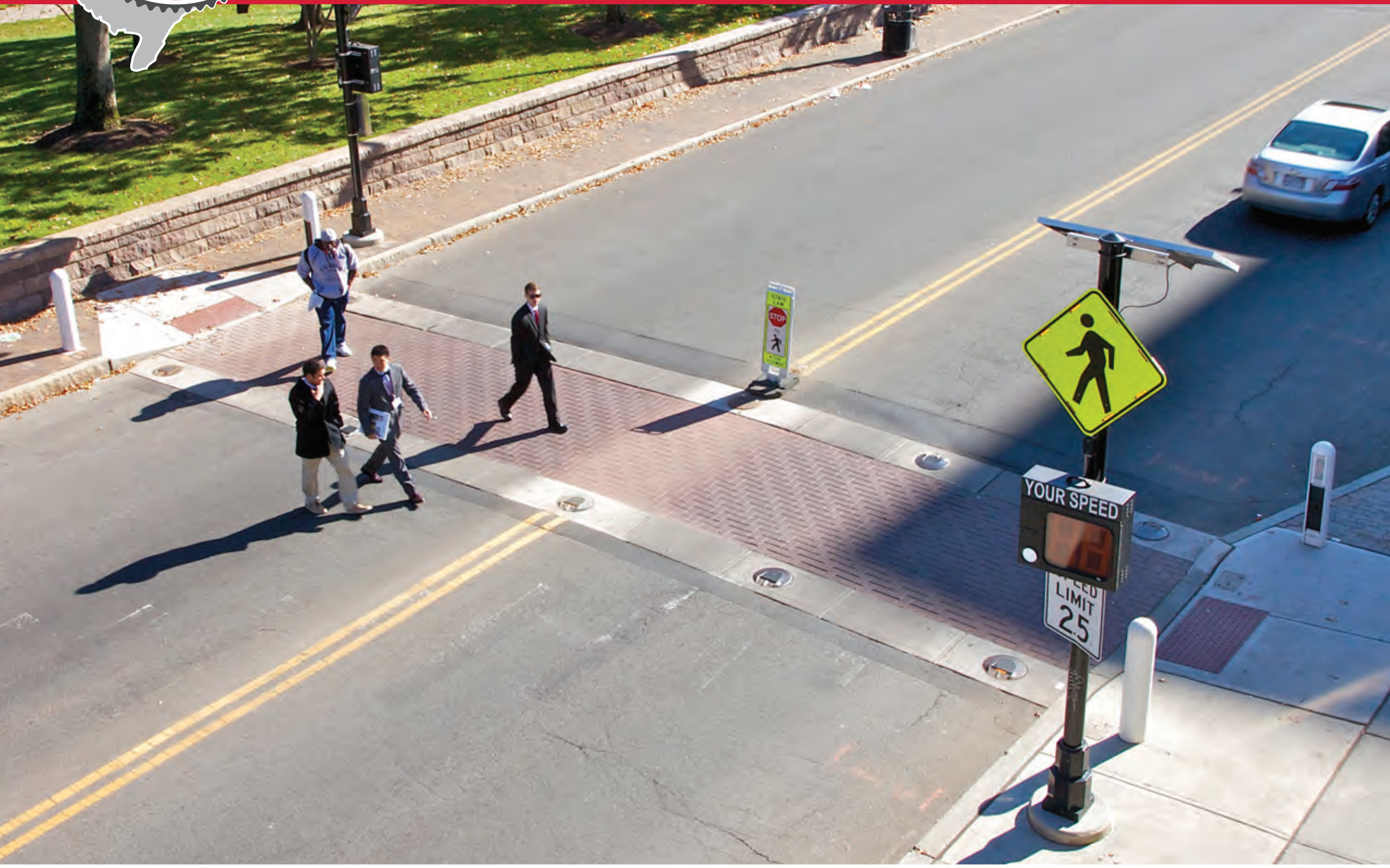
2012 PEDESTRIAN SAFETY TRACKING REPORT

New Jersey Bicycle and Pedestrian Resource Center



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Executive Summary

New Jersey roads and highways can be a dangerous place for pedestrians to travel on. Though national trends show a decline among some age groups in driving, pedestrian facilities for safe walking have not kept pace with changing trends in travel behavior. This report shows some of the trends in pedestrian injuries and fatalities on New Jersey's roads and highways. It is divided into three chapters. The first is an examination and analysis of demographic and crash scene characteristics in aggregate for the state of New Jersey using the Plan4Safety crash database. New to this year's report are more detailed analyses of age-related crashes as well as a new speed limit analysis, which focuses on severe injuries as they relate to the posted speed limits on the segment of the road on which the crash occurred. In particular, the findings in this section show a significant relationship between the posted speed limit and crash severity, for fatal crashes in particular.

The second chapter is an expanded analysis of the Pedestrian Danger Index (PDI) created in last year's report. This year the research looks at the entire state at the municipal level and uses four different measures of pedestrian exposure: population density, employment density, percent of workers walking to work, and vehicle availability to workers. The data show that PDI values for fatal crashes are more geographically concentrated than they are all crashes. Municipalities with low PDI values (indicating greater pedestrian safety) for fatal crashes tend to be located in urban areas, whereas those with high PDI values tend to be located in suburban and rural areas. This is due to higher pedestrian activity and lower vehicle speeds in urban areas compared to rural and suburban areas.

The final chapter of this report is an all-new analysis of the origins and destinations of pedestrians and drivers involved in pedestrian crashes in the ten municipalities that had the most crashes between 2003 and 2011. The results of this analysis show that many more drivers than pedestrians involved in crashes are from out-of-town. This may reflect employment and commuting patterns as people from outside the city drive there to access job opportunities. Safety could improve in these areas by ensuring pedestrian facilities are well marked and roads have slow speeds. Further research expanding this illustrative methodology could incorporate more built environment factors as well as a wider variety of location types beyond urban areas (suburban and rural locations).

Chapter 1: Overview of Pedestrian Crash Statistics for the State of New Jersey

This report builds on the existing Pedestrian Safety Tracking Reports from 2010 and 2009. In those reports, the analyses focused on demographic characteristics and, most recently, a preliminary analysis of the spatial patterns of crashes in urban areas and New Jersey counties.

In this year's update, the analysis was expanded to include three main components.

1. Demographic characteristics of New Jersey vehicle-pedestrian collisions using updated data through 2011.
2. A more detailed analysis of the geographic trends in pedestrian crashes using a group of Pedestrian Danger Indices developed by the research team from an extensive look at the literature.
3. A new approach toward understanding the patterns of accidents involving pedestrians through a look at the origins and destinations of both drivers and pedestrians involved in crashes.

The following section begins with the demographic update to the previous reports.

Section I: Introduction to Characteristics of New Jersey Pedestrian Crashes

This chapter covers the trends in New Jersey pedestrian-related vehicle crashes from 2003 to 2011. The examination considers several factors that are potentially key to understanding the demographic variation of pedestrian injuries and fatalities on New Jersey's road and highways. Though every effort is made to closely examine the data and trends underlying the data, one key limitation must be stated up front. These data do not take into account the number of pedestrians on New Jersey's roads and highways that are *not* involved in vehicles crashes. Therefore, it was not possible to directly deduce from these data the level of danger involved in walking New Jersey's roads and highways. However, as an improvement on past reports, the research team has made an effort to address the "exposure" problem by analyzing several potential proxy measures. The results of this pedestrian exposure index analysis are included in Chapter 2.

The analysis for this year's demographic chapter was expanded to focus on a key factor in pedestrian crash severity: age. While younger people are more often injured in pedestrian crashes, older adults are much more likely to be killed. This finding is troubling. A deeper examination is made into potential related effects, such as alcohol use and time of day factors.

Total pedestrian injuries and fatalities based on vehicle miles traveled (VMT) are shown in Table 1 and Figure 1. The trends show a very slight decrease in pedestrian injuries and fatalities per VMT in the most recent years. Situational and spatial factors are also included in the analysis, such as time of day, time of year, light condition (light/dark), alcohol use, and road type (local road, county highway, state highway, etc.).

An additional factor analyzed in this year's expanded report is speed limit. Given Plan4Safety's new linkage to road characteristics data, the research team was able to relate the pedestrian crashes to the posted speed limit of the road segment the respective crash occurred on. These results reveal a strong association between more serious injury and death with higher posted speeds. However, these analyses are limited; they cannot take into account the actual speed of the vehicle(s) involved in the crash.

Section II: Total Pedestrian Fatalities and Injuries

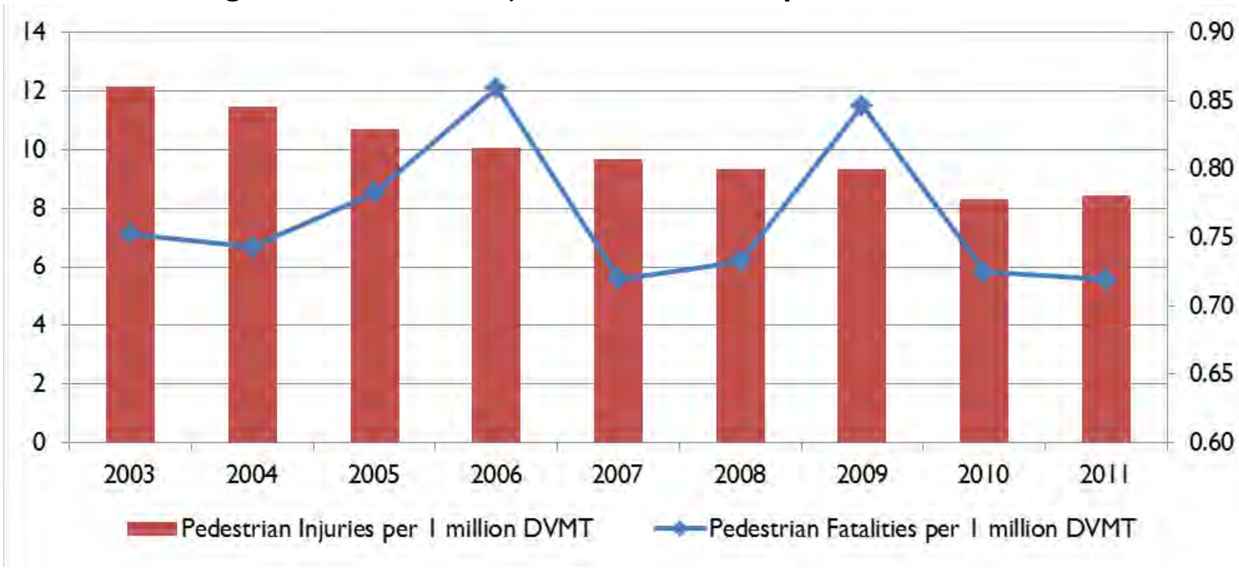
The nine-year period from 2003 to 2011 saw a total of 1,387 pedestrian fatalities in vehicle-pedestrian crashes, or an average of 154 per year (see Table 1). During the same nine-year period, New Jersey police recorded 18,027 pedestrian injuries in vehicle-pedestrian crashes, or 2,003 per year. Fatalities varied by about twenty percent over the period of study, with a high of 178 in 2006 to a low of 144 in 2011. A modest drop in pedestrian injuries is observable in these data, first in 2006, and then more consistently throughout the following years from 2007-2011. When controlling for vehicle miles traveled, the data show a consistent decrease in pedestrian injuries per 1 million daily vehicle miles traveled (DVMT): from 12.2 in 2003 to 8.4 in 2011. This decrease was in parallel with a drop in DVMT, which could mean pedestrians are exposed to fewer vehicles and are therefore getting injured less because of fewer conflicts.

Table 1: Summary of Pedestrian Crashes in New Jersey, 2003-2011

	Pain	Injured	Killed	Daily VMT	Pedestrian Fatalities per 1 million DVMT	Pedestrian Injuries per 1 million DVMT
2003	3,576	2,376	147	195,237,000	0.8	12.2
2004	3,588	2,289	148	199,119,000	0.7	11.5
2005	3,569	2,175	159	203,076,000	0.8	10.7
2006	3,210	2,081	178	207,131,000	0.9	10.1
2007	3,261	2,016	150	208,419,000	0.7	9.7
2008	3,317	1,876	147	200,651,000	0.7	9.4
2009	3,222	1,865	169	199,586,000	0.9	9.3
2010	2,992	1,659	145	200,075,779	0.7	8.3
2011	2,977	1,690	144	200,256,907	0.7	8.4
Total	**29,712**	**18,027**	**1,387**			

Controlling for vehicle exposure is only one half of the difficult task of pedestrian exposure to vehicle traffic. Pedestrians also have to be present in order to be at risk of being involved in a crash. Unfortunately at this time no adequate measurement exists to address the pedestrian side of the exposure problem. Measuring the number of pedestrians is a difficult, costly and time-consuming task, but it is also arguably the most difficult obstacle facing research into pedestrian safety. Without good measures of the number of pedestrians present on the street and sidewalks, researchers cannot provide reliable estimates of safety. Instead researchers are required to use rough proxy measures to estimate the number of pedestrians in a given place. This issue is examined in more detail later in this report.

Figure 1: Pedestrian Injuries and Fatalities per 1 Million DVMT



Section III: Gender

Male pedestrians are more often involved in vehicle crashes than women (see Figures 2a and 2b). This has been demonstrated in vehicle crash data for decades. This holds true for pedestrian fatalities and injuries in New Jersey as well, but is particularly troubling for fatal crashes involving pedestrians. The evidence from the 2009 NHTS shows that men (49%) and women (51%) walk in proportion to their population overall. In the data analyzed from New Jersey crashes, male pedestrians are overrepresented in fatal crashes in New Jersey from 2003-2011 by nearly 17 percentage points, sixty-six percent to thirty-four percent for women. Some of this difference may be explained by exposure, if indeed men walk more than women, particularly at night when walking is more dangerous (see time of day analysis below). It remains an open research question as to the cause of these gender differences in fatal crashes. One explanation may be that as pedestrians, men take more risks than women.

Figure 2a: Pedestrians Killed by Gender, 2003-2011

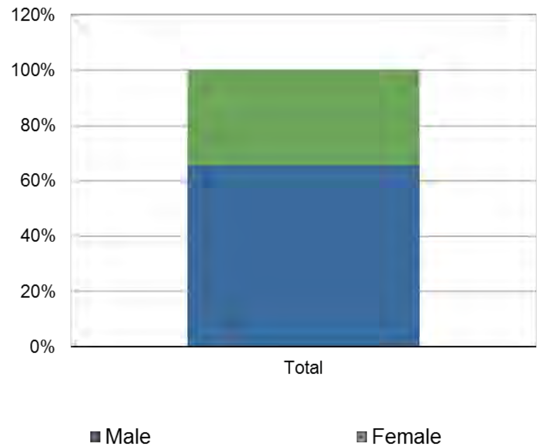
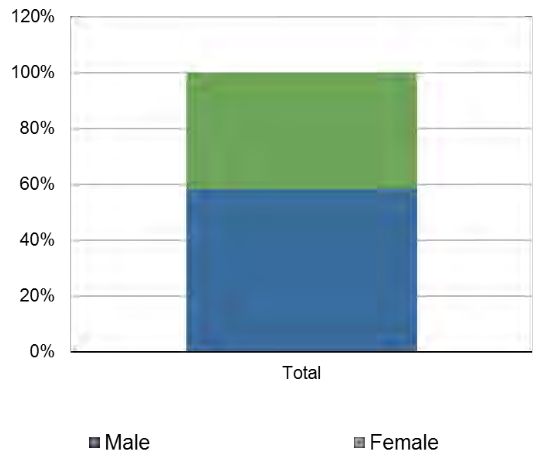


Figure 2a: Pedestrians Injured by Gender, 2003-2011



Section IV: Age

This year's report focuses attention on age. Age is one of the most significant factors in vehicle crashes, but the data reviewed for this report also show significant patterns related to age and pedestrian fatalities and injuries (see Figures 3a and 3b). Crash data were compared to the 2010 Census distribution of ages for New Jersey.

The results of this analysis show a higher proportion of adults over 54-years-old are killed as pedestrians in vehicle-pedestrian crashes compared to their distribution in the population as a whole. Children under 18 are significantly underrepresented in pedestrian fatalities. However, among those injured in crashes the data are reversed. Fewer older adult pedestrians are injured in vehicle-pedestrian crashes than their proportion of the population, while far more pedestrians in the 10-17 and 18-24 categories are injured compared to their distribution in the overall population. This may demonstrate the overall risk-taking behavior among younger pedestrians, while collisions among older adults may be occurring in spatially different locations where higher speeds result in more deaths. Older people are also frailer and therefore may be more susceptible to moderate or severe injuries when involved in a vehicle crash as pedestrians. This conjecture is a testable hypothesis and could be investigated in more detail in future research.

Figure 3a: Pedestrian Fatalities by Age as a Percent of Cumulative Compared to Population

