

# Urban Structure Factors Affecting Bike Theft Rates

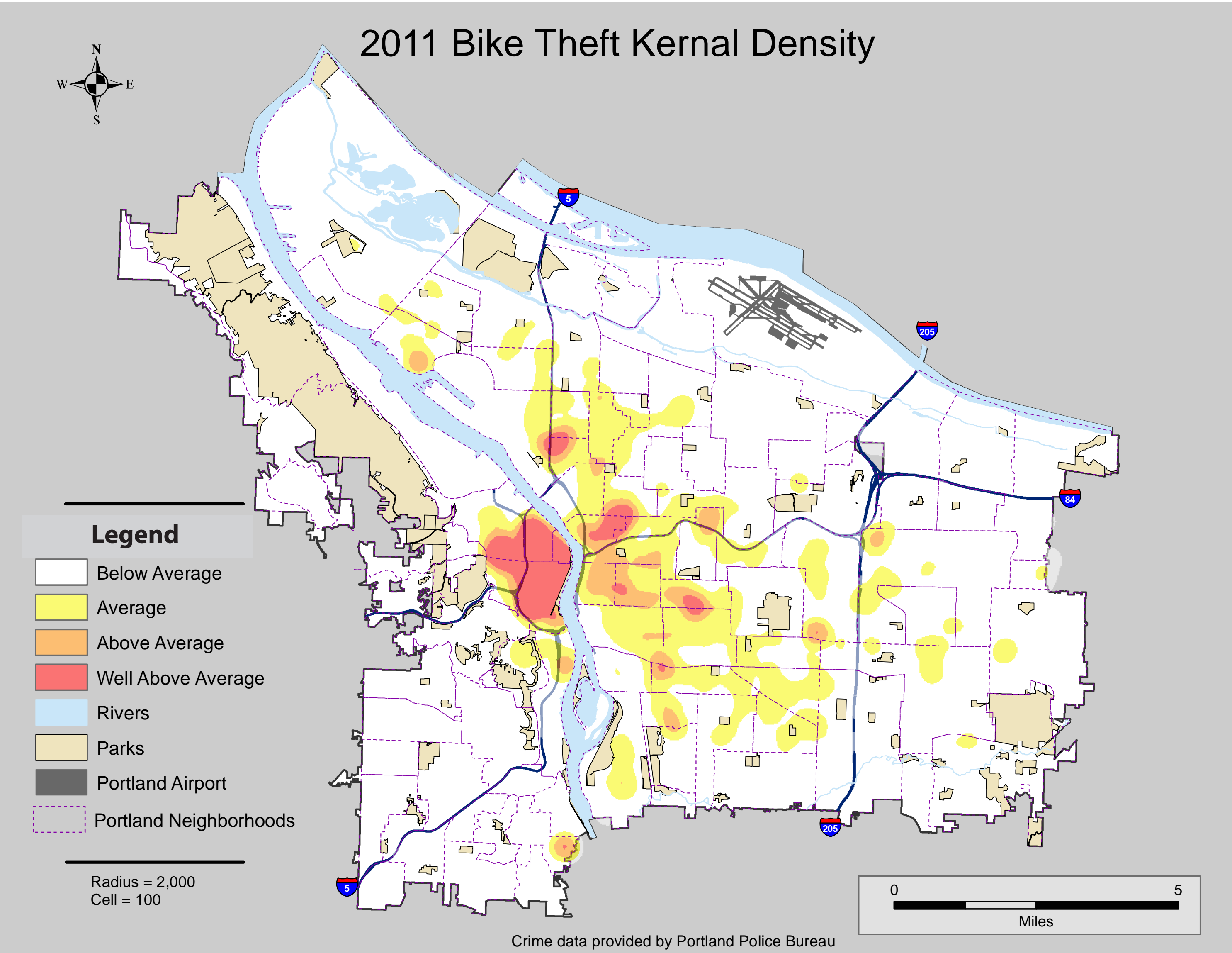
Can we predict areas of high bicycle theft rates by the urban structure?

