



Urban Area Criteria for the 2020 Census

**New Mexico SDC Annual Meeting
December 2, 2021**

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U.S. Census Bureau**

Proposed Urban Area Criteria for the 2020 Census

Increase the
Minimum
Threshold to
Qualify as an
Urban Area

*Total housing units
or population*

1

Cease
Distinguishing
Different Types of
Urban Areas

2

Reduce the
Maximum
Distance of Jumps

3

No Longer Include
Low Density Hop
or Jump “Corridor”
in the Urban Area

4

Adoption of
Housing Unit
Density Threshold
for Qualification of
Census Blocks

5

Use of LEHD data
for Splitting
Agglomerations

6

Proposed Urban Area Criteria for the 2020 Census

1

Increase the Minimum Threshold
to Qualify as an Urban Area



Population: 10,000

OR



Housing Units: 4,000

2

Cease Distinguishing
Different Types of Urban Areas

Urban Clusters: Urban Areas
with population of 2,500 to
49,999

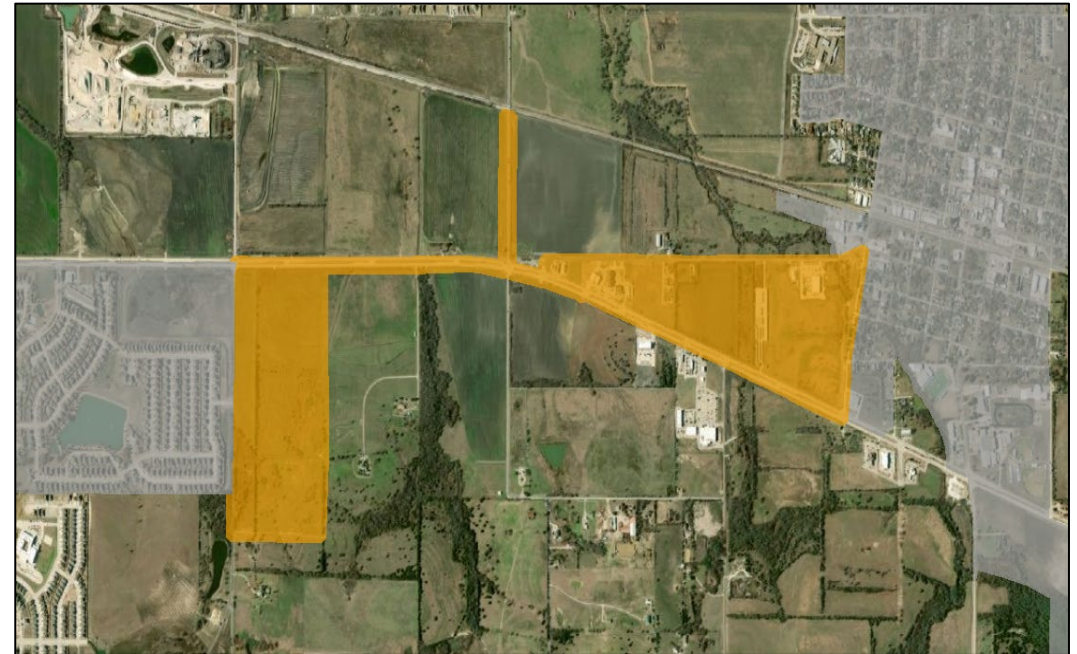
Urbanized Areas: Urban Areas
with population of 50,000 or
more

Proposed Urban Area Criteria for the 2020 Census

3 Reduce the Maximum Distance of Jumps

- From 2.5 miles back down to **1.5 miles**
 - Extended to 2.5 miles in 2000
 - Impervious surface added in 2010
 - Combination led to over-bounding in 2010
- Excluded territory still extends hops and jumps to maximum of 5 miles
 - Water and wetlands

4 No Longer Include Low Density Hop or Jump “Corridor” blocks in the Urban Area



- 2010 Jump Blocks
- 2010 Qualified Urban Blocks

Proposed Urban Area Criteria for the 2020 Census

5

Adoption of Housing Unit Density Threshold for Qualification of Census Blocks

385 housing units
(occupied or vacant)
per square mile

Equivalent to
1 housing unit
per 1.6 acres

Equivalent to
approximately
1,000 persons
per square
mile

More direct measure
of developed
landscape

Ability to update
extent of Urban Areas
between censuses

Census block-level
housing unit counts
are invariant

Final Criteria: NLCD



New National Land Cover Database (2019) released since Proposed Urban Area Criteria was published

Final Criteria: Group Quarters

Table 1.

Change in Group Quarters Population by Major Group Quarters Type: 2010 to 2020

United States	Population		Change 2010 to 2020	
	2010	2020	Number	Percent
Total	7,987,323	8,239,016	251,693	3.2
Institutionalized population	3,993,659	3,753,401	-240,258	-6.0
Correctional facilities for adults	2,263,602	1,967,297	-296,305	-13.1
Juvenile facilities	151,315	88,115	-63,200	-41.8
Nursing facilities/skilled-nursing facilities	1,502,264	1,627,046	124,782	8.3
Other institutional facilities	76,478	70,943	-5,535	-7.2
Noninstitutionalized population	3,993,664	4,485,615	491,951	12.3
College/university student housing	2,521,090	2,792,097	271,007	10.7
Military quarters	338,191	328,372	-9,819	-2.9
Other noninstitutional facilities	1,134,383	1,365,146	230,763	20.3

Note: The 2010 GQ Total Population was revised to 7,987,393 due to the 2010 Census Count Question Resolution.

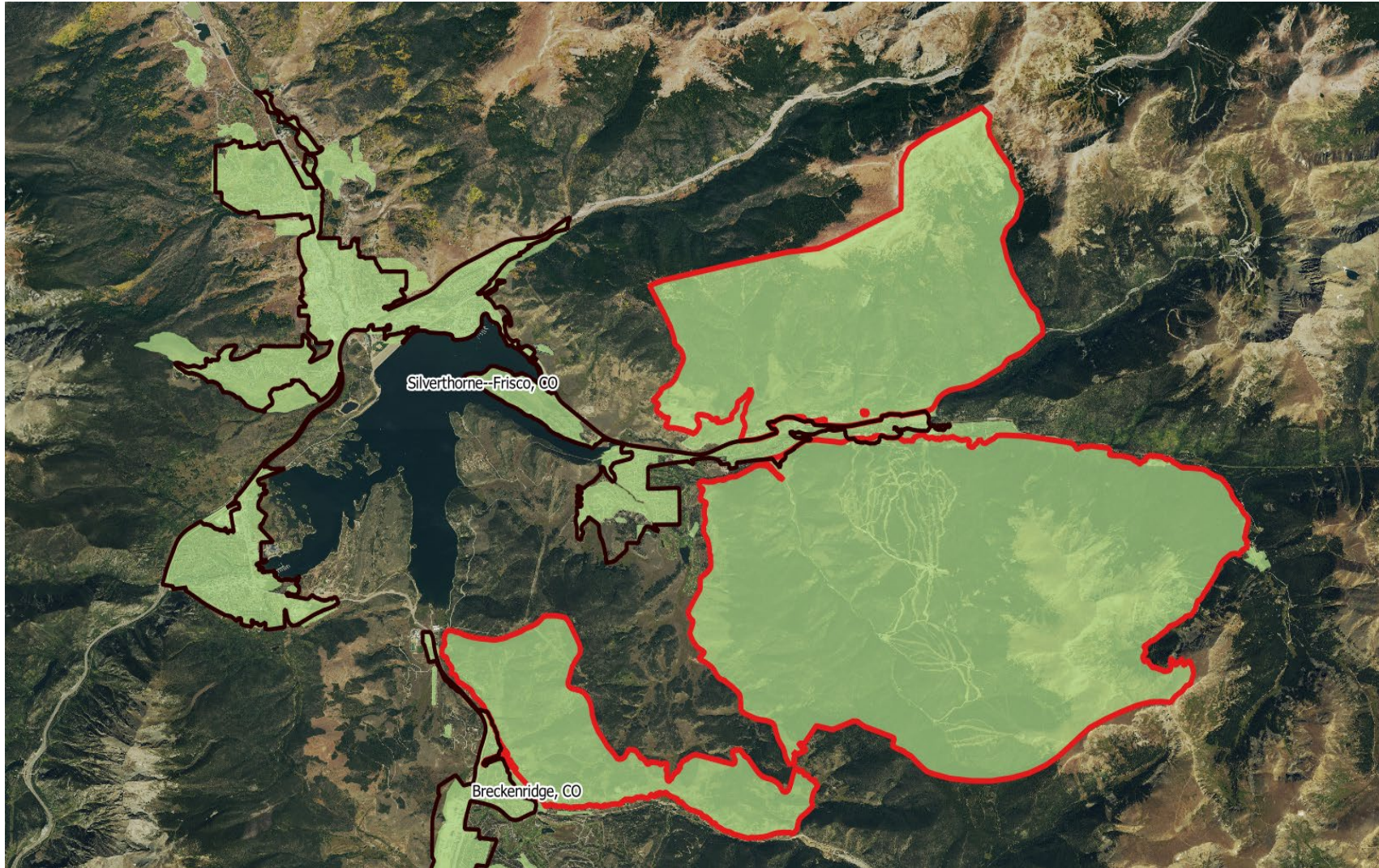
The 2020 Group Quarters Definitions and Code List are available in Appendix B in the 2020 Census Redistricting Data (Public Law 94-171) Summary File Technical Documentation.

Information on confidentiality protection, nonsampling error, and definitions is available at <<https://www2.census.gov/programs-surveys/decennial/2020/technical-documentation/complete-tech-docs/summary-file/>>.

Source: U.S. Census Bureau, 2010 Census Advance Group Quarters Summary File; 2020 Census Redistricting Data (Public Law 94-171) Summary File.

- college residence halls
- residential treatment centers
- skilled nursing facilities
- group homes
- military barracks
- prisons
- worker dormitories

Final Criteria: Group Quarters



The proposed criteria specified automatically qualifying blocks with Group Quarters as urban if they were adjacent to already qualified urban area. During criteria testing, this led to large blocks with low housing and population expanding the urban areas, sometimes by miles. Further testing is continuing.

Final Criteria: Minimum Threshold

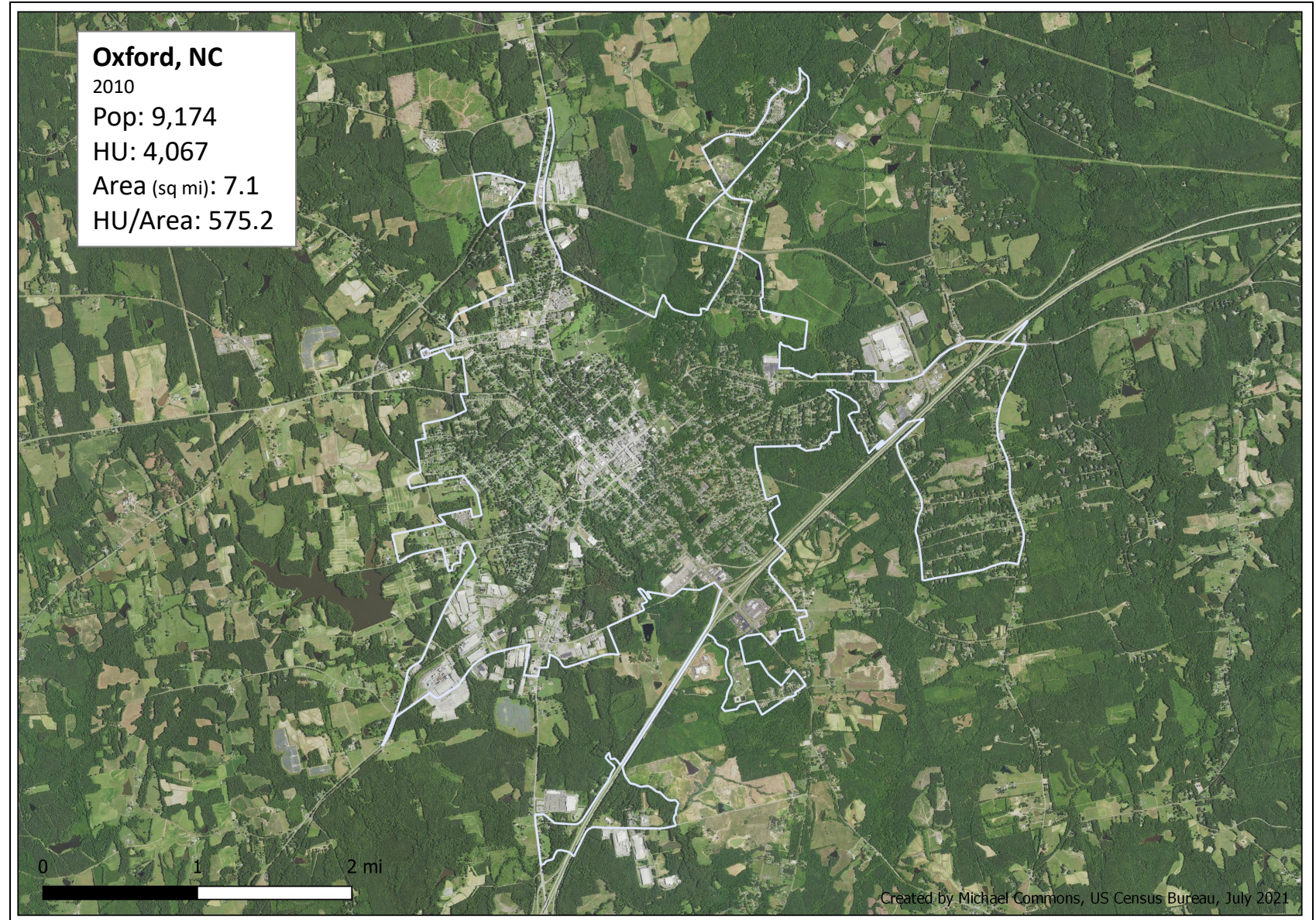
Minimum Urban Area
Qualification:

5,000 Persons
or

2,000 Housing Units

Oxford, NC

Dense “downtown” core
surrounded by lower
density development



Final Criteria: High Density Cores

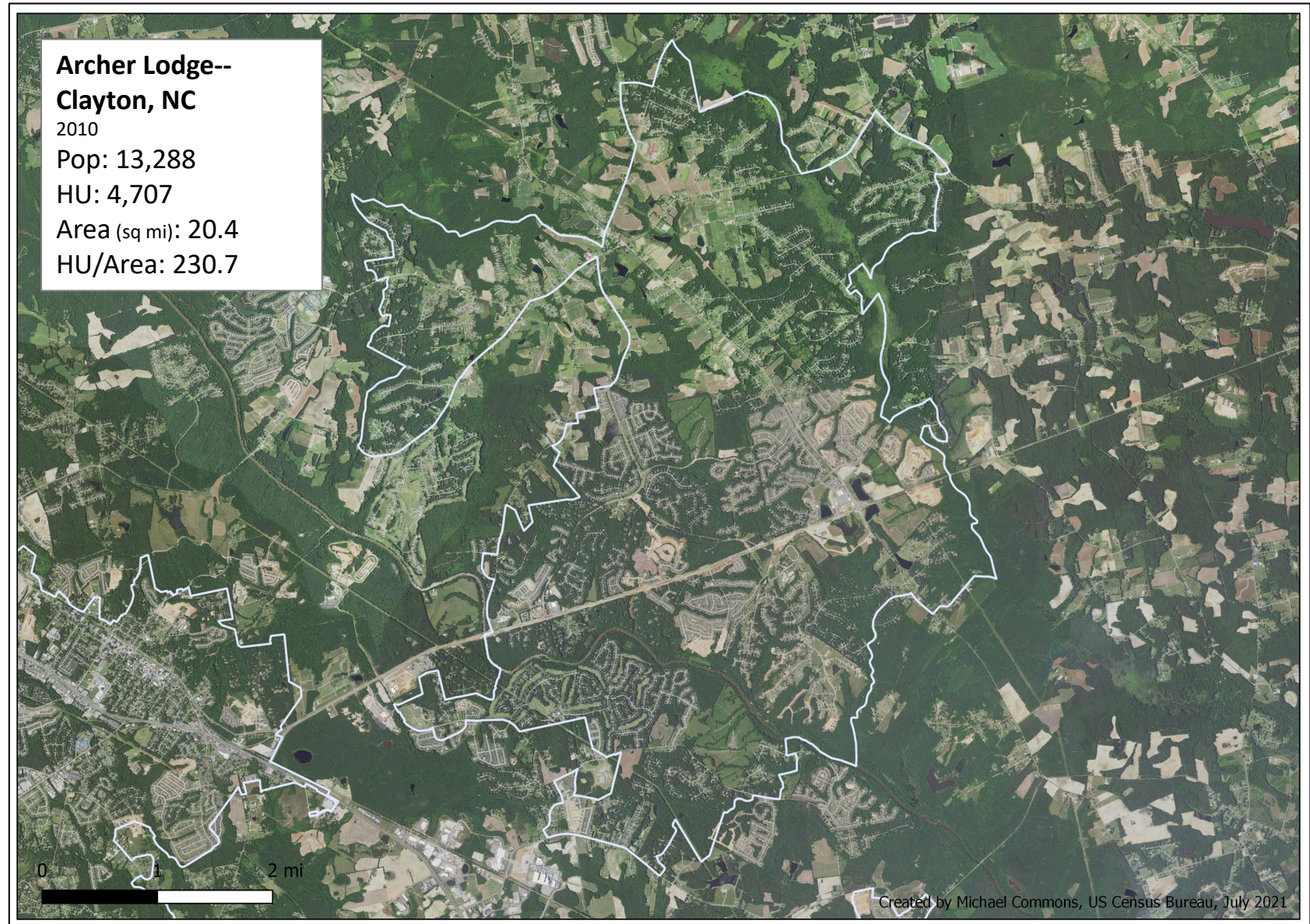
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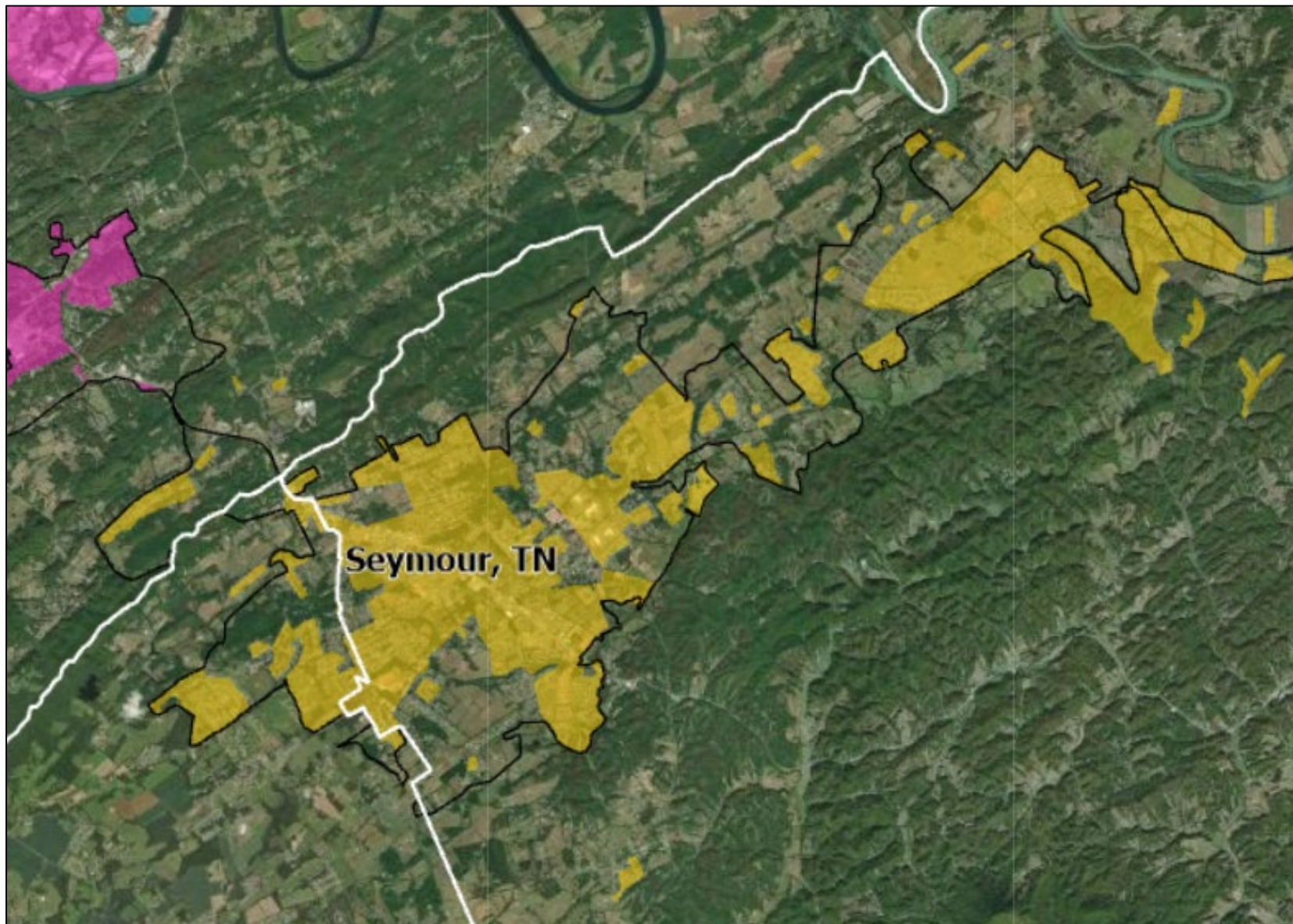
2,000 Housing Units

Archer Lodge – Clayton, NC

No dense core. Suburb of
Raleigh, mostly made up of
subdivisions



Final Criteria: Housing Unit Density



Final Criteria: Housing Unit Density

Density Classes

HU/Acre	Acres/HU	HU/Sq mi	Pop/Sq mi	Acres/Pop	Pop/Acre
2.00	0.5	1,280	3,328	0.19	5.20
1.00	1.0	640	1,664	0.38	2.60
0.67	1.5	427	1,109	0.58	1.73
0.60	1.7	385	1,001	0.64	1.56
0.50	2.0	320	832	0.77	1.30
0.40	2.5	256	666	0.96	1.04
0.33	3.0	213	555	1.15	0.87

Final Criteria: Housing Unit Density

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0.40	2.5	256	666	0.96	1.04
0.33	3.0	213	555	1.15	0.87

Primary Core
1275 HPSM -or-
Impervious -or-
GQ & 500 PPSM

500+ Total HU

Secondary Core
425 HPSM -or-
Impervious -or-
GQ & 500 PPSM

500+ Total HU

Hop/Jump Core
425 HPSM -or-
Impervious -or-
GQ & 500 PPSM

10+ Total HU

Final Fill
200 HPSM -or-
GQ & 500 PPSM

Non-Residential Urban
Territory
Impervious -or-
1000 Jobs

Hop Connection



Jump Connection



Non-Res Connection



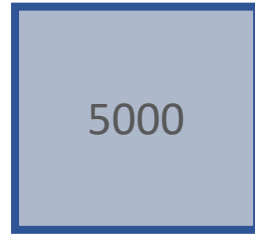
Merge Connection



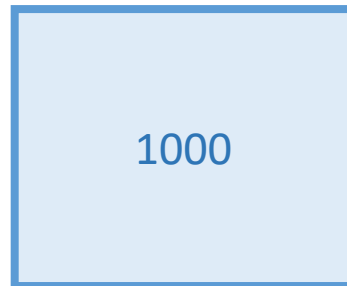
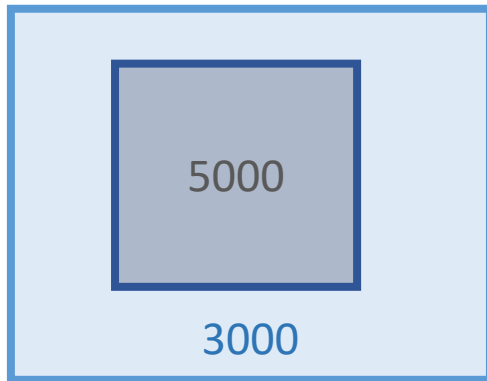
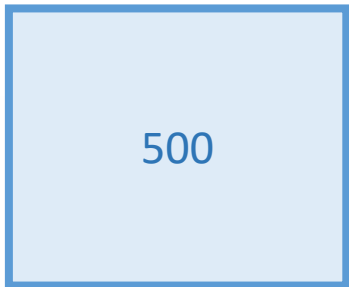
Split Evaluation



