



Water Issues in Texas



Topics to be Discussed

- Challenge to supplying water to fast growing areas in Texas
- Texas State water planning experiences
- Lake Texoma Advisory Committee
- Desalinization Issues
- Texas Water Rights



Texas Population Growth

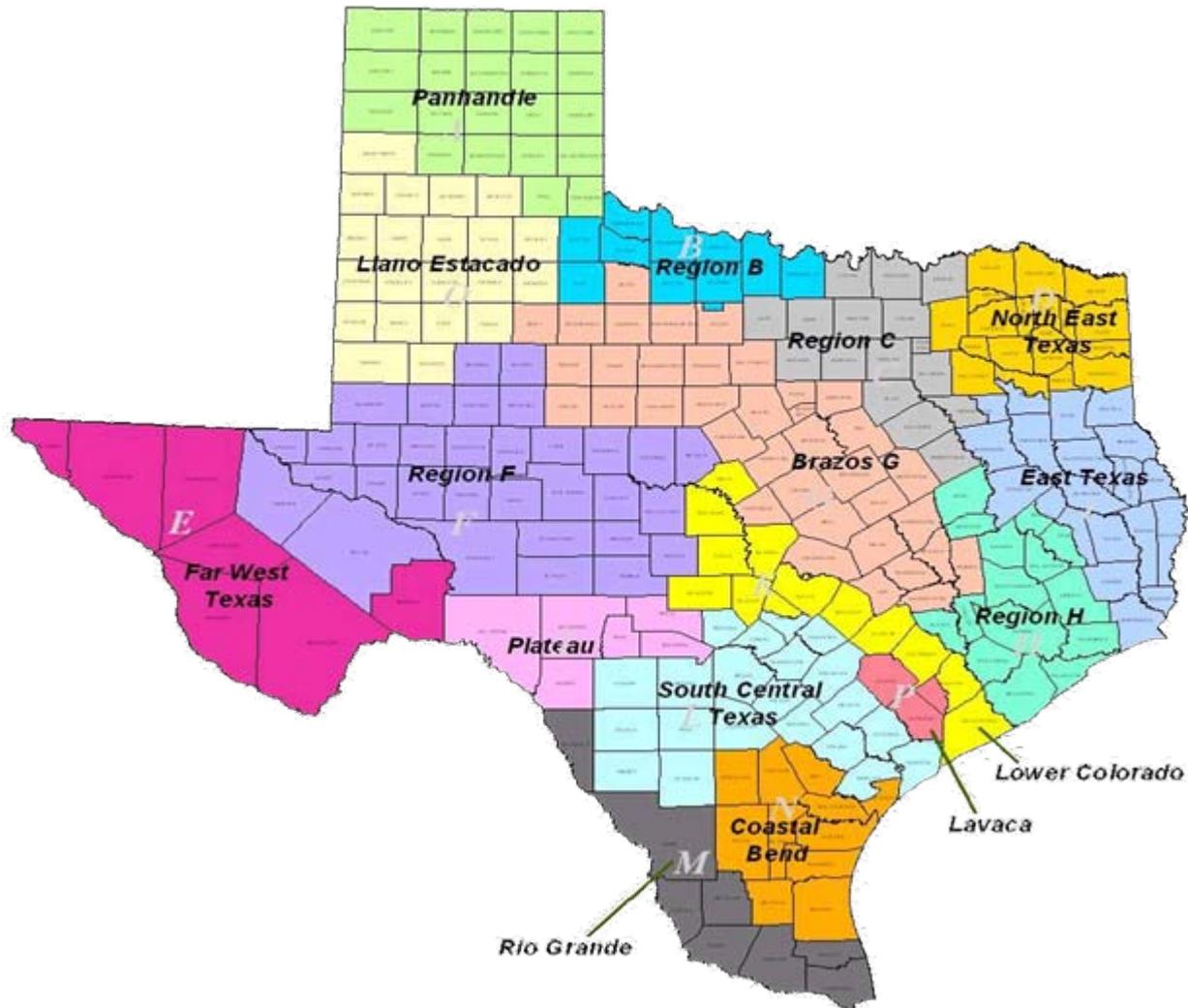
- Currently – 23 million
- 2050 – 43-46 million (projected)



Region C Water Population Details

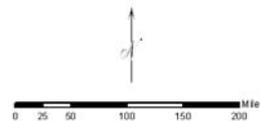
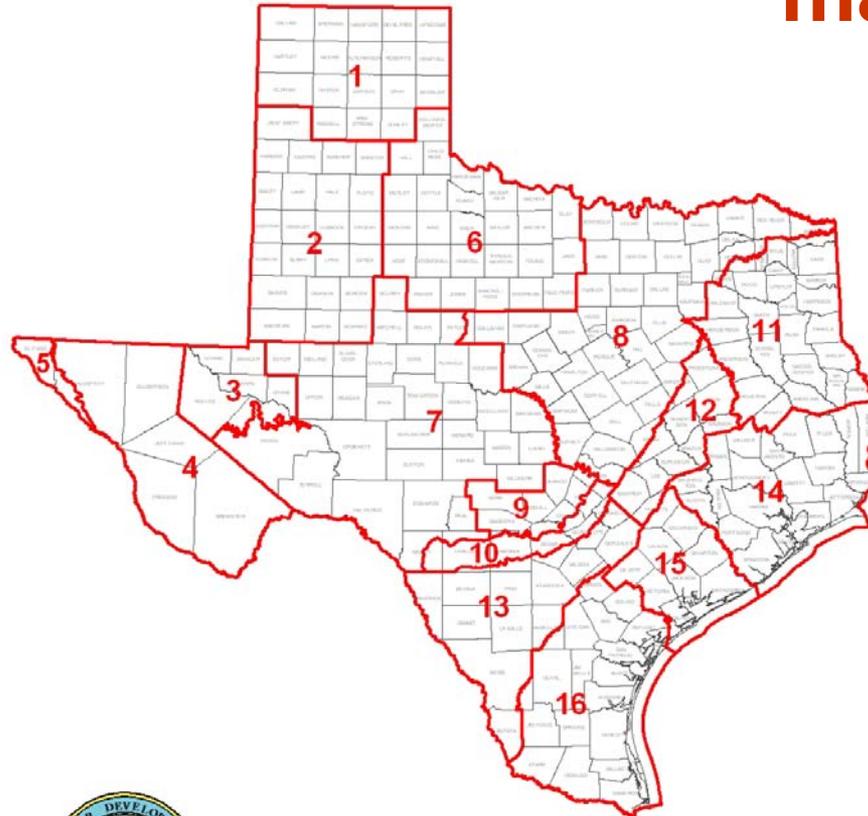
- Dallas/Fort Worth to Red River – 27% of State's population by 2010
- 2008 – 6.3 million people (est.)
- Mid-century – 11-12 million people (est.)

