Palm Beach MPO

Pedestrian and Bicycle Safety Study

040416004.16

Palm Beach Metropolitan Planning Organization

presents

Pedestrian and Bicycle Safety Study

Prepared by:
Kimley-Horn and Associates, Inc.

The preparation of this report has been financed in part by the U.S. Department of Transportation (USDOT), through the Federal Highway Administration (FHWA) and/or the Federal Transit Administration (FTA), the State Planning and Research Program (Section 505 of Title 23, U.S. Code) and Palm Beach County, Florida.

The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

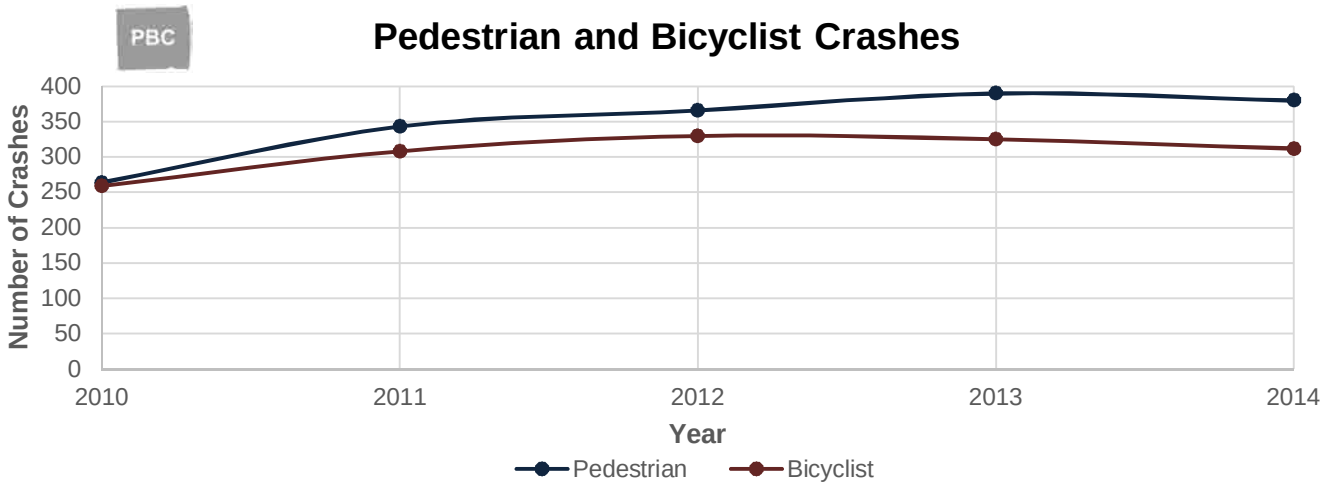
©Kimley-Horn and Associates, Inc.
February 2017
040416004

Executive Summary

Pedestrian and bicyclist crashes and the resulting deaths and injuries are a serious problem on our nation's roadways, and Palm Beach County is no exception. Over 25% of all traffic related fatalities in Florida and Palm Beach County involved a motor vehicle hitting a pedestrian or pedalcyclist[1].

Source: National Highway Traffic Safety Administration (NHTSA)

The Palm Beach MPO conducted the Pedestrian and Bicycle Safety Study to formally analyze five years of pedestrian and bicyclist crash data in Palm Beach County and develop evidence-based recommendations for safety countermeasures, educational strategies, and performance targets. Crash data from 2010 to 2014 were obtained and analyzed from the Florida Department of Transportation's (FDOT) Unified Basemap Repository (UBR). A total of 1,743 traffic collisions with pedestrians and 1,534 traffic collisions with bicyclists were recorded from the timeframe studied. Hospital data from the Florida Department of Health's (FDOH) Florida Injury Surveillance Data System provided unique insights into injuries that are not recorded in the traffic collision data, particularly juvenile bicyclist crashes.



Source: 2010-2014 FDOT UBR Data

[1]Pedalcyclist and bicyclist are generally interchangeable terms for this purpose, a person on a vehicle powered solely by pedals.

Crash density and hot spot analysis maps were prepared based on the FDOT UBR data. Ten clusters of hot spots and 10 high crash corridors were identified. The following tables show recommended countermeasures based on the crash data. Additional studies including pedestrian road safety audits may be needed to further the implementation strategy.

Quantifiable safety targets and performance measures are valuable because tracking progress will determine if the initiatives are meeting the targets. The Palm Beach MPO will monitor the Bicycle and Pedestrian Safety Performance Measures and Targets with the ultimate goal of zero incidents and will work with partner agencies to achieve the Safety Initiatives.

Top 10 Hot Spot Potential Countermeasures

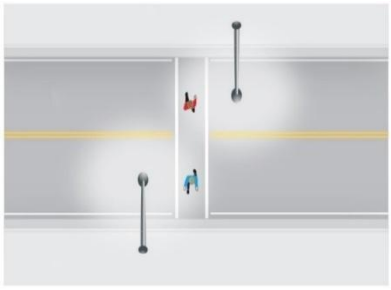
Map ID	Location	Potential Countermeasures	ROW Ownership
S1	Palmetto Park Road at Federal Highway	Median Crossings	City of Boca Raton FDOT
S2	Atlantic Avenue at NE 5 Avenue/Old Dixie Highway	Bus Stop Treatments	City of Delray Beach FDOT
S3	Boynton Beach Boulevard at Seacrest Boulevard	Lane Eliminations/Narrowing	County FDOT
S4	Lake Worth Road at Congress Avenue	Crossing Islands	County FDOT
S5	Lake Worth Road at Davis Road	Bus Stop Treatments Speed Monitoring Devices	Village of Palm Springs County FDOT
S6	Lake Worth Road at Jog Road	Bus Stop Treatments	County FDOT
S7	Military Trail at Forest Hill Boulevard	Leading Pedestrian Interval	FDOT
S8	Dr Martin Luther King Jr Boulevard at SW 5 Street	Bus Stop Treatments Raised Pedestrian Crossings Lane Eliminations/Narrowing Pedestrian Hybrid Beacons	City of Belle Glade
S9	Okeechobee Boulevard at Military Trail	Accessible Pedestrian Signals Leading Pedestrian Interval Lighting and Illumination	FDOT
S10	45 Street at Australian Avenue	Accessible Pedestrian Signals Flashing Yellow Arrow	County

Clicking on the Map ID's, will bring you to the respective maps in Appendix D - Individual Spots/Corridors.

Top 10 High Crash Corridor Potential Countermeasures

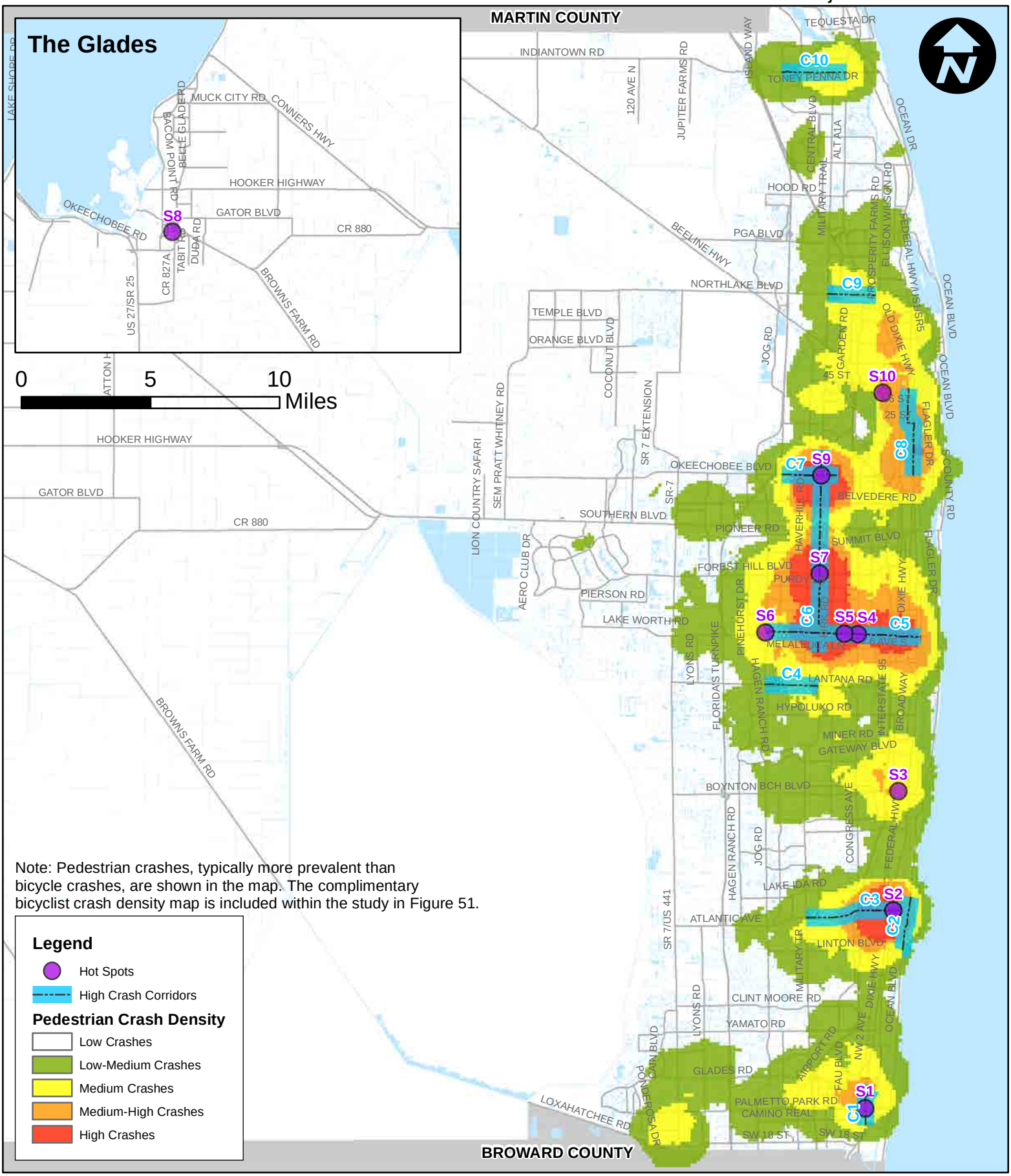
Map ID	Location	Potential Countermeasures	ROW Ownership
C1	Federal Highway from Camino Real to Glades Road	Exclusive Pedestrian Phasing Speed Monitoring Devices	FDOT
C2	Ocean Boulevard from Linton Boulevard to Thomas Street	Advanced Stop Lines/Bike Boxes Leading Pedestrian Interval Speed Monitoring Devices	FDOT
C3	Atlantic Avenue from Military Trail to Ocean Boulevard	Advanced Stop Lines/Bike Boxes Shared Lane Markings Median Crossings Exclusive Pedestrian Phasing Leading Pedestrian Interval Lighting and Illumination	City of Delray Beach FDOT
C4	Lantana Road from Jog Road to Military Trail	Bus Stop Treatments	County
C5	Lake Worth Road from Jog Road to Lakeside Drive	Leading Pedestrian Interval Flashing Yellow Arrow Prohibited Right Turn on Red Lighting and Illumination	FDOT
C6	Military Trail from Melaleuca Lane to Community Drive	Flashing Yellow Arrow Lighting and Illumination	County FDOT
C7	Okeechobee Road from Drexel Road to Congress Avenue	Bus Stop Treatments Accessible Pedestrian Signals Lighting and Illumination	FDOT
C8	US 1 from Okeechobee Boulevard to 49 Street	Prohibited Right Turn on Red Lighting and Illumination	City of West Palm Beach FDOT
C9	Northlake Boulevard from Military Trail to Alt A1A	Lighting and Illumination	County
C10	Indiantown Road from Central Boulevard to Alt A1A	Crossing Islands Rectangular Rapid Flashing Beacons	FDOT

Potential Countermeasure: Median Crossings



Potential Countermeasure: Lighting & Illumination

Potential Countermeasure: K-12 Pedestrian and Bicycle Education


The Glades
MARTIN COUNTY
BROWARD COUNTY
0
5
10
Miles
Note: Pedestrian crashes, typically more prevalent than bicycle crashes, are shown in the map. The complimentary bicyclist crash density map is included within the study in Figure 51.
Legend
Hot Spots
High Crash Corridors
Pedestrian Crash Density
Low Crashes
Low-Medium Crashes
Medium Crashes
Medium-High Crashes
High Crashes

Pedestrian and Bicycle Safety Performance Measures and Targets

Objective	Current Value (2014)[1]	2025 Target	Vision[2]
Reduce the number of….			
Pedestrian Injuries	323	≤160	0
Pedestrian Fatalities	32	≤15	0
Bicyclist Injuries	268	≤130	0
Bicyclist Fatalities	9	≤4	0
Pedestrian and Bicyclists Injuries and Fatalities that occurred within the hot spots and high crash corridors	137	≤68	0
Juvenile (Age 0-18) Bicycle and Pedestrian Crashes	82	≤41	0
Reduce pedestrian and bicyclist crashes that occur under dark conditions and between 10pm and 6am	57[3]	≤28	0

[1]The current value (2014) are obtained from FDOT UBR data.
[2]Palm Beach MPO strives towards Vision Zero; where no pedestrians and bicyclists are injured or killed.
[3]Accounts for the number of crashes occur under dark conditions where street lights are both present and not present.

Safety Initiatives

Initiative	Lead Agency	Partners	Goal
Provide complete streets/safety education workshops	Palm Beach MPO	Local Municipalities, Palm Beach County Engineering, FDOT, FHWA, and FAU Center for Urban & Environmental Solutions (CUES)	At least 1 Workshop annually
Conduct road safety audits (RSAs) for hot spots & corridors identified in this plan	Palm Beach MPO	FDOT, Local Municipalities, and Palm Beach County Engineering	At least 1 RSA annually
Conduct crosswalk safety campaigns in hot spots in this plan	Local Law Enforcement	FDOT Community Traffic Safety Team (CTST) and Alert Today Alive Tomorrow, Local Municipalities, Palm Beach County Engineering, FDOT, FHWA, South Florida Regional Transportation Authority (SFRTA), and Palm Tran	At least 1 Campaign annually
Educate children on pedestrian and bicycle safety skills	Palm Beach County School District	FDOT Safe Routes to School, SafeKids, WalkSafe, BikeSafe, Palm Beach YMCAs, and FAU CUES	All K-12 Schools Implement Curriculum annually
Educate adults on bicycle safety skills	League of American Bicyclists	Adult Education Organizations, FDOT, Palm Beach MPO, Local Municipalities, and AARP	At least 1 Training annually
Implement bike light safety campaigns to educate and distribute bike lights to cyclists in each hot spot and corridor identified in this plan	Local Law Enforcement and FDOT	Local Municipalities FDOT CTST and Alert Today Alive Tomorrow, and League of American Cyclists	At least 1 Campaign annually

Table of Contents

Chapter 1. Introduction....11
Chapter 2. Literature Review....12
Chapter 3. Data Collection and Analysis....13
Chapter 4. Recommendations....61

List of Figures

Figure 1. Strava Data – Pedestrians....14
Figure 2. Strava Data – Cyclists....15
Figure 3. Pedestrian Fatalities by Year....16
Figure 4. Pedestrian Injuries by Year....16
Figure 5. Pedalcyclist Fatalities by Year....17
Figure 6. Pedalcyclist Injuries by Year....17
Figure 7. Pedestrian Fatalities by Age....18
Figure 8. Pedestrian Injuries by Age....18
Figure 9. Pedalcyclist Fatalities by Age....19
Figure 10. Pedalcyclist Injuries by Age....19
Figure 11. Percentage of Fatalities Involving a Motor Vehicle....20
Figure 12. 2004-2013 Pedestrian and Pedalcyclist Fatalities....21
Figure 13. Pedestrian Fatalities by Lighting Condition....22
Figure 14. Percentage Pedestrian Fatalities by Time of Day....23
Figure 15. Percentage Pedalcyclist Fatalities by Time of Day....24
Figure 16. Pedestrian Fatalities in Traffic Crashes by Age....25
Figure 17. Pedestrian Injuries in Traffic Crashes by Age....25
Figure 18. Pedalcyclist Fatalities by Age....26
Figure 19. Pedalcyclist Injuries by Age....26
Figure 20. Pedestrian Crashes by Weather Condition....27
Figure 21. Pedestrian Crashes with Alcohol/Drugs Involved....28
Figure 22. Bicyclist Crashes by Weather Condition....28
Figure 23. Bicyclist Crashes with Alcohol/Drugs Involved....29
Figure 24. Pedestrian and Bicyclist Crashes....30

Figure 25. Pedestrian Crashes by Time of Day 31
Figure 26. Pedestrian Crashes by Month 32
Figure 27. Pedestrian Crashes by Day of Week 32
Figure 28. Pedestrian Crashes by Road Surface Condition 33
Figure 29. Pedestrian Crashes by Weather Condition 33
Figure 30. Pedestrian Crashes by Alcohol/Drugs Involvement 34
Figure 31. Pedestrian Injury Severity 35
Figure 32. Pedestrian Crashes by Lighting Condition 35
Figure 33. Pedestrian Crashes by Age 36
Figure 34. Pedestrian Crashes by Gender 37
Figure 35. Bicyclist Crashes by Time of Day 38
Figure 36. Bicyclist Crashes by Month 38
Figure 37. Bicyclist Crashes by Day of Week 39
Figure 38. Bicyclist Crashes by Road Surface Condition 39
Figure 39. Bicyclist Crashes by Weather Condition 40
Figure 40. Bicyclist Crashes Alcohol/Drugs Involvement 41
Figure 41. Bicyclist Injury Severity 42
Figure 42. Bicyclist Crashes by Lighting Condition 42
Figure 43. Bicyclist Crashes by Bike Lane Position 43
Figure 44. Bicyclist Crashes by Age 44
Figure 45. Bicyclist Crashes by Gender 44
Figure 46. 2010-2014 Pedestrian Crash Density 48
Figure 47. 2010-2014 Pedestrian Crash Density (Alcohol/Drug Related) 49
Figure 48. 2010-2014 Pedestrian Crash Density (Juvenile Related–Under Age 18) 50
Figure 49. 2010-2014 Pedestrian Crash Density (Elderly Related-Over Age 65) 51
Figure 50. 2010-2014 Pedestrian Crash Density (Nighttime Related-Between 2000-0600) 52
Figure 51. 2010-2014 Bicyclist Crash Density 53
Figure 52. 2010-2014 Bicyclist Crash Density (Alcohol/Drug Related) 54
Figure 53. 2010-2014 Bicyclist Crash Density (Juvenile Related–Under Age 18) 55
Figure 54. 2010-2014 Bicyclist Crash Density (Elderly Related-Over Age 65) 56
Figure 55. 2010-2014 Bicyclist Crash Density (Nighttime Related-Between 2000-0600) 57
Figure 56. Top 10 Hot Spots and Top 10 High Crash Corridors 60

List of Tables

Table 1. Data Sources 13
Table 2. Pedestrian Fatalities in the United States, Florida, and Palm Beach County 23
Table 3. Pedalcyclist Fatalities in the United States, Florida, and Palm Beach County.....23
Table 4. Top 10 Hot Spots 58
Table 5. Top 10 High Crash Corridors.....59
Table 6. Pedestrian and Bicycle Safety Performance Measures and Targets 90
Table 7. Safety Initiatives.....91

List of Appendices

Appendix A: Literature Review
Appendix B: Crash Data Maps
Appendix C: Transportation Improvement Program (TIP) Projects FY 2017-2021
Appendix D: Individual Spots/Corridors
Appendix E: Lighting and Illumination
Appendix F: Palm Beach MPO Initiatives

Chapter 1. Introduction

Pedestrian and bicyclist crashes and the resulting deaths and injuries are a serious problem on our nation's roadways, and Palm Beach County is no exception. In 2013, *4,735 pedestrians* were killed in traffic crashes in the United States, representing fourteen percent (14%) of all roadway-related fatalities (NHTSA, 2013). Seventy-three percent (73%) of pedestrian fatalities occur in urban areas. As well in 2013, *743 pedalcyclists*[1] were killed in traffic crashes, representing 2.3 percent (2.3%) of all roadway-related fatalities (NHTSA, 2013). Sixty-eight percent (68%) of all pedalcyclist fatalities occur in urban areas.

Transportation for America's *Dangerous by Design*, cites that most pedestrian and bicyclist crashes occur in areas with insufficient infrastructure such as the lack of nighttime roadway lighting, sidewalks, and signals/signs. Wider roads (arterials) have also been regarded as a factor for crashes since, without countermeasures such as a refuge island, the crossing distance becomes large for the pedestrian and bicyclist to navigate. The absence of sufficient infrastructure is exacerbated when roadways are designed primarily for high speed traffic because the survivability of a crash is significantly reduced.

The implementation of countermeasures will reduce current risk faced by pedestrians and bicyclists. Examples of countermeasures include crossing islands, bus stop treatments, and advanced stop lines/bike boxes. When installed in high pedestrian/bicyclist traffic areas, these countermeasures have been shown to reduce the risk of crashes and fatalities.

How to Use this Document

The Palm Beach MPO Pedestrian and Bicycle Safety Study provides information to transportation professionals and community stakeholders intended to result in positive outcomes for non-motorized safety. Transportation agencies and local government staff can use the document to understand typical crash patterns, identify whether an upcoming project may be within a high crash area, select optimal safety countermeasures, work toward the common goal of implementing countermeasures, and working toward achieving safety targets.

[1] Pedalcyclist and bicyclist are generally interchangeable terms for this purpose, a person on a vehicle powered solely by pedals.

"Pedestrians are a part of every roadway environment, and attention should be paid to their presence in rural areas as well as urban areas... pedestrians are the lifeblood of our urban areas, especially in the downtown and other retail areas." (AASHTO, 2001)

Chapter 2. Literature Review

An examination of previous work regarding bicyclist and pedestrian safety was conducted as a base for the literature research of this Pedestrian and Bicycle Safety Study. National and state literature was reviewed to identify countermeasures that could be reasonably implemented. Listed below are the documents reviewed. Appendix A summarizes the key points from the literature review and the positive impacts on pedestrian and bicyclist safety from the national and state work.

- Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices, Eighth Edition, NHTSA, 2015
- FHWA Concludes Pedestrian Countermeasure Study in Three Cities. Tamara Redmon. ITE Journal, Volume 81, Number 8. August 2011
- Dangerous By Design, Smart Growth America, 2014
- Effects of Shared Lane Markings on Bicyclist and Motorist Behavior, Federal Highway Administration, 2004
- PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System, 2004
- BIKESAFE: Bicycle Countermeasure Selection System, 2006
- Pedestrian Safety Engineering and ITS-Based Countermeasures Program for Reducing Pedestrian Fatalities, Injury Conflicts, and Other Surrogate Measures Final System Impact Report, Federal Highway Administration, 2009
- Pedestrian Countermeasure Policy Best Practice Report, Federal Highway Administration
- Best Practices in State Bicycle and Pedestrian Planning. Florida Planning and Development Lab, Florida State University, Department of Urban and Regional Planning, 2005
- Florida Pedestrian and Bicycle Strategic Safety Plan. The Center for Urban Transportation Research, University of South Florida, 2013
- Florida Strategic Highway Safety Plan, Florida Department of Transportation, 2012

Chapter 3. Data Collection and Analysis

Data collection and analysis activities were conducted for the purposes of identifying crash trends for pedestrians and bicyclists. The data types analyzed along with their respective sources are listed in Table 1. Crash density and hot spot analysis maps were done through the use of Geographic Information System (GIS) based on Florida Department of Transportation (FDOT) Unified Basemap Repository (UBR) data. Crash density maps illustrate the geographic dispersion and clustering of crashes. Hot spot analysis maps identified ten (10) clusters of hot spots and ten (10) high crash corridors for pedestrian and bicyclist crashes. It is important to be aware that each data source is limited in some way. The Florida Department of Health's (FDOH) Florida Injury Surveillance Data System data primarily comes from death certificates, hospital discharge data, and emergency department discharge data. Florida Department of Highway Safety and Motor Vehicles (DHSMV) Traffic Crash Facts Annual Report sources their data from crash reports submitted by Florida officers. The FDOT UBR is based on DHSMV data. Using only a few sources to obtain information can lead to incomplete data and therefore a potentially misleading conclusion. It is important to note, data from FDOT UBR, as opposed to FDOH, DHSMV, and National Highway Traffic Safety Administration (NHTSA), refers to pedalcyclists as bicyclists (*no difference in definition for purposes of this Study*); therefore, bicyclist will be used when presenting FDOT UBR data.

Table 1. Data Sources

Source	Data Type
FDOH	Health-related data
DHSMV	Crash-related data
NHTSA	
Palm Beach County crash system data	
FDOT UBR	

Strava User Data

A review of data available through *Strava.com* was also conducted as a tool to study bicycle trip patterns. Strava is a smartphone-based application that uses GPS location to track data about runs, walks, or bike rides taken by its members. The data available through Strava provides an overview of popular routes for pedestrians and cyclists. Smartphone-based applications such as

Strava are largely used by runners and experienced on-road bicyclists who use their bike for recreational activity. The userbase is a small sample of all runners, walkers, or cyclists.

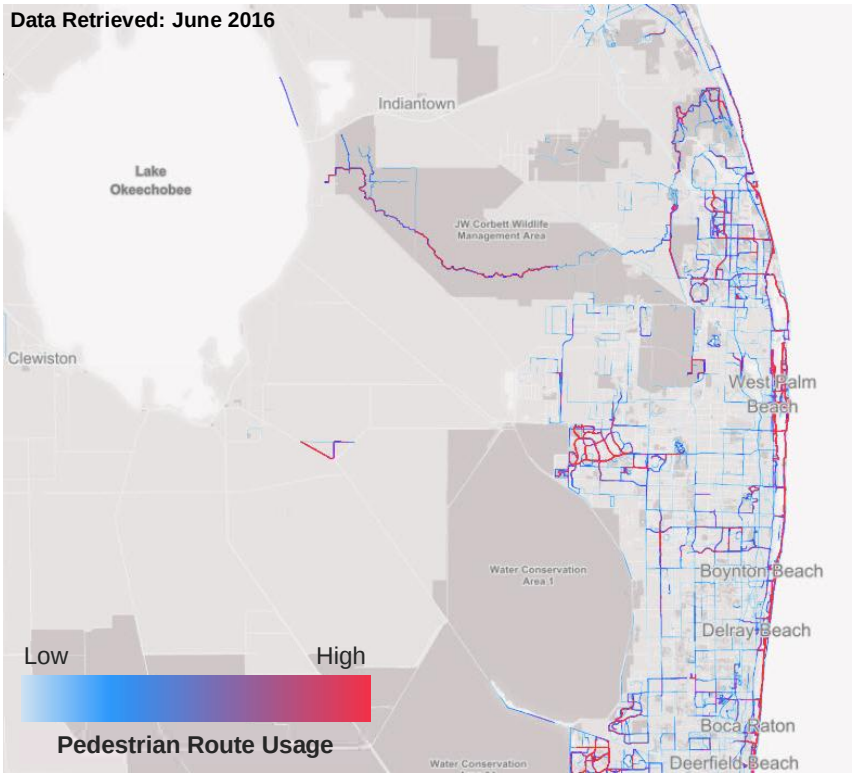


Figure 1. Strava Data – Pedestrians

Figure 1 displays pedestrian route usage data from Strava. Thick red and thinner blue routes signify high and low usage rates, respectively. A close look at the west side of Palm Beach County reveals residential areas as high route usage zones. In particular, the Cities of Wellington, Boca Raton, and West Palm Beach have high concentrations of route usage. The barrier island of Palm Beach County also has a high concentration of pedestrian route usage. Aside from the attraction of the beach, there are lively areas situated along the coast that lend themselves to pedestrian traffic. Delray Beach, Boynton Beach, and Lake Worth also have popular downtown areas in the eastern core.

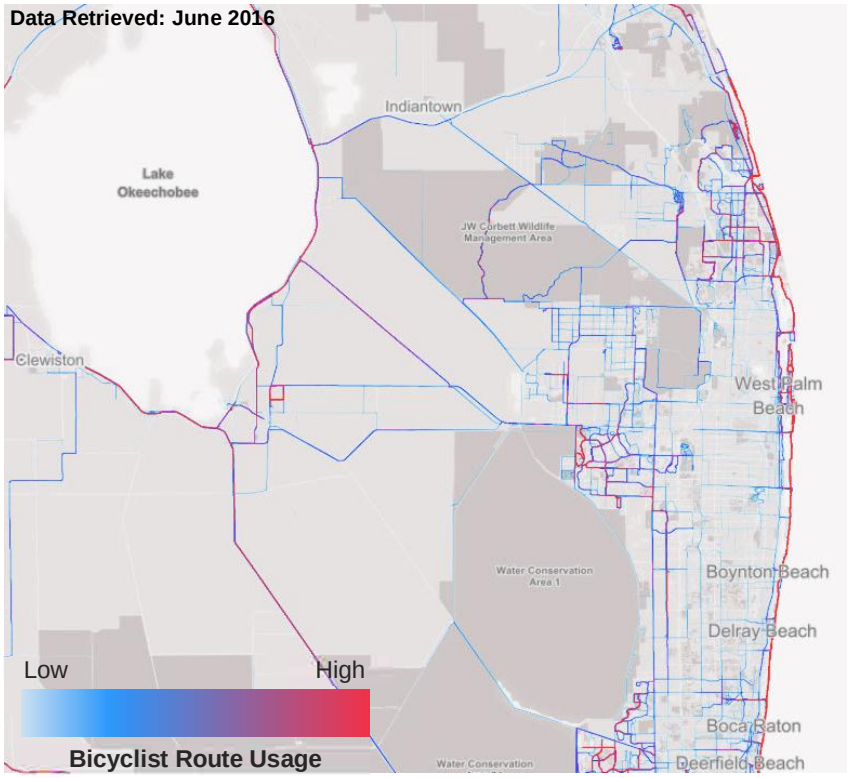


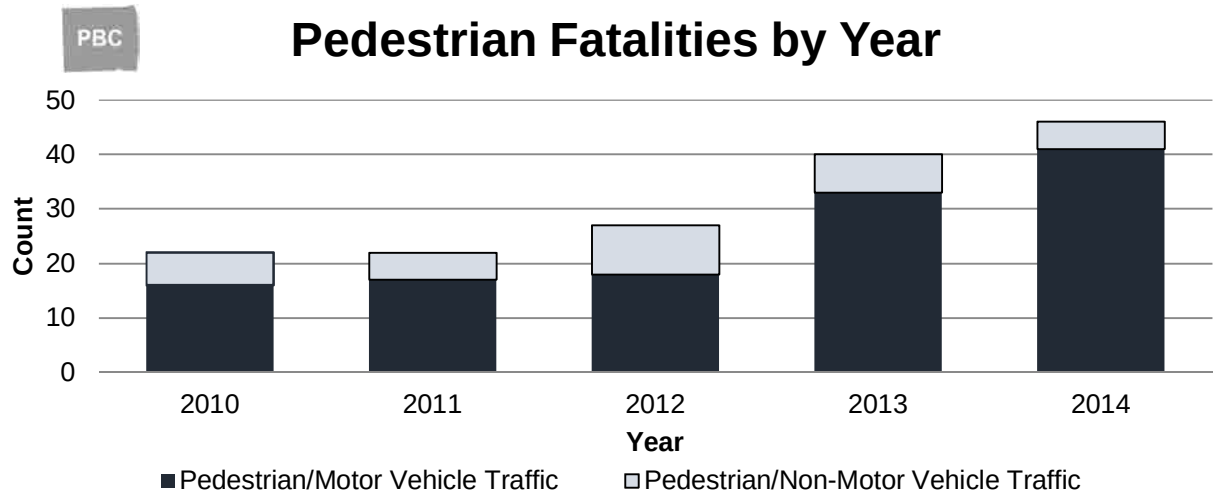
Figure 2. Strava Data – Cyclists

Figure 2 is another representation of data from Strava users but this time from bicyclists. Both maps are very similar, with high route usage concentrated in residential areas and along the coast. The Cities of Wellington, Boca Raton, and West Palm Beach continue to be areas of high route usage. The northern communities of Palm Beach Gardens and Jupiter also have some of the highest concentrations of route usage by bicyclists.

Health-Related Data Analysis

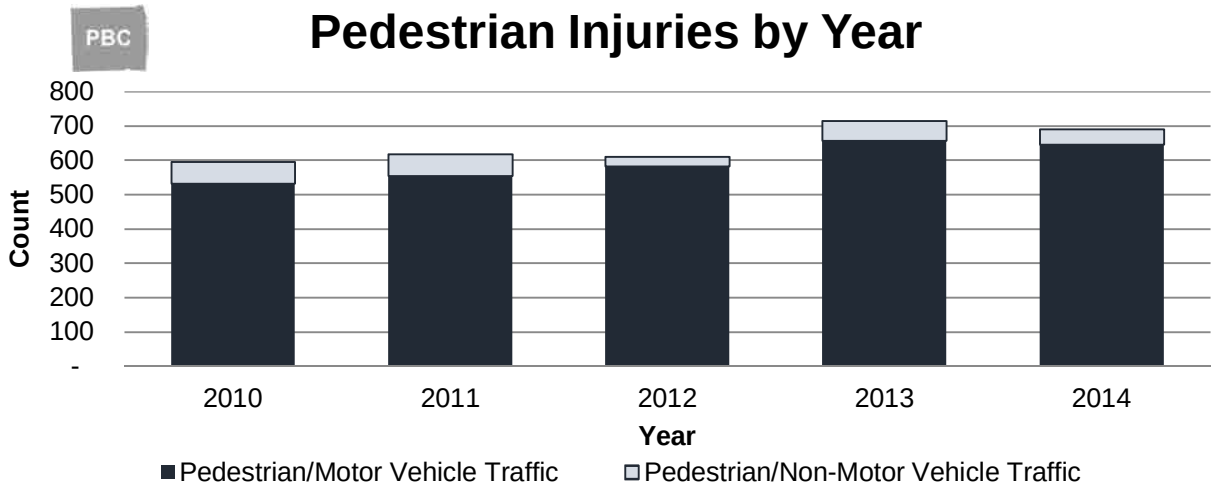
Palm Beach County data for pedalcyclist and pedestrian related fatalities, hospitalizations, and emergency department admissions were retrieved from the FDOH. The FDOH specifically categorizes these events as either involving a motor vehicle or not. Figure 3 and Figure 4 display the yearly total of pedestrian fatalities and injuries from 2010 to 2014. By far, most of the pedestrian fatalities and injuries involved a motor vehicle. The data suggests an increasing trend of pedestrian fatalities involving motor vehicles. In addition, pedestrian injuries involving motor vehicles shows a slight increase trend. In the five (5) years of data collected, 2012 had the most

non-motor vehicle related pedestrian fatalities and the least non-motor vehicle related pedestrian injuries.



Source: FDOH Injury Surveillance Data System

Figure 3. Pedestrian Fatalities by Year

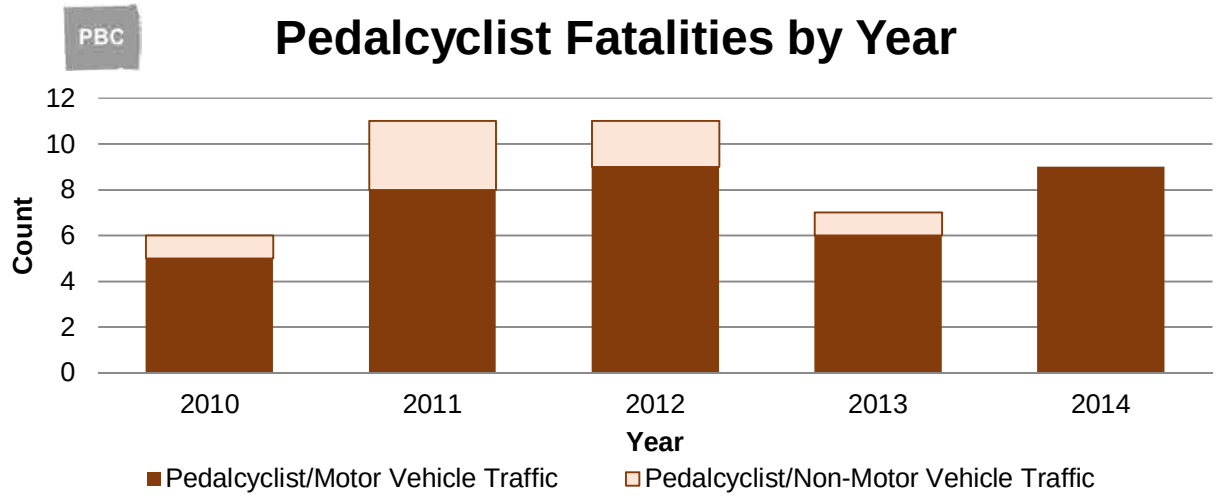


Source: FDOH Injury Surveillance Data System

Figure 4. Pedestrian Injuries by Year

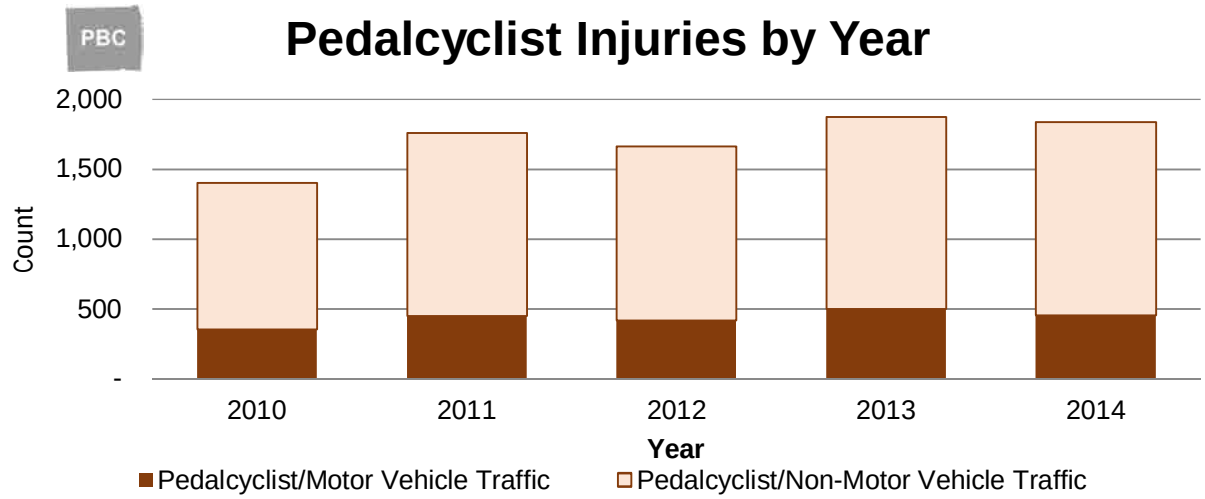
Figure 5 and Figure 6 shows the yearly pedalcyclist fatalities and injuries from 2010 to 2014. The majority of pedalcyclist fatalities involved a motor vehicle. In 2014, there were no pedalcyclist

fatalities in non-motor vehicle crashes. In contrast, most of the pedalcyclist injuries did not involve a motor vehicle.



Source: FDOH Injury Surveillance Data System

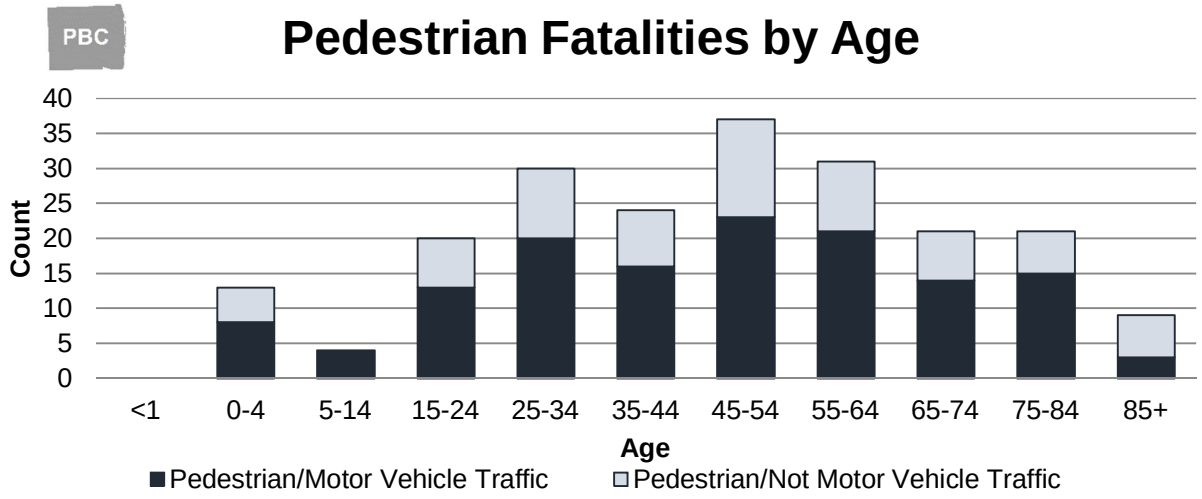
Figure 5. Pedalcyclist Fatalities by Year



Source: FDOH Injury Surveillance Data System

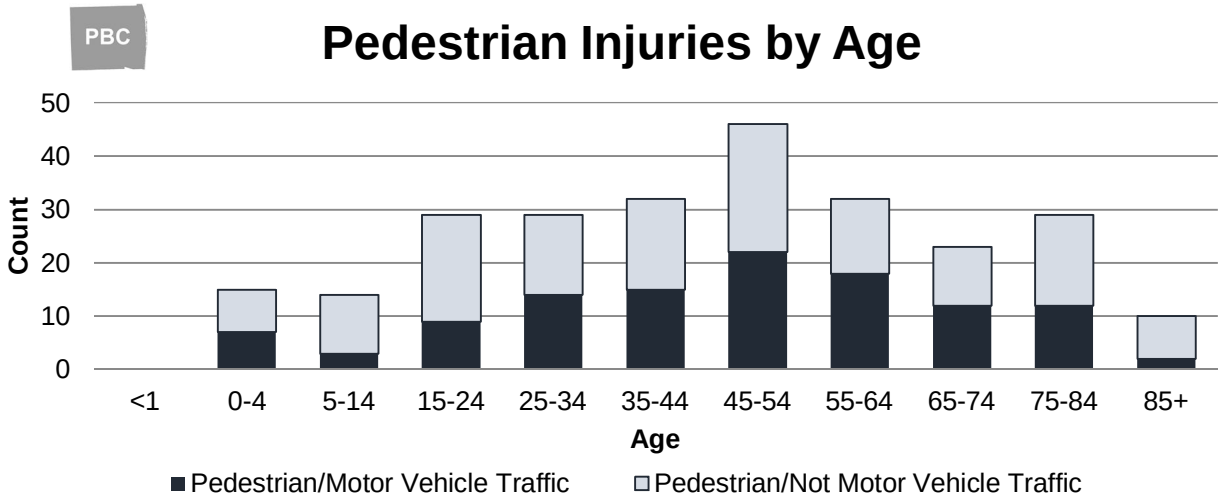
Figure 6. Pedalcyclist Injuries by Year

Figure 7 and Figure 8 show total pedestrian fatalities and injuries by age from 2010 to 2014. Pedestrian fatalities and injuries were most common in ages 45-54. Pedestrians aged 55-64 experienced the second most fatalities.



Source: FDOH Injury Surveillance Data System

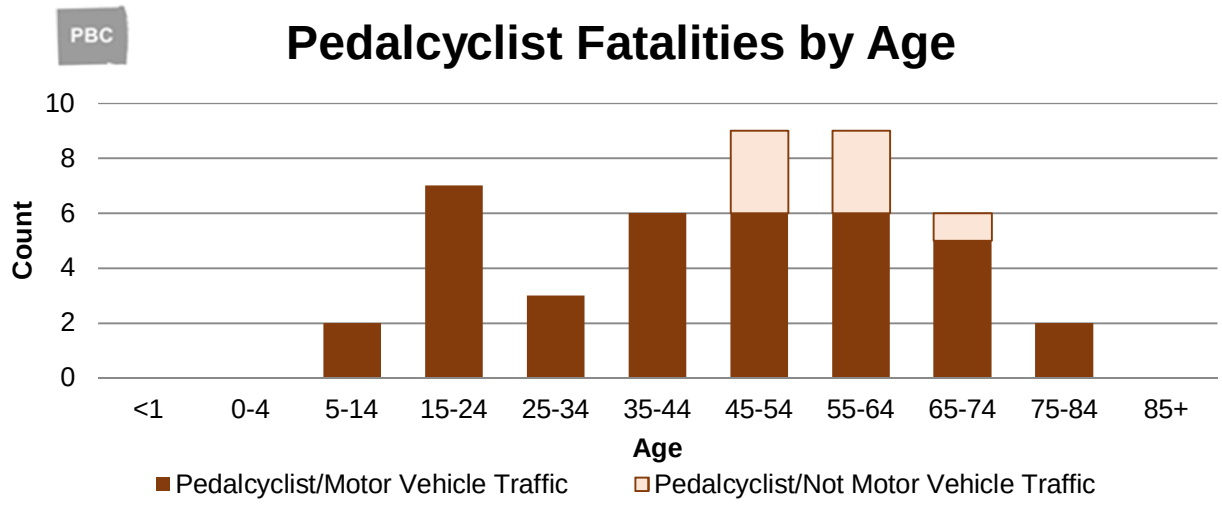
Figure 7. Pedestrian Fatalities by Age



Source: FDOH Injury Surveillance Data System

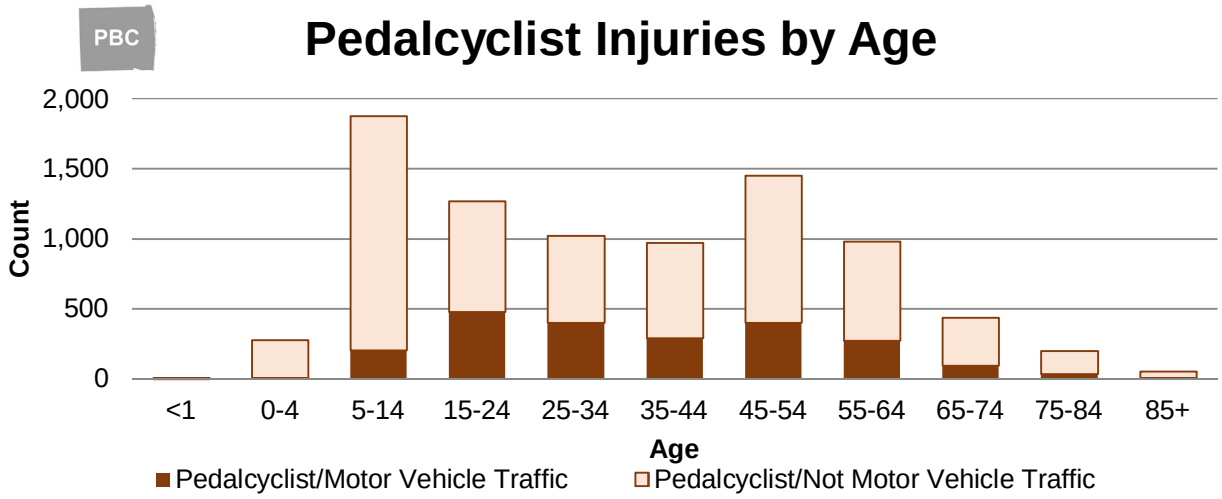
Figure 8. Pedestrian Injuries by Age

Figure 9 shows most pedalcyclist deaths involving a motor vehicle occurred in ages 15-24. The spread of fatalities amongst ages 35-64 were even with no age group being overrepresented. Figure 10 shows pedalcyclist injuries not involving a motor vehicle; young pedalcyclists under the age of 15 (*particularly ages 5-14*) were overrepresented along with the middle age group (*particularly ages 44-54*). An interesting result from studying FDOH data are that most pedalcyclist injuries did not involve a motor vehicle, especially for schoolchildren ages 5-14.



Source: FDOH Injury Surveillance Data System

Figure 9. Pedalcyclist Fatalities by Age



Source: FDOH Injury Surveillance Data System

Figure 10. Pedalcyclist Injuries by Age

Department of Highway Safety and Motor Vehicles (DHSMV)

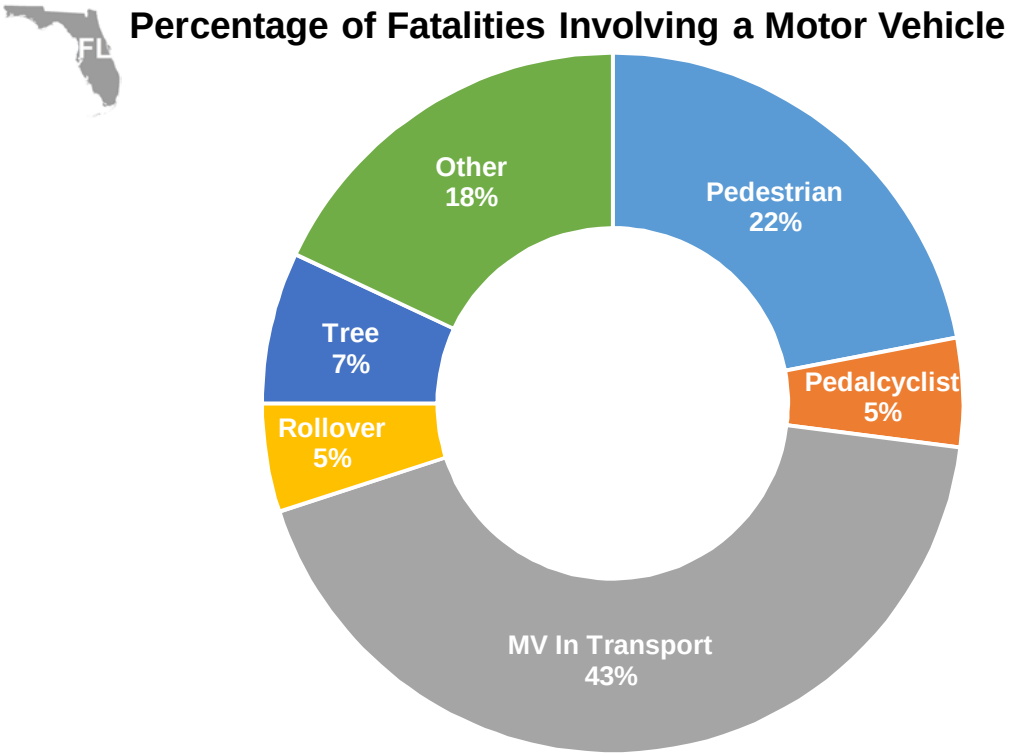
The following is a compilation of county and state data from the DHSMV. The most current data available from the DHSMV is from the year of 2014. In 2014, Palm Beach County was ranked as one of the top five (5) counties out of 67 counties in Florida with the highest

PBC Rankings State wide

#3 in Pedestrian Crashes and Injuries
#4 in Pedestrian Fatalities
#4 in Pedalcyclist Crashes and Injuries
#5 in Pedalcyclist Fatalities

Source: 2014 DHSMV Crash Facts

pedestrian and pedalcyclist crashes, injuries and fatalities. Also, over twenty-five percent (25%) of all traffic related fatalities in Florida involved a motor vehicle hitting a pedestrian or pedalcyclist as shown in Figure 11. In addition, less than fifty percent (50%) of all traffic related fatalities in Florida involved another motor vehicle.



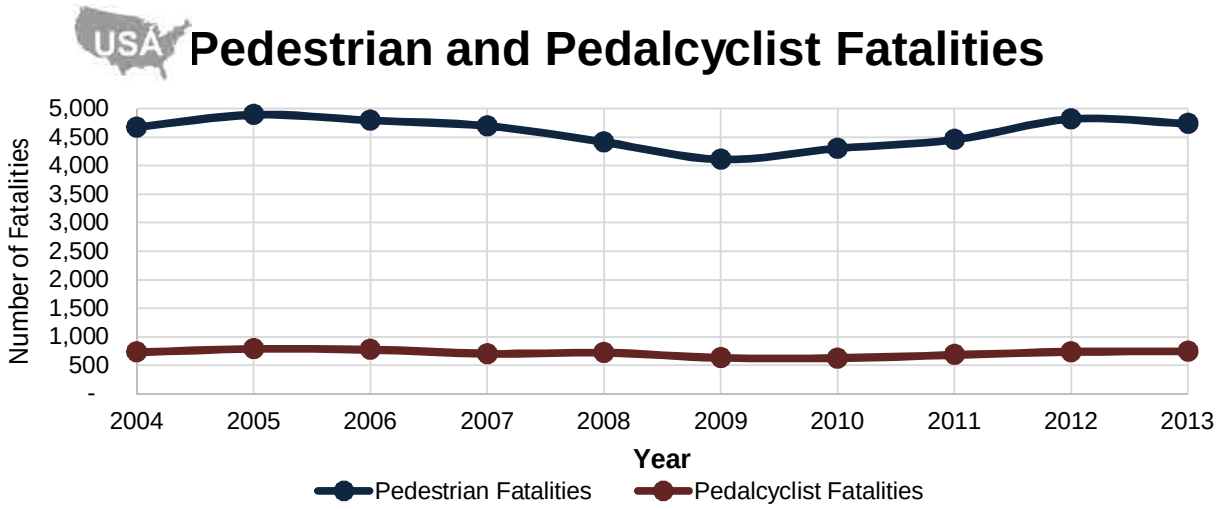
Source: 2014 DHSMV Crash Facts

Figure 11. Percentage of Fatalities Involving a Motor Vehicle

National Highway Traffic Safety Administration (NHTSA)

The following analysis is made from national and state data taken from NHTSA's 2013 Traffic Safety Facts. NHTSA concluded that 5.5 percent (5.5%) of total traffic related fatalities in Florida were pedalcyclist fatalities, the highest in the nation and more than double the nation's average of 2.3 percent (2.3%). However, this statistic slightly decreased the next year to 5.01 percent (5.01%), as reported by the DHSMV's 2014 Crash Facts. NHTSA also reported that twenty-five percent (25%) of the pedestrian deaths were during crashes that involved hit and run drivers.

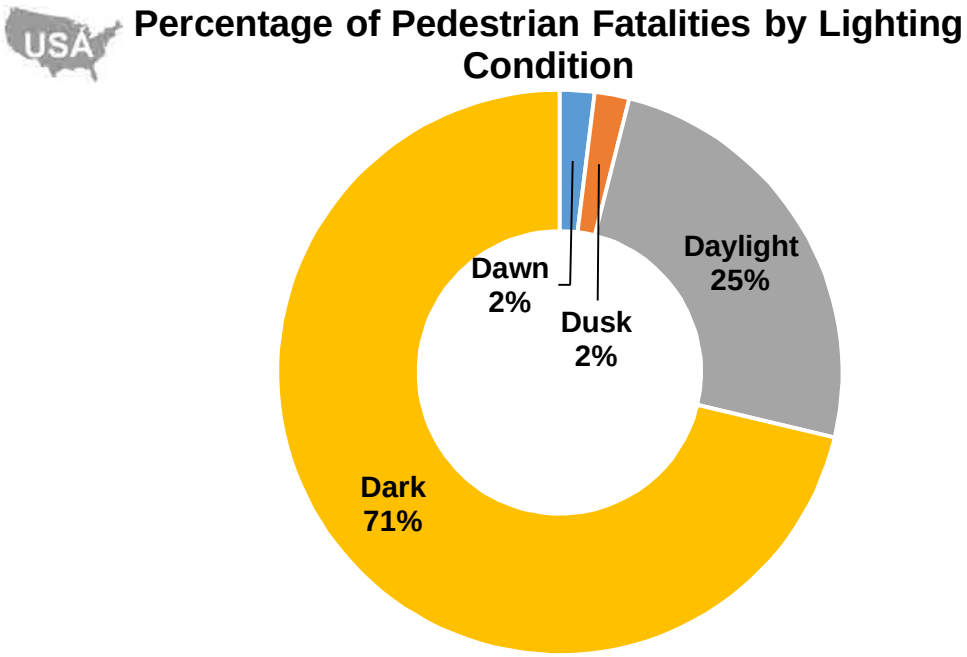
Figure 12 depicts the total pedestrian and pedalcyclist fatalities in traffic crashes from 2004 to 2013 in United States. The number of pedestrian and pedalcylist fatalities were relatively the same trend and both decreased in the year 2009.



Source: 2013 NHTSA Pedestrian Traffic Safety Facts

Figure 12. 2004-2013 Pedestrian and Pedalcyclist Fatalities

Figure 13 displays data from NHTSA on pedestrian fatalities by lighting conditions. It is noted that the majority of fatalities occurred during dark lighting conditions.



Source: 2013 NHTSA Pedestrian Traffic Safety Facts

Figure 13. Pedestrian Fatalities by Lighting Condition

Table 2 and Table 3 compares Palm Beach pedestrian and pedalcyclist fatalities with statewide and national information. As of 2014, Florida and Palm Beach County have nearly double the national average ratio for pedalcyclist fatalities to total traffic fatalities. Also, when compared to the national average, Florida and Palm Beach County have experienced a higher percentage of pedestrian deaths relative to total traffic fatalities. However, Palm Beach County, has fewer pedestrian and pedalcyclist fatalities per million persons than the state of Florida as a whole, but this figure is still higher than the national average.

Table 2. Pedestrian Fatalities in the United States, Florida, and Palm Beach County

	Pedestrians		
	Pedestrian Fatalities	Percentage of Total Fatalities	Fatalities per Million Persons
United States[1]	4,735	14.5	14.98
Florida[2]	606	24.30	30.47
Palm Beach[2]	35	26.92	25.51

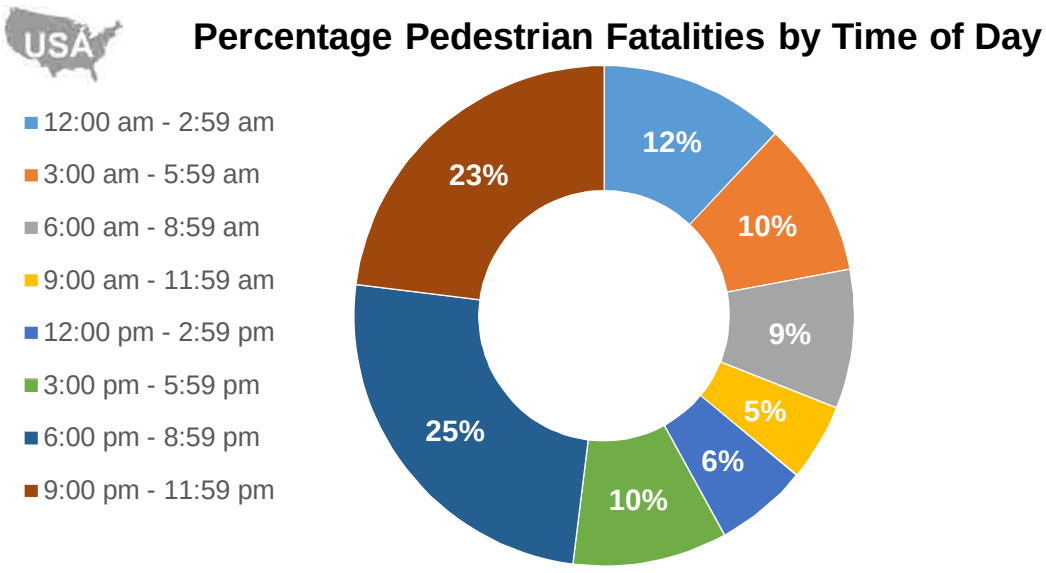
[1]Source: 2013 NHTSA Traffic Safety Facts (US table data)
[2]Source: 2014 DHSMV Crash Facts (PBC, Florida facts)

Table 3. Pedalcyclist Fatalities in the United States, Florida, and Palm Beach County

	Pedalcyclists		
	Pedalcyclist Fatalities	Percentage of Total Fatalities	Fatalities per Million Persons
United States[1]	743	2.3	2.35
Florida[2]	135	5.41	6.78
Palm Beach[2]	7	5.38	4.10

[1]Source: 2013 NHTSA Traffic Safety Facts (US table data)
[2]Source: 2014 DHSMV Crash Facts (PBC, Florida facts)

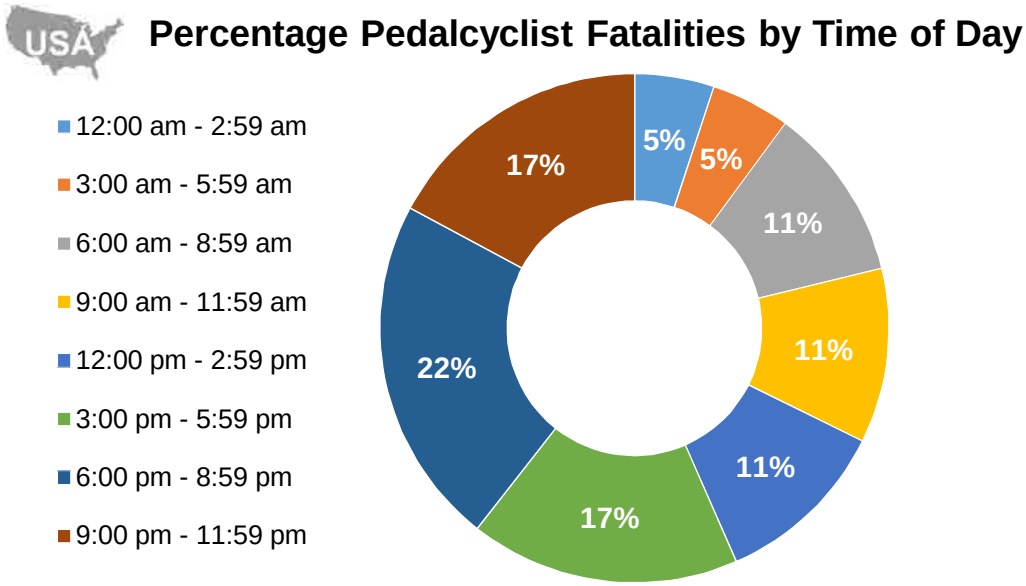
Figure 14 displays the total percentage of pedestrian fatalities in traffic crashes by time of day. About forty-eight percent (48%) of pedestrian fatalities occurred during 6 pm–11:59 pm which is consistent with Figure 13, majority of pedestrian fatalities occurred during dark lighting conditions.



Source: 2013 NHTSA Traffic Safety Facts

Figure 14. Percentage Pedestrian Fatalities by Time of Day

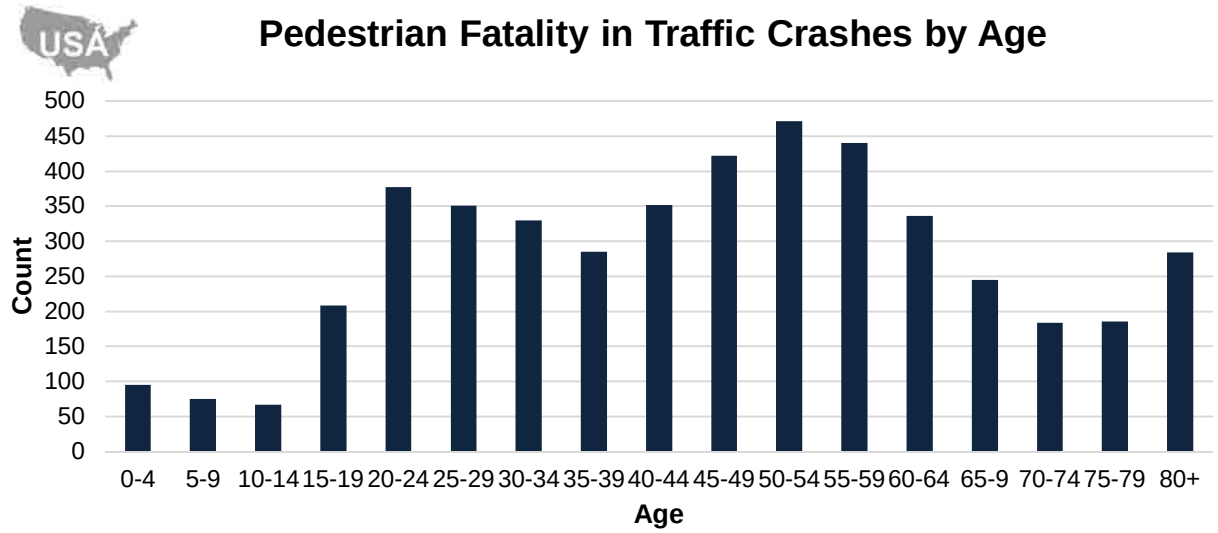
Figure 15 shows the time of day pedalcyclist fatalities occurred. About twenty-two percent (22%) occurred during 6 pm–8:59 pm. Pedestrian fatalities during the same timeframe is similar at twenty-five percent (25%). However, only thirty-nine percent (39%) of pedalcyclist fatalities occurred during 6 pm–11:59 pm.



Source: 2013 NHTSA Traffic Safety Facts

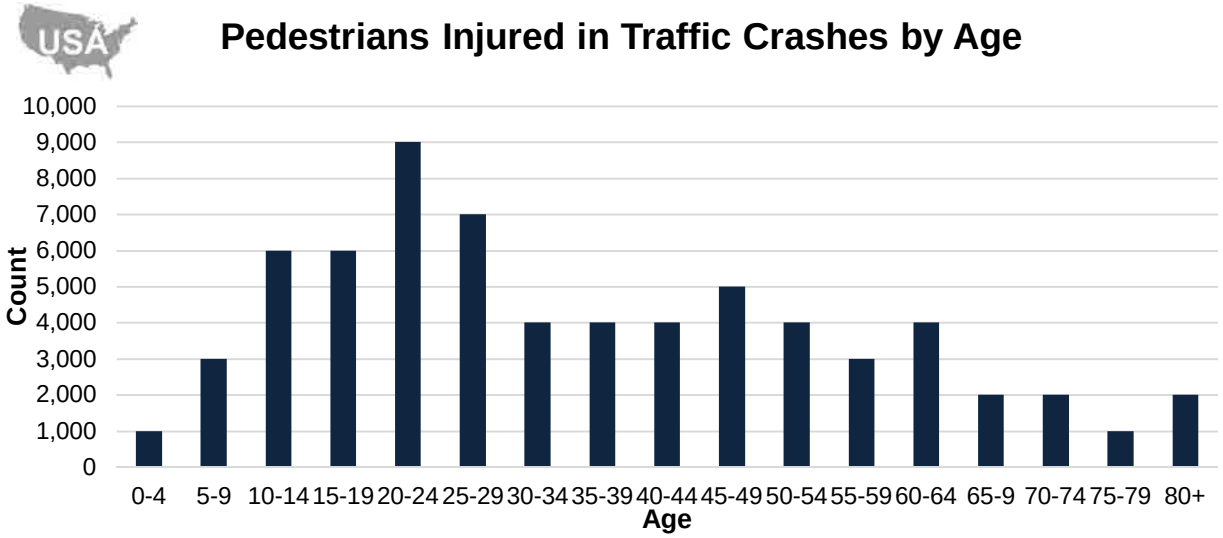
Figure 15. Percentage Pedalcyclist Fatalities by Time of Day

Figure 16 and Figure 17 display the nationwide total of pedestrian fatalities and injuries by age, respectively. The majority of pedestrian fatalities are from ages 45-59, which is consistent with Figure 7 (2010-2014 PBC Pedestrian Fatalities by Age). However, ages 15-29 experienced the most injuries, which is consistent with Figure 8 (2010-2014 PBC Pedestrian Injuries by Age).



Source: 2013 NHTSA Pedestrian Traffic Safety Facts

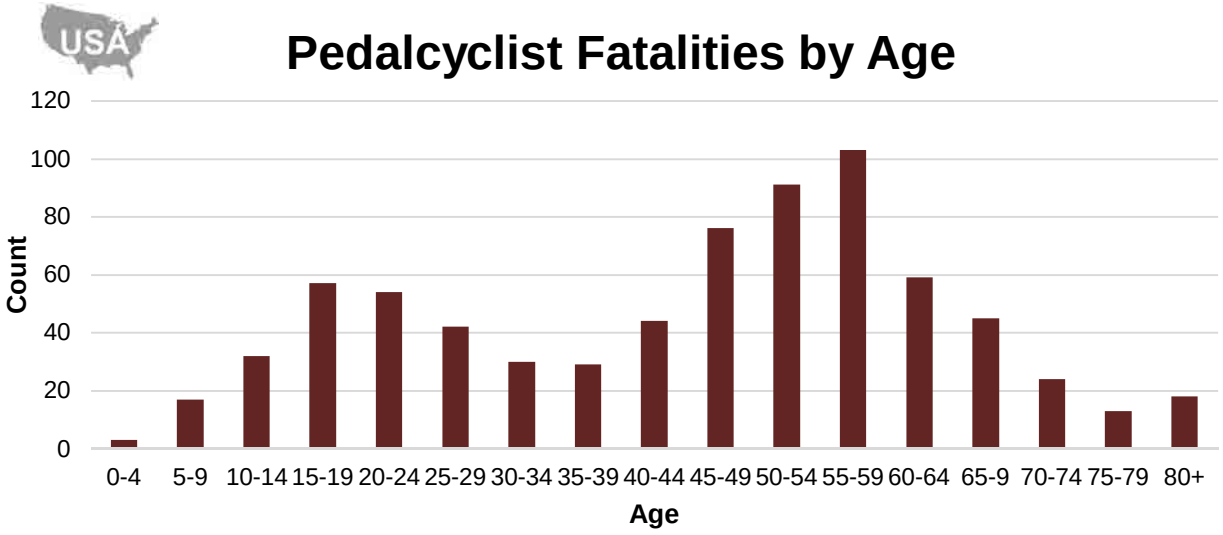
Figure 16. Pedestrian Fatalities in Traffic Crashes by Age



Source: 2013 NHTSA Pedestrian Traffic Safety Facts

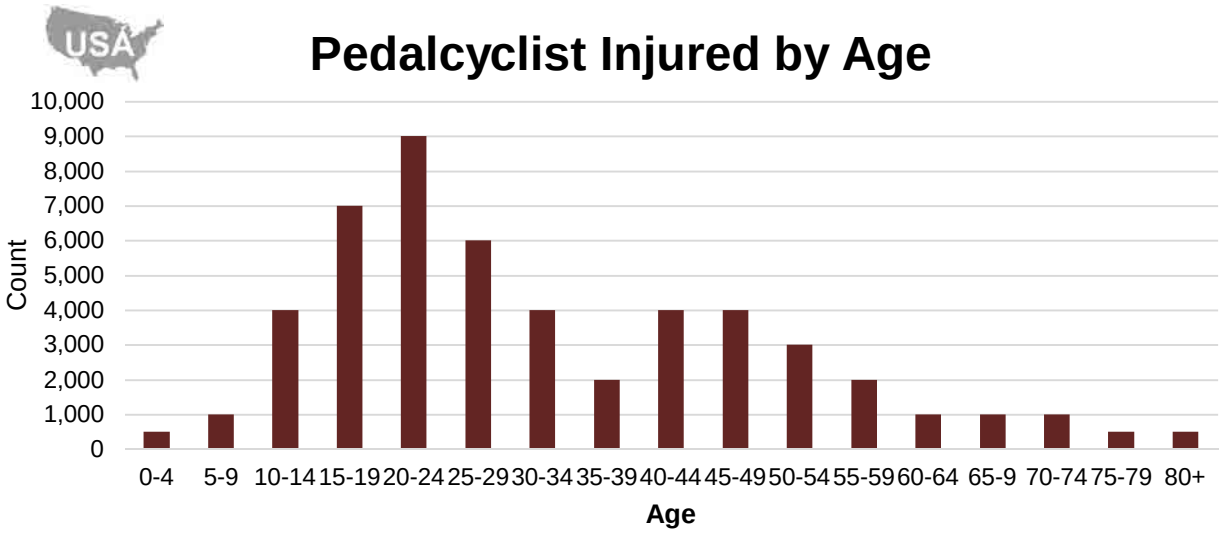
Figure 17. Pedestrian Injuries in Traffic Crashes by Age

Figure 18 and Figure 19 displays the nationwide total of pedalcyclist fatalities and injuries by age, respectively. The majority of pedalcyclist fatalities are from ages 45-59, which is consistent with Figure 16 (Pedestrian Fatalities in Traffic Crashes by Age). Majority of pedacylists injuries are from ages 15-29, which is similar as Figure 17 (Pedestrian Injuries in Traffic Crashes by Age).



