



Region C Water Planning Group Meeting

TRA Central
Wastewater Treatment Plant
July 12, 2004

Agenda

- Action Items
 - Water Management Strategies (2)
 - Neighborhood Study
 - Water Conservation Survey
- Discussion Items
 - Status of Request for Supplemental Funding
 - Current Water Supplies
 - Water Management Strategies (6)

Agenda

- List of Updated Plans
- Update on Water Conservation and Reuse Tasks
- Key Water Quality Parameters
- Chapter 2 – Population and Water Needs
- Agricultural Areas Possibly Impacted by Water Transfers
- Speaker Comments (May 17 RCWPG mtg)
- Overall Status and Next Steps

Action Item

Feasibility of Water Management
Strategies

Feasibility of WMS

- Desalination
- Aquifer storage and recovery

Desalination

- 2001 *Region C Water Plan*
 - Desalination is used when salinity is too high to meet water quality standards
 - Cost of desalination has decreased in recent years
 - Process is being used more frequently
 - Conclusion: Include desalination as a management strategy in order to utilize supplies from Lake Texoma and the Red River.

Desalination

- Suggestions for 2006 Plan
 - Include desalination as a management strategy in order to utilize supplies from Lake Texoma and the Red River.
 - Desalination could also be used to treat brackish groundwater, water from the Gulf of Mexico, and water from the Brazos River.
 - Specific projects:
 - Desalination of Lake Texoma water
 - Local projects from other sources for specific suppliers
 - Desalination of Gulf of Mexico water and importation to Region C

Aquifer Storage and Recovery (ASR)

- *2001 Region C Water Plan*
 - Storing excess water in aquifers and retrieving this water when needed. Water can be introduced as enhanced recharge or injected through a well into the aquifer.
 - Potential to store large amounts of water at lower costs than traditional surface storage.

Aquifer Storage and Recovery (ASR)

- 2001 Plan (continued)
 - Requires suitable geological conditions for implementation and can cause contamination of groundwater. Water must be treated prior to being injected.
 - Tarrant Regional Water District has studied ASR.
 - Conclusion: Studies of ASR should continue, and pilot projects should be implemented if the strategy appears promising.

Aquifer Storage and Recovery (ASR)

- Suggestions for 2006 Plan
 - Studies of ASR should continue, and pilot projects should be implemented if the strategy appears promising.
 - Potentially feasible strategy for The Colony and Addison, which are studying ASR
 - No additional supply for Addison or The Colony. Would be used to meet peaks.

Action Item

Neighborhood Study

Neighborhood Study

- Seeking approval of summary memo
 - Made minor changes to improve clarity
 - p. 4: Defined cooling degree days and heating degree days
 - p. 6: Distinguished between two similar paragraphs. Added “For all selected neighborhoods...” to first sentence, second paragraph. Added “For the Tarrant County neighborhoods...” to the first sentence, seventh paragraph.

Neighborhood Study

- p. 13: Added explanation of outdoor use model coefficients: “Coefficient *a* for the higher outdoor use group is 4.4 times coefficient *a* for the lower outdoor use group. This means that the higher outdoor use group is predicted to use 4.4 times as much water outdoors in response to the weather compared to the lower outdoor use group.”

Action Item

Water Conservation Surveys

Water Conservation Survey

- Seeking approval of WUG and WWP water conservation surveys
- Surveys designed to gather information needed to assess the potential for regional water conservation savings
- Would like to add the following question to the WUG and WWP surveys:
 - “What percentage of your retail 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.”

Discussion Item

Status of Request for
Supplemental Funding

Request for Supplemental Funding

- Region C supplemental funding approved for the following tasks:
 - Reimburse Region C for the expenses associated with the Anna and Athens amendments
 - Fund \$25,000 worth of additional water conservation work
 - Fund \$125,000 worth of reuse work

TWDB Schedule

- July 21 – supplemental contract execution date
- September 1 – deadline to amend contracts
- Spring 2005 – Legislature works on budget requests
- June 1, 2005 – TWDB will know if funding is denied
- January 5, 2006 – regional water plans due

Discussion Item

Current Water Supplies

Summary of Survey Responses

- Response rates
 - 63% county judges responded
 - 53% water user groups responded
 - 85% wholesale water providers responded

Summary of Survey Responses

- County Judge Responses (63%)
 - Half had no comments
 - 3 stated that population was underestimated
 - 1 stated that irrigation demands will likely decrease over time rather than remain constant

Summary of Survey Responses

- Water User Group (WUG) Responses (53%)
 - Water demand projections
 - 60% agreed with projections
 - Majority of remainder said estimates were too low
 - A few said estimates were too high
 - Water supply sources
 - 70% agreed with supply sources and water available from those sources
 - 30 WUGs commented on corrections to data sheet and provided additional information on potential new supplies

Summary of Survey Responses

- Water management strategies
 - 82 WUGs agreed with proposed potential water management strategies
 - 28 WUGs provided information on future projects or offered new potential strategies

Summary of Survey Responses

- Wholesale Water Provider (WWP) Responses (85%)
 - FNI offered to meet with each WWP
 - 13 WWPs chose to meet with us
 - WWPs provided additional information on future water plans

Summary of Survey Responses

- Adjustments to memo since draft was released on July 2, 2004
 - Irving should have Marvin Nichols Reservoir, Lake Wright Patman, and Oklahoma water listed as potential future sources, as well as Ralph Hall and reuse
 - FNI has attempted to contact 10 respondents to seek additional information
 - FNI has received additional information from 8 of those respondents
 - Meeting with Denton scheduled

Current Water Supplies

- Draft Memorandum on Supply by Source
 - Surface water supplies
 - Region C Reservoirs
 - Permitted Surface Water Imports
 - Groundwater supplies
 - 2 Major Aquifers (Carrizo-Wilcox, Trinity)
 - 3 Minor Aquifers (Woodbine, Queen City, Nacatoch)
 - Other Aquifer
 - Reuse (Direct and Indirect)
 - Local supplies
 - Run-of-the-River
 - Stock Tanks (Livestock)

Surface Water Supplies

- Water Availability Models
 - Firm yield of reservoirs
 - Minimum annual diversions for run-of-the-river water rights
- Red River WAM
 - Recently modified by TCEQ
 - Supplies to be updated

Groundwater Supplies

- Groundwater Availability Models (GAM)
 - Carrizo-Wilcox (2 models)
- Other GAMs
 - Northern Trinity-Woodbine GAM – expect by September 2004
 - Queen City GAM – expect by December 2004
- Updated only Carrizo-Wilcox supplies

Other Supplies

- Reuse
 - Currently permitted
 - Surveys
- Local Supplies
 - Supply from stock tanks is the 2000 use reported to TWDB
 - Run-of-the-river supplies determined by the WAMs

Currently Available Supply

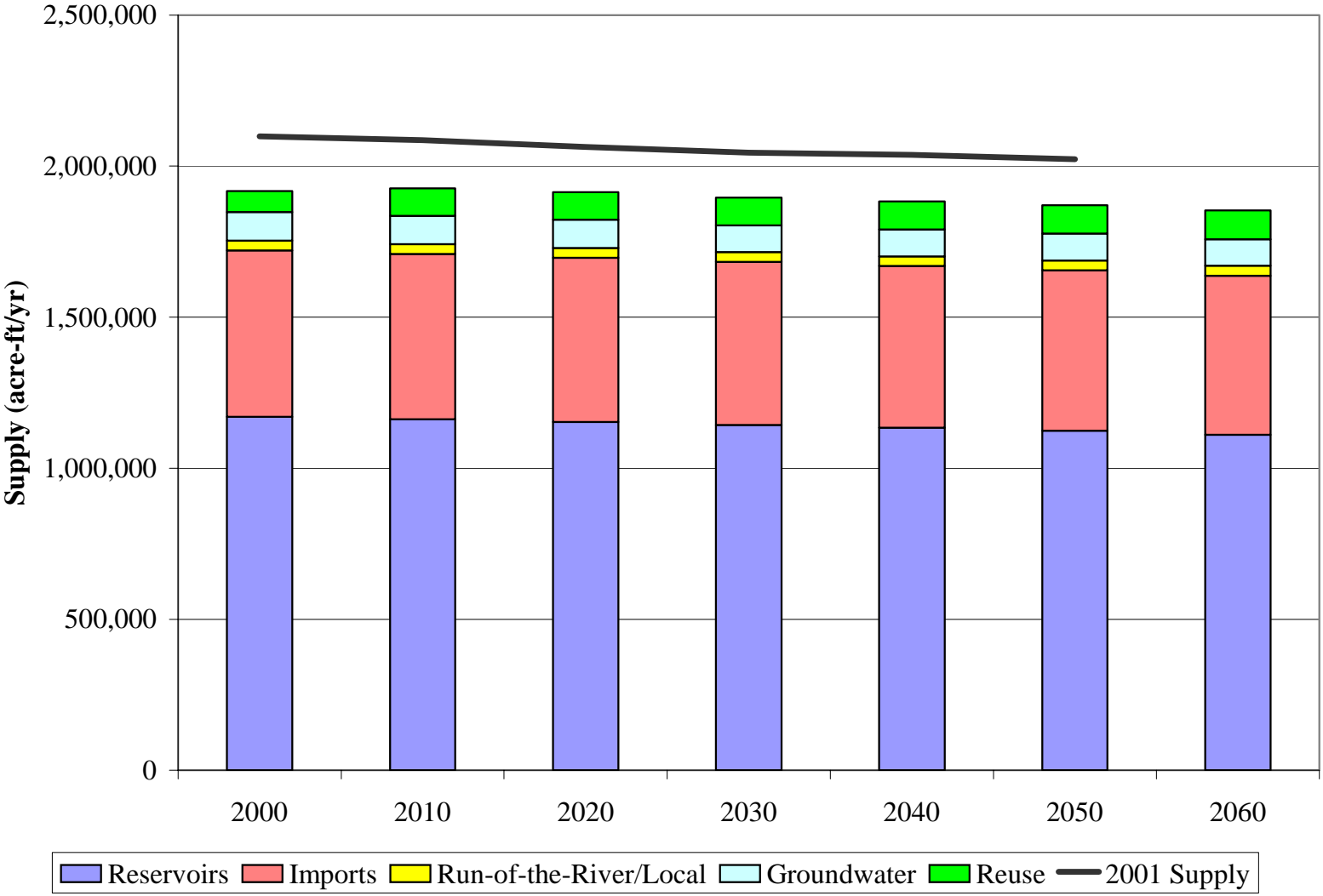
- Includes connected and unconnected
- 1.9 million acre-feet per year – total supply
 - 60% Region C reservoirs
 - 30% Surface water imports
 - 5% Groundwater
 - 5% Reuse and local supplies

