# 2020 Census Urban Areas: Considerations, Delineations, and Trends

Texas Demographic Conference

May 24, 2023

Urban Areas Team

Geography Division

U.S. Census Bureau

United States® Census Bureau

# Overview

- What, why, and how of the Census Bureau's urban area (UA) delineation.
- Key UA criteria changes from 2010 – 2020.
- Key UA trends for the U.S. and Texas from 2010 – 2020.
- Beyond 2020.

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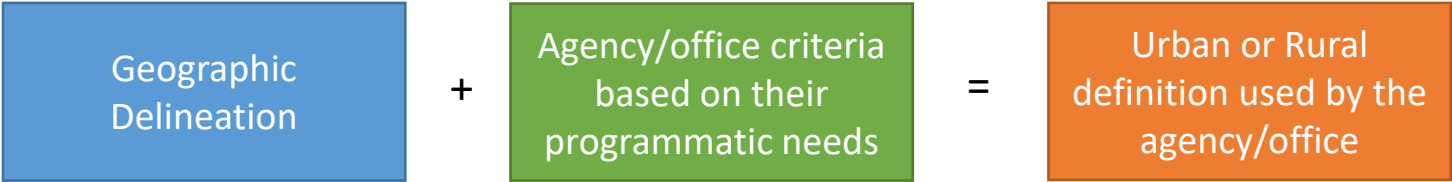# What, why, and how of the Census Bureau's UA delineation

# How does the Federal Government Define Urban and Rural?

It varies. There is no single "urban" or "rural" definition.

Tribal, federal, state, and local agencies and offices develop different urban and rural definitions depending on their programmatic needs and uses, including:

- allocating program funds,
- setting program standards, and
- implementing and measuring aspects of their programs.

| Geographic Delineation | + | Agency/office criteria based on their programmatic needs | = | Urban or Rural definition used by the agency/office |

# How does the Federal Government Define Urban and Rural?

# How does the Federal Government Define Urban and Rural?

Commonly used federal geographic delineation sources used by federal agencies in defining urban and rural:

| Geographic Delineation | Unit of Geography | Primarily based on… |
|---|---|---|
| Census UAs and Rural Territory | Census Blocks | • Housing unit and population counts and densities.<br>• Land use.<br>• Commuting. |
| Metropolitan and Micropolitan Statistical Areas (Core Based Statistical Areas) | Counties | • Census UAs.<br>• Commuting. |
| Rural-Urban Commuting Areas (RUCA) | Census Tracts | • Census UAs.<br>• Commuting. |

# Why does the Census Bureau delineate UAs?

**The Census Bureau delineates UAs for statistical data tabulation, publication, and analysis.**

However, the Census Bureau recognizes that many tribal, federal, state, and local governments define their program requirements based on the urban and rural delineation.

For this reason, the Census Bureau:

- Invites all stakeholders to actively participate in reviewing and commenting on proposed updates to the UA criteria via the *Federal Register* Notice leading up to the Decennial Census.

- Invites all stakeholders to ask questions. The Census Bureau works with tribal, federal, state, and local agencies as well as other stakeholders to ensure understanding of our classification.

# What are Census UAs?

- Purpose: Delineation of geographical areas, identifying individual UAs and the rural portion of the nation, for the tabulation and presentation of statistical data.

- Census Bureau UAs:
  - Represent densely developed territory.
  - Encompass residential, commercial, and other non-residential urban land uses.

**Urban Area**

- Population and Housing Unit Thresholds
- Density Thresholds
- Urban Land Use
- Linking Development Across Landscapes
- Splitting Large Agglomerations

# UA Delineation: Evolution Over Time

- The history of UA delineation is marked by change and re-evaluation of the thresholds and criteria for delineating UAs after each decennial census.

- The Census Bureau has delineated UAs since the late 1800s.

- Modern UA concepts began with the 1950 Census to capture growing suburban development.

- Census 2000 moved from primarily interactive to primarily automated process.

- Concepts have been refined each decade as technology and data availability has improved our ability to evaluate the nature of "urban" and "rural" settlement.
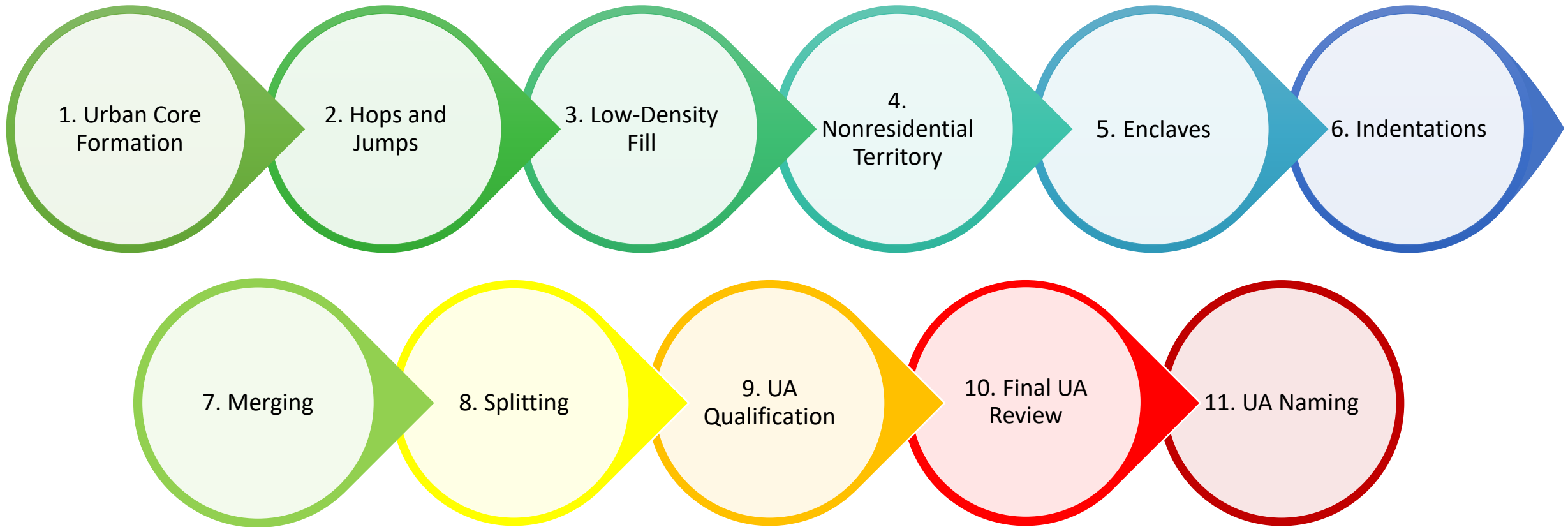
# UA Program Cycle
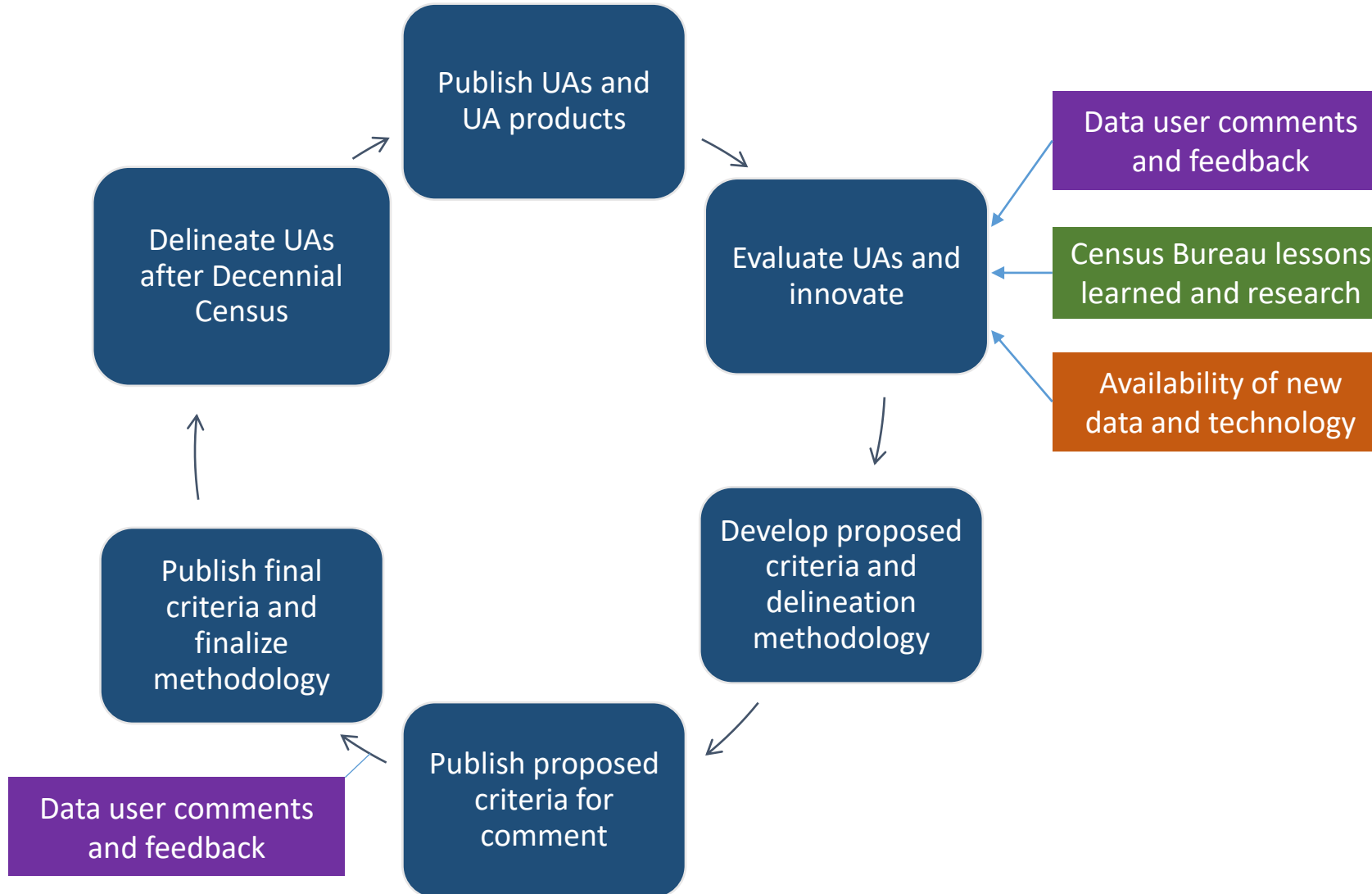
# How are UAs Delineated?

The Census Bureau uses a nationally-consistent, objective approach, to create UAs and rural territory. These areas are designed to meet the needs of a broad range of analysts and users interested in the definition of and data for urban and rural communities for statistical purposes.
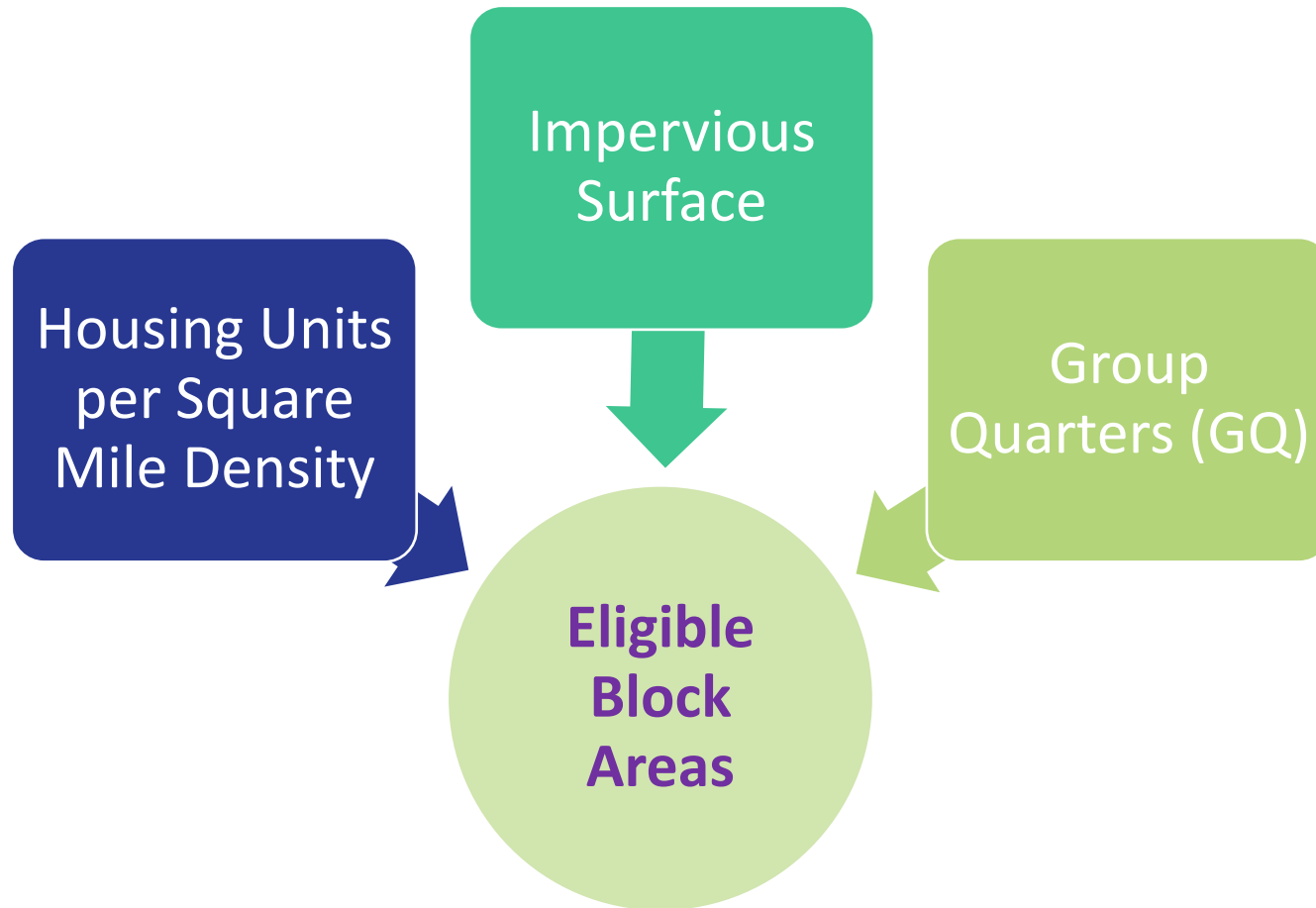
In 2020, the final delineation criteria were implemented using:

- Python-based delineation software.
- Census blocks and Decennial Census block-level housing unit and population data.
- Impervious surface, hydrography, and wetlands data.
  - Sources: Census MAF/TIGER System, National Land Cover Dataset, and Coastal Change Analysis Program.
- Commuting data.
  - Source: Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES).

