UNDERSTANDING AND REDUCING RCMP MOTOR VEHICLE COLLISIONS

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Introduction

Despite training to handle the operation of motor vehicles under a variety of road, weather, and situational conditions, a substantial proportion of police vehicles are involved in collisions on an annual basis (Becker, Zaloshnja, Levick, Li, & Miller, 2003; Lundalv, Philipson, & Sarre, 2010). This is not unexpected given that police officers typically spend half of their shift in their vehicles (Plecas, McCormick, & Cohen, 2011). Moreover, police often multi-task while driving by using their mobile data terminals, cell phones, or other equipment, even when travelling at high speeds (Anderson, Courtney, Plecas, & Chamberlin, 2005; Cohen, Plecas, Mahaffy, & Levine, 2009; Plecas et al., 2011). Thus, routine travel by police in the context of their on-duty activities increases their risk relative to the general population of being involved in or injured from a motor vehicle collision (Becker et al., 2003).

Motor vehicle collisions account for nearly one-tenth (9 per cent) of police officer injuries (Brandl, 1996). Moreover, accidents account for an increasing proportion of police officer deaths while on-duty and motor vehicle related incidents are the leading cause of those accidental deaths (Brandl, 1996; Kanable, 2009; Pinizzotto, Davis, & Miller, 2002). Interestingly, although those in the general public at highest risk of being involved in a motor vehicle collision are men under 25 years old, when it comes to policing, officers in their mid-30s, with approximately 10 years of policing experience, are most at risk of dying in a motor vehicle collision while on-duty. One possible explanation is a sense of invincibility accumulated by having many years on the job successfully experiencing high-risk situations (Pinizzotto et al., 2002).

Much of the research on police motor vehicle collisions, and in particular, those resulting in injury and/or death, has focused on high speed pursuits. Research has consistently found that approximately one-third of high speed police pursuits result in a collision, one-tenth result in injury, and approximately 1% result in death (Becknell, Mays, & Giever, 1999; Hoffmann and Mazerolle, 2005; Payne and Fenske, 1996). However, these pursuits are frequently initiated for minor reasons (Hoffmann and Mazerolle, 2005). Given this, many researchers have concluded there is a need for more restrictive policies regarding police pursuits (Becknell et al., 1999; Hoffmann and Mazerolle, 2005).

At the same time, limited research has focused on the contributing role of speed to collision, injury, and death outside of high speed pursuits. Lundalv and colleagues (2010) proposed a time profit calculation demonstrating how much time could be saved in responding to a call for service by driving at different speeds. For instance, driving 30 kilometres at 110 kilometres an hour rather than 90 kilometres an hour results in a time profit of 4 minutes (i.e., reduces arrival at the destination from 20 to 16 minutes). However, they questioned this practice given that greater speed increases the risk of a collision and time profits tend to be small (Boden, 2004 as cited in Lundalv et al., 2010). Moreover, in their study, travelling at high speeds was the primary explanatory factor in the nearly 2,500 Swedish police motor vehicle collisions under study. However, Becker and colleagues' (2003) results also suggested that travelling under emergency conditions (i.e., high speed) was not related to injury or death of police motor vehicle occupants, thus this issue needs to be explored in more depth.

While police motor vehicle collisions are a leading cause of accidental deaths among police officers, police officer fatalities while on-duty have actually decreased over time (Kanable, 2009). However, this appears to be the result of decreasing homicides of police officers, as accident rates have remained relatively stable (Southwick, 2010). This latter finding is particularly important, as Southwick (2010)

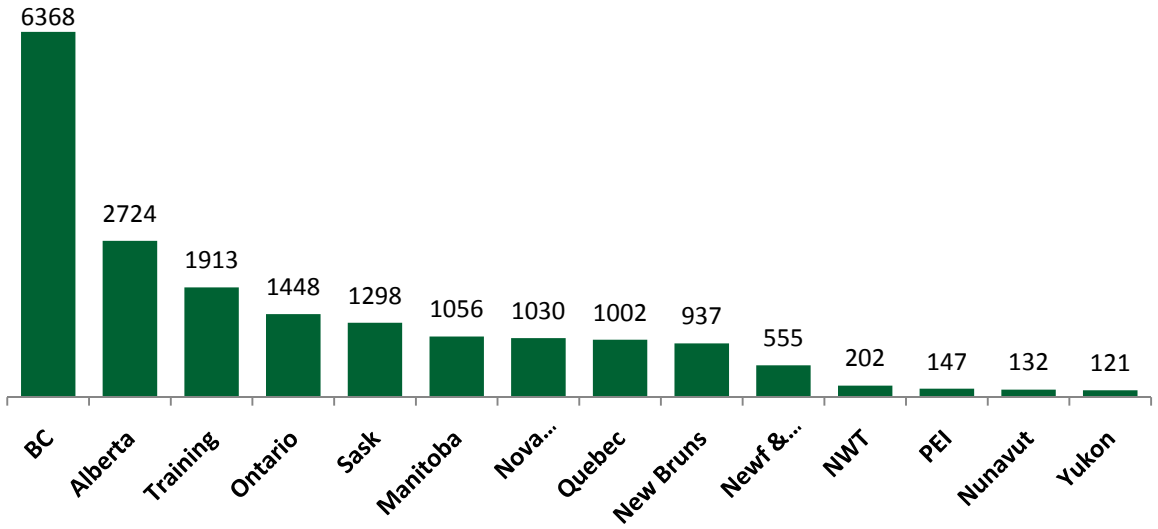
found that while the risk of dying in an on-duty accident decreased for average workers in the general population, the rates have remained stable for police. This suggests that not enough is being done to reduce the risk of police officer accidental death. Thus, it is important to understand the nature of police motor vehicle collisions for the purpose of training police officers. For instance, Pinnizzotto and colleagues (2002) suggested that particular attention should be paid to whether speed or fatigue were common factors in collisions, whether there were shift or time of day factors related to collisions, and what role the nature of duty at the time of the collision (e.g. traffic stop, emergency assistance, general patrol) played in collisions.

Despite the fact that police officers are unlikely to ever fire their weapon while on-duty (Kanable, 2009), police are required to recertify on an annual basis. However, although they are driving a motor vehicle on every shift they work, and spending at least half of their shift in their vehicle (Plecas et al., 2011), police officers often receive motor vehicle training only as cadets (Pinnizzotto et al., 2002). Moreover, despite their initial driver training, which provides them with better professional driving skills than the general public (Dorn and Barker, 2005), police risk of motor vehicle collision may be increased relative to the general public given the multiple distractions present in the vehicle (Kanable, 2009; Plecas et al., 2011). Therefore, it is essential to consider the frequency and patterns of motor vehicle collisions involving the police as they may suggest areas for training. With the above in mind, this report analyses Royal Canadian Mounted Police (RCMP) data on police motor vehicle collisions to understand the nature and quantity of RCMP motor vehicle collisions across Canada and to analyse whether particular patterns appear.

THE ROYAL CANADIAN MOUNTED POLICE (RCMP)

The RCMP operates federally across Canada and is the provincial police force for all provinces and territories in Canada, except Ontario and Quebec. It also operates on a municipal level, policing 180 different municipalities throughout Canada. As of May 2010, nearly 18,933 RCMP members were employed municipally, provincially, federally, or in another capacity (e.g., training) by the RCMP (Burczycka, 2010). As shown in Figure 1, the largest proportion of RCMP members is found in British Columbia, followed by Alberta and Ontario. Ontario has the third highest proportion of RCMP members despite being policed provincially by the Ontario Provincial Police, which is likely the result of it being the location of the national RCMP headquarters.

FIGURE 1: DISTRIBUTION OF RCMP MEMBERS ACROSS CANADA



When an RCMP member is involved in a collision, an investigation occurs and a Police Motor Vehicle Collision Report is completed and forwarded to a National Claims and Litigation Directorate database (called W5) for record keeping and analysis. A copy of this database containing the details of RCMP motor vehicle collisions from across Canada between 1998 and 2010 was provided to the Centre for Public Safety and Criminal Justice Research for analysis.

Results

A total of 7,000 Police Motor Vehicle Collision Reports were provided for analysis. While the bulk of recorded collisions occurred between 2003 and 2010, several occurred as far back as 1998. It is important to note that rather than reflecting an increasing trend in RCMP vehicle collisions, the trend reflected is of an increasing tendency to hold collision data electronically in databases, in particular, the recently developed W5 database used in this study. Another important issue to note is that these reports were not always completely filled out; therefore, the W5 data was limited in some areas, and resulted in an inability to completely analyse some of the trends in police motor vehicle collisions. The RCMP have recently taken steps to address these data problems and while the current results will be somewhat limited in some areas, future analyses of this sort should provide greater clarity on RCMP vehicle collisions.

