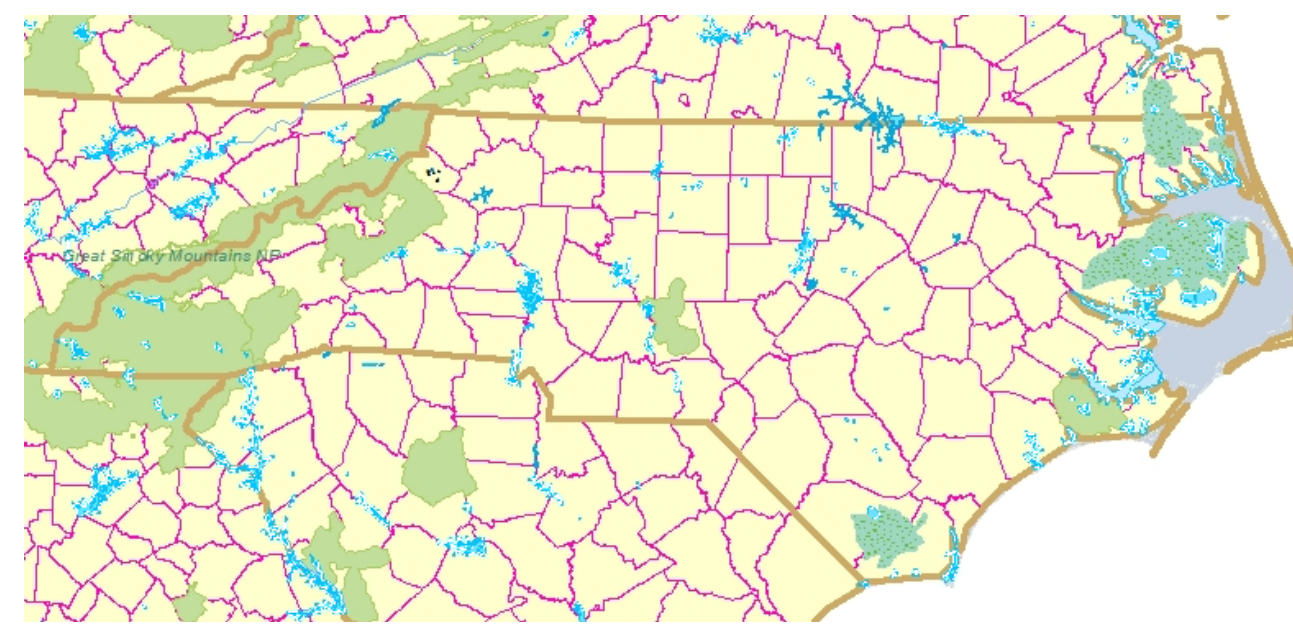# Food Environment in the Lost Province
Evaluating Mobile Market Locations in Watauga County, NC

Background

There is a well-documented connection between limited food access and chronic disease outcomes, particularly in rural communities. However, analyzing food security in rural areas and creating solutions to increase food access isn't a simple undertaking. This project aims to assess the food environment in rural, low-income Watauga County, NC - focusing particularly on the town of Boone, NC and the surrounding area – aiming to demonstrate the practicality and limitations of assessing food access by applying mapping tools. Watauga County is part of a dense mountainous area of the Southern Appalachian Mountains known as the Lost Province. Due to its isolated location, there is need for improved food access in this area; 22.8% of children in Watauga County live in food insecure homes and 27% of the total population is obese[1].

Methodology

This model contains:
- · Population Density
- · Grocery Store Locations
- · Park Locations
- · Walking Radii around Potential Mobile Market Locations

