
2. PUBLIC USE MICRODATA AREAS

The nation, regions, divisions, states, and Public Use Microdata Areas, or PUMAs, are the only geographic areas identified in the American Community Survey (ACS) Public Use Microdata Sample (PUMS). PUMAs are geographic areas defined specifically for the dissemination of PUMS data from the decennial census, ACS, and Puerto Rico Community Survey.

PUMAs were first delineated for the 1990 Census by the state data centers (SDCs) in cooperation with regional, state, local, and tribal organizations and agencies. They are redrawn following each decennial census. This means that PUMA identifiers change each decade with varying comparability across time.

In the PUMS files, PUMAs are identified by a five-digit code. However, the five-digit codes are not unique across states. State identifiers must be used in conjunction with PUMA codes when working with data for multiple states. For example, data users can combine the state FIPS code for California (06) with PUMA code 07701 to extract records for the San Joaquin County (Central)—Stockton City (North) PUMA. A complete list of 2010 PUMA codes and descriptions is available on the U.S. Census Bureau's Web site.⁷

PUMA boundaries are defined using three main criteria:

1. Each PUMA must have a population of 100,000 or more at the time of delineation, and that population threshold must be maintained throughout the decade. Areas that are experiencing substantial population decline at the time of delineation (or where decline is anticipated) are delineated to include a population greater than 100,000 persons. If the population falls substantially below 100,000 in a given PUMA, the Census Bureau may combine that PUMA with one or more adjacent PUMAs to ensure data confidentiality.
2. PUMAs are based only on aggregations of counties and census tracts and cannot cross state boundaries.
3. The building blocks for PUMAs must be contiguous—or share a common border—unless the

features of the counties or census tracts used as building blocks are noncontiguous (for example, islands). As long as population criteria are met, one county may be designated as a PUMA.

Contiguous census tracts may be aggregated to create a PUMA, as can two or more contiguous counties. Tract-based PUMAs may cross county boundaries, provided each PUMA-county part meets a minimum population of 2,400.

In addition to the required criteria, the Census Bureau strongly encourages the SDCs to incorporate the following guidelines in their PUMA definitions:

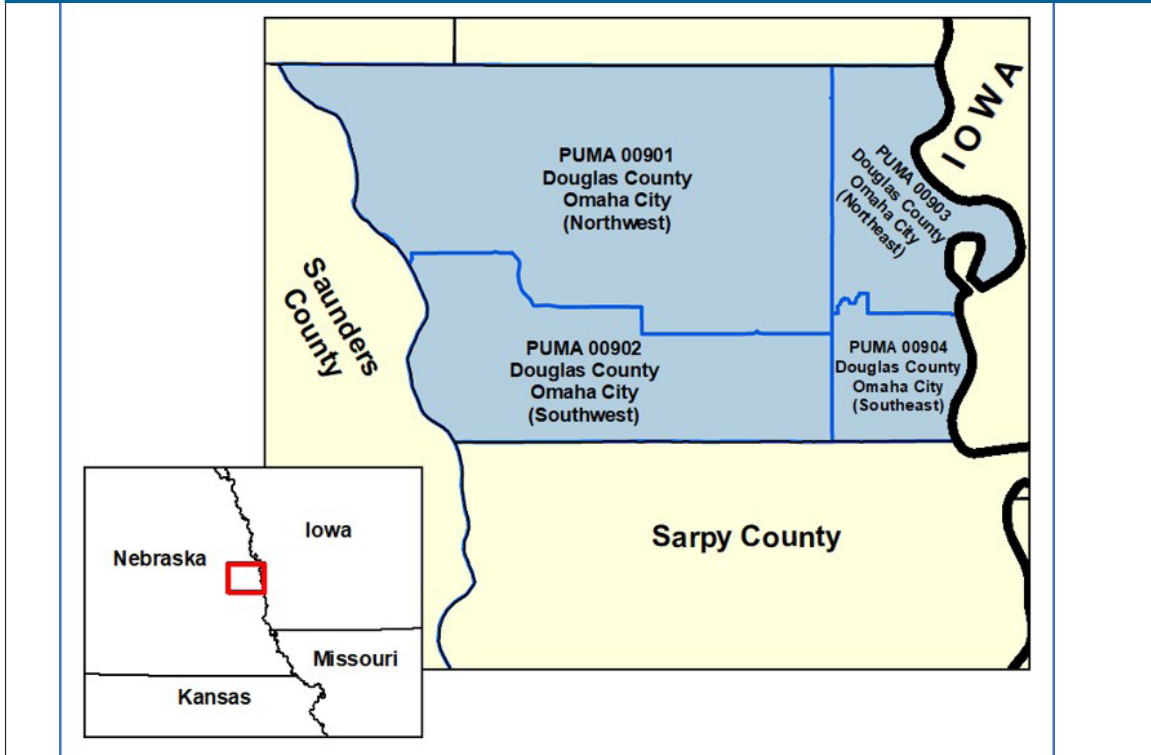
- Wherever possible, each PUMA should comprise an area either entirely inside or entirely outside metropolitan or micropolitan statistical areas.
- 2010 place definitions, 2010 urban/rural definitions, and local knowledge should inform PUMA delineations.
- PUMAs should not contain more than 200,000 people, unless identified as an area that is likely to undergo substantial population decline over the decade.
- PUMAs should avoid unnecessarily splitting American Indian reservations (AIRs) and/or off-reservation trust lands (ORTLs), and separating American Indian populations particularly if large numbers of American Indians are included within all parts of the split AIRs/ORTLs.

