Delineating the Public Use Microdata Areas for the 2020 Census

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Scope of the presentation

- Introduction of the Public Use Microdata Areas (PUMAs)
- 2020 PUMA delineation process
- Questions & answers

Source: U.S. Census Bureau. 2010 and 2020 Census Count

Public Use Microdata Areas (PUMA) 101

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What are Public Use Microdata Areas (PUMAs)?

- What?
  - **Non-overlapping**, statistical geographic areas that partition each state or equivalent entity into geographic areas containing **no fewer than 100,000 people**.
- When?
  - Defined **every ten years**
- Who?
  - **State Data Centers (SDCs)** are primary participants for PUMA delineation.
  - Local inputs from stakeholders are encouraged
- Why?
  - For the tabulation and dissemination of the decennial census and American Community Survey (ACS) Public Use Microdata Sample **(PUMS) data**.

When do we utilize the ACS PUMS file?

Table. Sex of Workers (16+ years old) by Vehicles Available

	Tarrant County
Total:	1,018,656
No vehicle available	16,310
1 vehicle available	185,466
2 vehicles available	449,541
3 vehicles available	228,033
4 vehicles available	99,858
5 or more vehicles available	39,448
Male:	548,505
No vehicle available	8,389
1 vehicle available	86,120
2 vehicles available	246,966
3 vehicles available	127,334
4 vehicles available	56,418
5 or more vehicles available	23,278
Female:	470,151
No vehicle available	7,921
1 vehicle available	99,346
2 vehicles available	202,575
3 vehicles available	100,699
4 vehicles available	43,440
5 or more vehicles available	16,170

Source: 2020 ACS 5-Year Table B08014

- What if we also need to consider another factor, such as age?
  - Census Bureau does not pre-tabulate worker's vehicle availability by sex AND age.
  - Need to customize the tabulation using an individual level ACS sample data (along with the sample weights)

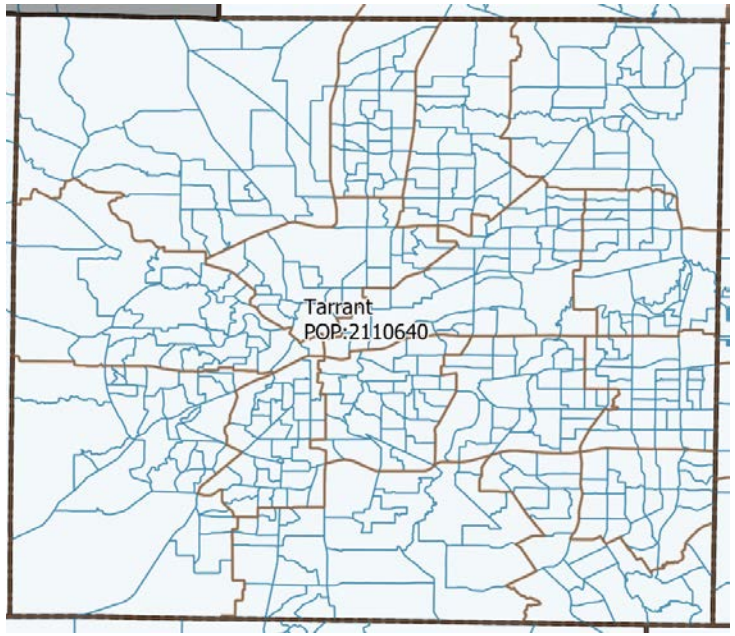
The ACS PUMS file

- Fully customizable individual data versus data confidentiality
  - ACS data provide many variables/attributes
  - For geographies with relatively few people, attackers can identify individual's detail information by cross-referencing all the attributes

- To protect ACS survey respondents' confidentiality
  - The required population size to insure confidentiality is 100,000+ people
  - The closest available existing geography with that population size would be: county (and its equivalency)
    - However, many counties do not have a population of 100,000+
    - Census Bureau needs to "create" a specific type of geography for the PUMS file, which are the PUMAs

PUMAs - examples

1. Single county with multiple PUMAs (counties with a large population)



PUMA 02501: Tarrant County (Northeast)--Grapevine, Southlake & Colleyville Cities

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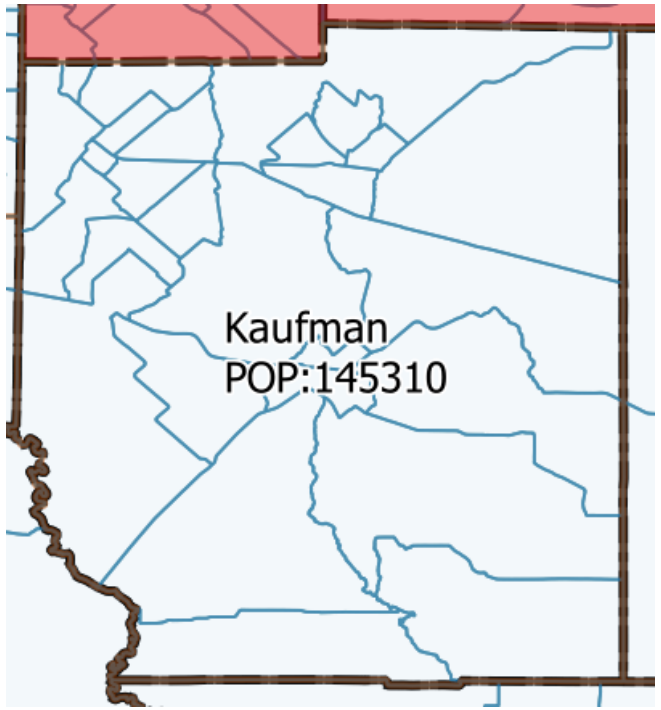
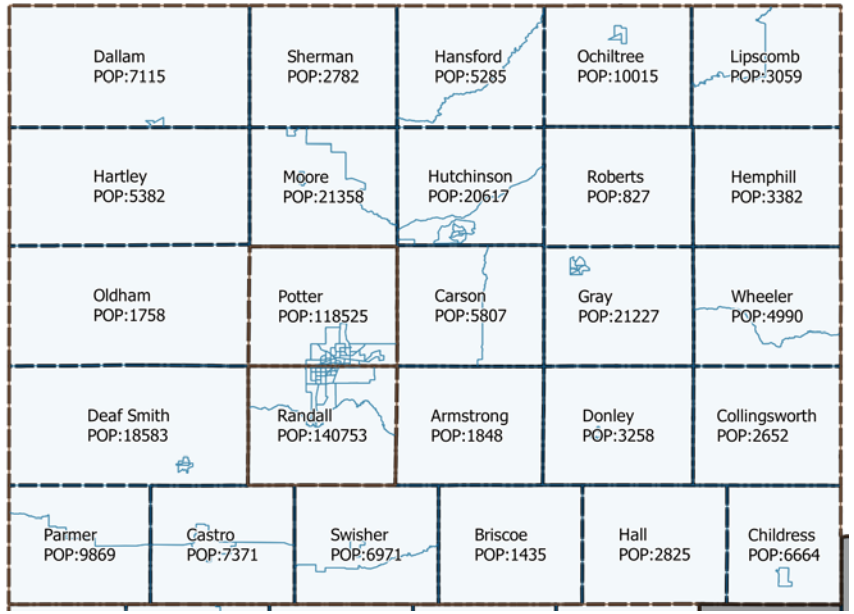
PUMA 02516: Tarrant County (Northwest)--Fort Worth (Northwest) & Saginaw Cities

