North Carolina
Bicycle Crash Facts
2008 - 2012

Prepared for

The North Carolina Department of Transportation
Division of Bicycle and Pedestrian Transportation

Prepared by

The University of North Carolina
Highway Safety Research Center

Libby Thomas
Daniel Levitt

March 2014

Contents

Figures

Tables

General NC Bicycle Crash Trends

Over the past ten years, more than 9,700 bicycle-motor vehicle crashes were reported by North Carolina agencies. Apart from an unusual drop in 2009, the ten-year trend in crashes has been gradually upward (Figure 1).[1] Even with the unusual drop in 2009, the most recent five years have averaged 4 percent more crashes compared to the first five years (2003-2008). The increase has occurred in urban areas, while rural areas have actually experienced a slight decrease in the average number.

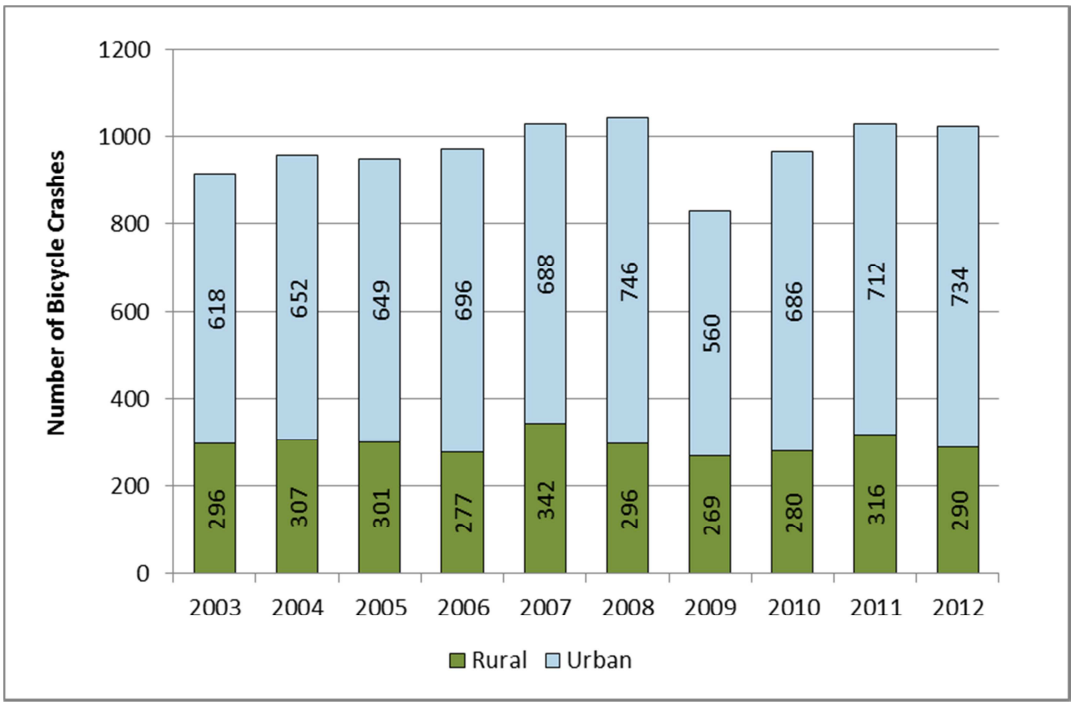

Figure 1. NC bicycle crash trends, 2003 - 2012 (counts of crashes).

A total of 4,889 collisions were reported from 2008 to 2012. Of these, 111 crashes involved bicyclist fatalities (Figure 2). Two others involved motorist fatalities. Another 46 collisions each year(on average) resulted in bicyclists receiving disabling type injuries (Figure 2). An ambulance was requested for two-thirds of the collisions (data not shown).

[1] Statewide, annual Vehicle Miles Traveled increased by 1.1% from 101.5 billion in 2008, to 102.6 billion in 2009, so a reduction in exposure to auto traffic would not seem to explain the drop in bicycle crashes in 2009. There is no information on the amount of bicycling but little reason to think that there was a significant decrease from 2007 to 2009. Weather trends could have affected bicycling amounts. There were some concerns by State officials that 2009 crash reporting was not complete for some jurisdictions.

Figure 2. NC Fatal and Disabling Injury Bicyclist Crashes.

Apart from fluctuations in the number of crashes that is due to chance, the amount and locations of riding by bicyclists would have the greatest impacts on bicycle collision frequencies. Unfortunately, data are unavailable on the amounts of riding by bicyclists in NC. Variation in year-to-year collisions may be subject to influences such as weather trends and other factors that may affect the amount of riding. Another primary risk factor is motor vehicle traffic volumes. A combination of amounts and locations of riding, motorized travel, reporting changes, and other factors including safety changes, may explain some of the variations in reported bicycle collisions.

Various factors may be associated with the risk of more severe injuries, as well as with the occurrence of crashes. For example, from 2008 to 2012, a majority of bicycle crashes with motor vehicles occurred within the counties in the Piedmont region (where most people in the State live), with fewer occurring in the Coastal Plain and Mountain regions of the State. (Numerical crash trends by region are shown in Figure 3.)

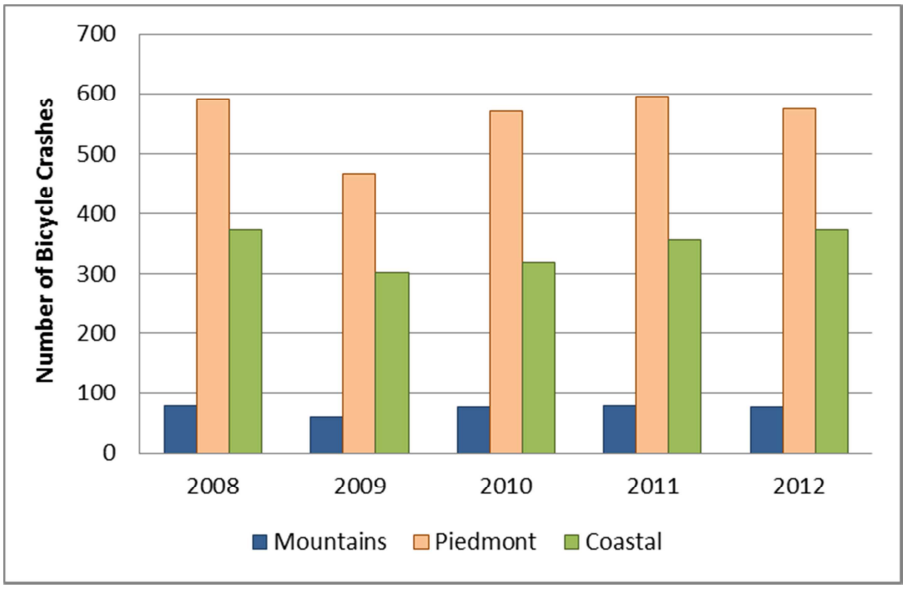

Figure 3. Five-year bicycle crash trends by region of NC.

