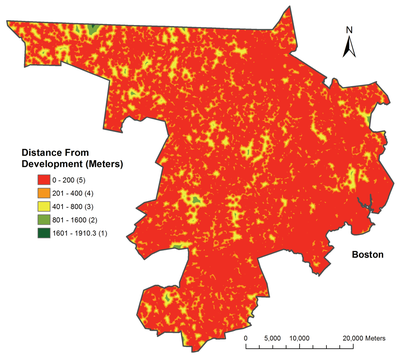
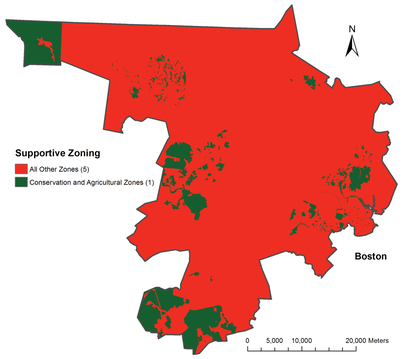
An Analysis of the Vulnerability of Agricultural Lands in Middlesex County

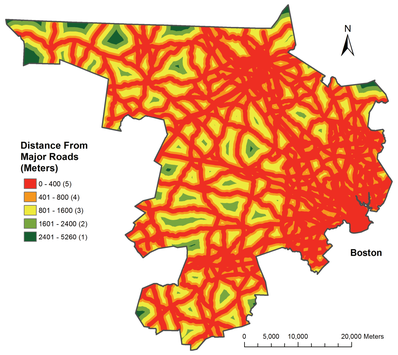
Distance From Development



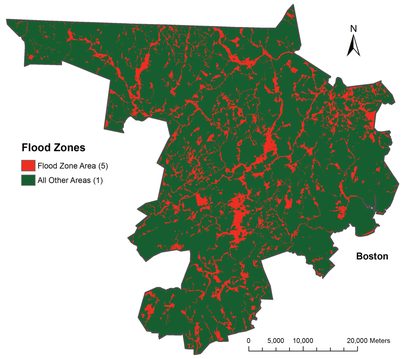
Supportive Zoning



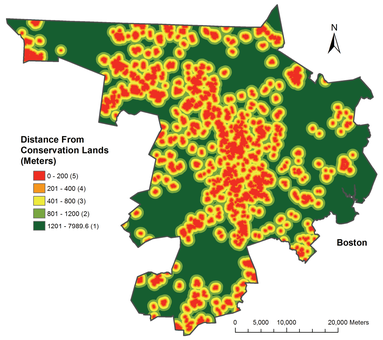
Distance From Major Roads



Flood Zones



Distance From Conservation Lands



Cartographer: Kyle Greaves **Date**: 12/8/2011

Data Sources: MassGIS

Project Coordinate System: NAD 1983 State Plane MA (M)

Tufts UNIVERSITY

Introduction

The majority of farmland preservation programs across the country typically employ quantitative mapping techniques that help identify and prioritize farms that are unprotected, and available for acquisition. It is common, that one of the various selection criteria include a measure of farm vulnerability, which attempts to quantify the farm's susceptibility to conversion as a result of development pressure. Due to a large and dense population, agricultural land in the Northeastern U.S. tends to be located closer to urban centers than the rest of the county, which increases the chances farms will be converted to non agricultural uses.

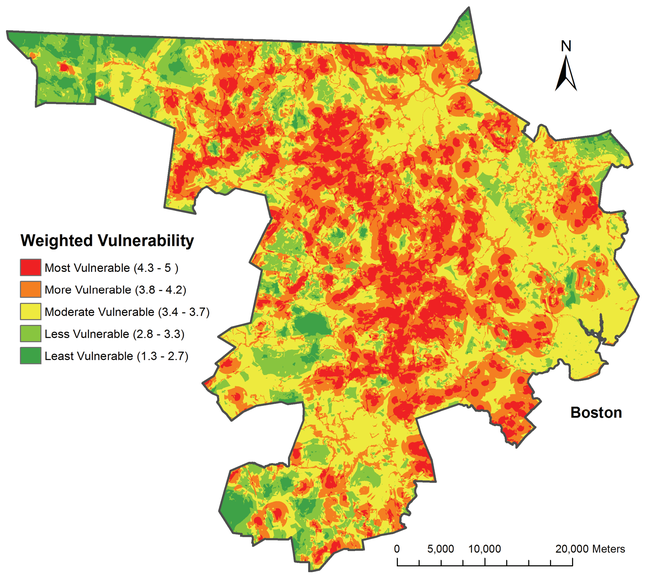
Currently, the Massachusetts Agricultural Preservation Restriction (APR) is the dominant tool to preserve farmland across the Commonwealth. While vulnerability is one component of their selection criteria, the APR program does not employ the use of quantitative mapping techniques to prioritize potential acquisitions. While the APR has had great success, the program has the potential to more strategically target the best, as well as the most vulnerable farmland.