2. Single county in a single PUMA



PUMA 01400: Kaufman County

3. Multiple counties in a single PUMA (counties with a small population)



PUMA 00100: Panhandle Regional Planning Commission (Outside Potter & Randall Counties)

Census Tract (2020)

County

PUMA (2020)

2020 PUMA delineation process

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Criteria for PUMAs

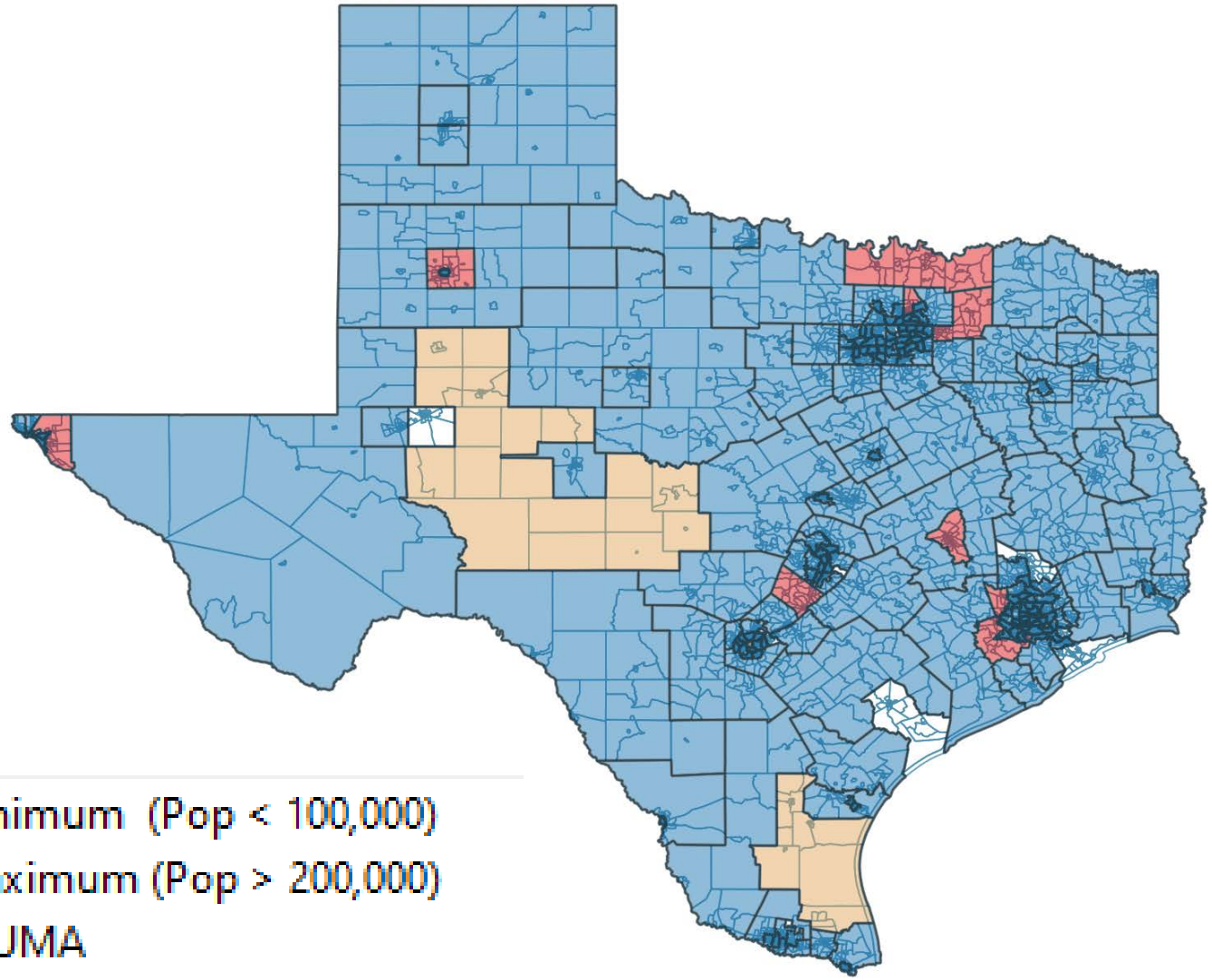
1. Minimum population of 100,000 people (hard threshold)
2. Consider splitting PUMAs of 200,000+ people (soft threshold)
3. PUMAs do not cross state boundaries
4. The smallest unit for PUMA development is Census Tract
5. PUMAs should be geographically contiguous
6. 85 character maximum length for PUMA names

Platform and tools for the PUMA delineation

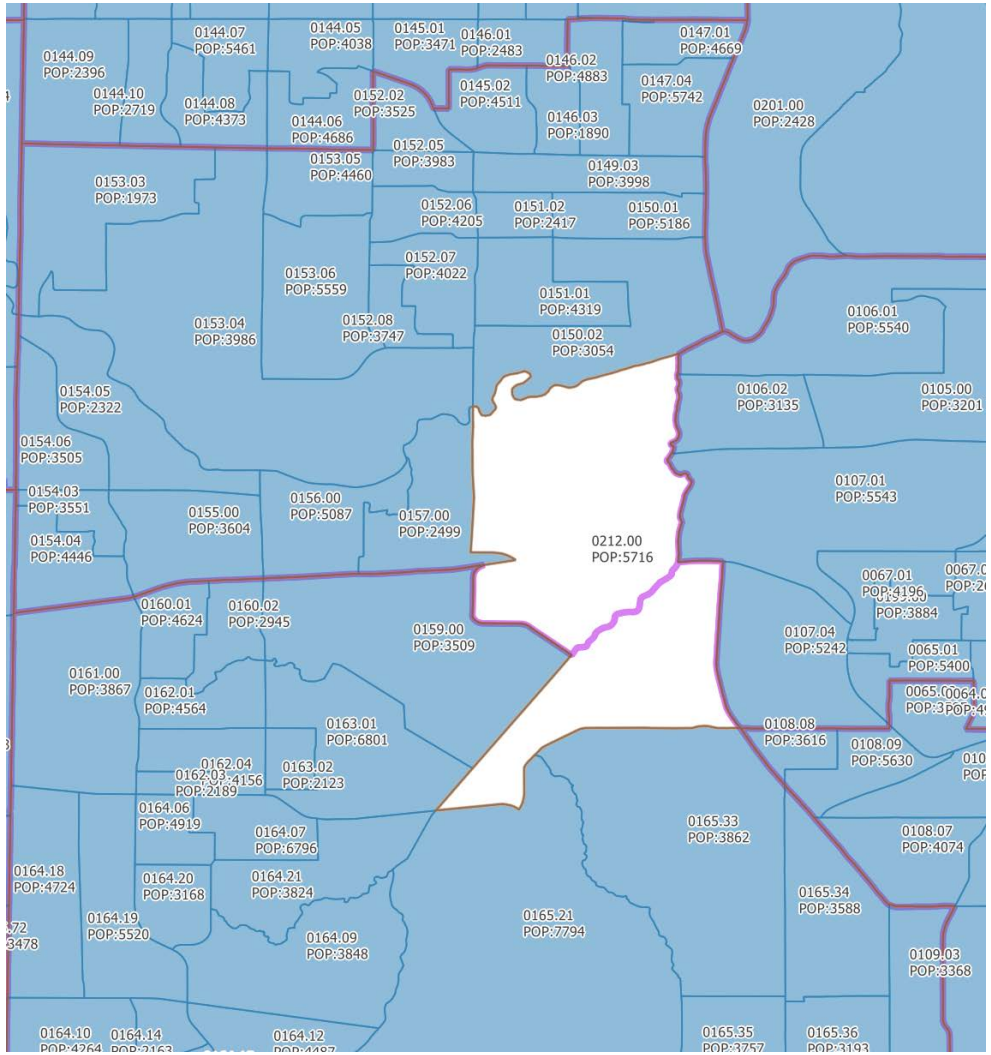
- Platform:
  - QGIS (v 3.4.4)
  - Geographic Update Partnership Software (GUPS), an add-on app
- Tools
  - Texas 2010 PUMA boundaries layer
  - Census Tract total population (2020 counts) is provided in GUPS
  - Data spreadsheet with population trend analysis and extrapolated to 2030
  - Census Block Group layer with population change info between 2010-2019
  - Texas Council of Government (COG) boundary layer
  - Esri Street map imagery

