Geographic Information Systems Analysis of Crime in San Luis Obispo for 2012

A Senior Project

presented to

the Faculty of the Social Sciences Department

California Polytechnic State University, San Luis Obispo

In Partial Fulfillment

of the Requirements for the Degree

Bachelor of Science

by

Eric DeLorme

June, 2013

Table of Contents

<u>Senior Project Proposal</u>

The research and final project that I plan to do will be composed of a few different parts. I will be taking crime report data from the city of San Luis Obispo and analyzing it with GIS software. The data will be from the most recent reported calendar year. I will be looking at the data spatially so that I can compare the areas of the city in which crime is most prevalent. I will be creating multiple maps which will be looking individually at different types of crime, such as violent crimes, burglary and theft, assault and battery, sex crimes, alcohol and drug related crimes, and others. I hope to be able to compare the maps of individual crimes to compile a complete spatial view of the city as it relates to criminal activity. It should be interesting to compare the completed maps to the proximity to schools, bars, other local businesses, and population density, to see what has the greatest impact on where the crimes are committed.

The final project will consist of a number of GIS maps of the city of SLO, an analysis of each and the implications of the findings. I would also like to do a simple analysis with all the crimes committed during one year, and another with all the crimes committed five years later so that I can examine the changes over that period. Hopefully this will illuminate some trends that influence the crime in the city and may provide some solutions for the problems. In conclusion, my final project should be a comprehensive report of the crime report data in SLO, examined spatially, and analyzed in comparison to previous years, hopefully providing insight into current trends in crime in our city.

Annotated Bibliography

1) "San Luis Obispo Crime Map." The Tribune. San Luis Obispo, n.d. Web.

      Abstract: This source will provide a comprehensive list of all calls made to the dispatch over the course of the specified years. All calls are mapped on an interactive framework and include the street, time of call, and nature of the crime. This data can be used for entering all data for the specified year into an excel document to import to ArcGIS for mapping.

2) "From the Cell to the Streets: GIS for Probation, Parole, and Corrections." Esri. N.p., n.d. Web. 14 Feb. 2013.

      Abstract: This article provides a guide for the possible uses of GIS software in probation, parole, and corrections. It gives insight into the advantages of mapping correctional facilities to better utilize resources and staff. The article shows the benefits of using geospatial information to compile data on probationers and parolees who are no longer in custody, and gives tips on how to accomplish this. For example, using GIS to better contact your caseload of probationers given their geographic locations.

3) "GIS for Law Enforcement." Esri. N.p., n.d. Web. 14 Feb. 2013.

      Abstract: This article gives information and tips on how to best use resources and officers in the field for law enforcement agencies. It explains how all law enforcement can benefit from the integration of many sources of data that are visually represented using GIS platforms. In addition, it can be used in near real time to analyze areas that are prone to high crime and need extra patrols. It gives suggestions on which areas of a departments overall mission would be best enhanced by spatial data analysis.

4) Vann, Irvin B., and G. David Garson. "Crime Mapping And Its Extension To Social Science Analysis." Social Science Computer Review 19.4 (2001): 471. Academic Search Premier. Web. 14 Feb. 2013.

      Abstract: The purpose of this article is to present the definitions of 21 geographic information system (GIS) functions used in crime mapping and to propose how these functions may be applied more generally to social science research. Most social data are spatial, but this fact has been largely ignored in sociological and social science research. More extensive use of both spatial statistics and spatial analysis in sociology seems likely, and hopefully this article will stimulate social scientist readers to explore using GIS in their research. [ABSTRACT FROM AUTHOR]

5) Li, Weimin, and John D. Radke. "Geospatial Data Integration And Modeling For The Investigation Of Urban Neighborhood Crime." Annals Of GIS 18.3 (2012): 185-205. Academic Search Premier. Web. 16 Feb. 2013.

Abstract: With more than half a century of development, Geographic Information Science (GIS) has evolved to become an interdisciplinary field of spatial thinking, geographic knowledge, geospatial technologies, and application practices. However, the integration of GIS in social science research is yet fully developed and more proactive empirical research examples are needed to continuously advance the application of GIS in social science research. To meet this challenge, in this article, the authors use the investigation of urban neighborhood crime as an experiment to examine the capability of geospatial technologies in the investigation of neighborhood crime in Oakland, CA, United States. First, a comprehensive theoretical framework is constructed with major neighborhood criminology theories to guide the empirical experiment. Second, a GIS-based methodological framework integrates geospatial data collection, integration, processing, and modeling on the one hand and advanced statistical methods on the other, to lead a data-driven examination of neighborhood crime. Specifically, a Random Neighborhood Sampling Matrix enables the generation of Hierarchical Adjustable Spatial Neighborhoods (HASNs). Areal Interpolation Matrixes allow the transformation of raw data in various geographic units to that in the HASN unit. Furthermore, a Neighborhood Accessibility Matrix accommodates the modeling of accessibility to nearest location-based crime factors from sampled neighborhoods. Third, multivariate statistics and multiple regression statistics are used to examine the relations between different types of neighborhood crime and their explanatory factors. Research results indicate that the GIS-based methodological framework generates research findings highly consistent with those reported in the literature. [ABSTRACT FROM AUTHOR]

6) Zhang, Haifeng, Geetha Suresh, and Youliang Qiu. "Issues In The Aggregation And Spatial Analysis Of Neighborhood Crime." Annals Of GIS 18.3 (2012): 173-183. Academic Search Premier. Web. 16 Feb. 2013.

Abstract: Prior studies of neighborhood crime have largely overlooked a border issue in the aggregation of criminal incidents to small areal units and a denominator problem arising from the use of population to normalize crime counts and have failed to discern racial disparities in crime victimization due to the use of non-race-specific crime data. This article explores the relationships between neighborhood characteristics and robbery victimization by applying an improved method for neighborhood crime aggregation and normalization to race-disaggregated incident data. Results suggest that controlling for above issues helps better explain the spatial variations of robbery victimization across urban neighborhoods. The methods and findings have implications for improving the measurement accuracy of neighborhood crime and disentangling the effects of race and other socioeconomic factors on urban crime. [ABSTRACT FROM AUTHOR]

7) Quist, Janet. "GIS Crime Mapping Improves Public Safety." Nation's Cities Weekly 22.17 (1999): 7. Academic Search Premier. Web. 16 Feb. 2013.

Abstract: Reports on the government's efforts to develop crime-mapping strategies to improve law enforcement and expand Geographic Information System (GIS) applications to broader public safety issues in the United States. Background information on GIS and computerized crime mapping; Uses of crime mapping; Public safety priorities; Technology; Expenditures and length of time using GIS/mapping system. [ABSTRACT FROM AUTHOR]

8) Garson, G. David, and Irvin Vann. "Resources For Computerized Crime Mapping." Social
       Science Computer Review 19.3 (2001): 357. Academic Search Premier. Web. 16 Feb.
       2013.

