# New Orleans Regional Pedestrian and Bicycle Crash Report, 2011-2012

## Final Report


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PEDESTRIAN BICYCLE RESOURCE INITIATIVE

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## Executive Summary

Pedestrian and bicyclist safety has long been a concern in the New Orleans metro area, with crash and fatality rates often rising well above national averages. In recent years, the rapid development of bicycle infrastructure and improvements to the existing pedestrian network—especially in Orleans Parish—has contributed to a surge of increased walking and biking activity in the region. As more of the region's residents choose to walk or bicycle for transportation and recreation, demand for safe neighborhoods in which to do so grows. Meanwhile, the region continues to struggle with a persistent crash problem: the number of bicycle crashes has increased every year since 2006, and both pedestrian and bicycle crash totals have begun for the first time since 2006 to approach crash frequencies documented prior to Hurricane Katrina.

The Regional Planning Commission has periodically evaluated pedestrian and bicycle crash data from 1999 through 2012. Although some encouraging trends have emerged, overall crash incidence does not appear to be decreasing, and the spatial patterns of crash occurrence have remained stable over time: for over a decade, the same crash-prone neighborhoods and corridors have appeared in these analyses as pedestrian and/or bicycle safety priorities.

This report outlines demographic, temporal, and spatial trends of reported pedestrian and bicycle crashes in 2011 and 2012, in relation to previously evaluated datasets. It is intended to assist policymakers in establishing safety priorities and developing safer and more comfortable facilities for pedestrians and bicyclists where they are needed most.

The report includes general crash statistics for seven Louisiana parishes: Orleans, Jefferson, Plaquemines, St. Bernard, St. Tammany, St. Charles, and St. John the Baptist. This geographic area describes the New Orleans-Metairie-Kenner Metropolitan Statistical Area, as defined by the US Census Bureau. Additional analysis is provided for Orleans and Jefferson Parishes, which together represented 86% of pedestrian crashes and 90% of bicycle crashes within the seven-parish study area during this reporting period. These two parishes are the exclusive focus of portions of this report because the large number of total crashes within this geographically constrained, more densely populated portion of the region facilitates more advanced spatial and statistical analysis than is possible elsewhere in the region, where far fewer crashes have occurred.

Key findings of this report include:

- Crashes disproportionately affect those living in and traveling through high-poverty areas. In Orleans Parish, where 19% of the population lives in high-poverty census tracts,[1] approximately 25% of pedestrian and bicycle crashes occurred in those tracts in 2011 and 2012.

[1] For whom poverty status is defined; American Community Survey 5-Year estimates, 2008-2012, Table S1701: Poverty Status in the Past 12 Months See p. 13 for detailed definition

- In 2011 and 2012, an average of 1.44 pedestrian crashes and 1.05 bicycle crashes were reported in the region per day. While still below pre-Hurricane Katrina figures (an average of 1.9 pedestrian crashes and 1.2 bicycle crashes were reported each day between 1999 and 2002), these figures have been increasing in recent years and suggest a troubling upward trend in crash frequency, particularly for bicyclists. Importantly, however, this increase also correlates to a steady increase in bicycle commuting as estimated through the American Community Survey, and corroborated through PBRI and RPC's local count program, which found a 52% increase in bicyclists observed from 2010-2014.

- Demographic and temporal trends have remained stable over time since 2006, with a few exceptions: a greater proportion of older adults are being struck as either pedestrians or bicyclists, while the proportion of bicyclists involved in crashes who are black has decreased, and the share of bicycle crashes involving female cyclists has increased.

- As in previous years, more than a quarter of Orleans Parish pedestrian crashes occurred in New Orleans' French Quarter and CBD during this period, while the percentage of bicyclist crashes occurring in the French Quarter and CBD has jumped from 17% in 2010 to over 25% in 2012.

- Many of the corridors, intersections, and generalized clusters identified as top crash locations in Orleans and Jefferson Parishes were also identified as such in previous crash analyses, indicating consistent user demand for pedestrian and bicycle access along and across these major urban arteries, as well as inadequate protection and infrastructure provision for non-motorized users.

- Sixteen statistically significant pedestrian crash clusters and fifteen statistically significant bicycle crash clusters were identified in the East Bank Core of the urbanized region, indicating areas where infrastructure or enforcement intervention may be critically needed to reduce crash incidence.

- Additional research relating to the specific relationships between pedestrian and bicycle facility construction, increasing rates of active transportation use, and crash outcomes is needed in order to better understand the context of the trends identified in this report and identify opportunities to reduce crash frequency and severity for all road users.

Since 2008, significant investment in active transportation infrastructure has been made in the region, including hurricane recovery-funded road projects involving corridor re-designs and road diets, school zone improvements, accessibility enhancement, policy development and implementation, educational campaigns for drivers, pedestrians, and bicyclists, active transportation-focused plans, and more. As these efforts continue and demand for safe opportunities to walk and bicycle grows, local and regional entities should use this data to continue to examine how and why crashes have occurred and endeavor to implement interventions that improve crash outcomes, promote continued growth in active transportation activity, and support safe, active, livable communities throughout the region.

# 1.0 Introduction

This report provides an updated overview of crash statistics for pedestrians and bicyclists in the New Orleans Metropolitan region for 2011-2012, the most recent years for which this data is available. The region is defined as the seven Louisiana parishes (Orleans, Jefferson, Plaquemines, St. Bernard, St. Tammany, St. Charles, and St. John the Baptist) that make up the New Orleans-Metairie-Kenner Metropolitan Statistical Area, as defined by the US Census Bureau. This document summarizes the demographic characteristics of the region's population, then provides a detailed examination of the crash data provided to the New Orleans Regional Planning Commission (RPC) by the Louisiana Department of Transportation and Development (DOTD), including regional crash statistics, crash totals and maps for each parish in the region,[2] and geospatial crash patterns identified in Orleans and Jefferson Parishes, including statistically significant crash clusters.

This report builds on crash data analyses previously conducted by the RPC for the 1999-2002 Period (as reported in the *2005 New Orleans Metropolitan Area Bicycle and Pedestrian Plan*[3]) and for the 2006-2010 period (evaluated in the *New Orleans Regional Bicycle and Pedestrian Crash Report 2006 -2008* and the *New Orleans Regional Pedestrian and Bicycle Crash Report 2009-2010*).[4]

The purpose of this report is to guide policymakers in identifying regional safety concerns and developing safer, more comfortable transportation facilities for users of all modes.

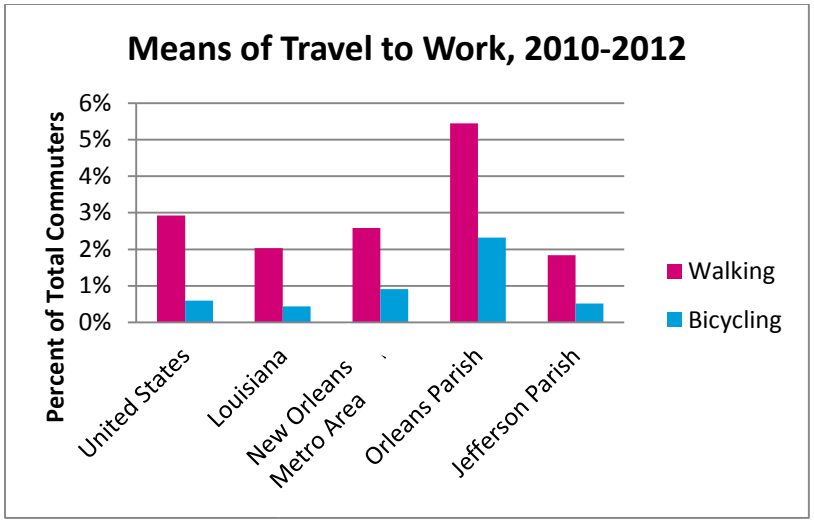
## 1.1 Regional Active Transportation Profile

Although Louisiana as a whole tends to lag behind national trends in the prevalence of active transportation, the New Orleans Metro area—and Orleans Parish in particular—approaches or exceeds national averages. According to the U.S. Census Bureau's American Community Survey (3-year estimates[5]), during the 2010-2012 period, an estimated 2.03% of Louisianans walked to work, and 0.44% commuted via bicycle—a slight increase from the 2008-2010 ACS figure for bicycle commuting. This compares unfavorably to a national walking mode share of 2.92% and a 0.60% share for bicycling (Figure 1). However, within the New Orleans Metro area, walking mode share figures approached the national average at 2.59%, and bicycling mode share exceeded the national figure at 0.91%. Rates of walking and bicycling were highest in Orleans Parish, with 5.45% walking to work and 2.32% bicycling during this period, while the largest parish in the region, Jefferson Parish lags behind the regional average with 1.84% commuting on foot and 0.52% bicycling to work. Notably, rates of bicycling to work have increased from the 2008-2010 period statewide, at the metro area level, and in both Orleans and Jefferson Parish, indicating a rise in the popularity of bicycling for transportation in Louisiana.

[2] In order to provide continuity with previous crash reports, Tangipahoa Parish (which recently joined the RPC) is excluded
[3] Available at www.norpc.org
[4] All previous crash report documents are available at www.pbriLA.org

[5] Table B08301: Means of Transportation to Work. Note: total commuters excludes those who work at home

Figure 1: Means of Travel to Work, 2010-2012




However, despite relatively low rates of active transportation mode share statewide, Louisiana remains far above the national average for pedestrian and bicycle fatalities.[6] In 2011 and 2012, 206 pedestrians were killed in Louisiana, and the state's ranking for the rate of pedestrian deaths rose from 10th in 2010 to 6th in 2011 and 4th in 2012 (Table 1).

Meanwhile, after a few years of declining totals, cyclist deaths have also risen in this period—a total of 42 bicyclists were killed in 2011 and 2012, and the state's ranking for fatality rates was 2nd highest in the nation both years, behind only Florida (Table 2). These figures suggest that despite efforts to more effectively and safely accommodate the growing number of active road users through policy and infrastructure change in Louisiana, safety is still a major concern.

Table 1: Louisiana Pedestrian Fatalities, 2006-2012

| Louisiana Pedestrian Fatalities, 2006-2012 | | | | |
|---|---|---|---|---|
| Year | LA Pedestrian Deaths | LA rate per 100,000 population | National rate per 100,000 population | Louisiana Ranking |
| 2006 | 97 | 2.24 | 1.6 | 8 |
| 2007 | 111 | 2.49 | 1.54 | 4 |
| 2008 | 107 | 2.4 | 1.44 | 3 |
| 2009 | 107 | 2.38 | 1.33 | 3 |
| 2010 | 77 | 1.69 | 1.39 | 10 |
| 2011 | 88 | 1.92 | 1.42 | 6 |
| 2012 | 118 | 2.56 | 1.51 | 4 |

Table 2: Louisiana Bicycle Fatalities, 2006--2012

| Louisiana Bicycle Fatalities, 2006-2012 | | | | |
|---|---|---|---|---|
| Year | LA Cyclist Deaths | LA rate per 1 Million population | National rate per 1 million population | Louisiana Ranking |
| 2006 | 24 | 5.6 | 2.58 | 2 |
| 2007 | 22 | 5.12 | 2.31 | 2 |
| 2008 | 11 | 2.49 | 2.35 | 14 |
| 2009 | 13 | 2.89 | 2.05 | 7 |
| 2010 | 10 | 2.2 | 2.00 | 16 |
| 2011 | 18 | 3.93 | 2.17 | 2 |
| 2012 | 24 | 5.22 | 2.31 | 2 |

[6] Data comes from the National Highway Traffic Safety Administration's National Center for Statistics and Analysis, Annual Traffic Safety Facts Reports, years 2011 and 2012. Available at: NHTSA Bicyclists and Other Cyclists Traffic Safety Fact Sheets, http://www-nrd.nhtsa.dot.gov and http://www-fars.nhtsa.dot.gov/States/StatesPedestrians.aspx

Within Louisiana, the New Orleans Metropolitan region accounted for 22% of pedestrian fatalities and 17% of bicyclist fatalities in 2011 and 2012, representing an average pedestrian fatality rate of 1.89 per 100,000 population per year and a cyclist fatality rate of 2.94 per million population per year—both lower than the statewide average but still above national figures.

Table 3: Pedestrian Crash Statistics, 2011-2012

| Pedestrian Crash Statistics, 2011-2012 | | | | |
|---|---|---|---|---|
| Parish | Pedestrian Crashes | Fatalities | Severe Injuries | Children (1-17) |
| Orleans | 631 | 15 | 46 | 108 |
| Jefferson | 271 | 15 | 15 | 73 |
| St. Tammany | 64 | 7 | 2 | 19 |
| St. John the Baptist | 32 | 3 | 2 | 9 |
| St. Charles | 31 | 4 | 1 | 9 |
| St. Bernard | 22 | 1 | 0 | 7 |
| Plaquemines | 1 | 0 | 0 | 0 |

Figure 2: Percentage of Pedestrian Crashes in Metro Area by Parish

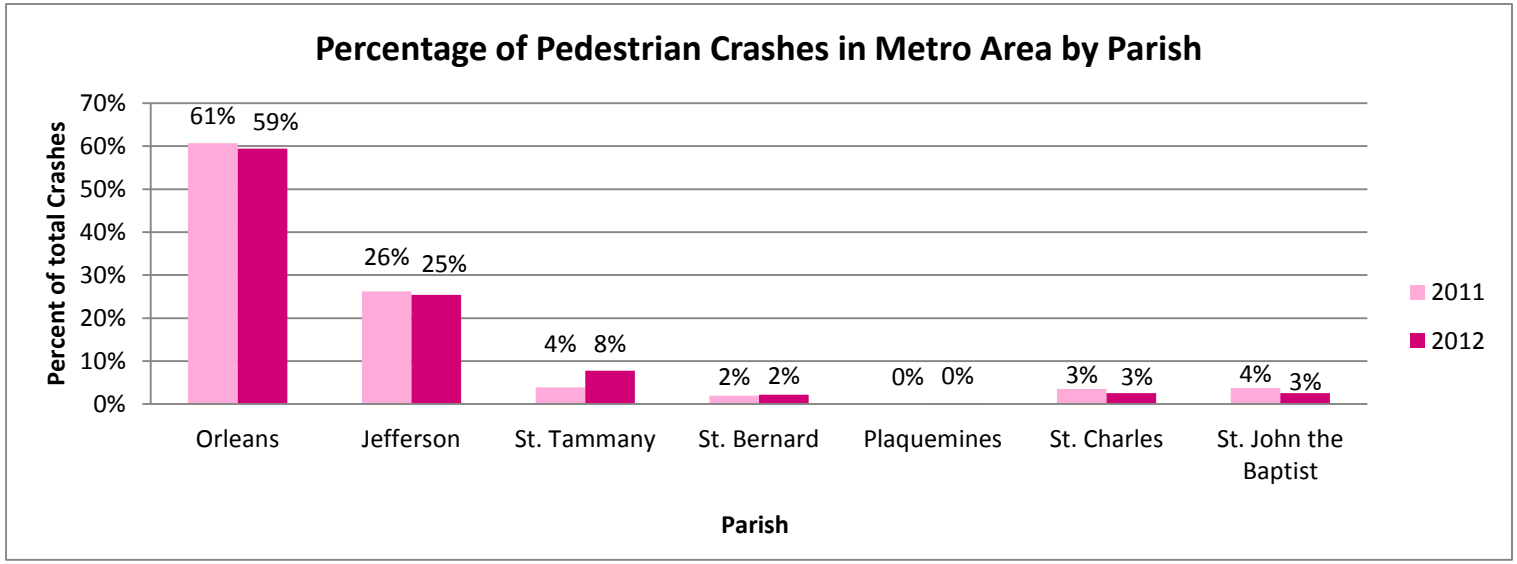
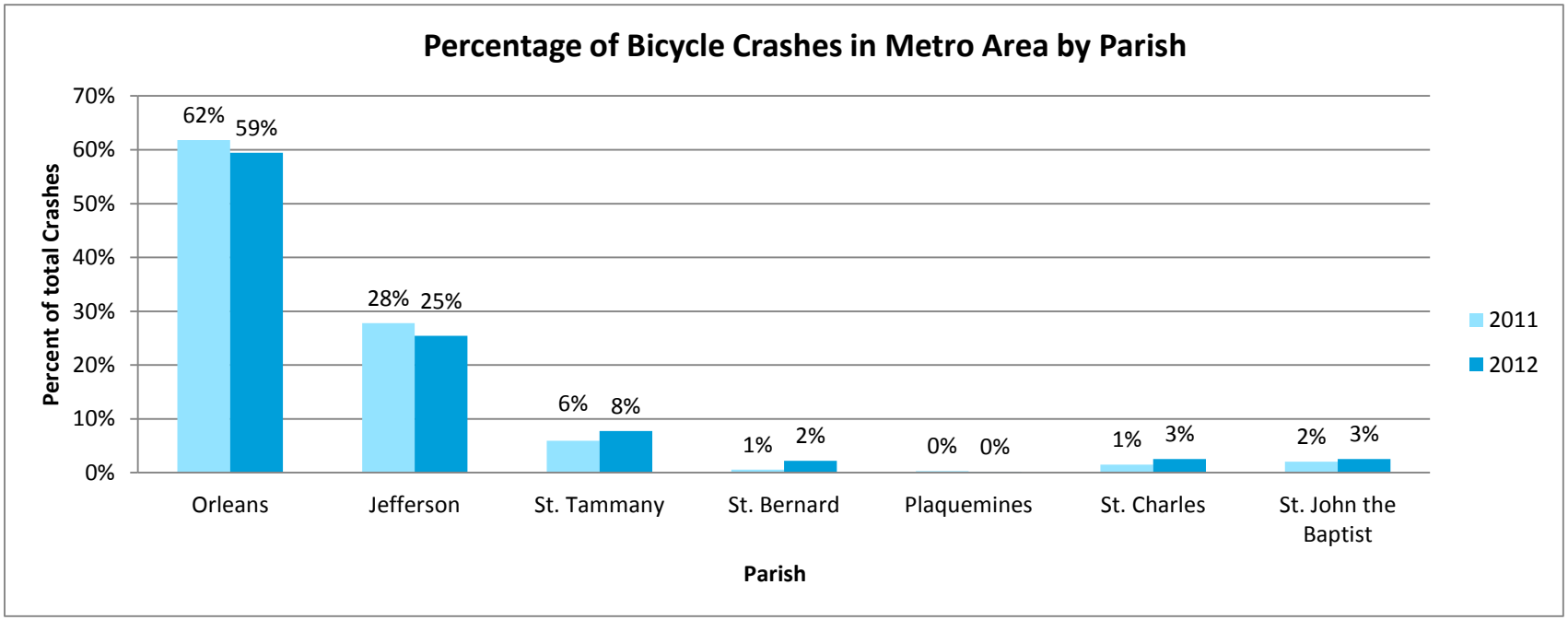


Table 4: Bicycle Crash Statistics, 2011-2012

| Bicycle Crash Statistics, 2011-2012 | | | | |
|---|---|---|---|---|
| Parish | Bicycle Crashes | Fatalities | Severe Injuries | Children (1-17) |
| Orleans | 498 | 2 | 26 | 40 |
| Jefferson | 194 | 2 | 6 | 51 |
| St. Tammany | 37 | 0 | 0 | 4 |
| St. John the Baptist | 17 | 3 | 0 | 4 |
| St. Charles | 8 | 0 | 0 | 2 |
| St. Bernard | 11 | 0 | 0 | 4 |
| Plaquemines | 3 | 0 | 0 | 0 |

Figures 2 and 3 show the percentage of pedestrian and bicycle crashes respectively during the 2011-2012 period by parish within the region, highlighting that the majority (86% of pedestrian crashes and 90% of bicycle crashes) occurred in the more urbanized parishes of the region, Orleans and Jefferson. Portions of this report which depend on a sufficient sample size and geographic precision for statistical analysis focus exclusively on these two parishes for this reason. Tables 3 and 4 describe the number of total crashes, fatalities and severe injuries, and crashes involving children by parish for pedestrian and bicycle crashes.

Figure 3: Percentage of Bicycle Crashes in Metro Area by Parish



## 1.2 Poverty and Transportation Planning in the New Orleans Metropolitan Region

As discussed in previous iterations of this report, pedestrian and bicycle safety outcomes often correlate to poverty rates and, by extension, automobile access. Areas where poverty is more prevalent tend to have higher rates of walking and bicycling, as well as transit use. Higher rates of active transportation use can—unless efforts are made to ensure safe conditions—correspond to higher crash frequencies in these areas.

Areas of concentrated poverty (defined here as census tracts with poverty rates above 40%[7]) and pedestrian and bicycle crashes have been mapped for Orleans and Jefferson Parish, where as discussed above, the majority of crash incidents occurred and, in the case of Orleans Parish, where the most significant concentrations of poverty occur.

In the New Orleans metropolitan region, 17.7% of the population lived below the poverty level in 2012,[8] exceeding the national average of 14.9%. In Orleans Parish, 27.2% live in poverty, and 19.1% live in high-poverty census tracts, representing an increase from previous data evaluated.[9]

In Jefferson Parish, 15.3% live in poverty, but only 0.5% live in high-poverty census tracts (a slight decrease from the 2006-2010 American Community Survey findings, where 3% of the population were found to live in such areas), indicating very little spatial concentration. Figure 4 illustrates this difference, showing the distribution of high-poverty census tracts as of the 2008-2012 American Community Survey 5-Year Estimates for Orleans and Jefferson Parish. This suggests that as in previous studies, spatial concentration of poverty remains a significant issue in Orleans Parish.

Examining the relationship between poverty and pedestrian and bicycle safety, we see that crashes disproportionately affect those living in and traveling through high-poverty areas. In Orleans Parish, where 19% of the population lives in high-poverty census tracts, approximately 25% of pedestrian and bicycle crashes occurred in those tracts in 2011 and 2012 (Tables 5 and 6). Moreover, a sizeable majority of crashes occurred within ½ mile of these areas. This represents an acceleration of trends previously identified, as the

[7] High poverty in this study is defined as census tracts that have 40% or higher poverty rate, as defined by the US Census Bureau. This measure, also utilized in the *New Orleans Metropolitan Bicycle and Pedestrian* Plan (2005) was developed in accordance with the methodology of Jargowsky (Poverty and Place, 1997), which defined high-poverty census tracts as those with a poverty rate above 40%. Jargowsky's research indicates that residents of areas with poverty rates above this benchmark are particularly susceptible to negative neighborhood effects. Previous analyses (*2005 Metropolitan Bicycle and Pedestrian Plan* and *New Orleans Regional Bicycle and Pedestrian Crash Report, 2006-2008)* utilized census block group-level data. At this time, American Community Survey data on poverty rates is not available at this level of geography.

[8] For whom poverty status is defined; American Community Survey 5-Year estimates, 2008-2012, Table S1701: Poverty Status in the Past 12 Months

[9] 15% of the population of Orleans Parish was found to live in a high-poverty census tract in the 2006-2010 ACS 5-year estimates documented in the *New Orleans Regional Bicycle and Pedestrian Crash Report 2009-2010*

percentage of crashes occurring near high-poverty areas in Orleans Parish has increased. In Jefferson Parish, on the other hand, the number of high-poverty census tracts decreased during this period,[10] though a slightly disproportionate share of crashes occurred near or within high-poverty areas.

**Table 5: Pedestrian Crashes and Poverty**

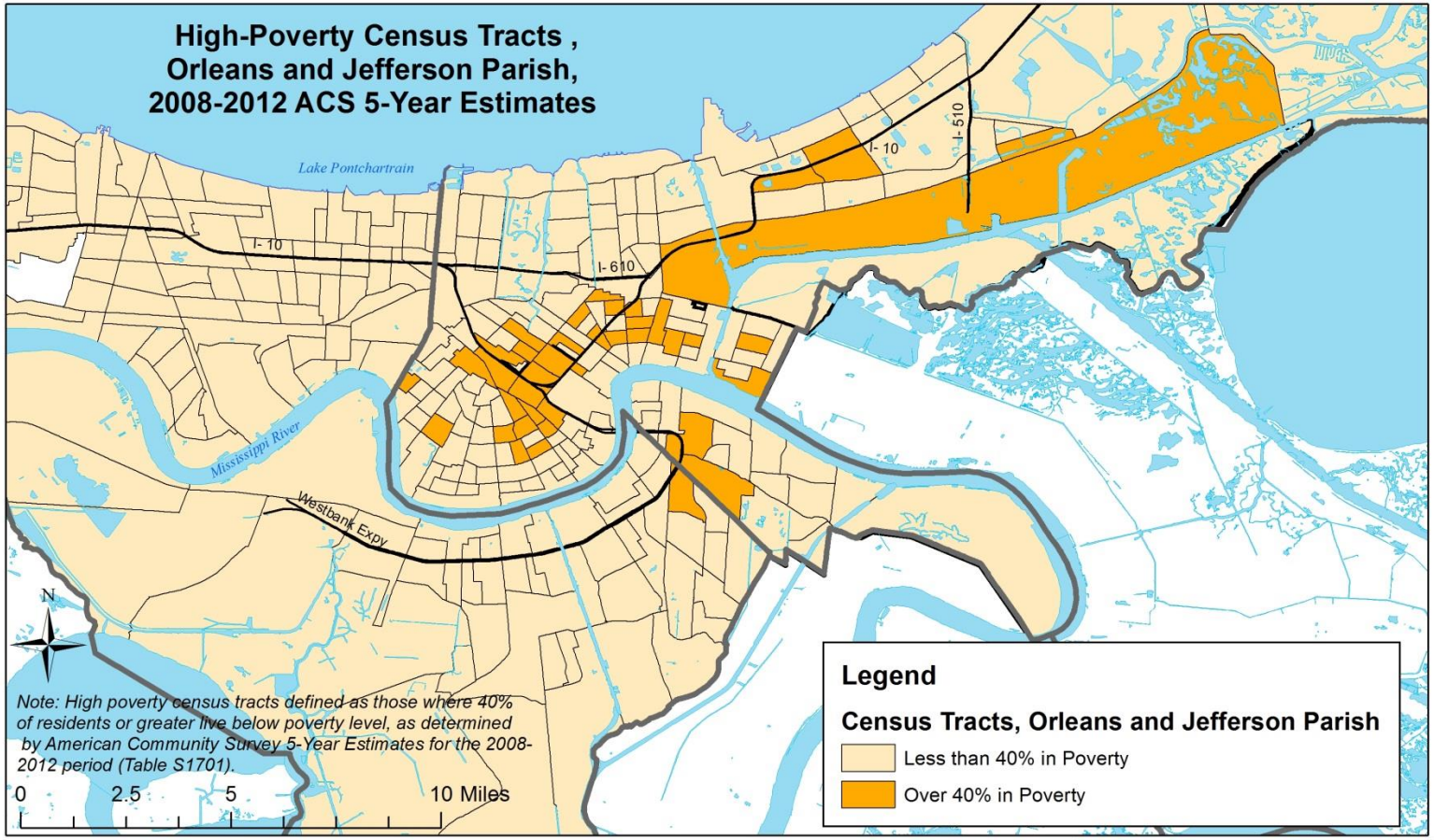
| Pedestrian Crashes and Poverty | | | |
|---|---|---|---|
| Year of Pedestrian Incidents | % in High Poverty Census Tracts | % within 1/4 mile of High Poverty Census Tracts | % within 1/2 mile of High Poverty Census Tracts |
| Orleans Parish | | | |
| 2011 | 24% | 52% | 74% |
| 2012 | 29% | 55% | 76% |
| Jefferson Parish | | | |
| 2011 | 1% | 3% | 9% |
| 2012 | 1% | 2% | 2% |

**Table 6: Bicycle Crashes and Poverty**

| Bicycle Crashes and Poverty | | | |
|---|---|---|---|
| Year of Bicycle Incidents | % in High Poverty Census Tracts | % within 1/4 mile of High Poverty Census Tracts | % within 1/2 mile of High Poverty Census Tracts |
| Orleans Parish | | | |
| 2011 | 26% | 57% | 81% |
| 2012 | 23% | 53% | 83% |
| Jefferson Parish | | | |
| 2011 | 0% | 1% | 3% |
| 2012 | 3% | 4% | 5% |

[10] As defined by a poverty rate above 40% at the census tract level in the 2008-2012 American Community Survey 5-Year Estimates, in comparison to 2006-2010 ACS 5-year estimates. Note that more detailed geographic analysis (e.g. the census block group level) would more effectively describe spatial concentrations of poverty, especially in Jefferson Parish where census tracts tend to encompass a larger geographic area and multiple distinct neighborhood areas.

**Figure 4: High Poverty Census Tracts, Orleans and Jefferson Parish, 2008-2012 ACS 5-Year Estimates**

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Special Disclaimer Concerning Crash Data:
1) CONFIDENTIAL INFORMATION—This document is exempt from discovery or admission under 23 U.S.C. 409.—Contact the LADOTD Traffic Safety Office at (225) 379-1929 before releasing any information.
2) This report is prepared solely for the purpose of identifying, evaluating, and planning safety improvement on public roads; and is therefore exempt from discovery or admission under 23 U.S.C. 409

Data Sources: Basemap Created using 2012 TIGER/Line Shapefiles for regional roads, census tracts, and water features.
Poverty data source: 2008-2012 American Community Survey, 5-year estimates, Table S1701. Any use of the data must be accompanied with this citation and accompanying seals and logos.
Coordinate System: GCS North American 1983
Datum: North American 1983
Units: Degree
Reference Scale: 1:0

## 2.0 Detailed Analysis of Crash Data

This section summarizes various characteristics of reported pedestrian and bicycle crashes, aggregated to the seven-parish region, highlighting demographic, temporal, and behavioral facets of the region's active transportation safety issues.

The data were provided to the RPC by the Louisiana Department of Transportation and Development (DOTD). DOTD compiles police crash reports for all parishes in Louisiana, and has provided the RPC and PBRI with data involving pedestrian and bicycle crashes for the New Orleans region for the years 2011 and 2012 (see Appendix A for data processing methodology). The data provide the demographic characteristics of pedestrians and bicyclists involved in crashes, details about the conditions under which crashes took place, some behavioral factors which may have contributed to crash incidents, and geographic reference points allowing spatial analysis of crash locations. This report explores these data, but does not attempt to identify crash causality or responsibility beyond stating "contributing factors" identified in the crash records. The crash cluster analysis section of this document, however, identifies statistically significant geographic clusters of crashes in Orleans and Jefferson parish which represent areas in need of further examination so as to identify whether characteristics of the built environment have contributed to high crash frequencies.

Overall, 1,052 pedestrians and 768 bicyclists were involved in crashes that were reported to police agencies during the 2011-2012 period. This represents an average of 1.44 pedestrian crashes and 1.05 bicycle crashes per day, or 526 pedestrian crashes and 384 bicycle crashes per year. Two of these collisions appear to have involved cyclists striking pedestrians; the remainder involved motor vehicles colliding with active users. These figures show a steady increase in the number of reported bicycle crashes, and a slight upward trend in the number of pedestrian crashes over the last 7 years. While still below pre-Hurricane Katrina figures (when between 1999 and 2002 an average of 1.9 pedestrian crashes and 1.2 bicycle crashes were reported each day), these increases suggest a troubling upward trend in crash frequency, particularly for bicyclists.

Importantly, the following limitations exist in the use of this data: first, it is known that many incidents involving pedestrians or bicyclists occur each year for which no police report is completed and/or submitted to DOTD. These crashes are not accounted for in this report. Second, demographic or other attribute data for some records is incomplete (e.g. age is not recorded for 10.9% of pedestrians and 6.4% of bicyclists). These omissions may skew summary statistics somewhat. Finally, the data was geocoded with geographic coordinates by DOTD and the RPC. However, a small number of records (2.1% of pedestrian crash records and 1.5% of bicycle crash records) were identified with remaining geocoding errors, likely due to reporting errors. These non-geocoded records impacted spatial analysis to a small degree.

Despite these limitations, the data provide a useful overview of crash trends and spatial patterns in the New Orleans region. Notably, data quality has improved considerably over the last several years, permitting the inclusion of a number of new

attributes to this analysis. A descriptive analysis of regional crash trends is provided below to identify the frequency and severity of crashes, when collisions occur, who is involved in these crashes, and additional factors reported which help identify general trends in the circumstances and behaviors that lead to crash occurrence.

## 2.1 Pedestrian Regional Data

In 2011, pedestrian crashes dipped slightly to the lowest number since 2007, then increased to a Post-Katrina high of 594 in 2012 (Figure 5). While this volatility means that no clear upward or downward trend can be confidently identified, these figures remain lower than the 1999-2002 average of more than 600 per year. Clearly, however, as the national comparisons above indicate, pedestrian crashes are a persistent problem. In recent years, the region has taken steps (including the development of the New Orleans Pedestrian Safety Action Plan) which aim to address crash frequency (and severity), but the outcomes of these efforts are not yet reflected in crash totals.