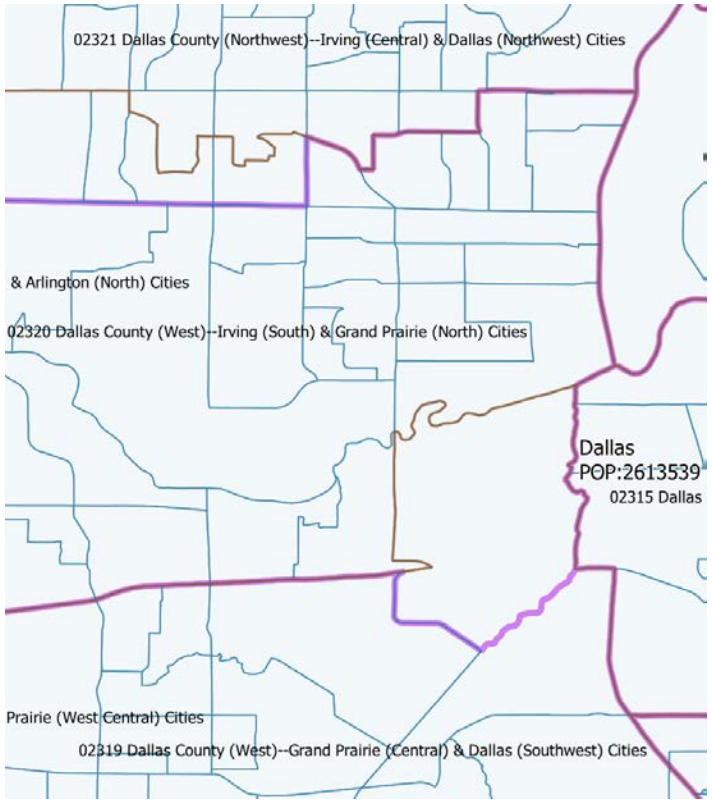
PUMA delineation process – step 1

- Inserted the Texas 2010 PUMA boundaries layer to QGIS
- GUPS highlights PUMAs (based on 2020 population counts) in three types
- The Blank/White polygons are Census Tracts with boundary changes in 2020



Step 2 – Addressed Census Tracts with boundaries changes in 2020





- Census Tract (2020)
- PUMA (2010)
- PUMA (2020)
- County

Step 3 – Locate PUMAs that need to be modified

- GUPS highlights PUMAs
  - PUMAs with 200,000+ people (based on 2020 population counts)
  - PUMAs with < 100,000 people (based on 2020 population counts)

- Non-highlighted PUMAs but need to make sure their potential population changes (extrapolated trend) are taken into account for the decade of 2020-2030

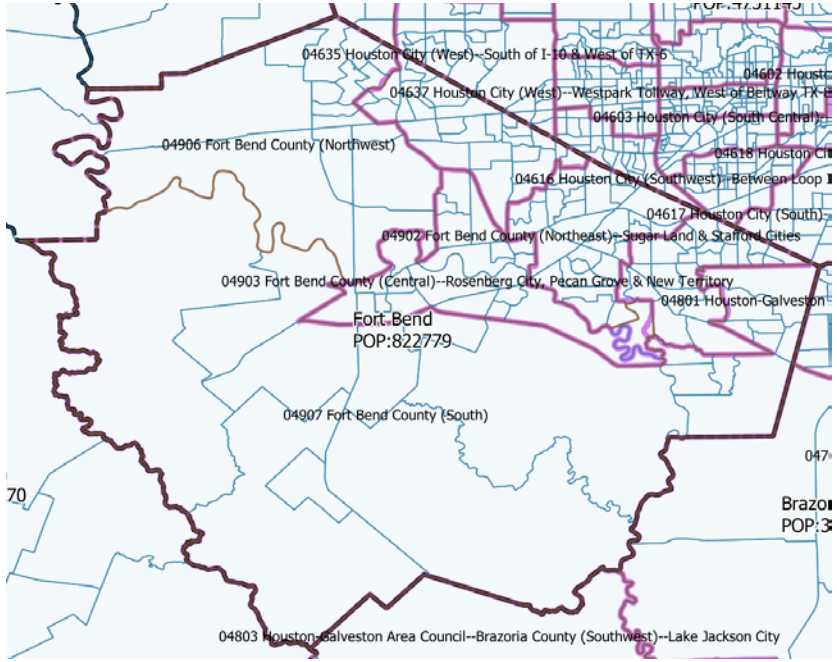
Tools to inform the delineation decisions

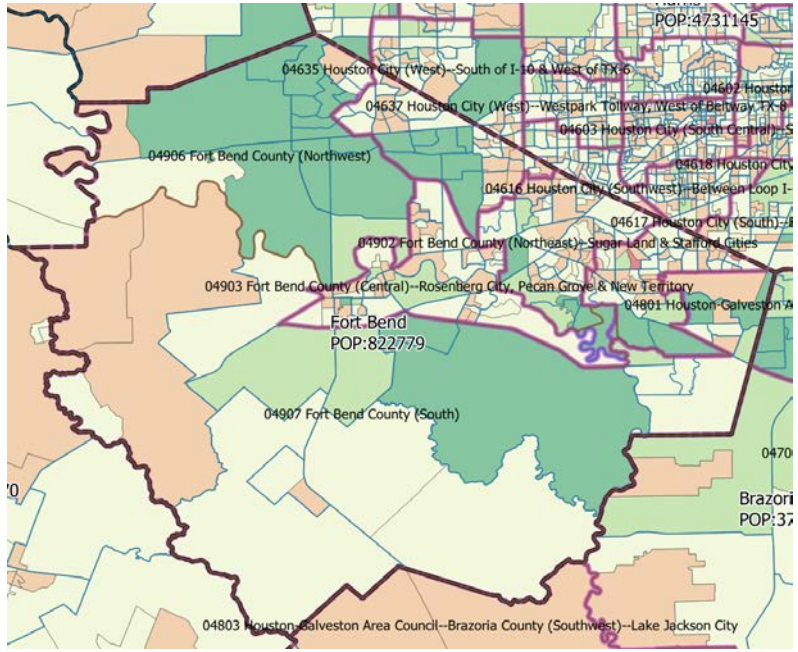
- Data Spreadsheet with Population trend analysis and extrapolated to 2030

