

AM I DONE?

- Data and project are in unzipped folder named **central_falls**
- Created new geopackage named **cf_digitize.gpkg** in the **raw** folder
- Created new layers in that geopackage...
- Each of the layers digitizes and symbolized correctly:

Layer	Layer in cf_digitize.gpkg Geopackage	EPSG: 6567	Shapes Digitized identically	Symbolized similarly to handouts	Attributes Correct and id is primary key
Lusts	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ecg	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
parks	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
zones	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
watersheds	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

- Field Calculator of population density
- With the statistical summaries answer the following questions about parks:
 - How many parks are there?
 - How large is the largest park?
 - How large is the smallest park?
 - What is the average park size?
 - What is the total Area of all of the parks?
- Parks_parking joined to Parks and saved in derived folder
- Parking lots per 250m by 250m grid square calculated, with the following results:

park	pArea	lot_spots	street_spots	parking_per_grid
Blackstone	187500	40	5	15
Spintex	125000	20	0	10
Macomber	187500	100	20	40
Jenks	62500	0	5	5
FC	125000	120	10	65

Lab: Kids and Lead in Rhode Island

Which geographic regions of Rhode Island contained the **most children** and the **highest ratio of children per working age adults** in 2020?

PURPOSE

- Learn how to acquire and save U.S. Census data in R / RStudio.
- Gain working knowledge of different quantitative thematic map types:
 - Choropleth
 - Proportional symbol, with the POINT ON SURFACE tool.
 - Dot density, with the RANDOM POINTS INSIDE POLYGONS tool.
- Practice previously learned GIS tools.
- Visualize the sensitivity of geographic analysis to the modifiable areal unit problem and scale.

OUTCOMES

We will query spatial data layers of:

- Children in Rhode Island, in counties, towns, and tracts.
- Foreign-born children in Rhode Island tracts.

We will produce QGIS map layers (*not full layouts*) of:

- Map 1: Child Dependency Ratio by County
- Map 2: Child Dependency Ratio by Municipality
- Map 3: Child Dependency Ratio by Census Tract
- Map 4: Total Children by Municipality (proportional symbol)
- Map 5: Child Density by Municipality (dot density)
- Map 6: Percentage of Foreign-Born Children by Municipality

BACKGROUND

We started asking about the distribution of kids in Rhode Island when thinking about the public health impacts of lead poisoning from old housing stock, and the vulnerability of foreign-born children due less information about health risks from lead and less ability to secure lead-free housing as tenants or owners. Although lead paint has been banned in the United States since 1978, it is still found in older homes, and older plumbing systems may still contain lead pipes or fixtures.

For the purposes of this lab:

- **children** are people under the age of 18
- **working age adults** are people aged 18 to 65
- **child dependency ratio** is the number of children divided by the number of working age adults times 100

PROCEDURE

1. Practice two new tools with Central Falls data.
2. Use R and RStudio to query and save Census data.
3. Use QGIS to create the six map layers listed above.

Q: Can you think of any other motivations for mapping either:

- the geographic distribution of total children

- the geographic distribution of the ratio between children and working age adults?

SAMPLE DATA DICTIONARY: CENSUS DEMOGRAPHIC PROFILE

The census uses alpha-numeric codes for its data field names. Therefore, you need data dictionaries in order to decipher what each variable means. Here's a sample of the *demographic profile* data dictionary:

name	label
DP1_0001C	Count!!SEX AND AGE!!Total population
DP1_0002C	Count!!SEX AND AGE!!Total population!!Under 5 years
DP1_0003C	Count!!SEX AND AGE!!Total population!!5 to 9 years
DP1_0004C	Count!!SEX AND AGE!!Total population!!10 to 14 years
DP1_0005C	Count!!SEX AND AGE!!Total population!!15 to 19 years
DP1_0006C	Count!!SEX AND AGE!!Total population!!20 to 24 years
DP1_0007C	Count!!SEX AND AGE!!Total population!!25 to 29 years
DP1_0008C	Count!!SEX AND AGE!!Total population!!30 to 34 years
DP1_0009C	Count!!SEX AND AGE!!Total population!!35 to 39 years
DP1_0010C	Count!!SEX AND AGE!!Total population!!40 to 44 years
DP1_0011C	Count!!SEX AND AGE!!Total population!!45 to 49 years
DP1_0012C	Count!!SEX AND AGE!!Total population!!50 to 54 years
DP1_0013C	Count!!SEX AND AGE!!Total population!!55 to 59 years
DP1_0014C	Count!!SEX AND AGE!!Total population!!60 to 64 years
DP1_0015C	Count!!SEX AND AGE!!Total population!!65 to 69 years
DP1_0016C	Count!!SEX AND AGE!!Total population!!70 to 74 years
DP1_0017C	Count!!SEX AND AGE!!Total population!!75 to 79 years
DP1_0018C	Count!!SEX AND AGE!!Total population!!80 to 84 years
DP1_0019C	Count!!SEX AND AGE!!Total population!!85 years and over
DP1_0020C	Count!!SEX AND AGE!!Total population!!Selected Age Categories!!16 years and over
DP1_0021C	Count!!SEX AND AGE!!Total population!!Selected Age Categories!!18 years and over
DP1_0022C	Count!!SEX AND AGE!!Total population!!Selected Age Categories!!21 years and over
DP1_0023C	Count!!SEX AND AGE!!Total population!!Selected Age Categories!!62 years and over
DP1_0024C	Count!!SEX AND AGE!!Total population!!Selected Age Categories!!65 years and over

Q: Which variables are most useful for finding the following?