The severity of pedestrian crashes (Figure 6) is similar to previous years of data evaluation. In total, 11.6% of pedestrian crashes in 2011-2012 were identified as fatal or severe (in terms of injury to involved pedestrian), down slightly from 13% in 2009-2010.

Figure 5: Pedestrian Crashes by Year, New Orleans Metro Area

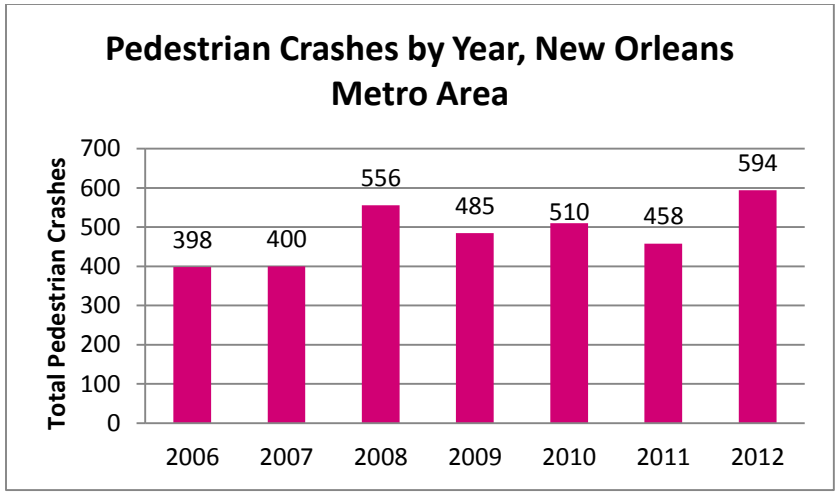
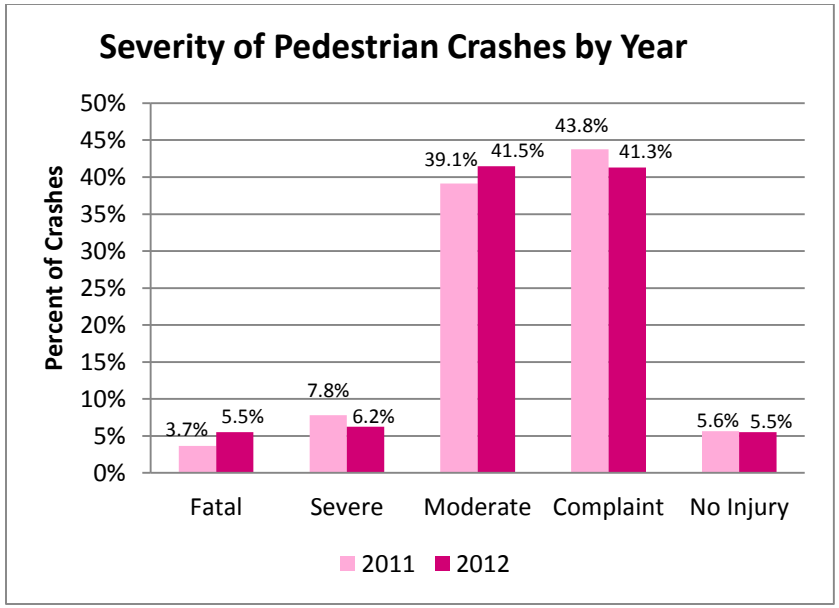



Figure 6: Severity of Pedestrian Crashes by Year (7-Parish Region Total)



As in previous years analyzed, the data by month (Figure 7) shows slightly higher crash incidence during spring and autumn months, and decreases in August and February. This seasonal effect is relatively mild, though, suggesting that walking (and therefore pedestrian exposure) does not vary significantly from month to month.

Figure 7: Percentage of Pedestrian Crashes by Month (7-Parish Region Total)

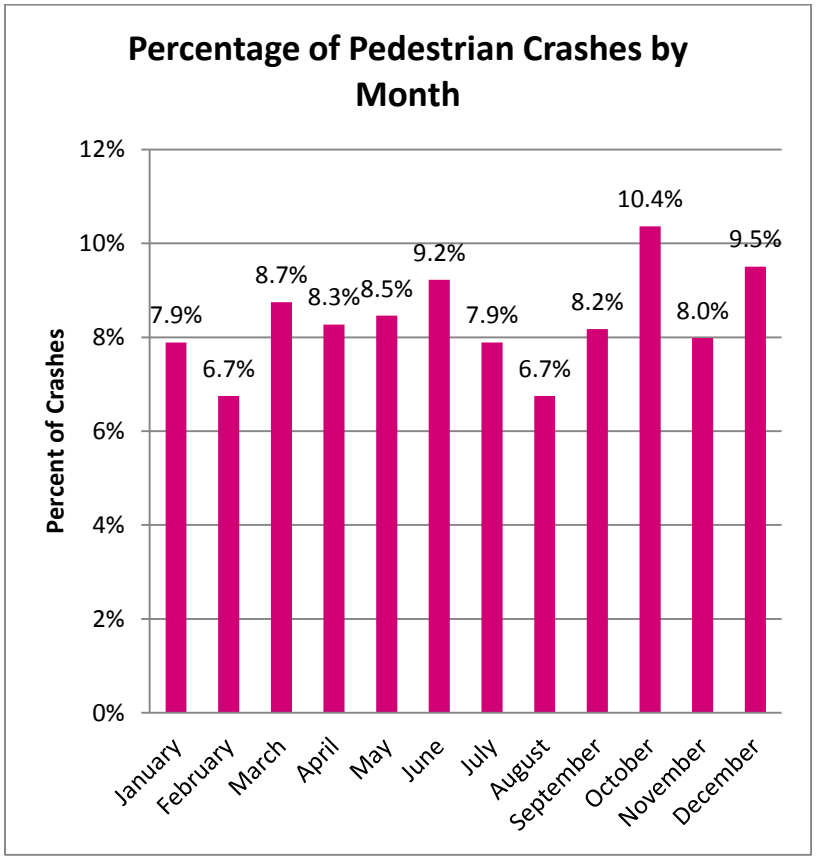



Figure 8 shows variances in crash incidence by day of the week. Again, crash patterns are relatively stable from day to day with no clear peak or period of reduced frequency.

Figure 8: Percentage of Pedestrian Crashes by Day of the Week (7-Parish Region)

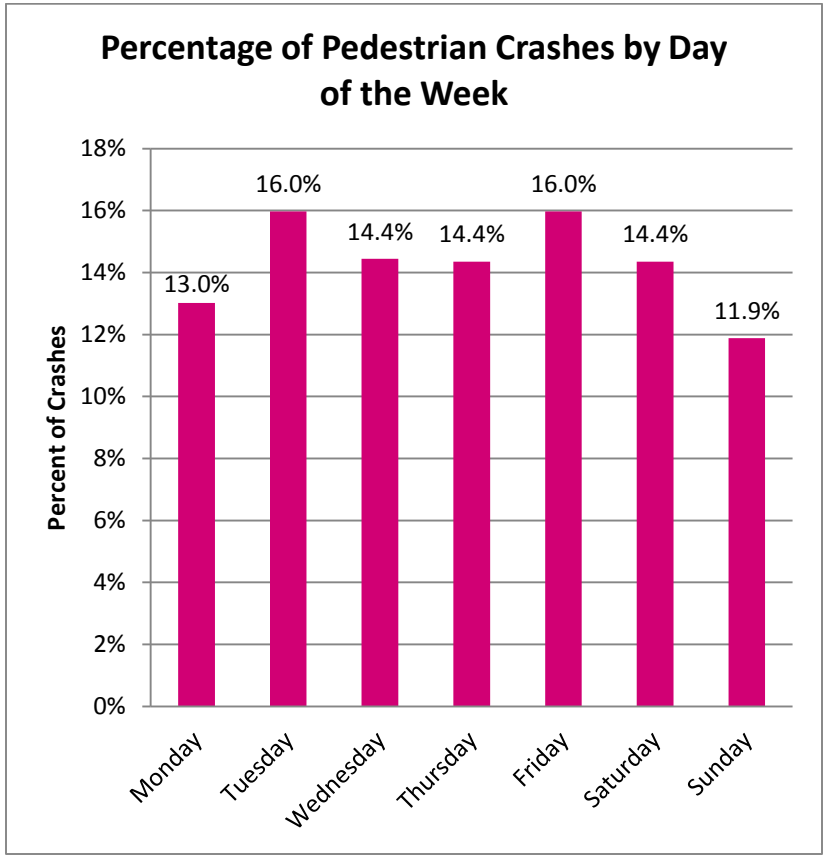
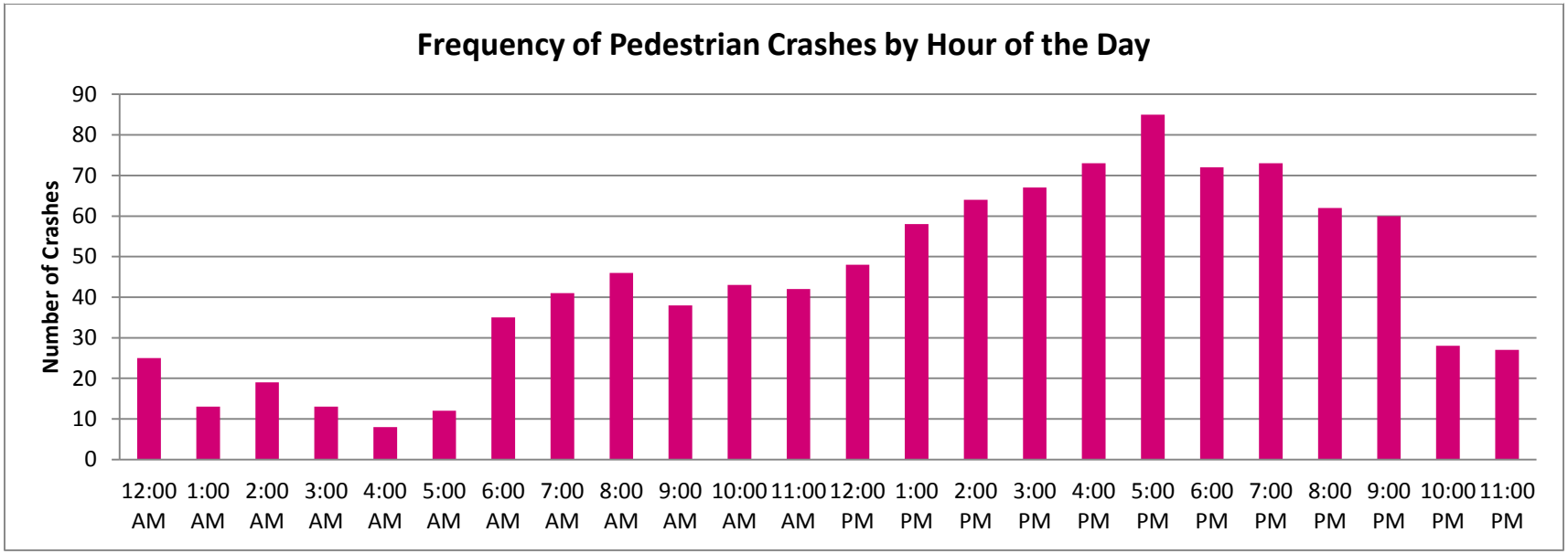


Figure 9: Frequency of Pedestrian Crashes by Hour of the Day (7-Parish Region Total)




Hourly crash patterns have remained stable as well, with a slight rise in crashes during morning commute hours, and steadily rising crash incidence throughout the afternoon culminating in a 5pm peak. Notably, crash frequency remains high late into the late evening (Figure 9).

The majority of pedestrians (76%) involved in crashes are adults (Figure 10). This reflects a continuing trend of a decreasing proportion of juvenile crash victims compared to before Hurricane Katrina, when 35% of all 1999-2002 pedestrian crashes involved youth.

Figure 10: Pedestrian Crashes--Juvenile vs. Adult (7-Parish Region Total)

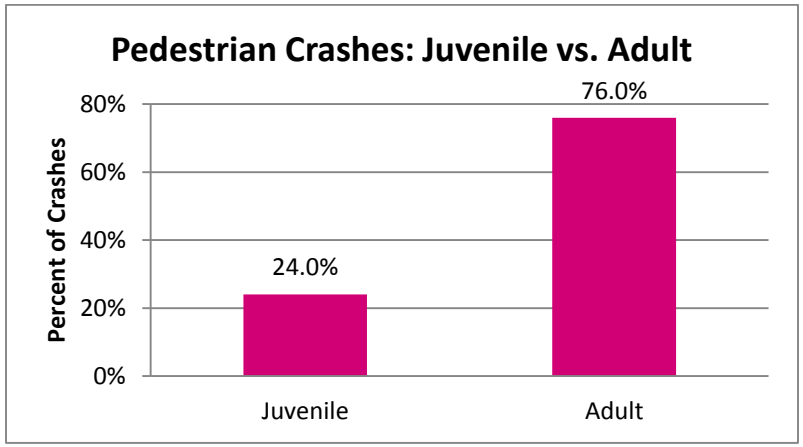


Figure 11 shows the overall age breakdown of pedestrians involved in crashes, showing peaks involving very young children, teenagers, a dramatic spike of 25-year-olds, and then a slight rise among adults age 50-60. The patterns of crash incidence by life stage (Figure 12) has remained relatively stable over time, with the proportion of young children involved in crashes holding steady at 11.6%, though the percentage of older adults (65+) involved increased slightly from 5% to 7.3% during this period, possibly reflecting the increasing population of older residents in this region and nationwide. Designing facilities that effectively meet the needs of the most vulnerable age groups of users is essential to creating safe, accessible streets for all.

Figure 11: Crash Frequency by Age of Pedestrian (7-Parish Region Total)

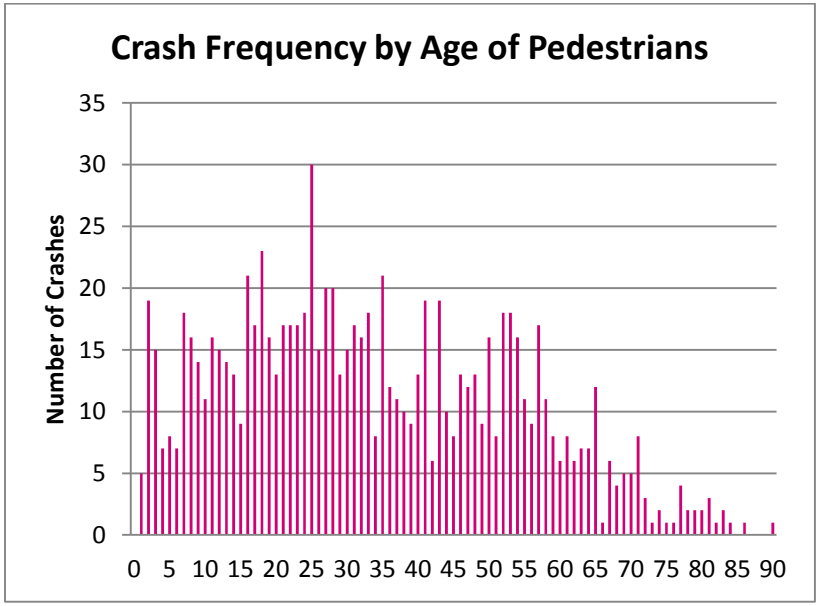
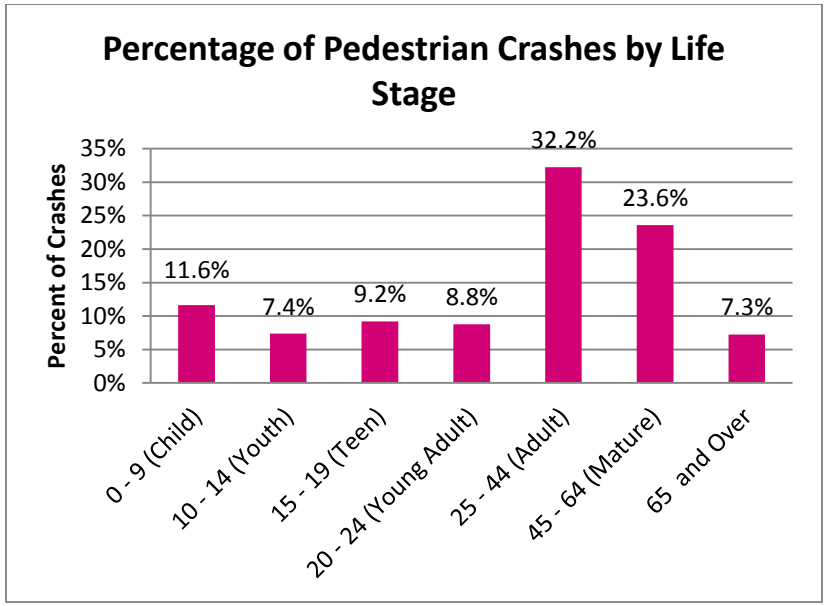



Figure 12: Percentage of Pedestrian Crashes by Life Stage (7-Parish Region Total)




As in previous years, the majority of pedestrians regionally involved in crashes were black (55%) (Figure 13), likely reflecting the demographic composition of Orleans Parish, where a large proportion of the crashes occurred. However, at the regional level, where only 35% of the population identifies as black[11], these figures suggest that black residents are disproportionally impacted by traffic violence.

Figure 14 shows the proportion of males and females involved in crashes as pedestrians. Consistent with previous data, the proportion of females involved in crashes (38.7%) was substantially lower than the proportion of males.

[11] American Community Survey 2012 1-Year Estimates, Table DP05

Figure 13: Percentage of Pedestrian Crashes by Race (7-Parish Region Total)

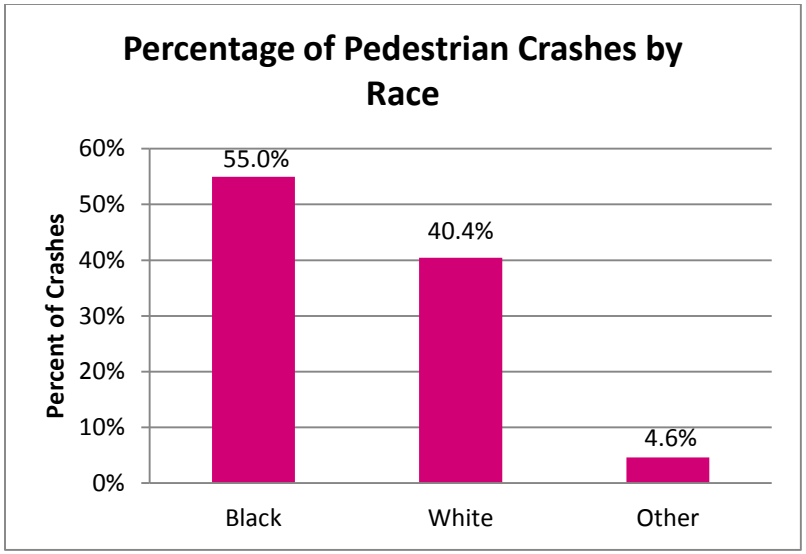
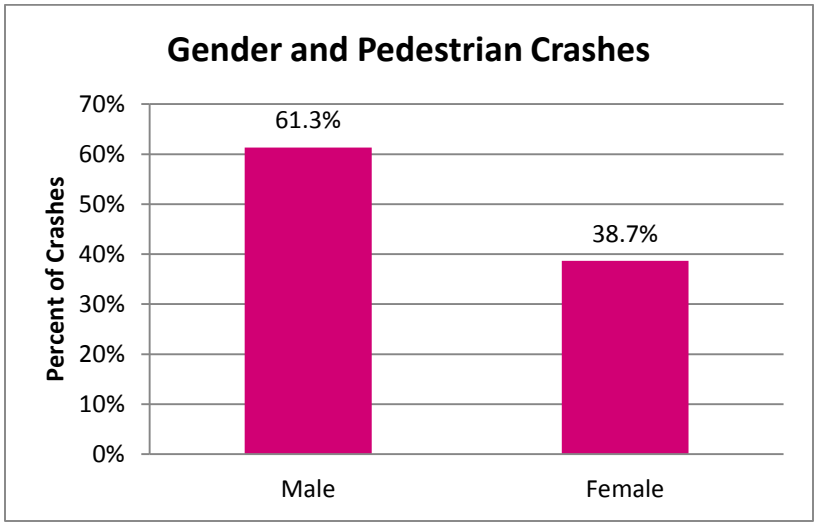
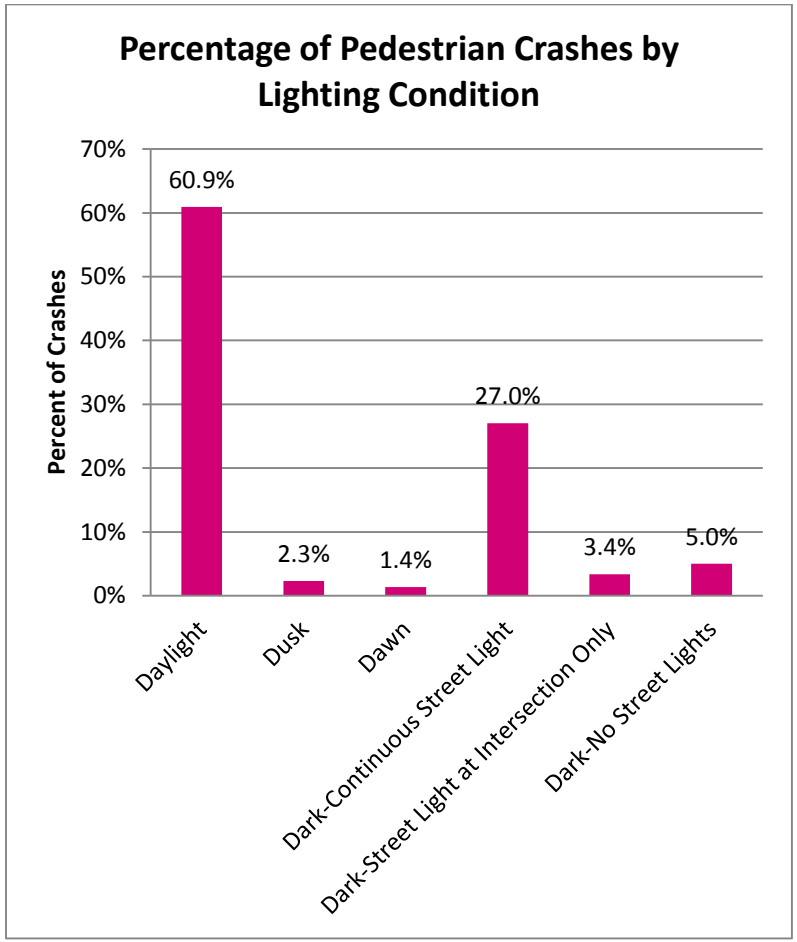



Figure 14: Gender and Pedestrian Crashes (7-Parish Region Total)




Consistent with previous data, the majority (61%) of pedestrian crashes took place during the day (Figure 15), while 35% occurred at night under variable lighting conditions.

Figure 15: Percentage of Pedestrian Crashes by Lighting Condition (7-Parish Region Total)



Looking at pedestrian crashes by road type (Figure 16), we see that the largest share of crashes took place on two-way, undivided streets. Compared to the 2009-2010 data, the share of collisions occurring on one-way streets has increase somewhat, from about 21% to more than 27%. The majority (78%) of crashes took place on local or parish roadways (Figure 17).

According to the DOTD crash records, about 40% of pedestrian crashes occurred at intersections, while the majority (61%) occurred elsewhere (Figure 18). This suggests that pedestrians crossing roadways at locations other than the intersection represents a significant safety issue in this region.

Figure 16: Percentage of Pedestrian Crashes by Road Type (7-Parish Region Total)

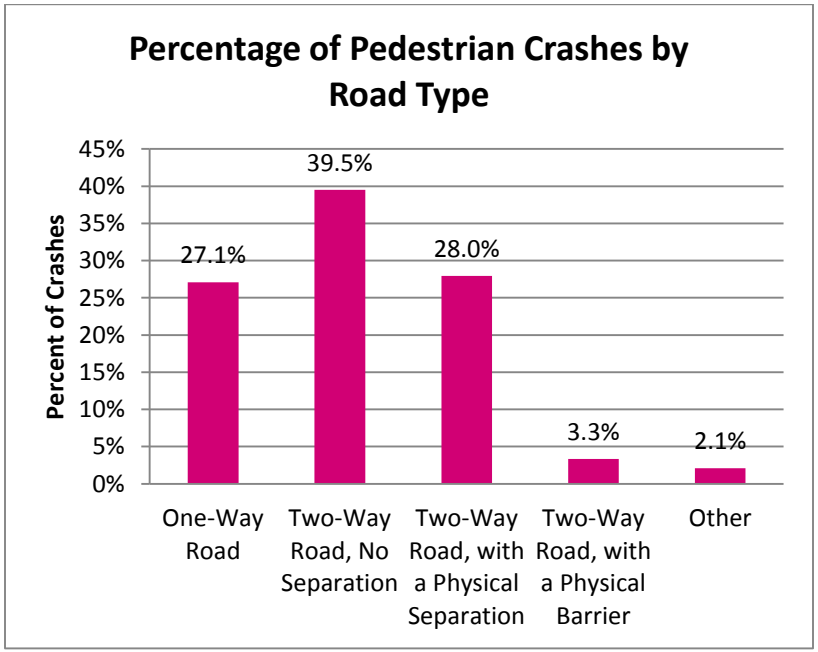



Figure 17: Percentage of Pedestrian Crashes by Roadway Jurisdiction (7-Parish Region Total)

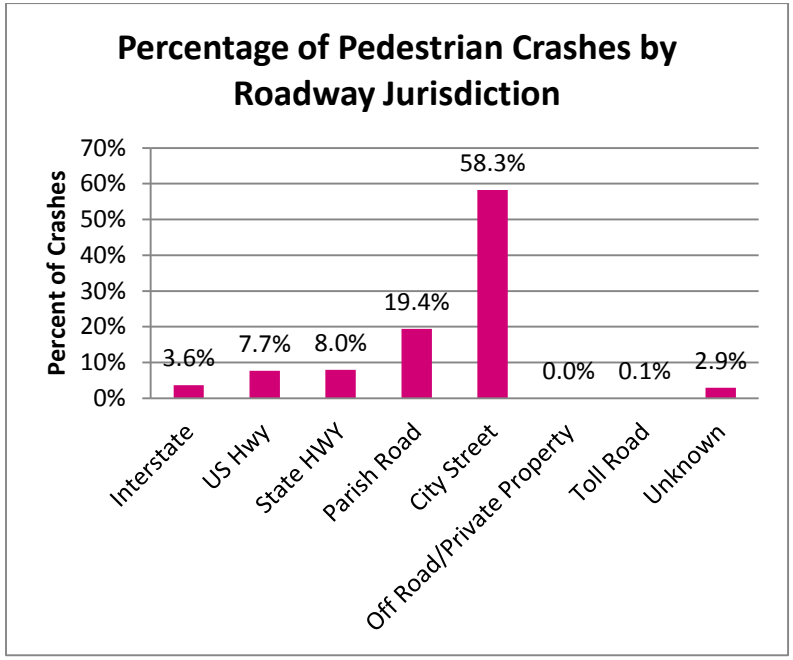
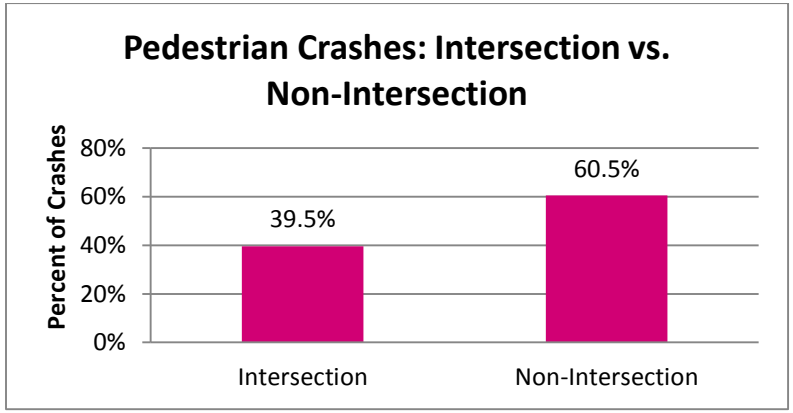
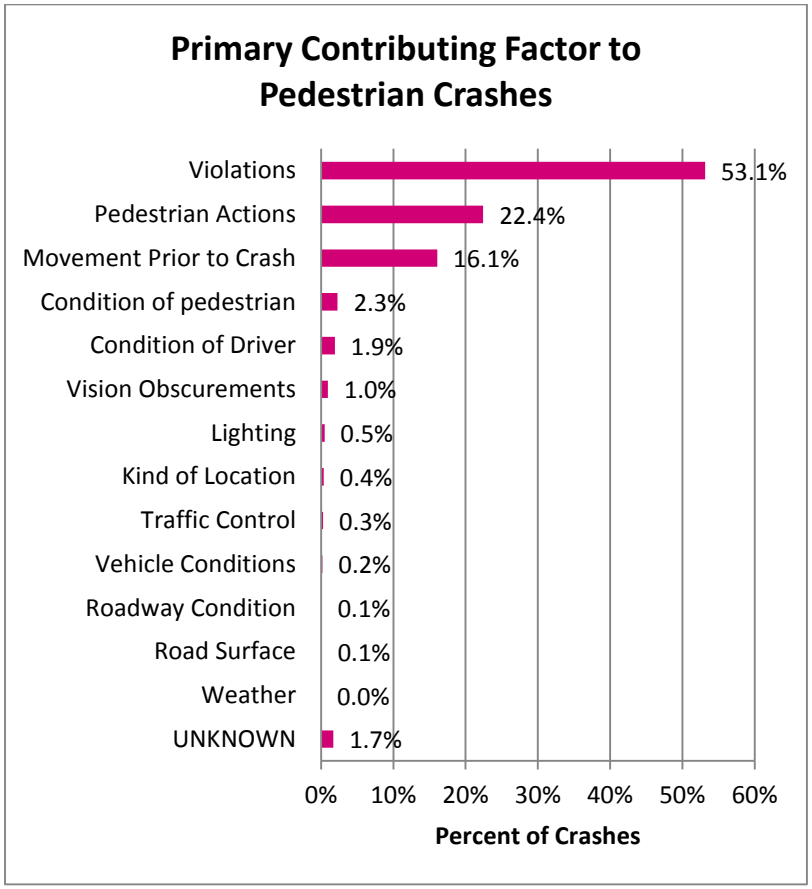



Figure 18: Pedestrian Crashes: Intersection vs. Non-Intersection (7-Parish Region)



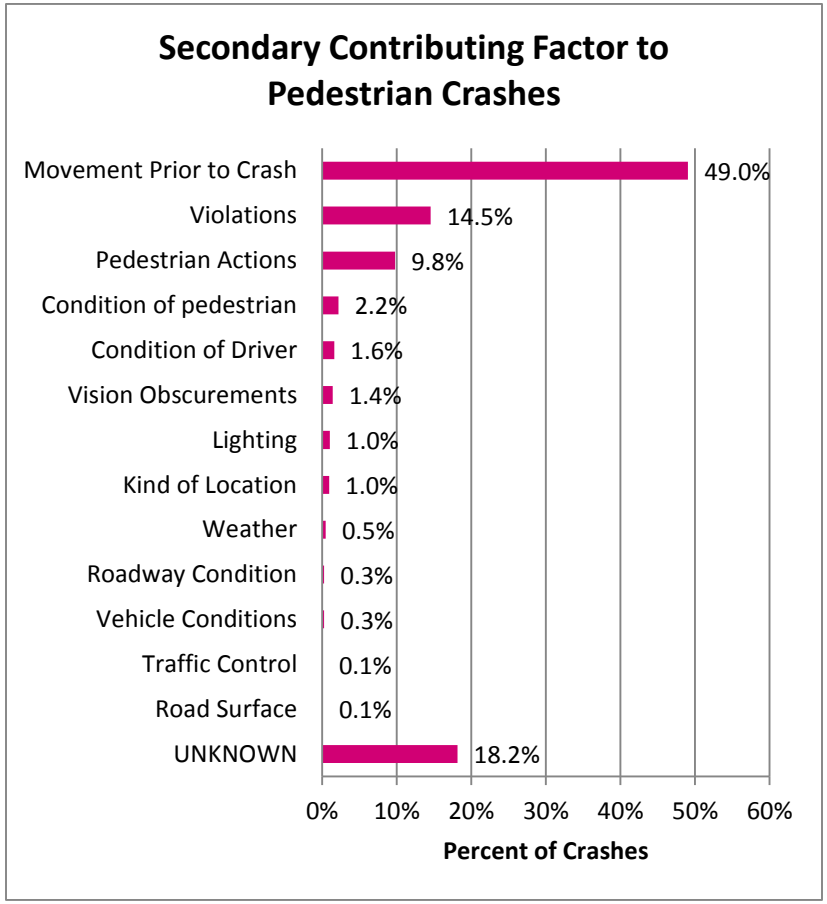
In more than half of crashes involving pedestrians, a violation of traffic law was cited as the primary contributing factor to the crash, followed by pedestrian actions or vehicle movements prior to the crash (Figure 19).

