Memorandum

CITY OF DALLAS

DATE November 11, 2011

TO Honorable Mayor and Members of the City Council

SUBJECT Dallas' Approach to Water Conservation Briefing

On Wednesday, November 16, 2011 you will be briefed on Dallas' Approach to Water Conservation. The briefing material is attached for your review.

If you have questions or need additional information, please let me know.

Forest E. Turner
Assistant City Manager

Attachment

c: Mary K. Suhm, City Manager
Thomas P. Perkins, Jr., City Attorney
Rosa A. Rios, Acting City Secretary
Craig D. Kinton, City Auditor
Judge C. Victor Lander, Administrative Judge
A.C. Gonzalez, First Assistant City Manager
Ryan S. Evans, Assistant City Manager
Jill A. Jordan, P.E., Assistant City Manager
Joey Zapata, Interim Assistant City Manager
Jeanne Chipperfield, Chief Financial Officer
Frank Librio, Public Information Officer
Helena Stevens-Thompson, Assistant to the City Manager – Council Office

Dallas' Approach to Water Conservation

Dallas Water Utilities

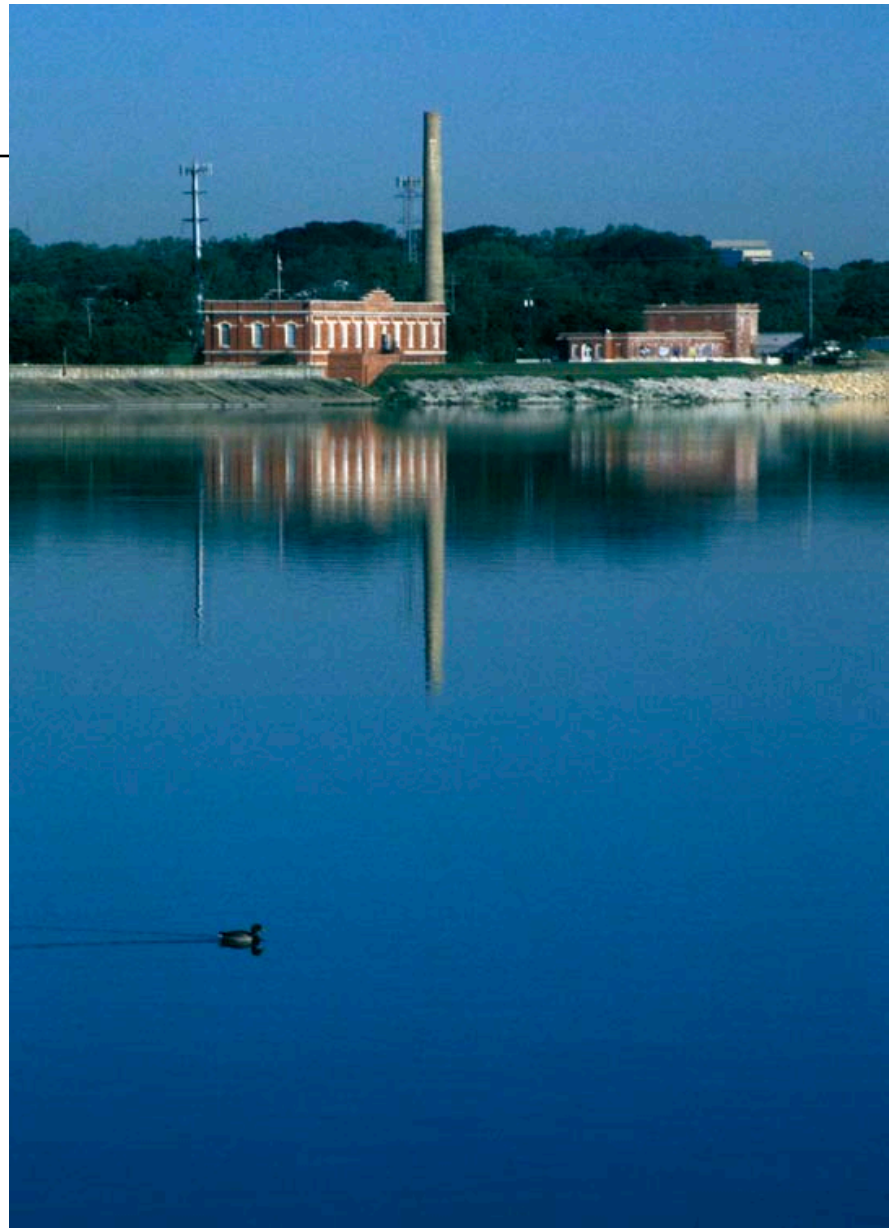
November 16, 2011

Purpose

This briefing provides an overview of Dallas' water conservation efforts

Outline

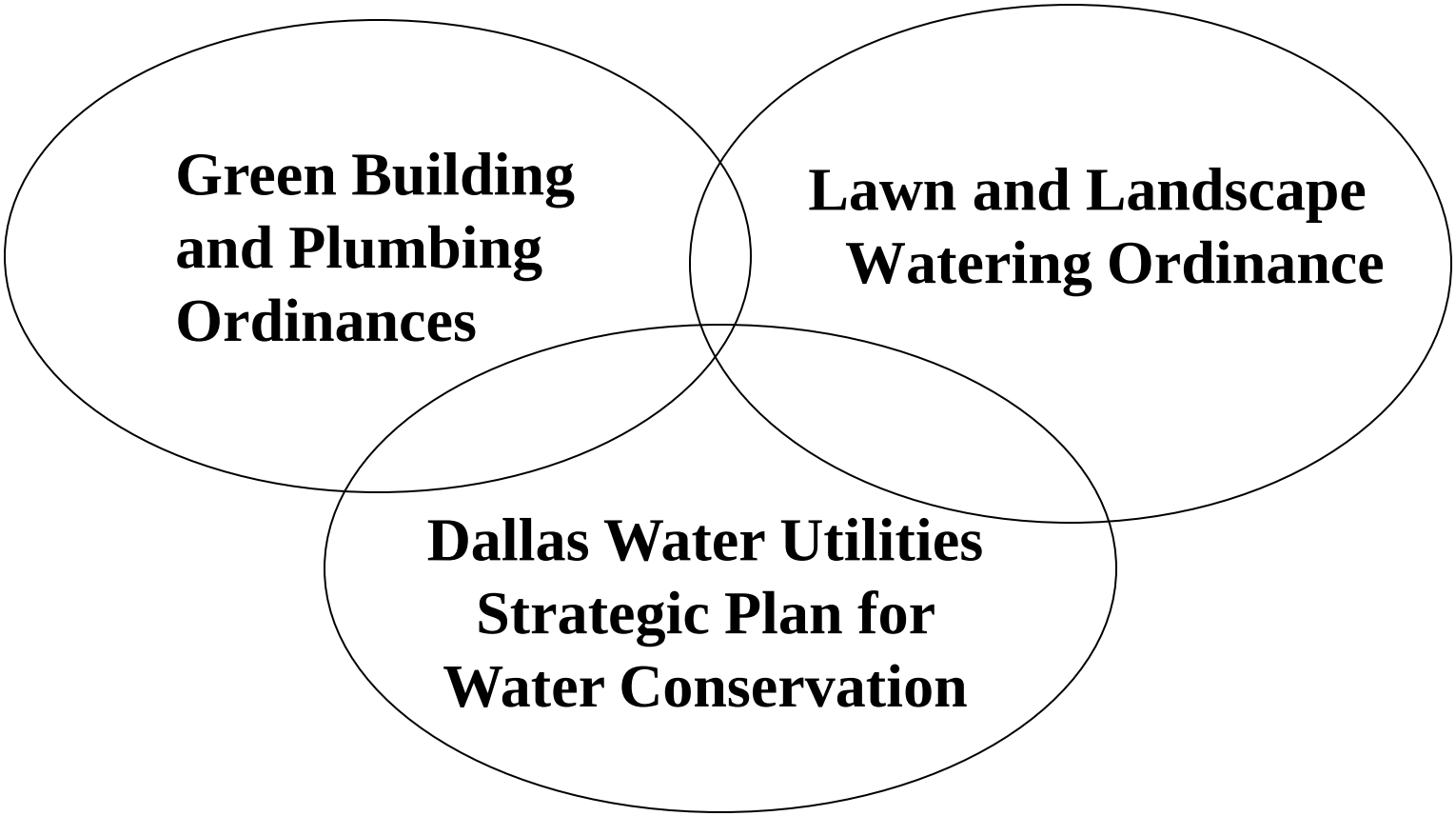
- Executive Summary
- City of Dallas Water Conservation Efforts
  - Green Building, Plumbing, and Lawn and Landscape Watering Ordinances
  - Dallas Water Utilities Strategic Plan for Water Conservation
- Additional Conservation Approaches
- Summary and Future Activities
- Appendix
  - Water Loss Management Program
  - Water use