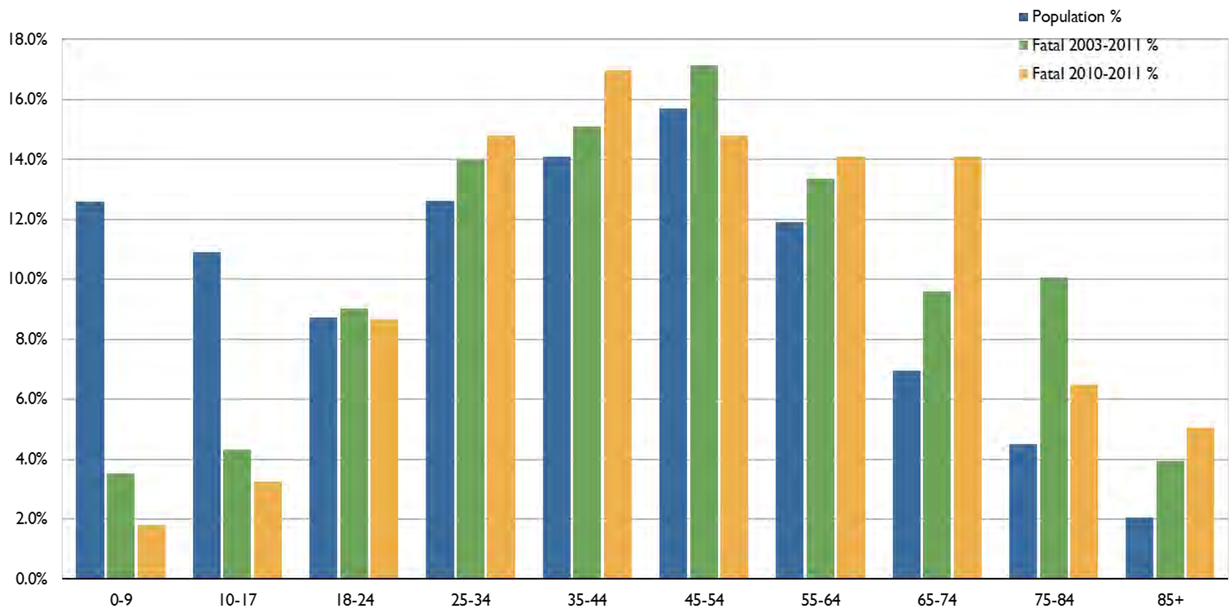
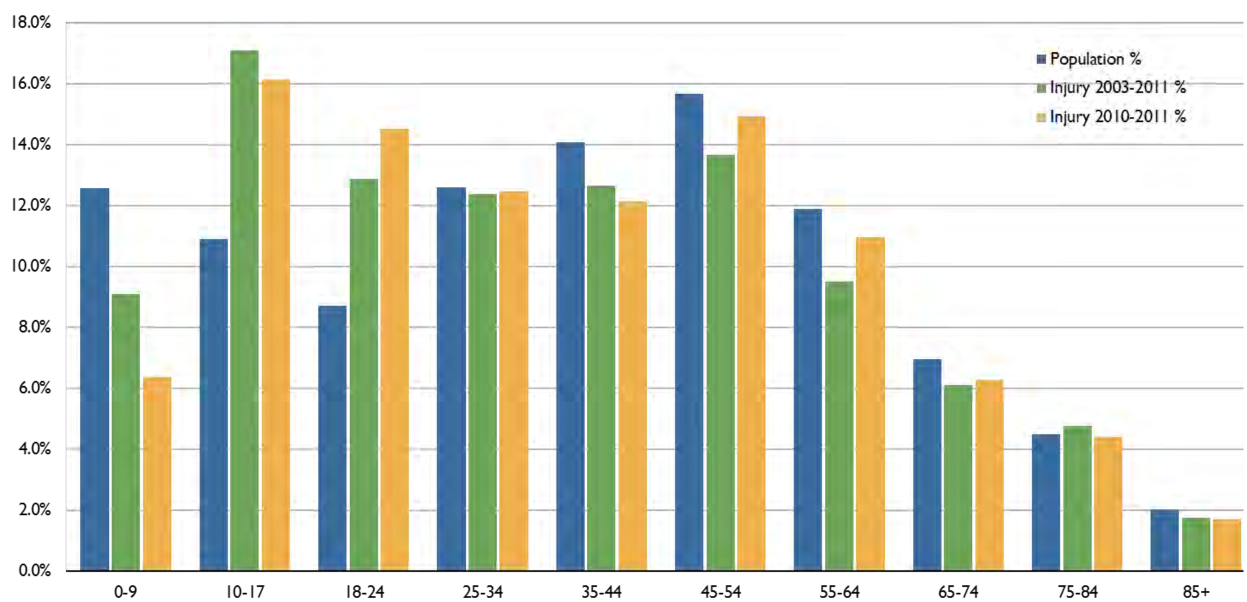
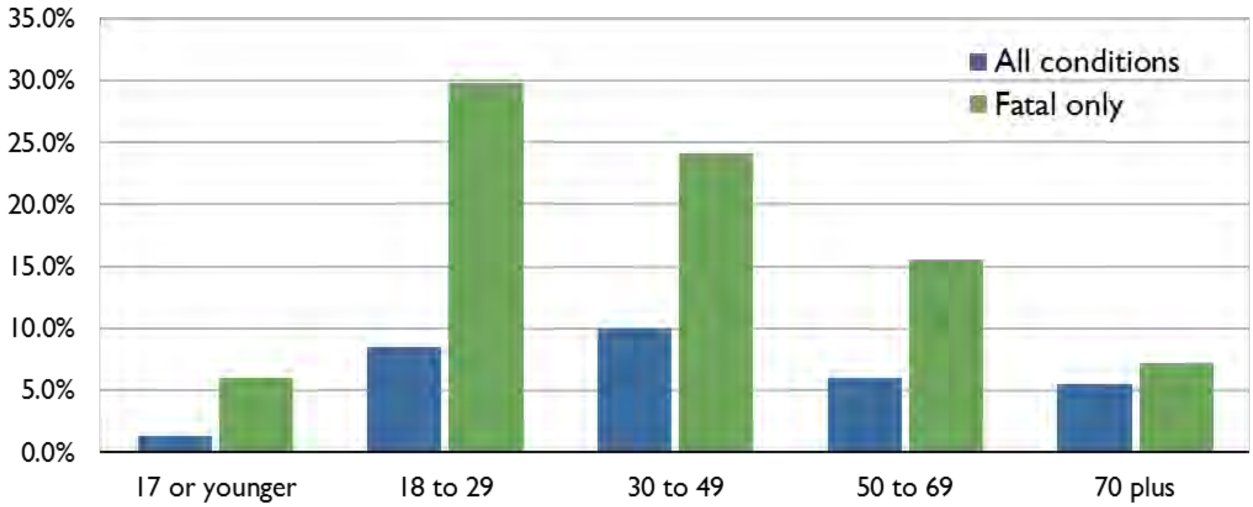


Figure 3b: Pedestrian Injuries by Age as Percent of Cumulative Compared to Population



More detailed analysis shows that age is a key factor in alcohol use, as would be expected since legal restrictions on drinking are in place (see Figure 4). Thirty percent of 18- to 29-year-olds killed in crashes have alcohol reportedly involved. This is compared to a rate of seventeen percent overall. When the analysis is done using drinking age as key variable, the results show that pedestrians over drinking age are three times more likely to be killed in a pedestrian crash, but overall less likely to be moderately injured or incapacitated. This is likely due to the influence of older adults, who are far more likely to be killed in crashes than the younger cohort and less to do with alcohol use. In summary, drinking age does not seem to be a useful proxy for more severe alcohol-related crashes.

Figure 4: Alcohol Presence by Age Category for Pedestrian Crashes



Section V: Road Type

Classifying crashes by road type sheds light on the dangers of different speeds, since many of the state and county highways have much higher design and posted speeds than the municipal roads (see Figures 5a and 5b). This relationship presents itself in the comparison of fatal crashes by road type to injurious crashes by road type. From 2003-2011, for example, state highways represented the greatest risk to pedestrians for fatal crashes, with thirty-five percent of fatalities occurring on state highways. Just over twenty percent of fatalities occurred on municipal roads over the same period, while twenty-seven percent occurred on county highways. For crashes resulting in injuries, though, this relationship is reversed. Only nine percent of injurious crashes involving pedestrians occurred on state highways from 2003-2011; over forty-two percent occurred on municipal roads. Injuries that occurred on county highways were the same as fatalities on such roads, twenty-seven percent. Crashes on state highways are more often serious because of higher speeds.

All types of injurious crashes have seen declines over the period of study. The most current year, 2011, saw the fewest injurious pedestrian crashes on record in all road categories.

Figure 5a: Percent Fatal Crashes by Road Type

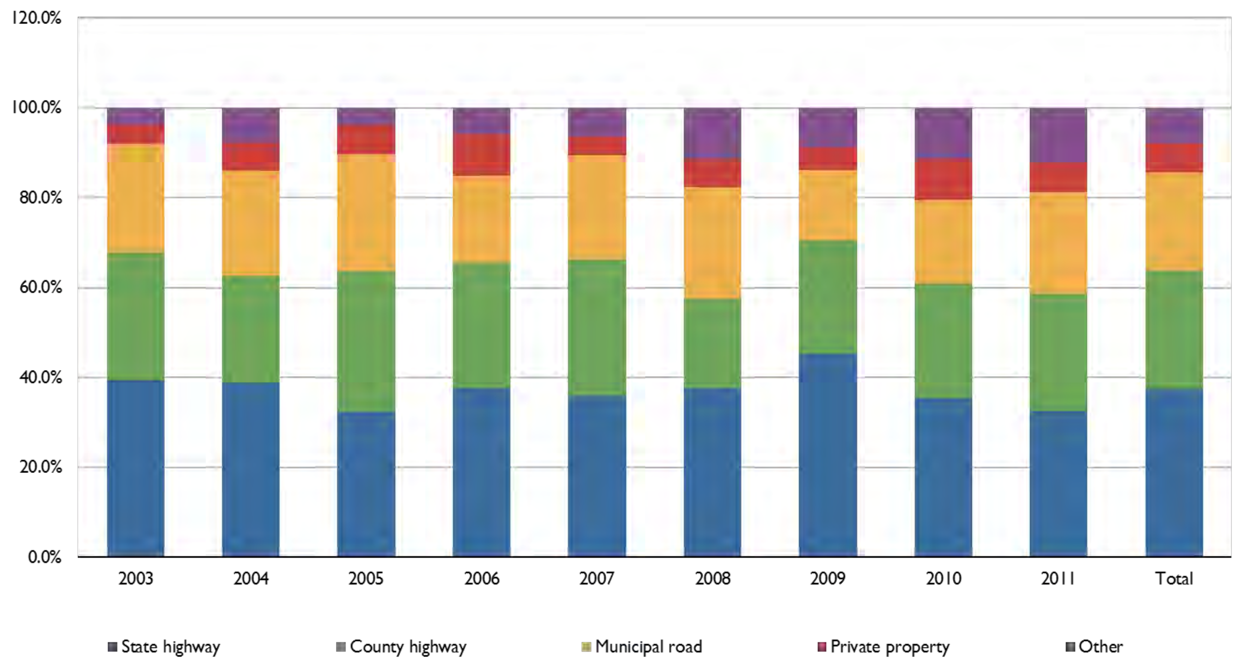
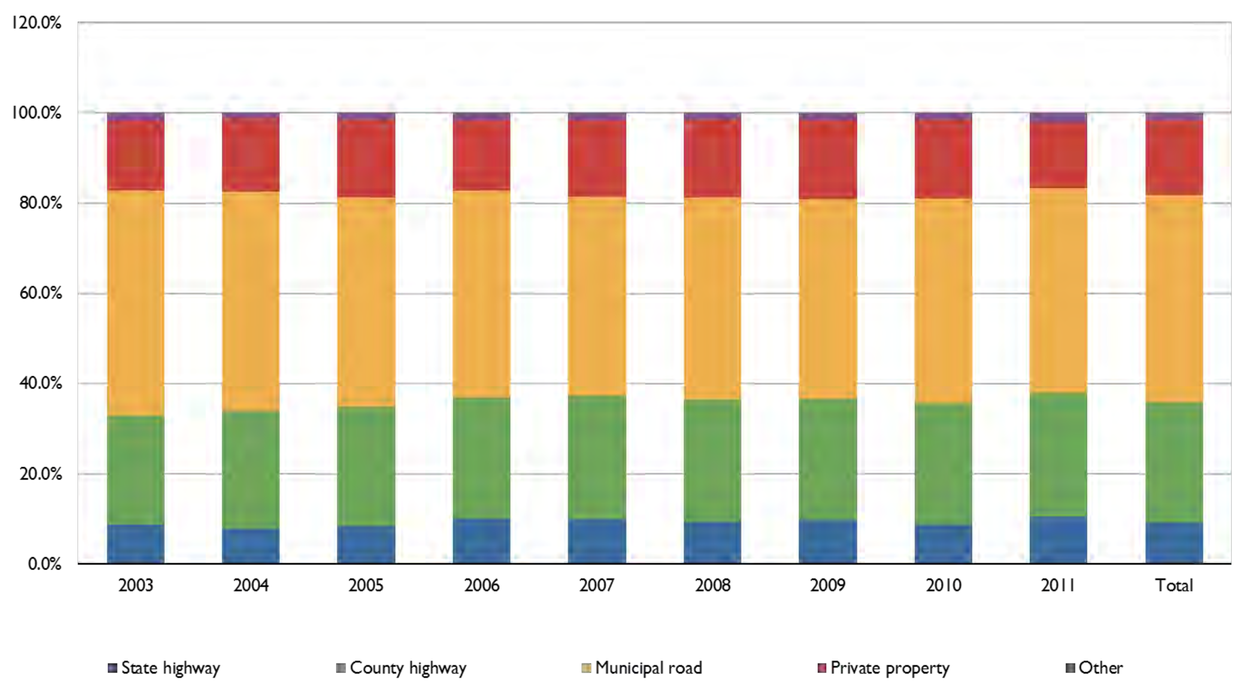


Figure 5b: Percent Injurious Crashes by Road Type



Section VI: Time of Day

Data for the study period show that most pedestrian fatalities (66%) occur at night. This statistic illustrates the importance of visibility in pedestrian safety. In contrast, however, most pedestrian injuries (64%) occur during daylight hours. The relatively high proportion of injuries during the daytime is due to greater pedestrian presence. Most pedestrian activities occur during the day, thus putting more pedestrian on the streets at risk of traffic crashes. When broken down by age category, there is not a significantly different relationship related to light condition and age; more fatalities are in the same proportions across age categories.

Hourly data of the nine-year period show that pedestrian injuries predominately occur in the afternoon/ evening period. This can be directly related to activities and road usage by individuals.

Section VII: Day of Week

Aggregate data for the 2003-2011 period show that pedestrian fatalities and injuries vary only modestly between the days of the week (see Figures 6a and 6b). Injuries are worst on Fridays. The higher frequency of crashes on Fridays may be due to a combination of various factors, including greater traffic volumes, greater traffic and pedestrian volumes after dark, and alcohol consumption. Despite lower traffic volumes on weekends, Saturdays have the most fatalities. Sundays also have a large fatality-to-injury discrepancy. Lower injury rates and higher fatality rates on weekends suggest that higher speeds due to lower traffic volume may be a contributing factor to these higher weekend fatality rates.

Figure 6a. Percent Fatal Pedestrian Crashes by Day of Week

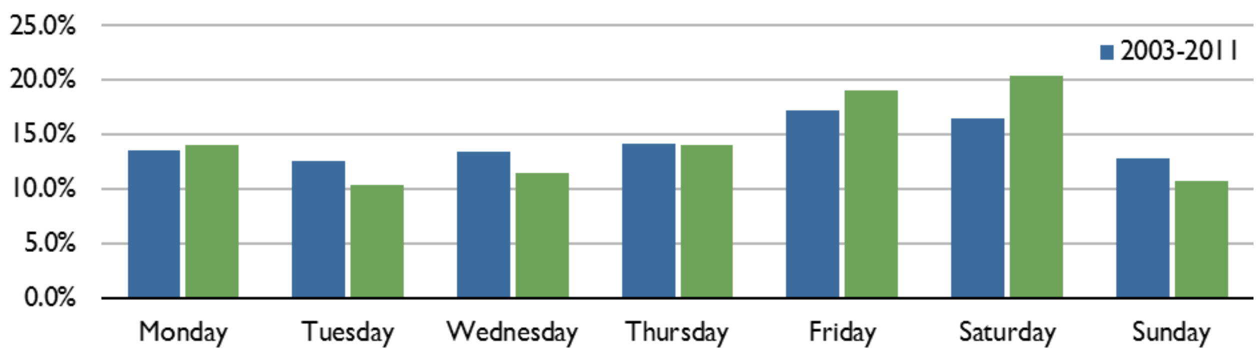
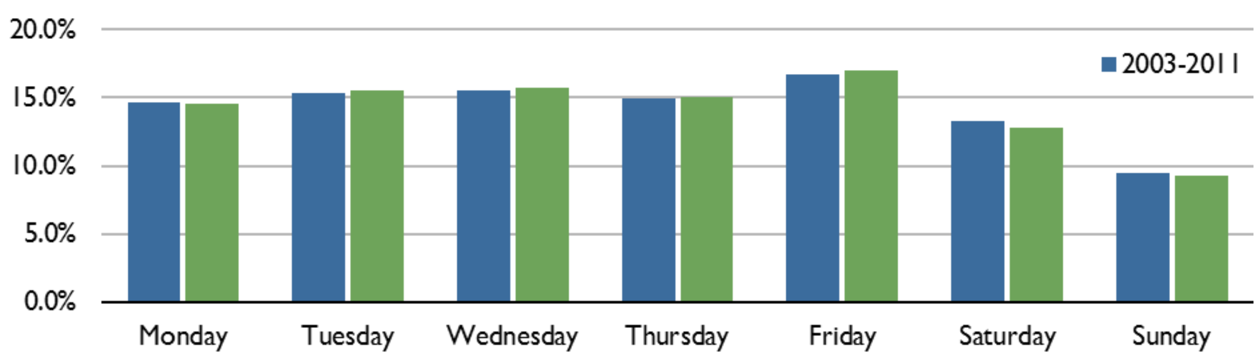


Figure 6b. Percent Injury Pedestrian Crashes by Day of Week



Section VIII: Month of Year

The largest number of pedestrian crashes occurs during the October-December period (see Figures 7a and 7b). Aggregate data from the 2003-2011 period show that both fatalities and injuries peak in the month of December. The reason for a large number of crashes in December may be a combination of weather, high volumes of holiday traffic, alcohol consumption and unfamiliarity with driving in winter weather conditions. It is worth noting that a large number of injuries occur in May and June, which may be due to higher pedestrian volumes and academic breaks.

Figure 7a. Percent Injury Pedestrian Crashes by Month of Year

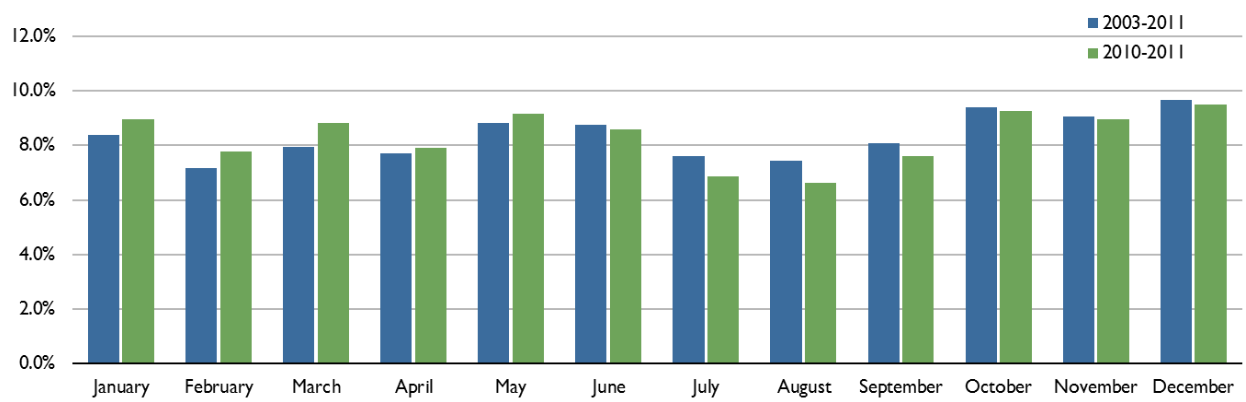
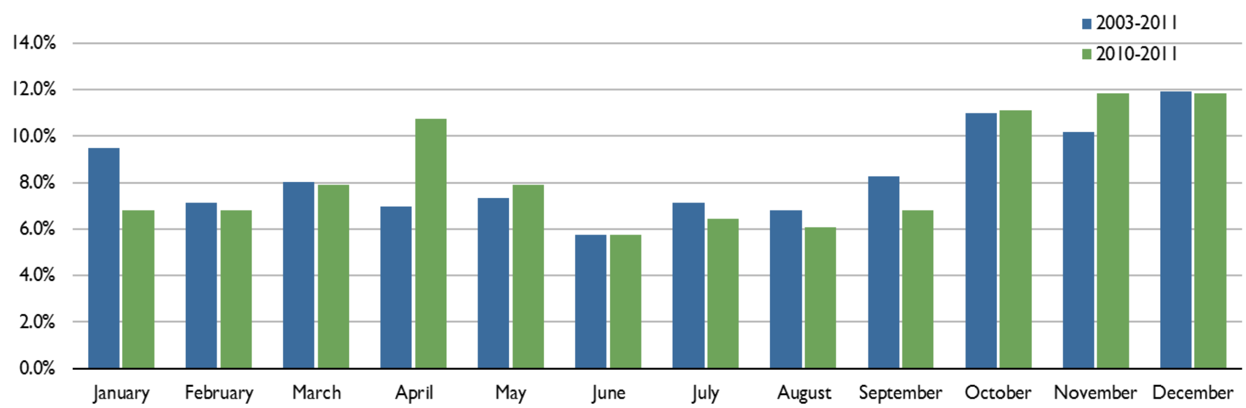


Figure 7b. Percent Fatal Pedestrian Crashes by Month of Year



Section IX: Weather Conditions

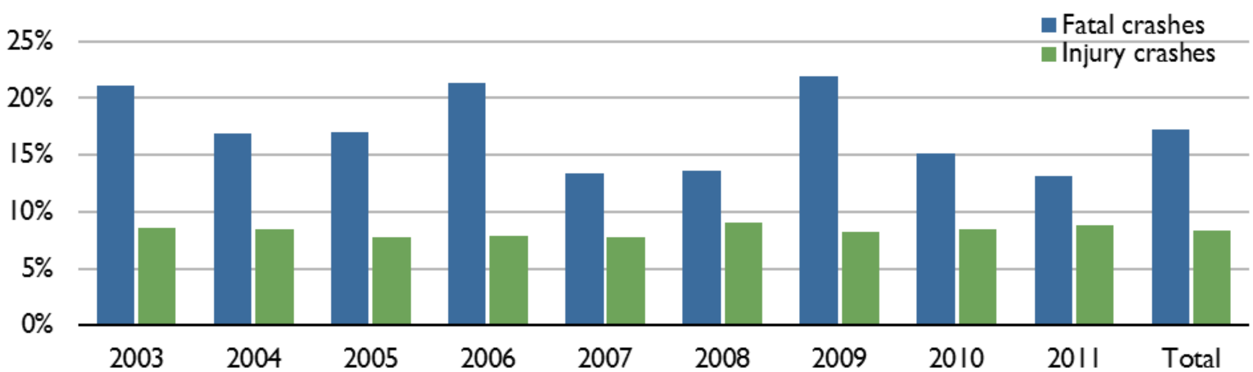
Weather conditions are difficult to use to predict an outcome with respect to pedestrian safety. One can assume that from an exposure standpoint, there are many fewer pedestrians out on the streets during inclement weather. Unfortunately due to the limitations of New Jersey crash data, testing this empirically is not yet possible. With the available crash data, there is not a significant difference in injuries or fatalities for those pedestrians who are involved in crashes during inclement weather conditions. About three percent of pedestrian crashes are fatal in both clear and poor weather. About forty percent of pedestrian crashes result in moderate injuries or worse.

