Issues with Current Urban-Rural Classification Measures and Some Alternatives

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Introduction

- One of the biggest issues plaguing consistent analysis of U.S. geographic disparities is the variety of measures that classify regions as "urban" or "rural“
- While the geographic units present some challenges (e.g. states versus counties versus zip codes versus census tracts) much of the variation comes in the many different ways regions are classified
- Per USDA – “Rural definitions can be based on administrative, land-use, or economic concepts, exhibiting considerable variation in socio-economic characteristics and well-being of the measured population”

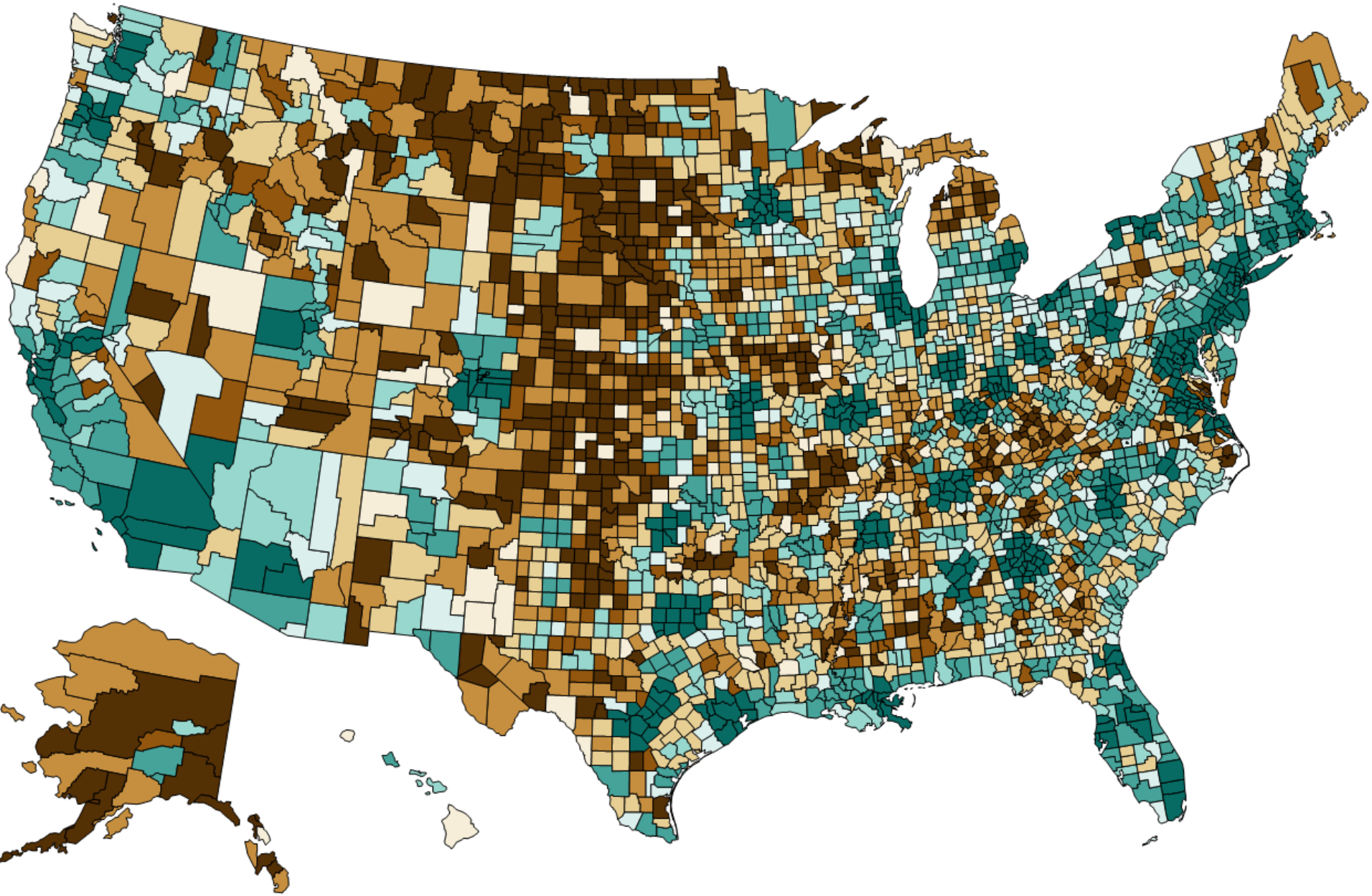
Federal Agencies Dictate Policy

- US Census – Defines urban, then urban adjacent, what is left is rural.
- US Office of Management and Budget (OMB) – Define metropolitan area based on urban area and economic indicators. Everything else is non-metropolitan and gets other divisions.
- US Dept of Agriculture Economic Research Service (USDA-ERS) – More nuanced with several different view points looking at urban, rural, remote, and frontier.