However, compared to the 57 percent of total bicycle crashes, only 44 percent of fatal bicycle crashes occurred in the Piedmont region (Figure 4). A larger share of fatal crashes (51 percent) compared to total crashes (35 percent) occurred within the Coastal Plain counties. Part of the explanation is in the extent of urban and rural crashes among the different regions. Rural areas tend to have higher speed roads, few roadways with lighting, and may not have shoulders or other space to ride separately from higher speed motorized traffic. Other factors, as already mentioned, likely also played a role in these trends.

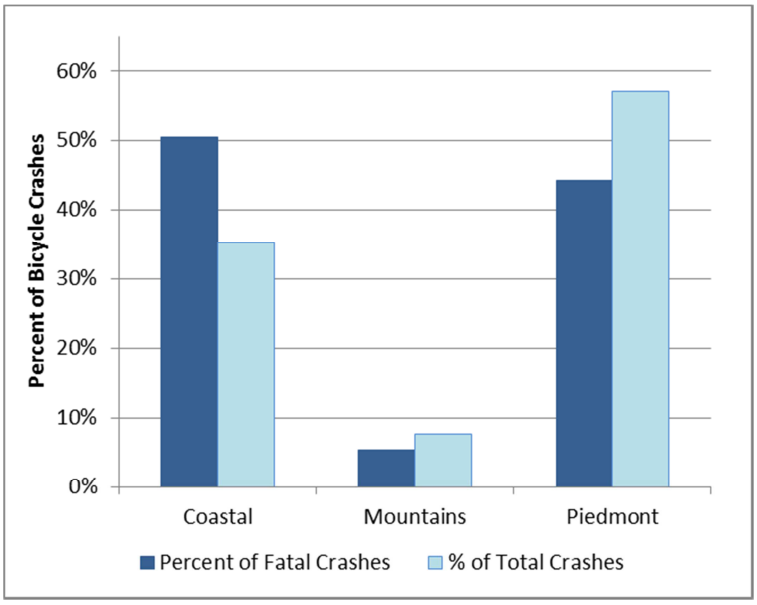

Figure 4. Fatal and Total Crash proportions by Region of the State, 2008-2012.

The remainder of this report summarizes the location types, person, time, environmental and roadway characteristics for the 4,894 bicycle-motor vehicle crashes reported statewide for 2008-2012. This information, and similar information developed for local communities, can aid in the targeting of resources and countermeasures to address bicycle safety problems. See the companion *North Carolina Bicycle Crash Types* summary report for descriptions of the types of crashes, or events leading up to the crashes. Crash type information can also aid in identifying and developing appropriate treatments.

Note that the data in these reports, and in the query tool on the website (http://www.pedbikeinfo.org/pbcat_nc/_ped.cfm), may include non-injury collisions with low property damage, which were not officially "reportable" but had, nevertheless, been reported to the State Division of Motor Vehicles. Non-reportable collisions may not be included in other State crash statistics; however, since under-reporting of bicycle crashes is common,[2] any "non-reportable" bicycle collisions were retained. As with all crash data, the reported numbers in the crash characteristics that follow undoubtedly reflect some error, including errors or gaps in reporting, as well as errors made during data entry and coding but every effort has been made to ensure the highest quality possible.[3]

[2] Injury to Pedestrians and Bicyclists: An analysis based on hospital emergency department data. Report No. FHWA-RD-99-078. US Department of Transportation, Federal Highway Administration.

[3] Note that each crash report was reviewed for the data described in these reports and available on the NCDOT-DBPT website for query. This review offered the opportunity to correct some coding errors.

Where NC Bicycle Crashes Occur

As illustrated in figure 1, more than two-thirds (70 percent) of NC bicycle collisions over the past five years occurred within municipal (urban) limits, with about 30 percent in rural (unincorporated) areas of the State. Although designated as rural (outside of municipal limits), some of these locations could also be built up.

In fact, when looking at development density, as coded by the reporting enforcement agencies, the trend is more heavily weighted toward bicycle crashes occurring in at least somewhat developed areas. Eighty-four percent of all crashes occurred in areas that are at least 30 percent developed, and only 16 percent occurred in areas that are less than 30 percent developed (Table 1).

The areas that are between 30 and 70 percent developed may represent areas in transition, where infrastructure is often still more rural in nature and traffic speeds remain high, while traffic volumes and roadway complexity may be changing.

Table 1. NC bicycle-motor vehicle crashes by area development extent.

Development extent	2008	2009	2010	2011	2012	Total
Rural (<30% Developed)	158	144	171	166	148	787
	15.2[1]	17.4	17.7	16.1	14.5	16.1 [2]
Mixed (30% To 70% Developed)	161	131	111	143	130	676
	15.5	15.8	11.5	13.9	12.7	13.8
Urban (>70% Developed)	723	554	684	719	746	3,426
	69.4	66.8	70.8	69.9	72.9	70
	1,042	829	966	1,028	1,024	4,889 [4]
Total	21.3 [3]	17	19.8	21	20.9	

In this and each of the following tables, the formatting is as follows:
The top row for each variable level is the count of crashes with that characteristic. The numbers (with decimals) in the bottom rows for each category are percentages.

[1] = Row percent of column total
[2] = Row total percent of total
[3] = Column total percent of total
[4] = Total includes total minus any cases with missing or unknown data

Somewhat reflecting the information on development extent, 42 percent of crashes occurred in areas indicated as residential in nature, a similar 42 percent in commercial districts, about 13 percent in areas designated as farms, woods, or pasture, and very small percentages occurred in institutional (about 3 percent) and industrial areas (0.3 percent) (Table 2).

