

# International Conference on Ecology & Transportation



Organized and Co-sponsored by the  
Center for Transportation and the Environment

September 13-17  
Duluth, Minnesota



Co-hosted by the Minnesota Department of Transportation



## 2009 Proceedings



Adapting to Change

## **Acknowledgements**

These proceedings are published by the Center for Transportation and the Environment (CTE), located at the Institute for Transportation Research and Education (ITRE), North Carolina State University (NCSU), with additional funding support provided in part by the Federal Highway Administration, U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, California Department of Transportation, Washington State Department of Transportation, University of California at Davis, and Defenders of Wildlife.

CTE thanks the following persons and organizations for their assistance with this publication:

- Paul J. Wagner, Washington State Department of Transportation, ICOET 2009 Conference Chair; Debra Nelson, New York State Department of Transportation, ICOET 2009 Program Committee Chair; and members of the ICOET 2009 Steering, Program, and Abstract Review Committees; whose hard work and dedication to the field of transportation and ecology generated an excellent technical program for the conference, the results of which are reflected in these proceedings.
- The Minnesota Department of Transportation, most notably Frank Pafko and Scott Bradley; the Minnesota Department of Natural Resources; and the Federal Highway Administration Minnesota Division Office; who co-hosted the conference, designed the field trips, moderated technical sessions, and prepared presentations showcasing the state's outstanding research and partnership-building efforts.
- Ann Hartell, Nancy Bailey, and Walt Thomas of CTE, who assisted in preparation and review of the manuscript, and in the development and distribution of the document.
- Most importantly, to all the Authors who, in contributing their work to these conference proceedings, have expanded the body of knowledge on wildlife, habitat, and ecosystem issues related to the delivery of surface transportation systems.

Note: These proceedings are not a peer-reviewed publication. The research presented herein is a compilation of the technical papers and posters selected for presentation at the 2009 International Conference on Ecology and Transportation. Presentations were selected by the ICOET 2009 Program Committee based on a set of criteria that included relevance to the conference theme and applicability of research results. Presentations included in this document may be in full paper or abstract format. Contact information for the authors is provided where possible to encourage further networking among conference participants and other professionals about current research applications and best practices in the transportation/ecology field.

### **Bibliographic Citation**

Please use the following format to cite works from these proceedings:

[Author last name, first name]. ["Title of Paper"]. In *Proceedings of the 2009 International Conference on Ecology and Transportation*, edited by Paul J. Wagner, Debra Nelson, and Eugene Murray. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University, 2010.

### **Cost Statement**

CD-ROM copies of this public document were duplicated for a unit cost of \$3.10 USD per copy and were distributed to ICOET 2009 conference participants upon their individual request. No printed copies of the document were produced.

### **To Order Additional Copies**

Additional CD-ROM copies of these proceedings may be ordered through CTE for \$25.00 USD (including shipping and handling) while supplies last. To order, please call CTE at (919) 515-8893 or email your request to [cte\\_email@ncsu.edu](mailto:cte_email@ncsu.edu). An Adobe Acrobat PDF version of the proceedings is also available for download from the Web at [www.icoet.net](http://www.icoet.net).

© 2010 Center for Transportation and the Environment, North Carolina State University. All rights reserved.

This publication may be reproduced in whole or in part for non-profit educational purposes provided that credit is given to the author(s) and to the Center for Transportation and the Environment, North Carolina State University.

ISBN: 978-0-9778094-4-8

## THE IMPORTANCE OF PRE-CONSTRUCTION DATA FOR PLANNING AND EVALUATING WILDLIFE CROSSING STRUCTURES

**Paula MacKay** (509-933-1340, [paula.mackay@coe.montana.edu](mailto:paula.mackay@coe.montana.edu)) Research Associate, Western Transportation Institute, Montana State University, 222 E. 4<sup>th</sup> Avenue, Suite 104, Ellensburg, WA 98926, USA

**Robert A. Long** (509- 933-1340, [robert.long@coe.montana.edu](mailto:robert.long@coe.montana.edu)) Research Ecologist, Western Transportation Institute, Montana State University, 222 E. 4<sup>th</sup> Avenue, Suite 104, Ellensburg, WA 98926, USA

**James S. Begley** (509-933-1340, [james.begley@coe.montana.edu](mailto:james.begley@coe.montana.edu)) Research Associate, Western Transportation Institute, Montana State University, 222 E. 4<sup>th</sup> Avenue, Suite 104, Ellensburg, WA 98926, USA

