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# Black Bear Mortalities in the Mountain National Parks: 1990-2009

## 20 Year Summary Report

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Photo by D. McKown, Kootenay National Park, Hwy 93 South, 2009

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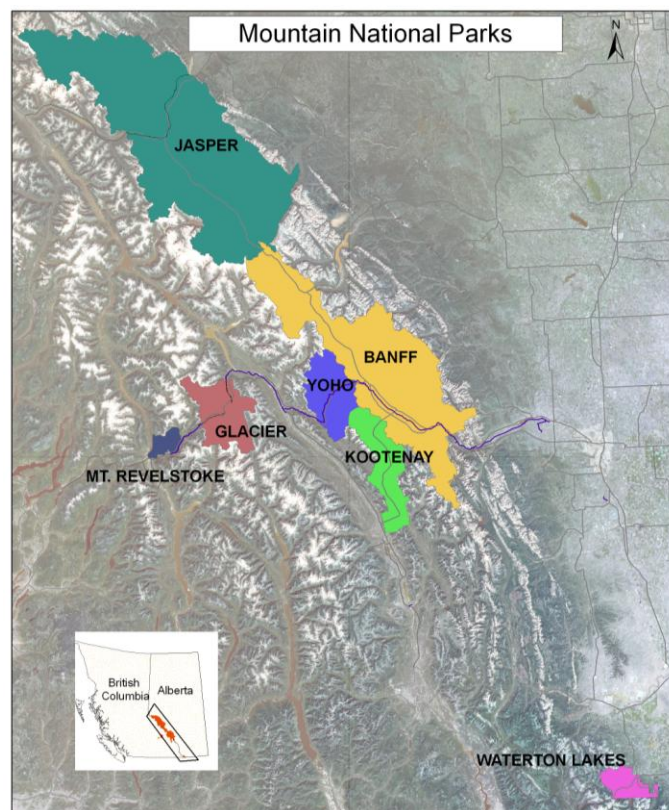
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## Background

This summary report is the outcome of a project to obtain, amalgamate and verify black bear mortality records for the Mountain National Parks (Banff, Jasper, Kootenay, Yoho, Waterton Lakes, Mt. Revelstoke and Glacier National Parks) for the period 1990-2009 (Figure 1). Each National Park or Field Unit has maintained wildlife mortality records that include black bears. These databases are distinct and vary in both structure and content. In some Field Units, the wildlife conflict specialist has maintained standalone records or summary reports of bear handling, encounters, and mortalities. In other Field Units, this information is contained in paper records, a general wildlife observation database, CanSIS (prior to 1993), the Occurrence Reporting systems of Miles Plus and, more recently, the Occurrence Tracking System (OTS). This report brings all black bear mortality records 1990-2009 together in one database across the Mountain National Parks.

Figure 1. Mountain National Parks



## Objectives

The objectives of this report are to verify and compile the known records of black bear mortalities from all the Mountain National Parks and make these results available in the public domain. Additionally, a single accurate database will provide both consistency and reliability in monitoring black bears metrics into the future.

## Methods

### Mortality Data

All available sources of information on black bear mortality were obtained and checked for accuracy and completeness. No one data set contained a complete and accurate set of records. Sources used were individual Park wildlife mortality or observational databases or summary (paper) reports, CanSIS (prior to 1993), the Occurrence Reporting systems of Miles Plus and OTS (Occurrence Tracking System) and interviews with Park staff involved with the event. All records were cross-referenced to the most original data source obtainable to determine sex/ age classification, date, location and mortality cause. These mortalities were compiled in Access format with assumptions and process steps documented (Wrazej, 2009). Included in this database are records of mortalities located outside of the National Park boundaries. These are generally the result of observations or reports of mortalities adjacent to Park and do not reflect complete provincial records. These records have been maintained for potential future use, but are not presented in this report.

This report includes records of black bears being struck on either a highway or railway but the carcass was not found; therefore mortality could not be confirmed. These "bear strike" records have been documented across the Parks with varying consistency. Records have been included in the mortality database since 2000 in the Lake Louise, Yoho, Kootenay Field Unit (LLYK) and since 2004 in Banff Field Unit (BAFU). For all Parks, OTS was the primary source used for records throughout the 1990's, however the reporting consistency is not known. Public reports of an injured bear were included only if a cause for injury was witnessed or reported (such as being struck by a car or lying on the highway) and the event was confirmed by evidence.