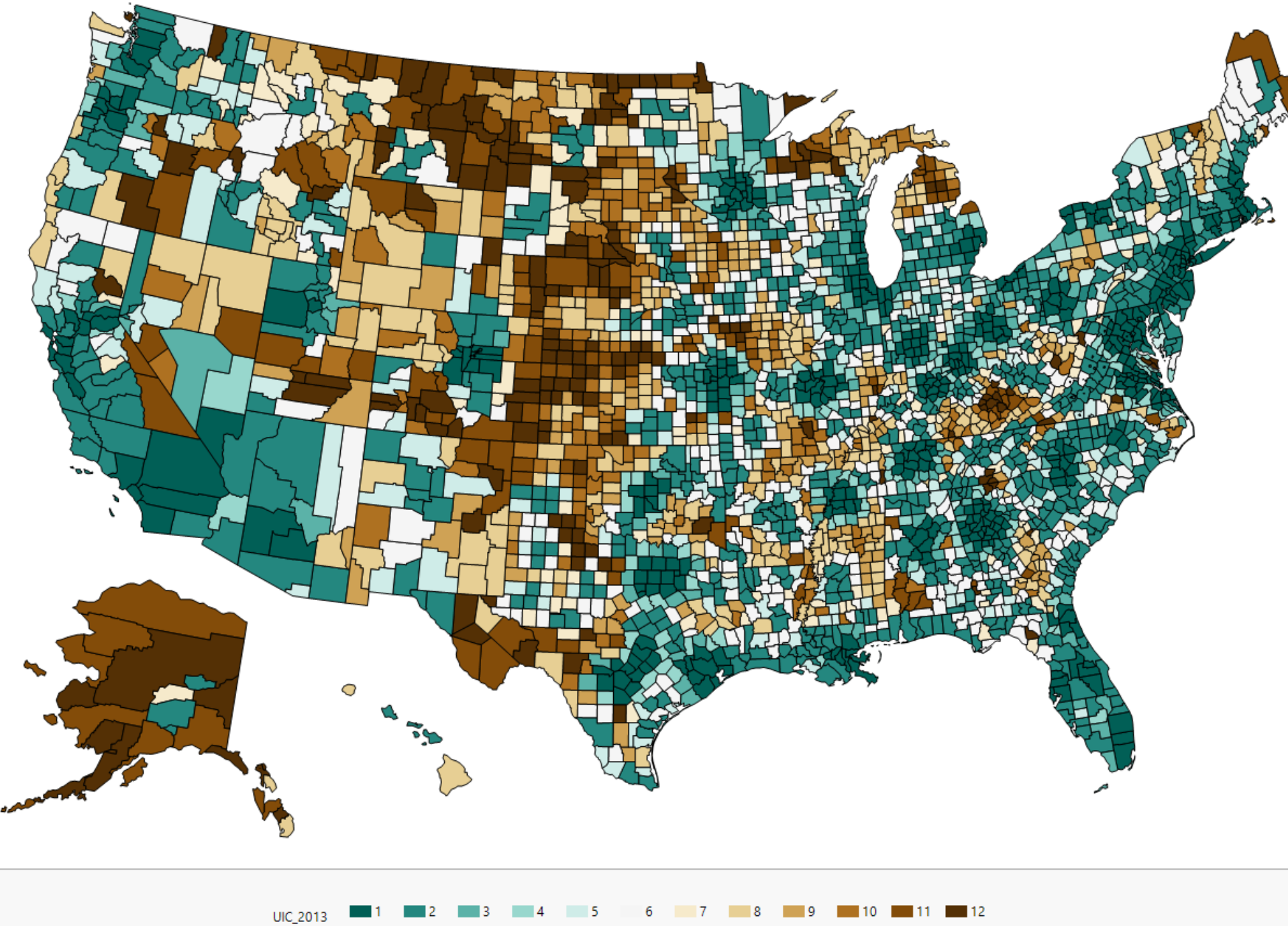
Defining Rural

- Rural-Urban Continuum Code (RUCC):
  - Primary county level indicator
  - 9 levels (1-3 are urban counties)
- Urban-Influence Code:
  - Designed to explore ‘urbanicity’; if urban or how urban adjacent
  - 12 levels (1 and 2 are urban counties)
- County Metropolitan Subclass
  - Aligns with OMB definitions of metropolitan, micropolitan, noncore

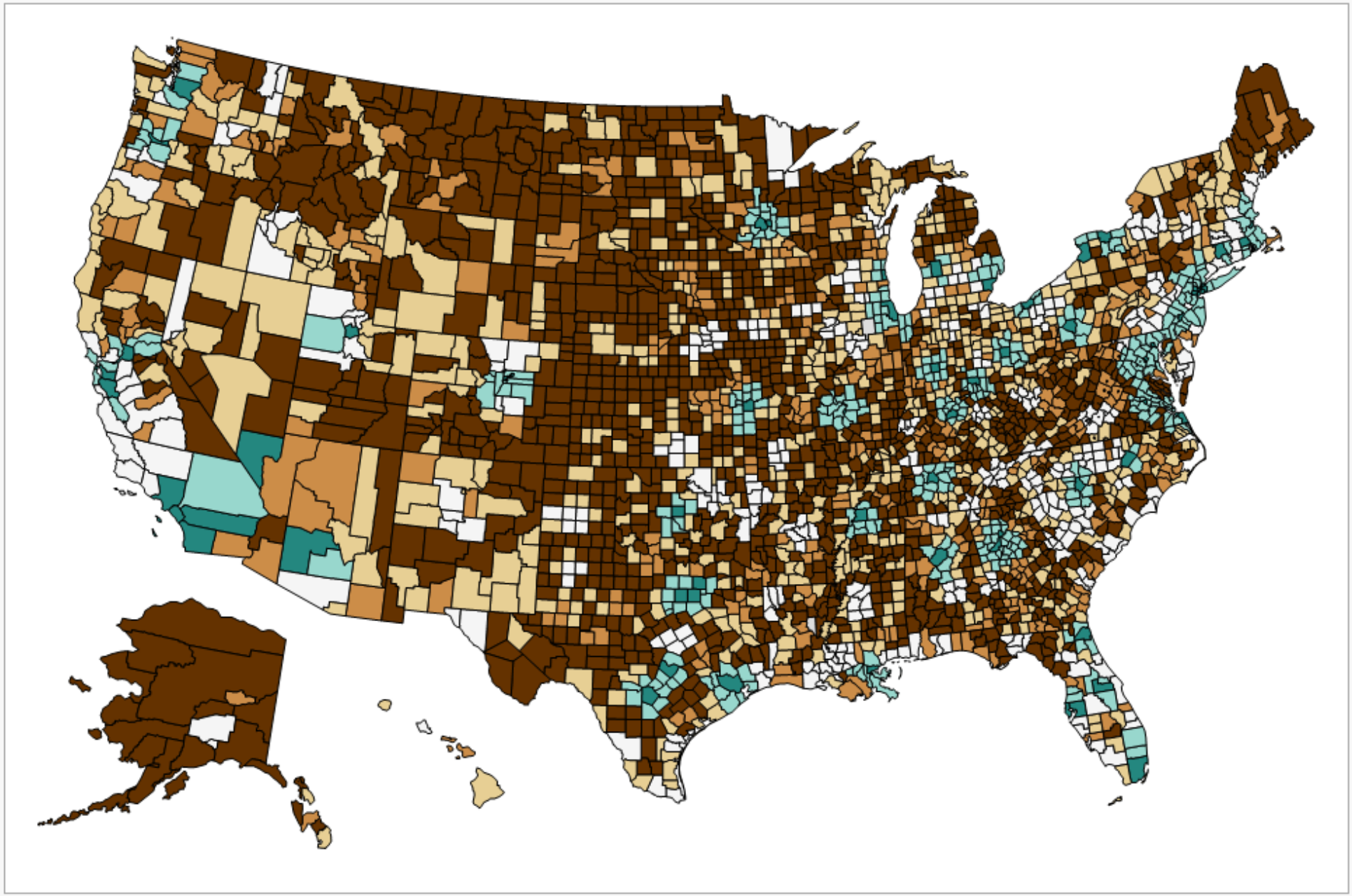
County Colored by Rural-Urban Continuum Code (2013)



County Colored by Urban Influence Code (2013)