Another factor relatable to weather in these data is the road surface condition at the time of the crash. The data are reported for a variety of conditions, but for ease of analysis, the categories are collapsed into "slippery" surfaces (icy, snowy, wet, etc.) and dry. The difference between these two variables – weather condition and road surface condition – is minor, so it is expected that the results will be similar. About three percent of pedestrian crashes result in deaths in both slippery and dry conditions; about forty percent of pedestrian crashes result in moderate injury or worse in dry conditions and about thirty-eight percent in slippery.

Section X: Alcohol

Data for crashes involving alcohol reveal a disturbing trend (see Figure 8). Fatal crashes are about three times more likely to involve alcohol impairment by the vehicle driver than injurious crashes over the entire ten years of data. The fatality data year-to-year varies quite significantly, but an average of seventeen percent of fatalities over the entire period involve alcohol compared to about eight percent on injurious crashes. The number of reported pedestrians under the influence of alcohol was not significant or reliably reported in these data.

Figure 8: Percent Pedestrian Crashes Involving Alcohol by Year



Section XI: Pedestrian Crashes by County

The data reported to the Plan4Safety database allow a certain degree of spatial analysis. This section briefly highlights some of the county-level variation in crash statistics during the nine-year study period (see Table 4). In general, urban and northern counties have lower rates of pedestrian crashes when controlling for population density than suburban and southern counties. Three significant outliers are present in the population density analysis: Atlantic, Ocean and Burlington Counties. Both Atlantic and Ocean Counties are shore counties with large tourism economies. They tend to attract visitors who are likely to walk more often than other places, and who are unfamiliar with the areas. The visitors to these places are also likely to consume alcohol and walk at night. Burlington County, on the other hand, is a large suburban county on the Delaware River. Detecting reasons why Burlington has a high fatality rate normalized by population density is difficult.

Controlling for population only (omitting land area) yields slightly different results (see Table 4). Smaller, northern counties (Essex, Hudson, Passaic and Union) have much higher total crash rates when only population is controlled. Atlantic County is also high. Burlington drops to near the bottom, suggesting that its large land area might be a bigger factor in the density analysis above. In terms of fatal crashes, Atlantic remains an outlier in fatal crashes when only population is controlled. Both Ocean and Burlington drop back to the rest of the counties in the fatal crash analysis. Union is the only other outlier and is difficult to explain with the available data.

Table 4: County-level Pedestrian Crash Rates

		Injury Crashes 2003-2011		Fatal Crashes 2003-2011	
County	**Population Census 2010**	**Frequency**	**Injuries / 10,000 Population**	**Frequency**	**Deaths / 10,000 Population**
Atlantic	274,549	1,851	67.4	89	3.2
Bergen	905,116	5,428	60.0	133	1.5
Burlington	448,734	1,029	22.9	61	1.4
Camden	513,657	2,599	50.6	87	1.7
Cape May	97,265	466	47.9	12	1.2
Cumberland	156,898	531	33.8	22	1.4
Essex	783,969	8,170	104.2	138	1.8
Gloucester	288,288	740	25.7	37	1.3
Hudson	634,266	6,382	100.6	79	1.2
Hunterdon	128,349	150	11.7	15	1.2
Mercer	366,513	1,580	43.1	54	1.5
Middlesex	809,858	3,386	41.8	120	1.5
Monmouth	630,380	2,032	32.2	90	1.4
Morris	492,276	1,258	25.6	48	1.0
Ocean	576,567	1,914	33.2	95	1.6
Passaic	501,226	3,876	77.3	73	1.5
Salem	66,083	117	17.7	11	1.7
Somerset	323,444	893	27.6	30	0.9
Sussex	149,265	267	17.9	7	0.5
Union	536,499	3,527	65.7	107	2.0
Warren	108,692	238	21.9	11	1.0

Section XII: Speed Limits

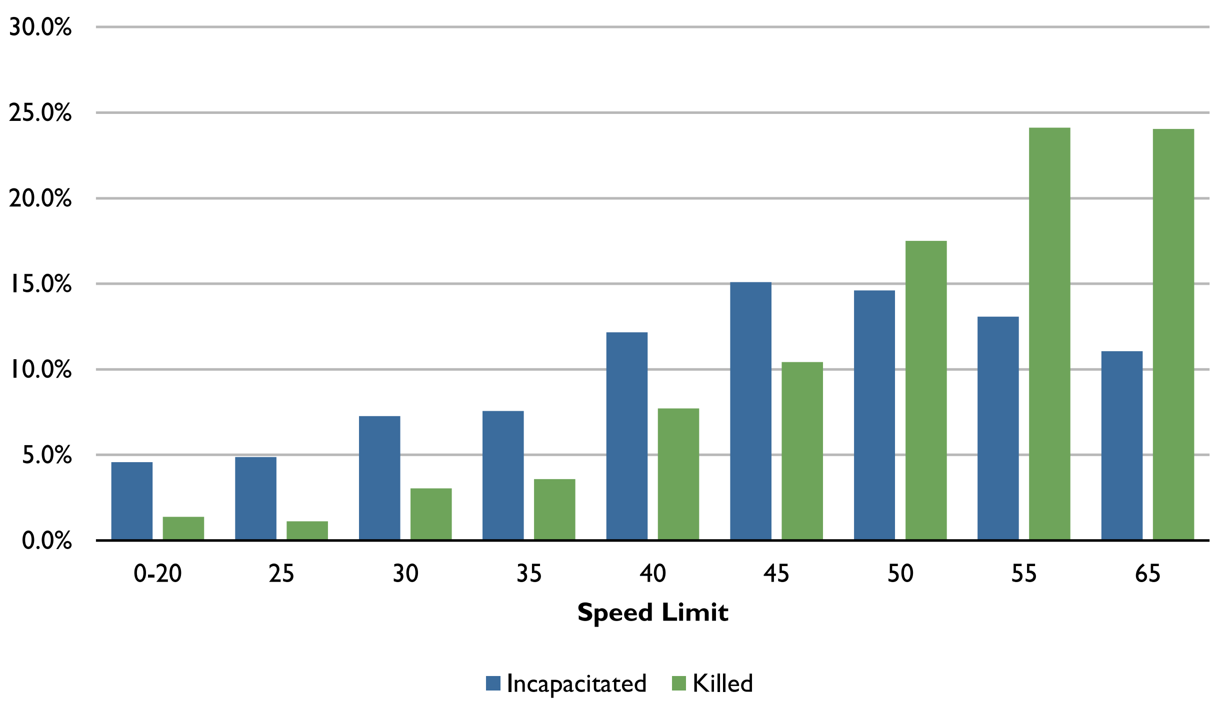
New to this year's analysis is the inclusion of posted speed limits based on road characteristics data linked to the Plan4Safety database (see Table 5). New Jersey's roads vary in their posted speed limits from 10 miles per hour to 65 miles per hour. Unlike other states, New Jersey does not have any roads with speed limits higher than 65 miles per hour.

Table 5: Pedestrian Condition by Posted Speed Limit

Posted Speed Limit	Complaint of Pain	Moderate Injury	Incapacitated	Killed	Total
0-20	1,635	665	112	34	2,446
25	12,119	5,828	932	214	19,093
30	1,146	655	146	61	2,008
35	2,202	1,335	301	143	3,981
40	948	745	257	163	2,113
45	411	368	158	109	1,046
50	355	370	156	187	1,068
55	185	151	70	129	535
65	84	86	29	63	262
Total	**19,085**	**10,203**	**2,161**	**1,103**	**27,660**

The analysis examines the most severe pedestrian injuries and deaths on New Jersey's roads and highways. The aggregate numbers in Table 5 show the largest number of fatalities and injuries at 25 miles per hour, but these data are misleading because they do not take into account the quantity of roads and pedestrian activity along those roads. Since there are problems with measuring pedestrian exposure, the analysis instead focuses on the percentage of pedestrian crashes resulting in incapacitated or killed pedestrians. Figure 9 clearly demonstrates the relationship between speed (as represented by posted speed limit) and severity of pedestrian crashes. While the total number of pedestrian crashes declines with each increment of speed limit category, the percentage of fatal crashes increases. Clearly speed kills unprotected pedestrians.

Figure 9: Percent Pedestrian Crashes Resulting in Incapacitated or Killed Pedestrians by Posted Speed Limit



Chapter 2: A Detailed Analysis Using a Pedestrian Danger Index

Section I: Introduction to the Pedestrian Danger Index

Building upon last year's report, the year's report analyzes the crash data for all municipalities in New Jersey using a Pedestrian Danger Index (PDI). The resulting maps showing the geographic distribution of low and high PDI values in Appendix B give a visual representation of crash data over the nine-year study period between 2003 and 2011. The 2011 Pedestrian Safety Tracking Report recorded PDIs for the ten largest municipalities in New Jersey. The 2012 report expands the index to include all municipalities in the state. The index was initially developed by the Surface Transportation Policy Partnership in the 1990s and has since become best practice for comparing pedestrian crash rates between municipalities. The measure was adapted to include a PDI for all pedestrian crashes as well as for fatal crashes only.

Acquiring pedestrian counts for all municipalities would provide the ideal measure for pedestrian exposure to use in the calculation of a Pedestrian Danger Index. Because this was not practical for this research, nor are there data readily available, proxies are used. A review of the literature on pedestrian exposure reveals that there is no widely accepted proxy; therefore, the three most common exposure measures were used: employment density, population density, and workers walking to work (as reported in the American Community Survey), as well as the less commonly used number of vehicles available per household (also as reported in the American Community Survey) to see if this measure produces similar results. Using these variables, PDIs were calculated for both total crashes and fatal crashes, resulting in a total of eight PDI indices. Each index is shown in the accompanying maps and tables in Appendix A. The four exposure measures attempt to account for pedestrian activity; a high number of workers walking to work, population density, employment density, or households without access to a vehicle in a community suggest that many pedestrians are exposed to automobiles. Calculating PDIs also identifies the geographic patterns of crashes throughout the state, as well as the differences between different pedestrian exposure measures. The rest of the chapter discusses and compares the results of each measure.

In conducting this part of the study, three questions guided our research. These were:

1) Which municipalities are safest for pedestrians?
2) Does the risk of a fatal crash differ from the risk of any type of crash?
3) How can the PDI be used to draw conclusions about the characteristics of safe municipalities versus those that are more dangerous for pedestrians?

The second section of this chapter examines and discusses the geographical dispersion of PDI values. Section III discusses whether there is an exposure measure threshold below which PDI values were significantly lower than those above. The fourth section discusses the socio-economic factors that are associated with high and low PDI values, followed finally by the conclusion.

Section II: Geographic Patterns of the Pedestrian Danger Index

This section is divided into two analyses of the geographic distribution of low and high values of the Pedestrian Danger Index, each of which looks at each of the four exposure measures separately. The first part looks at the Pedestrian Danger Indices for all crashes, while the second part looks at the Pedestrian Danger Indices for fatal crashes only. For each exposure measure, the maps and subsequent analysis were conducted in two parts: the first step mapped the PDI values for all municipalities, and the second mapped the ten municipalities with the ten lowest PDI values and those ten with the highest (see Appendix B and Tables 6 and 7). (It should be noted that not all municipalities have employment, workers who walk to work, or households without a car. When this is case, they are shown as "No Value" on the maps, and were not included the analysis or the tables as they do not have a PDI value and therefore cannot be compared with those municipalities with a value for the exposure measure.) The results in this section and the discussion in Section IV are based on the results of these maps. As will be discussed, the geographic and demographic characteristics are significantly different for fatal crashes then for all crashes.

<u>Part A. All Crashes</u>

The geographic distribution of PDIs for fatal crashes is not particularly strong. The lowest values tend to be located in urban areas of the state and the highest in the rural areas, but this pattern is much weaker than in for fatal crashes (see Table 6).

Population Density: Population density has the strongest geographic pattern of all the exposure measures. Municipalities with the lowest PDI values tend to be located in the urban areas in northern New Jersey and Trenton. Three of the ten communities with the lowest values are in northern New Jersey, with a fourth near Trenton, while three are located on the northern part of the shore. Conversely, those with low population densities are distributed in more rural areas across the state.

Employment Density: The geographic distribution of PDIs for this variable differs from the other three exposure measures. Rather than being lowest in urbanized regions, low PDIs are distributed much more evenly across the state. Municipalities with the ten highest and lowest scores are also distributed fairly evenly throughout the state.

Workers Walking to Work: While municipalities with the lowest PDIs are more likely to be located in the northeast and those with the highest in more rural areas in the northwest and southeast, the geographic pattern overall is not very strong for those. However, three communities with the lowest PDIs are located in the urban northeast, with the others located in more rural areas. Those with the highest values are distributed across the state.

Households Without a Vehicle: This exposure measure shows both low and high PDI values distributed fairly evenly across New Jersey, without a strong geographic pattern. Those municipalities with the lowest PDIs are distributed across the state, with four in the urban northeast. Those with the highest values are, again, located around the state in more rural areas.

Table 6: PDI Values of Municipalities with the Least and Most Number of Crashes,

			PDI Values				
	Municipality	**Total Crashes**	**Population Density**	**Employment Density**	**Workers Walking to Work**	**Households without a Vehicle**	**Average PDI**
1	**Fredon**	1	1.7	0.7	9.1	4.2	4.0
2	**Green**	1	1.4	0.8	22.2	17.8	10.9
3	**Interlaken**	1	0.5	0.04	128.8	64.4	48.5
4	**Loch Arbour**	1	2.6	0.5	798.8	698.9	375.2
5	**Longport**	1	0.5	0.03	40.8	15.9	5.5
6	**Milford**	1	0.8	0.02	18.3	19.3	9.6
7	**Newfield**	1	0.8	0.02	26.1	5.3	8.0
8	**Stockton**	1	2.0	0.01	42.5	261.2	76.4
9	**Stow Creek**	1	9.9	3.7	20.9	90.5	31.2
10	**Victory Gardens**	1	0.07	0.08	16.8	3.5	5.1
			[…]				
556	**New Brunswick**	860	1.7	1.2	2.0	0.5	1.5
557	**Passaic**	891	0.7	1.7	2.3	0.5	1.3
558	**Trenton**	936	1.1	1.1	2.3	0.5	1.3
559	**Irvington**	966	1.0	3.8	14.4	1.3	5.1
560	**Elizabeth**	1,055	0.9	3.1	1.1	0.3	1.4
561	**Atlantic City**	1,148	8.6	2.5	4.6	1.8	4.4
562	**Camden**	1,202	2.0	3.8	3.4	0.6	2.4
563	**Paterson**	2,059	0.9	5.0	2.5	0.4	2.2
564	**Jersey City**	3,007	0.8	4.7	0.7	0.2	1.6
565	**Newark**	3,673	1.3	7.2	0.7	0.1	2.3

Part B. Fatal Crashes

Nearly half of all municipalities had no recorded fatal crashes between 2003 and 2011 (see Table 7). These communities received a PDI of zero, and did not use them in our analysis. The geographic distribution of PDIs for fatal crashes is dramatic, especially when compared with the widely-dispersed geographic nature of PDIs for all crashes. The lowest values are concentrated in the northern, urban areas of the state and the highest in the rural areas. While the relationship between low PDIs and high exposure measures is weak for the PDI indices for all crashes, those municipalities with the lowest fatal crash PDIs have among the highest population densities, employment densities, workers walking to work, and households without a vehicle in the state.

Population Density: This measure has the strongest geographic pattern of all the exposure measures. The municipalities with the lowest PDI values are located in the northeast and around Trenton. All ten of the lowest PDIs are located in northern New Jersey. Conversely, communities with high PDIs tend to be located in rural communities in the south.

Employment Density: The PDI values show a geographic pattern similar to the population density exposure measure, with municipalities with low PDI values located in the northeast. Nine out of the ten municipalities with the lowest PDI values are located in the northeast, with the tenth located on the shore. Those with the highest PDIs are also geographically concentrated, with eight out ten located in the rural and suburban areas of the south and northwest.

Workers Walking to Work: The geographic pattern of the percent of workers walking to work is slightly weaker than the other exposure measures. Seven of the ten municipalities with lowest PDI values are located in northern New Jersey; the others are in central New Jersey. Communities with high PDIs are more likely to be located in the south and northwest.

Households Without Access to a Vehicle: This exposure measure shows a similar pattern to workers walking to work, with a concentration of low-PDI municipalities located in the northeast with the others spread throughout the state. Eight of the ten municipalities with the lowest PDIs are located in northern New Jersey; the other two are also urban, Camden and Trenton. Conversely, those with the highest PDIs are dispersed throughout the state.

Table 7: PDI Values of Municipalities with the Least and Most Number of Fatal Crashes

			PDI Values				
	Municipality	**Total Fatal Crashes**	**Population Density**	**Employment Density**	**Employees Walking to Work**	**Households without a Vehicle**	**Average PDI**
	245 municipalities had no pedestrian fatalities between 2003 and 2011						
556	**Trenton**	17	0.02	0.02	0.04	0.01	0.02
557	**Woodbridge**	19	0.5	0.3	9.5	2.7	3.3
558	**Lakewood**	19	0.07	0.2	0.06	0.02	0.10
559	**Toms River**	19	0.1	0.2	0.3	0.05	0.2
560	**Atlantic City**	20	0.2	0.1	0.08	0.03	0.09
561	**Edison**	21	0.07	0.1	0.1	0.04	0.08
562	**Paterson**	21	0.01	0.03	0.03	0.00	0.02
563	**Jersey City**	22	0.01	0.01	0.005	0.00	0.01
564	**Elizabeth**	32	0.03	0.08	0.04	0.01	0.04
565	**Newark**	53	0.02	0.04	0.01	0.002	0.02

<u>Part C: Statewide PDI Average</u>

After calculating the PDIs for each exposure measure, the average PDI was found for all municipalities to help summarize the analysis (see Table 8 and Appendix A.) As would be expected, the patterns described in the previous paragraphs are similar to the average of the PDIs for all the exposure measures. Municipalities with the lowest PDI values for fatal crashes are concentrated in northern New Jersey, while those with the highest values are in more rural areas in southern New Jersey. The PDI values for all crashes are more widely dispersed throughout the state for both high and low values. Three municipalities in the northeast are among those with the lowest PDI values, while eight such municipalities for fatalities only are located there.

Part of the aim of this report is to explore the results of using different variables as a proxy for pedestrian exposure. While it is not within our scope to determine which variable is ideal to do so, our analysis demonstrates how the resulting PDI values and geographical distribution of municipalities with high and low values varies depending upon the proxy used. Each proxy tells a slightly different story about which municipalities are safest for pedestrians, but perhaps the most important story is that the differences between each exposure measure is minimal when the statewide patterns of the PDI values were examined for each exposure measure that was used. The geographic distribution, as well socio-economic characteristics, of each municipality did not vary a lot between exposure measures; rather the differences were strongest between: 1) the municipalities with the lowest PDI values and those with the highest values; and 2) between PDI values for all crashes and values for fatal crashes only. Overall, municipalities with low PDI values were urban, with higher densities, and more workers walking to work and no-vehicle households. This was especially true for fatal crashes. On the other hand, municipalities with high PDI values tended to be suburban or rural, with lower densities, and fewer workers walking to work and no-vehicle households.

