

2005 Long Range Water Supply Plan Update

Dallas Water Utilities

March 2, 2005

Why We Are Here Today

- Continue Dallas' tradition of a 50 year commitment to provide our citizens and our customer cities sufficient, dependable source of high quality water to sustain and support continued economic development
- Provide information on the 2005 Long Range Water Supply Plan to the year 2060
- Seek Council support to provide planning strategies based on the 2005 Long Range Water Supply Plan to the Region C Planning Board

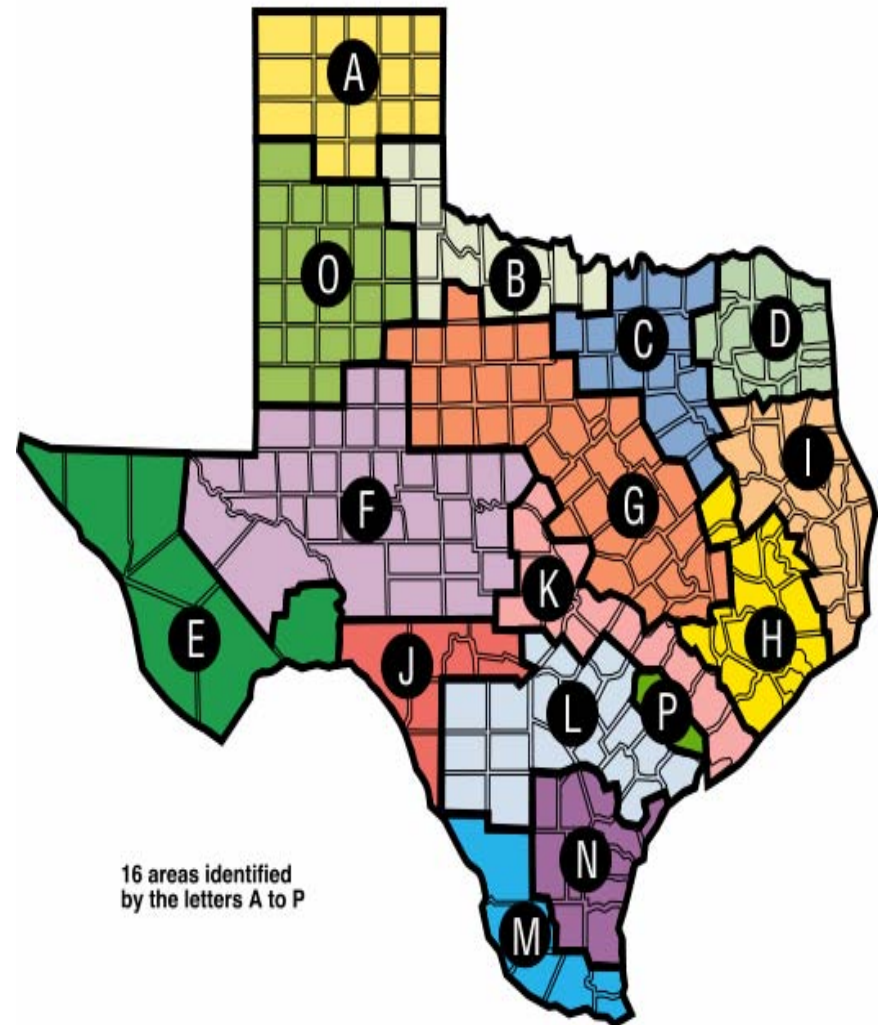
History - Economic Development

- Dallas has been an economic leader, aided by available water and transportation resources
- Historically Dallas has done long-term planning to ensure water supply is available to meet future needs
- For more than 50 years, the City of Dallas and its customer cities have been able to grow economically with no constraints on the availability of sufficient, high quality sources of water to meet the needs of industrial, commercial and residential development

Regional Planning Process

- Senate Bill One (passed in 1997)
 - Comprehensive water legislation:
 - Drought vulnerability
 - Limited water supplies
 - Increased water needs
 - Five-year planning cycle
 - Emphasis on local and regional input
 - 16 planning regions
 - Projects must be “consistent” with the Plans in order to obtain TCEQ surface water permits and TWDB funding

Regional Water Planning Areas



Regional Planning Process

- Regional Water Planning Group Responsibilities
 - Consider local plans
 - Develop and adopt regional water plans
 - Consider public input
 - Provide region-specific analyses
 - Regional Water Plans offer preliminary, planning-level analysis of Water Management Strategies
- Water User Group Responsibilities
 - Participate in the planning process
 - Submit any local plans for meeting water supply needs
 - Undertake detailed studies of Water Management Strategies to move towards implementation
 - Secure needed water resources (permitting, funding, construction, maintenance)

Regional Planning Calendar - 2005

- March 14-18 – Dallas submits plan to Region C Consultant
- April 18 (estimate) – Region C Board votes to approve preliminary plan
- June 1 (estimate) – Region C required to publish “Draft” plan for public comment & meetings
- December 30 – Region C Final Plan due to Texas Water Development Board

Comparing Plan Recommendations to Region C Requirements

- **Dallas Long Range Water Supply Plan (LRWSP) was prepared with recommendations for multiple options and multiple sources**
 - Very high-level analysis based primarily on construction and O&M cost
 - Projects require further study prior to development
 - Conditions often change resulting in the need to revise strategies (example-Oklahoma water no longer viable)
- **Water supply planning is often opportunistic with new unplanned options surfacing (example-Lake Fork)**

Comparing Plan Recommendations to Region C Requirements

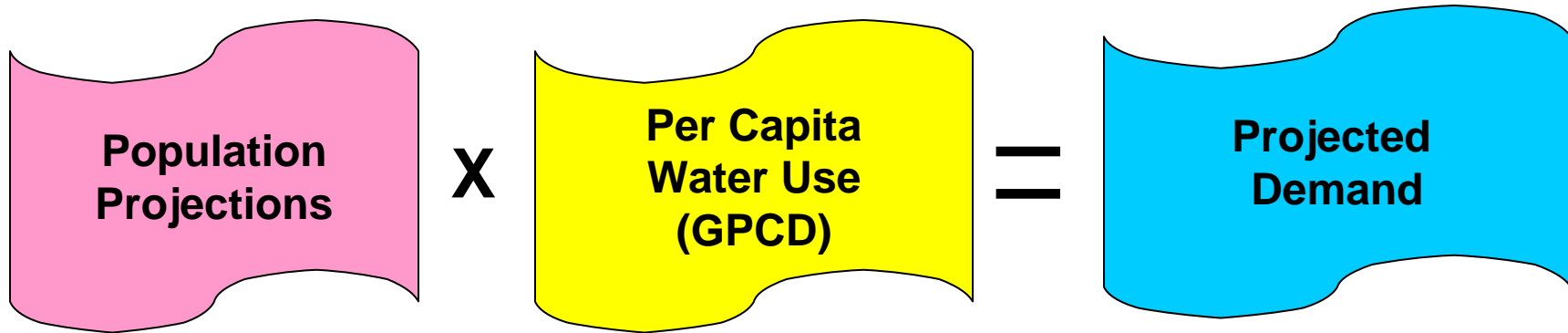
- **Dallas does need additional water supplies above that from conservation, recycling, and securing return flows to meet its needs through 2060**
- **Guidelines for Regional Water Plan Development** (*See Note) **require that water management strategies identify specific sources including location, amount, and partnerships**
- **Dallas needs to identify and submit specific water supply sources rather than participation in the studies recommended by the consultant**
 - **For example, Dallas cannot submit “participation in a Sabine River Basin project” as a water supply strategy**
 - **Submittal of a proposed source does not commit Dallas to proceed with any project (example - Oklahoma)**

(*Note – From Texas Water Development Board Regional Water Planning Group Contract Requirements, Exhibit “B”)

Health, Environment & Human Services and Finance & Audit Committee Briefings

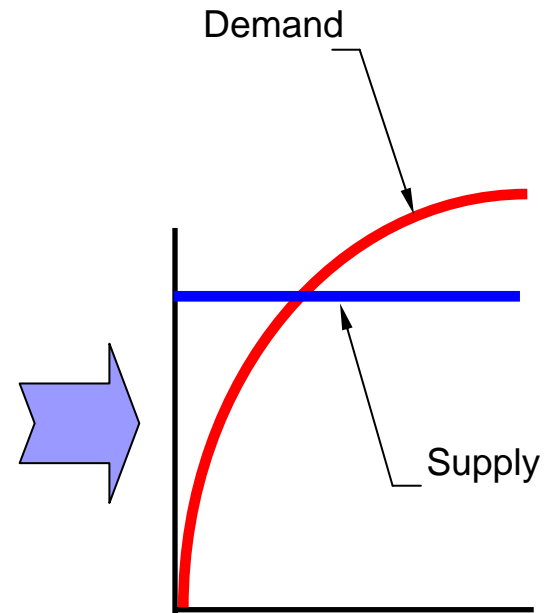
<u>Meeting Date</u>	<u>Briefing</u>
14-Feb-05	Recycled Water Implementation Plan
7-Jan-05	Water Conservation Five Year Strategic Plan Water Conservation Program
13-Dec-04	Hearts Bluff Mitigation Plan
25-Oct-04	Calculation of Water and Wastewater Rates Dallas As a Regional Water Provider Historical Prospective Hearts Bluff Mitigation Bank Filing Sulphur River
27-Sep-04	Dallas As a Regional Water Provider Legal Issues Rate Setting Process for Customer Cities Water and Wastewater Services
24-Aug-04	Update to Long Range Water Supply Plan
28-Jun-04	Water Sales Contract With The North Texas Municipal Water District Capital Improvement Plan
14-Jun-04	Potential Water Supplies
5/24/2004	Water Planning Strategies For the Future of Dallas Potential Water Supplies
12-Apr-04	Dallas Water Issues: Customer Cities Contracts and Rate Setting Info
1-Mar-04	Dallas Water Supply Issues: Current and Future Plans Briefings Dallas Water Supply Issues: Regional Planning Process

Components of Water Supply Planning



- Region C Projections
- NCTCOG Projections
- City Inputs

- Historic Water Use Trends
- Project Plumbing Code Conservation
- Information From City On Zoning Changes



Long Range Water Supply Plan Update - Scope

- Update population and water demand projections
 - Extend to 2060
- Project future water supply needs
- Inventory existing City of Dallas water supply sources
- Include findings from other ongoing studies
 - Water Conservation 5-Year Strategic Plan
 - Water Recycling Implementation Plan
- Identify and evaluate additional new water supply sources
 - Evaluate on a cost basis
 - Include comments, derived from review of available literature, on potential environmental and socio-economic issues that might impact development
- Recommend future water supply strategies

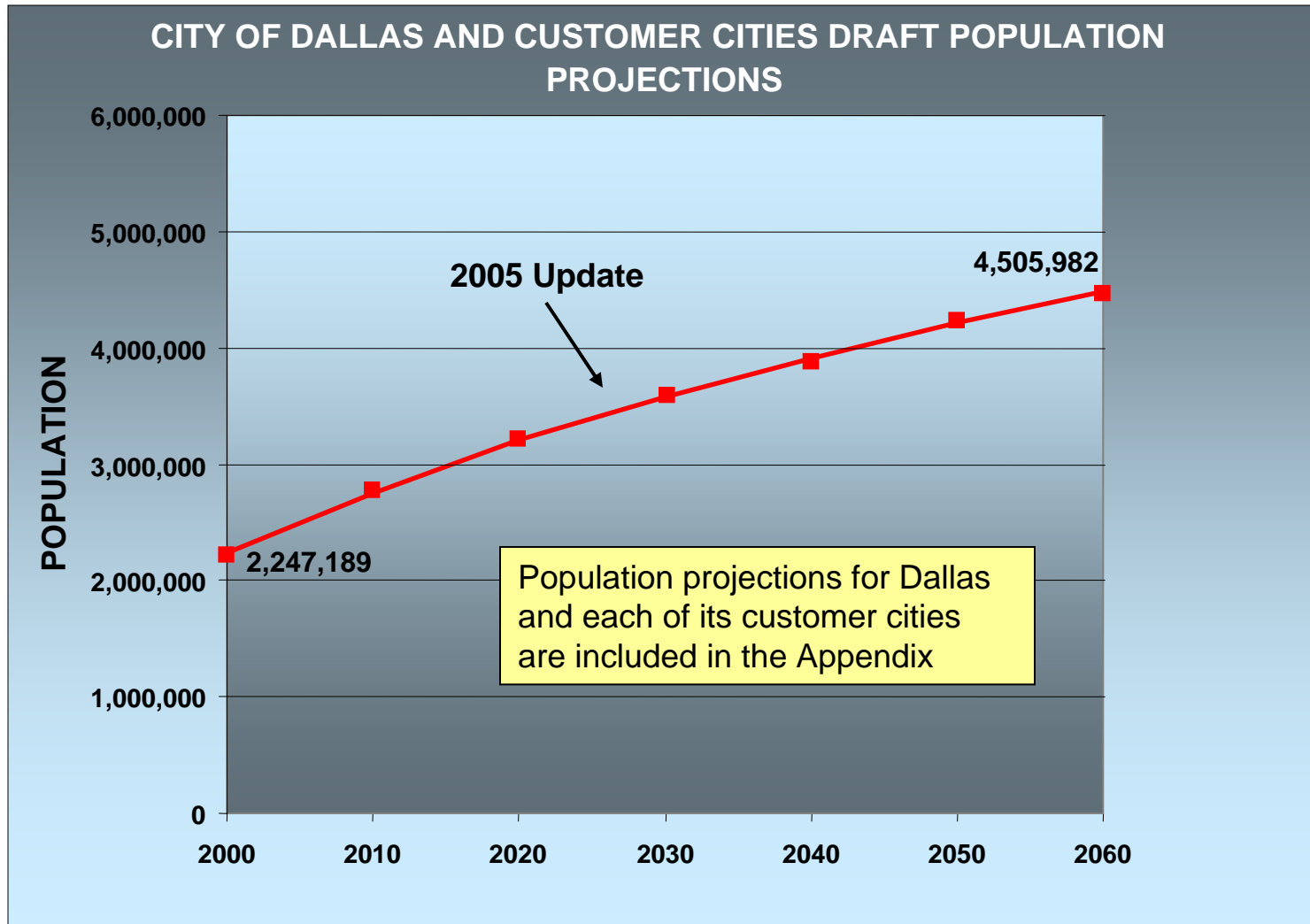
Why is Dallas Updating its Water Supply Plan?

- Provide updated information for the City to project future water supply requirements
- 2000 census indicated higher population growth rates
- Significant opposition to Marvin Nichols Reservoir
- Options expanded to consider potential supplies from sources not previously evaluated
- Recycled water has gained more support
- Conservation has gained increased awareness and support
- Need to coordinate with current State mandated regional water supply planning process
- Extends planning horizon to 2060

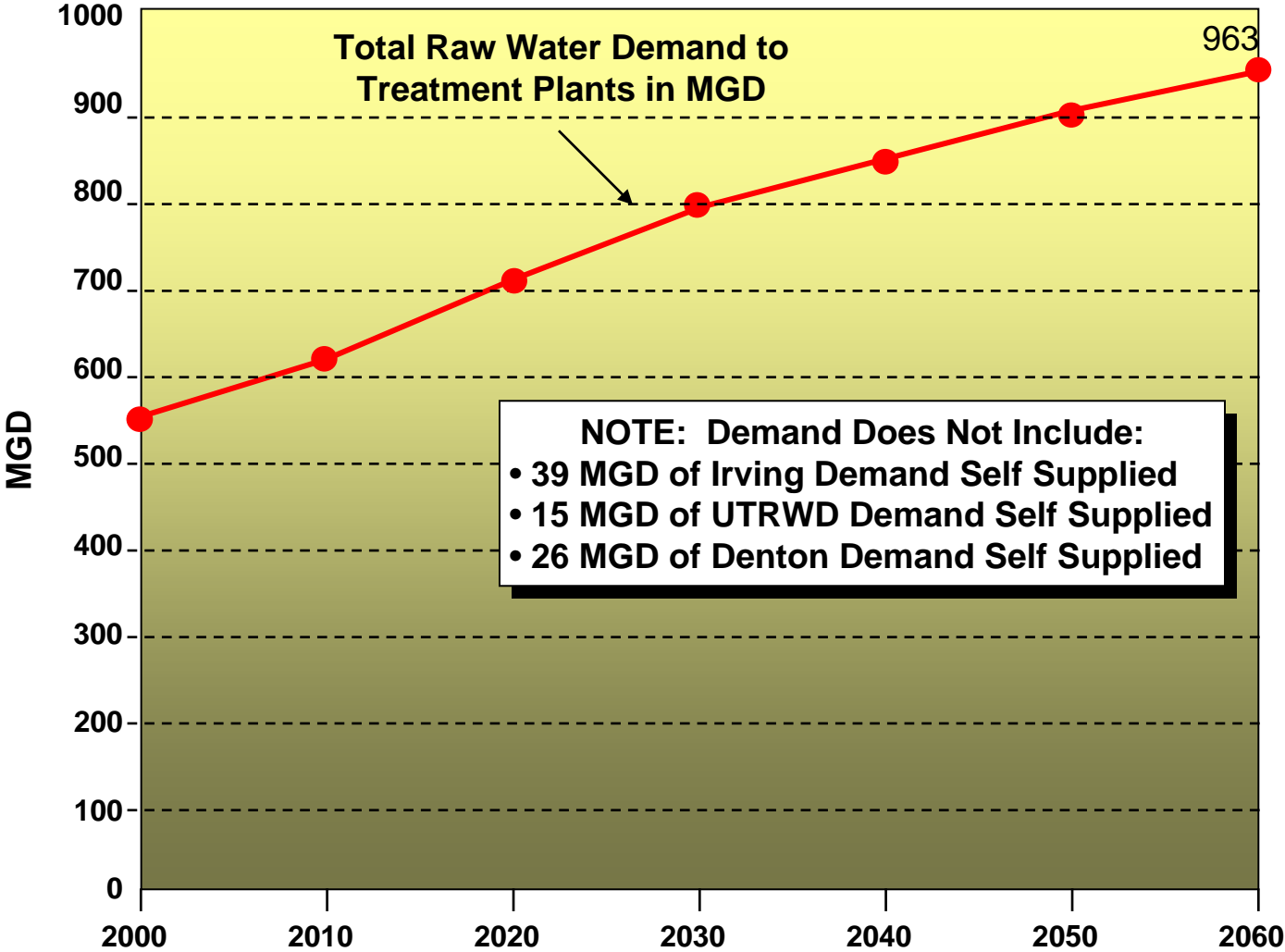
Long Range Water Supply Plan Update – Public Involvement