Table 2. NC bicycle-motor vehicle crashes by crash area by development type.

Development type	2008	2009	2010	2011	2012	Total
Commercial	465	317	384	429	435	2,030
	44.6	38.2	39.8	41.7	42.5	41.5
Farms, Woods, Pastures	120	126	130	138	108	622
	11.5	15.2	13.5	13.4	10.5	12.7
Industrial	1	2	4	4	3	14
	0.1	0.2	0.4	0.4	0.3	0.3
Institutional	30	21	35	25	39	150
	2.9	2.5	3.6	2.4	3.8	3.1
Residential	426	363	413	432	439	2,073
	40.9	43.8	42.8	42.0	42.9	42.4
Total	1,042	829	966	1,028	1,024	4,889
	21.3	17.0	19.8	21.0	20.9	

Using 2010 (middle year) population estimates as a rate denominator, the average yearly bicycle crash rate averages for 2008 - 2012 were as follows:

- about 1 per 10,000 residents for the State as a whole,
- 1.4 per 10,000 across all urban areas, and
- 0.6 per 10,000 residents in unincorporated (rural) areas of the State.[4]

Table 3 shows the 12 counties with the highest numbers of bicycle-motor vehicle crashes. (Twelve counties were included in the list this period due to a virtual three-way tie for the tenth position.) The 12 highest crash counties accounted for 60 percent of NC's reported bicycle-motor vehicle crashes.

Most of the counties are highly urbanized. Thus, the high crash counties are, largely, reflections of where people live in the State. However, bicycle crash rates based on population vary from 0.6 to a high of 2.8 among these top ten. The county-level rates may reflect differences in amounts of cycling in the counties in addition to other exposure and risk factors. About half of the counties experienced increases or little change in bicycle crash rates compared to the 2006-2010 five-year period, and about half observed decreases.

[4] Population estimates from North Carolina Office of State Budget and Management website, from: http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/countygrowth_2010.html

Table 3. Twelve Counties with highest numbers of bicycle-motor vehicle crashes, 2008-2012.[5]

County	5-yr. Crash Count	% of NC total (4,894)	Avg. 1-yr. Count	July 2010 Estimate [6]	Avg. yearly crash rate / 10,000 residents	Prior Avg yrly rate (2006-2010)
Wake	651	13.3	130.2	906,908	1.4	1.4
Mecklenburg	580	11.9	116.0	923,390	1.3	1.4
Guilford	344	7	68.8	489,677	1.4	1.3
New Hanover	329	6.7	65.8	203,299	3.2	2.8
Durham	215	4.4	43.0	271,297	1.6	1.5
Cumberland	184	3.8	36.8	327,445	1.1	1.3
Orange	128	2.6	25.6	134,302	1.9	1.8
Buncombe	126	2.6	25.2	238,886	1.1	1.1
Forsyth	106	2.2	21.2	351,381	0.6	0.6
Gaston	93	1.9	18.6	206,139	0.9	1.0
Robeson	92	1.9	18.4	134,422	1.4	1.7
Pitt	91	1.9	18.2	168,787	1.1	1.1
Subtotal top 12 Counties	2,939	60.1%	587.8	4,355,933	1.3	1.4

Reflecting the high crash counties, a majority of the cities with the highest crash frequencies are the most populous cities in their respective counties (Table 4). These 11 cities accounted for about 45 percent of the State's reported bicycle crashes. The crash rates based on population averaged 1.7 per 10,000 residents, which is higher than the average of 1.4 per 10,000 for municipalities across the entire State. The numbers may reflect differences in amounts of bicycling as well as other risk factors. Lower rates of auto ownership, factors such as presence of colleges and universities, or a strong cycling culture, may foster more widespread use of bicycles in some communities than in others. However, there are no data available to directly compare crash rates based on miles of bicycling, numbers of cycling trips, or other better measures of exposure.

[5] Crashes for all counties may be obtained through the crash data query tool. Population-based rates are shown in the 6th column.

[6] Population estimates from North Carolina Office of State Budget and Management website, from: http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/countygrowth_2010.html

Table 4. Eleven NC cities with the highest numbers of bicycle-motor vehicle collisions, 2008-2012.

Municipality (previous rank)	5-yr Crash Count	Percent of NC total (4894)	Average 1-year count	July 2010 population estimate[7]	Avg. yearly crash rate / 10,000 residents	Prior Avg. yearly rate (2006-2010)
Charlotte	520	10.6	104	734,052	1.4	1.6
Raleigh	430	8.8	86	406,056	2.1	2.2
Wilmington	239	4.9	47.8	106,760	4.5	3.6
Greensboro	239	4.9	47.8	269,696	1.8	1.4
Durham	194	4	38.8	229,014	1.7	1.6
Fayetteville	138	2.8	27.6	208,615	1.3	1.7
Asheville	95	1.9	19	83,558	2.3	2.4
Cary	95	1.9	19	136,278	1.4	1.2
Rocky Mount	94	1.9	18.8	57,693	3.3	3.7
Chapel Hill	79	1.6	15.8	57,428	2.8	2.6
Winston-Salem	78	1.6	15.6	229,986	0.7	0.6
Top 11 totals	2201	45.0%	440.2	2,519,136	1.7	

The crash characteristics described in the remainder of this summary are also undoubtedly related to exposure, or when and where people ride, who is riding (age, attitudes, skill and physical condition) as well as how often and how far, and how much traffic is encountered. In addition, as already mentioned, crash numbers can also change over time due to chance, to changes in crash reporting procedures, and because of safety countermeasures including engineering, educational, and enforcement initiatives.

[7] Population estimates from North Carolina Office of State Budget and Management website, from: http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/revmuniestbycounty_2010.html

Bicyclist Characteristics

Bicyclist Age

With year-to-year variability in the number and proportions of crashes by different ages, clear trends are difficult to decipher (Table 5). (Note that age group intervals vary to show more detail for the younger age groups.) Over the entire five-year time period, the largest proportion of crashes involved the 41 to 50 year group (17 percent), followed by the 16 to 20 year group, (14 percent), and the 11 to 15 year age group (13 percent). Crash involvement by children, especially the 11 to 15 year age group, seems to be on a general downward trend. Crashes among those ages 16 to 20 have fluctuated, while those among 21 to 25 year-olds have risen over this period. (Analyses by population could normalize trends according to age groups, but do not provide information about the amounts of riding among the different ages.)

