

Mapping Food Deserts in Greenville County

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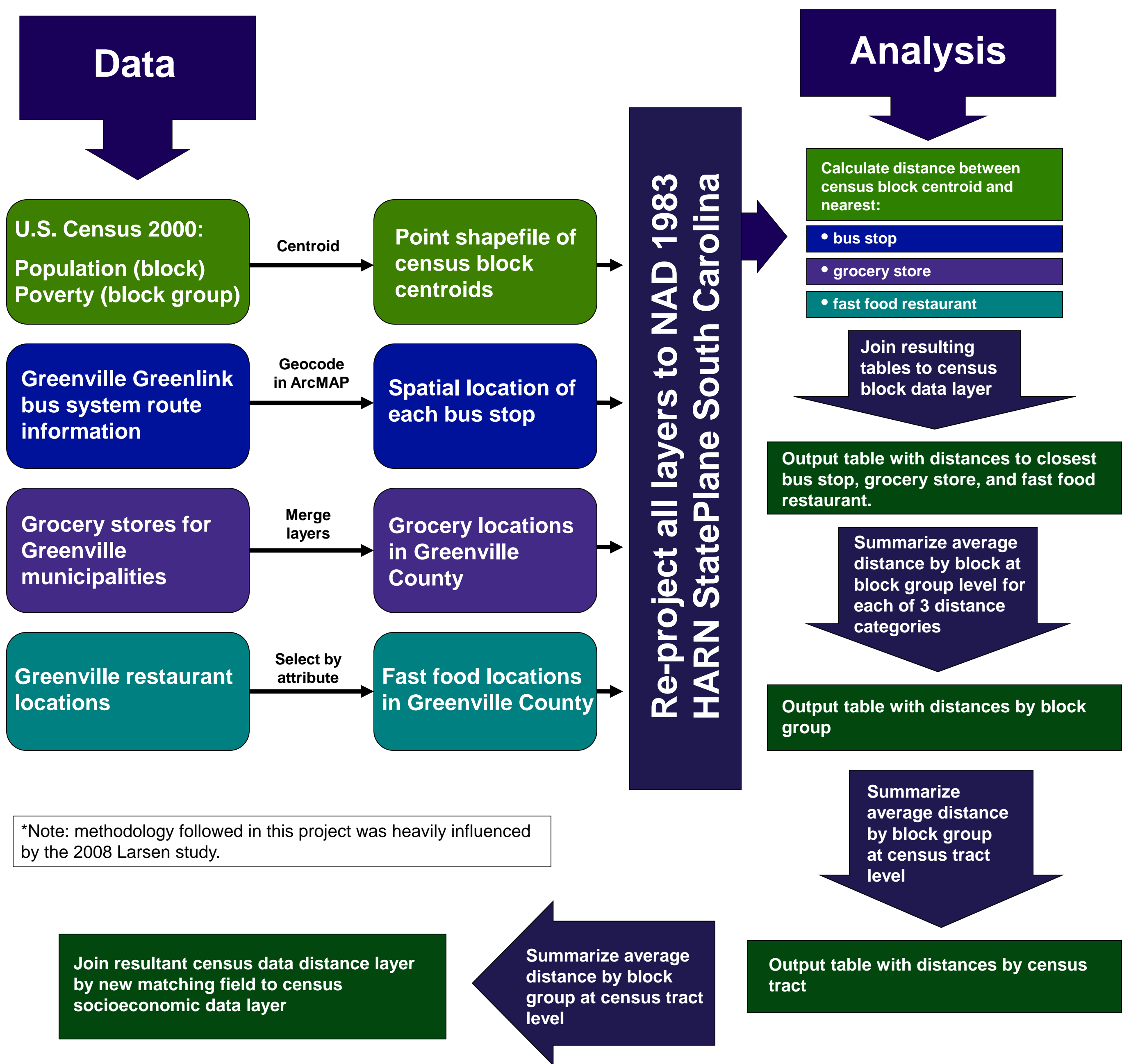
I. Abstract

In studying the effects of living in poverty in Greenville County, SC, it is important to recognize transportation and accessibility issues. In many large U.S. cities, “food deserts” have been identified in which there exist fewer healthy food options accessible to areas with poor residents. The primary objective of this project is thus to determine whether one or multiple food deserts exists in Greenville County, and, if so, where they are located. To determine whether such a desert existed in Greenville, I mapped the grocery store locations and chain fast food store locations in Greenville County against the poverty rates in each census tract in the county. The results from the centroid of each census block to the nearest food or bus facility shows no clear patterns for emergence of food deserts using county poverty as the measure.

