

Exploring the Motor City Mapping Parcel Survey

Introduction

In the second half of the 20th century, the population of Detroit, Michigan contracted by more than half and decreased from a peak population of 1.9 million in the 1950s¹ to fewer than 715,000 in 2010.² The causes of this decline are various and include a combination of industrial restructuring and out-migration to the metropolitan region. One of the effects of this dramatic population decline is widespread residential vacancy and decline of housing structures within the city of Detroit. Decline of this scale has many implications for residents and for the city as whole, and it has therefore attracted the attention of city, state, and regional governments, charitable foundations, and data organizations interested in better understanding the decline.

To this end, two organizations called Data Driven Detroit and Loveland Technologies with support from the City of Detroit, the Skillman Foundation, and the Kresge Foundation set out to survey every parcel in the city to assess its condition, occupancy, vacancy status, and more. The results of the survey were published in 2014.

This study is an exploration of the data that the survey produced, along with other data recently made available by the City on land ownership. With it, I wanted to understand the scale and distribution of vacancy and structural decline in the city, as well as how vacancy and structural decline are related to patterns in land ownership. My interest in this is both general and specific. Generally, I hope to gain familiarity with this rich dataset about the city in which I conduct my research. Although questions of land use and land ownership are not central to my dissertation research questions, a better knowledge of these phenomena may enrich my understanding of the questions I do explore in my work and give me a fuller understanding of my study site's context. More specifically, I volunteer with an organization in Detroit called the People's Platform that is developing a People's Atlas of Detroit to help fight land speculation and dispossession in the city. The data from the parcel survey has been incorporated in official discourses produced by the City and other actors about the need to downsize the city and cut off resources to the "least viable" neighborhoods.³ According to the analysis of the People's Platform, the City and its partners often misrepresent decline the city in order to justify austerity policies and the selling of public land to speculators. Therefore, I am interested in examining this data more carefully to assess whether and in what ways this might be true. This study is quite modest and does not fully achieve these goals,

¹ Boyle, K. (2001). The ruins of Detroit: Exploring the urban crisis in the Motor City. *Michigan Historical Review*, 27, 109-127.

² U.S. Census Bureau. (2012). *State & county quickfacts: Detroit (city), MI*. Retrieved from <http://quickfacts.census.gov/qfd/states/26/2622000.html>

³ <http://kresge.org/sites/default/files/Uploaded%20Docs/Detroit-Future-City-executive-summary.pdf>

but it has provided an opportunity to begin exploring this data, and in the conclusion, I outline ways in which I might take my analysis farther in the coming months.

Data

The data for this project was taken from two sources. First, the Motor City Mapping (MCM) Parcel Survey is parcel-level data on property condition throughout Detroit city. It was assembled by a coalition of organizations, including a team of 200 people who surveyed nearly every parcel in the city (nearly 380,000 properties) to assess various characteristics such as vacancy, condition of structures, occupancy status, evidence of dumping or fire, etc. Data was collected in the winter of 2013-2014 and was subsequently processed, checked for accuracy, and released in late 2014. The data is available at the parcel level and aggregated at the Census tract level.

The second data set is parcel data provided by the City of Detroit that contains ownership information, allowing me to analyze abandonment and decay in the city (as indicated by the MCM data) in relation to property ownership. The data includes the name and last known address of the owner of each parcel, and I primarily used this to compare rates of vacancy and structure condition between local property owners and non-local property owners. This data required a modest amount of preparation; for instance, I manually corrected misspellings in the city or state of parcel owners' addresses. This data was joined to the MCM data by Census tract number. The MCM data contains approximately 8,000 fewer parcels than the City data, which the metadata explains is primarily the result of the MCM survey combining certain parcels. City data that was not joined to the MCM layer was dropped from the analysis.

One of the challenges of conducting global cluster analyses on this data set is the irregular shape of Detroit. In particular, the cities of Hamtramck and Highland Park are completely enclosed within the city and represent gaps in the data. For the nearest neighbor cluster analysis, which compares the distribution of data compared to a hypothetical distribution in an area of the same size, this affects the analysis. This is noted where it is an issue in the following section.

