



At Risk

Proceedings of a Conference
on the Biology and Management of
Species and Habitats at Risk

VOLUME ONE

February 15 - 19, 1999
University College of the Cariboo
Kamloops, British Columbia

edited by
Laura M. Darling
Wildlife Branch
British Columbia Ministry of Environment, Lands and Parks
Victoria, British Columbia

August 2000

SPONSORS OF THE PUBLICATION

B.C. Hydro

British Columbia Ministry of Environment, Lands and Parks
The Canada Trust Friends of the Environment Foundation
Canadian Wildlife Service - Environment Canada
Forest Renewal British Columbia
Habitat Conservation Trust Fund
Interpretation Canada (B.C. chapter)
Science Council of British Columbia - Central Interior
The Toronto Zoo (Mammals)
University College of the Cariboo

THE POWER IS YOURS

BChydro 



Environment
Canada
Canadian Wildlife
Service

Environnement
Canada
Service Canadien
de la faune



Canadian Cataloguing in Publication Data

Main entry under title:

At risk

Includes bibliographical references.

ISBN 0-7726-4348-2

1. Endangered species - British Columbia - Congresses.
 2. Biological diversity conservation - British Columbia - Congresses.
 3. Wildlife habitat improvement - British Columbia - Congresses.
- I. Darling, Laura M. II. University College of the Cariboo. III. British Columbia. Ministry of Environment, Lands & Parks.
QH77.C3A8 2000 333.95'22'09711 C00-960290-9

Cover artwork by Michael Hames

SPONSORS OF THE CONFERENCE

Association for Biodiversity Information
 Association of Professional Biologists of British Columbia
 Bear Brewing Company
 British Columbia Conservation Data Centre
 British Columbia Field Ornithologists
 British Columbia Ministry of Environment, Lands and Parks
 Canadian Society of Environmental Biologists
 The City of Kamloops
 Canadian Wildlife Service - Environment Canada
 Ducks Unlimited
 Environmental Educator's Provincial Specialist's Association
 Federation of British Columbia Naturalists
 Forest Alliance of British Columbia

Forest Renewal British Columbia
 The Friends of Ecological Reserves
 Interior Lumber Manufacturers' Association
 Interpretation Canada (B.C. Chapter)
 Kamloops Naturalist Club
 The Leon and Thea Koerner Foundation
 Nature Trust of British Columbia
 Sierra Club of British Columbia
 Science Council of British Columbia - Central Interior
 Spruce City Wildlife Association
 University College of the Cariboo
 Weldwood of Canada Ltd.
 Wild BC



PREFACE

This collection of papers stems from the third conference in British Columbia to focus on species and habitats at risk. The first, co-hosted by the Federation of British Columbia Naturalists, Douglas College, and the British Columbia Ministry of Environment was held at Douglas College in Vancouver in 1980 (Stace-Smith et al. [eds.], 1980, *Threatened and Endangered Species and Habitats in British Columbia and the Yukon*). The second was sponsored by the Federation of British Columbia Naturalists and the Northwest Wildlife Preservation Society and was held in Vancouver in 1991 (Rautio [ed.], 1991, *Community Action for Endangered Species*). This most recent meeting, held in Kamloops, 15 – 19 February 1999, and co-hosted by the British Columbia Ministry of Environment, Lands and Parks and the University College of the Cariboo, had more than 60 partnering organizations and businesses. Interest and participation in each of these conferences was high and attendance was at capacity. The papers in the proceedings from these 3 conferences can be used to gauge of the state of our knowledge of the biology of species. At each of the first 2 conferences, 8 papers dealt with the biology of a species at risk. In this third set of proceedings, there are papers dealing with aspects of the biology of more than 60 species. Some of the titles of the papers presented in Kamloops would have been unimaginable at the earlier conferences—for example, an overview of research on the marbled murrelet would have been a very slim paper a decade or 2 ago!

The proceedings from the Kamloops conference also hint at other emerging trends in approaches to species and habitats at risk. In the past decade, increasing concern about loss of biodiversity and the growing number of species at risk has resulted in an increase in research and inventory work, especially for species groups and habitats that have been traditionally ignored by wildlife management. As a result, included in these proceedings are preliminary lists of species at risk for mosses, marine invertebrates, dragonflies, beetles, freshwater molluscs, and butterflies. “Natural history” has also resurfaced as an important field of study as such information becomes crucial to the proper management of species, particularly those at risk, and this renaissance is reflected in a number of papers. An expanding awareness of the role of organisms at risk in ecological processes is highlighted in several places in these proceedings. Examples include discussions of the fragile cryptogamic crusts of grasslands and shrub-steppes, and of the complicated and fragile interconnections of mycorrhizal fungi.

The Kamloops conference and its proceedings are an important step in communicating the results of the recent, original and innovative work to managers, scientists, educators, naturalists, and the general public. There are many sobering signs of how desperate the situation has become: far more extensive and complicated endangered species lists; a growing number of ecosystems at risk; an increasing understanding of how fragile some ecosystems are; and accelerated rates of habitat loss and fragmentation. On the bright side, there is the tremendous energy that has in recent years been put toward public education, and documenting, classifying, researching, and conserving species at risk.

These papers are a valuable glimpse into that effort.

DAVID FRASER AND KARL LARSEN, CO-CHAIRS
ERIC LOFROTH, DON REID, LAURA DARLING, AND ERIC PARKINSON, ORGANIZING
COMMITTEE

EDITOR'S NOTE

The papers in these Proceedings have not been peer reviewed – the content is fully the authors' responsibility. Each paper was subjected to a grammar and copy edit, to address issues of spelling, grammar, and conventions of style and layout selected for this document. I made it my responsibility to review all edit suggestions made by our copy editors, and to approve all changes I felt did not alter the intent of the author; most authors were contacted during this process to address contentious edits, to clarify wording, or to provide missing documentation. The papers were submitted at varying degrees of technical detail, and individual writing styles varied substantially; however, we made no attempt to change the character of the papers submitted. Graphics were submitted in numerous production formats and layout styles; we have done our best to ensure that each graphic is readable and gets the point of the graphic to the reader. The final product is the result of the immense effort by many people to make each paper better.