       Abstract: Focuses on the features of geographic information systems (GIS)
resources used for the computerized mapping of crime. Publication of new research tools
applicable to topics in sociology, public administration, criminology and other social sciences;
Challenges in establishing a GIS n crime analysis units; Necessity of training personnel to form
and maintain GIS. [ABSTRACT FROM AUTHOR]

9) Boba, Rachel, Ph.D. "Introductory Guide to Crime Analysis and Mapping." Community
       Oriented Policing Services. USDOJ, n.d. Web.

       Abstract: A guide to creating viable maps for crime analysis. Similar to an
introductory book for any class on GIS, this publication focuses mainly on how to apply all
knowledge of ArcGIS to criminal data analysis. Gives detailed explanation on how to use
features, feature classes, geocoding, and problem solving techniques to accomplish the map
making process.

10) Garson, David G., and Irvin B. Vann. "GIS for Small and Medium Law Enforcement
       Jurisdictions." GIS for Small and Medium Law Enforcement Jurisdictions. The
       Governor's Crime Commission North Carolina Criminal Justice Analysis Center, n.d.
       Web. 16 Feb. 2013.

       Abstract: The purpose of this effective practices booklet is to provide an overview
of the GIS implementation process for managers and staff in small to medium size law
enforcement jurisdictions. Without specifying or dictating the precise organizational and
technical structure needed for implementation, this booklet seeks to establish the general
managerial framework for crime mapping at the local level. It is hoped that through it managers
will be able to gain a strategic vision of the purposes and administrative dimensions of GIS in
law enforcement. Moreover, sections of this manual may be used as an implementation checklist
for each stage of the GIS life cycle. Appendices list relevant contacts and resources.
[ABSTRACT FROM AUTHOR]

I) Analysis of crime data for the city of San Luis Obispo over a two year period

    A) Look at different layouts of data to represent the crime independently

    B) Compare the data sets between years to spot trends in the crime

    C) Compare the data sets to local areas to see what parts of the city have the greatest

       impact on crime location

II) Maps by type of crime

    A) Violent crime (one map from each year)

       i) Analysis of findings

       ii)   Could include dot density maps, gradient maps

    B) Property crime (one map from each year)

       i) Analysis of findings

       ii)   Could include dot density maps, gradient maps

    C) Alcohol/Drug crime (one map from each year)

       i) Analysis of findings

       ii)   Could include dot density maps, gradient maps

III) Maps by proximity

    A) All crime by proximity to schools

       i) Analysis of findings

       ii)   Will include buffers around schools for multiple distances

    B) All crime by proximity to downtown area

       i) Analysis of findings

   ii) Small buffer zone to target crimes that are committed because of the proximity to downtown

IV) Complete analysis of crime trends in San Luis Obispo, compilation of all information gathered through the GIS analysis

V) Conclusion with possible suggestions for law enforcement to allocate resources and target specific areas of the city

Analysis

The city of San Luis Obispo is one that is afflicted by a wide variety of crime. Given the distinct demographics of this city, which include many young adults attending Cal Poly, and the surrounding cities, including Paso Robles, Atascadero, and Nipomo, which have a high incidence of gang activity overflowing into the city limits, the criminal activity here is relatively unique. In my opinion, the geographic diversity of the San Luis Obispo area is a major factor in the crime heterogeneity, with the rural areas serving as a ground for many narcotics dealers and manufacturers, attracting nonnative San Luis Obispoans to the drug activity (DeLorme, 2013). To better understand the way that crime is affecting our city, it is important to have a geographical frame of reference. Knowledge of the location of schools, retailers, public transportation, and restaurants can provide an important framework to study the reasons why certain types of crime happen where they do. I hypothesize that most of the crime in the city will fall into a relatively small area. Some areas I expect to be highly impacted by crime are; the downtown region of the city, student housing developments, and shopping centers. In order to grasp the effect of crime on the city, a spatial layout and analysis over a one year period should highlight some important crime trends in the area. Using GIS (Geographic Information Systems) to effectively analyze crime data will provide for a very simple and comprehensive report of the current problems with crime we face in the city. This report should equip the layperson with the capability to visually review the criminal activity in the city, understand and process the areas with the largest crime problems, and clearly represent the city's progression in crime, positive or negative, over the past year. I will be looking at different categories of crime independently from each other to pinpoint where certain crimes are most prevalent. In addition, I will be using

different maps to highlight the important aspects of criminal activity in the city. The major goals of this report are to; provide a clear and concise way to view crimes in San Luis Obispo over the past year, and to offer accessible information to the public and law enforcement about which parts of the city are highest risk for designated crimes.

Methods

For the GIS analysis of this report, crime data for the city of San Luis Obispo was obtained from the city. The data covers all crime calls within the city limits from January 1, 2012 to December 31, 2012. Of all the possible crimes, those that could be tied to addresses (2,920) were then geocoded into the GIS software to be analyzed along with several other layers pertinent to describing the city, such as, city streets, schools, government land, and city boundaries. Geocoding is the matching of a street address to a reference layer to represent the data as individual points. The geocoding then represented each crime as a point at a certain location in the city, along with information about the crime type, time, and date committed. Figure 1, "Graph of Total Crime", shows the breakdown of crime type by summation. Using the point data, a kernel density analysis was performed to determine areas of the city which are most heavily affected by crime over the whole year. A kernel density analysis is a spatial representation of point data interpolated over an area to give approximate density of the points. The more dense areas will be represented with redder colors while the less dense areas will be represented with greener colors. The crimes were then separated into the following categories of similar type; Graffiti/Vandalism, Drug/DUI, Assault/Robbery/Sex Crimes, and Burglary/Theft. The kernel density analysis was repeated on each of these categories to distinguish between areas that have higher incidence of certain types of crime. The categorical densities were then