For analyses at the tract level, I excluded 2 of a total 297 Census tracts that cover the city. The first is the tract that is constituted by Belle Isle, a large island park which contains only one parcel, which was not surveyed in the Motor City Mapping project. The second is a tract located near the Northend neighborhood for which the data appears incomplete, without explanation. I do not believe that these exclusions substantially affect the analysis.

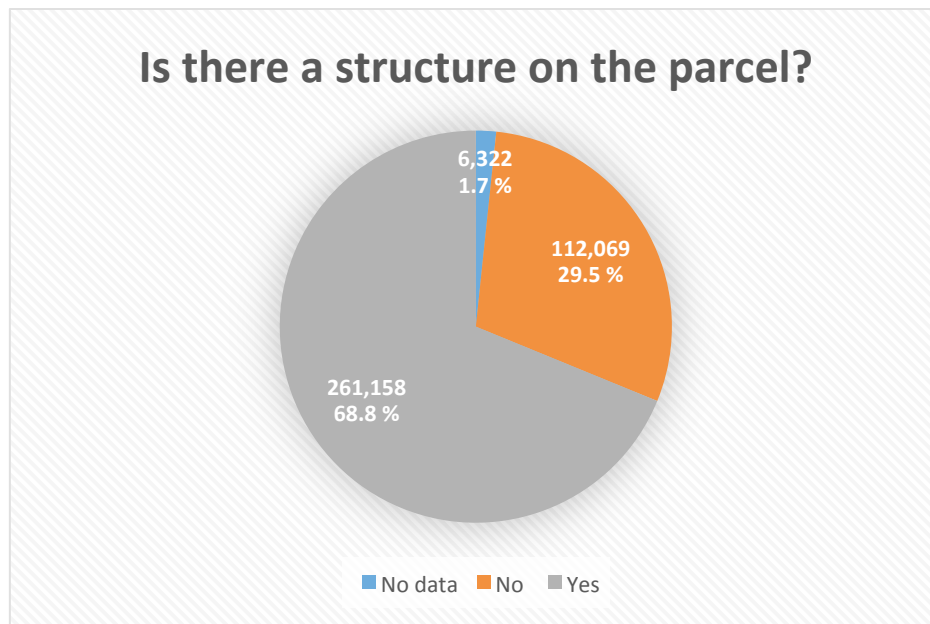
Analysis

Descriptive statistics

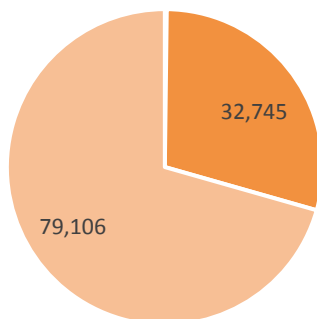
Vacancy

Approximately 29.5 percent of parcels in the city are vacant lots, meaning they have no structures present. Among vacant lots, the data set further specifies whether lots are improved or unimproved, where an improved lot "exhibits a presence of people activity [sic], showing consistent

care [such as] landscaping, fences, paved lots, parks, playgrounds, and so on,”⁴ and whether they are maintained or unmaintained, where maintenance indicates mowing or upkeep of a paved surface. This is depicted in the pie charts below.

