Center for Public Safety Initiatives

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Working Paper # 2009-07

Rochester Motor Vehicle Break-Ins

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Objectives

This paper will examine the issues of motor vehicle break–ins in Rochester through spatial, temporal, aoristic and other environmental analysis. These use analysis are also used to determine the increase or decrease in motor vehicle breaks in certain PSA (Police Service Area) within particular days, weeks, and months. These certain PSAs were selected based upon the high increase or hotspots of motor vehicle break-ins the city of Rochester; these PSAs are 30, 44, 46, 50, and 51. The PSAs selected includes residential areas as well as commercial areas within Rochester. The data of motor vehicle break-ins collected are from the beginning of May 2007 to the end of April 2009.

Approach Methods

ArcGIS and Crime Stat III are the main components used to perform these analyses and to display the results. Through these applications, methods of hotspot density, nearest neighbor hierarchal spatial clustering, aoristic analysis, day of week analysis, and month of year analysis were used. Google Maps was also used to locate and view these areas with significant amount of motor vehicle break-ins.

Hotspots are applied in this analysis to locate certain areas with increase in motor vehicle break-ins. It is determined by the color codes of yellow to red; yellow being the lesser increase of motor vehicle break-ins and red as severe increase in crime. The locations with these hotspots are selected to be further examined for more detailed information, such as what environmental issues that influence the increase of motor vehicle break-ins.

Aoristic analysis was utilized to determine the common time frame of vast amount of vehicle break-ins. Since vehicle break-ins occur at an unknown time, the only data that can be used is time 1 and time 2. Time 1 is when the victim last saw his vehicle, undamaged and had nothing stolen. Time 2 is when the victim approaches his vehicle and found it damaged and realized what was stolen in the vehicle. Aoristic analysis determines the most common time of vehicle break-ins by equally distributing the weight of each hour to determine the equal opportunities in which motor vehicle break-ins may occur. For example, incident 1 occurring from 1am to 8am has a 7 hour time span where each hour had an equal opportunity of having the vehicle broken into. Therefore, if incident 2 has a time frame from 3am to 10am with a 7 hour

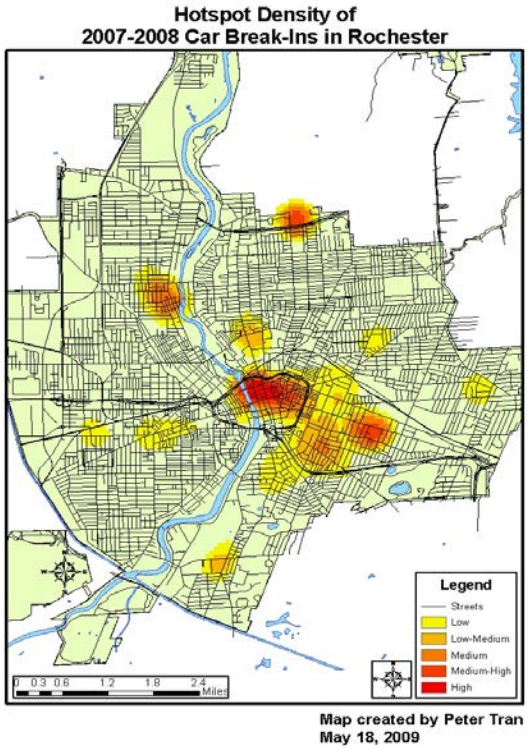
time span, aoristic analysis will determine the common time frame of motor vehicle break-ins at 3am to 8am with a 5 hr time span by analyzing both incident 1 and 2.

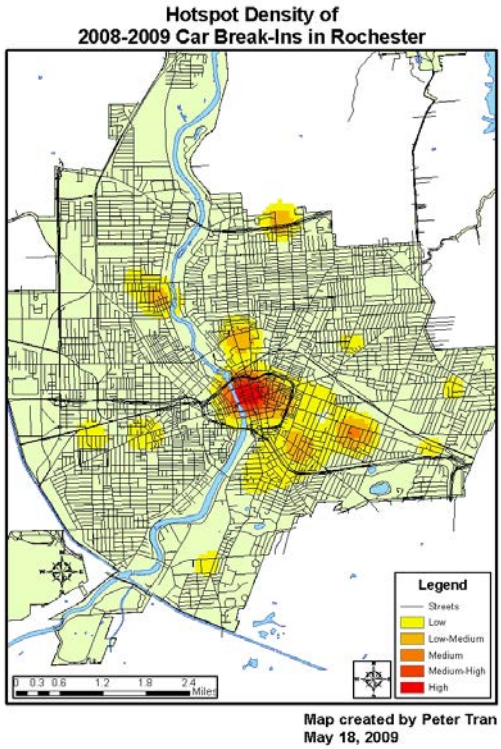
Unlike hotspot density analysis, nearest neighbor hierarchal spatial clustering analysis was employed to group any incidents that may be related to each other by providing much more in depth information than hotspot analysis. These clustering of motor vehicle break-ins are usually found where hotspots occurs due to the increase of that particular crime; however, hotspots does not reveal the amount of related vehicle break-ins.

Day of week analysis was used to determine which day of the week has what amount of motor vehicle break-ins. As with the month of year analysis, it verifies what month as the most increase in vehicle break-ins. With these analyses, hypothesis may be made to determine if there are environmental, seasonal, and other issues that affect the increase of vehicle burglary. The employment of patrol may also become more effective if a specific day or month stands out. It also implies other issues that may cause the increase of vehicle break-ins. For example, if Thursday had the most increase in vehicle break-ins, we can determine if the overcrowd of vehicles at parking facilities near nightclubs and bars may attract potential burglars.

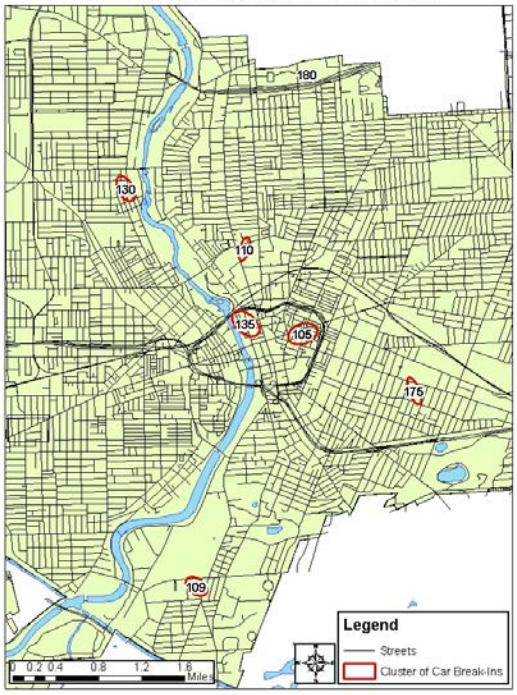
Areas of Interest

City of Rochester



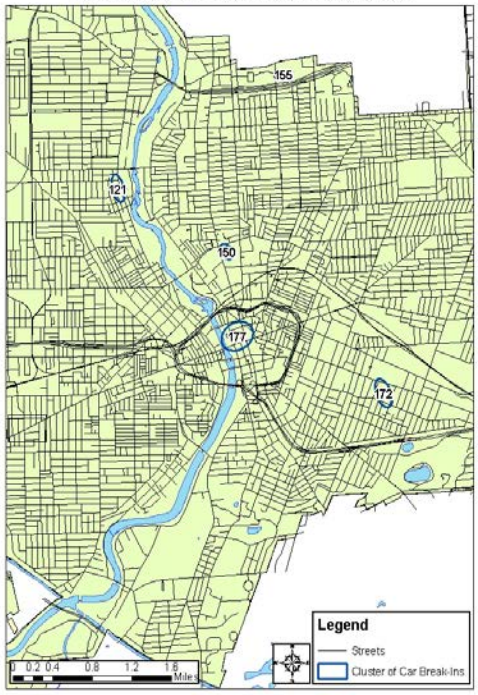


Nearest Neighbor Hierarchical Spatial Clustering of 2007-2008 Car Break-Ins in Rochester