- In accordance with our commitment to have public comment and input into the water supply planning process, DWU hosted five public meetings
- Public involvement influenced the outcome of the 2005 Water Supply Plan Update
- Meetings were held December 13, January 26, February 3rd, 10th and 17th
 - Received comments both in support of and in opposition to the consultant's recommendations
- 169 people attended at least one public meeting
- 58 people attended more than one meeting
- In addition to public meetings, the consultant either met with, or talked to a select group of individuals for a total of 40 hours, providing information related to the study/recommendations. An additional 21 man-hours were spent responding to emails from this group of individuals
- Our consultant - Chiang, Patel, and Yerby (CP&Y) – serves as a sub-consultant to the Region C consultant, Freese & Nichols
 - CP&Y's role was to develop population projections for Region C

Population Projections

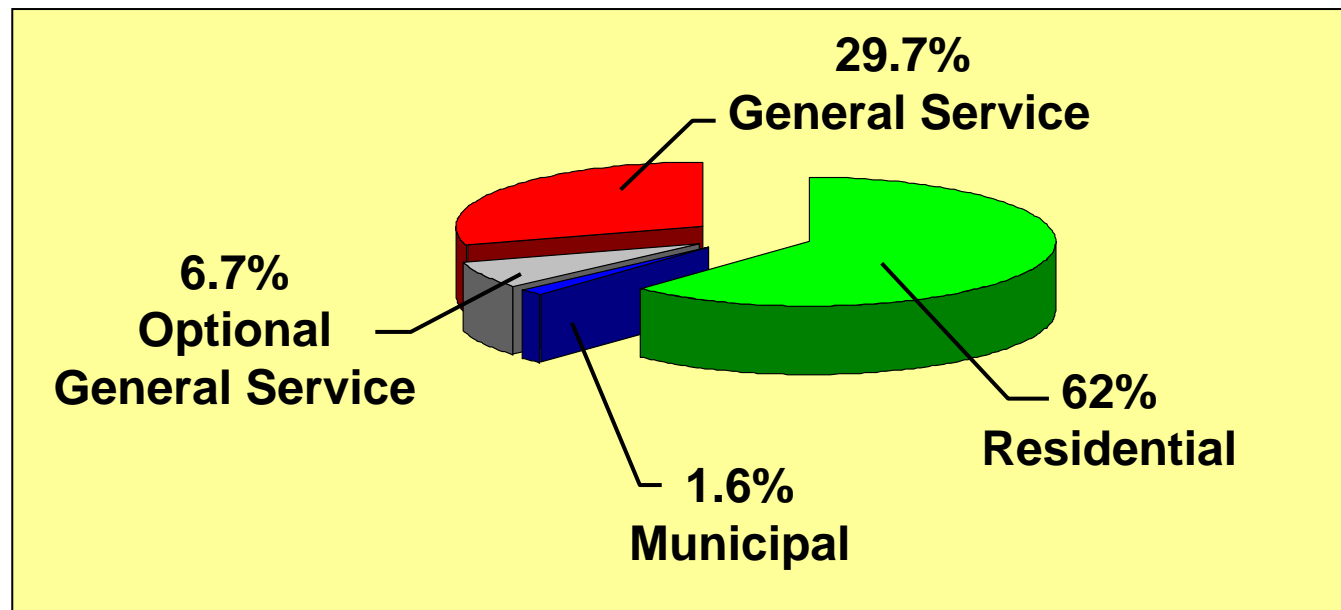


Projected Water Demands

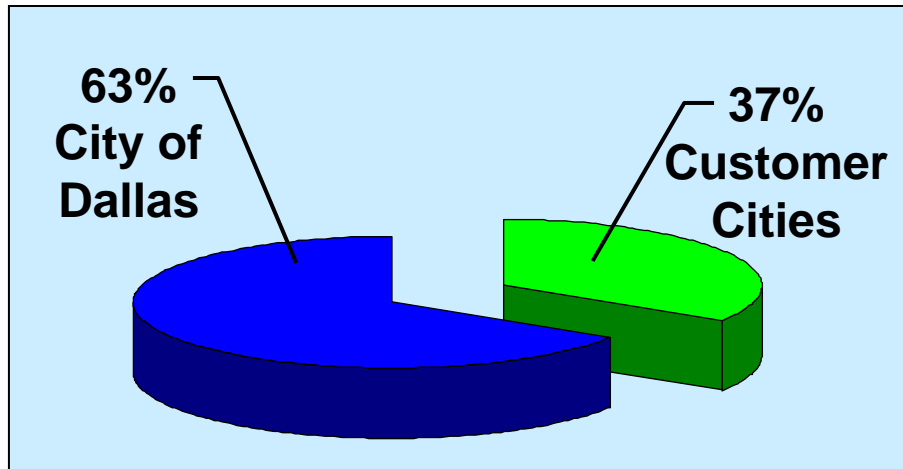


Characteristics of Dallas' Treated Water Use

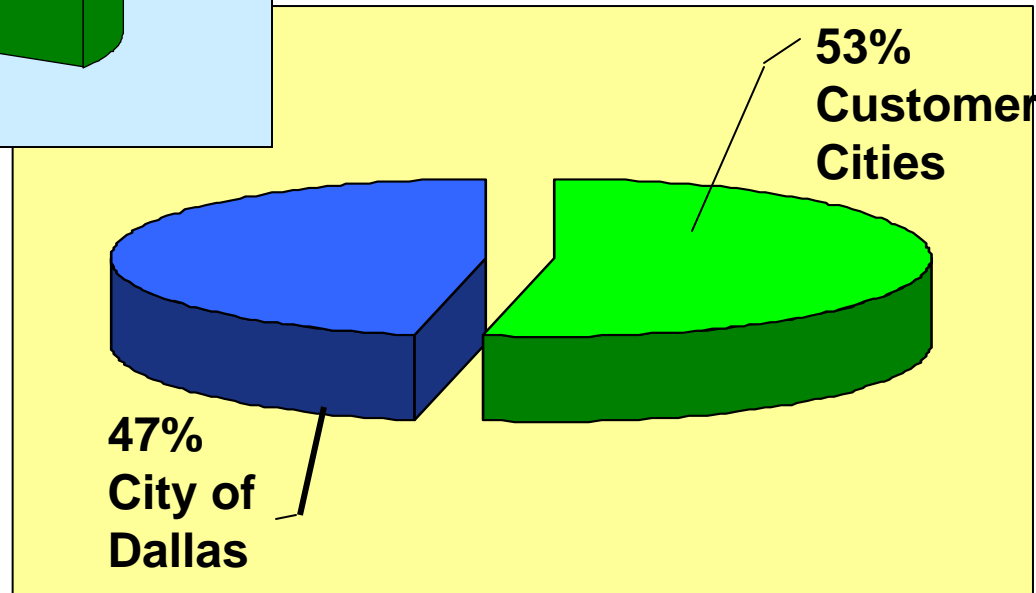
Analysis of Dallas Water Use completed as part of City of Dallas Five-Year Strategic Plan on Water Conservation



Comparison of Dallas' Untreated Water Supply Demands – Today and 2060 Projection



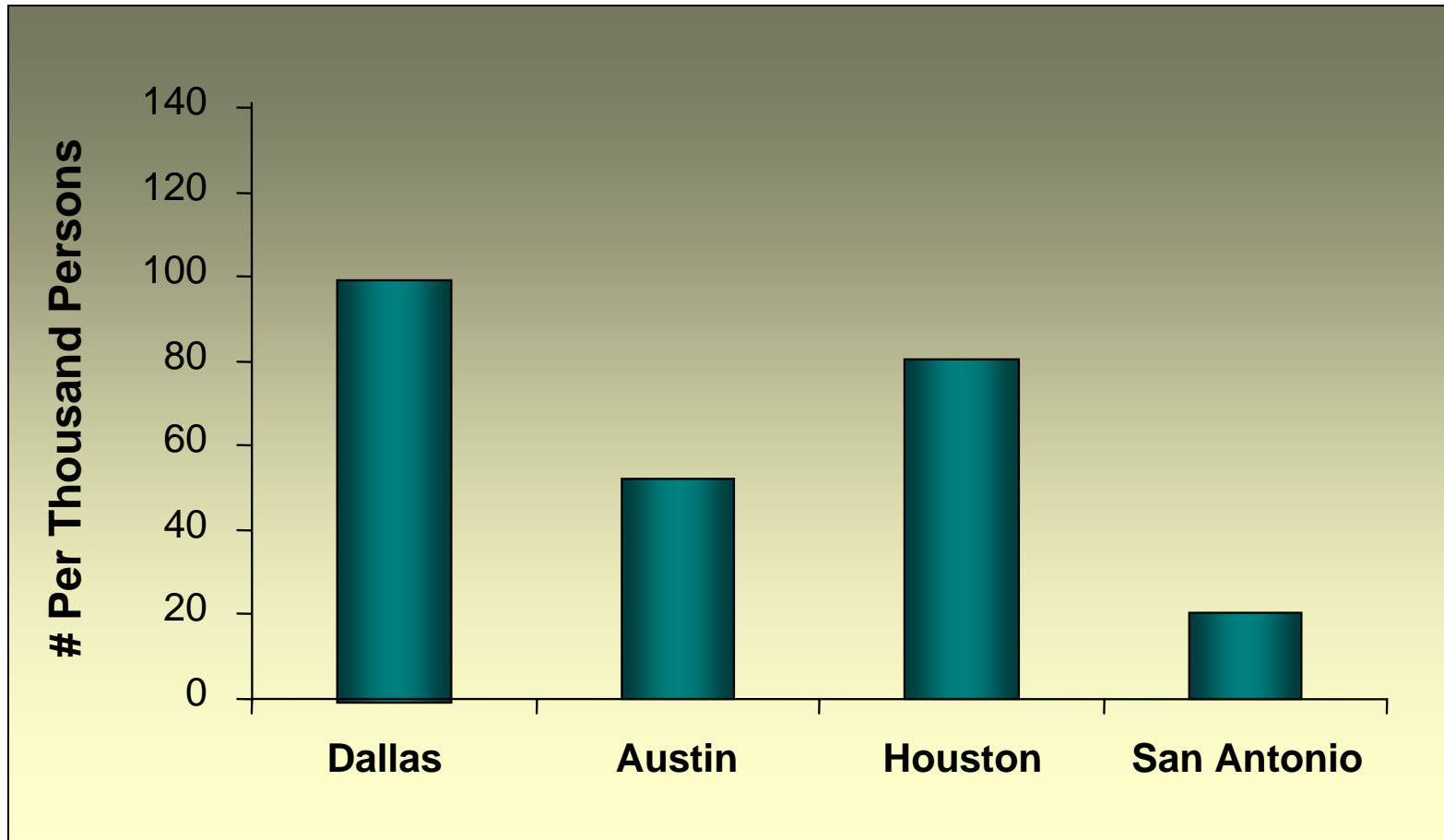
**Current Use -
Today**



**Projected Use
in 2060**

Dallas Demographics

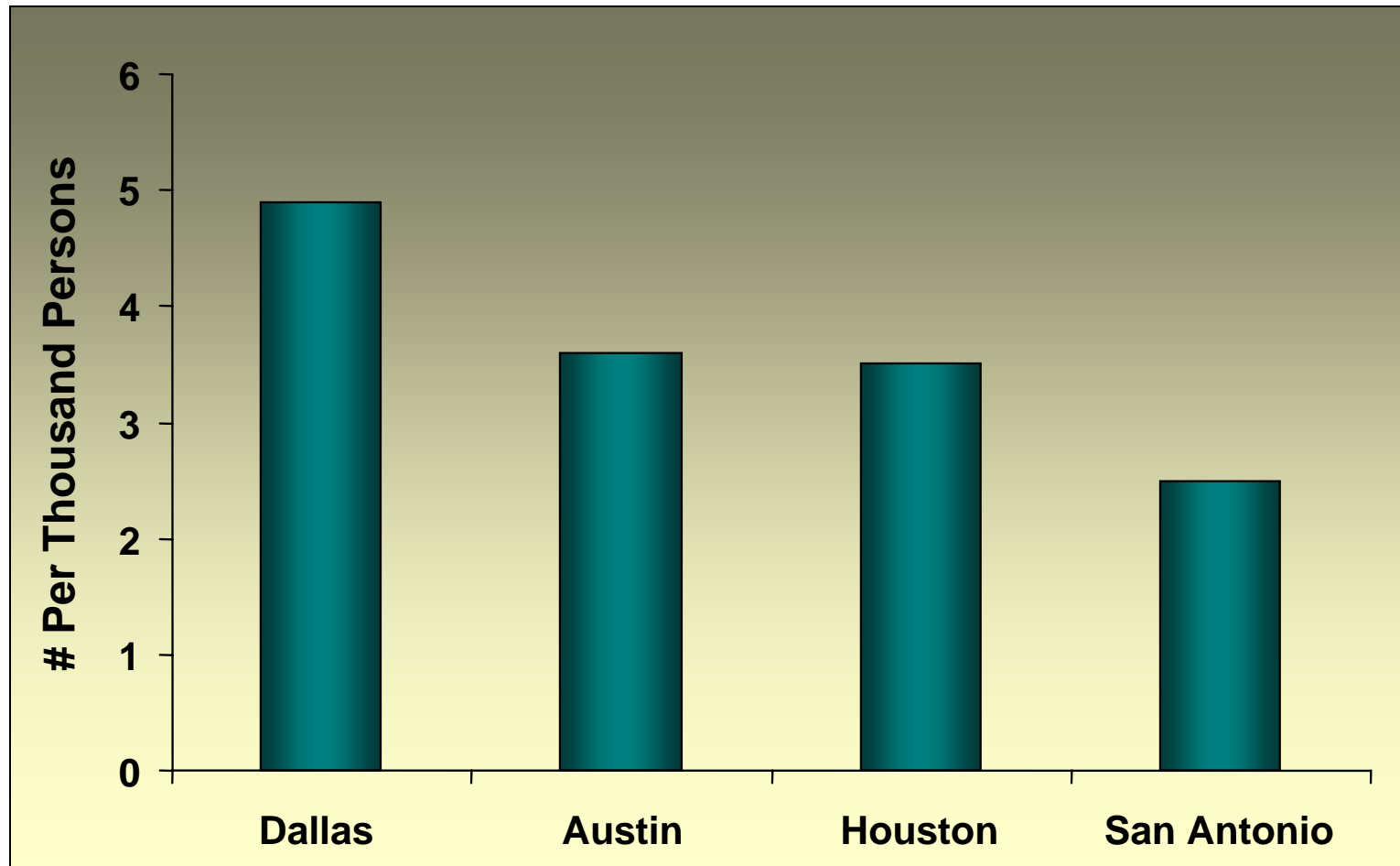
Office Space Comparison/Per Capita Basis



References: Texas Real Estate Center, Various Sources
City of Dallas Economic Development Dept. (CoStar Software)

Dallas Demographics

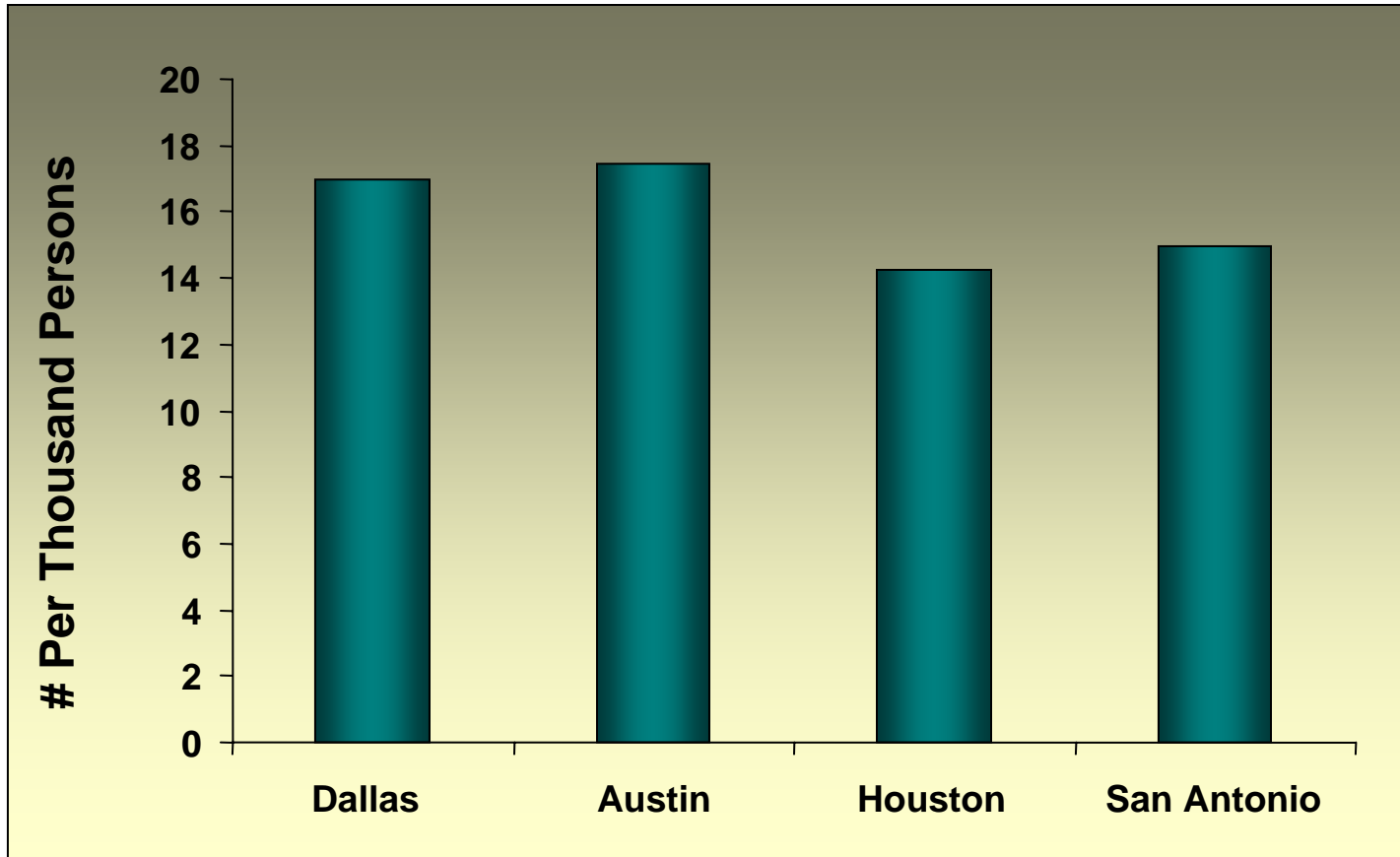
Restaurant Comparison/Per Capita Basis



References: City of Dallas Health Department
City of Austin Health Department
City of San Antonio Health Department