Source: 2013 NHTSA Traffic Safety Facts

Figure 18. Pedalcyclist Fatalities by Age



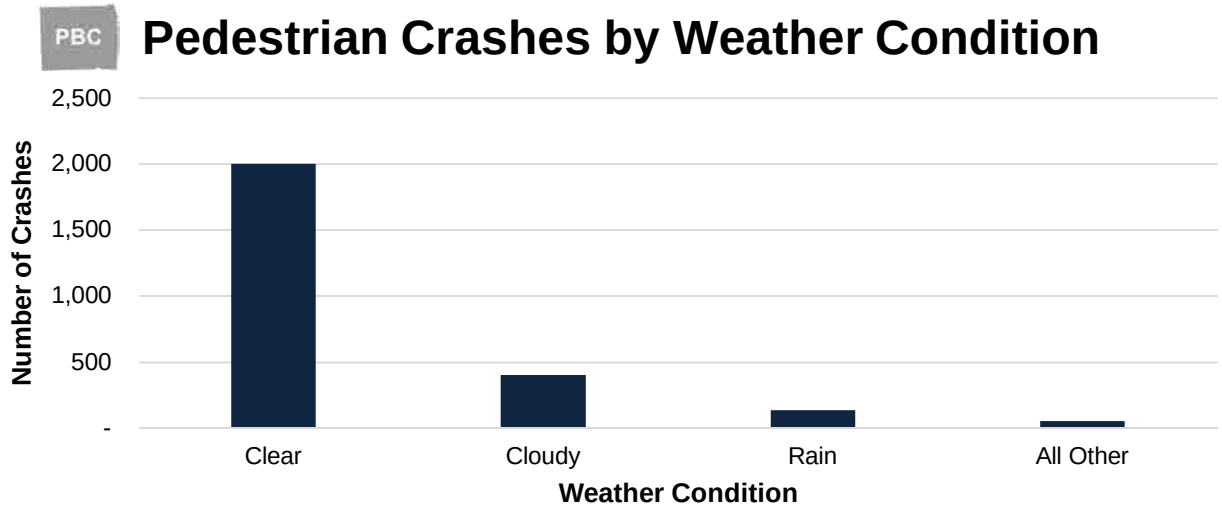
Source: 2013 NHTSA Traffic Safety Facts

Figure 19. Pedalcyclist Injuries by Age

Palm Beach County Crash System Data

Palm Beach County pedestrian and bicyclist crash data was obtained from the Palm Beach County Traffic Division's (PBCTD) traffic crash database. The data spans over five (5) years from 2010 to 2014. During this time frame, the PBCTD reported 2,591 pedestrian crashes and 1,714 bicyclist crashes.

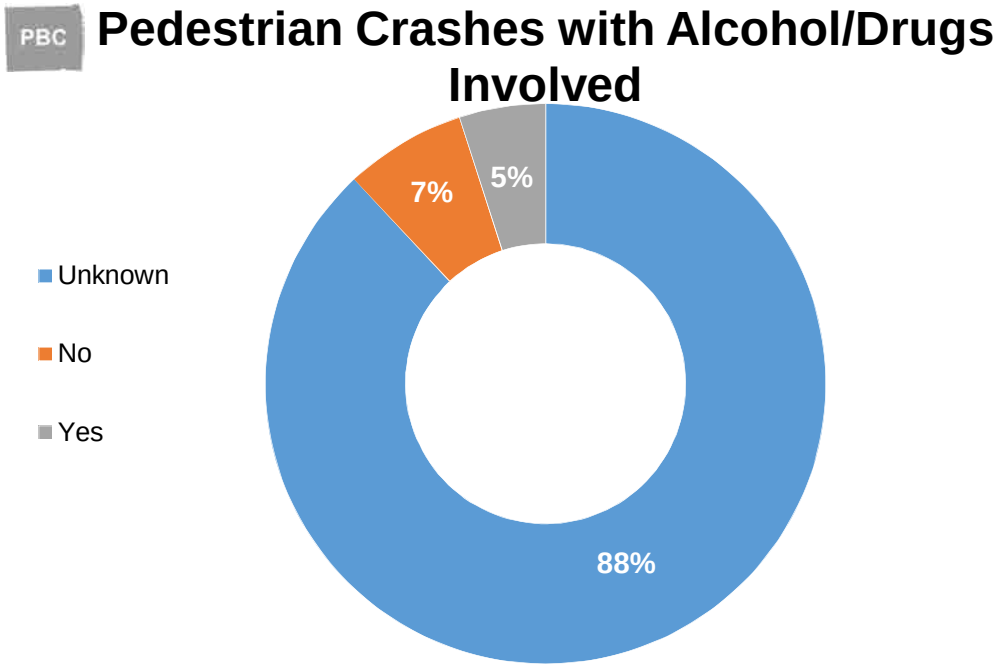
Figure 20 illustrates the pedestrian crashes by weather condition. The majority of the accidents happened during clear weather. The reason for this could be that people are usually less willing to walk during cloudy and rainy weather.



Source: 2010-2014 PBCTD Crash System Data

Figure 20. Pedestrian Crashes by Weather Condition

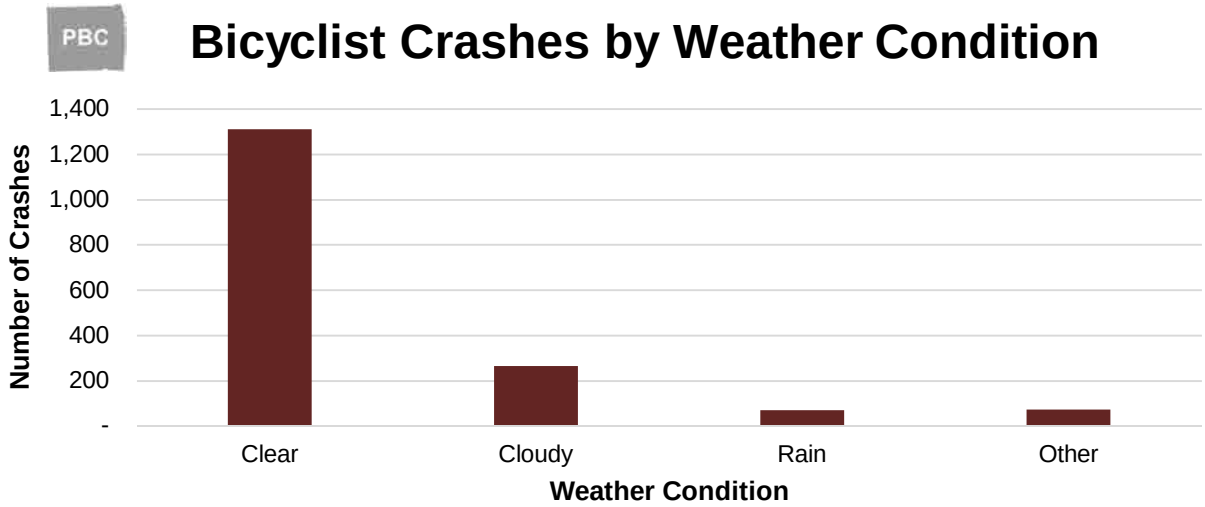
Figure 21 shows the percentage of pedestrian crashes in which alcohol or drugs were involved. Police officers did not report alcohol or drugs involvement in about eighty-eight percent (88%) of these accidents. Testing subjects involved in these accidents for alcohol or drugs, is usually only done when the officer suspects such involvement. As a result, little beneficial data can be extracted from this chart since it involves the bias of the officer in deciding whether or not to administer an alcohol/drug test.



Source: 2010-2014 PBCTD Crash System Data

Figure 21. Pedestrian Crashes with Alcohol/Drugs Involved

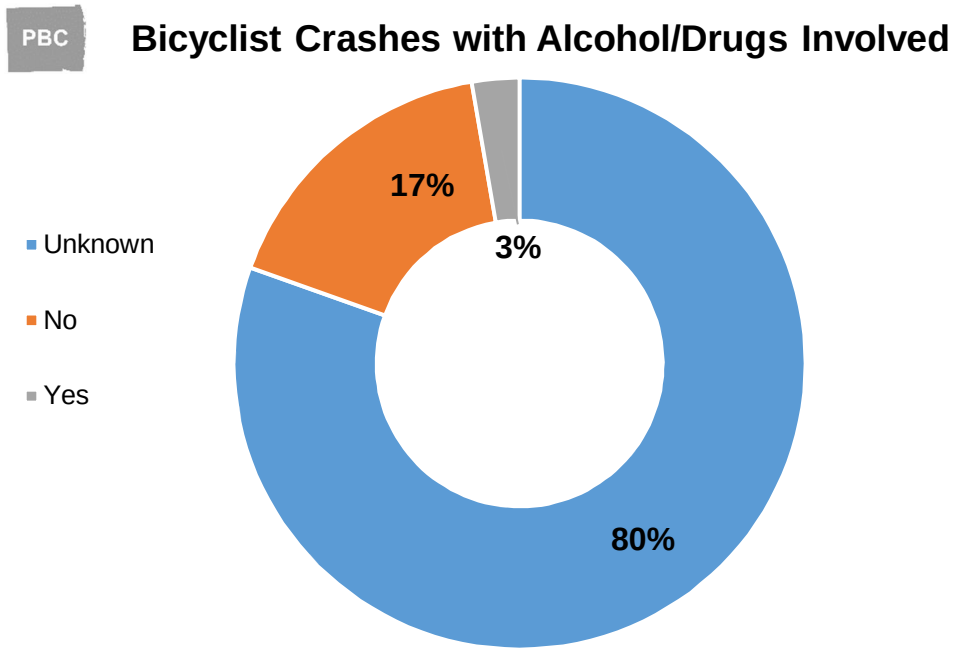
Figure 22 illustrates bicyclist crashes by weather condition. Following a pattern identical to pedestrian crashes, the majority of bicyclist crashes happened during clear weather with cloudy and rainy weather following behind respectively.



Source: 2010-2014 PBCTD Crash System Data

Figure 22. Bicyclist Crashes by Weather Condition

In stark contrast to pedestrian data, a larger percentage of individuals involved in bicyclist crashes were tested for the presence of alcohol or drugs as shown in Figure 23. About twenty percent (20%) of the crashes involving bicyclists had information about alcohol/drug involvement. Of the twenty percent (20%), three percent (3%) had alcohol/drug involvement. When comparing percentages, pedestrian crashes were involved with more alcohol/drug involvement than bicyclist crashes.

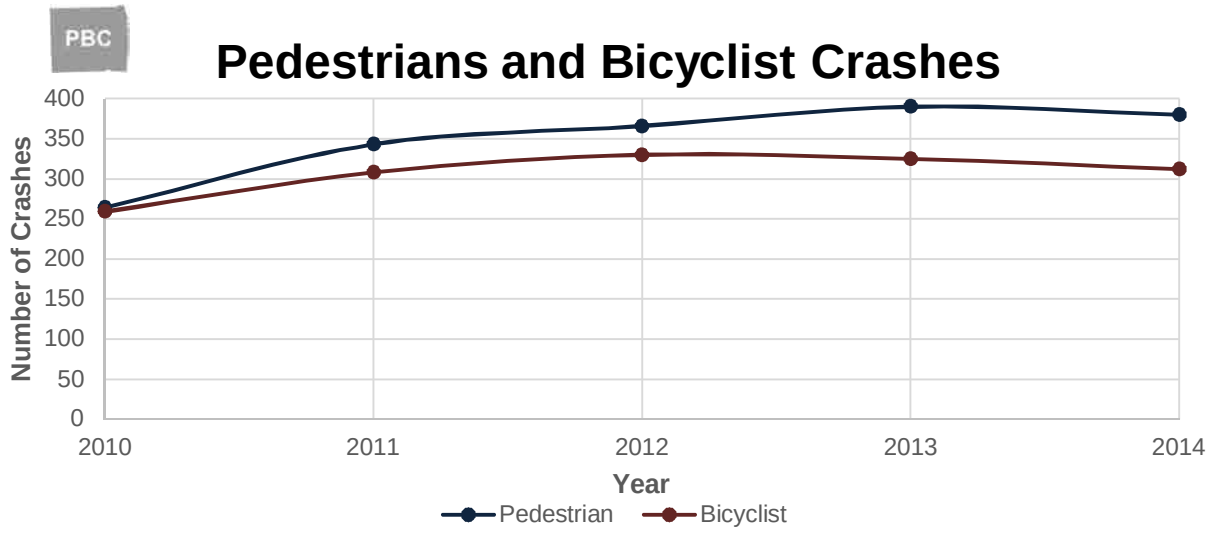


Source: 2010-2014 PBCTD Crash System Data

Figure 23. Bicyclist Crashes with Alcohol/Drugs Involved

Crash Data Statistics

Palm Beach County pedestrian and bicyclist crash data as reported to the DHSMV were obtained from FDOT UBR. The latest five (5) years of verified crash data was from January 2010 to December 2014 at the time of analysis. Pedestrian crashes increased from 2010 to 2013 with a slight decrease in 2014 and bicyclist crashes increased from 2010 to 2012 and decreased from 2012 to 2014 as shown in Figure 24. A total of 1,743 traffic collisions with pedestrians were recorded from 2010 to 2014 and a total of 1,534 traffic collisions with bicyclists were recorded from 2010 to 2014. In comparison with statistics collected from the Palm Beach County Crash System Data, from 2010 to 2014, Palm Beach County had 2,591 traffic collisions with pedestrians (about 49% more than FDOT UBR reported data) and 1,714 traffic collisions with bicyclists (12% more than FDOT UBR data). For the purposes of this report, bicyclist is the same as pedalcyclist.



Source: 2010-2014 FDOT UBR Data

Figure 24. Pedestrian and Bicyclist Crashes

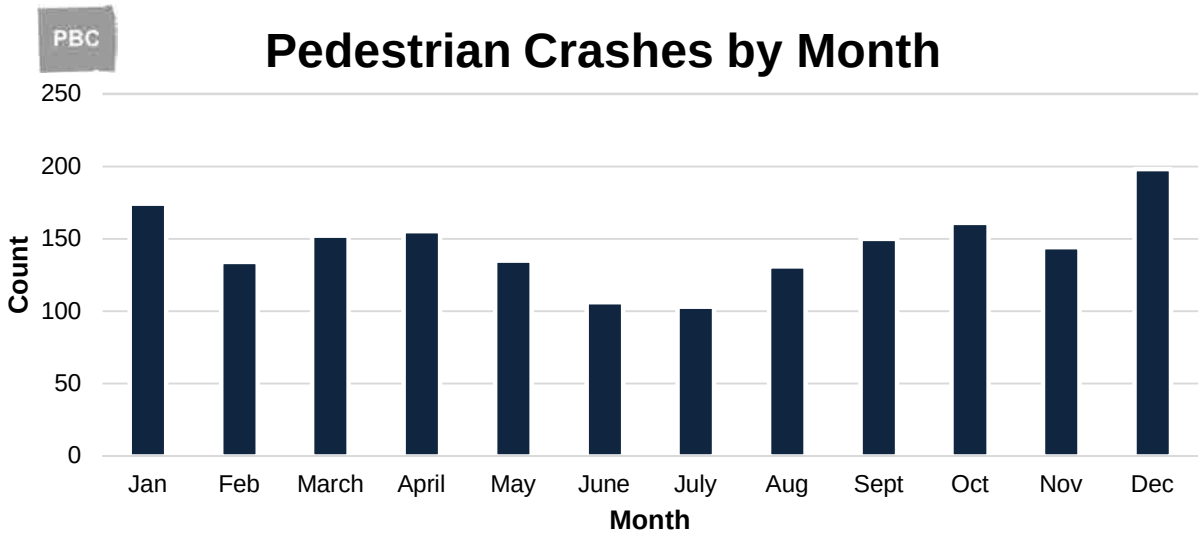
Pedestrian Crash Data

Figure 25, Figure 26, and Figure 27 depicts pedestrian crashes in Palm Beach County from 2010 to 2014 by time of day, month, and day of the week. Figure 25 reveals a bimodal distribution with peaks at 1100 and 1600 hours (military time). The bimodal characteristic suggests there are two periods during the day that see the most collisions between motor vehicles and pedestrians. Roughly, these periods range from 0700 – 1200 hours and 1500 – 2100 hours.

Source: 2010-2014 FDOT UBR Data

Figure 25. Pedestrian Crashes by Time of Day

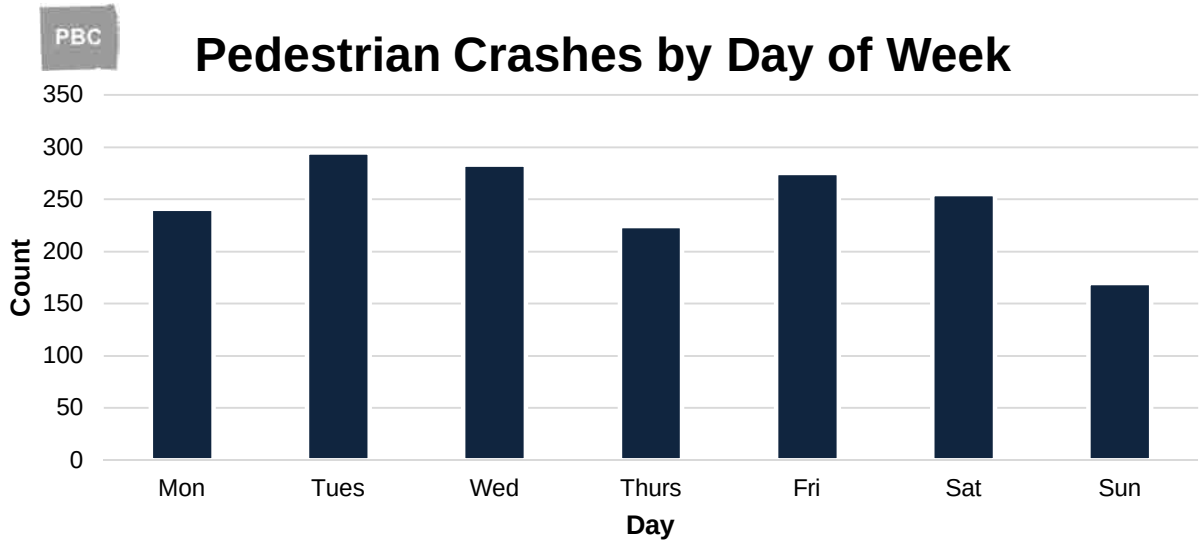
Figure 26 graphically relates pedestrian crashes by month. This dataset has a symmetrical distribution between the first half of the year and the second. It should be noted; January and December have the highest instances of pedestrian crashes and June and July have the fewest. The reason behind this could be that in Florida the weather is hottest during the summer months and people might be more willing to go outside and walk during the winter months.



Source: 2010-2014 FDOT UBR Data

Figure 26. Pedestrian Crashes by Month

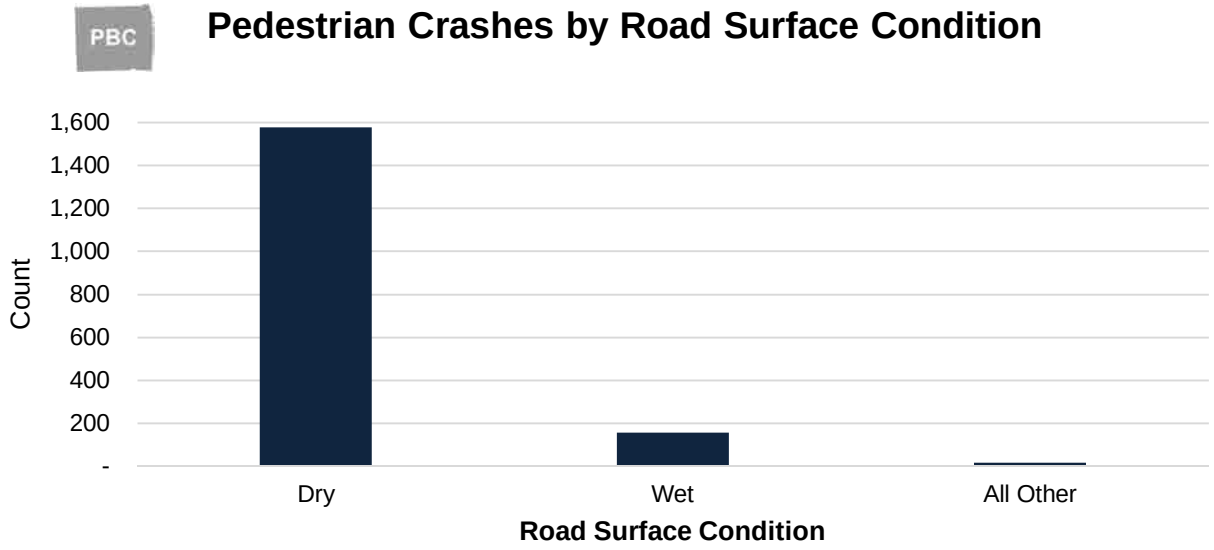
Figure 27 takes a look at pedestrian crashes by the day. Sunday has the least amount of pedestrian crashes; however, the rest of the days are comparable in crashes.



Source: 2010-2014 FDOT UBR Data

Figure 27. Pedestrian Crashes by Day of Week

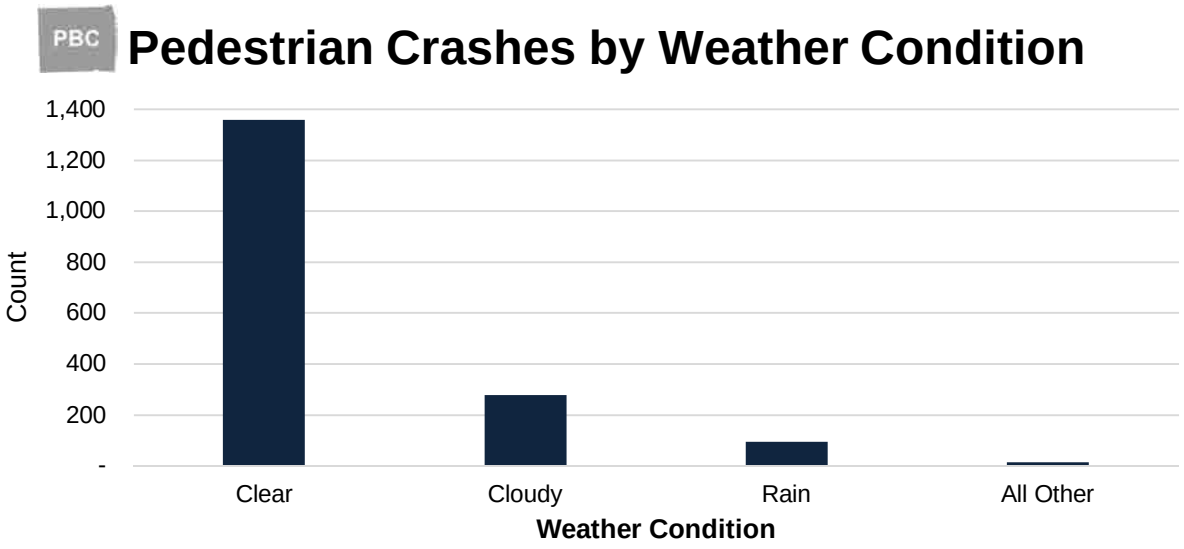
Figure 28 compares pedestrian crashes to road surface condition. More than ninety percent (90%) of the crashes involved dry road surface conditions.



Source: 2010-2014 FDOT UBR Data

Figure 28. Pedestrian Crashes by Road Surface Condition

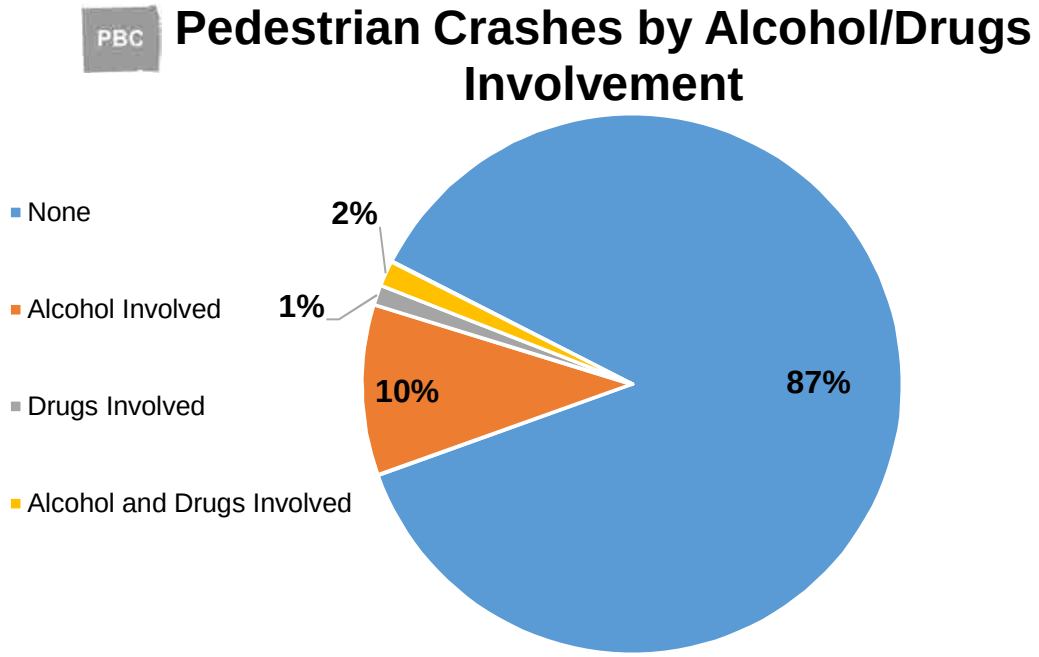
Figure 29 shows pedestrian crashes by weather condition. Figure 28 and Figure 29 shows the majority of pedestrian crashes occurred while the weather was dry and clear. This may be because pedestrians are less likely to walk outside during unfavorable weather conditions.



Source: 2010-2014 FDOT UBR Data

Figure 29. Pedestrian Crashes by Weather Condition

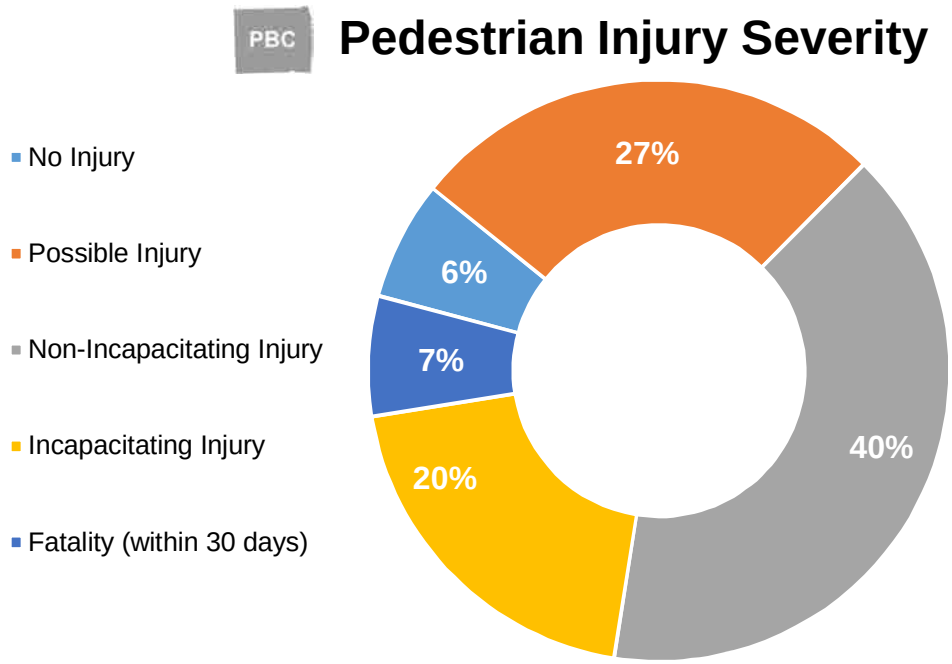
Alcohol and drugs involvement in traffic crashes is important to know. Without this information, it would be difficult to understand the factors causing these accidents. Figure 30 shows a total of thirteen percent (13%) of pedestrian crashes involved alcohol and/or drugs.



Source: 2010-2014 FDOT UBR Data

Figure 30. Pedestrian Crashes by Alcohol/Drugs Involvement

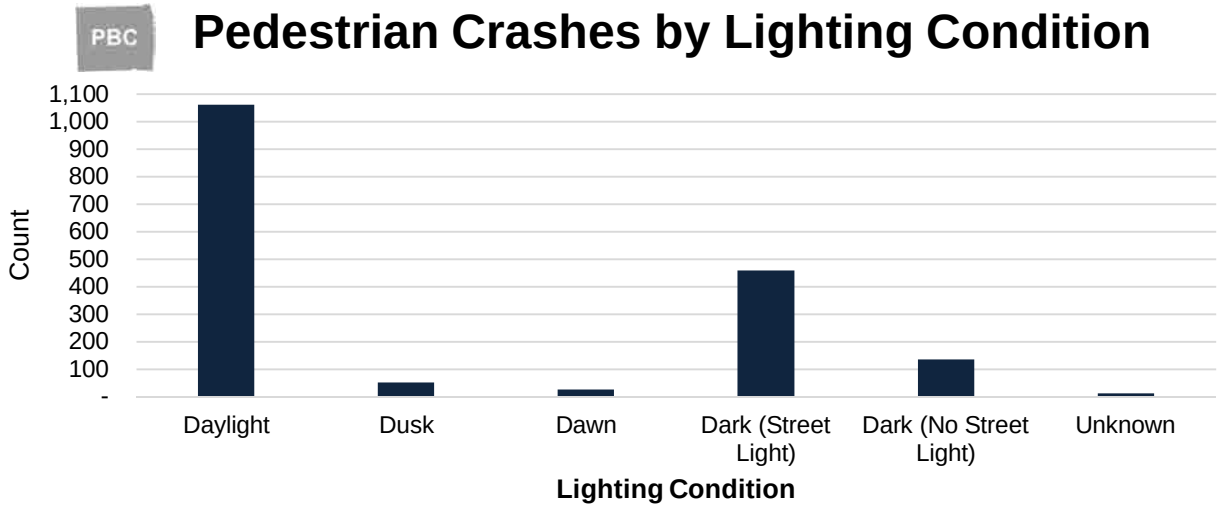
Injury severity is another factor that gives insight to the overall characteristics of pedestrian crashes. A large number of fatalities may indicate a lack of proper infrastructure for pedestrians. Figure 31 shows seventy-three percent (73%) of pedestrians involved in traffic accidents either did not have injuries or sustained minor injuries, the worst being lacerations and bruises.



Source: 2010-2014 FDOT UBR Data

Figure 31. Pedestrian Injury Severity

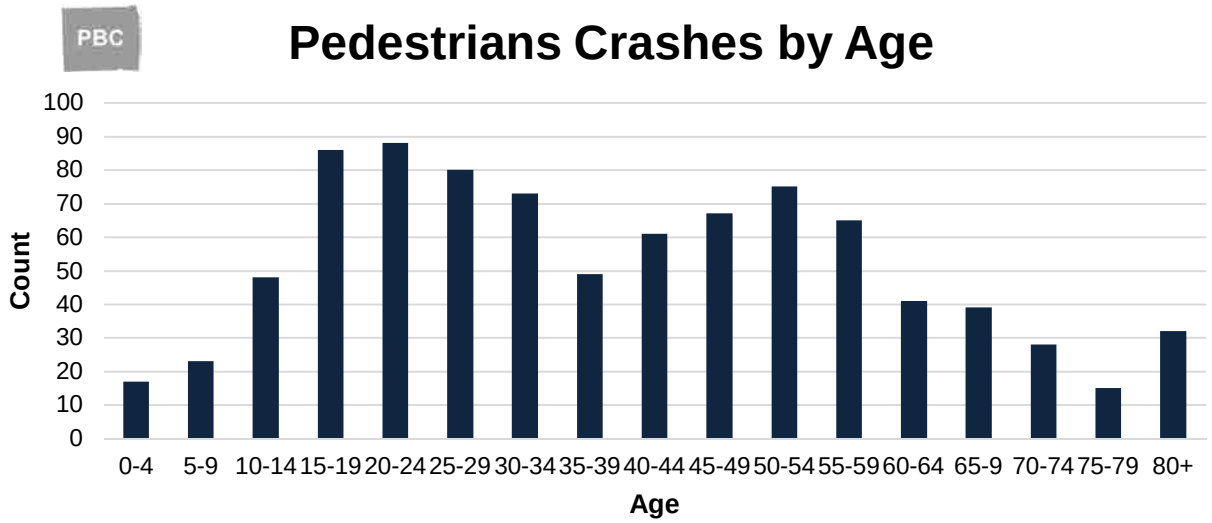
Figure 32 indicates that the majority of pedestrian crashes occurred in daylight. Dawn and dusk period had the least amount of crashes. The “unknown” category could mean the lighting condition was never recorded in the accident report.



Source: 2010-2014 FDOT UBR Data

Figure 32. Pedestrian Crashes by Lighting Condition

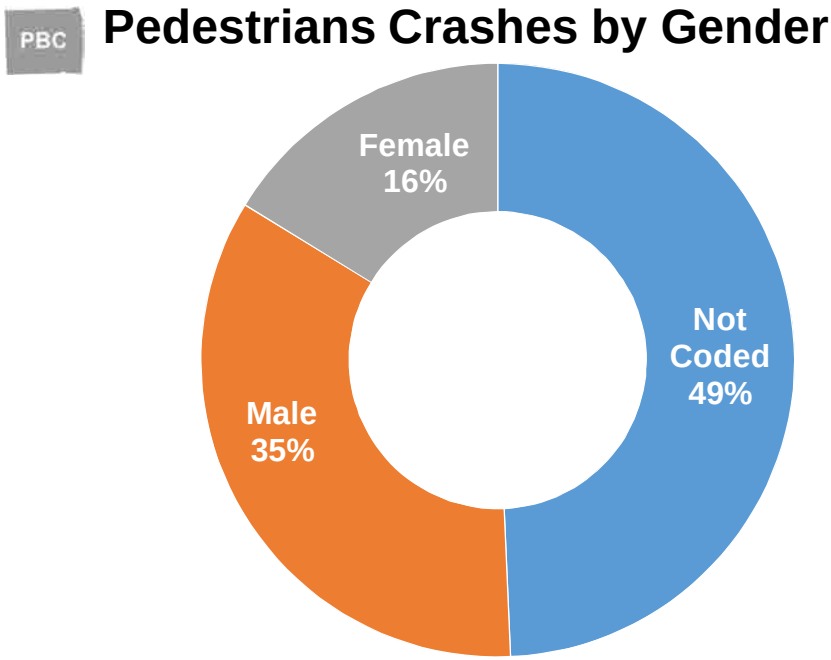
Figure 33 displays pedestrian crashes by age. From this data, it is observed that there are two age ranges that experienced the most crashes, 15-34 and 45-59. The distribution of this graph confirms the data presented in Figure 16 (FDOT UBR Data-Pedestrian Fatalities) and Figure 17 (FDOT UBR Data-Pedestrian Injuries); all share peaks at the age ranges of 15-34 and 45-59.



Source: 2010-2014 FDOT UBR Data

Figure 33. Pedestrian Crashes by Age

Figure 34 shows the relationship between pedestrian crashes by gender. Over forty-night percent (49%) of the crashes did not have gender data recorded. But of the recorded data, more than fifty percent (50%) were male. Males are more likely in engaging in risky behaviors than females and are overrepresented in pedestrian deaths in most countries.

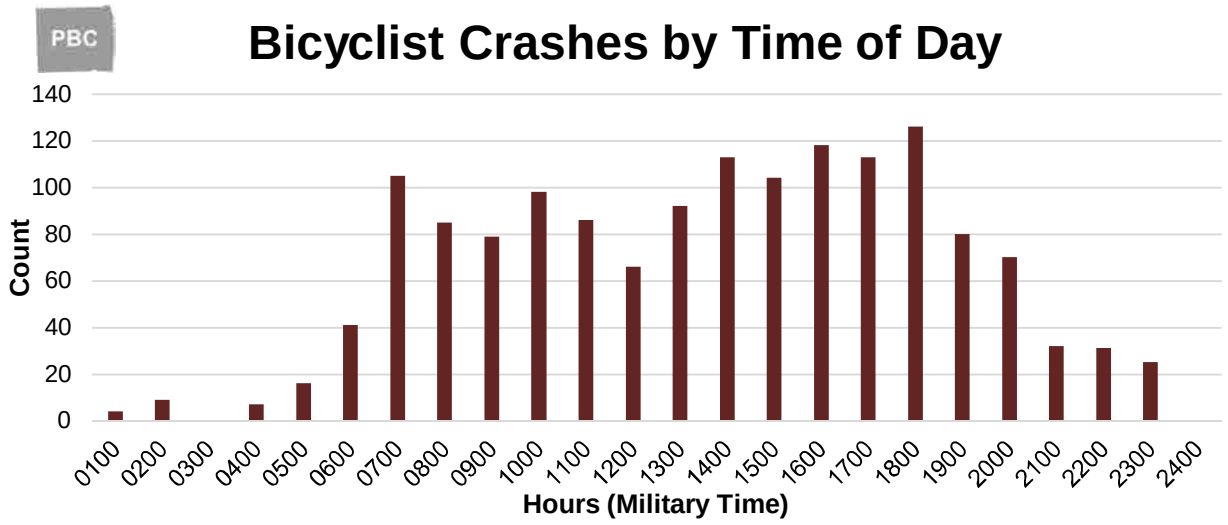


Source: 2010-2014 FDOT UBR Data

Figure 34. Pedestrian Crashes by Gender

Bicyclist Crash Data

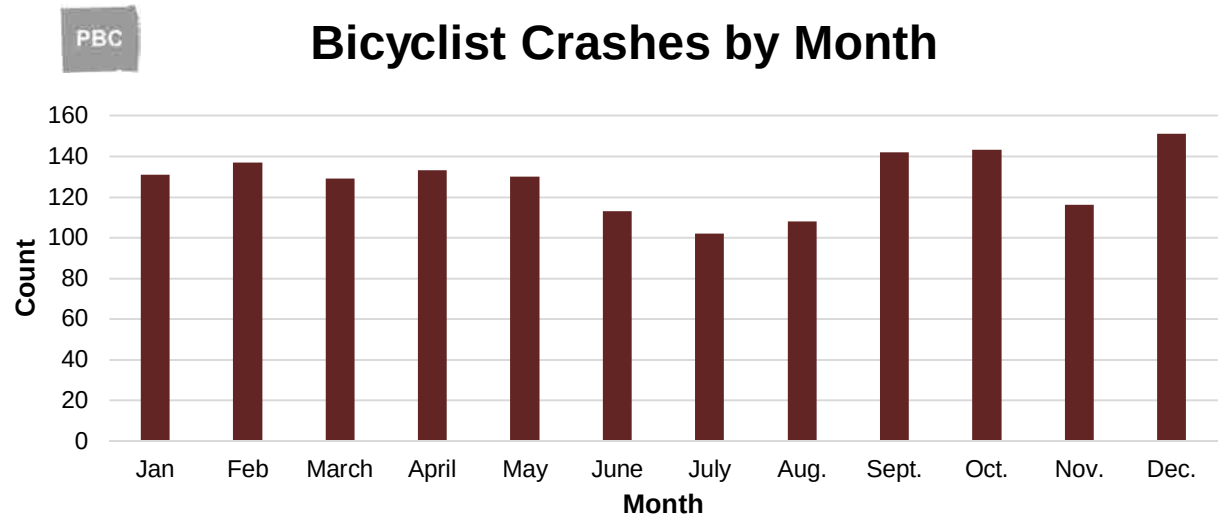
Figure 35, Figure 36, and Figure 37 illustrates bicyclist crashes in Palm Beach County from 2010 to 2014 by time of day, month, and day of the week. Similarly, to Figure 25 (FDOT UBR Data-Pedestrian Crashes by Time of Day), bicyclists have two periods during the day were the most accidents occur, 0700 – 1100 hours and 1400 – 1800 hours (military time). The time periods seem to suggest a correlation between the occurrence of bicyclist crashes and the typical rush hours of traffic.



Source: 2010-2014 FDOT UBR Data

Figure 35. Bicyclist Crashes by Time of Day

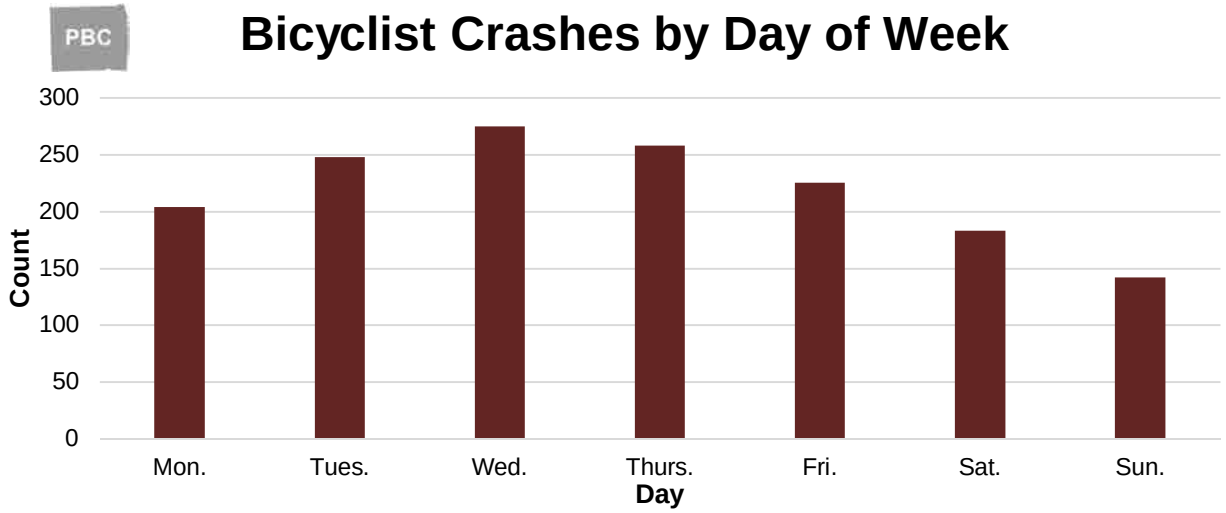
Figure 36 illustrates bicyclist crashes by month. The distribution of crashes over the months are even. The month of July experienced the least number of crashes while December saw the most. As in Figure 26 (Pedestrian Crashes by Month), this data coincides with pedestrian crashes which also occurred in low numbers during the summer but higher numbers during the winter.



Source: 2010-2014 FDOT UBR Data

Figure 36. Bicyclist Crashes by Month

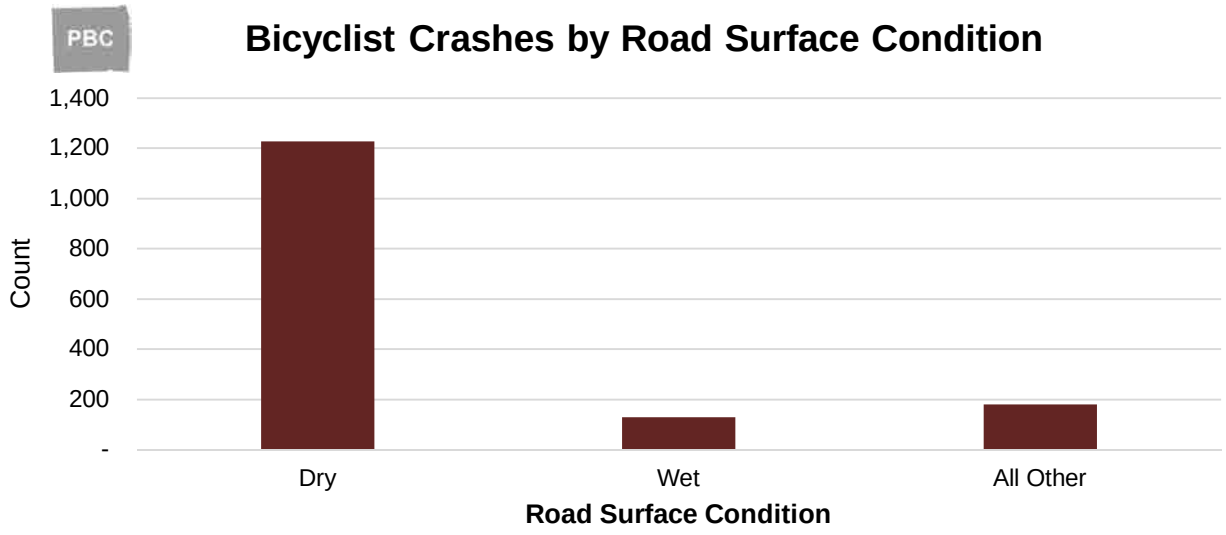
Figure 37 displays bicyclist crashes by the day of the week. This information follows a positively skewed normal distribution with the bulk of the crashes occurring between Tuesday and Thursday. As with pedestrian crashes, Figure 27 (Pedestrian Crashes by Day of Week), Sunday had the least amount of bicyclist crashes.



Source: 2010-2014 FDOT UBR Data

Figure 37. Bicyclist Crashes by Day of Week

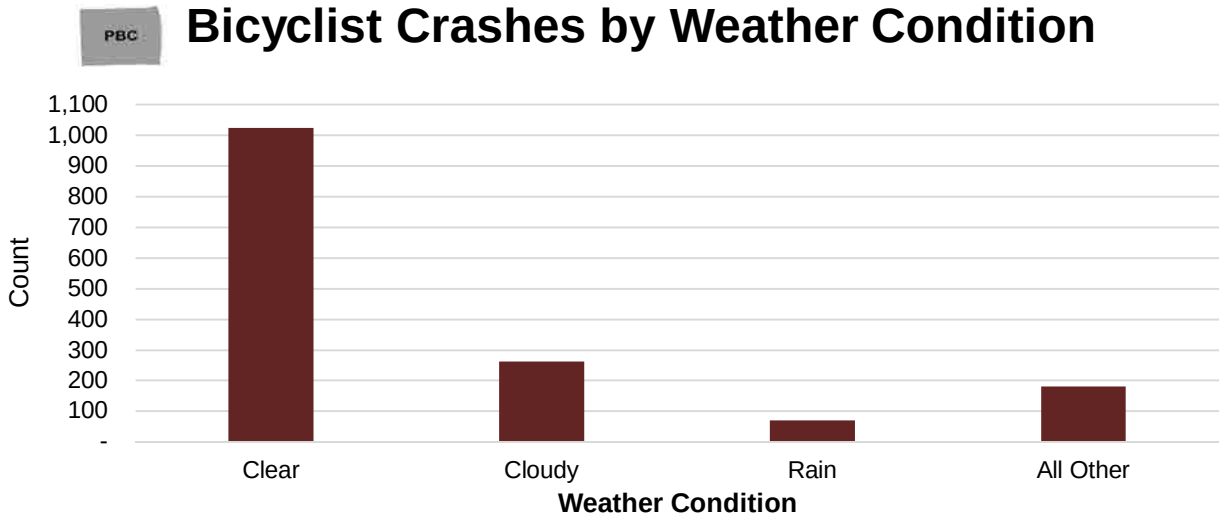
Figure 38 displays the bicyclist crashes based on road surface condition. More than seventy-five percent (75%) of the accidents occurred during dry weather.



Source: 2010-2014 FDOT UBR Data

Figure 38. Bicyclist Crashes by Road Surface Condition

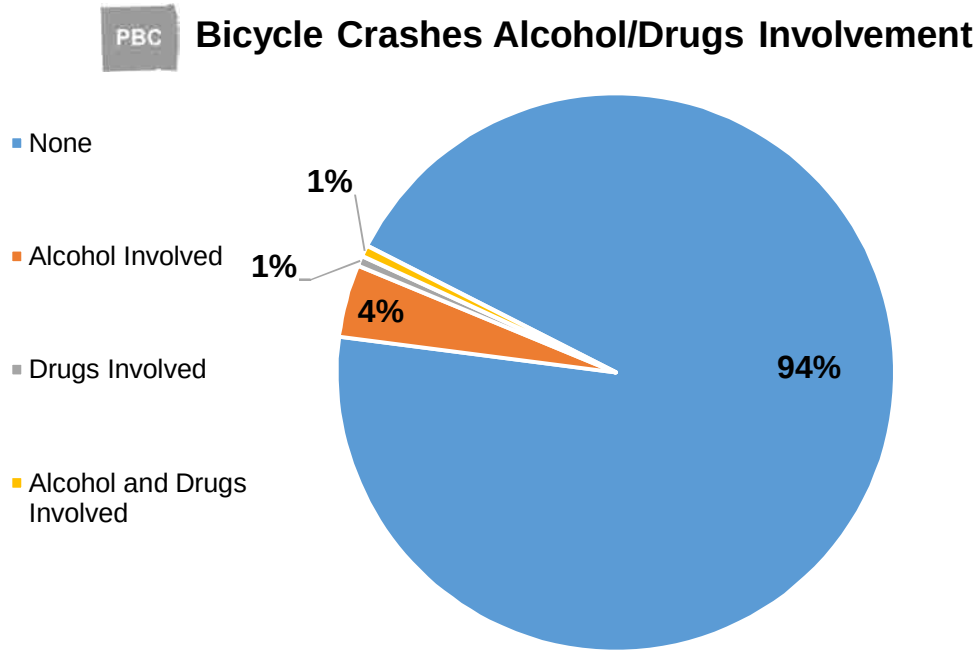
Figure 39 compares bicyclist crashes to the weather condition at the time of the accident. The majority of the accidents occurred during clear weather. Similarly, to pedestrian crashes in Figure 28 (Pedestrian Crashes by Road Condition) and Figure 29 (Pedestrian Crashes by Weather Condition), wet road conditions, or rainy weather equated to the least amount of crashes.



Source: 2010-2014 FDOT UBR Data

Figure 39. Bicyclist Crashes by Weather Condition

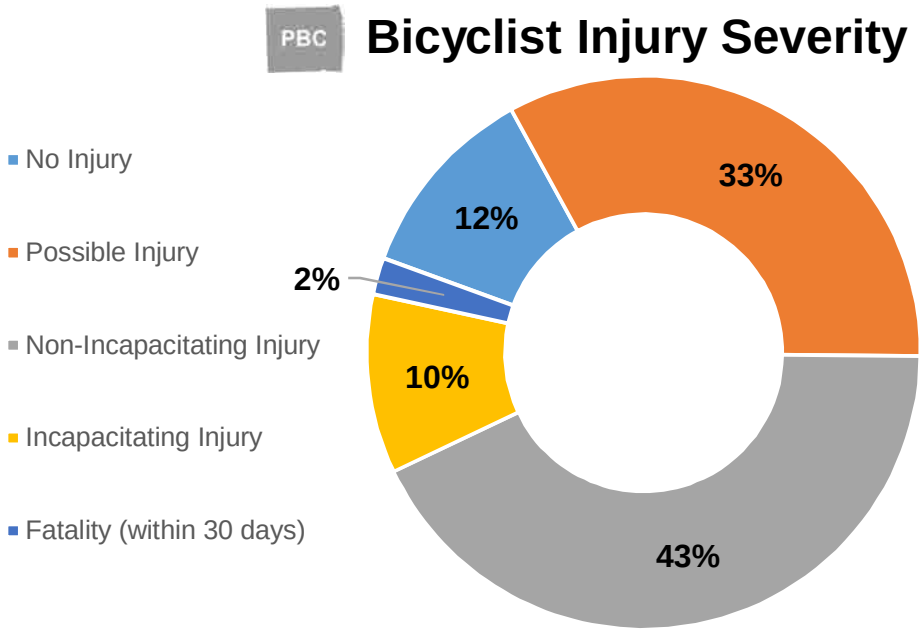
Figure 40 shows only six percent (6%) of the bicyclist crashes involved alcohol and/or drugs. This is in stark contrast to pedestrians, Figure 30 (Pedestrian Crashes by Alcohol/Drugs Involvement), who had over double the amount of alcohol and/or drugs involved.



Source: 2010-2014 FDOT UBR Data

Figure 40. Bicyclist Crashes Alcohol/Drugs Involvement

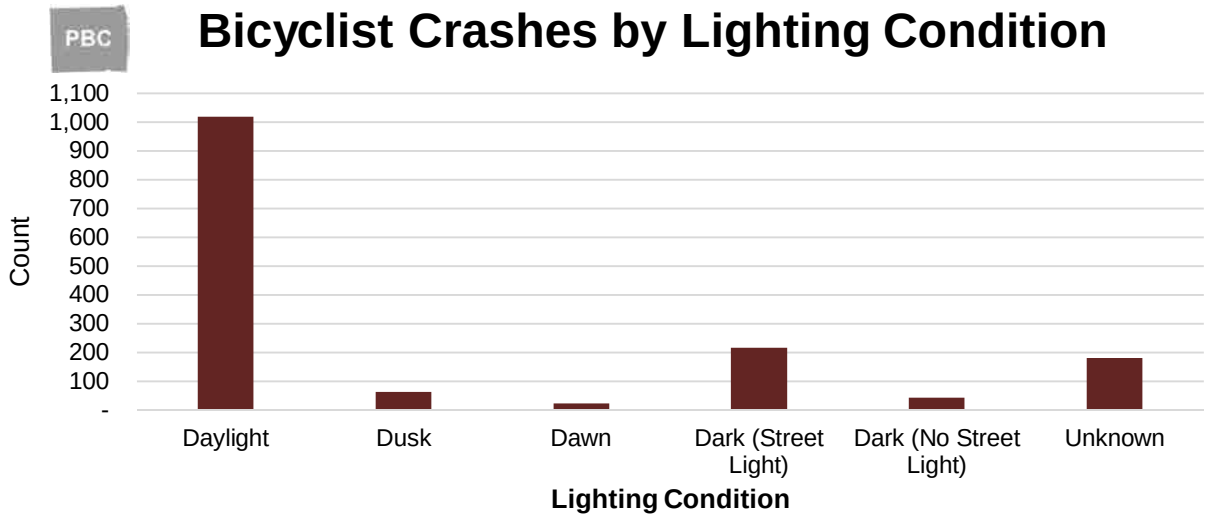
Figure 41 shows that eighty-eight percent (88%) of bicyclists involved in traffic crashes had either no injury or minor injuries such as lacerations and/or bruises. This data is very similar to Figure 31 (Pedestrian Injury Severity), which had the percentage of no injury/minor injuries at seventy-three percent (73%).



Source: 2010-2014 FDOT UBR Data

Figure 41. Bicyclist Injury Severity

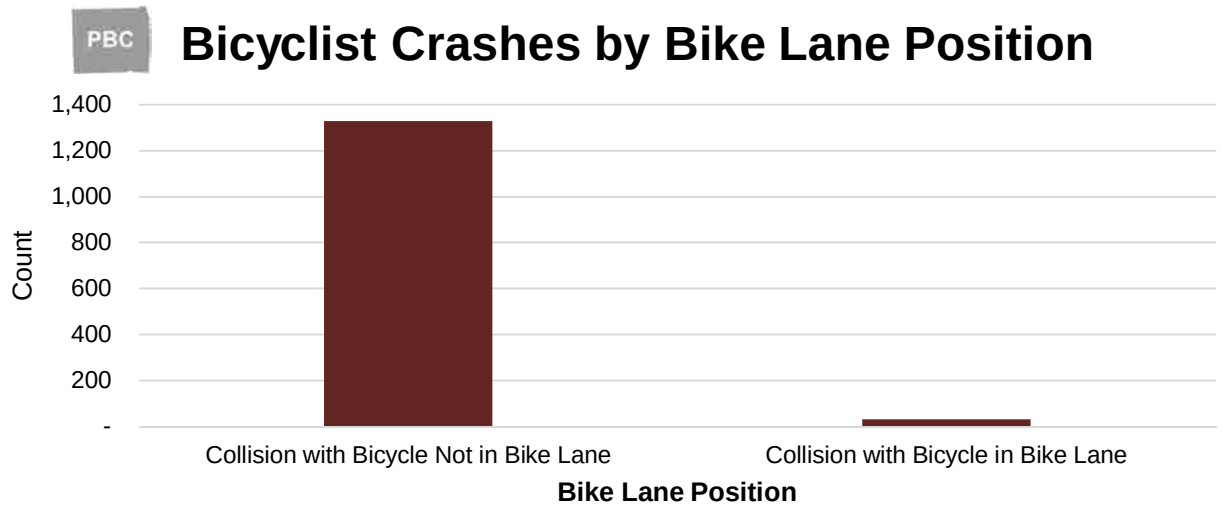
The spread of bicyclist crashes over different lighting conditions is identical to pedestrian crashes seen in Figure 32 (Pedestrian Crashes by Lighting Condition). Crashes most frequently occurred during daylight lighting conditions, as seen in Figure 42. The second most frequent occurrence of crashes occurred during dark lighting conditions with street lights.



Source: 2010-2014 FDOT UBR Data

Figure 42. Bicyclist Crashes by Lighting Condition

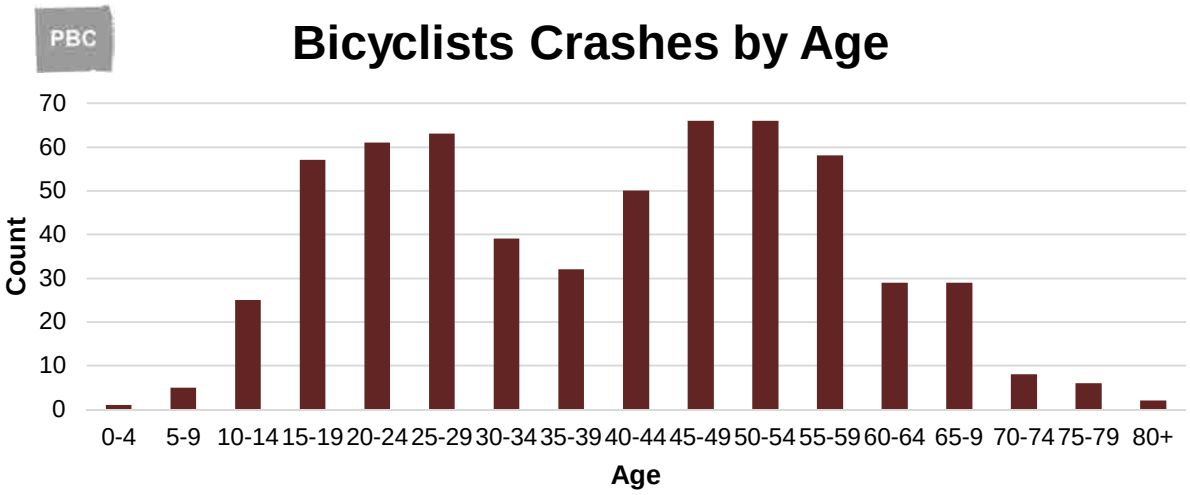
Knowing whether or not bicyclists are being hit by motor vehicles in the bike lane or not is pertinent information when developing a safety plan. At the very least, the information indicates when a bike lane is present and in use, the amount of crashes are substantially less than if there was not one or the bicyclist was not using it. Figure 43 shows that the majority of pedalcyclist crashes occurred when the bicycle was not in a bike lane. This information, however, does not clarify if there was a bike lane available for the bicyclist or not.



Source: 2010-2014 FDOT UBR Data

Figure 43. Bicyclist Crashes by Bike Lane Position

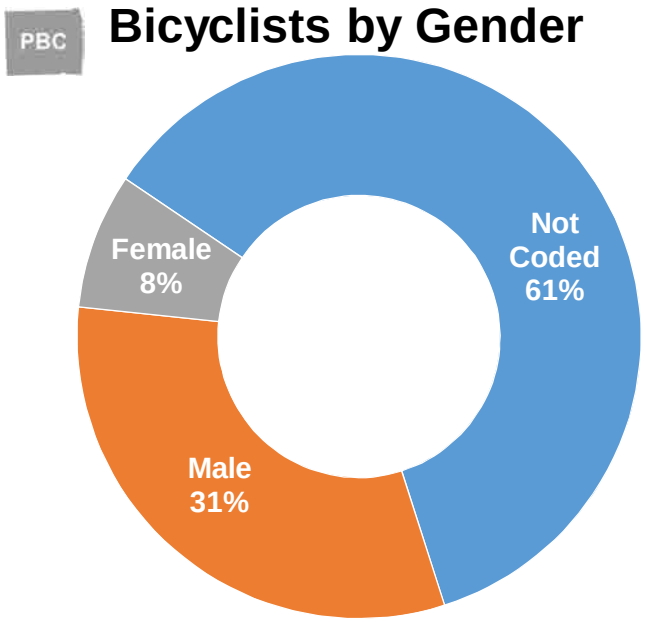
Bicyclists between ages 15-29 and ages 40-59 have experienced the most traffic crashes as seen in Figure 44. This data closely matches the age distribution in Figure 33 (Pedestrian Crashes by Age).



Source: 2010-2014 FDOT UBR Data

Figure 44. Bicyclist Crashes by Age

In regards to bicyclist gender, Figure 43 shows sixty-one percent (61%) of the crashes did not record this data. However, of the thirty-nine percent (39%) of recorded data, thirty-one percent (31%) were male. As with pedestrians in Figure 34 (Pedestrian Crashes by Gender), the male bicyclists were involved in more crashes that females.



Source: 2010-2014 FDOT UBR Data

Figure 45. Bicyclist Crashes by Gender

Palm Beach County High Crash Clusters

High crash clusters were identified based on GIS crash data mapping. The locations of crashes and fatalities were mapped for pedestrian and bicycle crashes within Palm Beach County from 2010 through 2014. The density of crashes and fatalities were also mapped to depict the spread of pedestrian or bicycle-related crashes. Hot spot analysis maps identified ten (10) clusters of hot spots and ten (10) high crash corridors for pedestrian and bicyclist crashes. Density maps are a simple and effective way to show density differences in geographic distributions. For this Study, crash density is the number of crashers per square mile and the maps provided are a graphical representation of crash data through the use of colors that indicate the crashes. The Study used the Jenks Natural Breaks classification system, which is a data classification method designed to break points by picking the breaks that best group similar values and maximize the differences between classes. This data classification method defines the "low, low-medium, medium, medium-high, and high" ranges for the individual map series.

In addition to the density maps for all pedestrian and bicycle crashes, the density of several specific crash types were also mapped.

Crashes

Figure 46 and Figure 51 are heat maps that show the frequency of pedestrian and bicyclist crashes for a given location in Palm Beach County. The major clusters of pedestrian related crashes are around the Cities of West Palm Beach, Lake Worth, and Delray Beach. More specifically, corridors from Melaleuca Lane to Okeechobee Boulevard and from Linton Boulevard to Atlantic Avenue have experience a high concentration of crashes. The Cities of Lake Worth and Delray Beach also experienced the most bicycle crashes albeit in a more confined zone. The City of Lake Worth has a cluster depicting high crash volume between the corridor of Melaleuca Lane and 10th Ave North as shown in Figure 50. In the City of Delray Beach, the high volume of bicyclist crashes occurred at the Linton Boulevard and Lake Ida Road corridor.

Alcohol/Drug-Use

Alcohol/drug related crashes involving pedestrians and bicyclist were also mapped to detect problematic areas. Figure 47 shows the Cities of West Palm Beach and Lake Worth as having the highest pedestrian crash densities in the county. Figure 52 shows Lake Worth as the only city with a high density of alcohol/drug involved bicyclist crashes.

Age Group

Two age groups, juveniles (18 and under) and elderly (65 and older), were analyzed to give further insight into pedestrian and bicyclist crashes.

- Juvenile (ages 18 and under)

  The City of Lake Worth has the largest cluster of juveniles involved in pedestrian crashes, as seen in Figure 48. A small spot in the cities of West Palm Beach and Delray Beach also indicate the presence of high crash density. For bicyclist crashes, Figure 53 shows that the cities of Lake Worth and West Palm Beach have the highest volume crashes. Appendix B includes juvenile heat maps overlaying school bus stops in Palm Beach County and there are 21,800 school bus stops.

- Elderly (ages 65 and older)

  Figure 49 shows that the City of Delray Beach has the largest cluster of elderly people involved in pedestrian crashes. Also, the City of Boca Raton has a small cluster of high volume pedestrian crashes involving elderly people. Figure 54 shows multiple small clusters spread out in the City of Delray Beach depicting high volume zones of bicyclist crashes involving elderly people. The Cities of Lake Worth and West Palm Beach also have some hotspots showing high crash density of bicyclists.

Nighttime

Figure 50 and Figure 55 illustrate the densities of nighttime crashes from 2000 – 0600 hours within Palm Beach County for pedestrians and bicyclists, respectively. The Cities of West Palm Beach, Lake Worth, and Delray Beach have high densities of nighttime pedestrian crashes. More specifically, the corridor between Okeechobee Boulevard and Belvedere Road in the City of West Palm, Forest Hill Boulevard to Melaleuca Lane in the City of Lake Worth, and Atlantic Avenue to Linton Boulevard in the City of Delray Beach. For bicyclists, the only city with high densities of crashes at night is Lake Worth. The concentration of this hotspot is between the Forest Hill Boulevard and Melaleuca Lane corridor.

Appendix B includes additional crash data maps overlay on functional classification, land use, transit data, existing greenway and bicycle facilities, schools, and Hispanic/Latino and African American population density.

Majority of the pedestrian and bicyclist crashes occurred on Urban Principal Arterials - Other. Other Principal Arterial roadways include driveways to specific parcels and at-grade intersections with other roadways. Urban arterials characteristics are listed below.

- Serve major activity centers, highest traffic volume corridors, and longest trip demands
- Carry high proportion of total urban travel on minimum of mileage
- Interconnect and provide continuity for major rural corridors to accommodate trips entering and leaving urban area and movements through the urban area
- Serve demand for intra-area travel between the central business district and outlying residential areas

From the land use map, majority of the pedestrian and bicyclist crashes occurred in recreational and residential areas. There were very few crashes that occurred in agriculture and retail/office areas. The transit map shows many crashes at the high ridership stops but does not mean that there is a direct correlation between the Palm Tran stops and crashes. The existing greenway and bicycle facilities map and bicyclist crashes does not show a direct correlation. Presence of existing facilities does not determine less crashes occurred.

Demographics are used to identify population segments by specific characteristics. In Palm Beach County, 18.8 percent (18.8%) are African-Americans and twenty percent (20%) are Hispanic or Latino. In the City of West Palm Beach around Okeechobee Boulevard and Military Trail includes a high population of African-Americans. Also in the City of West Palm Beach around Okeechobee Boulevard and Military Trail includes a high population of Hispanic or Latino. As well as the City of Palm Springs on Forest Hill Boulevard, City of Lake Clarke Shores, Incorporated Areas, and City of Boca Raton.

Appendix C includes the Transportation Improvement Program (TIP) FY 2017 – 2021 overlaying the hot spots and high crash corridors. Appendix D includes the individual ten (10) clusters of hot spots and ten (10) high crash corridors for pedestrian and bicyclist crashes.