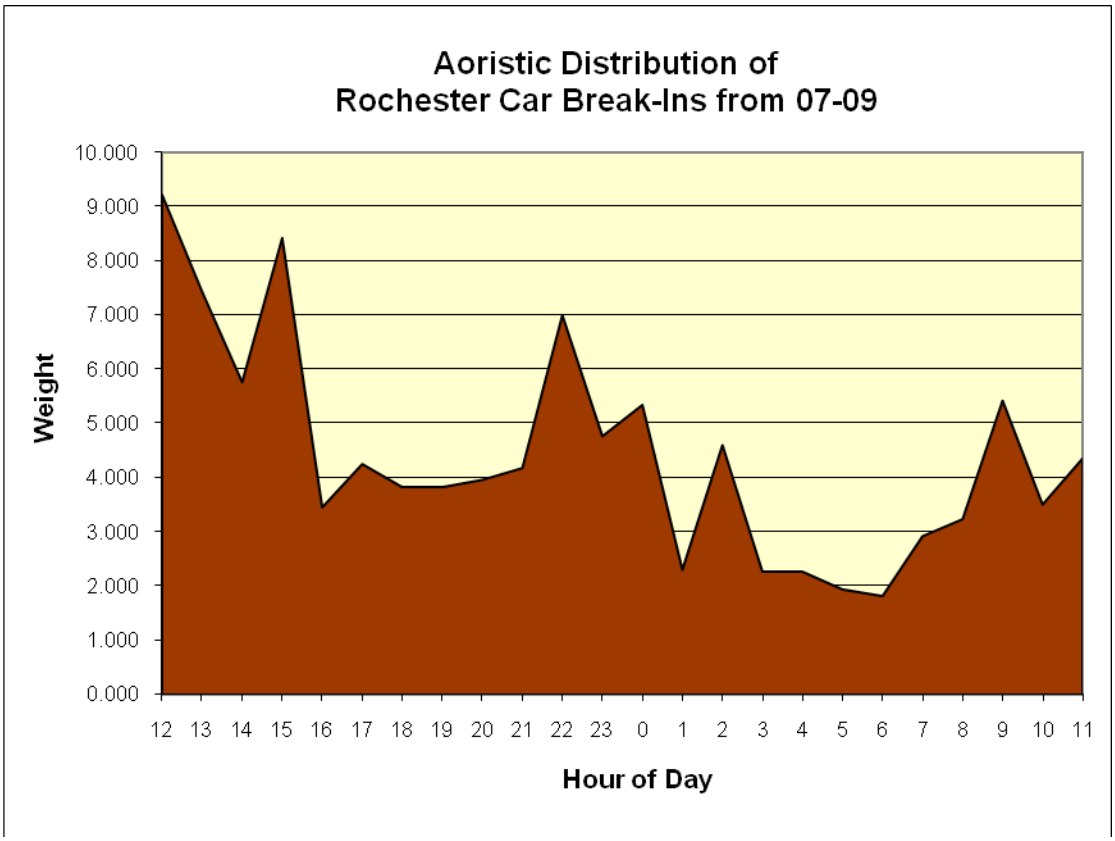


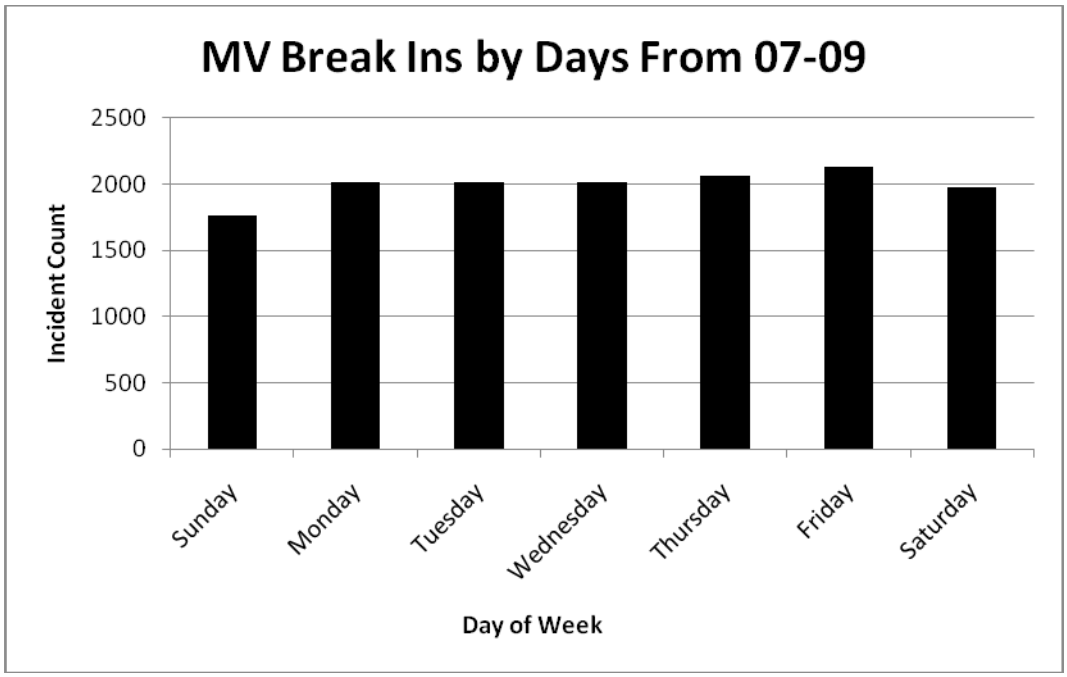
Map created by Peter Tran
May 18, 2009

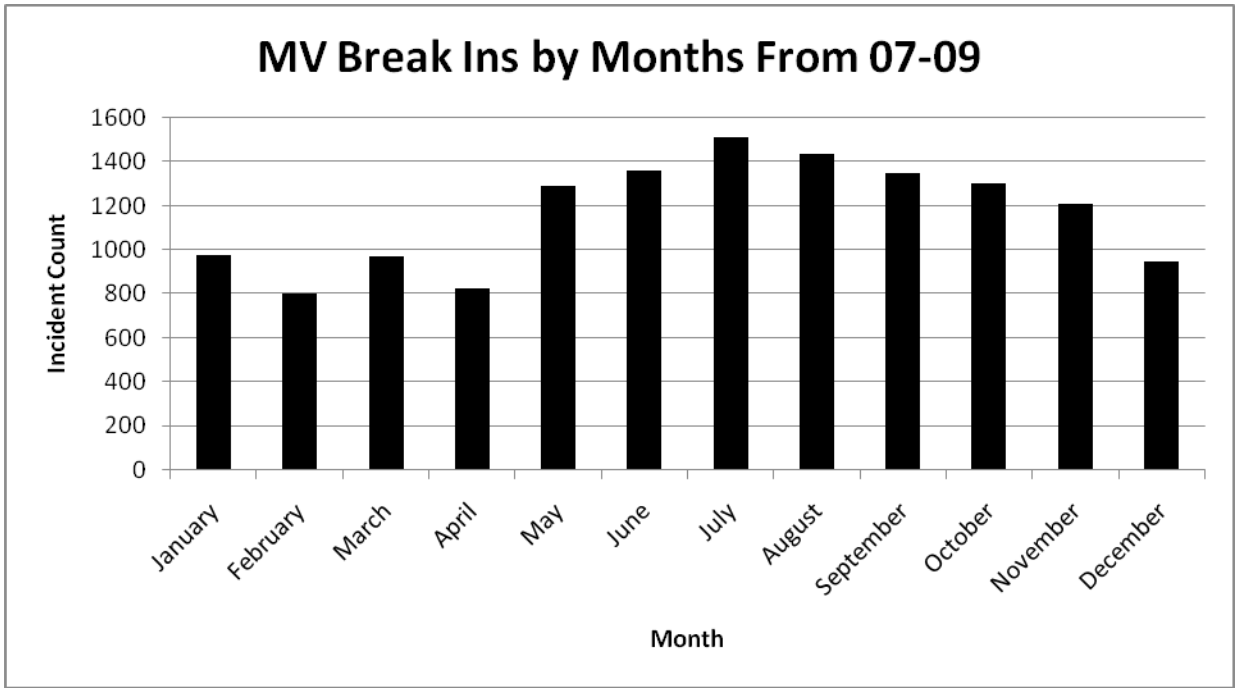
Nearest Neighbor Hierarchical Spatial Clustering of 2008-2009 Car Break-Ins in Rochester



