

8.0 SUMMARY

The ongoing systematic daily collection of multi-species wildlife accident data by the Ministry's Maintenance Contractors continues to provide the Ministry with information critical for understanding the highway/wildlife habitat interface. In addition to helping identify motor vehicle-related accident trends among larger ungulates and carnivores, the WARS system has provided unexpected insights into the evolution of the Province's road ecology. It has been used to identify the introduction of alien species in the natural habitat (possums on Hornby Island; bison in the Peace Country) the colonization or recolonization of an area (coyotes in the Lower Mainland), and the impact of new highway development on higher carnivores (cougars on Vancouver Island).

The ability to continuously monitor wildlife accidents has become a vital component in understanding many of the spatial and temporal aspects of wildlife-related motor vehicle accidents in the Province. As the WARS database grows each year, it becomes an increasingly valuable tool for directing and focusing the Ministry wildlife accident mitigation efforts. As improvements in the WARS system occur over time, the Ministry's ability to proactively address the issues of wildlife-related motor vehicle accidents will increase. The success of the WARS system in British Columbia has made it a model for other agencies seeking to monitor wildlife-related motor vehicle accidents (Staines, B. *et al*, 2001; Ramp and Croft; 2002, L-P Tardiff and Associates, 2003.)



9.0 REFERENCES

- Arychuk, D., 2004, *Personal Communication*, Rocky Mountain Elk Foundation, Edmonton, Alberta
- Ashworth, D., 2001, *Personal Communication*, Conservation Officer, British Columbia Ministry of Water, Land and Air Protection (MWLAP), Conservation Officer Service, British Columbia, Canada
- Austin, M., 1999, *Personal Communication*, Large Carnivore Specialist, Ministry of Water, Land and Air Protection (MWLAP), Wildlife Branch, Research and Conservation Section, British Columbia, Canada
- Becker, E., 2001, *Personal Communication*, Area Manager, British Columbia Ministry of Transportation, British Columbia, Canada
- British Columbia Ministry of Environment, Lands and Parks, 1994, *Cougar in British Columbia*, Victoria, 6pp
- British Columbia Ministry of Environment, Lands and Parks, 1994, *Grizzly Bears in British Columbia*, Victoria, 6pp
- British Columbia Ministry of Environment, Lands and Parks, 2000, *Bighorn Sheep in British Columbia*, Victoria, 6pp
- British Columbia Ministry of Environment, Lands and Parks, 2000, *Caribou in British Columbia*, Victoria, 6pp
- British Columbia Ministry of Environment, Lands and Parks, 2000, *Elk in British Columbia*, Victoria, 6pp
- British Columbia Ministry of Environment, Lands and Parks, 2000, *Moose in British Columbia*, Victoria, 6pp
- British Columbia Ministry of Environment, Lands and Parks, 2000, *Mule and Black-tailed Deer in British Columbia*, Victoria, 6pp
- British Columbia Ministry of Environment, Lands and Parks, 2000, *White-tailed Deer in British Columbia*, Victoria, 6pp
- British Columbia Ministry of Environment, Lands and Parks, 2001, *Black Bears in British Columbia*, Victoria, 6pp
- British Columbia Ministry of Forests, 1999, *Biogeographic Zones of British Columbia Map*, Research Branch, Victoria, B.C.
- British Columbia Ministry of Transportation, 2003, *Opening Up BC. A Transportation Plan for British Columbia*
- Canadian Wildlife Service, 1990, *Hinterland Who's Who, Mammals: Coyote*, Ottawa, Ontario
- Canadian Wildlife Service, 1993, *Hinterland Who's Who, Mammals: Porcupine*, Ottawa, Ontario
- Canadian Wildlife Service, 1993, *Hinterland Who's Who, Mammals: Wolf*, Ottawa, Ontario
- Clevenger, A. P., and N. Waltho. 2000. *Factors influencing the effectiveness of wildlife underpasses in Banff National Park*, Alberta, Canada. *Conservation Biology* 14:47-56.
- Clevenger, A.P., Chruszez, B., and Gunson, K.E. 2001. *Highway mitigation fencing reduces wildlife-vehicle collisions*. *Wildlife Society Bulletin*, 29(2): 646-653.

Griffin, L., 1997, *A Preface to a Discussion of Six Procedures for Evaluating Highway Safety Projects*, Report No. FHWA-RD-08-033, Federal Highway Administration, Washington, D.C.

