

MAJOR CRASHES IN VERMONT, 1992-2003

Data Analysis for Strategic Highway Safety Plan

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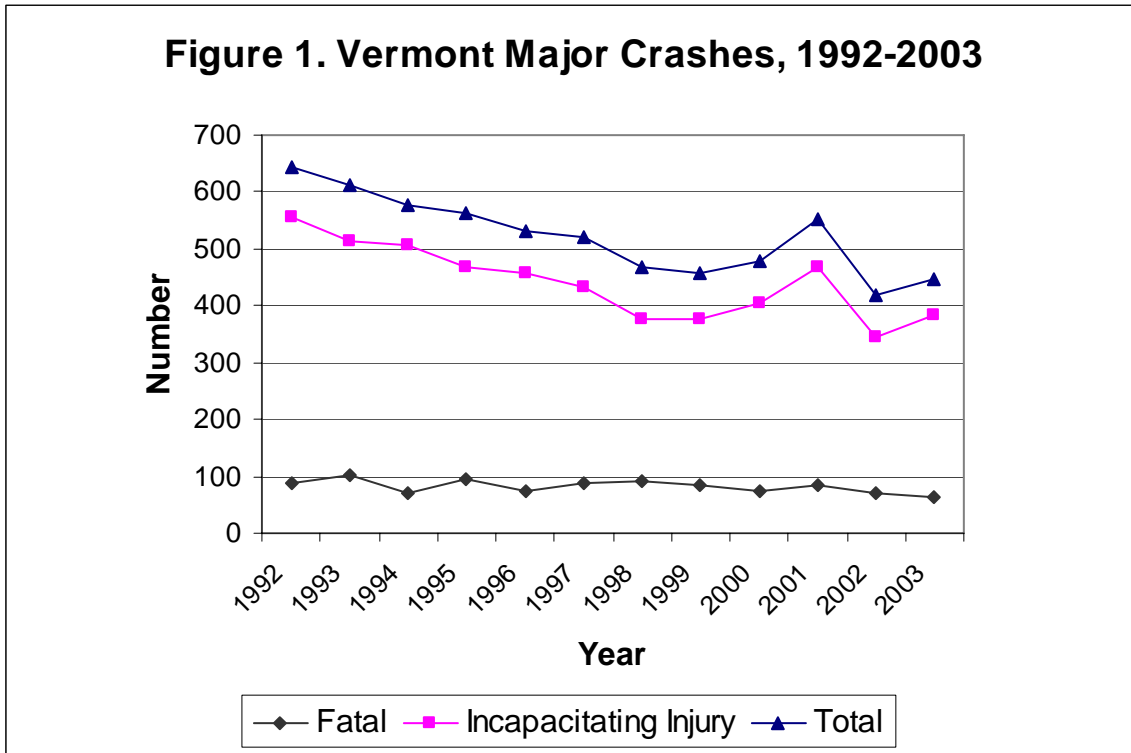
Preliminary data analysis for Vermont’s Strategic Highway Safety Plan (SHSP) involved compiling the number of major crashes each year between 1992 and 2003, and dividing these annual totals into crashes that resulted in fatalities versus crashes that resulted in incapacitating injuries. Data analysis also provided the number and percentage of major crashes for 1999-2003 (combined) within each of 22 Emphasis Areas, as well as for each of the five years separately. The specific variables used for the analyses are shown in the Appendix.

Major Crashes, 1992-2003

Table 1 shows the total annual number of major crashes in Vermont between 1992 and 2003, as well as the number of major crashes resulting in fatalities and the number resulting in incapacitating injuries. The total number of major crashes during the time period is 6,267, which averages to 522 crashes per year. Of the 6,267 major crashes, 981, or 15.7 percent, resulted in fatalities (an average of 82 crashes per year), while 5,286, or 84.3 percent, resulted in incapacitating injuries (an average of 440 per year).

