CRIME, VEGETATION, AND ETHNICITY,

AUSTIN, TEXAS, 2006-2010

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DEDICATION

For those who have and continue to provide endless encouragement, enthusiasm, and love: my mother, Patsy Carlisle Phillips; my father, Dr. Jerry Styne Phillips; and my wonderful husband, R. Layne Holland.

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CHAPTER I

INTRODUCTION

Background and Significance

Crime is a ubiquitous urban dilemma. In 1930, the United States Federal Bureau of Investigation (FBI) began management of a system, the Uniform Crime Reporting Program (UCR), to collect standardized crime data from law enforcement agencies nationwide. These crime data are publically accessible. The FBI UCR ". . . compiles, publishes, and distributes the data to participating agencies, state UCR Programs, and others interested in the nation's crime data" (FBI 2004). At the program's inception, the FBI identified and defined seven particular crimes or offenses, classified as either violent or property, in a hierarchal list that is still used today and termed Part I crimes: violent crimes—murder, rape, robbery, and aggravated assault; property crimes—burglary, larceny-theft, and motor vehicle theft. In 1982, the FBI added arson as the eighth UCR crime but not as a part of the traditional Part I crime hierarchy (FBI UCR 2012).

Debates about vegetation being an amenity in urban space are scattered throughout the literature on the development of cities (Byron and Wolch 2009). The temporal context regarding societal mores and environment activism have produced different perceptions and opinions depending on area size, vegetation assemblage, land-use type, access, and nomenclature that define natural spaces. (Kaplan and Kaplan 1989; Costanza et al. 1997; Hayes 2000; Kuo and Sullivan 2001; Hartman et al. 2003;

Ackerman and Murray 2004; DeMotto and Davies 2006; Byron and Wolch 2009; Home et al. 2010).

Ethnic landscapes are manifest in large cities in the United States. These distinguishable places reflect the cultural imprints of particular ethnic groups (Nostrand and Estaville 2001; Miyares and Airriess 2007). Ethnic enclaves of urban neighborhoods provide for some people a feeling of safety and for others danger; individual perception and background vary greatly (Frazier, Margai, and Tettey-Fio 2003). Austin, Texas is a city that historically and persistently has had a distinct ethnic divide with present-day Interstate Highway 35 roughly demarking this cultural divide—whites to the west and Hispanics and blacks to the east.

The purpose of this research is to determine if relationships among the variables—crime, vegetation, and ethnicity—exist in Austin, Texas. The analysis took a three-step approach: (1) examine the relationship between crime and vegetation, (2) the relationship between crime and ethnicity, and (3) the relationship among crime, vegetation, and ethnicity. In other words, does the presence of particular urban green space vegetation have an association between the number of crimes reported, regardless of locations of ethnic majorities?

This study's focus is thus a contribution to the current scientific research seeking to elucidate potential, individual and societal, benefits provided by nature (i.e., green space vegetation) in high-density urban areas. These benefits or services have been historically overlooked in lieu of more obvious economic value (Sustainable Sites Initiative 2009). Such economic value is typically found either in the extractive consumption of natural resources or in the reduction of construction investment by clearing a site instead of working with existing vegetation (Hayes 2000; U.S. Green Building Council 2009). The financial concerns continue as sites are maintained, particularly landscaping that is expensive especially when attempting to grow nonnative or maladaptive plants (Sustainable Sites Initiative 2009; Hayes 2000; Costanza et al. 1997; McPherson 1992).

This study used geospatial and statistical tools available through geographic information systems (GIS) to compare the location of crimes reported in Austin, Texas to vegetation and then to ethnic majorities in the city during the study period, 2006 to 2010. Principal questions addressed include: Does the presence of vegetation reduce crime in an area? Do crimes increase as distance from vegetation increases? Is the crime-vegetation relationship consistent when comparing different ethnic enclaves? As Creswell (2009) suggested, the research question may be directional: Is it possible to duplicate the results of Kuo and Sullivan's 2001 study, "… the greener a building's surroundings were, the fewer crimes reported" (Kuo and Sullivan 2001, 343) in a larger spatiotemporal scale expanded beyond an inner city neighborhood into different urban spaces through a period of five years?

Literature Review

Several themes underscore human-environment interaction. One of the themes, the need for nature in cities, has been at the center of studies in a variety of disciplines. Biological or psychological response to nature has been tested in multiple studies (Kuo and Sullivan 2001; Sullivan, Kuo, and Depooster 2004; Donovan and Pestemon 2010; Thompson et al. 2012). Researchers have reported these human relationships with nature may alter individual actions and consequently affect specific societal phenomena, such as health, community organization, or crimes (Kuo and Sullivan 1998; Kuo, Sullivan, and DePooter 2004; Beatley 2009).

Extensively studied from a geographic perspective are varying aspects of crime, green space, and ethnicity; however, studies that examine the interrelationships of these three variables together have not been undertaken. The three variables seem disparate but perhaps when considered in combination they may offer new insights and further understanding of human-environment interaction. The literatures on parks/green space, crime, or ethnicity are each large. Geography journals have many papers about crime or ethnicity and the combination of the two. However, research that explores the relationships of the three variables—greenspace, crime, and ethnicity—seems nonexistent.

Research examining the relationships between nature and the human condition ranges from architecture and urban planning to ecology and biology, and from public administration to criminology, for instance. The studies differ in the aspect or definition of nature, a term defined variously as parks, green space, open space, and vegetation. While each of these expressions has a unique definition, it is possible to generalize them all into the category of urban nature (Kuo, Sullivan, and Depooter 2004).

Regardless of perspective or how nature is defined, a theme reoccurs in the literature: a need for nature exists within a high-density, built urban environment. That is, evidence points to the benefits to humans in creating and retaining aspects of the natural condition in common areas such as public open spaces. Scholars have studied these beneficial human-nature relationships regarding the proximity of residents to city parks (Hartman et al. 2003; Abercrombie et al. 2008; Home, Bauer, and Hunziker 2010;

Seaman, Jones, and Ellaway 2010). Other studies have focused on specific variables such as tree canopy height in residential areas (Kuo and Sullivan 2001; Donovan and Prestemon 2010). Much of the literature reviewed for this research concludes with the idea that nature provides some type of benefit for both individuals and society (Kuo and Sullivan 2001; Sullivan et al. 2004; Sullivan 2005; Guite, Clark, and Ackeral 2006; Gale et al. 2011; Donovan and Prestemon 2012; Thompson et al. 2012).

Bryne and Wolch (2009, 743) highlighted: “It is peculiar that geographers have not studied parks as extensively as other disciplines.” During the past decade, nevertheless, expounding the benefit of nature, outdoor physical activities, and access to public parks has reignited. Particular emphasis on green space and the ecological benefits it provides to the built environment has been central to this resurgence (Byrne and Wolch 2009; Thompson et al. 2012).

In 2001, Kuo and Sullivan (2001, 343) asked if vegetation reduced crime in the inner city and reported: “Results indicate that although residents were randomly assigned to different levels of nearby vegetation, the greener a building’s surroundings were, the fewer crimes reported.” Several researchers have continued this theme and studied the effects of various aspects of exposure to nature on crime rates. A decade later, Donovan and Prestemon’s (2012) investigation in Portland, Oregon, for example, corroborated Kuo and Sullivan’s hypothesis (1998, 2001). The literature frequently examines the exposure to nature on various socioeconomic phenomena in urban environments. Often a correlation suggested urban natural environments have beneficial effects on well-being, mental health, and stress levels of residents (Sullivan et al. 2004; Guite et al. 2006; Beatley 2009; Thompson et al. 2012). Other benefits range from increased social capital and sense of community (Guite et al. 2006) to improved physical health and reducing symptoms of various disorders (Beatley 2009). Kuo and Sullivan (2001) thus opened the door for empirical examination of specific social consequences considering crime and nature.

Several dichotomies exist on the topic of parks in the city, especially about social harm and social benefit. Equity and access have been historically contentious issues when studying parks. Discriminatory policy and design often leave lasting imprints on parks (Byrne and Wolch 2009). Crime and fear of crime are likewise blights on public parks, that is, the natural landscape interpreted as an unwelcoming landscape. Some researchers suggest that wild, unkempt vegetation creates cover for criminal and other socially unacceptable activity, thereby reducing park use or producing a criminal market place or landscapes of fear (Tuan 1979; DeMotto and Davies 2006; National Crime Prevention Council 2009).

From a geographic perspective, the study and analysis of crime offers insight to theoretical and applied cultural geography. Such research also affords an opportunity for further development of the potential of GIS for the examination, analysis, and visualization of sizeable spatial datasets. The geographic study of crime reveals distinct spatial and temporal patterns and distributions that often vary in magnitude and offer insight into the larger societal condition of an area. Diffusion of crime follows economic patterns and creates economic loss (DeMotto and Davies 2006; Lockwood 2007). In fact, the Bureau of Justice Statistics (2010) estimated that, for crimes both reported and not reported to the police in the U.S, the total economic loss to victims for 2007 was $1.19 billion for violent crime and $16.21 billion for property crime. Crime, moreover, is often an indicator of quality of life for a community with myriad potential causation and correlation variables to investigate. Understanding the spatial and temporal patterns of crime helps police departments allocate appropriate resources in effective ways. The societal benefit attained through the prediction and prevention of crime is greater economic stability and personal safety (Harries 1999; Santos 2013).

Theoretical Framework

Routine Activity (RA) Theory (Cohen and Felson 1979) was the guiding crime theory for my study. Donovan and Pestemon (2010, 5-6) used RA theory to frame research on trees and crime in Portland and explained:

> RA theory states that three conditions must be met before a crime can occur. First, there must be a potential criminal. Second, there must be a potential victim. Third, there must be a lack of effective authority that can both observe and respond to a crime. These three conditions are necessary but not sufficient conditions for crime occurrence; a criminal also weighs the expected costs and benefits of a crime before deciding whether to act.

My research also recognized environmental criminology. Santos (2013, 23) asserted the "…goal is to analyze crime data to identify patterns of behavior and environmental factors that create crime and unwanted activity." Also understood was the concept of "…the problem analysis triangle where place is a necessary component of crime along with time, offender and target or victim" (Santos 2013, 26-27). Clarke's (1983) situational crime prevention, based on environmental criminology, divides prevention techniques into five categories. The second category is focused on "…increasing the perceived risk in committing the crime" (Santos 2013, 32), which is similar to RA theory's third premise in that effective authority to observe and respond increases the perceived risk to potential criminals. Clarke (1983) emphasized multiple prevention measures, including defensible space architecture and community crime prevention, which encourage residents to increase surveillance.

Routine activity theory, environmental criminology, and the problem analysis triangle all refer to place as an important element in crime analysis. One aspect that defines place is its perceived appearance; in outdoor settings the amount, type, and condition of vegetation contribute to this perception (Kuo and Sullivan 1998, 2001).