Map created by Peter Tran
May 18, 2009



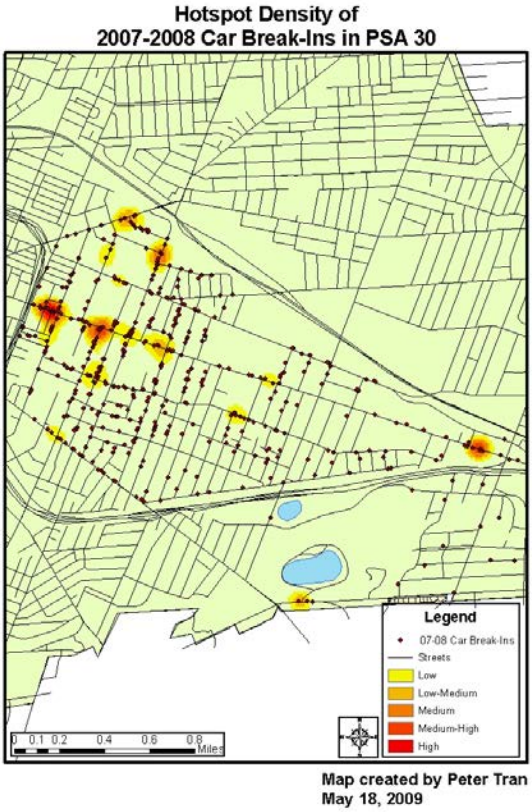


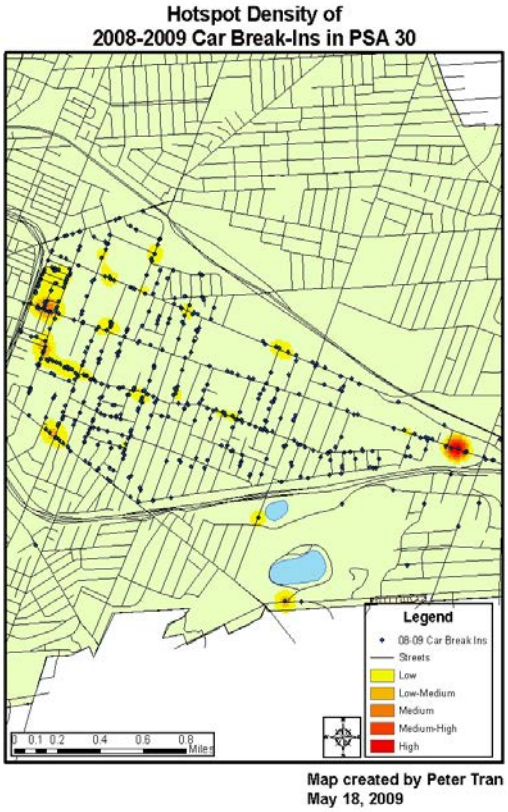


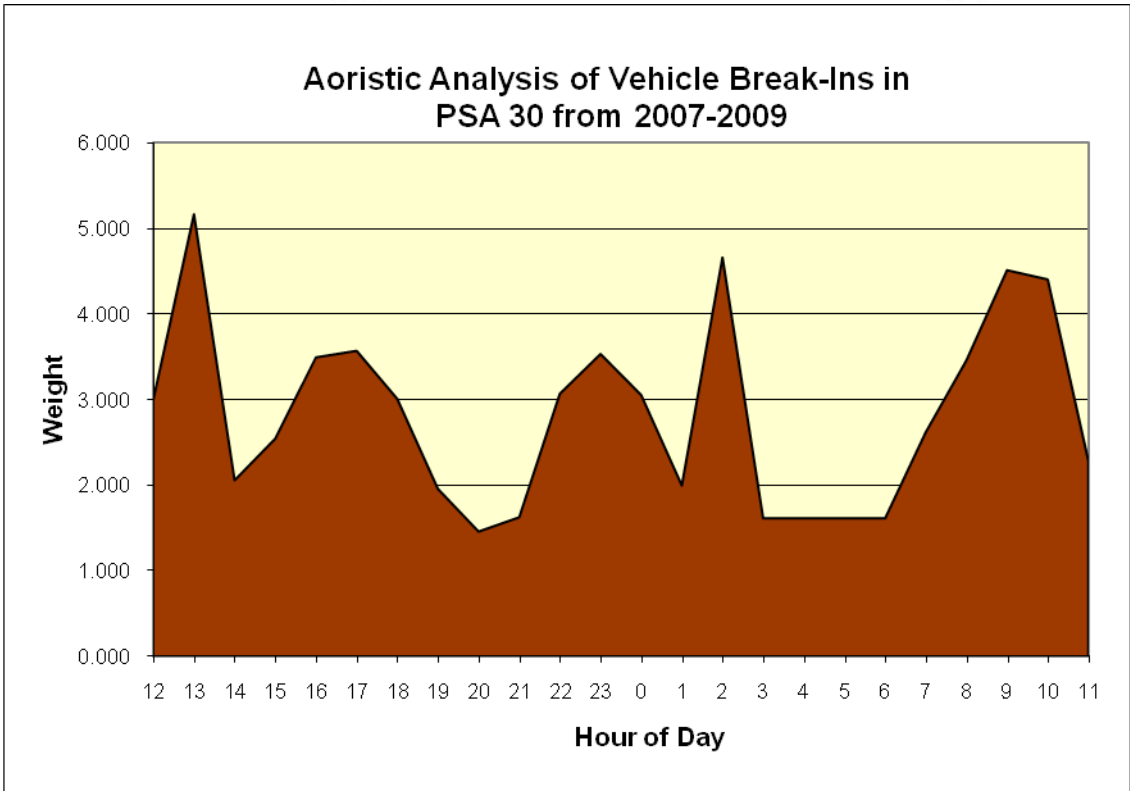
Results

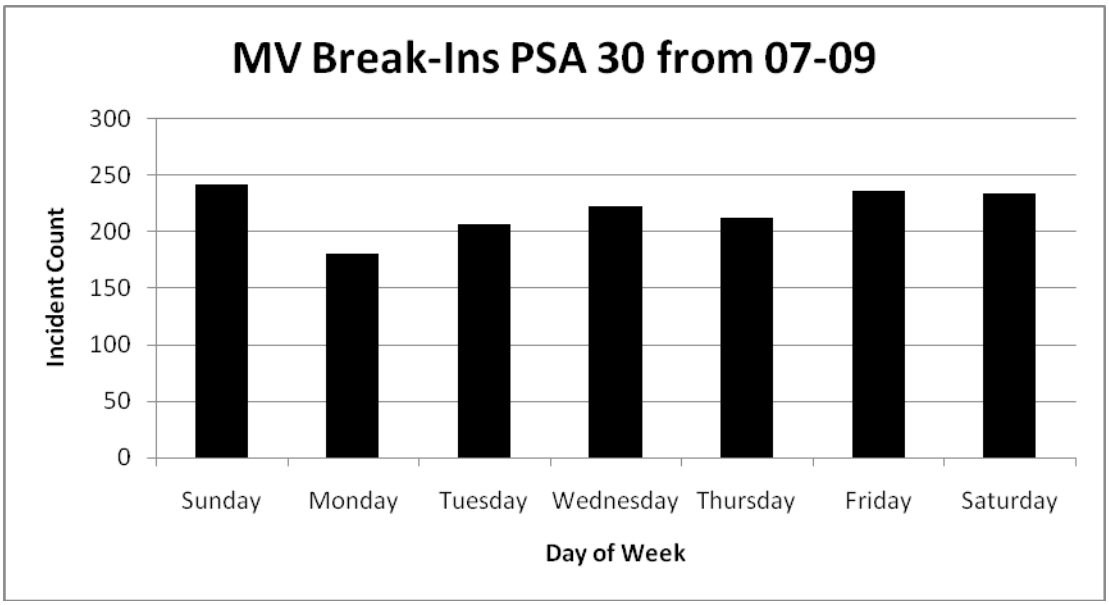
- PSA 30, 44, 46, 50, and 51 in Rochester has significant amount of motor vehicle break-ins from 2007-2009.
- Around 12pm, 3pm, and 10pm in Rochester has the most significant car break-ins.
- Motor vehicle break-ins in each day of the week seem to be relatively similar.
- Summer to fall season seems to have the most significant number of motor vehicle break-ins.

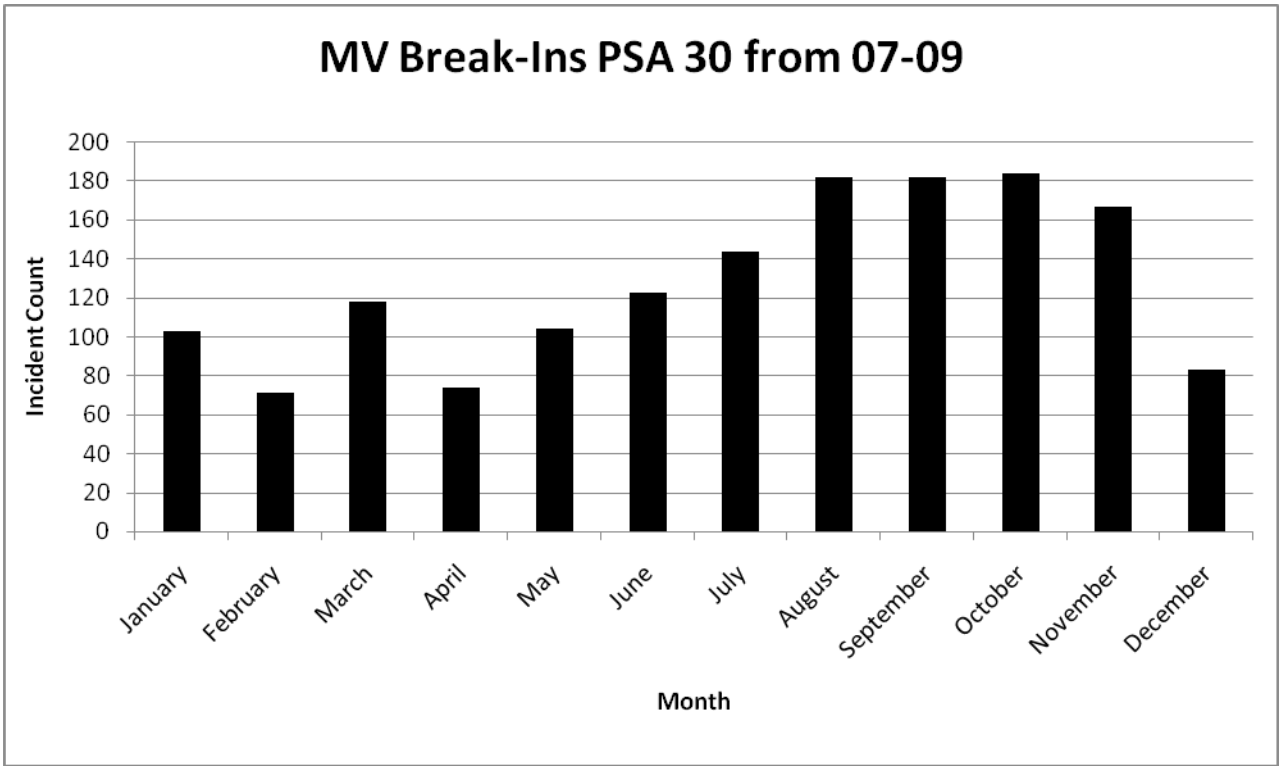
PSA 30


Hotspot Density of
2007-2008 Car Break-Ins in PSA 30
Legend
07-08 Car Break-Ins
Streets
Low
Low-Medium
Medium
Medium-High
High
0 0.1 0.2 0.4 0.6 0.8
Miles
Map created by Peter Tran
May 18, 2009


Hotspot Density of
2008-2009 Car Break-Ins in PSA 30
Legend
08-09 Car Break-Ins
Streets
Low
Low-Medium
Medium
Medium-High
High
0 0.1 0.2 0.4 0.6 0.8
Miles
Map created by Peter Tran
May 18, 2009


Aoristic Analysis of Vehicle Break-Ins in
PSA 30 from 2007-2009
Weight
6.000
5.000
4.000
3.000
2.000
1.000
0.000
12 13 14 15 16 17 18 19 20 21 22 23 0 1 2 3 4 5 6 7 8 9 10 11
Hour of Day



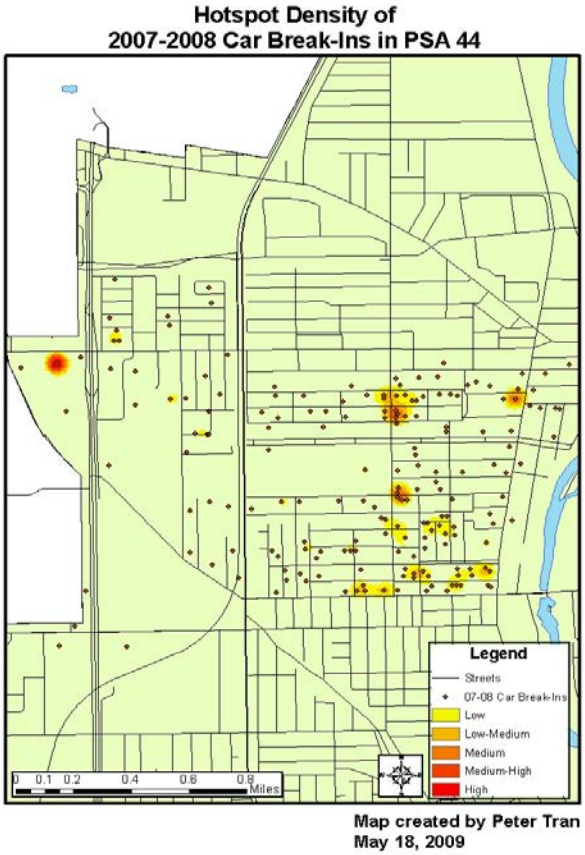


Results

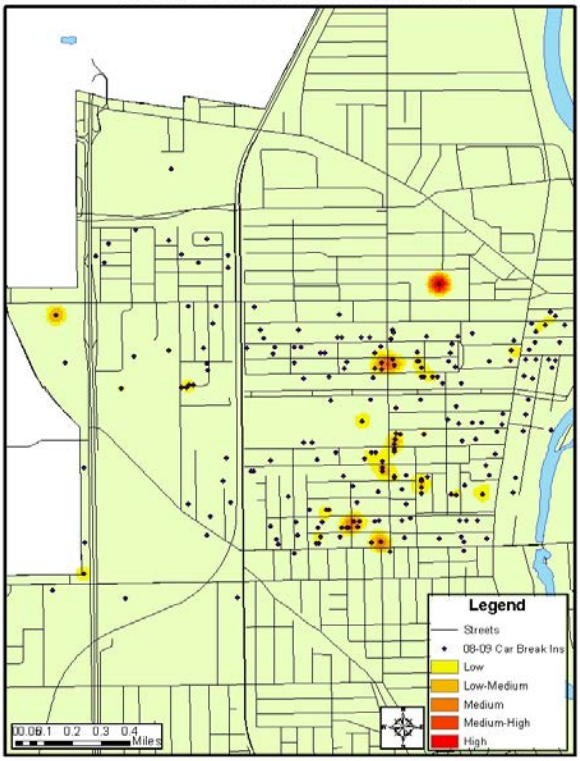
- East Ave/Ryan Alley, N. Goodman St./College Ave, East Ave/Meigs St, and East Ave/Probert St. intersections has the most significant amount of motor vehicle thefts

- These locations are parking lots for clubs, restaurants, and grocery stores.
- 1pm, 2am, and 8am-10am has the highest peak of motor vehicle break-ins in PSA 44
- PSA 30 has relatively similar amounts of motor vehicle break-ins throughout each day of the week.
- Fall season has the most significant amount of motor vehicle break-ins in PSA 30.