Comparison to 2001 Plan

- 180,000 acre-feet per year less than reported in 2001 plan in year 2000
 - 92,000 af/y less – Carrizo-Wilcox aquifer*
 - 25,000 af/y less – reservoirs and imports
 - 40,000 af/y less – local / run-of-river*
 - 25,000 af/y less – reuse (by 2020, reuse is higher than 2001 plan)
- Differences due to:
 - WAM assumptions – surface water
 - GAM for Carrizo-Wilcox
 - Reuse – cooling for Lockheed Martin no longer used

* Not fully utilized in 2001 plan

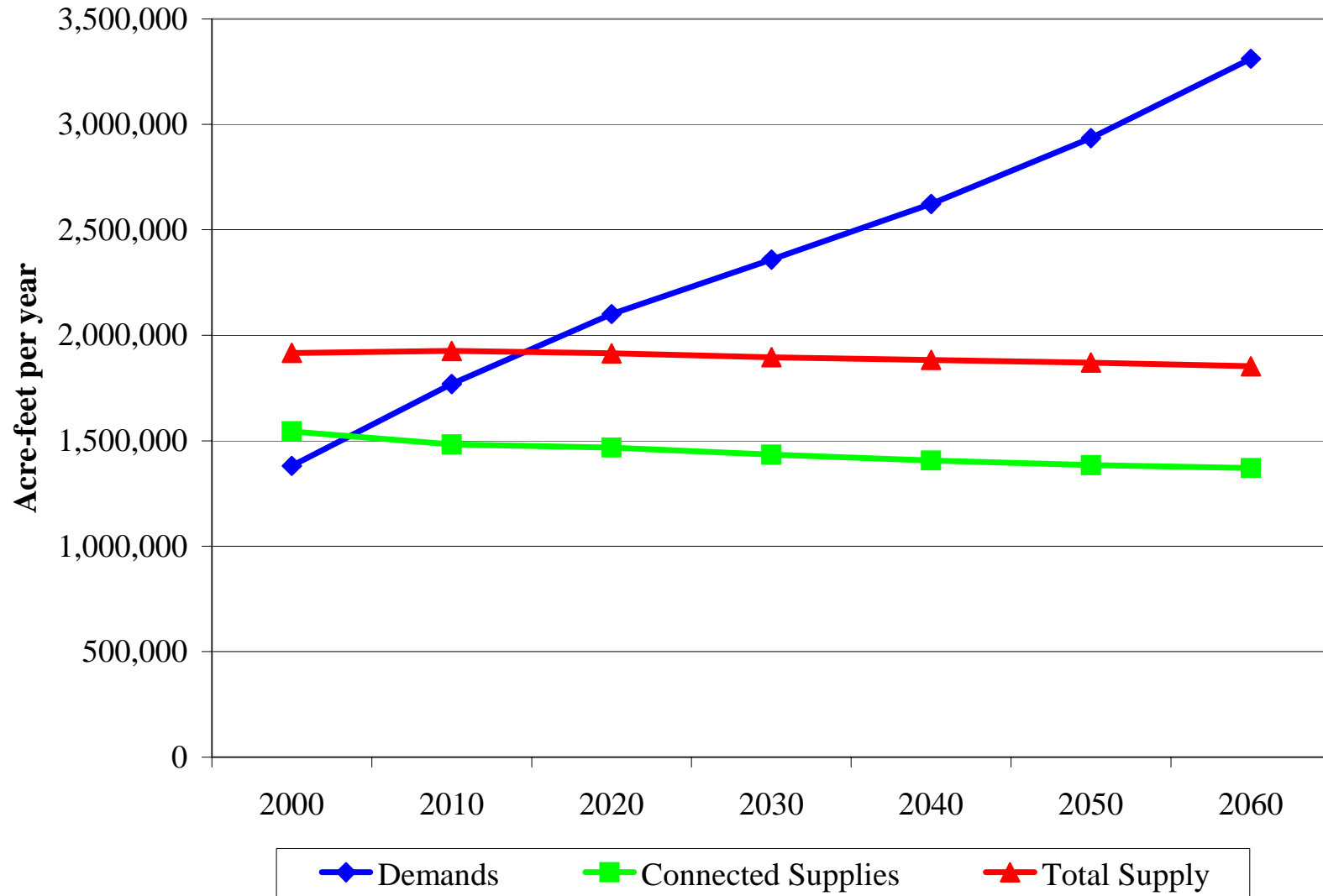
Summary of Supply by Source



Steps to Refine Supplies

- Update Red River Basin supplies
- Update groundwater – Trinity, Woodbine and Queen City when GAMs become available
- Coordinate with groundwater districts
- Coordinate with adjoining regions
- Define supplies available to water user groups
 - limited by contracts, infrastructure constraints and WTP capacities

Draft Supply-Demand Comparison



Connected Supplies (1.5 million acre-feet per year)

- Limited by Infrastructure
 - Lake Fork (Dallas) – 120,000 af/y
 - Lake Palestine (Dallas) – 114,000 af/y
 - Joe Pool Lake – 10,000 af/y unconnected
- Limited by Contracts
- Limited by Operation
 - TRWD uses safe yield
- Limited by WTP capacities
 - New to 2006 update

Discussion Item

Water Management Strategies

Connection of Existing Supplies

- *2001 Region C Water Plan*
 - Major connections
 - Dallas to Lake Fork
 - Irving to Lake Chapman
 - Upper Trinity RWD to Lake Chapman
 - Gainesville to Moss Lake
 - Weatherford to Lake Benbrook
 - Two proposed Wise County power plants to Lake Bridgeport

Connection of Existing Supplies

- 2001 Plan (continued)
 - Proposed Freestone County power plants to Richland-Chambers Reservoir
 - Tarrant Regional WD to Lake Benbrook and Eagle Mountain Lake
 - Tarrant Regional WD East Texas pipeline capacity expansion
 - Dallas connection to Lake Palestine
 - Grapevine direct reuse project
 - Other projects

Connection of Existing Supplies

- 2001 Plan (continued)
 - List of potential connections
 - Uncommitted Lake Texoma supply
 - Corsicana's Richland-Chambers supply
 - Duncanville, Cedar Hill, and remainder of Grand Prairie supply in Joe Pool Lake
 - TXU Forest Grove supply in Cedar Creek Lake
 - Mineral Wells' Lake Mineral Wells supply
 - Carrizo-Wilcox aquifer in Freestone County
 - Carrizo-Wilcox aquifer in Navarro County
 - TRA/Ennis reuse project

Connection of Existing Supplies

- 2001 Plan (continued)
 - Conclusion: Include connection of existing supplies as a major component of the Region C plan.

Draft Memo on Connection of Existing Supplies

- Draft memo summarizing connection of existing sources
 - Projects included in 2001 plan
 - Projects implemented since 2001 plan
 - Projects studied in 2001 plan but not recommended
 - New ideas since 2001 plan
 - Projects that are potentially feasible for 2006 plan

Draft Memo on Connection of Existing Supplies

- Connection of existing supplies is expected to be a major element in the 2006 plan, as it was in the 2001 plan
- Includes the development of regional water systems
- Retail water distribution system expansions were outside of the purview of the plan, but they are specifically mentioned in the 2001 plan as consistent with the plan

Draft Memo on Connection of Existing Supplies

- General categories for connecting existing supplies
 - Connection to other Water User Group or regional supplier
 - Expansion/renovation of existing connection
 - New/renewed/increased contracts
 - Water treatment plant expansions
- General categories assumed potentially feasible if needed

Draft Memo on Connection of Existing Supplies

- Potentially feasible strategies
 - Toledo Bend Reservoir
 - Oklahoma water
 - Lake Wright Patman
 - North Texas MWD Lake Texoma already authorized
 - GTUA Lake Texoma already authorized
 - Lake Texoma not yet authorized – desalination
 - Lake Texoma not yet authorized – blending with Elm Fork reservoirs

Draft Memo on Connection of Existing Supplies

- Gulf of Mexico desalination
- Joe Pool Lake
- DWU Cypress Basin supplies
- Sam Rayburn Reservoir/B.A. Steinhagen
- Lake Livingston
- Lake Fork
- Lake Palestine
- Additional Lake Palestine
- Waxahachie/Rockett SUD/Red Oak from Dallas

Draft Memo on Connection of Existing Supplies

- Wilmer, Hutchins, Palmer, and Ferris connection to DWU
- Tarrant Regional WD additional Cedar-Richland pipeline
- Tarrant Regional WD West Fork connection
- Tarrant Regional WD purchase from Brazos RA
- Jack County steam electric power (TRWD)
- Midlothian Connection to TRWD

Draft Memo on Connection of Existing Supplies

- Ennis connection to TRWD
- Lakeside connection to TRWD
- Lake Lavon additional yield
- Terrell connection to NTMWD
- North Texas MWD Cypress Basin supplies
- North Texas MWD interim Lake Fork use
- North Texas MWD interim GTUA Texoma water

Draft Memo on Connection of Existing Supplies

- North Texas MWD interim treated water purchase from Dallas
- North Texas MWD treatment and delivery
- North Texas MWD/GTUA supply to North Collin and South Grayson Counties
- Hackberry connection to Little Elm, Frisco, or North Texas MWD
- Celina connection to North Texas MWD
- Celina connection to GTUA

Draft Memo on Connection of Existing Supplies

- Bryson from Lake Jacksboro
- Aledo from Fort Worth
- Kennedale from Fort Worth
- Pantego from Fort Worth
- Kennedale from Arlington
- Pantego from Arlington
- Corsicana connection to Richland-Chambers
- Parallel Weatherford pipeline from Lake Benbrook