My study suggests that the presence of substantial vegetation in public parks creates an environment that people are drawn to and occupy with ease. The addition of more people creates a less conducive landscape for the potential criminal activities regardless of the ethnic majority of an area.

My thesis research problem statement is: Substantial vegetation in public parks reduces the number of crimes in Austin, Texas regardless of differences in the ethnic majorities.

CHAPTER II

METHOD

The fundamental research question for my thesis research is: Does substantial vegetation in public parks reduce the number of crimes in Austin, Texas regardless of differences in the ethnic majorities? To address this issue, I employed a mixed method that gathered quantitative data for investigation and interviews key informants in Austin to understand the qualitative factors underlying the hard data. My three working hypotheses are:

(1) The presence of substantial vegetation in public parks in Austin, Texas correlates positively with crime rates in nearby neighborhoods.

(2) Crime rates correlate positively with each neighborhood ethnic group in Austin, Texas.

(3) The presence of substantial vegetation in public parks in Austin, Texas correlates positively with crime rates regardless of the differences in neighborhood ethnic composition.

Study Area and Time Frame

Austin, Texas is the study area for three reasons, each having a direct relationship to the study's major variables: (1) Austin's population has increased 20 percent from 2000 to 2010 (U.S. Census 2012), while (2) the city's index crime rate has decreased from 6,327.7 rate per 100,000 in 2000 to 6,230.8 rate per 100,000 in 2010 (Crime in Texas 2000, 2010). And (3) the area has a sharp cultural and physical geographic divide roughly along Interstate Highway 35 and the Balcones Escarpment, creating distinctive east and west sides of the city. Located on Austin's eastside is the Blackland Prairie natural region as well a majority of minority residents, mostly Latinos and African Americans. Much of the west side of the city is built on the Edwards Plateau and has a white majority population (Figures 1 and 2).

Austin is the county seat of Travis County and the state's capital. Austin has a growing a national reputation as a leading "green city" and the city is actively marketing itself as such (City of Austin 2011). The study area, bound precisely by the administrative boundary of the Austin Police Department Patrol Area, does not extend beyond the city limit.

The study's timeframe from 2006 to 2010 coincides with the U.S. Census Bureau American Community Survey's five-year estimates. The crime data contain all Part 1 index crimes (N=241,509) in the Austin Police Department's (APD) jurisdiction for the five years, except for arson that was not reported consistently throughout the period.

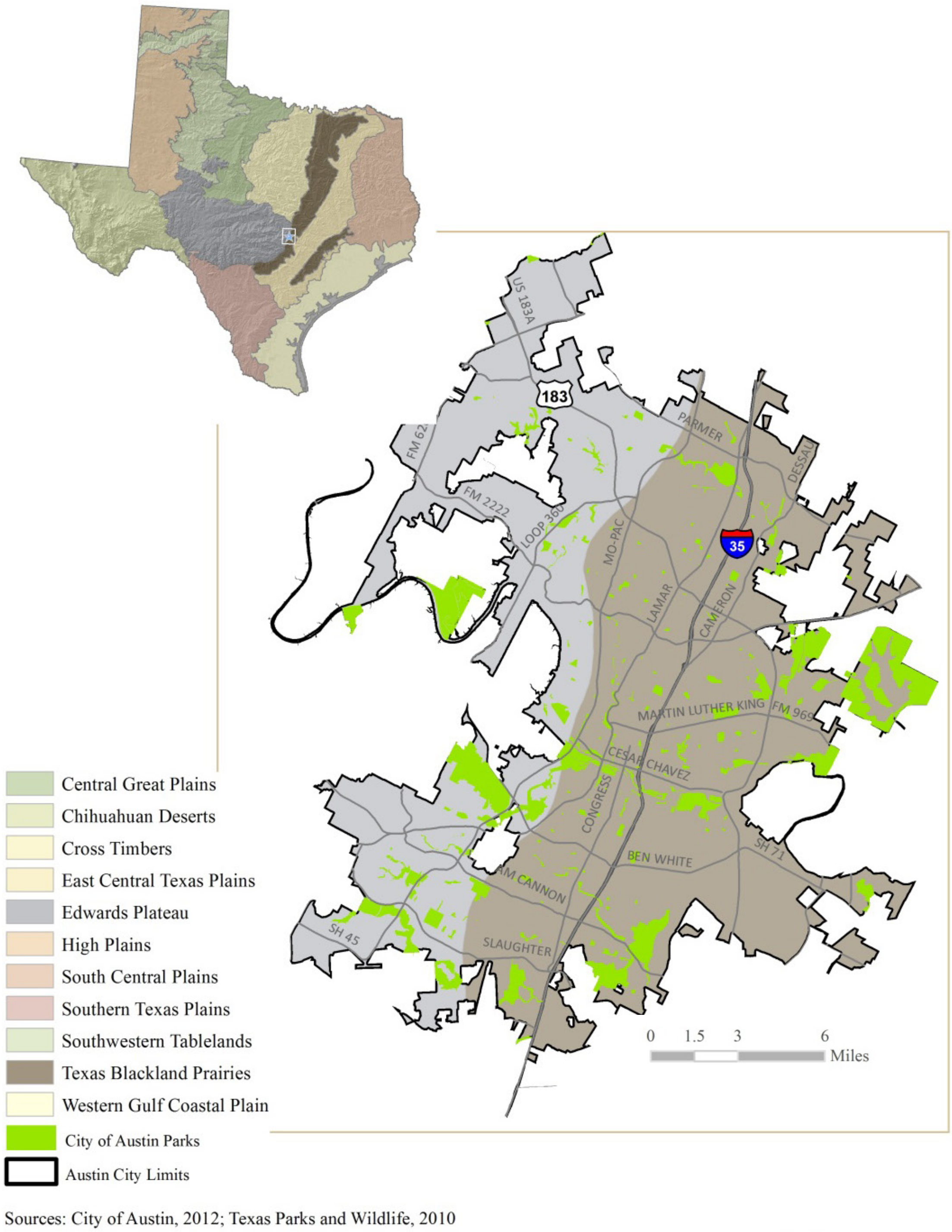

Figure 1. Study Area with Texas Major Natural Regions and Austin Parks.

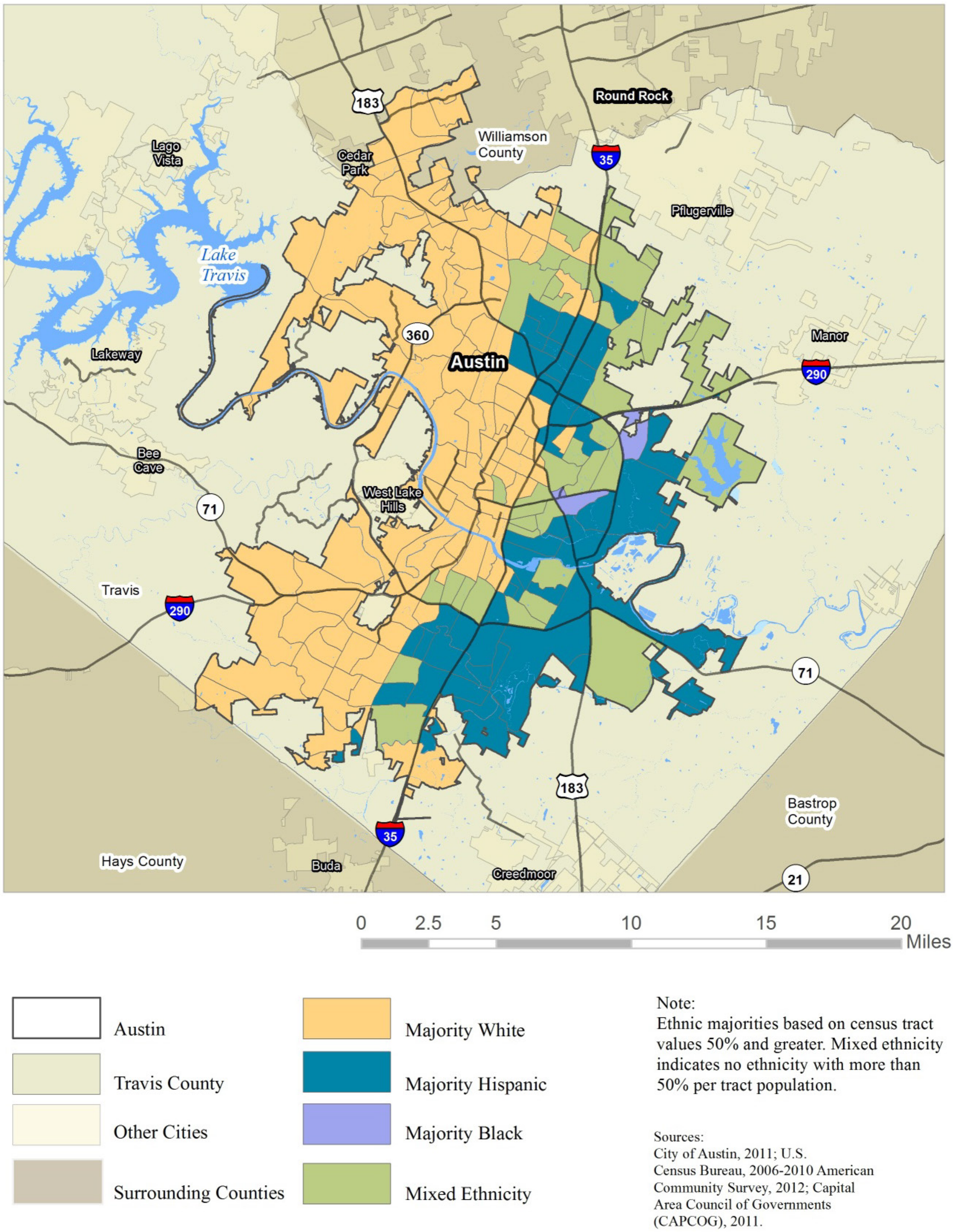

Figure 2. Ethnic Majority by Census Tract in Austin, Texas.

Operational Definitions

The following operational definitions are in the order of crime, vegetation, and ethnicity, the cornerstone variables of this research. Described by the FBI UCR program are seven Part I offenses with two main classifications. In the first group are the violent crimes of murder and nonnegligent manslaughter, forcible rape, robbery, and aggravated assault, and second group includes the property crimes of burglary, larceny-theft, and motor vehicle theft. See Appendix A for full definitions (FBI 2004).

The definition of substantial vegetation in public open spaces is more complicated than those for violent and property crimes. There is neither social nor governmental consensus on urban nature. The definitions differ depending on perspective, method, scale, and measurement technique. In the absence of such a definition, this study used the City of Austin GIS dataset for parks in conjunction with 2006 Austin tree canopy layer. The city's dataset includes 264 parks (approximately 15,925 acres) divided into ten types: district, golf course, greenbelt, metro, nature preserve, neighborhood, planting strips/triangles, pocket, school, and special. The Planning/GIS Office of the Watershed Protection and Development Review Program created the 2006 tree canopy layer dataset to depict approximate tree canopy cover for greater Austin, Texas area (Figure 3). Supplemental information found in the metadata explains the geoprocessing steps that created the data: "…unsupervised classification using ERDAS Imagine and 2006 color infrared aerial photography, supplemental raster and vector processing using Spatial Analyst Tools in ESRI ArcMap 9.3" (City of Austin 2010).