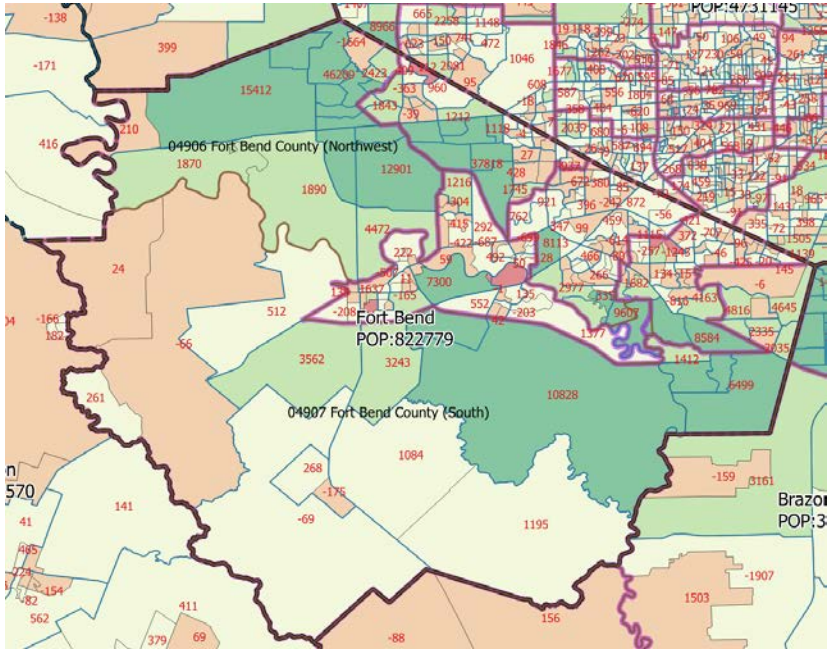
	A	B	C	D	E	F	G	H	I	J	K	
1	GEOID_PUMA	GEOID_PUMA20	RvPOP_2020	NAME	POP2010_CB	POP2019_ACS	POP2020_CB	PopChange_10_20	PctPopChange_10_20	POP2030_ACS	POP2030_CB	Comments
2	4800100	4800100	175080	Panhandle Regional Planning Commission (Outside Potter & Randall Counties)	186,129	182,075	175,080	-11,049	-5.9	174,546	164,031	
3	4800200	4800200	118525	Panhandle Regional Planning Commission--Potter County--Amarillo City (North)	121,073	119,674	118,525	-2,548	-2.1	117,076	115,977	
4	4800300	4800300	140753	Panhandle Regional Planning Commission--Randall County--Amarillo City (South)	120,725	134,026	140,753	20,028	16.6	158,728	160,781	
5	4800400	4800400	121125	South Plains Association of Governments (Outside Lubbock County)	132,828	128,390	121,125	-11,703	-8.8	120,148	109,422	
6	4800501	4800501	156648	South Plains Association of Governments--Lubbock County--Lubbock City (Central)	112,013	114,589	109,807	-2,206	-2.0	119,373	107,601	Received 15 tracts from 0502
7	4800502	4800502	153991	South Plains Association of Governments--Lubbock County--Lubbock City (Outer)	166,818	190,219	200,832	34,014	20.4	233,678	234,846	Assigned 15 tracts to 0501
8	4800600	4800600	156090	North Texas Regional Planning Commission (Outside Wichita County) & Wise County	150,487	155,058	156,090	5,603	3.7	163,547	161,693	
9	4800700	4800700	129350	North Texas Regional Planning Commission--Wichita County--Wichita Falls City	131,500	131,596	129,350	-2,150	-1.6	131,774	127,200	
10	4800800	4800800	212873	Texoma COG--Grayson, Cooke & Fannin Counties	193,229	205,592	212,873	19,644	10.2	228,552	232,517	No change to 2010 PUMA
11	4800900	4800900		Hunt & Rockwall Counties--Rockwall, Greenville & Dallas (Far Northeast) Cities	164,466	191,337	207,775	43,309	26.3	241,240	251,084	Split PUMA to 2 new PUMA: 1
12		4807000	107819	Rockwalll County								
13		4807100	99956	Hunt County								
14	4801000	4801000	157271	Ark-Tex COG (West)	158,918	159,246	157,271	-1,647	-1.0	159,855	155,624	
15	4801100	4801100	121347	Ark-Tex COG (East)--Bowie & Cass Counties	123,029	123,432	121,347	-1,682	-1.4	124,180	119,665	
16	4801200	4801200	119456	East Texas COG (Northeast)--Harrison, Upshur & Marion Counties	115,486	117,615	119,456	3,970	3.4	121,569	123,426	
17	4801300	4801300	129012	East Texas COG (Northwest)--Van Zandt, Wood, Camp & Rains Counties	117,858	124,113	129,012	11,154	9.5	135,729	140,166	
18	4801400	4801400	145310	Kaufman County	103,350	123,804	145,310	41,960	40.6	161,790	187,270	
19	4801501	4801501	113973	East Texas COG (Central)--Smith County (Outside Tyler City)	106,726	110,571	113,973	7,247	6.8	117,712	121,220	
20	4801502	4801502	119506	East Texas COG (Central)--Smith County (West)--Tyler City	102,988	116,878	119,506	16,518	16.0	142,674	136,024	
21	4801600	4801600	124239	East Texas COG (Central)--Gregg County--Longview City	121,730	123,443	124,239	2,509	2.1	126,624	126,748	
22	4801700	4801700	125117	East Texas COG (Southeast)--Rusk, Cherokee & Panola Counties	127,971	129,200	125,117	-2,854	-2.2	131,482	122,263	
23	4801800	4801800	140072	East Texas COG (Southwest)--Henderson & Anderson Counties	136,990	138,880	140,072	3,082	2.2	142,390	143,154	
24	4801901	4801901	134556	Collin County (Southwest)--Dallas (North), Plano (South) & Richardson (North) Cities	110,593	125,827	134,556	23,963	21.7	154,119	158,519	
25	4801902	4801902	120540	Collin County (Southwest)--Plano City (West)	108,690	118,240	120,540	11,850	10.9	135,976	132,390	
26	4801903	4801903	107033	Collin County (Southwest)--Plano City (Central)	102,439	112,482	107,033	4,594	4.5	131,133	111,627	
27	4801904	4801904	151305	Collin County (South Central)--Allen, Murphy, Plano (East) & Parker Cities	116,388	142,035	151,305	34,917	30.0	189,665	186,222	
28	4801905	4801905	157125	Collin County (Central)--McKinney City	118,649	152,127	157,125	38,476	32.4	214,300	195,601	
29	4801906	4801906		Collin County (Northwest)--Frisco City (East) & Prosper Town	103,745	176,427	204,407	100,662	97.0	311,408	305,069	Split PUMA to 2 new PUMA: 1
30	4801907	4801907	189499	Collin County (East)	121,837	147,790	189,499	67,662	55.5	195,988	257,161	
31		4801908	101147	Collin County (Northwest)--Celina City & Prosper Town								
32		4801909	103260	Collin County (Northwest)--Frisco City (East)								
33	4802001	4802001	132680	Denton County (Far Southeast)--Carrollton (North) & Dallas (North) Cities	105,750	127,731	132,680	26,930	25.5	168,553	159,610	
34	4802002	4802002	117263	Denton County (Southeast)--Lewisville City	102,230	113,035	117,263	15,033	14.7	133,101	132,296	
35	4802003	4802003	152796	Denton County (South Central)--Flower Mound Town & Highland Village City	116,966	143,703	152,796	35,830	30.6	193,357	188,626	
36	4802004	4802004	187002	Denton County (East Central)--Frisco (West), The Colony & Little Elm Cities	110,301	171,653	187,002	76,701	69.5	285,592	263,703	
37	4802005	4802005	126464	Denton County (Central)--Denton (Central) & Corinth Cities	112,942	125,100	126,464	13,522	12.0	147,679	139,986	
38	4802006	4802006	190217	Denton County (North & West)--Denton City (Outer)	114,425	152,600	190,217	75,792	66.2	223,496	266,009	Census Tract Boundary Chang
39	4802101	4802101	192455	Ellis County	149,610	173,772	192,455	42,845	28.6	218,644	235,300	
40	4802102	4802102	179927	Johnson County	150,934	167,212	179,927	28,993	19.2	197,443	208,920	
41	4802200	4802200	141757	North Central Texas COG (West)--Hood, Erath, Palo Pinto & Somervell Counties	125,673	137,559	141,757	16,084	12.8	159,633	157,841	
42	4802301	4802301	115131	Dallas County (Northeast)--Rowlett & Garland (Northeast) Cities	102,489	114,081	115,131	12,642	12.3	135,609	127,773	

