

# McLean County Bike Safety

2014-2015 Bicycle Crash Analysis

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# foreword

Citizens of McLean County:

McLean County has a thriving cyclist community, which includes bike commuters, recreational riders, amateur and professional athletes, and me. I've been a member of the cycling community for about five years now, and I love to ride my bike. When I'm not doing that, I'm hard at work as a 'Data Scientist' which is an ominous sounding title for someone that plays with data. I'm part statistician, part software engineer. More than anything, I'm profoundly curious.

One day, in my first year of cycling, I was riding down the road. I felt a 'thud' on my shoulder, and the next thing I knew, I was admiring one of McLean's many fine ditches. I had been hit by a mirror, from a car passing too close. The driver didn't stop to see if I was okay; they just kept on going. Unfortunately, my story isn't unique; for nearly every cyclist on the road, there is a story like this one of a near miss or close call.

Cycling is an amazingly healthy, rewarding, and fun outdoor activity. But is riding a bike in McLean County dangerous? I'm going to explore that question, using data, in this report. I'll do my best to speak plainly and without bias on behalf of the data. Hopefully, as you read along, you'll have some ideas on just how safe our county is for cyclists and maybe even what we could do to make it a safer place to ride.

Ride Safe,

Mike Bernico

# introduction

In this report we will use public data to examine who is involved in cyclist/motorist crashes, why those crashes occurred, when cyclist/motorist crashes occur, and lastly where they occur. Lastly, this report will conclude with some recommendations on the reduction of future cyclist/motorist crashes which will hopefully be useful for policymakers, cyclists, and motorists.

The data used in this report comes from three primary sources:

- Police reports from the Normal Police Department, provided to us via a 'Freedom of Information Act' (FOIA) request.
- Police reports from the McLean County Sheriff, provided to us via a FOIA request.
- Police reports from the Bloomington Police Department, provided to us via a FOIA request.

Data was reported from January 1, 2014, until June 30, 2015, with the exception of one McLean County incident that occurred on July 7, 2015.

This data is made publicly available by the authors at [https://github.com/mbernico/mclean\\_bike\\_safety](https://github.com/mbernico/mclean_bike_safety).

# who?

When I started this research, I had a pretty clear idea in my mind as to who the victims involved in motorist/cyclist crashes would be. I was wrong. I expected the victims to be the spandex-wearing, 7-bike-owning, 'hard core' cyclists, which is the group I place myself in. In reality, the people most often involved in motorist/cyclist crashes are casual riders and those relying on their bicycle as transportation.

The data from the Bloomington and Normal Police Departments provides quite a bit of insight into who is most often involved in motorist/cyclist crashes.

- In only three cases the bicycle involved in the crash is the type of bicycle sold by a specialty bike store. Most often the bike involved was a brand available in department stores.
- When gender is known, 68% of the time the cyclist involved is male.
- All ages and dates of birth were redacted by the Bloomington and Normal police, however only one name was redacted, presumably because of that cyclist's age.