County Metropolitan Subclass



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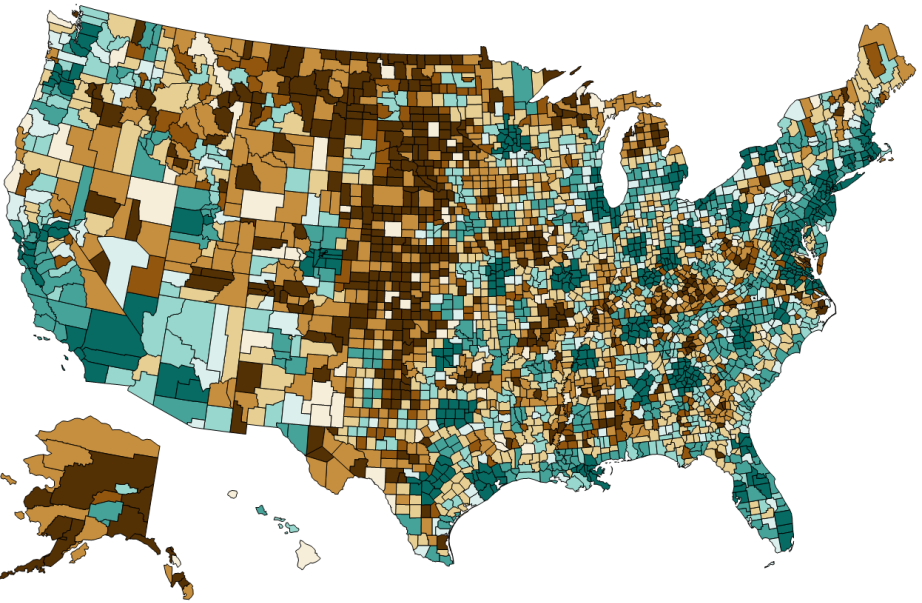
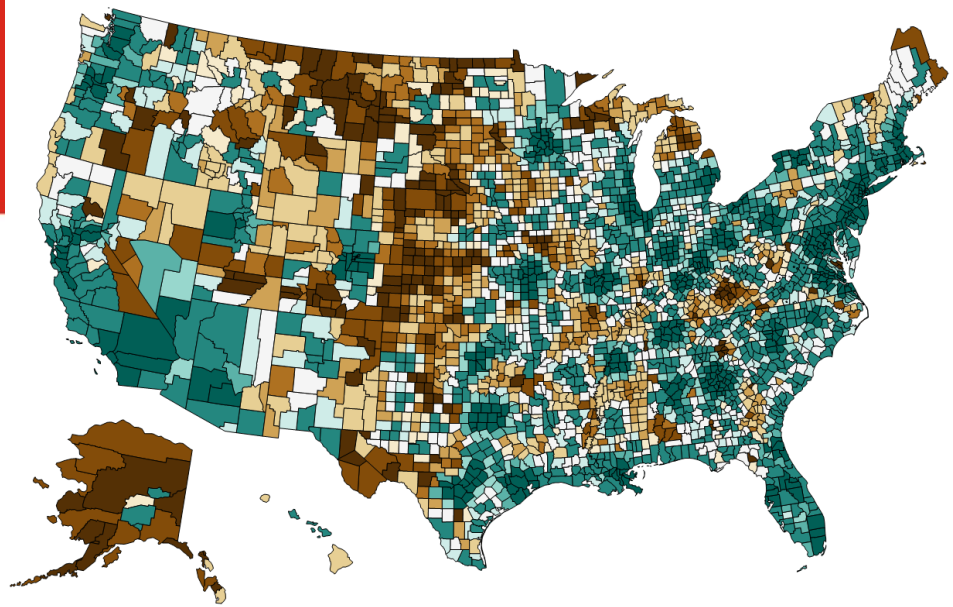


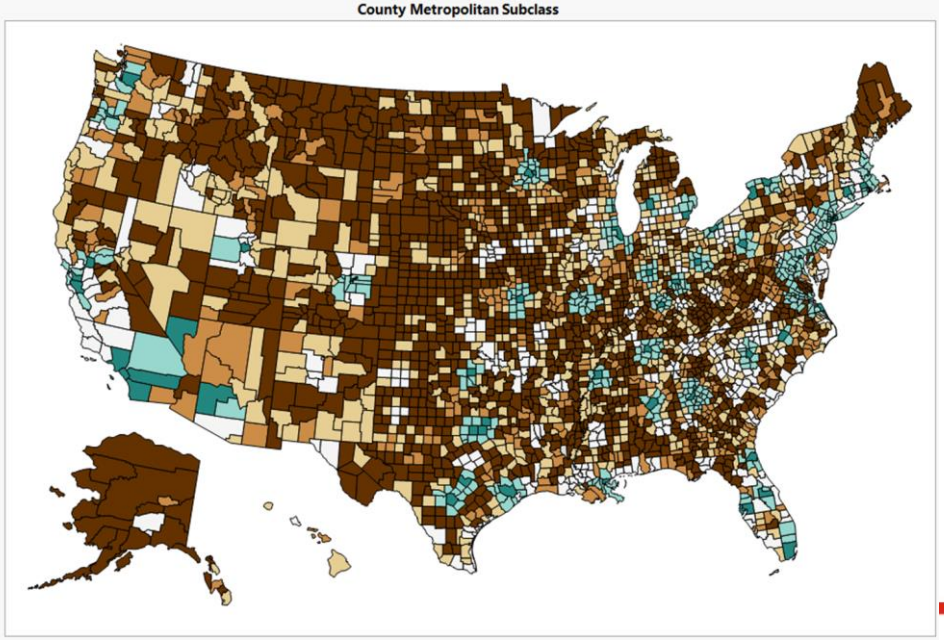
RUCC_2013 1 2 3 4 5 6 7 8 9

County Colored by Urban Influence Code (2013)