This GIS analysis conducts a vulnerability analysis of active agricultural lands within Middlesex County Massachusetts. As a result of limitations in available data, this analysis will examine only a handful of vulnerability characteristics. These include proximity to non-agricultural development, proximity to major roads, proximity to existing conservation land, the existence of supportive zoning and lastly, location within a floodplain. By better understanding the multitude of factors that can impact vulnerability, the state and the APR program may be able to more proactively target high value farms that are facing strong development pressures.

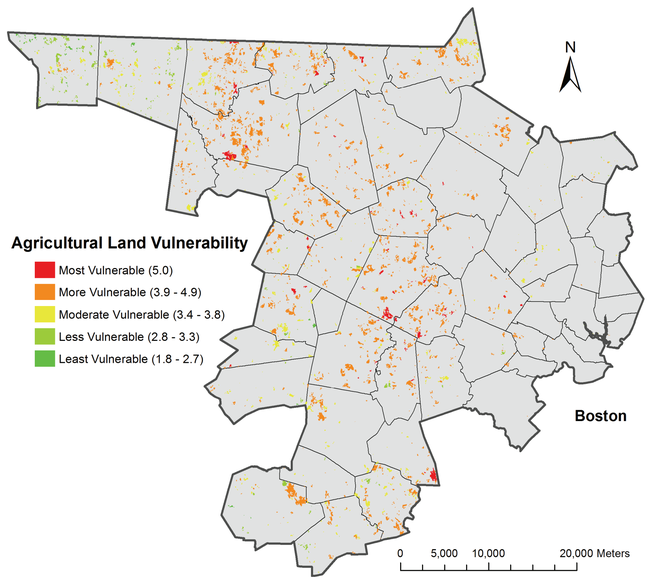
Methodology

For the farmland vulnerability analysis I used a variety of spatial analyst tools to develop distance based raster layers for the five vulnerability criteria. I then reclassified the layers using a 1-5 scoring system (1 – least vulnerable and 5 – most vulnerable). Ultimately, I used the weighted overlay tool to compile the farmland vulnerability layers into one composite map. The layers were weighted as follows: Proximity to development (25%); Proximity to major roads (25%); Proximity to conservation land (25%); Supportive zoning (15%) and Location within a flood zone (10%). Finally, I used the zonal statistics function to aggregate the weighted vulnerability score onto the unprotected agricultural parcels within Middlesex County. The result, was the creation of the "Agricultural Land Vulnerability" map that spatially demonstrates the vulnerability of unprotected agricultural lands across Middlesex County.

Weighted Vulnerability



Agricultural Lands Vulnerability

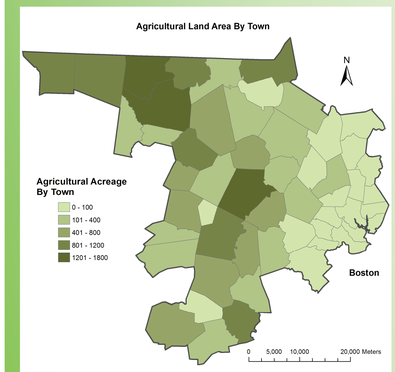


Background

Middlesex County

According to the U.S. Census, Middlesex County is home to over 1.5 million people in an area just over 817 square miles. This means that nearly 23 percent of the states population and 22 percent of total housing units are located on only 10.4 percent of the total land area in the Commonwealth. As a result, the population density of Middlesex County is over two times the state' average.

Middlesex Counties proximity to the Metropolitan Statistical Areas of Boston, Cambridge and Quincy have made this one of the fastest growing counties in the Northeast. According to the 2007 U.S. Census of Agriculture the total agricultural land area in Middlesex County was 33,893 acres.



The APR Program

The Agricultural Preservation Restriction (APR) program began in 1977 as a tool to preserve the Commonwealths invaluable agricultural resources. The APR program places permanent easements on farmland to keep it a part of the working landscape in perpetuity. To date, the APR program has permanently protected 803 farms for a total of 66,931 acres across MA.