



U.S. Department  
of Transportation  
**National Highway  
Traffic Safety  
Administration**



---

DOT HS 811 090

February 2009

# **An Analysis of Speeding-Related Crashes: Definitions and the Effects of Road Environments**

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

|  |  |  |   |  |           |
|--|--|--|---|--|-----------|
| 1. Report No.<br>DOT HS 811 090  |  | 2. Government Accession No.                          |   | 3. Recipient's Catalog No.   |           |
| 4. Title and Subtitle<br><br><b>An Analysis of Speeding-Related Crashes:<br/>Definitions and the Effects of Road Environments</b>  |  |  |   | 5. Report Date:<br>February 2009                                       |           |
| 7. Authors<br><b>Cejun Liu*</b> and <b>Chou-Lin Chen</b> <sup>†</sup>  |  |  |   | 6. Performing Organization Code<br>NVS-421                             |           |
| 9. Performing Organization Name and Address<br>* Program Analyst, Mathematical Analysis Division, National Center for Statistics and Analysis, NHTSA.<br><sup>†</sup> Supervising Mathematical Statisticians, Mathematical Analysis Division, National Center for Statistics and Analysis, NHTSA.  |  |  |   | 8. Performing Organization Report No.                                  |           |
| 12. Sponsoring Agency Name and Address<br>Mathematical Analysis Division, National Center for Statistics and Analysis<br>National Highway Traffic Safety Administration<br>1200 New Jersey Avenue SE.<br>Washington, DC 20590  |  |  |   | 10. Work Unit No. (TRAIS)n code  |           |
|  |  |  |   | 11. Contract of Grant No.  |           |
|  |  |  |   | 13. Type of Report and Period Covered<br><b>NHTSA Technical Report</b> |           |
|  |  |  |   | 14. Sponsoring Agency Code   |           |
| 15. Supplementary Notes<br>Useful comments from Rajesh Subramanian, James Bean, Earl Hardy, Davey Warren, Jim Simons, Randolph Atkins, Edward Sheldahl, and other reviewers are acknowledged.  |  |  |   |  |           |
| 16. Abstract<br><br>Speeding is reported in the Fatality Analysis Reporting System (FARS) as a driver-level attribute that combines "driving too fast for conditions" or "in excess of posted speed limit." There is a growing need to parse out these two factors, especially for those designing countermeasures. The report, using data from the State Data System quantifies the extent of these two aspects related to speeding using data from six States whose police accident reports actually parse these out.<br><br>The result of this analysis shows that this really depends on the severity of the crash. In fatal crashes, about 55 percent of all speeding-related crashes were due to "exceeding posted speed limits" as compared to the 45 percent that were due to "driving too fast for conditions." The comparable percentages for speeding-related injury crashes were 26 percent versus 74 percent and those for PDO (property-damage-only) crashes were 18 percent versus 82 percent.<br><br>The second aspect examined in this study is how these crashes, which related to the factors "driving too fast for conditions" or "exceeding posted speed limit," were affected by roadway environments. It shows that the speeding-related crashes that were due to "driving too fast for conditions" were more likely to have occurred on roads with higher speed limits (50+ mph) as compared to other crashes. Roadway environments analyzed also include: roadway surface conditions, roadway alignment, and intersection/intersection-related roadway segment. |  |  |   |  |           |
| 17. Key Words<br>Speeding-related crashes, driving too fast for conditions, exceeding posted speed limit, road environments, road speed limit, road surface conditions, road alignment, road intersection, SDS   |  |  | 18. Distribution Statement<br>This report is free of charge from the NHTSA Web site at <a href="http://www.nhtsa.dot.gov">www.nhtsa.dot.gov</a> |  |           |
| 19. Security Classif. (of this report)<br>Unclassified   |  | 20. Security Classif. (of this page)<br>Unclassified |   | 21. No of Pages<br>26  | 22. Price |

## Table of Contents

---

|  |    |
|--|----|
| 1. Executive Summary .....   | 1  |
| 2. Introduction .....  | 3  |
| 2.1 Background .....   | 3  |
| 2.2 Objective of the Study .....   | 4  |
| 3. Data and Methods .....  | 5  |
| 4. Speeding-Related Crashes by Two Contributing Factors .....              | 6  |
| 5. Speeding-Related Crashes by Road Environments .....                     | 9  |
| 5.1 Speeding-Related Crashes by Road Speed Limit.....                      | 9  |
| 5.2 Speeding-Related Crashes by Road Surface Conditions and by Month ..... | 10 |
| 5.3 Speeding-Related Crashes by Road Alignment and by Month .....          | 13 |
| 5.4 Speeding-Related Crashes by Road Intersection and by Month .....       | 16 |
| 6. Conclusions.....  | 19 |
| 7. Appendix.....   | 20 |

# 1. Executive Summary

Speeding is one of the most common contributing factors of traffic crashes. Data extracted from the Fatality Analysis Reporting System (FARS) show that the driver-level attribute “driving too fast for conditions or in excess of posted speed limit” is the critical contributing factor in more than 99 percent of all speeding-related fatal crashes, as defined by the National Highway Traffic Safety Administration. A marginal number of drivers were determined to be speeding through citations of speeding violations reported to FARS.

In this study, two aspects related to speeding-related crashes are examined. One is how each of the two individual factors, “driving too fast for conditions” (DTFFC) and “exceeding posted speed limit” (EPSL), contributed to speeding-related crashes. The other aspect is how these speeding-related crashes, which related to the factor DTFFC or EPSL were affected by road environments. Road environments examined include: posted speed limit, road surface conditions, road alignment, and road intersection/intersection-related. Data from NHTSA’s State Data System (SDS) was used in the analyses.

Some highlights of the findings of this analysis are presented below:

- In fatal crashes, about 55 percent of all speeding-related crashes were due to EPSL as compared to the 45 percent that were due to DTFFC.
- A marginal number (about 0.4 percent) of all fatal crashes were determined to be speeding-related through citations of speeding violations issued to the driver.
- In speeding-related crashes that resulted in one or more injuries, about 26 percent of the crashes were due to EPSL as compared to the 74 percent that were due to DTFFC.
- In speeding-related property-damage-only crashes, about 18 percent of the crashes were due to EPSL as compared to the 82 percent that were due to DTFFC.
- The percentage of all crashes that were speeding-related (DTFFC or EPSL) varied considerably among the States, from about 6 percent to about 20 percent of all crashes. The variance of the population density, road speed limit, weather conditions, economic status, education level, etc. among the States might have played a role in this difference.
- Speeding-related crashes that were due to DTFFC were more likely to have occurred on roads with higher speed limits (50+ mph) as compared to other crashes. Speeding-related crashes that were due to EPSL occur on either lower speed limit (less than 50 mph) roads or higher speed limit (50+ mph) roads as compared to other crashes.

- In speeding-related crashes that were due to DTFFC, the relative proportions of crashes that occurred under adverse road surface conditions (“Snowy/Slushy/Icy/Slippery” and “Wet”) were much higher during cooler months (December to March), as compared to other crashes. This seasonality was relatively weak as a contributing factor in speeding-related crashes that were due to the factor EPSL.
- The relative proportion of crashes that occurred on the curved sections of the road was much higher in speeding-related (DTFFC or EPSL) crashes. There was no important variation of this relative proportion across the month of the year.
- Speeding-related (DTFFC or EPSL) crashes were more likely to have occurred on non-intersection/non-intersection-related stretches of roads. There was no important variation of this relative proportion across the month of the year.

## 2. Introduction

### 2.1 Background

Speeding is one of the most prevalent factors contributing to traffic crashes. It reduces a driver's ability to steer safely around curves or objects in the roadway, extends the distance necessary to stop a vehicle, and increases the distance a vehicle travels while a driver reacts to a dangerous situation. Higher crash speeds also reduce the ability of vehicle, restraint system, and roadway hardware such as guardrails, barriers, and impact attenuators to protect vehicle occupants.

In 2007, about 31 percent of all fatal crashes were speeding-related resulting in 13,040 fatalities. The economic cost to society of speeding-related crashes is estimated by NHTSA to be \$40.4 billion per year.<sup>1</sup>

NHTSA defines a crash to be speeding-related if any driver involved in the crash is charged with a speeding-related offense or if a police officer indicates that racing, driving too fast for conditions, or exceeding the posted speed limit was a contributing factor in the crash.<sup>1 2</sup>

In Table 1, the speeding-related fatal crashes by NHTSA definition during 2001-2007 are displayed. Data was extracted from the Fatality Analysis Reporting System (FARS). It shows that driver-level DTFFC or EPSL are the critical contributing factors in more than 99 percent of all speeding-related fatal crashes. Also, the number of violation charges issued to speeding drivers is small in fatal crashes.