Table 1. Vermont Major Crashes, 1992-2003

Year	Fatal	Incapacitating Injury	Total
	N	N	N
1992	87	556	643
1993	101	512	613
1994	69	508	577
1995	95	467	562
1996	74	456	530
1997	88	433	521
1998	90	377	467
1999	84	375	459
2000	75	403	478
2001	83	468	551
2002	72	346	418
2003	63	385	448
Total	981	5,286	6,267
Mean	82	440	522



As is evident in both [Table 1](#) and [Figure 1](#), the total number of major crashes steadily declined between 1992 and 1999 before increasing in 2000 and 2001, declining again in 2002, then increasing somewhat in 2003. Despite these fluctuations, the total number of major crashes was substantially less in 2003 (448 crashes) than in 1992 (643 crashes), representing a 30 percent decrease in the annual number of major crashes during the time period.

Between 1992 and 2003, the number of crashes resulting in incapacitating injuries exhibited a pattern mirroring that of major crashes. In 1992, 556 major crashes resulted in incapacitating injuries; in 2003, 385 crashes did so. This difference represents a decrease of 31 percent. The number of fatal crashes was also lower in 2003 (63 crashes) than in 1992 (87 crashes), but the decline was somewhat less consistent than was found for incapacitating injuries and total major crashes. Nonetheless, the difference between the number of fatal crashes in 1992 and 2003 represents a decline of 28 percent. Thus, all three measures—total major crashes, crashes resulting in fatalities, and crashes resulting in incapacitating injuries—showed substantial declines between 1992 and 2003.

Major Crashes by Emphasis Area, 1999-2003 Combined

Between 1999 and 2003, the number of major crashes totaled 2,354, and the number of fatalities or incapacitating injuries totaled 3,028. Table 2 provides a summary of major crashes for 22 Emphasis Areas. Each Emphasis Area is identified by a key strategy for reducing the number of major crashes in that area. Emphasis Areas are organized into six categories or parts: Drivers, Special Users, Vehicles, Highways, EMS, and Management. Five Emphasis Areas are not applicable to Vermont crash data, reducing the total number of relevant Emphasis Areas to 17, and the total number of categories or parts to four.

Part 1: Drivers. The Drivers section contains eight Emphasis Areas, one of which is not applicable to Vermont data (“Increasing Driver Safety Awareness”). Of the major crashes between 1999 and 2003, 27 percent (636 of 2,354 major crashes) involved a driver under the age of 21 (Emphasis Area, “Instituting Graduated Licensing for Young Drivers”). Five percent of major crashes (127 crashes) resulted in drivers being cited for driving with a suspended license or driving without a license (“Ensuring Drivers are Licensed and Fully Competent”). Seven percent of major crashes (164 crashes) involved a driver between the ages of 65 and 74, and six percent (153 crashes) involved a driver over the age of 74 (“Sustaining Proficiency in Older Drivers”).

Fifteen percent of major crashes (347 crashes) involved excessive speed or otherwise aggressive, erratic or reckless behavior (“Curbing Aggressive Driving”). Nineteen percent of major crashes (439 crashes) were alcohol related (“Reducing Impaired Driving”). Inattention, fatigue or falling asleep contributed to 336 or 14 percent of major crashes. Four percent of major crashes (84 crashes) listed the apparent operator condition as fatigue or falling asleep (“Keeping Drivers Alert”). Twenty-four percent of the 3,028 individuals fatally or severely injured in major crashes (739 individuals) were not using a restraint device (“Increasing Seat Belt Usage and Improving Airbag Effectiveness”).

Part 2: Special Users. Two Emphasis Areas are included in the Special Users section. As Table 2 shows, seven percent of major crashes involved pedestrians (“Making Walking and Street Crossing Easier”) and two percent (48 crashes) involved bicyclists (“Ensuring Safer Bicycle Travel”).

