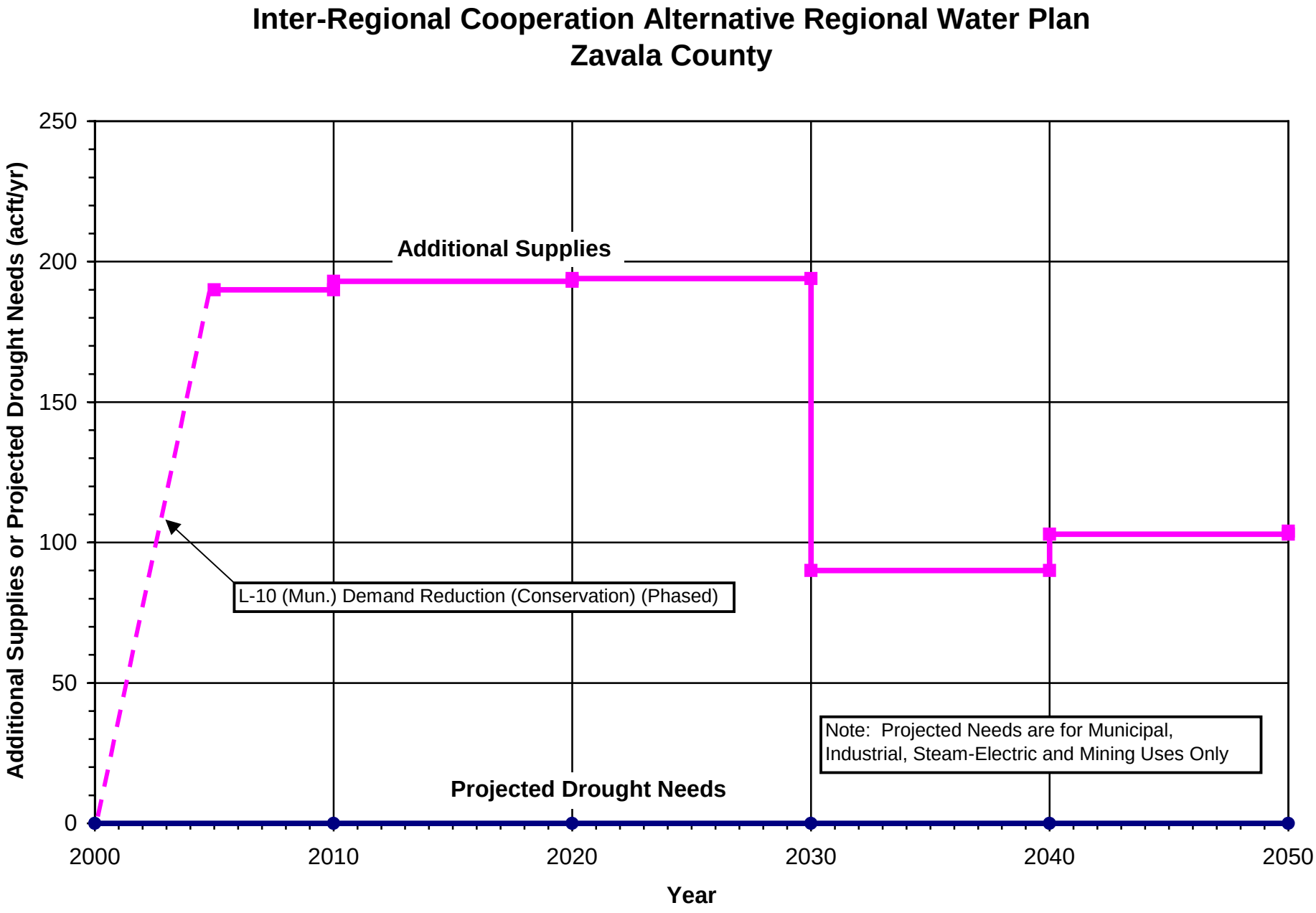
South Central Texas Region						**County =**	**Uvalde**	
County Summary of Projected Water Needs and Water Supply Options						**User Group(s) =**	**all**	
Projected Water Needs (acft/yr)								
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		2,682	3,166	3,493	4,241	4,880	5,609	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		63,443	63,343	58,335	56,366	51,766	47,475	
	Total Needs		**66,125**	**66,509**	**61,828**	**60,607**	**56,646**	**53,084**	
	Mun, Ind, S-E, & Min Needs		**2,682**	**3,166**	**3,493**	**4,241**	**4,880**	**5,609**	
	Irrigation Needs		**63,443**	**63,343**	**58,335**	**56,366**	**51,766**	**47,475**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		318	346	371	235	258	283	1
L-15	Edwards Irrigation Transfers	42,500	3,000	4,000	4,000	5,000	5,000	6,000	2, 3, 4
SCTN-4	Brush Management								5
SCTN-5	Weather Modification								5
SCTN-9	Rainwater Harvesting								5
	Small Aquifer Recharge Dams								5
L-10 (Irr.)	Demand Reduction (Conservation)		14,143	14,143	14,143	14,143	14,143	14,143	6
	Total New Supplies		**17,461**	**18,489**	**18,514**	**19,378**	**19,401**	**20,426**	
	Total System Mgmt. Supply / Deficit		**-48,664**	**-48,020**	**-43,314**	**-41,229**	**-37,245**	**-32,658**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**636**	**1,180**	**878**	**994**	**378**	**674**	
	Irrigation System Mgmt. Supply / Deficit		**-49,300**	**-49,200**	**-44,192**	**-42,223**	**-37,623**	**-33,332**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.								
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of								
	an estimated potential annual transfer of 50,000 acft based on Proposed Permits prorated to 400,000 acft/yr.								
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
6	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation								
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.								

Inter-Regional Cooperation Alternative Regional Water Plan
Wilson County



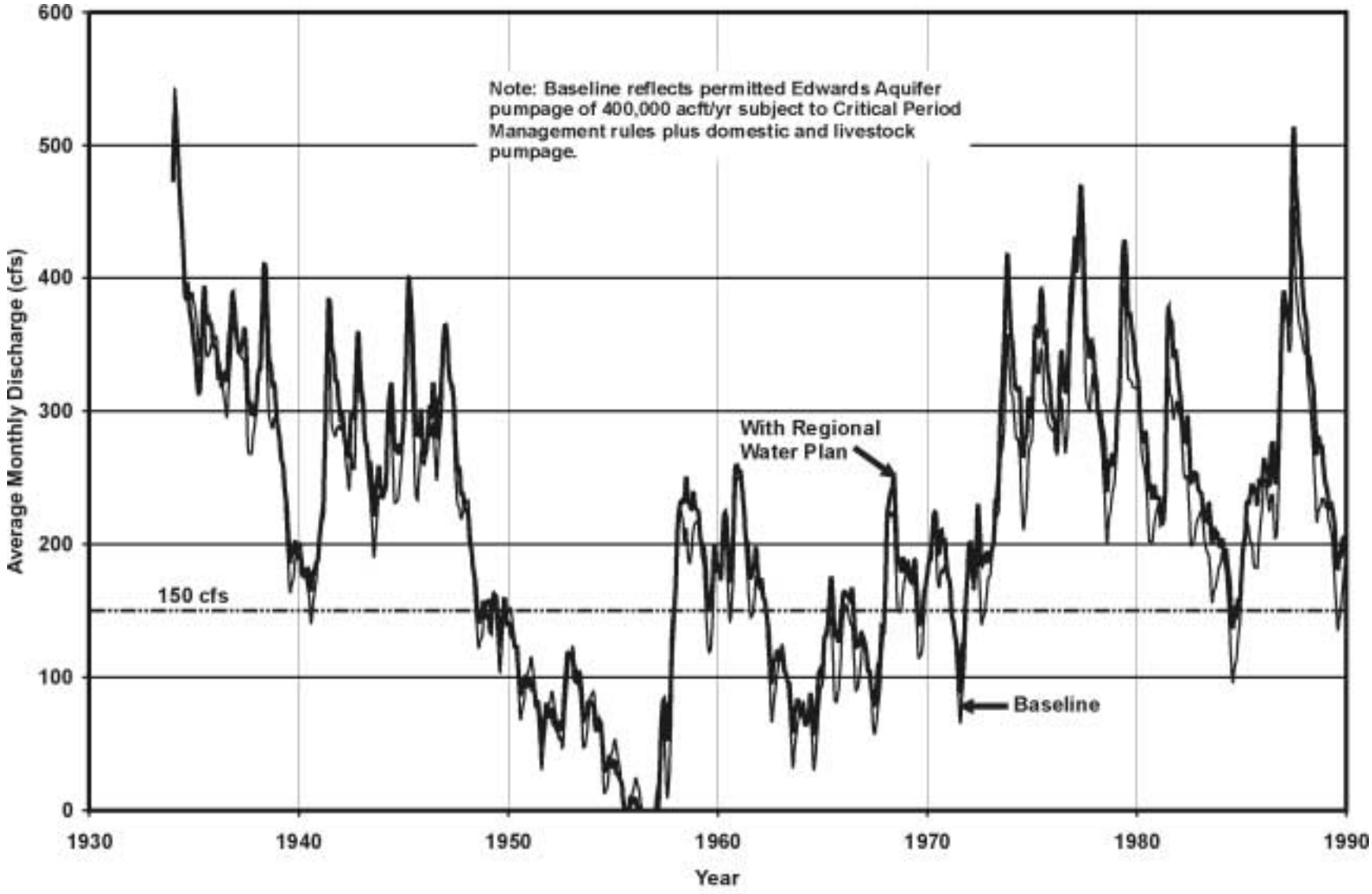
Inter-Regional Cooperation Regional Water Management Alternative Plan

South Central Texas Region						County =	Wilson		
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all		
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		0	0	0	0	63	145	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		0	0	0	0	0	0	
	Total Needs		**0**	**0**	**0**	**0**	**63**	**145**	
	Mun, Ind, S-E, & Min Needs		**0**	**0**	**0**	**0**	**63**	**145**	
	Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		171	183	194	114	122	130	1
SCTN-2a	Carrizo Aquifer - Local Supply						200	200	2
SCTN-4	Brush Management								3
SCTN-5	Weather Modification								3
SCTN-9	Rainwater Harvesting								3
	Small Aquifer Recharge Dams								3
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**171**	**183**	**194**	**114**	**322**	**330**	
	Total System Mgmt. Supply / Deficit		**171**	**183**	**194**	**114**	**259**	**185**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**171**	**183**	**194**	**114**	**259**	**185**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Floresville.								
3	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

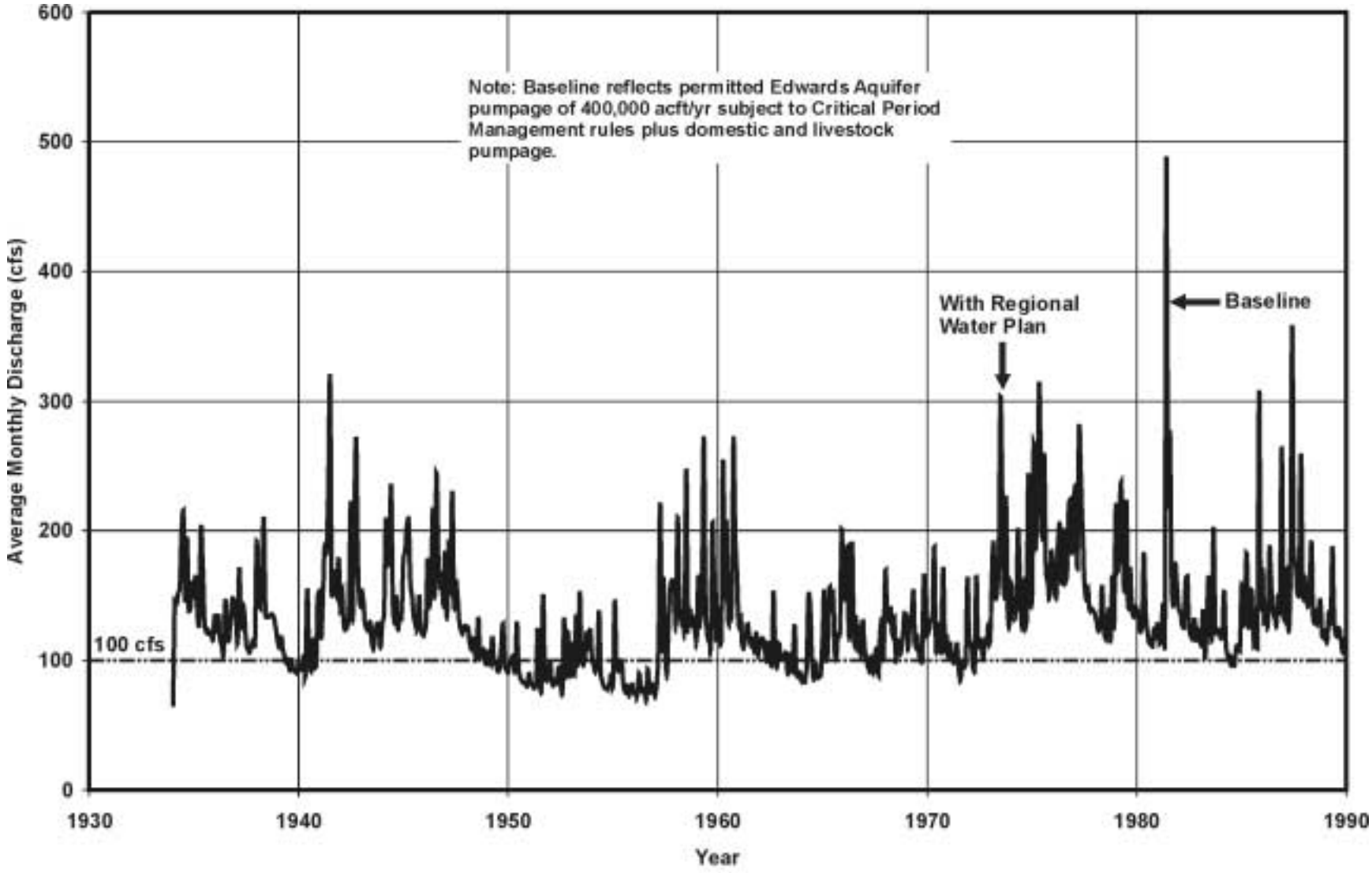

Inter-Regional Cooperation Alternative Regional Water Plan
Zavala County
Additional Supplies or Projected Drought Needs (acft/yr)
250
200
150
100
50
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
Projected Drought Needs
Note: Projected Needs are for Municipal, Industrial, Steam-Electric and Mining Uses Only

Inter-Regional Cooperation Regional Water Management Alternative Plan

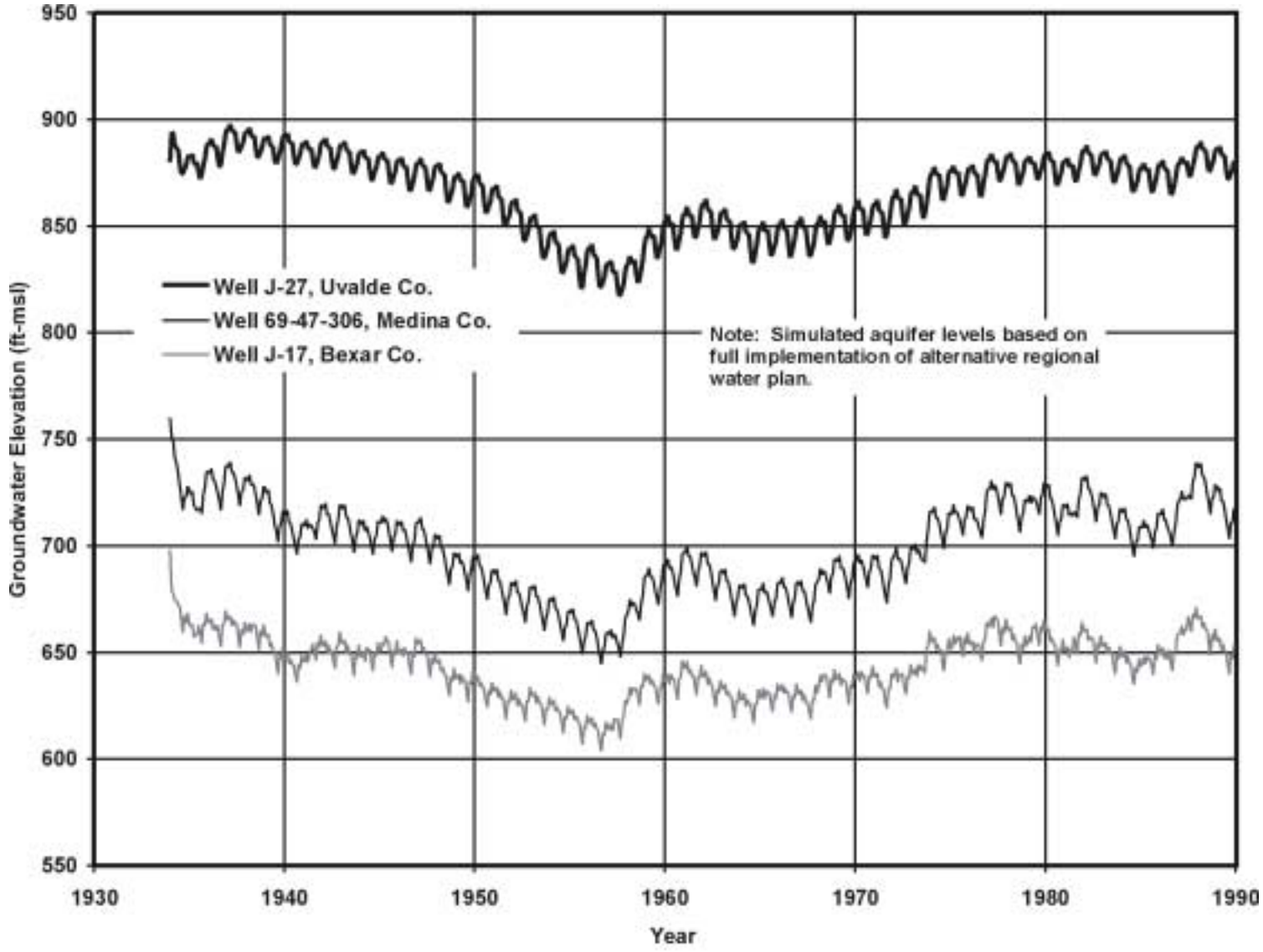
South Central Texas Region						County =		Zavala	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =		all	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		0	0	0	0	0	0	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		80,722	76,589	72,655	88,293	84,673	81,200	
	Total Needs		**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
	Mun, Ind, S-E, & Min Needs		**0**	**0**	**0**	**0**	**0**	**0**	
	Irrigation Needs		**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		190	193	194	90	103	104	1
SCTN-4	Brush Management								2
SCTN-5	Weather Modification								2
SCTN-9	Rainwater Harvesting								2
	Small Aquifer Recharge Dams								2
L-10 (Irr.)	Demand Reduction (Conservation)		6,401	6,401	6,401	6,401	6,401	6,401	3
	Total New Supplies		**6,591**	**6,594**	**6,595**	**6,491**	**6,504**	**6,505**	
	Total System Mgmt. Supply / Deficit		**-74,131**	**-69,995**	**-66,060**	**-81,802**	**-78,169**	**-74,695**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**190**	**193**	**194**	**90**	**103**	**104**	
	Irrigation System Mgmt. Supply / Deficit		**-74,321**	**-70,188**	**-66,254**	**-81,892**	**-78,272**	**-74,799**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation								
	application rate.								



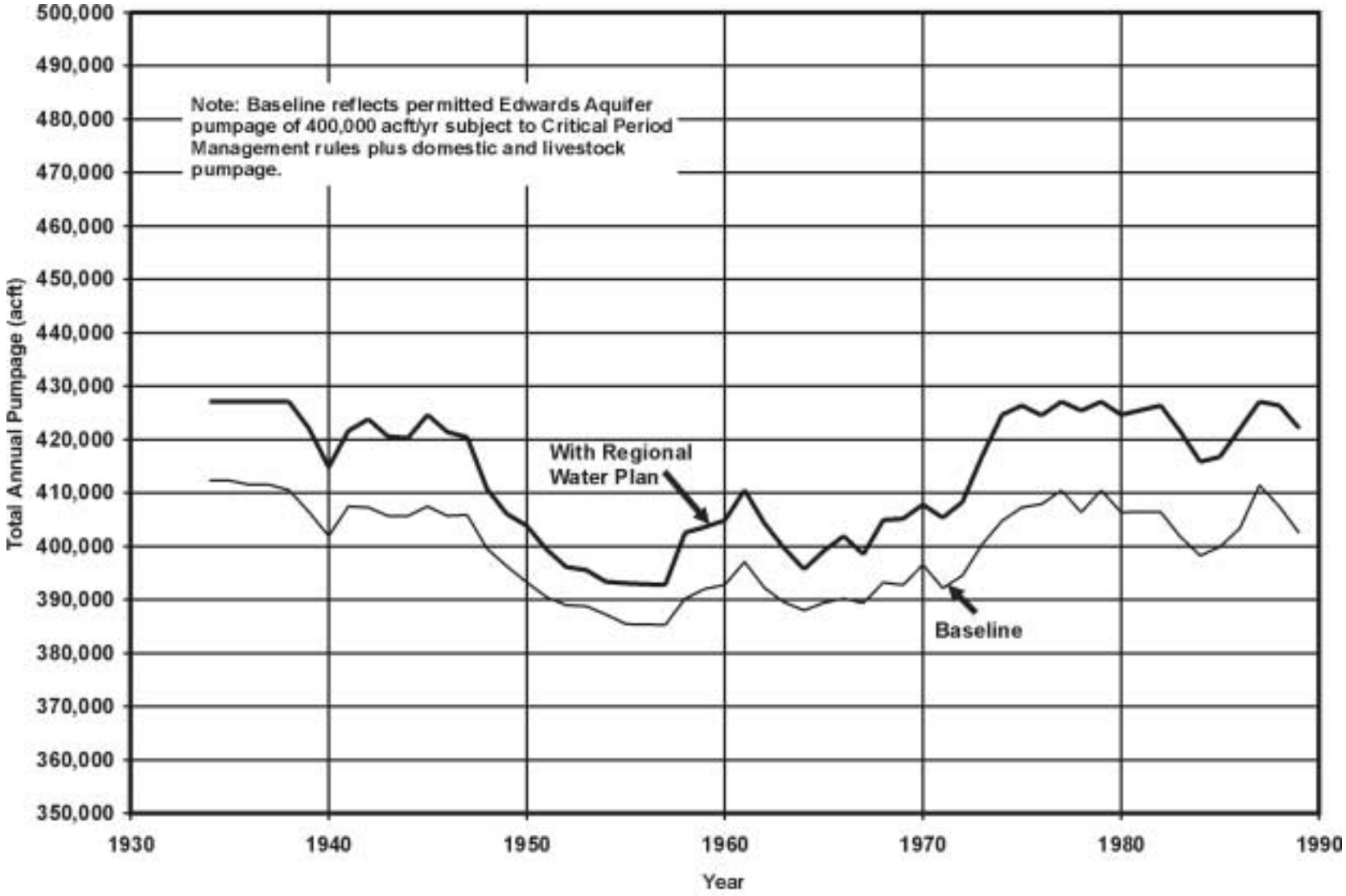
Inter-Regional Cooperation Alternative Regional Water Plan
Simulated Comal Springs Discharge



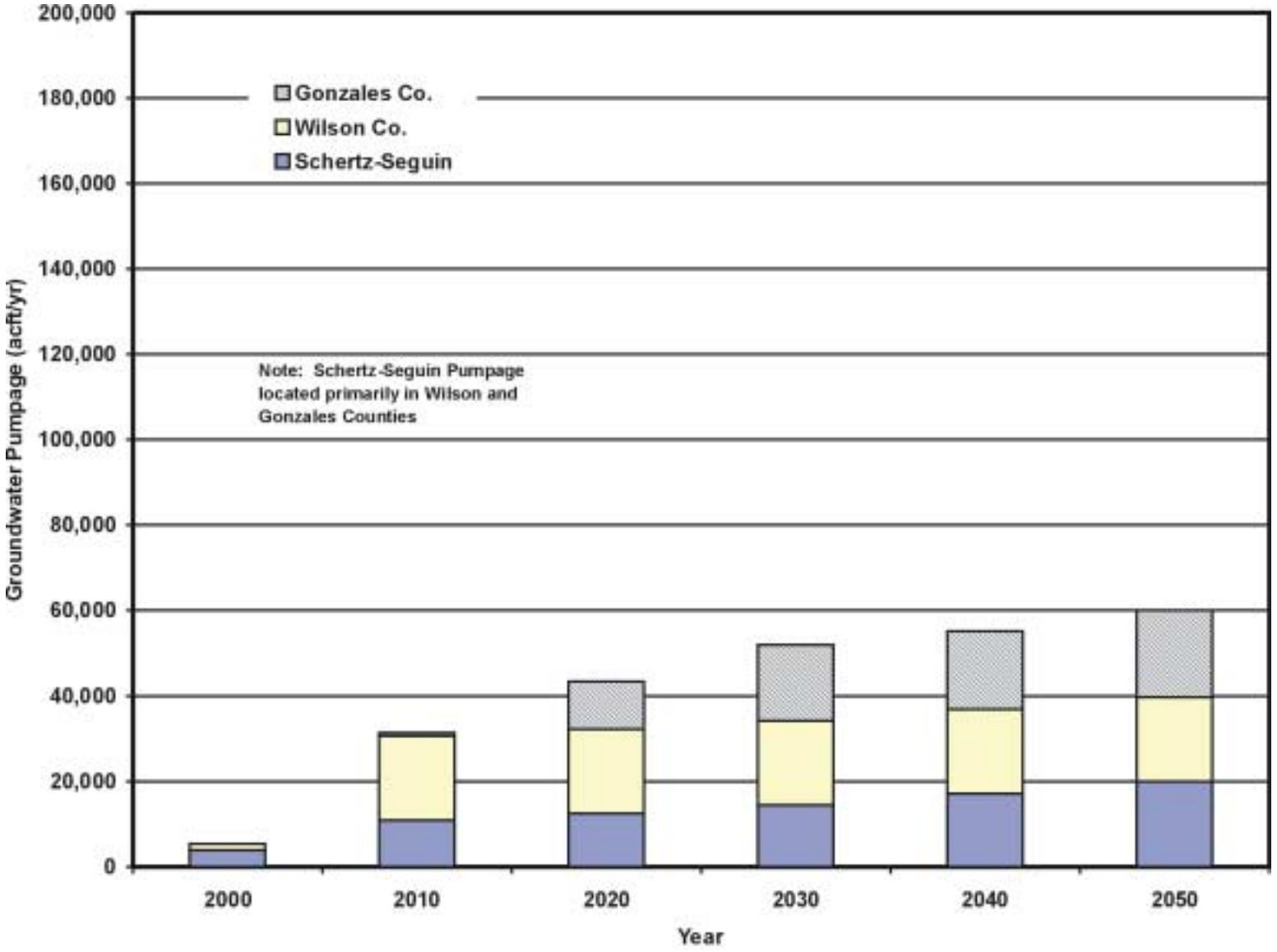
Inter-Regional Cooperation Alternative Regional Water Plan
Simulated San Marcos Springs Discharge



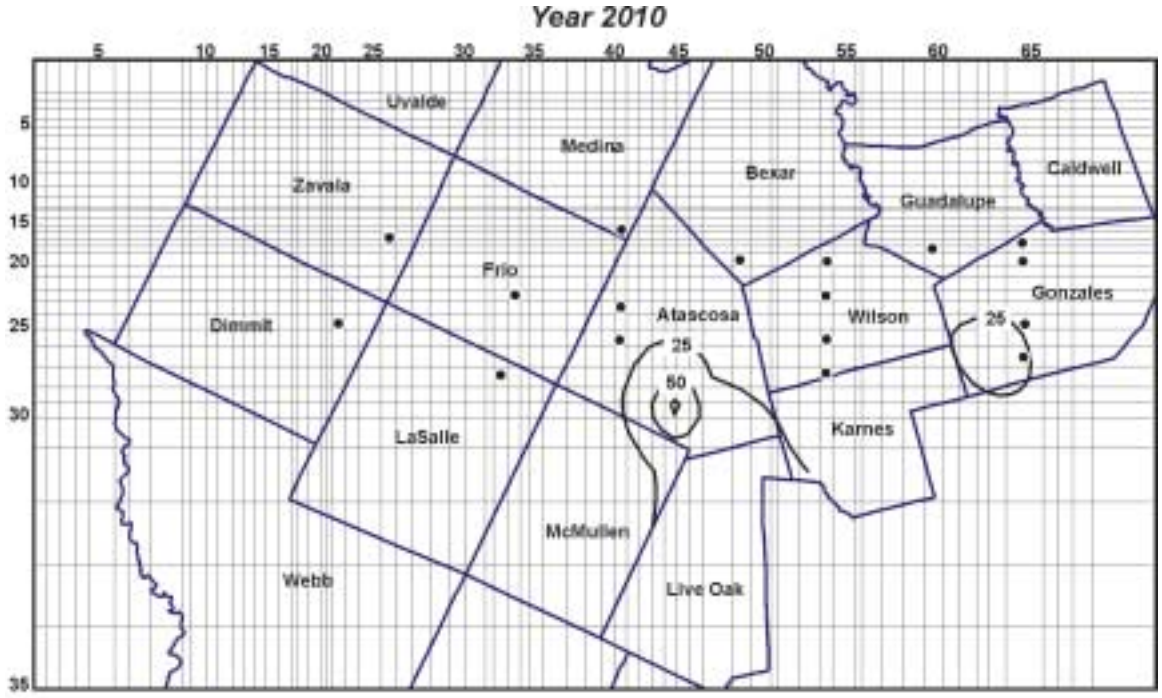
Inter-Regional Cooperation Alternative Regional Water Plan
Simulated Edwards Aquifer Levels

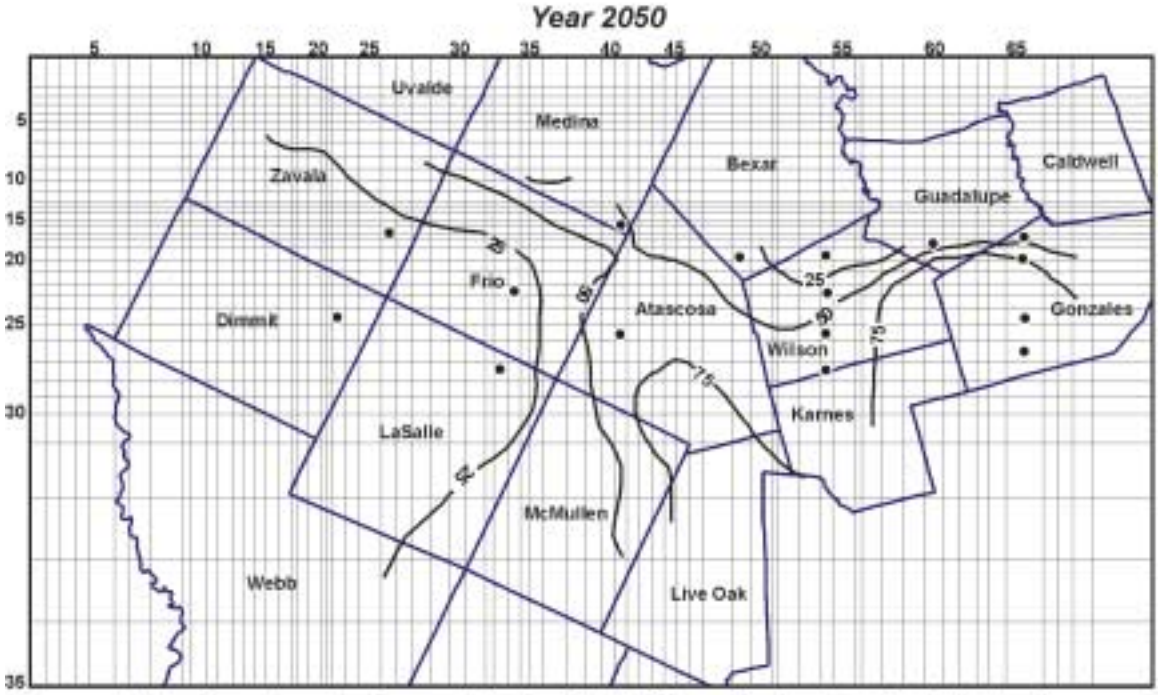


Inter-Regional Cooperation Alternative Regional Water Plan
Simulated Edwards Aquifer Pumpage



Inter-Regional Cooperation Alternative Regional Water Plan
Additional Carrizo Groundwater Pumpage

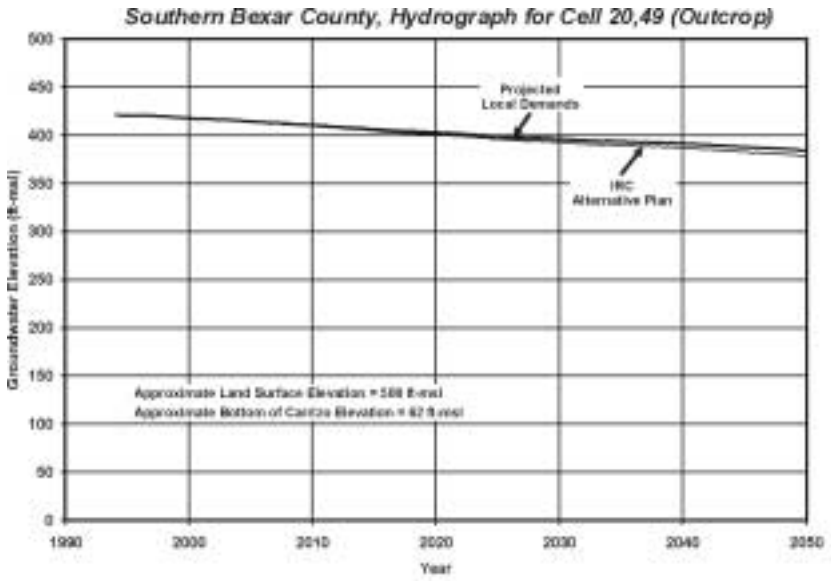


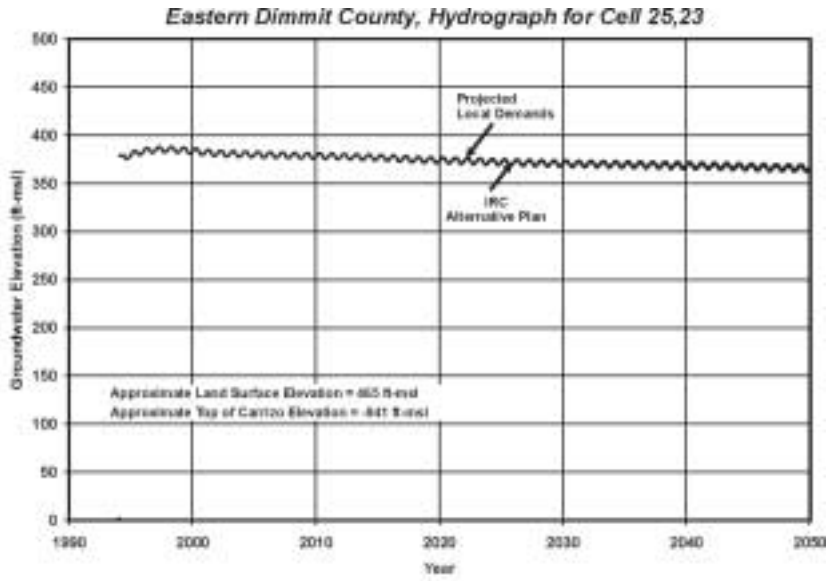


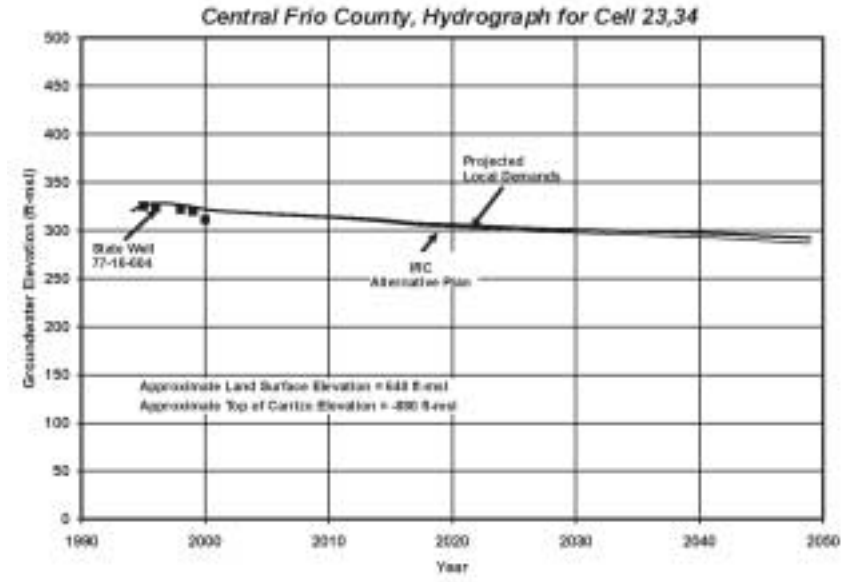
Note: Drawdown is referenced to simulated 1994 aquifer levels and includes both projected local demands and development of water supply options in this alternative regional water plan.