No attempt has been made to relate the number of mortalities to population demographics. There are no reliable evidence based population estimates for black bears in any of the Mountain National Parks. Over the years some Parks have reported population numbers based upon opinion and short duration research projects (Kansas et al 1989 for example). Unlike grizzly bears, black bears have reasonably high reproductive rates and are much more resilient than most large carnivores (Weaver et al 1996). Readers are strongly cautioned not to draw conclusions about the impact of these mortalities on population demographics and viability. We feel any interpretation of these mortality statistics to population level conclusions is folly.

### Mortality Classification

Confirmed black bear mortalities in the Mountain National Parks are classified by mortality type (Table 1). This classification was adapted from McLellan et al., 1999.

Table 1. Mortality causes, categories and codes.

Mortality Type	Categories		Codes
<b>Natural</b>			<b>NA</b>
<b>Unknown</b>			<b>UN</b>
<b>Human Caused</b>			
	Government Action		
		Safety	<b>GS</b>
		Agriculture	<b>GA</b>
		Garbage	<b>GG</b>
	Accidental		
		Railway	<b>AR</b>
		Highway	<b>AH</b>
		Capture/Handling	<b>AC</b>
		Other	<b>AO</b>
	Illegal		<b>IL</b>

All confirmed black bear mortalities are categorized as being the result of Natural, Human or Unknown causes. Human-Caused is further categorized by: *Legal Harvest, Government Action, Accidental and Illegal. Government Action* describes where a bear was killed, by a government wildlife official as a management problem, for the apparent reason that the bear was attracted to garbage, agricultural livestock/ feed, or where public safety was threatened. Numerous records were found for the government destruction of a black bear, without specification of the reason. The assumption was made that these were garbage/ food conditioned events, *if* the event was in an area of human development and there was no evidence to the contrary, i.e., mention of human injury or threat. The *Accidental* category includes road and railway mortalities and those resulting from the process of capture or handling of a bear. In the event that a Park employee subsequently destroyed an injured bear, the mortality type is the original source of injury. The *Accidental Other* subcategory included unusual mortalities that do not fit in any of the above, for e.g., electrocution, and strangulation.

## Results

Records were obtained for 477 confirmed black bear mortalities in the Mountain National Parks between 1990 and 2009 (Table 2).

Table 2. Age, sex class and cause of death for confirmed black bear mortalities<sup>1</sup> in the Mountain National Parks, 1990 – 2009.

Cause of Death	Age-Sex class							Total
	Adult	Adult	NonAdult <sup>2</sup>	NonAdult	Adult	NonAdult	Unk Age	
	Female	Male	Female	Male	sex unknown	sex unknown	sex unknown	
<b>Natural</b>	3	2		1	2	4		12
<b>Unknown</b>	1	7	1	2	2	3		16
<b>Human Caused</b>								
Government Action								
Safety	3	9		2		3	0	17
Agriculture								
Garbage	21	23	2	1	5	2	3	57
<b>Accidental</b>								
Railway	25	46	2	12	7	13	20	125
Highway	47	67	6	20	8	51	39	238
Capture/handling		4				1		5
Other		3		1		1	2	7
Total: human-caused	96	152	10	36	20	71	64	449
Total: all deaths	100	161	11	39	24	78	64	477

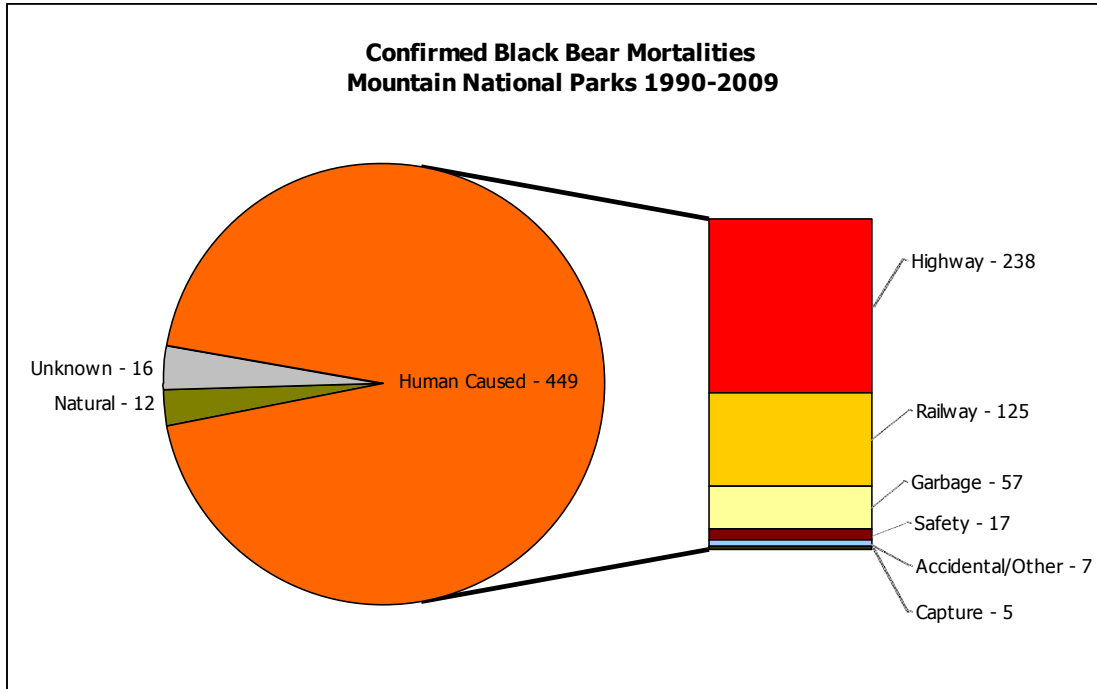
<sup>1</sup> mortalities = dead bears and management removals from the ecosystem.  
<sup>2</sup> NonAdult = bear that has not reached second birthday (coy, yearling, subAdult )

