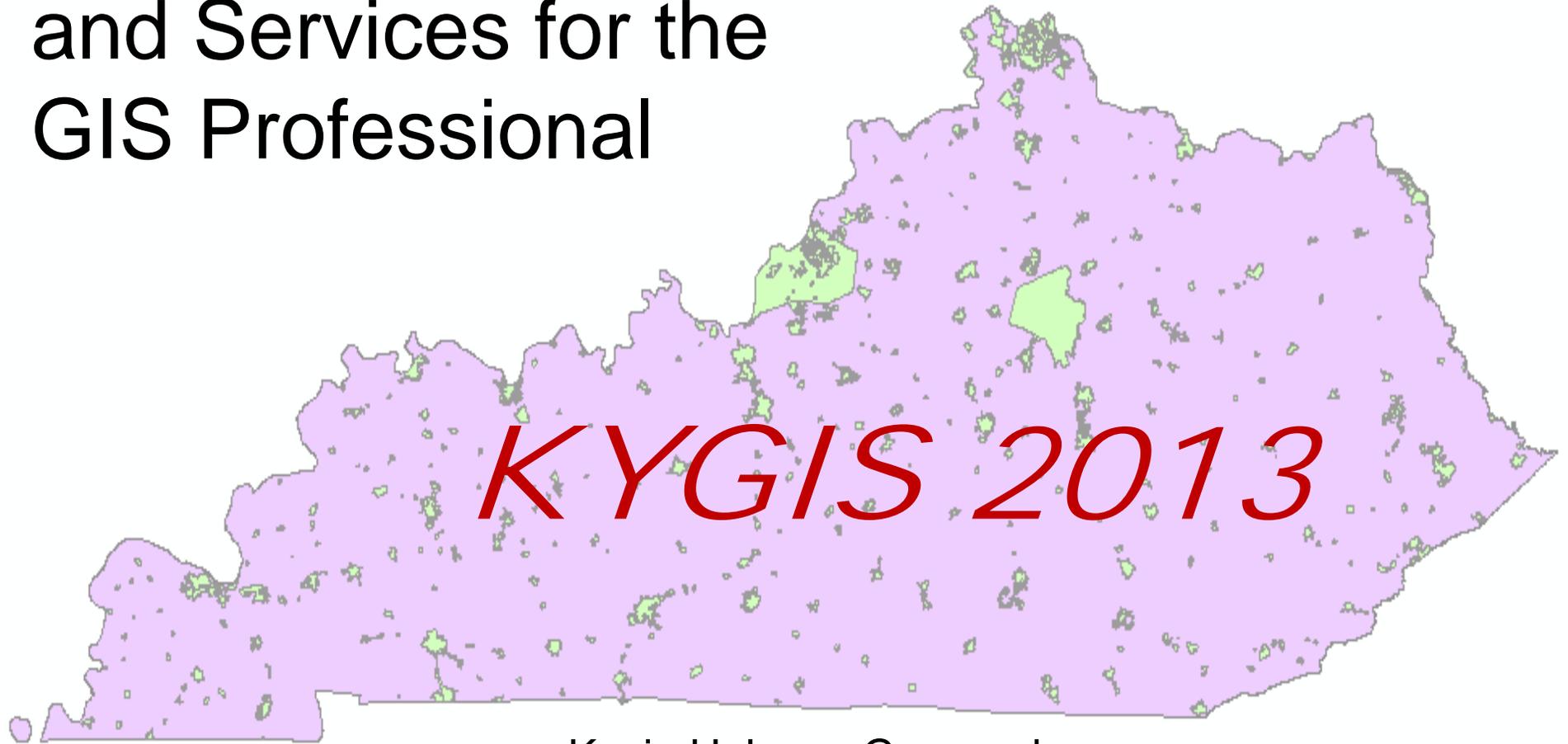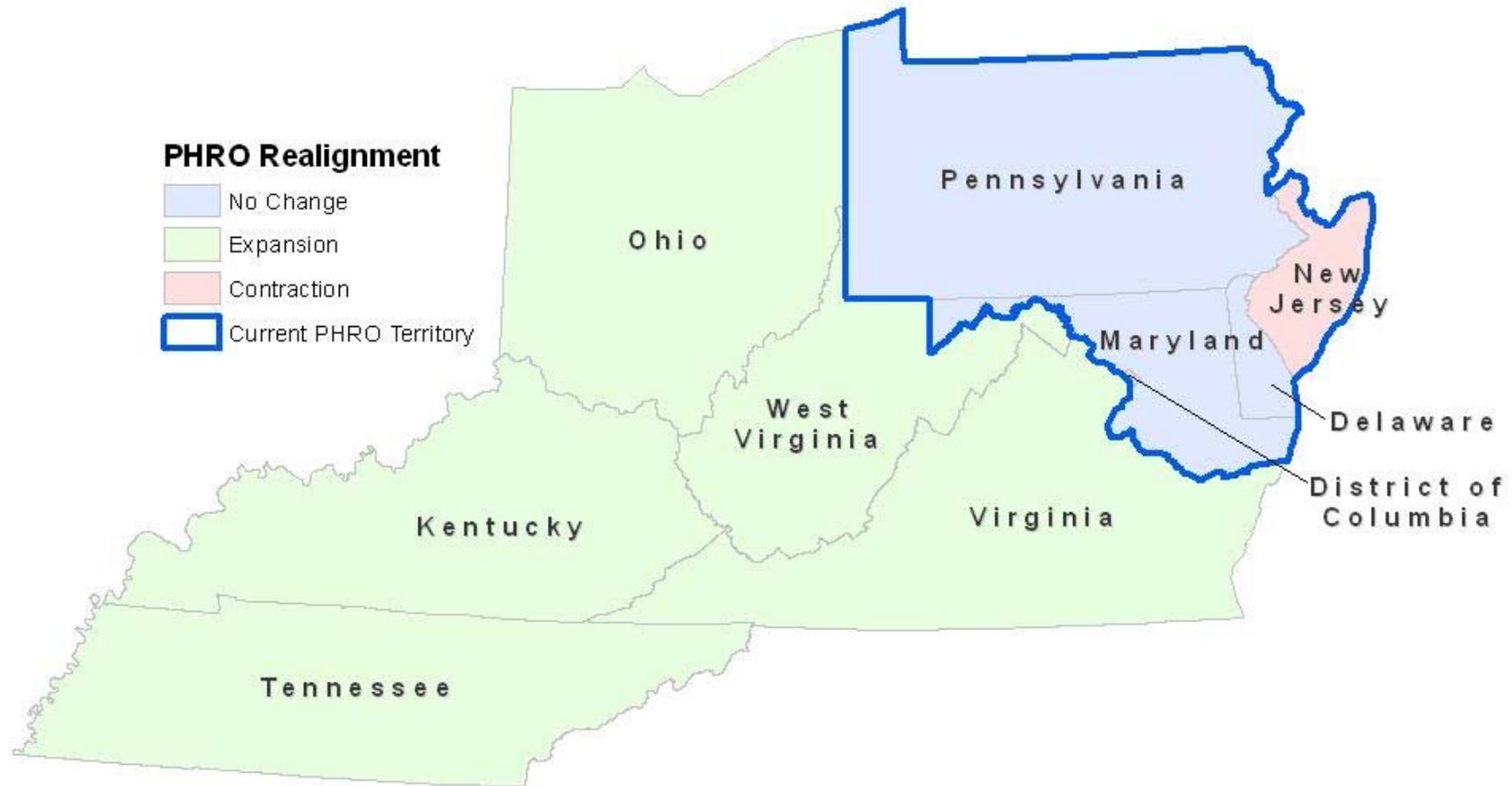# Geospatial Tools, Data, and Services for the GIS Professional

KYGIS 2013

Kevin Holmes, Geographer
Erran Persley, Data Dissemination Specialist
US Census Bureau: Philadelphia Regional Office

United States Census Bureau
Philadelphia Region
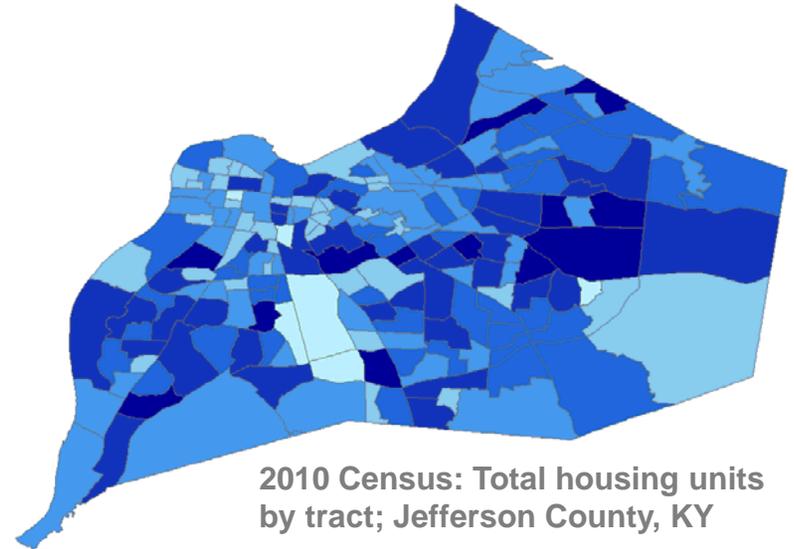
Changes in PHRO Territory: January 2013

Mapping Census Data

Kevin Holmes, Geographer

Overview

- The MAF/TIGER Database (MTDB)
- Edges/Linear Features
- Polygons/Geographic Areas
- Mapping Exercises
- Post-Census & New Geographic Releases

2010 Census: Total housing units by tract; Jefferson County, KY

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The MAF/TIGER Database (MTDB)

- **M**aster **A**ddress **F**ile (MAF)
- **T**opologically **I**ntegrated **G**eographic **E**ncoding and **R**eferencing (TIGER)
- Developed to support 1990 Census
  - Digitized from USGS quads

