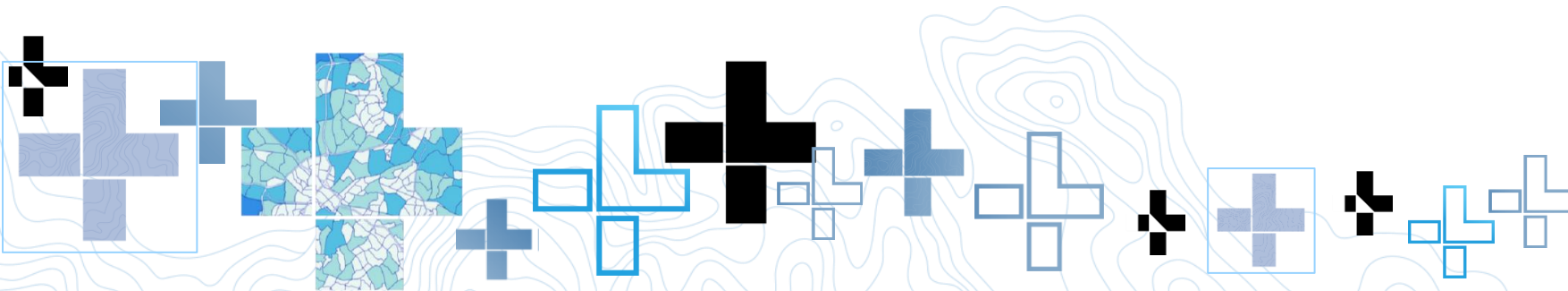




# Agenda:

- Who we are.
- Our background in Redistricting.
- 2020 Census PL94-171 Data workflow.
- What does 2020 look like.
- Open questions and next steps.

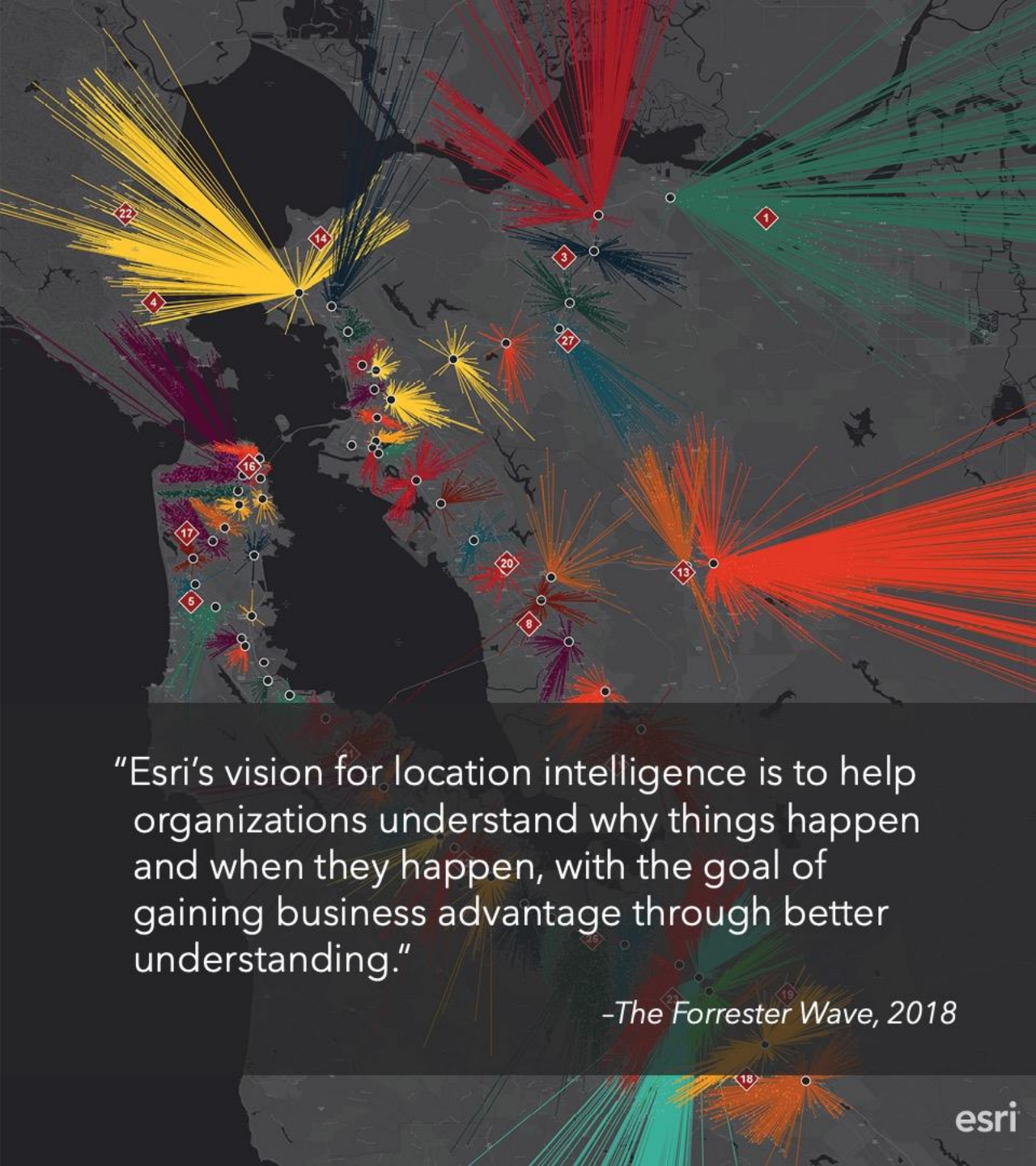




# WHO WE ARE

Esri is the **global leader** in geographic information systems (GIS) software, location intelligence, and mapping.

With more than **100** offices worldwide and professionals from **67** countries, Esri provides organizations of every size and industry the tools to get deeper insights from their geographic and transactional data to improve operational and business results.



"Esri's vision for location intelligence is to help organizations understand why things happen and when they happen, with the goal of gaining business advantage through better understanding."

