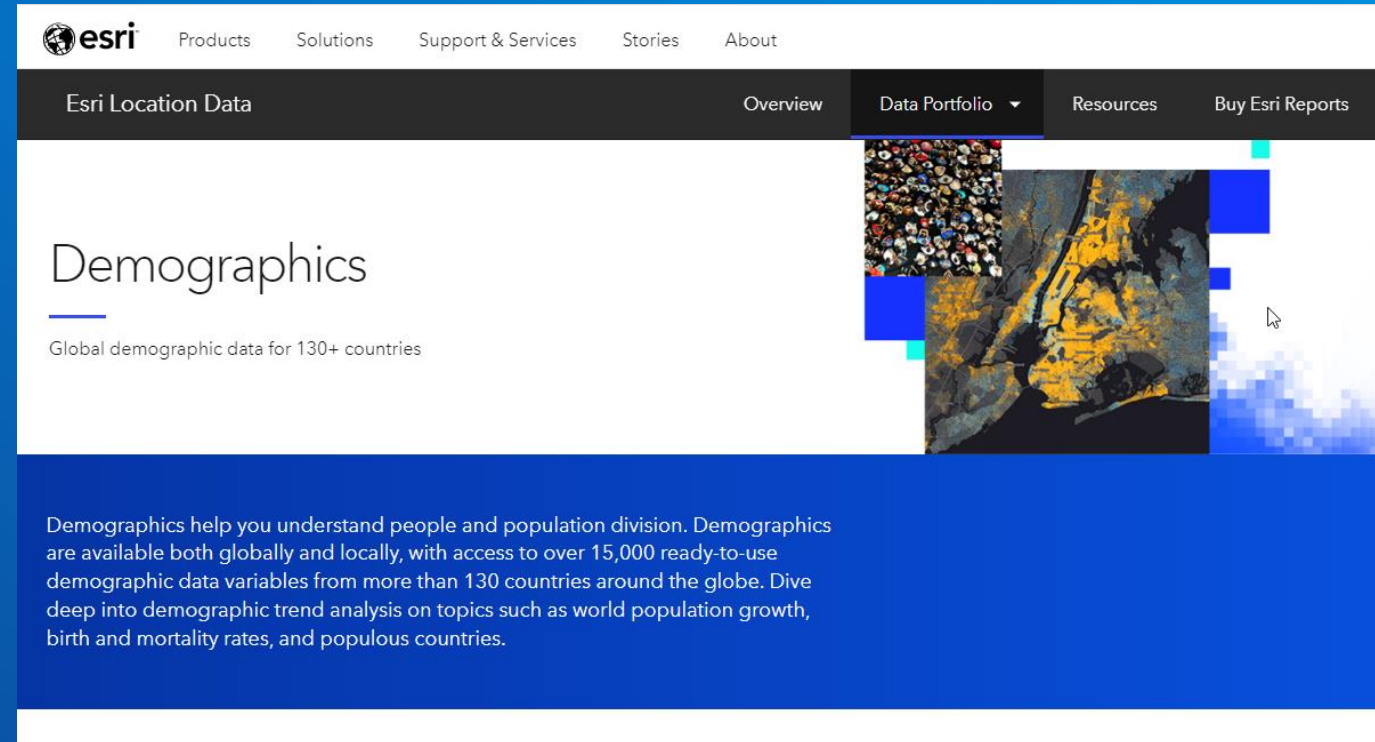


Making DHC Analysis More Accessible & Exploring Solutions for Data Users

Kyle R. Cassal
Chief Demographer – Esri Data Development

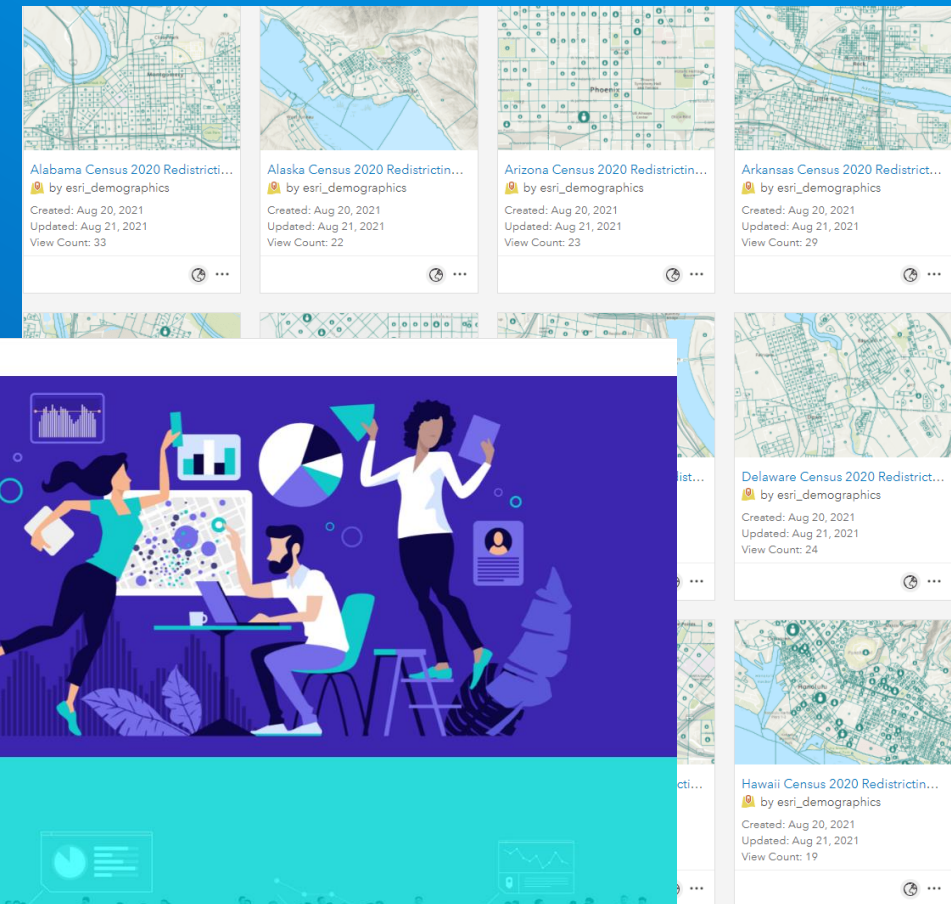
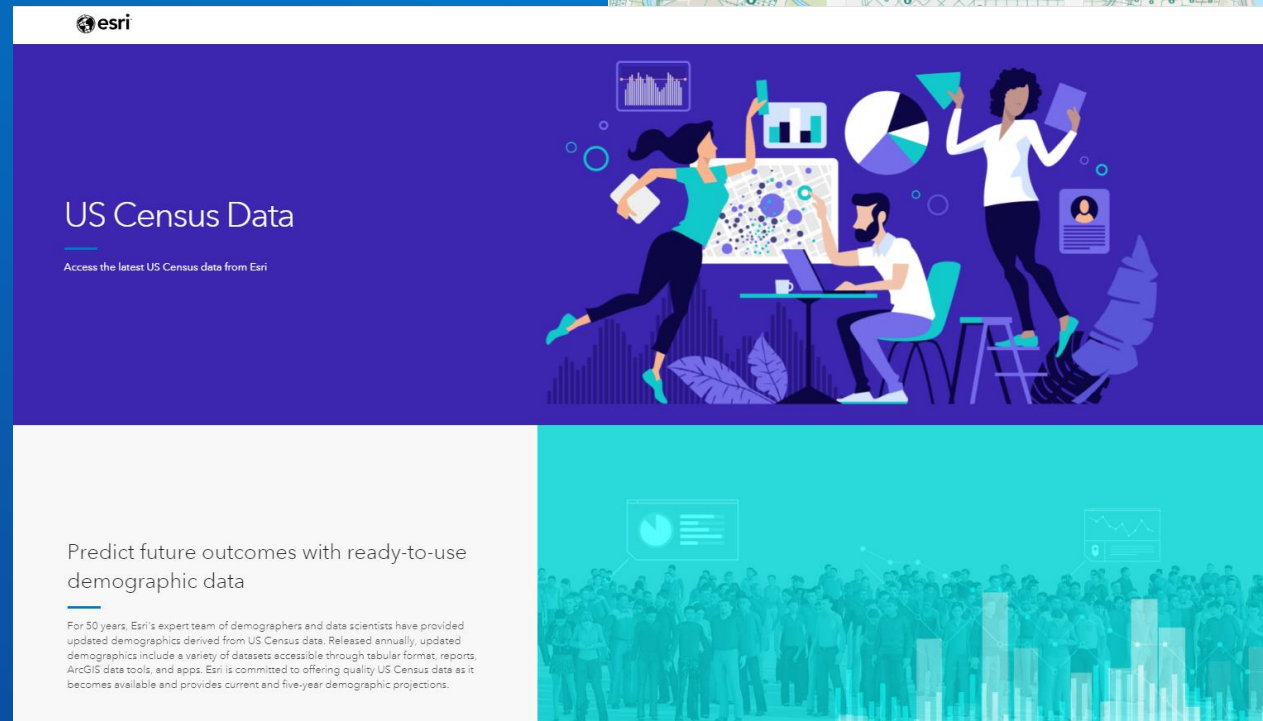
What We Do

- Esri Demographics
 - 2022/2027 Esri Updated Demographics
 - Esri Tapestry Segmentation
 - Esri Consumer Spending
 - Esri Market Potential



What We Do

- Census Data
 - Census 2000, 2010, & 2020
 - Data Enrichment
 - Reports
 - Infographics
 - Living Atlas of the World

