Oil and Gas Well Danger to Schools in LA County

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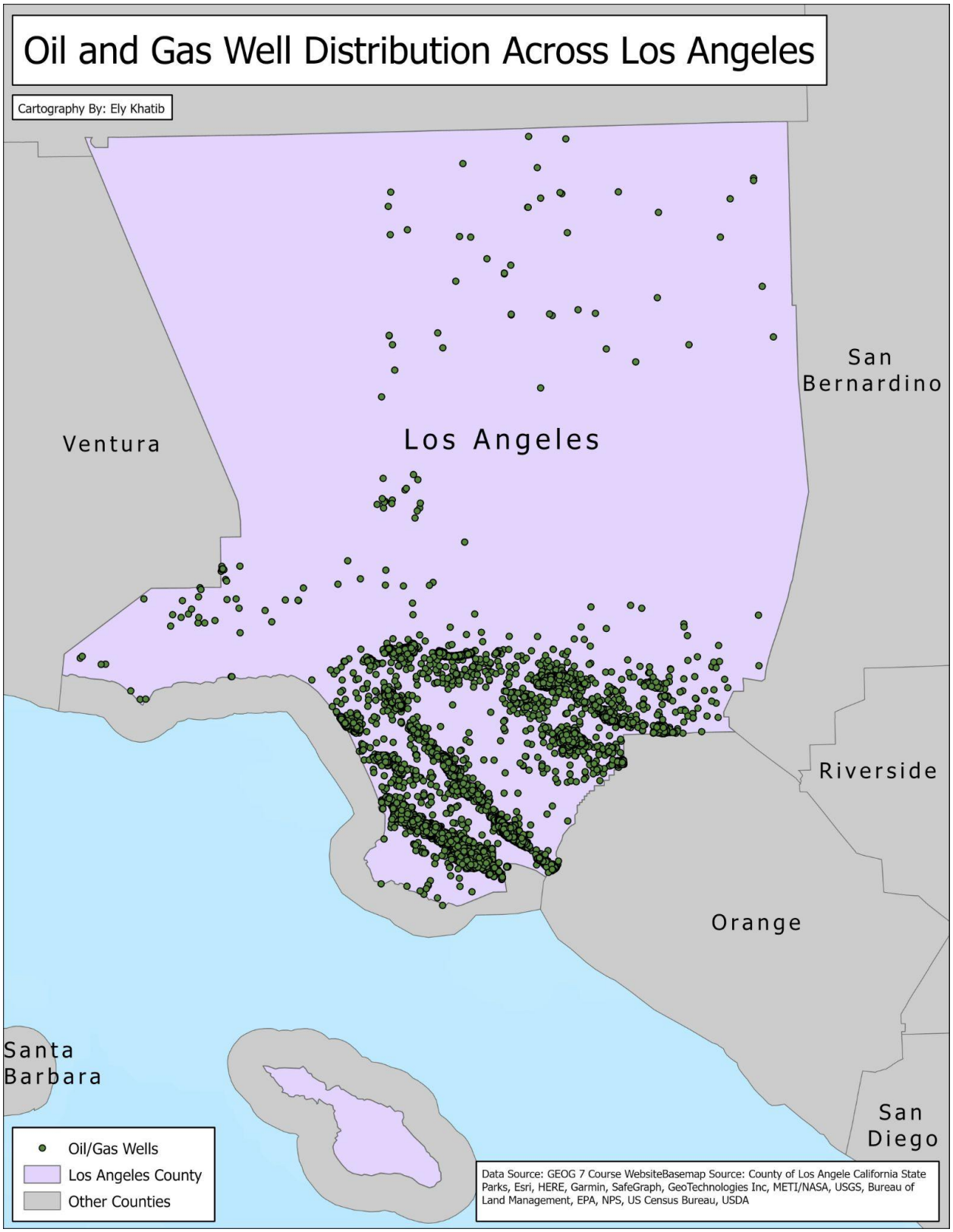
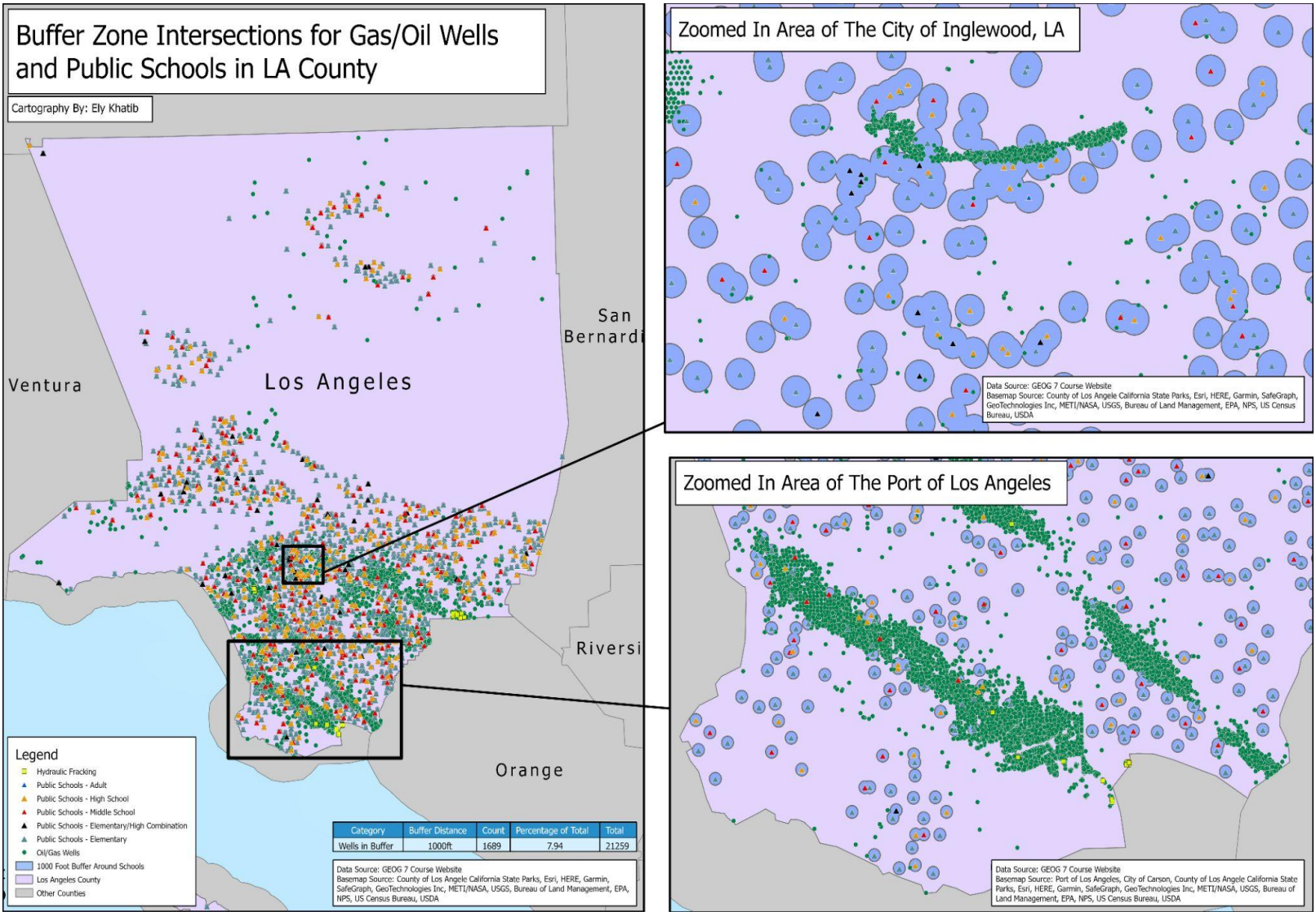
General Distribution of Oil and Gas Wells in LA