-The Forrester Wave, 2018

# Redistricting Background

## Some History:

1980's

*Highly Constrained*

1990's

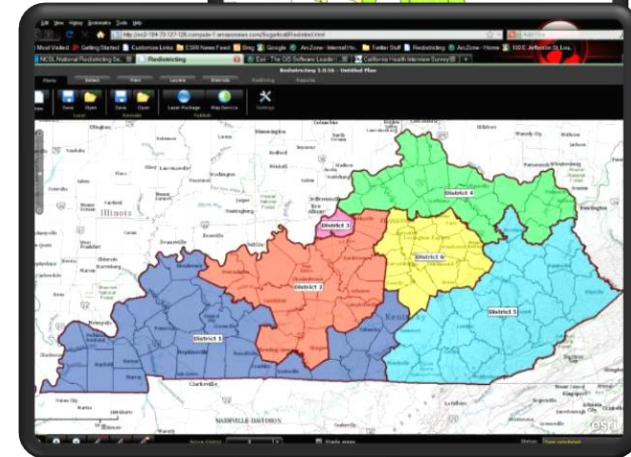
Tools available but cumbersome

2000's

Usability and some public involvement

2010's

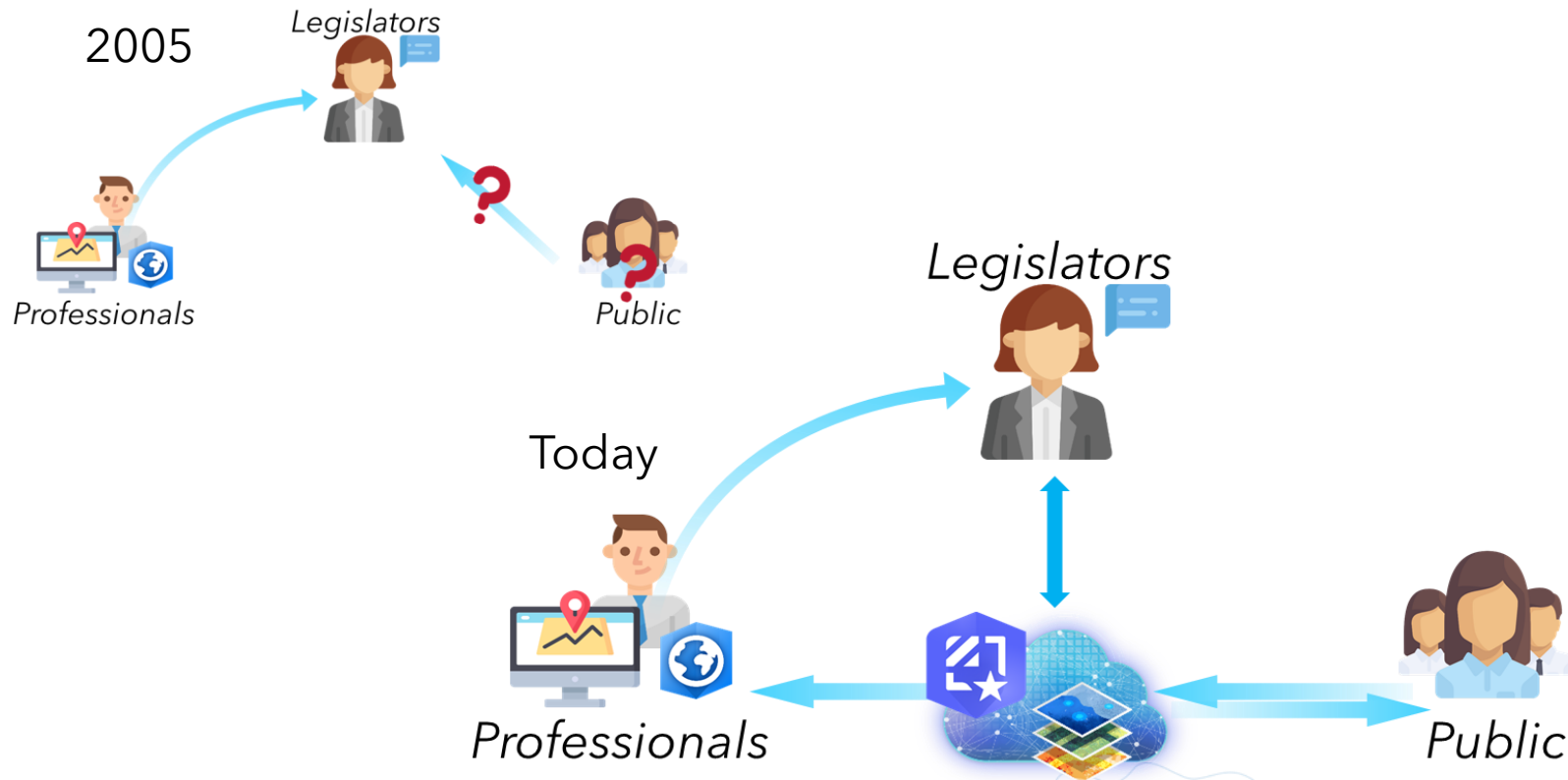
Almost consumer-level





# A Vision for 2010 Redistricting

## Esri Redistricting Story



*A browser approach would increase collaboration within the legislature and between citizens*

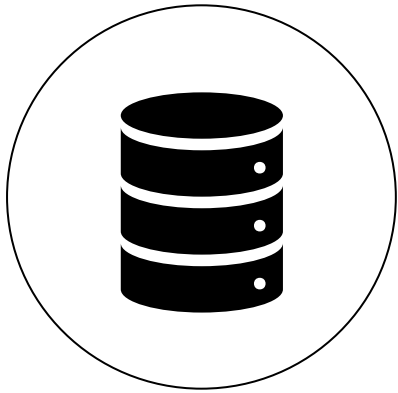
- Provided via web browser
- Facilitates collaboration, sharing, and community building
- Easy to use interface reduces costs associated with training
- Minimal GIS experience required
- Centralized IT
- Cost effective way to provide access to citizens

# *Features Overview*

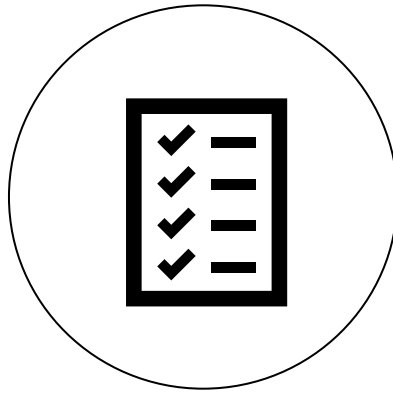
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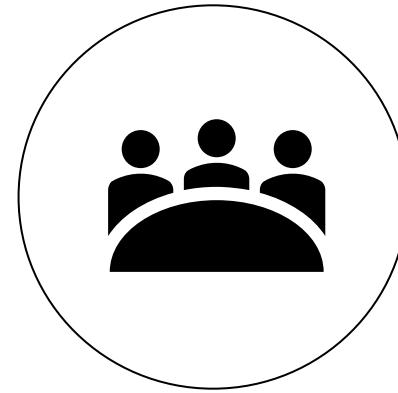
Esri Redistricting



Data  
Sources



Plan  
Management



Collaboration

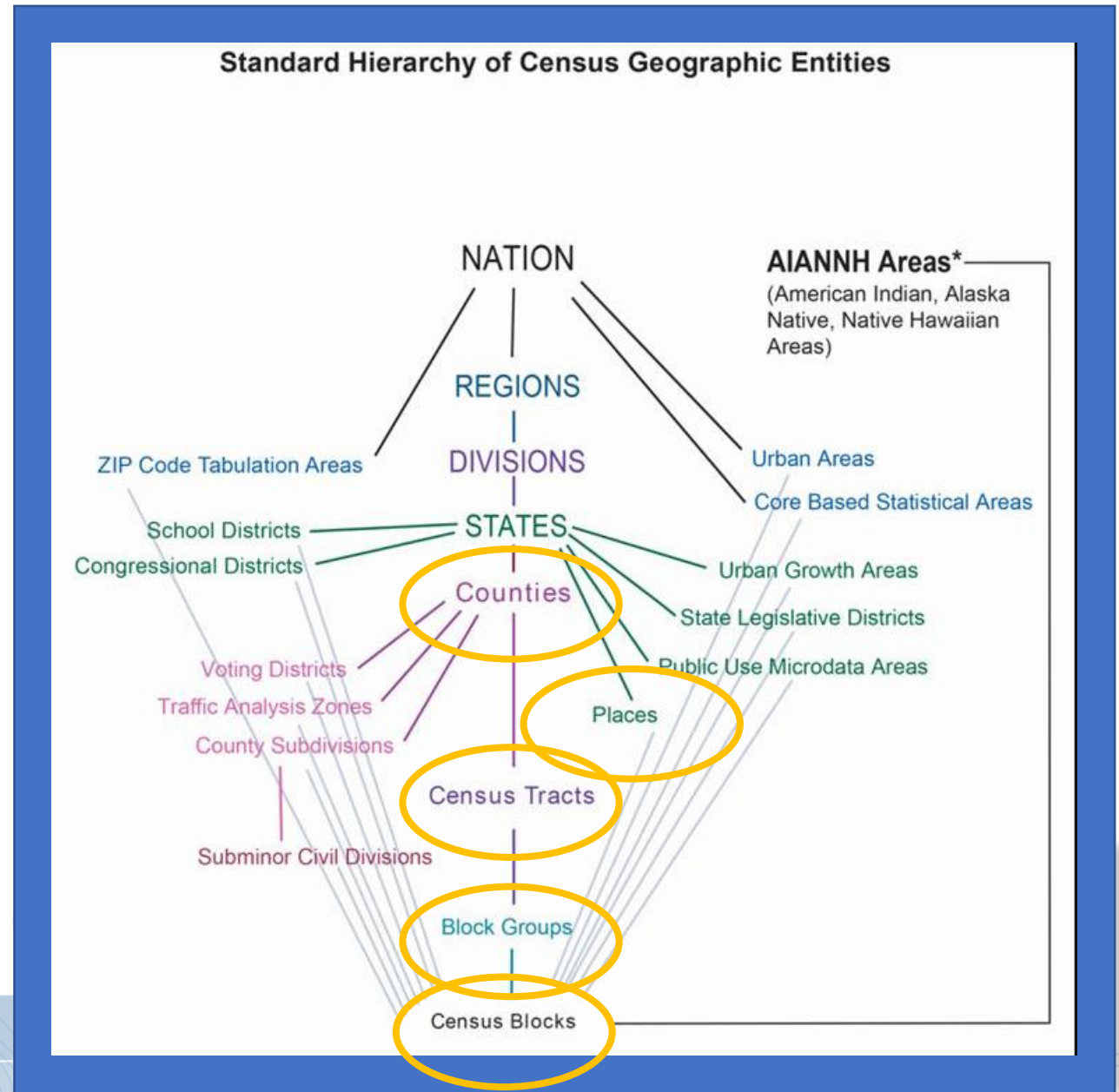


# Census Data—The P.L. Story

## Public Law (P.L.) 94-171

*...enacted by Congress in December 1975, requires the Census Bureau to provide states the opportunity to identify the small area geography for which they need data in order to conduct legislative redistricting. The law also requires the U.S. Census Bureau to deliver this data no later than one year from Census day.*

