[redacted] Planning

2004 WATER - REGION C WATER PLANNING

REGION C WATER PLANNING GROUP

mike

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com
www.regioncwater.org

July 14, 2004

I will set up a meeting to discuss
Jim

Mr. Jim Pierce
Assistant Public Works Director
Town of Addison
16801 Westgrove
P.O. Box 9010
Addison, TX 75001-9010

Subject: Water Conservation Strategies for Regional Water Planning

Dear Mr. Pierce:

The Region C Water Planning Group is actively working on updating the 2001 *Region C Water Plan*. The updated *Region C Water Plan* will be completed by January 5, 2006. Water conservation is an important issue for regional water planning, and the Texas Water Development Board rules require the Planning Group to consider recommending water conservation strategies for each water user group that has a projected water need during the 50-year planning period. We are seeking your input regarding potentially feasible water conservation strategies.

The attached pages list potentially feasible water conservation strategies that the Planning Group is evaluating. Detailed information about these strategies is available from the Texas Water Development Board at the following online locations:
http://www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/Feb/DraftBMPs2-27-04.pdf
http://www.twdb.state.tx.us/assistance/conservation/Documents/DraftBMPs4-28-04Vol2.pdf

For each water conservation strategy that you have already implemented, please report the types of targeted water users, the degree of public participation, the amount of water that has been saved, and your cost in implementing and operating the program (including overhead). If you have implemented conservation strategies that are not on the list, please add them and report the above information.

For each water conservation strategy that you have not implemented, please indicate whether you would consider pursuing the strategy. If you are interested in pursuing conservation strategies that are not on the list, please add them.

Please call Nina Jacobson of Alan Plummer Associates, Inc. at 214-631-6100 with any questions, comments, or corrections you may have regarding this survey. Please return your completed survey to the address shown on the third page of the attached survey by July 31, 2004. We greatly appreciate your attention and cooperation in responding to this survey, which will help the Planning Group evaluate water conservation strategies for Region C.

Sincerely,

James M Parks

Jim Parks
Chairman

Cc: Roy Eaton, Secretary

Region C Water Planning Group
Potentially Feasible Water Management Strategies for Water User Groups (WUGs)
Please Return by July 31, 2004

Name of Water User Group: Town of Addison
Contact Person:_____
Telephone Number:_____ FAX:_____
Email Address:_____
Mailing Address:_____

1. Based on your most recent system water audit, how much "unaccounted-for" water do you have? Please list quantity (million gallons and percent of total use) and specify if adjustments were made for line flushing, fire flows and other unmetered uses. How much do you estimate that you lost to leakage? How much raw water did you pump (million gallons)? How much treated water did you purchase (million gallons)?

2. If applicable, what is your current cost for raw water?

3. Do you offer rebates, incentives, or retrofit kits for customers to conserve water? Please describe your rebate/incentive/retrofit program. What is the value of the rebate/incentive/retrofit kit? How many rebates/incentives/retrofits have you paid out or distributed? How long has your program been in place?

4. Do you have a program to educate the public and/or schoolchildren about water conservation? Please describe your program. Please attach any information on water conservation that is distributed to the public.

5. Do you have an ordinance that prohibits water waste? If so, please attach a copy of the ordinance.

6. Do you reuse treated wastewater effluent? If so, please describe your reuse program (source, customers, uses, contracted water amounts, infrastructure capacity, etc.)

7. Please provide a summary of your water rates. Please include quantity and cost information for each rate tier.

8. Please report information about the conservation strategies that you have already implemented. For strategies that you have not implemented, please indicate whether you would consider pursuing these strategies.

Strategy Name	Have You Implemented This Strategy? (please circle)		Target Water Users * (please circle)	Degree of Public Partieipation/ Interest ** (please circle)	Amount of Water Saved Per Year		Startup Cost ($)	Annual Operating Cost ($/year)	Would You Consider Implementing This Strategy? (please circle)		If No, Why Not?
	Yes	No			Quantity	Units			Yes	No	
Public Information/School Education	Y	N	R Ind C Inst	H M L NA					Y	N	
Water Conservation Pricing	Y	N	R Ind C Inst	H M L NA					Y	N	
System Water Audit and Water Loss	Y	N	R Ind C Inst	H M L NA					Y	N	
Pressure Control and Leak Detection	Y	N	R Ind C Inst	H M L NA					Y	N	
Water Waste Prohibition (Ordinance/ Enforcement)***	Y	N	R Ind C Inst	H M L NA					Y	N	
Customer Indoor Water Audit	Y	N	R Ind C Inst	H M L NA					Y	N	
Showerhead/Faucet Aerator Retrofit Program	Y	N	R Ind C Inst	H M L NA					Y	N	
Toilet Replacement Program	Y	N	R Ind C Inst	H M L NA					Y	N	
Clothes Washer Rebate	Y	N	R Ind C Inst	H M L NA					Y	N	
Customer Irrigation Audit	Y	N	R Ind C Inst	H M L NA					Y	N	
Landscape Irrigation Systems Rebate	Y	N	R Ind C Inst	H M L NA					Y	N	
Landscape Design and Conversion Program (including Xeriscaping)	Y	N	R Ind C Inst	H M L NA					Y	N	
General Industrial, Commercial, and Institutional (ICI) Conservation Rebate	Y	N	R Ind C Inst	H M L NA					Y	N	
ICI Water Audit, Water Waste Reduction, and Site-Specific Conservation Programs	Y	N	R Ind C Inst	H M L NA					Y	N	
Reuse of Treated Wastewater Effluent	Y	N	R Ind C Inst	H M L NA					Y	N	

* R=Residential, Ind=Industrial, C=Commercial, Inst=Institutional,

** H=High, M=Medium, L=Low, NA=Not applicable

*** Note that the "Water Waste Prohibition" is different from a Drought Contingency or Emergency Water Management Plan. See http://www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/Feb/DraftBMPs2-27-04.pdf for examples of Water Waste Prohibition.

9. Please report information about other conservation strategies that you have already implemented. Also, please indicate other conservation strategies that you are interested in pursuing.

Strategy Name	Have You Implemented This Strategy? (please circle)		Target Water Users * (please circle)	Degree of Public Participation/ Interest ** (please circle)	Amount of Water Saved Per Year		Startup Cost ($)	Annual Operating Cost ($/year)	Would You Consider Implementing This Strategy? (please circle)	
	Yes	No			Quantity	Units			Yes	No
	Y	N	R Ind C Inst	H M L NA					Y	N
	Y	N	R Ind C Inst	H M L NA					Y	N
	Y	N	R Ind C Inst	H M L NA					Y	N
	Y	N	R Ind C Inst	H M L NA					Y	N

* R=Residential, Ind=Industrial, C=Commercial, Inst=Institutional

** H=High, M=Medium, L=Low, NA=Not applicable

10. What percentage of your <u>retail</u> residential, commercial, industrial, and institutional customers use automatic irrigation systems? If possible, please report the number of automatic irrigation systems (from permits or other sources) and your total number of connections.

11. Please use this space to provide any other information or comments on your water conservation efforts. Use additional sheets if needed.

Please return by July 31, 2004, to:

Nina Jacobson
Alan Plummer Associates, Inc.
1349 Empire Central, Suite 702
Dallas, Texas 75247-4006

214-631-6109 (fax)

4-30-04

Region C Water Planning Group
Confirmation of Water Needs Projections and Proposed Water Management Strategies of Water User Groups (WUGs)
Please Return by April 30, 2004

Name of Water User Group: Town of Addison
Contact Person: Mike Murphy
Telephone Number: 972-450-2878 FAX: 972-450-2837
Email Address: MMurphy@ci.addison.tx.us
Mailing Address: same as letter

1. Do you agree with the projected water demands? If not, what changes would you suggest? What is the basis for your suggested changes? (Note: The demands have been approved by the TWDB and cannot be changed at this time. However, we can plan for additional supplies to meet any demands that you believe are significantly underestimated.)

We agree with the projected water demands

2. Do you agree with the list of available water supply sources? If not, what changes are needed? (Note: Surface water supplies have been adjusted to reflect availability as determined from the state Water Availability Models. Groundwater supplies have not been updated from the 2001 *Region C Water Plan.*)

We agree with the currently available water supplies.

3. Do you agree with the proposed water management strategies listed in the 2002 State Water Plan and those being considered for this update. If not, what strategies are you considering? What strategies are you NOT considering?

We agree with the proposed management strategies. We have implemented more agressive conservation measures. We have implemented a water rate schedule that rewards and promotes water conservation. We are looking into the potential for aquifer storage and recovery.

4. Please give any other comments you have on these data. Use the back (or other sheets) if needed.

We are confused by the chart "Projected Total Demand VS Currently Available Supply." The chart shows we will not have enough water in 2010, But wont available supplies be increased by 2010? The purpose of this Chart is not clear.

Please return by April 30, 2004, to:

Richard Shaffer
Chiang, Patel & Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, Texas 75235

214-589-6905 ~~(fax)~~ (o)
214 638 3723

TOWN OF
ADDISON **PUBLIC WORKS**

To: Richard Shaffer

From: Jim Pierce, P.E.
Asst. Public Wks. Dir.
Phone: 972/450-2879
FAX: 972/450-2837
jpierce@ci.addison.tx.us

Company: Chiang, Patel & Yerby

214-638-3723 → FAX #: ~~214-589-6905~~

16801 Westgrove
P.O.Box 9010
Addison, TX 75001-9010

Date: 4-28-04

# of pages (including cover): 3

Re: Region C Confirmation of Needs & Water Mgt.

☐ Original in mail ☒ Per your request ☐ FYI ☐ Call me

Comments:

Please See Attached.

J. Pierce

HP LaserJet 4100 MFP

Town of Addison
972 450 2837
04/28/2004 03:54 PM

Fax Call Report

Job	Date/Time	Type	Identification	Duration	Pages	Result
229	04/28 03:52 PM	Send	92146383723	01:04	4	OK

CP&Y

Partners for a Better Quality of Life

FACSIMILE TRANSMITTAL

TO: Jim Pierce
Fax No: 972 450-2837
Company: City of Addison
Subject: Region C Water Planning

FROM: Frank Pugsley
Fax No.: 214-638-3723
CP&Y Project No.: FNI 0230
Date: 04/28/04
No. Pages (including cover): 2

IF YOU DID NOT RECEIVE ALL PAGES, PLEASE NOTIFY US AT (214) 638-0500

MESSAGE:

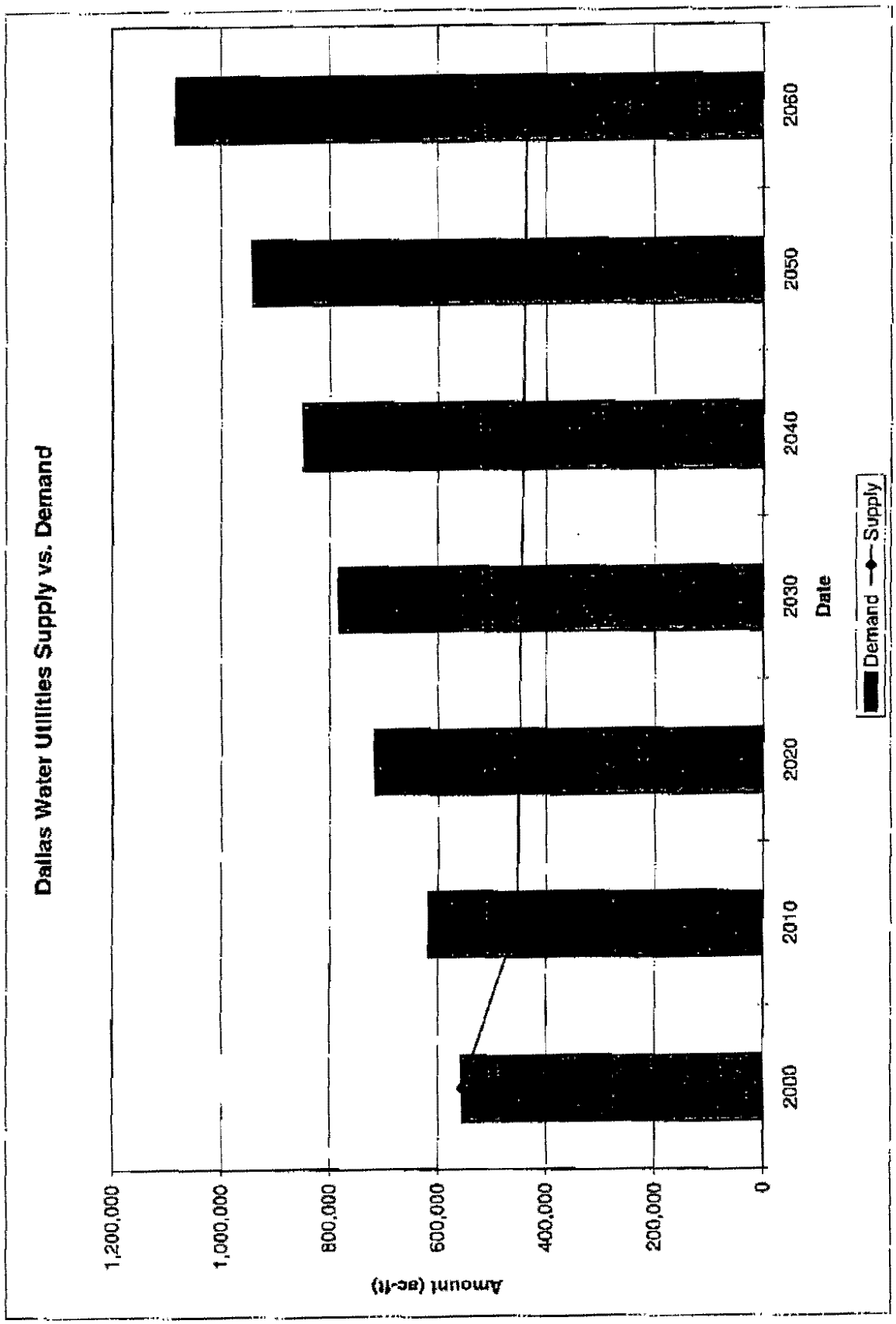
Jim,

Here is the chart I was able to locate regarding the DWU projected supply and demand. I apologize for not having more information for you.

Frank Pugsley
Chiang, Patel & Yerby, Inc.
1820 Regal Row, Ste. 200
Dallas, TX 75235
(214) 638-0500

Chiang, Patel & Yerby, Inc.
1820 Regal Row, Suite 200,
Dallas, Texas 75235
214.638.0500 • 972.263.3960 metro • 214.638.3723 fax
www.cpyi.com

DWU summary Chart 311



REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

April 12, 2004

Mr. Mike Murphy
Director of Public Works
Town of Addison
16801 Westgrove
Addison, TX 75001

Subject: Water Management Strategies for Regional Water Planning

Dear Mr. Murphy:

The Region C Water Planning Group is actively working on the update to the 2001 *Region C Water Plan*. The updated *Region C Water Plan* is to be completed by January 5, 2006. In September 2002 and again in January 2003, we surveyed you regarding projected population and water demands for the Town of Addison. With your input, the population and water demand projections have been updated and have been approved by the Region C Water Planning Group and the Texas Water Development Board. The Planning Group is now evaluating available water supplies and proposed water management strategies. We are again seeking your input on your available water supplies and proposed water management strategies.

We have attached summaries of the following information for the Town of Addison:

- population projections
- water demand projections
- currently available water supplies
- recommended water management strategies from 2001 *Region C Water Plan*
- potential water management strategies for 2006 *Region C Water Plan*

We are asking that you review this information and provide any comments or corrections needed to accurately reflect your water needs and proposed projects for additional water supplies. Please call Richard Shaffer of Chiang, Patel & Yerby, Inc. at 214-638-0500 with any questions, comments, or corrections you may have regarding this survey. Please return your completed survey to the address shown on the second page of the attached survey by April 30, 2004. We greatly appreciate your attention and cooperation in reviewing this information, which will provide the basis for long-range water supply planning in Region C.

Sincerely,

Jim Parks
Chairman

Cc: Roy Eaton, Secretary

Frank Pugsley 214-589-6903

FRANK 2145896903

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com
www.regioncwater.org

Region C Water Planning Group
Confirmation of Water Needs Projections and Proposed Water Management Strategies of Water User Groups (WUGs)
Please Return by April 30, 2004

Name of Water User Group: Town of Addison
Contact Person:_____
Telephone Number:_____FAX:_____
Email Address:_____
Mailing Address:_____

1. Do you agree with the projected water demands? If not, what changes would you suggest? What is the basis for your suggested changes? (Note: The demands have been approved by the TWDB and cannot be changed at this time. However, we can plan for additional supplies to meet any demands that you believe are significantly underestimated.)

2. Do you agree with the list of available water supply sources? If not, what changes are needed? (Note: Surface water supplies have been adjusted to reflect availability as determined from the state Water Availability Models. Groundwater supplies have not been updated from the 2001 *Region C Water Plan.*)

3. Do you agree with the proposed water management strategies listed in the 2002 State Water Plan and those being considered for this update. If not, what strategies are you considering? What strategies are you NOT considering?