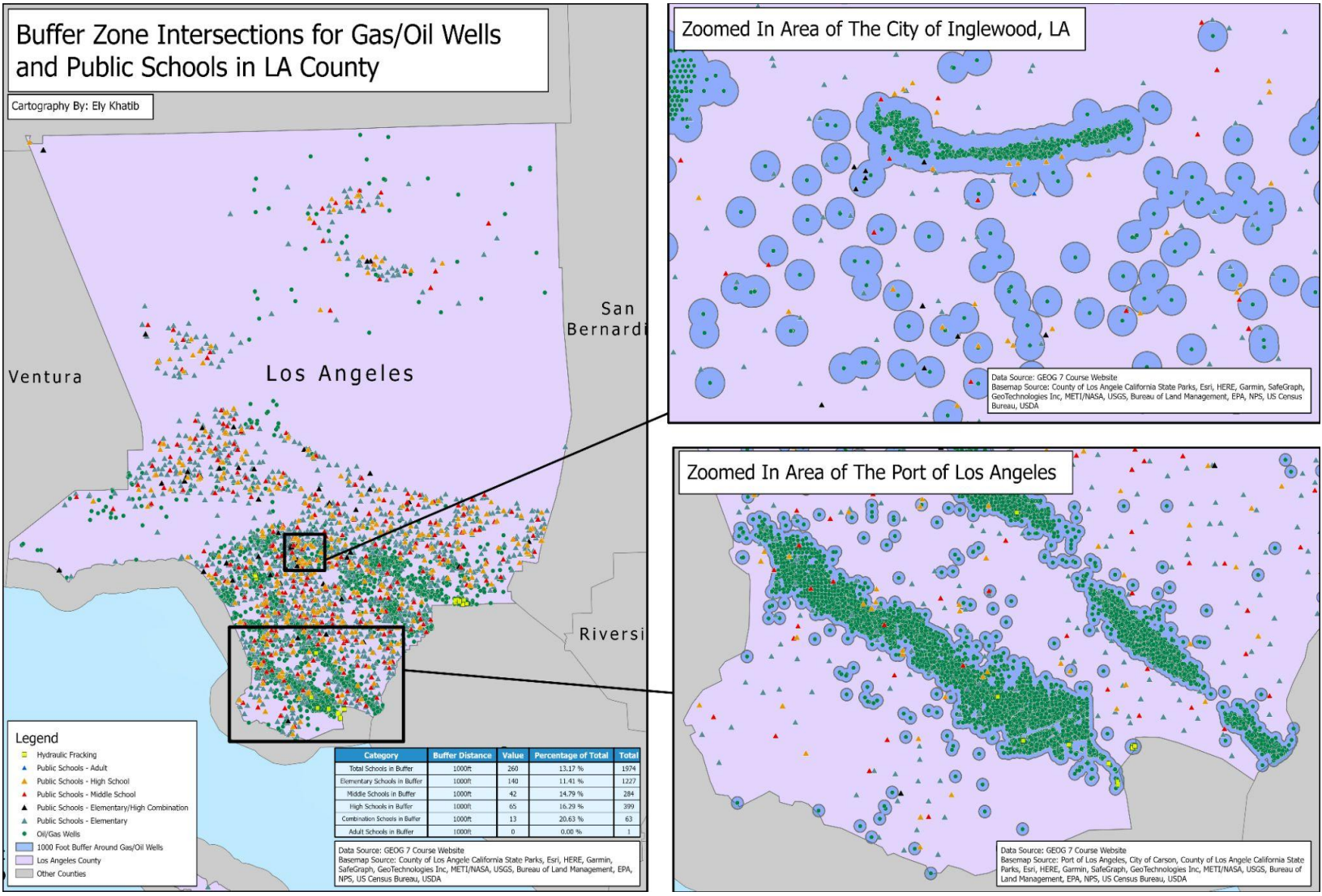


Buffer Maps for Gas/Oil Wells

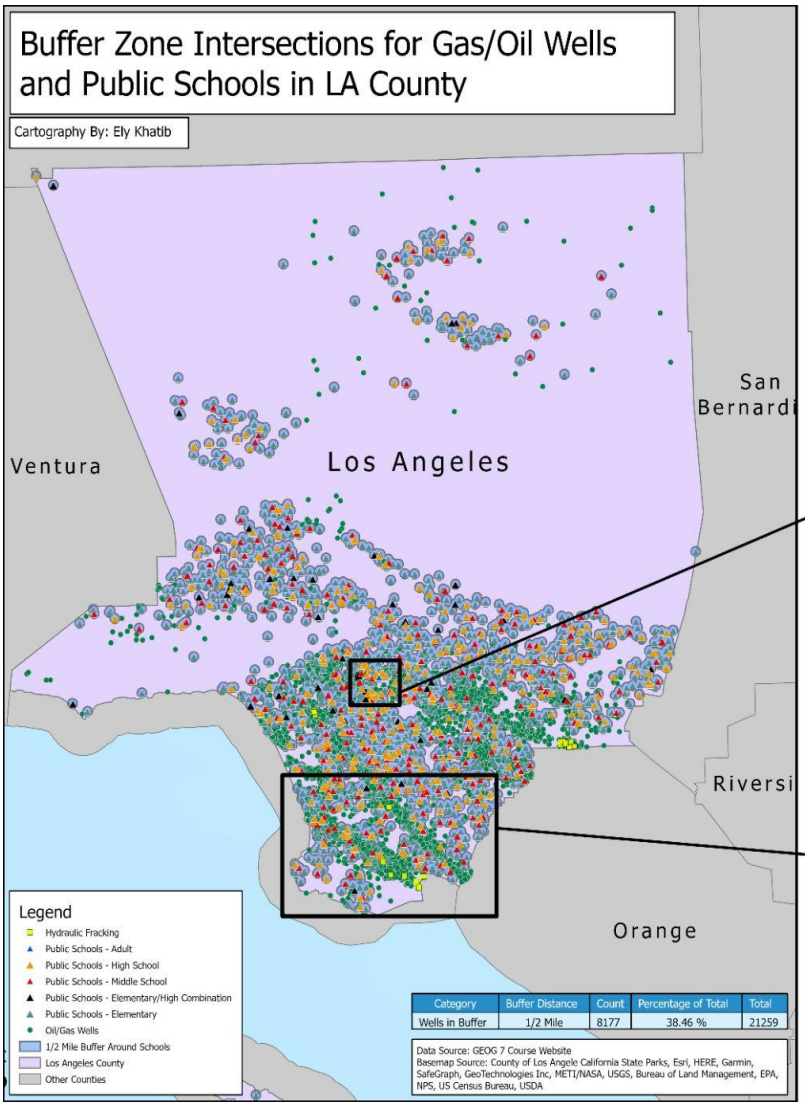
1. 1000 Foot Buffer Around Schools