*P.L. 94-171 requires the U.S. Census Bureau to furnish "basic tabulations of population" to each state, including for those small areas the states have identified.*



# The P.L. table as a Data Model.

FIGURE 1-5. GEOGRAPHIC HEADER RECORD

Field	Data dictionary reference	Field size	Starting position	Data type	Summary levels									
					040	050	060	067	140	150	155			
<b>Record Codes</b>														
File Identification	FILEID	6	1	A/N	X									
State/US-Abbreviation (USPS)	STUSAB	2	7	A	X									
Summary Level	SUMLEV	3	4	A/N	X									
Geographic Variant	GEOVAR	2	12	A/N	X									
Geographic Component	GEOCOMP	2	14	A/N	X									
Characteristic Iteration	CHARITER	3	16	A/N	X									
Characteristic Iteration File Sequence Number	CIFS	2	19	A/N	X									
Logical Record Number	LOGRECNO	7	21	N	X									
<b>Geographic Area Codes</b>														
Geographic Record Identifier	GEOID	60	28	A/N	X									Block
Geographic Code Identifier	GEOCODE	51	88	A/N	X									American
Region	REGION	1	139	A/N	X									Native
Division	DIVISION	1	140	A/N	X									Home I
State (FIPS)	STATE	2	141	A/N	X									American
State (NS)	STATENS	8	143	A/N	X									Native
County (FIPS)	COUNTY	3	151	A/N	X									Home I
FIPS County Class Code	COUNTYCC	2	154	A/N	X									FIPS Amer
County (NS)	COUNTYNS	8	156	A/N	X									Alaska
County Subdivision (FIPS)	COSUB	5	164	A/N	X									Hawaii
FIPS County Subdivision Class Code	COSUBCC	2	169	A/N	X									Native
County Subdivision (NS)	COSUBNS	8	171	A/N	X									American
Subminor Civil Division (FIPS)	SUBMCD	5	179	A/N	X									Code
FIPS Subminor Civil Division Class Code	SUBMCDCC	2	184	A/N	X									American
Subminor Civil Division (NS)	SUBMCDNS	8	186	A/N	X									Home I
Estate (FIPS)	ESTATE	5	194	A/N	X									Subdiv
FIPS Estate Class Code	ESTATECC	2	199	A/N	X									American
Estate (NS)	ESTATENS	8	201	A/N	X									Subdiv
Consolidated City (FIPS)	CONCIT	5	209	A/N	X									Tribal Cen
FIPS Consolidated City Class Code	CONCITCC	2	214	A/N	X									Tribal Blo
Consolidated City (NS)	CONCITNS	8	216	A/N	X									Alaska Na
		5	224	A/N	X									Corporate
		8	231	A/N	X									FIPS Asse
		4	239	A/N	X									Corporate
		2	242	A/N	X									Alaska Na
		8	245	A/N	X									Corporate
		6	239	A/N	X									Metropol
		2	245	A/N	X									Microsp

FIGURE 1-5. GEOGRAPHIC HEADER RECORD—Con.

Field	Data dictionary reference	Field size	Starting position	Data type	Summary levels										
					040	050	060	067	140	150	155				
Block	BLOCK	4	246	A/N											
American Indian Area/Alaska Native Area/Hawaiian Home Land (Census)	AIANNH	4	250	A/N											
American Indian Trust Land/Hawaiian Home Land Indicator	AIHNTLI	1	254	A/N											
American Indian Area/Alaska Native Area/Hawaiian Home Land (FIPS)	AIANNHFP	5	255	A/N											
FIPS American Indian Area/Alaska Native Area/Hawaiian Home Land Class Code	AIANNHCC	2	260	A/N											
American Indian Area/Alaska Native Area/Hawaiian Home Land (NS)	AIANNHNS	8	262	A/N											
American Indian Tribal Subdivision (Census)	AITS	3	270	A/N											
American Indian Tribal Subdivision (FIPS)	AITSFP	5	273	A/N											
FIPS American Indian Tribal Subdivision Class Code	AITSCC	2	278	A/N											
American Indian Tribal Subdivision (NS)	AITSNS	8	280	A/N											
Tribal Census Tract	TTRACT	4	288	A/N											
Tribal Block Group	TBLKGRP	1	294	A/N											
Alaska Native Regional Corporation (FIPS)	ANRC	5	295	A/N											
FIPS Alaska Native Regional Corporation Class Code	ANRCCC	2	300	A/N											
Alaska Native Regional Corporation (NS)	ANRONS	8	302	A/N											
Metropolitan Statistical Area/Micropolitan Statistical Area	CBSA	5	310	A/N											
Metropolitan/Micropolitan Indicator	MEMI	1	315	A/N											
Combined Statistical Area	CSA	3	316	A/N											
Metropolitan Division	METDIV	5	319	A/N											
New England City and Town Area	NECTA	5	324	A/N											
NECTA Metropolitan/Micropolitan Indicator	NMEMI	1	329	A/N											
Combined New England City and Town Area	CONECTA	3	330	A/N											
New England City and Town Area Division	NECTADIV	5	333	A/N											

FIGURE 1-5. GEOGRAPHIC HEADER RECORD—Con.

Field	Data dictionary reference	Field size	Starting position	Data type	Summary levels									
					040	050	060	067	140	150	155	156		
Metropolitan Statistical Area/ Micropolitan Statistical Area Principal City Indicator	CBSAPCI	1	338	A/N										
New England City and Town Area Principal City Indicator	NECTAPCI	1	339	A/N										
Urban Area	UA	5	340	A/N										
Urban Area Type	UATYPE	1	345	A/N										
Urban/Rural	UR	1	346	A/N										
Congressional District (116th)	CD116	2	347	A/N										
Congressional District (118th)	CD118	2	348	A/N										
Congressional District (119th)	CD119	2	351	A/N										
Congressional District (120th)	CD120	2	353	A/N										
Congressional District (121st)	CD121	2	355	A/N										
State Legislative District (Upper Chamber) (2018)	SLDU18	3	357	A/N										
State Legislative District (Upper Chamber) (2022)	SLDU22	3	360	A/N										
State Legislative District (Upper Chamber) (2026)	SLDU24	3	363	A/N										
State Legislative District (Upper Chamber) (2028)	SLDU26	3	366	A/N										
State Legislative District (Upper Chamber) (2030)	SLDU28	3	369	A/N										
State Legislative District (Lower Chamber) (2018)	SLDL18	3	372	A/N										
State Legislative District (Lower Chamber) (2022)	SLDL22	3	375	A/N										
State Legislative District (Lower Chamber) (2026)	SLDL24	3	378	A/N										
State Legislative District (Lower Chamber) (2028)	SLDL26	3	381	A/N										
State Legislative District (Lower Chamber) (2030)	SLDL28	3	384	A/N										
Voting District	VTD	4	387	A/N										
Voting District Indicator	VTDI	1	393	A/N										
ZIP Code Tabulation Area (5-Digit)	ZCTA	5	394	A/N										
School District (Elementary)	SDELM	5	399	A/N										
School District (Secondary)	SDESEC	5	404	A/N										
School District (Unified)	SOLU	5	409	A/N										
Public Use Microdata Area	PUMA	5	414	A/N										

FIGURE 1-5. GEOGRAPHIC HEADER RECORD—Con.