Table 5. Age group of bicyclists involved in NC crashes.

Bicyclist age	2008	2009	2010	2011	2012	Total
0-5	13	5	6	15	8	47
	1.3	0.6	0.6	1.5	0.8	1.0
6-10	71	64	73	62	64	334
	6.9	7.7	7.6	6.1	6.4	6.9
11-15	154	108	112	125	114	613
	15	13.1	11.7	12.4	11.4	12.7
16-20	143	115	120	150	134	662
	13.9	13.9	12.6	14.9	13.4	13.7
21-25	92	104	116	100	138	550
	8.9	12.6	12.1	9.9	13.8	11.4
26-30	81	67	68	72	86	374
	7.9	8.1	7.1	7.1	8.6	7.8
31-40	120	77	127	110	98	532
	11.7	9.3	13.3	10.9	9.8	11
41-50	179	157	160	163	155	814
	17.4	19	16.7	16.2	15.5	16.9
51-60	117	95	123	146	136	617
	11.4	11.5	12.9	14.5	13.6	12.8
61-70	50	26	42	46	55	219
	4.9	3.1	4.4	4.6	5.5	4.5
71+	10	8	9	20	10	57
	1	1	0.9	2	1	1.2
Total	1,030	826	956	1,009	998	4,816
	21.4	17.1	19.8	20.9	20.7	

Combining age categories into larger ranges gives a picture of the overall crash involvement by children, young adults, middle-aged adults, and older adults (Figure 5). Children up to age 16, on average, accounted for about 21 percent of bicycle-motor vehicle crash-involvement over this time period. Teens and young adults between the ages of 16 to 29 accounted for 31 percent; adults from 30 to 59 years account for 41 percent, and older adults 61 and up, for 7 percent.

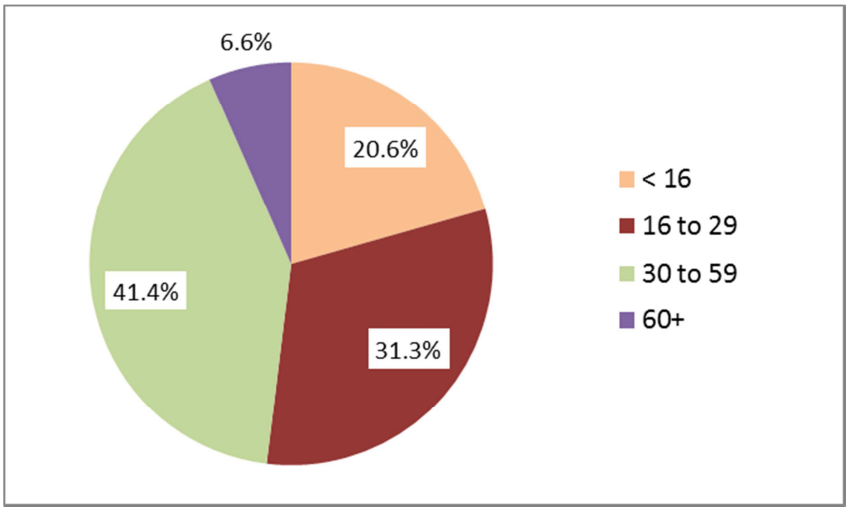

Figure 5. Percentage of NC bicycle crashes by bicyclist age range, 2008-2012.

Bicyclist Injury

Table 6 shows the data for all five years for crashes where the injury severity was reported. As shown in Table 6, bicycle crashes tend to be more frequently severe, with 2.3 percent resulting in fatal injuries. This proportion compares with less than 1 percent (about 0.6 percent) of all reportable crashes resulting in fatalities for the same time period. An additional 7 percent of pedestrians suffered serious (A-type) injuries over the five years. This percentage seems to have decreased somewhat compared with the period 2006-2010.

Table 6. Five-year bicycle crash injury levels.*

Bicyclist Injury	2008	2009	2010	2011	2012	Total
K: Killed	29	14	20	21	27	111
	2.8	1.7	2.1	2.1	2.7	2.3
A: Disabling Injury	48	44	43	58	39	232
	4.7	5.4	4.6	5.9	3.9	4.9
B: Evident Injury	433	355	443	406	414	2,051
	42.5	43.6	47.2	41.1	41.9	43.2
C: Possible Injury	407	330	337	407	424	1,905
	40	40.5	35.9	41.2	42.9	40.1
O: No Injury	101	72	96	97	84	450
	9.9	8.8	10.2	9.8	8.5	9.5
Total	1,018	815	939	989	988	4,749
	21.4	17.2	19.8	20.8	20.8	

*Counts are of crashes with the most severe injury reported. Crashes with unknown injury severity are omitted.

Figure 6 shows the number of bicyclists by age group who received fatal or disabling type injuries, those with less severe injuries, and those reported to receive no injuries. (Note that less than 10 percent were reported to receive no injuries.