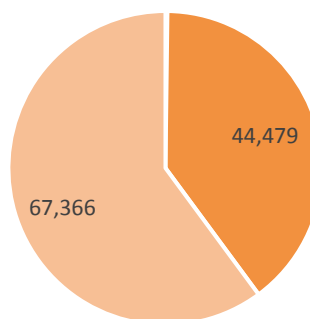


Improvement status



■ Improved ■ Unimproved

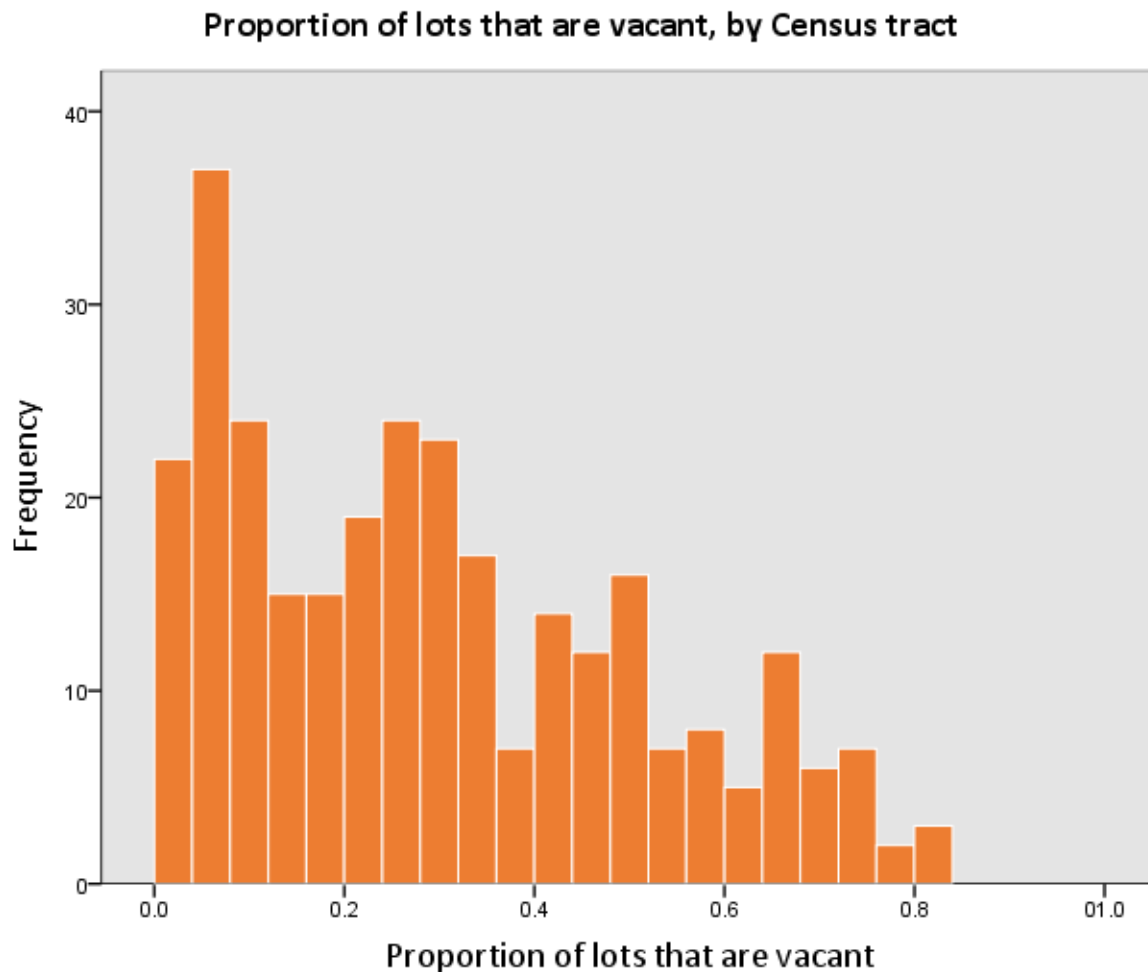
Maintenance status



■ Maintained ■ Unmaintained

When the data is aggregated at the Census tract level, the mean percent of parcels by tract that are vacant is 29.8 percent, while the median percent of parcels by tract is 25.8 percent. The difference between the median and the mean suggests that the data is not normally distributed or contains outliers. The histogram below indeed indicates a positively skewed distribution, meaning that while some of the tracts have vacancy rates above 80 percent, the bulk of the tracts have much lower rates.