# UA Delineation Steps

1. Urban Core Formation
2. Hops and Jumps
3. Low-Density Fill
4. Nonresidential Territory
5. Enclaves
6. Indentations
7. Merging
8. Splitting
9. UA Qualification
10. Final UA Review
11. UA Naming

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# Step 1: Urban Core Formation



Housing Units per Square Mile Density

Impervious Surface

Group Quarters (GQ)

**Eligible Block Areas**

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# Step 2: Hops and Jumps

- Connect noncontiguous urban territory through road connections.
- Hops occur first.
  - Maximum hop distance is 0.5 miles.
  - Hops continue to propagate until there are no more qualified connections.
- Jumps occur after hops are completed.
  - Jump distance is between 0.5 and 1.5 miles.
  - Jumps only occur once, then stop.

Jumps

Hop
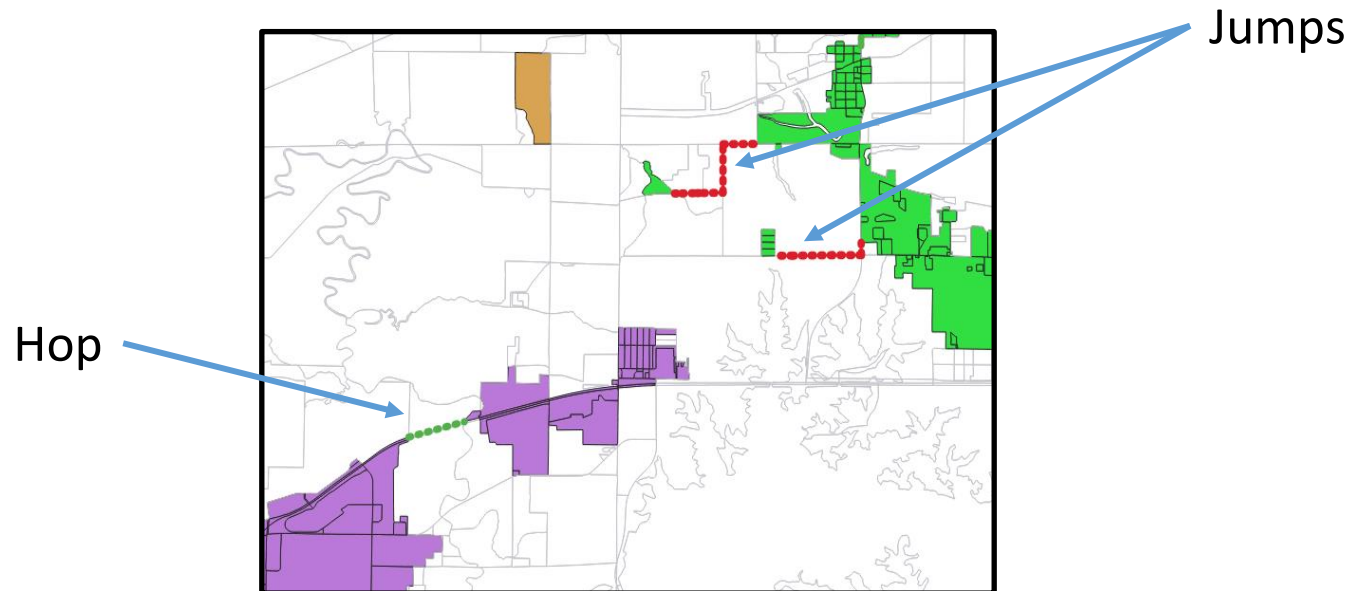
# Steps 3-6: Adding territory



Adding blocks with low housing density and nonresidential urban land uses (e.g., airports, commercial and industrial parks on the edges of **areas**).
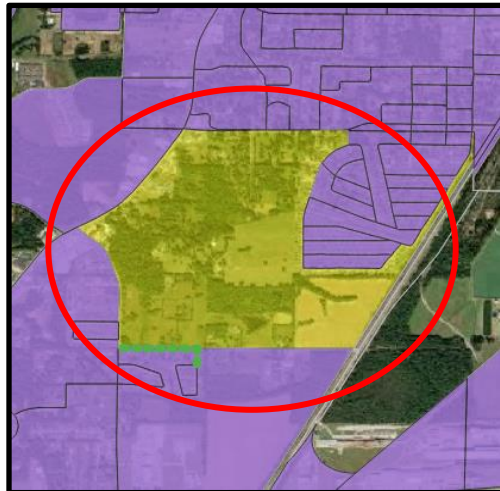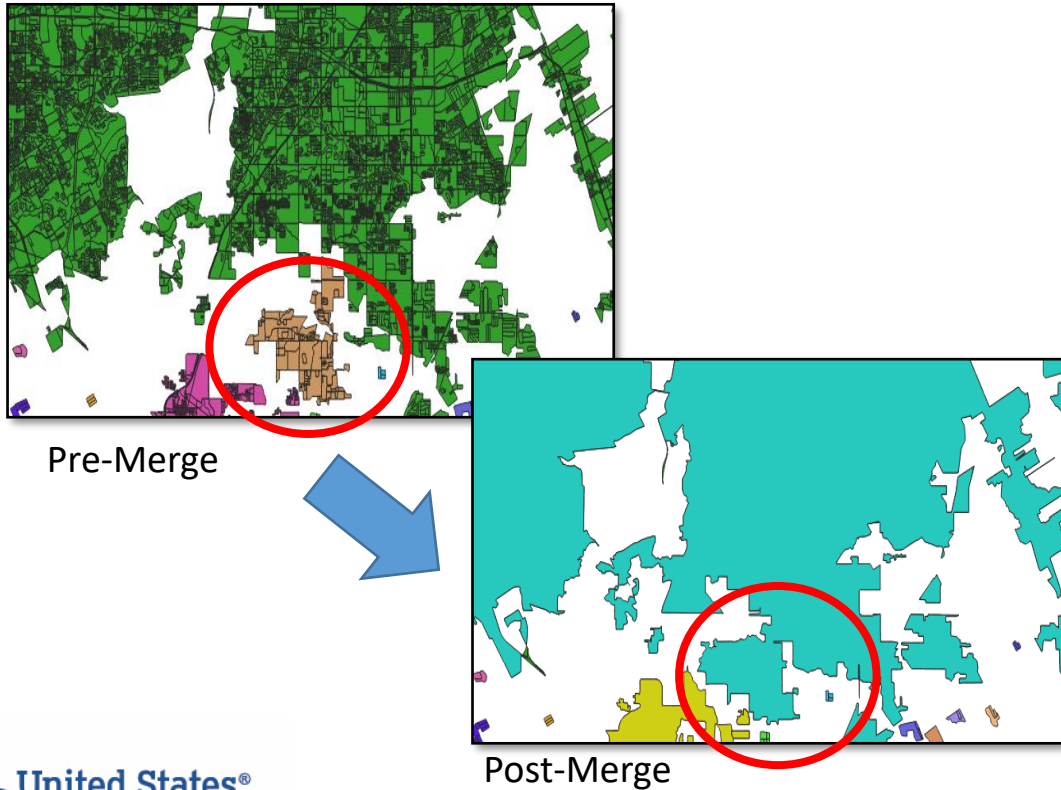


Filling enclaves.



Filling indentations.

# Step 7 and 8: Merging and Splitting

Merge eligibility: **Areas** that would not qualify as final UAs that are within 0.25 miles of qualifying **areas**.

Split eligibility: Separate UAs for the 2010 Census or **areas** connected via low-density fill (in step 4).
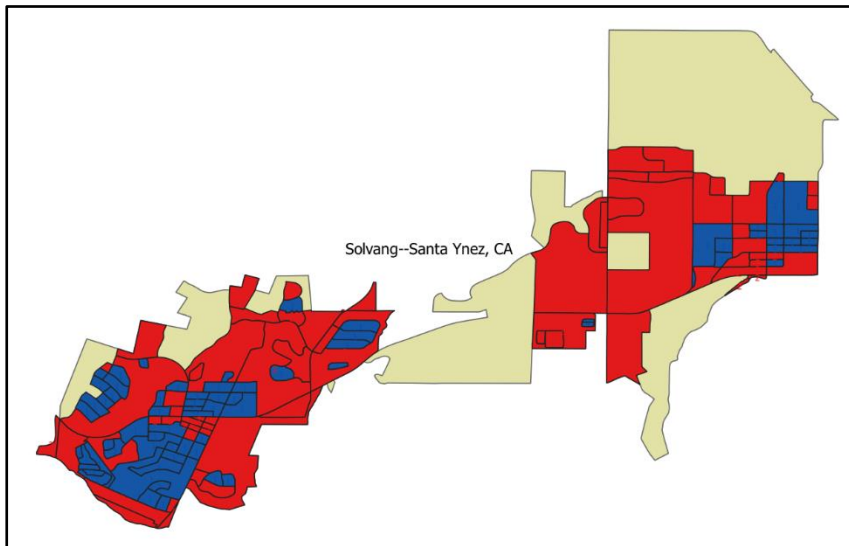
Split location: Determined using commuter data.

Pre-Merge

Post-Merge

Pre-Split

Post-Split
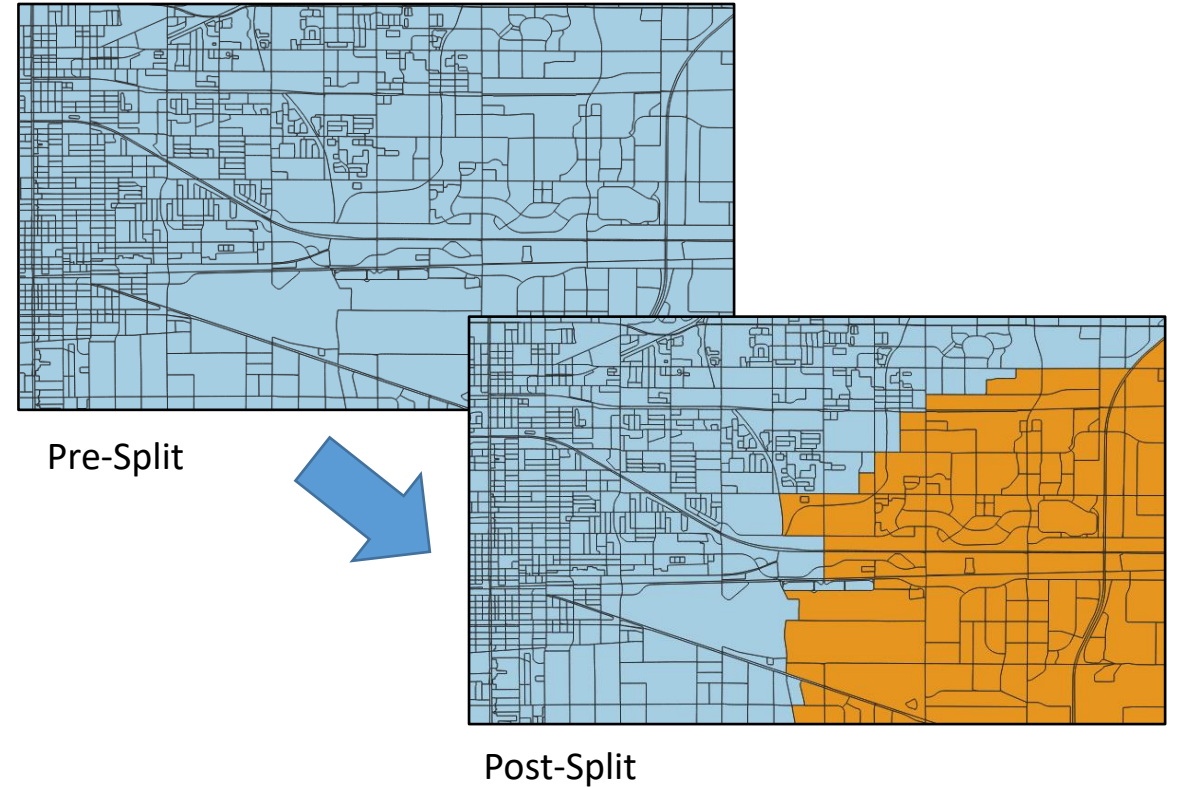
# Step 9: Qualification

The **area** must contain:
- A set of blocks with ≥ 500 housing units surrounding a core made up of at least one block with ≥ 1,275 housing units per square mile.
- At least 5,000 people or at least 2,000 housing units.
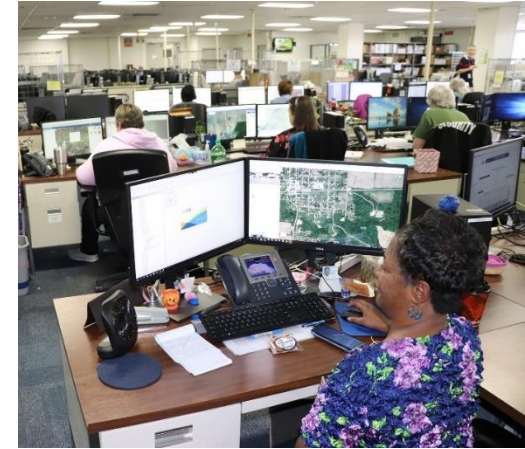
Solvang--Santa Ynez, CA

This final UA contains 2 sets of qualifying cores (blue) with surrounding blocks (red).