**Table 2. Vermont Strategic Highway Safety Plan
Summary of Major Crashes by Emphasis Areas, 1999-2003**

	Emphasis Areas	Vermont Major Crashes*	Percent
Part 1: Drivers	1. Instituting Graduated Licensing for Young Drivers	636 major crashes involved a driver under the age of 21 (out of 2,354 major crashes)	27%
	2. Ensuring Drivers are Licensed and Fully Competent	127 Citations for DLS/operating with no license (out of 2,354 major crashes)	5%
	3. Sustaining Proficiency in Older Drivers	164 major crashes involved a driver between the ages of 65 and 74	7%
		153 major crashes involved a driver over the age of 74	6%
	4. Curbing Aggressive Driving	347 major crashes listed excessive speed, following too closely or driving in erratic, reckless or aggressive manner as a contributing factor	15%
	5. Reducing Impaired Driving	439 major crashes were alcohol related	19%
	6. Keeping Drivers Alert	336 major crashes listed inattention or fatigued, asleep as a contributing factor	14%
		84 major crashes listed driver's condition as fell asleep, fatigued, etc	4%
7. Increasing Driver Safety Awareness	-NA-		
8. Increasing Seat Belt Usage and Improving Airbag Effectiveness	739 vehicle occupants fatally/severely injured (out of 3,028 total fatalities/severe injuries) were not using a restraint device	24%	
Part 2: Special Users	9. Making Walking and Street Crossing Easier	160 major crashes involved pedestrians	7%
	10. Ensuring Safer Bicycle Travel	48 major crashes involved bicyclists	2%

**Table 2. Vermont Strategic Highway Safety Plan
Summary of Major Crashes by Emphasis Areas, 1999-2003 (cont'd)**

	Emphasis Areas	Vermont Major Crashes*	Percent
Part 3: Vehicles	11. Improving Motorcycle Safety and Increasing Motorcycle Awareness	205 major crashes involving motorcycles	9%
	12. Making Truck Travel Safer and Fully Competent	176 major crashes involving heavy trucks	7%
	13. Increasing Safety Enhancements in Vehicles	-NA-	
Part 4: Highways	14. Reducing Vehicle-Train Crashes	1 major crashes involving a collision with a train	0%
	15. Keeping Vehicles on the Roadway	901 major crashes involving running off the road	38%
	16. Minimizing the Consequences of Leaving the Road	Major run-off the road crashes - Overturned (27.0%) - Collision with tree/large bush (26.9%) - Collision with pole/sign (13.3%) - Collision with guard rail/curb (12.7%) - Collision with other fixed object (12.3%) - Collision with ledge/boulder (7.8%)	
	17. Improving the Design and Operation of Highway Intersections	580 major crashes at an intersection	25%
	18. Reducing Head-on Crashes	280 major head-on crashes	12%
	19. Designing Safer Work Zones	14 major crashes in work zones	1%
	Part 5: EMS	20. Enhancing Emergency Medical Capabilities to Increase Survivability	-NA-
Part 6: Management	21. Improving Information and Decision Support Systems	-NA-	
	22. Creating More Effective Processes and Safety Management Systems	-NA-	

*Source: Vermont Crash Data (1999-2003)

Note: Between 1999 and 2003, there were 2,354 major crashes and 3,028 fatalities/incapacitating injuries.

Part 3: Vehicles. The Vehicles section contains three Emphasis Areas, but one (“Increasing Safety Enhancements in Vehicles”) is not applicable to Vermont crash data. As seen in Table 2, 205 or nine percent of major crashes involved motorcyclists (“Improving Motorcycle Safety and Increasing Motorcycle Awareness”). Seven percent of major crashes (176 of 2,354 crashes) involved heavy trucks (“Making Truck Travel Safer and Fully Competent”).