Agree with most. Strategy should implemented More aggressive conservation measures have implemented to rate program that rewards and promotes water conservation. Looking into potential aquifer Storage

4. Please give any other comments you have on these data. Use the back (or other sheets) if needed.

Please return by April 30, 2004, to:

Richard Shaffer
Chiang, Patel & Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, Texas 75235

214-589-6905 (fax)

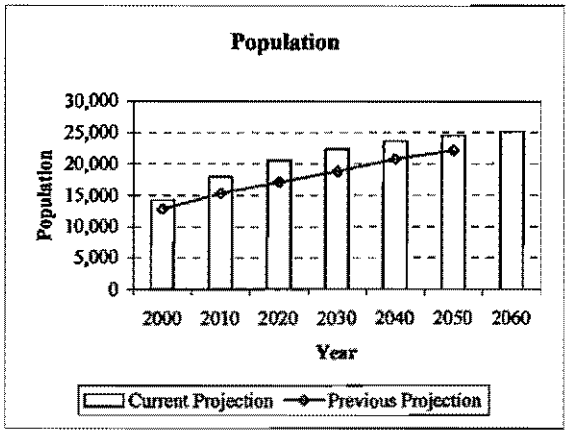
1 acre-ft = 25,851 gallons

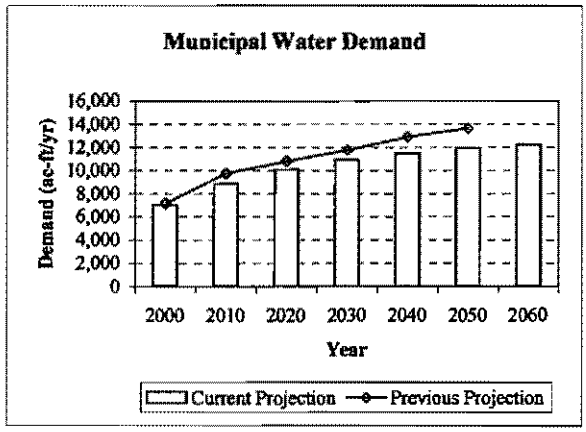
325,851 gal/ac-ft × 6,998 ac-ft/yr = 2,280,300,000 gallons/yr

= 6,247,411 gpd (avg)

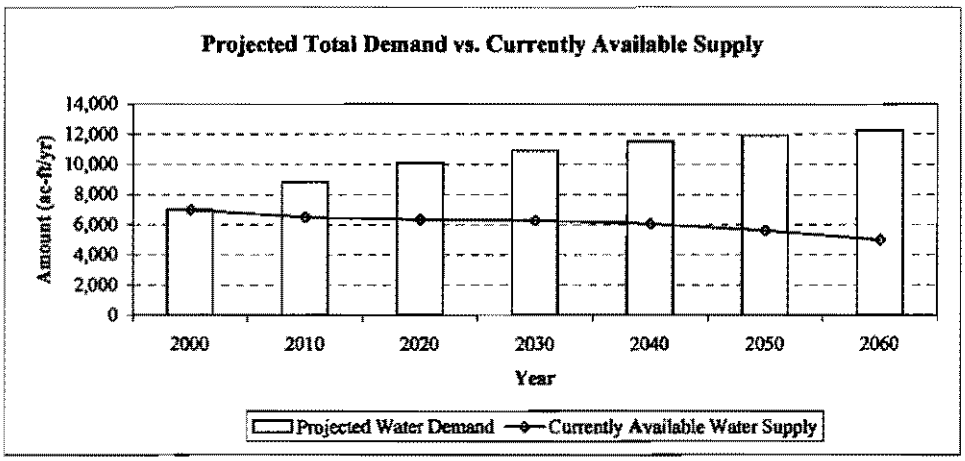
Town of Addison

	2000	2010	2020	2030	2040	2050	2060
Projected Population	14,166	17,919	20,534	22,358	23,629	24,515	25,133
Projected Municipal Water Demand (ac-ft/yr)	6,998	8,852	10,074	10,919	11,514	11,918	12,218
Projected Wholesale Water Demand (ac-ft/yr)	0	0	0	0	0	0	0
Total Projected Water Demand (ac-ft/yr)	6,998	8,852	10,074	10,919	11,514	11,918	12,218





Currently Available Water Supplies	2000	2010	2020	2030	2040	2050	2060
DWU Sources - DWU	6,998	6,507	6,345	6,254	6,060	5,613	4,987
TOTAL	6,998	6,507	6,345	6,254	6,060	5,613	4,987



Recommended Water Management Strategies from 2001 Region C Water Plan
Renew DWU contract
Continue purchasing water from DWU

Potential Water Management Strategies for 2006 Region C Water Plan
Renew DWU contract
Continue purchasing water from DWU
Water conservation

RECEIVED
APR 05 2004
MAYOR/CITY COUNCIL

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

cc Ron
Mike

TO: Mayors, County Judges

FROM: James M. Parks, Chairman, RCWPG

DATE: April 1, 2004

SUBJECT: Notice of Intent to Apply for Supplemental Funding

PUBLIC NOTICE

Notice is hereby given that the Region C Water Planning Group (RCWPG) is applying for supplemental grant funding from the Texas Water Development Board's (TWDB) Research and Planning Fund to be used for preparation of the 2006 Regional Water Plan. The application is being filed with the Executive Administrator of the Texas Water Development Board on or before April 1, 2004. The RCWPG consists of the following counties: Collin, Cooke, Dallas, Denton, Ellis, Fannin, Freestone, Grayson, Henderson (portion of county within Trinity Basin), Jack, Kaufman, Navarro, Parker, Rockwall, Tarrant, and Wise.

The North Texas Municipal Water District serves as the designated political subdivision for the RCWPG and will be filing the application on behalf of the RCWPG. The applicant, North Texas Municipal Water District, is represented by James M. Parks, Executive Director, and can be reached at the address listed below.

The purpose of the proposed supplemental planning tasks is to assist in the development of the 2006 Regional Water Plan as described in 31 Texas Administrative Code (TAC) Section 357.

Any comments regarding this grant application must be filed with the TWDB and RCWPG within thirty (30) days of the date of this Notice at the following addresses:

Mr. J. Kevin Ward
Executive Administrator
Texas Water Development Board
P. O. Box 13231, Capitol Station
Austin, Texas 78711-3231

Mr. James M. Parks
Administrator/Chairman
Region C Water Planning Group
c/o NTMWD
P. O. Box 2408
Wylie, Texas 75098

For further questions or additional information, please contact James M. Parks at the NTMWD office at 972/442-5405.

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com
www.regioncwater.org

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

October 4, 2002

Mr. Mike Murphy
Town of Addison
P. O. Box 9010
Dallas, TX 75001-9010

Subject: Population Projections and Data Survey – Please respond by September 30, 2002

Dear Mr. Murphy:

Senate Bill One, passed by the Legislature in June 1997, requires that Regional Water Planning Groups update approved Water Plans at least every five years. The effort to update our region's plan has begun and we are seeking your input in the planning process. Your city is located in Region C and the Board Members of the Region C Water Planning Group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional planning update process now underway.

The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the update of the regional water plan. Other members of the consulting team include, Alan Plummer Associates, Cooksey Communications, and Chiang, Patel & Yerby.

As instructed by the legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. **With this letter, we are attaching a survey seeking information from you to help us determine whether the TWDB population projections are appropriate for your city or whether they should be revised.** We are also seeking other information important for planning. The TWDB is scheduled to provide initial water needs projections by the end of September. When we receive this information, we will provide it to you and seek your input. Please fill out the attached survey and return it to Ed Motley of Chiang, Patel and Yerby by no later than September 30, 2002. To maintain our schedule, information must be provided by the due date to be included in the updated Regional Water Plan.

To help you fill out the survey, attached is some information on historical and projected populations in Region C.

Table of Historical and Projected Population for Your City. This table presents the historical and projected population for your city developed by the TWDB. The projections are for values within your city limits.

Table of Historical and Projected Population for Your County. This table presents the TWDB historical and projected population for the cities in county(ies) in which you are located.

If you have any questions or need additional information to complete the survey, please contact Mr. Ed Motley, Project Engineer at Chiang, Patel & Yerby, at (214) 638-0500.

Thank you in advance for your timely completion of the survey as this information will provide the basis for updating the water plan for Region C.

Yours very truly,

Terrace Stewart
Chair, Region C Water Planning Group

C: Jim Parks, Vice Chair
Roy Eaton, Secretary

Attachments: Population Projection Survey
Historical and Projected Population Tables
Brochure

Region C Water Planning Group
Population Projection Survey of Cities
Please Return by September 30, 2002

City: TOWN OF ADDISON Contact Person: MIKE MURPHY
Telephone Number: 972-450-2878 FAX: 972-450-2837
Email Address: mmurphy@ci.addison.tx.us
Mailing Address: 16801 WESTGROVE, ADDISON TX. 75001

1. Are the TWDB projections of population for your city reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data. Examples of supporting data include:
   - Documentation of undercount in 2000 census.
   - Documentation of higher migration into county over past several years than experienced between 1990 and 2000.
   - Changes in city boundaries, including annexation.

YES, PROJECTIONS ARE REASONABLE.

2. Please give your comments on the TWDB population projections for your county(ies).

O.K.

3. We have a copy of your city's drought contingency plan dated August 24, 1999. If you have more recent conservation and drought contingency plan(s) for your city, please provide a copy(ies).

(SEE ATTACHED)

4. What conservation measures does your city use? Are these measures effective? What is the cost of each water conservation measure your city employs?

THIS CURRENT YEAR, THE TOWN IMPLEMENTED A VERY AGGRESSIVE PUBLIC AWARENESS CAMPAIGN. INCLUDING MAIL OUTS - DOOR HANGERS - C.D.'S - TOILET TABS - MEASURES SEEMED TO BE VERY EFFECTIVE. THE COST WAS $8500. Its difficult to measure effectiveness,

5. What source(s) of water supply does your city currently use? If you have a contract for water supply, is there a contractual limit? Is there an option to increase the contractual amount? Please also note if you are having any problems with water quantity or water quality.

THE TOWN OF ADDISON CONTRACTS IT WATER SUPPLY FROM THE CITY OF DALLAS. OUR CURRENT RATE OF FLOW AGREEMENT IS 11.0 MILLION GALLONS PER DAY. WITH ABILITY TO INCREASE INCREMENTALLY.

NO PROBLEMS TO DATE.

6. If groundwater is part or all of your water supply, please list:

   - The number of water wells in operation.
   - The number of usable water wells not currently in operation.
   - The aquifer(s) being used.
   - Their location (county and basin).
   - Their depth.
   - The production capacity of each well.

   Please also note if you are having any problems with current well production, either quantity or quality.

   N.A.

7. How do you plan to meet future water needs?
   CURRENTLY LOOKING INTO DEVELOPMENT OF REUSE PROGRAM AND GROUNDWATER DEVELOPMENT.

8. Is your city planning to develop additional source(s) of water supply in the future? If so, please provide quantity in each source and location of each source. If your city is not planning to develop additional water supply, would you please tell us why not?
   WE ARE LOOKING INTO AQUIFER STORAGE AND GROUNDWATER DEVELOPMENT.

9. Please provide a copy of any water supply plan(s) developed for your city.

   N/A

10. Do you currently provide raw water or treated water to any other water suppliers? Please list other suppliers for which you provide water and the amount you provided to each of them in 2000. Please note if you are providing raw or treated water next to each customer. Please include contractual amounts and contract expiration dates, if any, for these customers.

    NO - - -

11. Do you expect to discontinue providing water to any of these suppliers? If so, what changes do you expect?

N/A

12. Do you expect to begin providing water to any additional suppliers? If so, please list those entities you plan to supply, the amount of water you plan to supply, and the expiration date of the water supply contract, if applicable. What changes do you expect?

N/A

13. If you treat your own potable water, what is the current capacity of water treatment plant(s)? What are your plans for plant expansion?

N/A

14. Does your city currently use or sell treated wastewater for reuse? If so, how much on an annual basis and for what purposes?

N/A

15. Does your city have plans to begin using or to increase the amount of reuse applied in the future? If so, what increases do you expect to see and what is the expected timing of these increases? For what purposes will the reuse water be used?

NO PLANS IN NEAR FUTURE.

16. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by September 30, 2002, to:

Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

Town of Addison

Table of Historical and Projected Population

Region	WUG Name	County Name	Basin Name	P1990	P2000	P2010	P2020	P2030	P2040	P2050	P2060
C	ADDISON	DALLAS	TRINITY	8,703	14,166	17,919	20,534	22,359	23,629	24,515	25,133

Dallas County

Table of Historical and Projected Population

Region	WUG Name	County Name	Basin Name	P1990	P2000	P2010	P2020	P2030	P2040	P2050	P2060
C	ADDISON	DALLAS	TRINITY	8,783	14,166	17,910	20,534	22,356	23,629	24,515	25,133
C	BALCH SPRINGS	DALLAS	TRINITY	17,406	19,375	21,083	22,564	23,849	24,963	25,930	26,768
C	CARROLLTON	DALLAS	TRINITY	40,024	49,822	57,942	64,873	70,250	74,873	78,704	81,880
C	CEDAR HILL	DALLAS	TRINITY	19,930	32,044	40,208	59,075	69,870	78,946	86,556	92,949
C	COCKRELL HILL	DALLAS	TRINITY	3,746	4,443	4,782	4,947	5,028	5,067	5,086	5,095
C	COMBINE	DALLAS	TRINITY	434	624	845	1,048	1,168	1,267	1,442	1,649
C	COMBINE WSC	DALLAS	TRINITY	470	900	1,392	1,840	2,106	2,370	2,714	3,173
C	COPPELL	DALLAS	TRINITY	16,878	35,734	45,957	51,500	54,505	56,134	57,016	57,497
C	COUNTY-OTHER	DALLAS	TRINITY	2,465	1,899	1,474	1,140	887	687	533	412
C	DALLAS	DALLAS	TRINITY	900,879	1,121,131	1,281,072	1,433,740	1,483,557	1,549,834	1,712,144	1,995,823
C	DALLAS COUNTY WCID #6	DALLAS	TRINITY	1,245	2,850	4,728	6,434	7,447	8,453	9,765	11,513
C	DE SOTO	DALLAS	TRINITY	30,544	37,646	50,000	65,000	75,000	86,000	97,000	107,000
C	DUNCANVILLE	DALLAS	TRINITY	35,008	36,081	37,100	38,069	38,988	39,862	40,692	41,480
C	EAST FORK SUD	DALLAS	TRINITY	727	768	816	860	886	912	946	991
C	FARMERS BRANCH	DALLAS	TRINITY	24,250	27,508	30,470	33,161	35,808	37,833	39,855	41,693
C	GARLAND	DALLAS	TRINITY	180,620	215,768	256,885	294,249	308,806	320,000	323,000	325,000
C	GLENN HEIGHTS	DALLAS	TRINITY	3,768	5,618	7,332	8,919	10,300	11,752	13,013	14,182
C	GRAND PRAIRIE	DALLAS	TRINITY	81,519	98,750	138,883	165,711	194,459	231,088	273,547	317,251
C	GRAPEVINE	DALLAS	TRINITY	83	0	0	0	0	0	0	0
C	HIGHLAND PARK	DALLAS	TRINITY	8,739	8,842	8,937	9,025	9,106	9,181	9,249	9,313
C	HUTCHINS	DALLAS	TRINITY	2,719	2,805	5,000	10,000	16,000	24,000	32,000	34,000
C	IRVING	DALLAS	TRINITY	155,037	191,615	219,238	240,099	255,853	267,751	276,736	283,521
C	LANCASTER	DALLAS	TRINITY	22,117	25,894	50,000	80,000	100,000	120,000	135,000	146,000
C	LEWISVILLE	DALLAS	TRINITY	555	3	2	2	2	2	2	2
C	MESQUITE	DALLAS	TRINITY	101,464	124,522	165,000	200,000	230,000	245,000	249,000	250,600
C	OVILLA	DALLAS	TRINITY	279	251	369	540	792	1,162	1,704	2,500
C	RICHARDSON	DALLAS	TRINITY	64,861	70,929	78,027	82,719	85,818	87,867	89,221	90,118
C	ROCKETT SUD	DALLAS	TRINITY	1,193	1,751	2,469	3,094	3,465	3,833	4,313	4,954
C	ROWLETT	DALLAS	TRINITY	19,907	37,452	51,871	63,171	72,480	80,014	86,111	91,047
C	SACHSE	DALLAS	TRINITY	5,152	8,091	10,760	13,183	15,384	17,362	19,197	20,845
C	SARDIS-LONE ELM WSC	DALLAS	TRINITY	36	36	36	36	36	36	36	36
C	SEAGOVILLE	DALLAS	TRINITY	8,968	10,816	16,000	23,000	32,000	42,000	50,000	55,000
C	SUNNYVALE	DALLAS	TRINITY	2,228	2,693	5,000	7,000	9,000	11,000	13,000	13,300
C	UNIVERSITY PARK	DALLAS	TRINITY	22,259	23,324	24,092	24,647	25,046	25,335	25,543	25,693
C	WILMER	DALLAS	TRINITY	3,479	3,393	5,500	7,500	8,800	10,500	14,000	22,000
C	WYLIE	DALLAS	TRINITY	0	306	580	827	1,048	1,248	1,426	1,584
		DALLAS Total		1,852,810	2,218,898	2,648,167	3,038,309	3,270,000	3,500,000	3,800,000	4,200,000

Acronym	Full Name
WS	Water System
UD	Utility District
SUD	Special Utility District
WSC	Water Supply Corp
MUD	Municipal Utility District
WCID	Water Control & Improvement District
MWD	Municipal Water District
FWSD	Fresh Water Supply District
WD	Water District
MWSD	Municipal Water Supply District

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OCT-10-2002 10:49AM

Fax Call Report

Job	Date	Time	Type	Identification	Duration	Pages	Result
72	10/10/2002	10:47:28AM	Send	92146383723	2:00	8	OK

Sent by: CHIANG PATEL & YERBY 214 638 0723; 10/04/02 2:27PM;#145; Page 1

CP&Y Partners for a Better Quality of Life

FACSIMILE TRANSMITTAL

From:
Mike Murphy
Fax No: (972) 450 - 2837
Company: City of Addison
Subject:

To:
Reggie Fountain
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CP&Y Project No.: FNT 0230
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FACSIMILE TRANSMITTAL

From:

~~To~~ Mike Murphy

Fax No: (972) 450 - 2837

Company: City of Addison

Subject:

TO:

~~FROM~~ Reggie Fountain

Fax No.: 214-638-3723

CP&Y Project No.: FN1 0230

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Mike — I cannot attend.

REGION C WATER PLANNING GROUP

Senate Bill 1 - Texas Water Development Board

Jim

TO: Mayors, County Judges, Water Districts, Water Suppliers, and Water Rights Holders

FROM: Jim Parks, Vice Chairman, RCWPG

DATE: June 7, 2001

SUBJECT: Public Meeting Notice

PUBLIC NOTICE

The Region C Water Planning Group will hold a public meeting to gather suggestions and recommendations from the public as to issues that should be addressed or provisions that should be included in the Region C Water Plan 2001 – 2005 Planning Cycle or State Water Plan.

The meeting will be held as follows:

July 10, 2001
1:30 P.M.
Trinity River Authority
Central Wastewater Treatment Plant
6500 W. Singleton Boulevard
Grand Prairie, Texas

The Region C water planning area contains sixteen counties including Collin, Cooke, Dallas, Denton, Ellis, Fannin, Freestone, Grayson, Henderson, Jack, Kaufman, Navarro, Parker, Rockwall, Tarrant, and Wise. Questions relating to the meeting should be referred to Terrace Stewart, Chairman, RCWPG, 214/670-3144, or Jim Parks, Vice-Chairman, 972/442-5405.