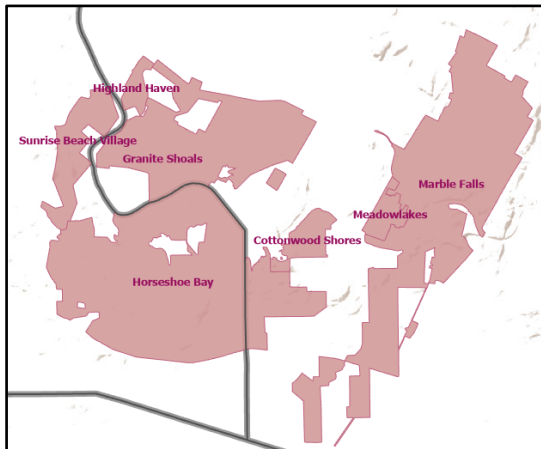The entire **area** (beige) has a total HU count of 4,330, and a total population of 10,295.

# Step 10: Final Review and Naming

Census Bureau subject matter experts reviewed and added or removed individual blocks from the UA delineation where appropriate.



Incorporated Places



UAs
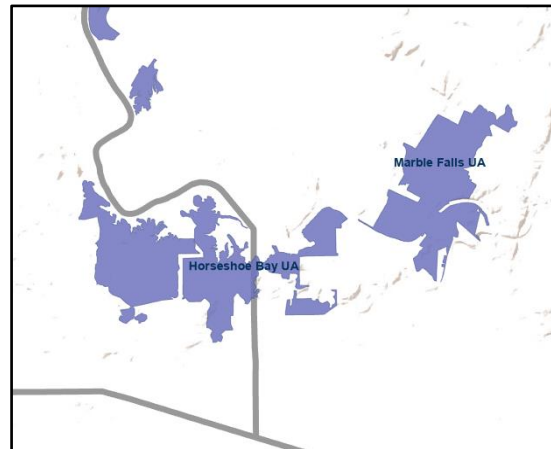


UAs are named primarily based on the most populous incorporated place(s) or census designated place(s) within the UA.

# 2020 Census UA Products

**Urban and Rural Classification website:**
Urban and Rural (census.gov)

**TIGER/Line Shapefiles:**
TIGER/Line Shapefiles (census.gov)

**TIGERweb:**
TIGERweb (census.gov)

**Census Geocoder:**
Census Geocoder



2020 Census
Urban Areas of the United States and Puerto Rico
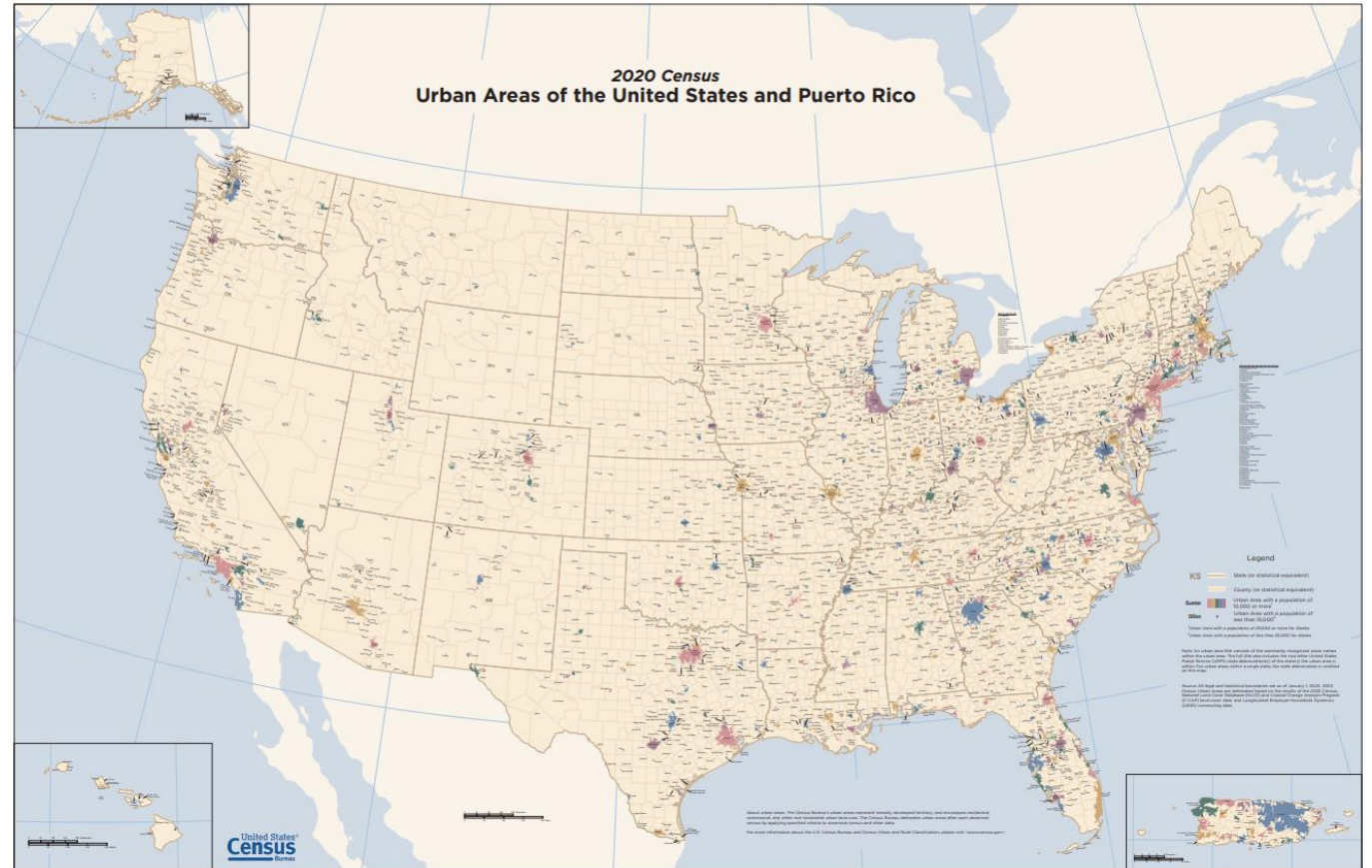
# Key 2020 Census UA Criteria Changes

# Origin of UA Criteria Changes
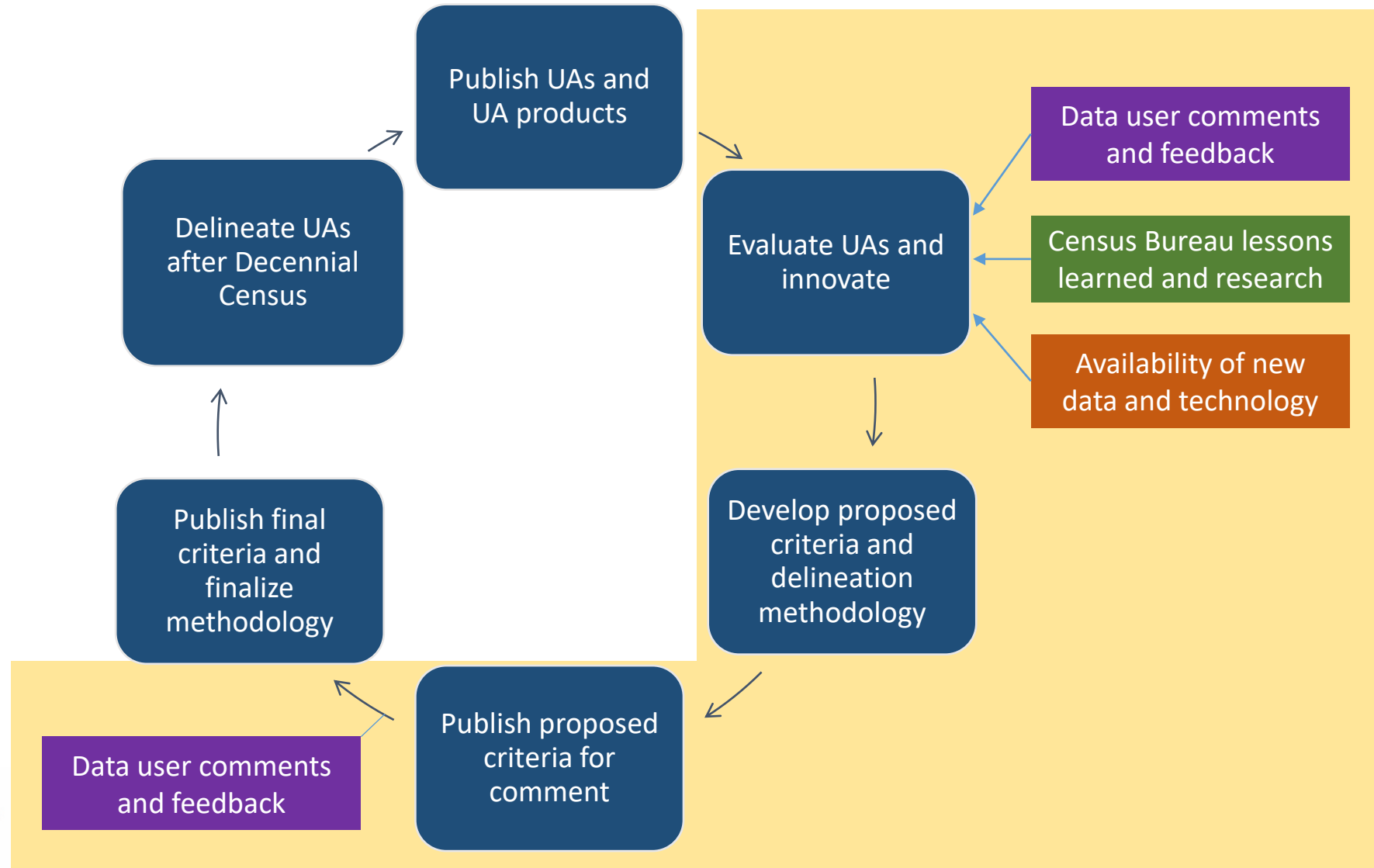
# 2020 Census UA Delineation Key Criteria Changes

1. Minimum threshold for qualification as urban raised from at least 2,500 people in 2010 to at least 2,000 housing units or at least 5,000 people in 2020.

2. Delineation based primarily on housing unit data at only the census block level instead of only population data at various geographic levels.