II. Introduction & Objectives

Food deserts are geographic areas without appropriate access to healthy food items with reference to socioeconomic information, on the theory that lower-income communities have lower access to healthy foods, especially compared to their proximity to convenience stores and fast food vendors. One source more succinctly defined them to be “socially distressed neighborhoods with relatively low average incomes and poor access to healthy foods.” These food deserts have been developing over the last several decades, as big supermarket retailers followed wealth in its suburbanization. The convenience stores and fast food restaurants that have popped up in the wake of the exodus are often more available in the food deserts of low socioeconomic status (SES) areas. These new stores offer not only higher prices on food, but typically also unhealthy food – commonly causing significantly less consumption of fruits and vegetables and significantly higher consumption of sugary and fatty foods. This, too, is expensive, both to society at large and to the individuals affected, as poor eating habits are costly in relation to health and disease. The types of diets described in these areas have a high incidence rate of obesity, hypertension, diabetes, and other chronic diseases, and can even precipitate premature death. Therefore, the primary objective of my project was to evaluate the prevalence of this environmental justice issue in Greenville County by measuring accessibility of areas of higher poverty rates to grocery store and fast food restaurant locations.

III. Methodology



IV. Results & Discussion

Figure 1: Poverty Rate by Census Tract

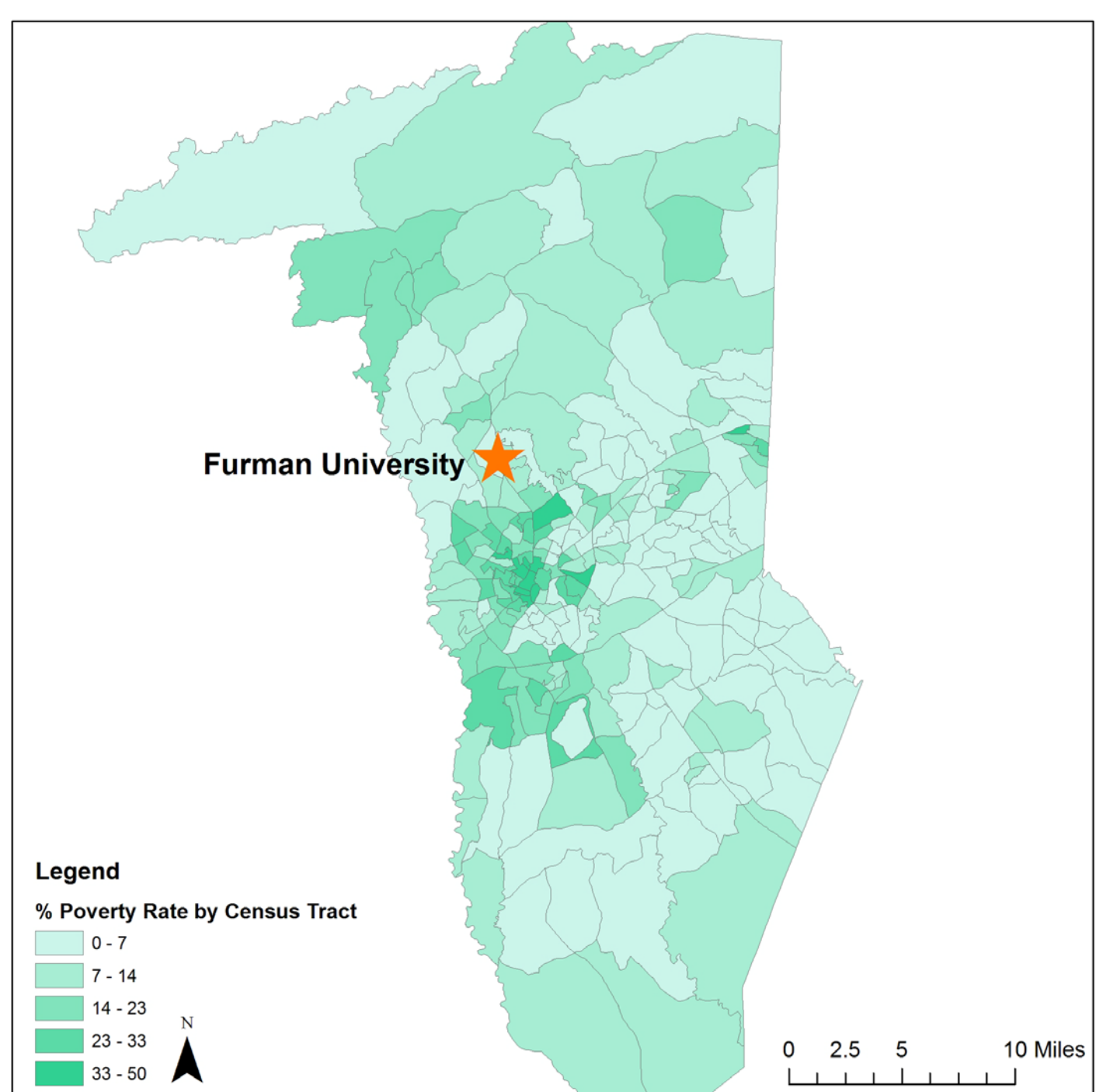


Figure 1 displays the rate of impoverishment in each census tract in Greenville County. The areas with the darkest shades represent areas with the highest percentage of inhabitants living below the poverty line, as calculated by the 2000 U.S. census. The areas with the highest poverty incidence rates seem to be urban, within the Greenville city limits.