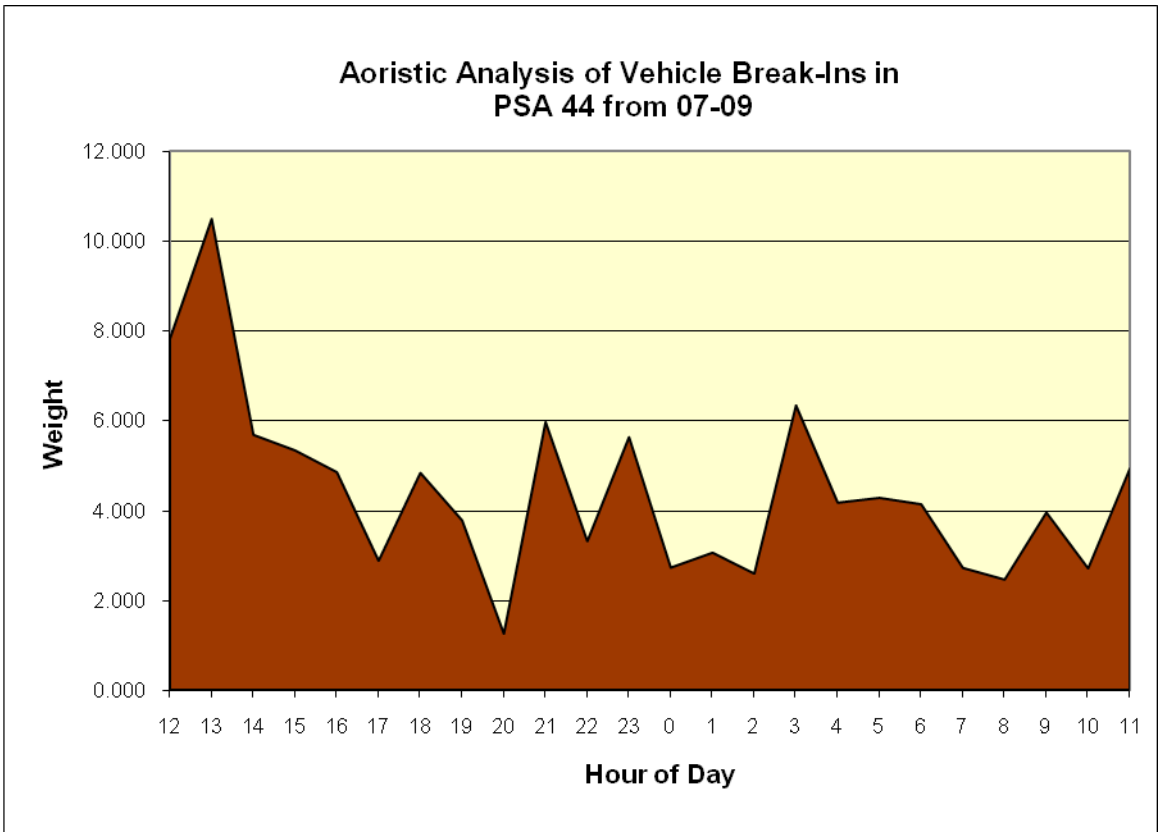
PSA 44

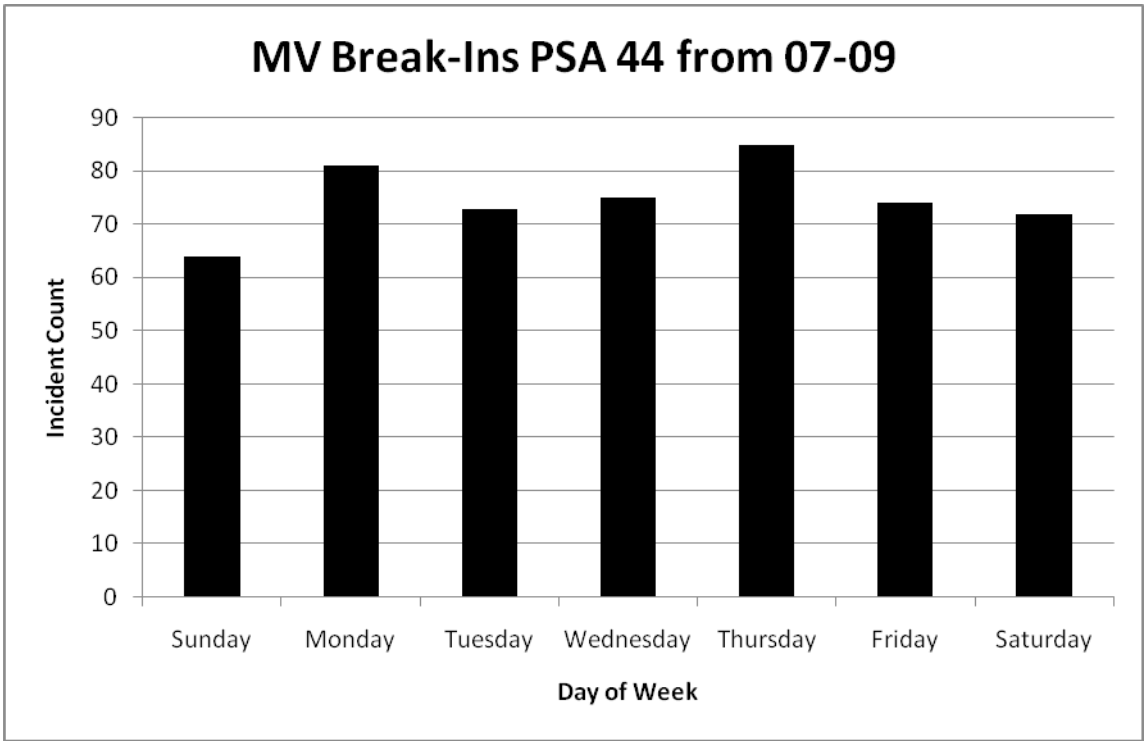


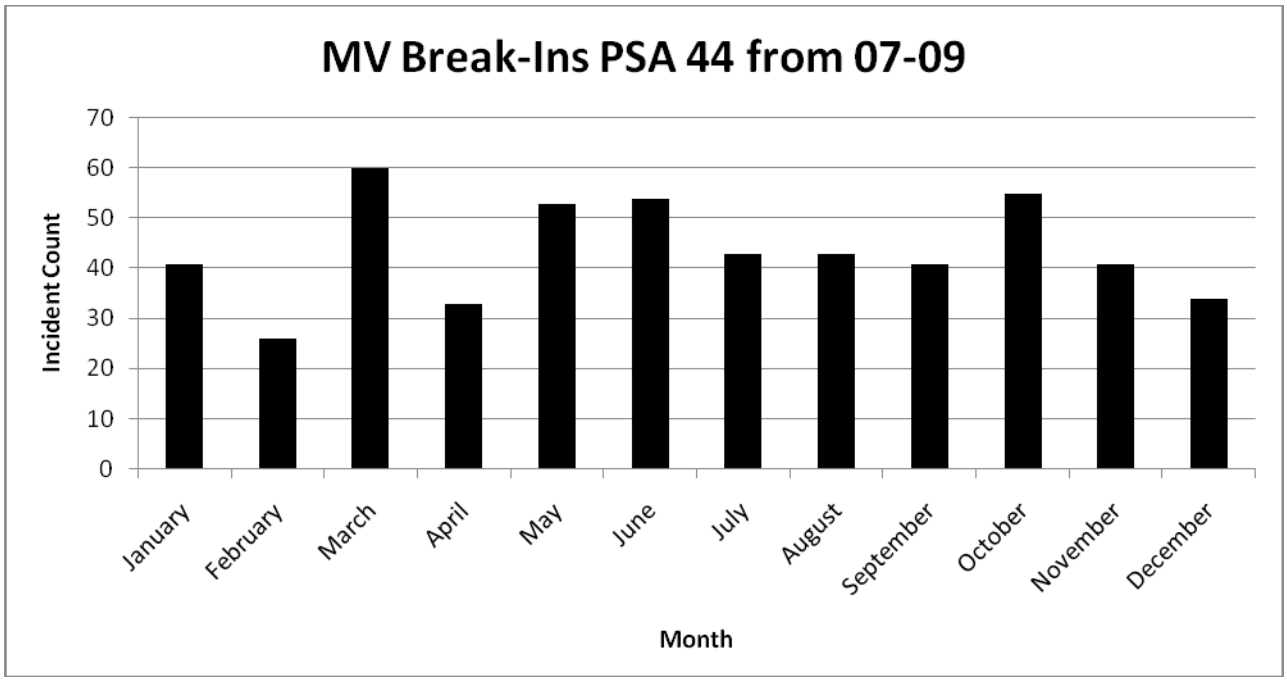
Hotspot Density of
2008-2009 Car Break-Ins in PSA 44