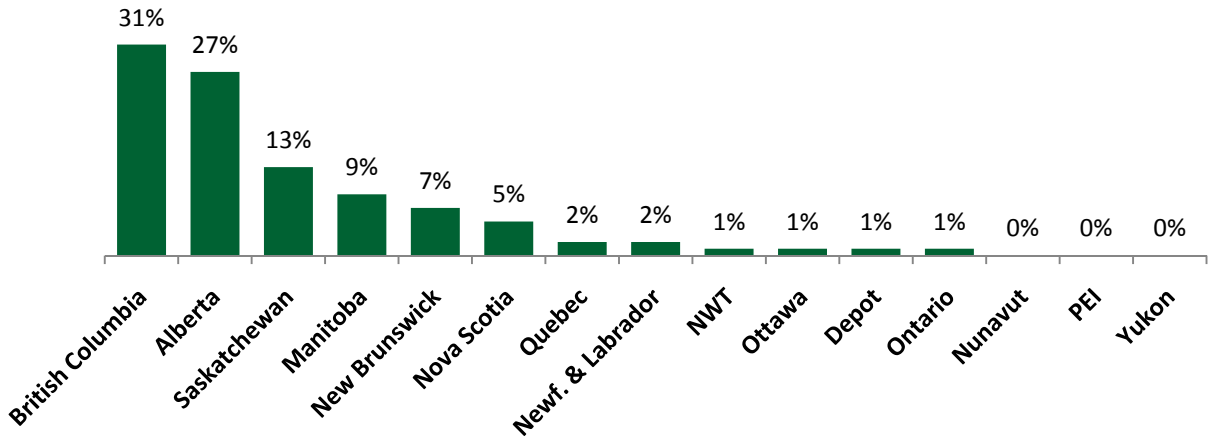
TABLE 1: NUMBER OF RCMP COLLISIONS RECORDED ELECTRONICALLY BETWEEN 1998 AND 2010

Year	Number of Collisions Recorded Electronically
1998	1
1999	1
2000	1
2001	3
2002	5
2003	133
2004	683
2005	656
2006	768
2007	895
2008	1,265
2009	1,553
2010	1,033

GENERAL INFORMATION

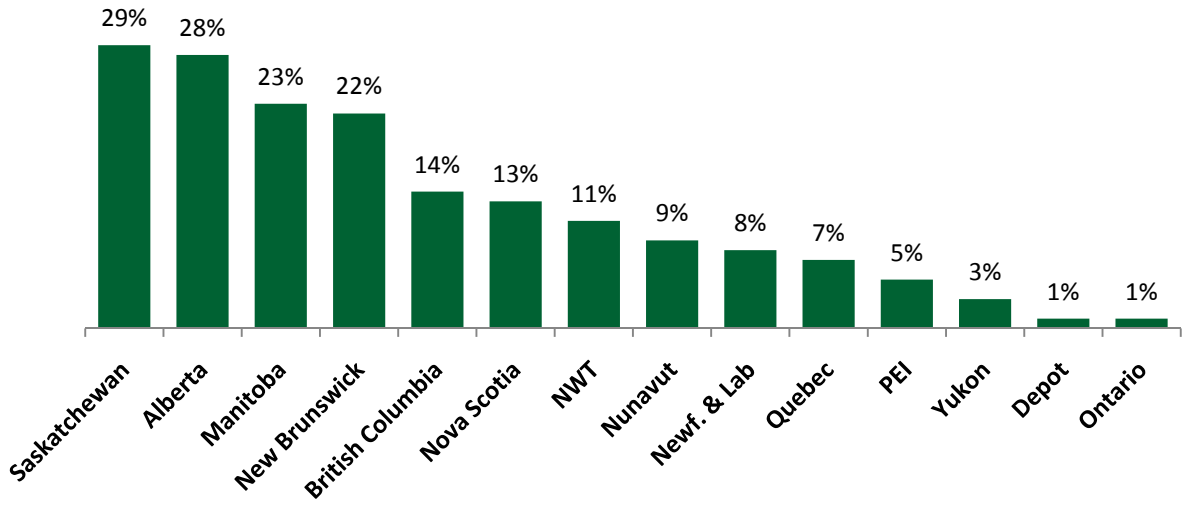
As the final three years of data were the most representative of the overall number of collisions, only the 2,870 RCMP motor vehicle collisions occurring over these three years that also had the division recorded were used to compare the distribution of collisions by district. Given that "E" Division in British Columbia has the largest proportion of RCMP members, it was not surprising to find that one-third of the collision reports originated from there (see Figure 2). Similarly, "K" Division in Alberta reported one-quarter of the 2008-2010 collisions in the database. These two main locations were followed by "F" Division in Saskatchewan, which contributed less than one-fifth of collisions, and "D" Division in Manitoba, which contributed one-tenth of RCMP vehicle collisions.

FIGURE 2: DISTRIBUTION OF RCMP VEHICLE COLLISION REPORTS BY DISTRICT 2008–2010



It is important to consider that simply having more working RCMP will result in a greater number of collisions. To account for this, a collision proportion was calculated by comparing the number of reported collisions to the overall number of RCMP members working in the district. With this calculation, Saskatchewan actually experienced the highest overall rate of RCMP vehicle collisions, followed by Alberta and Manitoba (see Figure 3). Despite having the greatest number of RCMP members, British Columbia's proportion of RCMP vehicle collisions fell to fifth.

FIGURE 3: PROPORTION OF RCMP VEHICLE COLLISIONS BY DISTRICT BETWEEN 2008-2010



A possible explanation for the higher rate of collisions in Saskatchewan, Alberta, and Manitoba is weather, given that these provinces are among those with the lowest temperatures in the winter season. This was supported by the fact that other provinces and territories having the coldest temperatures in the winter season (New Brunswick, the Northwest Territories, and Nunavut), despite having relatively low numbers of RCMP members stationed there, had the fourth, seventh, and eighth highest proportion of collision reports, respectively, between 2008 and 2010. Given this, weather as a factor in RCMP vehicle collisions will be explored in more detail later.

The day of the week the collision occurred was analysed for all collision data and found to vary slightly, although not substantially. Most RCMP vehicle collisions occurred mid-week on Wednesdays (17 per cent) and Thursdays (16 per cent). In contrast, the lowest proportion occurred on Sundays (12 per cent). It is important to note that the maximum difference in collisions by day of the week represented only a 5% variation, or a difference of less than 300 RCMP vehicle collisions across Canada. Similarly, there was a very small amount of variation in the time of day that the RCMP vehicle collision occurred. Specifically, approximately 5% of the collisions occurred at each of noon through 0700 hours, 2200 hours through midnight, and again at 0300 hours. In contrast, only 2% of collisions occurred in the early morning hours of 0600 and 0700 hours.

RCMP VEHICLE OPERATOR DATA

Overwhelmingly, RCMP members involved in vehicle collisions were male (83 per cent); however, this is consistent with the proportion of males employed by the RCMP (Burczycka, 2010). The average age of the member involved in a collision was 35 years old with a range of 19 to 77 years old. Overall, half of the members involved in a collision were between the ages of 24 and 37. Given that the average age of those involved in collisions was 35, it was not surprising to find that the members involved in a collision had, on average, nine years of service. However, this analysis was based on only 1,383 collisions as 77% of the cases had the years of service data coded as 0. In effect, the analysis of nearly 1,500 collisions were consistent with the previous literature in that the members involved in collision tended to be experienced police members.

Virtually all (97 per cent) RCMP collisions involved regular members as opposed to civilian members (1 per cent) or other RCMP employees (2 per cent). Slightly more than one-quarter (28 per cent) of collisions involved members who were off duty at the time of the collision. At the time of the collision, two-thirds (67 per cent) of the on-duty members were on general duty activities. Slightly more than one-tenth (14 per cent) were on "other" duties at the time, which primarily included plain-clothes duty, driver training, or traffic enforcement.