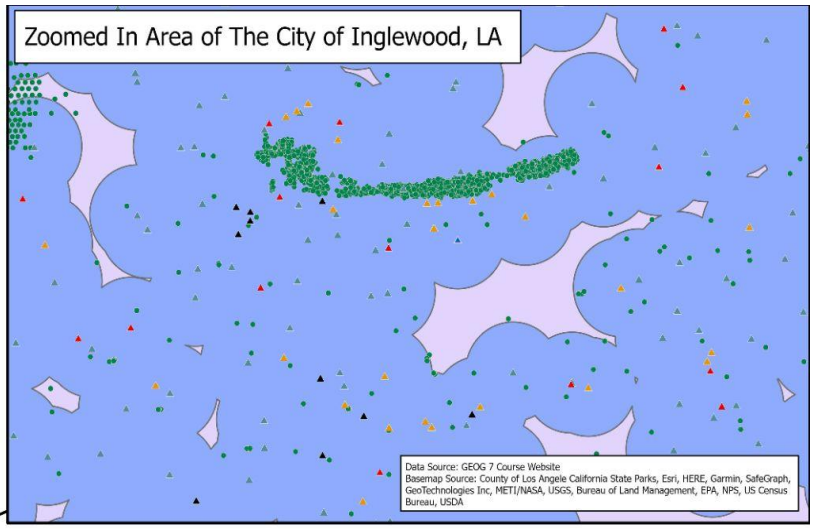


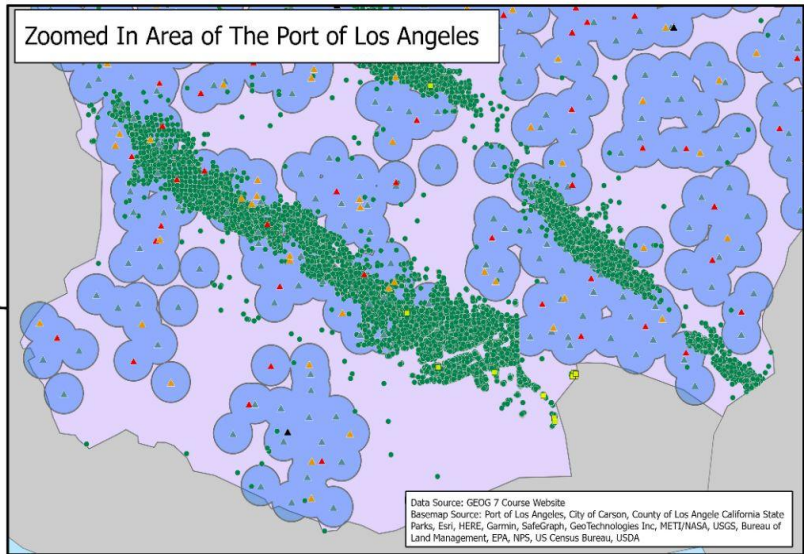
2. 1000 Foot Buffer Around Oil/Gas Wells