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GEOG 592 - Winter 2014

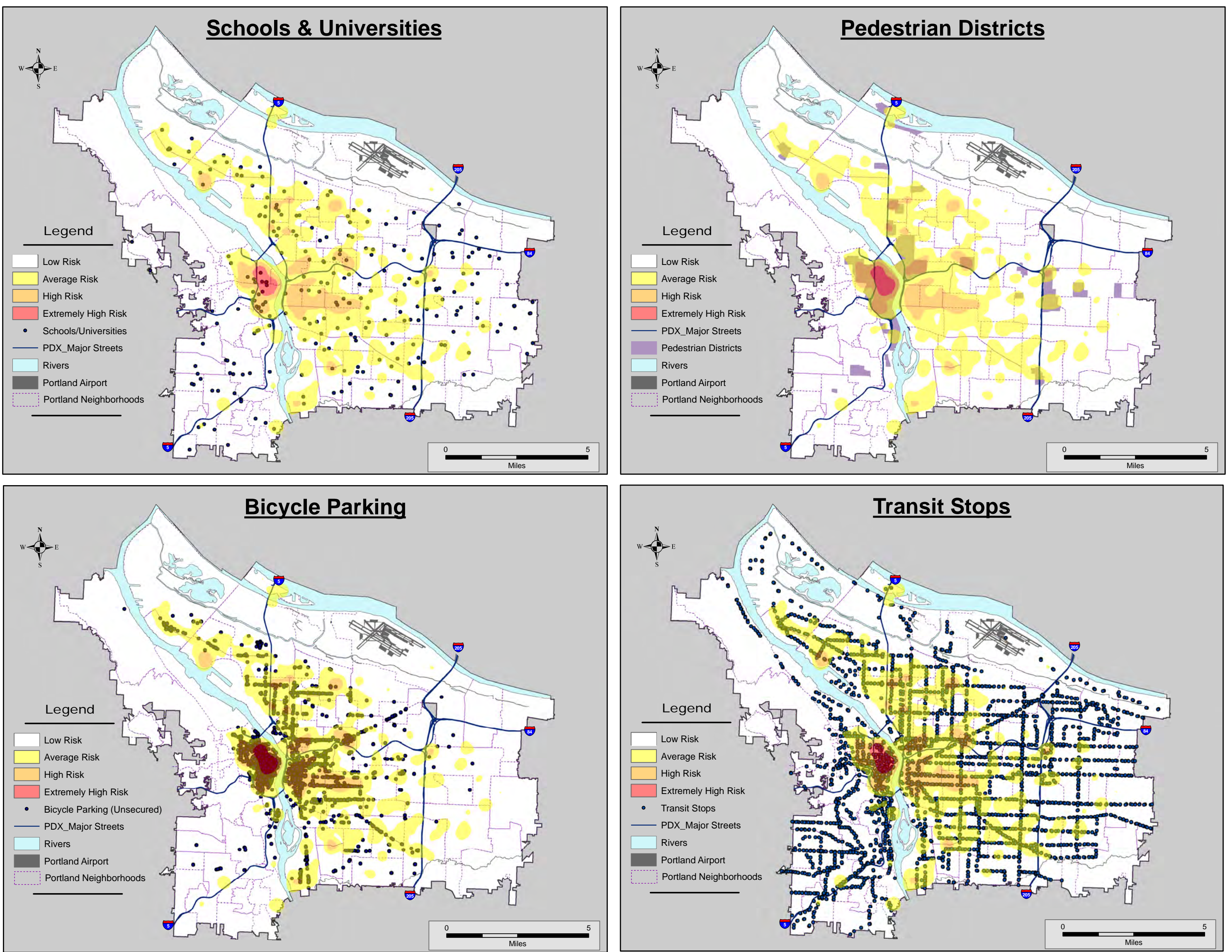
## Bicycle Theft In Portland

Portland Oregon... a rainy city with stop and go traffic, tons of crisscrossing rail tracks that is all split down the middle by a river. This should be the sound of a cyclist's nightmare city, yet Portland is continually voted in the top cities for bicycle friendliness. Portland has built a really great cycling network of trails and designated bike roads that along with Portlander's willingness to get out in the rain has created a one of a kind bicycling city. Yet with high numbers of bikes out and about also comes a high rate of bicycle theft. Thousands of bicycles and bike parts are stolen in Portland each year but an actual number can be difficult to pinpoint because oftentimes stolen bikes aren't reported to Portland Police which is evidenced from the National Crime Victim Survey. Of those that are only about a third are reported with a serial number for tracking making two-thirds of reported stolen bicycles very difficult to track.