Table 8: Municipalities with the Lowest and Highest Average PDI Values

	All Crashes		Fatal Crashes Only	
	Municipality	**Average PDI**	**Municipality**	**Average PDI**
1	Fair Haven	0.1	West New York	0.004
2	Franklin (Hunterdon Co.)	0.5	Hoboken	0.005
3	Wildwood Crest	0.6	Union City	0.005
4	West New York	0.7	Jersey City	0.007
5	Union City	0.8	Passaic	0.01
6	Hoboken	1.0	Princeton	0.01
7	Woodbine	1.0	New Brunswick	0.02
8	Brielle	1.1	Newark	0.02
9	Trenton	1.3	Paterson	0.02
10	West Wildwood	1.3	Cliffside Park	0.02
	[…]		[…]	
556	Essex Fells	414.1	Chesilhurst	30.8
557	Winslow	498.6	Winslow	38.0
558	Barnegat Light	526.1	Lebanon	47.9
559	Bass River	852.2	Folsom	66.4
560	Greenwich (Warren Co.)	974.6	Pilesgrove	72.8
561	Franklin (Somerset Co.)	1,522.0	Estell Manor	73.7
562	Willingsboro	1,539.0	Willingboro	84.5
563	Teterboro	1,734.4	Teterboro	92.1
564	Woodland Park	1,883.4	Barnegat Light	132.7
565	Washington (Bergen Co.)	2,455.9	Mantoloking	139.0

Part D. Discussion of the Geographic Patterns of the Pedestrian Danger Index

While each of the four exposure measures results in municipalities ranked differently on each PDI index, there are similarities between them. The most striking is that urban communities are more likely to have low PDI values, which indicates a safer environment for pedestrians, regardless of the exposure measure used. The lowest PDIs for fatal crashes are heavily concentrated in these municipalities, far more so than the lowest PDIs for all crashes, even though these cities typically have higher populations and densities. This may be explained in part by the slower automobile speeds in these areas, which reduce the likelihood of a deadly crash. Additionally, the high number of people walking may increase pedestrian visibility and slow down traffic, making drivers more aware of the presence of pedestrians. Finally, roads in urban areas tend to be narrower, have shorter blocks, and have more sidewalks than their suburban and rural counterparts, increasing pedestrian safety when people cross streets and walk on the side of the road.

Some municipalities are among those with either the highest ten or lowest ten PDI values on multiple indices. Hoboken, West New York, Passaic, and Union City are among the ten municipalities with the lowest fatal crash PDI for all four exposure measures. Interestingly, this pattern does not hold true for the highest PDI values for all crashes. For all four exposure measures, the municipalities with the lowest PDIs also have among the highest population densities, employment densities, number of workers walking to work, and number of households without access to a vehicle. The reverse is true for those with high PDIs. These characteristics of municipalities with low PDI values suggests that regardless of the pedestrian exposure measure used, high pedestrian exposure is a characteristic associated with fewer fatal and, to a lesser degree, total crashes.

Section III: Is There an Exposure Measure Threshold?

The research team also examined the data to see if there is a natural threshold for each exposure measure below which PDI values were significantly lower than those above. If such a break were found, it would indicate that a particular exposure measure value might be the value for a municipality to reach in order to increase pedestrian safety. However, we did not find a distinct threshold for any of the four exposure measures. While municipalities with similar PDI values often have similar exposure measure values, the data did not show a distinct threshold for exposure measures below which PDI values were lower than those above.

Section IV: Socio-Economic Factors

This year's report added an examination of two socio-economic variables for each municipality: median household income and the percent of residents who are non-White. The aim is to see if there is a relationship between these factors and PDI values. The research team looked at these two variables for each exposure measure for the ten municipalities with the lowest PDI values and the ten with the highest, as well as the averages of the ten highest and ten lowest across all exposure measures (see Table 9.).

Table 9: Socio-economics: Average of All Exposure Measures

	Median Income			Percent Non-White Residents		
	All Crashes	Fatal Crashes	Average	All Crashes	Fatal Crashes	Average
Ten Lowest PDIs	$66,343	$58,246	$62,295	25%	44%	34%
Ten Highest PDIs	$87,116	$89,476	$88,772	18%	19%	19%

For all exposure measures, PDI values for fatal crashes demonstrate a stronger pattern of the percentage of residents who are non-White and have low median household incomes than do PDI values for all crashes. Municipalities with low PDI values for fatal crashes generally have high percentages of non-

White residents and low median household incomes. The municipalities with ten lowest PDI values for both all crashes and fatal crashes only average a median income of $62,295 and a percent of non-White residents of thirty-four percent. Those with the ten highest PDIs average $88,772 and nineteen percent, respectively.

When the municipalities are disaggregated into all crashes and fatal crashes, the differences in average household incomes are small: $66,343 compared with $58,246, respectively, for those with the ten lowest, and $87,116 compared with $89,476 for those with the ten highest. There is also a small difference when comparing the percent of non-White residents in the ten municipalities with the highest PDI values: eighteen percent and nineteen percent However, there is a bigger difference in the percent of non-White residents for those with the lowest PDI values: twenty-five percent for all crashes and forty-four percent for fatal crashes only. These results show that there is less of difference in socio-economics when comparing high-or low-ranked fatal crashes or total crashes. Rather, the biggest differences occur when comparing the municipalities with the ten highest and ten lowest PDI values. Municipalities with low PDI values have lower household incomes and a higher percent of residents who are non-White, on average. Many (though not all) are urban areas, which, as discussed in the previous section, have a built environment that is often safer for pedestrians in addition to having a more diverse and, in some cases, a poorer population.

Section V: Conclusion

The expanded Pedestrian Danger Index included all of New Jersey's municipalities that were based on four exposures measures: population density, employment density, number of workers walking to work, and no-vehicle households. The data show that PDI values for fatal crashes are more geographically concentrated than are those for all crashes. Municipalities with low PDI values (indicating greater pedestrian safety) for fatal crashes tend to be located in urban areas, whereas those with high PDI values tend to be located in suburban and rural areas. While these patterns are weaker for all-crash PDI values, they are still evident. Further examination of the data did not reveal a distinct threshold for any of the four exposure measures below which PDI values were significantly lower than those above. There are, however, distinct socio-economic patterns for low PDI values, and again the fatal crash patterns were stronger than the all-crash patterns. Municipalities with low PDI values tend to have high non-White populations and low median household incomes.

Because literature on the use of pedestrian exposure measures is limited, our use of the four different measures will add to the literature on best practices in quantifying pedestrian safety. Further research and analysis of pedestrian exposure measures would further pedestrian safety research in New Jersey and across the country by determining how to best capture the activity of pedestrians on the street.

Chapter 3: Origins of Drivers and Pedestrians Involved in Crashes in High-Crash Municipalities

Section I: Introduction

Mapping where the pedestrians and drivers involved in crashes are from can help illuminate the characteristics of crashes and who is causing them. The research team examined the crash data of the municipalities in New Jersey that had the most number of pedestrian crashes between 2003 and 2011. Data were acquired for the following municipalities: Atlantic City, Camden, Elizabeth, Irvington, Jersey City, New Brunswick, Newark, Passaic, Paterson, and Trenton. For each municipality, the following data were acquired from each crash: the zip code, city, and state of the driver(s) involved; and the zip code, city, and state of the pedestrian(s) involved. The total number of pedestrians and drivers from each zip code were then separately summed and divided by the total number of pedestrian and driver records, respectively, in each municipality to obtain the percentage of drivers or pedestrians who live in each zip code. The resulting maps show which zip codes that the drivers and pedestrians involved in pedestrian crashes came from. The rest of this chapter will discuss the results of the maps, which are found in Appendix B.

It should be noted that the number of crashes used in the analysis is significantly less than the actual number of pedestrian crashes that occurred in each municipality during the time frame under consideration. This is due to incomplete nature of the crash records; some were missing a zip code, city, and/or state. The zip code was found for those that did not have a zip code but had a city and state, as long as the city did not have multiple zip codes. If it did, the entry was eliminated for mapping purposes, as the correct zip code couldn't be determined. Typically, about seventy-five percent of the data were able to be kept for use in this report.

Section II: Results

Two sets of maps were produced for each of the ten municipalities in this analysis for pedestrians and drivers who are involved in crashes (see Appendix B). One shows the zip codes that the pedestrians originate from and the second showed the zip codes that the drivers originate from. Tables included on the maps report the percentage of drivers or pedestrians who are from the city, from outside the city but within New Jersey, and from outside New Jersey. A summary of where pedestrians and drivers are from can also be found below, in Table 10.

Part A. Drivers

In only five of the ten municipalities are the majority of the drivers involved in crashes reside in zip codes located within the municipality: Camden (57%), Elizabeth (53%), Paterson (62%), Trenton (69%), and Jersey City (52%). Atlantic City has the highest percentage of drivers from out-of-state at fourteen percent. The average is forty-nine percent. Atlantic City is an anomaly amongst the ten cities, with seventy-three percent of drivers from outside of the city; Irvington and New Brunswick have the next highest percentage, both with sixty-four percent. Five cities – Atlantic City, Irvington, New Brunswick, Newark, and Passaic – had more than half of the drivers originating from outside of the city.

Part B. Pedestrians

In all ten municipalities, pedestrians are more likely to come from the municipality under consideration than drivers are, ranging from fifty-three percent in Atlantic City to eighty-five percent in Paterson, with an average of seventy-four percent (see Table 10). Atlantic City has the highest percentage of pedestrians from outside of New Jersey at seventeen percent, while Irvington has the lowest at one percent. Unlike the drivers involved in crashes, where half the cities had drivers originating from outside the city, no city had more than half the pedestrians originating from outside the city. The highest is Atlantic City, with forty-seven percent from outside the city. These results show that drivers involved in pedestrian crashes are more likely to come from outside the city under consideration, while pedestrians are more likely to be local.

Table 10: Origins of Pedestrians and Drivers in Municipalities with the Most Crashes

PEDESTRIANS					DRIVERS				
	In City	NJ, Out-of-City	Out-of-State	Total Outside City		In City	NJ, Out-of-City	Out-of-State	Total Outside City
Atlantic City	53%	30%	17%	47%	**Atlantic City**	29%	58%	14%	72%
Camden	81%	16%	3%	19%	**Camden**	57%	36%	7%	44%
Elizabeth	70%	25%	5%	30%	**Elizabeth**	53%	40%	7%	47%
Irvington	74%	32%	1%	34%	**Irvington**	36%	58%	6%	64%
Jersey City	82%	14%	3%	18%	**Jersey City**	52%	27%	8%	35%
New Brunswick	62%	34%	5%	39%	**New Brunswick**	36%	58%	6%	64%
Newark	75%	23%	3%	26%	**Newark**	46%	45%	9%	54%
Passaic	79%	18%	3%	21%	**Passaic**	49%	45%	5%	51%
Paterson	85%	13%	2%	15%	**Paterson**	62%	31%	7%	38%
Trenton	84%	14%	3%	17%	**Trenton**	69%	28%	9%	37%
Average	**74%**	**22%**	**4%**	**26%**	**Average**	**49%**	**43%**	**8%**	**50%**

NOTE: Driver and pedestrian percentages are calculated only from the total number pedestrian-driver crashes that have zip codes, NOT from the total number of crashes.

Section III: Discussion

Pedestrians are more likely to originate from the municipality in question than are drivers. There are a number of possible explanations for this pattern. If many employees are commuting by car, those involved in crashes are likely to be the driver rather than the pedestrian since their primarily transportation activity is to drive to and from work. The same is likely to be true for visitors, as they often drive to one destination. Local residents, conversely, may find walking a preferable transportation mode as their trip types are likely to be more varied and include walkable destinations. Additionally, they know the area better and may feel more comfortable walking. The individual characteristics of each city may also affect the geographical distribution of drivers and pedestrians. Atlantic City is an anomaly, with a high percentage of both drivers and pedestrians originating from outside of the city, likely because it has high number of tourists.

There are distinct geographical patterns of drivers and pedestrians involved in crashes. Most pedestrians are from the municipality under consideration (average: 74%); approximately half the drivers are (average: 43%). This suggests that drivers who are from outside the city are more likely to be involved in a pedestrian crash. Those who walk frequently are more vulnerable to crashes; they may not own a car and may frequently walk to work. These ten cities – the ten cities in New Jersey with the highest number of crashes between 2003 and 2011 – also have significantly higher percentages of residents who walk to walk and who do not own a car (see Table 11). The state average of workers who walk to work is three percent, while the average for these ten cities is eight percent. The percentages of those who do not own a vehicle are seven percent and thirty-four percent, respectively. These cities also have a high percentage of non-white residents (67% on average compared with nineteen percent state-wide), as well as low median incomes ($37,645 compared with $83,361). While the sample size is small, all of these statistics suggest that socioeconomics may have a relationship to the number of crashes in a municipality. There are many factors that contribute to crashes; municipalities with high populations and population densities are likely to have high numbers of crashes simply because of the number of people present. However, these municipalities also typically – as has been seen in this analysis of these ten high-crash cities – are home to high numbers of residents who may be more vulnerable to car crashes because they tend to walk frequently: those without a car, those with low incomes, minority populations, and those who walk to work. Additionally, these cities have many drivers who are not from the area often because they are centers of employment and tourism. These municipalities and those with a similar profile, therefore, may benefit from safety improvements for pedestrians, especially in those areas that have these populations and those that have high numbers of pedestrian crashes.

Table 11: Profile of the Municipalities with the Most Crashes, 2003-2011

	% Workers Walking to Work	% No Vehicle	Median Income	% Non-White Residents
Atlantic City	17%	44%	$28,256	71%
Camden	7%	35%	$26,347	84%
Elizabeth	7%	25%	$44,678	53%
Irvington	2%	27%	$41,538	93%
Jersey City	8%	39%	$57,520	65%
New Brunswick	17%	30%	$40,528	40%
Newark	8%	38%	$35,696	73%
Passaic	9%	42%	$30,363	65%
Paterson	4%	29%	$34,302	59%
Trenton	6%	32%	$37,219	67%
Average	8%	34%	$37,645	67%
State Average	3%	7%	$83,361	19%

These ten municipalities are employment centers, attracting many workers from outside the municipalities, thereby increasing traffic levels. Data from the Longitudinal-Employer Household Dynamics (LEHD) Origin-Destination Employment Statistics were used as a proxy for the baseline of people who commute to these municipalities. The data, from the from 2011[1], show that among all ten municipalities an average of eighty-three percent of people working in the municipality in question lived

[1] U.S. Census Bureau, 2013, OnTheMap Application, Longitudinal-Employer Household Dynamics Program, http://onthemap.ces.census.gov/

outside of it and an average of only seventeen percent lived and worked there. The many out-of-town employees may help explain high numbers of out-of-town drivers involved in crashes in many of the municipalities since most employees are likely commuting into work by car. Non-residents are less likely to be familiar with local habits of pedestrians, traffic rules, and street navigation, making them more susceptible to pedestrian-vehicular crashes.

Section IV: Conclusion

Exploring the residential origins of pedestrians and drivers involved in vehicle crashes shows that many more drivers than pedestrians involved in crashes are from out-of-town. This may reflect the high numbers of out-of-town employees who drive to these municipalities during the week. Safety could improve by ensuring that roads, especially in municipalities with many residents who are vulnerable to crashes, have slow speeds and supportive safety and pedestrian infrastructure.

Conclusions and Implications

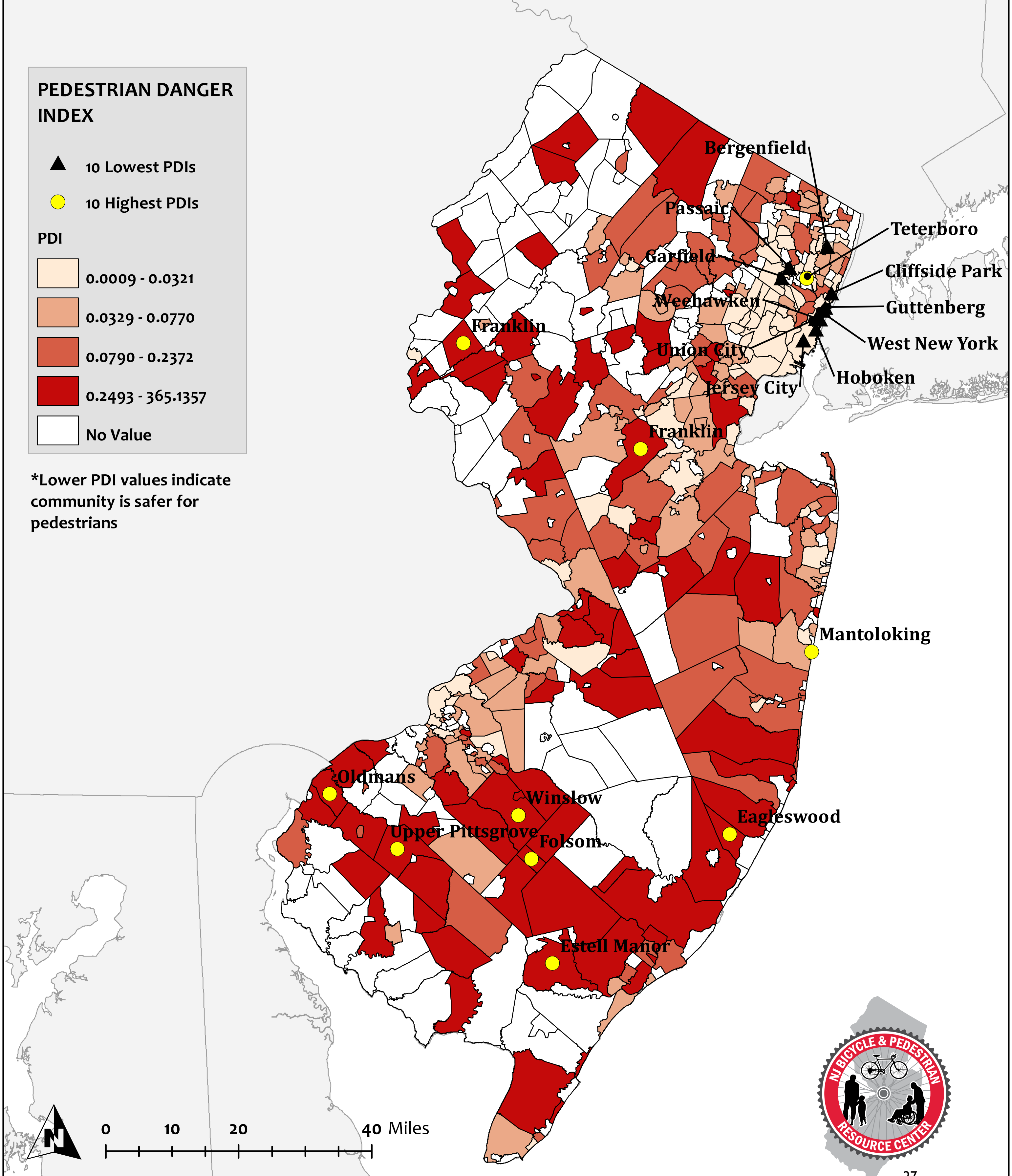
This report showed some of the trends in pedestrian injuries and fatalities on New Jersey's roads and highways. It provided analyses of demographics and crash scene characteristics, indices measuring pedestrian danger of municipalities, and the origins of pedestrians and drivers of ten municipalities.

The report explored the characteristics of vehicle-pedestrian crashes in New Jersey municipalities. Using crash data between 2003 and 2011, it found distinct demographic and situational characteristics of vehicle-pedestrian crashes. Pedestrian fatalities are most likely to occur at night and as posted speed limits increase, and are most common among older people and men. The data also show that PDI values for fatal crashes are more geographically concentrated than are PDI values for all crashes. They are also lowest in urban municipalities and highest in suburban and rural municipalities. Additionally, drivers involved in crashes are more likely to be from out-of-town than are pedestrians. This may reflect the draw of employment opportunities when people from outside the city drive there to access jobs.