Figure 46. 2010-2014 Pedestrian Crash Density

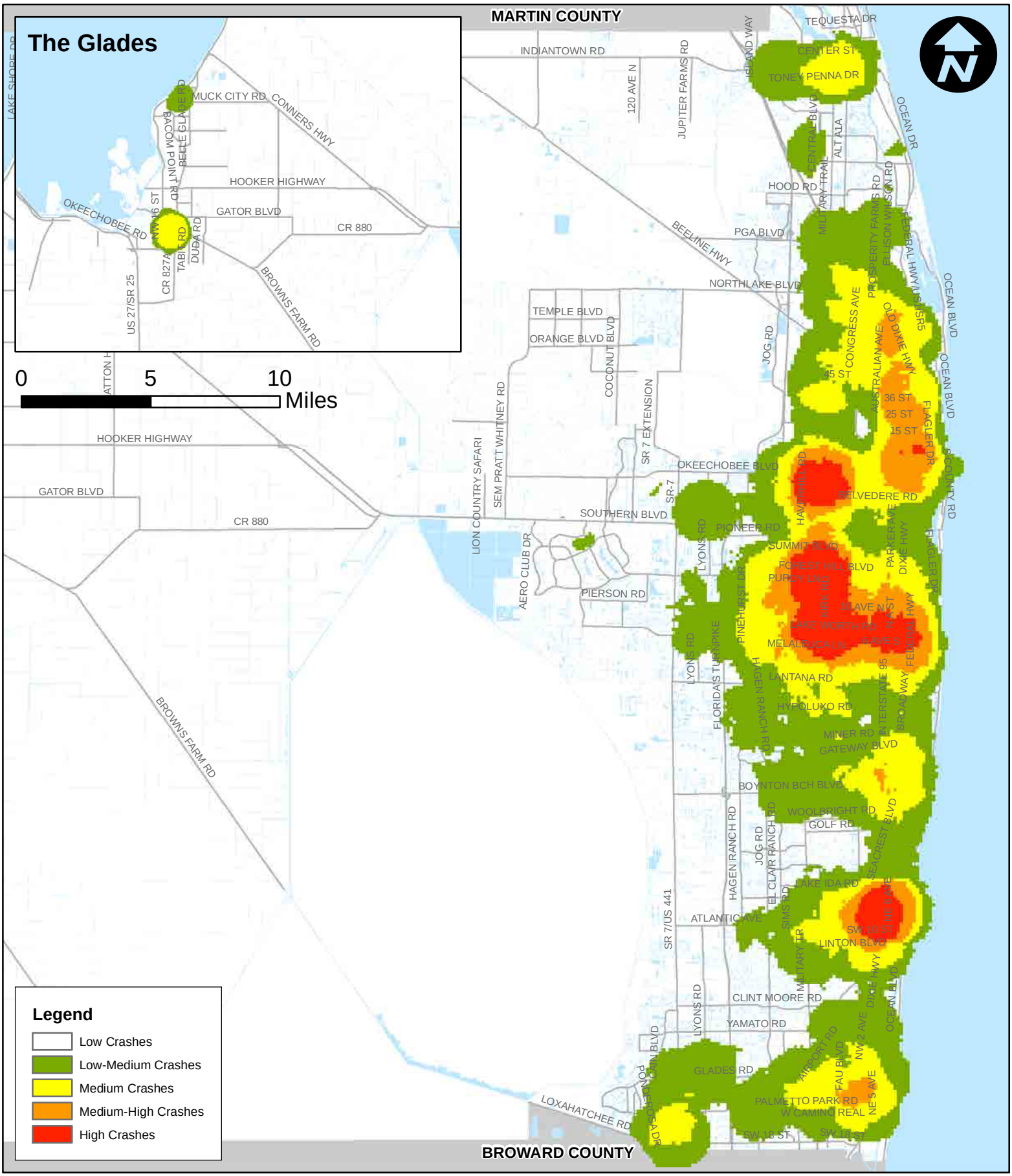


Figure 47. 2010-2014 Pedestrian Crash Density
Alcohol/Drug Related

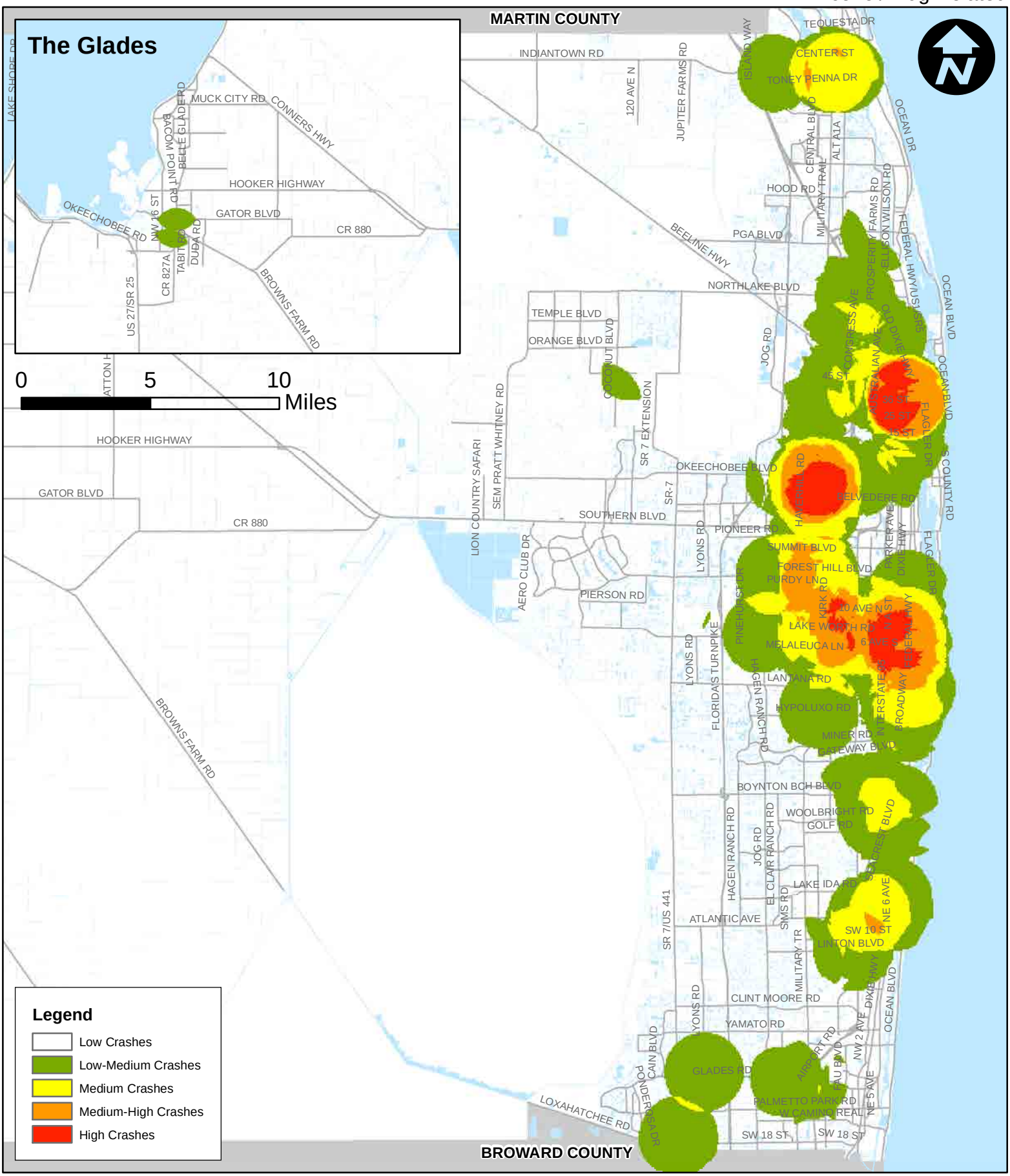


Figure 48. 2010-2014 Pedestrian Crash Density
Juvenile Related–Under Age 18

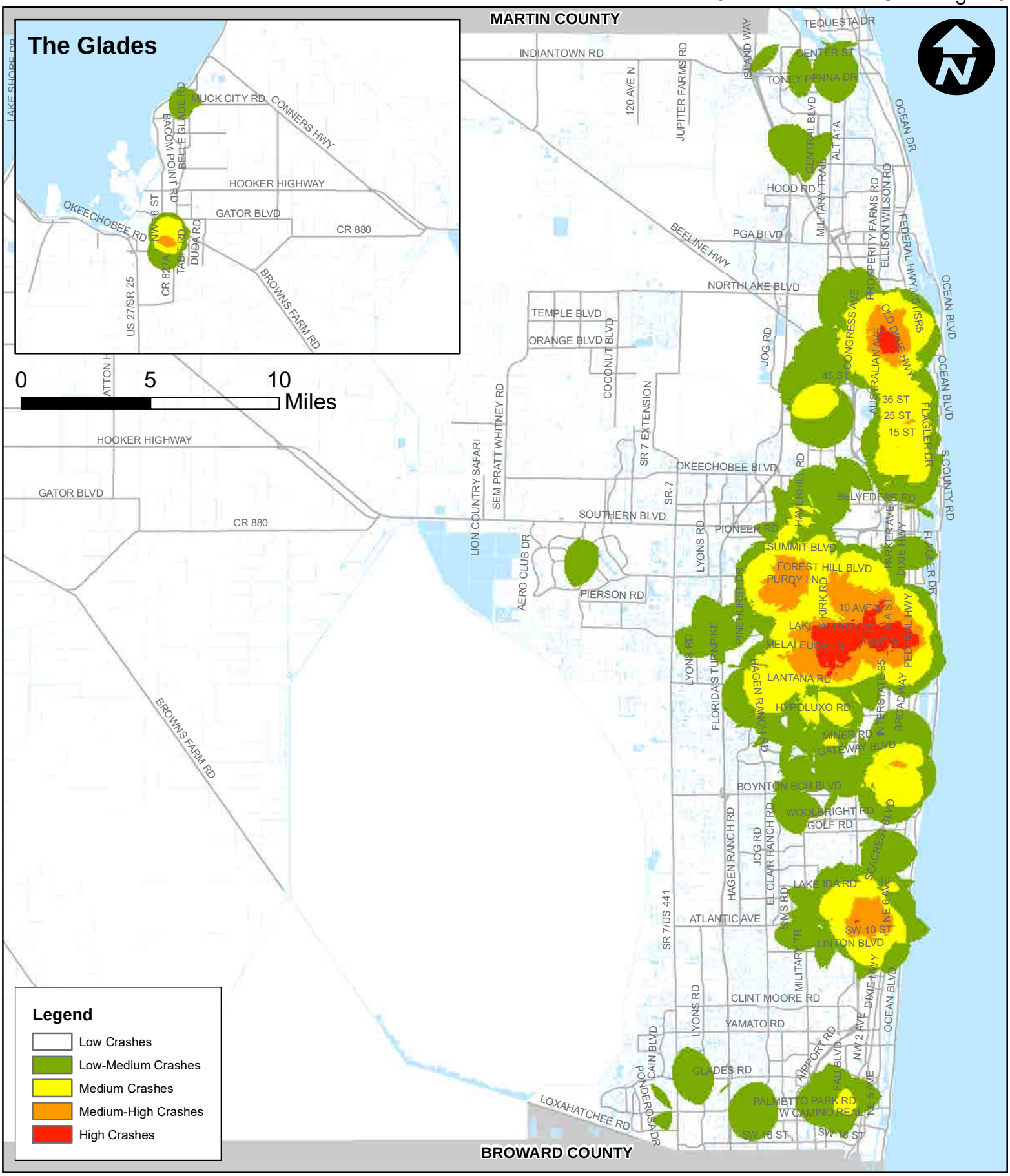


Figure 49. 2010-2014 Pedestrian Crash Density
Elderly Related-Over Age 65

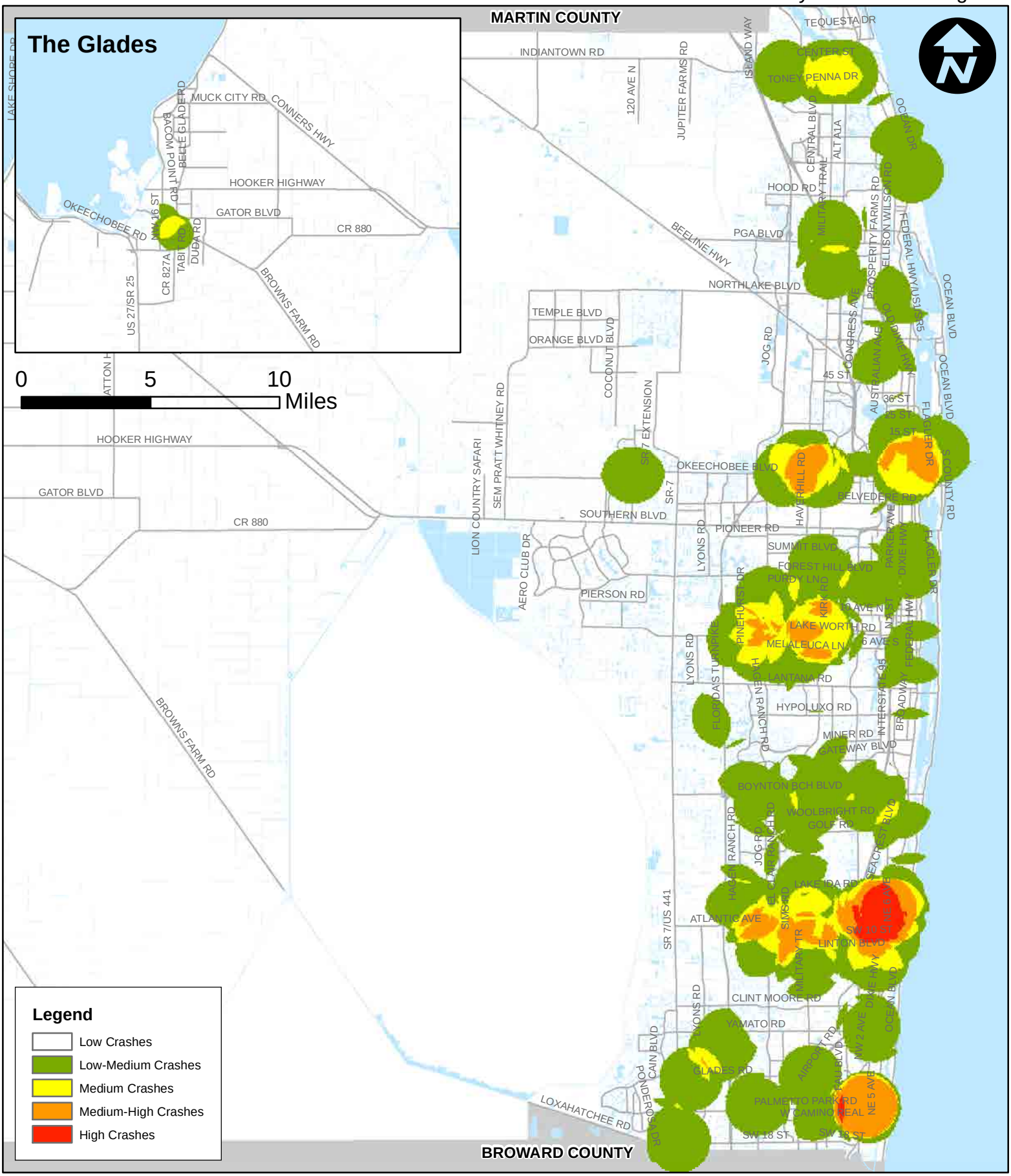


Figure 50. 2010-2014 Pedestrian Crash Density
Nighttime Related-Between 2000-0600

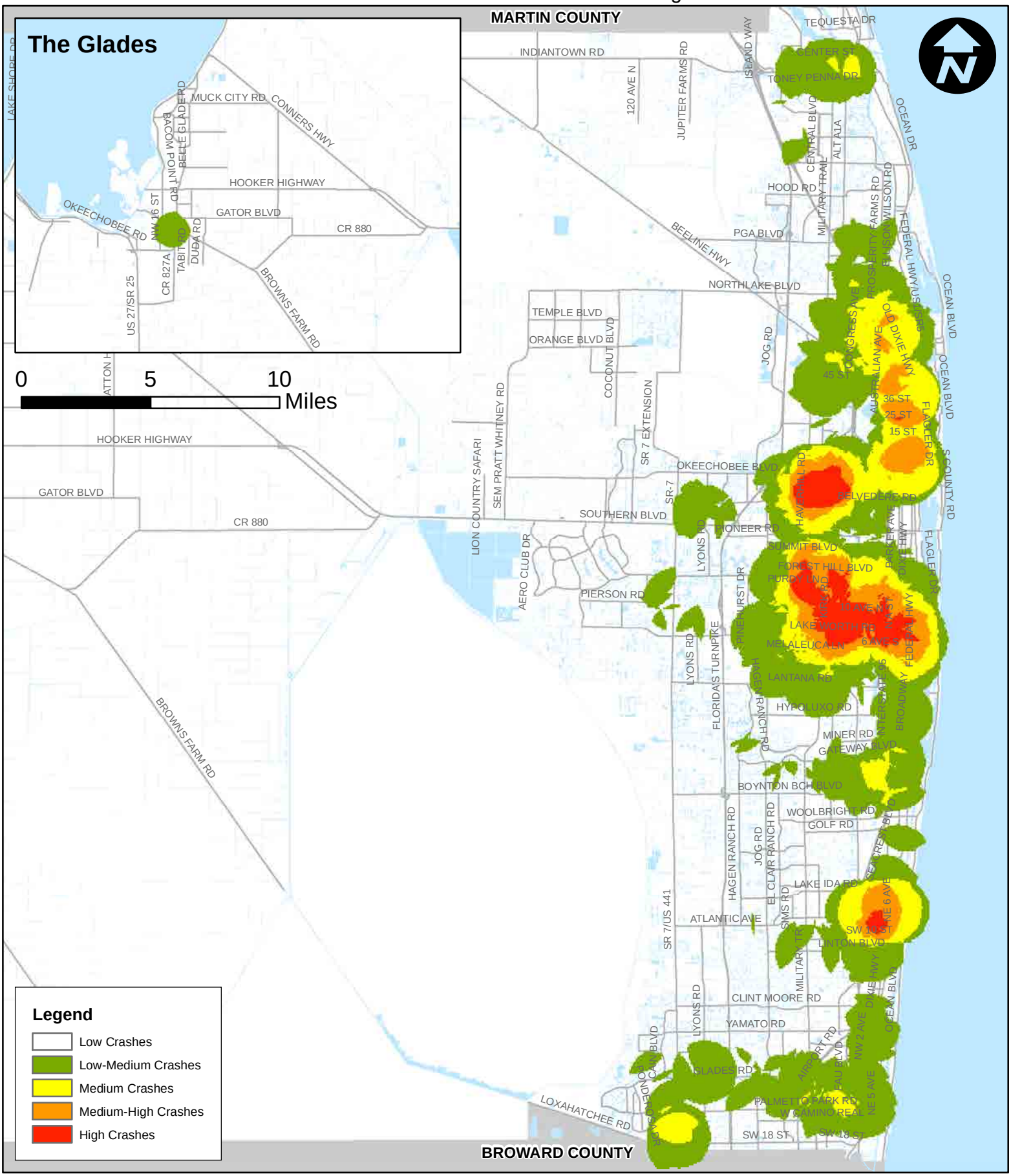


Figure 51. 2010-2014 Bicyclist Crash Density

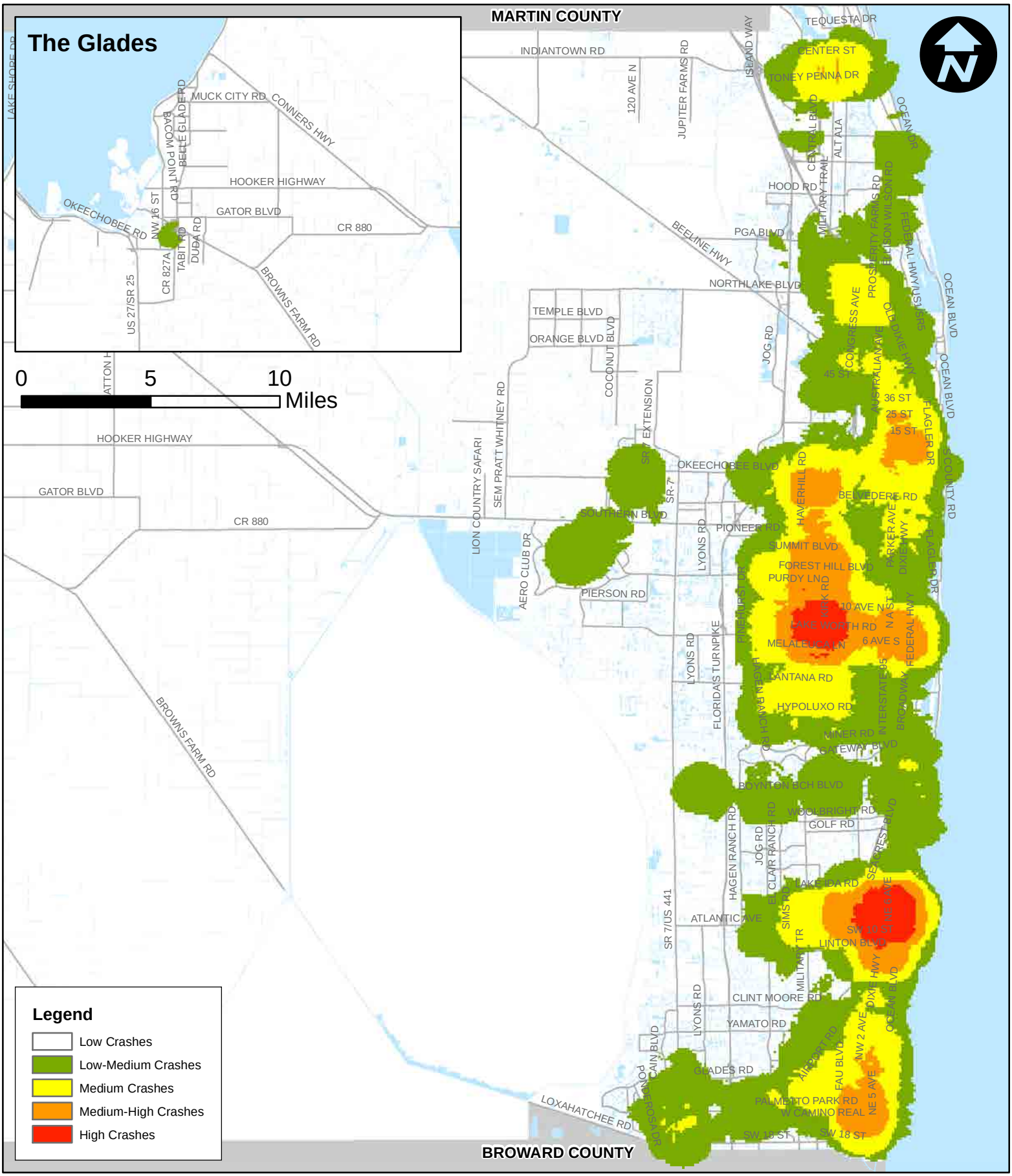


Figure 52. 2010-2014 Bicyclist Crash Density
Alcohol/Drug Related

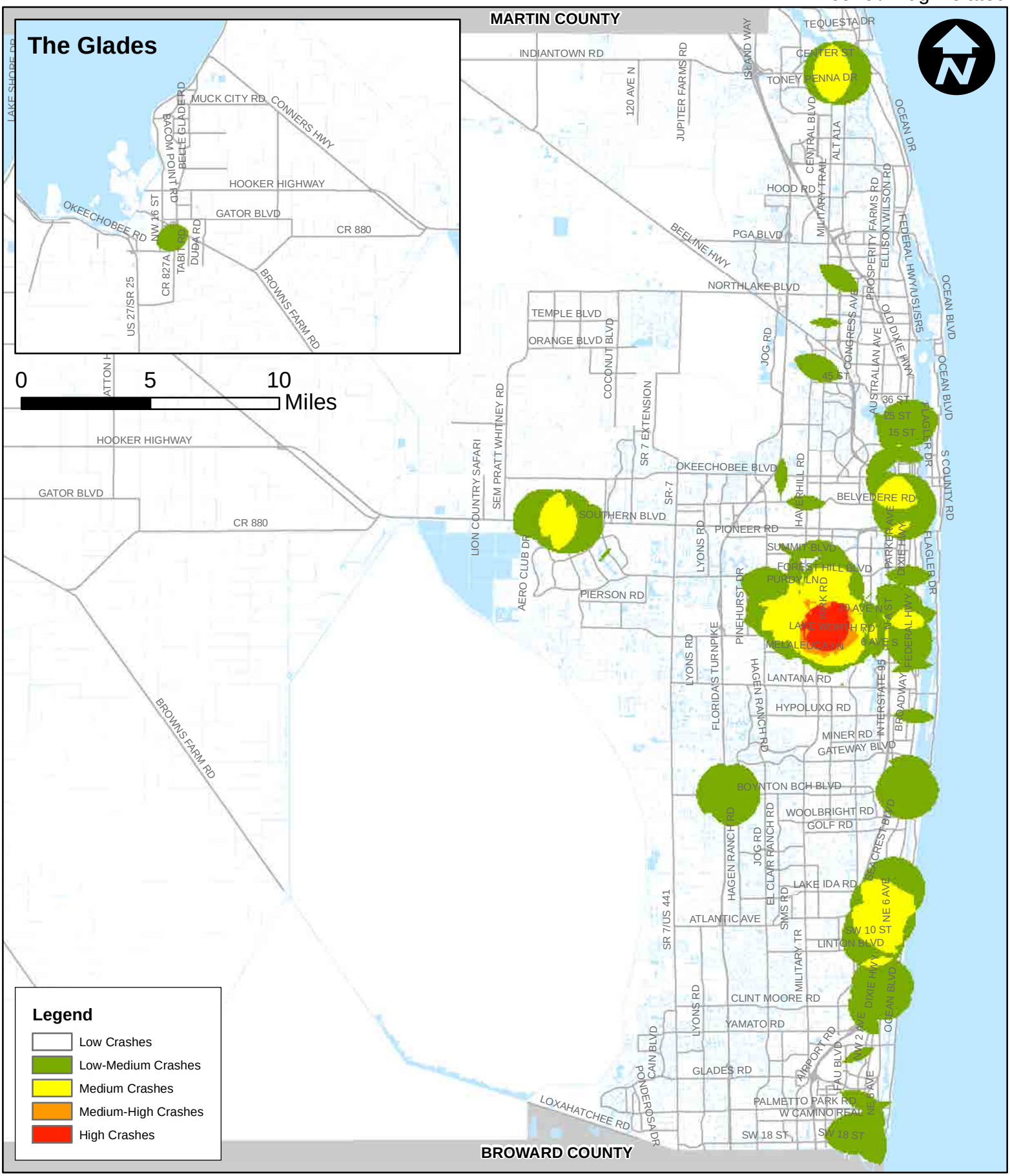


Figure 53. 2010-2014 Bicyclist Crash Density
Juvenile Related–Under Age 18

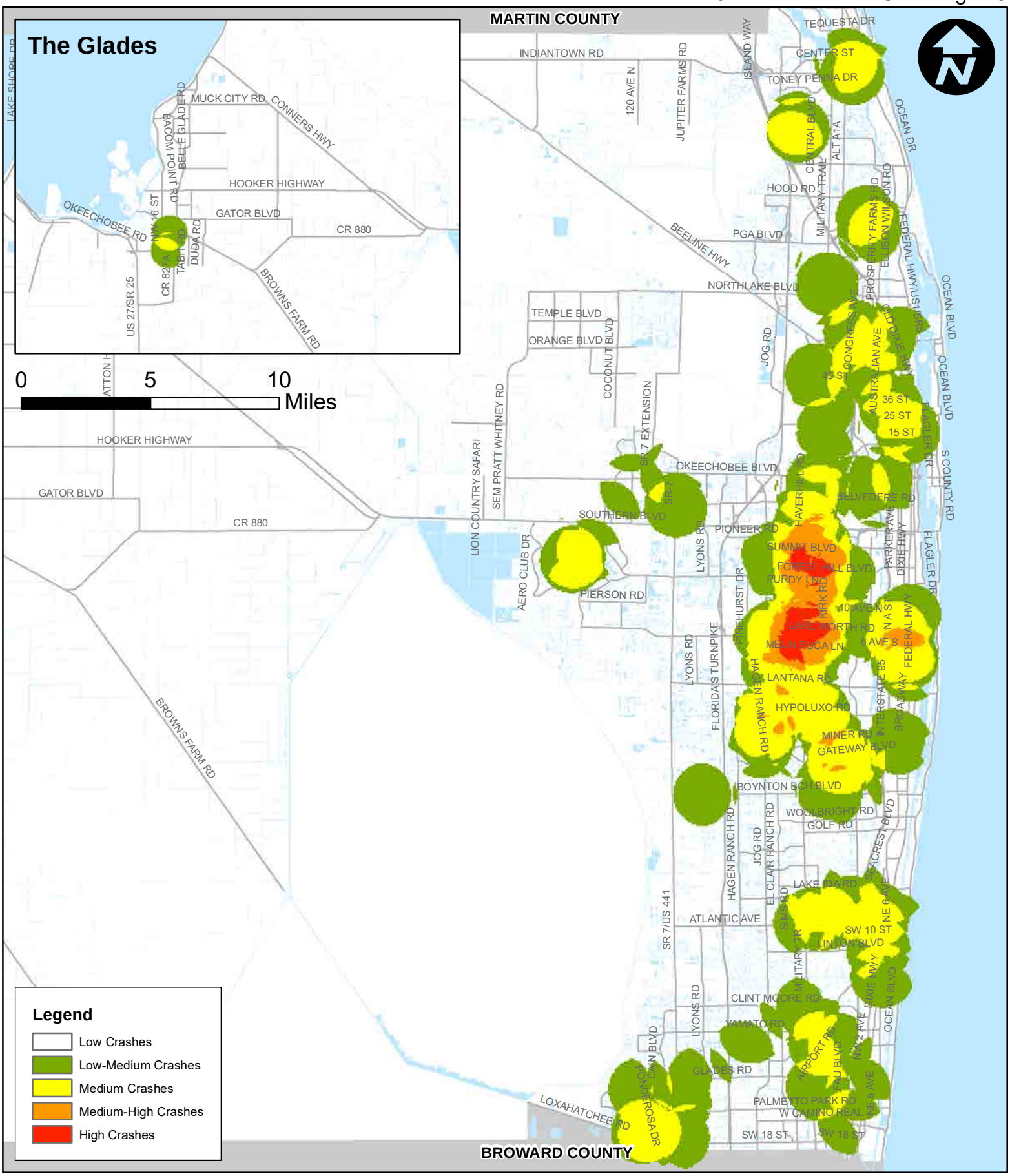


Figure 54. 2010-2014 Bicyclist Crash Density
Elderly Related-Over Age 65

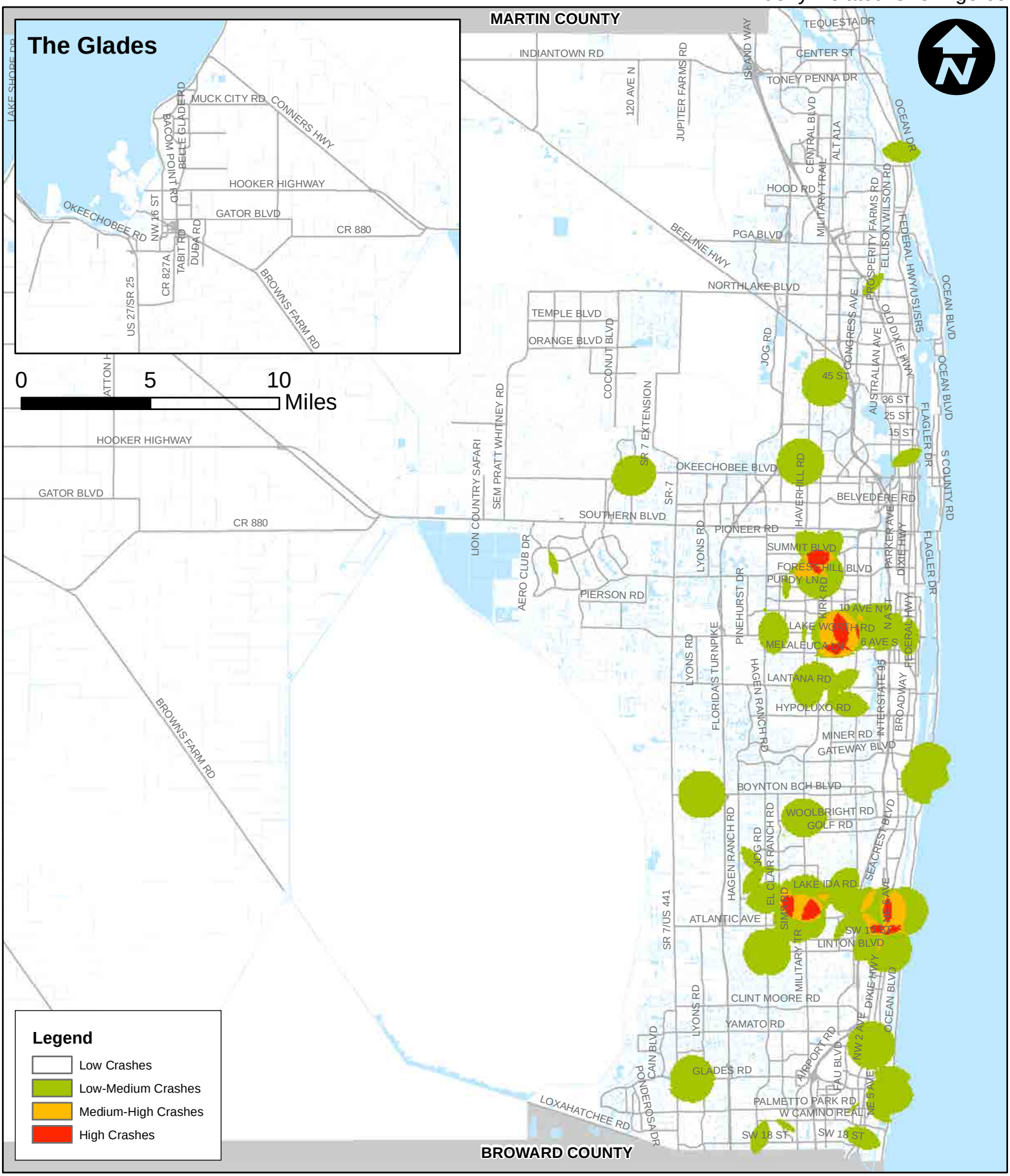


Figure 55. 2010-2014 Bicyclist Crash Density
Nighttime Related-Between 2000-0600

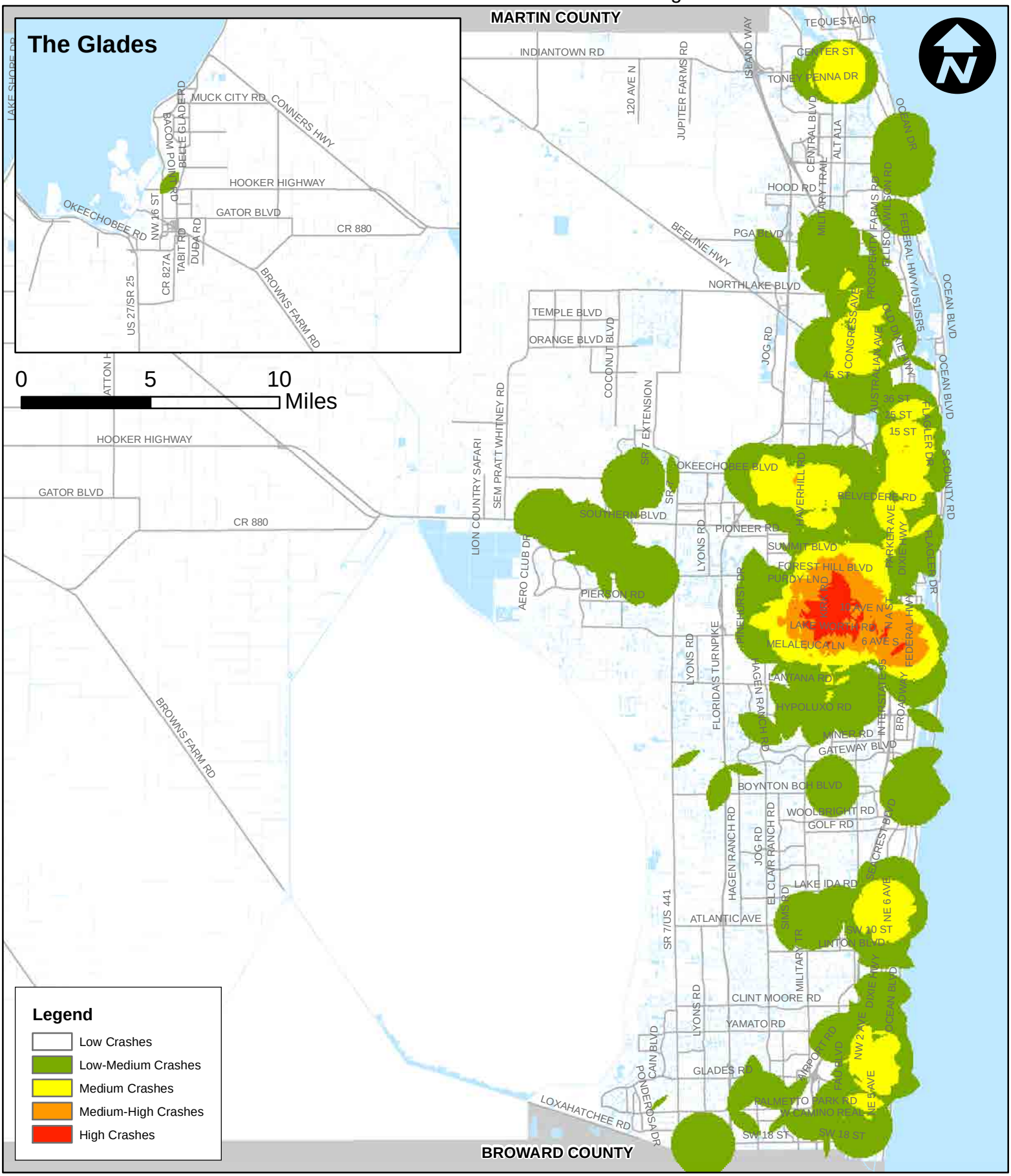


Table 4 and Table 5 lists the top ten (10) hot spots and top ten (10) high crash corridor with right-of-way (ROW) ownership as shown in Figure 56.

Table 4. Top 10 Hot Spots

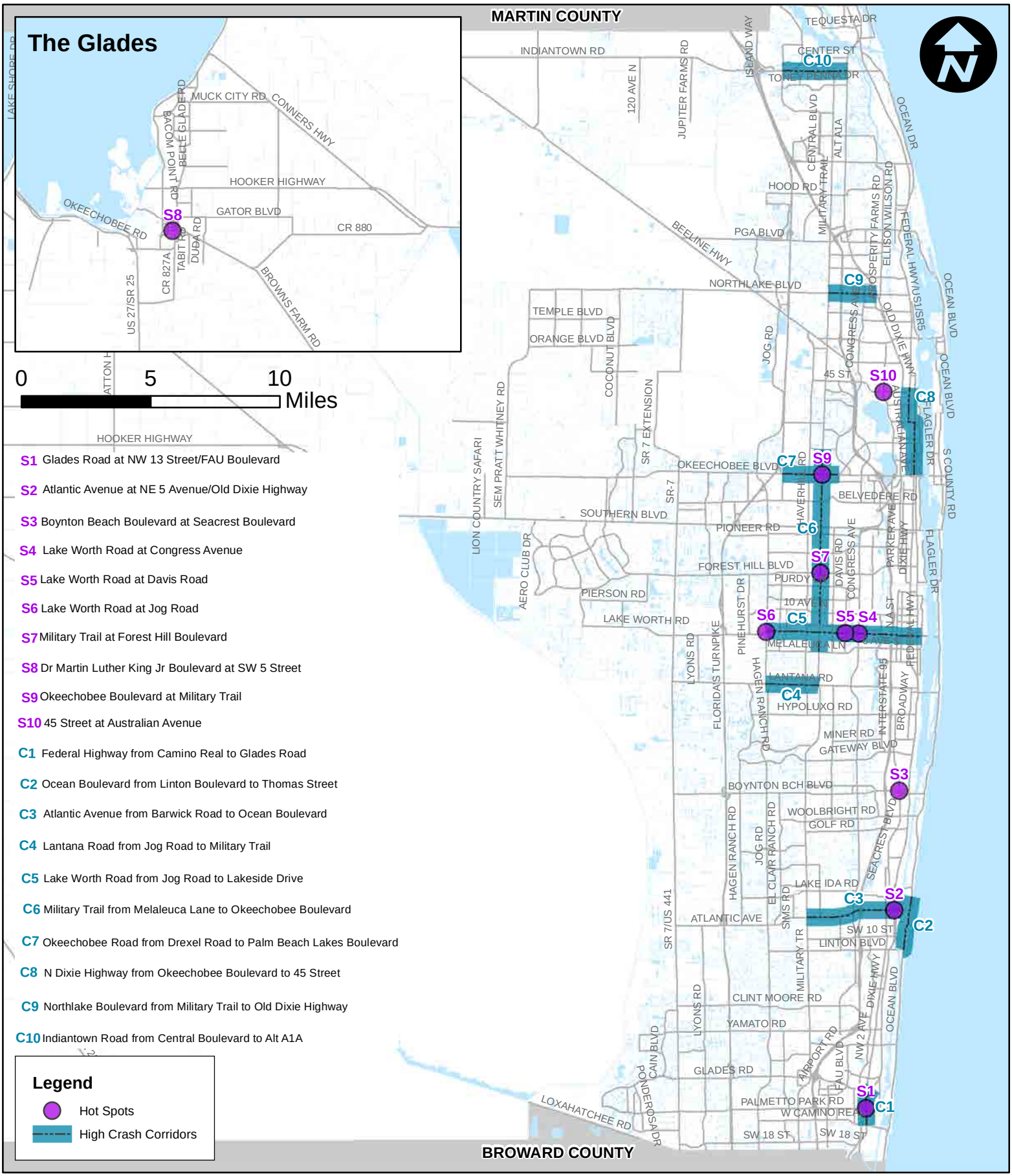
Map ID	Projects	Intersection	ROW Ownership
S1	Palmetto Park Road	Federal Highway	City of Boca Raton FDOT
S2	Atlantic Avenue	NE 5 Avenue/Old Dixie Highway	City of Delray Beach FDOT
S3	Boynton Beach Boulevard	Seacrest Boulevard	County FDOT
S4	Lake Worth Road	Congress Avenue	County FDOT
S5	Lake Worth Road	Davis Road	Village of Palm Springs County FDOT
S6	Lake Worth Road	Jog Road	County FDOT
S7	Military Trail	Forest Hill Boulevard	FDOT
S8	Dr Martin Luther King Jr Boulevard	SW 5 Street	City of Belle Glade
S9	Okeechobee Boulevard	Military Trail	FDOT
S10	45 Street	Australian Avenue	County

Clicking on the Map ID's, will bring you to the respective maps in Appendix D - Individual Spots/Corridors.

Table 5. Top 10 High Crash Corridors

Map ID	Projects	Limits	ROW Ownership
C1	Federal Highway	Camino Real to Glades Road	FDOT
C2	Ocean Boulevard	Linton Boulevard to Thomas Street	FDOT
C3	Atlantic Avenue	Military Trail to Ocean Boulevard	City of Delray Beach FDOT
C4	Lantana Road	Jog Road to Military Trail	County
C5	Lake Worth Road	Jog Road to Lakeside Drive	FDOT
C6	Military Trail	Melaleuca Lane to Community Drive	County FDOT
C7	Okeechobee Road	Drexel Road to Congress Avenue	FDOT
C8	US 1	Okeechobee Boulevard to 49 Street	City of West Palm Beach FDOT
C9	Northlake Boulevard	Military Trail to Alt A1A	County
C10	Indiantown Road	Central Boulevard to Alt A1A	FDOT

Figure 56. Top 10 Hot Spots & Top 10 High Crash Corridors



S1 Glades Road at NW 13 Street/FAU Boulevard

S2 Atlantic Avenue at NE 5 Avenue/Old Dixie Highway

S3 Boynton Beach Boulevard at Seacrest Boulevard

S4 Lake Worth Road at Congress Avenue

S5 Lake Worth Road at Davis Road

S6 Lake Worth Road at Jog Road

S7 Military Trail at Forest Hill Boulevard

S8 Dr Martin Luther King Jr Boulevard at SW 5 Street

S9 Okeechobee Boulevard at Military Trail

S10 45 Street at Australian Avenue

C1 Federal Highway from Camino Real to Glades Road

C2 Ocean Boulevard from Linton Boulevard to Thomas Street

C3 Atlantic Avenue from Barwick Road to Ocean Boulevard

C4 Lantana Road from Jog Road to Military Trail

C5 Lake Worth Road from Jog Road to Lakeside Drive

C6 Military Trail from Melaleuca Lane to Okeechobee Boulevard

C7 Okeechobee Road from Drexel Road to Palm Beach Lakes Boulevard

C8 N Dixie Highway from Okeechobee Boulevard to 45 Street

C9 Northlake Boulevard from Military Trail to Old Dixie Highway

C10 Indiantown Road from Central Boulevard to Alt A1A

Legend

Hot Spots

High Crash Corridors

Chapter 4. Recommendations

Pedestrian and bicycle safety recommendations were developed based on the literature review, crash data analysis, and input from the Pedestrian and Bicycle Safety Team Meetings. The recommendations follow the 5-E model – Education, Encouragement, Engineering, Enforcement, and Evaluation. In addition, the recommendations have been developed in a manner that will help engineers, planners, and policy makers to select countermeasures for specific crash types that the data show are common in Palm Beach County, and in locations identified through the hot spot analysis. These and other countermeasures can be implemented throughout Palm Beach County, but are particularly relevant within the hot spots and corridor areas.

Engineering and Enforcement Countermeasures

A summary of the general countermeasures for pedestrian and bicycle safety are as follows.

- **Advanced Stop Lines/Bike Boxes** – Move stop lines farther back from the pedestrian crosswalk to allow pedestrians, bicyclists, and drivers to have a clearer view of each other. Stop lines should be 15-30 feet back to the marked crosswalk and gives cyclist the opportunity to position themselves.
- **Bus Stop Treatments** – Relocate bus stops closer to intersections and/or marked crosswalks to promote safe pedestrian behavior. This will reduce the frequency and severity of pedestrian and bicycle crashes.
- **Shared Lane Markings (sharrows)** – Indicate a shared lane environment and proper path for bicycles and automobiles. Shared lane markings encourage drivers to leave space for cyclists and alert drivers the space cyclists are likely to occupy in the lane.
- **Crossing Islands** – Provide raised pedestrian refuge islands in strategic locations of the street at intersections or midblock crossings to protect crossing pedestrians from motor vehicles. Center crossing islands allow pedestrians to deal with only one direction of traffic at a time.
- **Median Crossings** – Install median crossings at divided roadways that separate traffic flows. Median crossings help pedestrians cross intersections by reducing the crossing distance from the curb to a protected area.
- **Raised Pedestrian Crossings** – Install a raised intersection or a raised pedestrian crossing, which carries the added benefit of reducing vehicle speeds. The intersections

can be built with a variety of materials, such as asphalt, concrete, stamped concrete, or pavers. The raised pedestrian crossings are usually located at a midblock crossing.

- **Accessible Pedestrian Signals (APS)** – Communicates information about the WALK and DON'T WALK intervals in non-visual forms (Ex: audible tones and vibrotactile surfaces) to people who are blind or visually-impaired. The APS are devices imbedded to pedestrian signal poles.
- **Exclusive Pedestrian Phasing** – Add exclusive pedestrian phases in downtown areas with high pedestrian traffic. The exclusive pedestrian phase stops all vehicular movement and allows pedestrians access to cross in any direction at the intersection.
- **Leading Pedestrian Interval (LPI)** – Give the pedestrian the WALK signal 3-7 seconds prior to the concurrent green phase with permissive turns for motor vehicles to allow pedestrians to enter the crosswalk before turning vehicles attempt to cross their path.
- **Flashing Yellow Arrow** – Allow drivers to turn left or right after yielding to all oncoming traffic and to any pedestrians in the crosswalk. The oncoming traffic has a green light and drivers must wait for a safe gap in the oncoming traffic before turning.
- **Prohibited Right Turn on Red (RTOR)** – Prohibit motorists from turning right on red and reduce the risk of a collision with a pedestrian/bicyclist who is to the right of the motorist and crossing the main road at locations with visibility concerns or high pedestrian activity.
- **Lane Eliminations/Narrowing** – Some roads may have more travel lanes than necessary, and the width of the excess lanes could be re-purposed to meet other community goals. The opportunities of lane eliminations/narrowing, include bicycle facilities, parking, or wider sidewalks and will encourage motor vehicles to lower their speeds.
- **Lighting and Illumination** – Install lighting on both sides of wide streets and streets in urban areas. Provide lighting at mid-block locations that "front-lights" the pedestrian.
- **Rectangular Rapid Flashing Beacons (RRFB)** – Provide user-actuated amber LEDs that supplement warning signs at unsignalized intersections or mid-block crosswalks. RRFBs are activated by pedestrians manually by a push button or an automated pedestrian detection system.
- **Pedestrian Hybrid Beacons (PHB)** – At higher volume mid-block locations, provide PHBs that are only activated by pedestrians when needed at uncontrolled mainline crossing points.

- **Speed Monitoring Devices** – Install along the side of the road and display the speed of each approaching vehicle along with the posted speed of the facility. Portable radar speed trailers are used to deter speeding and may be more effective than static signs due to their portability.
- **Visible Enforcement** – Focuses on a "Triple E" strategy, Enforcement intervention, inexpensive Engineering enhancements, and an Education component. The Education component includes signage, community presentations, online engagement, school participation, and media attention. Enforcement intervention techniques include focused enforcement of driver yielding to pedestrian lanes in high-volume pedestrian locations. An example is the Best Foot Forward program currently in the City of Orlando and Orange County.
- **Progressive Ticketing** – Introduce ticketing through a three-staged process, Educating, Warning, and Ticketing.

Advanced Stop Lines/Bike Boxes

Description: Move stop lines farther back from the pedestrian crosswalk to allow pedestrians, bicyclists, and drivers to have a clearer view of each other. Stop lines should be 15-30 feet back of the marked crosswalk and give cyclists the opportunity to position themselves in a visible location.

Targeted 5-E Model: Engineering

Targeted Crash Types: Left-Hook and Right-Hook Crashes

Hot Spots and Corridors:

- C2: Ocean Boulevard from Linton Boulevard to Thomas Street (Ocean Boulevard at Atlantic Avenue)
- C3: Atlantic Avenue from Military Trail to Ocean Boulevard (Atlantic Avenue at Congress Avenue)

Notes:

- Allow cyclists to bypass motor vehicles that are queued rather than be in the blind spot to the right of the traffic.
- Cyclists are in a safer and visible location since they are in front of traffic.
- Make pedestrian crossing movements more visible.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy:
Implement as a component of any road improvement project or as a separate project.

Source: NACTO

Bus Stop Treatments

Description: Provide safe, convenient, and inviting access for transit users to reduce the frequency and severity of pedestrian and bicycle crashes at and near bus stops. This may include building new crosswalks or relocating bus stops to be near existing crosswalks.

Targeted 5-E Model: Engineering

Targeted Crash Types: Midblock and Right-Angle Crashes

Hot Spots and Corridors:

- S4: Lake Worth Road at Congress Ave
- S5: Lake Worth Road at Davis Road
- S6: Lake Worth Road at Jog Road
- S8: Dr Martin Luther King Jr Boulevard at SW 5 Street
- C4: Lantana Road from Jog Road to Military Trail
- C7: Okeechobee Road from Drexel Road to Congress Avenue

Notes: Ensure that the stops have adequate:

- Sidewalk connectivity
- Roadway crossing treatments
- Signage
- Americans with Disabilities Act (ADA) access
- Shelters, places to sit, trash receptacles, and schedules

Lead Agency: Palm Tran

Implementation Strategy: Relocate bus stops closer to an intersection and/or marked crosswalk as a component of roadway improvement or beautification projects by coordinating with local government/transit agencies.

Shared Lane Markings (sharrows)

Description: Indicate a shared lane environment and proper path for bicycles and automobiles. Shared lane markings encourage drivers to leave space for cyclists and alert drivers the space cyclists are likely to occupy in the lane.

Targeted 5-E Model: Engineering

Targeted Crash Types: Bicycle crashes

Hot Spots and Corridors:

- C3: Atlantic Avenue from Military Trail to Ocean Boulevard (Swinton Avenue to Ocean Boulevard)

Notes:

- Sharrows do not designate a particular part of the road with cyclists, it is a marking to guide cyclists to the best place to ride and help motorist to share the lane with bicyclist.
- Sharrows are appropriate for low volume and speed.

Lead Agency: FDOT and Palm Beach County Engineering and Public Works

Implementation Strategy: Implement as a roadway improvement or beautification projects by coordinating with local government/transit agencies.

Crossing Islands

Description: Provide raised pedestrian refuge islands in strategic locations of the street at intersections or midblock crossings to help protect crossing pedestrians from motor vehicles. Crossing islands reduce the exposure time experienced by a pedestrian in the intersection or midblock crossing and allow pedestrians to cross only one direction of traffic at a time.

Targeted 5-E Model: Engineering

Targeted Crash Types: Midblock and Intersection Crashes

Hot Spots and Corridors:

- S4: Lake Worth Road at Congress Avenue
- S6: Lake Worth Road at Jog Road
- S7: Military Trail at Forest Hill Boulevard
- S8: Dr Martin Luther King Jr Boulevard at SW 6 Street
- C10: Indiantown Road from Central Boulevard to Alt A1A (Indiantown Road at Hepburn Avenue)

Notes: Crossing islands should consider:

- Supplemental to the crosswalk at uncontrolled locations.
- Illuminate islands with street lights, signs, or reflectors.
- Accommodation to pedestrians in wheelchairs.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as a component of any road improvement project or as a separate project.

Median Crossings

Description: Install curbed median treatments at divided roadways that separate traffic flows. Median crossings help pedestrians cross intersections by reducing the crossing distance from the curb to a protected area.

Targeted 5-E Model: Engineering

Targeted Crash Types: Midblock Crashes

Hot Spots and Corridors:

- S1: Palmetto Park Road at Federal Highway
- C3: Atlantic Avenue from Military Trail to Ocean Boulevard (Atlantic Avenue at Swinton Avenue)

Notes:

- Median crossings may be depressed, raised, or flush with the road surface.
- Provides a protected space for pedestrians and bicyclists.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as a component of any road improvement project, lane reduction project, or as a separate project as needed.

Raised Pedestrian Crossings

Description: Install a raised intersection or a raised pedestrian crossing, which carries the added benefit of reducing vehicle speeds. The intersections can be built with a variety of materials, such as asphalt, concrete, stamped concrete, or pavers. The raised pedestrian crossings are usually located at a midblock crossing.

Targeted 5-E Model: Engineering

Targeted Crash Types: Midblock Crashes

Hot Spots and Corridors:

- S8: Dr Martin Luther King Jr Boulevard at SW 6 Street

Notes:

- Slows traffic and put pedestrians in a more visible position.
- Appropriate in areas with significant pedestrian traffic and where motor vehicle traffic should move slowly.
- Can be an urban design element through the use of special paving materials.
- Ensure the crossings will be detectable by and accessible to pedestrians with vision impairments and ADA compliance.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as a component of any road improvement project, lane reduction project, or as a separate project as needed.

Accessible Pedestrian Signals (APS)

Description: Communicates information about the WALK and DON'T WALK intervals in non-visual forms (Ex: audible tones and vibrotactile surfaces) to people who are blind or visually-impaired. The APS are devices imbedded to pedestrian signal poles.

Targeted 5-E Model: Engineering

Targeted Crash Types: Right-Hook Crashes

Hot Spots and Corridors:

- S9: Okeechobee Boulevard at Military Trail
- S10: 45 Street at Australian Avenue
- C7: Okeechobee Road from Drexel Road to Congress Avenue

Notes:

Some of the features are

- Audible walk indications – when the visual WALK sign or walking person symbol is on, the recommended standard for the audible is a rapid ticking, beeping sound, or a speech message
- Vibrotactile walk indications – the arrow on the pushbutton or the pushbutton housing, vibrates for the visual WALK sign or walking man symbol *(your hand must be on the arrow in order to feel it)*

APS is recommended to be placed on two separated poles, rather than with two pushbuttons on one pole.

Lead Agencies: FDOT and Palm Beach County Engineering and Public Works

Implementation Strategy: Implement as part of traffic operations projects at signalized intersections with heavy pedestrian traffic.

Excusive Pedestrian Phasing

Description: Add exclusive pedestrian phases in downtown areas with high pedestrian traffic. The exclusive pedestrian phase stops all vehicular movement and allows pedestrians access to cross in any direction at the intersection.

Targeted 5-E Model: Engineering

Targeted Crash Types: Right-Hook Crashes

Hot Spots and Corridors:

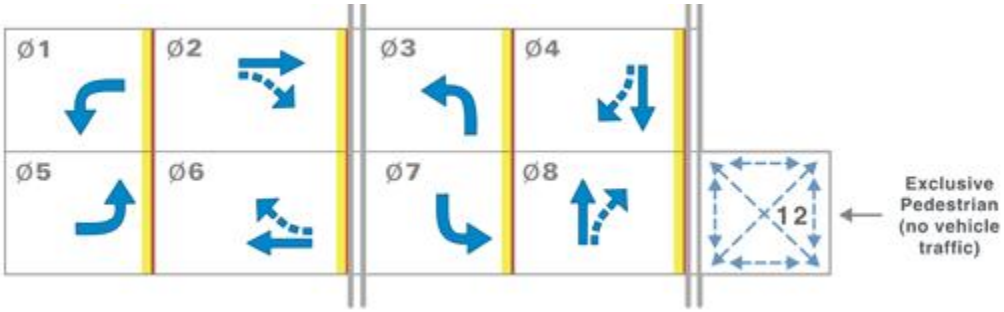
- C1: Federal Highway from Camino Real to Glades Road (Federal Highway at Palmetto Park Road)
- C3: Atlantic Avenue from Military Trail to Ocean Boulevard (Atlantic Avenue at Swinton Avenue and NE 5 Avenue)

Notes:

- The phasing is referred to as “exclusive” or as a “pedestrian scramble.”
- The signal timing needs to consider the needs of trucks, buses, other motor vehicles, and vehicle volumes, including volumes of right and left turn motorists.
- Install pedestrian crossing markings indicating pedestrians may walk diagonally across the intersection.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as part of resurfacing and traffic operations projects at signalized intersection where there are heavy pedestrian traffic.



Source: U.S. Department of Transportation Federal Highway Administrations Chapter 4

Leading Pedestrian Interval (LPI)

Description: Give the pedestrian the WALK signal 3-7 seconds prior to the concurrent green phase with permissive turns for motor vehicles to allow pedestrians to enter the crosswalk before turning vehicles attempt to cross their path. LPIs increase the visibility of pedestrians in the intersection and reinforce their right-of-way over turning vehicles.

Targeted 5-E Model: Engineering

Targeted Crash Types: Right-Hook Crashes

Hot Spots and Corridors:

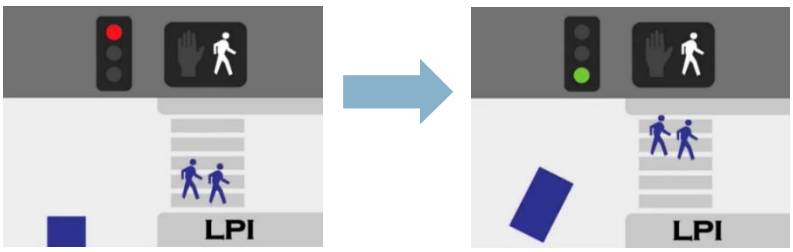
- C2: Ocean Boulevard from Linton Boulevard to Thomas Street (Ocean Boulevard at Atlantic Avenue)
- C3: Atlantic Avenue from Military Trail to Ocean Boulevard (Atlantic Avenue at Swinton Avenue)
- C5: Lake Worth Road from Jog Road to Lakeside Drive (Lake Worth Road at Military Trail)
- S7: Military Trail at Forest Hill Boulevard
- S9: Okeechobee Road at Military Trail

Notes:

- Increase the percentage of motorists who yield the right-of-way to pedestrians because pedestrians are in the crosswalk by the time the traffic signal turns green.
- Increase the visibility of crossing pedestrians and give them priority within the intersection.
- LPI may benefit people who are older or mobility-impaired to provide more time to cross the street safely.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as part of resurfacing and traffic operations projects at signalized intersection where heavy turning traffic comes into conflict with crossing pedestrians during the permissive phase of the signal cycle. The Traffic Operations Office can also implement LPIs as standalone projects.



Flashing Yellow Arrow

Description: Allow drivers to turn left or right after yielding to all oncoming traffic and to any pedestrians in the crosswalk. The oncoming traffic has a green light and drivers must wait for a safe gap in the oncoming traffic before turning.

Targeted 5-E Model: Engineering

Targeted Crash Types: Left-Hook and Right-Hook Crashes

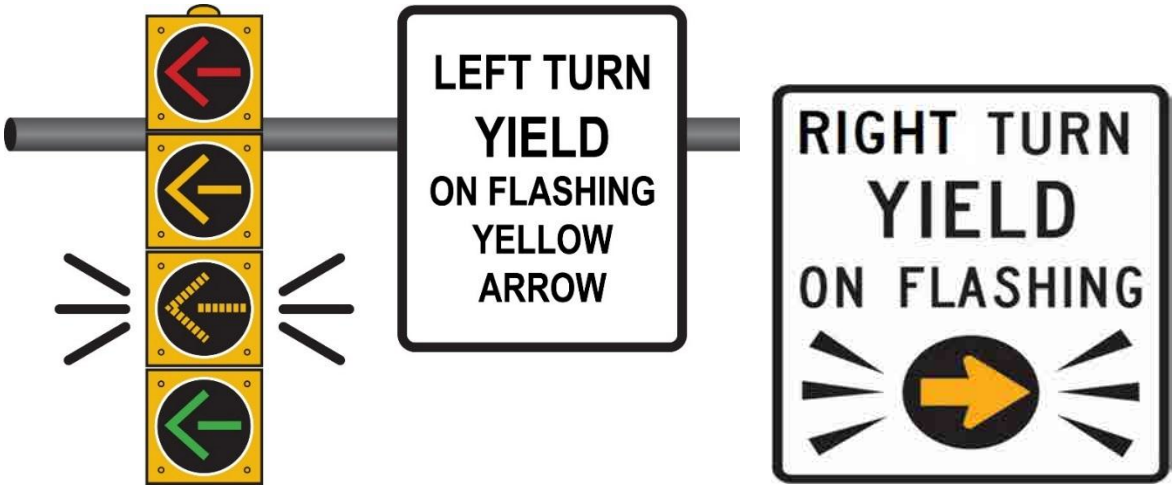
Hot Spots and Corridors:

- C5: Lake Worth Road from Jog Road to Lakeside Drive
- C6: Military Trail from Melaleuca Lane to Community Drive
- S10: 45 Street at Australian Avenue

Notes: The flashing yellow arrow means left or right turns permitted and yield to oncoming traffic and pedestrians. The signal's left or right turn phase could operate as protected only with the green and solid yellow arrows during certain hours of the day and then as protected/permissive during other hours of the day, depending upon traffic flows.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as part of resurfacing and traffic operations projects at signalized intersection



Prohibited Right Turn on Red (RTOR)

Description: Prohibit motorists from turning right on red and reduce the risk of a collision with a pedestrian/bicyclist who is to the right of the motorist and crossing the main road at locations with visibility concerns or high pedestrian activity.

Targeted 5-E Model: Engineering

Targeted Crash Types: Right-Hook Crashes

Hot Spots and Corridors:

- C5: Lake Worth Road from Jog Road to Lakeside Drive
- C8: US 1 from Okeechobee Boulevard to 45 Street

Notes:

- RTOR restrictions should be used at school crossings.
- Can be part-time ROTR prohibitions during certain time periods or at all times of day.
- Signs should be visible to right-turning motorists stopped in the curb lane at the crosswalk.
- Provide illuminated “No Turn on Red” signs.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as part of resurfacing and traffic operations projects at signalized intersections.

R10-11

R10-11a

R10-11b

Lane Eliminations/Narrowing

Description: Some roads may have more travel lanes than necessary, and the width of the excess lanes could be re-purposed to meet other community goals. The opportunities of lane eliminations/narrowing, include bicycle lanes, parking, or sidewalks and will encourage motor vehicles to lower their speeds.

Targeted 5-E Model: Engineering

Targeted Crash Types: Midblock Crashes

Hot Spots and Corridors:

- S3: Boynton Beach Boulevard at Seacrest Boulevard
- S8: Dr Martin Luther King Jr Boulevard at SW 6 Street

Notes: A traffic analysis should be conducted to see if vehicle capacity exceeds existing and projected volumes for a lane elimination.

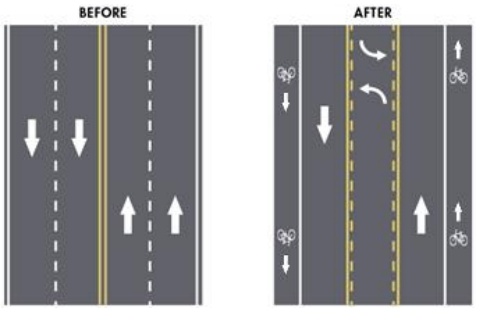
- Convert four-lane undivided roadways into three lanes (one travel lane in each direction and a center two-way left-turn lane (TWLTL)).
- Consider for four-lane bi-directional roadways with moderate volumes with average daily traffic (ADT) of 15,000 or less, and for three-lane one-way streets with ADT of 20,000 or less.

Lane narrowing reduces travel speeds on high-speed roadways. The recommended minimum widths of lanes:

- 11 feet for major/minor arterials and collectors
- 10 feet for local roads and auxiliary lanes

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as a component of any roadway resurfacing or improvement projects, or as a stand-alone project.



Lighting and Illumination

Description: Install lighting on both sides of wide streets and streets in urban areas. Provide lighting at mid-block locations that "front-lights" the pedestrian. This will optimize visibility and personal security of pedestrian and bicyclists during low-light conditions.

Targeted 5-E Model: Engineering

Targeted Crash Types: Nighttime Crashes

Hot Spots and Corridors:

- S9: Okeechobee Road at Military Trail
- C3: Atlantic Avenue from Military Trail to Ocean Boulevard
- C5: Lake Worth Road from Jog Road to Lakeside Drive
- C6: Military Trail from Melaleuca Lane to Community Drive
- C7: Okeechobee Road from Drexel Road to Congress Avenue
- C8: US 1 from Okeechobee Boulevard to 45 Street
- C9: Northlake Boulevard from Military Trail to Alt A1A

Notes: FDOT's vision is a fatality free transportation system and an FHWA focus state for both intersection safety and bicycle and pedestrian safety. An allocation of $20 million per year over the next five years are targeted for state highway system (SHS) intersection lighting retrofits. For fiscal year (FY) 2017, fourteen (14) locations were identified in Palm Beach County. Appendix E includes the Intersection Lighting Retrofits for Pedestrians Methodology and the FY 2017 locations. Effective in July 2016, FDOT changed their policy to require pedestrian lighting for all new and reconstructed signalized intersections, roundabouts, and midblock crossings.

- The illumination should produce 1.5 times the normal roadway illumination while maintaining the uniformity lighting levels.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as a component of any roadway improvement or beautification projects, or as a stand-alone project.

Rectangular Rapid Flashing Beacons (RRFB)

Description: Provide user-actuated amber LEDs that supplement warning signs at unsignalized intersections or mid-block crosswalks. RRFBs are activated by pedestrians manually by a push button or an automated pedestrian detection system.

Targeted 5-E Model: Engineering

Targeted Crash Types: Midblock Crashes

Hot Spots and Corridors:

- C10: Indiantown Road from Central Boulevard to Alt A1A

Notes:

- Rectangular-shaped high intensity lighting emitting diode (LED)-based indications, flashes rapidly in a wig-wag flickering flash pattern and is mounted immediately between the crossing sign and the sign's supplemental arrow plaque.
- Installed in conjunction with marked crosswalks and signs.
- May be installed on either two-lane or multi-lane roadways. But it's less well-suited for multi-lane roadways.
- In conditions where there is a combination of both high traffic volumes and high pedestrian volumes, the use of RRBs may not be appropriate and a PHB may be more appropriate.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement at an unsignalized intersection when a conventional traffic signal or pedestrian hybrid beacon (PHB) is not desired.

Pedestrian Hybrid Beacons (PHB)

Description: PHBs are a special type of beacon used to warn and control traffic at an unsignalized location. The beacon head consists of two red lenses above a single yellow lens and is dark until the pedestrian activates the PHBs. PHBs are recommended for locations at higher volume midblock locations to assist pedestrians in crossing a street at a marked crosswalk.

Targeted 5-E Model: Engineering

Targeted Crash Types: Midblock Crashes

Hot Spots and Corridors:

- S8: Dr Martin Luther King Jr Boulevard at SW 6 Street

Notes:

- Activated by pedestrians detectors, such as pushbuttons.
- Installed in conjunction with marked crosswalks, signs, advanced yield lines to warn and control traffic, and pedestrian countdown signals.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement when a conventional signal warrant is not met or where a conventional traffic signal is not desired.

Speed Monitoring Devices

Description: Install along the side of the road and display the speed of each approaching vehicle along with the posted speed at the facility. Portable radar speed trailers are used to deter speeding and may be more effective than static signs due to their portability. And increase speed limit compliance. It will display drivers' real-time speeds compared to the speed limit.

Targeted 5-E Model: Education and Enforcement

Targeted Crash Types: High-Speed Crashes

Hot Spots and Corridors:

- S5: Lake Worth Road at Davis Road
- C1: Federal Highway from Camino Real to Glades Road
- C2: Ocean Boulevard from Linton Boulevard to Thomas Street
- C8: US 1 from Okeechobee Boulevard to 45 Street

Notes:

- Portable speed trailers are not a substitute for permanent actions, such as traffic-calming treatments to address neighborhood speeding issues.
- Best used in residential areas and can be used in conjunction with neighborhood speech watch programs or other safety education programs because it provides immediate feedback to motorists.

Lead Agencies: FDOT, Palm Beach County Engineering and Public Works, and Local Government Agencies

Implementation Strategy: Implement as part of education, enforcement, or work zone projects.

Visible Enforcement

Description: Focuses on a "Triple E" strategy, Enforcement intervention, inexpensive Engineering enhancements, and an Education component. The Education component includes signage, community presentations, online engagement, school participation, and media attention. Enforcement intervention techniques include focused enforcement of driver yielding to pedestrian lanes in high-volume pedestrian locations. An example is the Best Foot Forward program currently in the City of Orlando and Orange County.

Targeted 5-E Model: Enforcement and Engineering

Targeted Crash Types: All Crashes

Best Foot Forward
for pedestrian safety
YIELD

Source: BestFootOrlando

Notes:

- The Orlando Police Department and the Orange County Sheriff's Office set up enforcement operations throughout the region and stopped drivers who failed to yield to pedestrians in marked crosswalks as the law requires.
- Every person stopped is reminded that drivers must yield to people walking while driving through marked crosswalks.
- Increase driver-awareness of the need to share the roadway with pedestrians and bicyclist.

Lead Agencies: FDOT and Police Departments

Implementation Focus Areas:

- Boca Raton
- Delray Beach
- Boynton Beach
- Lake Worth
- West Palm Beach
- Riviera Beach
- Belle Glade

Progressive Ticketing

Description: Introduce ticketing through a three-staged process, Educating, Warning, and Ticketing.

Targeted 5-E Model: Enforcement

Targeted Crash Types: All crashes

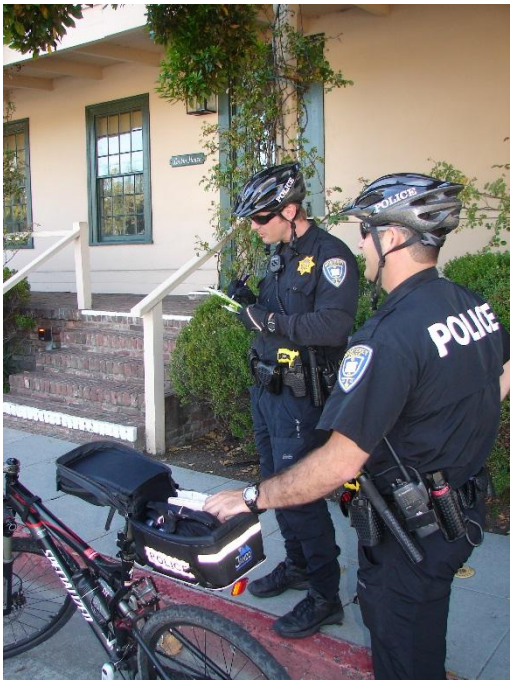
Notes: Issuing tickets is the strongest strategy of an enforcement program. The three main steps of the progressive ticketing program are as follows.

1. Educating – Establish community awareness of the problem. To inform the public understanding that drivers are speeding and the consequences of speeding.
2. Warning – Announce what action will be taken and why and give the public time to change behaviors before ticketing starts.
3. Ticketing – Hold a press conference announcing when and where the police operations will occur. If the public continue their unsafe behaviors, officers issue tickets.

Lead Agency: Police Departments

Implementation Focus Areas:

- Delray Beach
- Palm Springs
- Greenacres



Source: SafeRoutesInfo.org

Educational and Encouragement Strategies

- **Adult Cycling Skills Class** – Provide practical hands-on classes for adults, age 18 and up, to teach biking for transportation, fun, and fitness.
- **Driver/Pedestrian Education** – Expand efforts to better reach the general driving and pedestrian population such as the Florida's 3-foot law for cyclist and enforcement in yielding to pedestrians. Some of the efforts include a marketing campaign focused on drivers, increasing cycling questions on the driver's test, providing more information at the Department of Highway Safety and Motor Vehicles (DHSMV) and local bicycle shops.
- **Spanish Language Outreach Campaign** – Implement a large-scale outreach effort to educate pedestrians and cyclists on key safety issues in certain demographic areas. These include crossing on marked crosswalks, using pedestrian signals, wearing helmets, not running red lights/riding onto oncoming traffic, and staying visible.
- **K-12 Pedestrian and Bicycle Education** – Inform K-12 students the importance and education of walking and bicycling. Students are full of energy and eager to learn. This could be associated with National Walk to School Day and National Bike to School Day.
- **Open Streets Events** – Open Streets events temporarily restrict automobile traffic to open roads for community members of all ages to walk, bike, skate, socialize, and more. This will give residents an opportunity to explore their neighborhood and local businesses in a safe, fun, and family-friendly way.
- **Officer Training** – Include information on what, when, where, and how law enforcement should occur to maximize behavior change and to reduce the number of crashes involving pedestrians.

Adult Cycling Skills Class

Description: Provide practical hands-on classes for adults, age 18 and up, to teach biking for transportation, fun, and fitness.

Targeted 5-E Model: Education and Encouragement

Targeted Crash Types: Adult Crashes

Notes:

- Introduction and hands-on classes for adults.
- Teach the basics of balancing, starting, stopping, and steering a bike, as well a proper helmet fit and adjustment.
- Learn the rules of the road and route planning.
- FDOT has held a free bicycle helmet fitting training.

Lead Agencies: FDOT, Palm Beach MPO, and Local Government Agencies

Implementation Focus Areas:

- Delray Beach
- Palm Springs
- Greenacres
- West Palm Beach
- Jupiter

Source: The League of American Bicyclists

Driver/Pedestrian Education

Description: Expand efforts to better reach the general driving and pedestrian population such as the Florida's 3-foot law for cyclist and enforcement in yielding to pedestrians. Some of the efforts include a marketing campaign focused on drivers, increasing cycling questions on the driver's test, providing more information at the DHSMV and local bicycle shops.

Targeted 5-E Model: Education, Enforcement, and Encouragement

Targeted Crash Types: Straight-Through Crashes

Notes:

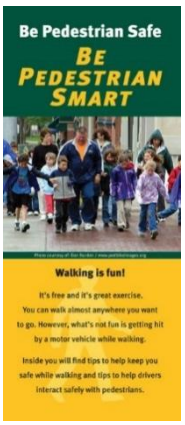
- Educate the public of the state law that requires the motorists give a three-foot clearance when passing cyclists through posters, installation of signage in high-crash areas, and enforcement of the law.
- Provide educational materials at DHSMV and local bicycle shops.
- Educational materials, marketing campaigns, and programs should be sensitive of different groups of people.

Lead Agencies: FDOT, Palm Beach MPO, and Local Government Agencies

Implementation Strategy: Implement signage as a component of any roadway improvement projects and coordinate with local municipalities and law enforcement agencies to distribute educational materials and enforce the law. Collaborate with local agencies on marketing campaigns.

Implementation Focus Areas:

- Delray Beach
- Palm Springs
- Greenacres
- West Palm Beach
- Jupiter



Spanish Language Outreach Campaign

Description: Implement a large-scale outreach effort to educate pedestrians and cyclists on key safety issues in certain demographic areas. These include crossing on marked crosswalks, using pedestrian signals, wearing helmets, not running red lights/riding onto oncoming traffic, and staying visible.

Targeted 5-E Model: Education and Encouragement

Targeted Crash Types: All Crashes

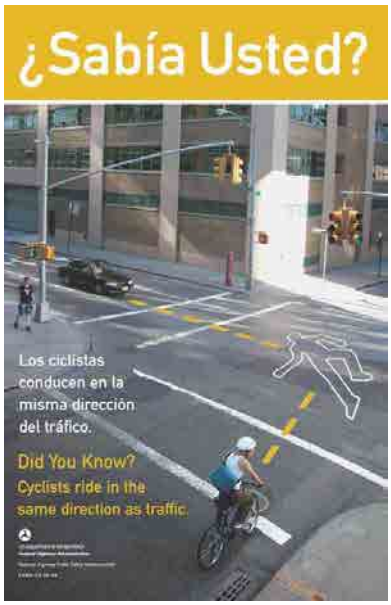
Notes:

- Create educational materials and guidelines in Spanish.
- Understand the audience to develop the right message and content.
- Distribute and educate people in particularly at local Hispanic Community Centers, churches, bilingual handouts in schools/parent workshops & etc.

