

Data for Assessment of Pre-1993 Plumbing Fixtures Bartow County

Background

One of the conservation measures included in the Metropolitan North Georgia Water Planning District's Water Supply and Water Conservation Management Plan is Water Conservation Action No. 2 Replace older, inefficient plumbing fixtures, which requires local water providers to implement a program to speed the conversion of older, inefficient plumbing fixtures to current low-flow models. The data in this paper has been collected to assist with that step.

Homes built in or prior to 1993 may contain inefficient toilets. Before the 1950s, toilets typically used 7 gallons or more for each flush. By the end of the 1960s, toilets were designed to flush with only 5.5 gallons, and in the 1980s the new toilets being installed were using only 3.5 gallons. Today, a new toilet uses no more than 1.6 gallons of water. Title 8, Section 8-2-3 of Georgia code states that after April 1, 1992 all residential buildings of all types shall not be constructed with a toilet that uses more than 1.6 gallons of water per flush.

Replacing an inefficient toilet with a toilet that uses 1.6-gallons per flush will save approximately 50 – 75% of a toilet's water use.

- Replacing a 7-gallon per flush toilet will save 5.4 gallons per flush or 77 percent.
- Replacing a 5-gallon per flush toilet will save 3.4 gallons per flush or 68 percent.
- Replacing a 3.5-gallon per flush toilet will save 1.9 gallons per flush or 54 percent.

2000 Census Data

The 2000 Census contains categories that ask about the age of housing. The category "Year Structure Built" asks homeowners in 2000 what year their home was built. The Census Bureau's detailed definition of this category is as follows:

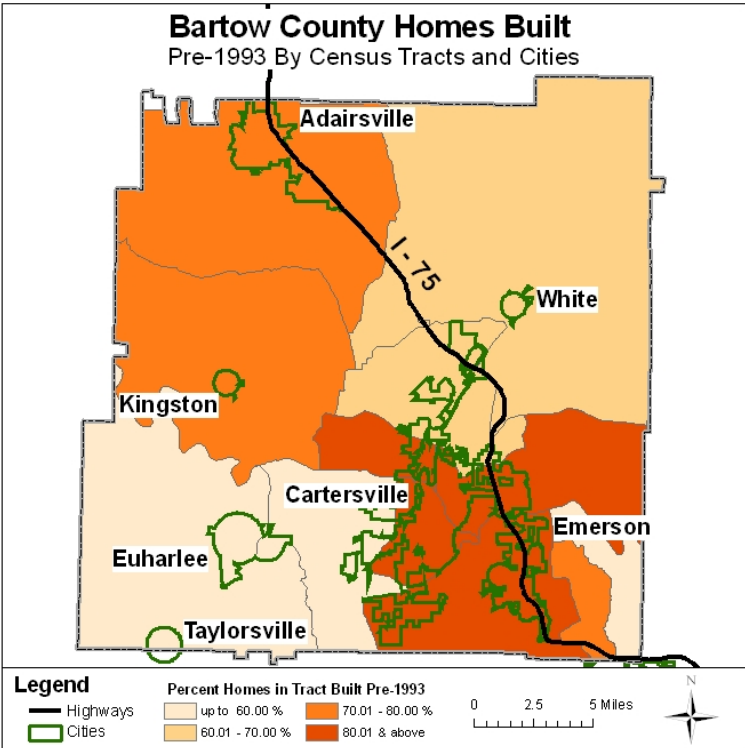
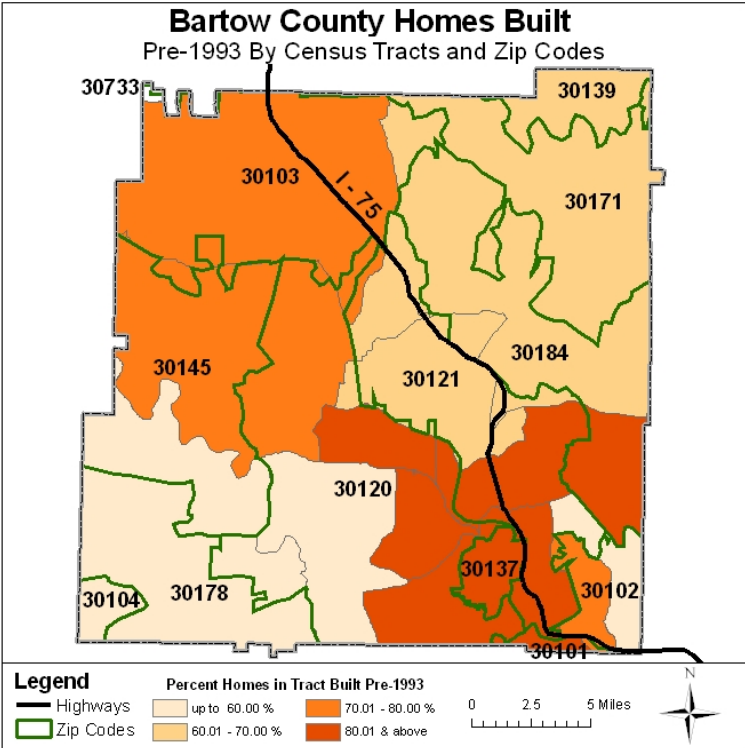
| Bartow County Households | |
|---------------------------------|-------|
| Year Built | Count |
| Built 1990 to 1994 | 4,009 |
| Built 1980 to 1989 | 6,291 |
| Built 1970 to 1979 | 4,040 |
| Built 1960 to 1969 | 2,863 |
| Built 1950 to 1959 | 1,993 |
| Built 1940 to 1949 | 1,025 |
| Built 1939 or earlier | 1,681 |