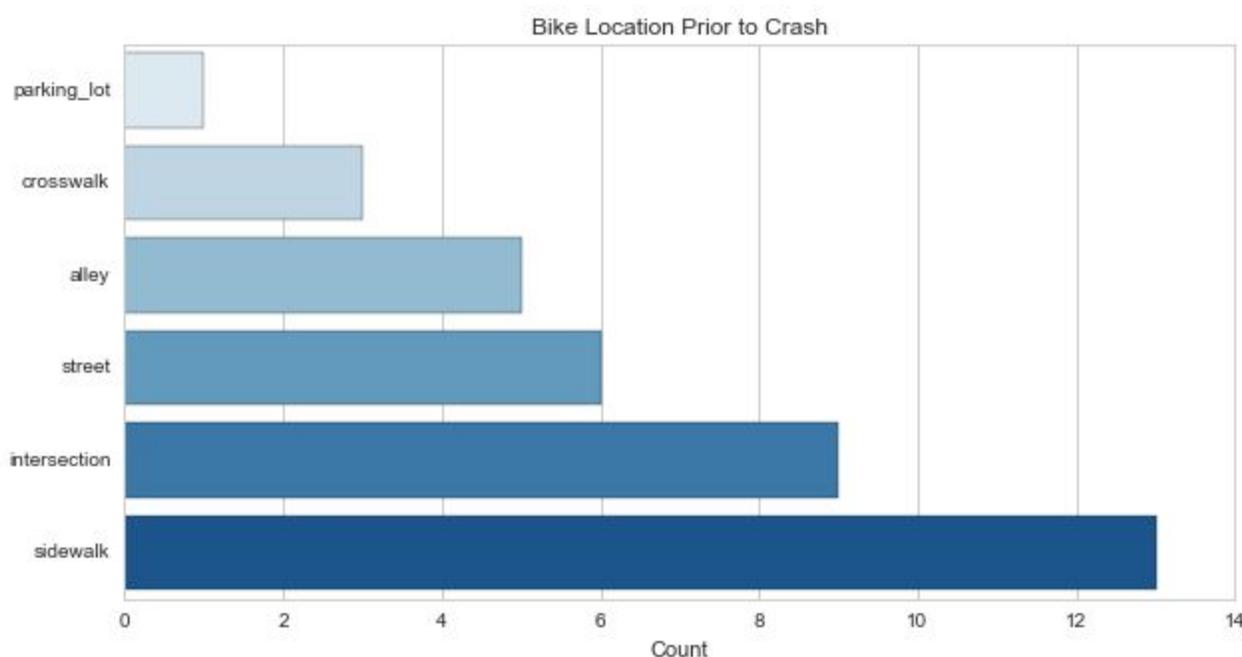
Of course, the city Police Department data contains an obvious bias. Bloomington-Normal is an urban area; the crashes reported in that data pertain to 'in-town' crashes, and it doesn't tell us much about rural crashes. Fortunately, the McLean County Sheriff's data can tell us the rest of the story. While there were only two crashes that occurred in rural McLean County, in both cases the cyclist involved **was** a recreational athlete. Also, in both cases, the crash resulted in serious injury. We will discuss both individual cases at a later point.

# why?

For a statistician, 'why' is the most dangerous question to attempt to answer. We exist in a world based on quantified uncertainty, which is a nice way of saying we aren't ever sure of anything. That said, the data we've had the opportunity to review does suggest a few important ideas we'd like to share with the reader.

## Cyclist Location Immediately Prior to Crash

Most often, immediately prior to the crash, the cyclist was reported as located on the sidewalk. Intersections and crosswalks are the next in line, but let's wait to discuss those as they deserve their own section.



In many places, it's illegal to ride a bike on the sidewalk. But why? Are sidewalks more dangerous to ride on than roads?

Before we can answer that question for our own community, we need to understand how many cyclists and motorists in our community travel on roads, sidewalks, and other paths. The technical term for this is exposure, but the idea is simple. To calculate a baseball player's batting average we would need to understand not only how often he hit the ball, but also how often he swung the bat. Understanding exposure is critical to understanding bike safety. It's an important number we don't have.

Luckily, in the case of sidewalks, other people have done work that we can borrow. In some research done in Palo Alto, CA, the researchers discovered that across all ages and genders, the risk of cycling on the sidewalk was 1.8 times (80% higher risk of crash) that of cycling on a roadway (Wachtel, et al. 1994). When traveling against traffic on the sidewalk, that risk increases to 4.5 (or a 350% higher risk of crash).

While there are multiple causal explanations for these numbers, back in our community the data suggests that riding on the sidewalk creates an opportunity for cyclists to enter and leave the road in unexpected ways.

If you're a cyclist, your safest bet is to ride on the road and obey the same traffic laws, signs, and signals as motorists.

## The Left Hand Turn

In city traffic, the most dangerous place a cyclist can be is in front of a motorist who is executing a left hand turn. About 36% of all motorist/cyclist crashes in McLean County happened when a bicycle was moving in front of a motorist turning left. If you're a cyclist, this probably isn't a surprise to you. Many of the cyclists I've spoken to about this fact have experienced a near miss in this situation.

One of those cyclists, who also rides motorcycles, suggested that this was a common problem with motorcycles as well. That's exactly the case. The National Highway Traffic Safety Association notes that 41% of fatal motorcycle crashes involve another vehicle turning left in front of the motorcycle (NHTSA, 2014).

I'll leave it to the experts to suggest how to best handle this scenario, but the data clearly shows this is a dangerous place to be.