Lead Agencies: FDOT, Palm Beach MPO, and Local Government Agencies

Implementation Focus Areas:

- Palm Springs
- Lake Worth
- Boynton Beach
- Greenacres
- Palm Springs



K-12 Pedestrian and Bicycle Education

Description: Inform K-12 students the importance and education of walking and bicycling. Students are full of energy and eager to learn. This could be associated with National Walk to School Day and National Bike to School Day.

Targeted 5-E Model: Education and Encouragement

Targeted Crash Types: Juvenile Crashes

Notes: Some of the education should include the basics:

- How to cross the street safely
- Basic bike and helmet fitting
- How to position yourself properly on the road
- How to let drivers know your intentions, safely negotiate turns, and intersections
- Basics of traffic law

Lead Agencies: FDOT, Palm Beach MPO, Palm Beach County Schools, and Local Government Agencies

Implementation Focus Areas:

- Delray Beach
- Boynton Beach
- Atlantis
- Belle Glade
- Lake Worth
- Greenacres
- Riviera Beach

Open Streets Events

Description: Open Streets events temporarily restrict automobile traffic to open roads for community members of all ages to walk, bike, skate, dance, socialize, and more. This will give residents an opportunity to explore their neighborhood and local businesses in a safe, fun, and family-friendly way.

Targeted 5-E Model: Education and Encouragement

Targeted Crash Types: All Crashes

Notes:

- Cities are hosting a “Ciclovia” or Open Streets event such as City of St. Petersburg in Pinellas County and City of Fort Lauderdale in Broward County.
- Open streets generate positive public heath, offer environmental benefits and new economic opportunities, building community, cultural identity, and social engagement.
- Display “pop-up” projects such as bike lanes.

Lead Agencies: FDOT, Local Government Agencies, Local Businesses, and Police Departments

Implementation Focus Areas:

- Boca Raton
- Delray Beach
- Boynton Beach
- West Palm Beach

Officer Training

Description: Include information on what, when, where, and how law enforcement should occur to maximize behavior change and to reduce the number of crashes involving pedestrians and bicyclists.

Targeted 5-E Model: Education

Targeted Crash Types: All Crashes

Notes: The officer training will improve officers understanding of cyclists' rights and responsibilities, as well as boost awareness. The pedestrian and bicycle training consist of understanding the role of engineering, education, and enforcement can and should play in improving pedestrian and bicycle safety.

Lead Agency: Police Departments

Implementation Focus Areas:

- Boca Raton
- Delray Beach
- Palm Springs
- Lake Worth
- Palm Beach
- Jupiter

Source: PedBikeInfo.org

Evaluation

Evaluation consists of two parts; monitoring activity levels and monitoring incidents (injuries and fatalities).

Monitoring Activity

The bike & pedestrian count program evaluates and verify accuracy for the 36 bike count stations and 32 pedestrian count stations.

Bike & Pedestrian Count Program

Description: Evaluate and verify accuracy for the 36 bike count stations and 32 pedestrian count stations.

Targeted 5-E Model: Evaluation

Notes: There are two counters that are being used to collect data, pyro-box for pedestrians and pneumatic tubes for bicyclists. Collecting and verifying pedestrian and bicycle counts will help identify deficiencies in the transportation system, analyze existing patterns, evaluate the impacts of projects; and inform future design, planning, prioritization, and maintenance decisions. Appendix F includes more information about the bike & pedestrian count program.

Implementation Focus Areas:

- West Palm Beach
- Delray Beach

Next Steps

Vision Zero is a multi-national road traffic safety philosophy that eventually no one will be killed or seriously injured within the road transportation system.

Quantifiable safety targets and performance measures will assist Palm Beach MPO and its partners in monitoring progress and establishing best practices. The Palm Beach MPO will monitor performance measures and targets in this plan as shown in Table 6 with the ultimate goal of zero incidents and will work with partner agencies to implement county-wide safety initiatives which is shown in Table 7.

The Palm Beach MPO encourages the use of its grant funds to the program countermeasures for hot spots and corridors listed in this plan. A current listing of projects funded through the MPO near hot spots and corridors can be found in Appendix C. Additionally, other initiatives of the MPO will provide additional resources for local jurisdictions. These resources include the Bike and Pedestrian Count Program, Commuter Challenge, Complete Streets Plan, and the Hazardous Walking Conditions analysis. More information about these projects can be found in Appendix F.

Table 6. Pedestrian and Bicycle Safety Performance Measures and Targets

Objective	Current Value (2014)[1]	2025 Target	Vision[2]
Reduce the number of….			
Pedestrian Injuries	323	≤160	0
Pedestrian Fatalities	32	≤15	0
Bicyclist Injuries	268	≤130	0
Bicyclist Fatalities	9	≤4	0
Pedestrian and Bicyclists Injuries and Fatalities that occurred within the hot spots and high crash corridors	137	≤68	0
Juvenile (Age 0-18) Bicycle and Pedestrian Crashes	82	≤41	0
Reduce pedestrian and bicyclist crashes that occur under dark conditions and between 10pm and 6am	57[3]	≤28	0

[1]The current value (2014) are obtained from FDOT UBR data.
[2]Palm Beach MPO strives towards Vision Zero; where no pedestrians and bicyclists are injured or killed.
[3]Accounts for the number of crashes occur under dark conditions where street lights are both present and not present.

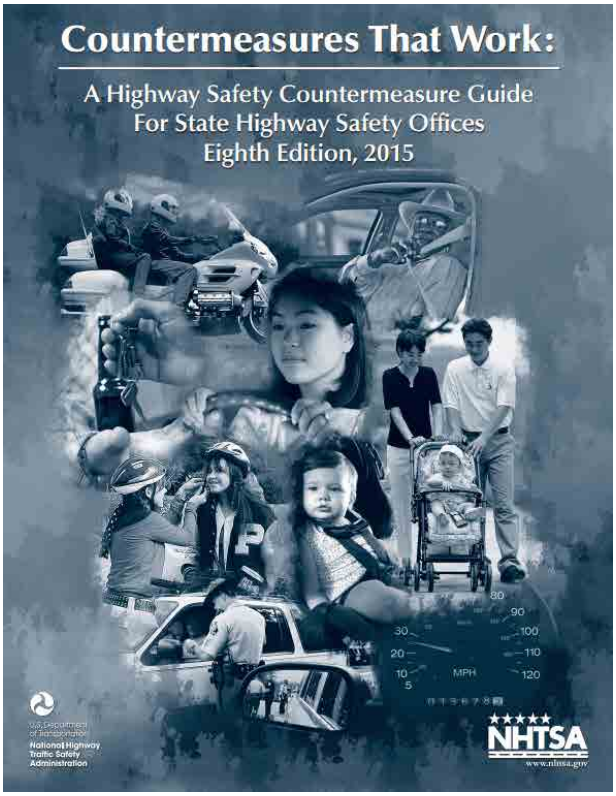
Table 7. Safety Initiatives

Initiative	Lead Agency	Partners	Goal
Provide complete streets/safety education workshops	Palm Beach MPO	Local Municipalities, Palm Beach County Engineering, FDOT, FHWA, and FAU Center for Urban & Environmental Solutions (CUES)	At least 1 Workshop annually
Conduct road safety audits (RSAs) for hot spots & high crash corridors identified in this plan	Palm Beach MPO	FDOT, Local Municipalities, and Palm Beach County Engineering	At least 1 RSA annually
Conduct crosswalk safety campaigns in hot spots in this plan	Local Law Enforcement	FDOT Community Traffic Safety Team (CTST) and Alert Today Alive Tomorrow, Local Municipalities, Palm Beach County Engineering, FDOT, FHWA, South Florida Regional Transportation Authority (SFRTA), and Palm Tran	At least 1 Campaign annually
Educate children on pedestrian and bicycle safety skills	Palm Beach County School District	FDOT Safe Routes to School, SafeKids, WalkSafe, BikeSafe, Palm Beach YMCAs, and FAU CUES	All K-12 Schools Implement Curriculum annually
Educate adults on bicycle safety skills	League of American Bicyclists	Adult Education Organizations, FDOT, Palm Beach MPO, Local Municipalities, and AARP	At least 1 Training annually
Implement bike light safety campaigns to educate and distribute bike lights to cyclists in each hot spot and high crash corridor identified in this plan	Local Law Enforcement and FDOT	Local Municipalities FDOT CTST and Alert Today Alive Tomorrow, and League of American Cyclists	At least 1 Campaign annually

Appendix A
Literature Review

Literature Review

Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices, Eighth Edition, NHTSA, 2015



In 2015, the National Highway Traffic Safety Administration (NHTSA) created this guide to present proven countermeasure strategies for common traffic safety problems. This guide explains in detail the effectiveness, associated costs, and usage of each countermeasure. In addition, NHTSA cites the importance of vehicle design as a part of countermeasures that help reduce pedestrian and bicyclist injuries. Some of the suggested roadway countermeasures related to pedestrians are described below.

- **Pedestrian safety zones** – Increase cost-effectiveness of interventions by targeting education, enforcement, and engineering measures to specific geographic areas and audiences where significant portions of the pedestrian crash pattern exist. Pedestrian zone programs can target a full range of pedestrian crash problems within a limited geographic area or focus on particular types of problems that comprise a large portion of the problem within a limited area.
- **Reduce and enforce speed limits** – Increase reaction times for both drivers and pedestrians to avoid crashes, as well as reduce the severity of pedestrian injuries when these crashes do occur by reducing motorist travel speeds in key areas. Reducing speed limits as a stand-alone tactic has been shown in evidence-based studies to reduce actual speeds by only a fraction of the reduction in posted speed limit. However, it was noted that even one or two mile per hour (mph) reductions in actual travel speeds are estimated to yield substantial fatal and injury crash reductions for pedestrians. For maximum effectiveness, speed limit reductions should be accompanied by communication and outreach that inform the public and make the case for speed reduction, engineering techniques that actively

encourage motorists to drive at slower speeds such as narrower lanes, and heightened, visible law enforcement.

- **Targeted enforcement** – Increase compliance with appropriate traffic laws by both pedestrians and motorists to reduce injuries and fatalities. Traffic enforcement is most effective when it is highly visible and publicized to reinforce the message of the required behavior and to raise the expectation that failure to comply may result in legal consequences. A coordinated program of targeted enforcement should involve a range of support activities, such as communications and outreach to notify the public, training law enforcement officers on goals and procedures, and educating prosecutors and judges so they understand the importance of the campaign and are prepared for the increase in citations that enforcement will produce.
- **Safe Routes to School (SRTS)** – Increase the amount of bicycling and walking trips to and from school while simultaneously improving safety for children walking and bicycling. SRTS programs are community-based and are intended to be comprehensive from education to enforcement to engineering. Encouragement and learning about positive health outcomes are often incorporated into SRTS programs. Since October 2012, SRTS funding has been incorporated into the Transportation Alternatives Program (TAP).

FHWA Concludes Pedestrian Countermeasure Study in Three Cities. Tamara Redmon. ITE Journal, Volume 81, Number 8. August 2011

In 2003, the Federal Highway Administration (FHWA) conducted a study of pedestrian safety countermeasures in three major U.S. cities; Miami, Las Vegas, and San Francisco. These cities were given grants to develop, deploy, and evaluate low-cost countermeasures for improving pedestrian safety. Field teams were tasked with assessing the effectiveness of the new countermeasures. In an effort to help their assessments, FHWA researchers helped create a list of measures of effectiveness (MOEs). MOEs ranged from measuring the motor vehicle's speed, percentage of driver's braking, percentage of pedestrians trapped in crosswalk, percentage of yielding drivers, pedestrian delay time, and pedestrian crossing time. Countermeasures implemented as part of the FHWA study are listed below.

- TURNING VEHICLES YIELD TO PEDESTRIANS (R10-15 series) signs
- In-Street Pedestrian Crossing (R1-6 series) signs
- NO TURN ON RED (R10-11 series) signs
- Portable radar speed trailers
- Pedestrian signal push buttons that confirm the press
- Automated pedestrian detection
- Rectangular rapid flashing beacons (RRFBs)
- Leading pedestrian interval
- Prohibition of permissive left-turns

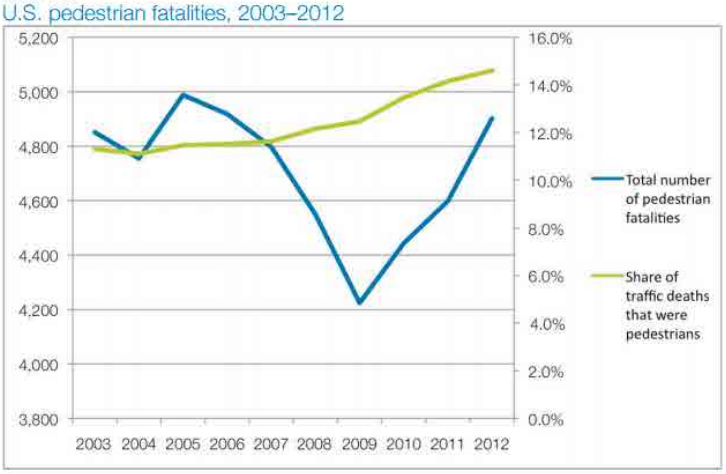
R10-15

Dangerous By Design, Smart Growth America, 2014

Dangerous by Design describes the pedestrian safety issue in the United States and documents preventable pedestrian fatalities and what can be done to make our streets safer for everyone. The authors use years of data to calculate a Pedestrian Danger Index (PDI) that ranks state and cities according to the relative risk pedestrians face. Florida is consistently ranked #1 with the highest PDI in the nation.

Another key finding of the data analysis is that although the number of pedestrian fatalities dipped during 2006 through 2009, the number of pedestrian fatalities has been on an increasing trend since 2010. Furthermore, the percentage of traffic fatalities that are pedestrians has steadily increased regardless of the raw number of pedestrian fatalities. In 2012, people on foot represented nearly 15 percent (15%) of all traffic fatalities.

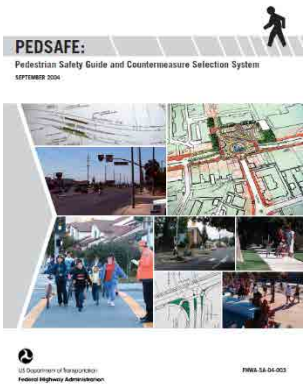
FIGURE 1
U.S. pedestrian fatalities, 2003–2012



Effects of Shared Lane Markings on Bicyclist and Motorist Behavior, Federal Highway Administration, 2004

The primary goal of this study was to determine the effects that a sharing lane (sharrow) has on the safety of the motorist and bicyclist. The sharrow is denoted by a pavement marking visible to both the motorist and bicyclist. The placement of this marking is determined by the safest bicyclist lane position. It is recommend by researchers to place this marking in the center of the travel lane unless both the motorist and bicyclist can share the lane side by side with enough passing separation. The placement in the center of the travel lane will encourage bicyclists to occupy the full travel lane and minimize wear. This study also shows that sharrows can be installed per MUTCD guidance spacing for about $4,000 per lane-mile.

PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System, 2004



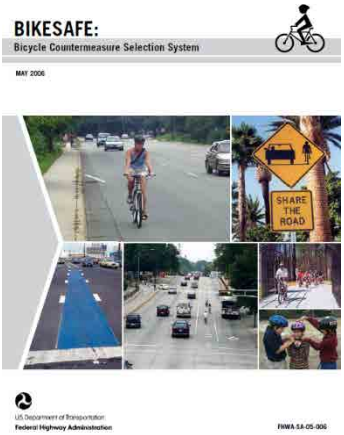
The Pedestrian Safety Guide and Countermeasure Selection System provides users with information for improving the movement and safety of pedestrians. PEDSAFE includes several tools:

- Selection Tool – Find appropriate countermeasures on the basis of desired objectives.
- Interactive Matrices – View the countermeasures associated with crash types and performance objectives.
- Countermeasures – Read descriptions of the 49 engineering, education, and enforcement treatments.
- Case Studies – Review real-world examples of implemented treatments.

BIKESAFE: Bicycle Countermeasure Selection System, 2006

The Bicycle Countermeasure Selection System provides users with information for improving the movement and safety of bicyclists. BIKESAFE includes several tools:

- Selection Tool – Find appropriate countermeasures based on desired objectives.
- Interactive Matrices – View the countermeasures associated with crash types and performance objectives.
- Countermeasures – Read descriptions of the 50 engineering, education, and enforcement treatments.
- Case Studies – Review real-world examples of implemented treatments.



Pedestrian Safety Engineering and ITS-Based Countermeasures Program for Reducing Pedestrian Fatalities, Injury Conflicts, and Other Surrogate Measures Final System Impact Report, Federal Highway Administration, 2009

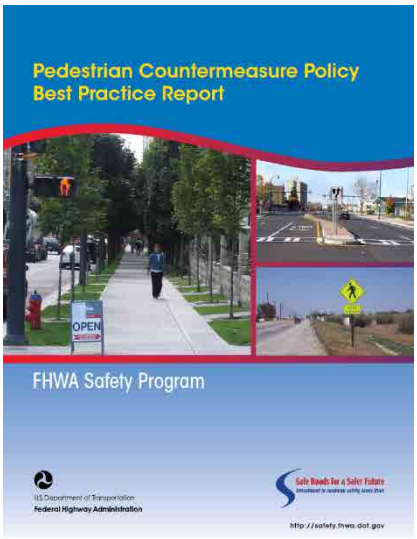
This report details the deployment and evaluation of a countermeasures program that is ITS-based and includes pedestrian safety engineering. The focus of this program was to reduce pedestrian fatalities, injuries, and conflicts in three cities: Las Vegas, Miami, and San Francisco. The first phase of this program consisted of analyzing pedestrian crashes, selecting appropriate countermeasures, deployment and evaluation plans, and collecting and analyzing baseline data. The second phase included implementing and evaluating the impacts of the countermeasures. A total of 18 unique pedestrian safety countermeasure combinations were deployed, ten of which were set in more than one of the three cities. The rest were deployed in only one city. After these countermeasures were evaluated, the following seven were classified as being “highly effective in impacting behaviors related to pedestrian safety”:

- Leading pedestrian interval
- Pedestrian countdown signals
- In-street pedestrian signs
- Activated flashing beacons

- Rectangular rapid flashing beacons (RRFB)
- Call buttons that confirm the press
- Danish offset combined with high-visibility crosswalk, advance yield markings, and YIELD HERE TO PEDESTRIAN signs

Pedestrian Countermeasure Policy Best Practice Report, Federal Highway Administration

The Pedestrian Countermeasure Policy Best Practice report discusses proven pedestrian safety countermeasures such as raised medians, refuge islands, paved shoulders, and walkways. The report states that the use of raised medians and refuge islands can benefit the safety of pedestrians by:



- allowing pedestrians to cross one direction of traffic at a time
- providing space for improved lighting for pedestrian crossing
- reducing motor vehicle crashes
- decreasing motorist delays
- increasing roadway capacity
- reducing vehicle speeds
- providing space for landscaping within the right-of-way

"*All multilane facilities shall be designed with a raised or restrictive median except four-lane sections with design speeds of 40 mph or less. Facilities having design speeds of 40 mph or less are to include sections of raised or restrictive median for enhancing vehicular and pedestrian safety, improving traffic efficiency, and attainment of the standards of the Access Management Classification of that highway system*."

Best Practices in State Bicycle and Pedestrian Planning. Florida Planning and Development Lab, Florida State University, Department of Urban and Regional Planning, 2005

This report presents the best practices for bicycle and pedestrian planning suitable to the Florida. This project consisted of reviewing bicycle and pedestrian plans from 18 states across the U.S. This report concludes with the following recommendations organized into three categories:

- Intervention
    - Targeting pedestrian and bicyclist safety education programs at motorists, roadway design professionals, and law enforcement officers
    - Enforcing unsafe motor vehicle driver and bicyclist behaviors
    - Increasing bikeway and walkway width standards
    - Adopting roadway standards that allow the construction of narrower streets
    - Prioritizing projects that provide for exclusive pedestrian phases at intersections

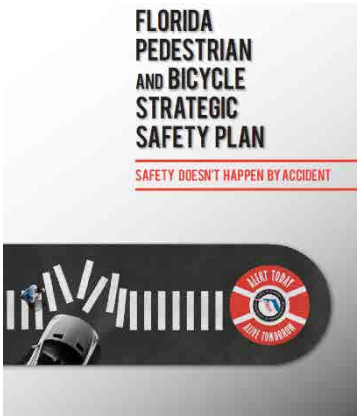
- Implementation
    - Connecting land use planning and bicycle and pedestrian planning
    - Fostering intergovernmental coordination of bicycle and pedestrian planning
    - Promoting bicycle and pedestrian planning with MPOs and local agencies
    - Targeting capital improvements to high risk geographical areas

- Evaluation
    - Collecting data related to the percentage of Floridians who travel by bicycling or walking during daily activities
    - Collecting data related to the percentage of streets in urban areas with adequate pedestrian and bicycle facilities
    - Using direct digital input of all crash-related information at the scene of a crash

Florida Pedestrian and Bicycle Strategic Safety Plan. The Center for Urban Transportation Research, University of South Florida, 2013

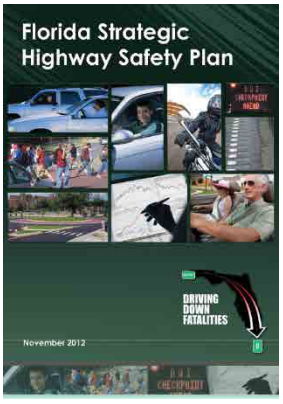
The Florida Pedestrian and Bicycle Strategic Safety Plan (PBSSP) was created to supplant "The Florida Strategic Highway Safety Plan" by taking a more detailed approach to improving pedestrian and bicycle safety in the state of Florida. Palm Beach has been listed in the PBSSP as one of the top ten counties in Florida with the highest number of pedestrian fatalities and injuries. Some of the objectives of the PBSSP include:

- Conducting studies to determine pedestrian and bicycle fatality/injury trends.
- Evaluate the current use of countermeasures and their effectiveness.
- Identify, promote, and implement pedestrian and bicycle best practices on Florida's transportation network.



Florida Strategic Highway Safety Plan, Florida Department of Transportation, 2012

The Florida Strategic Highway Safety Plan emphasizes the importance of improving pedestrian and bicyclist safety. According to this Safety Plan, from 2006 to 2010, pedestrian fatalities decreased from 546 to 460. To address the issue of pedestrians and bicyclist safety, this safety plan offers the following suggestions:



- Using better detection systems for bicycles at signalized intersections
- Initiating bicycle and pedestrian traffic count programs
- Determining the relationship between design, capacity, and safety
- Conducting annual training for bicycle and pedestrian design
- Minimizing conflict severity by implementation of innovative intersection design options
- Increasing the knowledge of safety related policies, laws, programs, and procedures
- Educating planners, engineers, and decision-makers on community and infrastructure design that enhances the use of transportation alternatives

Medians and Pedestrian Crossing Islands in Urban and Suburban Areas

A *median* is an area between opposing lanes of traffic, excluding turn lanes. Medians in urban and suburban areas can either be open (pavement markings only) or they can be channelized (raised medians or islands) to separate various road users.

Pedestrian crossing islands (or refuge areas)—also known as center islands, refuge islands, pedestrian islands, or median slow points—are raised islands placed on a street at intersections or midblock locations to separate crossing pedestrians from motor vehicles.

There are several types of medians and pedestrian crossing islands, and if designed and applied appropriately, they improve the safety benefits to both pedestrians and vehicles in the following ways:

- They may reduce pedestrian crashes by 46 percent and motor vehicle crashes by up to 39 percent.
- They may decrease delays (by greater than 30 percent) for motorists.
- They allow pedestrians a safe place to stop at the mid-point of the roadway before crossing the remaining distance.
- They enhance the visibility of pedestrian crossings, particularly at unsignalized crossing points.
- They can reduce the speed of vehicles approaching pedestrian crossings.
- They can be used for access management for vehicles (allowing only right-in/right-out turning movements).
- They provide space for supplemental signage on multi-lane roadways.

Background

Midblock locations account for more than 70 percent of pedestrian fatalities. This is where vehicle travel speeds are higher, contributing to the larger injury and fatality rate seen at these locations. More than 80 percent of pedestrians die when hit by vehicles traveling at 40 mph or faster while less than 10 percent die when hit at 20 mph or less. Installing such raised channelization on approaches to multi-lane intersections has been shown to be especially effective. Medians are a particularly important pedestrian safety countermeasure in areas where pedestrians access a transit stop or other clear origins/destinations across from each other. Providing raised medians or pedestrian refuge areas at marked crosswalks has demonstrated a 46 percent reduction in pedestrian crashes. At unmarked crosswalk locations, medians have demonstrated a 39 percent reduction in pedestrian crashes.

Guidance

Raised medians (or refuge areas) should be considered in curbed sections of multi-lane roadways in urban and suburban areas, particularly in areas where there are mixtures of significant pedestrian and vehicle traffic (more than 12,000 Average Daily Traffic (ADT)) and intermediate or high travel speeds. Medians/refuge islands should be at least 4 feet wide (preferably 8 feet wide to accommodate pedestrian comfort and safety) and of adequate length to allow the anticipated number of pedestrians to stand and wait for gaps in traffic before crossing the second half of the street.

Key Resources

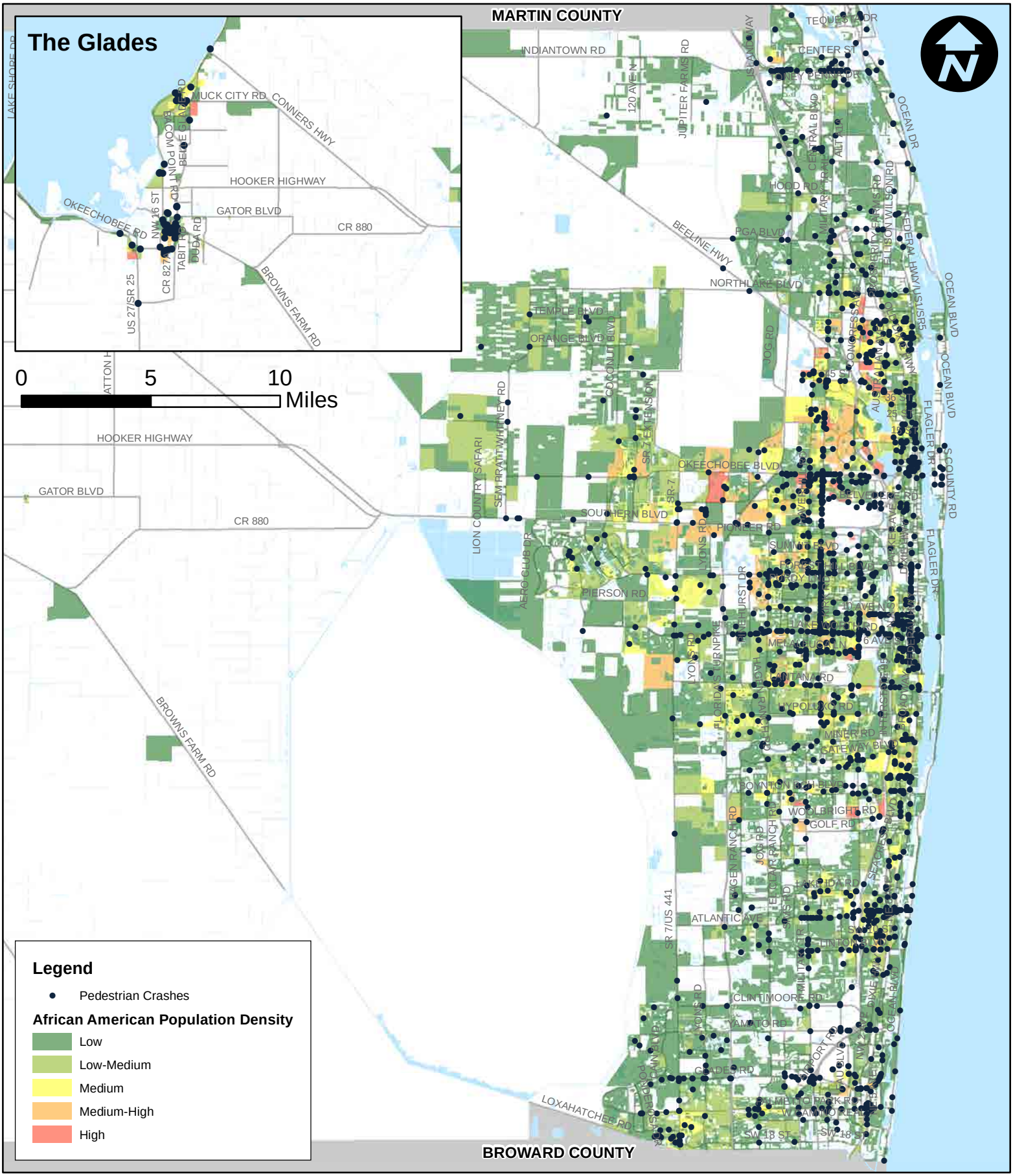
A Review of Pedestrian Safety Research in the United States and Abroad, p. 85-86
http://www.walkinginfo.org/library/details.cfm?id=13
Pedestrian Facility User's Guide: Providing Safety and Mobility, p. 56
http://drusilla.hsrc.unc.edu/cms/downloads/PedFacility_UserGuide2002.pdf
Guide for the Planning, Design, and Operation of Pedestrian Facilities, American Association of State Highway and Transportation Officials, 2004 [Available for purchase from AASHTO]
https://bookstore.transportation.org/item_details.aspx?id=119
Pedestrian Road Safety Audits and Prompt Lists
http://www.walkinginfo.org/library/details.cfm?id=3955
FHWA Office of Safety Bicycle and Pedestrian Safety
http://safety.fhwa.dot.gov/ped_bike/
Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations, p. 55
http://www.walkinginfo.org/library/details.cfm?id=54
Handbook of Road Safety Measures
http://www.cmfclearinghouse.org/study_detail.cfm?stid=14
Analyzing Raised Median Safety Impacts Using Bayesian Methods
http://www.cmfclearinghouse.org/study_detail.cfm?stid=213

FHWA Contacts

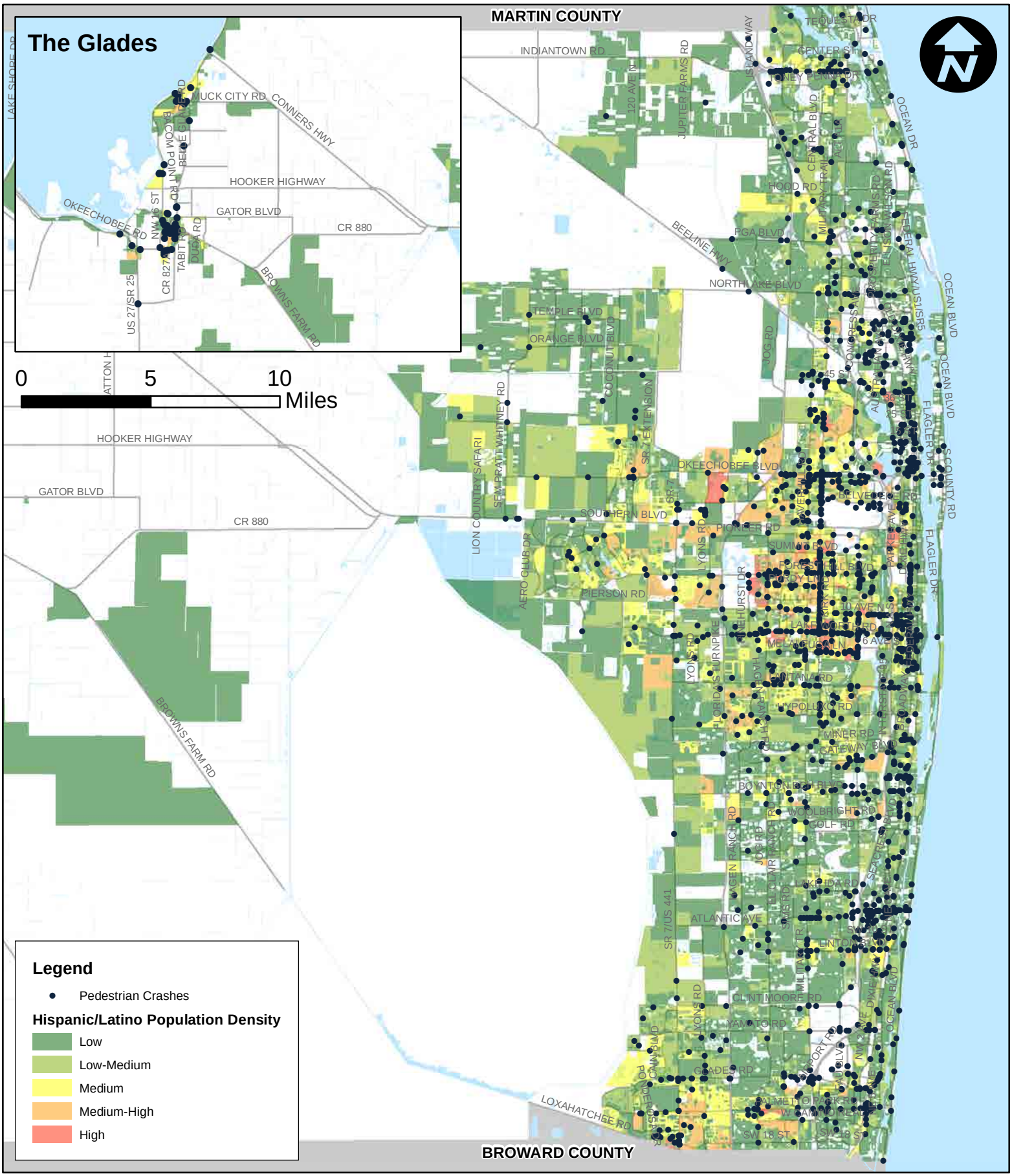
Office of Safety: Tamara Redmon, tamara.redmon@dot.gov, 202-366-4077
FHWA Office of Research: Ann Do, ann.do@dot.gov, 202-493-3319
FHWA Resource Center: Peter Eun, peter.eun@dot.gov, 360-753-9551
FHWA Web site: http://safety.fhwa.dot.gov/policy/memo071008/#ped_refuge

Appendix B
Crash Data Maps

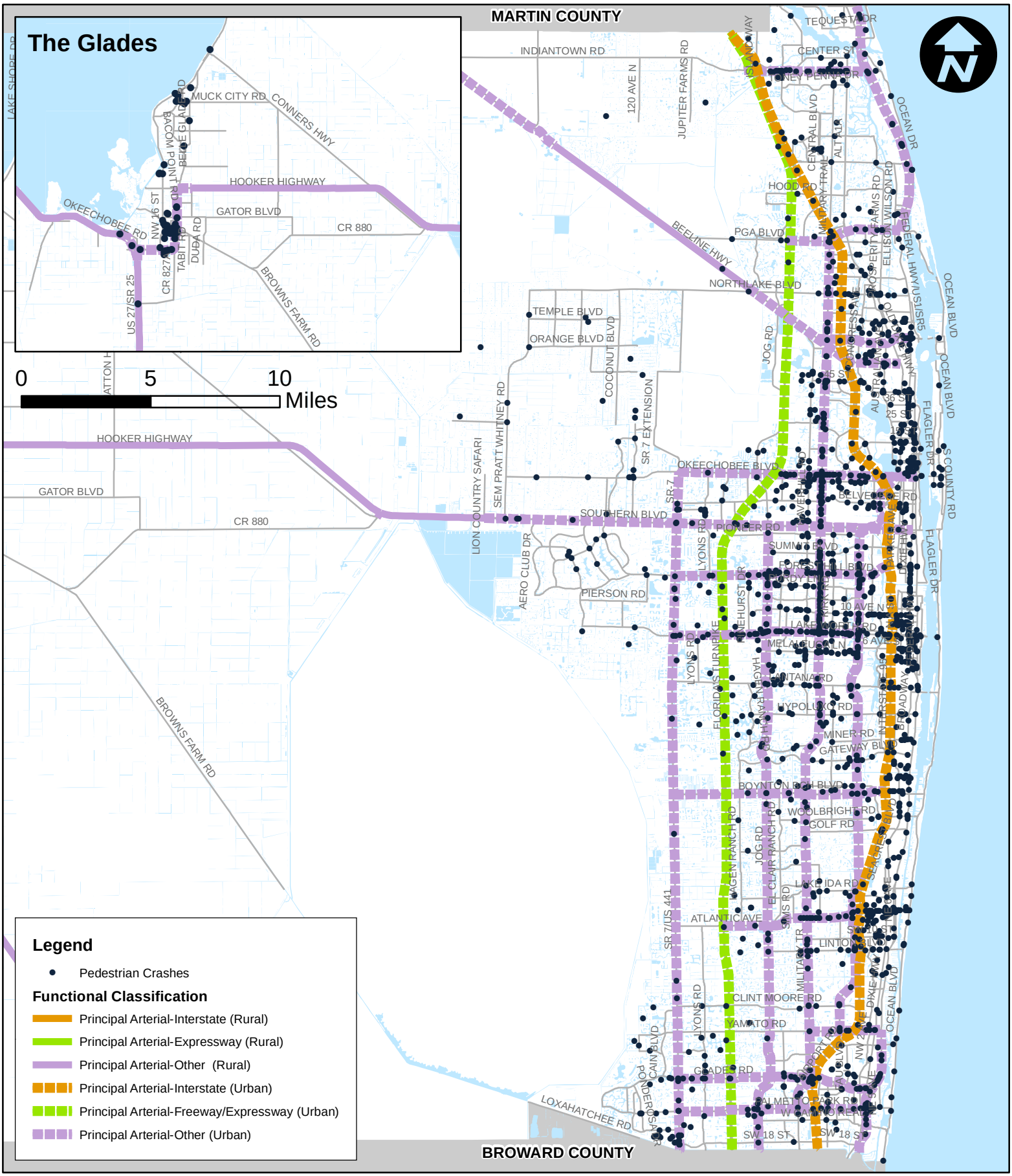
Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Pedestrian Crashes



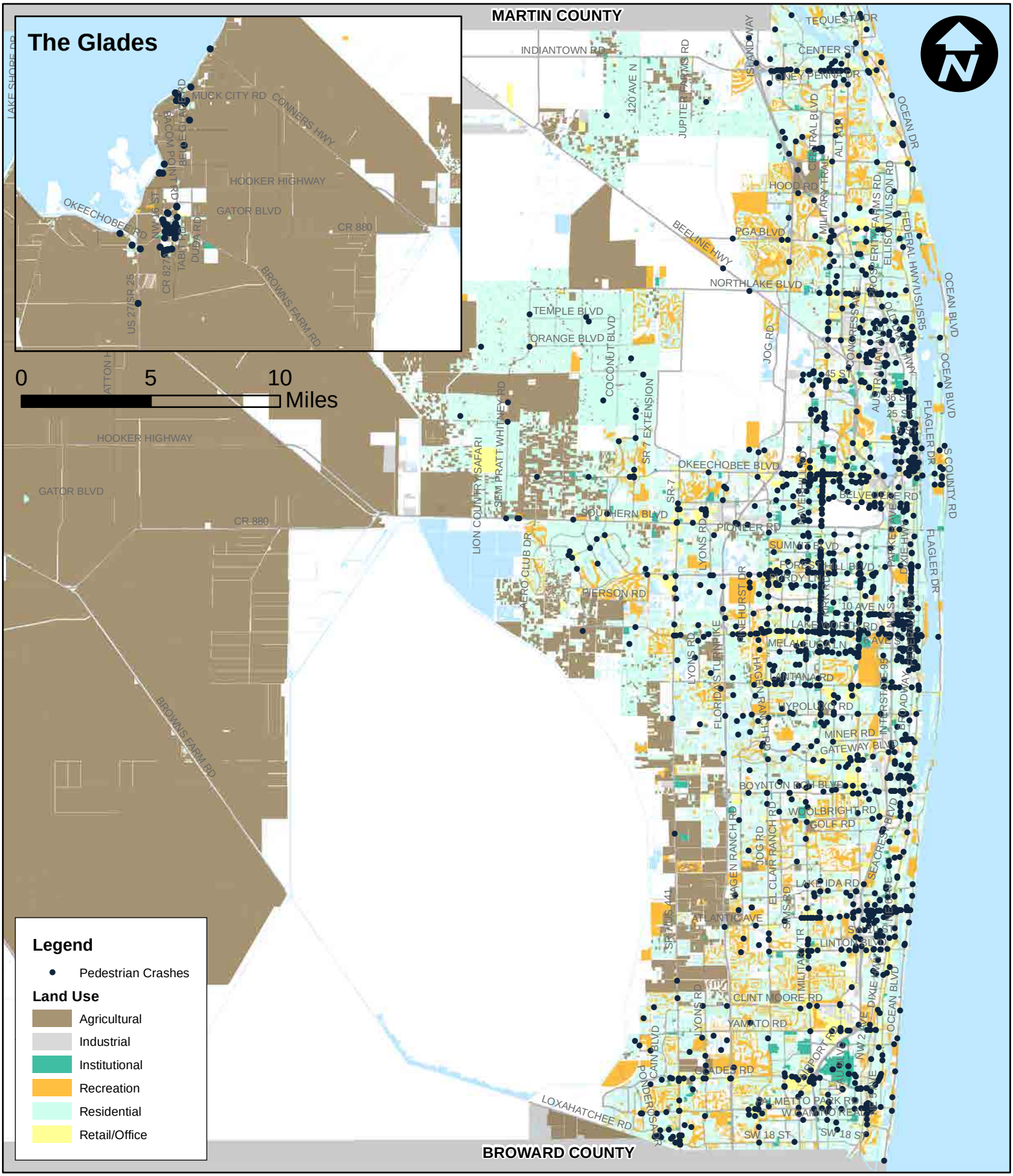
Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Pedestrian Crashes



Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Pedestrian Crashes

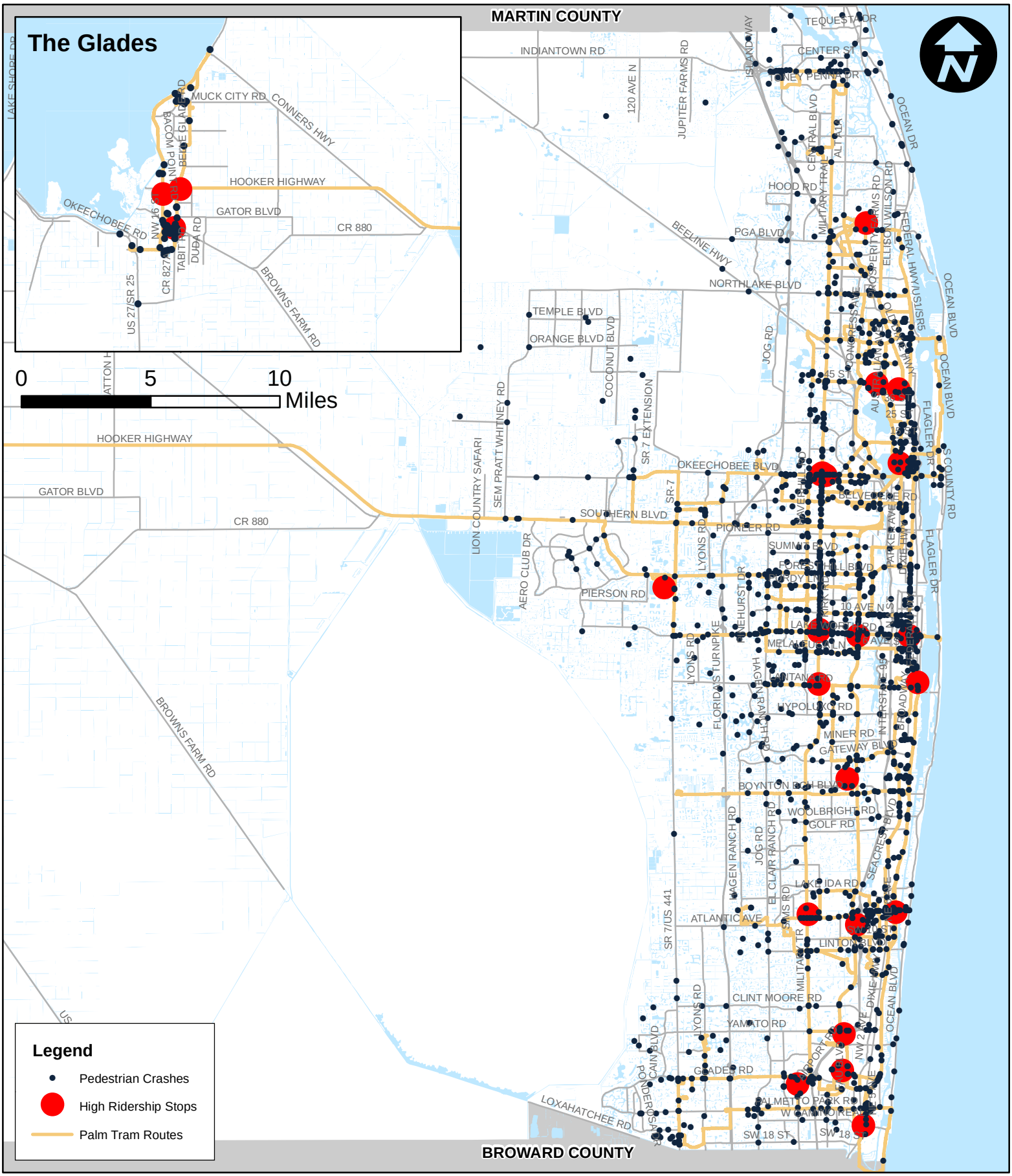


Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Pedestrian Crashes



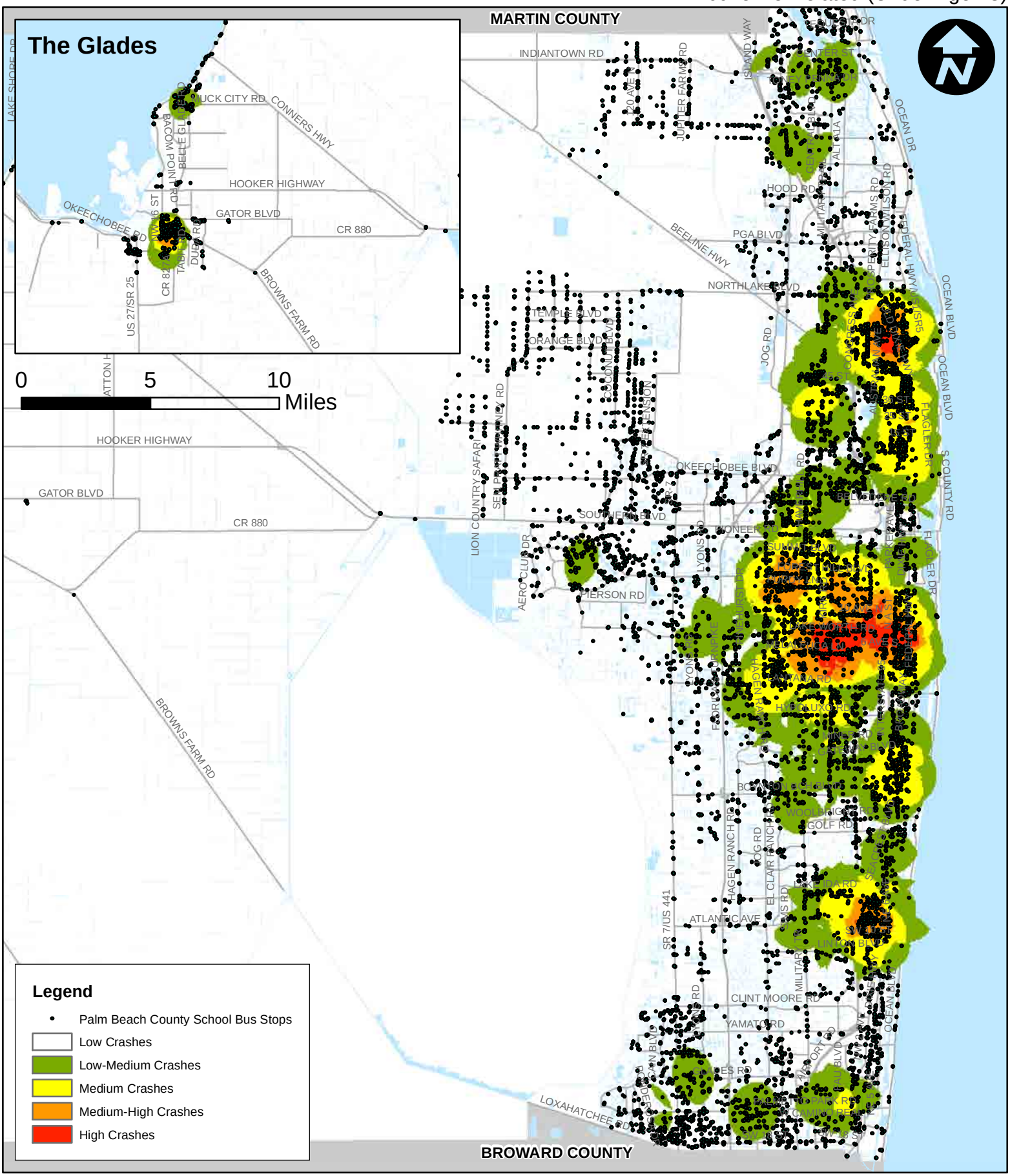
Source: Palm Beach County

Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Pedestrian Crashes



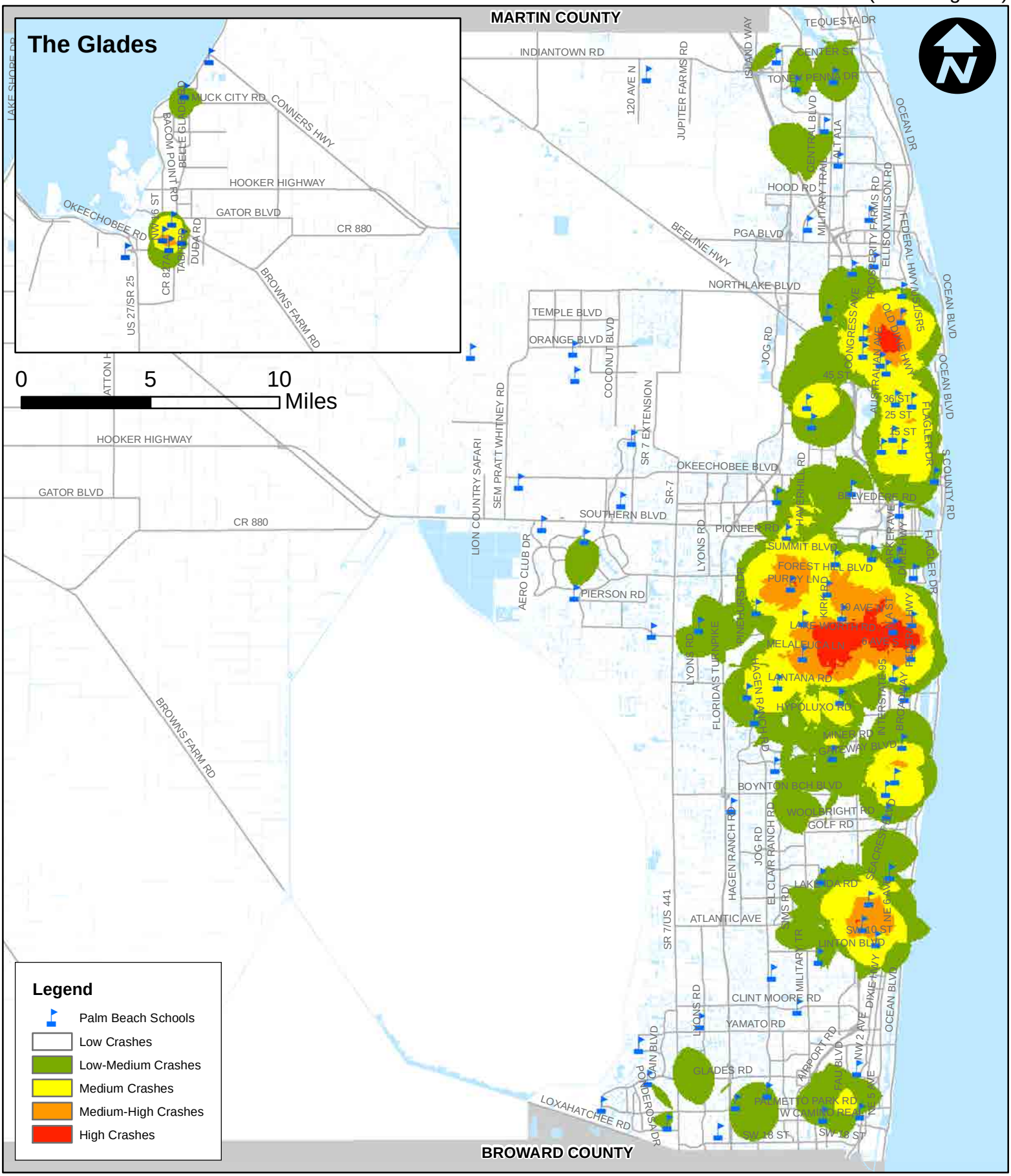
Palm Beach MPO
Pedestrian and Bicycle Safety Study

2010-2014 Pedestrian Crashes
Juvenile Related (Under Age 18)

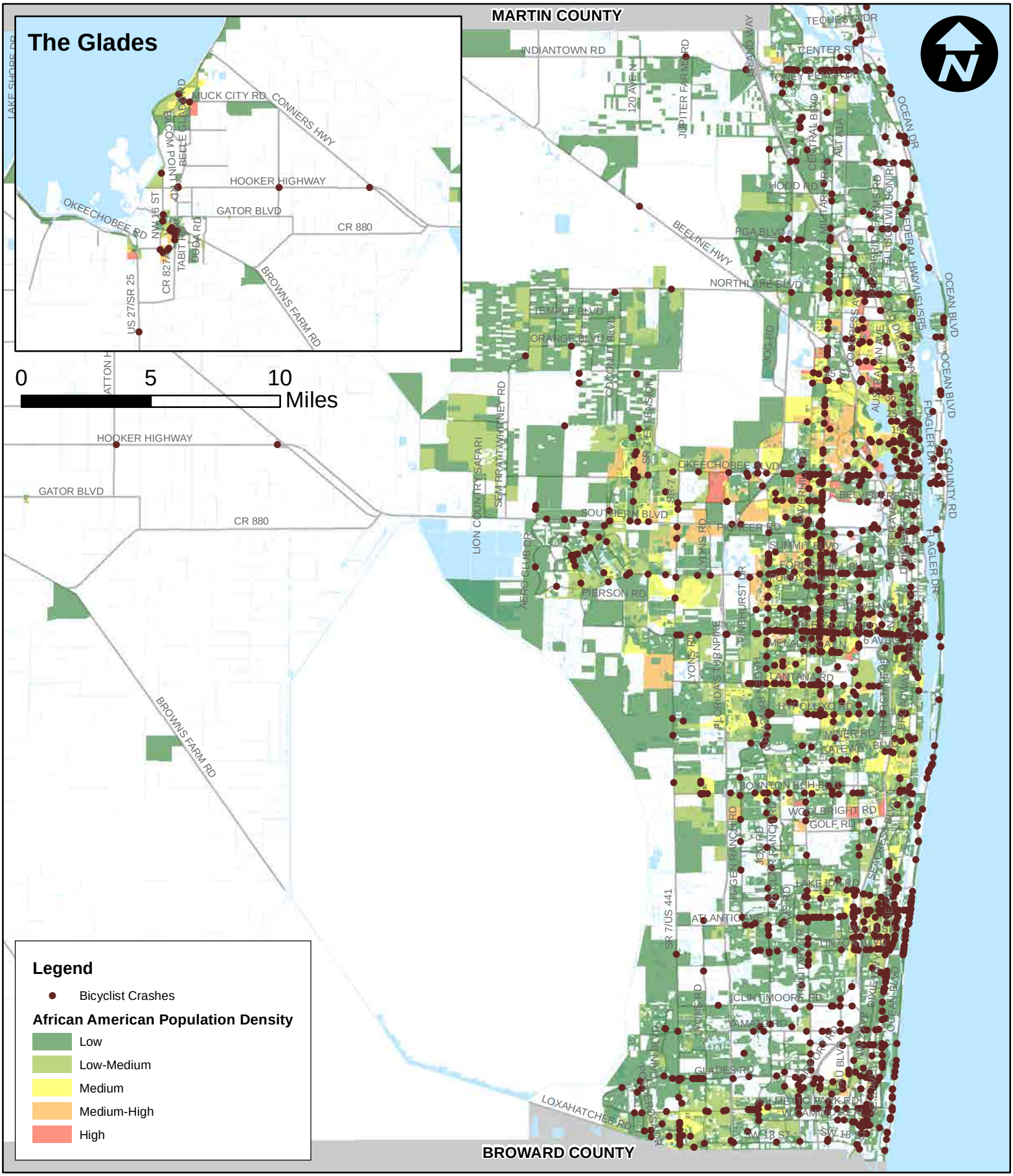


Palm Beach MPO
Pedestrian and Bicycle Safety Study

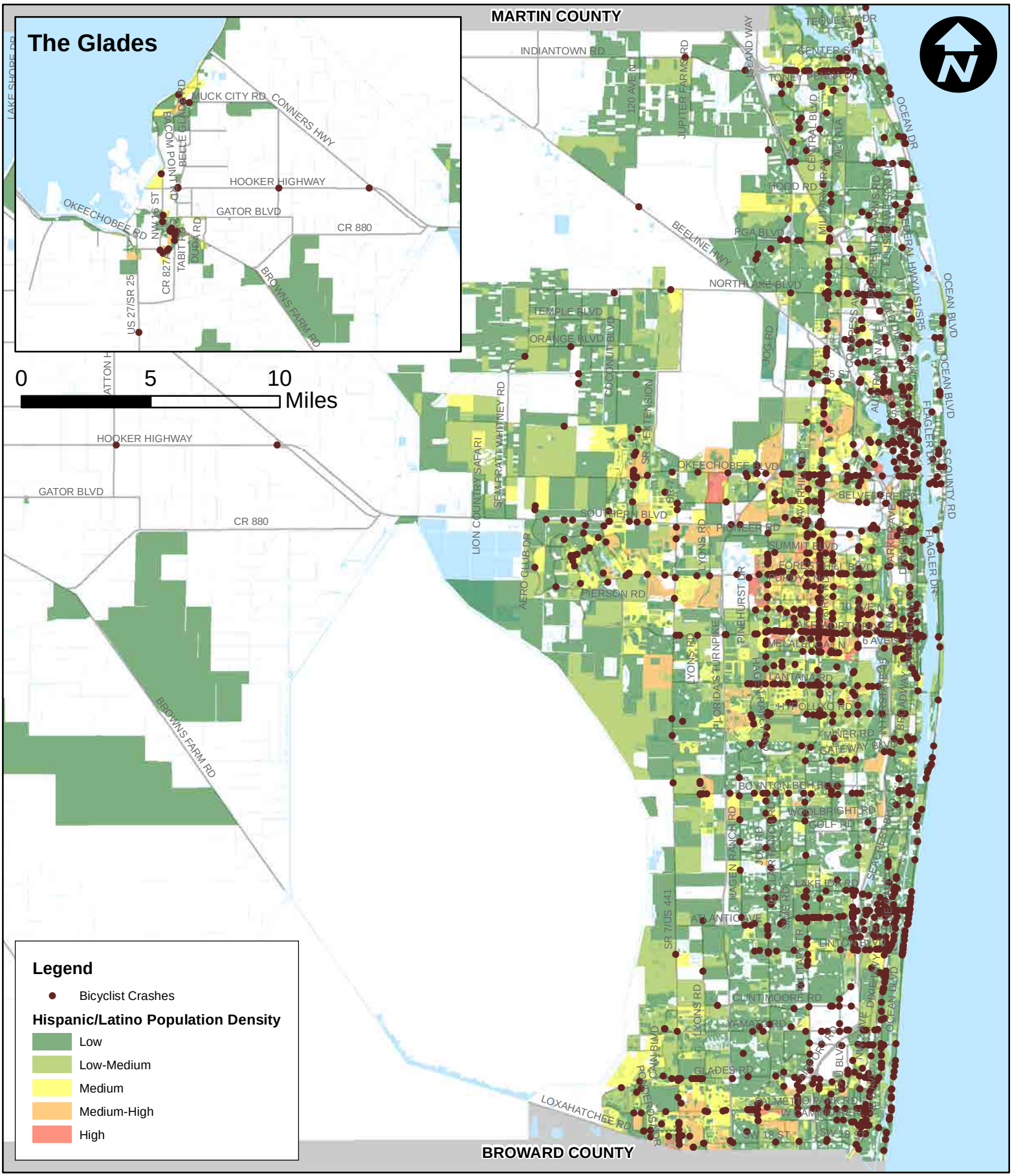
2010-2014 Pedestrian Crashes
Juvenile Related (Under Age 18)



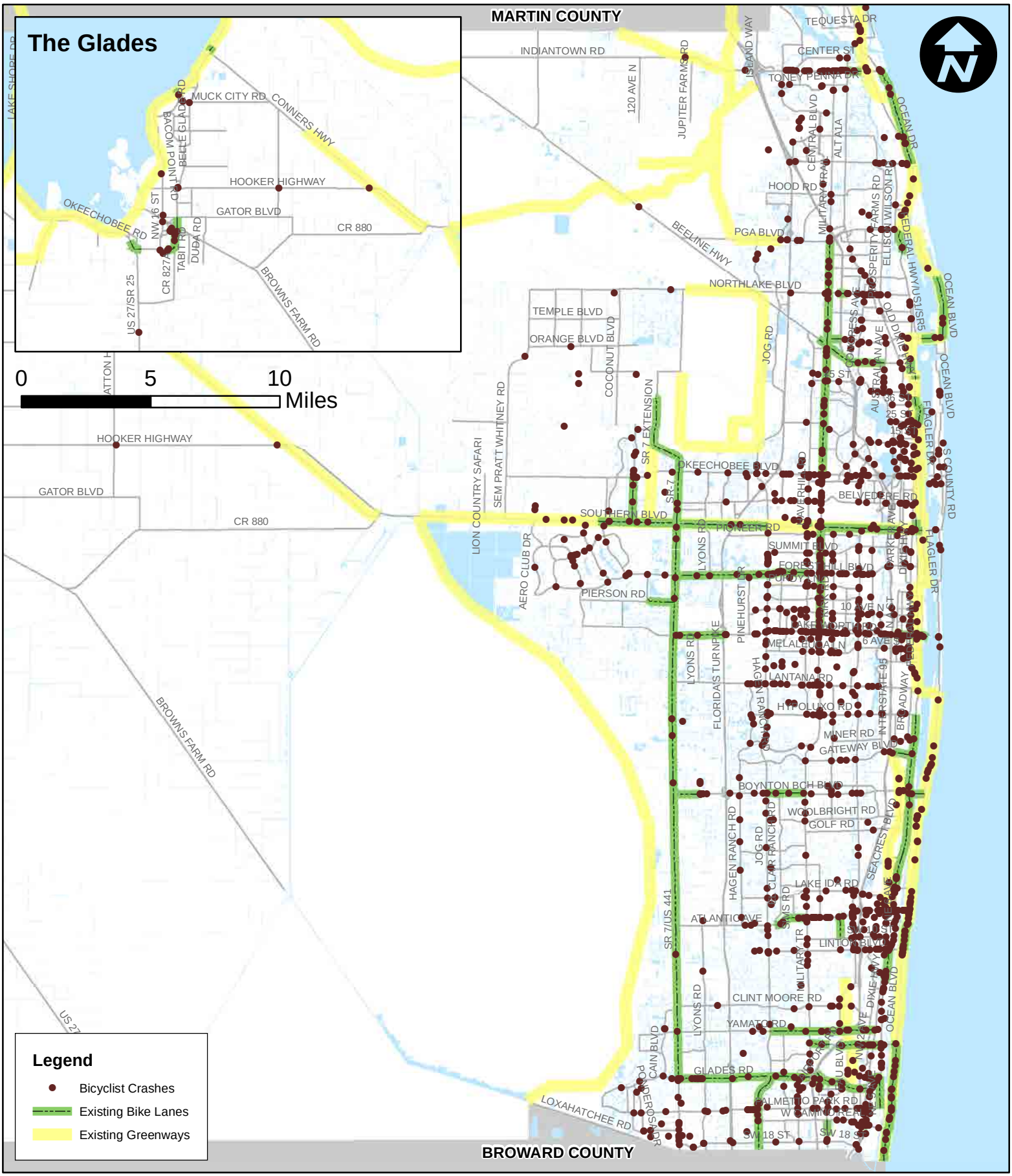
Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Bicyclist Crashes



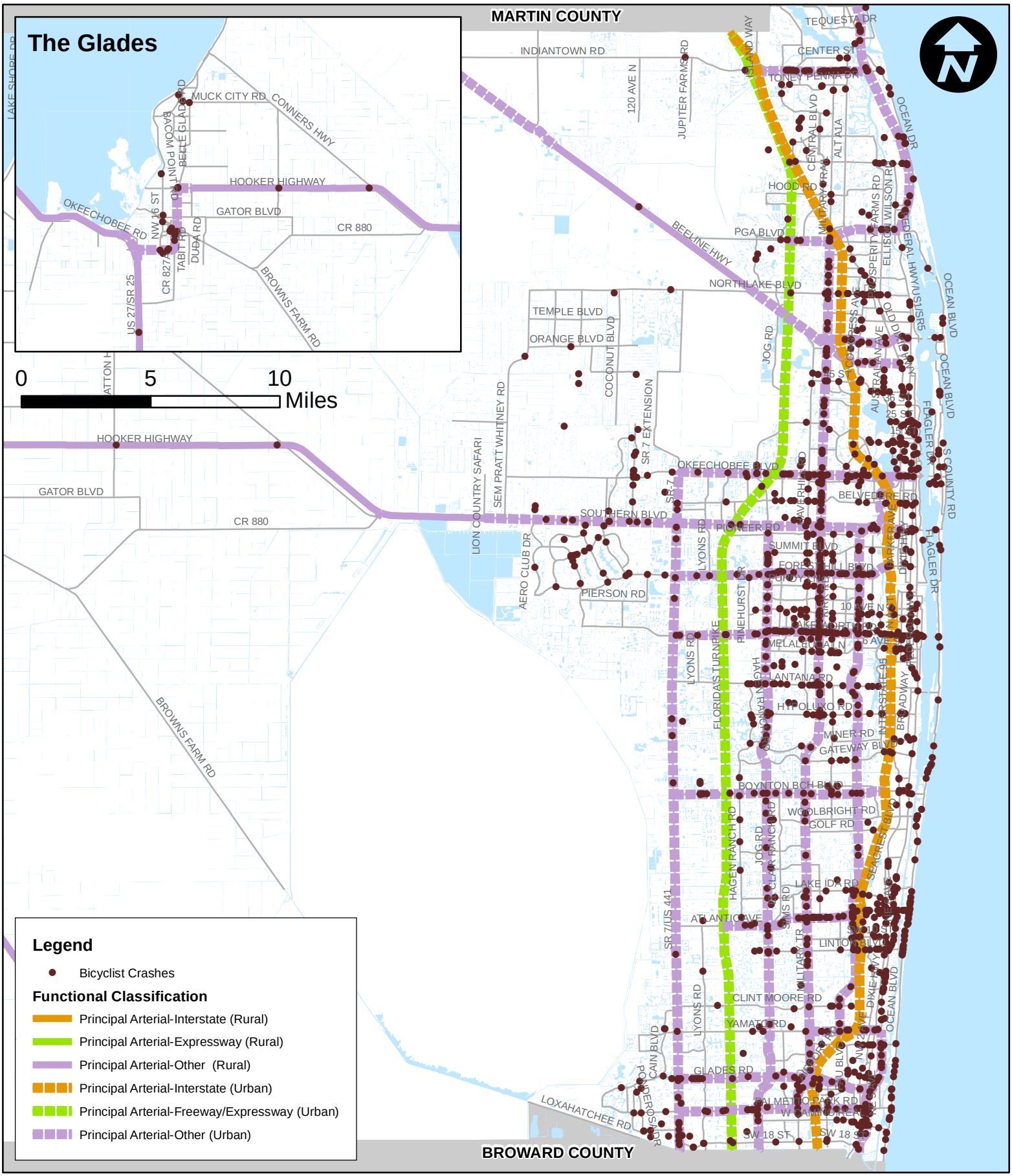
Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Bicyclist Crashes



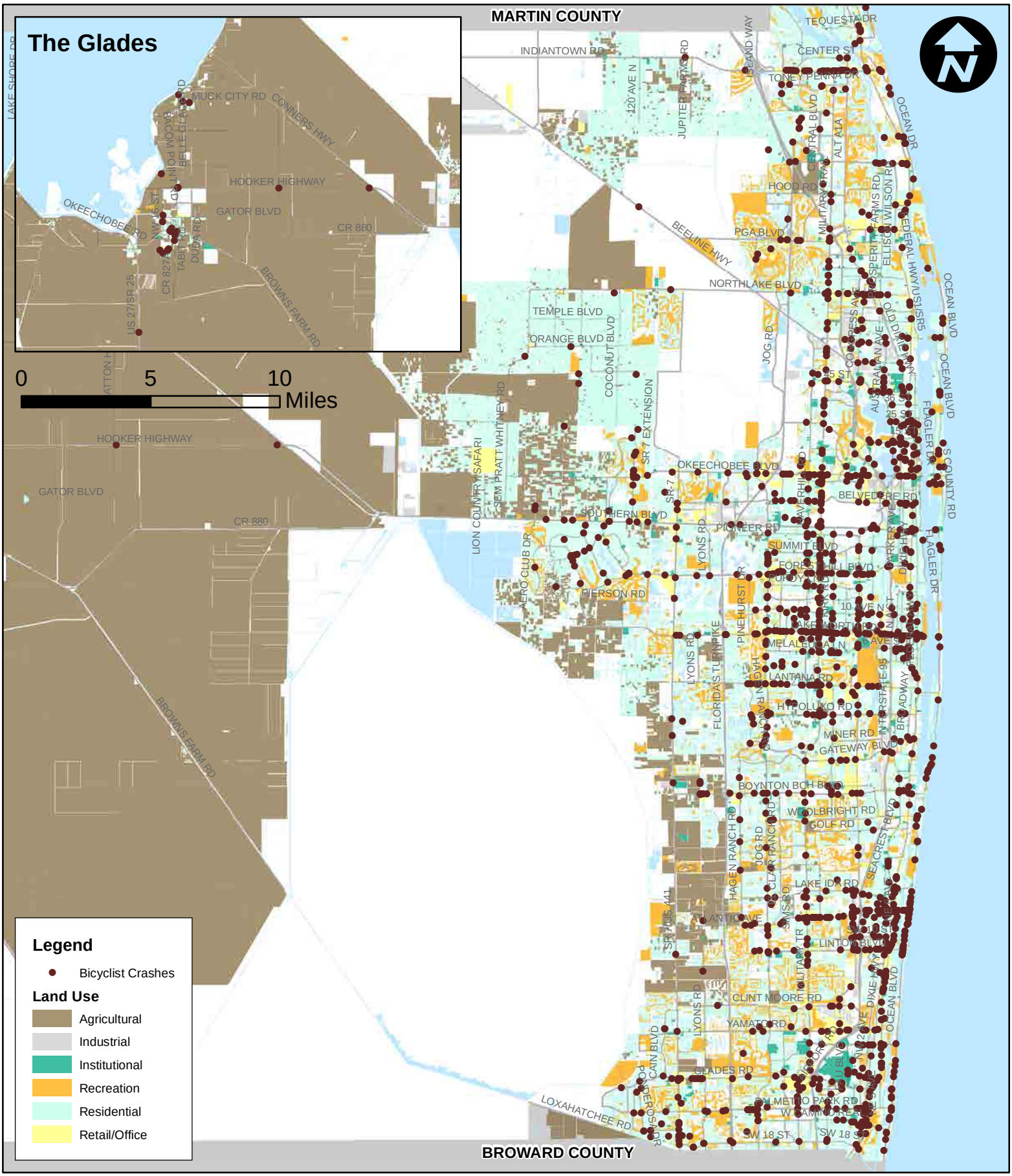
Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Bicyclist Crashes