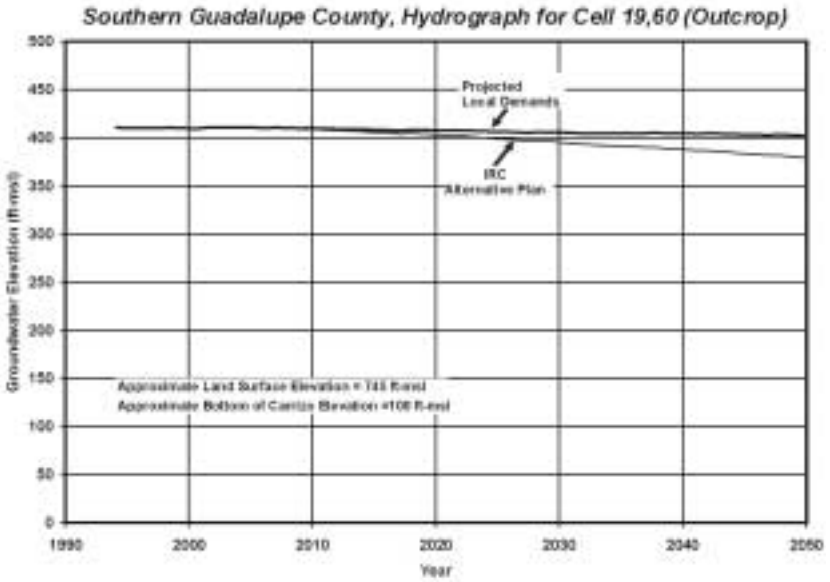
● Monitoring Well Location

Inter-Regional Cooperation Alternative Regional Water Plan
Simulated Carrizo Aquifer Drawdown

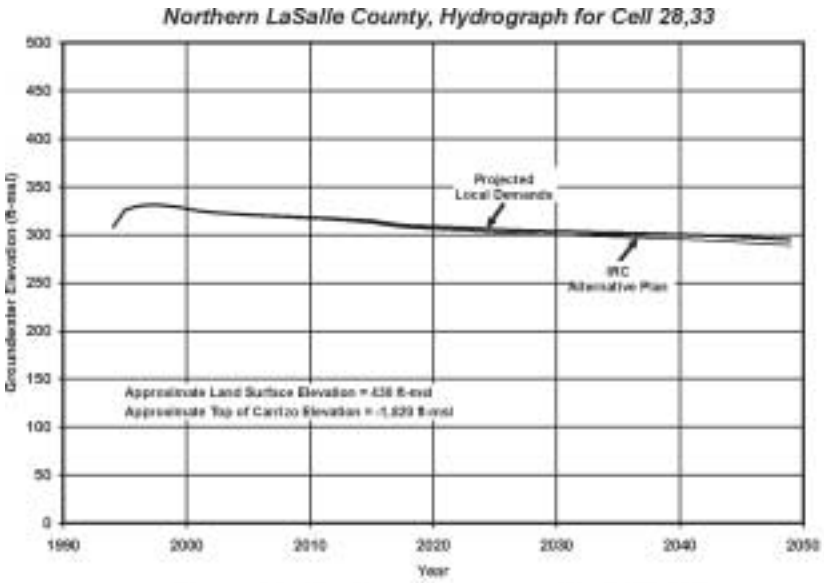


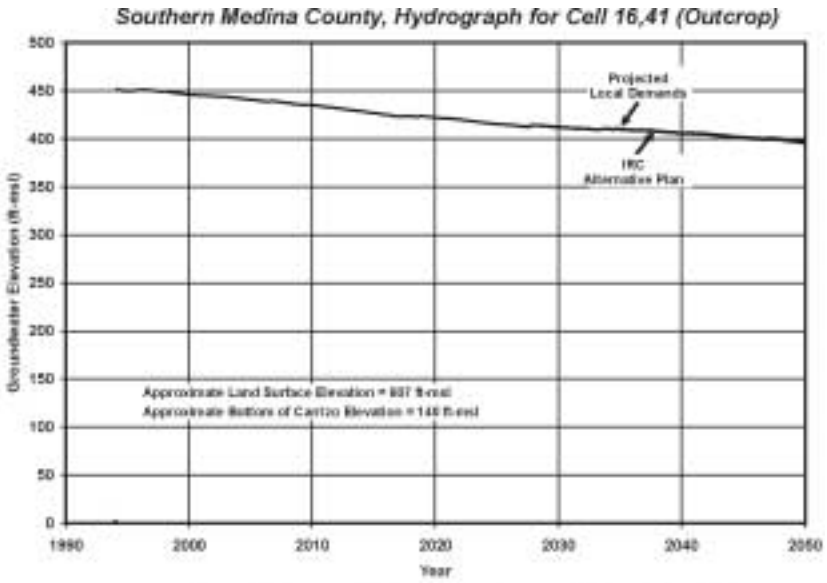


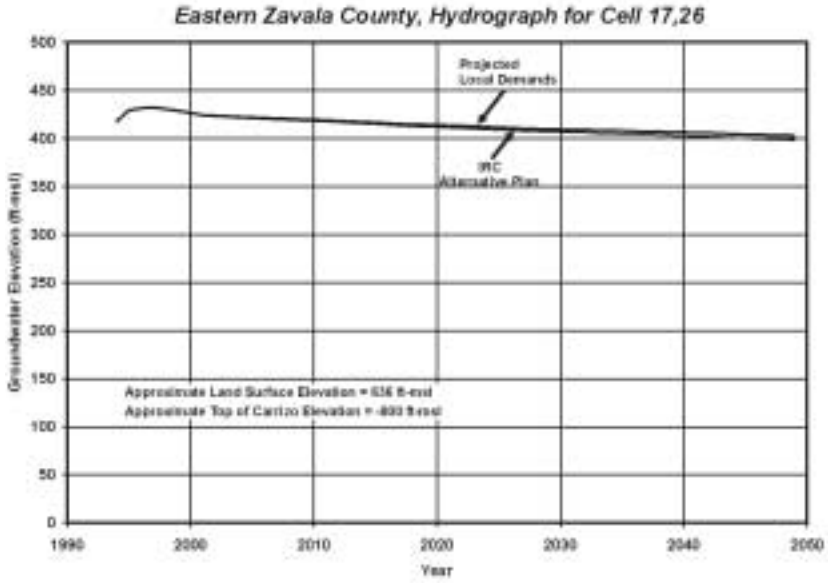


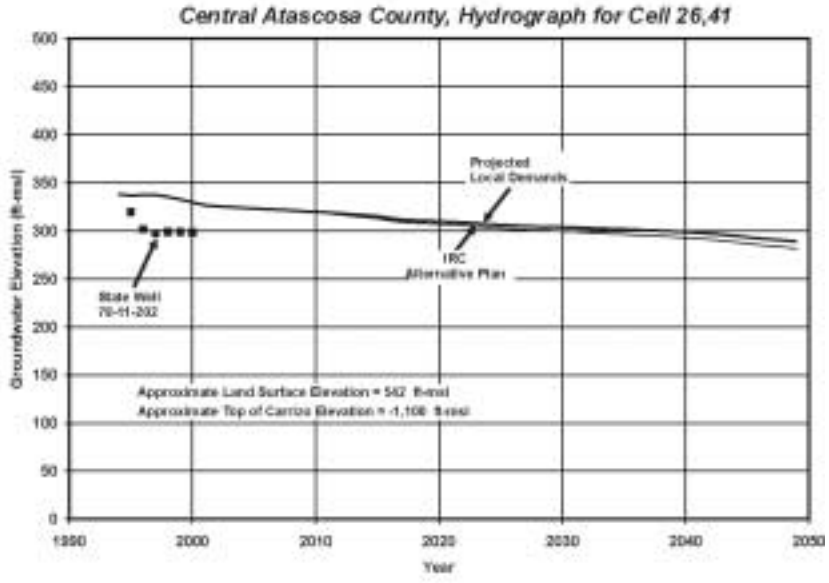


Inter-Regional Cooperation Alternative Regional Water Plan - Carrizo Aquifer

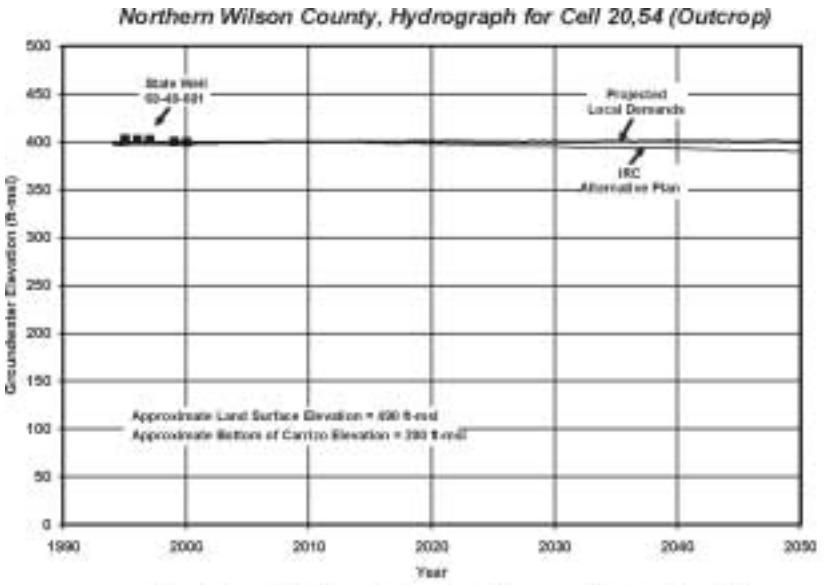


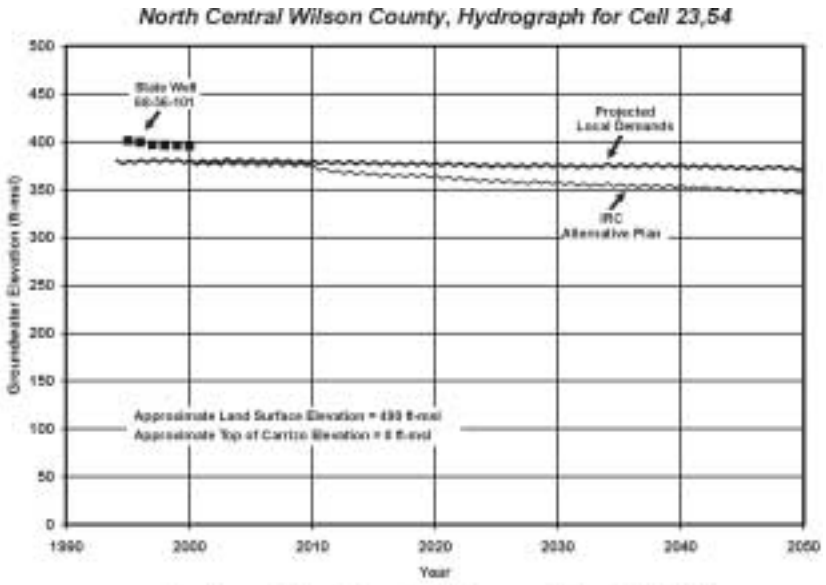


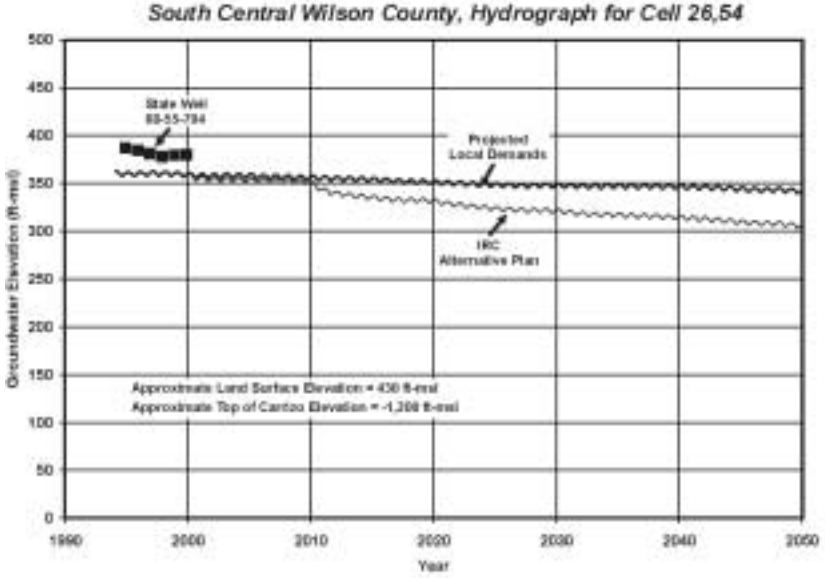


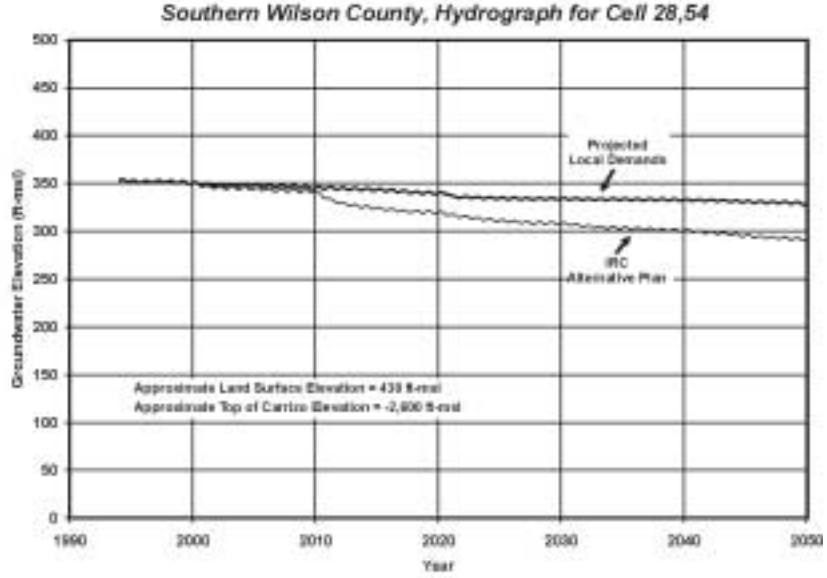


Inter-Regional Cooperation Alternative Regional Water Plan - Carrizo Aquifer

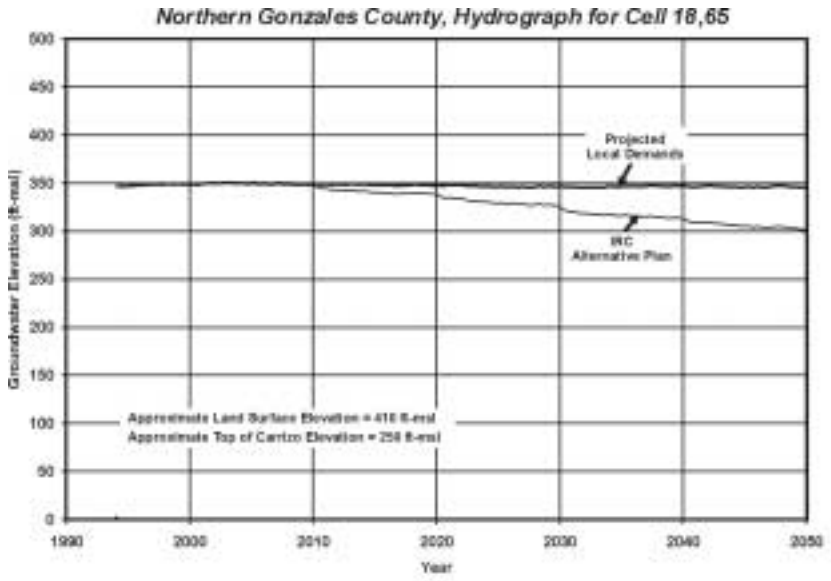


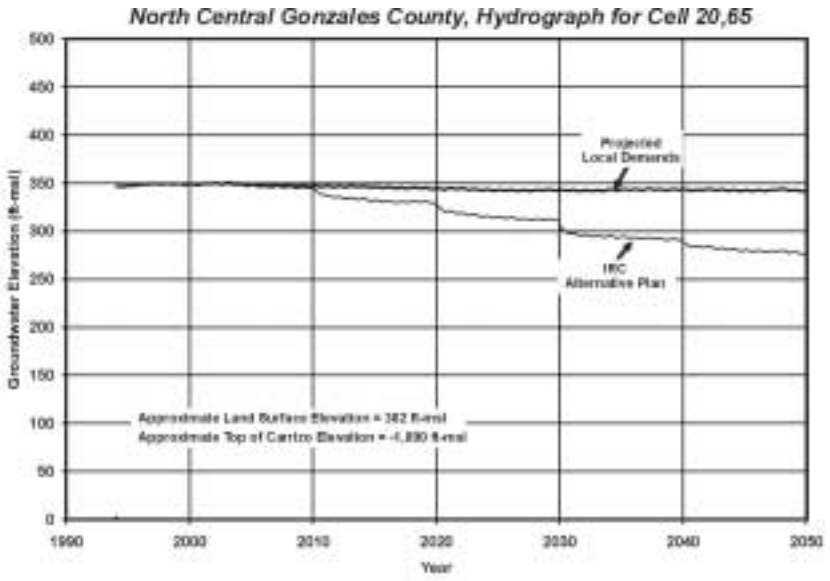


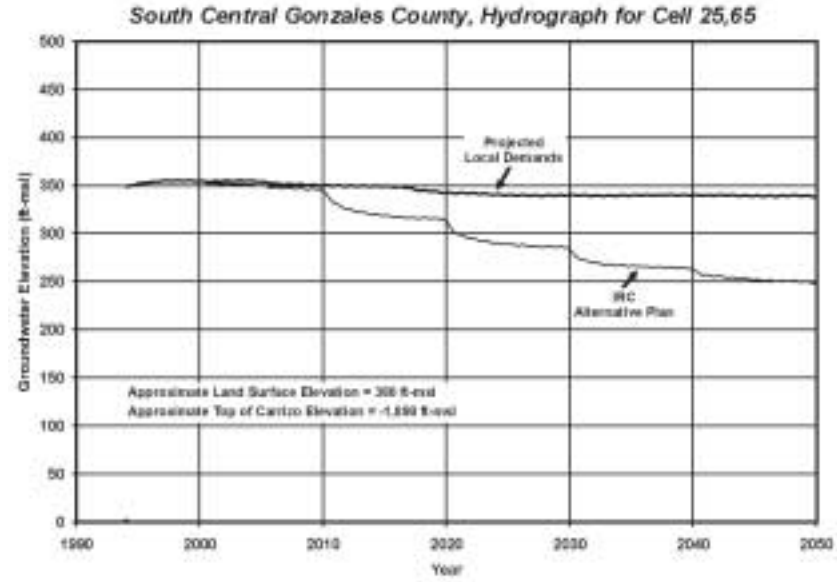


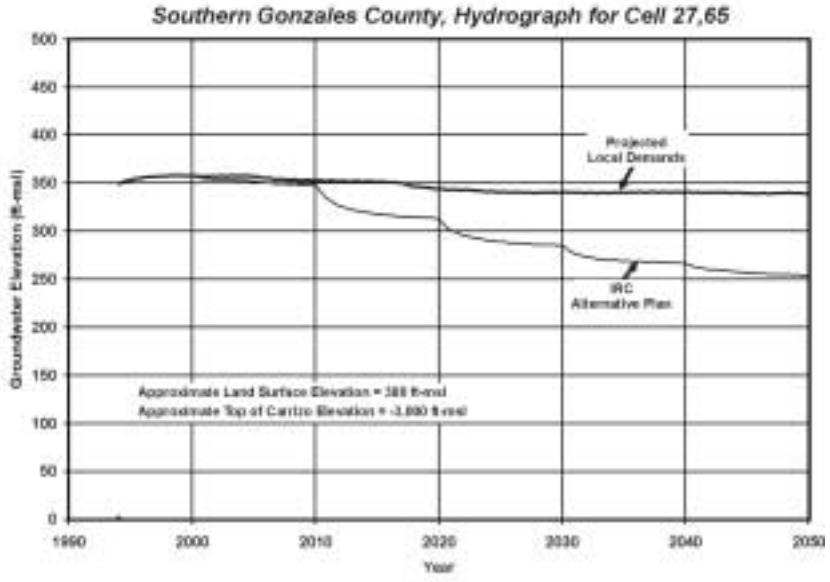


Inter-Regional Cooperation Alternative Regional Water Plan - Carrizo Aquifer

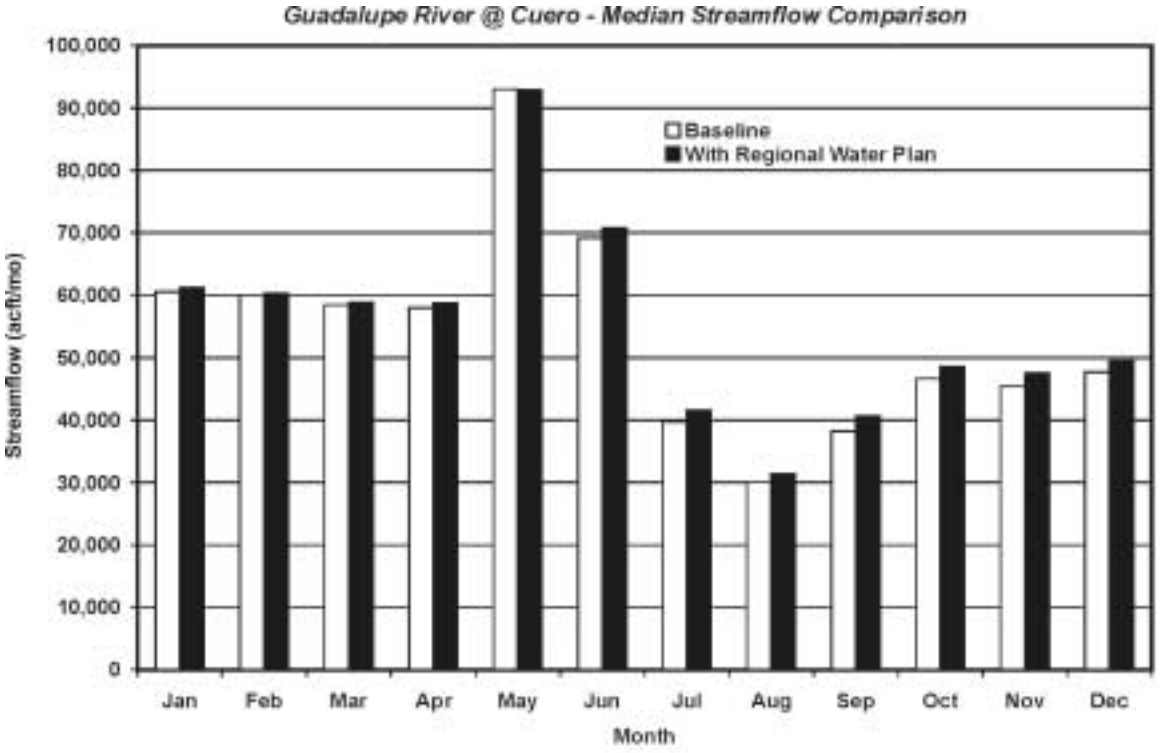


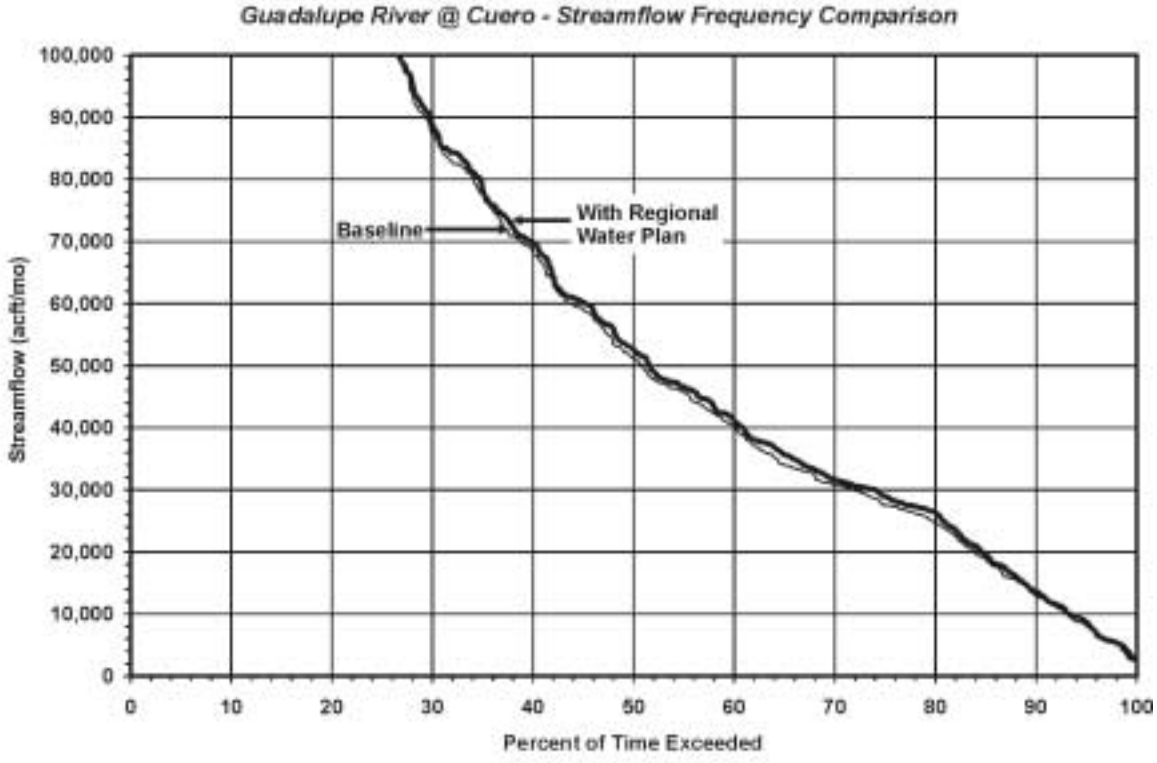




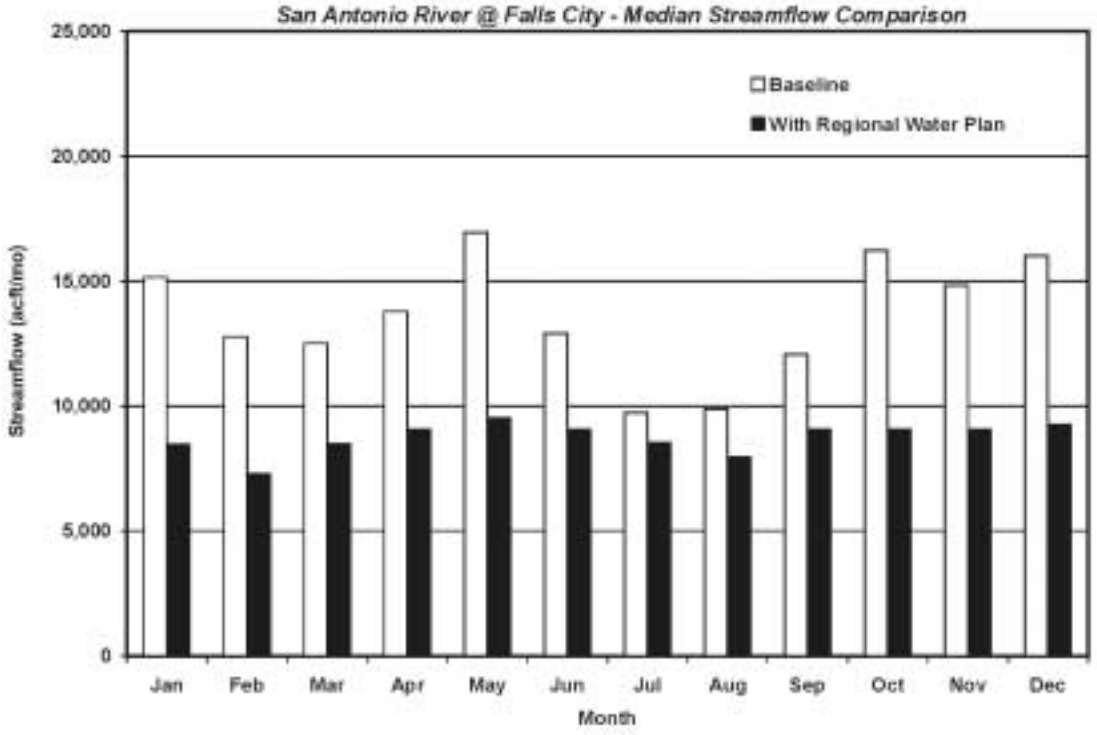


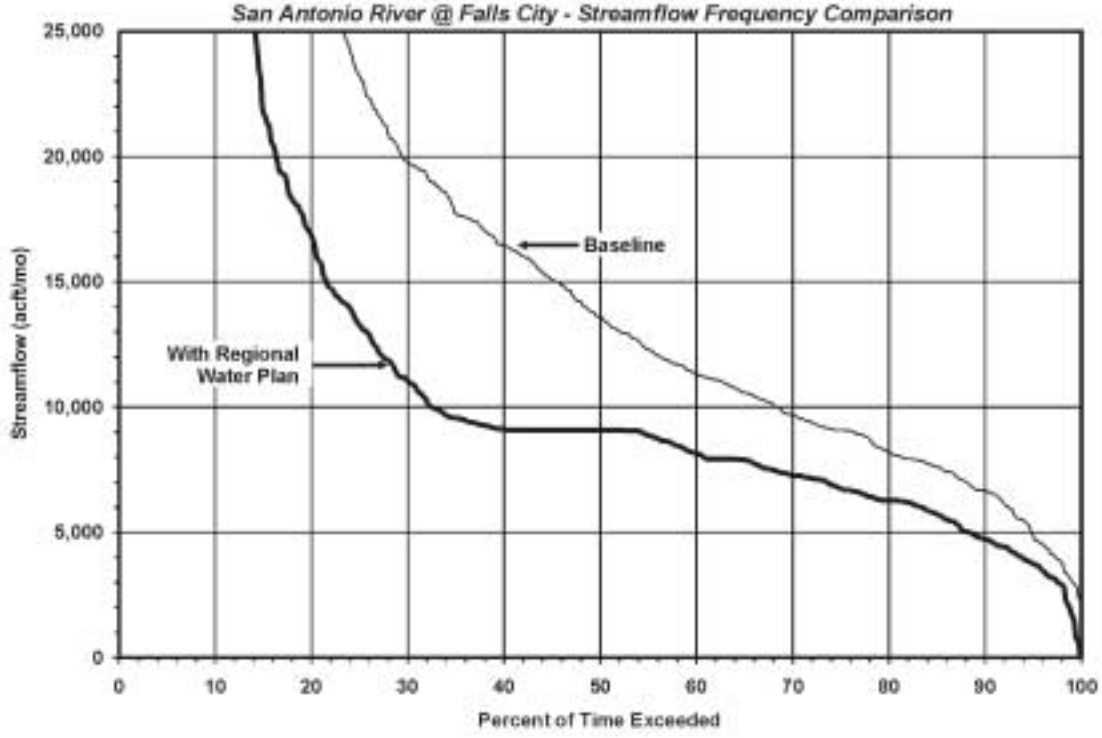
Inter-Regional Cooperation Alternative Regional Water Plan - Carrizo Aquifer



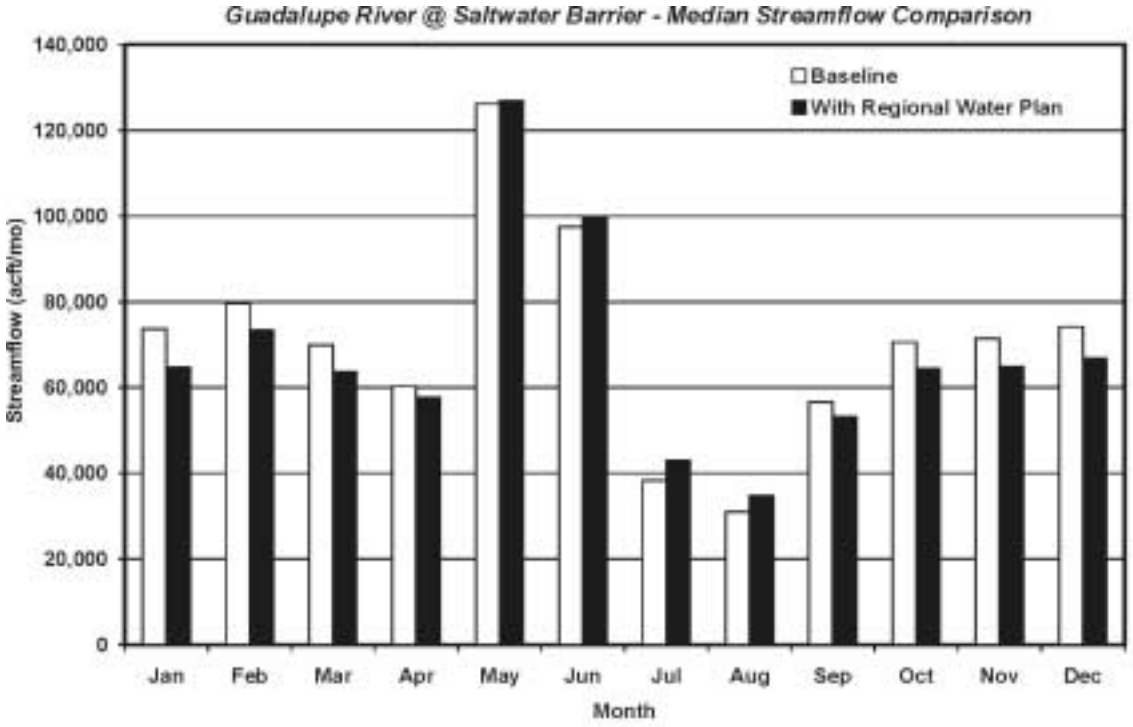


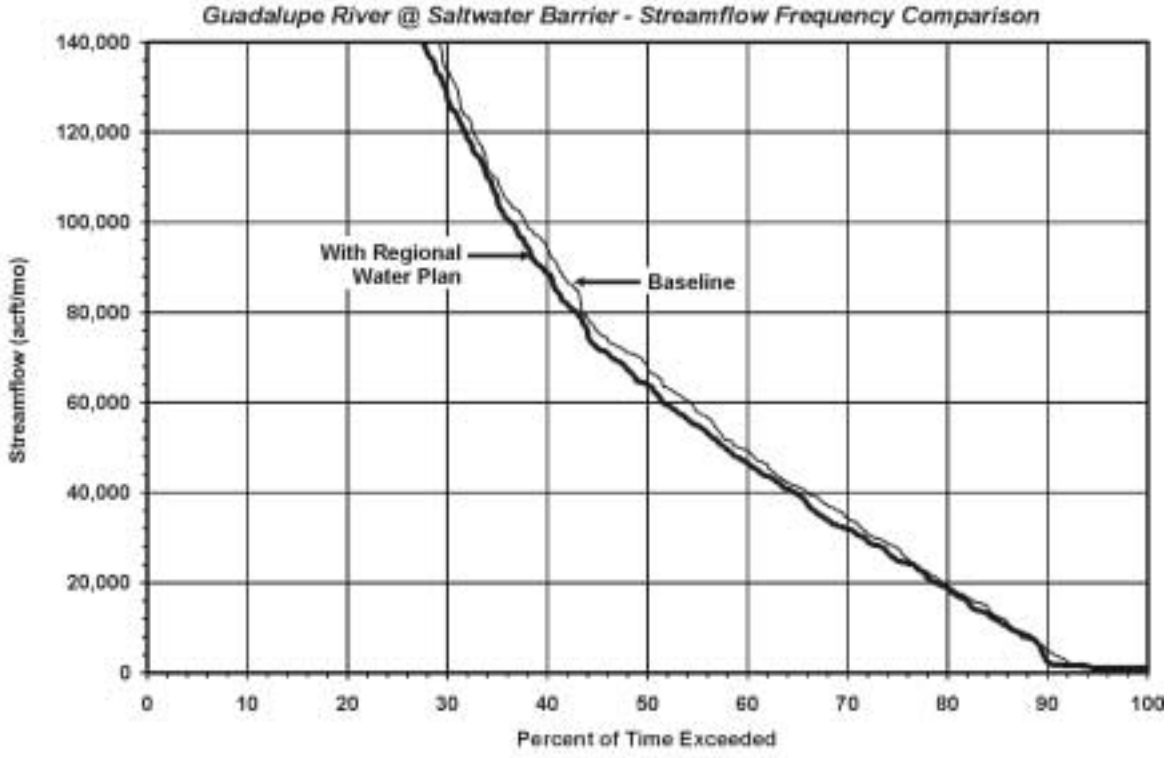
Inter-Regional Cooperation Alternative Regional Water Plan
Streamflow Comparisons





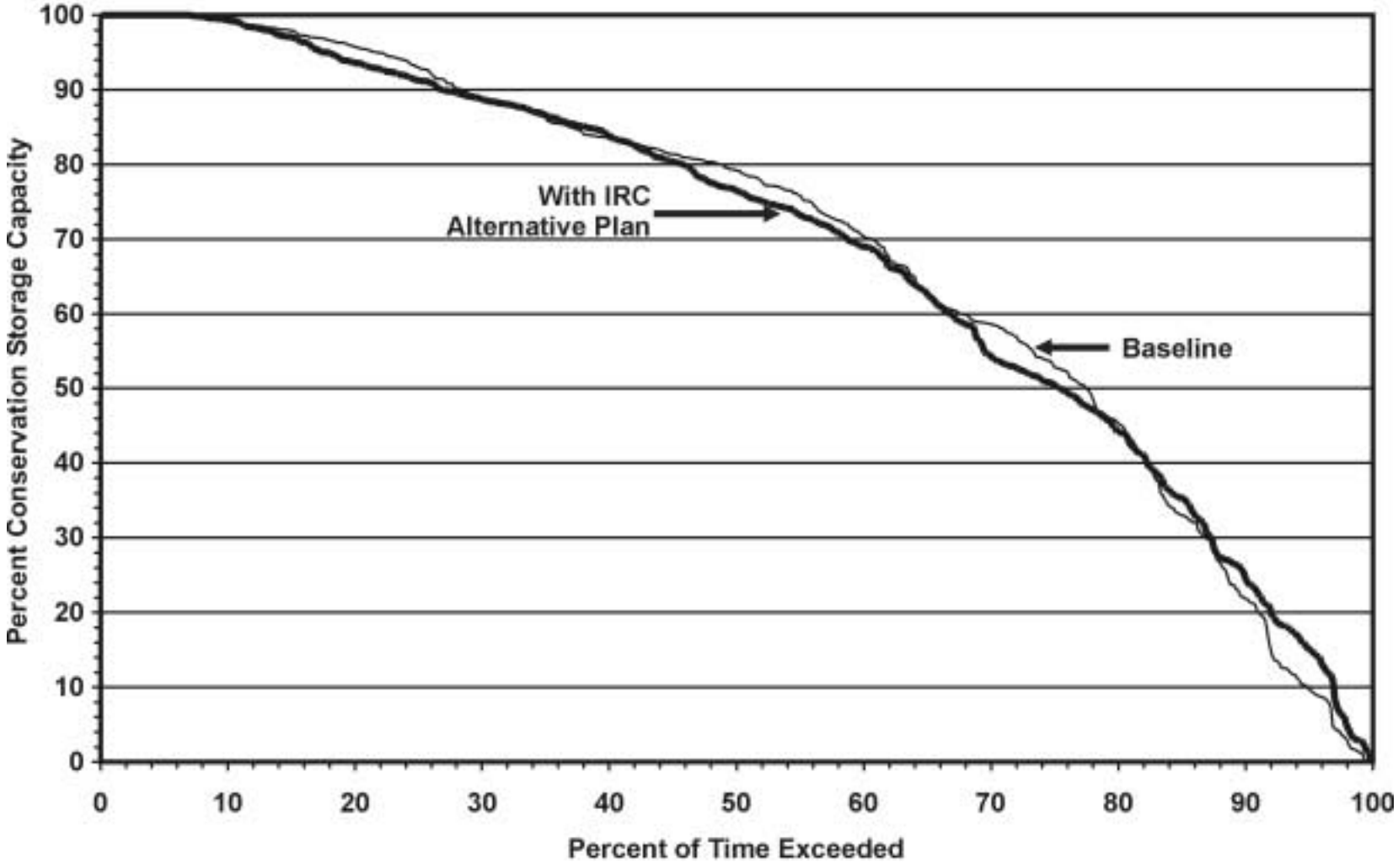
Inter-Regional Cooperation Alternative Regional Water Plan
Streamflow Comparisons





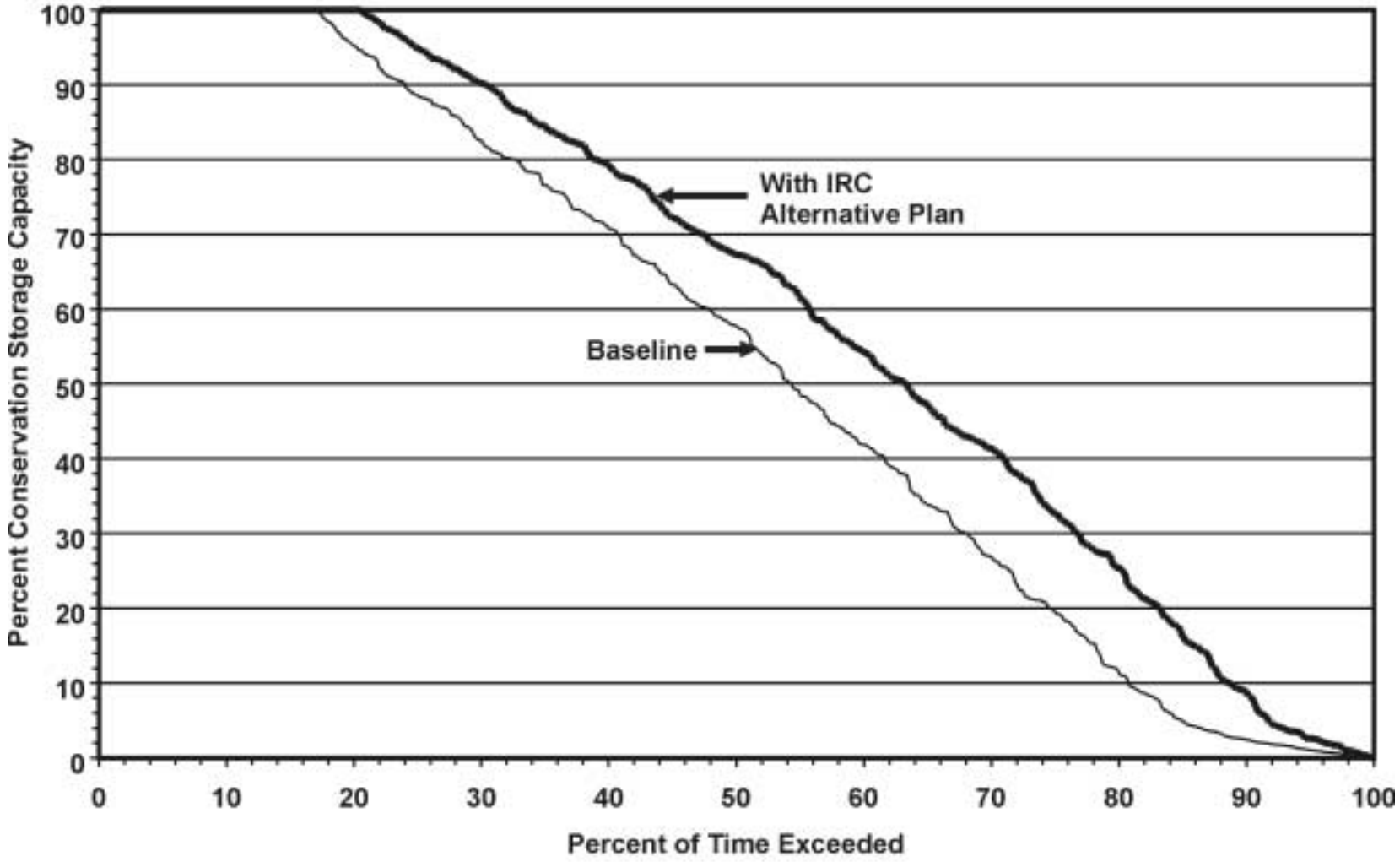
Inter-Regional Cooperation Alternative Regional Water Plan
Streamflow Frequency Comparisons

Choke Canyon Reservoir — Storage Frequency Comparison
Year 2050



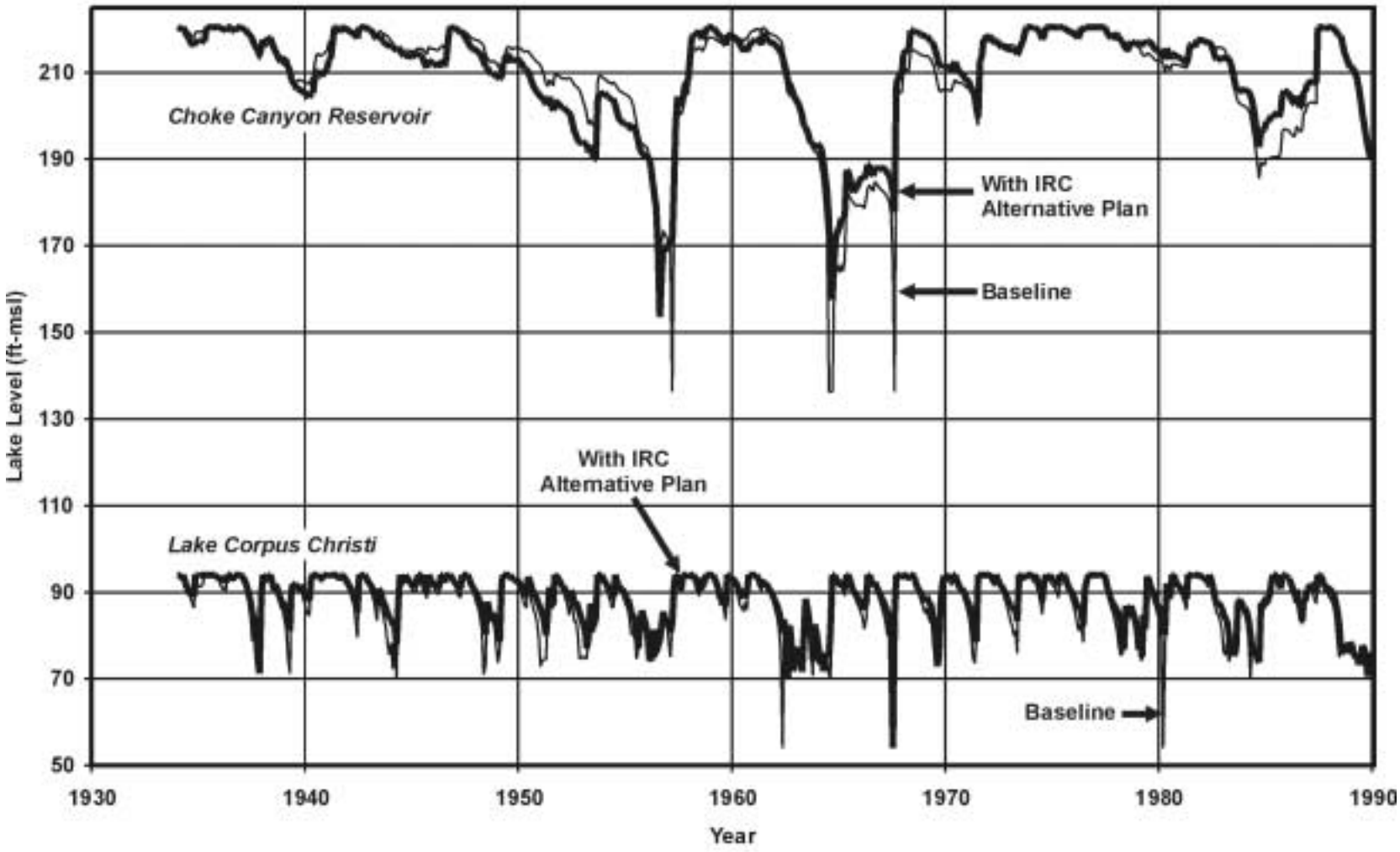
Inter-Regional Cooperation Alternative Plan