compared back to the original density which included all types of crime together. To view the areas of the city that are at highest risk for certain crimes, we must first examine the city and the crime as a whole. If we can look at the areas of the city which have the highest prevalence of all types of crime, we may be able to predict and explain the areas in which certain types of crime happen more accurately. After looking at the city as a whole, we can then break down the crimes by type to see exactly where we expect certain crimes to happen.
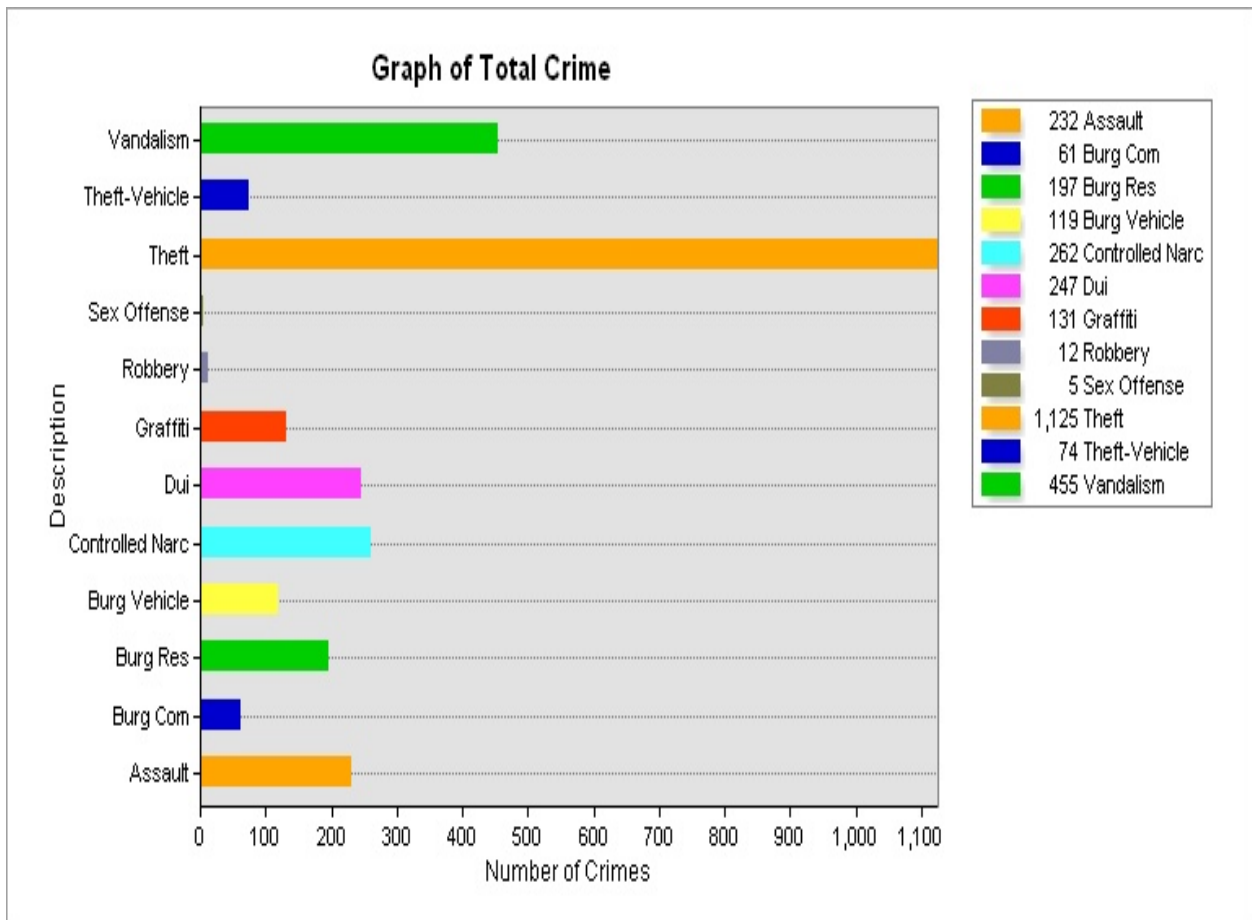

Figure 1.

<u>Results</u>

Figure 2, "San Luis Obispo Crime Overview" is a kernel density analysis of the city which includes a large sample of all crimes committed between January 1, 2012, and December 31, 2012. The kernel density analysis is a GIS tool which shows the relative density of a number of control points and allows one to view the trend of the surface. In this case we are looking at the crime density over the surface of the city, with the green areas being relatively low density, and the yellow-red areas being relatively high density. There is one hotspot area in the city with extremely high density of crimes, with the prevalence gradually lessening the further away from the focal point. Of the 2,920 plotted crimes over the year, this area represents a large cluster and the rest of the city contains a relatively uniform distribution for the rest of the crime. This area of the city, from Monterey Street at the North, to Marsh Street at the South, Chorro Street to the East, and Nipomo Street to the West accounts for the highest density of crimes in 2012. This can be explained largely because this area is the most central part of the city with the most densely packed commercial and private businesses. Other factors help to explain the high prevalence of crime in this part of the city which I will examine in greater detail for individual crime categories.
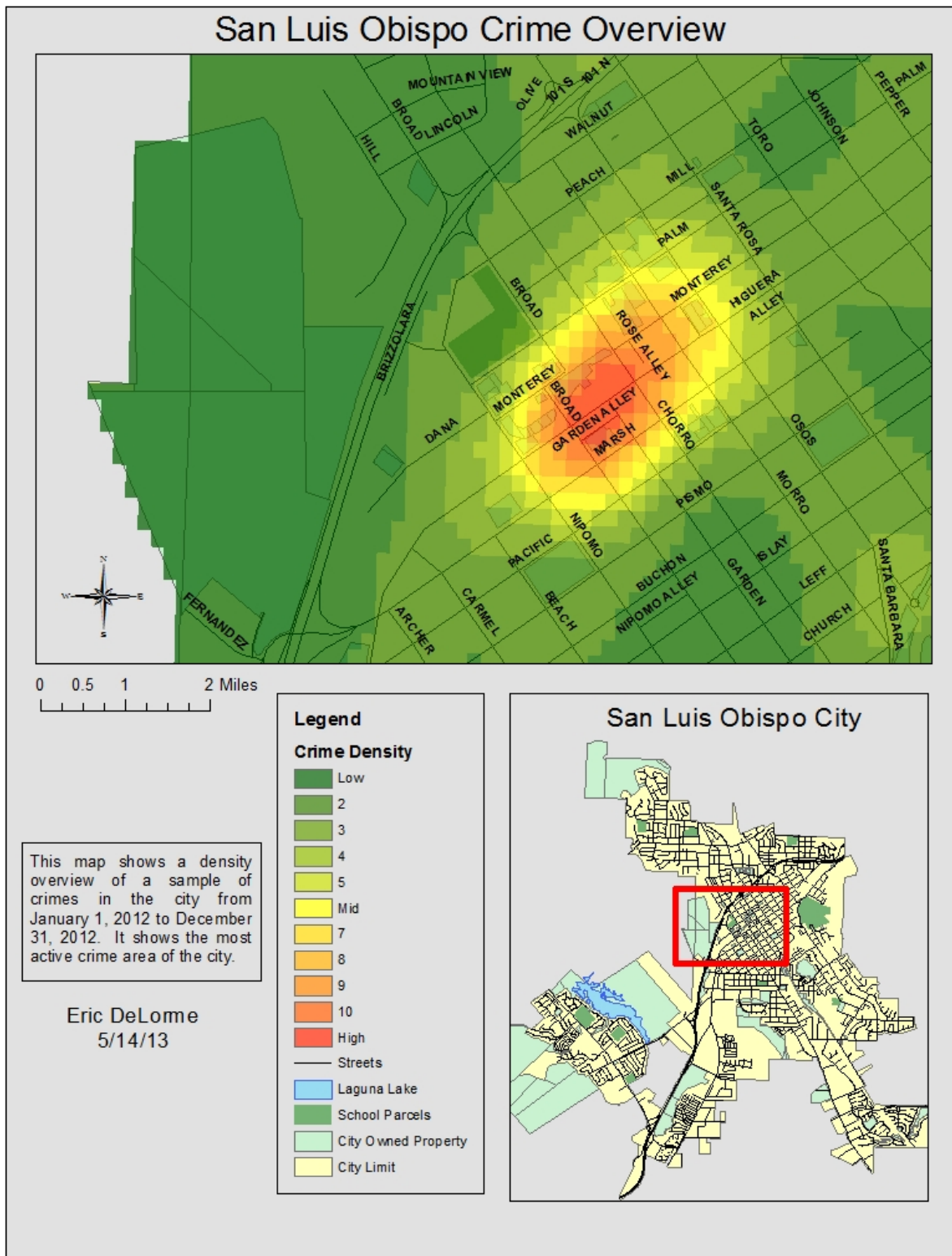
Figure 2.