Figure 19: Primary Contributing Factor to Pedestrian Crashes (7-Parish Region)




These same three factors were identified as the most common secondary contributing factors to crashes (Figure 20).

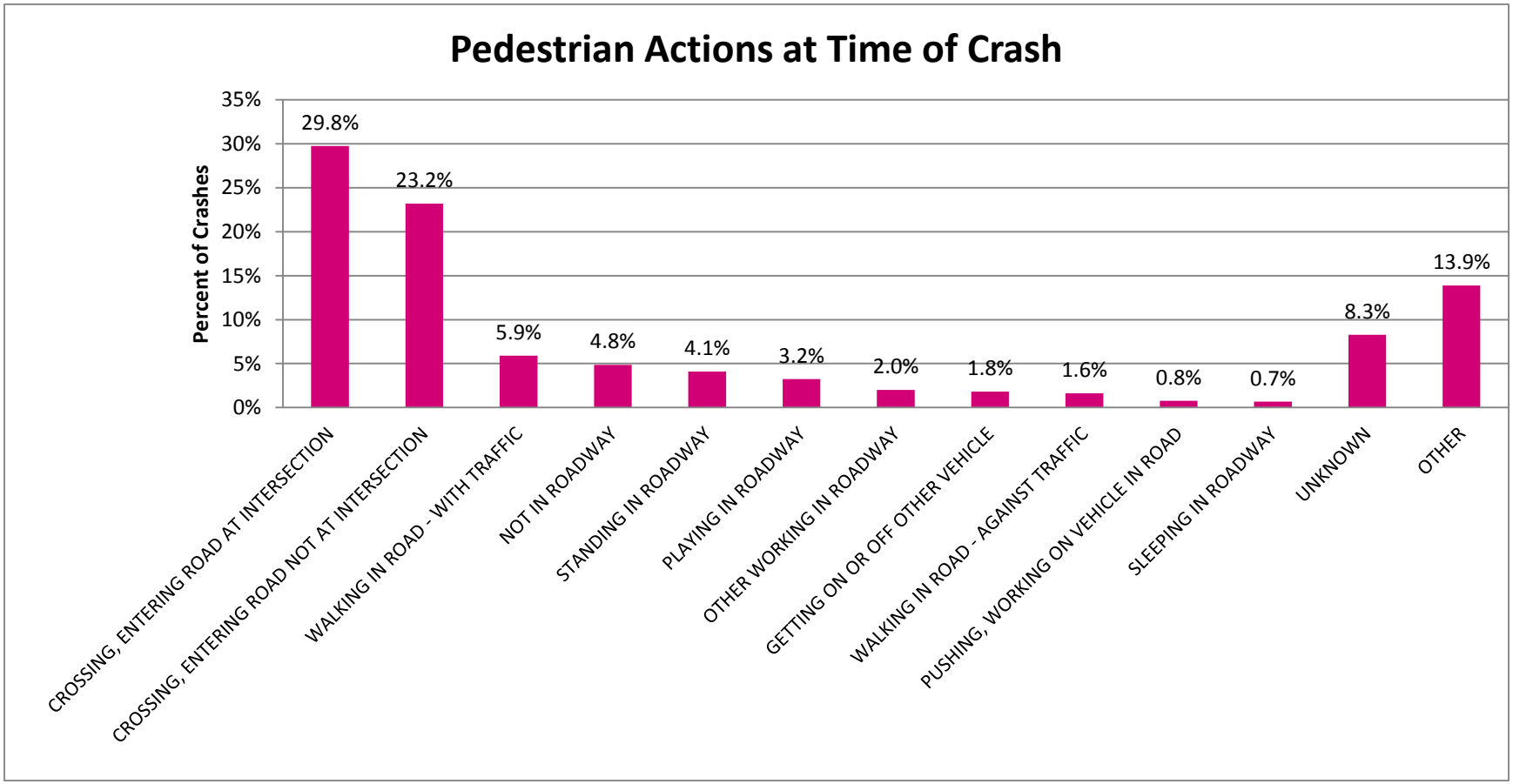
Figure 20: Secondary Contributing Factor to Pedestrian Crashes (7-Parish Region)



Where identified, crossing the roadway—either at an intersection or elsewhere—was the most common pedestrian action occurring at the time of the crash, although a substantial proportion of pedestrians were also struck while walking in the roadway with traffic (6%), standing in the roadway (4%), or while not on the roadway at all (5%) (Figure 21).

The manner in which collisions occurred is difficult to discern using the crash records supplied: the majority of pedestrian crashes were identified as either "non-collision with motor vehicle" or "other," indicating that the categories DOTD uses to classify this attribute poorly suit the unique characteristics of pedestrian crashes (Figure 22). Notably, however, aggressive driving was identified as a factor

**Figure 21: Pedestrian Actions at Time of Crash (7-Parish Region Total)**



in 23% of pedestrian crashes, while distracted driving was identified in 14% of crashes. Pedestrian use of drugs or alcohol was identified as an issue in 8.2% of crashes.

Finally, 27 pedestrian crashes (2.6%) involved pedestrians struck by trucks or buses, while 27.7% of crashes were classified as hit and run incidents with drivers illegally leaving the scene of the crash (Figure 23).

Figure 23: Hit and Run Pedestrian Crashes (7-Parish Region Total)

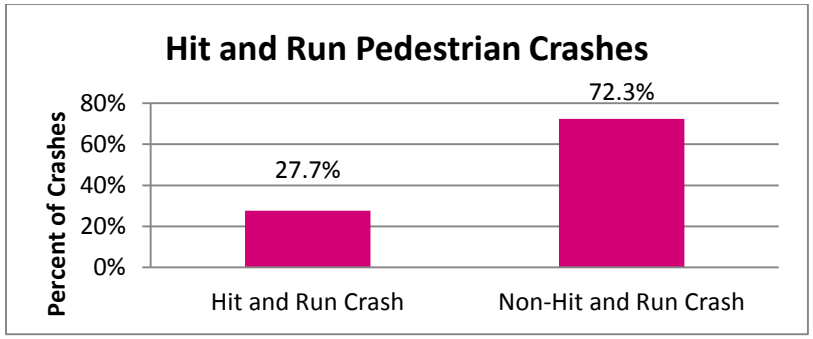



Figure 22: Pedestrian Crashes by Manner of Collision (7-Parish Region Total)

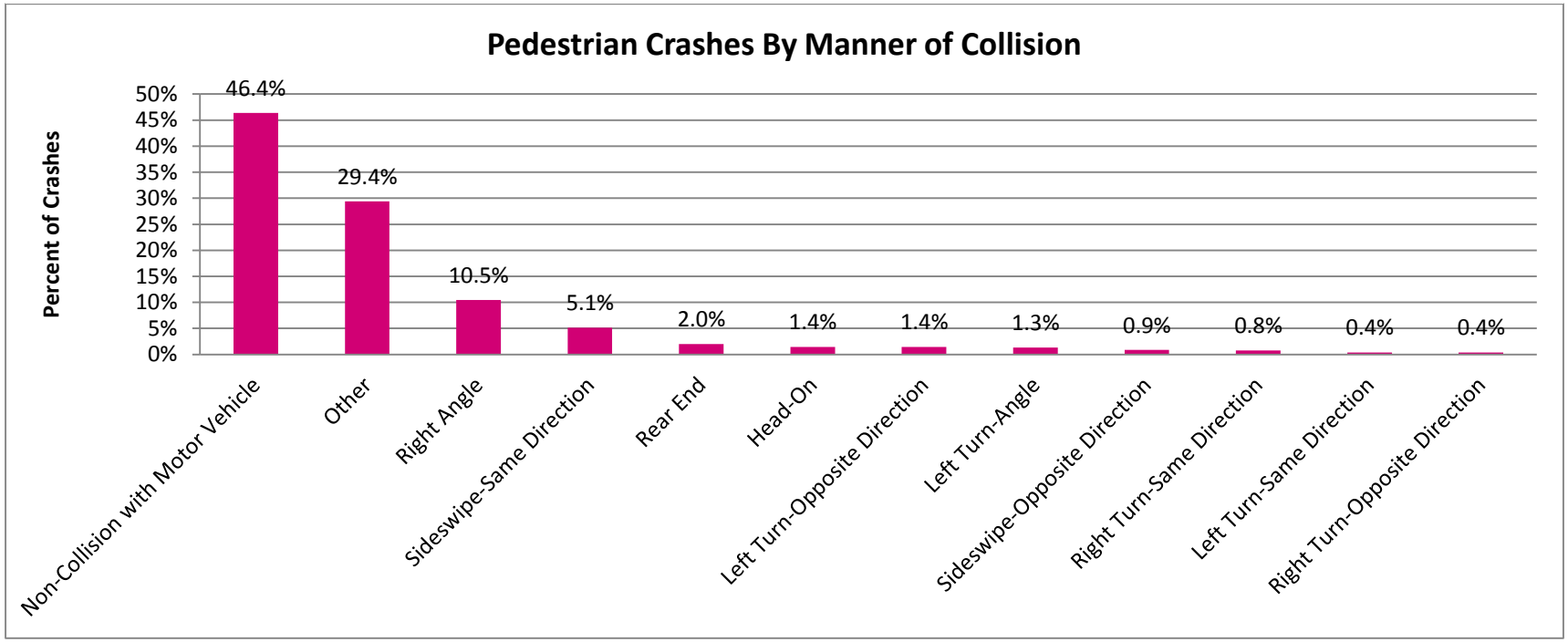


Figure 24: Bicycle Crashes by Year, New Orleans Metro Area

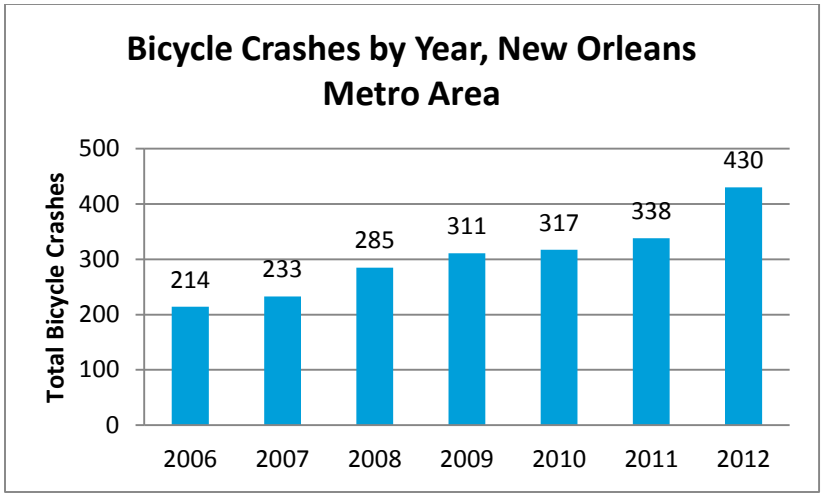
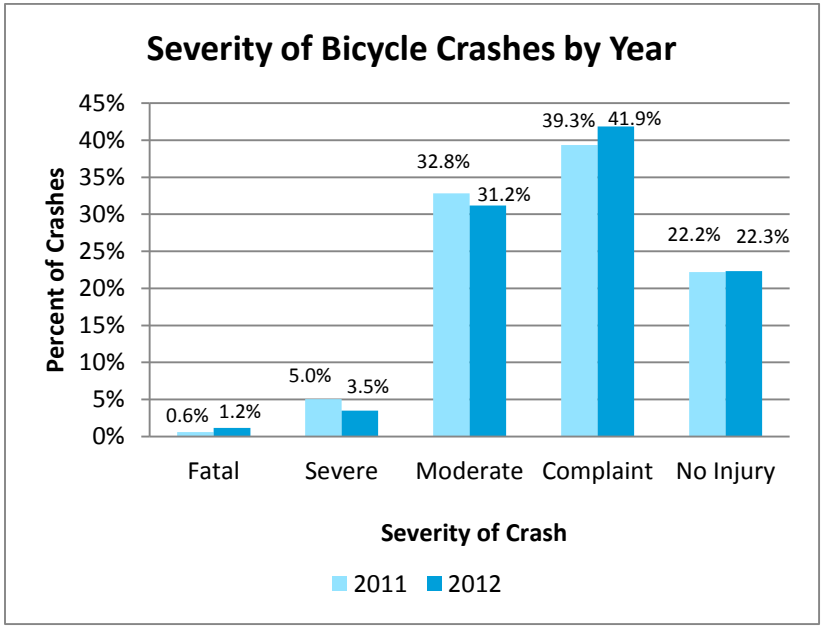



Figure 25: Severity of Bicycle Crashes by Year (7-Parish Region Total)



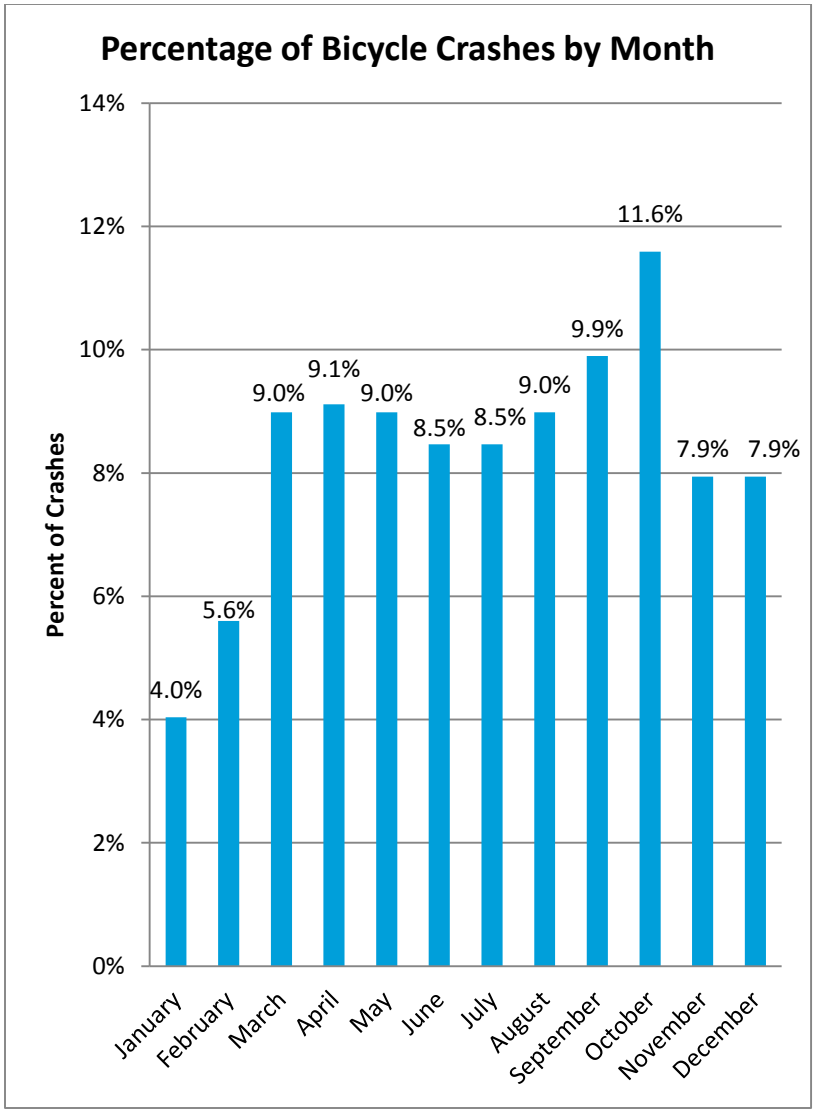

## 2.2 Bicyclist Regional Data

The number of bicycle crashes in the seven-parish region has increased each year since 2006, with a high of 430 reported crashes in 2012 (Figure 24). These figures likely correspond to the documented increases in the number of people bicycling in the region, as well as the region's repopulation following Hurricane Katrina, however, the consistent upward growth in crash incidence represents a troubling trend.

Figure 25 highlights the severity of injuries sustained by cyclists during this period. About 5% of crashes were fatal or severe, comparable with previous years of data. Notably, a greater proportion of pedestrian crashes resulted in fatal or severe injury (11.6%), comparable with previous studies which suggest that the nature of bicycle collisions—ameliorated by cyclist velocity, helmet use, etc—may result in a reduced share of fatalities and severe injuries.

Temporal characteristics of bicycle crashes are similar to those for pedestrian crashes: slightly higher totals in fall and spring months during favorable weather (though the decrease in bicycle crash incidence in winter was more pronounced for bicycles during this period) (Figure 26).

Figure 26: Percentage of Bicycle Crashes by Month (7-Parish Region Total)




To a greater extent than for pedestrians, bicycle crashes tend to decrease on the weekends, consistent with previous data sets (Figure 27).

Figure 27: Percentage of Bicycle Crashes by Day of Week (7-Parish Region Total)

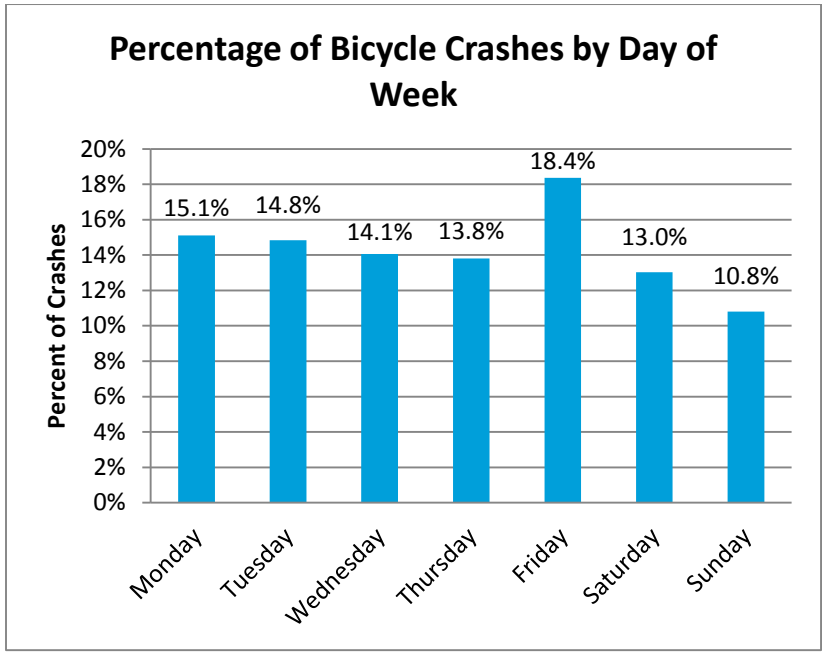
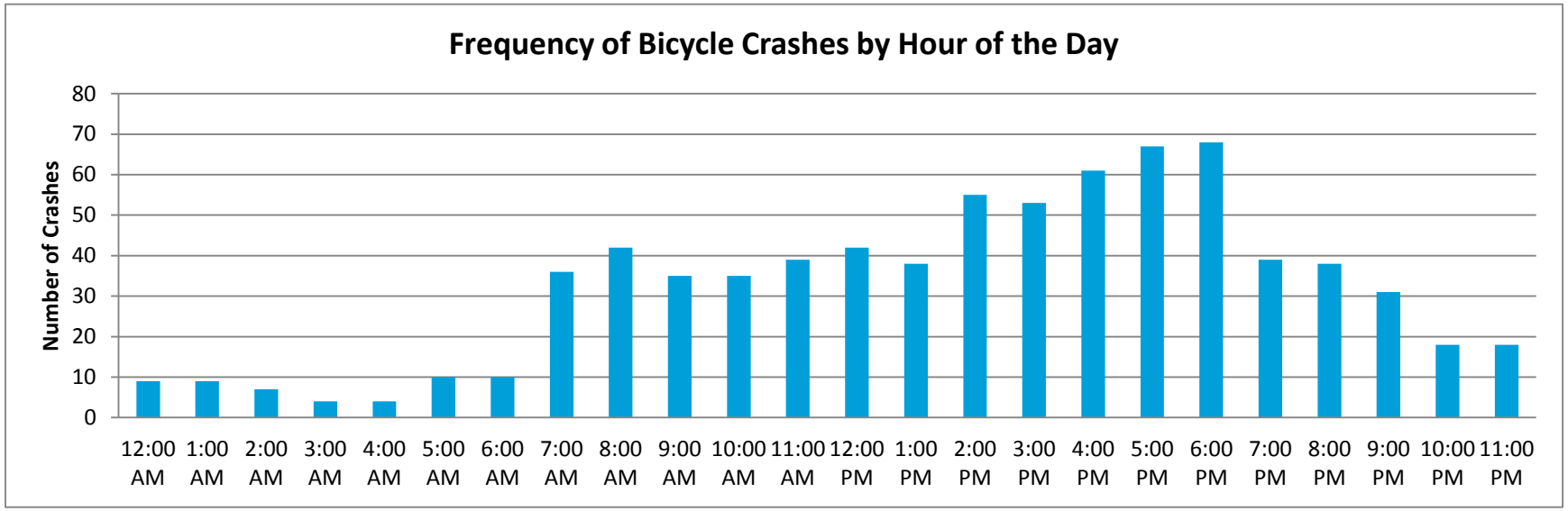


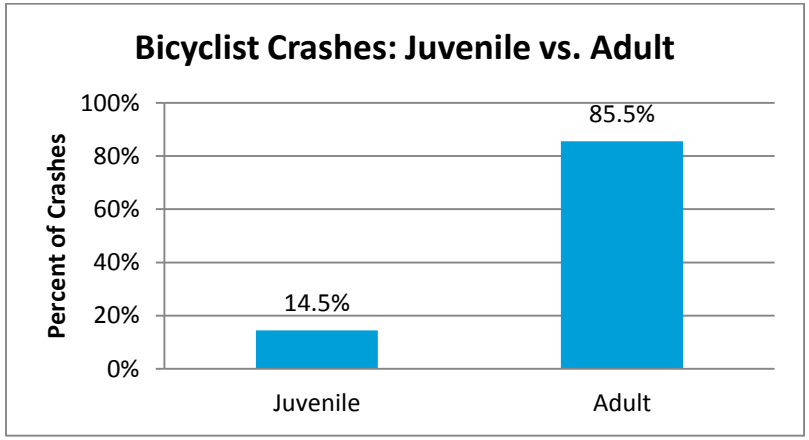
Figure 28: Frequency of Bicycle Crashes by Hour of the Day (7-Parish Region Total)




Bicycle crashes also follow a similar pattern as pedestrian crashes for the time of day crashes are likely to occur, building steadily through the afternoon to a 5-6pm peak, but dropping off more sharply into the evening relative to pedestrians. These patterns, too, are consistent with earlier data (Figure 28).

In a continuation of previously identified trends, a smaller share of cyclists involved in crashes were juveniles (17 or younger) in 2011-2012 than documented in earlier data: only 14.5% compared to 21% in 2009-2010, and almost 30% from 1999-2002 (Figure 29).

Figure 29: Bicyclist Crashes-Juvenile vs. Adult (7-Parish Region Total)



Overall, the age of cyclists ranged from 3 to 89 years old, with a similar composition as that identified in the 2009-2010 data featuring an increasing number of crashes involving younger adults who have embraced bicycles for transportation and recreation (approximately ages 20-30), as well as a significant number of older adults (ages 50-60) (Figure 30). This data is indicative of the largest user groups of bicyclists overall, and highlights the need for safety education across a wide range of users and age groups to promote safety. Broken down by life stage, patterns remain similar to 2009-2010, with a much larger share of older adults involved in crashes compared to the 1999-2002 dataset, highlighting the need for targeted cycling safety outreach among this user group (Figure 31).

Figure 30: Crash Frequency by Age of Cyclists (7-Parish Region Total)

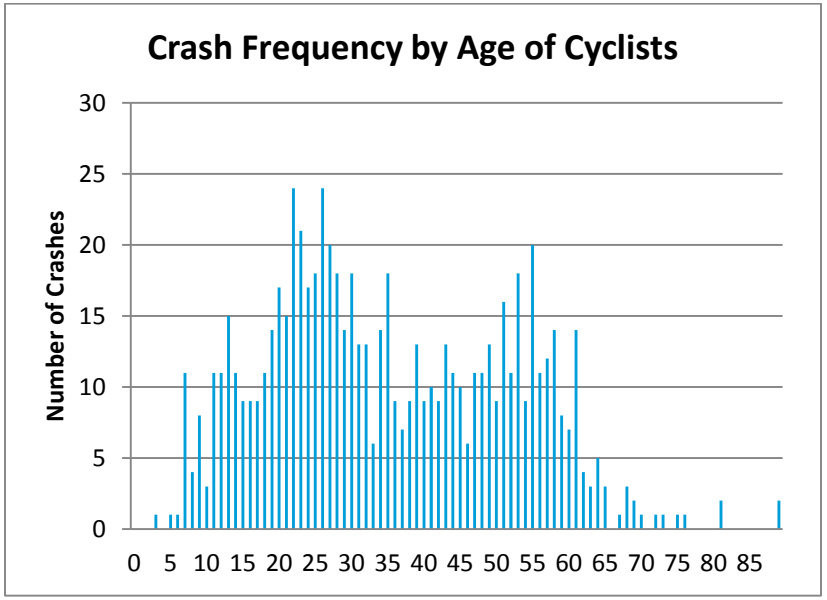



Figure 31: Percentage of Bicycle Crashes by Life Stage (7-Parish Region Total)

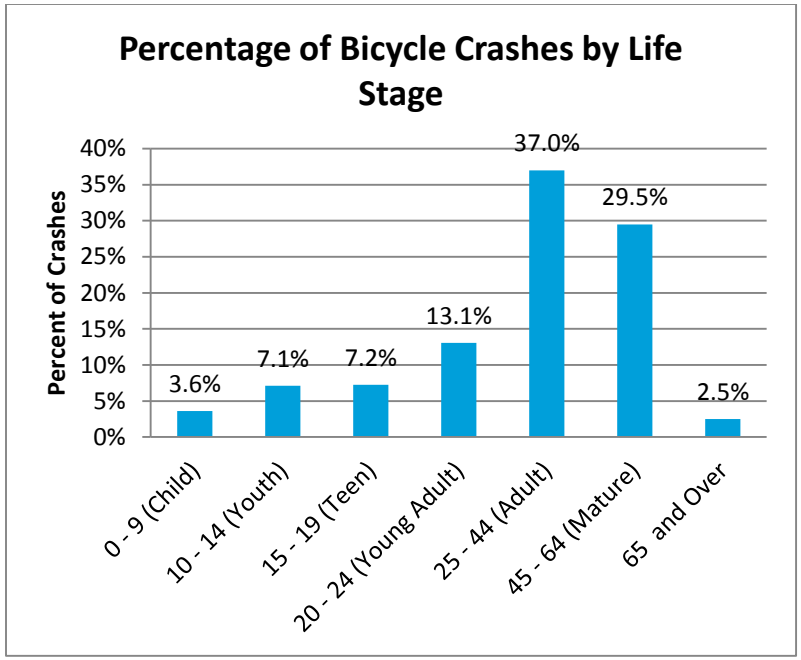


Figure 32 shows the racial classification of cyclists involved in crashes. Notably, the proportion of white bicyclists involved in crashes has risen considerably, from 48% in 2009-2010 to 59% in 2011-2012. This suggests a shift in the demographics of who is choosing to bicycle in the region. Moreover, the proportion of women involved in crashes has also increased from 13% in 2009-2010 to over 20%, suggesting that more women are bicycling now than before (Figure 33).

Figure 32: Percentage of Bicycle Crashes by Race (7-Parish Region Total)

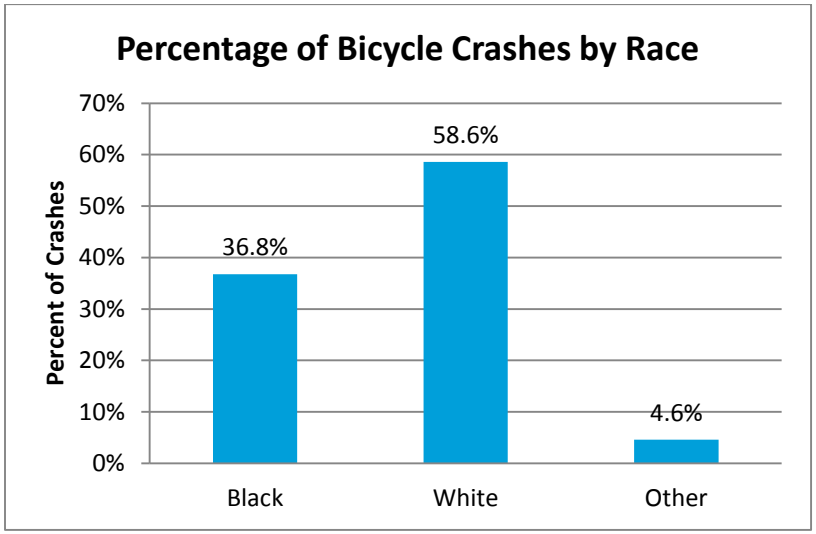
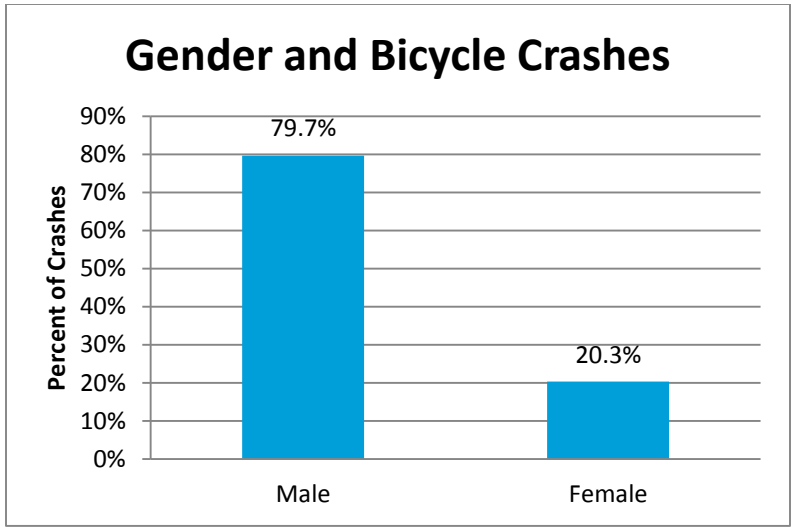



Figure 33: Gender and Bicycle Crashes (7-Parish Region Total)




Unlike for pedestrians, the greatest share of bicycle crashes (38%) took place on two-way, separated roadways during this period (Figure 34), again a departure from previous data, where crashes on unseparated roadways were most common. In Orleans Parish in particular, many of the recently installed bicycle facilities occur on this type of road. Future research should evaluate the relationship between facility development, bicyclist route choice, and crash outcomes in greater detail.

As demonstrated in previous reports, the majority of crashes (73%) took place during daylight hours (Figure 35).

As with pedestrians, most bicycle crashes (79%) occurred on local or parish roads (Figure 36). Unlike pedestrian crashes, the majority took place at intersections (65%) (Figure 37).

