7-2012

New Orleans Regional Pedestrian and Bicycle Crash Report, 2009-2010

Tara Tolford
University of New Orleans

UNO Transportation Institute

New Orleans Regional Pedestrian and Bicycle Crash Report, 2009-2010

Final Report

Prepared by:

Pedestrian Bicycle Resource Initiative, Merritt C. Becker, Jr.
University of New Orleans Transportation Institute

Principal Author: Tara Tolford, MURP

Prepared for:

Regional Planning Commission for Jefferson, Orleans, Plaquemines, St. Bernard, and St. Tammany Parishes and the Louisiana Department of Transportation and Development

State Project No. 2000011387

RPC Contract no. NORBP3-UNO

Greater New Orleans Pedestrian & Bicycle Program

PBRI PEDESTRIAN BICYCLE RESOURCE INITIATIVE

MERRITT C. BECKER, JR. UNO TRANSPORTATION INSTITUTE

July 2012• New Orleans, Louisiana

A Project of the
Regional Planning Commission , the Louisiana Department of Transportation and Development, and the University of New Orleans

The preparation of this report has been financed in part by the Louisiana Department of Transportation and Development Highway Safety Department.

Table of Contents

List of Tables ii
List of Figures iii
Acknowledgements iv
Executive Summary 1
Introduction 3
Demographic Profile of the Region 3
Poverty and Transportation Planning in the New Orleans Metropolitan Region 6
Detailed Analysis of Crash Data 9
Bicyclist Regional Data 11
Pedestrian Regional Data 17
Implications of Summary Statistics 22
Geographic Analysis 23
Spotlight: French Quarter and CBD 23
Bicycling Spatial Data Overview 26
Bicycle Crash Cluster Analysis 30
Pedestrian Spatial Data Overview 35
Pedestrian Crash Cluster Analysis 39
Conclusions and Research Implications 44

List of Tables

Table 1: Louisiana Pedestrian Fatalities, 2006-2010 4
Table 2: Louisiana Bicycle Fatalities, 2006-2010 4
Table 3: Orleans Parish Pedestrian Crashes and Poverty, 2009-2010 8
Table 4: Orleans Parish Bicycle Crashes and Poverty, 2009-2010 8
Table 5: Jefferson Parish Pedestrian Crashes and Poverty, 2009-2010 8
Table 6: Jefferson Parish Bicycle Crashes and Poverty, 2009-2010 8
Table 7: Bicycle Crashes in French Quarter and CBD, 2009-2010 23
Table 8: Pedestrian Crashes in French Quarter and CBD, 2009-2010 23
Table 9: Top Bicycle Crash Locations by Frequency, Orleans & Jefferson Parish, 2009-2010 26
Table 10: Top Ten Bicycle Crash Corridors, Orleans Parish, 2009-2010 27
Table 11: Top Ten Bicycle Crash Corridors, Jefferson Parish, 2009-2010 27
Table 12: Bicycle Generalized STAC Crash Cluster Centers, 2009-2010 31
Table 13: Statistically Significant Bicycle Crash Cluster STAC Analysis Output 34
Table 14: Top Pedestrian Crash Locations by Frequency, Orleans and Jefferson Parish, 2009-2010 35
Table 15: Top Ten Pedestrian Crash Corridors, Orleans Parish, 2009-2010 36
Table 16: Top Ten Pedestrian Crash Corridors, Orleans Parish, 2009-2010 36
Table 17: Pedestrian Generalized STAC Crash Cluster Centers, 2009-2010 40
Table 18: Statistically Significant Pedestrian Crash Cluster STAC Analysis Output 43

List of Figures

Figure 1: Means of Travel to Work, 2008-2010 3
Figure 2: Percentage of Pedestrian Crashes by Parish, 2009-2010..... 5
Figure 3: Percentage of Bicycle Crashes by Parish, 2009-2010..... 5
Figure 4: Percent of Population in Poverty by Census Tract, Orleans and Jefferson Parish, 2009-2010 7
Figure 5: Bicycle Crashes per Year, 2006-2010 11
Figure 6: Percentage of Bicycle Crashes by Severity, 2009-2010..... 12
Figure 7: Percent of Severity of Bicycle Crashes by Year, 2009-2010..... 12
Figure 8: Percentage of Bicycle Crashes by Month, 2009-2010..... 13
Figure 9: Percentage of Bicycle Crashes by Day of the Week, 2009-2010 .. 13
Figure 10: Number of Bicycle Crashes by Hour of the Day, 2009-2010 13
Figure 11: Bicycle Crashes: Juvenile vs. Adult, 2009-2010 13
Figure 12: Age of Cyclists by Crash Frequency, 2009-2010..... 14
Figure 13: Percentage of Bicycle Crashes by Life Stage, 2009-2010..... 14
Figure 14: Percentage of Bicycle Crashes by Race, 2009-2010..... 15
Figure 15: Gender and Bicycle Crashes, 2009-2010..... 15
Figure 16: Percentage of Bicycle Crashes by Road Type, 2009-2010..... 16
Figure 17: Percentage of Bicycle Crashes by Lighting Condition, 2009-2010 16
Figure 18: Pedestrian Crashes per Year, 2006-2010 17
Figure 19: Percentage of Pedestrian Crashes by Severity, 2009-2010..... 17
Figure 20: Percent of Severity of Pedestrian Crashes by Year, 2009-2010 . 18
Figure 21: Percentage of Pedestrian Crashes by Month, 2009-2010..... 18
Figure 22: Percentage of Pedestrian Crashes by Day of the Week, 2009-2010..... 18
Figure 23: Number of Pedestrian Crashes by Hour of the Day, 2009-2010 19
Figure 24: Pedestrian Crashes: Juvenile vs. Adult, 2009-2010..... 19
Figure 25: Age of Pedestrians by Crash Frequency, 2009-2010..... 20
Figure 26: Percentage of Pedestrian Crashes by Life Stage, 2009-2010..... 20
Figure 27: Percentage of Pedestrian Crashes by Race, 2009-2010..... 20
Figure 28: Percentage of Pedestrian Crashes by Lighting Condition, 2009-2010..... 21
Figure 29: Gender and Pedestrian Crashes, 2009-2010..... 21
Figure 30: Percentage of Pedestrian Crashes by Road Type, 2009-2010.... 21
Figure 31: Bicycle Crashes in French Quarter and CBD, 2009-2010..... 24
Figure 32: Pedestrian Crashes in French Quarter and CBD, 2009-2010..... 25
Figure 33: Bicycle Crashes in Orleans Parish, 2009-2010..... 28
Figure 34: Bicycle Crashes in Jefferson Parish, 2009-2010..... 29
Figure 35: Bicycle Crashes in the Orleans and Jefferson Parish East Bank Core, 2009-2010..... 32
Figure 36: Statistically Significant Crash Clusters, Orleans and Jefferson Parish East Bank Core, 2009-2010 33
Figure 37: Pedestrian Crashes in Orleans Parish, 2009-2010..... 37
Figure 38: Pedestrian Crashes in Jefferson Parish, 2009-2010..... 38
Figure 39: Pedestrian Crashes in the Orleans and Jefferson Parish East Bank Core, 2009-2010..... 41
Figure 40: Statistically Significant Pedestrian Crash Clusters, Orleans & Jefferson Parish East Bank Core, 2009-2010..... 42

Acknowledgements

We would like to thank the following individuals who provided valuable data, insight, and feedback to PBRI and actively participated in the development of this project:

Billy Fields, Ph.D.
Assistant Professor, Political Science
Texas State University

Jon Dodson
Graduate Research Assistant
University of New Orleans

Karen Parsons, AICP
Principal Planner
Regional Planning Commission

Dan Jatres
Pedestrian and Bicycle Program Manager
Regional Planning Commission

Clare Brown, GISP
Data Manager/Webmaster
Regional Planning Commission

Executive Summary

For many years, Louisiana and the New Orleans metro area have stood well above national averages in terms of the number of bicycle and pedestrian crashes by population. Fatalities among bicyclists and pedestrians, too, remain well above national averages at the state level, despite relatively low relative rates of active transportation mode share. While long-range data suggests that Louisiana and the New Orleans metro area appear to be making some gains in bicyclist and pedestrian safety, both the state and the region continue to face a challenging crash problem, particularly in Orleans and Jefferson Parishes: as the New Orleans region has recovered from Hurricane Katrina and its population has rebounded, so too has its high rate of bicycle and pedestrian crashes.

The Regional Planning Commission has periodically evaluated bicycle and pedestrian crash data from 1999 through 2010, and while total crash numbers in recent years are well below pre-2005 levels and certain encouraging trends have emerged, the spatial and demographic patterns of crash occurrence have remained largely similar to those identified Pre-Katrina. This report outlines the demographic and spatial trends of crash data from 2009 and 2010 in relation to previous datasets and is intended to guide policymakers in developing safer and more efficient facilities for bicycles and pedestrians.

In Orleans and Jefferson Parishes, the same intersections, corridors, and nodes have appeared on crash maps year after year, marking areas that are in serious need of safety intervention. These areas should be further examined to evaluate the specific design characteristics or operating conditions which contribute to high crash incidence, and how to mitigate these through targeted safety improvements.

Additional key findings of this report include:

- Bicycle crashes have gone up in the New Orleans region every year since 2006; however, additional research is needed to evaluate these increases in the context of the region's increasing population during this period, as well as in light of evident increases in both active transportation infrastructure investment and facility use.

- Pedestrian crashes have stabilized and decreased since 2008, but while these remain well below Pre-Katrina totals, they continue to be heavily concentrated in New Orleans' downtown neighborhoods and on several key arterial corridors.

- Both the proportion and absolute quantity of juveniles involved in both bicycle and pedestrian crashes has dropped since Hurricane Katrina, and has remained relatively low even as the population has rebounded and families have returned.

- The region's crash problem impacts visitors to the region, as well as residents: about 1/5 of bicycle crashes and 1/4 of pedestrian crashes in 2009 and 2010 occurred in New Orleans' French Quarter and Central Business District, while seven of the bicycle or pedestrian crash clusters identified as statistically significant are centered in the French Quarter, CBD, or Marigny neighborhoods, all of which are popular tourist destinations, as well as major employment centers and/or residential neighborhoods.

- In Jefferson Parish, meanwhile, a few major arterial roads are associated with an enormous proportion of all bicycle and pedestrian incidents. These too have remained constant over time, and require additional research and attention to identify projects and policies aimed at reducing crash rates in target areas.

Between 2008 and 2012, the City of New Orleans and the Regional Planning Commission have overseen the installation of major bicycle and pedestrian facility improvements, and these efforts are expected to continue. Many of these projects came about due to hurricane recovery funded projects. As these conclude, future project selection should consider the findings of this crash analysis to determine project priorities.

The rapid ongoing expansion and improvement of New Orleans' biking and walking networks—and plans for projects and policies in other parishes that will increase opportunities for similar improvement programs region-wide—presents a critical moment in which to proactively examine these troublesome areas and identify design interventions that will improve safety for users of all modes. Failure to do so would be to miss an important opportunity to improve safety and quality of life for all residents and visitors of the region.

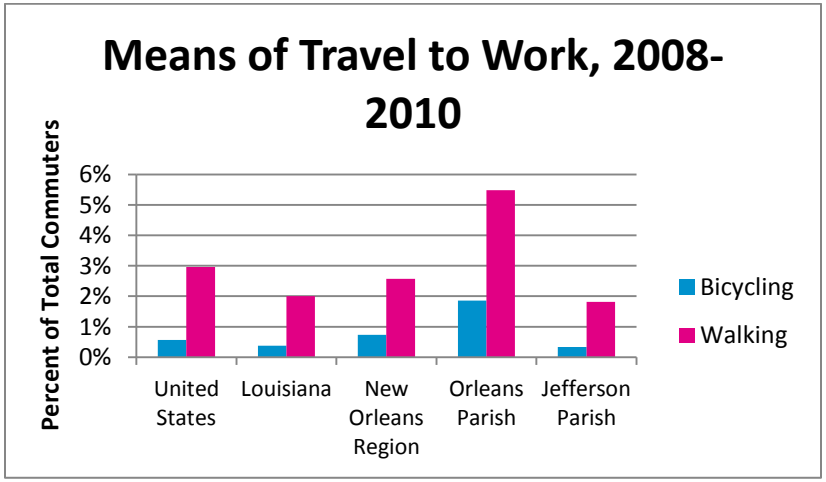
Introduction

This report provides an overview of existing conditions for bicyclists and pedestrians in the New Orleans Metropolitan region. It first summarizes demographic characteristics of the region's population, and then provides a detailed examination of crash data for the years 2009 and 2010, the most recent years for which complete crash data is available. The report also analyzes patterns of crashes, identifying statistically significant "crash hot spots." 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)* and for the 2006-2008 period (evaluated in the *New Orleans Regional Bicycle and Pedestrian Crash Report 2006-2008),* allowing an evaluation of Pre- and Post-Hurricane Katrina trends and shifts. This report is intended to guide policymakers in developing safer and more efficient facilities for bicycles and pedestrians.

Demographic Profile of the Region

According to the U.S. Census Bureau's American Community Survey, during the 2008-2010 period, an estimated 0.38% of Louisianians commuted to work via bicycle and 2.0% walked to work, compared to a national average of 0.57% for cycling and 2.96% for walking (Figure 1). Within the New Orleans metro area, cycling and walking commute figures were slightly higher: 0.73% of residents biked to work, and 2.57% walked. Biking and walking commute rates were highest in Orleans Parish, at 1.85% and 5.49% respectively; significantly higher than the national average. In Jefferson parish, 0.34% of commuters traveled to work by bicycle and 1.81% commuted by walking.[1] With the exception of the share of commuters who walk to work in Orleans Parish, which decreased slightly (though remaining well above national and state averages), all bicycling and walking commute mode shares have increased both nationwide and at the state, local, and regional levels relative to the 2006-2008 period. However, Louisiana's active transportation growth rate continues to somewhat lag behind national trends.

Figure 1: Means of Travel to Work, 2008-2010



[1] Data from U.S. Census Bureau, 2008-2010 American Community Survey 3-Year Estimates, Table B08301: Means of Transportation to Work.
Note: Total commuters excludes those who work at home.

Despite relatively low rates of active transportation mode share at the state level, Louisiana remains well above the national average in bicycle and pedestrian fatalities.[2] In 2009 and 2010, 185 pedestrians were killed in Louisiana. In 2009, Louisiana had the third highest pedestrian fatality rate in the nation. In 2010, the fatality rate dropped considerably, though it is not yet clear if this is indicative of long-term safety improvements (Table 1).

Cyclist deaths in Louisiana remain higher than national averages, although again there was a drop in the number of cyclist fatalities in Louisiana between 2009 and 2010, bringing the state down from the 7th highest fatality rate to the 16th highest. Overall, cyclist deaths have dropped from a high of 24 in 2006 to just 10 in 2010, suggesting that progress is being made in improving cyclist safety around the state (Table 2).

Louisiana appears to be making some gains in pedestrian and bicyclist safety, relative to previous years. Compared to 1999-2002 data found in the Regional Planning Commission's *2005 New Orleans Metropolitan Area Bicycle and Pedestrian Plan*,[3] overall trends indicate a gradual downward shift in the number of fatalities experienced. However, the state remains above national averages in terms of fatalities per population, suggesting that considerable work remains to continue improving safety for all road users.

Table 1: Louisiana Pedestrian Fatalities, 2006-2010

Louisiana Pedestrian Fatalities				
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	78	1.72	n/a	n/a

Table 2: Louisiana Bicycle Fatalities, 2006-2010

Louisiana Bicycle Fatalities				
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

[2] Data comes from the National Highway Traffic Safety Administration's National Center for Statistics and Analysis, Annual Traffic Safety Facts Reports, years 2009-2010. Note: National 2010 pedestrian fatality data by state and rankings not available at publication.

[3] Accessible at: http://transportation.uno.edu/phire-content/assets/files/PBRI-2005-New-Orleans-Metropolitan-Bicycle-and-Pedestrian-Plan.pdf

Within the state, the New Orleans Metropolitan region accounted for 26% of pedestrian fatalities and 17% of cyclist fatalities in 2009 and 2010, representing an average pedestrian fatality rate of 2.09 per 100,000 population per year—lower than the statewide average—and a cyclist fatality rate of 1.75 per million population per year—lower than both state and national figures. This is considerably lower than rates reported in 2006-2008 for the region, and may indicate overall safety improvements in the New Orleans area. However, Transportation for America's 2011 report, *Dangerous by Design,* ranks the New Orleans metro area 15th worst in the nation in its list of the most dangerous metro areas for pedestrians, based on an index of the percentage of people walking to work and the fatality rate per 100,000 population.[4]

Figures 2 and 3 show the percentage of pedestrian and bicycle crashes by parish within the region, respectively, demonstrating that the vast majority (83% of pedestrian crashes and 87% of bicycle crashes) are occurring in the more urbanized portions of the region, namely Orleans and Jefferson parishes. For this reason, as well as due to data limitations which make it infeasible to perform spatial analysis of more rural and suburban parishes, portions of this report focus exclusively on the urbanized Orleans and Jefferson Parish portion of the region.

[4] T4america.org/resources/dangerousbydesign/2011.

