

## METHODOLOGY FOR STATE AND COUNTY TOTAL HOUSING UNIT ESTIMATES (VINTAGE 2019): APRIL 1, 2010 TO JULY 1, 2019

### OVERVIEW

Every ten years, the U.S. Census Bureau conducts a decennial census. In all other years, the Census Bureau estimates the number of housing units. For each annual release of housing unit estimates, the entire series of estimates beginning with the most recent census—in this case, April 1, 2010—is revised and updated. The estimates use building permits, estimates of non-permitted construction, mobile home shipments, and estimates of housing loss to estimate change in the housing stock. These component data come from various Census Bureau surveys.

We produce housing unit estimates for all states and counties annually. We release these estimates to the public, and they are used as controls for several Census Bureau surveys, including the American Community Survey (ACS), the American Housing Survey (AHS), and the Housing Vacancy Survey (HVS). In addition to state and county housing unit estimates, we also produce subcounty housing unit estimates. These estimates are central to the production of population estimates for cities and towns across the nation.

### METHOD

We produce housing unit estimates using the components of housing change. In this model, we add together the 2010 Census count of housing units, estimated new residential construction, and estimated new mobile homes. From this sum, we subtract the estimated housing units lost. Lost units also include a component for units lost due to natural disasters. The computation of annual July 1 housing unit estimates is expressed by the following formula:



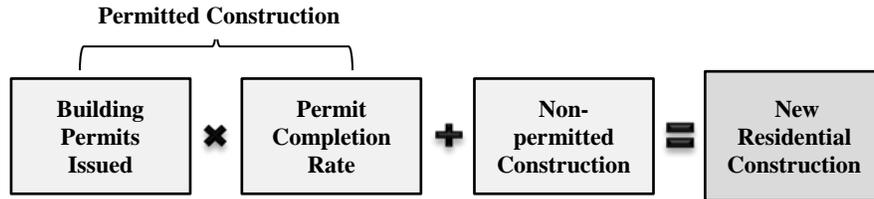
After these data are combined to produce a preliminary set of housing estimates, they are reviewed by members of the Federal-State Cooperative for Population Estimates (FSCPE) and by local jurisdictions. The final housing estimates may reflect updates from their review of the estimates. Each component of the housing unit change model is described below.

### 2010 Census Housing Units

Every year, we re-tabulate the 2010 Census counts of housing units in current legal geographic boundaries to form the base for the annual housing unit estimates. The base for the housing estimates reflects annual geographic boundary updates from the Boundary and Annexation Survey (BAS) that are legally effective as of January 1. The base also includes the results of completed Count Question Resolution (CQR) actions and geographic program revisions incorporated into the Master Address File (MAF)/TIGER Database through May of each estimate's year.

## New Residential Construction

Residential construction is the largest component of housing change. We estimate new residential construction in two parts: permitted construction and non-permitted construction. The calculation of new residential construction is represented by the following formula:



### *Permitted Construction*

According to the Census Bureau, more than 98 percent of all new housing units are erected in places that issue building permits. We calculate estimates of new permitted construction by multiplying the number of residential building permits issued by a permit completion rate. Data on issued permits come from the Building Permits Survey (BPS).<sup>1</sup> This survey includes reported permits from approximately 20,000 jurisdictions. These data are reported to the BPS by calendar year for cities and towns across the country. Implicit in the method of using calendar year permits is an assumption of a six-month lag time between when a building permit is issued and when the housing unit is completed. Thus, permits that are issued in the first six months of a particular calendar year are not processed in the housing unit estimates until the following year. For example, the July 1, 2019 housing unit estimates are based on permits issued between January 1, 2018 and December 31, 2018. Permits issued between January 1, 2019 and December 31, 2019 will be processed in the 2020 housing unit estimates.

The permit completion rates used to calculate new permitted construction are based on national estimates of permits that are either abandoned or deemed “out of scope” by the Survey of Construction (SOC).<sup>2,3</sup> We update the completion rate every year, as new survey data become available. The 2019 permit completion rate reflects the percent of building permits issued in calendar year 2018 that resulted in completed housing units.

### *Non-permitted Construction*

We calculate estimates of new, non-permitted construction using data on new residential housing units constructed in places that do not issue building permits. These data also come from the SOC. The estimates of non-permitted construction are regional-level data that we distribute to all places that do not receive building permits, based on each place’s share of the region’s total housing units enumerated

<sup>1</sup> The Census Bureau conducts the BPS. For more information about this survey, see <https://www.census.gov/construction/bps/>.

<sup>2</sup> Abandoned permits are permits where the survey respondent or building permit office has indicated that construction of the housing unit(s) authorized by that permit will not be completed using that permit. Out-of-scope permits are those that were reported as permits for new, privately-owned housing units by the building permit office, but it was later determined that the units did not meet the definition of new, privately-owned housing units (e.g., the units were intended as group quarters, for commercial use, etc.).

<sup>3</sup> The Census Bureau conducts the SOC. For more information about this survey, see <https://www.census.gov/econ/overview/co0400.html>.

in the 2010 Census. For example, if a place contained 5 percent of the region’s housing units as of the 2010 Census and does not issue building permits, we distribute 5 percent of the region’s non-permitted units in the SOC to that place. There is no lag time applied to the estimates of non-permitted construction. The sampling frame for the SOC does not include any non-permitting areas in the West; therefore, we do not distribute non-permitted housing units to places in that region.