## On Being Mirrored

On June 24<sup>th</sup>, 2014 at 3:04pm Matthew McKee was riding west on 2500 North Road from Lake Bloomington to Lake Evergreen. He was struck by the mirror of a Ford F-150 driven by Trevor Curry and knocked off his bike. Trevor Curry was ticketed by a McLean County Sheriff's deputy for violating 625 ILCS 5/11-601(A). Curry pled guilty and paid a \$200 fine.

When we first read about this case we were confused. What about Illinois' "3-Foot Rule" (625 ILCS 5/11 703) that was put in place specifically to protect cyclists in this situation? Clearly, if the cyclist was struck by a mirror, we can assume the car was closer than 3 feet from the cyclist.

We asked the Deputy who issued the citation and we were told:

*To give you a short answer that particular citation is just the one I chose to issue. It is just easier to prove that he did not slow down or stop to avoid striking the cyclist rather than say he was too close..... It is just what I chose to do on that particular call.*

*McLean County Sheriff's Deputy #11838*

As legal laypeople, we can't presume to know if the 3-Foot Rule should have been applied here. It also isn't clear that the 3-Foot Rule would carry a penalty more fitting for the seriousness of this situation. However, to a layperson, it would seem that incidents like this one are precisely why that law exists.

Anecdotally, stories of cyclists hit by mirrors are somewhat common, however in our dataset only one such incident exists. This suggests that these events are either rare or rarely reported. They are, however, serious - and, at least in this case, the punishment for hitting the cyclist was minimal.

## Cyclist-Directed Road Rage

Road Rage directed towards cyclists appears to be very common. We conducted a survey of 49 local athletes and found that 30 of them have reported experiencing behaviors such as the motorist yelling at, honking, or throwing things at the cyclist, within the last year. Our survey was very small, however we can use a technique taken from Bayesian Statistics called Markov Chain Monte Carlo to allow us to say with 95% certainty that between 47% and 74% of the recreational athletes in McLean County have experienced cyclist-directed road rage in the last year.

Most of the time, angry motorists are harmless. But, sometimes, they aren't.

On July 7<sup>th</sup>, 2015 at 6:18pm, cyclist Dean Davis was riding west on 2250 North Rd, while participating in a popular weekly cycling event. According to witnesses and the victim, motorist Randy Crump was honking at the cyclists participating in the event, passing the cyclists very closely, and then rapidly applying his brakes. When Crump suddenly braked in front of Dean Davis, Davis was forced to ride off the road in order to not hit the car.

Davis was severely injured in this incident. McLean County Sheriff's Deputies originally cited Crump for Reckless Driving, Reckless Conduct, and a violation of Illinois "3-Foot Rule" (625 ILCS 5/11-703(D)). Since the initial charges were filed, some have been upgraded to felonies, and additional charges were filed related to the other cyclists that Crump allegedly harassed. At the time of writing this report, the case is being tried and a final outcome is unknown.

## The Illinois 3-Foot Law

In our dataset, we're aware of three cases where the 3-Foot Law may have been applied and one where it was applied. No statewide metrics are known to exist for the application of the 3-Foot Law. It isn't clear to us when this law is and isn't enforced, but this is a place where further investigation should be conducted.

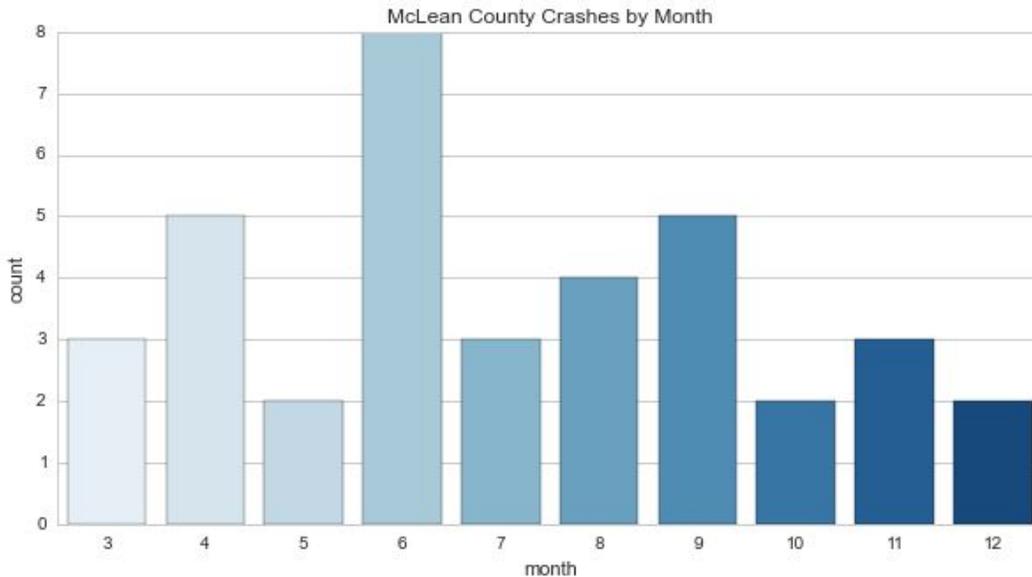
A nationwide study conducted on bicycle safety laws concluded, "It has become clear throughout the length of this study that the 3 Foot Law carries the expectation of minimal enforcement. In fact, the law appears to be one that is difficult to enforce at all" (Brown, 2013).