3. Maximum jump distance reduced from 2.5 miles to 1.5 miles.

4. Introduced the use of commuter data to determine where to split large urban agglomerations.

5. No longer distinguish "urban areas" as "urbanized areas" or "urban clusters".

# 2020 Census UA Criteria Changes

Minimum threshold for qualification as urban raised from at least 2,500 people in 2010 to at least 2,000 housing units <u>or</u> at least 5,000 people in 2020.
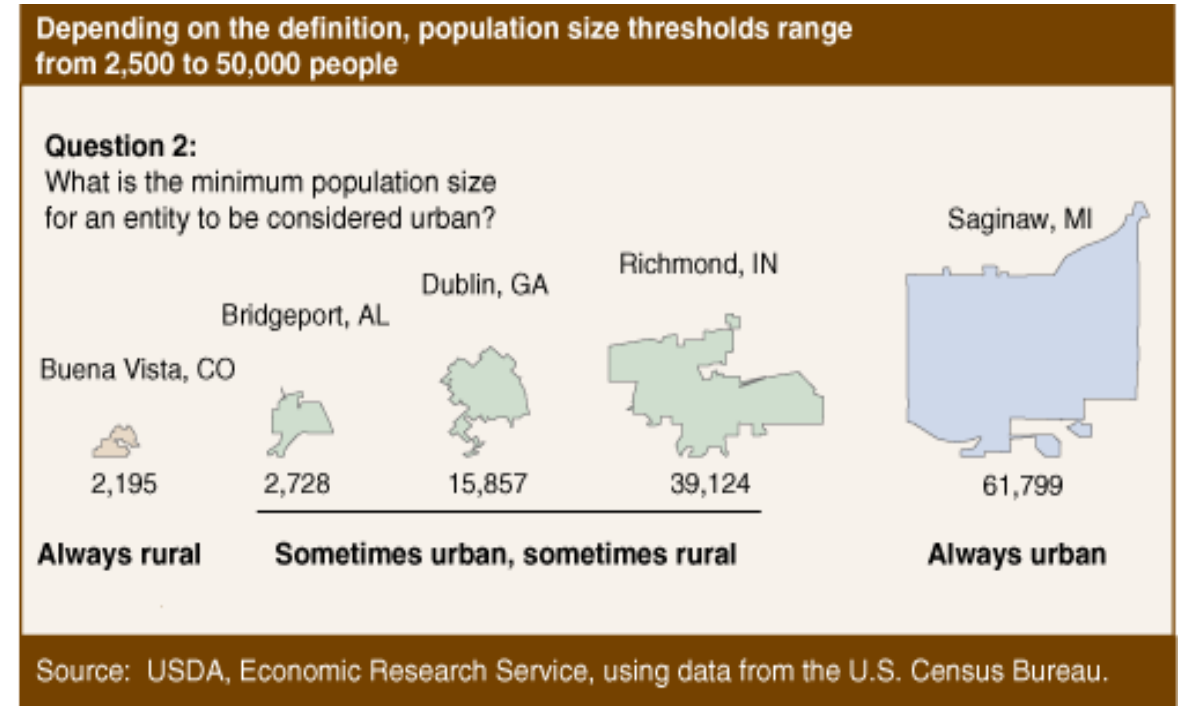
- 2,500-person threshold had been in use since 1910.
  - Prior to 1910 the thresholds fluctuated from 2,500 to 8,000.
- Census Bureau's threshold was the lowest in use in various agencies' urban/rural definitions.
- Rural stakeholders and analysts have questioned the continued validity of the 2,500-person threshold and have routinely asked if we would consider an increase.



Depending on the definition, population size thresholds range from 2,500 to 50,000 people

Question 2:
What is the minimum population size for an entity to be considered urban?

| Buena Vista, CO | Bridgeport, AL | Dublin, GA | Richmond, IN | Saginaw, MI |
|---|---|---|---|---|
| 2,195 | 2,728 | 15,857 | 39,124 | 61,799 |
| Always rural | Sometimes urban, sometimes rural | | | Always urban |

Source: USDA, Economic Research Service, using data from the U.S. Census Bureau.

Source: Cromartie and Bucholtz (2008), "Defining the 'Rural' in Rural America."
USDA ERS - Defining the "Rural" in Rural America

# 2020 Census UA Criteria Changes

Qualification Threshold Increase Example
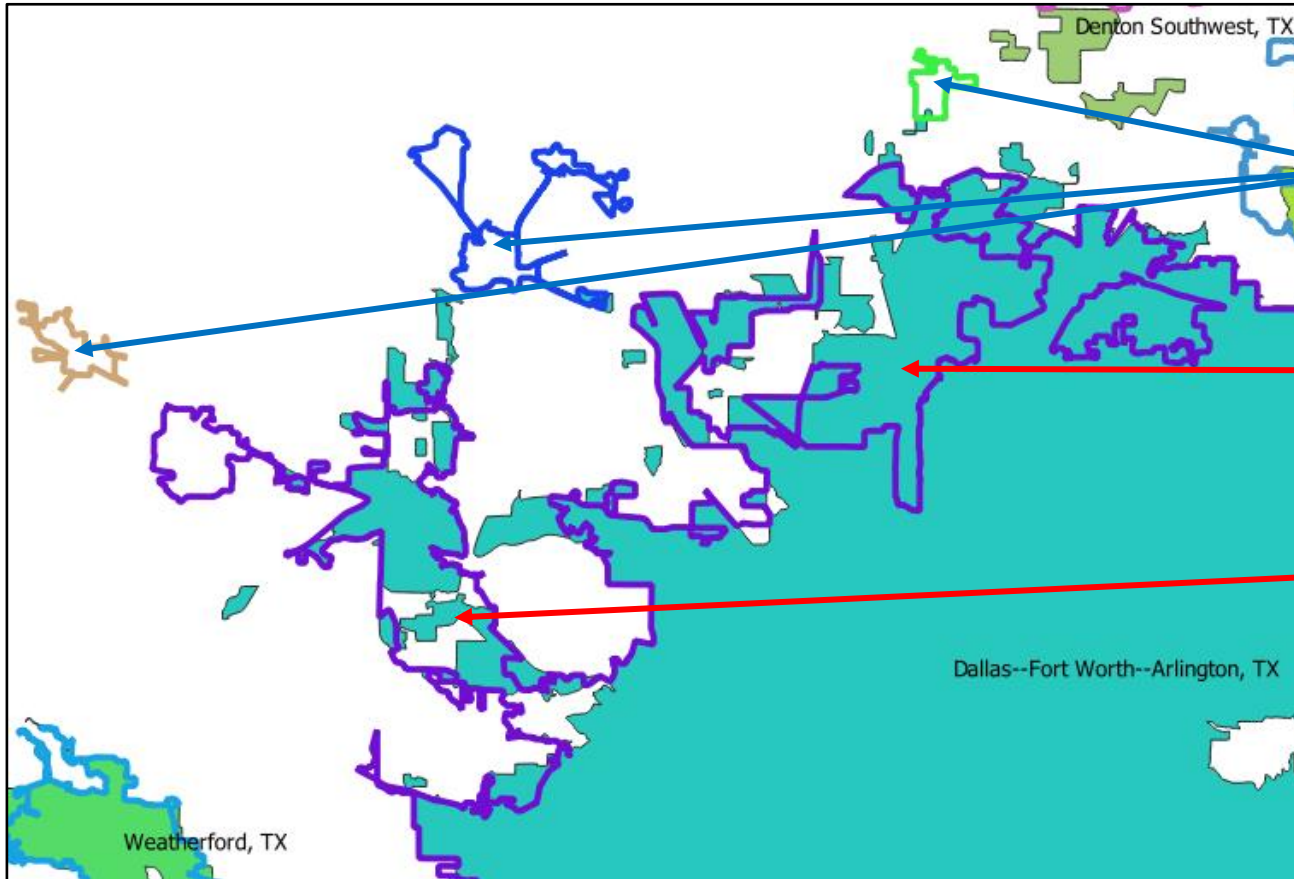


2010 Census Urban Clusters of Springtown, TX, Pecan Acres, TX, and Justin, TX no longer qualify as 2020 Census UAs.

2020 Census UA Dallas--Fort Worth--Arlington, TX has expanded to a larger footprint.

Increase in noncontiguous portions of UAs.

Legend:
- 2020 UA *(shaded and labeled)*
- 2010 UA *(outlined)*

# 2020 Census UA Criteria Changes

Delineation based primarily on housing unit data at the census block level instead of population data.

National Average:

200 housing units per square mile (HPSM) = 500 people per square mile (PPSM).

More direct measure of developed landscape

Ability to update extent of UAs between censuses

425 housing units per square mile (HPSM) for initial cores

200 HPSM to fill in extent of UAs

1,275 HPSM to ensure each UA has a high-density nucleus

Census block-level housing unit counts are invariant
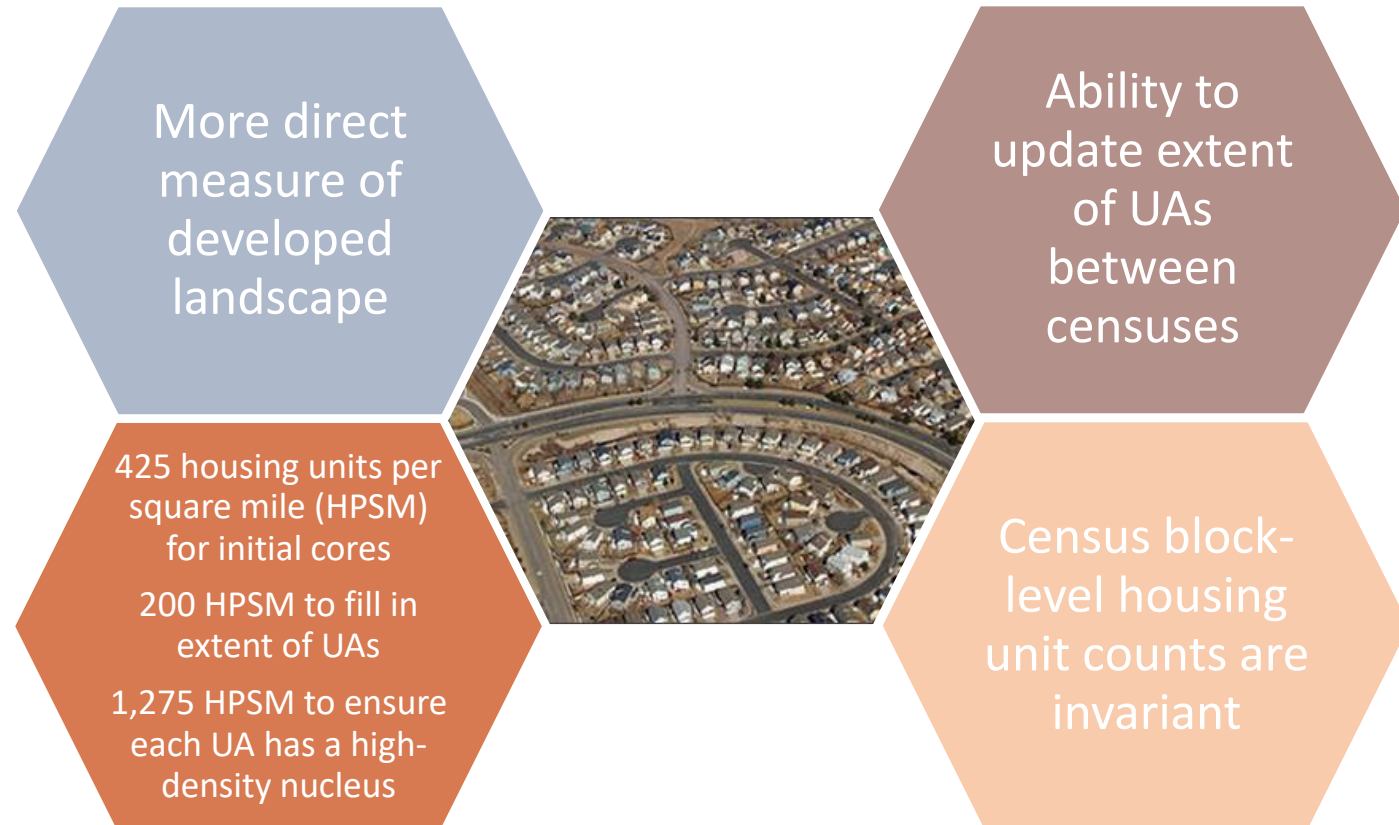
# 2020 Census UA Criteria Changes

## 2010 and 2020 UA Changes Example
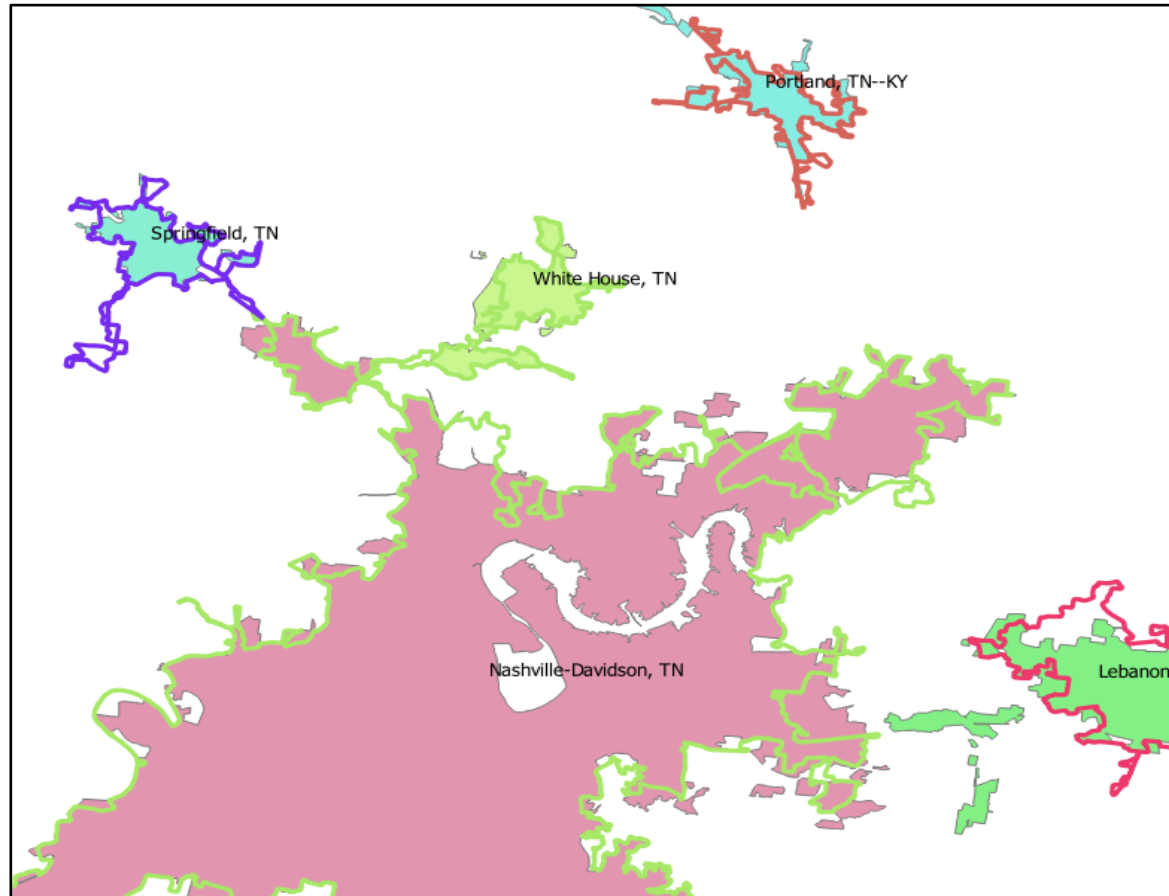


Most 2020 Census UAs maintained a similar footprint to 2010 Census UAs with changes around the edges.