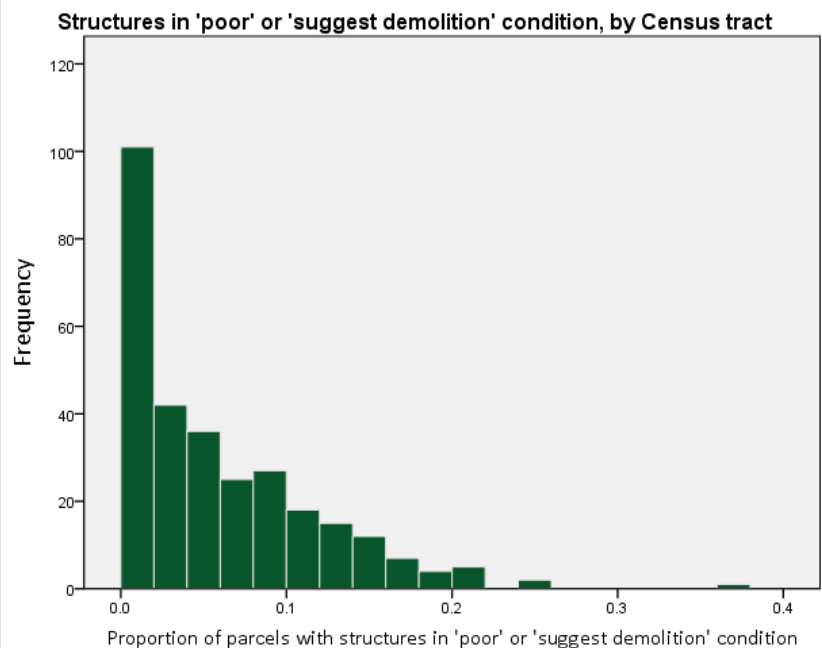
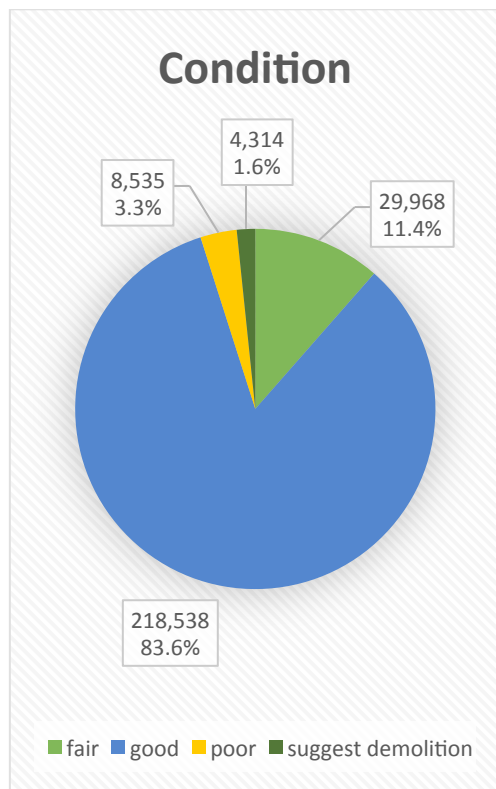
⁴ This description comes from the metadata, which can be found here: http://datadrivendetroit.org/web_ftp/motorcitymapping/Metadata/MCM_CertifiedResults_Winter2014/Metadata_MCM_CertifiedResults_Winter2014.xls



Condition

Of parcels where there is a structure present, the data specifies condition as good, fair, poor, or suggest demolition.⁵ For 2 percent of structures, demolition is suggested, and 84 percent of structures are in good condition. This data is depicted in the pie chart below. Aggregated at the Census tract level, this data again has a positively skewed distribution, as demonstrated by the histogram of the proportion of structures in 'poor' or 'suggest demolition' condition shown below. The mean percent of structures in the worst two categories of condition is 5.85 percent, and the median is 4.33 percent.

