

1.0 INTRODUCTION

1.1 Overview

The Environmental Management Section, Engineering Branch, British Columbia Ministry of Transportation and Infrastructure (BCMoT), administers the Wildlife Accident Reporting System (WARS). WARS was designed to systematically record the location, number and type of wildlife accidents reported by BCMoT Maintenance Contractors on numbered highways in British Columbia (Map 1.1). Records in the WARS database date back to 1978 when wildlife accident data collection was originally initiated. Currently, WARS has over 78,000 wildlife accident records for a diverse range of wild animal species, including deer, moose, elk, mountain sheep, and bears.

As part of its continuing efforts to protect the motoring public; stem the rising societal cost of human fatalities and injuries, motor vehicle damage, and highway maintenance; and reduce the loss of wildlife on provincial highways, BCMoT uses the WARS system to:

1. identify accident-prone locations and accident trends;
2. direct cost-effective mitigation efforts;
3. evaluate the effectiveness of mitigation techniques;
4. provide data for highway planning purposes;
5. model and forecast accidents;
6. analyze traffic and climatic relationships for species-specific accident trends;
7. develop species-specific accident risk profiles for highway corridors; and
8. establish policies and strategies for accident issues and mitigation initiatives.

As its database has grown, the WARS system has become an increasingly valuable information resource for BCMoT. Environmental management staff at BCMoT Headquarters and the Ministry's Regional Environmental Coordinators have direct access to the WARS system enabling them to provide wildlife-related motor vehicle accident information at the provincial, regional and district levels (Maps 1.2 and 1.3).

With WARS, BCMoT has been able to maximize the use and effectiveness of its existing warning system infrastructure in a manner supported by statistically significant data, and not speculation or unfounded assumptions. (Sielecki, 2003a, 2003b, 2005a) Monitoring accident rates and locations over time helps the Ministry identify developing problems in a timely manner. WARS also directs Ministry attention to high wildlife accident locations to reduce the operating costs of its private maintenance contractors.



Wildlife highway fatality

(Photo: Mike Kent)

Map 1.1 Numbered Highways in British Columbia



Map 1.2 Highway Regions in British Columbia



Map 1.3 Highway Regions and Districts in British Columbia



South Coast Region

1. Lower Mainland District
2. Vancouver Island District

Southern Interior Region

3. Rocky Mountain District
4. West Kootenay District
5. Okanagan-Shuswap District
6. Thompson-Nicola District
7. Cariboo District

Northern Region

8. Peace District
9. Fort George District
10. Bulkley-Stikine District
11. Skeena District

WARS, with its long established, extensive multi-species, geographically-oriented database, has proven to be invaluable to other government agencies, consultants, researchers, wildlife associations, special interest groups and members of the general public. The Ministry of Water, Land and Air Protection (MWLAP) uses WARS data to assess provincial wildlife population trends in its management units. The WARS database contains long-term wildlife-related records that cannot be assembled or extrapolated from any other information sources in British Columbia.

Whenever new technology suitable for reducing wildlife accidents becomes available, WARS data is used to support decisions for locating the technology for test purposes. The Insurance Corporation of British Columbia (ICBC), the provincial insurance carrier for motor vehicles in British Columbia, uses WARS data for identifying highway locations where joint BCMoT/ICBC initiatives can be directed. These initiatives include exclusion fencing and infrared camera detection systems targeted specifically to reduce wildlife-related motor vehicle collisions.

1.2 Methodology

Wildlife accidents are recorded by the Ministry's Road and Bridge Maintenance Contractors located throughout British Columbia (Map 1.4). Data regarding wildlife-vehicle accidents, such as species and location, by Landmark Kilometre Inventory (LKI), are recorded on WARS forms H0107 (2001/06) (Figure 1.1). These forms are compiled by each Highway District office and then sent on a monthly basis to the Engineering Branch, HQ. The forms are screened, coded and then entered into the WARS database.

**Map 1.4 BC Ministry of Transportation and Infrastructure
Maintenance Contract Service Areas**



1 South Island	8 South Okanagan	15 Thompson	22 North Peace
2 Central Island	9 Kootenay Boundary	16 South Cariboo	23 Nechako
3 North Island	10 Central Kootenay	17 Central Cariboo	24 Lakes
4 Howe Sound	11 East Kootenay	18 North Cariboo	25 Bulkley Nass
5 Sunshine Coast	12 Selkirk	19 Fort George	26 Skeena
6 Lower Mainland	13 Okanagan-Shuswap	20 Robson	27 North Coast
7 Fraser Valley	14 Nicola	21 South Peace	28 Stikine

WARS forms are not completed for highways maintained by the Federal Government or the Yukon Government under agreements with the British Columbia Government. These are:

- Highway 1 – Glacier National Park
- Highway 1 – Mt. Revelstoke National Park
- Highway 1 – Yoho National Park
- Highway 4 – Pacific Rim National Park,
- Highway 93 – Kootenay National Park
- Highway 97 – Alaska Highway (to Yukon Border)
- Highway 97 – Alaska Highway (Watson Lake to Iron Creek)
- Highway 1 – Alaska Highway (Morley to Swift River)
- Haines Highway
- Skagway Highway

1.3 Reporting

WARS is a flexible system which attempts to meet a broad range of requirements, from producing site specific reports over a few kilometres to creating detailed reports of various aspects of wildlife-vehicle accidents for the entire province. WARS data are used to produce annual reports for each calendar year and a wide range of ad hoc reports. Annual reports provide detailed information and analyses of wildlife-vehicle accidents for a given year. Multi-decade reports provide significant long term information of wildlife-vehicle accidents and examine trends such as frequency, location and magnitude of accidents. Ad hoc reports are created for people in need of specific information for particular species on selected highways. Approximately 30% of these inquiries are from BCMoT personnel. The remaining inquiries are made by other government agencies, consultants, researchers, news media, wildlife associations, and members of the general public.