Field	Data dictionary reference	Field size	Starting position	Summary levels									
				Data type	050	060	067	140	150	155			
Area Characteristics													
Area (Land)	AREALAND	14	439	N	X	X	X	X	X	X	X	X	X
Area (Water)	AREAWATR	14	433	N	X	X	X	X	X	X	X	X	X
Area Base Name	BASENAME	100	447	A/N	X	X	X	X	X	X	X	X	X
Area Name-Legal/Statistical Area Description (L/SAD) Term-Part Indicator	NAME	125	547	A/N	X	X	X	X	X	X	X	X	X
Functional Status Code	FUNCTSTAT	1	672	A/N	X	X	X	X	X	X	X	X	X
Geographic Change User Note Indicator	GUCNI	1	673	A/N									
Population Count (100%)	POP100	9	674	N	X	X	X	X	X	X	X	X	X
Housing Unit Count (100%)	HU100	9	683	N	X	X	X	X	X	X	X	X	X
Internal Point (Latitude)	INTPTLAT	11	692	A/N	X	X	X	X	X	X	X	X	X
Internal Point (Longitude)	INTPTLON	12	703	A/N	X	X	X	X	X	X	X	X	X
Legal/Statistical Area Description Code	LEADC	2	715	A/N	X	X	X	X	X	X	X	X	X
Part Flag	PARTFLAG	1	717	A/N									X
Special Area Codes													
Urban Growth Area	UGA	5	718	A/N									

How to Use This Product  
2024 Redistricting Data Prototype (Public Use SA 1572) Summary File  
U.S. Census Bureau

1-11

**An ArcGIS Census Data Model**

The diagram illustrates a geospatial data model for census data, showing the relationship between various geographic features and their associated data tables. The model is organized into several main categories:

- Census Feature Dataset:** This is the primary data source, containing various census-related features.
- Geographic Feature Classes:** These include:
  - Point - Feature Class:** Contains point features like census tracts and blocks.
  - Line - Feature Class:** Contains line features like roads and rivers.
  - Polygon - Feature Class:** Contains polygon features like census tracts and blocks.
  - Relationship Classes:** Define the spatial relationships between different feature classes.
- Table - Feature Class:** These are the data tables that store the census data, including:
  - Block - Feature Class:** Stores data for census blocks.
  - Tract - Feature Class:** Stores data for census tracts.
  - County - Feature Class:** Stores data for counties.
  - State - Feature Class:** Stores data for states.
  - Country - Feature Class:** Stores data for countries.
  - Zip Code - Feature Class:** Stores data for ZIP codes.
  - Metropolitan Area - Feature Class:** Stores data for metropolitan areas.
  - Nonmetropolitan Area - Feature Class:** Stores data for nonmetropolitan areas.
  - Urban Area - Feature Class:** Stores data for urban areas.
  - Rural Area - Feature Class:** Stores data for rural areas.
  - Water Area - Feature Class:** Stores data for water bodies.
  - Land Area - Feature Class:** Stores data for land areas.
  - Population - Feature Class:** Stores data for population counts.
  - Household - Feature Class:** Stores data for household counts.
  - Age - Feature Class:** Stores data for age distributions.
  - Gender - Feature Class:** Stores data for gender distributions.
  - Ethnicity - Feature Class:** Stores data for ethnic distributions.
  - Marital Status - Feature Class:** Stores data for marital status distributions.
  - Education - Feature Class:** Stores data for education levels.
  - Income - Feature Class:** Stores data for income levels.
  - Occupation - Feature Class:** Stores data for occupation types.
  - Industry - Feature Class:** Stores data for industry types.
  - Transportation - Feature Class:** Stores data for transportation modes.
  - Health - Feature Class:** Stores data for health status.
  - Crime - Feature Class:** Stores data for crime rates.
  - Environment - Feature Class:** Stores data for environmental factors.
  - Demographics - Feature Class:** Stores data for demographic trends.
  - Geography - Feature Class:** Stores data for geographic coordinates.
  - Time - Feature Class:** Stores data for time periods.
  - Other - Feature Class:** Stores data for other miscellaneous information.

The diagram also shows the relationships between these feature classes and the data tables, indicating how the data is organized and accessed within the ArcGIS environment.

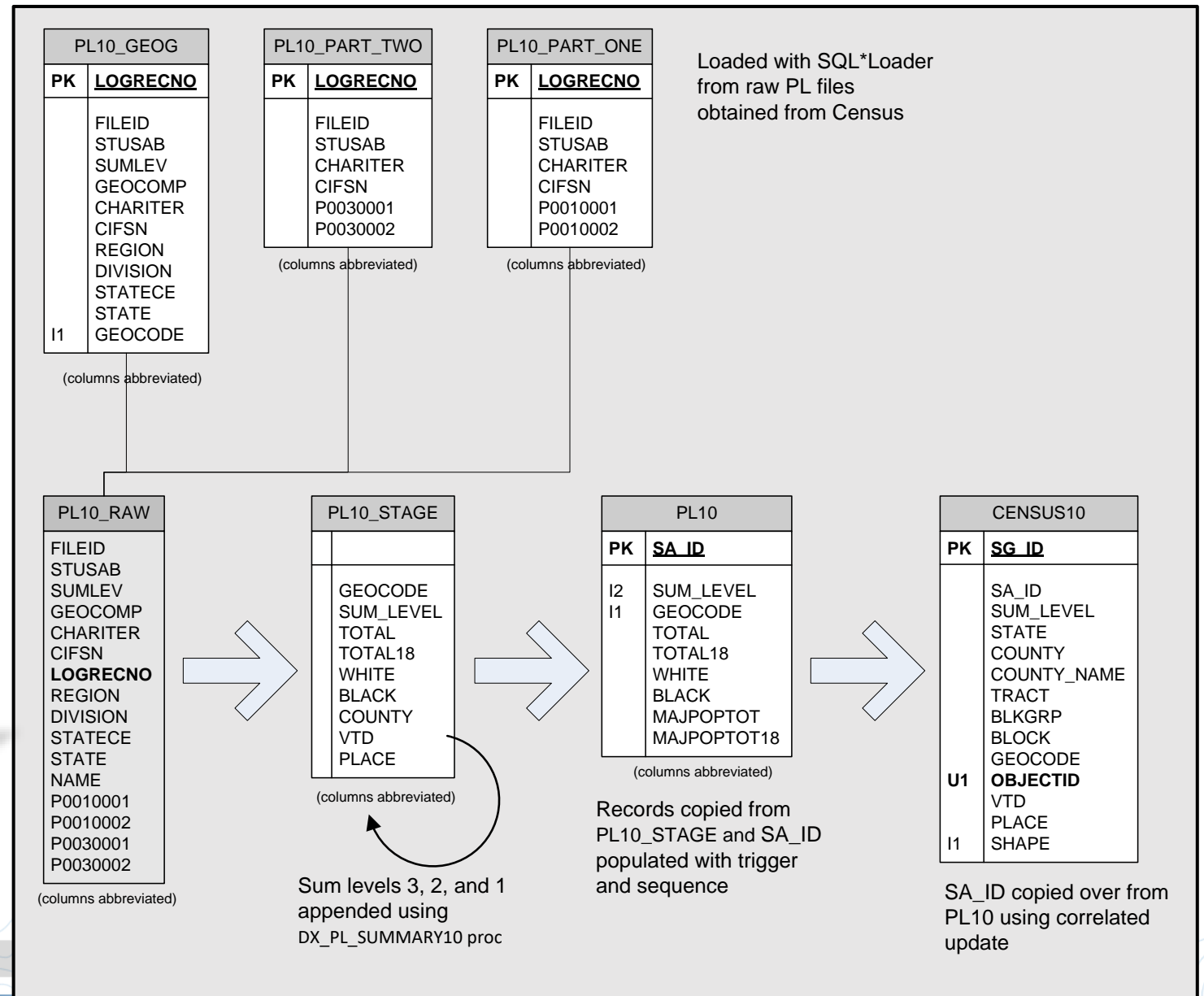
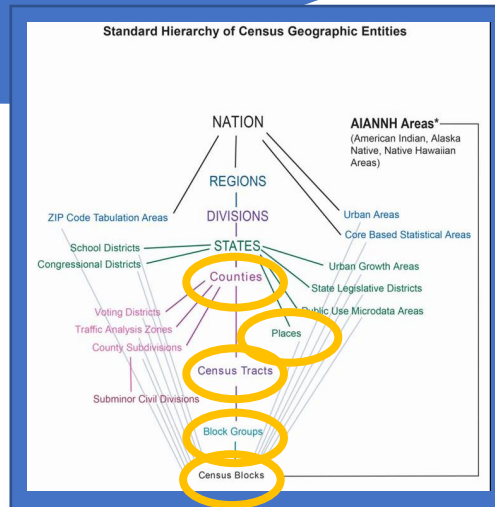


How the P.L.  
table is  
populated.