The sex of the bear was recorded for only 65% of the total mortalities. Of the 311 records with recorded sex class, 36% were female bears and 64% were male bears.

### Mortalities by Cause

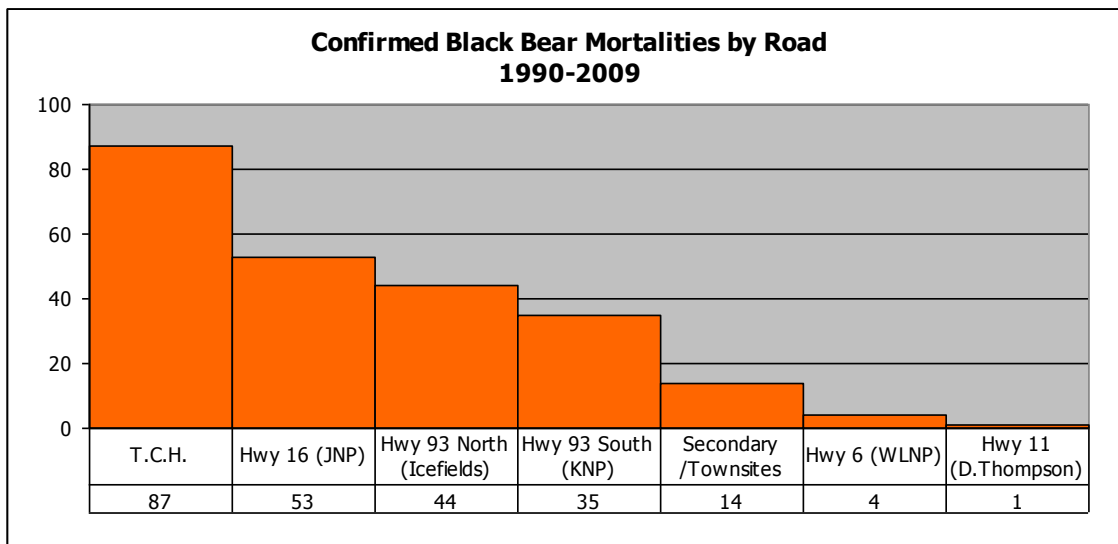
Graphic display of data from Table 2 demonstrates that 94% of all known mortalities have been human caused (Figure 2).

Figure 2. Confirmed black bear mortalities by cause, Mountain National Parks, 1990-2009.



Within the Mountain National Parks, highways are the highest individual source (53%) of human caused black bear mortalities and railways account for the next largest source (28%). The Trans Canada Highway (TCH) is the single largest source of confirmed black bear road mortality (37%) and Highway 93 (north and south) is the second largest source (33%) (Figure 3). There are approximately 637 km of through highways and 287 km of railway lines within in these parks. (This does not include secondary roads or sections of double track.) Calculation of the kills per kilometre shows that there has been a higher mortality rate for the railway (.436) than the roadways (.352).

Figure 3. Confirmed black bear highway mortalities by roadway, Mountain National Parks, 1990-2009.