The primary spatial mechanism explored by this model is how many greater Boone area residents are in a 1km walking distance from two proposed mobile market locations. A 1km walking distance was chosen because this is the distance a person can walk in about 10 minutes, which is considered feasible for a rural area[2]. The model is based upon walkability because there is no public transit available in Watauga County. Furthermore, walkable access to fresh food retail has been associated with a decrease in obesity[3]. Using grocery store data from ReferenceUSA and demographic data from the 2010 Census, the model aims to demonstrate the current food environment in Watauga County. To evaluate the suitability of potential mobile market locations, GIS raster tools, such as Reclassify, Polygon to Raster Conversion, and Euclidean Distance, are used to determine possible locations based on three important factors: (1.) Distance from existing grocery stores, (2.) Proximity to densely populated Census blocks, and (3.) closeness to local parks to encourage walking patrons[4]. The Raster Calculator was then applied to obtain an overall suitability score for two mobile market locations.
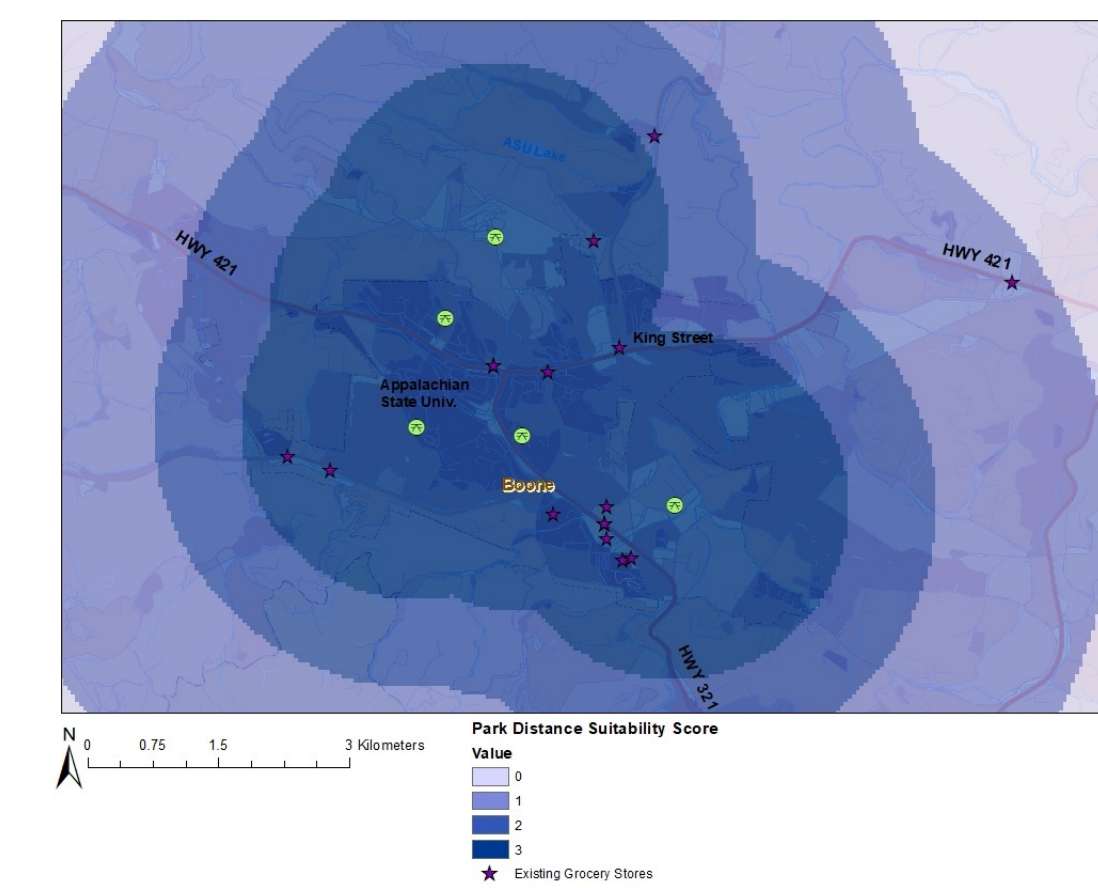
Alexandra Cross, May 2018