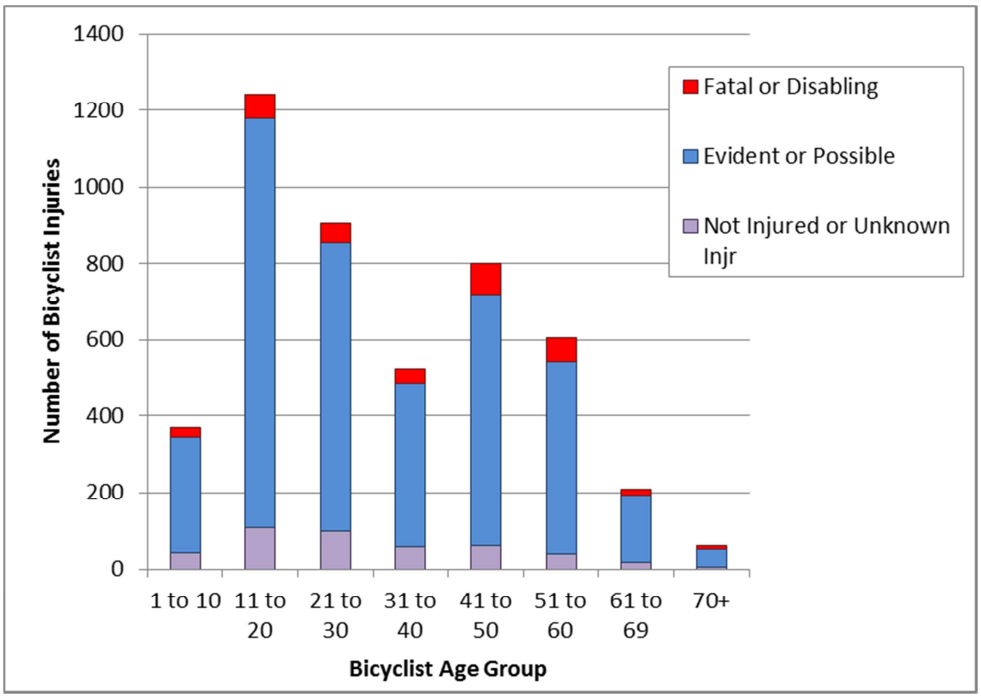

Figure 6. Injury severity by age group of bicyclist, 2008-2012.

Although the total numbers are smaller due to overall smaller involvement in crashes, older adults (especially ages 70 and older) have the highest rate of fatal of disabling injury for those in crashes (17 percent). The severe injury rate for adults ages 41 to 60 was about 10 percent, while that for younger ages was in the range of 5 - 7 percent killed or disabling injuries.

Bicyclist Gender

There is relatively little change year-to-year, with male bicyclists accounting for about 85 percent of the crash-involved bicyclists in NC (Table 7).

Table 7. Gender of bicyclists involved in crashes.

Gender	2008	2009	2010	2011	2012	Total
Female	157	116	130	155	163	721
	15.2	14.1	13.6	15.4	16.3	15
Male	878	708	831	850	835	4,092
	84.8	85.9	87.4	84.6	83.7	85
Total	1,035	824	951	1,005	998	4,813
	21.5	17.1	19.8	20.9	20.7	

Bicyclist Alcohol Use

According to the information available on police crash reports, alcohol use by bicyclists was detected or suspected for about 7 percent of all bicyclists involved in crashes. The numbers and proportion using alcohol appears to have declined since 2008, but it is also possible that there have been changes in reporting (Table 8). Suspected alcohol use does not confirm that alcohol was a factor in the crash.

Table 8. Bicyclist use of alcohol.

Bicyclist Alcohol Use suspected/detected	2008	2009	2010	2011	2012	Total
No	950	773	899	950	938	4,510
	91.4	93.2	93.8	93.6	93.9	93.2
Yes	89	56	59	65	61	330
	8.6	6.8	6.2	6.4	6.1	6.8
Total	1039	829	958	1,015	999	4,840
	21.5	17.1	19.8	21	20.6	

Driver Characteristics

On average, 14 percent of the collisions were reported to involve hit and run drivers, in itself of interest to enforcement and safety officials. Driver characteristics data are usually lacking for hit and run drivers unless they were subsequently identified; occasionally data are missing for other drivers as well. The numbers and percentages in the driver tables below reflect the first driver involved in the crash, and exclude other cases with missing data for the drivers.

Driver Age

On average, drivers younger than age 25 accounted for more than 21 percent of all collisions with bicyclists (Table 9). (Note that again age intervals vary). Drivers ages 25 to 29 accounted for another 11 percent. Among 10-year+ age groups, the largest proportion of crashes involved the 30 to 39 year age group of drivers (18 percent), closely followed by the 40 to 59 year old group (18 percent), with proportions decreasing for groups aged 50 and older.

Table 9. Ages of drivers involved in crashes with bicyclists.

Driver Age	2008	2009	2010	2011	2012	Total
< 19	68	50	58	60	78	314
	7.4	7.0	7.0	6.8	8.8	7.4
20-24	131	107	93	111	122	564
	14.3	15.0	11.2	12.6	13.8	13.3
25-29	103	73	90	97	97	460
	11.3	10.3	10.8	11.0	10.9	10.9
30-39	170	137	163	139	152	761
	18.6	19.2	19.5	15.8	17.1	18.0
40-49	169	110	141	171	149	740
	18.5	15.4	16.9	19.4	16.8	17.5
50-59	130	96	136	140	114	616
	14.2	13.5	16.3	15.9	12.9	14.6
60-69	77	71	76	94	97	415
	8.4	10.0	9.1	10.7	10.9	9.8
70+	65	68	77	70	78	358
	7.1	9.6	9.2	7.9	8.8	8.5
Total	913	712	834	882	887	4,228
	21.6	16.8	19.7	20.9	21.0	

Driver Gender

Male drivers accounted for 55 percent of the bicycle-motor vehicle crashes and female drivers 45 percent over this period (Table 10). Although there are slight year-to-year fluctuations, no obvious trend is apparent.

Table 10. Gender of drivers involved in collisions with bicyclists.

Driver Sex	2008	2009	2010	2011	2012	Total
Female	422	311	369	398	403	1,903
	46.3	43.7	44.1	45.1	45.3	45.0
Male	489	401	467	484	486	2,327
	53.7	56.3	55.9	54.9	54.7	55.0
Total	911	712	836	882	889	4,230
	21.5	16.8	19.8	20.9	21.0	

Driver Injury Severity

As would be expected, drivers are rarely seriously injured in crashes with bicyclists. Approximately 98 percent received no injuries from 2008-2012, with about 3 percent reported to receive possible or evident injuries (data not shown). There were two driver fatalities and two drivers who received disabling injuries as a result of crashes involving bicyclists. (Note that other motor vehicles could also have been involved in the collisions.)

Driver Alcohol Use

Alcohol use by drivers in crashes with bicyclists was detected or suspected in about 2 percent of crashes (Table 11). This indication does not confirm impairment or that alcohol was a factor in the crash.

Table 11. Suspected alcohol use among drivers involved in collisions with bicyclists.