In FARS, there was no information to parse out the relative contributions the factors DTFFC or EPSL made to speeding-related fatal crashes. From research and engineering aspects, it is particularly relevant to examine how these two individual factors contributed to speeding-related crashes. While FARS does not parse out these two factors, some States in NHTSA's State Data System (SDS) have information that would facilitate such an analysis.<sup>3</sup> Six States (Kansas, Kentucky, Maryland, Montana, North Carolina, and Wisconsin) had specific information on whether the driver was traveling too fast for conditions or exceeding the posted speed limit. Also, information on road environments was available in the data from these six States.

---

<sup>1</sup> *Traffic Safety Facts 2007: Speeding*, (October 2008). DOT HS 810 998. Washington, DC: National Highway Traffic Safety Administration.

<sup>2</sup> Liu, C., Chen, C.-L., Subramanian, R., & Utter, D. (June 2005). *Analysis of Speeding-Related Fatal Motor Vehicle Traffic Crashes*. NHTSA Technical Report DOT HS 809 839. Washington, DC: National Highway Traffic Safety Administration.

<sup>3</sup> *State Data System Crash Data Report: 1990 – 1999* (July 2002). DOT HS 809 504. Washington, DC: National Highway Traffic Safety Administration.

**Table 1: Speeding-Related Fatal Crashes by NHTSA Definition During 2001-2007**

| Year | Driving Too Fast for Conditions<br>or<br>In Excess of Posted Speed Limit* |       | Racing*<br>(Since 1998) |      | Speed-Related<br>Offenses**<br>(Since 1997) |      | Total  |     |
|------|---|-------|-------------------------|------|---|------|--------|-----|
|      | Number  | %     | Number                  | %    | Number                                      | %    | Number | %   |
| 2001 | 11,179  | 99.21 | 38                      | 0.34 | 51  | 0.45 | 11,268 | 100 |
| 2002 | 12,046  | 99.42 | 24                      | 0.20 | 46  | 0.38 | 12,116 | 100 |
| 2003 | 11,798  | 99.41 | 28                      | 0.24 | 42  | 0.35 | 11,868 | 100 |
| 2004 | 11,594  | 99.31 | 23                      | 0.20 | 57  | 0.49 | 11,674 | 100 |
| 2005 | 11,958  | 99.46 | 25                      | 0.21 | 40  | 0.33 | 12,023 | 100 |
| 2006 | 12,016  | 99.45 | 27                      | 0.22 | 39  | 0.32 | 12,082 | 100 |
| 2007 | 11,586  | 99.37 | 30                      | 0.26 | 43  | 0.37 | 11,659 | 100 |

**Notes:**

\*Driver-level related factors.

\*\*Violations charged, which includes: racing, speeding (above speed limit), speed greater than reasonable and prudent (not necessarily over the speed limit), exceeding special speed limit (e.g., for trucks, buses, or on bridge, in school zone, etc.), energy speed (exceeding 55 mph, non-pointable), and general speed-related violations.

Source: FARS 2001-2007.

Based on the basic rules governing the speed of vehicles (for a law enforcement officer to issue a speeding ticket to a vehicle driver) in each of the six States (Kansas, Kentucky, Maryland, Montana, North Carolina, and Wisconsin), the “road environment” is one of the key factors related to speeding-related crashes (see Appendix).

In another study, speeding-related fatalities, as a percentage of the total fatalities by month, were higher in cooler months.<sup>4</sup> This study also analyzed the seasonal variation of speeding-related crashes.

**2.2 Objective of the Study**

Two aspects related to speeding crashes are examined in this study. One is how the two individual factors, DTFFC and EPSL, contribute to speeding-related crashes. The other one is how these speeding-related crashes are affected by road environments.

<sup>4</sup> Liu, C., Chen, C.-L., & Utter, D. *Speeding-Related Crash Fatalities by Month, Day, and Selected Holiday Periods*, NHTSA Crash•Stats. July 2005. DOT HS 809 890. Washington, DC: National Highway Traffic Safety Administration.



### 3. Data and Methods

The primary database used in this study was NHTSA’s State Data System (SDS) database. Two individual variables, DTFFC and EPSL, were available in some States in this database. The SDS is a census of all crashes (fatal, injury, and property-damage-only crashes) that are extracted from police accident reports from 31 States.<sup>3</sup>

In this study, “speeding-related crashes” are defined as the crashes that are related to DTFFC or EPSL. The comparison group in the study, “other crashes,” includes crashes other than two types of speeding-related crashes mentioned above.<sup>†</sup>

The following factors that relate to the road environment are examined:

- Posted speed limit;
- Road surface conditions: dry, wet, and snowy / slushy / icy (slippery);
- Road alignment: straight, curved; and
- Road intersection/intersection-related versus others.

Data from six States (Kansas, Kentucky, Maryland, Montana, North Carolina and Wisconsin) was used in the analysis. For these six States, all relevant variables – DTFFC, EPSL, and all road environment variables – were available in the SDS.<sup>†</sup> Crashes with unknown/missing values of above variables were not included in the analyses.

---

<sup>†</sup> It should be noted that there is a wide variety in the type and number of speeding-related crashes coded among the States, such as speed violation charged (e.g., exceeding posted speed limit), contributing factor (e.g., driving too fast for conditions), pre-crash critical event, etc. Here, two variables, DTFFC and EPSL, made up greater than 99 percent of the speeding-related fatal crashes, and therefore we focus this analysis on these two predominant factors.

## 4. Speeding-Related Crashes by Two Contributing Factors

As shown in Table 2, the percentage of all crashes that were speeding-related crashes (DTFFC or EPSL) varied considerably among these six States (from 6% to 19.7%). Specific characteristics of each individual State (population density, speed limit, weather conditions, economic status, education level, etc.) could play a role.<sup>2</sup>

As shown in Table 3, the percentage of fatal speeding-related crashes due to EPSL were higher than those due to DTFFC (55% versus 45%). In speeding-related injury and property-damage-only crashes, the crashes due to EPSL were lower than those due to DTFFC (26% versus 74%, and 18% versus 82%, respectively).

Table 4 shows the comparisons of total and speeding-related (DTFFC or EPSL) fatal crashes between FARS and SDS in the six States. Two counts in FARS and SDS were close to each other in total fatal crashes and speeding-related fatal crashes for each individual State. The difference comes from many factors, such as the differences in data collection sources and the definition of fatal crashes (e.g., in FARS, data are collected from crashes that resulted in the death of a person within 30 days of the crash).

**Table 2: Total and Percentage of Speeding-Related Crashes in Six States**

| State  | Total Crashes | Speeding-Related Crashes <sup>†</sup> | Percentage of Speeding-Related Crashes (Yearly Average) |
|--|---------------|---------------------------------------|---|
| <b>Kansas</b> (1998-2003)  | 467,551       | 52,452                                | 11.2  |
| <b>Kentucky</b> (2000-2002)  | 464,287       | 27,803                                | 6.0   |
| <b>Maryland</b> (1998-2004)  | 710,289       | 139,983                               | 19.7  |
| <b>Montana</b> (1998-2004)   | 156,019       | 30,191                                | 19.4  |
| <b>North Carolina</b> (1994-1999)  | 1,399,833     | 224,518                               | 16.0  |
| <b>Wisconsin</b> (1998-2003)   | 856,328       | 117,308                               | 13.7  |
| <b>Total</b>   | 4,054,307     | 592,255                               | 12.8  |
| <b>Note:</b> <sup>†</sup> Speeding-related crashes (fatal, injury, and property-damage-only) data is from Table 3. |               |                                       |   |
| <b>Source:</b> State Data System (SDS)   |               |                                       |   |