Draft Memo on Connection of Existing Supplies

- Additional Moss Creek Lake yield
- Parallel Gainesville pipeline from Moss Lake
- Athens from Lake Palestine
- Athens from Cedar Creek Lake
- Athens from Forest Grove Lake
- Upper Trinity RWD treatment and delivery
- TRA Tarrant County water system treatment and delivery
- TRA Ellis County system

Draft Memo on Connection of Existing Supplies

- Cooke County system
- Grayson County system
- East Parker County system
- Southeast Wise County system
- Navarro County system
- Kemp Cedar Creek Lake system expansion
- Lake Worth
- Ovilla direct connection from Dallas
- Expand Cedar Hill connection from Dallas

Draft Memo on Connection of Existing Supplies

- Expand Carrollton, Lewisville, and The Colony connections from Dallas
- Expand Combine WSC connection to Dallas through Seagoville
- Johnson County SUD from Dallas
- Connection to other WUG or regional supplier
- Expansion/renovation of existing connections
- New/renewed/increased contracts
- Water treatment plant expansions

Draft Memo on Connection of Existing Supplies

- Strategies NOT recommended as potentially feasible
 - Tarrant Regional WD Lake Texoma
 - Tarrant Regional WD Freestone County Groundwater
 - North Texas MWD extend Lake Texoma pipeline

Water Conservation Strategies

- 2001 *Region C Water Plan*
 - Demand projections include conservation savings of 15 percent of municipal per capita water use, or about 400,000 acre-feet in Region C
 - Savings to result from conservation in the following areas:
 - Low-flow plumbing fixtures (required by law)
 - Outdoor water conservation measures
 - Improved indoor water use habits
 - Public education
 - Projected savings of 10 gpcd in 2000, 27 gpcd in 2030, and 34 gpcd in 2050.

Water Conservation Strategies

- 2001 *Region C Water Plan* (Continued)
 - Encourage state funding of conservation education and of efforts to evaluate and improve conservation programs
 - Use data developed to evaluate additional conservation savings in the next five-year planning cycle

Water Conservation Strategies

- Suggestions for 2006 Plan
 - Conclusion:
 - Apply RCWPG-approved screening methodology to list of 49 potential water conservation strategies compiled from the Task Force BMPs and the TWDB-sponsored study of water conservation
 - Develop list of potentially feasible water conservation strategies and applicability
 - Evaluate potential water savings for each potentially feasible strategy and each WUG

Water Conservation Strategies

- Potentially feasible strategies (by type of use)
 - General
 - Public and school education program
 - Water conservation pricing
 - Water system audit, pressure control, leak detection
 - Water waste prohibition
 - Indoor
 - Customer indoor water audit
 - Showerhead and faucet aerator retrofit program
 - Water-efficient toilet replacement program
 - Water-efficient clothes washer program

Water Conservation Strategies

- Outdoor
 - Customer irrigation audit
 - Landscape irrigation systems rebate program
 - Landscape design and conversion program
- Industrial, Commercial, and Institutional (ICI)
 - General ICI rebate program
 - ICI water audit, water waste reduction, and site-specific water conservation program
- Reuse

General Water Conservation Strategies

- Public and school education program
 - Teaches water-conserving behavior and reinforces such behavior through periodic reminders
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Projected water need
 - No public and school education program
 - Estimated potential water savings
 - Projected two percent savings on total water usage

General Water Conservation Strategies

- Water conservation pricing
 - Water consumption decreases with increasing water price
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Projected water need
 - Estimated potential water savings based on price elasticities from literature
 - Future price increases to be estimated from strategies recommended in *previous* round of planning

General Water Conservation Strategies

- Water system audit, pressure control, and leak detection
 - Account for all water entering and existing system, including different types of water losses
 - HB 3338 requires all retail public utilities that provide potable water to perform a water system audit
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Total unaccounted-for water (UFW) > 12 percent
 - Projected water need
 - Estimated potential water savings:
 - Difference between existing UFW and a target UFW for each WUG
 - Need UFW data for many WUGs

General Water Conservation Strategies

- Water waste prohibition
 - Prohibit irrigation water waste
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Projected water need
 - No water waste prohibition
 - Estimated potential water savings:
 - Based on installation of rain sensors
 - 3.3 percent of irrigation water usage for accounts with automatic irrigation systems
 - Need data on number of automatic irrigation systems

Indoor Water Conservation Strategies

- Showerhead and faucet aerator retrofit program
 - Replace older, inefficient showerheads and faucet aerators (residential customers)
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Existing or projected indoor residential water usage > 50 gpcd
 - Percentage of pre-1992 housing > 20 percent
 - Projected water need
 - No showerhead and faucet aerator retrofit program
 - Estimated potential water savings:
 - 5.5 gpcd for replacement of inefficient showerheads
 - 2.0 gpcd for replacement of inefficient faucet aerators
 - Assumes that all showerheads and aerators in household replaced
 - Need data about ICI accounts (types, water usage)

Indoor Water Conservation Strategies

- Customer indoor water audit program
 - Purposes (residential customers)
 - Educate customers on water-conserving habits
 - Install water-efficient showerheads and faucet aerators
 - Identify (and possibly repair) leaks
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Existing or projected indoor residential water usage > 50 gpcd
 - Projected water need
 - No customer indoor water audit program
 - Estimated potential water savings:
 - 5.5 gpcd for replacement of inefficient showerheads
 - 2.0 gpcd for replacement of inefficient faucet aerators
 - 1.4 – 1.7 gpcd for replacement of leaking toilet flappers
 - Some overlap with showerhead and faucet aerator retrofit program

Indoor Water Conservation Strategies

- Water-efficient toilet replacement program
 - Replace older, inefficient toilets (residential customers)
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Existing or projected indoor residential water usage > 50 gpcd
 - Percentage of pre-1992 housing > 20 percent
 - Projected water need
 - No water-efficient toilet replacement program
 - Estimated potential water savings:
 - 10.5 gpcd for replacement of inefficient toilets, assuming that all toilets in household replaced
 - Need data about ICI accounts (types, water usage)

Indoor Water Conservation Strategies

- Water-efficient clothes washer rebate program
 - Rebate for replacement of inefficient clothes washers (residential customers)
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Existing or projected indoor residential water usage > 50 gpcd
 - Projected water need
 - No water-efficient clothes washer rebate program
 - Estimated potential water savings:
 - 5.6 gpcd for replacement of inefficient clothes washers
 - Need data about ICI accounts (types, water usage)

Outdoor Water Conservation Strategies

- Customer irrigation audit program
 - Purposes (residential, ICI customers)
 - Review current water schedule
 - Inspect system operation
 - Recommend repairs or changes to increase efficiency
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Existing or projected outdoor water usage > 20 percent of total
 - Projected water need
 - No customer irrigation audit program
 - Estimated potential water savings, audited customers with automatic irrigation systems:
 - 10 percent of irrigation water use (single-family residential)
 - 15 percent of irrigation water use (multi-family, ICI)
 - Need data on number of automatic irrigation systems

Outdoor Water Conservation Strategies

- Landscape irrigation systems rebate program
 - Improve efficiency of irrigation systems (residential, ICI)
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Existing or projected outdoor water usage > 20 percent of total
 - Projected water need
 - No landscape irrigation systems rebate program
 - Estimated potential water savings, customers with automatic irrigation systems that receive rebates:
 - 5 percent of irrigation water use
 - Some overlap with savings from water waste prohibition
 - Need data on number of automatic irrigation systems

Outdoor Water Conservation Strategies

- Landscape design and conversion program
 - Promote “water wise” landscaping (residential, ICI)
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Existing or projected outdoor water usage > 20 percent of total
 - Projected water need
 - No landscape design and conversion program
 - Estimated potential water savings:
 - 30 percent of irrigation water use for areas where turf replaced by water wise landscaping

ICI Water Conservation Strategies

- ICI general rebate program
 - Rebates for large-scale improvements in efficient ICI water usage
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Existing or projected ICI water usage > 20 percent of total
 - Projected water need
 - No ICI general rebate program
 - Estimated potential water savings:
 - 3 percent of overall ICI water use

ICI Water Conservation Strategies

- ICI water audit, water waste reduction, and site-specific water conservation program
 - Purposes
 - Audit water use at specific site
 - Recommend site-specific improvements to reduce water use
 - Evaluate for municipal WUGs with:
 - Existing or projected total water usage > 125 gpcd
 - Existing or projected ICI water usage > 20 percent of total
 - Projected water need
 - No ICI water audit, water waste reduction, and site-specific water conservation program
 - Estimated potential water savings:
 - 15 percent of ICI water use for audited customers

Reuse Water Conservation Strategies

- Reuse of reclaimed water
 - Reduce need for potable or raw water
 - Evaluate for WUGs and WWPs with:
 - Permitted wastewater treatment capacity > 1 MGD
 - Estimated potential potable or raw water savings:
 - Evaluated on case-by-case basis.

Water Conservation Strategies

- Will seek approval of the list of potentially feasible water conservation strategies at August 23 meeting

Water Reuse

- *2001 Region C Water Plan*
 - Reuse already applied in Region C
 - Reuse will serve a major role in meeting future water supplies in Region C
 - Region C has several reuse projects in permitting stage

Water Reuse

- 2001 Plan (continued)
 - Conclusion: Incorporate water management strategies involving reuse as a major component of the long-term water supply for Region C. Encourage planning and implementation of additional reuse projects. Monitor legislation and regulatory actions related to reuse.