Part 4: Highways. Six Emphasis Areas are included in the Highways section of Table 2. Only one major crash (rounded to zero percent) involved a collision with a train (“Reducing Vehicle-Train Crashes”). Thirty-eight percent of major crashes (901 crashes) involved a vehicle running off the road (“Keeping Vehicles on the Roadway”). Consequences of these run-off the road crashes were: vehicle overturned (27.0 percent); collision with tree/large bush (26.9 percent); collision with pole/sign (13.3 percent); collision with guard rail/curb (12.7 percent); collision with other fixed object (12.3 percent); and collision with ledge/boulder (7.8 percent) (“Minimizing the Consequences of Leaving the Road”). Twenty-five percent of major crashes (580 crashes) occurred at an intersection (“Improving the Design and Operation of Highway Intersections”). Twelve percent of major (280 crashes) involved head-on crashes (“Reducing Head-on Crashes”), and one percent (14 crashes) took place in a work zone (“Designing Safer Work Zones”).

Part 5: EMS. The sole Emphasis Area in the EMS section is not applicable to Vermont crash data (“Enhancing Emergency Medical Capabilities to Increase Survivability”).

Part 6: Management. The two Emphasis Areas in the Management section also are not applicable to Vermont crash data (“Improving Information and Decision Support Systems” and “Creating More Effective Processes and Safety Management Systems”).

Summary. Table 3 shows the seven Emphasis Areas with the highest percentages of major crashes (or percentage of fatalities/severe injuries in the case of restraint device usage). Four characteristics stand out in their relatively strong associations with crashes that resulted in fatalities and incapacitating injuries: vehicles leaving the road (38 percent of major crashes); drivers under the age of 21 (27 percent of major crashes); crashes at intersections (25 percent of major crashes); and vehicle occupants fatally/severely injured not wearing a restraint device (24 percent of total fatalities/severe injuries). Three additional areas represent smaller but still sizable percentages of crashes: alcohol-related crashes (19 percent of crashes); crashes involving aggressive driving (15 percent of major crashes); and inattention (14 percent of major crashes). Five of these characteristics/Emphasis Areas are in the Drivers section, the two remaining are in the Highways section. This pattern suggests that efforts to reduce the number of major crashes in Vermont should focus primarily on characteristics of drivers.

**Table 3. Vermont Strategic Highway Safety Plan
Emphasis Areas with Highest Percentages of Major Crashes, 1999-2003**

Emphasis Areas	Vermont Major Crashes	Percent
Keeping Vehicles on the Roadway	Vehicles leaving the road	38%
Instituting Graduated Licensing for Young Drivers	Drivers under the age of 21	27%
Improving the Design and Operation of Highway Intersections	Crashes at intersection	25%
Increasing Seat Belt Usage and Improving Airbag Effectiveness	Vehicle occupants fatally/severely injured unrestrained	24%*
Reducing Impaired Driving	Alcohol related	19%
Curbing Aggressive Driving	Aggressive driving	15%
Keeping Drivers Alert	Inattention	14%

*Percent based upon total fatalities/severe injuries

Trends in Major Crashes by Emphasis Area, 1999-2003

Tables 4-7 provide statistics for each year between 1999 and 2003 for Emphasis Areas within the Driver, Special User, Vehicle, and Highway components, respectively, so that any trends in the characteristics associated with major crashes will be apparent. Because the total number of crashes varied from year to year, percentages are a more meaningful basis of comparison across years. Percentages are based on the total number of major crashes (or total number of fatalities/severe injuries for the Emphasis Area regarding seat belt usage) in a given year, so a smaller number of crashes may actually yield a higher percentage in a particular Emphasis Area relative to another year with a greater total number of crashes.

Part 1: Drivers. Table 4 shows statistics associated with the Driver Emphasis Areas. The percentage of crashes involving drivers under age 21 ranged between 25 and 30 percent during the time period. Percentages fluctuated somewhat from year to year, but no clear pattern or trend is evident. Citations for driving with a suspended license or driving without a license ranged from a low of two percent of major crashes to a high of nine percent. The percentage of crashes resulting in these types of citations declined between 1999 and 2001, increased in 2002 and remained fairly stable in 2003. As a percentage of all major crashes, those involving a driver between the ages of 65 and 74 ranged from 6-8 percent. The percentage of major crashes involving drivers over the age of 74 jumped markedly between 1999 and 2000, from three to eight percent, then was fairly stable before declining to six percent in 2003.

