Boston's Produce Aisle on Wheels: The Fresh Truck

A GIS Framework for Fresh Truck Expansion to Serve Older Adults

Introduction

Since 2013, Boston's Fresh Truck has been selling produce out of a truck in neighborhoods across the city. The Fresh Truck serves community members of all ages, but offers a unique benefit to older adults. Older adults may have mobility limitations, so the Fresh Truck's ability to stop along easily walkable roads and within walking distance (500 meters) of highly populated residential areas is particularly important. The Fresh Truck is also unique in that it accepts two forms of government food assistance, Famer's Market Nutrition Coupons and the traditional EBT/SNAP benefits card.

This analysis looks to identify possible new stops for the Fresh Truck that would serve older adults in particular, by considering current access to Farmer's Market produce as well as the residential density of older adults. Although this analysis is located only in Boston, a similar framework could be applied to other cities and demographics.

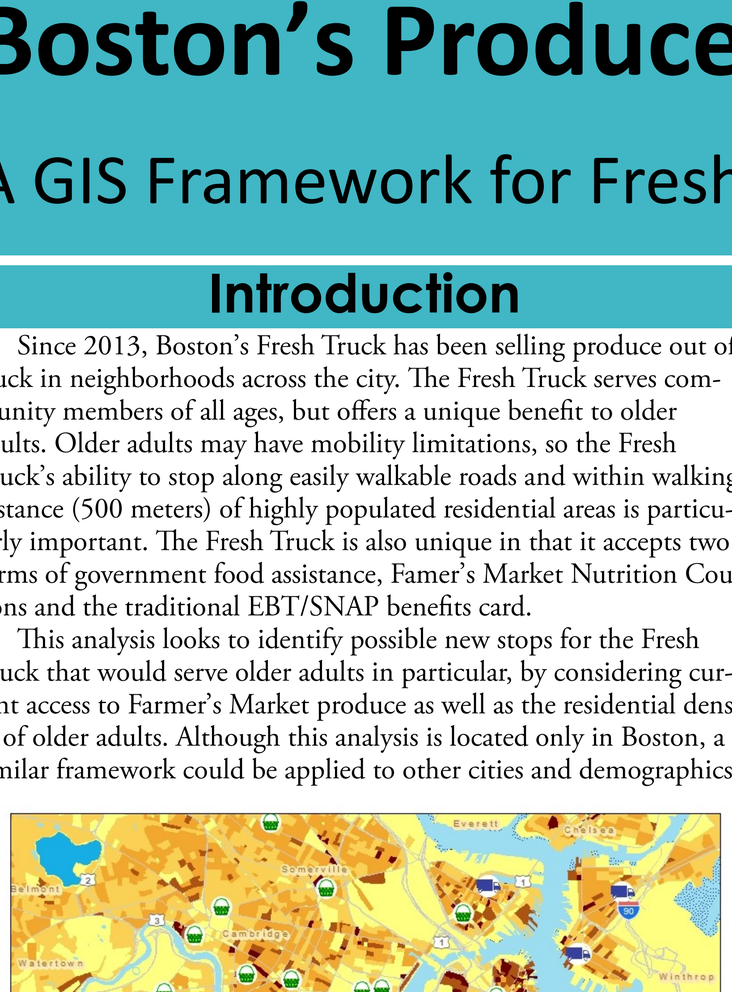


Figure 1. Current Produce Markets and Residential Density of Older Adults
The map above shows the existing Fresh Truck stops as well seasonal and year-round stationary Farmer's Markets, overlaid on the density of residents 60 years and older data from the 2010 census by census block.

Methods

Data Sets

Three datasets are involved in this suitability analysis: current Fresh Truck stops, current stationary Farmers Markets, and census data by block group from 2010. A Fresh Truck stop shape file was created by mapping and projecting the latitude and longitude of current Fresh Truck stops. The farmer's market dataset is released by the Massachusetts Department of Agriculture and was last updated in 2016. The attribute that noted year-round or seasonal status was particularly important for this analysis, as year-round and seasonal farmer's markets were weighted differently in the rasterization model.