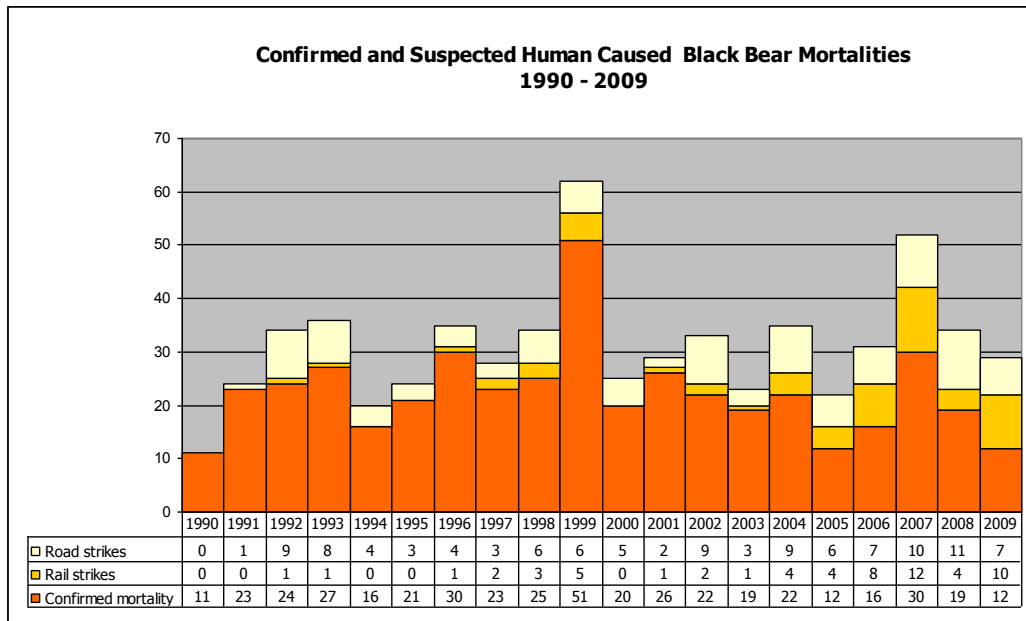


In Banff National Park, Hebblewhite et al (2003) found that in a small sample of radio collared bears, 82% of the mortalities were human caused. Of those human caused mortalities 44% (n=4) were highway related, 33% (n=3) were management mortalities, and 22% (n=2) were

management removals. This high percentage of management related mortalities is most likely due to the fact that many of these radio-collared animals were also considered problem bears.

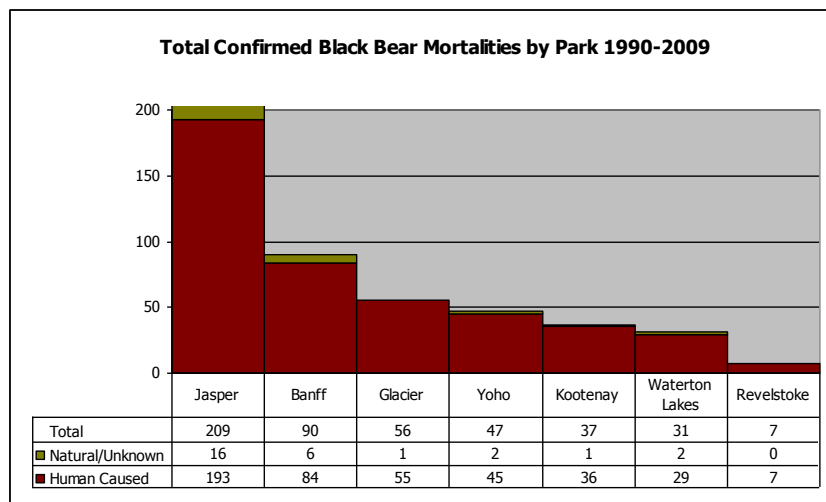
For the past 20 years there has been an average of 22.5 confirmed human caused black bear mortalities per year (Figure 4). In addition to these confirmed mortalities, there were 172 records of 'strike' events (a black bear being hit by a vehicle or train but not found). One hundred and thirteen of these were on roadways and 59 on rail lines within the Mountain National Parks, an average of 8.6 per year. Opinions vary in the estimation how frequently a strike actually results in the death of a bear (W. Bradford, S. Michel, H. Morrison, G. Skinner pers. com.). Bears have been observed to survive serious injuries. However the likelihood of locating a struck bear is limited by several factors: the potential distance travelled by an injured animal, the accuracy of reports, and risk factors for personnel. In addition, studies conducted with radio-collared bears have confirmed that not all strikes are reported. Park Wildlife Conflict specialists agree that absolute mortality rates are 'underestimated' by the stipulation of a found carcass. Currently, this measure is considered to be the least subjective relative measure available.

Figure 4. Confirmed and suspected human caused black bear mortalities within the Mountain National Parks, 1990-2009.



### Individual Park Analysis

The highest number of total black bear mortalities has been in Jasper National Park (Figure 5). Figure 5. Total confirmed black bear mortalities within the Mountain National Parks, 1990-2009.