Figure 34: Percentage of Bicycle Crashes by Road Type (7-Parish Region Total)

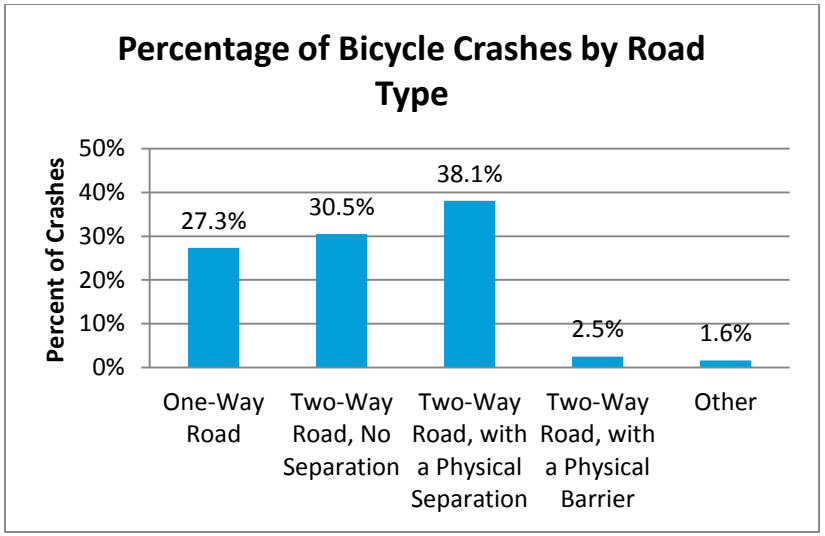



Figure 35: Percentage of Bicycle Crashes by Lighting Condition (7-Parish Region)

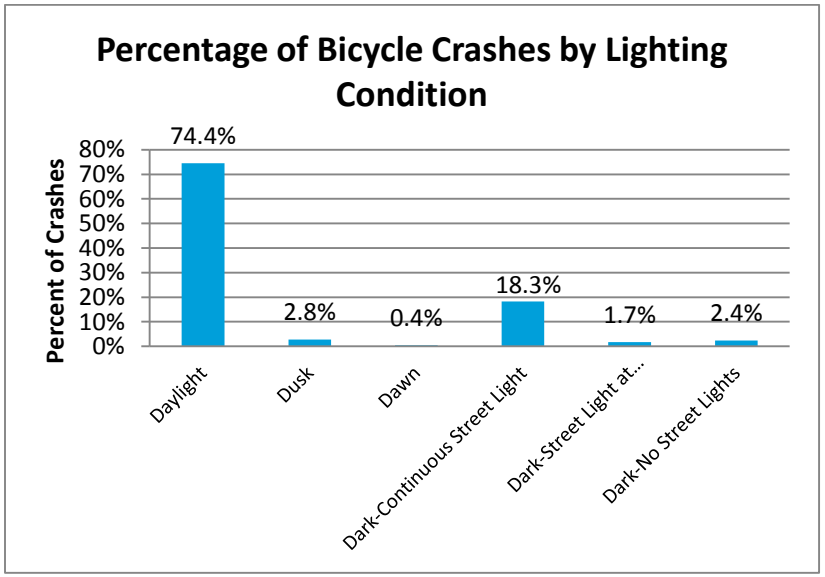



Figure 36: Percentage of Bicycle Crashes by Road Jurisdiction (7-Parish Region)

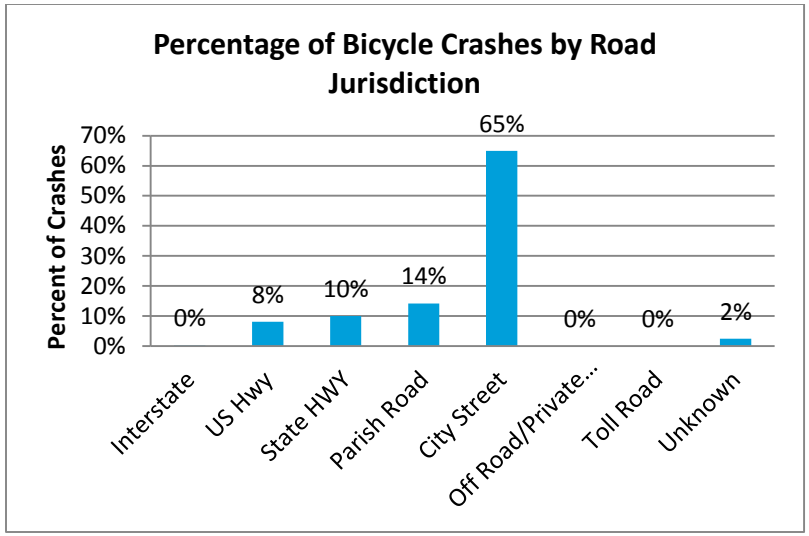
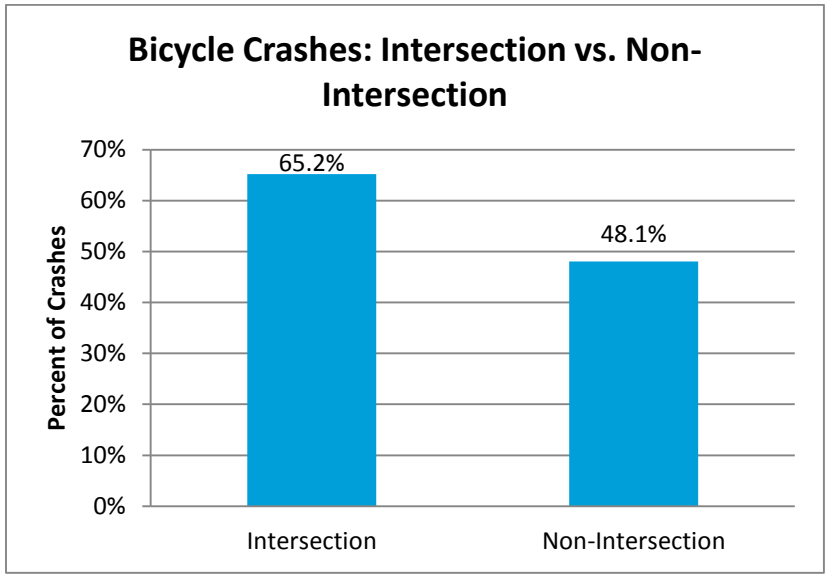
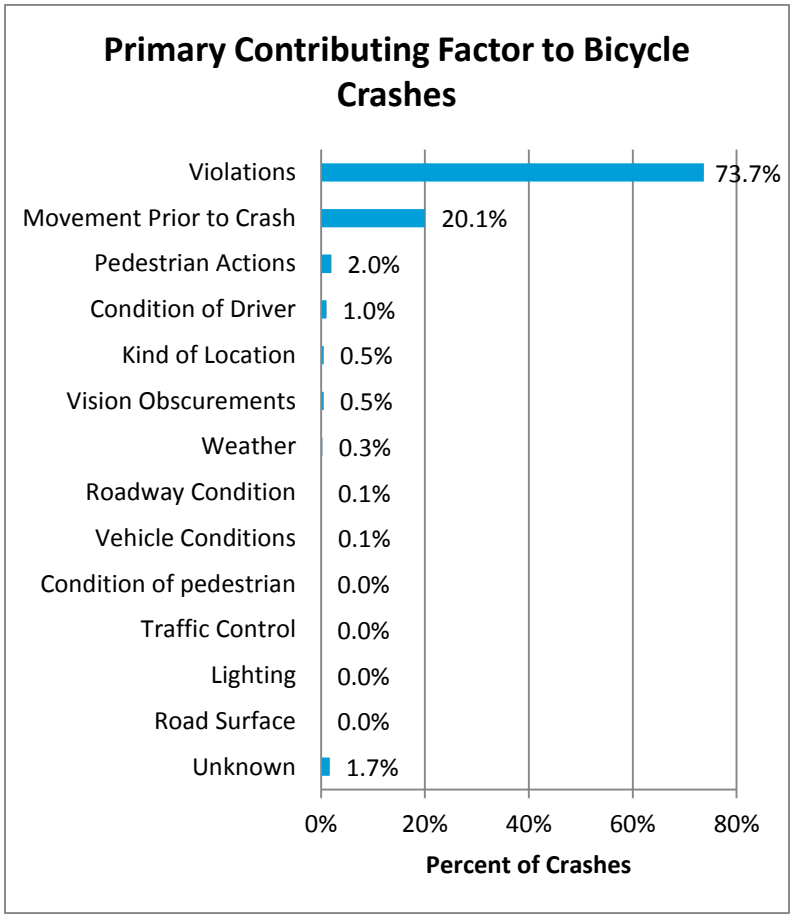



Figure 37: Bicycle Crashes--Intersection vs. Non-Intersection (7-Parish Region)



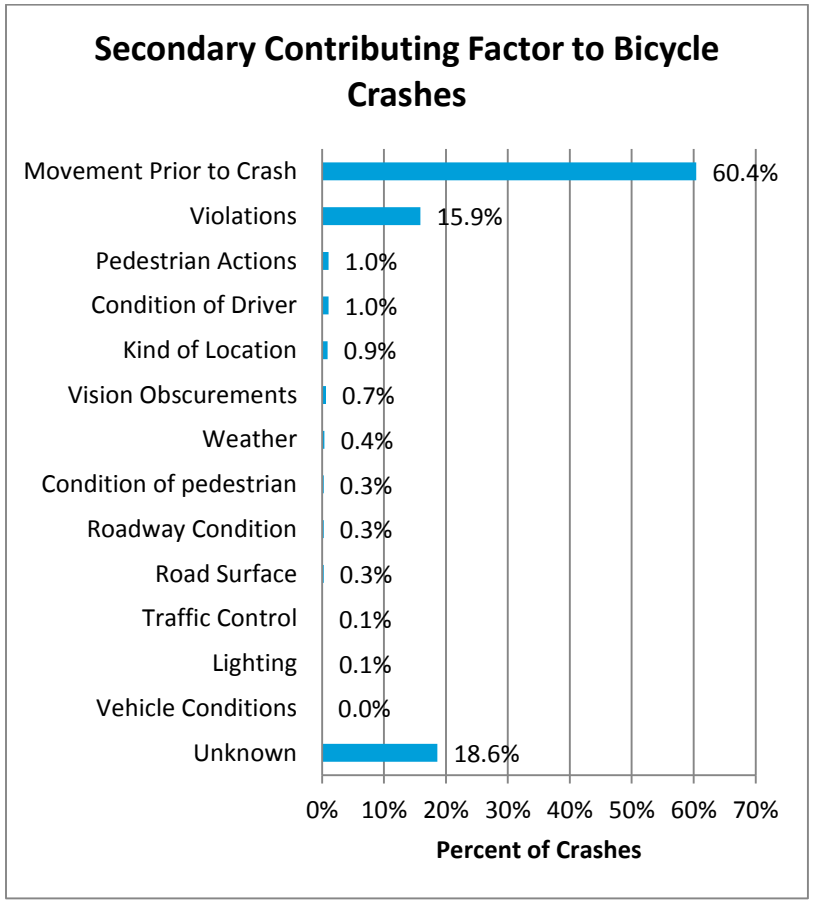
The overwhelming majority of crashes were primarily attributed to traffic violations (74%), with 20% attributed to movements prior to the crash (Figure 38).

Figure 38: Primary Contributing Factor to Bicycle Crashes (7-Parish Region Total)




Importantly, it is not necessarily clear using the data available whether the movements or violations in question are attributable to the cyclists or to the operator of a motor vehicle. Secondary contributing factors are largely identified as the same two issues (Figure 39).

Figure 39: Secondary Contributing Factor to Bicycle Crashes (7-Parish Region)



The manner of collision identified in the crash records illustrates the challenge of classifying bicycle crashes in terms designed for collisions between motor vehicles—19% of crashes are classified as "other"—however, it is notable that 40.5% of crashes were identified as right-angle collisions, 15.5% as sideswipes, 5.2% as rear end collisions, and smaller percentages for head-on collisions and various turning-movement incidents (Figure 40).

Relatedly, the large majority of cyclists (68.4%) were proceeding straight ahead at the time of the crash (Figure 41). Among other crashes for which cyclist movement is known, 6.1% involved bicyclists traveling the wrong direction on the roadway, with smaller percentages of bicyclists entering traffic from the shoulder, or making a turn. Future evaluation of the specific actions of the motorists involved in these crashes may allow a clearer picture of the circumstances that lead to a crash.

**Figure 40: Bicycle Crashes by Manner of Collision (7-Parish Region Total)**

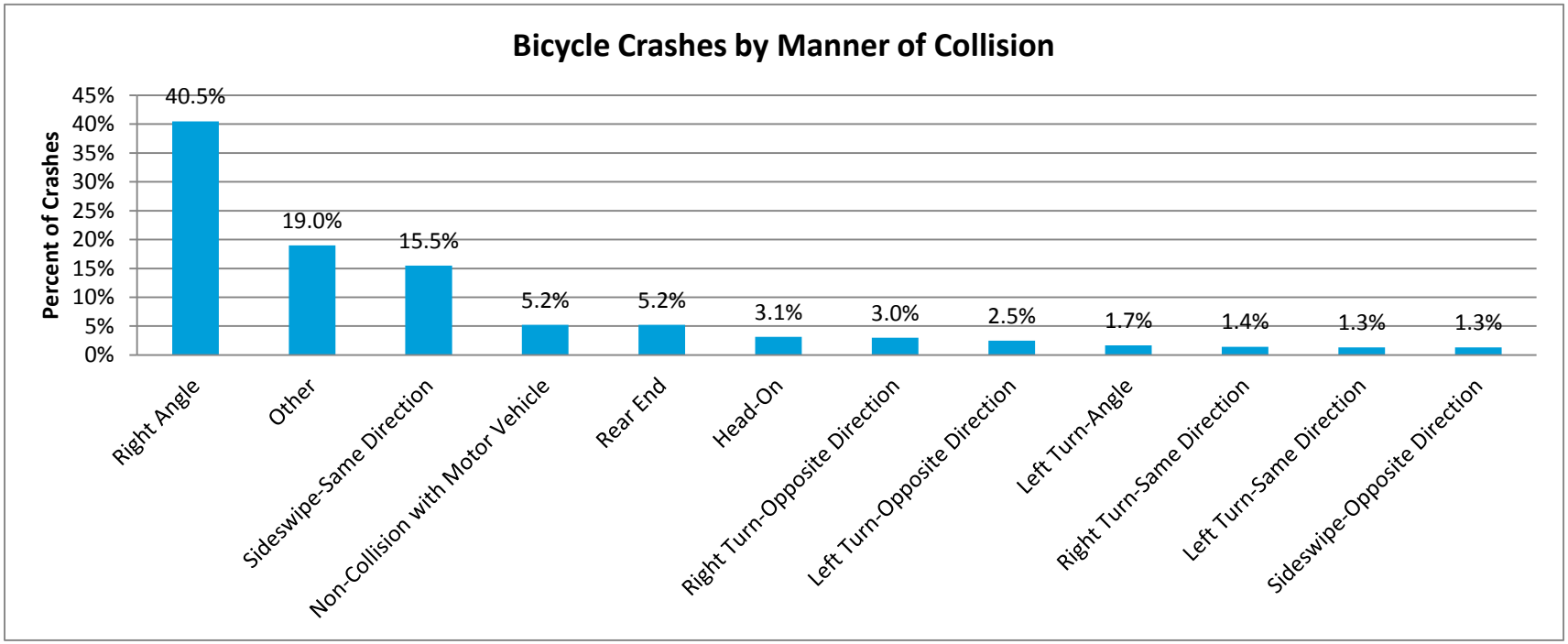
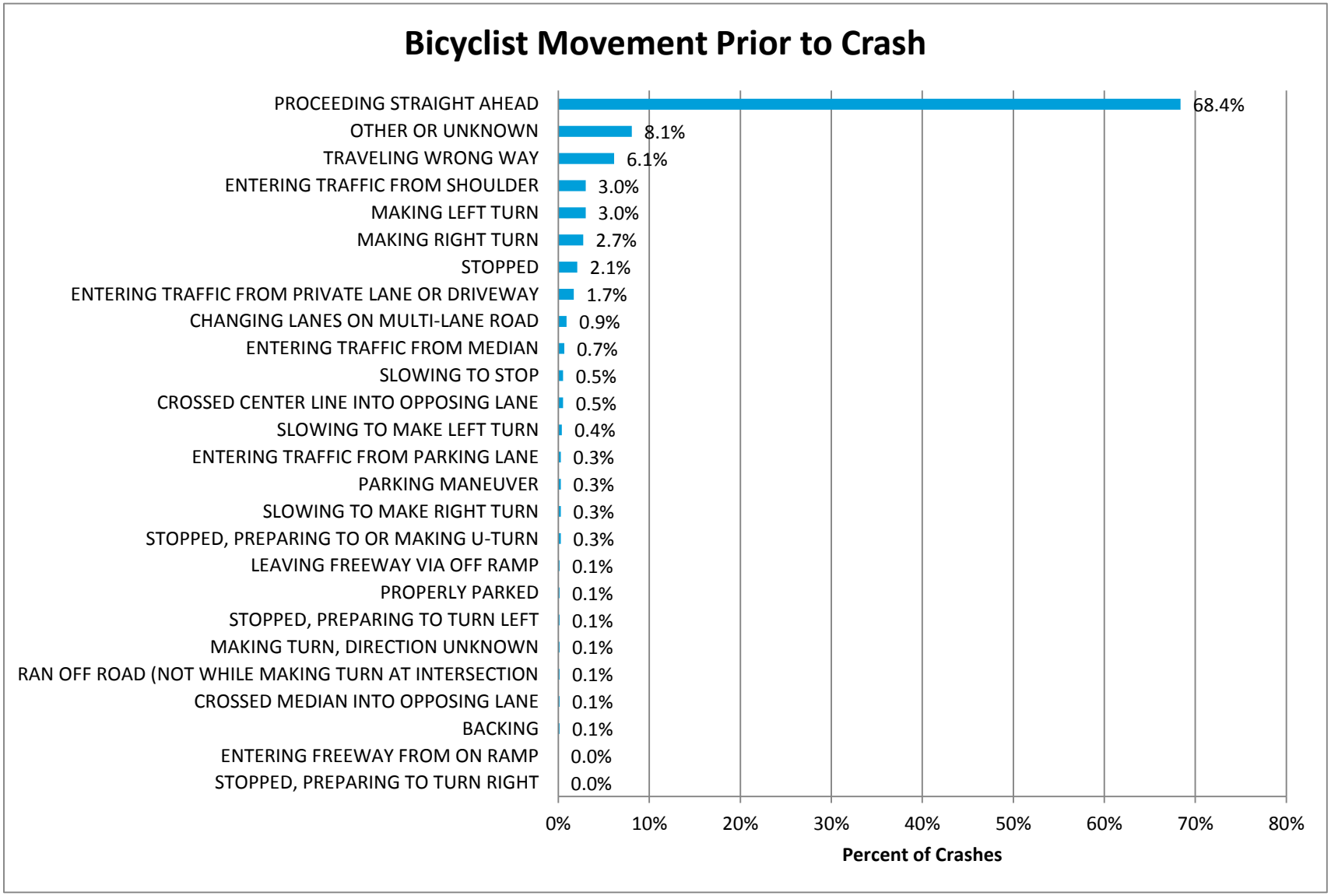


Figure 41: Bicyclist Movement Prior to Crash (7-Parish Region Total)



Violations were cited in 79% of crashes involving bicycles during this period (to either the bicyclist or the motorist) (Figure 42). Of those violations attributed to cyclists, improper turning, failure to yield, and disregarded traffic control were the most common (Figure 44). Twenty-four percent of bicycle crashes were hit-and-run incidents (Figure 43).

Figure 42: Percentage of Bicycle Crashes Where Violations Cited (7-Parish Region)

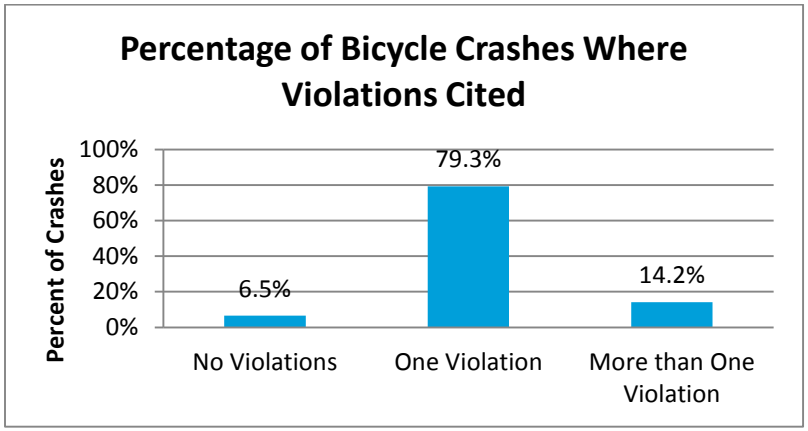



Figure 43: Hit and Run Bicycle Crashes (7-Parish Region Total)

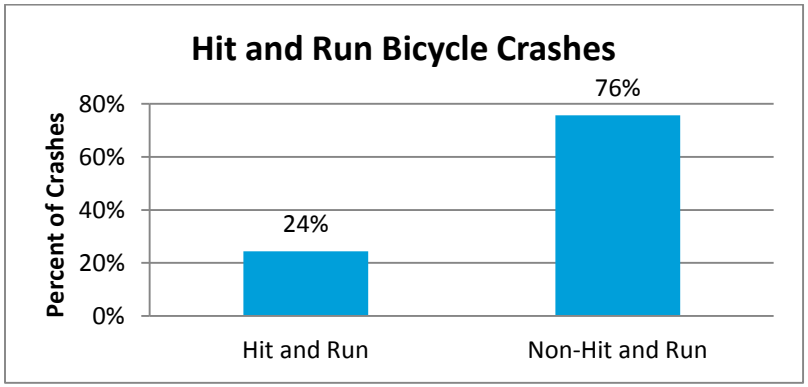
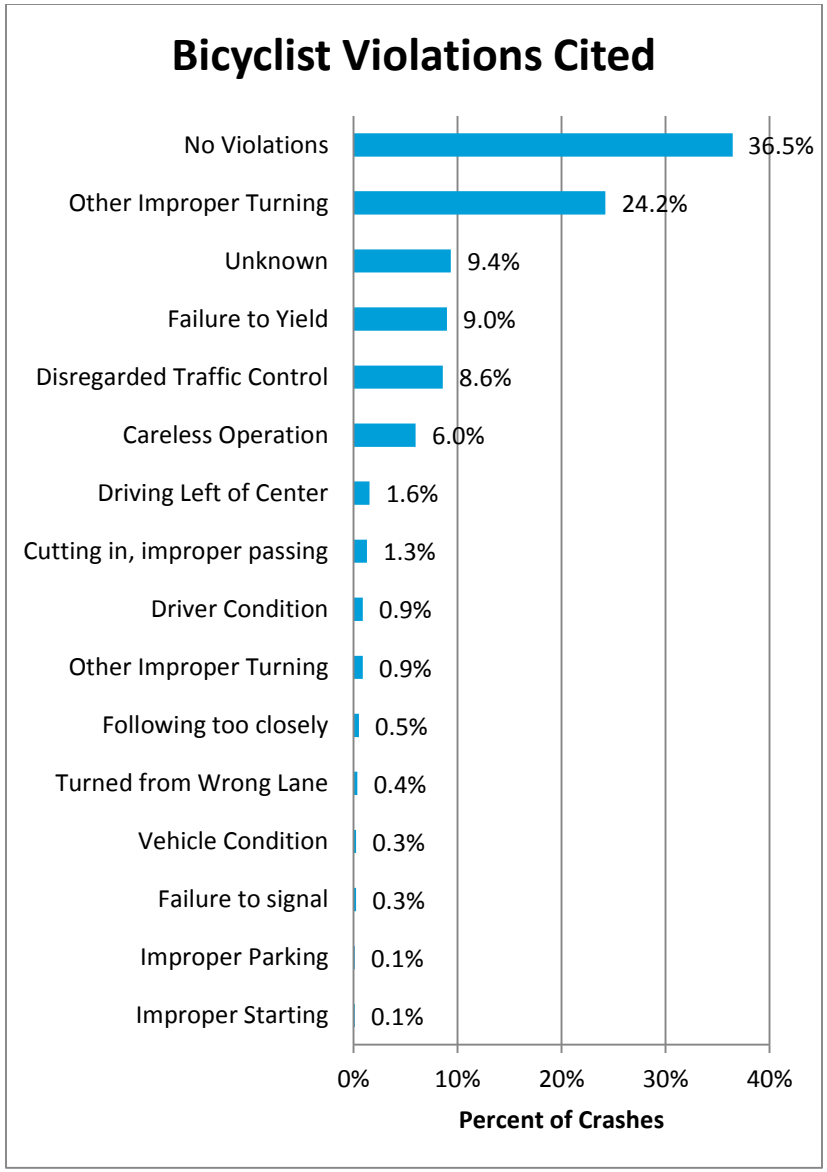



Figure 44: Bicyclist Violations Cited (7-Parish Region Total)



## 2.3 Implications of Summary Statistics

The pedestrian and bicycle statistics provided above a description of who was involved in regional crashes during the study period, when and under what conditions collisions occurred, and the severity of injuries resulting. Overall, this data suggests that pedestrian safety on the region's roadways is a persistent problem, and bicycle safety is a growing challenge as both the number of bicyclists and crash frequency rise.

The demographic composition of those involved in crashes has also shifted over time: fewer children are being struck (as either pedestrians or bicyclists), while a greater share of cyclist crashes involve older adults. In addition, there has been a proportional increase in the number of cyclists involved in crashes who are white or female, likely reflecting changes in who is choosing to bicycle, as described in the *2014 Pedestrian and Bicycle Count Report.*[12]

During the 2011-2012 period, significant road infrastructure investments were made in the New Orleans region, particularly in Orleans Parish, many of which included improved accommodation for pedestrians and/or bicyclists. These investments are intended to encourage and facilitate safer walking and bicycling by creating (in some instances) dedicated spaces for bicyclists and improving accessibility for pedestrians. However, the crash data suggest that these changes to the built environment may require a period of adjustment as motorists adapt to the influx of non-motorized uses, new facility types, and new policies (e.g. Complete Streets) and regulations (e.g. requiring drivers to maintain a three-foot passing distance) aimed at protecting vulnerable road users. A direct analysis of local data comparing safety outcomes before and after specific new facilities have been installed has not yet been conducted and represents an important opportunity for future research.

Ultimately, research has demonstrated that more pedestrians and bicyclists on the road can eventually be expected to result in safer streets for all users.[13] However, achieving this goal will require ongoing education and enforcement efforts in addition to new infrastructure to ensure that users of all modes understand the rules of the road and are held accountable for their actions. Increasing crash totals during this study period reflect a region in transition toward becoming more biking and walking-friendly through both infrastructure improvements and educational outreach. It is important to remember that crash totals should not be relied upon as the sole performance measure employed to evaluate regional road user safety, but must be considered in the context of increases or decreases in the amount of walking and biking occurring in the region, as well as in relationship to ongoing changes in the built environment.

[12] www.pbriLA.org

[13] For more information about relevant studies documenting the impact of increased bicycling and walking on road safety, see: Alliance for Biking and Walking *Bicycling and Walking in the United States: 2014 Benchmarking Report,* http://www.bikewalkalliance.org/resources/benchmarking

## 3.0 Geographic Analysis of Crash Data

In addition to the analysis of various crash attributes across the region as described above, examining the spatial distribution of pedestrian and bicycle crashes helps to provide a more meaningful understanding of crash incidence and permits the identification of specific locations and corridors where intervention is most needed.

In this section, general maps of crash locations throughout the region are provided.[14] Additional mapping and analysis is provided for Orleans and Jefferson Parish, including crash cluster analysis to identify statistically significant "hot spots" where crash-reduction efforts should be directed and additional analysis of crashes in New Orleans' French Quarter and CBD.

As shown in Figures 45 and 46, the bulk of crash incidents occurred in Orleans and Jefferson Parish (86% of pedestrian crashes and 90% of bicycle crashes). See maps in Appendix B for illustrations of the approximate locations of pedestrian and bicycle crashes in each of the remaining parishes. A cluster of crashes occurs in the Slidell area in St. Tammany Parish, while the Laplace section of Airline Highway in St. John the Baptist Parish appears to have been the focus of a disproportionate share of that parish's incidents. Crash patterns in St. Charles and St. Bernard parishes are relatively diffuse, while Plaquemines Parish had so few crashes during this period that no patterns are discernable. Although crash totals in these parishes are too low, and patterns too diffuse, to enable statistical analysis of crash hot spots, future data analysis should be conducted at the local level to identify potential pedestrian or bicycle safety interventions needed on corridors or at intersections corresponding to the locations of crashes.

[14] Note on processing of data: the data was geocoded with geographic coordinates by DOTD and the RPC. However, a small number of records (2.1% of pedestrian crash records and 1.5% of bicycle crash records) were identified with remaining geocoding errors, likely due to reporting errors. These non-geocoded records impacted spatial analysis to a small degree.

**Figure 45: Pedestrian Crashes in New Orleans Metro Area, 2011-2012**

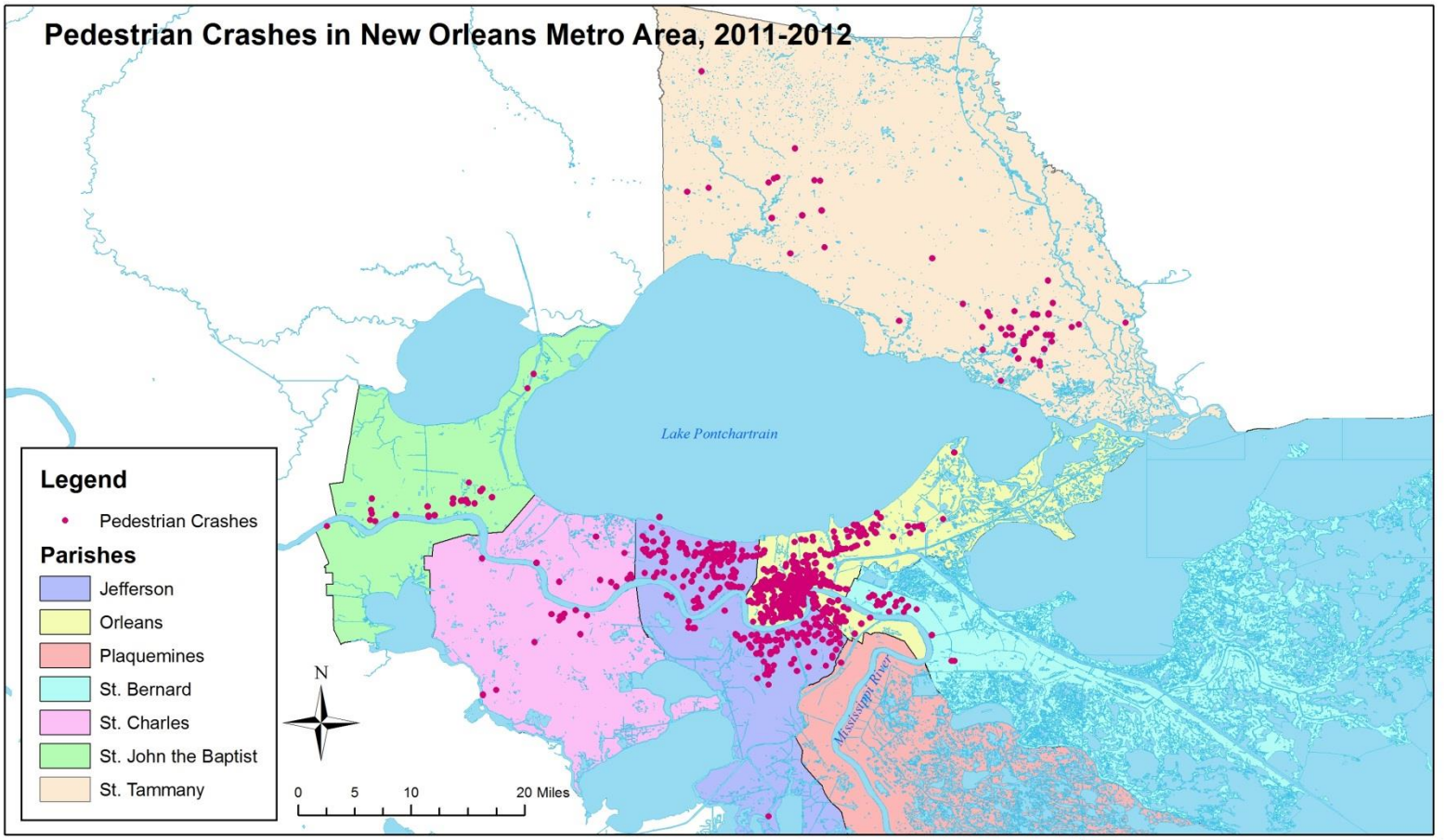



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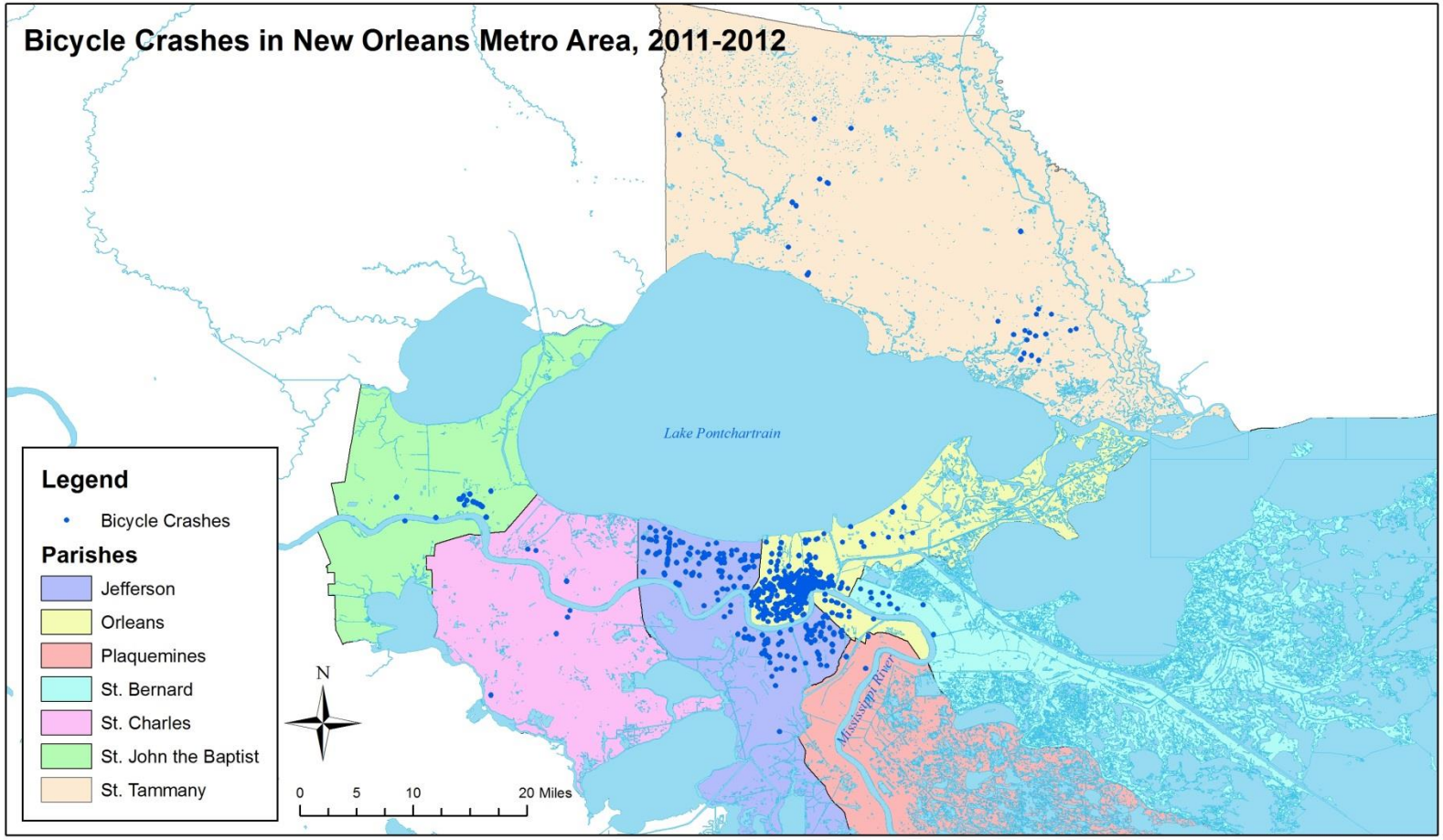
**Figure 46: Bicycle Crashes in New Orleans Metro Area, 2011-2012**




RPC REGIONAL PLANNING COMMISSION FOR THE PARISHES OF JEFFERSON ORLEANS PLAQUEMINES ST. BERNARD ST. TAMMANY ST. CHARLES ST. JOHN THE BAPTIST LOUISIANA

DOTD LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

PBRI PEDESTRIAN BICYCLE RESOURCE INITIATIVE

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## 3.1 Spotlight: French Quarter and CBD

As described in earlier iterations of this report, downtown New Orleans, including the Central Business District (CBD) and French Quarter have long borne a disproportionate share of the city's and region's crash problem. Tables 7 and 8 and Figures 47 and 47 illustrate the share of the city and urban area's crashes that occurred in these neighborhoods in 2011 and 2012 for pedestrians and bicyclist respectively.