Identifying the area of high crime density is useful in and of itself because law enforcement agencies can use the information to send police to the problem areas, attempting to be proactive in crime fighting. Fighting crime proactively, meaning maintaining a strong police presence to deter people from ever committing crimes in the first place, and implementing community oriented policing methods, is an excellent way to reduce crime. Community Oriented Policing Services, or COPS has become a major overhaul in many departments across the country. COPS seeks to, "promote organization strategies, which support the systematic use of partnerships and problem solving techniques, to proactively address the immediate conditions that give rise to public safety issues such as crime, social disorder, and fear of crime" (COPS, 2013). Departments employing these methods try to initiate collaborative partnerships with the community, transform their organizational structure to support community outreach, and solve problems systematically and proactively to develop effective responses (COPS, 2013). It is departments that use Community Oriented Policing Services which would be at the forefront of GIS analysis to streamline police resources. Therefore, information such as that which is represented in the map "San Luis Obispo Crime Overview" would be very beneficial without any further analysis. However, it does not really explain why the crime happens where it does, and what can be done to change the trends.

For someone unfamiliar with the layout of the city of San Luis Obispo, it will be very helpful to know that the hotspot area for crime overview is the primary downtown region of the city, with densely packed shops, bars, and restaurants. The fact that this city is a college town, supporting the population of California Polytechnic State University is also helpful in understanding why this particular region is such a crime ridden area. A major factor influencing

this region which must be taken into account is the alcohol consumption by the college students and young adults in this area. The night life, particularly at the bars located on Higuera Street, seems to be a reasonable place to begin with the explanation of crime in the city. This portion of Higuera Street includes several bars or pubs which are frequented primarily by college aged adults on nights and weekends. The relationship between crime and alcohol is well known and studied in detail. The Department of Justice published a few statistics, "Each year, more than 600,000 students between the ages of 18 and 24 are assaulted by another student who has been drinking", and "37% of almost 2 million convicted offenders currently in jail, report that they were drinking at the time of their arrest" (Drugs and Crime, 2013). It is clear and constant that alcohol and crime are highly correlated. This largely explains why the vast majority of crime in the city happens within approximately a quarter mile of the bars, where people have been consuming alcohol, often becoming fairly intoxicated. Many of these people have impaired judgment and make poor choices when they are drinking, leading to assault, theft, sex crimes, drunk in public arrests, DUI, and other crimes. It is also an area of the city where many police officers and sheriff's deputies are deployed to prevent some of the crime from happening. As a member of the San Luis Obispo law enforcement community, I know there is a high occupancy of law enforcement especially on weekends in the downtown area. This allows for fast response time and potential de-escalation of incidents that may otherwise go uninterrupted. With the implementation of Community Oriented Policing Services in our city, it seems safe to assume that while the density of crimes in this area is still quite high, it is less than it would be if police were randomly assigned to parts of the city with no knowledge of criminal trends. The map shows a gradual decrease in density the further away you go from the central downtown areas. With an increase in the radius from the areas with alcohol service, the more area the police need

to cover to respond to crime. With the majority of officers concentrating on the downtown area which has the highest likelihood for crime, it follows that there will be more crimes committed, especially those of assault, drug, and alcohol, which have a small window of opportunity for arrest, without the knowledge and response of law enforcement. These analyses will become clearer as we examine the crimes individually.

To further the analysis of the crime patterns in the city, breaking down the crimes by type will help so that we know the areas to target for specific types of crime. In a college town such as San Luis Obispo, alcohol and drugs are always a problem. I separated out all the crimes which involve drugs or DUI related charges. If we examine Figure 3, "Drug and DUI Density", we can see a very similar hotspot to that of all the crimes combined. The downtown area, which is the main alcohol provider in the town, is also the main area where drug and DUI offenses are committed. It is logical that if a group of students or young adults go to the bars in the downtown area, one of them will drive for a group of friends. Often what happens is the designated driver will decide he or she will be OK with just a few drinks and still drive home. A study by Dejong and Winsten on whether the designated drivers of college students stay sober, reports,

> "The survey by Dejong and Winsten (1999) found that of the students reporting to
> have consumed alcohol in the past year and who served as a DD in the past 30
> days, 53% indicated they did not consume any alcohol the last time they served as
> a DD. An additional 26% said they consumed one drink and 19% reported having
> consumed more than one drink when performing the role of DD."