Speed and other forms of aggressive driving contributed to 15 percent of major crashes in three of the five years. In the remaining two years, percentages were 17 percent and 12 percent, which appear to be fairly normal fluctuations. The percentage of major crashes related to alcohol declined from 24 percent of major crashes in 1999 to 16 percent of major crashes in 2001, but then increased to 19 percent in 2003, which could reflect the start of an upward trend.

The percentage of major crashes listing inattention, fatigue or the driver falling asleep as a contributing factor increased between 1999 (12 percent) and 2001 (15 percent), declined slightly in 2002 (14 percent), then increased again in 2003 (16 percent). These could reflect normal fluctuations, or an upward trend since the percentage in 2003 is the highest for the five-year period. The percentage of major crashes that appear to have been caused by a driver being fatigued or falling asleep increased substantially during the last two years of the period, although they still comprise a small percentage of all major crashes. In 1999, two percent of major crashes involved drivers who were fatigued or fell asleep, but in 2003, seven percent of major crashes did. Finally, the percentage of fatalities/severe injuries to vehicle occupants who were not wearing a restraint device declined sharply between 1999 (31 percent of fatalities/severe injuries) and 2001 (22 percent), then was constant for the remaining two years.

**Table 4. Vermont Strategic Highway Safety Plan
Summary of Major Crashes for Part 1, Driver Emphasis Areas, 1999-2003**

Emphasis Areas	Vermont Major Crashes*	1999		2000		2001		2002		2003	
		N	%	N	%	N	%	N	%	N	%
1. Instituting Graduated Licensing for Young Drivers	Major crashes involving a driver under the age of 21	122	27%	143	30%	136	25%	111	27%	124	28%
2. Ensuring Drivers are Licensed and Fully Competent	Citations for DLS/operating with no license	40	9%	28	6%	12	2%	25	6%	22	5%
3. Sustaining Proficiency in Older Drivers	Major crashes involving a driver between the age of 65 and 74	29	6%	35	7%	37	7%	28	7%	35	8%
	Major crashes involving a driver over the age of 74	16	3%	37	8%	37	7%	38	9%	25	6%
4. Curbing Aggressive Driving	Major crashes listing excessive speed, following too closely or driving in erratic, reckless or aggressive manner as a contributing factor	70	15%	79	17%	68	12%	61	15%	69	15%
5. Reducing Impaired Driving	Alcohol related major crashes	108	24%	90	19%	87	16%	69	17%	85	19%
6. Keeping Drivers Alert	Major crashes listing inattention or fatigued, asleep as a contributing factor	56	12%	65	14%	84	15%	59	14%	72	16%
	Major crashes listing driver's condition as fell asleep, fatigued	7	2%	6	1%	12	2%	26	6%	33	7%
7. Increasing Driver Safety Awareness	-NA-										

8. Increasing Seat Belt Usage and Improving Airbag Effectiveness	Vehicle occupants fatally/severely injured not using a restraint device	183	31%	157	25%	163	22%	113	22%	123	22%
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*Source: Vermont Crash Data (1999-2003)

Number of major crashes: 1999-459; 2000-478; 2001-551; 2002-418; 2003-448

Number of fatalities/incapacitating injuries: 1999-582; 2000-620; 2001-755; 2002-514; 2003-557

Part 2: Special Users. Statistics for Special Users Emphasis Areas are shown in Table 5. The percentage of major crashes that involved a pedestrian fatality or incapacitating injury was six percent in three of the five years during the period, and eight percent in the remaining years. The percentage of major crashes that resulted in a bicyclist being fatally or severely injured was only two percent in each year between 1999 and 2003.