However, this isn't to say the law isn't useful. In a 2011 blog post, Keating Legal, a law firm specializing in bicycle crashes, stated that the 3-Foot Rule has been useful in civil court (Keating, 2011).

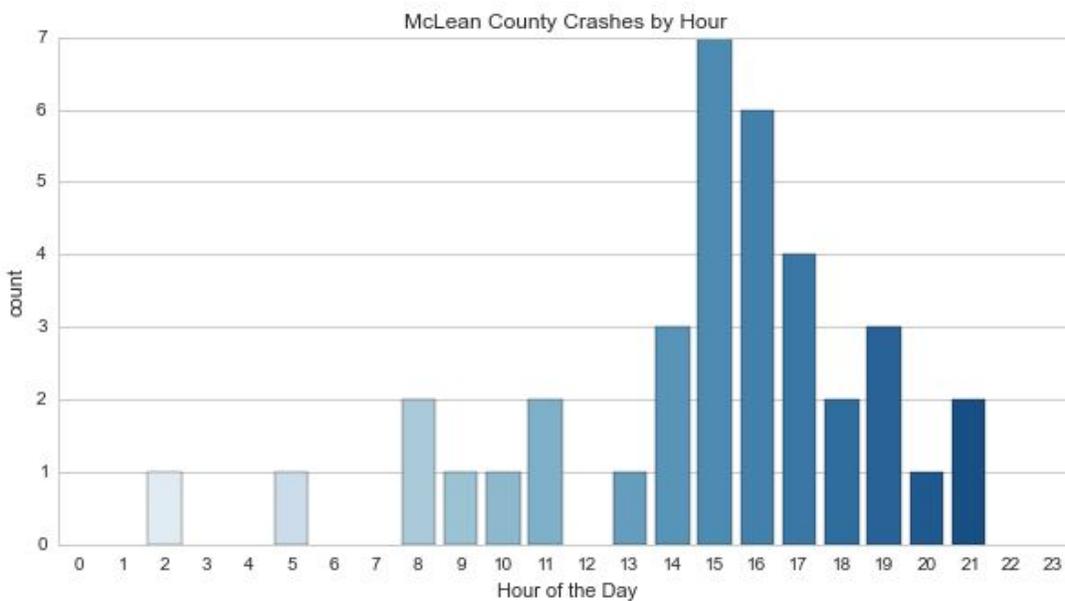
Bicycle safety advocacy groups should most certainly reach out to our local law enforcement groups and gain a greater understanding of when and how the 3-Foot Law can be applied. In the meantime, our current understanding is that for McLean County cyclists, despite their status as the most vulnerable vehicles on the road, it would be unwise to assume that any special protections exist for that status.