The annual frequency of all confirmed and suspected mortalities by type is presented for each Park (Figures 6-12).

Figure 6. Confirmed and suspected black bear mortalities, Jasper National Park, 1990-2009.

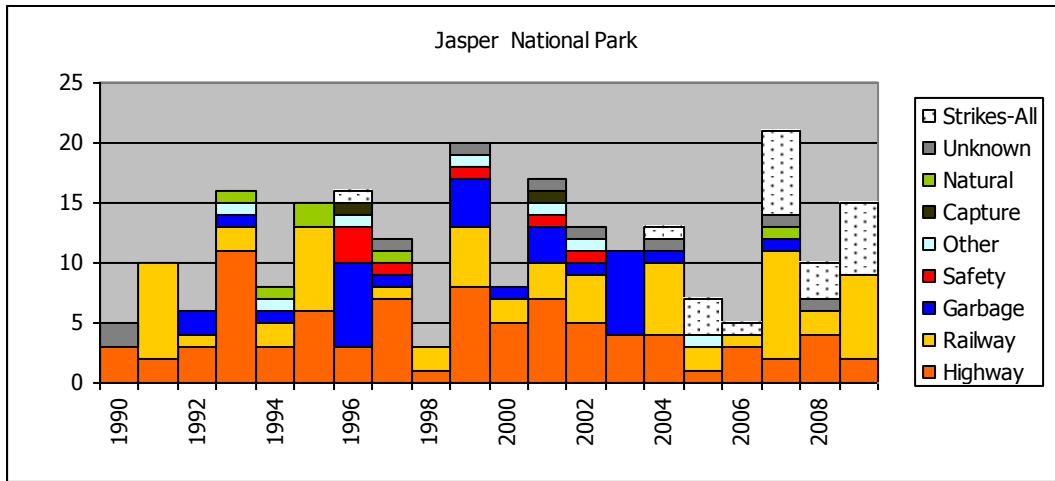


Figure 7. Confirmed and suspected black bear mortalities, Banff National Park, 1990-2009.

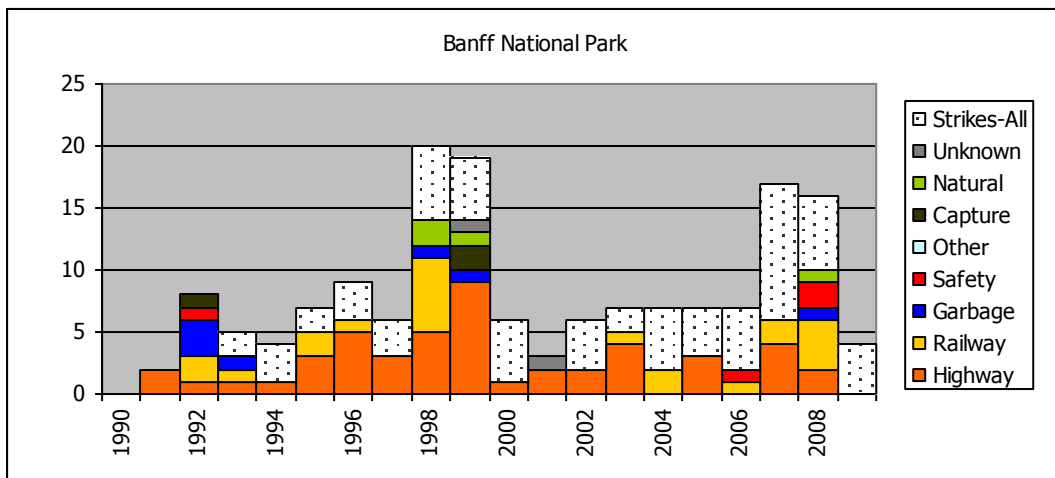


Figure 8. Confirmed and suspected black bear mortalities, Yoho National Park, 1990-2009.