Part 3: Vehicles. Table 6 shows statistics for major crashes for Emphasis Areas within the Vehicles category. The percentage of major crashes involving motorcyclist fatalities or incapacitating injuries was eight percent in three of the five years, and ten percent in the remaining two years. The percentage of major crashes involving a heavy truck ranged from six to eight percent, and comprising eight percent of major crashes in three of the five years.

Part 4: Highway. Statistics for crashes within the Highway Emphasis Areas are shown in Table 7. During the five-year period, only one major crash involved a collision with a train. Running off the road was associated with between 31 and 43 percent of crashes. Percentages declined, but then rose again during the period, and were essentially the same in 2003 as in 1999. The consequences of running off the road varied, but roughly half resulted in the vehicle overturning or colliding with a tree or large bush. The percentages of different types of major run-off-the road crashes fluctuated somewhat, and no clear patterns are evident during the time period. The percentage of major crashes occurring at intersections first increased from 18 to 30 percent, then decreased to 23 percent. Major crashes involving head-on collisions tripled between 1999 (seven percent of all major crashes) and 2002 (22 percent), with most of the increase occurring between 2001 and 2002. However, between 2002 and 2003, the percentage dropped to 13 percent, still considerably higher than at the start of the period. Major crashes in work zones were negligible during the period, fluctuating between zero percent (due to rounding) and one percent.

**Table 5. Vermont Strategic Highway Safety Plan
Summary of Major Crashes for Part 2, Special User Emphasis Areas, 1999-2003**

Emphasis Areas	Vermont Major Crashes*	1999		2000		2001		2002		2003	
		N	%	N	%	N	%	N	%	N	%
9. Making Walking and Street Crossing Easier	Major crashes involving pedestrians	26	6%	27	6%	46	8%	27	6%	34	8%
10. Ensuring Safer Bicycle Travel	Major crashes involving bicyclists	10	2%	10	2%	11	2%	10	2%	7	2%

*Source: Vermont Crash Data (1999-2003)

Number of major crashes: 1999-459; 2000-478; 2001-551; 2002-418; 2003-448

**Table 6. Vermont Strategic Highway Safety Plan
Summary of Major Crashes for Part 3, Vehicle Emphasis Areas, 1999-2003**

Emphasis Areas	Vermont Major Crashes*	1999		2000		2001		2002		2003	
		N	%	N	%	N	%	N	%	N	%
11. Improving Motorcycle Safety and Increasing Motorcycle Awareness	Major crashes involving motorcycles	48	10%	36	8%	42	8%	41	10%	38	8%
12. Making Truck Travel Safer and Fully Competent	Major crashes involving heavy trucks	29	6%	39	8%	37	7%	35	8%	36	8%
13. Increasing Safety Enhancements in Vehicles	-NA-										

*Source: Vermont Crash Data (1999-2003)

Number of major crashes: 1999-459; 2000-478; 2001-551; 2002-418; 2003-448

**Table 7. Vermont Strategic Highway Safety Plan
Summary of Major Crashes for Part 4, Highway Emphasis Areas, 1999-2003**

Emphasis Areas	Vermont Major Crashes*	1999		2000		2001		2002		2003	
		N	%	N	%	N	%	N	%	N	%
14. Reducing Vehicle-Train Crashes	Major crashes involving a collision with a train	0	0%	0	0%	0	0%	0	0%	1	0%
15. Keeping Vehicles on the Roadway	Major crashes involving running off the road	191	42%	180	38%	172	31%	167	40%	191	43%
16. Minimizing the Consequences of Leaving the Road	Major run-off the road crashes										
	- Overturned		27%		23%		28%		31%		26%
	- Collision with tree/large bush		31%		25%		25%		25%		28%
	- Collision with pole/sign		10%		16%		15%		14%		11%
	- Collision with guard rail/curb		14%		14%		10%		10%		15%
	- Collision with other fixed object		9%		17%		13%		11%		12%
	- Collision with ledge/boulder		8%		6%		8%		10%		8%
17. Improving the Design and Operation of Highway Intersections	Major crashes at an intersection	82	18%	143	30%	163	30%	97	23%	95	21%
18. Reducing Head-on Crashes	Major head-on crashes	34	7%	38	8%	58	11%	93	22%	57	13%
19. Designing Safer Work Zones	Major crashes in work zones	4	1%	2	0%	2	0%	4	1%	2	0%