Driver Alcohol	2008	2009	2010	2011	2012	Total
No	911	719	847	899	899	4,275
	97.6	98.1	98.6	98.1	98.6	98.2
Yes	22	14	12	17	13	78
	2.4	1.9	1.4	1.9	1.4	1.8
Total	933	733	859	916	912	4,353
	21.4	16.8	19.7	21.0	21.0	

Temporal and Environmental Factors

Month of Year

There is substantial difference in the proportions of bicycle-motor vehicle crashes as related to month of year. In contrast to pedestrian collisions, more bicycle collisions occur during the summer months (Figure 7). About 54 percent of collisions occurred during the five months from May to September. January and February typically observe the fewest bicycle-motor vehicle collisions.

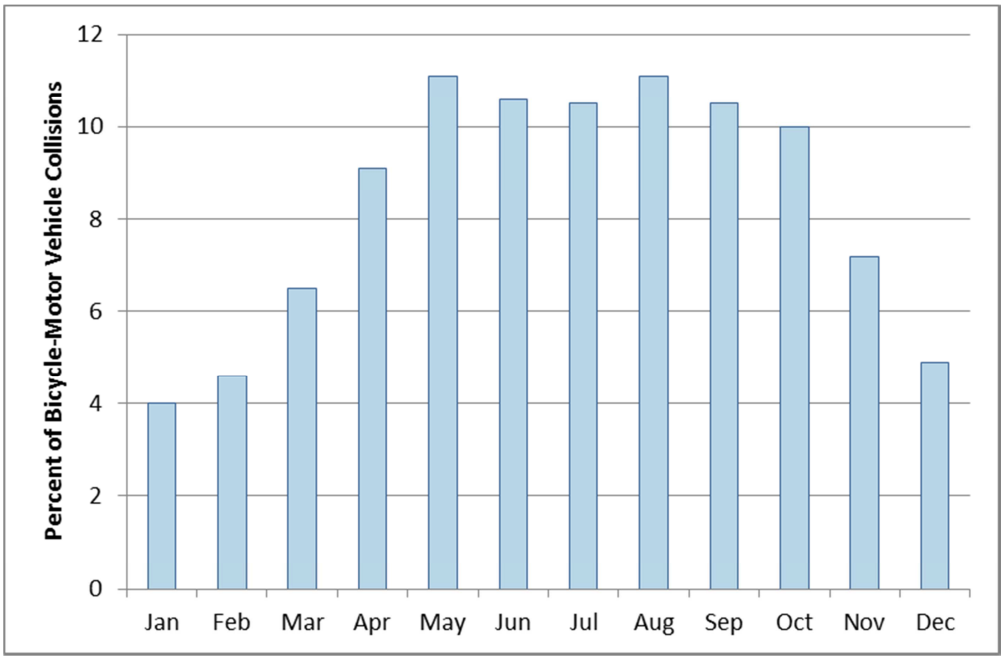

Figure 7. NC bicycle collisions by crash month, 2008-2012.

Day of Week and Time of Day

Friday is the highest crash day with 16 percent. Thirty-four percent of collisions occurred between the hours from 2 to 6 pm across all the days, followed by 25 percent between 6 and 10 pm (Figure 8). Note that these patterns may vary across the State and for urban and rural areas.

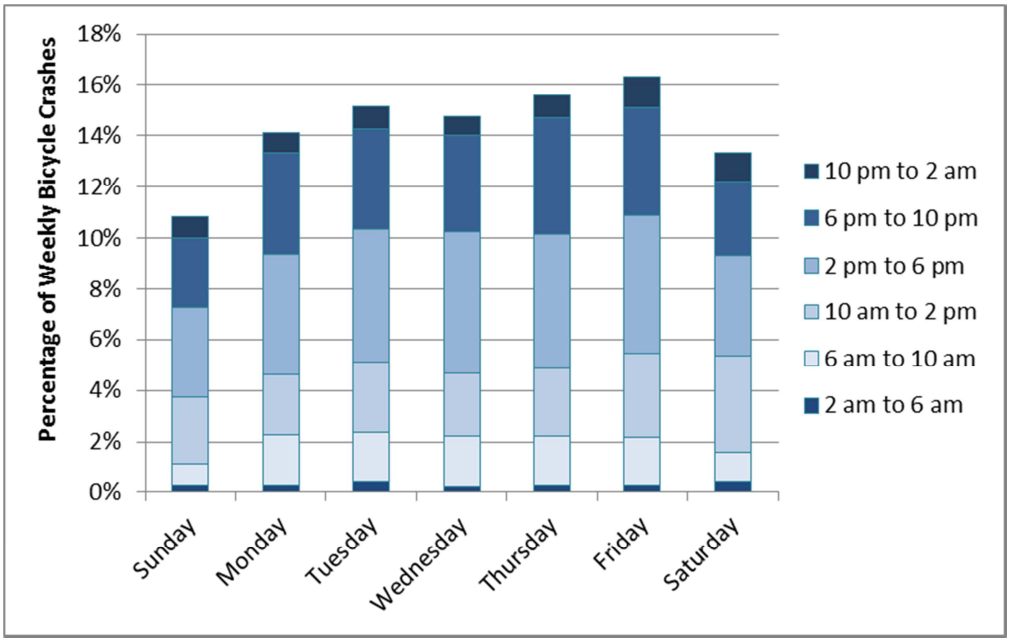

Figure 8. NC bicycle crashes by day of week and time of day, 2008-2012.

Light Conditions

About three-fourths (74 percent) of crashes happened during conditions of daylight Hours when most bicycle riding takes place (Figure 9). About 12 percent occurred during conditions of darkness, on lighted roadways (most likely in urban areas), with another 10 percent at night on unlighted road sections. Dawn and dusk conditions combined account for about 5% of crashes, with all other or unknown lighting conditions accounting for less than 1 percent. There is some variability across years in these percentages, but no distinct trends. The proportions of crashes occurring under lower light conditions may be over-represented based on the amount of riding that occurs under such conditions, but, again, there are no data to support this conjecture.