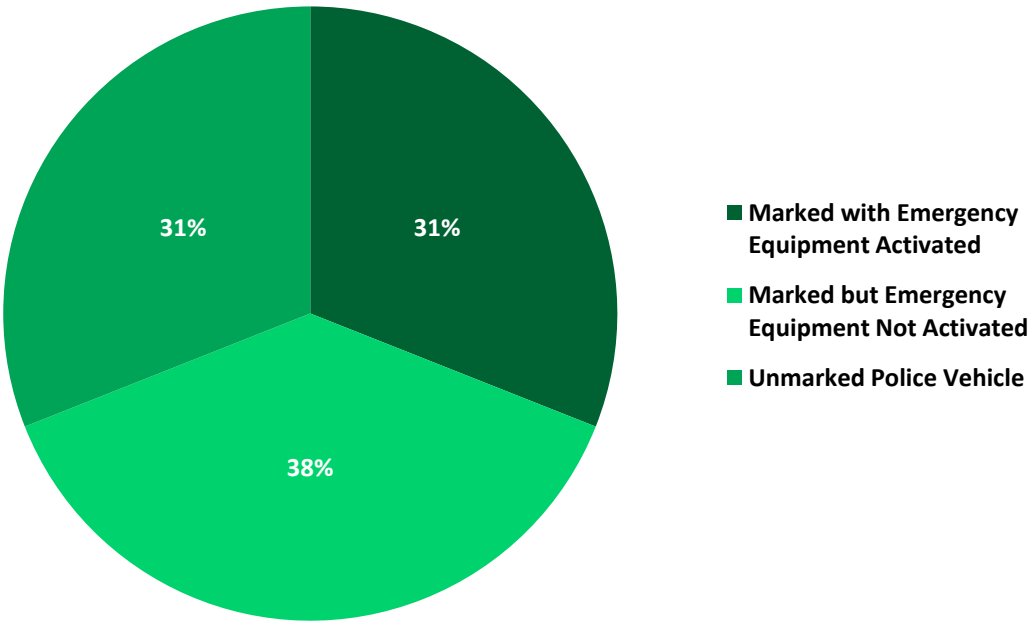
At the time of the collision, on-duty members were on their first shift of the cycle (91 per cent) and had slept, on average, five hours in the previous 24-hour period. Very few members involved in a collision had worked one through three shifts (6 per cent each), four shifts (1 per cent), or more (1 per cent) prior to the collision. It was very surprising to find that so many members were involved in a collision on their first shift, as it was expected that these members would be the most rested having just come off four days away from work. However, there are a couple of potential explanations for this result. Again, the proportion of shifts involving a "0" was substantial and may actually reflect missing data rather than having worked no shifts prior to the one with the collision. Alternatively, the fact that they had slept only five hours on average prior to their collision shift may explain the increased tendency to be involved in a collision, as this is less than the recommended amount of sleep people should get each night. In other words, given their lack of the recommended seven to eight hours of sleep prior to their collision shift, their focus and reflexes may have been blunted. Alternatively, these members were likely driving their own vehicle during the four days off and may have become slightly unaccustomed to using the various tools in the police car, such as the mobile data terminal or the emergency equipment; therefore, their ability to multitask may be less on the first shift than after they become familiar with the vehicle.

It would be interesting to examine how far into the shift, particularly the first shift, an incident occurred, as this may support the theory that unfamiliarity the police vehicle or police fatigue is associated with vehicle collisions. Unfortunately, data on the time the shift started and time patrol started was not regularly reported and so this information could not be reliably analysed. It is important to record this data in the future in order to provide greater clarity on things like fatigue or lack of familiarity with a police vehicle or police driving.

RCMP VEHICLE DATA

Nearly all (96 per cent) of the collisions reported involved a vehicle; however, it is essential to note that over half (54 per cent) of the data was missing. Data on whether the car was marked was more reliable, with approximately one-fifth (19%) of data missing. The remaining 6,164 reports indicated that, most commonly, the vehicle involved in a collision was marked, and did not have its emergency equipment activated at the time of the collision (see Figure 4).

FIGURE 4: NATURE OF RCMP VEHICLE INVOLVED IN COLLISION

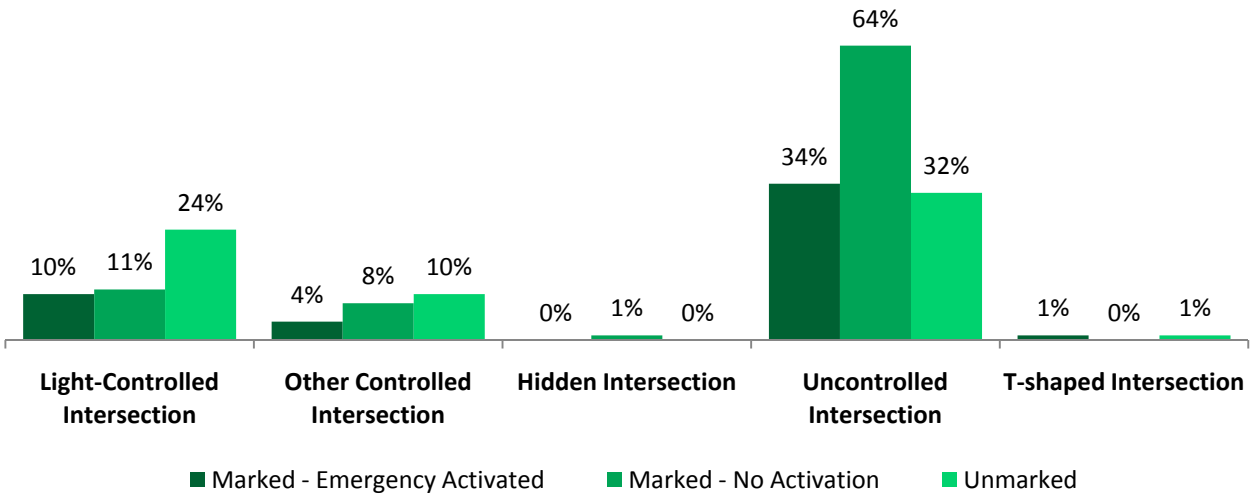


Although risk for collisions may increase when driving in an emergency situation, only one-third of incidents involved vehicles driving with their emergency equipment (i.e. lights and/or sirens) activated. Likewise, it would be anticipated that the risk for collisions at an intersection involving a vehicle with activated emergency equipment would increase given that police may need to run a red light when responding; however, this was not the case. Although nearly two-thirds (62 per cent) of collisions occurred at an intersection, usually, it was uncontrolled (43 per cent), or controlled by a light (15 per cent) or other sign (7 per cent). It is important to note that in one-third (34 per cent) of collisions occurring in an intersection, the intersection was recorded as "device unknown"; therefore, this data has limited use in informing the RCMP regarding the nature of intersection-based collisions.

More collisions involving a marked vehicle without activated emergency equipment occurred at uncontrolled intersections than marked vehicles with activated emergency equipment (see Figure 5). In addition, even when collisions occurred in an emergency situation (i.e. equipment activated), the RCMP vehicle was travelling, on average, at a speed of 54 kilometres per hour, which, although significantly faster than marked, but non-emergency activated police vehicles (X = 38 kilometres per hour) was not

excessive given the posted speed limit in the area was typically 55 kilometres per hour.[1] Therefore, it did not seem like RCMP were driving in a dangerous fashion when they were responding to an emergency situation, and that collisions were no more likely to occur in this situation than when driving generally.

FIGURE 5: NATURE OF POLICE MOTOR VEHICLE AND NATURE AND INTERSECTION



Unfortunately, one-third of the data on the vehicles' speed at the time of the collision or the posted speed at the location of the collision was not recorded. In the remaining cases, the average speed travelled by the member at the time of the collision was 37 kilometres per hour in an area where the posted speed was 42 kilometres per hour. In effect, only one-quarter (23 per cent) of members were speeding at the time of the incident, as defined by travelling 10 kilometres per hour or more over the posted speed limit. On average, members who were speeding were going 30 kilometres per hour over the speed limit; however, this analysis consisted of only 843 collisions and is, therefore, difficult to generalize. Not surprisingly, members who were speeding at the time of the collision were more likely to be driving a marked vehicle with their lights and/or siren activated (45 per cent), as opposed to driving a marked vehicle without the emergency equipment activated (21 per cent), or driving an unmarked vehicle (16 per cent). Although it was interesting to find that one-fifth of marked vehicles driving in a non-emergency situation were speeding, it should be noted that there was a lot of missing data on speed; therefore, any results involving speed are difficult to apply to collisions in this sample.