Written comments may be sent prior to July 10, 2001, to:

TERRACE STEWART
Chairman
Region C Water Planning Group
c/o City of Dallas, Water Utilities
1500 Marilla, Room 4AN
Dallas, Texas 75201

JIM PARKS
Vice-Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P. O. Box 2408
Wylie, Texas 75098

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

File: Region C WTR Plan
Mike

TOWN OF ADDISON

PUBLIC WORKS DEPARTMENT (972) 450-2871

Post Office Box 9010 Addison, Texas 75001-9010 16801 Westgrove

MEMORANDUM

DATE: 5 FEBRUARY 2001

TO: RON WHITEHEAD

FROM: JIM PIERCE

SUBJECT: EXECUTIVE SUMMARY OF THE EXECUTIVE SUMMARY OF THE REGION C WATER PLAN

This memo is to briefly speak to your concern that has been expressed about the adequacy of our future water supply in the face of strong population growth for our Region.

The Region C Water Plan, completed in January 2001, which is an outgrowth of Senate Bill One, addresses this issue. (Copy of Executive Summary Attached).

Briefly:

- Region C covers 16 counties in North Central Texas.
- Dallas County population is expected to increase from 2.0 million to 3.26 million in 2050.
- The Region C population is expected to increase from 4.8 million to 9.5 million in 2050. (Most of this increase is expected in the next 25 years).
- Current water sources are: 34 water reservoirs in Region C plus others outside the Region. These reservoirs supply 90% of the current water demand.
- Groundwater is an important source, especially in rural areas. However, in many areas, groundwater is being withdrawn at rates exceeding replenishment.
- Reuse of treated wastewater will become an important source of water in the future.
- Additional water supplies must be developed before 2050. Projected water use in 2050 is more than double the 1996 use.
- By 2030, projected water demand will exceed current total supply.

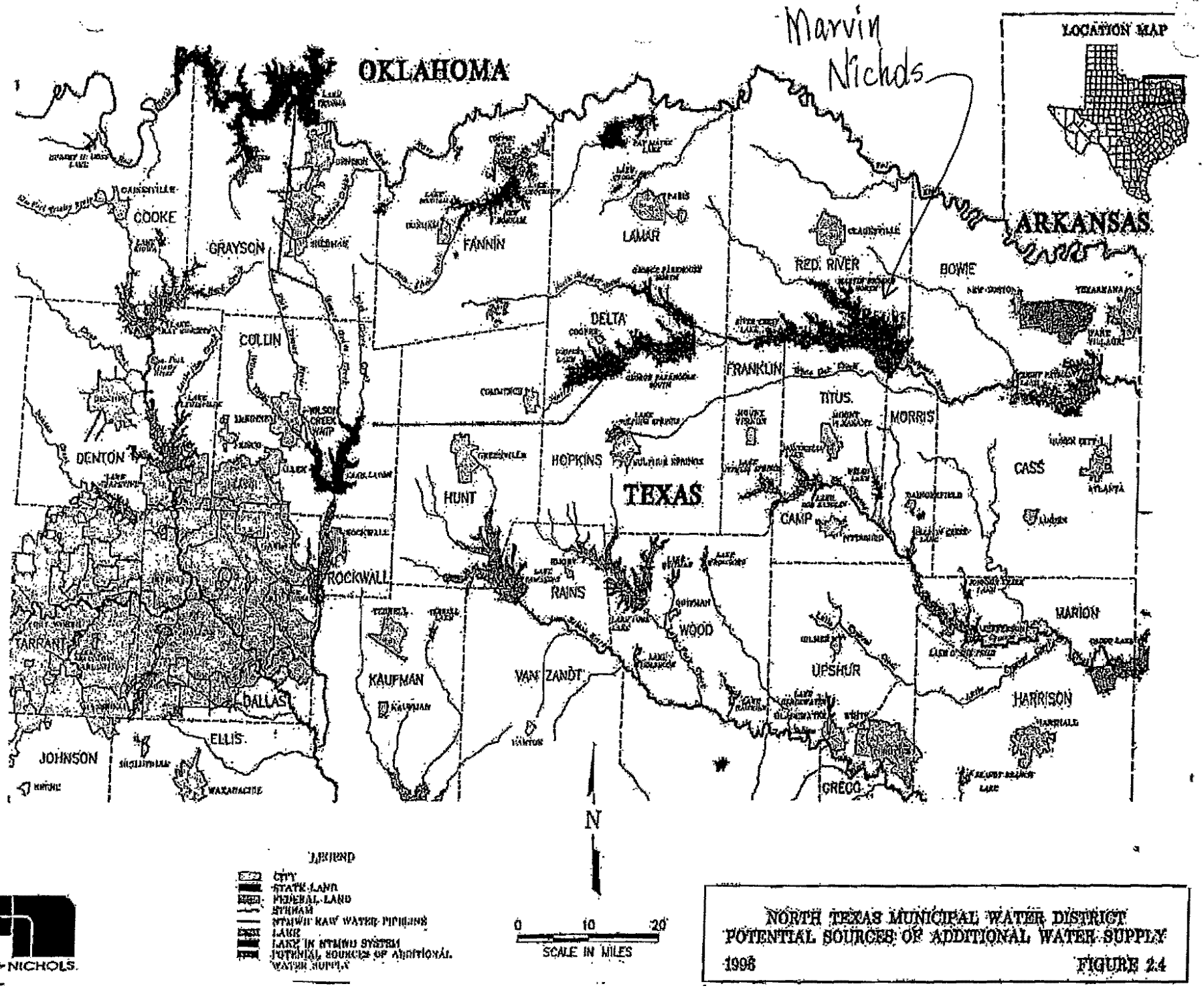
The principal recommended strategy is the development of Marvin Nichols I Lake in the Sulfur River Basin (out of Region C, in Region D) in northeast Texas. Cost is estimated at $1.6 billion.

Estimated costs to the Region's water providers for all recommended water management strategies are as shown below:

WATER PROVIDER	ESTIMATED COST (BILLIONS)
Dallas Water Utilities	$1.492
Tarrant Regional Water District	$1.167
N. TX Municipal Water District	$1.435
Fort Worth	$0.221
Trinity River Authority	$0.166
All Others in the Region	$1.674
Total	$6.158

Please let me know if you have any questions, or would like more information about this issue.

Cc: Chris Terry
Mike Murphy



FREESE NICHOLS

NORTH TEXAS MUNICIPAL WATER DISTRICT
POTENTIAL SOURCES OF ADDITIONAL WATER SUPPLY
1998
FIGURE 2.4

REGION C WATER PLAN

January 2001

Executive Summary

This report presents the Senate Bill One regional water plan developed in the year 2000 for Region C. Region C covers all or part of 16 counties in North Central Texas, as shown in Figure ES-1.

The Region C water plan was developed under the direction of the 19-member Region C Water Planning Group. The planning process included the following steps, which are presented in this executive summary and described in greater detail in the main report and the appendices:

- Description of Region C
- Population and Water Demand Projections
- Analysis of Water Supply Currently Available to Region C
- Comparison of Water Supply and Projected Water Demand
- Evaluation and Selection of Water Management Strategies
- Regulatory, Administrative, Legislative, and Other Recommendations
- Plan Approval Process and Public Participation

ES-1 Description of Region C

As of 1998, the estimated population of Region C was 4,779,210 - 24.4 percent of Texas' total population. The two most populous counties in Region C, Dallas and Tarrant, have 70.6 percent of the region's population. There are 38 cities in Region C with an estimated 1998 population of more than 20,000. These cities include 80.5 percent of the 1998 population of the region.

Economic Activity in Region C

Region C includes most of the Dallas and Fort Worth-Arlington metropolitan statistical areas, which have experienced strong economic growth in the 1990s. Payroll and employment in

Region C are concentrated in the central urban counties of Dallas and Tarrant. The largest business sectors in Region C in terms of payroll are services and manufacturing.

Water-Related Physical Features in Region C

Most of Region C is in the upper portion of the Trinity Basin, with smaller parts in the Red, Brazos, Sulphur, and Sabine Basins. Figure ES-1 shows the major streams in Region C. Precipitation increases west to east in Region C from slightly more than 30 inches per year in western Jack County to more than 44 inches per year in the northeast corner of Fannin County. The average annual runoff in the region also increases from the west to the east. Evaporation is higher in the western part of Region C. The patterns of rainfall, runoff, and evaporation result in more abundant water supplies in the eastern part of Region C than in the west.

There are 34 reservoirs in Region C with conservation storage over 5,000 acre-feet, all of which are shown in Figure ES-1. These reservoirs and others outside of Region C provide most of the region's water supply. Reservoirs are necessary to provide a reliable surface water supply in this part of the state because of the wide variations in natural streamflow. Reservoir storage serves to capture high flows when they are available and save them for use during times of normal or low flow.

The Trinity aquifer supplies most of the groundwater used in Region C. Other aquifers in the region include the Carrizo-Wilcox, the Woodbine, the Nacatoch, and the Queen City.

Current Water Uses and Demand Centers in Region C

Water use in Region C has increased significantly since 1980, primarily in response to increasing population and municipal demand. The historical record shows years of high use, including 1988, 1996, and 1998. High use years are associated with dry weather, which causes higher municipal demands due to increased outdoor water use. It is interesting to note that Region C, with 24.4 percent of Texas' population, had only 7.2 percent of the state's water use in 1997. This is primarily because Region C has very limited water use for irrigation. About 85 percent of the current water use in Region C is for municipal supply, followed by manufacturing use as the second largest category, then by steam electric power generation. Irrigation, mining, and livestock are relatively minor uses of water in Region C.

Current Sources of Water Supply

Total water use in Region C has increased significantly since 1980, but groundwater use has actually decreased in that period. Since 1990, over 90 percent of the water use in Region C has been supplied by surface water, but groundwater is still an important source of supply, especially in some rural areas. Most of the surface water supply in Region C comes from major reservoirs. Another significant water source for Region C is surface water imported from other regions. The Trinity aquifer is by far the largest source of groundwater in Region C, with the Woodbine, Carrizo-Wilcox and other minor aquifers also used. Current use of groundwater exceeds the reliable long-term supply available in many parts of Region C.

Over half of the water used for municipal supply in Region C is discharged as treated effluent from wastewater treatment plants, making wastewater reclamation and reuse a potentially significant source of additional water supply for the region. At present, only a fraction of the region's treated wastewater is actually reclaimed and reused in the region. Many of the region's water suppliers are considering reuse projects, and it is clear that reuse of treated wastewater will be a significant part of future water planning for Region C.

Water Providers in Region C

Water providers in Region C include regional wholesale suppliers (river authorities and water districts) and retail suppliers (cities and towns, water supply corporations, special utility districts, and private water companies). Cities and towns provide most of the retail water service in Region C. Table ES-1 shows some basic data on sales to others by the five major water providers in Region C, which are the only water suppliers in the region with over 20,000 acre-feet per year in wholesale sales.

Agricultural and Natural Resources in Region C

Agricultural and natural resources in Region C are dependent on the region's water resources. Wetlands often rely on water from streams and reservoirs. Wetlands provide food and habitat for fish and wildlife, water quality improvement, flood protection, shoreline erosion control, and groundwater exchange, in addition to opportunities for human recreation, education, and research. Threatened or endangered species can depend on habitat associated with rivers and streams. The Texas Parks and Wildlife Department has identified several Region C stream segments as having significant natural resources based on their high water quality, exceptional

Table ES-1
Major Water Providers in Region C

Major Water Provider	1997 Wholesale Sales (Acre-Feet)			Number of Wholesale Customers		
	Raw	Treated	Total	Cities	Water Suppliers	Others
Tarrant Regional WD	258,448	0	258,448	12	11	16
North Texas MWD	0	168,247	168,247	23	14	1
Dallas	13,324	148,281	161,605	17	4	2
Fort Worth	427	39,521	39,948	28	2	4
Trinity River Authority	15,220	22,217	37,437	8	2	1

aquatic life, high aesthetic value, fisheries, spawning areas, unique state holdings, endangered or threatened species, priority bottomland hardwood habitat, wetlands, springs, and pristine areas.

Region C includes almost 6,000,000 acres in farms and over 2,500,000 acres of cropland. Less than 1 percent of the cropland in Region C is irrigated, but there are localized areas of irrigation. The market value of agriculture products is significant in all Region C counties, with a total value for 1997 of almost $500,000,000. For the region as a whole, the market value of livestock is almost twice that of crops. There are large areas classified as prime farmland by the Natural Resources Conservation Service in Cooke, Denton, Collin, Tarrant, Dallas, and Ellis Counties.

Oil and natural gas fields are significant natural resources in portions of Region C. There is a high density of oil wells in Jack, Wise, Cooke, and Grayson Counties, with a lesser density in Denton, Parker, Navarro, Henderson, and Kaufman Counties. There is a high density of producing natural gas wells in Freestone, Parker, Jack, and Wise Counties, with a lesser density in Navarro, Henderson, Denton, Cooke, and Grayson Counties.

There are some lignite coal resources in Region C. The most significant current lignite production in Region C is in Freestone County to supply TXU Electric's Big Brown Steam Electric Station on Lake Fairfield.

Summary of Threats and Constraints to Water Supply in Region C

The most significant potential threats to existing water supplies in Region C are surface water quality concerns, groundwater drawdown, and groundwater quality. Constraints on the development of new supplies include the availability of sites and unappropriated water for new water supply reservoirs and the challenges imposed by environmental concerns and permitting.

Most of the water suppliers in Region C will have to develop additional supplies before 2050. The major water suppliers have supplies well in excess of current needs, but they will require additional water to meet projected growth. Some smaller water suppliers face a more urgent need for water.

Surface water quality concerns that might affect Region C water supplies include the following:

- Detection of atrazine at low levels in some water supply reservoirs
- Nutrient levels in water supply reservoirs
- Total organic carbon (TOC) levels in source waters
- Elevated levels of dissolved solids in some reservoirs and stream reaches
- Trace levels of arsenic in some waters.

In general, these concerns can be addressed by standard water treatment methods and do not pose a significant threat to water supplies in the region.

Drawdown of aquifers poses a threat to small water suppliers and to household water use in rural areas. As water levels decline, the cost of pumping water grows and water quality generally suffers. Water level declines have been reported in localized areas in each of the aquifers in Region C. In particular, the region-wide pumping from the Trinity and Nacatoch aquifers is estimated to be greater than the recharge. Concern about groundwater drawdown is likely to prevent any substantial increase in groundwater use in Region C and may require conversion to surface water in some areas.

Groundwater quality in Region C aquifers is generally acceptable for most municipal and industrial purposes. However, natural concentrations of arsenic, fluoride, nitrate, chloride, iron, manganese, sulfate, and total dissolved solids in excess of either primary or secondary drinking water standards occur in some areas.

Water-Related Threats to Agricultural and Natural Resources in Region C

Water-related threats to agricultural and natural resources in Region C include changes to natural flow conditions, water quality concerns, and inundation of land due to reservoir development. In general, there are few significant water-related threats to agricultural resources in Region C due to the limited use of water for agricultural purposes. Water-related threats to natural resources are more significant.

ES-2 Population and Water Demand Projections

Methodology for Projections of Population and Water Demand

The Texas Water Development Board's Senate Bill One planning guidelines require the use of TWDB's population and water demand projections from the 1997 *Texas Water Plan* unless revisions are approved by TWDB based on changed conditions or new information. The TWDB projects water demand separately for municipal, manufacturing, steam electric power generation, mining, irrigation, and livestock uses. Municipal demand is developed for each community with a population of over 500 and includes commercial, institutional, and residential water uses but does not include manufacturing use. A "county other" group for each county covers municipal use in rural areas and communities with less than 500 people. All demand categories except municipal are developed on a countywide basis.

To develop the population and water demand projections for Region C, the Region C water planning group went through the following steps:

- Assembled historical data and previous TWDB projections and developed tables and figures that could be reviewed by counties, cities, water suppliers, industries, and other interested entities.
- Sent the TWDB data and a questionnaire to all Region C counties, cities with a population over 1,000, regional water suppliers, retail water suppliers (supplying over 0.2 mgd), and large industries.
- Gathered population data from the State Data Center and the North Central Texas Council of Governments.
- Reviewed the previous TWDB population projections for each county and recommended changes to projections where current populations deviate significantly from the previous projections.
- Adjusted city population projections based on historical trends and knowledge of expected future development using the county population projections as controls.

- Compared TWDB's projections of per capita municipal water demand from the 1997 Texas Water Planwith actual per capita water demand in the 1990s from TWDB data.
- Developed data on 1998 per capita water use for Region C water providers.
- Adjusted previous TWDB projections in per capita water demand to reflect actual use in the 1990s, trends in water use, water conservation, reasonable minimum demands for water, knowledge of future development that might affect per capita needs, and other factors.
- Developed tables and graphs for each city in the region to assist in the review of the recommended projections.
- Revised projections of water demand for steam electric power generation based on input from TXU Electric.
- Checked previous TWDB projections for manufacturing, mining, irrigation, and livestock use and left them unchanged after comparison with recent historical data.
- Formed a Technical Review Committee consisting of experienced water resource planners to review the recommendations of the consultants on population and water use and report to the planning group.
- Held a public meeting to receive input on the water demand projections.
- Made a number of additional changes as a result of TWDB review and input.
- Submitted the revised projections to the TWDB board, which approved the revised projections in December of 1999.

Population Projections

Table ES-2 presents the adopted population projections by county for Region C. Figure ES-2 shows the historical and projected population for the region. All counties are projected to increase in population between now and 2050, and the projected 2050 population for Region C is 9,481,157. Once the county population projections were completed, city population projections were adjusted based on historical trends and knowledge of expected future development. The county populations served as controls in this process, and all population not assigned to a particular city was included as county other.

