



Population Density Near Kittanning Coal Deposits

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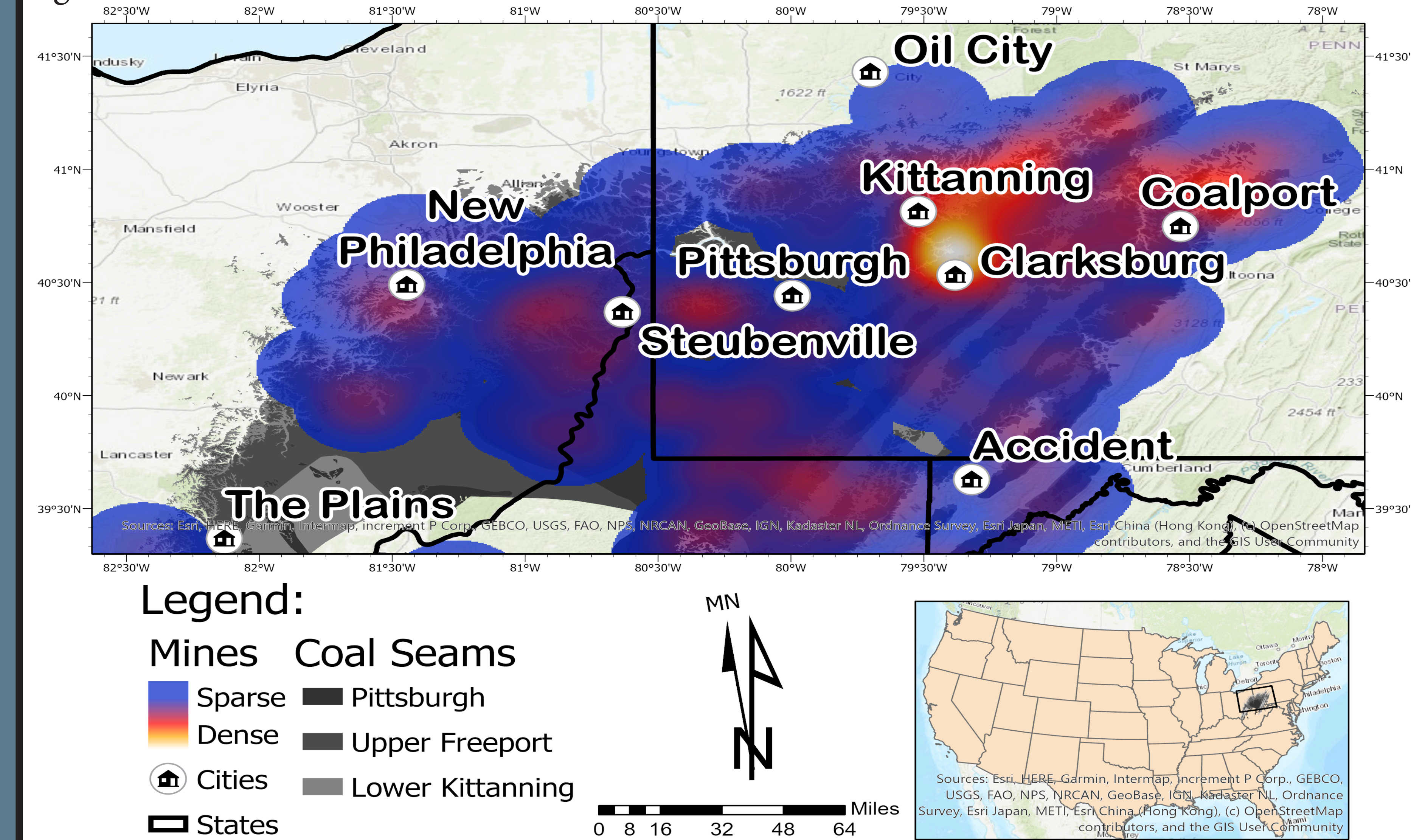
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1. Abstract

The Kittanning coal seams run underneath West Virginia, south-east Ohio, and southwestern Pennsylvania. It is part of a sequence that underlies the Freeport and Pittsburgh coals. All three seams are of Pennsylvanian Age. Of the seams in the Northern Appalachian Basin, the Kittanning has the among the largest extents. For that reason, it will most likely be the greatest influencer on population patterns. Since the early 1800s, the people of the region mined and used coal to produce their energy. As such, it is the goal of this research is to determine the spatial relationship between the economic coal sources and population centers.

Figure 1



3. Methods

Using the data sets from Ruppert, et al. [2], the areal extents of the coals were mapped, in addition to point data of mine locations. Data from a 1900 census [1] was used to best estimate the population during the peak coal mining in the 1800s. To compare population density to coal deposits, an assumption is made that the relationship is in proximity to mines, which are likely where seams are most accessible. The hypothesis is that those that live near historic coal towns should live within 5 miles of a coal mine. To test that hypothesis, the point mine data was converted to polygon data as a heat density map (Fig. 1). The Intersect tool was used to determine population within 5 miles of a mine.

4. Results and Discussion

Fig. 1 shows greatest concentration of mines in west-central PA. Minor concentrations appear in southeastern OH and where northern WV. The analysis produced population data that appears to be grouped by the density of the original data [1]. In several places, these points are overlaid with data from multiple counties. That is interpreted as portions of the population being grouped with the nearest common mine. A potential bias appears from choosing Kittanning, for which the coal is named, but is unfounded. In that region (Fig. 3A), less than 5% of the population lived near a coal mine. The Steubenville region (Fig. 3B) was slightly more concentrated, up to 8% of the population near a mine. The concentration of mines is lower than 3A, indicating a real trend. The last area of study is near Accident (Fig. 3C). Much of the population is on top of Kittanning coal, and at least 26% of the population was within 5 miles of a coal mine.