Collision Site Data

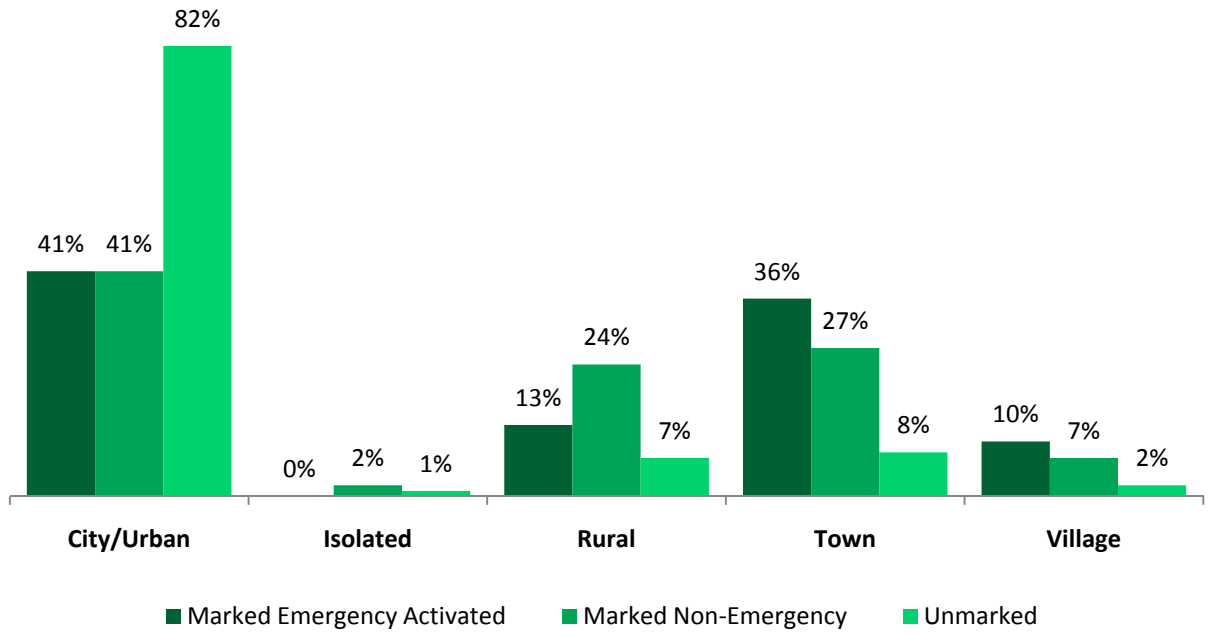
Nearly all of the incidents occurred outdoors (95 per cent), with the remaining collisions occurring inside, for instance, in a parking garage. Given that one-third of all collisions occurred in the daylight hours between noon and 1900 hours, it was not surprising to find that half (52 per cent) of all collisions occurred during daylight. Another 42% of all RCMP collisions occurred during "dark" conditions, while

[1] Analysis based on the 2,543 total cases where speed exceeded 0 km/h

very few occurred during dawn (2 per cent) or dusk (5 per cent). Vehicles that were unmarked were substantially more likely to be involved in a daytime collision (70 per cent) than were marked vehicles (42 per cent), whereas marked vehicles driving either with (51 per cent) or without (49 per cent) emergency equipment activated nearly equally likely to have night time collisions, compared to only one-quarter (23 per cent) of unmarked vehicles.

Over half (55 per cent) of collisions occurred in city or urban areas, with nearly another quarter (23 per cent) occurring in smaller towns and 6% in villages. One-third of collisions involving marked emergency activated vehicles occurred in towns, compared to one-quarter of marked non-emergency activated vehicles and one-tenth of unmarked vehicles (see Figure 6). In contrast, unmarked vehicles were substantially more likely to be involved in a city-based collision than were marked vehicles. Marked non-emergency activated vehicles were more likely to be involved in a rural-based collision. However, overall, rural or other fairly isolated areas were not common locations for collisions (16 per cent). Not surprisingly then, 81% of the roads where collisions occurred were paved, while less than one-fifth were gravel (14 per cent) or earth (3 per cent) roads.

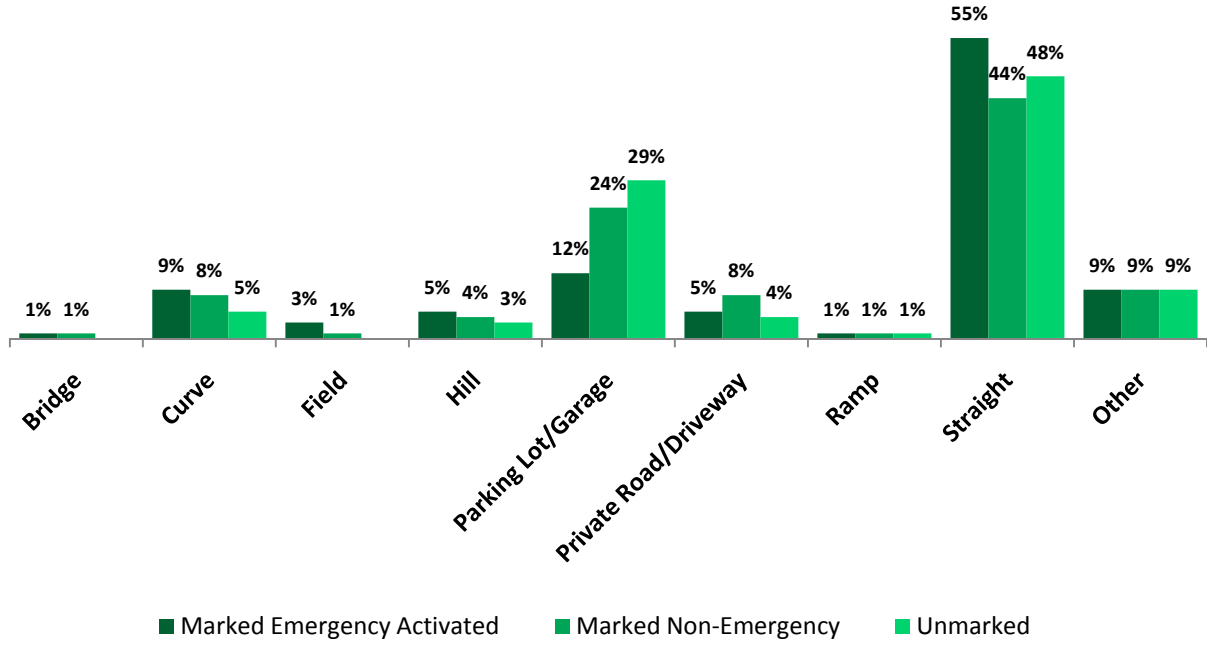
FIGURE 6: LOCATION OF COLLISION BY TYPE AND STATUS OF RCMP VEHICLE



Nearly half (48 per cent) of vehicle collisions occurred on straight roadways, while 7% involved a curving road. Nearly three-quarters (72 per cent) were undivided roadways, and there were an average of two lanes. The next more common site of an RCMP vehicle collision occurred in parking areas, as nearly one-quarter occurred in either a parking lot (20 per cent) or parking garage (3 per cent). These results also varied slightly based on vehicle status (see Figure 7); emergency activated marked vehicles were more likely to be involved in a collision while travelling on a straight road, whereas the tendency for parking

lot collisions was higher for marked non-emergency activated and unmarked vehicles, compared to emergency activated vehicles.

FIGURE 7: LOCATION OF COLLISION BY THE TYPE AND STATUS OF RCMP VEHICLE

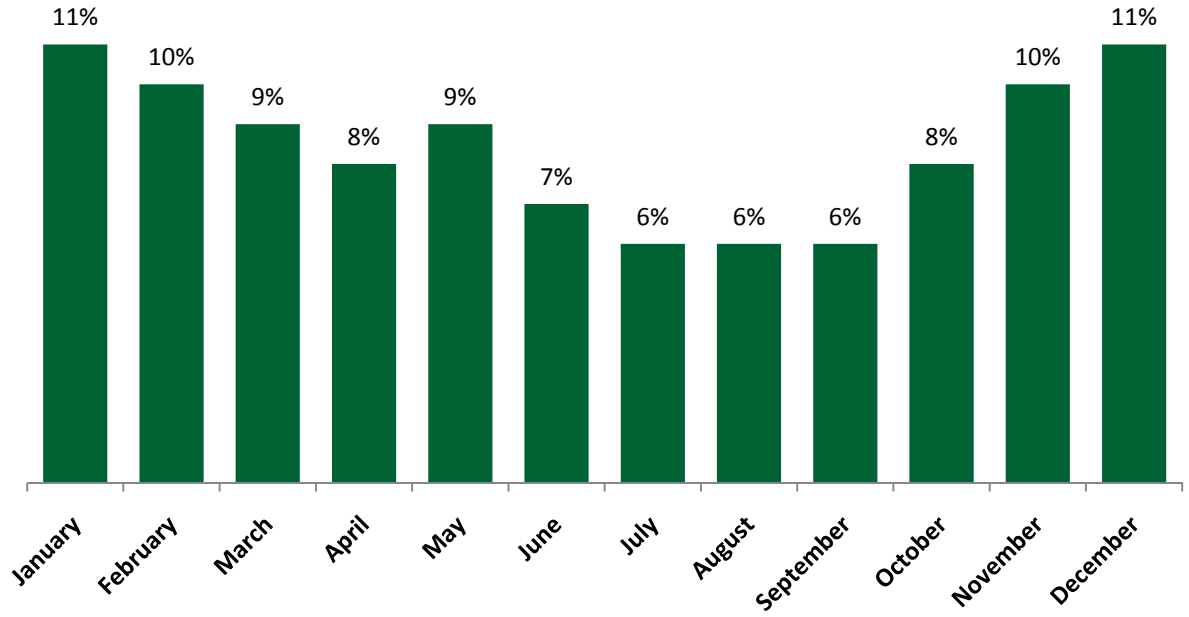


Weather and Road Conditions at Time of Collision

A little over half (56 per cent) of the RCMP vehicle collisions occurred in dry conditions. The remaining conditions were hazardous, either from snow (17 per cent), ice (13 per cent), or rain (13 per cent). For the most part, visibility was good (86 per cent) at the time of the collision, with only 9% of collisions having occurred under what was recorded as "poor" visibility. The remainder of collisions (5 per cent) were recorded as occurring under "average" conditions.