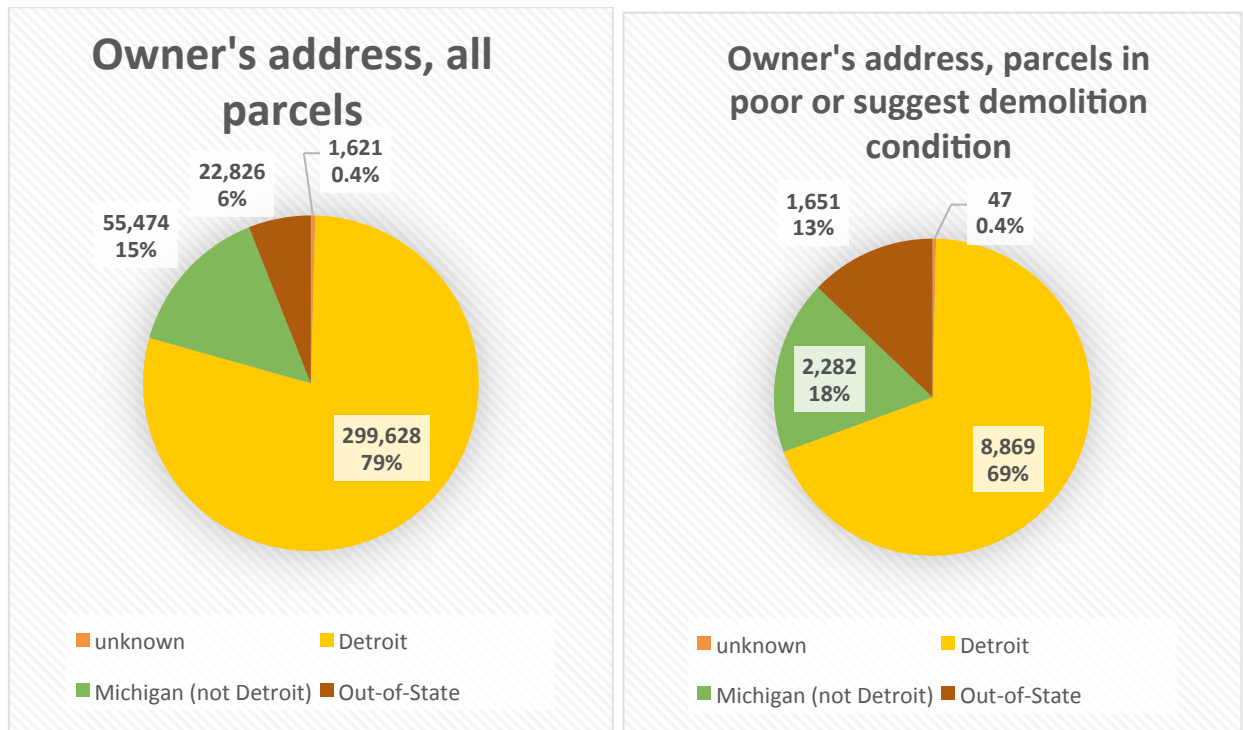
⁵ For more detail on how condition was accessed and what is meant by each classification, again see the metadata: http://datadrivendetroit.org/web_ftp/motorcitymapping/Metadata/MCM_CertifiedResults_Winter2014/Metadata_MCM_CertifiedResults_Winter2014.xls



Structure Condition and Ownership

By joining the Motor City Mapping data with parcel data from the City of Detroit, we can examine the condition of properties in relation to their ownership. 78.9 percent of all parcels, regardless of condition, have owners whose last known address was located within the city of Detroit, 14.6 percent have addresses within Michigan but outside Detroit city, and 6.0 percent have addresses outside the state of Michigan. (For 0.4 percent of parcels, ownership information is unknown.) When we consider only parcels in 'poor' or 'suggest demolition' condition, 69.0 percent are owned by Detroiters, 17.8 percent are owned by Michiganders outside the city, and 12.8 percent are owned by non-Michiganders.⁶ This means that owners who are not located within the city are proportionally more likely to have properties in 'poor' or 'suggested demolition' condition than those owners with addresses inside the city. This is discussed further in the conclusion.

⁶ Owners include not only individual people, but also banks and other companies, government agencies, and other institutions.



Spatial Clusters

Throughout this section, I analyze spatial clustering of parcels with structures in 'poor' or 'suggest demolish' condition. For ease of communication, I will refer to these simply as parcels in poor condition, but the analysis includes parcels from both of the lowest condition categories.

