

FINDING FRESH FOOD:

A SITE SUITABILITY ANALYSIS FOR FARMERS' MARKETS IN THE BOSTON AREA

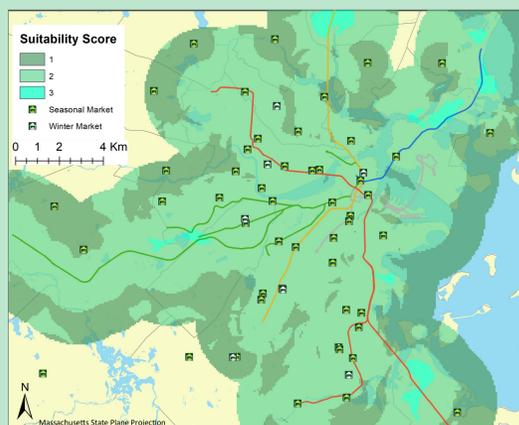
Motivation

Farmers' markets have gained popularity in the past decade, and have been thought to be ways to mitigate a wide range of social issues, from food insecurity, obesity, climate change, and community disinvestment.

This project will model a decision making criteria for where to locate a new farmers' market in the Boston area. This model will explore how to compare different areas for their suitability for a farmers market location evaluated by proximity to a T stop, distance from a current farmers' market, and located within a highly populated area (exact definitions can be found in Results section). While these are certainly not all of the criteria for choosing a farmers' market location, this model will provide a way to compare multiple sites according to these criteria. Choosing a location close to both a T stop and a highly populated area makes the farmers' market accessible to people who work in or commute through the area, as well as residents. Making sure that a new farmers' market is not too close to an already existing farmers' market prevents oversaturation of the market and hopefully prevents markets from stealing customers from each other, keeping the markets profitable for farmers.

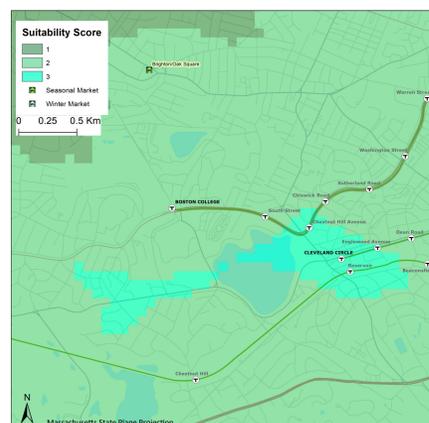
Methodology

In order to make this assessment, the distance from the three criteria-T stations, existing farmers' markets, and highly populated areas—were calculated and buffers were applied to the map. Highly populated areas were calculated by dividing census population data by land area. Although in practice the distances mapped may require mediating conditions, such as sidewalks, to be traveled, this model only accounted for straight line distance. Distances were then reclassified so that favorable features received high scores. The scores for each location were then combined using map algebra to generate an overall score. All features were weighted evenly, as they were all deemed to be equally important to the success of a new market.



Desirable Locations

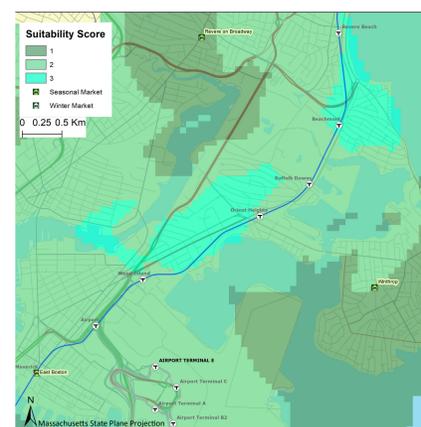
Cleveland Circle



One of the areas with a highly favorable overall score is shown to the left. This area is near the Cleveland Circle T-station. It also meets the other model criteria of being in a highly populated area and far from an existing farmers' market. The overall score of 3 shows that this location did well in all categories. Comparing this location with Google Street View shows that there is a park in this area that could provide an appropriate amount of space for a farmers' market, providing support for the model producing logical results.