Legend:
- 2020 UA *(shaded and labeled)*
- 2010 UA *(outlined)*

# 2020 Census UA Criteria Changes

Max jump distance to noncontiguous territory reduced from 2.5 miles to 1.5 miles.

## Criteria:

- Maximum distance for "jumping" across low-density intervening territory reduced from 2.5 miles to 1.5 miles (return to the jump distance that was in effect from 1950 through 1990).

- Does not include the intervening low-density "hop" and "jump" corridor blocks in the UA.

## Impact:

- Minimizes over-bounding caused by addition of impervious surface landcover in 2010.

- Reduces the amount of land area within individual UAs. Provides a truer measurement of the extent of urbanization and urban sprawl.

- More discrete UAs. Fewer connections to other UAs.

- More noncontiguous UAs.

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# 2020 Census UA Criteria Changes

Jump Distance and Intervening Low-Density Territory Example

2010 Census UA
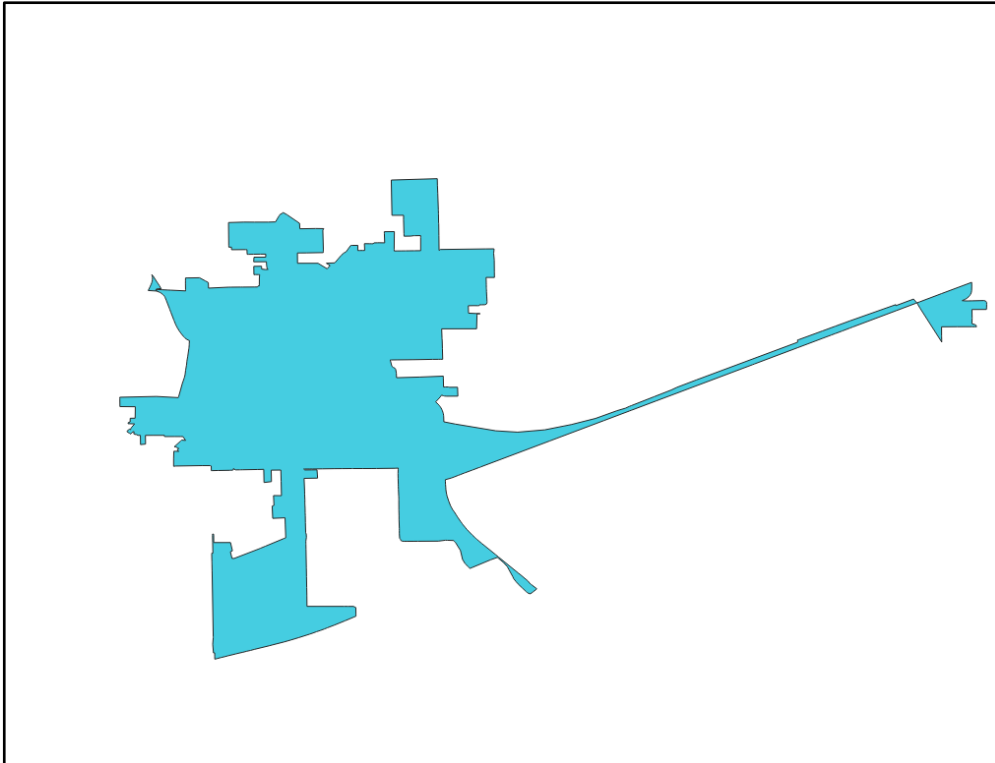
2020 Census UA

# 2020 Census UA Criteria Changes
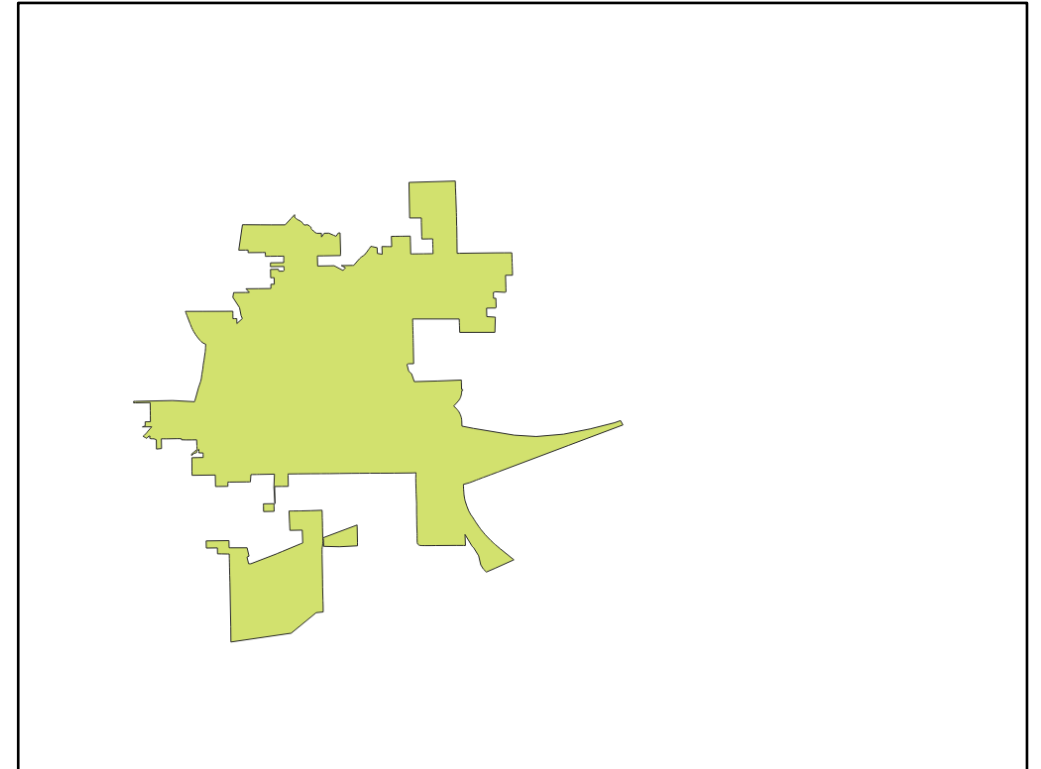
## Jump Distance Example



Evansville, IN
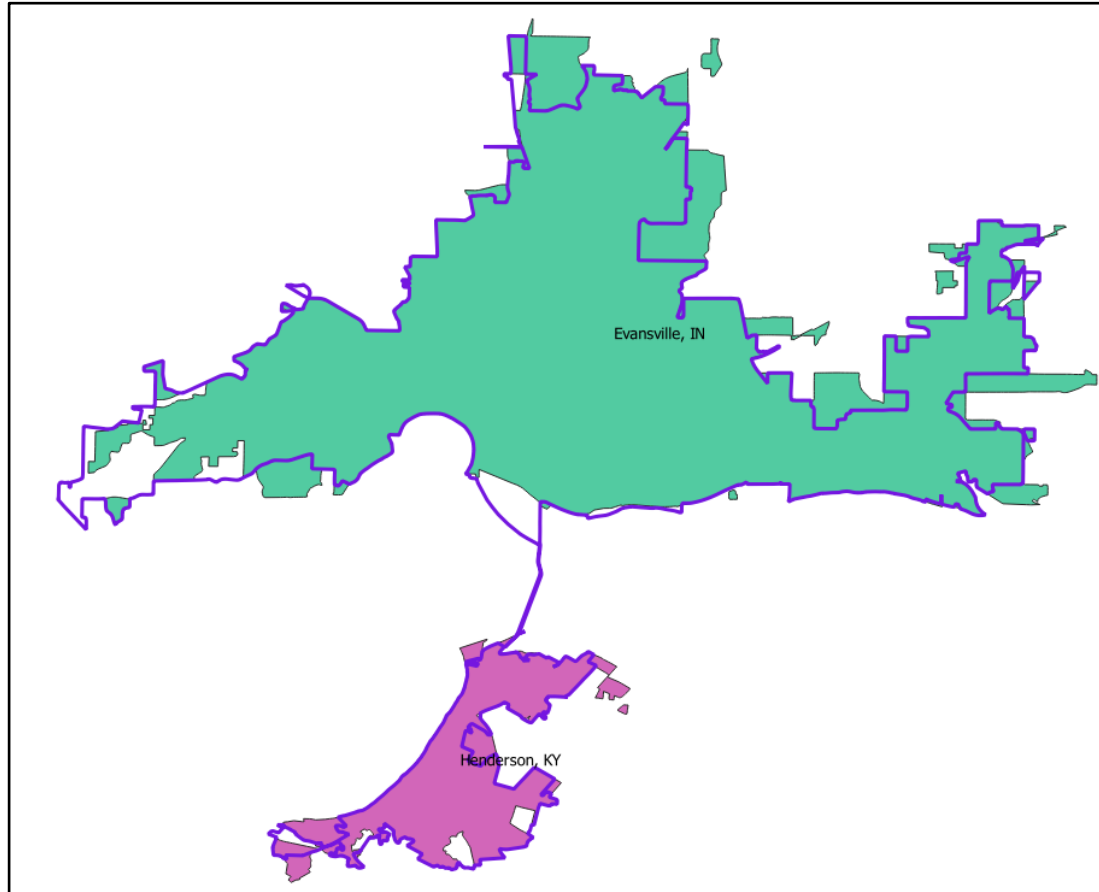
Henderson, KY

2010 Evansville, IN--KY UA became 2020 Evansville, IN UA and Henderson, KY UA.

Legend:
- ◼ 2020 UA *(shaded and labeled)*
- ☐ 2010 UA *(outlined)*

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# 2020 Census UA Criteria Changes

Introduced the use of commuter data to determine where to split large urban agglomerations.

- The delineation process results in large urban agglomerations encompassing multiple, individual UAs.

- For 2020 we introduced commuting data (LODES dataset) to better determine where to split the urban agglomerations.