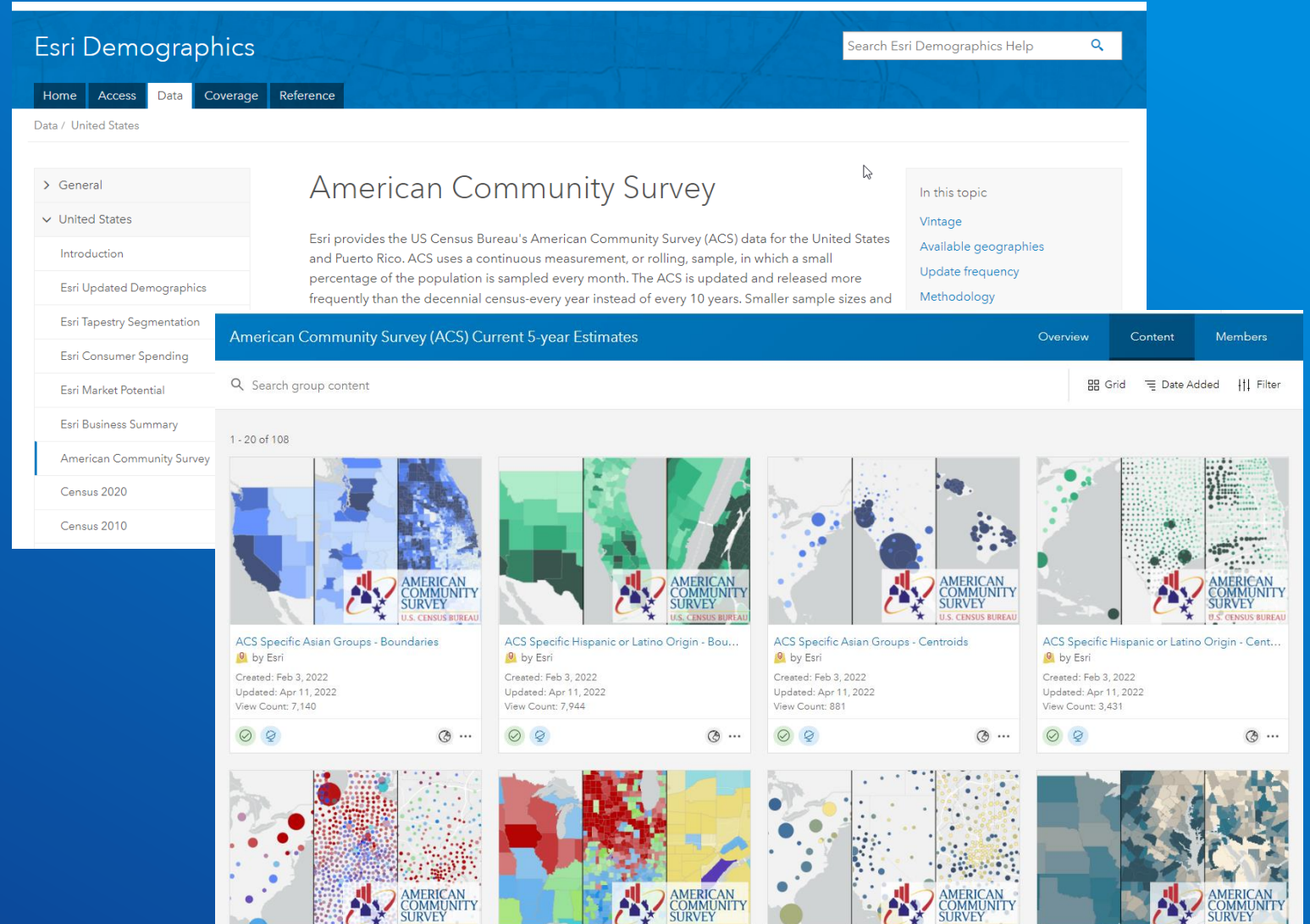


- <https://www.esri.com/en-us/landing-page/product/2020/us-census-demographics-data>
- <https://www.esri.com/arcgis-blog/products/arcgis-living-atlas/state-government/pl-94-171-2020/>

What We Do

- Census Data

- ACS 2016-2020 5-yr data
- Data Enrichment
- Reports
- Infographics
- Living Atlas of the World



- <https://doc.arcgis.com/en/esri-demographics/data/acs.htm>
- <https://www.esri.com/arcgis-blog/products/arcgis-living-atlas/mapping/updates-to-american-community-survey-layers-now-available-in-arcgis-living-atlas/>

Why Are DHC Data Important to Esri

- Esri serves census data to all types of users
 - Business analytics
 - Nonprofit organizations
 - Local governments
 - Physical sciences
 - Social sciences



Making DHC Analysis More Accessible

through the Esri platform

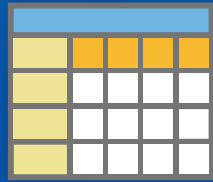
Demonstration Data

Processing

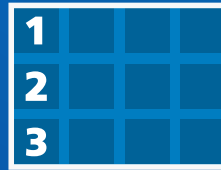
Census Bureau
releases Privacy-
Protected Microdata
Files (PPMFs) or
Summary Files



IPUMS NHGIS
tabulates files with
inclusion of original
tables from 2010
Summary Files



ESRI pulls data
tables for select
geographies/fields
and makes
alterations



ESRI appends data
to TIGER
geographic
boundaries



ESRI publishes data
layers to ArcGIS
Living Atlas of the
World for data users



Demonstration Data

Redistricting

- Living Atlas of the World
- Compare SF1 to DP step-by-step

The image shows two overlapping screenshots. The top screenshot is of the ArcGIS Living Atlas of the World website. It features a search bar with the text "Census Demonstration Products v*", a navigation menu with icons for All, Trending, Basemaps, Imagery, Boundaries, People, Infrastructure, and Environment, and filter options for content type, time, and region. The bottom screenshot is of an ArcGIS Blog article titled "Accuracy vs. Privacy: create web maps to compare Census demonstration products" by Lauren Scott Griffin, dated May 14, 2021. The article features a large image of a U.S. Census 2020 document with the Department of Commerce seal and a list of census versions on the right side.