Water Demand Projections

Table ES-3 shows the adopted water demand projections for Region C by county. Table ES-4 and Figure ES-3 show the projected water demand for the region by type of use. The projected 2050 water demand for Region C is 2,536,902 acre-feet per year, which is more than double the 1996 use in the region. Most of the change from previous TWDB projections is in municipal

Table ES-2
Adopted County Population Projections for Region C

County	Historical 1996	2000	2010	2020	2030	2040	2050
Collin	373,095	443,000	635,455	923,309	1,150,001	1,351,000	1,501,395
Cooke	33,196	34,209	36,967	38,816	40,000	41,250	42,500
Dallas	1,999,926	2,104,858	2,326,828	2,556,793	2,784,704	3,045,931	3,259,995
Denton	349,566	423,327	591,350	802,461	1,033,731	1,200,000	1,349,999
Ellis	94,097	103,070	123,854	144,054	162,273	175,403	185,364
Fannin	27,435	30,000	33,601	37,000	39,501	40,499	41,001
Freestone	17,757	18,167	18,800	19,300	19,600	20,000	20,300
Grayson	100,611	106,119	110,226	114,702	117,865	120,981	122,000
Henderson (Partial)	45,761	46,562	51,261	55,515	57,704	58,690	60,476
Jack	7,435	7,819	8,139	8,591	8,934	9,175	9,353
Kaufman	61,646	68,368	87,106	108,291	129,359	147,108	162,417
Navarro	42,875	45,191	49,207	53,031	57,015	59,200	61,000
Parker	73,897	80,436	99,095	118,287	139,094	156,023	171,216
Rockwall	34,287	41,175	61,392	88,136	122,000	160,588	203,529
Tarrant	1,306,457	1,415,759	1,594,218	1,798,894	1,915,375	2,111,193	2,205,610
Wise	41,019	44,800	54,674	64,363	73,641	81,000	85,002
Region C Total	4,609,060	5,012,860	5,882,173	6,931,543	7,850,797	8,778,041	9,481,157

demands, with a smaller change in steam electric power demands. No changes were made to TWDB's previous projections for manufacturing, mining, irrigation, or livestock demands.

One of the most important reasons for the increase in projected per capita demand for Region C is the high water use recorded for many Region C water suppliers in 1996 and 1998. This high water use occurred despite significant water conservation efforts in the region and despite the impact of low flow plumbing fixtures. There are several factors that tend to increase per capita municipal water use in the region:

- In many communities, new development is large houses with large lots, sprinkler systems, swimming pools, and other water-using amenities.
- The number of people per household is decreasing in most of Region C. This tends to cause an increase in per capita use because household uses are spread over fewer people.
- Many Region C communities are experiencing rapid commercial development, which increases per capita water use.

Figure ES-2
Historical and Projected Population for Region C

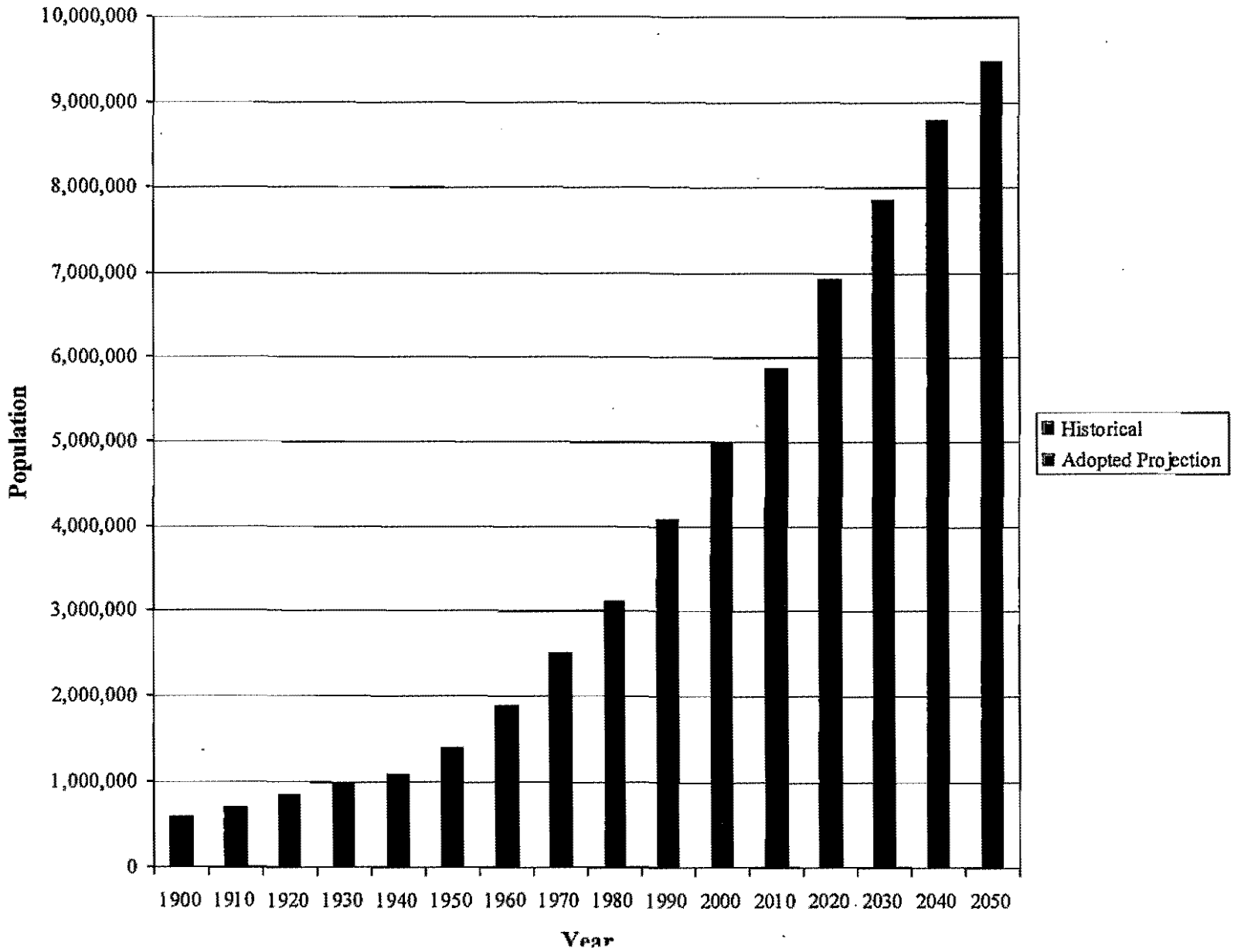


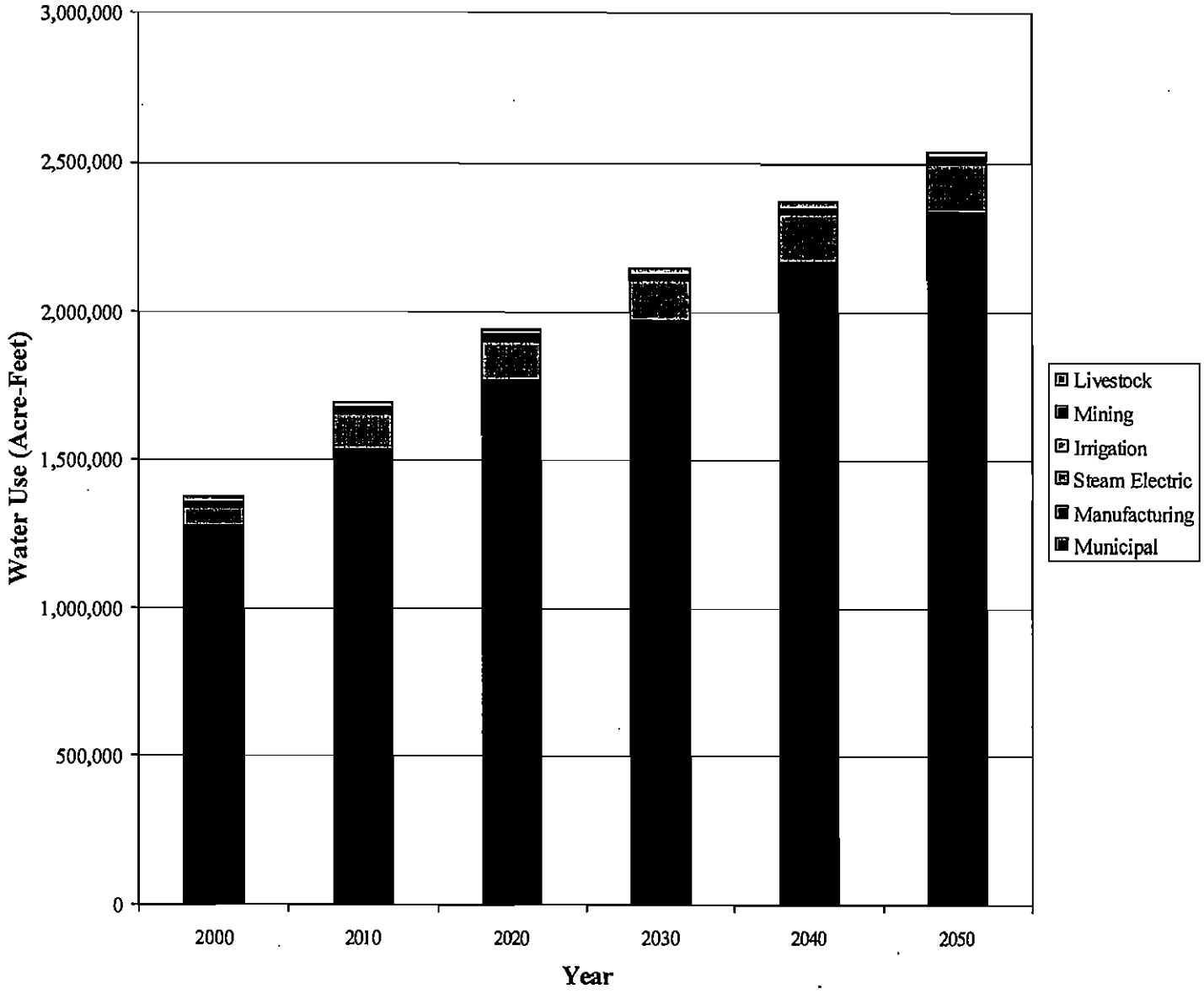
Table ES-3
Adopted County Water Demand Projections for Region C
- Values in Acre-Feet per Year -

County	Historical 1996	Projected Water Demand					
		2000	2010	2020	2030	2040	2050
Collin	89,230	129,015	199,964	262,520	312,307	363,821	401,007
Cooke	8,429	9,054	9,133	9,238	9,304	9,581	9,879
Dallas	505,423	594,937	683,097	751,767	810,356	883,850	940,289
Denton	65,075	90,209	135,740	185,725	230,286	257,410	281,989
Ellis	19,721	24,372	43,204	46,030	49,309	53,991	55,575
Fannin	17,515	12,100	13,330	14,500	15,597	16,572	17,515
Freestone	20,608	20,074	31,058	33,000	33,036	37,260	37,290
Grayson	29,152	29,060	29,760	30,242	31,347	32,508	33,688
Henderson (Partial)	10,785	12,697	13,169	13,478	13,697	13,737	13,908
Jack	3,337	2,644	2,589	2,574	2,591	2,615	2,652
Kaufman	10,653	21,219	24,401	27,392	32,361	34,832	42,017
Navarro	10,558	10,301	10,845	11,210	11,850	12,303	12,735
Parker	12,372	14,120	24,528	28,455	37,697	42,853	45,725
Rockwall	6,566	9,160	19,805	26,027	33,061	41,320	50,249
Tarrant	291,406	379,205	423,578	468,728	490,960	527,716	553,302
Wise	25,688	18,206	31,460	34,007	36,067	37,819	39,082
Region C Total	1,126,518	1,376,373	1,695,661	1,944,893	2,149,826	2,368,188	2,536,902

Table ES-4
Adopted Water Demand Projections for Region C by Type of Use
- Values in Acre-Feet per Year -

Use	Historical 1996	Projected Water Demand					
		2000	2010	2020	2030	2040	2050
Municipal	946,454	1,162,093	1,401,197	1,625,412	1,808,337	1,988,513	2,125,330
Manufacturing	71,366	117,577	135,114	148,798	162,714	183,188	207,637
Steam Electric Power	52,103	59,800	122,300	132,700	139,700	156,192	162,192
Mining	22,576	13,046	13,231	14,190	15,294	16,515	17,950
Irrigation	9,689	5,382	5,344	5,318	5,306	5,305	5,318
Livestock	24,330	18,475	18,475	18,475	18,475	18,475	18,475
Total	1,126,518	1,376,373	1,695,661	1,944,893	2,149,826	2,368,188	2,536,902

Figure ES-3
Adopted Projections
for Water Use by Category in Region C



ES-3 Analysis of Water Supply Currently Available to Region C

Total water use in Region C in 1996 was over 1,100,000 acre-feet. About 74 percent of the region's 1996 water use came from in-region reservoirs. The projected total reliable water supply available to Region C in 2050 from current sources will be about 2,023,000 acre-feet per year. (This figure does not consider supply limitations due to the capacities of current raw water transmission facilities and wells.) Figure ES-4 shows the projected total water availability for Region C. The sources of supply for Region C in 2050 include:

- 1,138,000 acre-feet per year (56%) from in-region reservoirs
- 181,000 acre-feet per year (9%) from groundwater
- 70,000 acre-feet per year (3%) from local supplies
- 82,000 acre-feet per year (4%) from reuse
- 552,000 acre-feet per year (28%) from imports from other regions

2,023,000 ac-ft

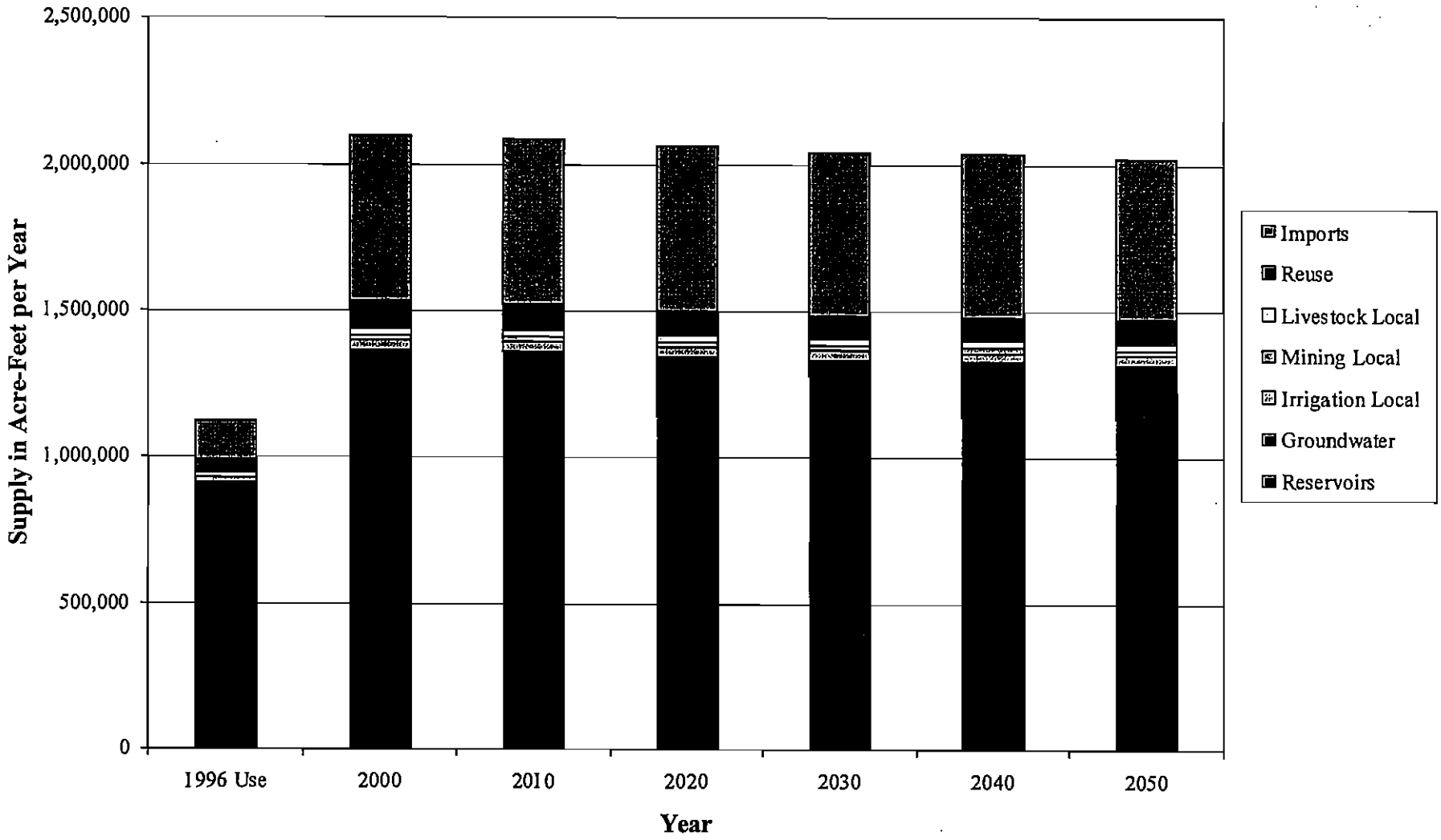
The projected supply available to Region C from existing sources in 2050 is significantly less than the projected 2050 water use. (2,536,902 ac-ft)

If the supply limitations due to the capacities of current raw water transmission facilities and wells are considered, the available supply for Region C is reduced significantly. Most water user groups will have to make improvements to water transmission facilities or wells to provide for their projected needs. Several major Region C water supplies will require additional raw water transmission facilities before they can be utilized fully.

Current groundwater use in parts of Region C exceeds the projected long-term water supply availability. Supplies from other sources will be needed in these areas so that groundwater use can be reduced. Counties and aquifers where current use exceeds long-term supplies include the following:

- Trinity aquifer in Cooke County
- Trinity and Woodbine aquifers in Denton County
- Woodbine aquifer in Ellis County
- Trinity and Woodbine aquifers in Grayson County
- Nacatoch aquifer in Kaufman County
- Trinity aquifer in Parker County
- Trinity aquifer in Tarrant County.

Figure ES-4
Overall Water Supply Availability in Region C by Source



Some of the total supply shown as available to Region C will probably not be utilized fully during the period covered by this plan. This includes over 90,000 acre-feet per year of groundwater shown to be available in the Carrizo-Wilcox aquifer in Freestone County.

The five major water providers in Region C (City of Dallas, Tarrant Regional Water District, North Texas Municipal Water District, City of Fort Worth, and Trinity River Authority) provided over 903,000 acre-feet of water in 1996 (80% of the total provided in the region). They have 74% of the 2050 water supply currently available to the region.

The recent dry summers of 1996, 1998, 1999, and 2000 have caused very high water use for many Region C water suppliers. These droughts have put stress on some of the region's major reservoirs, which are designed for a 5 to 7 year drought like that of the 1950's. The high demands also exposed supply limitations for many smaller suppliers (especially those dependent on groundwater) and exposed treatment and distribution limitations for other suppliers.