State Water Planning Regions



Groundwater Management Areas in Texas

groundwater management areas



DISCLAIMER
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Map updated by Mark Myers, CEO
Date: 2/10/2010
January 2010

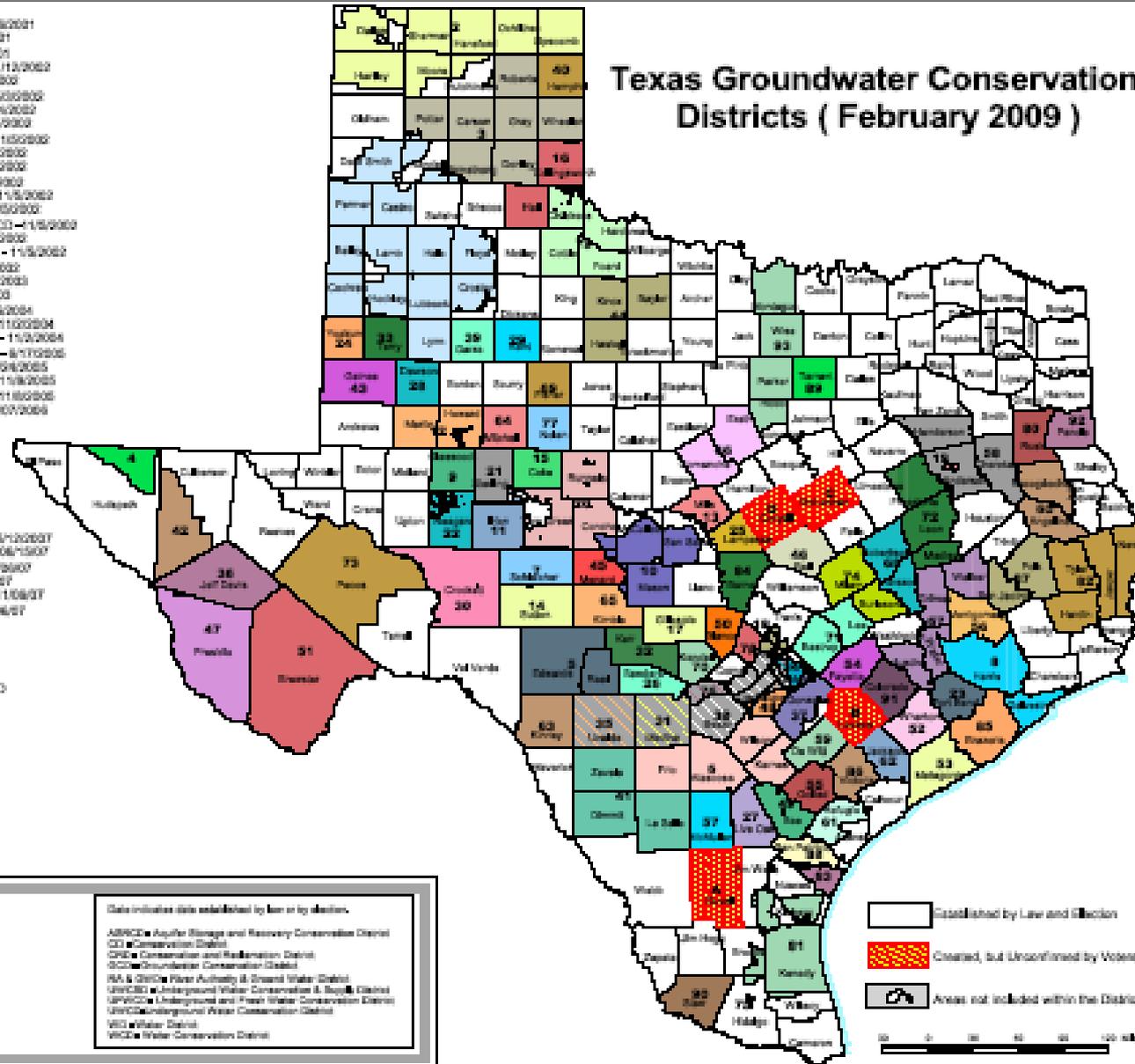
- 1 High Plains UWCD No.1 - 8/29/1991
- 2 North Plains GCD - 1/2/1995
- 3 Permian GCD - 1/21/1998
- 4 Hays/Path County UWCD No. 5 - 1/5/1997
- 5 Red-Cedar GCD - 5/25/1999
- 6 Evergreen UWCD - 8/28/1985
- 7 Plateau UWCD - 3/4/1974
- 8 Harris-Galveston Subordinate District - 4/22/1975
- 9 Blackrock GCD - 8/21/1981
- 10 Hockley UWCD No. 1 - 8/14/1982
- 11 Don County WCD - 8/21/82
- 12 Permian Basin UWCD - 8/21/1982
- 13 Fox Crossing WCD - 4/4/1986
- 14 Sutton County UWCD - 4/5/1988
- 15 Cove County UWCD - 11/4/1988
- 16 Mesquite GCD - 11/4/1988
- 17 Hill County UWCD - 8/8/1987
- 18 Barton Springs/Dezade Aquifer CD - 8/13/1987
- 19 Anderson County UWCD - 10/17/1987
- 20 Lipan-Kakapo WCD - 11/3/1987
- 21 Sterling County UWCD - 11/3/1987
- 22 Santa Rita UWCD - 8/18/1989
- 23 Fort Bend Subordinate District - 8/28/1989
- 24 Sandy Land UWCD - 11/7/1989
- 25 Saragosa UWCD - 11/7/1989
- 26 Banters County RA & GCD - 11/7/1989
- 27 Live Oak UWCD - 11/7/1989
- 28 Mesa UWCD - 1/29/1990
- 29 Salt Fork UWCD - 5/8/1990
- 30 Crockett County GCD - 1/28/1991
- 31 Medina County GCD - 8/28/1991
- 32 Headwaters UWCD - 11/5/1991
- 33 South Plains UWCD - 3/8/1992
- 34 Elm Creek CD - 5/1/1993
- 35 Uvalde County UWCD - 8/1/1993
- 36 Jeff Davis County UWCD - 11/2/1993
- 37 Gonzales County UWCD - 11/2/1994
- 38 Edwards Aquifer Authority - 8/28/1999
- 39 Garza County UWCD - 11/2/1994
- 40 Hemphill County UWCD - 11/4/1997
- 41 Mt. Rogers GCD - 11/17/1999
- 42 Co. Bosman County GCD - 3/21/1998
- 43 Llano Subordinate UWCD - 11/21/1998
- 44 Rolling Plains GCD - 1/28/1999
- 45 Moteno County UWCD - 8/14/1999
- 46 Clearwater UWCD - 8/21/1999
- 47 Presidio County UWCD - 8/21/1999
- 48 Guadalupe County GCD - 11/14/1999
- 49 Ites GCD - 1/22/2001
- 50 Blanco-Pedernales GCD - 1/22/2001
- 51 Brewster County GCD - 11/8/2001
- 52 Coastal Bend GCD - 11/8/2001
- 53 Coastal Plains GCD - 11/8/2001
- 54 Fayette County GCD - 11/8/2001
- 55 Collier County GCD - 11/8/2001
- 56 Lone Star GCD - 11/8/2001
- 57 Midland GCD - 11/8/2001
- 58 Meshas & Trinity Valleys GCD - 11/8/2001
- 59 Pecan Valley GCD - 11/8/2001