- https://livingatlas.arcgis.com/en/browse/?q=census%20demonstration%20products#d=2&q=census%20demonstration%20products%20v*
- <https://www.esri.com/arcgis-blog/products/arcgis-living-atlas/mapping/accuracy-vs-privacy/>

Demonstration Data

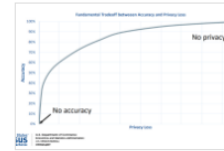
Demographic & Housing Characteristics File

- Living Atlas of the World

- 148 variables

- States
- Counties
- County Subdivisions
- Congressional Districts
- Tracts
- Block Groups
- American Indian Areas
- Places

Census Demonstration Products v20220316 March 2022



Compare original Census 2010 SF1 and Census 2010 with differential privacy applied for eight levels of geography. The data were released on 03-16-2022.

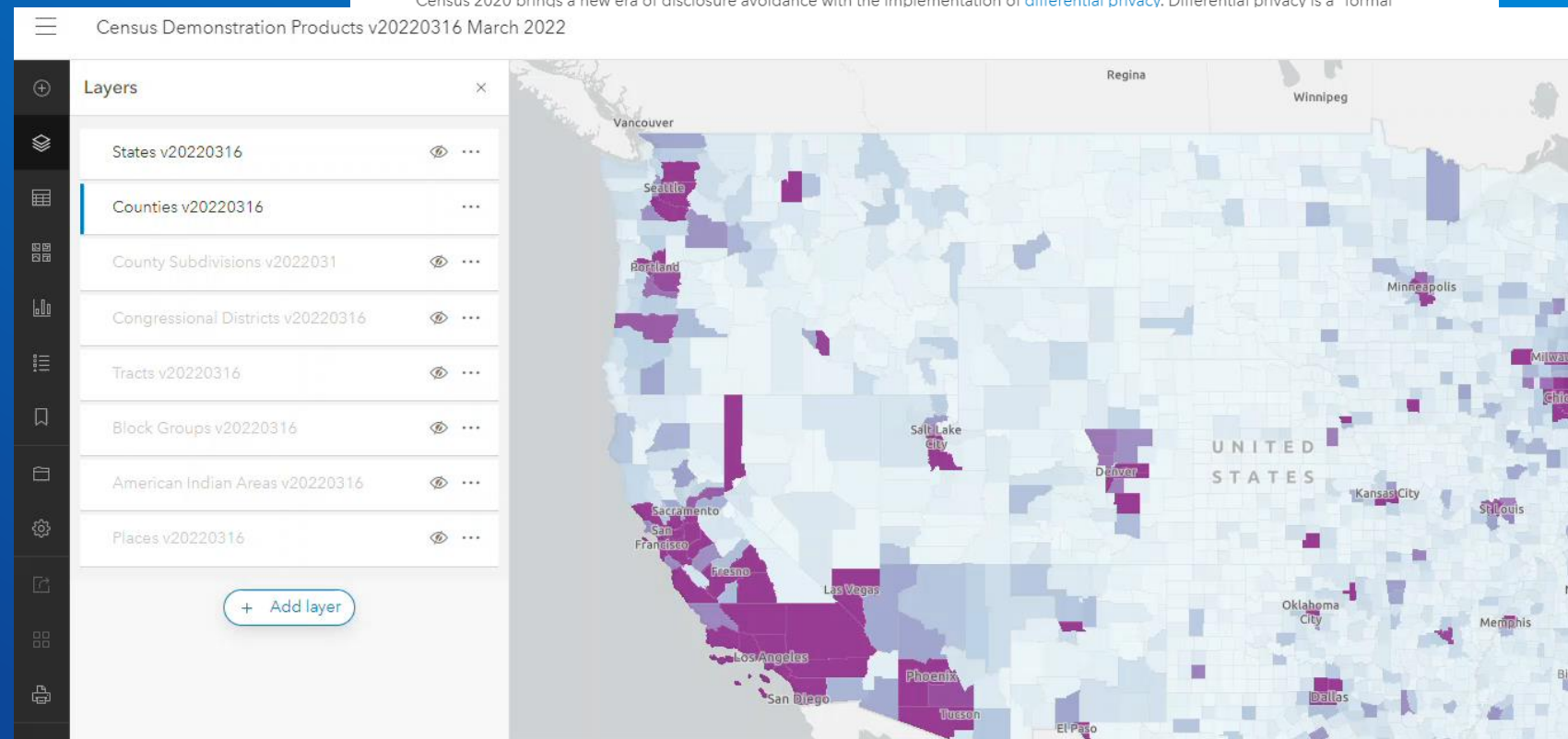
Web Map by [ale10036](#)

Created: Jun 9, 2022 Updated: Jun 13, 2022 View Count: 30

Description

Version/Sprint 03-16-2022 (March 2022) Privacy Loss Budget of 20.82 for person tables and 22.77 for housing tables

Census 2020 brings a new era of disclosure avoidance with the implementation of [differential privacy](#). Differential privacy is a “formal