Given the various criteria and guidelines for defining PUMA boundaries, counties with large populations typically are subdivided into multiple PUMAs, while PUMAs in more rural areas usually comprise two or more adjacent counties.⁸ Figure 2.1 shows four PUMAs located within Douglas County, Nebraska. In contrast, Figure 2.2 shows a single PUMA in Alabama (PUMA 00100) that spans four counties. Three of these counties (Colbert, Franklin, and Lauderdale) are fully contained within the PUMA, while one county (Marion) is only partially contained within the PUMA.

⁷ U.S. Census Bureau, 2010 PUMA Names, <https://www2.census.gov/geo/pdfs/reference/puma/2010_PUMA_Names.pdf>.

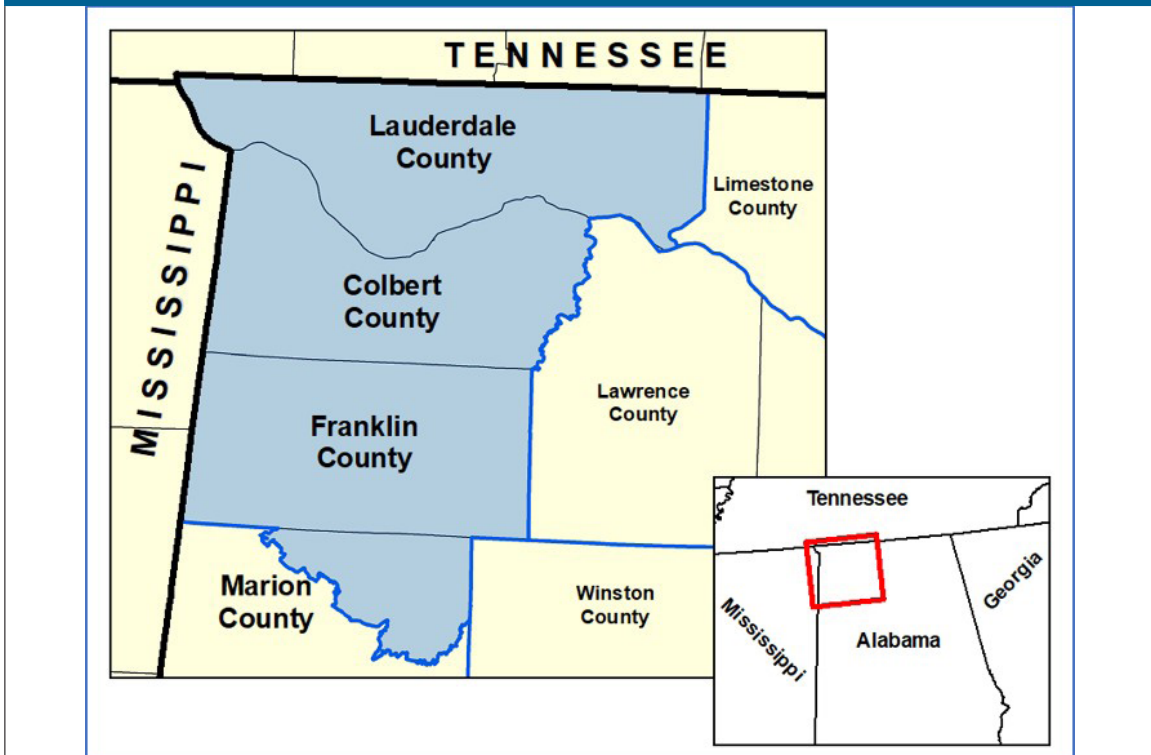
⁸ For more information, see the Census Bureau's Final Public Use Microdata Area (PUMA) Criteria and Guidelines for the 2010 Census and the American Community Survey, <https://www2.census.gov/geo/pdfs/reference/puma/2010_puma_guidelines.pdf>.