- total population:

- kids (age under 18):

- working age adults (age 18 to 65):

SAMPLE DATA DICTIONARY: AMERICAN COMMUNITY SURVEY FOREIGN-BORN BY AGE

Theme: SEX BY AGE BY NATIVITY AND CITIZENSHIP STATUS

name	label
B05003_002	Estimate!!Total:!!Male:
B05003_003	Estimate!!Total:!!Male:!!Under 18 years:
B05003_004	Estimate!!Total:!!Male:!!Under 18 years:!!Native
B05003_005	Estimate!!Total:!!Male:!!Under 18 years:!!Foreign born:
B05003_006	Estimate!!Total:!!Male:!!Under 18 years:!!Foreign born:!!Naturalized U.S. citizen
B05003_007	Estimate!!Total:!!Male:!!Under 18 years:!!Foreign born:!!Not a U.S. citizen
B05003_008	Estimate!!Total:!!Male:!!18 years and over:
B05003_009	Estimate!!Total:!!Male:!!18 years and over:!!Native
B05003_010	Estimate!!Total:!!Male:!!18 years and over:!!Foreign born:
B05003_011	Estimate!!Total:!!Male:!!18 years and over:!!Foreign born:!!Naturalized U.S. citizen
B05003_012	Estimate!!Total:!!Male:!!18 years and over:!!Foreign born:!!Not a U.S. citizen
B05003_013	Estimate!!Total:!!Female:
B05003_014	Estimate!!Total:!!Female:!!Under 18 years:
B05003_015	Estimate!!Total:!!Female:!!Under 18 years:!!Native
B05003_016	Estimate!!Total:!!Female:!!Under 18 years:!!Foreign born:
B05003_017	Estimate!!Total:!!Female:!!Under 18 years:!!Foreign born:!!Naturalized U.S. citizen
B05003_018	Estimate!!Total:!!Female:!!Under 18 years:!!Foreign born:!!Not a U.S. citizen
B05003_019	Estimate!!Total:!!Female:!!18 years and over:
B05003_020	Estimate!!Total:!!Female:!!18 years and over:!!Native
B05003_021	Estimate!!Total:!!Female:!!18 years and over:!!Foreign born:
B05003_022	Estimate!!Total:!!Female:!!18 years and over:!!Foreign born:!!Naturalized U.S. citizen
B05003_023	Estimate!!Total:!!Female:!!18 years and over:!!Foreign born:!!Not a U.S. citizen
B05003_002	Estimate!!Total:!!Male:
B05003_003	Estimate!!Total:!!Male:!!Under 18 years:

Q: How can you calculate the total number of foreign-born children?

Alert: Different data themes have a different “universe” total *for whom the data is known*. For example, the American Community Survey may not have confident estimates on the native / foreign born status of *all children*. Therefore, if you want to calculate ratios or percentages, you should use instead the *total children for whom native / foreign born status is known*.

Q: How can you calculate the total number of children for whom native / foreign born status is known?

DATA SOURCES

You need to acquire the following data sources using R. All of the Census data shall have the following metadata in common:

- **Responsible Party:** U.S. Census
- **Spatial Representation Type:** vector multi-polygons
- **Spatial Coverage:** Rhode Island
- **Spatial Reference System:** EPSG 4269: North American Datum 1983 geographic coordinate system
- **Temporal Coverage:** 2020
- **Lineage:** Downloaded from the Census API using the `tidycensus` package in R.
- **Distribution:** Available free from Census via the API using the `tidycensus` package in R.
- **Constraints:** Public Domain data by the U.S. Census Bureau
- **Attributes:**

<ul style="list-style-type: none"> • Name: GEOID • Description: code to uniquely identify features in the Census • Data Type: nominal text • Accuracy: n/a • Domain: unique codes composed of integer numbers stored as text • Missing Data: no missing data 	<ul style="list-style-type: none"> • Name: DP1_0001C • Description: Count: Sex and Age: Total Population • Data Type: integer • Accuracy: The Census is a complete population count. • Domain: count data; four census tracts have values of 0 indicating no population • Missing Data: no missing data 	<ul style="list-style-type: none"> • Name: DP1_0021C • Description: Count: Sex and Age: Total Population: Selected Age Categories: 18 years and over • Data Type: integer • Accuracy: The Census is a complete population count. • Domain: count data • Missing Data: no missing data 	<ul style="list-style-type: none"> • Name: DP1_0024C • Description: Count: Sex and Age: Total Population: Selected Age Categories: 65 years and over • Data Type: integer • Accuracy: The Census is a complete population count. • Domain: count data • Missing Data: no missing data
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Other metadata will vary as follows:

- **Title:** counties2020
 - **Spatial Resolution:** county
- **Title:** towns2020
 - **Spatial Resolution:** county subdivision
- **Title:** tracts2020
 - **Spatial Resolution:** tract
- **Title:** tracts2020foreign
 - **Spatial Representation Type:** none
 - **Spatial Reference System:** none
 - **Temporal Coverage:** 5-year estimates (2016-2020)
 - **Attributes:** GEOID is the same as above. For other variables, see the American Community Survey data dictionary above

AM I DONE?

- Show the six map layers listed at the beginning of the lab to any instructor.
- Back up your work to the W:\ network drive and log out.