

Georgia Environmental Protection Division
Middle Chattahoochee Council
Water Conservation Technical Memorandum

Section 1 – Introduction

The regional water planning councils were charged with incorporating management practices that included and promoted water conservation into their Regional Water Plans (Section 6). This technical memorandum describes the water conservation practices selected by the Council. Where data were available and reasonable assumptions could be made, anticipated water savings associated with the selected practices were quantified and are presented herein. Recognizing the challenge of selecting meaningful and measurable management practices; the Council also included recommendations to the state (Section 7) to collect better baseline water use data, to determine water conservation techniques already in use throughout the region, and to perform detailed analysis on water resources gaps on the basis of ecological and other scientific investigations.

To assist the Council's in selecting water conservation management practices appropriate for the region, the Georgia Environmental Protection Division (EPD) provided planning guidance. A detailed water conservation guidance document is available on the State Water Plan website.¹ The planning guidance categorizes conservation practices in the following categories:

Tier ONE: Basic water conservation activities and practices that are currently required or general mandates that will certainly be included in upcoming amended rules.

Tier TWO: Conservation activities and practices that will be addressed in upcoming amended rules, but for which detailed requirements are uncertain.

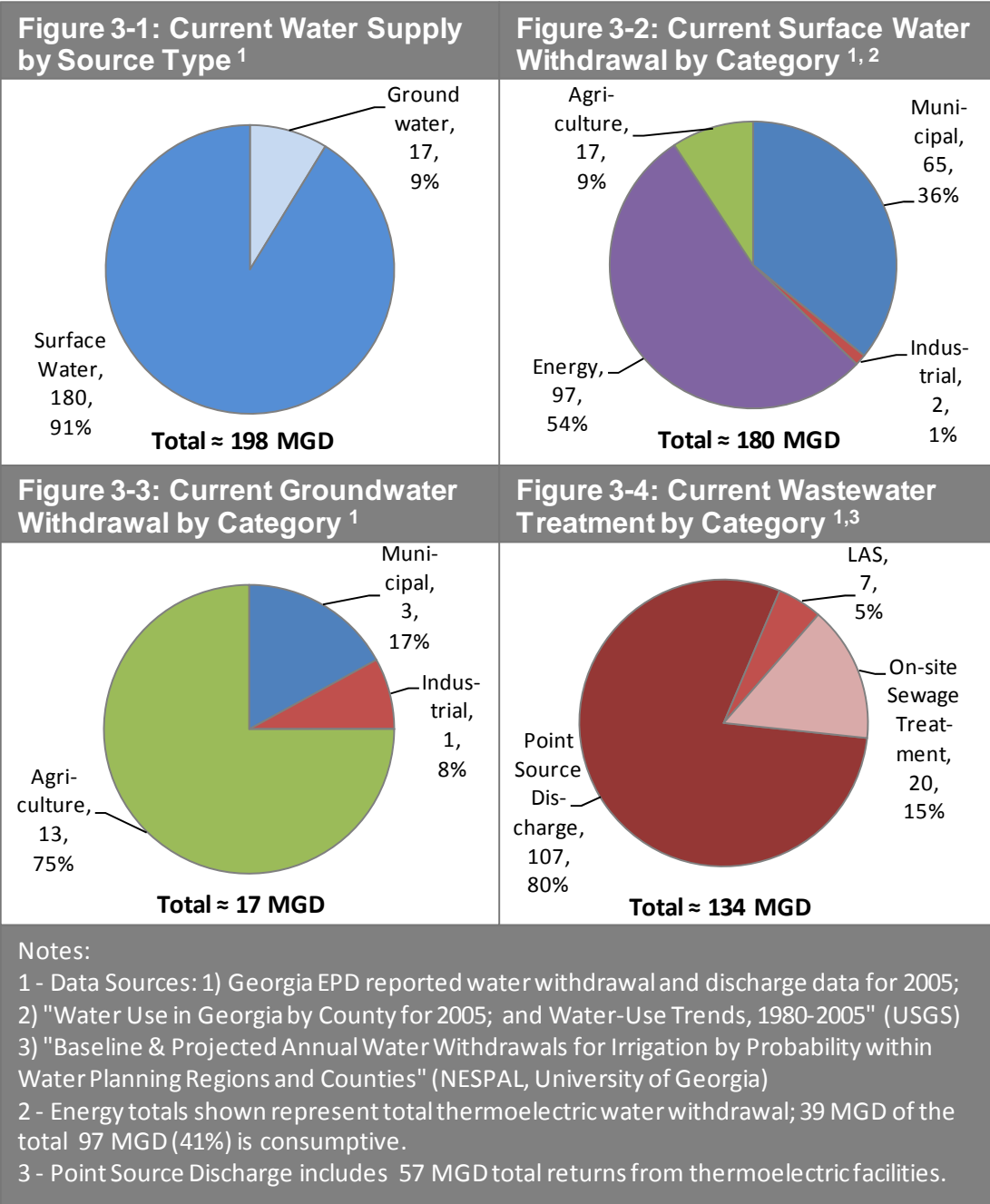
Tier THREE: Basic water conservation practices for all water users that may not be addressed in current or upcoming amended rules.