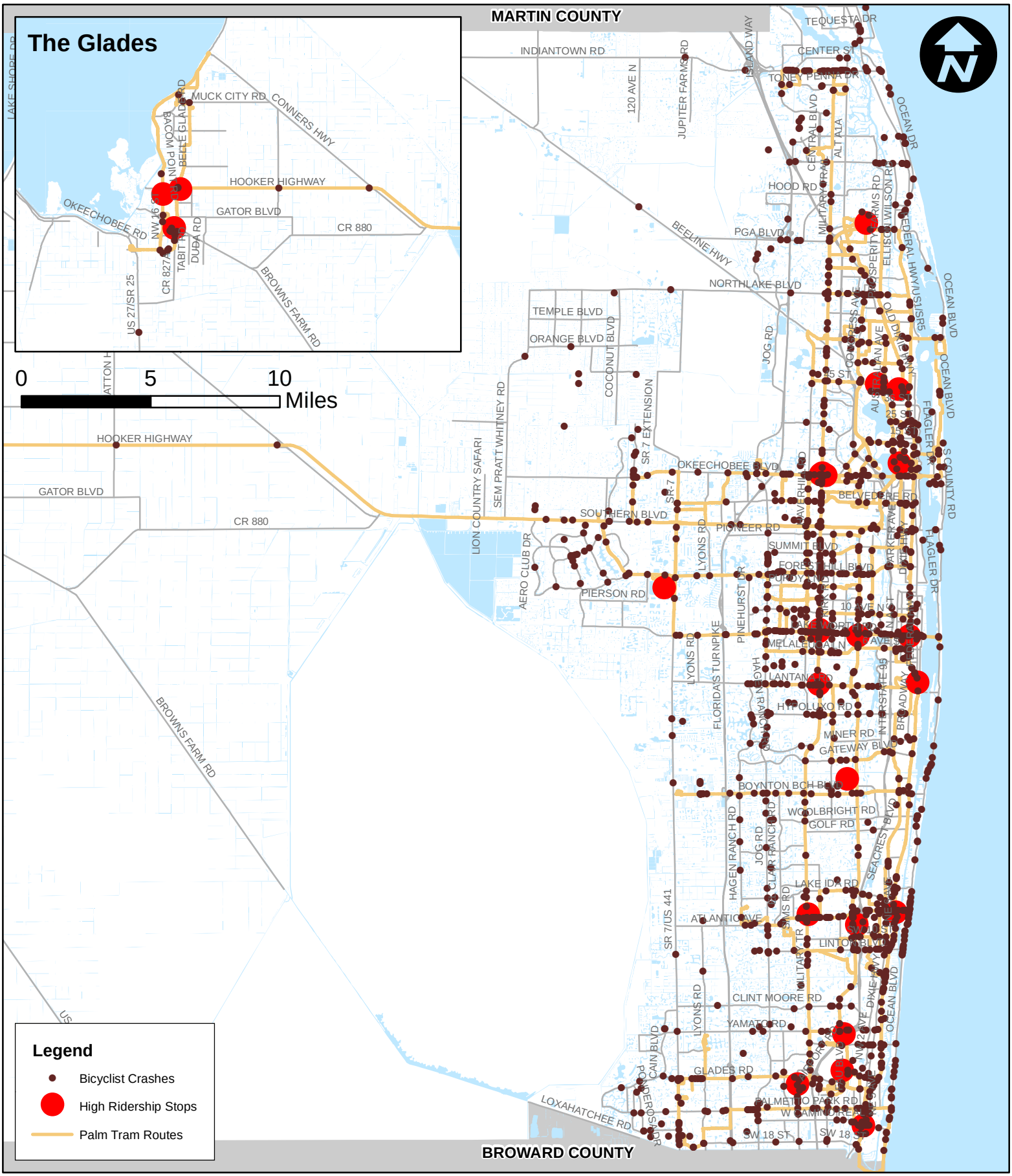
Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Bicyclist Crashes



Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Bicyclist Crashes

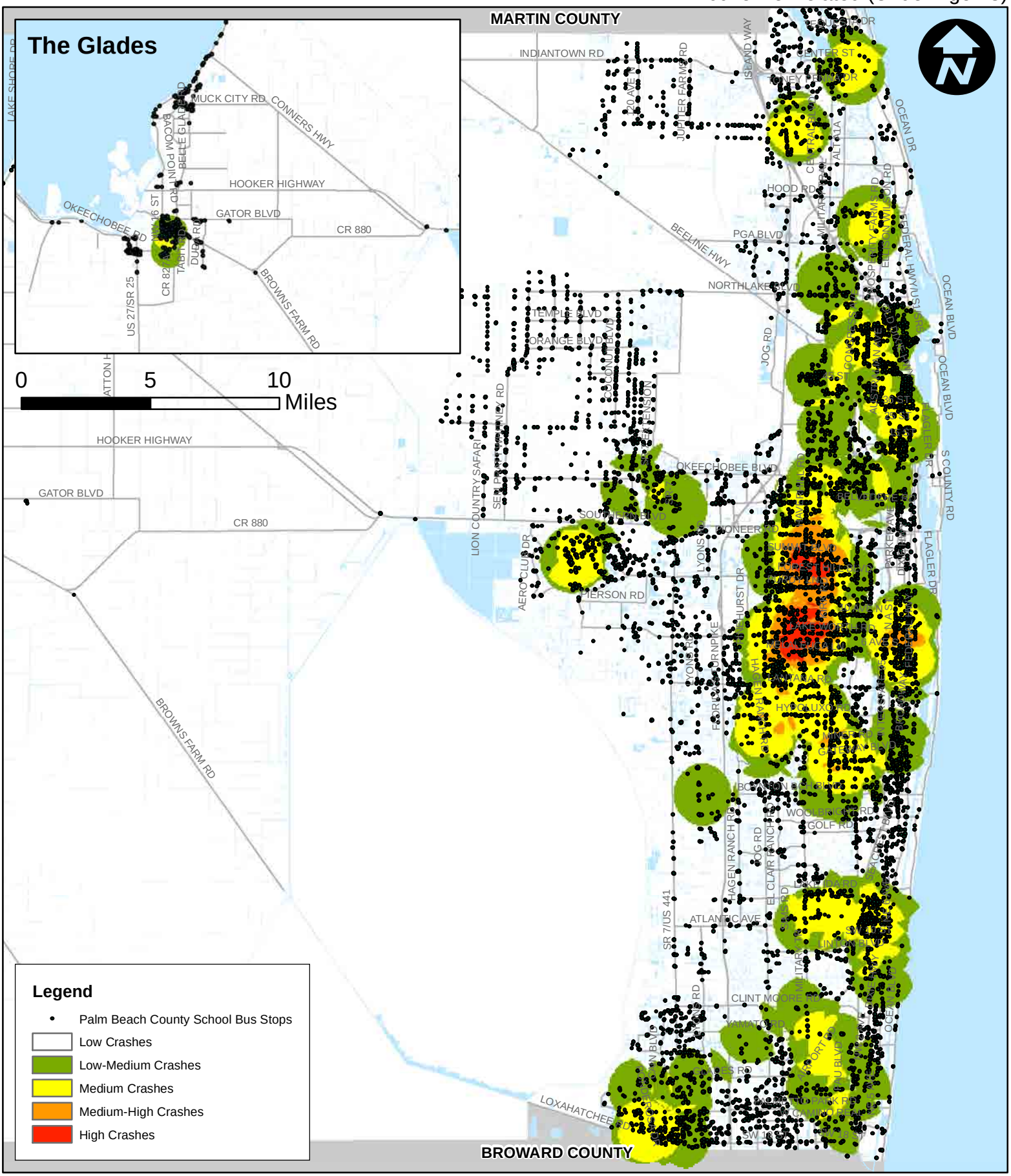


Palm Beach MPO
Pedestrian and Bicycle Safety Study
2010-2014 Bicyclist Crashes



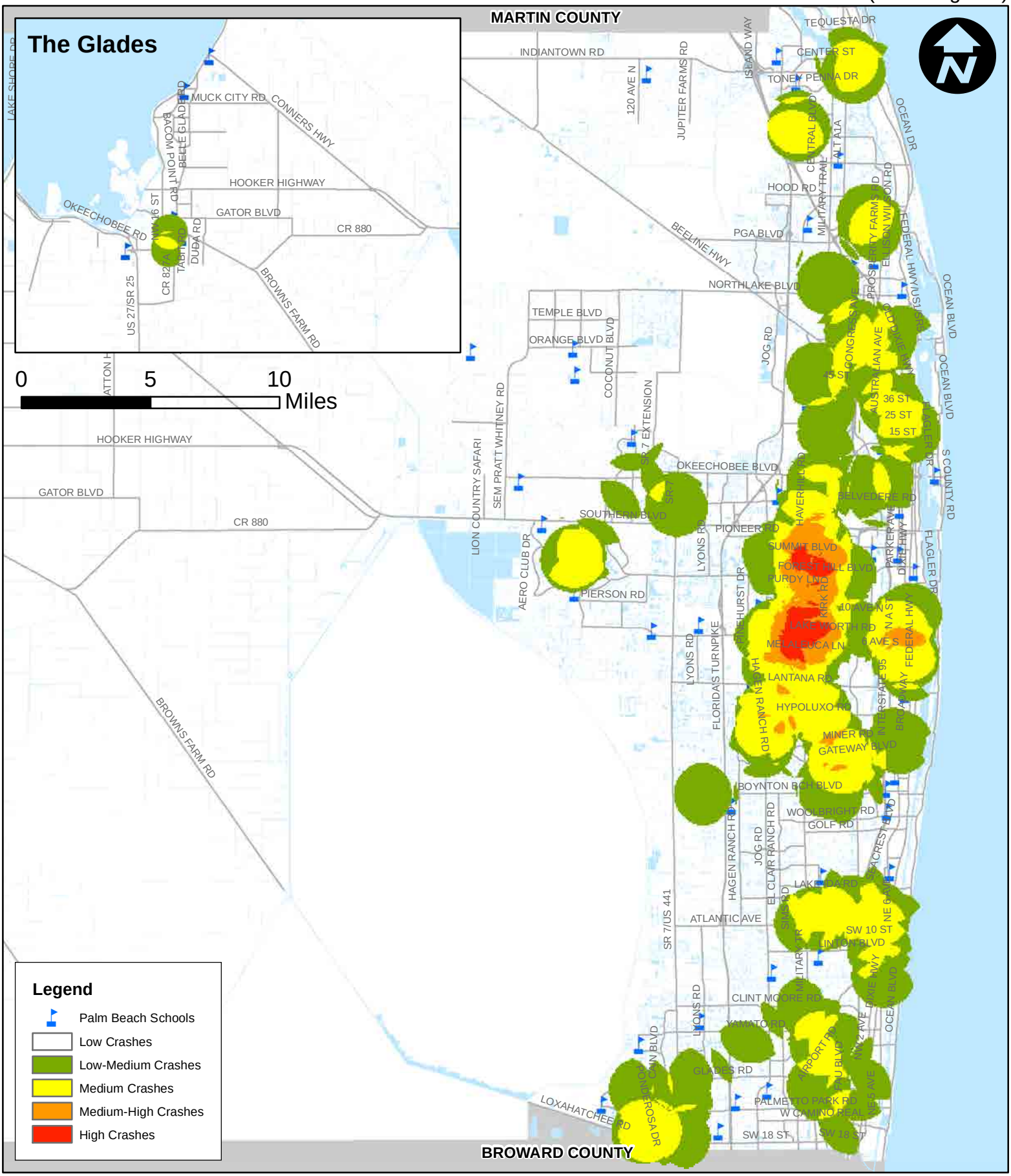
Palm Beach MPO
Pedestrian and Bicycle Safety Study

2010-2014 Bicyclist Crashes
Juvenile Related (Under Age 18)



Palm Beach MPO
Pedestrian and Bicycle Safety Study

2010-2014 Bicyclist Crashes
Juvenile Related (Under Age 18)



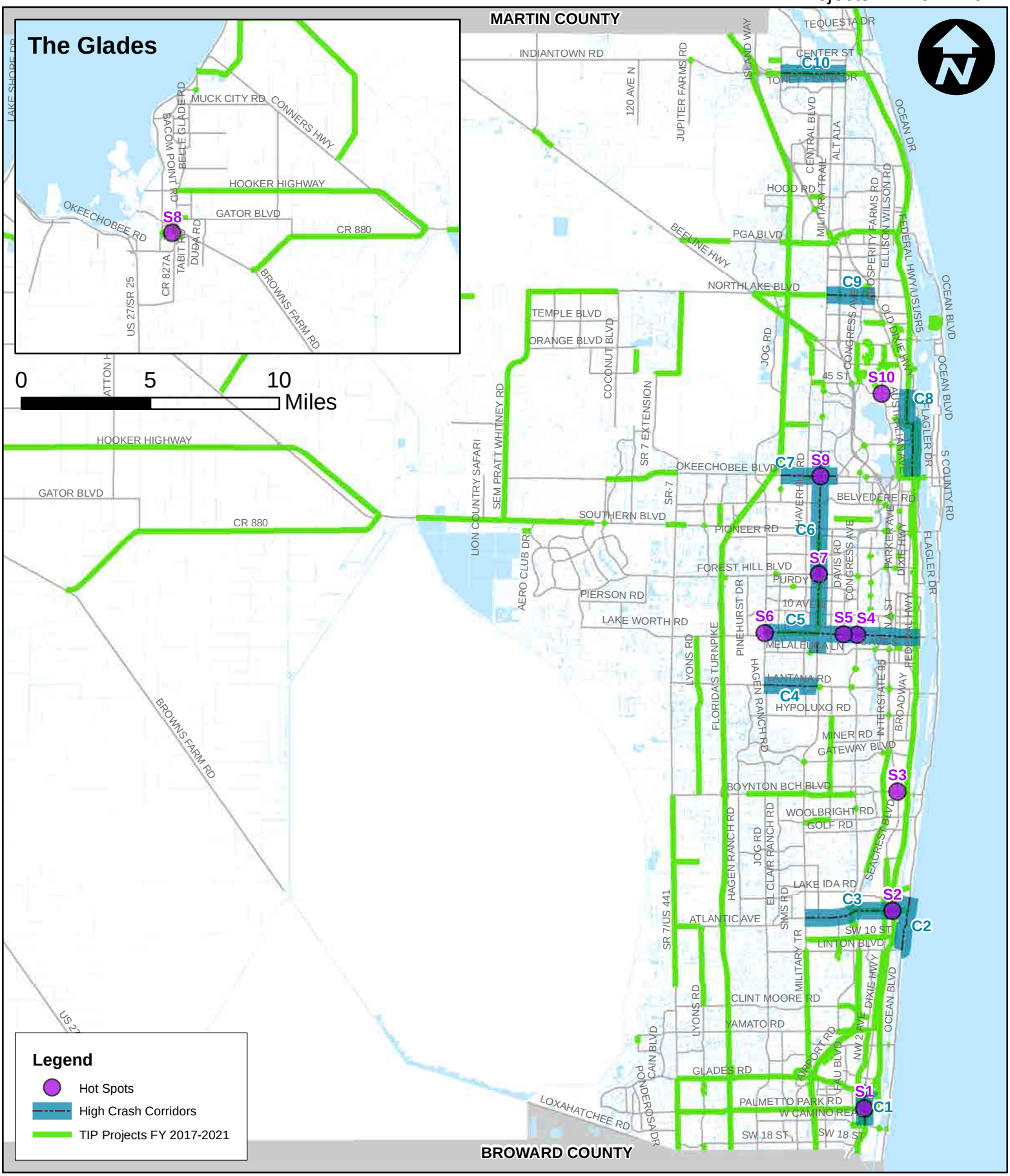
Appendix C
Transportation Improvements Program (TIP) Projects FY 2017-2021

Top 10 Hot Spots and adjacent TIP Projects FY 2017 – 2021						
Map ID	**Location**	**TIP Funding Program**	**Project Number**	**Location**	**Improvement**	**Total Cost**
S1	Palmetto Park Rd at Federal Hwy	Local Initiatives	435160-1	SR 7 to NW 2nd Ave	Construct 10ft multi-use pathway on the south side of roadway	$3,154,565
S2	Atlantic Avenue at NE 5 Ave/ Old Dixie Hwy	Major MPO Projects	438400-1	Tri-Rail Station to Atlantic	Purchase Delray Beach Trolleys (replacement)	$860,000
S3	Boynton Beach Blvd at Seacrest Blvd	SIS Capacity	434722-1	I-95/SR-9 at Atlantic Ave interchange	Add Lanes, New SIS Connector Project	$13,044,601
		Major Maintenance	432344-1	Boynton Beach from W. of Palm Isle Drive to Congress Ave	Resurfacing	$6,557,900
S4	Lake Worth Rd at Congress Ave	--	--	--	--	--
S5	Lake Worth Rd at Davis Rd	--	--	--	--	--
S6	Lake Worth Rd at Jog Rd	Minor Projects	201250-5	Lake Worth Rd at Jog Rd.	Intersection Improvement	$630,000
S7	Military Trail at Forest Hill Blvd	Major Maintenance	428719-1	Military Trail from Lake Worth Road to S. of Southern Blvd	Resurfacing	$12,068,128
S8	Dr. Martin Luther King Jr. Blvd at SW 5th St	Transportation Alternatives	438291-1	Various Belle Glade Neighborhoods	Sidewalk	$877,000
		Railroads	438887-1	SR 715 SCFC Crossing No.272312H	Rail Safety Project	$32,000
		Local Initiatives	438392-1	Various locations along existing bus routes (30 total)	Public Transportation Shelter	$600,000
S9	Okeechobee Blvd at Military Trail	Minor Projects	437740-1	Military Trail at Adult Education Center, N. of Okeechobee Blvd	Traffic Signals	$268,037
		Minor Projects	438392-1	Various locations along existing bus routes (30 total)	Public Transportation Shelter	$600,000
S10	45th St at Australian Ave	--	--	--	--	--

Top 10 High Crash Corridors and adjacent TIP Projects FY 2017 – 2021						
Map ID	**Location**	**TIP Funding Program**	**Project Number**	**Location**	**Improvement**	**Total Cost**
C1	Federal Highway from Camino Real to Glades Rd	Major MPO Projects	438386-1	Camino Real to Indiantown Rd	New express bus service with associated multimodal corridor improvements	$54,500,000
C2	Ocean Boulevard from Linton Boulevard to Thomas Street	--	--	--	--	--
C3	Atlantic Avenue from Military Trail to Ocean Boulevard	Local Initiatives	438400-1	Tri-rail Station to Atlantic Ave/A1A	Delray Beach Trolleys	$860,000
C4	Lantana Road from Jog Road to Military Trail	--	--	--	--	--
C5	Lake Worth Road from Jog Road to Lakeside Drive	Minor Projects	201250-5	Lake Worth Rd at Jog Rd.	Intersection Improvement	$630,000
		Minor Projects	436113-1	Lake Worth Rd from Sherwood Forest Blvd to Military Trail	Lighting	$427,821
C6	Military Trail from Melaleuca Lane to Community Drive	Major Maintenance	428719-1	Military Trail from Lake Worth Rd to S. of Southern Blvd	Resurfacing	$12,068,128
		Local Initiatives	438392-1	Various locations along existing bus routes (30 total)	Public Transportation Shelter	$600,000
		Major Maintenance	437878-1	Military Trail at Forest Hill Blvd	Intersection Improvement	$11,143,836
C7	Okeechobee Road from Drexel Road to Congress Avenue	Minor Projects	201353-4	Okeechobee Blvd. at Church St.	Intersection Improvement	$2,200,000
C8	US 1 from Okeechobee Boulevard to 49th Street	Major MPO Projects	438386-1	Camino Real to Indiantown Rd	New express bus service with associated multimodal corridor improvements	$54,500,000
C9	Northlake Boulevard from Military Trail to Alt A1A	O&M Roadways	201551-5	Northlake Blvd from S.R. 710 to Military Trail	Safety Improvements and Resurfacing	$1,500,000
C10	Indiantown Road from Central Boulevard to Alt A1A	Local Initiatives	432883-3	Island Way to U.S. 1	Install Adaptive Signal Technology. Install patterned pavement crosswalk improvements at signalized intersections from 67th Road to Alt A1A.	$3,922,000

Palm Beach MPO
Pedestrian and Bicycle Safety Study

Top 10 Hot Spots & Top 10 High Crash Corridors
TIP Projects FY 2017-2021



Appendix D
Individual Spots/Corridors

Palm Beach MPO
Pedestrian and Bicycle Safety Study
S1 (Palmetto Park Road at Federal Highway)

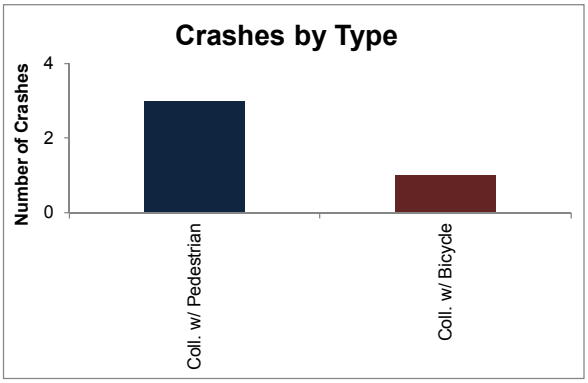
Executive Summary
Table 4

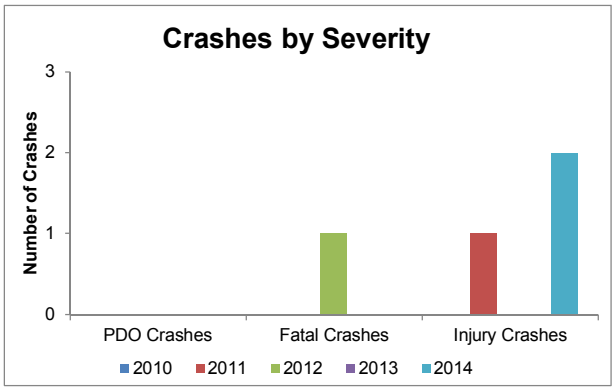
Palmetto Park Road at Federal Highway (S1)

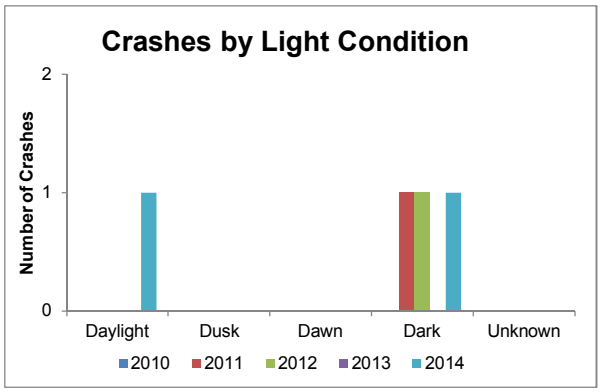
Palmetto Park Road at Federal Highway (S1)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	0	1	1	0	1	3	0.60	75.0%
	Coll. w/ Bicycle	0	0	0	0	1	1	0.20	25.0%
	Total Crashes	**0**	**1**	**1**	**0**	**2**	**4**	**0.80**	**100.0%**
Severity	PDO Crashes	0	0	0	0	0	0	0.00	0.0%
	Fatal Crashes	0	0	1	0	0	1	0.20	25.0%
	Injury Crashes	0	1	0	0	2	3	0.60	75.0%
Lighting Conditions	Daylight	0	0	0	0	1	1	0.20	25.0%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	1	1	0	1	3	0.60	75.0%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	0	1	1	0	2	4	0.80	100.0%
	Wet	0	0	0	0	0	0	0.00	0.0%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	0	0	0	0	0.00	0.0%
	February	0	1	0	0	1	2	0.40	50.0%
	March	0	0	0	0	1	1	0.20	25.0%
	April	0	0	0	0	0	0	0.00	0.0%
	May	0	0	0	0	0	0	0.00	0.0%
	June	0	0	0	0	0	0	0.00	0.0%
	July	0	0	0	0	0	0	0.00	0.0%
	August	0	0	0	0	0	0	0.00	0.0%
	September	0	0	0	0	0	0	0.00	0.0%
	October	0	0	1	0	0	1	0.20	25.0%
	November	0	0	0	0	0	0	0.00	0.0%
	December	0	0	0	0	0	0	0.00	0.0%
Day of Week	Sunday	0	1	0	0	0	1	0.20	25.0%
	Monday	0	0	1	0	0	1	0.20	25.0%
	Tuesday	0	0	0	0	0	0	0.00	0.0%
	Wednesday	0	0	0	0	0	0	0.00	0.0%
	Thursday	0	0	0	0	0	0	0.00	0.0%
	Friday	0	0	0	0	0	0	0.00	0.0%
	Saturday	0	0	0	0	2	2	0.40	50.0%
Hour of Day	00:00-06:00	0	0	0	0	0	0	0.00	0.0%
	06:00-09:00	0	0	0	0	0	0	0.00	0.0%
	09:00-11:00	0	0	0	0	0	0	0.00	0.0%
	11:00-13:00	0	0	0	0	0	0	0.00	0.0%
	13:00-15:00	0	0	0	0	0	0	0.00	0.0%
	15:00-18:00	0	0	0	0	1	1	0.20	25.0%
	18:00-24:00	0	1	1	0	1	3	0.60	75.0%

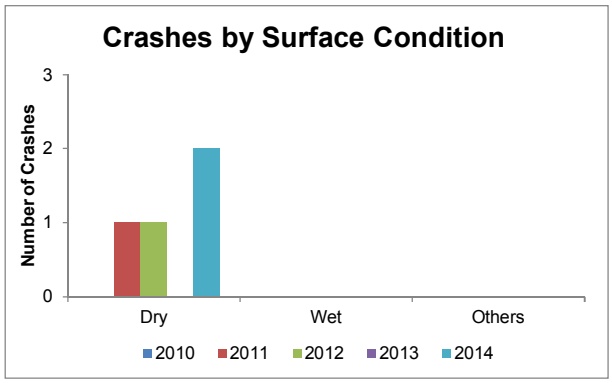
Palmetto Park Road at Federal Highway (S1)

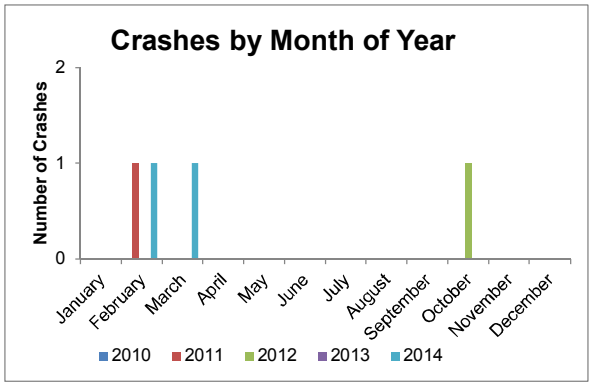
Crash Histograms

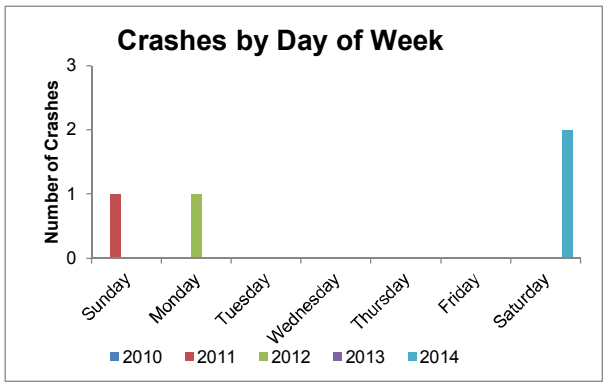












Palm Beach MPO
Pedestrian and Bicycle Safety Study

S2 (Atlantic Avenue at NE 5 Avenue/Old Dixie Highway)

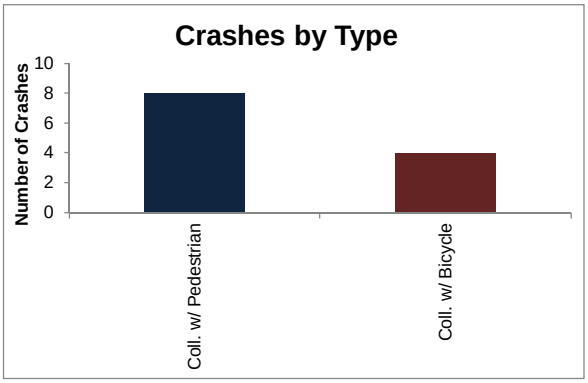
Executive Summary
Table 4

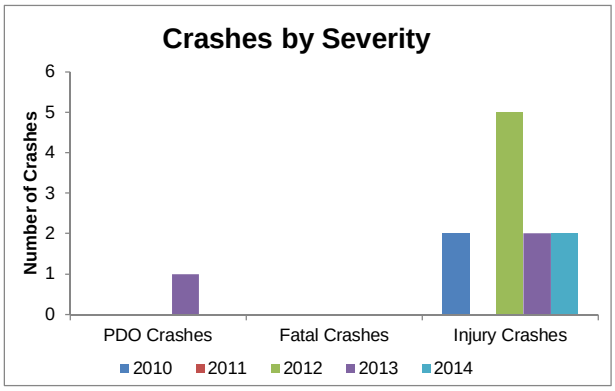
Atlantic Avenue at NE 5 Avenue/Old Dixie Highway (S2)

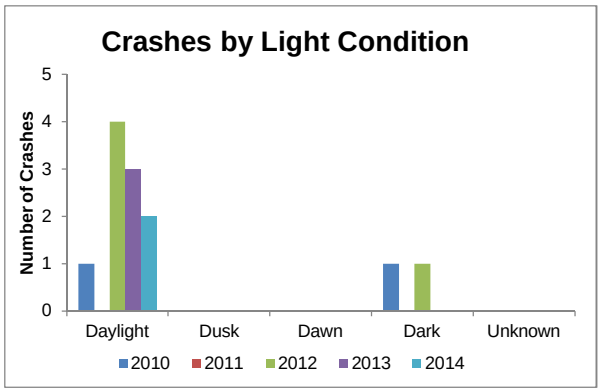
Atlantic Avenue at NE 5 Avenue/Old Dixie Highway (S2)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	2	0	3	3	0	8	1.60	66.7%
	Coll. w/ Bicycle	0	0	2	0	2	4	0.80	33.3%
	Total Crashes	**2**	**0**	**5**	**3**	**2**	**12**	**2.40**	**100.0%**
Severity	PDO Crashes	0	0	0	1	0	1	0.20	8.3%
	Fatal Crashes	0	0	0	0	0	0	0.00	0.0%
	Injury Crashes	2	0	5	2	2	11	2.20	91.7%
Lighting Conditions	Daylight	1	0	4	3	2	10	2.00	83.3%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	1	0	1	0	0	2	0.40	16.7%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	2	0	4	3	2	11	2.20	91.7%
	Wet	0	0	1	0	0	1	0.20	8.3%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	0	0	0	0	0.00	0.0%
	February	0	0	0	0	0	0	0.00	0.0%
	March	0	0	0	0	0	0	0.00	0.0%
	April	0	0	0	0	1	1	0.20	8.3%
	May	1	0	0	0	0	1	0.20	8.3%
	June	0	0	0	0	0	0	0.00	0.0%
	July	1	0	0	0	0	1	0.20	8.3%
	August	0	0	0	0	0	0	0.00	0.0%
	September	0	0	3	0	0	3	0.60	25.0%
	October	0	0	2	2	1	5	1.00	41.7%
	November	0	0	0	0	0	0	0.00	0.0%
	December	0	0	0	1	0	1	0.20	8.3%
Day of Week	Sunday	1	0	0	0	0	1	0.20	8.3%
	Monday	1	0	1	0	0	2	0.40	16.7%
	Tuesday	0	0	0	1	0	1	0.20	8.3%
	Wednesday	0	0	1	0	0	1	0.20	8.3%
	Thursday	0	0	1	1	1	3	0.60	25.0%
	Friday	0	0	1	0	0	1	0.20	8.3%
	Saturday	0	0	1	1	1	3	0.60	25.0%
Hour of Day	00:00-06:00	1	0	0	0	0	1	0.20	8.3%
	06:00-09:00	0	0	0	1	0	1	0.20	8.3%
	09:00-11:00	0	0	1	1	1	3	0.60	25.0%
	11:00-13:00	1	0	0	1	0	2	0.40	16.7%
	13:00-15:00	0	0	2	0	0	2	0.40	16.7%
	15:00-18:00	0	0	1	0	1	2	0.40	16.7%
	18:00-24:00	0	0	1	0	0	1	0.20	8.3%

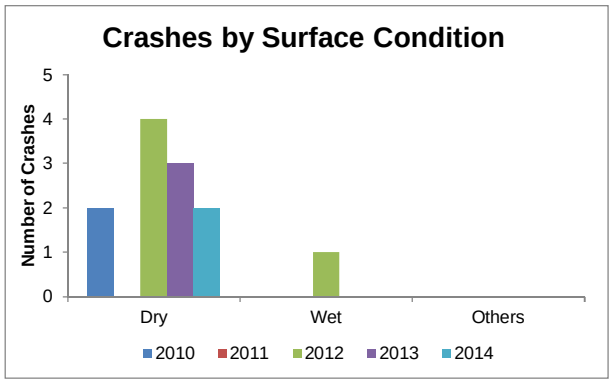
Atlantic Avenue at NE 5 Avenue/Old Dixie Highway (S2)

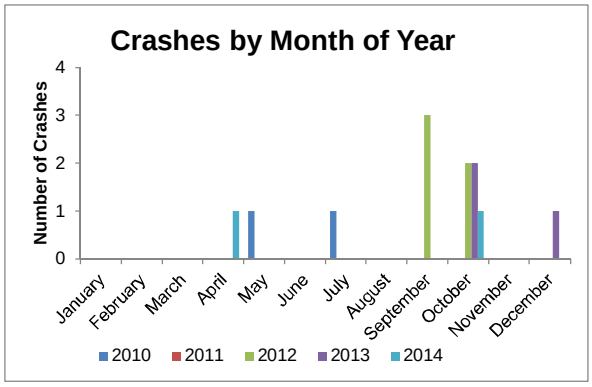
Crash Histograms

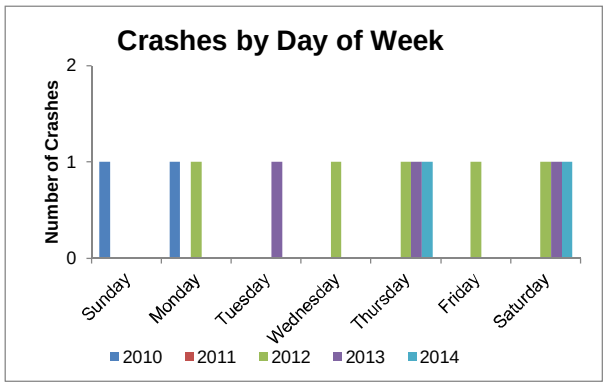






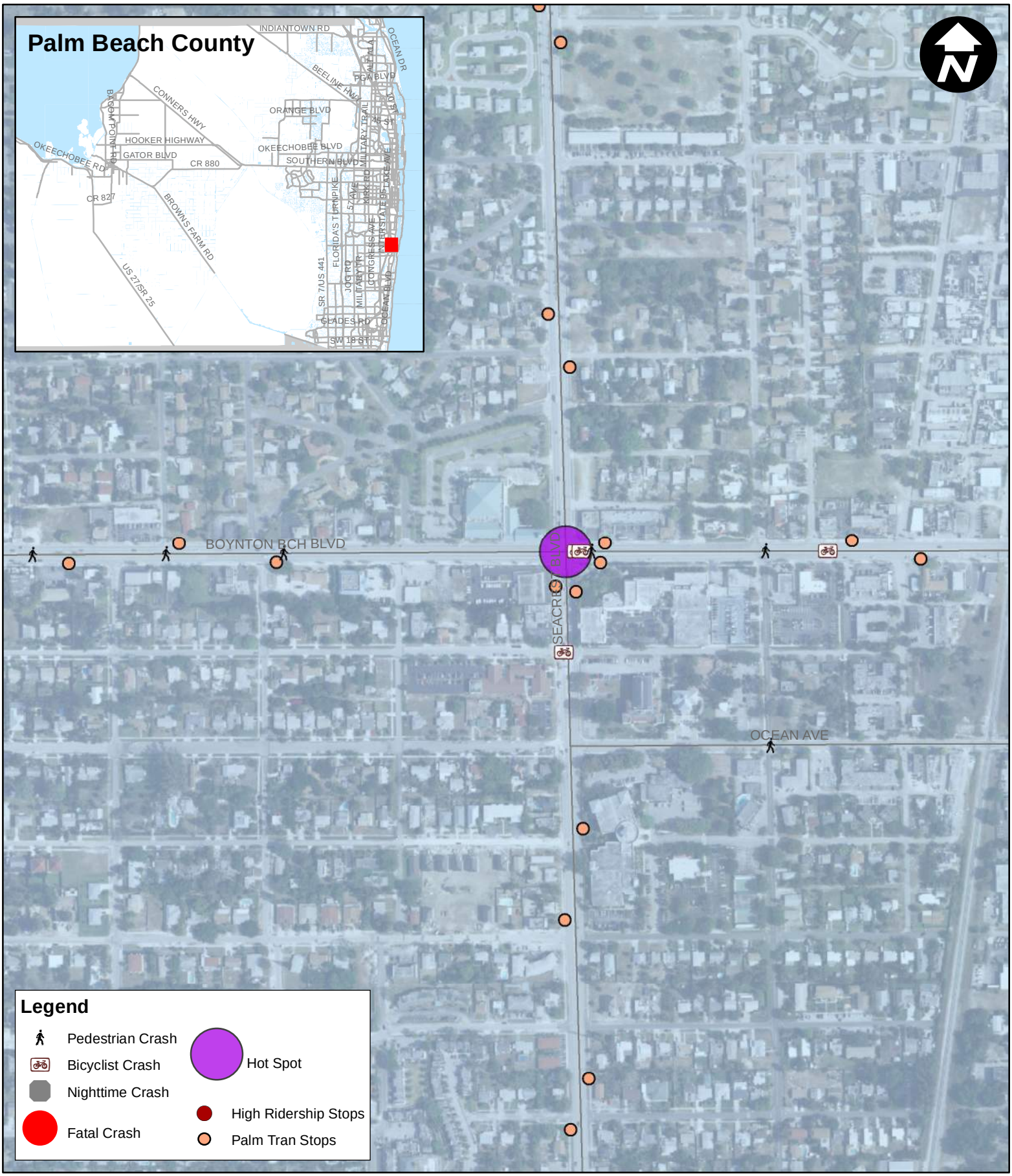






Palm Beach MPO
Pedestrian and Bicycle Safety Study

S3 (Boynton Beach Boulevard at Seacrest Boulevard)



Executive Summary
Table 4

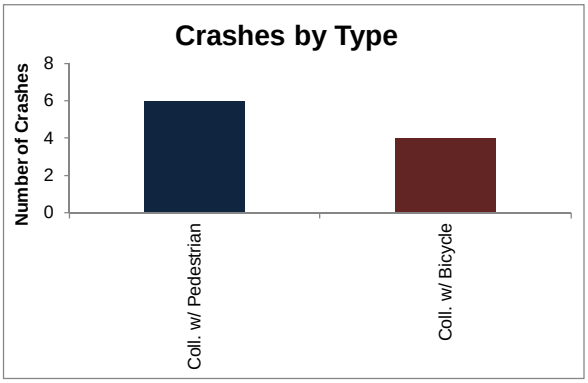
0 0.05 0.1 Miles

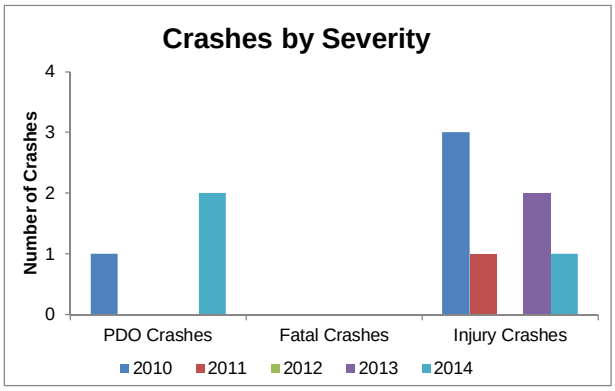
Boynton Beach Boulevard at Seacrest Boulevard (S3)

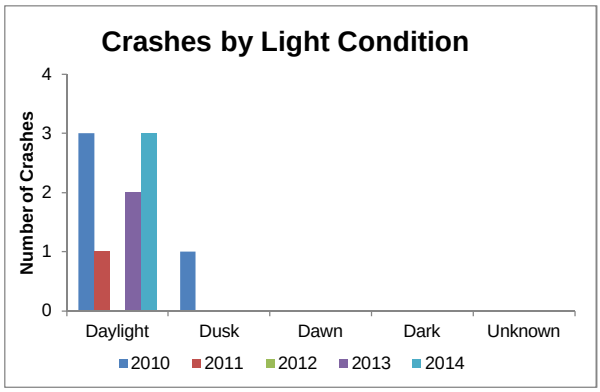
Boynton Beach Boulevard at Seacrest Boulevard (S3)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	2	0	0	2	2	6	1.20	60.0%
	Coll. w/ Bicycle	2	1	0	0	1	4	0.80	40.0%
	Total Crashes	**4**	**1**	**0**	**2**	**3**	**10**	**2.00**	**100.0%**
Severity	PDO Crashes	1	0	0	0	2	3	0.60	30.0%
	Fatal Crashes	0	0	0	0	0	0	0.00	0.0%
	Injury Crashes	3	1	0	2	1	7	1.40	70.0%
Lighting Conditions	Daylight	3	1	0	2	3	9	1.80	90.0%
	Dusk	1	0	0	0	0	1	0.20	10.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	4	1	0	2	3	10	2.00	100.0%
	Wet	0	0	0	0	0	0	0.00	0.0%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	1	0	0	0	0	1	0.20	10.0%
	February	0	0	0	0	1	1	0.20	10.0%
	March	0	0	0	1	1	2	0.40	20.0%
	April	0	1	0	0	1	2	0.40	20.0%
	May	0	0	0	0	0	0	0.00	0.0%
	June	0	0	0	0	0	0	0.00	0.0%
	July	0	0	0	0	0	0	0.00	0.0%
	August	1	0	0	0	0	1	0.20	10.0%
	September	0	0	0	0	0	0	0.00	0.0%
	October	0	0	0	0	0	0	0.00	0.0%
	November	0	0	0	0	0	0	0.00	0.0%
	December	2	0	0	1	0	3	0.60	30.0%
Day of Week	Sunday	0	0	0	1	1	2	0.40	20.0%
	Monday	2	0	0	0	1	3	0.60	30.0%
	Tuesday	0	1	0	0	0	1	0.20	10.0%
	Wednesday	0	0	0	0	1	1	0.20	10.0%
	Thursday	0	0	0	0	0	0	0.00	0.0%
	Friday	2	0	0	0	0	2	0.40	20.0%
	Saturday	0	0	0	1	0	1	0.20	10.0%
Hour of Day	00:00-06:00	0	0	0	0	0	0	0.00	0.0%
	06:00-09:00	0	0	0	0	0	0	0.00	0.0%
	09:00-11:00	0	0	0	1	0	1	0.20	10.0%
	11:00-13:00	0	1	0	0	0	1	0.20	10.0%
	13:00-15:00	0	0	0	0	0	0	0.00	0.0%
	15:00-18:00	4	0	0	1	2	7	1.40	70.0%
	18:00-24:00	0	0	0	0	1	1	0.20	10.0%

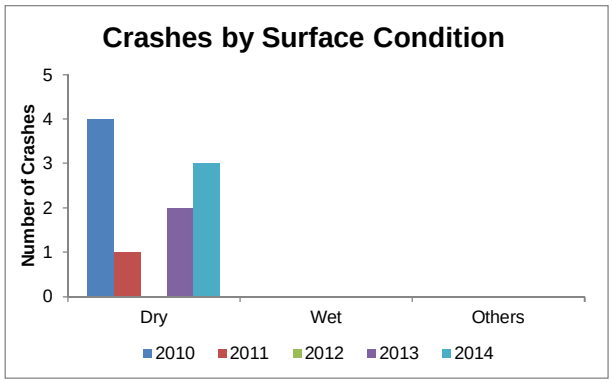
Boynton Beach Boulevard at Seacrest Boulevard (S3)

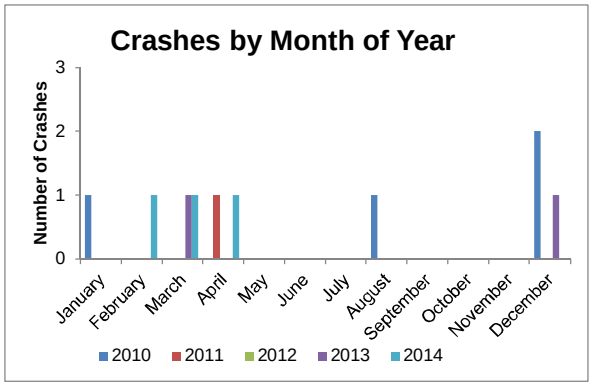
Crash Histograms

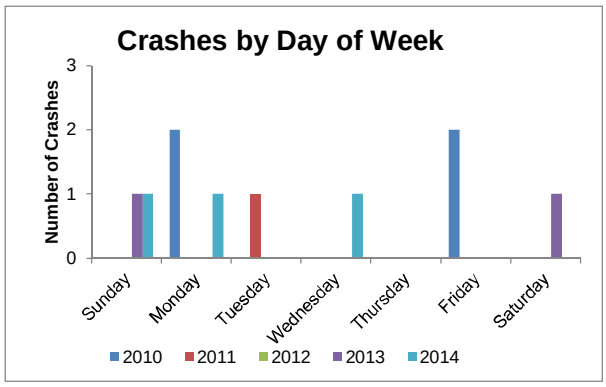




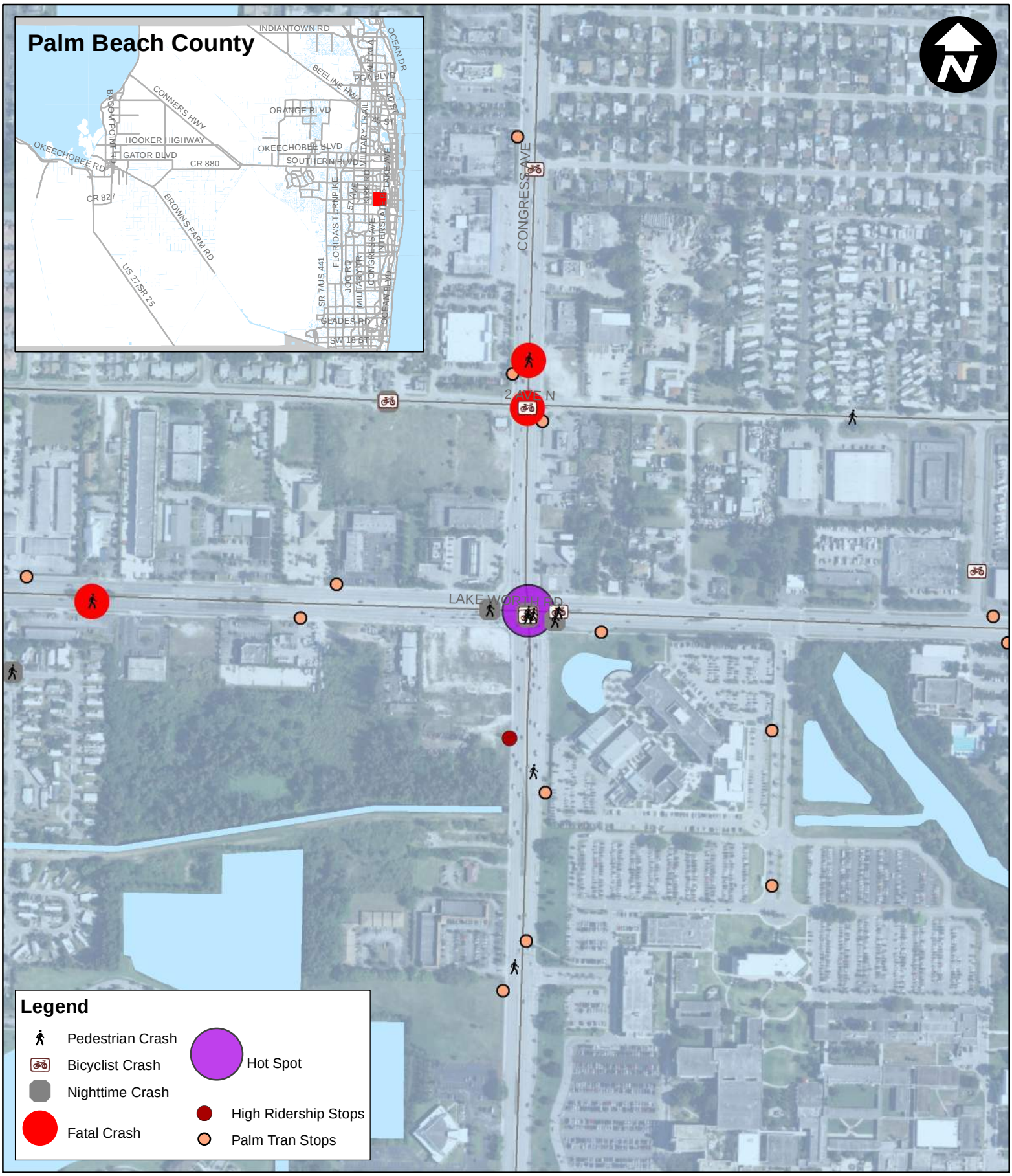








Palm Beach MPO
Pedestrian and Bicycle Safety Study
S4 (Lake Worth Road at Congress Avenue)



Executive Summary
Table 4

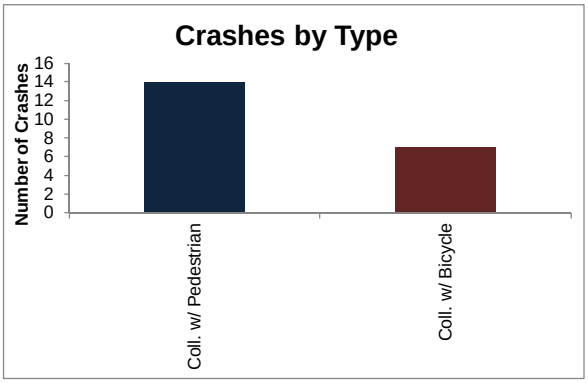
0 0.05 0.1 Miles

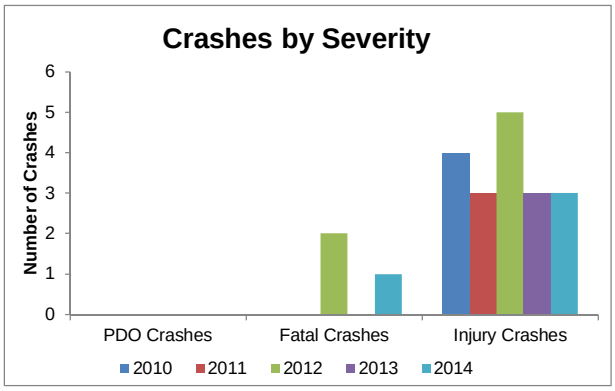
Lake Worth Road at Congress Avenue (S4)

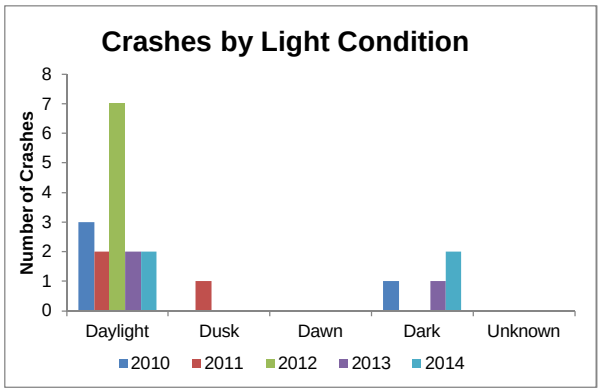
Lake Worth Road at Congress Avenue (S4)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	2	1	4	3	4	14	2.80	66.7%
	Coll. w/ Bicycle	2	2	3	0	0	7	1.40	33.3%
	Total Crashes	**4**	**3**	**7**	**3**	**4**	**21**	**4.20**	**100.0%**
Severity	PDO Crashes	0	0	0	0	0	0	0.00	0.0%
	Fatal Crashes	0	0	2	0	1	3	0.60	14.3%
	Injury Crashes	4	3	5	3	3	18	3.60	85.7%
Lighting Conditions	Daylight	3	2	7	2	2	16	3.20	76.2%
	Dusk	0	1	0	0	0	1	0.20	4.8%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	1	0	0	1	2	4	0.80	19.0%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	4	3	6	3	3	19	3.80	90.5%
	Wet	0	0	1	0	1	2	0.40	9.5%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	1	0	0	1	0.20	4.8%
	February	0	0	1	0	1	2	0.40	9.5%
	March	0	0	0	0	0	0	0.00	0.0%
	April	0	0	0	0	0	0	0.00	0.0%
	May	0	0	3	0	0	3	0.60	14.3%
	June	2	0	0	0	0	2	0.40	9.5%
	July	1	0	0	1	0	2	0.40	9.5%
	August	0	0	1	0	0	1	0.20	4.8%
	September	0	0	0	0	1	1	0.20	4.8%
	October	1	1	0	2	0	4	0.80	19.0%
	November	0	1	0	0	1	2	0.40	9.5%
	December	0	1	1	0	1	3	0.60	14.3%
Day of Week	Sunday	1	1	0	0	2	4	0.80	19.0%
	Monday	1	0	0	0	1	2	0.40	9.5%
	Tuesday	1	1	2	1	0	5	1.00	23.8%
	Wednesday	0	1	2	1	0	4	0.80	19.0%
	Thursday	1	0	2	1	1	5	1.00	23.8%
	Friday	0	0	1	0	0	1	0.20	4.8%
	Saturday	0	0	0	0	0	0	0.00	0.0%
Hour of Day	00:00-06:00	0	0	3	0	1	4	0.80	19.0%
	06:00-09:00	0	1	1	0	0	2	0.40	9.5%
	09:00-11:00	0	1	3	0	0	4	0.80	19.0%
	11:00-13:00	1	0	0	0	1	2	0.40	9.5%
	13:00-15:00	1	0	0	0	0	1	0.20	4.8%
	15:00-18:00	1	1	0	2	1	5	1.00	23.8%
	18:00-24:00	1	0	0	1	1	3	0.60	14.3%

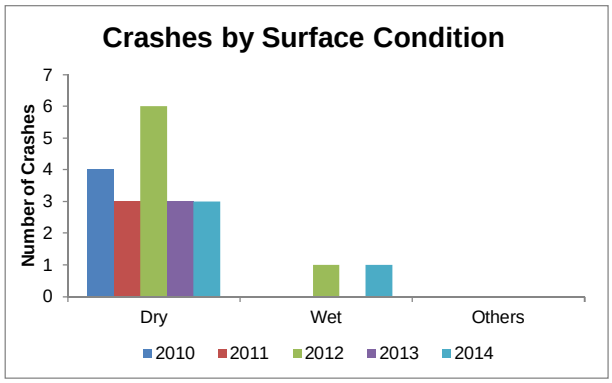
Lake Worth Road at Congress Avenue (S4)

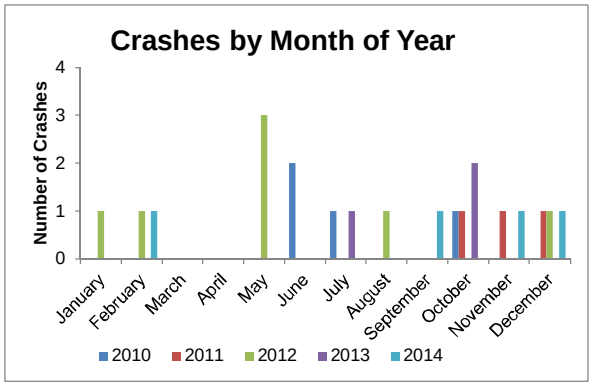
Crash Histograms

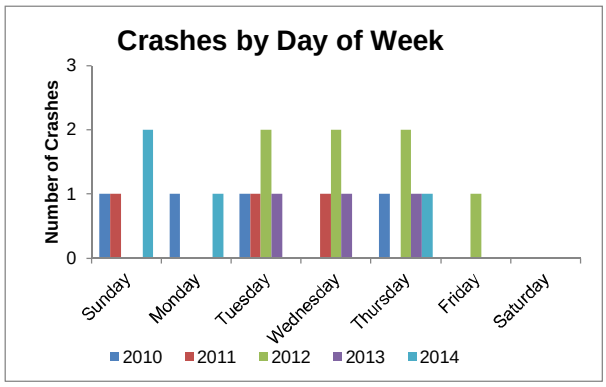












Palm Beach MPO
Pedestrian and Bicycle Safety Study

S5 (Lake Worth Road at Davis Road)

Executive Summary
Table 4

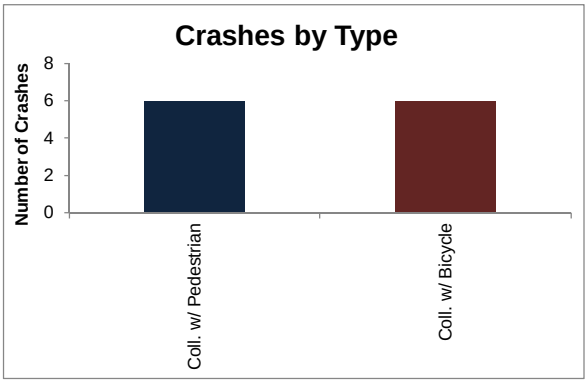
0 0.025 0.05
Miles

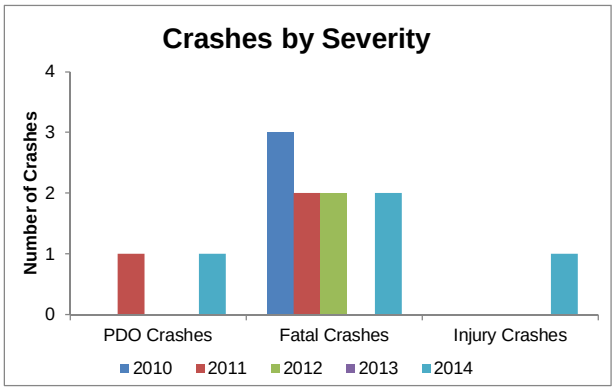
Lake Worth Road at Davis Road (S5)

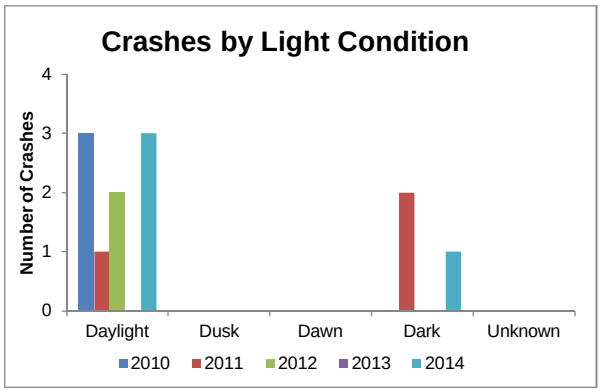
Lake Worth Road at Davis Road (S5)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	1	0	2	0	3	6	1.20	50.0%
	Coll. w/ Bicycle	2	3	0	0	1	6	1.20	50.0%
	Total Crashes	**3**	**3**	**2**	**0**	**4**	**12**	**2.40**	**100.0%**
Severity	PDO Crashes	0	1	0	0	1	2	0.40	16.7%
	Fatal Crashes	3	2	2	0	2	9	1.80	75.0%
	Injury Crashes	0	0	0	0	1	1	0.20	8.3%
Lighting Conditions	Daylight	3	1	2	0	3	9	1.80	75.0%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	2	0	0	1	3	0.60	25.0%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	2	3	2	0	4	11	2.20	91.7%
	Wet	1	0	0	0	0	1	0.20	8.3%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	0	0	1	1	0.20	8.3%
	February	0	0	0	0	0	0	0.00	0.0%
	March	0	1	1	0	0	2	0.40	16.7%
	April	0	0	0	0	1	1	0.20	8.3%
	May	1	1	0	0	0	2	0.40	16.7%
	June	1	0	0	0	0	1	0.20	8.3%
	July	0	0	0	0	0	0	0.00	0.0%
	August	1	0	0	0	0	1	0.20	8.3%
	September	0	0	0	0	1	1	0.20	8.3%
	October	0	1	0	0	0	1	0.20	8.3%
	November	0	0	0	0	0	0	0.00	0.0%
	December	0	0	1	0	1	2	0.40	16.7%
Day of Week	Sunday	1	2	0	0	0	3	0.60	25.0%
	Monday	0	0	0	0	2	2	0.40	16.7%
	Tuesday	0	0	0	0	0	0	0.00	0.0%
	Wednesday	0	0	0	0	0	0	0.00	0.0%
	Thursday	1	0	1	0	1	3	0.60	25.0%
	Friday	0	1	1	0	0	2	0.40	16.7%
	Saturday	1	0	0	0	1	2	0.40	16.7%
Hour of Day	00:00-06:00	0	2	2	0	0	4	0.80	33.3%
	06:00-09:00	1	0	0	0	0	1	0.20	8.3%
	09:00-11:00	1	0	0	0	0	1	0.20	8.3%
	11:00-13:00	0	0	0	0	1	1	0.20	8.3%
	13:00-15:00	0	0	0	0	1	1	0.20	8.3%
	15:00-18:00	1	0	0	0	1	2	0.40	16.7%
	18:00-24:00	0	1	0	0	1	2	0.40	16.7%

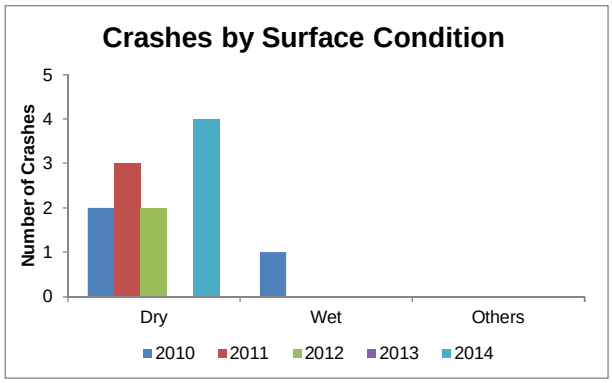
Lake Worth Road at Davis Road (S5)

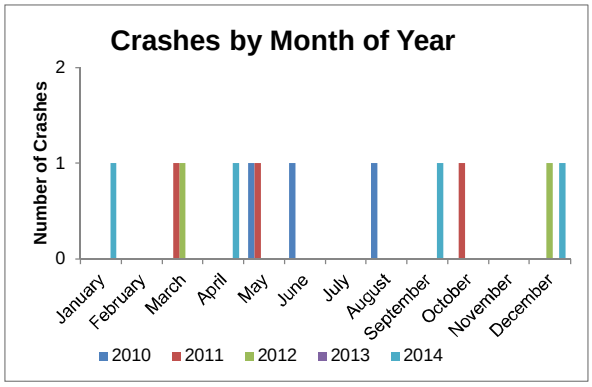
Crash Histograms

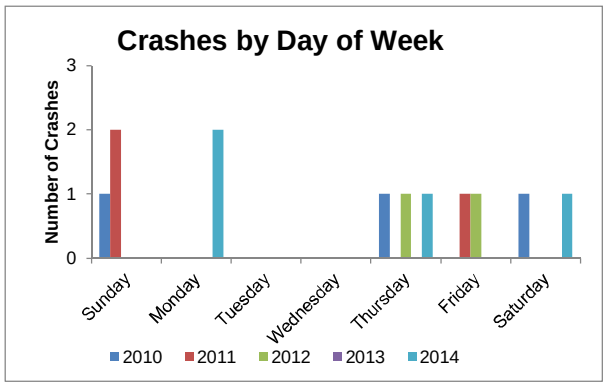






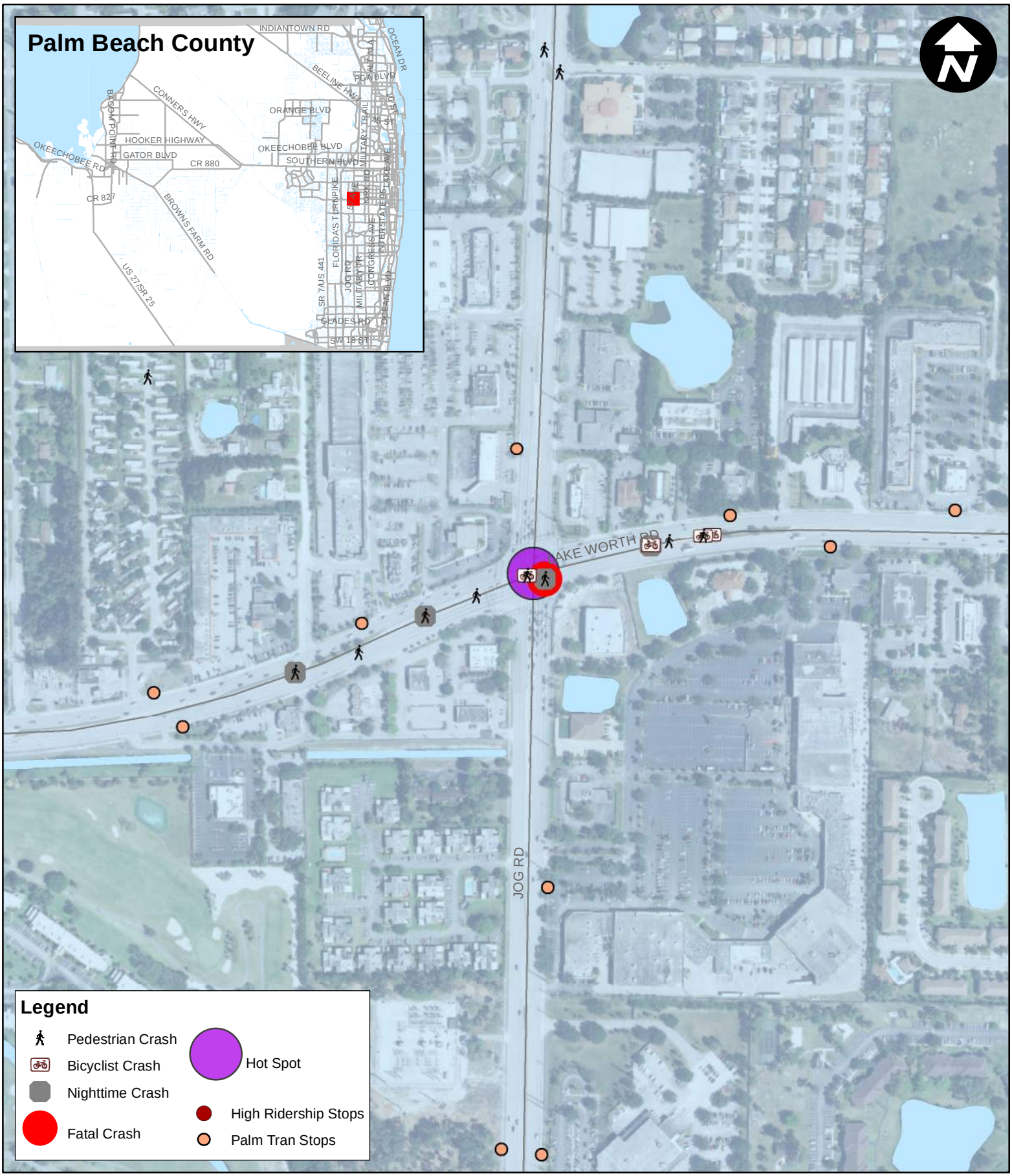






Palm Beach MPO
Pedestrian and Bicycle Safety Study

S6 (Lake Worth Road at Jog Road)



Executive Summary
Table 4

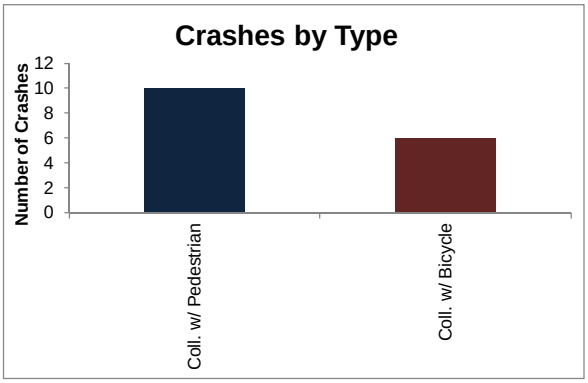
0 0.05 0.1 Miles

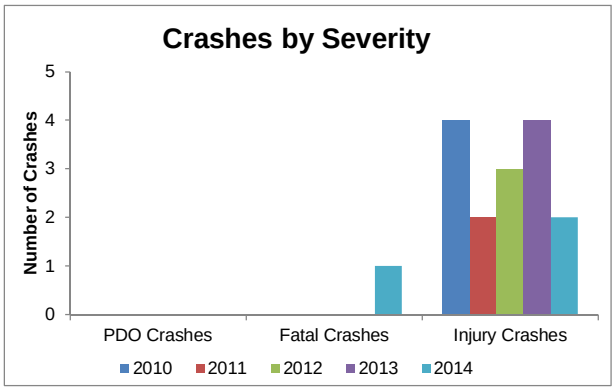
Lake Worth Road at Jog Road (S6)

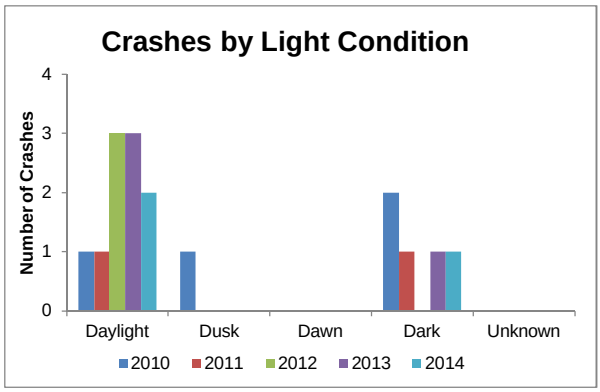
Lake Worth Road at Jog Road (S6)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	2	1	1	3	3	10	2.00	62.5%
	Coll. w/ Bicycle	2	1	2	1	0	6	1.20	37.5%
	Total Crashes	**4**	**2**	**3**	**4**	**3**	**16**	**3.20**	**100.0%**
Severity	PDO Crashes	0	0	0	0	0	0	0.00	0.0%
	Fatal Crashes	0	0	0	0	1	1	0.20	6.3%
	Injury Crashes	4	2	3	4	2	15	3.00	93.8%
Lighting Conditions	Daylight	1	1	3	3	2	10	2.00	62.5%
	Dusk	1	0	0	0	0	1	0.20	6.3%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	2	1	0	1	1	5	1.00	31.3%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	4	2	3	4	3	16	3.20	100.0%
	Wet	0	0	0	0	0	0	0.00	0.0%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	1	1	0	0	0	2	0.40	12.5%
	February	0	1	0	1	1	3	0.60	18.8%
	March	0	0	0	0	1	1	0.20	6.3%
	April	0	0	1	0	0	1	0.20	6.3%
	May	0	0	1	0	0	1	0.20	6.3%
	June	2	0	0	0	0	2	0.40	12.5%
	July	0	0	0	1	0	1	0.20	6.3%
	August	0	0	0	0	1	1	0.20	6.3%
	September	0	0	0	0	0	0	0.00	0.0%
	October	0	0	0	1	0	1	0.20	6.3%
	November	0	0	0	0	0	0	0.00	0.0%
	December	1	0	1	1	0	3	0.60	18.8%
Day of Week	Sunday	1	0	0	0	0	1	0.20	6.3%
	Monday	0	0	0	2	0	2	0.40	12.5%
	Tuesday	1	1	0	0	0	2	0.40	12.5%
	Wednesday	0	0	2	0	2	4	0.80	25.0%
	Thursday	0	1	0	2	0	3	0.60	18.8%
	Friday	1	0	1	0	0	2	0.40	12.5%
	Saturday	1	0	0	0	1	2	0.40	12.5%
Hour of Day	00:00-06:00	1	0	0	1	0	2	0.40	12.5%
	06:00-09:00	1	1	0	0	0	2	0.40	12.5%
	09:00-11:00	0	1	0	1	0	2	0.40	12.5%
	11:00-13:00	0	0	1	0	0	1	0.20	6.3%
	13:00-15:00	0	0	0	0	1	1	0.20	6.3%
	15:00-18:00	1	0	2	1	1	5	1.00	31.3%
	18:00-24:00	1	0	0	1	1	3	0.60	18.8%