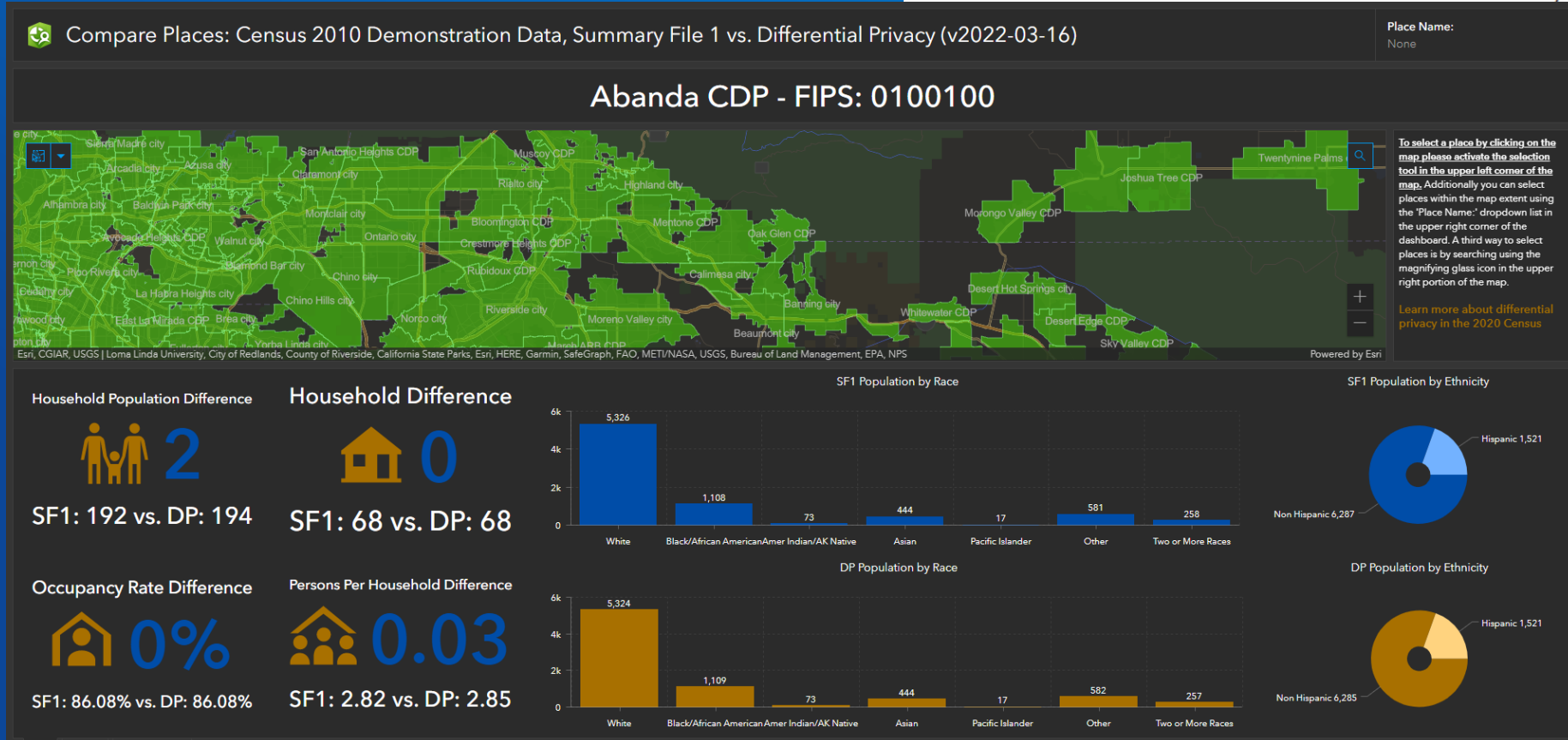


Demonstration Data

Compare Places Dashboard

Esri Demographics

Compare Places Dashboard: Review the Most Recent Census 2020 Disclosure Avoidance System (v2022-



Kyle R. Cassal
Alex Henesy

The Disclosure Avoidance System (DAS) is an essential component of this system required by law to protect the data. The DAS represents a significant improvement over prior censuses the Census Bureau. The techniques historically consisted of "data reconstruction attack," Census Bureau disclosure avoidance called

- <https://www.esri.com/arcgis-blog/products/esri-demographics/state-government/compare-places-dashboard-review-the-most-recent-census-2020-disclosure-avoidance-system-v2022-03-16/>
- <https://arcgis-content.maps.arcgis.com/apps/dashboards/3f7b119166be4963915d68cf86c371e9>



Alexandria city - FIPS: 5101000



To select a place by clicking on the map please activate the selection tool in the upper left corner of the map. Additionally you can select places within the map extent using the 'Place Name:' dropdown list in the upper right corner of the dashboard. A third way to select places is by searching using the magnifying glass icon in the upper right portion of the map.