*when?*

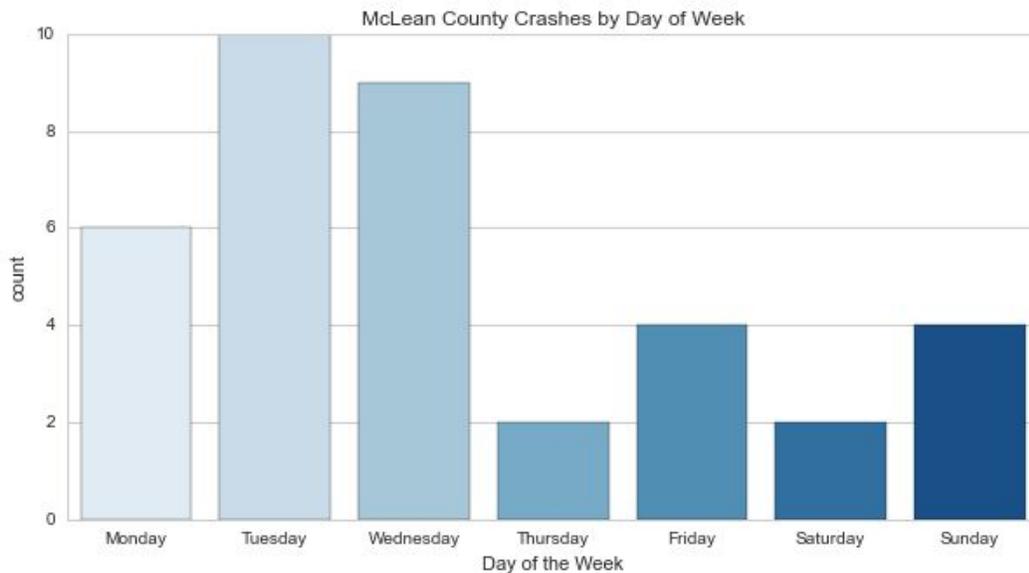
Most cycling related crashes occur in the more hospitable months of the year, which probably isn't surprising to anyone that lives in McLean County.



Things become slightly more interesting when we examine crash hour. The data tells us that 67% of cyclist/motorist crashes happen between the hours of 2pm and 8pm and that 35% of those crashes occur between the hours of 3pm and 5pm.



Lastly, we can examine the day of the week on which most crashes occur. Surprisingly, most crashes (51%) occur on either Tuesday or Wednesday.



So, then, most crashes occur in the afternoons on weekdays. There are many possible explanations, including:

- It could be that cyclists are most on the roads at these times.
- It could be that these times are, for some reason, more dangerous than other times to be on a bike.
- It could be that the people who ride bikes during these hours are more likely to create a hazardous situation.
- It could be that the people who drive cars during these hours are more likely to create a hazardous situation.
- Lastly, and most probably, the answer is 'some combination of the above.'

Knowing when bikes use the roads would be key in gaining additional insight.

where?

We can use a heat map to see where bicycle/vehicle crashes occurred. Three areas of higher concentration exist around downtown Bloomington, Illinois State University, and the area between Uptown Normal and the intersection of Linden and Vernon.