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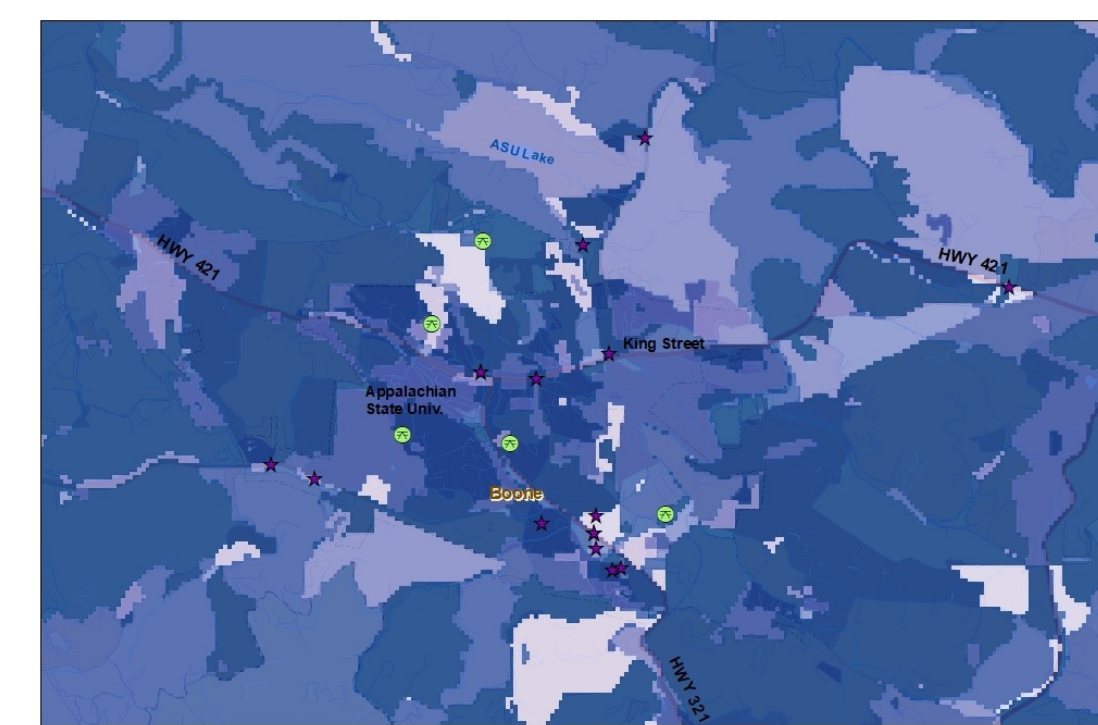
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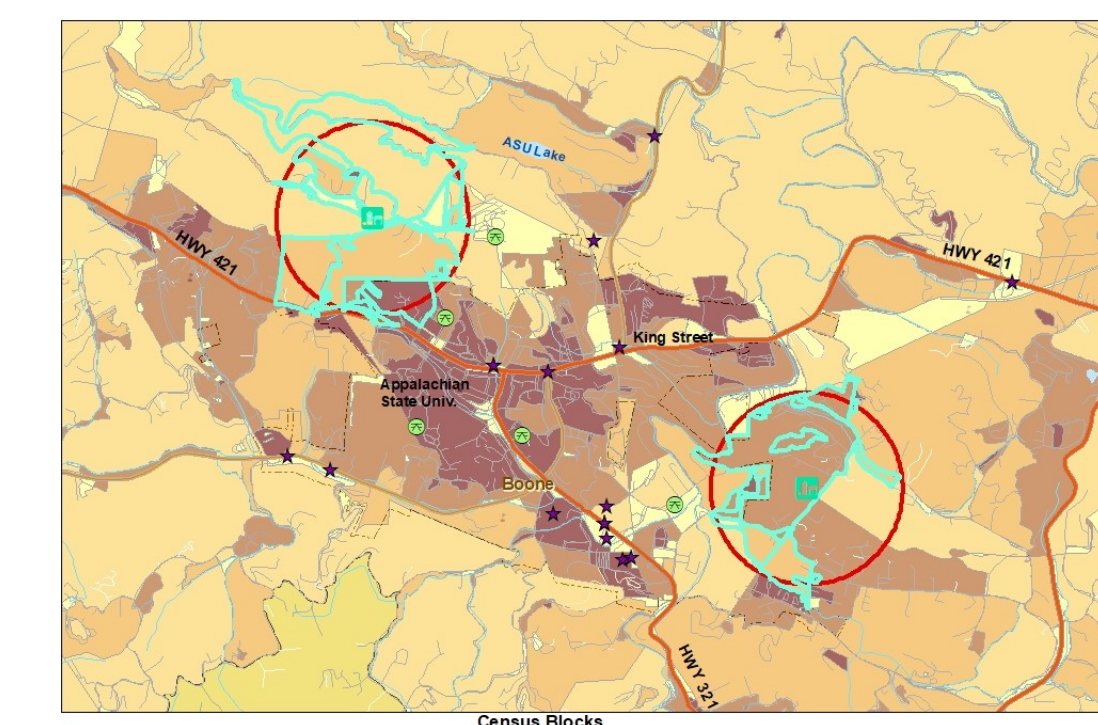Friedman School of
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