Tier FOUR: Additional water conservation practices that can be considered if a gap exists between current or future water supplies and the demands for the region.

Figures 3-1 through 3-4 show the current (2005) and forecast future (2050) water withdrawals in the region.

¹ http://www.georgiawaterplanning.org/pages/technical_guidance/regional_planning_guidance.php

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Section 2 – Selected Water Conservation Practices

The following table (adapted from Table 6-2) summarizes the demand management practices selected by the Council. Details regarding the selection of these practices are provided in the Management Practice Selection Technical Memorandum.

Table 6-1: Water Management Practices Selected by the Middle Chattahoochee Water Planning Region	
Management Practice	Description/Definition of Action
WATER QUANTITY	
<i>DEMAND MANAGEMENT TO ADDRESS INSTREAM FLOW SUSTAINABILITY CRITERIA</i>	
→ GAPS ADDRESSED: SURFACE WATER AVAILABILITY	
→ COUNCIL GOALS ADDRESSED: 6, 7, 8	
WC-1: Support implementation of Tier 1 and 2 conservation activities (HIGH PRIORITY)	Tier 1 and 2 water conservation practices include those required by existing law or anticipated in upcoming state rule-making: <ul style="list-style-type: none"> • Submittal of water conservation plans by withdrawal permittees (391-3-6-.07 and 391-3-2-.04(11)) • Landscape irrigation limits (4pm to 10am), as required by Water Stewardship Act of 2010 (with exemptions) (12-5-7) • Even-odd watering restrictions for non-irrigation outdoor water uses (391-3-30) • Public car wash facility regulations, which require best management practices (391-31) • Demonstration by water withdrawal permittees of progress toward water conservation goals or water efficiency standards (State Water Plan, Section 8) • Public water systems to conduct water loss audits according to IWA/AWWA Water Audit Method² (Water Stewardship Act, Section 3). • Amendment of local building codes to require sub-metering in multi-tenant buildings, installation of high efficiency plumbing fixture in all new construction, and installation of high-efficiency cooling towers in new construction (Water Stewardship Act, Sections 7, 8, & 9)
WC-2: Encourage all water providers to consider conservation oriented rate structures at the time of refinancing or recapitalization	Encourage citizens to conserve water by providing an economic incentive while maintaining revenue requirements. May include, but not limited to the following: <ul style="list-style-type: none"> • For most customers, change rate structures from predominately declining block type to predominately conservation type • Perform a rate and revenue analysis • Ensure adequate billing system functionality

² American Water Works Association/International Water Association, *IWA/AWWA Water Audit Method*, Manual 36, 2009. <<http://www.awwa.org/Resources/WaterLossControl.cfm?ItemNumber=48055>>

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Table 6-1: Water Management Practices Selected by the Middle Chattahoochee Water Planning Region	
Management Practice	Description/Definition of Action
	<ul style="list-style-type: none"> Review and update pricing
WC-3: Encourage all water providers to implement education and outreach programs	Raise awareness about the value of local water resources and the need to conserve; empower individuals and businesses to make informed decisions about their water using behavior and the fixtures and appliances they employ

Several of the conservation management practices listed in Table 6-1 have been evaluated to estimate their potential water savings. The practices and the assumptions made to determine estimated savings are detailed below.

Section 3 – Water Savings Estimates

Plumbing code adjustments for replacement of old toilet fixtures with higher efficiency models were embedded within the municipal water forecasts as part of this planning effort (see Supplemental Document 7 - Municipal and Industrial Water and Wastewater Forecasting Memorandum).³ The Water Stewardship Act, passed after completing the initial round of forecasting, further reduced the flush volume of toilet fixtures from 1.60 gallons per flush to 1.28 gallons per flush on all new and renovation construction after July 1, 2012. The initial plumbing code water efficiency adjustment estimated the effect of the plumbing code requirement due to toilet replacement over the period of 2010-2050. This analysis was further refined taking into account the increased efficiency associated with the Water Stewardship Act.

The steps to estimate the water use reduction due to the plumbing code and the Water Stewardship Act are described below.

Step 1. Estimate the current mix and number of toilets for each county by flush volume based on the US Census Age and number of Housing Units information. An assumed two toilets per household was utilized in the analysis. The estimate for flow volumes was based on the following timeline for different flush volume toilets in the Georgia.