Lake Corpus Christi — Storage Frequency Comparison
Year 2050



Inter-Regional Cooperation Alternative Plan

Choke Canyon Reservoir/Lake Corpus Christi — Lake Level Trace
Year 2050



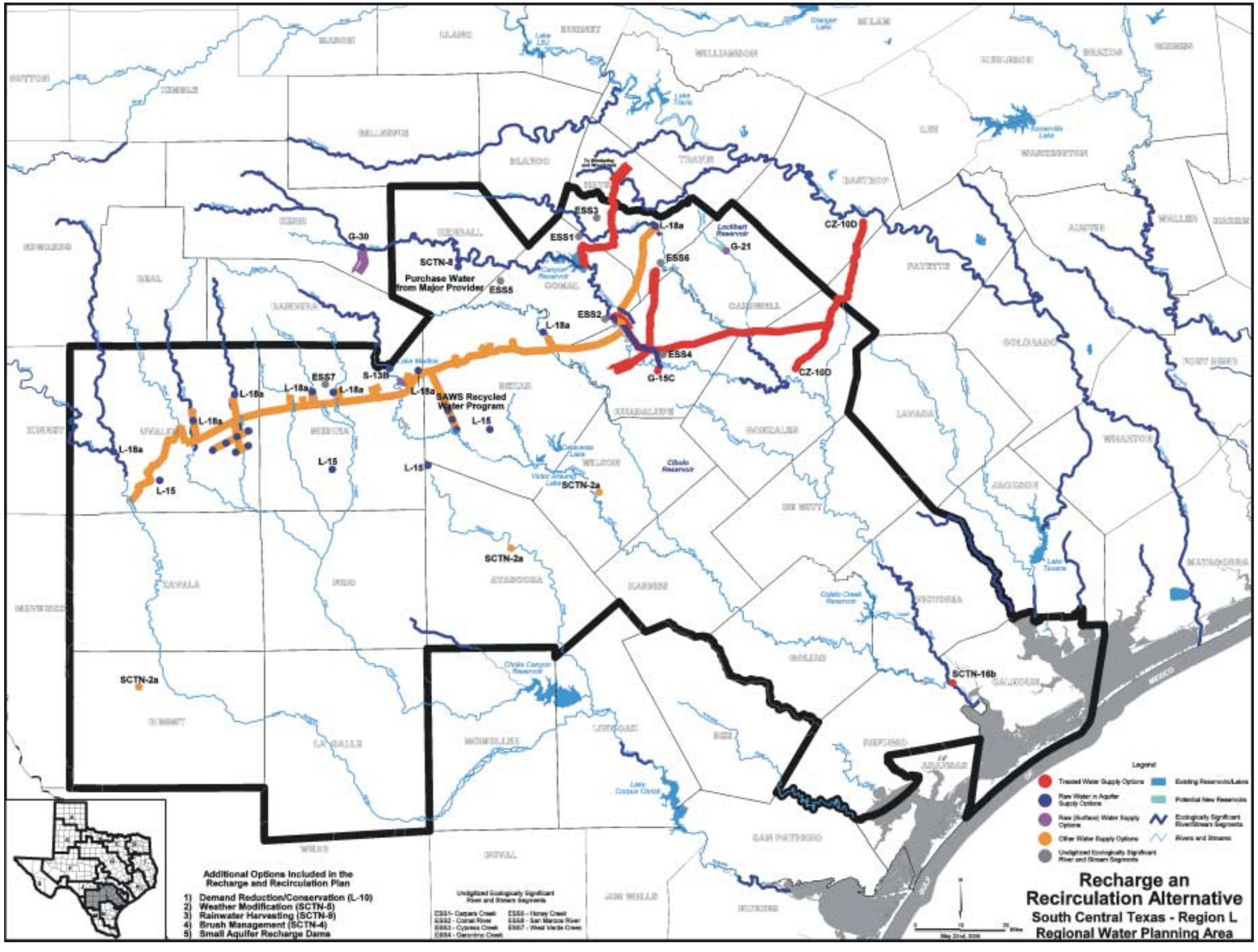
Inter-Regional Cooperation Alternative Plan

“Recharge & Recirculation” Regional Water Management Alternative Plan

South Central Texas Regional Water Planning Group

San Antonio River Authority

HDR Engineering, Inc.
June 13, 2000


ESS3
ESS1
L-18a
CZ-10D
G-30
G-21
SCTN-8
Purchase Water from Major Provider
ESS5
ESS6
ESS2
L-18a
ESS4
G-15C
CZ-10D
S-13B
ESS7
L-18a
L-18a
L-18a
L-18a
SAWS Recycled Water Program
L-15
L-18a
L-15
L-15
SCTN-2a
SCTN-2a
SCTN-2a
SCTN-16b
Additional Options Included in the Recharge and Recirculation Plan
1) Demand Reduction/Conservation (L-10)
2) Weather Modification (SCTN-5)
3) Rainwater Harvesting (SCTN-9)
4) Brush Management (SCTN-4)
5) Small Aquifer Recharge Dams
Undigitized Ecologically Significant River and Stream Segments
ESS1- Calpers Creek
ESS2 - Comal River
ESS3 - Cypress Creek
ESS4 - Geronimo Creek
ESS5 - Honey Creek
ESS6 - San Marcos River
ESS7 - West Verde Creek
Legend
Treated Water Supply Options
Raw Water in Aquifer Supply Options
Raw (Surface) Water Supply Options
Other Water Supply Options
Undigitized Ecologically Significant River and Stream Segments
Existing Reservoirs/Lakes
Potential New Reservoirs
Ecologically Significant Riverstream Segments
Rivers and Streams
Recharge an Recirculation Alternative
South Central Texas - Region L
Regional Water Planning Area
May 22nd, 2006

South Central Texas Region Alternative Water Plans

Alternative Name: **Recharge and Recirculation Alternative**

Alternative ID: **R&R**

Alternative Description: *The Recharge and Recirculation Alternative Regional Water Plan, proposes a comprehensive integration of recharge enhancement and recirculation to maximize supply available from the Edwards Aquifer.* ***One test*** *for a maximized supply is conditioned on not allowing an increase in pumpage to reduce flow from Comal Springs below baseline conditions (400,000 acft/yr of permitted pumpage); and, a* ***second test*** *maintains a minimum flow from Comal Springs at 60 cfs (which is not subject to diversion for recirculation).*

The objectives of this plan are to be accomplished through:

1. *Developing all reasonably economical recharge enhancement options;*
2. *Increasing recharge to the aquifer by diverting unappropriated flow at Lake Dunlap and recirculating enhanced springflow from Comal Springs back to streams and recharge structures on the Edwards Aquifer Recharge Zone in Bexar, Medina, and Uvalde Counties; and*
3. *Transferring groundwater from west to east to maintain water levels, municipal pumpage, and springflow in the eastern part of the aquifer during drought conditions.*

The following simulations are proposed to determine the maximized water supply for this recharge and recirculation alternative. Two tests, as described above, will be performed for each Run.

- *Run 1: Include all recharge enhancement features, voluntary transfer of Edwards irrigation rights to municipal use, and transfer and recirculate available water from Lake Dunlap to the recharge zone in Bexar, Medina, and Uvalde Counties;*
- *Run 2: Include same recharge enhancement and recirculation features in Run 1 and add the feature of transferring all the available flow from Lake Dunlap to Cibolo Creek when flow from Comal Springs approaches critical conditions (assumed to be about 150 cfs);*
- *Run 3: Include same recharge enhancement and recirculation features in Run 1 and 2 and add the feature of transferring groundwater from the western part of the aquifer to Cibolo Creek when flow from Comal Springs approaches critical conditions (assumed to be about 150 cfs); and*
- *Run 4: Include same recharge enhancement and recirculation features in Run 1, 2, and 3 and add a feature of transferring groundwater from the western part of the aquifer to Bexar County when flow from Comal Springs approaches critical conditions (assumed to be about 150 cfs).*

The following water supply options are included in the Recharge & Recirculation Alternative Regional Water Plan (in no particular order):

1. *Demand Reduction / Conservation (L-10)*
2. *Edwards Irrigation Transfers (L-15)*
3. *Edwards Recharge – Type 2 Projects (L-18a)*
4. *Guadalupe River Diversion to Recharge Zone (G-30)*
5. *Medina Lake Recharge Enhancement (S-13B)*
6. *Edwards Aquifer Recirculation Systems*
7. *Carrizo Aquifer – Gonzales & Bastrop Counties (CZ-10D)*

8. *Carrizo Aquifer – Local Supply (SCTN-2a)*
9. *Canyon Reservoir (G-15C)*
10. *Wimberley and Woodcreek - Canyon (G-24)*
11. *Lockhart Reservoir (G-21)*
12. *Trinity Aquifer Optimization (SCTN-8)*
13. *Rainwater Harvesting (SCTN-9)*
14. *Weather Modification (SCTN-5)*
15. *Brush Management (SCTN-4)*

Recharge and Recirculation Alternative Regional Water Plan
Summary of Key Information for
South Central Texas Regional Water Planning Group

Quantity, Reliability, and Cost

- Plan includes management supplies to meet projected needs, ensure reliability, and maintain springflow, resulting in a quantity of additional water supplies sufficient to meet projected needs for municipal, industrial, steam-electric power, and mining uses only through the year 2020 or 2030. In order to meet projected needs through the year 2050 and allow for direct comparison with other alternative regional water plans, additional water supplies sufficient to provide about 60,000 acft (in year 2030) to about 100,000 acft (in year 2050) will need to be added to this alternative plan.
- Unit cost is above the average of the five alternative plans under consideration.

Environmental Factors

- Greatest decrease in median annual streamflow in the Guadalupe River at Cuero and at the Saltwater Barrier among the five alternative plans under consideration.
- Greatest concerns with respect to Ecologically Significant Stream Segments among the five alternative plans under consideration.
- Least concerns with Water Quality & Aquatic Habitat and Cultural Resources among the five alternative plans under consideration, however, inclusion of necessary additional water supplies could increase concerns.

Impacts on Water Resources

- No unmitigated reductions in water available to existing water rights.
- Long-term reductions in water levels in the Carrizo Aquifer in Gonzales and Bastrop Counties.

Impacts on Agriculture and Natural Resources

- Major commitment to municipal and irrigation water Demand Reduction (Conservation) (L-10).
- Includes Brush Management (SCTN-4) and Weather Modification (SCTN-5).
- Inclusion of water supply options to meet projected irrigation needs in full is estimated to be economically infeasible at this time. Weather Modification (SCTN-5) assists irrigation and dry-land agriculture (crops and ranching).
- Includes maximum potential voluntary transfer of Edwards Aquifer irrigation permits to municipal permits through lease or purchase.
- Includes Medina Lake - Recharge Enhancement (S-13B) which reduces or eliminates water supplies from the Medina Lake System for irrigation in Bexar, Medina, and Atascosa Counties.

Other Relevant Factors per SCTRWPG

Comparison of Strategies to Meet Needs

- Selection of water supply options comprising the alternative plan based on integration of recharge enhancement and recirculation to maximize supply available from the Edwards Aquifer, preferences expressed by planning units, and closest available supply.

Interbasin Transfer Issues

- Projected non-irrigation needs in basin(s) of origin are met throughout the planning period.
- Plan includes one interbasin transfer: 1) Recirculation Systems from the Guadalupe River near Lake Dunlap and the Blanco River near Kyle to the outcrop of the Edwards Aquifer in the San Antonio and Nueces River Basins.

Third-Party Impacts of Voluntary Redistribution of Water

- Potential positive or negative effects of Edwards Irrigation Transfers (L-15).
- Lower water levels in some portions of the Carrizo Aquifer.

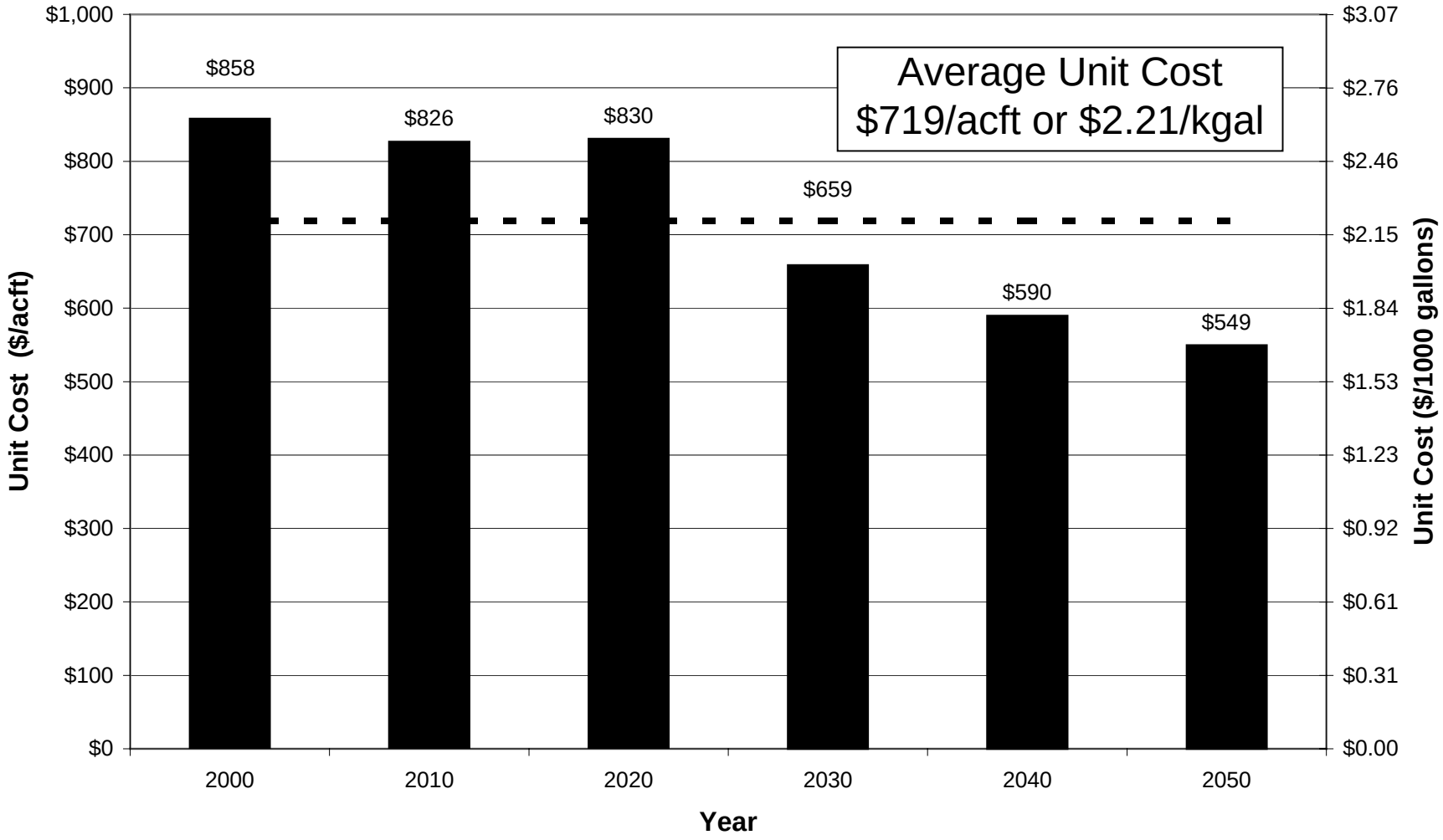
Regional Efficiency

- Edwards Irrigation Transfers (L-15) require no new facilities. Transferred water would likely be available at or very near locations having projected municipal, industrial, steam-electric power, and mining needs in Uvalde, Medina, Atascosa, and Bexar Counties.
- Recirculation Systems provide for recovery and recirculation of enhanced Comal springflow resulting from implementation of Edwards Recharge – Type 2 Projects (L-18a), Medina Lake - Recharge Enhancement (S-13B), and Guadalupe River Diversions to Recharge Zone (G-30).
- Consider reduced transmission capacity in the Recirculation Systems and elimination of Guadalupe River Diversions to Recharge Zone (G-30) to moderate unit cost.

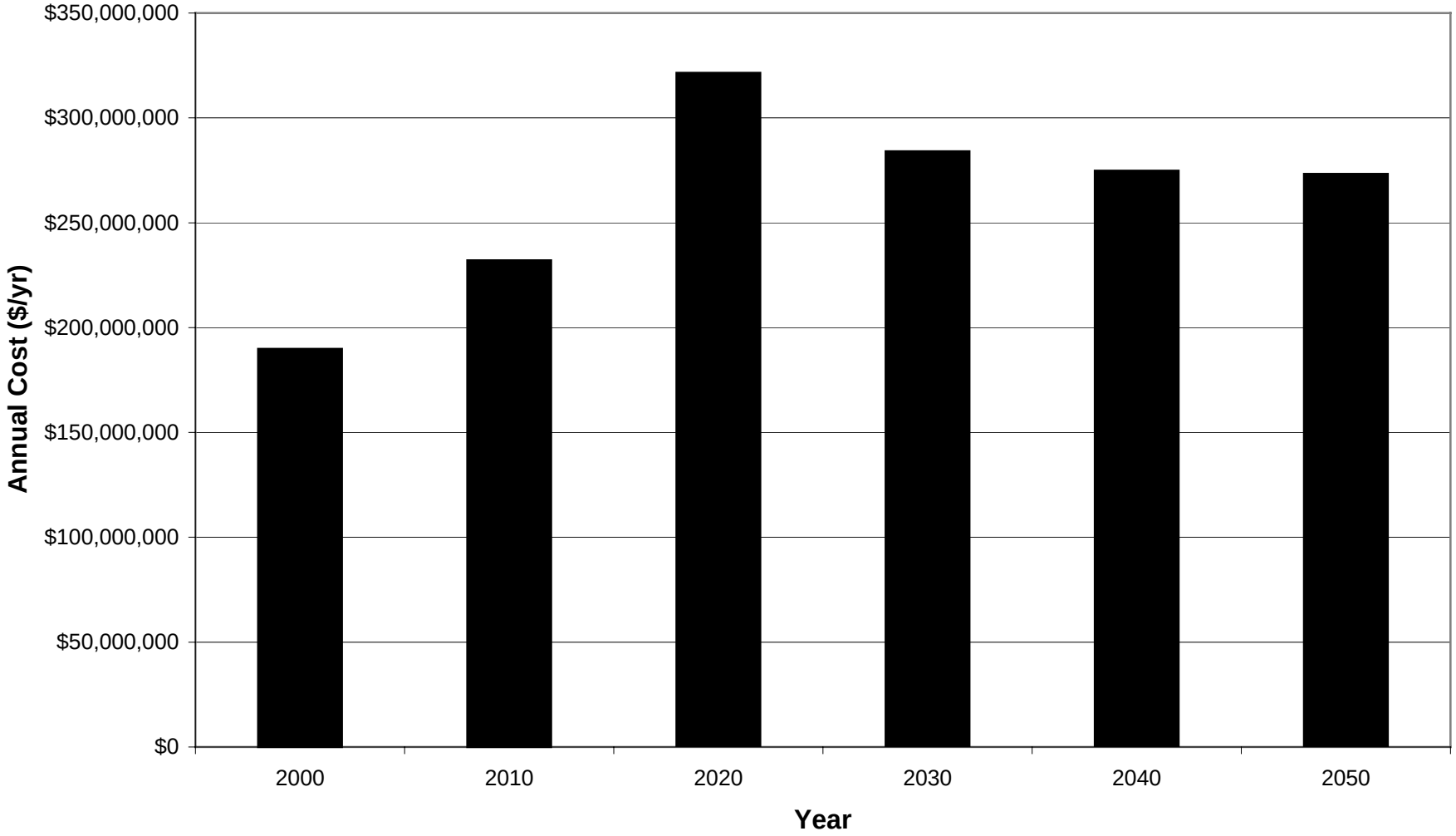
Effect on Navigation

- Not applicable.

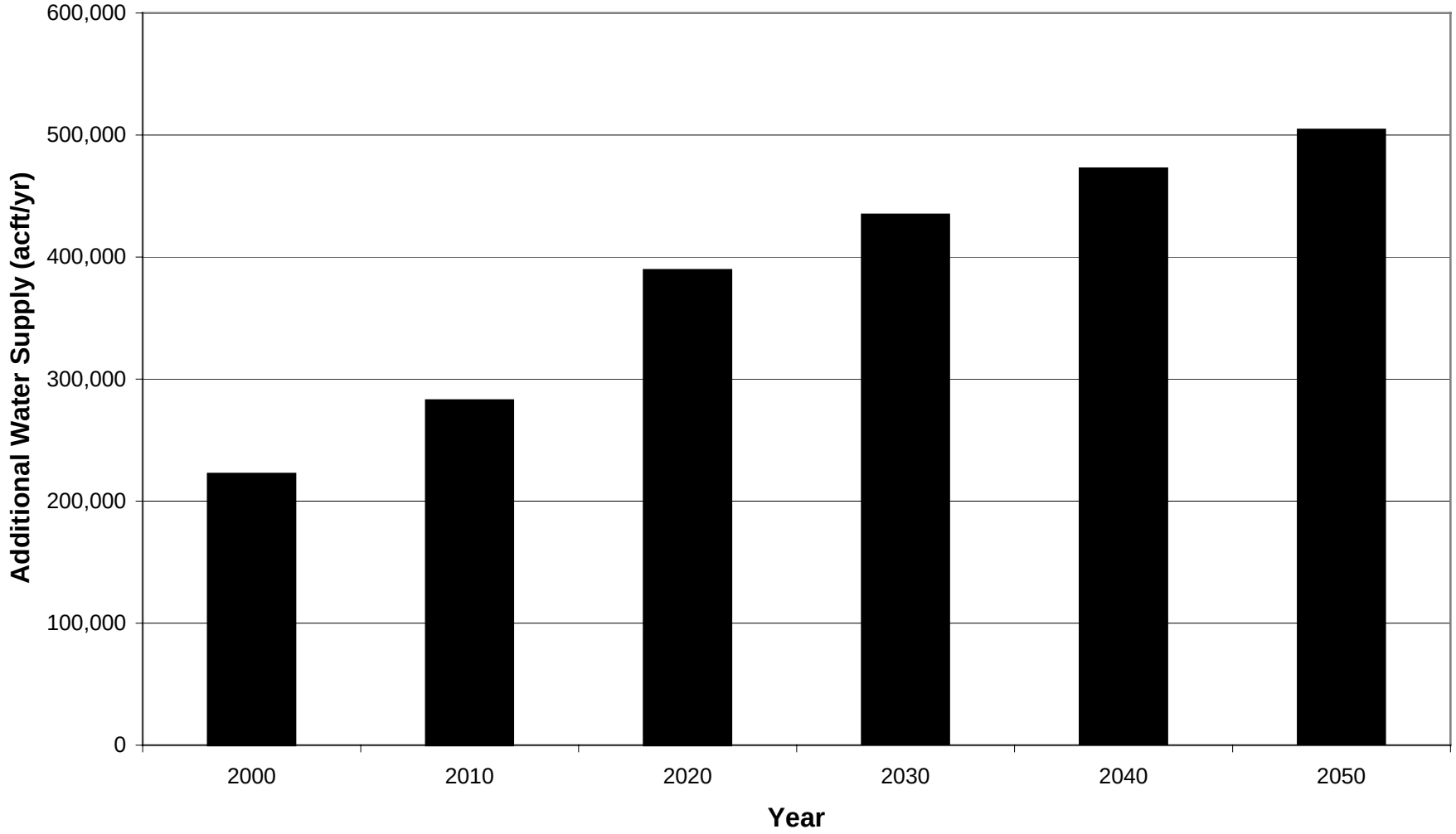
Inter-Regional Cooperation Alternative Regional Water Plan
Unit Cost of Cumulative Additional Water Supply



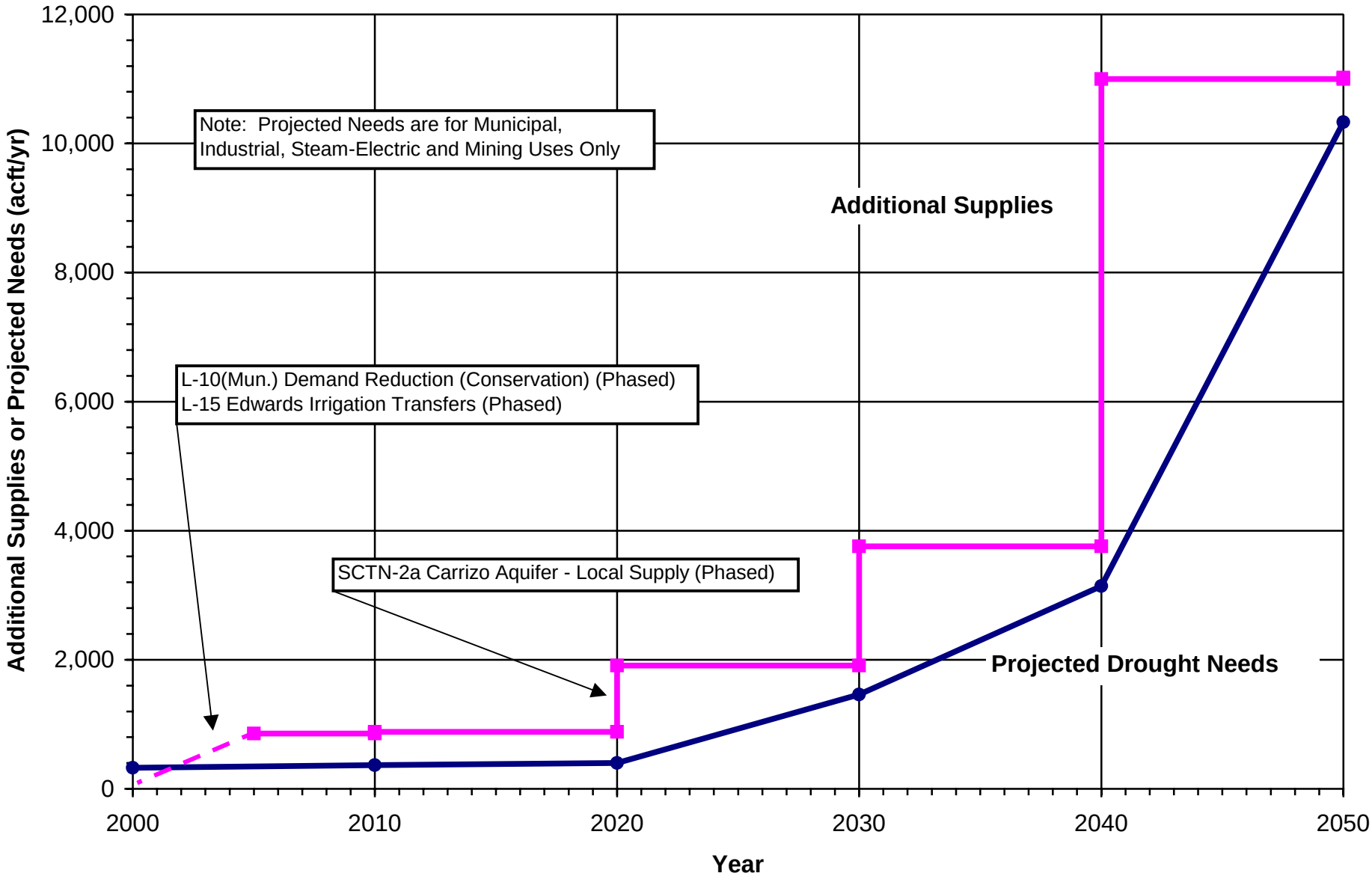
Inter-Regional Cooperation Alternative Regional Water Plan
Annual Cost of Cumulative Additional Water Supply



Inter-Regional Cooperation Alternative Regional Water Plan
Cumulative Additional Water Supply



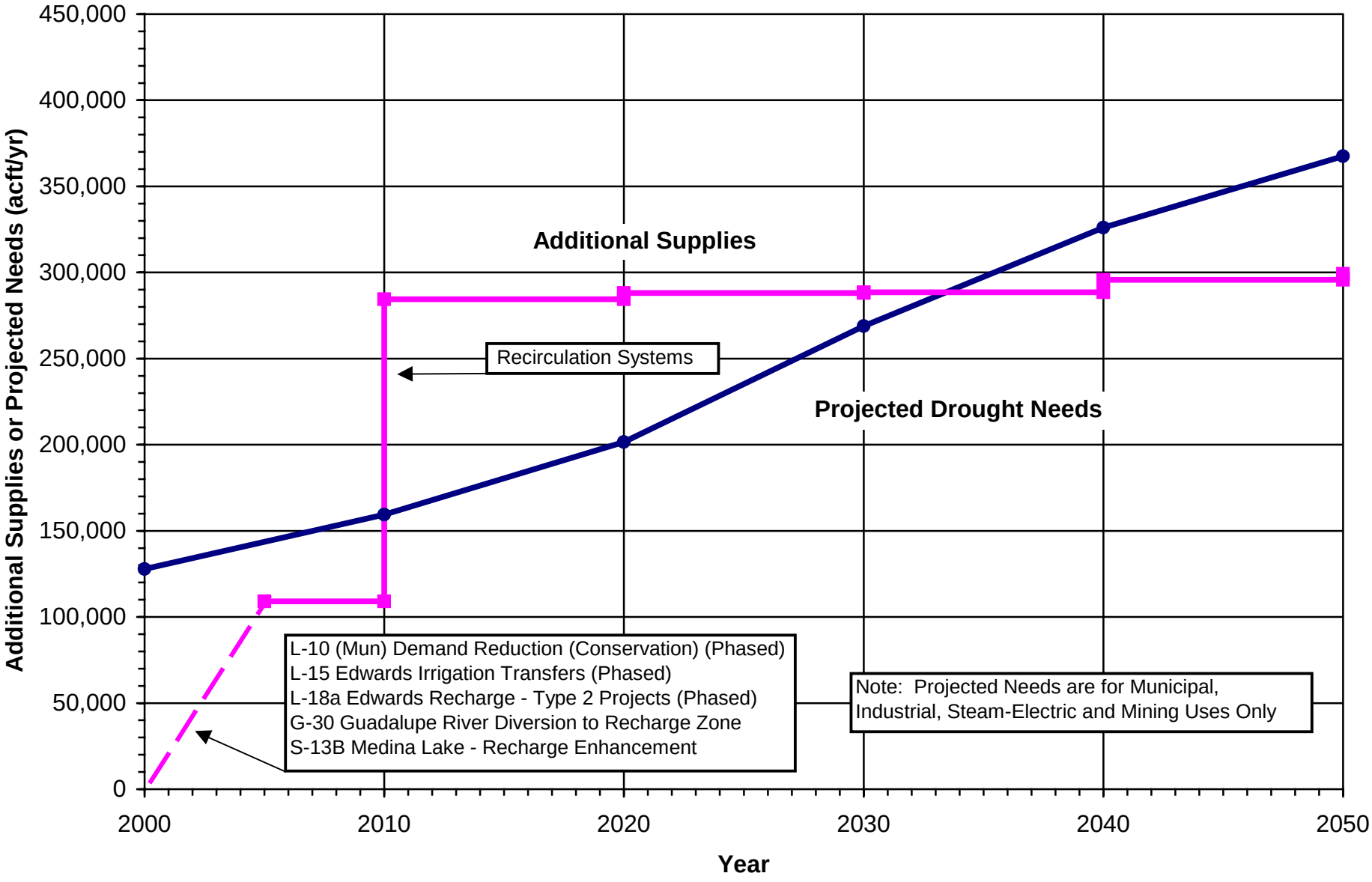
Recharge and Recirculation Alternative Regional Water Plan
Atascosa County



Recharge and Recirculation Regional Water Management Alternative Plan

South Central Texas Region						County =	Atascosa	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	325	366	401	468	530	587	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	1,504	8,504	
	Mining	0	0	0	995	1,109	1,239	
	Irrigation	38,418	36,718	35,170	43,726	42,190	40,713	
	Total Needs	**38,743**	**37,084**	**35,571**	**45,189**	**45,333**	**51,043**	
	Mun, Ind, S-E, & Min Needs	**325**	**366**	**401**	**1,463**	**3,143**	**10,330**	
	Irrigation Needs	**38,418**	**36,718**	**35,170**	**43,726**	**42,190**	**40,713**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		356	384	411	259	300	319	1
L-15	Edwards Irrigation Transfers	81,000	500	500	500	500	700	700	2, 3, 4
SCTN-2a	Carrizo Aquifer - Local Supply					1,000	3,000	10,000	5, 6
SCTN-4	Brush Management								7
SCTN-5	Weather Modification								7
SCTN-9	Rainwater Harvesting								7
	Small Aquifer Recharge Dams								7
L-10 (Irr.)	Demand Reduction (Conservation)		3,692	3,692	3,692	3,692	3,692	3,692	8
	Total New Supplies		**4,548**	**4,576**	**4,603**	**5,451**	**7,692**	**14,711**	
	Total System Mgmt. Supply / Deficit		**-34,195**	**-32,508**	**-30,968**	**-39,738**	**-37,641**	**-36,332**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**531**	**518**	**510**	**296**	**857**	**689**	
	Irrigation System Mgmt. Supply / Deficit		**-34,726**	**-33,026**	**-31,478**	**-40,034**	**-38,498**	**-37,021**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.								
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of								
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.								
4	Additional Edwards supply is for City of Lytle.								
5	Additional Carrizo supply is for Steam-Electric and Mining use.								
6	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
7	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
8	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation								
	application rate.								

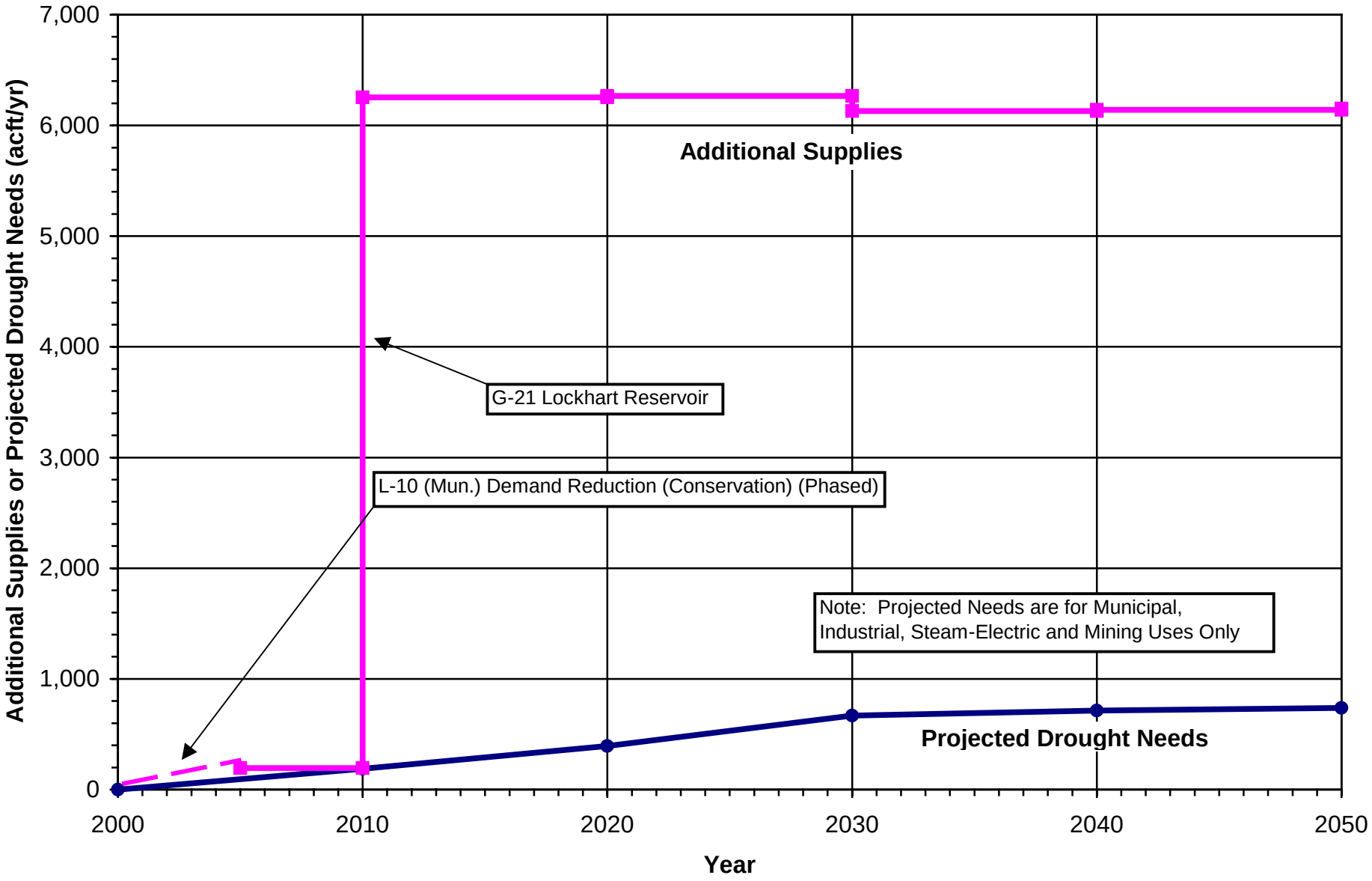
Recharge and Recirculation Alternative Regional Water Plan
Bexar County



Recharge and Recirculation Regional Water Management Alternative Plan

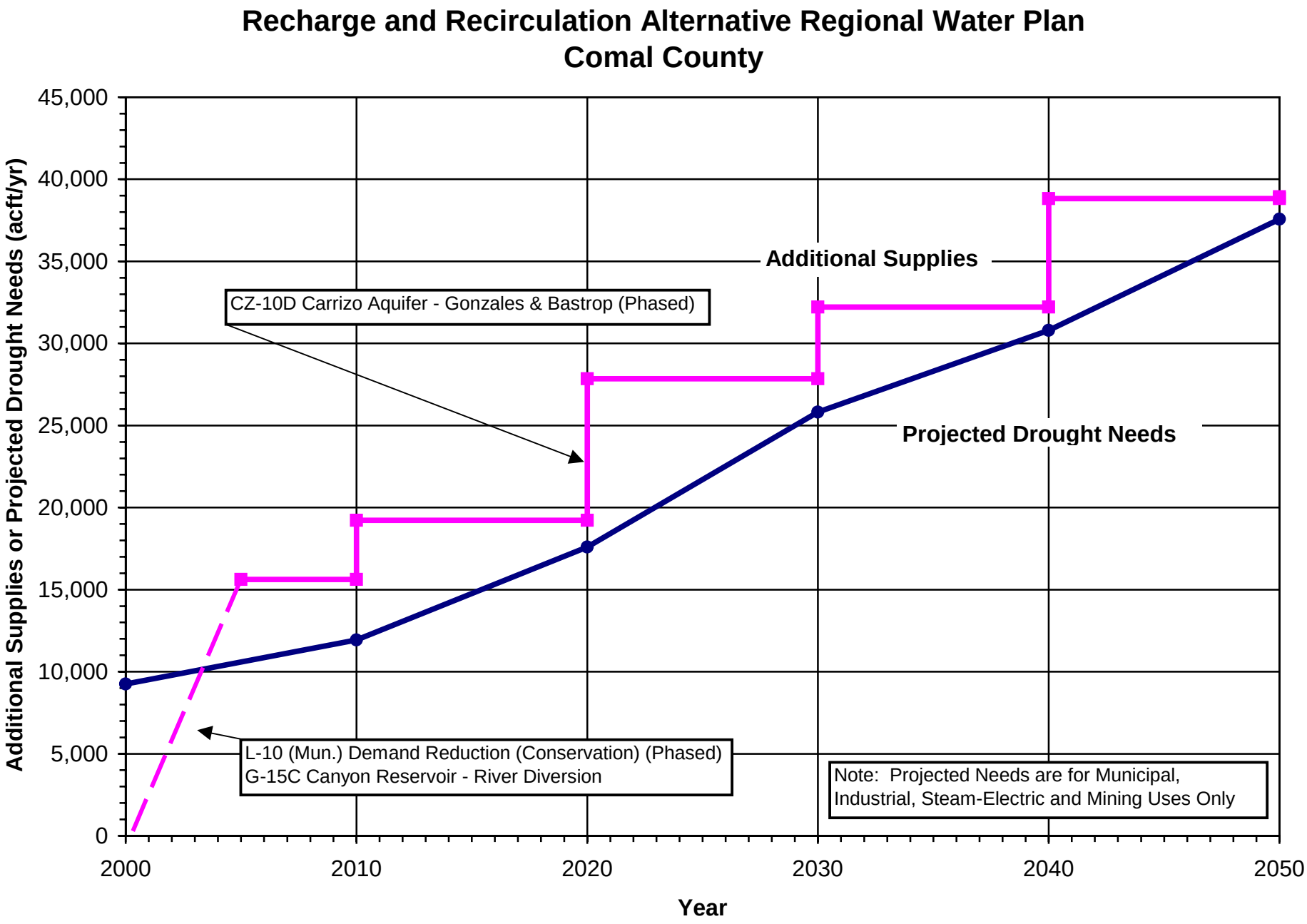
South Central Texas Region						County =		Bexar	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =		all	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		122,867	154,495	196,301	262,070	315,633	353,309	
	Industrial		0	0	0	1,430	4,759	8,192	
	Steam-Electric		0	0	0	0	0	0	
	Mining		4,963	4,936	5,201	5,406	5,645	5,962	
	Irrigation		22,575	20,374	19,585	19,015	18,385	17,368	
	Total Needs		**150,405**	**179,805**	**221,087**	**287,921**	**344,422**	**384,831**	
	Mun, Ind, S-E, & Min Needs		**127,830**	**159,431**	**201,502**	**268,906**	**326,037**	**367,463**	
	Irrigation Needs		**22,575**	**20,374**	**19,585**	**19,015**	**18,385**	**17,368**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		33,528	42,509	41,210	36,533	38,834	40,934	1
L-15	Edwards Irrigation Transfers	81,000	50,000	55,000	60,000	65,000	70,000	71,300	2, 3
L-18a	Edwards Recharge - Type 2 Projects	21,577	13,451	21,577	21,577	21,577	21,577	21,577	4
G-30	Guadalupe River Diversion to Recharge Zone	3,902	3,902	3,902	3,902	3,902	3,902	3,902	4
S-13B	Medina Lake - Recharge Enhancement	8,136	8,136	8,136	8,136	8,136	8,136	8,136	4
	Recirculation Systems			153,297	153,297	153,297	153,297	153,297	5
SCTN-4	Brush Management								6
SCTN-5	Weather Modification								6
SCTN-9	Rainwater Harvesting								6
	Small Aquifer Recharge Dams								6
L-10 (Irr.)	Demand Reduction (Conservation)		4,521	4,521	4,521	4,521	4,521	4,521	7
	Total New Supplies		**113,538**	**288,942**	**292,643**	**292,966**	**300,267**	**303,667**	
	Total System Mgmt. Supply / Deficit		**-36,867**	**109,137**	**71,556**	**5,045**	**-44,155**	**-81,164**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**-18,813**	**124,990**	**86,620**	**19,539**	**-30,291**	**-68,317**	8
	Irrigation System Mgmt. Supply / Deficit		**-18,054**	**-15,853**	**-15,064**	**-14,494**	**-13,864**	**-12,847**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.								
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of								
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.								
4	Supply values shown for this option are based on independent technical evaluations. Option was simulated in combination with								
	Recirculation Systems for alternative plan evaluations.								
5	The basis of this alternative plan is to meet the projected needs of Bexar County with recharge and recirculation projects. The								
	Recirculation Systems were simulated in combination with Options L-18a, G-30, and S-13B.								
6	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
7	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation								
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.								
8	Additional supplies of approximately 60,000 acft/yr in 2030 growing to 100,000 acft/yr in 2050 are needed for direct comparison								
	of this alternative plan to others.								

