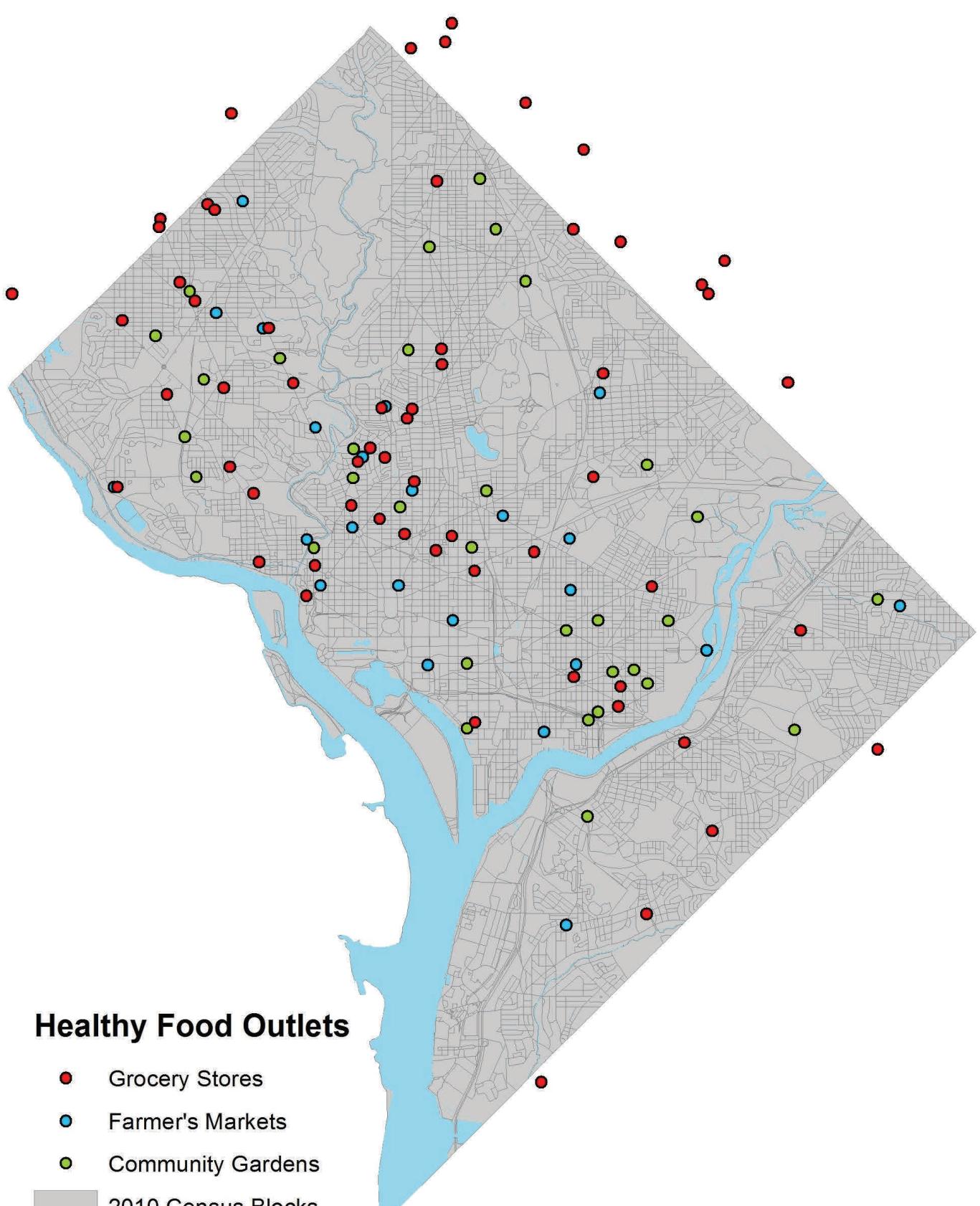
