Bicyclist Safety When Commuting in the Downtown Corridor

Problem Statement: The study reviews the correlation between bicycle accidents and bike route changes through the downtown corridor in Portland, Oregon

Research:

The three other studies on bicycle accidents that were researched were done in Portland, Oregon, Philadelphia, Pennsylvania, and New Brunswick, New Jersey. Each project was looked at to see the methods that were used for their analysis. These three particular studies were selected to understand and acquire which tools might be beneficial to show the best results for this project. Below are the key points we took from each study.

The City of Portland has a program called Vision Zero. The purpose of this program is to completely eliminate any serious injuries or fatalities for all who use city streets. They created a map that showed where the largest areas of bike accidents occurred in Portland. Using crash data to tie the crashes to intersections. They used two factors to determine the highest ranked areas, number of accidents and severity. I tried to find their data and was unable to locate it or reach someone to get their data. I ended up finding similar data through the Oregon Department of Transportation. We used the same ideas to locate crash sites.

There was another mapping project in Philadelphia, PA. Tyler Dahlberg was trying to analyze crash data to find trends and hot spots. At that point there was no available data for the public. Tyler used crash data from the Pennsylvania Department of Transportation to filter out bike related crashes. He used the Optimal Hot Spot Analysis tool to located the clustering. He ran the tool trying to look at the relationship with crashes and aggressive drivers. He ran this tool a few times looking at different factors. At the end he calculated crash rates and paired that with traffic count data to show crash rates for certain streets.

The STAATS study was conducted in the state of New Jersey in 1999 by Petra Staats using GIS to analyze bicycle accidents. Petra used police accident data since the only electronic data that was available concerning bicycle accidents was the total number of accidents within each municipality. Petra marked the accident locations at the nearest intersection because the police accident data only listed the closest intersection not the exact accident locations. A road network was used and graduated colors of the roads to indicate accident intensity on each of the roadways. Graduated symbols were used to indicate locations where multiple accidents occurred. The analysis in the STAATS study indicated specific locations where bicycle safety may need improvements such as adding dedicated bike lanes to certain roadways or moving a bus stop to a safer location for bicyclists.

References:

City of Portland Vision Zero Project https://www.portlandoregon.gov/transportation/article/518952

McGlone, Daniel. "Analyzing Philadelphia Crash Data." Azavea Atlas. N.p., 02 Apr. 2014. Web. 12 Mar. 2016.

Staats, Petra. "A Bicycle Accident Study Using GIS Mapping and Analysis"
Petra Staats, Graduate Assistant, Transportation Policy Institute, Rutgers University, New Brunswick, NJ, USA

ESRI

Tools:

Definition Query: This was helpful in eliminating certain bike routes in our early stages. Also the tool was used to create the three neighborhoods that comprised our study area.

Clip: The was used to limit certain layers to the study area.

Merge: This was used on all of crash data that was from individual years. Also the bike routes from different years used this tool.

Snap Tool: The was used to bring the crash point data to the closest road for analysis.

Erase: This tool was used to eliminate roads that were overlapping bike and street layers. To the be merged as one set.

Collect Events: The tool was helpful in the analysis of crash sites. Allowing us to create grouping of nearby accidents and show clustering.

Kernel Density: This tool was another form of showing hot spots with the crash data.

Network Analysis: This tool was used to show routes that allowed the rider to avoid the high density crash intersections and stretches of streets.

Table to Excel: This tool was used to help edit attribute tables to sort through the data and pull out relevant crash site data.

Data Sources:

Metro RLIS datasets: *2007-2015 bike routes, 2015 major rivers, 2015 streets, 2015 neighborhoods, 2015 city boundary*.

Crash accident datasets: *2007-2013 from Oregon Department of Transportation*.