Figure 2.1. PUMAs in Douglas County, Nebraska



Source: U.S. Census Bureau.

Figure 2.2. Alabama PUMA 00100 (Lauderdale, Colbert, Franklin, and Northeast Marion Counties)



Source: U.S. Census Bureau.

Place of Work and Migration PUMAs

Place of work (POW) PUMAs and Migration (MIG) PUMAs are used in the publication of ACS PUMS files to provide data on place of work, in- and out-migration flows, and demographic characteristics of workers and migrants. POWPUMAs identify the location of a respondent's primary place of work, while MIGPUMAs identify a respondent's place of residence 1 year ago.

POWPUMAs and MIGPUMAs follow the same sets of boundaries and codes, but are not always aligned with standard PUMAs. Because POWPUMAs/MIGPUMAs are county-based, they may contain multiple standard PUMAs that have been aggregated together to create larger areas in order to protect the confidentiality of respondents. In these instances, the POWPUMAs/MIGPUMAs are assigned unique codes that do not match the codes of any standard PUMAs.

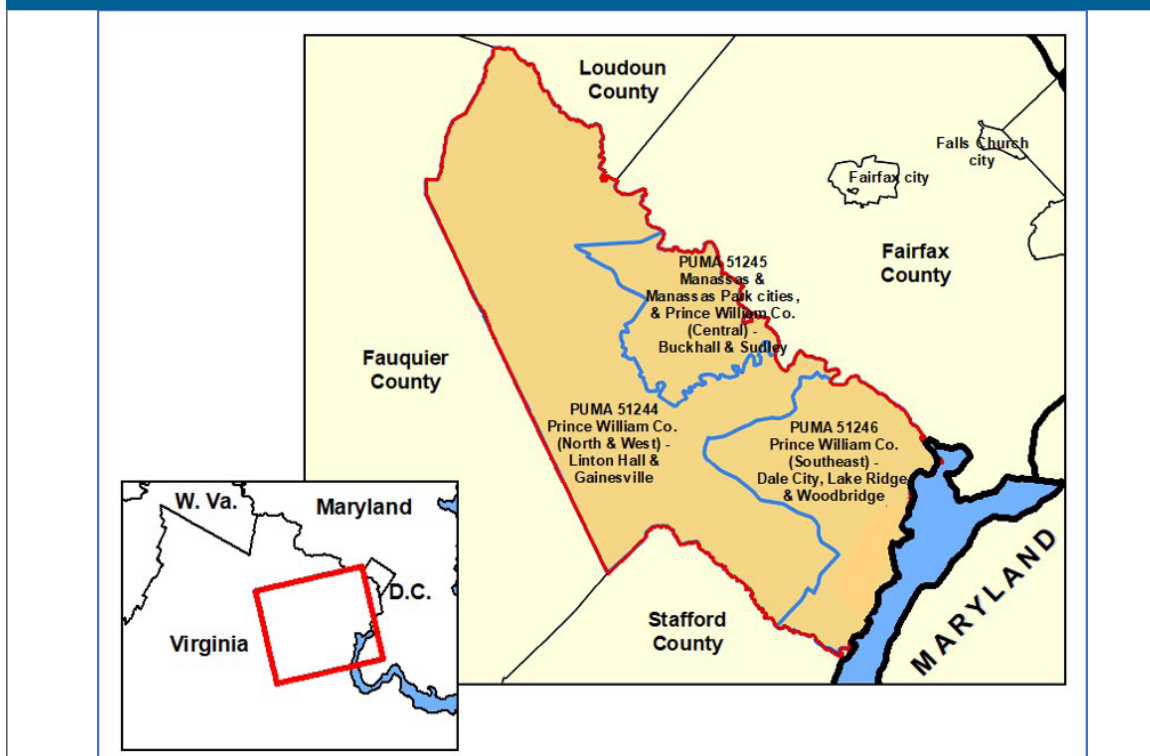
For example:

- POWPUMA/MIGPUMA 51115 in Virginia represents an area that covers Stafford County and is exactly aligned with Virginia PUMA 51115.
- POWPUMA/MIGPUMA 51256 in Virginia represents an area that completely covers Manassas and Prince William County. It is an aggregate of Virginia PUMAs 51244, 51245, and 51246 (see Figure 2.3).