**Table 3: Speeding-Related Crashes by Crash Severity in Six States**

| State  | Speeding-Related Crashes        |           |                              |           | Total          |
|--|---------------------------------|-----------|------------------------------|-----------|----------------|
|  | Driving Too Fast For Conditions |           | Exceeding Posted Speed Limit |           |                |
|  | Number                          | %         | Number                       | %         |                |
| <b>Fatal Crashes</b>   |                                 |           |                              |           |                |
| <b>Kansas</b> (1998-2003)  | 492                             | 72        | 188                          | 28        | 680            |
| <b>Kentucky</b> (2000-2002)  | 220                             | 46        | 262                          | 54        | 482            |
| <b>Maryland</b> (1998-2004)  | 595                             | 42        | 811                          | 58        | 1,406          |
| <b>Montana</b> (1998-2004)   | 405                             | 71        | 165                          | 29        | 570            |
| <b>North Carolina</b> (1994-1999)  | 1,196                           | 35        | 2,203                        | 65        | 3,399          |
| <b>Wisconsin</b> (1998-2003)   | 592                             | 46        | 689                          | 54        | 1,281          |
| <b>Total</b>   | <b>3,500</b>                    | <b>45</b> | <b>4,318</b>                 | <b>55</b> | <b>7,818</b>   |
| <b>Injury Crashes</b>  |                                 |           |                              |           |                |
| <b>Kansas</b> (1998-2003)  | 15,867                          | 86        | 2,505                        | 14        | 18,372         |
| <b>Kentucky</b> (2000-2002)  | 7,416                           | 72        | 2,819                        | 28        | 10,235         |
| <b>Maryland</b> (1998-2004)  | 46,433                          | 80        | 11,737                       | 20        | 58,170         |
| <b>Montana</b> (1998-2004)   | 9,374                           | 89        | 1,101                        | 11        | 10,475         |
| <b>North Carolina</b> (1994-1999)  | 70,491                          | 66        | 36,237                       | 34        | 106,728        |
| <b>Wisconsin</b> (1998-2003)   | 32,897                          | 75        | 10,722                       | 25        | 43,619         |
| <b>Total</b>   | <b>182,478</b>                  | <b>74</b> | <b>65,121</b>                | <b>26</b> | <b>247,599</b> |
| <b>Property-Damage-Only Crashes</b>  |                                 |           |                              |           |                |
| <b>Kansas</b> (1998-2003)  | 30,668                          | 92        | 2,732                        | 8         | 33,400         |
| <b>Kentucky</b> (2000-2002)  | 14,131                          | 83        | 2,955                        | 17        | 17,086         |
| <b>Maryland</b> (1998-2004)  | 66,744                          | 83        | 13,663                       | 17        | 80,407         |
| <b>Montana</b> (1998-2004)   | 18,426                          | 96        | 720                          | 4         | 19,146         |
| <b>North Carolina</b> (1994-1999)  | 85,621                          | 75        | 28,770                       | 25        | 114,391        |
| <b>Wisconsin</b> (1998-2003)   | 61,335                          | 85        | 11,073                       | 15        | 72,408         |
| <b>Total</b>   | <b>276,925</b>                  | <b>82</b> | <b>59,913</b>                | <b>18</b> | <b>336,838</b> |
| <b>All Speeding-Related Crashes</b>  |                                 |           |                              |           |                |
| <b>Kansas</b> (1998-2003)  | 47,027                          | 90        | 5,425                        | 10        | 52,452         |
| <b>Kentucky</b> (2000-2002)  | 21,767                          | 78        | 6,036                        | 22        | 27,803         |
| <b>Maryland</b> (1998-2004)  | 113,772                         | 81        | 26,211                       | 19        | 139,983        |
| <b>Montana</b> (1998-2004)   | 28,205                          | 93        | 1,986                        | 7         | 30,191         |
| <b>North Carolina</b> (1994-1999)  | 157,308                         | 70        | 67,210                       | 30        | 224,518        |
| <b>Wisconsin</b> (1998-2003)   | 94,824                          | 81        | 22,484                       | 19        | 117,308        |
| <b>Total</b>   | <b>462,903</b>                  | <b>78</b> | <b>129,352</b>               | <b>22</b> | <b>592,255</b> |
| <b>Note:</b> Crashes with unknown/other severity and unknown/other speeding status were not included in the table. |                                 |           |                              |           |                |
| <b>Source:</b> State Data System.  |                                 |           |                              |           |                |

**Table 4: Comparisons of Total and Speeding-Related Fatal Crashes  
Between FARS and SDS in Six States**

| State                             | Fatal Crashes in FARS |                  | Fatal Crashes in SDS |                  |
|-----------------------------------|-----------------------|------------------|----------------------|------------------|
|                                   | Total                 | Speeding-Related | Total                | Speeding-Related |
| <b>Kansas</b> (1998-2003)         | 2,598                 | 855              | 2,606                | 680              |
| <b>Kentucky</b> (2000-2002)       | 2,293                 | 432              | 2,313                | 482              |
| <b>Maryland</b> (1998-2004)       | 4,016                 | 1,319            | 4,060                | 1,406            |
| <b>Montana</b> (1998-2004)        | 1,486                 | 628              | 1,483                | 570              |
| <b>North Carolina</b> (1994-1999) | 7,961                 | 2,859            | 8,006                | 3,399            |
| <b>Wisconsin</b> (1998-2003)      | 4,188                 | 1,284            | 4,210                | 1,281            |

**Source:** FARS and State Data System.

## 5. Speeding-Related Crashes by Road Environments

As pointed out in Section 2, speeding-related crash fatalities, as a percentage of total fatalities, are higher in cooler months.<sup>4</sup> Road environments could play a role.

Based on the basic rules governing speed of vehicles (for a law enforcement officer to issue a speeding ticket to a vehicle driver) in each of the six States, the road environments are key factors related to speeding-related crashes (see Appendix). The effects of road environments on speeding-related crashes are examined in this section.

Four factors related to road environments (speed limit, surface conditions, road alignment, and intersection/intersection-related) and the effect of seasonality (month) are also examined in this section.

### 5.1 Speeding-Related Crashes by Road Speed Limit

Table 5 shows that the percentage of speeding-related crashes due to DTFFC on roads with higher speed limits (50+ mph) are all higher (red highlights) than the ones in other crashes (blue highlights) for these six States. That is, speeding-related crashes due to DTFFC are more likely to have occurred on roads with higher speed limits (50+ mph), as compared to other crashes.

Speeding-related crashes due to EPSL occur both on lower speed limit (less than 50 mph) roads (Kansas, Maryland, Montana, and Wisconsin) as well as on higher speed limit (50+ mph) roads (Kentucky and North Carolina), as compared to other crashes (blue highlights).

Therefore, on average, speeding-related crashes due to DTFFC resulted in more serious injuries to vehicle occupants and other road users per crash, as compared to other crashes (due to their occurrences on higher speed roads and hence the greater kinetic energy to be dissipated in the crash<sup>2</sup>).

**Table 5: Relative Proportion of Speeding-Related Crashes and Other Crashes by Speed Limit**

| State                             | 0-50 mph (%) |           |           | 50+ mph (%) |           |           |
|-----------------------------------|--------------|-----------|-----------|-------------|-----------|-----------|
|                                   | DTFFC*       | EPSL**    | Other     | DTFFC*      | EPSL**    | Other     |
| <b>Kansas</b> (1998-2003)         | 53           | <b>78</b> | <b>66</b> | <b>47</b>   | 22        | <b>34</b> |
| <b>Kentucky</b> (2000-2002)       | 45           | 66        | <b>72</b> | <b>55</b>   | <b>34</b> | <b>28</b> |
| <b>Maryland</b> (1998-2004)       | 79           | <b>90</b> | <b>87</b> | <b>21</b>   | 10        | <b>13</b> |
| <b>Montana</b> (1998-2004)        | 53           | <b>73</b> | <b>69</b> | <b>47</b>   | 27        | <b>31</b> |
| <b>North Carolina</b> (1994-1999) | 42           | 52        | <b>78</b> | <b>58</b>   | <b>48</b> | <b>22</b> |
| <b>Wisconsin</b> (1998-2003)      | 53           | <b>73</b> | <b>64</b> | <b>47</b>   | 27        | <b>36</b> |

**Notes:** 1. \* Driving too fast for conditions (DTFFC). \*\* Exceeding posted speed limit (EPSL). 2. Higher percentage of speeding-related crashes highlighted in red color, as compared to the ones in other crashes (all highlighted in blue color).  
**Source:** State Data System.

## 5.2 Speeding-Related Crashes by Road Surface Conditions and by Month

In speeding-related crashes (driving too fast for conditions, DTFFC), a higher proportion of crashes occurred on adverse road surface conditions (“Snowy/Slushy/Icy[Slippery]” and “Wet”) during cooler months (December to March), as compared to other crashes (Figure 1 and Table 6). Important differences in the distribution of the relative proportions among these six States can be seen in Figure 1 and Table 6.

However, this seasonality was relatively weak in speeding-related crashes due to EPSL, compared with the speeding-related crashes due to DTFFC (see Table 6).