Figure 2: Percentage of Pedestrian Crashes by Parish, 2009-2010

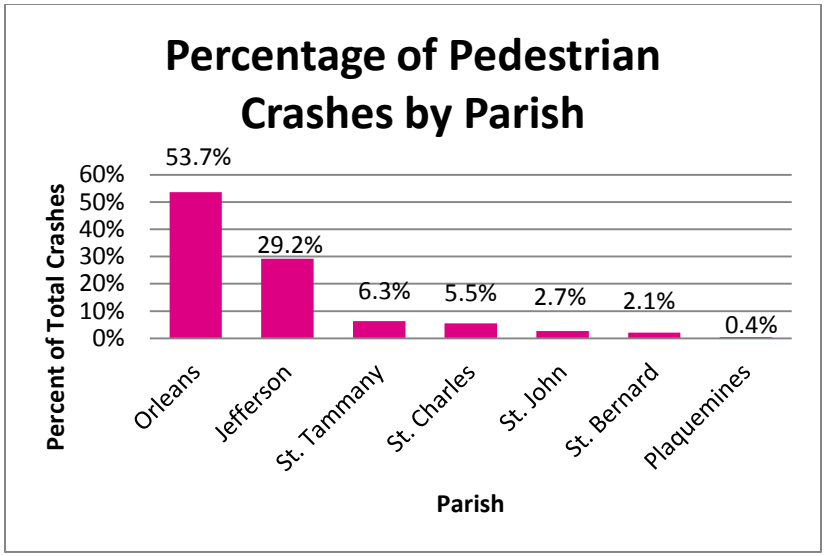
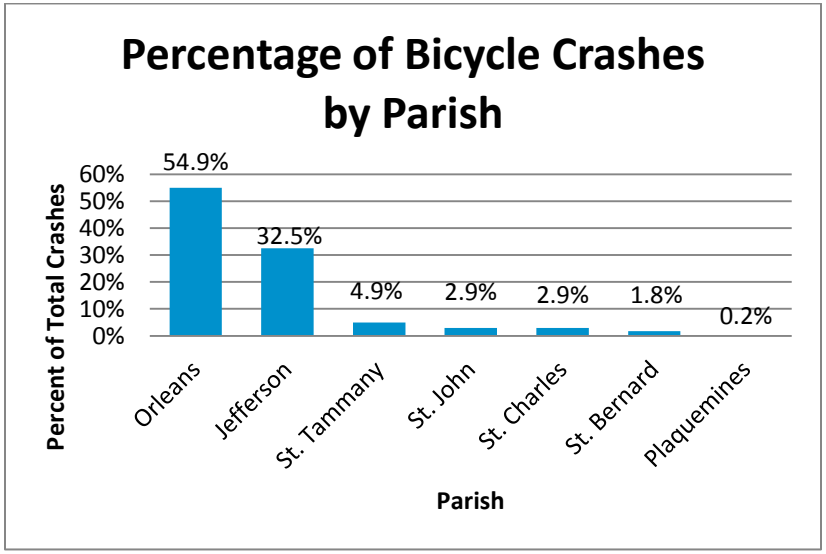


Figure 3: Percentage of Bicycle Crashes by Parish, 2009-2010



Poverty and Transportation Planning in the New Orleans Metropolitan Region

As identified in the *2005 New Orleans Metropolitan Bicycle and Pedestrian Plan*, there is a complex but persistent relationship between poverty, lack of access to automobiles, and bicycle and pedestrian safety. Out of necessity, higher poverty areas tend to correspond to higher rates of bicycling, walking, and transit use. In the absence of infrastructure improvements and policies aimed at improving safety, higher rates of walking and biking within a given neighborhood may translate to higher absolute numbers of crashes in an area.

Areas of concentrated poverty (defined here as census tracts with poverty rates above 40%[5]) and bike and pedestrian crashes have been mapped for Orleans and Jefferson Parishes. Because these parishes have the highest degrees of concentrated poverty in the region, as well as the majority of crash incidents, the geographic relationship between poverty and safety is examined more closely for these two parishes.[6]

Poverty affects the entire New Orleans Metropolitan region, with 17% of the population living below the poverty level in 2010, exceeding the national average of 15%.[7] However, the urbanized areas of Orleans Parish—and to a lesser extent, Jefferson Parish—suffer the most spatially concentrated poverty. In Orleans parish, 27% of the population (92,045) live in poverty—the same percentage as in 2000—and 15% of the population live in high-poverty census tracts. In Jefferson parish on the other hand, 16% of the population (70,076) live in poverty, while only 3% live in high-poverty census tracts, indicating far less spatial concentration. Figure 4 illustrates this difference, showing the distribution of high-poverty census tracts as of the 2006-2010 American Community Survey[8] in Orleans and Jefferson Parishes, and suggesting—as in previous studies—that the spatial concentration of poverty remains a serious issue for Orleans Parish.

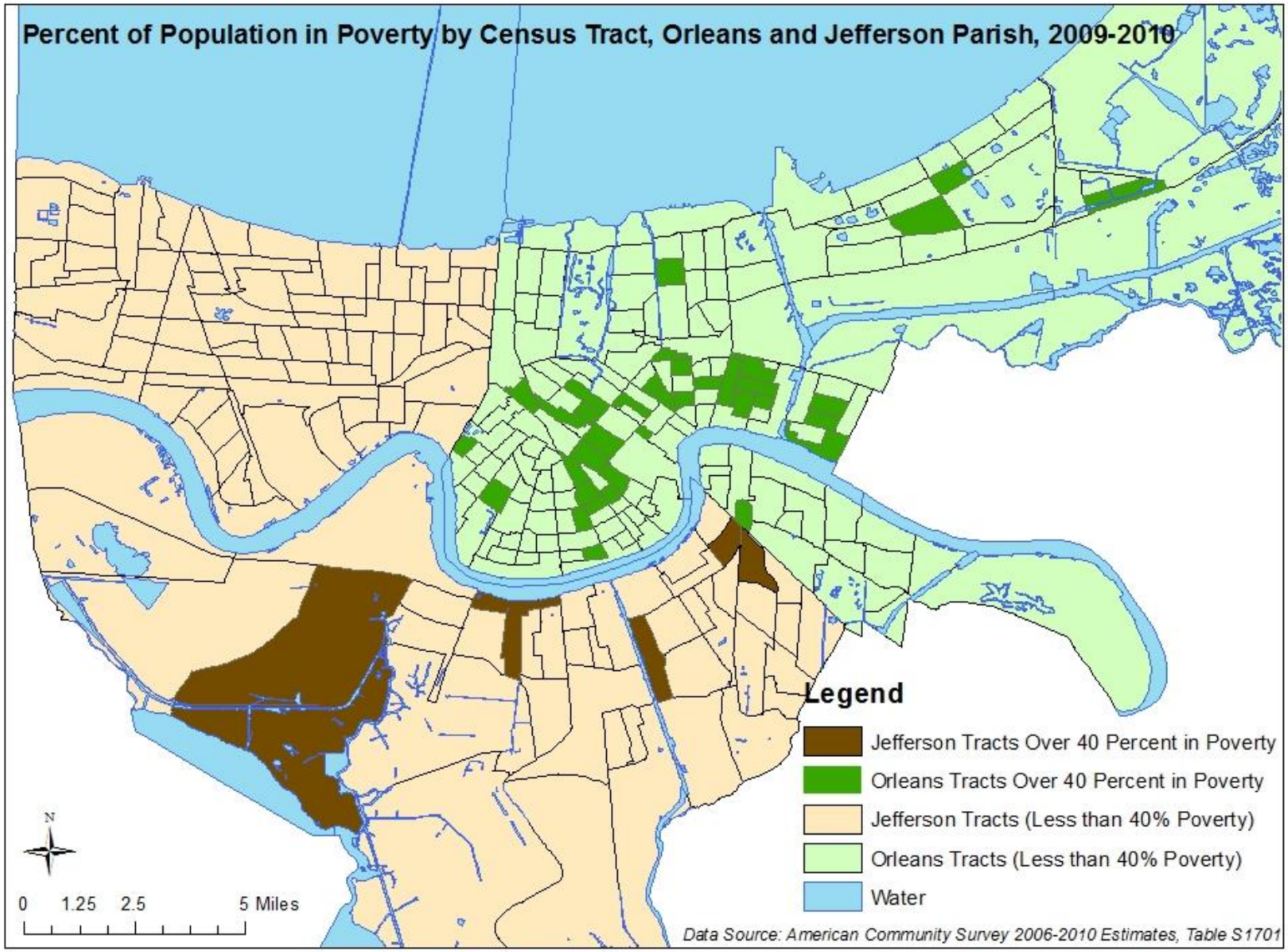
[5] Previous analyses utilizing U.S. Census Summary Data examined this relationship at the block group level. At this time, American Community Survey block-group level data estimates on poverty rates are not available. Analysis of data on the census tract level, rather than on the block group level, facilitates a less fine-grained analysis of the spatial distribution of poverty and appears to suggest a lesser degree of concentration (e.g., 15% of the population of Orleans Parish lived in a high poverty census tract in 2010, whereas in 2000, 28% of the population lived in a high poverty census block group. Further research is needed to examine which differences are due to actual demographic and spatial change, and which are simply a reflection of the varying scales of analysis used.

[6] High Poverty census tract information is based on 2006-2010 Census data, the most relevant period for which data is available.

[7] For whom poverty status is defined; data source: 2010 American Community Survey 1-Year estimates, Table S1701: Poverty Status in the Past 12 months.

[8] The most relevant period for which data is available on this geographic scale; 2006-2010 American Community Survey 5-year estimates. Table S1701: Poverty Status in the Past 12 Months

Figure 4: Percent of Population in Poverty by Census Tract, Orleans and Jefferson Parish, 2009-2010



Examining the relationship between poverty and bicycle and pedestrian safety demonstrates a negative relationship between these variables in both Orleans and Jefferson Parishes (Tables 3, 4, 5, and 6), although this relationship is far less pronounced than it has been shown to be at the block group level. The data show that the majority of bicycle and pedestrian crashes occur within or adjacent to high poverty census tracts. During 2009 and 2010, about 21% of all pedestrian crashes and 25% of all bicycle crashes in Orleans Parish occurred within high poverty census tracts (home to 15% of the population); and in Jefferson Parish, 5% of pedestrian and 4% of bicycle crashes in Jefferson Parish (where only 3% of the population reside) occurred within these tracts.

Expanding the scope of analysis to ½ mile from high poverty block groups—a reasonable walking distance most people—these figures increase to about 65% of pedestrian and 75% of bicycle crashes in Orleans Parish, and 17% of both bicycle and pedestrian crashes in Jefferson Parish. These figures are much lower than those produced using 2000 Census Block Group data, which may reflect either a shift in the spatial distribution of crashes relative to poverty, an inherent limitation of the less fine-grained dataset currently available, or both. This discrepancy in data, as well as the complex relationships between poverty and crash frequency, requires additional research in order to identify causal factors and implement effective safety interventions in these areas.

Table 3: Orleans Parish Pedestrian Crashes and Poverty, 2009-2010

Orleans Parish 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 Tracts
2009	20%	42%	67%
2010	22%	40%	64%

Table 4: Orleans Parish Bicycle Crashes and Poverty, 2009-2010

Orleans Parish 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 Tracts
2009	26%	55%	76%
2010	23%	55%	74%

Table 5: Jefferson Parish Pedestrian Crashes and Poverty, 2009-2010

Jefferson Parish 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 Tracts
2009	4%	10%	12%
2010	5%	16%	21%

Table 6: Jefferson Parish Bicycle Crashes and Poverty, 2009-2010

Jefferson Parish 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 Tracts
2009	4%	12%	13%
2010	4%	13%	21%

Detailed Analysis of Crash Data

In order to provide a holistic portrait of bicycle and pedestrian safety in the seven-parish region, this section analyzes multiple characteristics of reported bicycle and pedestrian crashes to illuminate various facets of the region's safety issues.

The data were provided to the RPC by the Louisiana Department of Transportation and Development (LADOTD). The LADOTD compiled police crash reports for all parishes in Louisiana, and provided the Regional Planning Commission and the Pedestrian Bicycle Resource Initiative with data involving pedestrian and bicycle crashes for the seven-parish New Orleans metro area for the years 2009 and 2010.

The data provide the demographic characteristics of pedestrians and cyclists involved in crashes and allow a spatial analysis of crash locations. This report explores the relationships among crashes, demographics, and temporal data for cyclists and pedestrians. Because of data limitations, this report does not evaluate the specific environmental conditions under which incidents occurred, nor does it identify crash circumstances or causality. The "hot spot" section does, however, identify statistically significant geographic clusters of crashes which should be examined in greater detail to evaluate characteristics of the built environment which may contribute to high crash frequencies.

Overall, this analysis demonstrates the breadth of the crash problem for cyclists and pedestrians in the region. During the 2009-2010 period, a total of 995 pedestrian crashes and 628 bicycle crashes were reported to the police, for an average of 1.36 pedestrian crashes and 0.86 bicycle crashes per day, or 498 pedestrian crashes and 314 bicycle crashes per year. Five of these collisions involved cyclists striking pedestrians, the remainder involved crashes between motor vehicles and pedestrians or bicyclists.

These figures are higher than during the 2006-2008 period, which experienced 1.2 pedestrian crashes and 0.67 bicycle crashes per day. However, data from the years immediately following Hurricane Katrina reflects a region in transition, therefore the apparent increase in crashes is likely attributable to a substantially larger population and by extension, more road users of all types. It may also be useful to draw comparisons to pre-2005 data, although the region's overall population remains smaller: from 1999-2002, there were an average of 1.9 pedestrian crashes and 1.2 bicycle crashes reported each day, and an average of 451 bicycle crashes and 719 pedestrian crashes per year. Therefore, total bicycle and pedestrian crashes remain well below Pre-Katrina levels.

Certain limitations are present in the examination of these data which must be noted. First, incidents involving bicycles or pedestrians for which no police report was filed are not accounted for within this analysis, resulting in a probable undercount of total crashes. Second, demographic data for some records is incomplete (e.g., age is not recorded for 12.6% of pedestrian crashes and 7.0% of bicycle crashes).

Despite these limitations, the data provide a useful and accessible overview of crash trends and spatial patterns within the region. A descriptive analysis of regional bicycle and pedestrian crash data for the New Orleans Metropolitan area is provided below to determine the frequency and total number of incidents, the severity of injuries resulting from crashes, when collisions occur, and who is involved in these crashes.

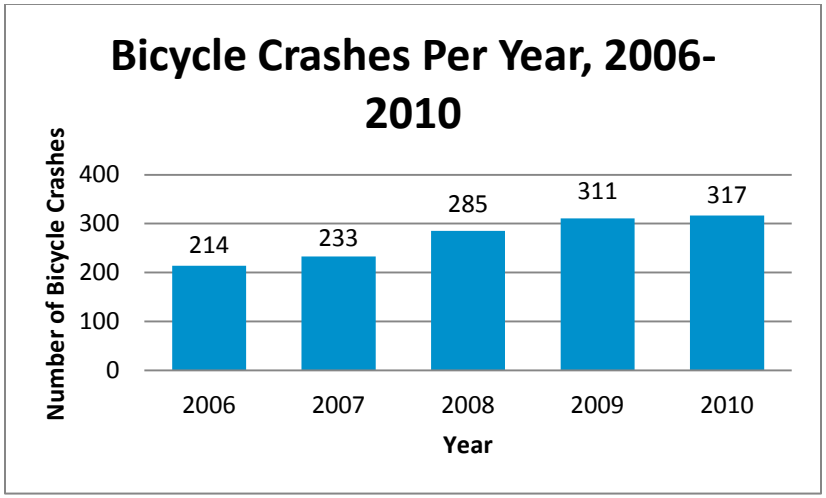
Bicyclist Regional Data

The number of bicycle crashes in the seven-parish New Orleans region was examined for the two year period of 2009 and 2010, the latest years for which data is available. For comparison, Figure 5 also includes crash totals from 2006-2008, showing an overall increase from year to year that likely corresponds to the region's increasing population following Hurricane Katrina.

From 2008 to 2010, there appears to be a general stabilization of bicycle crash rates, in line with the slowing rate of population increase. As noted above these totals remain significantly lower than the number of incidents recorded between 1999 and 2002, which ranged from about 350 to 500 per year.

Lacking reliable data on overall cycling rates during this period, however, it is difficult to determine whether the relative safety of cyclists is increasing. Future study efforts should examine increases or decreases in crash rates in relationship to not only population, but to the substantial recent increases in bicyclists and pedestrians observed in *The New Orleans Pedestrian and Bicycle Count Report, 2012*[9].

Figure 5: Bicycle Crashes per Year, 2006-2010



Figures 6 and 7 indicate the severity of injuries sustained by cyclists during the study period, overall, and by year. The majority of crashes (63%) resulted in little or no injury, with the remaining 37% of cyclists involved in incidents suffering moderate, severe, or fatal injuries. There was little variation between the two years of data in this respect, and these trends are consistent with those identified before and after Hurricane Katrina.

[9] Accessible at http://www.planning.uno.edu/pbri/research.html

Figure 6: Percentage of Bicycle Crashes by Severity, 2009-2010

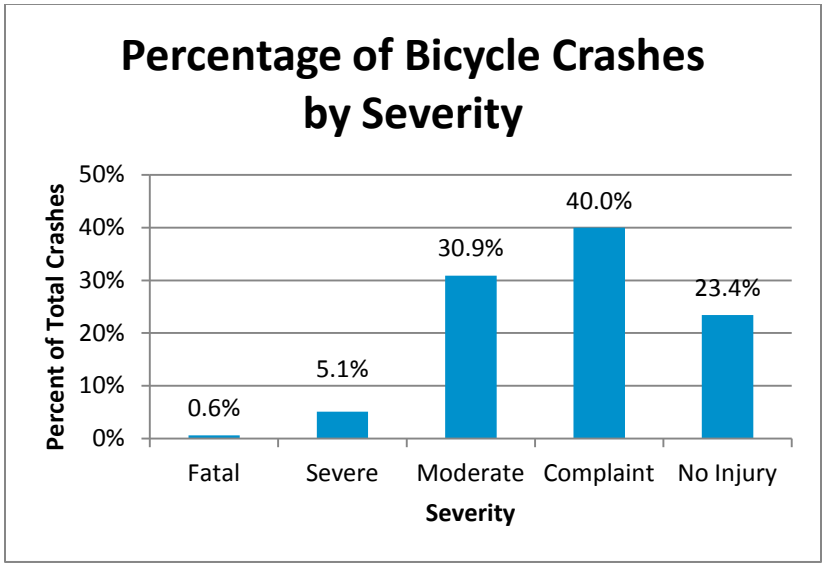
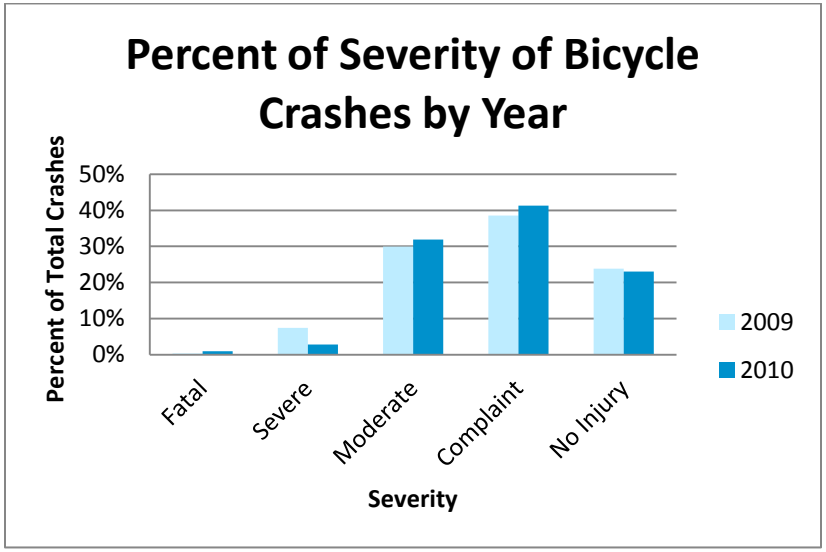


Figure 7: Percent of Severity of Bicycle Crashes by Year, 2009-2010



Examining the data by temporal characteristics, we see that bicycle crashes tended to peak during spring and autumn months, peaking in April and September with greater than 10% of all crashes each (Figure 8). The fewest number of incidents occurred in December, with only 5.3% of total crashes. These trends correspond to observed trends in *The New Orleans Bicycle and Pedestrian Count Report, 2012,* which recorded much higher active transportation facility use during spring and autumn months, likely indicating decreased numbers of cyclists during inclement weather and therefore fewer crashes.