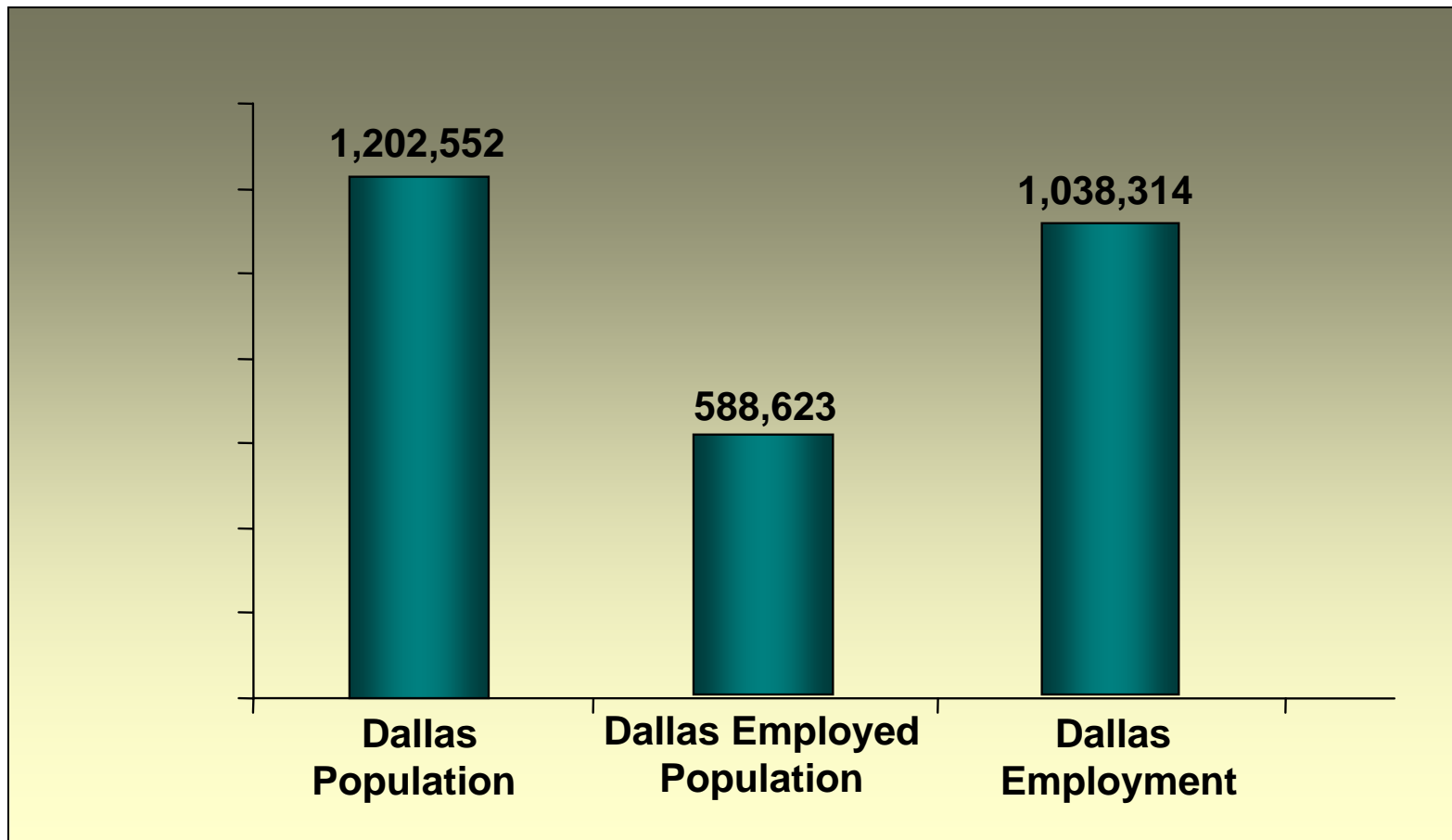
Dallas Demographics

Hotel Room Comparison/Per Capita Basis



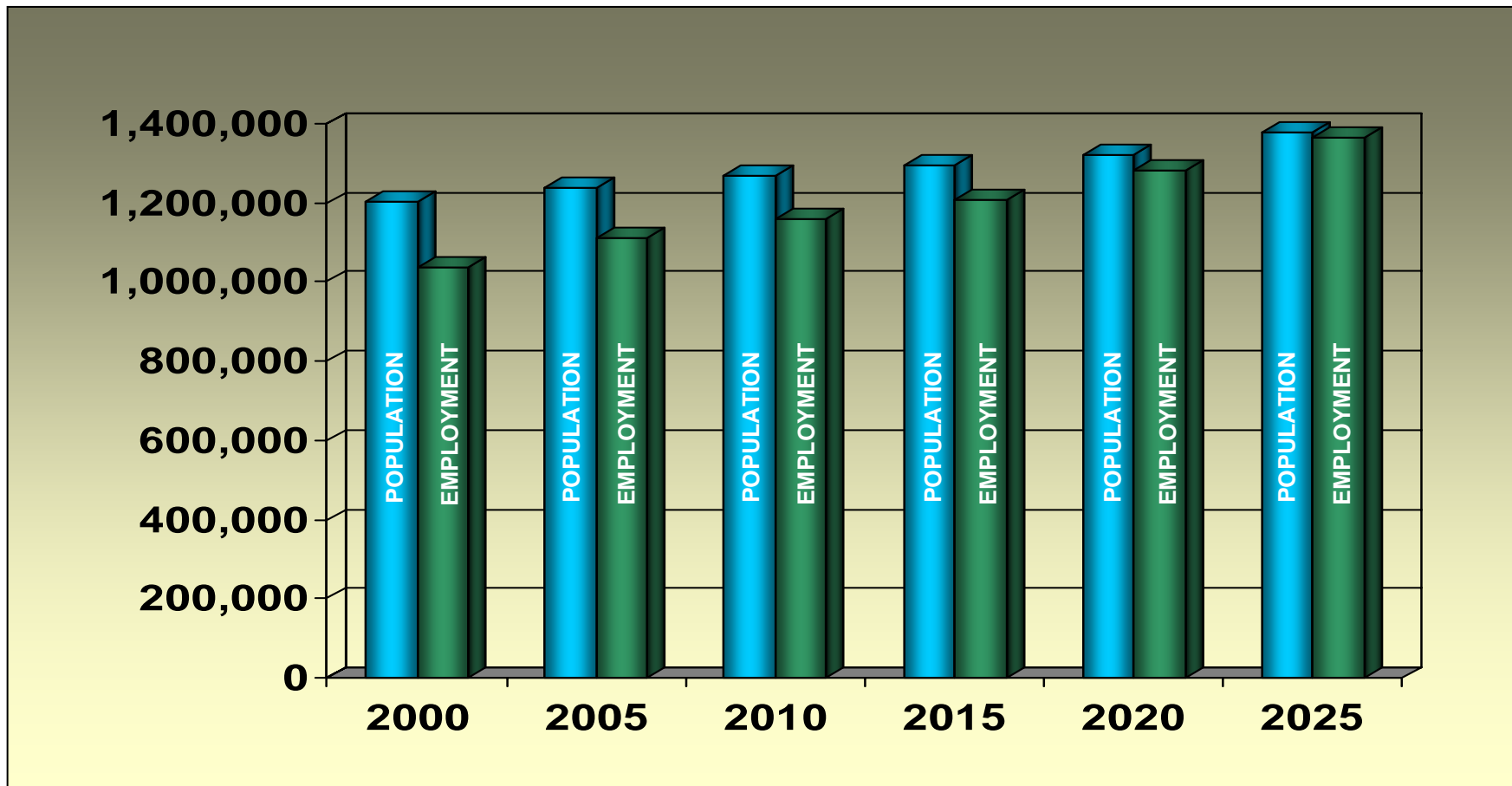
References: San Antonio Convention and Visitors Bureau
Texas Real Estate Center, Various Sources
Office of the Governor, Travel Research, Year 2000 Numbers

Dallas Demographics



References: NCTCOG Population & Employment Projections
2000 Census Data, US Census Bureau

Dallas Demographics



References: NCTCOG Estimate adjusted from 2000 Census count. Does not include group quarters.

Conservation Issues: Can Dallas Reduce GPCD to 140?

- **Dallas needs to conserve water, but a realistic goal for GPCD needs to be set**
- **62% of Dallas water demand is residential (120 GPCD average from FY96 to FY03)**
- **Remainder is from offices, hotels, restaurants, schools and industry**
 - **Dallas has the highest occupied office space per capita in the state**
 - **This water use supports the Dallas economy**
- **Although achieving 140 GPCD is not realistic, Dallas should continue to implement ambitious conservation measures**
- **With full implementation of Dallas' conservation strategies and recycled water initiatives, the 2060 GPCD for Dallas service area is projected to be 153 which approaches the goal of the Water Conservation Implementation Task Force**

Conservation

Perspectives Relative to DWU Water Conservation Program

- **Initial five-year strategic plan anticipated to achieve an average 1% per year reduction in overall water consumption over first five years**
- **A target savings of 15 percent (through 2060) for City of Dallas is consistent with preliminary targets proposed in Region C Long Range Water Supply Planning**
- **Use of water (i.e., total GPCD) is significantly affected by the number of hotels, restaurants, and offices located in Dallas resulting in a large daytime population increase**
- **DWU water conservation targets to be adjusted on five-year intervals based on results of implemented practices, technology developments, and City Council considerations**
- **DWU's Water Conservation Program should continue to be a part of planning for long range water supply needs**

Recycled Water Program

Perspectives Relative to DWU

- **Providing multiple barriers is critical to a successful recycled water augmentation program**
- **The DWU Recycled Water Program should be updated on a periodic basis**
- **The DWU Recycled Water Program, which includes 120 mgd of augmentation and an initial amount of about 18 mgd of direct use for nonpotable purposes, is the appropriate approach for planning long range water supply**

Evaluation Strategy for Each Supply Alternative

- Existing supply or new reservoir
- Connected or unconnected supply
- If new reservoir (to the extent that information is available):
 - Total number of acres impacted
 - Environmental/cultural impacts
 - Jurisdictional area
 - Magnitude of resident impacts
 - Economic impacts
 - Oil & gas production
 - Timber production
 - Agricultural production
- Water quality compatibility
- Permit issues
 - Water rights permit status
 - Interbasin transfer permit status
 - Federal permit status
- Costs
 - Total capital cost
 - Total annual cost
 - Cost per 1000 gal.
- Other considerations

Where We Were - 2004

- Briefed Council on Long Range Water Supply needs
- Council raised concerns related to Long Range Water Supply Plan
 - Encouraged DWU to consider additional conservation
 - Encouraged DWU to consider additional recycled water
 - Look at additional return flows
 - Re-evaluate population and future demands
 - Consider additional water supply options

What We Have Done

- Incorporated public input into the long range water planning process
- Developed Five Year Strategic Plan on Water Conservation
- Developed Recycled Water Implementation Plan
- Contracted for an update to the 2000 Long Range Water Supply Plan
 - Evaluated population and future water demands
 - Evaluated additional return flows
 - Evaluated many additional water supply options
 - Identified water needs through 2060

Good News

- Anticipate substantial water savings through an aggressive conservation program
 - Both direct and indirect recycled water projects have been added to our water supply planning options
 - Identified an additional 27 MGD in return flows
-
- These steps delay the projected need for a new water supply from 2025 to 2035

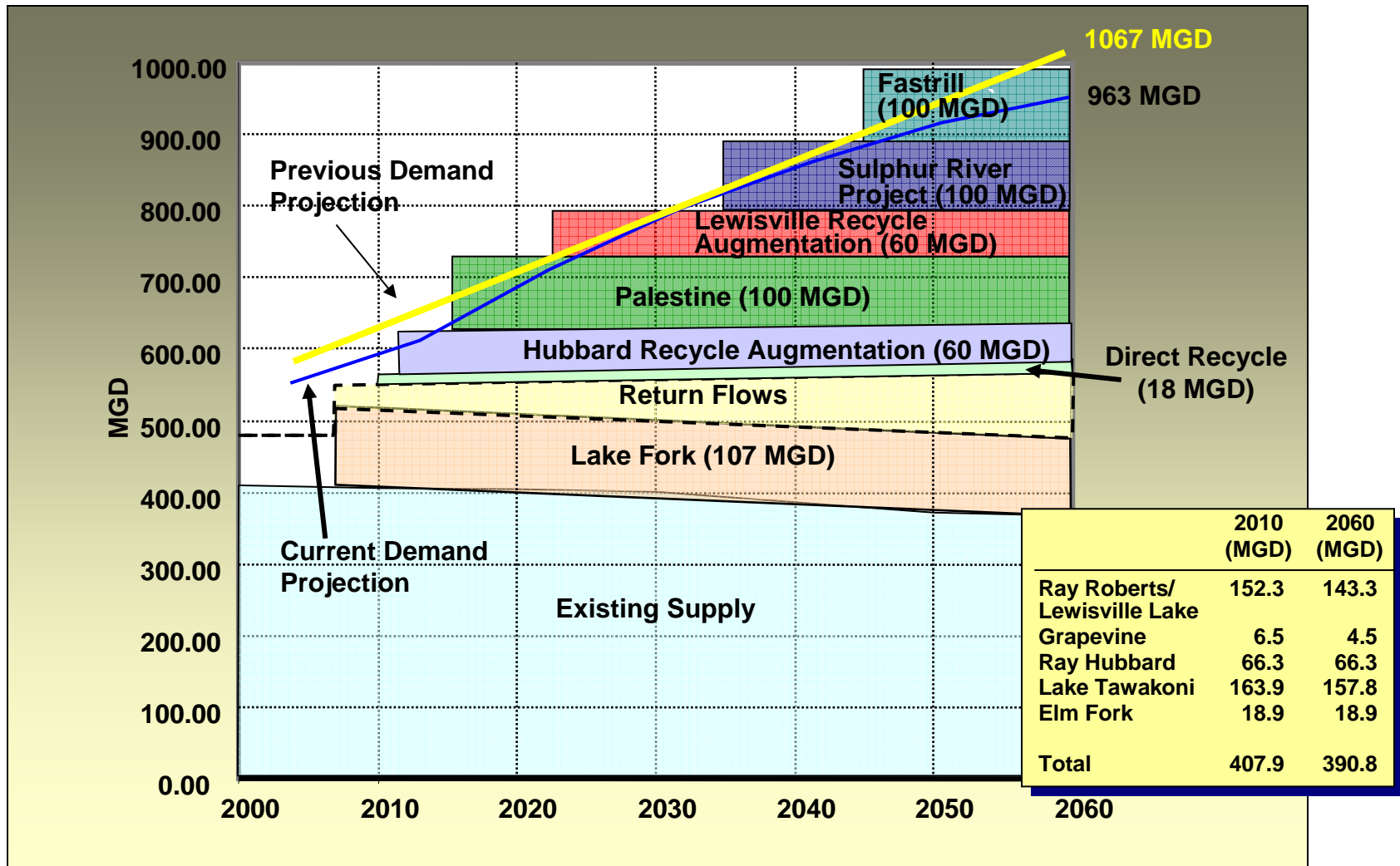
Where We Are Today - 2005

- Consultant identified options for additional water supply sources to meet the projected needs beyond 2035
- Consultant performed cost analysis of water supply options to determine the most cost effective alternatives
- Consultant also performed a high level literature review of environmental and socio-economic impacts of each water supply option

Where Do We Propose to Go from Here

- Need to pursue additional water supply alternatives
 - Conservation
 - Recycling
 - Return Flows
 - Connect existing water resources
 - Evaluate recommended options to determine those which are most feasible
- Too early in the evaluation process to take any options off the table
- Dallas should participate in the two proposed feasibility studies – Sulphur River Basin Study and Lake Fastrill
- Provide input to Region C on proposed alternatives to meet the State's requirements

Recommended Strategies



Demand was increased by 10% from projected base demand for projection error or unforeseen changes.

Cost Comparison of Alternatives

Strategy	Existing	Proposed	Available Yield (MGD)	Cost per 1000 gallons
Return Flows	✓		71	\$0.10
Lake Fork (Delivered through Tawakoni Infrastructure)	✓		107	\$0.44
Lewisville Recycle Augmentation		NA	60	\$0.50
Hubbard Recycle Augmentation		NA	60	\$0.58
Direct Recycle		NA	18	\$0.77
Marvin Nichols (Dallas' Portion of Cooperative Project)		✓	100	\$0.80
Fastrill Lake (Delivered through Palestine)		✓	100	\$0.93
Lake Palestine	✓		98	\$0.96
George Parkhouse ¹		✓	100	\$0.85
Water Conservation (2005 to 2010)		NA	16.6	\$1.02
Lake Columbia (Delivered through Palestine)		✓	32	\$1.07
Oklahoma (through Ray Hubbard)	✓		100	\$1.09
Toledo Bend (Dallas' Portion of Cooperative Project)	✓		89	\$1.23
Reallocation of Wright Patman Flood Pool	✓		100	\$1.39
Lake O' the Pines	✓		80	\$1.45
Lake Texoma	✓		100	\$1.48
Purchase Wright Patman water from Texarkana	✓		100	\$1.50
Lake Livingston	✓		100	\$1.57
Mesa Water (Groundwater)	✓		179	\$1.75
Sam Rayburn/B.A. Steinhagen	✓		100	\$2.25
System operation of Wright Patman/Jim Chapman	✓		100	\$2.50

Assumptions:

Debt service based on 6% for 30 years. Includes O&M and power costs.