These studies show that there is an important effect of the road surface conditions with seasonality (month) on speeding-related crashes that related to the factor DTFFC. This could partially explain the fact that speeding-related crash fatalities, as a percentage of the total fatalities by month, are higher in cooler months.<sup>4</sup> In the winter season and under adverse road surface conditions, it could be easy for a vehicle to exceed a safe travel speed (this safe travel speed might need to be lower than the posted speed limit).<sup>5</sup>

**Table 6: Relative Proportion of Speeding-Related Crashes (DTFFC & EPSL) and Other Crashes Under Adverse Road Surface Conditions (Snowy/Slushy/Icy [Slippery] and Wet)**

| State | Crash  | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sept | Oct  | Nov  | Dec  |
|-------|--------|------|------|------|------|------|------|------|------|------|------|------|------|
| KS    | DTFFC  | 79.6 | 74.9 | 66.8 | 45.4 | 37.9 | 42.1 | 27.8 | 30.2 | 39.2 | 41.6 | 38.4 | 76.3 |
|       | EPSL   | 19.9 | 22.3 | 16.3 | 13.0 | 10.0 | 8.7  | 5.1  | 4.3  | 8.1  | 10.8 | 9.5  | 17.8 |
|       | Others | 29.6 | 26.6 | 22.9 | 14.6 | 10.8 | 10.3 | 6.3  | 6.5  | 10.5 | 12.8 | 10.9 | 24.5 |
| KY    | DTFFC  | 90.9 | 82.0 | 78.4 | 75.2 | 74.3 | 73.6 | 74.5 | 67.8 | 76.2 | 74.0 | 81.5 | 92.0 |
|       | EPSL   | 22.8 | 16.4 | 17.1 | 14.8 | 10.9 | 8.8  | 6.1  | 8.0  | 10.2 | 13.7 | 20.0 | 29.7 |
|       | Others | 33.2 | 23.0 | 22.2 | 17.6 | 17.4 | 14.4 | 12.6 | 11.0 | 17.1 | 18.1 | 24.8 | 40.9 |
| MD    | DTFFC  | 74.4 | 68.4 | 61.4 | 58.6 | 56.9 | 55.6 | 47.3 | 47.8 | 54.4 | 48.5 | 60.0 | 64.2 |
|       | EPSL   | 23.3 | 19.4 | 17.2 | 17.0 | 16.7 | 16.0 | 11.5 | 12.3 | 14.8 | 14.0 | 18.3 | 17.2 |
|       | Others | 32.7 | 29.1 | 22.6 | 21.8 | 20.3 | 16.9 | 13.0 | 13.4 | 16.7 | 15.3 | 19.8 | 24.0 |
| MT    | DTFFC  | 95.9 | 92.5 | 85.5 | 65.9 | 40.6 | 30.7 | 11.9 | 13.2 | 27.4 | 56.8 | 90.3 | 94.1 |
|       | EPSL   | 37.4 | 29.9 | 21.2 | 10.8 | 9.7  | 9.1  | 2.2  | 3.0  | 4.4  | 10.9 | 21.6 | 36.6 |
|       | Others | 61.5 | 46.5 | 32.1 | 17.4 | 13.4 | 11.6 | 4.1  | 4.2  | 9.0  | 14.3 | 31.7 | 47.0 |
| NC    | DTFFC  | 72.8 | 68.6 | 43.8 | 35.2 | 28.0 | 42.2 | 38.5 | 34.3 | 43.9 | 37.6 | 42.8 | 53.8 |
|       | EPSL   | 30.3 | 27.1 | 19.1 | 14.4 | 11.0 | 16.3 | 13.9 | 10.8 | 17.0 | 14.4 | 18.9 | 24.3 |
|       | Others | 31.0 | 30.1 | 20.2 | 16.2 | 10.4 | 17.9 | 14.4 | 11.7 | 18.9 | 15.5 | 19.9 | 23.0 |
| WI    | DTFFC  | 94.9 | 90.9 | 84.5 | 68.8 | 46.3 | 44.2 | 30.1 | 36.2 | 42.2 | 52.6 | 74.9 | 90.4 |
|       | EPSL   | 42.5 | 31.5 | 20.9 | 14.4 | 12.3 | 9.5  | 4.9  | 7.3  | 9.1  | 12.5 | 17.3 | 31.0 |
|       | Others | 55.7 | 40.3 | 28.8 | 21.2 | 16.1 | 12.5 | 6.3  | 9.1  | 11.5 | 16.5 | 22.4 | 41.7 |

Source: State Data System.

<sup>5</sup> *Speed Management Strategic Initiative*. September 2005. DOT HS 809 924. Washington, DC: National Highway Traffic Safety Administration.

**Figure 1: Relative Proportion of Speeding-Related Crashes (Driving Too Fast for Conditions, DTFFC) and Other Crashes by Road Surface Condition and by Month in Six States**

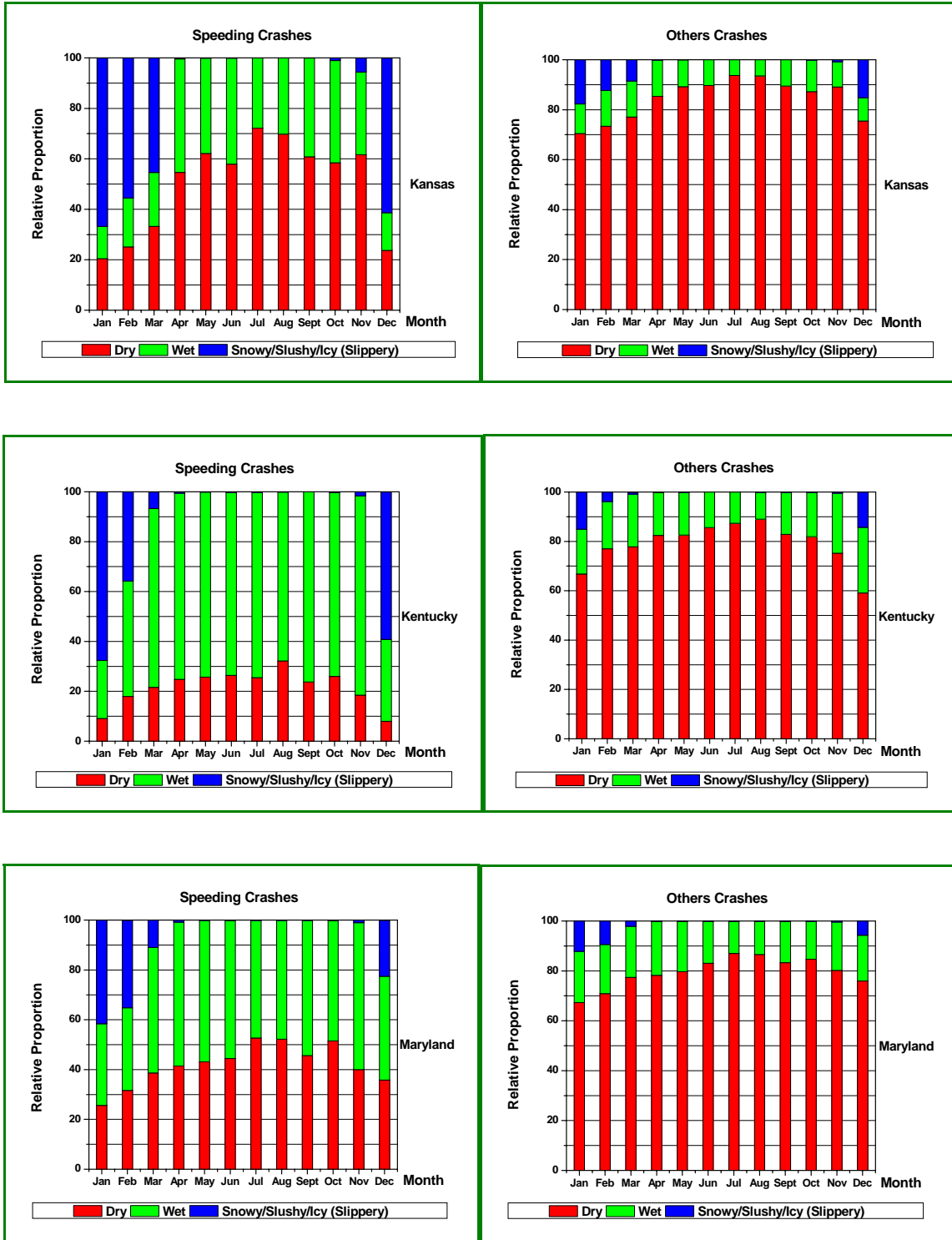
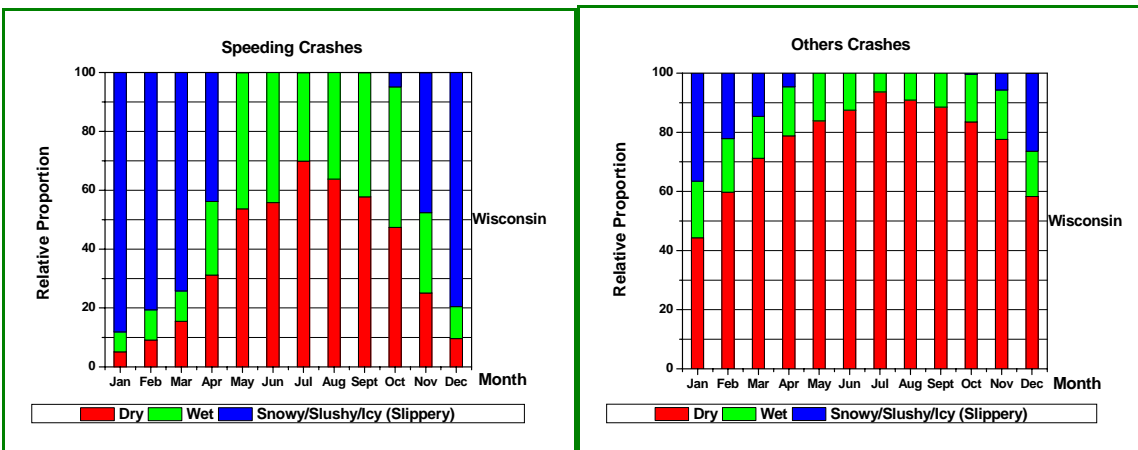
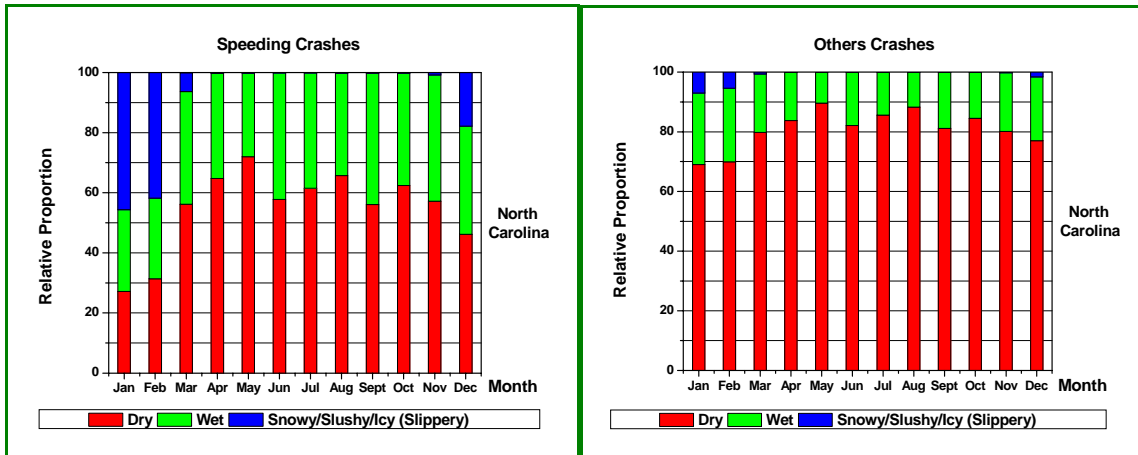
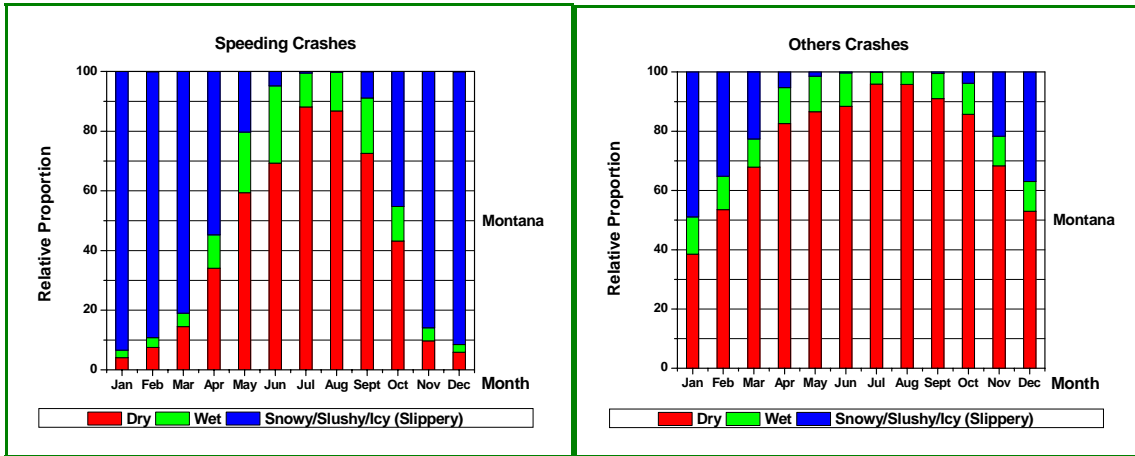