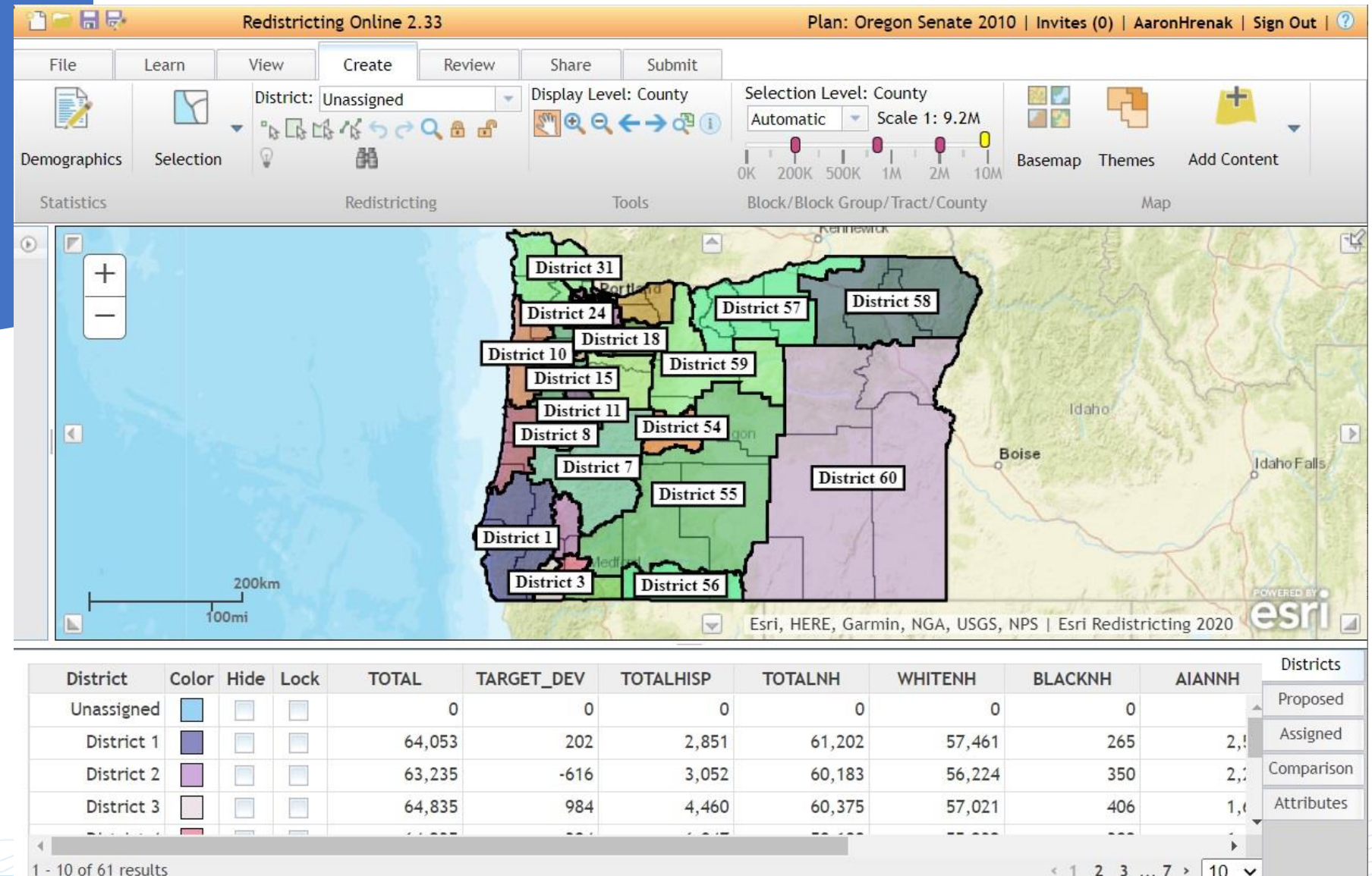
## Steps for processing 2020 Census P.L. data

1. Download 2020 Census PL94-171 data from Census Bureau
2. PL data is loaded into staging database, the separate parts are joined into a singular table
3. Summarization of all relevant attributes is performed per hierarchy (block, block group, tract, county, place, voting district)
4. Summary data is joined to corresponding geography
5. Data is exported to file geodatabase for delivery to Product Team
6. Modified Edges feature class added to each state file geodatabase
7. ArcGIS Pro document created for each state
8. Map Service published for each state
9. App configuration file updated to include new service
10. Software updated to latest build
11. Regression testing performed
12. Implementation coordination with customer