ES-4 Comparison of Current Water Supply and Projected Water Demand

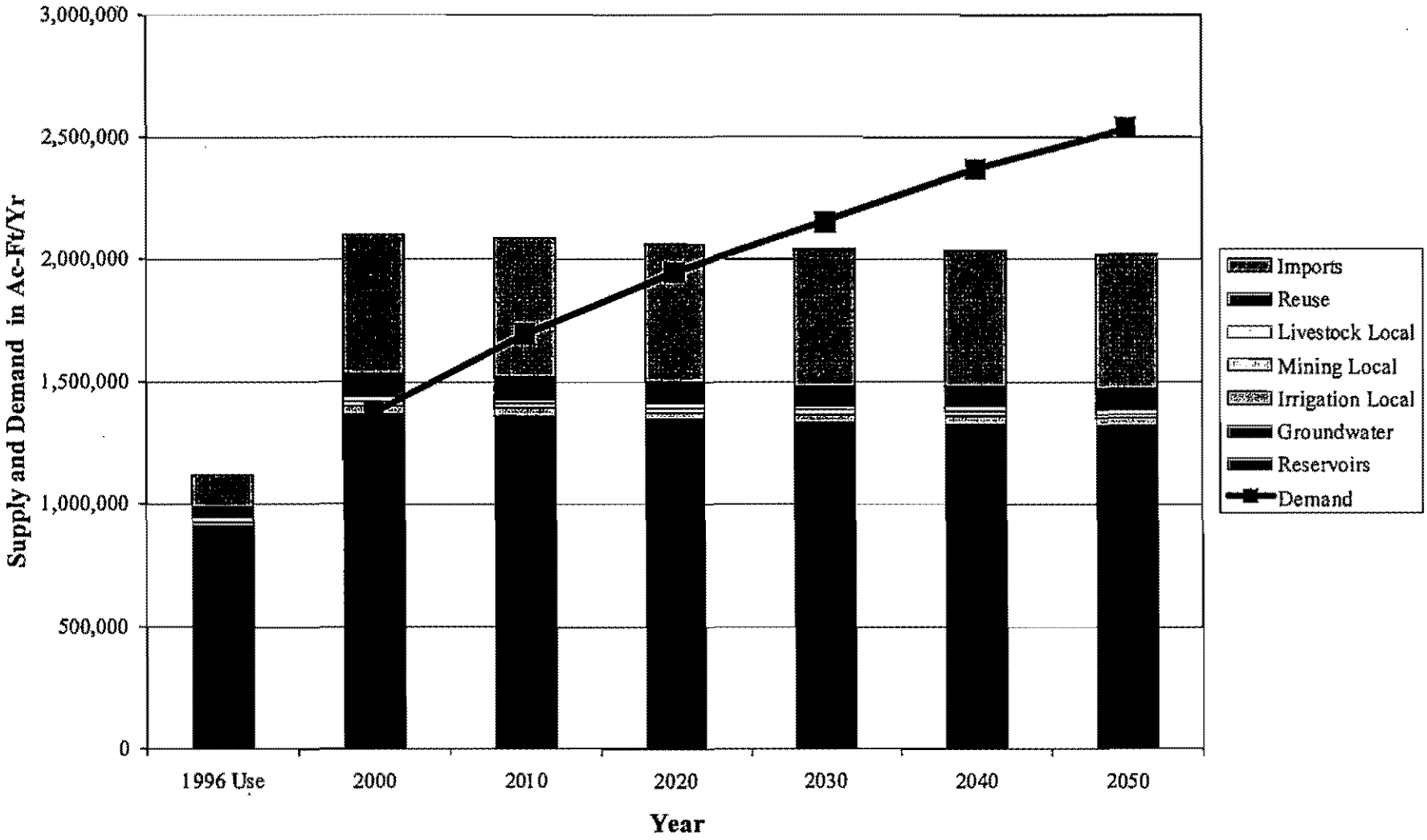
Comparison of Supply and Demand

Figure ES-5 shows the comparison of total supply with demand for Region C, including supplies that require additional water transmission facilities before they are available to the region. By 2030, the projected demand for Region C exceeds the total supply, even if all of the supplies available to the region are used in full.

Considering only currently connected supplies (those with transmission systems already in place), the following facts emerge for Region C:

- In 2000, three Region C counties (Cooke, Dallas, and Parker) show a net need for immediate additional supplies when all demands and all connected supplies are totaled.
- Significant additional supplies need to be connected before 2010 in Region C. (Several major projects to connect existing supplies are already underway.)
- By 2050, 11 out of the 16 Region C counties show a need for the connection or development of additional supplies to meet projected demands.
- By 2050, 193 out of 281 Region C water user groups show a need for the connection or development of additional supplies to meet projected demands.
- Current plans call for the connection of significant additional supplies for Region C over the next few years, including the following:
    - Irving and Upper Trinity Regional Water District's Lake Chapman pipeline is scheduled for completion by 2003 and will connect 65,700 acre-feet per year.

Figure ES-5
Comparison of Total Connected and Unconnected Supply with Demand for Region C



- Dallas Water Utilities Lake Fork pipeline is scheduled for completion by 2004 and will connect 120,000 acre-feet per year.
- Tarrant Regional Water District is planning additional capacity for its pipeline to Richland-Chambers Lake that will connect an additional 110,000 acre-feet per year by 2005.

- Many Region C water suppliers depend on the region's major water providers (Dallas Water Utilities, Tarrant Regional Water District, North Texas Municipal Water District, Fort Worth, and Trinity River Authority) for all or part of their supplies. Each of those major water providers will need additional supplies by 2050.

Socio-Economic Impacts of Not Meeting Projected Water Needs

If no additional water supplies are developed, Region C will face substantial shortages in water supply over the next 50 years. The Texas Water Development Board provided technical assistance to regional water planning groups in the development of information on the socio-economic impacts of failing to meet projected water needs. TWDB's findings for Region C can be summarized as follows:

- The currently connected supplies in Region C would meet only 52.5 percent of the projected 2050 demand.
- Without any additional supplies, the region's projected 2050 population would be limited to 6,078,289, instead of 9,481,157, a reduction of 35.9 percent.
- Without any additional supplies, the region's projected 2050 employment would be limited to 2,605,111, instead of 4,425,184, a reduction of 41.1 percent.
- Without any additional supplies, the region's projected 2050 income would be limited to $109,505,000,000, instead of $171,199,000,000, a reduction of 36.3 percent.

ES-5 Evaluation and Selection of Water Management Strategies

The regional water planning group went through several steps in the evaluation and selection of water management strategies for Region C:

- Review of previous plans for water supply in Region C, including locally developed plans and the most recent state water plan
- Development of goals, issues, and concerns for the planning process
- General consideration of the types of water management strategies required by Senate Bill One regional planning guidelines
- Development of evaluation criteria for management strategies
- Evaluation of individual strategies

- Development of cost information for individual strategies
- Selection of strategies.

The development of a water plan covering fifty years for a region as large and populous as Region C is full of uncertainties. The implementation of the resulting plan must be flexible to allow for slower or faster than expected growth, unexpected obstacles in development of water management strategies, and unexpected opportunities. Specific points to remember include the following:

- The order in which steps are taken and the exact amount of supply available from each source are subject to variation.
- Water suppliers may need to turn to other alternatives if the recommended alternatives prove to be impractical.
- Changes in one element of the plan can affect other elements.
- Given the uncertainty in developing future supplies, flexibility in plan implementation is essential to success.
- The details of the plan will probably change as implementation proceeds.

Goals of the Planning Process

The goals for the Region C water planning effort are as follows:

- Provide sufficient water to meet realistic estimates of demand in a timely manner.
- Develop an effective continuing planning process to maintain reliable estimates of supply, maintain realistic estimates of demand, and identify appropriate programs and facilities to meet the water supply needs of Region C.
- Provide for the water supply needs of Region C in a manner that supports the continued economic strength of both Region C and the state as a whole.
- Develop a water supply plan that recognizes the economic, environmental, and cultural importance of natural resources and provides for the maintenance of those resources.
- Address the water supply needs of small cities and rural areas as well as large metropolitan areas.
- Provide for sustainable groundwater use in areas where groundwater is an essential component of the water supply plan.

Types of Water Management Strategies Considered

As required by Senate Bill One guidelines, the Region C Water Planning Group considered specific types of water management strategies as means of developing additional water supplies:

- Water conservation and drought response planning
- Reuse of wastewater
- Expanded use or acquisition of existing supplies
- Reallocation of reservoir storage to new uses
- Voluntary redistribution of water resources
- Voluntary subordination of water rights
- Enhancement of yields of existing sources
- Control of naturally occurring chlorides
- Interbasin transfers
- New supply development
- Water management strategies in the current state water plan
- Brush control, precipitation enhancement, and desalination
- Water right cancellation
- Aquifer storage and recovery
- Other measures.

Methodology for Evaluating Water Management Strategies

The Region C Water Planning Group considered the following factors in the evaluation of potential water management strategies:

- Quantity of water made available
- Reliability of supply
- Unit cost of delivered and treated water
- Difficulty of addressing environmental issues
    - Instream flows
    - Bay and estuary flows
    - Wildlife habitat
    - Cultural resources
    - Wetlands
    - Water quality
    - Other
- Impacts on water resources and other management strategies

- Impacts on agricultural and natural resources
- Consistency with plans of Region C water suppliers
- Consistency with other regions.

Development of cost estimates for water management strategies followed guidelines provided by the Texas Water Development Board. The costs include a 30 percent allowance for engineering and contingencies for pipelines and a 35 percent engineering and contingency allowance for other projects. Costs are for development of new supplies and do not include costs for:

- Facilities already in place
- Replacement or upgrading of aging facilities
- Improvements to meet changing regulatory requirements
- Improvements for water distribution to retail customers.

Recommended Water Management Strategies for Major Water Providers

A large part of the water supplied in Region C is provided by the five major water providers in the region: Dallas Water Utilities, Tarrant Regional Water District, North Texas Municipal Water District, Fort Worth, and Trinity River Authority. These five entities will continue to provide the majority of the water supply for Region C through 2050, and they will also develop most of the new supply developed in that time period. Recommended water management strategies to meet the needs of these major water providers include the following:

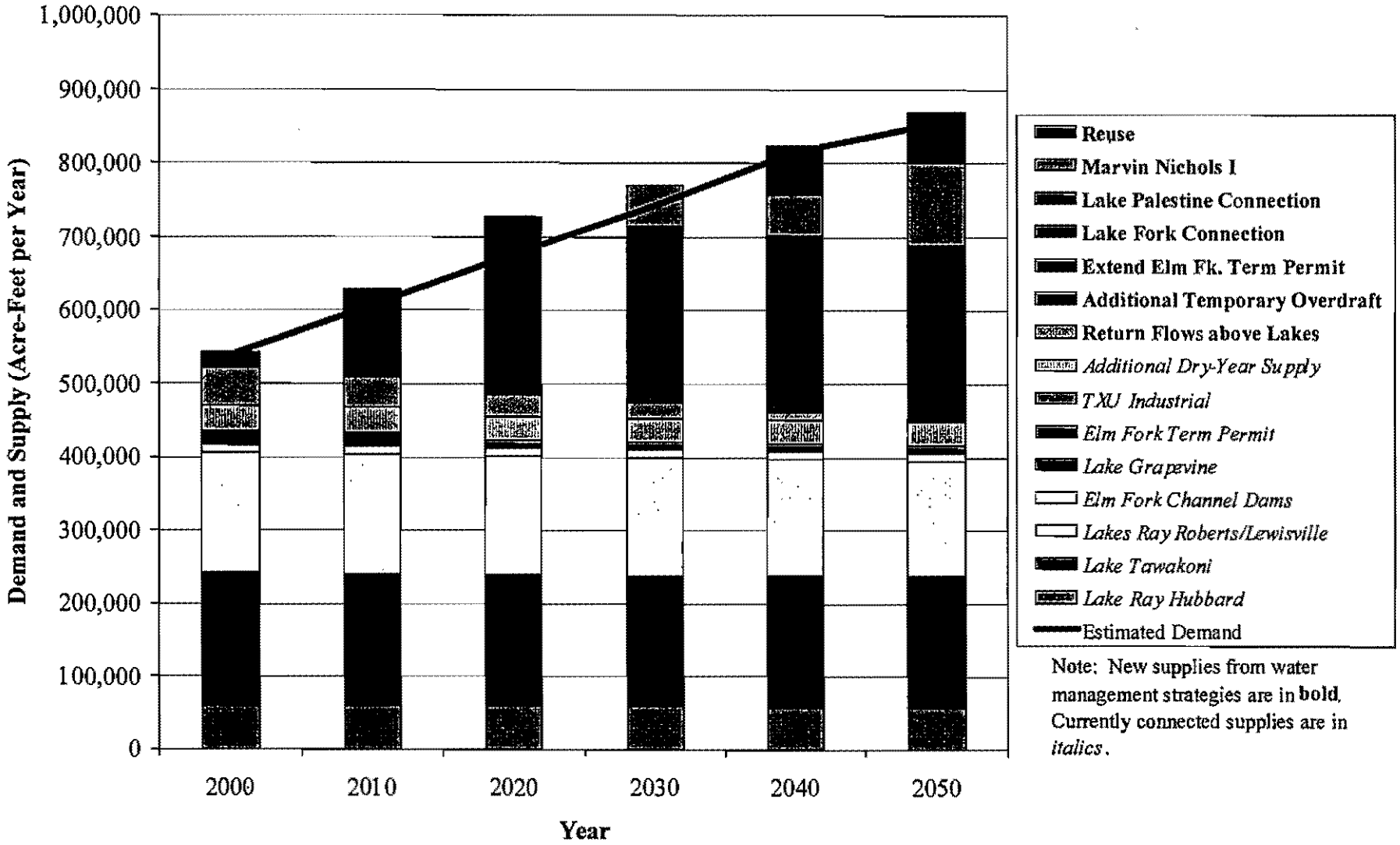
- **Marvin Nichols I Lake**
    - Major new reservoir in the Sulphur River Basin in the North East Texas Region (Region D)
    - Cooperative effort of Region C and Region D water suppliers
    - Total yield of 619,100 acre-feet per year
        - 123,800 acre-feet per year to Region D
        - 112,000 acre-feet per year to Dallas Water Utilities
        - 156,000 acre-feet per year to Tarrant Regional Water District
        - 163,300 acre-feet per year to North Texas Municipal Water District
        - 25,000 acre-feet per year to Irving
        - 39,000 acre-feet per year to meet other Region C needs.

- Estimated capital cost for Region C (including transmission to Region C but not including treatment) of $1,625,190,000.

- **Dallas Water Utilities**
  - Figure ES-6 shows the overall comparison of supply and demand for Dallas Water Utilities with recommended water management strategies.
  - Continue to use return flows above its lakes (50,000 acre-feet per year in 2000, decreasing to 0 by 2050).
  - Temporarily overdraft its reservoirs in 2000 (22,000 acre-feet per year in 2000).
  - Extend the Elm Fork permit for wet weather diversions (10,000 acre-feet per year).
  - Connect Lake Fork Reservoir to its system (120,000 acre-feet per year).
  - Connect Lake Palestine to its system (109,600 acre-feet per year).
  - Participate in the Marvin Nichols I project (112,000 acre-feet per year).
  - Develop a reuse project (68,300 acre-feet per year).
  - Renew contracts with existing customers as they expire.
  - Develop additional water treatment capacity as needed.
  - Other alternatives for Dallas Water Utilities include additional reuse and development of yield from return flows in the watersheds of water supply reservoirs.

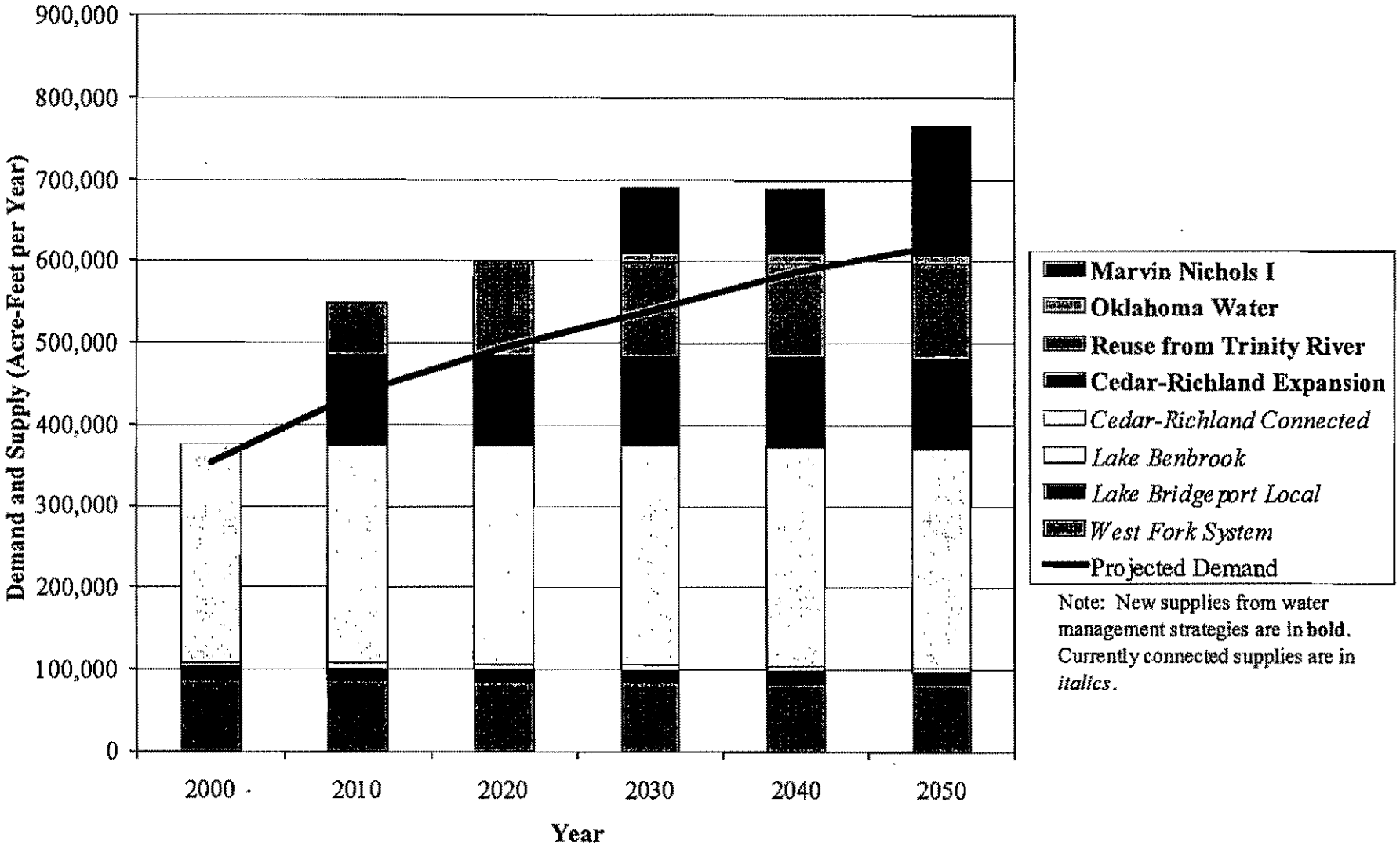
- **Tarrant Regional Water District**
  - Figure ES-7 shows the overall comparison of supply and demand for Tarrant Regional Water District with recommended water management strategies.
  - Add pumps and a booster pump station to develop additional capacity in the pipeline from Richland-Chambers Lake to Tarrant County (110,000 acre-feet per year).
  - Develop the West Fork Connection to allow water to be transferred among the parts of the water supply system.
  - Develop the proposed reuse project to pump water from the Trinity River into Cedar Creek Lake and Richland-Chambers Lake to supplement yields (115,500 acre-feet per year).
  - Develop a water supply from existing water sources in Oklahoma (12,000 acre-feet per year)
  - Develop a third pipeline from Cedar Creek Lake and Richland-Chambers Lake to Tarrant County.
  - Participate in the Marvin Nichols I project (156,000 acre-feet per year).
  - Other alternatives for Tarrant Regional Water District include the development of Lake Tehuacana and obtaining water from Lake Texoma.

