

**Certified Estimates of the
Total Populations of Municipalities in North Carolina
for July 1, 2016
and
Standard and Revised Estimates of the Total Populations of
Municipalities in North Carolina for July 1, 2010 through July 1, 2016**

Technical Documentation

**Demographic & Economic Analysis Section
North Carolina Office of State Budget & Management**

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Introduction

This document provides an overview of the methods used to produce the standard and certified population estimates for each of the 553 municipalities in North Carolina. These estimates were released by the Office of State Budget and Management in September 2017. These population estimates replace those produced by this office in September of 2016. These population estimates were based, in part, on the July 1, 2016 population estimates for North Carolina and each of its component counties that were released in September 2017.

Both sets of municipal population estimates reference July 1, 2016 as the estimation date. The *standard population estimates* assume that the municipal boundaries were those in place as of that same date: July 1, 2016. The *certified population estimates* use the same reference date (July 1, 2016) for the population estimates but incorporate reported boundary changes to municipalities through July 1, 2017. The *certified population estimates* are used in statutorily-defined funding formulas while the *standard population estimates* may be used in planning. With the exception of the differences in municipal boundaries that may result in differences in the reported estimated population (since the certified estimates include any population living in areas added to or subtracted from a municipality after July 1, 2016), in all other ways the standard and certified population estimates are the same. The following sections describe the methods used to derive these population estimates.

Methods

The foundations for the 2016 population estimates were the population counts from the 2010 Census. Adjustments were made to the original Census count based on adjustments by the U.S. Census Bureau through the Count Question Resolution (CQR) program. These include population in a misallocated prison in Tabor City and population in a prison that was not counted in Troy. In addition, these estimates incorporate population counts from three municipalities that have conducted post-2010 Special Census counts for their municipalities (Morrisville, Love Valley and Raynham).

First, for each municipality, a set of 2016 population estimates was produced based upon the three methods presented below. In each case household population was estimated and then the group quarters population estimate for July 1, 2016 was added to the initial population estimate. Then, the set of three initial population estimates for each municipality was averaged using weights as described within this section with the resulting population estimate then controlled to the 2016 population estimate for the county or counties for which a municipality was located.¹ Each of the three methods are described below.

Method I. Constant Share

This method assumes that the household population of a municipality changes at the same rate as the household population of the county in which it is located. The population of each individual area annexed from January 2, 2010 through July 1, 2016 (or July 1, 2017 for the certified

¹ See the *Certified Estimates of the Total Populations of Counties in North Carolina Counties for July 1, 2016 and Estimates of the Total Populations and Populations by Age, Sex, Race, and Hispanic Origin of Counties in North Carolina for 2010 through 2016*.

estimates) is assumed to change from its effective annexation date to July 1, 2016 at this same rate.

Method II. Partitioned Change

This method assumes that areas more recently incorporated into the city limits of a municipality may change at different rates from that of the core city. Each municipality is divided into up to three geographical areas: the core city (areas enclosed by the April 2000 corporate limits), the inner edge (all areas annexed between April 2000 and April 2010), and the outer edge (areas annexed after January 1, 2010).

The household population within the core city is assumed to change from April 1, 2010 at a rate that is a function of its 2000 to 2010 rate of change for the municipality.

The area in the inner edge is assumed to change at a rate which is a function of the rate of change for the core city, the rate of change of the less urban part of the county (the household population of the county minus all of the population living within its core cities), the population density of the area in the inner edge, the population density of the core city, and the population density of the less urban part of the county.

The household population in the areas in the outer edge is assumed to change from its effective annexation date to July 1, 2016 at a rate which is a function of the rate of change for the municipality as it existed in 2010 (the core city plus the area in the inner edge), the rate of change of the less urban part of the county, the population density of the area in the outer edge, the population density of the 2010 city, and the population density of the less urban part of the county.

Method III. Changes in Housing Unit Shares

This method assumes that the municipal share of the county household population within the municipal boundaries used for the 2010 Census (reported boundaries as of January 1, 2010) changes from 2010 to the estimate date at the same rate as the municipal share of the total number of county housing units. Housing unit growth is based upon housing unit counts for April 2010 and the housing unit estimates through 2016 from the Population Estimates Program of the U. S. Census Bureau,² with adjustments made by this office to remove units in areas annexed since 2010, and from data submitted directly from municipalities and counties via the North Carolina Demographic Information Survey.³ The Census Bureau housing unit estimates are partially based upon building permit data obtained through the Census Bureau building permit surveys of permit issuing local governments of North Carolina that are conducted on a monthly or yearly basis. The population of each individual area annexed from January 2, 2010 through the estimate date is assumed to change from its effective annexation date at the rate computed for Method II.

² See <https://www.census.gov/programs-surveys/popest.html>.

³ Each year the Office of State Budget and Management conducts the North Carolina Demographic Information Survey (<http://ncds.osbm.nc.gov>). This is a survey of local governments that includes three component parts: (1) A Group Quarters Population Survey; (2) A New Residential Construction and Mobile Home Survey; and (3) A Municipal Boundary and Annexation Survey.

After the 2010 Census, estimates of the population were prepared for 2010 and compared to the actual census counts. From this review, each municipality was categorized into one of three weighting systems that resulted in the lowest estimation error for each individual municipality: equal weights where all three methods predicted equally well for a municipality, weights of 50%/25%/25% when one method predicted particularly well for a municipality and 40%/40%/20% when two methods predicted about equally well for a municipality. The use of a weighted averaging of population estimates as done by this office has shown to be a robust method for accounting for estimation error (Bryan 2004; Murdock et al. 2006; Murdock and Ellis 1992; Siegel 2002:428–30).

The standard population estimates include revisions to the population estimates of municipalities for July 1, 2010 through July 1, 2015. These revised population estimates incorporate adjustments as a result of changes to historical input data. The revised population estimates provide a means of tracking municipal population change over time.

Comparisons to the U.S. Census Bureau Estimates

These population estimates differ from those released by the U.S. Census Bureau in May of 2017 and are not directly comparable to the U.S. Census Bureau estimates. The U.S. Census Bureau utilizes a component technique with administrative records to estimate county populations and a housing unit method to distribute county populations to the local level. This office uses an average of two methods to estimate county populations (see the *Certified Estimates of the Total Populations of Counties in North Carolina Technical Documentation* for more information about the methods used) and a weighted average of three methods (as described in this document) to estimate the population for municipalities. In addition to using different techniques to estimate the population, this office's population estimates incorporate more recent data for the group quarters population. Finally, the population estimates released by the U.S. Census Bureau include reported changes to municipal boundaries through January 1, 2016 whereas the population estimates produced by this office incorporate reported boundary changes through July 1, 2016 (for the standard population estimates) and through July 1, 2017 (for the certified population estimates).

Citations

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