NC State law requires bicyclists operating at night to have an active, white front light visible from at least 300 feet, and a rear, red reflector that is visible from a distance of 200 feet. In addition, active rear, red lights are also available to supplement passive reflectors. Reflective clothing, leg and arm bands, helmets or other reflective gear may further help increase the conspicuity of cyclists riding at night. Locations where bicyclists frequently ride at night, such as trail crossings or commuting routes, may also be considered for enhanced street lighting.

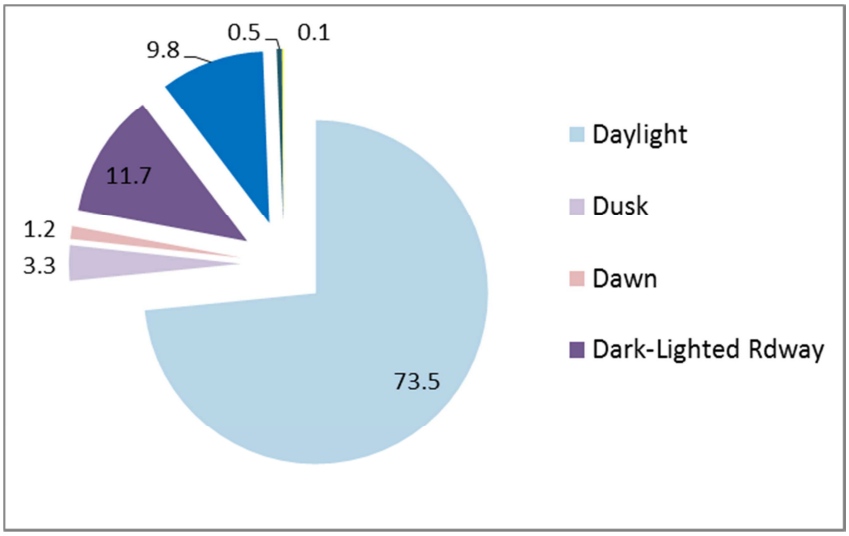

Figure 9. Bicycle collisions (percentage) by light condition, 2008 - 2012.

Weather

The vast majority – about 96 percent over the five years – of crashes occurred under clear (83 percent) or cloudy (12.5 percent) weather conditions (Figure 10). About 4 percent of bicycle-motor vehicle crashes took place under rainy conditions, with all other icy, snowy, foggy, and other conditions accounting for less than 1 percent of the total. Nevertheless, wet or slippery conditions affect bicyclists' ability to ride safely and efforts should be made to provide surfaces suitable for riding in wet weather. About 8 percent, or more than twice as many bicycle collisions occurred when surfaces were wet or had standing water, as occurred while it was actually raining (surfaces data not shown).

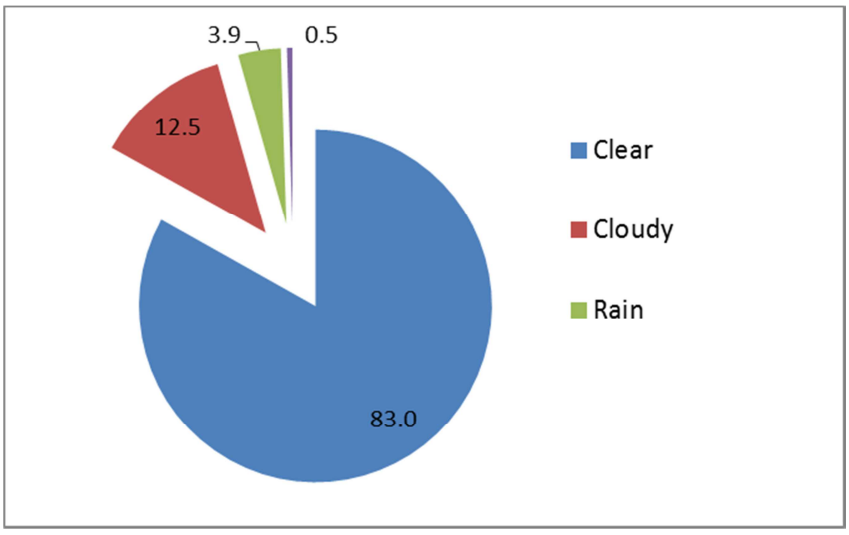

Figure 10. Bicycle crashes (percentage) by weather conditions, 2008-2012.

Roadway Characteristics

Roadway Type

On average, more than three-fourths of bicycle collisions that occurred on a roadway or road right-of-way, occurred on two-way, undivided roads. About 16 percent occurred on two-way roads divided by a median, with much smaller percentages on two-way roads divided with a positive median barrier (often freeways), or on one-way roads (Figure 11).

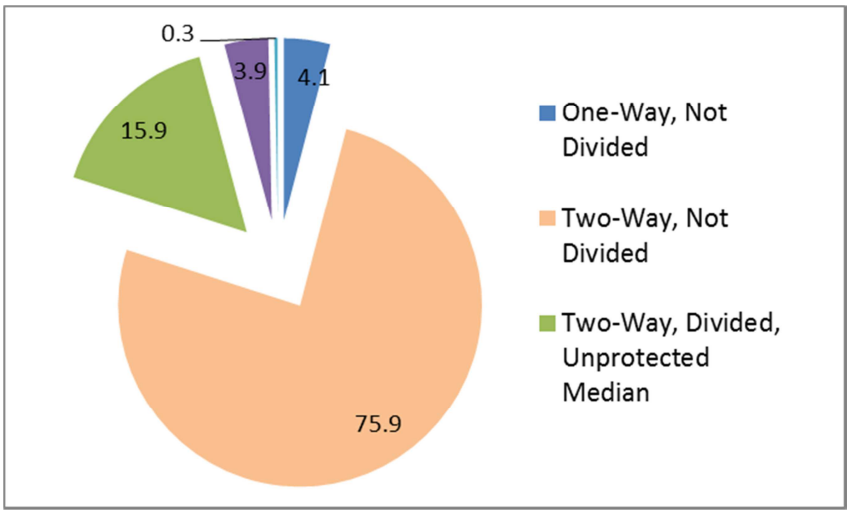

Figure 11. Percentage of on-road NC bicycle crashes by road configuration, 2008-2012.