Executive Summary

- Dallas has made great strides in reducing its per capita water demand through the use of conservation and efficiency programs
  - A 13 percent decrease in annual usage since FY 2001-02 when the City adopted stricter conservation measures
  - Ongoing water conservation efforts and implementation of the Water Conservation Five-Year Strategic Plan have helped Dallas save approximately 146 BG or 40 MGD
- City of Dallas has migrated to a more holistic approach to conserving water by the adoption of
  - Green Building ordinances (including current building code requirements for efficient fixtures)
  - Lawn and Landscape watering ordinances
  - Water conservation strategic plans
- Current water conservation goal is to reduce per capita water use by 1.5 percent per year

City of Dallas Water Conservation Efforts



Green Building and Plumbing, and Lawn and Landscape Watering Ordinances

Background - Ordinances

- Dallas currently operates under the 2006 International Plumbing Code (IPC) with adopted NTCOG and city amendments
- A primary objective of the 2006 IPC is to protect the potable water supply from contamination
- The use of gray water and other non-potable water is allowed with this primary consideration in mind
- 2006 IPC provides for the minimum code requirements for potable water fixture use
- Dallas code amendments allow for the use of water efficient fixtures and non-potable water systems for reuse

Green Building Ordinance

- The purpose of the Green Building Ordinance is to:
  - Reduce the use of natural resources
  - Create healthier and more sustainable living environments
  - Minimize the negative environmental impacts of development in Dallas
- Ordinance adopted in April 2008
- Phase I became effective October 2009
- September 28, 2011 amendment strengthened the water conservation provisions of Phase I

Green Building Ordinance – Phase I and II

- Phase I effective October 2009 and applies to all new construction
  - Water requirements: All projects must demonstrate a 20% reduction in water use from the baseline calculated for the total water fixtures determined under the 2006 IPC
  - 20% water reduction may be met by compliance with Greenbuilt Texas, LEED or LEED equivalent acceptable methods
- Phase II applies to all new construction
  - In order to accommodate the new IGCC, Phase II of Green Building Ordinance was delayed until October 2012

International Green Construction Code

- International Green Construction Code (IGCC) is undergoing final revisions and is slated for adoption by the International Code Council (ICC) in April 2012
- North Central Texas Council of Governments (NCTCOG) will convene a regional Green and Energy Code Advisory Board in November 2011 to establish a process for reviewing and approving the new IGCC
- Dallas participates on the NCTCOG Advisory Board and has already begun a review of some provisions of the IGCC
- Staff will begin the adoption process for the new IGCC by the City as soon as the final version is passed by the NCTCOG
- Staff anticipates further water reduction requirements as part of the new code

Lawn and Landscape Watering Ordinance

- Purpose of ordinance is to mandate that lawn and landscape irrigation water be used in a manner that prevents waste, conserves water resources for their most beneficial and vital uses, and protects public health and safety
  - Implemented in 2001 and amended in 2007
- Major components of the ordinance prohibit:
  - The irrigation of lawns and landscapes from 10:00 a.m. to 6:00 p.m. from April 1 through October 31
  - The use of irrigation systems with faulty pipes or systems with broken or missing sprinkler heads
  - The use of irrigation systems during rain events
  - Excessive runoff of water from lawns as a result of overwatering
  - The watering of impervious areas such as sidewalks and streets

Dallas Water Utilities Strategic Plan for Water Conservation

Water Conservation Plans – State Requirements

- Water Conservation Plans must be submitted to the TCEQ every five years to coincide with the regional water planning process
- Specific, quantified five and ten year targets for water savings must be included in the plans
- An entity applying for a new or amended water right must prepare and implement a water conservation/ drought contingency plan, and submit that plan with the application

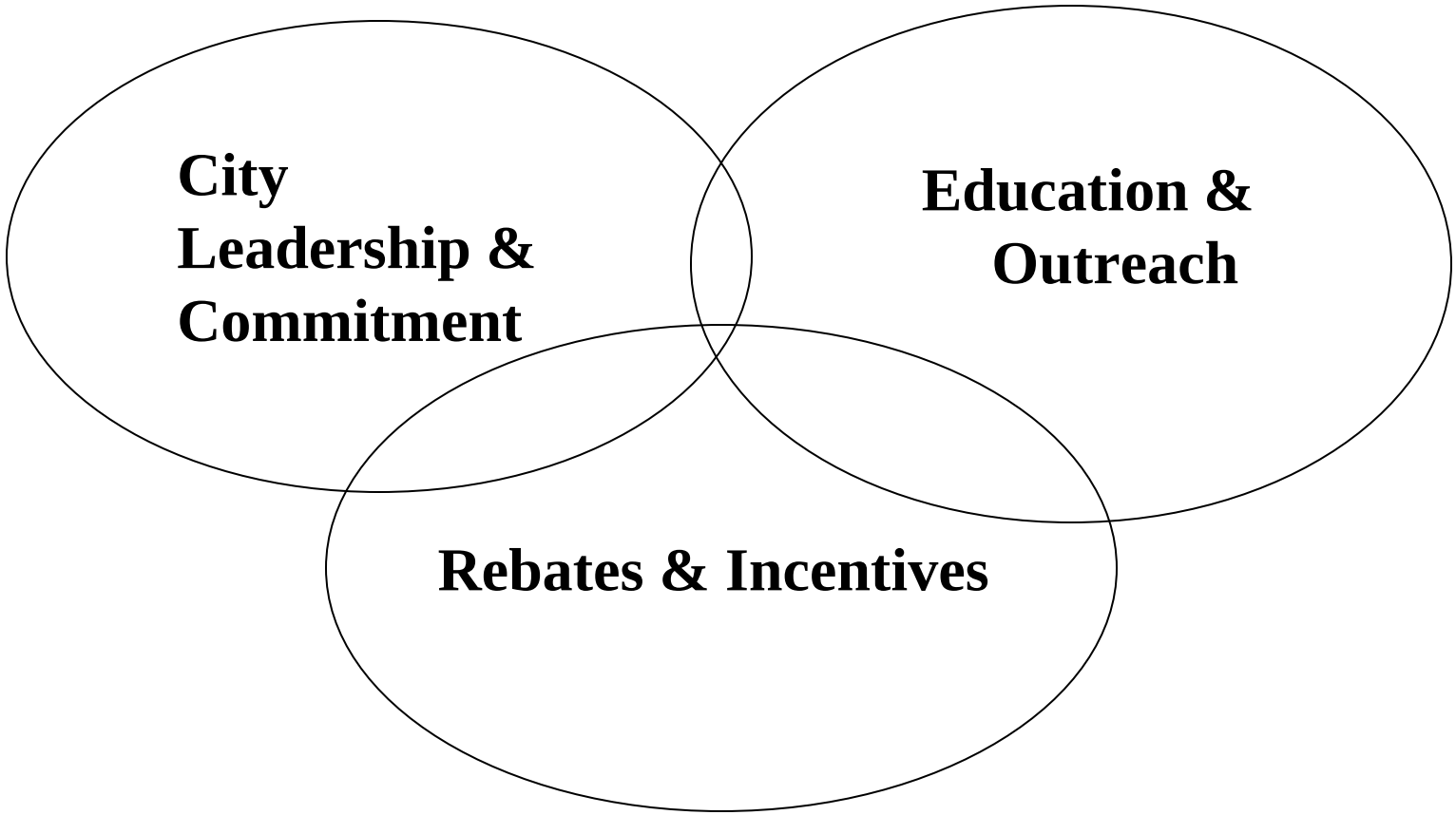
Background: DWU Water Conservation Program Chronology