Figure 1 (continued)





### 5.3 Speeding-Related Crashes by Road Alignment and by Month

The relative proportion of crashes that occurred on curved roads is much higher in speeding-related crashes that were due to the factor DTFFC, when compared to other crashes (Figure 2 and Table 7). There is no important variation of this relative proportion across the months. Also, important differences in the distribution of the relative proportions among these six States are shown.

Note that the above characteristics can also be observed in speeding-related crashes due to the factor EPSL (see Table 7).

Therefore, both types of speeding-related crashes (DTFFC and EPSL) are more likely to have occurred on curved roads.

**Table 7: Relative Proportion of Speeding-Related Crashes (DTFFC & EPSL) and Other Crashes on Curved Roads**

| State | Crash  | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sept | Oct  | Nov  | Dec  |
|-------|--------|------|------|------|------|------|------|------|------|------|------|------|------|
| KS    | DTFFC  | 19.7 | 16.7 | 18.8 | 18.1 | 20.1 | 20.4 | 21.0 | 20.4 | 19.2 | 19.8 | 19.7 | 17.2 |
|       | EPSL   | 21.8 | 21.2 | 20.1 | 23.9 | 24.0 | 20.7 | 25.8 | 22.8 | 20.3 | 21.9 | 22.9 | 19.7 |
|       | Others | 7.1  | 6.9  | 6.7  | 6.0  | 6.2  | 6.3  | 6.5  | 6.3  | 5.9  | 6.0  | 6.1  | 6.9  |
| KY    | DTFFC  | 49.5 | 46.5 | 50.5 | 52.6 | 52.6 | 55.2 | 56.8 | 54.6 | 55.8 | 55.4 | 53.2 | 44.9 |
|       | EPSL   | 40.9 | 47.2 | 42.5 | 41.7 | 39.6 | 42.5 | 43.2 | 40.2 | 44.6 | 37.7 | 41.7 | 40.5 |
|       | Others | 18.7 | 15.7 | 15.7 | 15.3 | 16.4 | 16.5 | 16.6 | 16.1 | 16.5 | 16.0 | 16.5 | 17.3 |
| MD    | DTFF   | 31.7 | 29.0 | 29.5 | 28.9 | 30.0 | 30.1 | 30.9 | 30.6 | 29.9 | 29.6 | 32.3 | 30.0 |
|       | EPSL   | 34.9 | 34.2 | 34.4 | 35.8 | 34.5 | 35.0 | 36.4 | 34.2 | 32.7 | 34.5 | 34.4 | 34.8 |
|       | Others | 10.6 | 10.0 | 9.3  | 9.4  | 9.5  | 9.1  | 9.3  | 9.2  | 9.3  | 9.4  | 10.0 | 9.8  |
| MT    | DTFFC  | 31.6 | 34.7 | 32.3 | 42.1 | 50.3 | 53.6 | 55.7 | 53.5 | 47.5 | 44.9 | 39.6 | 34.8 |
|       | EPSL   | 30.8 | 30.7 | 30.8 | 32.9 | 38.3 | 41.5 | 37.9 | 36.4 | 33.6 | 34.6 | 36.4 | 28.3 |
|       | Others | 12.6 | 12.7 | 12.1 | 12.3 | 11.9 | 12.7 | 13.0 | 13.0 | 12.3 | 12.1 | 13.2 | 11.7 |
| NC    | DTFFC  | 43.0 | 41.8 | 48.6 | 49.5 | 50.9 | 48.5 | 49.6 | 50.1 | 47.9 | 50.3 | 50.9 | 48.6 |
|       | EPSL   | 44.1 | 44.2 | 45.7 | 44.5 | 45.6 | 45.2 | 45.7 | 45.4 | 45.7 | 46.0 | 45.6 | 46.1 |
|       | Others | 9.4  | 8.7  | 8.0  | 7.9  | 8.0  | 8.3  | 8.3  | 8.3  | 8.1  | 8.3  | 8.0  | 7.9  |
| WI    | DTFFC  | 25.1 | 27.2 | 26.8 | 29.2 | 33.9 | 35.1 | 38.5 | 37.6 | 35.4 | 33.7 | 33.2 | 27.8 |
|       | EPSL   | 25.2 | 24.0 | 23.0 | 27.4 | 25.6 | 26.7 | 28.0 | 28.7 | 27.4 | 26.6 | 26.5 | 24.5 |
|       | Others | 10.0 | 9.3  | 9.2  | 8.0  | 7.6  | 8.1  | 8.4  | 8.1  | 8.0  | 8.0  | 9.3  | 10.2 |

**Source:** State Data System.

**Figure 2: Relative Proportion of Speeding-Related Crashes (Driving Too Fast for Conditions) and Other Crashes by Road Alignment and by Month in Six States**