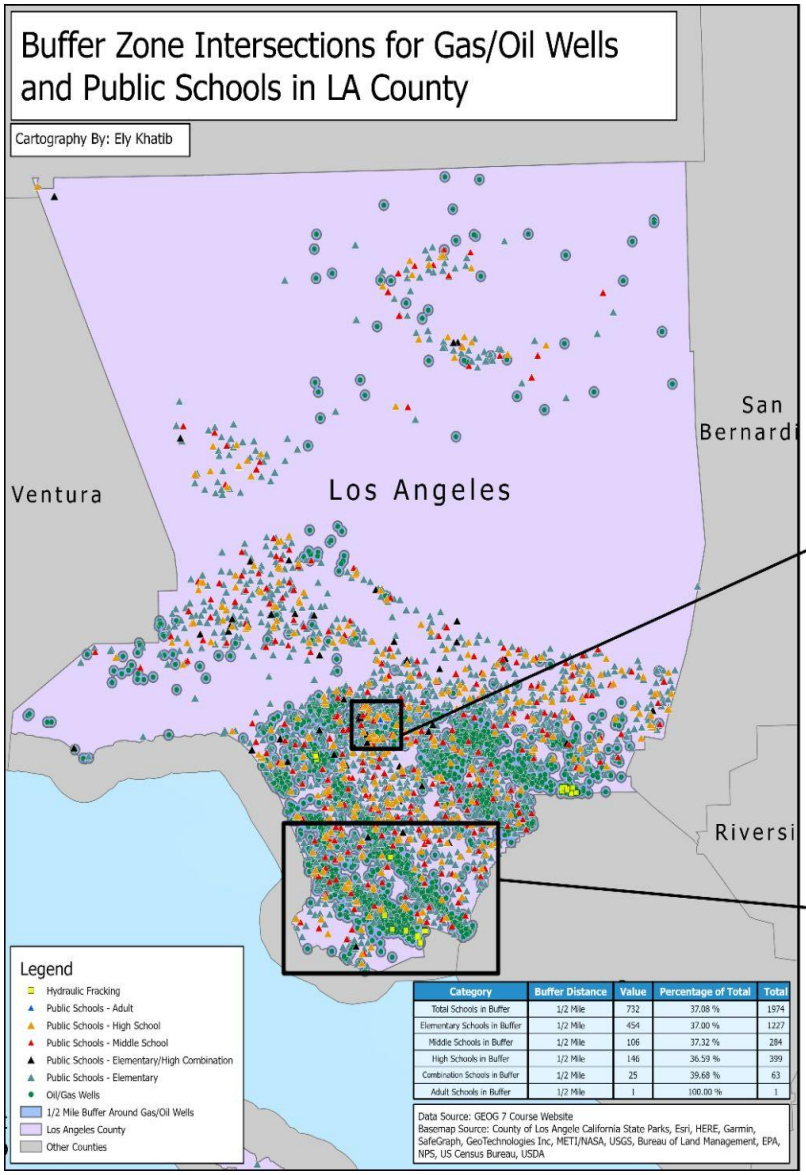
3. 1/2 Mile Buffer Around Schools

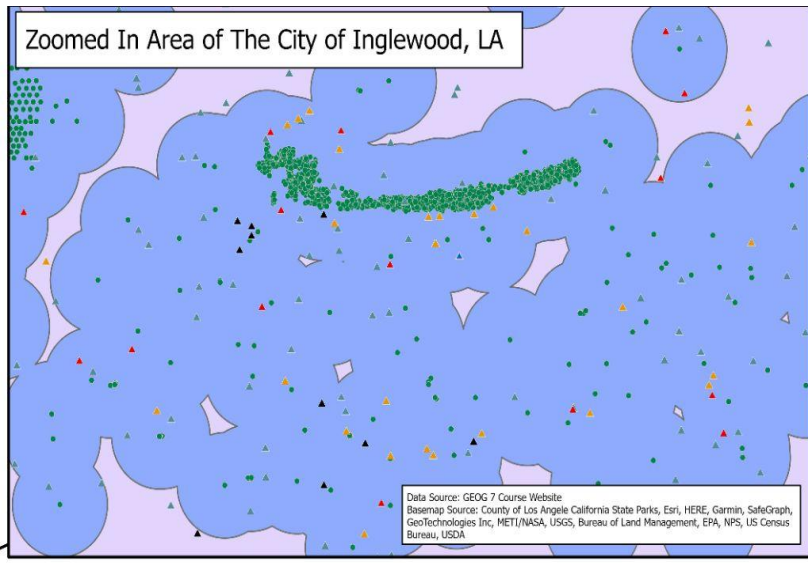


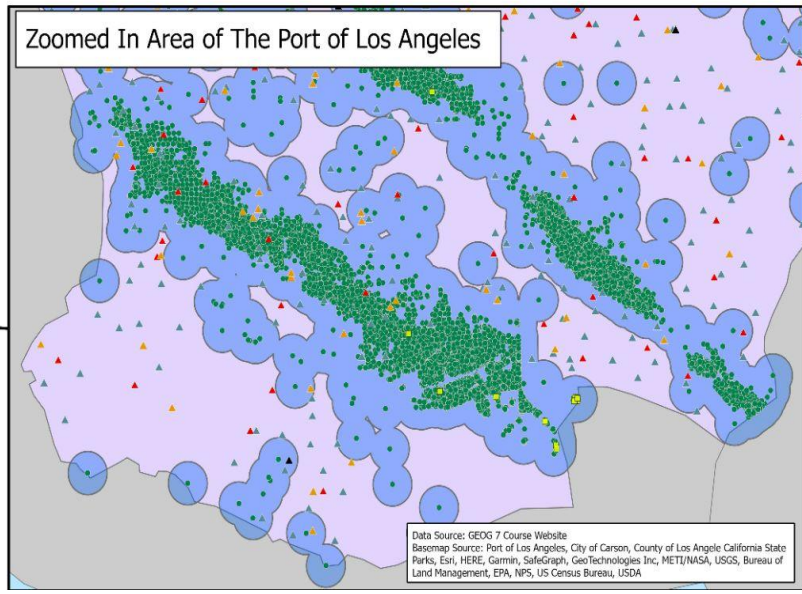




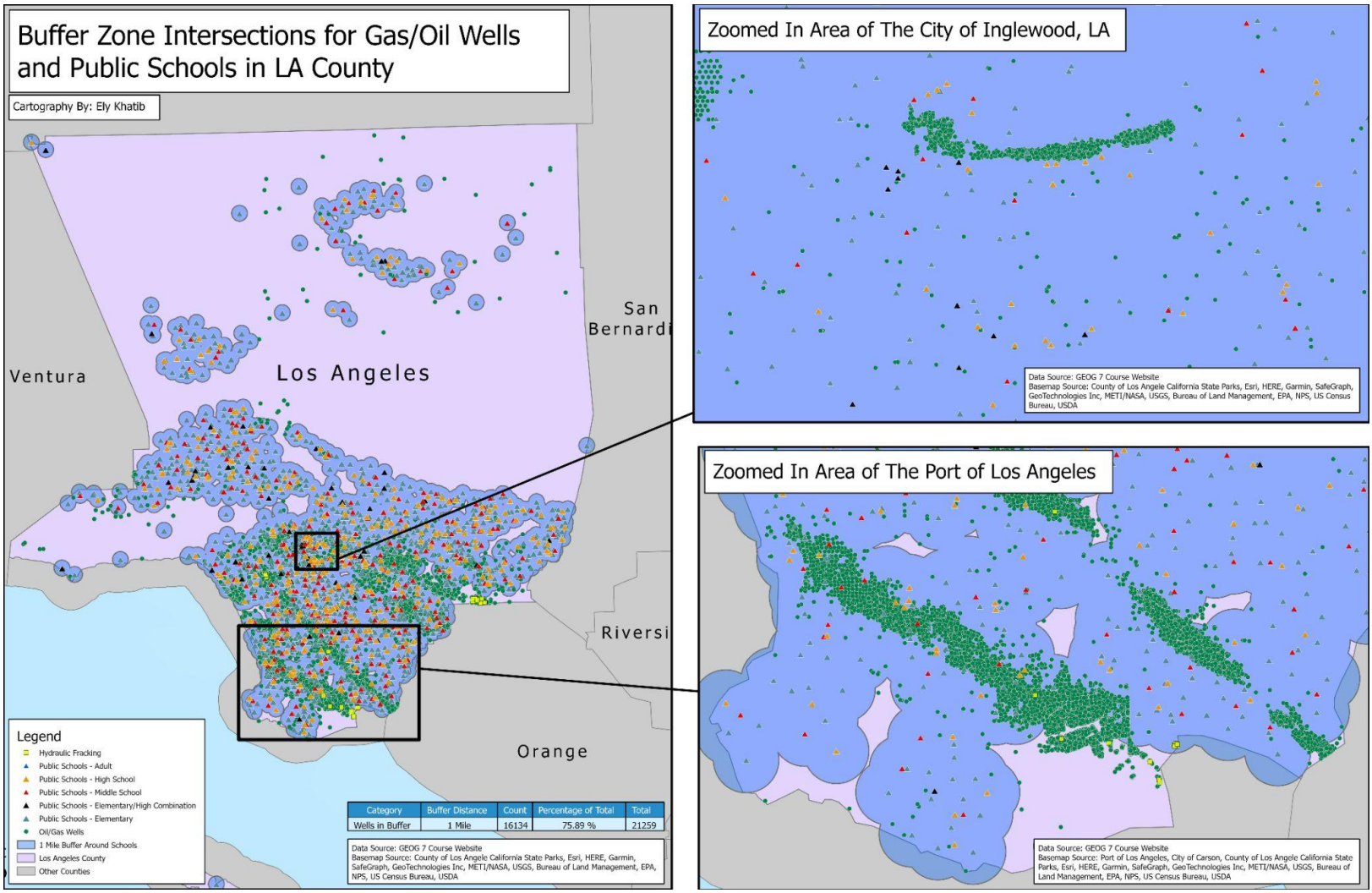
4. 1/2 Mile Buffer Around Oil/Gas Wells



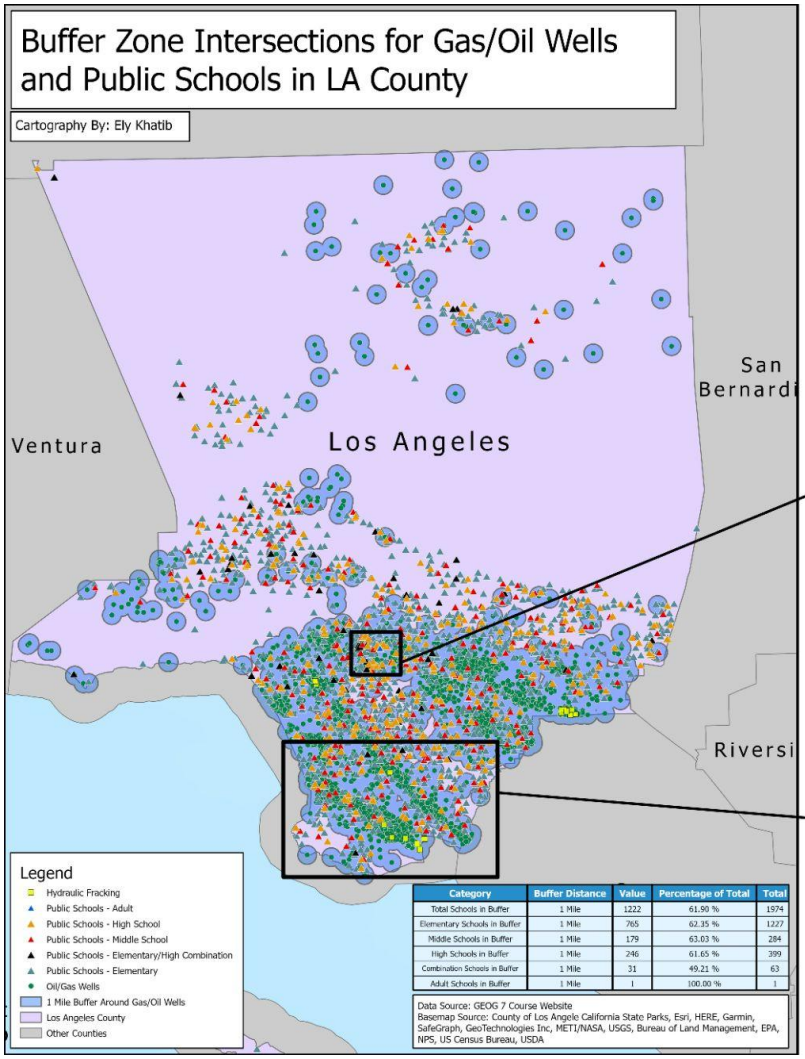


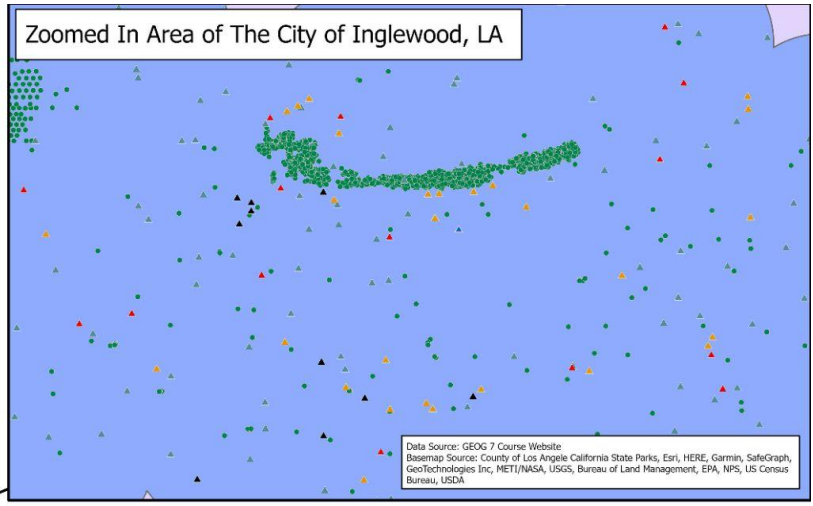


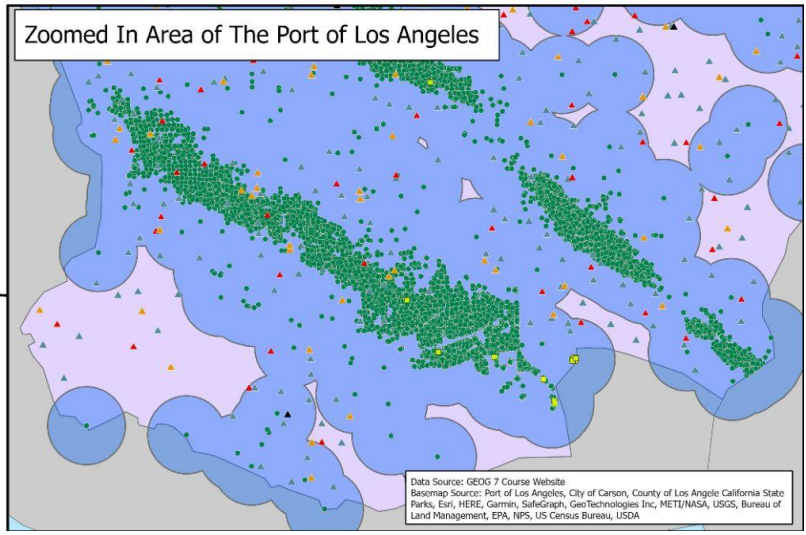
5. 1 Mile Buffer Around Schools



6. 1 Mile Buffer Around Oil/Gas Wells







List of Schools Within One Mile Fracking Rigs (by district)