1.4 Assumptions and Constraints

The Ministry estimates the number of wild animals recorded by the WARS system represents only about 25% to 35% of the actual number of wild animals killed. The low number of reports can be attributed to a number of factors. In high traffic areas, the remains of small species of wildlife, like badgers and raccoons, often become unrecognizable after being run over by a number of vehicles.



Coyote remains

(Photo: BC Ministry of Transportation and Infrastructure)

Data is also lost due to the following:

- animals die outside the highway right-of-way,
- Ministry Maintenance Contractors are not called by law enforcement officials or private citizens to clean up all wildlife-related accidents,
- animal remains are removed by passing motorists for personal use or consumption,
- animal remains are removed by natural predators or scavengers,
- animal remains are obscured by snow, ice, vegetation, or roadside debris,
- errors and omissions in reporting accident locations and/or species type,
- random and systematic errors and omissions in reporting and data processing, and
- process changes in reporting and data handling

WARS contains data on wildlife-vehicle accidents dating back to 1978. The data used in this report represents the data received from District offices and Maintenance Contractors by December 31, 2008.

1.5 Species Identification

Since 2008, the Ministry has published two wildlife roadkill identification guides to help its Maintenance Contractors more accurately identify carcasses of wildlife they find (Sielecki, 2008; Sielecki, 2009). Reporting is still based largely on generic species classification.

For WARS, white-tailed, black-tailed and mule deer are all reported as “deer”, with comments on the respective Dakota Whitetail and Northwest Whitetail, Columbia Black-tailed Deer, Mule Deer, and Sitka Black-tailed Deer subspecies recorded separately, if provided by the Maintenance Contractor. Similarly, Roosevelt Elk and Rocky Mountain Elk, the North American Elk subspecies that occur in British Columbia, are both reported as “elk”.

The “moose” classification includes the subspecies Northwestern Moose, Alaskan Moose and Shiras Moose. The “sheep” classification includes the Bighorn Sheep subspecies, California Bighorn Sheep and Rocky Mountain Bighorn Sheep, and the Thinhorn Sheep subspecies, Dall’s Sheep and Stone’s Sheep. The bison classification includes the North American Bison subspecies, Woods Bison and Plains Bison.

The “bear” classification includes black bears and grizzly bears. In British Columbia, black bears can range in colour from black to white, with cinnamon, brown and blonde not being uncommon. The blue bear or “glacier” bear is rare.



Bison on centreline

(Photo: Colin Leake)



Kermode Bear

(Photo: Tom Ryan, Tourism BC)

1.6 Data Quality

The quality of the data contained in the WARS system is very dependent on the reporting diligence of the Ministry’s Maintenance Contractors. Since wildlife accidents often occur at very untimely hours, under less than ideal weather conditions, comprehensive reporting at the accident scene is difficult at times.

In 2002, of the 5,031 reports received, 28% lacked valid segment numbers, and 28% lacked valid kilometre references. These reports did not contain enough information for Environmental Management Section staff to determine the valid segment numbers and km references. This represented a dramatic decline in reporting diligence from the year 2001, when, of the 5,123 reports received, only 7% lacked valid segment numbers and 10% lacked valid km references. A data quality feedback mechanism appears to be required to keep reporting quality consistent. When Wildlife Accident Report Forms are filled out correctly and consistently with the necessary LKI and km information, the value of the WARS data to the Ministry, Maintenance Contractors, and others increases.

Initially, the Maintenance Contractors’ positive response to the new WARS forms H0107 (1999/01) appeared to be address the issue of data completeness and accuracy. Up until 2002, the data provided on the new H0107 forms was appeared more complete and accurate than data provided in earlier years, thus it more valuable for analysis and outcomes.

WARS data helps the Ministry direct its limited financial resources for wildlife accident mitigation to locations where it is most needed. ICBC also uses WARS data to evaluate Ministry cost-sharing proposals for highway safety projects. Since each wildlife-related accident clean-up can cost hundreds of dollars in Maintenance Contractor staff and equipment time, the WARS system can direct Ministry attention to high wildlife accident locations to reduce the operating costs for Maintenance Contractors.

1.7 WARS Enhancements

In 1994, two notable enhancements were made to the system. The first of these was expanding on the Potential Hazard reporting function of the system. In addition to Potential Hazard Reports for specified highways, the system can now also produce Potential Hazard Reports by Province, Region and District. This function can identify where accidents are most likely to occur within the area of concern whether it is a particular highway or Region. The second enhancement involved the capability of the system to report on the location of wildlife mitigation measures throughout British Columbia. WARS now contains up-to-date information on the location of wildlife fencing, reflectors and wildlife warning signs throughout the Province. In 2000, additional functions were added to the WARS system to streamline database queries and make multi-year analysis of species-specific accidents easier. To improve the accuracy and timelines of reporting and report production, the development of a web-based reporting system is underway. In 2008, the WARS system was migrated to a Microsoft Vista platform.

1.8 Region and District Boundary Changes

As a result of significant organizational restructuring in BCMoT, major changes in the Region and District Boundaries occurred in 2002. The number of Regions was reduced from 6 to 3, and the number of Districts was reduced from 27 to 11.

In each amalgamated Region and District, the Ministry Maintenance Contractors continue to collect WARS data separately for the Maintenance Contract Service Areas that remain in the former districts. The data is merged either at Ministry District offices or at Headquarters for reporting purposes.