This is alarming information given that many college students have just recently become of legal age and may not yet know their limits. In addition to the main hotspot there are a number of localized hotspots which stand out, specifically, to the north, at the intersection of Foothill and Santa Rosa, and on Hathway Street. These places consist mainly of student housing and are also two main connections between the campus of Cal Poly and the rest of the city. These two roads are high traffic areas on nights and weekends when students and young adults go out.
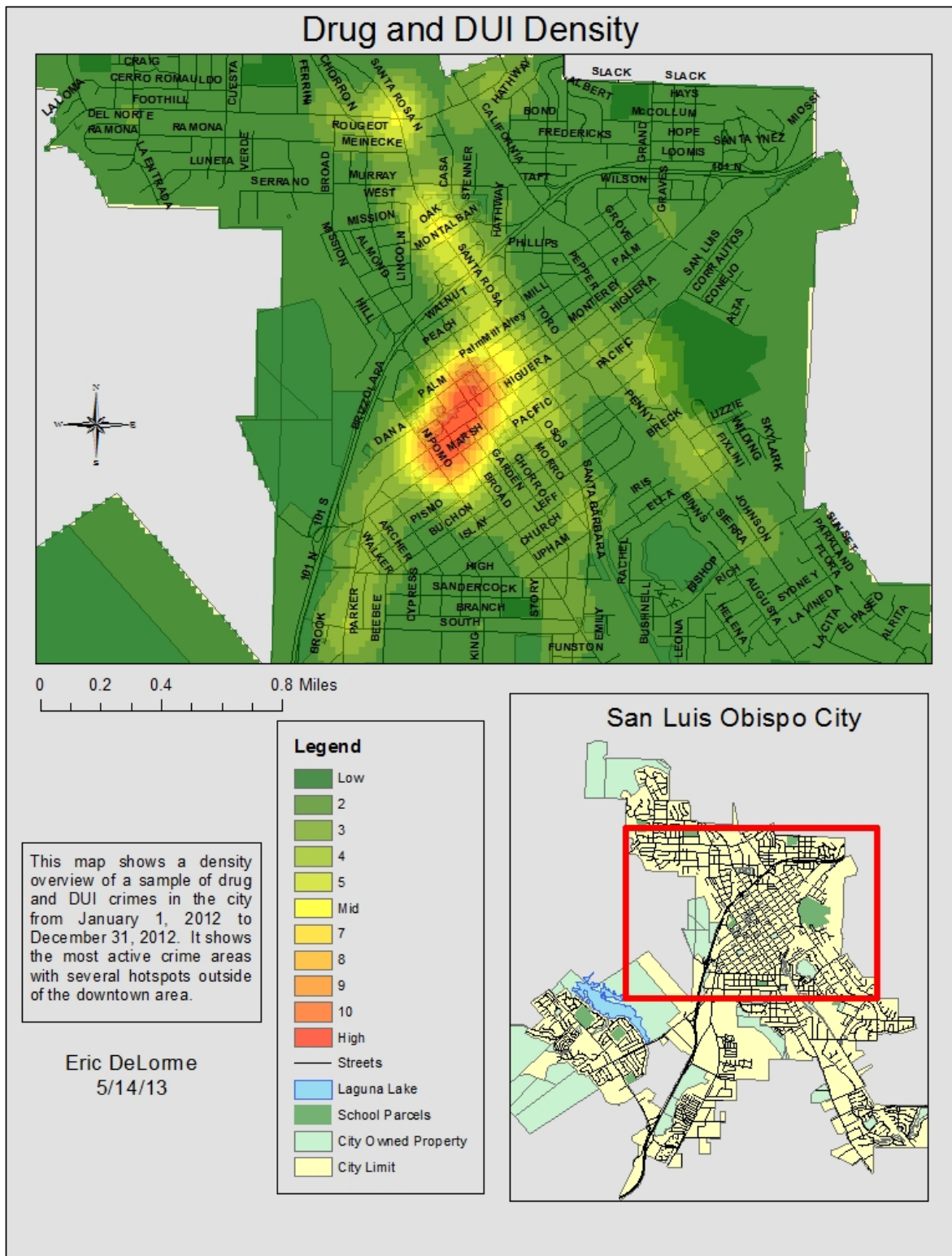
Figure 3.

The higher density of crime in these areas shows that the law enforcement presence is successful in their attempt to isolate areas of high DUI and drug use. Another highly important aspect of the map are the snake-like protrusions from the central hotspot. These "arms" of mid-level density follow the main streets (Santa Rosa, Higuera, Broad, and Johnson), which lead away from the downtown region and into the residential areas of San Luis Obispo. There are a few possible explanations for this. The first is that the law enforcement officers are following drivers away from the downtown area to ensure that they are truly impaired while driving. Following the driver for a period of time would give the officer the evidence they need to arrest for DUI. Another explanation is the law enforcement officers are stationed along the streets in an attempt to catch drunk drivers on their way out of the downtown region. I would hypothesize that a combination of these two methods accounts for a large portion of the DUI arrests in the city.

The narcotics portion of the analysis is a little more difficult to pinpoint, however, there is one spot in particular that seems interesting and should be analyzed. The mid-level density on Santa Rosa Street near Stenner Street consists nearly completely of student housing. According to the U.S. Department of Health and Human Services, as of 2010 the rate for narcotics use for young adults aged 18-25 was 21.5% (Substance Abuse, 2011). It seems plausible that a significant portion of drug/narcotics usage would happen in an area primarily associated with housing of young adults in this age range. I would hypothesize that some of the pockets of density which are represented by the 2-4 level, are associated with student housing, and therefore relatively higher drug use than the rest of the city, where narcotics usage should follow a much more even distribution, given the level one density over the area. Another area that should be highlighted is the eastern part of the map next to the large school parcel. The school is San Luis

Obispo High School, and the map shows an area of density at approximately level 4. The U.S. Department of Health and Human Services states that the rate of narcotics use for youths aged 12-17 for 2010 was 10.1% (Substance Abuse, 2011). It follows that there would be a higher relative density around the school when the rate of illicit drug use by this age group is so significant.

The next breakdown by crime type that I will be analyzing is the combination of graffiti and vandalism. A sample of arrest data from 17 major cities shows that between 50%-70% of all graffiti is created by adolescents between the ages of 12 and 19 (Graffiti Hurts, 2013). Given the young age of most people who commit the crime of graffiti, it would seem that the proximity to schools would serve as a good place to begin looking for elevated levels. However, in San Luis Obispo, there does not seem to be a correlation between school proximity and elevated levels of graffiti. If we examine Figure 4, "Graffiti and Vandalism Density", the school parcels which are denoted in dark green, do not have any higher incidence of graffiti or vandalism than other residential areas of the city. The same held true even after the application of a 100 meter buffer around the school parcels. There are two main hotspots in the city, the first, which is the same as the other two maps, is in the primary downtown area. The second, somewhat predictably, is located on Stenner Street, to the north of the downtown area. This is a major student housing development and consists primarily of college aged adults. A possible explanation for the elevated level of graffiti and vandalism in this area is the amount of alcohol consumed. With a higher population of college students in a densely packed area, it is a relatively safe assumption that the alcohol consumption per capita is far higher than other parts of the city. With the elevated alcohol consumption comes more crime associated with inebriation. It follows then,