1. Culver Unified School District

District,C,254	School,C,254	Street,C,254	City,C,254	Zip,C,254	State,C,254	Type,C,254	Latitude,N,19,11	Longitude,N,19,11
Culver City Unified	El Rincon Elementary	11177 Overland Ave.	Culver City	90230-5454	CA	Elementary	33.994836000	-118.39041000000

2. Long Beach Unified School District

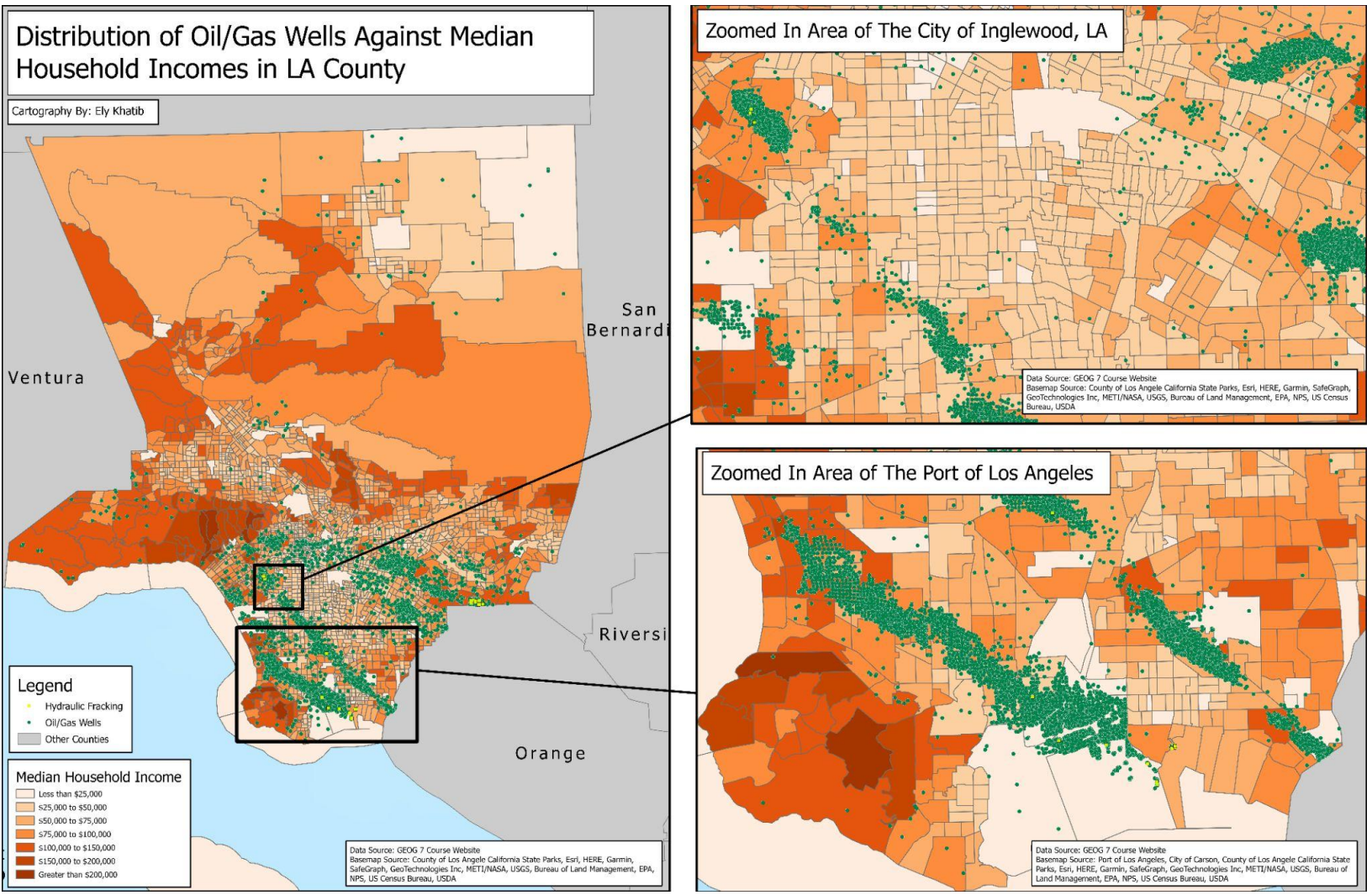
District,C,254	School,C,254	Street,C,254	City,C,254	Zip,C,254	State,C,254	Type,C,254	Latitude,N,19,11	Longitude,N,19,11
Long Beach Unified	Chavez Elementary	730 West Third St.	Long Beach	90802-2745	CA	Elementary	33.770252000	-118.18293000000
Long Beach Unified	California Academy of Mathematics and Science	1000 East Victoria St., Bldg. SAC3 rm3117	Carson	90747-0001	CA	High School	33.867124000	-118.25869000000
Long Beach Unified	Stevenson Elementary	515 Lime Ave.	Long Beach	90802-2642	CA	Elementary	33.773254000	-118.18371000000
Long Beach Unified	Franklin Classical Middle	540 Cerritos Ave.	Long Beach	90802-1623	CA	Intermediate/Middle/Junior High	33.773406000	-118.17793000000