Note: 1 mile = 5, 280 feet = 1.6 kilometers

Figure 2: Access to Bus Stops by Poverty Rate

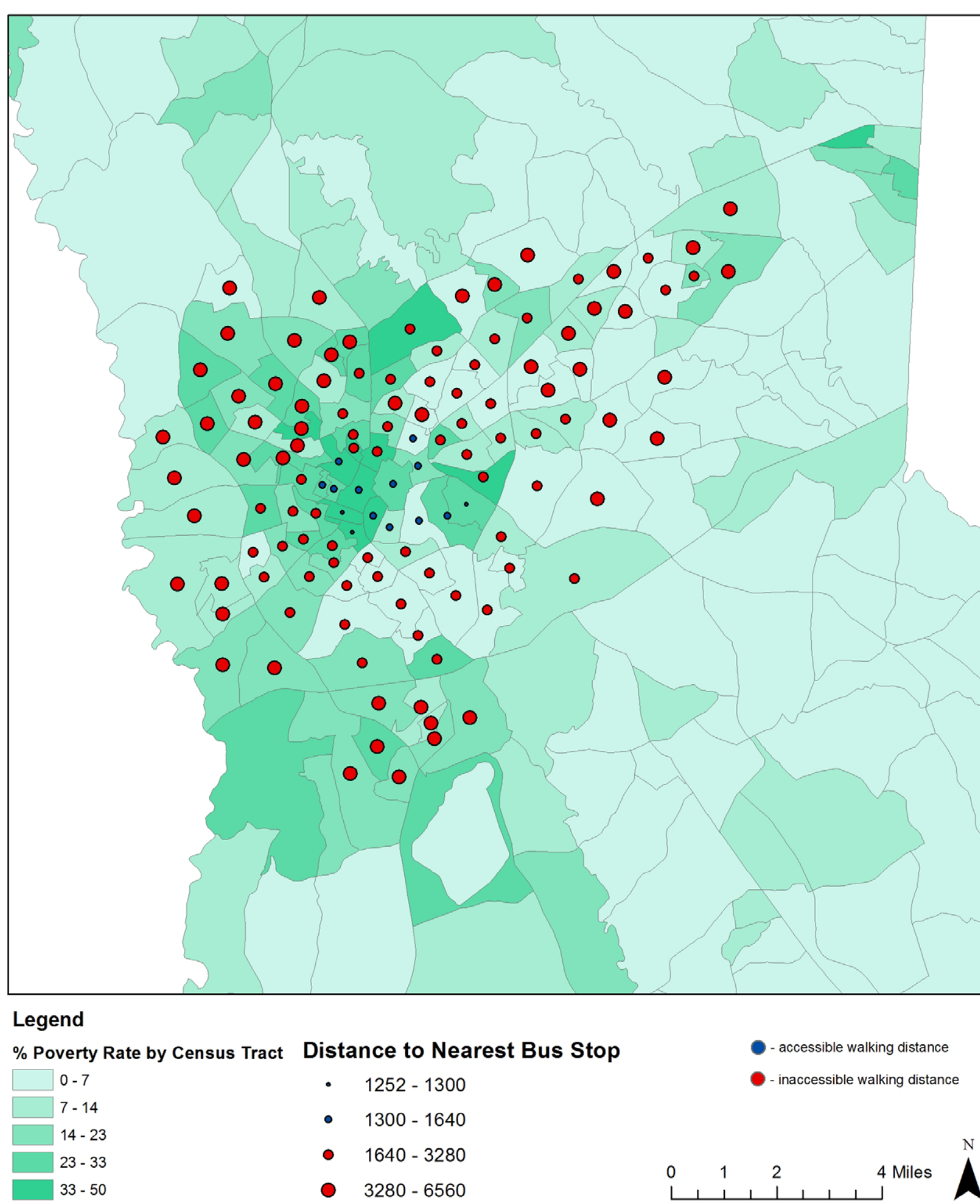


Figure 2 shows walking accessibility to Greenville Greenlink city bus stops, which is defined by distances less than approximately 1,640 feet (or 500 meters). The size of the circles increase with degree of inaccessibility, with red circles represents tracts lacking walking access to bus stops, on average by census block.

Public transportation accessibility is important for a number of reasons in this analysis. Although it was assumed that many households in impoverished areas would not have access to cars, it was also assumed that walking access to the public transportation system in Greenville would necessarily provide access to a grocery store at some stop along the route that was also within walking distance. Therefore, access to public transportation could eliminate what appears to be a the lack of access to grocery stores or fast food restaurants in those respective maps by walking alone.

Figure 3 shows the current Greenlink bus routes and stops. Due to a policy implemented in October 2009, riders are now only allowed to enter or exit the bus at the designated stops.