Draft Memo on Water Reuse

- Draft memo summarizing reuse projects
 - Projects included in 2001 plan
 - Developments since 2001 plan
 - Projects that are potentially feasible for 2006 plan

Draft Memo on Water Reuse

- Reuse is expected to be a major element in the 2006 plan, as it was in the 2001 plan
- Direct reuse
 - Most suited for irrigation and industrial uses
 - Can be authorized by TCEQ without the full water right permitting process

Draft Memo on Water Reuse

- Indirect reuse
 - The return of treated wastewater effluent to the waters of the state before rediversion for reuse
 - Can be used for potable water supplies, as well as irrigation and industrial purposes
 - Requires water right from TCEQ

Draft Memo on Water Reuse

- Several major applications before TCEQ at this time
 - Tarrant Regional WD – Richland-Chambers and Cedar Creek reuse projects
 - Trinity River Authority – reuse application
 - Dallas – reuse application
 - Upper Trinity RWD – Lake Chapman reuse
 - Irving – reuse application
 - North Texas MWD – additional Wilson Creek WWTP reuse
 - North Texas MWD – East Fork reuse

Draft Memo on Water Reuse

- General categories considered for reuse projects
 - Direct reuse for irrigation, manufacturing, mining, and steam electric power
 - Reuse from groundwater and imported surface water
 - Expansion of existing reuse projects
- Will be analyzed if needed and if specific plans are developed

Draft Memo on Water Reuse

- Potentially feasible strategies
 - Reuse of return flows above Dallas lakes
 - Dallas Southside Reuse project
 - Additional Dallas indirect reuse projects
 - Tarrant Regional WD Richland-Chambers reuse project
 - Tarrant Regional WD Cedar Creek reuse project
 - North Texas MWD additional Wilson Creek reuse

Draft Memo on Water Reuse

- North Texas MWD East Fork Trinity River
- North Texas MWD direct reuse for Collin County steam electric
- TRA additional Las Colinas reuse
- TRA Dallas County steam electric reuse
- TRA Ellis County steam electric reuse
- TRA reuse for Tarrant County irrigation
- TRA reuse for Denton County irrigation
- TRA Lake Grapevine reuse

Draft Memo on Water Reuse

- TRA Joe Pool Lake reuse
- Additional TRA indirect reuse projects
- Upper Trinity RWD reuse of Lake Chapman water
- Additional Upper Trinity RWD indirect reuse projects
- Ennis indirect reuse
- Fort Worth reuse for Tarrant County steam electric power
- Weatherford reuse for Parker County steam electric power

Draft Memo on Water Reuse

- Irving indirect reuse
- Other direct reuse for irrigation, manufacturing, mining, or steam electric power
- Reuse of groundwater or imported surface water
- Expansion of existing reuse projects

Draft Memo on Water Reuse

- Strategies NOT recommended as potentially feasible
 - North Texas MWD direct reuse for Rockwall County steam electric power
 - Grapevine direct reuse for irrigation

New Surface Water Supplies

- *2001 Region C Water Plan*
 - New reservoirs represent a large source of potential water supply
 - Environmental impacts are a concern
 - Inundation of wetlands, hardwoods, and other wildlife habitat
 - Changes to streamflows
 - Impacts on flows to bays and estuaries
 - Impacts on threatened and endangered species

New Surface Water Supplies

- 2001 Plan (continued)
 - Initially reviewed 32 potential reservoir sites
 - Retained 9 potential reservoir sites for more detailed study
 - Lower Bois d'Arc Creek
 - Tehuacana
 - Muenster
 - Ralph Hall
 - Upper Bois d'Arc Creek
 - George Parkhouse I and II
 - Marvin Nichols I and II

New Surface Water Supplies

- 2001 Plan (continued)
 - Recommended Lower Bois d'Arc Creek, Marvin Nichols I, Muenster.
 - Alternate reservoirs included Ralph Hall and Tehuacana.

New Surface Water Supplies

- Events since 2001 plan completion
 - Sulphur River Basin Authority and metroplex suppliers studied Marvin Nichols Lake
 - SRBA and COE basin-wide study of the Sulphur River is beginning
 - Upper Trinity RWD and Irving studied Ralph Hall and are pursuing a permit

New Surface Water Supplies

- Events since 2001 plan (continued)
 - DWU is considering Lake Columbia, Marvin Nichols Lake, George Parkhouse Lake and Black Cypress Lake
 - NTMWD is considering Lower Bois d'Arc Lake
 - TRWD is considering Lake Tehuacana
 - Construction of Muenster Lake is underway

Memo on New Surface Water Supplies

- Potentially feasible strategies
 - Black Cypress
 - Columbia (formerly Eastex)
 - George Parkhouse I
 - Lower Bois d'Arc Creek
 - Marvin Nichols
 - Muenster
 - Tehuacana
 - Ralph Hall
 - Increased use of other local supplies (where needed and available)

New Groundwater Supplies

- *2001 Region C Water Plan*
 - Largest available groundwater supplies located in Carrizo-Wilcox aquifer in Freestone County
 - Conclusion: Develop additional groundwater supplies where appropriate. Temporary overdraft where needed. Develop new wells where needed.

Memo on New Groundwater Supplies

- Draft memo summarizing new groundwater supplies
 - Projects included in the 2001 plan
 - Other strategies for groundwater since the 2001 plan
 - Projects that are potentially feasible for 2006 plan

Memo on New Groundwater Supplies

- GAM available for Carrizo-Wilcox aquifer
- GAMs for Trinity and Woodbine aquifers will be available soon
- Groundwater conservation districts in Freestone and Henderson Counties

Memo on New Groundwater Supplies

- Potentially feasible strategies
 - Roberts County groundwater (Mesa Water)
 - Central Texas Carrizo-Wilcox groundwater
 - Additional wells for suppliers already using groundwater
 - Temporary overdrafting of groundwater supplies
 - Reallocation of groundwater supplies

Memo on New Groundwater Supplies

– New well(s)

- Trinity aquifer for Anna
- Other aquifer for Annetta
- Other aquifer for Aurora
- Woodbine aquifer for Blue Ridge
- Trinity aquifer for Bolivar WSC
- Trinity aquifer for Collinsville
- Trinity or Woodbine aquifer for Ector
- Carrizo-Wilcox aquifer for Eustace

Memo on New Groundwater Supplies

- New well(s) (continued)
 - Carrizo-Wilcox aquifer for Fairfield
 - Carrizo-Wilcox aquifer for Flo Community WSC
 - Trinity or Woodbine aquifer for Gunter
 - Trinity or Woodbine aquifer for Gunter Rural WSC
 - Trinity aquifer for Kennedale
 - Trinity or Woodbine aquifer for Luella WSC
 - Woodbine aquifer for Maypearl
 - Trinity aquifer for Muenster
 - Trinity aquifer for Pelican Bay

Memo on New Groundwater Supplies

– New well(s) (continued)

- Trinity aquifer for Ponder
- Trinity or Woodbine aquifer for Southmayd
- Carrizo-Wilcox aquifer for Teague
- Trinity aquifer for Tioga
- Trinity or Woodbine aquifer for Tom Bean
- Trinity or Woodbine aquifer for Van Alstyne
- Carrizo-Wilcox aquifer for Virginia Hill WSC
- Trinity or Woodbine aquifer for Whitewright
- Trinity aquifer for Tarrant Regional WD

Memo on New Groundwater Supplies

- ASR for Addison
- ASR for The Colony
- New wells for other water suppliers as needed and as water is available

Interbasin Transfers

- *2001 Region C Water Plan*
 - Additional requirements imposed on surface water supplies originating in other basins that are associated with the water right
 - Conclusion: Allow interbasin transfers as needed for water supply projects.

Interbasin Transfers

- Suggestions for the 2006 plan
 - Conclusion: Allow interbasin transfers as needed for water supply projects. (Projects already permitted for IBT are not listed)
 - Toledo Bend Lake
 - Oklahoma water
 - Lake Wright Patman
 - Gulf of Mexico desalination
 - Additional Lake Texoma
 - Sam Rayburn/B.A. Steinhagen

Interbasin Transfers

- Suggestions for 2006 plan (continued)
 - Additional Lake Palestine
 - TRWD purchase from BRA
 - NTMWD interim GTUA Texoma water
 - Lower Bois d'Arc Creek
 - NTMWD/GTUA supply to North Collin and South Grayson Counties
 - Additional Moss Lake yield
 - Athens from Lake Palestine
 - Cooke County water supply project

Interbasin Transfers

- Suggestions for 2006 plan (continued)
 - Grayson County water supply project
 - Johnson County SUD from Dallas
 - Marvin Nichols Lake
 - Lower Bois d'Arc Creek Lake
 - Ralph Hall Lake
 - George Parkhouse I
 - Lake Columbia (formerly Eastex)
 - Black Cypress Lake

Discussion Item

List of Updated Plans

Reports completed since the 2001 *Region C Water Plan*

- Water supply plans
- Water availability model (WAM) reports
- Groundwater availability model (GAM) reports
- Volumetric surveys of reservoirs

Updated List of Plans

- Plans will be included as an appendix to the 2006 Region C report (updated Appendix B to the 2001 plan)
- Suggestions for additional plans to be included due to consultants by August 12
- Will include conservation and drought contingency plans
- Will seek approval of list at the next Region C meeting

Discussion Item

Update on Water Conservation
and Reuse Tasks

Other Conservation Tasks

- Model Water Conservation and Drought Contingency Plans
 - Municipal
 - Manufacturing
 - Steam Electric Power
 - Irrigation
- Present model plans for discussion at August 23 meeting

Discussion Item

Key Water Quality Parameters

Key Water Quality Parameters

- Surface water parameters selected based on:
 - TCEQ surface water quality standards
 - TCEQ Water Quality Inventory (305(b) report)
 - Aquatic life use
 - Recreation use
 - General use
 - Fish consumption use
 - Public water supply use
 - Suitability for irrigation
 - Treatability
- Groundwater parameters selected based on:
 - Key parameters identified in previous planning cycle
 - Current and proposed drinking water standards