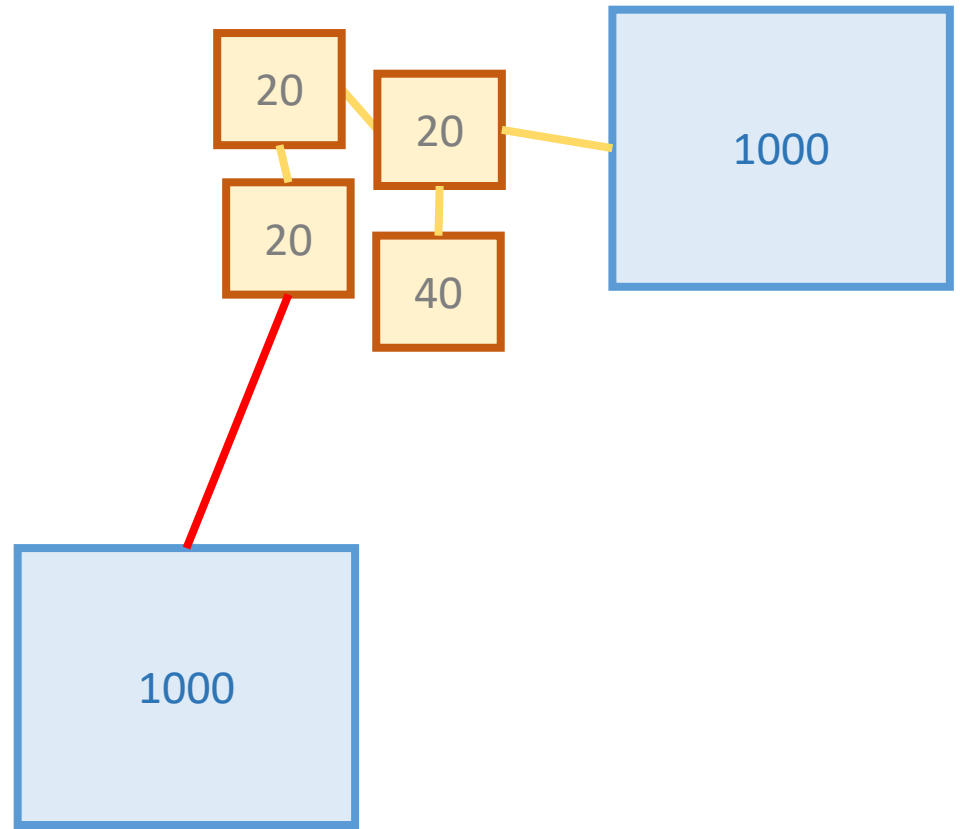
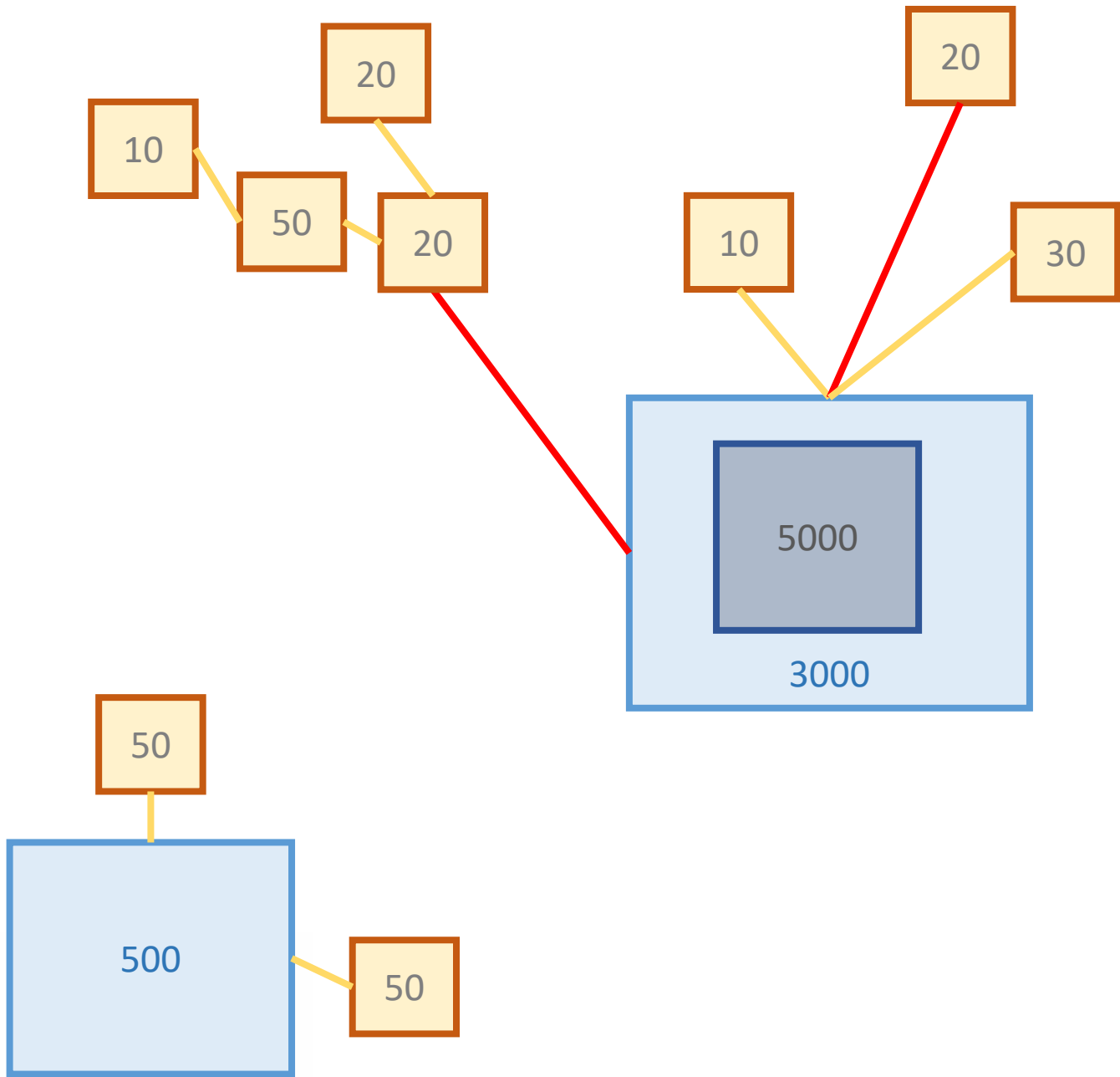
Primary Cores



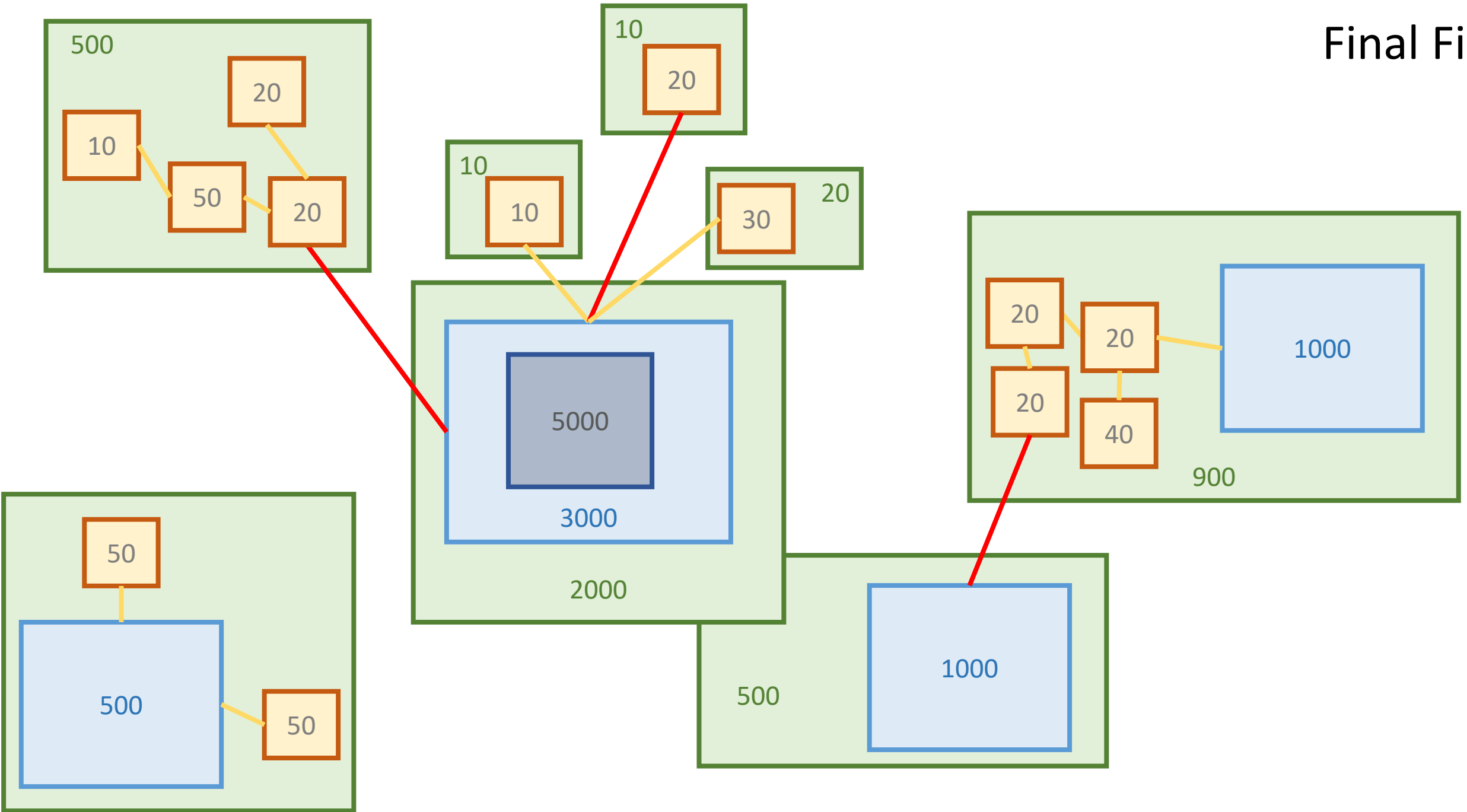
Secondary Cores



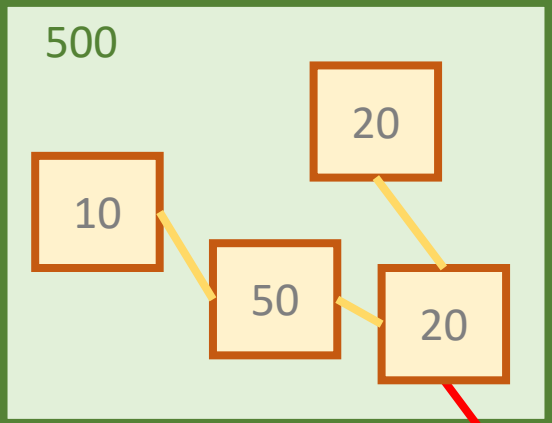
Jump Cores and Connections



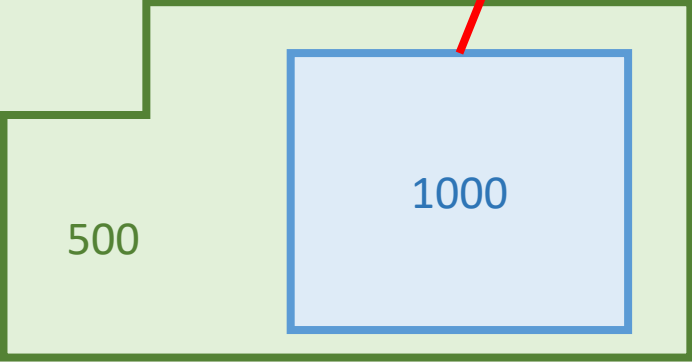
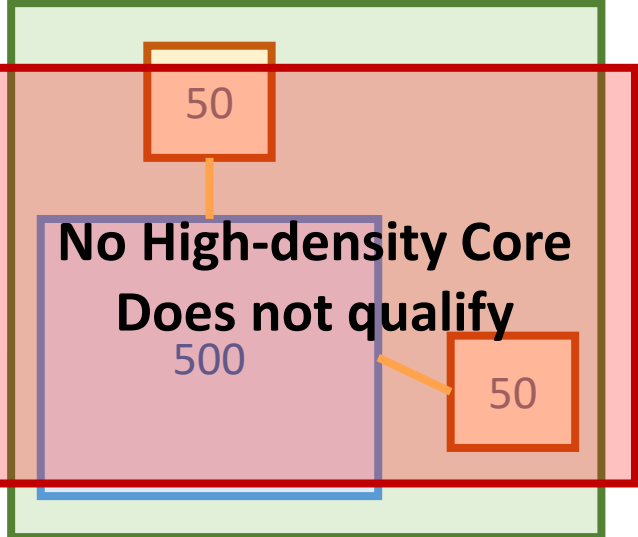
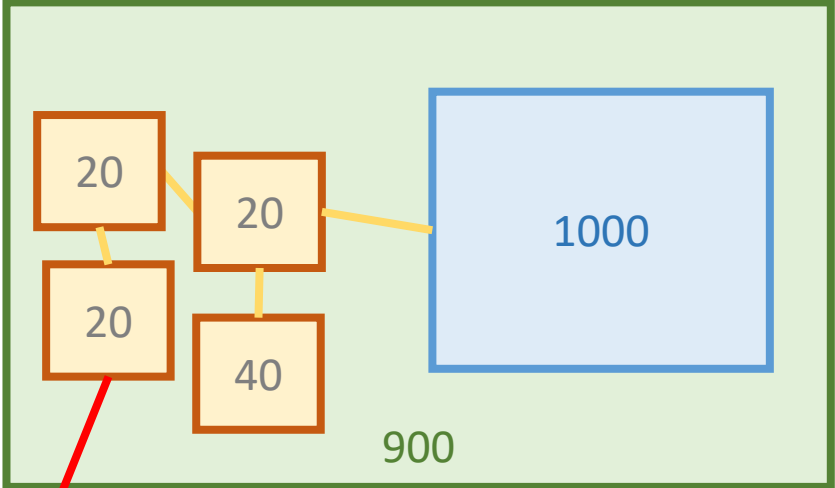
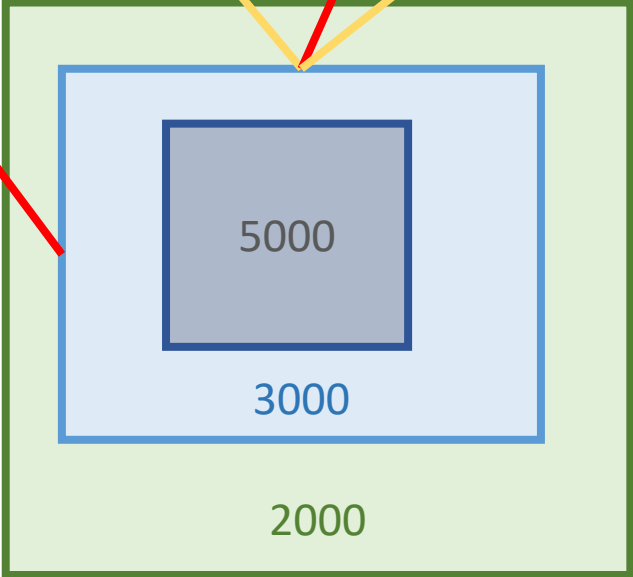
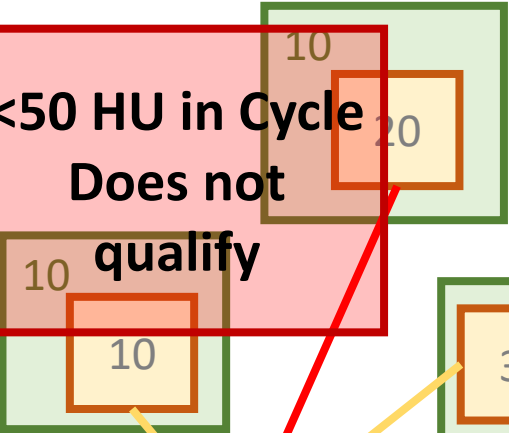
Final Fill