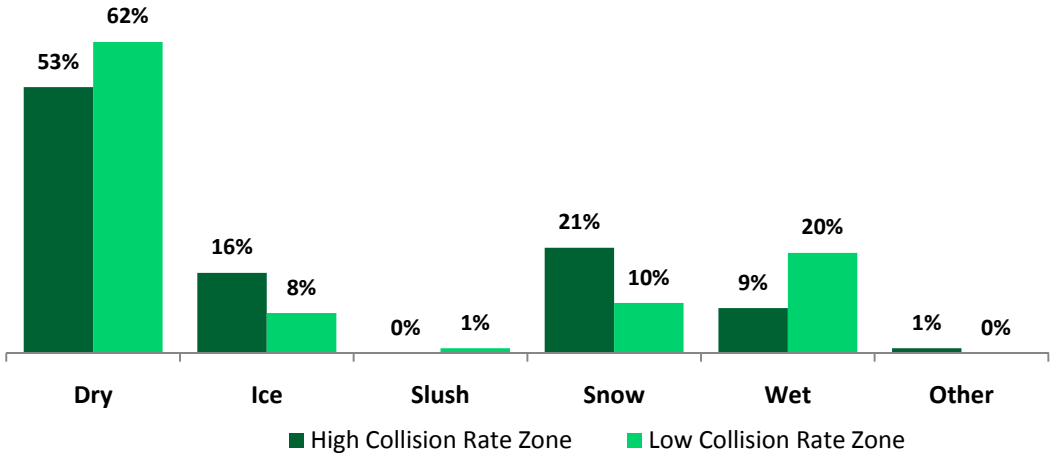
Earlier in this report, it was noted that the locations in Canada experiencing the lowest temperatures in the winter also experienced the highest rate of RCMP vehicle collisions. Despite the fact that over half of the conditions at the time of the collision were noted as "dry", the data below supported that weather appeared to be a factor in contributing to the collisions. The highest proportion of RCMP vehicle collisions occurred in the winter months of November through February (see Figure 8). While essentially half of RCMP vehicle collisions occurred in each of the first (January through June) and second (July through December) six months of the calendar year, the four main winter months accounted for almost half (42 per cent) of all RCMP vehicle collisions across Canada.

FIGURE 8: DISTRIBUTION OF RCMP COLLISIONS BY MONTH



Moreover, when comparing the regions with the highest rate of collisions (Saskatchewan, Alberta, Manitoba, New Brunswick, Northwest Territories, and Nunavut) to the remaining regions, there was a significant difference in weather conditions, in that the top six collision rate regions were less likely to experience dry conditions, and more likely to experience ice and snow (see Figure 9).[2] In contrast, members in the rest of Canada were more likely to experience wet conditions at the time of their collisions. Given this, it is important to consider the variation in causes of RCMP collisions by district.

FIGURE 9: WEATHER CONDITIONS COMPARED BETWEEN HIGH AND LOW COLLISION RATE ZONES

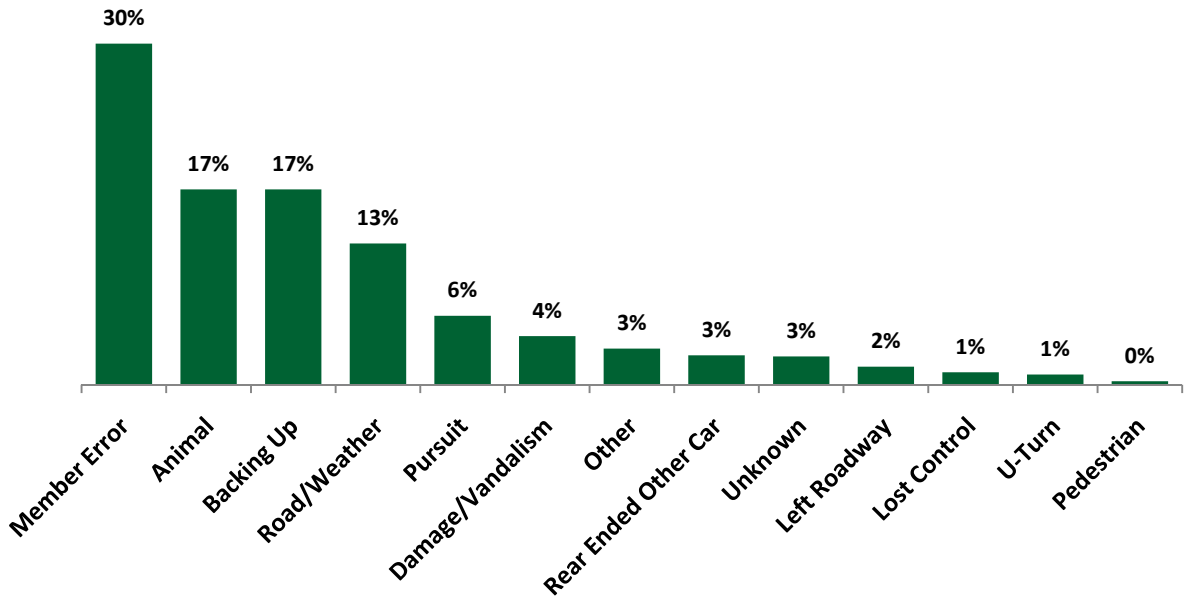


[2] x^2 (5) = 351, p < .001

Cause and Nature of Collision

At the time of the collision, the majority of RCMP members were on duty (72 per cent). The most common cause of collisions[3] was member error followed by hitting or being hit by an animal, backing up, and road/weather conditions. Of note, in only 17 cases was a pedestrian the cause of a police collision (see Figure 10).

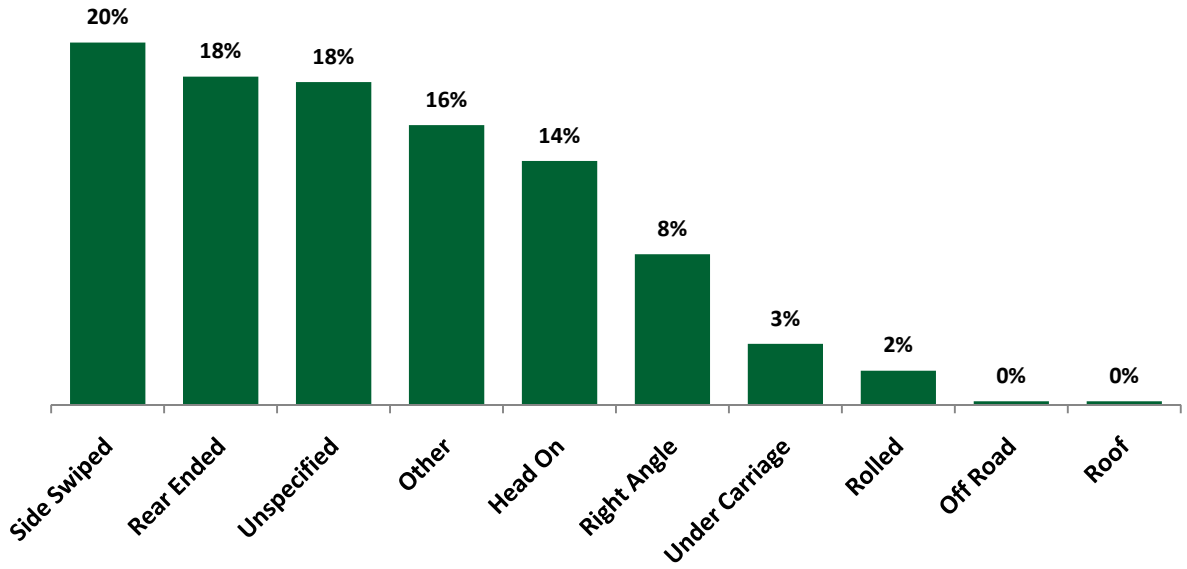
FIGURE 10: MAIN CAUSE OF POLICE COLLISION



In terms of the nature of collisions, the majority of police vehicles were side swiped, rear ended, or involved in a head on collision (see Figure 11). However, in a substantial proportion of cases, this information was not specified (18 per cent), making it difficult to obtain a comprehensive understanding of the nature of police collisions. Furthermore, it is not possible to determine fault (i.e., whether the police vehicle struck the other vehicle or was hit by the other vehicle). At the time of the collision, police vehicles were unlikely to be stopped (8 per cent). However, it is important to note that approximately half of the cases were missing information on this item (51 per cent) making it difficult to provide an accurate description of what police were engaged in at the time of the collision. As mentioned above, the average speed of the police vehicle at the time of the collision was 37 kilometres per hour and ranged from 1 to 180 kilometres per hour.