Key Water Quality Parameters

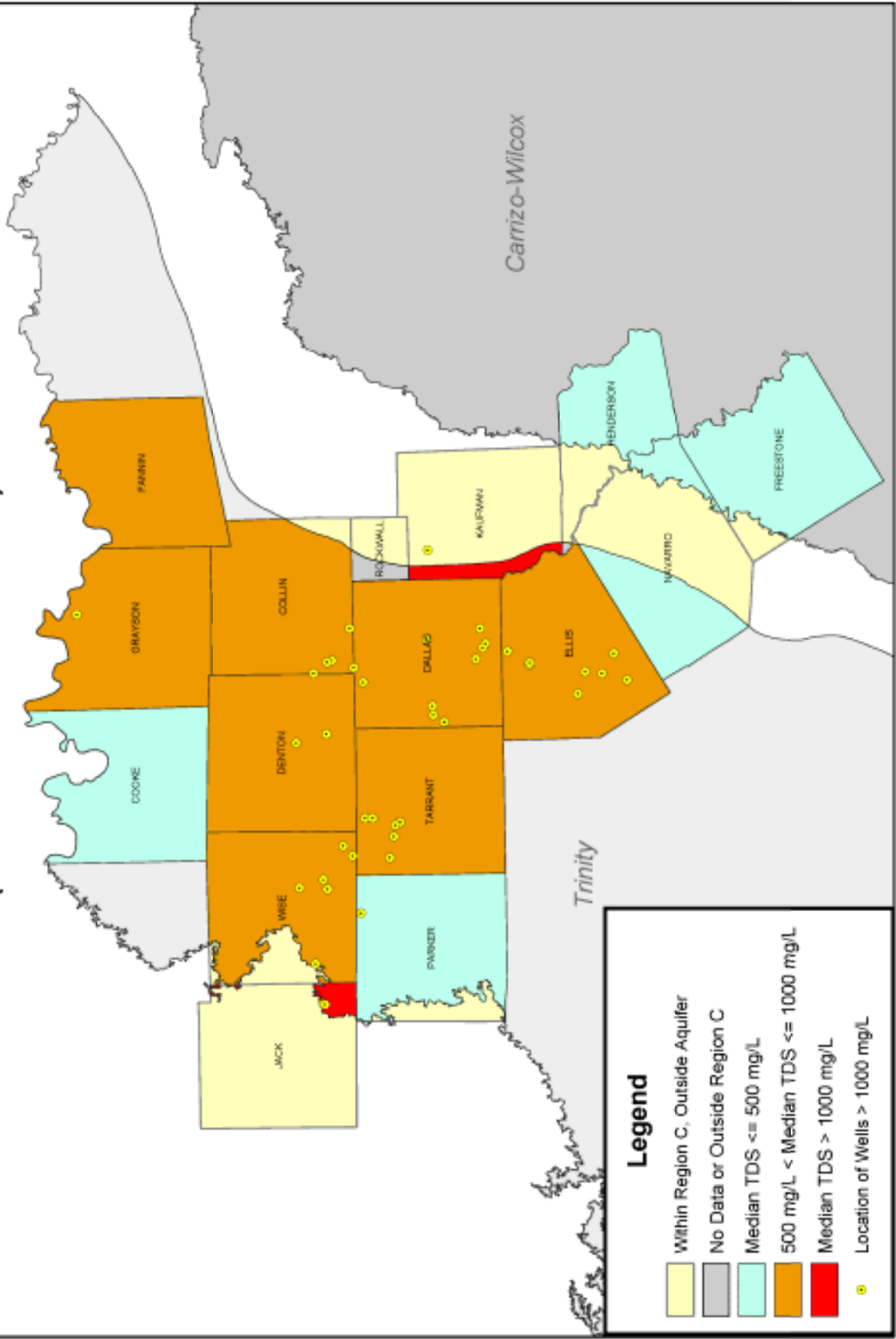
| Surface Water | Groundwater |
|------------------------|------------------------|
| Total Dissolved Solids | Total Dissolved Solids |
| Chloride | Chloride |
| Sulfate | Sulfate |
| Ammonia Nitrogen | Nitrate Nitrogen |
| Nitrate Nitrogen | Fluoride |
| Total Phosphorus | Arsenic |
| Total Organic Carbon | Selenium |
| Chlorophyll-a | Uranium |
| Alkalinity | |
| Dissolved Iron | |
| Dissolved Manganese | |

Key Water Quality Parameter Data Summary

| | Surface Water | Groundwater |
|--|--|--|
| Data Source | TCEQ Surface Water Quality Monitoring Database | TCEQ Groundwater Quality Monitoring Database |
| Data Summary | By TCEQ stream segment | By aquifer and county |
| Reported Statistical Quantities | Mean, median, 75 th percentile, maximum, minimum, number of samples | Mean, median, 75 th percentile, maximum, minimum, number of samples |



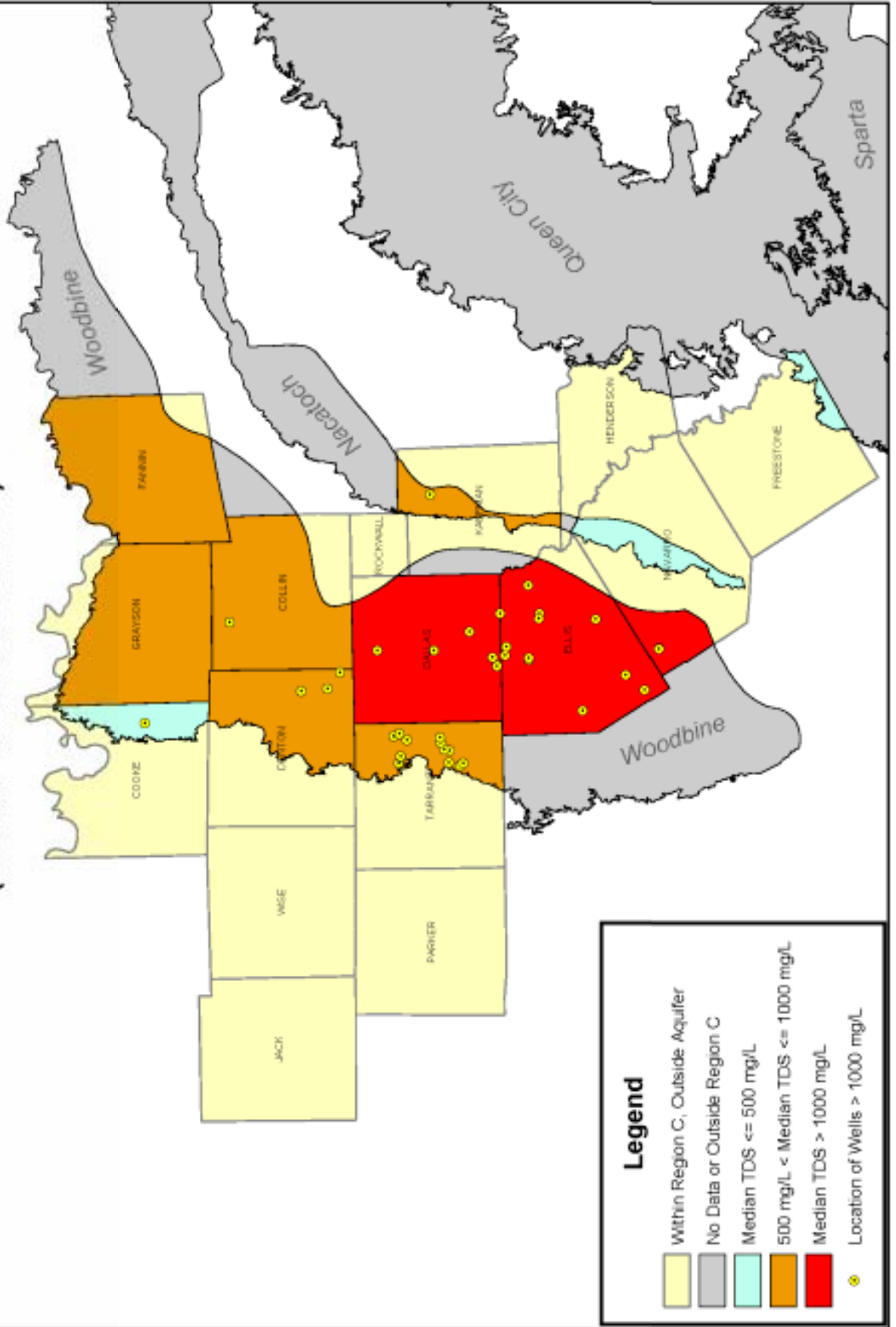
Region C Groundwater Quality Assessment Baseline TDS Conditions - Major Aquifers (Median Values: 1993-2004)



Legend

- Within Region C, Outside Aquifer
- No Data or Outside Region C
- Median TDS <= 500 mg/L
- 500 mg/L < Median TDS <= 1000 mg/L
- Median TDS > 1000 mg/L
- Location of Wells > 1000 mg/L

Region C Groundwater Quality Assessment Baseline TDS Conditions - Minor Aquifers (Median Values: 1993-2004)



Discussion Item

Chapter 2 – Projected Population
and Water Needs

Population Projections

- Basis
 - Census Data
 - NCTCOG Data
 - Build-out land area
 - Build-out density
 - WUG input (surveys)

Population Projections

- Methodology
 - Birth rates, death rates, and migration
 - Urbanization classification
 - Historical trends
 - Build-out populations from NCTCOG data
 - Survey responses