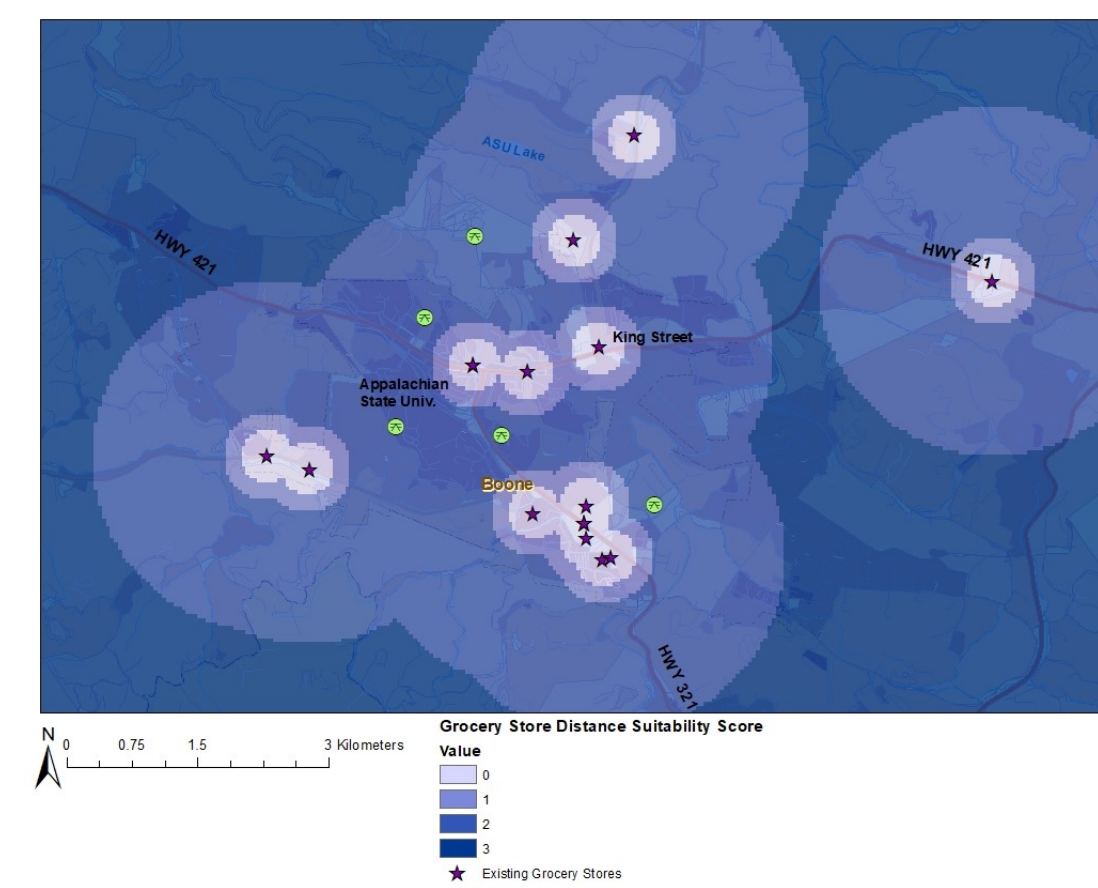
Distance from existing grocery stores: To maximize the number of residents within walking distance of fresh food retail, mobile market locations should not be too close to existing grocery stores