Further research into where pedestrians are hit – near job locations or residential areas, downtown or on rural roads – and the design characteristics of the nearby built environment could help develop further conclusions as to the characteristics of pedestrian crashes and preventative actions. Finally, as PDI values of municipalities and crash characteristics demonstrate, less urban areas and certain factors (e.g. age, gender, road type) are more susceptible to high rates of fatal crashes. Policies intended to prevent them should focus on these vulnerable areas and on mitigating the roadway factors that characterize such fatal crashes.

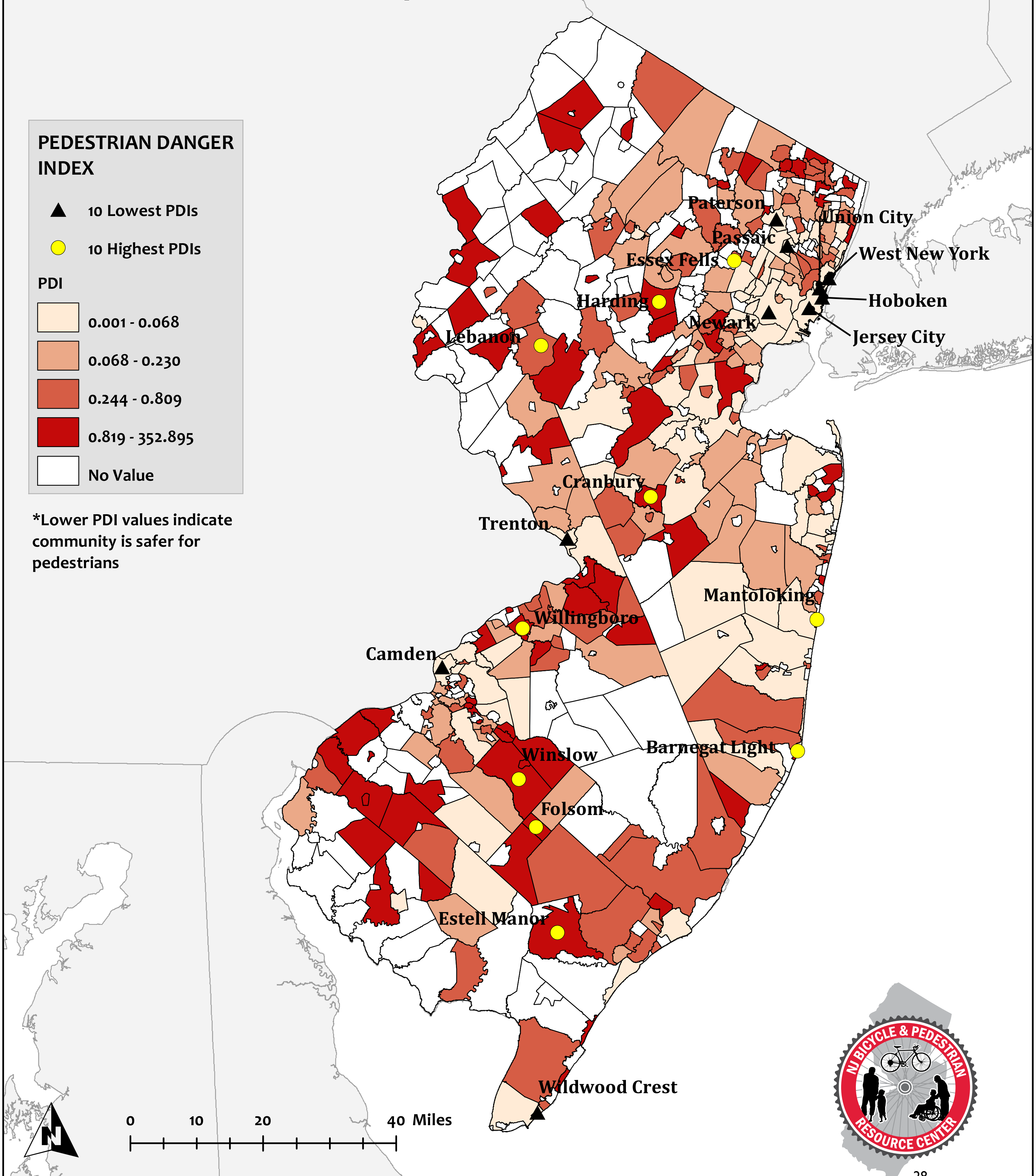
Appendix A: Pedestrian Danger Index Maps

Pedestrian Danger Index: Using Population Density to Measure Pedestrian Exposure to Fatal Crashes



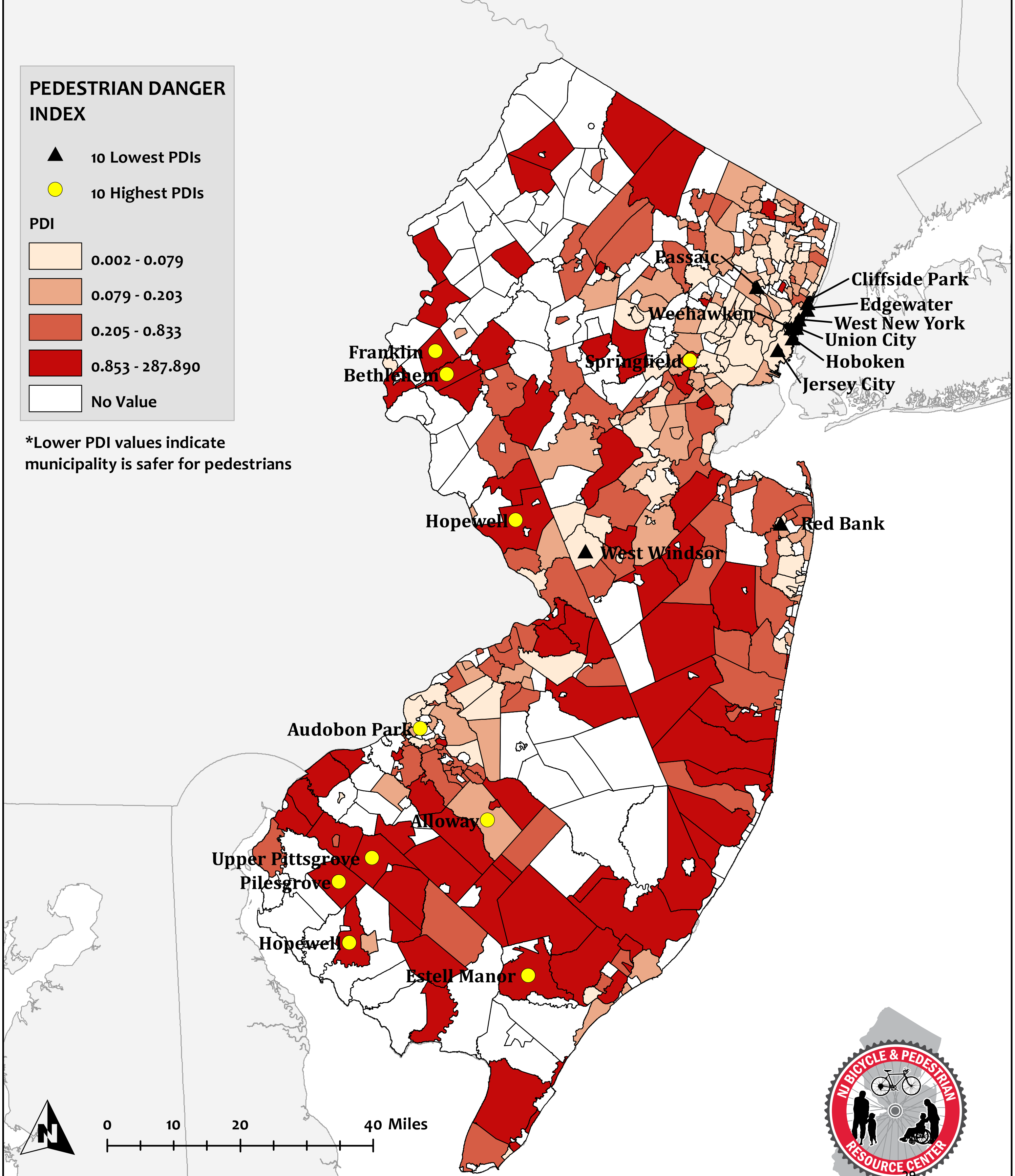
Sources: Plan4Safety, New Jersey Geographic Information Network, New Jersey Department of Labor and Workforce Development

Pedestrian Danger Index: Using No Access to a Vehicle for Work to Measure Pedestrian Exposure to Fatal Crashes



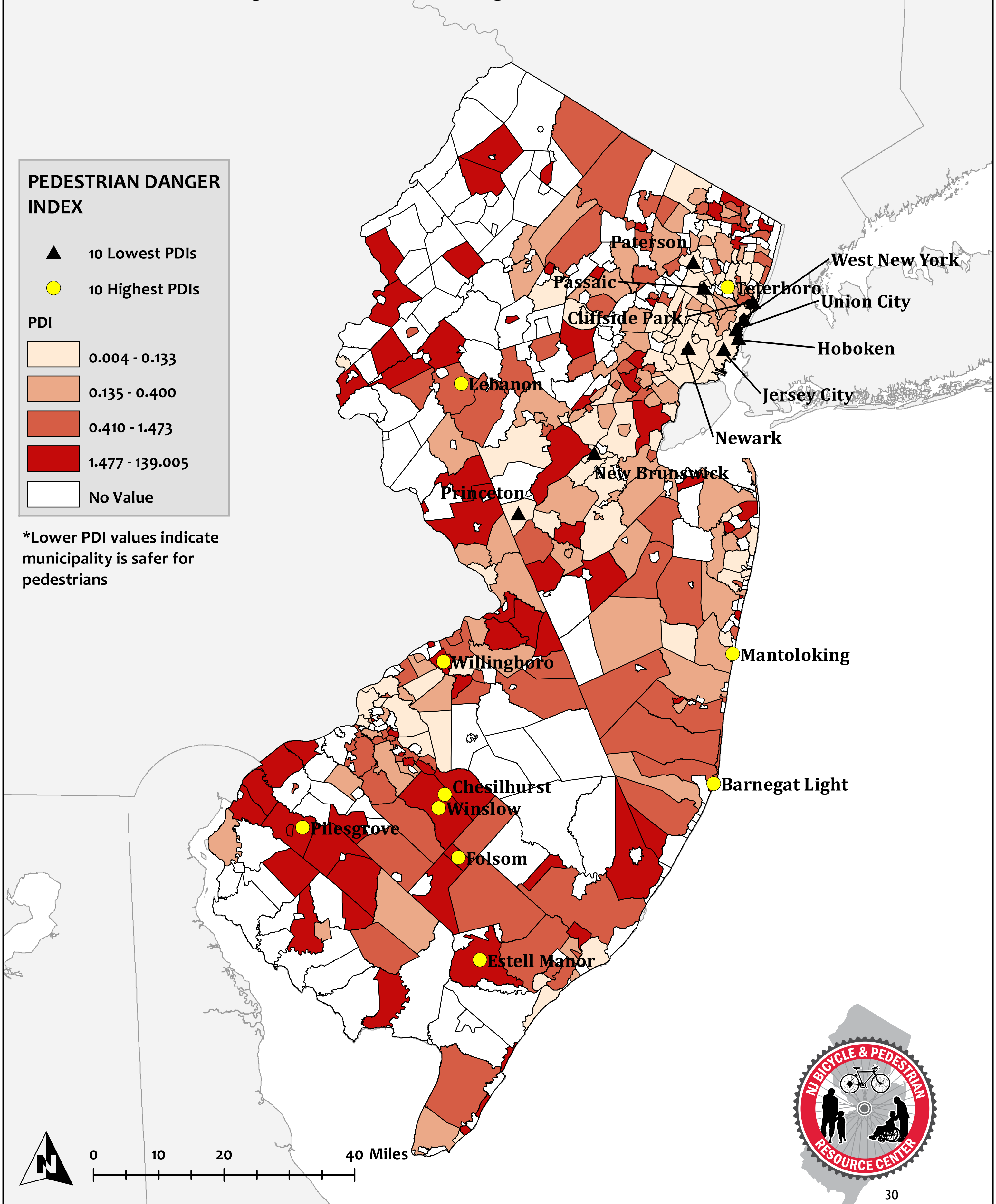
Sources: Plan4Safety, New Jersey Geographic Information Network,
US Census BureauAmerican Community Survey

Pedestrian Danger Index: Using Employment Density to Measure Pedestrian Exposure to Fatal Crashes



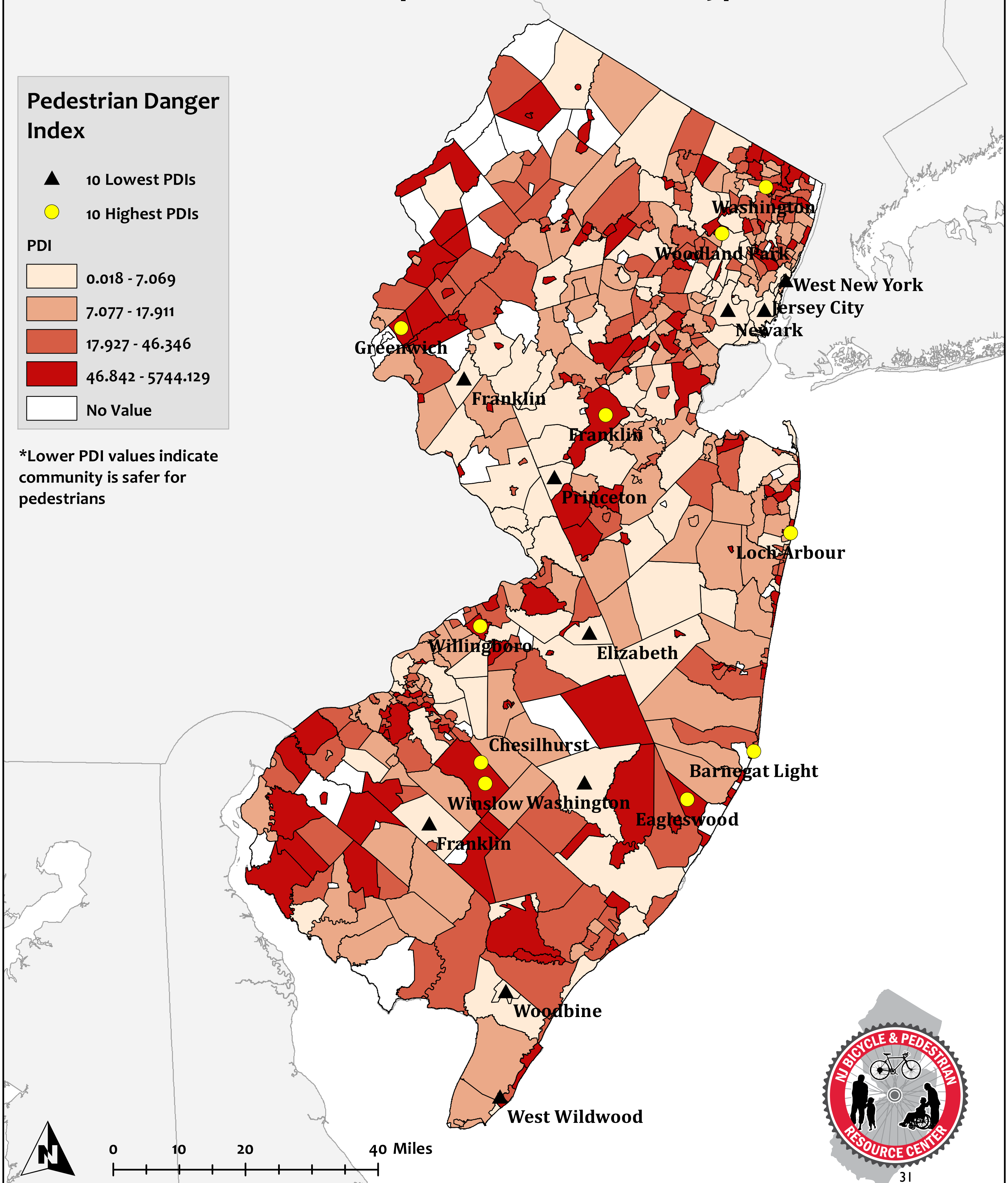
Sources: Plan4Safety, New Jersey Geographic Information Network, New Jersey Department of Labor and Workforce Development

Pedestrian Danger Index: Average of All Exposure Measures



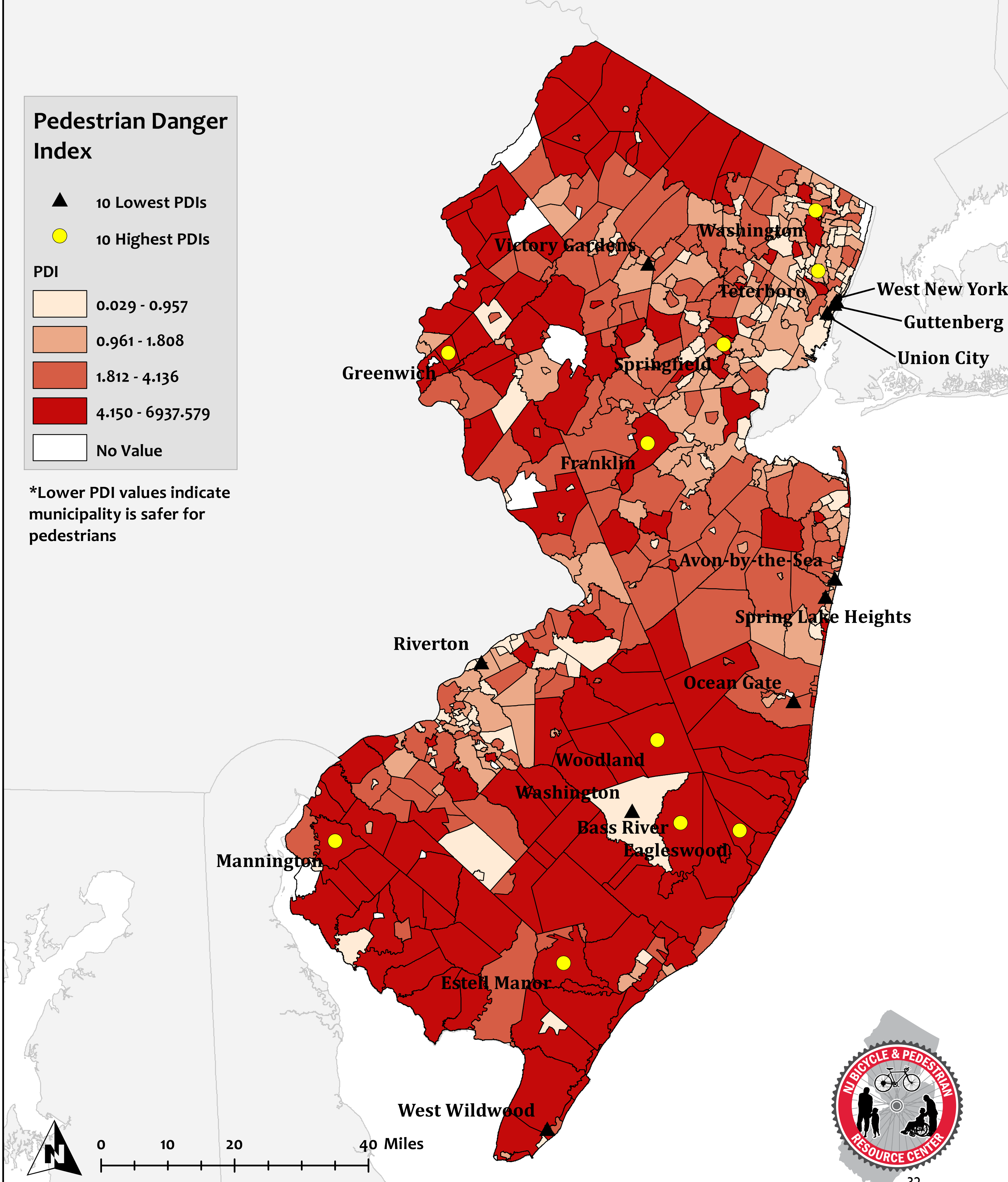
Sources: Plan4Safety, New Jersey Geographic Information Network, US Census Bureau/American Community Survey