As in previous years, more than a quarter of Orleans Parish pedestrian crashes occurred in this small area during this period, while the percentage of bicyclist crashes occurring in the CBD and French Quarter has increased from 17% in 2010 to over 25% in 2012. Although there tend to be few severe crashes (and during this study period, no fatalities) in this area due to slower traffic speeds, the very high crash frequency in the city's business and tourism core represents an ongoing concern.

Improvements to the built environment—including replacement of dysfunctional or missing pedestrian signals and targeted enforcement to reduce obstruction of pedestrian and bicycle rights-of-way—could significantly reduce crash incidence in this area. Already, Decatur Street in the French Quarter has been redesigned to be more pedestrian friendly. Future crash data should be studied to evaluate any improvement in crash outcomes following this development.

Moreover, a planned 2014/2015 pedestrian signal replacement project targeting the CBD is likely to significantly improve crash statistics. Continued evaluation of the data to measure the success of such interventions is important to advancing the implementation of the city's Complete Streets Policy and Pedestrian Safety Action Plan.

**Table 7: Pedestrian Incidents within the French Quarter and CBD**

| Pedestrian Incidents within the French Quarter and CBD | | | | |
|---|---|---|---|---|
| Year | Number of Crashes | Number of Severe Crashes | Percent of Total Orleans Parish Crashes | Percent of Total Orleans and Jefferson Parish Crashes |
| 2011 | 73 | 8 | 26.3% | 18.3% |
| 2012 | 91 | 9 | 25.8% | 18.1% |

**Table 8: Bicycle Incidents within the French Quarter and CBD**

| Bicycle Incidents within the French Quarter and CBD | | | | |
|---|---|---|---|---|
| Year | Number of Crashes | Number of Severe Crashes | Percent of Total Orleans Parish Crashes | Percent of Total Orleans and Jefferson Parish Crashes |
| 2011 | 47 | 3 | 22.5% | 15.5% |
| 2012 | 74 | 1 | 25.6% | 19.0% |

**Figure 47: Pedestrian Crashes in French Quarter and CBD, 2011-2012**

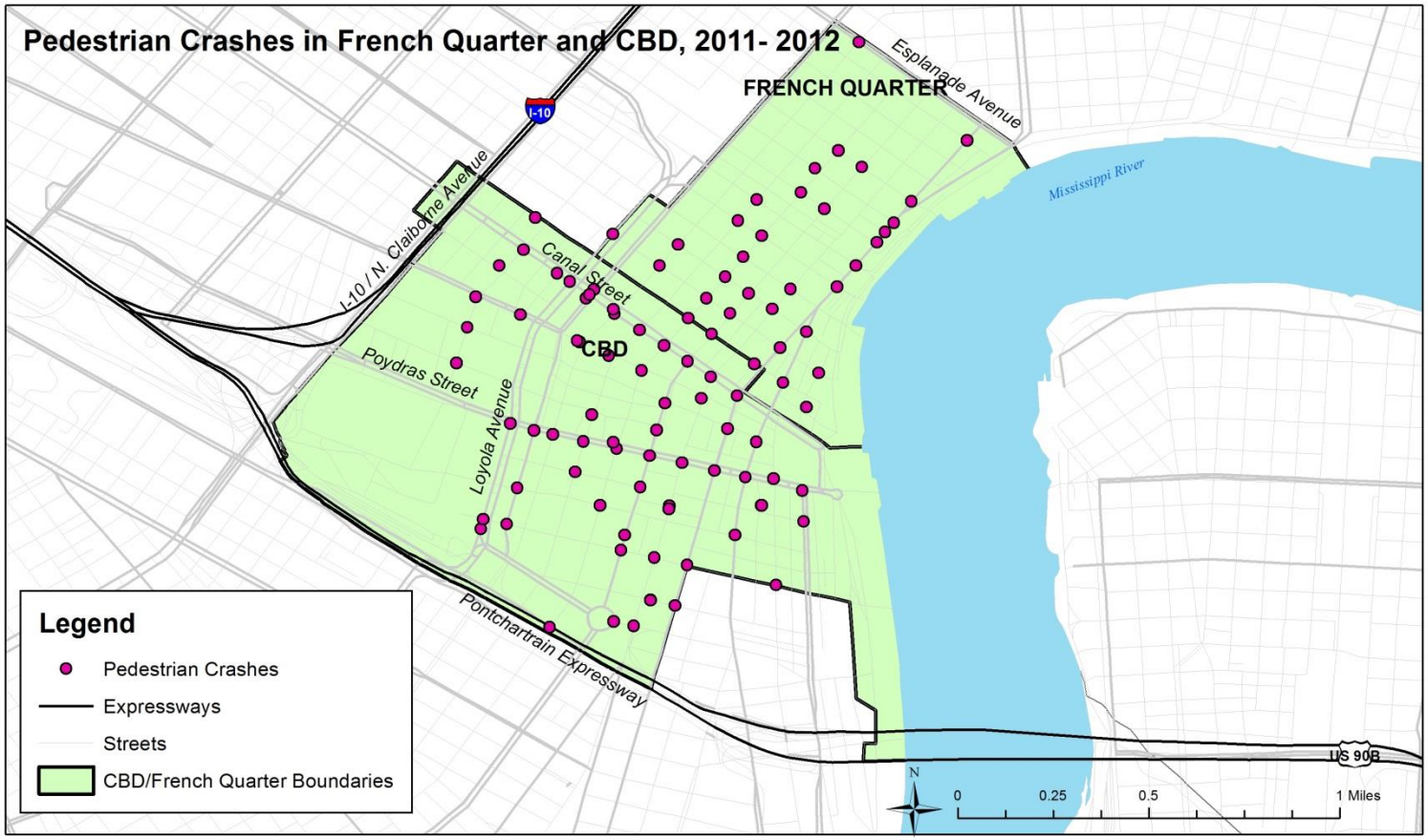


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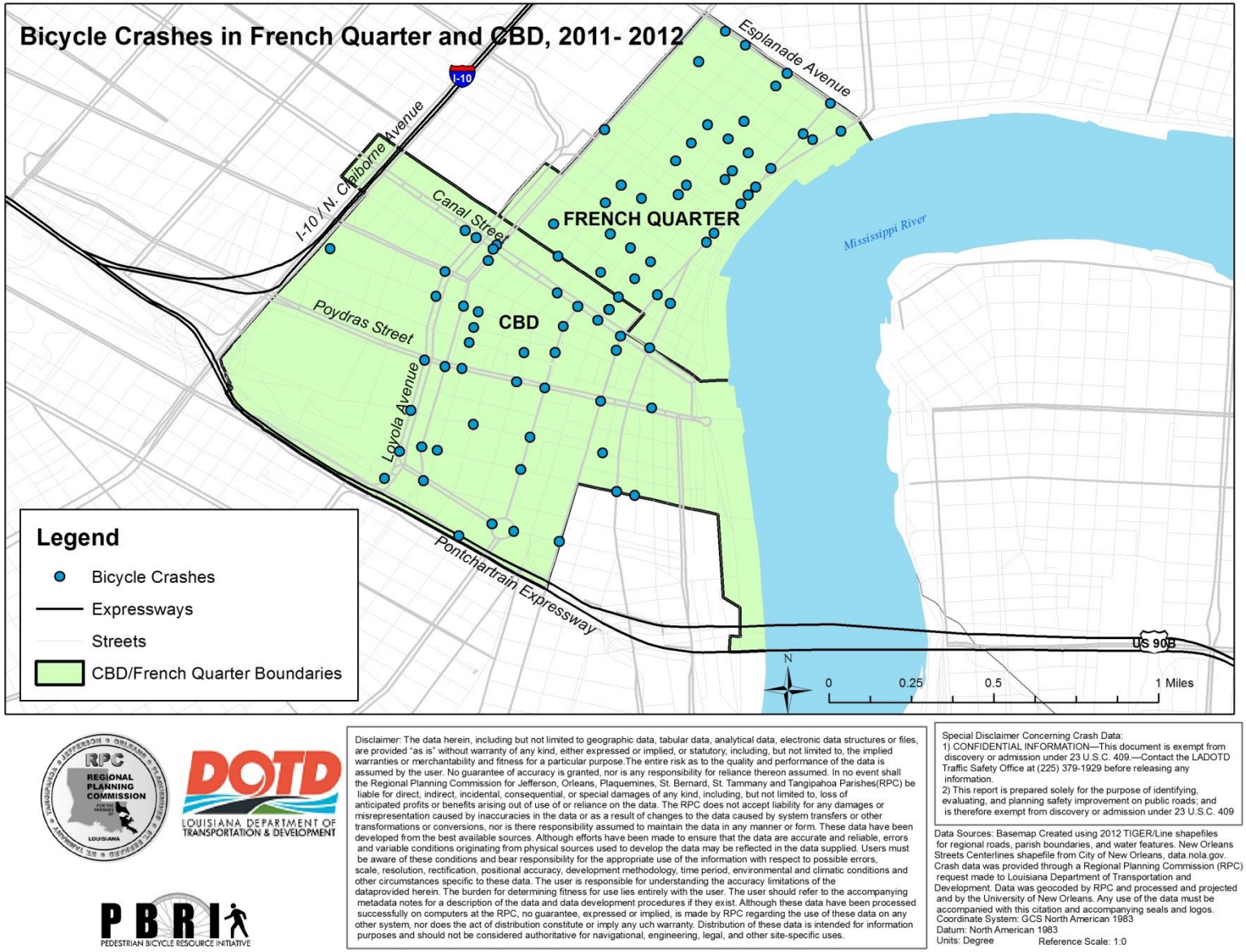
**Figure 48: Bicycle Crashes in French Quarter and CBD, 2011-2012**

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## 3.2 Pedestrian Spatial Data Overview

Figures 49 and 50 show the locations of all pedestrian crashes in 2011 and 2012 for which reliable geographic coordinates were provided in Orleans and Jefferson Parish, respectively. Points on these maps map represent more than one crash. Severity of crashes highlighting the locations of fatal and severe pedestrian crashes is mapped in figures 51 through 54. More than two crash incidents occurred at or near six intersections in Jefferson Parish and 29 intersections in Orleans Parish (Tables 9 and 10). This is a substantial increase from the 16 locations recording three or more pedestrian crashes in both parishes in 2009-2010.

In Jefferson Parish, the location at which the largest number of crash incidents occurred was at the intersection of two major arterials, Manhattan Boulevard and the Westbank Expressway. Two additional intersections along the latter corridor experienced multiple crashes during this period as well. In Orleans Parish, many of the highest crash frequencies appear at locations within the French Quarter and CBD, likely reflecting the very high volumes of pedestrians who travel in this area (see section 3.1). In addition, multiple crashes occurred at the intersections of two major urban arterials, such as Gentilly Boulevard and Elysian Fields Avenue, or Tulane Avenue and S Carrollton Avenue.

Pedestrian improvements have been undertaken at some of these locations (e.g. Decatur Street and Toulouse Street, Gentilly Boulevard and Elysian Fields Avenue) since 2012. These locations should be monitored to evaluate the effectiveness of these improvements. In addition, extensive pedestrian infrastructure improvements were completed in the French Quarter in late 2012/early 2013, which may help reduce pedestrian crash incidence in this area.

Tables 11 and 12 highlight the corridors where the highest absolute numbers of pedestrian crashes took place in Orleans and Jefferson Parish. In Jefferson Parish, Veterans Memorial Boulevard tops the list with 17 pedestrian crashes, followed by the Westbank Expressway with 15 crashes and Jefferson Highway with ten. In Orleans Parish, the Claiborne corridor (including both North and South Claiborne Avenue) had the greatest crash frequency with 36 crashes over two years. Canal Street and Carrollton Avenue (North and South) follow with 28 and 25 pedestrian crashes, respectively.

Most of the corridors in these tables were also identified as top crash corridors in previous crash analyses, indicating consistent user demand for pedestrian access along and across these major urban arteries, as well as inadequate protection and infrastructure provision for non-motorized users.

**Table 9: Top Pedestrian Crash Locations, Jefferson Parish 2011-2012**

| Top Pedestrian Crash Locations, Jefferson Parish 2011-2012 | |
|---|---|
| Location | Number of crashes, 2011-2012 |
| Manhattan Blvd & Westbank Expy | 5 |
| Loyola Dr & I-10 | 4 |
| 18th St & Hessmer Ave | 3 |
| Airline Dr & Clearview Pkwy | 3 |
| Loyola Dr & Clemson St | 3 |
| Westbank Expy & Barataria Blvd | 3 |

Table 10: Top Pedestrian Crash Locations, Orleans Parish, 2011-2012

| Top Pedestrian Crash Locations, Orleans Parish, 2011-2012 | |
|---|---|
| Location | Number of crashes, 2011-2012 |
| Canal St and N/S Rampart St | 6 |
| Poydras St & Camp St | 6 |
| St. Claude Ave & Elysian Fields Ave | 5 |
| Tulane Ave & S Carrollton Ave | 5 |
| Bienville St & Royal St | 4 |
| Decatur St & Toulouse St | 4 |
| Gentilly Blvd & Elysian Fields Ave | 4 |
| LaSalle St & Perdido St | 4 |
| Poydras St & S Peters St | 4 |
| Bourbon St & St. Phillip St | 3 |
| Bourbon St & Toulouse St | 3 |
| N Broad St & Orleans Ave | 3 |
| Canal St & Bourbon St/Carondelet St | 3 |
| N/S Carrollton Ave & Canal St | 3 |
| Chef Menteur Hwy & Louisa St | 3 |
| S Claiborne Ave & First St | 3 |
| Dauphine St & Toulouse St | 3 |
| Decatur St & St. Ann St | 3 |
| Iberville St & N Peters St | 3 |
| Magazine St & Milan St | 3 |
| Poydras St & Carondelet St | 3 |
| Poydras St & Loyola Ave | 3 |
| St. Bernard Ave & N Miro St | 3 |
| St. Charles Ave & Poydras St | 3 |
| Tchoupitoulas St & Andrew Higgins Dr | 3 |
| Tulane Ave & S Broad St | 3 |
| Tulane Ave & S Galvez St | 3 |
| Tulane Ave & S Pierce St | 3 |
| General DeGaulle Dr & Shirley Dr | 3 |

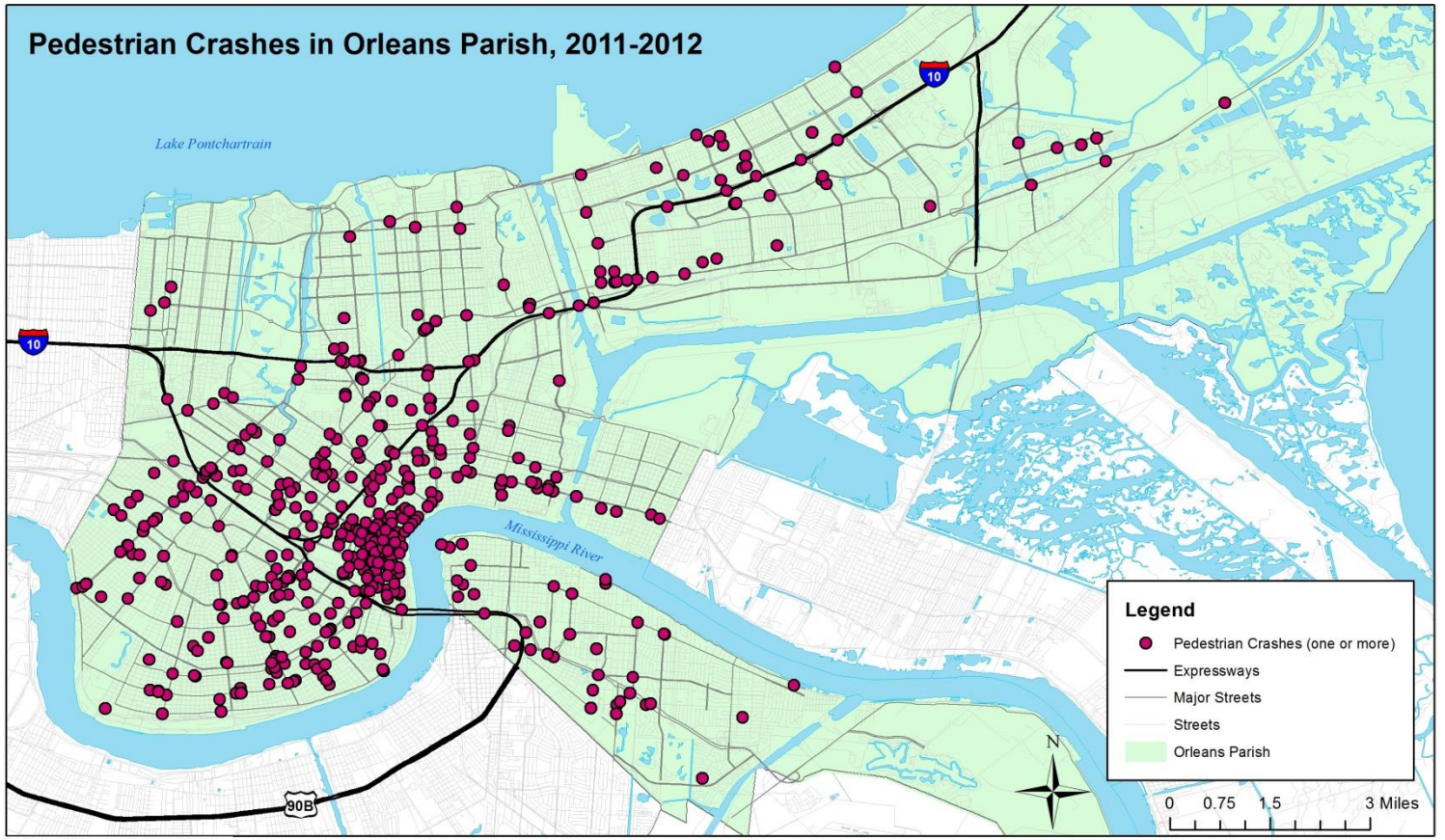
Table 11: Top Pedestrian Crash Corridors, Jefferson Parish

| Top 10 Pedestrian Crash Corridors, Jefferson Parish | | |
|---|---|---|
| Rank | Corridor | Number of crashes, 2011-2012 |
| 1 | Veterans Memorial Blvd | 17 |
| 2 | Westbank Expy | 15 |
| 3 | Jefferson Hwy | 10 |
| 4 | Airline Dr | 8 |
| 4 | Manhattan Blvd | 8 |
| 6 | I-10 | 7 |
| 6 | Loyola Dr | 7 |
| 8 | Ames Blvd | 6 |
| 9 | Barataria Blvd | 5 |
| 9 | Causeway Blvd | 5 |
| 9 | Lapalco Blvd | 5 |

Table 12: Top Pedestrian Crash Corridors, Orleans Parish

| Top 10 Pedestrian Crash Corridors, Orleans Parish | | |
|---|---|---|
| Rank | Corridor | Number of crashes, 2011-2012 |
| 1 | N/S Claiborne Ave | 36 |
| 2 | Canal St | 28 |
| 3 | N/S Carrollton Ave | 25 |
| 4 | Poydras St | 24 |
| 5 | Magazine St | 21 |
| 6 | St. Charles Ave | 20 |
| 7 | Bourbon St | 19 |
| 8 | Tulane Ave | 17 |
| 9 | Camp St | 16 |
| 9 | Decatur St | 16 |
| 9 | Elysian Fields Ave | 16 |

**Figure 49: Pedestrian Crashes in Orleans Parish, 2011-2012**

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Coordinate System: GCS North American 1983
Datum: North American 1983
Units: Degree
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**Figure 50: Pedestrian Crashes, Jefferson Parish, 2011-2012**

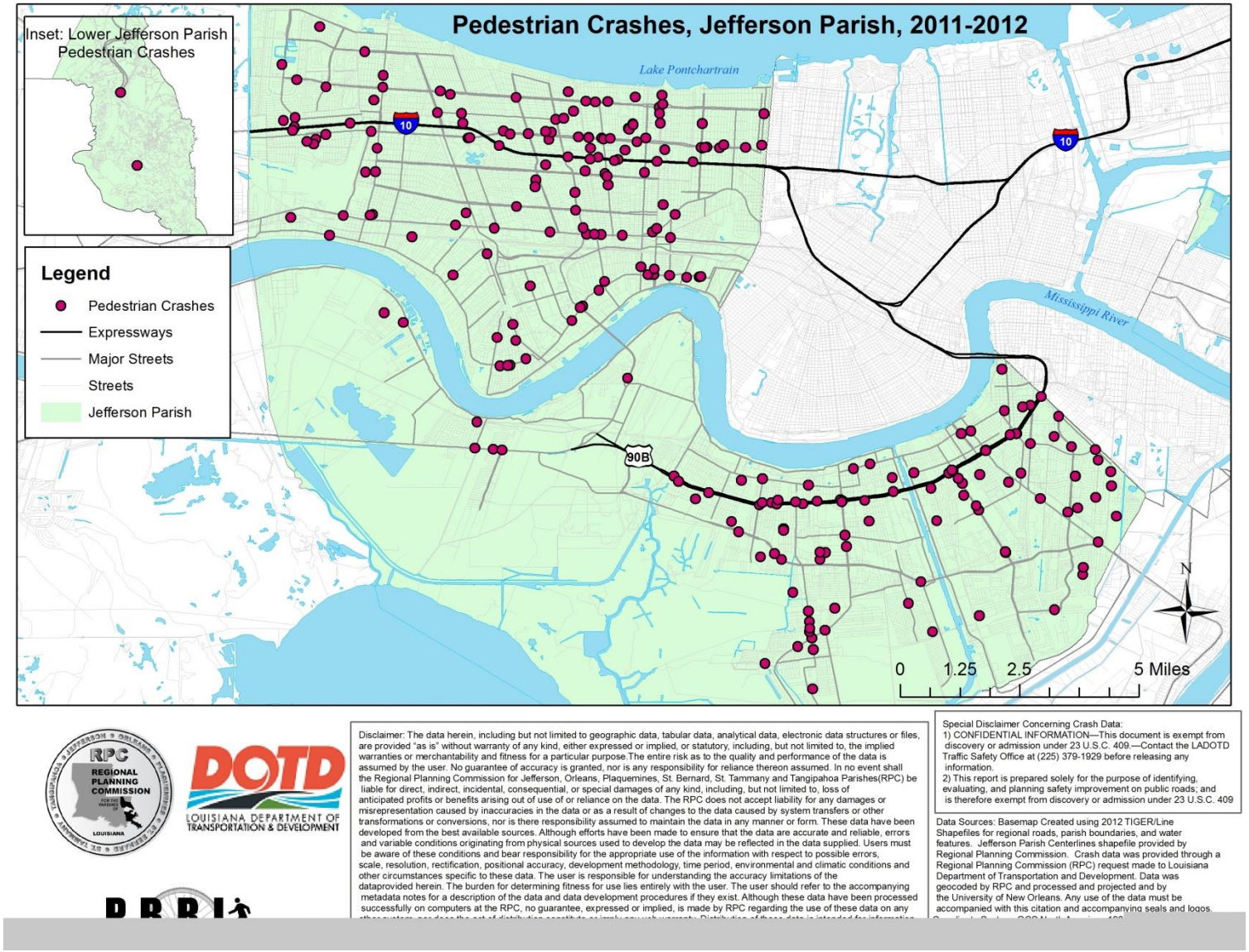
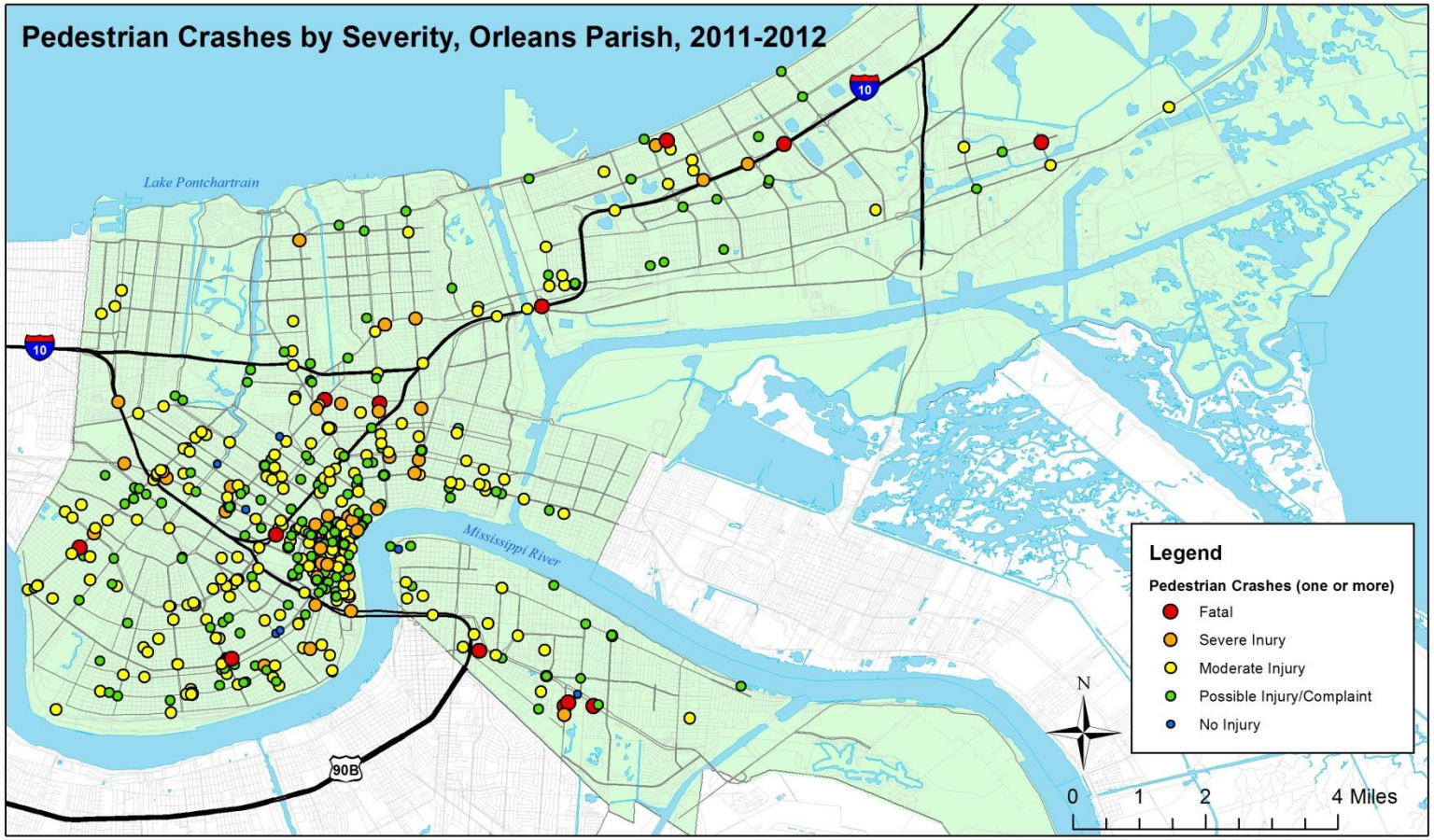


**Figure 51: Pedestrian Crashes by Severity, Orleans Parish, 2011-2012**

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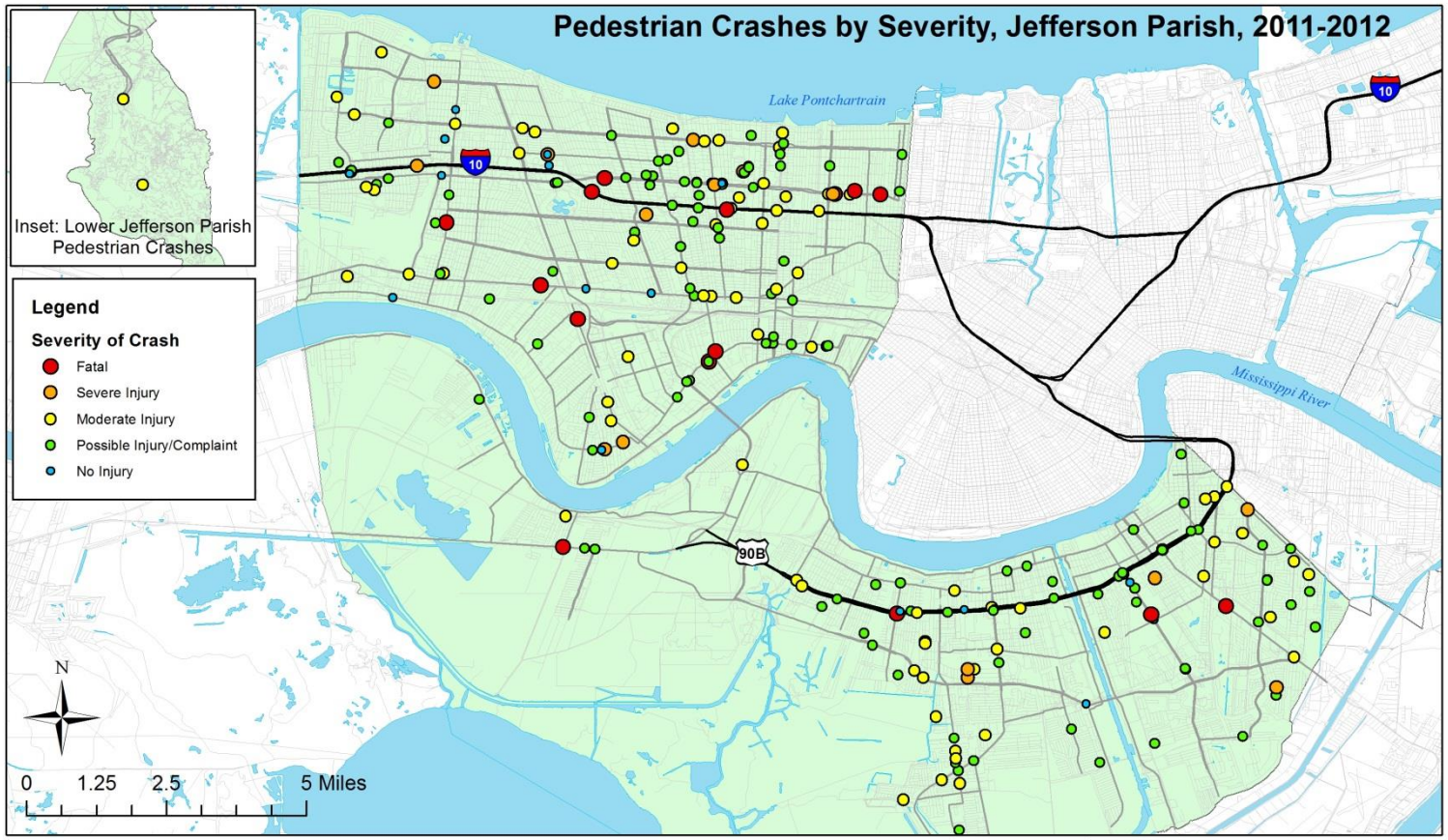
Datum: North American 1983
Units: Degree Reference Scale: 1:0