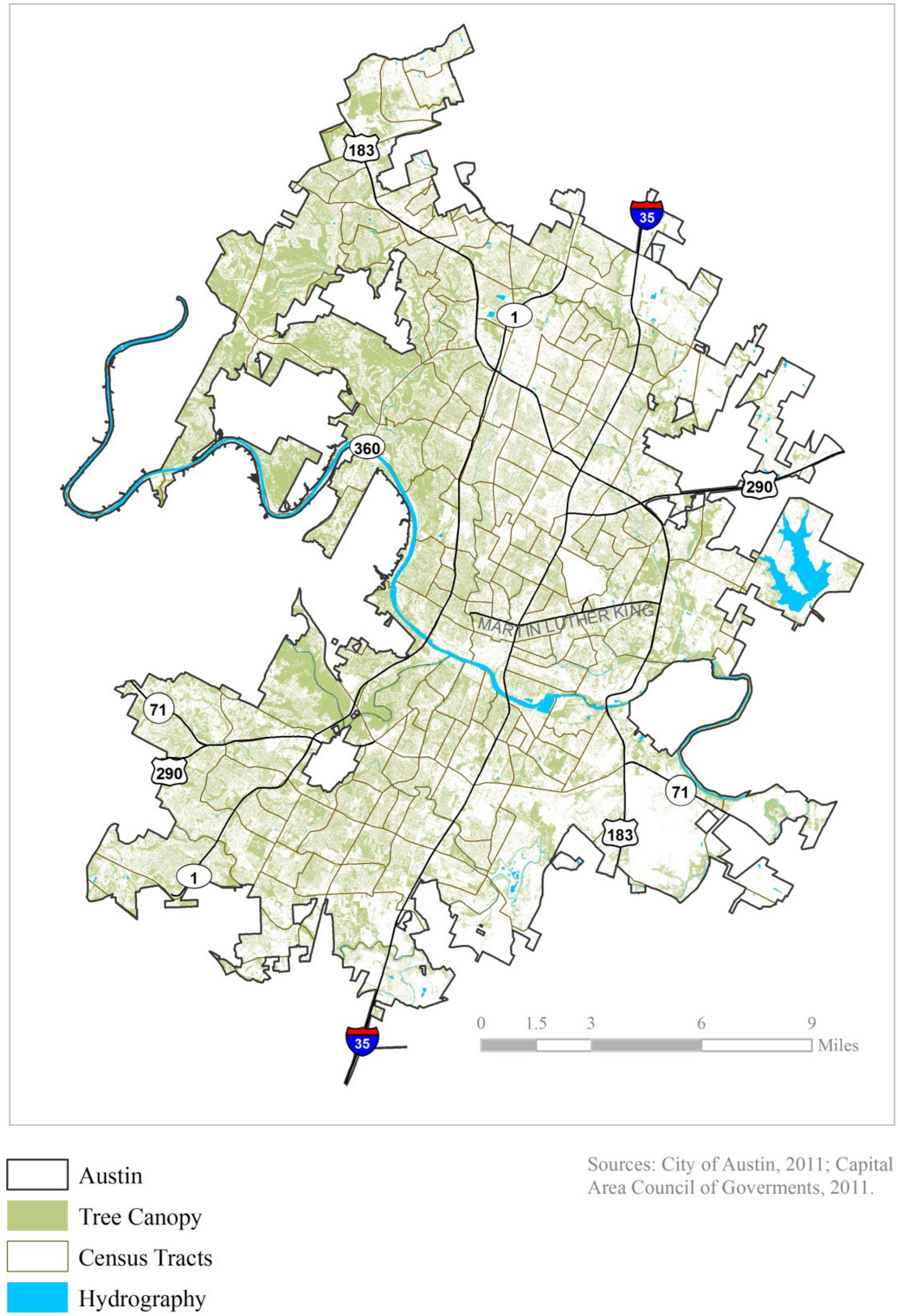

Figure 3. Tree Canopy 2006.

The U.S. Census defines the three dominant ethnic groups in the study area as white, Hispanic, and black. The study uses the majority (≥50%) percentage reported at the tract level. Table 1 lists operational variables with their definitions.

Table 1. General Definitions of Operational Variables.

Operational Variable	Definition
Violent Crime	All geocoded crimes with geocoding score over 80% (excluding records with geocoded score of 100% with street address "Austin, Texas") that are coded as murder (09A), rape (11A), robbery (120), and aggravated assault (13A) from the dataset provided by the Austin Police Department Research and Planning Unit.
Property Crime	All geocoded crimes with geocoding score over 80% (excluding records with geocoded score of 100% with street address "Austin, Texas") coded as burglary (220), theft (23A-23H), and motor vehicle theft (240) from the dataset provided by the Austin Police Department Research and Planning Unit.
Substantial Vegetation	50% or greater of each park's total area for its 2006 tree canopy.
Public Parks	56 parks sampled from the City of Austin parks GIS layer. See Selection of Austin Parks in following section for the sample technique.
Ethnicity	U.S. Census definition; white, black and Hispanic majorities (> 50%) determined at tract level from the American Community Survey five-year estimates, 2006-2010.

Selection of Parks

The criteria and sequence I used to select a sample of the 264 Austin parks are:

(1) Eliminate park types with (A) a total count of five or less and (B) park types with total sum areas less than 500 acres. Eliminated park types are golf course, planting strip/triangle, pockets, school and special.

(2) Construct a systematic random sample of three parks each from each of the remaining five park types and ensure that each park type has three parks in each quadrant of the city.

A. Calculate the mean center of violent and property crimes in the city; from the midpoint between of the two divide the city into quadrants NE, SE, NW, and SW. (Figure 4).

B. By process of systematic random sampling, select three cases of each of the five park types for each quadrant (n=56).

C. Ensure that at least half of the 56 cases (28 parks) meet the criteria of 50% or more tree canopy cover to satisfy the definition of "substantial vegetation."

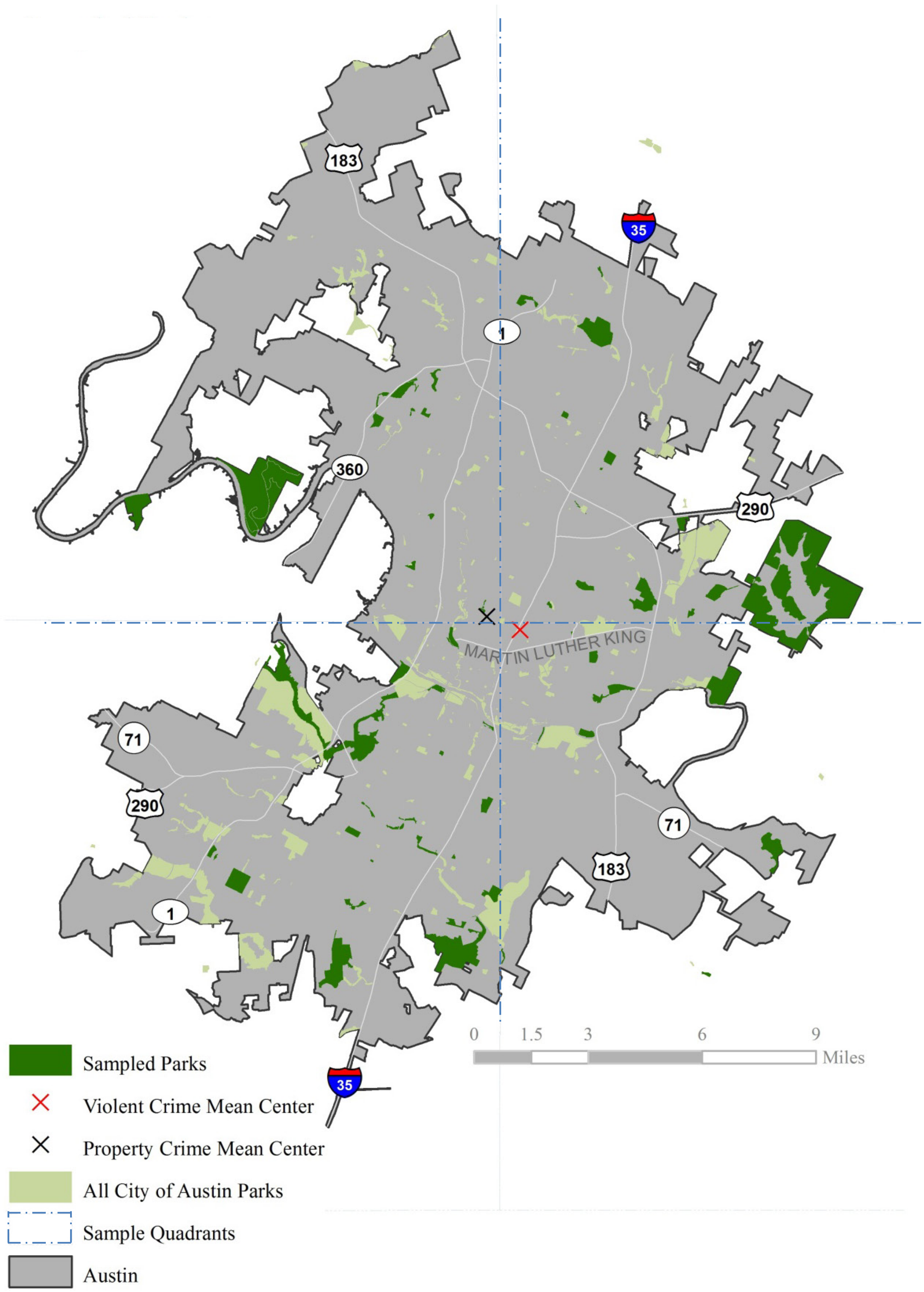

Figure 4. Sampled Parks with Quadrants and Mean Centers of Violent and Property Crime.

Data Collection

Crime data used in this study came from an open records request to the Austin Police Department (APD) (Appendix B). The crimes listed in Table 2 employ definitions and codes that do not match the standard FBI UCR format (01 to 07 for Part 1) but were aggregated into the customary FBI UCR crime definitions. The data containing 459,909 records were in a database format. I filtered these records by code and reduced by date to obtain the classification shown in Table 2. APD assigns codes based on the National Incident-Based Reporting System (NIBRS) codebook (FBI 2000). These data contain both the Police Reporting Area (PRA) and the physical address of each crime. Each record is geocoded as both a point based on address then spatially joined to the census tract area adding a weighted crime attribute for each census tract.

Table 2. Part 1 Offense Counts Austin, Texas, 2006–2010.