Figure 3: Bus Route and Bus Stop Locations

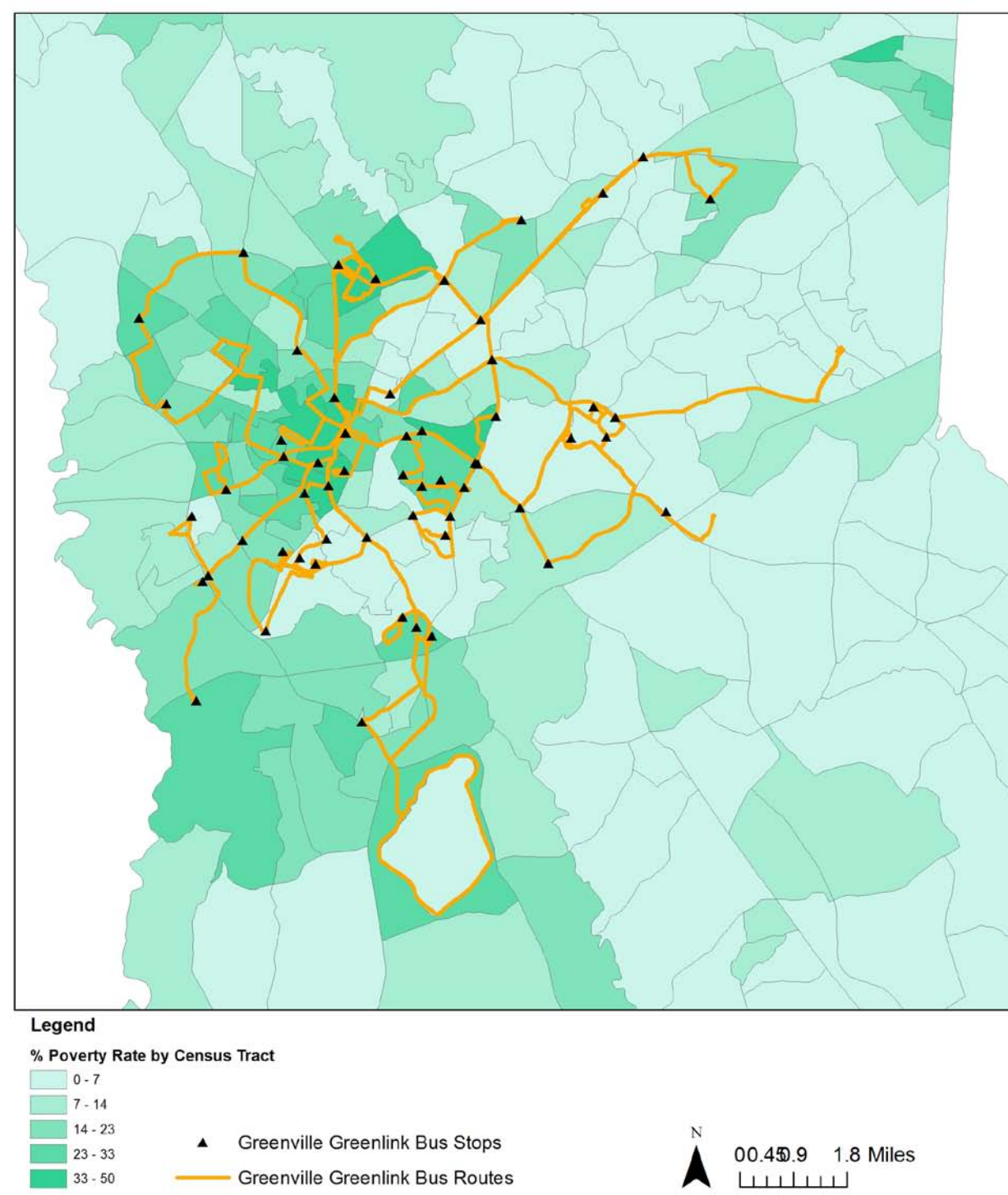
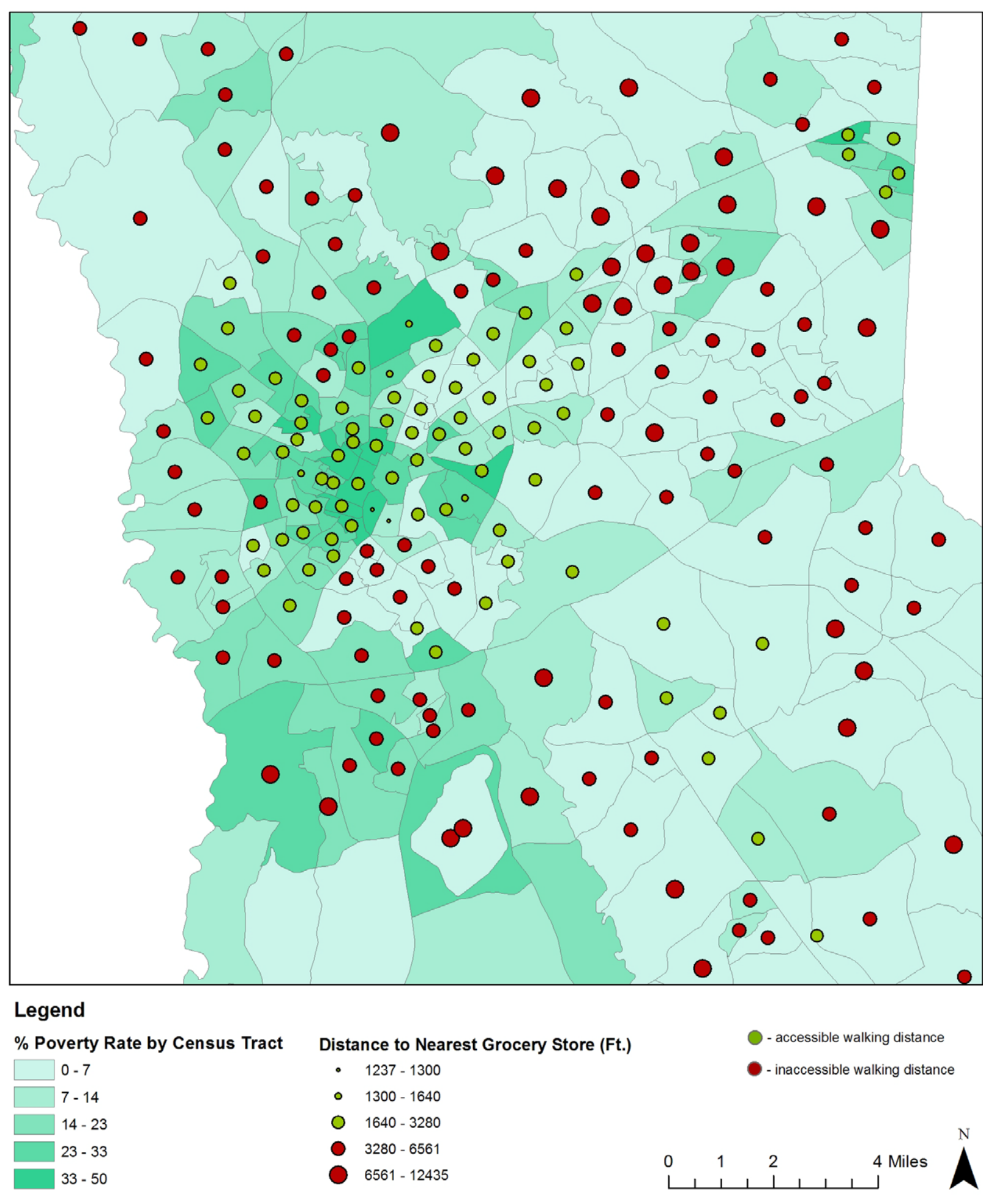