# 2020 Census P.L. data workflow

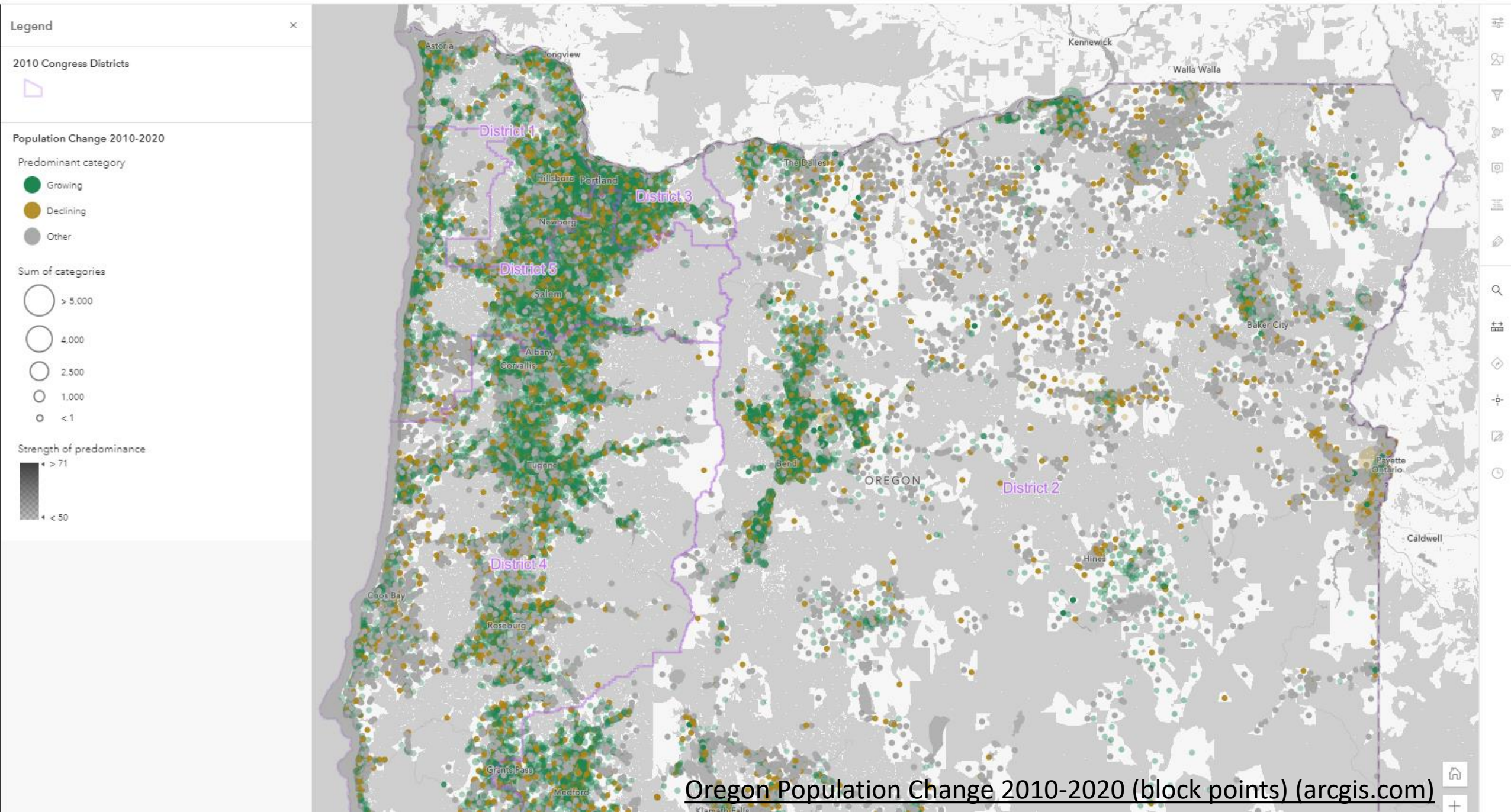


# Oregon Senate Districts

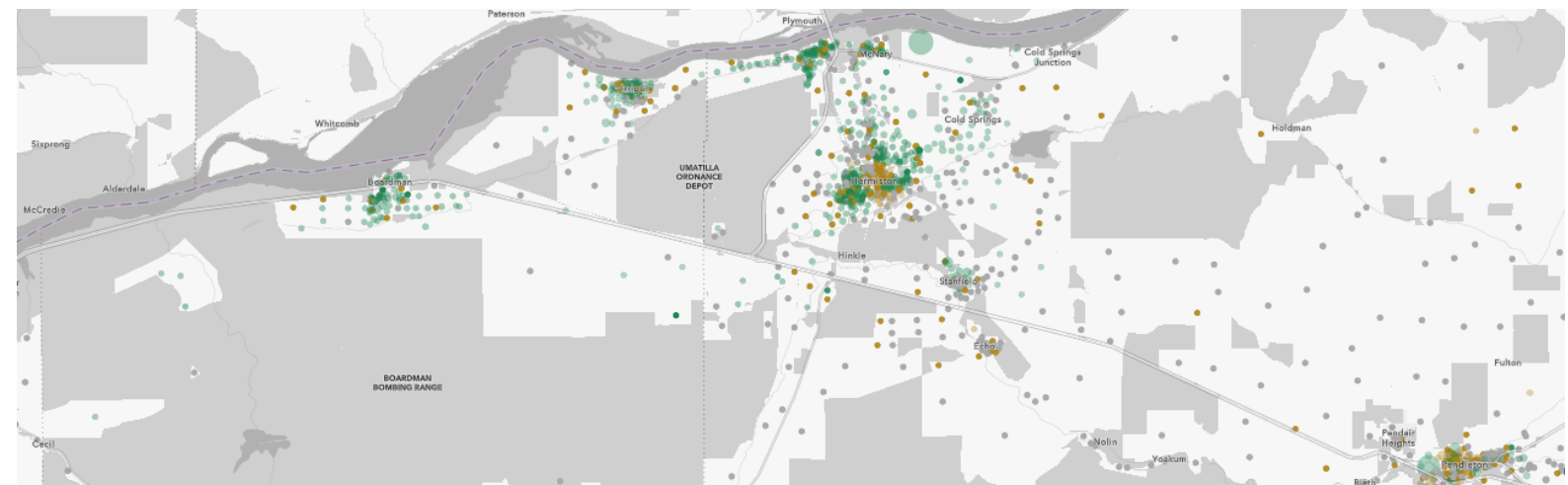
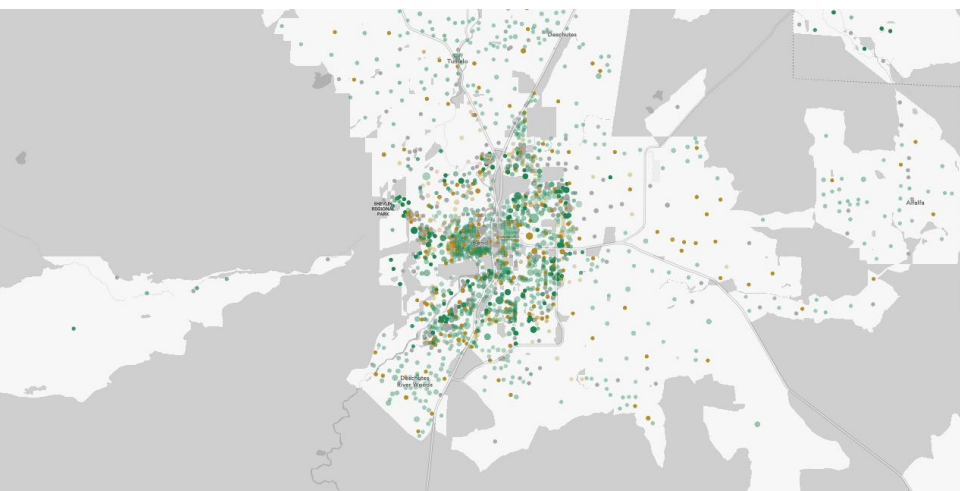
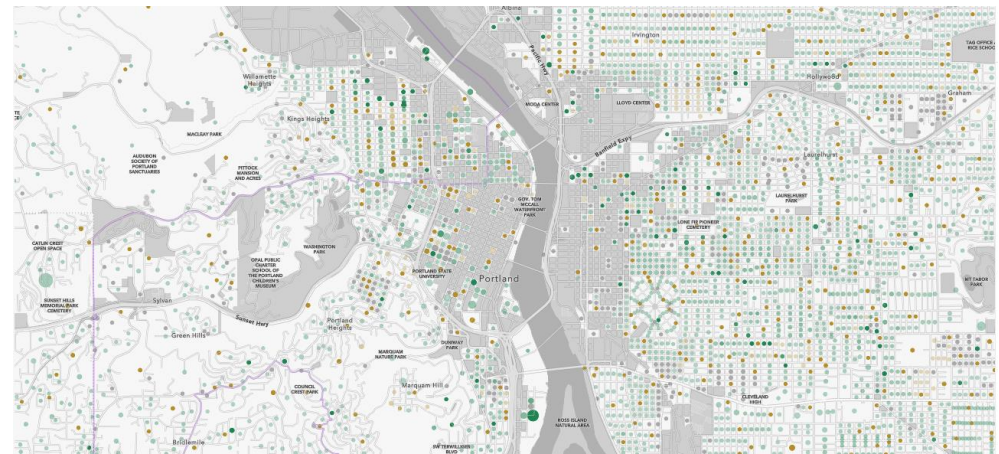
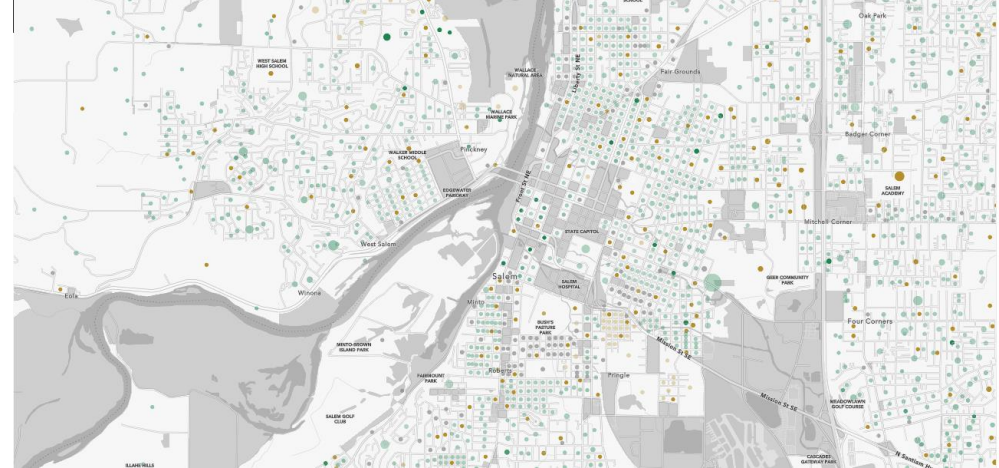
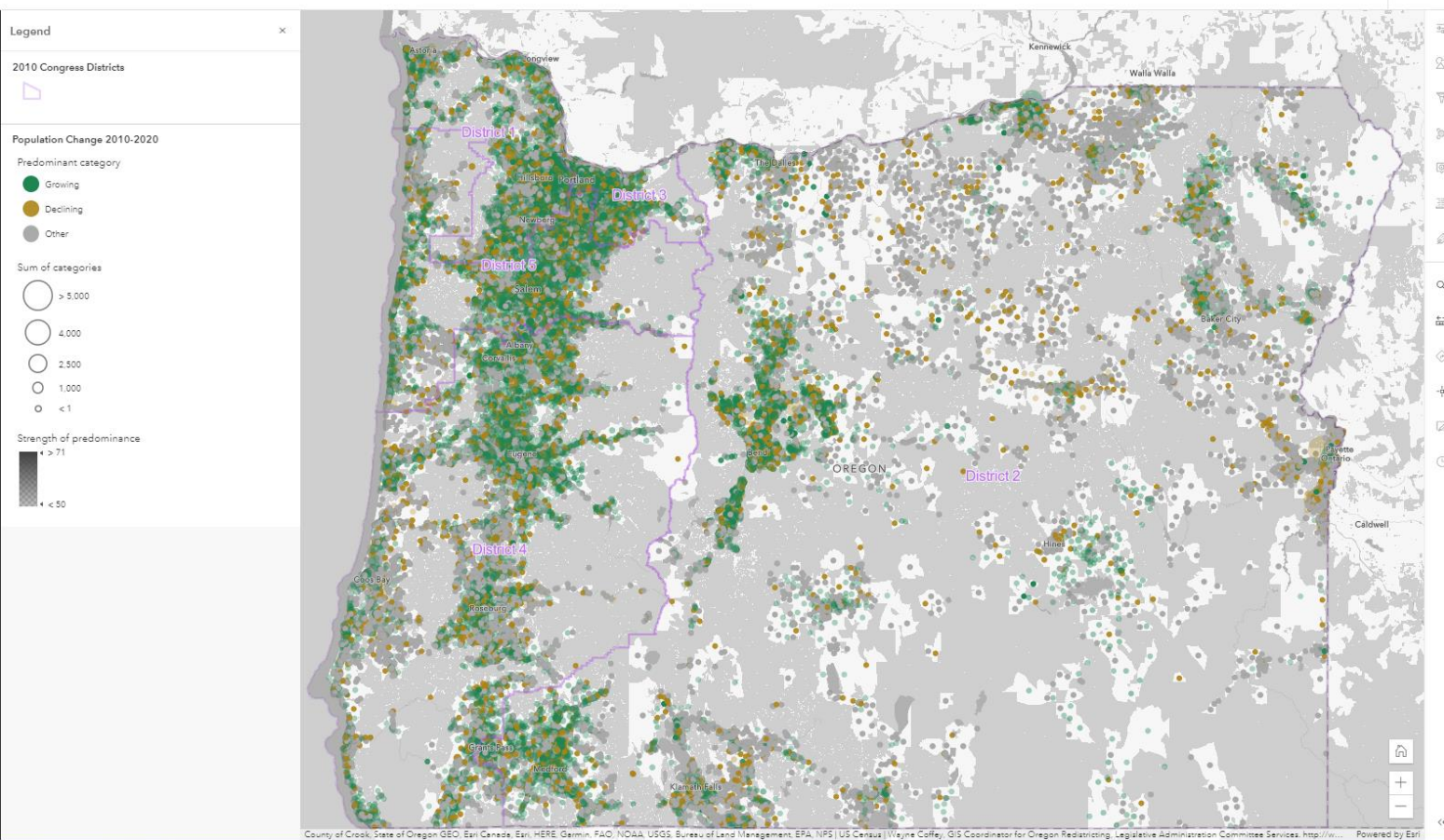