Remove non-Qualifying Cycles

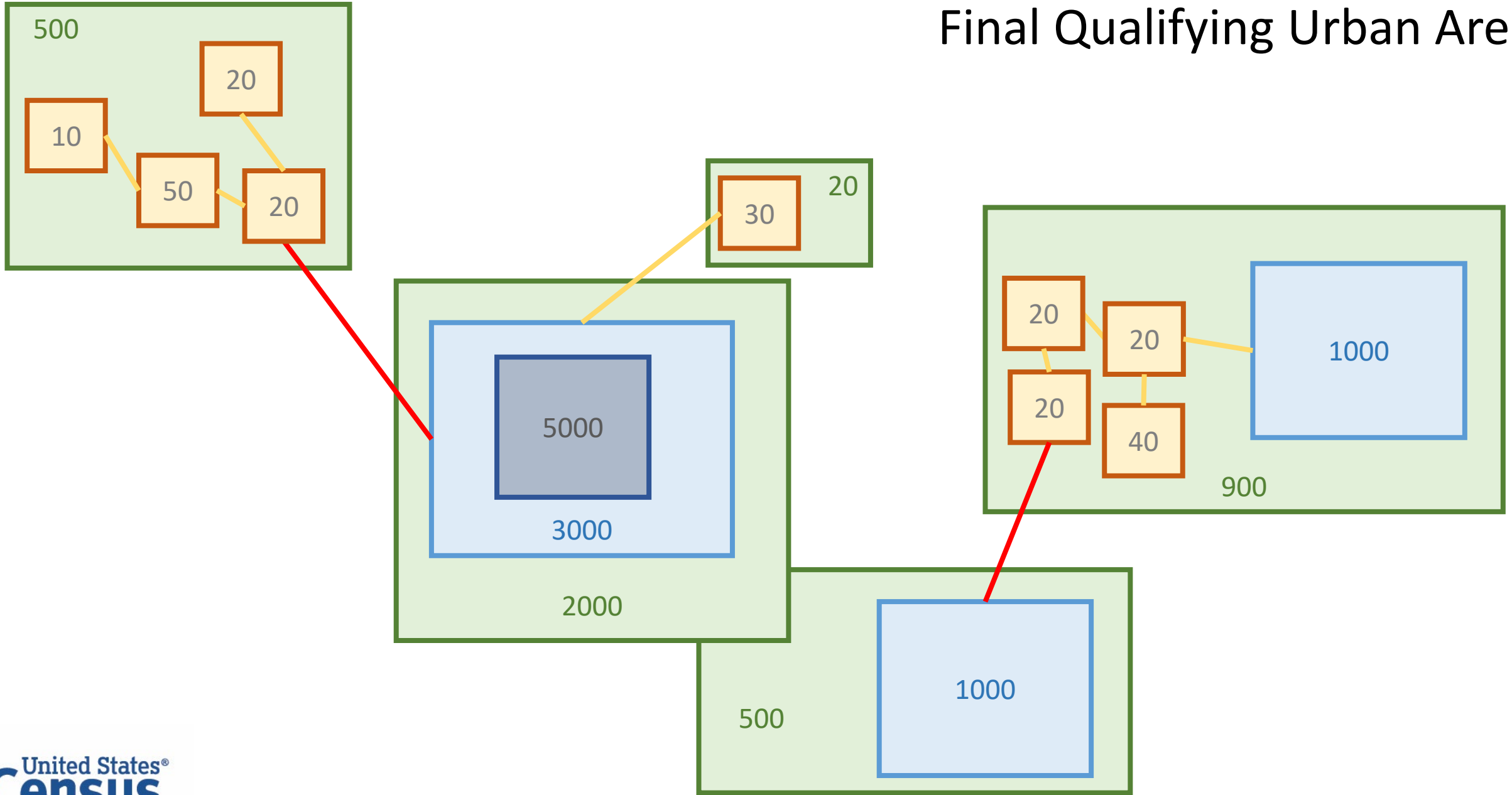


**<50 HU in Cycle
Does not
qualify**



**No High-density Core
Does not qualify**

Final Qualifying Urban Area



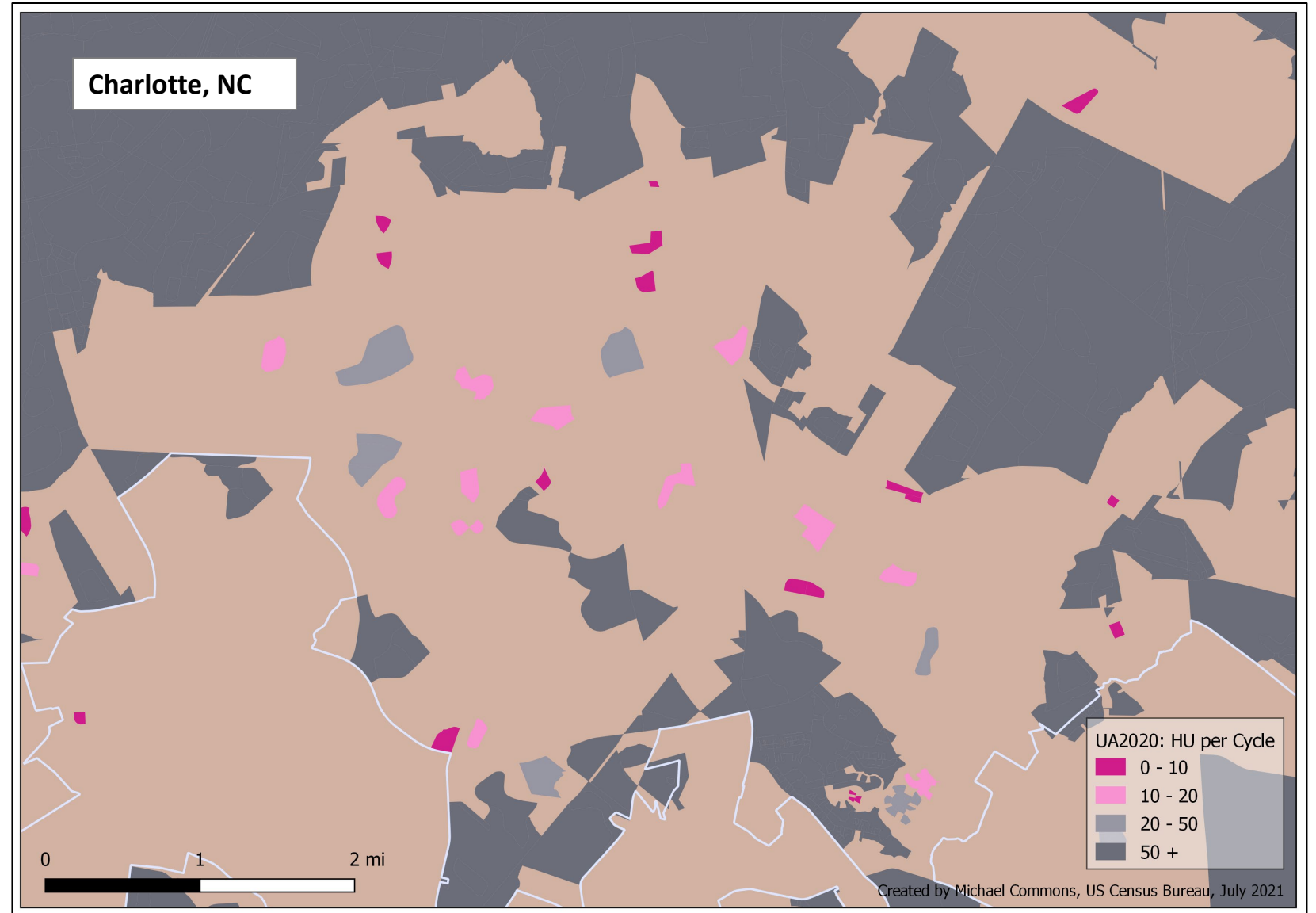
Parameterized Urban Area Criteria

Criteria	2010 Final	2020 FRN-Proposed	2020 Testing
Minimum Threshold for UA Qualification	2,500 persons	10,000 persons OR 4,000 HU	5,000 persons OR 2,000 HU
Minimum Threshold for Block Qualification*	1,000 PPSM and 500 PPSM	385 HPSM	1275 HPSM, 425 HPSM, 200 HPSM
Minimum Threshold for Core to be Hopped from	1,000 persons	385 HU	500 HU
Minimum Threshold for Core to be Jumped from	1,500 persons	577 HU	500 HU
Maximum Jump Distance	2.5 Miles	1.5 Miles	1.5 Miles
Hop and Jump "Corridors"	Included	Not included	Not included
Minimum Threshold for Final Cycle Inclusion	n/a	1 HU	50 HU