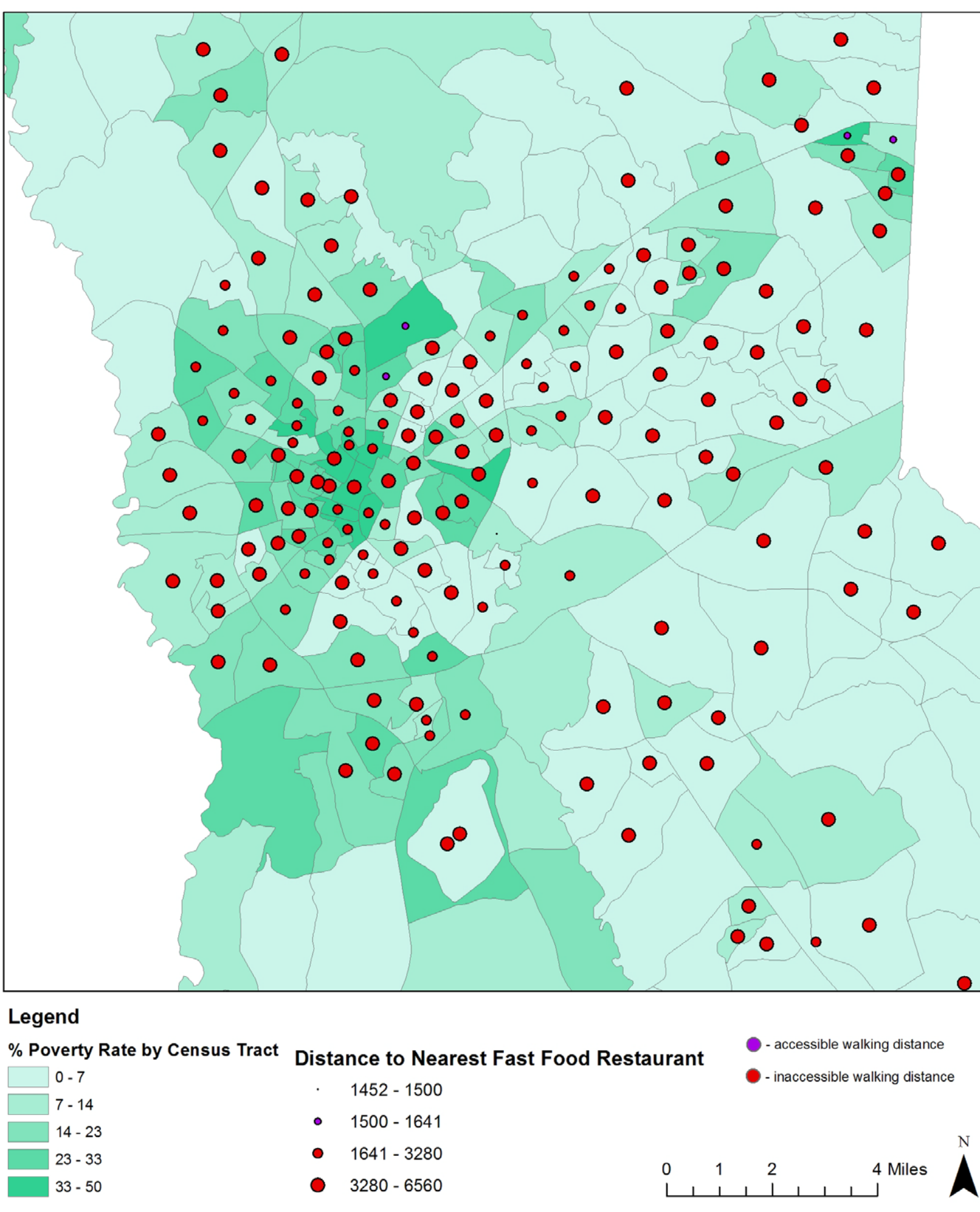
Figure 4: Access to Grocery Stores by Poverty Rate



