TO: Barry Waite, Bonnie Shrewsbury; PPD 631 Instructors

FROM: Michael Chen, USC Graduate Student, MPA '16

SUBJECT: Traffic Collisions in the City of Long Beach

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INTRODUCTION

The City of Long Beach is a densely populated metropolitan area in Southern California. Long Beach is characterized by its diverse communities, ranging from the middle class to low income areas of downtown, to the more affluent northern suburban area. A unique characteristic of Long Beach is that while it has a greater population density than Los Angeles, Long Beach operates the same as a small city at the management level. Long Beach features a council-manager form of government.

BACKGROUND

As most metropolitan areas can attest to traffic incidents and collisions are prevalent concerns for public safety. Long Beach is a large municipality with a high population of drivers. An area of concern for cities could be the number of traffic fatalities that they experience over a period of time. Different causes and categories of fatal collisions can range from alcohol related incidents; wrong way accidents, or unsafe speeding incidents. It is important for a city to know what the main cause of vehicular related deaths is in order to properly prepare and educate the drivers within their city. Another issue to consider is where the collisions are occurring. Does the location of the accident have a relative effect on the number of collisions in any given year?

Fatalities and deaths is a figure that city police departments really want to know because they can directly affect how police departments and city municipalities allocate their resources. As defined in the California State Vehicle Code a driver is "a person who drives or is in actual physical control of a vehicle" (California State VC §305). Not only are cities interested in knowing how many fatalities occur involving drivers each year, but they may also be interested in knowing whether or not alcohol or speeding was the main cause of death.

A good way to present this data to an agency or the City would be to use a graphical or visual representation. For the purpose of this class and project, GIS and ArcMap are very important and vital tools in this process. By placing the data points into ArcMap, we can then have a better idea

of what occurs within Long Beach, providing authorities a better tool to inform and notify the public of startling trends or patterns. The question that I am trying to research with this data is does outside factors such as drunk driving, speeding or wrong way incidents prove more concerning when considering fatal collisions or does the location of the incident have more of an effect?

DATA ANALYSIS

For this particular subject, the most important piece of data that I could use for analysis is traffic collision data for the State of California, specifically within Long Beach. One very website that I found to be helpful in particular was the Transportation Injury Mapping System that the University of Berkeley created. The TIMS website uses data from the Statewide Integrated Traffic Records System (SWITRS) data to create their database and layer files. The SWITRS data not only provides the approximate location of the collision, but the data also provides classifications of different characteristics related to the incident. For example, the SWITRS data includes data for if the collision had a fatality or if there was alcohol involved in the collision. Along with alcohol related incidents, the SWITRS data had a plethora of categorizations and classifications.

Process

Starting out, I had intended to find collision data for the most recent year, 2014. However, this data has not yet been aggregated by the State. However, SWITRS does have information regarding traffic collisions and incidents from 2003-2012 readily available for distribution. This data has already been aggregated in the TIMS website ready for use with ArcGIS. The data was packaged in a ready to use shape file which I could then upload into ArcMap.

Along with the SWITRS and TIMS data I also had to obtain shape files for the City of Long Beach's boundaries and streets. These shape files needed to be obtained from the Long Beach GIS department. Once obtained from their data catalog, the shape files were ready and easily added into the map file. The data that was obtained from Long Beach were the Centerlines, Council Districts, and City Boundaries shape files.

After importing all the data into ArcMap for spatial analysis, the shape-file obtained from TIMS included all traffic collisions from 2003-2012. Using that data without refining it down to certain characteristics and categories would have made the final map impossible to decipher. The first step in plotting the points was the create a selection of the available collisions to include only collisions that involved fatalities, then exporting that feature class as a separate layer from the base shape file (appendix A). The initial findings from plotting the collisions and factoring in only fatalities generated a pretty wide spread of data points throughout Long Beach. The initial plotting of data points allowed for a quick visual analysis of the data, but did not provide any

clear answer to the question mentioned above. After creating a map for all fatalities from 2003-2012, I took it even further, by focusing on the different causes for these fatal crashes in the City of Long Beach. By creating selections for causes such as speeding, alcohol, and wrong way incidents, I was able to generate another data map that depicts the fatal crashes for each of the different causes (appendix B).