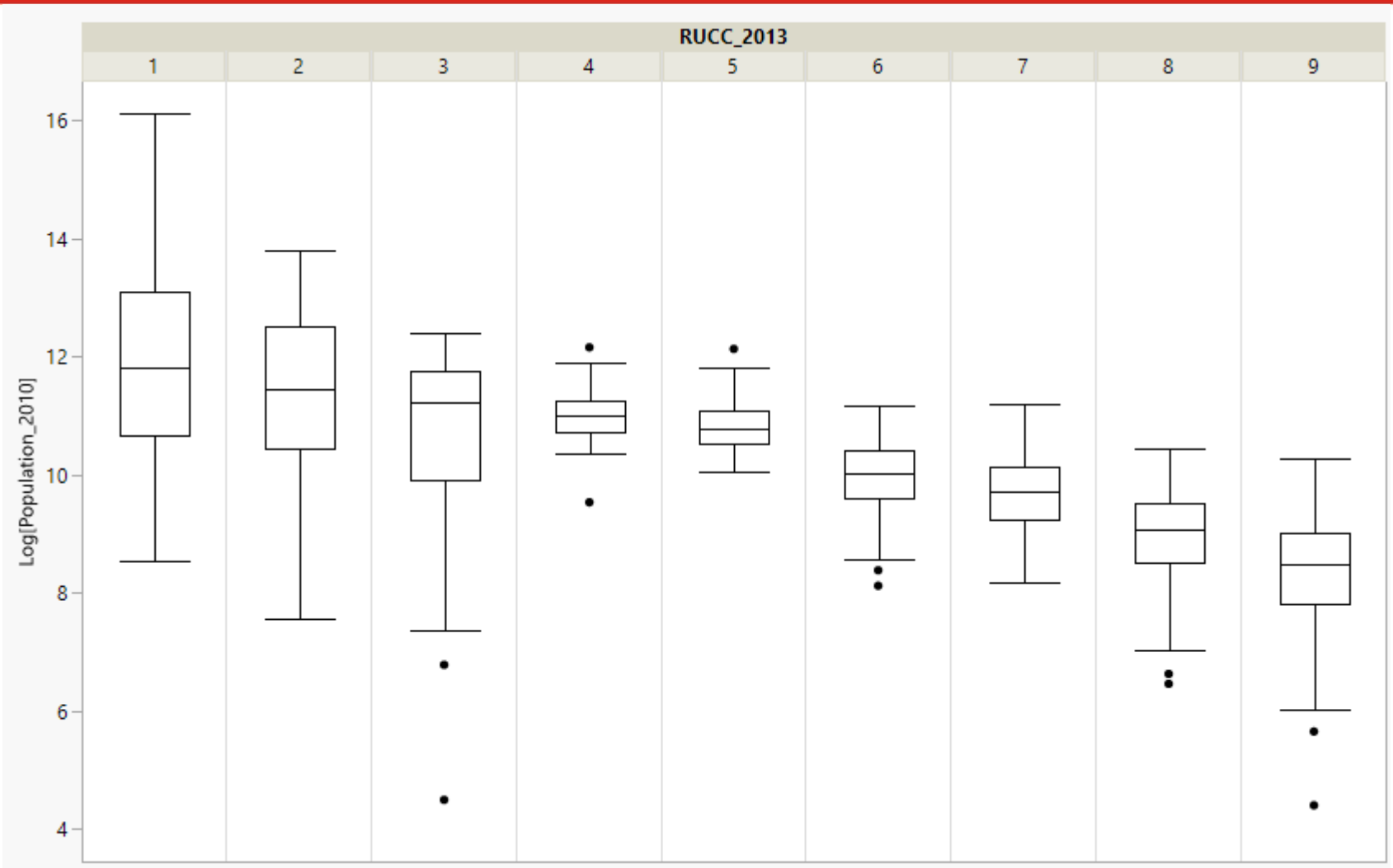
UIC_2013 1 2 3 4 5 6 7 8 9 10 11 12

County Metropolitan Subclass



County Metropolitan Subclass Large central metro Large fringe metro Medium metro Micropolitan Small metro Noncore

Rural-Urban Codes More Than Pop Density



One Alternative - RUCA

- Rural Urban Commuting Area – based on census tracts and zip code based on population density, urban environment, and daily commuting patterns.
- RUCA codes have become a popular alternative to the current RUCC and similar style codings.

Limitations

- Census Based –
  - Census tracts are biased towards encompassing ‘neighborhoods’
  - Consists of 30+ codes that can be combined in different ways depending on purpose; flexible but **not** continuum based
  - Can change over time as census tracts change
  - Vary greatly in size and amenities/infrastructure

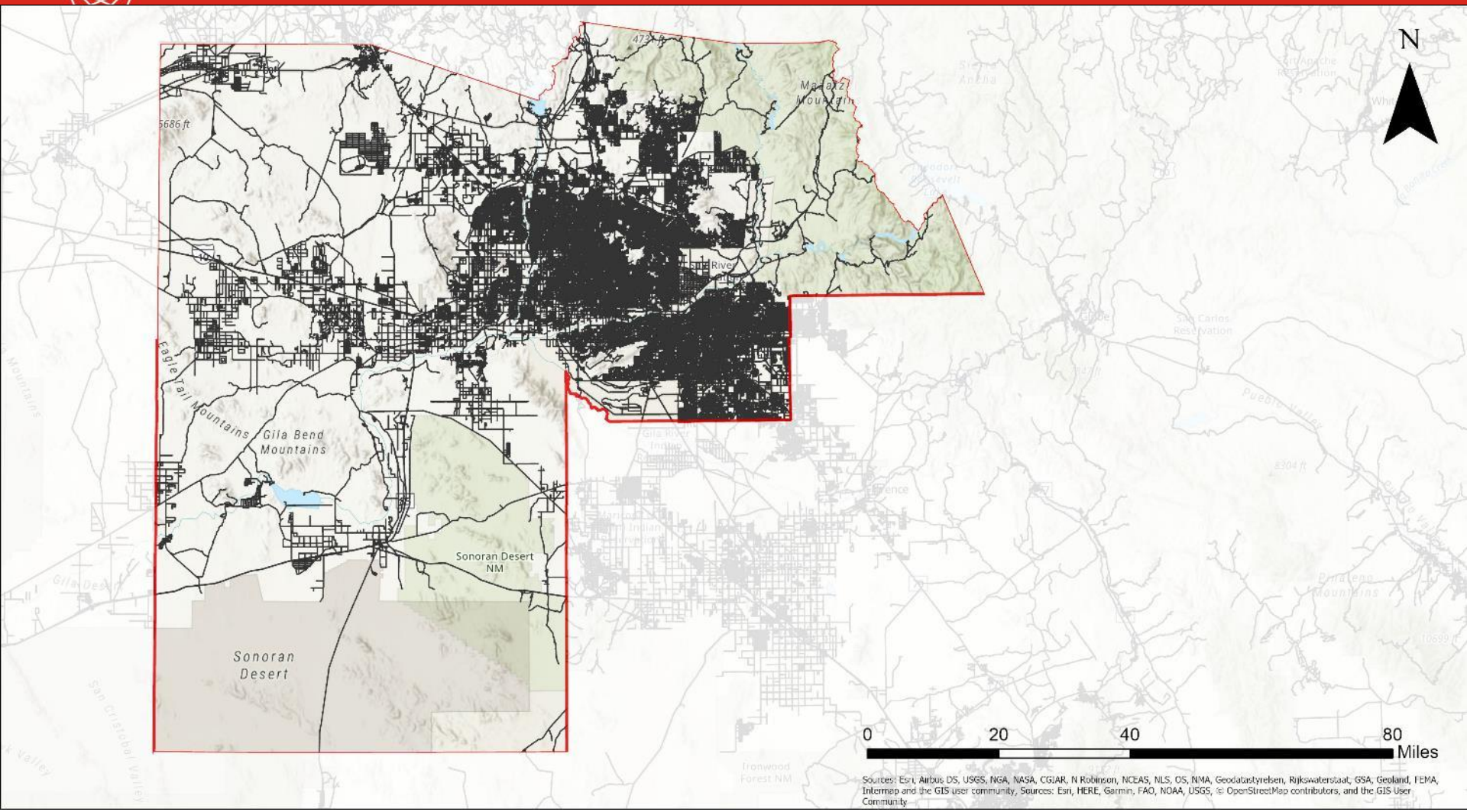
Opportunities

- Move away from strictly population based?
  - Consider Infrastructure?
  - Smaller than County?
  - Wide Variation within County?
    - Especially ‘Urban Adjacent’?
- What happens when we look at measure of infrastructure?