The third dataset used was age data by census block, collected via the US Census in 2010. Population by age was split up into sex and age categories; the population over 60 of both sexes was summed to make a new attribute reflecting the total population age 60+ per census block. Figure 1, to the left, shows the density of older residents by census block. Given that Boston is an urban area, the census blocks are small enough that using residential density is likely reflective of the true dense areas of older residents.

Analysis

Three scoring criteria were used to evaluate the suitability of a new stop location. Criteria 1 reflected the residential density of older adults in each raster cell, assuming that residents were distributed equally throughout the census block. This criteria was weighted highest because of all the factors, proximity to older adults is the most important feature to maximize impact of a new Fresh Truck stop targeted at older adults.

Criteria 2 scored each cell based on proximity to year-round farmers markets. Highest scores were given to areas more than 1,250 meters from an existing year-round market; areas within 500 meters were considered well-served and therefore not suitable for a new Fresh Truck stop.

Criteria 3, weighted least, considered the Euclidian distance from existing seasonal farmers markets. This was not weighted as heavily because they do not reflect consistent access to produce for nearby residents, as many only run six months of the year.

Figure 3. Possible Newtown Stop
In Newtown, the model identified relatively large swaths of underserved areas that may benefit from a Fresh Truck stop. While there are multiple public places that could accommodate a Fresh Truck Stop, Shublow Park near the Chiswick Road Green Line T Stop may be a good location. A stop at this location could serve the model's estimated 775 older adults living within a 500 meter radius of the stop.

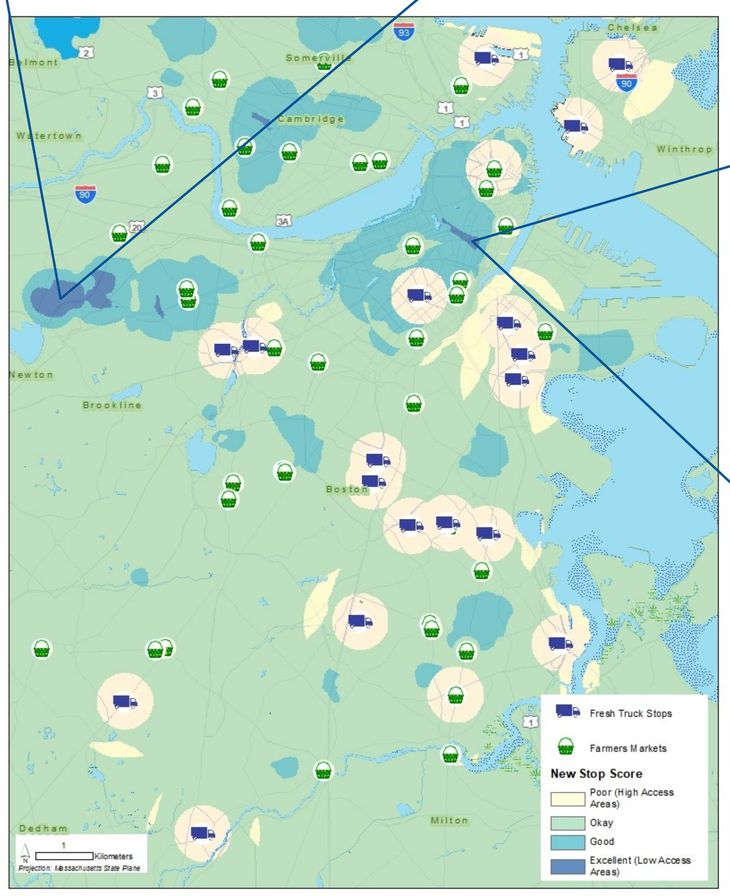


Figure 2. Possible New Stop Locations for the Fresh Truck
The model identified four possible areas to investigate further for Fresh Truck Expansion: two in Newtown, one in Cambridge, and one in downtown Boston.

Results

The model produced four areas that may be suitable for a new Fresh Truck stop aimed at older adults age 60+. Figure 2 depicts these areas, all North of Boston, in dark blue. Each dark blue cell represents an area that the model classifies as (1) not currently served by a farmers market or Fresh Truck stop, and (2) accessible to 650 or more older adults within a 500 meter radius.