Damas and Smith Ltd., 1983, *Wildlife Mortality in Transportation Corridors in Canada's National Parks, Impact and Mitigation, Volume 1, Main Report*, Submitted to Parks Canada, Ottawa, Ontario, Canada, 397 pp. & apps.

Gilfillan, G., 2001, *Personal Communication*, Project Manager, Winter Road Research and Development, Insurance Corporation of British Columbia, British Columbia, Canada

Holland, S. 1976, *Landforms of British Columbia, A Physiographic Outline*, British Columbia Department of Mines and Petroleum Resources, Bulletin 48, Victoria, B.C., pp. 138.

Jacob, G.H., J.F. Deegan II, J. Neitz, B.P. Murphy, K.V. Miller, and R.L. Marchinton, 1994, *Electrophysiological measurements of spectral mechanisms in the retinas of two cervids: white-tailed deer (*Odocoileus virginianus*) and fallow deer (*Dama dama*)*, *Journal of Comparative Physiology A*, 174: 551-557.

L-P Tardiff and Associates Inc., 2003, *Final Report: Collisions Involving Motor Vehicles and Large Animals in Canada*, Final Report to Transport Canada Road Safety Directorate, 43 pp.

McDonnell, K., 2004, *Personal Communication*, British Columbia Ministry of Water, Land and Air Protection

Macquisten, K., 2004, *A story about orphan grizzly bears*, Kicking Horse Grizzly Bear Refuge, Golden B.C.

Maine Interagency Work Group on Wildlife/Motor Vehicle Collisions, 2001, *Collisions between Large Wildlife Species, and Motor Vehicles in Maine, Interim Report*, Maine Department of Transportation, 34 pp.

National Park Service, 2004, *Wolves in the North Cascades*, North Cascades National Park, Sedro Woolley, Washington.

Orphan Bear Cub Review Committee, 2000, *Recommendations of the Orphaned Bear Cub Review Committee*, Wildlife Management, British Columbia Ministry of Water, Land and Air Protection, Victoria, British Columbia.

Perkins, M., 1999, *Highway Safety Improvement Programs Manual*, British Columbia Ministry of Transportation


Ramp, D. and D. Croft, 2002, *Saving Wildlife: Saving People on Our Roads, Annual Report 2002*, School of Biological, Earth and Environmental Sciences, University of New South Wales, 31 pp.

Reid, R., 2001, *Personal Communication*, Economist, British Columbia Ministry of Water, Land and Air Protection, Wildlife Program, British Columbia, Canada

Sielecki, L.E., 2009, *Wildlife Roadkill Identification Pocket Guide: 2009 Edition*, British Columbia Ministry of Transportation and Infrastructure, Victoria, British Columbia, ISBN 978-0-7726-6237-8 60 pp.

Sielecki, L.E., 2008, *Wildlife Roadkill Identification Guide: 2008 Edition*, British Columbia Ministry of Transportation, Victoria, British Columbia, ISBN 978-0-7726-5918-7, 45 pp.

Sielecki, L.E., 2007, *The Evolution of Wildlife Exclusion Systems on Highways in British Columbia*, In Proceedings of the 2007 International Conference on Ecology and Transportation (ICOET), edited by C. Leroy Irwin, Debra Nelson, and K.P. McDermott. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University, pp. 459-474.



Sielecki, L.E., 2005a, *Comprehensive Monitoring of Wildlife Mortality on British Columbia Highways using the WARS System (1978 to 2005)*, In Proceedings of the Symposium on Wild animals and traffic accidents: Monitoring, analysis, prevention measures, and measure evaluation, IXth International Mammalogical Congress (IMC9), August 2, 2005, Sapporo, Japan, pp. 19-36.

Sielecki, L.E., 2005b, *Wildlife Exclusion Systems for Accident Mitigation on British Columbia Highways*, In Proceedings of the Symposium on Wild animals and traffic accidents: Monitoring, analysis, prevention measures, and measure evaluation, IXth International Mammalogical Congress (IMC9), August 2, 2005, Sapporo, Japan, pp. 71-92.

Sielecki, L.E., 2004, *WARS 1983-2002: Wildlife Accident Reporting and Mitigation in British Columbia: Special Annual Report*, British Columbia Ministry of Transportation, Victoria, British Columbia, ISBN 0-7726-5222-8, 222 pp.