Offense (Code)	2006-2010 Totals
Homicide (09A)	131
Rape (11A)	1,431
Robbery (120)	6,795
Aggravated Assault (13A)	9,381
Burglary (220)	40,982
Theft (23A-23H)	170,939
Motor Vehicle Theft (240)	11,851
Total Part 1 Offenses	241,509

I downloaded shapefiles representing parks, 2006 tree canopy, roads, and city limit data from the City of Austin GIS Data Sets (ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html). The Capital Area Council of Governments (CAPCOG) provided the layers for surrounding areas, and Texas Department of Parks and Wildlife furnished a shapefile for natural regions of Texas.

Quantitative Methods

Processing and analyzing the data for crime, vegetation, and ethnicity in Austin and, then, constructing explanatory maps of the findings utilized ESRI ArcMap 10 GIS software.

Central tendencies for violent and property crime indicated the mean center of the reported violent crime was slightly east of IH-35 and that the mean center for property crime was slightly west of the IH-35. Both mean and median centers of the geocoded violent and property crime points are less than a mile from the IH35 and Martin Luther King Boulevard, approximately (Figure 5).

Figure 5. Central Tendencies of Part 1 Violent and Property Crimes.

Analysis of crime rates for census tracts utilized cluster and outlier algorithms, including a set of weighted features to identify statistically significant clustering (hot spots and cold spots) and spatial outliers using the Anselin Local Moran's I statistic. The feature weight, based on the number of geocoded crimes spatially joined to each census tract, is the calculated rate per 100,000 aggregated into violent and property crime. These GIS procedures available in the spatial statistics toolbox identified statistically significant clustering. The crime data demonstrated clustering with a property crime z-score of 5.816869 and violent crime z-score of 11.176495. These values indicate spatial autocorrelation, "…an important concept in crime hotspot analysis and prediction of crime spatial patterns" (Wang 2005, 254).

To test this study's first (vegetation in public parks correlates positively with crime rates) and third (vegetation in public parks correlates positively with crime rates regardless of ethnic composition) hypotheses, I created a .25 mile buffer around selected parks and counted each crime within this buffered area. Previous research has determined a .25 mile (0.4 km) buffer around a park to be the "…standard threshold distance used in park accessibility studies in the U.S." (Cutts et al. 2009, 1317); yet, some studies show people may walk up to 3.1 miles to use a park (Sister, Wolch, and Wilson 2009). I assessed correlation between the percentage of tree canopy cover and the numbers of crimes within the .25 mile buffered area. Additional analysis steps removed parks and looked specifically at 78 census tracts contained in the directional distribution radii of violent and property crime. I calculated the percentage tree canopy area per tract along with the rate per 100,000 for violent and assessed property crime and correlation. Regression analysis using IBM SPSS statistical software with crime as the dependent variable addressed the second hypothesis (ethnic composition affects crime rates) at the census tracts level.

Qualitative Methods

To augment the quantitative methods in this study, I surveyed key informants in Austin. The structured survey format drew from the quantitative findings to corroborate these results and to uncover additional explanatory trajectories, omissions, limitations, or errors (see Appendix C). I contacted local Austin experts who research one of the primary variables of interest. I asked each of the key informants to suggest others who may provide important information to my study. The snowball sampling technique yielded six key informants. Because the survey questions were not invasive and respondents remain anonymous, the Texas State University Institutional Review gave its approval by exception (Appendix C). The offices surveyed were Austin Police Department, Austin Parks and Recreation, The Austin Nature and Science Center (volunteer group) and The LBJ Wildflower Center.

CHAPTER III

ANALYSIS AND FINDINGS

Introduction

The analysis for this research considered each of the three variables: crime, vegetation, and ethnicity individually before the statistical investigation of correlation among the variables. This chapter will discuss in turn each variable before the discussion and reporting of the final analysis for each hypothesis.

Crime Data

Visualization of the crime data added to the understanding of its spatial distribution. The series of maps in Figures 6-10 provides base knowledge of Part 1 crime distribution in Austin aggregated for the study's timeframe, 2006-2010. Figures 6-7 display violent crimes, while Figures 8-9 show property crime, and Figure 10, total crime. These choropleth maps have census tracts as the spatial unit standardized by the rate per 100,000. The classification method for each map is natural breaks; this method is often used in crime analysis and identifies gaps in the data (U.S. Department of Justice 2005; Santos 2013).

The first map in each series is the aggregate crime rate per 100,000 of violent crime (Figure 6) and property crime (Figure 8). The second maps (Figures 7 and 9) are displays of the ArcMap output of clusters and outliers. Finally, Figure 10 shows the total crime rate per 100,000 for the sum of violent and property crime. The cluster and outlier analysis (Anselin Local Moran's I) tool identifies statistically significant spatial outliers (ESRI 2010).

Each of the visualization and analysis methods indicate higher levels of both violent and property crime in and around the intersection of Martin Luther King and IH35. Distinct spatial patterns emerge when viewing these maps, specifically crime rates and clustering are visibly higher on the city's east side. The property cluster analysis (Figure 9) is different in that clustering also occurs in the far western parts of the city.

Two census tracts (Figure 11) standout in this analysis and are located in the city's center just south of the intersection at Martin Luther King and IH35. Neither tract contains one of the randomly sampled parks. The two tracts comprise a majority the downtown area of the city. The cluster and outlier analysis for violent crime characterized these tracts as areas of statistically significant (0.05 level) clustering with high values (HH) (ESRI 2010). To the south of the two tracts with HH are two tracts with low values surrounded by areas with high values (LH). These LH tracts have low negative z-scores, indicating statistically significant (0.05 level) spatial outliers (ESRI 2010) (Figure 12). I examined the tree canopy and violent crime rate these four exemplar tracts.

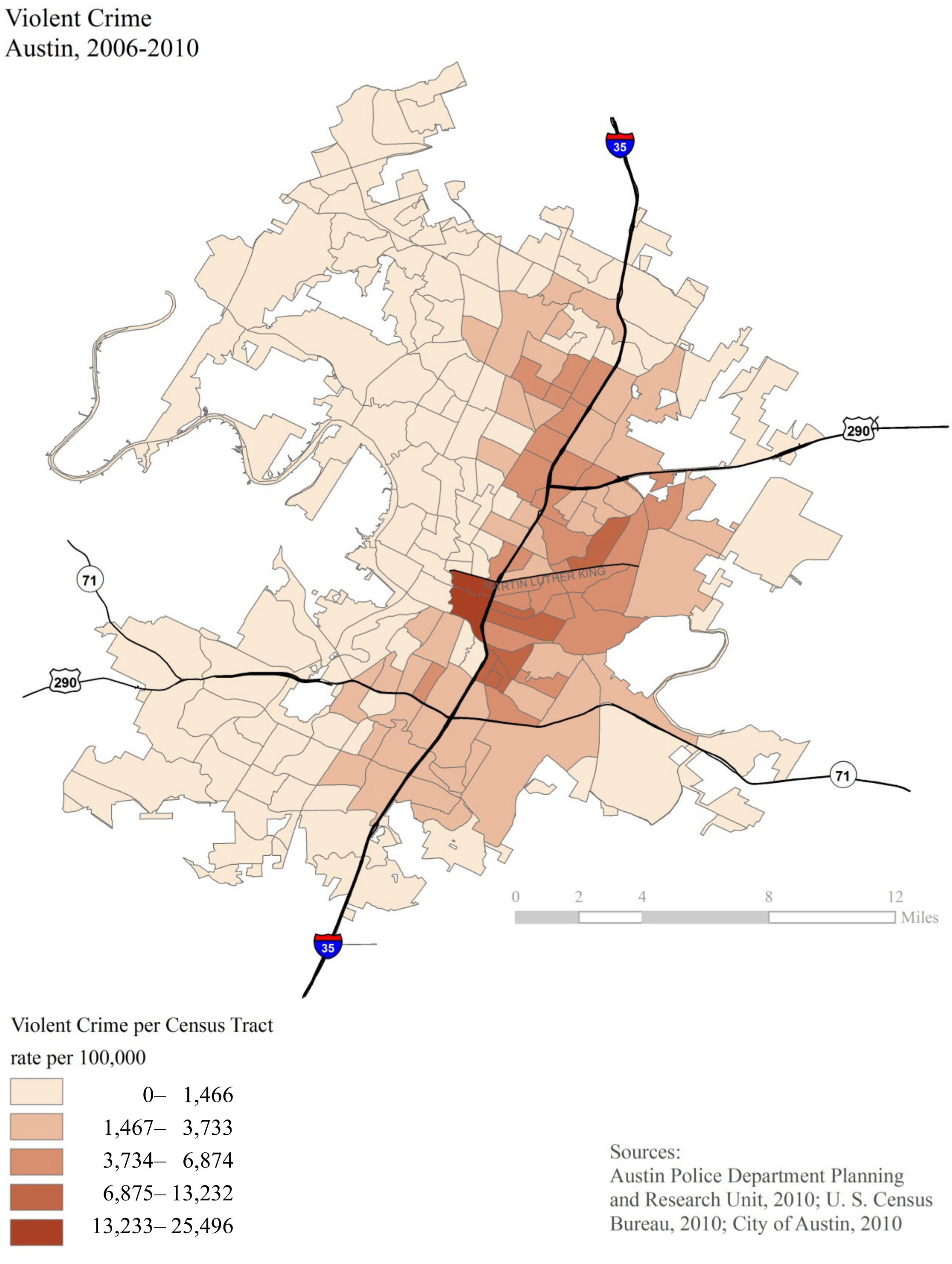

Figure 6. Violent Crime Rate per Census Tract.