Figure 9 represents the pattern of bicycle crashes by day of the week, showing a relatively even weekday distribution with a slight Friday peak, and decreased numbers of crashes on the weekends. This corresponds to patterns observed in the 1999-2002 dataset.

This dataset indicates that bicycle crashes tend to increase steadily through the morning to a late afternoon/evening peak from 5 to 6pm (Figure 10). This is consistent with all previous data sets (1999-2008), suggesting increased ridership as well as vehicular congestion during the evening commuter rush contribute to crash frequency. Better data on bicyclist travel patterns and bicycle infrastructure use is needed in order to fully evaluate this aspect of crash occurrence.

Figure 8: Percentage of Bicycle Crashes by Month, 2009-2010

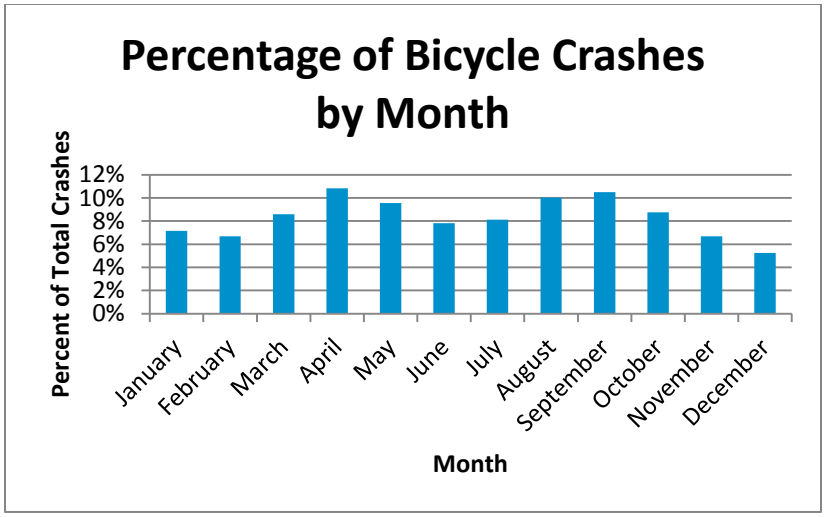


Figure 9: Percentage of Bicycle Crashes by Day of the Week, 2009-2010

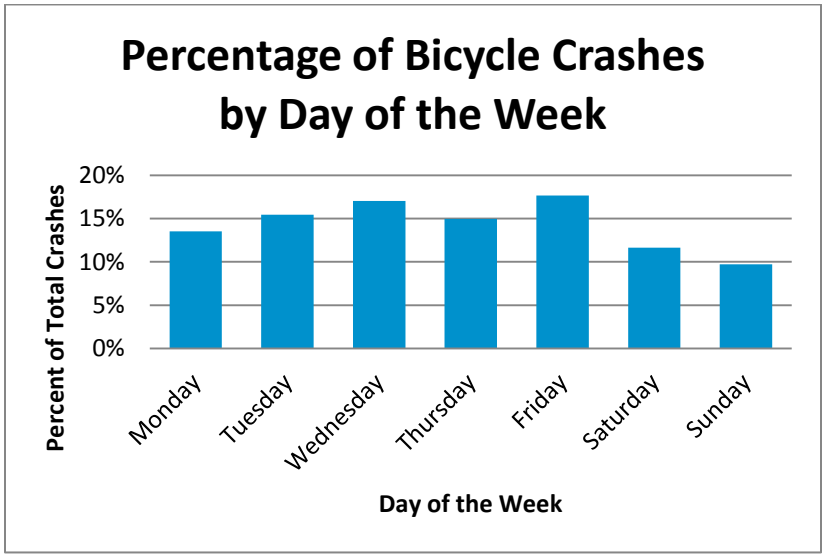


Figure 10: Number of Bicycle Crashes by Hour of the Day, 2009-2010

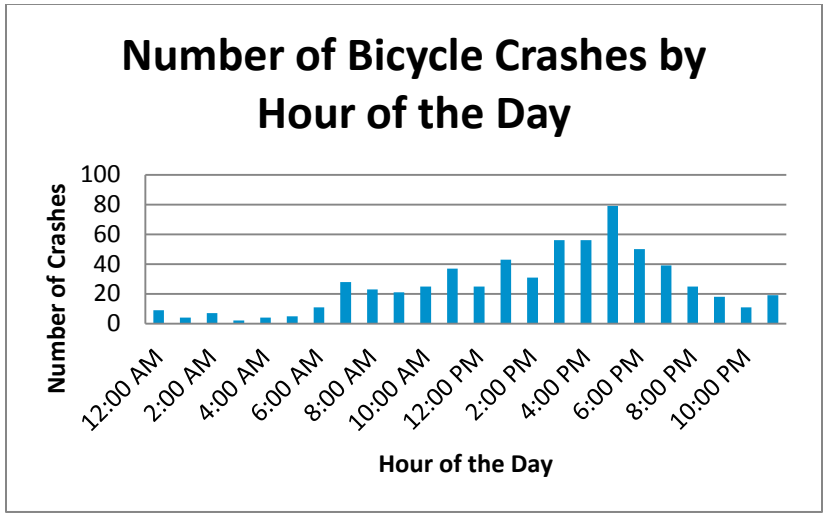
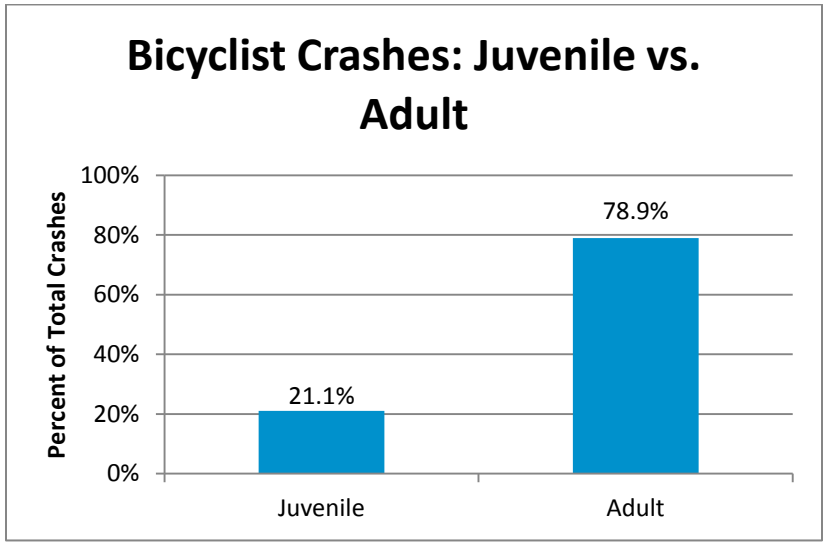


Figure 11: Bicycle Crashes: Juvenile vs. Adult, 2009-2010



The majority (79%) of bicyclists involved in crashes were adults (Figure 11). This is consistent with 2006-2008 data, which indicated a decreased proportion of juveniles (17 or younger) involved in crashes compared to Pre-Katrina, when approximately 30% of cyclists were under 18 years of age.

The age of cyclists involved in crashes[10] (Figure 12) ranges from two years old to 86 years old. Crash frequency peaks occur among two broad groups: teenagers and young adults (15 to 26), and middle aged adults (48 to 56). The highest single-age crash frequencies are at 15, 21, and 51 years of age. Relative to Pre-Katrina data, which showed a strong peak among adolescents and a smaller peak among cyclists in their early 40s, these figures indicate increased relative crash frequency among younger and older adults and suggest a broader range of bicyclists overall.

This is consistent with 2006-2008 data showing a greater proportion of crashes involving younger adults, which likely reflects increased popularity nationwide of bicycling for transportation, and also hints at an increasing number of older adults (i.e. baby boomers) getting involved in bicycling for transportation, recreation, or fitness.

Figure 12: Age of Cyclists by Crash Frequency, 2009-2010

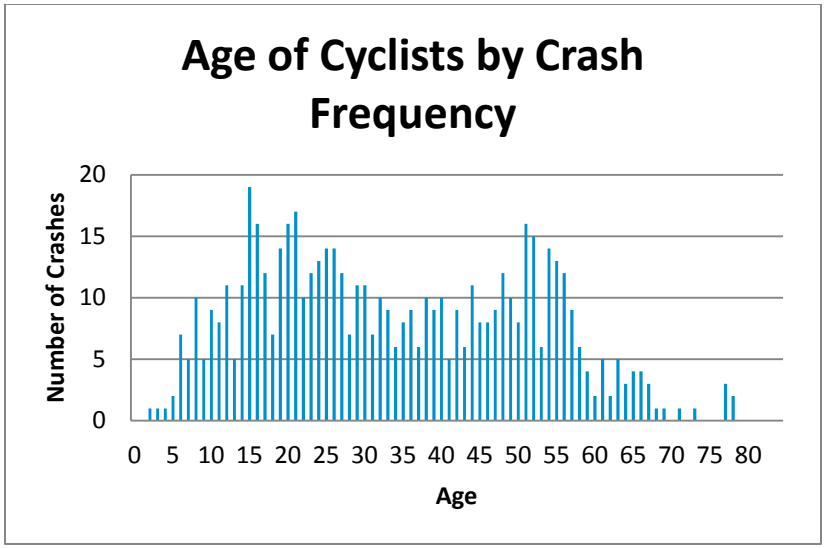
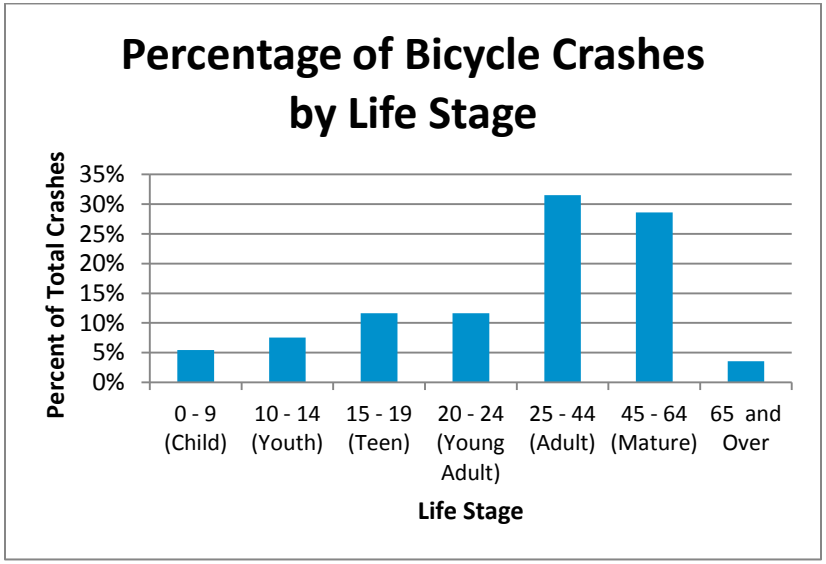


Figure 13: Percentage of Bicycle Crashes by Life Stage, 2009-2010



[10] In crashes for which demographic data was recorded. 93% of crashes in this dataset included cyclist age.

Breaking down the crash figures by life stages (Figure 13), as defined in the *2005 New Orleans Metropolitan Bicycle and Pedestrian Plan,* provides a slightly different angle from which to observe who crashes are affecting and allows for more targeted safety improvements for at-risk groups.

In the New Orleans region, the life stage chart again shows that the majority of crashes are occurring among adults. Significantly, the percentage of crashes involving older adults (45-64) has increased from just over 15% in 1999-2002, to more than 29% in 2009-2010. This indicates that there may be a particular need to encourage safe bicycling habits among this age group in order to bring these crash frequencies down. AARP Louisiana's "Biking for Boomers" program, for which AARP partners with a local bicycle advocacy group to provide safe cycling instruction and encouragement for older adults, is an excellent example of such a targeted program.

Figure 14 shows the racial classification of cyclists involved in crashes[11], indicating a roughly comparable split between white and black cyclists (48% to 46%) with less than 6% classified as "other." Figure 15 shows that the vast majority of bicycle crashes[12] (87%) involve male riders. Both these figures are consistent with Pre- and Post- Katrina recorded trends.

[11]For the 91.4% of crashes for which data on race was recorded.
[12] For the 92.6% of crashes for which gender was recorded.

Figure 14: Percentage of Bicycle Crashes by Race, 2009-2010

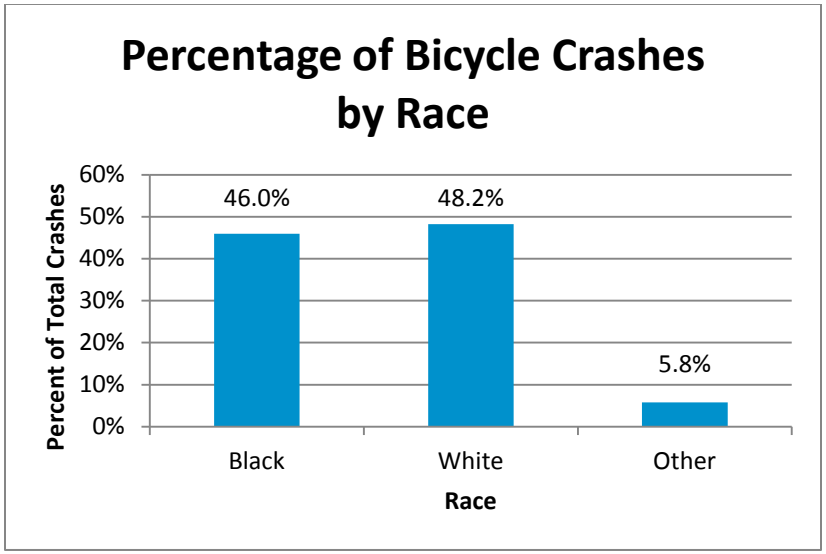
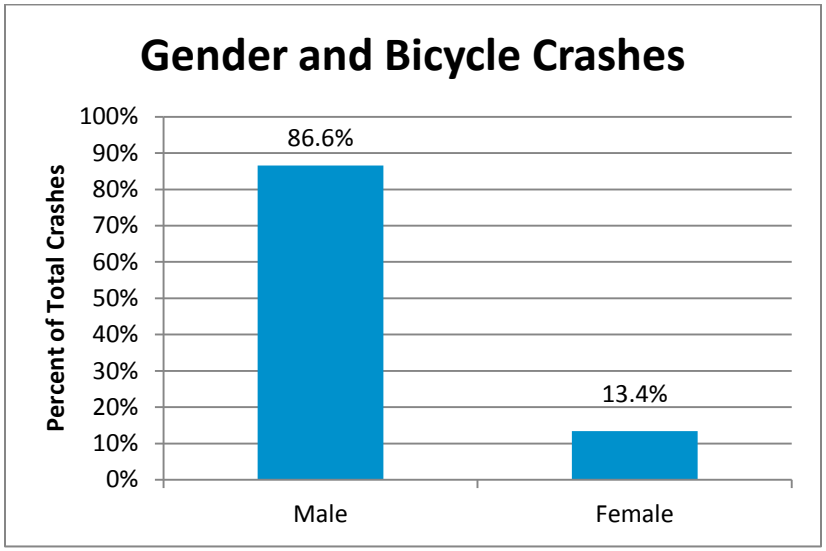


Figure 15: Gender and Bicycle Crashes, 2009-2010



Finally, lighting conditions and road type were reviewed to provide preliminary information on the circumstances in which crashes tend to occur. Most crashes take place on two-way roads, either with a physical separation (but not a barrier) between directions of traffic (38%) or without physical separation (32%) (Figure 16). The majority of crashes (73%) occur during daylight hours (Figure 17), likely attributable to higher overall volumes of cyclists during the day.