Sielecki, L.E., 2003a, *Wildlife Accident Reporting: A fundamental element in B.C.'s mitigation efforts*, In Proceedings of the 2003 Transportation Association of Canada (TAC) Annual Conference Proceedings, Workshop D, Wildlife Accident Mitigation, Saint John's, Newfoundland

Sielecki, L.E., 2003b, *The Wildlife Accident Reporting System (WARS) in British Columbia*, In Proceedings of the 2003 Infra Eco Network Europe (IENE) Conference on Habitat Fragmentation due to Transport Infrastructure, Brussels, Belgium, pp. 1-17.

Sielecki, L., 2001a, *WARS 2000, Wildlife Accident Reporting System, 2000 Annual Report (1991 to 2000 Synopsis)*, British Columbia Ministry of Transportation, Engineering Branch, Environmental Management Section, British Columbia, Canada, 75 pp. & apps.

Sielecki, L.E., 2001b, *Evaluating the effectiveness of wildlife accident mitigation installations with the wildlife accident reporting system (WARS) in British Columbia*, In Proceedings of the 2001 International Conference on Ecology and Transportation (ICOET), Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 473-489.

Sivic, A. and L.Sielecki, 2001, *Wildlife Warning Reflectors Spectrometric Evaluation*, British Columbia Ministry of Transportation, Engineering Branch, Environmental Management Section, British Columbia, Canada, 24 pp. & apps.

Staines, B., J. Langbein, and R. Putman (2001) *Road traffic accidents and deer in Scotland*. Deer Commission for Scotland, 80 pp. & apps.

Valentine, K.W.G. et al., 1978, *The Soil Landscapes of British Columbia*, British Columbia Ministry of Environment, Victoria, B.C. pp. 197.

Zacharias, C., 1999, *Personal Communication*, Environmental Management Coordinator, British Columbia Ministry of Transportation, Engineering Branch, Environmental Management Section, Victoria, British Columbia, Canada

Zacks, J.L., 1986, *Do White-Tailed Deer Avoid Red? An Evaluation of the Premise Underlying the Design of Swarflex Wildlife Reflectors*, Transportation Research Record 1075, 35-43



APPENDIX 1



The Wildlife Rehabilitators Network of British Columbia Member Rehabilitation Facilities

Region	Name, contact and specialty	Address and website	Phone and email
1 – Vancouver Island and Gulf Islands	Gabriola Rescue of Wildlife Society (GROWLS) – Darlene Mace-Harvey Rescue and transport all species	1430 Harrison Way Gabriola Island, BC V0R 1X2	(250) 247.7415 maceharvey@shaw.ca
	Island Wildlife Natural Care Centre – Jeff Lederman Marine mammals, homeopathy; treat all species	322 Langs Road Salt Spring Island, BC V8K 1N3 www.sealrescue.org	(250) 537.0777 iwncc@aol.com
	Mountaineer Avian Rescue Society (MARS) – Maj Birch Birds; rescue all species	6817 Headquarters Road Courtenay, BC V9J 1N2 www.wingtips.org	(250) 337.2021 mars@minfox.com
	North Island Wildlife Recovery Assn. – Robin and Sylvia Campbell Eagles, bears; treat all species	1240 Lefler Road P.O. Box 364 Errington, BC V0R 1V0 www.northislandwildliferecoverycenter.org	(250) 248.8534 niwra@nanaimo.ark.com
	Rory's Refuge – Aurora Paterson Birds	P.O. Box 45 Tofino BC, V0R 2Z0	(250) 725.3783 saw-whet@island.net
	Second Chance Wildlife Centre – Lorinne Anderson Raccoons, small mammals, nuisance wildlife advice; rescue all species	1788 Fielding Road Nanaimo, BC V9X 1T5 www.geocities.com/connladylori	(250) 618.8888 coonladylori@hotmail.com
	Thora Fleming Hummingbirds	866 Ash Street Campbell River, BC V9W 1G2	(250) 923.1524 t42@connected.bc.ca
2 – Lower Mainland and Sunshine Coast	Wild Animal Rehabilitation Centre (SPCA WildARC) – Sara Dubois Small birds and mammals; rescue all species	1020 Malloch Road Victoria, BC V9C 4G9 SPCA – 3150 Napier Lane Victoria, BC V8T 4V5 www.wildarc.com	(250) 478.9453 SPCA – (250) 388.7722 wildarc@shaw.ca
	Creature Comfort Wildlife Care – Cindy Rudolph Raccoons, small mammals, birds	5171 Brooks Road Halfmoon Bay, BC V0N 1Y2	(604) 885.4697 crudolph@uniserve.com
	Critter Care Wildlife Society – Gail Martin Mammals, education	481 – 216th Street Langley, BC V2Z 1R5 www.crittercarewildlife.org	(604) 530.2064 crittercare1@shaw.ca
	Elizabeth's Wildlife Centre – Elizabeth Melnick Small mammals and birds	32508 Verdon Way Abbotsford, BC V2T 7Y3 elizabeth_melnick@bc.sympatico.ca	(604) 855.3914 (pager) (604) 852.9173
	Gibsons Wildlife Rehabilitation Centre – Clint and Irene Davy Birds and small mammals	RR4 1211 Carmen Road Gibsons, BC V0N 1V4 www.gibsonswildlife.org	(604) 886.4989 gwrc@sunshine.net
Monika's Wildlife Shelter – Monika Tolksdorf All species, research, education	8137 – 192nd Street Surrey, BC V4N 3G5 www.monikas.com	(604) 882.0908 wildlife@monikas.com	