Recharge and Recirculation Alternative Regional Water Plan
Caldwell County



Recharge and Recirculation Regional Water Management Alternative Plan

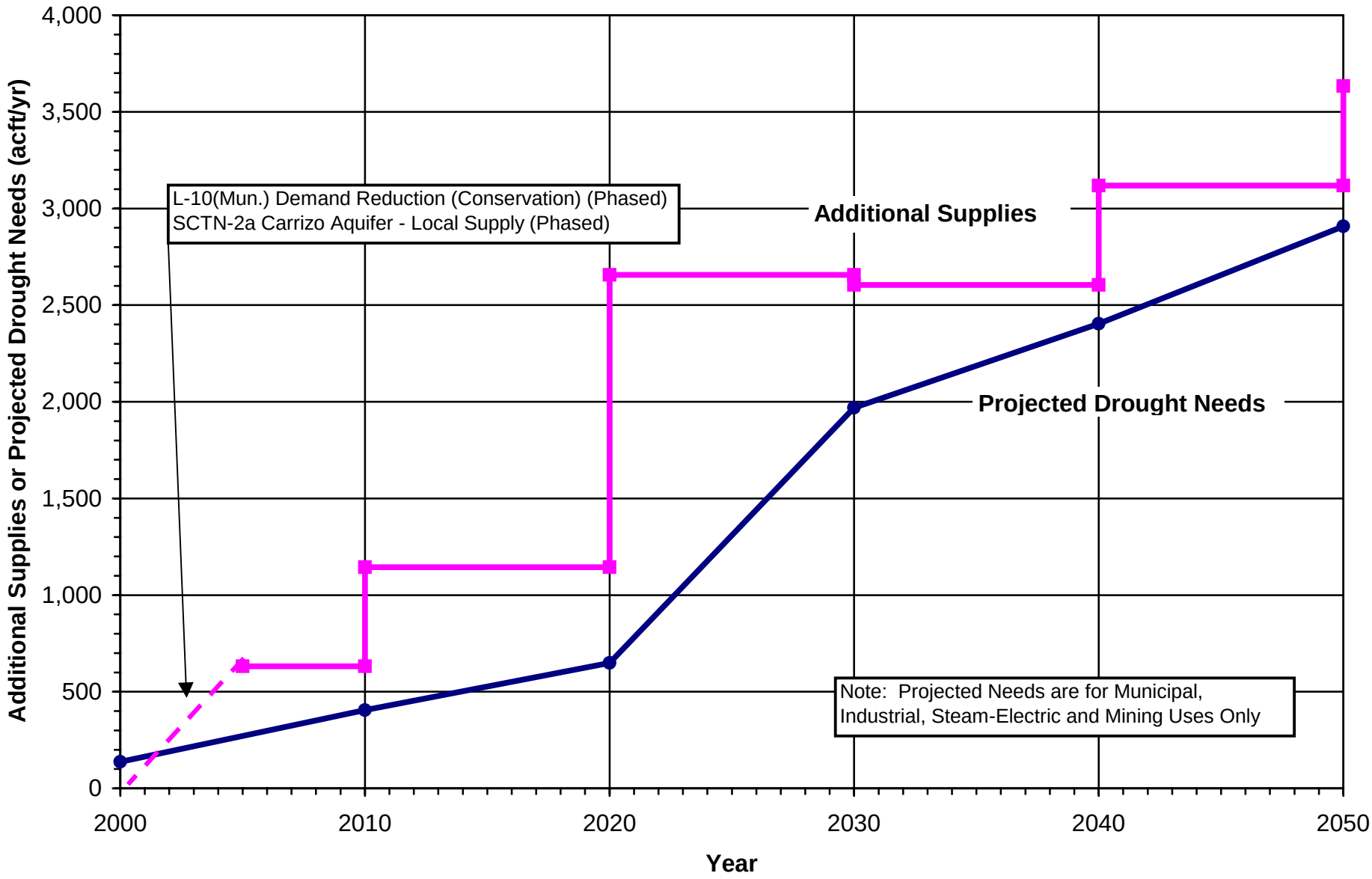
South Central Texas Region						County =	Caldwell	
County Summary of Projected Water Needs and Water Supply Options						**User Group(s) =**	**all**	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	0	188	393	668	714	737	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	0	0	0	0	0	0	
	Total Needs	**0**	**188**	**393**	**668**	**714**	**737**	
	Mun, Ind, S-E, & Min Needs	**0**	**188**	**393**	**668**	**714**	**737**	
	Irrigation Needs	**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		195	206	218	82	93	104	1
G-21	Lockhart Reservoir			6,048	6,048	6,048	6,048	6,048	2
	Small Aquifer Recharge Dams								3
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**195**	**6,254**	**6,266**	**6,130**	**6,141**	**6,152**	
	Total System Mgmt. Supply / Deficit		**195**	**6,066**	**5,873**	**5,462**	**5,427**	**5,415**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**195**	**6,066**	**5,873**	**5,462**	**5,427**	**5,415**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Water supply for City of Lockhart and/or other users downstream.								
3	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								


Recharge and Recirculation Alternative Regional Water Plan
Comal County
Additional Supplies or Projected Drought Needs (acft/yr)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
Projected Drought Needs
CZ-10D Carrizo Aquifer - Gonzales & Bastrop (Phased)
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
G-15C Canyon Reservoir - River Diversion
Note: Projected Needs are for Municipal,
Industrial, Steam-Electric and Mining Uses Only

Recharge and Recirculation Regional Water Management Alternative Plan

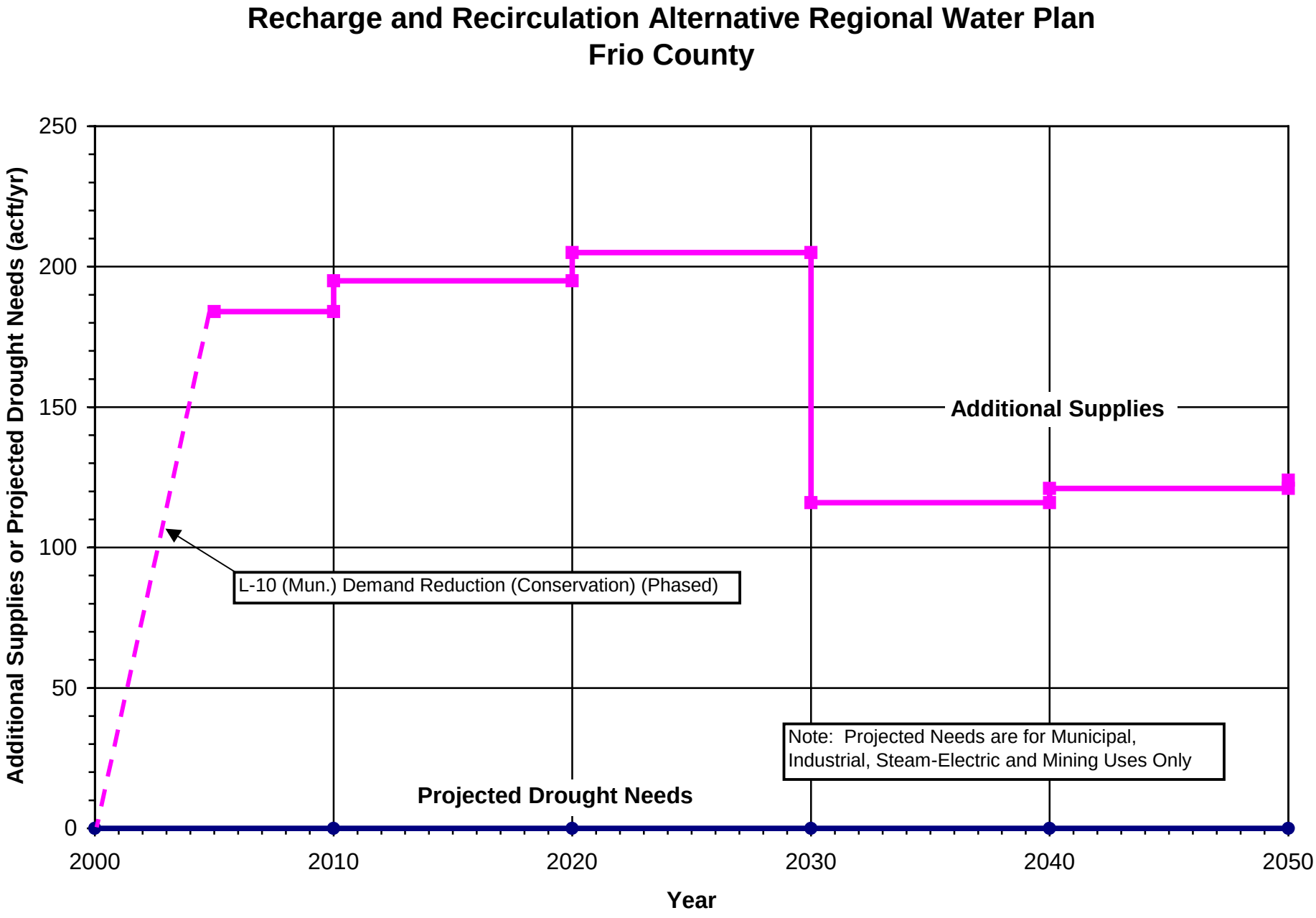
South Central Texas Region						County =	Comal	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		2,289	5,049	10,487	18,282	25,205	33,062	
Industrial		1,388	1,425	1,486	1,737	2,009	2,289	
Steam-Electric		0	0	0	0	0	0	
Mining		5,570	5,464	5,628	5,796	3,590	2,224	
Irrigation		30	14	0	0	0	0	
Total Needs		**9,277**	**11,952**	**17,601**	**25,815**	**30,804**	**37,575**	
Mun, Ind, S-E, & Min Needs		**9,247**	**11,938**	**17,601**	**25,815**	**30,804**	**37,575**	
Irrigation Needs		**30**	**14**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		616	718	848	718	824	942	1
G-15C Canyon Reservoir - River Diversion	15,000	15,000	15,000	15,000	15,000	15,000	15,000	2
CZ-10D Carrizo Aquifer - Gonzales & Bastrop	90,000			3,500	12,000	16,500	23,000	3, 4, 5
Small Aquifer Recharge Dams								6
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**15,616**	**15,718**	**19,348**	**27,718**	**32,324**	**38,942**	
Total System Mgmt. Supply / Deficit		**6,339**	**3,766**	**1,747**	**1,903**	**1,520**	**1,367**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**6,369**	**3,780**	**1,747**	**1,903**	**1,520**	**1,367**	
Irrigation System Mgmt. Supply / Deficit		**-30**	**-14**	**0**	**0**	**0**	**0**	
Notes:								
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.							
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.							
2	Portion of Canyon firm yield (with amendment) diverted below Seguin.							
3	Candidate New Supply to be shared among Comal, Guadalupe, and Hays Counties. Effects on regional aquifer levels to be quantified.							
4	Portion of 90,000 acft/yr available from northern Gonzales and southern Bastrop Counties under CZ-10D.							
5	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.							
6	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.							

Recharge and Recirculation Alternative Regional Water Plan
Dimmit County



Recharge and Recirculation Regional Water Management Alternative Plan

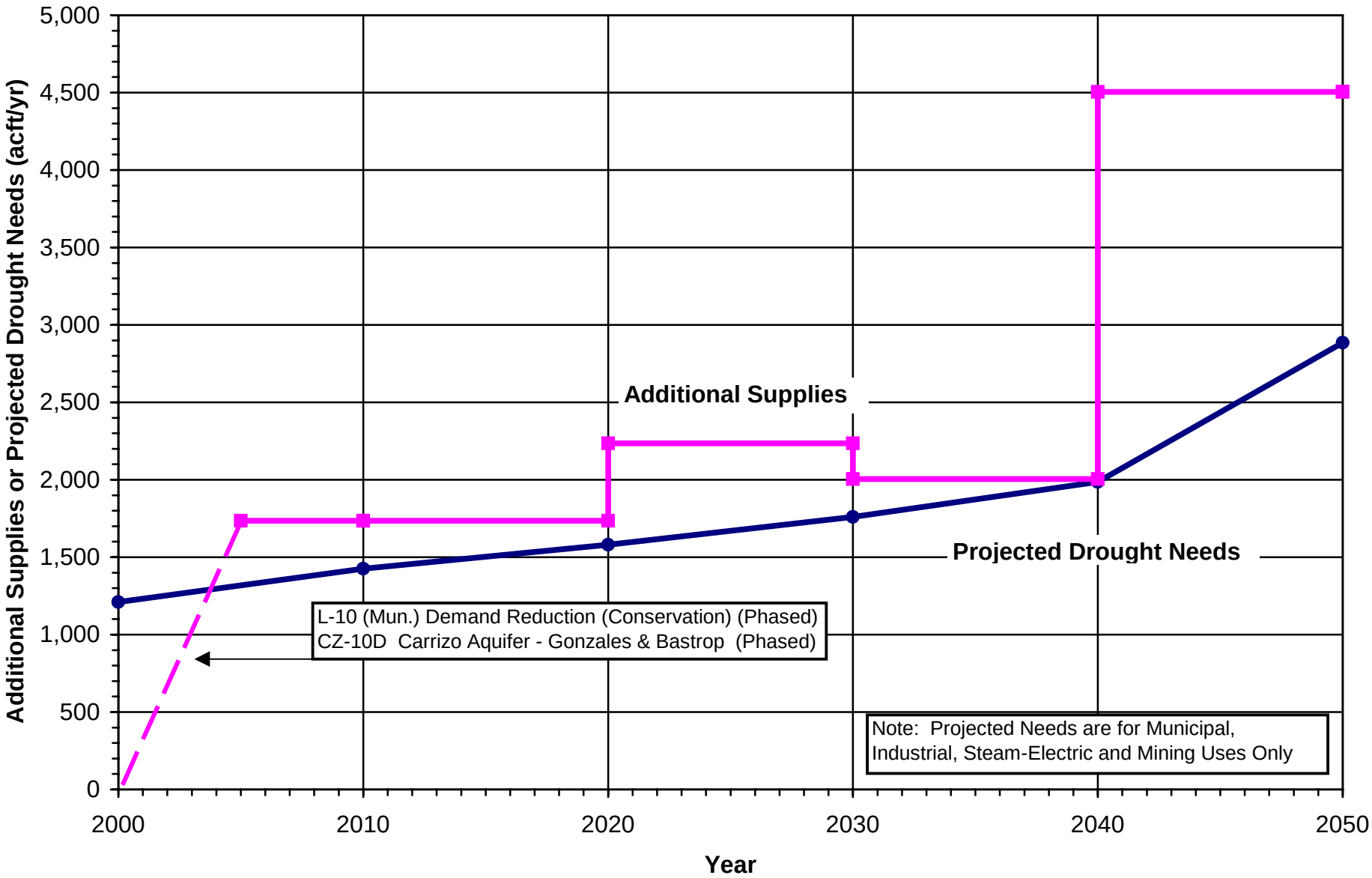
South Central Texas Region						County =	Dimmit	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	138	405	649	1,054	1,479	1,959	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	915	925	949	
	Irrigation	0	0	0	2,133	1,737	1,331	
	Total Needs	**138**	**405**	**649**	**4,102**	**4,141**	**4,239**	
	Mun, Ind, S-E, & Min Needs	**138**	**405**	**649**	**1,969**	**2,404**	**2,908**	
	Irrigation Needs	**0**	**0**	**0**	**2,133**	**1,737**	**1,331**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		131	144	156	104	118	133	1
SCTN-2a	Carrizo Aquifer - Local Supply		500	1,000	1,000	2,500	3,000	3,500	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**631**	**1,144**	**1,156**	**2,604**	**3,118**	**3,633**	
	Total System Mgmt. Supply / Deficit		**493**	**739**	**507**	**-1,498**	**-1,023**	**-606**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**493**	**739**	**507**	**635**	**714**	**725**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**-2,133**	**-1,737**	**-1,331**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Carrizo Springs and Mining supply.								
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								


Recharge and Recirculation Alternative Regional Water Plan
Frio County
Additional Supplies or Projected Drought Needs (acft/yr)
250
200
150
100
50
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
Projected Drought Needs
Note: Projected Needs are for Municipal, Industrial, Steam-Electric and Mining Uses Only

Recharge and Recirculation Regional Water Management Alternative Plan

South Central Texas Region						County =	Frio	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	0	0	0	0	0	0	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	71,126	67,646	64,365	76,505	73,519	70,662	
	Total Needs	**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
	Mun, Ind, S-E, & Min Needs	**0**	**0**	**0**	**0**	**0**	**0**	
	Irrigation Needs	**71,126**	**67,646**	**64,365**	**76,505**	**73,519**	**70,662**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		184	195	205	116	121	124	1
SCTN-4	Brush Management								2
SCTN-5	Weather Modification								2
SCTN-9	Rainwater Harvesting								2
	Small Aquifer Recharge Dams								2
L-10 (Irr.)	Demand Reduction (Conservation)		5,947	5,947	5,947	5,947	5,947	5,947	3
	Total New Supplies		**6,131**	**6,142**	**6,152**	**6,063**	**6,068**	**6,071**	
	Total System Mgmt. Supply / Deficit		**-64,995**	**-61,504**	**-58,213**	**-70,442**	**-67,451**	**-64,591**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**184**	**195**	**205**	**116**	**121**	**124**	
	Irrigation System Mgmt. Supply / Deficit		**-65,179**	**-61,699**	**-58,418**	**-70,558**	**-67,572**	**-64,715**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation								
	application rate.								

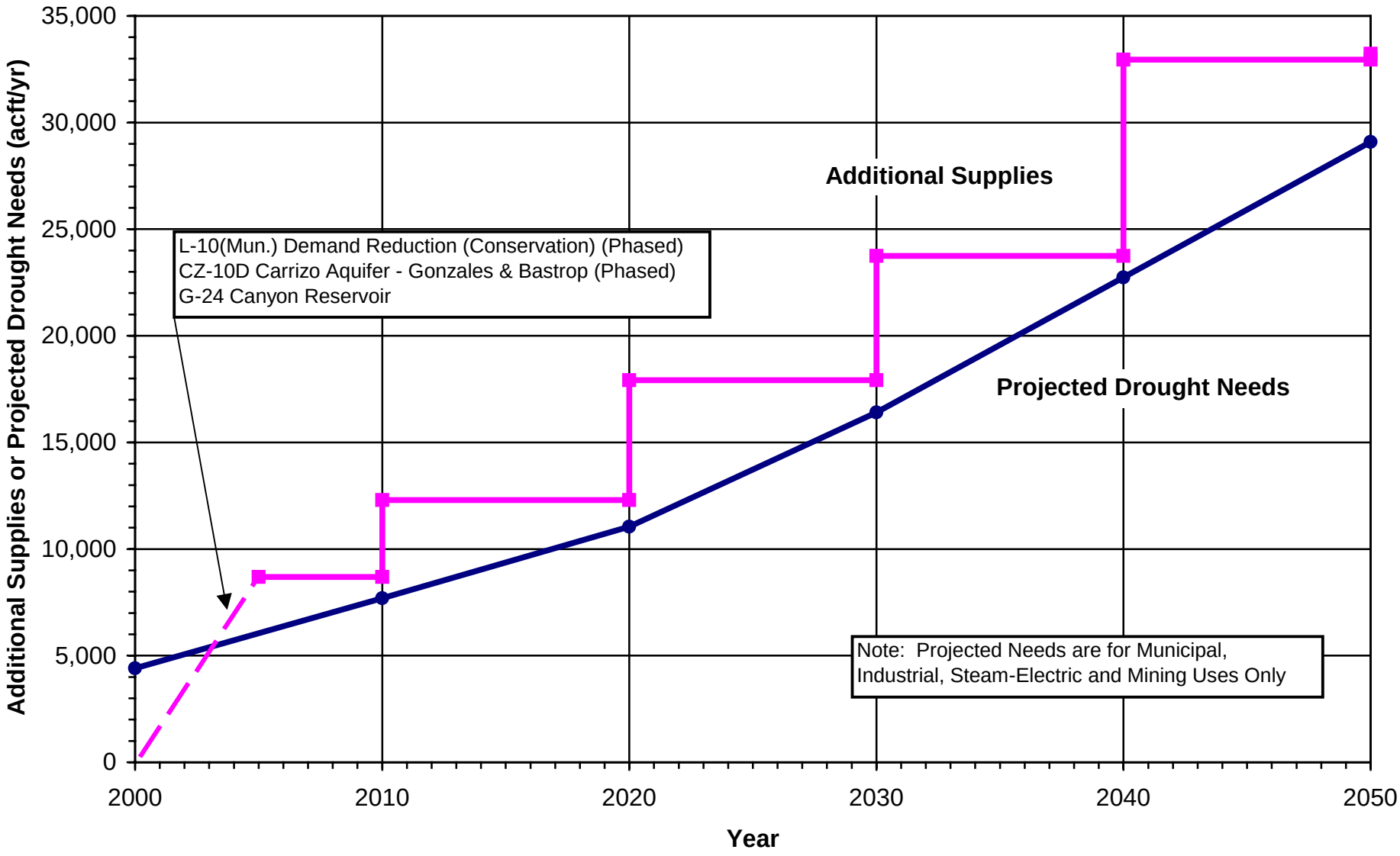
Recharge and Recirculation Alternative Regional Water Plan
Guadalupe County



Recharge and Recirculation Regional Water Management Alternative Plan

South Central Texas Region						County =	Guadalupe	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	29	23	30	71	87	773	
	Industrial	985	1,204	1,350	1,487	1,692	1,899	
	Steam-Electric	0	0	0	0	0	0	
	Mining	196	198	200	202	207	213	
	Irrigation	985	879	779	684	594	508	
	Total Needs	**2,195**	**2,304**	**2,359**	**2,444**	**2,580**	**3,393**	
	Mun, Ind, S-E, & Min Needs	**1,210**	**1,425**	**1,580**	**1,760**	**1,986**	**2,885**	
	Irrigation Needs	**985**	**879**	**779**	**684**	**594**	**508**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		235	236	236	5	5	6	1
CZ-10D	Carrizo Aquifer - Gonzales & Bastrop	90,000	1,500	1,500	2,000	2,000	2,500	4,500	2, 3, 4
	Small Aquifer Recharge Dams								5
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**1,735**	**1,736**	**2,236**	**2,005**	**2,505**	**4,506**	
	Total System Mgmt. Supply / Deficit		**-460**	**-568**	**-123**	**-439**	**-75**	**1,113**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**525**	**311**	**656**	**245**	**519**	**1,621**	
	Irrigation System Mgmt. Supply / Deficit		**-985**	**-879**	**-779**	**-684**	**-594**	**-508**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Comal, Guadalupe, and Hays Counties. Effects on regional aquifer levels to be quantified.								
3	Portion of 90,000 acft/yr available from northern Gonzales and southern Bastrop Counties under CZ-10D.								
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.								
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

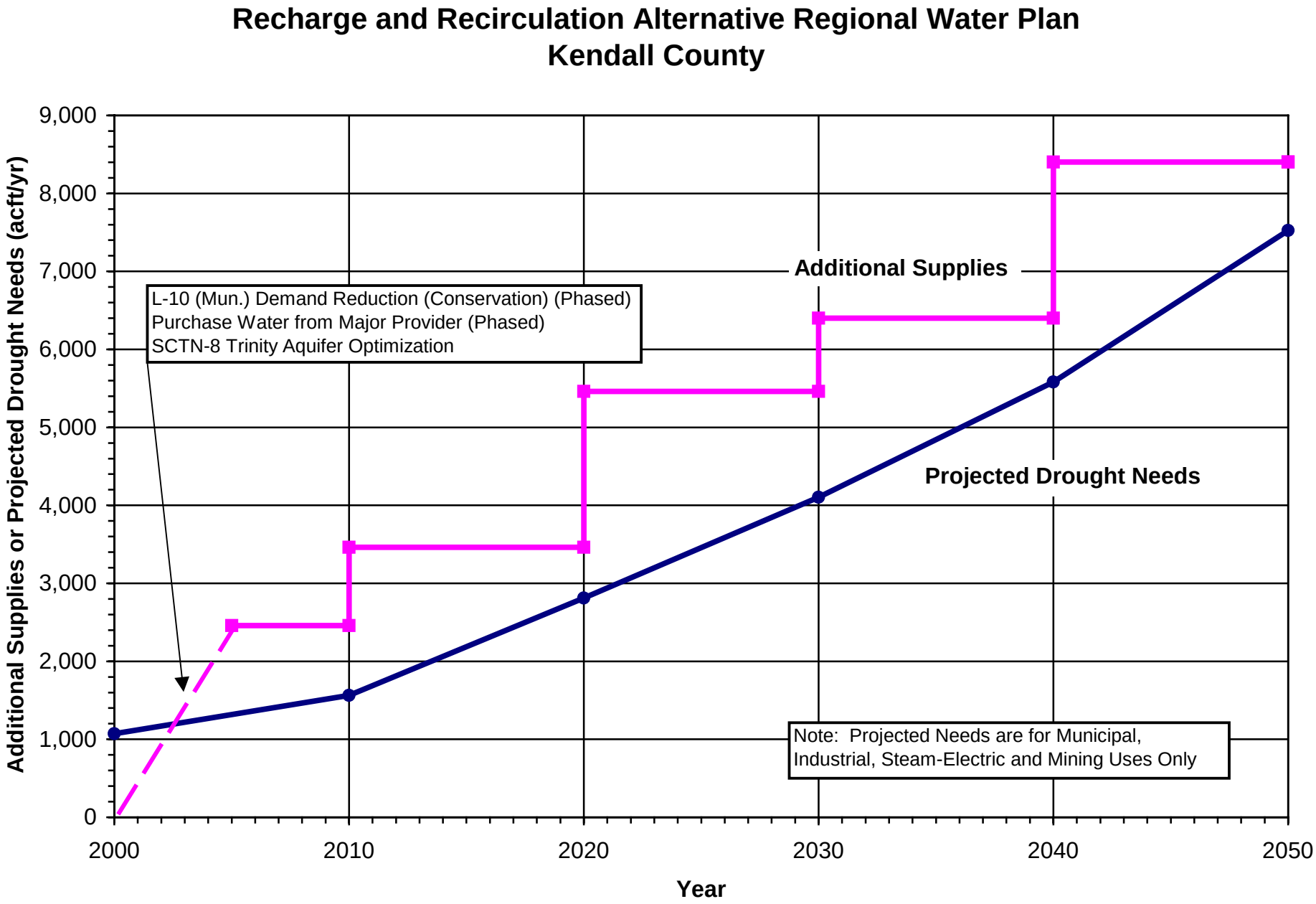
Recharge and Recirculation Alternative Regional Water Plan
Hays County



Recharge and Recirculation Regional Water Management Alternative Plan

South Central Texas Region						County =	Hays	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		4,325	7,609	10,980	16,349	22,696	29,059	
Industrial		0	0	0	0	0	0	
Steam-Electric		0	0	0	0	0	0	
Mining		84	82	68	55	37	28	
Irrigation		0	0	0	0	0	0	
Total Needs		**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
Mun, Ind, S-E, & Min Needs		**4,409**	**7,691**	**11,048**	**16,404**	**22,733**	**29,087**	
Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		647	747	873	699	906	1,174	1
CZ-10D Carrizo Aquifer - Gonzales & Bastrop	90,000	4,000	7,000	10,500	16,000	22,000	31,000	2, 3, 4
G-24 Canyon Reservoir	1,048	1,048	1,048	1,048	1,048	1,048	1,048	5
Small Aquifer Recharge Dams								6
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**5,695**	**8,795**	**12,421**	**17,747**	**23,954**	**33,222**	
Total System Mgmt. Supply / Deficit		**1,286**	**1,104**	**1,373**	**1,343**	**1,221**	**4,135**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,286**	**1,104**	**1,373**	**1,343**	**1,221**	**4,135**	
Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	

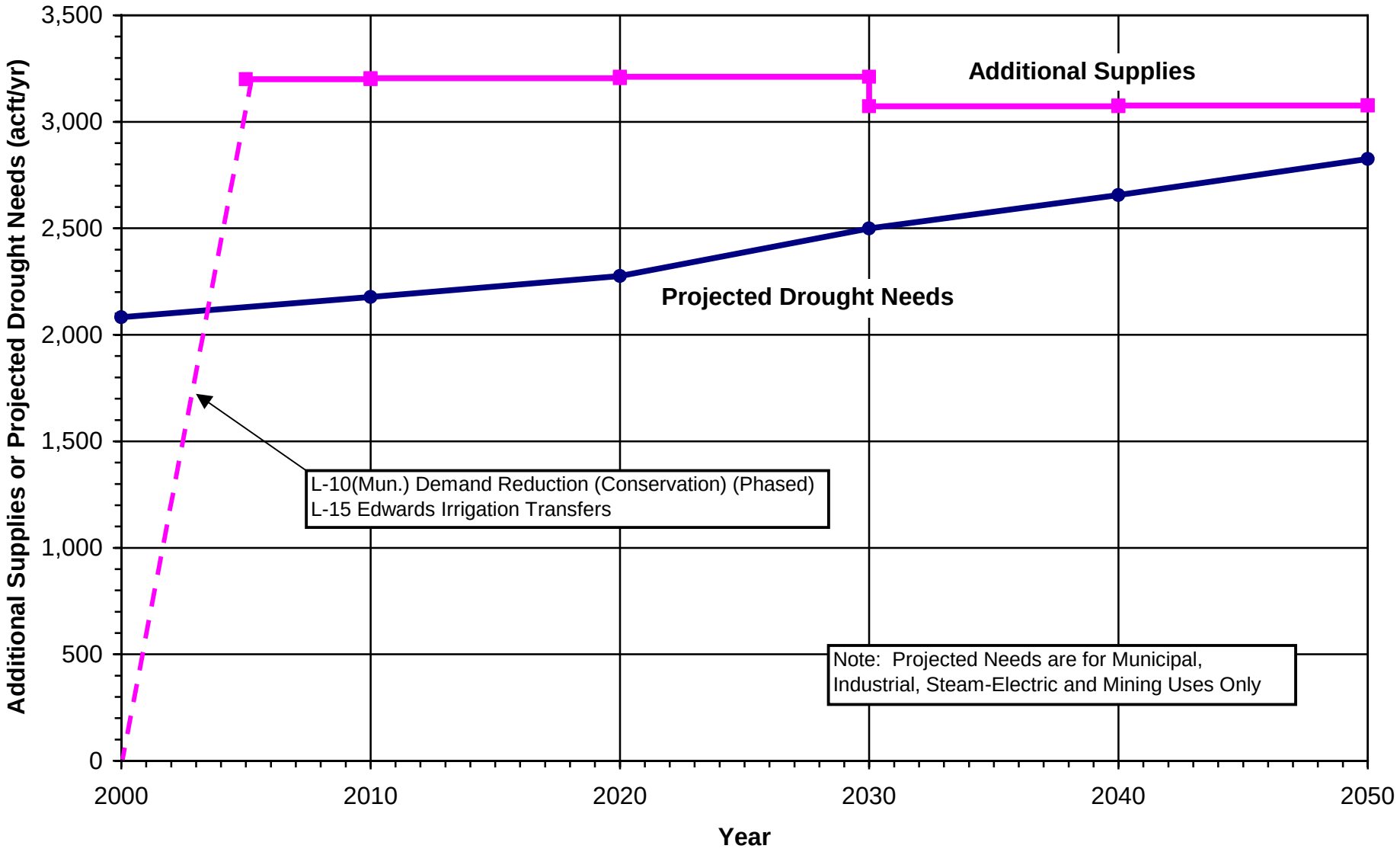
Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Comal, Guadalupe, and Hays Counties. Effects on regional aquifer levels to be quantified.
3	Portion of 90,000 acft/yr available from northern Gonzales and southern Bastrop Counties under CZ-10D.
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
5	Candidate New Supply for Wimberley and Woodcreek.
6	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.


Recharge and Recirculation Alternative Regional Water Plan
Kendall County
Additional Supplies or Projected Drought Needs (acft/yr)
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000
2010
2020
2030
2040
2050
Year
Additional Supplies
L-10 (Mun.) Demand Reduction (Conservation) (Phased)
Purchase Water from Major Provider (Phased)
SCTN-8 Trinity Aquifer Optimization
Projected Drought Needs
Note: Projected Needs are for Municipal,
Industrial, Steam-Electric and Mining Uses Only

Recharge and Recirculation Regional Water Management Alternative Plan

South Central Texas Region						County =	Kendall	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	1,070	1,560	2,808	4,099	5,578	7,518	
	Industrial	2	3	4	4	5	6	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	0	0	0	0	0	0	
Total Needs		**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
Mun, Ind, S-E, & Min Needs		**1,072**	**1,563**	**2,812**	**4,103**	**5,583**	**7,524**	
Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		67	71	71	11	11	11	1
Purchase Water from Major Provider		2,000	2,000	3,000	5,000	6,000	8,000	2, 3
SCTN-8 Trinity Aquifer Optimization	390	390	390	390	390	390	390	
SCTN-4 Brush Management								4
SCTN-5 Weather Modification								4
SCTN-9 Rainwater Harvesting								4
Small Aquifer Recharge Dams								4
L-10 (Irr.) Demand Reduction (Conservation)								
Total New Supplies		**2,457**	**2,461**	**3,461**	**5,401**	**6,401**	**8,401**	
Total System Mgmt. Supply / Deficit		**1,385**	**898**	**649**	**1,298**	**818**	**877**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,385**	**898**	**649**	**1,298**	**818**	**877**	
Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:								
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.							
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.							
2	Assumed purchase from Bexar County major provider. Kendall County water needs are not reflected in Bexar County table.							
3	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.							
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.							

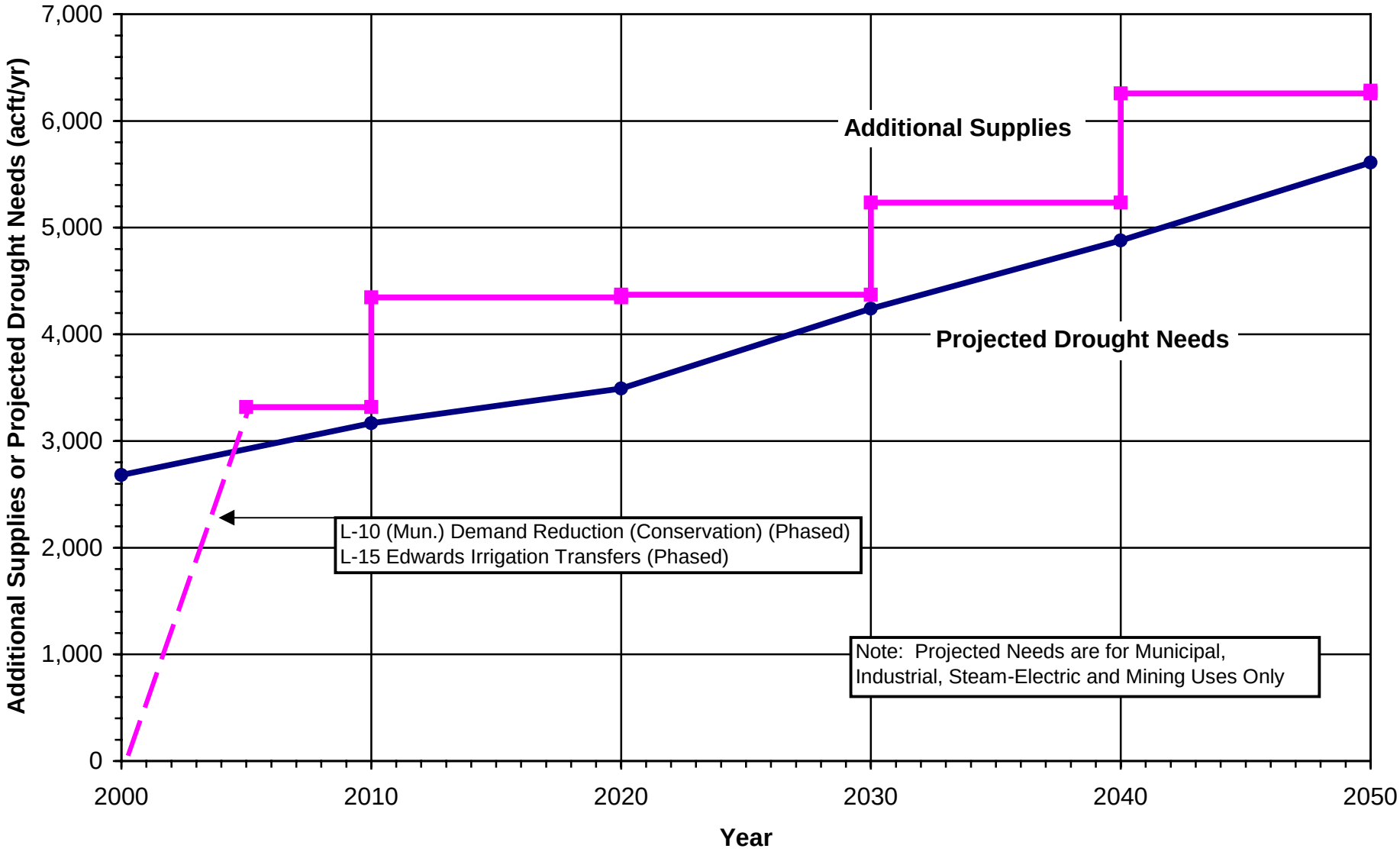
Recharge and Recirculation Alternative Regional Water Plan
Medina County



Recharge and Recirculation Regional Water Management Alternative Plan

South Central Texas Region						County =		Medina	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =		all	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		2,015	2,110	2,206	2,427	2,582	2,750	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		68	68	70	72	74	76	
	Irrigation		98,916	95,268	91,320	92,320	88,925	84,692	
	Total Needs		**100,999**	**97,446**	**93,596**	**94,819**	**91,581**	**87,518**	
	Mun, Ind, S-E, & Min Needs		**2,083**	**2,178**	**2,276**	**2,499**	**2,656**	**2,826**	
	Irrigation Needs		**98,916**	**95,268**	**91,320**	**92,320**	**88,925**	**84,692**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		200	205	211	73	76	78	1
L-15	Edwards Irrigation Transfers	81,000	3,000	3,000	3,000	3,000	3,000	3,000	2, 3
SCTN-4	Brush Management								4
SCTN-5	Weather Modification								4
SCTN-9	Rainwater Harvesting								4
	Small Aquifer Recharge Dams								4
L-10 (Irr.)	Demand Reduction (Conservation)		11,867	11,867	11,867	11,867	11,867	11,867	5
	Total New Supplies		**15,067**	**15,072**	**15,078**	**14,940**	**14,943**	**14,945**	
	Total System Mgmt. Supply / Deficit		**-85,932**	**-82,374**	**-78,518**	**-79,879**	**-76,638**	**-72,573**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**1,117**	**1,027**	**935**	**574**	**420**	**252**	
	Irrigation System Mgmt. Supply / Deficit		**-87,049**	**-83,401**	**-79,453**	**-80,453**	**-77,058**	**-72,825**	
Notes:									
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.								
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.								
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of								
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.								
4	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
5	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation								
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.								