# 2020 Census UA Changes
### Splitting Urban Agglomerations Example
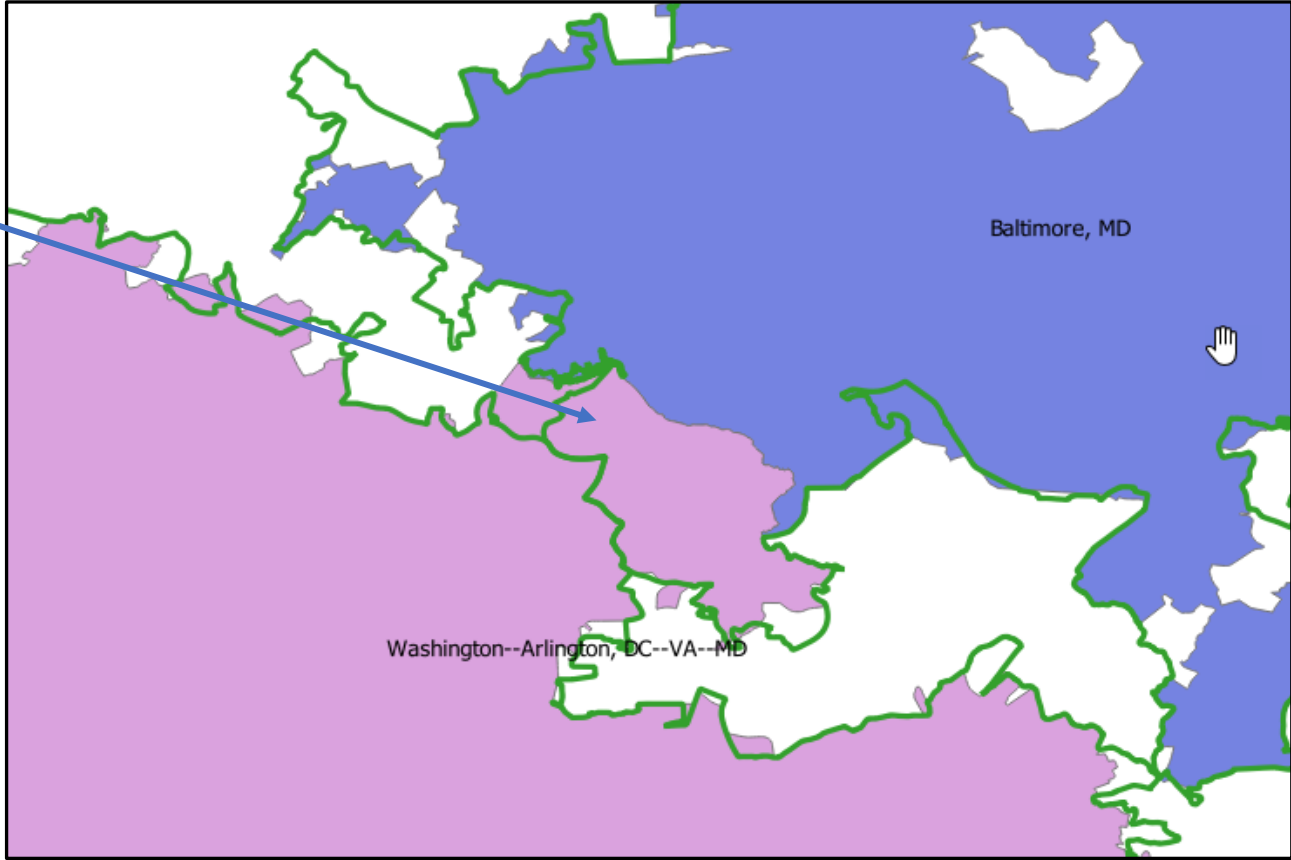
Implementing the LODES commuter data shifts the Washington--Arlington, DC--VA--MD UA northeast.

**2010 and 2020 Washington D.C. and Baltimore area UAs**



Legend:
- 2020 UA *(shaded and labeled)*
- 2010 UA *(outlined)*

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# 2020 Census UA Changes

No longer distinguish between "urbanized areas" and "urban clusters". All qualifying territory will be considered "urban" by the Census Bureau.

The Census Bureau no longer distinguishes between urbanized areas of 50,000 or more population and urban clusters of less than 50,000 population.

- No clear scientific basis for use of 50,000 population as a threshold distinguishing different types of UAs.
- The decision to adopt 50,000 population as a threshold for urbanized areas starting for the 1950 Census seems to have been based primarily on operational concerns and data availability than rooted in economic data, central place theory, or the importance of a place in a particular area.
- UAs above or below 50,000 population can be similar in terms of economic activity.
- Still possible for data users and agencies to identify areas based on population.

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# Key urban area trends for the U.S. and Texas (2010 – 2020)

# Key 2020 UA Trends, As Compared to 2010 UAs

- Similar percent of population and housing units urban vs. rural.
- Decrease in total number of UAs; but an increase in the number of UAs ≥ 5,000 population.
- Decrease in many UAs' size/land area; increase in population and housing density of UAs.
- Some 2010 UAs became two UAs in 2020.
- Some 2020 UAs include areas with of densely developed seasonal housing.

Note: These are national-level trends, and trends vary by region and state.

# Percent Population and Housing Units

| | | 2010 | | 2020 | |
|---|---|---|---|---|---|
| | | **Percent Population** | **Percent Housing** | **Percent Population** | **Percent Housing** |
| U.S.* | Urban | 81% | 79% | 80% | 79% |
| | Rural | 19% | 21% | 20% | 21% |
| TX | Urban | 85% | 83% | 84% | 83% |
| | Rural | 15% | 17% | 16% | 17% |

Sources: 2010 and 2020 Tabulation Block TIGER/Line Shapefiles

*Data includes 50 States and District of Columbia. Does not include UAs located in Puerto Rico and Island Areas.

# Decrease in Number of Discrete UAs?

| | | All UAs | | | UAs ≥ 5,000 Population | | |
|---|---|---|---|---|---|---|---|
| | | 2010 Urban Areas | 2020 Urban Areas | Percent Change | 2010 Urban Areas | 2020 Urban Areas | Percent Change |
| U.S.* | Urban | 3,573 | 2,612 | -27% | 2,282 | 2,387 | 5% |
| | Urbanized Area | 486 | NA | | 486 | NA | |
| | Urban Cluster | 3,087 | NA | | 1,796 | NA | |
| TX | Urban | 306 | 195 | -36% | 186 | 189 | 2% |
| | Urbanized Area | 34 | NA | | 34 | NA | |
| | Urban Cluster | 272 | NA | | 152 | NA | |

Sources: 2010 and 2020 state-sorted lists of urban areas on Urban and Rural (census.gov)

Primarily resulting from criteria changes:  Minimum threshold for qualification as urban raised from at least 2,500 people in 2010 to at least 2,000 housing units or at least 5,000 people in 2020.

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*Data includes 50 States and District of Columbia.  Does not include UAs located in Puerto Rico and Island Areas.

# Decrease in UA Size/Land Area; Increase in Population Density

| | | 2010 Urban Areas | 2020 Urban Areas | Percent Change |
|---|---|---|---|---|
| U.S.* | Land Area (mi$^2$) | 106,386 | 103,872 | -2% |
| | Pop Density (people/mi$^2$) | 2,343 | 2,552 | 9% |
| TX | Land Area (mi$^2$) | 8,746 | 9,052 | 3% |
| | Pop Density (people/mi$^2$) | 2,435 | 2,696 | 11% |

Sources: 2010 and 2020 state-sorted lists of urban areas on Urban and Rural (census.gov)

Primarily resulting from criteria changes:

- Max jump distance to <u>noncontiguous</u> territory reduced from 2.5 miles to 1.5 miles.
- Move from tract-based to only block-based delineation.

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*Data includes 50 States and District of Columbia. Does not include UAs located in Puerto Rico and Island Areas.
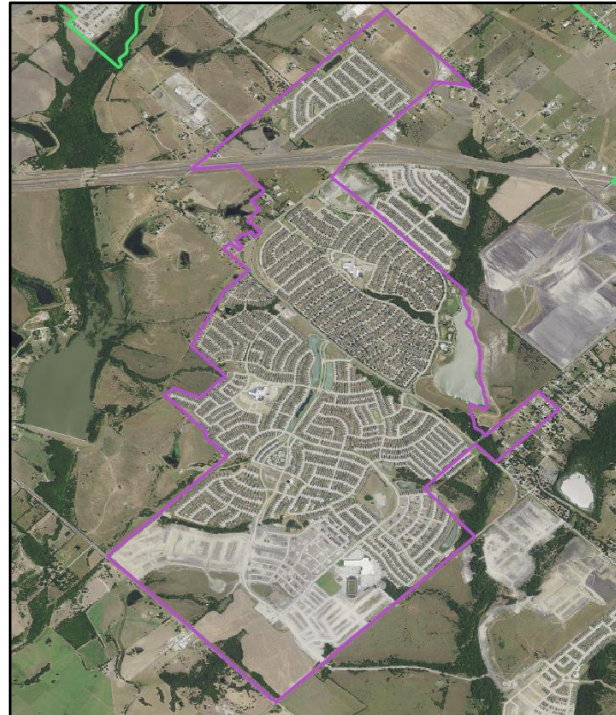
# New 2020 UAs

## Number of new UAs:

- U.S.: 36
- TX: 2
  - Heartland, TX and Sonterra, TX.
  - Planned communities.
  - Created as census designated places (CDPs) for the 2020 Census.

## Number of 2020 UAs that were part of a different or larger 2010 UA:

- U.S.: 2,030
- TX: 11
  - 10 2020 UAs were part of a larger 2010 UA.
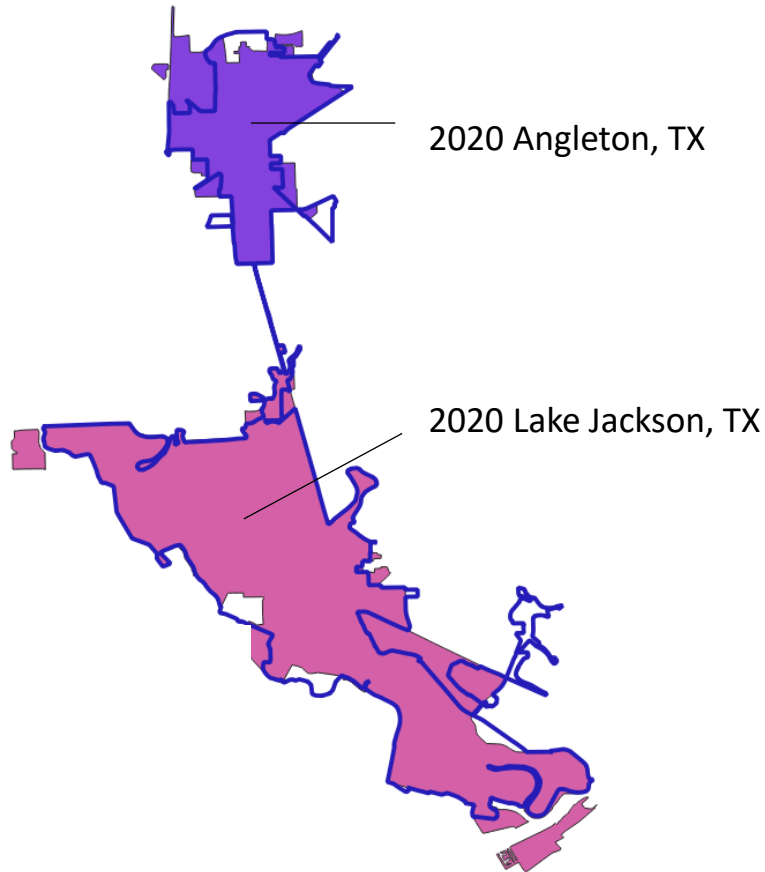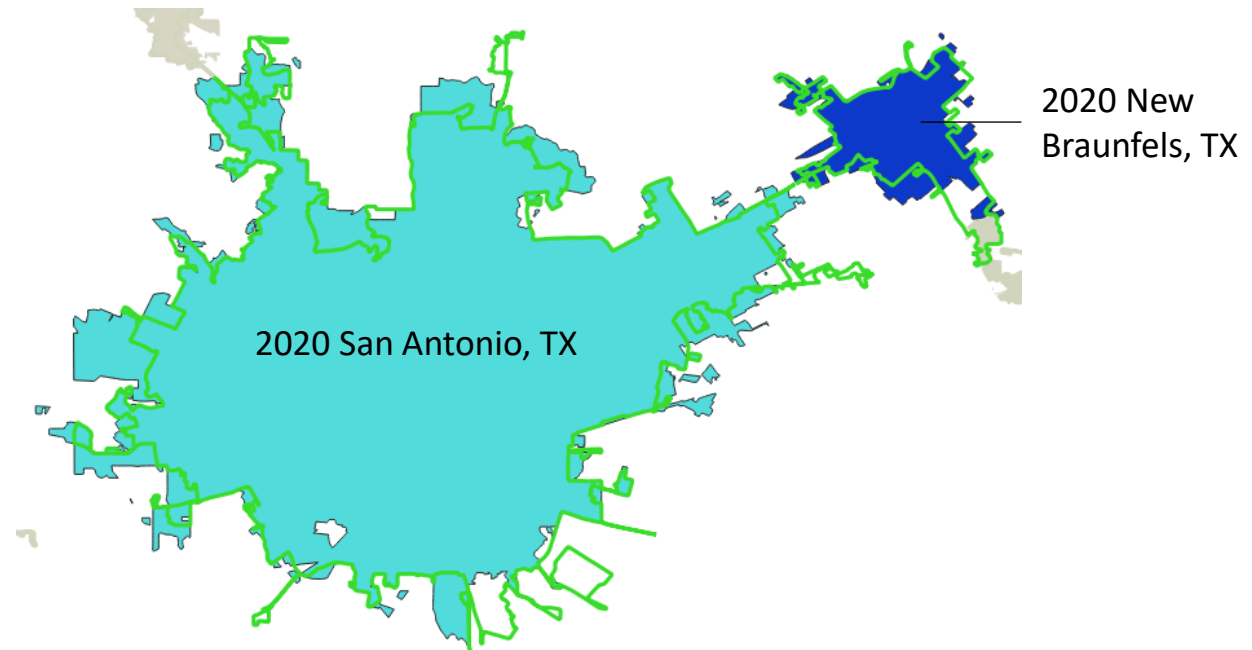  - 1 merged.