Source: 2000 US Census

The Georgia law requires low-flow toilets in all new residential buildings after April 1, 1992. The estimate of housing units built prior to 1993 is found by including half of 1990 to 1994 units in the above chart.

Using the Census 2000 Year Structure Built data an estimate of housing units built before 1993 would be 19,898. The 2005 Census estimate of households is 35,075. Based on these estimates, *approximately 57 percent of Bartow County's housing stock was built prior to 1993.*

Jurisdictions may want to focus their efforts on areas that have high concentrations of older homes since older homes were built with inefficient fixtures. The following maps illustrate the percent of homes built prior to 1993 by census tract. This first and second maps show the census tracts in relation to zip codes and cities, respectively.



Census 1990 Housing Estimates

The 1990 US Census reported housing units in a structure. In the following table, Single-Family housing units include single-family detached housing units, single-family attached housing units and duplex (two units per structure) units. The Multi-Family category includes units in structures containing three or more housing units. The Mobile Home category includes only those mobile homes either occupied by permanent residents or intended for occupancy on the site where they were found.

| Bartow County Housing Unit Estimates | | | | |
|---------------------------------------------|----------------------|------------------------------------|-----------------------------------|----------------------------------|
| Year | Housing Units | Single-Family Housing Units | Multi-Family Housing Units | Mobile Home Housing Units |
| 1990 | 21,757 | 14,429 | 1,510 | 5,615 |

Source: 1990 US Census

The following chart provides more details on concentrations of Bartow County’s population and housing stock for 1990.

| Jurisdiction | 1990 | |
|---------------------|-------------|----------------|
| | Pop | Housing |
| County Total | 55,915 | 21,759 |
| City Totals | 17,577 | 7,289 |
| Adairsville | 2,131 | 839 |
| Cartersville | 12,035 | 5,171 |
| Emerson | 1,201 | 443 |
| Euharlee | 850 | 296 |
| Kingston | 616 | 238 |
| Taylorville | 202 | 82 |
| White | 542 | 220 |

Source: US Census Bureau, August 2003. Georgia 2000 Population and Housing Unit Counts, Table 5

Natural Retrofit Estimate

The previous sections have estimated the number of homes built prior to 1993 in order to gain an initial understanding of the potential number of homes with inefficient toilets. However, all older homes do not have older, inefficient toilets; many may have remodeled bathrooms and/ or updated toilets. This needs to be taken into consideration as each jurisdiction designs a retrofit program.