[Learn more about differential privacy in the 2020 Census](#)

Household Population Difference



SF1: 138,139 vs. DP: 138,164

Household Difference



SF1: 68,082 vs. DP: 68,082

Occupancy Rate Difference



SF1: 94.07% vs. DP: 94.07%

Persons Per Household Difference



SF1: 2.03 vs. DP: 2.03

SF1 Population by Race



SF1 Population by Ethnicity



DP Population by Race



DP Population by Ethnicity



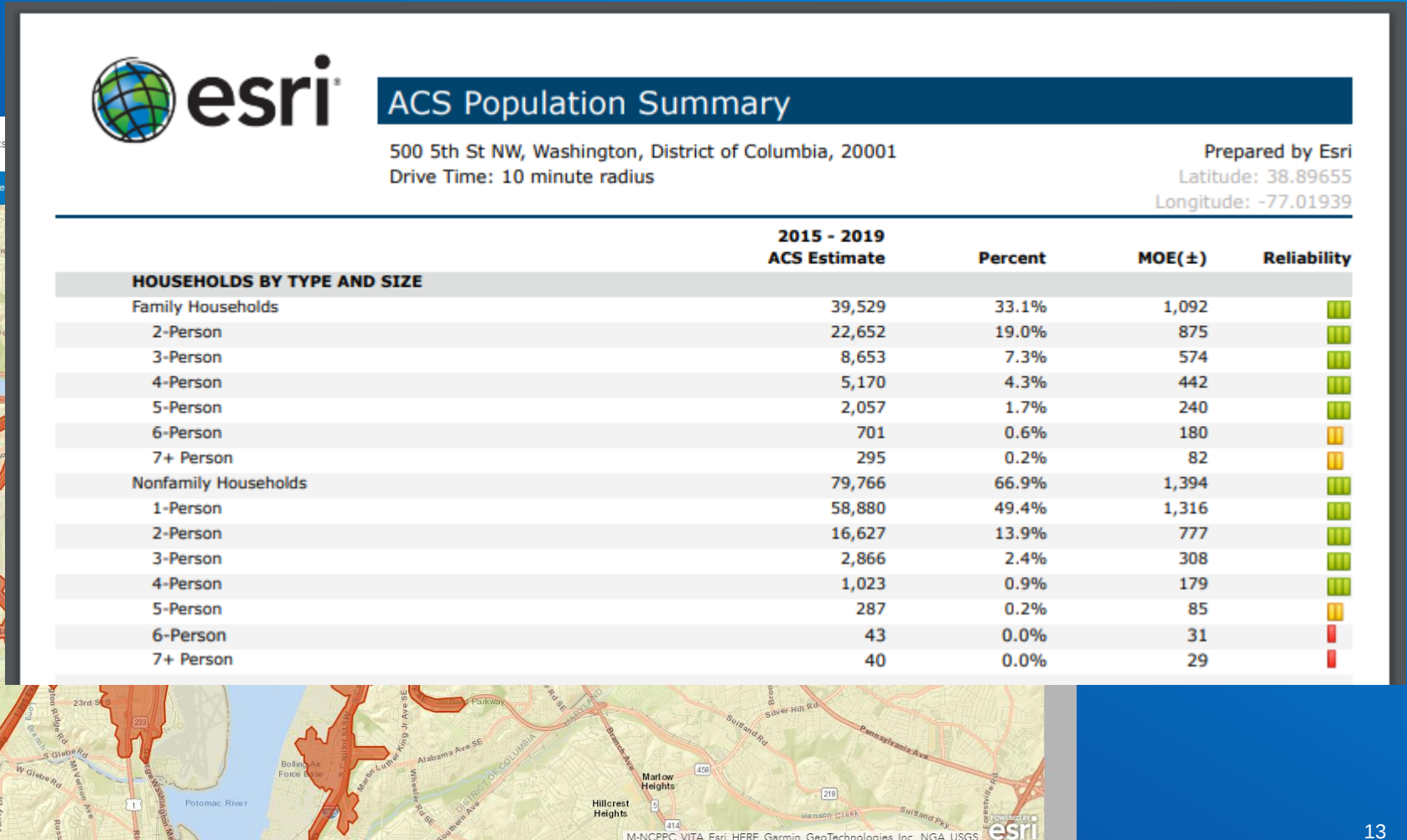
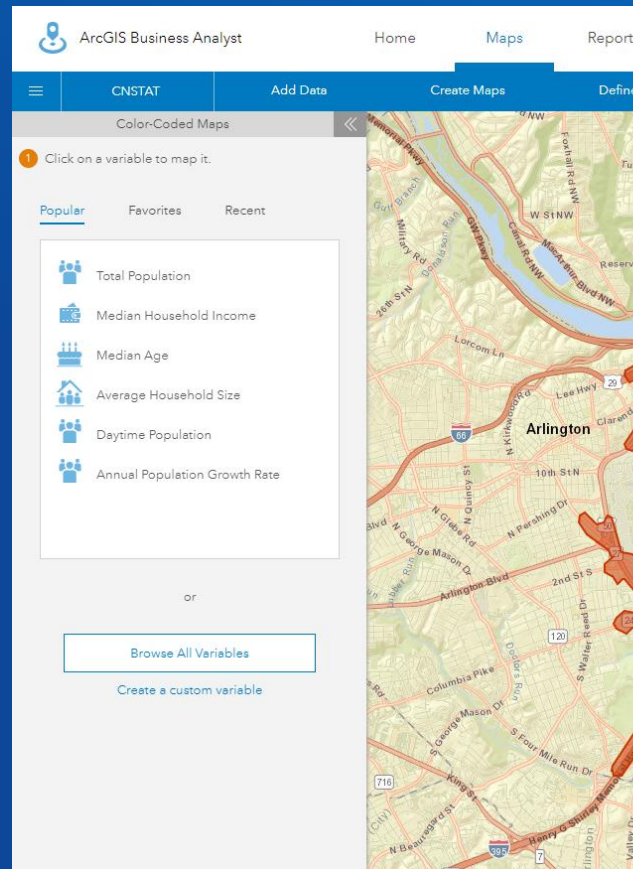
Exploring Solutions for Data Users

managing differentially privatized data

New Decade, New Challenges

How can we promote best practices?