**Heartland, TX**



**Sonterra, TX**

# One 2010 UA Became Two 2020 UAs

**2010** Lake Jackson--Angleton, TX

**2010** San Antonio, TX



2020 Angleton, TX

2020 Lake Jackson, TX

2020 New Braunfels, TX

2020 San Antonio, TX

Legend:
- 2020 UA *(shaded)*
- 2010 UA *(outlined)*

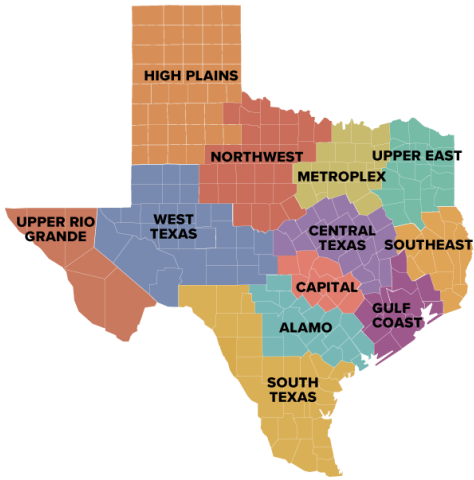# Two 2010 UAs Became one 2020 UA

**2020** Galveston--Texas City, TX

2010 Texas City, TX —

2010 Galveston TX —

Legend:

■ 2020 UA *(shaded)*

☐ 2010 UA *(outlined)*

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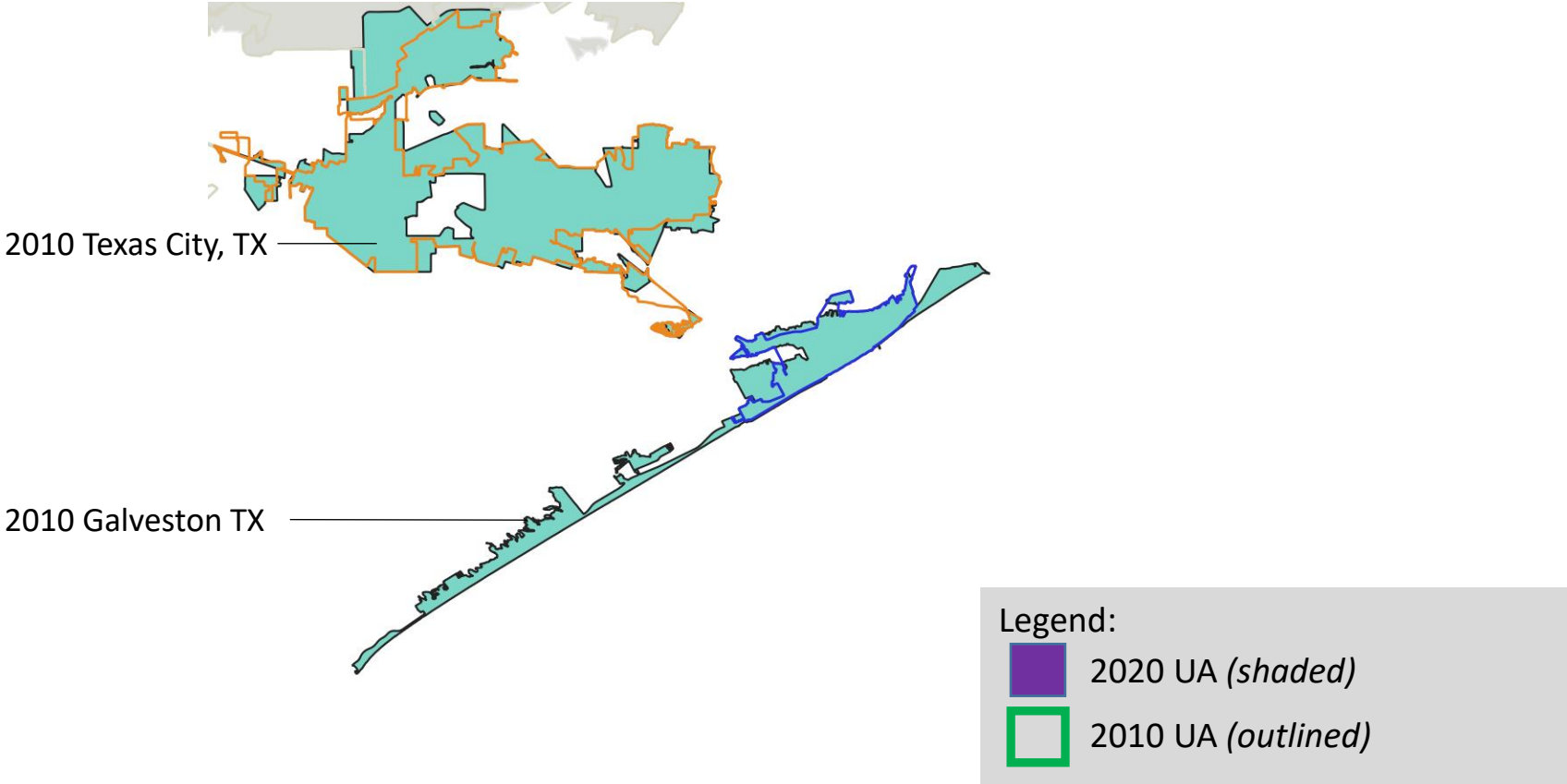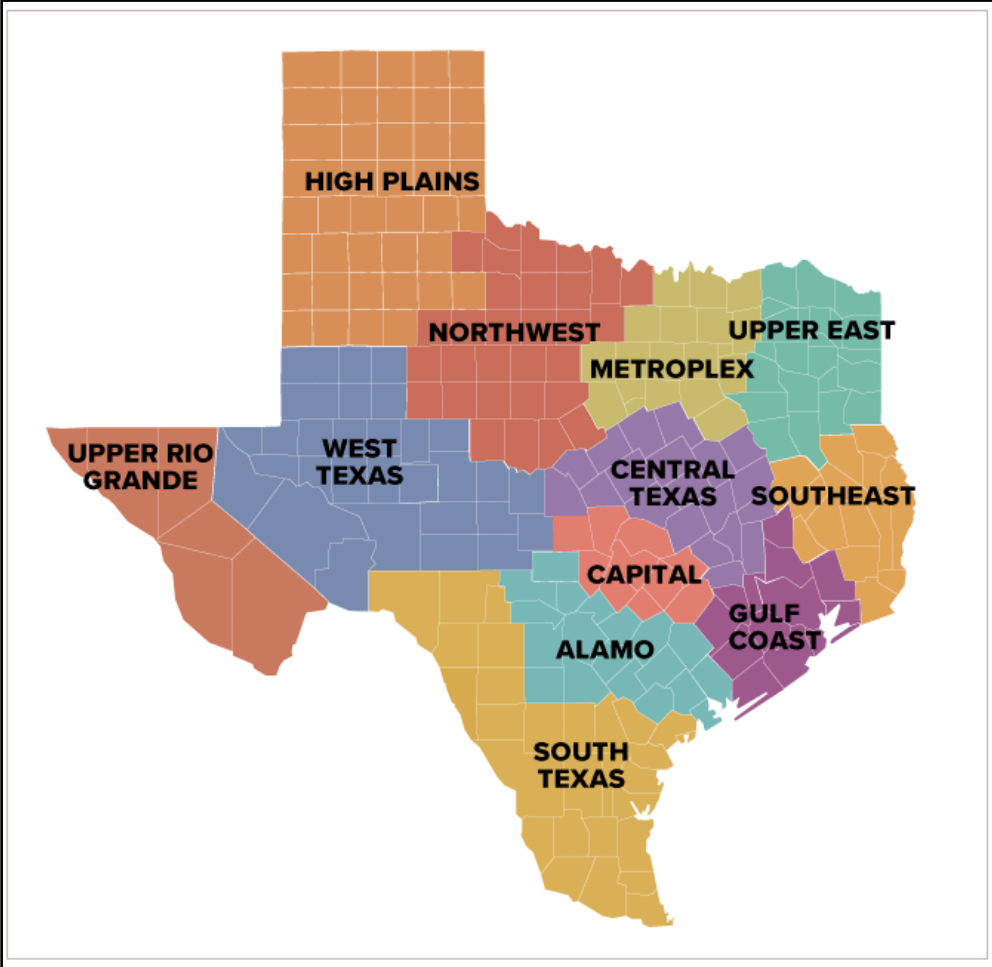
# Texas Regions



Source: Texas Comptroller Economic Regions

# Texas Regions: Basic Statistics



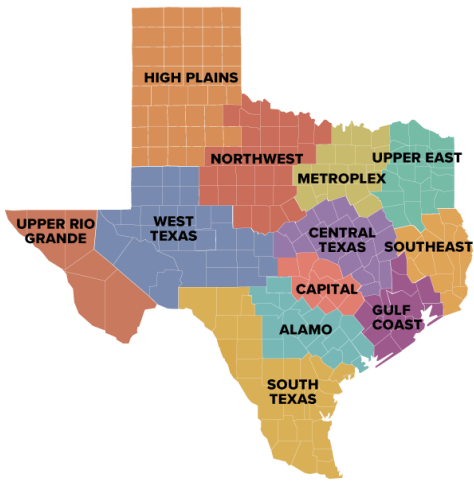| Region | UAs | 2020 Region Statistics | | |
|---|---|---|---|---|
| | | Total Region Pop | Percent Pop Urban | Urban Pop Density |
| Alamo | 19 | 2,863,800 | 82% | 2,864 |
| Capital | 17 | 2,407,031 | 84% | 2,742 |
| Central Texas | 14 | 1,254,261 | 68% | 2,215 |
| Gulf Coast | 19 | 7,297,022 | 92% | 2,995 |
| High Plains | 16 | 866,122 | 73% | 2,366 |
| Metroplex | 31 | 8,044,641 | 90% | 3,027 |
| Northwest Texas | 13 | 549,130 | 57% | 1,786 |
| South Texas | 24 | 2,408,692 | 85% | 2,503 |
| Southeast Texas | 10 | 768,635 | 54% | 1,366 |
| Upper East Texas | 20 | 1,149,993 | 44% | 1,265 |
| Upper Rio Grande | 3 | 888,720 | 94% | 3,339 |
| West Texas | 12 | 647,458 | 77% | 1,860 |

Sources: Texas Comptroller Economic Regions; 2020 County, Tabulation Block, and Urban Area TIGER/Line Shapefiles

# Texas Regions: Basic Statistics

| Region | UAs | 2020 Region Statistics | | | Most populous 2020 UA in the Region | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Total Region Pop | Percent Pop Urban | Pop Density Urban | Most populus UA | UA Pop | Pct of Total Urban Pop | UA Pop Density |
| Alamo | 19 | 2,863,800 | 82% | 2,864 | San Antonio, TX | 1,992,689 | 85% | 3,248 |
| Capital | 17 | 2,407,031 | 84% | 2,742 | Austin, TX | 1,809,888 | 89% | 2,921 |
| Central Texas | 14 | 1,254,261 | 68% | 2,215 | Killeen, TX | 257,222 | 30% | 2,561 |
| Gulf Coast | 19 | 7,297,022 | 92% | 2,995 | Houston, TX | 5,853,575 | 87% | 3,340 |
| High Plains | 16 | 866,122 | 73% | 2,366 | Lubbock, TX | 272,280 | 43% | 2,562 |
| Metroplex | 31 | 8,044,641 | 90% | 3,027 | Dallas--Fort Worth--Arlington, TX | 5,732,354 | 79% | 3,281 |
| Northwest Texas | 13 | 549,130 | 57% | 1,786 | Abilene, TX | 118,138 | 38% | 1,906 |
| South Texas | 24 | 2,408,692 | 85% | 2,503 | McAllen, TX | 779,553 | 38% | 2,390 |
| Southeast Texas | 10 | 768,635 | 54% | 1,366 | Beaumont, TX | 146,649 | 36% | 1,526 |
| Upper East Texas | 20 | 1,149,993 | 44% | 1,265 | Tyler, TX | 131,028 | 26% | 1,607 |
| Upper Rio Grande | 3 | 888,720 | 94% | 3,339 | El Paso, TX--NM* | 823,732 | 98% | 3,366 |
| West Texas | 12 | 647,458 | 77% | 1,860 | Odessa, TX | 154,818 | 31% | 1,800 |

Sources: Texas Comptroller Economic Regions; 2020 County, 2020 Tabulation Block, and 2020 Urban Area TIGER/Line Shapefiles; 2020 list of urban areas and state-sorted list of urban areas on Urban and Rural (census.gov)

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*El Paso, TX--NM data represents the Texas portion of the UA.