*Source: Vermont Crash Data (1999-2003)

Number of major crashes: 1999-459; 2000-478; 2001-551; 2002-418; 2003-448

Summary. Of the seven applicable Emphasis Areas in the Drivers section, those showing the greatest percentage increases between 1999 and 2003 are crashes involving a driver over the age of 74, and major crashes listing the driver's condition as asleep or fatigued. Although the increases are notable, percentages for these two areas are small. The broader category of crashes involving a fatigued, sleeping, or otherwise inattentive driver also appears to be on an upswing. In addition, although the percentage of alcohol-related major crashes was less in 2003 than in 1999, the percentage rose noticeably between 2002 and 2003, which may reflect the start of an upward trend. On a more positive note, the percentage of vehicle occupants fatally/severely injured who were not using a restraint device declined substantially before leveling off in recent years. The percentages of major crashes in other Emphasis Areas appear to have remained fairly stable or to have declined in recent years.

The two Emphasis Areas related to Special Users were fairly consistent in the percentages of major crashes involving pedestrians or bicyclists between 1999 and 2003. The small amount of variation evident in crashes involving pedestrians may simply reflect normal fluctuations.

Of the two relevant Emphasis Areas in the Vehicle section, the percentage of major crashes resulting in motorcyclists being fatally or severely injured fluctuated between eight and ten percent. The percentage of major crashes involving heavy trucks has been fairly stable in recent years, at around eight percent.

Within the Highway Emphasis Area, very few major crashes involved a collision with a train or took place in a work zone. In contrast, sizable percentages of major crashes involved running off the road. Although the percentage initially declined during the five-year period, it increased again, and the percentage of major run-off-the road crashes was essentially the same at the end of the period as at the beginning. The percentages associated with various consequences of running off the road in a major crash fluctuated during the time period, but no real trends are apparent. A vehicle overturning or colliding with a tree or large bush were the most common consequences of running off the road in a major crash. The percentage of major crashes that occurred at an intersection increased considerably, but then declined to an only slightly higher level in 2003 than in 1999. Head-on major crashes also increased markedly before declining, but the percentage in 2003 was still higher than it was in three of the four remaining years.

Overall, the number of major crashes declined substantially between 1992 and 2003. The numbers of crashes involving fatalities and those involving incapacitating injuries (separately) were also lower in 2003 than in 1999. Aggregate and individual-year major crash data for 1999-2003 show that some SHSP Emphasis Areas are associated with higher percentages of crashes than others. This information, coupled with five-year trend data for each area, suggest that increased attention and resources to certain areas—particularly those related to driver characteristics—might continue to reduce the number of major crashes in Vermont and improve the safety of Vermont's roads.

APPENDIX

Crash Data Variables Used for Analysis

Crash Data Variables Used for Analysis

Emphasis Area	Variables Used
1	position, age, injury, person type
2	injury, citations
3	position, age, injury, person type
4	injury, contributing circumstances
5	injury, alcohol related*
6	injury, contributing circumstances, operator condition
7	NA
8	injury, vehicle class, restraint
9	injury, person type
10	injury, person type
11	injury, vehicle class
12	injury, vehicle class**
13	NA
14	injury, vehicle collided with
15	injury, vehicle collided with
16	injury, vehicle collided with
17	injury, road characteristic
18	injury, accident type (direction of collision)
19	injury, contributing road condition
20	NA
21	NA
22	NA

*Alcohol related is computed from operator condition, contributing circumstance - driver, violation codes, alcohol percent, & drug test result

**Truck classification includes truck tractor[bobtail], tractor/trailer, tractor w/twin trailers, logging truck, logging tractor/trailer, single unit truck, & truck towing house trailer