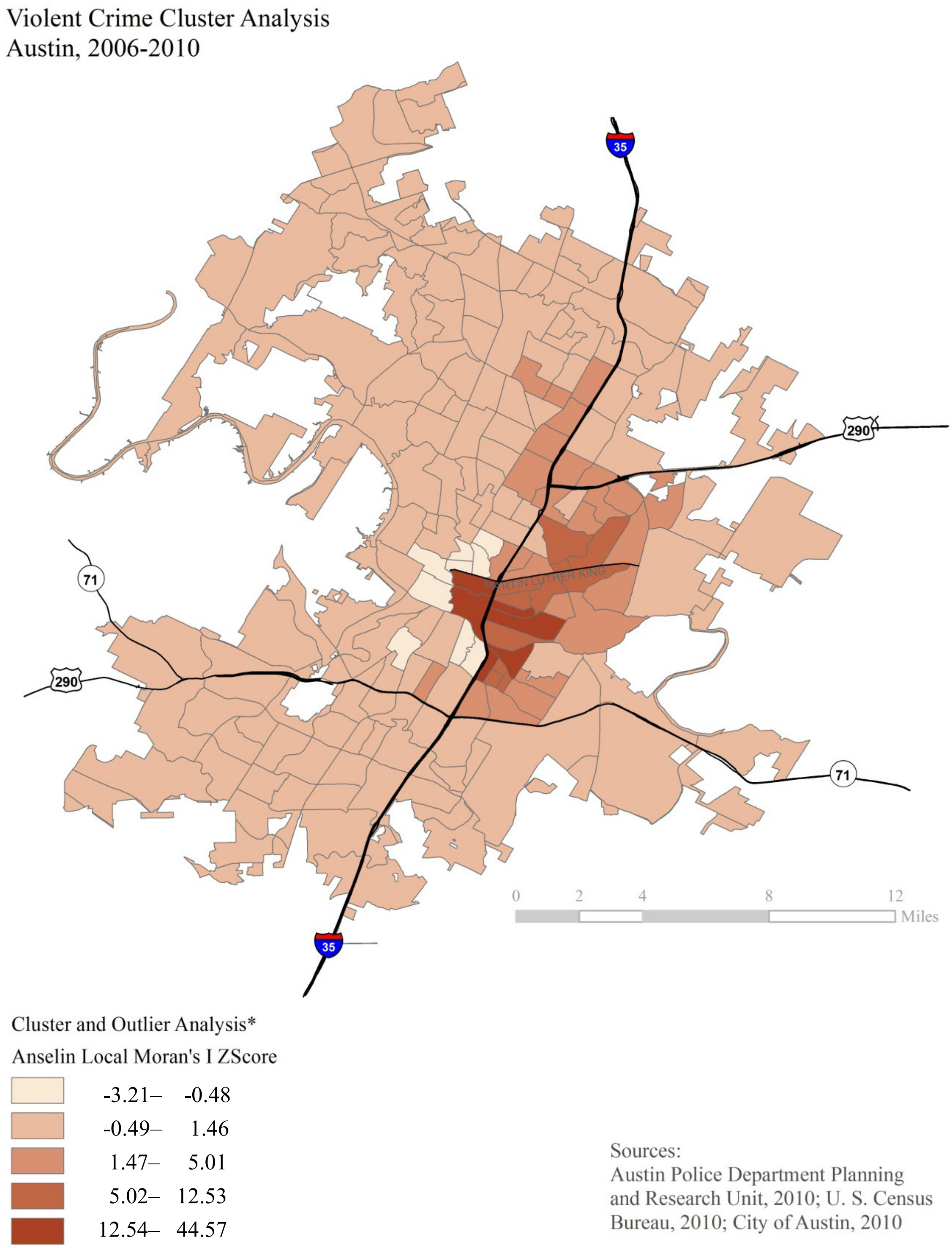

Figure 7. Violent Crime Cluster Analysis.

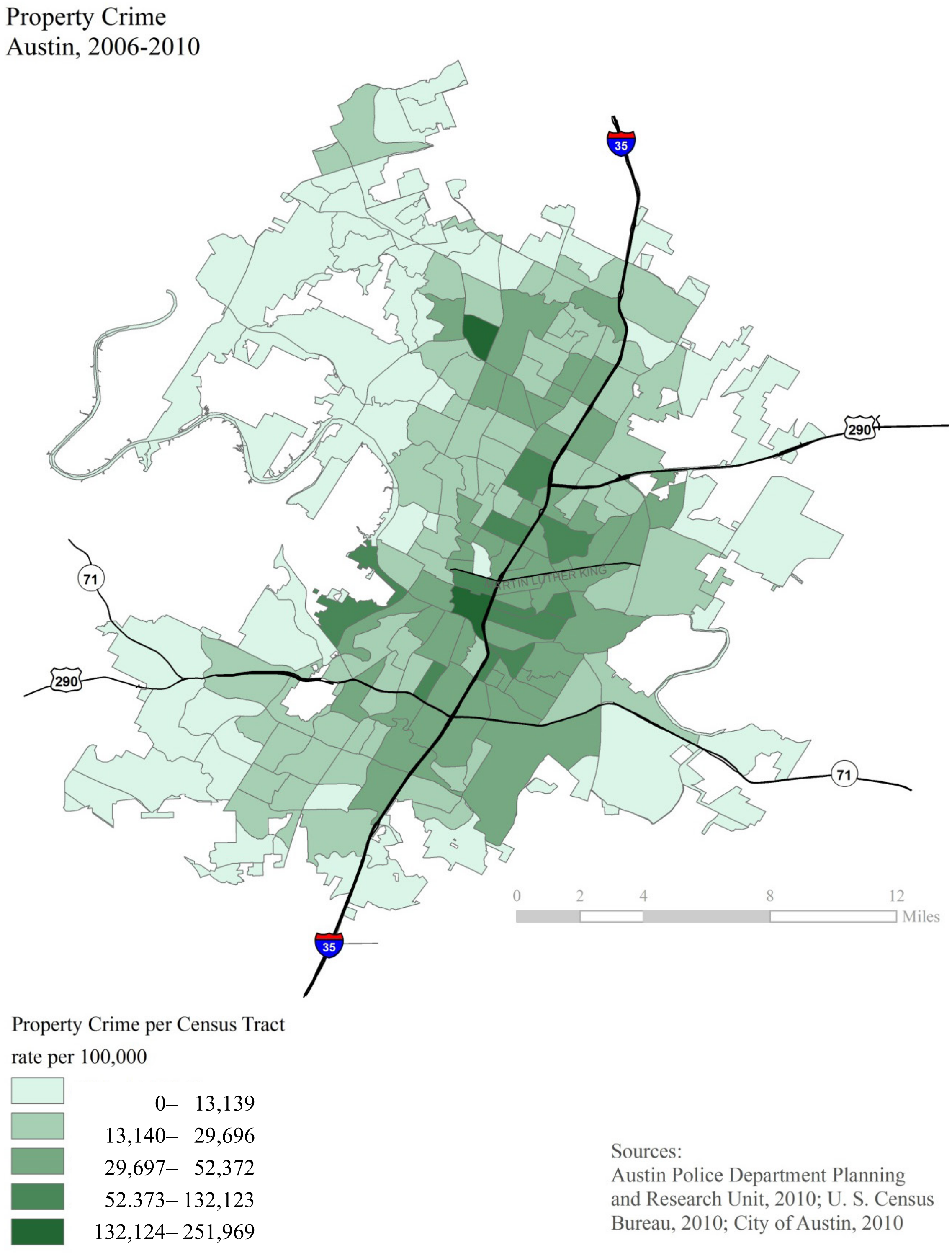

Figure 8. Property Crime Rate per Census Tract.

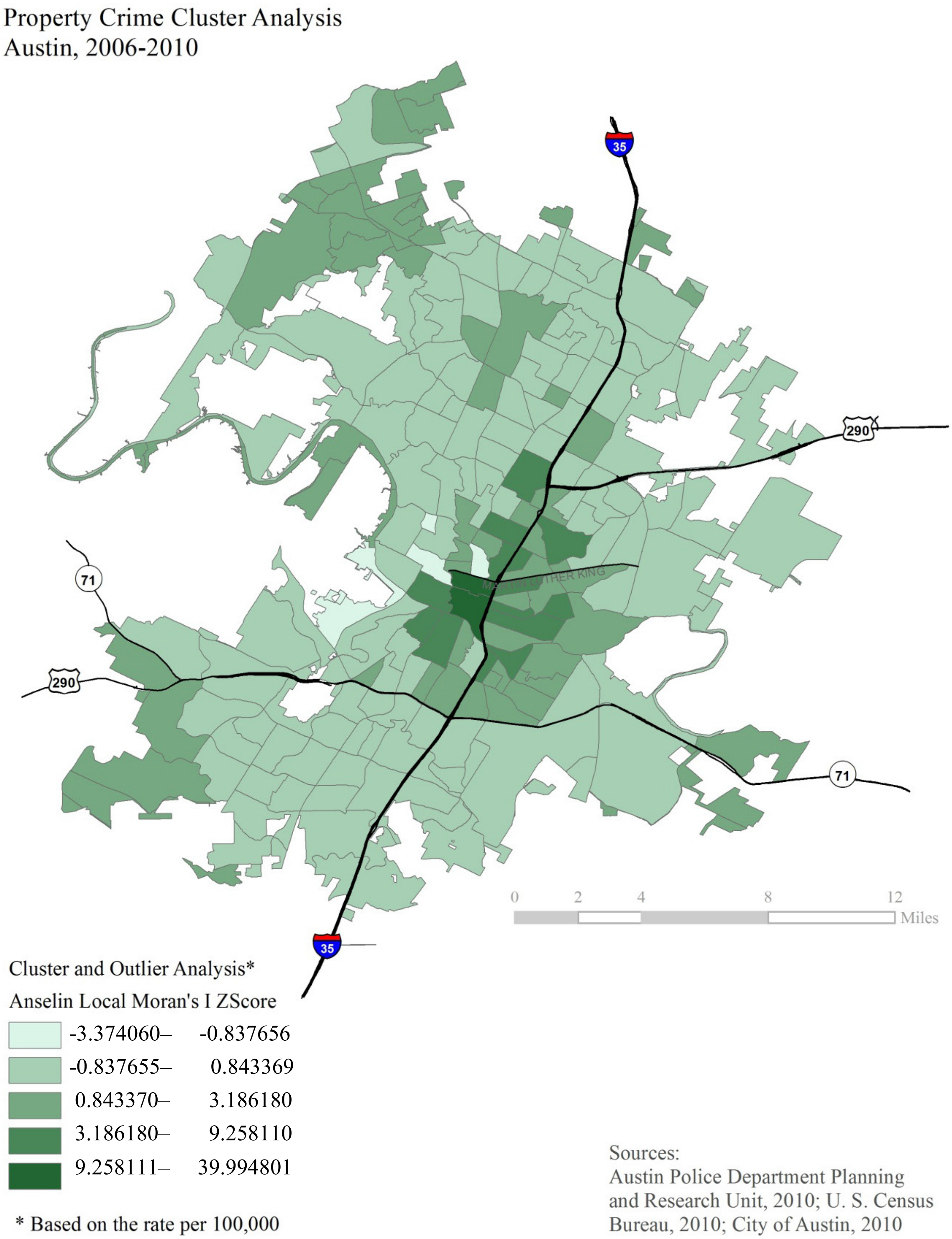

Figure 9. Property Crime Cluster Analysis.

Figure 10. Total Crime Rate per Census Tract.

Figure 11. High Crime Census Tracts.