These high impact areas represent, according to this model, locations where there is high need for farmers markets and no current facility fulfilling that need. Of these four areas, two were investigated further in Figures 3 and 4. Additional investigation using google maps revealed possible places that the Fresh Truck could stop in these high impact areas.

Discussion

This model maps three of the foundational attributes that would likely be important to consider when creating new mobile market stops aimed at those ages 60+. The model, however, makes multiple assumptions that may not hold in practice.

First, the model assumes that those age 60+ are evenly distributed throughout census blocks, which may or may not be the case. This is likely an adequate assumption for a densely populated area like Boston where the census blocks are relatively small, but in other less populated areas, this assumption may lead to results that are not useful.

The model also assumes that all residents age 60+ would equally benefit from a Fresh Truck stop, which is also likely not true. Residents at age 60 are likely more mobile and able to travel farther distances for their food than residents above age 80. Possible expansions of the model could further segment the population by age to find those with the most need.

It is also important to note that the map in Figure 1 over represents the availability of farmers markets and Fresh Truck stops, because each location only runs for a few hours one or two days of the week. This means that the model likely overestimates total access to farmers markets, because individual schedules may prohibit residents from visiting a market or Fresh Truck stop even if proximity or walkability does not.

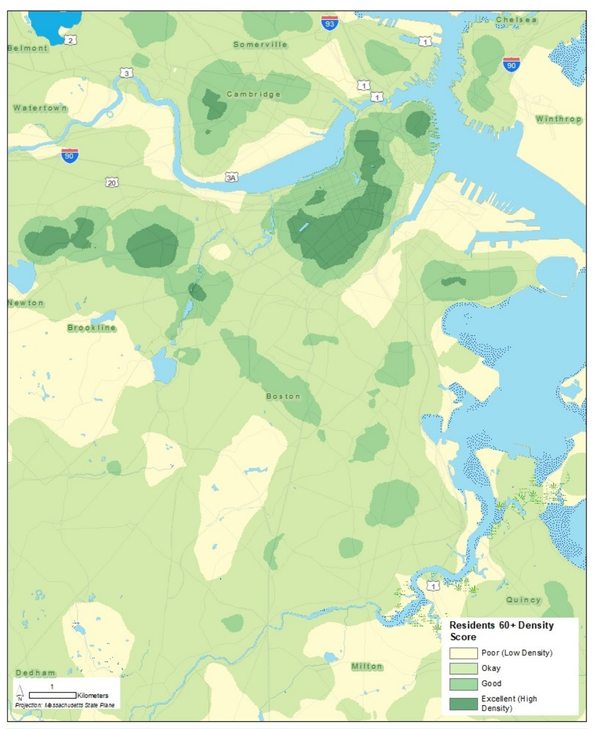
Nonetheless, this model provides a starting point for analysis of new locations for mobile market stops to serve residents over the age of 60.

Figure 4. Possible Chinatown Stop
In Chinatown, the model estimates that 790 older adults could be served by a Fresh Truck stop. Despite having higher residential density than the Newtown stop, there are no immediately clear public spaces that could accommodate a Fresh Truck stop in this location.