- 1980s
  - City of Dallas water conservation program consisted primarily of public education and outreach
- 2001
  - Council passed an ordinance prohibiting lawn and landscape water waste; adding time of day watering; and added additional rate tiers
  - Rain sensor rebate program established
- 2005
  - City Council adopted first Five-Year Water Conservation Strategic Plan including incentives
- 2007
  - Time of day watering restrictions expanded to April through October annually
- 2010
  - Council adopted an updated Five-Year Strategic Plan in June 2010

Background: Water Conservation Strategic Planning

- Dallas Water Utilities first Strategic Plan was adopted by City Council in 2005
  - Defined water conservation goals for a five year period ending in FY 2009
  - Plan included programs and budgets to achieve the goals
  - Strategic Plan was updated and adopted in 2010, building on the accomplishments from the original plan and setting new goals and programs for period ending FY 2015

Three Major Elements of 2010 Water Conservation Five-Year Strategic Plan



How We Chose Programs to Pursue

- In the development of the Water Conservation Five-Year Strategic Plan, screening criteria were developed to determine the most effective programs
- Programs chosen were based on:
  - Water savings
  - Cost /Benefits
  - Application to a broad range of customers and water uses
  - Feedback from stakeholders and customer cities
- 14 programs were recommended for implementation in the 2010 Water Conservation Five-Year Strategic Plan
  - Budgets to be submitted annually

Methodology for Cost Benefit Analysis of Water Conservation Programs

- Each water conservation program increases our available water supply
- Average cost of new water supply from 2005 Long Range Water Supply Plan including treatment costs is estimated at $550 per acre-feet
- Cost benefit analysis compared unit cost of new water supply to cost of each program which produces water in dollars per acre-feet
  - Acre-feet (ac-ft) is a water supply term and is equal to 325,851 gallons of water

Source: 2005 City of Dallas Water Conservation Five-Year Strategic Plan

Example of Analysis – Single Family Household Showerhead and Aerator Replacement Kit

Assumptions:

SF Household Size	2.77	people per household
Water Savings	20.775	gal/day per kit
Water Savings (2.77 x 20.775 / 325,851)	0.023	ac-ft/yr per kit
Total Water Savings over 15 years (.023 x 15)	0.349	ac-ft per life of kit
Cost per Kit	$ 27.53	
Cost Benefit per ac-ft ($27.53/.349)	$ 78.86	

Using this program, the cost of water produced is $78.86 per ac-ft which is cheaper than the average cost of a new water supply ($78.86 vs. $550 per ac-ft)

Source: 2005 City of Dallas Water Conservation Five-Year Strategic Plan

Cost Benefit Results for Programs

	Cost per ac-ft
Industrial Commerical Institutional (ICI) Grant	$ 33.92
Single Family (SF) Showerhead and Aerator Replacement	$ 78.86
Multi-Family (MF) Showerhead and Aerator Replacement	$ 108.14
Combined Cost for Public Awareness & School Education	$ 170.67
Pre-Rinse Spray Nozzle	$ 228.98
Water Efficient Toilet Replacement	$ 422.58
Single Family Water Audit	$ 482.91
Evapotranspiration (ET) Based Controller System	$ 558.19
Residential Clothes Washer	$ 648.33
Residential Landscape Replacement	$ 1,096.52
Rain Barrel	$ 1,606.14
Gray Water	$ 1,927.25
Rainwater Harvesting System	$ 2,244.20

Water conservation measures were considered “cost-effective” when their unit cost was less than the unit cost of expanding the water supply.

Status of Conservation Strategic Plan Programs – City Leadership & Commitment

1. Reduce water loss through additional leak detection
   - Enhance efforts to reduce system leak run times by adding more crews
   - Enhanced efforts commenced in FY11
   - Current budget of $1.8M for FY12
   - Proposed full year funding of approximately $2.3M for FY13, FY14, and FY15

   - For benefits from existing main replacement program and automated flushing, see additional information in Appendix

Source: City of Dallas Water Conservation Five-Year Strategic Plan June 2010

Status of Conservation Strategic Plan Programs – City Leadership & Commitment

2. Reduce water loss through improved metering accuracy
   - Refine meter/billing data by identifying and correcting zero reads, erroneous reads, and unauthorized uses
   - Meter replacement program
   - Enhanced efforts commenced in FY 2011
   - Annual budget of $1.1M

   - For more detail, see additional information in the Appendix

Source: City of Dallas Water Conservation Five-Year Strategic Plan June 2010

Status of Conservation Strategic Plan Programs– City Leadership & Commitment

3. Voluntary twice weekly watering
   - Encourages all customers to limit irrigation to a maximum of two days per week from April 1 through October 31
   - Outreach efforts commenced in FY 2010/ 2011 with Lawn Whisperer campaign
   - Regional effort in Save North Texas Water between Dallas and Tarrant Regional Water District has maximized outreach and leveraged an additional $1.5M in advertising
   - Projected budget: included in annual $1.38M appropriation for advertising campaign and media placement

Source: City of Dallas Water Conservation Five-Year Strategic Plan June 2010

Status of Conservation Strategic Plan Programs– City Leadership & Commitment

4. Industrial, Commercial and Institutional (ICI) Water-efficient Equipment Rule
   - Ordinance requirements to expand minimum water efficiency standards for commercial equipment in new and newly occupied ICI establishments
   - Scheduled for FY 2014
   - No cost consideration

5. Water-wise landscape design requirements
   - Expand ordinance requirements to limit turf areas in all new landscapes and require low water-use landscaping in other areas
   - Scheduled for FY 2014
   - No cost consideration

Source: City of Dallas Water Conservation Five-Year Strategic Plan June 2010

Status of Conservation Strategic Plan Programs– City Leadership & Commitment

6. Texas High Efficiency Toilet (HET) Law
   - New TX HET Law phasing in 1.28 gallons per flush (gpf) requirement
   - Effective date is 2014
   - No cost consideration

Source: City of Dallas Water Conservation Five-Year Strategic Plan June 2010

Status of Conservation Strategic Plan Programs– Education and Outreach Initiatives

7. ICI Hospitality Program
   - Engage hotels, motels and restaurants in the city's water conservation program and train hospitality staff on methods to reduce water use and waste
   - Commenced in FY2011
   - Budget of $50k per year

8. ICI Customer Water Audits
   - Review all end-uses of water and help customers identify potential water-efficiency improvements
   - Scheduled for FY2012
   - Budget of $220k per year

Source: City of Dallas Water Conservation Five-Year Strategic Plan June 2010

Status of Conservation Strategic Plan Programs– Education and Outreach Initiatives

9. ICI Training Programs
   - Training programs for facility managers for premise types that use the most water and licensed irrigators with a focus on the EPA Water Sense program
   - Scheduled for FY2012
   - Budget of $25k per year