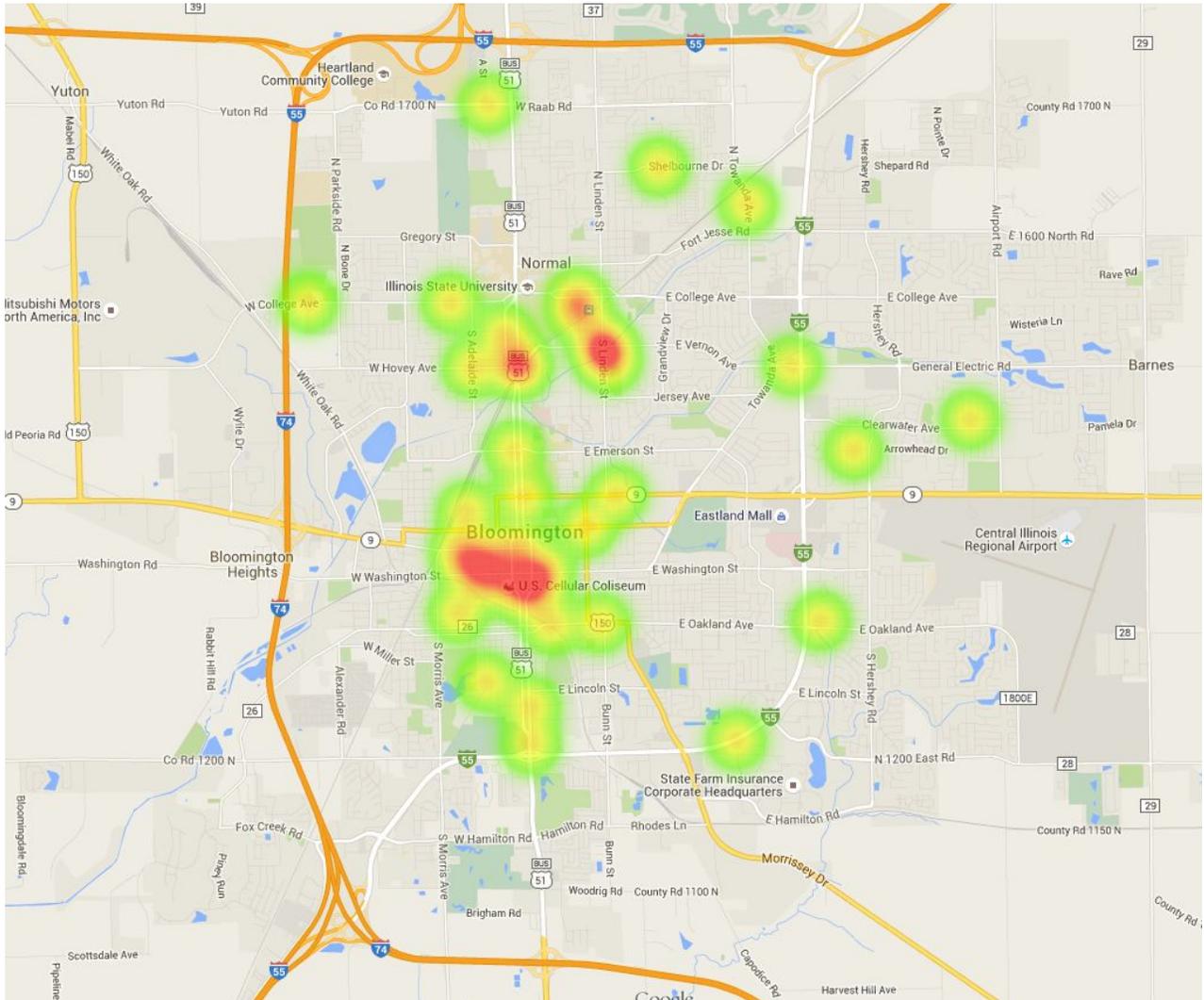
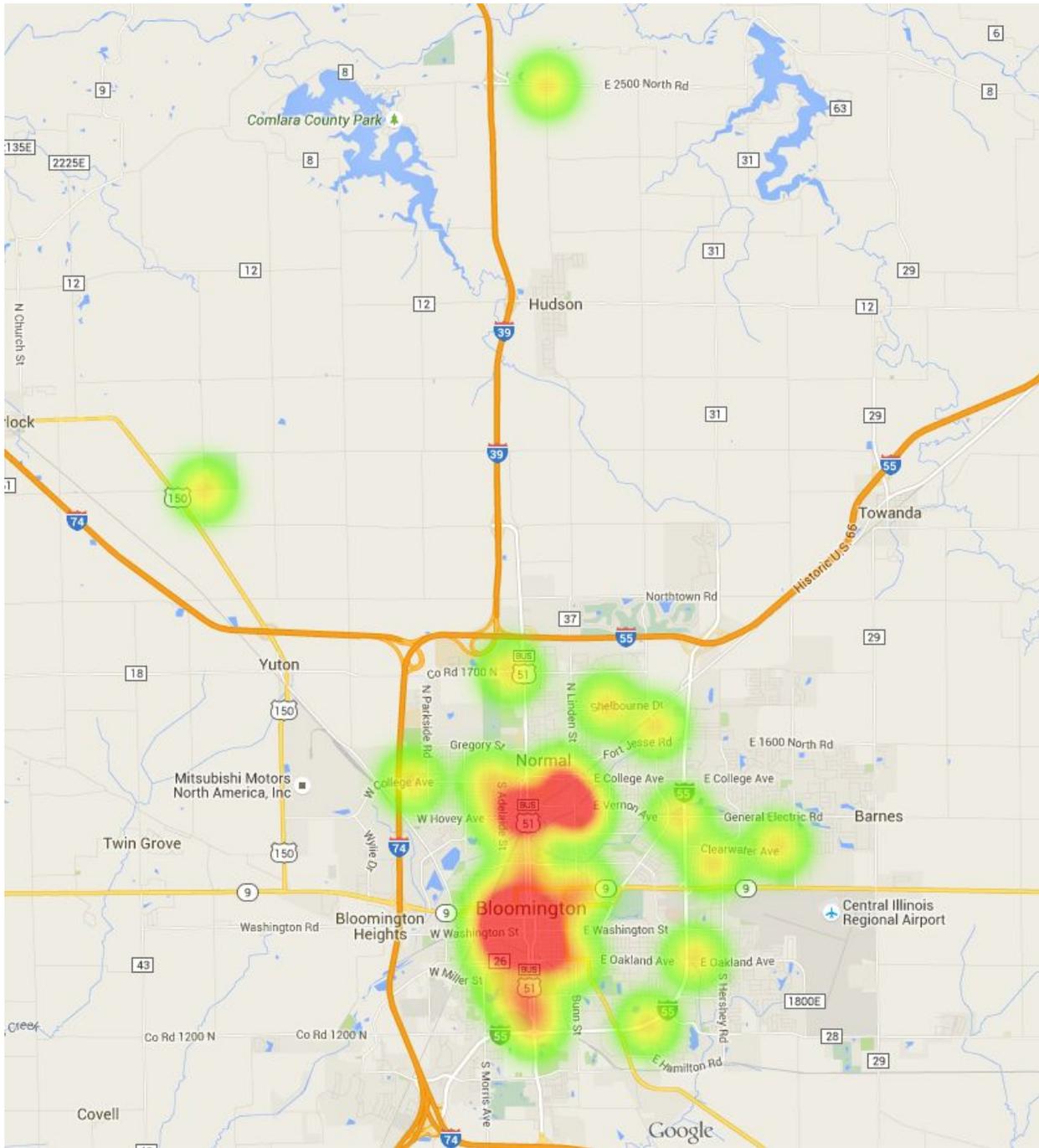