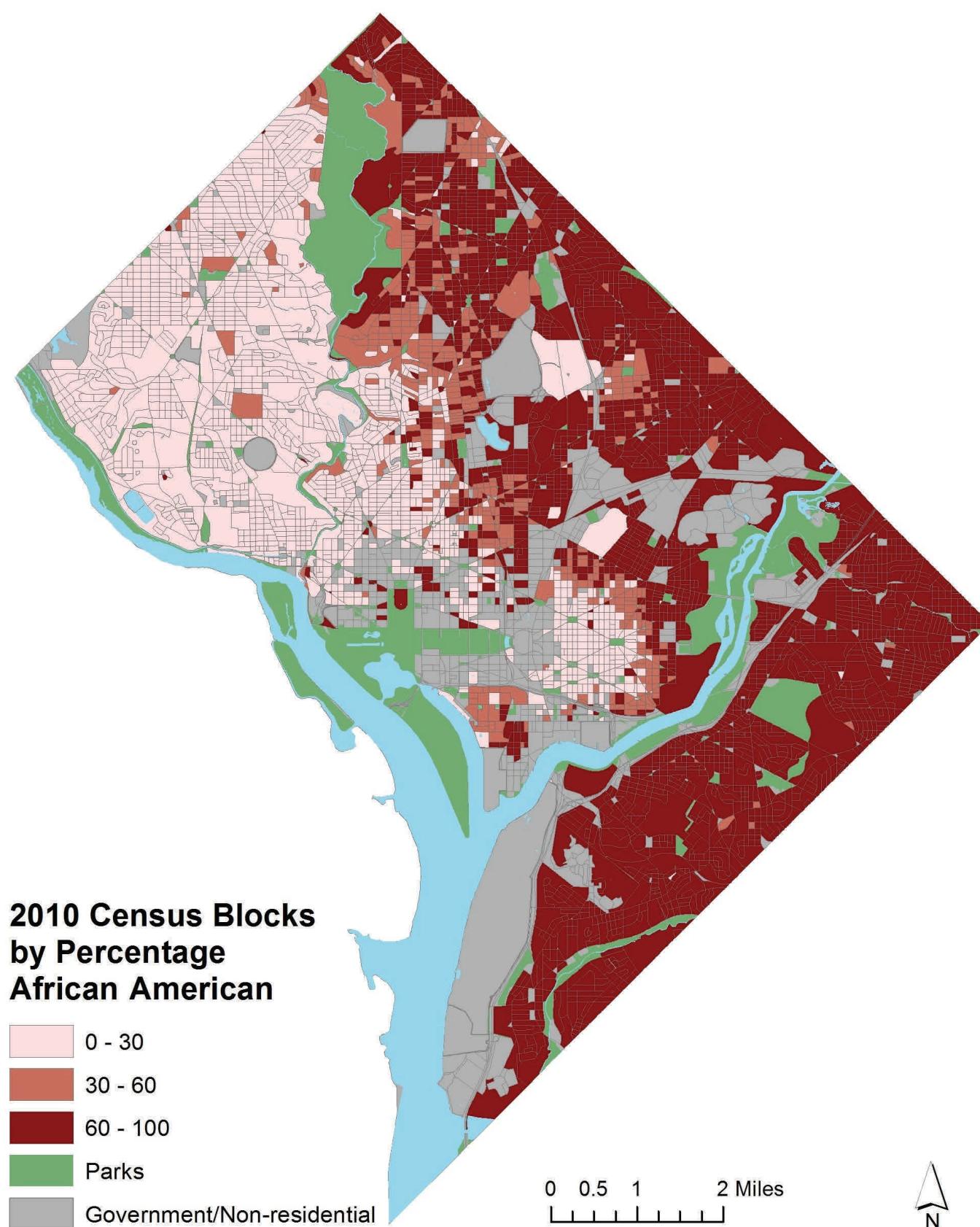