- 60 Pineywoods GCD - 11/8/2001
- 61 Refugio GCD - 11/8/2001
- 62 Tazewell GCD - 11/8/2001
- 63 Kinney County GCD - 11/2/2002
- 64 Lone Wolf GCD - 3/22/2002
- 65 Kincaid County GCD - 5/22/2002
- 66 Middle Trinity GCD - 5/22/2002
- 67 Antonine GCD - 11/8/2002
- 68 Blanco Valley GCD - 11/22/2002
- 69 Clear Fork GCD - 11/22/2002
- 70 Cove Creek GCD - 11/22/2002
- 71 Lost Pines GCD - 11/22/2002
- 72 Mid-East Texas GCD - 11/22/2002
- 73 Middle Pecos GCD - 11/22/2002
- 74 Post Oak Savannah GCD - 11/22/2002
- 75 Red Banks GCD - 11/22/2002
- 76 Trinity & San Rose GCD - 11/22/2002
- 77 West-Tex GCD - 11/22/2002
- 78 Hays Trinity GCD - 5/22/2003
- 79 Gateway GCD - 5/22/2003
- 80 Rock County GCD - 8/5/2004
- 81 Kennedy County GCD - 11/22/2004
- 82 Southeast Texas GCD - 11/22/2004
- 83 Corpus Christi ARA GCD - 8/17/2005
- 84 Central Texas GCD - 8/28/2005
- 85 Bosque County GCD - 11/28/2005
- 86 Victoria County GCD - 11/28/2005
- 87 Lower Trinity GCD - 11/28/2005

- 88 San Patricio County - 8/12/2007
- 89 Northern Trinity GCD - 08/12/07
- 90 Starr County GCD - 11/28/07
- 91 Colorado GCD - 11/28/07
- 92 Fannin County GCD - 11/28/07
- 93 Upper Trinity GCD 11/28/07

- Uncolored**
- A - Duval County GCD
 - B - Lavaca County GCD
 - C - Matamoros County GCD
 - D - Tallahassee GCD

Texas Groundwater Conservation Districts (February 2009)



Texas Commission on Environmental Quality



This map was prepared by the TCEQ for public review only. No claims are made as to accuracy or completeness of the information shown herein and it may not be suitable for any other use. The scale and location of mapped data are approximate. The groundwater conservation district boundaries are not final survey data and may not accurately delineate boundaries. For more information about this map, please contact TCEQ's Groundwater Review and Assessment Team.

Map printed February 26, 2009.

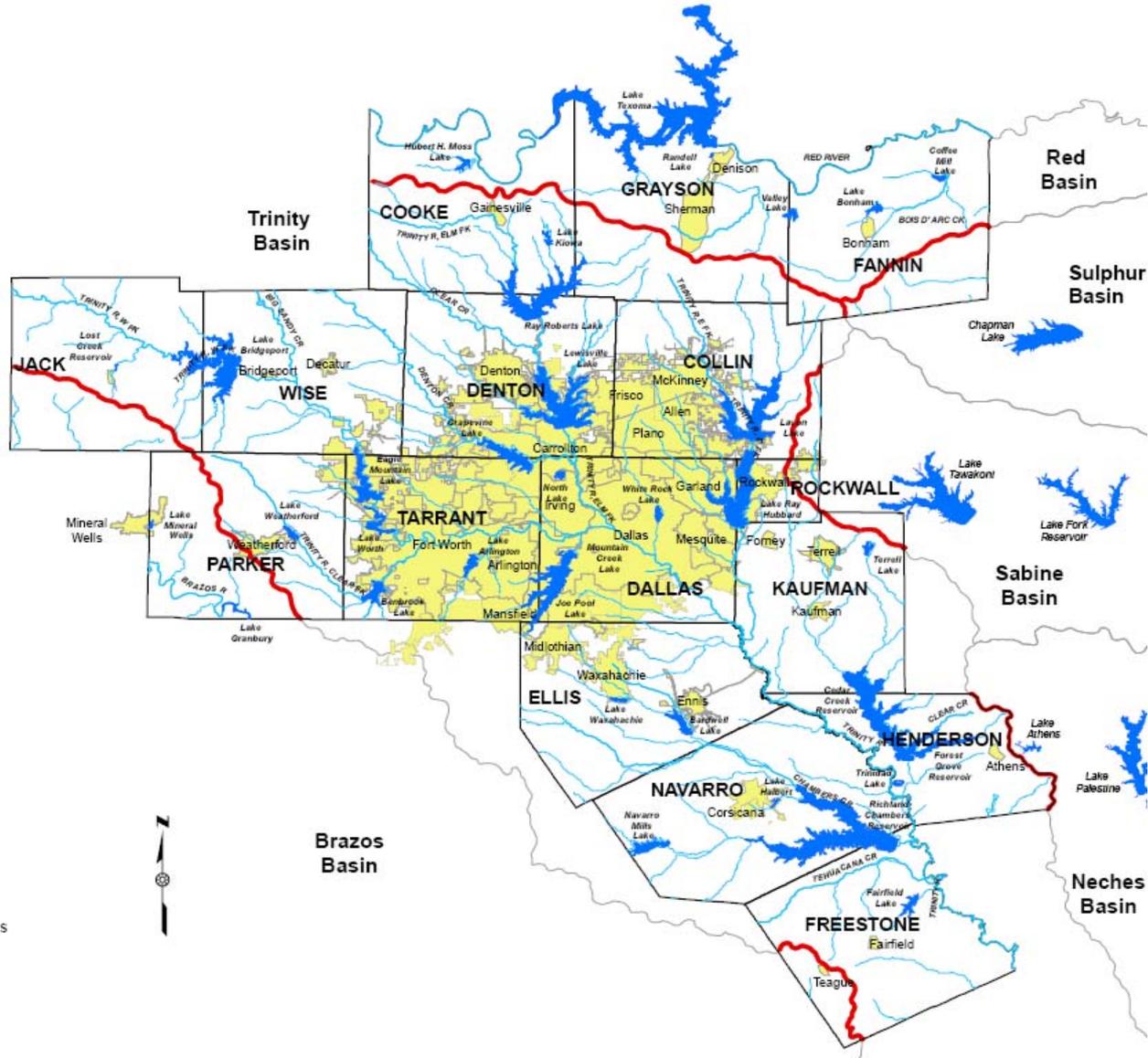
Color indicates date established by law or by election.