* Impervious surface qualification is consistent for all criteria

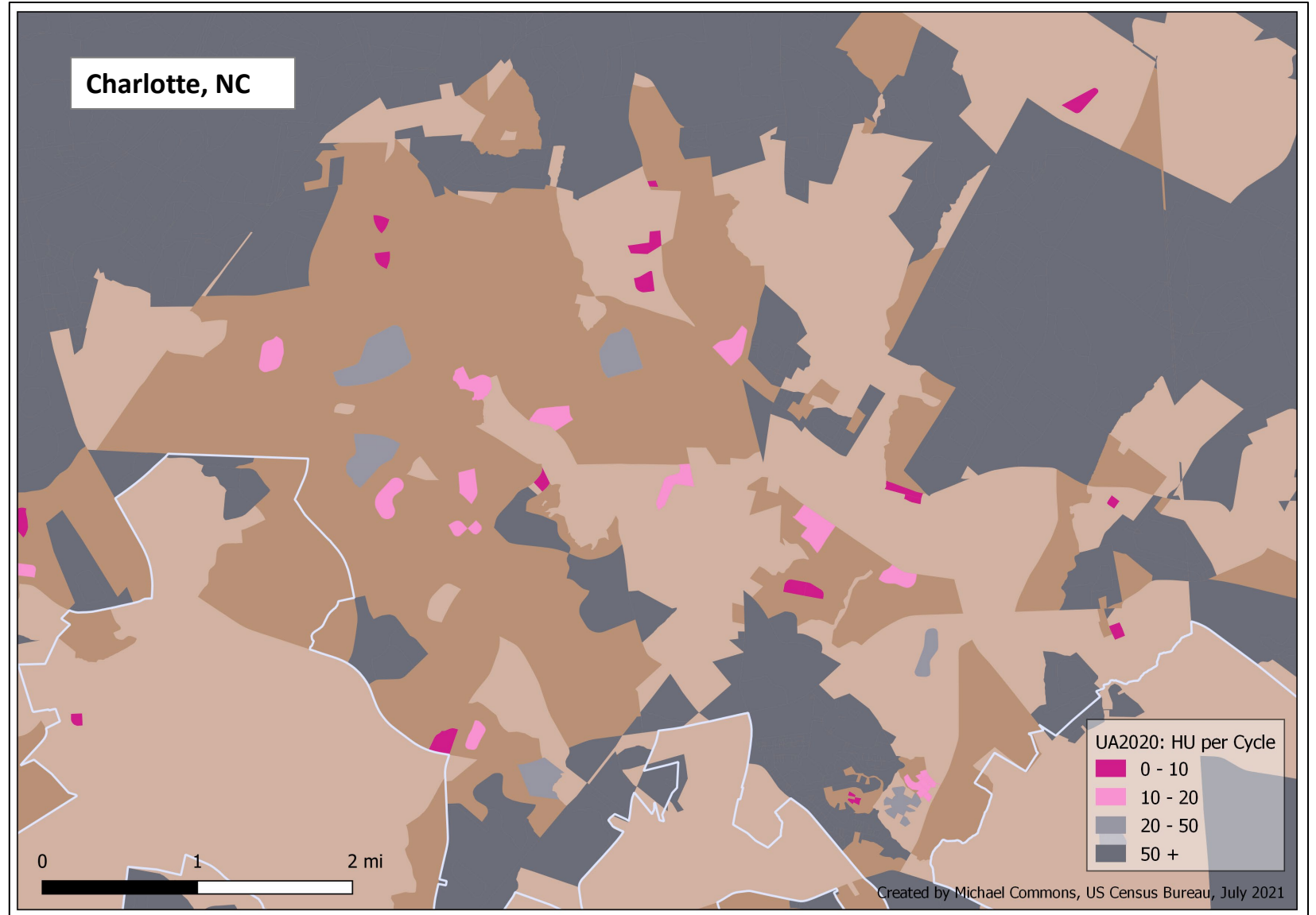
Cycle Change

- Minimum Urban Area Qualification
 - 5,000 Persons or 2,000 Housing Units
- High Density Cores
 - 1,275 HPSM (0.5 acres per HU)
 - 500 Persons
- Secondary Cores
 - 425 HPSM (3 acres per HU)
- Final Fill
 - 200 HPSM (3 acres per HU)
- Minimum Cycle Size
 - 50 Housing Units



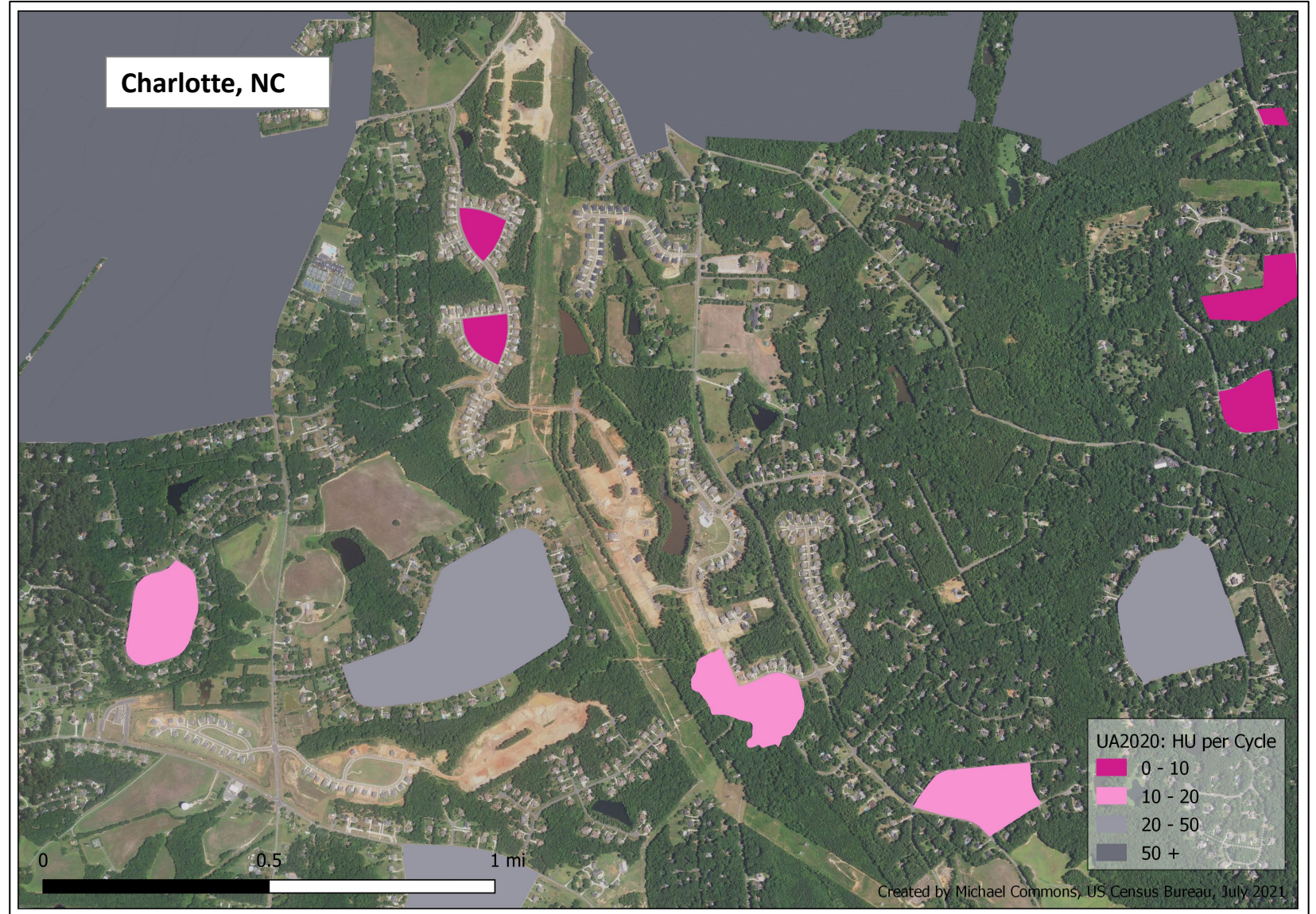
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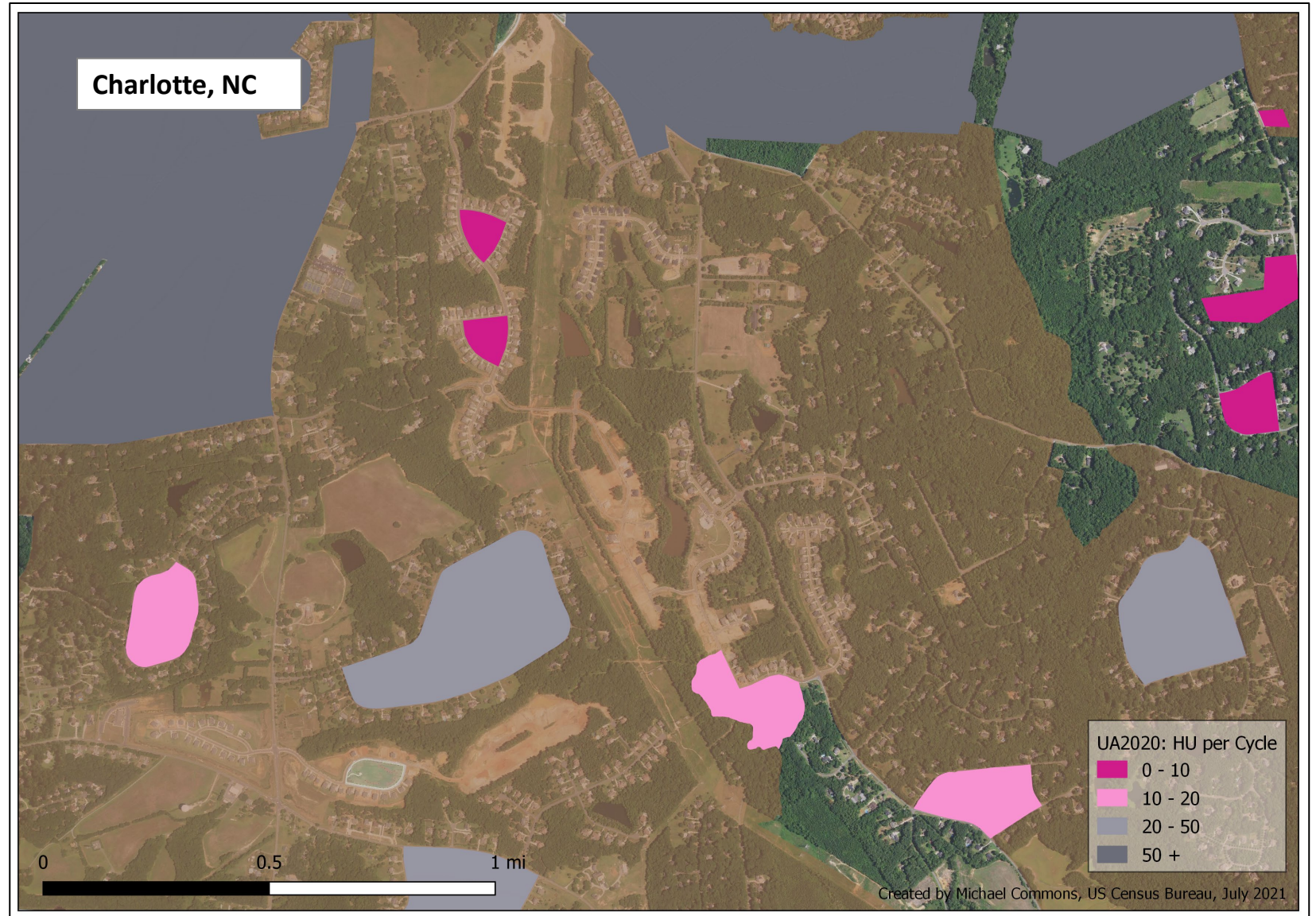
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Reduce the Number of Cycles per Urban Area

2020 FRN Proposed Criteria					Updated Test Criteria					Impact of Update			
UA	POP	HU	AREA	CYCLES	UA	POP	HU	AREA	CYCLES	POP	HU	AREA	CYCLES
Charlotte, NC	1,455,923	770,820	781.2	515	Charlotte, NC	1,478,343	782,530	855.0	62	1.5%	1.5%	9.4%	-88.0%
Raleigh (Wake County)-- Durham (Durham County)-- Cary (Wake County), NC	1,108,168	623,186	520.8	292	Raleigh (Wake County)-- Durham (Durham County)-- Cary (Wake County), NC	1,157,114	647,009	605.3	53	4.4%	3.8%	16.2%	-81.8%
Nashville-Davidson metropolitan government (balance), TN	1,048,952	587,129	530.4	255	Nashville-Davidson metropolitan government (balance), TN	1,096,300	610,114	602.6	35	4.5%	3.9%	13.6%	-86.3%
Memphis, TN	856,995	397,778	314.5	41	Memphis, TN	879,429	407,161	338.5	11	2.6%	2.4%	7.6%	-73.2%
Greensboro--Winston-Salem, NC	776,147	392,002	420.1	329	Greensboro--Winston-Salem, NC	792,989	400,021	469.0	43	2.2%	2.0%	11.6%	-86.9%
Knoxville, TN	465,361	241,612	289.0	142	Knoxville, TN	504,429	260,418	343.9	32	8.4%	7.8%	19.0%	-77.5%
Chattanooga, TN	275,434	142,697	174.6	96	Chattanooga, TN	289,172	149,013	193.6	8	5.0%	4.4%	10.9%	-91.7%
Asheville, NC	218,891	131,715	218.7	196	Asheville, NC	242,593	144,456	264.5	17	10.8%	9.7%	20.9%	-91.3%
Fayetteville, NC	278,189	131,192	151.8	65	Fayetteville, NC	298,974	141,112	177.3	12	7.5%	7.6%	16.8%	-81.5%
Wilmington, NC	195,198	116,768	105.7	28	Wilmington, NC	199,367	118,938	112.2	8	2.1%	1.9%	6.2%	-71.4%
Johnson City (Washington County)--Kingsport (Sullivan County)--Elizabethton, TN	187,037	99,134	137.5	205	Johnson City (Washington County)--Kingsport (Sullivan County)--Bristol, TN	239,922	126,103	196.8	37	28.3%	27.2%	43.1%	-82.0%
Hickory (Catawba County)-- Lenoir--Morganton, NC	153,897	73,891	135.3	193	Hickory (Catawba County)-- Lenoir--Morganton, NC	183,635	87,144	180.5	24	19.3%	17.9%	33.5%	-87.6%
Clarksville, TN	130,777	70,008	157.9	54	Clarksville, TN	137,497	73,546	171.5	16	5.1%	5.1%	8.6%	-70.4%
Burlington (Alamance County)--Graham--Mebane (Alamance County), NC	113,952	63,443	77.1	61	Burlington (Alamance County)--Graham--Mebane (Alamance County), NC	116,775	64,798	79.6	13	2.5%	2.1%	3.2%	-78.7%
Greenville, NC	110,391	58,875	52.5	42	Greenville, NC	113,688	60,429	58.0	14	3.0%	2.6%	10.5%	-66.7%