10. ICI Business Partnership/Stakeholders
   - Business leaders who represent top water using industries. Ongoing dialogue on new programs, what's working, what's not working
   - Scheduled for FY2012
   - No cost consideration

Source: City of Dallas Water Conservation Five-Year Strategic Plan June 2010

Status of Conservation Strategic Plan Programs – Rebates and Incentives

11. Enhanced residential toilet incentives
    - Expand “New Throne for Your Home” by offering free toilets to qualified applicants; increase distribution from 8K to 14K toilets annually
    - Enhanced program began in FY2011
    - Budget of $850k per year

12. ICI Financial Incentive Program
    - Project specific program to promote water efficient equipment installation and upgrades
        - Cooling processes, plumbing fixtures, laundry processing, medical/dental, and landscape irrigation
    - Scheduled for FY 2012
    - FY12 budget of $2.0M and projected $2.3M for FY13, FY14, and FY15

Source: City of Dallas Water Conservation Five-Year Strategic Plan June 2010

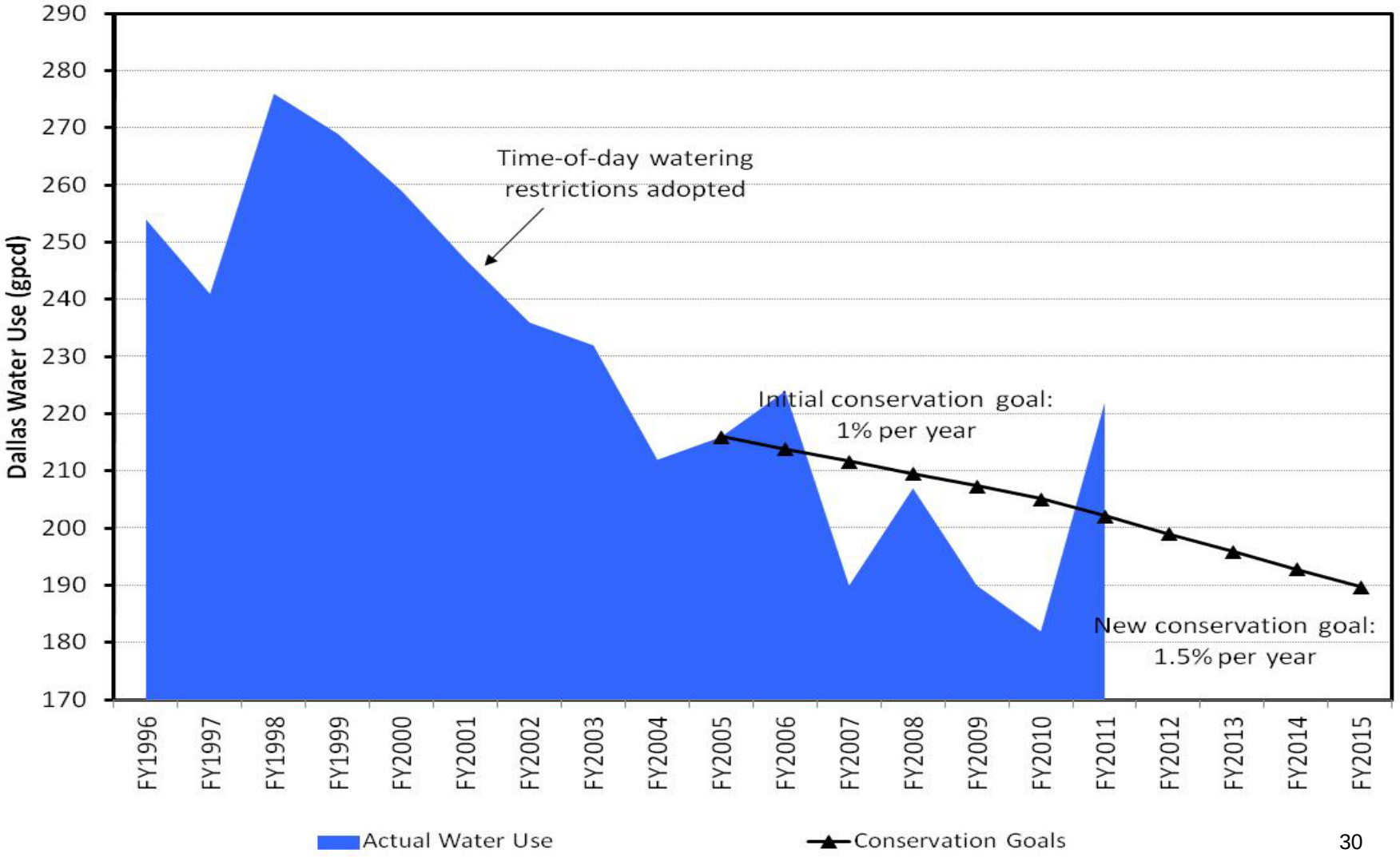
Status of Conservation Strategic Plan Programs – Rebates and Incentives

13. Residential Irrigation Incentive Program
    - Financial rebates for customers to retrofit their existing irrigation systems with water-conserving equipment
    - Scheduled for FY 2013
    - Projected budget of $100k for FY13; $700k for FY14 and $1.6M for FY15

14. Residential clothes washer rebate
    - Rebates offered to residential customers to replace older inefficient clothes washers with high-efficiency models
    - Scheduled for FY2013
    - Projected budget of $150k for FY13; $200k for FY14 and $0.5M for FY15

Source: City of Dallas Water Conservation Five-Year Strategic Plan June 2010

Water Consumption Trend



Additional Conservation Approaches

Additional Conservation Approaches

- The following water conservation approaches are permitted under current building and plumbing codes
  - Gray Water
  - Rainwater Harvesting System
  - Rain Barrels
  - Evapotranspiration (ET) Based Controller System
- These were not incentivized in the 2010 Water Conservation Five-Year Strategic Plan because analysis did not show them to be cost effective compared to other strategies chosen
- Various classes and seminars provided through our education and outreach include information or training on these topics
- Mandatory maximum twice a week watering – currently included as Stage 1 in the Drought Contingency Plan

Additional Conservation Approaches - Gray Water

- Gray water is defined in Texas as wastewater from clothes washers, showers, bathtubs, and sinks not used for the disposal of hazardous or toxic ingredients
- Allowed per the Dallas plumbing code, and must be identified (typically with different color pipes) and designed to prohibit cross connection to the potable public water supply system
- Gray water may need treatment
- May be used for irrigation or for toilets and urinals
- Not generally efficient for single family homes, due to a high cost to retrofit existing homes and buildings and long payback period
- The quantity of gray water is declining due to water conserving showerheads, faucets and clothes washers
- Better suited for commercial use and new construction

Additional Conservation Approaches - Rainwater Harvesting and Rain Barrels

- A typical system collects rainwater from the roof or pavement
- Rainwater harvesting is allowed per the Dallas Plumbing Code and considered to be a private non-potable water source similar to domestic water wells
  - Must be identified (typically with different color pipes) and designed to prohibit cross connection to the potable public water supply system
- Stored in underground or above-ground tanks and barrels
- The tank or barrel should have a tight cover to prevent algae and mosquito growth
- Various materials of tank construction are available such as concrete, steel, fiberglass, plastic, etc.
- Pumping system needed to provide adequate pressure for an irrigation system
- Generally not efficient for single family homes, since these don't hold enough water for lawn watering and have a very long payback period