50 year life cycle based on 2004 dollars with no inflation (implementation schedule not known)

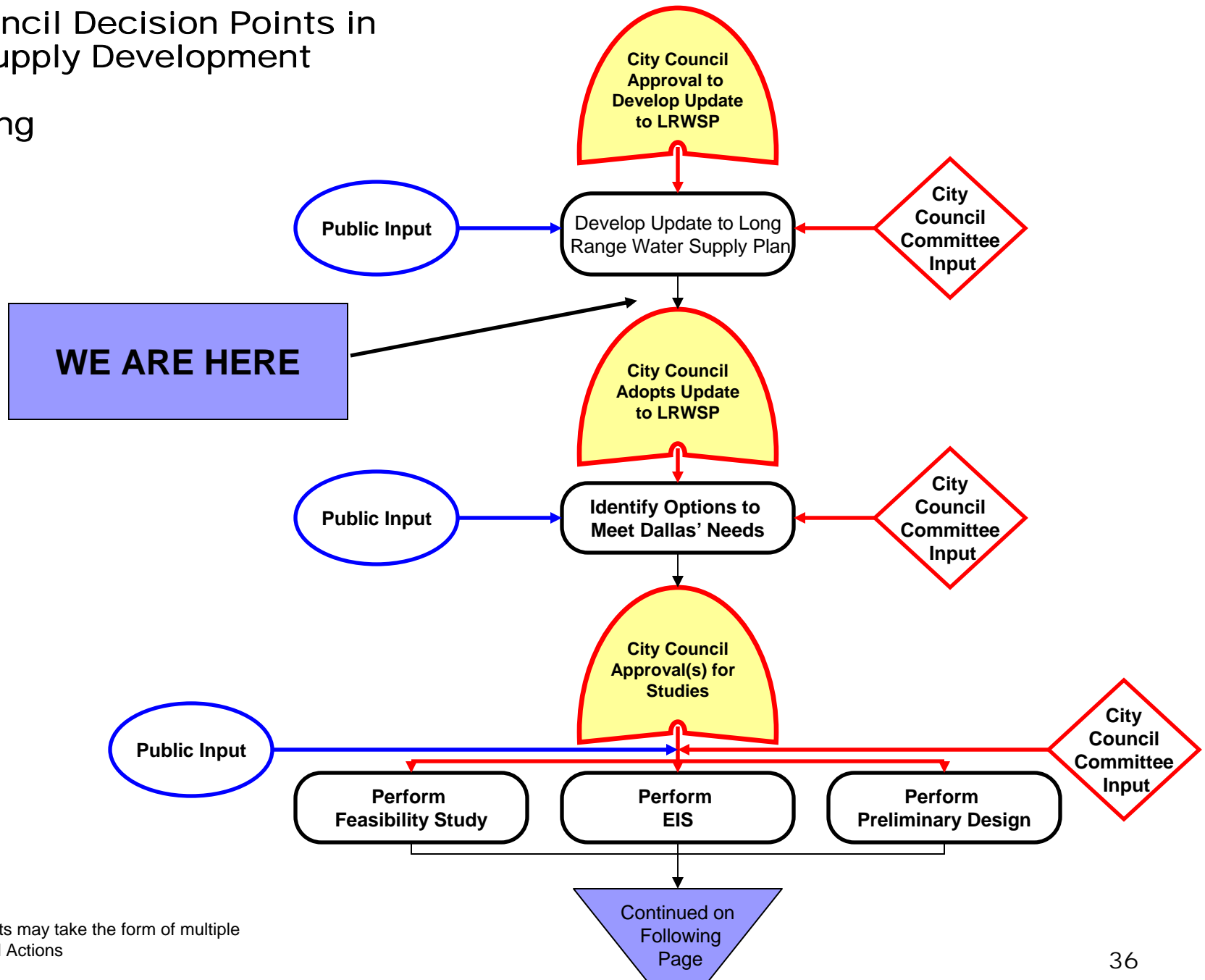
Notes

¹George Parkhouse is an alternative to development of Marvin Nichols Reservoir and cannot be built if Marvin Nichols is developed.

Summary of Environmental Impacts – Based on Literature Review

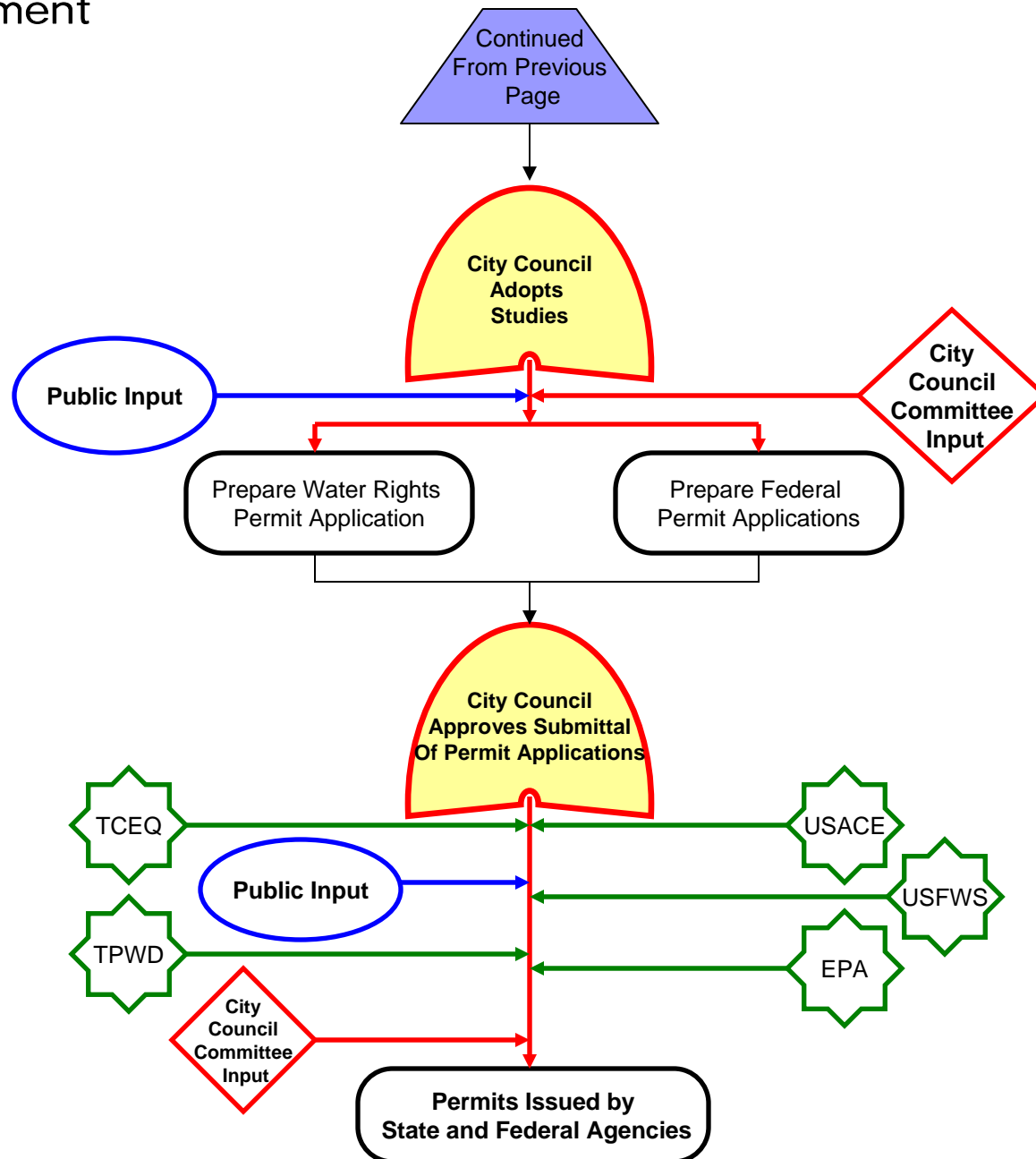
Strategy/Supply	Environmental Impact	Opposition Level
Return Flows	Low	Low
Conservation	Low	Low
Recycle		
Direct	Low	Low
Indirect Hubbard Recycle	Low	Low
Indirect Lewisville Recycle	Low	Low
Connect Existing DWU Supplies		
Lake Fork	Low	Low
Lake Palestine	Low	Low
Acquire & Connect to Other Existing Supplies		
Wright-Patman – Texarkana Purchase	Low	Low
Wright-Patman – System Operations	Low	Low
Lake O' the Pines	Low	Low
Toledo Bend	Low	Low
Oklahoma Water	Low	Low
Sam Rayburn	Low	Low
Texoma	Elevated	Low
Wright-Patman – Flood Pool Reallocation	Elevated	Low
Ground Water		
Mesa	Elevated	Low
New Reservoirs		
Fastrill	High	Elevated
George Parkhouse	High	Elevated
Columbia (Eastex)	High	Elevated
Marvin Nichols	Higher	Higher

City Council Decision Points in Water Supply Development Through Permitting



Notes:
Decision Points may take the form of multiple City Council Actions

City Council Decision Points in Water Supply Development Through Permitting (Continued)



Notes:
Decision Points may take the form of multiple City Council Actions

Next Steps

■ Identify Strategies to be Recommended to Region C

- Conservation
- Recycled Water – Direct Non-potable use & augmentation of supply through Lake Ray Hubbard and Lake Lewisville
- Connect Existing Supplies – Lake Fork, Lake Palestine
- Identify water supply source from the Sulphur River Basin, to include the Marvin Nichols Reservoir
- Fastrill Reservoir

■ Review Alternative Recommendations

Toledo Bend Reservoir

Sulphur River Basin Study

- George Parkhouse

- Wright Patman reallocation

Additional recycled water

Lake Columbia

Oklahoma Water

Lake O' the Pines

Lake Livingston

Lake Texoma

■ Request Council support to proceed with recommended strategies to Region C Planning Board

■ Council will be briefed and must approve all strategies prior to implementation by Dallas as a project

Timeline

- Brief Joint Committees on the proposed Fastrill Reservoir and the Sulphur River Basin Study - March 28, 2005
- Follow up briefing on Conservation 5-Year Strategic Plan to Joint Committees (HEHS & F&A) – April 11, 2005
- Bring Water Conservation Five Year Strategic Plan to Council for adoption on April 13, 2005
- Request Council authorization for participation in and funding for the Lake Fastrill Study & the Sulphur River Basin Study – April 13, 2005
- Request Council adoption of the 2005 Long Range Water Supply Plan – (est. April 2005)
- Bring Recycled Water Implementation Plan to Council – (est. June 2005)

Appendix

- Summary of Consultant Recommendations page 41
- Population projections page 43
- Recommended Alternatives pages 44 to 62
- Other Alternatives Studied pages 63 to 79
- Cost Evaluation Briefing on Lake Texoma pages 80 to 88
- Letter from the Sulphur River Basin
Authority Board page 89
- Glossary page 90

- Letters from the public involvement process
to be provided upon request

Summary of Consultant Recommendations

■ Supporting Studies & Other Initiatives

- Implement and fund Water Conservation Five Year Strategic Plan
- Develop a Long Term Water Conservation Plan
- Implement Recycle Study recommendations regarding institutional issues (organization, rate setting and marketing)
- Negotiate and execute contracts to secure return flows
- Participate in partnership with other Region C water providers in the Sulphur Basin Study
 - The Sulphur River Basin Authority approved the contract with the Army Corps of Engineers for the Basin-wide study on Feb 22, 2005
- Participate in Fastrill Studies

Summary of Consultant Recommendations

■ Capital Projects

- Complete Lake Fork Project by 2007
- Complete Cedar Crest Area Direct Recycle Project by 2010
- Complete Tawakoni Pipeline Expansion Project by 2012
- Complete White Rock Direct Recycle Project by 2012
- Complete Ray Hubbard Recycle Project by 2012
- Complete Palestine Water Supply Project by 2015
- Complete Lewisville Recycle project by 2022
- Connect a Sulphur River Basin water supply by 2035
- Connect an additional water supply project (either a Fastrill or Toledo Bend) by 2045
- Expand Water Treatment Plants as required to support growing peak day demands

Table 4.1 Recommended Historical and Projected Populations

City/Region	Projected Population						
	2000	2010	2020	2030	2040	2050	2060
City of Dallas							
Dallas (Total)	1,188,579	1,312,324	1,451,878	1,526,308	1,598,222	1,650,000	1,700,000
North High	429,704	453,914	469,118	472,890	474,671	475,200	476,000
East High	118,535	121,925	122,281	122,894	127,858	132,000	136,000
Central Low	401,630	470,699	564,239	610,180	660,066	696,300	731,000
South High	238,710	265,786	296,240	320,344	335,627	346,500	357,000
City of Dallas Total	1,188,579	1,312,324	1,451,878	1,525,450	1,598,222	1,650,000	1,700,000
Current Customer Cities							
Treated & Raw Water							
Addison	14,166	17,919	19,800	20,000	20,000	20,000	20,000
Carrollton	109,576	121,000	125,000	133,000	137,000	140,000	140,000
Cedar Hill (Total)	42,722	66,250	101,250	117,750	121,250	121,900	122,000
Cedar Hill	32,093	47,000	70,000	81,000	82,000	82,000	82,000
Glenn Heights	7,224	14,500	25,000	29,000	30,000	30,000	30,000
Ovilia	3,405	4,750	6,250	7,750	9,250	9,900	10,000
Cockrell Hill	4,443	4,782	4,947	5,028	5,067	5,086	5,095
Coppell	35,958	40,000	40,000	40,000	40,000	40,000	40,000
D/F/W International Airport	0	0	0	0	0	0	0
Dallas County WCID #6 (Total)	22,225	25,811	28,998	31,296	33,416	35,695	38,281
Dallas County WCID #6	2,850	4,728	6,434	7,447	8,453	9,765	11,513
Batch Springs	19,375	21,083	22,564	23,849	24,963	25,930	26,768
Denton	80,537	131,000	191,000	250,000	305,000	363,586	420,000
DeSoto	37,646	47,649	57,000	73,000	75,000	75,000	75,000
Duncanville	36,081	37,100	38,500	41,800	42,000	42,000	42,000
Farmers Branch	27,508	30,470	34,500	39,500	40,215	40,215	40,215
Flower Mound	50,702	78,500	89,000	93,000	93,000	93,000	93,000
Grand Prairie	127,427	175,987	212,932	250,000	265,000	265,000	265,000
Grapevine ²	42,059	51,352	58,023	62,812	66,250	68,718	70,490
Hutchins	2,805	5,000	10,000	14,000	15,000	15,000	15,000
Iving	191,615	214,000	219,000	227,500	235,000	235,000	235,000
Lancaster	25,894	50,000	68,000	82,000	92,500	106,000	120,000
Lewisville	77,737	111,000	140,000	149,500	149,500	149,500	149,500
Red Oak	4,301	11,500	17,000	23,500	27,525	27,525	27,525
Rockett SUD (Served) ³	22,369	31,259	37,228	40,487	46,087	53,815	63,194
Rockett SUD (Total)	37,281	52,099	62,047	67,479	76,811	89,691	105,323
Rockett SUD	23,454	32,672	40,249	44,163	50,064	57,464	66,139
Sardis Lone Elm WSC	6,215	8,065	8,309	8,363	9,301	11,097	13,444
Mountain Peak WSC	4,312	6,691	7,509	7,964	9,194	11,305	14,031
Mountain Peak WSC	1,200	1,733	2,360	3,019	3,739	4,632	5,728
Buena Vista Bethel SUD	2,100	2,938	3,620	3,970	4,513	5,193	5,981
Seagoville (Total)	15,045	23,183	31,706	39,676	42,814	45,487	48,848
Seagoville	10,823	16,668	23,000	29,000	30,000	30,000	30,000
Combine	1,788	2,392	2,969	3,474	4,019	4,702	5,563
Combine WSC	2,434	4,122	5,737	7,202	8,795	10,785	13,285
The Colony (Served) ⁴	26,531	38,982	50,000	54,800	60,500	65,000	67,859
The Colony (Total)	26,531	42,800	56,000	64,000	71,000	77,000	80,359
The Colony (by Plano)	0	3,818	6,000	9,200	10,500	12,000	12,500
UTTRWD	99,929	190,785	270,563	367,814	506,472	650,925	756,465
Waxahachie (E.C. WCID #1) ¹	21,082	28,281	36,202	46,342	59,322	75,937	97,206
Current Customers Total	1,055,217	1,452,177	1,786,424	2,093,651	2,352,346	2,569,734	2,783,982
Subtotal	2,243,796	2,764,501	3,238,302	3,619,101	3,950,568	4,239,734	4,483,982
Potential Customer Cities							
Combine							
Johnson Co. SUD ⁵	30,264	40,143	51,623	63,668	76,799	93,056	112,956
Ovilla							
Wilmer	3,393	5,500	7,500	8,800	10,500	14,000	22,000
Potential Customers Total	3,393	5,500	7,500	8,800	10,500	14,000	22,000
Total	2,247,189	2,770,001	3,245,802	3,627,901	3,961,068	4,253,734	4,505,982

¹ Ellis County WCID #1 has a fixed demand contract. Demand does not correlate to population shown. Population shown is not included in the Total.
² Grapevine has a fixed demand contract. Demand does not correlate to population shown. Population shown is not included in the Total.
³ DWU to supply approximately 60% of Rockett SUD's total demand. DWU's population served is estimated at 60% of total population.
⁴ A portion of The Colony's population is served by Plano and is not counted towards DWU's population served.
⁵ Johnson County SUD has a fixed demand contract. Demand does not correlate to population shown. Population shown is not included in the Total.