The "TI" in TIGER

- **T**opological **I**ntegration amongst all linear feature classifications
- Efficient storage (national coverage!)
- Helps prevent data gaps (open polygons)
- Poses "Rubbersheeting" challenges

MAF/TIGER: Supporting the 2010 Census

- MAF/TIGER Accuracy Improvement Project (MTAIP): 2003-2008

- Address Canvassing: Spring 2009

- Geographic Partnership Programs
    – Local Update of Census Addresses (LUCA)
    – New Construction (NC)
    – Participant Statistical Areas Program (PSAP)
    – Redistricting Data Program (RDP)
    – Boundary & Annexation Survey (BAS)

MAF/TIGER: Supporting the 2020 Census+

- Geographic Support System Initiative (GSS-I)
  - Integrated program utilizing partnerships for:
    - Improved address coverage
    - Continual spatial feature updates
    - Enhanced quality assessment & measurement (QI)
  - May allow for a <u>targeted</u> address canvassing operation in 2019 (cost avoidance)
  - Better quality <u>throughout</u> the decade to support intercensal surveys (ACS, Pop. Estimates)
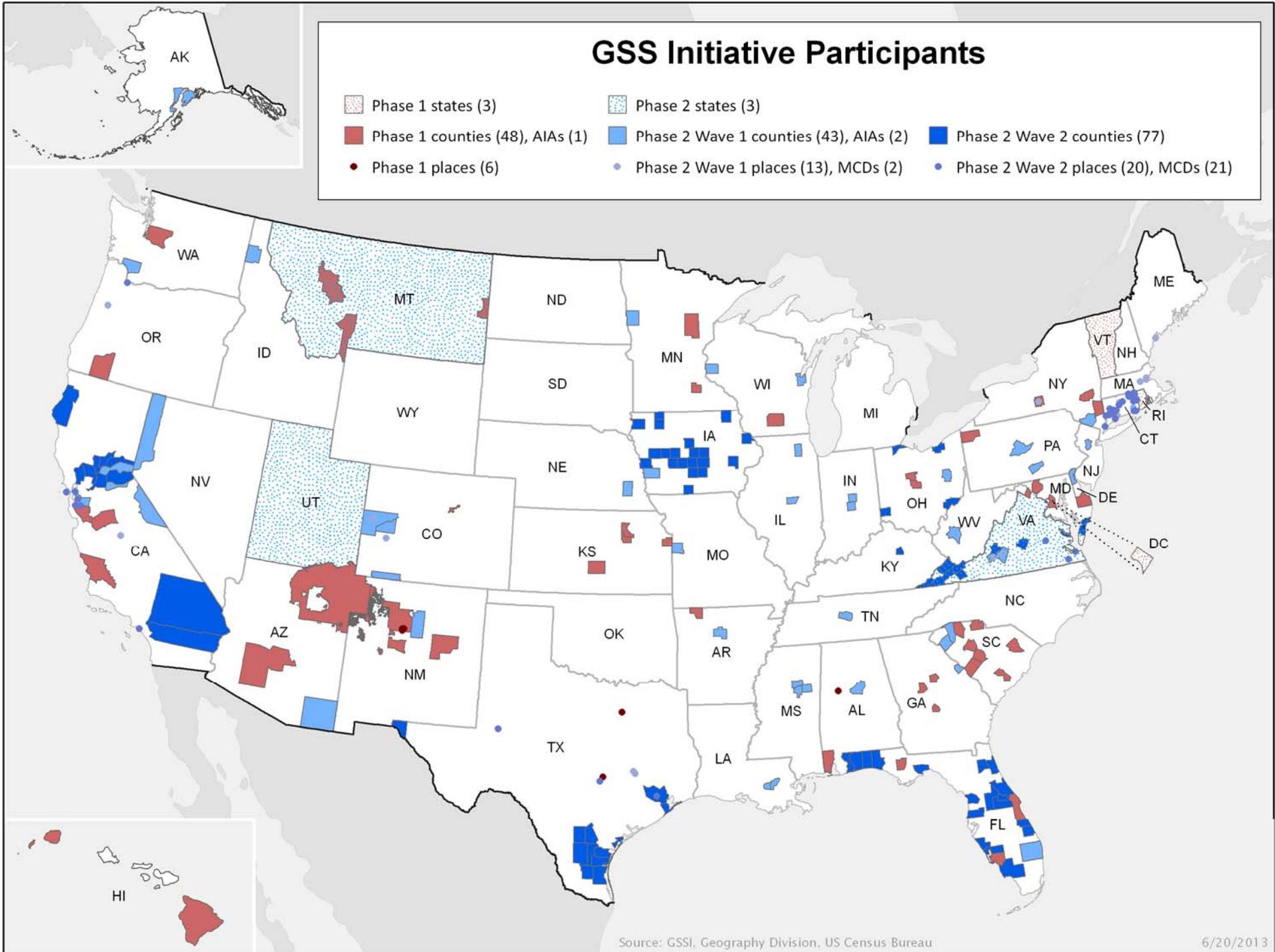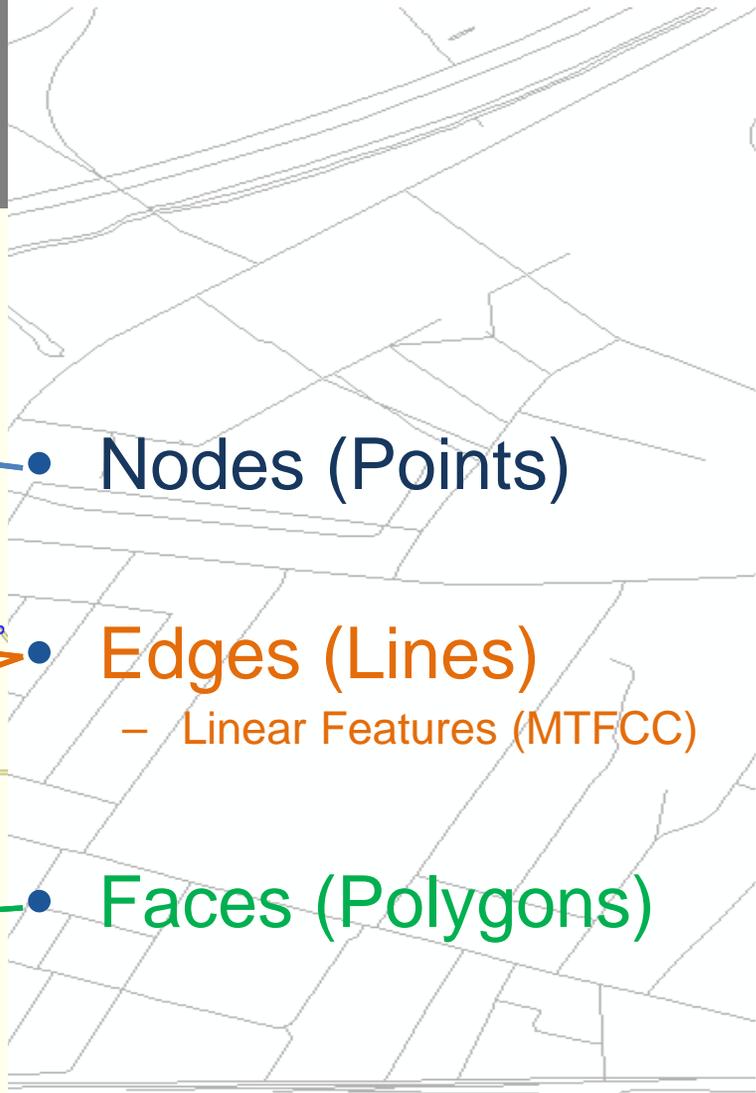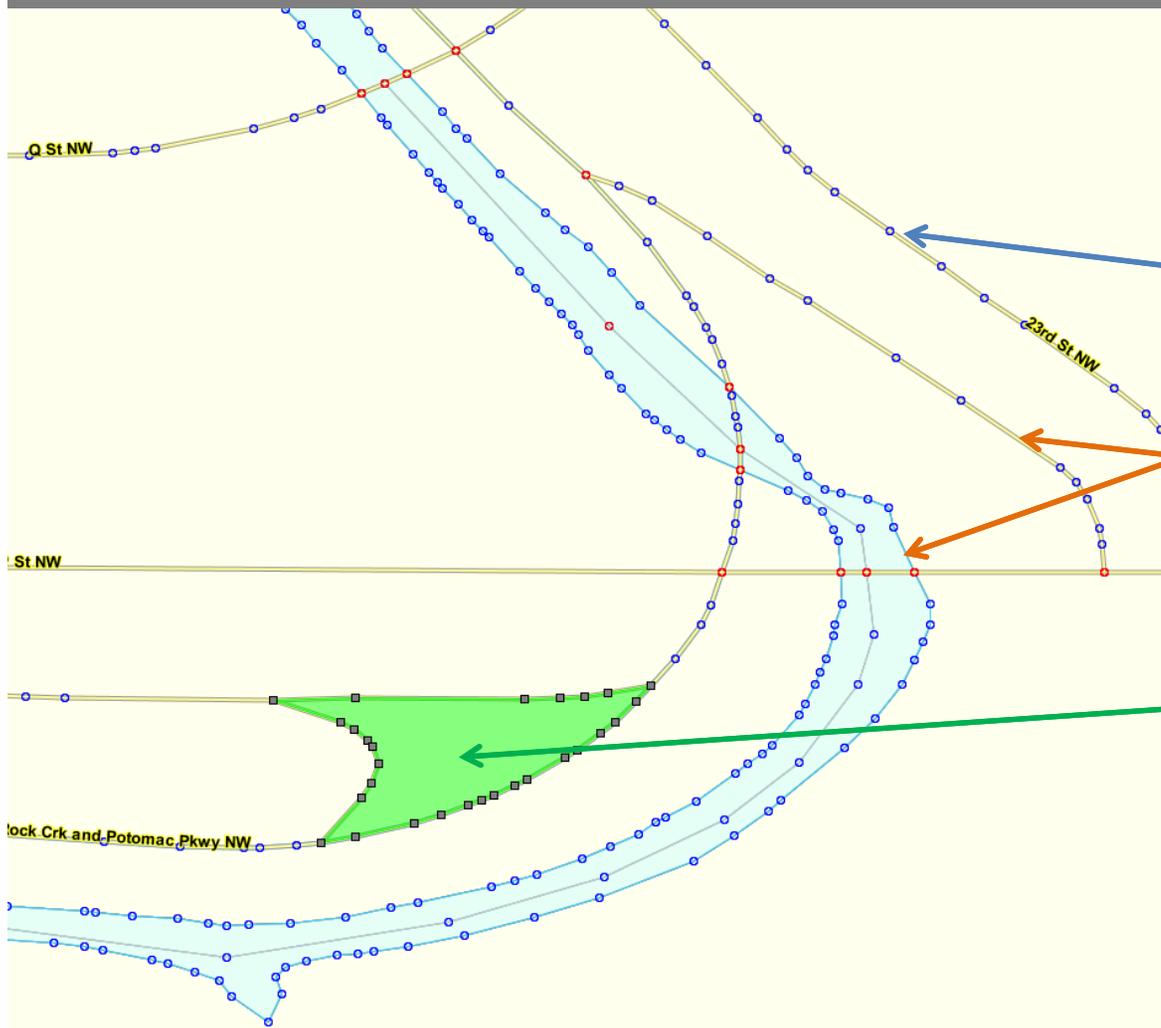
http://www.census.gov/geo/www/gss/