Additional Conservation Approaches - Rain Barrel Examples

- Allen, Texas
  - Program established in 2005
  - $25 per barrel with 2 barrel limit
  - 137 rebates issued for 168 barrels
- Fairview, Texas
  - Program established in 2005
  - $50 per barrel with 2 barrel limit
  - Estimate 50 rebates issued
- Plano, Texas
  - Program established in 2010
  - $25 per barrel with 2 barrel limit
  - Estimate 300 rebates issued
- Rain barrel classes are also offered in other Metroplex cities

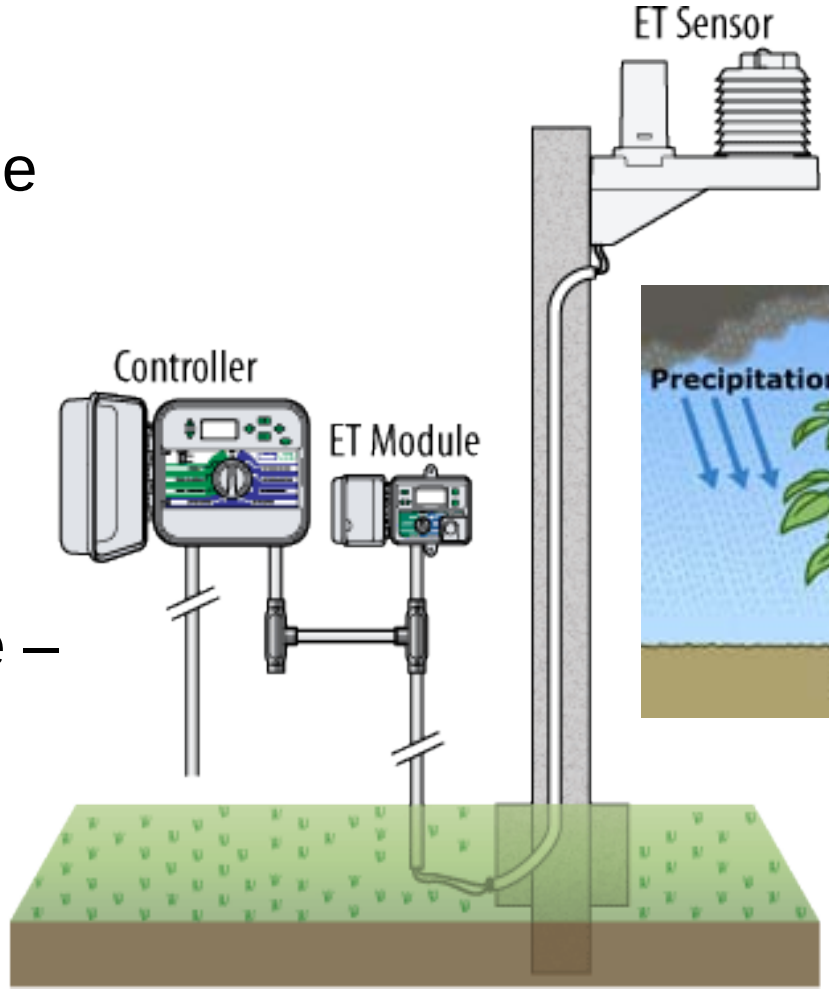
Additional Conservation Approaches – Commercial Example

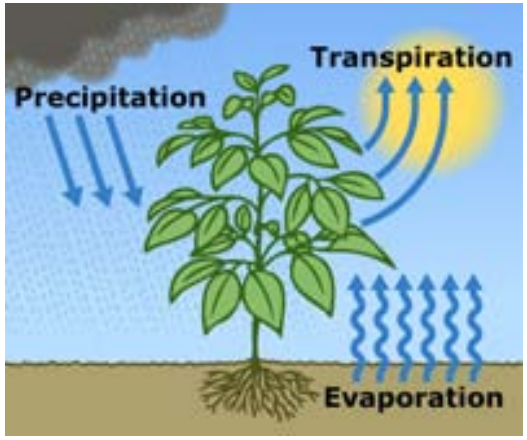
- Hotel to complete projects to achieve a LEED Silver certification in keeping with City policy
- Designed to reduce stormwater run-off through turf and rain garden
- A 25,000 gallon cistern will capture condensate water for irrigation instead of potable water
- Low flow water fixtures utilized as water saving technology

Omni Dallas Convention Center Hotel

Additional Conservation Approaches - Evapotranspiration (ET) Based Controller System

- Irrigation devices use soil water balance to schedule irrigation amounts and timing
- Some results have indicated these devices may increase water use – additional industry research is underway





Other Options for Additional Water Conservation Programs

- Toilet Flapper Retrofits
- Hot Water on Demand- Loop Point of Use
- Residential Dishwasher Replacement Incentives
- Residential Swimming Pool Covers
- Athletic Field Conversions
- Golf Course Conversions
- Wholesale Agency Financial Incentive Assistance
- Condensate Reuse
- Park Conversions
- Industrial Sub-metering
- Swimming Pools and Zoos
- Water Fountains
- Industrial Water Treatment
- Desalination
- Energy and Water Conservation Financial Incentives
- HOA Rules
- Performance Contracting
- Process Water
- Waterless Urinals

Summary and Future Activities

Summary

- Dallas has reduced its per capita water demand through the use of conservation and efficiency programs
  - A 13 percent decrease in annual usage since FY 2001-02 when the City adopted stricter conservation measures
  - Ongoing water conservation efforts and implementation of the Strategic Plan have helped Dallas save approximately 146 BG or 40 MGD
- Dallas' 5-year Water Conservation Strategic Plan is focused on obtaining the maximum water reduction at the least cost
- Reuse and conservation are an integral part of Dallas' future water supply, equaling 25% of our future need
- Current Water Conservation Five-Year Strategic Plan is aimed at reducing gallons per capita water use by 1.5 percent per year

Activities Planned for 2012

- January 2012 - Green Building Ordinance Task Force to reconvene
- February 2012 - Brief Council on review of current retail rate structure
- First Quarter 2012- Award contract for ICI Audits and Training Programs
- Third Quarter 2012- Authorize funding for ICI incentive program
- Review current and additional water conservation incentive programs in preparation for FY 2012-13 budget