This section presents two means of estimating how many homes in the county may still have older toilets. The first estimates the number of homes with older toilets based on the natural retrofit rate used in the computer model in the District’s Water Supply and Water Conservation Management Plan. The second identifies natural retrofit rates derived from surveys conducted by the National Association of Home Builders Research Center. The data also includes demographic information for those that have purchased plumbing fixtures.

1. District’s Decision Support System (DSS) Computer Model

The DSS model was used in the 2003 Water Supply and Water Conservation Management Plan to calibrate each county’s specific conditions, evaluate various water conservation measures, and predict future water demand reductions. One section of the model that addressed toilets identified 2 percent per year as the natural retrofit rate of older, inefficient toilets. This percent was based on empirical studies conducted by toilet manufacturers and general regional conditions.

If this 2 percent per year rate is applied to the number of homes built prior to 1993 (as identified on the first page of this document) the number of homes with older, inefficient toilets can be estimated. The following chart shows an estimate and the methodology of that estimate for homes with older, inefficient toilets. The estimated number of homes in the county with older, inefficient toilets is 14,724.

| Bartow Homes Built Prior to 1993 (A) | Natural Retrofit Rate (B) | Homes that Replace Toilets Each Year (C=A*B) | Homes that Replaced Older, Inefficient Toilets 1993 - 2005 (D=C*13 yrs) | Estimate of Homes with Older, Inefficient Toilets (E=A-D) |
|-------------------------------------------------|--------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| 19,898 | 2% | 398 | 5,173 | 14,724 |

The purpose of a retrofit program is to accelerate and increase the natural retrofit rate of toilets. Due to the natural retrofit rate, many of those homes that currently have older, inefficient toilets will have exchanged them for efficient toilets by 2030. A retrofit program that actually increases the natural retrofit rate must consider that several homes that participate in the retrofit program would have replaced their toilets whether a retrofit program existed or not. The District DSS model used the assumption that these free riders would account for 17 percent of retrofit program participants.

2. National Association of Home Builders Research Center (NAHB) Consumer Practices Report

The National Association of Home Builders Research Center annually conducts a Consumer Practices Report on repair and remodeling for both the census divisions and for each state. Each year the report generates a purchase rate for toilets purchased by owner occupied households in Georgia. This data is available for the years 2002 – 2005. This rate shows that approximately 4.8 percent of owner occupied homes in Georgia purchase toilets each year. A toilet purchase rate for renter occupied homes is also available for the South Atlantic region from 2001 - 2005. This rate shows that approximately 2.6 percent of renter occupied homes in the South Atlantic purchase toilets each year.

The numbers of homes that still have older, inefficient toilets based on the NAHB Consumer Practices Report are not estimated in this document. Although this data provides a more accurate picture of natural retrofit in Georgia, it is only available for a 4 to 5 year period. If data were available from 1993 – 2005, the average rate may be different for many reasons related to the economy. Also, the rate includes many homes built just after 1993 that are replacing toilets; and therefore, does not truly reflect the replacement of inefficient toilets for efficient toilets.

This information may be used in addition to local knowledge to estimate a local retrofit rate more unique to a particular jurisdiction. We suggest that local water utility personnel speak with local building code personnel and inspectors, local plumbing stores and other related industry personnel to get their perspectives on how many toilets have been purchased and replaced in the local jurisdiction since 1993.

The NAHB Consumer Practices Report also includes purchaser demographics to describe the type of house and owner/renter that is replacing their plumbing fixtures. When developing a retrofit program, this information may assist jurisdictions as they identify homes or areas to focus their program. In Georgia, the typical owner-occupied house replacing their plumbing fixtures were built in 1970 or later and are single story, single family residences. The typical homeowner is white, is between the ages of 35 and 64, has an income above \$50,000 and has lived in the house for less than 10 years. Renter occupied households differ in that a typical home replacing plumbing fixtures was built 1950 or later and the renter typically earns less than \$50,000.