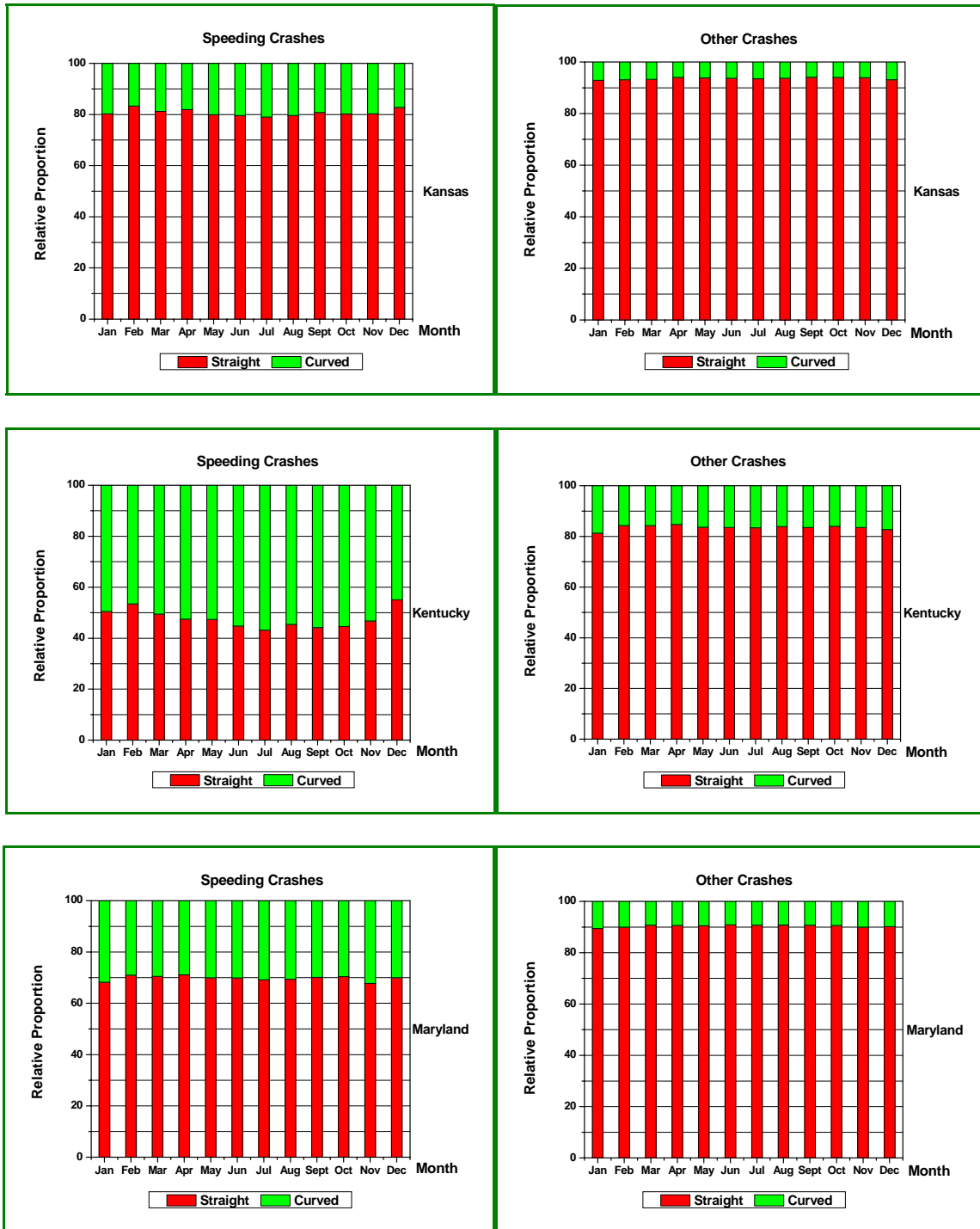
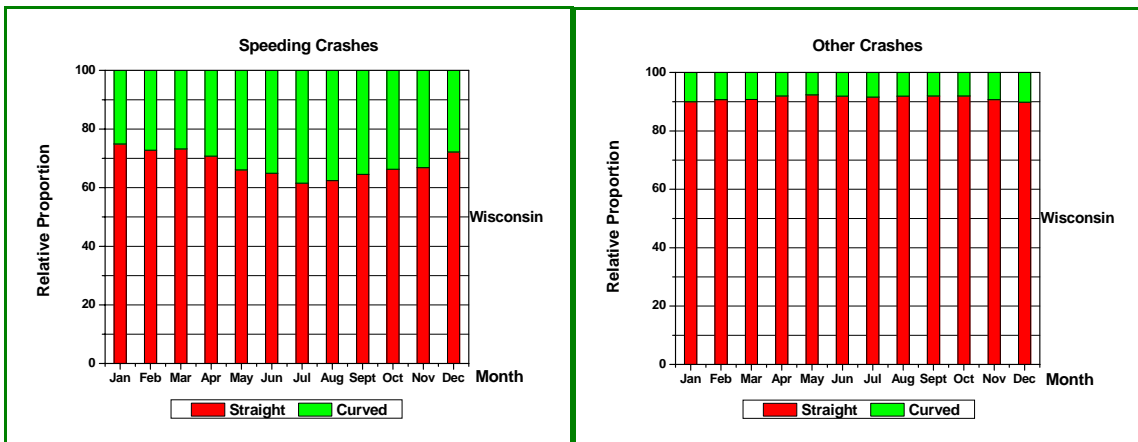
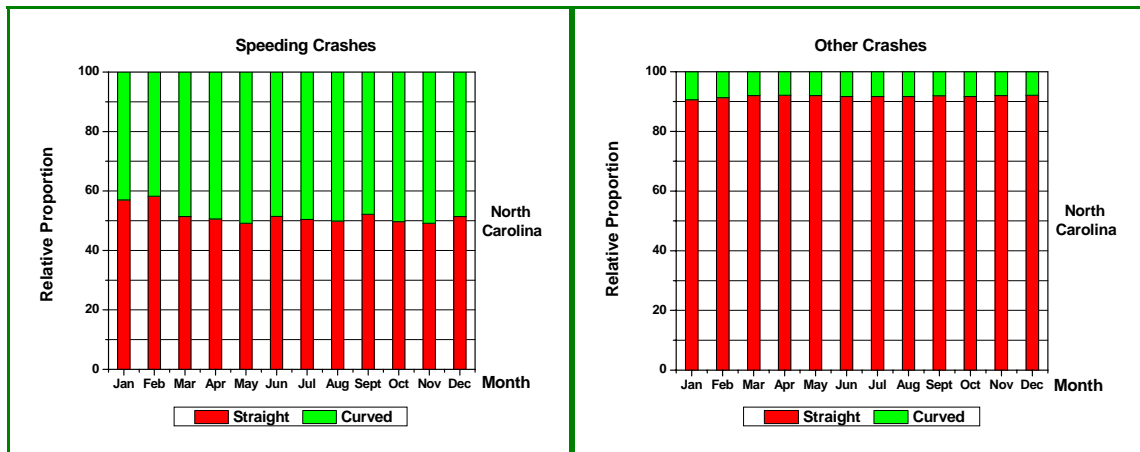
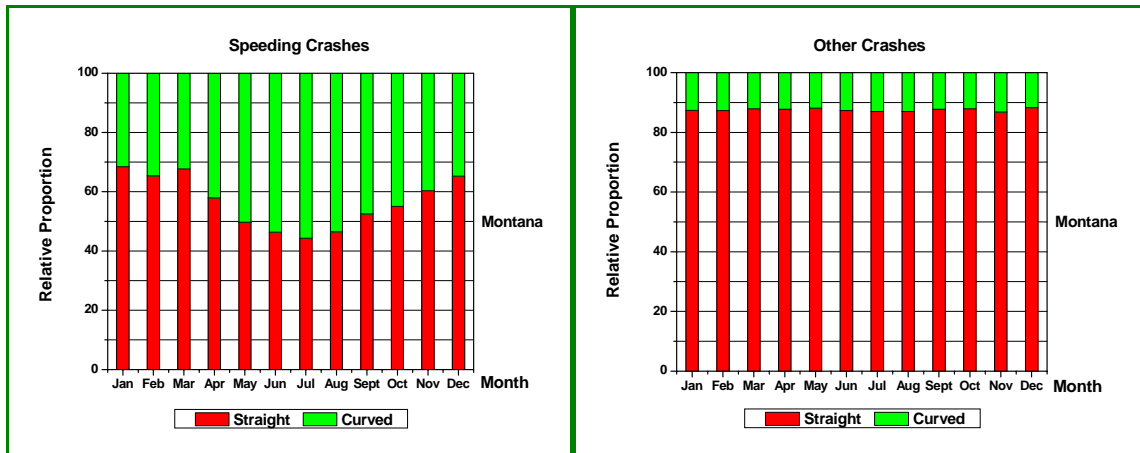


Figure 2 (continued)



## 5.4 Speeding-Related Crashes by Road Intersection and by Month

Figure 3 and Table 8 show that speeding-related crashes due to the factor DTFFC are more likely to have occurred on non-intersection/non intersection-related roads. There is no important variation of this relative proportion across the months.