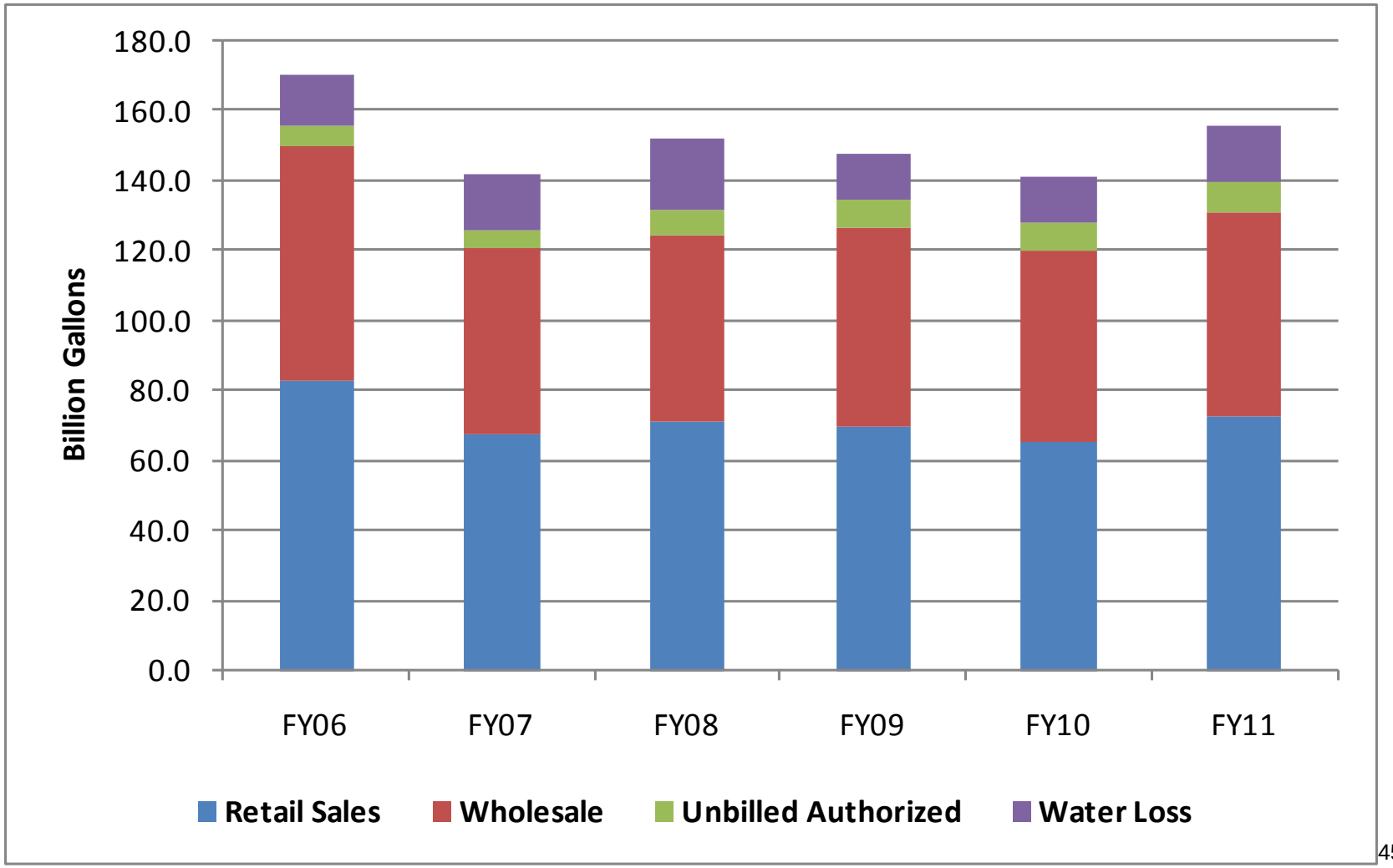
Appendix

Water Loss Management Program

Water Loss Reduction

- Dallas Water Utilities has several programs underway to minimize our unbilled water loss
- Industry standards set a goal of 10% for unaccounted water
- Dallas water loss programs include:
  - Main Replacement
  - Leak Detection
  - Meter Replacement
  - Flushing Activities
- Dallas' FY11 water loss was 10.3 percent

Dallas Total Treated Water Production



Main Replacement Program

- Dallas Water Utilities has approximately 5,000 miles of water pipelines
- There is a needs inventory of approximately 366 miles of water pipelines that have been identified and prioritized based on maintenance history
- Pipe size, type of pipe material, soil condition, break frequency, regulatory requirements, system overflows, and system demands are used in the replacement process
- Once identified, the pipe segments are prioritized and placed in the pipeline inventory database for replacement
- Annual costs for water main replacements average approximately $67.0M

Leak Detection

- Council approved current program in FY05
  - Acoustic Correlation used to locate leaks
- City Council Approved Enhancements in FY07, FY09, and FY11
  - Increased staff and equipment – now have 6 survey crews
  - Frequency of system survey every 2.5 years
- Goals and Benefits
  - Efficient use of water supply
  - Recovers production capacity and costs
  - Reduced liability and damage to property
  - Improved environmental quality
- Accomplishments
  - FY11 Leak Detection Program
    - Surveyed 2,982 miles of pipeline
    - Identified 291 unknown leaks
  - Since FY05 inception:
    - Surveyed 9,400 miles of pipeline
    - Located 1,603 unknown leaks
    - Saved an estimated 952 MG treated water
- Annual costs approximately $1.8M

Meter Replacement Program

- Meter accuracy ensures water usage is accurately billed
- Dallas Water Utilities has approximately 300,000 active water meters
- Vendors warranty meters as follows: 5/8” for 15 years, ¾” to 2” for 10 years, 3” and greater for 1 year
- Dallas Water Utilities averages 20,000 meter exchanges annually or approximately 1,600 per month
- Generally, we replace meters on the following schedule:
  - 5/8" Meters - 15 years
  - 3/4" to 2" Meters - 10 years
  - 3” and 4” Meters - 2 years
- Large meters 6” and greater are categorized by and tested according to annual consumption:
  - Category I - 15 million gallons (MG) or greater – tested every 6 months
  - Category II - 0.5MG to 14.9 MG – tested annually
  - Category III - Less than 0.5 MG – tested every two years
- Annual costs approximately $1.0M

Flushing Activities

- Generally we flush for 3 reasons
  - Customer generated (Water Quality)
    - Aesthetic problems such as taste, odor or color
  - Chlorine Residual Maintenance
    - Monthly dead-end (2,300 total)
    - Newly installed pipelines (~300)
  - Operational
    - Maintenance and repairs
    - Fire flow testing
- Automated flushing at 30 sites
  - Saves crew time and water
- Currently testing new technology
  - Solar powered auto-flushing
  - Controlled practice
  - Minimizes water loss
- Annual costs approximately $0.7M

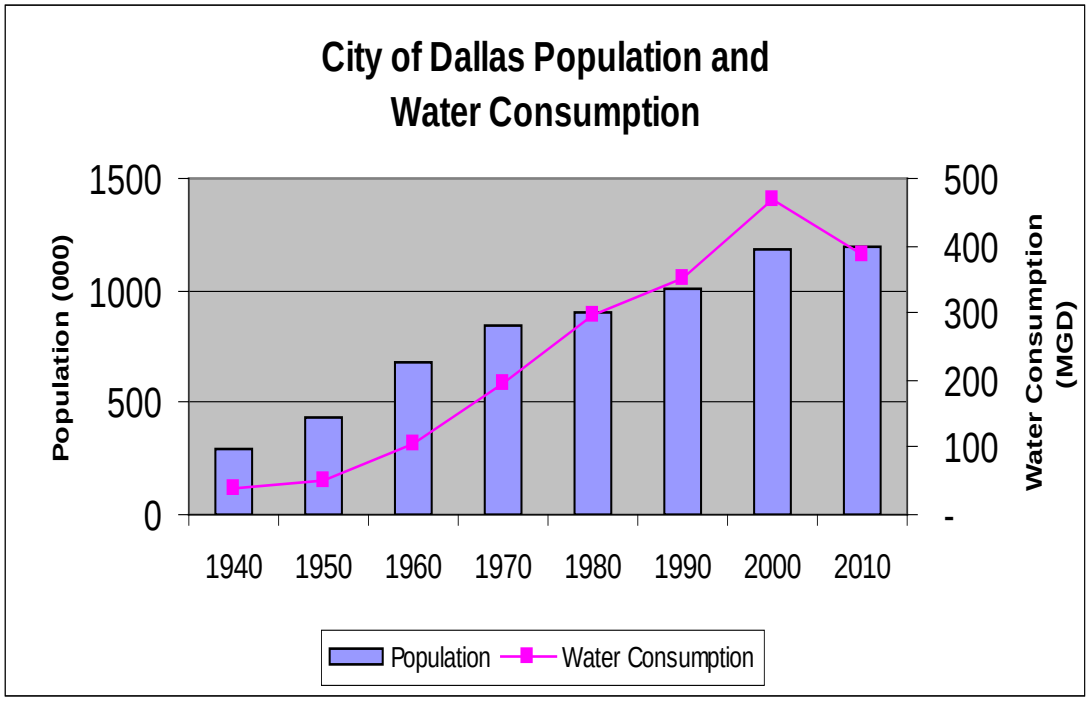
Water Use

Measures of Water Use

- Population growth
- Gallons Per Capita Daily – a measure of water use
- Economic conditions (jobs, new businesses, etc.)
- System water uses