Values and value labels for the POWPUMA and MIGPUMA variables are maintained in an Excel file under the "Code Lists" heading on the PUMS Technical Documentation Web page.⁹

⁹ U.S. Census Bureau, American Community Survey (ACS), PUMS Technical Documentation, <www.census.gov/programs-surveys/acs/technical-documentation/pums/documentation.html>.

Figure 2.3. Virginia POWPUMA/MIGPUMA 51256 (Manassas and Prince William Counties)



Note: POWPUMA/MIGPUMA 51256 is the area shaded orange in the figure and fully contains PUMAs 51244, 51245, and 51246. Source: U.S. Census Bureau.

Changes to PUMA Boundaries

The Census Bureau redraws PUMA boundaries every 10 years based on new population data from the decennial census. The 2012 ACS data files were the first to include PUMAs defined using the 2010 Census data. ACS data files from 2011 and earlier years used the PUMAs defined after the 2000 Census. This means that the ACS 5-year PUMS files from 2008–2012 through 2011–2015 include a mix of PUMAs that were drawn after the 2000 and 2010 Censuses. The records from data years 2008 through 2011 still carry the older 2000-based PUMA codes, while the records from 2012 and later years display the newer 2010-based PUMA geography.

Guidance for working with these dual-vintage PUMA codes is available in the ACS 5-year PUMS Technical Documentation (“PUMS ReadMe” files) for 2009–2013 through 2011–2015.¹⁰

Data users can also use PUMA Maps and equivalence files, described below, to visualize PUMA boundaries over time or calculate the proportion of a population from a 2010-based PUMA that lies within a 2000-based PUMA.

PUMA Maps and Equivalency Files

There are several tools available to help users understand and visualize PUMA definitions and boundaries.

TIGERweb is a Web-based application that provides a simple way to visualize TIGER (Topologically Integrated Geographic Encoding and Referencing database) data for PUMAs and other geographic areas.¹¹ For example, ACS data users can use this tool to see how 2000- and 2010-based PUMAs nest within or across counties and cities.

¹⁰ U.S. Census Bureau, American Community Survey (ACS), PUMS Technical Documentation, <www.census.gov/programs-surveys/acs/technical-documentation/pums/documentation.html>.

¹¹ U.S. Census Bureau, TIGERweb, <https://tigerweb.geo.census.gov/tigerwebmain/TIGERweb_apps.html>.

The 2010 Census PUMA Reference Maps can be used to display maps for each of the 2,378 2010-based PUMAs.¹² In addition to the boundaries and codes for PUMAs, these maps provide the names of federal AIRs, ORTLs, states and state equivalents, counties and county equivalents, county subdivisions (in states where they function as governmental units), places, and census tracts.

The 2010 PUMA Equivalency Files show the relationship between 2010 PUMAs and 2010 counties, and some standard 2010 Census geographic entities such as governmental minor civil divisions, places, and census tracts.¹³ Because 2010 PUMAs nest within states, there is a separate geographic equivalency file for each state.

The Tract to PUMA Relationship File allows users to identify which census tracts are contained within each PUMA.¹⁴

The Missouri Census Data Center’s Geocorr 2018 Geographic Correspondence Engine enables users to produce a geographic correspondence file, or cross-walk, between PUMAs and dozens of geographic layers.¹⁵ The database includes both 2000- and 2010-based PUMAs. Geocorr 2018 instructs the user to identify a source geography (such as PUMAs) and a target geography (for example, counties). The user is provided an allocation factor, which indicates the portion of the source area that falls within the target geography.

¹² U.S. Census Bureau, Geography Reference Maps, <www.census.gov/geo/maps-data/maps/reference.html>.

¹³ U.S. Census Bureau, Geography Program, Public Use Microdata Areas (PUMAs), <www.census.gov/programs-surveys/geography/guidance/geo-areas/pumas.html>.

¹⁴ U.S. Census Bureau, Geographies, Relationship Files, <www.census.gov/geographies/reference-files/2010/geo/relationship-files.html>.

¹⁵ Missouri Census Data Center, Geocorr 2018: Geographic Correspondence Engine, <<http://mcdc.missouri.edu/applications/geocorr2018.html>>.