Basemap: *ESRI,Google.*

Methods:

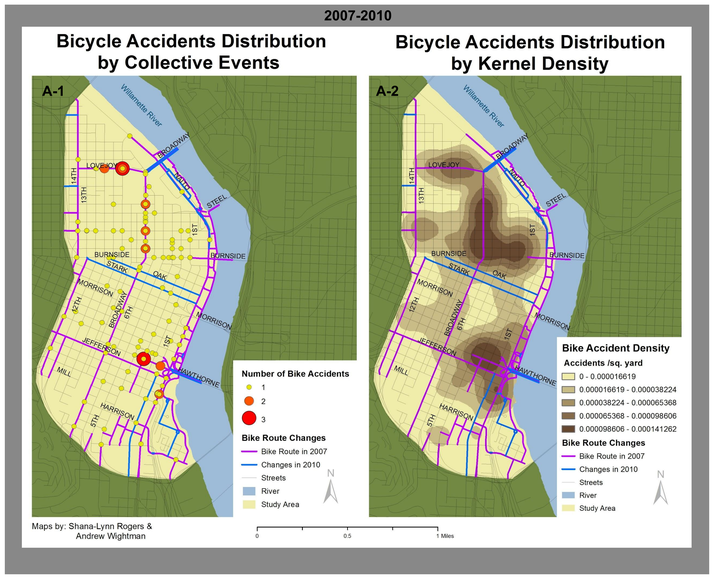
Once deciding on our focused study area, the field titled "YEAR" was added to our RLIS bike routes datasets for 2007, 2010, 2013, and 2015. The RLIS bike routes datasets were then merged together using the Merge Tool in ArcGIS, the 2007 and 2010 datasets, and the 2010 and 2015 datasets to show the changes in the routes over the years within the study area using proper symbology using the field titled "YEAR".

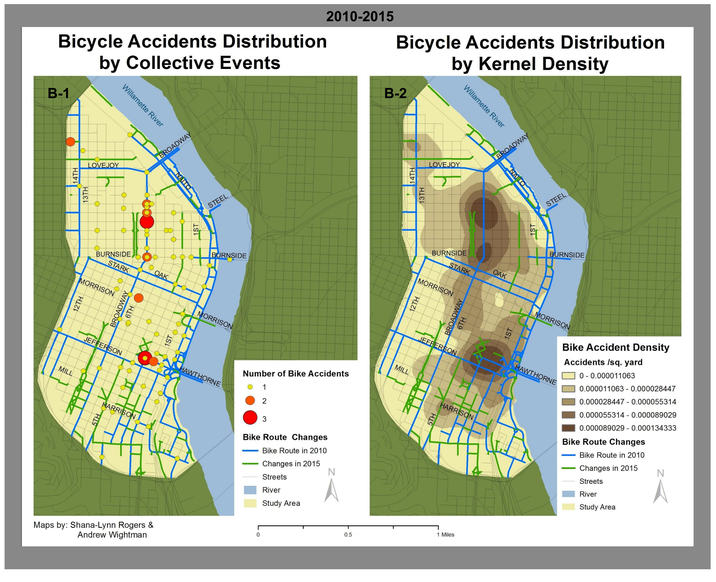
After each datasets had been merged, the datasets were then clipped to the study area to show only the focus area on the maps presented in this study.

The Collective Events Tool was used to convert the accident data to weighted point data. The Collect Events Tool combines coincident points. This is shown in the bike accidents layer in both of the "By Collective Event" maps below for the years 2007-2010 and the years 2010-2015. Which this is shown in "Map A-1 and Map B-1"

The Kernel Density Tool was used to show hot spots using the accident dataset. This is shown in the bike accidents layer in both of the "By Kernel Density" maps below for the years 2007-2010 and the years 2010-2015. Which this is shown in "Map A-2 and Map B-2"