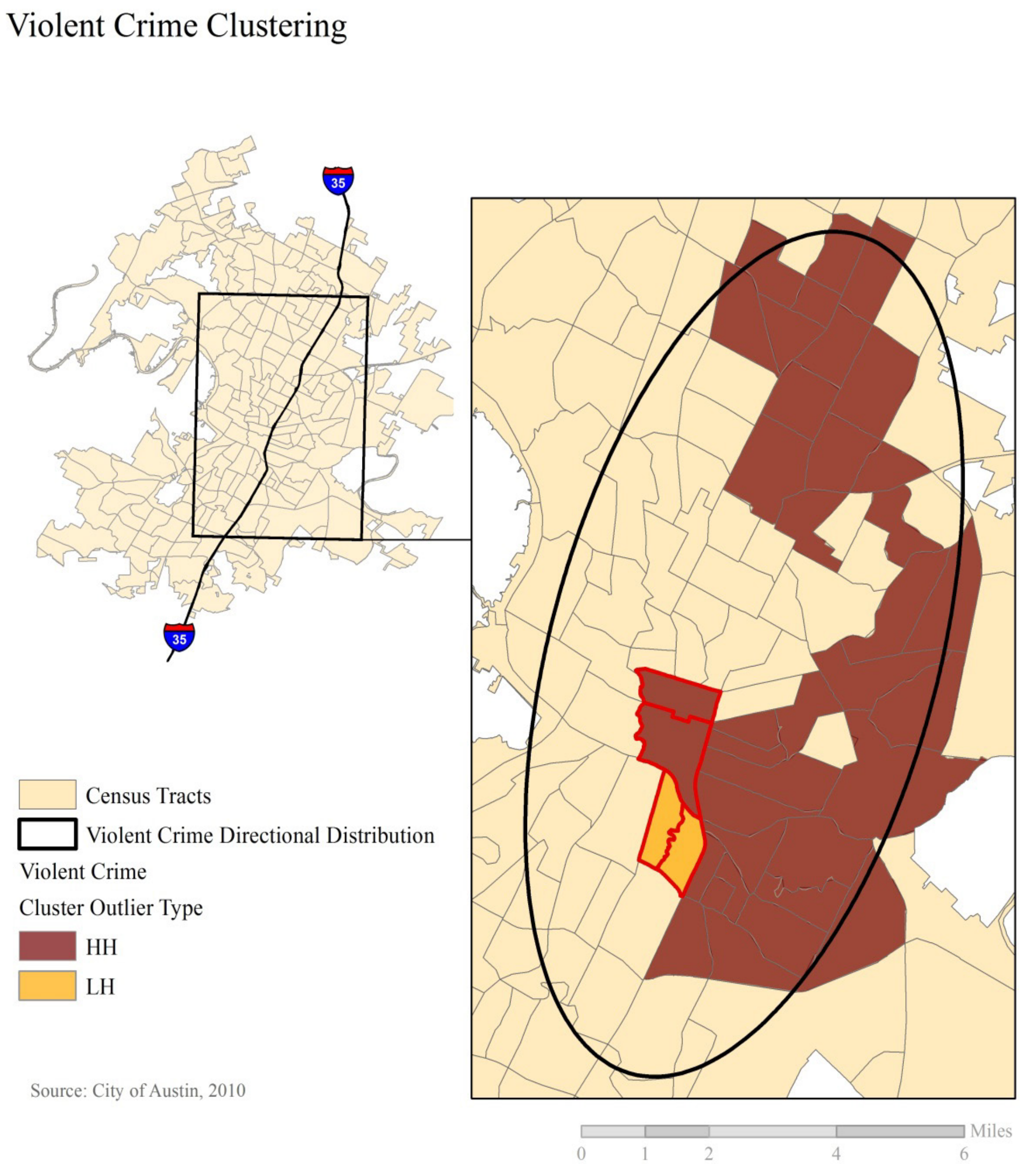

Figure 12. Violent Crime Cluster and Outlier.

Parks and Tree Canopy

The systematic random sampling produced 56 parks for analysis. While the study achieved the intended sample size and park type distribution with the systemic random process, the cumulative park area within the city quadrants was uneven. The total acreage of sampled parks in the NE is almost 40% of the total acreage for all the sampled parks (Figure 12). This is largely because Walter E. Long (1,872 acres), the largest park in Austin, is the metro park selected in the NE quadrant. Also selected was the second largest park in Austin, Emma Long (1,109 acres) in the NW quadrant. The third largest sampled park by area was the Barton Creek Greenbelt (841 acres); twelve sampled parks were 100 to 400 acres, while 41 of the sampled parks were less than 100 acres with 21 of these ≥20 acres. Appendix D lists the 56 sampled parks. The total tree canopy area in relation to park size ranged from 0% to 99% of the park area, with the average tree canopy of about 50% (Table 3). The calculation of the percentage of tree canopy was a

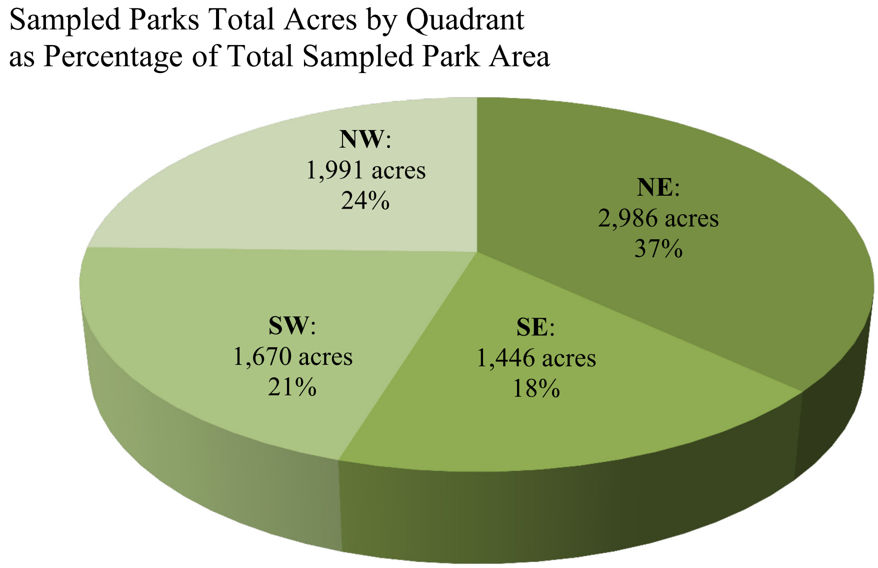

Figure 13. Park Area Percentage of Sampled Parks by Quadrant.

multistep process, utilizing basic tools available in ArcMap 10: selection, clip, and spatial join. Ultimately, dividing the tree canopy polygons' area by the park polygons' area resulted in the percent of tree canopy per sampled park. Visual verification of the datasets 2006 tree canopy layer and sampled parks by toggling the layers with National Agriculture Imagery Program (NAIP) 2010 imagery provided reasonable confidence in the data, even though the tree canopy layer produced by the City of Austin from 2006 imagery and the NAIP 2010 layer differed temporally.

Ethnicity

As seen in Figure 2, Austin is an ethnically divided city. To the west of IH35 are census tracts with ≥50% white populations, and to the east census tracts are either ≥50% Hispanic or of mixed ethnicity. Only two census tracts have a majority black population. Of the 218 census tracts within Austin, 119 have a majority white population, whereas Hispanics comprise the majority population for 53 tracts. There are 44 tracts with mixed ethnicity with no group having greater than a 50% majority.

Discussion of Final Analysis

The analysis found no significant correlations between the percentage tree canopy and the number of violent crimes ($r = -0.235$; $p = 0.081$), property crimes ($r = -0.008$; $p = 0.950$) or total crimes ($r = -0.031$; $p = 0.820$) within a quarter mile of the sampled parks. Supplementary analysis conducted for parks with 50 percent or greater tree canopy cover indicated no correlation between tree canopy and crime. The data for violent crime and property crime are not normally distributed; therefore, the nonparametric Spearman correlation was also calculated resulting once again in no significant association between percentage tree canopy and crime within a quarter mile of the sampled parks.

In a stepwise approach, I removed parks from consideration and shifted focus to the census tract level. The percent tree canopy for 78 census tracts from within the radii of violent and property crime directional distribution (Figure 5) was calculated and then compared to the rates of violent, property, and total crime. Correlation values modestly increased. The correlation of the total crime rate and percent tree canopy was rho = -0.298 (p = 0.008).

Although only two of the six the key informant survey responses agreed perceptually that no association exists between tree canopy and crime, their comments seem to more strongly confirm the lack of association. Several respondents did indicate they believed unkempt vegetation or thick understory might have a stronger relationship with crime. Listed below are a few comments underscoring this theme:

Overall Comments:

1. "brushes\shrubs\greenbelts offer more concealment and have more an impact on crime than trees." (Austin Police Department)
2. "I always heard that understory shrubs rather than trees affected crime levels." (LBJ Wildflower Center)

Comment about Question 3; a substantial number of trees are areas where criminals may find potential victims:

1. "That feels like it's true though other factors may need to be considered such as line of site under canopy. A broad view of the area and a view of other land uses doesn't seem any more at risk than an open area. Areas or corridors shrouded by dense underbrush and varied grade would seem to be at higher risk." (Austin Parks and Recreation)
2. "The green belts and parks might have more crime and they have trees. There are also a bit more remote." (Austin Nature and Science Center)

Comments about Question 4; The presence of a substantial number trees in city parks reduces crime rates in nearby neighborhoods:

1. "Just can't see any correlation." (Austin Nature and Science Center)
2. "The likelihood of having a tree-covered park might be higher in more affluent parts of town and those might have lower crime rates. Not to do with trees." (Austin Police Department)

Based on the quantitative and qualitative findings, the first hypothesis, the presence of substantial vegetation in public parks in Austin, Texas positively correlates with crime rates in nearby neighborhoods, is rejected (rho = 0.088; p = 0.517). This outcome means that no overall relationship exists between tree canopy area in parks and the total crime rate for the surrounding area in Austin. Rejection of the first hypothesis eliminated and thus rejected overall the third hypothesis, the presence of substantial vegetation in public parks in Austin, Texas positively correlates with crime rates in nearby neighborhoods regardless of ethnic majority.

Although the first and third hypotheses are rejected due to low correlation values for the sampled parks and census tracts overall, I re-examined this relationship, between tree canopy area and crime rates with a focus on tree canopy area of the census tract, rather than parks. I found that for the four tracts, tree canopy area has a strong negative correlation with crime rates (r = -0.92; p = 0.024), the higher the percentage tree canopy the lower the crime rate. The ethnic majority for these four census tracts is white, which led me to believe that tree canopy and crime may indeed be related if each ethnic group is analyzed separately.

Taking into account all 78 census tracts within the directional distribution radii for property and violent crime, the overall negative relationship remained (r = -0.288; p = 0

.010), meaning that, overall, higher crime rates are associated with lower tree canopy. Controlling for ethnicity, I calculated Spearman correlations for each ethnic group individually; correlation values for violent crime were significant for each of the three ethnic groups (Table 3). There is only one black majority census tract exists in the radii area and is it not completely contained by the radii; consequently I could not analyze separately the blacks' relationship with tree canopy. The Spearman correlations for the 39 white census tracts (rho = -0.403; p = 0.011), and the 25 Hispanic census tracts (rho = -0.500; p = 0.011) was actually stronger than the overall negative associate between tree canopy and crime rate (rho = -0.298; p = 0.008), whereas the 14 mixed ethnicity census tracts (rho = -0.635; p = 0.015) stood out. These findings indicate that, regardless of ethnicity, the higher the percentage tree canopy the lower the crime rate. Future studies, with a smaller scale and larger sample size may well find further evidence that regardless of ethnic composition crime rates and tree canopy have a negative relationship.