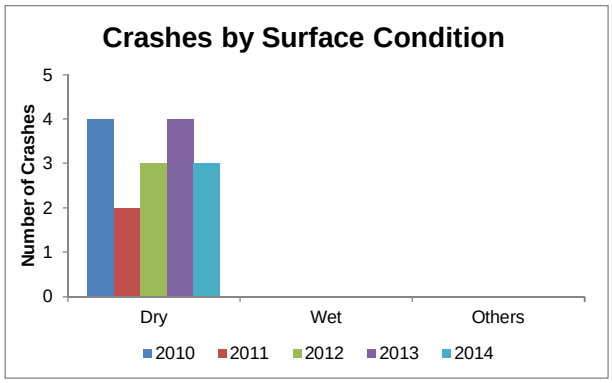
Lake Worth Road at Jog Road (S6)

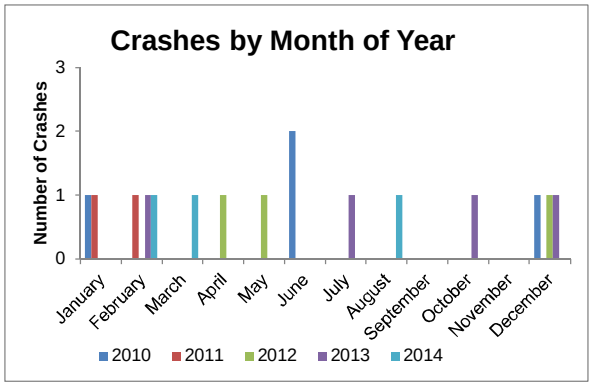
Crash Histograms

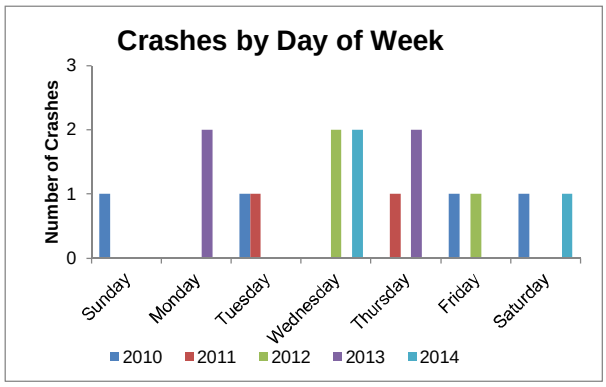






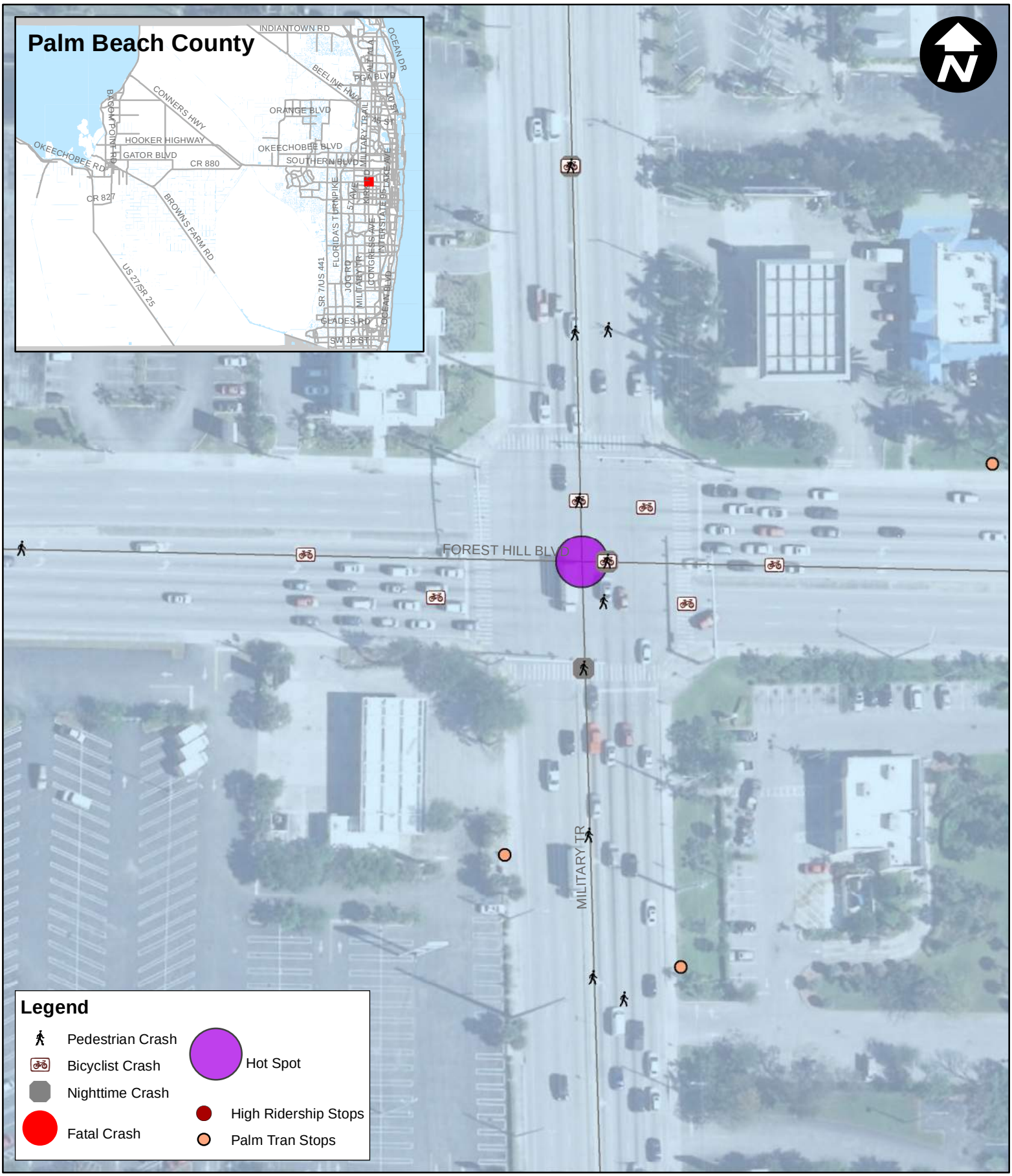






Palm Beach MPO
Pedestrian and Bicycle Safety Study

S7 (Military Trail at Forest Hill Boulevard)



Executive Summary
Table 4

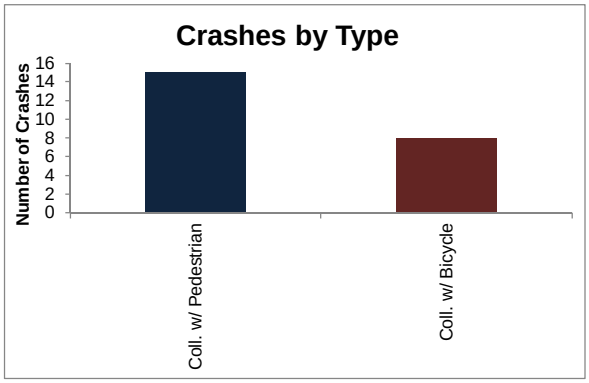
0 0.0125 0.025
Miles

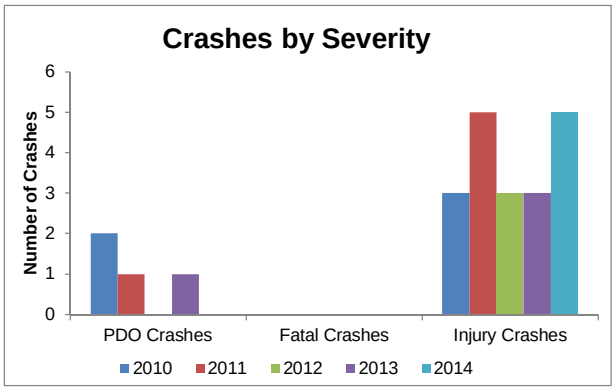
Military Trail at Forest Hill Boulevard (S7)

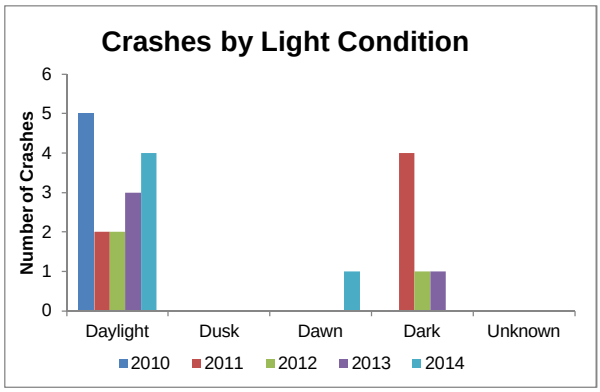
Military Trail at Forest Hill Boulevard (S7)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	1	5	3	3	3	15	3.00	65.2%
	Coll. w/ Bicycle	4	1	0	1	2	8	1.60	34.8%
	Total Crashes	**5**	**6**	**3**	**4**	**5**	**23**	**4.60**	**100.0%**
Severity	PDO Crashes	2	1	0	1	0	4	0.80	17.4%
	Fatal Crashes	0	0	0	0	0	0	0.00	0.0%
	Injury Crashes	3	5	3	3	5	19	3.80	82.6%
Lighting Conditions	Daylight	5	2	2	3	4	16	3.20	69.6%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	1	1	0.20	4.3%
	Dark	0	4	1	1	0	6	1.20	26.1%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	5	6	3	3	5	22	4.40	95.7%
	Wet	0	0	0	1	0	1	0.20	4.3%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	0	1	0	1	0.20	4.3%
	February	0	0	0	0	0	0	0.00	0.0%
	March	1	1	0	0	1	3	0.60	13.0%
	April	0	2	1	0	1	4	0.80	17.4%
	May	0	1	0	0	1	2	0.40	8.7%
	June	0	0	0	1	0	1	0.20	4.3%
	July	2	0	1	1	0	4	0.80	17.4%
	August	0	0	0	0	0	0	0.00	0.0%
	September	1	0	0	0	1	2	0.40	8.7%
	October	1	2	0	0	1	4	0.80	17.4%
	November	0	0	0	1	0	1	0.20	4.3%
	December	0	0	1	0	0	1	0.20	4.3%
Day of Week	Sunday	1	1	0	0	0	2	0.40	8.7%
	Monday	1	0	1	1	0	3	0.60	13.0%
	Tuesday	0	3	2	0	2	7	1.40	30.4%
	Wednesday	1	1	0	0	1	3	0.60	13.0%
	Thursday	0	0	0	3	0	3	0.60	13.0%
	Friday	0	0	0	0	0	0	0.00	0.0%
	Saturday	2	1	0	0	2	5	1.00	21.7%
Hour of Day	00:00-06:00	0	4	1	0	0	5	1.00	21.7%
	06:00-09:00	2	0	0	0	1	3	0.60	13.0%
	09:00-11:00	0	0	1	0	2	3	0.60	13.0%
	11:00-13:00	0	1	0	2	0	3	0.60	13.0%
	13:00-15:00	0	0	0	1	1	2	0.40	8.7%
	15:00-18:00	2	0	0	0	0	2	0.40	8.7%
	18:00-24:00	1	1	1	1	1	5	1.00	21.7%

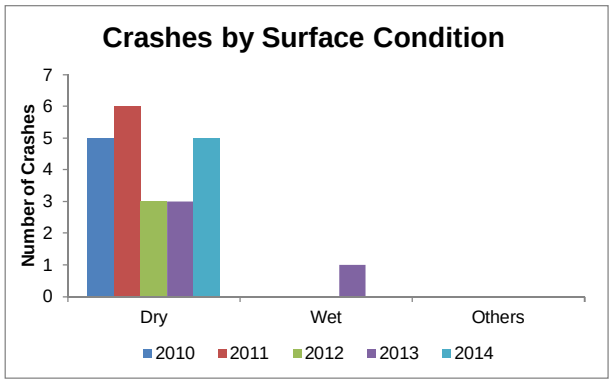
Military Trail at Forest Hill Boulevard (S7)

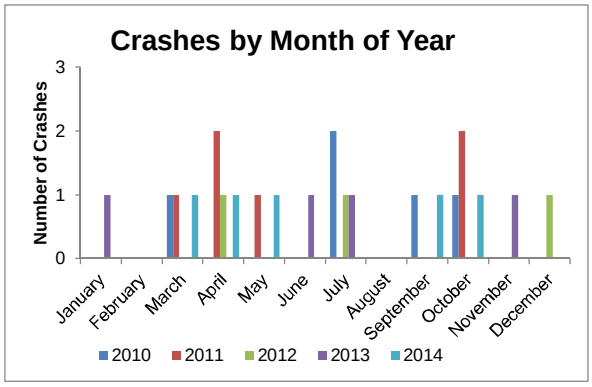
Crash Histograms

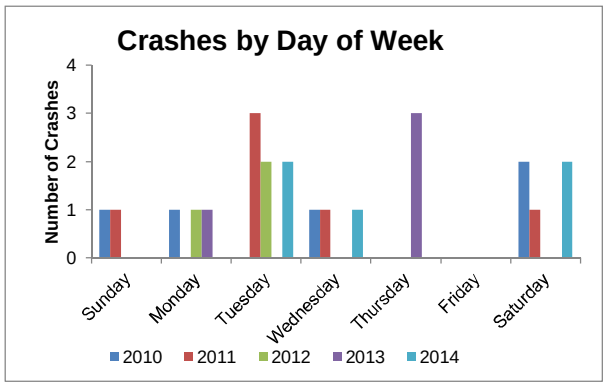












Palm Beach MPO
Pedestrian and Bicycle Safety Study

S8 (Dr Martin Luther King Jr Boulevard at SW 5 Street)

Executive Summary
Table 4

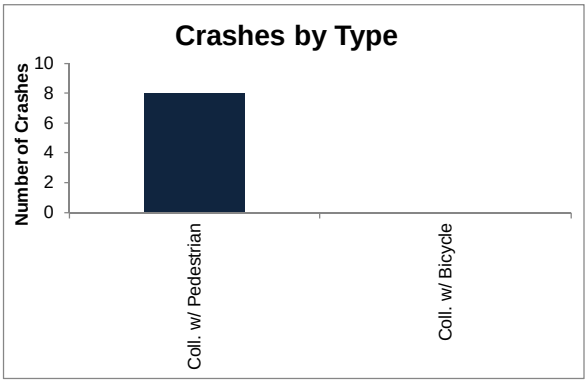
0 0.025 0.05
Miles

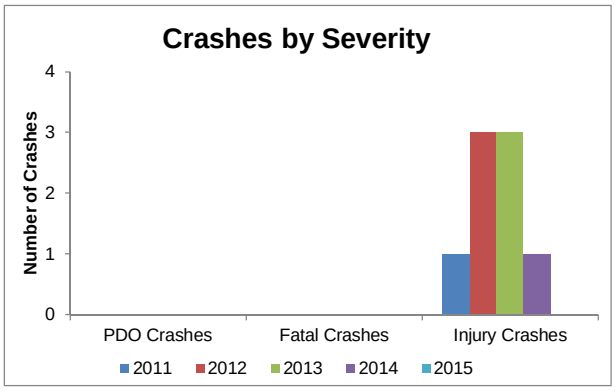
Dr Martin Luther King Jr Boulevard at SW 5 Street (S8)

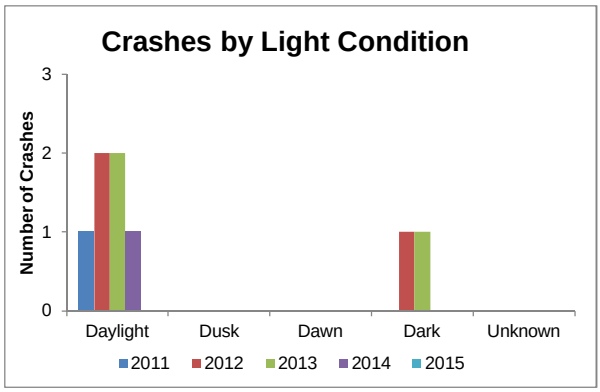
Dr Martin Luther King Jr Boulevard at SW 5 Street (S8)		Number of Crashes					Total	Average	Percent
		Year							
		2011	2012	2013	2014	2015			
Crash Type	Coll. w/ Pedestrian	1	3	3	1	0	8	1.60	100.0%
	Coll. w/ Bicycle	0	0	0	0	0	0	0.00	0.0%
	Total Crashes	**1**	**3**	**3**	**1**	**0**	**8**	**1.60**	**100.0%**
Severity	PDO Crashes	0	0	0	0	0	0	0.00	0.0%
	Fatal Crashes	0	0	0	0	0	0	0.00	0.0%
	Injury Crashes	1	3	3	1	0	8	1.60	100.0%
Lighting Conditions	Daylight	1	2	2	1	0	6	1.20	75.0%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	1	1	0	0	2	0.40	25.0%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	0	2	3	1	0	6	1.20	75.0%
	Wet	1	1	0	0	0	2	0.40	25.0%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	1	0	0	1	0.20	12.5%
	February	0	0	0	1	0	1	0.20	12.5%
	March	1	0	0	0	0	1	0.20	12.5%
	April	0	0	1	0	0	1	0.20	12.5%
	May	0	0	0	0	0	0	0.00	0.0%
	June	0	0	0	0	0	0	0.00	0.0%
	July	0	2	0	0	0	2	0.40	25.0%
	August	0	0	0	0	0	0	0.00	0.0%
	September	0	1	0	0	0	1	0.20	12.5%
	October	0	0	0	0	0	0	0.00	0.0%
	November	0	0	1	0	0	1	0.20	12.5%
	December	0	0	0	0	0	0	0.00	0.0%
Day of Week	Sunday	1	0	1	0	0	2	0.40	25.0%
	Monday	0	1	0	0	0	1	0.20	12.5%
	Tuesday	0	1	0	0	0	1	0.20	12.5%
	Wednesday	0	0	0	0	0	0	0.00	0.0%
	Thursday	0	0	1	1	0	2	0.40	25.0%
	Friday	0	1	0	0	0	1	0.20	12.5%
	Saturday	0	0	1	0	0	1	0.20	12.5%
Hour of Day	00:00-06:00	0	0	1	0	0	1	0.20	12.5%
	06:00-09:00	0	0	1	0	0	1	0.20	12.5%
	09:00-11:00	0	1	0	0	0	1	0.20	12.5%
	11:00-13:00	0	0	0	0	0	0	0.00	0.0%
	13:00-15:00	1	0	0	0	0	1	0.20	12.5%
	15:00-18:00	0	0	1	0	0	1	0.20	12.5%
	18:00-24:00	0	2	0	1	0	3	0.60	37.5%

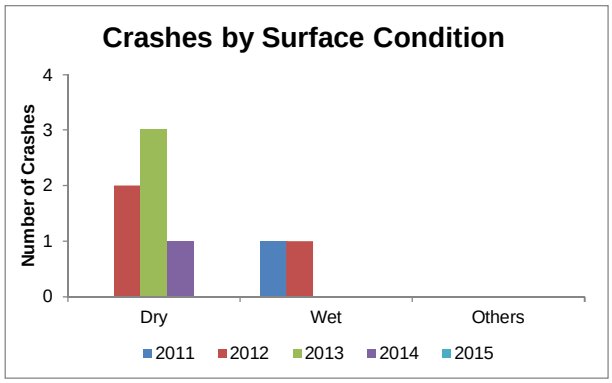
Dr Martin Luther King Jr Boulevard at SW 5 Street (S8)

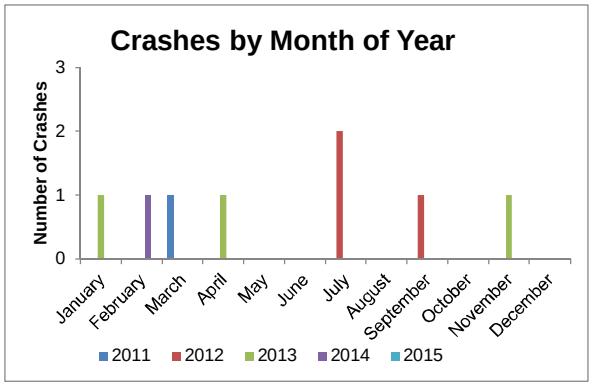
Crash Histograms

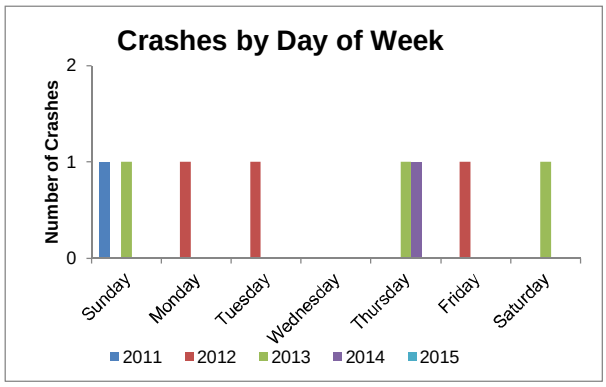






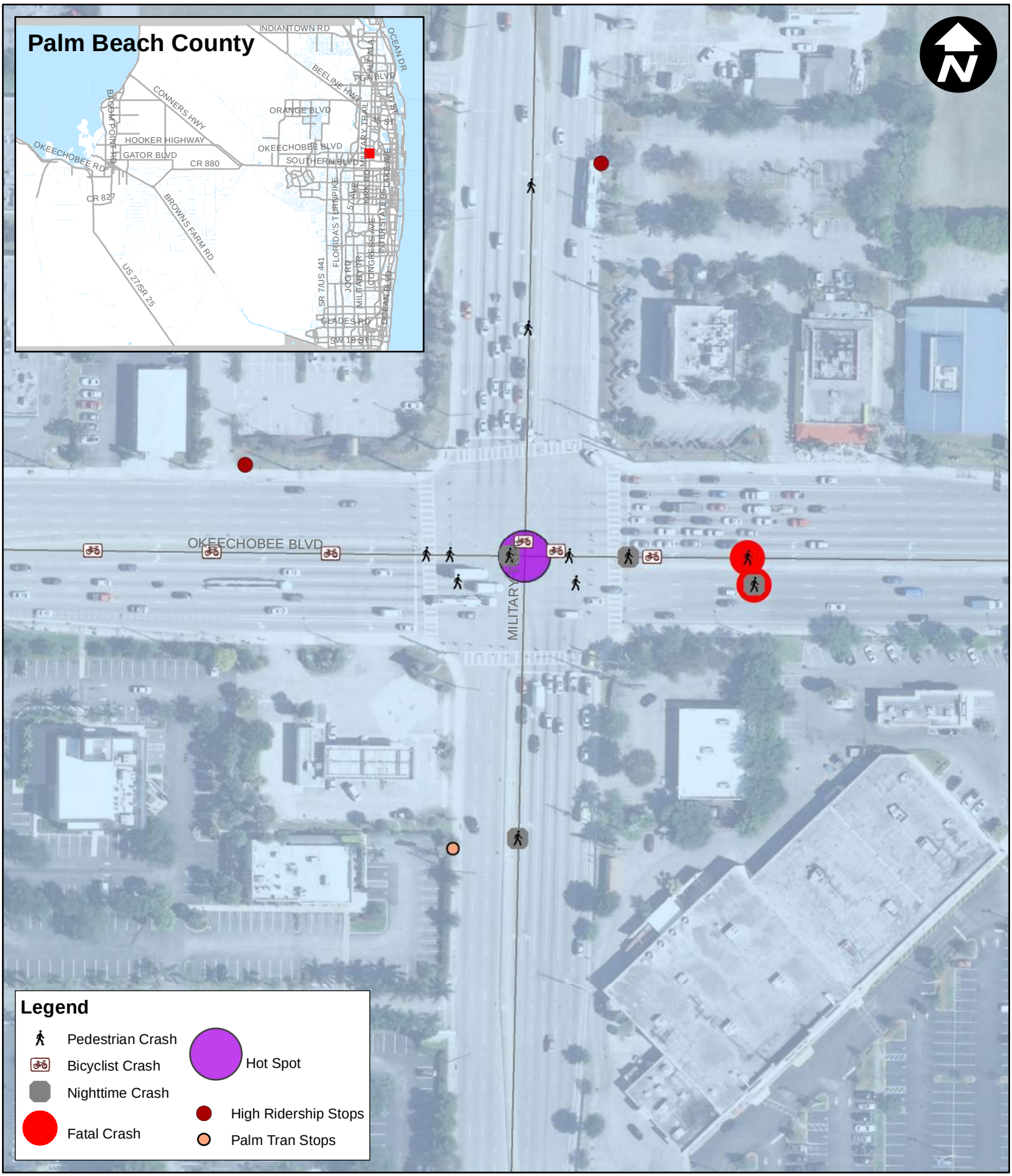






Palm Beach MPO
Pedestrian and Bicycle Safety Study

S9 (Okeechobee Boulevard at Military Trail)



Executive Summary
Table 4

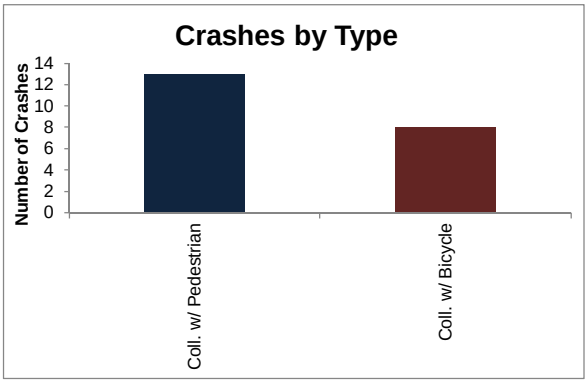
0 0.0125 0.025
Miles

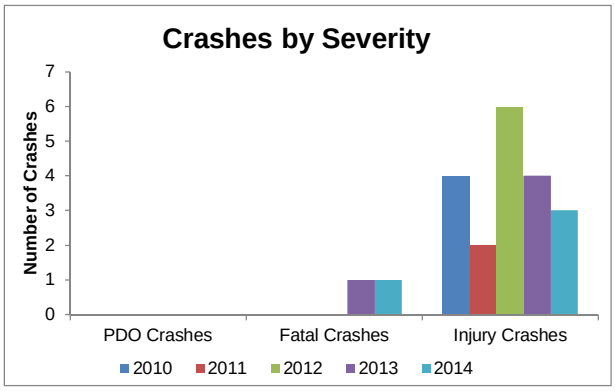
Okeechobee Boulevard at Military Trail (S9)

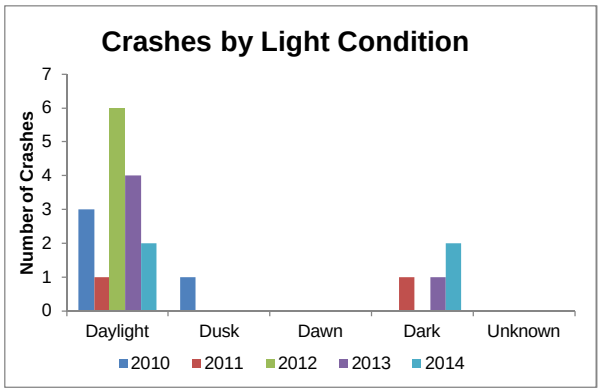
Okeechobee Boulevard at Military Trail (S9)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	2	1	4	3	3	13	2.60	61.9%
	Coll. w/ Bicycle	2	1	2	2	1	8	1.60	38.1%
	Total Crashes	**4**	**2**	**6**	**5**	**4**	**21**	**4.20**	**100.0%**
Severity	PDO Crashes	0	0	0	0	0	0	0.00	0.0%
	Fatal Crashes	0	0	0	1	1	2	0.40	9.5%
	Injury Crashes	4	2	6	4	3	19	3.80	90.5%
Lighting Conditions	Daylight	3	1	6	4	2	16	3.20	76.2%
	Dusk	1	0	0	0	0	1	0.20	4.8%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	1	0	1	2	4	0.80	19.0%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	4	2	6	4	4	20	4.00	95.2%
	Wet	0	0	0	1	0	1	0.20	4.8%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	2	1	0	0	0	3	0.60	14.3%
	February	0	0	0	0	1	1	0.20	4.8%
	March	0	1	1	0	0	2	0.40	9.5%
	April	1	0	1	0	1	3	0.60	14.3%
	May	0	0	1	1	0	2	0.40	9.5%
	June	0	0	0	0	1	1	0.20	4.8%
	July	0	0	0	0	0	0	0.00	0.0%
	August	0	0	1	2	1	4	0.80	19.0%
	September	0	0	1	0	0	1	0.20	4.8%
	October	0	0	1	2	0	3	0.60	14.3%
	November	1	0	0	0	0	1	0.20	4.8%
	December	0	0	0	0	0	0	0.00	0.0%
Day of Week	Sunday	1	1	2	1	1	6	1.20	28.6%
	Monday	0	0	0	0	0	0	0.00	0.0%
	Tuesday	1	0	0	1	1	3	0.60	14.3%
	Wednesday	2	0	1	1	1	5	1.00	23.8%
	Thursday	0	0	0	0	0	0	0.00	0.0%
	Friday	0	1	2	2	1	6	1.20	28.6%
	Saturday	0	0	1	0	0	1	0.20	4.8%
Hour of Day	00:00-06:00	0	0	0	1	0	1	0.20	4.8%
	06:00-09:00	0	0	1	0	0	1	0.20	4.8%
	09:00-11:00	0	1	1	0	0	2	0.40	9.5%
	11:00-13:00	2	0	1	0	0	3	0.60	14.3%
	13:00-15:00	1	0	1	1	1	4	0.80	19.0%
	15:00-18:00	0	0	1	1	1	3	0.60	14.3%
	18:00-24:00	1	1	1	2	2	7	1.40	33.3%

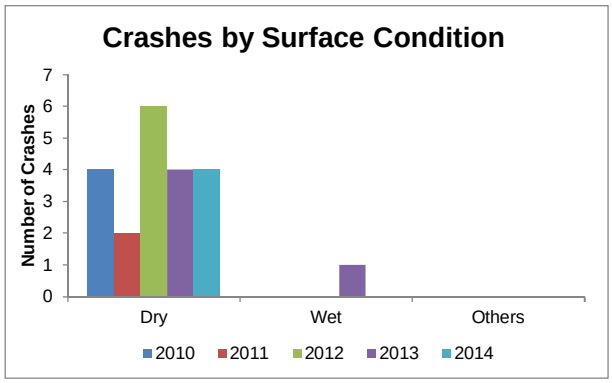
Okeechobee Boulevard at Military Trail (S9)

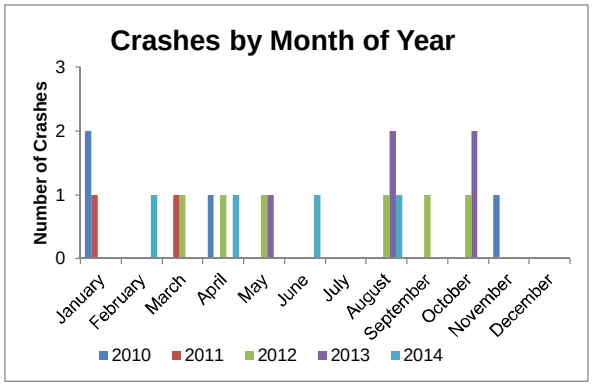
Crash Histograms

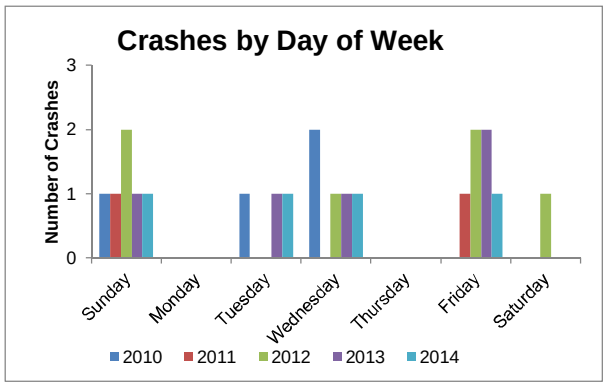






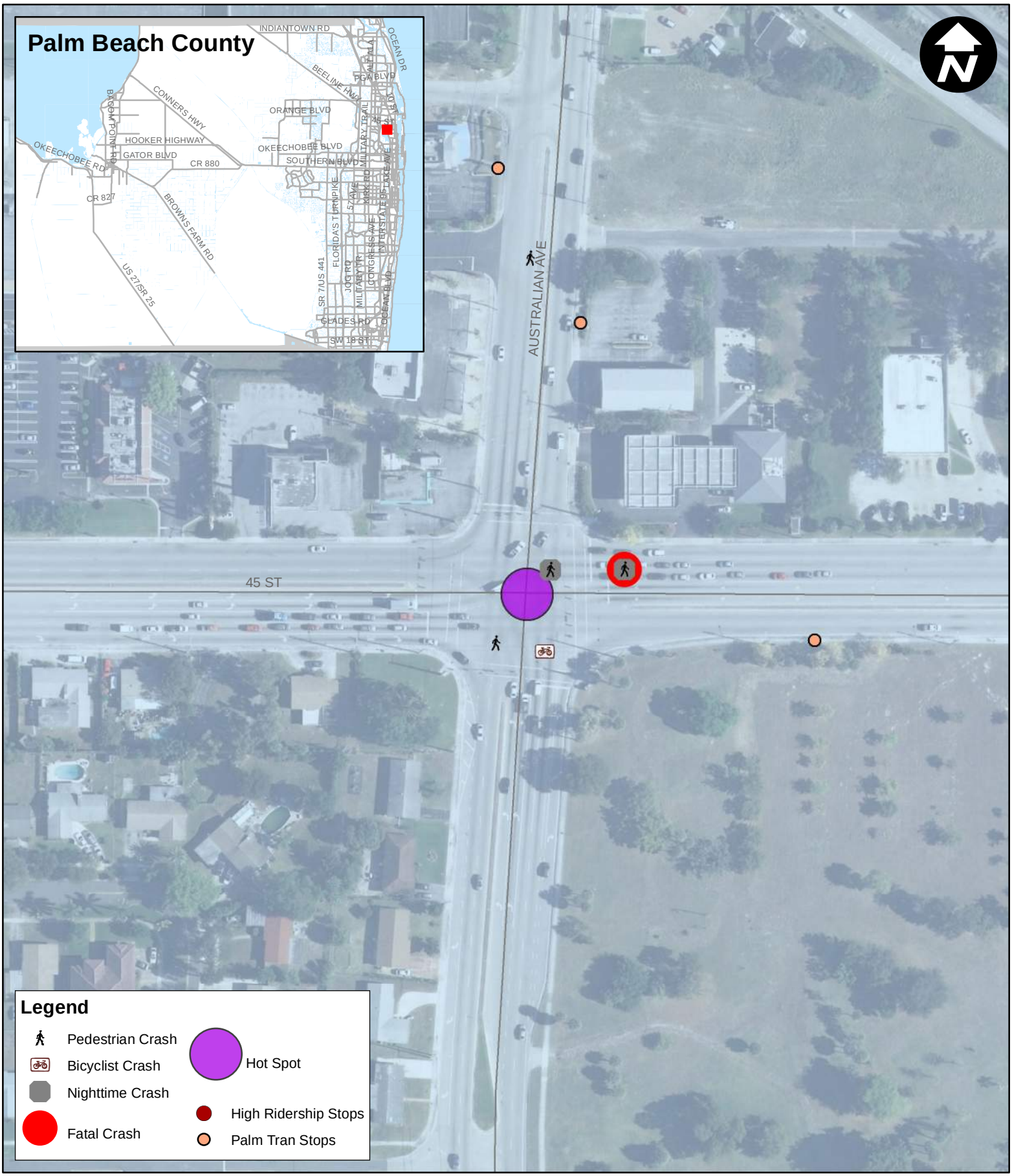






Palm Beach MPO
Pedestrian and Bicycle Safety Study

S10 (45 Street at Australian Avenue)



Executive Summary
Table 4

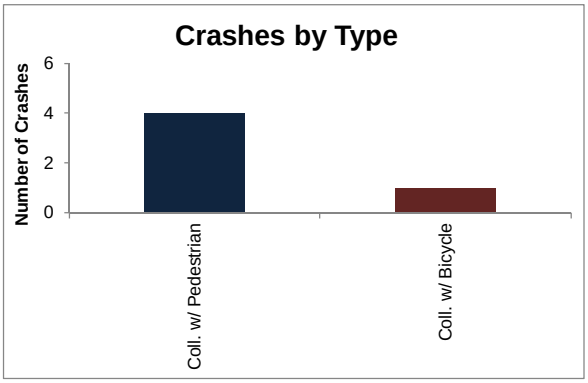
0 0.025 0.05
Miles

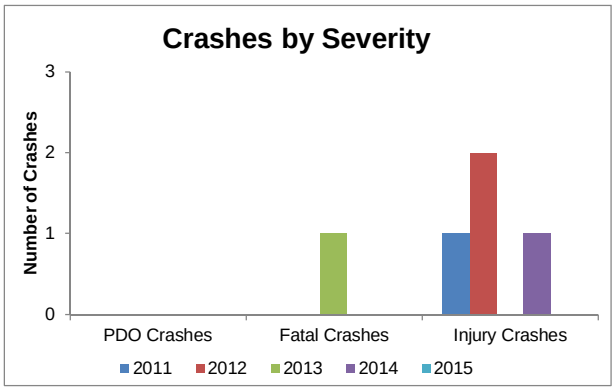
45 Street at Australian Avenue (S10)

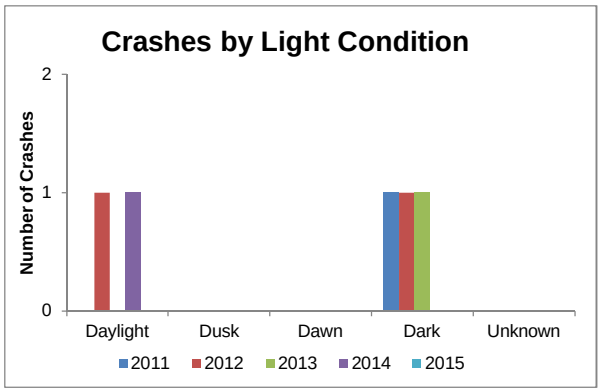
45 Street at Australian Avenue (S10)		Number of Crashes					Total	Average	Percent
		Year							
		2011	2012	2013	2014	2015			
Crash Type	Coll. w/ Pedestrian	1	2	1	0	0	4	0.80	80.0%
	Coll. w/ Bicycle	0	0	0	1	0	1	0.20	20.0%
	Total Crashes	**1**	**2**	**1**	**1**	**0**	**5**	**1.00**	**100.0%**
Severity	PDO Crashes	0	0	0	0	0	0	0.00	0.0%
	Fatal Crashes	0	0	1	0	0	1	0.20	20.0%
	Injury Crashes	1	2	0	1	0	4	0.80	80.0%
Lighting Conditions	Daylight	0	1	0	1	0	2	0.40	40.0%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	1	1	1	0	0	3	0.60	60.0%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	1	2	1	1	0	5	1.00	100.0%
	Wet	0	0	0	0	0	0	0.00	0.0%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	1	0	0	1	0.20	20.0%
	February	0	0	0	0	0	0	0.00	0.0%
	March	1	0	0	0	0	1	0.20	20.0%
	April	0	0	0	0	0	0	0.00	0.0%
	May	0	0	0	1	0	1	0.20	20.0%
	June	0	0	0	0	0	0	0.00	0.0%
	July	0	0	0	0	0	0	0.00	0.0%
	August	0	1	0	0	0	1	0.20	20.0%
	September	0	0	0	0	0	0	0.00	0.0%
	October	0	0	0	0	0	0	0.00	0.0%
	November	0	0	0	0	0	0	0.00	0.0%
	December	0	1	0	0	0	1	0.20	20.0%
Day of Week	Sunday	0	0	0	0	0	0	0.00	0.0%
	Monday	1	0	0	1	0	2	0.40	40.0%
	Tuesday	0	0	0	0	0	0	0.00	0.0%
	Wednesday	0	0	0	0	0	0	0.00	0.0%
	Thursday	0	0	1	0	0	1	0.20	20.0%
	Friday	0	0	0	0	0	0	0.00	0.0%
	Saturday	0	2	0	0	0	2	0.40	40.0%
Hour of Day	00:00-06:00	0	0	0	0	0	0	0.00	0.0%
	06:00-09:00	0	0	0	0	0	0	0.00	0.0%
	09:00-11:00	0	0	0	0	0	0	0.00	0.0%
	11:00-13:00	0	0	0	0	0	0	0.00	0.0%
	13:00-15:00	0	0	0	1	0	1	0.20	20.0%
	15:00-18:00	0	0	0	0	0	0	0.00	0.0%
	18:00-24:00	1	2	1	0	0	4	0.80	80.0%

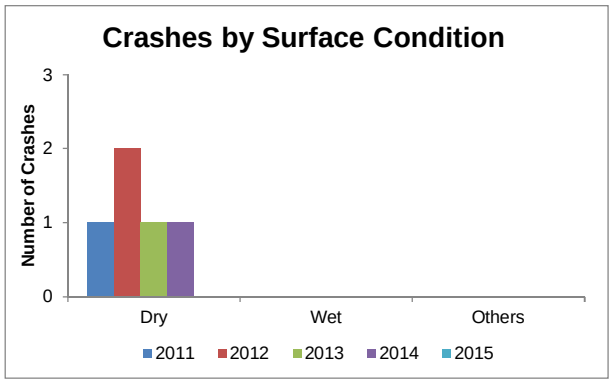
45 Street at Australian Avenue (S10)

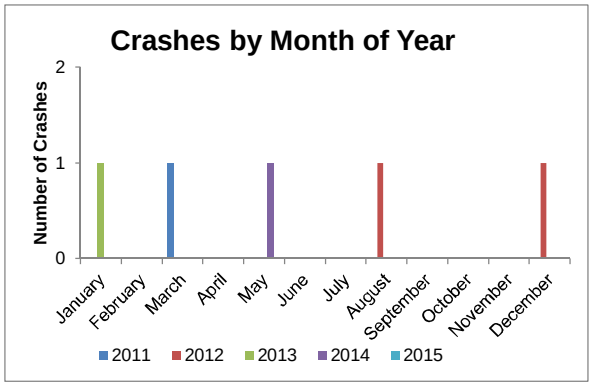
Crash Histograms

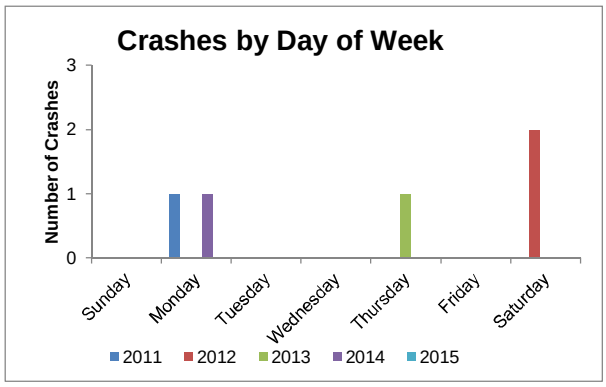












Palm Beach MPO
Pedestrian and Bicycle Safety Study

C1 (Federal Highway from Camino Real to Glades Road)

Executive Summary
Table 5

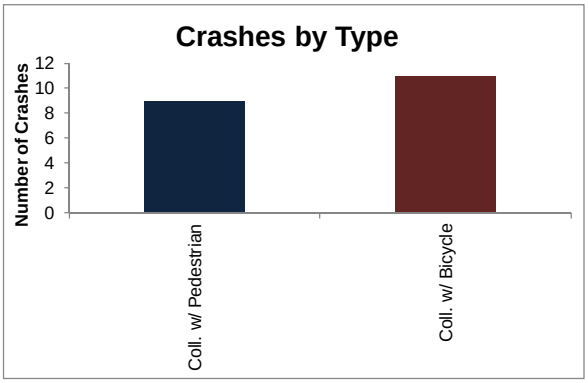
0 0.125 0.25 Miles

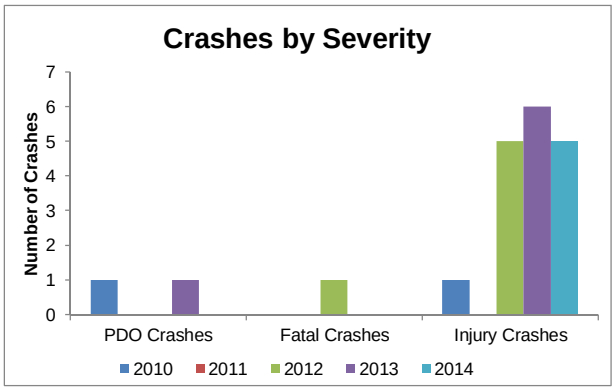
Federal Highway from Camino Real to Glades Road (C1)

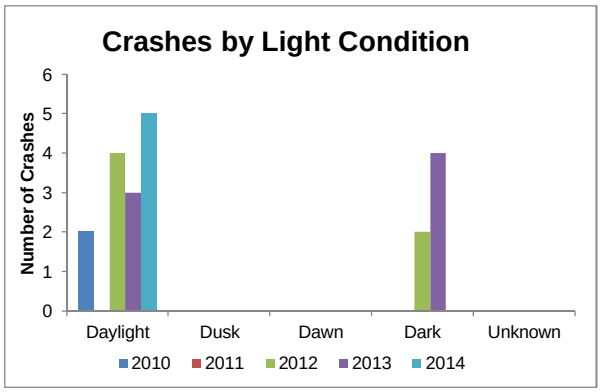
Federal Highway from Camino Real to Glades Road (C1)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	1	0	1	5	2	9	1.80	45.0%
	Coll. w/ Bicycle	1	0	5	2	3	11	2.20	55.0%
	Total Crashes	**2**	**0**	**6**	**7**	**5**	**20**	**4.00**	**100.0%**
Severity	PDO Crashes	1	0	0	1	0	2	0.40	10.0%
	Fatal Crashes	0	0	1	0	0	1	0.20	5.0%
	Injury Crashes	1	0	5	6	5	17	3.40	85.0%
Lighting Conditions	Daylight	2	0	4	3	5	14	2.80	70.0%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	0	2	4	0	6	1.20	30.0%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	2	0	6	6	4	18	3.60	90.0%
	Wet	0	0	0	1	1	2	0.40	10.0%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	0	2	2	4	0.80	20.0%
	February	0	0	0	0	1	1	0.20	5.0%
	March	0	0	1	2	0	3	0.60	15.0%
	April	1	0	1	0	0	2	0.40	10.0%
	May	0	0	1	0	0	1	0.20	5.0%
	June	0	0	0	0	0	0	0.00	0.0%
	July	0	0	0	0	0	0	0.00	0.0%
	August	1	0	0	0	1	2	0.40	10.0%
	September	0	0	0	0	0	0	0.00	0.0%
	October	0	0	1	3	0	4	0.80	20.0%
	November	0	0	0	0	0	0	0.00	0.0%
	December	0	0	2	0	1	3	0.60	15.0%
Day of Week	Sunday	0	0	1	1	0	2	0.40	10.0%
	Monday	0	0	2	0	2	4	0.80	20.0%
	Tuesday	0	0	0	1	0	1	0.20	5.0%
	Wednesday	0	0	2	0	0	2	0.40	10.0%
	Thursday	0	0	1	1	0	2	0.40	10.0%
	Friday	1	0	0	3	2	6	1.20	30.0%
	Saturday	1	0	0	1	1	3	0.60	15.0%
Hour of Day	00:00-06:00	0	0	0	1	0	1	0.20	5.0%
	06:00-09:00	0	0	0	2	0	2	0.40	10.0%
	09:00-11:00	0	0	2	0	0	2	0.40	10.0%
	11:00-13:00	0	0	0	0	0	0	0.00	0.0%
	13:00-15:00	1	0	0	0	0	1	0.20	5.0%
	15:00-18:00	1	0	3	2	4	10	2.00	50.0%
	18:00-24:00	0	0	1	2	1	4	0.80	20.0%

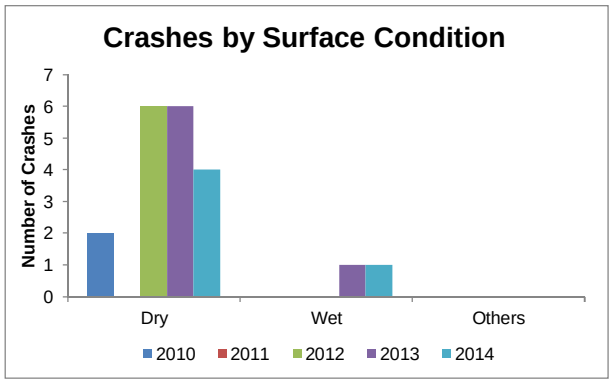
Federal Highway from Camino Real to Glades Road (C1)

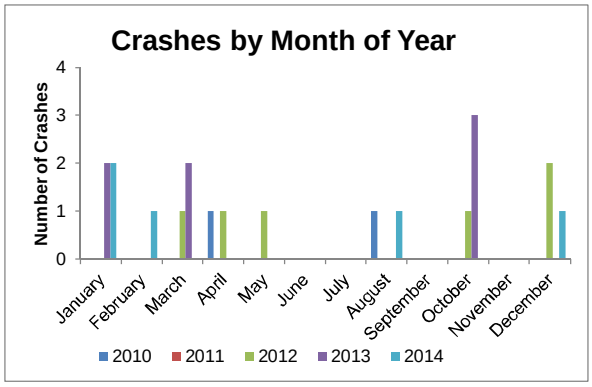
Crash Histograms

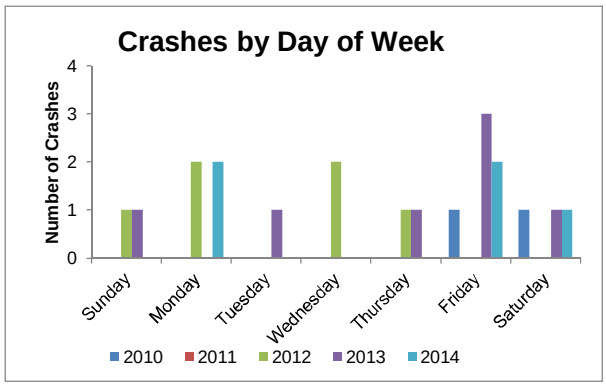












Palm Beach MPO
Pedestrian and Bicycle Safety Study

C2 (Ocean Boulevard from Linton Boulevard to Thomas Street)

Executive Summary
Table 5

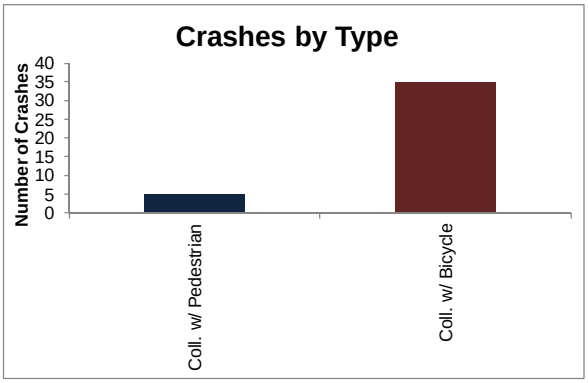
0 0.25 0.5 Miles

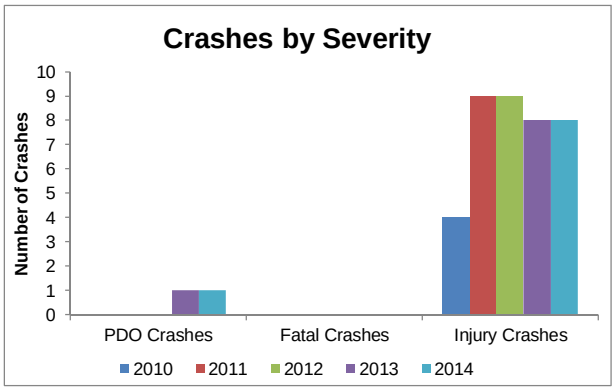
Ocean Boulevard from Linton Boulevard to Thomas Street (C2)

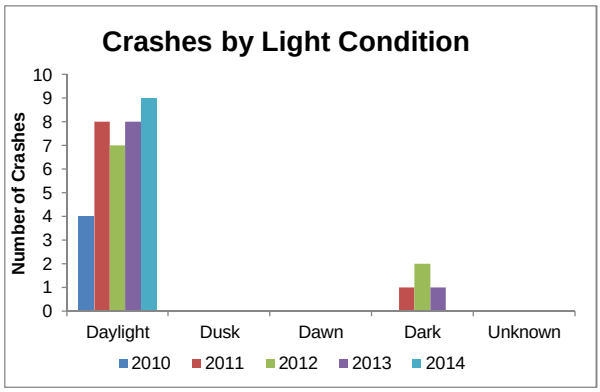
Ocean Boulevard from Linton Boulevard to Thomas Street (C2)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	0	1	1	2	1	5	1.00	12.5%
	Coll. w/ Bicycle	4	8	8	7	8	35	7.00	87.5%
	Total Crashes	**4**	**9**	**9**	**9**	**9**	**40**	**8.00**	**100.0%**
Severity	PDO Crashes	0	0	0	1	1	2	0.40	5.0%
	Fatal Crashes	0	0	0	0	0	0	0.00	0.0%
	Injury Crashes	4	9	9	8	8	38	7.60	95.0%
Lighting Conditions	Daylight	4	8	7	8	9	36	7.20	90.0%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	1	2	1	0	4	0.80	10.0%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	4	9	9	8	9	39	7.80	97.5%
	Wet	0	0	0	1	0	1	0.20	2.5%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	2	2	0	0	4	0.80	10.0%
	February	0	2	0	1	2	5	1.00	12.5%
	March	2	1	1	0	1	5	1.00	12.5%
	April	1	1	1	3	1	7	1.40	17.5%
	May	0	1	0	0	1	2	0.40	5.0%
	June	0	0	1	0	2	3	0.60	7.5%
	July	1	0	0	0	1	2	0.40	5.0%
	August	0	0	1	0	0	1	0.20	2.5%
	September	0	1	1	0	0	2	0.40	5.0%
	October	0	1	0	2	0	3	0.60	7.5%
	November	0	0	0	1	0	1	0.20	2.5%
	December	0	0	2	2	1	5	1.00	12.5%
Day of Week	Sunday	0	1	0	3	2	6	1.20	15.0%
	Monday	1	2	0	0	3	6	1.20	15.0%
	Tuesday	0	1	1	1	1	4	0.80	10.0%
	Wednesday	1	0	2	1	2	6	1.20	15.0%
	Thursday	0	2	0	1	1	4	0.80	10.0%
	Friday	2	1	2	3	0	8	1.60	20.0%
	Saturday	0	2	4	0	0	6	1.20	15.0%
Hour of Day	00:00-06:00	0	0	0	0	1	1	0.20	2.5%
	06:00-09:00	0	0	1	0	0	1	0.20	2.5%
	09:00-11:00	3	4	0	4	3	14	2.80	35.0%
	11:00-13:00	0	2	1	1	1	5	1.00	12.5%
	13:00-15:00	1	1	0	1	1	4	0.80	10.0%
	15:00-18:00	0	1	6	2	1	10	2.00	25.0%
	18:00-24:00	0	1	1	1	2	5	1.00	12.5%

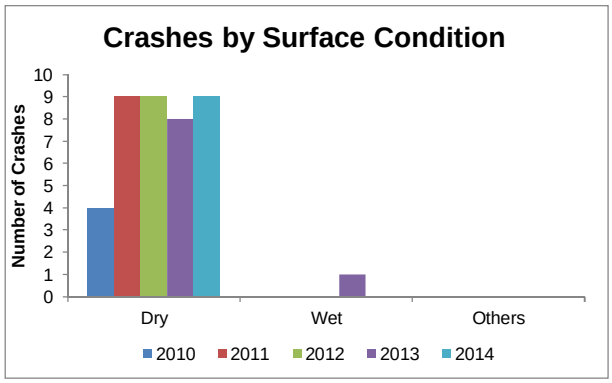
Ocean Boulevard from Linton Boulevard to Thomas Street (C2)

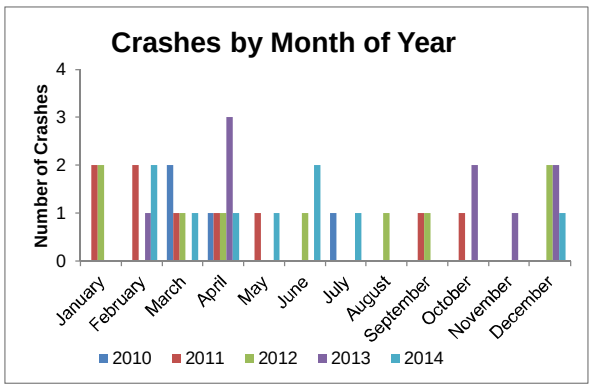
Crash Histograms

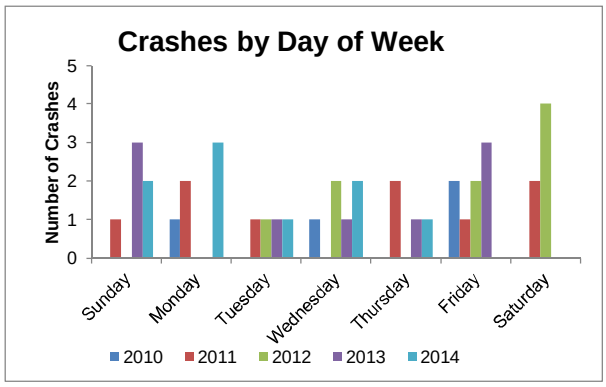






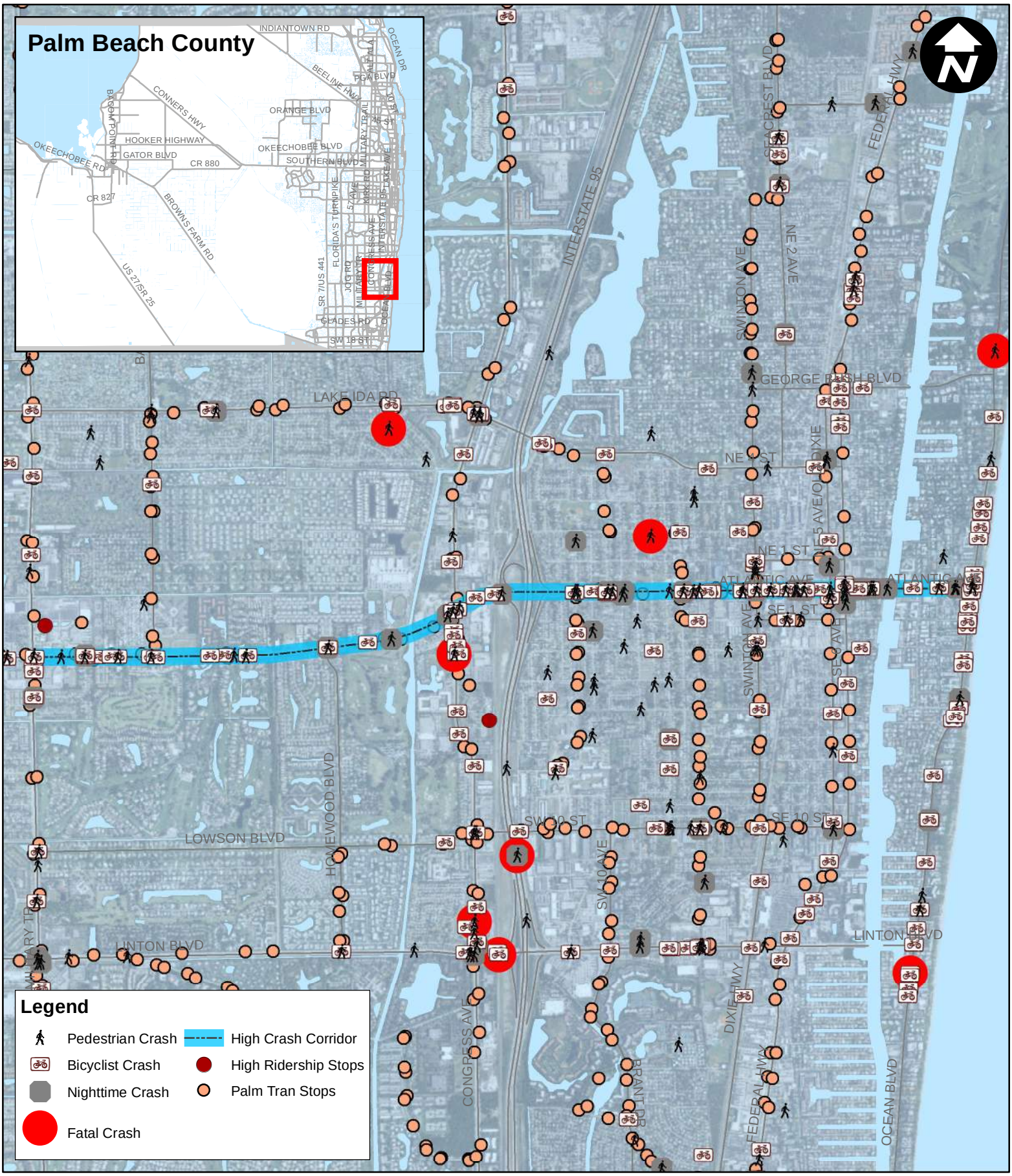






Palm Beach MPO
Pedestrian and Bicycle Safety Study

C3 (Atlantic Avenue from Military Trail to Ocean Boulevard)



Executive Summary
Table 5

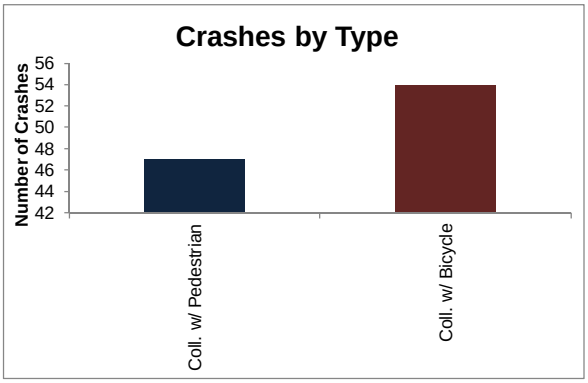
0 0.5 1 Miles

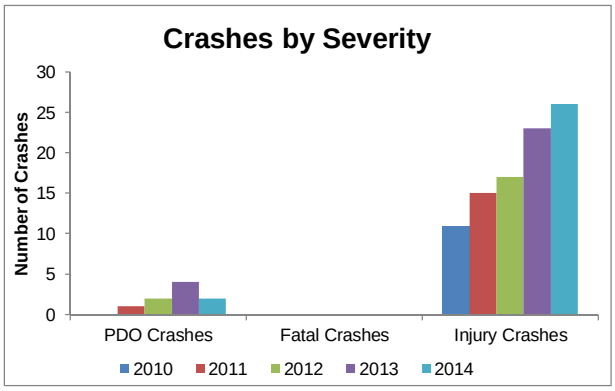
Atlantic Avenue from Military Trail to Ocean Boulevard (C3)

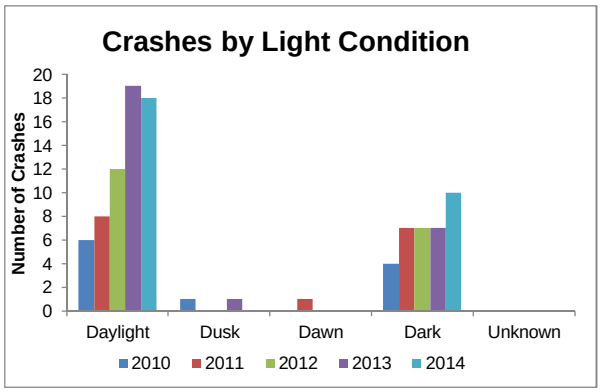
Atlantic Avenue from Military Trail to Ocean Boulevard (C3)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	6	10	10	11	10	47	9.40	46.5%
	Coll. w/ Bicycle	5	6	9	16	18	54	10.80	53.5%
	Total Crashes	**11**	**16**	**19**	**27**	**28**	**101**	**20.20**	**100.0%**
Severity	PDO Crashes	0	1	2	4	2	9	1.80	8.9%
	Fatal Crashes	0	0	0	0	0	0	0.00	0.0%
	Injury Crashes	11	15	17	23	26	92	18.40	91.1%
Lighting Conditions	Daylight	6	8	12	19	18	63	12.60	62.4%
	Dusk	1	0	0	1	0	2	0.40	2.0%
	Dawn	0	1	0	0	0	1	0.20	1.0%
	Dark	4	7	7	7	10	35	7.00	34.7%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	9	13	17	24	26	89	17.80	88.1%
	Wet	2	3	2	3	2	12	2.40	11.9%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	6	3	2	2	13	2.60	12.9%
	February	1	1	2	2	4	10	2.00	9.9%
	March	0	2	0	3	4	9	1.80	8.9%
	April	2	2	3	4	5	16	3.20	15.8%
	May	0	1	0	1	2	4	0.80	4.0%
	June	0	0	1	1	1	3	0.60	3.0%
	July	0	0	0	2	3	5	1.00	5.0%
	August	1	0	0	2	1	4	0.80	4.0%
	September	2	0	4	1	1	8	1.60	7.9%
	October	1	2	4	4	1	12	2.40	11.9%
	November	4	1	1	2	2	10	2.00	9.9%
	December	0	1	1	3	2	7	1.40	6.9%
Day of Week	Sunday	1	3	2	4	6	16	3.20	15.8%
	Monday	1	4	2	6	3	16	3.20	15.8%
	Tuesday	2	2	5	7	2	18	3.60	17.8%
	Wednesday	1	2	4	1	4	12	2.40	11.9%
	Thursday	1	3	0	3	4	11	2.20	10.9%
	Friday	4	0	3	1	3	11	2.20	10.9%
	Saturday	1	2	3	5	6	17	3.40	16.8%
Hour of Day	00:00-06:00	2	1	2	1	1	7	1.40	6.9%
	06:00-09:00	0	4	2	3	2	11	2.20	10.9%
	09:00-11:00	1	1	1	6	2	11	2.20	10.9%
	11:00-13:00	0	0	3	1	3	7	1.40	6.9%
	13:00-15:00	1	1	2	5	7	16	3.20	15.8%
	15:00-18:00	5	3	3	6	4	21	4.20	20.8%
	18:00-24:00	2	6	6	5	9	28	5.60	27.7%

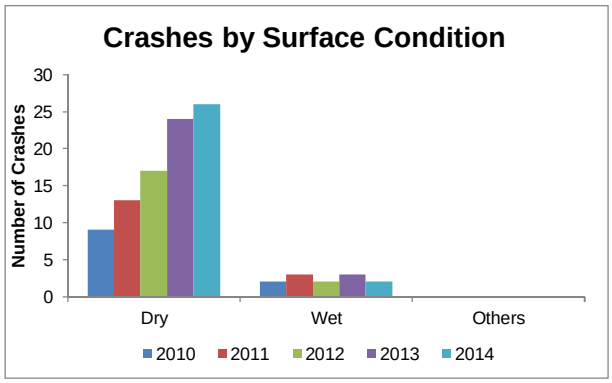
Atlantic Avenue from Military Trail to Ocean Boulevard (C3)

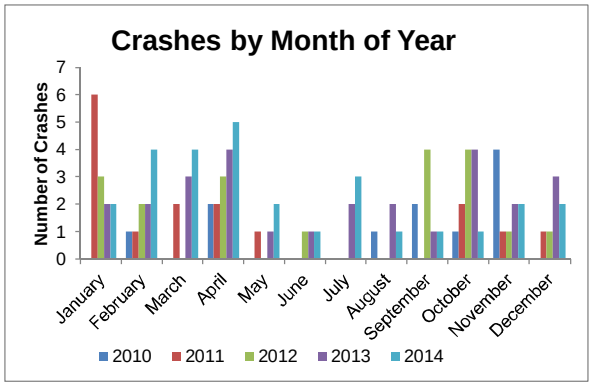
Crash Histograms

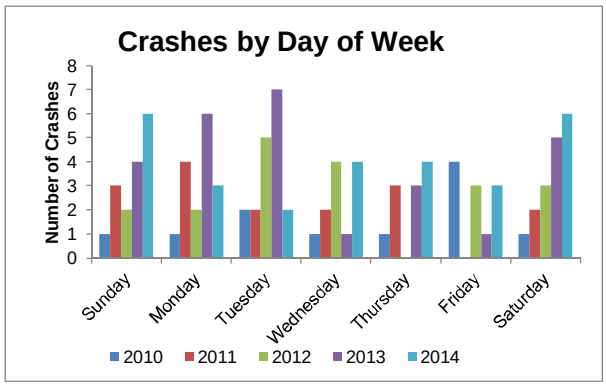






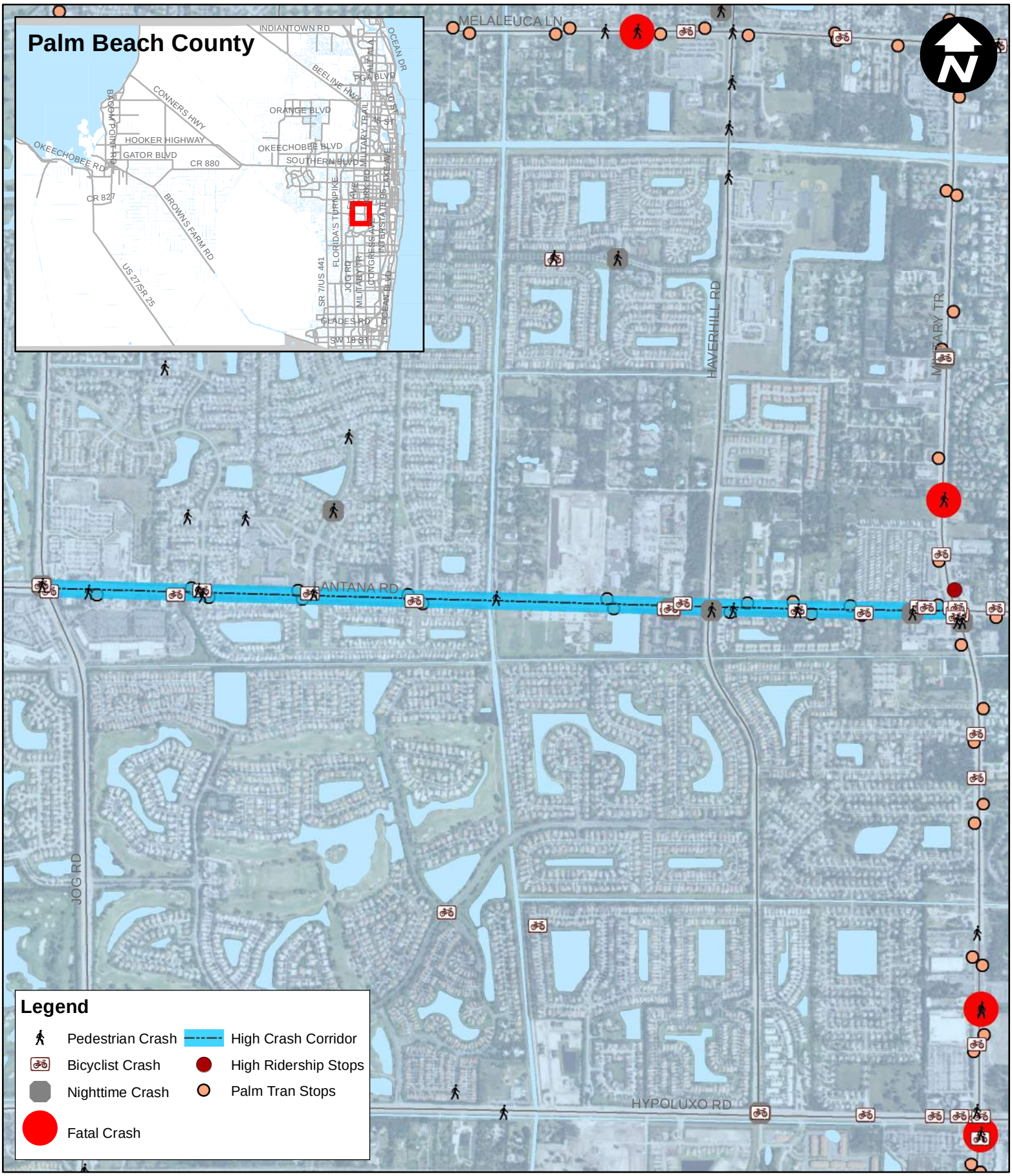






Palm Beach MPO
Pedestrian and Bicycle Safety Study

C4 (Lantana Road from Jog Road to Military Trail)