Figure 16: Percentage of Bicycle Crashes by Road Type, 2009-2010

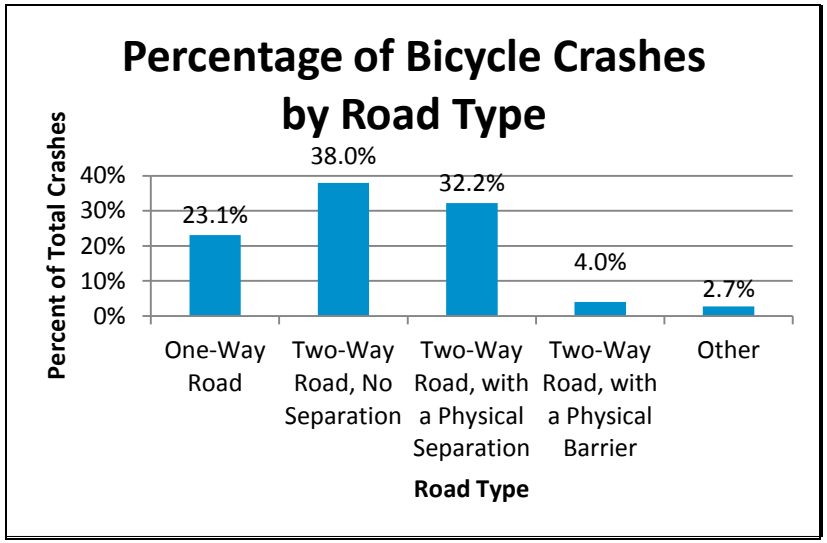


Figure 17: Percentage of Bicycle Crashes by Lighting Condition, 2009-2010

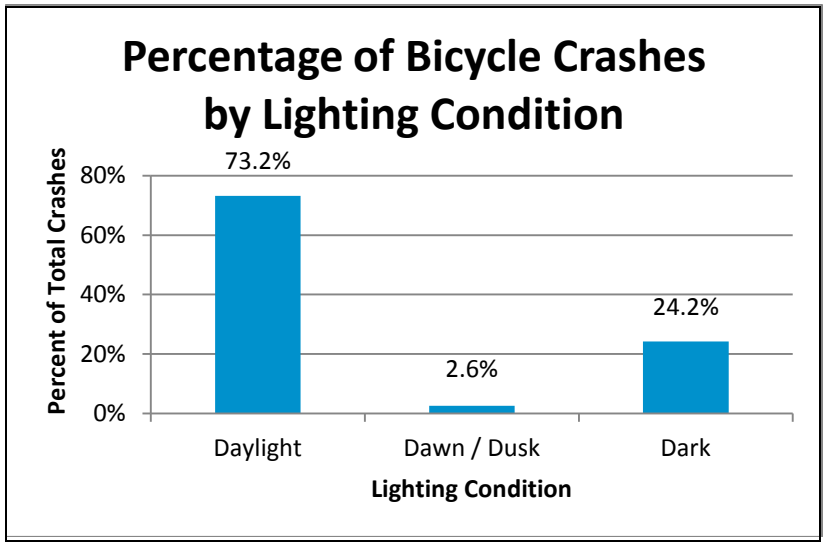


Figure 18: Pedestrian Crashes per Year, 2006-2010

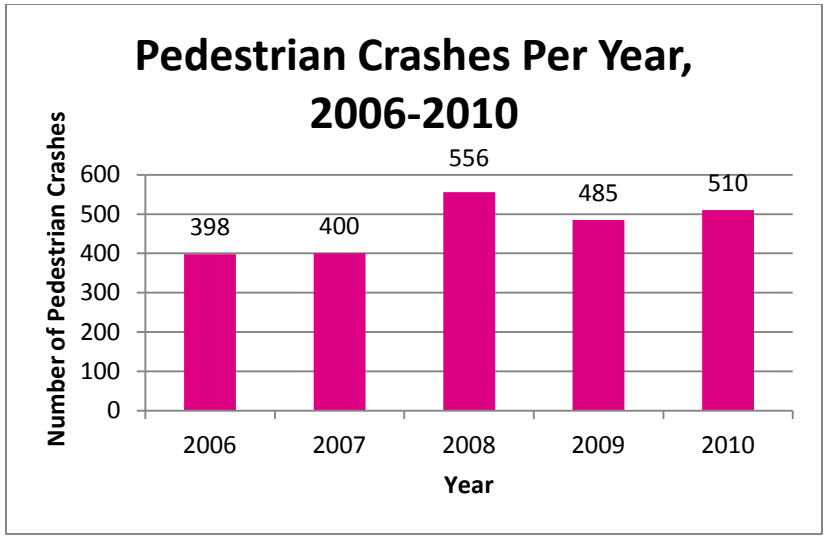
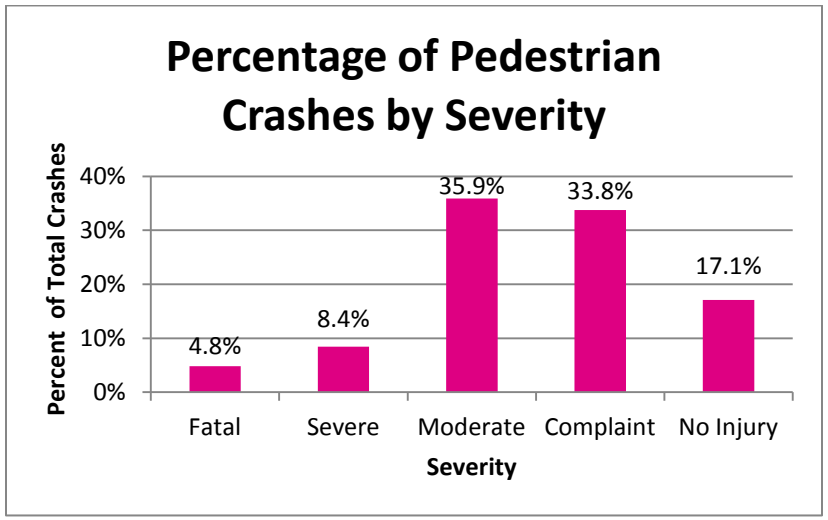


Figure 19: Percentage of Pedestrian Crashes by Severity, 2009-2010



Pedestrian Regional Data

In 2009 and 2010, pedestrian crashes decreased from a 2008 Post-Katrina high of 556, to 485 in 2009 and 510 in 2010 (Figure 18). These figures remain substantially lower than the 1999-2002 average of more than 600 per year. As among bicycle crashes, this overall decrease may be at least partially attributed to the region's reduced population, particularly in Orleans Parish, following Hurricane Katrina in 2005. Notably, however, the trend of steadily increasing crash totals from year to year observed for bicycles is not apparent for pedestrians. This may partly indicate that walking, as a mode of transportation, is not increasing in popularity as rapidly as bicycling appears to be.

The severity of pedestrian crashes (Figure 19) reflects a very similar pattern to bicycle crashes. A higher proportion of pedestrian incidents did, however, result in severe or fatal injuries (13%) than for bicycle incidents (8%). As noted in previous reports, this may reflect the different physical dynamics of bicycle and pedestrian collisions with vehicles. Pedestrian crashes tend to result in direct impact, whereas the impact of collisions with cyclists may be reduced by the cyclist's own velocity, helmet use, or the bicycle itself. As for pedestrians, the pattern of severity of crashes appears to be basically stable from year to year and consistent with both Pre- and Post-Katrina datasets (Figure 20).

Figure 20: Percent of Severity of Pedestrian Crashes by Year, 2009-2010

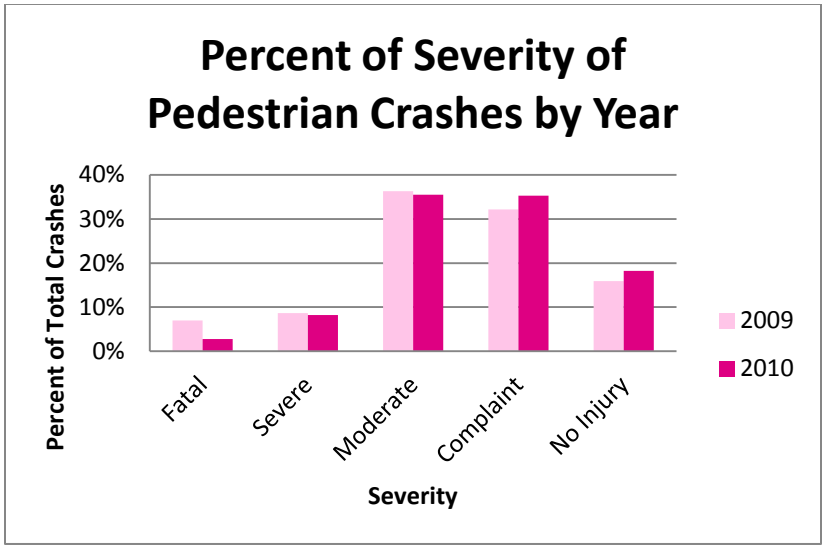
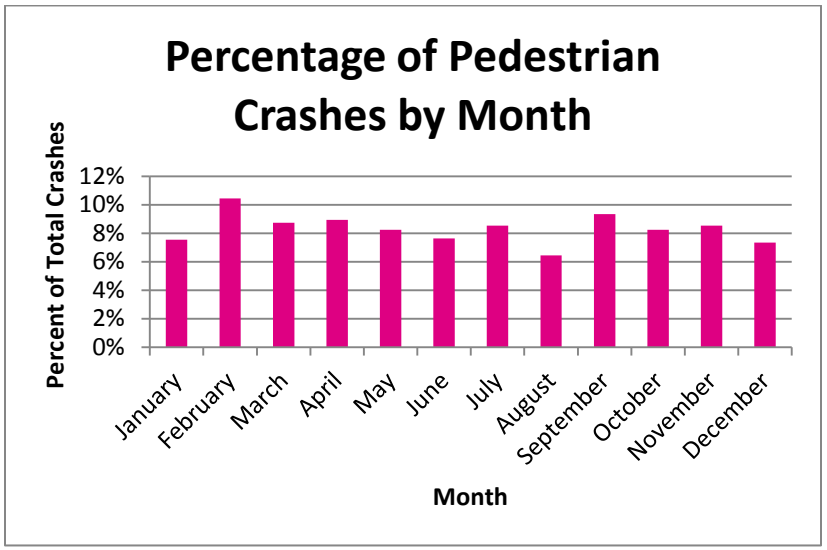


Figure 21: Percentage of Pedestrian Crashes by Month, 2009-2010



Similar to bicycling data, the percentage of pedestrian crashes by month (Figure 21) shows an overall incidence of higher crash numbers during spring and autumn months, although this trend is far less pronounced for pedestrians, suggesting that rates of walking (and by extension, opportunities for crashes) are less weather-dependant than for bicycling.

Figure 22 shows the percentage of pedestrian crashes by day of the week. Pedestrian crashes are relatively stable from day to day and like bicycle crashes, experience a slight Friday peak, but unlike bicycle crashes, pedestrian crashes tend not to decline during weekends.

Figure 22: Percentage of Pedestrian Crashes by Day of the Week, 2009-2010

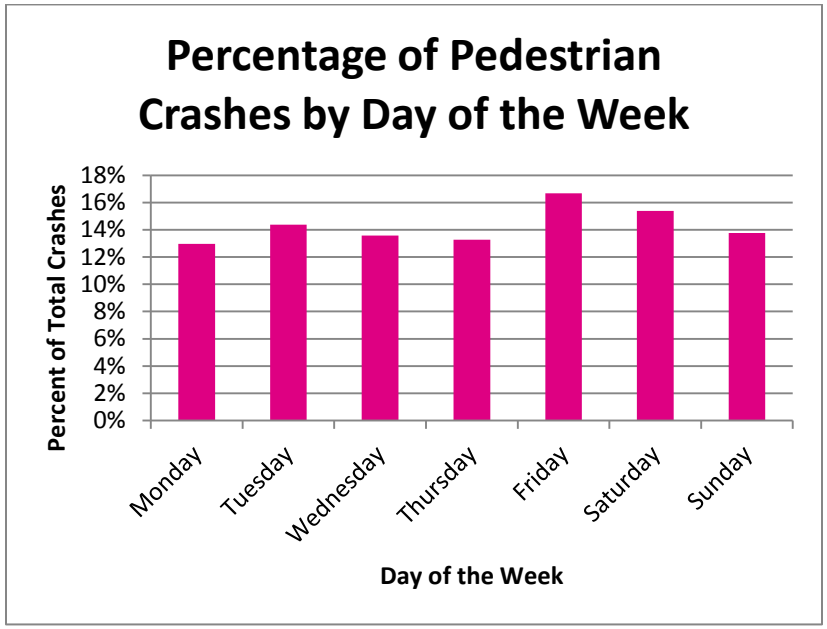


Figure 23 further breaks down the data by the hour of the day in which crashes occur. Similar to the bicycle crash data, pedestrian crashes tend to peak in the afternoon between 4pm and 7pm, in keeping with previously observed trends. However, pedestrian crashes continue to occur into the evening in greater frequency than bicycle crashes do, and are somewhat less concentrated around peak commuting hours.

As with bicycle crashes, the majority of those involved in pedestrian crashes are adults. This corroborates a trend observed in 2006-2008 of a decreased proportion (as well as total volume) of juveniles involved in crashes compared to before Hurricane Katrina. In 2009-2010, fewer than 26% of pedestrians involved in crashes were under the age of 18, compared to 35% from 1999-2002 (Figure 24).

Figure 25 shows the overall age composition of pedestrians involved in crashes, with a strong peak among teenagers (14-19), a spike among 27-28 year olds, and a an uneven gradual decrease from about age 30 onward. Again, relative to Pre-Katrina data, a far smaller proportion of very young children ("child" life stage in Figure 26, age 0-9) are involved in crashes as pedestrians: from 20% in 1999-2002, to 11% in 2009-2010.

Figure 23: Number of Pedestrian Crashes by Hour of the Day, 2009-2010

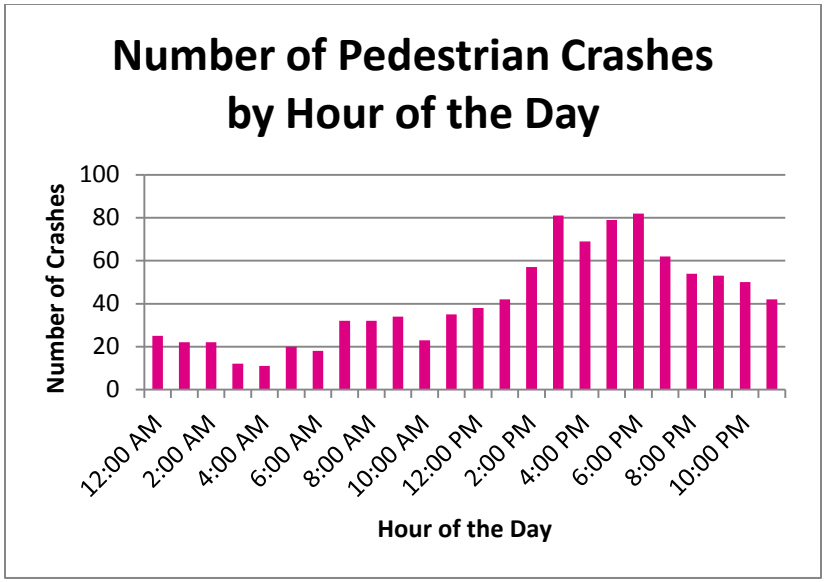


Figure 24: Pedestrian Crashes: Juvenile vs. Adult, 2009-2010

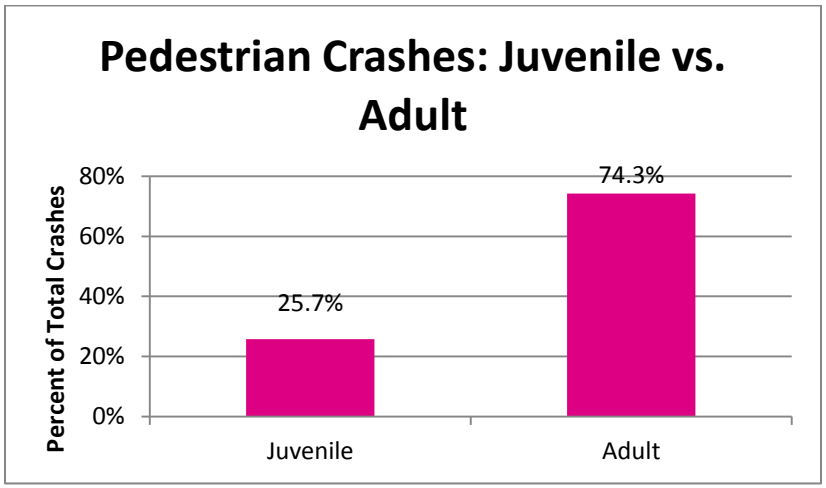


Figure 25: Age of Pedestrians by Crash Frequency, 2009-2010

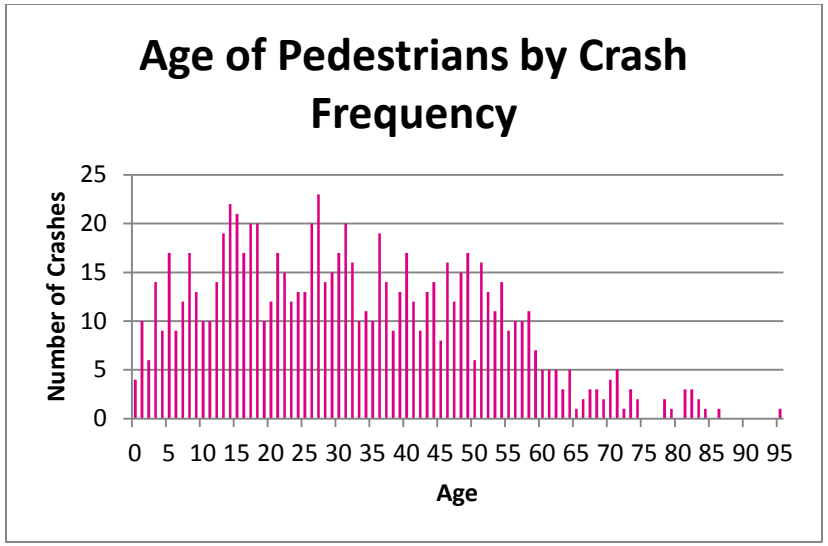
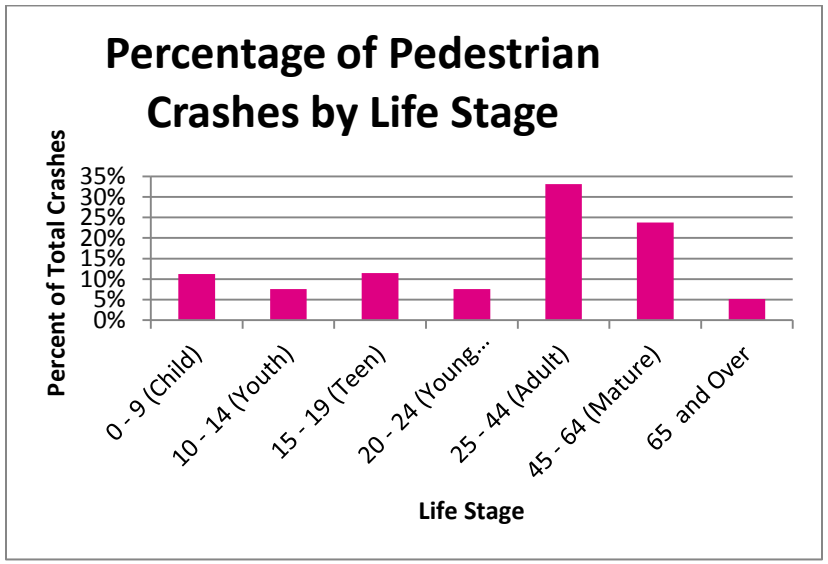


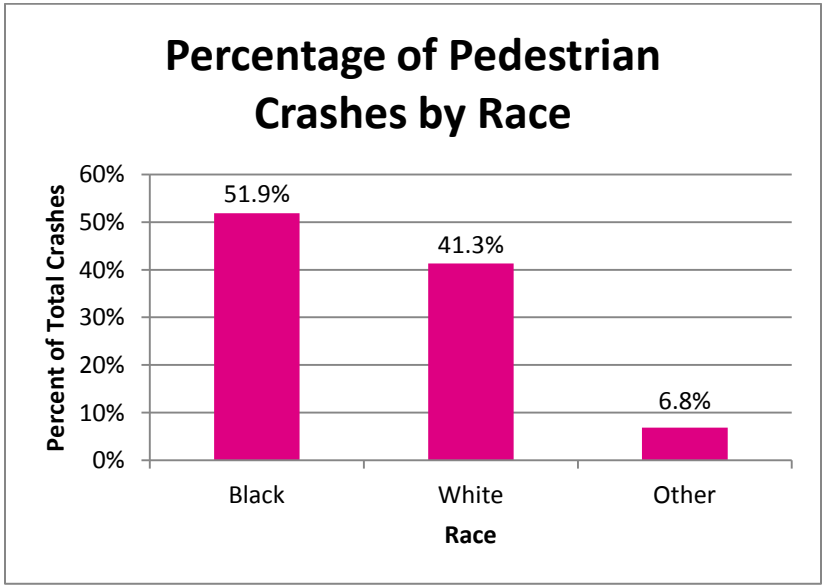
Figure 26: Percentage of Pedestrian Crashes by Life Stage, 2009-2010



Diverging from the bicycling crash data, a higher proportion of pedestrians involved in crashes are black (52%) than white (41%) (Figure 27). This is consistent with previously observed trends and likely reflective of the overall demographic makeup of Orleans Parish, where the largest number of crashes occur.