³ Available on Council website: http://www.flintochlockonee.org/pages/our_plan/index.php



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- Toilets installed prior to 1980 use an average of 5 gallons per flush
- Toilets installed between 1980 and 1992 use an average of 3.5 gallons per flush
- Toilets installed after 1992 use 1.6 gallons per flush
- Water Stewardship Act: toilets installed after July 1, 2012 use 1.28 gallons per flush (ULFTs)

Step 2. Estimate the water savings when higher volume per flush toilets are replaced with ultra low flush toilets (ULFTs) based on an estimate of the natural replacement rate of the remaining toilets installed prior to 1992 over the 40-year planning period. This replacement rate was assumed to be 2 percent per year, which corresponds to a life of 50 years per toilet, and is consistent with other regional water planning efforts in Georgia (Metropolitan North Georgia Water Planning District).

In order to generate an actual volume of water an estimated two toilets per household was assumed. The mix of toilets (by flush volume) was estimated as previously discussed. A baseline value of annual water use was then calculated assuming 5.1 flushes per person per day. This factor is derived from the Residential End Uses of Water study sponsored by the American Water Works Association Research Foundation (AWWARF, 1999).

Step 3. Apply the plumbing code adjustment as a reduction to the calculated per capita water use rate for each county over the planning period. This was accomplished by determining the change in annual water use associated with toilet flushing over the planning horizon as compared to the base year. For each time step the calculated number of ULFT's increased while higher volume toilets decreased. Holding the 5.1 flushes per person per day assumption constant resulted in a measurable savings as the mix of toilets changed. This savings was normalized by the population to generate savings on a per capita basis.

This adjustment to the water use rate was made prior to forecasting wastewater generation. The effects of the plumbing code adjustment on regional per capita values are summarized in Table 4. Demand scenario 1 reflects the initial adjusted 2050 per capita values used to generate forecasted demands as presented in Section 4. Demand scenario 2 reflects the adjusted per capita values with additional efficiency associated with the Water Stewardship Act incorporated.

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Table 4:

Comparative Reduction in Per Capita Demand Resulting from Toilet Fixture Replacement at Variable Flush Rates (values in gallons per capita per day)

County	Municipally-Supplied Demand			Self-Supplied Demand		
	Baseline Per Capita Demand	2050 Per Capita Demand		Baseline Per Capita Demand	2050 Per Capita Demand	
		Demand - Scenario 1 (1.60 gallons per flush)	Demand - Scenario 2 (1.28 gallons per flush)		Demand - Scenario 1 (1.60 gallons per flush)	Demand - Scenario 2 (1.28 gallons per flush)
Carroll County	146	140	138	75	69	67
Chattahoochee Coun	151	142	139	75	66	63
Clay County	158	150	148	75	67	64
Haralson County	199	192	190	75	68	65
Harris County	181	175	173	75	69	67
Heard County	277	270	268	75	68	66
Muscogee County	143	134	131	75	67	64
Quitman County	119	113	110	75	68	66
Randolph County	282	273	270	75	67	64
Stewart County	172	164	161	75	66	64
Troup County	159	151	148	75	67	65
AVERAGE	181	173	171	75	68	65

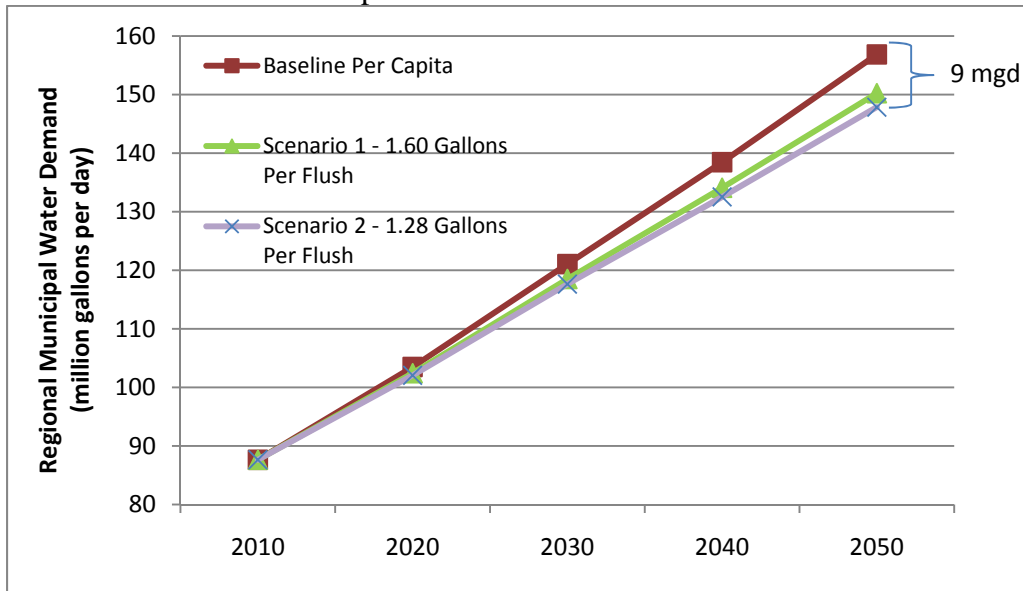
The total regional municipal water demand forecasts are illustrated in Figure 2 for three scenarios: baseline per capita without plumbing code adjustment, plumbing code adjustment with 1.60 gallon per flush toilet replacement, and plumbing code adjustment with 1.28 gallon per flush toilet replacement. The estimated reduction in total regional water use from baseline to demand scenario 2 (includes requirements associated with Water Stewardship Act) is approximately 9 million gallons per day on an annual average basis.