- ABRCD - Aquifer Storage and Recovery Conservation District
- CD - Conservation District
- CRD - Conservation and Reclamation District
- GCD - Groundwater Conservation District
- RA & GCD - River Authority & Ground Water District
- UWCD - Underground Water Conservation & Supply District
- UWCD - Underground and Fresh Water Conservation District
- UWCD - Underground Water Conservation District
- WD - Water District
- WCD - Water Conservation District

- Established by Law and Election
- Created, but Uncolored by Voters
- Areas not included within the District

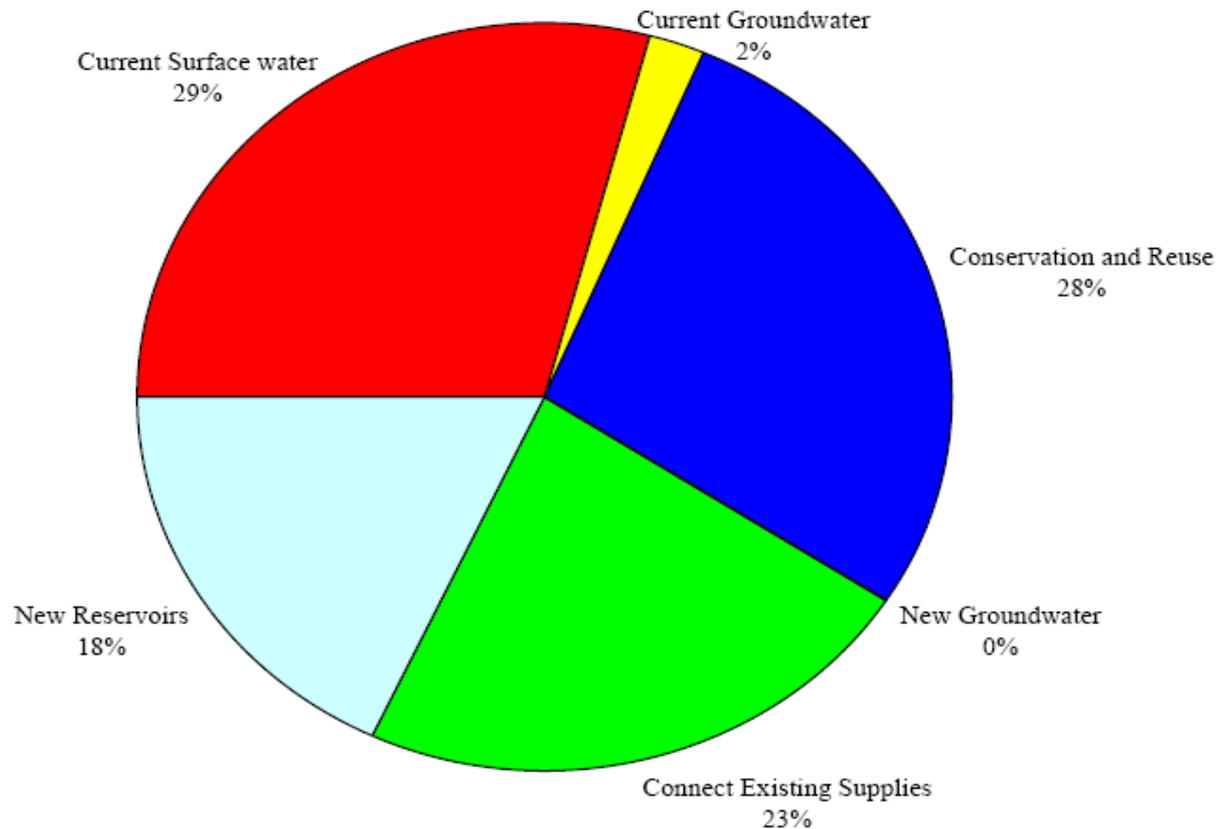
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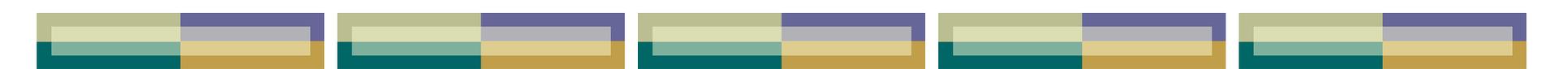
Region C Water Planning Area