After creating the maps for all fatal collisions and a separate map for their causes, I created two more maps, highlighting the concentration and cluster areas of fatal collisions and their causes (Appendix C & Appendix D). This is done in order to address the idea of collisions being more dependent on traffic conditions and location than being more influence by outside factors such as speeding or wrong way incidents.

Data Limitations

The limitations on this data are very tricky to deal with in the context of this project. The data obtained from SWITRS has some variation from the shape file obtained from the TIMS database. The SWITRS data that was provided came with a code handbook that included all the possible characteristics of collisions that the State of California deemed to be important to know. However, the TIMS shape file took out a number of categories in what it seems like to be an attempt to reduce the amount of clutter in the attribute table. The TIMS shape file does not contain certain data characteristics, some of which I was initially looking at doing a data analysis with. Another limitation that I had to work with is that sometimes the responding and recording agency of these collisions did not properly categorize the incident. Some incidents were listed with a "00" violation category, which is listed as "unknown".

Another limitation is that when trying to look at location of the collision, they were not placed down to exact coordinates. The accidents themselves were recorded in an approximate distance by the reporting agency. This could potentially skew the numbers and data points, with one data point being misrepresented in a different area. This could prove to be problematic with analysis that depends heavily on the actual physical location of the data point.

One thing that could have helped with the data analysis is more in depth information about the collisions. For example, if the SWITRS and TIMS data provided information such as the speed the vehicle was going before the incident occurred, a more in depth analysis could be done with the data. The limitations placed on the data file that was obtained left a lot of data open to interpretation. By providing more in depth data, the user of the shape file and data package could be able to do more analysis to find a pattern or trend. Another limitation is that when you take the initial data and start separating it into their respective categories, plotting onto the map of Long Beach results in a very bare map without much to analyze (Appendix E).