Tools to inform the delineation decisions

- Census Block Group level layer with population change between 2010-2019





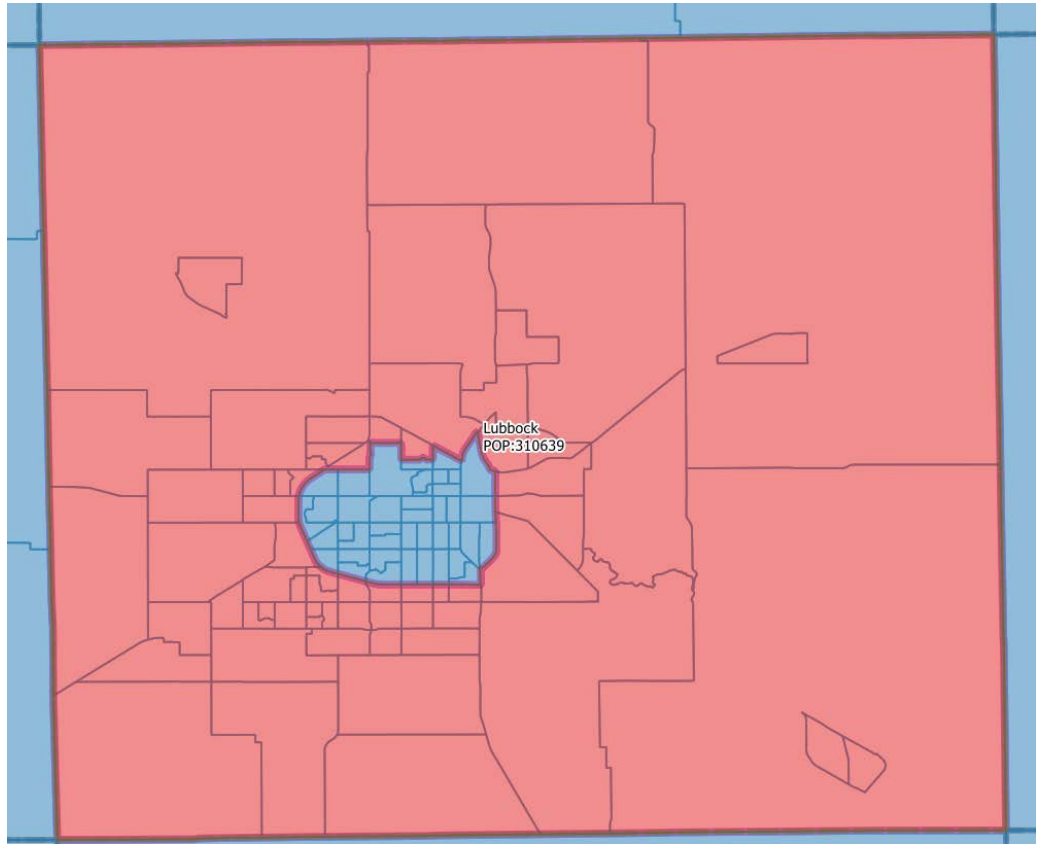


- Census Tract (2010)
- Census Tract (2020)
- PUMA (2010)
- PUMA (2020)
- County

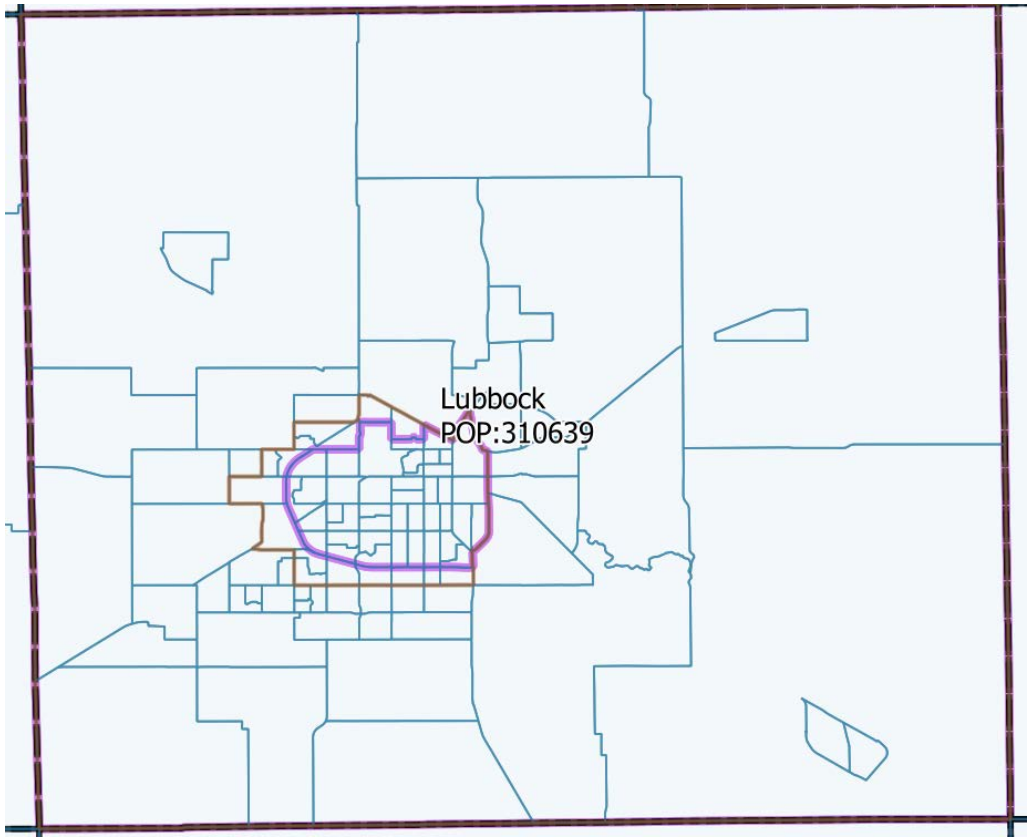
- -100% - -50%
- -50% - 0%
- 0% - 50%
- 50% - 100%
- > 100%