Pedestrian Danger Index: Using Number of Workers Walking Work to Measure Pedestrian Exposure to All Crash Types



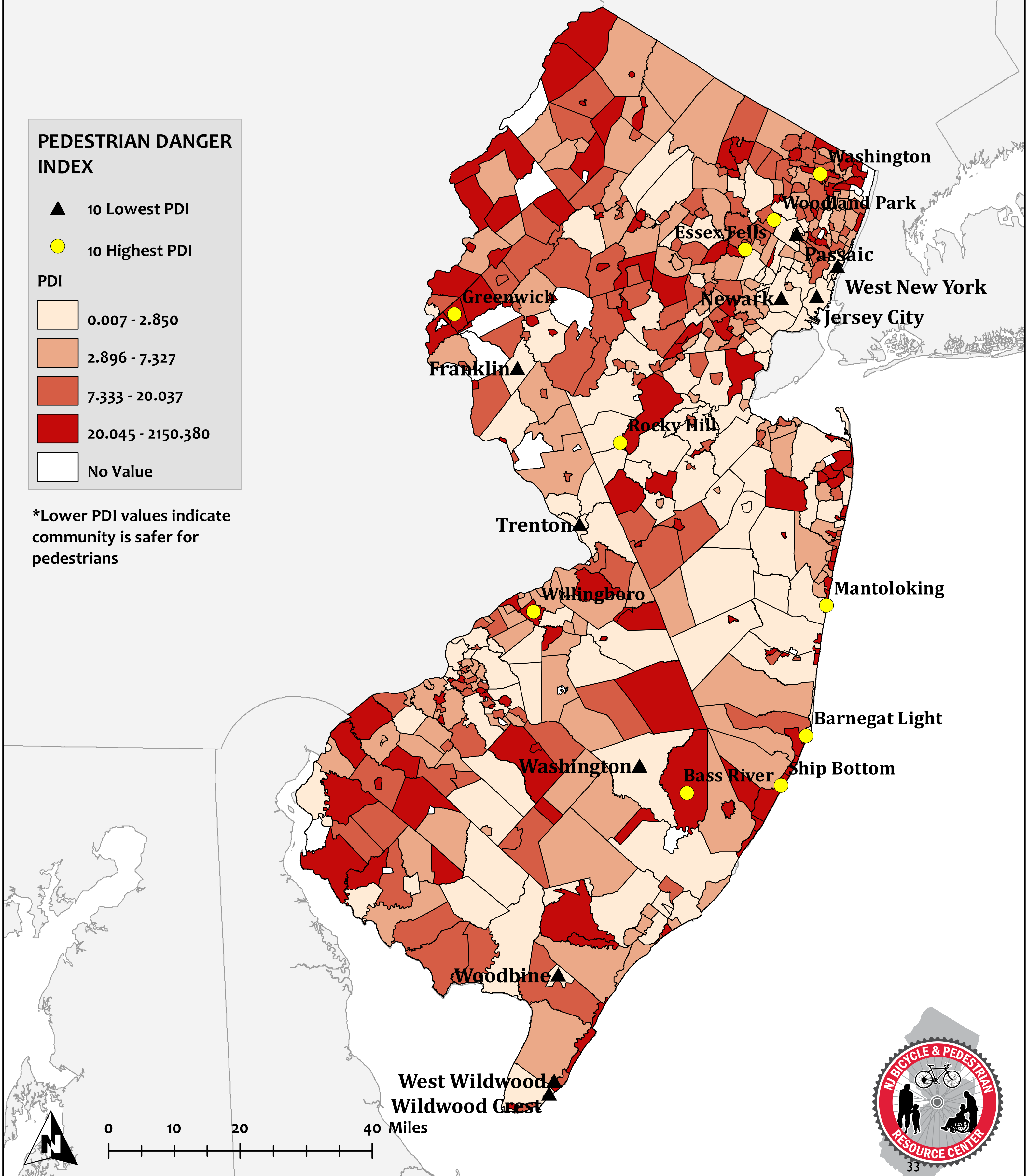
Sources: Plan4Safety, New Jersey Geographic Information Network, US Census Bureau/American Community Survey

Pedestrian Danger Index: Using Population Density to Measure Exposure to All Crashes



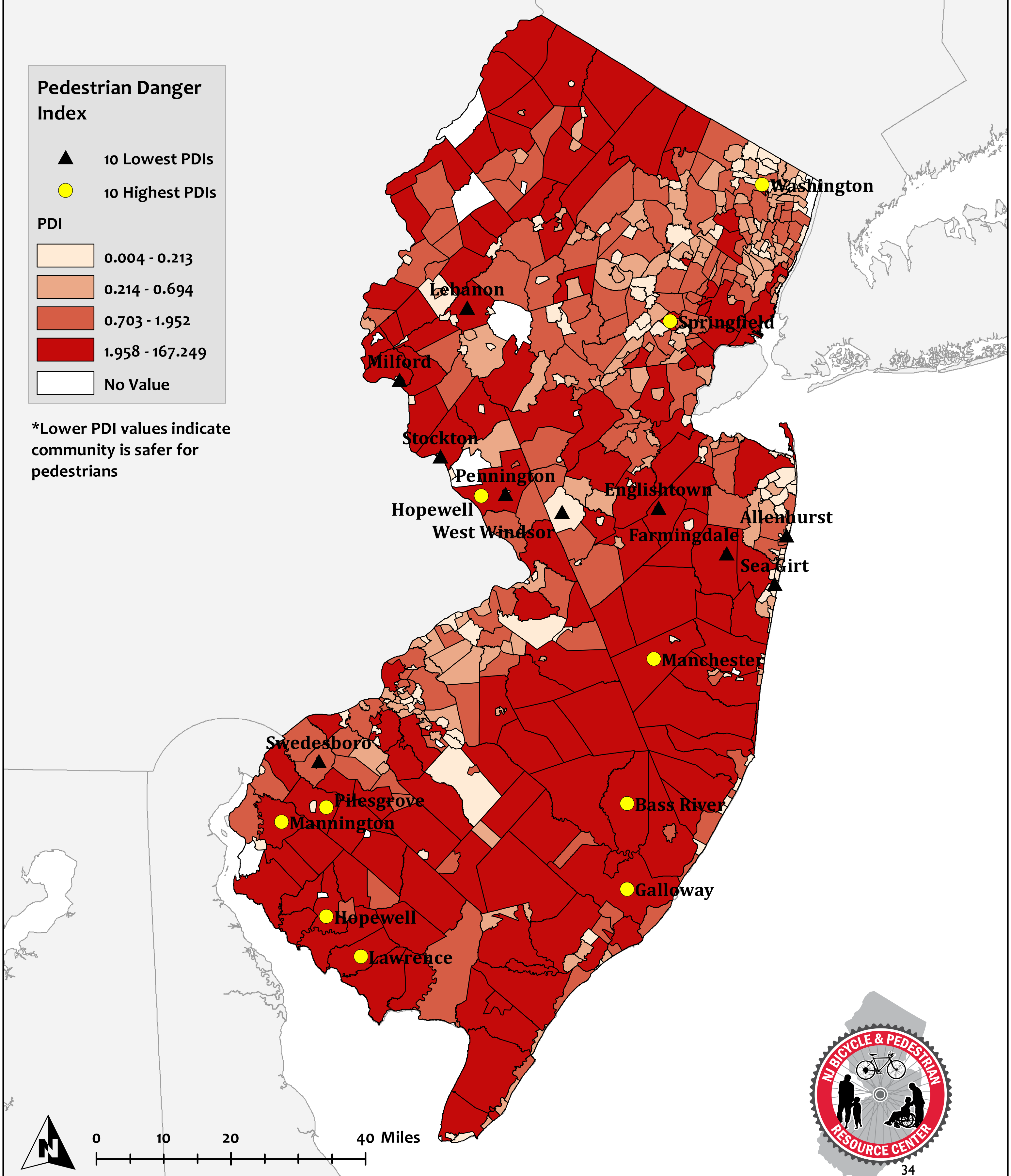
Sources: Plan4Safety, New Jersey Geographic Information Network, New Jersey Department of Labor and Workforce Development

Pedestrian Danger Index: Using No Access to a Vehicle to Measure Pedestrian Exposure to All Crashes



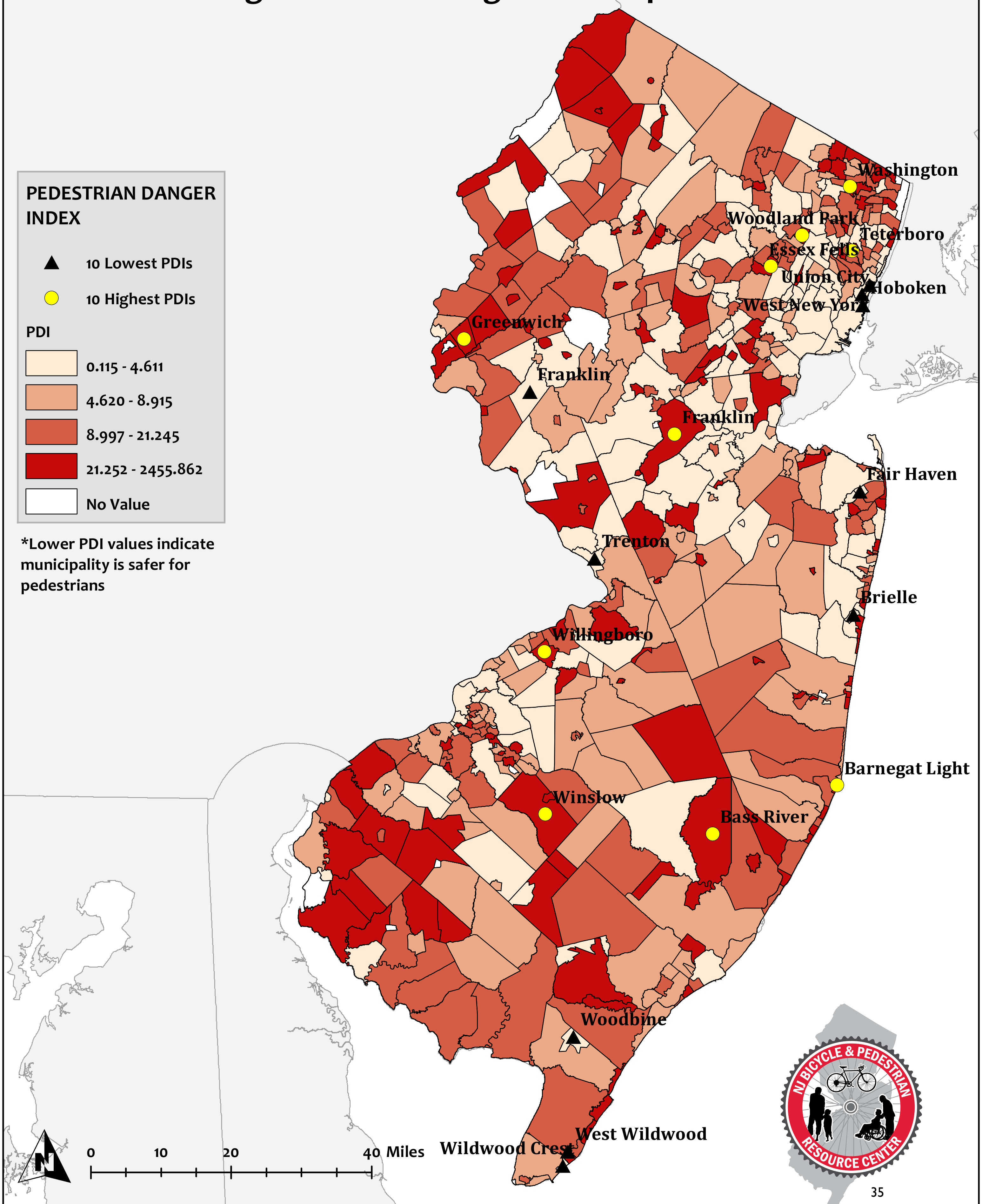
Sources: Plan4Safety, New Jersey Geographic Information Network, US Census Bureau/American Community Survey

Pedestrian Danger Index: Using Employment Density to Measure Pedestrian Exposure to All Crash Types



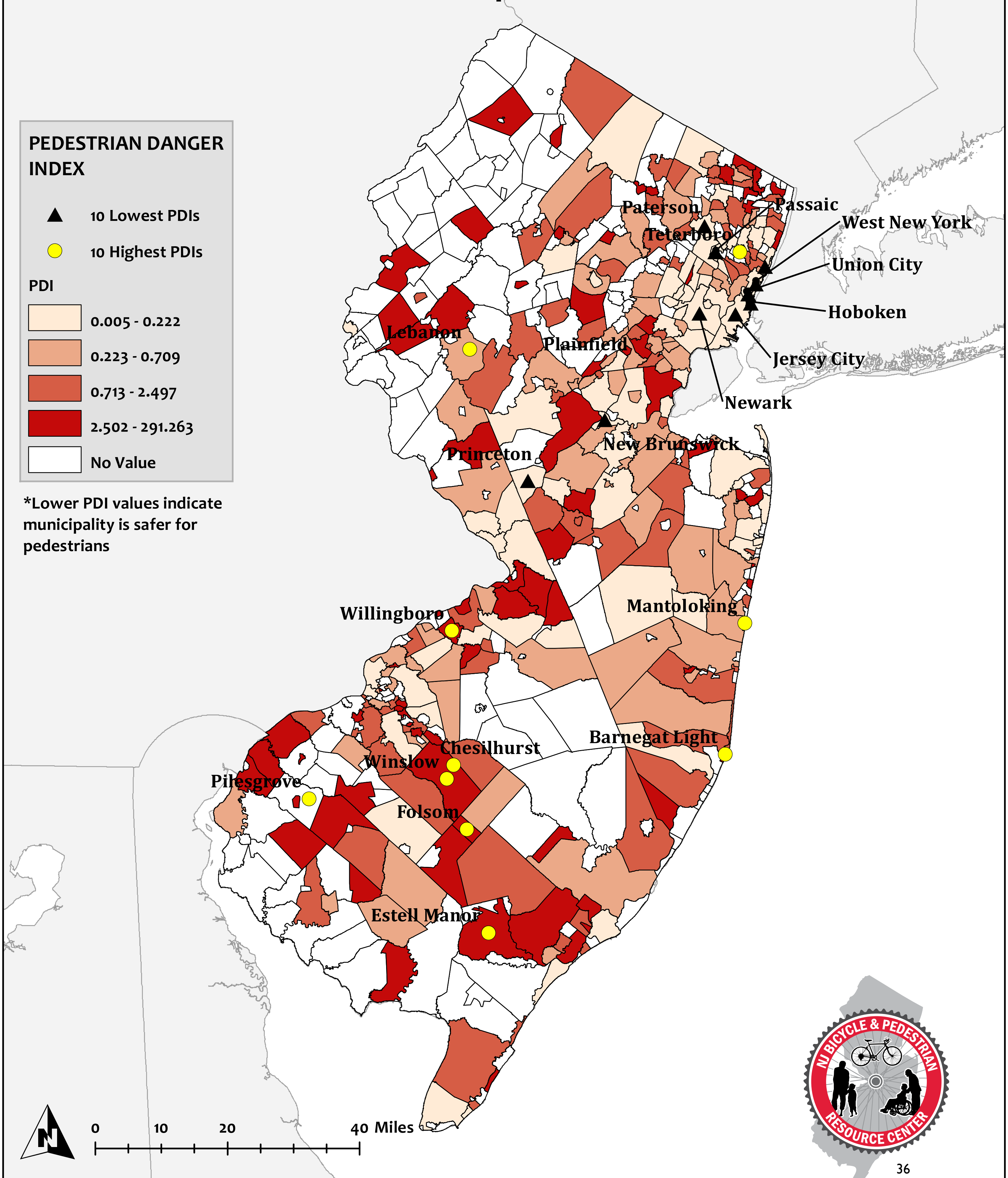
Sources: Plan4Safety, New Jersey Geographic Information Network, US Census Bureau/American Community Survey

Pedestrian Danger Index: Average of All Exposure Measures



Sources: Plan4Safety, New Jersey Geographic Information Network, US Census Bureau/American Community Survey

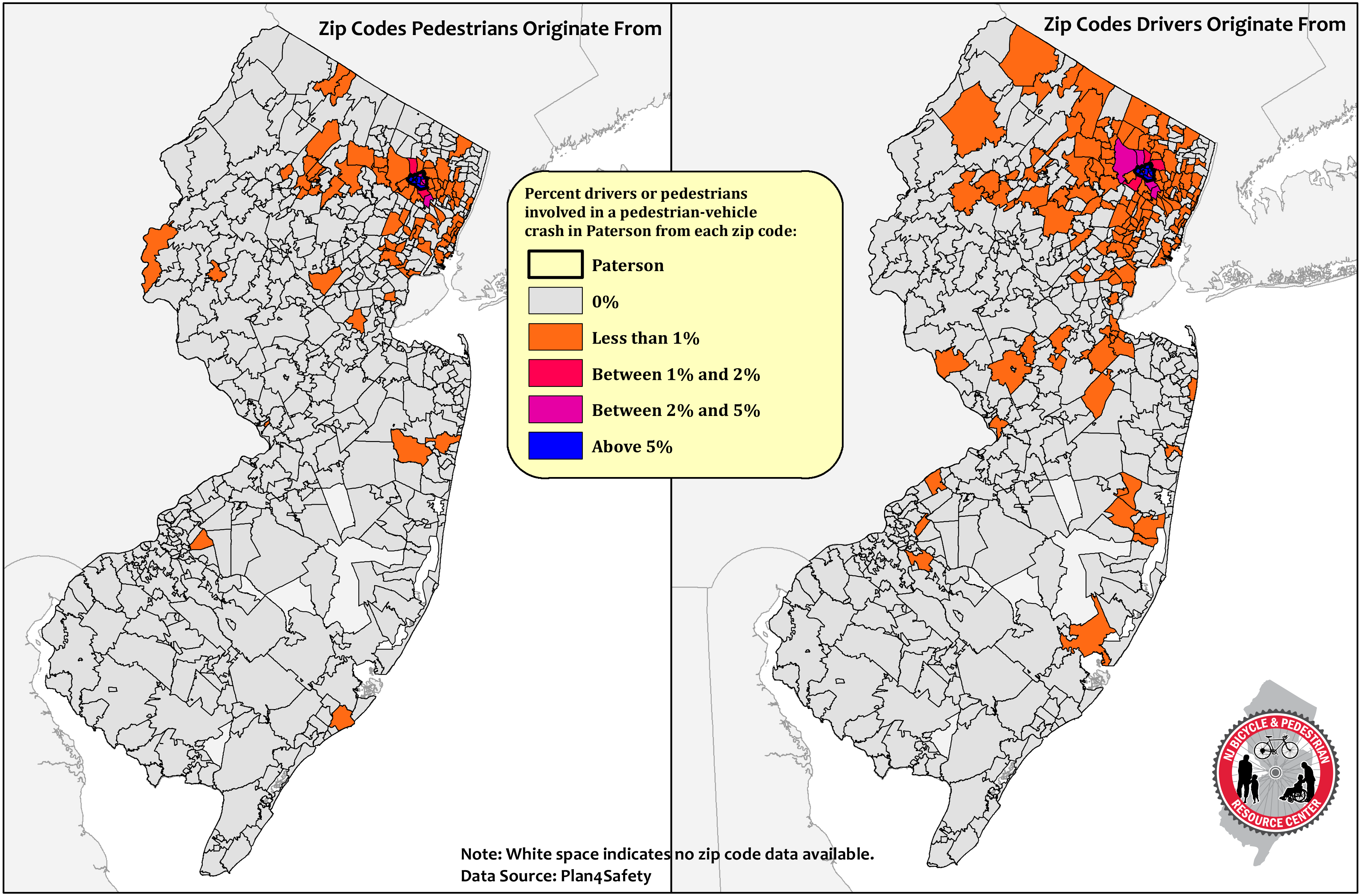
Pedestrian Danger Index: Using Number of Workers Walking to Work to Measure Pedestrian Exposure to Fatal Crashes