Nearest Neighbor

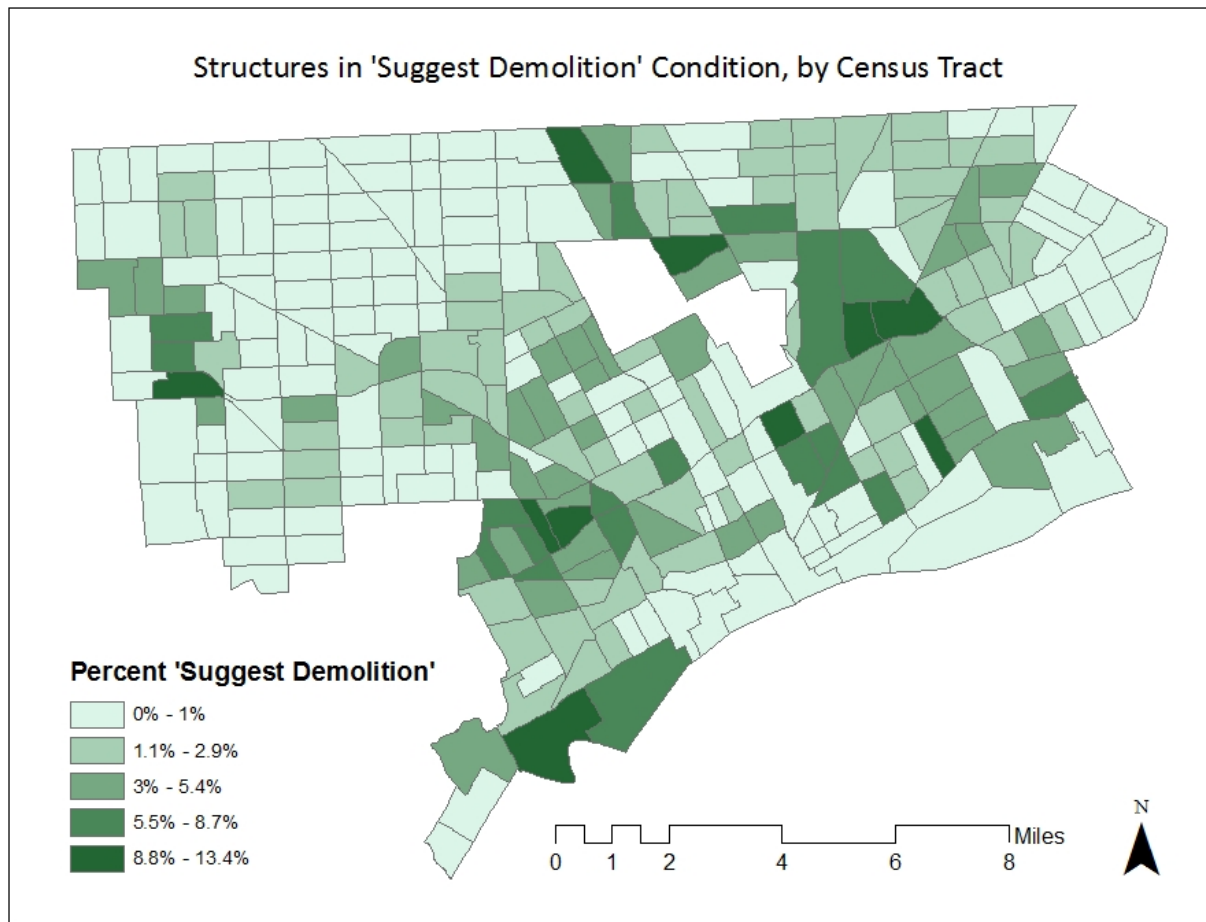
One method of measuring spatial clustering is nearest neighbor analysis. This process measures the distance between each observed data point and its nearest neighbor, averages all of the nearest neighbor calculations, and compares this average against the average we would expect to see if the data points were randomly distributed. If the average is significantly higher than expected from a random distribution, points are considered to be dispersed, and if it is lower than expected, points are considered to be clustered. I ran this calculation on parcels in poor condition (distance was measured from the center of each parcel), and I used an area measure of 3,982,515,643 sq. feet (which is the area of the city as assessed from a boundary file of Census tracts).

The analysis produced a nearest neighbor ratio of 0.583 with a z-score of -90.361, and a p-value of 0.000. This indicates a very strong pattern of clustering, since a z-score below -1.96 means that we can reject the null hypothesis that there is no difference between the observed distribution and a random distribution. The z-score is high enough that even though the irregular shape of the city (with Hamtramck and Highland Park enclosed within it) affects the analysis, we can be confident that the clustering we observe is indeed statistically significant.