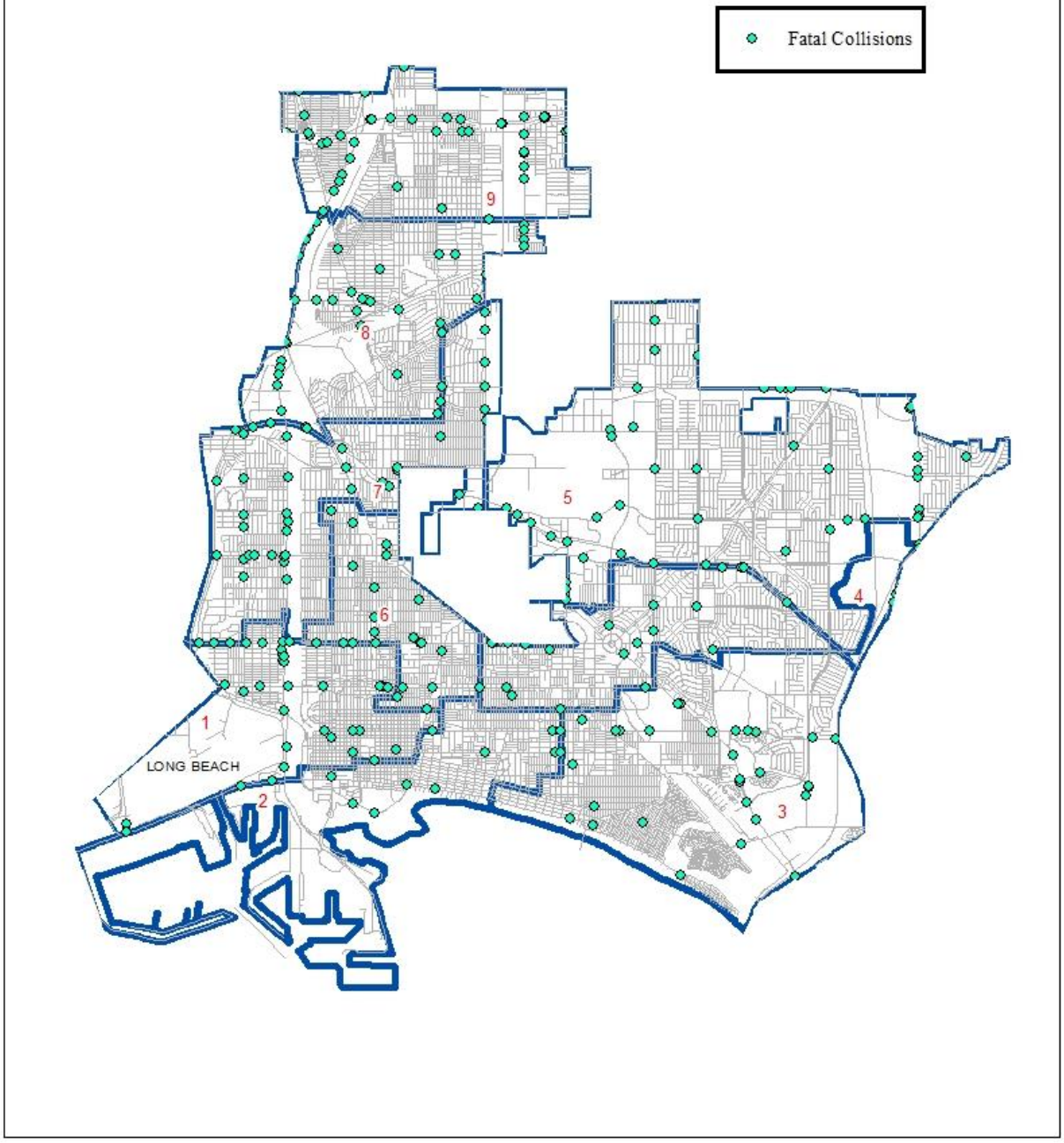
CONCLUSION AND FINDINGS

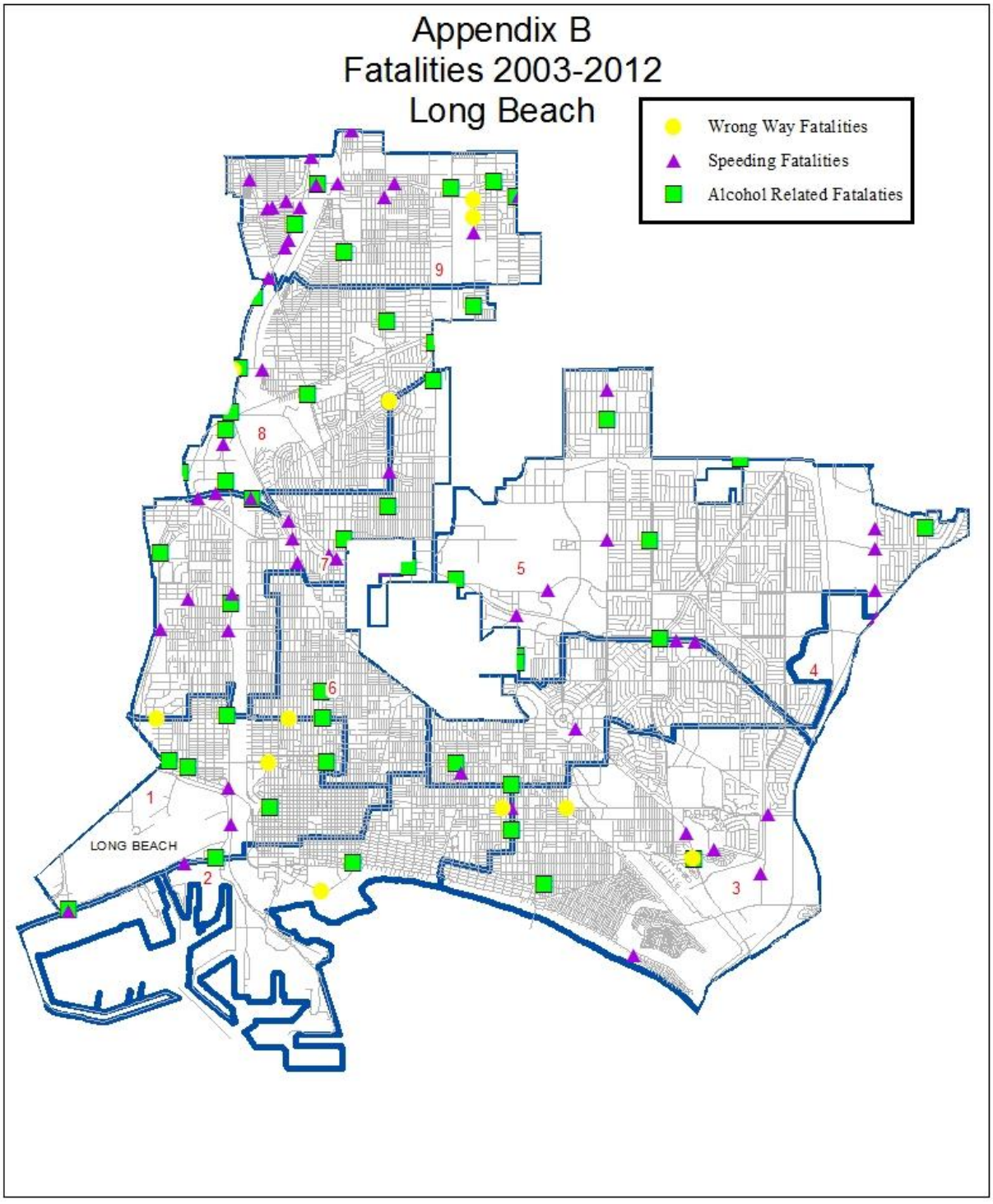
After examining the data points that were plotted into ArcMap, we can see a very small but subtle concentration of collisions and incidents clustered around a certain area in Long Beach (Appendix C). The fatal collisions have a concentration around the Pacific Coast Highway and the 710 freeway which are characterized by the green circle and red circle respectively. Although these numbers are spread out through 2003-2012, we can see a cluster around these two locations. Initially, the TIMS and SWITRS data categorizes the causes of these accidents, ranging from alcohol related incidents to improper turning.

Appendix B maps out locations of three causes of fatal traffic collisions in the 10 year period. Appendix B charts out all locations where alcohol, speeding, or wrong way was involved within the City of Long Beach. By focusing on the causes, we can see a cluster near the north end of Long Beach (Appendix D). Most of the speeding fatalities occurred within District 9 in the 10 year period which is characterized by the red circle.