**Figure 52: Pedestrian Crashes by Severity, Jefferson Parish, 2011-2012**

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Datum: North American 1983
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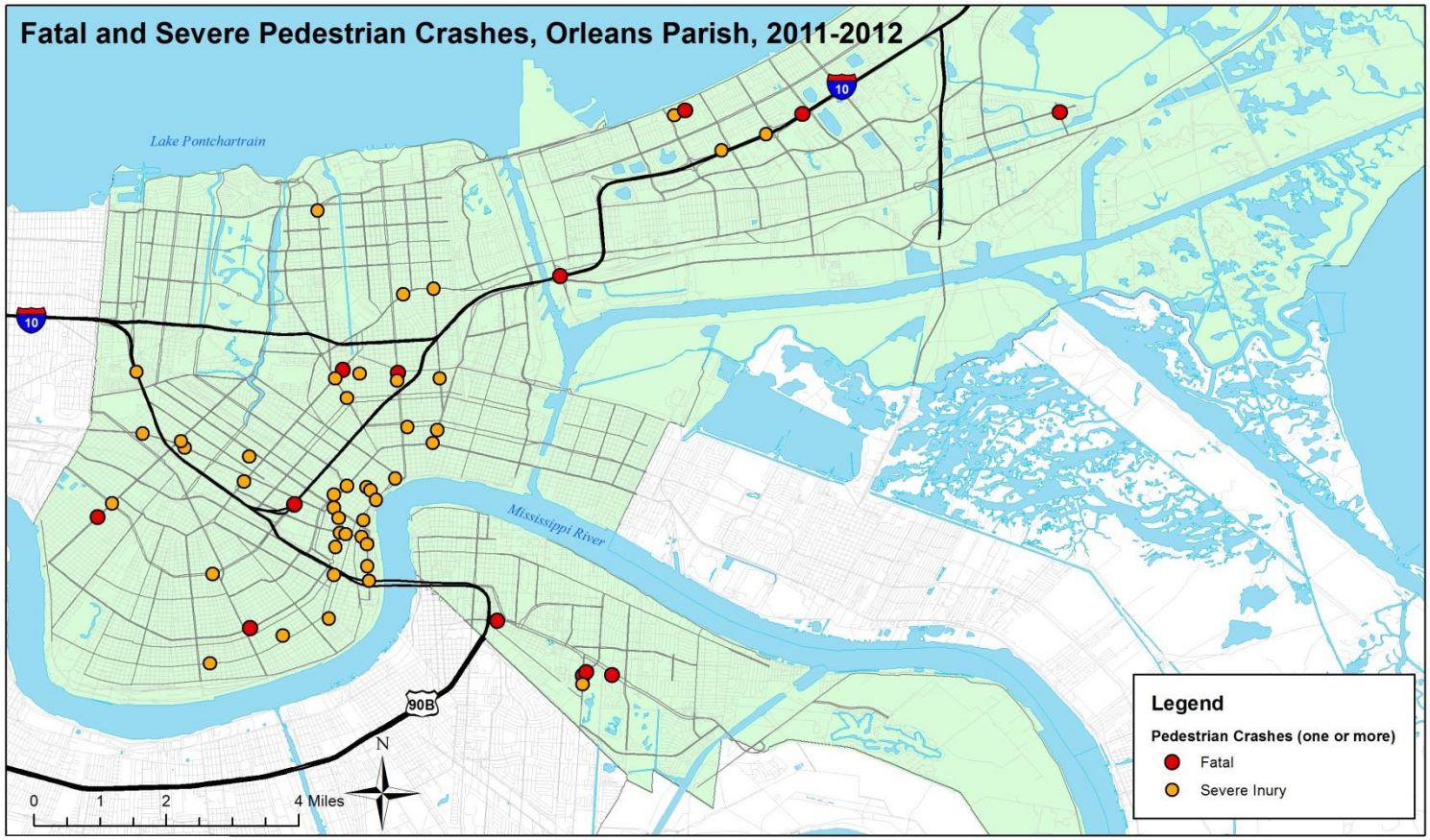
**Figure 53: Fatal and Severe Pedestrian Crashes, Orleans Parish, 2011-2012**

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Datum: North American 1983
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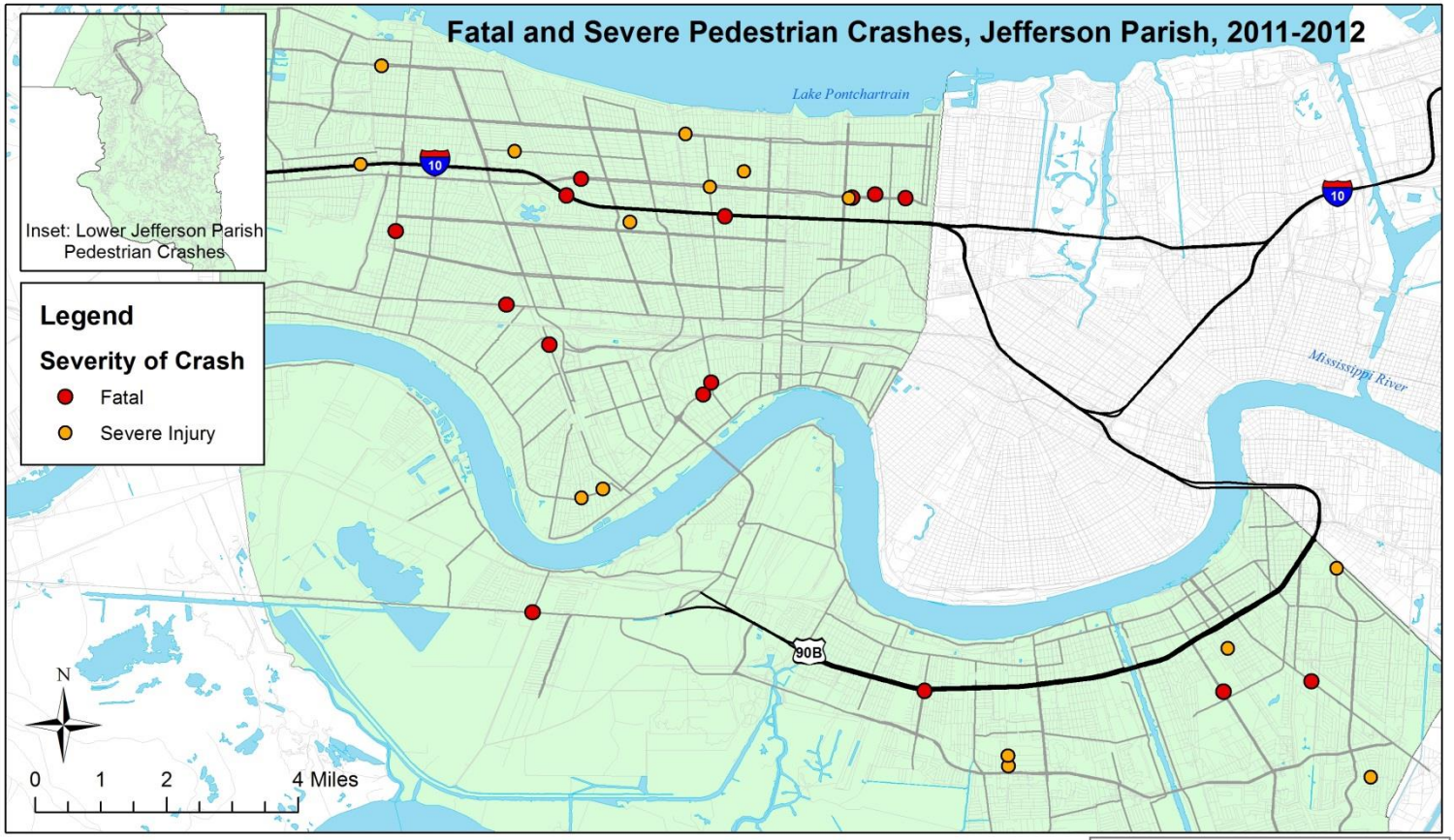
**Figure 54: Fatal and Severe Pedestrian Crashes, Jefferson Parish, 2011-2012**

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Units: Degree Reference Scale: 1:0

## 3.3 Pedestrian Crash Cluster Analysis

Crash cluster analysis is an additional tool for identifying geographic areas where an unusually high number of crashes are occurring. This technique allows the identification and description of statistically significant crash "hot spots," allowing policymakers to target and prioritize interventions. In this report, the Spatial and Temporal Analysis of Crime (STAC) routine from CrimeStat (Department of Justice) is used to identify crash hot spots. For a complete explanation of the various techniques for analyzing spatial statistics, including the methodology of using STAC, see Chapter 7 of the *2005 New Orleans Metropolitan Bicycle and Pedestrian Plan.*

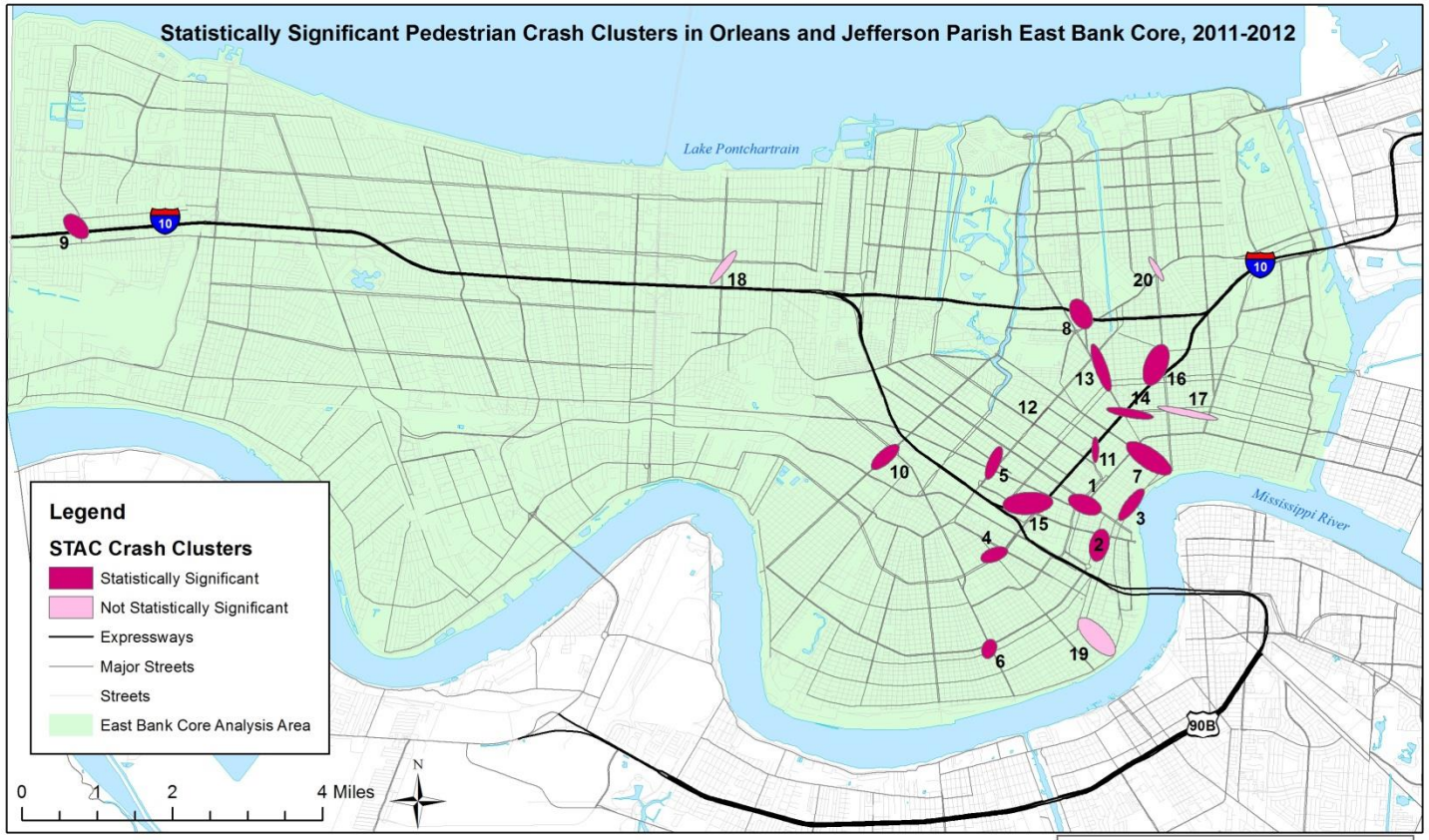
This tool identifies 20 pedestrian crash clusters throughout the core of Orleans and Jefferson Parishes. The 'core' area evaluated includes the portion of Jefferson and Orleans Parish on the East Bank of the Mississippi River and west of the Industrial Canal. Divisions created by bodies of water negatively impact the validity of STAC outputs. This core area of the region provides the densest concentration of crashes (as well as the densest population) in the greater metro area, and provides a well-defined area for analysis.

Figure 55 illustrates the analysis area and represents all 20 crashes identified, highlighting those that are statistically significant at the 95$^{th}$ percent confidence interval or higher. Statistical significance of clusters is determined by one of two key metrics: the number of crashes or the density of crashes within clusters. With a sample size of 666 crashes within the analysis zone, six or more crashes within a cluster or a cluster density of 9972.282 or greater meets the threshold for significance at which it is highly unlikely that the cluster is due to chance. For the 2011-2012 period, 16 of the clusters identified were statistically significant by crash frequency, while cluster 12 also met the threshold for significance by cluster density (Table 13). See Appendix C for full STAC Output tables.

**Table 13: Pedestrian Generalized Cluster Centers**

| Pedestrian Generalized Cluster Centers | | |
|---|---|---|
| Cluster | Approximate Location | Statistically Significant? |
| 1 | Canal St & N/S Rampart St | Yes |
| 2 | Camp St & Girod St | Yes |
| 3 | Decatur St & St Louis St | Yes |
| 4 | S Claiborne Ave & Jackson Ave | Yes |
| 5 | N Broad St & Banks St | Yes |
| 6 | St Charles Ave & Louisiana Ave | Yes |
| 7 | Esplanade Ave & Bourbon St | Yes |
| 8 | Paris Ave & I-610 | Yes |
| 9 | I-10 & Loyola Dr | Yes |
| 10 | S Carrollton Ave & Palm St | Yes |
| 11 | N Claiborne Ave & St Phillip St | Yes |
| 12 | N Broad St & Dumaine St | Yes |
| 13 | St Bernard Ave & N Rocheblave St | Yes |
| 14 | N Claiborne Ave & St Bernard Ave | Yes |
| 15 | Perdido St & S Roman St | Yes |
| 16 | Frenchmen St & N Dorgenois St | Yes |
| 17 | Spain St & N Robertson St | No |
| 18 | Veterans Blvd & Bonnabel Blvd | No |
| 19 | Annunciation St & Felicity St | No |
| 20 | Elysian Fields Ave & Gentilly Blvd | No |

**Figure 55: Statistically Significant Pedestrian Crash Clusters in Orleans and Jefferson Parish East Bank Core, 2011-2012**

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Reference Scale: 1:0

Coordinate System: GCS North American 1983
Datum: North American 1983
Units: Degree

## 3.4 Bicycle Spatial Data Overview

Figures 56 and 57 show the approximate locations of bicycle crashes in Orleans and Jefferson Parishes in 2011 and 2012, while Figures 58 through 61 illustrate the severity of crashes and highlight the locations of fatal and severe incidents. Whereas in previous years, very few intersections were cited as the location of more than one or two crashes over a two year period, in 2011 and 2012 there were five intersections with three or more bicycle crashes reported in Jefferson Parish, and 16 such intersections in Orleans Parish (Tables 14 and 15).

In Jefferson Parish, Williams Boulevard emerges as the clear locus of bicycle crash activity during this period. In Orleans Parish, the highest crash frequencies occurred at the intersections of S Claiborne Avenue and Tulane Avenue, Magazine Street and Jackson Avenue, and Loyola Avenue and Poydras Street.

As was the case for pedestrians, several key arterial roadways persistently dominate the list of top crash corridors, along with two French Quarter streets (Tables 16 and 17). In Jefferson Parish, the top crash corridors include Williams Boulevard, Veterans Memorial Boulevard, and the Westbank Expressway. In Orleans Parish, Claiborne Avenue (North and South), St. Charles Avenue, and Canal Street top the list. All of these corridors have been identified as the location of a substantial share of bicycle crashes in analyses both before and after Hurricane Katrina. Corridor plans directly addressing pedestrian and bicycle accommodation and safety on these important connections are needed to comprehensively address these ongoing concerns.

Table 14: Top Bicycle Crash Locations, Jefferson Parish, 2011-2012

| Top Bicycle Crash Locations, Jefferson Parish, 2011-2012 | |
|---|---|
| Location | Number of crashes, 2011-2012 |
| Gretna Blvd & Manhattan Blvd | 3 |
| Williams Blvd & W Metairie Ave | 3 |
| Williams Blvd & 20th St | 3 |
| Williams Blvd & I-10 | 3 |
| Williams Blvd & W Napoleon Ave | 3 |

Table 15: Top Bicycle Crash Locations, Orleans Parish, 2011-2012

| Top Bicycle Crash Locations, Orleans Parish, 2011-2012 | |
|---|---|
| **Location** | **Number of crashes, 2011-2012** |
| S Claiborne Ave & Tulane Ave | 5 |
| Magazine St & Jackson Ave | 5 |
| Loyola Ave & Poydras St | 5 |
| Bourbon St & Conti St | 4 |
| Dauphine St & Iberville St | 4 |
| S Broad St & Banks St | 3 |
| N Broad St & Dumaine St | 3 |
| Canal St & Camp St/Chartres St | 3 |
| Canal St & N/S Rampart St | 3 |
| N Claiborne Ave & Esplanade Ave | 3 |
| S Claiborne Ave & Washington Ave | 3 |
| Decatur St & Governor Nichols St | 3 |
| Decatur St & Toulouse St | 3 |
| Elysian Fields Ave & N Roman St | 3 |
| Iberville St & Dauphine St | 3 |
| N Rampart St & St. Louis St | 3 |
| St. Charles Ave & S Carrollton Ave | 3 |
| St. Claude Ave & Poland Ave | 3 |

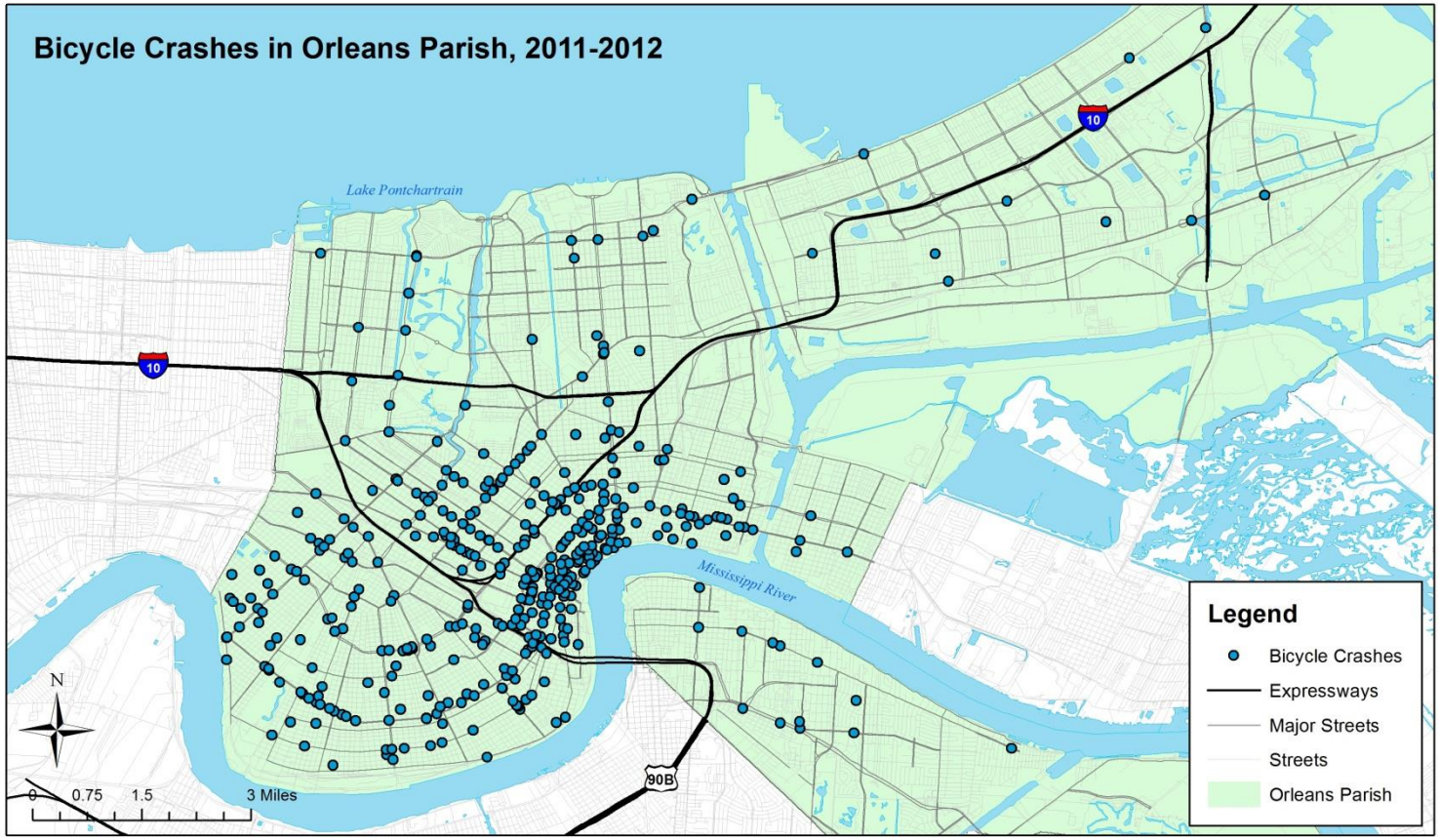
Table 16: Top 10 Bicycle Crash Corridors, Jefferson Parish

| Top 10 Bicycle Crash Corridors, Jefferson Parish | | |
|---|---|---|
| **Rank** | **Corridor** | **Number of crashes, 2011-2012** |
| 1 | Williams Blvd | 22 |
| 2 | Veterans Memorial Blvd | 13 |
| 3 | Westbank Expy | 12 |
| 4 | Jefferson Hwy | 11 |
| 5 | Airline Dr | 8 |
| 5 | Ames Blvd | 8 |
| 7 | Lapalco Blvd | 6 |
| 7 | W Esplanade Ave | 6 |
| 8 | Manhattan Blvd | 5 |
| 9 | Bonnabel Blvd | 4 |
| 9 | Barataria Blvd | 4 |
| 9 | Gretna Blvd | 4 |
| 9 | Metairie Rd | 4 |

Table 17: Top 10 Bicycle Crash Corridors, Orleans Parish

| Top 10 Bicycle Crash Corridors, Orleans Parish | | |
|---|---|---|
| **Rank** | **Corridor** | **Number of crashes, 2011-2012** |
| 1 | N/S Claiborne Ave | 42 |
| 2 | St. Charles Ave | 37 |
| 3 | Canal St | 33 |
| 4 | Magazine St | 24 |
| 5 | N/S Broad St | 21 |
| 6 | St. Claude Ave | 15 |
| 6 | N/S Carrollton Ave | 15 |
| 6 | Tulane Ave | 15 |
| 9 | Decatur St | 13 |
| 9 | Elysian Fields Ave | 13 |
| 9 | Chartres St | 13 |
| 9 | Esplanade Ave | 13 |
| 9 | Decatur St | 13 |
| 9 | Loyola Ave | 13 |

**Figure 56: Bicycle Crashes in Orleans Parish, 2011-2012**

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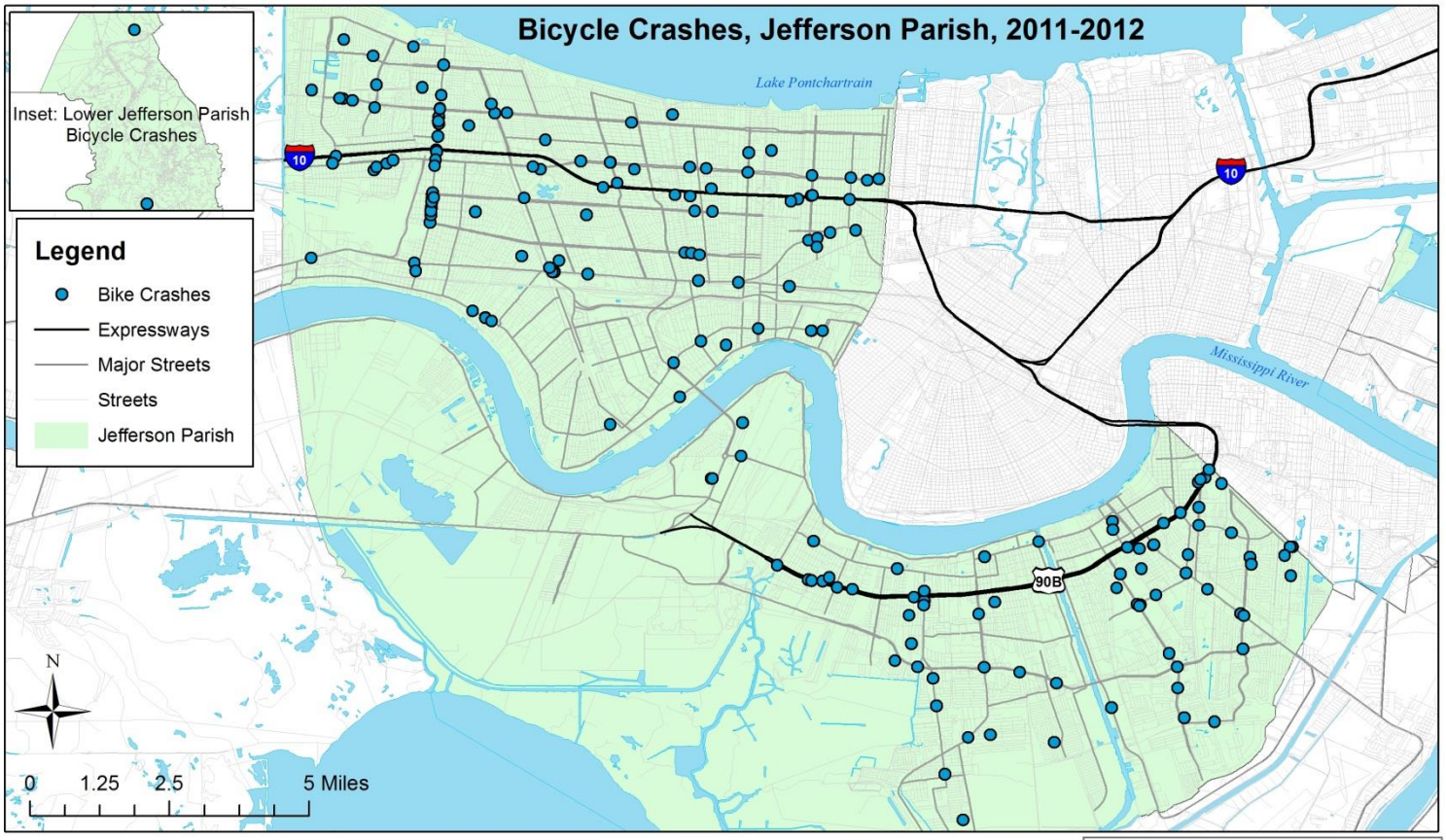
Datum: North American 1983
Units: Degree
Reference Scale: 1:0

**Figure 57: Bicycle Crashes, Jefferson Parish, 2011-2012**

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Reference Scale: 1:0

**Figure 58: Bicycle Crashes by Severity, Orleans Parish, 2011-2012**

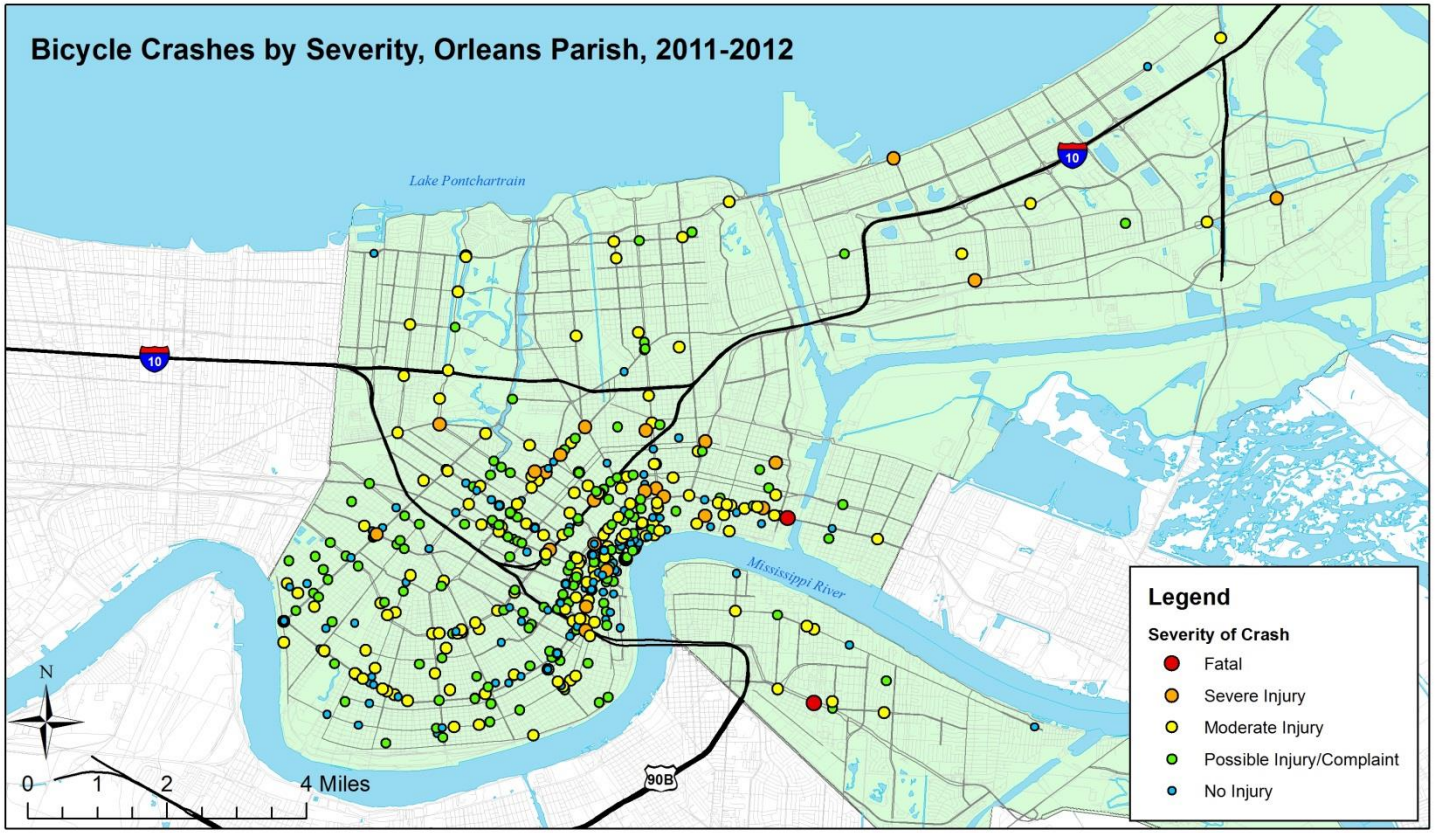


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**Figure 59: Bicycle Crashes by Severity, Jefferson Parish, 2011-2012**