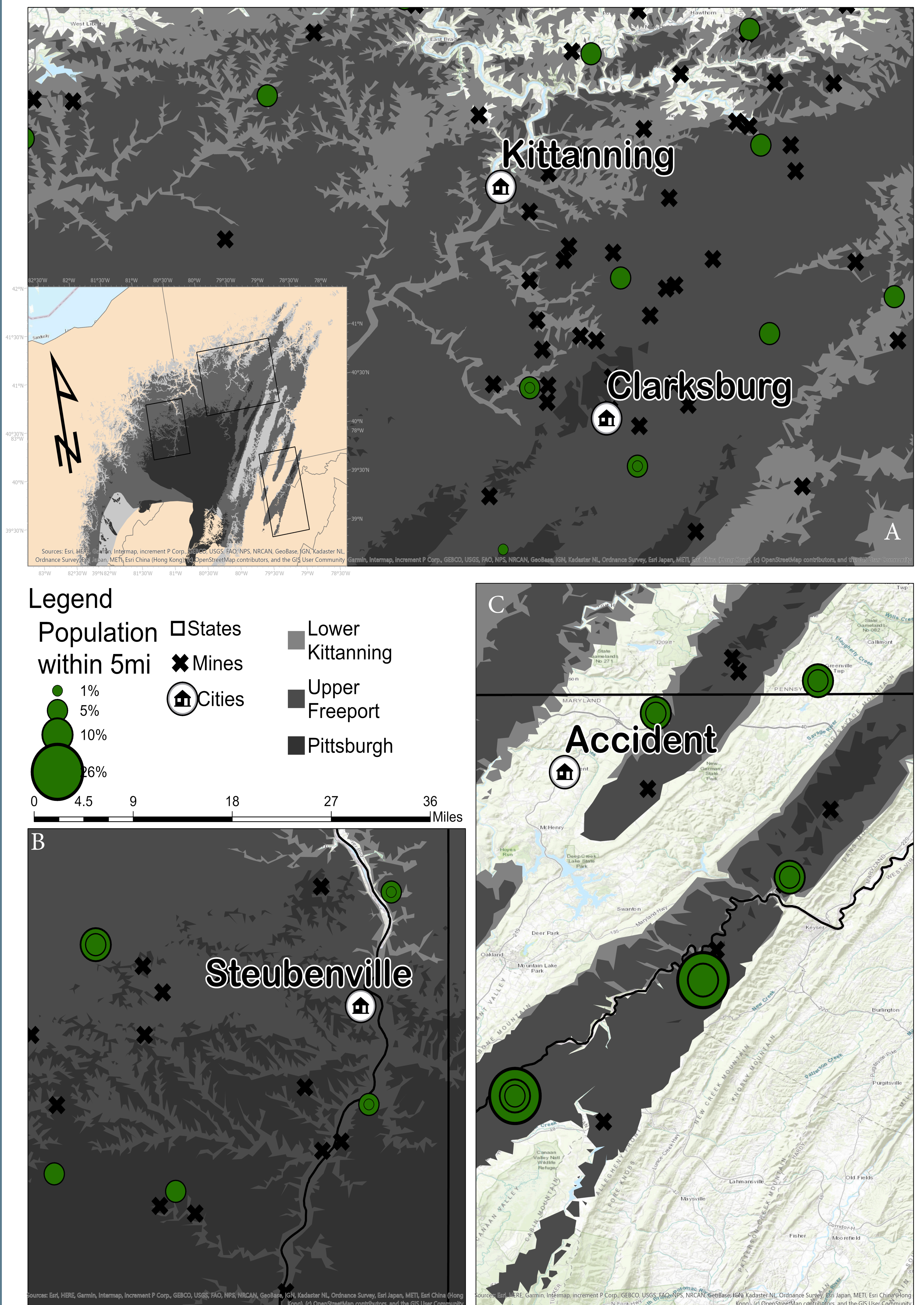
5. Conclusions

There is a slight relationship between coal sources and population. Heading south through the Basin, the concentration increases to roughly 1 in 4 people living within 5 miles of a mine. Pottsville mines and population are dense and further south. Future work may include studies of the southern coal seams, or a more sophisticated analysis of the NAB population density.

2. Background

The formation of the Appalachians created a large basin to its west, ultimately creating several coal deposits. Of interest are the Monongahela and Allegheny Groups (Fig. 2, right), which underlie the city of Kittanning. The Pottsville Group extends southwest of Fig. 1, outside of the study area, and is not considered.

SYSTEM	SERIES	GROUP	ASSESSED COAL BED or ZONE
PENNSYLVANIAN	UPPER	Monongahela Group	Pittsburgh coal bed
		Conemaugh Group	
	MIDDLE		Upper Freeport coal bed
		Allegheny Group	Lower Kittanning coal bed
			Fire Clay coal zone
	LOWER	Pottsville Group	Pond Creek coal zone Pocahontas No. 3 coal bed



6. Acknowledgments

The author wishes to extend his thanks to his faculty advisor, Dr. Gebremichael, for his help with this project. A second thank you must be extended to Ruppert et al. [2], without whom this data would not be digitized for research.

7. Sources

- [1] Esri_GeoInquiry_History (2015) [Online source]. US county population densities of 1900 (per square mile). ArcGIS.com. URL: <https://www.arcgis.com/home/item.html?id=9a263180b941d8480cd37d63670952b>. [March 2021].
- [2] Ruppert, L., Tewalt, S., and Bragg, L. (2002). Coal Resources of Selected Coal Beds and Zones in the Northern and Central Appalachian Basin. USGS Fact Sheet. URL: <http://pubs.er.usgs.gov/publication/fs00402> [March 2021].