Table 3. Correlation of Tree Canopy and Violent Crime Rate per Ethnic Group.

Ethnicity	Tracts (n=)	Tree Canopy Area*	Violent Crime Rate*	Spearman (rho=)	Spearman (p=)
White	39	0.517	1988.417	-0.403	0.011
Hispanic	25	0.258	4750.112	-0.500	0.011
Mixed	14	0.381	4392.734	-0.635	0.015

*mean per census tract

The second hypothesis examined the differences of ethnicity using crime rates per 100,000 at the census tract level. Linear regression conducted in IBM SPSS, included correlation, model summary, ANOVA, and coefficients for the dependent variable (crime rate per 100,000) and the three ethnic majorities as the predictors at a 95% confidence interval. The ethnic majorities in the regression model accounted for 15.4% of total variation (R^2= 0.154). The correlation between property crime and ethnicity was not statistically significant (Table 4). Hispanic and white ethnicity share an inverse relationship with crime: census tracts with Hispanic majorities have positive correlation with crime rate, while tracts with white majority have an almost equal negative relationship. Although the two predominantly black census tracts correlated with violent crime, the sample size was too small to make any generalization. The regression model's significance statistic for the F-test indicates that there is less than one in 1,000 chance that the observed correlation between one or more of the independent variables and the violent crime rate variable is due solely to random sampling error.

Table 4. Pearson Correlation, Crime Rate, and Ethnicity.

	Hispanic	White	Black
Violent Crime Rate per 100,000	0.342 (p = 0.000)	-0.367 (p = 0.000)	0.282 (p = 0.000)
Property Crime Rate per 100,000	0.114 (p = 0.047)	-0.113 (p = 0.049)	0.065 (p = 0.171)

CHAPTER IV

CONCLUSIONS

This study undertook a unique geographic question and furthered research into the associations between urban vegetation and social phenomena. The three study variables offered many of the typical challenges in geographic research: availability and type of data, the data's scale and resolution, the study's design, and sampling techniques. The mapping and representation of crime data is complex and varied, looking for causation is incredibly complicated and subjective, but important for economic and social considerations. Crime data tell seemingly different stories depending on the scale and analysis technique, indications of clustering and hotspots change as the area or timeframe analyzed changes. This scale problem is also true of demographic data; ethnic majorities at the tract level will differ from those at the block or city level. Correlations are tenuous because actions and responses of people are never dependent on one or two variables.

Rejection of vegetation and crime association, based on data that only represents a derived snapshot of tree canopy and does not consider other measures and types of vegetation, is also tenuous. Simply calculating area of tree canopy cover in parks disconcertingly neglects many traits in the summation of urban vegetation as well as limits the effects outside parks. There is need to examine understory shrubs and bushes and incorporate additional techniques to characterize vegetation. The use of Normalized Difference Vegetative Index (NDVI) would offer a more complete view of the level of vegetation at multiple scales. Inclusion of time series analysis may also offer improved insight. Utilizing surface mapping techniques to develop a composite measure of vegetation that includes NDVI and other remotely sensed data along with layers like tree canopy would enhance the characterization and measure of vegetation. However, issues with imagery availability and resolution will complicate examination.

Another problematic aspect of the study's design is the park sampling method that considered park distribution throughout the city and sampled parks by type in city quadrants. The largest areas of the sampled parks are outside the city's center where crime rates are highest. This park-crime location relationship may have skewed the analysis between crime and vegetation. When examining the 78 census tracts completely contained within the directional distribution of violent and property crime, there was a modest increase in correlation between crime and tree canopy at the census tract level. This higher correlation, of course, focused on data in the areas of higher crime clustering.

Scale thus moderates the weak acceptance of the association of ethnicity and crime. For a more refined analysis, census block data offer less aggregation and more detail that may be a better resolution for future studies.

Future studies that reexamine the relationships of vegetation and crime, regardless of ethnic group majorities, may still be fruitful. Using a more inclusive representation for vegetation and smaller areal unit, such as census block, would ideally, increase accuracy thus representing the data and modeling the relationship better. The elimination of parks in future studies may add focus to the analysis; as seen when exploring the correlation between percent tree canopy and crime rates. The inclusion of parks introduces more variables than vegetation. The impact of a park within a particular distance is highly subjective especially when variables such as access routes and visibility are not considered. If parks remain in future studies, the researcher needs to understand and control for a basic methodological flaw in this study's sampling technique that included a balance of the number of parks sampled per city quadrant. Instead, selecting parks that are located within the areal radii of both the violent and property crime directional distributions should be a more useful approach. In this way, the parks and ethnicity data would be better focused on the linking variable of crime. Additional focus could come from multivariate analysis and include compound factors such as education, access to resources, type of residential and commercial surroundings, population density, home ownership, or rental rates.

Previous studies linked increased street trees with reduced crime (Kuo and Sullivan 2001 and Donovan and Prestemon 2010). Donovan and Prestemon (2010) used the routine activity theory to explain that trees make public space more desirable, thus increasing the probability of a criminal being observed. I followed this framework, hypothesizing that the presence of substantial tree canopy in public parks creates an environment that people are drawn to and occupy with ease. The addition of more people produces a less conducive landscape for the potential criminal activities regardless of the ethnic majority of an area. While the analysis of these data concludes with the rejection of the hypotheses that the presence of substantial tree canopy in public parks in Austin, Texas reduces crime rates, aspects of both the quantitative and qualitative findings in this study will benefit future studies. The small correlation found when comparing crime rates to percent tree canopy in the higher crime census tracts did, in fact, suggest fewer crimes occur in areas where more tree canopy exists. Assuming increased human activity due to value added by more tree canopy, my study may partially support previous connections made between vegetation and reduced crime. My findings may also strengthen routine activity theory’s third premise that increase in effective authority to observe crime may reduce the occurrence of crime.

APPENDIX A

UCR DETAILED CRIME DEFINITIONS
(quoted information from the UCR Handbook 2010)

The seven Part I offense classifications included the violent crimes of murder and nonnegligent manslaughter, forcible rape, robbery, and aggravated assault and the property crimes of burglary, larceny-theft, and motor vehicle theft. By congressional mandate, arson was added as the eighth Part I offense category in 1979.

Part 1 Index Crime Definitions:

Criminal Homicide—Murder and Nonnegligent Manslaughter: The willful nonnegligent) killing of one human being by another. As a general rule, any death caused by injuries received in a fight, argument, quarrel, assault, or commission of a crime is classified as Murder and Nonnegligent Manslaughter (1a).

Forcible Rape: The carnal knowledge of a female forcibly and against her will.

Robbery: The taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or threat of force or violence and/or by putting the victim in fear.

Aggravated Assault: An unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily injury. This type of assault usually is accompanied by the use of a weapon or by means likely to produce death or great bodily harm.

Burglary: The unlawful entry of a structure to commit a felony or a theft.
The UCR Program classifies offenses locally known as burglary (any degree), unlawful entry with intent to commit a larceny or felony, breaking and entering with intent to commit a larceny, housebreaking, safecracking, and all attempts at these offenses as burglary.

Larceny-Theft (Pocket-picking, Purse-snatching, Shoplifting, Thefts From Motor Vehicles, Theft of Motor Vehicle Parts and Accessories, Theft of Bicycles, Theft From Buildings, Theft From Coin-operated Device or Machine, All Other): The unlawful

taking, carrying, leading, or riding away of property from the possession or constructive possession of another.
Larceny and theft mean the same thing in the UCR Program. All thefts and attempted thefts are included in this category with one exception: motor vehicle theft. Because of the high volume of motor vehicle thefts, this crime has its own offense category.Motor Vehicle Theft: The theft or attempted theft of a motor vehicle.

Motor Vehicle Theft includes the theft or attempted theft of a motor vehicle, which the UCR Program defines as a self-propelled vehicle that runs on land surface and not on rails; for example, sport utility vehicles, automobiles, trucks, buses, motorcycles, motor scooters, all-terrain vehicles, and snowmobiles are classified as motor vehicles. This category does not include farm equipment, bulldozers, airplanes, construction equipment, or water craft (motorboats, sailboats, houseboats, or jet skis). Taking a vehicle for temporary use when prior authority has been granted or can be assumed such as in family situations, rental car agreements, or unauthorized use by chauffeurs and others having lawful access to the vehicle must not be classified as motor vehicle thefts.

APPENDIX B

OPEN RECORD REQUEST

-----Original Message-----

From: pp36575@txstate.edu [mailto:pp36575@txstate.edu]
Sent: Friday, June 17, 2011 9:29 AM
To: Information, Public
Subject: Public Information - Open Records Act - Historic Crime Data

Date/Time Submitted: Friday, 6/17/11 at 09:29 AM

From: Phillicia Phillips
Mailing Address: TxState- Dept of Geography 601 University Dr
San Marcos, Tx
Phone: 512-245-1333
Fax:
E-mail address: pp36575@txstate.edu
Subject: Historic Crime Data

I am requesting: Copies of the following Record(s)

Please state your document request below:

This request is for historic UCR Part I offense data from 2001 to 2010 and police beat shapefile with narrative description of how beat boundaries are drawn. These crime data should contain at least index crime type and police beat location per occurrence and if possible arrest information per occurrence. The format should be one of the following: excel, text, comma separated value or dbase file. Thank you,
Phillicia

APPENDIX C

KEY INFORMANT INTERVIEW SURVEY

1. Austin parks with a substantial number of trees (i.e., almost half the park is covered with trees) are used more often than Austin parks with fewer trees?

(A) Strongly Agree (B) Agree (C) Neutral (D) Disagree (E) Strongly Disagree

Follow-up open-ended question: Why?

2. Austin parks with a substantial number of trees are used more than Austin parks with fewer trees, regardless of neighborhood ethnic majorities of Hispanics and African Americans?

(A) Strongly Agree (B) Agree (C) Neutral (D) Disagree (E) Strongly Disagree

Follow-up open-ended question: Why?

3. Austin parks with a substantial number of trees are areas where criminals may find potential victims?

(A) Strongly Agree (B) Agree (C) Neutral (D) Disagree (E) Strongly Disagree

Follow-up open-ended question: Why?

4. The presence of a substantial number trees in city parks reduces crime rates in nearby neighborhoods?

(A) Strongly Agree (B) Agree (C) Neutral (D) Disagree (E) Strongly Disagree

Follow-up open-ended question: Why?

5. So, an increase/decrease (depending on the answer to question 4) in the number of trees in city parks reduces crime rates in nearby parks?

(A) Strongly Agree (B) Agree (C) Neutral (D) Disagree (E) Strongly Disagree

Follow-up open-ended question: Why?

6. Neighborhood ethnic composition in Austin affects neighborhood crime rates?

(A) Strongly Agree (B) Agree (C) Neutral (D) Disagree (E) Strongly Disagree

Follow-up open-ended question: Which ethnic neighborhoods in Austin do you think are most affected by crime?