Note that the above characteristics can also be observed in speeding-related crashes due to the factor EPSL (see Table 8). That is, speeding-related crashes due to both DTFFC and EPSL are more likely to have occurred on non-intersection/non intersection-related roads.

**Table 8: Relative Proportion of Speeding-Related Crashes (DTFFC & EPSL) and Other Crashes on Non-Intersection/Non Intersection-Related Roads**

| State | Crash  | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sept | Oct  | Nov  | Dec  |
|-------|--------|------|------|------|------|------|------|------|------|------|------|------|------|
| KS    | DTFF   | 75.8 | 71.6 | 75.3 | 69.9 | 70.5 | 71.8 | 71.6 | 71.9 | 71.0 | 71.3 | 71.0 | 73.3 |
|       | EPSL   | 68.0 | 66.7 | 68.3 | 66.6 | 64.7 | 66.8 | 67.2 | 63.5 | 68.6 | 66.5 | 65.3 | 64.2 |
|       | Others | 64.0 | 62.1 | 62.7 | 60.6 | 63.0 | 63.4 | 62.2 | 61.5 | 61.2 | 63.6 | 69.9 | 65.7 |
| KY    | DTFF   | 85.5 | 83.7 | 79.8 | 80.6 | 79.9 | 83.7 | 84.1 | 82.1 | 81.6 | 81.5 | 79.7 | 82.9 |
|       | EPSL   | 74.1 | 78.5 | 77.3 | 75.0 | 74.0 | 74.4 | 79.4 | 77.5 | 77.0 | 80.1 | 79.7 | 77.7 |
|       | Others | 71.9 | 71.1 | 70.0 | 70.3 | 71.1 | 71.5 | 71.1 | 70.9 | 70.3 | 71.3 | 71.7 | 71.8 |
| MD    | DTFFC  | 78.8 | 78.5 | 75.7 | 72.4 | 73.5 | 73.6 | 74.7 | 75.1 | 74.5 | 74.7 | 74.6 | 77.1 |
|       | EPSL   | 77.1 | 76.4 | 77.8 | 75.5 | 75.0 | 76.8 | 76.6 | 77.5 | 76.9 | 77.4 | 77.1 | 77.3 |
|       | Others | 63.9 | 63.6 | 62.7 | 62.5 | 62.4 | 62.6 | 63.1 | 62.9 | 62.6 | 62.6 | 64.0 | 63.0 |
| MT    | DTFFC  | 68.0 | 70.0 | 72.2 | 81.5 | 83.2 | 81.7 | 80.5 | 79.5 | 78.7 | 79.2 | 81.1 | 75.6 |
|       | EPSL   | 70.8 | 65.1 | 65.6 | 63.3 | 71.2 | 71.6 | 69.5 | 67.2 | 71.0 | 72.4 | 66.9 | 67.5 |
|       | Others | 56.2 | 54.8 | 54.4 | 53.3 | 55.1 | 57.1 | 59.1 | 58.6 | 57.6 | 59.4 | 62.4 | 56.5 |
| NC    | DTFFC  | 89.8 | 87.8 | 87.6 | 87.2 | 87.6 | 88.0 | 88.3 | 87.9 | 87.5 | 87.0 | 86.6 | 87.9 |
|       | EPSL   | 83.6 | 82.7 | 84.1 | 83.4 | 83.8 | 83.9 | 85.2 | 83.5 | 83.6 | 83.7 | 84.1 | 84.0 |
|       | Others | 68.6 | 67.9 | 67.3 | 67.3 | 67.6 | 67.9 | 68.4 | 68.0 | 68.0 | 69.1 | 70.9 | 69.8 |
| WI    | DTFFC  | 73.3 | 75.2 | 75.2 | 77.3 | 69.6 | 69.1 | 72.7 | 71.1 | 68.1 | 66.9 | 74.9 | 73.7 |
|       | EPSL   | 68.0 | 61.5 | 66.0 | 69.2 | 66.0 | 67.1 | 66.5 | 69.0 | 66.7 | 65.8 | 67.1 | 66.8 |
|       | Others | 63.1 | 62.6 | 63.4 | 62.5 | 63.5 | 63.5 | 62.3 | 60.8 | 61.9 | 66.9 | 72.5 | 65.3 |

**Source:** State Data System.

**Figure 3: Relative Proportion of Speeding-Related Crashes (Driving Too Fast for Conditions) and Other Crashes by Road Intersection/Intersection-Related and by Month in Six States**

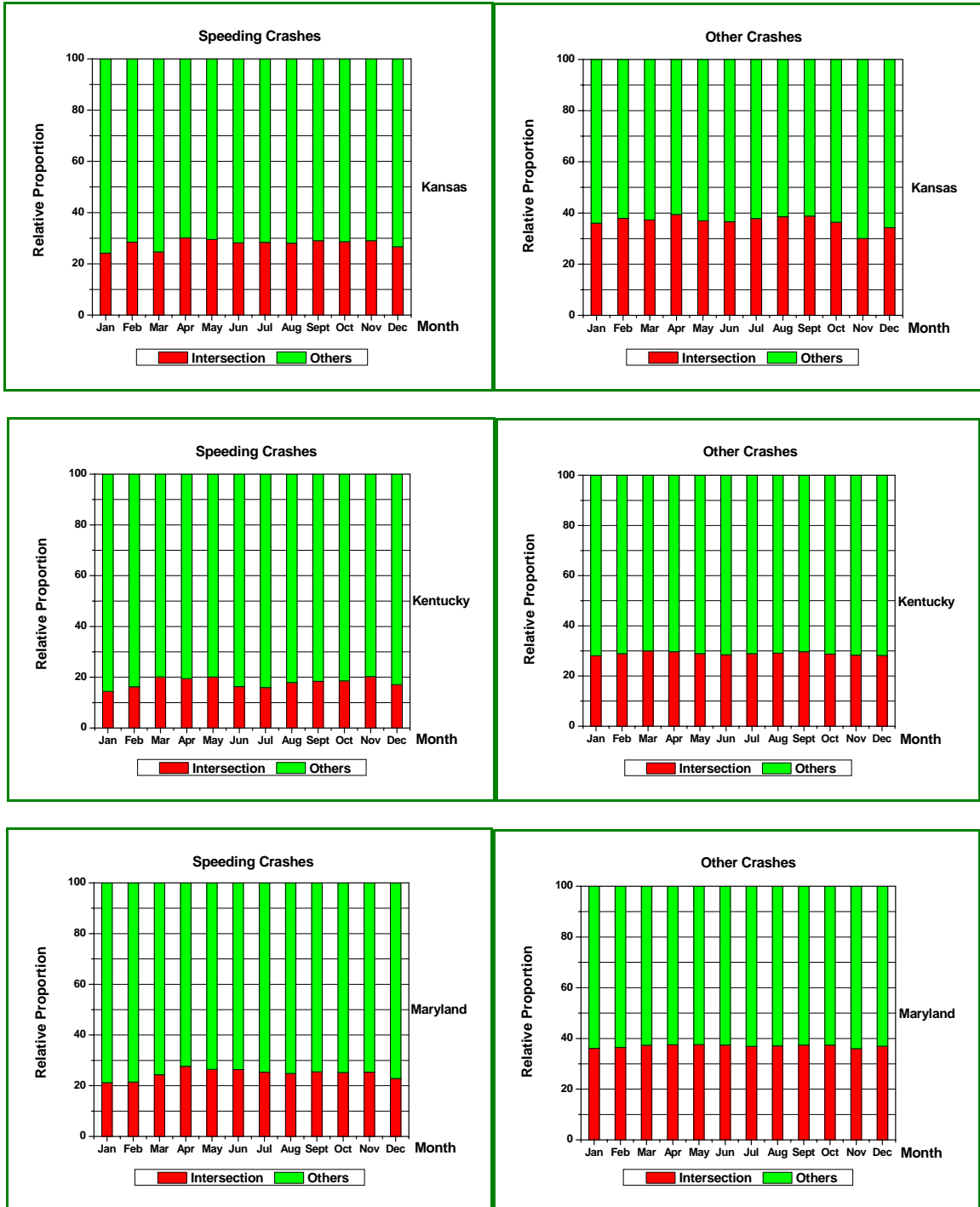
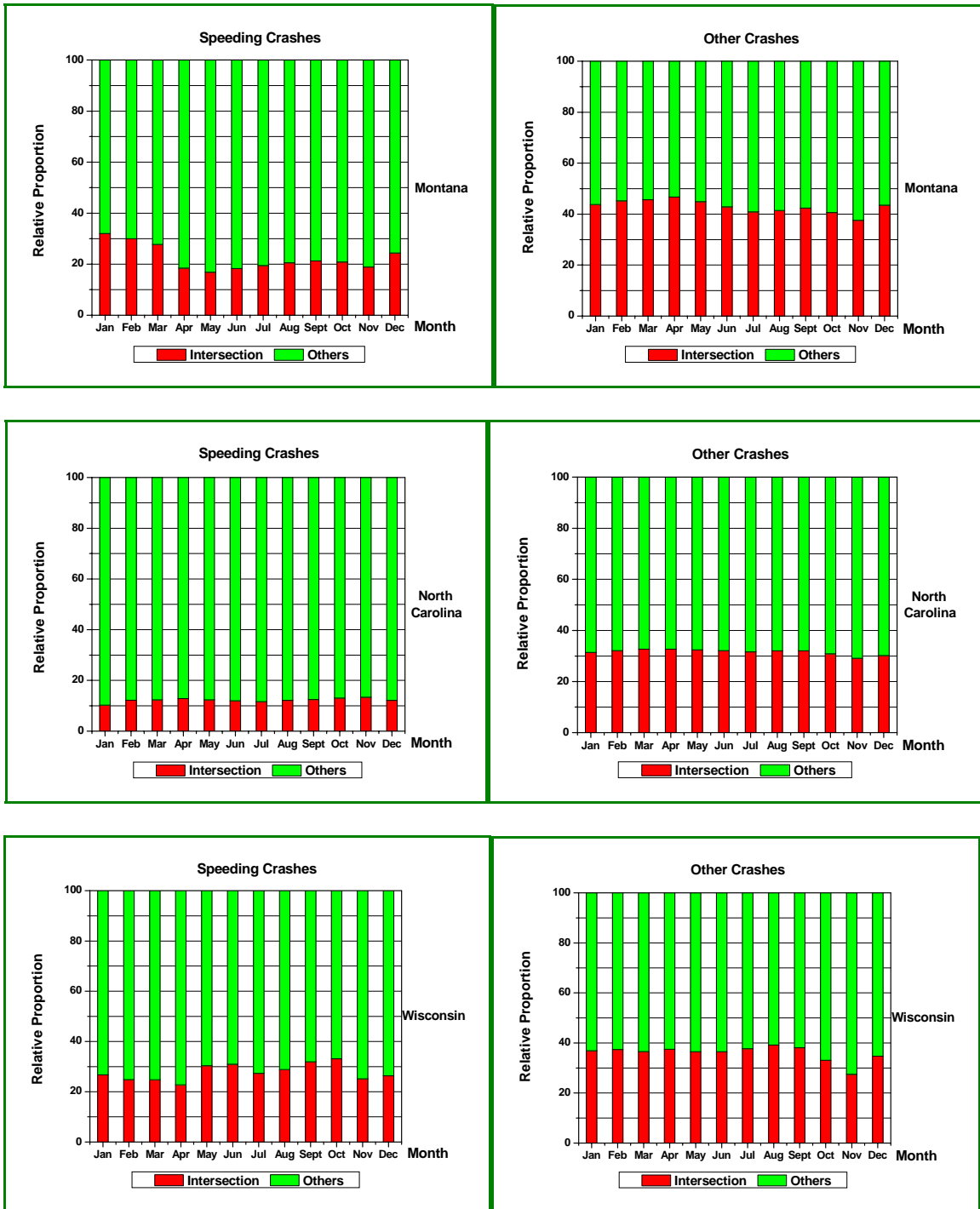