Figure 29 shows the percentage of males and females involved in pedestrian crashes. The proportion of females involved in crashes (37%) is much higher for pedestrians than for bicycles, and corresponds to previously reported statistics.

Figure 27: Percentage of Pedestrian Crashes by Race, 2009-2010



As in the bicycle crash analysis, and consistent with the 1999-2002 dataset, most pedestrian crashes occur during daylight hours (Figure 28). The proportion of incidents which occur at night has, however, increased somewhat relative to the 1999-2002 data, from about 30% to almost 40%.

Finally, looking at pedestrian crashes by road type (Figure 30), we see that as with bicycle crashes, the largest percentage of crashes occur on two-way streets with no physical separation. Though less pronounced than in the 2006-2008 period, this is consistent with findings from the *2005 New Orleans Metropolitan Area Bicycle and Pedestrian Plan,* and suggests there is a safety advantage on roadways with a pedestrian refuge (e.g. median or island) separating traffic, and thereby shortening crossing distances and minimizing vehicle conflicts.

Figure 28: Percentage of Pedestrian Crashes by Lighting Condition, 2009-2010

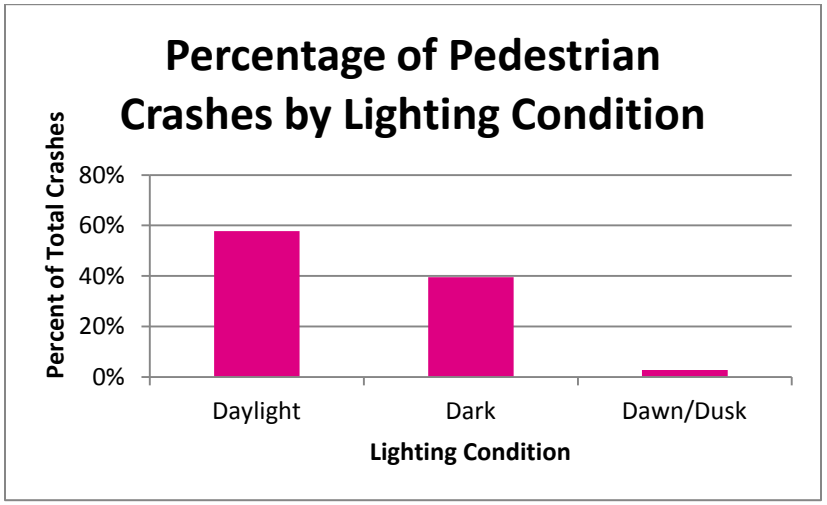


Figure 29: Gender and Pedestrian Crashes, 2009-2010

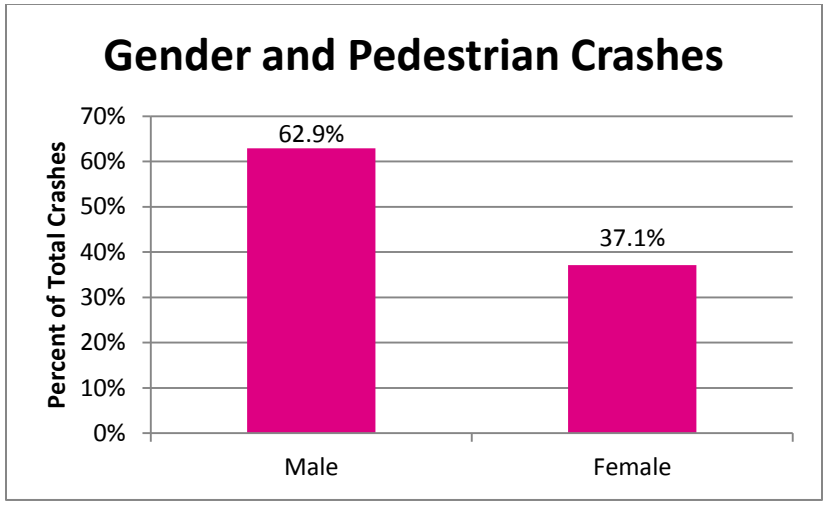
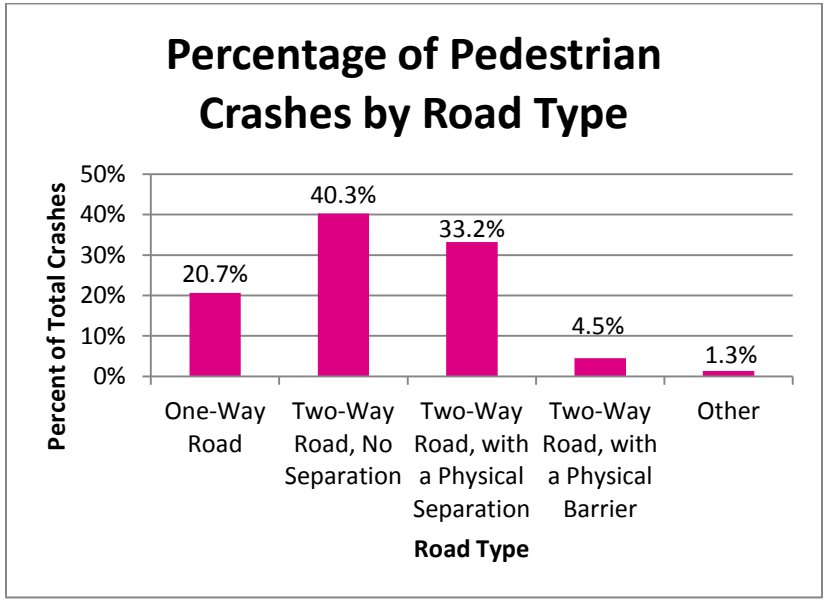


Figure 30: Percentage of Pedestrian Crashes by Road Type, 2009-2010



Implications of Summary Statistics

This analysis of pedestrian and bicycle crashes provides a description of the number of people involved in crashes, the severity of injuries resulting, and when, who, and under what conditions collisions are occurring. Importantly, although total crash numbers for bicyclists increased slightly relative to the years immediately Post-Katrina, crash totals for both years of this study period fell well below even the lowest figures for crashes during the 1999-2002 period. For pedestrians, crash totals have decreased since 2008, and remain well below Pre-Katrina figures.

Moreover, all age groups saw decreased total numbers of crashes relative to Pre-Katrina data. Most notably, there has been both an absolute and proportional decrease in the number of children (as bicyclists or pedestrians) being struck by vehicles. On the other hand, there has been a proportional increase in the number of older adult cyclists involved in accidents, suggesting new safety and educational challenges in the years ahead.

Comparisons of Pre- and Post-Katrina data in the New Orleans region must take into consideration a variety of complex factors, including not only a reduced total population, but demographic shifts and social trends, as well as sizable infrastructure investments that influence travel behavior, active transportation use, and overall safety. Crash data from 2009 and 2010 reflects a reduced but generally stabilized Post-Katrina New Orleans regional population, and provides a preliminary indication that pedestrian and bicycle safety is improving.

The next iteration of this report, based on 2011-2012 data, will allow stronger conclusions to be drawn regarding long-term trends. This data should also begin to reflect the correlation between crash rates and the documented increases in bicycling and walking between 2010 and 2012 (See: New Orleans Pedestrian and Bicycle Count Report 2012), as well the positive or negative impacts on safety of the major investments in active transportation infrastructure, particularly in Orleans Parish, in 2010 and 2011.

Further research is needed to more clearly articulate the relationship between bicycle and pedestrian crashes and active transportation behavior and use (e.g. counts and crash causality), as well as to more closely evaluate the environmental factors (e.g. presence or absence of facilities, other design factors) that contribute to crashes.

In the sections that follow, a more detailed geographic analysis of crash frequency in the region's urbanized core (Orleans and Jefferson Parishes) is presented.

Geographic Analysis

In addition to the analysis of crashes as they relate to poverty rates above, and the analysis of crashes across the urbanized region, examining the spatial distribution of pedestrian and bicycle crashes helps to create a more meaningful portrait of safety conditions within a geographic area, and is critical to decreasing crash frequency in high-incidence areas.

In this section, maps of crash locations are provided and a "Hot Spot" analysis is presented to identify statistically significant clusters of crashes and provide guidance as to where crash-reduction resources should be targeted. This analysis focuses on Orleans and Jefferson Parishes, which accounted for 87% of bicycle and 83% of pedestrian crashes during the 2009-2010 period, an even greater share of the region's crashes than in 2006-2008.[13]

Spotlight: French Quarter and CBD

New Orleans' downtown area in particular has a well-documented history of high crash frequencies for pedestrians and bicyclists. Data for 2009 and 2010 period were geocoded and examined to determine the frequency of crashes occurring within the CBD and French Quarter, to evaluate whether this trend has continued. Tables 7 and 8 show the percentages of total pedestrian and bicycle crashes in Orleans and Jefferson Parishes which occurred in New Orleans' French Quarter or CBD each year during the study period. Figures 31 & 32 represent the locations of these crashes spatially.[14] In 2009, crashes in these areas represented 20% of all bicycle crashes and 28% of pedestrian crashes in Orleans Parish. These figures decreased only slightly in 2010. Moreover, 50% of the intersections in Orleans and Jefferson Parishes at which more than two pedestrian crashes occurred (see Table 14) were located within this area—the city's business and tourism core. While few of the crashes in this vicinity are severe due to low traffic speeds, these figures are consistent with the high proportions of the city's crash problem recorded in previous reports, and indicate an ongoing safety issue for visitors and residents of this area alike.

Table 7: Bicycle Crashes in French Quarter and CBD, 2009-2010

Bicycle Incidents within the French Quarter and CBD			
Year	Number of Crashes	Percent of Total Orleans Parish Crashes	Percent of Total Orleans and Jefferson Parish Crashes
2009	33	20%	12%
2010	32	17%	12%

Table 8: Pedestrian Crashes in French Quarter and CBD, 2009-2010

Pedestrian Incidents within the French Quarter and CBD			
Year	Number of Crashes	Percent of Total Orleans Parish Crashes	Percent of Total Orleans and Jefferson Parish Crashes
2009	69	28%	17%
2010	77	27%	18%

[13] Hot spot analysis not performed for other areas of the region due to an insufficient number of incidents and inadequate geographic data.

[14] Maps indicate intersections where one or more crashes took place, not individual crashes; multiple incidents are represented by one map point.

Figure 31: Bicycle Crashes in French Quarter and CBD, 2009-2010

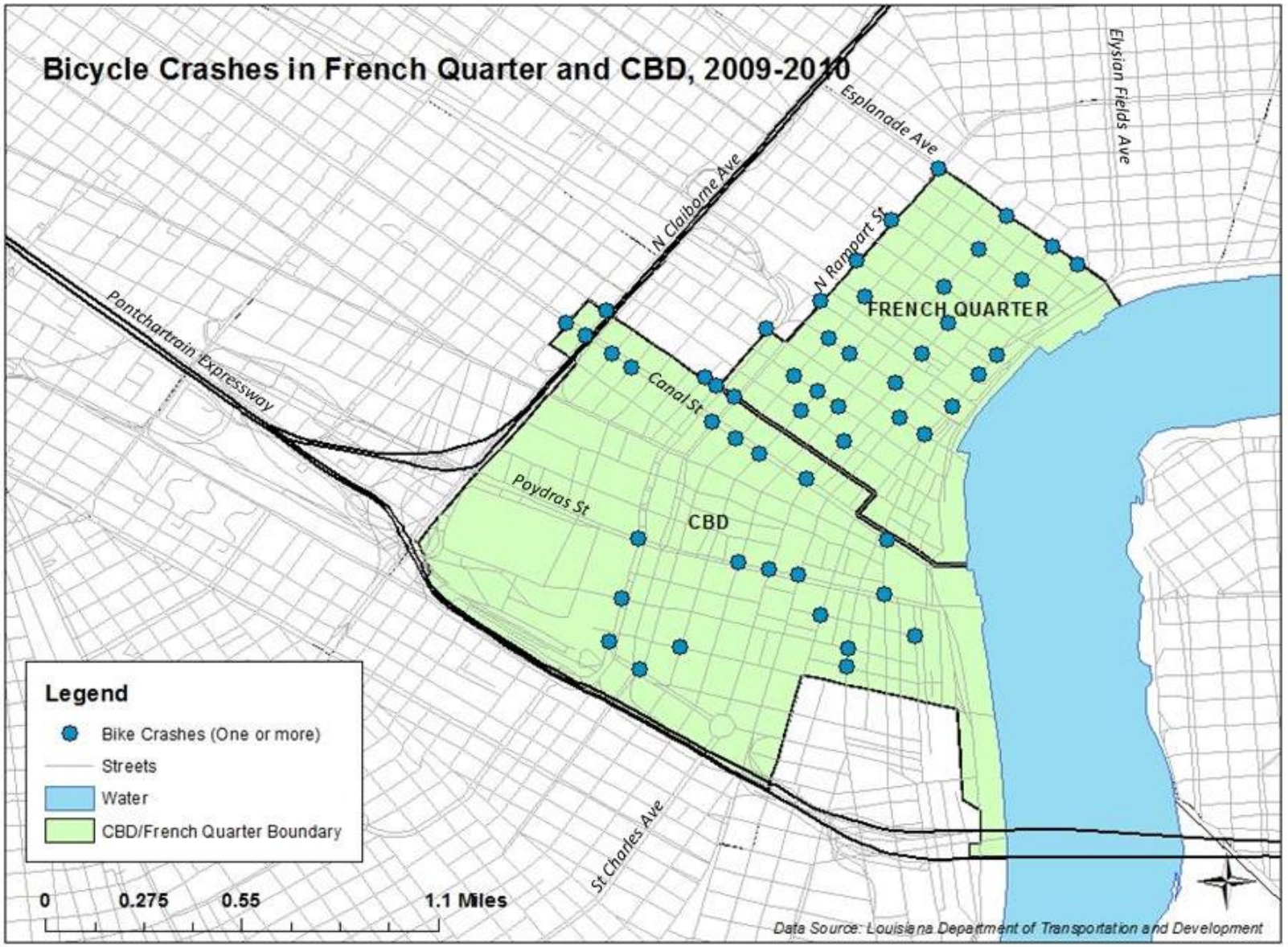
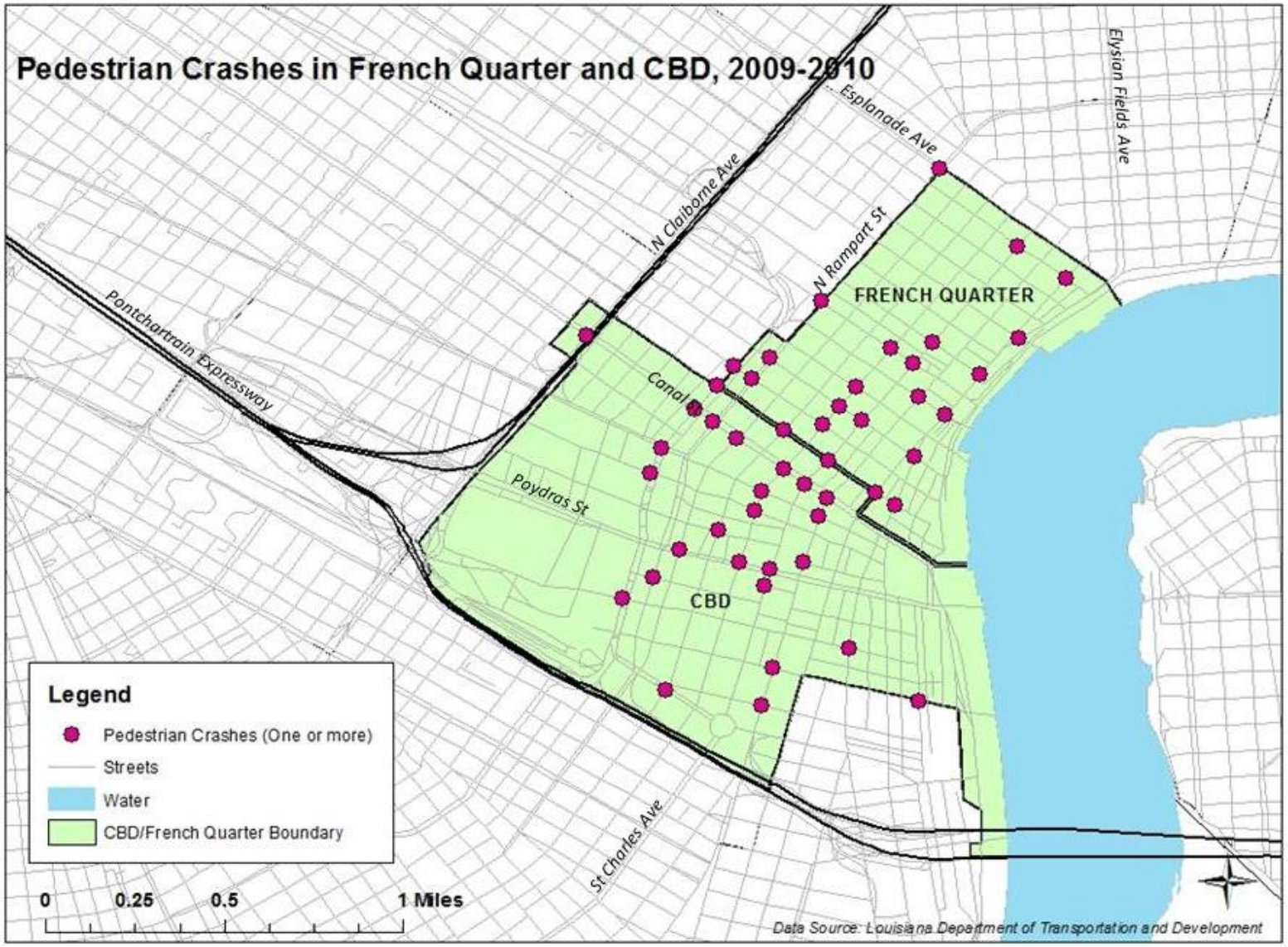


Figure 32: Pedestrian Crashes in French Quarter and CBD, 2009-2010



Bicycling Spatial Data Overview

There were 542 reported bicycle crashes in Orleans and Jefferson Parishes (East and West Bank) in 2009 and 2010. Of these, a few incidents involved more than one bicyclist, for a total of 549 bicyclists involved in crashes during this period. Of these 549 crash records, 94% contained sufficient geographic information to be geocoded and analyzed spatially, based on the intersection nearest to where the crash occurred.[15] Figures 33 and 34 show the locations of crashes in Orleans and Jefferson Parishes respectively. This provides important general data on where crashes are occurring within the region.