Recharge and Recirculation Alternative Regional Water Plan
Uvalde County

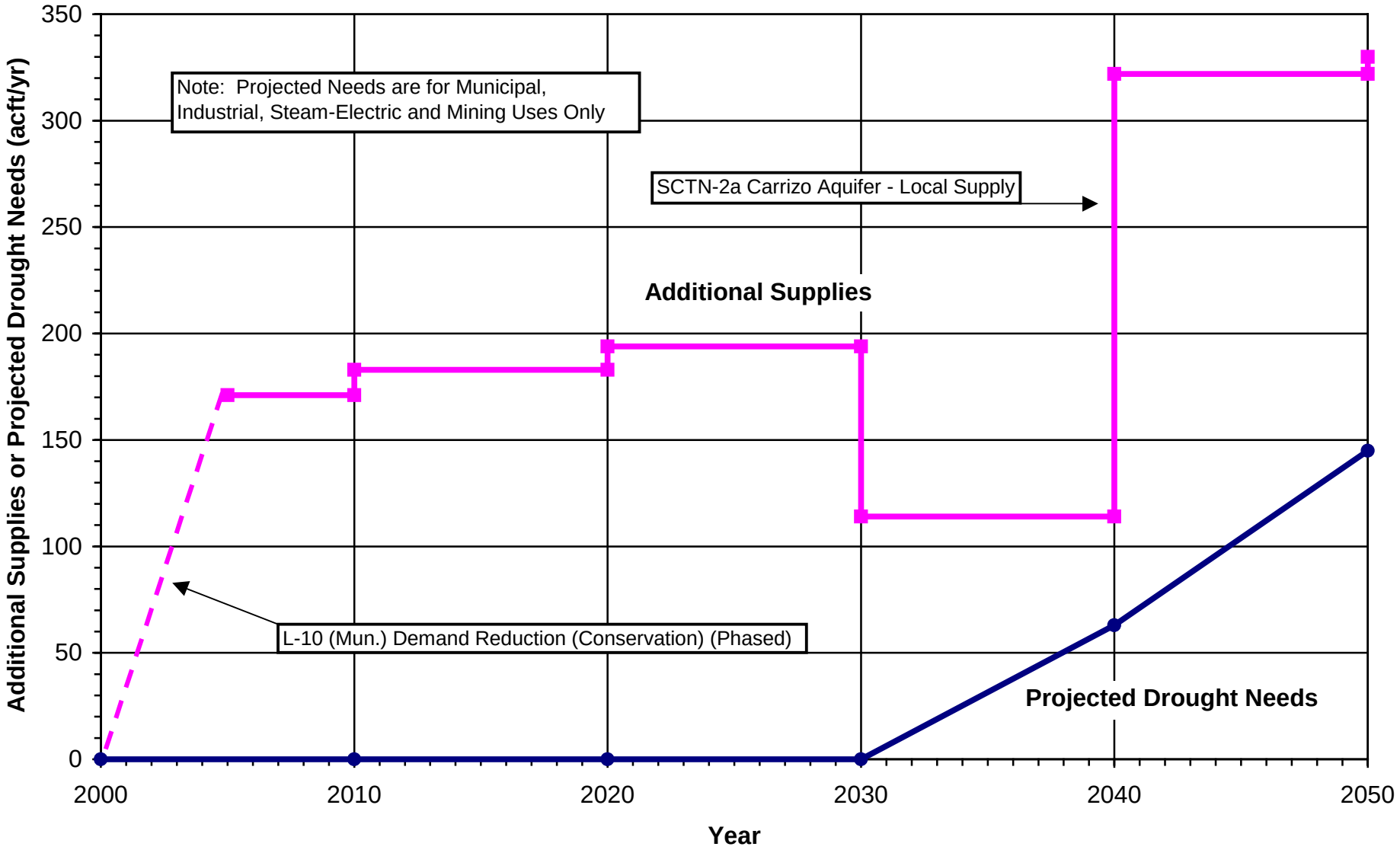


Recharge and Recirculation Regional Water Management Alternative Plan

South Central Texas Region						County =	Uvalde	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
Municipal		2,682	3,166	3,493	4,241	4,880	5,609	
Industrial		0	0	0	0	0	0	
Steam-Electric		0	0	0	0	0	0	
Mining		0	0	0	0	0	0	
Irrigation		75,263	72,798	70,154	71,022	68,880	65,676	
Total Needs		**77,945**	**75,964**	**73,647**	**75,263**	**73,760**	**71,285**	
Mun, Ind, S-E, & Min Needs		**2,682**	**3,166**	**3,493**	**4,241**	**4,880**	**5,609**	
Irrigation Needs		**75,263**	**72,798**	**70,154**	**71,022**	**68,880**	**65,676**	
Water Supply Options (acft/yr)	**Candidate**							
ID# **Description**	**New Supply**	**2000***	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.) Demand Reduction (Conservation)		318	346	371	235	258	283	1
L-15 Edwards Irrigation Transfers	81,000	3,000	4,000	4,000	5,000	5,000	6,000	2, 3, 4
SCTN-4 Brush Management								5
SCTN-5 Weather Modification								5
SCTN-9 Rainwater Harvesting								5
Small Aquifer Recharge Dams								5
L-10 (Irr.) Demand Reduction (Conservation)		14,143	14,143	14,143	14,143	14,143	14,143	6
Total New Supplies		**17,461**	**18,489**	**18,514**	**19,378**	**19,401**	**20,426**	
Total System Mgmt. Supply / Deficit		**-60,484**	**-57,475**	**-55,133**	**-55,885**	**-54,359**	**-50,859**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**636**	**1,180**	**878**	**994**	**378**	**674**	
Irrigation System Mgmt. Supply / Deficit		**-61,120**	**-58,655**	**-56,011**	**-56,879**	**-54,737**	**-51,533**	

Notes:	
*	Candidate New Supplies shown for year 2000 are identified for priority implementation, but will not be available immediately.
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.
2	Candidate New Supply to be shared among Uvalde, Medina, Atascosa, and Bexar Counties. Supply may not be reliable in drought.
3	Pursuant to draft EAA Critical Period Management rules, Candidate New Supply represents approximately 85 percent of
	the estimated maximum potential annual transfer (95,430 acft) based on Proposed Permits prorated to 400,000 acft/yr.
4	Early implementation of facilities assumed in cost estimation to ensure sufficient supply during drought.
5	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.
6	Estimates based upon use of LEPA systems on 80 percent of acreages irrigated in 1997, with conservation at 40 percent of irrigation
	application rate, but applicable to only 50 percent of Edwards Aquifer irrigation permitted quantities.

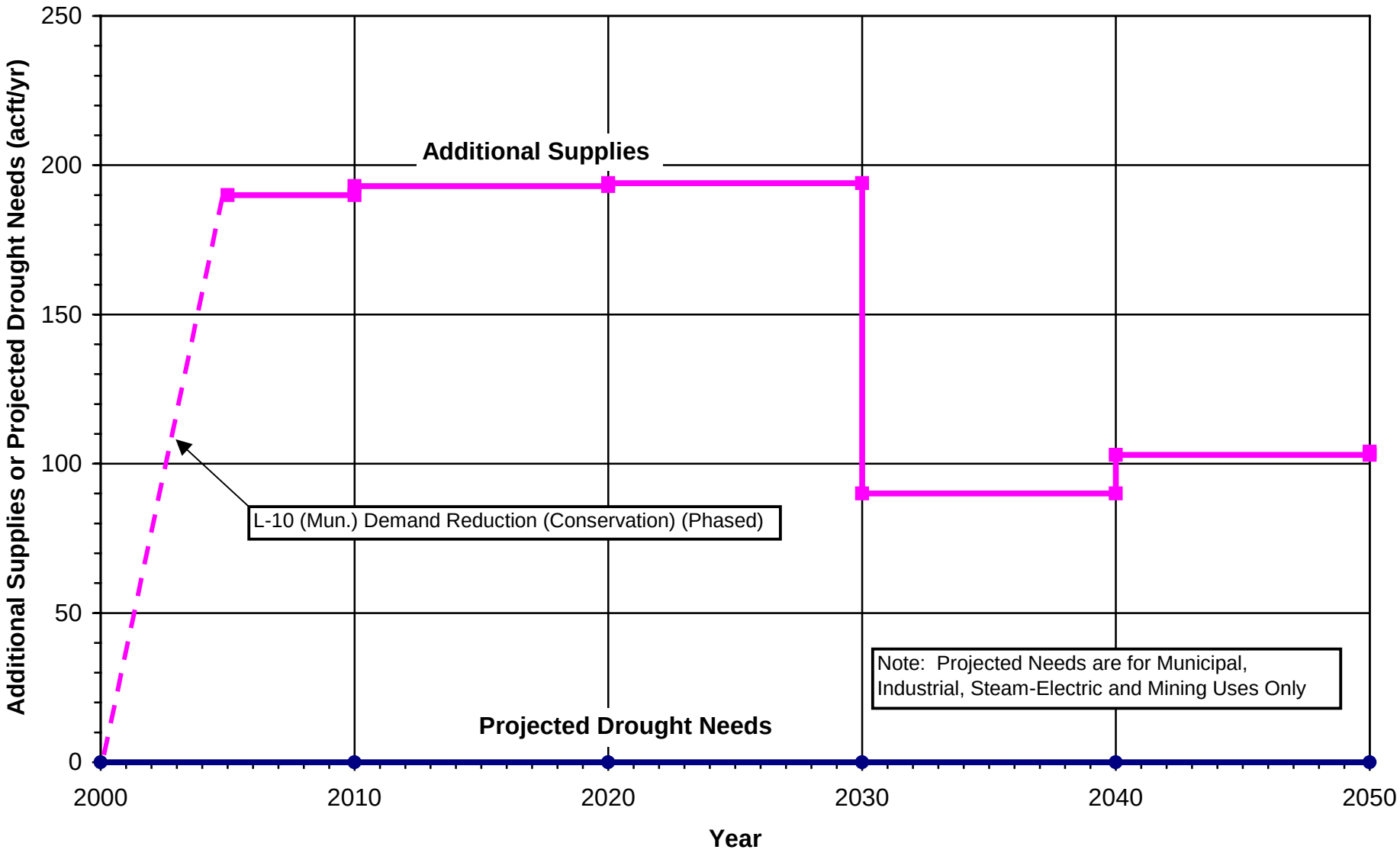
Recharge and Recirculation Alternative Regional Water Plan
Wilson County



Recharge and Recirculation Regional Water Management Alternative Plan

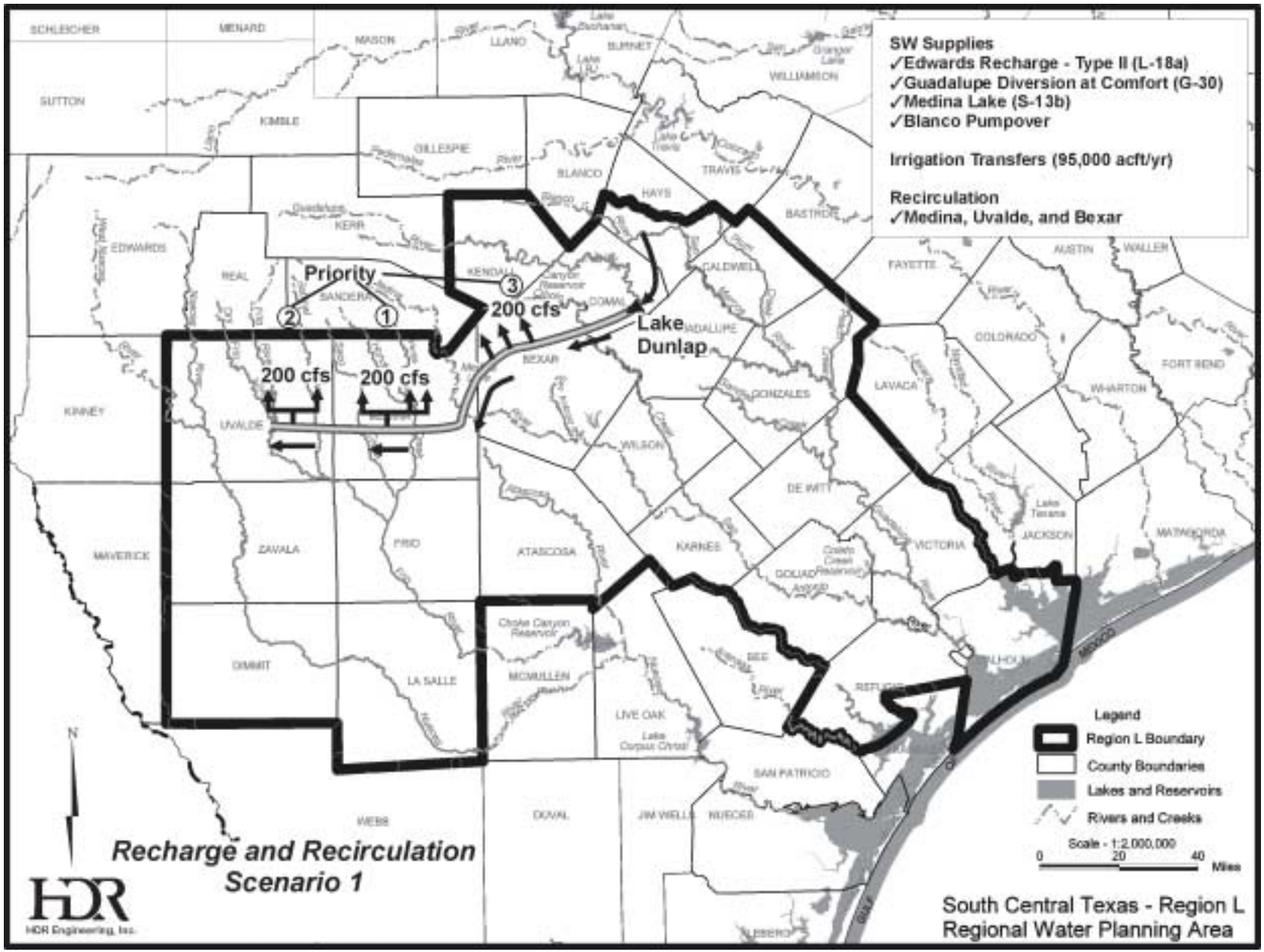
South Central Texas Region						**County =**		**Wilson**	
County Summary of Projected Water Needs and Water Supply Options						**User Group(s) =**		**all**	
Projected Water Needs (acft/yr)									
	User Group(s)		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal		0	0	0	0	63	145	
	Industrial		0	0	0	0	0	0	
	Steam-Electric		0	0	0	0	0	0	
	Mining		0	0	0	0	0	0	
	Irrigation		0	0	0	0	0	0	
	Total Needs		**0**	**0**	**0**	**0**	**63**	**145**	
	Mun, Ind, S-E, & Min Needs		**0**	**0**	**0**	**0**	**63**	**145**	
	Irrigation Needs		**0**	**0**	**0**	**0**	**0**	**0**	
Water Supply Options (acft/yr)		**Candidate**							
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		171	183	194	114	122	130	1
SCTN-2a	Carrizo Aquifer - Local Supply						200	200	2
SCTN-4	Brush Management								3
SCTN-5	Weather Modification								3
SCTN-9	Rainwater Harvesting								3
	Small Aquifer Recharge Dams								3
L-10 (Irr.)	Demand Reduction (Conservation)								
	Total New Supplies		**171**	**183**	**194**	**114**	**322**	**330**	
	Total System Mgmt. Supply / Deficit		**171**	**183**	**194**	**114**	**259**	**185**	
Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit			**171**	**183**	**194**	**114**	**259**	**185**	
	Irrigation System Mgmt. Supply / Deficit		**0**	**0**	**0**	**0**	**0**	**0**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Additional well(s) for Floresville.								
3	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								

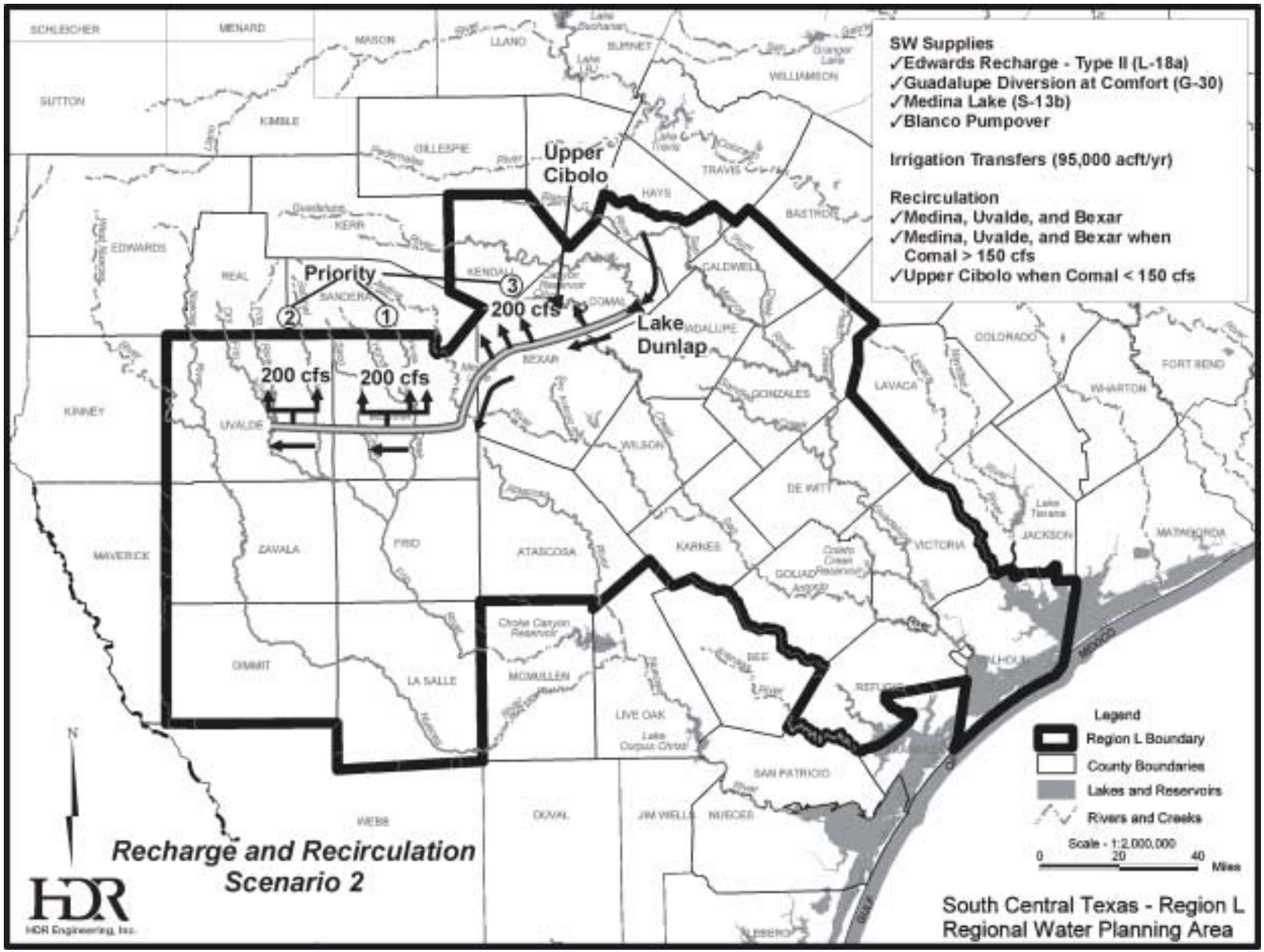
Recharge and Recirculation Alternative Regional Water Plan
Zavala County

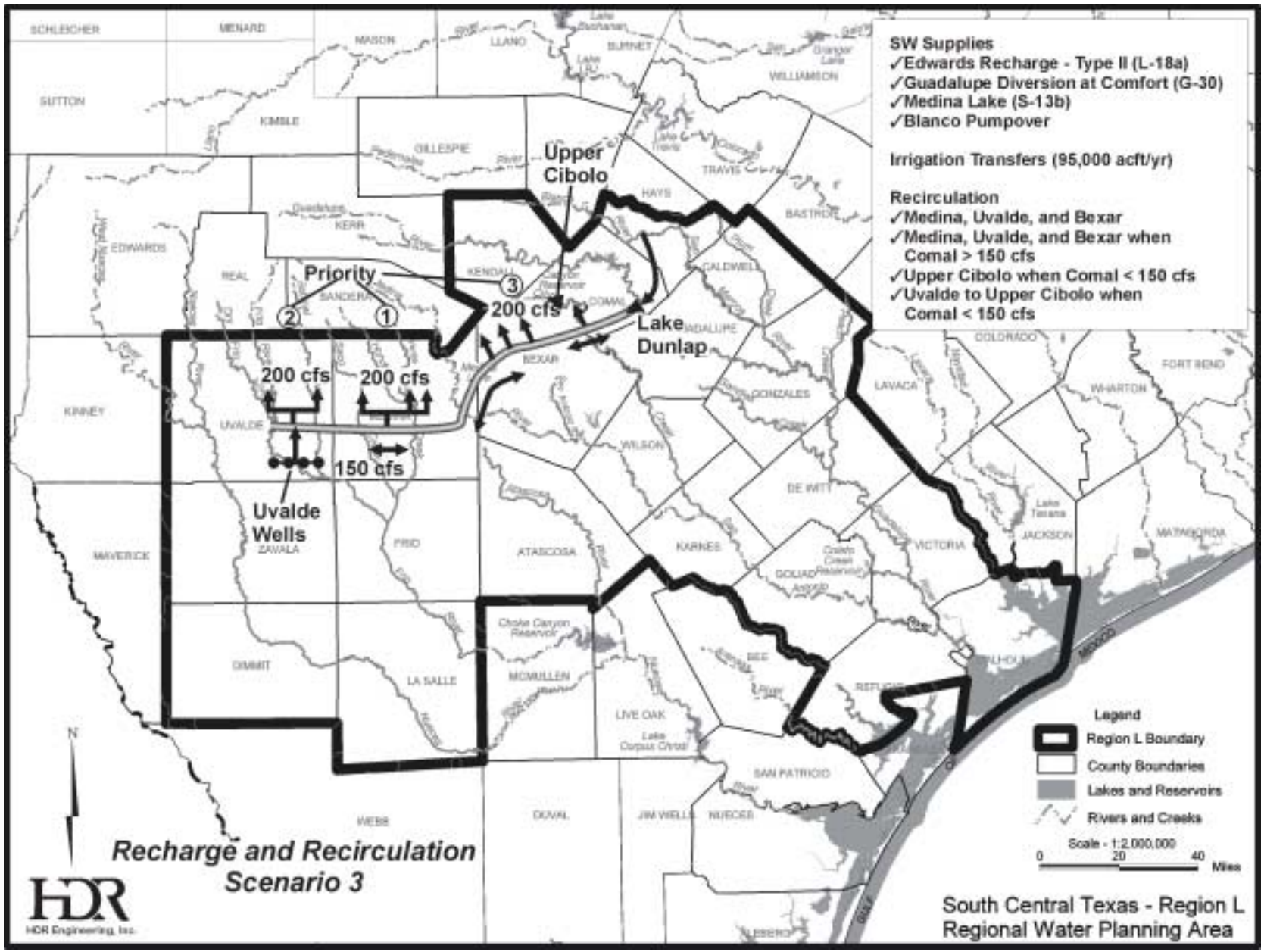


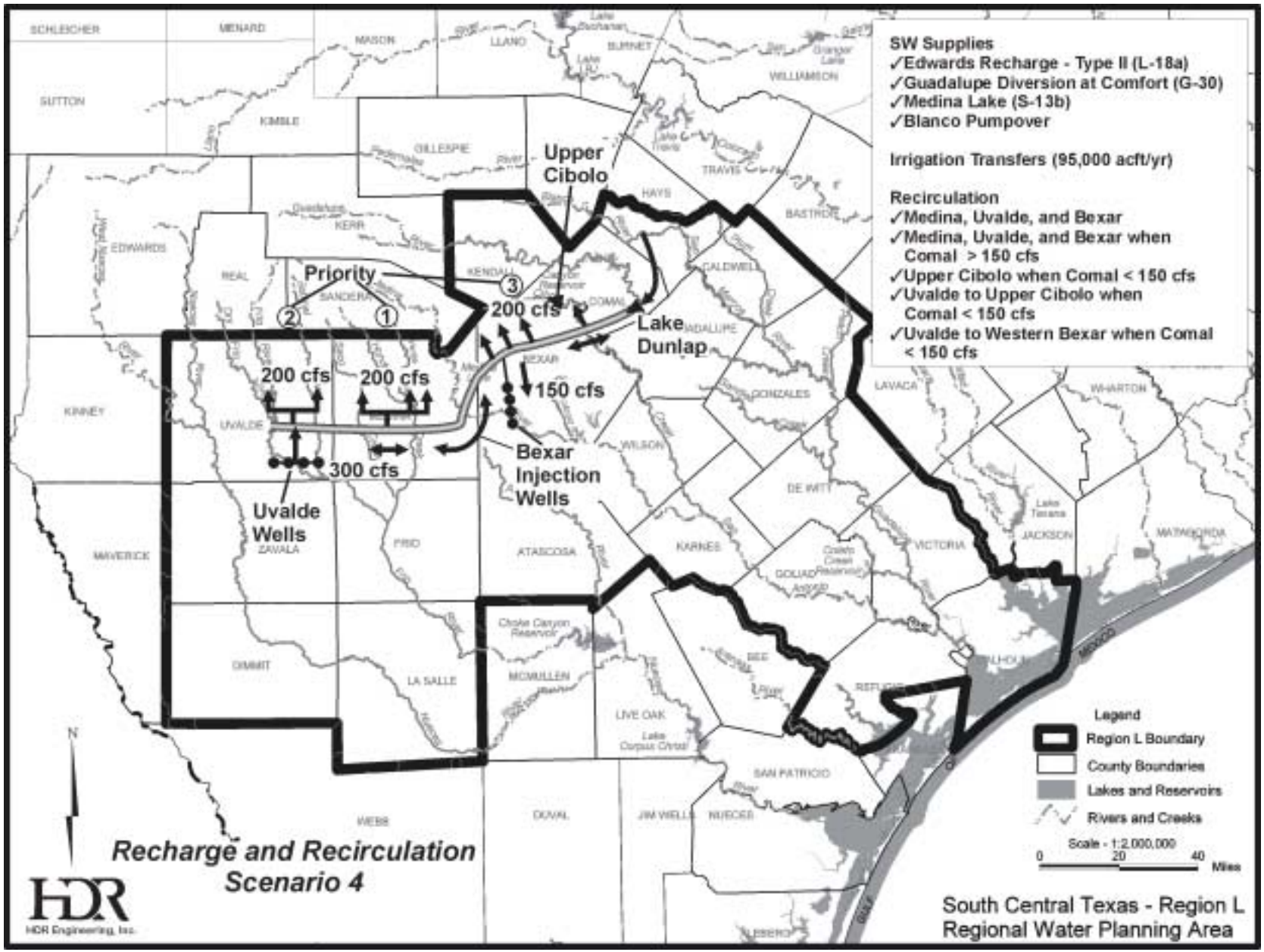
Recharge and Recirculation Regional Water Management Alternative Plan

South Central Texas Region						County =	Zavala	
County Summary of Projected Water Needs and Water Supply Options						User Group(s) =	all	
Projected Water Needs (acft/yr)								
	User Group(s)	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
	Municipal	0	0	0	0	0	0	
	Industrial	0	0	0	0	0	0	
	Steam-Electric	0	0	0	0	0	0	
	Mining	0	0	0	0	0	0	
	Irrigation	80,722	76,589	72,655	88,293	84,673	81,200	
	Total Needs	**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
	Mun, Ind, S-E, & Min Needs	**0**	**0**	**0**	**0**	**0**	**0**	
	Irrigation Needs	**80,722**	**76,589**	**72,655**	**88,293**	**84,673**	**81,200**	
Water Supply Options (acft/yr)		**Candidate**						
ID#	**Description**	**New Supply**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**Notes**
L-10 (Mun.)	Demand Reduction (Conservation)		190	193	194	90	103	104	1
SCTN-4	Brush Management								2
SCTN-5	Weather Modification								2
SCTN-9	Rainwater Harvesting								2
	Small Aquifer Recharge Dams								2
L-10 (Irr.)	Demand Reduction (Conservation)		6,401	6,401	6,401	6,401	6,401	6,401	3
	Total New Supplies		**6,591**	**6,594**	**6,595**	**6,491**	**6,504**	**6,505**	
	Total System Mgmt. Supply / Deficit		**-74,131**	**-69,995**	**-66,060**	**-81,802**	**-78,169**	**-74,695**	
	Mun, Ind, S-E, & Min System Mgmt. Supply / Deficit		**190**	**193**	**194**	**90**	**103**	**104**	
	Irrigation System Mgmt. Supply / Deficit		**-74,321**	**-70,188**	**-66,254**	**-81,892**	**-78,272**	**-74,799**	
Notes:									
1	Demand Reduction (Conservation) strategies assumed largely reflected in projected water demands.								
2	Option expected to provide additional water supply in many years, but dependable supply during drought is presently unquantified.								
3	Estimates based upon use of LEPA systems on 50 percent of acreages irrigated in 1997, with conservation at 20 percent of irrigation								
	application rate.								


SW Supplies
✓Edwards Recharge - Type II (L-18a)
✓Guadalupe Diversion at Comfort (G-30)
✓Medina Lake (S-13b)
✓Blanco Pumpover
Irrigation Transfers (95,000 acft/yr)
Recirculation
✓Medina, Uvalde, and Bexar
Priority
3
2
1
200 cfs
Lake Dunlap
200 cfs
200 cfs
Legend
Region L Boundary
County Boundaries
Lakes and Reservoirs
Rivers and Creeks
Scale - 1:2,000,000
0
20
40
Miles
N
Recharge and Recirculation Scenario 1
HDR
HDR Engineering, Inc.
South Central Texas - Region L
Regional Water Planning Area


SW Supplies
✓Edwards Recharge - Type II (L-18a)
✓Guadalupe Diversion at Comfort (G-30)
✓Medina Lake (S-13b)
✓Blanco Pumpover
Irrigation Transfers (95,000 acft/yr)
Recirculation
✓Medina, Uvalde, and Bexar
✓Medina, Uvalde, and Bexar when Comal > 150 cfs
✓Upper Cibolo when Comal < 150 cfs
Upper Cibolo
Priority
3
2
1
200 cfs
Lake Dunlap
200 cfs
200 cfs
Legend
Region L Boundary
County Boundaries
Lakes and Reservoirs
Rivers and Creeks
Scale - 1:2,000,000
0
20
40
Miles
N
Recharge and Recirculation Scenario 2
HDR
HDR Engineering, Inc.
South Central Texas - Region L
Regional Water Planning Area


SW Supplies
✓Edwards Recharge - Type II (L-18a)
✓Guadalupe Diversion at Comfort (G-30)
✓Medina Lake (S-13b)
✓Blanco Pumpover
Irrigation Transfers (95,000 acft/yr)
Recirculation
✓Medina, Uvalde, and Bexar
✓Medina, Uvalde, and Bexar when Comal > 150 cfs
✓Upper Cibolo when Comal < 150 cfs
✓Uvalde to Upper Cibolo when Comal < 150 cfs
Upper Cibolo
Priority
3
2
1
200 cfs
Lake Dunlap
200 cfs
200 cfs
150 cfs
Uvalde Wells
Recharge and Recirculation Scenario 3
Legend
Region L Boundary
County Boundaries
Lakes and Reservoirs
Rivers and Creeks
Scale - 1:2,000,000
0 20 40 Miles
South Central Texas - Region L Regional Water Planning Area
HDR Engineering, Inc.


SW Supplies
✓Edwards Recharge - Type II (L-18a)
✓Guadalupe Diversion at Comfort (G-30)
✓Medina Lake (S-13b)
✓Blanco Pumpover
Irrigation Transfers (95,000 acft/yr)
Recirculation
✓Medina, Uvalde, and Bexar
✓Medina, Uvalde, and Bexar when Comal > 150 cfs
✓Upper Cibolo when Comal < 150 cfs
✓Uvalde to Upper Cibolo when Comal < 150 cfs
✓Uvalde to Western Bexar when Comal < 150 cfs
Upper Cibolo
Priority
3
2
1
200 cfs
Lake Dunlap
200 cfs
200 cfs
150 cfs
300 cfs
Bexar Injection Wells
Uvalde Wells
Recharge and Recirculation Scenario 4
HDR
HDR Engineering, Inc.
N
Legend
Region L Boundary
County Boundaries
Lakes and Reservoirs
Rivers and Creeks
Scale - 1:2,000,000
0
20
40
Miles
South Central Texas - Region L
Regional Water Planning Area

Recharge and Recirculation Regional Water Management Plan

Summary of Features and Costs

June 13, 2000

- Surface Water Rights
  - Honored
  - Enhanced flow from Comal Springs is unavailable for meeting water rights or meeting Environmental Criteria. However, enhanced flow from the other springs is available for water rights and environmental criteria.
  - The baseline flow from Comal Springs is based on a simulation of 412,312 pumpage without irrigation transfers to Bexar County.

- Surface Water Supplies
  - Edwards Recharge-Type 2 Projects (L-18a: Frio, Sabinal, Verde, Hondo, Cibolo, Blanco, and Indian Creek Pumpover)
  - Guadalupe River Diversion to Recharge Zone (G-30) with recharge in NW Bexar County
  - Medina Lake Recharge Enhancements (S-13b)
  - Blanco River Pump Over to Lake Dunlap (Maximum of 75 cfs)
  - Unappropriated Surface Water at Lake Dunlap. Availability for recirculation is subject to making up a deficit between base springflow and scenario springflow. In other words, when flow from Comal Springs is lower with the Alternative Regional Water Plan than during the baseline conditions, the unappropriated flow is first allocated to surface water rights to cover this deficit.

- Water Transfers
  - Edwards Irrigation (L-15: 95,000 acft/yr)

- Other Management
  - Not included
    - ASR
    - Critical Period Management
    - Term Permits

- Increase in Water Supply produced by the alternative. The increase includes the contributions by all the surface water supplies listed above.
  - Sustained Yield Test: The difference between the total pumpage in the scenario and the total pumpage in the baseline simulation with the 95,000 ac-ft/yr irrigation transfers turned ON.
  - 400K Base: The difference between the total pumpage in the scenario and 400K Base with 95,000 acft/yr of irrigation transfers.

- Costs Estimates:
  - Capital: Include recharge and transfer facilities as well as the recirculation facilities.
  - O&M: Based on average flow of water through the facility
- Tests
  - Sustained Yield: All pumpages were set at a 69.5 percent of the 400K base pumpage and represents the reduction needed to maintain flow from Comal Springs at 60 cfs with a uniform reduction of all pumpage and all the other management factors turned OFF.
  - 400K Base: All pumpage except municipal was set to a multiplier of 1.00. Municipal pumpage multiplier was adjusted until the number of months of flow from Comal Springs was the same as during the 400K Base conditions with all of the management options turned OFF. The total was 91 months.
- Scenarios
  - Scenarios 1, 2, 3, and 4
    - Recirculate from Lake Dunlap at a maximum capacity of 600 cfs to
      - Medina County (maximum = 200 cfs and first priority)
      - Uvalde County (maximum = 200 cfs and second priority)
      - Bexar County (maximum = 200 cfs and third priority)
  - Scenarios 2, 3, and 4
    - Add feature of transferring all recirculation to Upper Cibolo Creek when flow in Comal Springs is less than 150 cfs. The transfer to Upper Cibolo Creek is turned OFF when the flow in Comal Springs exceeds 200 cfs.
  - Scenarios 3 and 4
    - Add feature of turning ON a transfer groundwater, at a rate of 150 cfs, from Uvalde County to Upper Cibolo Creek when the flow from Comal Springs is less than 150 cfs. The transfer it turned OFF when the flow from Comal Springs is greater than 200 cfs.
  - Scenario 4
    - Add feature of turning ON a transfer groundwater, at a rate of 150 cfs, from Uvalde County to Edwards Aquifer in western Bexar County when the flow from Comal Springs is less than 150 cfs. The transfer it turned OFF when the flow from Comal Springs is greater than 200 cfs

Flux for Sustained Yield Simulations
(Minimum Flow from Comal Springs is 60 cfs)
(acft/year)

	Baseline with 95,000 irrigation transfers	***Scenario 1***	***Scenario 2***	***Scenario 3***	***Scenario 4***
Pumpage					
Total	272,538	389,642	405,139	450,411	482,454
Change		117,104	132,601	177,873	209,916
Recirculation					
Lake Dunlap to Medina County	0	131,617	127,452	115,371	102,588
Lake Dunlap to Uvalde County		53,269	49,031	38,680	31,263
Lake Dunlap to Bexar County		45,406	43,280	35,877	28,964
Lake Dunlap to Cibolo Creek		0	2,176	12,947	21,655
Uvalde County Transfer to Cibolo Creek		0	0	8,732	14,069
Uvalde County Transfer to W. Bexar County		0	0	0	14,069
Springflow					
Comal Springs	216,168	262,464	253,896	224,376	200,837
All Springs except Leona	337,021	461,286	445,504	397,121	360,574
Leona Springs	20,854	28,419	27,917	25,871	23,477

Flux for 400K Base Simulations
(Number of Months of Flow Below 60 cfs at Comal Springs is Unchanged)
(acft/year)

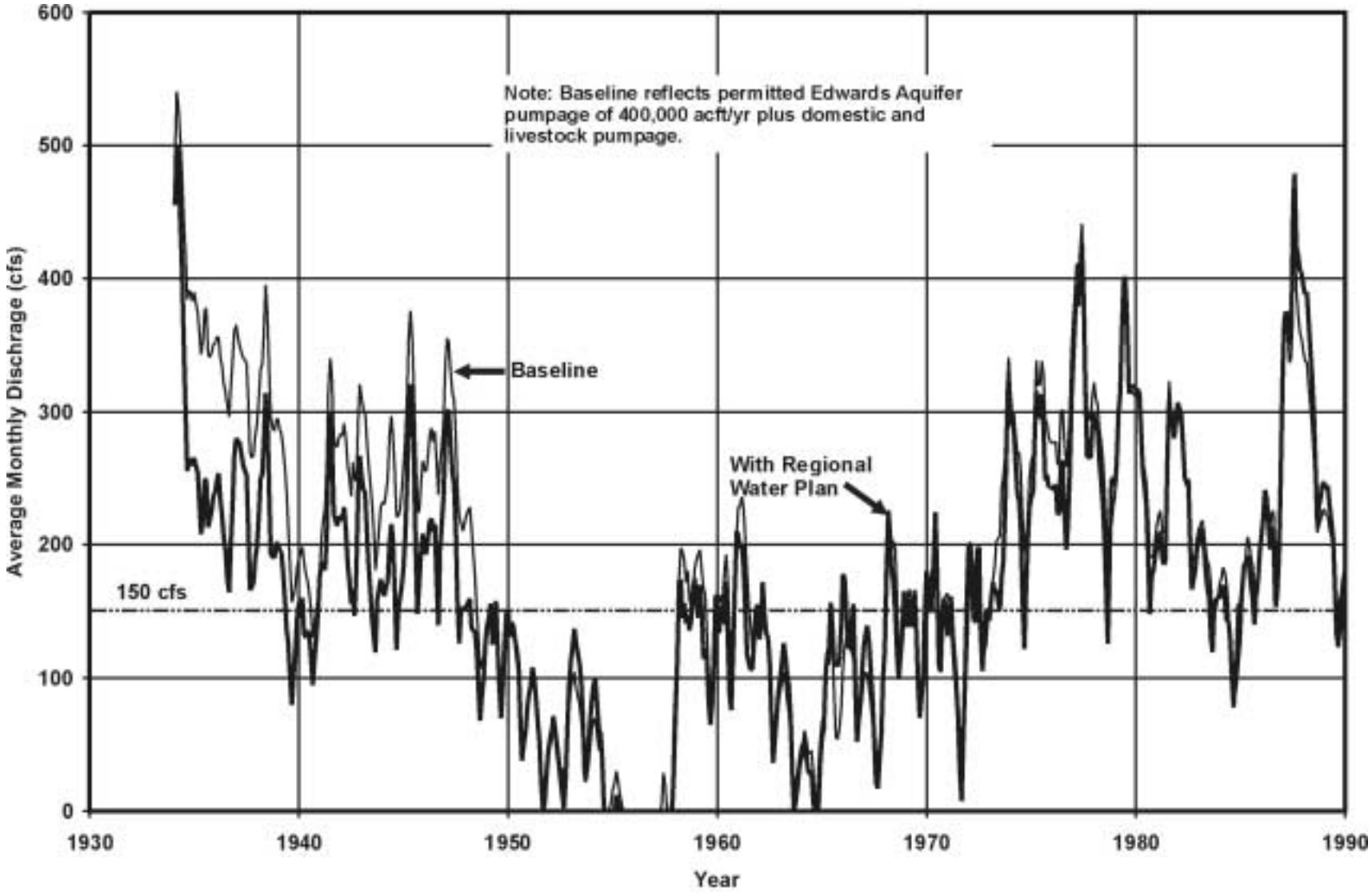
	Baseline with 95,000 irrigation transfers	***Scenario 1***	***Scenario 2***	***Scenario 3***	***Scenario 4***
Pumpage					
Total	412,312	512,323	524,703	567,667	599,226
Change		100,011	112,391	155,355	186,912
Recirculation					
Lake Dunlap to Medina County	0	92,239	79,936	67,882	59,062
Lake Dunlap to Uvalde County	0	27,920	26,668	20,710	17,694
Lake Dunlap to Bexar County	0	25,272	23,583	17,111	12,704
Lake Dunlap to Cibolo Creek	0	0	11,902	54,331	64,389
Uvalde County Transfer to Cibolo Creek	0	0	0	39,458	45,118
Uvalde County Transfer to W. Bexar County	0	0	0	0	45,118
Springflow					
Comal Springs	126,540	169,800	165,600	140,424	122,124
All Springs except Leona	224,963	321,655	314,180	278,876	254,186
Leona Springs	16,194	22,879	22,089	18,212	14,523