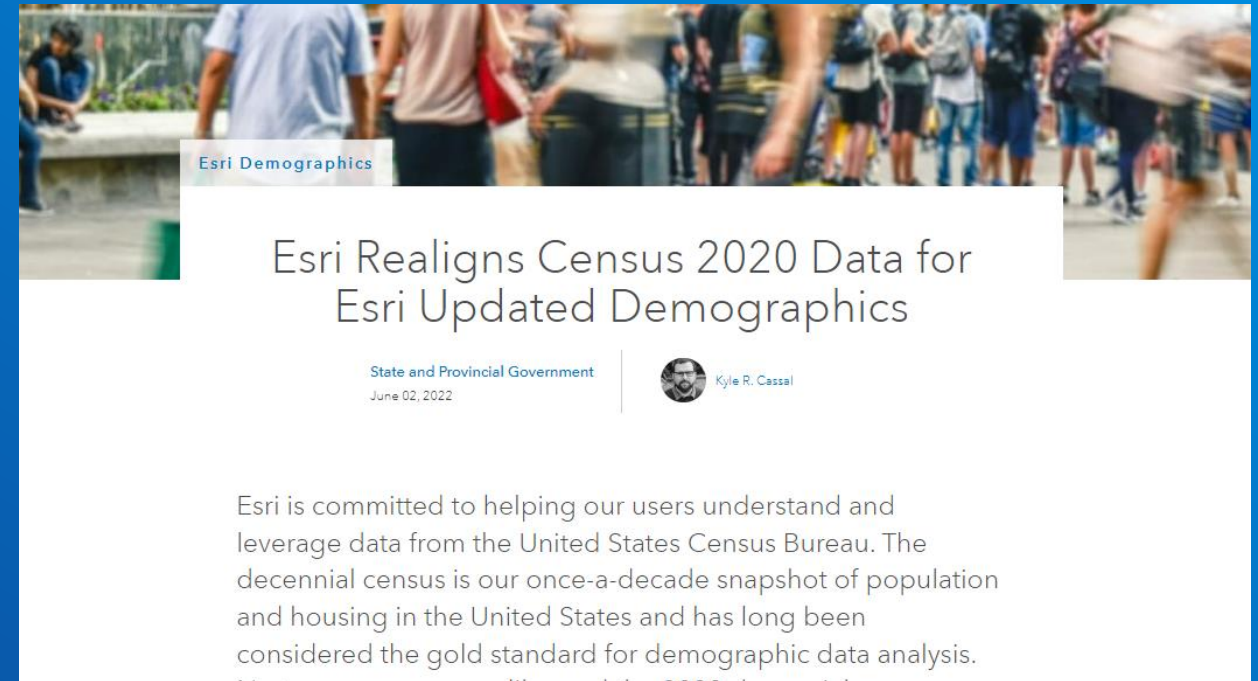
- ACS Margin Of Errors



Census 2020 Realignment

Maintaining demographic relationships

- Adjustments to over 500 Block Groups
- Improbable statistics
 - Large average persons per household
 - All persons under 18 years of age
- Impossible statistics
 - Households but no household population
 - Household population but no households
 - More households than household population



Geographic Conversions

Census 2010 data in Census 2020 geography

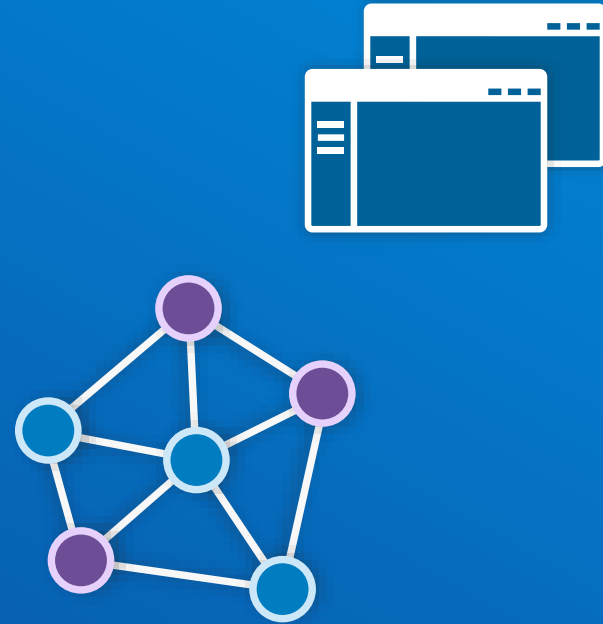
- 2010 may be only data for select statistics
- Delayed DHC data requires use of SF1 data
- Allows comparison of 2020 DHC to 2010 SF1