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GSS Initiative Participants

- Phase 1 states (3)
- Phase 2 states (3)
- Phase 1 counties (48), AIAs (1)
- Phase 2 Wave 1 counties (43), AIAs (2)
- Phase 2 Wave 2 counties (77)
- Phase 1 places (6)
- Phase 2 Wave 1 places (13), MCDs (2)
- Phase 2 Wave 2 places (20), MCDs (21)

AK

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CA
CO
KS
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KY
WV
VA
NC
AZ
NM
OK
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TN
SC
TX
LA
MS
AL
GA
FL
HI

Source: GSSI, Geography Division, US Census Bureau

6/20/2013

TIGER Structure

- **Nodes (Points)**

- **Edges (Lines)**
  - Linear Features (MTFCC)

- **Faces (Polygons)**

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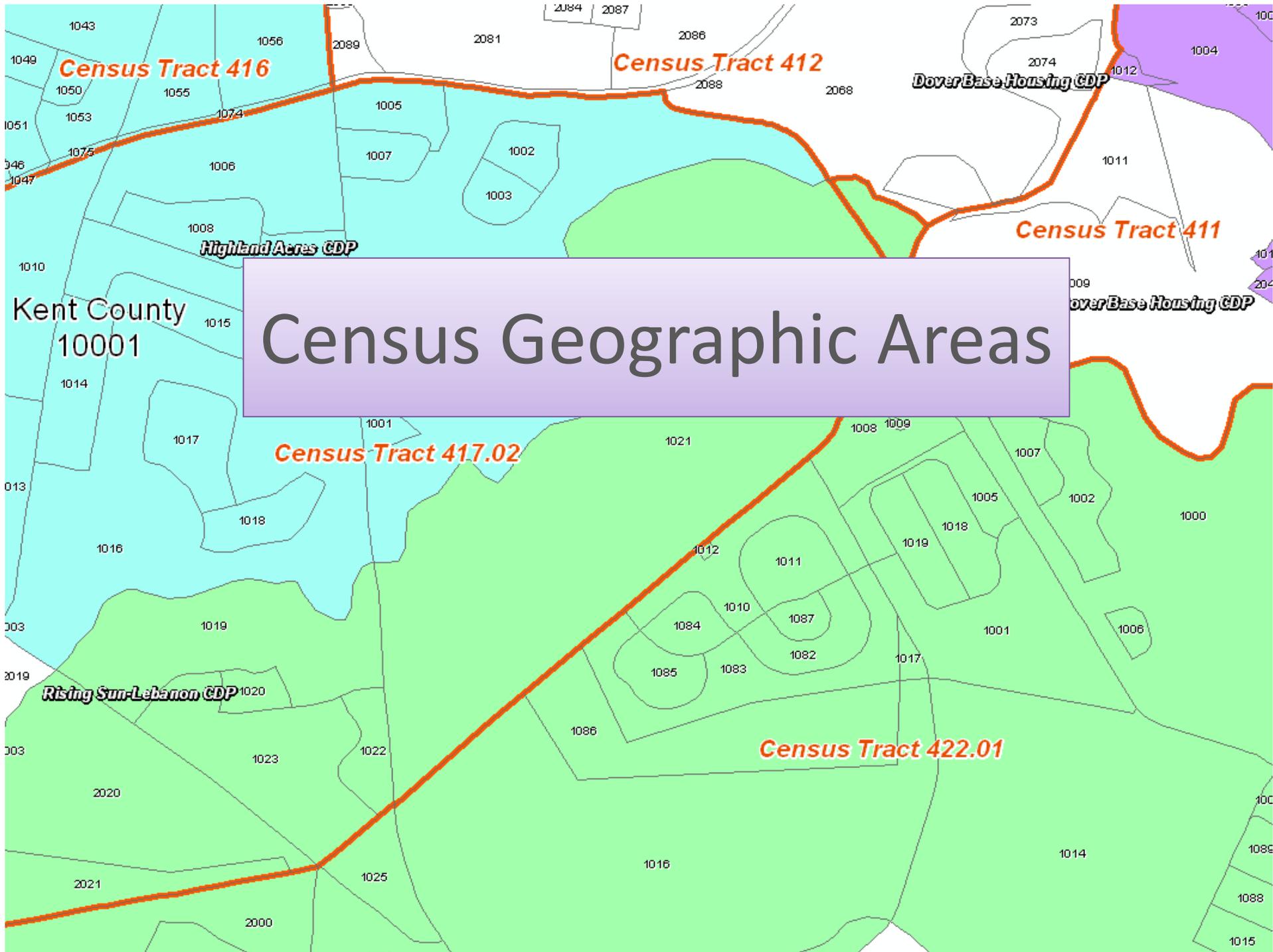# ArcGIS Demonstration

Basemapping:
- TIGERWeb – tigerWMS

Analysis:
- Edge/Linear Feature Download
  - MTFCC mapping
  - Spatial Metadata Identification (SMID)

www.census.gov

Census Geographic Areas

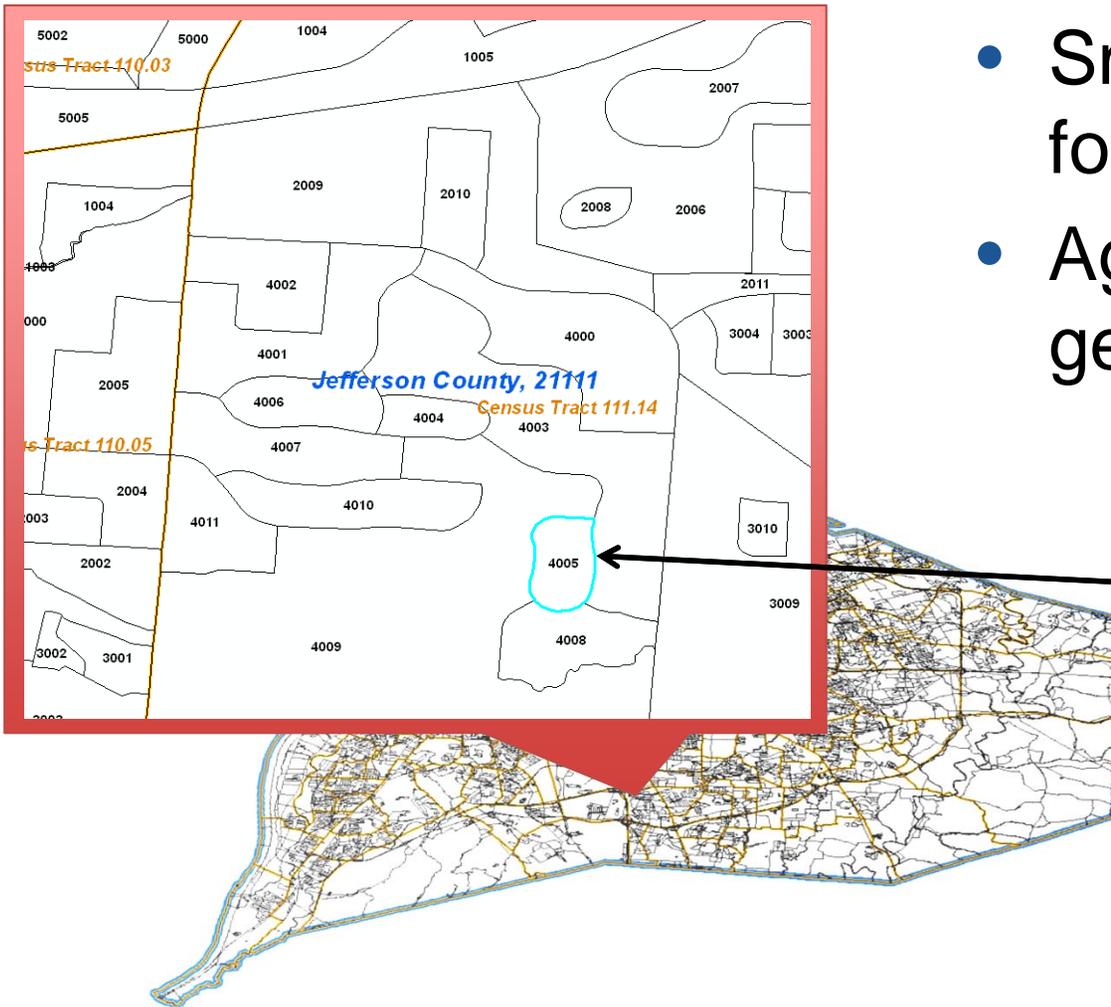# Data Aggregation & Geocoding

- **Decennial Census: Summary Level Statistical Data**
  - Individual/household data confidential for 72 years
    - 1940 Census Records Released April 2012
  - Data geocoded to Census Tabulation Block
    - Participant & Canvassing programs
  - Nesting of larger geographies allows for aggregation of block level data