Illustration 1: Bicycle/Vehicle Crashes in Bloomington/Normal



*Illustration 2: Bicycle/Vehicle Crashes in McLean County*

Note: These heat maps were built from count data, and these crashes have not been normalized by population or traffic count, as this data wasn't available at the time of writing this report. As such, these maps aren't able to show risk relative to exposure and very well may only reflect population.

# recommendations

So, where should we go from here? There are an almost unlimited number of possible ideas to try, improvements to make, and people to meet with, in the pursuit of the goal of reducing motorist/cyclist crashes. This section will attempt to call out, using the data and analysis we've done, the ideas which should prove most useful.

## Open Access to Data

Our community needs to provide open access to its public data. Providing open and transparent access to this and all public data is fundamental to improving this and many of our other current civic challenges.

The fastest way to improvement is likely through using data to make strongly informed decisions. Specifically, related to cycling, the data we need should include the following:

- Unobstructed access to all crash and incident reports.
- Information on exposure, including the number of bicycle commuters, cyclist counts on roads, and motorist counts on roads.
- Data from city engineers on motorist/motorist crashes, expected rates of crashes, and treatments applied to each road/intersection.

The good news is this data exists. There will be a cost to making this data easily accessible and public, but the return on investment should be significant.

The Chicago Department of Transportation has done an excellent job and should serve as an example for future projects in this area (CDOT, 2012).

## Target Casual Cyclists

Casual cyclists and commuters are involved in the largest number of crashes. The most common cause of crash in this group is cyclists not following the rules of the road. Targeting this demographic specifically with cycling safety programs or diversion programs may lead to the greatest reduction in overall cyclist/motorist crashes.

## Target the Left Hand Turn

For cyclists that are following the rules of the road, the most common cause of cyclist/motorist crashes is riding in front of and being struck by a motorist turning left. It follows that reducing the frequency of this type of crash would likely have an impact on crash frequency.

## Target Motorists and Law Enforcement

Given the frequency of negative interactions between cyclists and motorists, it isn't hard to see that cyclists have a public relations problem.

Programs that humanize cyclists and programs that make all road users aware of the rules of the road may help.

Additionally, communication between cycling advocacy groups and the leadership of the Bloomington Police Department, Normal Police Department, and McLean County Sheriff may be useful in coming to an awareness of the application of the 3-Foot Rule.

Conversations with city and county officials and leaders are also likely to be useful.

Anchoring the problem in the mind of public officials is most often crucial for influencing policy.

Like any marketing campaign, these types of programs are very likely to have great variance in their impact. Some will work very well, and others may not work at all. Extreme care should be exercised when implementing these programs. We'd like to recommend the use of focus groups, surveys, and A/B testing where applicable to measure each program so that time isn't wasted on the ineffective programs.

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