The pattern of bicycle crashes is relatively dispersed, compared to pedestrian crashes. While many crash locations indicated represent more than one crash incident, very few locations experienced more than two crashes during the two year period. Table 9 shows the intersections in Orleans and Jefferson Parish that experienced the greatest crash frequencies during this period. Causeway Blvd at Jefferson Hwy in Jefferson Parish topped the list with four crashes. The other three intersections, all in Orleans parish, each had three crashes. Two of these locations are along Claiborne Avenue, also the top bicycle crash corridor from 2006-2008, and 2009-2010 (Table 10).

Though it is difficult to assess crash patterns at individual intersections with only two years of data due to lower overall crash frequencies, these findings are consistent with both Pre- and Post-Katrina analyses. Evaluating crash patterns at the corridor level provides a more useful analysis, since bicycles typically travel across many intersections along a given corridor and may be at risk of collision at any point. In both Orleans and Jefferson Parishes, this is reflected in a clear distribution of crashes along major arterial roadways (Tables 10 and 11).

Table 9: Top Bicycle Crash Locations by Frequency, Orleans & Jefferson Parish, 2009-2010

Top Bicycle Crash Locations, Orleans and Jefferson Parish	
Location	Number of crashes, 2009-2010
Causeway Blvd and Jefferson Hwy	4
S Claiborne and Adams St	3
Canal St and Broad St	3
N Claiborne Ave and Esplanade Ave	3

[15] It should be noted that many of the crashes which could not be geocoded involved crash locations on, near, or underneath elevated expressways (e.g. I-10, I-610, US 90, Crescent City Connection, etc). Crashes occurring on service roads and surface streets running parallel to these facilities are therefore underrepresented within this analysis, but represent an additional safety concern for both bicyclists and pedestrians that should be evaluated more closely in the future.

In Orleans Parish, the major arteries of Claiborne Avenue, Canal Street, and St. Charles Avenue top the list, as in 2006-2008. These routes, popular with cyclists as cross-town connectors, all currently lack dedicated bicycle facilities and appear to present a safety hazard.

In Jefferson Parish, the list of top crash corridors for bicyclists also looks similar to its Pre- and Post-Katrina precedents, with the major, auto-oriented thoroughfares of the Westbank Expressway, Veterans Memorial Boulevard, and Airline Drive topping the list. Overall, Orleans Parish's bicycle crash problem remains greater in terms of the total number of incidents. However, both parishes in the region contain a number of problematic corridors that should be further examined to evaluate the specific design characteristics or operating conditions which contribute to high crash incidence, and how to mitigate these through targeted safety improvements.

Table 10: Top Ten Bicycle Crash Corridors, Orleans Parish, 2009-2010

Top 10 Bicycle Crash Corridors, Orleans Parish		
Rank	**Corridor**	**Number of crashes, 2009-2010**
1	Claiborne Ave	29
2	Canal St	26
3	St Charles Ave	21
4	St Claude Ave	15
5	Burgundy St	11
6	Franklin Ave	11
7	Elysian Fields Ave	10
8	N Rampart St	10
9	Esplanade Ave	10
10	Louisiana Ave	9
10	Broad St	9
10	N & S Dorgenois St	9

Table 11: Top Ten Bicycle Crash Corridors, Jefferson Parish, 2009-2010

Top 10 Bicycle Crash Corridors, Jefferson Parish		
Rank	**Corridor**	**Number of crashes, 2009-2010**
1	Westbank Expy	20
2	Veterans Memorial Blvd	16
3	Airline Dr	14
4	Williams Blvd	13
5	Jefferson Hwy	12
6	W Esplanade Ave	10
7	Loyola Dr	8
7	W Napoleon Ave	8
7	Clearview Pkwy	8
10	Barataria Blvd	6
10	Cleary Ave	6

Figure 33: Bicycle Crashes in Orleans Parish, 2009-2010

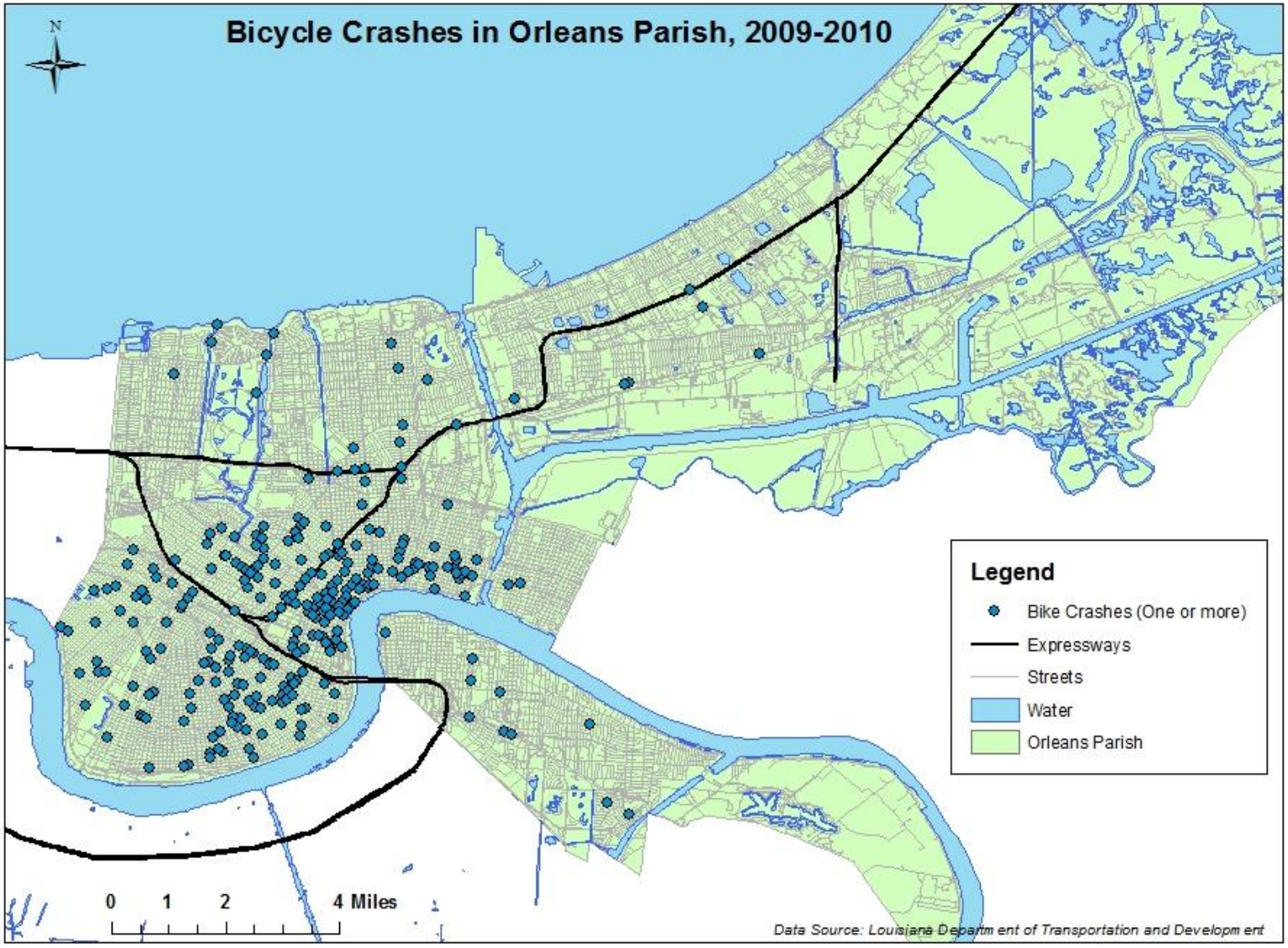
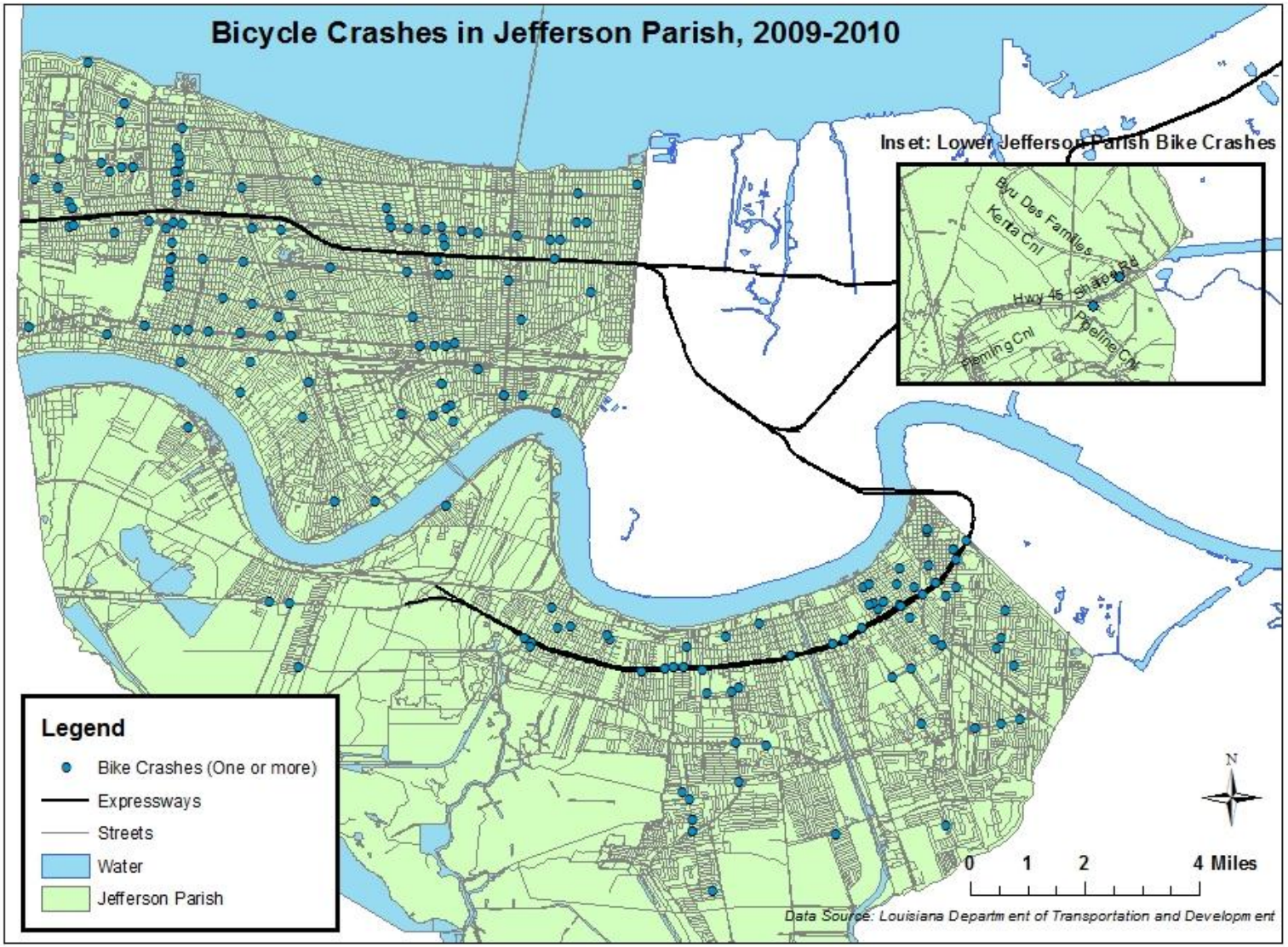


Figure 34: Bicycle Crashes in Jefferson Parish, 2009-2010



Bicycle Crash Cluster Analysis

Crash cluster analysis is an additional tool for identifying geographic areas where a higher than average number of incidents are taking place, beyond individual intersections or corridors. This technique allows the mapping of statistically significant crash "hot spots" which can help policy-makers more effectively prioritize areas that need intervention. In this analysis, the Spatial and Temporal Analysis of Crime (STAC) routine from CrimeStat (Department of Justice) is used to identify crash hot spots. For a full explanation of the various techniques for analyzing spatial statistics, including the methodology behind STAC, see Chapter 7 of the *2005 New Orleans Metropolitan Bicycle and Pedestrian Plan.*

The analysis finds 20 bicycle crash clusters throughout the core of Orleans and Jefferson Parishes (Table 12). The 'core' area analyzed represents the portion of Jefferson and Orleans Parish on the East Bank of the Mississippi River and West of the Industrial Canal. This 'core' area of the region, undivided by major bodies of water (which negatively impact the validity of spatial analysis outputs), provides the densest concentration of population in the greater Metro area and provides a well-defined area for analysis. Figure 35 illustrates each location in the East Bank Core where one or more crashes occurred.

There are two key metrics in the analysis. These are the number of crashes and density of crashes within clusters. Figure 36 represents all 20 crash clusters identified, and highlights those that are statistically significant by the metric of crash frequency: at the 95th percent confidence interval, there are more crashes in these clusters than we would expect to find by chance. At the 95th percent confidence interval or higher, given this sample size (417 geocoded crashes located within the East Bank Core) we would expect to see five crashes within a cluster. That is, if 6 or more crashes occur within a cluster, it is highly unlikely that it is due to chance. For seven of the clusters identified in the 2009-2010 dataset, the number of crashes that occurred is six or higher (Table 13).

The statistically significant clusters are approximately centered at:

- Iberville St and Burgundy St
- Canal St and Broad St
- Esplanade Ave and Chartres St
- Louisiana Ave and St Charles Ave
- Lafayette St and Camp St
- N Rampart St and Independence St
- Claiborne Ave and Martin Luther King Blvd

The other key metric in the analysis is cluster density. Only one of the clusters, Cluster 18, located at approximately Franklin Avenue and N. Robertson St, had a density that was statistically significant.[16]

Given that this analysis was based on only two years of data, it is not surprising that fewer significant clusters were found than in previous data analyses. The fact that eight significant clusters appear despite the limited timeframe and relatively small dataset indicates that clustering is still a significant issue in this region, and suggests that these bicycle crash "hot spots" should be examined in greater detail to evaluate factors that may be contributing to crash clusters in the vicinity and prioritized for safety interventions.

Table 12: Bicycle Generalized STAC Crash Cluster Centers, 2009-2010

Bicycle Generalized Cluster Centers	
Cluster	**Approximate Location**
1	Iberville St and Burgundy St
2	Canal St and Broad St
3	Esplanade Ave and Chartres St
4	Louisiana Ave and St Charles Ave
5	Lafayette St and Camp St
6	N. Rampart St and Independence St
7	Claiborne Ave and Martin Luther King Blvd
8	I-610 and Touro St
9	Dumaine St and Treme St
10	Lasalle St and 6th St
11	Loyola Dr and I-10
12	Decatur St and St Peter St
13	Josephine St and Oretha Castle Haley Blvd
14	Dauphine St and St Ferdinand
15	N Claiborne Ave and St Bernard Ave
16	N White St and Dumaine St
17	Loyola Ave and Julia St
18	Franklin Ave and N Robertson St
19	N Jefferson Davis Parkway and Bienville St
20	S Carrollton Ave and Washington Ave

[16] Note: This cluster, while significant, is too small in area to appear on a map at this scale. Similarly, cluster #2 does not appear at this scale due to small geographic size.