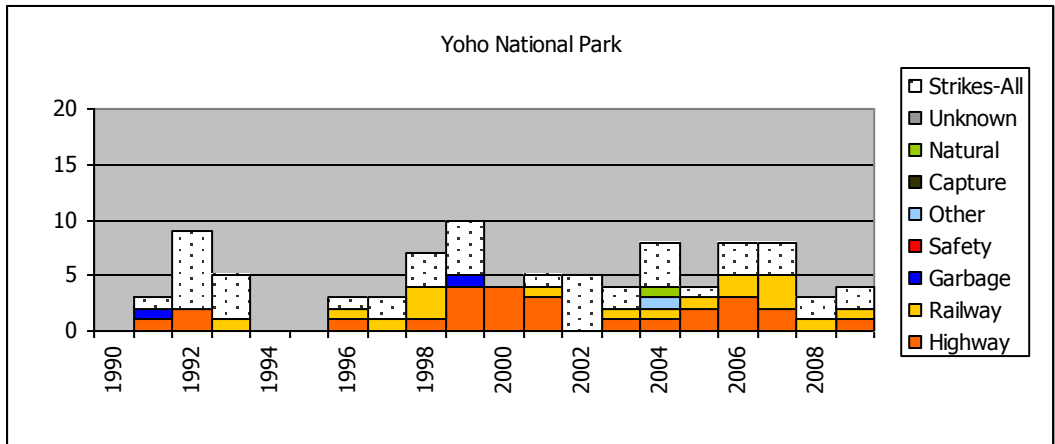


Figure 9. Confirmed and suspected black bear mortalities, Kootenay National Park, 1990-2009.

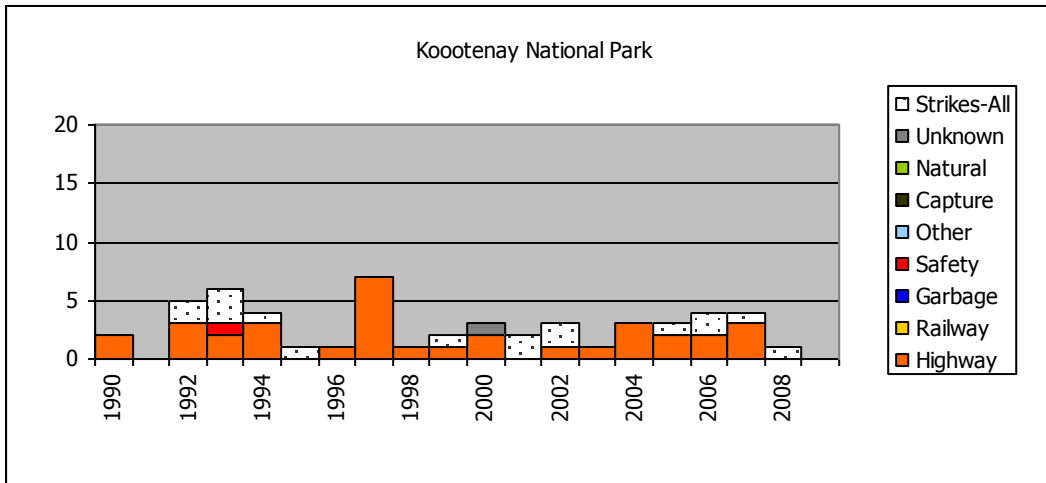


Figure 10. Confirmed and suspected black bear mortalities, Glacier National Park, 1990-2009.

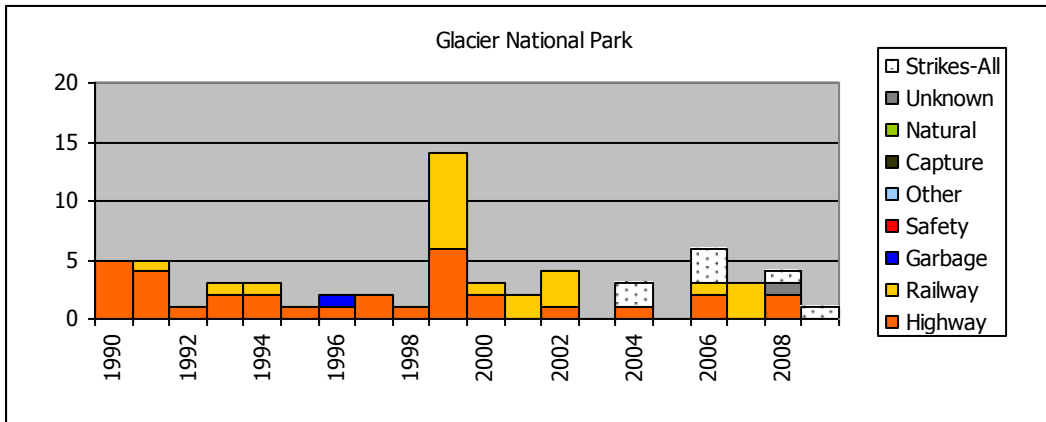


Figure 11. Confirmed and suspected black bear mortalities, Mt. Revelstoke National Park, 1990-2009.