Region C Water Plan Sources to Meet Needs by 2060

Figure ES.7
Sources of Water Available to Region C as of 2060





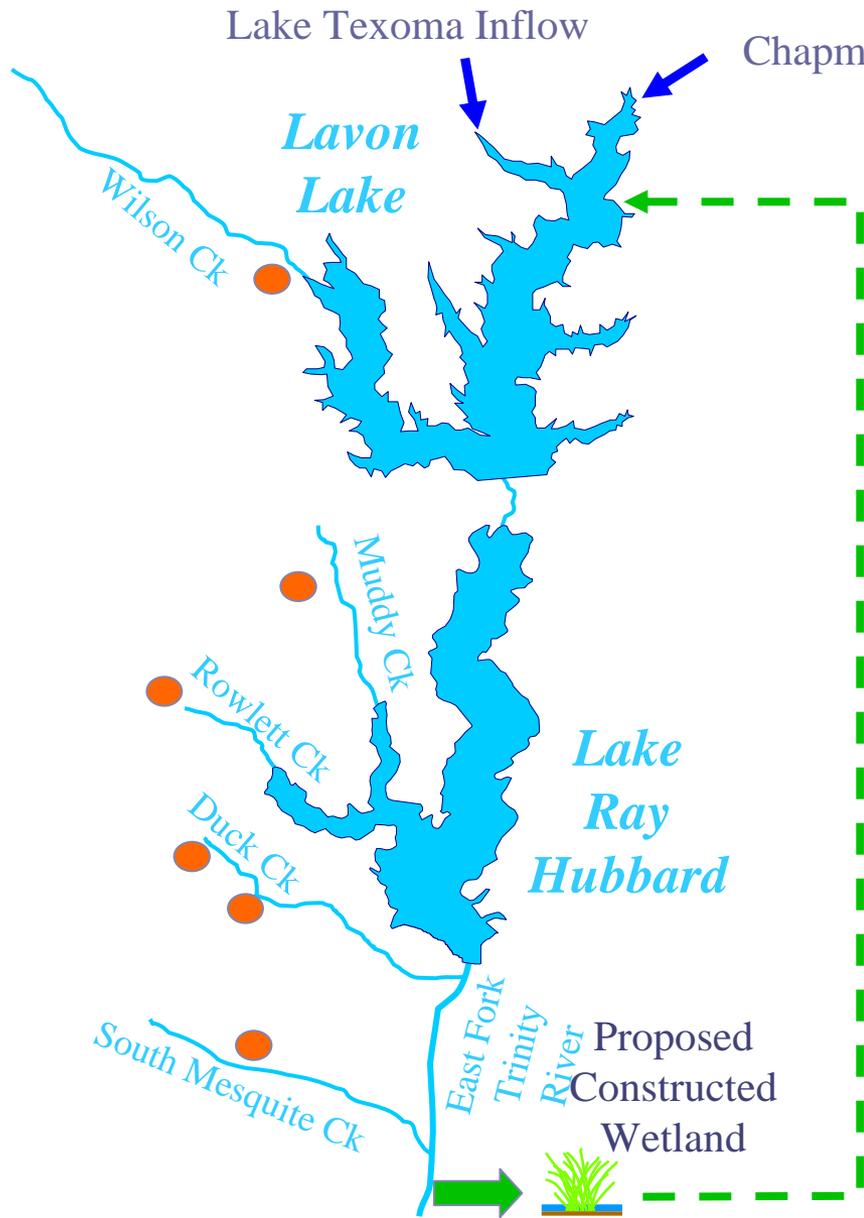
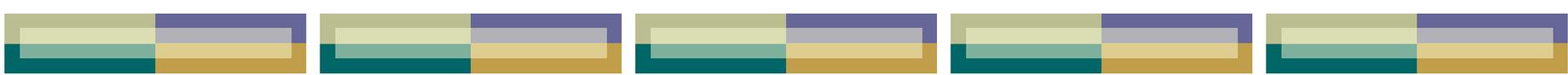
Region C Water Plan - Strategies

● Short Term/Intermediate

- Conservation
- Lake Texoma water
- Reuse
 - Tarrant Regional Water District – Richland Chambers
 - NTMWD – 260mm – Kaufman County to Lavon
- Sabine Water

● Long Term

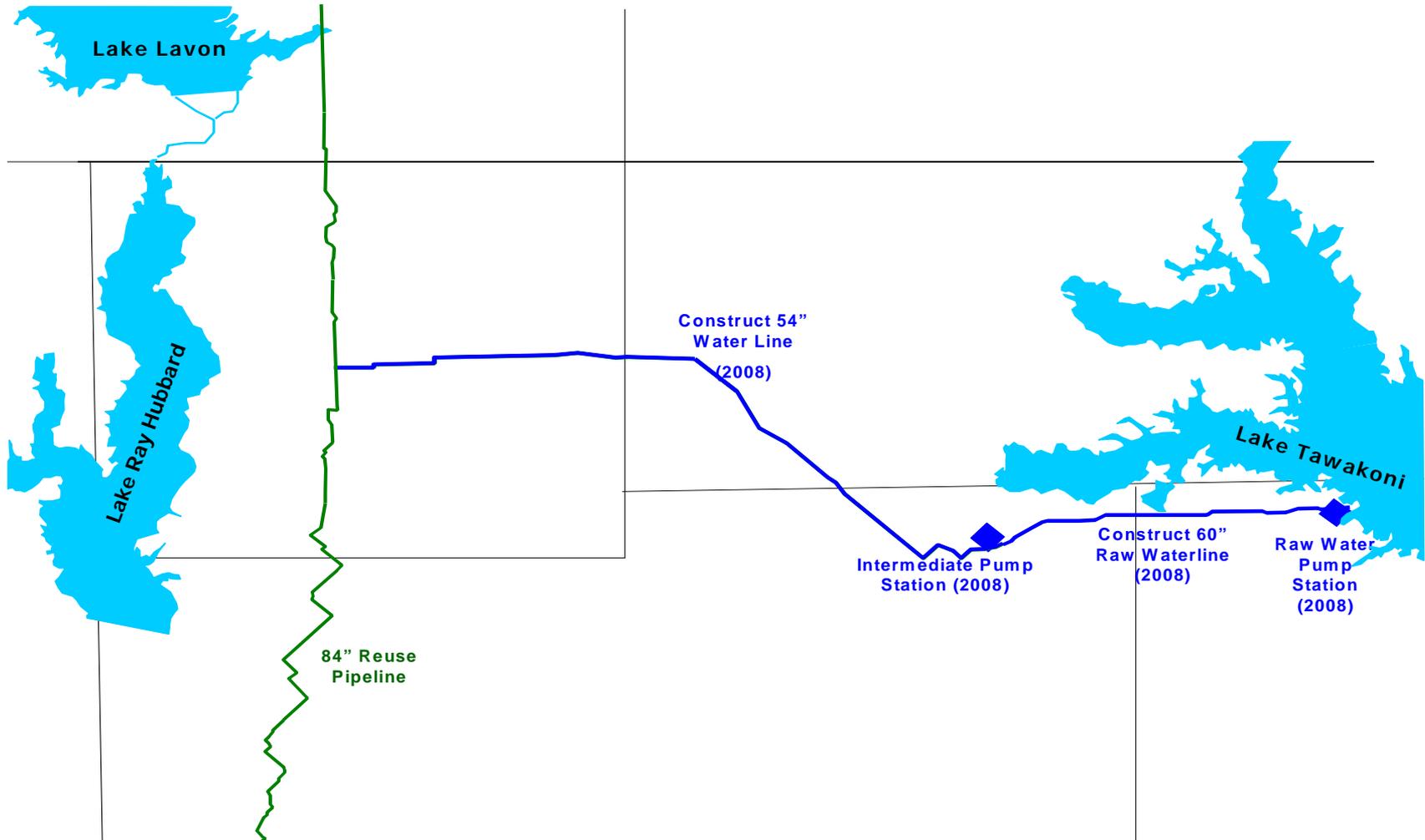
- Lower Bois d'Arc in Fannin County
- Major new reservoir – Marvin Nichols
- Lake Fastrill – Dallas Water Utilities
- Lake Ralph Hall – Upper Trinity Water District
- Water from Oklahoma