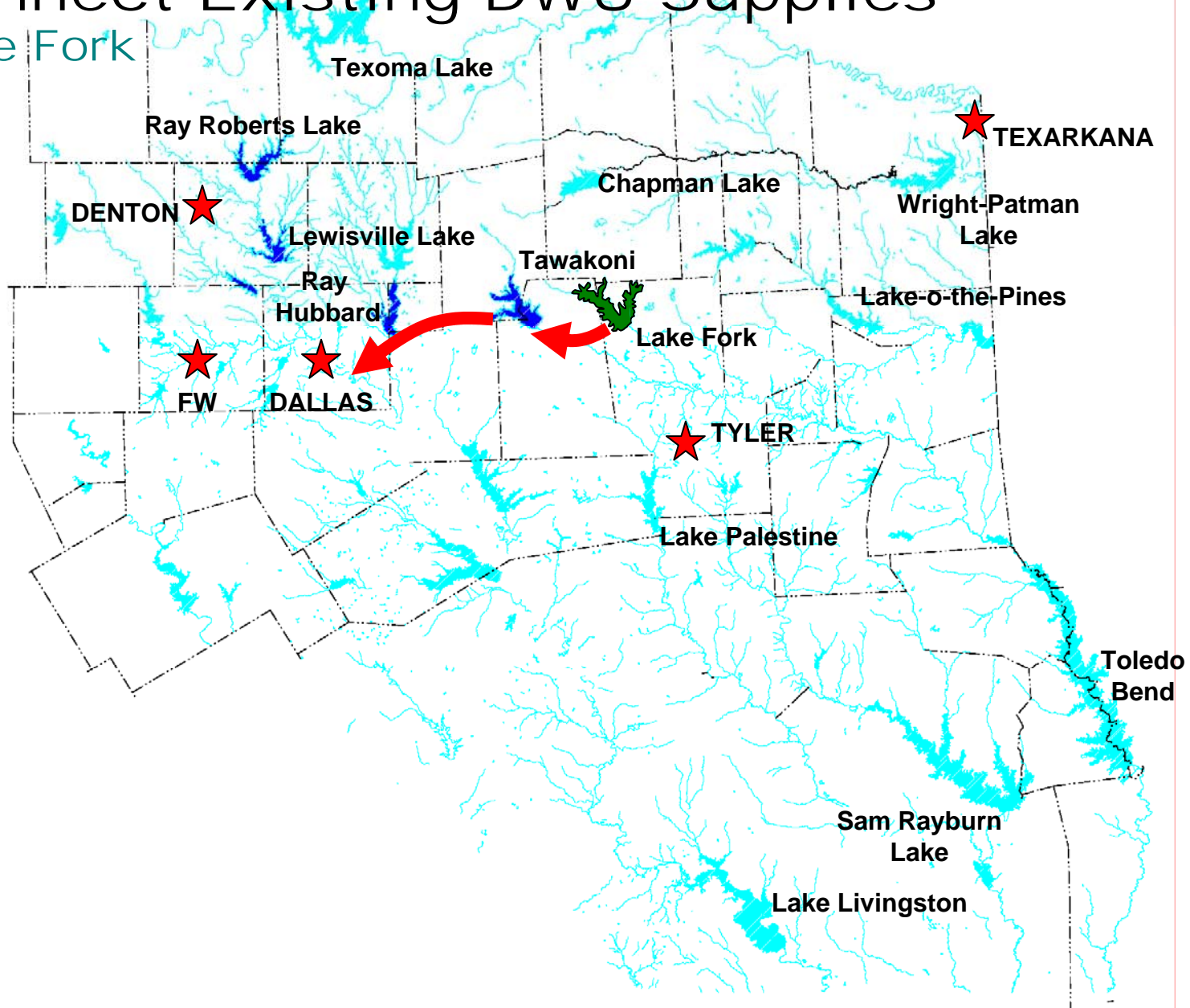
Recommended Alternatives

Return Flows

- Enter into contracts to guarantee return flow discharges
- “Secure” Return Flows
- Assumed Cost \$0.10/1000 gal.
- Projected Additional Supply
 - 2010 – 30.7 MGD
 - 2020 – 39.9 MGD
 - 2030 – 47.4 MGD
 - 2040 – 54.1 MGD
 - 2050 – 62.3 MGD
 - 2060 – 71.0 MGD

Connect Existing DWU Supplies

Lake Fork



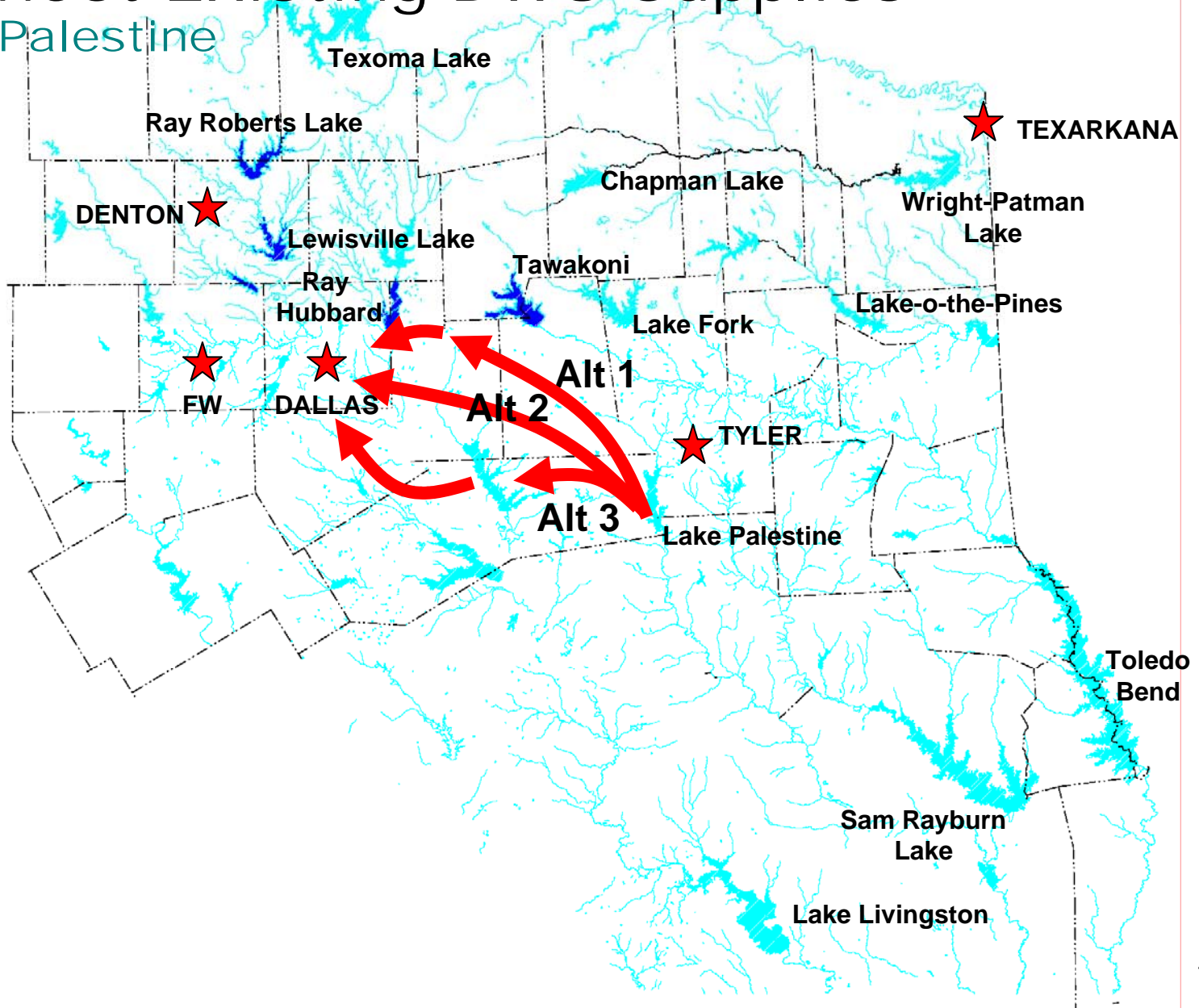
Connect Existing DWU Supplies

Lake Fork

- Quantity of water – 107 MGD (120,000 acre ft/year)
- River Basin – Sabine
- Reservoir Status - Existing
- Permits
 - All permits in place
- Contractual issues
 - Current raw water price agreement expires in 2014. Long term contract needs to be negotiated.
- Environmental issues
 - Issues already addressed in 404 permit
- Other development constraints
 - Project is under construction. Scheduled to be completed 2007. Completion of the Tawakoni Pipeline Expansion Project will be required to realize the full capacity of Lake Fork.
- Costs
 - Projected capital cost – \$351,439,000 (Includes Tawakoni Pipeline Expansion Project)
 - Total projected cost of water = \$0.44/1000 gal

Connect Existing DWU Supplies

Lake Palestine



Connect Existing DWU Supplies

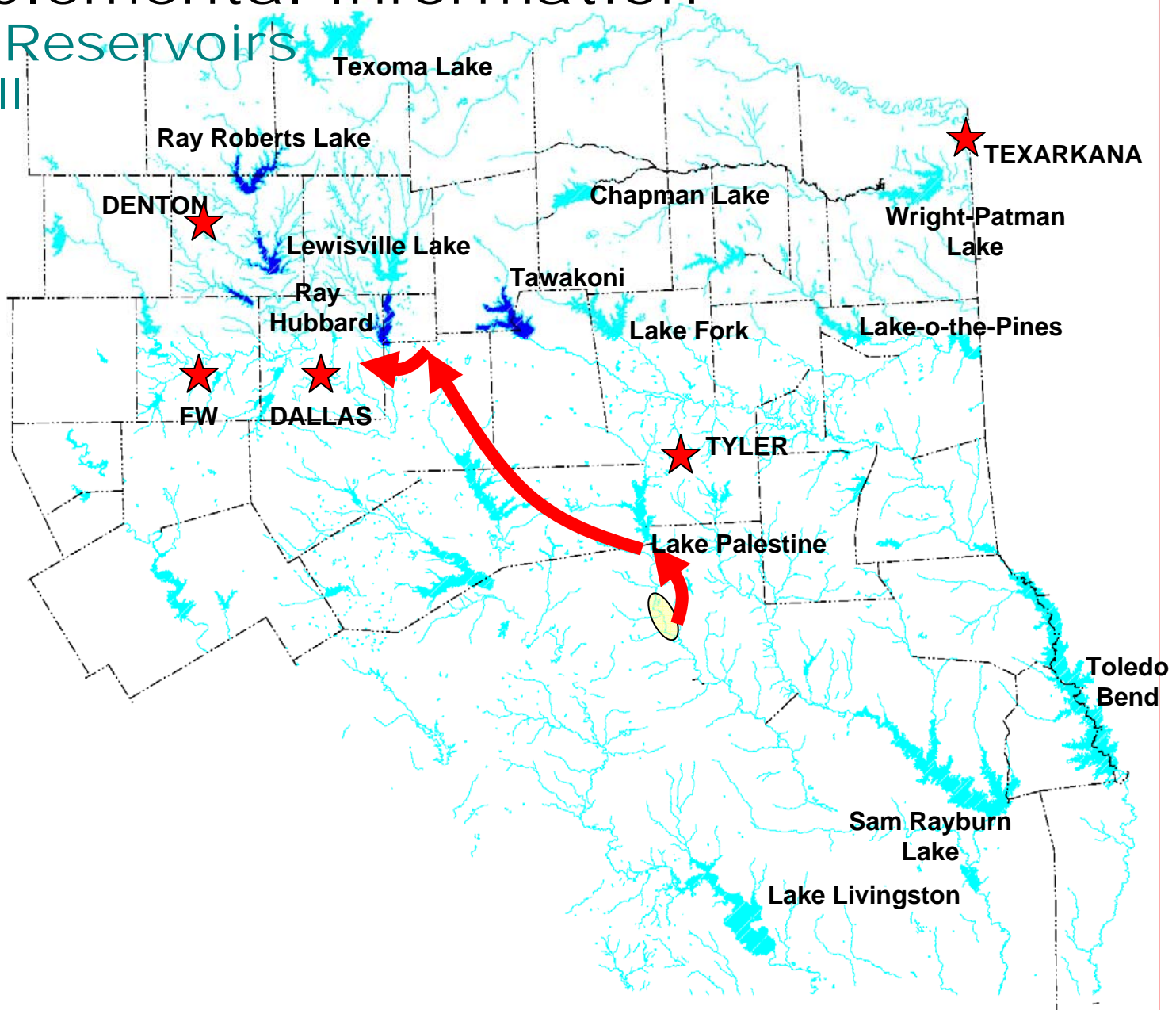
Lake Palestine

- Quantity of water – 98 MGD
- River Basin – Neches
- Reservoir Status - Existing
- Permits
 - Water rights permit in place
 - IBT permit in place
 - A new 404 permit will be required for conveyance
- Contractual issues
 - An additional 17 MGD can be purchased from UNRMWA
 - To date UNRMWA has not been willing to sell the additional water
- Environmental issues
 - Conveyance systems could impact some wetlands
- Other development constraints
 - None
- Costs
 - Projected capital cost – \$540,851,500
 - Total projected cost of water = \$0.96/1000 gal (Based on 100 MGD average yield 2005-2060)

Supplemental Information

New Reservoirs

Fastrill



Supplemental Information

New Reservoirs - Fastrill

- Quantity of Water – 100 MGD
- River Basin – Neches
- Reservoir Status – New
- Permits
 - New water rights permit required
 - New IBT permit required
 - A new 404 permit will be required for reservoir and conveyance
- Contractual Issues
 - Water must be purchased from UNRMWA.
- Environmental Issues
 - Project will inundate 27,000 wooded acres
 - Site in debris field of Space Shuttle Columbia
 - USF&W has rated portions of the site as a Priority 1 bottomlands. The impact of these areas is not quantified.
 - USF&W is currently drafting an Environmental Assessment to study the potential of creating the Neches River National Wildlife Refuge.
 - Discussions with USF&W staff indicate that the creation of the refuge is still in question
 - If refuge is approved, the reservoir development could be impacted
 - A private movement is underway to designate the Neches River as a Wild and Scenic River
 - No environmental studies completed
- Other Development Constraints
 - Fastrill is opposed by State environmental groups
 - Project will integrate well with the existing Palestine Project
- Costs
 - Capital cost - \$659,152,000
 - Total projected cost of water = \$0.93/1000 gal

Potential Sulphur River Projects

- Wright Patman Lake
 - Purchase surplus water from Texarkana
 - Reallocation of flood pool
 - System Operations with Copper Lake
- George Parkhouse
- Marvin Nichols
- Sulphur Basin Study
 - Provides comprehensive evaluation of these alternatives
 - Provides better data from which Dallas can decide which project best meets its needs
 - Does not obligate Dallas to pursue a particular alternative

Wright Patman Alternatives

Wright Patman - Texarkana Purchase



Acquire and Connect Other Existing Supplies

Purchase Wright Patman Water from Texarkana

- Quantity – 100 MGD
- River Basin – Sulphur
- Reservoir Status - Existing
- Permits
 - Water rights permit in place
 - New IBT permit required
 - 404 permit required
- Contract issues
 - Water purchased from Texarkana
 - Texarkana has not responded to requests for information regarding amount of water available or the terms of the sale
- Environmental issues
 - Conveyance systems could impact wetlands
- Costs
 - Conveyance capital cost - \$626,827,000
 - Total water cost \$1.50/1000 gal (Assuming raw water cost of \$0.30/1000 gal)

Acquire and Connect Other Existing Supplies

Reallocation of Wright Patman Flood Pool

- Quantity assumed – 100 mgd
- River Basin – Sulphur
- Reservoir Status – Existing, requires flood pool adjustments
- Permits
 - New water rights permit required
 - New IBT permit required
 - 404 permit required
- Contract issues
 - Water purchased from Texarkana or USCOE
- Environmental issues
 - Reallocation of the flood pool will raise level of lake; could impact White Oak Mitigation Area
- Other issues
 - The water rights holders may claim priority right to the water gained
 - Project feasibility needs further study
- Costs
 - Conveyance capital cost - \$746,883,850
 - Total water cost \$1.39/1000 gal. (Assuming a raw water cost of \$0.30/1000 gal)

Acquire and Connect Other Existing Supplies

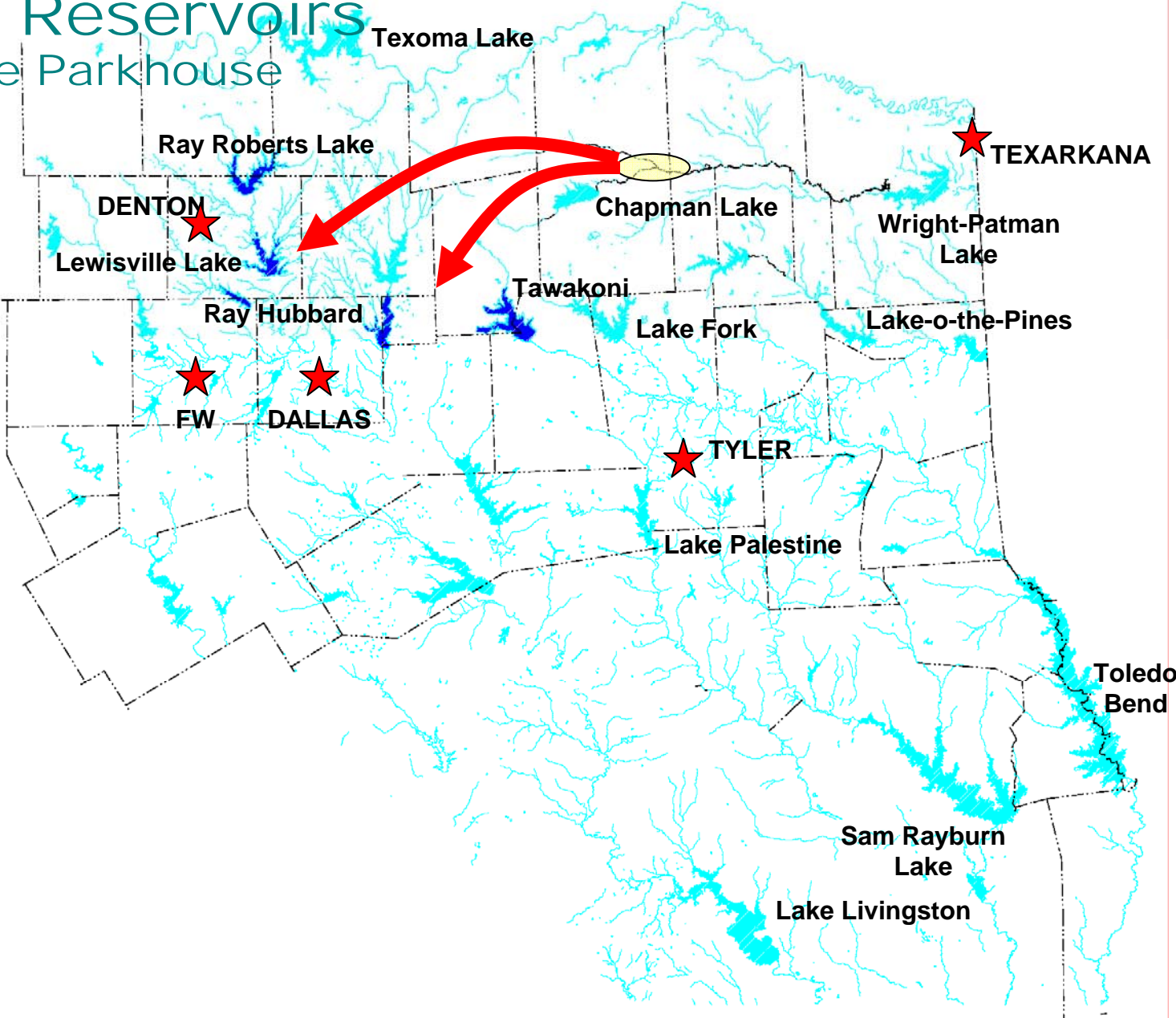
Wright Patman/Jim Chapman (System Operations)

- Quantity assumed – 100 MGD
- River Basin – Sulphur
- Reservoir Status - Existing
- Permits
 - New water rights permit required
 - New IBT permit required
 - 404 permit required
- Contract issues
 - Water purchased from USCOE
- Environmental issues
 - Conveyance systems could impact wetlands
- Other issues
 - The water rights holders may claim priority right to the water gained
 - Project feasibility needs to be studied
- Costs
 - Conveyance capital cost - \$1,149,787,000
 - Total water cost \$2.50/1000 gal.