Figure ES-6
Dallas Water Utilities Supply and Demand



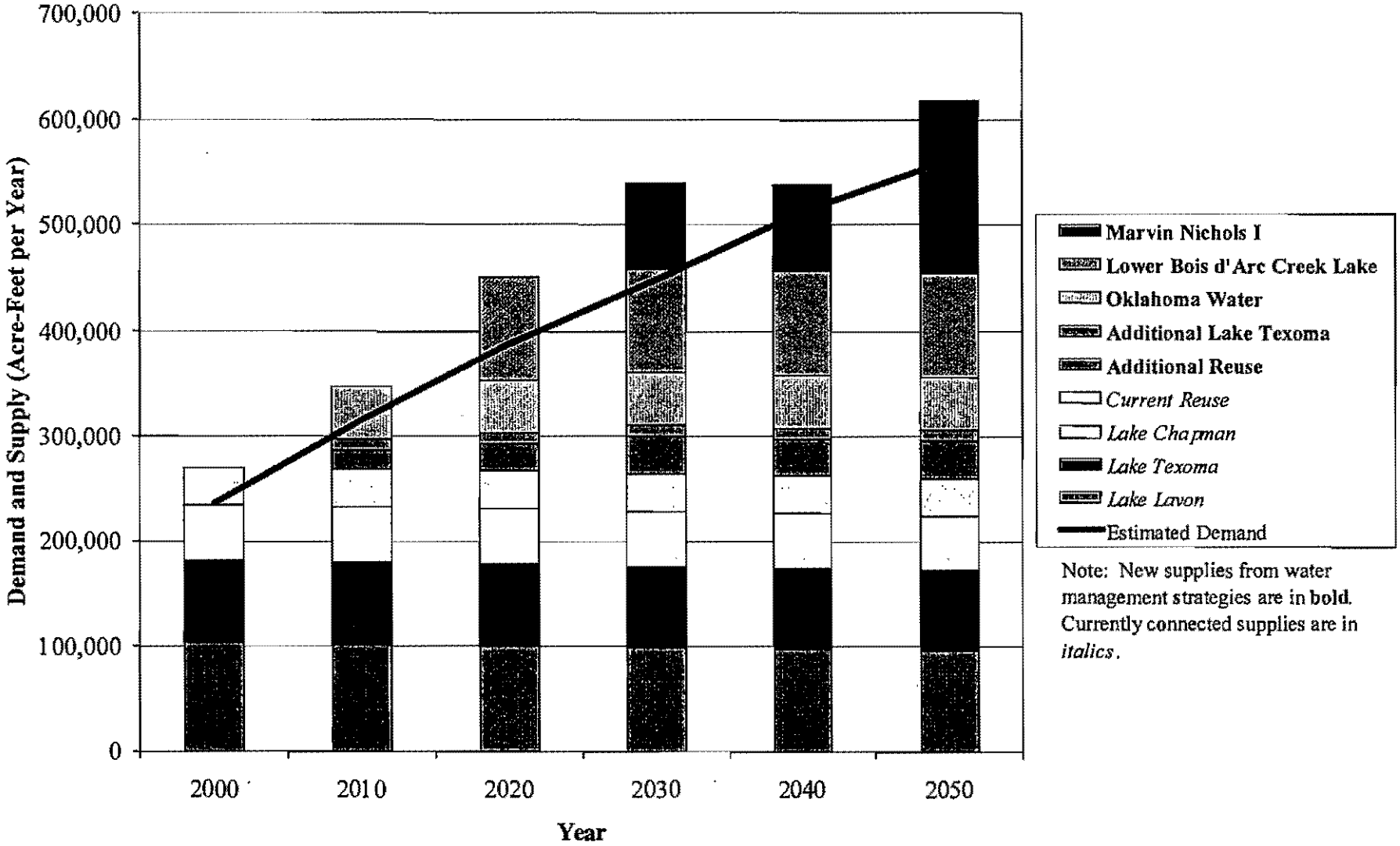
Note: New supplies from water management strategies are in **bold**. Currently connected supplies are in *italics*.

Figure ES-7
Tarrant Regional Water District Supply and Demand



- **North Texas Municipal Water District**
  - Figure ES-8 shows the overall comparison of supply and demand for North Texas Municipal Water District with recommended water management strategies.
  - Develop additional water supplies in Lake Lavon from reuse (35,900 acre-feet per year).
  - Develop additional water supplies from Lake Texoma (10,000 acre-feet per year).
  - Develop a water supply from existing water sources in Oklahoma (50,000 acre-feet per year).
  - Develop Lower Bois d'Arc Creek Reservoir on Bois d'Arc Creek (98,000 acre-feet per year).
  - Participate in the Marvin Nichols I project (163,300 acre-feet per year).
  - Develop additional water treatment capacity and treated water transmission system improvements as needed.
  - Other alternatives for North Texas Municipal Water District include obtaining a substantial additional supply from Lake Texoma and extending the existing Lake Texoma pipeline to minimize channel losses.
- **City of Fort Worth**
  - Continue to obtain essentially all of its raw water from Tarrant Regional Water District.
  - Renew contracts with its existing customers as they expire.
  - Develop additional water treatment capacity as needed.
- **Trinity River Authority**
  - Continue to obtain raw water from Tarrant Regional Water District for its Tarrant County water supply project.
  - Expand Tarrant County water supply project raw water transmission, water treatment, and treated water transmission facilities as needed to meet growing demands.
  - Obtain raw water from Tarrant Regional Water District to implement the Ellis County water supply project.
  - Develop raw and treated water transmission lines to implement the Ellis County water supply project.
  - Develop reuse projects:
    - Additional golf course and landscape irrigation in the Las Colinas area.
    - Golf course and landscape irrigation in Denton and Tarrant Counties.
    - Steam electric power supply in Dallas and Ellis Counties
    - Reuse for municipal supply in Dallas County through Joe Pool Lake and Lake Grapevine.

Figure ES-8
North Texas Municipal Water District Supply and Demand



Note: New supplies from water management strategies are in **bold**. Currently connected supplies are in *italics*.

Table ES-5
New Supply from Water Management Strategies and
Estimated Capital Costs for Region C Major Water Providers

Major Water Provider	New Supply, 2000-2050 (Acre-Feet per Year)	Estimated Capital Cost
Dallas Water Utilities	419,900	$1,492,649,000
Tarrant Regional Water District	393,500	$1,167,652,000
North Texas Municipal Water District	357,200	$1,435,447,000
Fort Worth	- [(a)]	$221,475,000
Trinity River Authority	81,500[(a)]	$166,081,000
Total	1,252,100	$4,483,304,000

Note: (a) New supplies for Fort Worth and Trinity River Authority are included in the Tarrant Regional Water District total.

Table ES-5 shows the total new supply from 2000 through 2050 and the estimated capital cost to develop the supply for the five major water providers in Region C.

Recommended Water Management Strategies by County

The recommended strategies for each county in Region C are summarized below:

- **Collin County**
  - Most Collin County water user groups will continue to obtain treated water from North Texas Municipal Water District.
  - Blue Ridge will develop new wells and continue to rely on the Woodbine aquifer.
  - Celina will obtain treated water from the Upper Trinity Regional Water District.
  - Dallas Water Utilities will supply the part of Dallas in Collin County.
  - Prosper will purchase treated water from North Texas Municipal Water District and Upper Trinity Regional Water District.
  - Water suppliers will temporarily overdraft groundwater while developing surface supplies.
  - Water for steam electric power will be provided by a direct reuse project.
- **Cooke County**
  - Current groundwater use in Cooke County exceeds TWDB's estimated long-term reliable supply.
  - Gainesville is currently developing transmission and treatment facilities to connect to its existing Moss Lake surface water supply.

- Muenster is planning to develop a 500 acre-foot per year supply from the proposed Muenster Lake in the next few years.
- The Cooke County water supply system will be developed using raw water from Gainesville's Moss Lake to provide surface water supplies for water users in the county.
- Water users will temporarily overdraft groundwater while developing surface supplies.
- Water users in Cooke County might consider formation of a groundwater management district.
- The Upper Trinity Regional Water District will supply treated water to Valley View and a portion of Cooke County Other.

- **Dallas County**
  - Most water user groups in Dallas County will continue to obtain treated water from Dallas Water Utilities and North Texas Municipal Water District, renewing contracts as they expire.
  - Irving will complete facilities to bring its water supply from Lake Chapman to Lake Lewisville for treatment by Dallas and use by Irving.
  - Irving will develop a supply from Marvin Nichols I Reservoir. ?
  - Grapevine will implement its authorized direct reuse project.
  - Dallas County Other demands will be met from Dallas Water Utilities, Trinity River Authority reuse projects, and the proposed Marvin Nichols I project.
  - Water for steam electric power generation and mining will come from Dallas Water Utilities and a Trinity River Authority reuse project.
- **Denton County**
  - Current groundwater use in Denton County exceeds TWDB's estimated long-term reliable supply.
  - Upper Trinity Regional Water District will continue to develop its surface water supply system. Most Denton County water suppliers will purchase raw or treated water from UTRWD.
  - Upper Trinity Regional Water District will deliver raw water from Lake Chapman to Lewisville Lake through lines constructed by Irving.
  - Upper Trinity Regional Water District will develop reuse of the water imported from Lake Chapman.
  - Upper Trinity Regional Water District, Denton, and Lewisville will continue to purchase raw water from Dallas Water Utilities.
  - Lewisville will purchase raw water from Lake Chapman from UTRWD.

- Dallas Water Utilities, North Texas Municipal Water District, and Fort Worth will continue to supply treated water to current customers in Denton County, renewing contracts as they expire.
- Water users will temporarily overdraft groundwater while developing surface supplies.
- Water users in Denton County might consider formation of a groundwater management district.
- Trinity River Authority will develop a reuse project for golf course and landscape irrigation.
- Additional mining supplies will be obtained from other local supplies.
- Water for steam electric power will be provided by a direct reuse project.

- **Ellis County**
  - Current groundwater use in Ellis County exceeds TWDB's estimated long-term reliable supply.
  - The Trinity River Authority and water suppliers in Ellis County will develop the Ellis County water supply system using raw water from Tarrant Regional Water District, treatment capacity from Waxahachie, and transmission facilities developed for the project.
  - Dallas Water Utilities will continue to provide treated water to Ellis County water suppliers, renewing contracts as they expire.
  - Ennis, Mansfield, and Midlothian will obtain raw water from Tarrant Regional Water District.
  - Milford will continue to obtain treated water from Files Valley Water Supply Corporation.
  - Water users will temporarily overdraft groundwater while developing surface supplies.
  - Water for steam electric power will be provided from Trinity River Authority and Ennis reuse projects and TRA's Joe Pool Lake and Lake Bardwell.
- **Fannin County**
  - Fannin County water user groups will develop a regional surface water supply system.
  - Until that system is developed, Fannin County water suppliers will continue to rely on groundwater.
- **Freestone County**
  - Fairfield will develop an additional well in the Carrizo-Wilcox aquifer.
  - Wortham will obtain treated water from Mexia.
  - Water for steam electric power will be provided from TRWD's Richland-Chambers Lake.

- **Grayson County**
  - Current groundwater use in Grayson County exceeds TWDB's estimated long-term reliable supply.
  - Development of the Grayson County water supply system is proposed to deliver water to users throughout the county. The system includes a raw water pipeline from Lake Texoma, a treatment and desalination plant, and treated water pipelines.
  - Water users will temporarily overdraft groundwater while developing surface supplies.
  - Water users in Grayson County might consider formation of a groundwater management district.
  - Denison will sell treated water to Pottsboro (using raw water rights obtained by Pottsboro).
- **Henderson County**
  - Most Henderson County water user groups have an adequate supply to meet projected water demands through 2050.
  - Malakoff will develop a surface water supply system using raw water from TRWD's Cedar Creek Lake.
- **Jack County**
  - All Jack County water user groups have an adequate supply to meet projected water demands through 2050.
- **Kaufman County**
  - Current groundwater use in Kaufman County exceeds TWDB's estimate of long-term reliable supply.
  - North Texas Municipal Water District, Terrell, and Dallas Water Utilities will continue to supply their current customers in Kaufman County.
  - Treated wastewater from Garland will be reused for steam electric power demand.
  - Water users will temporarily overdraft groundwater while developing surface supplies.
  - TRWD will supply surface water for mining.
  - Additional irrigation local supplies will be developed for irrigation demands.
- **Navarro County**
  - Corsicana will continue to provide treated water for most of the water suppliers in Navarro County, and Corsicana has an adequate water supply.
  - A new well will be developed in the Carrizo-Wilcox aquifer for mining use.

- **Parker County**
  - Current groundwater use in Parker County exceeds TWDB's estimated long-term reliable supply.
  - Weatherford is constructing a pump station and 36-inch pipeline to bring water from Lake Benbrook to Lake Weatherford. That project is planned for completion in 2002.
  - Weatherford will treat raw water made available by Tarrant Regional Water District and sell treated water to Aledo, Annetta, Hudson Oaks, and Willow Park, all of which currently use the Trinity aquifer for their water supply.
  - TRWD will provide additional water for Azle, Briar, Reno (through Springtown), and Springtown.
  - Additional county other and manufacturing supplies will be developed from TRWD through Weatherford.
  - Water for steam electric power will be provided by reuse of treated wastewater from Weatherford and by water from TRWD's Lake Benbrook.
  - Water for mining will be provided by increased local water supply diversions.
  - Water users will temporarily overdraft groundwater while developing surface supplies.
  - Water users in Parker County might consider formation of a groundwater management district.
- **Rockwall County**
  - Dallas Water Utilities will continue to supply the part of Dallas in Rockwall County.
  - Most water suppliers in Rockwall County will continue to obtain treated water from North Texas Municipal Water District.
  - Water for steam electric power will be provided by reuse.
- **Tarrant County**
  - Current groundwater use in Tarrant County exceeds TWDB estimate of reliable long-term supply.
  - Tarrant Regional Water District will continue to provide raw water for most of the water suppliers in Tarrant County.
  - Fort Worth and the Trinity River Authority's Tarrant County water supply project will continue to supply treated water to many Tarrant County water suppliers, renewing contracts as they expire.
  - Arlington, Benbrook, Fort Worth, Mansfield and the Trinity River Authority Tarrant County water supply project will expand water treatment plants to keep pace with increasing demands.
  - Kennedale and Pantego will obtain treated water from Arlington and Fort Worth.

- Dallas Water Utilities will provide supplies for Grand Prairie and Grapevine, renewing contracts as they expire.
- Grapevine will develop its direct reuse project.
- Water for steam electric power and golf course and landscape irrigation will be provided from reuse.
- Water users will temporarily overdraft groundwater while developing surface supplies.

- **Wise County**
  - Walnut Creek Special Utility District will serve Aurora, Boyd, Newark, and Rhome with treated water, using water purchased from Tarrant Regional Water District.
  - Alvord will add an additional well and continue to use the Trinity aquifer.
  - Briar, Bridgeport, and Decatur will obtain additional supplies from the Tarrant Regional Water District.
  - Upper Trinity Regional Water District will supply a portion of county other needs through Bolivar WSC.
  - Steam electric power needs will be provided by sales from Tarrant Regional Water District.

Table ES-6 summarizes the estimated capital costs of the recommended water management strategies for major water providers and (by county) for others. The estimated capital costs for all recommended water management strategies in the Region C plan total $6,157,941,000.

Livestock Demands

In 13 of the 16 Region C counties, the estimated county-wide water supply for livestock purposes can meet projected demands for the county as a whole. However, these overall county-wide supply and demand figures do not show areas of shortages that exist within the counties under drought conditions. The Region C Water Planning Group recommends several special measures to address localized livestock water shortages

- Overdrafting of aquifers during droughts
- Local brush control projects
- Maintaining existing stock ponds and adding new stock ponds
- Improving and maintaining existing NRCS dams
- Survey on agricultural water use to gather data for future planning.