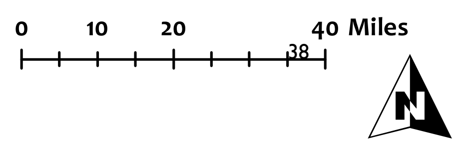
Sources: Plan4Safety, New Jersey Geographic Information Network, US Census Bureau/American Community Survey

Appendix B: Residential Origin-Destination Maps

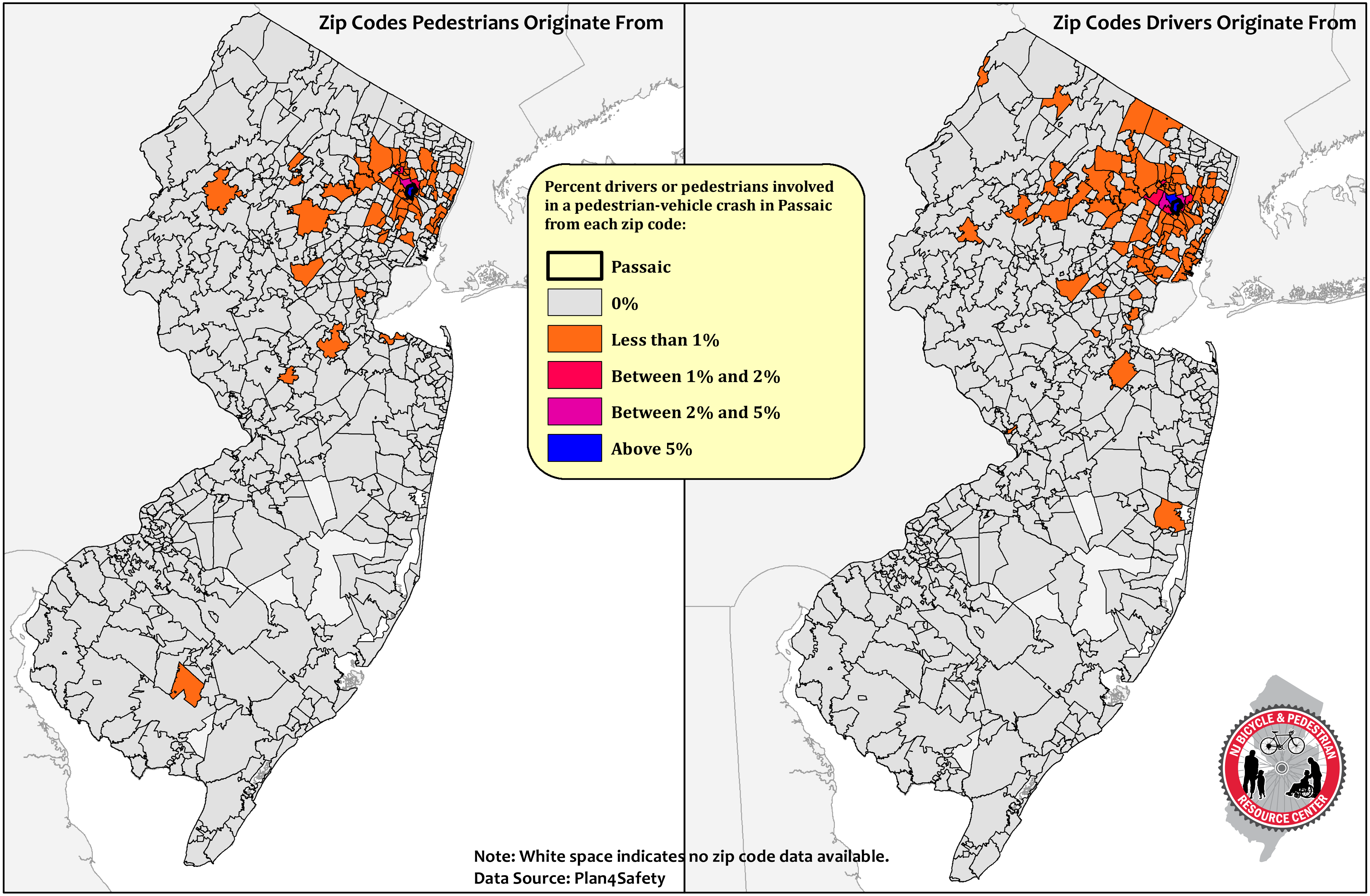
Pedestrian-Vehicle Crashes in Paterson: Zip codes of pedestrians and drivers involved in crashes



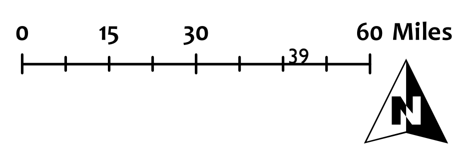
WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From Paterson	From New Jersey, Outside of Paterson	Out-of-State	Total Percent Outside Paterson
Drivers	62%	31%	7%	38%
Pedestrians	85%	13%	2%	15%



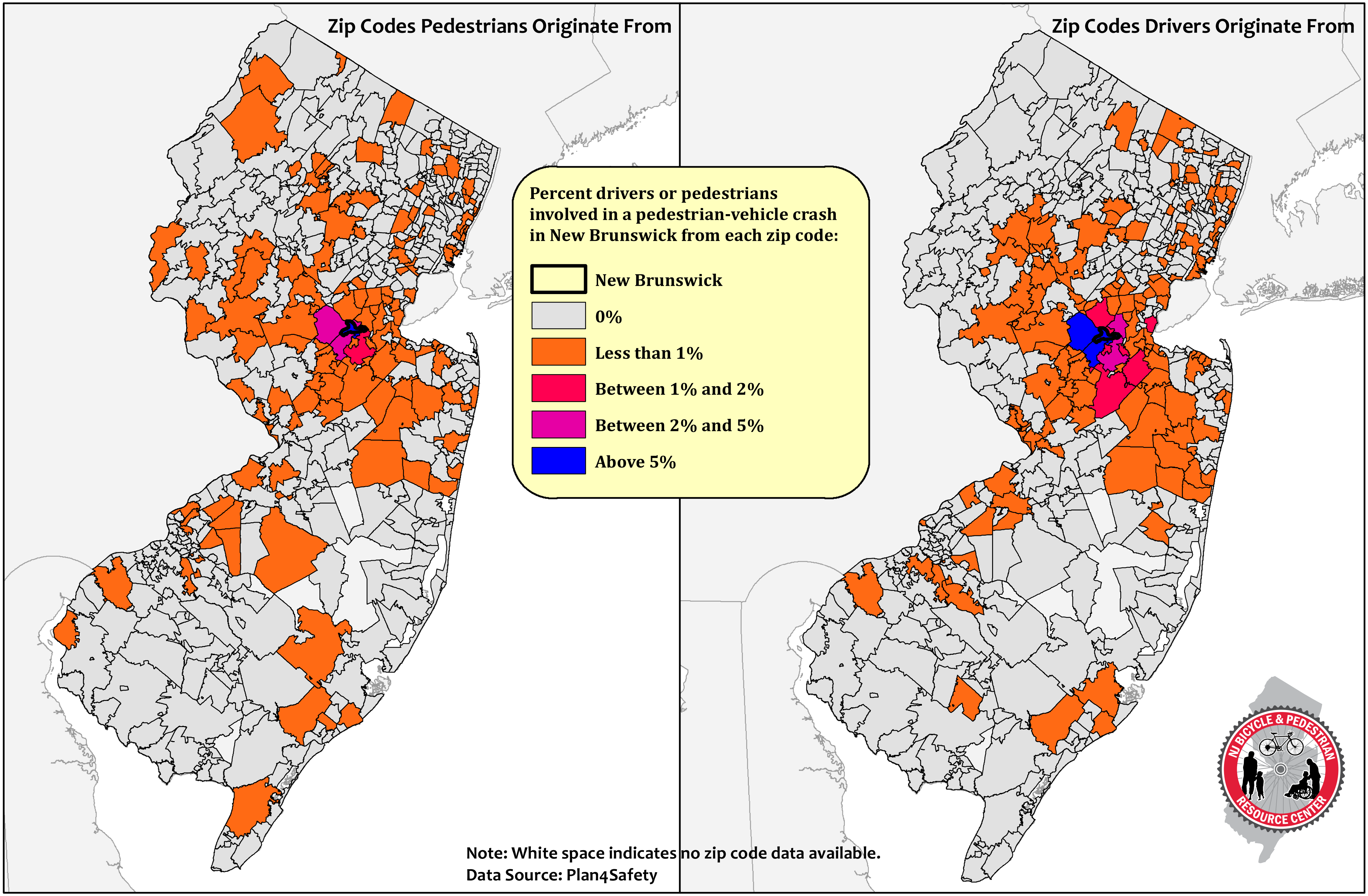
Pedestrian-Vehicle Crashes in Passaic: Zip codes of pedestrians and drivers involved in crashes



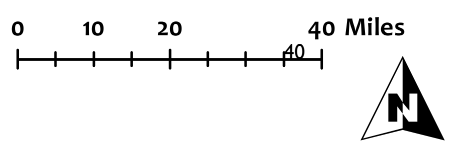
WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From Passaic	From New Jersey, Outside of Passaic	Out-of-State	Total Percent Outside Passaic
Drivers	49%	45%	5%	51%
Pedestrians	79%	18%	3%	21%



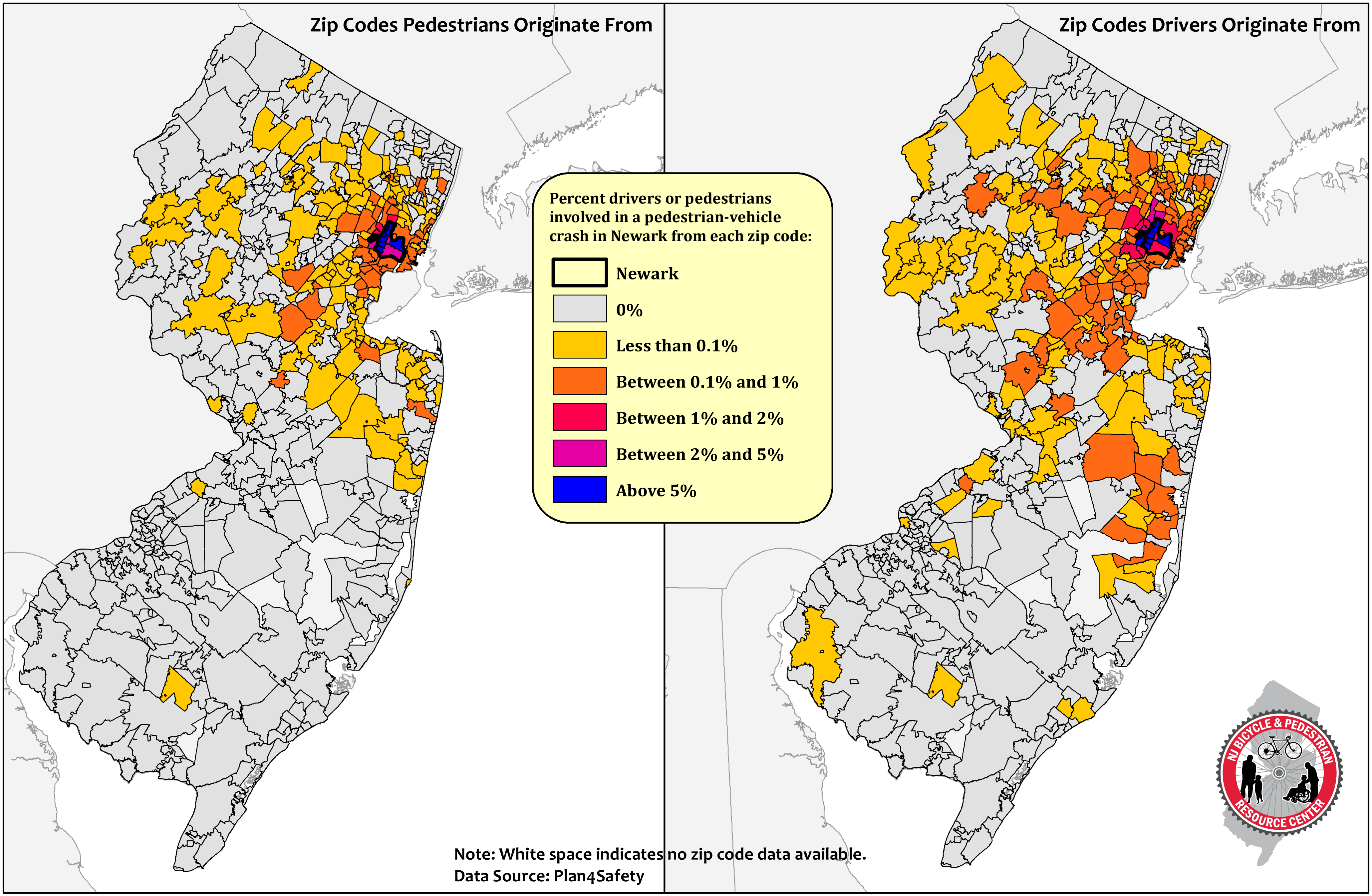
Pedestrian-Vehicle Crashes in New Brunswick: Zip codes of pedestrians and drivers involved in crashes



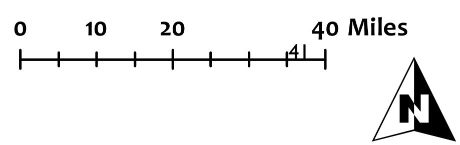
WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From New Brunswick	From New Jersey, Outside of New Brunswick	Out-of-State	Total Percent Outside New Brunswick
Drivers	36%	58%	6%	64%
Pedestrians	62%	34%	5%	39%



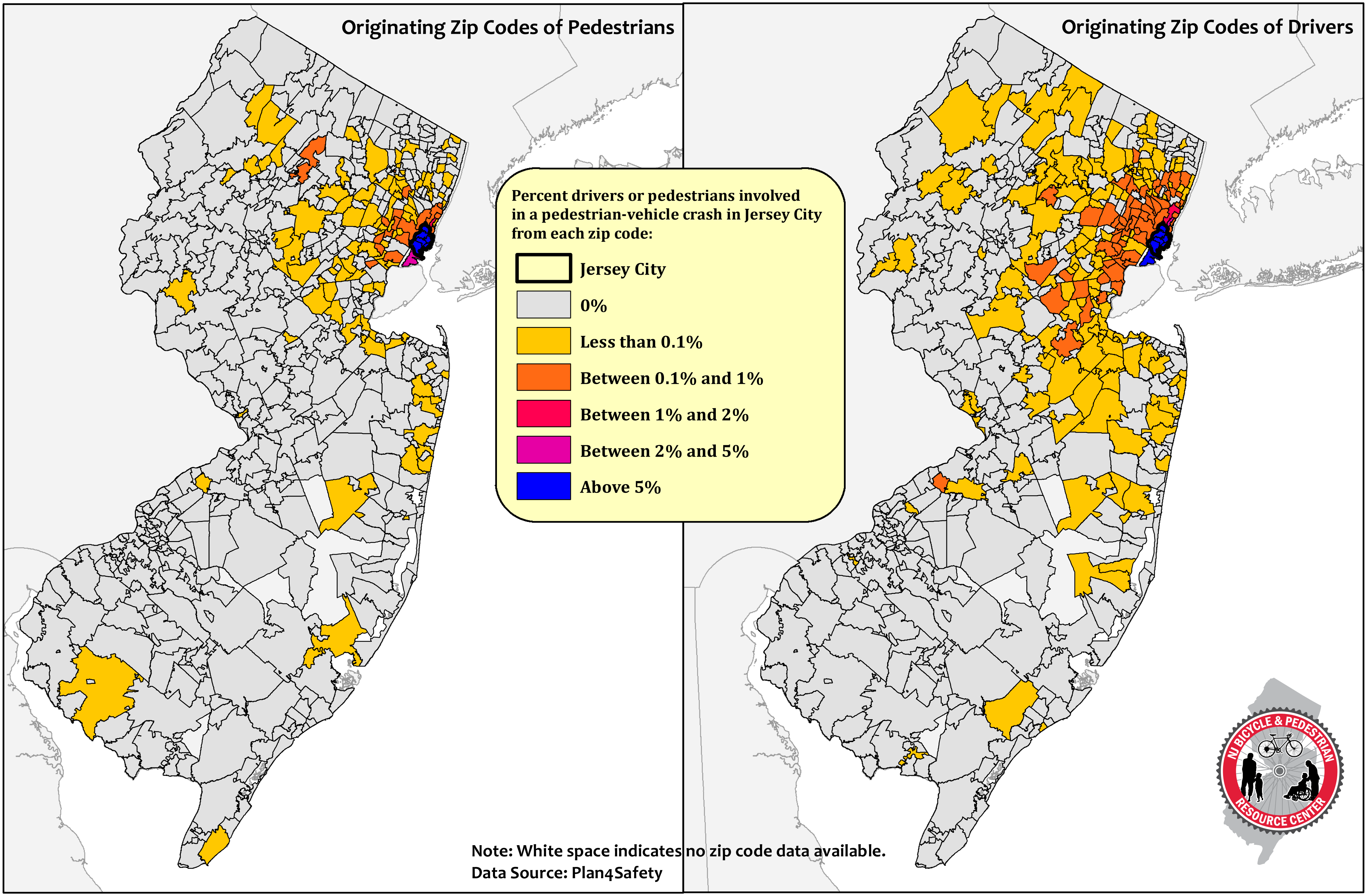
Pedestrian-Vehicle Crashes in Newark: Zip codes of pedestrians and drivers involved in crashes



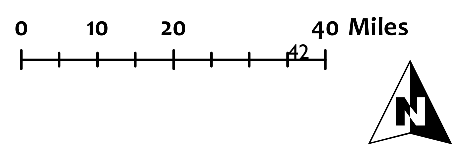
WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From Newark	From New Jersey, Outside of Newark	Out-of-State	Total Percent Outside Newark
Drivers	46%	45%	9%	54%
Pedestrians	75%	23%	3%	26%