Figure 2.3
Region C County Classifications

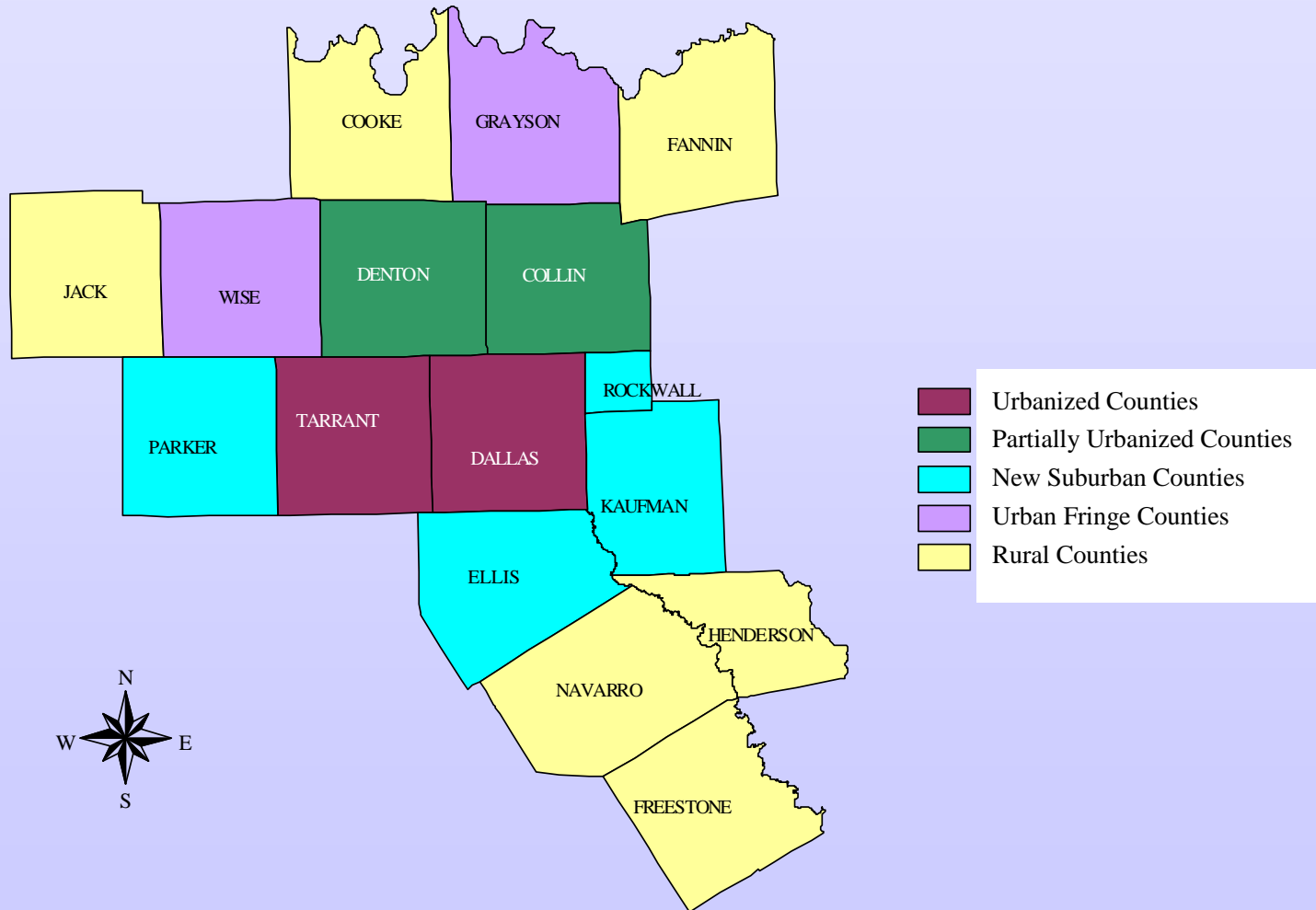


Figure 2.4
Historical and Projected Population in Region C

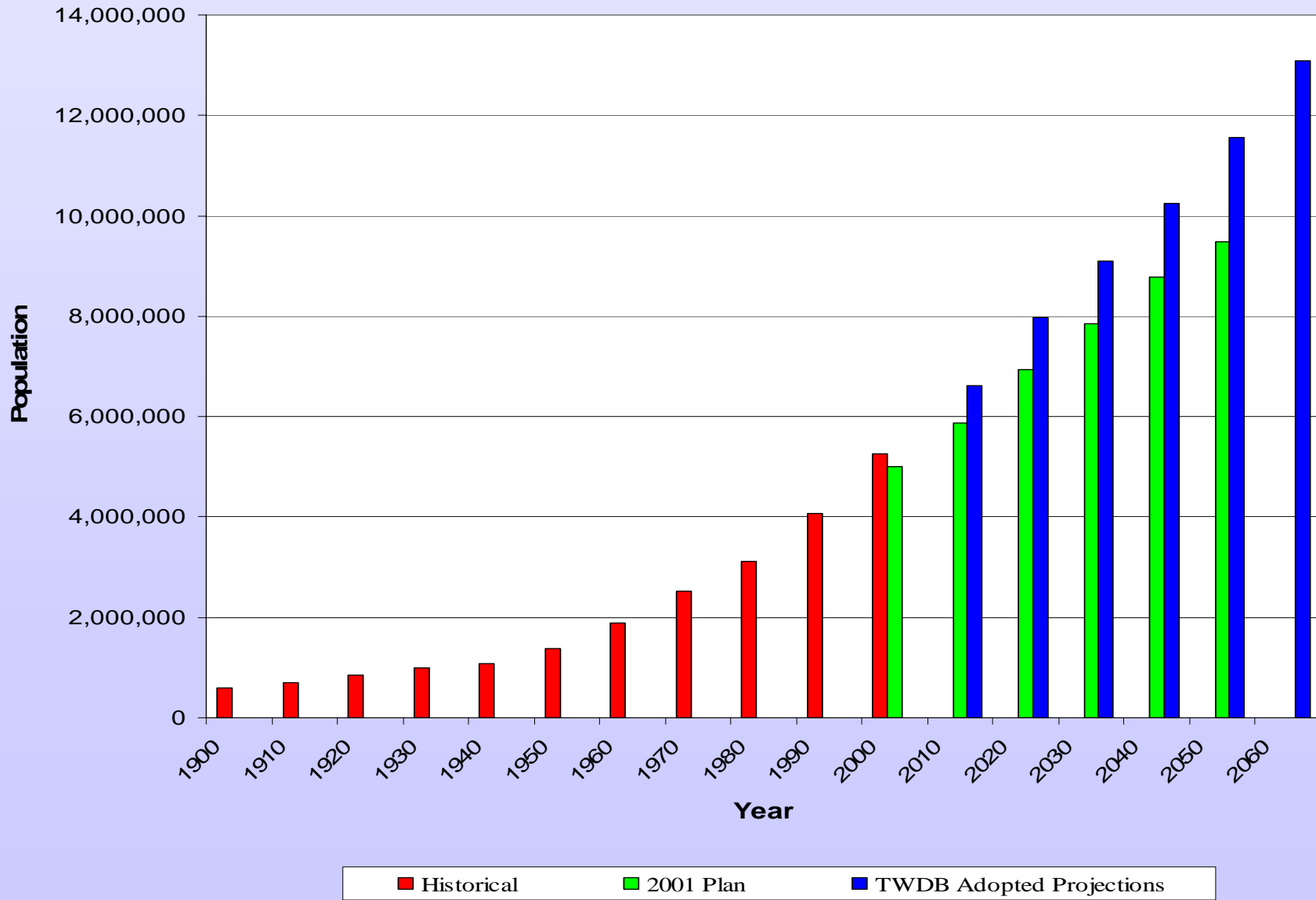


Figure 2.5
Historical and Projected Population Growth Rates by Decade in Region C

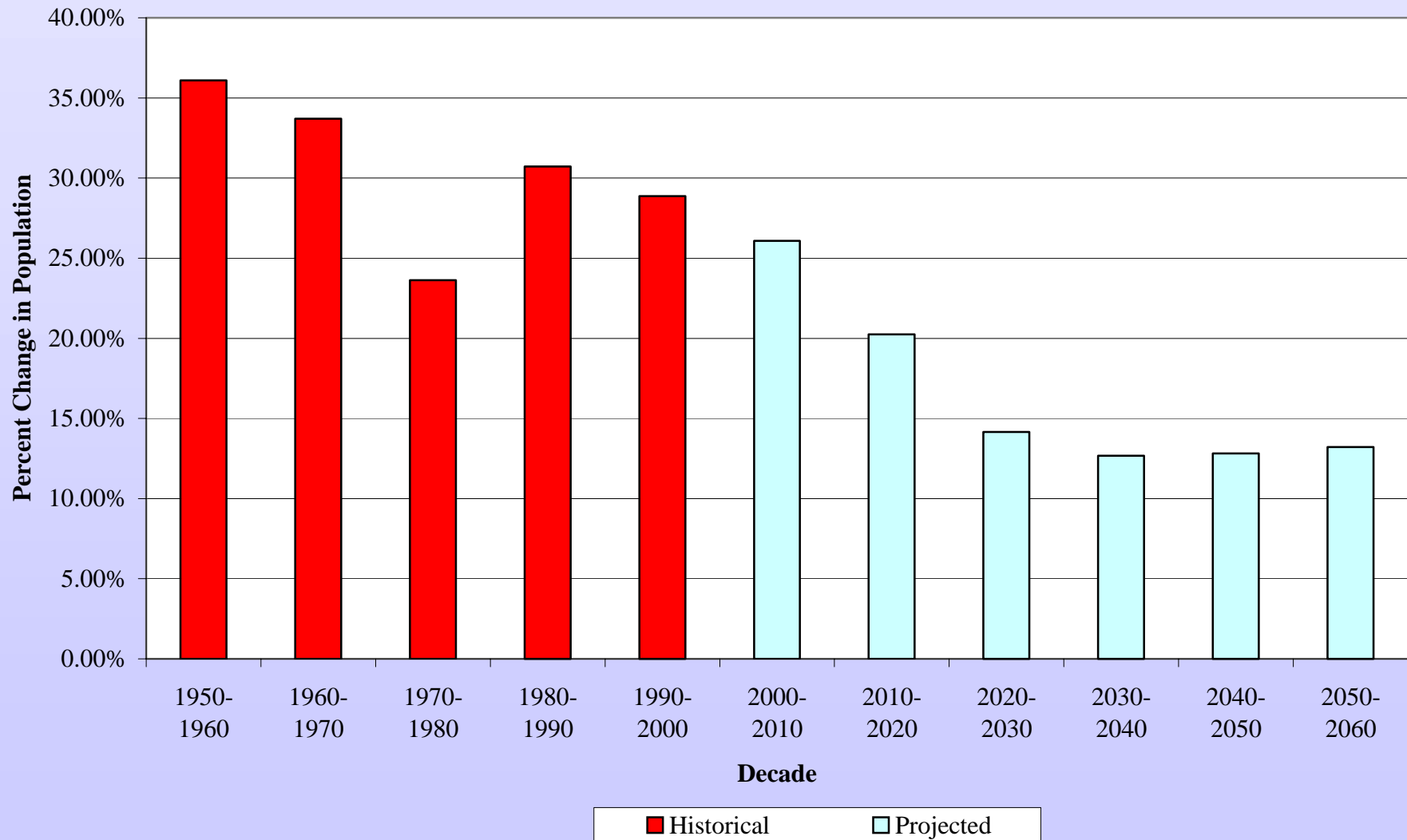
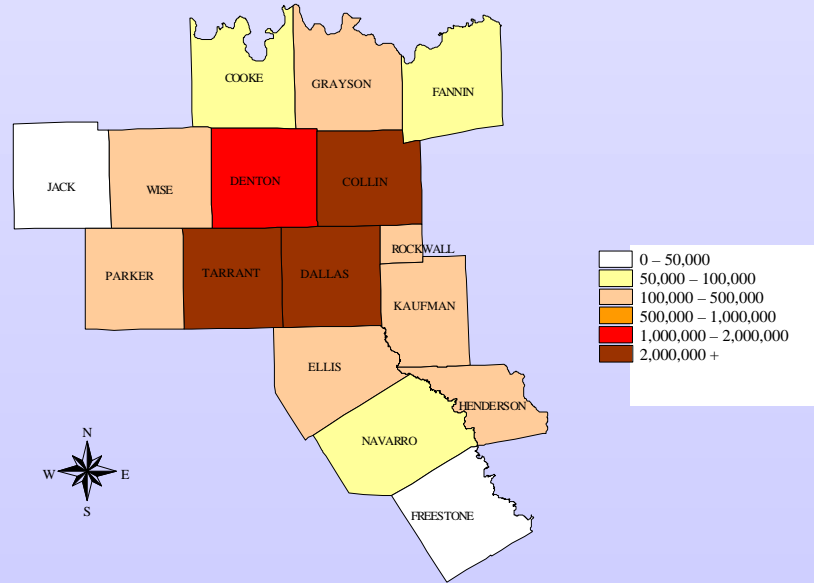
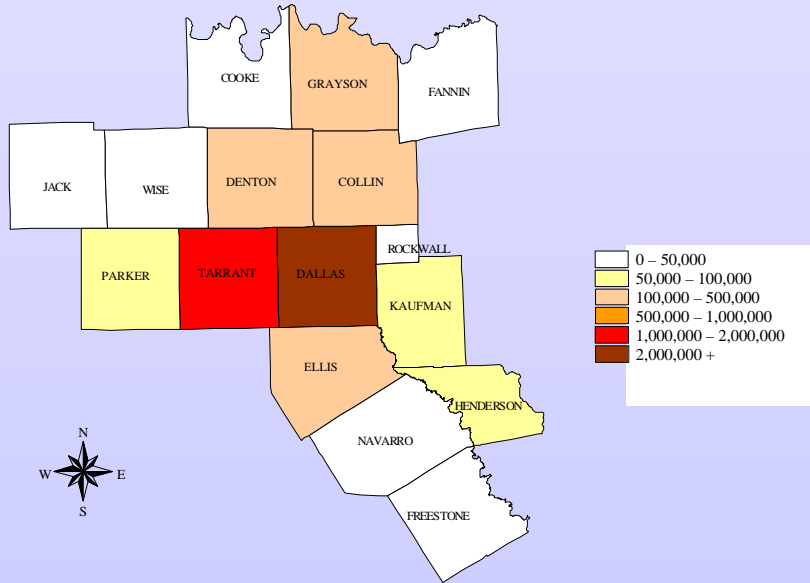