Executive Summary
Table 5

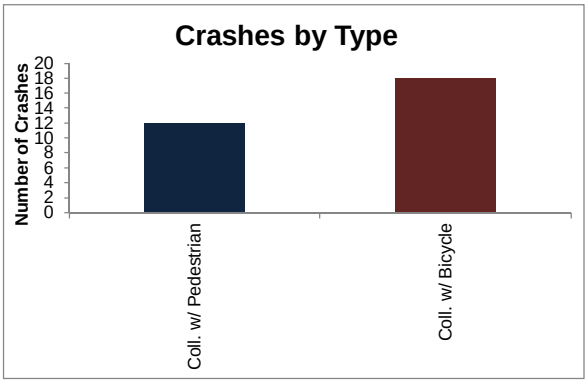
0 0.25 0.5 Miles

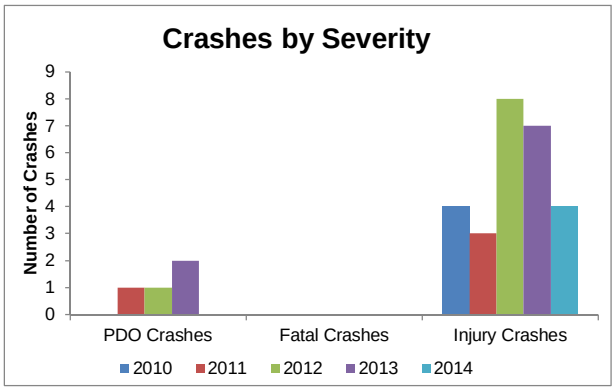
Lantana Road from Jog Road to Military Trail (C4)

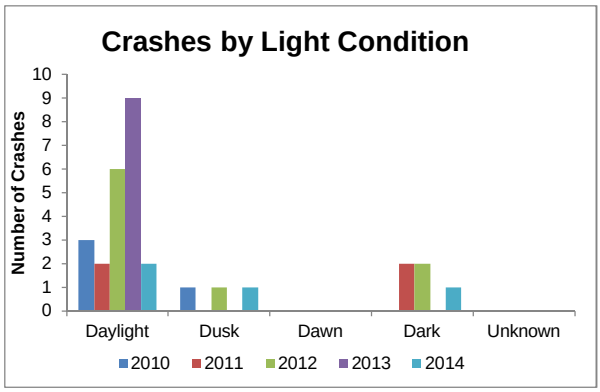
Lantana Road from Jog Road to Military Trail (C4)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	0	4	5	2	1	12	2.40	40.0%
	Coll. w/ Bicycle	4	0	4	7	3	18	3.60	60.0%
	Total Crashes	**4**	**4**	**9**	**9**	**4**	**30**	**6.00**	**100.0%**
Severity	PDO Crashes	0	1	1	2	0	4	0.80	13.3%
	Fatal Crashes	0	0	0	0	0	0	0.00	0.0%
	Injury Crashes	4	3	8	7	4	26	5.20	86.7%
Lighting Conditions	Daylight	3	2	6	9	2	22	4.40	73.3%
	Dusk	1	0	1	0	1	3	0.60	10.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	2	2	0	1	5	1.00	16.7%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	3	4	8	9	3	27	5.40	90.0%
	Wet	1	0	1	0	1	3	0.60	10.0%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	0	0	0	0	0.00	0.0%
	February	0	0	0	0	0	0	0.00	0.0%
	March	0	0	1	1	0	2	0.40	6.7%
	April	0	0	0	1	0	1	0.20	3.3%
	May	1	1	0	0	1	3	0.60	10.0%
	June	0	0	0	1	1	2	0.40	6.7%
	July	0	0	0	1	0	1	0.20	3.3%
	August	1	0	1	1	0	3	0.60	10.0%
	September	2	1	2	2	1	8	1.60	26.7%
	October	0	0	2	0	0	2	0.40	6.7%
	November	0	1	2	0	1	4	0.80	13.3%
	December	0	1	1	2	0	4	0.80	13.3%
Day of Week	Sunday	1	1	1	1	0	4	0.80	13.3%
	Monday	0	1	2	1	0	4	0.80	13.3%
	Tuesday	0	0	0	3	1	4	0.80	13.3%
	Wednesday	0	0	1	0	0	1	0.20	3.3%
	Thursday	1	0	1	1	0	3	0.60	10.0%
	Friday	0	0	4	3	3	10	2.00	33.3%
	Saturday	2	2	0	0	0	4	0.80	13.3%
Hour of Day	00:00-06:00	0	0	1	0	0	1	0.20	3.3%
	06:00-09:00	1	0	1	1	0	3	0.60	10.0%
	09:00-11:00	0	0	0	1	1	2	0.40	6.7%
	11:00-13:00	0	0	0	1	0	1	0.20	3.3%
	13:00-15:00	0	0	3	3	0	6	1.20	20.0%
	15:00-18:00	2	2	1	1	1	7	1.40	23.3%
	18:00-24:00	1	2	3	2	2	10	2.00	33.3%

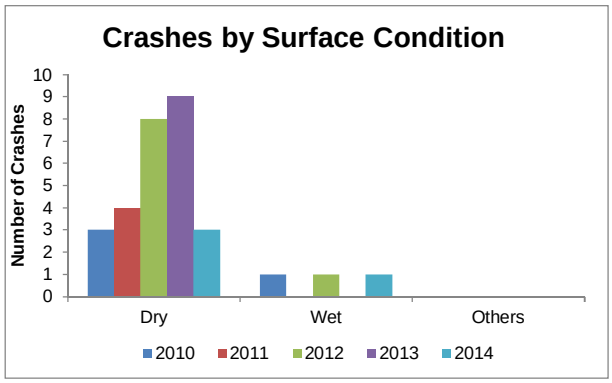
Lantana Road from Jog Road to Military Trail (C4)

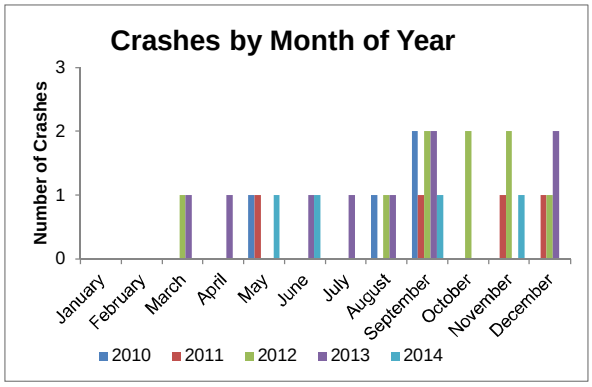
Crash Histograms

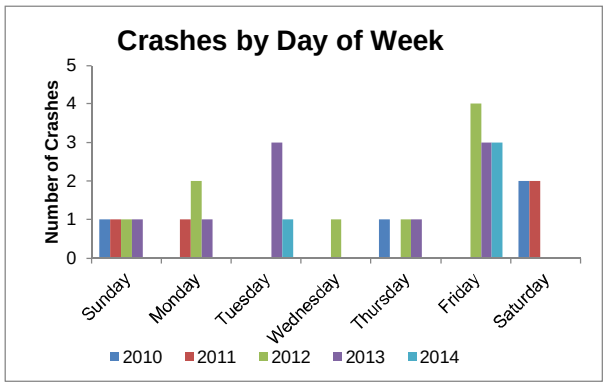






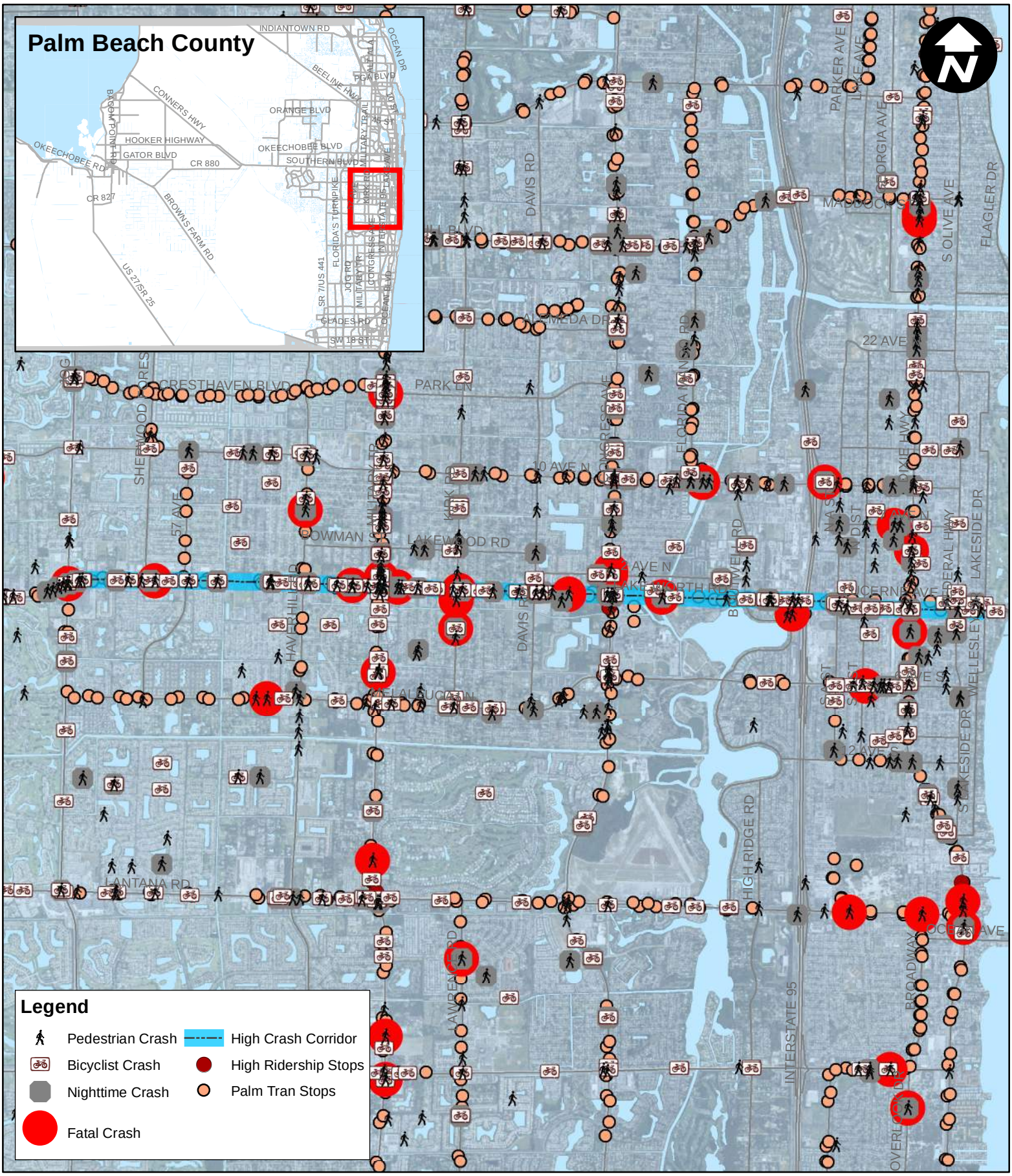






Palm Beach MPO
Pedestrian and Bicycle Safety Study

C5 (Lake Worth Road from Jog Road to Lakeside Drive)



Executive Summary
Table 5

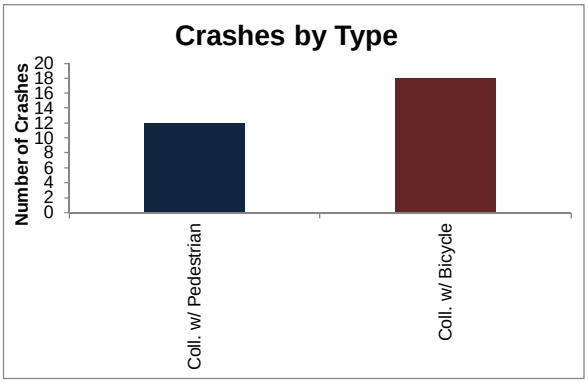
0 0.5 1 Miles

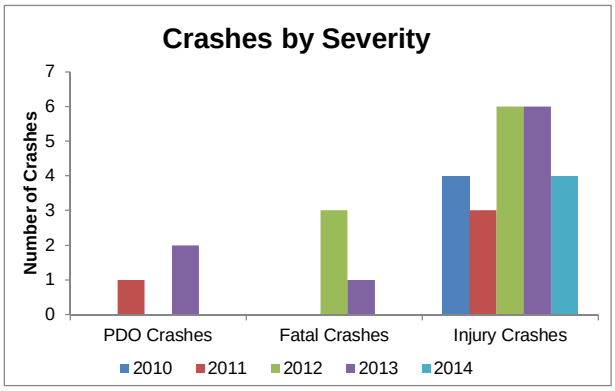
Lake Worth Road from Jog Road to Lakeside Drive (C5)

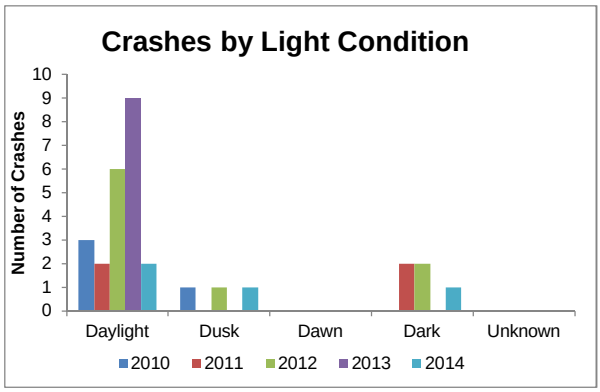
Lake Worth Road from Jog Road to Lakeside Drive (C5)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	0	4	5	2	1	12	2.40	40.0%
	Coll. w/ Bicycle	4	0	4	7	3	18	3.60	60.0%
	Total Crashes	**4**	**4**	**9**	**9**	**4**	**30**	**6.00**	**100.0%**
Severity	PDO Crashes	0	1	0	2	0	3	0.60	10.0%
	Fatal Crashes	0	0	3	1	0	4	0.80	13.3%
	Injury Crashes	4	3	6	6	4	23	4.60	76.7%
Lighting Conditions	Daylight	3	2	6	9	2	22	4.40	73.3%
	Dusk	1	0	1	0	1	3	0.60	10.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	2	2	0	1	5	1.00	16.7%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	3	4	8	9	3	27	5.40	90.0%
	Wet	1	0	1	0	1	3	0.60	10.0%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	0	0	0	0	0	0	0.00	0.0%
	February	0	0	0	0	0	0	0.00	0.0%
	March	0	0	1	1	0	2	0.40	6.7%
	April	0	0	0	1	0	1	0.20	3.3%
	May	1	1	0	0	1	3	0.60	10.0%
	June	0	0	0	1	1	2	0.40	6.7%
	July	0	0	0	1	0	1	0.20	3.3%
	August	1	0	1	1	0	3	0.60	10.0%
	September	2	1	2	2	1	8	1.60	26.7%
	October	0	0	2	0	0	2	0.40	6.7%
	November	0	1	2	0	1	4	0.80	13.3%
	December	0	1	1	2	0	4	0.80	13.3%
Day of Week	Sunday	1	1	1	1	0	4	0.80	13.3%
	Monday	0	1	2	1	0	4	0.80	13.3%
	Tuesday	0	0	0	3	1	4	0.80	13.3%
	Wednesday	0	0	1	0	0	1	0.20	3.3%
	Thursday	1	0	1	1	0	3	0.60	10.0%
	Friday	0	0	4	3	3	10	2.00	33.3%
	Saturday	2	2	0	0	0	4	0.80	13.3%
Hour of Day	00:00-06:00	0	0	1	0	0	1	0.20	3.3%
	06:00-09:00	1	0	1	1	0	3	0.60	10.0%
	09:00-11:00	0	0	0	1	1	2	0.40	6.7%
	11:00-13:00	0	0	0	1	0	1	0.20	3.3%
	13:00-15:00	0	0	3	3	0	6	1.20	20.0%
	15:00-18:00	2	2	1	1	1	7	1.40	23.3%
	18:00-24:00	1	2	3	2	2	10	2.00	33.3%

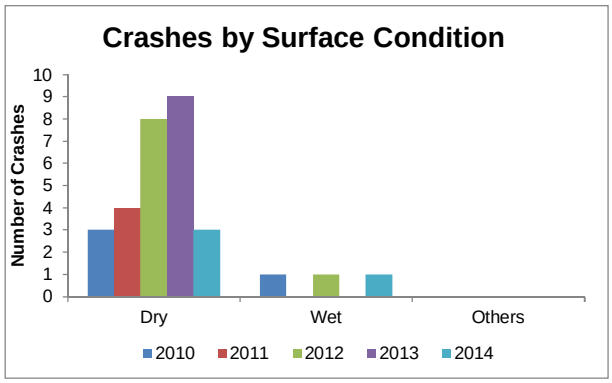
Lake Worth Road from Jog Road to Lakeside Drive (C5)

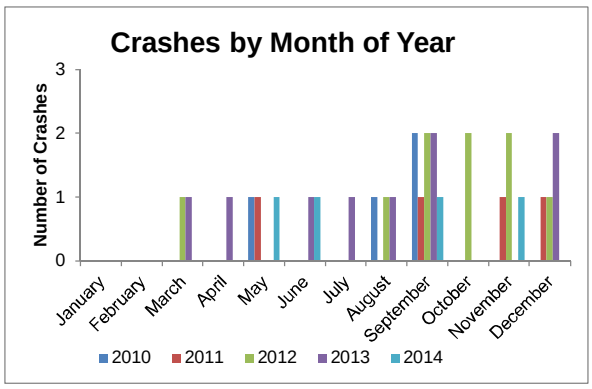
Crash Histograms

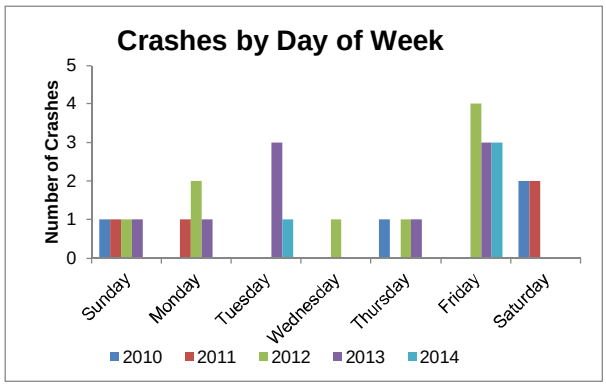






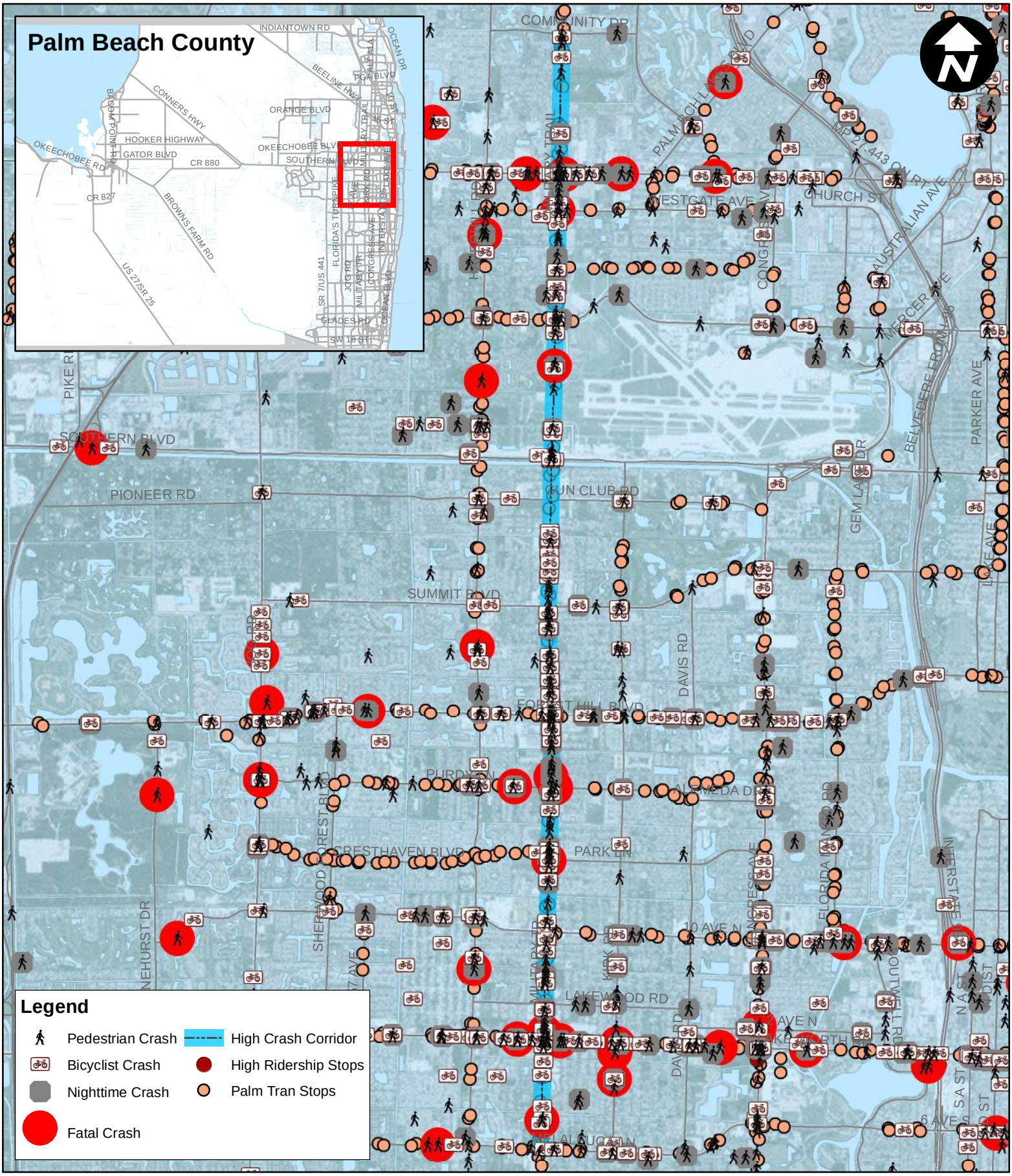






Palm Beach MPO
Pedestrian and Bicycle Safety Study

C6 (Military Trail from Melaleuca Lane to Community Drive)



Executive Summary
Table 5

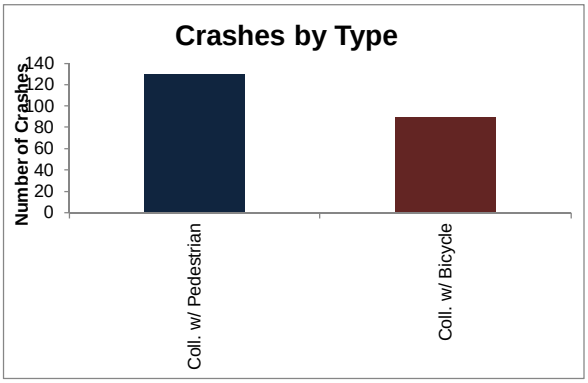
0 0.5 1 Miles

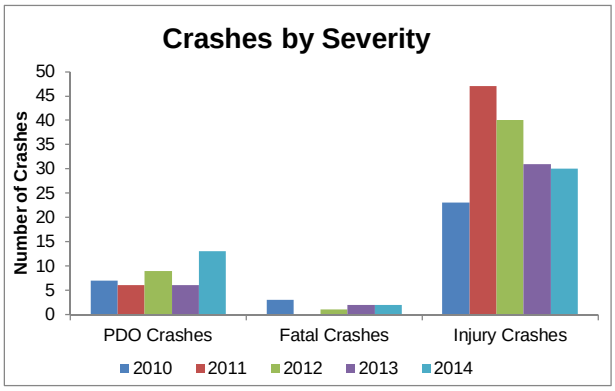
Military Trail from Melaleuca Lane to Community Drive (C6)

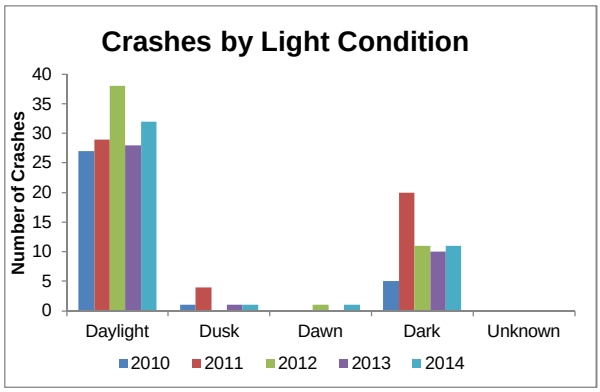
Military Trail from Melaleuca Lane to Community Drive (C6)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	17	32	28	25	28	130	26.00	59.1%
	Coll. w/ Bicycle	16	21	22	14	17	90	18.00	40.9%
	Total Crashes	**33**	**53**	**50**	**39**	**45**	**220**	**44.00**	**100.0%**
Severity	PDO Crashes	7	6	9	6	13	41	8.20	18.6%
	Fatal Crashes	3	0	1	2	2	8	1.60	3.6%
	Injury Crashes	23	47	40	31	30	171	34.20	77.7%
Lighting Conditions	Daylight	27	29	38	28	32	154	30.80	70.0%
	Dusk	1	4	0	1	1	7	1.40	3.2%
	Dawn	0	0	1	0	1	2	0.40	0.9%
	Dark	5	20	11	10	11	57	11.40	25.9%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	30	52	45	32	39	198	39.60	90.0%
	Wet	3	1	5	7	6	22	4.40	10.0%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	3	9	2	3	4	21	4.20	9.5%
	February	4	4	4	2	4	18	3.60	8.2%
	March	3	2	6	3	4	18	3.60	8.2%
	April	2	7	8	2	7	26	5.20	11.8%
	May	2	1	2	4	2	11	2.20	5.0%
	June	1	4	1	3	2	11	2.20	5.0%
	July	2	4	3	5	3	17	3.40	7.7%
	August	3	7	3	3	2	18	3.60	8.2%
	September	4	3	4	2	6	19	3.80	8.6%
	October	4	5	5	3	2	19	3.80	8.6%
	November	3	0	4	5	5	17	3.40	7.7%
	December	2	7	8	4	4	25	5.00	11.4%
Day of Week	Sunday	3	6	9	5	4	27	5.40	12.3%
	Monday	6	9	6	6	2	29	5.80	13.2%
	Tuesday	3	9	8	8	10	38	7.60	17.3%
	Wednesday	6	11	3	4	7	31	6.20	14.1%
	Thursday	3	9	5	7	7	31	6.20	14.1%
	Friday	5	6	10	6	5	32	6.40	14.5%
	Saturday	7	3	9	3	10	32	6.40	14.5%
Hour of Day	00:00-06:00	2	7	3	3	2	17	3.40	7.7%
	06:00-09:00	3	5	6	4	4	22	4.40	10.0%
	09:00-11:00	2	4	5	3	6	20	4.00	9.1%
	11:00-13:00	3	6	7	5	2	23	4.60	10.5%
	13:00-15:00	10	7	5	5	8	35	7.00	15.9%
	15:00-18:00	8	4	10	10	8	40	8.00	18.2%
	18:00-24:00	5	20	14	9	15	63	12.60	28.6%

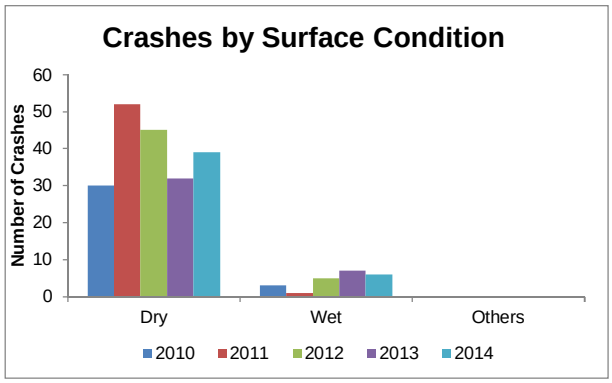
Military Trail from Melaleuca Lane to Community Drive (C6)

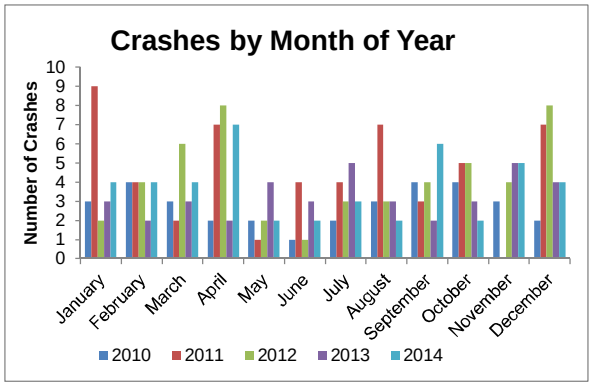
Crash Histograms

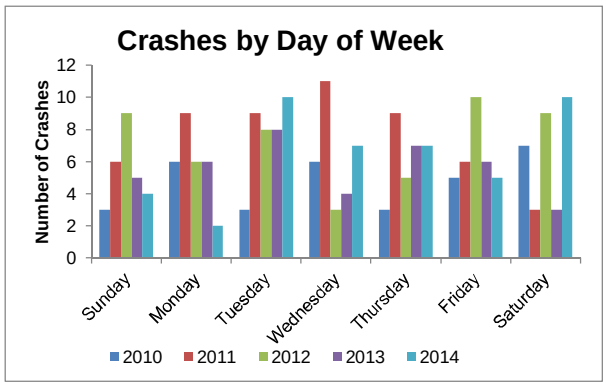






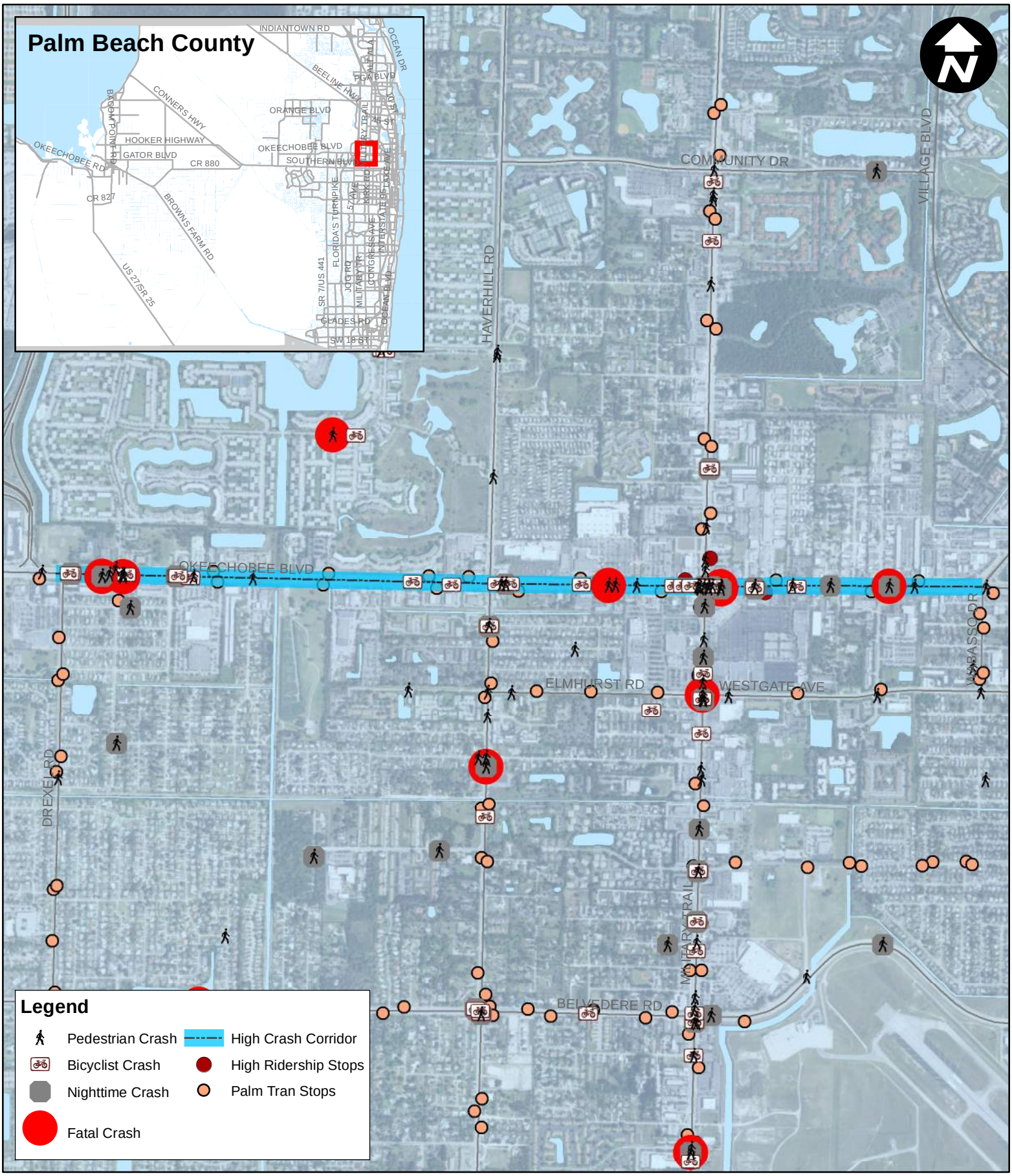






Palm Beach MPO
Pedestrian and Bicycle Safety Study

C7 (Okeechobee Road from Drexel Road to Congress Avenue)



Executive Summary
Table 5

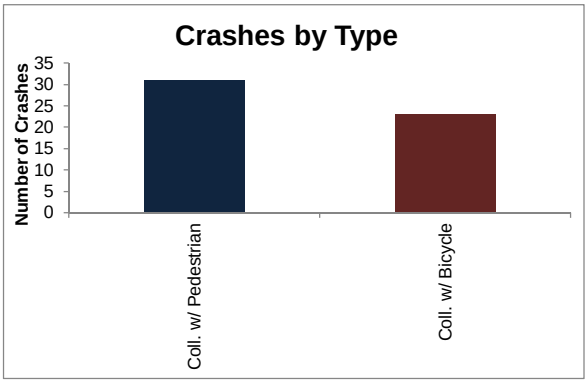
0 0.25 0.5 Miles

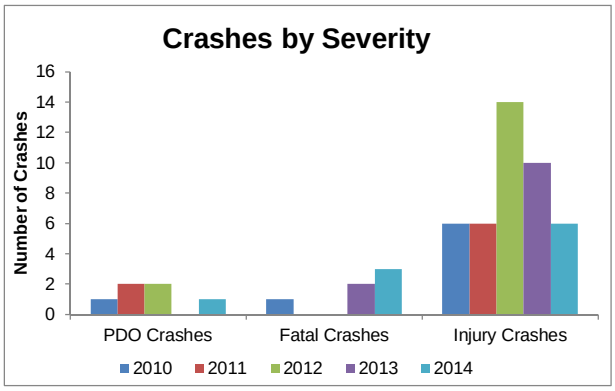
Okeechobee Road from Drexel Road to Congress Avenue (C7)

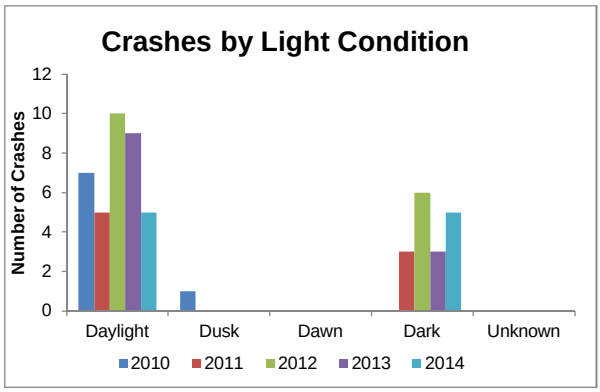
Okeechobee Road from Drexel Road to Congress Avenue (C7)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	3	6	9	8	5	31	6.20	57.4%
	Coll. w/ Bicycle	5	2	7	4	5	23	4.60	42.6%
	Total Crashes	**8**	**8**	**16**	**12**	**10**	**54**	**10.80**	**100.0%**
Severity	PDO Crashes	1	2	2	0	1	6	1.20	11.1%
	Fatal Crashes	1	0	0	2	3	6	1.20	11.1%
	Injury Crashes	6	6	14	10	6	42	8.40	77.8%
Lighting Conditions	Daylight	7	5	10	9	5	36	7.20	66.7%
	Dusk	1	0	0	0	0	1	0.20	1.9%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	3	6	3	5	17	3.40	31.5%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	8	8	15	11	10	52	10.40	96.3%
	Wet	0	0	1	1	0	2	0.40	3.7%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	1	2	2	1	1	7	1.40	13.0%
	February	1	0	0	0	1	2	0.40	3.7%
	March	0	0	0	3	0	3	0.60	5.6%
	April	1	2	1	0	1	5	1.00	9.3%
	May	1	2	1	1	0	5	1.00	9.3%
	June	1	1	0	0	1	3	0.60	5.6%
	July	0	1	2	2	2	7	1.40	13.0%
	August	0	0	3	2	1	6	1.20	11.1%
	September	1	0	2	0	0	3	0.60	5.6%
	October	0	0	1	3	1	5	1.00	9.3%
	November	2	0	3	0	1	6	1.20	11.1%
	December	0	0	1	0	1	2	0.40	3.7%
Day of Week	Sunday	4	4	4	3	3	18	3.60	33.3%
	Monday	0	1	3	2	1	7	1.40	13.0%
	Tuesday	1	0	1	1	3	6	1.20	11.1%
	Wednesday	2	1	2	3	1	9	1.80	16.7%
	Thursday	1	1	1	0	0	3	0.60	5.6%
	Friday	0	1	4	2	2	9	1.80	16.7%
	Saturday	0	0	1	1	0	2	0.40	3.7%
Hour of Day	00:00-06:00	0	2	1	2	0	5	1.00	9.3%
	06:00-09:00	2	0	1	1	3	7	1.40	13.0%
	09:00-11:00	0	1	2	1	0	4	0.80	7.4%
	11:00-13:00	2	2	2	2	0	8	1.60	14.8%
	13:00-15:00	3	0	1	1	1	6	1.20	11.1%
	15:00-18:00	0	1	3	1	1	6	1.20	11.1%
	18:00-24:00	1	2	6	4	5	18	3.60	33.3%

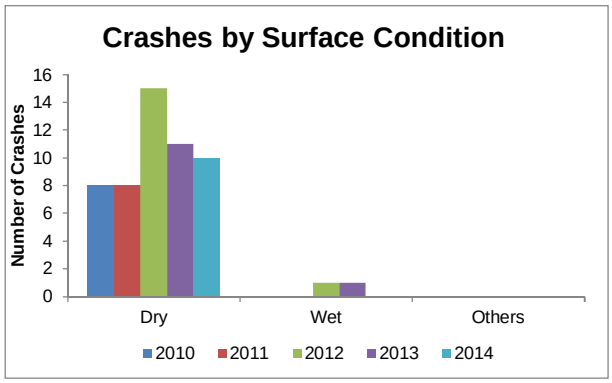
Okeechobee Road from Drexel Road to Congress Avenue (C7)

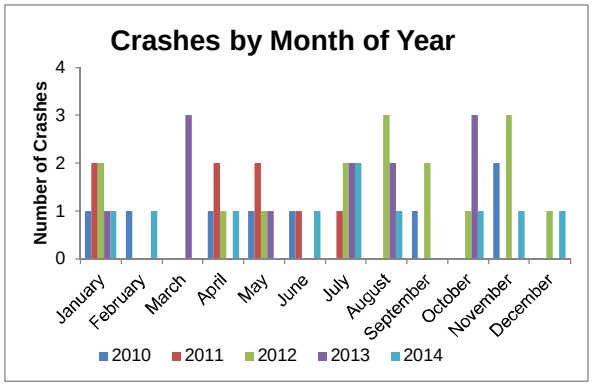
Crash Histograms

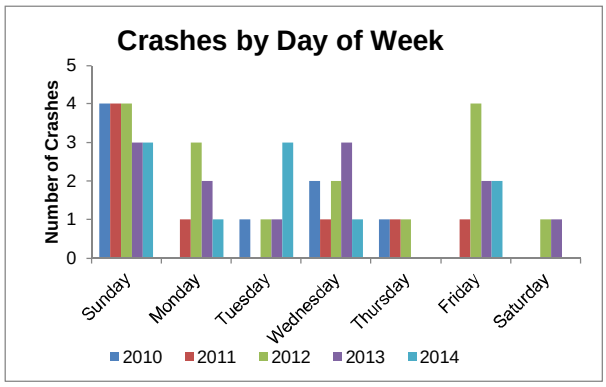






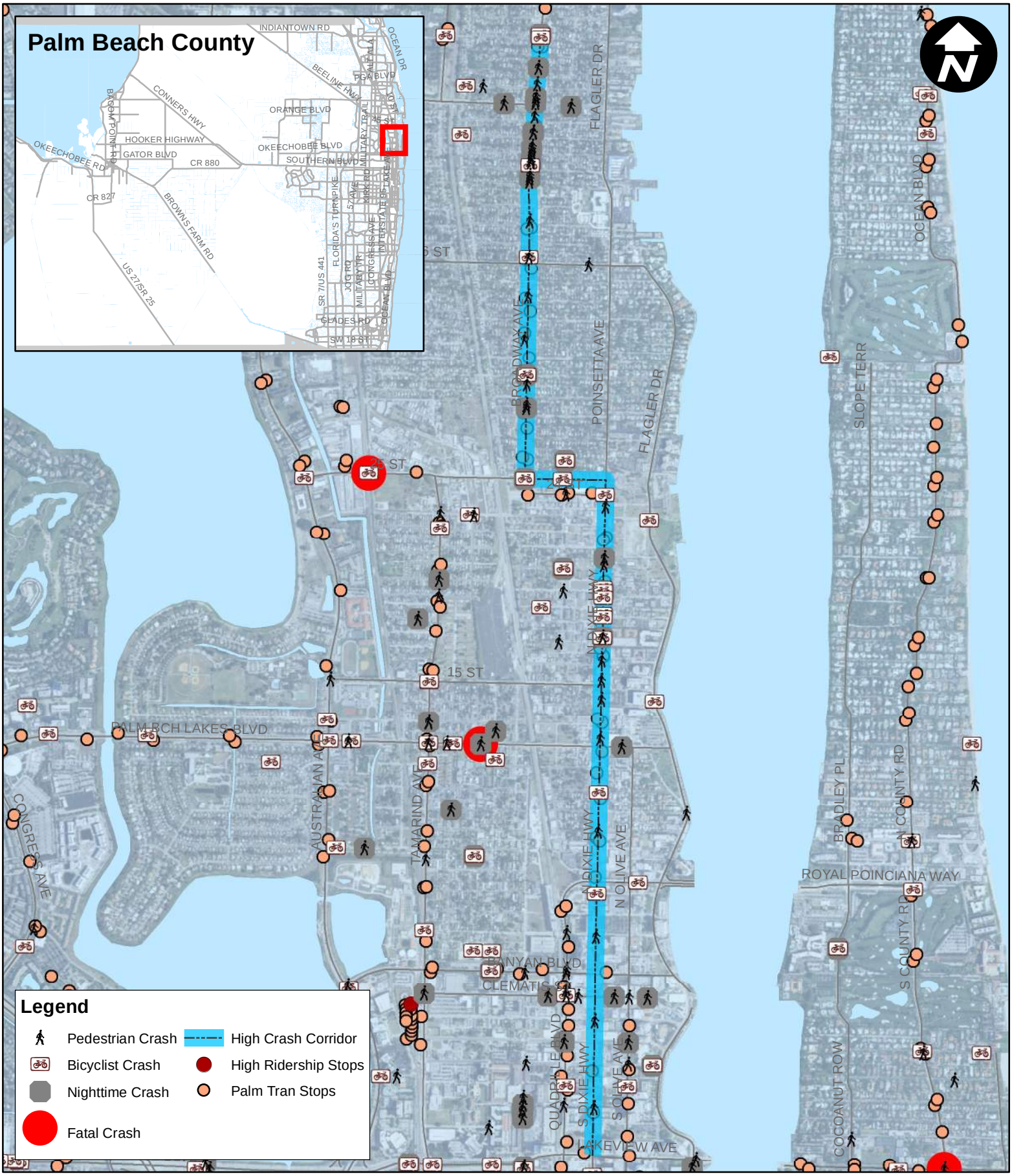






Palm Beach MPO
Pedestrian and Bicycle Safety Study

C8 (US 1 from Okeechobee Boulevard to 45 Street)



Executive Summary
Table 5

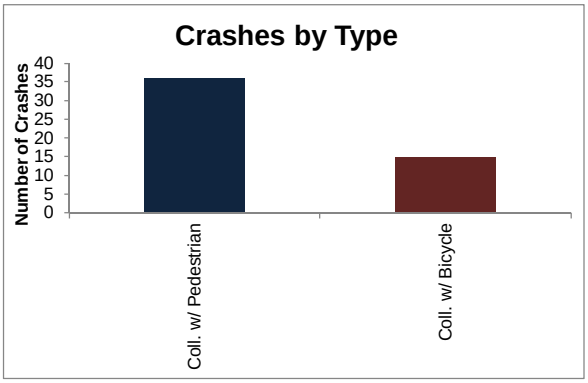
0 0.25 0.5 Miles

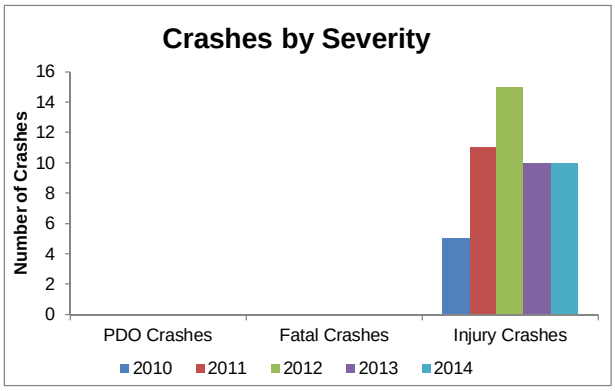
US 1 from Okeechobee Boulevard to 45 Street (C8)

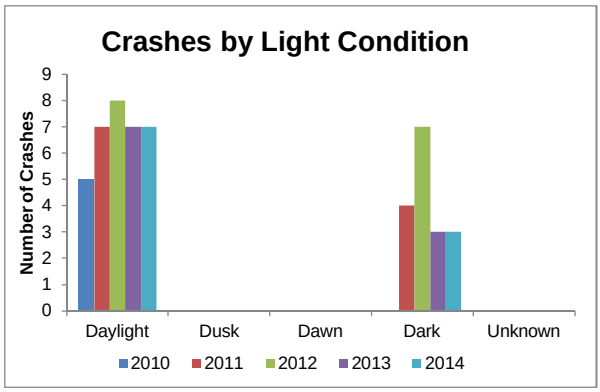
US 1 from Okeechobee Boulevard to 45 Street (C8)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	4	9	11	5	7	36	7.20	70.6%
	Coll. w/ Bicycle	1	2	4	5	3	15	3.00	29.4%
	Total Crashes	**5**	**11**	**15**	**10**	**10**	**51**	**10.20**	**100.0%**
Severity	PDO Crashes	0	0	0	0	0	0	0.00	0.0%
	Fatal Crashes	0	0	0	0	0	0	0.00	0.0%
	Injury Crashes	5	11	15	10	10	51	10.20	100.0%
Lighting Conditions	Daylight	5	7	8	7	7	34	6.80	66.7%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	0	4	7	3	3	17	3.40	33.3%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	5	9	13	10	10	47	9.40	92.2%
	Wet	0	2	2	0	0	4	0.80	7.8%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	1	2	1	2	0	6	1.20	11.8%
	February	1	1	0	2	1	5	1.00	9.8%
	March	1	1	3	0	0	5	1.00	9.8%
	April	0	0	0	2	0	2	0.40	3.9%
	May	0	0	2	0	0	2	0.40	3.9%
	June	1	1	0	2	2	6	1.20	11.8%
	July	0	0	2	1	2	5	1.00	9.8%
	August	0	2	1	0	1	4	0.80	7.8%
	September	1	1	3	0	1	6	1.20	11.8%
	October	0	0	2	0	3	5	1.00	9.8%
	November	0	1	1	0	0	2	0.40	3.9%
	December	0	2	0	1	0	3	0.60	5.9%
Day of Week	Sunday	0	3	3	2	1	9	1.80	17.6%
	Monday	3	0	3	0	2	8	1.60	15.7%
	Tuesday	0	4	4	1	2	11	2.20	21.6%
	Wednesday	1	1	0	2	1	5	1.00	9.8%
	Thursday	1	1	1	3	0	6	1.20	11.8%
	Friday	0	0	0	1	2	3	0.60	5.9%
	Saturday	0	2	4	1	2	9	1.80	17.6%
Hour of Day	00:00-06:00	0	2	3	0	1	6	1.20	11.8%
	06:00-09:00	0	1	1	1	1	4	0.80	7.8%
	09:00-11:00	1	0	1	2	2	6	1.20	11.8%
	11:00-13:00	0	2	2	0	0	4	0.80	7.8%
	13:00-15:00	2	2	1	2	2	9	1.80	17.6%
	15:00-18:00	1	2	1	1	1	6	1.20	11.8%
	18:00-24:00	1	2	6	4	3	16	3.20	31.4%

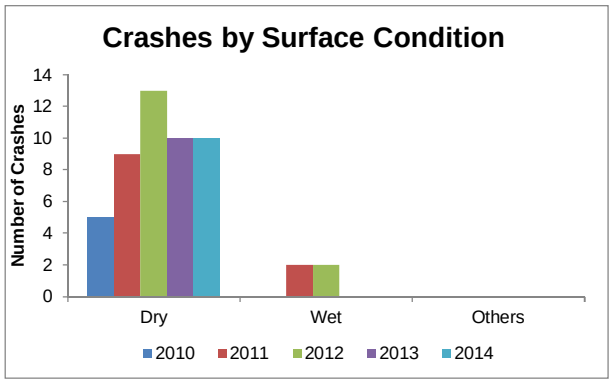
US 1 from Okeechobee Boulevard to 45 Street (C8)

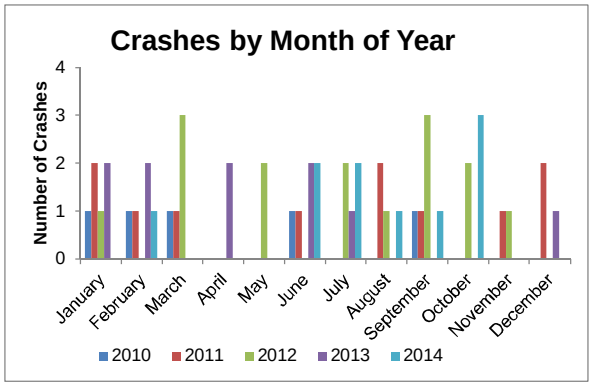
Crash Histograms

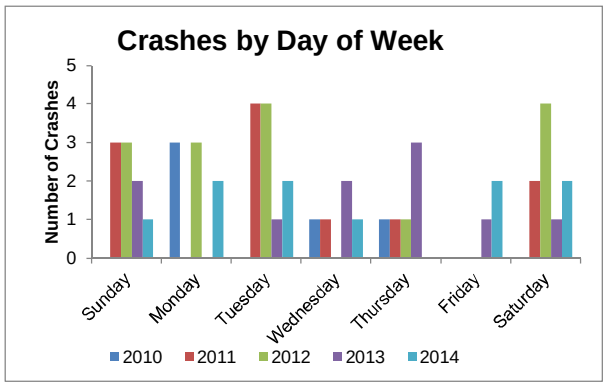






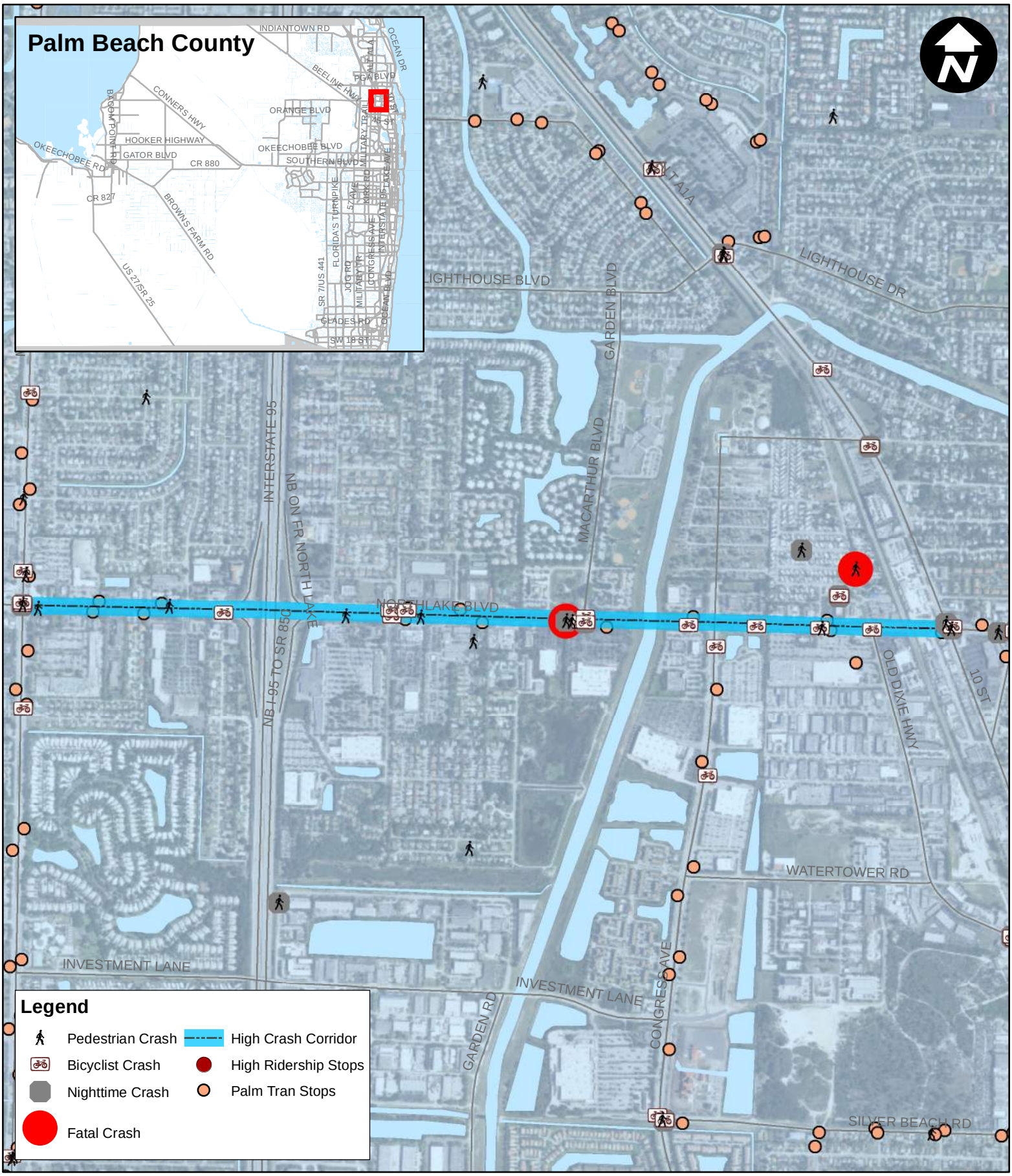






Palm Beach MPO
Pedestrian and Bicycle Safety Study

C9 (Northlake Boulevard from Military Trail to Alt A1A)



Executive Summary
Table 5

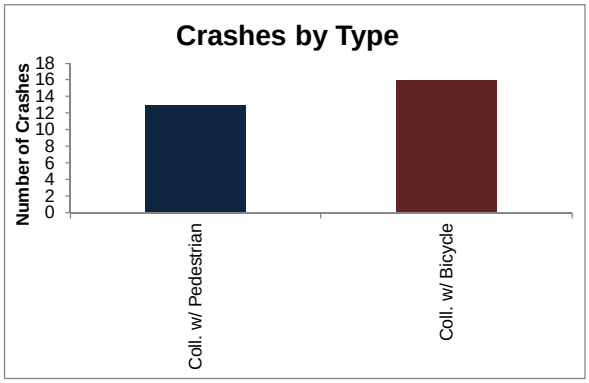
0 0.25 0.5 Miles

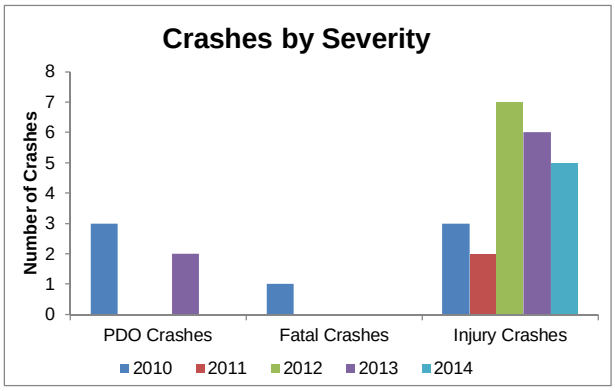
Northlake Boulevard from Military Trail to Alt A1A (C9)

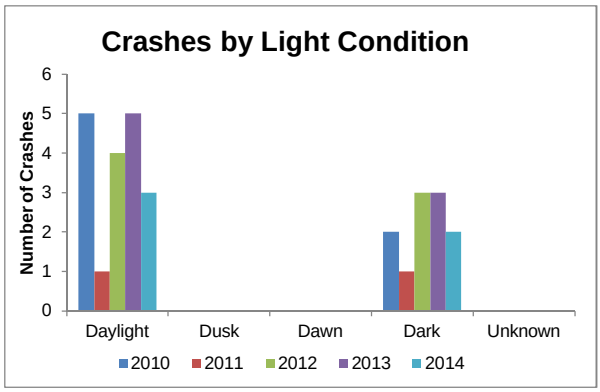
Northlake Boulevard from Military Trail to Alt A1A (C9)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	2	1	2	5	3	13	2.60	44.8%
	Coll. w/ Bicycle	5	1	5	3	2	16	3.20	55.2%
	Total Crashes	**7**	**2**	**7**	**8**	**5**	**29**	**5.80**	**100.0%**
Severity	PDO Crashes	3	0	0	2	0	5	1.00	17.2%
	Fatal Crashes	1	0	0	0	0	1	0.20	3.4%
	Injury Crashes	3	2	7	6	5	23	4.60	79.3%
Lighting Conditions	Daylight	5	1	4	5	3	18	3.60	62.1%
	Dusk	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	2	1	3	3	2	11	2.20	37.9%
	Unknown	0	0	0	0	0	0	0.00	0.0%
Surface Conditions	Dry	7	2	5	8	5	27	5.40	93.1%
	Wet	0	0	2	0	0	2	0.40	6.9%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	2	0	0	1	0	3	0.60	10.3%
	February	1	0	0	2	1	4	0.80	13.8%
	March	0	0	1	0	0	1	0.20	3.4%
	April	0	0	0	0	0	0	0.00	0.0%
	May	0	0	0	1	1	2	0.40	6.9%
	June	0	0	1	1	0	2	0.40	6.9%
	July	1	0	2	0	1	4	0.80	13.8%
	August	1	0	1	0	0	2	0.40	6.9%
	September	0	0	1	1	1	3	0.60	10.3%
	October	1	0	0	1	0	2	0.40	6.9%
	November	1	1	0	0	0	2	0.40	6.9%
	December	0	1	1	1	1	4	0.80	13.8%
Day of Week	Sunday	0	0	1	1	0	2	0.40	6.9%
	Monday	2	0	1	2	0	5	1.00	17.2%
	Tuesday	1	1	0	0	1	3	0.60	10.3%
	Wednesday	1	1	0	3	1	6	1.20	20.7%
	Thursday	2	0	1	1	2	6	1.20	20.7%
	Friday	0	0	3	0	0	3	0.60	10.3%
	Saturday	1	0	1	1	1	4	0.80	13.8%
Hour of Day	00:00-06:00	1	0	1	1	0	3	0.60	10.3%
	06:00-09:00	0	0	0	2	0	2	0.40	6.9%
	09:00-11:00	2	1	0	0	0	3	0.60	10.3%
	11:00-13:00	0	0	2	1	0	3	0.60	10.3%
	13:00-15:00	0	0	1	1	1	3	0.60	10.3%
	15:00-18:00	3	0	1	0	1	5	1.00	17.2%
	18:00-24:00	1	1	2	3	3	10	2.00	34.5%

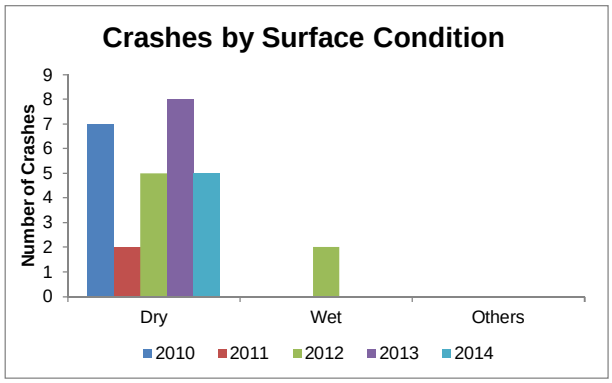
Northlake Boulevard from Military Trail to Alt A1A (C9)

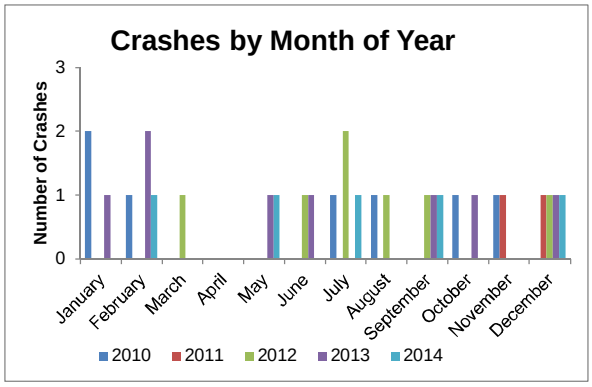
Crash Histograms

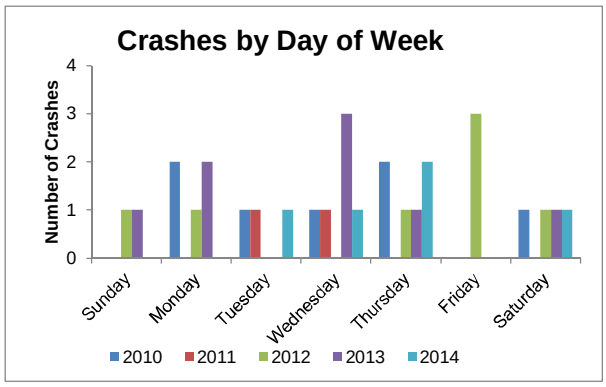






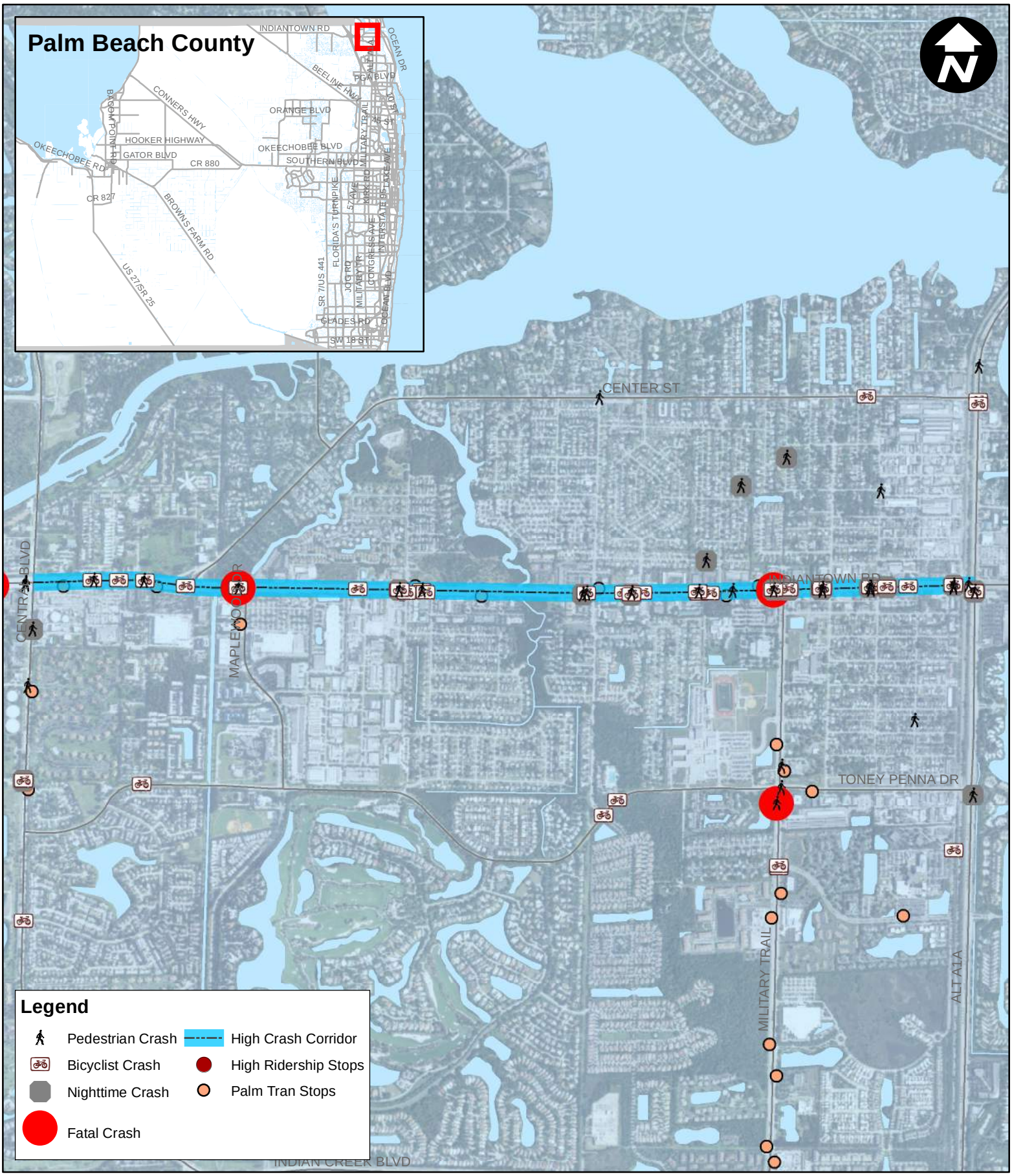






Palm Beach MPO
Pedestrian and Bicycle Safety Study

C10 (Indiantown Road from Central Boulevard to Alt A1A)



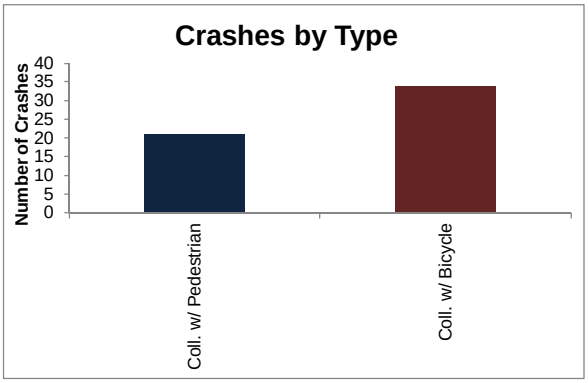
Executive Summary
Table 5

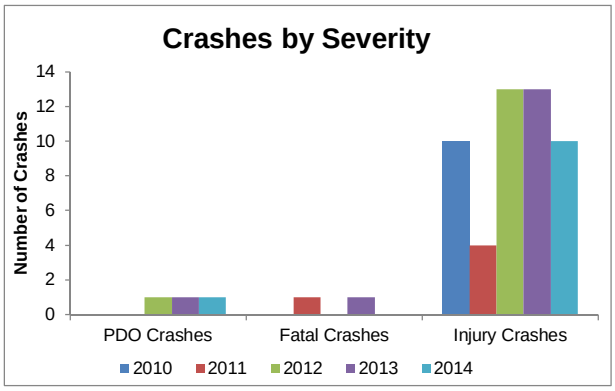
Indiantown Road from Central Boulevard to Alt A1A (C10)

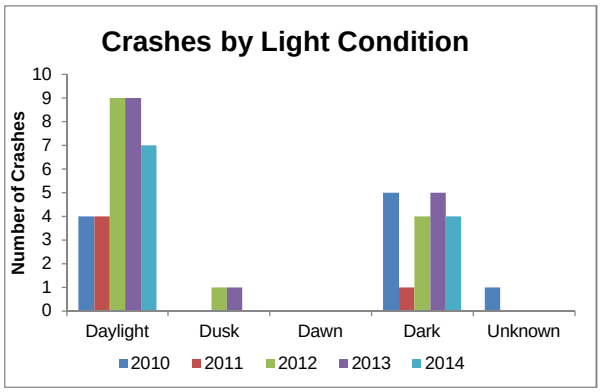
Indiantown Road from Central Boulevard to Alt A1A (C10)		Number of Crashes					Total	Average	Percent
		Year							
		2010	2011	2012	2013	2014			
Crash Type	Coll. w/ Pedestrian	4	1	5	7	4	21	4.20	38.2%
	Coll. w/ Bicycle	6	4	9	8	7	34	6.80	61.8%
	Total Crashes	**10**	**5**	**14**	**15**	**11**	**55**	**11.00**	**100.0%**
Severity	PDO Crashes	0	0	1	1	1	3	0.60	5.5%
	Fatal Crashes	0	1	0	1	0	2	0.40	3.6%
	Injury Crashes	10	4	13	13	10	50	10.00	90.9%
Lighting Conditions	Daylight	4	4	9	9	7	33	6.60	60.0%
	Dusk	0	0	1	1	0	2	0.40	3.6%
	Dawn	0	0	0	0	0	0	0.00	0.0%
	Dark	5	1	4	5	4	19	3.80	34.5%
	Unknown	1	0	0	0	0	1	0.20	1.8%
Surface Conditions	Dry	9	5	12	12	10	48	9.60	87.3%
	Wet	1	0	2	3	1	7	1.40	12.7%
	Others	0	0	0	0	0	0	0.00	0.0%
Month of Year	January	1	0	0	1	1	3	0.60	5.5%
	February	0	1	1	2	1	5	1.00	9.1%
	March	0	0	1	1	2	4	0.80	7.3%
	April	1	1	1	0	3	6	1.20	10.9%
	May	1	1	0	2	0	4	0.80	7.3%
	June	2	0	0	2	0	4	0.80	7.3%
	July	0	0	1	1	0	2	0.40	3.6%
	August	0	1	0	1	1	3	0.60	5.5%
	September	3	0	2	0	0	5	1.00	9.1%
	October	1	1	2	3	0	7	1.40	12.7%
	November	1	0	2	2	1	6	1.20	10.9%
	December	0	0	4	0	2	6	1.20	10.9%
Day of Week	Sunday	1	1	1	3	2	8	1.60	14.5%
	Monday	2	2	2	2	1	9	1.80	16.4%
	Tuesday	0	2	1	6	2	11	2.20	20.0%
	Wednesday	0	0	3	0	2	5	1.00	9.1%
	Thursday	3	0	3	3	2	11	2.20	20.0%
	Friday	3	0	0	0	0	3	0.60	5.5%
	Saturday	1	0	4	1	2	8	1.60	14.5%
Hour of Day	00:00-06:00	1	0	0	1	0	2	0.40	3.6%
	06:00-09:00	0	0	1	1	1	3	0.60	5.5%
	09:00-11:00	1	2	1	0	1	5	1.00	9.1%
	11:00-13:00	1	1	0	2	1	5	1.00	9.1%
	13:00-15:00	0	0	2	1	2	5	1.00	9.1%
	15:00-18:00	2	0	4	3	2	11	2.20	20.0%
	18:00-24:00	5	2	6	7	4	24	4.80	43.6%

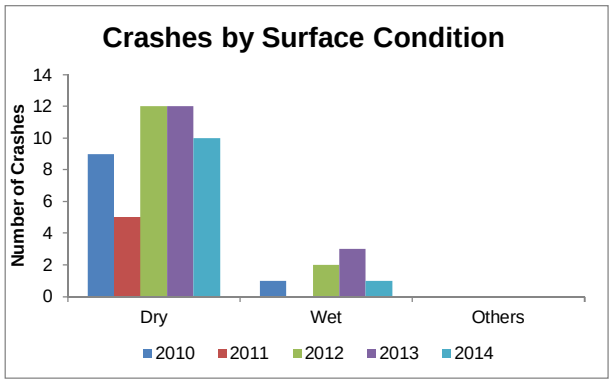
Indiantown Road from Central Boulevard to Alt A1A (C10)

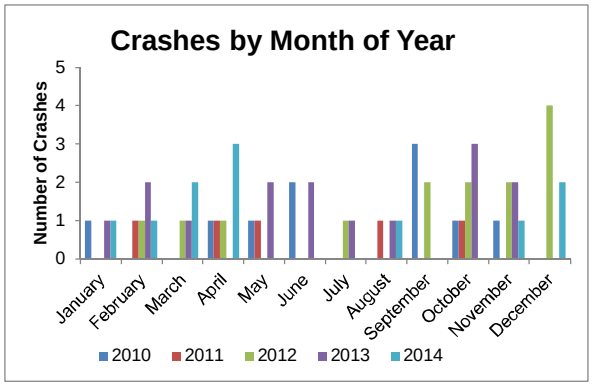
Crash Histograms

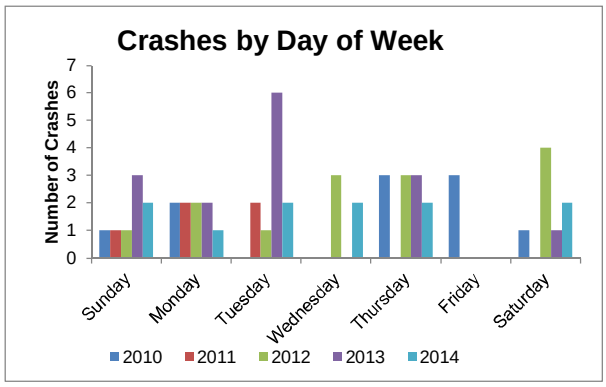












Appendix E
Lighting and Illumination

Florida Department of Transportation (FDOT)
Intersection Lighting Retrofits for Pedestrians

BLUF (Bottom Line Up-Front):

FDOT Vision: Fatality Free Transportation System. $20 Million/year spent over the next five years for targeted State Highway System (SHS) Intersection Lighting Retrofits can ***save approximately $4 Billion (Net Present Value)*** over the next 20 years in societal costs related to pedestrian fatality and injury crashes. This is a recurring benefit that will continue to reduce pedestrian crashes on the SHS well beyond the typical 20 year life cycle. Motor vehicle (and other user) crashes will also be reduced by this effort, but those benefits were not quantified in this study.