- -3,455 - -999
- -999 - 0
- 0 - 1,000
- 1,001 - 5,000
- 5,001 - 38,305

Addressed PUMAs with 200,000+ people



PUMA 00501: South Plains Association of Governments--Lubbock County--Lubbock City (Central)

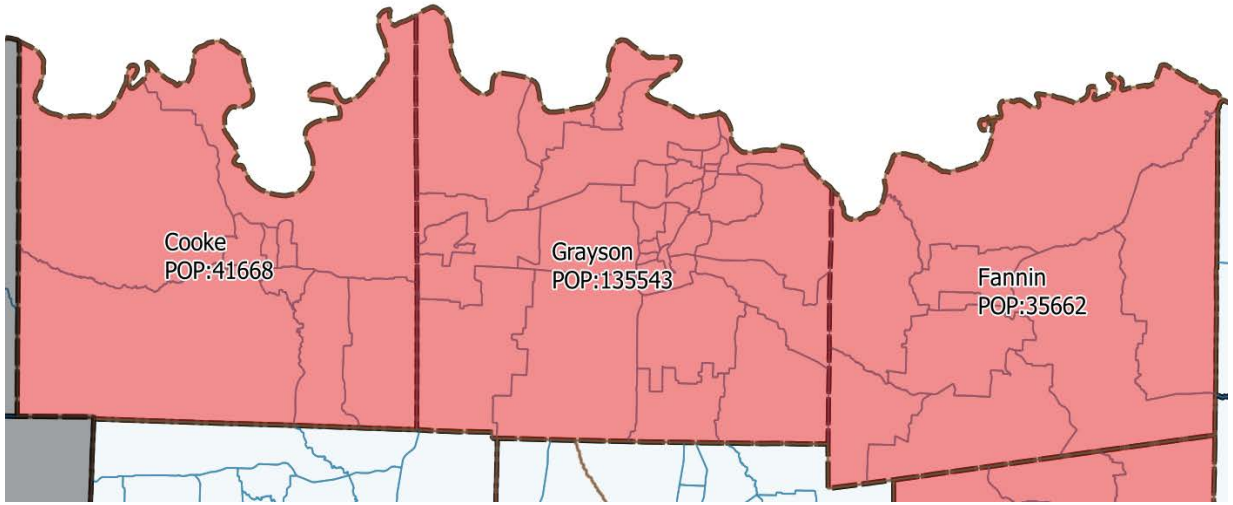


Census Tract (2020)
PUMA (2010)
PUMA (2020)
County

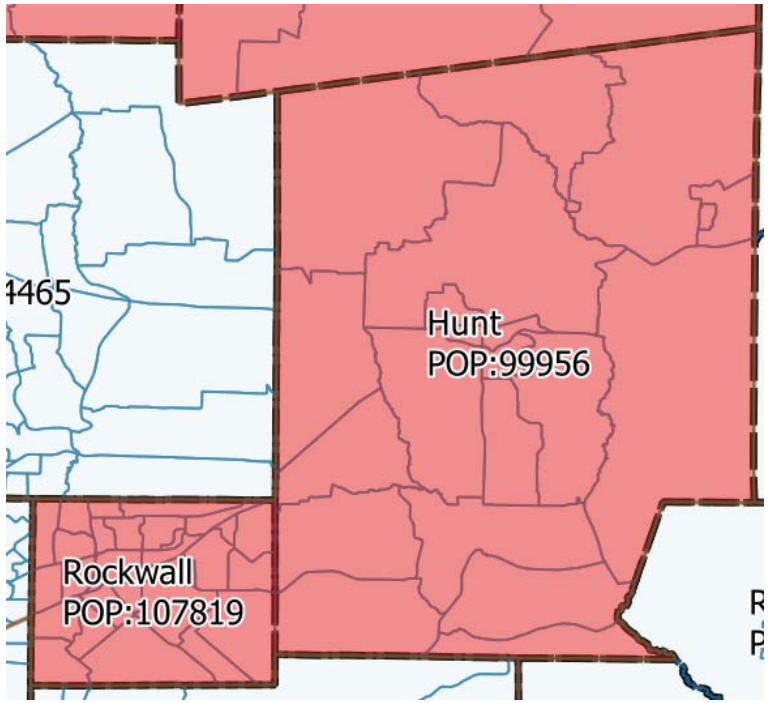
- Solution: expanded the Lubbock City (Central) PUMA

Addressed PUMAs with 200,000+ people

- Solution: maintained the historical PUMA boundaries (2010)