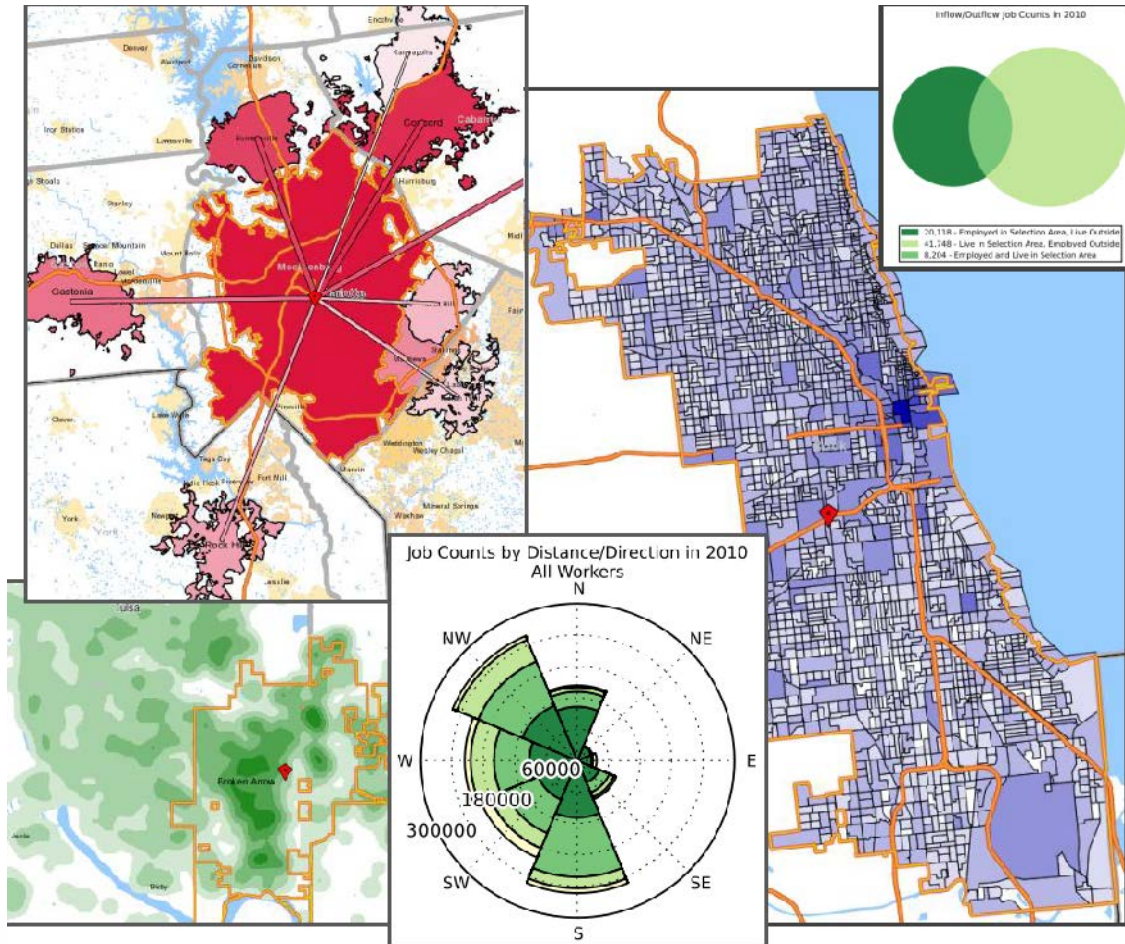
*Population derived from 2010 Census; Housing derived from Master Address File – NOT ENUMERATED 2020 CENSUS COUNTS



Values shown here are estimates. These are not the official counts from the 2020 Census and do not reflect the final Urban Area delineation for the 2020 Census.

Final Criteria: Splitting

6 Utilization of Longitudinal Employer-Household Dynamics (LEHD) data



OD

Filename of the OD datasets are described by the following templates
[ST]_od_[PART]_[TYPE]_[YEAR].csv.gz where

[ST] = lowercase, 2-letter postal code for a chosen state

[PART] = Part of the state file, can have a value of either "main" or "aux". Complimentary parts of the state file, the main part includes jobs with both workplace and residence in the state and the aux part includes jobs with the workplace in the state and the residence outside of the state.

[TYPE] = Job Type, can have a value of "JT00" for All Jobs, "JT01" for Primary Jobs, "JT02" for All Private Jobs, "JT03" for Private Primary Jobs, "JT04" for All Federal Jobs, or "JT05" for Federal Primary Jobs.

[YEAR] = Year of job data. Can have the value of 2002-2018 for most states.

As an example the main OD file of Primary Jobs in 2007 for California would be the file:
ca_od_main_JT01_2007.csv.gz

The structure of the OD files is as follows:

Origin-Destination (OD) File Structure			
Pos	Variable	Type	Explanation
1	w_geocode	Char15	Workplace Census Block Code
2	h_geocode	Char15	Residence Census Block Code
3	S000	Num	Total number of jobs
4	SA01	Num	Number of jobs of workers age 29 or younger ¹⁷
5	SA02	Num	Number of jobs for workers age 30 to 54 ¹⁷
6	SA03	Num	Number of jobs for workers age 55 or older ¹⁷
7	SE01	Num	Number of jobs with earnings \$1250/month or less
8	SE02	Num	Number of jobs with earnings \$1251/month to \$3333/month
9	SE03	Num	Number of jobs with earnings greater than \$3333/month
10	SI01	Num	Number of jobs in Goods Producing industry sectors
11	SI02	Num	Number of jobs in Trade, Transportation, and Utilities industry sectors
12	SI03	Num	Number of jobs in All Other Services industry sectors
13	createdate	Char	Date on which data was created, formatted as YYYYMMDD

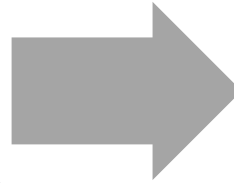
Proposed Urban Area Criteria: Splitting

Two-step process for accepting or adjusting 2010 split boundaries

Step One:

Conduct analysis of the new 2020 UAs using the 2010 UA splits

- Measure aggregate commuter flows into and out of each UA
- Upon qualification, the UA split boundaries are further analyzed in *Step Two*



Step Two:

Conduct block-level analysis of the commuter flows

- Using the LEHD data, apply the *Leiden Community Detection Algorithm* to identify natural partitions, or communities
- Split boundaries are then adjusted to match the nearest *LEHD Origin-Destination Community*

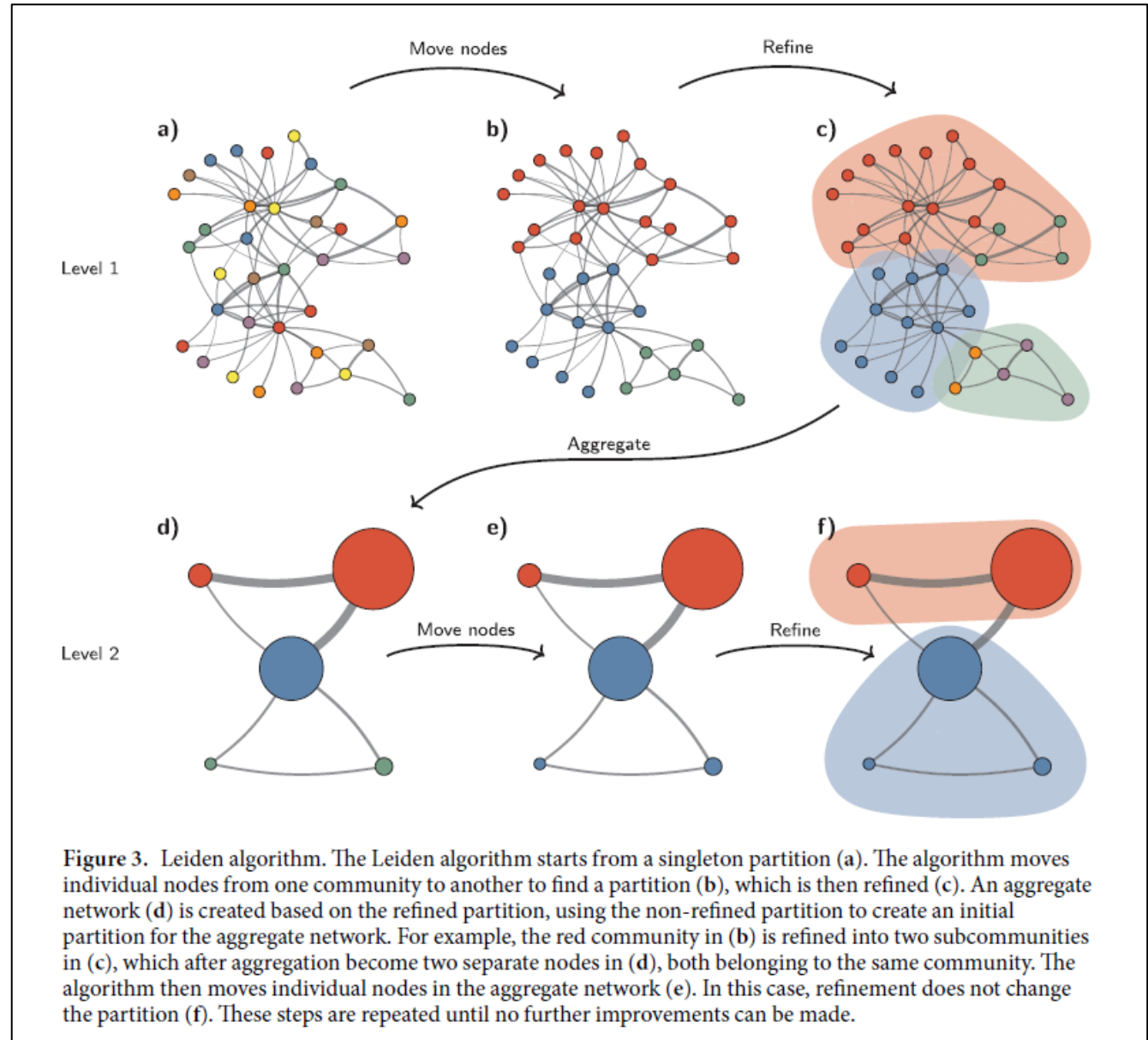
SCIENTIFIC REPORTS

From Louvain to Leiden: guaranteeing well-connected communities

V. A. Traag, L. Waltman & N. J. van Eck

Traag, V., L. Waltman and N.J. van Eck. "From Louvain to Leiden: guaranteeing well connected communities." *Scientific Reports*, 9, pp. 1-12.

<https://www.nature.com/articles/s41598-019-41695-z>



Proposed Urban Area Criteria: Splitting

Step One. Conduct analysis of the new 2020 UAs using the 2010 UA splits

Where do Avondale Residents work?	Flows	Percent
Phoenix--Mesa, AZ	80,034	83.5%
Avondale--Goodyear, AZ	11,110	11.6%
Tucson, AZ	1,473	1.5%
Buckeye, AZ	1,404	1.5%

Where do Avondale Workers live?	Flows	Percent
Phoenix--Mesa, AZ	20,124	57.0%
Avondale--Goodyear, AZ	11,110	31.4%
Buckeye, AZ	856	2.4%
Tucson, AZ	712	2.0%

Where do Washington Residents work?	Flows	Percent
Washington, DC--VA--MD	1,854,172	88.1%
Baltimore, MD	120,178	5.7%
Richmond, VA	26,252	1.2%
Virginia Beach, VA	16,304	0.8%

Where do Washington Workers live?	Flows	Percent
Washington, DC--VA--MD	1,854,172	81.6%
Baltimore, MD	149,564	6.6%
Waldorf, MD	28,690	1.3%
Virginia Beach, VA	25,987	1.1%

2018 LEHD Origin-Destination Employment Statistics (LODES) data

Proposed Urban Area Criteria: Splitting

Step Two. Conduct block-level analysis of the commuter flows

- Using the LEHD data, apply the *Leiden Community Detection Algorithm* to identify natural partitions, or communities
- Split boundaries are then adjusted to match the nearest *LEHD Origin-Destination Community*