Supplemental Information

New Reservoirs

George Parkhouse



Supplemental Information

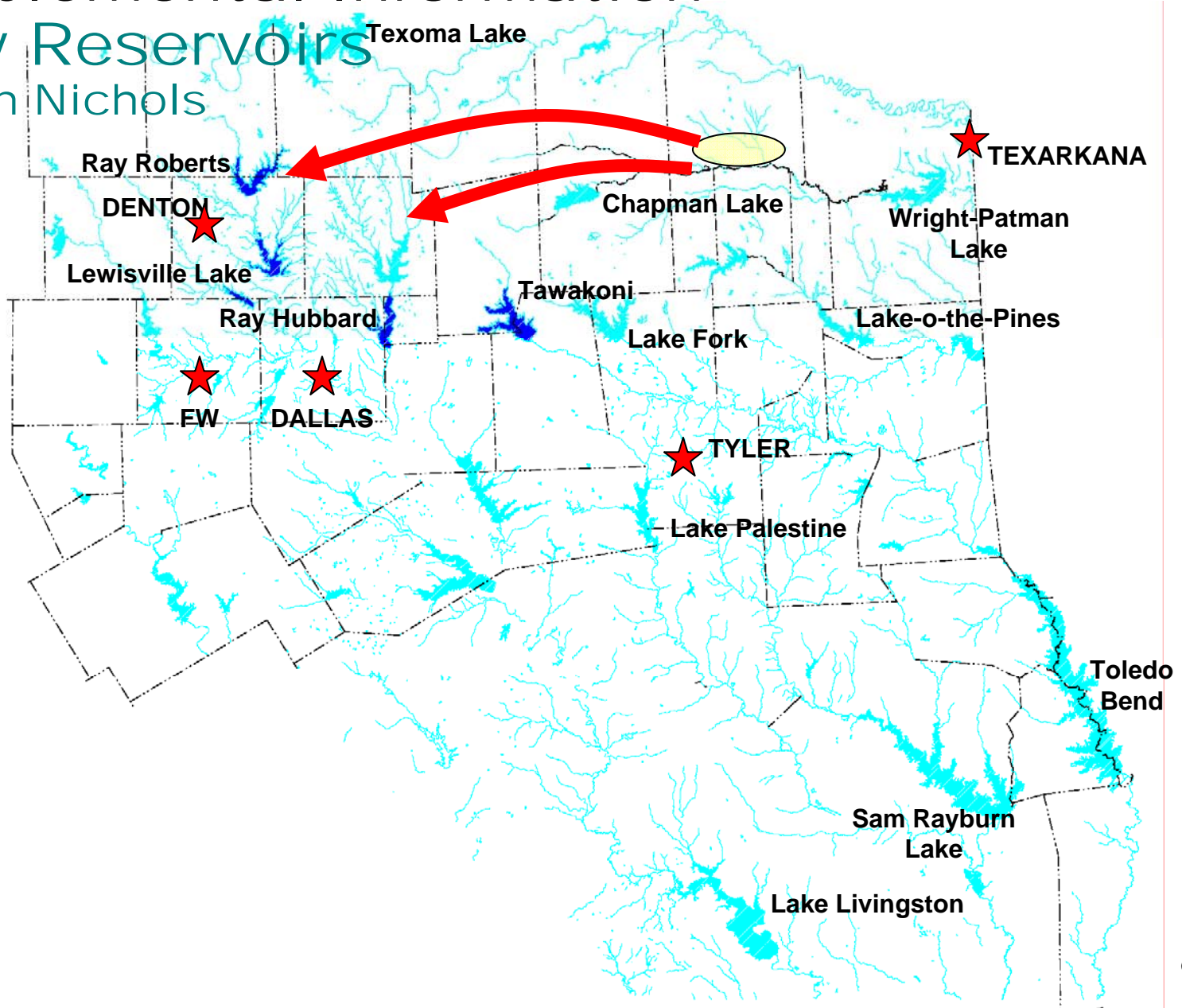
New Reservoirs

George Parkhouse

- Quantity of Water – 100 MGD
- River Basin – Sulphur
- Reservoir Status - New
- Permits
 - New water rights permit required
 - New IBT permit required
 - A new 404 permit will be required for reservoir and conveyance
- Contractual Issues
 - Not quantified
- Environmental Issues
 - Project will inundate approximately 25,000 acres
 - George Parkhouse has environmental issues similar to Marvin Nichols
 - Bottomland hardwoods (not quantified)
 - Socio-economic impacts (not quantified)
- Other Development Constraints
 - There have been no recent studies on George Parkhouse Reservoir
 - Local opposition is already organizing
 - Environmental stakeholders opposition is already organized
- Costs
 - Capital cost - \$470,427,000
 - Total projected cost of water = \$0.85/1000 gal

Supplemental Information

New Reservoirs Marvin Nichols



Supplemental Information

New Reservoirs

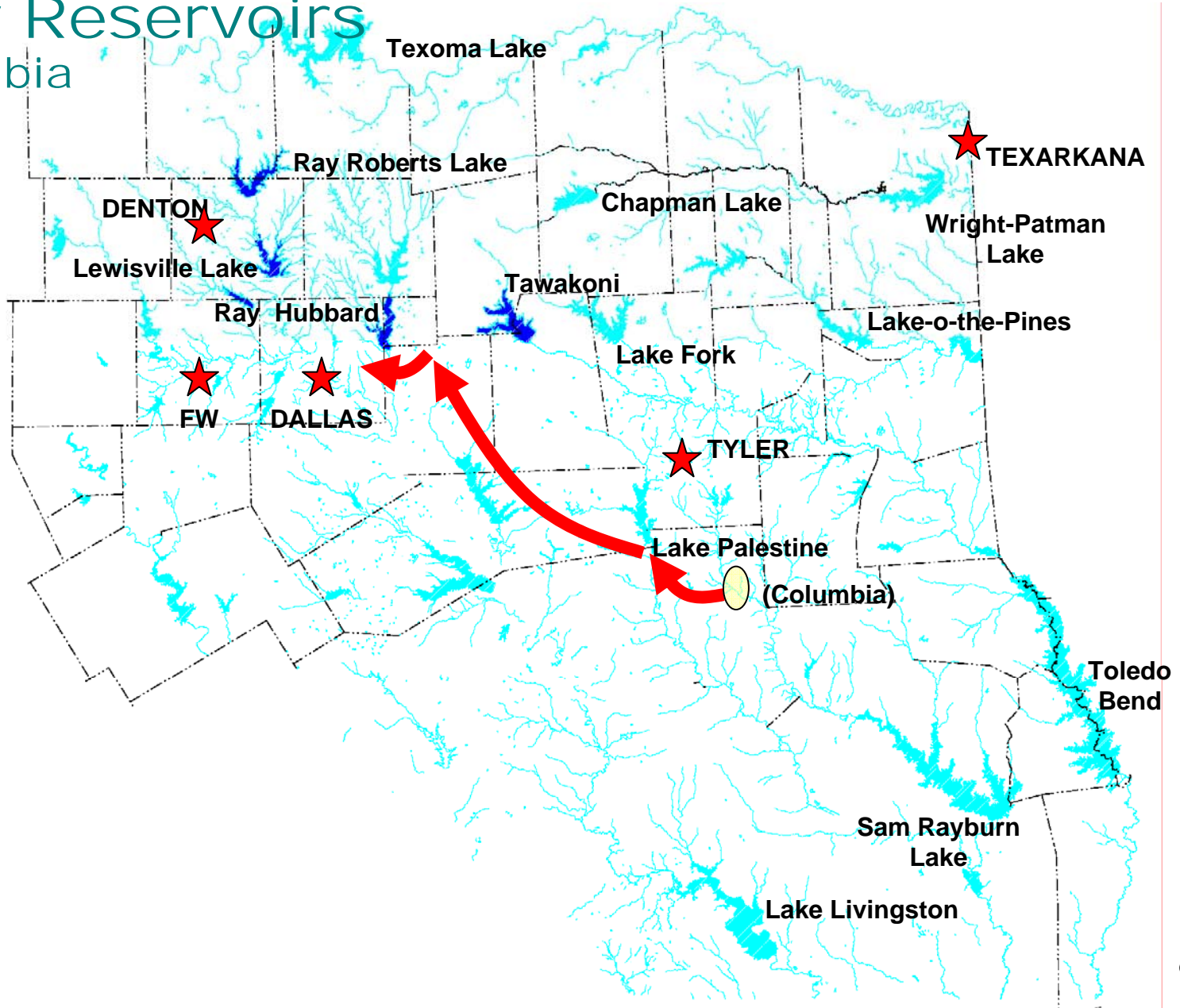
Marvin Nichols (Dallas' portion of cooperative project)

- Quantity of Water – 100 MGD
- River Basin – Sulphur
- Reservoir Status - New
- Permits
 - New water rights permit required
 - New IBT permit required
 - A new 404 permit for reservoir and conveyance will be required
- Contractual Issues
 - Marvin Nichols is being pursued by other North Texas Agencies
- Environmental Issues
 - The project will inundate 75,000 acres. The amount of mitigation land is a controversial issue.
- Other Development Constraints
 - Marvin Nichols has significant local opposition and environmental stakeholder opposition
- Costs
 - Capital Cost - \$393,365,000 (Dallas' portion)
 - Total projected cost of water = \$0.80/1000 gal

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Other Alternatives Studied

Supplemental Information- New Reservoirs Columbia

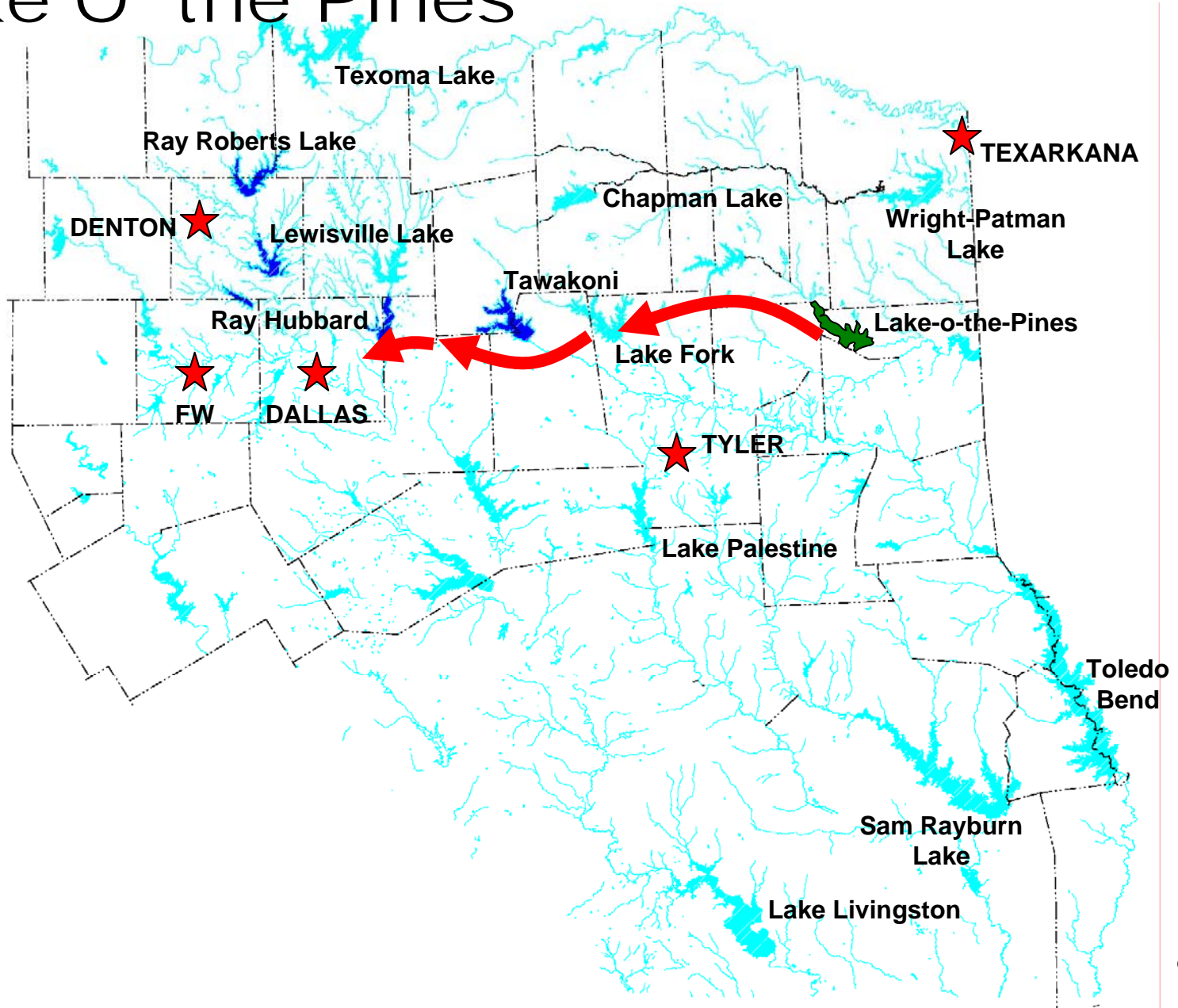


Supplemental Information

New Reservoirs - Columbia (Eastex)

- Quantity of Water – 32 MGD
- River Basin – Angelina, Neches
- Reservoir Status - New
- Permits
- New water rights permit in place
 - New IBT permit required
 - A new 404 permit for reservoir and conveyance will be required. A 404 permit application was submitted in October 2004. USCOE wants environmental impact statement. ANRA has selected an engineer and securing funding for the environmental study.
- Contractual Issues
 - Water would be purchased from the Angelina-Neches River Authority.
- Environmental Issues
 - The project will inundate 10,000 acres of wooded land. No detailed studies have been completed. Detailed environmental studies are to be authorized in February 2005.
- Other Development Constraints
 - Columbia has no known opposition.
- Costs
 - Capital cost - \$910,818,680 (includes integration with Palestine)
 - Total projected cost of water = \$1.07/1000 gal (when integrated with Palestine)

Lake O' the Pines



Acquire and Connect Other Existing Supplies

Lake O' the Pines

- Quantity – 80 MGD
- River Basin – Caddo
- Reservoir Status - Existing
- Permits
 - Water rights permit in place
 - New IBT permit required
 - 404 permit required
- Contract issues
 - Water purchased from Northeast Texas Municipal Water District
- Environmental issues
 - Conveyance systems could impact wetlands
 - Diversion could impact water levels in Caddo Lake
- Other issues
 - No studies available on the potential impacts on water levels in Lake O' the Pines and Caddo Lake
 - IBT permit might be opposed by well funded environmental groups associated with Caddo Lake who are concerned about Caddo Lake levels
- Costs
 - Conveyance capital costs \$490,869,000
 - Total water cost - \$1.45/1000 gal

Toledo Bend

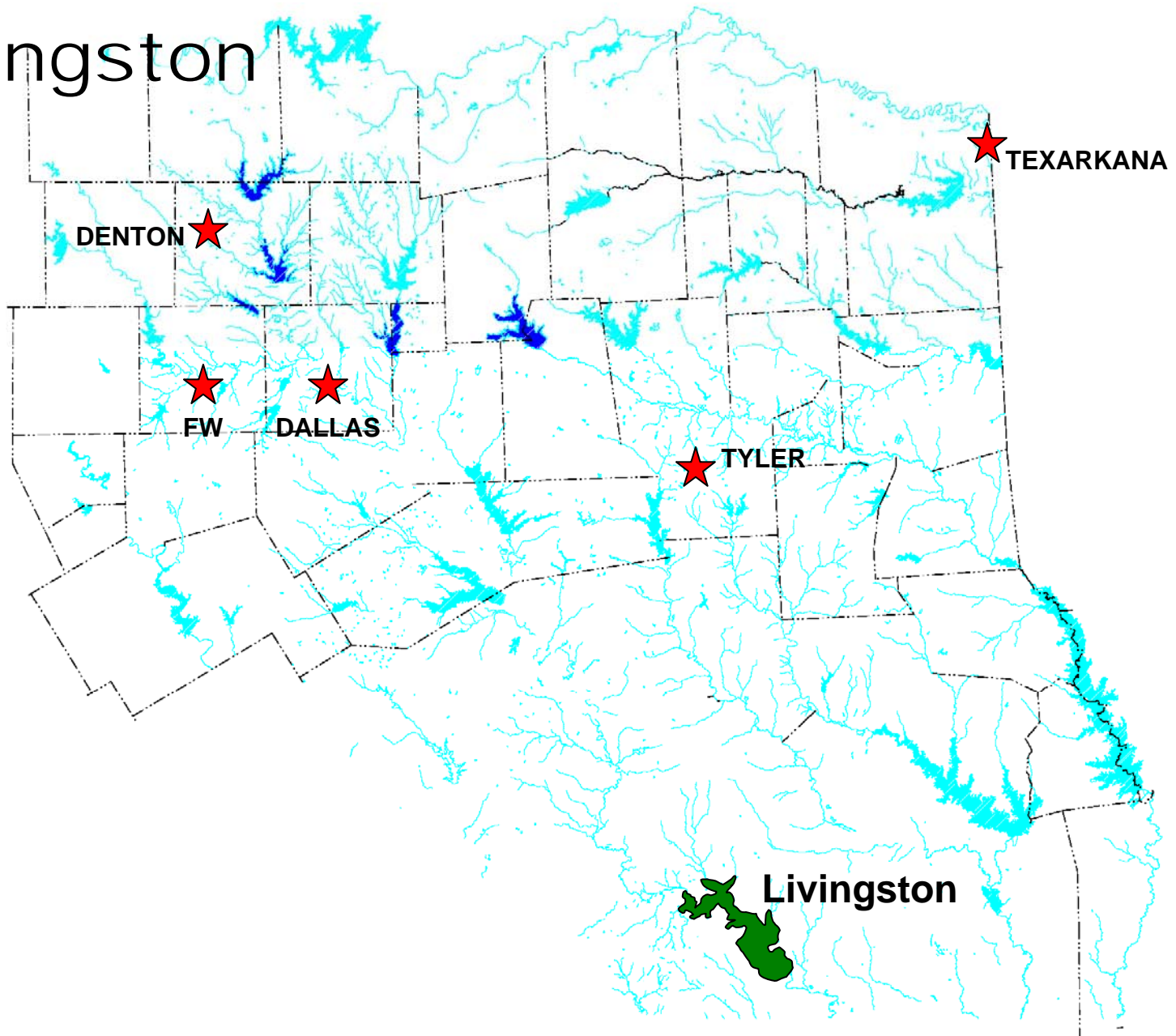


Acquire and Connect Other Existing Supplies

Toledo Bend (Dallas' portion of cooperative project)

- Quantity - 89 MGD
- River Basin – Sabine
- Reservoir Status - Existing
- Permits
 - Water rights permit in place
 - New IBT permit required
 - 404 permit required
- Contract issues
 - Water purchased from Sabine River Authority
- Environmental issues
 - Conveyance systems could impact wetlands
- Other issues
 - Part of a multi-agency project. Contract terms must be negotiated
- Costs
 - Conveyance capital costs \$475,697,726
 - Total water cost \$1.23/1000 gal

Livingston



Acquire and Connect Other Existing Supplies

Livingston

- Quantity Assumed – 179.0 MGD
- Permits
 - Water Rights Permit in Place
 - IBT Permit Not Required
 - 404 Permit Required
- Contract Issues
 - Water Would Be Purchased from Trinity River Authority
- Environmental Issues
 - Conveyance Systems Could Impact Wetlands
- Other Issues
 - TRA's Willingness to Sell Water Not Known
- Costs
 - Cost of Water Not Quantified
 - Capital Cost - \$706,842,000
 - Total Water Cost \$1.57/1000 Gal.