[3] The percentages are based on excluding crashes that were caused by third party error.

FIGURE 11: NATURE OF POLICE COLLISION

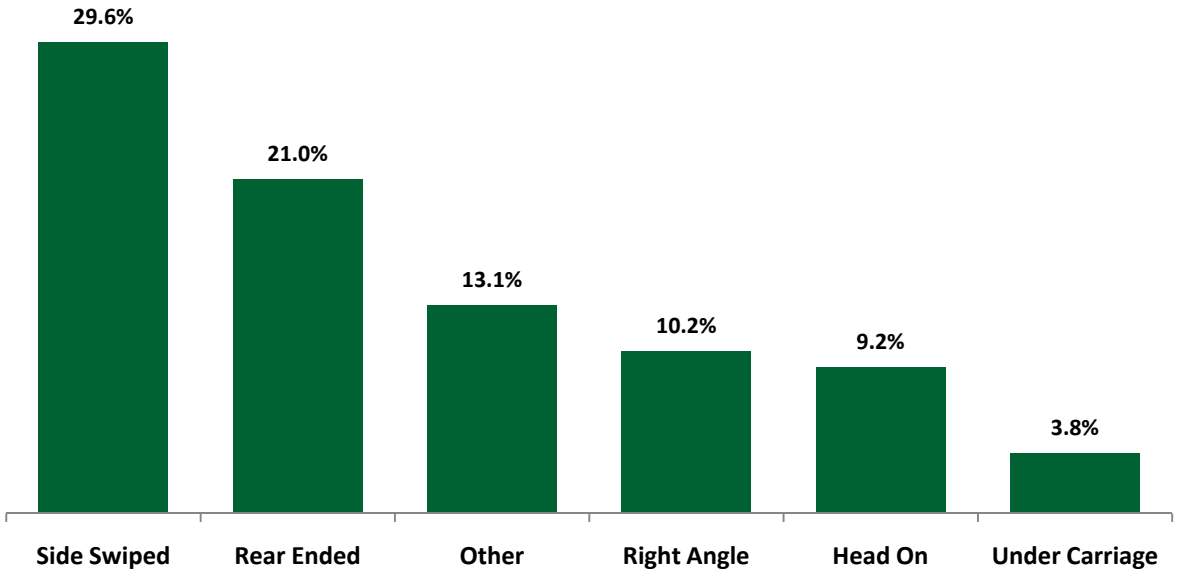


The majority of police collisions resulted in property damage (80 per cent), and there were very few injuries suffered by either the RCMP or third parties. Of the 7,000 police collisions, 132 (2 per cent) resulted in an injury to the RCMP and 161 (2 per cent) resulted in an injury to a third party. Of the 132 RCMP injuries, the overwhelming majority involved a minor injury (91 per cent). The remaining cases involved a disabling injury (6 per cent) and loss of consciousness (3 per cent). Of note, none of the police collisions resulted in an RCMP fatality. Of the 161 third party injuries, the overwhelming majority involved a minor injury (92 per cent). The remaining cases involved a disabling injury (5 per cent) or fatalities (4 per cent). To provide a more detailed analysis of the nature of police collisions, collisions due to member error, animals, backing up, and road/weather conditions will be examined in greater detail below.

COLLISIONS DUE TO MEMBER ERROR

There were 1,598 police collisions due to member error. In the majority of these cases, the operator of the police vehicle was on duty (80 per cent). In nearly one-third of cases (30 per cent), the police vehicle sideswiped another vehicle/object, and in approximately one-fifth of cases (21 per cent), the police vehicle rear-ended another vehicle/object (see Figure 12). A smaller proportion involved the police vehicle hitting another vehicle/object at a right angle or hitting another vehicle/object head on. The average speed of the police vehicle at the time of the collision was 24 kilometres per hour and ranged from 1 to 180 kilometres per hour.

FIGURE 12: NATURE OF POLICE COLLISION DUE TO MEMBER ERROR



Of all police collisions due to member error, the majority resulted in property damage (82 per cent). Thirty-nine of these cases (2 per cent) resulted in an injury to the RCMP and 61 (4 per cent) resulted in an injury to a third party. Of the 91 RCMP injuries, the majority involved a minor injury (92 per cent) and the remaining cases involved a disabling injury (8 per cent). None of the police collisions resulted in an RCMP fatality. Of the 61 third party injuries, the majority involved a minor injury (97 per cent). The remaining cases involved a disabling injury (2 per cent) or a fatality (2 per cent).

COLLISIONS INVOLVING ANIMALS

There were 916 police collisions involving animals. In slightly over half of these cases (51 per cent), the police vehicle hit the animal head on or was hit head on by the animal. There were very few instances of other types of collisions as approximately one-quarter (24 per cent) of animal-related collisions were unspecified. The average speed of the police vehicle at the time of the collision was 90 kilometres per hour and ranged from 5 to 180 kilometres per hour. Of all police collisions involving animals, the majority resulted in property damage (73 per cent). Three of these cases resulted in an injury to the RCMP member and one resulted in an injury to a third party; all sustained injuries were coded as minor in nature. None of the police collisions involving animals resulted in an RCMP or third party fatality.

COLLISIONS DUE TO BACKING UP

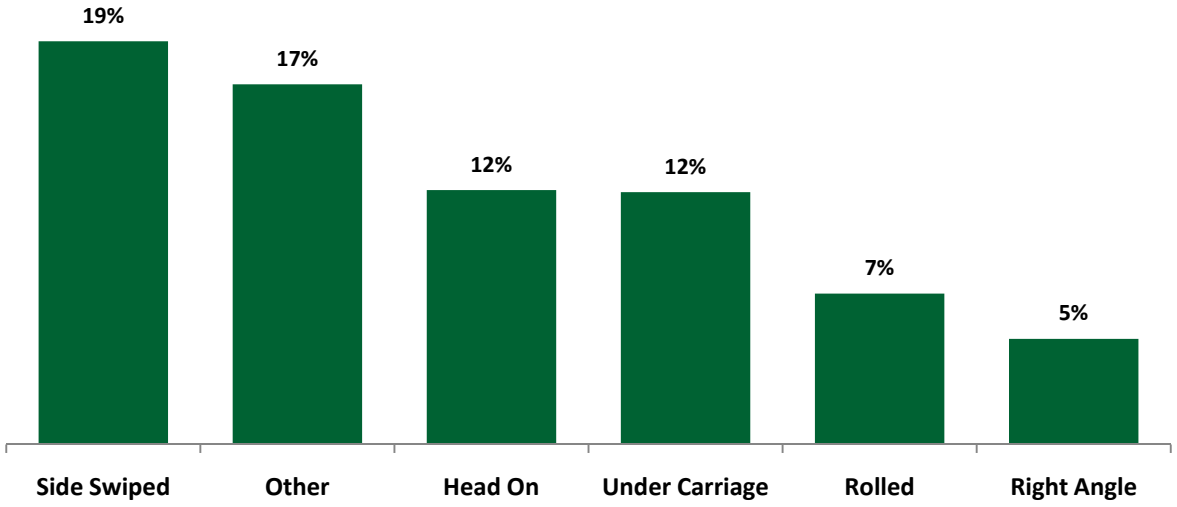
There were 918 police collisions due to backing up. In the majority of these cases, the operator of the police vehicle was on duty (75 per cent). In approximately one-quarter of cases (24 per cent), the police

vehicle rear ended another vehicle/object and in a little under one-fifth of cases (17 per cent), the police vehicle side swiped another vehicle/object. There were a few instances of other types of collisions (29 per cent) and slightly more than one-quarter (23 per cent) were unspecified.[4] The average speed of the police vehicle at the time of the collision was 5 kilometres per hour and ranged from 1 to 60 kilometres per hour. Of all police collisions due to backing up, the majority (76 per cent) resulted in property damage. Only one case resulted in an injury to the RCMP and four cases resulted in an injury to a third party; all sustained injuries were coded as minor in nature. None of the police collisions due to backing up resulted in an RCMP or third party fatality.