United States Census Bureau
Philadelphia Region

Census Tabulation Blocks

- Smallest geographic unit for data tabulation
- Aggregated to larger geographies as needed

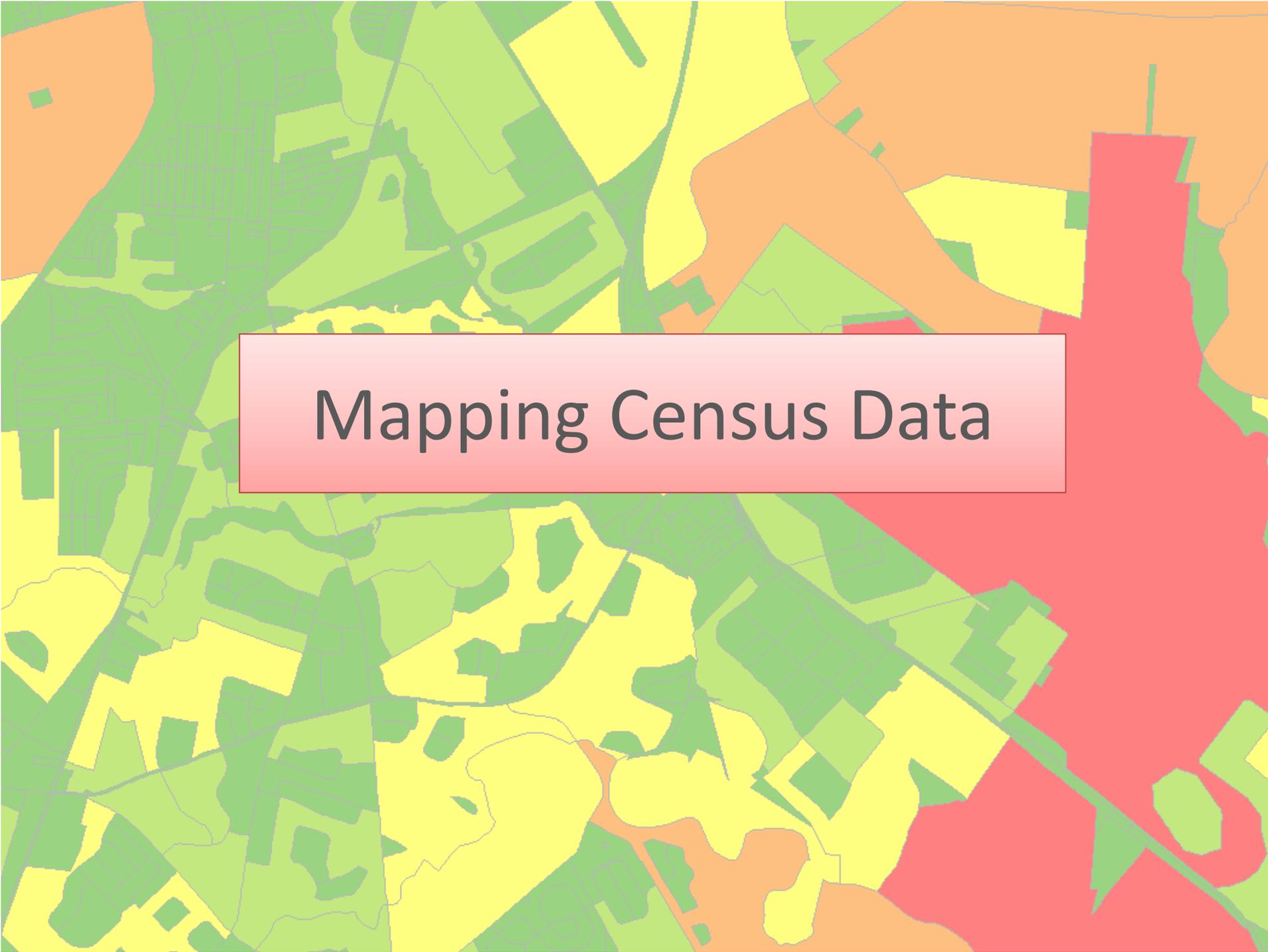Highlighted Block Geocode:
21111011114005

Census Tabulation Geographies
(Summary Levels)

Specific geographies may only tessellate at certain levels, but ALL are built upon Census Tabulation Blocks

ArcGIS Demonstration

Basemapping:

- TIGERWeb REST – tigerWMS_Current

Geographic Areas
- – File Acquisition
- – GEOID Components
- – Spatial Selection

www.census.gov

Mapping Census Data

Mapping Census Data

- 2 Components
  - Data (based on geographic extent)
  - Geographic files

- Be Aware of Data/Geog Vintages
  - If not, 'holes' in map may occur
  - 2010 Census data -> 2010 TIGER .shps

Obtaining Census Datasets

- ## <u>Raw Datasets</u>
  - FOR EXPERIENCED DATA USERS…many tables, codes, fields
  - Good for mapping large quantities of data (e.g. all tab blocks/county, all tracts/state, etc.)
  - Requires joining to TIGER shapefiles

  2010 Census: www.census.gov/rdo

  American Community Survey: www.census.gov/acs

  Economic Census: www.census.gov/econ

Obtaining Census Datasets

- **<u>American FactFinder</u>**

  - Faster data acquisition

  - Data thresholds (230 column limitation)

  - Requires joining to TIGER shapefiles

  AFF: http://factfinder2.census.gov

Obtaining Census Datasets

- TIGER Joined w/ Demographic Data
  - Fastest data acquisition
  - Limited socio-economic variables*
  - No data manipulation prior to joining/mapping

  census.gov/geo/maps-data/tiger-data.html
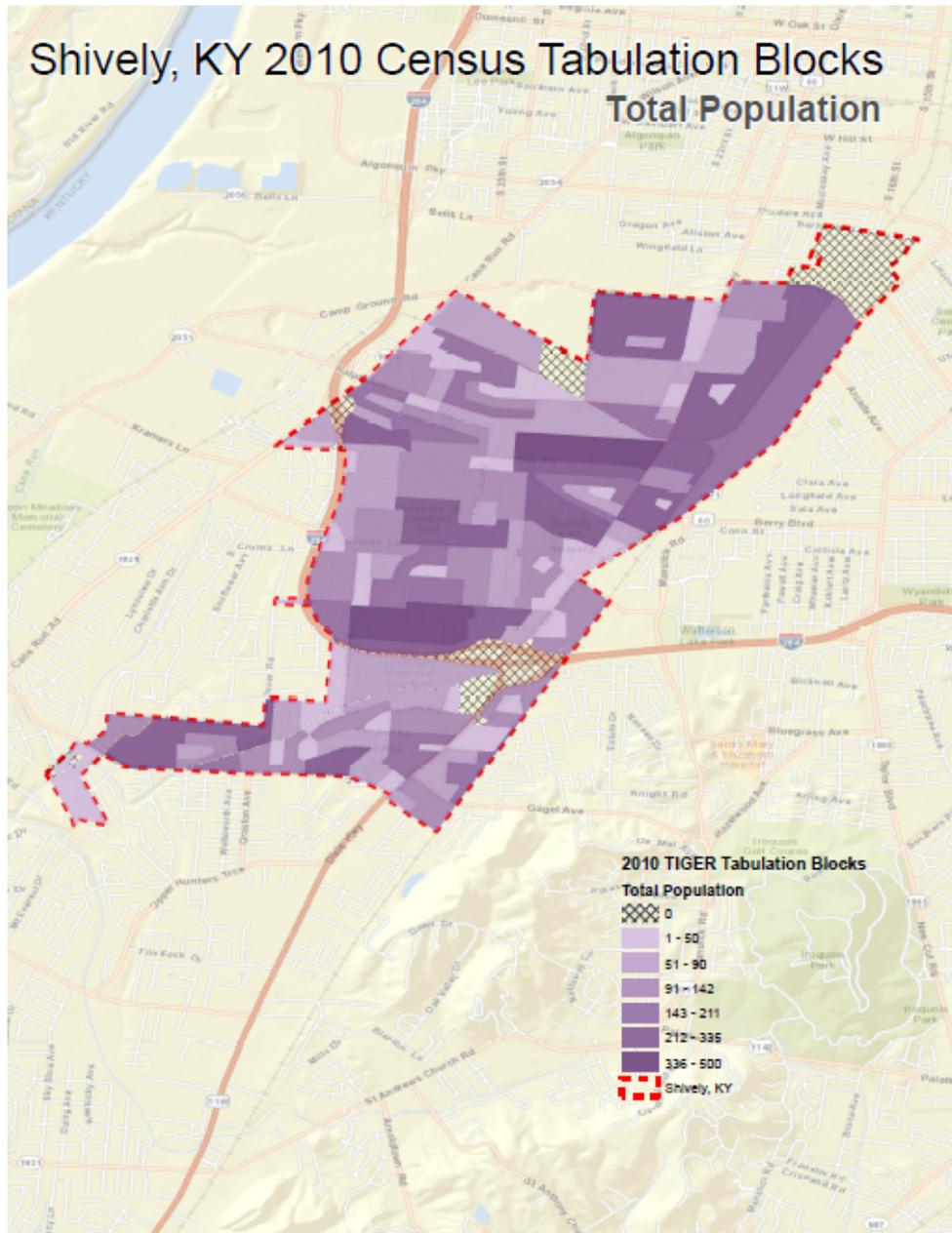
NEW!