Food Access in Washington, DC: Current Conditions and Potential for Improvement

Background

Lack of access to healthy food is a major problem in America's cities, particularly in minority communities. These communities often lack healthy food outlets such as grocery stores, farmer's markets, and community gardens. People turn to convenience stores and fast food, which provide overpriced and unhealthy food choices. As a result, African Americans and Latinos are more likely than whites to suffer from obesity and related health problems like Type 2 Diabetes.

This lack of food access is a serious problem in Washington, DC, where the USDA estimates that over 10% of households are food insecure. DC remains a racially-divided city, and food deserts dominate in majority African American areas.



Goals

First, I will rate each 2010 census block based on walkable access to healthy food outlets. I will use these results to show the locations of food deserts in the city and the degree to which this problem disproportionately affects African Americans.

Second, I will identify the optimal locations for new grocery stores to improve food access for underserved communities.

Methodology

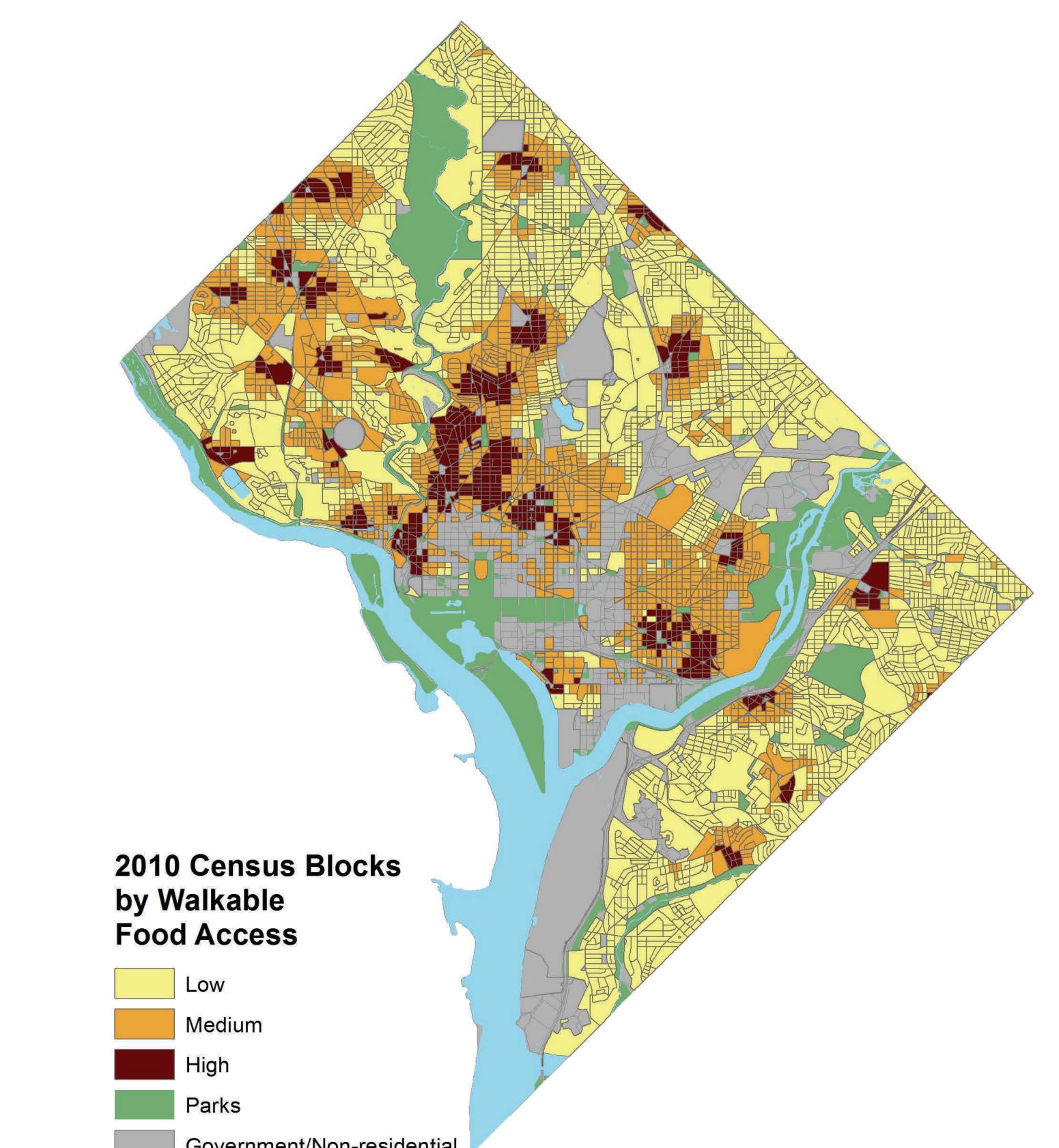
1) Rating Walkable Food Access

This assessment required finding each 2010 DC census block's distance to three types of healthy food outlets: grocery stores, farmer's markets, and community gardens. Layers for each outlet type came from the DC government. Using ReferenceUSA, I also downloaded all grocery stores in the Maryland zip codes bordering DC and created a shapefile using the XY coordinates. After selecting grocery stores that are within 1600m of DC, this file was merged with the DC grocery stores layer.