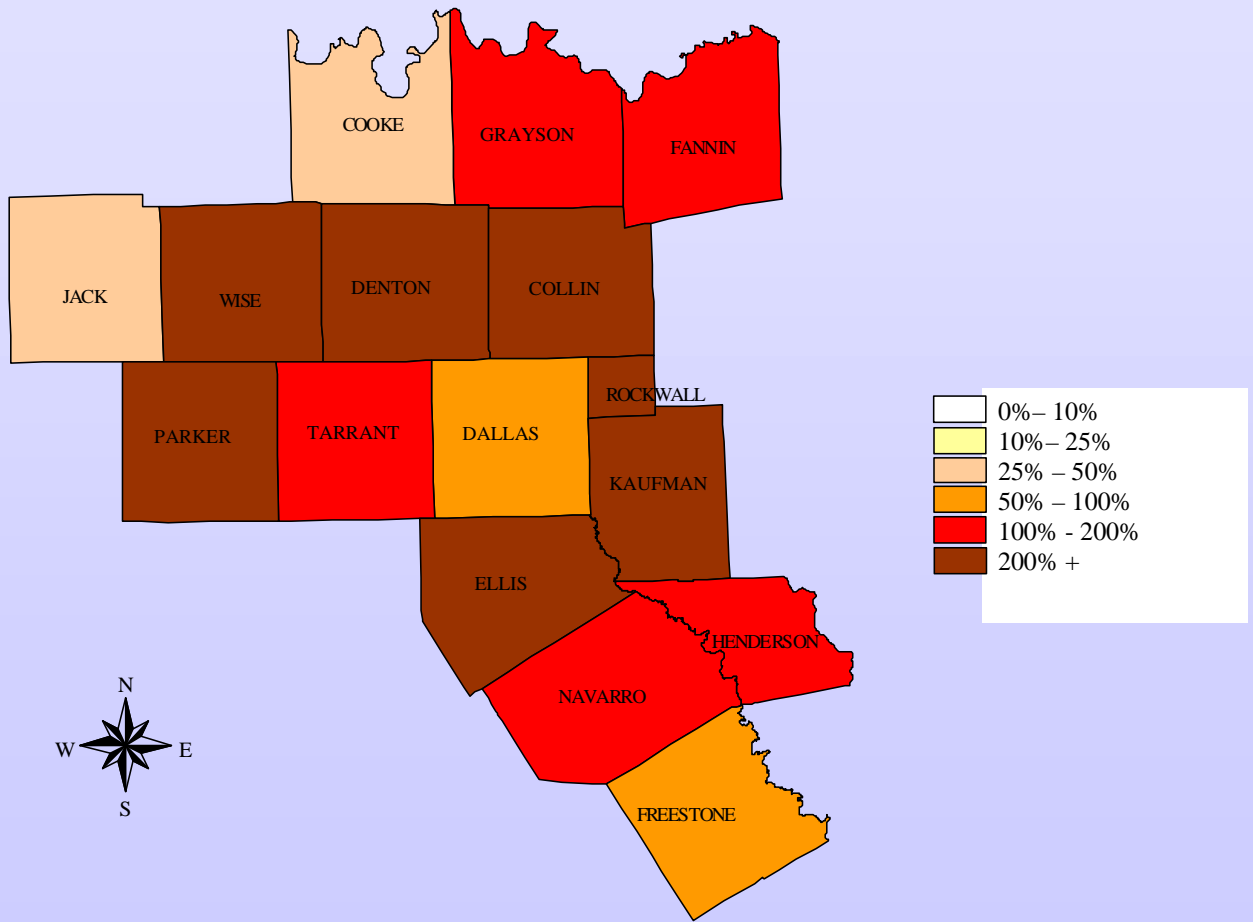
Figure 2.6 Region C Population



Historical 2000 Population

Projected 2060 Population

Figure 2.7
Projected 2000-2060 Population Increase



Projected Percent Increase 2000 - 2060

Water Demand Projections

- Basis (municipal water use)
 - Per capita dry-year water use
 - Adopted population projections
 - Historical water usage
 - TWDB surveys
 - State Data Center
 - WUG input (surveys)

Water Demand Projections

- Methodology (municipal water use)
 - Peak dry-year
 - Historical trends
 - Urbanization classification
 - Survey responses
 - Reductions for Plumbing Code requirements

Figure 2.8
Historical and Adopted Projections
for Water use by Category in Region C