Costs for Sustained Yield Simulations

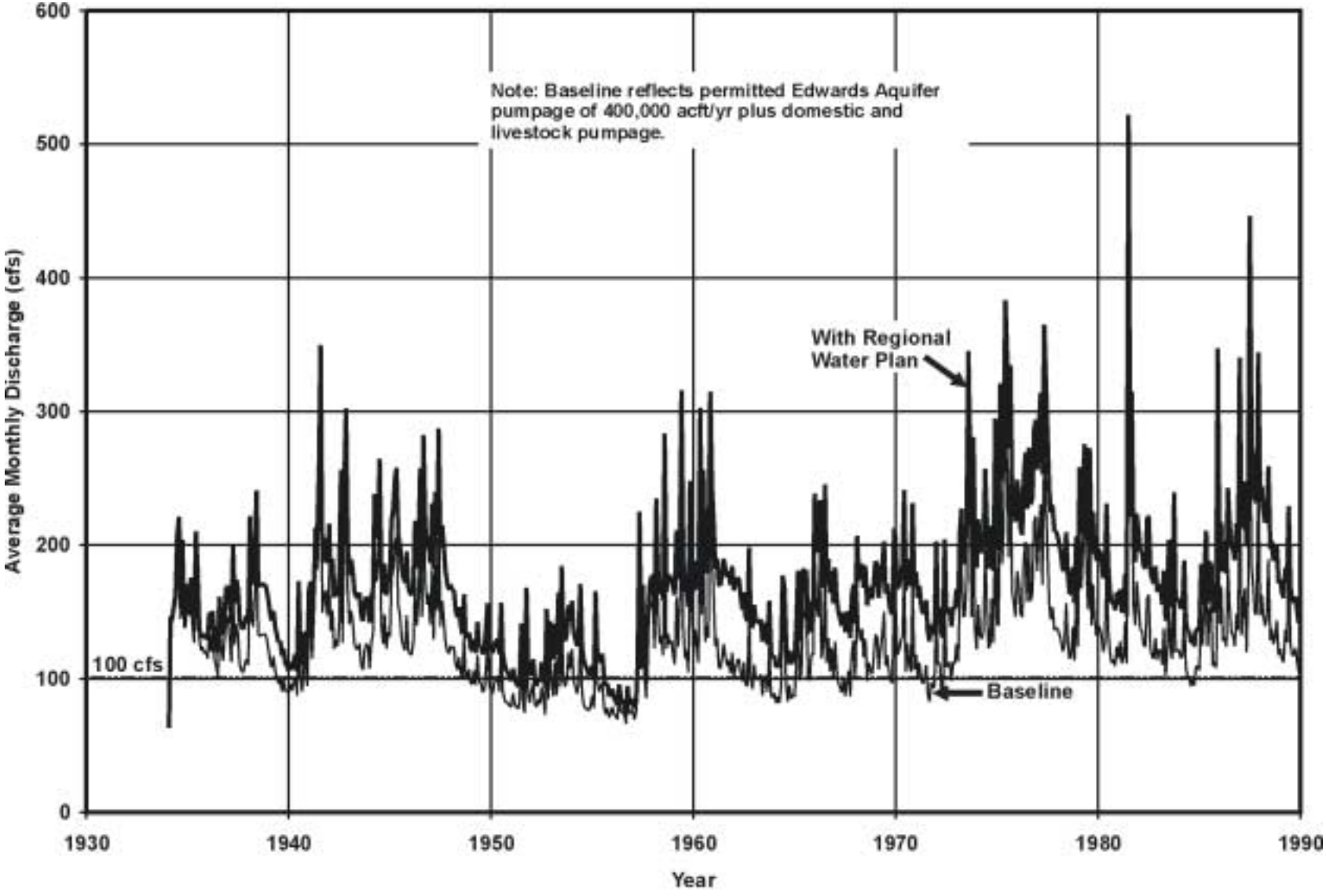
	Scenario 1	***Scenario 2***	***Scenario 3***	***Scenario 4***
Capital	$750,293,000	$752,091,000	$801,932,000	$871,442,000
Project	$1,134,732,000	$1,137,538,000	$1,211,485,000	$1,307,330,000
Annual	$121,316,000	$121,079,000	$125,886,000	$132,767,000
Annual Cost of Water ($ per acft)	$1,036	$913	$708	$632

Costs for 400,000 Base Simulations

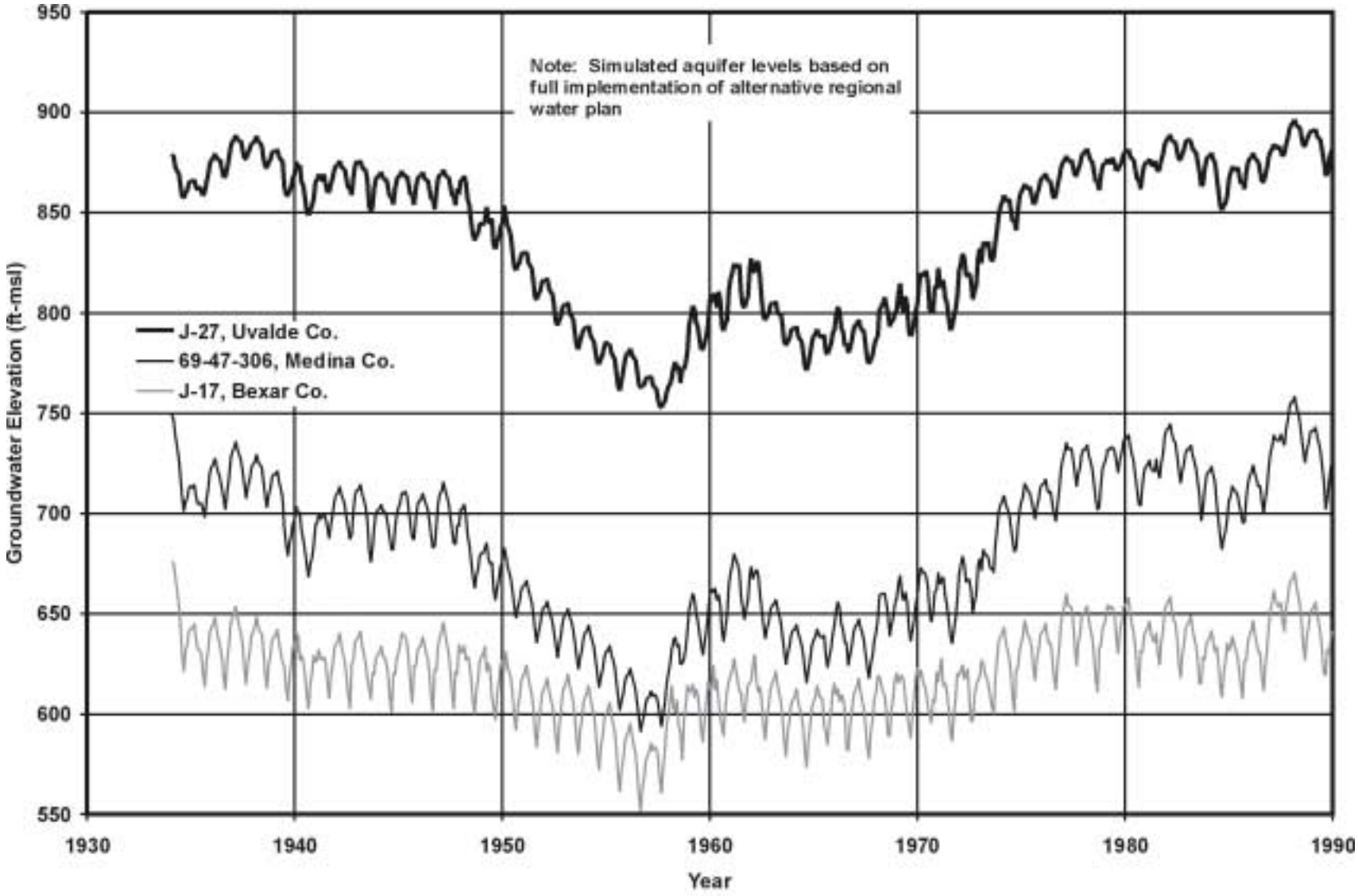
	Scenario 1	***Scenario 2***	***Scenario 3***	***Scenario 4***
Capital	$750,293,000	$752,091,000	$801,932,000	$871,442,000
Project	$1,134,723,000	$1,137,538,000	$1,211,485,000	$1,307,330,000
Annual	$114,123,000	$114,292,000	$123,976,000	$132,947,000
Annual Cost of Water ($ per acft)	$1,141	$1,017	$798	$711



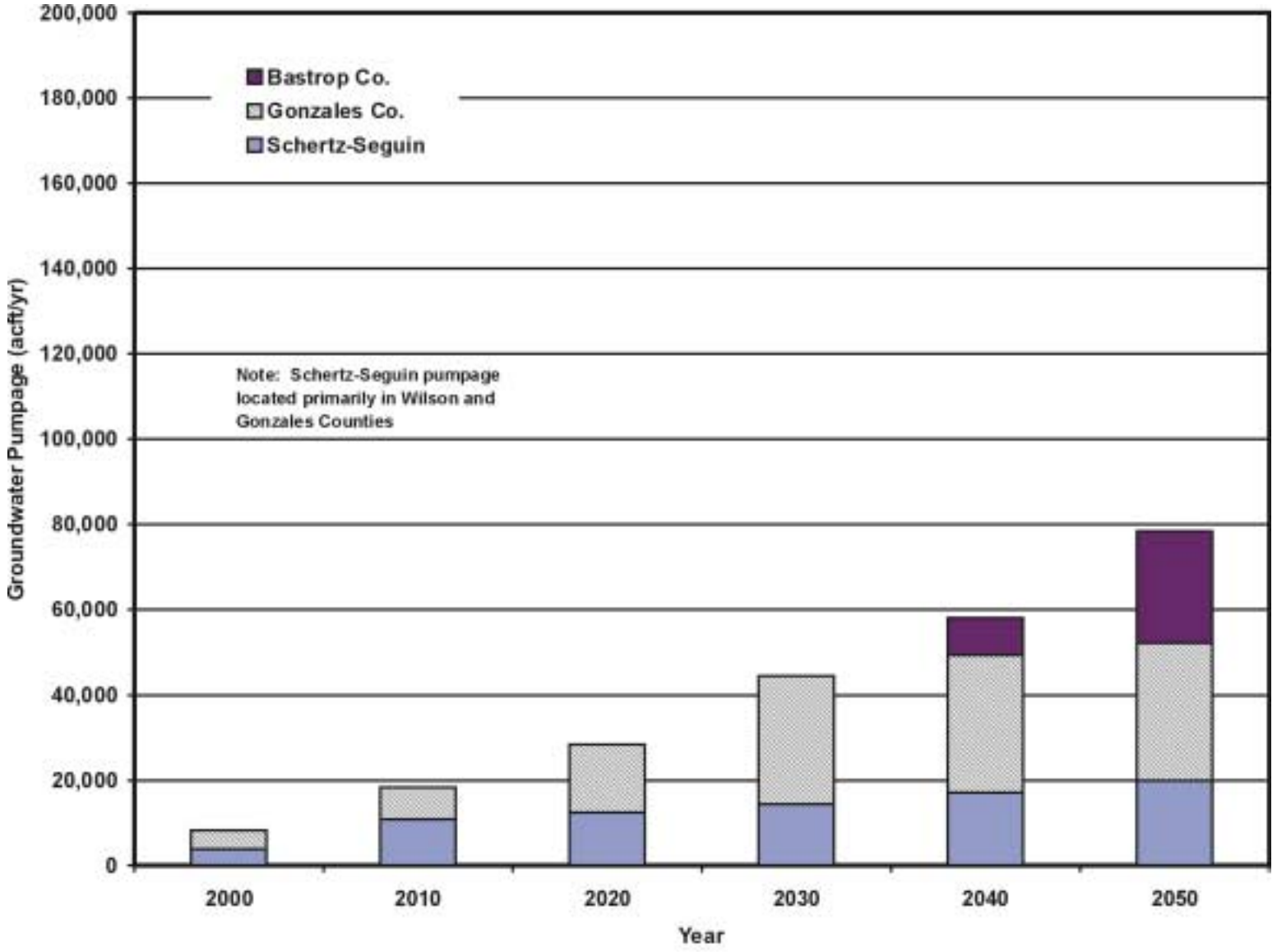
Recharge and Recirculation Alternative Regional Water Plan
Simulated Comal Springs Discharge



Recharge and Recirculation Alternative Regional Water Plan
Simulated San Marcos Springs Discharge

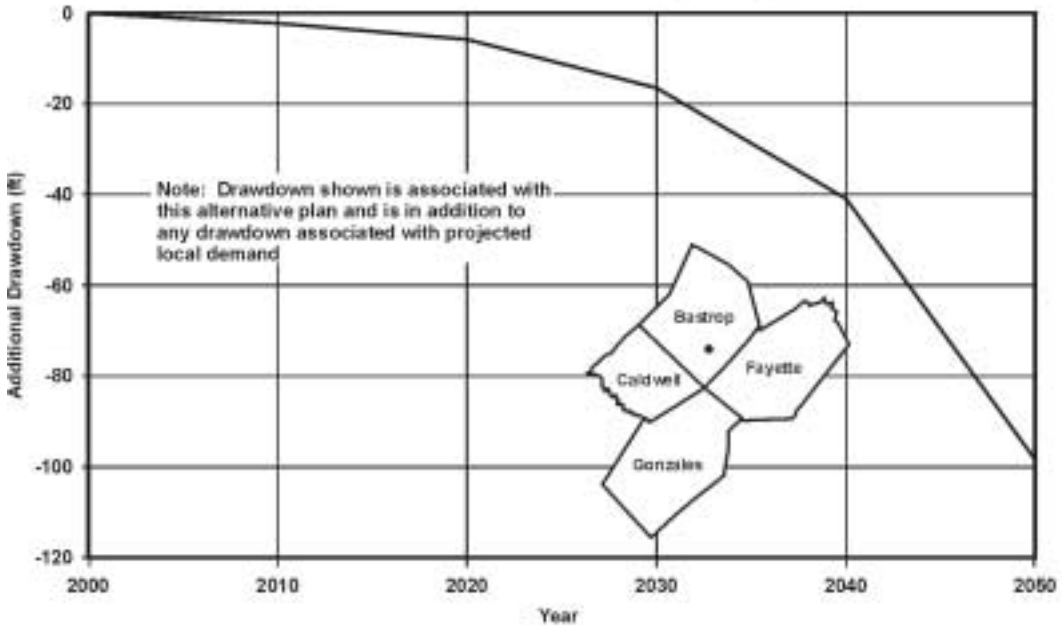


Recharge and Recirculation Alternative Regional Water Plan
Simulated Edwards Aquifer Levels

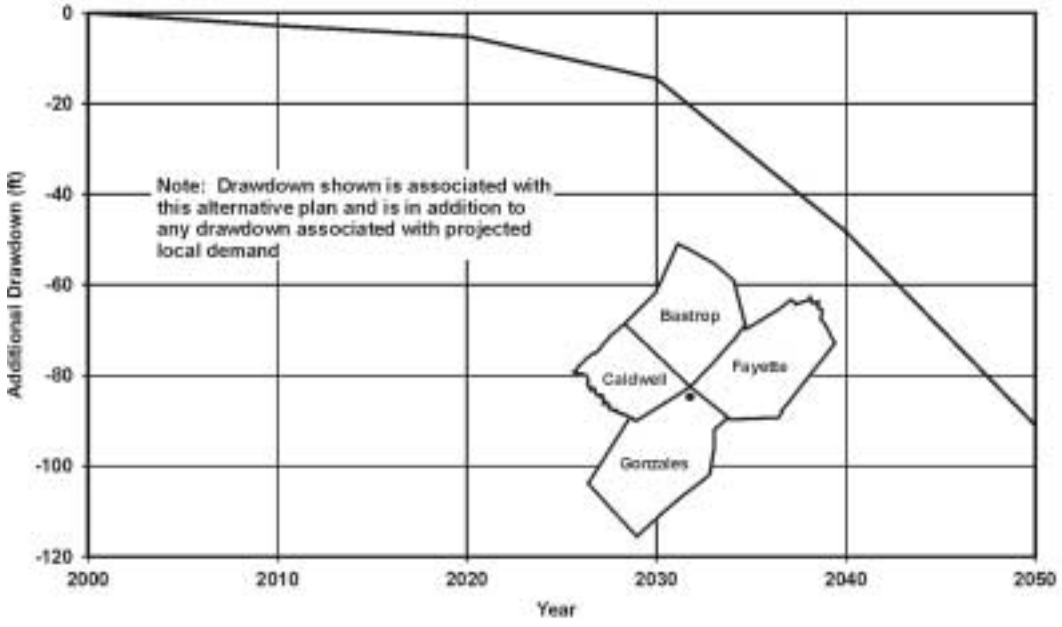


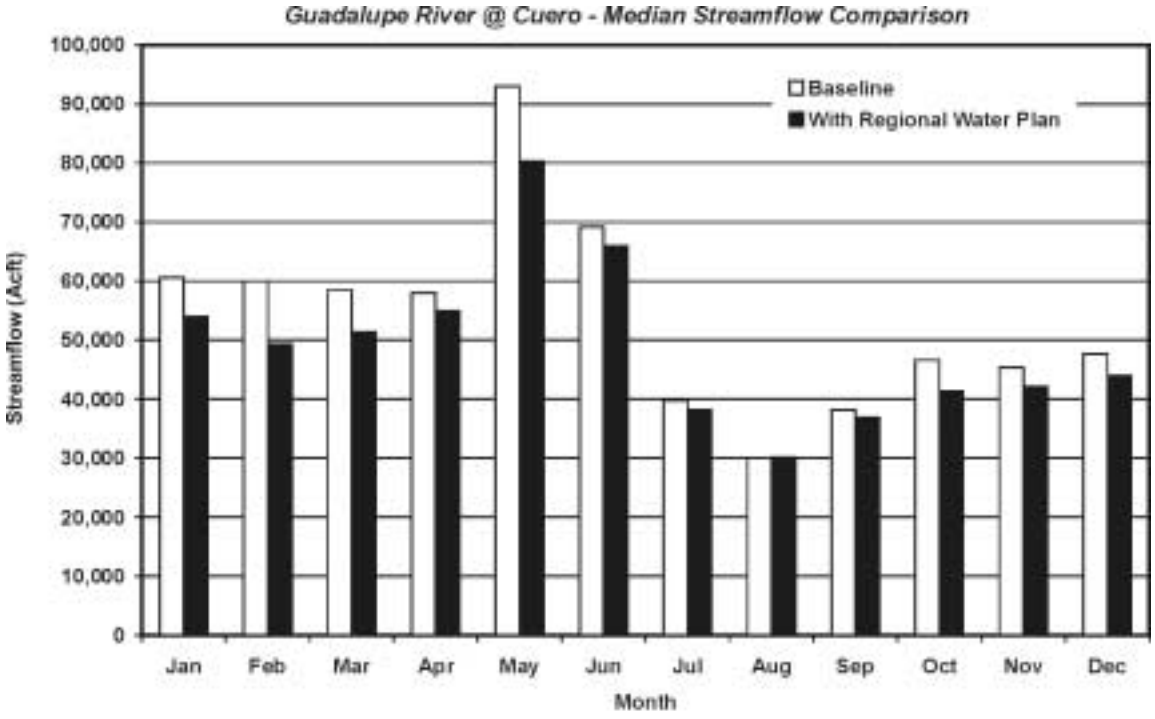
Recharge and Recirculation Alternative Regional Water Plan
Additional Carrizo Groundwater Pumpage

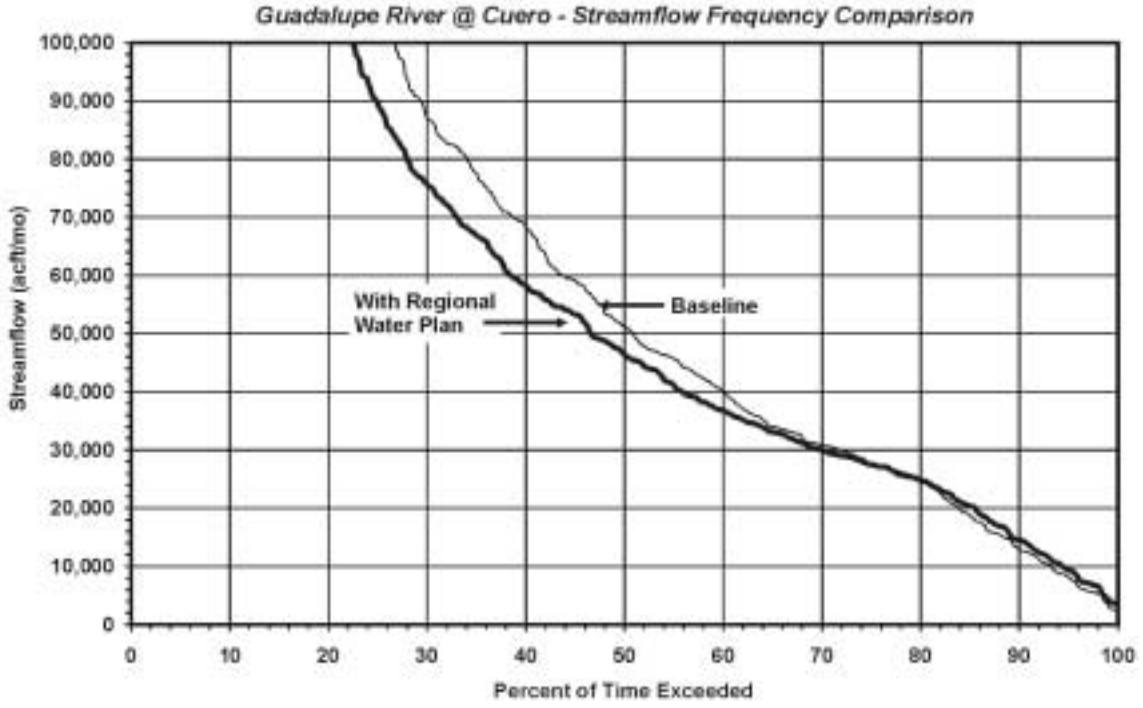
Drawdown in Southern Bastrop County



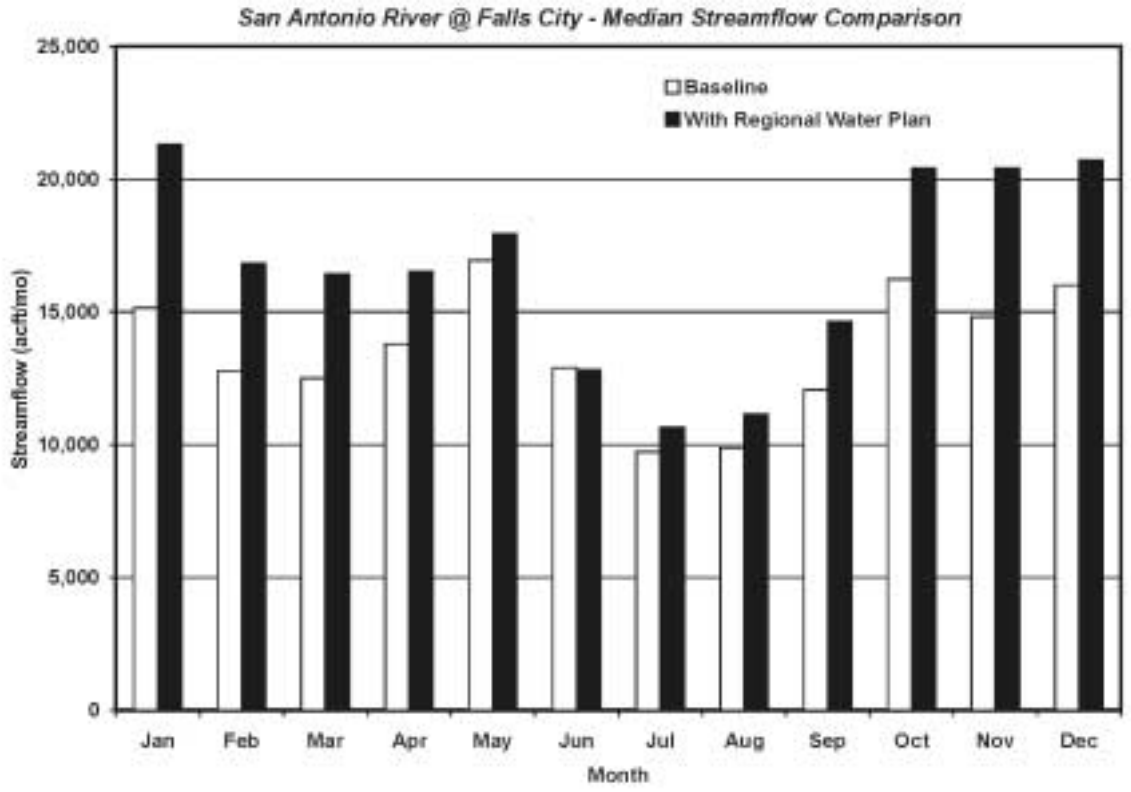
Drawdown in Northern Gonzales County

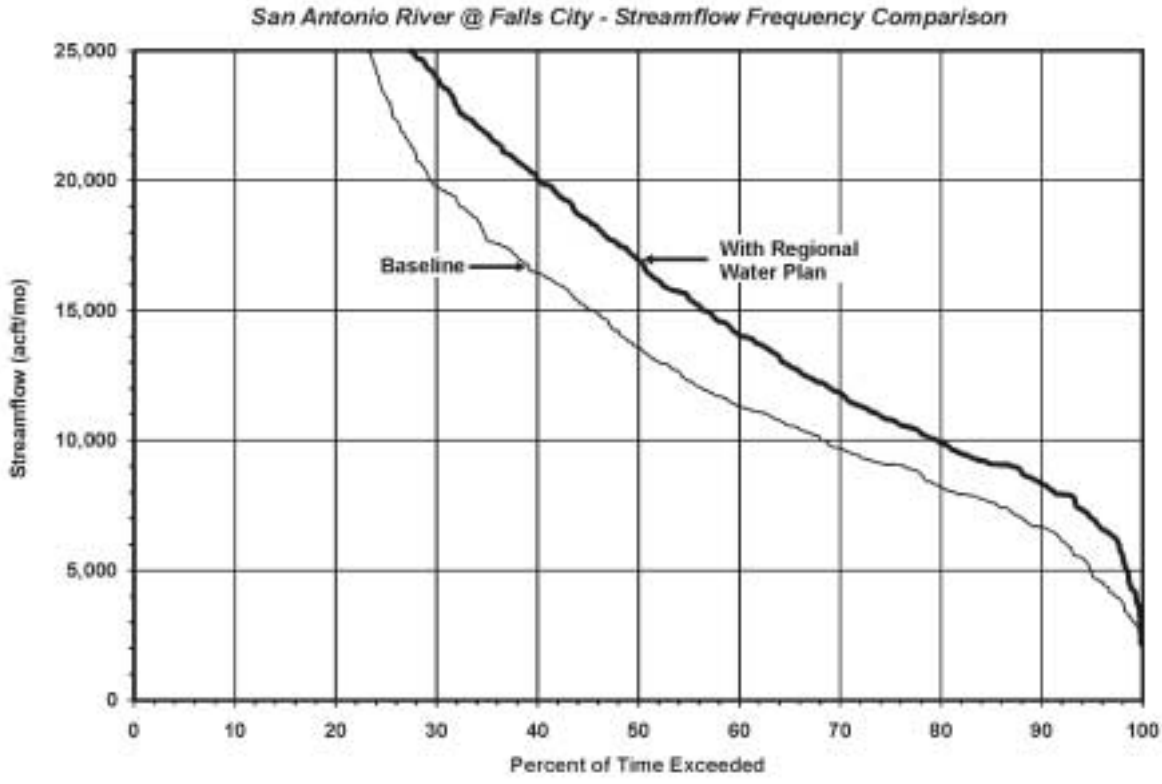




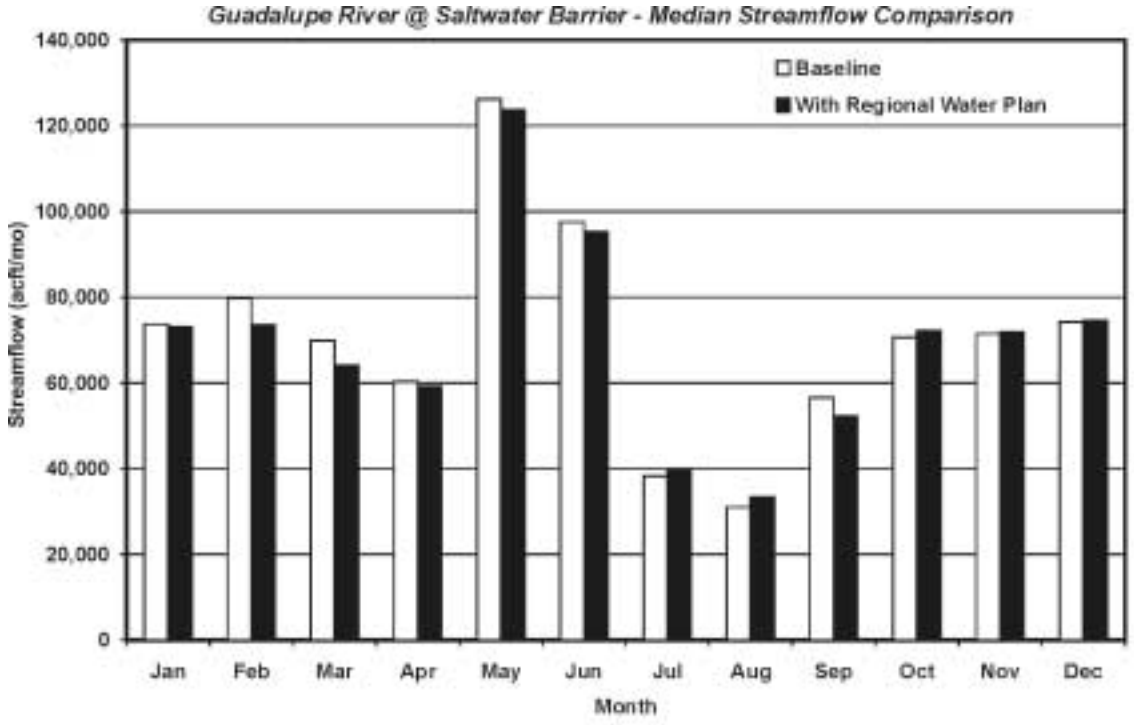


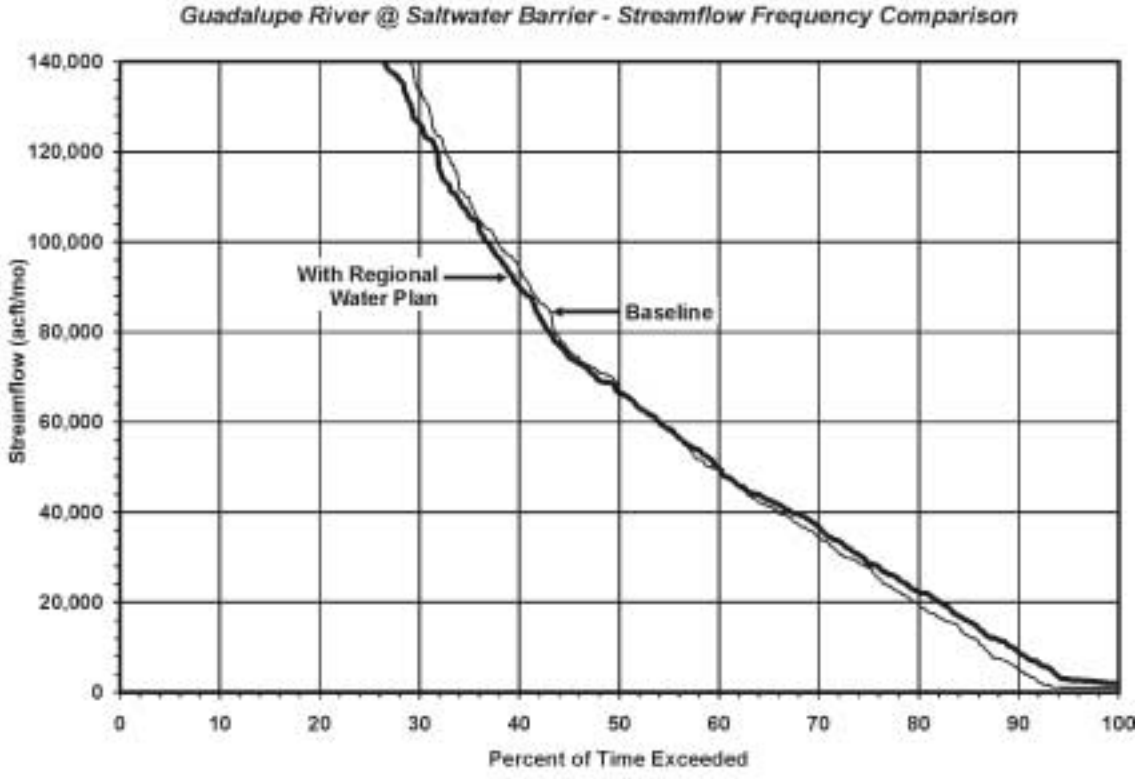
Recharge and Recirculation Alternative Regional Water Plan
Streamflow Comparisons





Recharge and Recirculation Alternative Regional Water Plan
Streamflow Comparisons





Recharge and Recirculation Alternative Regional Water Plan
Streamflow Frequency Comparisons

Figure 1
Composite Environmental and Cultural Resources Impacts Summary for Five Alternative Regional Water Plans