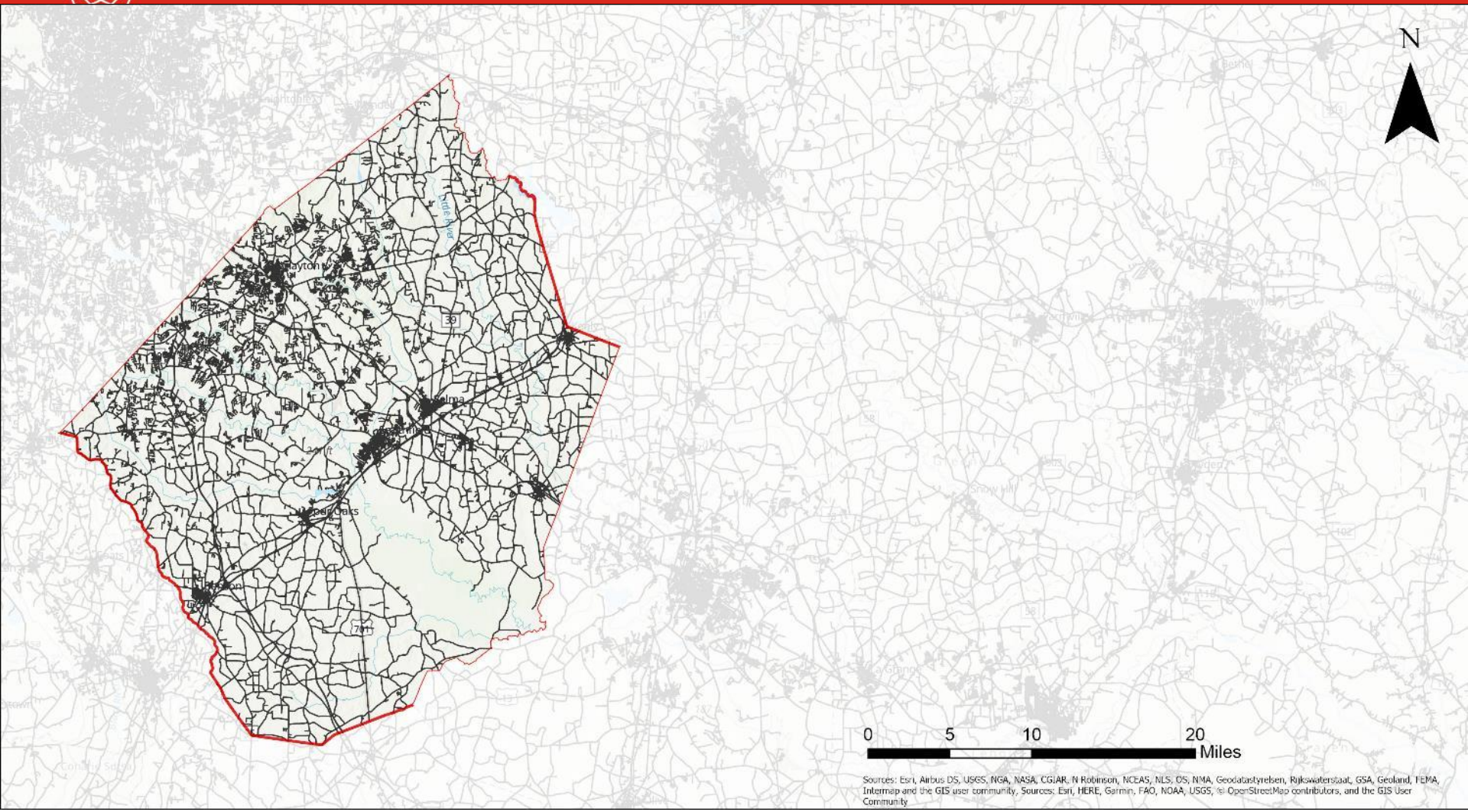
Road Density

- We look at road density as an example of an alternative measure of ‘rurality’
- Census assume that individuals outside of metropolitan areas might still have access to metropolitan features
- Seems unlikely if roads are unavailable
  - Also likely variation within county