Figure 35: Bicycle Crashes in the Orleans and Jefferson Parish East Bank Core, 2009-2010

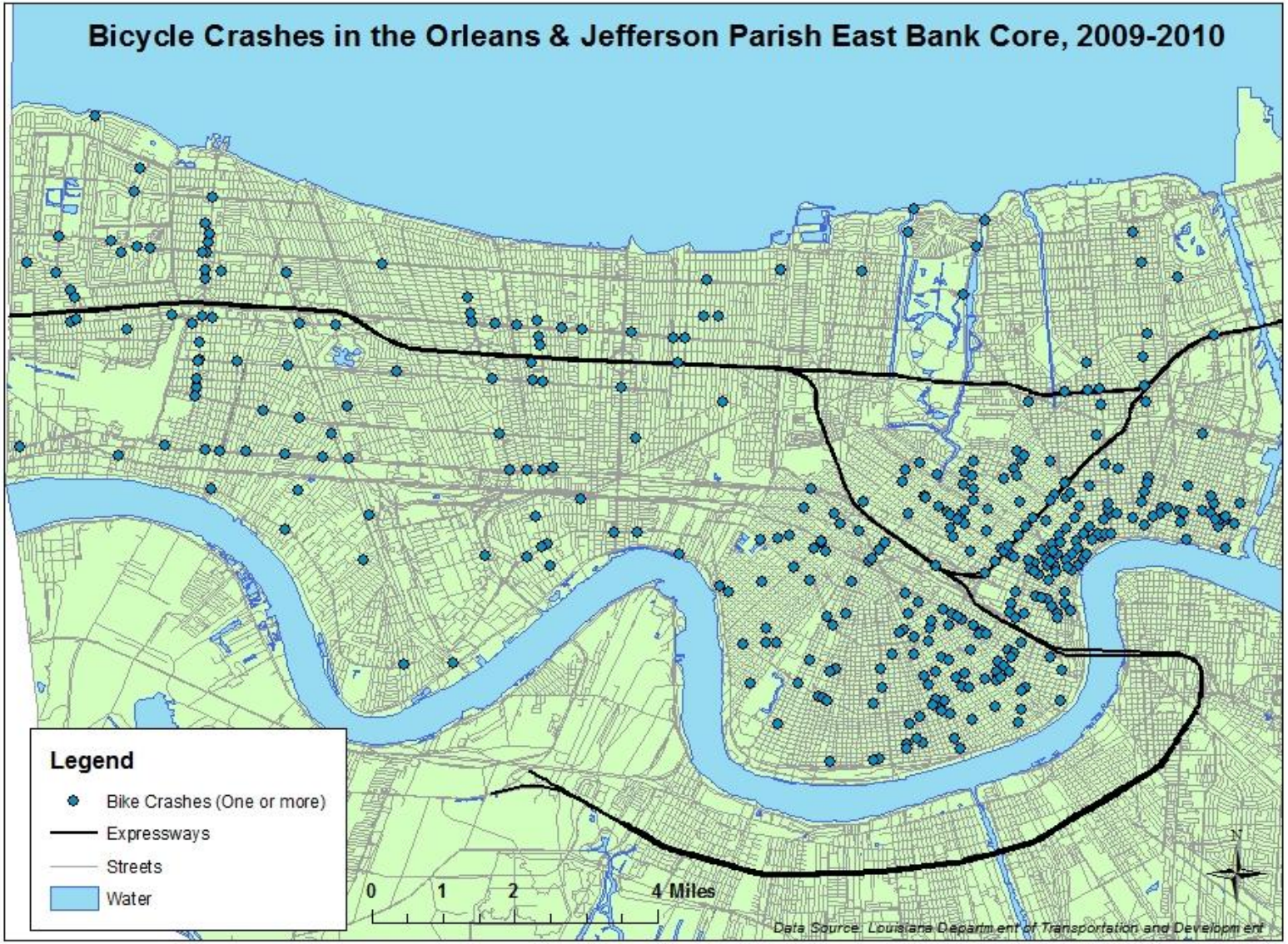


Figure 36: Statistically Significant Crash Clusters, Orleans and Jefferson Parish East Bank Core, 2009-2010

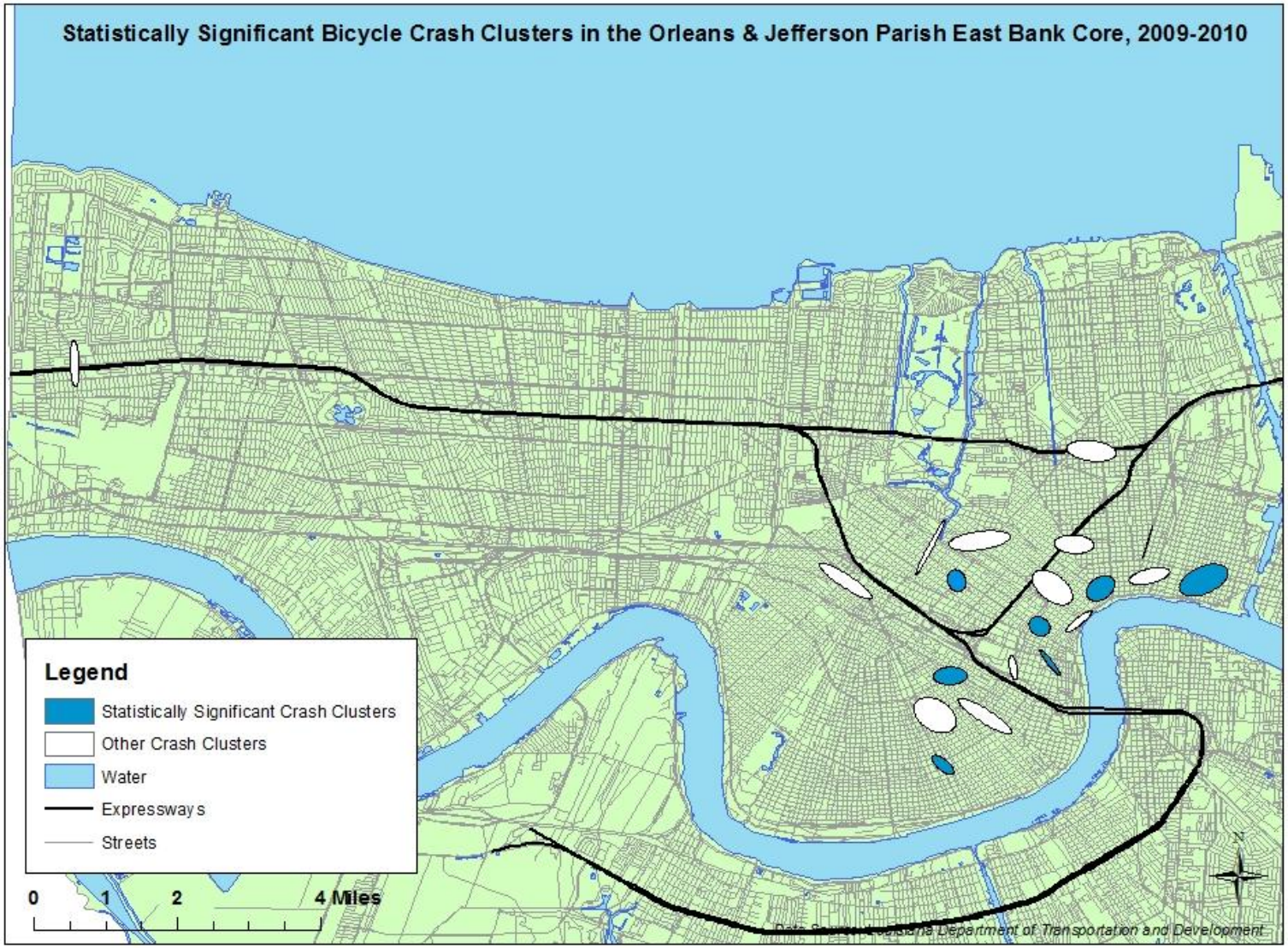


Table 13: Statistically Significant Bicycle Crash Cluster STAC Analysis Output

Spatial and Temporal Analysis of Crime (STAC): Statistically Significant Bicycle Crash Clusters								
Sample size .....: 417				**Distribution of the number of clusters found in simulation (percentile):**				
Measurement type .....: Direct				*Percentile*	*Clusters*	*Area*	*Points*	*Density*
Scan type..... .....: Triangular				min	3	0.00018	3	6.424858
Input units ....: Degrees				0.5	3	0.00018	3	6.424858
Output units ... .: Miles, Square Miles, Points per Square Miles				1	3	0.00078	3	7.043805
Standard Deviations ...: 1.0				2.5	4	0.00104	3	7.575316
Start time .....: 08:17:26 AM, 06/21/2012				5	4	0.00153	3	8.13016
Search radius.....: 402.336000				10	5	0.0026	3	9.006044
Boundary.....: -90.27730,29.91651 to -90.03037,30.04701				90	12	0.33311	5	1155.496101
Points inside boundary.: 415				**95**	**13**	**0.369**	**5**	**1955.084987**
Simulation runs .....: 100				97.5	15	0.39602	5	2888.389494
End time.....: 08:17:43 AM, 06/21/2012				99	15	0.42591	5	3864.067382
				99.5	16	0.46694	5	16482.17829
				max	16	0.46694	5	16482.17829
Cluster	**Mean X**	**Mean Y**	**Rotation**	**X-Axis**	**Y-Axis**	**Area**	**Points**	**Cluster Density**
1	-90.07118	29.95566	54.07254	0.14282	0.11908	0.05343	15	280.747229
2	-90.08793	29.96488	76.03485	0.15558	0.1111	0.0543	10	184.150292
3	-90.0588	29.96333	42.73569	0.14168	0.20306	0.09038	9	99.575529
4	-90.09071	29.92762	45.85942	0.17596	0.07284	0.04027	7	173.845758
5	-90.06901	29.9483	56.00949	0.21389	0.03369	0.02264	7	309.252799
6	-90.03792	29.965	60.52066	0.18297	0.32248	0.18537	6	32.368529
7	-90.08924	29.94563	87.9776	0.12346	0.20414	0.07918	6	75.778129
8	-90.0606	29.99114	9.07659	0.30122	0.14196	0.13434	5	37.218455
9	-90.06855	29.9635	44.74753	0.29968	0.17107	0.16106	5	31.044433
10	-90.09234	29.9377	41.87942	0.29419	0.2011	0.18587	5	26.900814
11	-90.26658	30.00876	88.05807	0.3233	0.05413	0.05498	5	90.942259
12	-90.06319	29.95663	46.64723	0.04837	0.21003	0.03192	5	156.664567
13	-90.0822	29.93748	36.68791	0.40474	0.09174	0.11665	4	34.290965
14	-90.0489	29.9658	73.9199	0.10125	0.25395	0.08078	4	49.517628
15	-90.06416	29.97225	4.14596	0.24259	0.12928	0.09853	4	40.597901
16	-90.08332	29.97299	80.87507	0.12796	0.37616	0.15122	4	26.452128
17	-90.07648	29.9473	81.33815	0.16878	0.04549	0.02412	4	165.843434
18	-90.04924	29.9727	14.91001	0.00212	0.22512	0.0015	3	2003.794423
19	-90.09329	29.97161	24.44003	0.03088	0.41459	0.04022	3	74.594819
20	-90.11038	29.96478	37.3981	0.39499	0.08638	0.10719	3	27.986877

Pedestrian Spatial Data Overview

Figures 37 and 38 show the locations of all pedestrian crashes in 2009 and 2010 in Orleans and Jefferson parishes respectively. Of the 766 total pedestrian crash incidents in the two-parish area during the study period, 59 involved more than one pedestrian for a total of 825 pedestrians impacted. Of these, 90% of crash locations contained sufficient information for geocoding.[17]

Many of the points on this map represent more than one crash, and 16 points represent more than two crashes that were reported at a given intersection in 2009 and 2010 (Table 14). As observed in previous datasets, many of the top pedestrian crash locations are in New Orleans' French Quarter and CBD, likely reflecting high numbers of pedestrians—and therefore many interactions between pedestrians and vehicles— in this area. However, numerous intersections with major arterial boulevards and avenues in both Orleans and Jefferson Parish are represented on this list also, indicating areas of concern which should be considered for future safety improvements.

Table 14: Top Pedestrian Crash Locations by Frequency, Orleans and Jefferson Parish, 2009-2010

Top Pedestrian Crash Locations, Orleans and Jefferson Parishes	
Location	Number of crashes, 2009-2010
Bourbon St and Canal St	6
Canal St and Carondelet St	5
N Peters St and Iberville St	5
Canal St and Claiborne Ave	4
Canal St and Rampart St	4
St Claude Ave and Clouet St	4
Veterans Memorial Blvd and Downs Blvd	4
Royal St and Iberville St	4
S Claiborne Ave and Leonidas St	4
Tulane Ave and S Broad St	4
Claiborne Ave and Carrollton Ave	4
General DeGaulle Dr and Crescent City Connection	3
Decatur St and Iberville St	3
Loyola Ave and Girod St	3
Louisiana Ave and S Saratoga St	3
Stumpf Blvd and Westbank Expy	3

[17] As with bicycle crashes, the remainder either lacked adequate or accurate geographic data, or were (in the case of 23 crash records) located on, under, or adjacent to elevated expressways (including and could not be accurately geocoded using two-dimensional geographic reference data. The prevalence of crashes associated with interstate service roads, on- and off-ramps, and underpasses is notable, and should be examined further.

Table 15: Top Ten Pedestrian Crash Corridors, Orleans Parish, 2009-2010

Top 10 Pedestrian Crash Corridors, Orleans Parish		
Rank	Corridor	Number of crashes, 2009-2010
1	Canal St	48
2	Claiborne Ave	40
3	St Charles Ave	28
4	Carrollton Ave	19
4	N Rampart St	19
4	Iberville	19
7	Royal St	18
8	St Claude Ave	17
9	Magazine St	16
9	Bourbon St	16

Table 16: Top Ten Pedestrian Crash Corridors, Orleans Parish, 2009-2010

Top 10 Pedestrian Crash Corridors, Jefferson Parish		
Rank	Corridor	Number of crashes, 2009-2010
1	Veterans Blvd	19
1	Westbank Expy	19
3	Airline Dr	11
3	Ames Blvd	11
3	Jefferson Hwy	11
3	Lapalco Blvd	11
7	Williams Blvd	9
7	W Esplanade Ave	9
9	Causeway Blvd	8
10	Downs Blvd	7
10	Transcontinental Dr	7

Tables 15 and 16 examine groupings of crashes along corridors, and further illuminate the distribution of crashes in Orleans and Jefferson Parishes, respectively. These tables clearly reflect a high frequency of incidents occurring along major arterials with high traffic volumes, as well as the high incidence of crashes within and around the French Quarter and other tourist-dense destinations, such as St Charles Avenue and Magazine Street. Canal Street and Claiborne Avenue (both North and South of Canal Street) in Orleans Parish, as well as Veterans Boulevard and the Westbank Expressway in Jefferson Parish, stand out as the corridors with the highest total numbers of recorded pedestrian crash incidents in the region.

Figure 37: Pedestrian Crashes in Orleans Parish, 2009-2010

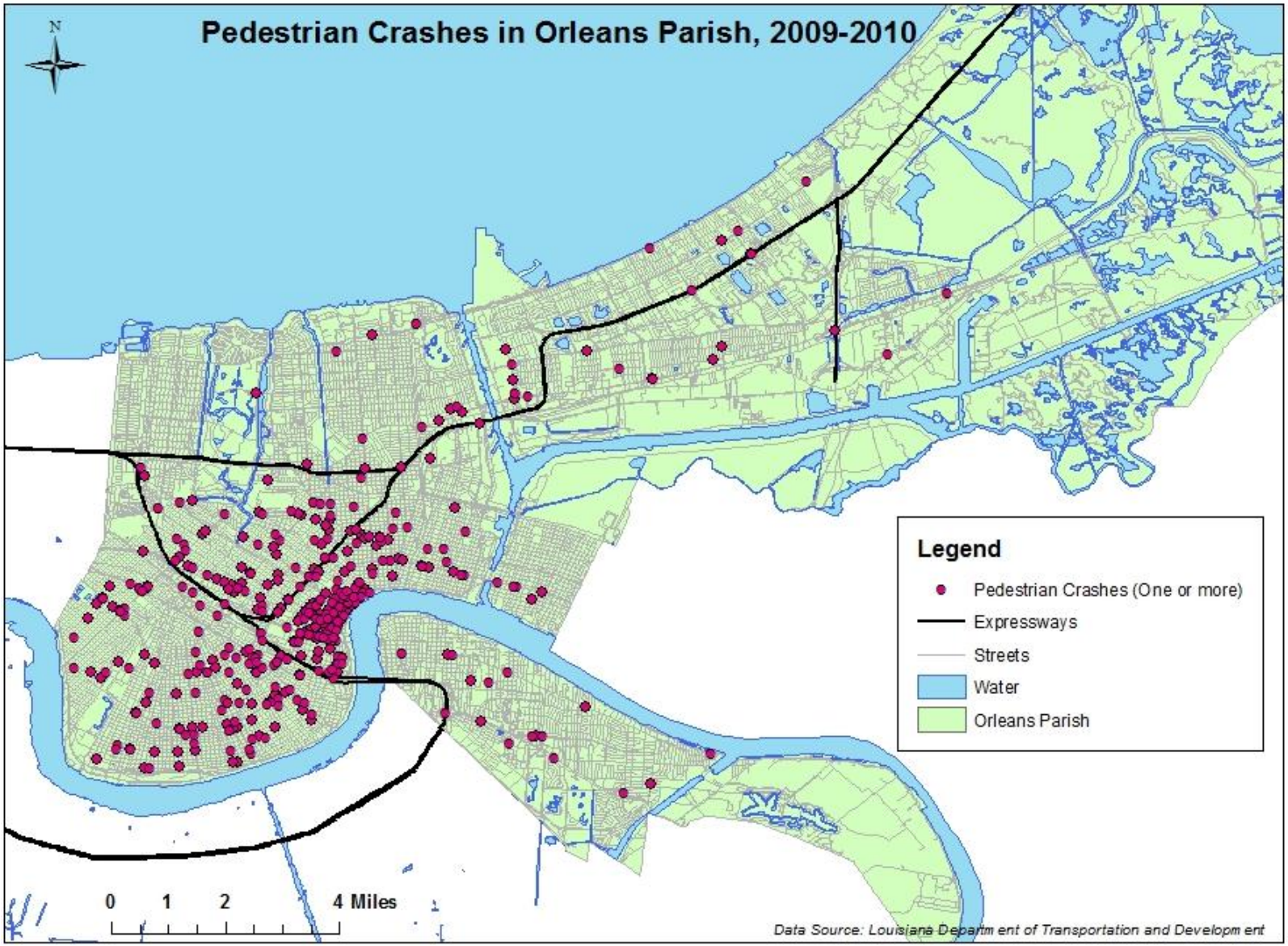
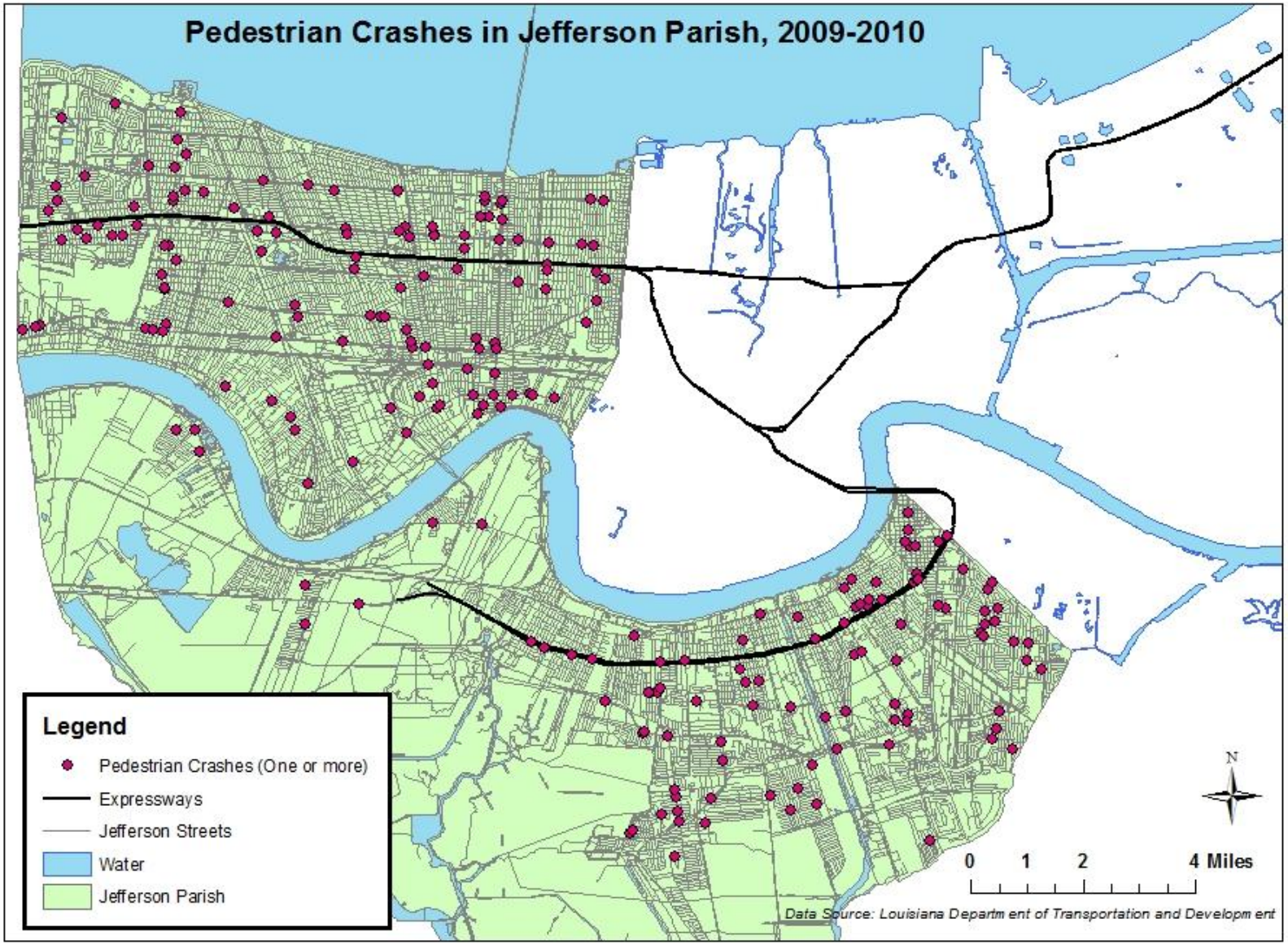


Figure 38: Pedestrian Crashes in Jefferson Parish, 2009-2010



Pedestrian Crash Cluster Analysis

As noted above, crash cluster analysis using the STAC routine helps identify geographic areas where a higher than average number of incidents are taking place, allowing policy-makers to more effectively prioritize resources.[18] Figure 39 illustrates the locations of the 576 geocoded crashes located within the East Bank Core of Orleans and Jefferson Parish.