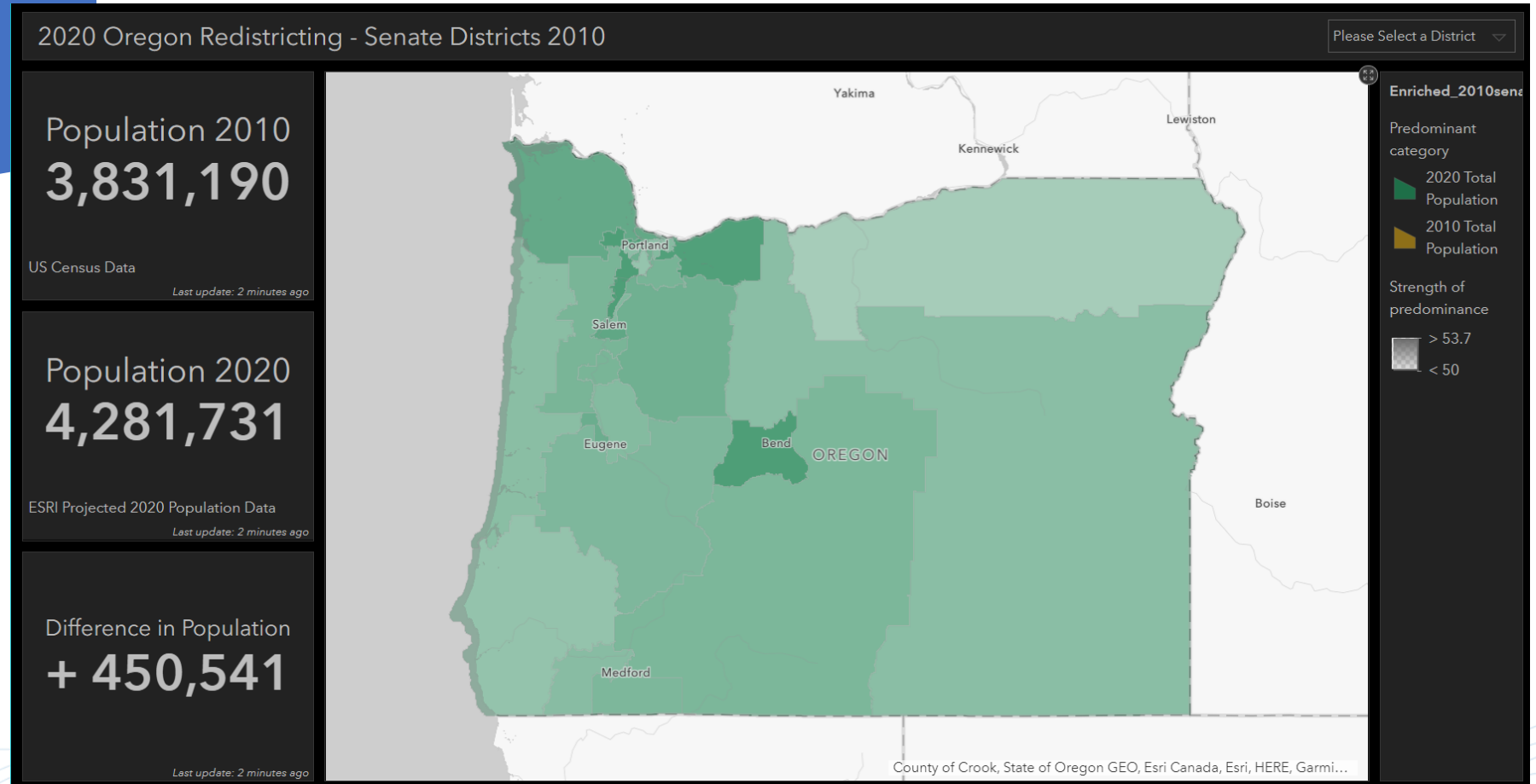
# What does 2020 look like?