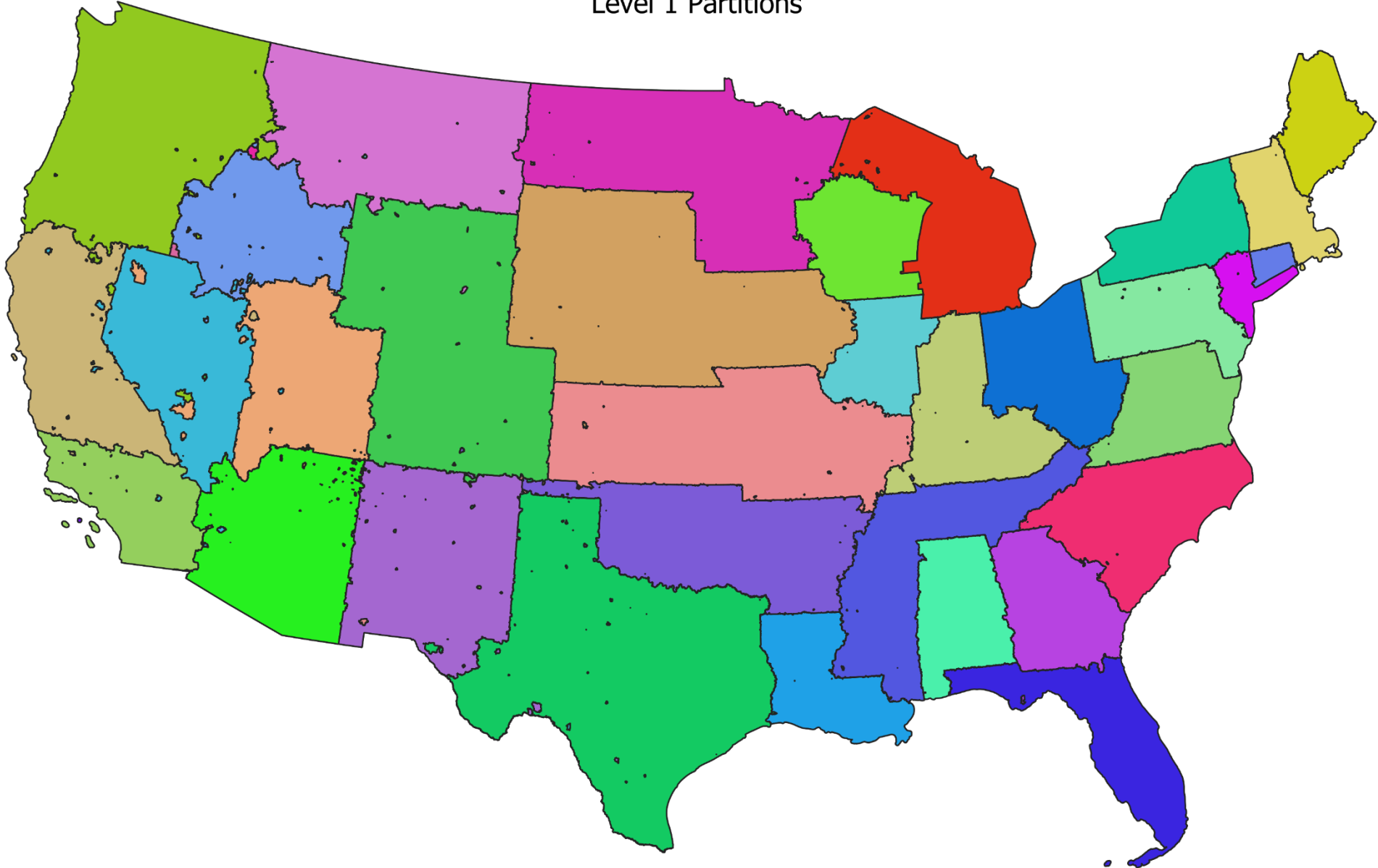
Literature related to *Leiden Community Detection Algorithm*:

Thomas, I., A. Adam, and A. Verhetsel. “Migration and commuting interactions fields: a new geography with community detection algorithm?” *Belgeo*, **4**, 2017, pp. 1-17.

Traag, V., L. Waltman and N.J. van Eck. “From Louvain to Leiden: guaranteeing well connected communities.” *Scientific Reports*, **9**, pp. 1-12.

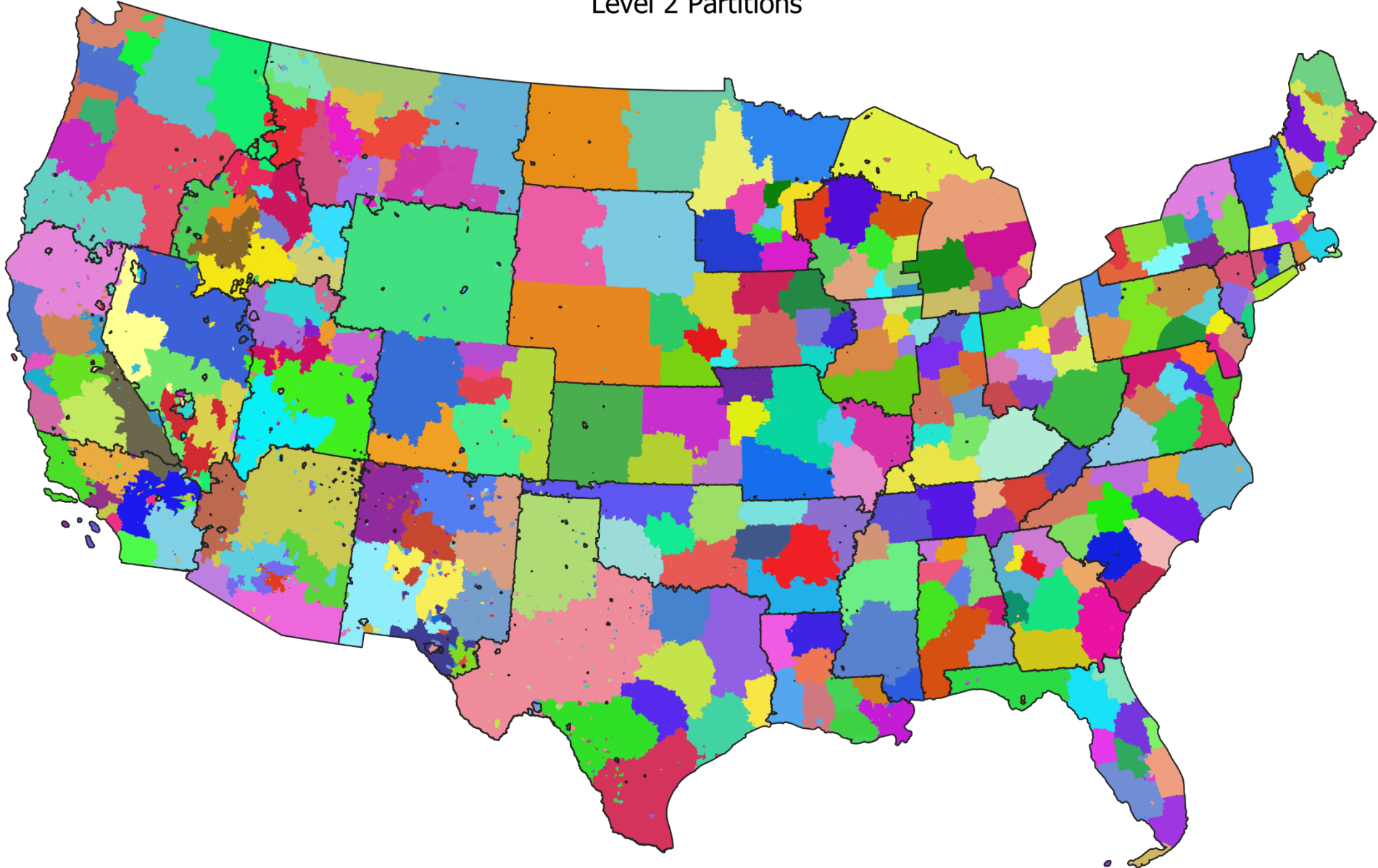
Stefanouli, M. and S. Polyzos. “Analysis of commuting in Attica: The Attica commuting network.” *Journal of Land Use, Mobility and Environment*, **Vol. 13, n. 1**, 2020, pp. 21-40.

LEHD Origin-Destination Employment Statistics Partitions
produced by the Leiden Community Detection Algorithm
Level 1 Partitions



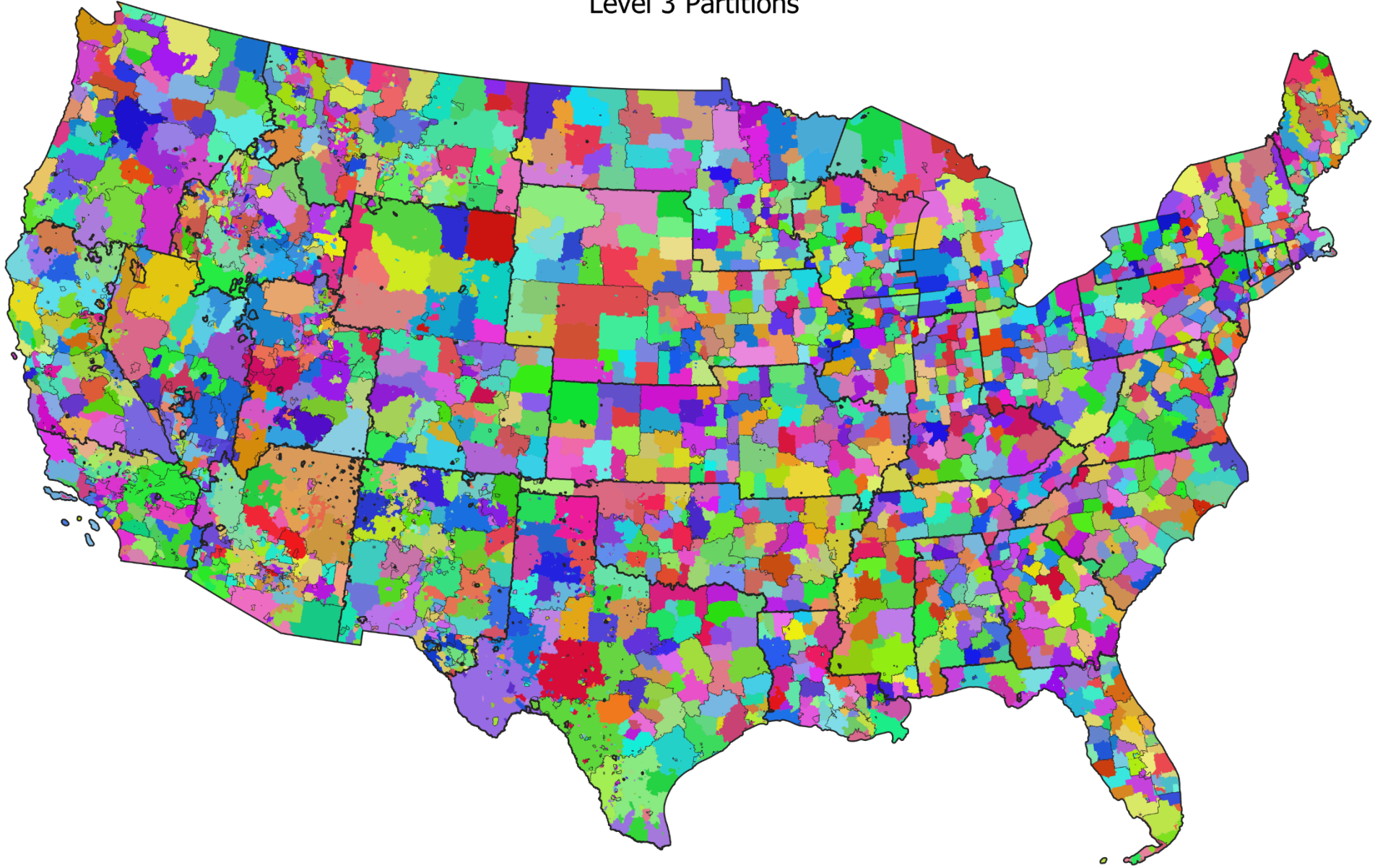
Unofficial Product. For demonstrative purposes only.

LEHD Origin-Destination Employment Statistics Partitions
produced by the Leiden Community Detection Algorithm
Level 2 Partitions



Unofficial Product. For
demonstrative purposes only.