Using a road network from OpenStreetMap, the 2010 census block centroids as the origins, and the three food outlet types as the destinations, I created three OD Cost Matrices to find the distance from each census block to the nearest of each type of food outlet, with a cutoff of 1600m. After summarizing the resulting tables, I joined this data to the census block layer. Each census block was scored based on the closest food outlets:

| | Grocery Store | Farmer's Market | Community Garden |
|------------------|---------------|-----------------|------------------|
| <400m (1/4 mile) | 12 | 4 | 2 |
| <800m (1/2 mile) | 8 | 2 | 1 |
| <1600m (1 mile) | 4 | 1 | 0 |

For example, a census block with a grocery store 700m away and a farmer's market 300m away would be $8+4=12$ points. Census blocks were classified as Low (0-5 points), Medium (6-11 points), or High Access (12+ points).



A comparison of the maps of DC's racial makeup and of food access illustrates the racial disparities. A table created using the statistics function in the census block attribute table shows that African Americans are much more likely to live in lower food access areas.

Percentages of Black and Non-black Residents with Low, Medium, and High Food Access

| | Low | Medium | High |
|-----------|------|--------|------|
| Black | 64.7 | 26.9 | 8.4 |
| Non-black | 28.8 | 45.9 | 25.3 |

2) Recommended Sites for New Grocery Stores

This analysis identifies retail space that would provide the best locations for new grocery stores to improve food access for the maximum number of people, particularly African Americans.

Using data on existing retail sites from the DC government, I selected sites with at least 15,000 sq ft available, a minimum threshold for a viable grocery store. Using the census blocks layer from my previous analysis, I also selected census blocks with low and medium food access.

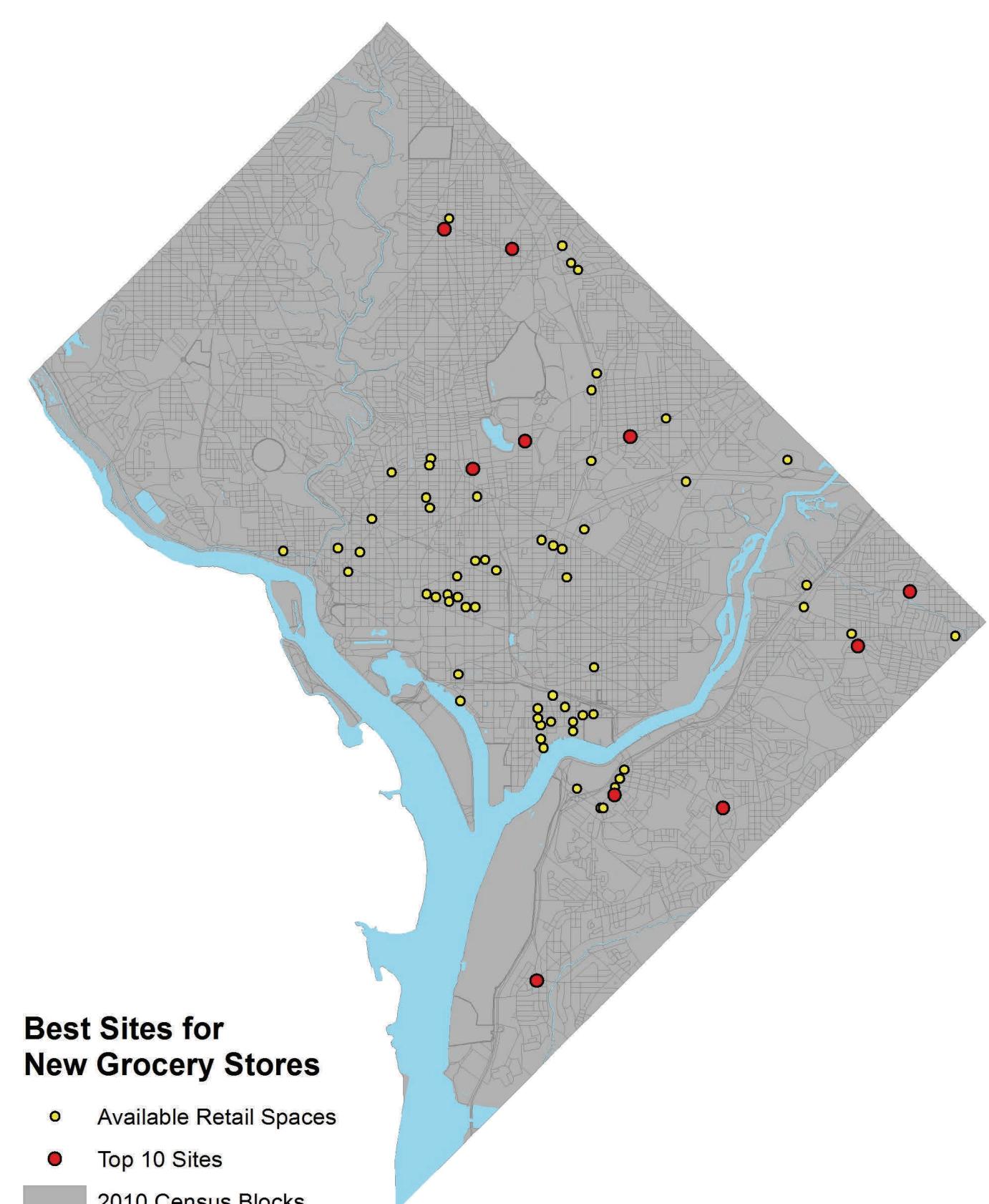
Using the suitable retail sites as the origins and census block centroids within 1600m as the destinations, I created a new OD Cost Matrix with rows for each route from a retail site to a block centroid. Each route was weighted based on distance and whether the census block is low or medium access:

| | <400m | <800m | <1600m |
|--------|-------|-------|--------|
| Low | 12 | 8 | 4 |
| Medium | 6 | 4 | 2 |

Each route was then given a score based on the formula:

$$\text{Weight} \times [(\text{Non-black population}) + 2 \times (\text{Black population})]$$

Routes were scored highest for being close to low access census blocks with high population (especially high black population). This table was summarized to find the total score for each retail site. The top 10 sites have been highlighted on the map below.



Cartographer: John Pollock, May 2012

Sources: Data.DC.Gov (Census Blocks, DC Grocery Stores, Farmer's Markets, Community Gardens, Retail); OpenStreetMap via MapCruzin.com (Roads); ReferenceUSA (MD Grocery Stores) Projection Coordinate System: Maryland State Plane NAD 1983 (meters)

I then updated the food access map to reflect having grocery stores at each of these 10 locations. Opening these stores would significantly improve food access for African Americans living in DC, as summarized in the following table.

Projected Percentages of Black and Non-black Residents with Low, Medium, and High Food Access

| | Low | Medium | High |
|-----------|------|--------|------|
| Black | 51.2 | 37.6 | 11.2 |
| Non-black | 26.1 | 48.1 | 25.8 |

Conclusions and Limitations

Large sections of Washington, DC are not served by healthy food outlets. Many residents, particularly African Americans, do not have walkable access to healthy food. A relatively small number of new food outlets, if properly sited, could significantly increase access for these underserved communities.

My analysis faces several limitations. While I had access to data on Maryland grocery stores near the DC border, I did not have comparable data for farmer's markets or community gardens. In rating access to food, the weights used were somewhat arbitrary and could not fully distinguish between the quality of different food outlets. In addition, this analysis focused on walkability and did not incorporate mass transportation access. However, while this assessment is imperfect, I believe it gives an accurate general picture of food access in DC.

In addition, the analysis on suitable grocery store locations faces two main limitations. First, it only uses existing retail spaces, while it is also possible to build new structures. Second, its only criterion for suitability is expanding food access to underserved populations, whereas a grocery store would use business criteria to find the best location. However, I believe my analysis is a good starting point for examining ways to improve food access in DC.