**Anthony P. Clevenger** (403-760-1371, [apclevenger@gmail.com](mailto:apclevenger@gmail.com)) Research Wildlife Biologist, Western Transportation Institute, Montana State University, 3-625 Fourth Street, Canmore T1W 2G7 Alberta, Canada

**Marcel P. Huijser** (406-543-2377, [mhuijser@coe.montana.edu](mailto:mhuijser@coe.montana.edu)) Research Ecologist, Western Transportation Institute, Montana State University, P.O. Box 174250, Bozeman, MT 59717, USA

**Amanda R. Hardy** (970-491-5020, [amandarhardy@gmail.com](mailto:amandarhardy@gmail.com)) PhD Student, Department of Fish, Wildlife and Conservation Biology, Colorado State University Fort Collins, CO 80523-1474, USA

**Robert J. Ament** (406-994 6423, [rament@coe.montana.edu](mailto:rament@coe.montana.edu)) Road Ecology Program Manager, Western Transportation Institute, Montana State University, P.O. Box 174250, Bozeman, MT 59717, USA

### **Project Description**

The authors discuss pre-construction wildlife data applications from three extensive highway mitigation projects in western North America.

### **Abstract**

Wildlife crossing structures, in concert with fencing, are increasingly being installed along major highways in an effort to improve landscape permeability for wildlife movement. Few road projects, however, have conducted extensive wildlife monitoring prior to the implementation of measures designed to mitigate highway effects on wildlife populations. Pre-construction monitoring can potentially inform the location of wildlife crossing structures, and provides critical baseline data for evaluating the performance of mitigation measures. At the most basic level, pre-construction presence data yield important information about which species can potentially be expected to use structures. Further, although the use of crossing structures by wildlife can be documented during the post-construction phase, it is difficult to assess whether *changes* in wildlife crossing success have occurred without relevant baseline data. Baseline data are also critical for assessing the effectiveness of fencing in reducing the rate of animal-vehicle collisions (AVCs). Finally, pre-construction baseline data can be coupled with power analyses to help guide the intensity and duration of post-construction monitoring.

Our poster describes pre-construction data applications from three highway projects in western North America: U.S. Highway 93 in Montana, Interstate 90 at Snoqualmie Pass in Washington, and the Trans-Canada Highway in Banff National Park, Alberta, Canada. The first two projects employ data gathered specifically to meet pre-construction monitoring objectives, which include assessing wildlife-vehicle collisions, quantifying rates of wildlife movement across the highway, measuring wildlife crossings via the use of existing structures (e.g., drainage culverts), and evaluating population distributions of select focal species in the vicinity of the highway. Remote cameras, track beds, snowtracking, noninvasive DNA sampling, and telemetry are among the field methods used to acquire pre-construction data. In contrast, the Banff application employs models of pre-existing data to help inform the placement of crossing structures during a later phase of the project.

We discuss objectives, methods, and relevant findings from each of the projects described above. We also illustrate how pre-construction monitoring can be used to help address larger, population-level objectives regarding habitat connectivity and gene flow—including for low-mobility species. Lastly, we offer recommendations for those engaged in planning highway mitigation projects; for example, monitoring efforts must be designed to yield sufficient statistical power to detect differences between pre-construction and post-construction data.

## **Acknowledgments**

We would like to thank Parks Canada, B. Chruszcz, K. Gunson, J. Wierzchowski (Banff case study); Confederated Salish and Kootenai Tribes, Federal Highways Administration, Montana Department of Transportation, M. Evans, J. Fuller, A. Kociolek (US-93 case study); Washington Department of Transportation, and Central Washington University (I-90 case study) for their respective contributions to the projects discussed in this poster.

## **Biographical Sketches**

**Paula MacKay** (Research Associate), **Robert A. Long** (Research Ecologist), **James S. Begley** (Research Associate), **Anthony P. Clevenger** (Research Wildlife Biologist), **Marcel P. Huijser** (Research Ecologist), and **Robert Ament** (Road Ecology Program Manager) are all with the Road Ecology Program at Montana State University's Western Transportation Institute. They each study aspects of wildlife-road interactions including the performance of wildlife crossing structures and road mitigation approaches.

**Amanda R. Hardy** is a Graduate Research Assistant in the Department of Fish, Wildlife and Conservation Biology at Colorado State University in Fort Collins and is currently studying the effects of recreationists on ungulates and visitor viewing opportunities in Grand Teton National Park.