7. The presence of a substantial number of trees in Austin city parks reduces crime rates regardless of the differences in neighborhood ethnic composition?

(A) Strongly Agree (B) Agree (C) Neutral (D) Disagree (E) Strongly Disagree

Follow-up open-ended question: Why?

8. Austin Hispanic and African-American neighborhoods with parks have higher rates crime than those Hispanic and African-American neighborhoods that do not have parks?

(A) Strongly Agree (B) Agree (C) Neutral (D) Disagree (E) Strongly Disagree

Follow-up open-ended question: Why?

9. Austin Hispanic and African-American neighborhoods with parks having a substantial number of trees have higher rates of crime than those that do not have a substantial number of trees?

(A) Strongly Agree (B) Agree (C) Neutral (D) Disagree (E) Strongly Disagree

Follow-up open-ended question: Why?

Survey Question Results	Strongly Agree	Some-what Agree	Neutral	Some-what Disagree	Strongly Disagree	majority
1. Austin parks with a substantial number of trees (i.e., almost half the park is covered with trees) are used more often than Austin parks with fewer trees?		3	2	1		somewhat agree
2. Austin parks with a substantial number of trees are used more than Austin parks with fewer trees, regardless of neighborhood ethnic majorities of Hispanics and African Americans?	1	2	2	1		somewhat agree/ neutral
3. Austin parks with a substantial number of trees are areas where criminals may find potential victims?		3	2			somewhat agree
4. The presence of a substantial number trees in city parks reduces crime rates in nearby neighborhoods?	1		2	2		neutral/ somewhat disagree
5. So, an increase/decrease (depending on the answer to question 4) in the number of trees in city parks reduces crime rates in nearby parks?		1	3	1		neutral
6. Neighborhood ethnic composition in Austin affects neighborhood crime rates?	2	1	1	1		strongly agree
7. The presence of a substantial number of trees in Austin city parks reduces crime rates regardless of the differences in neighborhood ethnic composition?		1	4			neutral
8. Austin Hispanic and African-American neighborhoods with parks have higher rates crime than those Hispanic and African-American neighborhoods that do not have parks?		1	1	3		somewhat disagree
9. Austin Hispanic and African-American neighborhoods with parks having a substantial number of trees have higher rates of crime than those that do not have a substantial number of trees?			1	4		somewhat disagree

Exemption Request EXP2012F8933 - Approval

AVPR IRB [ospirb@txstate.edu]
Sent: Wednesday, October 17, 2012 11:46 AM
To: Phillips, Phillicia

DO NOT REPLY TO THIS MESSAGE. This email message is generated by the IRB online application program.

Based on the information in IRB Exemption Request EXP2012F8933 which you submitted on 10/16/12 15:04:41, your project is exempt from full or expedited review by the Texas State Institutional Review Board.

If you have questions, please submit an IRB Inquiry form:

http://www.txstate.edu/research/irb/irb_inquiry.html

Comments:
No comments.

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Institutional Review Board

Office of Research Compliance

Texas State University-San Marcos

(ph) 512/245-2314 / (fax) 512/245-3847 / ospirb@txstate.edu / JCK 489

601 University Drive, San Marcos, TX 78666

APPENDIX D

Sampled Parks

Park Name	Park Type	Acres	Sample Quad	Park Address	Park Status	Service Level
Adams-Hemphill	Neighborhood	10	NW	201 W 30th St.	Developed	4
Armadillo	Neighborhood	2	SW	910 Armadillo Rd.	Undeveloped	6
Balcones	District	51	NW	12017 Amherst Dr.	Developed	2
Barrow Nature Preserve	Nature Preserve	7	NW	7515 Step Down Cv.	Undeveloped	6
Bartholomew	District	50	NE	5201 Berkman Dr.	Developed	2
Barton Creek	Greenbelt	841	SW	3753 S Capital of Texas Hwy.	Developed	1
Big Walnut Creek Nature Preserve	Nature Preserve	44	NE	9221 E US 290 HWY	Undeveloped	6
Blowing Sink Research Mgmt Area	Nature Preserve	165	SW	3705 Deer Ln.	Undeveloped	6
Bull Creek Park	District	48	NW	6701 Lakewood Dr.	Developed	2
Butler Shores at Town Lake	Metro	29	SW	200 S Lamar Blvd.	Developed	1
Buttermilk Branch	Greenbelt	4	NE	7501 Bethune Ave.	Developed	3
Colony	District	92	NE	7400 Loyola Ln.	Developed	2
Colorado River Wildlife Sanctuary	Nature Preserve	43	SE	5827 Levander Loop	Developed	5
Commons Ford Ranch	Metro	212	NW	614 N Commons Ford Rd.	Developed	1
Decker Tallgrass Prairie Preserve	Nature Preserve	348	NE	8001 Decker Ln.	Undeveloped	6
Deer Park at Maple Run Preserve	Nature Preserve	24	SW	4929 Davis Ln.	Undeveloped	6
Dittmar	District	33	SW	1009 W Dittmar Rd.	Developed	2
Dove Springs	District	73	SE	5801 Ainez Dr.	Developed	2
East Boggy Creek Greenbelt	Greenbelt	75	SE	5609 Stuart Circle	Undeveloped	6
Emma Long	Metro	1109	NW	1600 City Park Rd.	Developed	1

Park Name	Park Type	Acres	Sample Quad	Park Address	Park Status	Service Level
Garrison	District	39	SW	6001 Manchaca Rd.	Developed	2
Gillis	Neighborhood	7	SW	2410 Durwood Ave.	Developed	0
Givens	District	41	SE	3811 E 12th St.	Developed	2
Govalle	Neighborhood	26	SE	5200 Bolm Rd.	Developed	0
Gustavo "Gus" L. Garcia	District	48	NE	1101 E Rundberg Ln.	Developed	3
Indiangrass Wildlife Sanctuary	Nature Preserve	291	NE	10203 Lindell Ln?	Undeveloped	6
J.J. Seabrook	Greenbelt	3	NE	2000 Pershing Dr.	Undeveloped	6
John Trevino Jr. Park at Morrison Ranch	Metro	320	SE	9501 FM 969 Rd.	Developed	1
Little Walnut Creek	Greenbelt	207	NE	5100 E 51st St.	Undeveloped	6
Longhorn Shores at Town Lake	Metro	11	SE	60 S Pleasant Valley Rd.	Developed	1
Lower Bull Creek	Greenbelt	105	NW	7806 N. Capital of Texas Hwy.	Developed	3
Mabel Davis	District	54	SE	3427 Parker Ln.	Developed	3
Marble Creek	Greenbelt	11	SE	6605 E William Cannon Dr.	Undeveloped	6
Mary Moore Searight	Metro	344	SW	907 Slaughter Ln.	Developed	1
Mayfield Nature Preserve	Nature Preserve	21	NW	3801 W 35th St.	Developed	3
Meadows at Trinity Crossing	Neighborhood	17	NE	5900 Sendero Hills Parkway	Developed	0
North Acres	Neighborhood	3	NE	1112 Hermitage Dr.	Undeveloped	6
Norwood Tract at Town Lake	Metro	10	SW	1009 Edgecliff Terrace	Developed	1
Nuckols Crossing of Slaughter Creek Greenbelt	Greenbelt	12	SW	9900 S 1ST ST - not official	Undeveloped	6
Old Moore's Crossing	Neighborhood	12	SE	7420 Apperson St.	Undeveloped	6
Onion Creek	Greenbelt	211	SE	7004 Onion Creek Dr.	Developed	4

Park Name	Park Type	Acres	Sample Quad	Park Address	Park Status	Service Level
Onion Creek Metro Park	Metro	390	SE	8652 Nuckols Crossing Rd.	Undeveloped	6
Onion Creek Wildlife Sanctuary	Nature Preserve	173	SE	4435 E SH 71	Undeveloped	6
Patterson	Neighborhood	9	NE	4200 Brookview Rd.	Developed	2
Pease	District	43	NW	1100 Kingsbury St.	Developed	2
Perry	Neighborhood	10	NW	4800 Fairview Dr.	Developed	0
Ponciana	Neighborhood	5	SE	5201 Freidrich Ln.	Developed	6
Quail Creek	Neighborhood	16	NW	1101 Mearns Meadow Dr.	Developed	3
Sendera Mesa Park	Neighborhood	5	SW	4717 Davis Ln.	Undeveloped	6
Steck Valley	Greenbelt	38	NW	8403 Adirondack Trl.	Undeveloped	6
Stillhouse Hollow Nature Preserve	Nature Preserve	20	NW	7810 Sterling Dr.	Developed	5
Walnut Creek Park	Metro	291	NW	12138 N Lamar Blvd.	Developed	1
Walter E. Long	Metro	1872	NE	6620 Blue Bluff Rd.	Developed	1
Wells Creek	Greenbelt	9	NW	13120 Metric Blvd.	Undeveloped	6
Williamson Creek Central	Greenbelt	81	SW	5120 S 1st St.	Undeveloped	6
Zilker Nature Preserve	Nature Preserve	77	SW	301 NATURE CENTER DR	Developed	1

Source: City of Austin

Data exported from coa_park ESRI shapefile

ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html

Accessed: February 17, 2012

REFERENCE LIST

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VITA

Phillicia Phillips earned her first degree, Associate of Arts, from Trinity Valley Community College in 1996. In the same year, she began working for Southwest Texas State University's Student Learning Assistance Center (SLAC) where she acted as floating tutor and front desk coordinator. In 1997, she accepted a fulltime position with Office of Telecommunications where she continued to work until 2008. During this tenure she was accepted three merit promotions and completed over 15 certifications in: voice systems operations and maintenance, fiber optic engineering, personnel and project management. She successfully managed system and infrastructure upgrades, customer moves and changes, and cabling infrastructure growth throughout the university; this required collaboration with many small departments as well as large divisions, outside vendors, and service providers.

In 2008, she began the fulltime pursuit of her Bachelor of Science degree in Geography at Texas State University-San Marcos; graduating Cum Laude in 2009. She made the Dean's list six times while perusing a Bachelor degree, was inducted into the Golden Key International Honor Society and completed volunteer work with The Ladybird Johnson Wildflower Center, the San Marcos Greenbelt Alliance and the Renewable Energy Roundup.

In December, 2010, she accepted a Graduate Research Assistantship for the Department of Geography’s Texas Atlas Project. In this capacity, she acted as production manager for the Texas Crime Atlas. As project manager and cartographer she collected, aggregated and geo-referenced ten years of index crime data for nine Texas cities; with these data, over seven million records, and American Community Survey data from the U.S. Census Bureau, she constructed approximately one hundred and fifteen original cartographic pages. During this time she pursued a Master of Science in Geography at Texas State, as well as completed a five month full-time internship with the U.S. Geological Survey as Geographer, where she utilized ESRI Maplex Label engine to design and label the National Hydrography Million-Scale streams and waterbodies dataset. She was also elected the Master’s Faculty Representative for the Geography Student Graduate Forum and was invited and inducted into Alpha Chi National College Honor Society.

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