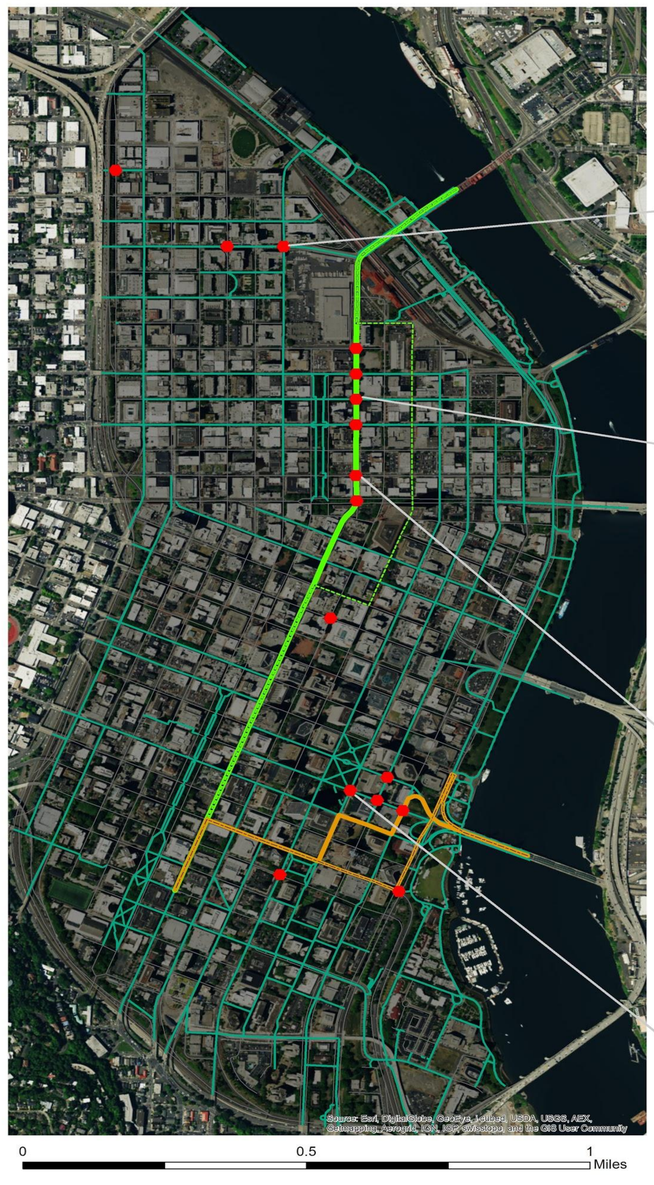
The previous method prepared the datasets to be used in the network analysis





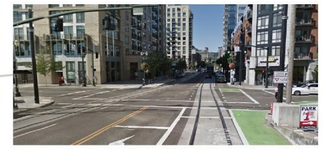
Results & Conclusion:

After locating which areas were trouble spots and snapping those to the street layers a network dataset was built. Next was Isolating the collective event points that had two or more accidents and creating a buffer. These buffer polygons were used as polygon barriers in the network analysis. The initial route for the Broadway Bridge to PSU took you through six accident areas. While the alternate route, after adding the barriers, avoided all accident sites. The difference in the milage was 0.2 mile further for the alternate route. The Hawthorne Bridge to PSU initially hits one accident site. The alternate route, looks like it hits an accident site but that is on the east end of the intersection. The alternate route for this adds 0.1 of a mile to avoid accident sites. For further studies it would be interesting to look at the limitability of riding on only bike routes as shown on the map. In most cases they don't meet up or have gaps in the routes. The accident data hadn't been updated since 2013, new data would be interesting to look at. There are quite a few bike route improvements in the last couple years and planned for future development.



MOST ACCIDENT PRONE INTERSECTIONS

NW 9th & Lovejoy



All three crashes happened in 2007 near this intersection. All were for vehicle not yeilding right of way as they were turning. There were no fatalities. The conditions were dry pavement and happened between 3:00pm and 5:00pm.

NW Broadway & Flanders

All three crashes happened in 2013 near this intersection. All were for vehicle not yeilding right of way as they were turning. There were no fatalities. The conditions were dry pavement and happened between 2:00pm and 9:00pm.

NW Broadway & Couch

Two crashes happened in 2010 and one in 2012 near this intersection. All were for vehicle not yeilding right of way as they were turning. There were no fatalities. The conditions were dry pavement and happened between 8:00am and 4:00pm.

SW 3rd & Madison

There were ten accidents between 2010 and 2013 near this intersection. All were for vehicle not yeilding right of way as they were turning. There was one fatality in 2012. The conditions were dry pavement except for one crash. They happened between 2:00pm and 10:00pm.

Poster Presentation by: Shana-Lynn Rogers & Andrew Wightman, March 15, 2016