Purpose and Need:

FDOT is an FHWA focus state for both Intersection Safety and Bicycle and Pedestrian Safety. These priority areas will benefit from this Lighting Initiative. *In 2013, Florida had the 2nd highest per capita Pedestrian Fatality Rate (Governors Highway Safety Association Report).*

Most pedestrian crashes occur at urban intersections, the majority (78%) of which happen at night between the hours 6 pm and 6 am. As a result, a ***Joint State Roadway Design Office and State Safety Office Team*** has been evaluating cost-effective solutions to increase safety at those signalized intersections having the greatest risk of night-time pedestrian crashes.

> *"Installing street lighting can reduce late-night/early-morning crashes at intersections by a weighted average of 35%"…FHWA Website*

To ***target intersections with the highest number of crashes***, the Central Office (CO) worked with the Districts to address the Top 20 intersections statewide. These 20 intersections were ranked based on their total number of pedestrian night-time crashes. The number of crashes ranged from 6 to 11 crashes per intersection over a five year period between 2009 and 2013. Central office staff, partnering with the District offices, developed contract documents and utilized District Design-Build Pushbutton Contracts to provide pedestrian lighting at these Top 20 intersections. The retrofit lighting installation at these Top 20 intersections was completed in April 2015.

In January 2016, we changed our policy (with management approval) to require pedestrian lighting for all new and reconstructed signalized intersections, roundabouts, and midblock crossings. Effective July 2016, all new lighting will be LED.

> *"While education and enforcement are important components of a comprehensive pedestrian safety program, the key is making structural changes in roadway design that better separate motor vehicles and pedestrians, slowing down motor vehicles, and enhancing visibility and awareness through signage and lighting."…Governors Highway Safety Association Report*

Following this concentrated effort for the top 20 intersections, ***a more systemic approach*** was developed to address nighttime intersections statewide. Due to its ***relatively low cost and high return on crash reduction***, lighting retrofits were evaluated for the remaining urban signalized intersections in Florida.

Data Collection

Crash data was provided in an Excel spreadsheet by the State Safety Office on all intersection related ***nighttime pedestrian related crashes and fatalities from 2009-2013***. Data was extracted from the FDOT CARS database for intersection crashes that occurred within 250' of the center of a signalized intersection with a breakdown of crashes per intersection. Of the 8,500 signalized intersections on the SHS, 5,000 were chosen for review based on the number of pedestrian crashes that occurred at or near these intersections. Those intersections with the most crashes ***provide a higher statistical reliability of success*** in the reduction of pedestrian related fatality and injury crashes. When looking at those intersections with at least one crash, it was found that four-lane and six-lane urban facilities represent a majority of these nighttime pedestrian crashes.

HSM Methodology and Process

Due to the randomness of pedestrian related crashes throughout roadway corridors ***a risk-based systemic approach*** was developed. The engineering analysis for this internal FDOT study was performed using a ***hybrid Highway Safety Manual (HSM)/Historical Crash Method (HCM) process***. This process is comprised of observed Florida historical pedestrian crash rates and frequencies provided by the State Safety Office combined with portions of those processes in the HSM, Volumes 1-3. The processes in the chapters on Network Screening (Chapter 4), Economic Appraisal (Chapter 7), Project Prioritization (Chapter 8), Urban and Suburban Arterials (Chapter 12) and Chapter 14 (Intersections) were reviewed and included where appropriate.

Crash Modification Factors (CMFs) Used:

During the statewide analysis of intersection crashes, multiple research studies were reviewed to confirm the benefits of pedestrian lighting. Some of the studies are based on before-after crash comparisons and some are based on meta-analysis (Crash system data observations). Regardless of method, all of the research reviewed indicated a higher than average reduction in pedestrian crashes as a result of the presence of, or addition of, intersection lighting.

The ***CMFs used in this study were from the HSM, Volume 3, Table 14-18*** (Below), and are consistent with the application of most HSM CMFs, in that the lighting countermeasure was not broken down further into subordinate crash types. Doing so, often leads to a loss in statistical reliability due to limits in available research data.

HSM Table 14-18: Potential Crash Effects of Providing Intersection Illumination

0.62 CMF	38% reduction	All nighttime injury crashes
0.58 CMF	***42% reduction***	***Pedestrian Nighttime Crashes***

Other HSM Lighting CMFs for Urban Intersections (4-Leg Signalized) offer reductions of 8% - 10% of total nighttime crashes (inclusive of cars, bikes, and peds). While these reductions also include pedestrian crashes, these benefits were not included in the benefit-cost analysis performed. Adding these crashes would increase the B/C ratios accordingly.

Average Crash Reduction Benefit

Average crash costs were computed representative of existing Florida distribution rates for pedestrian crashes. Using the values from the PPM, Volume 1, Ch. 23, the value to society for one nighttime pedestrian crash was derived as follows:

Nighttime Pedestrian Crash Cost (Weighted Average)			
PPM Crash Cost (VSL)	**Nighttime Pedestrian Crashes (2009-13)**	**Proportion (F+I)**	**Cost per Crash (F+I)**
K - $ 10,100,000	324	13%	$1,313,000
A - $ 574,000	708	29%	$166,460
B - $ 155,000	848	35%	$54,250
C - $ 96,600	574	23%	$22,218
Avg. Cost Nighttime Pedestrian Crash	2,454	100%	**$1,555,928**

Construction Costs

The average cost for each intersection lighting retrofit is $39,264 and is based on the statewide average unit cost for the pay items used to retrofit lighting on the top 20 intersections. Intersections where partial lighting is present will have slightly reduced costs. The average cost per intersection is broken down as follows:

Intersection Lighting Retrofit Unit Cost					
Pay Item No.	**Light Upgrades by Intersection**	**Average Quantity**	**Units**	**Unit Cost**	**Cost**
715-4-122	New Light Poles	3	EA	$4,250.00	$12,750
715-4-400	Relocated Light Poles	1	EA	$2,015.00	$2,015
715-16-5	Re-lamp & Re-ballast Luminaire	1	EA	$205.00	$205
715-5-30	Add Luminaire to Exist Pole	1	EA	$450.00	$450
635-2-11	Pull Boxes	3	EA	$500.00	$1,500
715-4-600	Remove Light Pole/Arm	0.5	EA	$200.00	$100
630-2-12	Conduit (Directional Bore)	400	LF	$18.50	$7,400
715-1-12	Lighting Conductors (No.6)	400	LF	$1.75	$700
715-1-15	Lighting Conductors (No.1)	800	LF	$5.75	$4,600
715-500-1	Pole Cable Distribution System	4	LF	$750.00	$3,000
				Signalized Intersection Lighting Retrofit	**$32,720**
				Add Design and Other Construction Costs at 20%	**$6,544**
				Total Lighting Retrofit for Signalized Intersection	**$39,264**

Project Approach and Rankings

Once all of the intersections with crashes were identified, the signalized intersections were then plotted on a GIS map along with nighttime pedestrian crashes along major urban and suburban highways according to relatively homogeneous segment characteristics. Segments and intersections were filtered by typical section, traffic volume, land development context, pedestrian traffic generators, and uniformity.

The Intersection crash spreadsheets from the Safety Office were reviewed, updated, and then ranked based on the highest benefit-cost ratios for retrofitting of lighting to address nighttime pedestrian crashes. Intersections for retrofitting were selected based on a roadway segment approach instead of selected isolated intersections. This approach targets roadway segments inclusive of multiple intersections exhibiting high pedestrian crash frequencies.

While some intersections within the selected high crash segments had no crashes, these intersections are still proposed for retrofitting. This is due to their similarity in roadway characteristics to other intersections within the segment exhibiting high crash rates. This approach is more uniform and addresses a significant portion of nighttime pedestrian crashes in a very systemic manner. ***Segments with high pedestrian intersection crashes are the targeted***

approach, but lighting retrofits are only proposed at intersections within those roadway segments. No roadway or corridor lighting between intersections is proposed.

Benefit-Cost

The Benefit for each segment of intersections was calculated by dividing the number of existing pedestrian intersection crashes over five years by five and then multiplying that number by the crash reduction factor (HSM) and the cost for one pedestrian crash. The cost for each segment of intersections was calculated by multiplying the number of intersections within each segment by $39,264 and then applying a 20-year Capital Recovery Factor of 0.0736 to annualize the cost. The segments were then ranked statewide based on their respective benefit-cost ratios.

Benefit: (# of crashes over 5 years/5) * 0.42* $1,555,928

Cost: # Intersections Retrofitted (In Segment) * Construction Cost * 0.0736 (20 Year Factor)

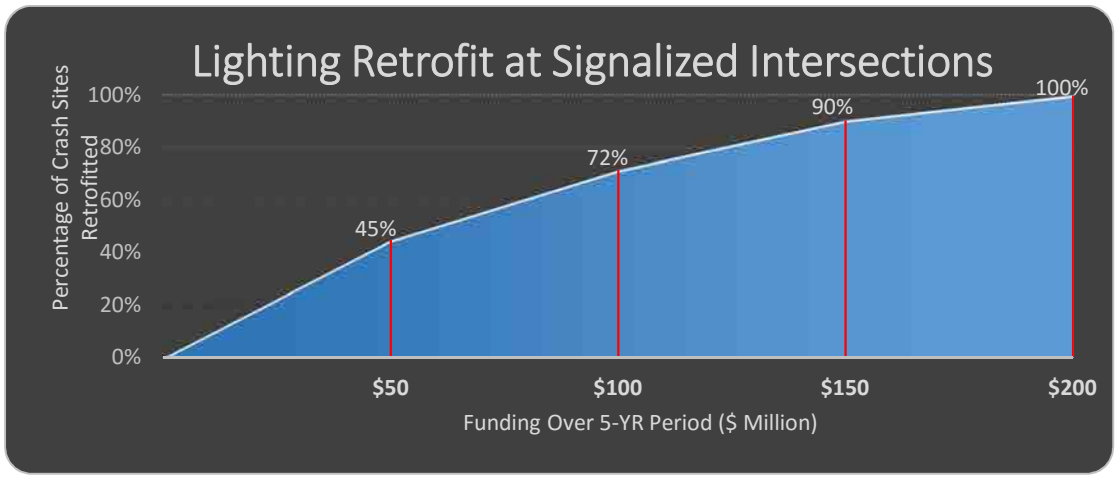
For Example: (1 Existing Crash/5 * 0.42 * $1,555,928/1) / 1 * $39,264*0.0736 =

45.2 B/C Ratio to Retrofit Lighting at an intersection with One Pedestrian Crash over 5 Years.

District Funding Allocations

Allocation for funding was determined based on total crash rate percentages for each district. The statewide average B/C ratio was 40:1 based on a $20 million/year allocation for lighting retrofits over five years. This B/C far exceeds other initiatives that we are advancing within the Department. ***This statewide allocation is projected to retrofit 2546 intersections representing about 2,309 crashes or 72 percent of all (3227) nighttime pedestrian intersection crashes over the next five years***. The crashes will continue to be reduced over the remainder of the 20 year lifespan of the lighting projects for a total net present value of crash reduction of $4 Billion. To fund all 3227 intersections with nighttime pedestrian crashes would require over $200 million.

The targeted segments for retrofitting have been ranked according to their benefit-cost ratios and the proposed funding allocations are provided below:



Florida Department of Transportation (FDOT)
Intersection Lighting Retrofits for Pedestrians

Intersection Retrofit Funding Allocation							
District	No. of Crashes Addressed (5-Year)	Fatalities (5-Year)	Intersections Retrofitted (5-Year)	Funding Allocation (5-Year)	Benefit (Annualized)	Cost (Annualized)	Avg. B/C Ratio
1	137	16	187	$ 7,340,000	$ 17,905,619	$ 540,224	33
2	208	22	249	$ 9,790,000	$ 27,185,174	$ 720,544	38
3	138	15	163	$ 6,400,000	$ 18,036,317	$ 471,040	38
4	470	58	522	$ 20,510,000	$ 61,428,037	$ 1,509,536	41
5	386	60	440	$ 17,260,000	$ 50,449,409	$ 1,270,336	40
6	606	64	601	$ 23,610,000	$ 79,202,959	$ 1,737,696	46
7	364	54	384	$ 15,090,000	$ 47,574,055	$ 1,110,624	43
Statewide	2309	289	2546	$ 100,000,000	$ 301,781,571	$ 7,360,000	40

References and Studies:

- http://www.ghsa.org/html/files/pubs/spotlights/spotlight_ped2014.pdf
- AASHTO Highway Safety Manual
- Holland-Wanvik 2009: 30% Reduction in Nighttime Ped Crashes, 46%-49% Reduction in all crashes (Non-EB, but based on 763,000 crashes), HSM Ref. for Table 14-18
- Elvik and Vaa (38 Before-After Studies, 14 in USA, 24 UK/Europe), HSM for Table 14-18
- Minnesota DOT; Before-After Study http://www.intrans.iastate.edu/reports/rural_lighting_FINAL.pdf
- Ohio-Chowdury: Adding Interchange Lighting results in 50% Reductions in all crashes (KABCO), 26% Reduction in KABC crashes. (Before/After-EB)
- Bullough: 12% reduction in total nighttime crashes through intersection lighting (KABCO)
- Michigan: 30% Reduction in Pedestrian Fatal and Injury Crashes (KA)
- Donnell: 12% reduction in total nighttime crashes (KABCO)

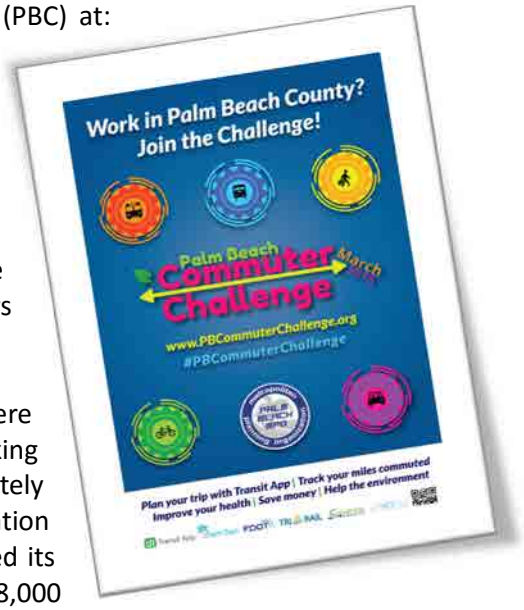
FY 2017			
INTERSECTION		**FM#**	**City**
Commercial Blvd	NE 6th Ave	431672-1	Oakland Park
Oakland Park	NE 6 Ave	431672	Oakland Park
W Sunrise Blvd	Sunset Strip	431666	Sunrise
SR 817 / University Dr	Sunset Strip	431666	Sunrise
Blue Heron Blvd	Avenue S	435144	Riviera Beach
Blue Heron Blvd	Avenue O	435144	Riviera Beach
Blue Heron Blvd	Australian Ave	435144	Riviera Beach
Blue Heron Blvd	Old Dixie Hwy	435144	Riviera Beach
Blue Heron Blvd	Ave H West	435144	Riviera Beach
Blue Heron Blvd	Ave F	435144	Riviera Beach
Military Tr	PGA Blvd	432883-2	Palm Bch. Gardens
SR 7	Marina Blvd	427938-1	Boca Raton
SR 7	Sandalfoot Blvd	427938-1	Boca Raton
SR 7	Judge Winikoff Rd	427938-1	Boca Raton
SR 7	Boca Woods Ln	427938-1	Boca Raton
SR 7	SW 3 St	427938-1	Boca Raton
SR 7	Palmetto Park Rd	427938-1	Boca Raton
SR 7	Atlantic Blvd	427937-2	Margate
SR 7	SW 11 St	427937-2	North Lauderdale
SR 7	Southgate Blvd	427937-2	Margate
SR 7	SW 17 St	427937-2	North Lauderdale
SR 7	SW 7 St	427937-2	Margate
SR 7	Coconut Creek Pkwy	427937-2	Margate
SR 7	Margate Blvd	427937-2	Margate
SR 7	Copans Rd	427937-2	Margate
SR 7	Rancho Blvd	427937-2	Margate
SR 7	Winfield Blvd	427937-2	Margate
SR 7	Prospect Rd	427937-2	North Lauderdale
SR 7	Bailey Rd	427937-2	North Lauderdale
SR 7	Blvd of Champions	427937-2	North Lauderdale
SR 7	SW 12 St	427937-2	North Lauderdale
SR 7 NB	Sample Rd	427937-1	Coconut/Margate/Coral
SR 7 SB	Sample Rd	427937-1	Coconut/Margate/Coral
SR 7	NW 31 St	427937-1	Margate
SR 7	Glades Rd	233166-2	Boca Raton
Ocean Dr	Arizona St	432323-1	Hollywood
Ocean Dr	Sheridan St	432323-1	Hollywood
Ocean Dr	Michigan St	432323-1	Hollywood
Ocean Dr	Harrison St	432323-1	Hollywood
Ocean Dr	Johnson St	432323-1	Hollywood
Ocean Dr	Indiana St	432323-1	Hollywood

Palm Beach County Projects

Appendix F
Palm Beach MPO Initiatives

Palm Beach MPO Commuter Challenge – March 2016

The Palm Beach Metropolitan Planning Organization (MPO) held its first Commuter Challenge during March 2016. The MPO collaborated with County Departments and community partners to promote the Challenge and encourage people to create workplace teams and log trips taken by transit, walking, bicycling, and carpooling within and to/from Palm Beach County (PBC) at: www.PBCommuterChallenge.org.



The Challenge motivated commuters to use alternative modes of transportation and supported team building. Teams organized activities such as the PBC Department of Environmental Resources Management's 10 mile group bicycle ride to work and the MPO's "Transit Tuesday" where staff took transit to work from across the county and documented their experiences. MPO Board members also participated in bicycle rides and took transit to work.

Over 250 participants signed up for the Challenge and 48 teams were created. Altogether more than 68,000 miles were logged by taking alternative modes of transportation for work, saving approximately 30,000 lbs of CO_2. In addition, the Florida Department of Transportation (FDOT) District 4 was inspired by the MPO's initiative and organized its own challenge for FDOT D4 employees that commuted another 8,000 miles by not driving alone. The Palm Beach MPO also coordinated with the PBC School District to do a March "Walk & Roll Challenge" with students from 8 schools that walked and biked 1,000 miles.

The Commuter Challenge culminated with a family friendly celebration that included a 1-mile bicycle ride, helmet fitting, bicycle safety rodeo, bus exhibit, bike share demonstration, and a transportation scavenger hunt with educational booths. Awards were presented to the top teams and individual commuters.

Participants were surveyed for feedback and more than 90% said they took an alternative mode of transportation they would have not normally taken because of the Challenge. Participants were also asked how often they would continue to take alternative modes of transportation as a result of the Challenge and approximately 20% responded frequently; 50% responded occasionally; approximately 20% responded rarely; and less than 10% responded that the Challenge did not influence their transportation mode choice. Lastly, participants were asked if they would participate again in the Challenge and 100% said Yes!

The Palm Beach MPO looks forward to making the Commuter Challenge an annual event and possibly expanding it to include Broward and Miami-Dade Counties to encourage all commuters in the Miami-Urbanized Area to use alternative modes of transportation.

Palm Beach
Commuter
Challenge
2016
PLAN YOUR TRIP
CREATE AN ACCOUNT
LOGIN
TRI RAIL

#PBCOMMUTERCHALLENGE
MOST RECENT

Palm Beach
Commuter
Challenge
Sky Bike BikeShare Demo
Kids Bicycle Rodeo & Walking Simulation
Family Friendly 1-mile Bicycle Ride @ 9:30 AM*
Awards Ceremony & Raffle Prizes @10:30 AM
Helmet Fitting
Transportation Scavenger Hunt
Join the Celebration!
Saturday April 2, 2016
9 AM-11 AM
South Flagler Drive at
West Palm Beach Waterfront
Join this family friendly event to celebrate the winners of the Palm Beach Commuter Challenge + County Public Schools Walk & Roll Contest! Participate in fun activities to learn about bicycle & pedestrian safety as well as local transit & carpool programs!
#PBCommuterChallenge
*Children under the age of 16 must wear a helmet.
PalmTran
TRI RAIL
SKYBIKE
FDOT
Transit App
BIKE AMERICA
SAFE KIDS
ZOO

1501
PalmTran
Live more, drive less! Join the Challenge at www.PBCommuterChallenge.org
HYBRID
Palm Beach
Commuter
Challenge
March 2016
PLAN YOUR TRIP
Transit App
PalmTran
FDOT
SKYBIKE
TRI RAIL

Hazardous Walking Conditions Analysis

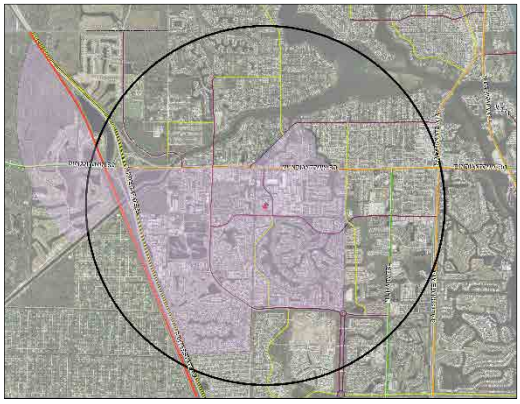
House Bill 41, also known as "Gabby's Law for Student Safety," outlines the identification and mitigation of hazardous walking conditions defined by s. 1006.23, F.S. House Bill 41 was amended in July 2015 to include Metropolitan Planning Organizations in the hazard identification process.

The MPO conducted a preliminary "desktop" analysis of five public elementary schools using aerial imagery. The analysis consisted of (1) looking within two miles of the school, (2) refining the study boundary to the school attendance zone, (3) focusing on arrival and dismissal hours, and (4) identifying hazards outlined in the statute.

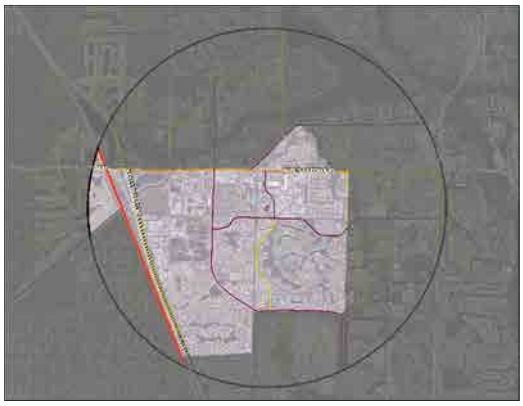
Section 1006.23, F.S. defines hazardous conditions for walking surfaces parallel to the road based on volume or posted speed as well as walking surfaces perpendicular to the road based on traffic volume.

Hazardous conditions are also defined for uncontrolled crossing sites based on traffic volume of the road or intersection, as well as uncontrolled crossing sites over the road based on posted speed or number of lanes.

Following the preliminary analysis, the MPO procured the services of Kimley-Horn and Associates to complete a county-wide study. The study included creating an inventory of sidewalks on major roads, an inventory of major intersections including traffic turn counts, whether or not the signals are controlled, as well as a sample assessment of two additional public elementary schools.



(1) A two-mile buffer is placed around each school.



(2) The two-mile buffer is refined to the school attendance zone. Students outside of two miles from the school are eligible for school bus transportation.

Moving forward, the MPO will use the sidewalk and intersection data to complete the analysis for all public elementary schools in Palm Beach County. Where there are missing sidewalks or hazardous crossings, the MPO will facilitate the mitigation process with local agencies including the PBC School District, municipalities, and utility organizations.

Executive Summary

Overview

In March 2015 the Palm Beach Metropolitan Planning Organization (MPO) was awarded a $20,000 grant to participate in the Federal Highway Administration's (FHWA) Bicycle-Pedestrian Count Technology Pilot Program. This program allowed the MPO to purchase equipment to capture pedestrian and bicycle activity throughout the county.

Purpose and Goals

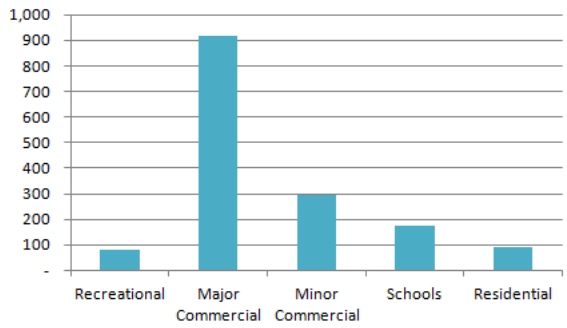
The purpose of collecting bicycle and pedestrian counts throughout the county is to analyze existing patterns, identify deficiencies in the transportation system, evaluate the impacts of projects, and inform future design, planning, prioritization, and maintenance decisions.

Deployment Methodology

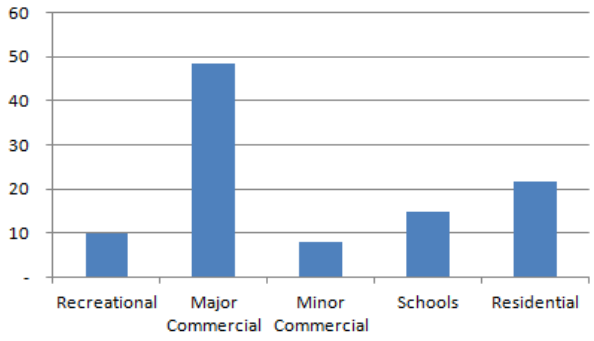
Eco-Counter portable counters were identified as the preferred automated devices. A total of 54 stations were selected for data collection. Count stations were categorized into factor groups according to area type and facility type to allow MPO Staff to estimate activity levels in uncounted locations with similar characteristics.

Data

Daily Pedestrian Averages by Area Type



Daily Bicyclists Averages by Area Type



Observed Pedestrian Facility Usage

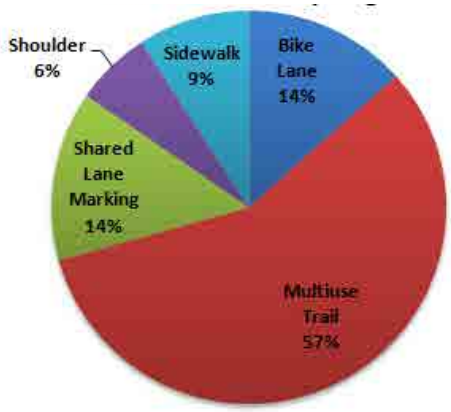
293

Daily average pedestrians observed

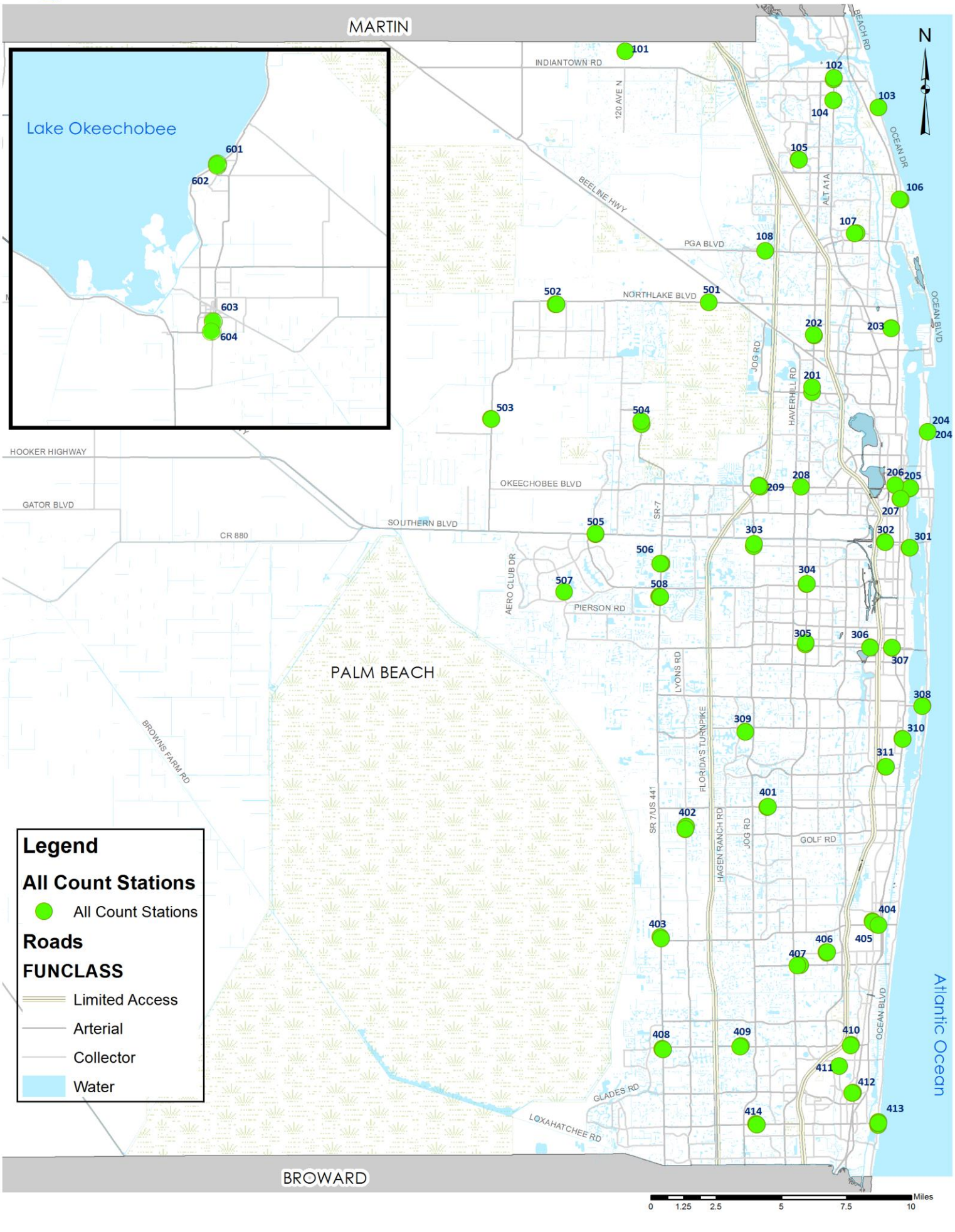
Observed Bicycle Facility Usage

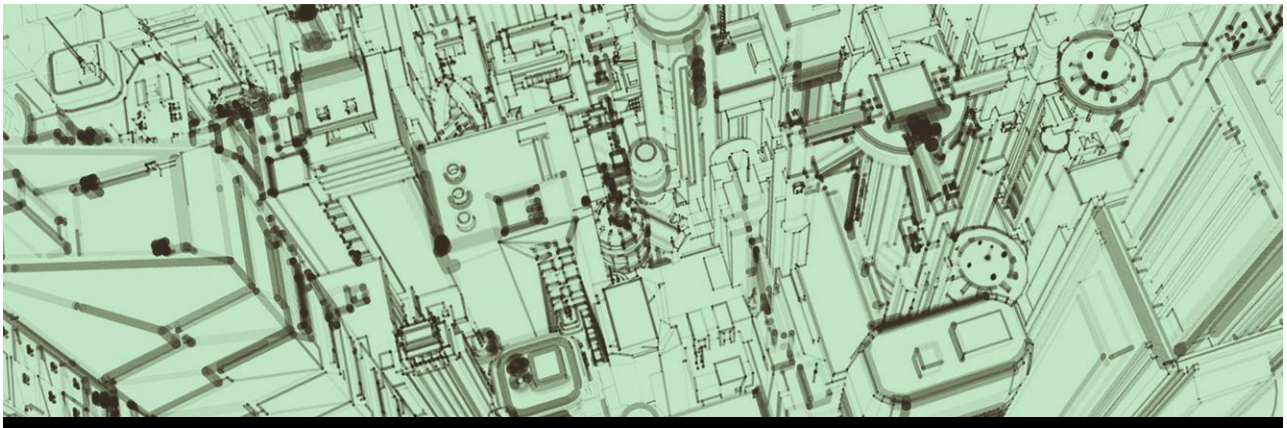
19

Daily average bicyclists observed



Bicycle & Pedestrian Count Program: All Stations





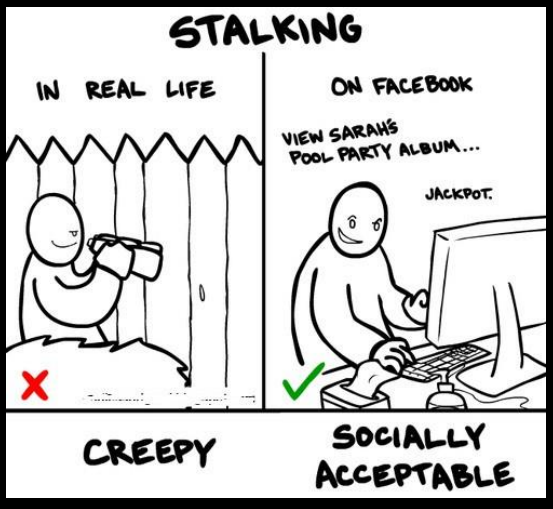
Palm Beach Metropolitan Planning Organization's
Bicycle and Pedestrian Count Pilot Program

2016 South Florida GIS EXPO

A Semi-Technical Presentation about How to Passively Stalk the General Public

Bike & Ped Count

Don't worry it's socially acceptable…



Presentation Chapters

- **Chapter 1:** Why "Stalk" Pedestrians and Cyclists?
- **Chapter 2:** Best Places to Stalk (with given technology)
- **Chapter 3:** Geospatial Data Management
- **Chapter 4:** Maps and Data
- **Chapter 5:** Future Espionage Missions
- **Chapter 6:** How Can Stalkers Better Manage their Data?

Chapter 1.

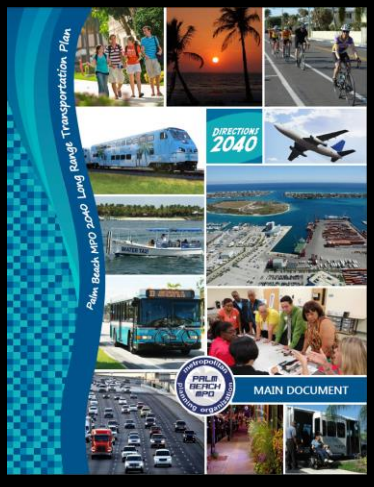
Why Count Pedestrians and Cyclists?

Palm Beach MPO

- Designated by Federal Law for populations over 50,000
  - Help allocate funding
- Represent various users and modes of transportation
  - Promote safety and transportation equity

Bike & Ped Count

Long Range Transportation Plan (LRTP)



Goal 3: Prioritize a safe and convenient non-motorized transportation network

	DESCRIPTION	CURRENT VALUE	2025 TARGET	2040 TARGET
3.1	Increase the percentage of			
	Pedestrian mode choice	1.45% [1]	3.5%	5%
	Bicycling mode choice	0.5% [1]	1.5%	3%
3.2	Increase *centerline mileage* of			
	Buffered bike lanes	8	50	100
	10-ft or wider shared use	25	75	125
	Designated bike lanes	125	250	500
	Priority bike network operating at LOS C or better	140	350	500
3.3	Increase percentage of *thoroughfare mileage* near transit hubs	10%	20%	40%
	That provides dedicated bicycle facilities (within 3 miles)	85%	100%	100%
	That provides dedicated pedestrian facilities (within 1 mile)			

Notes:
1. Source: U.S. Census Bureau, 2011-2013 3-Year American Community Survey, Table B08301

Bike & Ped Count

Project Timeline

- **March 2015** • Obtained $20K FHWA Pilot Grant
- **April-Oct. 2015** • Identified Counter 54 Stations
- **Oct. 2015** • Purchased 2 Counter Sets (6 each, 12 total)
- **Nov. 2015** • Deployed Counters
- **Aug. 2016** • Conclude Pilot, Summarize and Report Findings
- **Sept. 2016** • Completed counts of all stations

Bike & Ped Count

Purpose & Goals

- Understand traffic patterns

Short term

Mid term

- Identify deficiencies in transportation system
- Expand data collection system

- Evaluate impact of projects
- Inform future design, planning, prioritization, and maintenance decisions

Long term

Bike & Ped Count

Important Reasons for Counting…

Encourage Mode Switch

- Approximately 25% of all trips in the U.S. are less than 1 mile; yet 75% of these trips are taken by automobile.

- Improve Health
  - Car usage – *Less physical activity, environmental impacts, associated costs*
  - Active Modes – *Involves physical activity, no carbon footprint, more socially equitable, improves social engagement*

- Improve Safety
  - Given the size of the automobile versus pedestrians and cyclists; if this active user group were to be hit they are more likely to be injured.

Risk = Hazard x Exposure

- Pedestrian and Bicyclist *exposure (or volume) is not readily available or collected.* Researchers often use surrogate measures, such as population density, number of lanes crossed, time spent walking number or pedestrian trips and aggregate distance traveled by all pedestrians in a specific area of interest.
- Although there are different types of exposure measures, they have been criticized since they *do not account for the actual amount of walking people do.*
  - Researchers have developed statistical regression models; or applied computer vision techniques to estimate pedestrian [and cyclists] exposure or volumes.

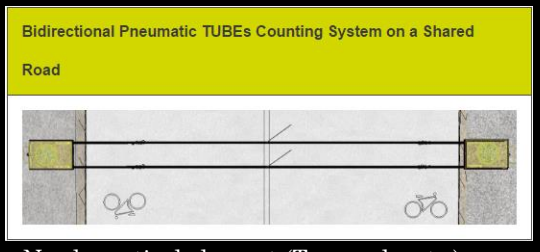
Bike & Ped Count

Chapter 2.

Best Places to Stalk (with given technology)

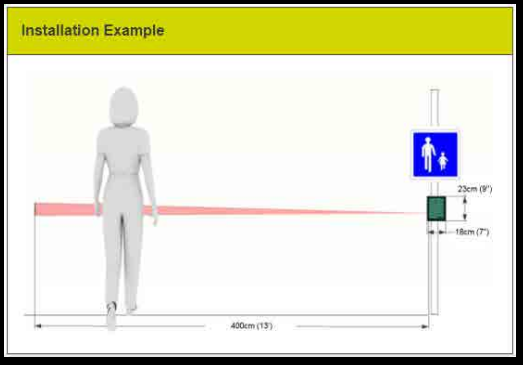
Counter Specifications

Pneumatic Tubes



- Needs vertical element (Tree, pole, etc.)
- Tubes up to 30' long
- Mode Selective (Cars vs. Bikes)

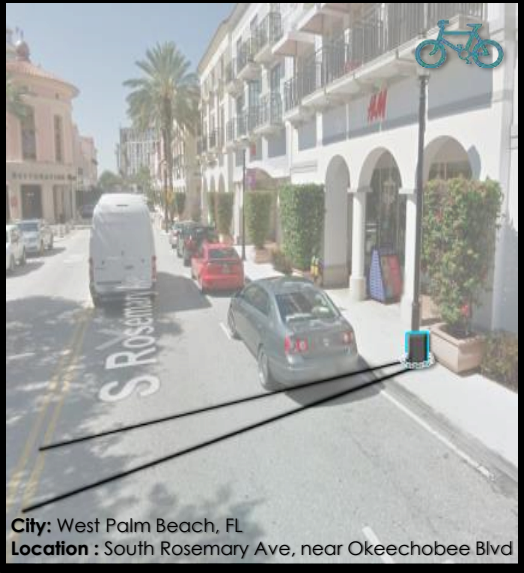
Pyro-Box



- Need vertical element (Tree, pole, etc.)
- 15' range heat sensor
- Not mode selective (Counts heat emitting objects)

How is data captured?

PNUEMATIC TUBES



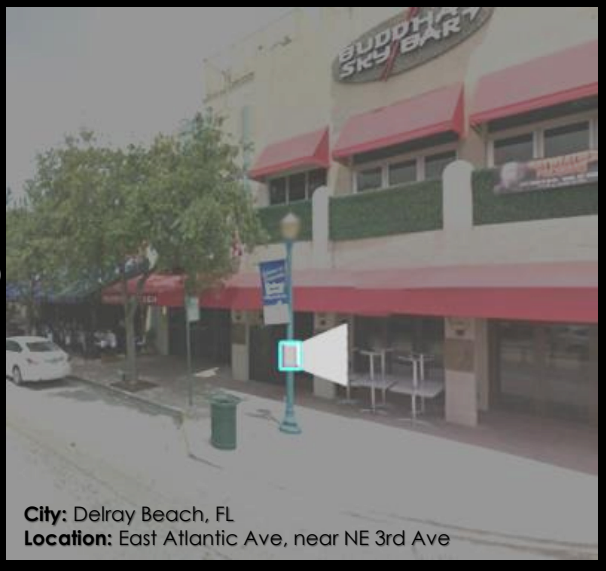
City: West Palm Beach, FL
Location : South Rosemary Ave, near Okeechobee Blvd

PYRO -BOX

City: Palm Beach Gardens, FL
Location: Gardens Pkwy, near Kew Gardens Ave

Best Places to Stalk

- Public Places
- Near Vertical Elements
- Locations with little to no background traffic (Pyro boxes)
- Locations with light car traffic (Pneumatic tubes)



City: Delray Beach, FL
Location: East Atlantic Ave, near NE 3rd Ave

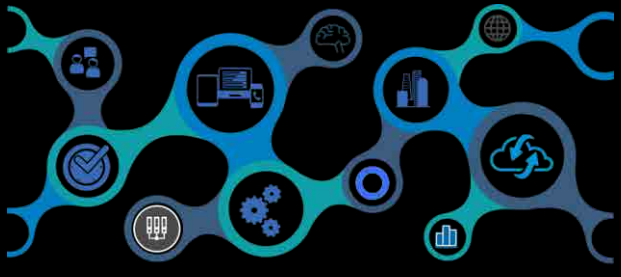
Bike & Ped Count

Installation Video

Chapter 3.

Geospatial Data Management

The Process



1.) Mapped Count Station Locations

2.) Categorized Stations in Business Table

3.) Deploy Counters at Stations

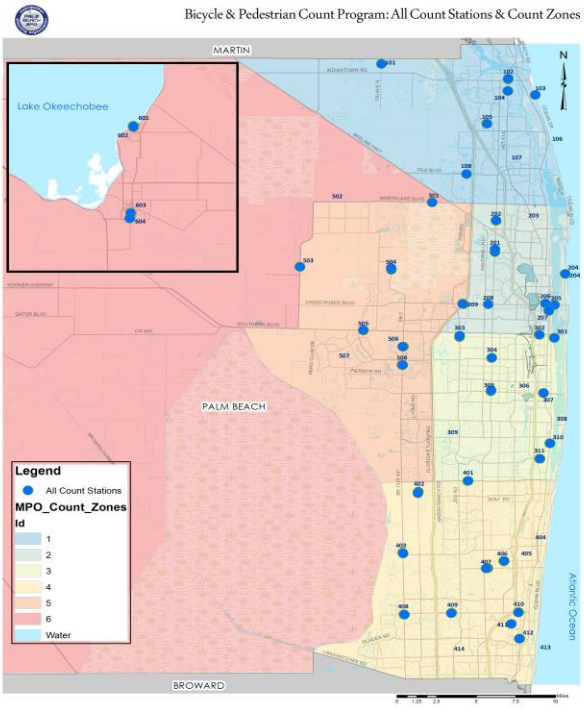
4.) Upload Count Data to Eco-Visio Platform via Bluetooth

5.) Download to Business Table

6.) Join Data to Count Shape file

1.) Mapped All Count Station Locations

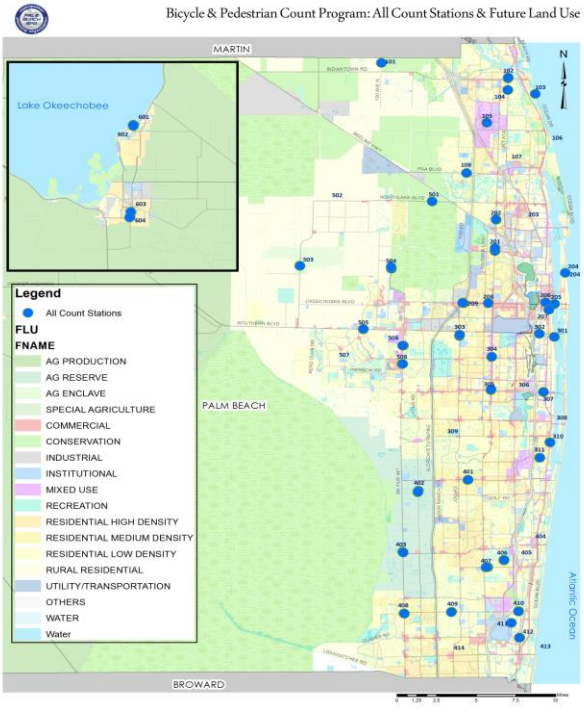
Station Identification Process



2.) Categorized Stations in Business Table

Factor Grouping

- Extrapolation factors are *used to expand short-duration counts to estimate volumes over longer time periods or to estimate activity level where no counts exist based counts collected* from other locations with similar characteristics. One method of extrapolation is called factor grouping. According to the National Cooperative Highway Research Program, it is important to extrapolate based on site similarities.
  - The long term goals of using factor grouping include extrapolating short term counts over longer periods of time and correlating non-motorized travel to zoning categories (e.g. average bike usage in school areas).
- Stations were assigned to 2 factor groups:
  - Area Type
  - Facility Type



Variation by Area Type

Area Type by Land Use Designation

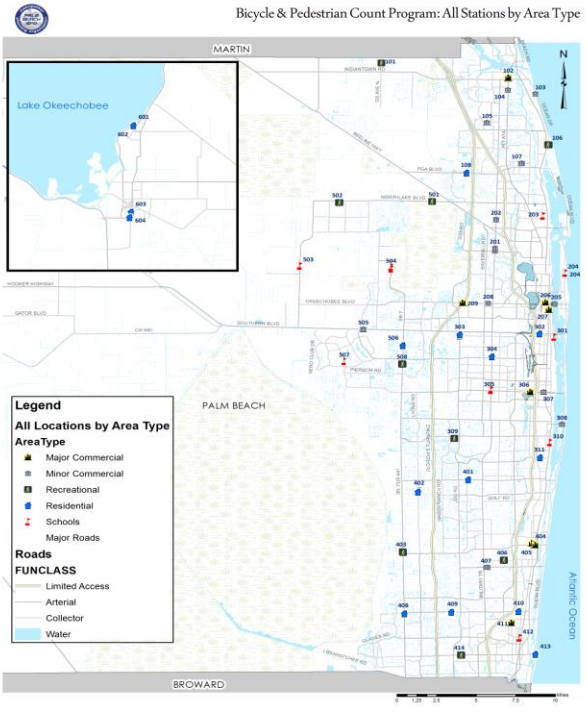
Recreational Ridership Locations
Preservation / Conservation District (PC)

Major Commercial / Office Centers
Commercial High Office District (CHO)
General Commercial District (CG)

Minor Commercial Centers
Commercial Low Office District (CLO)
Neighborhood Commercial District (NCD)
Community Commercial District (CC)
Commercial Recreational District (CRE)
Infill Redevelopment District (IR)

Schools / Colleges / Universities
Institutional and Public Facilities District (IPF)
Public Ownership District (PO)

Residential
Agriculture Residential District (AR)
Residential Estate District (RE)
Residential Transitional District (RT)
Single Family Residential District (RS)
Multifamily Residential District (RM)

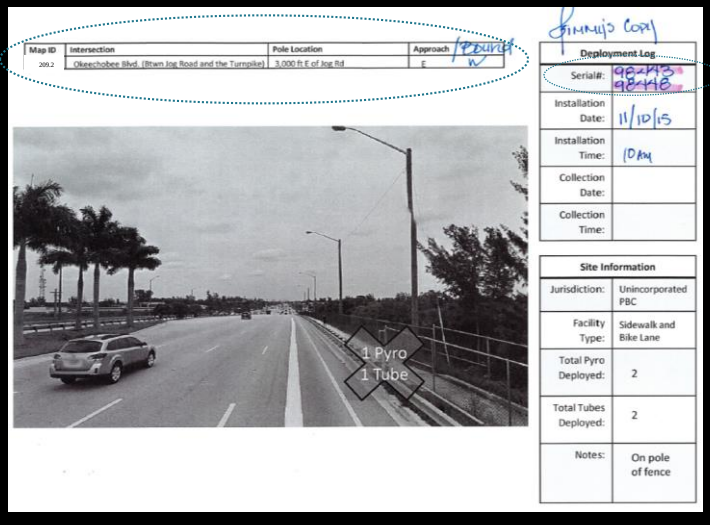


Variation by Facility Type

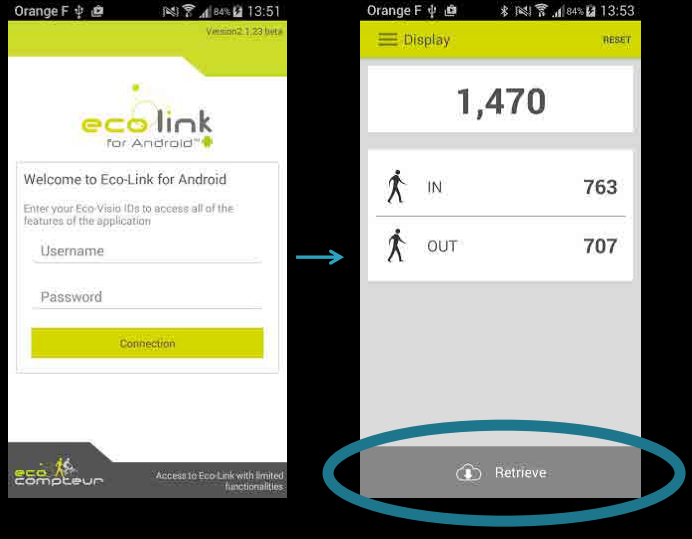
Type	Definition	Example Location	
Shared Lane Marking	A series of road markings used to indicate a shared lane environment for bicycles and automobiles, also referred to as 'sharrows'.[1]		**City Pictured:** West Palm Beach, FL **Location Pictured:** South Rosemary Ave, near Okeechobee Blvd
Shoulder	The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles for emergency use, and for lateral support of the base and surface courses.[2] For the purpose of this study shoulders are no more than 4' in width.		**City Pictured:** West Palm Beach, FL **Location Pictured:** Okeechobee Blvd, near Military Trail
Bike Lane	A portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists.[3] Bike lanes examined in this study were at least 5' wide.		**City Pictured:** Jupiter, FL **Location Pictured:** University Blvd, near Main Street

Type	Definition	Example Location	
Sidewalk	A portion of the pedestrian system from the edge of the roadway to the edge of the right-of-way (i.e., property line), generally along the sides of streets, between street corners.[4] Sidewalks have a desired minimum through zone of 6 feet and an absolute minimum of 5 feet.		**City Pictured:** Delray Beach, FL **Location Pictured:** East Atlantic Ave, near NE 3rd Ave
Multi-Use Path	A surface that is asphalt, concrete, or firmly packed crushed aggregate with a minimum width of 8' and preferred width of 10', made for the use of multiple means of non motorized travel.[5] This study categorizes any facility ≥ 8' as a multi-use path.		**City Pictured:** Boca Raton, FL **Location Pictured:** El Rio Trail

3.) Deploy Counters at Stations



4.) Upload Count Data to Eco-Link Platform via Bluetooth



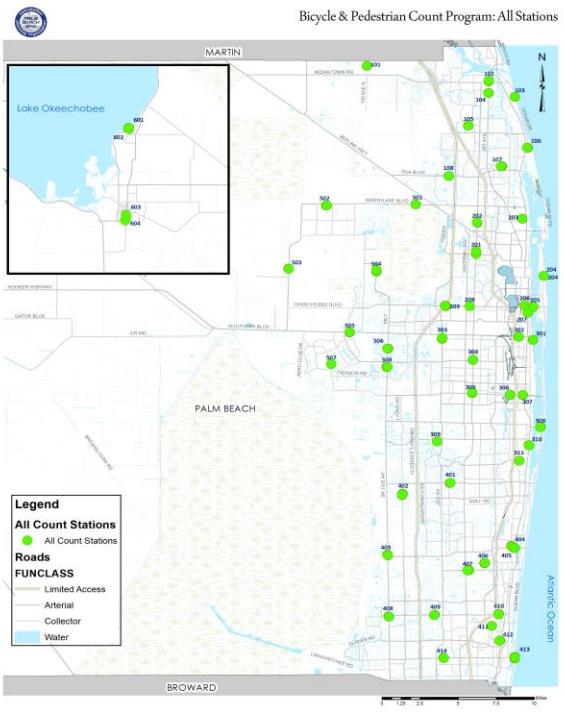
5.) Download to Business Table &
6.) Join Data to Count Shape file

Chapter 4.

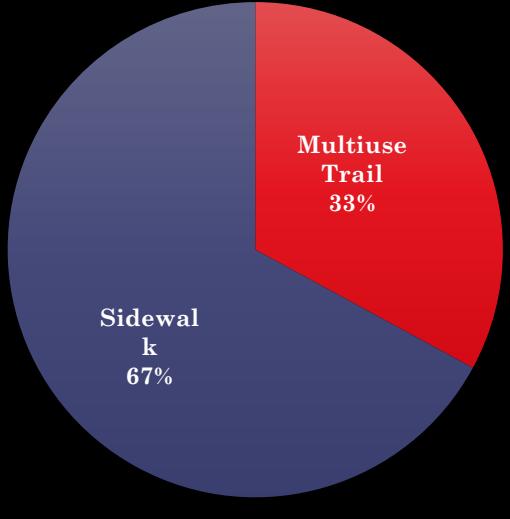
Maps and Data
(from November 2015 to September 2016)

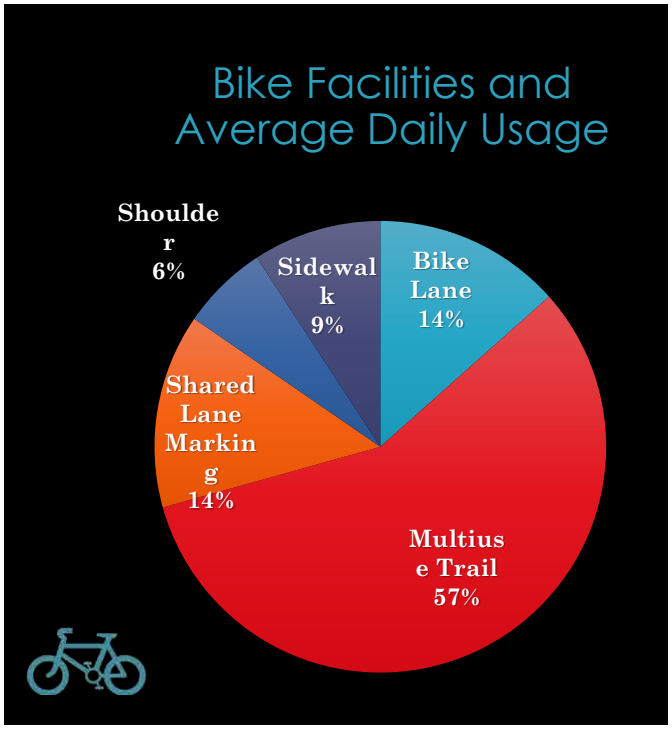
Quick Stats

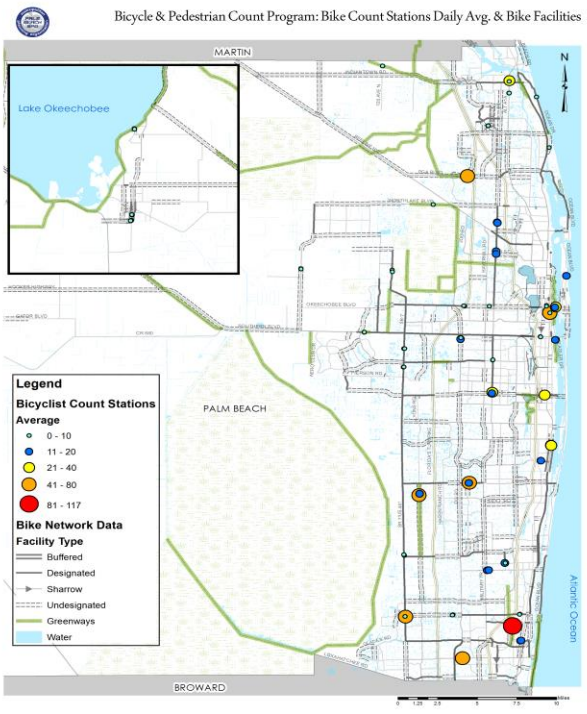
Pedestrian Count Totals	205,352
Days Counted	700
Average Daily Activity	293
Bicyclist Count Totals	16,089
Days Counted	868
Average Daily Activity	19

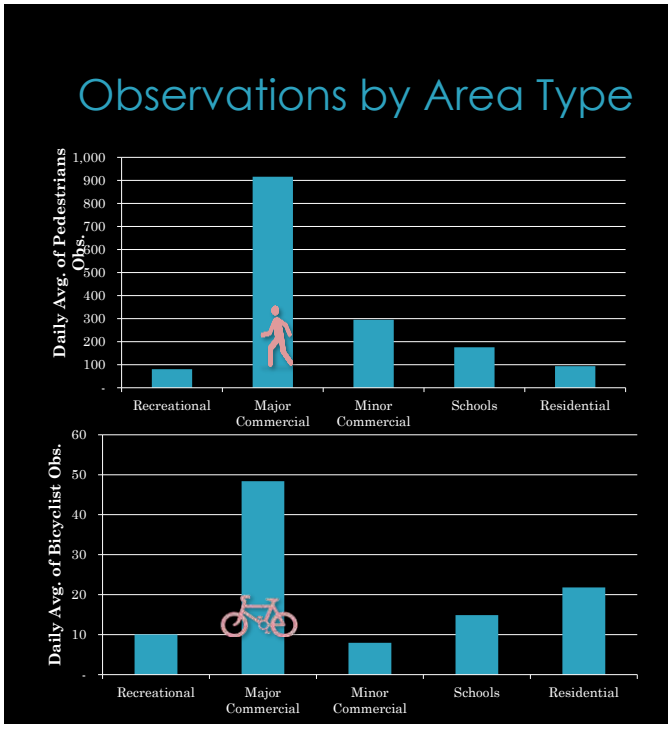


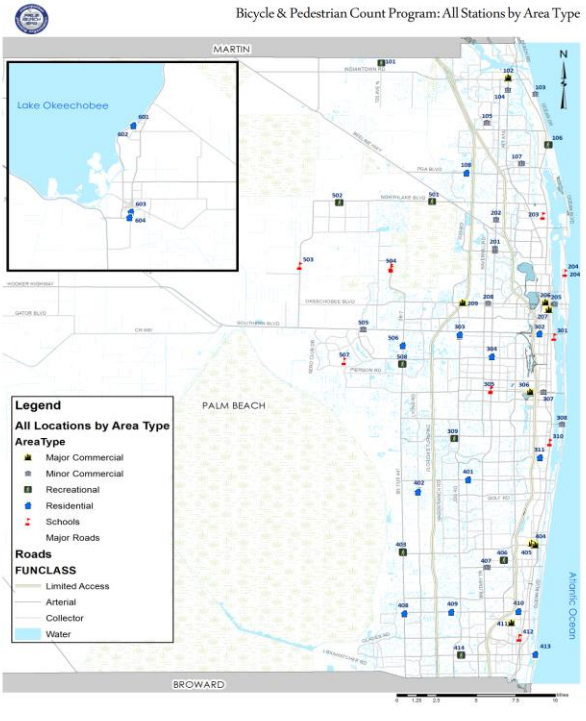
Pedestrian Facilities and Average Daily Usage



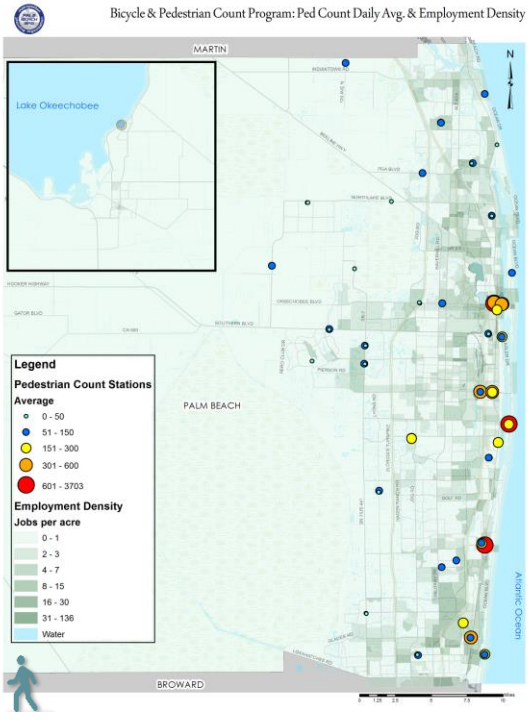

Bike Facilities and Average Daily Usage
Shoulder 6%
Sidewalk 9%
Bike Lane 14%
Shared Lane Marking 14%
Multiuse Trail 57%

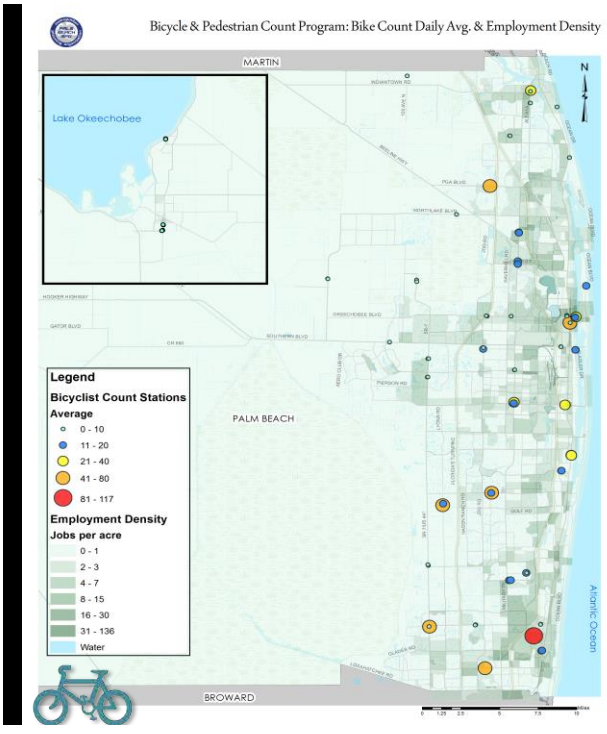

Bicycle & Pedestrian Count Program: Bike Count Stations Daily Avg. & Bike Facilities
MARTIN
Lake Okeechobee
PALM BEACH
BROWARD
Atlantic Ocean
N
Legend
Bicyclist Count Stations
Average
0 - 10
11 - 20
21 - 40
41 - 80
81 - 117
Bike Network Data
Facility Type
Buffered
Designated
Sharrow
Undesignated
Greenways
Water


Observations by Area Type
Daily Avg. of Pedestrians Obs.
1,000
900
800
700
600
500
400
300
200
100
-
Recreational
Major Commercial
Minor Commercial
Schools
Residential
Daily Avg. of Bicyclist Obs.
60
50
40
30
20
10
-
Recreational
Major Commercial
Minor Commercial
Schools
Residential

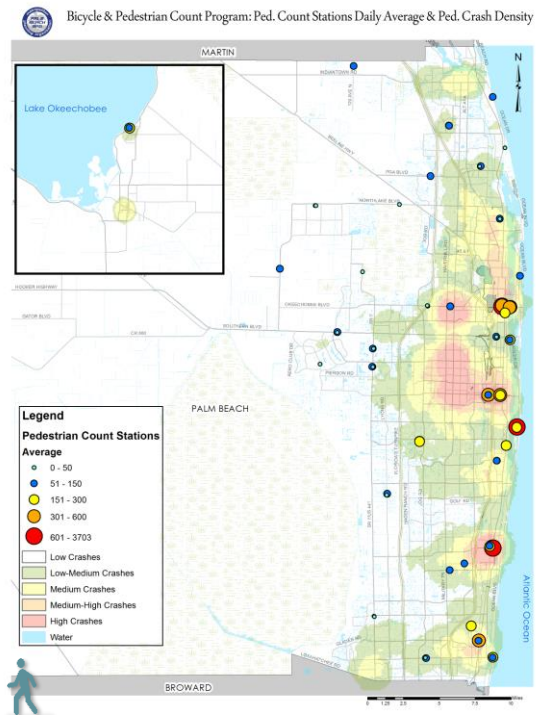

Bicycle & Pedestrian Count Program: All Stations by Area Type
MARTIN
Lake Okeechobee
PALM BEACH
BROWARD
Atlantic Ocean
N
Legend
All Locations by Area Type
AreaType
Major Commercial
Minor Commercial
Recreational
Residential
Schools
Major Roads
Roads
FUNCLASS
Limited Access
Arterial
Collector
Water

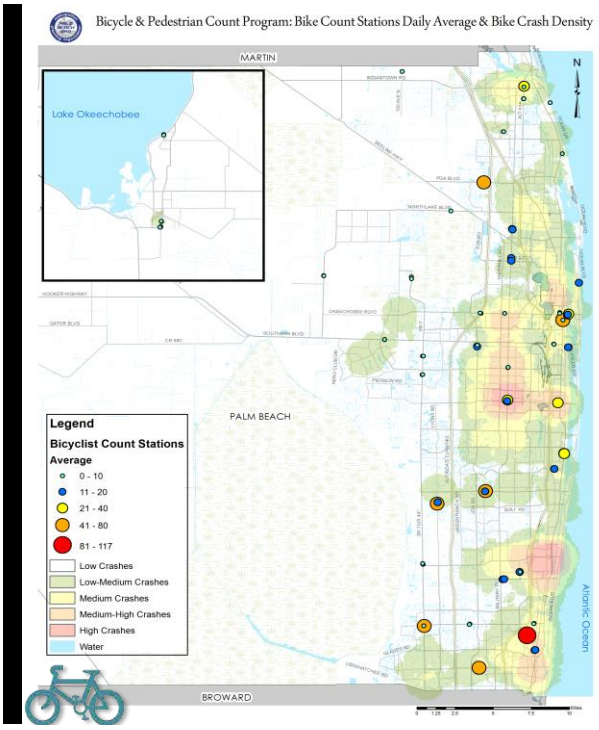
Commuter Travel



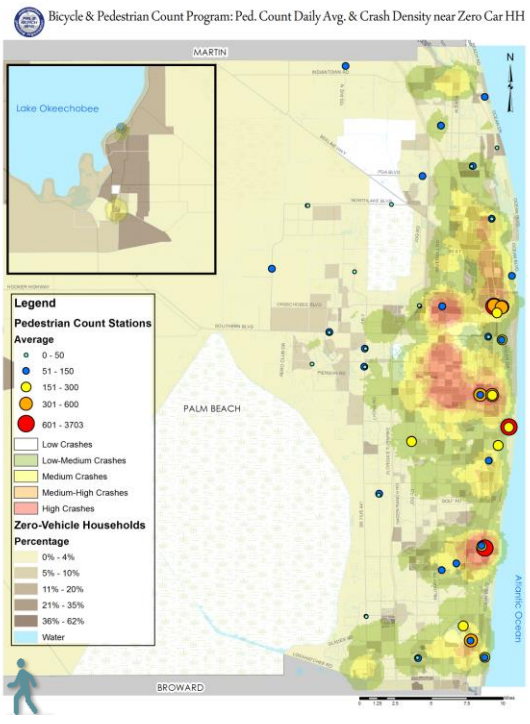


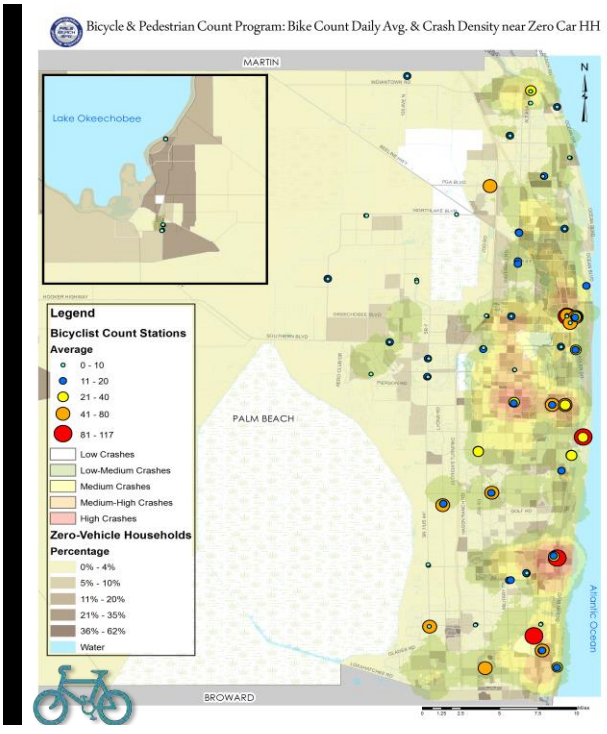
Safety





Safety + Equity





Are there other ways to analyze this data?

Chapter 5.

Future Espionage Missions

MAJOR TAKEWAY

- Plenty of opportunity for error in multi-step processes

NEXT STEPS

- Manually verify counts to confirm accuracy
- Audit program for inconsistencies and improvements
- Give someone else a chance to stalk

Special Thanks to…

- James "Jimmy" Davis – Equipment Technician
- PBC Engineering Department
- Nick Uhren, P.E.
- Jeremy Raw, FHWA
- Palm Beach MPO staff
- YOU!

Bike & Ped Count

Chapter 6.

How Can Stalkers Better Manage their Data?

Questions, Comments & Suggestions

- Are there other ways to analyze this data?
- Are there better ways to manage the data?
- How can we make this valuable to the public?

"Don't listen to what people say, watch what they do." -Anonymous

Franchesca Taylor, AICP - Senior Planner
Bicycle, Pedestrian and Transportation Demand Management Coordinator

Palm Beach MPO - *Transportation Planning for the Palm Beaches*
2300 N Jog Road, 4th Floor, West Palm Beach, FL 33411
D: (561) 478-5713 | M: (561) 684-4170 | F: (561) 242-7165
FTaylor@PalmBeachMPO.org | www.PalmBeachMPO.org | http://www.BikePalmBeach.org