ArcGIS Demonstration
Mapping Census Data

2010 Census: Total Population by Tabulation Block within Shively City, KY

2007-2001 ACS 5-Year: Lightning Demo

Method: TIGER/Line Shapefiles Pre-joined with Demographic Data
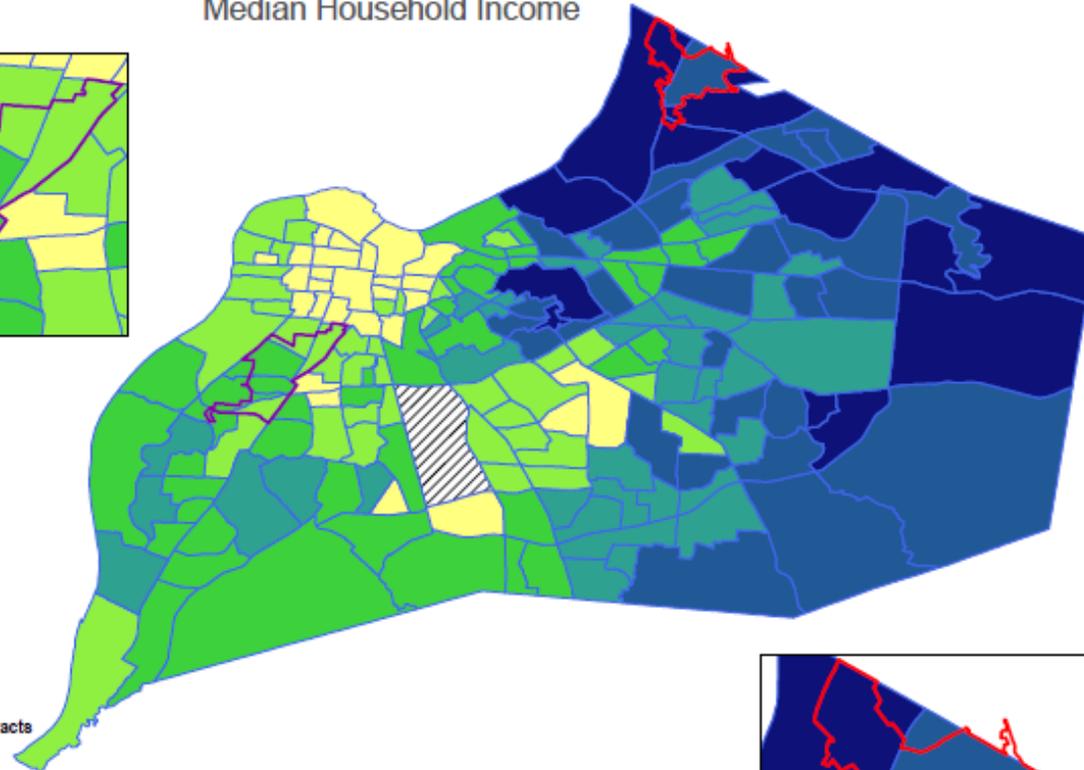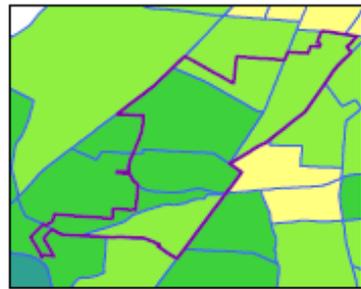
Final Result?

- More populous along main arteries (264/60/60B)

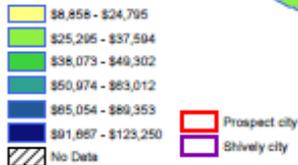- Null population along interchanges & business areas

Shively, KY 2010 Census Tabulation Blocks
Total Population

2010 TIGER Tabulation Blocks
Total Population
- 0
- 1 – 50
- 51 – 90
- 91 – 142
- 143 – 211
- 212 – 335
- 336 – 500
- Shively, KY

Other Map Examples

American Community Survey Data (socioeconomic)

Available every year in 1-year, 3-year, & 5-year estimates

Other Map Examples (cont)

2000 to 2010 Housing Unit Change
By 2010 Census Tract, Delaware

Wilmington City

Housing Unit Change 2000 to 2010
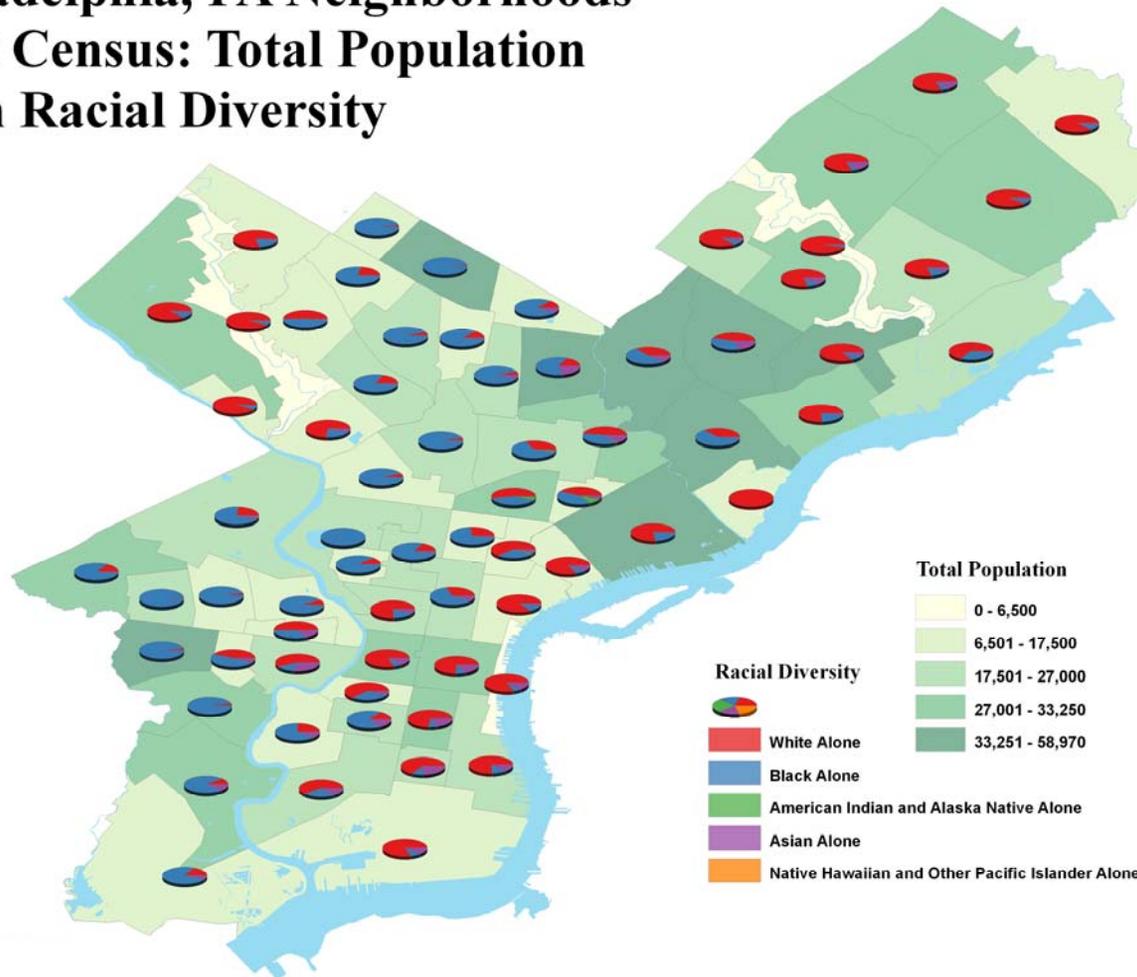- -625 - -500
- -499 - -1
- 0
- 1 - 500
- 501 - 2731
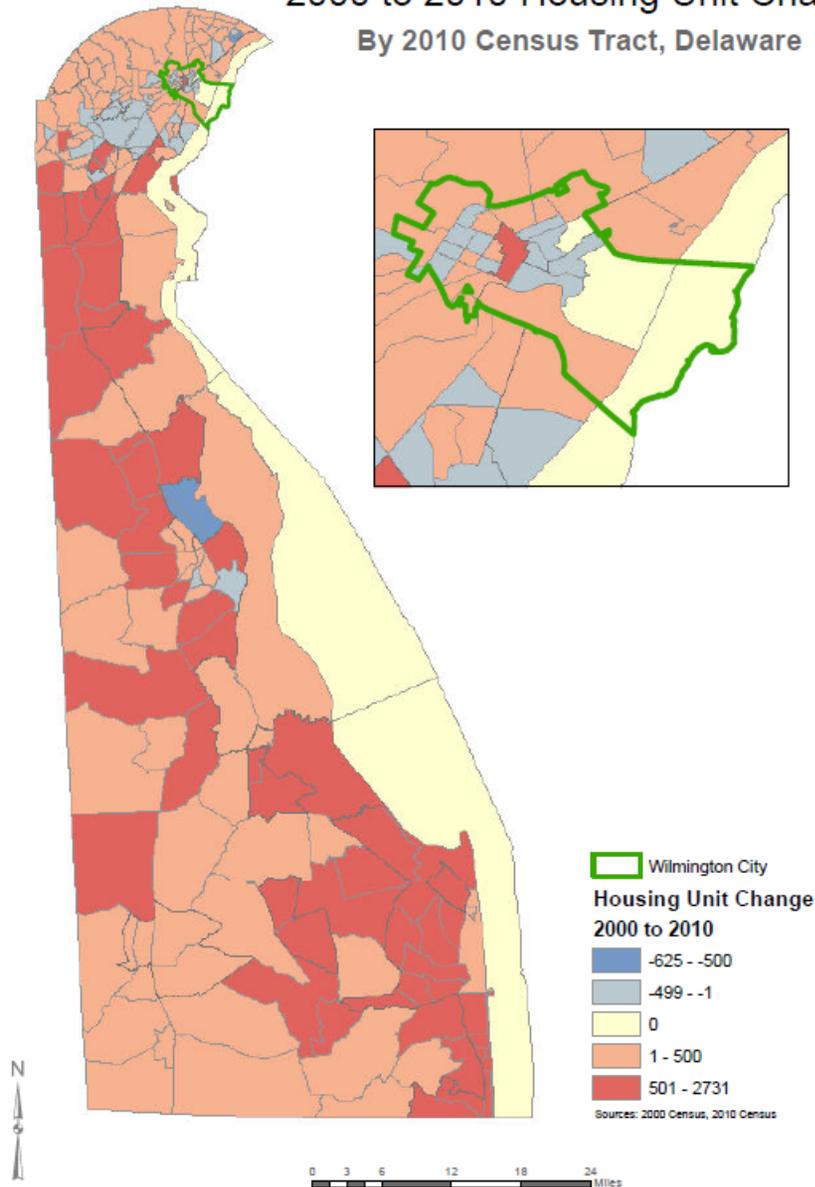
Sources: 2000 Census, 2010 Census

- Decennial change detection

- Data manipulation may be needed if/when Geographies also change through decade

Other Map Examples (cont)

- Nonstandard Geography?