that elevated vandalism of the surrounding area would correlate to higher levels of alcohol consumption, during the time the alcohol is consumed, given that alcohol affects decision making processes. It seems repetitive, however, areas which are frequented by mass numbers of people will statistically have more crime. This is evident when examining the hotspot in the downtown area. So far, examining the data categorically has not changed the primary hotspot where crimes are committed in San Luis Obispo.
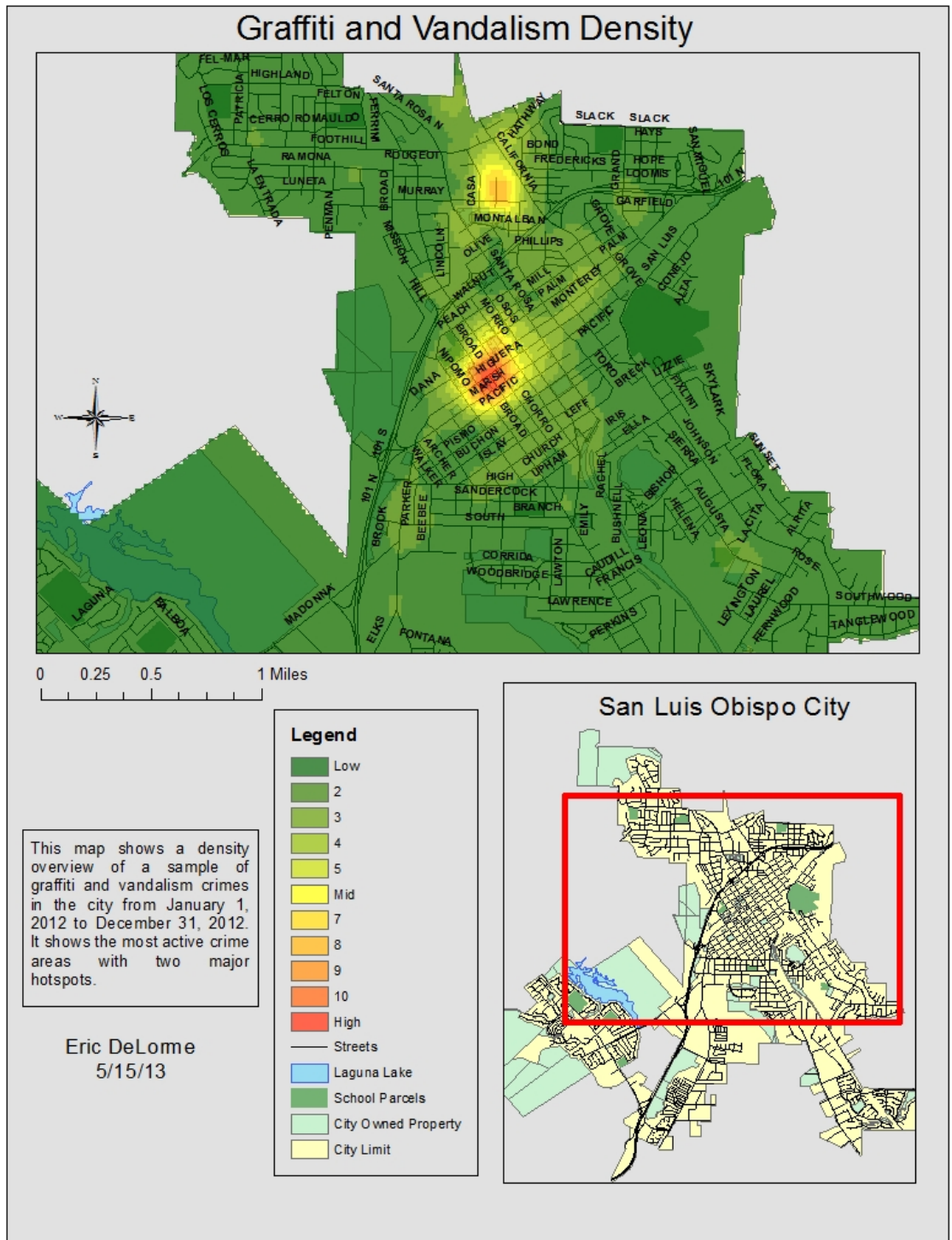
Graffiti and Vandalism Density

Legend

- Low
- 2
- 3
- 4
- 5
- Mid
- 7
- 8
- 9
- 10
- High
- Streets
- Laguna Lake
- School Parcels
- City Owned Property
- City Limit

This map shows a density overview of a sample of graffiti and vandalism crimes in the city from January 1, 2012 to December 31, 2012. It shows the most active crime areas with two major hotspots.

Eric DeLorme
5/15/13

0   0.25   0.5   1 Miles

San Luis Obispo City

Figure 4.