Laura M. Darling, Editor

ACKNOWLEDGEMENTS

Many hands make light work. These Proceedings and the conference from which they stem could not have happened without the input and support of many individuals and organizations.

The conference, sponsored by the B.C. Ministry of Environment, Lands and Parks and the University College of the Cariboo, was supported by financial and in-kind contributions from over 25 agencies and organizations, whose logos are presented on page iii of this volume.

Publication of these Proceedings was supported by financial contributions from 9 agencies and organizations whose logos appear on page ii. Special thanks to BC Hydro for making a substantial cash contribution, and to Ed Hill for making it happen. Authors of lengthy papers were called upon to contribute 'page charges' to cover costs of editing and layout. Additional financial support was provided by John Carnio, Curator of Mammals, The Toronto Zoo. Many thanks to Queen's Printer for rock-bottom pricing for print production, facilitating greater distribution of these documents.

The proceeds of a silent auction held at the conference also were directed towards the publication of these proceedings. The following organizations and individuals generously donated items: The Nature Trust of British Columbia, Nature Conservancy Canada, Ian Goudie, Bear Brewing Company, Lone Pine Press, Northwest Wildlife Preservation Society, Fraser's Thimble Farms, David Fraser, Neville Crosby Inc., Eric Lofroth, Vancouver Aquarium, Fred Cooke, Western Canada Wilderness Committee, Goldstream Park Nature House, Columbia Basin Fish and Wildlife Compensation Program, Greystone Press, Mountain Equipment Coop, UBC Press, Parks Canada, Wild Birds Unlimited, B.C. Conservation Data Centre, Vancouver Telescope Center, Royal B.C. Museum, Habitat Acquisition Trust, Creston Valley Wildlife Management Area, Province of B.C. Wildlife Tree Committee, David Green, The Field Naturalist, Dick Cannings, Rob Butler, Vancouver Island Marmot Foundation, BC Hydro, The Steelhead Society, Laskeek Bay Conservation Society, Robert Busch, Canadian Forest Products, World Wildlife Fund, Liz Hammond-Kaarremaa, Friends of Ecological Reserves, Jim Pojar, International Pacific Halibut Commission, Crown Publications, Tracee Geernaert, Larry Halvorsen, Bill Harper, and John Krebs.

Thanks to those who ensured the conference ran smoothly: J. A. Wightman for fund raising, conference planning, and administrative management of incoming submissions and conference scheduling; T. Rankin of the Forestry Continuing Studies Network for initial organization of the conference; G. Lyons and the UCC Activity Centre staff who orchestrated minute-to-minute activities at the UCC Campus Activity Centre; A. Harcombe and D. Eastman for input to selection of papers; B. Gowans, for her part in the silent auction; Kamloops Naturalist Club for running field trips at the conference; D. Lewis and R. Morris, for help in preparing conference packages; D. Williams, for organizing the poster session at the conference; session chairpersons for keeping speakers on time; T. Dickinson, B. Heise and W. Klenner, for hosting the keynote speaker and public lecturers; 'Bookies' and 'Strictly For The Birds' for acting as ticket agents for the public lectures; Roger Barnsley (President of UCC), John Jules (Kamloops Indian Band), and Cliff Branchflower (Mayor of Kamloops) for supporting the conference and graciously welcoming delegates; and Bear Brewery, for crafting a special run of 'Northern Spotted Ale' just for the conference.

C. Hoodicoff efficiently coordinated the huge volunteer workforce: N. Bertram, D. Bissonette, J. Bleuschke, A. Callahan, R. Canart, S. Cote, M. Grant, D. Haughland, T. Hoodicoff, J. Hromadnik, K. Johnston, C. Kissick, L. Larson, V. Larson, D. Lewis, K. Lowson, M. MacDonald, R. McAllister, R. Morris, C. Nesbit, A. Norquay, J. Pedersen, K. Pedersen, D. Pettman, N. Prichard, S. Raven, T. Richens, A. Ross, S. Rowsell, P. Ruley, K. Safford, L. Sheperd, J. Sorensen, B. Tanner, C. Tarasoff, A. Tipler, W. Tokarek, K. Turriff, S. Warman, and C. Yakowski.

Thanks to those who contributed to the production of these Proceedings: Ros Penty and Frances Backhouse, editors, and Larry Grainger, Wayne Sampson and Denton Pendergast of Rocket Science Design for patience, persistence and professionalism to improve the quality of each and every paper in this Proceedings; Gail Harcombe for facilitating and trouble-shooting production; UCC for carrying and administering proceeds from the conference; proof readers and other volunteers who ensured the final product was complete, M. Austin, M. Badry, C. Cadrin, S. Cannings, M. Chutter, S. Eaves, S. Flynn, L. Friis, L. Haggstrom, I. Hatter, J. Hobbs, G. Jones, D. Kang, N. Laity, T. Lea, E. Lofroth, Z. O'Neill, K. Paige, J. Quayle, L. Ramsay, L. Stanlake, H. Schwantje, L. Shaw, C. Tolkamp, B. von Sacken, L. Westereng, K. Wipond.

Thanks to Michael Hames for his artistic contribution to the conference and to species at risk; his art now graces posters, T-shirts and these Proceedings.

And a special recognition to each and every one of the presenters and delegates for participating.