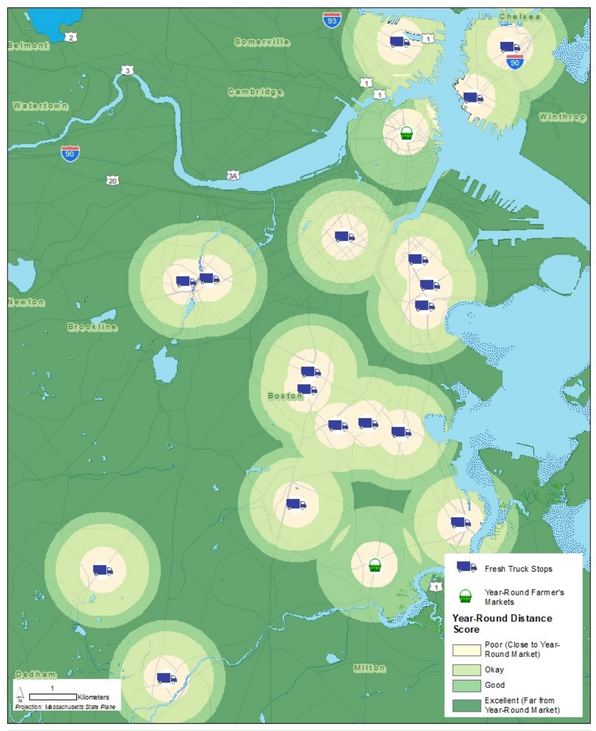
Conclusion

The purpose of this project was to use census data, existing stationary farmers markets, and existing Fresh Truck stops to evaluate possible locations for Fresh Truck expansion to serve older adults in particular. The model identified four areas of high need, as shown in dark blue in Figure 2. Possible future work could evaluate the utility of this model in a more suburban area, among different age groups. It may also be useful to expand the model to compare market access by day of the week, or by season, as both of these could change the highest need areas.

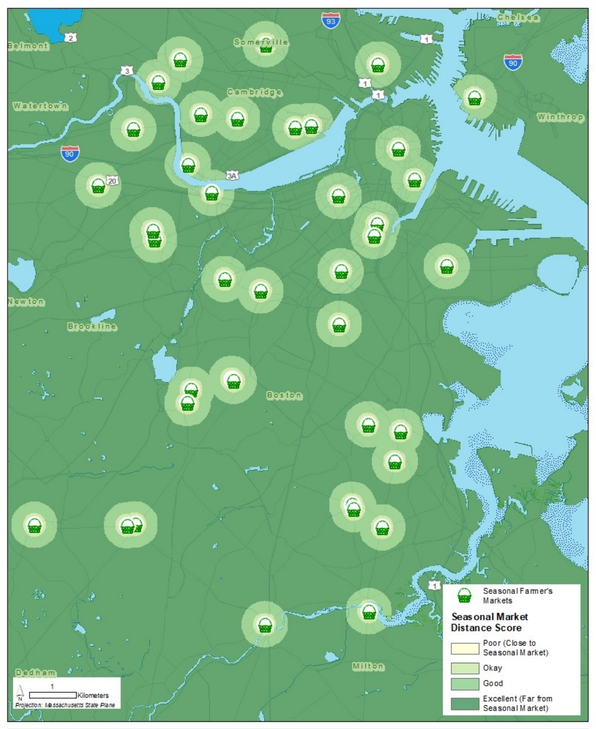
Scoring Criteria



Criteria 1. Residential Density of Older Adults
Each cell received a raster score based on the number of residents age 60+ in a 500 meter radius of each cell. The maximum cell value was just over 1,000 residents age 60+. Any cell with a value above 650 people was rated excellent.



Criteria 2. Distance to Year-Round Markets
Each cell received a raster score based on Euclidian distance to either Fresh Truck stops or year-round farmers markets. Cells outside of a 1,250 meter radius from existing markets received an excellent score.



Criteria 3. Distance to Seasonal Markets
Each cell received a raster score based on Euclidian distance to seasonal farmers markets. Because these markets contribute less access because of their seasonality, they were weighted lowest. Cells outside of a 750m radius were rated excellent.

Gabrielle Casutto

Tufts Friedman School of Nutrition Science and Policy
NUTR 231: Fundamentals of GIS
May 8, 2019

DATA SOURCES:

Farmers Markets: MassGIS Farmers' Markets, June 2016, MA Department of Agricultural Resources, published by MassGIS at https://docs.digital.mass.gov/dataset/massgis-data-farmers-markets, accessed April 9, 2019.

Fresh Truck Stops: Fresh Truck Stops Winter Schedule 18-19, March 2019, Fresh Truck Boston, converted to shapefile by Gabrielle Casutto using addresses found at http://www.freshtruck.org/wp-content/uploads/2018/12/Winter-Schedule-18-19-_-English-_-beginning-12.10.2018.pdf

Census blocks and demographics: Steven Manson, Jonathan Schroeder, David Van Riper, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 13.0 [Database]. Minneapolis: University of Minnesota. 2018. http://doi.org/10.18128/D050.V13.0, accessed April 9, 2019

IMAGES:

Truck Icon: https://pixabay.com/illustrations/truck-vehicles-transport-lead-1918551/

Food Basket Icon: https://pixabay.com/vectors/basket-green-plastic-container-312684/

Street Views: Google Maps Street View, accessed May 1, 2019