Speed Limit

A majority (64 percent) of NC's bicycle-motor vehicle crashes (that occurred on roadways with posted limits) occurred on roads with speed limits of 35 mph or less. However, crashes on higher speed roads may be especially severe (Figure 12). Less than 1 percent of bicyclists struck on NC roads with speed limits of 35 mph and lower received fatal or disabling type injuries, but the proportions killed rose to 22 percent of those struck on 55 mph roads. In all, 82 percent of bicyclists who were killed in their crashes, were struck on roadways of 40 mph limits and higher, the majority (57) were on 50 – 55 mph roadways. Many of North Carolina's higher speed roadways lack separated space or facilities for bicyclists to ride. (Note that there is a lack of reliable information on actual travel speeds of the striking vehicles, but the speed limit of the roadway provides some information about the general travel speed.)

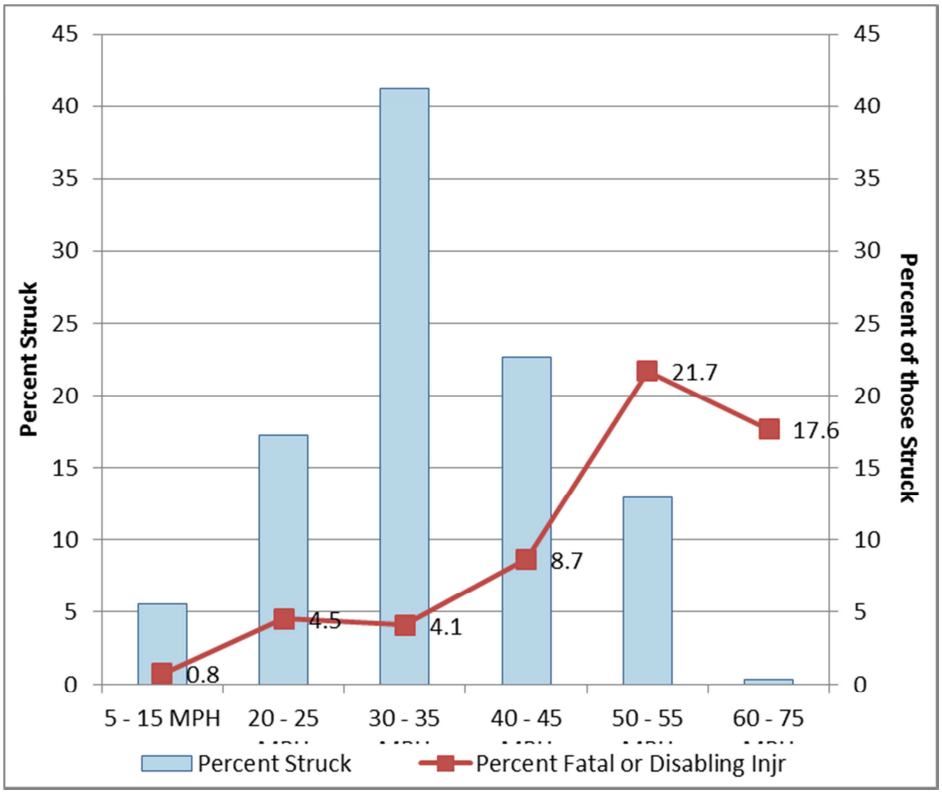

Figure 12. Roadway speed limits and NC bicycle crashes and severity, 2008-2012.

The red line and markers indicate the percentage of crashes on the different speed limit roads with fatal or disabling injuries.

Intersections and Traffic Control

According to data entered during crash typing, about half (49 percent) of all crashes occurred at or related to an intersection (including signalized commercial driveways). For crashes at intersection locations, the type of traffic control most often present was a stop sign (40 percent), followed by a traffic signal (33 percent) (Figure 13). About 18 percent of crashes at intersections were indicated to have no traffic control present. These locations could include main road junctions that have no control, with intersecting side streets that do, most often, have stop control.

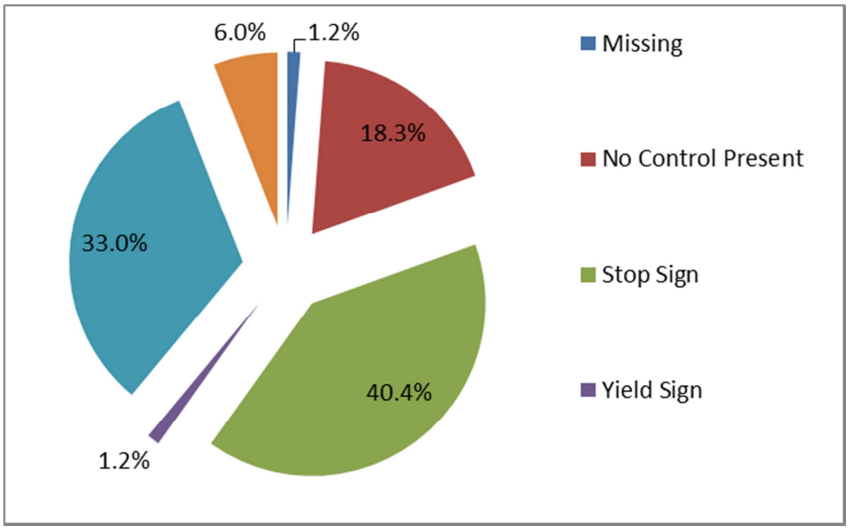

Figure 13. Type of Traffic Control Present and percent of Intersection and Intersection-related crashes only (n = 2,405) 2008-2012.

The crash factors discussed in this summary provide information useful for assessing problems and providing safe and accessible pedestrian facilities for local and State roads. Resources such as Pedestrian Road Safety Audit Guidelines and Prompt Lists (http://safety.fhwa.dot.gov/intersection/resources/fhwasa09027/resources/Pedestrian percent20Road percent20Safety percent20Audit percent20Guidelines.pdf) and PedSafe: Pedestrian Safety Guide and Countermeasure Selection System (http://www.pedbikesafe.org/PEDSAFE/) and others can provide additional assistance with diagnosing and identifying appropriate treatments for pedestrian safety issues.

For additional information on the crash types and other characteristics of bicycle-motor vehicle crashes occurring in the State over the same time period, see the *North Carolina Bicycle Crash Types* summary report.


THE UNIVERSITY OF NORTH CAROLINA
HIGHWAY SAFETY
RESEARCH CENTER