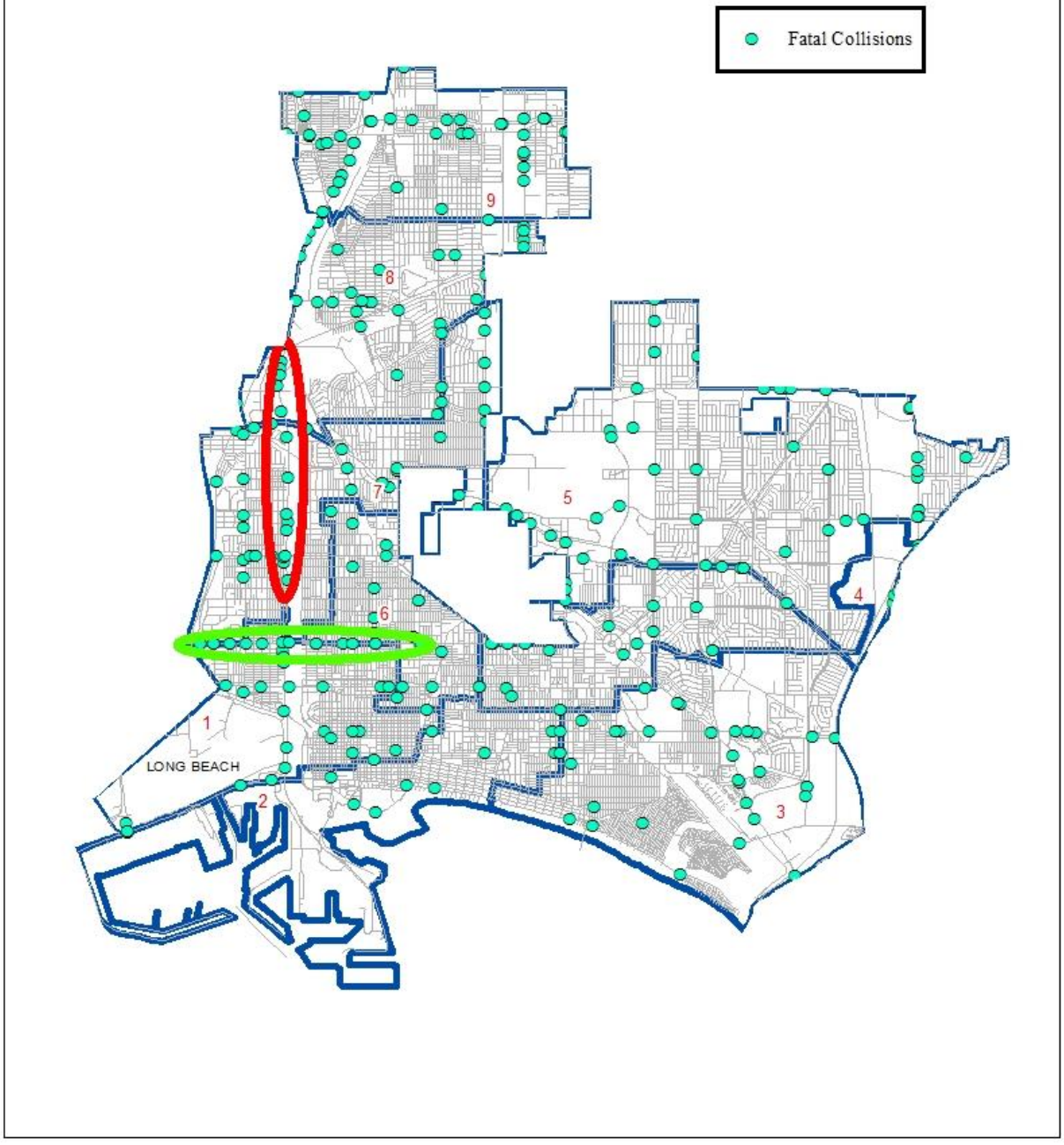
There is a limitation to having all these categorizations because then it is hard to find a correlation or a prevailing cause of deaths in traffic collisions. The data tells us that location is more of a factor than cause when it comes to fatal traffic collisions. Most of the crashes occurred around PCH and the 710, with varying causes for these fatalities. The conclusion that we can draw from the maps is that location is more of a concern when considering causes for traffic collisions. The data presented shows that outside factors had an influence on the fatal collisions, but the causes were not the same across the board. The same location and intersections occurred more often than the same type of causes.