### New Mobile Homes

The data we use to create estimates of new mobile homes come from the Manufactured Homes Survey (MHS).<sup>4</sup> We calculate annual mobile home estimates by compiling monthly state shipment data from July of the previous year through June of the current year. For example, the July 1, 2019 mobile home estimates are based on mobile home shipment data from July 1, 2018 through June 30, 2019. We distribute the state-level mobile home estimates to each place within the state based on each place’s share of the state’s total mobile homes. To do so, we use information from the Census 2000 long form on “type of structure” for housing units.

### Housing Unit Loss

We calculate housing unit loss by applying an annual loss rate to the housing stock. Then, we add to that estimate the number of units lost due to natural disasters. Housing loss rates are derived from the 2009 and 2011 American Housing Survey (AHS)<sup>5</sup> at the regional level. A unit is counted as lost if a survey was completed in 2009, but it was listed as a non-response (Type C, 30 – Demolished) in the 2011 survey.

The housing loss rates vary by type and age of structure, which are obtained from the 2010 American Community Survey (ACS) single-year file. Housing units fall under one of three types: houses (including apartments and flats), mobile homes, or other types of housing units. The housing loss rates are as follows:

Table 1. Housing Unit Loss Rates by Region, Type, and Age

Type of Unit	Loss Rate (Units Lost/1,000 Units)			
	Northeast	Midwest	South	West
House, Apartment/Flat				
10 years or less	0.00	0.00	0.00	0.00
11 to 30 years	0.37	0.37	0.37	0.37
31 to 59 years	0.40	1.31	2.57	0.54
60 or more years	0.75	3.68	6.85	0.64
Mobile Homes	8.74	4.08	3.64	1.80
Other Housing Units <sup>6</sup>	0.00	0.00	0.00	0.00

The rates of loss for units less than 10 years old is too small for us to estimate with confidence with the data we have available; therefore, we assume that the rate is zero. We also assume that the “Other

<sup>4</sup> The Census Bureau conducts the MHS. For more information about this survey, see <https://www.census.gov/programs-surveys/mhs.html>.

<sup>5</sup> The Census Bureau conducts the AHS. For more information about this survey, see <http://www.census.gov/programs-surveys/ahs/>.

<sup>6</sup> “Other Housing Units” include boats, recreational vehicles, and other types of housing arrangements.

Housing Units” are constantly functional and, since we have no growth component for this category, a loss rate of zero seems appropriate.

Numeric estimates of loss are then calculated by applying the above rates to the base file as it is aged to the current vintage year. The base file is given type and age of structure characteristics by applying distributions calculated from the 2010 ACS single-year file. After aging the base from April 1, 2010 to July 1, 2010, the process iterates annually and units increase in age by 1 year at each iteration.

Natural disaster loss estimates are calculated using FEMA’s (Federal Emergency Management Agency) records on requests for disaster assistance. These data are gathered as individuals affected by a natural disaster apply for assistance from the federal government. FEMA includes information on the severity of the damage a housing structure endured and its location, listing both street address and coordinates.

Housing units identified as complete losses are tallied as units lost to a natural disaster. Their associated coordinates are used to geocode them to the appropriate geography. The geocoding is updated each year to reflect annual changes to the geographic base.

### **July 1, 2010 Housing Unit Estimates**

We use one quarter of the 2010 permitted and non-permitted construction, mobile homes, and housing loss to produce the July 1, 2010 estimates. This represents the change in housing stock during the three-month period from April 1, 2010 to July 1, 2010.

### **REVIEW OF PRELIMINARY ESTIMATES**

The preliminary housing unit estimates are distributed for review to members of the FSCPE. Some FSCPE members provide revisions to the estimates in the form of alternative housing component data based on information they compile from the jurisdictions within their respective states. Alternative housing component data include local building permits, mobile home placements, demolitions, and housing completions derived from non-permitted construction, certificates of occupancy and housing conversions. We review submissions from FSCPE members, and those that are accepted replace the original housing component data for those jurisdictions.

### **ESTIMATES CHALLENGE AND SPECIAL CENSUS REVISIONS**

Localities that challenge the Census Bureau’s subcounty population estimates have the option of revising the housing component data specific to their area.<sup>7</sup> These revisions are included in the final housing unit estimates. The final estimates may also include other changes due to revisions that occur outside the component estimation framework and are the result of special censuses<sup>8</sup> for full jurisdictions. Special census revisions are reflected in the July 1, 2010 to July 1 of the year following the special census.

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<sup>7</sup> For a list of accepted subcounty population challenges, see <https://www.census.gov/programs-surveys/popest/about/challenge-program/results.html>.

<sup>8</sup> Special Census Program results are available here [https://www.census.gov/programs-surveys/specialcensus/data\\_products/official\\_counts.html](https://www.census.gov/programs-surveys/specialcensus/data_products/official_counts.html). For a list of accepted special census results incorporated into the Population Estimates, see <https://www.census.gov/programs-surveys/popest/about/special-census.html>