## Maps

A risk prediction model was computed using the weighted average multi-criteria evaluation method. This resulting prediction was then overlayed individually with the factors pedestrian areas, schools & universities, unsecured bicycle racks, and transit stops. This gave a visual representation of how much each factor weighed into the final risk model and how much of each factor was captured in the final risk model.



## Datasets

All crime related datasets were obtained from Portland Police Bureau for this project.

Transit, bicycle parking, school locations and pedestrian districts were obtained through Oregon Geospatial Enterprise Office & Civic Apps.

Additional graphics were obtained from Portland Police Bureau's Strategic Services Division.

## Theory Behind Bicycle Theft

Crime Opportunity theory suggests that offenders make rational choices and thus choose targets that offer a high reward with little effort and risk. The occurrence of a crime depends on two things: the presence of at least one motivated offender who is ready or willing to engage in a crime, and the conditions of the environment in which that offender is willing to commit that crime. Bicycle theft is largely an opportunistic crime that may be affected by the structure of the city including the proximity to downtown areas, school and college campuses, and public transportation stops according to the Center for Problem Oriented Policing. Theory also suggests that bicycle theft is a largely low-risk crime as studies have shown that it is very unlikely that people will report suspicious actions unless they are a cyclist themselves. Even police officers rarely stop and question suspicious activities around bicycles (Cohen, 2000).

## Methods

To test this theory we first mapped the 2011 bicycle thefts as a kernel density looking for what is referred to as "hotspots" of bicycle thefts using data provided by Portland Police Bureau. By looking at the areas of above average theft rate we were able to determine four factors that may affect the rate of bicycle thefts. With the help of Portland Police Bureau's Strategic Services Division and additional research we were able to weight the following factors.

FACTOR	WEIGHT
Pedestrian Areas	35%
Schools/Universities	35%
Unsecured Bike Racks	20%
Transit Stops	10%

Bicycle theft rates generally follow a very temporal pattern with higher rates stolen in the darkness and during the summer months. In 2011 the number of reported bicycle thefts was just under 2,000. However these numbers do not reflect bikes stolen in burglaries or where higher order crimes were committed at the same time.