Assault, robbery, and sex crimes occur in any city, however the number of incidents is not nearly as high as other types of crime. If we refer to the graph of total crime for 2012, we can see that there were only 249 crimes that fall into this category. While most citizens and all law enforcement would agree that this is still too high, the number averages out to fewer than 0.7 crimes per day over the course of the year in this category. This is by far the least prevalent crime category in the report. The reason for the choice of these three crimes to be grouped into a category is that they all involve violence in some way. Robbery as defined by the California Penal Code is, "The felonious taking of personal property in the possession of another, from his person or immediate presence, and against his will, accomplished by means of force or fear" (Official California Legislative, 2013). This is different from theft, which does not involve the presence of a victim or the use or threat of force. Considering this grouping, Figure 5, "Assault/Robbery/Sex Crime Density", shows three areas which should be examined more closely. The first, and most important is the central hotspot in the downtown area again. Referring again to a statistic published by the Department of Justice, stating that over 600,000 students aged 18-24 are assaulted by another student who has been drinking (Drugs and Crime, 2013), it is very clear that the area of the city containing the bars and restaurants which serve alcohol, will have a higher number of assaults when compared with the rest of the city.
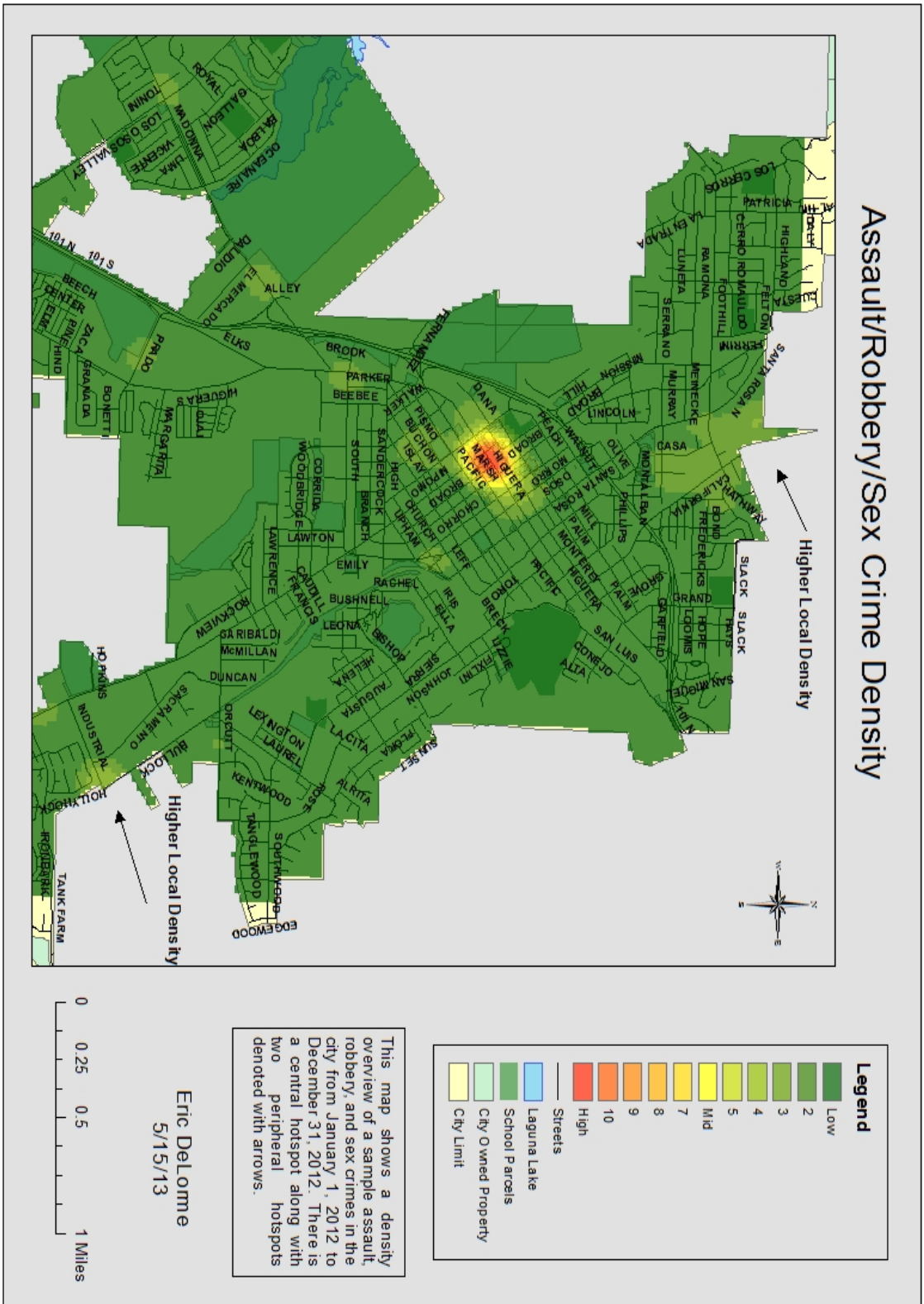
Figure 5.

24

There are also two spots of higher local density that I have denoted on the map, beginning with the area to the north, this is an area of student housing, which is nestled directly next to the campus of Cal Poly. This area is extremely high risk for both assault and sex crimes because of the high number of students that live both on the campus and in the surrounding community. This area has high pedestrian traffic which allows for easy targets especially on college aged women. I would hypothesize that with the elevated alcohol consumption in this area, relative to the rest of the city, we will continue to see an elevated density of violent crime and behavior. It is also important to remember that this analysis includes only those crimes which were reported and the unreported assaults, sex crimes, and other type of crime are not included in the scope of this report. The second area of higher local density, in the southeastern corner of the city, is again related strongly to alcohol consumption and possible overcrowding of a venue. This intersection is home to a popular college bar and dance club called "The Grad". This club is frequented nightly by hundreds of college aged adults, where there are performances, dances, and alcohol consumption. It is reasonable to assume that this club would have similar amounts of crime attributed with it given the level of crime density in the downtown area, where most of the other clubs are located. Both the areas of higher local density seem to be based on similar explanations as the main hotspot area.

The final crime category consists of burglary and theft which are the most prevalent in the city. According to the Uniform Crime Reports, property crime is the most prevalent in the United States, supporting the comparison within the city of San Luis Obispo (UCR Publications, 2013). It should be noted however, that burglary and theft are not the only property crimes

committed. Vandalism, graffiti, and others would fall into the property crime category according to the FBI. For the purposes of this report I further dissected property crimes to be more specific in each category. Referring to the graph on total crime statistics, there were approximately 1,500 thefts or burglaries in 2012. These two crimes alone account for more than 50% of the crimes in the sample. Figure 6, "Burglary and Theft Density", is in my opinion, the most diverse and interesting to examine. However, it supports my original hypothesis, showing a high level of crime density in shopping centers and student housing, as well as the primary downtown area. Starting with the ever present high density in the downtown area, it seems likely that the elevated burglary and theft manifest in this region because of the high number of shops. The opportunity for theft and burglary is directly proportional to the number of businesses in a particular area. Thus, the hotspot in the downtown area clearly is proportionally represented because it has the highest density of stores and businesses.

Moving to the north, the localized hotspot to the west of California Street, again is primarily student housing. It would be difficult to make the claim that college students steal more than other human demographics, however, it is clear in the map that there is a localized hotspot in center of the student housing development. Therefore, there are a limited number of explanations. The first is that college students do, in fact, steal proportionally more than other demographics. This would put students at risk from other students who live in the surrounding area. This seems to be a semi-reasonable claim, but there may be other factors at play. Another possibility is that students houses are less secure than a nuclear family's home. Students may not lock their doors as frequently, putting themselves at an elevated risk for break-ins. College students also generally live with roommates. It is possible that theft is committed by a

roommate, unbeknownst to the other. This is an example of Crime Opportunity Theory, which

defined by the National Institute of Justice is, "When offenders want to commit a crime, they

look for an opportunity or a practical target" (National Institute of Justice, 2013). For example,

if a roommate sees cash on his or her roommate's desk, it provides a perfect opportunity for theft

because it is a practical target and allows for plausible deniability when questioned, if at all.

These explanations may work independently or have an additive effect, contributing to the

elevated burglary and theft density in the student housing developments.