Region	Name, contact and specialty	Address and website	Phone and email
Lower Mainland and Sunshine Coast cont'd.	Orphaned Wildlife Rehabilitation Society (OWL) – Bev Day Raptors, education	3800 – 72nd Street Delta, BC V4K 3N2 www.owlcanada.ca	(604) 946.3171 owlrehab@dcnet.com
	Vancouver Aquarium Marine Mammal Rescue and Rehabilitation – Jeremy Fitz-Gibbons Marine mammals	845 Avison Way Stanley Park P.O. Box 3232 Vancouver, BC V6B 3X8	(604) 659.3545 (604) 659.3540
	Wildlife Rescue Association of BC (WRA) Birds, bats, oil spill; rescue all species	5216 Glencairn Drive Burnaby, BC V5B 3C1 www.wildliferescue.ca	(604) 526.7275 wildlife@vcn.bc.ca
3 – Thompson	Kamloops Wildlife Park Wildlife Rehabilitation Centre – Paul Williams, John Benedik All species	9077 Dallas Drive P.O. Box 698 Kamloops, BC V2C 5L7 www.kamloopswildlife.org	(250) 573.3242 ext. 230 johnbenedik@kamloopswildlife.org
	Kee-Two Wildlife Rehabilitation Centre – Karen Beggs Raptors, migratory birds, small mammals	2061 – 70th Street SE Salmon Arm, BC V1E 1X4	(250) 832.8200
4 – Kootenay	BEAKS – Carol Pettigrew CWS Migratory permit only	318 – 103rd Street Castlegar, BC V1N 3G2	(250) 365.3701 cpet@netidea.com
5 – Cariboo	Raptor Rehabilitation Centre – Elizabeth Schupbach Raptors, waterfowl, migratory birds; rescue all species	Site 13C – 9 RR4 Williams Lake, BC V2G 2P1	(250) 989.8900
	Sedge and Dona-Gail Barnes Stabilization and transport	3985 McLean Road Quesnel, BC V2J 6V5	(250) 992.7787
6 – Skeena	Janet Gifford-Brown Birds, small mammals	P.O. Box 57, Tlell Queen Charlotte Islands, BC V0T 1Y0	(250) 557.4253 jgbrown@qcislands.net
	Prince Rupert Wildlife Rehabilitation Shelter – Nancy and Gunther Golinia Raptors, all species	P.O. Box 26 Prince Rupert, BC V8J 3P4 www.citytel.net/wildlife	(250) 624.4143 fax (250) 624.4159 wildlife@citytel.net
	Peter Grundmann & Nancy Robbins Raptors, all spp.	PO Box 438 Sandspit, Queen Charlotte Islands, BC V0T 1Y0	(250) 637.5499
7A – Omineca	Northern Wildlife Rescue Society – Rachel Morey Raptors and small mammals	2269 Canan Way Prince George, BC V2K 4A7 www.northernwildliferescue.com	(250) 962.0015 info@northernwildliferescue.com
7B – Peace	Northern Lights Wildlife Society – Angelika Langen Bears, large ungulates, raptors	17366 Telkwa High Road Smithers, BC V0J 2N7	(250) 847.5101
8 – Okanagan	South Okanagan Rehabilitation Centre for Owls – Sherri Klein Raptors	P.O. Box 1166 RR2 Eagle Bluff Road Oliver, BC V0H 1T0 www.sorco.org	(250) 498.4251 sherricklein@telus.net
Out of BC	Progressive Animal Welfare Society (PAWS) – Kip Parker Large mammals, treat all spp.	15305 – 44th Avenue W Lynnwood, WA USA 98037 www.paws.org	(425) 787.2500 kparker@paws.org