PUMA 00800: Texoma COG--Grayson, Cooke & Fannin Counties

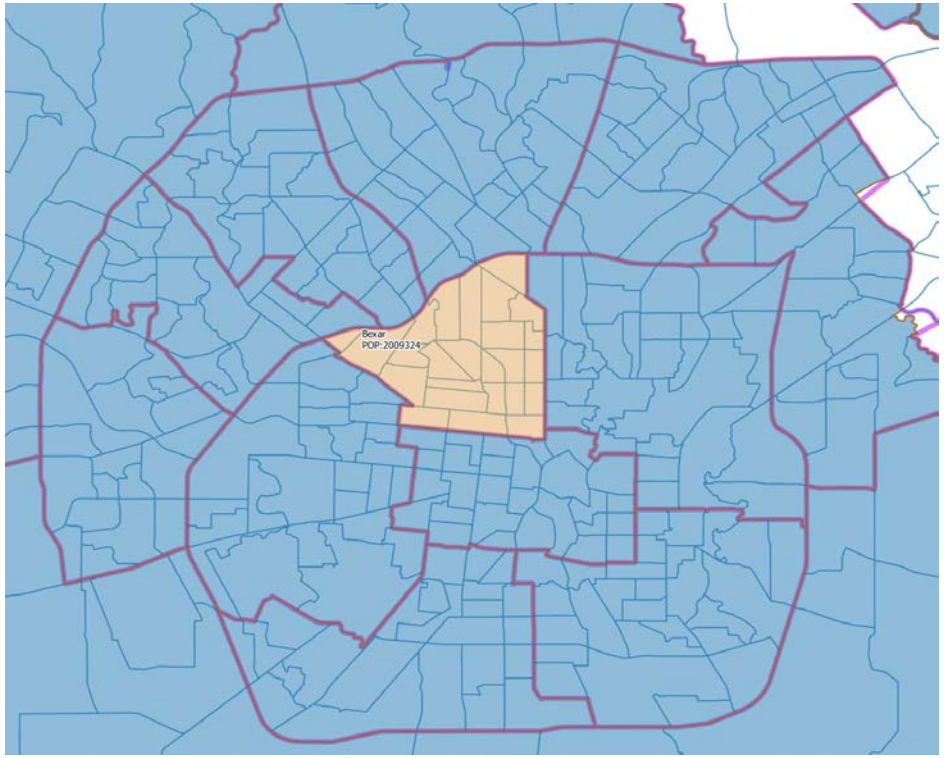


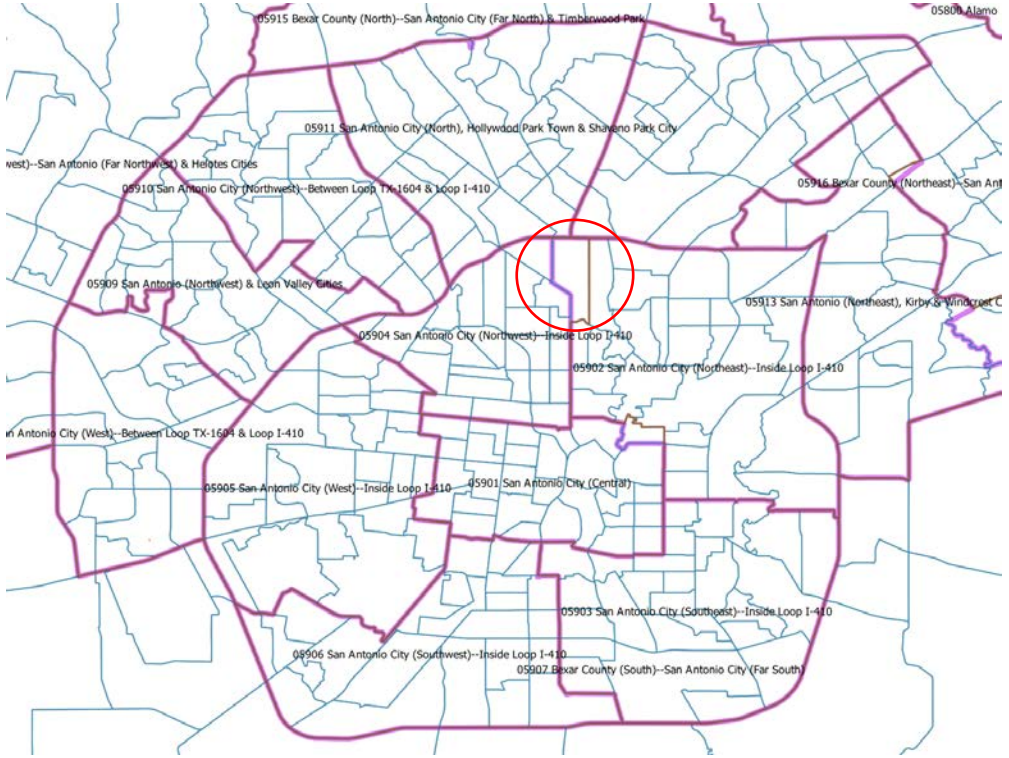
PUMA 00900: Hunt & Rockwall Counties--
Rockwall, Greenville & Dallas (Far Northeast) Cities

Census Tract (2020)
County
PUMA (2020)

Addressed PUMAs with <100,000 people

- Solution: expanded the San Antonio City (Northwest) – Inside Loop I-410 PUMA





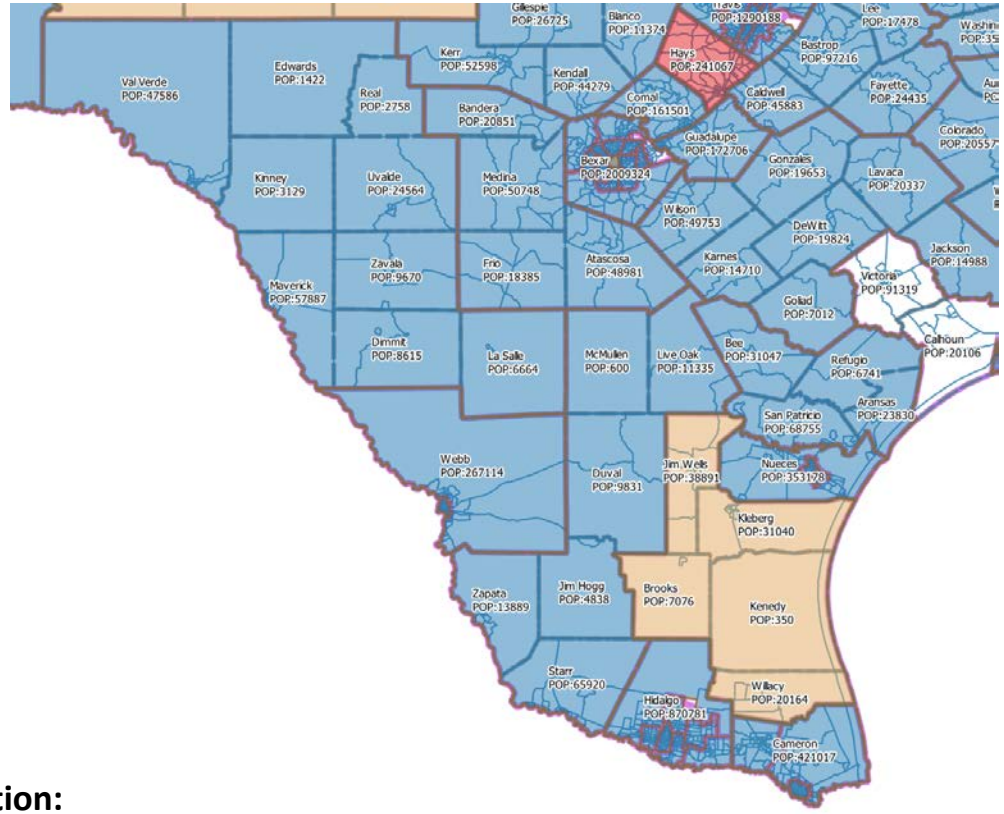
Census Tract (2020)

PUMA (2010)

PUMA (2020)