Figure 3 (continued)



## 6. Conclusions

Two aspects related to speeding crashes were examined in this study. The first aspect is how these two individual factors, DTFFC and EPSL, contributed, relatively, to speeding-related crashes. The other aspect is how these crashes that related to DTFFC or EPSL were affected by road environments. Data from NHTSA's SDS was used in the analyses.

In fatal crashes, the percentage of speeding-related crashes due to ESPL are overall higher than those due to DTFFC. In speeding-related injury and property-damage-only crashes, the percentage of speeding-related crashes due to ESPL are overall lower than those due to DTFFC.

There exist important differences in the percentage of all crashes that were speeding-related among these six States. Speeding-related crashes due to DTFFC are more likely to have occurred on higher speed limit roads (50+ mph) as compared to other crashes.

The relative proportion of crashes that occurred under adverse road surface conditions is much higher in speeding-related crashes that were due to DTFFC during cooler months (December to March). That is, in the winter season, it could be easy for a vehicle to exceed a safe travel speed under adverse road surface conditions. The safe travel speed might need to be lower than the posted speed limit.

The relative proportion of crashes that occurred on curved roads is much higher in speeding-related (DTFFC or EPSL) crashes. There is no important variation of this relative proportion across the month. Speeding-related crashes were more likely to have occurred on non-intersection/non intersection-related roads. There is no important variation of this relative proportion across the months.

## 7. Appendix

The basic rules governing speed of vehicles in Kansas, Kentucky, Maryland, Montana, North Carolina, and Wisconsin.

### **Kansas Statutes**

#### **8-1557**

### **Chapter 8.--AUTOMOBILES AND OTHER VEHICLES**

#### **Article 15.--UNIFORM ACT REGULATING TRAFFIC; RULES OF THE ROAD (Basic rule governing speed of vehicles)**

No person shall drive a vehicle at a speed greater than is reasonable and prudent under the conditions and having regard to the actual hazards then existing. Consistent with the foregoing, every person shall drive at a safe and appropriate speed when approaching and crossing an intersection or railroad grade crossing, when approaching and going around a curve, when approaching a hill crest, when traveling upon any narrow or winding roadway, and when special hazards exist with respect to pedestrians or other traffic or by reason of weather or highway conditions.

### **Kentucky Revised Statutes (KRS)**

#### **189.390 Speed -- Secretary authorized to increase speed limit in certain areas by official order -- Parking.**

(2) An operator of a vehicle upon a highway shall not drive at a greater speed than is reasonable and prudent, having regard for the traffic and for the condition and use of the highway.

### **Maryland Transportation Code**

#### **§ 21-801. Basic rule.**

*(a) Reasonable and prudent speed required.* A person may not drive a vehicle on a highway at a speed that, with regard to the actual and potential dangers existing, is more than that which is reasonable and prudent under the conditions.

*(b) Driver to control speed.* At all times, the driver of a vehicle on a highway shall control the speed of the vehicle as necessary to avoid colliding with any person or any vehicle or other conveyance that, in compliance with legal requirements and the duty of all persons to use due care, is on or entering the highway.

*(c) Drivers to reduce speed in certain circumstances.* Consistent with the requirements of this section, the driver of a vehicle shall drive at an appropriate, reduced speed when approaching and crossing an intersection at which cross traffic is not required to stop by a traffic control device.

*(d) Approaching and going around curves.* Consistent with the requirements of this section, the driver of a vehicle shall drive at an appropriate, reduced speed when approaching and going around a curve.



(e) *Approaching crests of grades.* Consistent with the requirements of this section, the driver of a vehicle shall drive at an appropriate, reduced speed when approaching the crest of a grade.

(f) *Traveling on narrow or winding roadways.* Consistent with the requirements of this section, the driver of a vehicle shall drive at an appropriate, reduced speed when traveling on any narrow or winding roadway.

(g) *Special dangers as to pedestrians or other traffic.* Consistent with the requirements of this section, the driver of a vehicle shall drive at an appropriate, reduced speed when any special danger exists as to pedestrians or other traffic or because of weather or highway conditions.

### **Montana Code Annotated-2007 (MCA)**

#### **61-8-303. Speed restrictions.**

(3) Subject to the maximum speed limits set forth in subsection (1), a person shall operate a vehicle in a careful and prudent manner and at a reduced rate of speed no greater than is reasonable and prudent under the conditions existing at the point of operation, taking into account the amount and character of traffic, visibility, weather, and roadway conditions.

(4) Except when a special hazard exists that requires lower speed for compliance with subsection (3), the limits specified in 61-8-312 and in this section or established as authorized in 61-8-309 through 61-8-311 and 61-8-313 are the maximum lawful speeds allowed.

### **North Carolina General Statutes (NCGS)**

#### **§ 20-141. Speed restrictions.**

(a) No person shall drive a vehicle on a highway or in a public vehicular area at a speed greater than is reasonable and prudent under the conditions then existing.

### **Wisconsin Statutes and Annotations**

(2) REASONABLE AND PRUDENT LIMIT. No person shall drive a vehicle at a speed greater than is reasonable and prudent under the conditions and having regard for the actual and potential hazards then existing. The speed of a vehicle shall be so controlled as may be necessary to avoid colliding with any object, person, vehicle or other conveyance on or entering the highway in compliance with legal requirements and using due care.

(3) CONDITIONS REQUIRING REDUCED SPEED. The operator of every vehicle shall, consistent with the requirements of sub. (2), drive at an appropriate reduced speed when approaching and crossing an intersection or railway grade crossing, when approaching and going around a curve, when approaching a hillcrest, when traveling upon any narrow or winding roadway, when passing school children, highway construction or maintenance workers or other pedestrians, and when special hazard exists with regard to other traffic or by reason of weather or highway conditions.

DOT HS 811 090  
February 2009



U.S. Department  
of Transportation  
**National Highway  
Traffic Safety  
Administration**