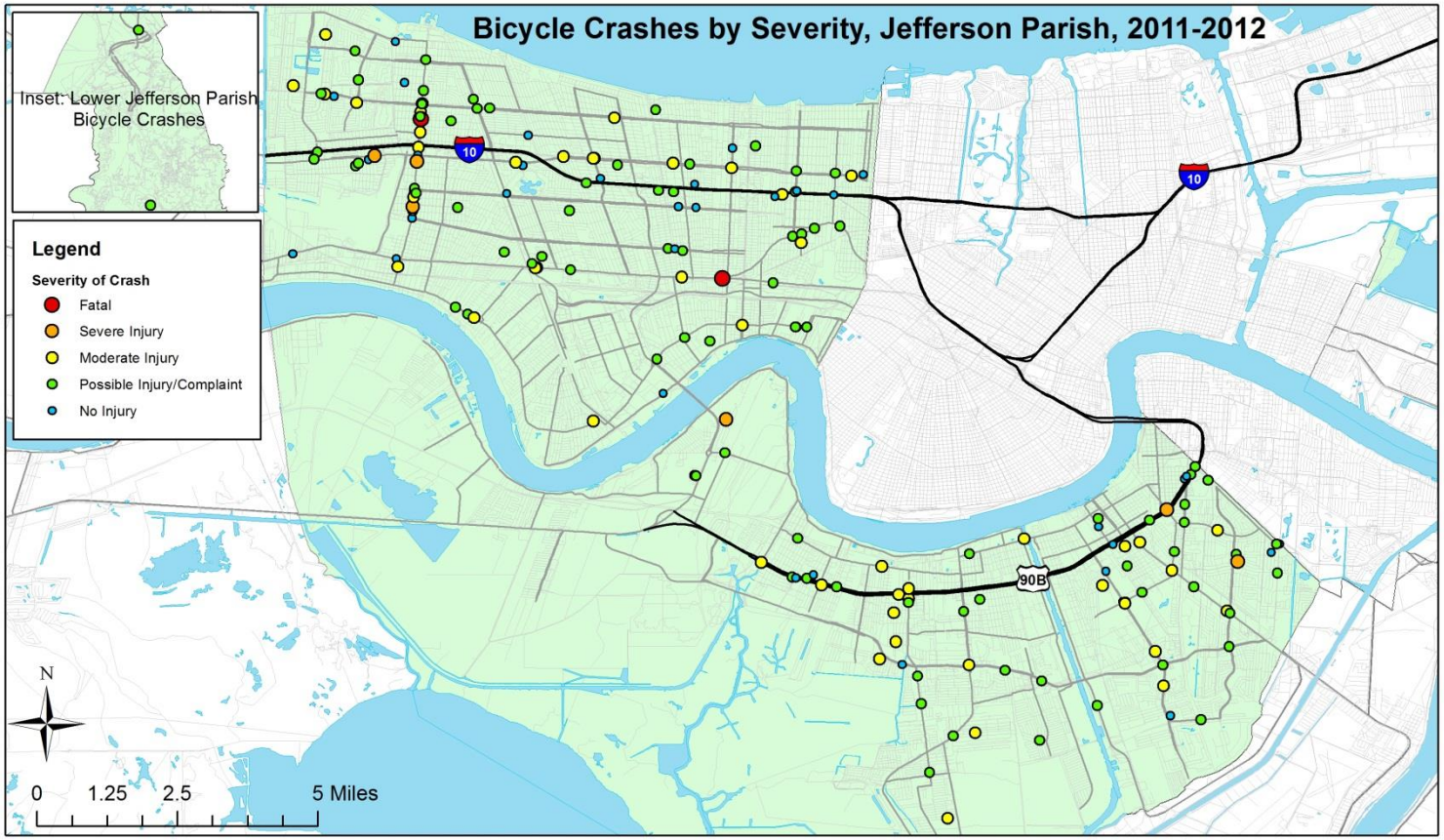


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**Figure 60: Fatal and Severe Bicycle Crashes, Orleans Parish, 2011-2012**

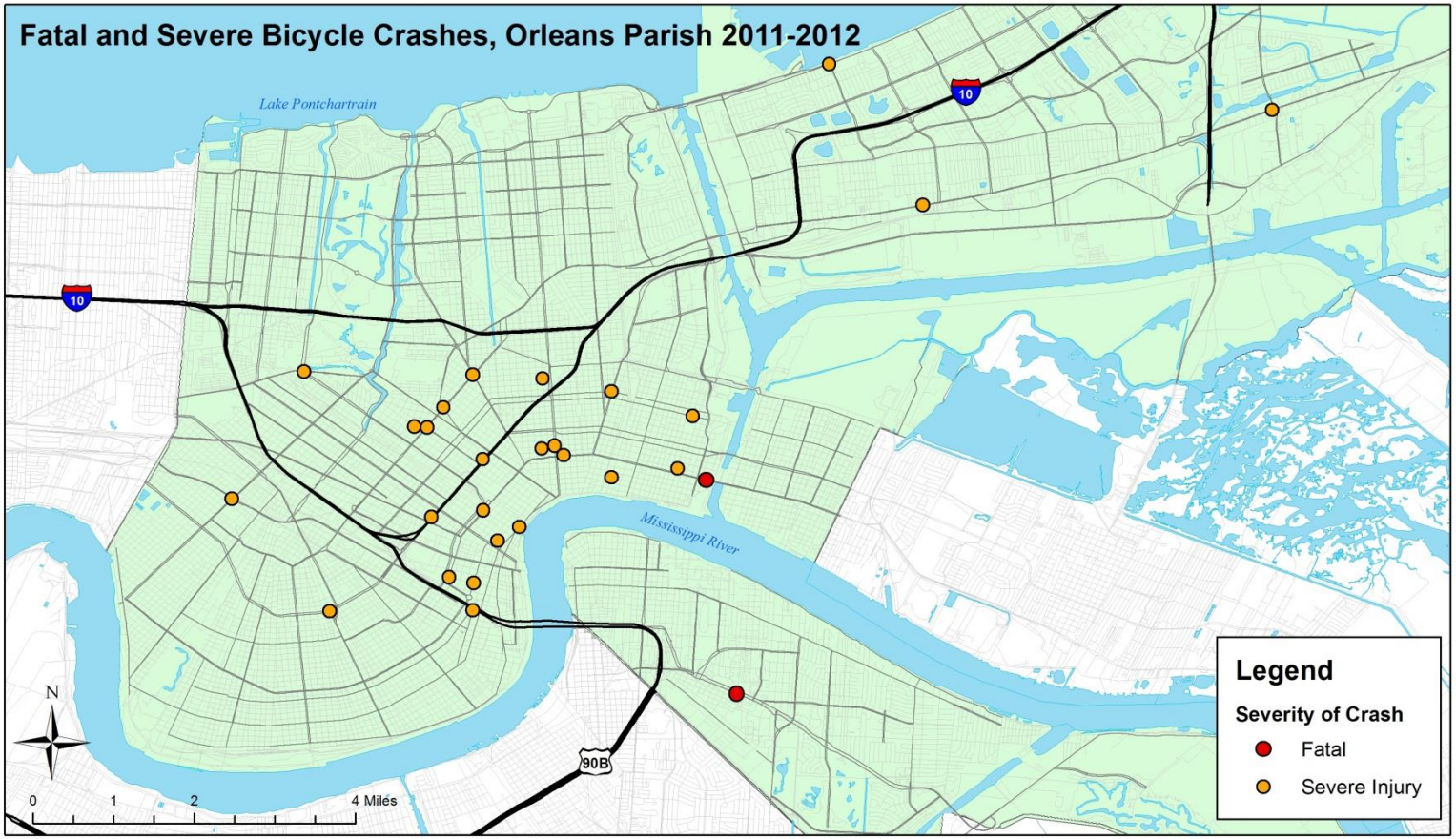


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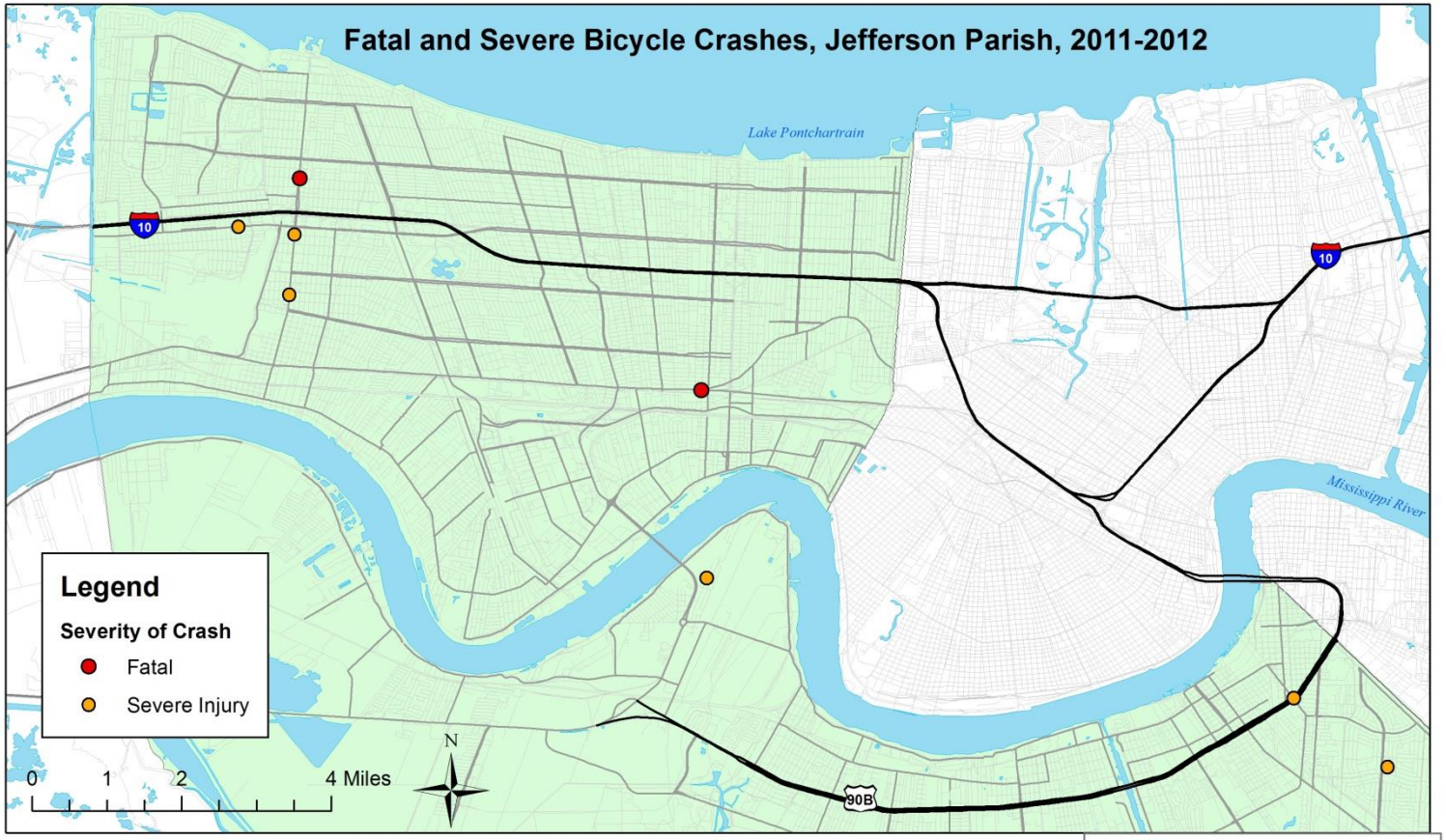
**Figure 61: Fatal and Severe Bicycle Crashes, Jefferson Parish, 2011-2012**

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## 3.5 Bicycle Crash Cluster Analysis

In the East Bank Core analysis area described above, 579 bicycle crashes occurred in 2011 and 2012. STAC crash cluster analysis was conducted on this dataset to identify locations where an unusually high number of crashes have occurred and where resources should potentially be directed to address safety deficiencies.

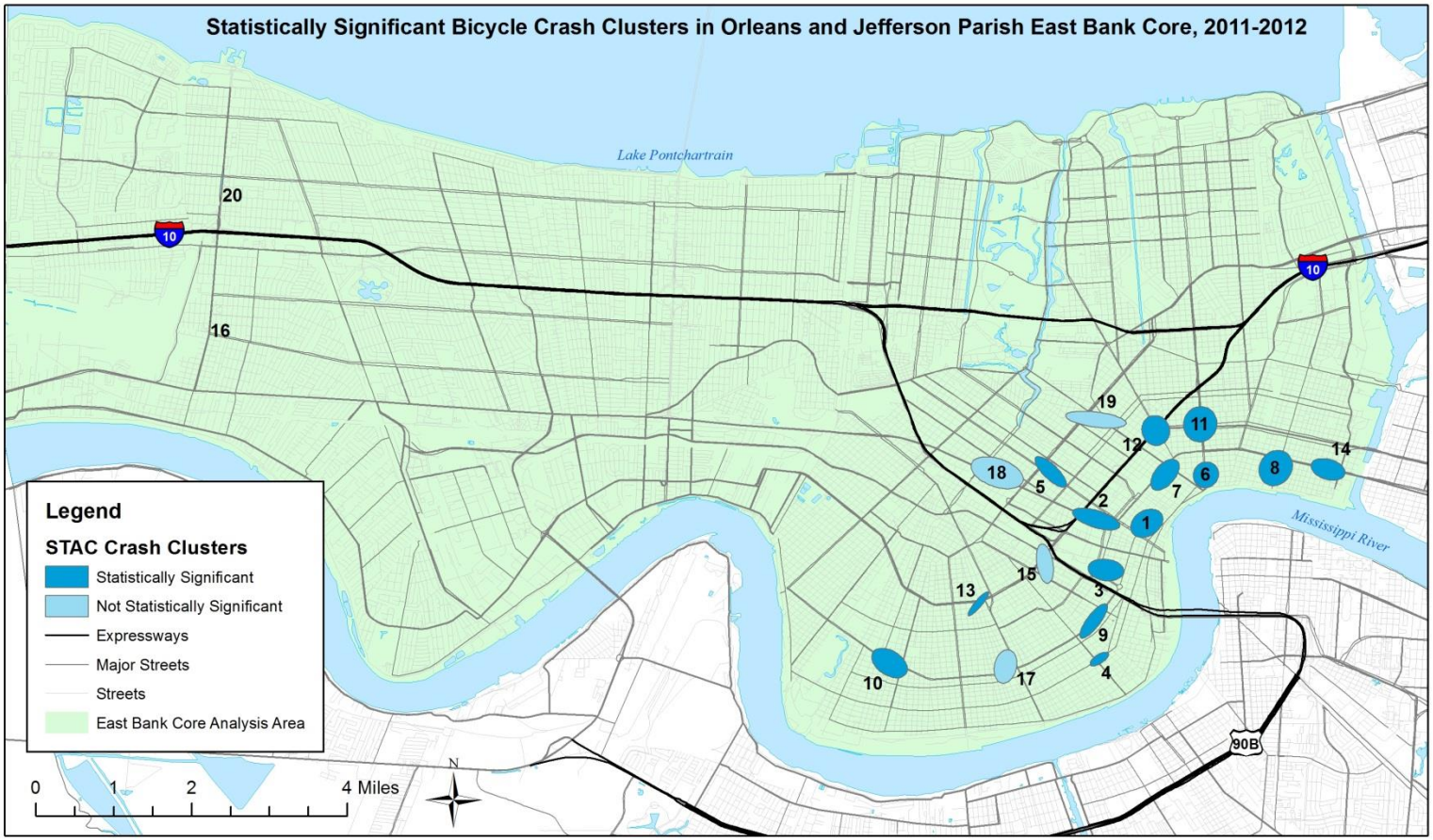
The 20 crash clusters identified by completing 100 STAC simulation runs are mapped in Figure 62, and the approximate centers of the clusters are identified in Table 18. Of these, fourteen were statistically significant at the 95th percent confidence interval with six or more crash points. An additional cluster achieved significant with a cluster density greater than 5544.74 (see Appendix C for full STAC output table). The majority of significant clusters are in New Orleans' downtown and surrounding neighborhoods, with a few remaining significant clusters in the Uptown and Mid-City neighborhoods.

Additional research should be conducted to evaluate the conditions in the vicinity of these crash hot spots and to identify infrastructure, enforcement, or education interventions which could help reduce crash incidence in these areas.

Table 18: Bicycle Generalized Cluster Centers

| Bicycle Generalized Cluster Centers | | |
|---|---|---|
| Cluster | Approximate Location | Statistically Significant? |
| 1 | Royal St & Bienville St | Yes |
| 2 | Tulane Ave & LaSalle St | Yes |
| 3 | O'Keefe Ave & Julia St | Yes |
| 4 | Magazine St & Jackson Ave | Yes |
| 5 | Canal St & N/S Rocheblave St | Yes |
| 6 | Elysian Fields Ave & Chartres St | Yes |
| 7 | N Rampart St & Gov Nichols St | Yes |
| 8 | Burgundy St & Louisa St | Yes |
| 9 | St. Charles Ave & Felicity St | Yes |
| 10 | St. Charles Ave & Arabella St | Yes |
| 11 | Elysian Fields Ave & N Claiborne Ave | Yes |
| 12 | N Claiborne Ave & St. Bernard Ave | Yes |
| 13 | S Claiborne Ave & Delachaise St | Yes |
| 14 | St. Claude Ave & Lesseps St | Yes |
| 15 | S Claiborne Ave & Erato St | No |
| 16 | Williams Blvd & 20th St | Yes |
| 17 | Carondelet St & Amelia St | No |
| 18 | Tulane Ave & S Gayoso St | No |
| 19 | Esplanade Ave & N Rocheblave St | No |
| 20 | Williams Blvd & Taffy Dr | No |

**Figure 62: Statistically Significant Bicycle Crash Clusters in Orleans and Jefferson Parish East Bank Core, 2011-2012**

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Reference Scale: 1:0

Coordinate System: GCS North American 1983
Datum: North American 1983
Units: Degree

## 4.0 Conclusions and Research Implications

This report builds on previous research on pedestrian and bicycle crash patterns, evaluating when crashes happened during the 2011-2012 period, where, to whom, and under what conditions. Overall, it is clear that the region's pedestrian and bicycle safety concerns identified in the 2005 New Orleans Metropolitan Bicycle and Pedestrian Plan persist. Pedestrian crash totals, while still well below pre-Katrina figures, remain high, while bicycle crash totals have steadily increased each year since 2006 to meet or exceed figures reported prior to 2005. Statewide, this region's high crash incidence and fatality rates contributes to a dismal overall state safety ranking for pedestrians and bicyclists.

In part, the increase in bicycle crashes may be attributable to the significant increase in bicycling activity in the region over the last several years, as documented in the *2014 Pedestrian and Bicycle Count Report*. Shifting demographics in who is bicycling in the New Orleans area (more young adults and older adults, more women, and a greater percentage of bicyclists who are white) are reflected in the crash data. A few trends are positive, such as a declining proportion of those involved in bicycle and pedestrian crashes who are children.

However, overall patterns in crash incidence have remained relatively steady over time. Crash frequency (for both pedestrians and bicyclists) is very high in New Orleans' downtown and French Quarter and along major arterial corridors (including the highly auto-oriented boulevards of Jefferson Parish). Year after year, the same corridors are identified as potentially hazardous for non-motorized users, and the number and locations of crash "hot spots" are similar from year to year. Although region-wide efforts to improve pedestrian, bicyclist, and motorist behaviors and to enforce new and existing legislation protecting non-motorized road users will eventually reduce crash totals, improving safety outcomes at these specific, problematic locations may in some cases require direct change to the built environment to address existing deficiencies.

In the last several years, significant investment in active transportation infrastructure has been made in the region. This includes engineering interventions at certain intersections and in school zones, corridor-level roadway redesigns and road diets, and improvements to make the region's pedestrian networks more accessible in accordance with Americans with Disabilities Act (ADA) guidance. This investment also includes the completion of the Jefferson Parish Bicycle Master Plan, which calls for infrastructure change along several of the corridors identified in this report as top crash locations. Moreover, the City of New Orleans has recently completed a Pedestrian Safety Action Plan to prioritize and address safety issues relating to the city's high pedestrian injury and fatality rates, and a Pedestrian and Bicycle Action Plan has been developed for the metro area as part of the state's Strategic Highway Safety Plan.

Additional research is needed to evaluate the specific impacts on safety and usership before and after infrastructure changes or targeted enforcement/education efforts. Although overall crash totals do not currently appear to be declining, it may be possible to identify and quantify safety improvements at the corridor or

intersection level where significant changes have been made. In particular, future research should evaluate the relationship between facility development, bicyclist route choice, and crash outcomes in greater detail. Such evaluations are necessary in order to comprehensively implement a “complete streets” approach and ensure that measures undertaken to reduce injuries and fatalities resulting from crashes are effective and safety and quality of life are protected throughout the region

# Appendix A: Crash Data Analysis Methodology

The Pedestrian Bicycle Resource Initiative (PBRI) has been granted the task of evaluating all available Metropolitan New Orleans pedestrian-bicycle crash data for the Regional Planning Commission for the years of 1999 through 2010. This section summarizes the methodology used by the University of New Orleans to evaluate and present pedestrian and bicycle crash data provided by Louisiana Department of Transportation and Development (DOTD) to the Regional Planning Commission. This methodology was developed by PBRI in 2009 as documented in "*A Guidebook to Comprehending and Organizing Pedestrian Bicycle Crash Data in the New Orleans Metropolitan Region.*" This document was updated in 2014 to reflect new RPC data use requirements and changes reflecting new versions of the Microsoft and ESRI products employed in the analysis.

*Please note that for this report, 2011-2012 crash data were provided as Excel spreadsheets with the relevant crash attributes from the Vehicle Table, Pedestrian Table, and DOTD Table already processed and joined. A separate set of Excel spreadsheets were provided with data from the Crash Table. These two resulting tables were joined by crash number in ArcGIS (see Part 2 of this methodology). In addition, geocoded coordinates were already embedded in the crash tables upon delivery of the data courtesy of the RPC. It was determined that these coordinates provided reasonably accurate geographic information for greater than 95% of all crash records, and additional geocoding was not conducted. Therefore, portions of this methodology were unnecessary for the evaluation of this dataset.*

**Part 1. Analyzing Data in Microsoft Access Database**

The data were originally collected as crash reports by police agencies in the region, and are stored in the New Orleans Regional Planning Commission's files in two separate formats:

- All data between the years of 1999 and 2002 are available as Microsoft Office spreadsheets. The extension for these files is '.xls'.
- All data between the years of 2003 and 2012 were saved as Microsoft Access tables, or spreadsheets, which were aggregated into databases for each year. The databases are saved in Microsoft Access format as 'crash[year]_plus_dotd.' The extension for these files is '.mdb.'

Each Microsoft Access database (from the years 2003-2012) contains four tables that are relevant to pedestrian/bicycle related crash incidents. Those are:

- **Crash_tb (Crash Table)**
  This table contains general data on all crashes reported in that year
- **Vehic_tb (Vehicle Table)**
  This table contains data on every vehicle involved in a reported crash for that year. The number of records, or rows in the table, should be about double that listed in the crash table, since the overwhelming number of crashes reported involve a collision between two vehicles, and a record is present for both. In the 'VEH_TYPE_CD" (Vehicle type) column, bicycles are coded as 'F.
- **Pedes_tb (Pedestrian Table)**
  This table contains data on any pedestrians involved in a crash. The number of records listed in this table should be small compared to those listed in the crash and vehicle tables.

- **Dotd_tb (DOTD Table)**
  This table contains additional data for all crashes that occur on state roadways. Geographic coordinates from this table should be used wherever they are available for improved accuracy of crash geocoding.

First, a new copy of the original database is saved so that the original, unmodified version is preserved. Second, relationships between tables are created by crash number in order to link the four relevant tables (crash, bicycle, pedestrian, and DOTD coordinates).

In order to create relationships in Access between the four relevant bicycle/pedestrian crash data tables, one must:

a) open a crash database in Microsoft Access
b) Click the 'Database Tools' dropdown menu from the taskbar
c) Click 'Relationships'
d) The relationships screen will open up. The screen should be blank at this point. Right click on the blank screen and choose 'Show Table."
e) Highlight the crash table (Crash_tb) and choose 'Add," followed by the vehicle (vehic_tb), pedestrian (pedes_tb) and DOTD (dotd_tb) tables.
f) Find the 'Crash Number' in the 'Crash_tb" list that appears and drag it to the 'Crash Number' in the next list over. When you release the mouse button, a line should appear between the two lists. This symbolizes relationship between the two tables, meaning that Access will now relate them by their common attribute (the crash number). Repeat this step between the crash table, the pedestrian table, and the DOTD table.
g) When complete, changes are saved.

Next, querys are conducted to bring together fields from various tables into a single location based on a common field (thus the necessity of building a relationship between tables before they can be queried.)

The purpose of querying the crash data is to join information from the Vehicle, pedestrian, and DOTD tables together with information in the Crash table. For example, while the Vehicle table contains demographic information about drivers involved in a collision, it does not contain the date or time of the collision. By running a query, the user may bring this separate information into one single location that can then be converted to a table or exported as a spreadsheet.

There are two methods for querying data: using the 'design view' or the 'wizard.' While it is simpler to use the wizard feature, we use the design view, as this method makes *filtering* easier to complete.

The steps necessary to create a single table containing relevant vehicle and crash data are as follows:

a) Open the crash database in MS Access where you performed the relationship exercise; this progress should have been saved in order to complete the following exercise.
b) Click the 'Create' tab at the top of the screen, and click the 'Query design' button. Two screens should appear: the query screen in the background and the 'Show Table' screen in the foreground.
c) In the 'Show Table' screen, double click **Crash_tb** and **Vehicle_Tb** . You may now close out the 'Show Table' screen. The tables you selected should appear in the query screen with a line between them, indicating that they are connected. The boxes representing each table list on ly the fields contained within the tables. Once the query is

complete, it will produce a query table with the data for each selected fields.

d) To select fields for the new query, double click each field that you wish to include. The field titles are fairly self explanatory, but users should refer to the **CODE_Tb** table for reference. **Include the crash number from one of the tables, as well as 'Vehic_Type_Cd' (vehicle type code, located in the vehicle table)** in addition to any other data desired for analysis.
e) Once you've added the vehicle type code as a field, go to the bottom half of the query screen and type 'F' into the 'criteria' row, in the 'Vehic_type_cd' column. Remmeber that F represents bicycles. This is one of two ways of filtering data; when the table is created, it will only include records of bicycle crash incidents.
f) Once you've added all necessary fields, click the X to close the query screen. You will be prompted to save the changes to the query. Save it as 'Bicycle_Crash_Data_[year]_v1.'

The query now appears listed in the query section. Only bicycles are listed under 'vehicle type' for this query.In order to create relationships between queries and tables, the user must turn it into a table. The steps for this process are as follows.

a) Click on the 'Query' tab, and right click on the 'Bicycle_Crash_Data' file that you created in the last exercise. Click on 'Design View.'
b) Once in design view, click the top button 'Make Table,' a screen will prompt you to name the table that will be created. Title it 'Bicycle_Crash_Table_[year]_v1' and click OK.
c) Close the query design table. Save changes when prompted.
d) A table-creation query should be listed in the query secton with the name 'Bicycle_Crash_Table_[year]_v1'; double click it, click 'yes.'

Next, the user creates a query with vehicle crash data **only for motor vehicles involved in a collision with a bicycle**. Therefore, two separate spreadsheets may be created: one for bicycles involved in a collision, and one for motor vehicles involved in that same collision.

In order to do this, we bring together data from the 'Bicycle_Crash_table_[year]_v1' table and the vehicle table. The steps for this process are as follows.

a) Select all the fields from the 'Bicycle_Crash_Table_[year]_v1' table except for vehicle type.
b) Select the vehicle type field from the vehicle table (vehic_tb).
c) In the criteria for this field, type "not F."
d) Run the query. When prompted to save your changes, title it 'Vehicles_that_collided_with_bicycles_[year]_v1'

By using the crash number field of the bicycle crash table that we created in the previous lesson to run the query, and then proceeding to filter out all bicycle entries, a query is created that contains only data for vehicles that collided with bicycles.

Finally, all queries and tables are exported as MS Excel documents for further analysis.

**Part 2: Spatial analysis of data in ArcGIS**

In order to join data in ArcMap to connect tables, the following steps are completed.

a) Open ArcMap; click on the 'Add Data' Button, navigate to the crash data databases, and add the vehicle, pedestrian, DOTD, and crash tables. (If you click the 'Source' tab at the bottom of the table of contents menu, these tables will be

listed. To View their contents, right click on the title of the table you wish to view in the table of contents and click 'Open.')

b) Right click on one of the tables you wish to join, point to 'joins and relates,' and click 'join.'
c) Where it asks you which field you wish to base the join upon, choose 'crash number.' On the second selection, choose which table you wish to join the other to (for example, you may wish to join the Crash table to the Vehicle table. Last, chose the common field between them (Crash number).
d) Click 'ok.'

The two tables will now merge together, so that the first table now contains all the data from the two original tables.

There are three ways to import the geographic attributes of the crash data. The first way is to use the field labeled "lat/lon" that is designed to provide GPS coordinates of the crash location. This field, in theory, could be imported directly into ArcGIS providing geographic coordinates for each crash. This field is often, however, left blank and is known to have been unreliable in past analysis. As more police begin to carry GPS receivers, this situation should improve. At the present time, however, the "lat/lon" column is not adequately populated to be useful for a successful geographic analysis.

However, the DOTD_TB table provides reliable geographic coordinates for crashes along state routes. These coordinates are believed to be accurate, and for records where they are available, they should be used.

The third method for importing geographic attributes of the file, where DOTD coordinates are not available, is to geocode, or geographically represent, the crash data. This will require some preparation.

*Step One: Concatenating*

Aside from the lat/lon field, there is no single filed that specifies a crash location. The best alternative in this database is the designation of the closest intersection to the crash location. This can be determined by combining the primary road columns (prim_road_name) with the intersecting road column (Inter_Road). These two columns must be combined (or concatenated) and then saved to move into ArcGIS. This task can be completed in Excel. The steps for this process are as follows:

a) Open a spreadsheet containing the bicycle crash data in Excel.
b) Create a new column by clicking 'insert' on the task bar. Scroll down and click 'Column.' This will be the column where we will combine primary and intersecting road columns. Name it "INTERSECT."
c) An example of the basic formula that can be used to concatenate the columns is: =CONCATENATE(A1," ",  "&"," ",  B1) where A1 represents the primary road and B1 represents the intersecting road
d) Save the file to import to ArcMap in the following step.

*Step 2: Creating an address locator*

Several important features should be noted about geocoding the bike/ped crash data. First, because of the distance between primary and intersecting roads, this methodology is not recommended for country roads with few cross streets. This is especially important in outlying parishes. Because of this limitation, spatial statistical techniques have only been employed in the core, urbanized parts of the New Orleans region.  Second, a good knowledge of local roads is required to effectively geocode the files. Many streets in the New

Orleans area have both locally known street names as well as state road number designations. The crash files provided by the state most often use the state road designations, but the ArcGIS files often have the local road designations. This makes local knowledge imperative for accurate geocoding. Finally, there are many spelling mistakes in the crash database files. Setting the spelling tolerance fairly low and then manually evaluating the results is necessary to ensure good return rates. The steps for this process are as follows:

a) Open ArcMap
b) Click on 'Customize' from the main menu, point to 'toolbars' and click on 'geocoding.' A small toolbar will appear. Click on the mailbox button for 'geocode addresses.'
c) In the "address locator style,' choose the 'US Streets' option.
d) For 'reference data' select the relevant parish streets shapefile. For Orleans parish, this shapefile is available through the City of New Orleans GIS Data Portal (https://data.nola.gov). Other parish street shapefiles may be obtained from the U.S. Census Bureau or local government agencies.
e) Align the correspondent data in the Field Map screen
f) Select a place on your hard drive to save your address locator. Assign it a recognizable name, such as "New Orleans Streets."

*Step Three: Geocoding Addresses*

The steps for this process are as follows:

a) Open "geocoding' toolbar, and click 'geocode addresses.'
b) In the 'input table' selection of the window that appears, browse for the table created in step 1 of this section. Select it.
c) In the 'address locator' selection screen, browse for the address locator that you created in step two of this section. Select it.
d) In the right column of the 'input address field' screen, click the blank cell to the right of the 'streets' cell. In the drop down menu, choose the "intersect" selection.
e) Choose an area on your hard drive to export the resultant shapefile and click "ok."

The geocoded shapefile will be added to the work session.