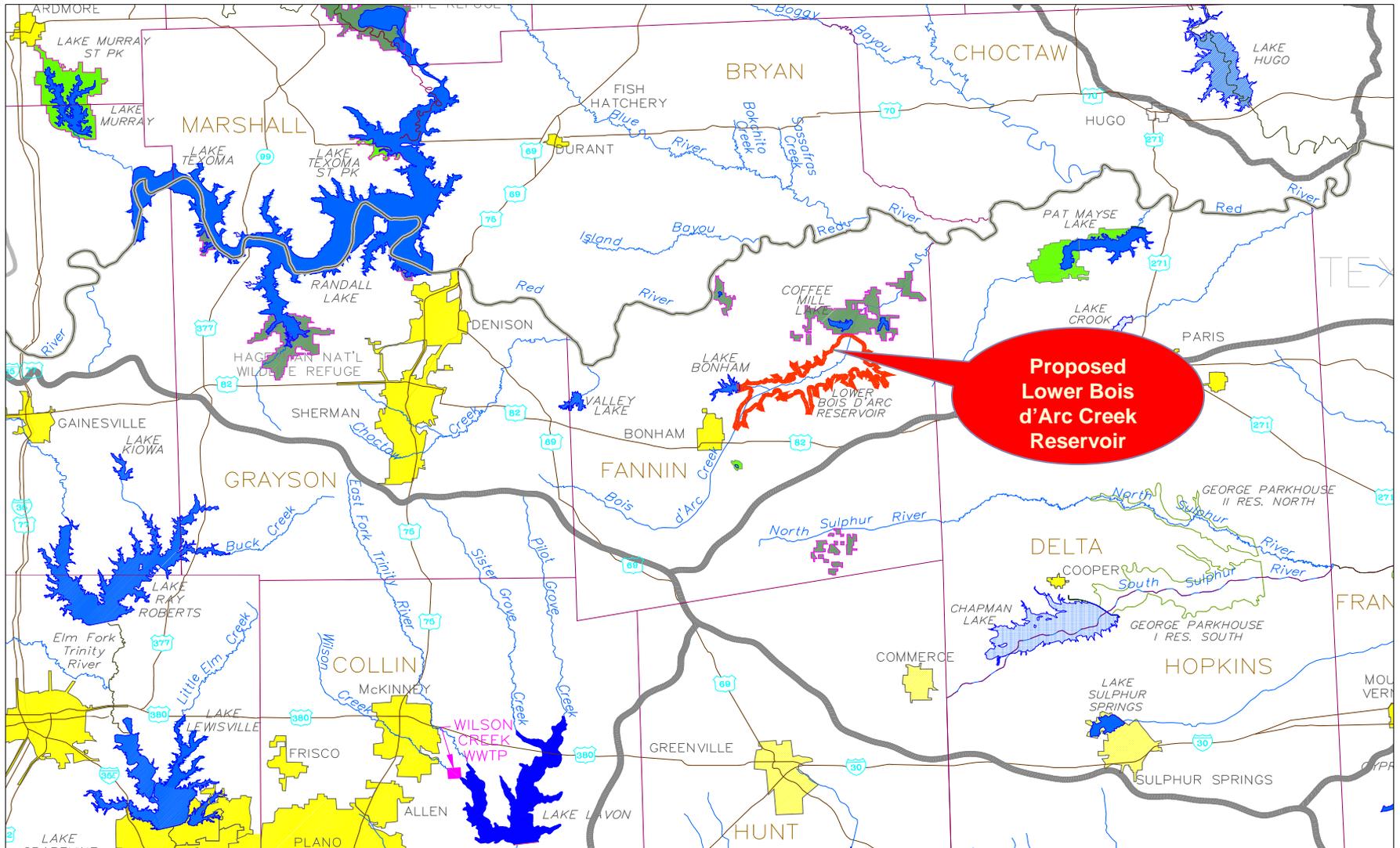
East Fork Raw Water Supply Project



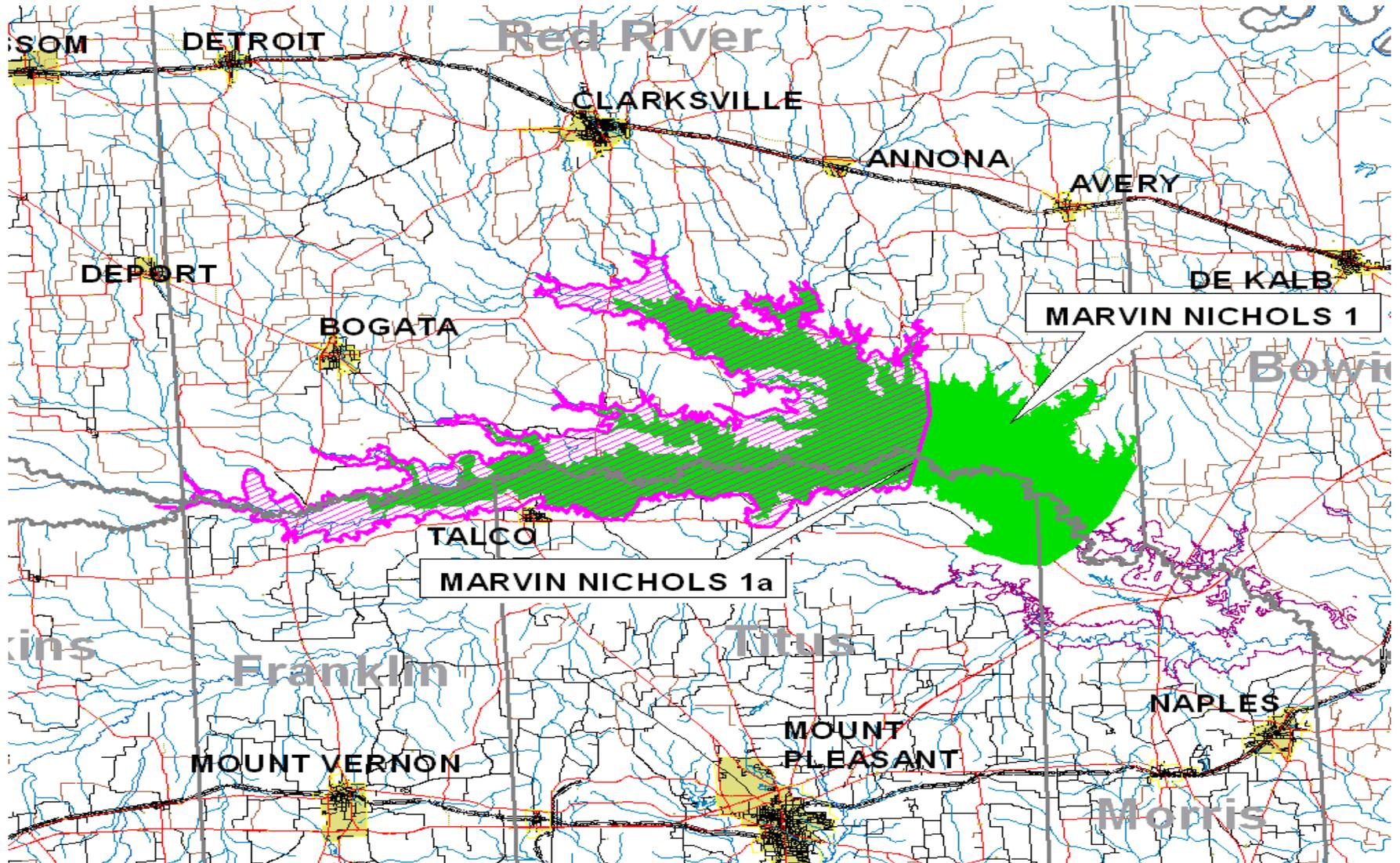
SRA Upper Basin Supply Project Schematic



Proposed Lower Bois d'Arc Creek Reservoir



Proposed Marvin Nichols Reservoir



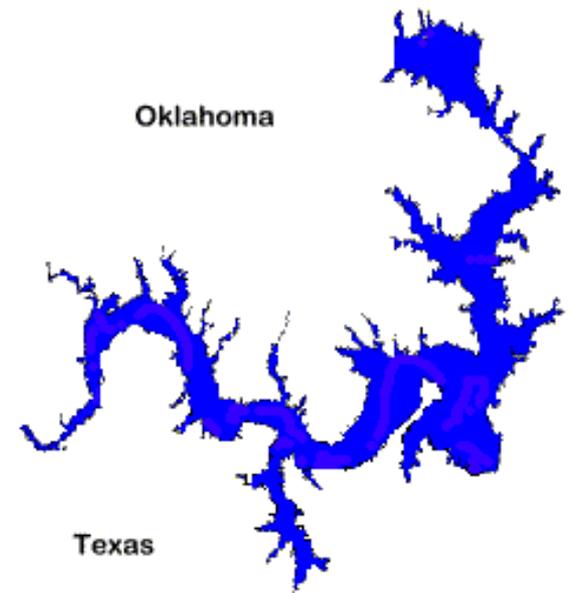


Recommend Water Management Strategy Cost

- Additional 2.7 million acre-feet of water needed by 2060
- Total Capital Cost - \$13,202,929,595

Existing Surface Water Supplies in Region C

- Existing reservoirs primarily committed to DFW area water needs
- Lake Texoma
 - 3rd largest lake in Texas