Map created by Peter Tran
May 18, 2009


Aoristic Analysis of Vehicle Break-Ins in PSA 44 from 07-09
Weight
12.000
10.000
8.000
6.000
4.000
2.000
0.000
12 13 14 15 16 17 18 19 20 21 22 23 0 1 2 3 4 5 6 7 8 9 10 11
Hour of Day


MV Break-Ins PSA 44 from 07-09
Incident Count
90
80
70
60
50
40
30
20
10
0
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Day of Week

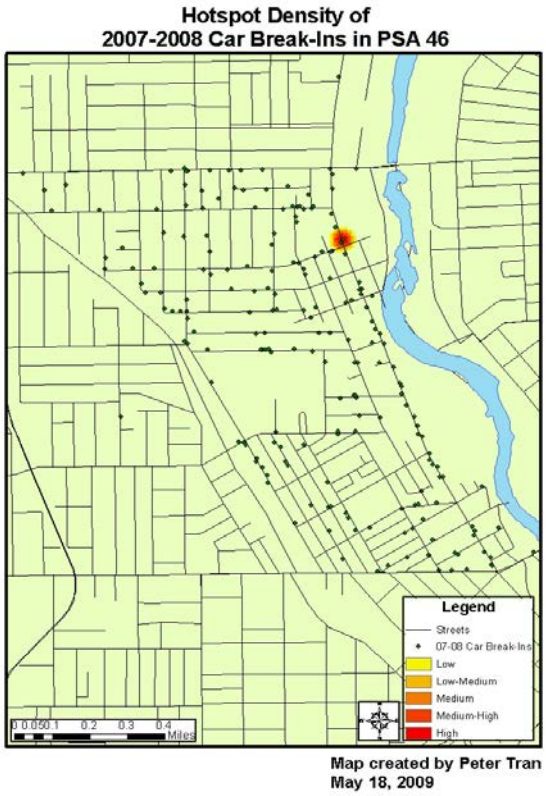


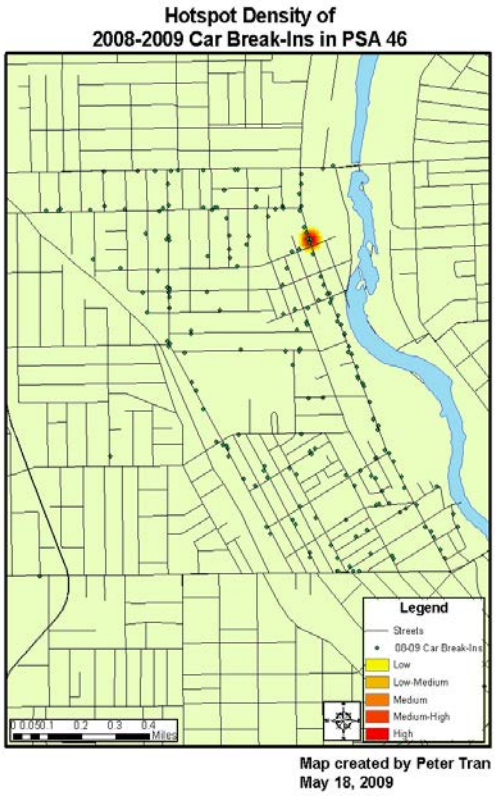
Results

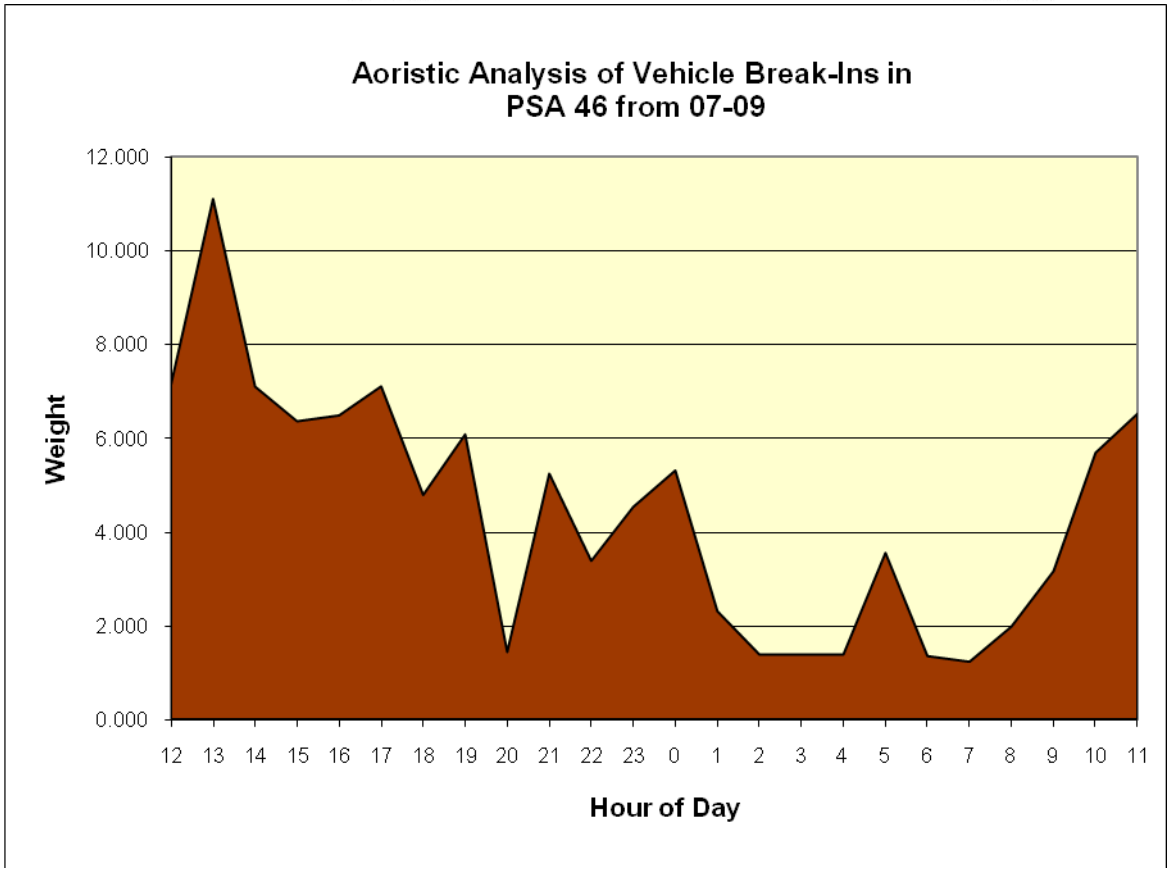
- 1151 Ridgeway Ave., 180 Ridgeway Ave., 346 Driving Park Ave., 1300's Dewey Ave., Augustine St./Dewey intersection, and Archer St./Lakeview Park Rd. intersection reveals significant amount of motor vehicle break-ins.

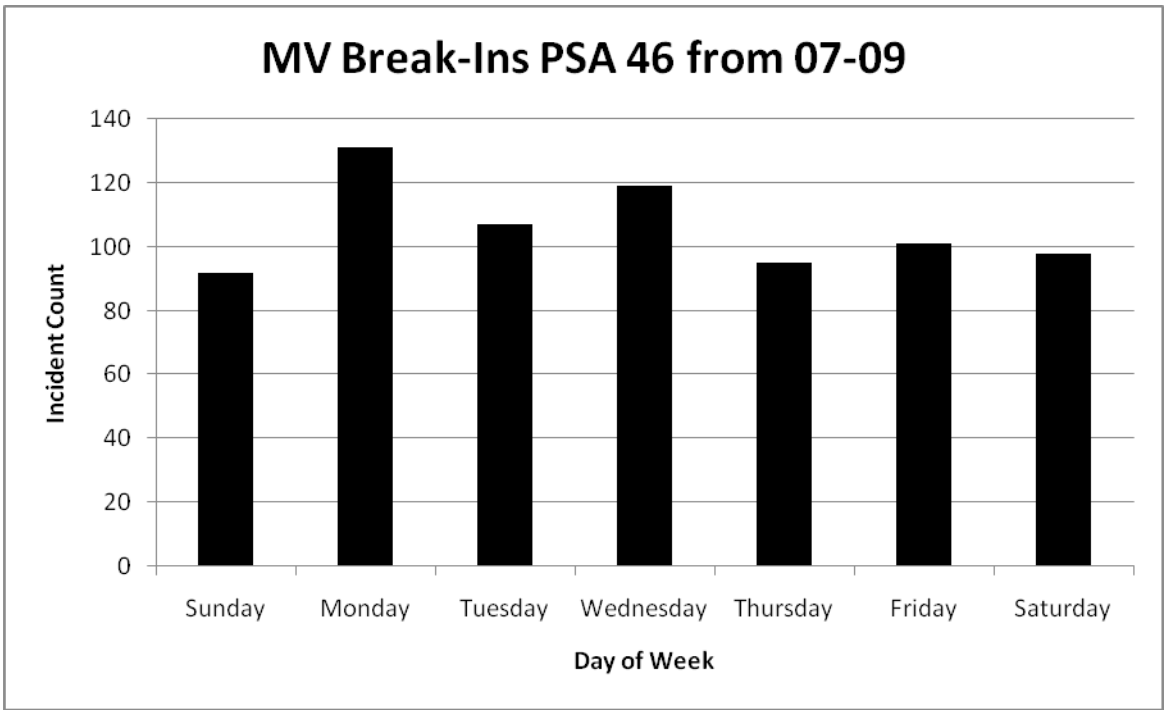
- Most of these areas are parking lots for a bowling alley, high school, and convenient/shopping stores (with an exception to Archer St./ Lakeview Park Rd. – neighborhood street parking).
- Around 1pm shows the most significant car break-ins in PSA 44.
- Motor vehicle break-ins in each day of the week seem to be relatively similar.
- Summer to fall season seems to have the most significant number of motor vehicle break-ins.