Table ES-6
Capital Costs for Region C Recommended Water Management Strategies

Major Water Provider/County	Estimated Capital Cost
Major Water Providers	
Dallas Water Utilities	$1,492,649,000
Tarrant Regional Water District	$1,167,652,000
North Texas Municipal Water District	$1,435,447,000
Fort Worth	$221,475,000
Trinity River Authority	$166,081,000
Subtotal for Major Water Providers	**$4,483,304,000**
Others (by County)	
Collin County	$14,371,000
Cooke County	$42,380,000
Dallas County	$553,801,000
Denton County	$581,277,000
Ellis County	$15,232,000
Fannin County	$70,658,000
Freestone County	$14,995,000
Grayson County	$98,785,000
Henderson County	$7,809,000
Jack County	$0
Kaufman County	$29,912,000
Navarro County	$5,670,000
Parker County	$83,017,000
Rockwall County	$4,795,000
Tarrant County	$83,452,000
Wise County	$68,483,000
Subtotal for Others	**$1,674,637,000**
TOTAL FOR REGION C	**$6,157,941,000**

Consistency with the Regional Water Plan

In evaluating consistency with this regional water plan, TNRCC and TWDB should consider the following factors:

- Willing buyer/willing seller transactions should be allowed.
- Maximum flexibility should be afforded to water suppliers. Changes in timing, order, amount of supply, and details of project development should be allowed.
- Consistency requirements should be waived, if appropriate.
- Small uses that do not affect water supplies should be regarded as consistent with this plan.

- Projects to repair or replace existing facilities should be regarded as consistent with this plan.
- Projects for internal distribution improvements and other projects that do not involve development or connection of a new supply should be regarded as consistent with this plan.
- Projects intended to improve water quality or meet regulatory requirements should be regarded as consistent with this plan.
- Projects that promote regional cooperation should receive state support and be regarded as consistent with this plan.
- TWDB and TNRCC should support fast-track efforts by water suppliers when such efforts are needed.

ES-6 Regulatory, Administrative, Legislative, and Other Recommendations

The Region C Water Planning Group makes the following recommendations for regulatory, administrative, legislative, and other changes:

- Recommendations related to the Senate Bill One planning process
  - Allow alternative strategies for near and long term planning needs.
  - Encourage TWDB to exercise discretion in the consideration and approval of funding for alternatives not presented as part of the regional water plan.
  - Encourage TNRCC to exercise discretion in the consideration and approval of water right permit applications not part of the regional water plan.
  - Allow regional water planning groups to assume that contracts for water supply will be renewed when they expire.
  - Provide clarification of the impact of designating a unique stream segment.
- Recommendations related to TNRCC policy and water rights
  - Make some water rights exempt from cancellation for ten years of non-use.
  - Reduce the regulatory and legislative obstacles to indirect reuse of treated wastewater.
  - Remove barriers to interbasin transfers of water.
- Recommendations for state and federal programs to address water supply issues
  - Increase funding for Texas Water Development Board loans and the state participation program to assist with the development of water supply projects.
  - Accelerate studies of groundwater availability for the Trinity aquifer.
  - Increase state participation in water conservation efforts.

- Provide a program for education of board members of Water Supply Corporations, Special Utility Districts, and Municipal Utility Districts.
- Increase state participation in watershed protection planning.
- Encourage federal funding for development, maintenance, and upgrading of NRCS structures.
- Provide state assistance with maintenance and construction of stock ponds.
- Encourage the Texas Agricultural Statistics Service to include water supply questions on its survey of farmers and ranchers.

- Recommendations for ecologically unique river and stream segments
  - Provide clarification of the impacts of designating a unique stream segment.
- Recommendations for unique sites for reservoir construction
  - Marvin Nichols I
  - Lower Bois d'Arc Creek
  - Muenster
  - Tehuacana

ES-7 Plan Approval Process and Public Participation

The Region C Water Planning Group made special efforts to inform and seek input from the general public, water suppliers, and others with special interest in the planning process.

Regional Water Planning Group

The original legislation for Senate Bill One and the Texas Water Development Board planning guidelines establish regional water planning groups to control the planning process. The Region C Water Planning Group held regular meetings open to the public during development of the plan, including nine meetings in 1998, 11 meetings in 1999, and 15 meetings in 2000.

Outreach to Water Suppliers and Regional Planning Groups

The Region C Water Planning Group made special efforts to contact water suppliers in the region and obtain their input in the planning process.

- The planning group sent out questionnaires early in the Region C planning seeking information on population and water use projections and other water supply issues.
- The planning group appointed a technical review committee composed of experienced water resource planners to review population and water demand projections.

- The planning group instructed its consultants to contact water suppliers as planning progressed.

The Region C and Region D water planning groups formed the Sulphur River Task Group, including members of both water planning groups, to coordinate water supply planning involving the Sulphur River Basin. As a result of cooperative efforts, both planning groups support the development of Marvin Nichols I Reservoir on the Sulphur River in Region D

Outreach to the Public

The Region C Water Planning Group outreach efforts for the public included the following:

- Publication of newsletters to inform the public.
- Public awareness presentations to interested groups throughout the region.
- Media outreach program to involve the news media.
- Publication of the draft of the *Initially Prepared Region C Water Plan* on the Freese and Nichols web page, at http://www.freese.com/senbill1/regionc/index.htm

Public Meetings and Public Hearings

The Region C Water Planning Group has held the following public meetings and hearings to bring the Region C Water Plan to the public:

- Required initial meeting on the planning process.
- Public Hearing on population and water use
- Five public meetings throughout the region on water needs and potential strategies
- Five public meetings and a public hearing on draft initially prepared plan in September of 2000.

Implementation Strategies

Section 7.2 of the report includes a discussion of implementation strategies for complex elements of the water supply plan for Region C:

- Conservation
- Reuse of reclaimed wastewater
- Marvin Nichols I Reservoir
- Water from Oklahoma.

Texas Water Development Board
City Historical and Projected
Municipal Use and Population

City Name: ADDISON

Year	Yearly Municipal Use (Acre-Feet)	Population	Gallons Per Day (GPD)
1980	1634	5553	263
1981	1948	6061	287
1982	2036	6217	292
1983	2789	6437	387
1984	3240	6666	434
1985	3583	6995	457
1986	3602	7340	438
1987	3848	7600	452
1988	3724	7870	422
1989	3448	8389	367
1990	3590	8783	365
1991	3830	9068	377
1992	3825	9545	358
1993	4213	10336	364
1994	4311	10241	376
1995	4984	10579	421
1996	5447	11287	431
2000	5888	11892	442
2010	6863	14382	426
2020	7461	16128	413
2030	7696	17893	384
2040	8495	19852	382
2050	9091	21246	382

TEXAS WATER DEVELOPMENT BOARD
HISTORICAL & PROJECTED POPULATION AND WATER USE
DALLAS COUNTY

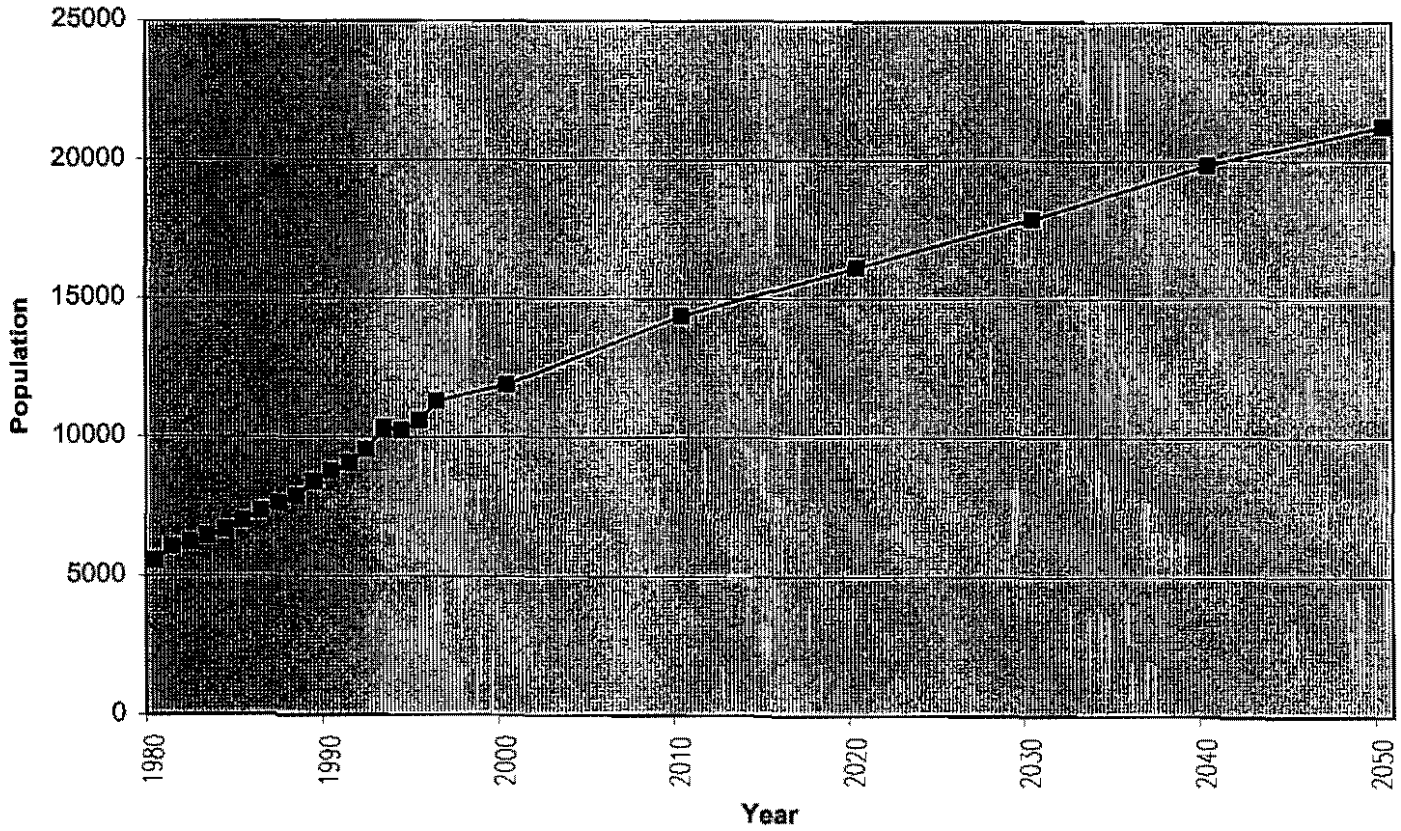
YEAR	POPULATION	PER CAPITA MUNICIPAL USE (GPCD)	MUNICIPAL USE (ACRE-FEET)	MANUFACTURING USE (ACRE-FEET)	S.E. POWER USE (ACRE-FEET)	MINING USE (ACRE-FEET)	IRRIGATION (ACRE-FEET)	LIVESTOCK USE (ACRE-FEET)	TOTAL USE (ACRE-FEET)
1980	1,556,390	207	360,018	34,440	22,333	4,039	0	453	421,283
1984	1,735,963	211	410,233	28,367	20,384	192	115	444	459,725
1985	1,781,722	216	431,737	28,451	21,956	842	250	424	483,660
1986	1,841,000	205	422,167	29,267	15,705	757	250	422	468,569
1987	1,852,000	205	426,003	25,495	18,998	2,426	250	423	473,595
1988	1,854,700	224	465,649	23,444	22,342	2,329	125	534	514,423
1989	1,820,792	207	421,389	27,251	17,194	104	115	512	466,565
1990	1,852,810	210	436,359	27,969	18,214	104	100	537	483,283
1991	1,874,647	196	411,321	24,137	11,073	2,980	80	543	450,134
1992	1,899,924	198	422,368	26,152	10,710	2,981	80	716	463,009
1993	1,938,116	206	448,164	26,426	12,564	2,981	1,317	791	492,243
1994	1,962,971	186	408,814	26,619	9,398	2,972	1,198	482	449,483
1995	1,979,840	202	447,123	26,169	14,539	2,986	1,198	516	492,531
1996	1,999,926	204	456,439	27,843	16,325	2,986	1,317	513	505,423
2000	2,074,858	233	541,754	33,506	18,000	3,867	100	718	597,945
2010	2,286,828	228	584,935	38,926	20,000	4,376	100	718	649,055
2020	2,556,793	220	631,247	43,539	20,000	5,124	100	718	700,728
2030	2,764,704	209	652,703	47,420	23,000	5,678	100	718	729,819
2040	3,045,931	210	716,390	56,142	23,000	6,638	100	718	802,988
2050	3,259,995	209	763,422	65,850	23,000	4,798	100	718	857,888

TEXAS WATER DEVELOPMENT BOARD
UTILITY DATA TABLE
HISTORICAL WATER USE

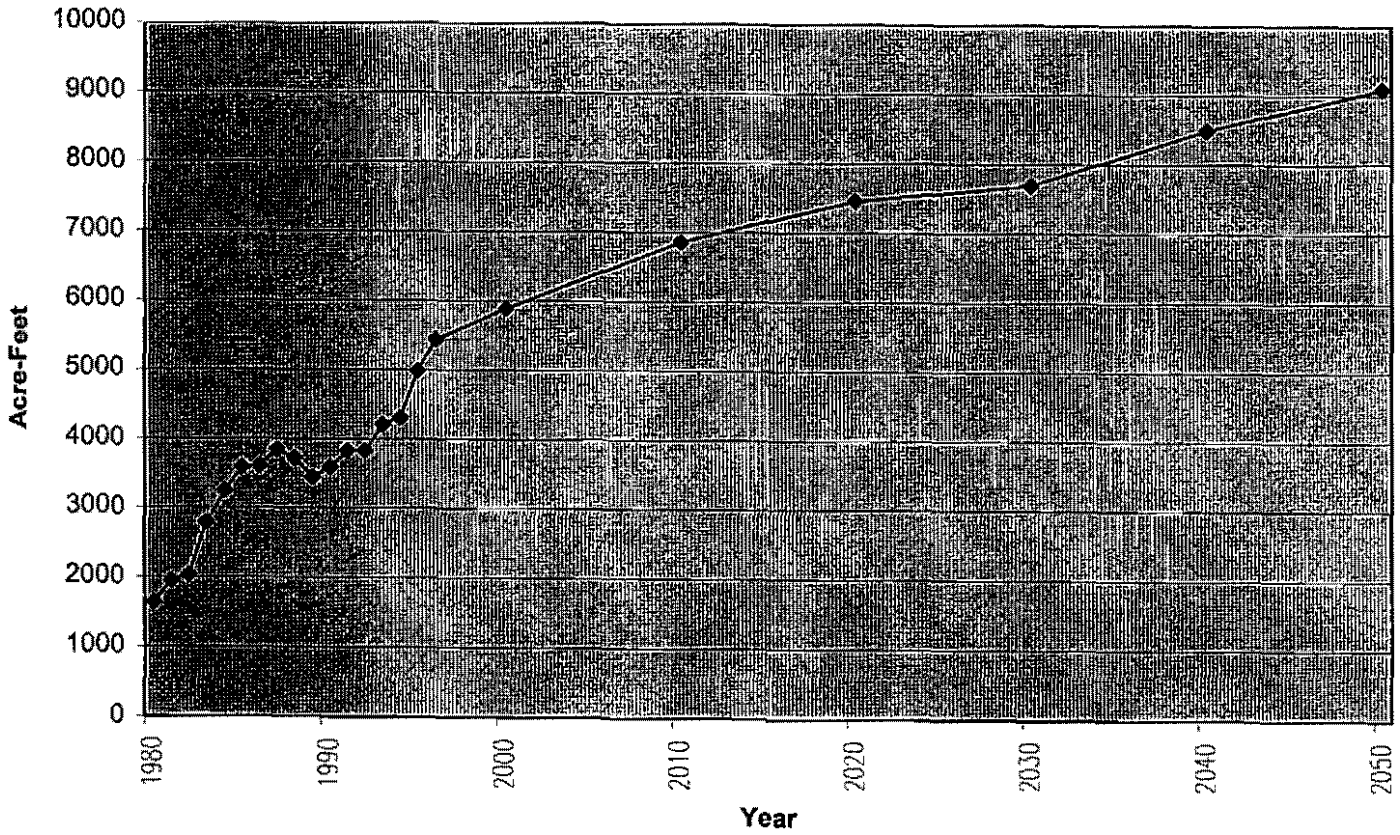
CITY OF ADDISON

YEAR	HISTORICAL POPULATION	SELF-SUPPLIED (ACRE-FEET)	PURCHASED (ACRE-FEET)	TOTAL WATER (ACRE-FEET)	% GROUND WATER	SALES TO OTHER SUPPLIERS (ACRE-FEET)	INDUSTRIAL SALES (ACRE-FEET)	POWER SALES (ACRE-FEET)	RAW SALES (ACRE-FEET)	MUNICIPAL RESULT (ACRE-FEET)	PER CAPITA USE (GPCD)
1980	5553	0	1836	1836	0	7	195	0	0	1634	263
1981	6061	19	2140	2159			211			1948	287
1982	6217	19	2165	2184			148			2036	292
1983	6437	15	2924	2939			150			2789	387
1984	6666	17	3516	3533			293			3240	434
1985	6995	17	3645	3662			79			3583	457
1986	7340	18	3604	3622			20			3602	438
1987	7600	18	3849	3867			19			3848	452
1988	7870	12	3866	3878			154			3724	422
1989	8389		3636	3636		43	145		43	3448	367
1990	8783		3726	3726			136			3590	365
1991	9068		3840	3840			10			3830	377
1992	9545		3837	3837			12			3825	358
1993	10336		4229	4229			16			4213	364
1994	10241		4324	4324			13			4311	376
1995	10579		4992	4992			8			4984	421
1996	11287		5504	5504			57			5447	431