3. Los Angeles Unified School District

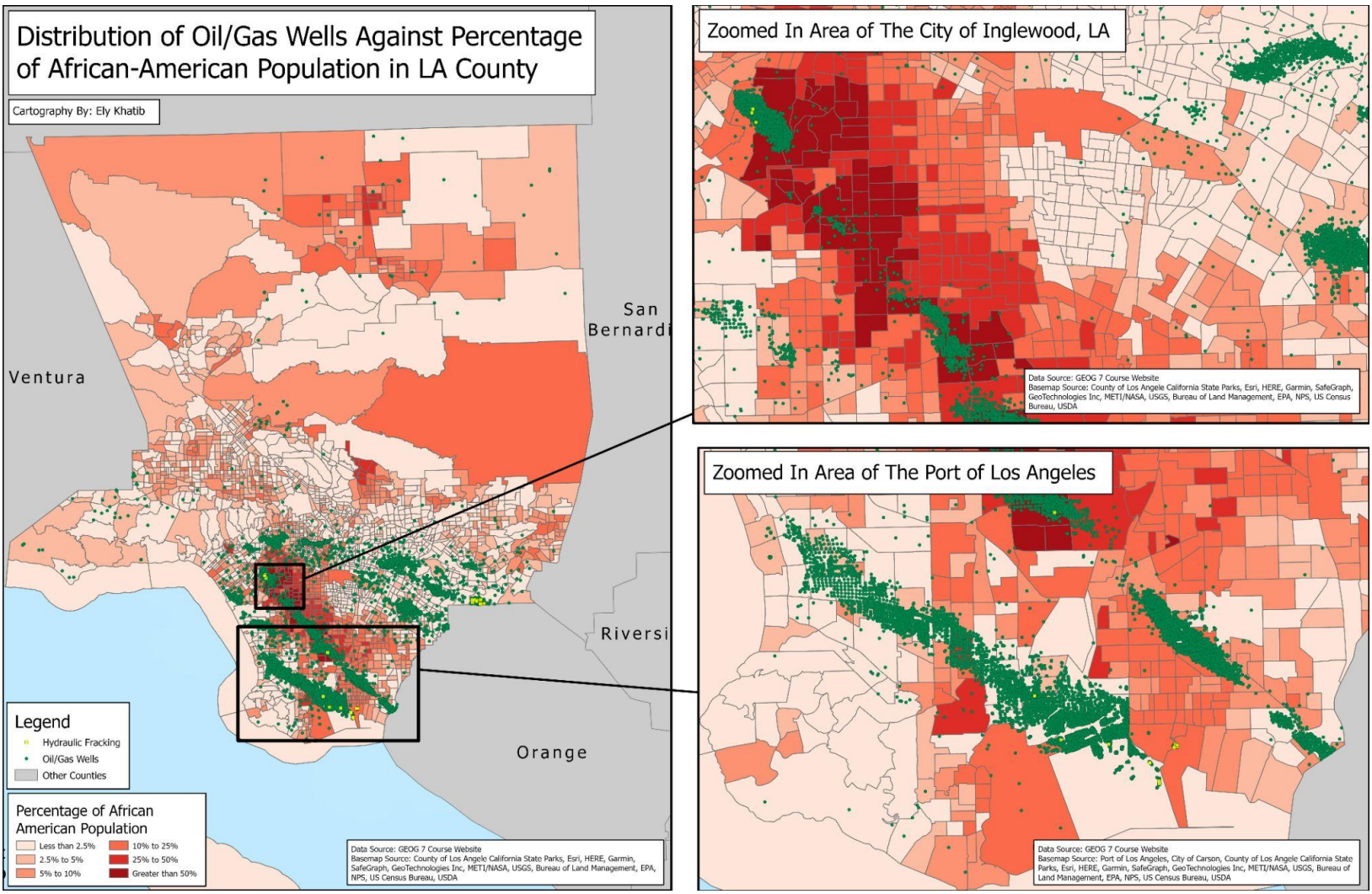
District,C,254	School,C,254	Street,C,254	City,C,254	Zip,C,254	State,C,254	Type,C,254	Latitude,N,19,11	Longitude,N,19,11
Los Angeles Unified	George De La Torre Jr. Elementary	500 North Island Ave.	Wilmington	90744-5524	CA	Elementary	33.775424000000	-118.26596000000
Los Angeles Unified	Magnolia Science Academy 3	1254 East Helmick St.	Carson	90746-3164	CA	Elementary-High Combination	33.851630000000	-118.24958000000
Los Angeles Unified	Phineas Banning Senior High	1527 Lakme Ave.	Wilmington	90744-1526	CA	High School	33.794039000000	-118.26077000000
Los Angeles Unified	Avalon High	1425 North Avalon Blvd.	Wilmington	90744-1506	CA	High School	33.791884000000	-118.26340000000
Los Angeles Unified	Annalee Avenue Elementary	19410 South Annalee Ave.	Carson	90746-2687	CA	Elementary	33.854838000000	-118.25296000000
Los Angeles Unified	Broadacres Avenue Elementary	19424 South Broadacres Ave.	Carson	90746-2710	CA	Elementary	33.854531000000	-118.24027000000
Los Angeles Unified	Fries Avenue Elementary	1301 Fries Ave.	Wilmington	90744-2510	CA	Elementary	33.788723000000	-118.26557000000
Los Angeles Unified	Gulf Avenue Elementary	828 West L St.	Wilmington	90744-3310	CA	Elementary	33.786538000000	-118.27208000000
Los Angeles Unified	Wilmington Park Elementary	1140 Mahar Ave.	Wilmington	90744-3815	CA	Elementary	33.785999000000	-118.24571000000
Los Angeles Unified	Glenn Hammond Curtiss Middle	1254 East Helmick St.	Carson	90746-3164	CA	Intermediate/Middle/Junior High	33.851630000000	-118.24958000000