Figure 40 and Table 17 represent the 20 crash clusters identified in 100 STAC simulation runs, and highlights those that are statistically significant by the metric of crash frequency. That is, at the 95th percent confidence interval, there are more crashes in these clusters than we would expect to find by chance. At the 95th percent confidence interval or higher, given this sample size we would expect to see six crashes within a cluster. Therefore, if 7 or more crashes occur within a cluster, it is highly unlikely that it is due to chance (Table 18).

For nine of the clusters identified in the 2009-2010 dataset, the number of crashes that occurred is seven or higher. The statistically significant clusters are approximately centered at:

- Canal St and Burgundy St
- Broad St and Banks St
- Decatur St and Toulouse St
- Camp St and Lafayette St
- Esplanade Ave and Chartres St
- Loyola Ave and I-10
- Claiborne Ave and Carrolton Ave
- St Charles Ave and Louisiana Ave
- St Bernard Ave and N Dorgenois St

None of the clusters were significant in terms of cluster density. However, these nine significant clusters suggest continued evidence of localized pedestrian crash clustering in downtown and downtown-adjacent neighborhoods of New Orleans. Once again, while this analysis cannot tell us why these clusters are centers of pedestrian crashes, these areas should be considered prime targets for future safety interventions.

[18] See Chapter 7 of the 2005 New Orleans Metropolitan Bicycle and Pedestrian Plan.

Table 17: Pedestrian Generalized STAC Crash Cluster Centers, 2009-2010

Pedestrian Generalized Cluster Centers	
Cluster	Approximate Location
1	Canal St and Burgundy St
2	Broad St and Banks St
3	Decatur St and Toulouse St
4	Camp St and Lafayette St
5	Esplanade Ave and Chartres St
6	Loyola Ave and I-10
7	Claiborne Ave and Carrollton Ave
8	St Charles Ave and Louisiana Ave
9	St Bernard Ave and N Dorgenois St
10	St Philip St and N Villere St
11	Gravier St and S Roman St
12	N Claiborne Ave and Spain St
13	Pauger St and N Derbigny St
14	Tchoupitoulas St and Antonine St
15	S Claiborne Ave and Josephine St
16	N Broad St and Dumaine St
17	Airline Dr and Williams Blvd
18	Magazine St and Jena St
19	Laurel St and Valmont St
20	Washington Ave and LaSalle St

Figure 39: Pedestrian Crashes in the Orleans and Jefferson Parish East Bank Core, 2009-2010

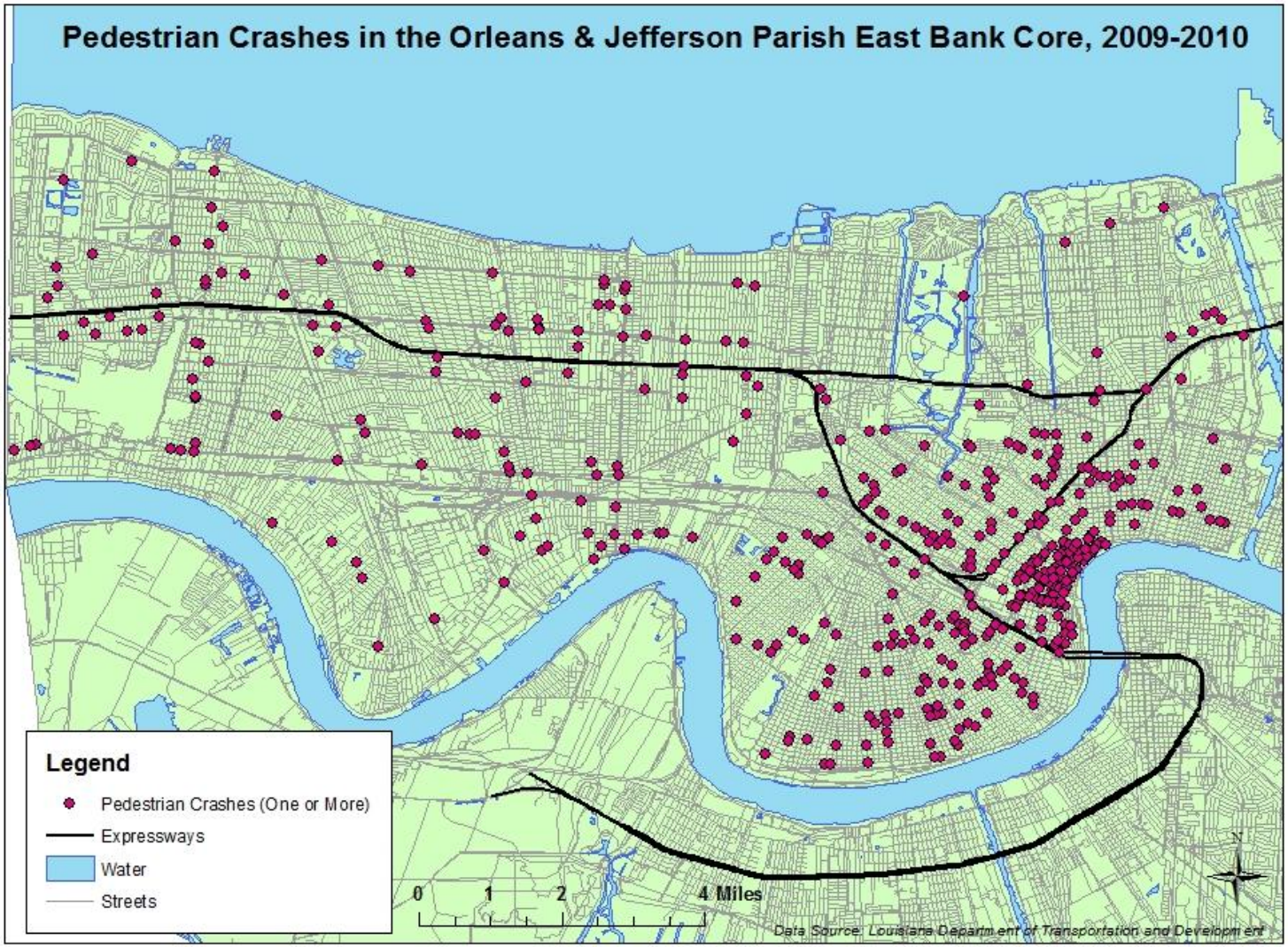


Figure 40: Statistically Significant Pedestrian Crash Clusters, Orleans & Jefferson Parish East Bank Core, 2009-2010

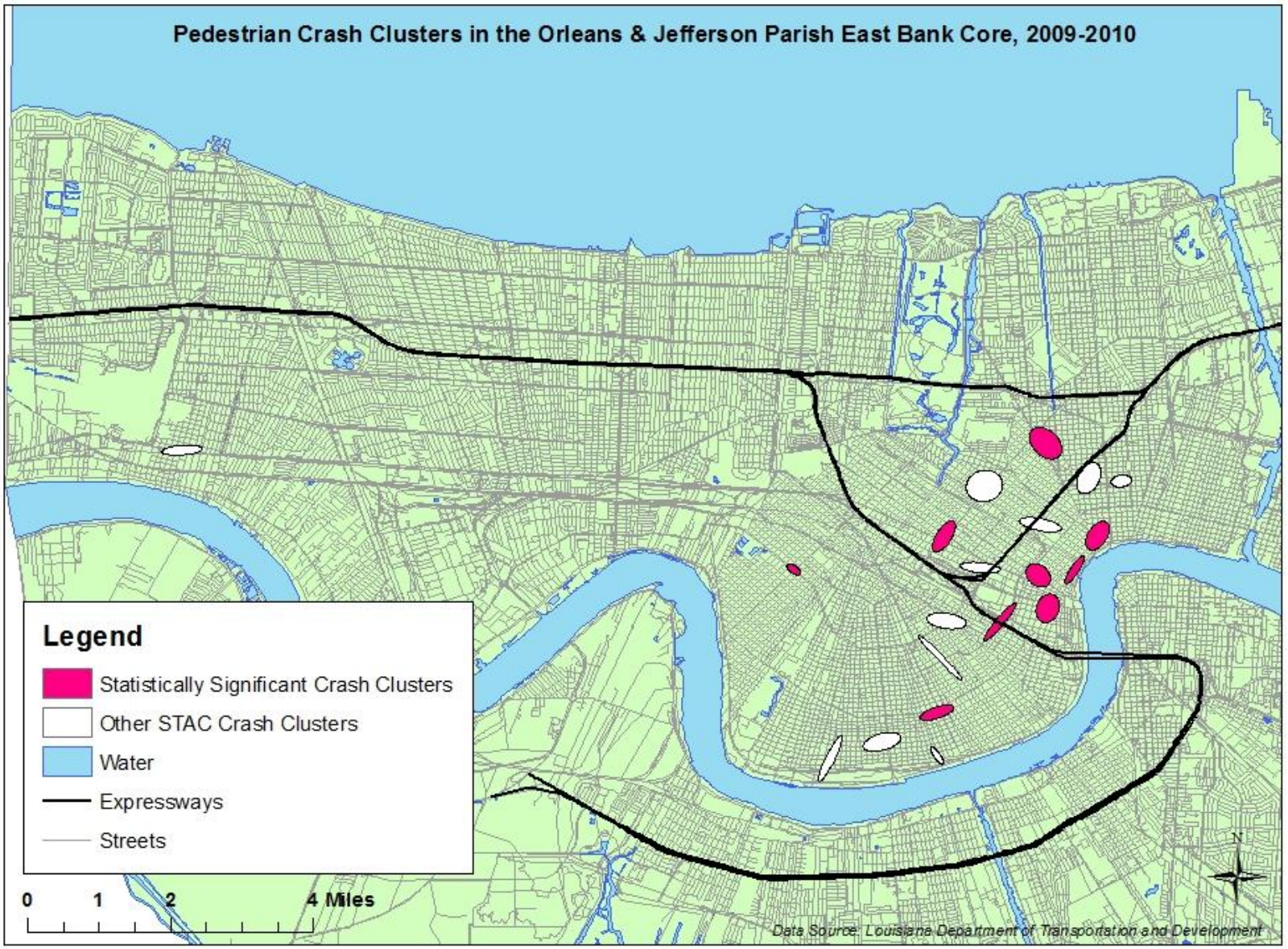


Table 18: Statistically Significant Pedestrian Crash Cluster STAC Analysis Output

Spatial and Temporal Analysis of Crime (STAC): Statistically Significant Pedestrian Crash Clusters								
Sample size .....: 576				**Distribution of the number of clusters found in simulation (percentile):**				
Measurement type .....: Direct				*Percentile*	*Clusters*	*Area*	*Points*	*Density*
Scan type..... .....: Triangular				min	13	0.00007	3	6.292239
Input units ....: Degrees				0.5	13	0.00007	3	6.292239
Output units ... .: Miles, Square Miles, Points per Square Miles				1	14	0.00008	3	6.521052
Standard Deviations ...: 1.0				2.5	15	0.00019	3	6.673982
Start time .....: 09:00:50 AM, 06/21/2012				5	15	0.00073	3	6.869571
Search radius.....: 402.336000				10	16	0.00123	3	7.262094
Boundary.....: -90.27856,29.91648 to -90.02960,30.03822				90	20	0.4131	5	2429.452555
Points inside boundary.: 574				**95**	**20**	**0.43671**	**6**	**4083.678156**
Simulation runs .....: 100				97.5	20	0.44951	6	15661.49291
				99	20	0.46005	6	37710.53815
				99.5	20	0.47678	6	41744.69511
				max	20	0.47678	6	41744.69511
Cluster	**Mean X**	**Mean Y**	**Rotation**	**X-Axis**	**Y-Axis**	**Area**	**Points**	**Cluster Density**
1	-90.07111	29.95487	54.71642	0.1771	0.13105	0.07292	45	617.145061
2	-90.09021	29.96277	27.80396	0.09471	0.23853	0.07097	12	169.075042
3	-90.06375	29.95602	29.41119	0.05064	0.21828	0.03472	11	316.781227
4	-90.06919	29.94824	14.06791	0.13761	0.20187	0.08727	11	126.042601
5	-90.05911	29.96292	26.90259	0.11786	0.21563	0.07984	10	125.249931
6	-90.07888	29.94545	35.56172	0.05308	0.32526	0.05424	8	147.493279
7	-90.12065	29.95609	40.34157	0.10291	0.0507	0.01639	7	427.018537
8	-90.09163	29.92713	68.44456	0.07642	0.21788	0.05231	7	133.819196
9	-90.06961	29.98162	53.38267	0.24788	0.16222	0.12633	7	55.412534
10	-90.07068	29.96515	12.98126	0.26144	0.08543	0.07017	6	85.50819
11	-90.08287	29.95645	6.79653	0.2435	0.07304	0.05587	6	107.384286
12	-90.05428	29.97396	78.54689	0.08208	0.12623	0.03255	6	184.322517
13	-90.0609	29.97457	19.41588	0.13429	0.22759	0.09601	6	62.491641
14	-90.09161	29.91841	59.98919	0.13618	0.03922	0.01678	6	357.602302
15	-90.08969	29.94567	9.51884	0.24358	0.10751	0.08227	5	60.775822
16	-90.08202	29.97296	48.9636	0.21195	0.22793	0.15177	5	32.944389
17	-90.2446	29.98021	84.9906	0.06682	0.24664	0.05177	5	96.573103
18	-90.10277	29.9212	71.19984	0.11416	0.23951	0.0859	4	46.567176
19	-90.11329	29.91781	22.81114	0.05507	0.34134	0.05906	3	50.798013
20	-90.09099	29.93825	49.64428	0.40932	0.04272	0.05494	3	54.604452

Conclusions and Research Implications

Overall, this data suggests that as the New Orleans region has recovered from Hurricane Katrina and its population has rebounded, so too has its high rate of bicycle and pedestrian crashes, particularly in Orleans and Jefferson Parish. While total crash numbers are well below pre-2005 levels, and certain encouraging trends have emerged, such as an ongoing reduction in the number of children being struck, the patterns of crash occurrence—both spatial and demographic—remain largely similar to those identified Pre-Katrina.

Moreover, Louisiana and the New Orleans Metro area remain well above national averages in terms of the number of bicycle and pedestrian crashes by population. Additional research is needed to evaluate shifts in crash rates, particularly at the local level, in light of both the region's recent population and demographic shifts, as well as in the context of increasingly vigorous active transportation investment and facility use.

In Orleans and Jefferson Parish, year after year, the same corridors and similar crash cluster locations are identified as particular safety concerns. New Orleans' CBD and French Quarter retain high concentrations of crashes relative to the rest of the city. In Jefferson Parish, a few major arterial roads are associated with an enormous proportion of bicycle and pedestrian incidents. New Orleans and Louisiana have been selected by the Federal Highway Administration as a Pedestrian Safety Focus City and State in 2011-2012, highlighting these safety shortcomings on a national stage.

Between 2008 and 2012, the City of New Orleans and the Regional Planning Commission oversaw the installation of significant bicycle and pedestrian facility improvements throughout the city. This work is continuing at a rapid pace, and plans for additional bicycle and pedestrian infrastructure and/or planning efforts are underway in several communities within the region. Future research efforts should examine whether these infrastructure improvements, as well as complementary effort—such as the Regional Planning Commission's Social Marketing Campaign and Bicycle Commuter Workshops, increasing advocacy efforts (e.g. Bike Easy in New Orleans), or newly adopted policies (e.g. City of New Orleans' Complete Streets Policy)— have impacted the frequency, distribution, or characteristics of crashes in the region.

In addition, a more in-depth proximity analysis that relates this crash data to the changing transit routes and school locations since Hurricane Katrina is needed to more confidently draw conclusions about these relationships. As the quality of crash data improves (e.g. with GPS technology to pinpoint the geographic location of crashes), it may also be possible to conduct a reliable spatial examination of crashes throughout the greater seven-parish region.

Most importantly, the problematic 'hot spots,' corridors, demographic groups, and neighborhoods identified within this analysis can and should be addressed through strategic, data-driven projects and policies that target safety interventions where they are needed most. By making the streets safer for bicyclists and pedestrians, we can improve safety and quality of life for all the region's residents and visitors.