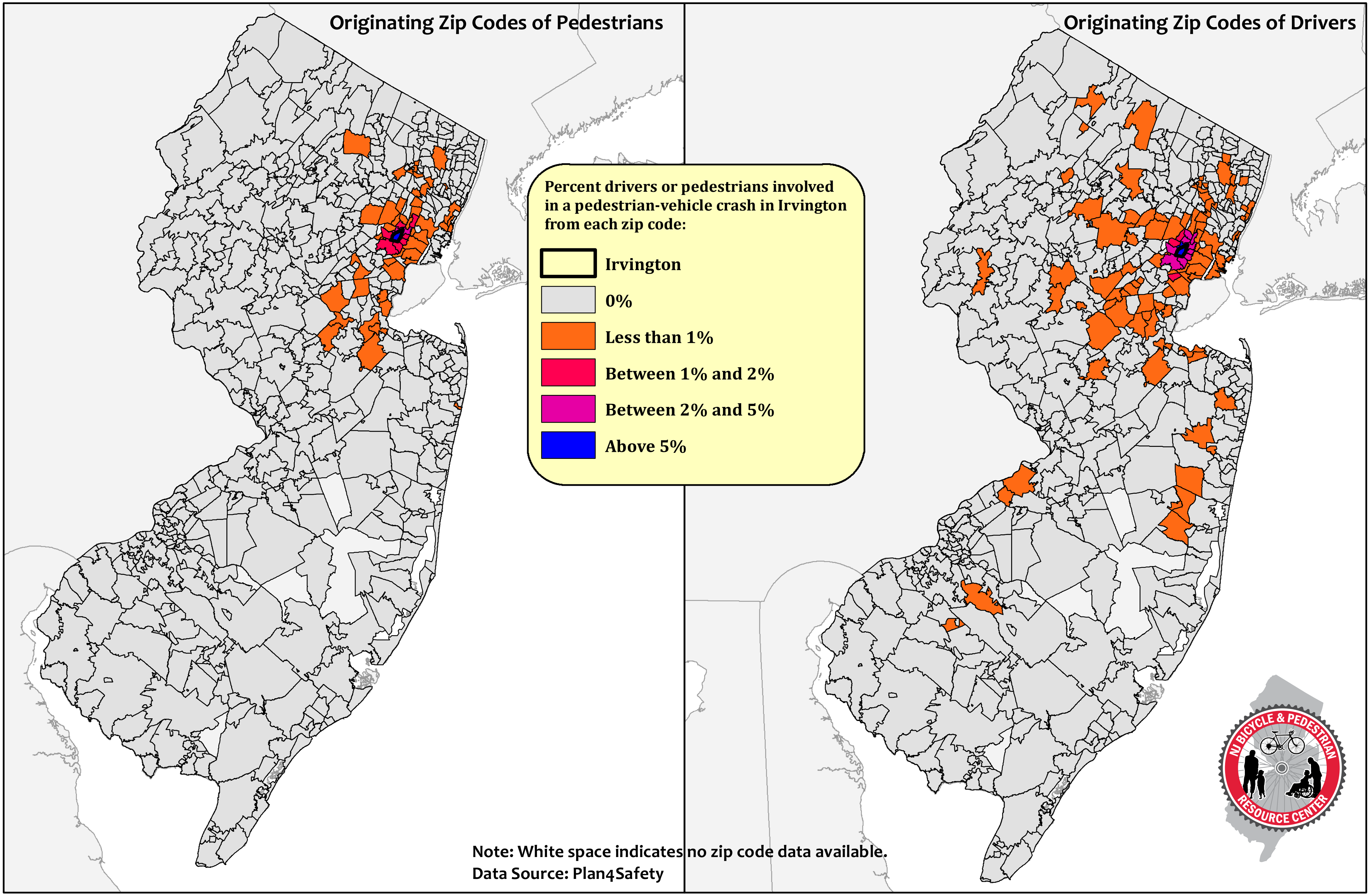
Pedestrian-Vehicle Crashes in Jersey City: Zip codes of pedestrians and drivers involved in crashes



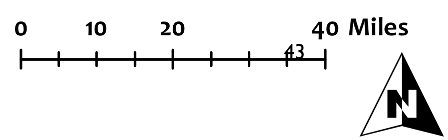
WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From Jersey City	**From New Jersey, Outside of Jersey City**	**Out-of-State**	**Total Percent Outside Jersey City**
Drivers	52%	27%	8%	35%
Pedestrians	82%	14%	3%	18%



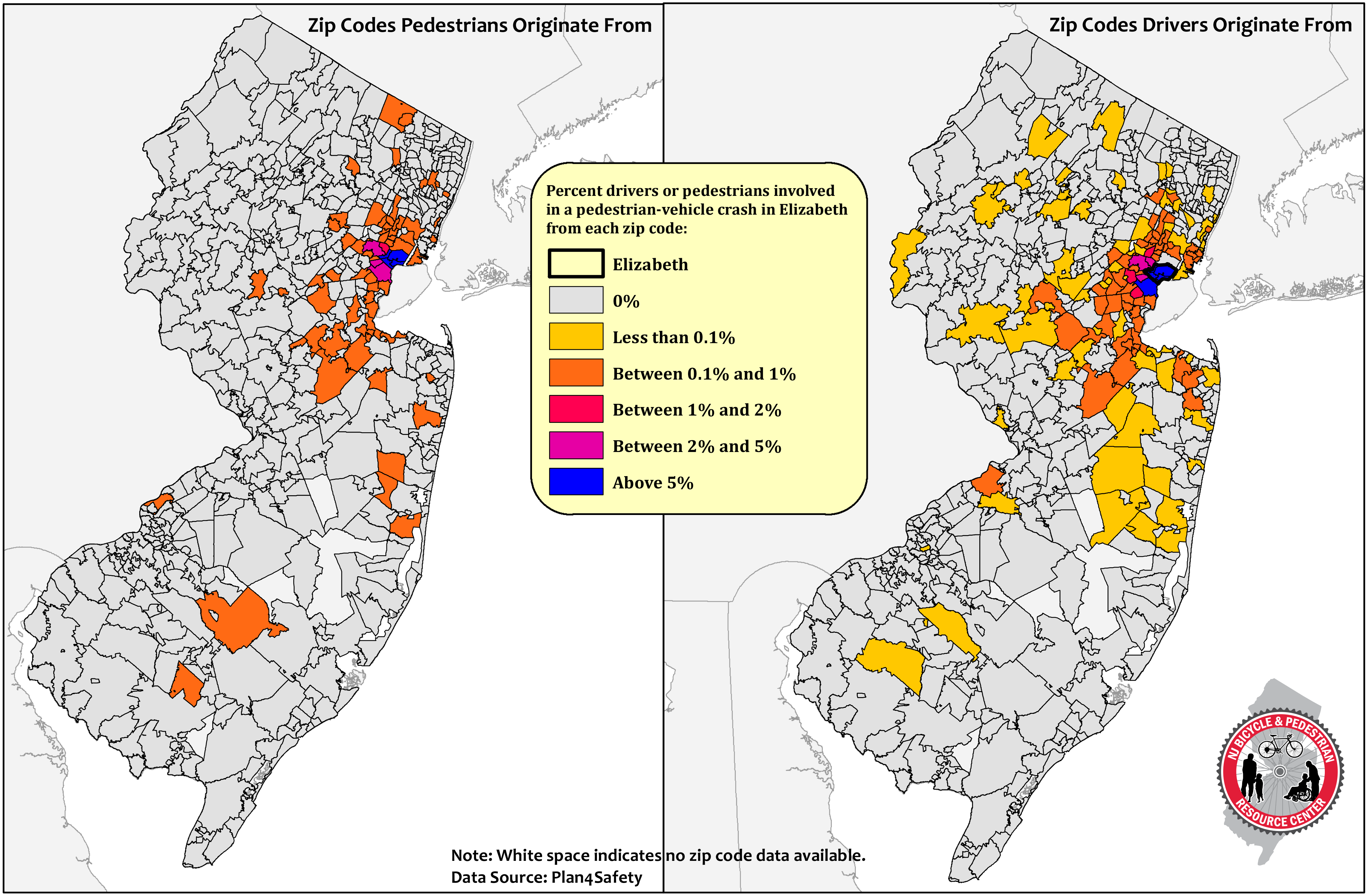
Pedestrian-Vehicle Crashes in Irvington: Zip codes of pedestrians and drivers involved in crashes



WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From Irvington	**From New Jersey, Outside of Irvington**	**Out-of-State**	**Total Percent Outside Irvington**
Drivers	36%	58%	6%	64%
Pedestrians	74%	32%	1%	34%

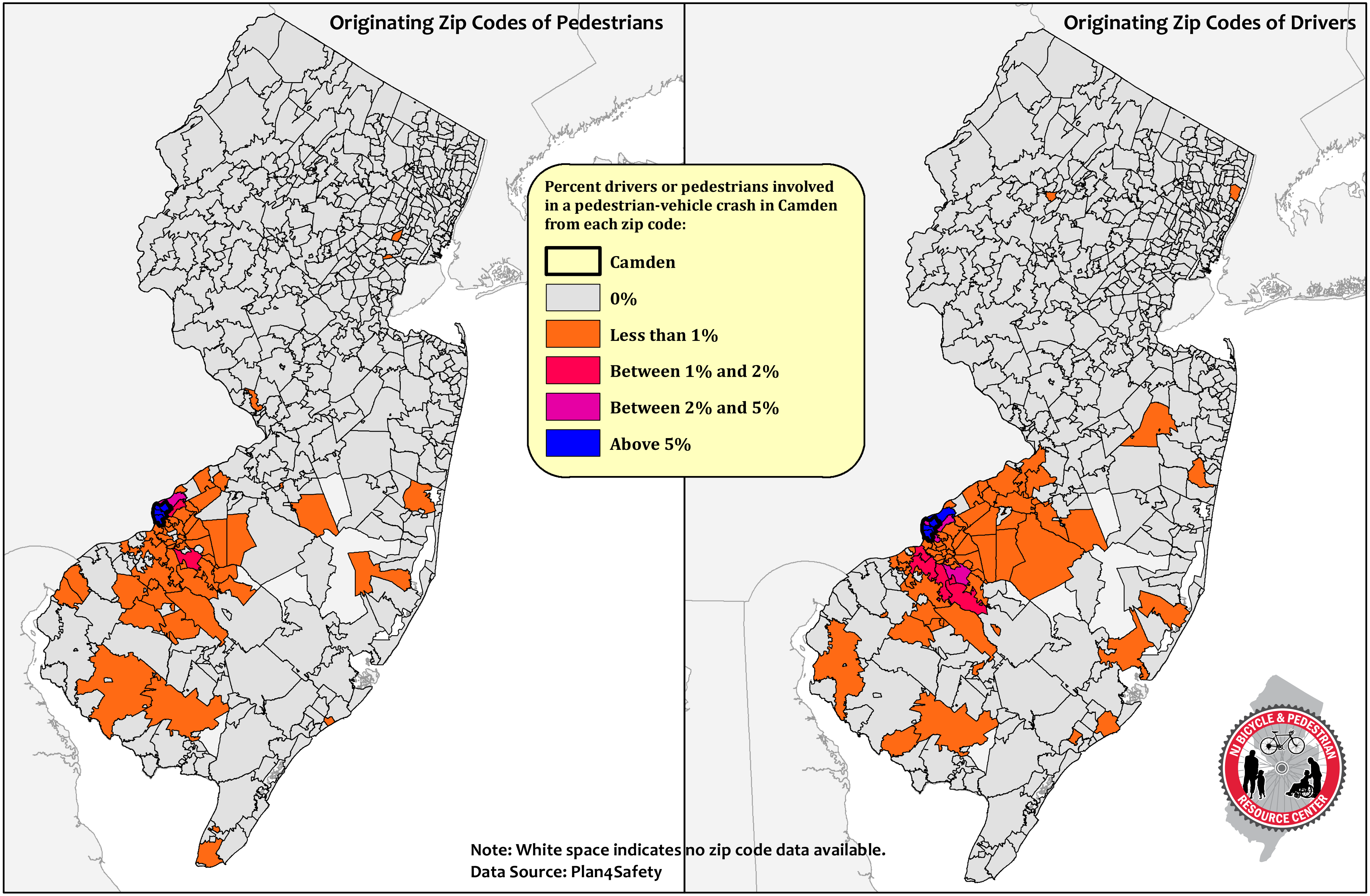


Pedestrian-Vehicle Crashes in Elizabeth: Zip codes of pedestrians and drivers involved in crashes



WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From Elizabeth	From New Jersey, Outside of Elizabeth	Out-of-State	Total Percent Outside Elizabeth
Drivers	53%	40%	7%	47%
Pedestrians	70%	25%	5%	30%

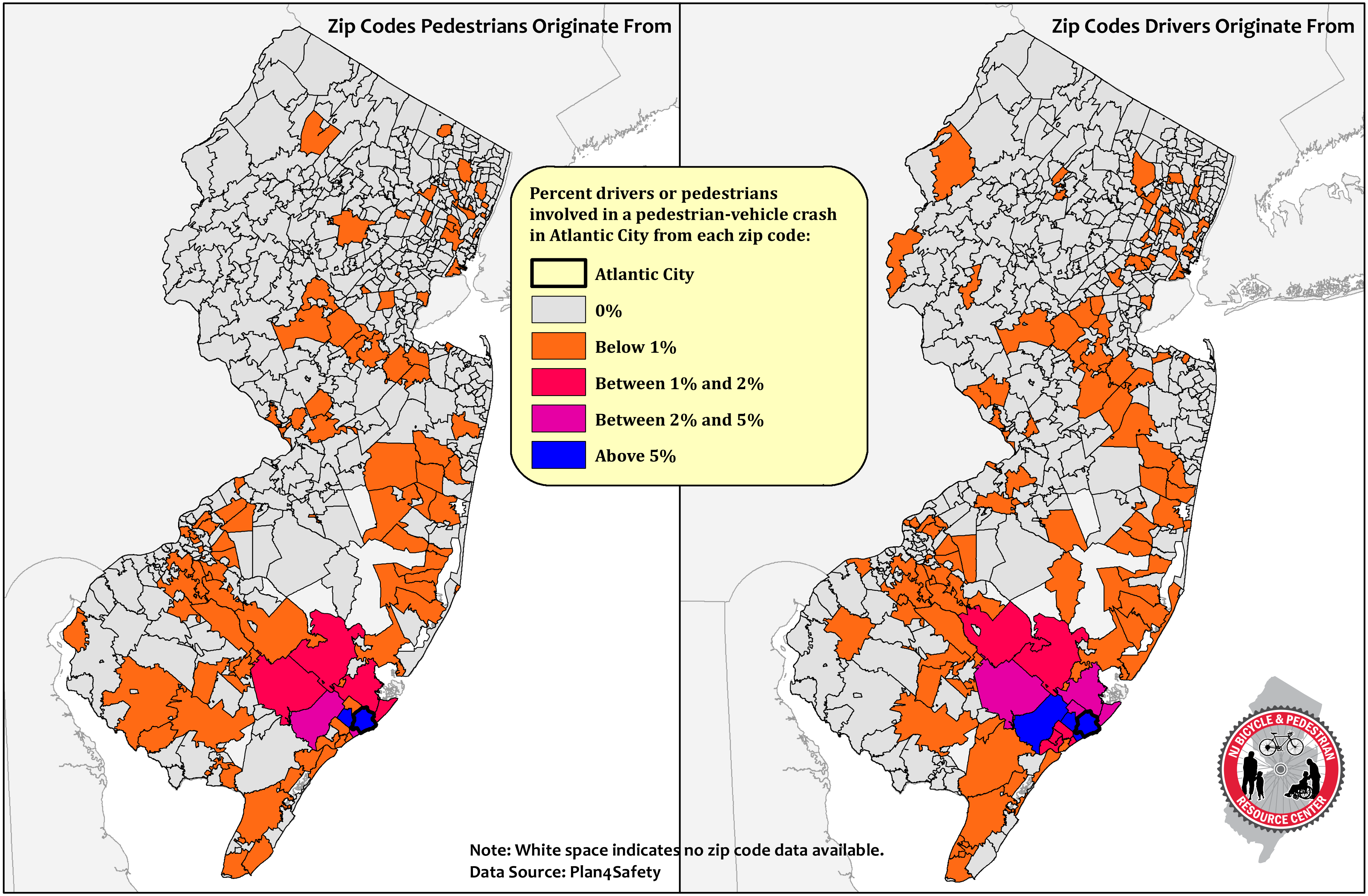
Pedestrian-Vehicle Crashes in Camden: Zip codes of pedestrians and drivers involved in crashes



WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From Camden	From New Jersey, Outside of Camden	Out-of-State	Total Percent Outside Camden
Drivers	57%	36%	7%	44%
Pedestrians	81%	16%	3%	19%

0 10 20 40 Miles

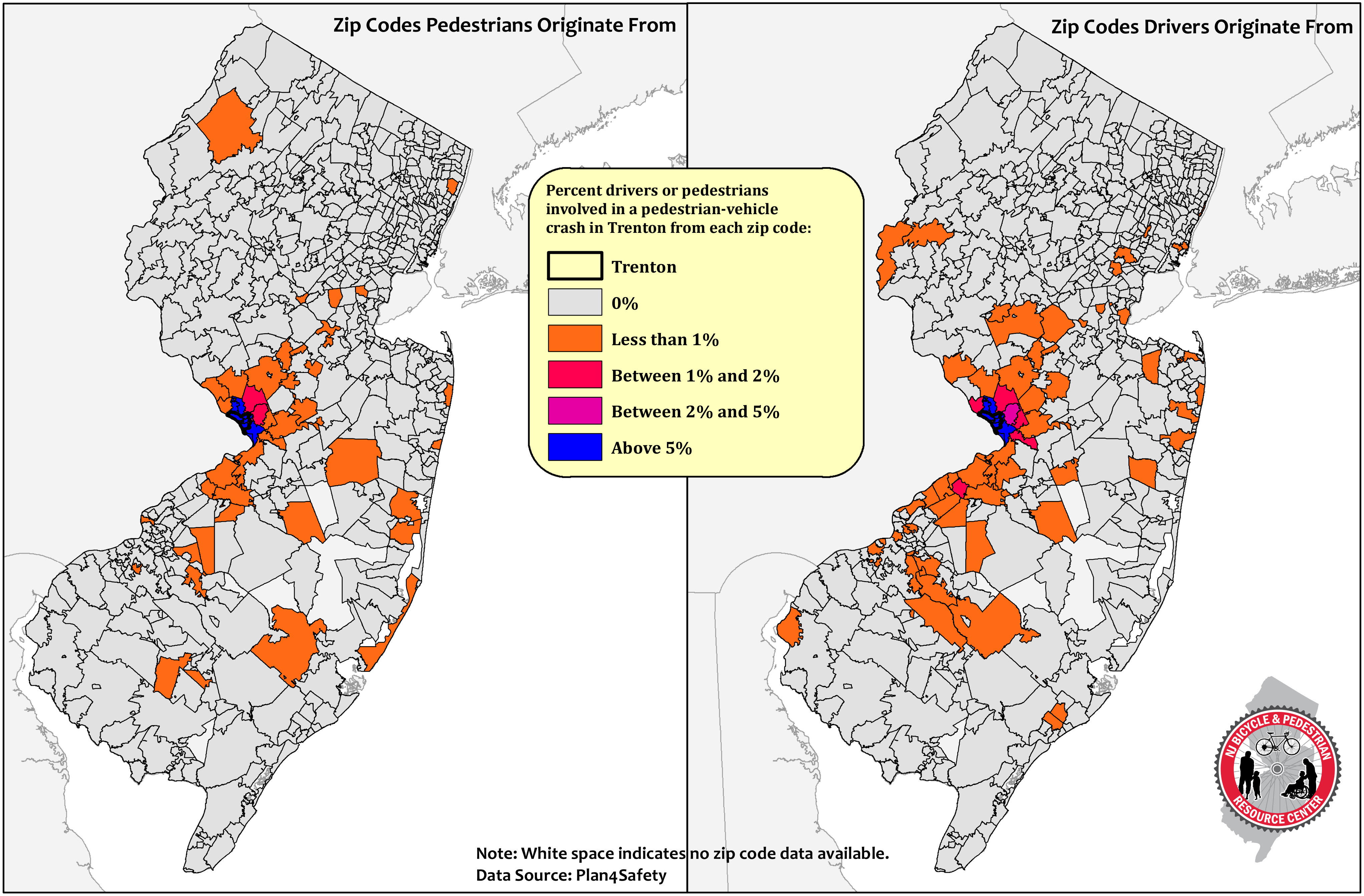
Pedestrian-Vehicle Crashes in Atlantic City: Zip codes of pedestrians and drivers involved in crashes



WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From Atlantic City	From New Jersey, Outside of Atlantic City	Out-of-State	Total Percent Outside Atlantic City
Drivers	29%	58%	14%	72%
Pedestrians	53%	30%	17%	47%

0 10 20 40 Miles

Pedestrian-Vehicle Crashes in Trenton: Zip codes of pedestrians and drivers involved in crashes



WHERE ARE PEDESTRIANS AND DRIVERS INVOLVED IN CRASHES FROM?				
	From Trenton	From New Jersey, Outside of Trenton	Out-of-State	Total Percent Outside Trenton
Drivers	69%	28%	9%	37%
Pedestrians	84%	14%	3%	17%