Extra Analysis

1. Oil/Well Distribution Against Median Income



2. Oil/Well Distribution Against Race: African American Population Percentage



GIS Methodology

Distribution of Oil/Gas Wells in LA

There were many steps involved with creating the various maps above. The first step was to import all the data needed. This includes oil/gas wells, public schools, the shapefiles for all counties and LA county, as well as the census tracts and demographic data to be used for later. The first map on the distribution of oil/gas wells in LA simply included only adding the wells and county data, and then making the map as aesthetically pleasing as possible with labels, symbols, and colors.

Buffer Maps

The next 6 buffer maps were a bit more complicated. The first step was to create the buffer layers for both the schools and the wells, for each sized buffer (1000ft, ½ mile, and 1 mile). This was done using the Buffer Tool. The input layer is the layer that the buffer will be around, the distance is the one of the above three, I kept a 'planar' method, and set the dissolve type to 'dissolve all output features into a single feature.'

Then I wanted to disaggregate by school type (elementary, middle, high, combination, and adult). In order to do this, I opened the attribute table for the public schools data, clicked 'select by attributes' and set the type equal to one of the school types, and created a layer based off of the selected attributes. Repeating this for each school type, I was able to change the color of each school type so that it is more easily noticeable which symbol corresponds to which school type. Furthermore, I used the same method to separate oil/gas wells that had hydraulic fracking rigs and changed the symbols for these as well. Then I spent a good amount of time changing colors and symbols again to find effective yet aesthetic colors. Once this was done, I realized the map was a bit too zoomed out to illustrate the information effectively because of the numerous symbols on the map. Therefore I created two zoomed-in maps of different areas of LA so that the buffer distances as well as the school types could be seen more clearly. The last step included adding the infographic to the map, however in order to do this, I needed to count the number of wells and/or schools within the given buffer distance. To find this number, I used the Spatial Join Tool. Inside this tool, the target layer is the item we want to count and then I used the buffer layer that I was measuring (e.g. Schools_1000ft_Buffer). I used a one-to-many join since multiple items could be within one buffer zone, and used 'intersect.' After creating this new joined layer, I used a definition query to include only those values where the 'Join Count' was equal to 1, indicating that the item indeed intersected the buffer. I then used the attribute table for both the spatially joined layer and the original target layer to find both the number of intersecting items, and total number of items to calculate the percentage. In the layout tab, I added a table infographic and converted it to a graphic so that I could edit it and input the appropriate information for each map (category being counted, buffer distance, number of intersecting, items, percentage of total, and total items). The last couple steps involved adding all appropriate legends, titles, credits, lines, and borders to the map.

One last aspect of this part of the project was creating the list of schools within one mile of a hydraulic fracking rig, grouped by district. This was fairly simple, I created a layer of solely hydraulic fracking rigs after selecting them from the oil/gas wells layer, then created one mile buffer zone layer from this, and finally spatially joined this layer with the public schools layer. Using a definition query to include only those where the 'Join Count' was equal to 1, I now had a layer of only the schools that were one mile away from a fracking rig. Finally, I used 'Select by Attributes' for each individual school district and exported the table to be copied to this document.

Demographic Maps

Creating the demographic maps was almost exactly like the assignment in Unit 7. I had already loaded the census tract data as well as the standalone tables with the information I would use (DP05 and DP03). However I needed to complete the table join, but ran into a similar problem that I had in the Unit 7 assignment. The GEOID2 field in the standalone tables was missing the leading zero, so I had to create a new field labeled GEOID3 from GEOID2 that now had the leading zero. This was done by clicking 'Calculate Field' and inputting the following code: "0"+str(!GEOID2!)[0:10]. Once this was done for both tables, I could now join them to the census tract data using the GEOID field from the tract attribute table. For each demographic map, I used a graduated colors map and used the appropriate field for each map. Spending some time changing the colors and breaks of each map, then adding all appropriate legends, titles, credits, lines, and borders lead to the maps displayed above.

Hazard and Demographic Assessment

People who live closer to oil/gas wells will generally be at a higher health risk because of the pollutants in the air. These risks include asthma, cancer, cardiovascular diseases, birth defects, and preterm birth. Furthermore, there is an increased risk for individuals near multiple wells. In other words, the more gas/oil wells in an area, the more pollutants there are in the air and the greater risk individuals are in those areas. All of these risks and damages have been prevalent in people living within 2.5 miles (Zhang, 2021). Close to 60% of each school type is affected at the highest buffer zone created in this document around gas/oil wells (only 1 mile). For adults, 100% of adult schools in the data set will be affected with a 1 mile buffer zone around wells. This means there is an additional 1.5 miles that is unaccounted for which could increase that percentage. On top of this, 75% of all gas/oil wells are within a 1 mile buffer zone created around schools. Further analysis should be done to see the population of schools within the extra 1.5 mile buffer distance since this is also where people could be affected by pollutants. It is unclear from the data what percentage of the total population is affected by oil/gas well pollutants, but it is clear that a majority of children or students are within the risk range of oil/gas wells.

Based on the demographic maps above, oil/gas wells are at the highest concentrations in low income areas and areas with high African-American populations. This means these individuals are at a greater risk and likely a disproportionately greater risk, than other types of individuals. It seems unfair that individuals are disproportionately affected based on race and income, however further analysis should be done to confirm the proportional effects rather than just basing this conclusion off of geospatial speculation.

Works Cited

Zhang, Huanjia. “Californians Living within Miles of Oil and Gas Wells Have Toxic Air.” *EHN*, 21 Oct. 2021, https://www.ehn.org/oil-and-natural-gas-industry-air-pollution-2655333610.html#:~:text=People%20living%20within%202.5%20miles,Science%20of%20The%20Total%20Environment.