High Population Density	Proximate to T station	Far from existing market
✓	✓	✓

East Boston



Another area with a highly favorable overall score is shown to the right, an area near East Boston by the Orient Heights T stop. It meets all of the criteria in the model: in a highly populated area, far from an existing farmers' market, and near a T station. Comparing this location with Google Street View provides support that this is a high-traffic residential area, providing more evidence for the model as a functional decision making criteria. There is a park in this area as well that could provide an appropriate amount of space for a farmers' market.

High Population Density	Proximate to T station	Far from existing market
✓	✓	✓

Results

This model successfully demonstrated a decision making criteria for where to locate a new farmers' market in the Boston area. To receive a score of 3, locations had to be more than 1800 meters from an existing farmers' market, less than 1000 meters from a T station, and in an area with a resident density greater than 20000 residents per 500 meters. As shown in the map to the left, there are very few places that meet this criteria in the Boston area. While the areas that received a score of 3 should be considered as potential sites for new farmers' markets, the data may be indicating that the Boston area is becoming oversaturated with farmers' markets. This is especially problematic because not only are farmers' markets intended to serve customers, but they are a crucial marketplace for farmers, providing them with a direct

link to consumers. An oversaturation of the market could mean that fewer customers attend each market, thus lowering sales and the economics incentives of farmers to attend these markets or their ability to make a profit.

On the other hand, farmers' markets do provide customers with access to fresh fruits and vegetables, serving an important purpose not only as markets but as providers of healthy food options and community development. When discussing access, it is important to note that most of these markets are seasonal and are only available to customers 1-2 days per week.

Model Evaluation

This model successfully shows a pilot decision making criteria for where to place a new farmers' market. However, it did lead to some logical inconsistencies. For example, water bodies were not accounted for in the model, so there are situations, as seen in the Desirable Locations maps, where areas that are in rivers or lakes are deemed highly favorable locations for farmers' markets. There are also other criteria for where to locate a new farmers' market that would ideally be taken into account, including proximity to major roads so that farmers can drive in, the availability of enough open space to host a market, and perhaps a way to measure need or demand in the neighborhood. The model could potentially be improved by adjusting the reclassifications of the features that were evaluated, perhaps being more generous to which locations receive high scores to analyze the suitability of more sites. Additionally, certain features could be weighted differently in the map algebra if one were determined to be more crucial for the success of the market than another. Further research could use this model to examine the suitability of existing market locations as favorable sites for a market, by removing markets and running the model again.

References

- Google Maps: Street View. Accessed April 29, 2019.
- MassGIS Data: Farmers' Market, 2016 Mass Department of Agricultural Resources. Accessed April 9, 2019.
- MassGIS Data: MBTA Rapid Transit, 2018 Central Transportation Planning Staff. Accessed April 9, 2019.
- United States Census, Population and Housing Unit Counts - Blocks, 2010, accessed April 9, 2019.
- Pearson, A. Wilson, N. 2013. Optimizing locational access of deprived populations to farmers' markets at a national scale: one route to improved fruit and vegetable consumption?. PeerJ.
- Widener, MJ, et al. 2011. Dynamic urban food environments: a temporal analysis of access to healthy foods. American Journal of Preventative Medicine.

Primary data for this study were obtained from the MassGIS Database and the 2010 US Census. There are some notable concerns about the data, such as missing data from the Farmers Market dataset, as this only includes markets that are registered with Massachusetts Department of Agriculture and shows mobile markets as existing in only one location. Also of note, the Census data is nearly a decade old, and may no longer accurately represent the situation. However, these data were the most authoritative sources available.

Cartographer

Maps and poster designed by Maggie O'Connor as part of NU-TR231: Fundamentals of GIS, Tufts Friedman School of Nutrition Science and Policy. May 2019.