Now moving to the southwest, there are two other hotspots with density levels from

approximately 7-9. One area is a large shopping center just off Highway 101, including a

Ralph's, Sports Authority, and Best Buy. Sports Authority and Best Buy in particular sell high

end products which can be worth a considerable amount of money. The other is a shopping

center which includes a Costco, Home Depot, Bev-Mo, and Old Navy. A reasonable explanation

for the elevated burglary and theft in this region would be the high quality of the goods available

in the shopping centers. Rational Choice Theory can help us understand why people would

choose to steal from higher end stores. The theory simply states that people act rationally, so

that even a criminal will be weighing the costs and benefits of any particular crime (Review of

the Roots, 2013). In this case, the costs are getting caught and arrested, so the benefits must

outweigh those costs in order for the crime to feasibly be committed. The more money a good is

worth, the greater the benefit to the thief and the more likely they are to commit the crime

because the benefit will outweigh the cost. Considering this theory, regions with stores that sell

higher end products are at a greater risk for property crime because of the raised benefit to the

criminal. The remainder of the city has considerably more uniform distribution of crime than the

other categorical breakdowns. This makes logical sense given the proportionally higher number of crimes within the burglary and theft category. Referring to the graph of total crime again, we can see there were approximately 200 residential burglaries in the sample, explaining the trend of broadened higher density over the entire city, rather than all the crime remaining concentrated in commercial or public areas.

I think this may be the most helpful of the maps in terms of changing police practices to be proactive in crime fighting. The other analyses show hotspot areas which are all relatively similar and already have a significant police presence during busy times. This map shows that property crimes are somewhat unpredictable, however, give indications of regions which may be at higher risk for the sole reason of their geographical location. It is possible that these areas receive higher traffic than other areas of the city, leading to crimes of opportunity being committed in the neighborhoods. If this is in fact what is happening, there should be an equal response by law enforcement to try to limit the opportunities of potential criminals. Presence alone can be a strong deterrent especially in neighborhoods which have not historically been frequented by law enforcement units. A professor from Florida State, Johnathan Klick, studied the effects of increased police presence in Washington D.C., and found a 15% reduction in crime on days when there were additional officers on duty (Elish, 2013). We can safely assume a similar percentage of reduction in crime if there was more police presence in areas which have little to no presence to begin with.
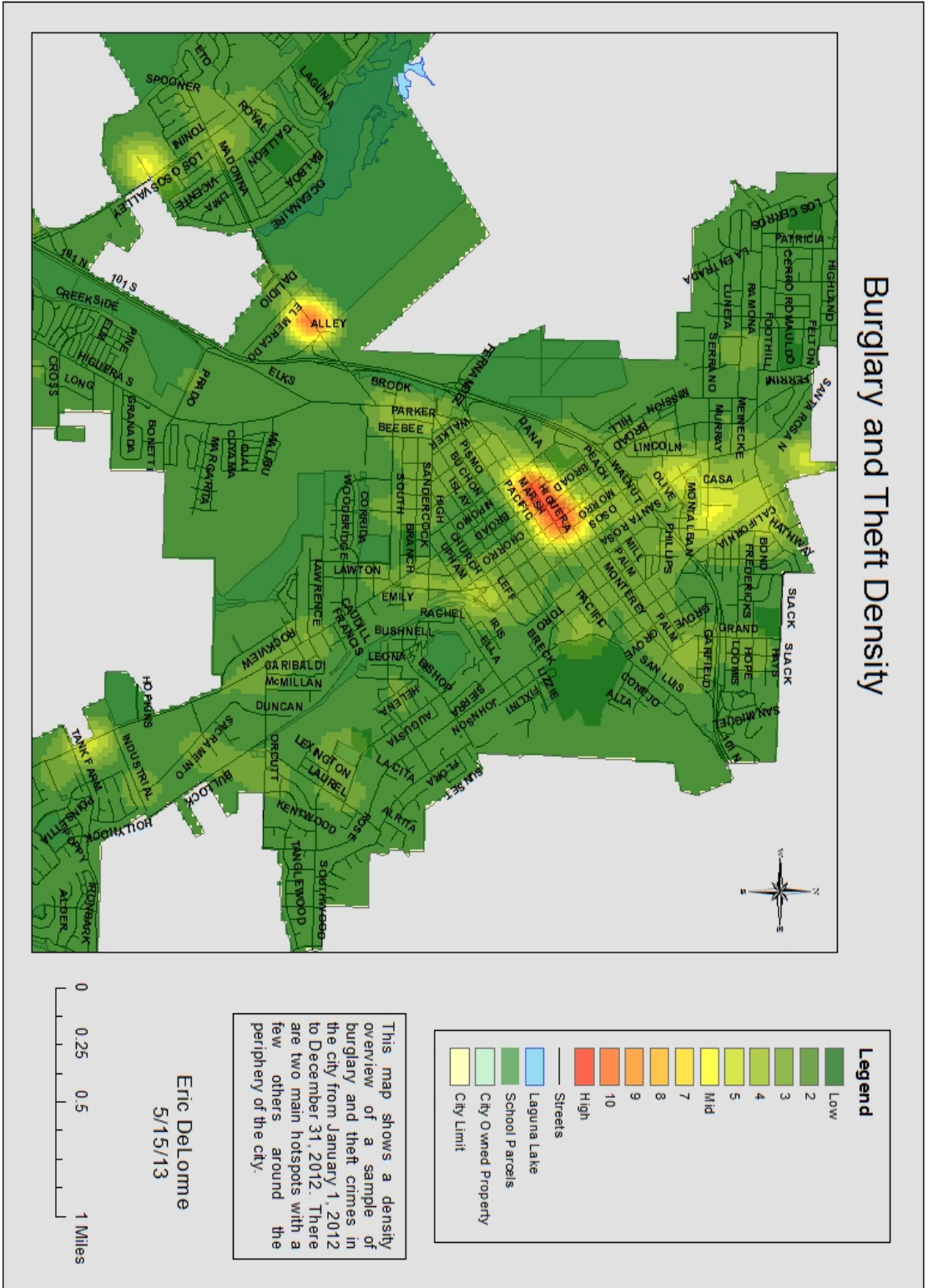
Figure 6.

Conclusions

Looking critically at the categorical breakdown of criminal activity in the city of San Luis Obispo for the year 2012 has highlighted some important points. The downtown area of the city is the most heavily impacted by crime and should most certainly be at the forefront of law enforcement's proactive crime fighting techniques. If the city continues to use Community Oriented Policing Services, there should be a general trend of crime reduction over the next few years. An important finding of this report is the effect that college students have on criminal behavior and trends. The areas dominated by student housing developments are at a considerably higher risk for crime of all types than other residential zones of the city. Alcohol plays a significant role in the decision making processes of college students and all adults as well. Criminal behavior and alcohol are highly correlated and the areas of the city with high alcohol service and consumption are associated with elevated crime density. Associations with age and illicit drug use serve to explain why there are hotspots around San Luis Obispo High School and many student housing developments close to the campus of Cal Poly. It is clear where the problem regions of the city are, and why they have become such problem areas. It is unlikely that these regions will ever be rid of crime so there must be a response by law enforcement attempting to reduce the density in these hotspots.

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