Proximity to parks: Parks are important community gathering places. Locating a market near a park will attract more walking patrons, particularly families with children.

Population density: In order to serve as many people as possible, ideal locations for mobile markets are as close as possible to densely populated Census blocks.

Walking buffer: To estimate how many residents will be affected by these two mobile market locations, a 1 km walking buffer is drawn. This shows us what Census blocks have their centroid in the buffer.
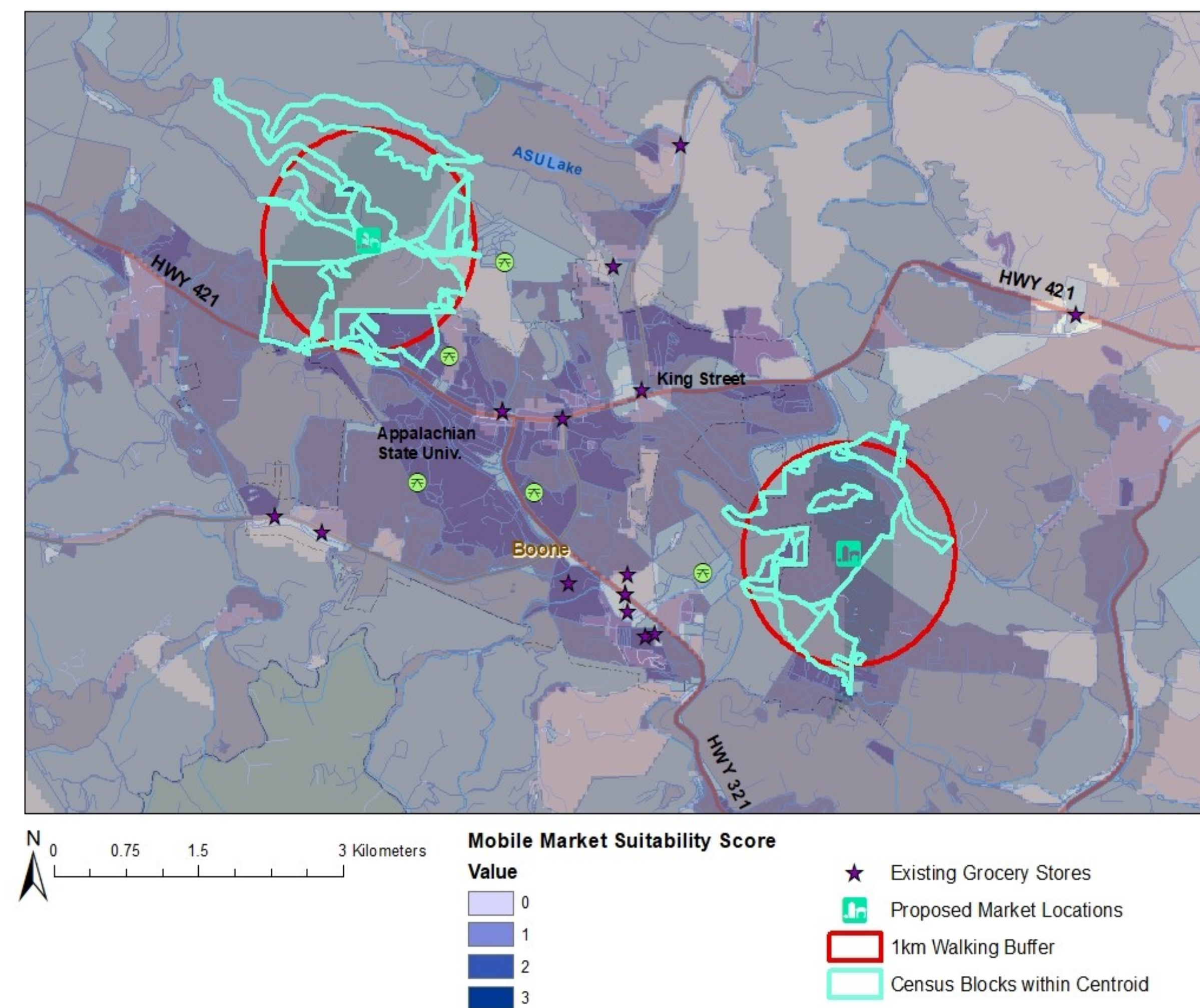
Raster Calculator Results with Walking Buffer:

Combining all three considerations, this map suggests two potential mobile market locations with maximum suitability scores of 3.