Getis-Ord Hot Spot Analysis

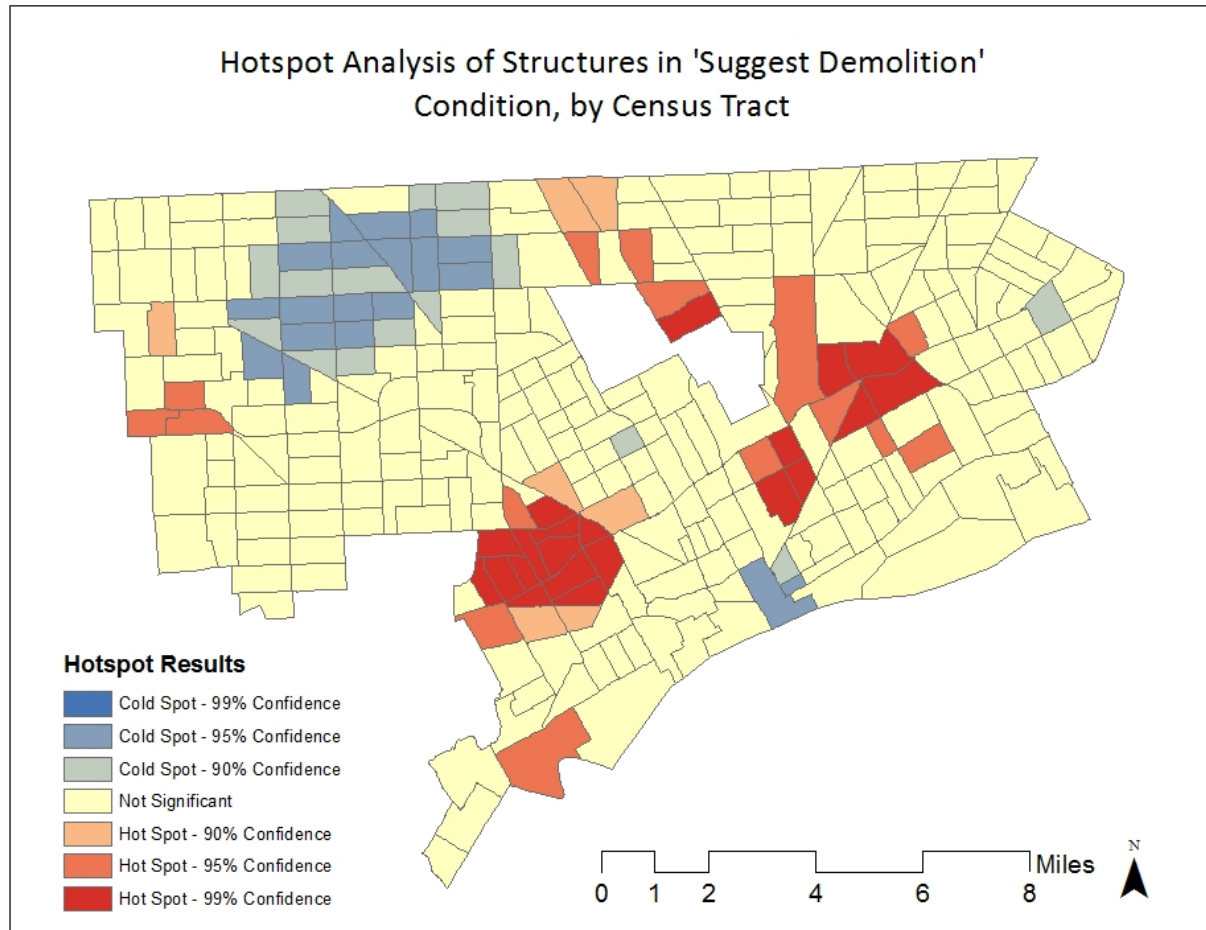
While the Nearest Neighbor analysis tells us that the distribution of houses in poor condition is clustered, it doesn't tell us where those clusters are located. A choropleth of the data gives some

sense of the spatial distribution of structures in the worst condition. In the map below, I have visualized the percentage of structures in each Census tract in 'suggest demolition' condition, categorized according to a Jenks natural breaks classification scheme.