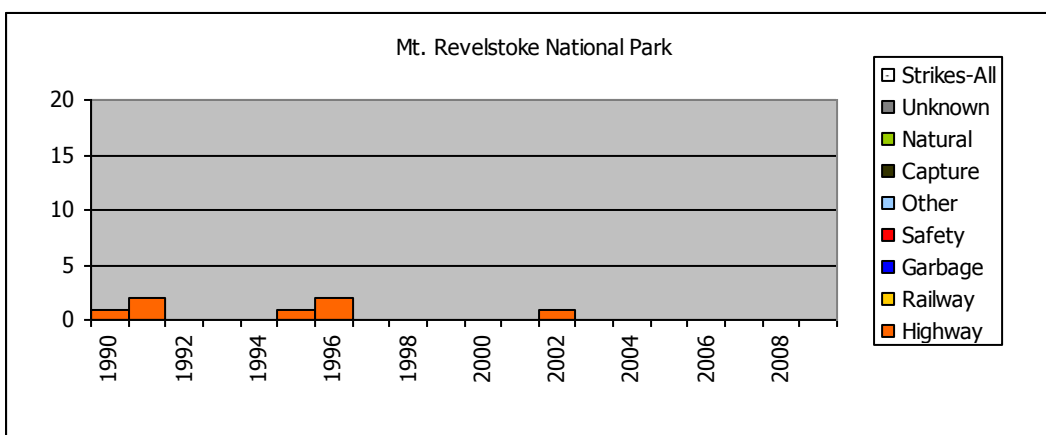
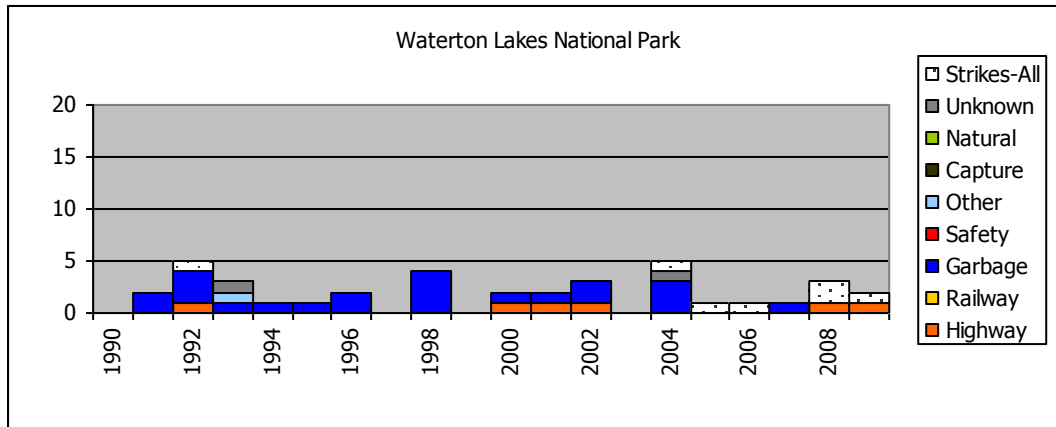