Figures 4 and 5 show the accessibility to grocery stores and fast food restaurants by walking. Accessibility is calculated by a definition of less than approximately 1,640 feet (or 500 meters) as a reasonable walking distance. The size of the circle on each census tract represents the average distance to the nearest supermarket or fast food restaurant from the census blocks within that tract. Circles colored green denote that at least one store is within walking distance for tract residents, on average, while a red circle indicates that there is not walking accessibility to a grocery store or fast food restaurant, respectively.

Based on analysis of the resulting accessibility against the gradient of poverty rates, it seems that poverty level is not a good indicator of grocery store accessibility. Based on the current distribution, grocery store placement varies more with urban-rural differences; this may be skewed by the third-party data input into that particular data source. According to figure 5, displaying fast food access, it appears that there are very few census tracts that demonstrate walking access to chain fast food restaurants at all. 75% of the tracts showing access to fast food restaurants are also tracts with poverty rates over 25%, but since there are so few with access (only four within walking distance), this is perhaps too statistically insignificant to draw generalized conclusions about increased accessibility to cheaper and less healthy fast food restaurants in areas with higher poverty rates.

Figure 5: Access to Fast Food by Poverty Rate



V. Conclusions & Further Study

Based on the spatial analysis, distinct geographic areas with low accessibility to healthy food sources and higher poverty rates did not emerge. This suggests an absence of food deserts in Greenville County. An urban bias for grocery store location does seem to emerge. With regards to the bus accessibility information, it seems significant in some route locations to consider the importance of the bus riding policy change. Some areas, particularly south of the city of Greenville, appear to have both higher-than-average levels of poverty and a sparse distribution of bus stops. With an integrated spatial analysis and more bus stops in this area, it is likely that many of the red “inaccessibility” circles could be transformed to areas with accessibility.

Future research could run alternative spatial analyses integrating the public transportation access and walking access to facilitate a more nuanced depiction of real levels of accessibility for Greenville residents by census tract. It would be particularly interesting, given the recent change in bus policy, to measure the impact on accessibility the “scheduled-stops only” policy will have for poorer communities. Potentially, net accessibility to healthy foods, like in grocery stores, could appear dramatically differently.

Future research could also evaluate the pricing structure of the respective eating facilities and determine a foods accessibility analysis for the poorer areas of Greenville based on food cost and nutritional value. Another complementary research avenue would be to evaluate the geographic accessibility to recreational or exercise facilities for each census tract to evaluate the broader health accessibility issues in poorer communities.

VI. Acknowledgements

I am deeply indebted to Amelie Davis for her savvy assistance throughout the project in troubleshooting many complications, from classification and projection issues to obtaining the right data. I would also like to thank Dr. Suresh Muthukrishnan for his guidance and assistance in finding the appropriate data layers.

VII. References, Projection, and Data Sources

References: Larsen, Kristian, and Jason Gilliland. “Mapping the evolution of ‘food deserts’ in a Canadian city: Supermarket accessibility in London, Ontario, 1961-2005.” International Journal of Health Geographies 2008, 7:16. <http://www.ij-healthgeographics.com/content/7/1/16>.

Projection used: NAD 1983 HARN StatePlane South Carolina FIPS 3900 Intl Feet

Datum used: D North American 1983 HARN

Data sources: U.S. Census Bureau, www.ridgreenlink.com, Greenville Public Library’s Business and Company Resource Center research database, Jay Navarro’s Spring 2009 GIS project Greenville grocery data layers, Furman GIS Drive Server.