Sam Rayburn

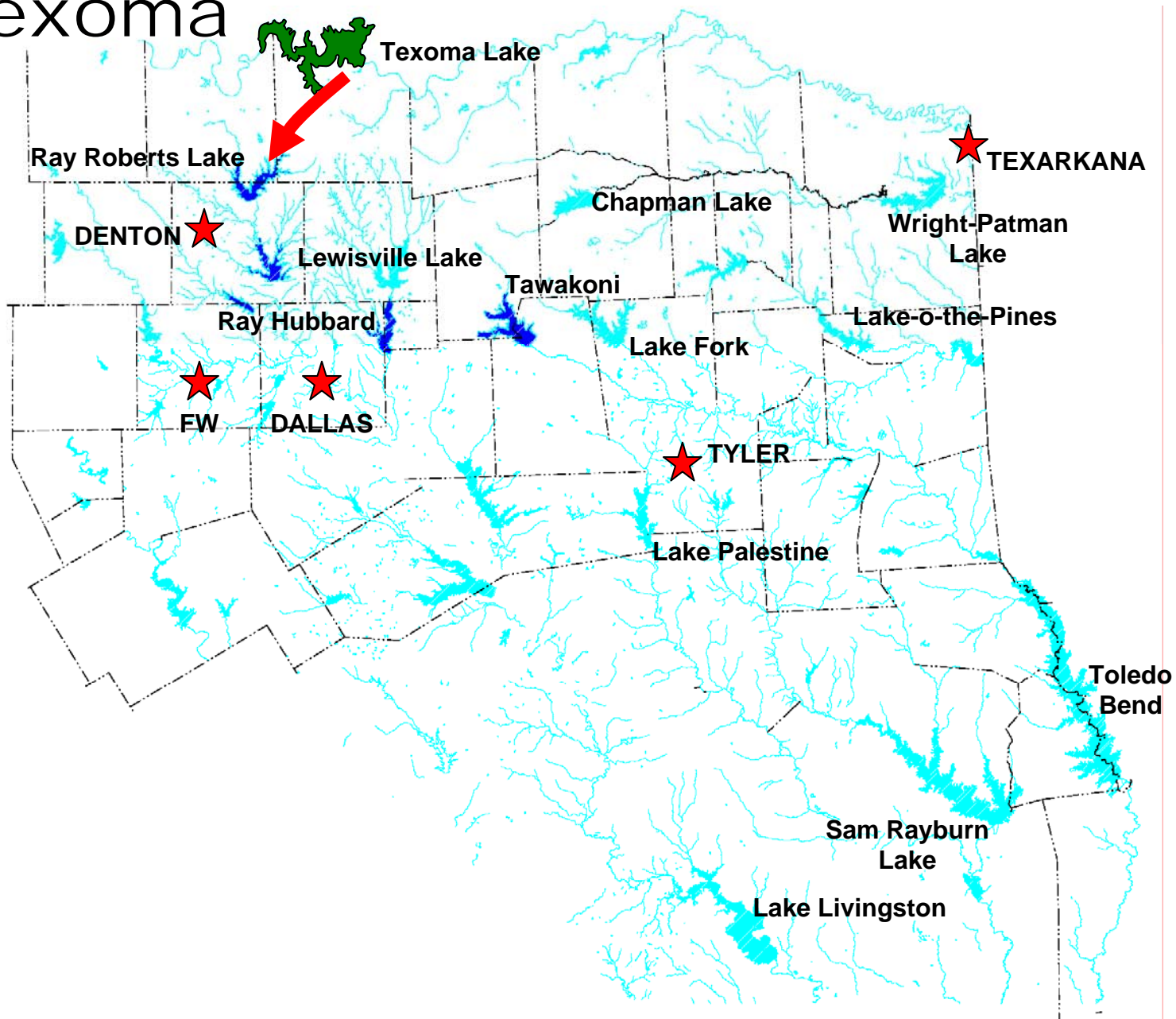


Acquire and Connect Other Existing Supplies

Sam Rayburn/B.A. Steinhagen

- Quantity of water – 100 MGD
- River Basin – Angelina, Neches
- Reservoir Status - Existing
- Permits
 - Water rights in place
 - IBT permit in place
 - 404 permit required
- Contract issues
 - Water would be purchased from Lower Neches Valley Authority
- Environmental issues
- UNRMWA's willingness to sell Sam Rayburn water and its cost have not been quantified.
 - Conveyance systems could impact wetlands
- Other issues
 - Water would need to pass through Lake Palestine
- Costs
 - Conveyance capital cost - \$1,287,642,500
 - Total water cost \$2.25/1000 gal (Assumes a raw water cost of \$0.10/1000 gal)

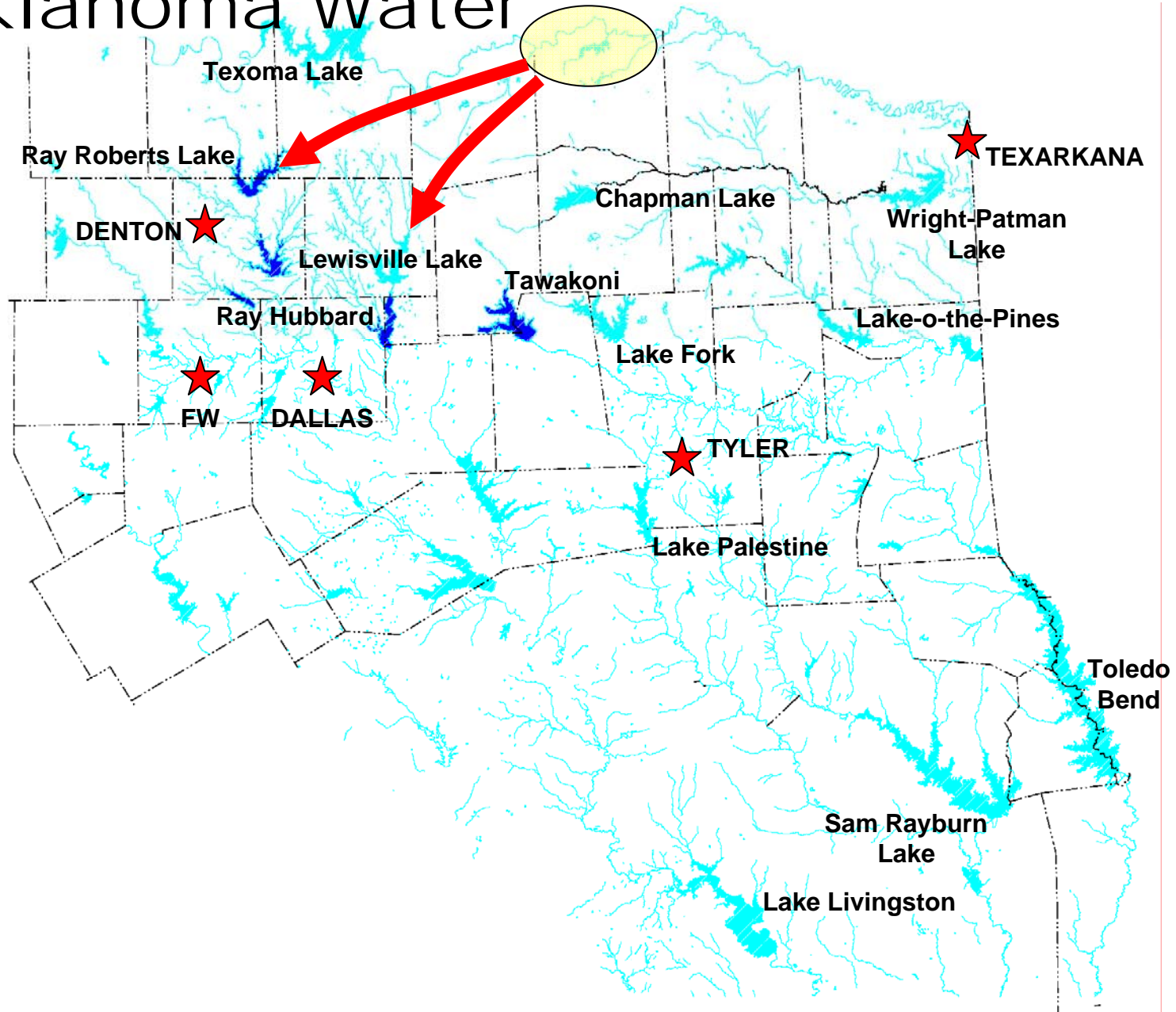
Texoma



Acquire and Connect Other Existing Supplies- Lake Texoma

- Quantity of water – 100 MGD
- River Basin – Red
- Reservoir Status - Existing
- Permits
 - New water rights permit required
 - New IBT permit required
 - 404 permit required
- Contract issues
 - Water would be purchased from USCOE
- Environmental issues
 - Conveyance systems could impact wetlands
- Other issues
 - GTUA, by Congressional action, has rights to 45 mgd of the 134 mgd available
 - Discussions with USCOE staff indicates that NTMWD has a priority request for the remaining 89 mgd available
 - Additional water would be available only through further Congressional actions
 - Water is high in TDS, must be partly desalinated
 - Water is high in Bromide. Bromide has a significant impact on the formation of disinfection by-products (carcinogens) when ozone is used for disinfection.
- Costs
 - Capital cost - \$429,615,000
 - Total cost of water - \$1.48/1000 gal

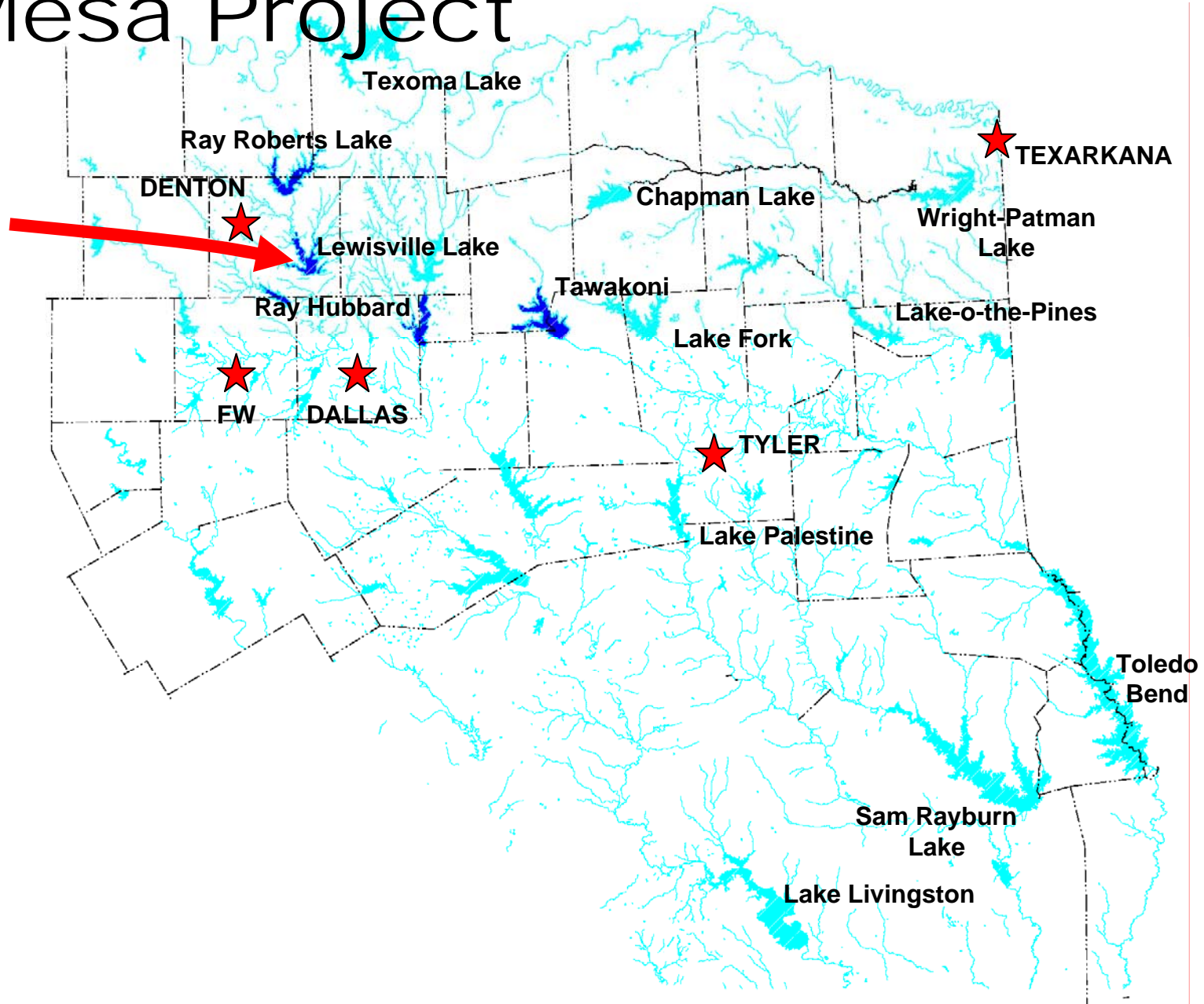
Oklahoma Water



Acquire and Connect Other Existing Supplies - Oklahoma Water (Through Ray Hubbard)

- Quantity assumed – 100.0 MGD
- River Basin – Sardis
- Reservoir Status - Existing
- Permits
 - New water rights permit from State of OK required
 - IBT permit required
 - 404 permit required
- Contract issues
 - Contracts must be negotiated with state of OK and Native American Tribes in SE OK
 - The cost of water is not quantified
- Environmental issues
 - Conveyance systems could impact wetlands
- Other issues
 - Moratorium in place on sale of water to Texas by Oklahoma Legislation
- Costs
 - Conveyance capital cost - \$300,537,000
 - Total water cost \$01.09/1000 gal (Assuming a raw water cost of \$0.50/1000 gal)

Mesa Project



Supplemental Information

Ground Water – Mesa Water

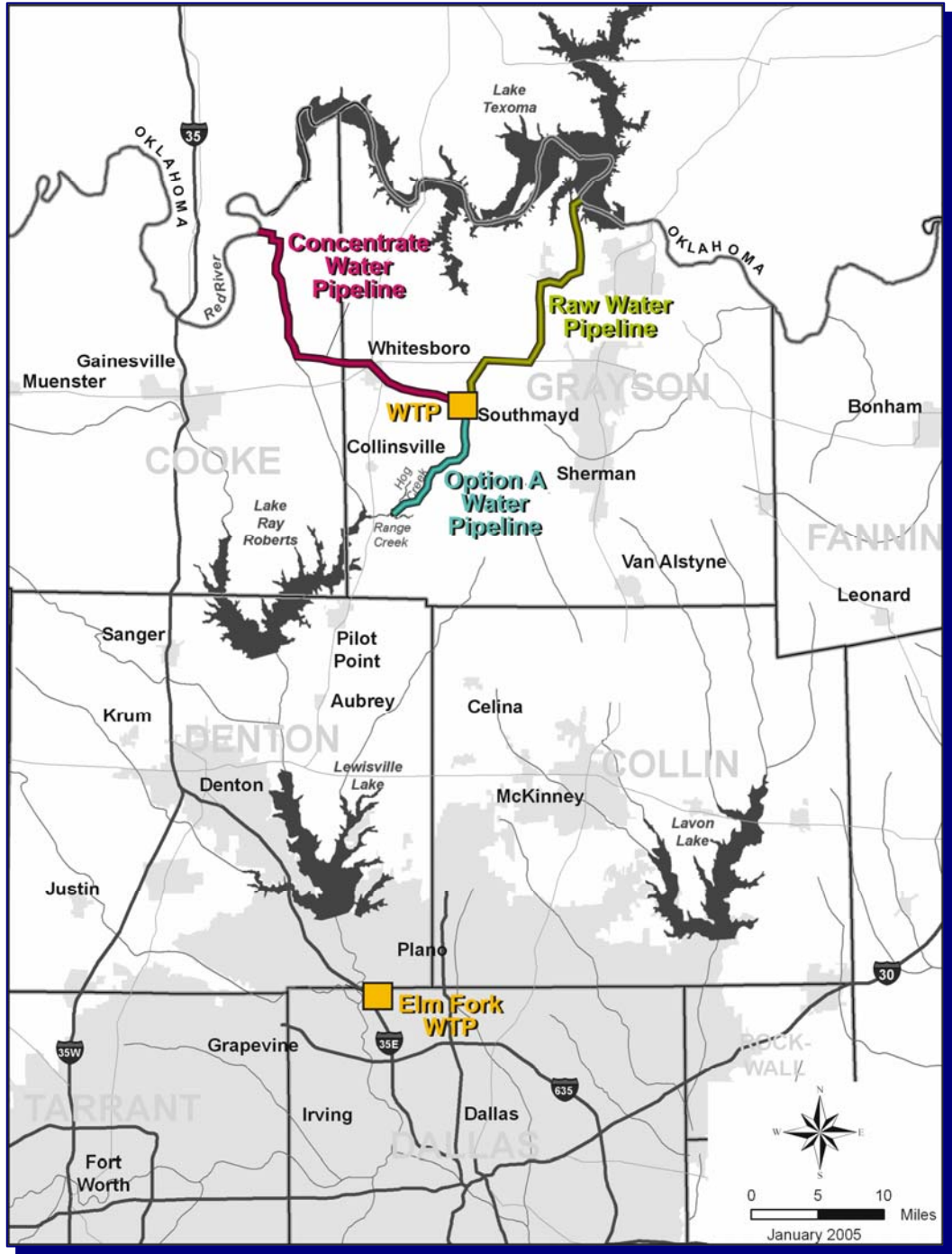
- Quantity of water – 179 MGD
- Ground Water
- Permits
 - The Panhandle Ground Water Conservation District has issued an export permit for water in Roberts County
 - IBT permit not required
 - A new 404 permit will be required for conveyance
- Contractual Issues
 - Mesa water would enter into a supply contract with DWU.
- Environmental Issues
 - Project will ultimately deplete aquifer in Roberts County to approx. 50% of its capacity in 200 yrs. This will impact local domestic, livestock and irrigation wells; however, for the most part, these wells are owned by the landowners gaining income from the sale of the water. Pipelines will cross long distance, may have environmental issues
- Other Development Constraints
 - Contractual and regulatory hurdles are not quantified.
- Costs
 - Capital cost - \$1,758,300,000
 - Total projected cost of water = \$1.75/1000 gal