Population Growth

- New water use estimates will utilize new 2010 census data
- Project population estimates for future years in 10 year increments (2020, 2030, 2040, 2050, 2060, and 2070)
- Population estimates and gallons per capita daily (GPCD) will then be used to project future and water demand projections for Dallas and customer cities



Gallons Per Capita Daily (GPCD)

- Gallons per capita daily (GPCD) is the amount of water that one person consumes in one day
  - Useful as a benchmark for a city to compare against itself how efficiently it is using water
  - Not a good benchmark to compare cities against one another as each city has its own unique characteristics
  - Dallas has a population of 1.2M people, with an additional 500K employed people from outside the City which increases our GPCD
- The Texas Water Development Board indicates in the 2012 Draft Water Plan that there are valid reasons that cities have differing per capita use values:
  - Climatic conditions
  - Amount of commercial and institutional customers
  - Construction activities
  - Price of water
  - Income of customers
  - Number of daily or seasonal residents
  - Age of infrastructure
- The passage of SB 181 calls for a standard methodology for measuring water usage throughout the State of Texas

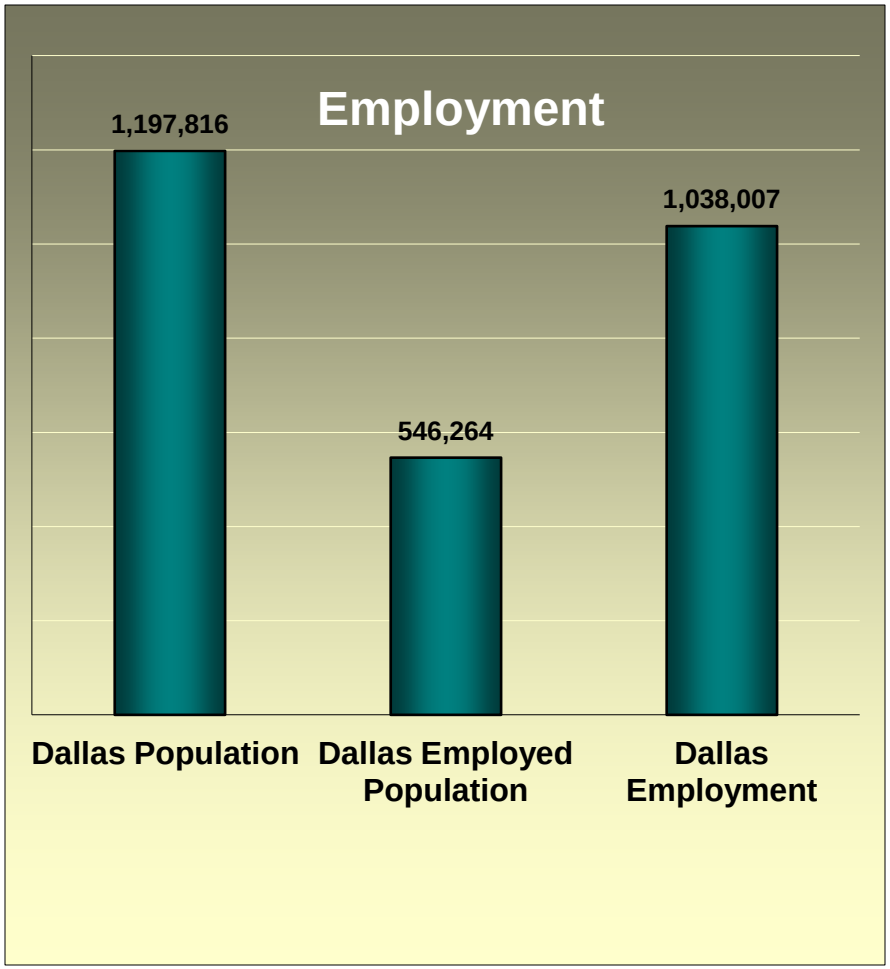
GPCD Comparisons
Comparing Apples to Oranges

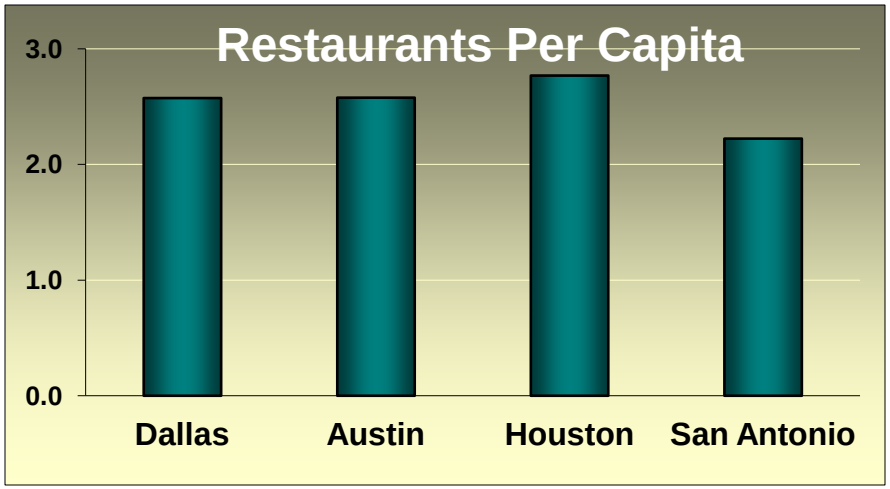
City	2008 Gallons per Capita per Day (GPCD)	2008 Residential GPCD
Houston	134	65
San Antonio	149	92
Dallas	213	95
Austin	171	102
Fort Worth	192	75

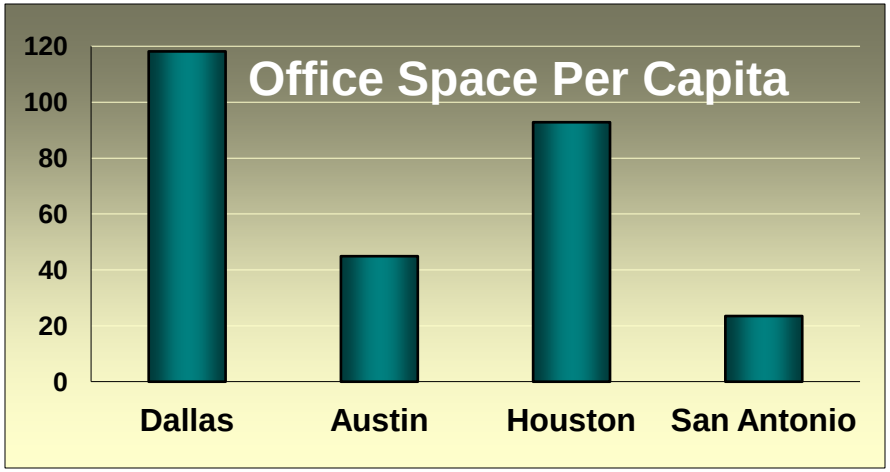
Total GPCD does not tell the whole story