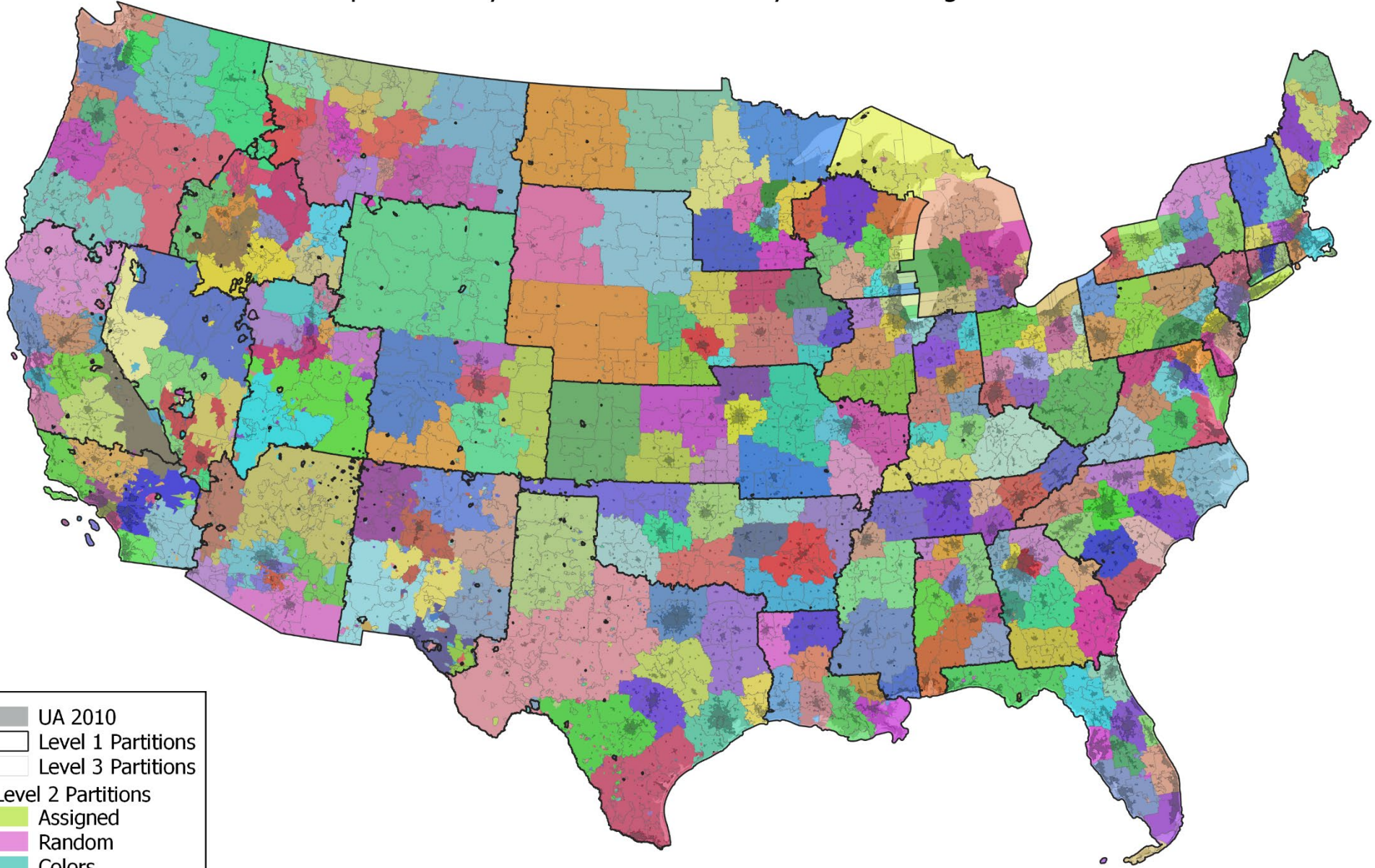
LEHD Origin-Destination Employment Statistics Partitions
produced by the Leiden Community Detection Algorithm
Level 3 Partitions



Unofficial Product. For
demonstrative purposes only.



LEHD Origin-Destination Employment Statistics Partitions
produced by the Leiden Community Detection Algorithm



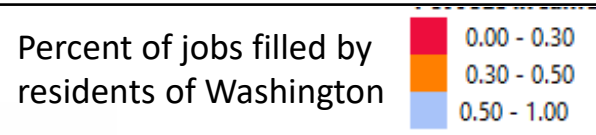
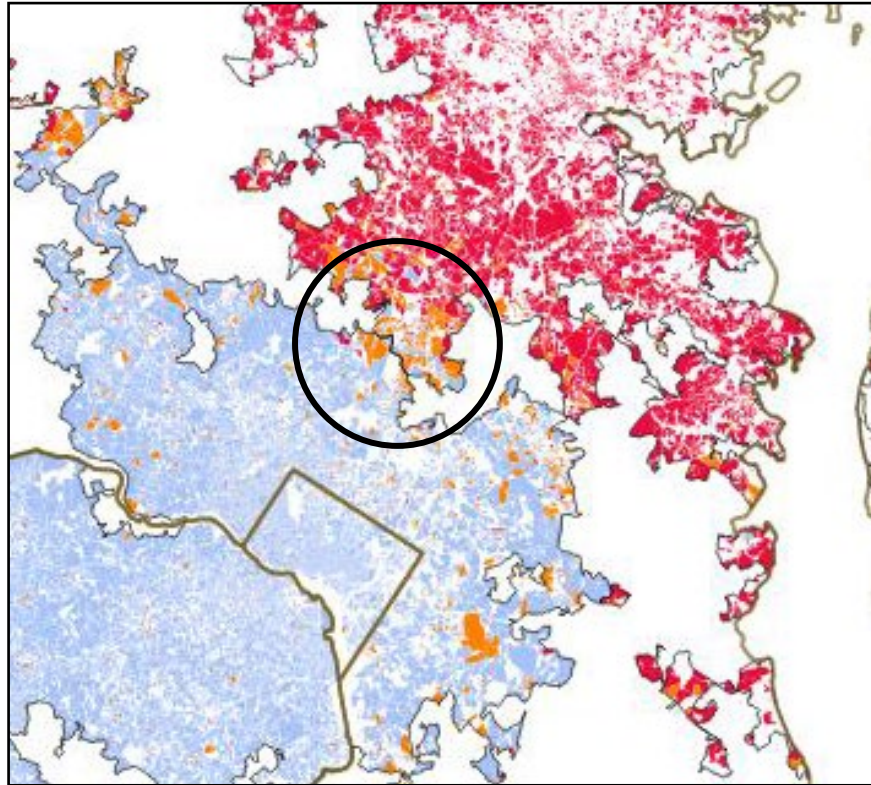
Unofficial Product. For demonstrative purposes only.

- UA 2010
- Level 1 Partitions
- Level 3 Partitions
- Level 2 Partitions
 - Assigned
 - Random
 - Colors

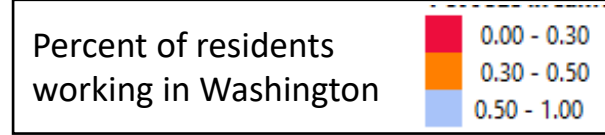
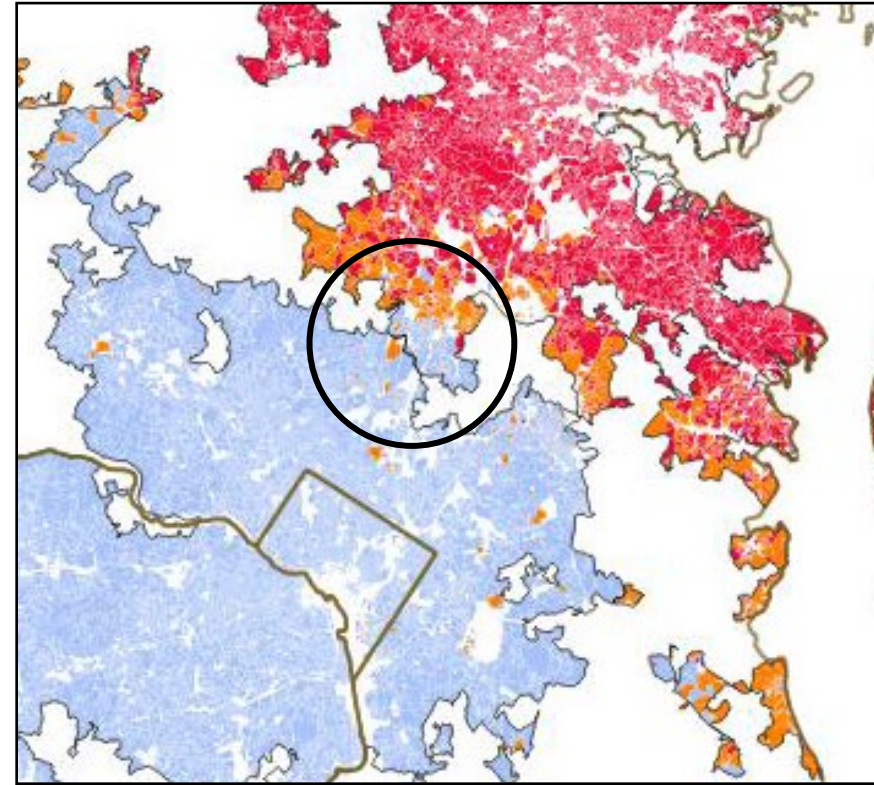


Proposed Urban Area Criteria: Splitting

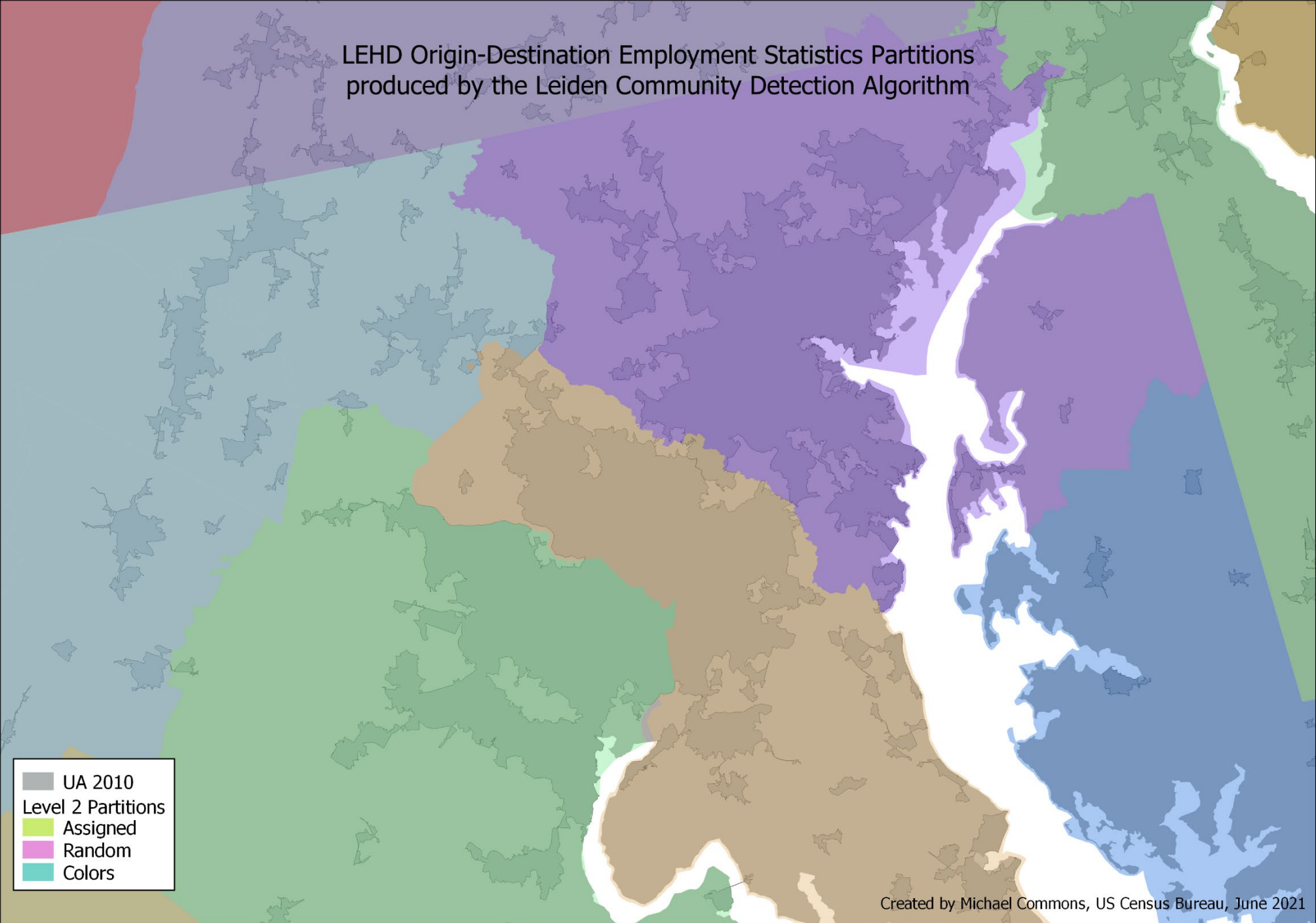
Where do Washington Residents work?



Where do Washington Workers live?



LEHD Origin-Destination Employment Statistics Partitions
produced by the Leiden Community Detection Algorithm



Unofficial Product. For demonstrative purposes only.



Schedule

Spring 2021	Publish Proposed Urban/Rural Criteria in the Federal Register Notice
Summer 2021	Review comments on Proposed Urban/Rural Criteria published in the Federal Register Notice
Winter 2021-2	Publish Final Urban/Rural Criteria in the Federal Register Notice
Summer 2022	Publish Federal Register Notice announcing qualifying Urban Areas

Contact Us

Send questions and comments to us at
geo.urban@census.gov

Proposed Criteria Federal Register Notice:

<https://www.federalregister.gov/documents/2021/02/19/2021-03412/urban-areas-for-the-2020-census-proposed-criteria>

**Census Bureau Urban and Rural page with link to
*2020 Proposed Urban Area Criteria Viewer:***

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