SOC 4650/5650: PS-07 - Active Well Heads in Missouri

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Directions

Using data accessed from the `lecture-11` repository, create a map illustrating the density of active wellheads by county in Missouri. Your entire project folder system, including data and notebook output, should be uploaded to GitHub by **Monday, April 9th** at 4:15pm.

Part 1: Analysis Development (Review from Lectures 01 and 02)

The goal of this section is to create a self contained project directory with all of the data, code, map documents, results, and documentation a project needs. Make sure to include all relevant directories, a well formatted notebook, and a 'README' that traces the changes you make to all of your data.

Part 2: Data Preparation

The goal of this section is to create two shapefiles of projected data in `R` that are ready to be mapped in ArcMap.

1. For the wellhead data:
   (a) Import the three tables of Missouri oil and gas wellheads and combine them so that you have one single data frame.
   (b) Clean the data by subsetting both columns, so that you only have the `apiNum`, wellhead operator, type, status, longitude, latitude, and year. Further clean it by subsetting observations so that you only have *active* wellheads.
   (c) Perform both a duplicate observation and missing data analysis, and report your results. Remove any observations that are "true" (i.e. "full") duplicates using the `dplyr::distinct()` function (see Lecture 05).
   (d) Project that data using the given `x,y` coordinates, and check the projection using `leaflet`.

(e) Export the data using the `NAD1983` geographic coordinate system.

2. For the county data:

(a) Import the Missouri statewide counties data from the `lecture-11` repository and combine them.

(b) Calculate the square miles of each county (remember that the area will be given as character data - they will need to be converted to numeric and then calculated from the square meters).

(c) Export the data using the `NAD1983` geographic coordinate system.

Part 3: Mapping Wellheads in Missouri

The goal of this section is produce a well-designed, properly normalized choropleth map of the *density* of wellheads per square mile in each county. This will necessitate completing a spatial join of the data before creating your map layout. You should feel free to add ground layers as necessary to clarify your presentation of the data as well. Your map layout should be exported as a `pdf` file at `300dpi`. Make sure your `README.md` file contains a written description of the results - focus on describing the spatial distribution of wellheads in Missouri.