Cost Evaluation of Two Options to Deliver Lake Texoma Water to City of Dallas

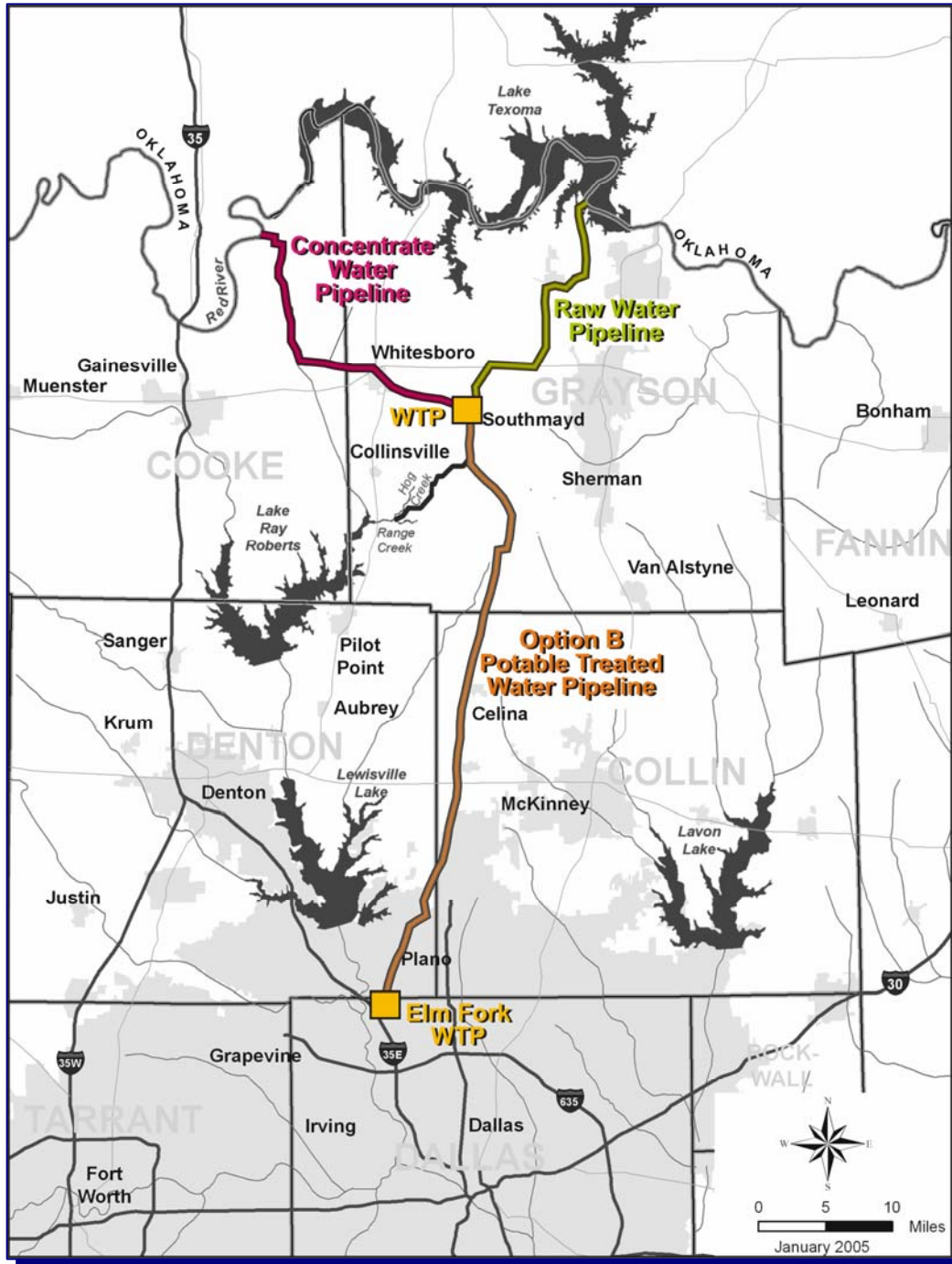
Ken Choffel, P.E.
HDR Engineering, Inc.

February 17, 2005



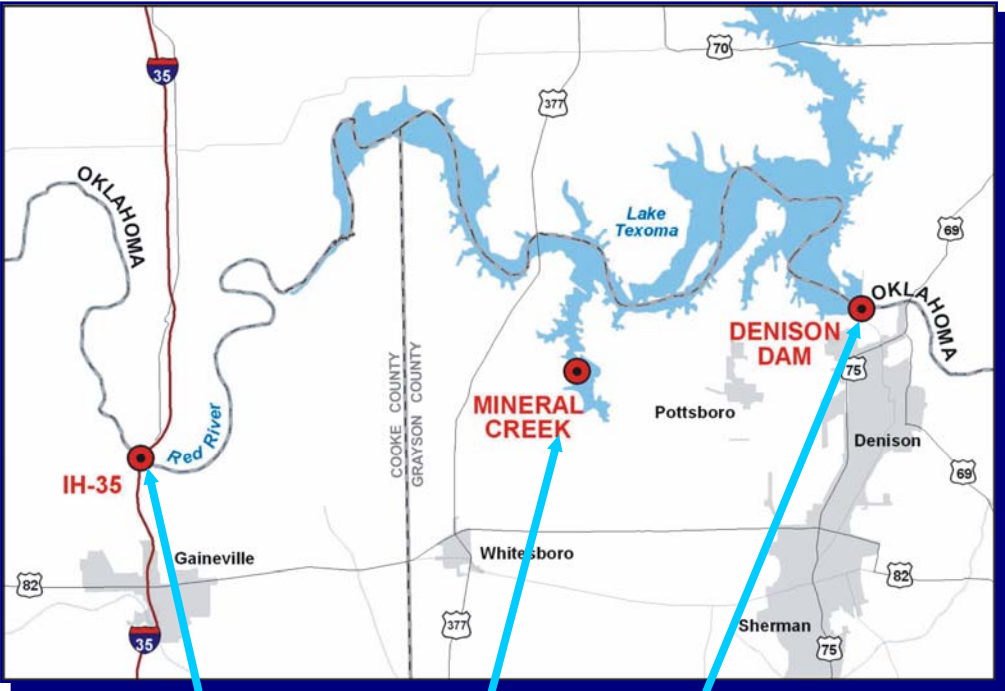


Option A — Lake Texoma to Lake Ray Roberts



Option B — Lake Texoma to Elm Fork WTP

Lake Texoma Water Quality

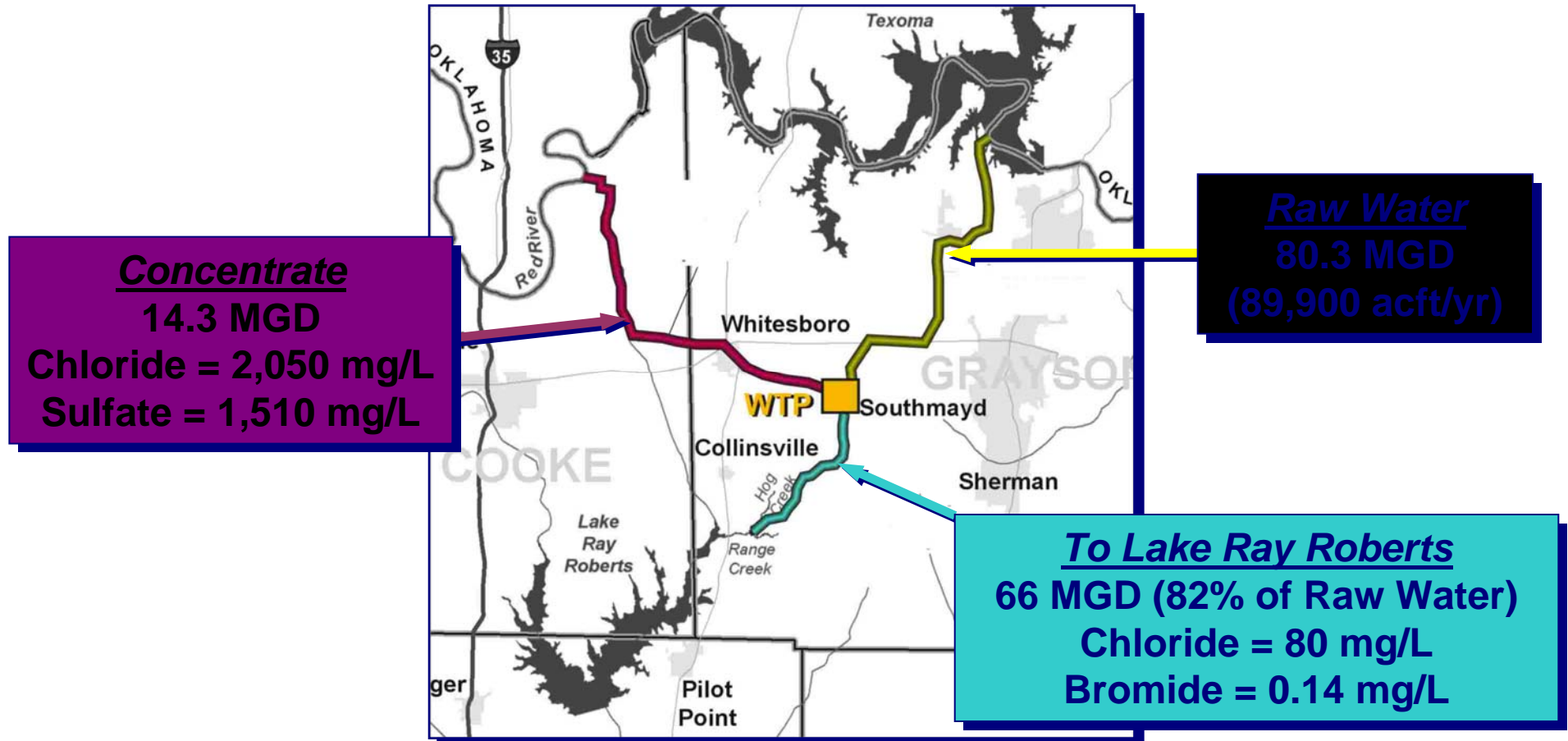


				<i>Drinking Water Standard or Treatment Requirement</i>
Chloride (mg/L)	1,406	421	344	300
Bromide (mg/L)	1.37	0.50	0.74	0.20

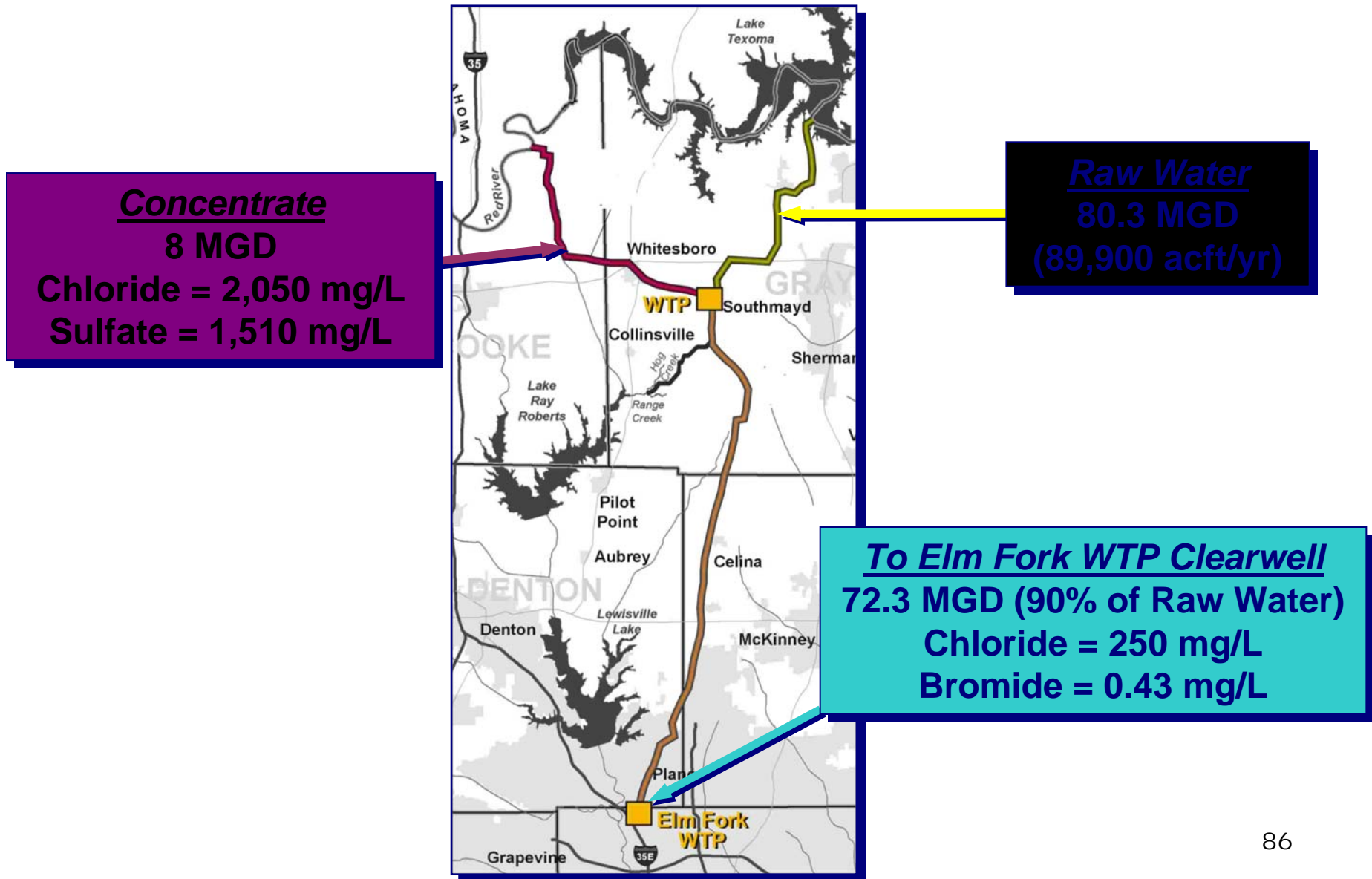
Stream Standards for Discharge

<i>Stream Segment</i>	<i>Chloride (mg/L)</i>	<i>Sulfate (mg/L)</i>	<i>TDS (mg/L)</i>
Above Lake Texoma	2,000	1,200	6,000
Lake Texoma	600	300	1,500
Lake Ray Roberts	80	60	500

Option A — Water Production Rates



Option B — Water Production Rates



Summary of Costs

	<i>Option A</i>	<i>Option B</i>
Total Project Cost	\$291,200,000	\$366,400,000
Annual Cost	\$43,460,000	\$45,020,000
Debt Service	48%	59%
O&M	52%	41%
Quantity of Water Provided (MGD & acft/yr)	66 73,930	72.3 80,990
Unit Cost of Water (acft)	\$588	\$556
Unit Cost of Water (per 1,000 gallons)	\$1.80	\$1.71

Contracting and Permitting

- Red River Compact (1978)
 - 50% Texas
 - 50% Oklahoma

- Water Resources Act of 1986
 - Additional 150,000 acft for Texas Subject to Reallocation Study
 - Lake Texoma Advisory Committee (1988)

- U.S. Army Corps of Engineers
 - Reallocation Study and Contracting Issues
 - Section 404 Permit

- Texas Commission on Environmental Quality
 - Water Rights Permit — Interbasin Transfer
 - Discharge Permit — Water Quality



Sulphur River Basin Authority

February 23, 2005

BOARD MEMBERS

- Judy Lee
PRESIDENT
MT PLEASANT
- Dick Goodman
VICE PRESIDENT
GLANSVILLE
- Mike Russell
POWDERLY
- Mickey McKenzie
SULPHUR SPRINGS
- Jim Thompson
ATLANTA
- Mike Kennedy
TEKAMORCA

Michael Burke
EXECUTIVE DIRECTOR

Mr. Robert M. Johnson, P.E., Director
Dallas Water Utilities
City Hall
1500 Marilla, Room 4AN
Dallas, TX 75201

Re: Army Corps of Engineers
Sulphur River Basin – Basin Wide Study

On Tuesday, February 22, 2005 the Sulphur River Basin Authority (SRBA) Board voted to authorize the President to execute the Federal Cost Sharing Agreement (FCSA) with the Department of the Army Corps of Engineers. Attached to the FCSA is the Project Management Plan (PMP) that outlines the project for which the SRBA Board will be the local sponsor. The project outlined is the Sulphur River Basin – Basin Wide Study and encompasses the following goals.

- 1.) Ecosystem restoration
- 2.) Flood Damage Reduction
- 3.) Water Availability

The Study is expected to take 5-6 years with a total cost of 8-9 million dollars. This is a 50/50 cost sharing agreement with the local sponsor providing 50% of the costs. In order to provide for these funds, the SRBA Board also voted to extend, for an additional five years, the current agreements we have with the following entities.

- 1.) Tarrant Regional Water District
- 2.) North Texas Municipal Water District
- 3.) Upper Trinity Regional Water District
- 4.) City of Irving

The first three entities' Boards have already agreed to the extension. The City of Irving is expected to pass on the agreement next month. We welcome the participation of the City of Dallas in this study effort and look forward to being at your meeting on March 28, 2005 to answer any questions you may have.

Sincerely,
SULPHUR RIVER BASIN AUTHORITY


Michael Burke, Executive Director

Cc: Honorable Laura Miller, Mayor - City of Dallas
Dallas City Council Members

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Glossary

Term	Definition
404 permit	Section 404 of the Clean Water Act established a program to regulate the discharge of dredged and fill material into waters of the US, including wetlands. The US Army Corps of Engineers administers the 404 permits.
ANRA	Angelina-Neches River Authority
EPA	Environmental Protection Agency
General Service	Business accounts including commercial, apartments and retail
GPCD	gallons per capita per day
GTUA	Greater Texoma Utility Authority
IBT permit	Interbasin Transfer permit
LRWSP	Long Range Water Supply Plan
MGD	million gallons per day
NCTCOG	North Central Texas Council of Governments
NETMWD	Northeast Texas Municipal Water District
NTMWD	North Texas Municipal Water District
O & M	Operating & Maintenance
Optional General Service	Industrial accounts using over one million gallons per month
Recycled water - direct use	The use of reclaimed water that has been transported from a wastewater treatment plant to the point of use without being discharged into a natural body of water.
Recycled water augmentation	The use of reclaimed water that has been discharged to a natural body of water prior to its use
Return flows	Sewage effluent that is discharged from a wastewater treatment plant to the river and can be used by others downstream
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TPWD	Texas Park & Wildlife Department
TWDB	Texas Water Development Board
UNRMWA	Upper Neches River Municipal Water Authority
USACE	US Army Corps of Engineers
USCOE	U. S. Army Corps of Engineers
USFWS	US Fish & Wildlife Service
UTRWD	Upper Trinity Regional Water District