Innovative Techniques

Working across population and household universes

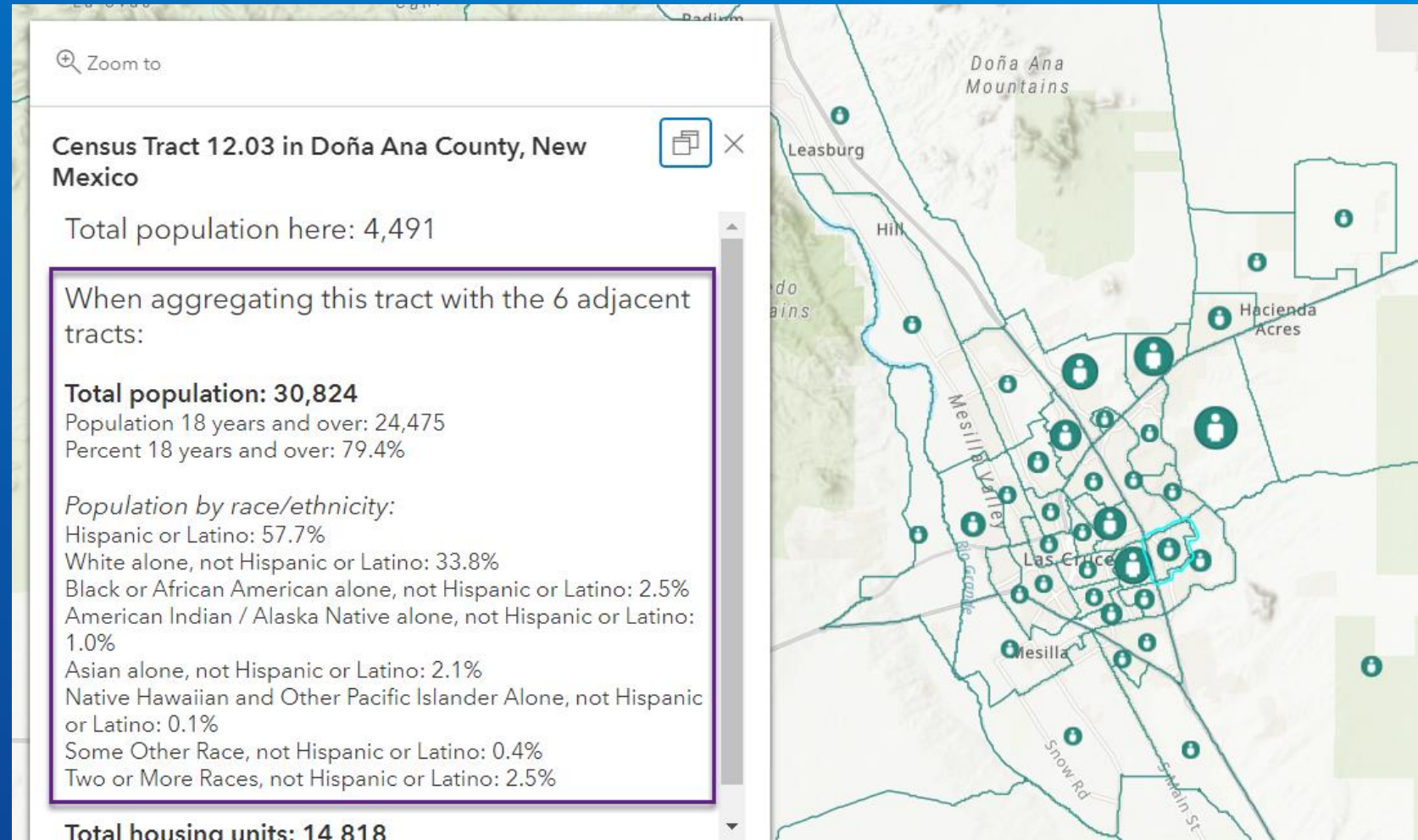
- Persons per household
 - Evaluate reliability of person universe
 - Evaluate reliability of housing universe
 - If both reliable combine for PPH
 - If not reliable then borrow data from alternative source
 - Prior census data
 - Larger geography
 - Tapestry segmentation



Map information

Data on-the-fly

- Aggregate adjacent data for small geography



- <https://www.esri.com/arcgis-blog/products/arcgis-living-atlas/state-government/pl-94-171-2020/>

Map Symbolology

Layer effects

- Blur



The perfect layer effect for differentially-private data: Blur

Mapping
May 25, 2022



Diana Lavery

You may have heard that data from the 2020 Decennial Census has been protected using differential privacy, and have questions about mapping this data.

Privacy and accuracy, two aims of the U.S. Census Bureau, are inherently conflicting, especially in the day of advanced computing and data linking. The Census Bureau has protected the privacy of 2020 Census by applying differential privacy: injecting some noise into the data, and by doing some additional data processing. In short, the tradeoff in the



Contact Information

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- Esri Demographics: <https://doc.arcgis.com/en/esri-demographics/>
- Esri Differential Privacy Resources: <https://differential-privacy-resources-esri.hub.arcgis.com/>