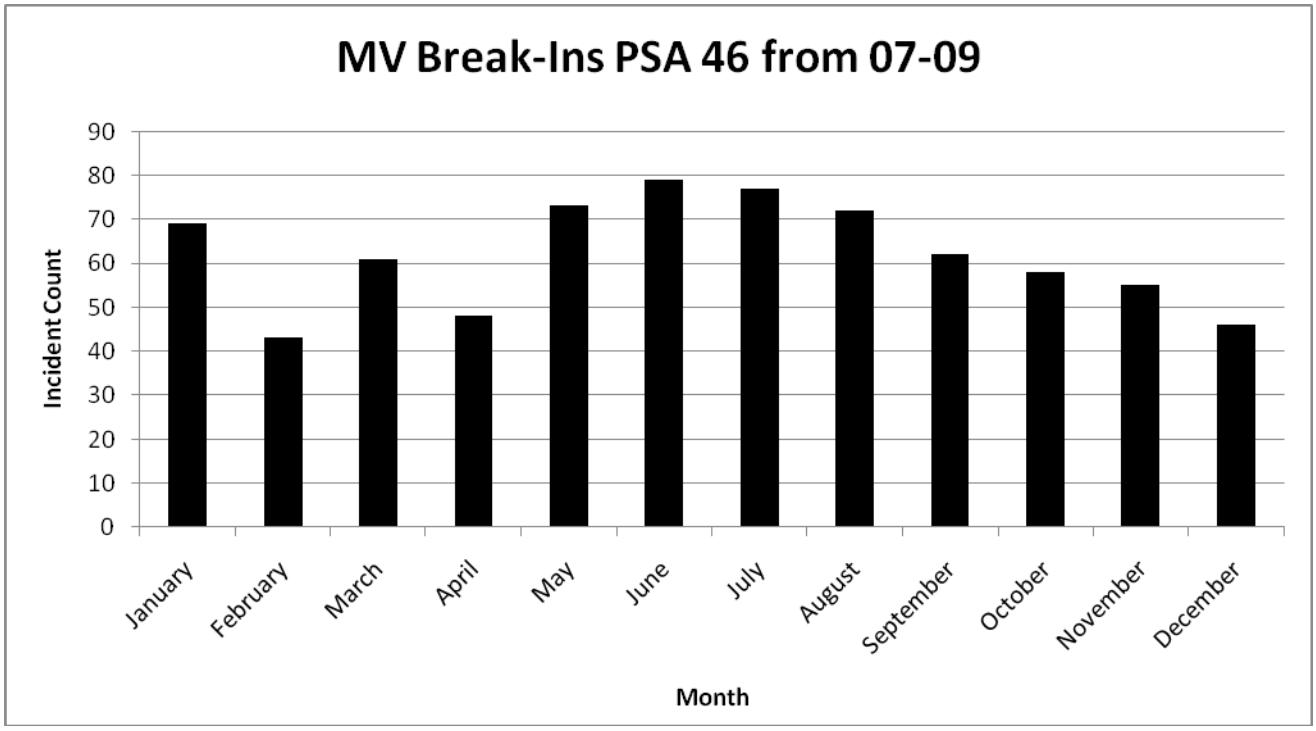
PSA 46


Hotspot Density of
2007-2008 Car Break-Ins in PSA 46
Legend
Streets
07-08 Car Break-Ins
Low
Low-Medium
Medium
Medium-High
High
0 0.05 0.1 0.2 0.3 0.4
Miles
Map created by Peter Tran
May 18, 2009


Hotspot Density of
2008-2009 Car Break-Ins in PSA 46
Legend
Streets
08-09 Car Break-Ins
Low
Low-Medium
Medium
Medium-High
High
0 0.05 0.1 0.2 0.3 0.4
Miles
Map created by Peter Tran
May 18, 2009


Aoristic Analysis of Vehicle Break-Ins in
PSA 46 from 07-09
Weight
12.000
10.000
8.000
6.000
4.000
2.000
0.000
12 13 14 15 16 17 18 19 20 21 22 23 0 1 2 3 4 5 6 7 8 9 10 11
Hour of Day



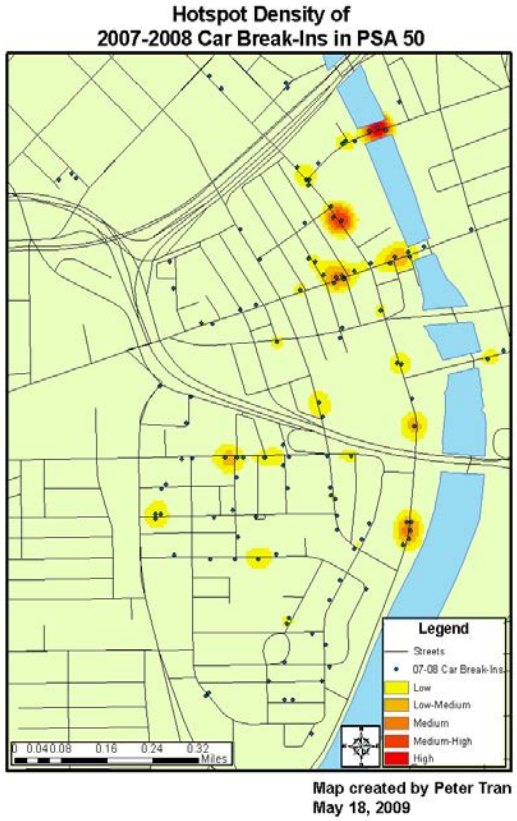


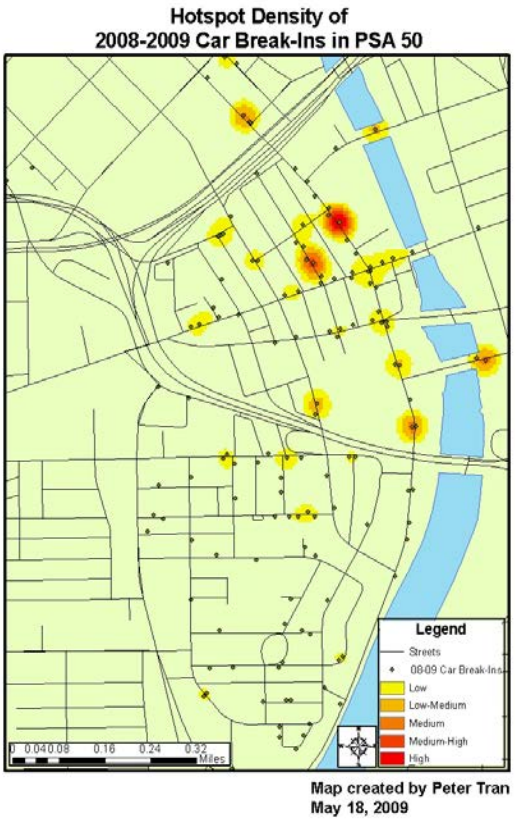
Results

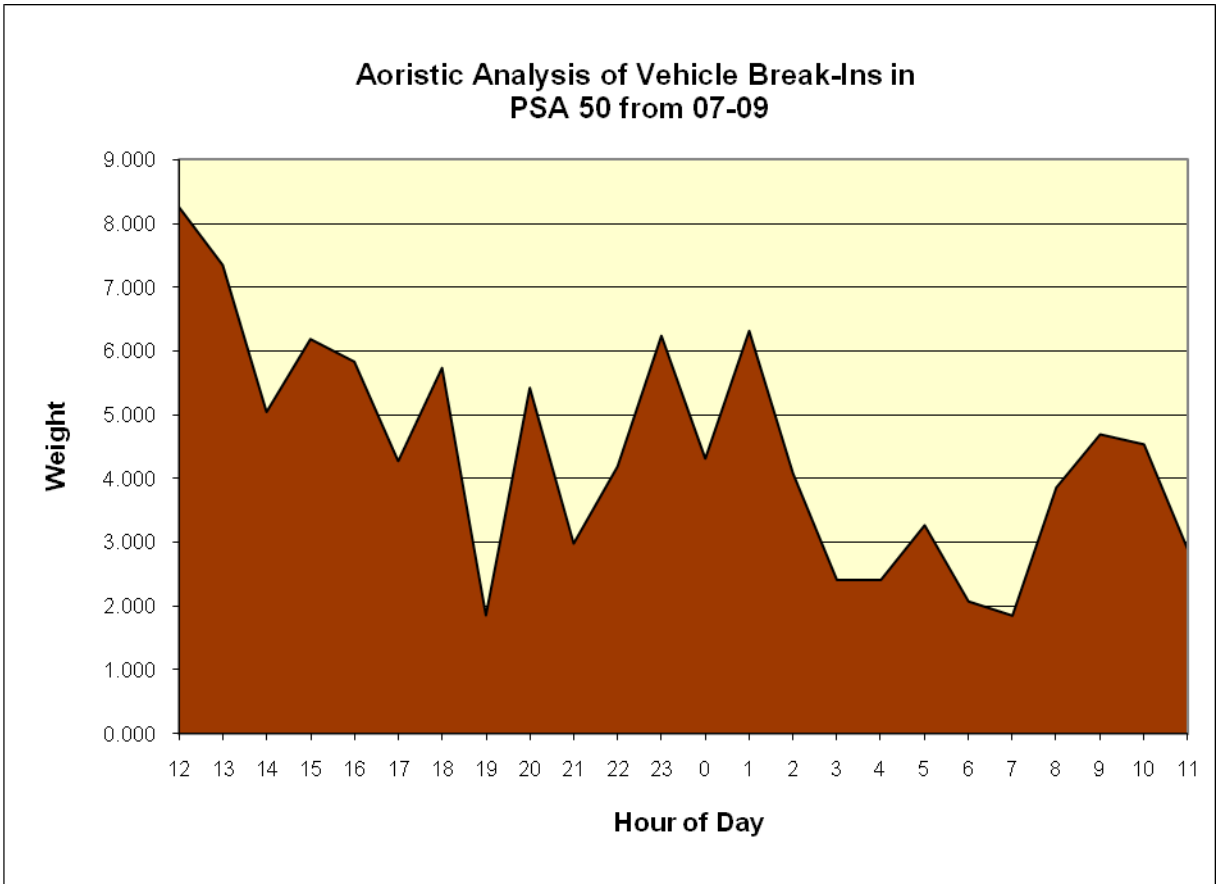
- 700's Lake Ave has the most significant amount of motor vehicle break-ins.