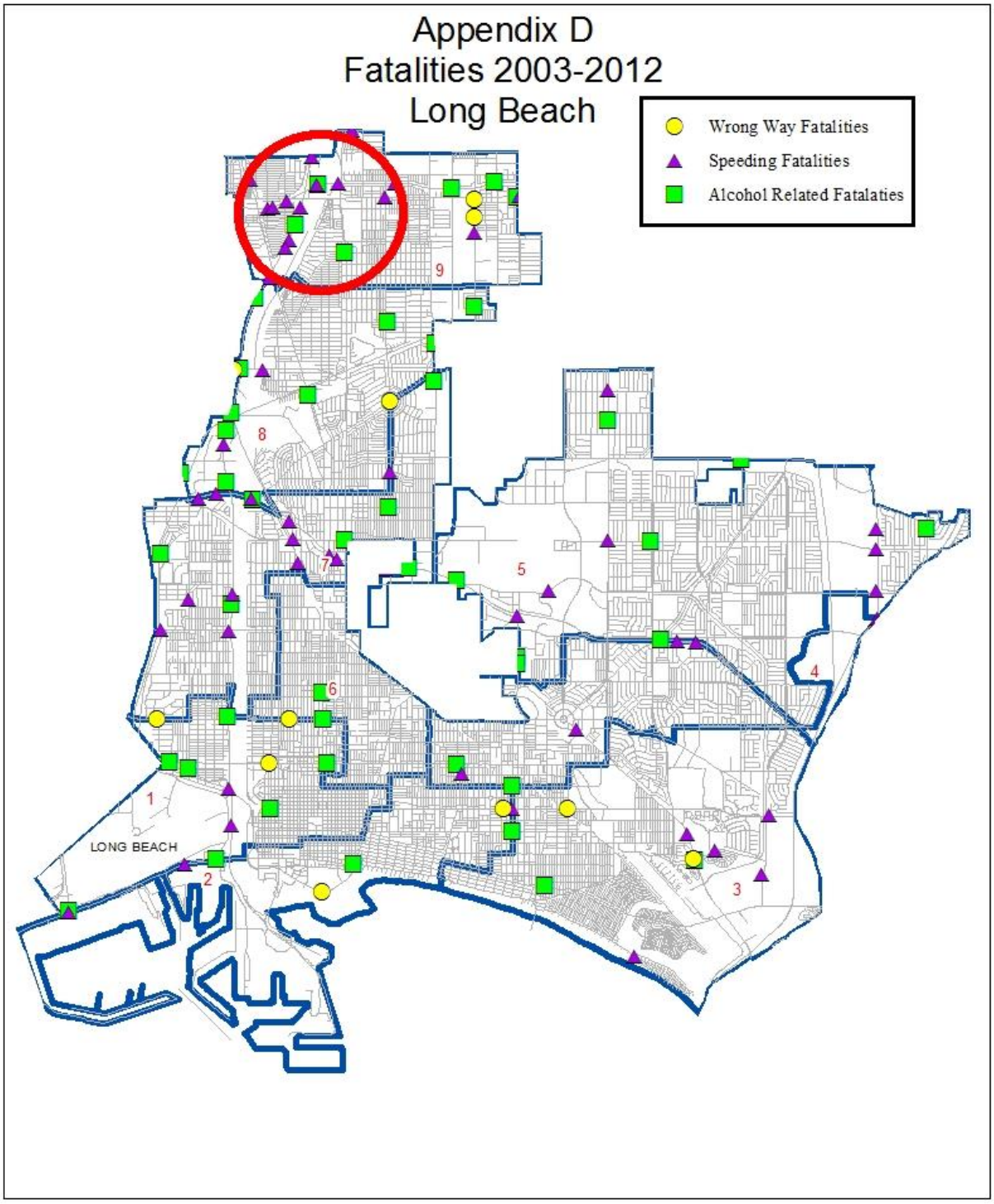
Appendix A
Fatalities 2003-2012
Long Beach




Appendix B
Fatalities 2003-2012
Long Beach
Wrong Way Fatalities
Speeding Fatalities
Alcohol Related Fatalaties
9
8
7
5
6
4
1
LONG BEACH
2
3

Appendix C:
Fatalities 2003-2012
Long Beach




Appendix D
Fatalities 2003-2012
Long Beach
Wrong Way Fatalities
Speeding Fatalities
Alcohol Related Fatalaties
9
8
7
5
6
4
1
LONG BEACH
2
3

Appendix E
Fatalities 2003-2012
Long Beach