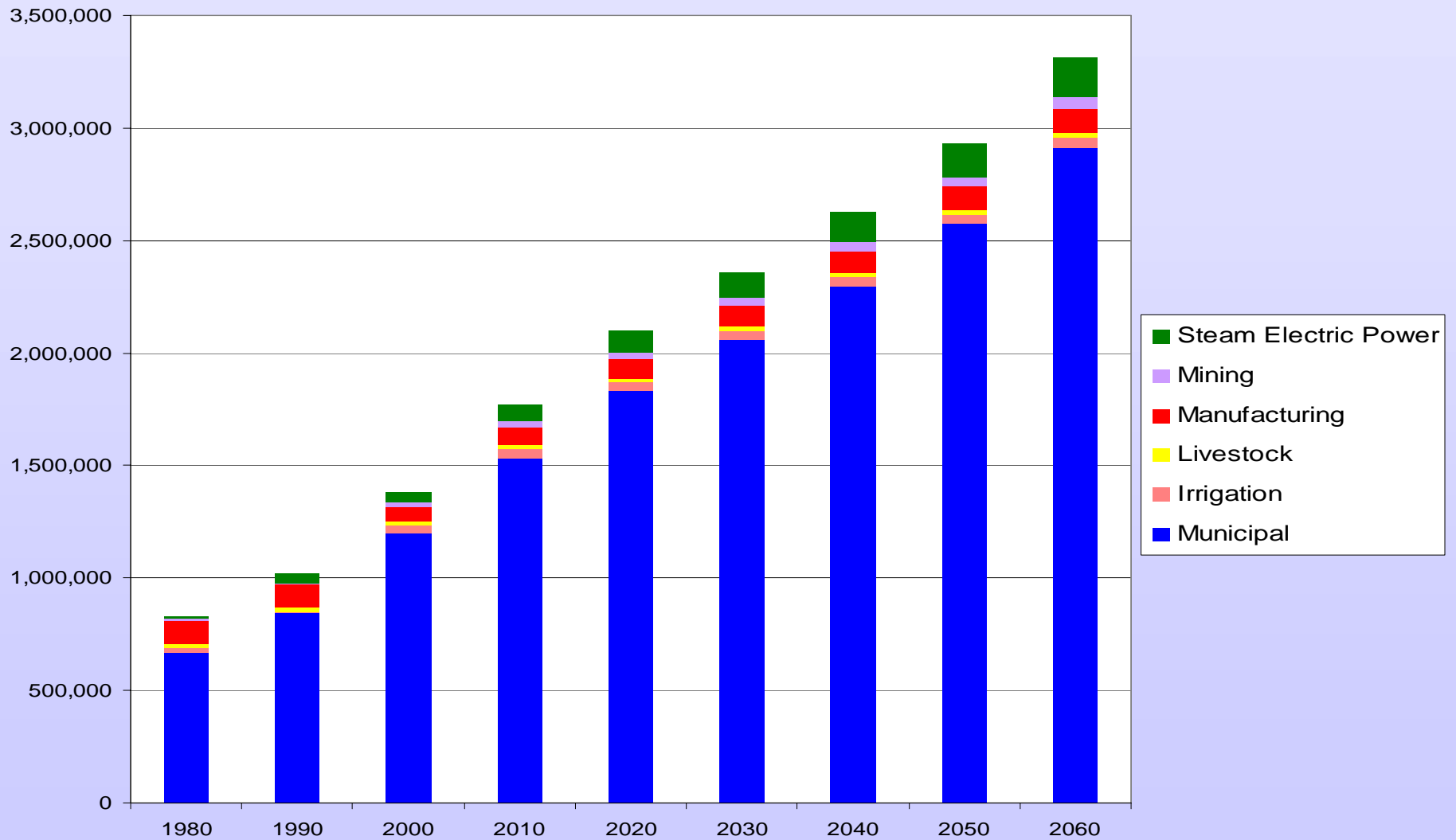
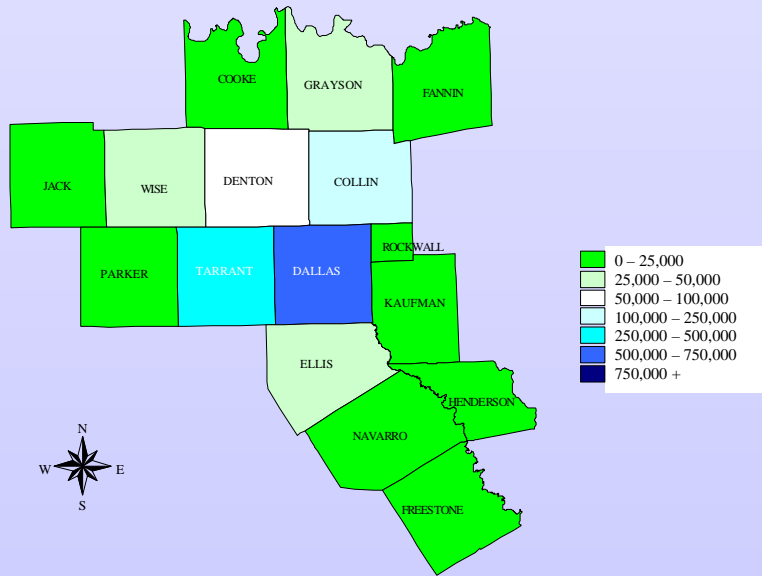
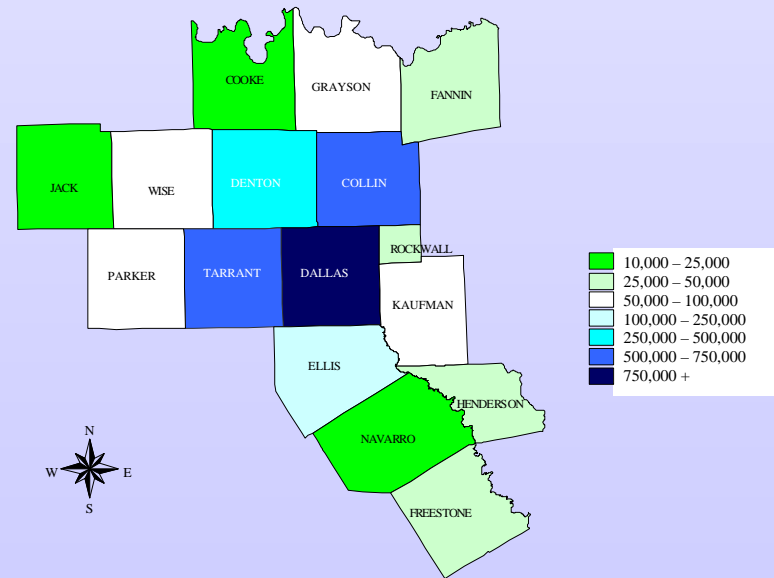


Figure 2.9 Region C Water Use

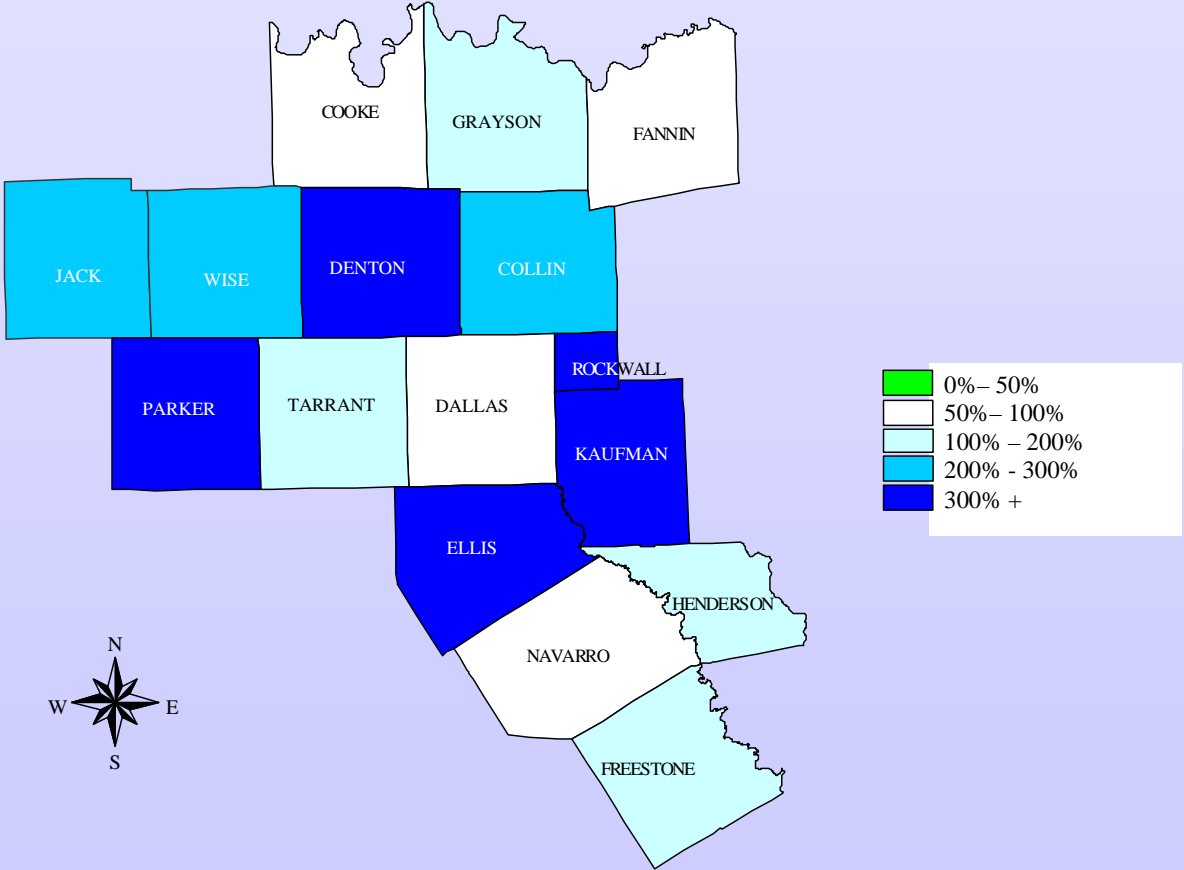


Historical 2000 Water Demand (Acre-Feet)



Projected 2060 Water Demand (Acre-Feet)

Figure 2.10
Projected 2000-2060 Water Use Increase



Projected Percent Increase 2000 - 2060

Discussion Item

Agricultural Areas Possibly
Affected by Water Transfers

Agricultural Areas Possibly Affected by Water Transfers

- Rural counties in Region C
 - Cooke
 - Fannin
 - Freestone
 - Grayson
 - Henderson
 - Jack
 - Navarro
 - Parker
- Rural areas outside of Region C

Agricultural Areas Possibly Affected by Water Transfers

- Agricultural areas could be affected by significant groundwater withdrawals and water surface changes
- Agricultural areas could be inundated by new reservoirs

Discussion Item

Summary of Speaker Comments
at May 17 RCWPG Meeting

Speaker Comments

- Summary of speaker comments were posted on the Region C web site in advance of today's meeting
- www.regioncwater.org

Discussion Item

Update on Overall Status and
Next Steps

Schedule

- Recently completed tasks
 - Potentially feasible water management strategies
 - Desalination
 - Aquifer storage and recovery
 - Met with wholesale water providers
 - Completed follow-up phone calls to water user groups for survey responses not received by April 30

Schedule

- Recently completed tasks (continued)
 - Finalized neighborhood water conservation study
 - Sent surveys to groundwater conservation districts

Schedule

- Upcoming tasks
 - Discuss potentially feasible strategies by type over the next several months
 - Mail surveys on water conservation strategies
 - Finalize Chapter 2
 - Follow-up on surveys to groundwater conservation districts
 - Follow-up on surveys regarding water conservation strategies
 - Continue working on key water quality parameters

August Discussion Items

- Feasible water management strategies
 - System operation
 - Conjunctive use of groundwater and surface water
 - Reallocation of reservoir storage
 - Brush control
 - Precipitation enhancement
 - Water right cancellation

August Discussion Items

- Memo summarizing comparison of supply and demand
- Potential impacts of water management strategies on water quality
- Quantify impacts on agricultural resources of transfer of water from rural to urban areas
- Model conservation and drought contingency plans.

August Discussion Items

- Draft Chapter 1
- Draft Chapter 3
- Draft comparison of supply and demand
- TWDB policy discussions
 - Agriculture
 - Rural
 - Data

August Action Items

- Feasible Water Management Strategies
 - Water reuse
 - Water conservation
 - Connection of existing supplies
 - Surface water resources
 - Groundwater resources
 - Interbasin transfers
- Memo summarizing currently available supplies

August Action Items

- Unique stream segments
- Approval of Chapter 2
- Key water quality parameters
- Updated list of plans (bibliography)