COLLISIONS DUE TO ROAD/WEATHER CONDITIONS

There were 664 police collisions due to road/weather conditions. In the majority of these cases, the operator of the police vehicle was on duty (75 per cent). The most common characteristics of these cases included side swiping, head on, and under carriage (see Figure 13). The average speed of the police vehicle at the time of the collision was 45 kilometres per hour and ranged from 1 to 160 kilometres per hour.

FIGURE 13: NATURE OF POLICE COLLISION DUE TO ROAD/WEATHER CONDITIONS



Of all police collisions due to road/weather conditions, six (1 per cent) resulted in an injury to the RCMP and six (1 per cent) resulted in an injury to a third party. The majority of RCMP (83 per cent) and third party (100 per cent) injuries were minor in nature, with only one disabling RCMP injury. None of the police collisions due to road/weather conditions resulted in an RCMP or third party fatality.

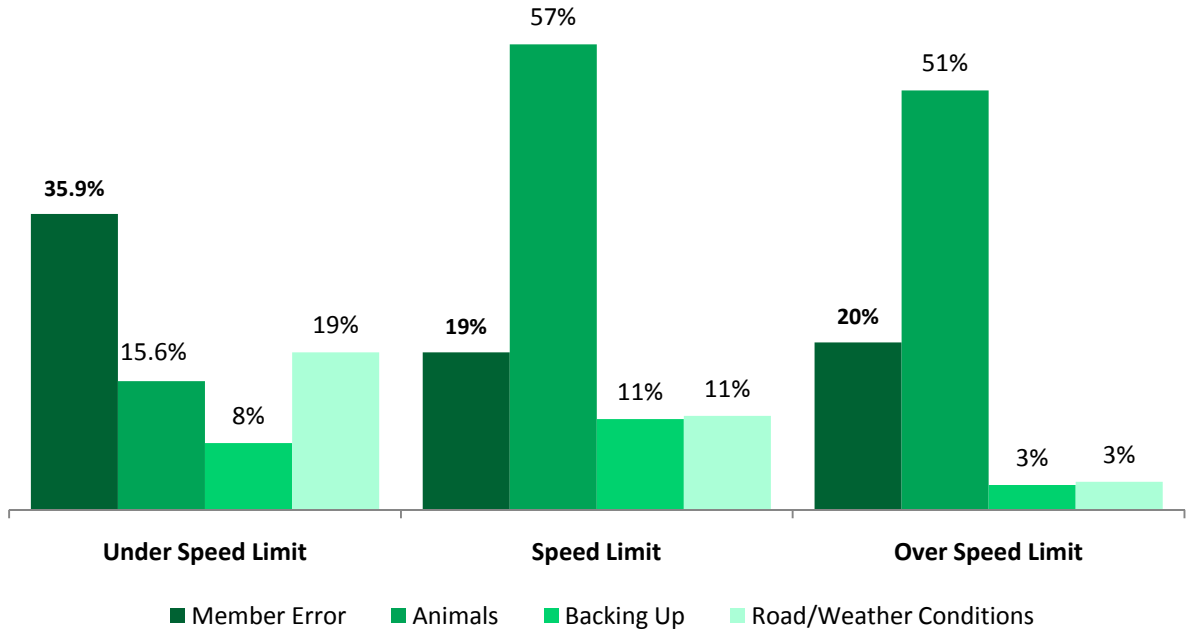
[4] Approximately 1% of cases involved a police vehicle backing up yet involved in a head-on collision. These cases reflect the importance of ensuring data quality.

Factors Influencing Collisions

To determine what factors contributed to police collisions, the four most common causes of police collisions (i.e., member error, animals, backing up, and road/weather conditions) were examined in greater detail with respect to speed, road conditions, visibility conditions, and whether the police vehicle was marked or unmarked.

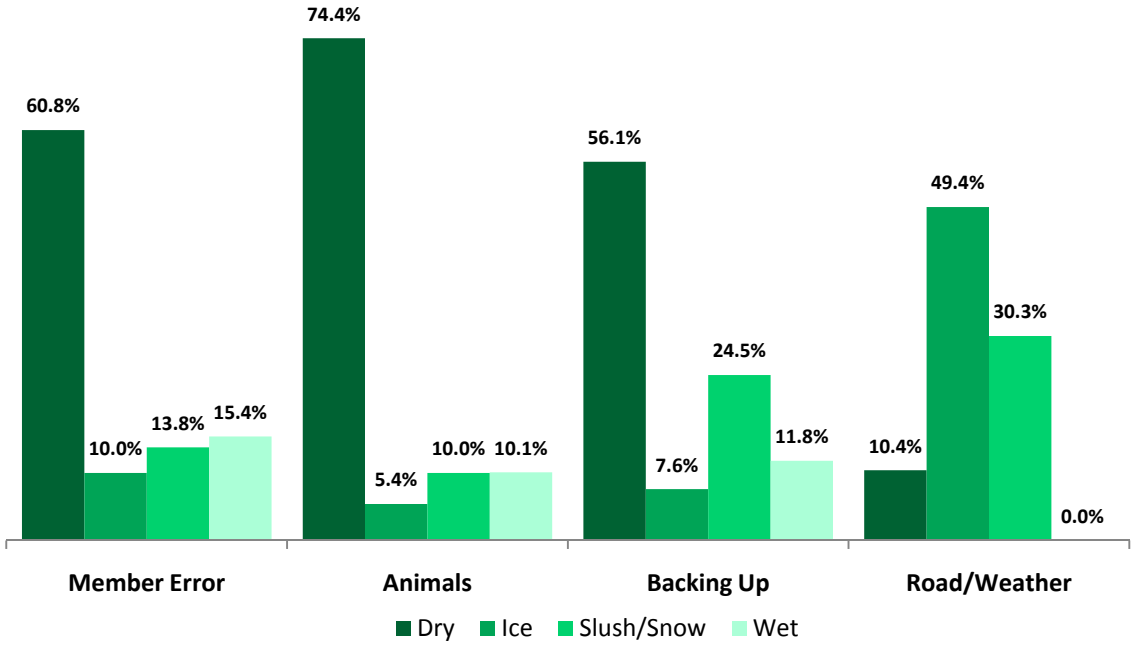
Comparisons were made between RCMP members who were not speeding (i.e., driving 10 kilometres or more below the speed limit), RCMP members who were driving at the speed limit (i.e., driving between 9 kilometres below or above the speed limit), and RCMP members who were speeding (i.e., driving 10 kilometres or more above the speed limit). The average speed of RCMP members who were not speeding was 30 kilometres per hour, the average speed of RCMP members who were driving at the speed limit was 76 kilometres per hour, and the average speed of RCMP members who were speeding was 106 kilometres per hour. As illustrated in Figure 14, the most common causes of police collisions when the vehicle was going under the speed limit were member error and road/weather conditions. In contrast, when the vehicle was driving at or above the speed limit, the most common causes of police collisions were animals and member error.

FIGURE 14: CAUSE OF COLLISION BY SPEED OF POLICE VEHICLE



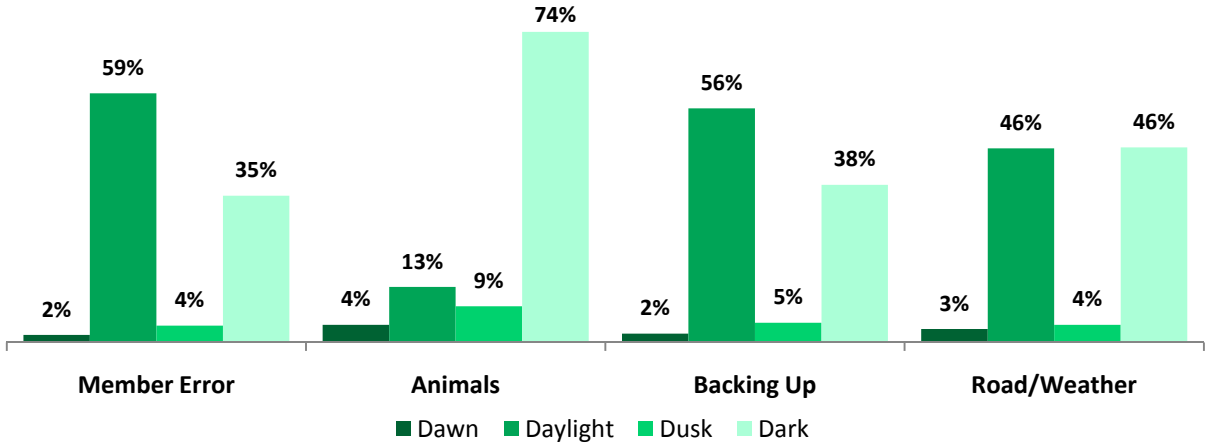
The proportion of police vehicle collisions that occurred under various road conditions were examined for the four most common causes of police collisions. As illustrated in Figure 15, collisions due to member error, animals, and backing up most commonly occurred when the surface of the road was dry. In contrast, and not surprisingly, collisions due to road/weather conditions most commonly occurred when the surface of the road was icy or slushy/snowy.