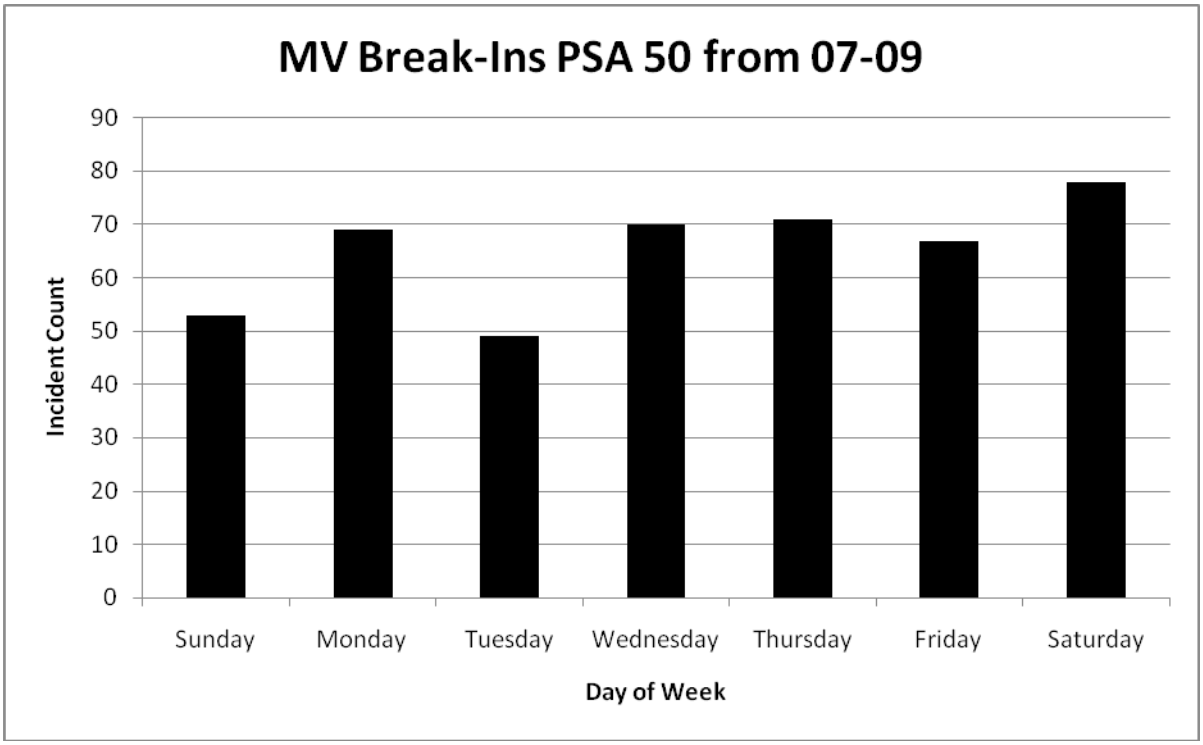
- Mondays seems to have the most amounts of motor vehicle break-ins; however, there seems to be no significant amount of differences.
- Around 1pm in Rochester have the most significant car break-ins.
- Motor vehicle break-ins in each day of the week seem to be relatively similar.
- Summer season and the month of January seem to have the most significant number of motor vehicle break-ins.

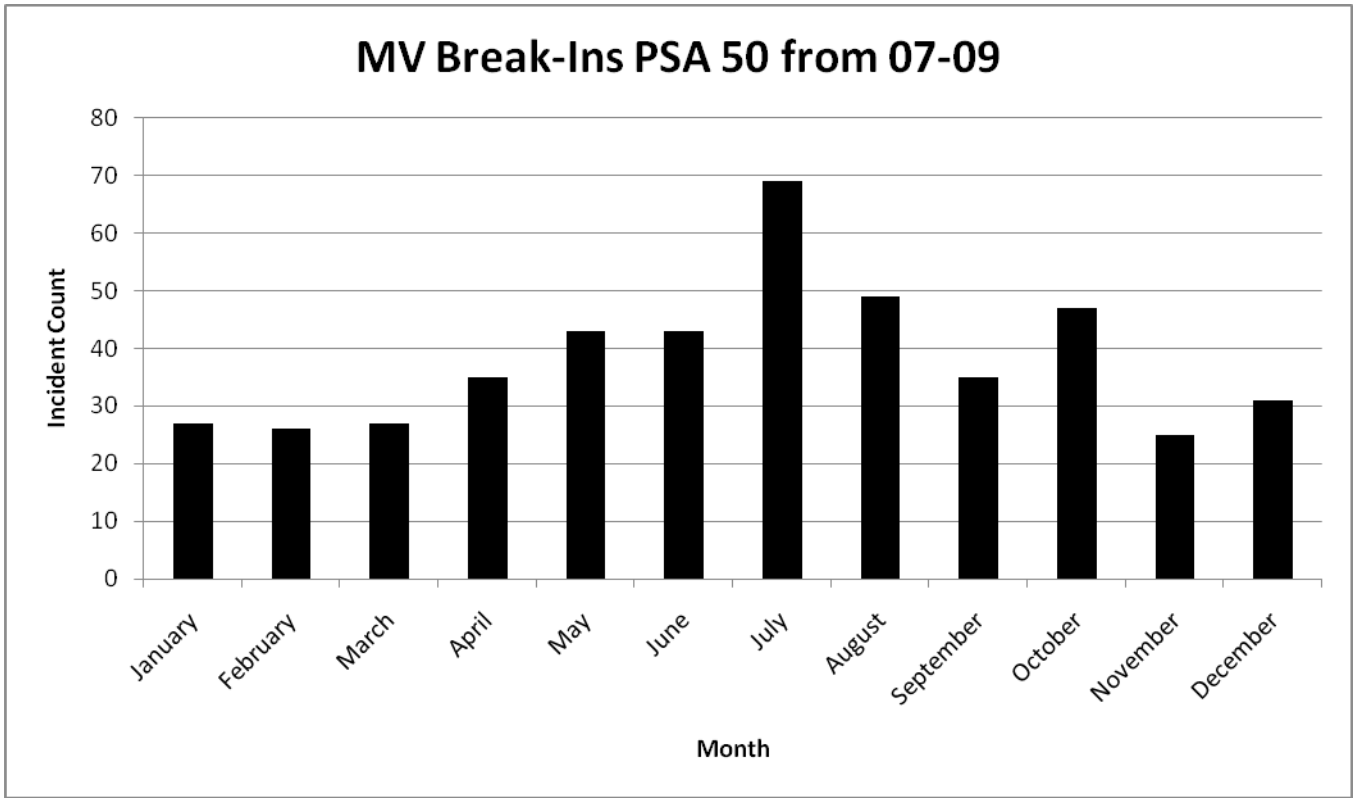
PSA 50






Aoristic Analysis of Vehicle Break-Ins in PSA 50 from 07-09
Weight
9.000
8.000
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
12 13 14 15 16 17 18 19 20 21 22 23 0 1 2 3 4 5 6 7 8 9 10 11
Hour of Day


MV Break-Ins PSA 50 from 07-09
Incident Count
90
80
70
60
50
40
30
20
10
0
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Day of Week



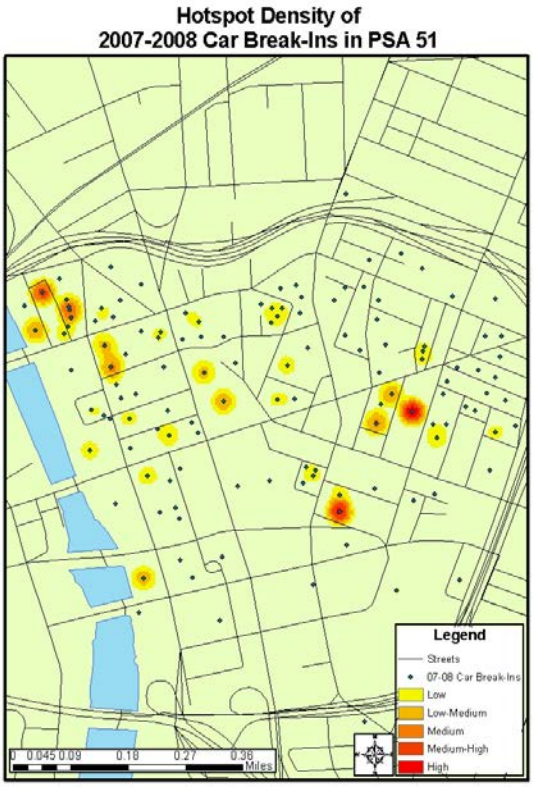
Results

- 100's Andrew St., 300's Andrew St., 70 State St., and 28 N. Fitzhugh St. have the most significant amount of motor vehicle break-ins.

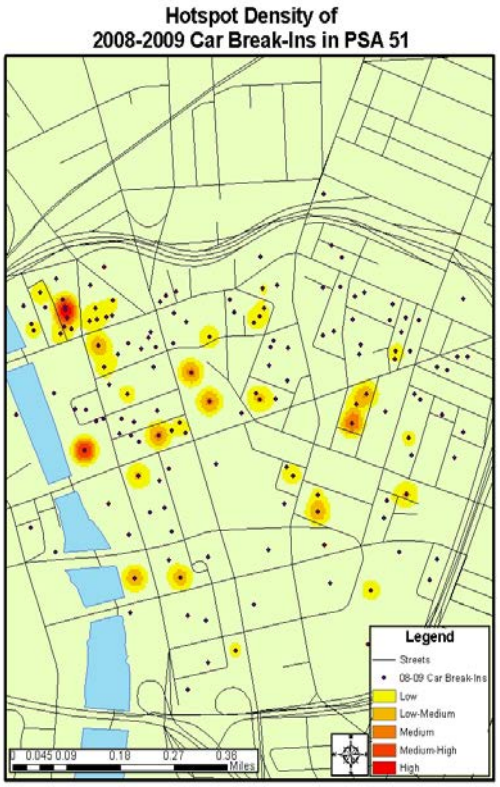



- These areas are parking areas for bars, restaurants, and hotels (with exception to 28 N. Fitzhugh St. - parking garage for city hall and others).
- Around 12pm seems to have the most significant car break-ins.
- Saturdays seems to have the most motor vehicle break-ins.
- The month of July seems to have the most significant number of motor vehicle break-ins.