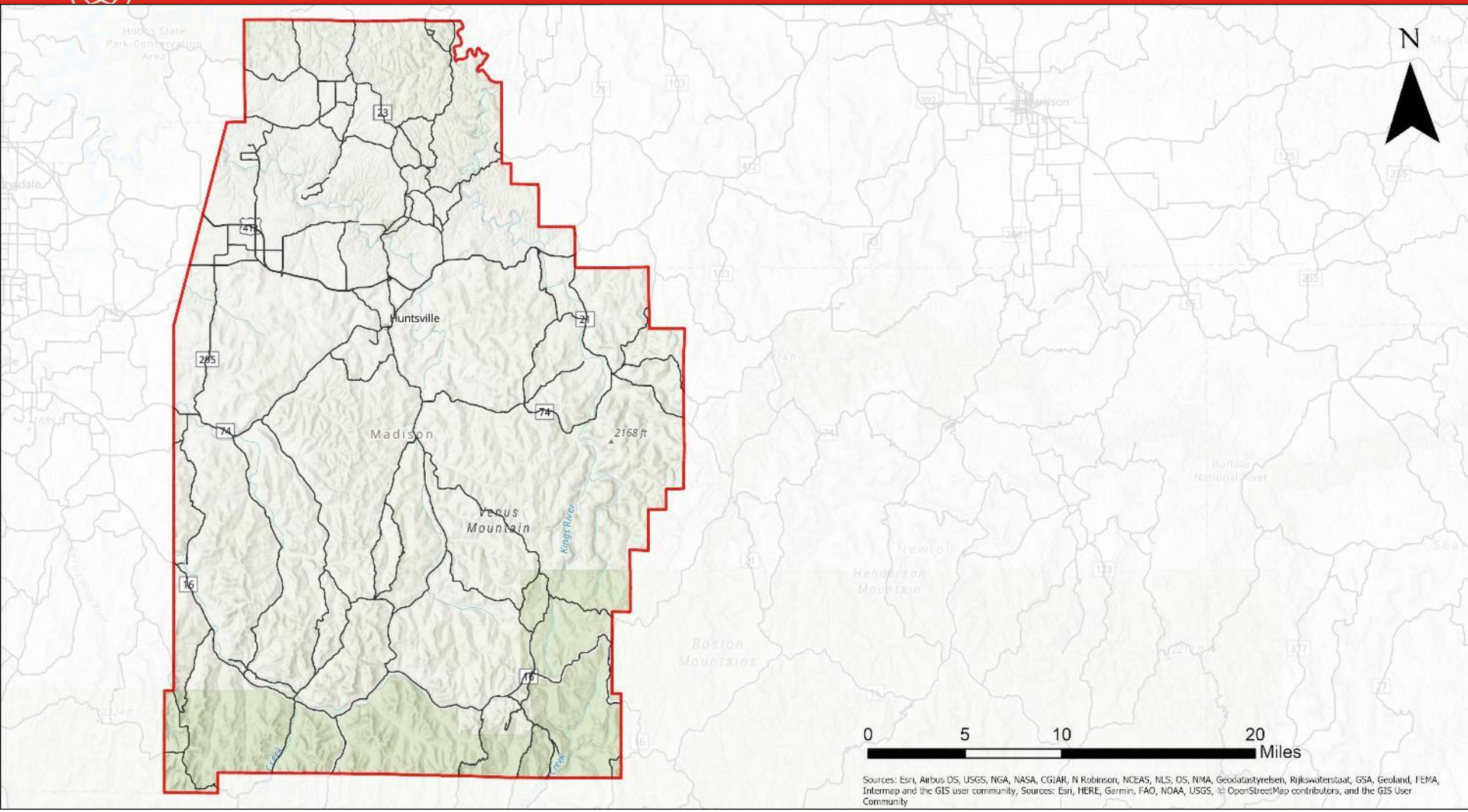
Example: Maricopa County, AZ (RUCC=1)



Example: Johnston County, NC (RUCC = 1)



Madison County, AR (RUCC =2)



Innovation: Grid Methodology

- Overlay entire US in 10 km x 10 km square grid
- Calculate road density within each square
- Proportion amount of square falls ‘within’ a county
- Calculate weighted metrics (sums, means, and standard deviations) within each county

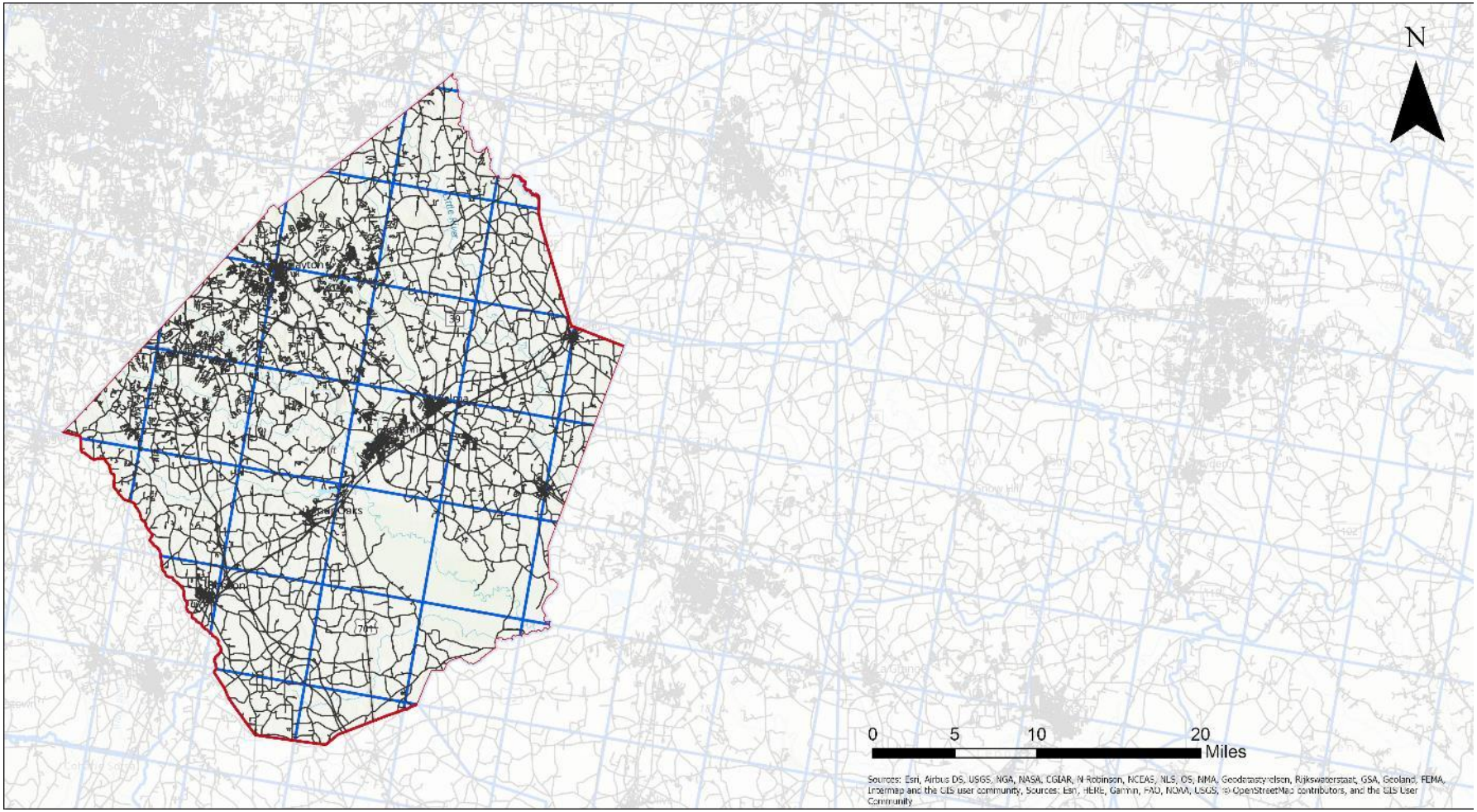
Continued

- Overlay work performed in ArcGIS
- US (with Alaska, Hawaii, DC, and Puerto Rico) gridded into 100,865 unique grid squares
- Total counties from all regions was 3,223
- The intersection of county with grid encompassed 142,495 unique combinations. 44% of grid x county combinations contained 100% of a single county