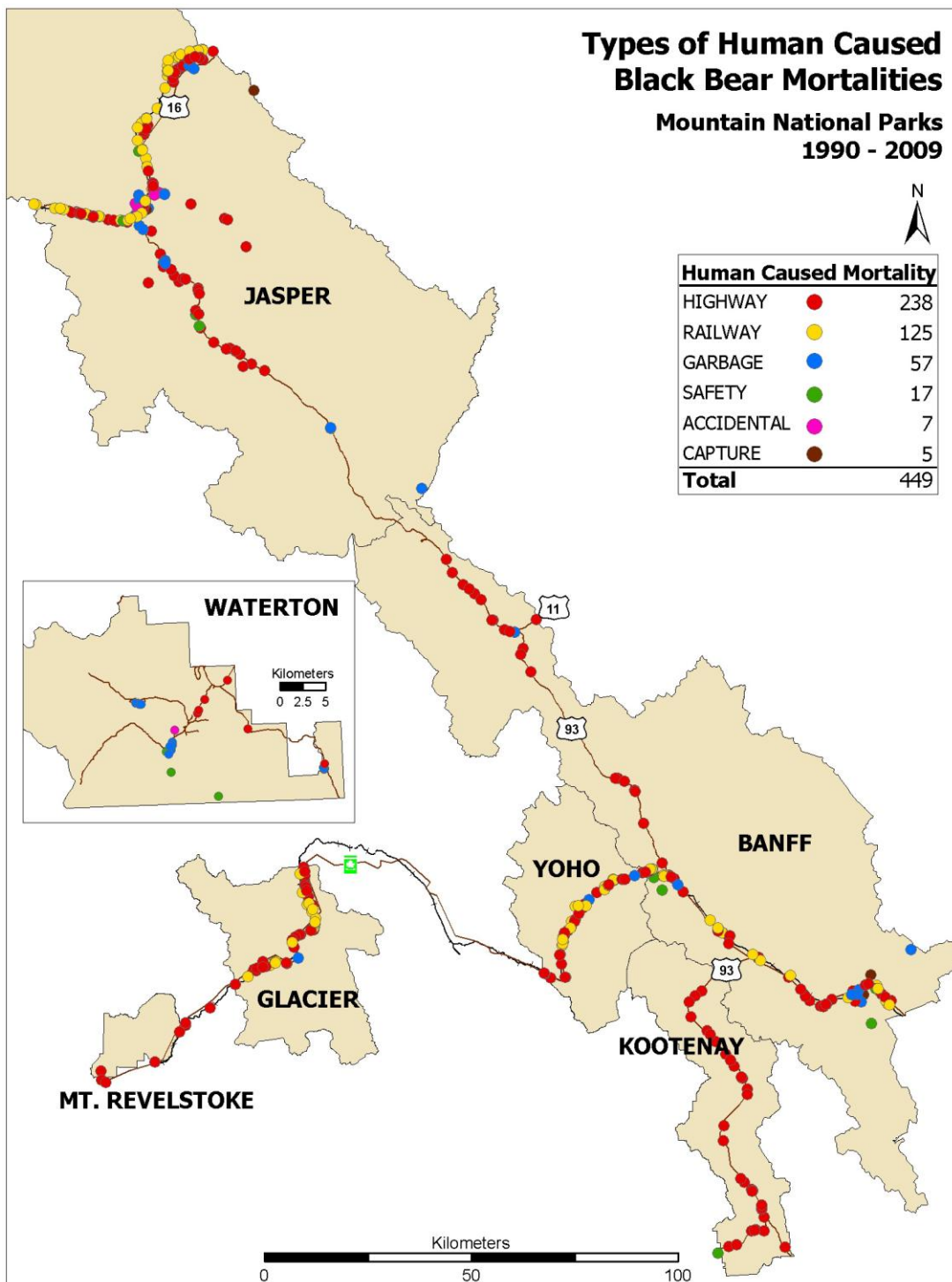
Figure 12. Confirmed and suspected black bear mortalities, Waterton Lakes National Park, 1990-2009.



## Location and type of confirmed Human Caused Mortalities

Confirmed human caused black bear mortalities are concentrated along the valley bottom transportation corridors throughout the Mountain National Parks (Figure 13). The accuracy of the location data varies from GPS level accuracy to points created from a general description. If no specific location data was provided in the original records, a point location was ascribed, resulting in a potential error of plus or minus one kilometre.

Figure 13. Location and type of confirmed human caused black bear mortalities, Mountain National Parks, 1990-2009.



## Discussion

For this compilation of mortality records, protocols were established for the reclassification, interpretation or modification of the original data. These protocols and all assumptions have been documented with the mortality database (Wrazej 2009).

There is high confidence that these records represent the *minimum* known mortalities. There is low confidence in the completeness of the dataset or the accuracy of some specifics of sex and age class categorization. The rigor of the reporting of highway or railways strikes is uncertain. As events were reported they normally resulted in the generation of 'occurrences,' however prior to 1995, the eventual outcome was captured on the original paper records. These records are no longer available in all the Mountain National Parks.

During the 1990's the reporting mechanism and protocols between mountain parks and external organizations, specifically CP and CN Rail lines, was formalized and improved. Within Jasper National Park, it is currently thought that virtually all bear rail strikes are reported (W.Bradford, pers.com.). This rigorous level of reporting is not occurring in all Mountain National Parks.

The necessity of a found carcass is believed to 'underestimate' the mortalities that result from road and rail strikes. Additional investigation into radio-telemetry studies and strike records could be undertaken to provide a more objective basis for estimating the impact of this mortality source.

Between 1990 and 2009, there was an average of 22.5 known, human caused mortalities per year. As stated previously, any interpretation of the significance of this on the black bear population is problematic. There is currently no frame of reference for the population and therefore, no conclusions can be drawn on the impact of this mortality rate. In addition, a high percentage of records (35%) are missing sex classification information.

## Acknowledgments

The collection and verification of data for this report would not have been possible without the assistance and cooperation of Parks Canada staff. This included Park Wardens Wes Bradford, Hal Morrison, Rob Watt, Jon Stuart-Smith, and Steve Michel. Shelagh Wrazej compiled and updated the Mountain Park mortality database with support from Tao Gui. Hilary Husar and Helene Cassista provided support with occurrence searches. Archived literature was searched and retrieved readily with the assistance of Cathy Hourigan.

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