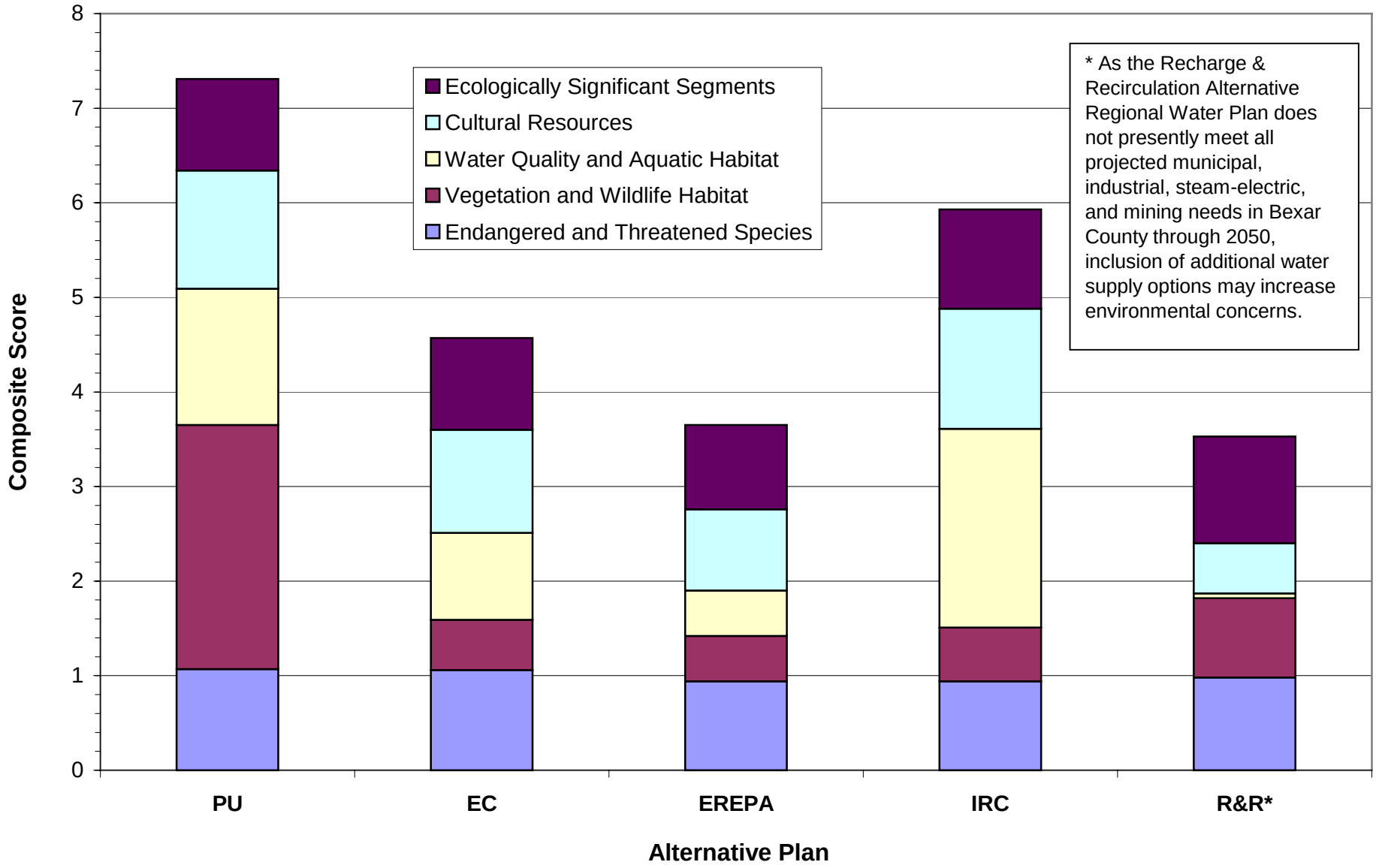


Figure 2
Endangered & Threatened Species

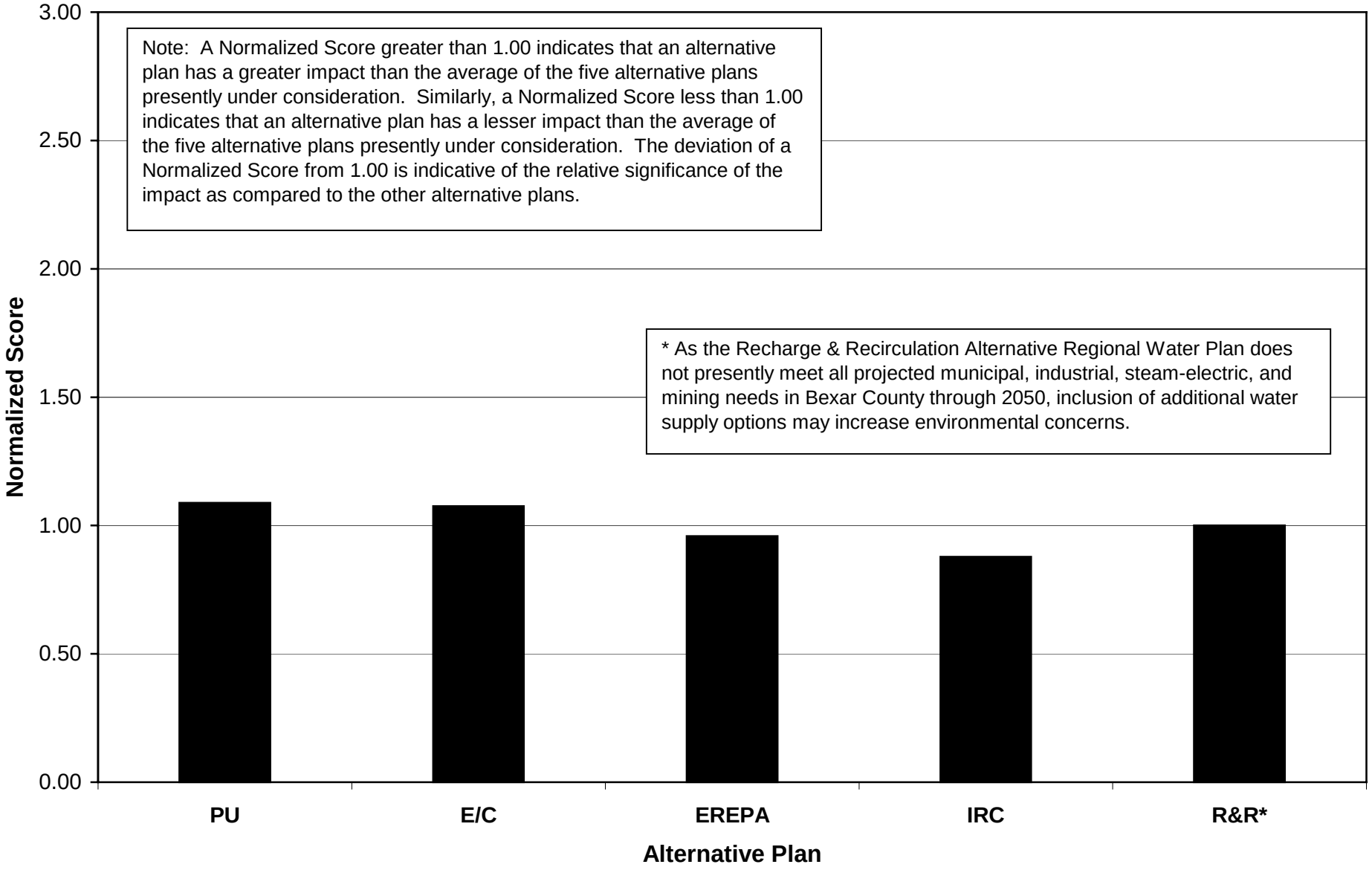


Figure 3
Vegetation & Wildlife Habitat

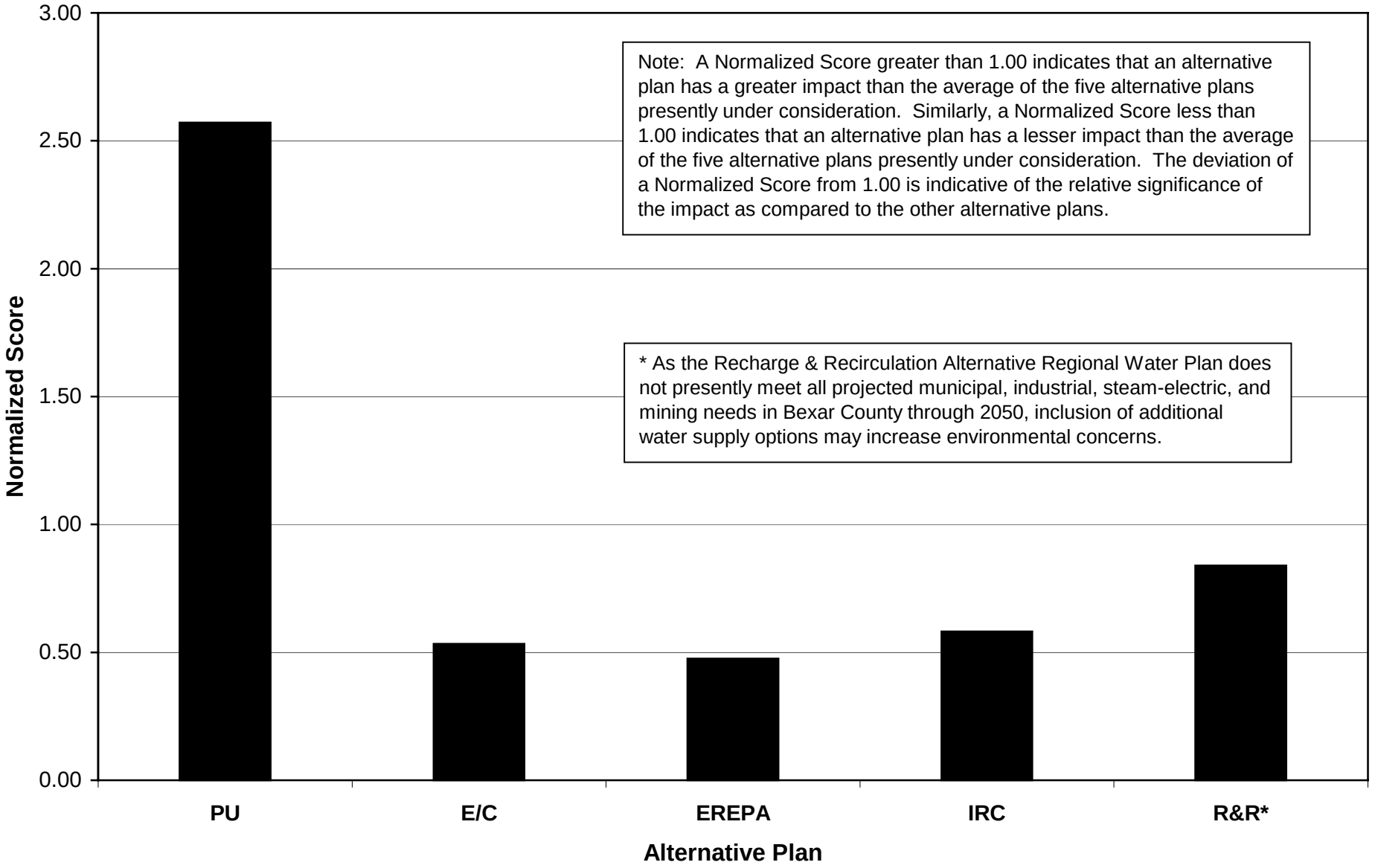


Figure 4
Water Quality & Aquatic Habitat

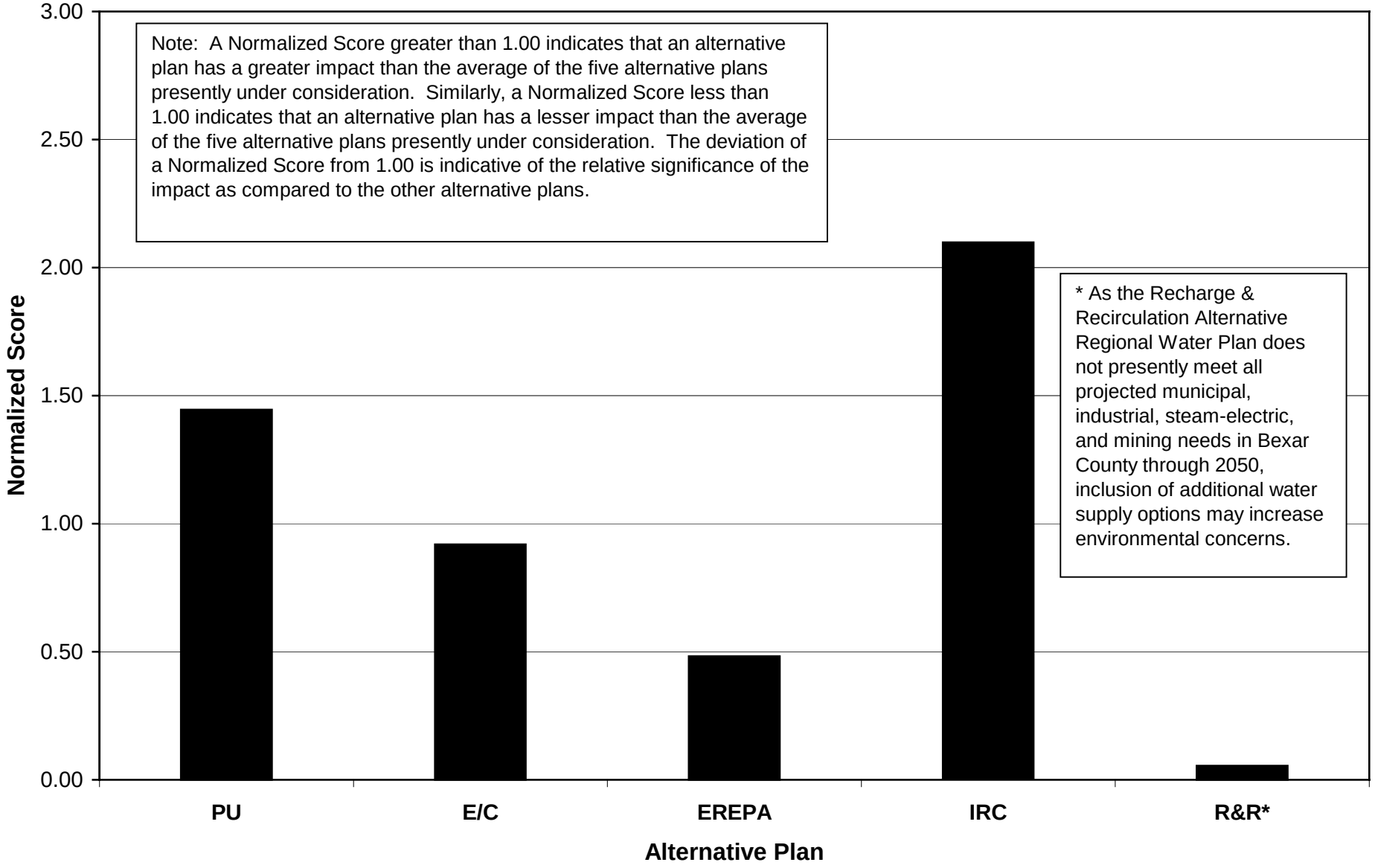


Figure 5
Cultural Resources

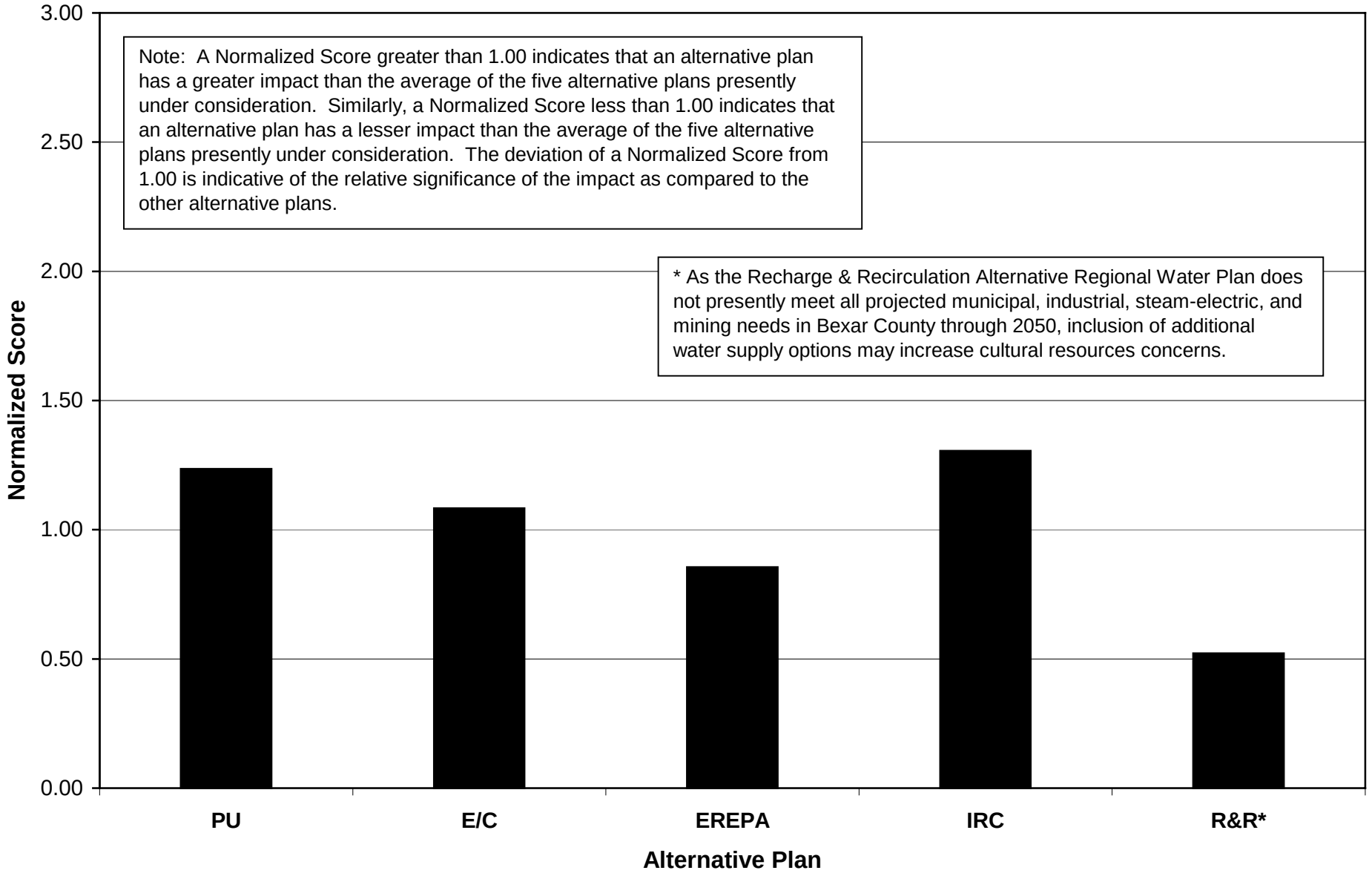
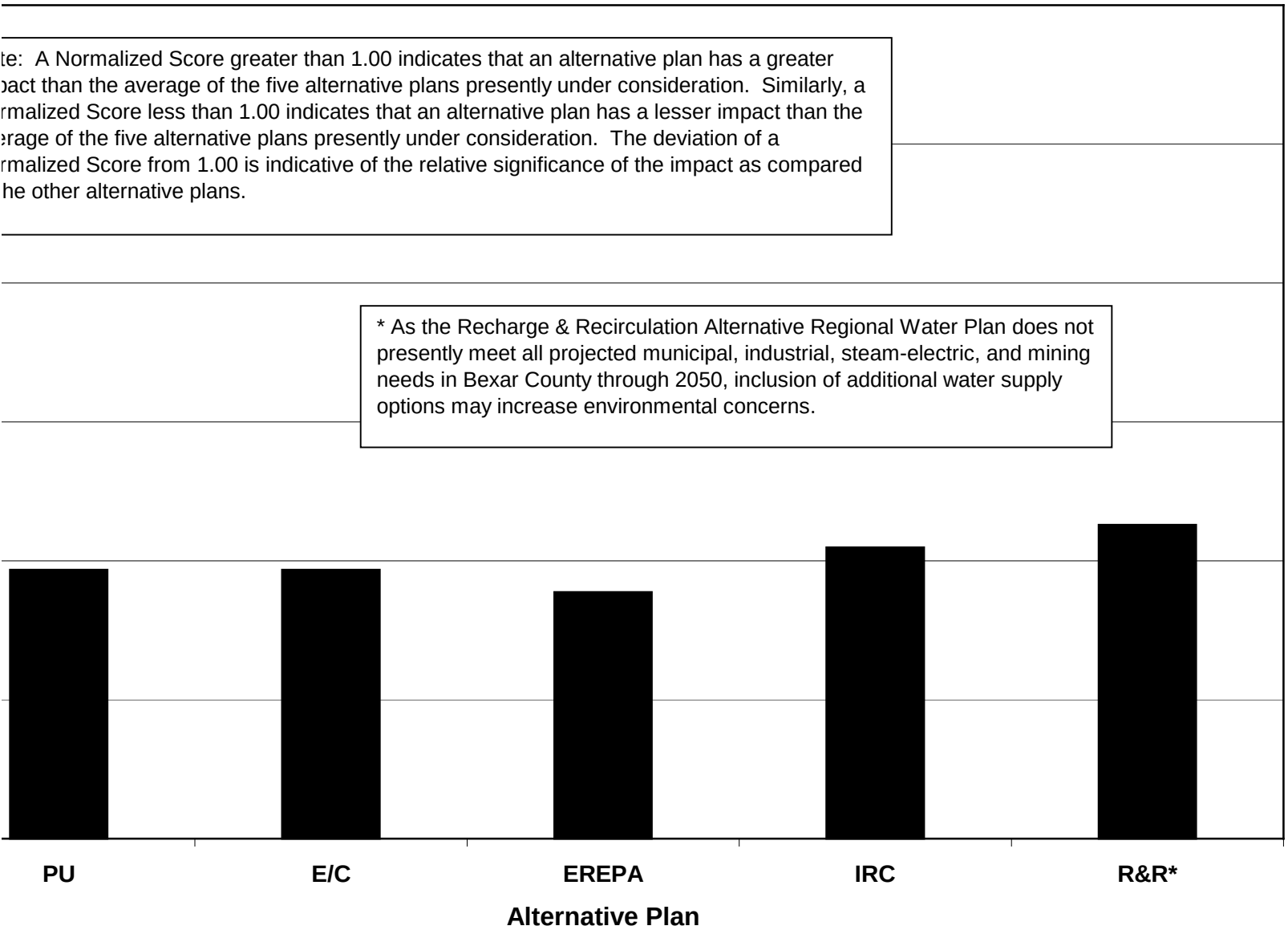


Figure 6
Ecologically Unique River and Stream Segments



Assessment of Potential Environmental Impacts of Five South Central Texas Region Regional Water Management Alternative Plans

1.0 Introduction

This document is a preliminary assessment of the potential environmental impacts of the five Alternative Water Management Plans now under consideration in Region L. The assessment is based on engineering descriptions provided by HDR Engineering, Inc. of the individual water supply options used to construct the Alternative Plans and on environmental data compiled during previous studies of the water supply options and updated for this phase of the Senate Bill 1 work in region L.

This assessment is preliminary in the sense that neither environmental nor engineering site-specific studies have been performed to verify the published data employed, identify environmental resources at risk that can be avoided, finalize facility locations and operational routines, and propose compensation for unavoidable impacts. This assessment provides relative rankings of potential environmental impacts of the Alternative Plans (and individual water supply options) as they are presently described. However, most of the facilities evaluated here have been designed and located only in a conceptual sense, the actual locations of intakes, pipeline rights-of-way, and other project features will not be finally determined until site-specific field studies and land acquisition programs have been completed. For that reason many, if not most of the potential impacts tabulated in the following evaluations, can be avoided or significantly mitigated by relocation of project elements. This is particularly the case with respect to facilities such as pipelines and individual well pads and less so for reservoirs, for which there may be a limited set of suitable sites.

2.0 Methods

For each Water Supply Option, potential impacts to five resource categories were evaluated:

1) Endangered and Threatened Species,
2) Vegetation and Wildlife Habitats,
3) Water Quality and Aquatic Habitats,
4) Cultural Resources
5) Ecologically Unique Segments

The composite impact values from each resource evaluation were tabulated for all water supply options included in each of the Water Management Alternatives. Raw impact scores in each of the five resource evaluations were divided by the average score for the five alternatives to produce normalized scores that can be summed over the resource categories to arrive at an overall relative impact assessment for the five Alternative Plans. The normalized scores are summarized in Table 1. For comparison, linear rankings of the potential impacts of the five Alternative Plans are also included in Table 1.

2.1 Endangered and Threatened Species

To assess the relative impact potential of the five water management plans on endangered and threatened species, and watchlist species, the potential impacts of each individual water supply option were first evaluated with respect to those species using a two-part index system. First, each listed species was assigned a multiplier that reflected its status: 1-species of concern, 2-threatened, 3-endangered. In cases where status varied among state and federal agencies, the higher status was used. As a practical matter, we note that federally listed endangered and threatened species enjoy a higher level of legal and regulatory protection than do state listed species. While Texas Organization for Endangered Species (TOES) watchlist species have no special protections, their presence often serves as a useful marker for areas of particularly high biodiversity or unique habitats.

The most current county lists and mapped occurrences of endangered and threatened species within Region L were obtained from the Texas Parks and Wildlife Department Natural Heritage Program. Supplementary information on federally listed species in Region L was obtained from the U.S. Fish and Wildlife Service, and Texas Organization for Endangered Species was contacted to update information on their watchlist species. Reported occurrences of protected and watchlist species, areas of existing, suitable habitats for those species, and their historic ranges were compared to pipeline routes prepared by HDR Engineering to determine where potential impacts might occur.

Each water supply option was then evaluated with respect to its potential impact on endangered and threatened species by assigning a numerical value from zero (0) to three (3) to each instance in which construction or operational disturbances could result in an impact to one of these species according to the following criteria:

0 -- No adverse impact expected, project in historic range only
1 -- Species known to occur within county, but not likely to impact
2 -- Species or potential habitat known to occur within the project area, may impact habitats or individuals of widespread species
3 – Species or habitat present within the corridor, significant reductions in critical habitat or population of endemic species possible.

Each potential impact score was then multiplied by the status score and the product of the two values entered in the results table for that option. All species impact values were then summed for each water supply option. The summed impact values for the suite of water supply options employed in each of the five Alternative Water Management Plans are tabulated and summed over each Alternative to generate an overall endangered and threatened species impact value. This information is summarized in Table 2

2.2 Vegetation and Wildlife Habitat

The South Central Texas Region water supply options impact a variety of habitats in a variety of manners. Any comparison of the alternative plans based on the total impact to wildlife habitat must take into consideration the relative value of each of the habitats

being disturbed and to the extent of the disturbance. In this comparison, each of the water supply options was given a "total adjusted impact value" based on a matrix of the total area of each of the habitat types disturbed and the level of impact to each. The sum of these impact values for each of the options within an alternative plan was used to compare the five alternative plans.

For each option, the total land area potentially disturbed was divided into categories based on types of disturbance. For example, inundation of land due to the construction of a reservoir is a different type of disturbance than the temporary construction corridor of a pipeline easement. Using information about each option given in the October 1999 Technical Evaluations of South Central Texas Region Water Supply Options, the May 2000 South Central Texas Region Water Management Alternative Plans and from updates from HDR Engineering, Inc., the number of acres of each type of disturbance was estimated. Pipeline routes were provided digitally by HDR and overlaid on to DRG (Digital Raster Graphic) maps of 7.5 minute USGS Quads using ArcView. From this, pipeline lengths and areas were calculated. A 30foot permanent easement corridor was given to pipelines with pipe diameters less than 36inches and 40foot corridors for those with diameters greater than 36inches. A 100foot temporary construction corridor was given to all pipelines. Area inundated by reservoirs was provided in the 1999 Technical Evaluations, as well as other estimations of land area disturbed. The total area for facilities such as water treatment plants, pump stations, storage units, and wells was calculated by subtracting any reservoir areas and permanent pipeline easement areas from the total impact area stated in the 1999 Technical

Habitat categories were based on a clustering of the eight Physiognomic Regions of vegetation by the Texas Parks and Wildlife Department.

1) 0-30% canopy cover - grasslands, shrubland and cropland.
2) 31-70% canopy cover - brushland and parkland.
3) 70-100% canopy cover - woodland and forest.
4) All wetland and wooded riparian areas

Area to be disturbed in each habitat type were multiplied by a factor reflecting the projected severity of disturbance:
Low (x1) - temporary disturbance only
Medium (x2) - permanent disturbance, managed at reduced habitat/wildlife value
High (x3) – permanent disturbance, habitat/wildlife value nil or permanently removed through inundation or construction.

The product of the level of impact multiplier and the adjusted value for the type of habitat yielded the "Adjusted Impact Value." The sum of these values is the "Total Adjusted Impact Value" for the option. These values, together with linear rank and normalized scores are presented in Table 3

2.3 Water Quality and Aquatic habitats

Potential impacts to water quality and aquatic habitats were evaluated in a two stage process. First, an impact matrix tabulating the water quality/aquatic habitat effects of the individual Water Supply Options was developed and scores were summed over the sets of Options comprising the Alternative Plans. Second, net changes in streamflows in the Guadalupe, San Antonio, and Nueces Rivers, and estuarine inflows, resulting from development of each of the five Alternative Plans were evaluated and tabulated (Table 9). Normalized scores from the two evaluations were summed to produce a composite score (Table 4).

Each water supply option was evaluated with respect to a list of seven potential impact classes and assigned a score if the impact was likely to result from project implementation. Impact classes employed and the associated scoring was as follows:

1) Inundation/Conversion of lotic to lentic habitat: 1
2) Streamflow reductions:1, or 0.25 if compliant with consensus planning criteria
3) Alteration of flood frequency (below storage reservoirs): 1
4) Alteration of physico-chemical characteristics of streamflow:1, or 0.25 if compliant with consensus planning criteria
5) Blocks aquatic migration (<u>any</u> dam on a perennial stream): 1
6) Alteration of annual hydrograph: 1, or 0.25 if compliant with consensus planning criteria
7) Construction disturbance: 1 for <u>each</u> outfall, intake, pipeline stream crossing, and dam

2.4 Cultural Resources

The following references were used to obtain identify and obtain other information on historic sites:

B. Dooley Awbrey, C. Dooley and the Texas Historical Commission. <u>Why Stop? A guide to Texas Historical Roadside Markers</u>, 3rd Edition. Gulf Publishing Company. 1992. p 540.

Texas Historical Commission. Texas Historic Sites Atlas. Online. Texas Historical Commission Homepage. Internet. atlas.thc.state.tx.us/Atlas/atlas_search_frame.html

All historic sites mapped within a mile of the pipeline corridor using ArcView and the DRG files mentioned above were entered into the impact matrix along with their distances from the pipeline and other details relevant to determining probable impact. The probable impact on each historic site was determined according to the criteria listed below. These values were then summed to obtain a "total historical site impact value" for each water supply option.

1. Historic sites that were mapped at a distance greater than 0.50 mile from the pipeline were assigned a value of "0".
2. Sites between 0.25 and 0.50 mile were assigned a value of "1".
3. Sites less than 0.25 mile were assigned a value of "2".
4. Sites that would be permanently inundated by reservoir waters were assigned a value of "3".
5. An additional impact point was assigned if the historical site was a cemetery. (For example: If a historical site was less than 0.25 mile from the pipeline and it was a cemetery; it was assigned a value of "3".)
6. Other reasons for adding and subtracting impact points are listed in the spreadsheet mentioned above.

Potential impacts to archaeological resources were estimated by compiling the number of proposed disturbances to landforms considered to be of relatively high potential for containing buried archaeological deposits. The high-potential areas were defined to be stream terraces bordering both perennial and intermittent streams. A probable impact index was devised which included factors reflecting site potential and type of disturbance for each instance of the activity:

1) perennial stream crossings - 1.5
2) intermittent stream crossings – 1
3) construction parallel to perennial stream channels - 2.5,
4) construction parallel to intermittent stream parallels - 2.

For each water supply option, impact values for historical sites were added to the potential archaeological site impact estimate to arrive at a total impact value. Cultural resources impacts are summarized in Table 5.

2.5 Ecologically Unique Segments

Instances of individual Water Supply Option activities projected to occur in stream segments nominated as Ecologically Unique River and Stream Segments by Texas Parks and Wildlife Department are tabulated in Table 6, and the results summed for each Alternative in table 6a. Table 7 summarizes the characteristics on which nomination as an ecolocically unique segment was based, while Table 8 provides more detail on the activities and environmental effects expected in each segment.

Results

Table 1 presents a comparison of the environmental impact potentials of the five Alternative Water Management Plans being considered. The distribution of impacts among the water supply options making up the five Alternative Water Management Plans is shown in Figure 1 and in Tables 2 through 6a and the relative potential impacts of the five Alternative Plans are shown graphically in Figures 1 through 6. Impact matrices developed for individual water supply options are available as electronic files.

Table 1
Comparison of Alternative Water Management Plans

Rank

	Endangered and Threatened Species	Vegetation and Wildlife Habitat	Water Quality and Aquatic Habitat	Cultural Resources	Ecologically Significant Segments	Total	Rank
PU	5	5	4	4	2.5	20.5	5
EC	4	2	3	3	2.5	14.5	3
EREPA	2	1	2	2	1	8	1
IRC	1	3	5	5	4	18	4
RR	3	4	1	1	5	14	2

Normalized Interval

	Endangered and Threatened Species	Vegetation and Wildlife Habitat	Water Quality and Aquatic Habitat	Cultural Resources	Ecologically Significant Segments	Total	Rank
PU	1.07	2.58	1.44	1.25	.97	7.31	5
EC	1.06	.53	.92	1.09	.97	4.57	3
EREPA	.94	.48	.48	.86	.89	3.65	2
IRC	.94	.57	2.10	1.27	1.05	5.93	4
RR	.98	.84	.050	.53	1.13	3.53	1

Table 2
Composite Endangered and Threatened Species Impact Values for all Water Supply Options

Option		PU	EC	EREPA	IRC	RR
SCTN-1a		38	38	38	38	
SCTN-2a		0	0	0	0	0
SCTN-2b					0	
SCTN-3c		62	76		76	
SCTN-4		High*	High*	High*	High*	High*
SCTN-5		0	0	0	0	0
SCTN-6a			78	78		78
SCTN-8		28				28
SCTN-9		0	0	0	0	0
SCTN-14a					56	
SCTN-14b					50	
SCTN-16a			71			
SCTN-16b		71				
S-13b			25	25		25
S-15c		39				
G-15c		30	30	30	30	30
G-21		9				9
G-24		60	60	60	60	60
G-30						100
L-10		0	0	0	0	0
L-15		0	0	0	0	0
L-18a		125				125
L-18c			80	80	80	
CZ-10c		40	40	40	39	
CZ-10d		76		76		76
C-13c			73			
C-17a				82		
C-17b					75	
SAWS recycle.		0	0	0	0	
Trin. Aqu. Bex.		0				
Edwards Aqu.						0
Totals	Raw	578	571	509	466	531
	Normalized	1.07	1.06	0.94	0.94	0.98
	Rank	5	4	2	1	3

* Brush Control Management has the potential of affecting over a million acres of brushland. Depending upon the areas to be controlled a variety of important species could be adversely affected. Species that are likely to reside in brushland habitat include the endangered ocelot and jaguarundi, the Texas horned lizard, Texas tortoise and plains spotted skunk to name a few.

Table 3
Composite Vegetation and Wildlife Habitat Impact Values for all Water Supply Options

Option		PU	EC	EREPA	IRC	RR
SCTN-1a		657	657	657	657	
SCTN-2a		Low*	Low*	Low*	Low*	Low*
SCTN-2b					Low*	
SCTN-3c		5,179	4,422		4,422	
SCTN-4		High**	High**	High**	High**	High**
SCTN-5		0	0	0	0	0
SCTN-6a			2,777	2,777		6942
SCTN-8		750				750
SCTN-9		0	0	0	0	0
SCTN-14a					3,297	
SCTN-14b					4,028	
SCTN-16a			10,654			
SCTN-16b		10,654				
S-13b			0	0		0
S-15c		84,604				
G-15c		505	505	505	505	505
G-21		13,639				13,639
G-24		1,052	1,052	1,052	1,052	1,052
G-30						907
L-10		0	0	0	0	0
L-15		0	0	0	0	0
L-18a		13,769				13,769
L-18c			4,230	4,230	4,230	
CZ-10c		3,088	3,088	3,088	2,810	
CZ-10d		9,086		9,086		9,086
C-13c			2,266			
C-17a				5,033		
C-17b					11,341	
SAWS recycle.		0	0	0	0	
Trin. Aqu. Bex.		0				
Edwards Aqu.						0
Totals	Raw	142,983	29,651	26,428	32,342	46,650
	Normalized	2.58	0.53	0.48	0.57	0.84
	Rank	5	2	1	3	4

*SCTN-2a and 2b explore the potential of existing wells and new well fields for use by nearby municipalities. The number of wells and lengths of pipelines are undetermined, but the habitat impact value is thought to be small, compared to that of other options.

** Brush Control could potentially affect over a million acres of brushland by conversion to grassland. The level of impact is comparable to that of a pipeline permanent maintenance easement. This yields an impact value of over 4,000,000 which is 20 times larger than the cumulative impact of all options.

Table 4
Composite Water Quality and Aquatic Habitat Impact Values for all Water Supply Options

Option		PU	EC	EREPA	IRC	RR
SCTN-1a		1.5	1.5	1.5	1.5	
SCTN-2a		0	0	0	0	0
SCTN-2b					0	
SCTN-3c		3	3		3	
SCTN-4		1	1	1	1	1
SCTN-5		1	1	1	1	1
SCTN-6a			1.25	1.25		1.25
SCTN-8		2.5				2.5
SCTN-9		0	0	0	0	0
SCTN-14a					2.25	
SCTN-14b					2.25	
SCTN-16a			3.25			
SCTN-16b		3.25				
S-13b			0	0		0
S-15c		5.75				
G-15c		1	1	1	1	1
G-21		4.25				4.25
G-24		1	1	1	1	1
G-30						1.25
L-10		0	0	0	0	0
L-15		0	0	0	0	0
L-18a		3.25				3.25
L-18c			2.25	2.25	2.25	
CZ-10c		2.25	2.25	2.25	2.25	
CZ-10d		1.25		1.25		1.25
C-13c			4.25			
C-17a				5.25		
C-17b					6.25	
SAWS recycle.		0	0	0	0	
Trin. Aqu. Bex.		0				
Edwards Aqu.						0.5
Totals	Options	31	21.75	17.75	23.75	18.25
	Normalized	5	1.51	0	2.26	0.19
	Net streamflow	1	2	2	4	1
	Normalized	0	1.67	1.67	5	0
	Composite Score	5	3.18	1.67	7.26	0.19
	Normalized	1.44	0.92	0.48	2.10	0.05
	Rank	4	3	2	5	1

Table 5
Composite Cultural Resources Impact Values for all Water Supply Options

Option		PU	EC	EREPA	IRC	RR
SCTN-1a		26.5	26.5	26.5	26.5	
SCTN-2a		0	0	0	0	0
SCTN-2b					0	
SCTN-3c		105	89		89	
SCTN-4		High*	High*	High*	High*	High*
SCTN-5		0	0	0	0	0
SCTN-6a			35	35		35
SCTN-8		12				12
SCTN-9		0	0	0	0	0
SCTN-14a					81	
SCTN-14b					103	
SCTN-16a			82.5			
SCTN-16b		82.5				
S-13b			2	2		2
S-15c		44				
G-15c		0	0	0	0	0
G-21		22				22
G-24		22.5	22.5	22.5	22.5	22.5
G-30						8.5
L-10		0	0	0	0	0
L-15		0	0	0	0	0
L-18a		26				26
L-18c			16	16	16	
CZ-10c		79	79	79	48	
CZ-10d		85		85		85
C-13c			89.5			
C-17a				83		
C-17b					147	
SAWS recycle.		0	0	0	0	
Trin. Aqu. Bex.		0				
Edwards Aqu.						
Totals	Raw	504.5	442	349	533	213
	Normalized	1.25	1.09	0.86	1.27	0.53
	Rank	4	3	2	5	1

* Brush Control could be potentially very high. All Stream terraces to be impacted by brush clearing must be surveyed for cultural resources.

Table 6
Ecologically Significant River and Stream Segments Nominated by Texas Parks and Wildlife Department Potentially Affected by Water Supply Options in and Adjacent to the Region L Planning Area

	Blanco River	Comal River	Frio River	Garcitas Creek	Geronimo Creek	Guadalupe River-Upper	Guadalupe River-Middle	Guadalupe River Lower	Nueces River-Upper	Sabinal River	San Marcos River-Gonzales	West Nueces River	West Carancahua Creek	Colorado River-Bastrop	Colorado River-Matagorda	Onion Creek
SCTN-1a																
SCTN-2a																
SCTN-2b																
SCTN-3c (PU)					xng*									xng		
SCTN-3c (EC, IRC)		xng												xng		
SCTN-4																
SCTN-5																
SCTN-6a							ldu[1]	rdu[2]								
SCTN-8						(rci)										
SCTN-9																
SCTN-14a								rdx								
SCTN-14b								rdx								
SCTN-16a								rdsx								
SCTN-16b								rdsxu								
S-13b																
S-15c																
G-15c					xng		lds									
G-21											(rcp)					
G-24	xng					lds										xng
G-30						rdsu										
L-10																
L-15																
L-18a	rcp		rci						rcp	rci		rcp				
L-18c			rci							rci						
CZ-10c (PU, EC, EREPA)							gw									
CZ-10c (IRC)							gw									
CZ-10d					xng		gw									
C-13c														cd rds		

Table 6 Continued

	Blanco River	Comal River	Frio River	Garcitas Creek	Geronimo Creek	Guadalupe River-Upper	Guadalupe River-Middle	Guadalupe River Lower	Nueces River-Upper	Sabinal River	San Marcos River-Gonzales	West Nueces River	West Carancahua Creek	Colorado River-Bastrop	Colorado River-Matagorda	Onion Creek
C-17a															cd rdsx	
C-17b				xng				xng					xng		rdx	
SAWS recycle.																
Trin. Aqu. Bex.																
Edwards Aqu. Recir.			xng							xng						

* Key to Table Entries

rci - recharge dam; median daily flow <0, intermittent impoundment
rcp - recharge dam; median daily flow >0, perennial impoundment
cd – channel dam; diversion pool only
ld – reservoir diversion
rd – river diversion
s=stored water, x=existing run of river rights, u=unappropriated flow, ( )=tributary impoundments
xng-Pipeline crossing
gw – groundwater withdrawals with a significant effect on streamflow
rfp – reduced flood peaks from upstream dam operation
[1] Diversion at Lake Dunlap
[2] Diversion at Gonzales

Table 6a
Summary of Potential Effects on Ecologically Significant River and Stream Segments

	Stream Crossings	Diversions	Diversions of Unappropriated Water	Dam in Segment	Total Score	Normalized Score
PU	6	3	1	2	12	0.97
EC	5	5	1	1	12	0.97
EREPA	4	4	2	1	11	0.89
IRC	7	5	1	0	13	1.05
RR	6	4	2	2	14	1.13

Table 7
Criteria Used by TPWD to Nominate Ecologically Unique River and Stream Segments in and Adjacent to the Region L Planning Area

	Biological Function	Hydrologic Function	Riparian Conservation	Water Quality Aquatic Life/Uses	Threatened & Endangered spp.
Arenosa Cr.				ecoregion stream	
Blanco R.		Edwards Aquifer Recharge		overall use	
Carpers Cr.				ecoregion stream	
Comal R.		Edwards Aquifer Recharge	Landa Park		multiple spring-dependent spp.
Cypress Cr.		Edwards Aquifer Recharge		overall use	
Frio R.	Texas Natural River Systems Nominee	Edwards Aquifer Recharge	Garner State Park	overall use, aesthetic	
Garcitas Cr.	Estuarine wetlands			ecoregion stream	diamondback terrapin*
Geronimo Cr.				ecoregion stream	
Guadalupe R., Upper		Edwards Aquifer Recharge	Guadalupe River Park	overall use #2 scenic river in Texas	
Guadalupe R., Middle					golden orb*
Guadalupe R., Lower	Freshwater and marine wetlands		Victoria Municipal Park Guadalupe Delta WMA	overall use	whooping crane

Table 7 Continued

	Biological Function	Hydrologic Function	Riparian Conservation	Water Quality Aquatic Life/Uses	Threatened & Endangered spp.
Honey Cr.			Honey Creek Natural Area		
Mission R.	Freshwater and marine wetlands				
Upper Nueces R.	T. Nat R Systems	Edwards Aquifer Recharge		Aesthetic	
Sabinal R.	T. Nat R Systems	Edwards Aquifer Recharge		Aesthetic	
Upper San Marcos R.			multiple University and City parks	overall use	multiple spring-dependent spp.
Lower San Marcos R.			Palmetto State Park		
San Miguel Cr.				ecoregion stream	
West Nueces R.		Edwards Aquifer Recharge			
West Verde Cr.			Hill Country Natural Area		
West Carancahua Cr.				ecoregion stream	
Colorado R.-Bastrop				overall use	blue sucker
Tidal Colorado R.	Freshwater and marine wetlands				
Onion Creek				ecoregion stream	

Table 7 Continued

	Biological Function	Hydrologic Function	Riparian Conservation	Water Quality Aquatic Life/Uses	Threatened & Endangered spp.
Middle Nueces R.	Resident and migratory bird habitat; Freshwater wetlands		City of Corpus Christi Wildlife Sanctuary; Hazel Bazemore County Park	overall use	Wood stork, interior least tern, indigo snake, black spotted newt, South Texas siren, white-faced ibis, golden orb*
Tidal Nueces R.	Marine wetlands; Migratory bird habitat		Nueces River Park	overall use	Brown pelican, piping plover, reddish egret, snowy plover*, white-faced ibis, wood stork, migrating whooping cranes, opossum pipefish, Gulf saltmarsh snake*, indigo snake, diamondback terrapin*

* Not listed as Threatened or Endangered by the State of Texas or U.S. Fish and Wildlife Service

Table 8
Summary of Water Supply Option Features Potentially affecting Ecologically Unique River and Stream Segments Nominated by Texas Parks and Wildlife Department in and Adjacent to Region L

Blanco River

L-18a recharge dam: Enhance Edwards Aquifer recharge, flow from San Marcos Springs
Impounds a permanant pool
Dam may affect recreational use

Frio River

L-18a, L-18c recharge dams: Enhance Edwards Aquifer recharge
Downstream of perennial reach, no effect on aqautic biota or water- oriented uses
Far downstream of Garner State Park

Upper Guadalupe River

SCTN-8 tributary dams: Supplement Trinity Aquifer recharge
Reduced channel scour in tributaries below dams
No effect on low flows in Guadalupe River, effects on flood flows minor
Impoundments not likely to maintain fish communities capable of nuisance insect suppression without management

G-30 river diversion: Supplement Edwards Aquifer recharge
Flow reductions >10% at flows above median
No effect on flood peaks
No effect on low flow regime
No effect on overall use of Guadalupe River

G-24 Canyon Lake diversions: divert small amount of appropriated, stored water

Middle Guadalupe River

SCTN-6a reservoir diversion: Enhance Edwards Aquifer recharge and flow from Comal Springs
No effects on flood flows
Downstream flow reductions limited at lowest flow range

G-15c reservoir diversion: Diversion of stored water released from Canyon Lake increases flow between Canyon and diversion point

CZ-10c groundwater withdrawal: Streamflow reduction over Carrizo recharge zone
Largest proportional reduction at lowest flows

Lower Guadalupe River

SCTN-14a,b river diversions: Divert appropriated water at salt water barrier
No effects on freshwater wetlands, public properties or use

Small reduction in annual estuary inflow, no effect on low flow regime

No effect on flood peaks and volumes

SCTN-16a,b river diversions: Divert stored, appropriated and unappropriated water at salt water barrier

No effects on freshwater wetlands, public properties or use

Changes in annual hydrograph from stored water delivery

Small reduction in annual estuary inflow, no effect on low flow regime

No effect on flood peaks and volumes

Sabinal River

L-18a, L-18c recharge dams: Enhance Edwards Aquifer recharge

Downstream of perennial reach, no effect on aqautic biota or water- oriented uses

Lower San Marcos River

G-21 tributary dam: Reduction of Plum Creek flood flows may reduce some flood peaks at Palmetto State Park

Impounds perennial pool

Upper Nueces River

L-18a recharge dam: enhance Edwards Aquifer recharge, located at extreme lower portion of perennial reach, may affect recreational use

Colorado River-Bastrop

C-13c channel dam: Stored water released from Highland Lakes increases flow between Mansfield Dam and diversion point near Bastrop

Colorado River-Matagorda

C-17a,b channel dam: Stored water released from Highland Lakes increases flow between Mansfield Dam and diversion point (Colorado County), while diversion of run of river irrigation rights decreases flow downstream

Groundwater withdrawal not expected to affect streamflow

All river and reservoir diversions and surface impoundment options listed here comply with the Consensus Planning Criteria for instream flows and for bay and estuary inflows. Pipeline crossings were not considered to be a credible threat to the resources of any of the nominated river and stream segments, and are not listed here.