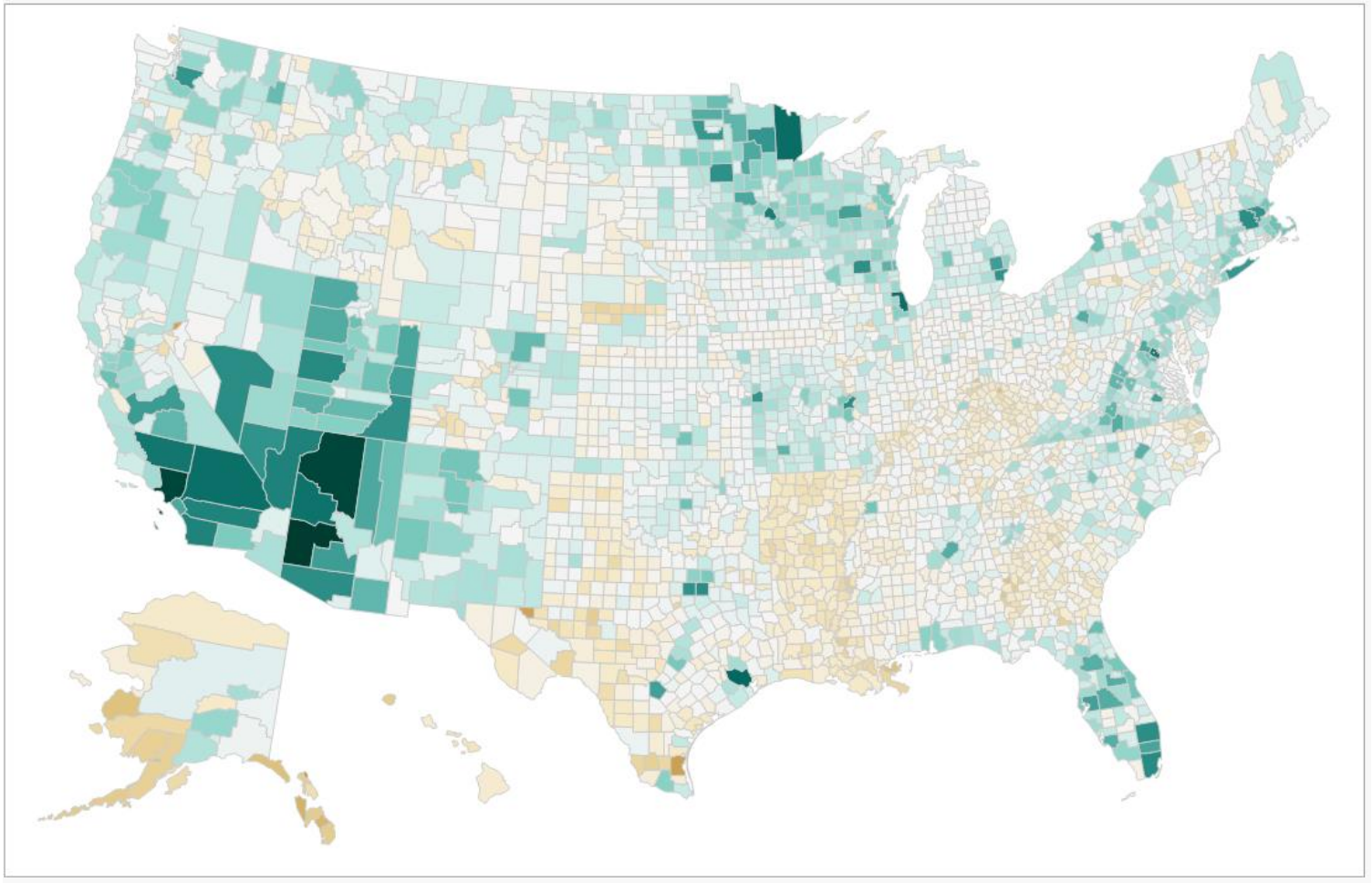
Road Info

- Calculated 9,533,014 road segments.
- Each lane of each road counted independently
- Roads exist on 107,124 grid x county combinations
- Data was limited to 3,142 counties and District of Columbia
- Primary metrics – **log total** road lengths and **standardized log standard deviation** of road lengths within county