County

A complex case to modify PUMAs < 100,000 people

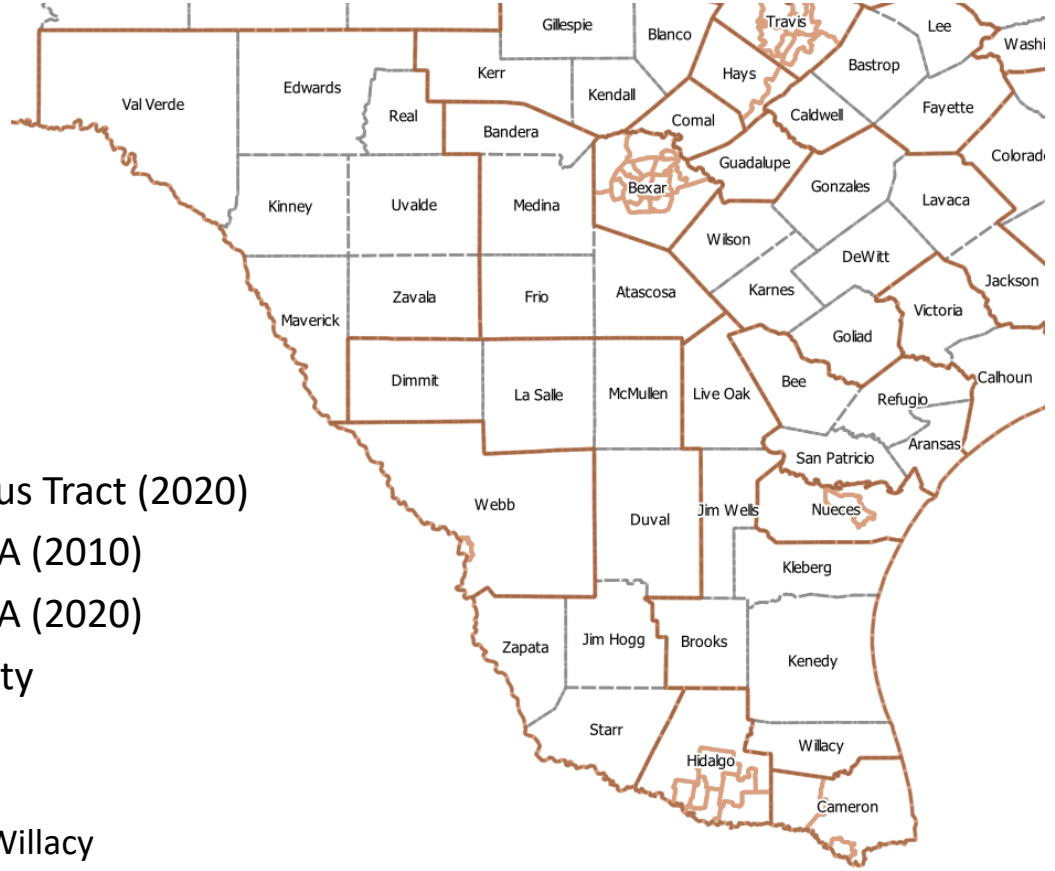


Census Tract (2020)

PUMA (2010)

PUMA (2020)

County

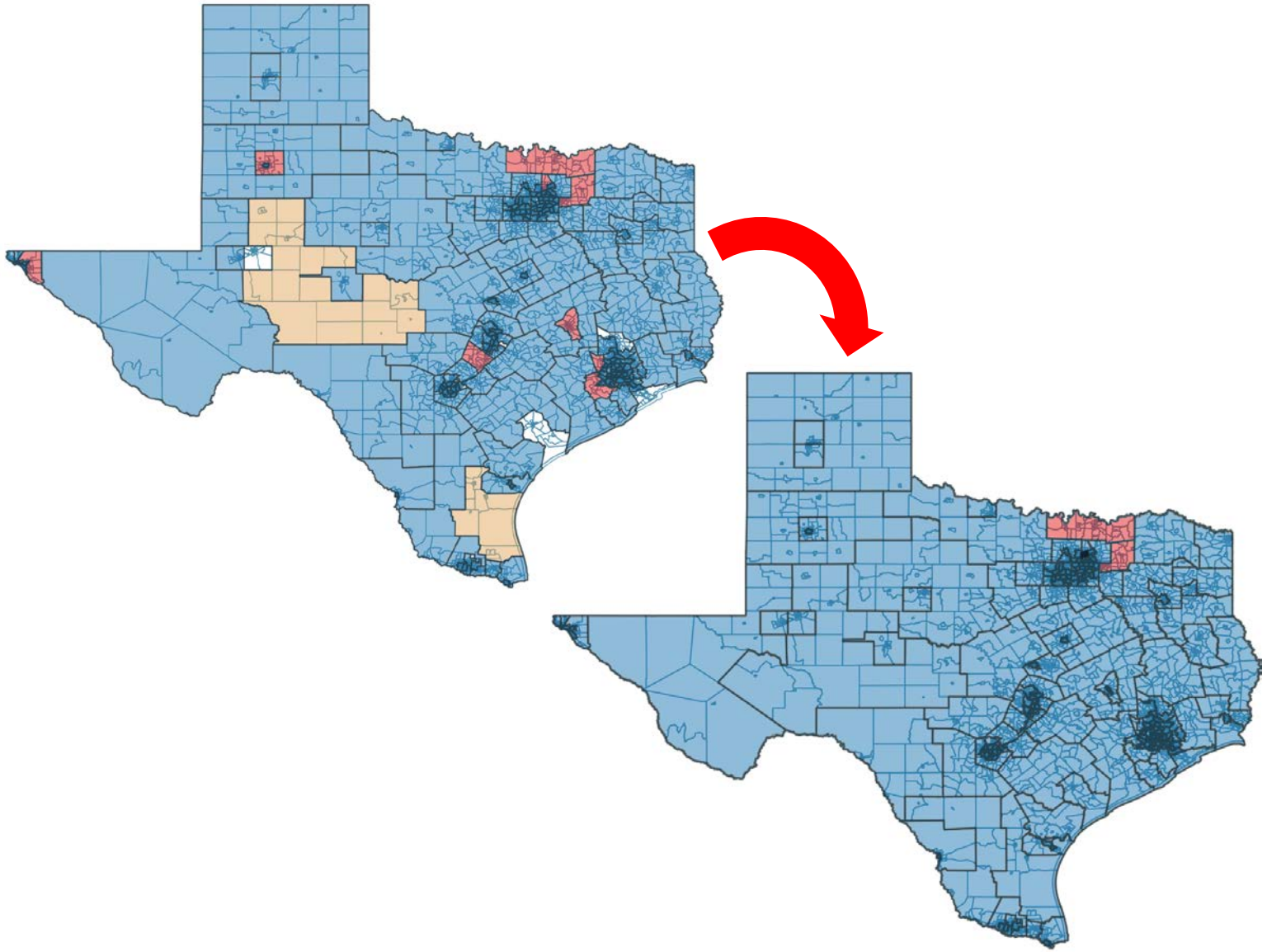


Solution:

1. **Added Live Oak County**, and PUMA name changed to Coastal Bend COG (Central) & Willacy County; PUMA number changed to 4807700
2. **Added La Salle and Dimmit Counties and removed Live Oak County**, and PUMA name changed to South Texas Development Council (South) & Coastal Bend COG (West) & Dimmit & La Salle; PUMA number changed to 4807600
3. **Remove La Salle and Dimmit Counties**, and PUMA name changed to Middle Rio Grande Development Council--Excluding Dimmit & La Salle Counties; PUMA number changed to 4807500

Texas 2020 PUMAs – final results

- 212 PUMAs
  - 16 Census Tract boundary change cases
  - 5 PUMAs were expanded to include more population
  - 7 out of the 9 PUMAs with 200,000+ people were split into two new PUMAs
- Texas 2020 PUMA delineation was submitted to Census Bureau on 1/31/2022



Questions & Answers

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