 - 90% of available, existing water supplies in Region C
 - 4% devoted to municipal water
 - Remainder is flood control/hydropower



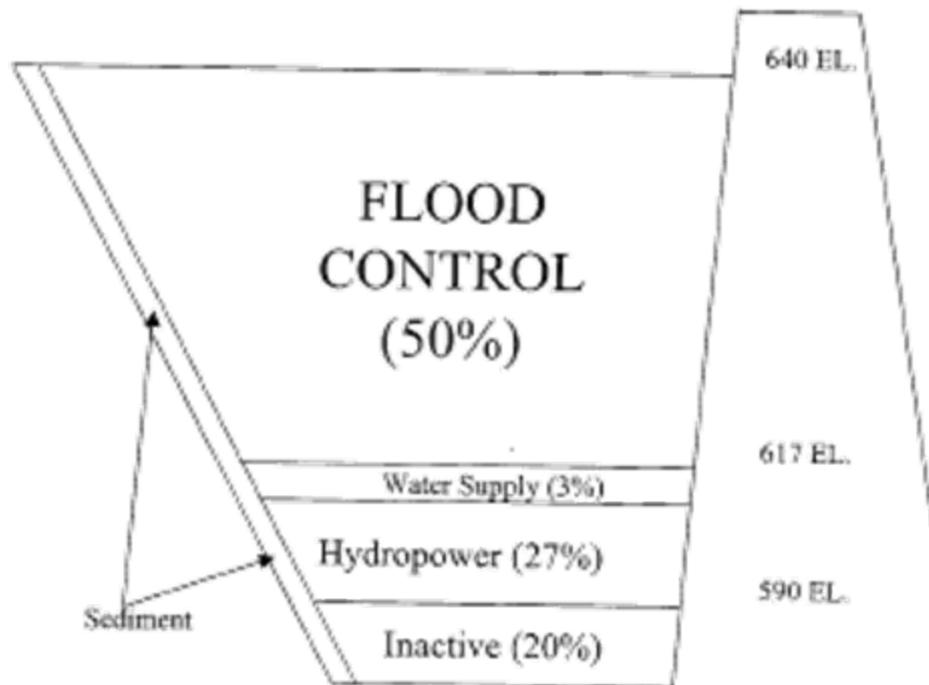


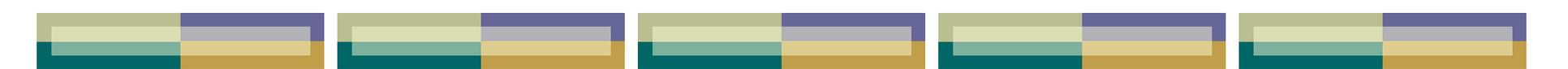
Lake Texoma Reallocation

- 1986 – Water Resources Act provided additional 50,000 acre-feet for GTUA member cities and water providers
- GTUA and NTMWD currently pursuing USACE for completion of Reallocation Study
- The Reallocation Study has been sent to the Assistant Secretary of the Army with a recommendation to approve and sign
- Anticipate receiving contracts July 2, 2009