The true impact of water savings associated with fixture replacement on regional water resources is further dependent upon how fast the resultant wastewater is released back to those resources. The wastewater generated and discharged via a point source directly to a surface water course is representative of non-consumptive water use. The variables and assumptions utilized to develop the point source discharges for the region are detailed in Supplemental Document 7 - Municipal and Industrial Water and Wastewater Forecasting Memorandum.

For this analysis, the municipal wastewater forecasts for the three scenarios presented in Figure 2 were determined. The estimated point source discharge quantities were deducted from the total water use estimates to calculate the consumptive water demand in each case. The resulting reduction in regional consumptive water use for the municipal sector is estimated to be approximately 4 million gallons per day on an annual average basis. This reduction in consumptive demand represents the actual benefit for this particular practice to the regional water resources and is illustrated in Figure 3.

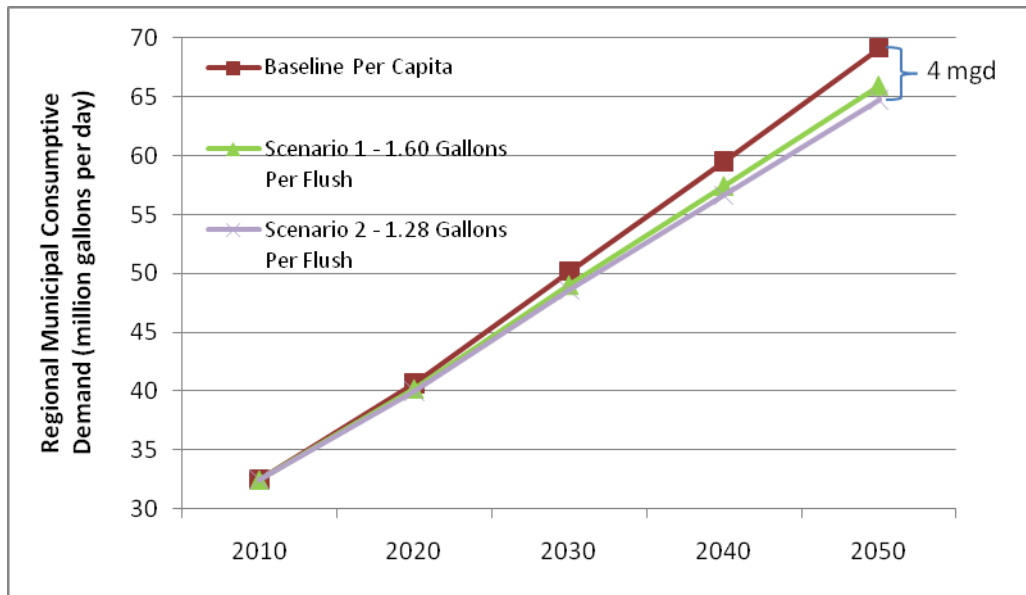
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Figure 2: Forecasted Regional Municipal Water Demand Resulting from Toilet Replacement at Variable Flush Rates



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Figure 3: Forecasted Regional Municipal Consumptive Demand Resulting from Toilet Replacement at Variable Flush Rates



Other water savings information on non-farm conservation practices was discussed by the Council. The following points were noted:

- Large water-using industries in the region (including energy production) generally already implement good conservation programs. They have in-house expertise on specific practices for their operations.
- The Council generally prefers encouraging Tier 3 and 4 practices with incentives to a regulatory approach.

Therefore, the Council recommended the following conservation management practices for non-farm water uses:

- WC-2: Encourage all water providers to consider conservation oriented rate structures at the time of refinancing or recapitalization.*
- WC-3: Encourage all water providers to implement education and outreach programs*

See Section 2 for more detailed descriptions of these management practices.

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Section 4 – Conclusions

This memo summarizes the information that the Council evaluated in selecting conservation management practices. The Council recognized the priority importance of conservation as an important tool in its plan. Conservation practices will help to address shortfalls identified by the resource assessment models for surface water and groundwater availability. They will also support attainment of the Council's vision and goals. The Council discusses and questions the current criteria by which flows are evaluated in the resource assessment model. The Council calls for a better information base for future planning.