POPULATION OF ADDISON



MUNICIPAL USE FOR ADDISON



TEXAS WATER DEVELOPMENT BOARD
MUNICIPAL USE BY CITY AND RURAL COUNTY
SUMMARY FOR DALLAS COUNTY

City Name	Projected Year 2000 Municipal Use (Acre-Feet)	Projected Year 2010 Municipal Use (Acre-Feet)	Projected Year 2020 Municipal Use (Acre-Feet)	Projected Year 2030 Municipal Use (Acre-Feet)	Projected Year 2040 Municipal Use (Acre-Feet)	Projected Year 2050 Municipal Use (Acre-Feet)
ADDISON	5888	6863	7461	7696	8495	9091
BALCH SPRINGS	2316	2412	2429	2211	2095	2012
CARROLLTON (P-C)	11382	11956	12193	11359	10954	10505
CEDAR HILL (P-C)	6125	7877	9740	11457	14550	18363
COCKRELL HILL	450	433	416	363	333	317
COMBINE (P-C)	91	98	105	90	99	109
COPPELL	5602	7282	9082	10609	13418	16970
DALLAS (P-C)	299680	320090	321618	311812	322452	331648
DE SOTO	6774	8134	9286	9587	10712	11968
DUNCANVILLE	7136	7356	7421	6719	6408	6159
FARMERS BRANCH	10292	10394	10858	10500	11513	12665
GARLAND (P-C)	35418	33751	33320	33609	32034	30943
GLENN HEIGHTS (P-C)	1403	1605	1783	1852	2035	2236
GRAND PRAIRIE (P-C)	14829	14967	13037	13289	13465	13545
GRAPEVINE (P-C)	20	21	20	22	24	25
HIGHLAND PARK	3591	3516	3532	3724	3979	4290
HUTCHINS	608	672	759	844	1032	1262
IRVING	46989	47908	50257	51525	56576	61771
LANCASTER	3616	3883	3997	3709	3556	3478
LEWISVILLE (P-C)	185	232	292	316	366	423
MESQUITE	21234	21648	23246	25912	28588	31256
OVILLA (P-C)	68	74	81	83	91	100
RICHARDSON (P-C)	19190	17830	17976	18768	20065	21339
ROWLETT (P-C)	5172	5681	6583	8217	10233	12831
SACHSE (P-C)	1445	2144	2308	2617	2879	3076
SEAGOVILLE	1799	2440	2642	2617	2847	3047
SUNNYVALE	672	757	880	1111	1387	1733
UNIVERSITY PARK	5905	5720	5578	5674	5938	6304
WILMER	263	258	254	230	216	206
COUNTY-OTHER	23611	38933	74093	96181	130050	145750
COUNTY TOTAL	541754	584935	631247	652703	716390	763422

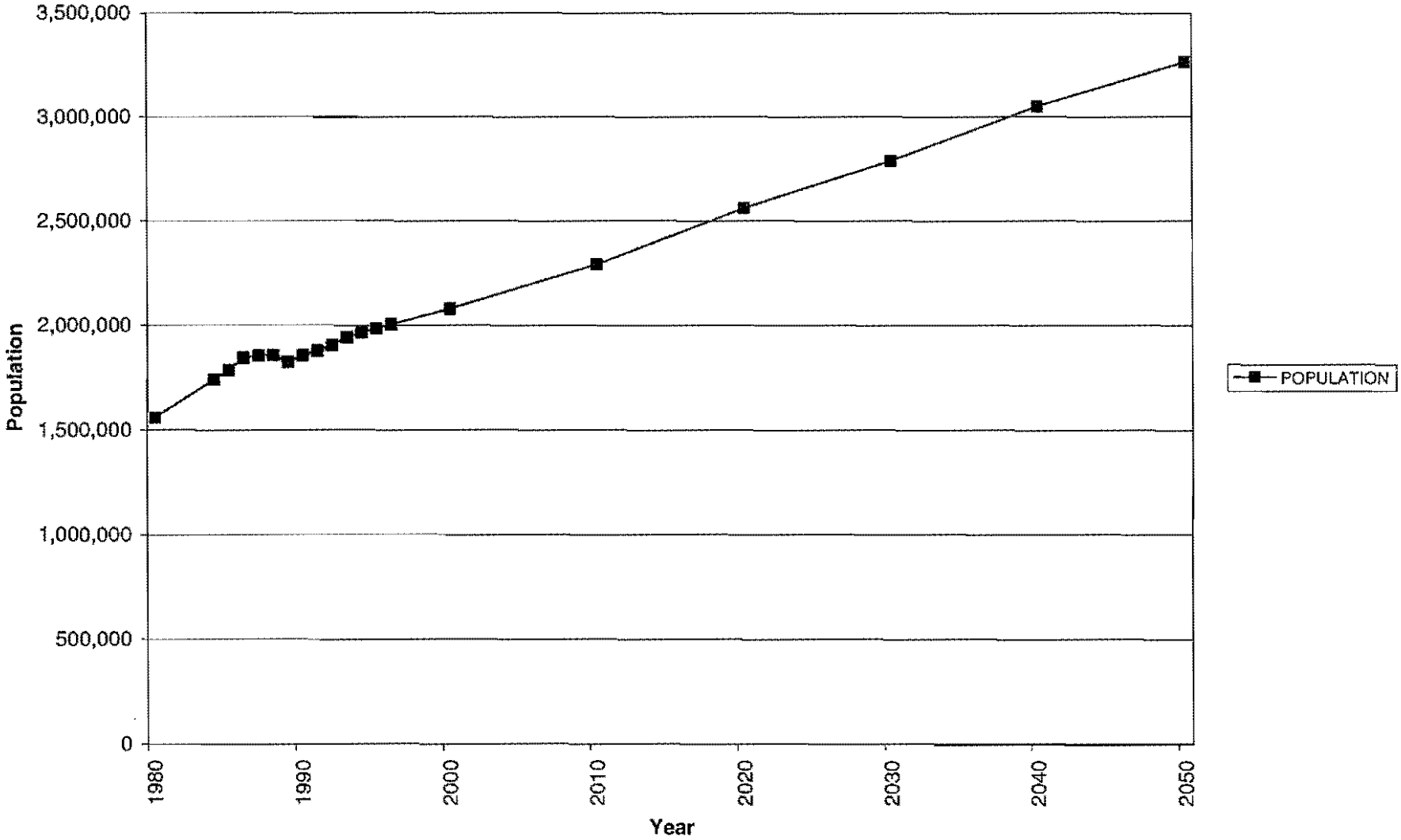
NOTES
1. COUNTY OTHER IS FOR RURAL/UNINCORPORATED AREAS OR COMMUNITIES OF POPULATION OF LESS THAN 500.
2. (P-R) REPRESENTS A CITY THAT IS IN PARTIALLY TWO OR MORE RIVER BASINS.
3. (P-C) REPRESENTS A CITY THAT IS IN PARTIALLY TWO OR MORE COUNTIES.

TEXAS WATER DEVELOPMENT BOARD
POPULATION BY CITY AND RURAL COUNTY
SUMMARY FOR DALLAS COUNTY

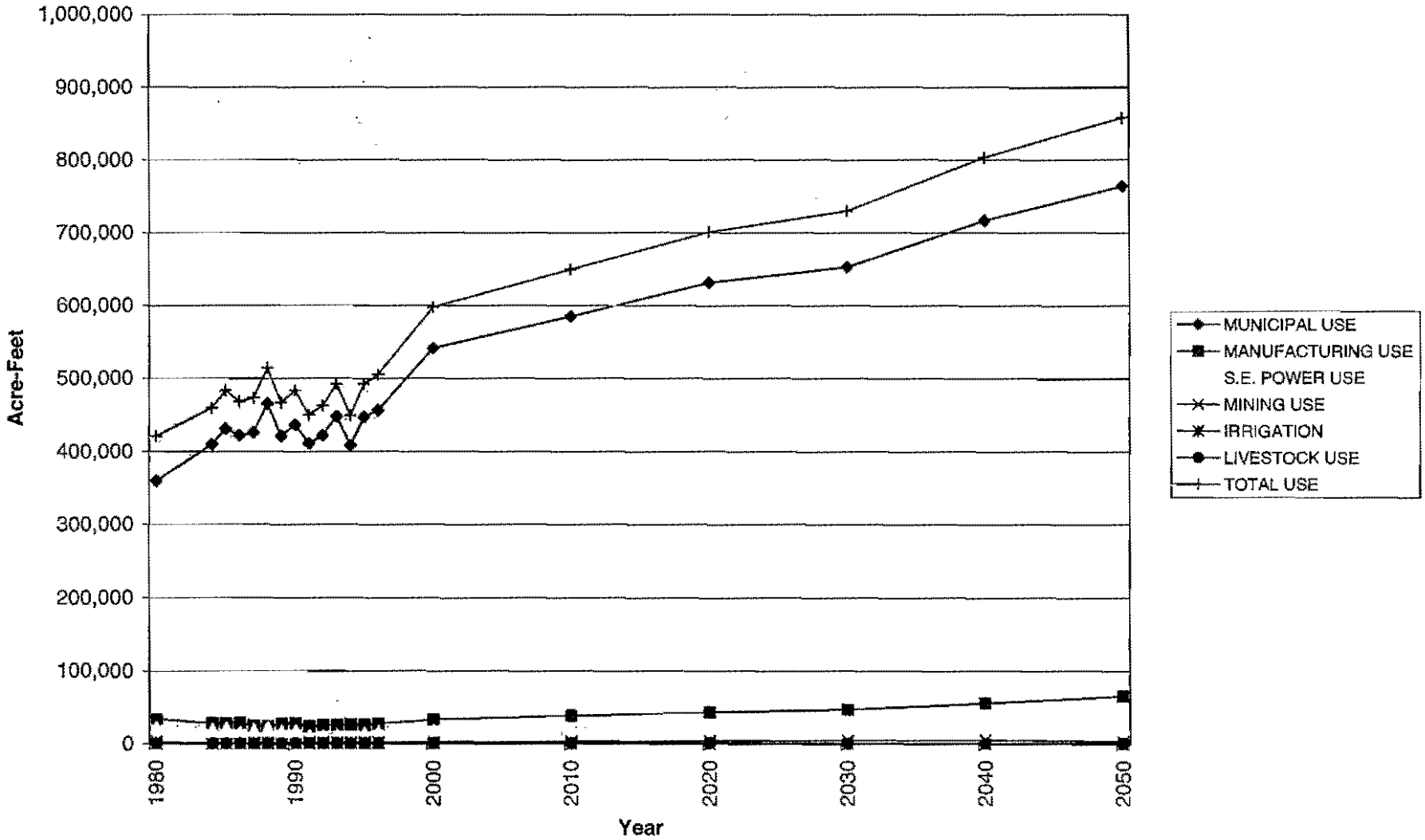
City Name	Estimated Year 2000 Population	Estimated Year 2010 Population	Estimated Year 2020 Population	Estimated Year 2030 Population	Estimated Year 2040 Population	Estimated Year 2050 Population
ADDISON	11892	14382	16128	17893	19852	21246
BALCH SPRINGS	21998	24747	26774	27802	27102	26420
CARROLLTON (P-C)	48387	53102	56692	58280	56527	54527
CEDAR HILL (P-C)	27203	37205	48309	62751	79688	101196
COCKRELL HILL	4057	4153	4270	4267	4070	3882
COMBINE (P-C)	504	590	682	762	845	937
COPPELL	23368	32345	42230	55062	70050	89118
DALLAS (P-C)	1005780	1039119	1071352	1104635	1146878	1189062
DE SOTO	35571	45670	55264	63870	71902	80944
DUNCANVILLE	39323	42924	45691	46865	45404	43989
FARMERS BRANCH	25381	26665	29021	31039	34260	37815
GARLAND (P-C)	196391	213697	227069	232590	225185	217516
GLENN HEIGHTS (P-C)	5010	5972	6889	7763	8569	9459
GRAND PRAIRIE (P-C)	88257	95439	96990	100536	102741	104243
GRAPEVINE (P-C)	99	110	122	133	146	156
HIGHLAND PARK	8905	9071	9497	10137	10964	11858
HUTCHINS	3085	3594	4290	5235	6445	7935
IRVING	177002	188410	205810	229994	255092	279929
LANCASTER	24640	28184	30759	32146	31435	30740
LEWISVILLE (P-C)	768	1021	1352	1611	1869	2168
MESQUITE	117742	138042	159638	180723	200956	221454
OVILLA (P-C)	319	366	424	483	532	586
RICHARDSON (P-C)	73526	76162	81876	86364	92811	99739
ROWLETT (P-C)	24689	31309	39178	49564	62147	77924
SACHSE (P-C)	9082	15948	18735	21435	23800	25423
SEAGOVILLE	12846	18938	21443	23602	25938	27761
SUNNYVALE	2666	3413	4292	5448	6843	8595
UNIVERSITY PARK	22528	22797	23163	24008	25610	27319
WILMER	2665	2840	3027	3155	3059	2966
COUNTY OTHER	61174	110613	225826	296551	405211	455088
COUNTY TOTAL	2074858	2286828	2556793	2784704	3045931	3259995

NOTES
1. COUNTY OTHER IS FOR RURAL/UNINCORPATED AREAS OR COMMUNITIES OF POPULATION OF LESS THAN 500.
2. (P-R) REPRESENTS A CITY THAT IS IN PARTIALLY TWO OR MORE RIVER BASINS.
3. (P-C) REPRESENTS A CITY THAT IS IN PARTIALLY TWO OR MORE COUNTIES.

TWDB Historical and Projected Population For Dallas County



TWDB Historical and Projected Water Use for Dallas County



Mike -
Please respond to this inquiry. I would like to see the response before it goes in.
Thankyou John

REGION C WATER PLANNING GROUP

Senate Bill 1 - Texas Water Development Board

March 23, 1999

TO: WATER PLANNING REGION C CITIES AND TOWNS

Subject: Population and Water Use Projections for Regional Water Planning

In 1997, the Texas Legislature passed Senate Bill 1 to address water supply issues. Among other provisions, Senate Bill 1 initiated regional water planning efforts across the state. The bill called for the formation of regional water planning groups to take the lead in the regional planning efforts. Your city is in Region C, and the members of the regional water planning group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional water planning process which is now under way. The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the development of a regional water plan. Other members of the consulting team include Alan Plummer Associates, Chiang, Patel and Yerby, and Cooksey-McGill Communications.

As instructed by the legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the preparation of regional water supply plans through the year 2050. These regulations require that regional water plans be based on projections of population and water use developed by the TWDB in 1996 for use in the 1997 *Texas Water Plan*, unless the regional water planning group can provide convincing evidence that those projections should be updated. With this letter, we are attaching a survey seeking information from you to help us determine whether the previous TWDB projections are appropriate for your city or whether they should be revised. This information is **very important** because the projections of water use will be the basis for all of our water planning efforts. The TWDB has provided guidance for changing projections of population and water use, and we can send you a copy upon request.

The TWDB will make changes to population and water use projections only if the Regional Planning Groups recommend the new information. To help you fill out the survey, we are providing some information on historical and projected water use in your city:

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

Table of Historical Water Use for Your City. The data in this table were provided by the TWDB based on your city's annual reports of water use. Perhaps the key column is the "municipal result", which represents non-industrial water use by your customers. It is computed as the total water intake (self-supplied water plus purchases) minus wholesale sales to other suppliers, minus sales to major industries, minus sales to power plants, minus any other sales of raw water. The "municipal result" is based on water pumping rather than on metered water sales and thus includes system losses.

Table of Projected Population and Municipal Water Use for Your City. This table presents the projections of population and municipal water use for your city developed by the TWDB for the 1997 water plan. The projections are for values within your city limits, and the municipal water use is for a dry (high-use) year. The municipal water use is comparable to the "municipal result" column in the table of historical water use. It does not include wholesale sales to other suppliers, sales to industries, etc. Note that the table includes TWDB projections of dry-year per capita water use. These are generally declining because TWDB believes that water conservation will significantly reduce per capita demands across the state.

Table of Historical and Projected Total Population and Water Use for Your County. This table presents the TWDB projections of population and water use by category for your county.

Graph of Historical and Projected Population for Your City. This graph shows TWDB historical and projected population for your city.

Graph of Historical and Projected Municipal Water Use for Your City. This graph shows TWDB historical and projected municipal water use for your city. As with the tables, the municipal water use does not include wholesale sales to other suppliers, sales to industries, etc.

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Larry D. Rivers, P.E., of Chiang, Patel & Yerby, Inc., at 817-540-4220. Your assistance in returning the questionnaire by April 23, 1999 is needed. We very much appreciate your attention and cooperation in reviewing these data, which will provide the basis for long range water supply planning in your region.

Yours very truly,

Terrace Stewart, P.E.
Chairman
Region C Water Planning Group

Region C Water Planning Group
Population and Water Use Projections Survey of Cities
RETURN BY APRIL 23, 1999

City: _____

Contact Person: _____

Telephone Number: _____ FAX: _____ E-Mail _____

Address: _____ Date Completed _____

1. Are the TWDB projections of population for your city reasonable? If not, what quantitative projections would you suggest? What is the basis for your suggested changes?

2. Are the TWDB projections of municipal water use for your city reasonable? If not, what quantitative projections would you suggest? What is the basis for your suggested changes?

3. Please give your comments on the TWDB projections for county population and water use.

4. What source(s) of water supply does your city use currently?

5. Is your city planning to develop additional source(s) of water supply in the future? If so, please provide quantity in each source and location?

6. Do you currently provide raw water or treated water to any other water suppliers? Please list other suppliers for which you provide raw water and the amount you provided to each of them in 1998. Please list other suppliers for which you provide treated water and the amount you provided to each of them in 1998.

7. Do you expect to discontinue providing water to any of these suppliers or to begin providing water to any additional suppliers? If so, what changes do you expect?

8. Please provide copies of any water supply plans your city has prepared which you would like to have considered in the development of a regional water supply plan.

9. Does your city have a conservation and drought contingency plan? If so, please provide a copy.

10. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return to:
Larry D. Rivers, P.E.
Chiang, Patel & Yerby, Inc.
4100 Amon Carter Blvd., Suite 104
Ft. Worth, Texas 76155
TEL: (817) 540-4220
FAX: (817) 354-4935

Dallas Water Utilities has projected the following delivery rate to the Town:

Year	Maximum Delivery Rate (MGD)		DAY ACRE-FT	45
2000	6.52	7.63	= 23.41	8553
2010	6.12	8.98	= 27.55	10,066
2020	6.66	9.87	= 30.28	11,063
2030	6.87	10.48	= 32.15	11,748
2040		10.89	= 33.41	12,207
2050		11.16	= 34.24	12,510

The delivery rate required for this system is the maximum daily demand rate which is 9.75 MGD at Buildout.

WATER DISTRIBUTION SYSTEM

The analysis and design of the water distribution system has been based on the total water demand anticipated, as well as, the geographical distribution of this demand. The existing line sizes were reviewed and the proposed lines sized to deliver the maximum hourly demand in the system of 16.42 MGD and to refill the existing elevated storage tank during the minimum hourly demand. The analysis was based on the ultimate development of Addison. All existing lines are adequate to convey the maximum hourly demands.

1) Surveyor Pump Station and Ground Storage Reservoir

This facility is located on Surveyor Drive just north of Belt Line Road. Three high service pumps are located at this site along with one 2 million gallon prestressed concrete ground storage reservoir. Each pump is identical and have a rated capacity of approximately 5.5 MGD. This station is schematically shown in Figure 5. This station has a single supply from Dallas Water Utilities Transmission Line between their Elm Fork Treatment Plant and their Beltwood Station.