# Texas Regions: Percent Change 2010 to 2020



| Region | Percent Change 2010 to 2020 | | | | | |
|---|---|---|---|---|---|---|
| | UAs | UAs ≥ 5,000 Pop | Region Pop | Urban Pop | Urban Land Area | Urban Pop Density |
| Alamo | -30% | -5% | 17% | 16% | 9% | 6% |
| Capital | -26% | 6% | 32% | 32% | 15% | 14% |
| Central Texas | -44% | 8% | 12% | 11% | 2% | 8% |
| Gulf Coast | -44% | 0% | 20% | 19% | 9% | 10% |
| High Plains | -47% | -6% | 3% | -2% | -7% | 6% |
| Metroplex | -23% | 11% | 19% | 18% | 4% | 14% |
| Northwest Texas | -50% | 0% | 0% | -12% | -8% | -4% |
| South Texas | -31% | -4% | 6% | 1% | -10% | 13% |
| Southeast Texas | -29% | 0% | 0% | -5% | -4% | 0% |
| Upper East Texas | -44% | 6% | 3% | -6% | -10% | 4% |
| Upper Rio Grande | -40% | 0% | 8% | 5% | 3% | 2% |
| West Texas | -33% | -8% | 13% | 11% | 21% | -9% |

Sources: Texas Comptroller Economic Regions; 2010 and 2020 County, Tabulation Block, and Urban Area TIGER/Line Shapefiles; 2010 and 2020 lists of urban areas and state-sorted lists of urban areas on Urban and Rural (census.gov)

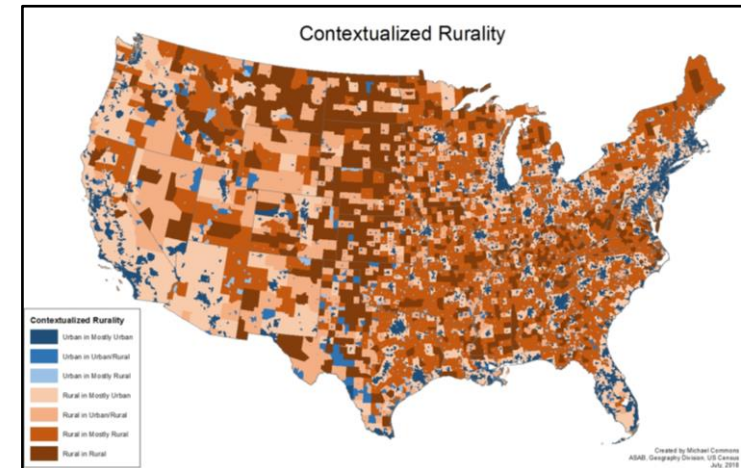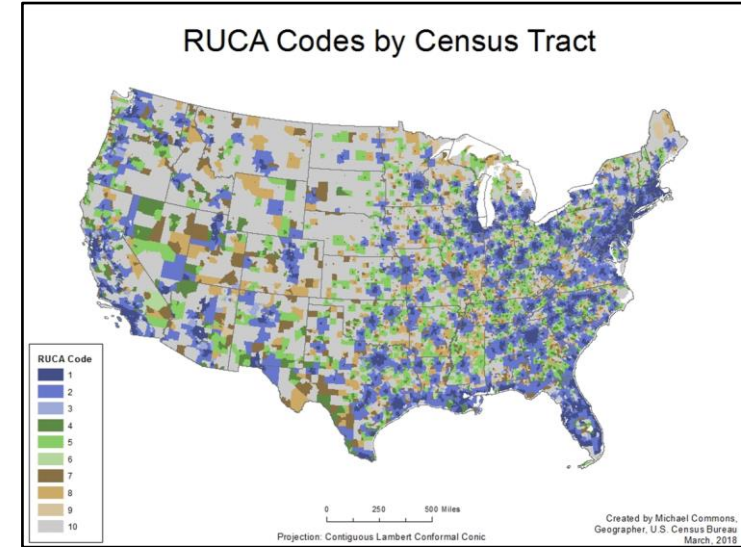# Beyond 2020

# Beyond 2020: Next Steps

- Demographic data published in the Demographic and Housing Characteristics File (DHC).
  - Scheduled publication Summer 2023.
  - Subjects: Age, sex, race, Hispanic or Latino origin, household type, family type, relationship to householder, group quarters population, housing occupancy, and housing tenure.
  - Some tables are repeated by race and ethnicity.
- Continue working with stakeholders.
  - The Census Bureau works with tribal, federal, state, and local agencies as well as other stakeholders to ensure understanding of our classification.
  - There are different advantages and disadvantages to urban qualification based on each individual program or funding agency and often qualification for one program may equal a disadvantage in a different program for the same entity.

# Beyond 2020: UA Criteria

- Given data user feedback to date, the Census Bureau:
  - Does not anticipate significant UA criteria changes.
  - Will consider additional land use datasets to identify exempted territory.
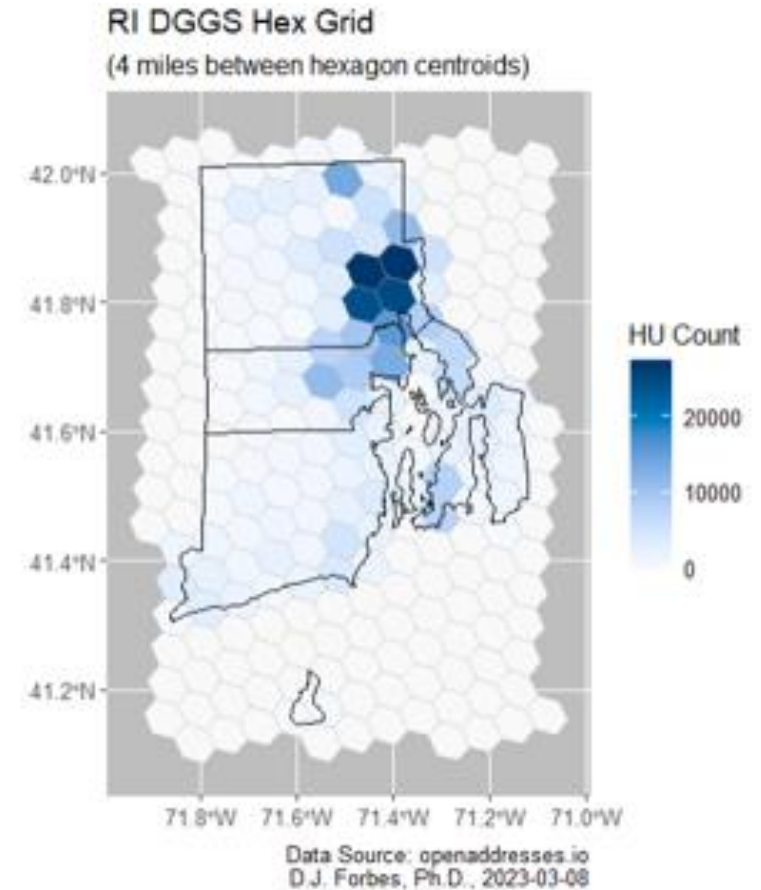    - Datasets must be nationally-consistent and freely-available sources.

# Beyond 2020: Investigating Urban-Rural Continuum

- Classifications tend to be dichotomous:
  - Urban/Rural; Metropolitan/Nonmetropolitan.
  - Rural and Nonmetropolitan are residual categories.
- Move towards additional categories:
  - USDA Economic Research Service Rural-Urban Commuting Areas, Rural Urban Continuum Codes.
  - National Center for Health Statistics County Classification.

# Beyond 2020: Investigating Grids

- ## Investigating UA delineation via grids:
  - Census blocks and other census geographies vary in size.
  - Possibility of a more uniform, close to equal geographic unit with less bias.

RI DGGS Hex Grid
(4 miles between hexagon centroids)

HU Count

Data Source: openaddresses.io
D.J. Forbes, Ph.D., 2023-03-08

# Beyond 2020: Additional Considerations

- Continuum and grid-based delineation in addition to "traditional" UA delineation?
  - Historical comparability.
  - Agency reliance on Census Bureau UAs for programmatic uses.

- Intercensal updates
  - Possibility post-2020 delineation since 2020 UAs are housing unit-based.
  - Options:
    - Additive update (most likely), e.g., "add urban" to the current delineation where development occurs.
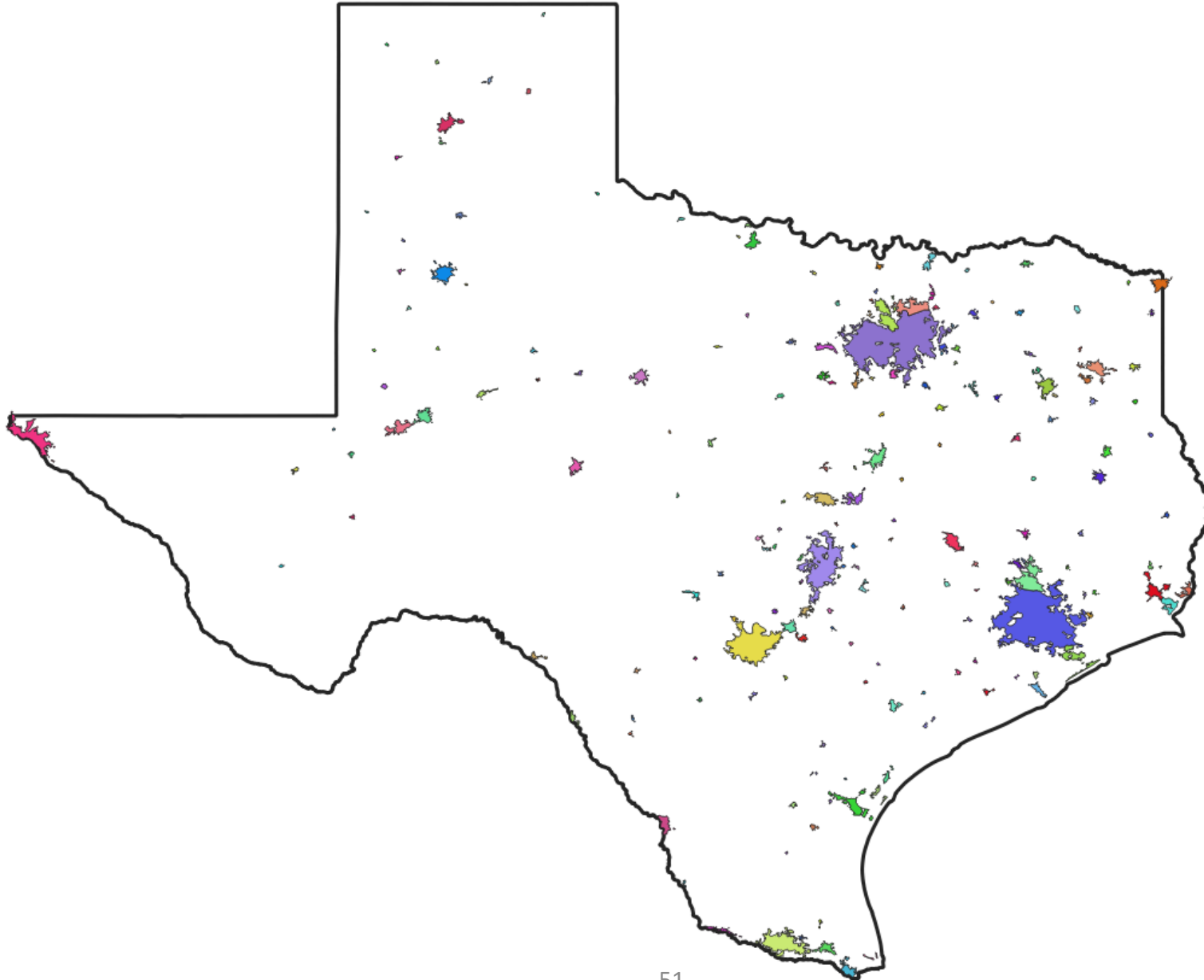    - Complete re-delineation.

Post-2010 development on the west side of the San Antonio, TX UA.
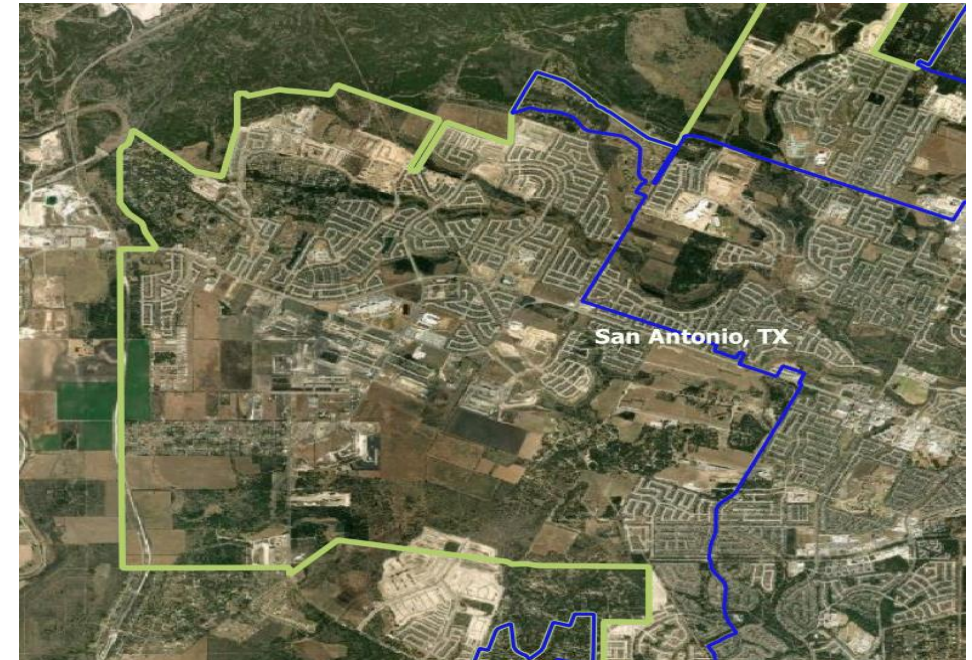


Legend:
- 2020 UA Boundary
- 2010 UA Boundary

# Texas 2020 UAs

# Questions?

U.S. Census Bureau

Geography Division

https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html

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