- Identify Census geographic level that "plays nice" with your geography

- Spatial join as needed
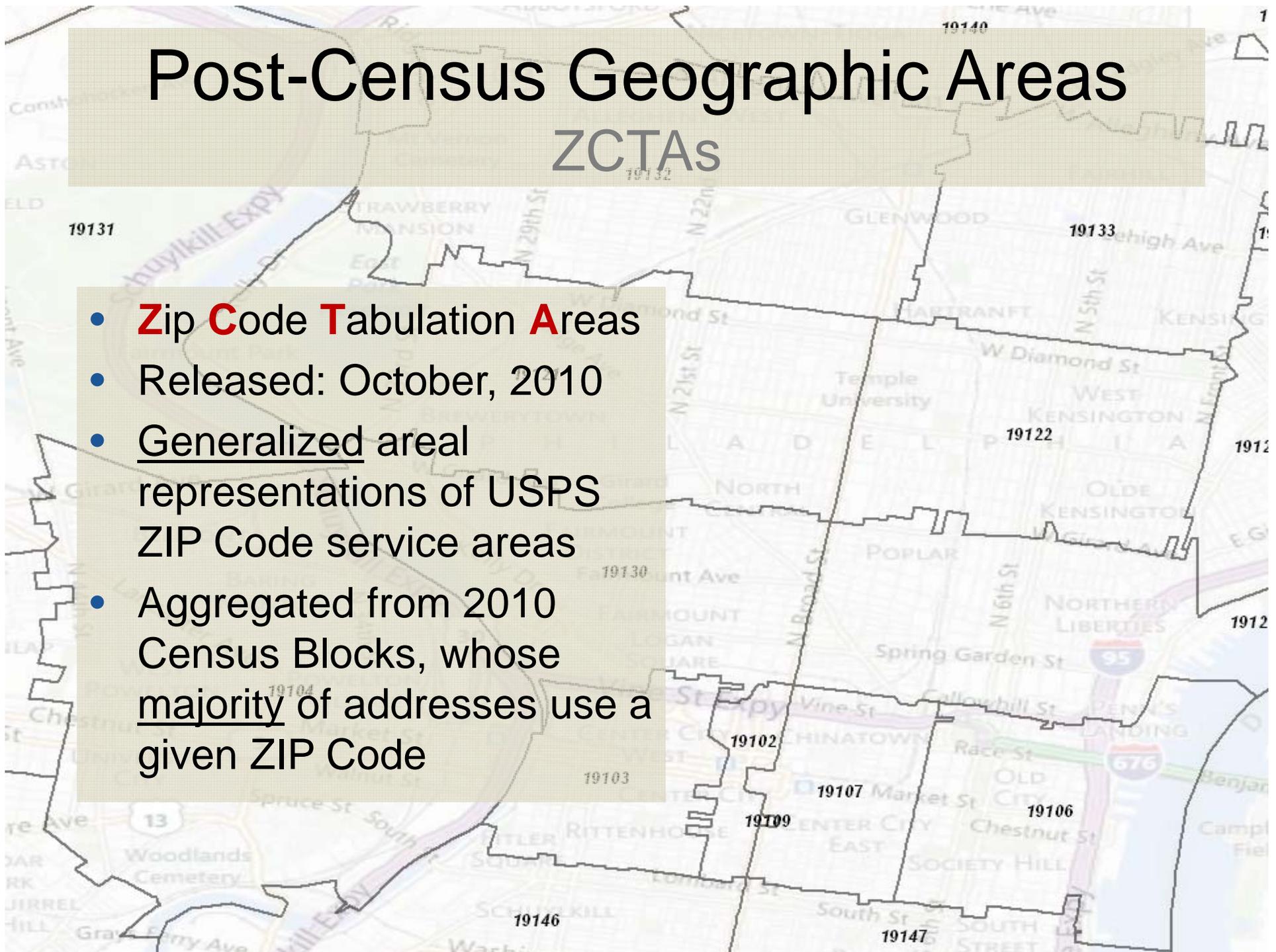
Post-Census Geographic Areas

- ZCTAs
- Urban/Rural Areas
- PUMAs
- Congressional & State Legislative Districts
- Legal Boundaries (BAS)

Post-Census Geographic Areas
ZCTAs

- **Z**ip **C**ode **T**abulation **A**reas
- Released: October, 2010
- <u>Generalized</u> areal representations of USPS ZIP Code service areas
- Aggregated from 2010 Census Blocks, whose <u>majority</u> of addresses use a given ZIP Code
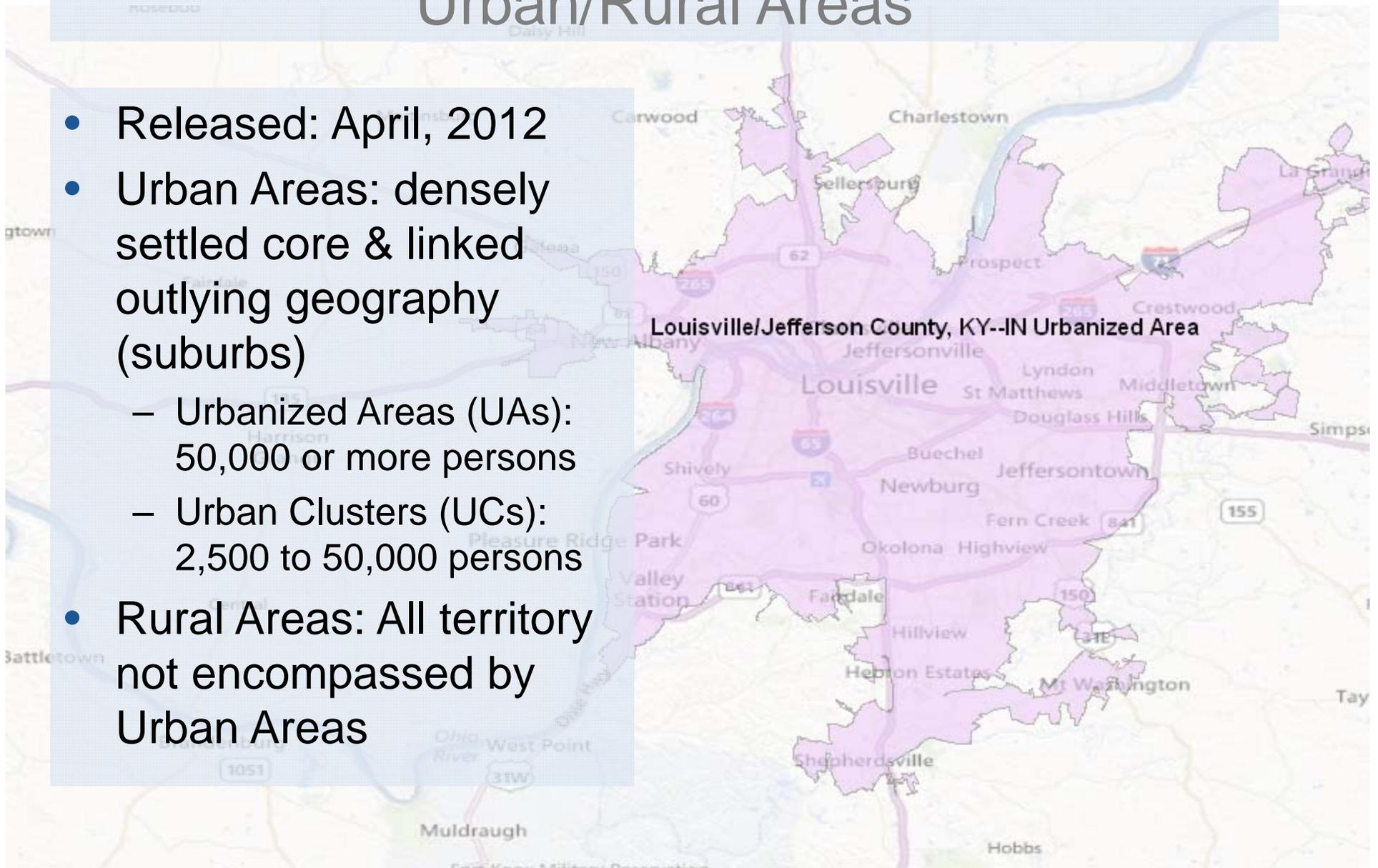
Post-Census Geographic Areas
Urban/Rural Areas

- Released: April, 2012
- Urban Areas: densely settled core & linked outlying geography (suburbs)
  - Urbanized Areas (UAs): 50,000 or more persons
  - Urban Clusters (UCs): 2,500 to 50,000 persons
- Rural Areas: All territory not encompassed by Urban Areas