Source: Texas Water Development Board 2012 Draft Water Plan

Economic Conditions - Dallas Commercial Demographics

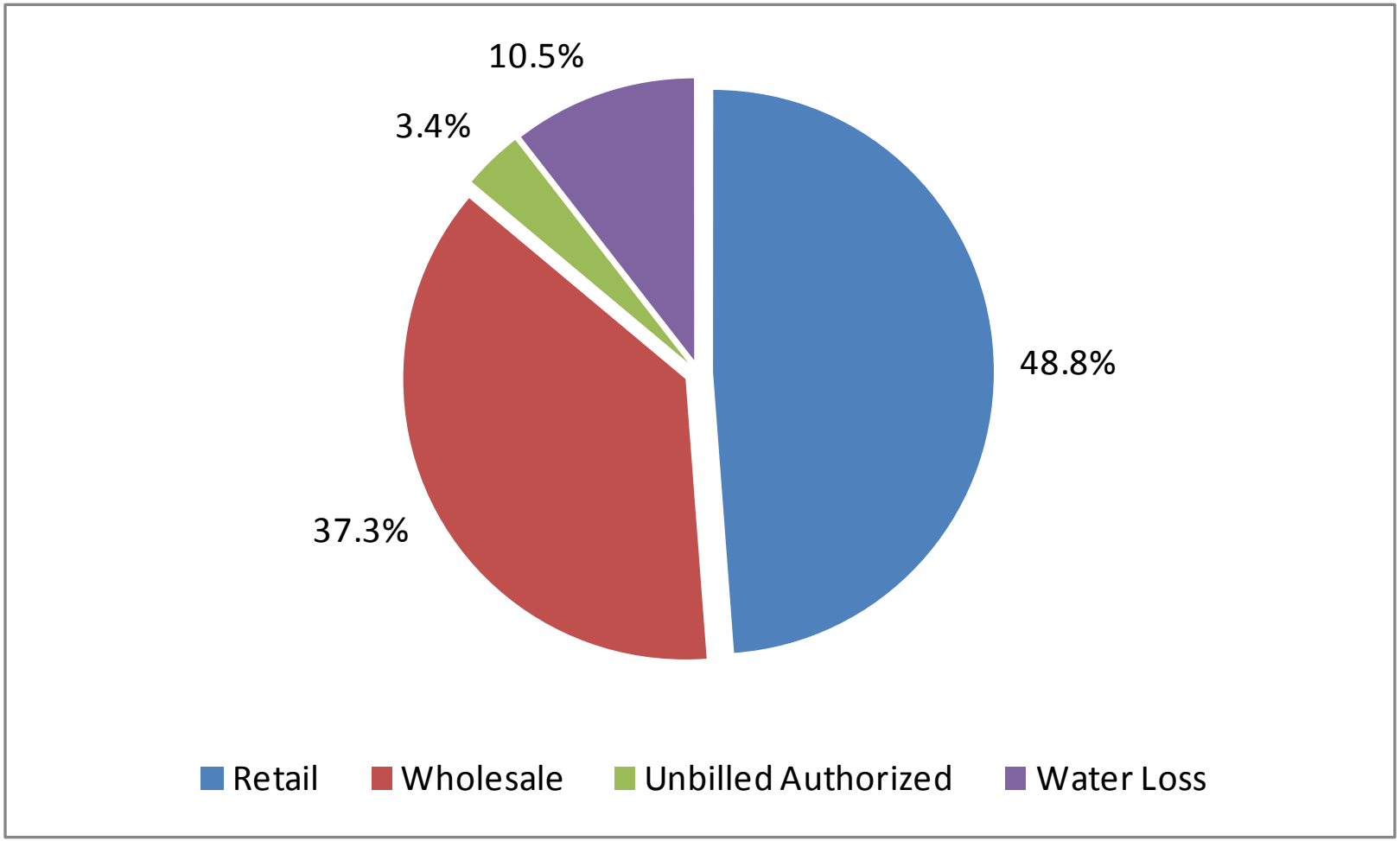






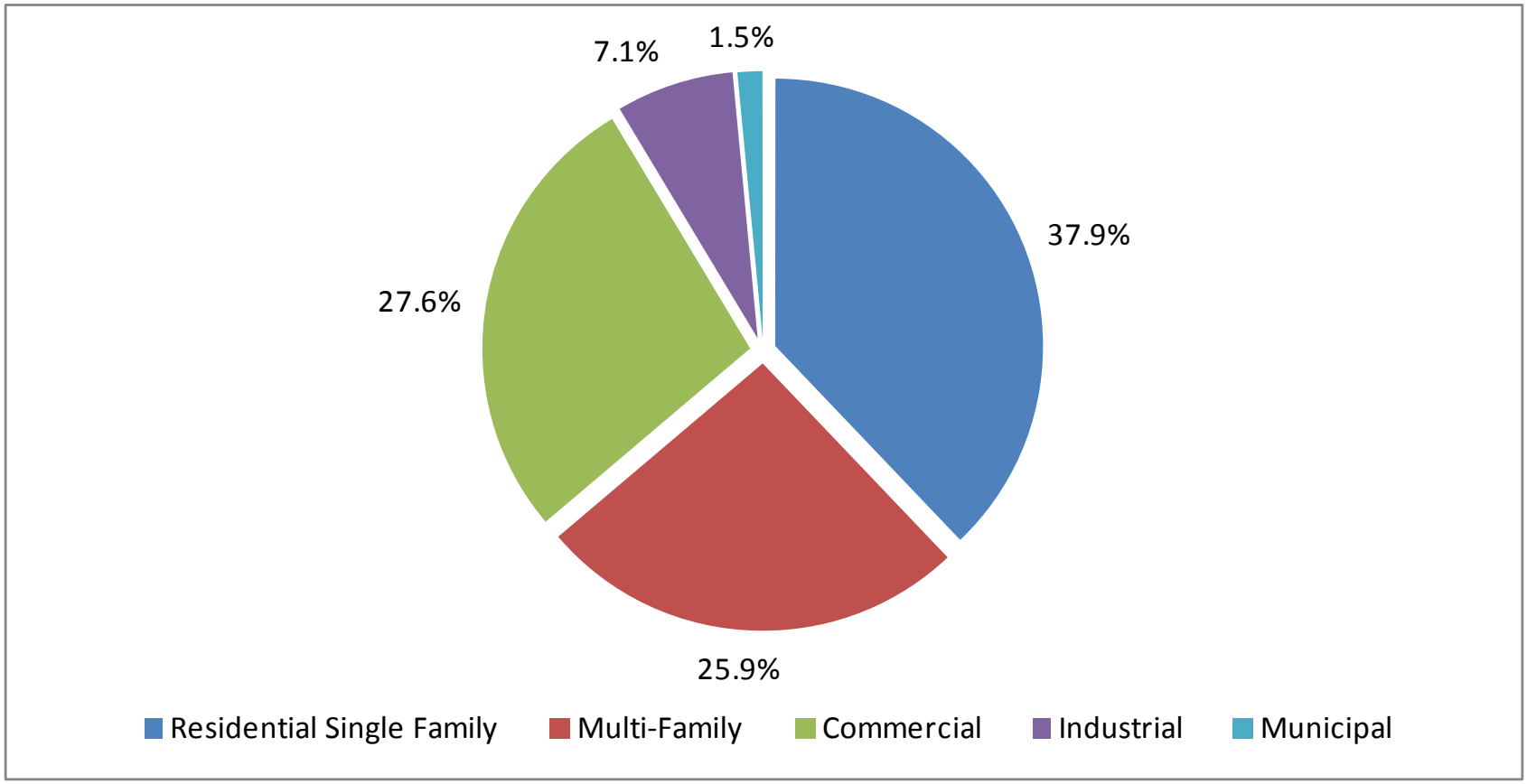
Sources: 2010 Census Data; Texas Workforce Commission
D & B Business Data 2011; Selected Office Submarkets – CoStar 2011
City of Dallas Economic Development Department

How Dallas' System Water is Used



Represents Total Water Use for FY04 – FY08; Dallas serves a total population of 2.3M people
Source: City of Dallas Water Conservation Five-Year Strategic Plan Updated June 2010

City of Dallas Retail Water Use



Represents Total Water Use for FY04 – FY08; Dallas serves a retail population of 1.2M people
Source: City of Dallas Water Conservation Five-Year Strategic Plan Updated June 2010