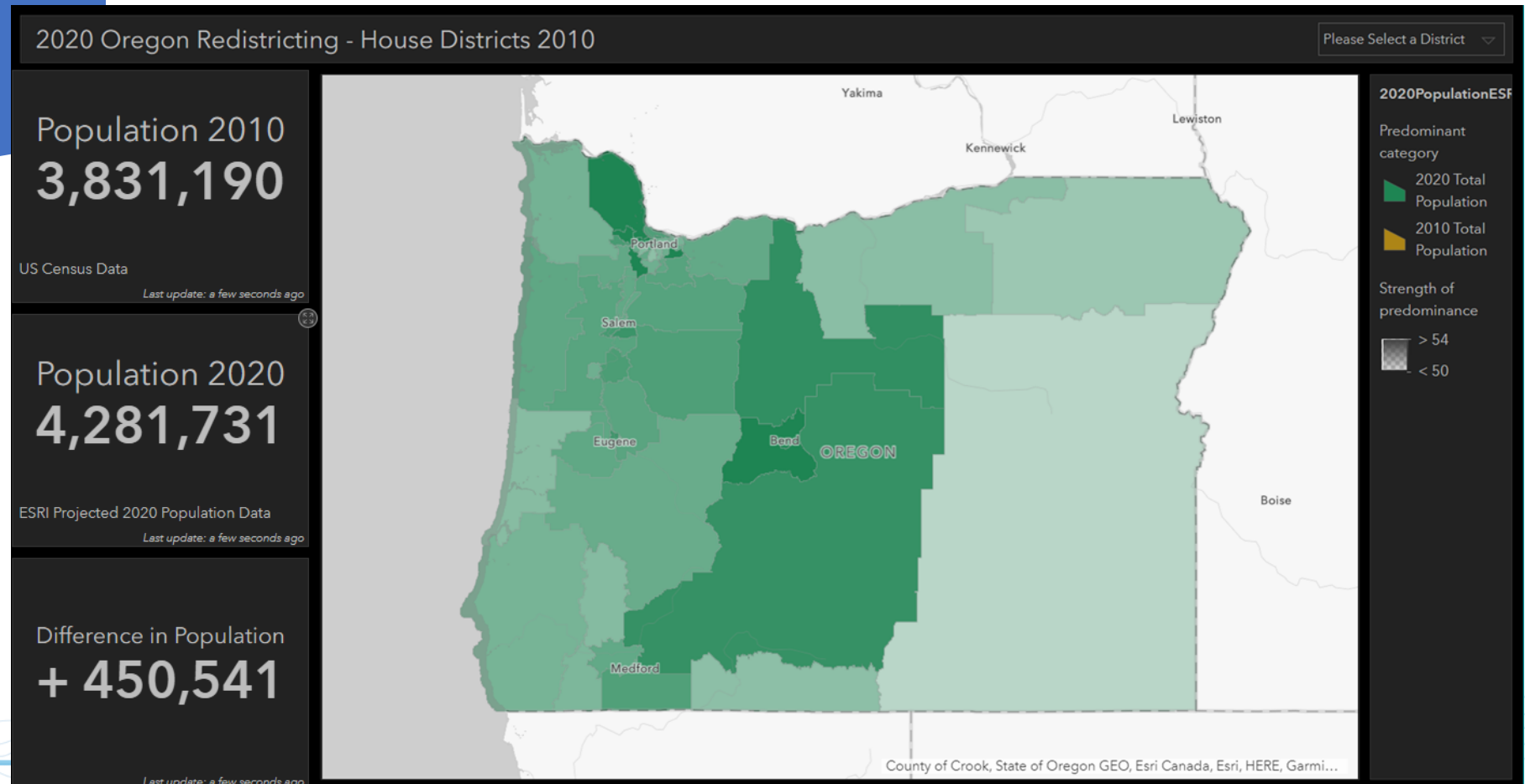


# Oregon Senate Districts

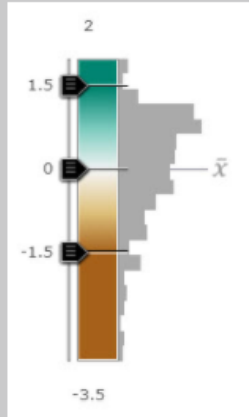




# Oregon House Districts

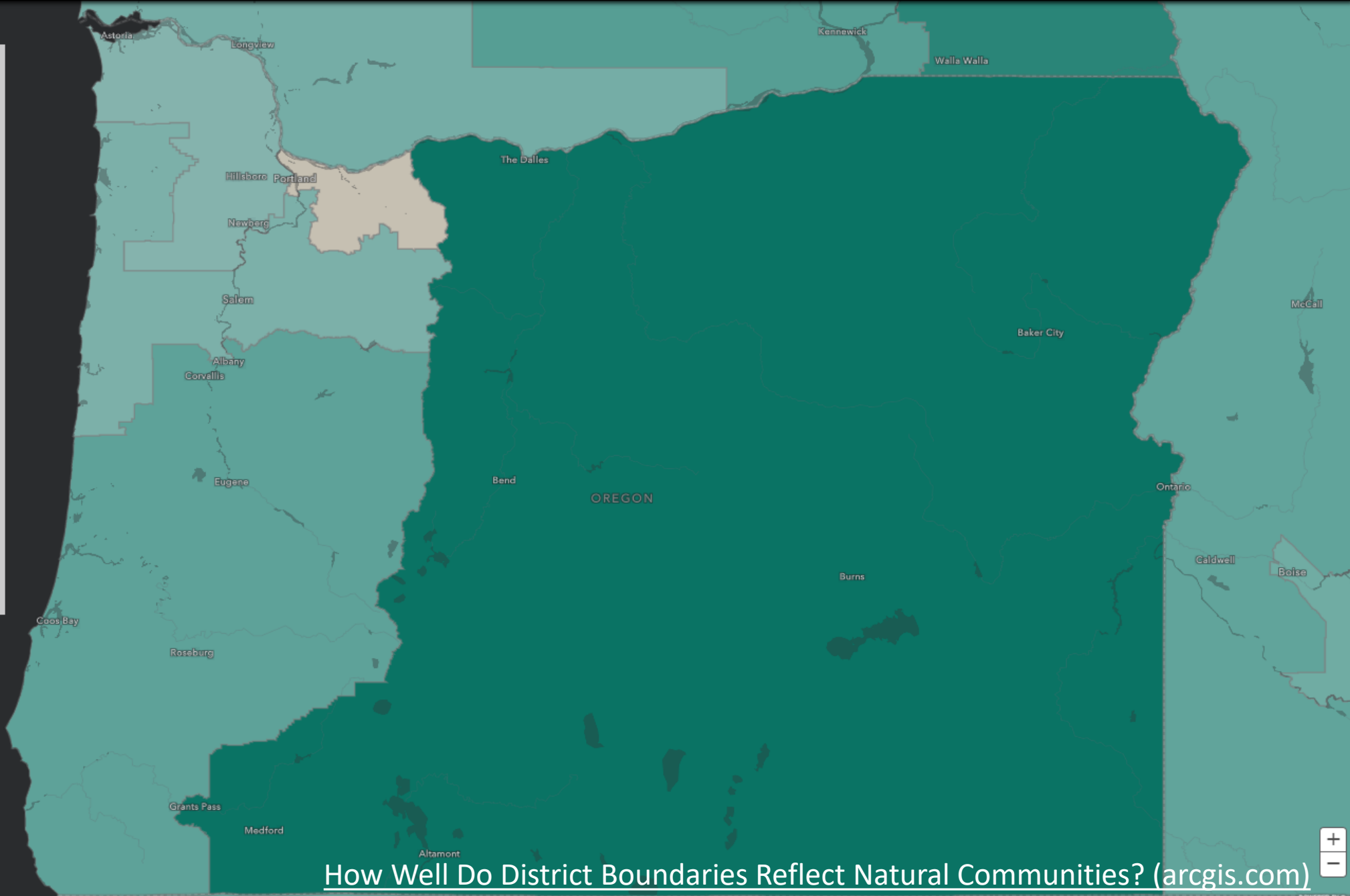


## Natural Communities Score



Click on a district in the map to see the "Natural Communities" score along with all the components that went into it.

**Observation:** urban areas tend to be brown (indicating a low natural communities score) - perhaps urban areas are more divided by infrastructure than the non-urban areas. Infrastructure as a boundary works against a district in this index since both infrastructure variables had negative loadings.



How Well Do District Boundaries Reflect Natural Communities? ([arcgis.com](https://arcgis.com))

# Introductions



## Richard Leadbeater, Global Manager State Government Industry Solutions

Email: [rleadbeater@esri.com](mailto:rleadbeater@esri.com)

Office: 909-369-4448

Twitter: @PolicyMapper

Joined Esri in 1997. Mr. Leadbeater's focus is on developing tools and solutions addressing government administrative functions with attention towards the use of GIS in support of policy development, elections, redistricting, and government administrative processes.

Before Esri, Mr. Leadbeater worked as the Geographic Information Project Manager developing and implementing GIS, CADD, and Document Imaging technologies at the Washington Suburban Sanitary Commission. The WSSC is one of the largest public Water and Wastewater Utilities in the United States.

*Mr. Leadbeater received a BS in Social Science and Geographic Arts from the University of Maryland in 1983.*

*"My goal is to move the application of GIS and geographic analysis further, from its present use by technology professionals, into the conversations that define government policy and its operations. The data governments generate must be thought of as a resource, a valued resource, that wants exploitation. I believe that data in the 21st century is what timber, iron, and coal were to the 19th century. More importantly, this resource needs proper crafting. Today, we talk about producing and mining data, but the real value is in the creation of finished goods."*







esri

THE  
SCIENCE  
OF  
WHERE

Thank you