FIGURE 15: ROAD CONDITIONS UNDER COLLISION CAUSE



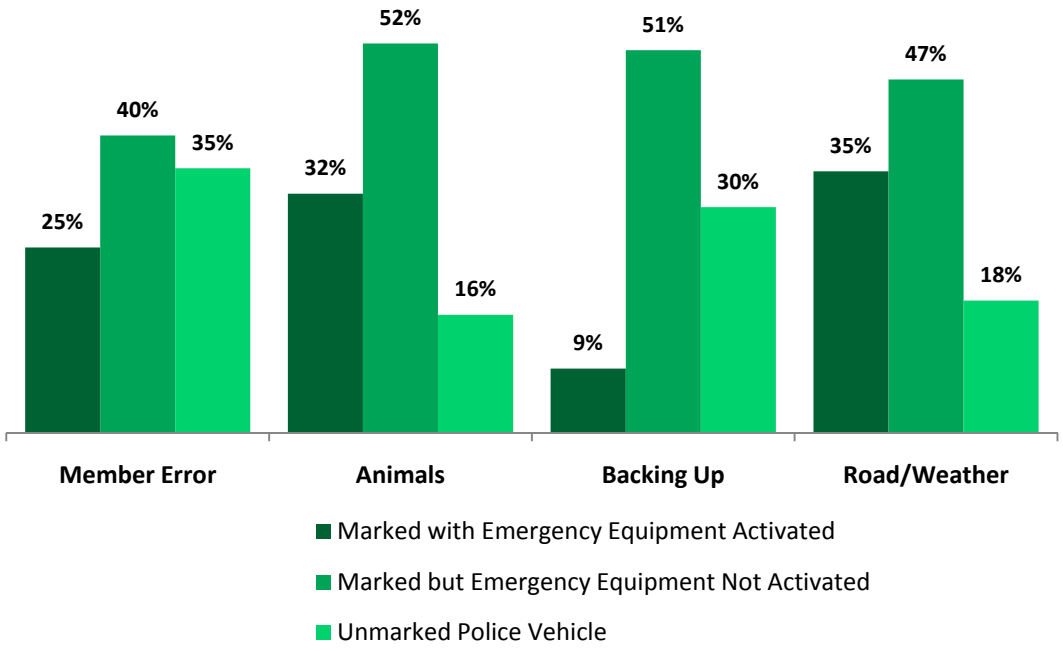
The proportion of police vehicle collisions that occurred under various lighting and visibility conditions were examined for the four most common causes of police collisions. As illustrated in Figure 16, collisions due to member error, backing up, and road/weather conditions tended to occur during the day and at night. In contrast, collisions involving animals tended to occur at night. Despite the fact that many collisions occurred at night, visibility conditions were judged to be good in the overwhelming proportion of cases involving member error (88 per cent), animals (83 per cent), and backing up (85 per cent). The only exception was for road/weather conditions (69 per cent).

FIGURE 16: LIGHT CONDITIONS UNDER ACCIDENT CAUSE



As illustrated in Figure 17, at the time of the collision, it was most common for the RCMP vehicle involved in a collision to be marked without its emergency equipment activated. However, there were some differences within the nature of the cause. Marked vehicles with their emergency equipment activated were more likely to be involved in a collision resulting from road/weather conditions or a collision with an animal, whereas unmarked vehicle collisions were most likely to be attributed to member error or backing up.

FIGURE 17: POLICE VEHICLE UNDER ACCIDENT CAUSE



Recommendations

Driving a motor vehicle is a high-risk activity, given that motor vehicle collisions while on-duty are the leading cause of accidental police deaths (Kanable, 2009). Given this, more attention should be given to training throughout a police officer's career, especially since previous research found an average of eight years since last receiving advanced driver training among RCMP members involved in collisions (Cohen and Plecas, 2007).

Previous research suggested that high speed police pursuits were a major contributor to police vehicle collisions. However, the RCMP introduced a policy preventing members from engaging in high speed pursuits. As a result, only 4% of current collisions could be associated to a pursuit, and only 59 of all 7,000 collision reports indicated that a member was speeding while engaging in a pursuit. In fact, less than one-quarter of collisions overall involved a member who was speeding at the time. Thus, high speed pursuits and members speeding do not appear to be major factors in RCMP vehicle collisions. That being said, driving at high speed did appear to be a factor in two particular forms of collisions. Specifically, collisions involving animals (21 per cent speeding versus 15 per cent not speeding) and collisions

attributed to road/weather conditions (15 per cent speeding versus 11 per cent not speeding) were two of only three situations where the member was more likely to be speeding than not. It is important to note that when the collision was attributed to member error, police were equally likely to be speeding or not speeding (28 per cent each).

Although no one clear cause of collision was identified in the current study, member error was the most common source, accounting for nearly a third of all collisions. In addition, weather was an important factor, as 50% of all collisions occurred in the four winter months of November through February, a greater rate of collisions occurred in cold-weather regions, and one of the more common causes of RCMP collisions was documented as "road/weather conditions". Importantly, as noted above, this cause was one of only three situations where RCMP members were more likely to be speeding (15 per cent) than not speeding (11 per cent) at the time of the collision. In effect, it appears that members were, at times, not driving safely given the weather. Moreover, when members were speeding and involved in a collision based on "road/weather conditions", it appeared their speeding was unnecessary, as they were most likely to be driving a marked vehicle in a non-emergency situation. Thus, some members likely need more awareness regarding driving safely in unsafe conditions. Presumably, RCMP training already specifically focuses on developing bad weather driving skills, but follow-up training should be conducted to ensure members retain these skills over the course of their career, especially given that the typical member involved in a collision had nine years of policing experience.

Similarly, additional training or policies concerning "backing up" vehicles should be considered, since backing up a police vehicle was listed as the cause of one-fifth of all collisions. Unfortunately, there was no situational data available to provide further clarity on why and when police are involved in collisions from backing up their vehicle. It is possible that these collisions result when a member is backing out of their parking spot, such as when leaving quickly to respond to a call for service. This is especially true if they are also multi-tasking (e.g. checking the MDT for call information, talking to dispatch or other members) while backing out of their space. If not already in place, the RCMP should encourage adopting policies that require their members to always back into parking spots regardless of where they are parking (i.e. at the station, at a location for a call). Alternatively, or in addition, RCMP could consider adopting technology that allows drivers to view objects behind them on a screen in their vehicle (e.g. projected onto the MDT). However, the financial requirements to adopt such technology into police vehicles may not be a reasonable expenditure. Thus, it is recommended that the RCMP first collect additional situational data on collisions from backing up to understand in more depth why these collisions occur.

Fatigue may also be an important factor for RCMP to consider, given that members involved in a collision were working, on average, on only five hours of sleep. In addition, familiarity with the vehicle may also be a factor as members were generally on their first shift at the time of the collision. However, data concerning number of consecutive shifts worked prior, shift start time, and collision time were not consistently or reliably collected, meaning fatigue and familiarly must remain only theories for now.

Interestingly, the available data did suggest that driving under certain conditions one would assume would increase the risk for a collision, such as driving under emergency conditions or speeding, did not appear to be statistically significantly related to vehicle collisions. In effect, it seemed that simply the large number of hours that members spent driving was a main risk factor for vehicle collisions. Moreover, it should be considered that perhaps a factor that was not measured here (i.e. multi-tasking) is the more likely cause of vehicle collisions involving RCMP members. Plecas and colleagues (2011) recently found that when driving on duty, police often engage in several different activities, including using their MDT,

talking on the radio, and scanning the area for criminal activity. As the member's attention is not fully focused on the road, the risk for collision is heightened. Still, it is important to note that members were at fault for only a third of all collisions, meaning that many of these collisions likely could not have been prevented. Still, a reduction in multi-tasking while driving would increase road awareness among members, and increase the amount of time members have to react to a possible collision.

Conclusion

This study evaluated causes of RCMP vehicle collisions with the goal of providing recommendations to reduce these occurrences. In many cases, data was missing or recorded unreliably and the necessary analysis could not be conducted; this was particularly problematic when it came to determining the specific cause(s) of the collision. To ensure evidence-based policies are implemented in the future, it is clear that data collection on police vehicle collisions needs to be conducted more thoroughly. As noted, steps have already been taken by the RCMP towards improving the nature of this data and similar analyses in the future should provide more concrete evidence as to the causes of police vehicle collisions.

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