WATER STORAGE IN LAKE TEXOMA

	<u>Acro-Feet</u>	<u>Percentage</u>
Total Capacity	5,194,200	100%
Flood Control Storage	2,613,800	50%
Power Storage	1,420,200	27%
Inactive Storage	1,010,200	20%
Municipal and Industrial	150,000	3%





Lake Texoma Advisory Committee Background

- Lake Texoma is authorized by federal law for the purpose of flood control, hydropower, river flow control, and recreation
- 1985 – NTMWD and GTUA entered into partnership to develop water resources in Lake Texoma
- Municipal and industrial water use currently constitutes only 3% of the volume of the lake
- Recreation interest in the lake (marine operators) became concerned over impact of water removal from the lake
- 1989 – Congressman Hall (TX) and Congressman Watkins (OK) passed Public Law 100-71 creating the LTAC
- LTAC membership is approved by the Commander of the USACE Tulsa District
- LTAC purpose is to provide advice and recommendations to the USACE on operation of Lake Texoma



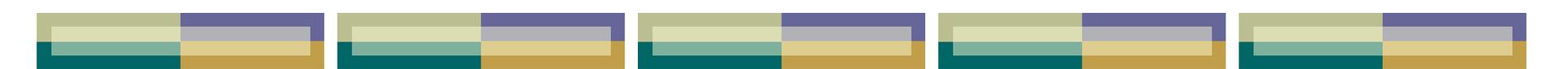
Lake Texoma Advisory Committee

- Issues to be considered include, but are not limited to:
 - Lake level (pool) stabilization
 - Lake shore management
 - Water quality
 - Wildlife and fisheries management
 - Public recreation
 - Law enforcement
 - Cultural resource protection
 - Water safety
 - Erosion control
 - Land management
 - Other subjects that affect the overall lake area



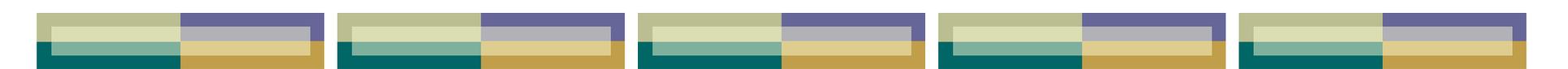
Lake Texoma Advisory Committee Membership

- Membership consists of 22-29 members
- These members include representatives from:
 - Lake associations
 - Water supply interests
 - Hydropower interests
 - Marina operators
 - State park departments
 - State and federal wildlife departments
 - Navigation interests
 - Real estate associations
 - County government
 - Environmental groups
 - Private boat dock interests
 - Flood control interests
 - Other interests as appropriate



Lake Texoma Advisory Committee

- In 20 years of existence, the LTAC has accomplished several tasks
- The most important is the recognition and acceptance of the plan for the operation of Lake Texoma on a variable level
- An unwritten and unseen portion of the LTAC's function is to provide an opportunity for the various interest groups to express view points and gain an understanding in the multiple uses in which the lake serves
- Interests by other lakes in establishing a similar operation



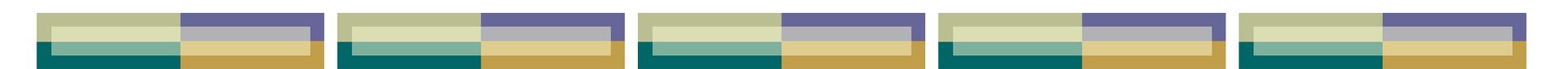
Desalinization Issues

- Much of the water in Texas has a total dissolved solid of 1,000+ mg/liter
- The Red River water in our area ranges from 1,150-1,200 mg/liter upstream to 2,000 mg/liter +
- The Brazos River has a high level of dissolved solids and ranges in the 1,800-2,500 mg/liter in the basin



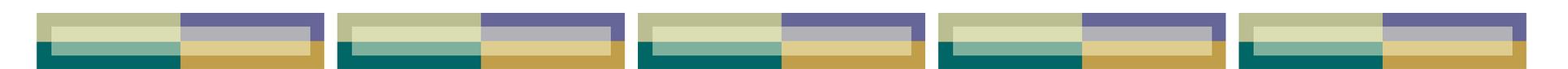
Desalinization Issues

- Brackish underground resources are also available in much of the state, but are not currently used
- These resources will need to be used in the future to meet growing population demand
- Technology for treatment is available today
 - Reverse Osmosis (RO) – most common
 - Pressurizing raw water through filters
 - Electro-Dialysis Reversal (EDR) – electrical energy to attract positive and negative ions in brackish water



Cost of Desalinization

- Initial capital cost
- Continuing operational cost (electrical energy)
- Cost is directly related to cost of energy
- Reasonable to predict use of desalinized water will become more common in the future as fresh water resources are unable to meet the growing population demands for water
- Major environmental issue
 - Brine disposal
 - Mix with other water and discharge in stream (presents permitting issue). Cannot degrade the existing stream quality
 - Subsurface injection. Can be accomplished below fresh water is found, but is expensive



Texas Water Rights

- State is deemed to own all surface water rights
- Definition includes all the water that falls from the sky separated by a break in vegetation
- Impoundment of less than 250 acre-feet of surface water is permitted for stock tanks and similar agricultural needs without acquiring a permit
- Anything greater than 250 acre-feet requires issuance of a permit from the State
- Regulatory agency in Texas is the TCEQ, formerly the TNRCC, formerly the Texas Department of Water Resources, formerly the Texas Water Commission, formerly the Texas Board of Water Engineers



Texas Water Permits

- Permits required to be submitted to the state regulatory agency
- Must include engineering, legal and other data to support water right request
- Many of the 23 river basins in Texas have already been totally appropriated, especially those in the west part of the State
- Red River and Sabine River have not been over-appropriated
- In cases where more water rights have been appropriated than exists in the basin, priority has been established by the date of the permit



Texas Water Rights

- Transferring water from one river basin to another requires an interbasin transfer permit
 - Often difficult to achieve
- Water right permits are strictly monitored by the TCEQ and water use must be reported on an annual basis
- Water rights can be withdrawn for lack of use or additional disregard for permit conditions
- GTUA's water permit dates back to 1957, among the older permits in the Red River Basin