Approximately 1,904 residents within 1 km walking buffer of the two proposed mobile market locations

Results

These maps aim to show the two best potential locations for a mobile market in Watauga County. The two markets would have an estimated 1,904 residents within the 1 km walking buffer. The suitability score and walkability buffer methodologies used in this model (pictured below) could be extended and used in other rural areas. However, walking buffers are better suited for areas with a denser population than Watauga County. While these two mobile market locations are ideal for best impact, based on suitability score, improving infrastructure is probably the ideal solution to improve food insecurity in a rural area. Public transportation, walking paths, and sidewalks are all ways to proliferate food access and thus food security.
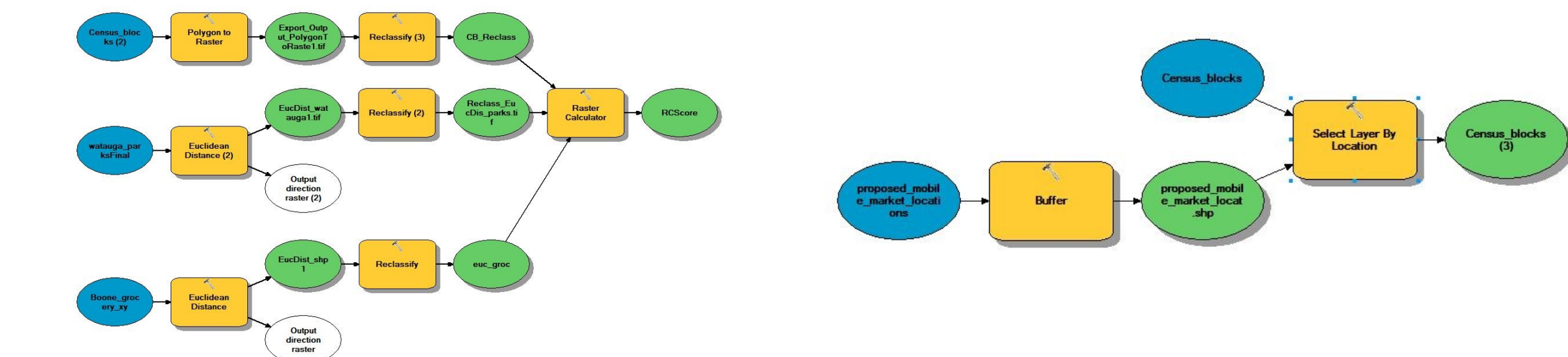
Discussion

There are notable limitations to the interpretations of this model's findings. The model uses ReferenceUSA grocery store data, potentially ignoring other sources of food like CSA programs, community gardens, and food banks. Census block information comes from 2010 and it is possible the population demographics have changed notably since then. The model also did not take into account elevation, which plays an important role in resource access in Appalachia. Some areas may be too steep for walking access or may lack a sidewalk. Also, the model uses a walking buffer as a spatial mechanism and does not factor in car access. In rural areas, residents primarily drive to the grocery store. In an attempt to make up for this, the model factors in closeness to parks in order to draw the attention of more walking patrons who may visiting neighboring parks. Additionally, due to the large size of rural census blocks, it is hard to know for sure how many residents are within the walking buffer. This model includes census blocks with their centroid within the buffer, but does leave out some densely populated areas nearby. This, combined with the inability to count park visitors, means it is possible that more people could be within 1 km walking distance buffer of the two mobile market locations. While no model is perfect, hopefully this project can bring attention to food insecurity in rural Appalachia. Overall, this project offers an optimistic look at improving food access in Watauga County through the addition of two mobile market locations. Future projects should assess infrastructure needs and car access, utilizing both vector and raster tools, to better evaluate food security.

References:

1. Hunger Research: Understanding Food Insecurity in Your Community: Watauga County, NC. School of Government, UNC, 2015.
2. Western Australian Planning Commission. Liveable Neighbourhoods: A Western Australian Government Sustainable Cities Initiative, 2nd ed. Perth: Western Australian Planning Commission, 2000.
3. Rundle, Andrew, et al. "Neighborhood Food Environment and Walkability Predict Obesity in New York City." Environmental health perspectives 117.3 (2009): 442- 7. ProQuest. Web. 1 May 2018.
4. Project For Public Spaces: Good Places. PPPS, December 2008.

Data Sources:

2010 Population and Housing Census. January 2011, US Department of Commerce
U.S. Businesses. 2014. ReferenceUSA
North Carolina Land Use. January 2016, North Carolina Statue University
USA Roads & Hydrography. 2005. ESRI ArcMap Catalogue, ESRI Data and Maps.

Projection:

NAD 1983 StatePlane North Carolina FIPS 3200 Meters

Mobile Market Suitability Score

Value: 0, 1, 2, 3

★ Existing Grocery Stores
Proposed Market Locations
1km Walking Buffer
Census Blocks within Centroid