Louisville/Jefferson County, KY--IN Urbanized Area
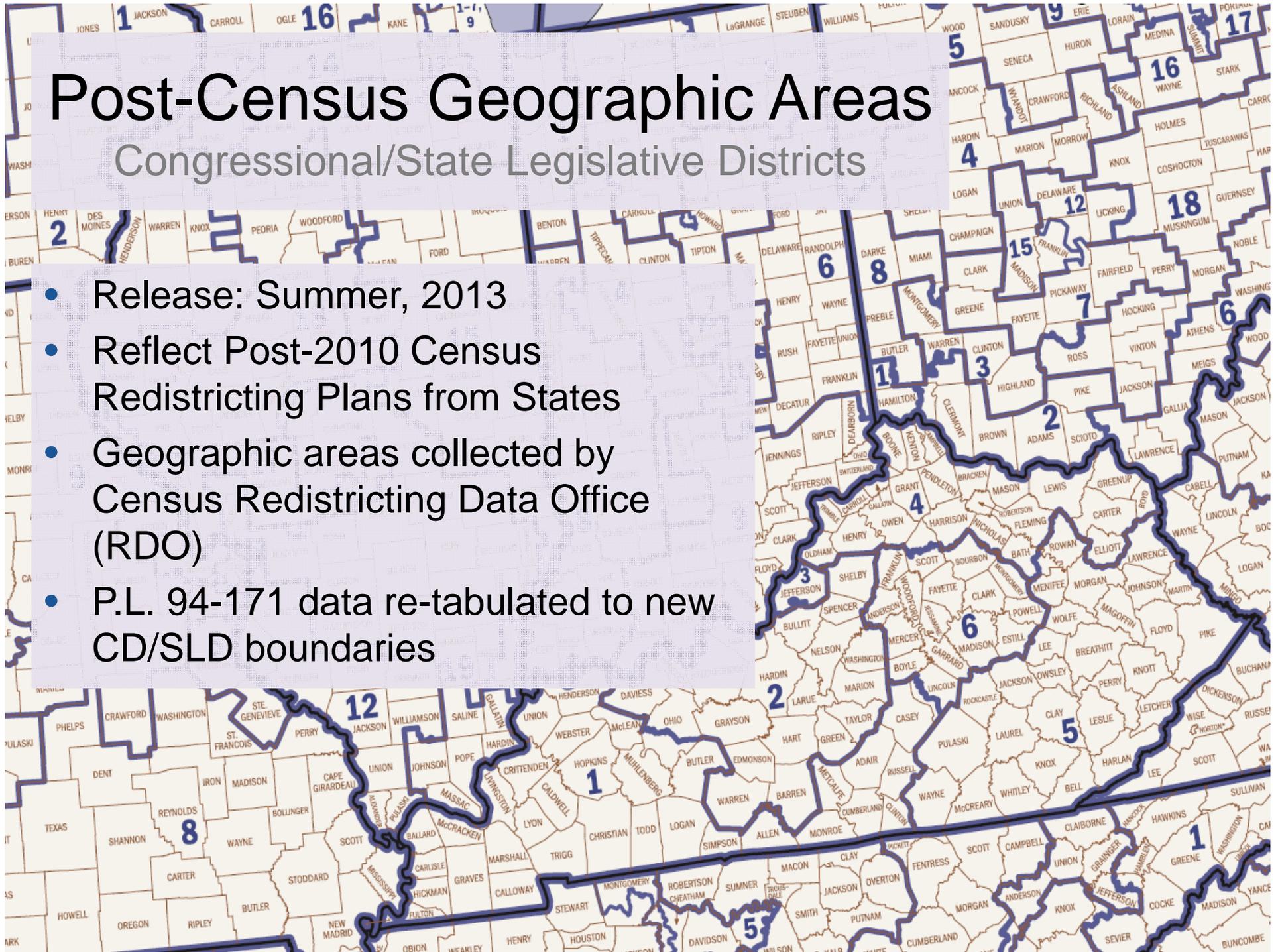
Post-Census Geographic Areas
PUMAs

- **P**ublic **U**se **M**icrodata **A**reas
- Release: Fall, 2012
- Statistical geographic area defined for Public Use Microdata Sample (PUMS) data
  - 1% & 5% samples of HUs, providing <u>detailed</u> data while preserving confidentiality by removing identifiers
- Delineated by State Data Centers (SDCs) in 2011
- Microdata records identify no geographic area with fewer than 100,000 persons
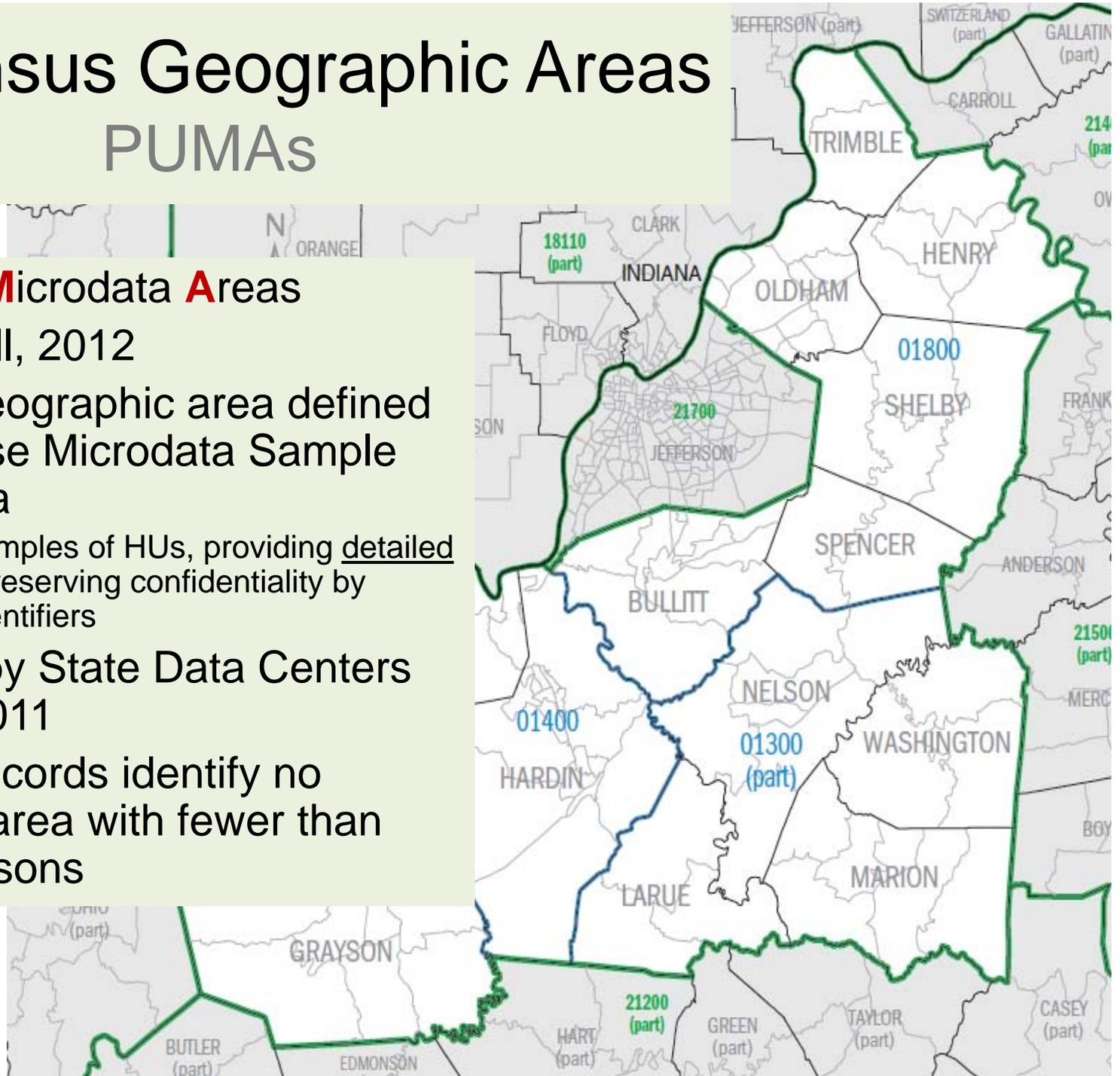
Post-Census Geographic Areas
Congressional/State Legislative Districts

- Release: Summer, 2013
- Reflect Post-2010 Census Redistricting Plans from States
- Geographic areas collected by Census Redistricting Data Office (RDO)
- P.L. 94-171 data re-tabulated to new CD/SLD boundaries

Post-Census Geographic Areas
## Legal Boundaries (BAS)

- **B**oundary & **A**nnexation **S**urvey

- Yearly program updating legal boundaries & names of all governmental units

- Decennial Census
- Economic Census
- Population Estimates Program
- American Community Survey
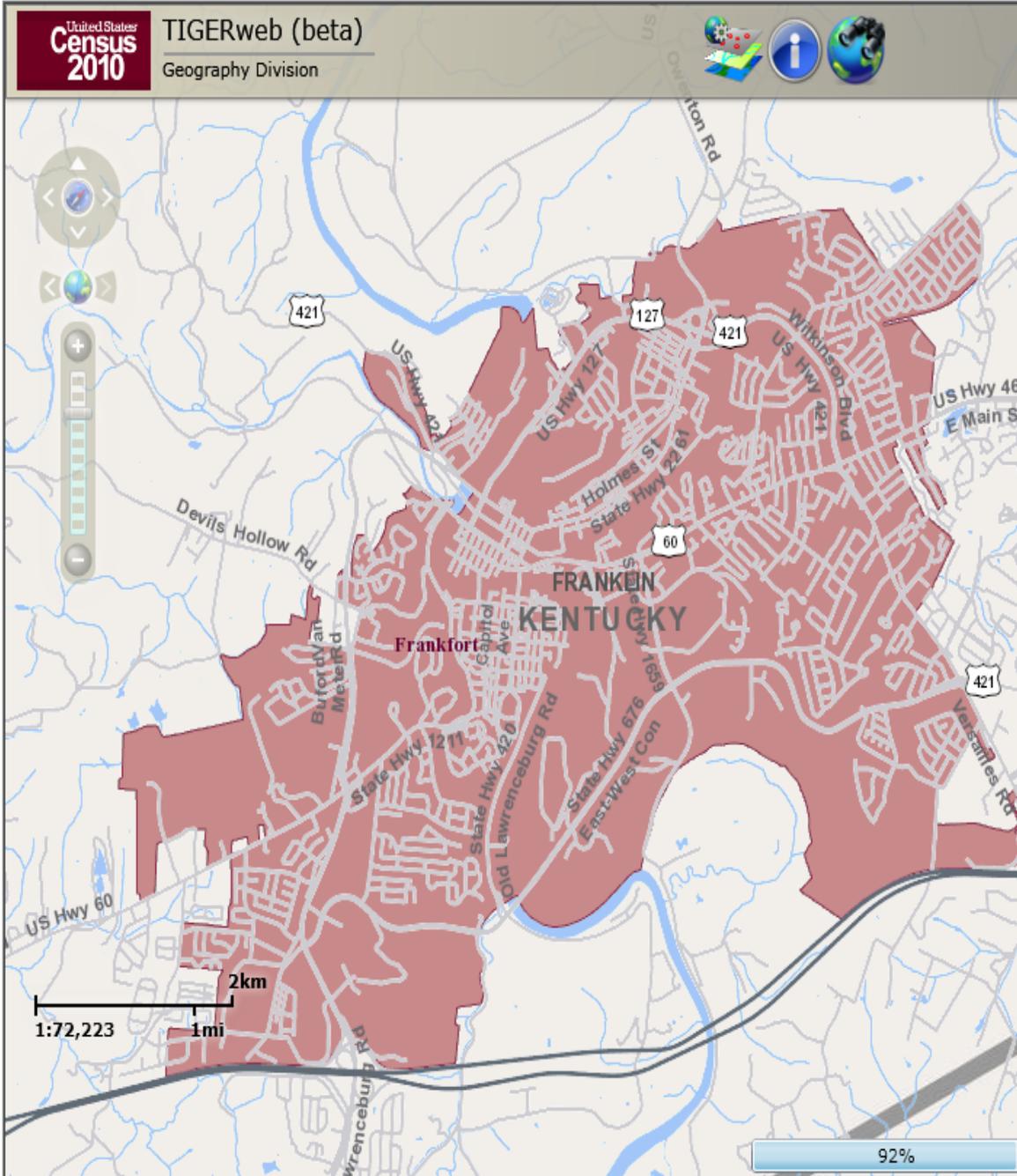
2014 BAS