PSA 51



Map created by Peter Tran
May 18, 2009



Map created by Peter Tran
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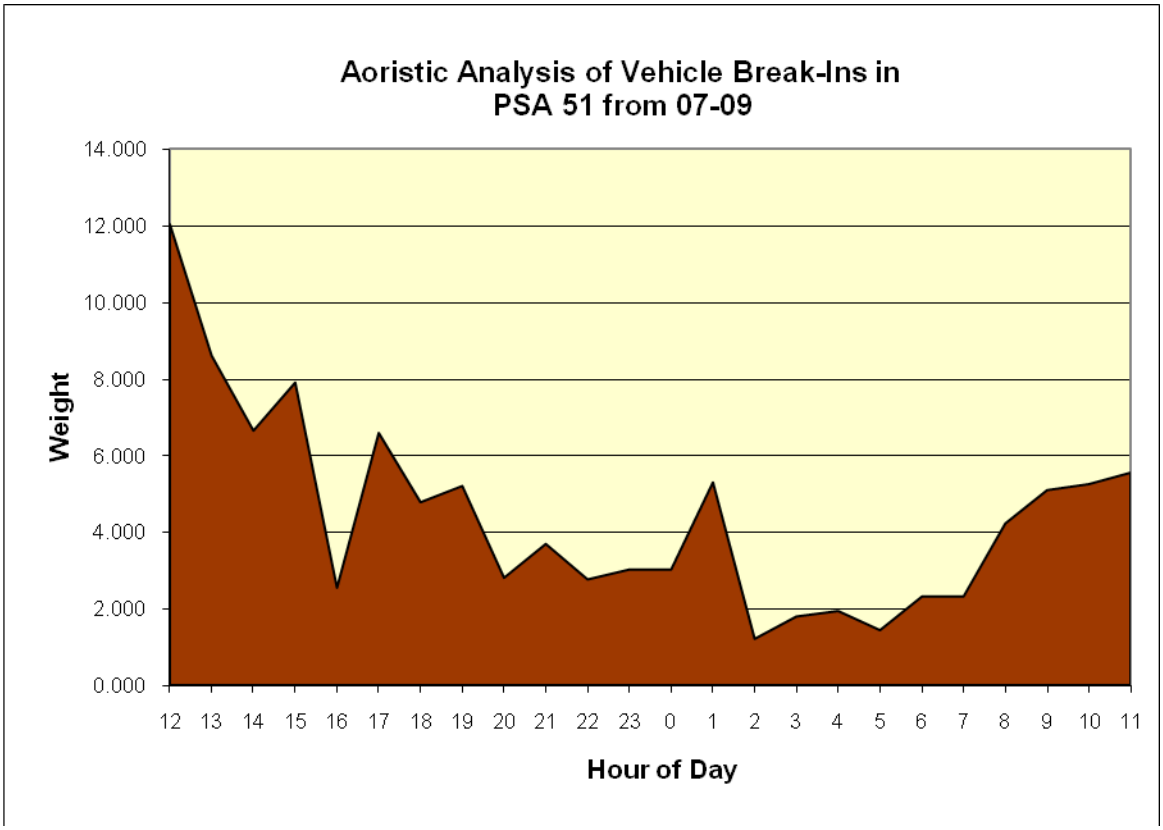

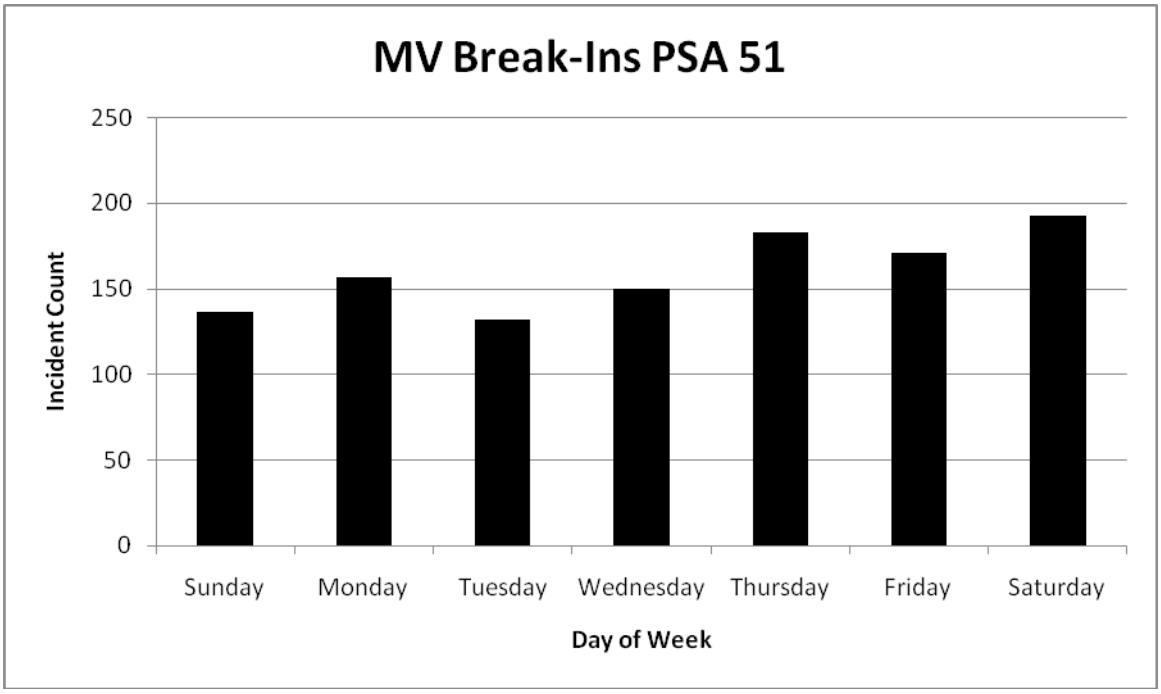

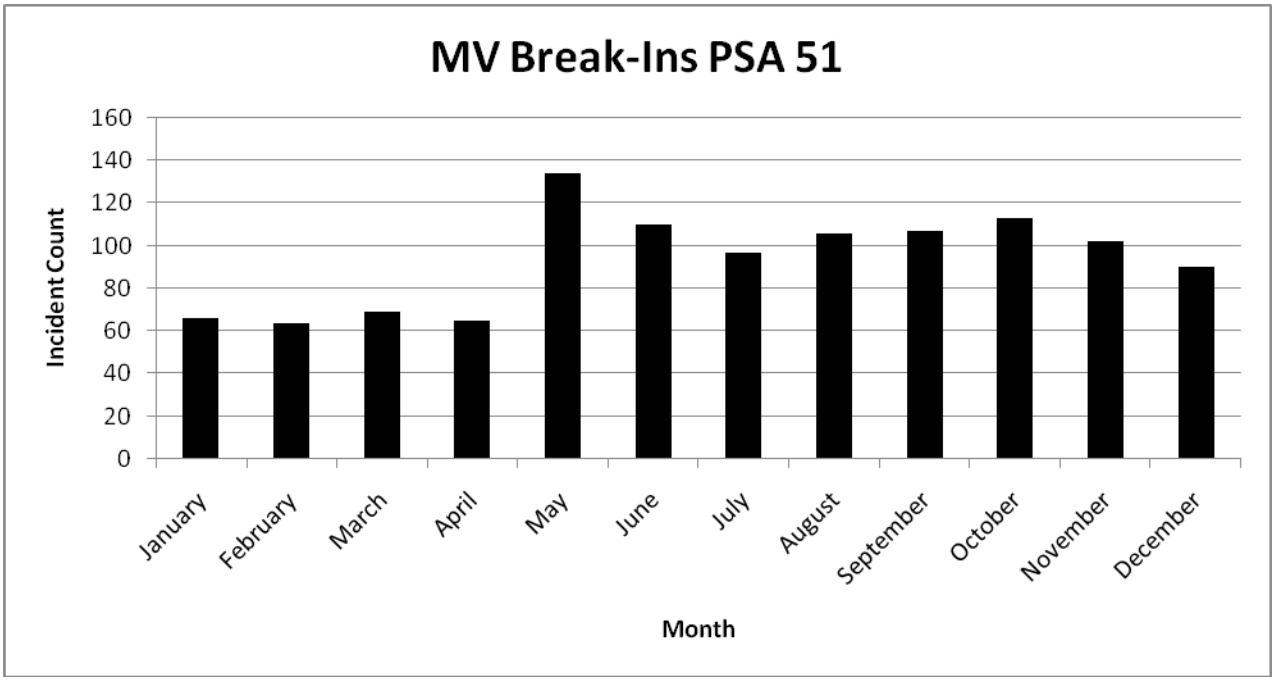

Results

- N. Water St./Carnage Alleys, East Main St./Scio St., St. Paul St./Andrew St., Broadway St./ James St. intersection, and 120 East Main St. reveals the most significant amount of motor vehicle break-ins.
- Around 12pm shows the most significant car break-ins.
- Saturday seems to be the day with most motor vehicle break-ins.
- The month of May seems to have the most significant number of motor vehicle break-ins.

Conclusion

Drawing from the results and data collected from these analyses, other detailed analysis may also be implemented to further specify the problems in these areas with significant amount of motor vehicle break-ins. These results can also be further examined by studying what, if any action was taken that further increased or decrease of motor vehicle break-ins in certain area. These results are also essential for better and beneficial employment of patrols and implementation of surveillance equipments. However, there are also problems with the data collected, such as seasonal effects. It is difficult to compare motor vehicle break-ins in 2007 to 2008 and 2009 due to the time span within the data collected. The motor vehicle break-ins data received lacks the months of January to April in 2007 while these months in 2008 and 2009 were available. In the data of 2008, all months of motor vehicle break-ins were available. In the 2009 data, the months of May to December were unavailable. This skews the analyses such as the month of year analysis because all 12 months of data in 2008 were available as opposed to 2007 and 2009. Because of this, 2007-2009 month of year analysis on motor vehicle break-ins would reveal that if there is a sufficient increase in car break-ins in the months of 2008 that it would also represent the months in 2007 and 2009. Another incorrect method in interpreting the results is comparing the day of week analysis to the month of year analysis. For example, if Monday has the most significant amount of car break-ins while the month of year analysis reveals that June has also the most significant amount of car break-ins, it is implausible to theorize that Mondays in June has the most significant amount of car break-ins. Each analysis represents its own context and comparing the two analyses will create implausible theories and suggestions. Spatial temporal analysis while using a specific type of surface chart/graph will provide more accurate time intervals of motor vehicle break-ins by providing the comparison and correlation of hour, day, and month; for example, Mondays 1pm-3pm in June are the most significant amount of break-ins. These are the criteria that should be taken into consideration before implementing patrols at any time.