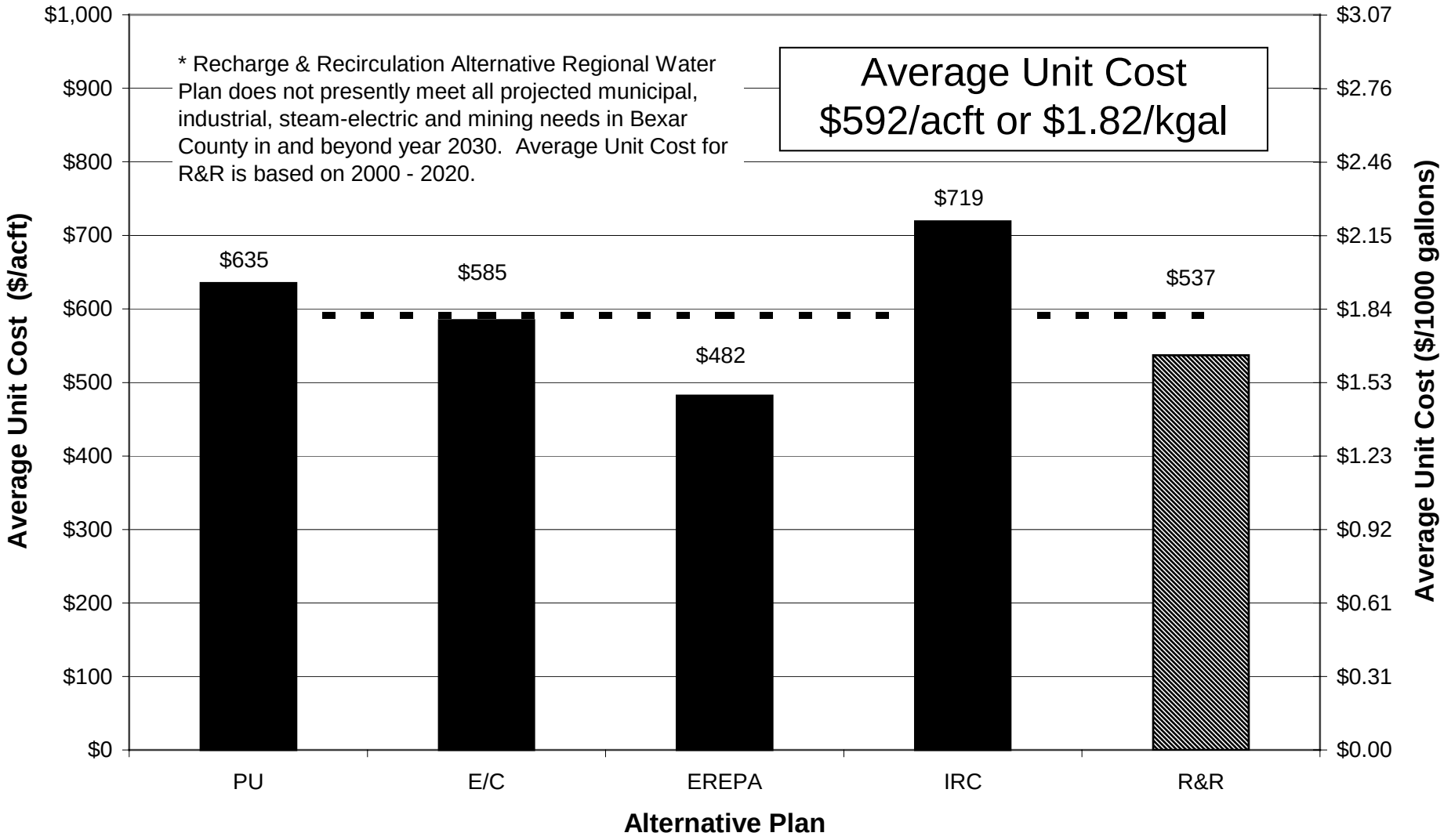
Table 9

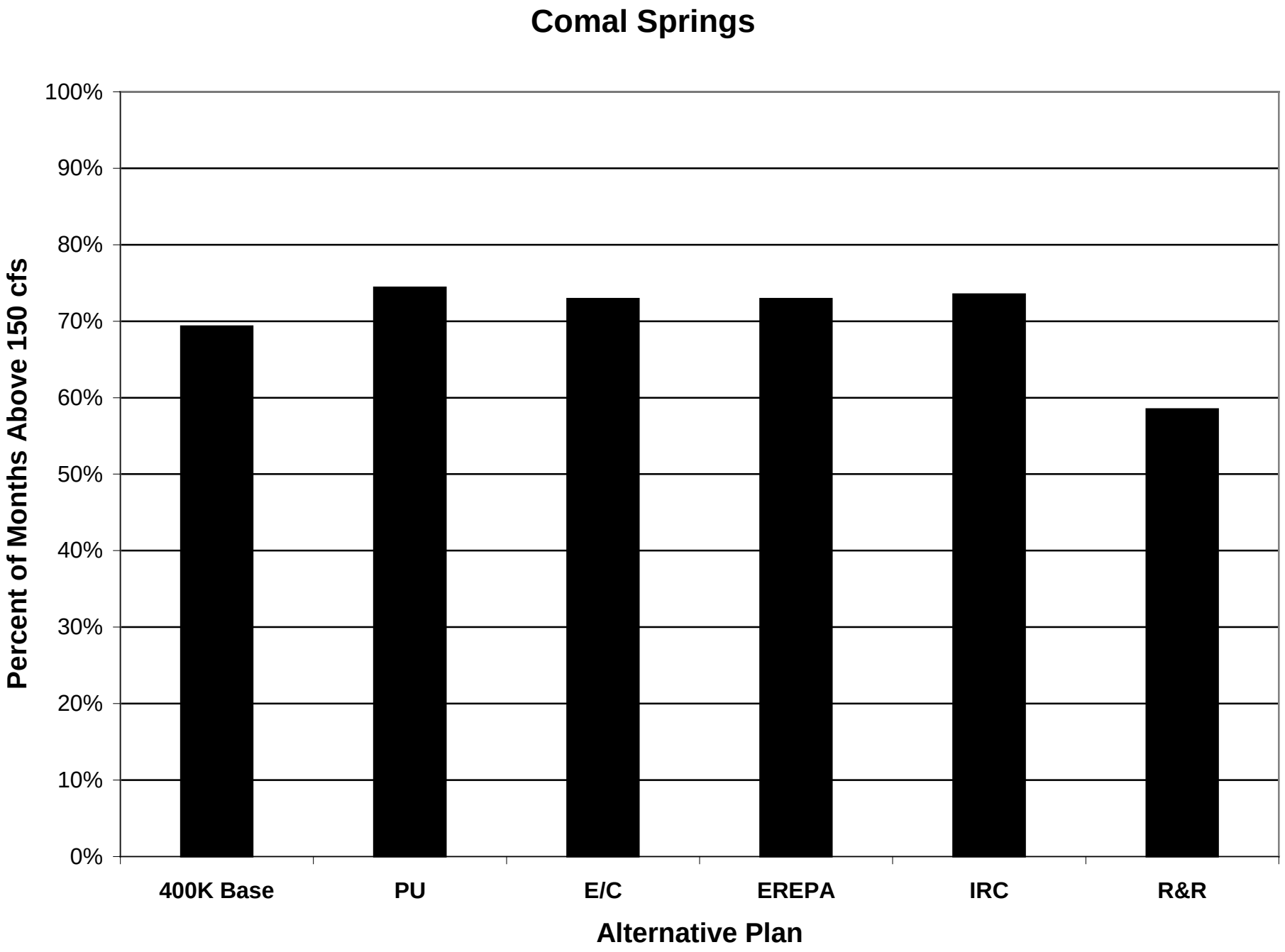
Net Streamflow Change From Implementation of the Five Alternative Water Management Plans

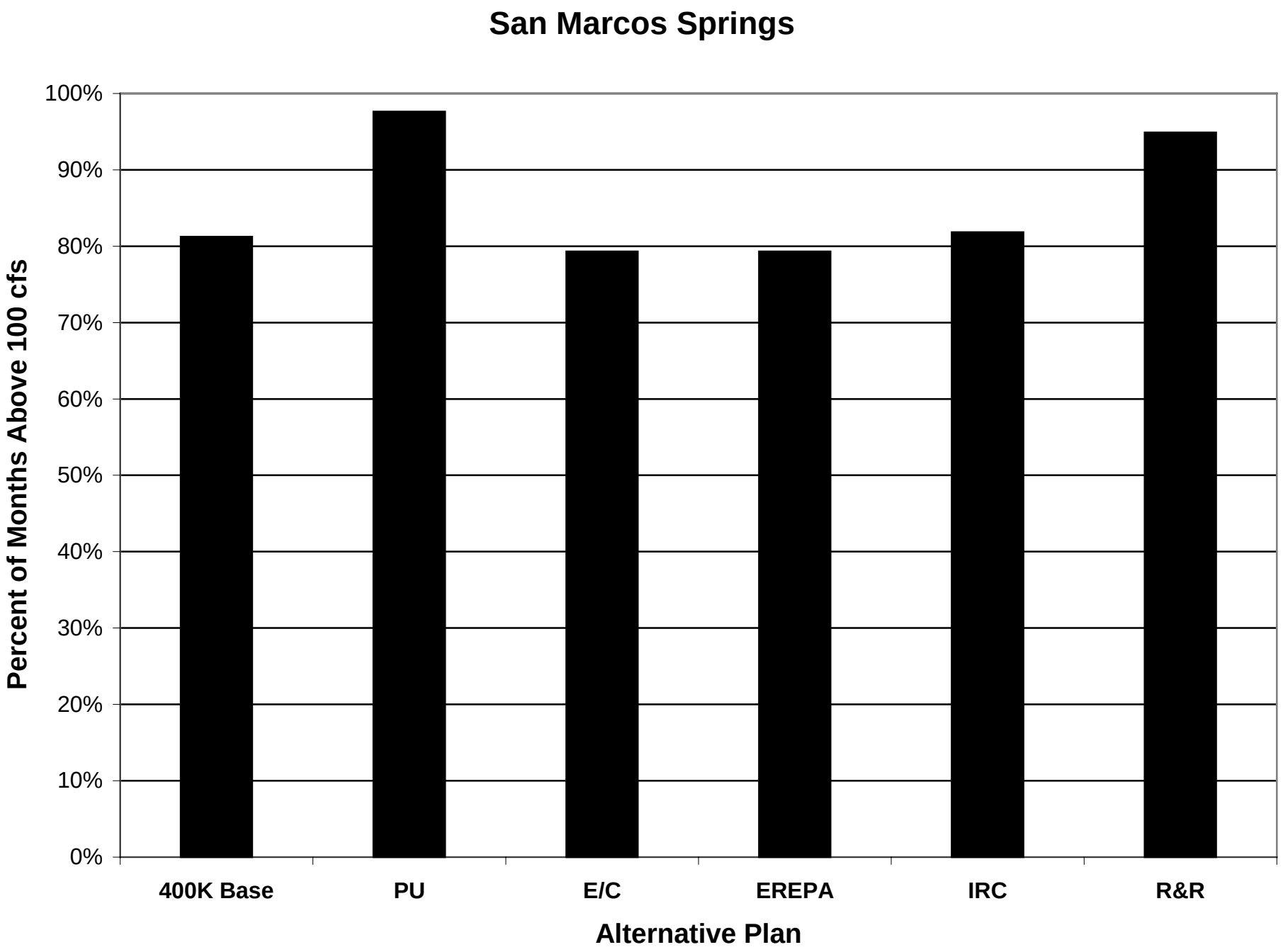
	PU	EC	EREPA	IRC	RR
Guadalupe R. @ Cuero	0	1	1	0	0
San Antonio R. @ Falls City	0	0	0	4	0
Salt Water Barrier	0	0	0	0	0
Nueces R. @ Calallen	1	1	1	0	1
Total	1	2	2	4	1
Normalized Score	0.5	1	1	2	0.5

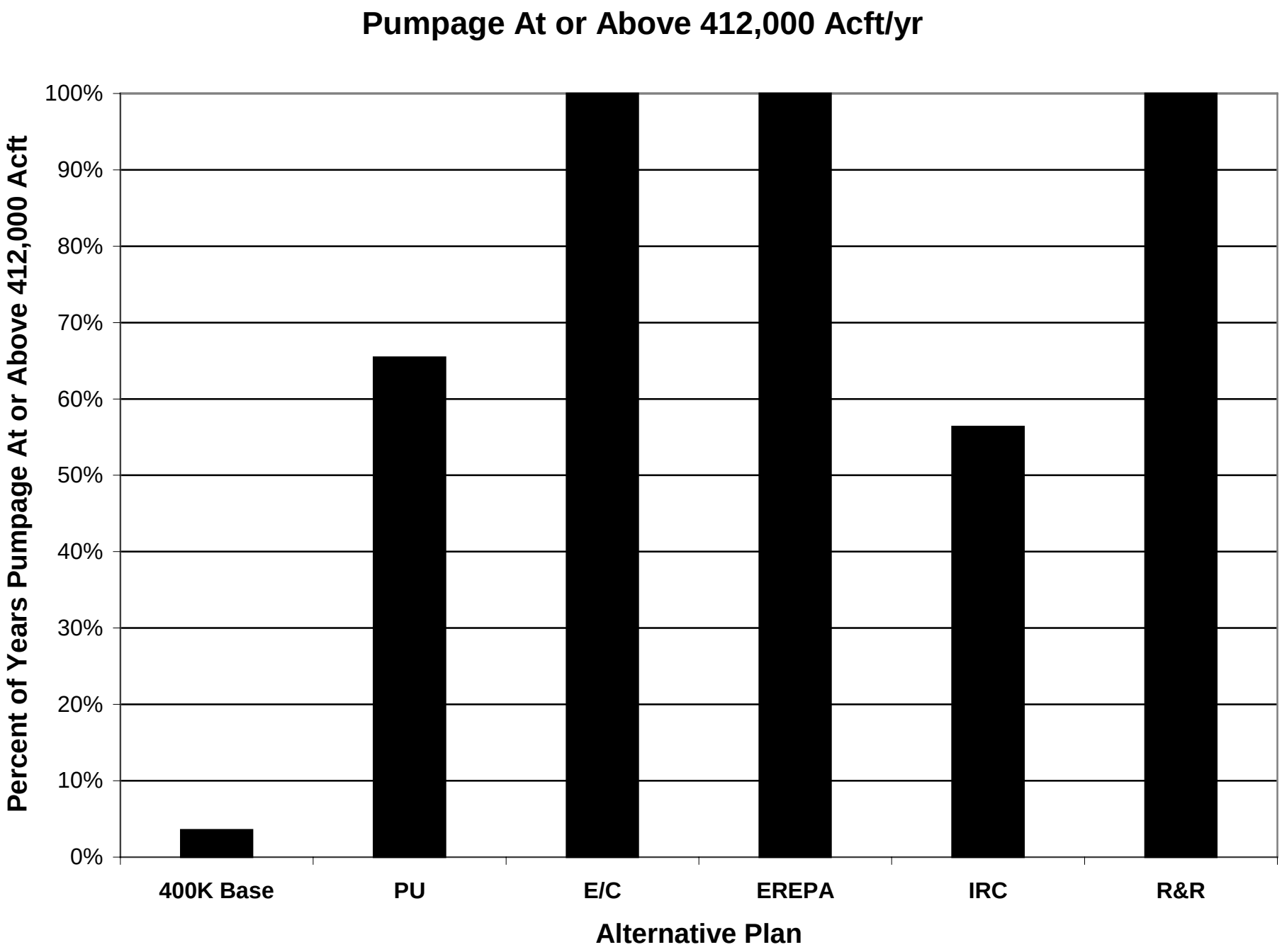
0 – flow increase or no change at low (<50th percentile) flows, no change or only minor decrease in high flows
1 – moderate flow decrease at at low flows (<10% between 50th and 75th percentiles)
2 - moderate flow decrease at at low flows, moderate decrease in high flows (>20% between 50th and 75th percentiles)
3 – flow decrease >10% between 50th and 75th percentiles
4 - flow decrease >10% between 50th and 75th percentiles, and decrease >20% between 50th and 75th percentile

Average Unit Cost Comparison of Alternative Regional Water Plans

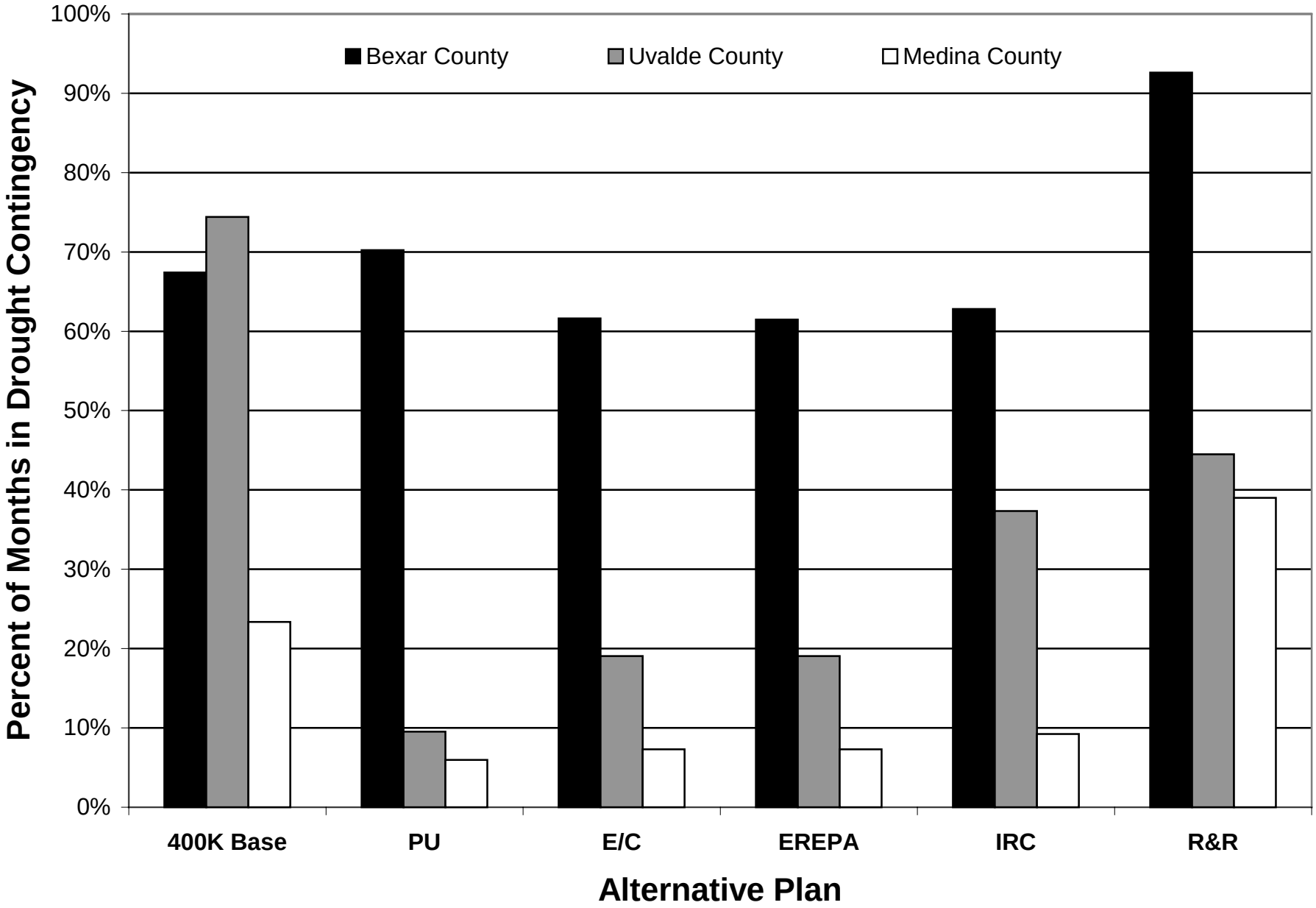


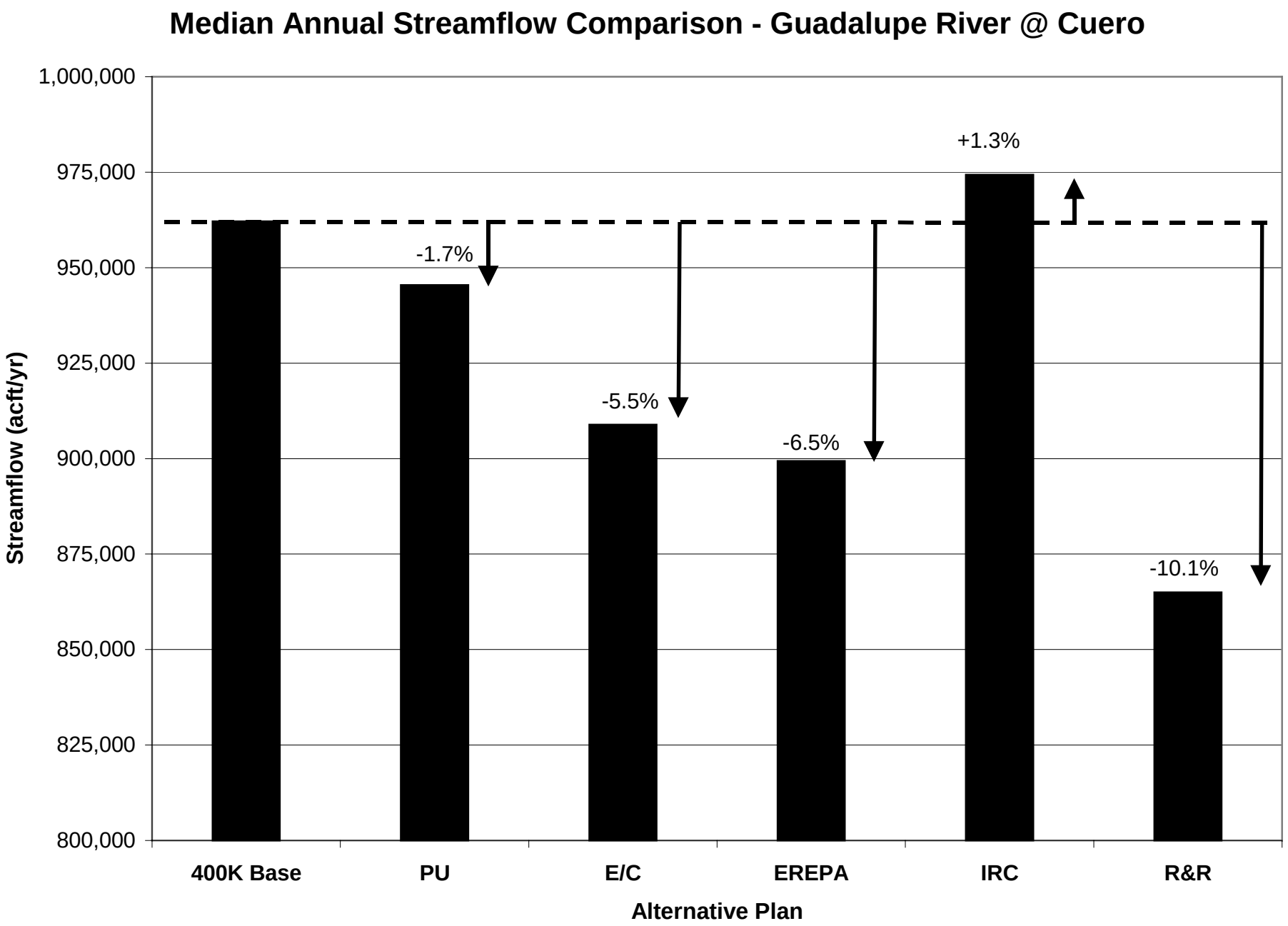

Comal Springs
Percent of Months Above 150 cfs
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
400K Base
PU
E/C
EREPA
IRC
R&R
Alternative Plan


San Marcos Springs
Percent of Months Above 100 cfs
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
400K Base
PU
E/C
EREPA
IRC
R&R
Alternative Plan

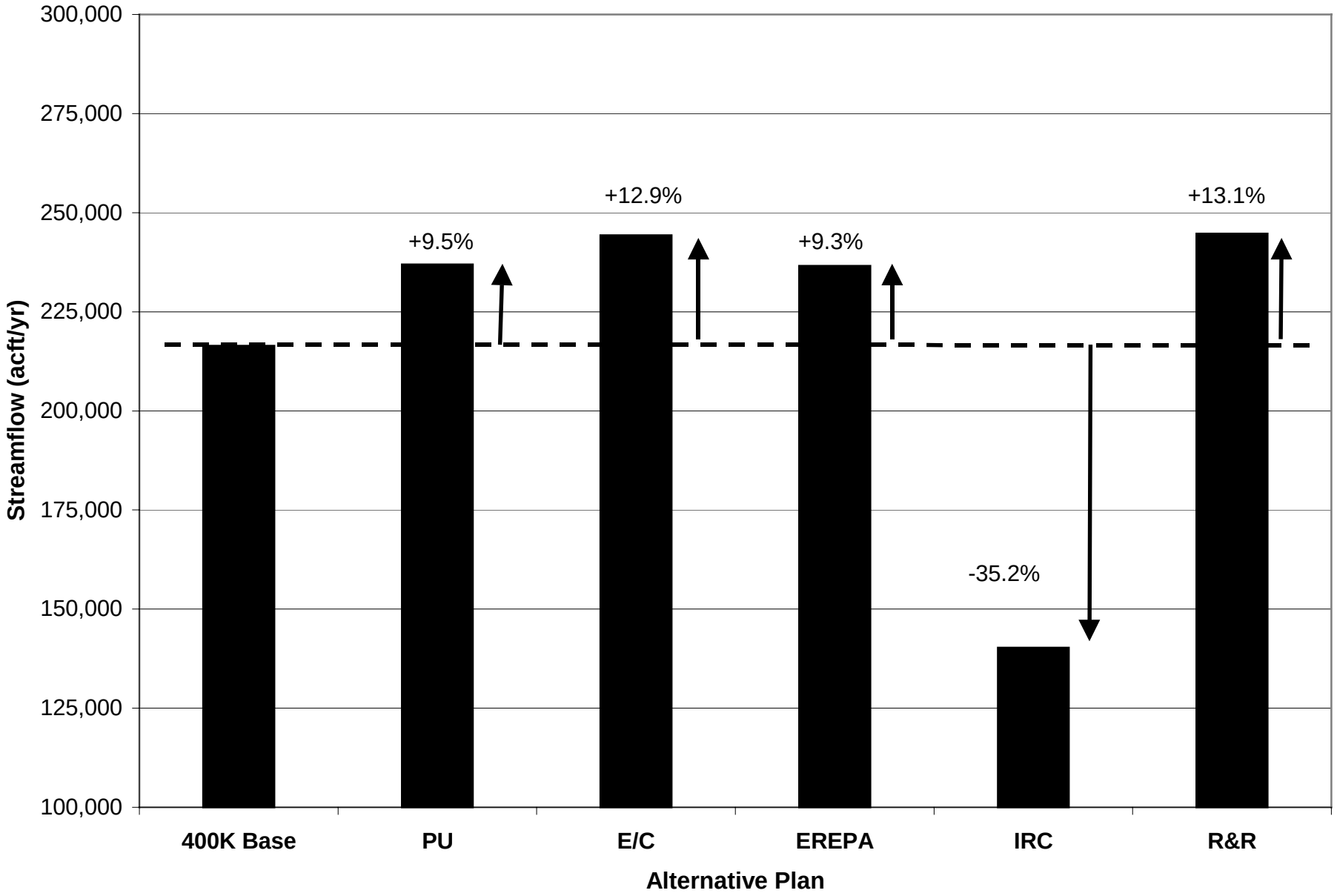

Pumpage At or Above 412,000 Acft/yr
Percent of Years Pumpage At or Above 412,000 Acft
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
400K Base
PU
E/C
EREPA
IRC
R&R
Alternative Plan

County Comparisons of Months in Drought Contingency

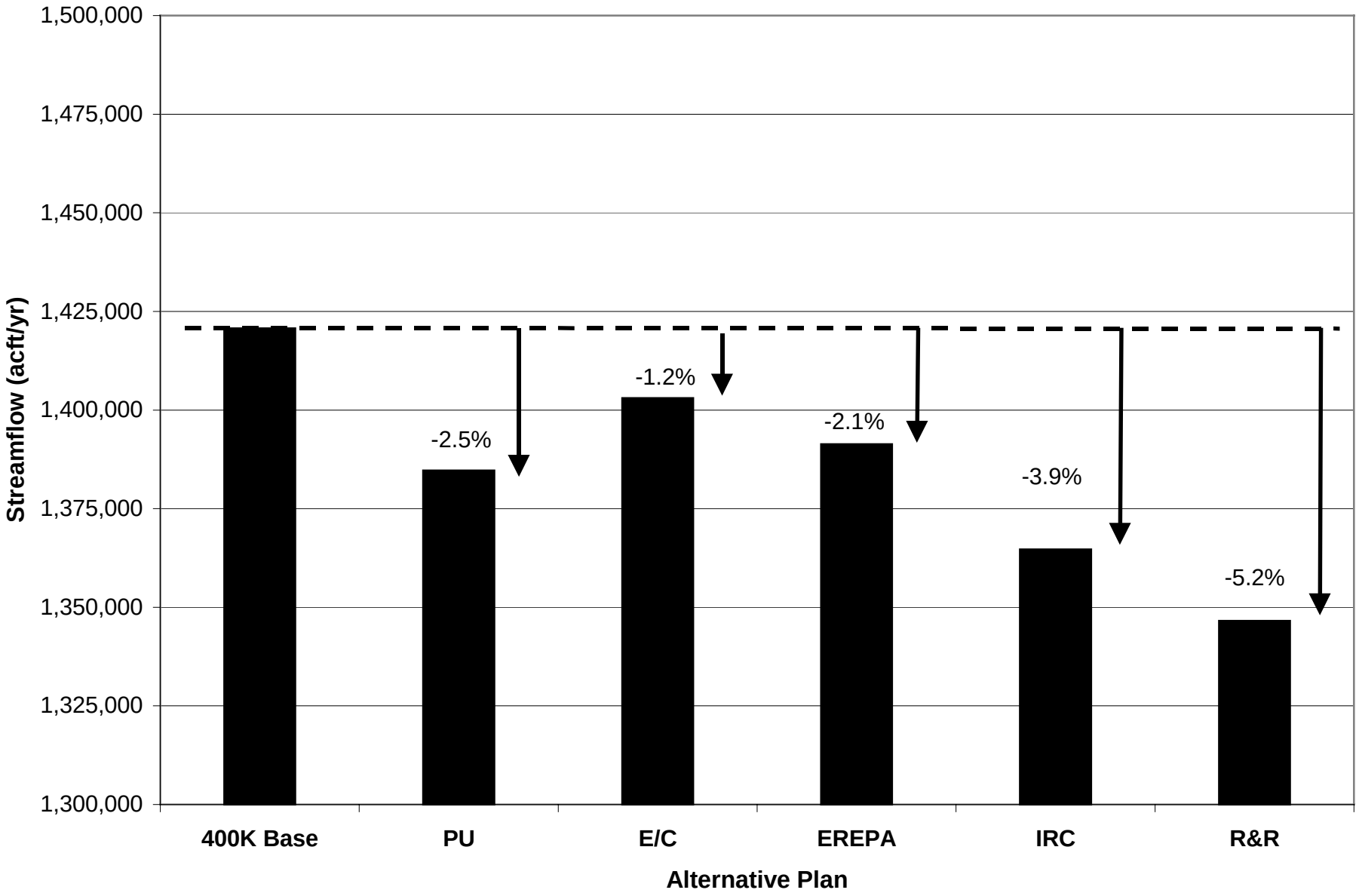


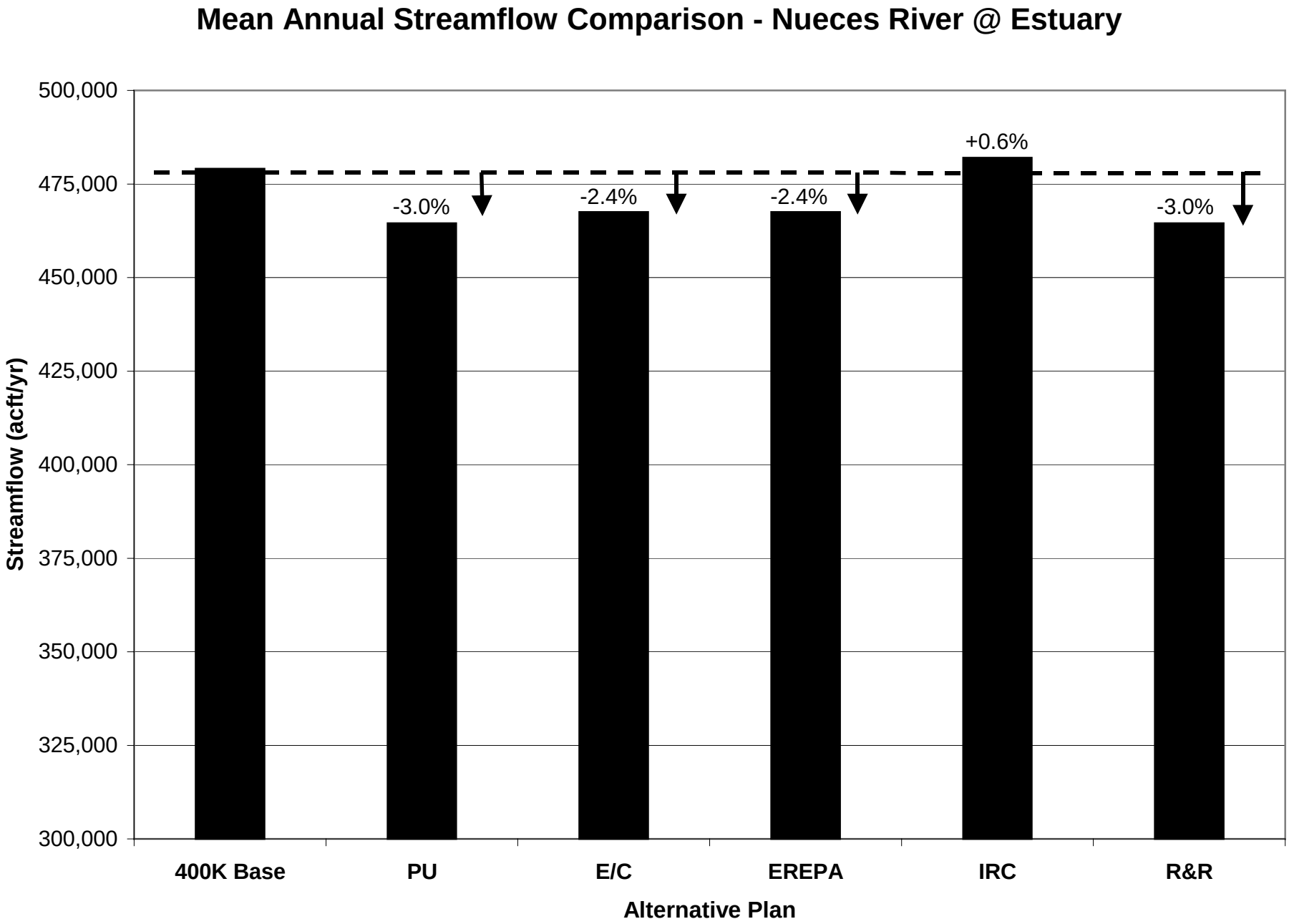

Median Annual Streamflow Comparison - Guadalupe River @ Cuero
1,000,000
975,000
950,000
925,000
900,000
875,000
850,000
825,000
800,000
Streamflow (acft/yr)
+1.3%
-1.7%
-5.5%
-6.5%
-10.1%
400K Base
PU
E/C
EREPA
IRC
R&R
Alternative Plan

Median Annual Streamflow Comparison - San Antonio River @ Falls City



Median Annual Streamflow Comparison - Guadalupe R. Saltwater Barrier




Mean Annual Streamflow Comparison - Nueces River @ Estuary
500,000
475,000
450,000
425,000
400,000
375,000
350,000
325,000
300,000
Streamflow (acft/yr)
-3.0%
-2.4%
-2.4%
+0.6%
-3.0%
400K Base
PU
E/C
EREPA
IRC
R&R
Alternative Plan

General Procedures & Assumptions for Formulation and Technical Evaluation of Regional Water Management Alternative Plans

Procedures for Formulation of Regional Water Management Alternative Plans

1) Identification of water supply options for inclusion in an alternative plan is based on the applicable, plan-specific criteria established by the South Central Texas Regional Water Planning Group (SCTRWPG). These criteria are: (1) Planning Unit Approach, (2) Environmental/Conservation Approach, (3) Economic, Reliable, Environmental, Publicly Acceptable Approach (EREPA), (4) Interregional Cooperation Approach, and (5) Recharge and Recirculation Approach.
2) Order of implementation of water supply options within each alternative plan is primarily based on the estimated time to implement in relation to the occurrence of projected water needs, with due consideration of engineering economies and other factors.
3) Alternative plans include system management supplies to account for:
    a) Implementation of water supply options in advance of projected need to allow for system operations with the Edwards Aquifer, project development at optimal size, time for reservoir filling, time for accumulation of storage in aquifer(s), interim seasonal peaking capacity, and/or unknown problems in permitting/construction.
    b) Uncertainty as to dependable supply from the Edwards Aquifer during drought to the extent that such supply may be dependent upon as yet unspecified minimum springflows at Comal and San Marcos Springs.
    c) Uncertainty as to the ultimate ability to implement specific water supply options.
    d) The possible occurrence of drought more severe than that which has occurred historically.
4) Consistency in system management quantities of supplies included in the alternative plans is desirable (to facilitate cost comparisons), but may not always be possible.

Procedures for Technical Evaluation of Regional Water Management Alternative Plans

1) Establish baseline (year 2000) hydrologic simulation for the Edwards Aquifer.
    a) Breakdown of use type and geographical distribution based on EAA originally proposed permits (without any voluntary transfers from irrigation to municipal use); and
    b) Starting heads and seasonal distribution of pumpage based on factors developed by the TWDB and currently used in the GWSIM4 model.
2) Establish baseline (year 2000) hydrologic simulation for the Carrizo (including Simsboro) Aquifer.
    a) Use available simulated starting heads representative of 1994 levels (available additional measured well levels obtained since 1994 will be plotted for reference); and
    b) Breakdown of use type and geographical distribution, and specified local pumpage quantities and use types, as projected by the TWDB.

3) Establish baseline (year 2000) hydrologic simulations for the Gulf Coast and Trinity Aquifers using best available models and technical data, and specified local pumpage quantities and use types, as projected by the TWDB.
4) Establish baseline hydrologic simulations for Nueces, Guadalupe – San Antonio, Lavaca, and Lower Colorado River Basins based on assumptions noted below and available information.
5) Perform hydrologic simulations that reflect the projected implementation of water supply options comprising each alternative plan for each decade from 2000 through 2050.
6) Quantify the Available Yield, Total Annual Costs, Annual Unit Costs of Water, Environmental Effects, Impacts on Water Resources of the State, Impacts of Water Management Strategies on Threats to Agricultural and Natural Resources of the Region, Equitable Comparison and Consistent Consideration with Other Water Management Strategies, Interbasin Transfer Provisions in Texas Water Code Sect. 11.085(k)(1), Third Party Social and Economic Impacts from Voluntary Redistribution of Water, Efficient Use of Existing Supplies and Opportunities for Development and Operation of Regional Water Facilities, and Effects on Navigation [Sect. 357.7(a)(7)] associated with the implementation and operation of each alternative plan. Costs will be presented on a Second Quarter 1999 basis and computed in accordance with Cost Estimating Procedures set forth in Appendix A of the "Technical Evaluation of South Central Texas Region Water Supply Options."
7) Assess cumulative effects of alternative plan implementation based on differences between the baseline (year 2000) and full implementation (year 2050) hydrologic simulations.

Assumptions

1) Full exercise of surface water rights.
2) Edwards Aquifer pumpage of 400,000 acft/yr (plus domestic & livestock) subject to Critical Period Management Rules currently (March 29, 2000) under review by an assessment team for the Edwards Aquifer Authority. This is consistent with provisions in the EAA statute (SB1477) regarding permitted pumpage of 400,000 acft/yr after 2007 and with potential critical period management actions reducing pumpage by 15 percent to 340,000 acft/yr. Note that by agreement with the TWDB, an Edwards Aquifer supply of 340,000 acft/yr has been assumed for assessment of regional water needs. However, springflows resulting from the 400,000 acft/yr Edwards Aquifer pumpage scenario will be used in the baseline hydrologic simulations of the Guadalupe – San Antonio and Nueces River Basins.
3) Options and alternative plans involving Edwards Aquifer recharge enhancement will generally be evaluated on the basis of potential recharge recovery permits derived from increased sustained yield as described in Appendix C of the "Technical Evaluation of South Central Texas Region Water Supply Options." Some variation of this assumption may be required for full evaluation of the Recharge & Recirculation Alternative Plan.

4) In the evaluation of options and alternative plans involving river diversions for Edwards Aquifer recharge enhancement (recirculation), the diversion of "enhanced springflow" will not be assumed subject to downstream water rights. River diversions for Edwards Aquifer recharge enhancement may not result in simulated water rights shortages greater than those which would occur subject to the 400,000 acft/yr Edwards Aquifer pumpage scenario.

5) Water treatment will not be necessary for Edwards Aquifer recharge enhancement options if water originates upstream of the outcrop of the Edwards Aquifer or from the Edwards Aquifer.

6) Subordination of all senior Guadalupe River hydropower permits to Canyon Reservoir. This assumption is based on past actions of the GBRA to subordinate its own Guadalupe River hydropower rights and on an existing GBRA contractual agreement with the City of Seguin.

7) Delivery of GBRA's full contractual obligations from Canyon Reservoir to point of diversion in all years. Uncommitted balance of Canyon Reservoir currently (March 29, 2000) authorized annual diversions, and additional diversions proposed under an amendment presently before TNRCC, to be diverted near Nolte Dam unless otherwise assigned in the assessment of needs. It is expected that this amendment will be granted prior to submittal of the Regional Water Plan.

8) Baseline (year 2000) effluent discharge / return flow in the Guadalupe - San Antonio and Nueces River Basins will be that reported for 1988 and adjusted for SAWS direct reclaimed water use of 35,000 acft/yr. Estimated effluent discharge / return flow representative of each decade from 2010 through 2050 is included for Bexar County. Estimates are computed as a fixed percentage of projected municipal demand based on best available information for recent years.

9) Operation of power plant reservoirs (Braunig, Calaveras, and Coleto Creek) subject to authorized consumptive uses at the reservoir, with makeup diversions as needed to maintain full conservation storage subject to senior water rights, instream flow constraints, and/or applicable contractual provisions.

10) Desired San Antonio River flows at Falls City gage of 55,000 acft/yr, with seasonally varying minimums under current SAWS/SARA/CPS agreement.

11) Application of Environmental Water Needs Criteria of the Consensus Planning Process (Appendix B, Technical Evaluation of South Central Texas Region Water Supply Options) in consideration of water potentially available as unappropriated streamflow for diversion and/or impoundment as a part of a new water supply option.

12) Relative priority of surface water supply options within an alternative plan will be based on order of implementation.

13) Operation of Choke Canyon Reservoir/Lake Corpus Christi (CCR/LCC) System subject to the Corpus Christi Phase 4 (maximum yield) policy and TNRCC Agreed Order regarding freshwater inflows to the Nueces Estuary.

14) Historical Edwards Aquifer recharge estimates developed by HDR.

15) Applicable rules of groundwater management districts included.

16) A single point of delivery identical to that in the technical evaluation of water supply options will be assumed for the major municipal demand center of the South Central Texas Region.

17) Regional water treatment facilities are sized to meet peak-day demands (assumed to be approximately 2.0 times average-day demands).

18) Terminal storage facilities are included near regional water treatment facilities as necessary to ensure reliability subject to peak-day demands during drought.

19) Period of record for simulations: Guadalupe-San Antonio River Basin (1934-89, Critical Drought = 1950s), Nueces River Basin (1934-96, Critical Drought = 1990s), Colorado River Basin (1941-65, Critical Drought = 1950s).

Hydrologic Models

Guadalupe-San Antonio River Basin Water Availability Model (WRAP) (TNRCC/HDR)
Nueces River Basin Water Availability Model (WRAP) (TNRCC/HDR)
Colorado River Daily Allocation Program (RESPONSE) (LCRA)
Edwards Aquifer (Balcones Fault Zone) Model GWSIM4 (TWDB)
Carrizo-Wilcox Aquifer Model (TWDB/LBG-G/HDR)
Carrizo-Wilcox (Simsboro) Aquifer Model (BEG/TWDB/HDR)
Gulf Coast Aquifer Model (TAMU-CC)
Trinity Aquifer Model (TWDB)
Guadalupe-San Antonio River Basin Model (HDR)
Nueces River Basin Model (HDR)
Lower Nueces River Basin & Estuary Model (HDR)
SIMYLD, RESOP, & SIMDLY (TWDB/TDWR)