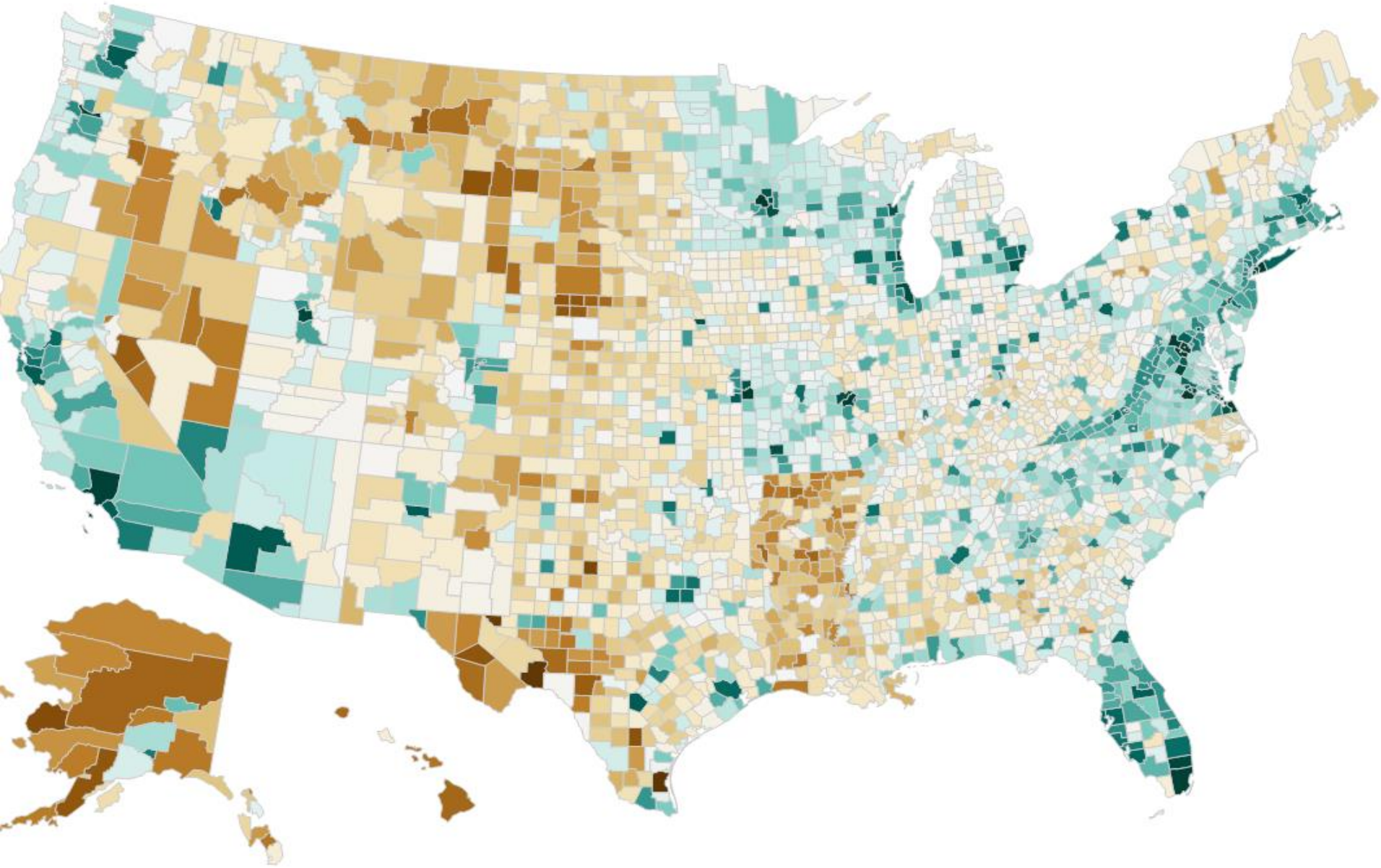
Example



Total Roads – Not Interesting (so is mean roads)



More Interesting – St Log St Dev



Results

- We see state by state variation in the map
  - Wisconsin, Missouri, Iowa
  - Virginia, Florida, Arizona
- We see some ‘urban’ areas are in areas with limited road access
  - Seems to counter some of the RUCC assumptions
- Roads alone provide an incomplete and slightly biased view

Moving Forward

- Many groups are moving to smaller area units for estimating urban/rural.
- Is Census tract the answer? More research needed
- Alternative measures provide unique information beyond pop density
- Need measures that are more nuanced and understand ‘rural’

Blog - https://jphmpdirect.com/

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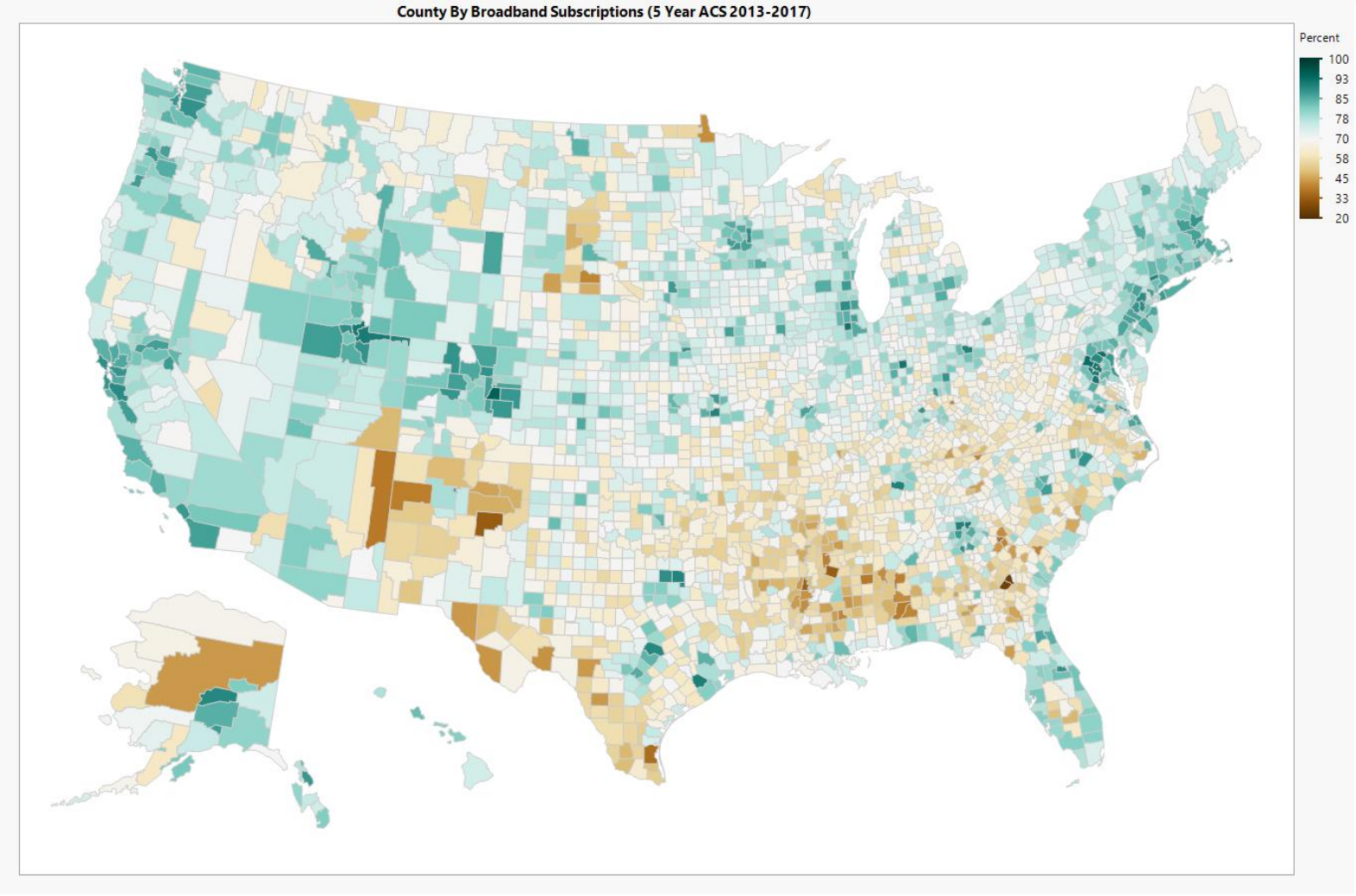
Optional: Additional Reading

- Defining the ‘Rural’ in Rural America: https://www.ers.usda.gov/amber-waves/2008/june/defining-the-rural-in-rural-america/
- Rural Health Information Hub: https://www.ruralhealthinfo.org/
- Census Urban and Rural Information: https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html
- Rural Policy Research Institute: http://www.rupri.org/Forms/Poverty%20and%20Definition%20of%20Rural.pdf

Optional: Other Metrics

- RWJ County Health Rankings (https://www.countyhealthrankings.org/)
  - Pros – Easy to Use, Open Access, Composite Ranking Based on Multiple Factors (including built environment and social determinants)
  - Cons – Ranks and Not Scored, State Focused
- Walkscore/Walkability Index (https://www.walkscore.com/)
  - Pros – Open Access for Individual Use, Composite Ranking Based on Neighborhood Factors (including crime and public transportation)
  - Cons – Bad for rural comparisons (many have Walkscore of 0)

Optional: How about Broadband Access?



Bonus Content – Log Population