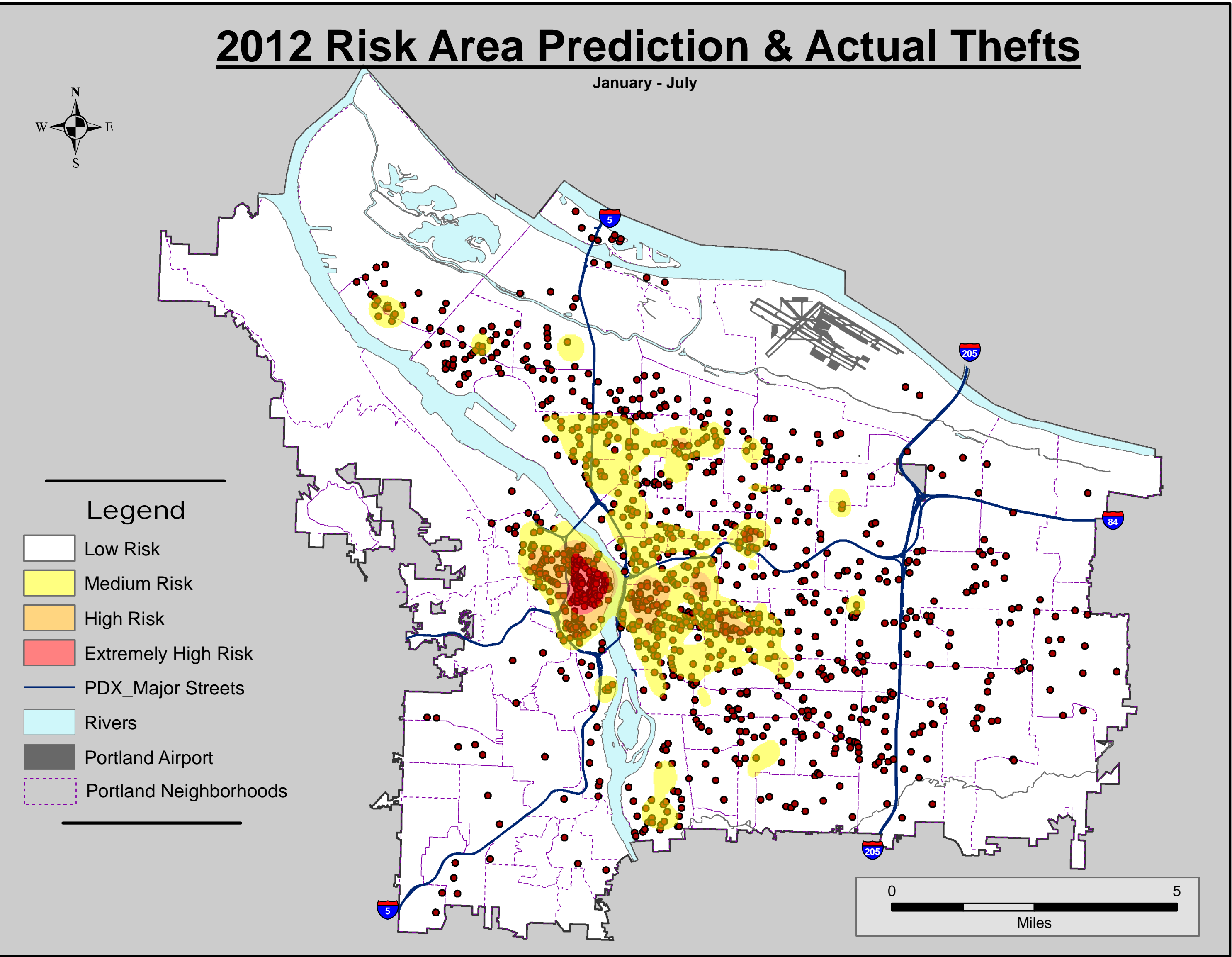
To understand the reasons behind which bikes are stolen it is important to understand the reasons why bikes are stolen to begin with. In general there are three main types of bicycle thieves:

- Joyriders-those who steal any type of bicycle for transportation and/or enjoyment. These offenders generally abandon the stolen bicycle after use. Younger offenders (16 and under) typically fit this group.
- Acquisitive-those who exploit easy opportunities to steal any type of bicycle and trade it for cash or goods (such as drugs).
- Volume-those who steal specific types of bicycles and/or numerous bicycles to order.

Volume thefts are the most difficult to control as locks and fences don't generally deter these thieves short of locking the bike in a secure dwelling making the scope of this project to focus on acquisitive and joyrider thefts.

## Results

The results of the risk model were it captured a large amount of the bicycle thefts that occurred in the following six months. Transit stops seemed not to be a large predictor of whether or not a bicycle would be at high risk of being stolen. The greatest predictors of actual thefts was whether or not the bicycle was parked in a pedestrian district and the amount of bicycle racks. These areas were not surprising or unusual because bike theft is considered an opportunistic crime. However it was surprising that transit stops did not have a large affect because most literature suggested that public transit stops were the largest predictor (Cohen, 2000).



## Caveats to the Data

All data may not be represented as a large majority of bike theft is not reported and therefore not available for this project. Additionally 56 thefts that occurred in the first six months of 2012 did not have XY coordinated and were not included in this project. In 2011 120 thefts did not have XY data and were excluded. Additionally thefts that occurred as part of a higher crime were excluded.