Taking this a step further, we can also analyze where the data is statistically clustered. To assess this, I have performed a Getis-Ord (Gi*) Hot Spot Analysis. This analysis assesses each data point in relation to the data points around it—in this case, those points within a fixed distance band of one mile—to find clusters of points with high values and clusters with low values.

Because of the number of records in the parcel survey, it was computationally difficult to conduct this analysis on the individual parcel records, and so I performed the analysis on the data aggregated at the Census tract level. The values being assessed in this analysis were therefore the percent of structures in each Census tract in 'suggest demolition' condition. Clusters of high values (visualized in red in the map below) are therefore clusters of parcels with a high percentage of structures in the worst condition, and clusters of low values (visualized in blue) are clusters of parcels with a lower percentage of structures in the worst condition.



Conclusion

This analysis has provided a brief look into the results of the Motor City Mapping parcel survey and compared some of that survey's findings with parcel ownership records from the City of Detroit. One of the most interesting findings for me came in the condition of structures with Detroit owners compared to non-Detroit owners. I found that structures in the worst condition are 10 percent more likely to be owned by a non-Detroit owner than are structures in any condition. This makes some logical sense: non-local owners may have a harder time performing maintenance than local owners, and have less at stake in maintaining property than those who live in or near such properties.

However, as a Michigander who is not originally from Detroit, I find this particularly enlightening because of the spatial imaginaries that proliferate about Detroit among those not from the city. In my hometown of Grand Rapids, MI, located 150 miles west of Detroit, I often hear disparaging comments about the condition of Detroit, particularly in the context of discussions about whether state money should be invested in tearing down abandoned buildings or improving infrastructure. Implicit in such comments is often the suggestion that Detroiters are irresponsible property owners whose city is not worthy of state investment because they'll squander it. However, this analysis shows non-Detroit owners—including some of my fellow Grand Rapidians—who are disproportionately more likely to own structures in 'poor' or 'suggest demolition' condition.

Future Work

This data set is rich and offers many opportunities for further investigation. In future work, I would like to do more with the ownership information than just comparing the impact of local vs. non-local ownership. For instance, I would like to consider the impact on vacancy and condition of ownership by the biggest land owners (including government entities and financial institutions, but also numerous private speculators who own hundreds or even thousands of parcels). I would also like to examine other variables in the MCM survey, including more about vacant lots being maintained or unmaintained and improved or unimproved.

I would also like to perform a logistic regression to try to predict vacancy status and/or 'suggest demolition' condition. A logistic regression would be particularly helpful for this data because such a regression analysis does not assume that data is normally distributed (as this data is not) and it can be used with binary data rather than continuous data. Factors that might contribute to the regression analysis include owners' distance from Detroit, whether parcels are owned by big owners or small owners, and whether the plot is located in a colloquially named neighborhood or not.⁷ Assessing these factors will first require a significant amount of data preparation.

While it is more of a visualization challenge than an analysis challenge, I would like to map all of the non-local owner addresses for parcels that are in 'suggest demolition' condition.⁸ This too would require a significant amount of data cleaning before geocoding of the addresses will be possible, and it's my hope that I will be able to complete this work on the data this summer, perhaps with the help of other researchers and Detroiters interested in this data set.

⁷ While some of Detroit's neighborhoods exhibit strong neighborhood identity, many sections of the city do not lie in areas that are colloquially recognized as part of named neighborhoods. A data file compiled from a variety of sources offers a good sense of what areas fall into colloquially named neighborhoods and which don't: http://d3.d3.opendata.arcgis.com/datasets/b4ce77680a8d4d1fac8e2c3ba303d0f9_0. I expect that those parcels in colloquially defined neighborhoods are less likely to be unimproved vacant lots or structures in the worst condition.

⁸ The idea for this kind of visualization comes from a recent piece by Taylor Shelton on vacant properties in Louisville (<http://brokensidewalk.com/2015/no-vacant-property-is-an-island/>).