**Part 3: Using CrimeStat 3.3 for Statistical Analysis of Crashes**

This section provides a detailed, step-by-step guide to using the CrimeStat program for bicycle/pedestrian hotspot evaluation. This technique was pioneered in the *2006 RPC Bicycle/Pedestrian Regional Master Plan*. This previous document provides an overview of the theoretical underpinning of the procedure. This methodology was tested extensively by Dr. Billy Fields in order to ensure reliable results for the study area and available data. Other methods of conducting statistical analysis of the spatial distribution of crashes, such as those available through ArcGIS software, are available but have not been tested for suitability with this data. The CrimeSTAT tool is utilized here in order to ensure consistency with analyses of earlier data sets. Future research efforts should include the comparison of multiple methodologies in order to determine discrepancies among these tools and assess whether newer statistical tools should be employed. This document shows how to replicate the steps used in the hotspot analysis using CrimeStat. The steps for this process are as follows:

*Step 1:*
Download and install CrimeStat Version 3.3. This program, developed by the National Institute of Justice, is available at: http://www.icpsr.umich.edu/CrimeStat/ .

*Step 2:*
Once you have downloaded the program, open the program. You should enter the shapefile that you would like to use here. Select the crashes for the defined area and save just the selected crashes as your reference shapefile. Use this as your primary file.

You will also notice a tab labeled "reference file." It is also possible to select a file that tells CrimeStat what your study area is. I have not used this feature before and have instead used the original shapefile as the reference area. You can test this if you would like, but I have found that simply using the primary file works well. Note: You can also use dbf or other files as well. I have found that shapefiles work well, however.

Select the shapefile location from your computer in the "select files" tab. You will then want to enter the field in the shapefile that has the "x" and the "y" coordinates. Obviously, you need to make sure that your shapefile has these columns to make the analysis work. A note on shapefile size: Usually you will want to use a shapefile for a fairly confined area with distinct geographic boundaries. I usually focus on the core area of the New Orleans EastBank area (Orleans from the Industrial Canal to Eastbank Jefferson Parish). I have found that if you include New Orleans East and the Westbank, you will not get focused results. Figuring out how to effectively include these areas in the analysis is something that still needs to be addressed.

*Step 3:*
Now that you've entered the shapefile for analysis, there are many features available in CrimeStat to choose from. I tested a number of these in the 2006 RPC Regional Plan. The most useful feature for the bicycle/pedestrian hotspot analysis is the Spatial and Temporal Analysis of Crime (STAC) simulation feature. This feature is found in the "Spatial description" tab.

*Step 4:*
The STAC feature can now be accessed through the "Hot Spot Analysis II" tab.

*Step 5:*
Now you will set up the parameters for the run. Click on the STAC tab and you see that the parameters tab becomes an option. You will now be able to enter the parameters. Click on "STAC parameters."

*Step 6:*
You will now enter parameters. I tried just about every conceivable formulation here. Depending on the dataset, you will find that you will need to alter your search radius and number of points to get enough points to make the evaluation run smoothly. Sometimes what you enter will not work and the computer will tell you that it cannot compute with the desired parameters.

Usually, however, a quarter mile search radius with a minimum number of 3 points in a triangular scan with the data set boundary will work well. I also set the simulation run feature to "100." When you run this, you will see the computer running through simulation runs as it completes the analysis. At the end, you will receive a shapefile with the hotspot clusters that you should be able to open in ArcGIS and you'll get an Excel file with the results from your simulation runs.

*Step 7: Analysis*
What you should get from this work is a shapefile with a number of clusters. Each one of these clusters is not, however, statistically significant. We ran the simulation run feature to distinguish the significant clusters form the insignificant ones. You will now want to cross-reference the Excel table and identify the significant cluster numbers. PBRI uses the 95% confidence threshold. Now, go back to ArcGIS and manually click "identify" on each cluster. You will see a number attached to each one. Cross-reference the numbers from the Excel table with the ones in ArcGIS to determine the statistically

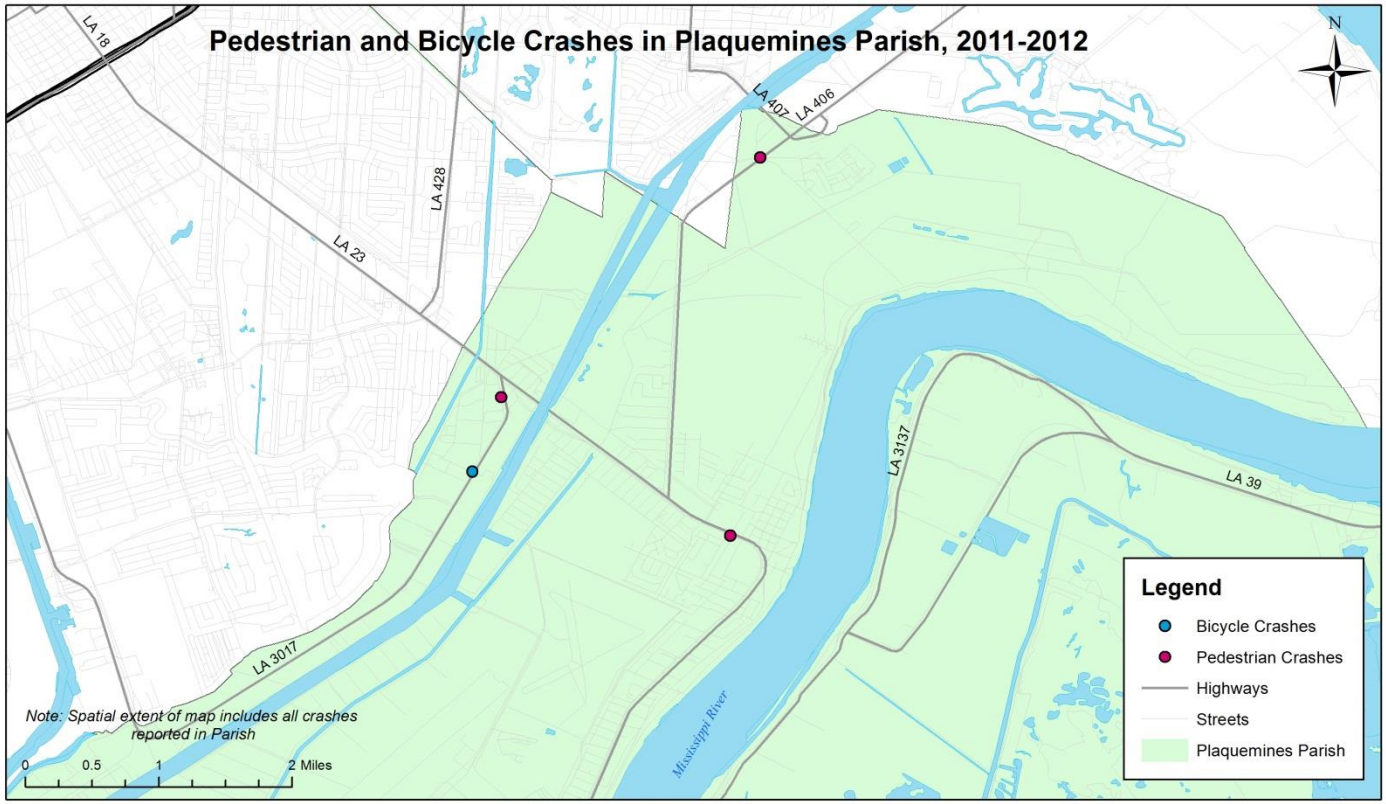
significant clusters. Delete the insignificant clusters. The result is an ArcGIS file with the significant clusters.

The reason that STAC was selected with these dimensions was that it returned small, tight clusters that focus attention on neighborhood size areas that can, hopefully, be remediated with improved bicycle and pedestrian infrastructure and programming.

Other goals may result in a need to different parameters.
This method results in crash clusters that we can say with 95% confidence did not result by chance. The policy implications of this are that some urban design and/or behavioral factors are leading to this concentration of crashes.

For a detailed description of the underlying theory of this methodology please check *the New Orleans Bicycle and Pedestrian Plan* or, for even greater depth, see the guidebook that accompanies the CrimeStat program.

## Appendix B: Crash Location Maps – Plaquemines, St. Bernard, St. Charles, St. John, and St. Tammany Parishes

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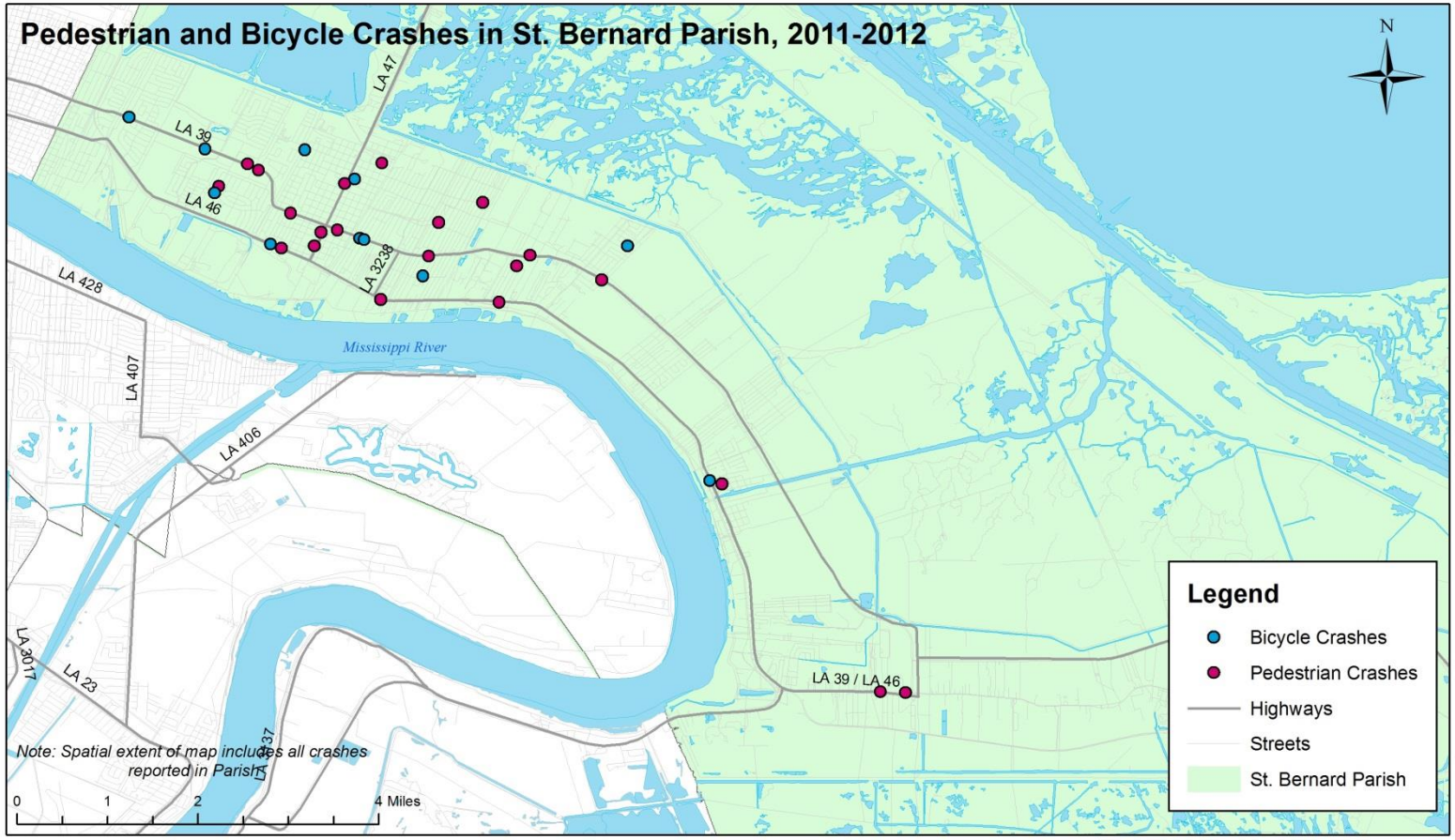


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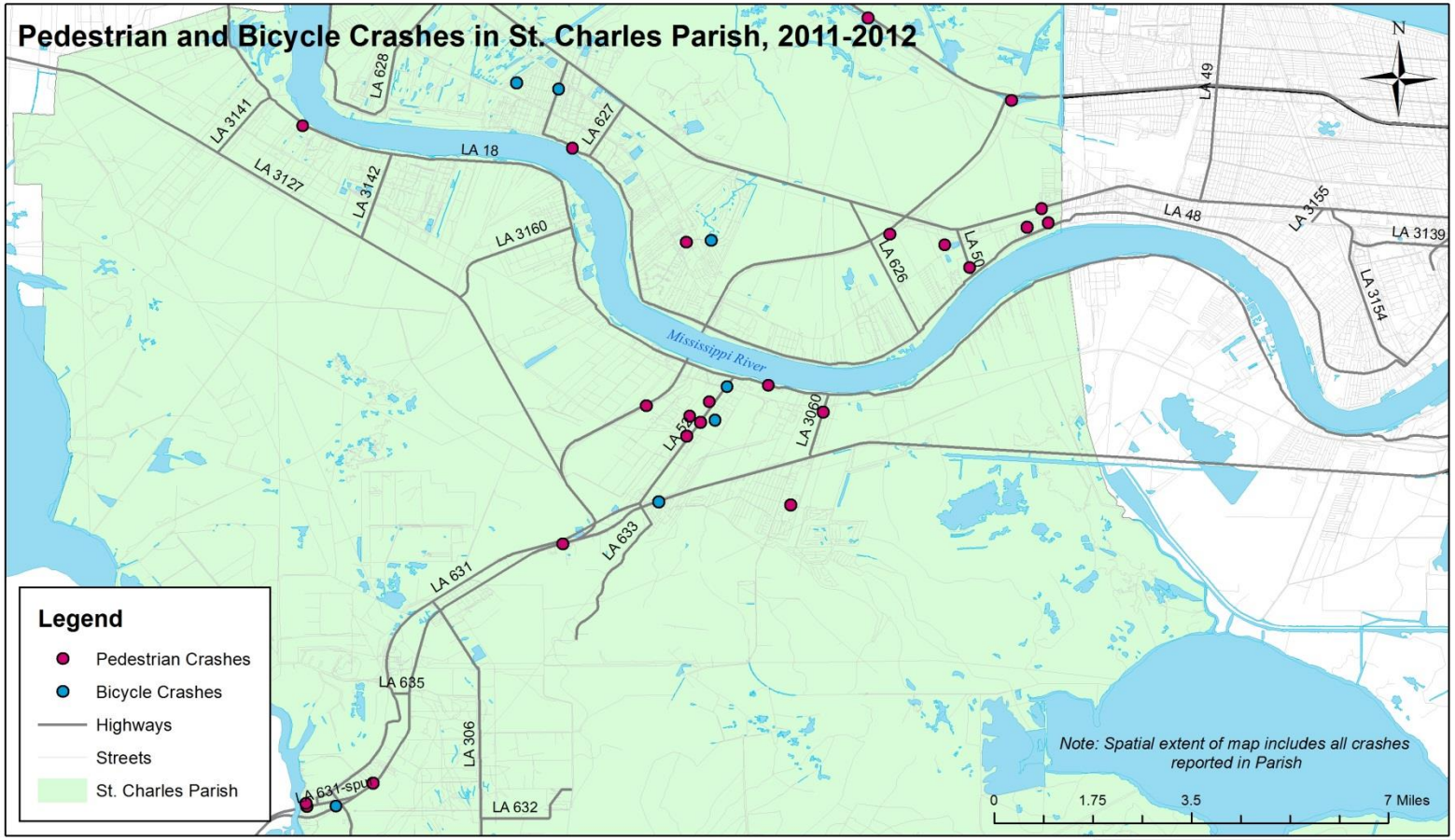


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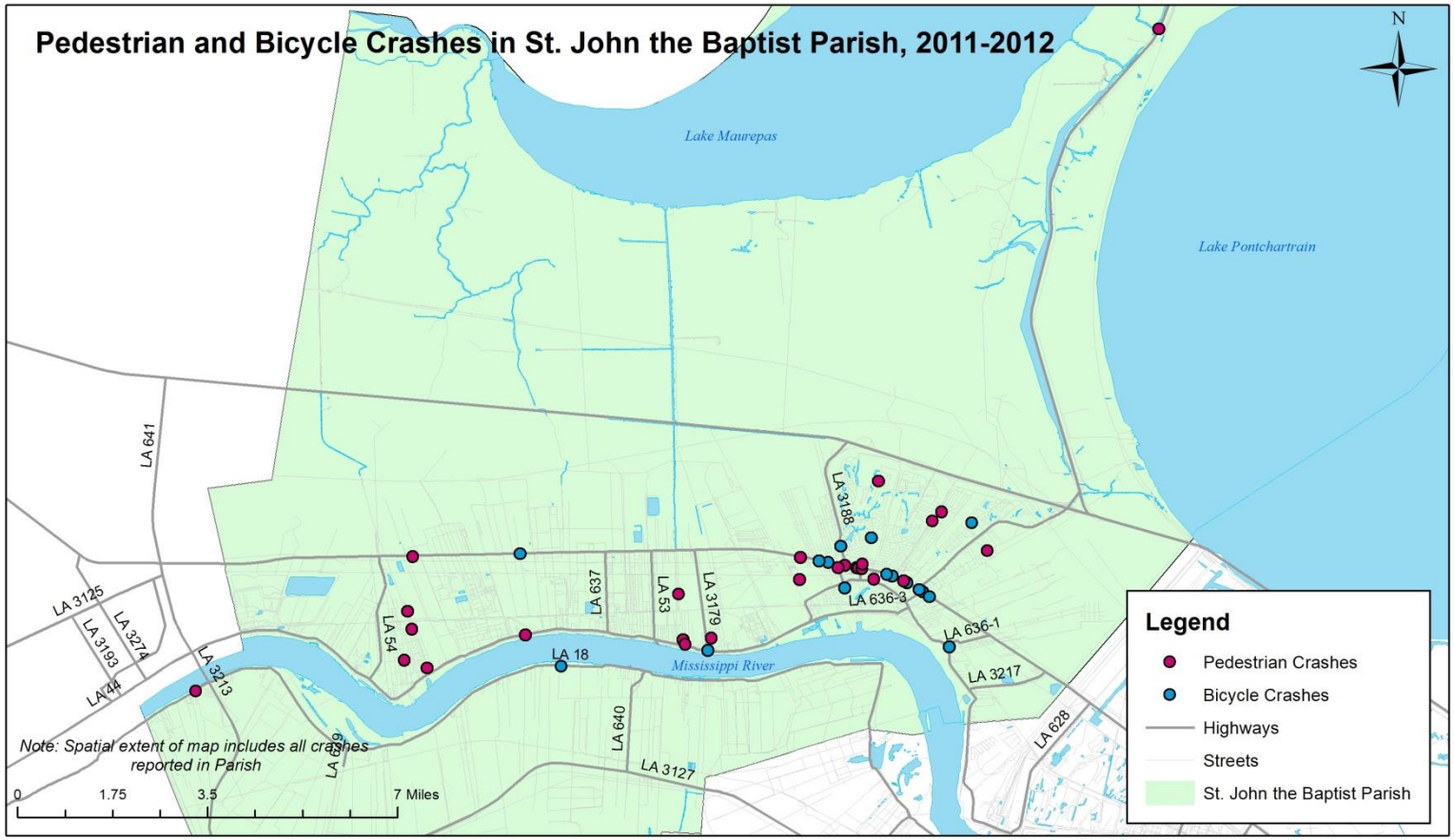


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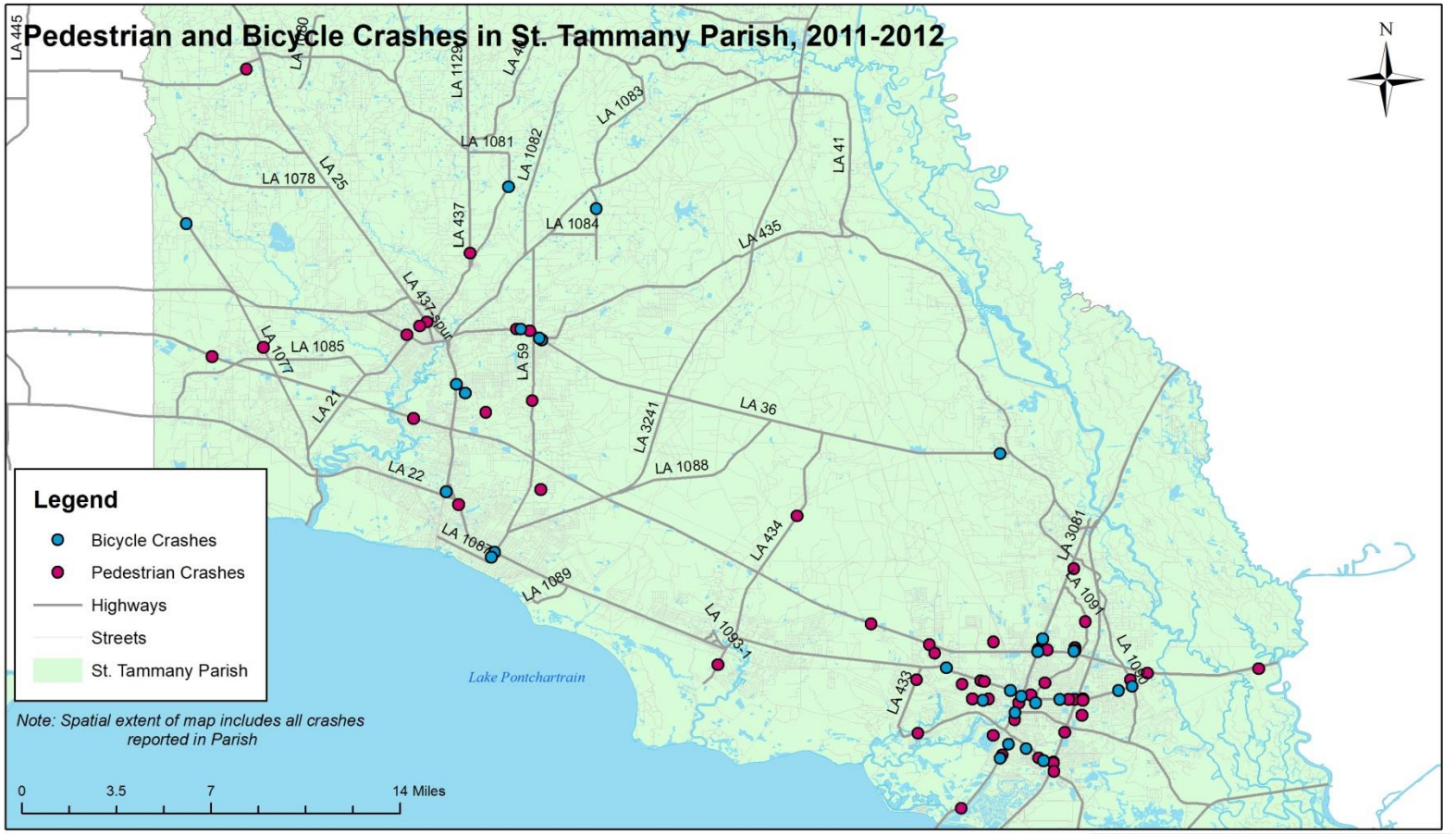


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Data Sources: Basemap Created using 2012 TIGER/Line Shapefiles for regional roads, parish boundaries, and water features. Louisiana Highway System shapefile from Atlas: The Louisiana Statewide GIS. Crash data was provided through a Regional Planning Commission (RPC) request made to Louisiana Department of Transportation and Development. Data was geocoded by RPC and processed and projected and by the University of New Orleans. Any use of the data must be accompanied with this citation and accompanying seals and logos.
Coordinate System: GCS North American 1983
Datum: North American 1983
Units: Degree
Reference Scale: 1:0

# Appendix C: STAC Pedestrian and Bicycle Crash Output Tables, 2011-2012

| Spatial and Temporal Analysis of Crime (STAC): Statistically Significant Pedestrian Crash Clusters | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample size: 666 | | | | **Distribution of the number of clusters found in simulation (percentile):** | | | | |
| Measurement Type: Direct | | | | *Percentile* | *Clusters* | *Area* | *Points* | *Density* |
| Scan Type: Triangular | | | | min | 20 | 0.00009 | 3 | 6.414943 |
| Input Units: Degrees | | | | 0.5 | 20 | 0.00009 | 3 | 6.414943 |
| Output Units: Miles, Square Miles, Points per Square Mile | | | | 1 | 20 | 0.0001 | 3 | 6.603883 |
| Standard Deviations: 1.0 | | | | 2.5 | 20 | 0.00013 | 3 | 7.229442 |
| Start time: 02:22:07 PM, 08/01/2014 | | | | 5 | 20 | 0.0003 | 3 | 7.385708 |
| Search radius: 402.336000 | | | | 10 | 20 | 0.00057 | 3 | 7.8258 |
| Boundary: -90.26983,29.91645 to -90.02578,30.03841 | | | | 90 | 20 | 0.38335 | 6 | 5239.338 |
| Points inside boundary: 664 | | | | **95** | **20** | **0.40619** | **6** | **9972.282** |
| Simulation runs: 100 | | | | 97.5 | 20 | 0.41497 | 6 | 23630.06 |
| End time: 02:22:38 PM, 08/01/2014 | | | | 99 | 20 | 0.45428 | 6 | 31139.72 |
| | | | | 99.5 | 20 | 0.46766 | 9 | 33243.01 |
| | | | | max | 20 | 0.46766 | 9 | 33243.01 |
| | | | | | | | | |
| **Cluster** | **Mean X** | **Mean Y** | **Rotation** | **X-Axis** | **Y-Axis** | **Area** | **Points** | **Cluster Density** |
| **1** | -90.0731 | 29.95522 | 27.62229 | 0.20576 | 0.11862 | 0.07668 | **35** | 456.45 |
| **2** | -90.0703 | 29.94742 | 10.51125 | 0.11212 | 0.21812 | 0.07683 | **31** | 403.51 |
| **3** | -90.0641 | 29.9552 | 33.1559 | 0.07459 | 0.24849 | 0.05823 | **22** | 377.84 |
| **4** | -90.0905 | 29.94555 | 65.32056 | 0.08969 | 0.16667 | 0.04696 | **13** | 276.83 |
| **5** | -90.0906 | 29.96322 | 19.23653 | 0.07104 | 0.23050 | 0.05144 | **10** | 194.40 |
| **6** | -90.0915 | 29.92743 | 13.88288 | 0.08418 | 0.13024 | 0.03444 | **9** | 261.30 |
| **7** | -90.0607 | 29.96411 | 38.79393 | 0.31958 | 0.12772 | 0.12823 | **8** | 62.39 |
| **8** | -90.0738 | 29.99189 | 69.0637 | 0.20835 | 0.11845 | 0.07753 | **7** | 90.29 |
| **9** | -90.2671 | 30.0087 | 52.69074 | 0.18889 | 0.11203 | 0.06648 | **7** | 105.29 |
| **10** | -90.1115 | 29.96438 | 43.31308 | 0.08648 | 0.21637 | 0.05879 | **7** | 119.07 |
| **11** | -90.0711 | 29.96577 | 89.95594 | 0.17239 | 0.03943 | 0.02135 | **7** | 327.80 |
| **12** | -90.0818 | 29.97217 | 36.64215 | 0.00054 | 0.15787 | 0.00027 | **6** | **22248.43** |
| **13** | -90.07 | 29.98155 | 72.87669 | 0.32860 | 0.07120 | 0.07350 | **6** | 81.63 |
| **14** | -90.0644 | 29.97279 | 11.71103 | 0.27514 | 0.05767 | 0.04985 | **6** | 120.36 |
| **15** | -90.084 | 29.95544 | 85.24627 | 0.14755 | 0.28879 | 0.13386 | **6** | 44.82 |
| **16** | -90.0594 | 29.98208 | 17.40321 | 0.13259 | 0.28315 | 0.11795 | **6** | 50.87 |
| 17 | -90.0533 | 29.97282 | 13.45101 | 0.35595 | 0.04460 | 0.04987 | 5 | 100.26 |
| 18 | -90.1426 | 30.00085 | 33.97021 | 0.05288 | 0.26032 | 0.04325 | 5 | 115.60 |
| 19 | -90.0708 | 29.92977 | 50.90398 | 0.30978 | 0.12623 | 0.12285 | 5 | 40.70 |
| 20 | -90.0593 | 30.00054 | 62.99299 | 0.17489 | 0.03574 | 0.01964 | 5 | 254.61 |

## Spatial and Temporal Analysis of Crime (STAC): Statistically Significant Bicycle Crash Clusters

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample Size: 579 | | | | **Distribution of the number of clusters found in simulation (percentile):** | | | | |
| Measurement type: Direct | | | | *Percentile* | *Clusters* | *Area* | *Points* | *Density* |
| Scan type: Triangular | | | | min | 14 | 0.00022 | 3 | 6.01 |
| Input units: Degrees | | | | 0.5 | 14 | 0.00022 | 3 | 6.01 |
| Output units: Miles, Square Miles, Points per Square Miles | | | | 1 | 15 | 0.00024 | 3 | 6.64 |
| Standard Deviations: 1.0 | | | | 2.5 | 15 | 0.00037 | 3 | 6.69 |
| Start time: 02:36:40 PM, 08/01/2014 | | | | 5 | 18 | 0.00054 | 3 | 7.48 |
| Search radius: 402.336000 | | | | 10 | 18 | 0.00102 | 3 | 7.60 |
| Boundary: -90.27260,29.91764 to -90.02987,30.03779 | | | | 90 | 20 | 0.39459 | 6 | 2952.91 |
| Points inside boundary: 577 | | | | **95** | **20** | **0.40095** | **6** | **5544.74** |
| Simulation runs: 100 | | | | 97.5 | 20 | 0.44819 | 6 | 8186.29 |
| End time: 02:37:10 PM, 08/01/2014 | | | | 99 | 20 | 0.45196 | 7 | 12513.84 |
| | | | | 99.5 | 20 | 0.49918 | 8 | 13356.80 |
| | | | | max | 20 | 0.49918 | 8 | 13356.80 |
| | | | | | | | | |
| **Cluster** | **Mean X** | **Mean Y** | **Rotation** | **X-Axis** | **Y-Axis** | **Area** | **Points** | **Cluster Density** |
| **1** | -90.0674 | 29.95517 | 43.78952 | 0.15321 | 0.20448 | 0.09842 | **38** | 386.10 |
| **2** | -90.0768 | 29.95595 | 20.65597 | 0.27891 | 0.10671 | 0.09350 | **19** | 203.21 |
| **3** | -90.075 | 29.94649 | 9.77424 | 0.2014 | 0.13733 | 0.08689 | **11** | 126.60 |
| **4** | -90.0762 | 29.92991 | 51.45488 | 0.05458 | 0.12411 | 0.02128 | **9** | 422.97 |
| **5** | -90.0853 | 29.96473 | 49.32951 | 0.25009 | 0.08556 | 0.06722 | **9** | 133.88 |
| **6** | -90.0564 | 29.96417 | 10.94075 | 0.14016 | 0.16638 | 0.07326 | **9** | 122.85 |
| **7** | -90.064 | 29.96419 | 32.90871 | 0.11946 | 0.22535 | 0.08457 | **9** | 106.42 |
| **8** | -90.0434 | 29.96544 | 17.58265 | 0.18214 | 0.23101 | 0.13219 | **9** | 68.08 |
| **9** | -90.0773 | 29.93698 | 32.85944 | 0.07673 | 0.25858 | 0.06233 | **8** | 128.35 |
| **10** | -90.1153 | 29.92916 | 41.65345 | 0.23158 | 0.14952 | 0.10878 | **8** | 73.55 |
| **11** | -90.0575 | 29.97359 | 4.88819 | 0.18611 | 0.22681 | 0.13261 | **7** | 52.79 |
| **12** | -90.0657 | 29.97243 | 83.80994 | 0.19272 | 0.15572 | 0.09428 | **7** | 74.25 |
| **13** | -90.0987 | 29.94019 | 35.88482 | 0.04147 | 0.18752 | 0.02443 | **6** | 245.60 |
| **14** | -90.0337 | 29.9652 | 22.3319 | 0.19751 | 0.12833 | 0.07963 | **6** | 75.35 |
| 15 | -90.0864 | 29.94765 | 82.54864 | 0.25393 | 0.09008 | 0.07186 | 5 | 69.58 |
| **16** | -90.2417 | 29.99265 | 4.58816 | 0.00072 | 0.16247 | 0.00037 | 5 | **13520.13** |
| 17 | -90.0937 | 29.92852 | 9.37906 | 0.12333 | 0.21721 | 0.08416 | 5 | 59.41 |
| 18 | -90.0953 | 29.96456 | 24.22263 | 0.3088 | 0.17656 | 0.17128 | 5 | 29.19 |
| 19 | -90.0769 | 29.97446 | 8.63177 | 0.33953 | 0.0973 | 0.10379 | 5 | 48.18 |
| 20 | -90.2395 | 30.01803 | 5.56757 | 0.00999 | 0.20708 | 0.00650 | 5 | 769.11 |