New Geographic Prototypes
Google Earth KMLs

- Detailed & Generalized layers at County and Tract Levels

- GEOID Attribute Only

- PROTOTYPES – Input from users requested to build a more useful product
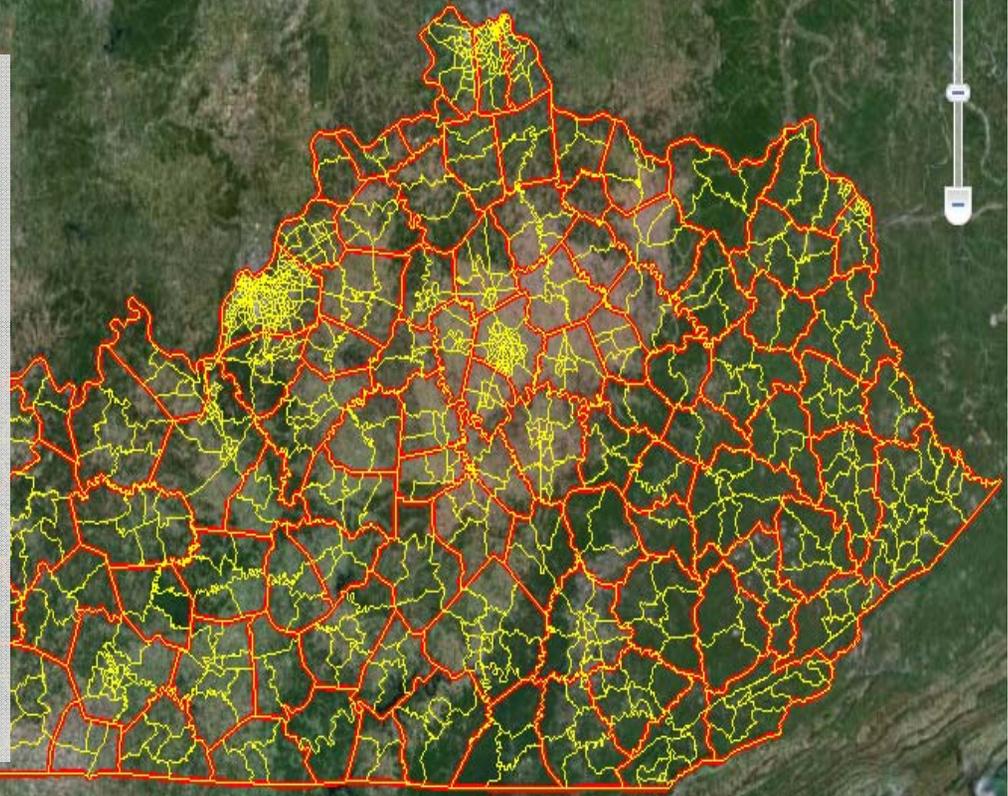
TIGERweb

- Web Mapping Service (WMS)
- View, query, select Census geographic areas
- Does not include demographic data

Digital Geographic Products: Summary

TIGER/Line Shapefiles	Full detail, extensive attributes, current vintages
TIGER Geodatabases	Full detail, limited attributes, current vintages
TIGER/Line Shapefiles & Geodatabases w/ Demographic Data	Full detail, limited attributes, limited vintages
Cartographic Boundary Files	Generalized detail, limited attributes, limited vintages
KML Prototype Files	Generalized detail, limited attributes, limited vintages
TIGERWEB – WMS & REST map services	Detailed, extensive attributes, current vintages

Mapping Census Data

QUESTIONS?

Kevin Holmes, Geographer
US Census Bureau: Philadelphia Regional Office

United States™
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Philadelphia Region

THANK YOU!

Remaining Time is YOURS

- Questions & Custom Application Inquiries
- Explore w/ AFF & ArcGIS
- Mapping Exercise

Kevin Holmes, Geographer
Erran Persley. Data Dissemination Specialist

Data/Mapping Exercise

Thematically map number and/or concentration of bachelor's degrees obtained throughout every county in KY

County with largest number of bachelor's degrees?
County with highest percentage of bachelor's degrees?

Data/Mapping Exercise
TIPS

- Pre-joined…
- Metadata…
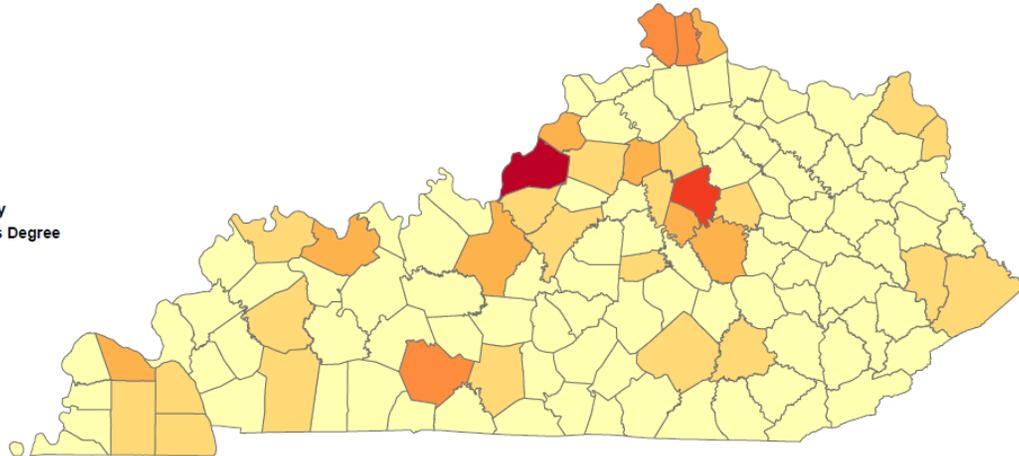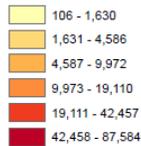- See "Cheat Sheet" in folder for step by step instructions
- ASK QUESTIONS!

Thematically map number and/or concentration of bachelors degrees obtained throughout every county in KY
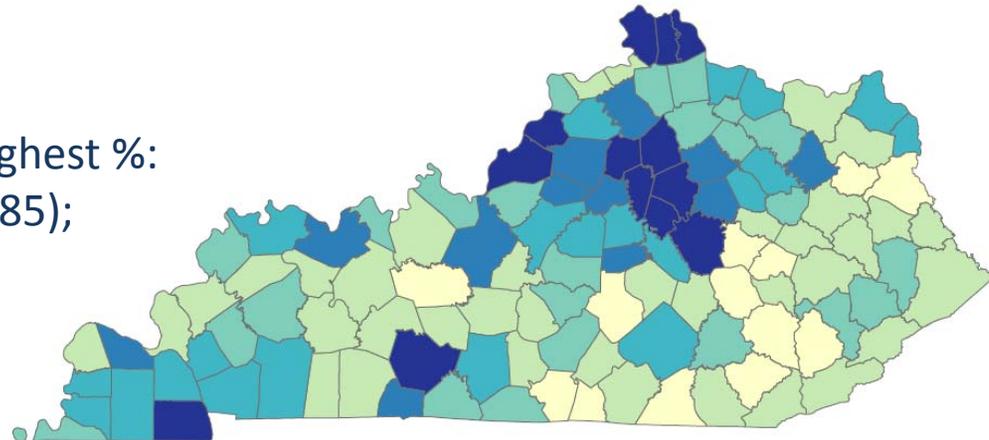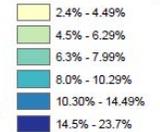
Data/Mapping Exercise
RESULTS

County w/ highest #:
Jefferson (21111);
87,584

ACS_11_5YR_County
TOTAL Pop Bachelors Degree
- 106 - 1,630
- 1,631 - 4,586
- 4,587 - 9,972
- 9,973 - 19,110
- 19,111 - 42,457
- 42,458 - 87,584

County w/ highest %:
Oldham (21185);
23.7%

ACS_11_5YR_County
% Pop Bachelors Degree
- 2.4% - 4.49%
- 4.5% - 6.29%
- 6.3% - 7.99%
- 8.0% - 10.29%
- 10.30% - 14.49%
- 14.5% - 23.7%

Thematically map number and/or concentration of bachelors degrees obtained throughout every county in KY