

Landscape

Ecology

and **Wildlife Habitat
Evaluation:**

CRITICAL INFORMATION for Ecological Risk
Assessment, Land-Use Management Activities,
and Biodiversity Enhancement Practices

STP 1458

Editors:

Lawrence Kapustka, Gregory Biddinger,
Matthew Luxon, Hector Galbraith



STP 1458

***Landscape Ecology and Wildlife
Habitat Evaluation: Critical
Information for Ecological Risk
Assessment, Land-Use Management
Activities, and Biodiversity
Enhancement***

*Lawrence Kapustka, Hector Galbraith, Matthew Luxon, and
Gregory Biddinger, editors*

ASTM Stock Number: STP1458



ASTM International
100 Barr Harbor Drive
PO Box C700
West Conshohocken, PA 19428-2959

Printed in the U.S.A.

Library of Congress Cataloging-in-Publication Data

Landscape ecology and wildlife habitat evaluation : critical information for ecological risk assessment, land-use management activities, and biodiversity enhancement/ Lawrence Kapustka... [et al.].

p. cm. — (STP ; 1458)

Selected papers presented at the symposium "Landscape ecology and wildlife habitat evaluation" held in Kansas City, Missouri, on 7–9 April 2003.

Includes bibliographical references and index.

ISBN (invalid) 080313476

1. Ecological risk assessment—Congresses. 2. Land use—Environmental aspects—Congresses. 3. Habitat (Ecology)—Congresses. 4. Landscape ecology—Congresses. I. Kapustka, Lawrence. II. ASTM special technical publication ; 1458.

QH541.15.R57L36 2004

333.95'14—dc22

2004049022

Copyright © 2004 ASTM International, West Conshohocken, PA. All rights reserved. This material may not be reproduced or copied, in whole or in part, in any printed, mechanical, electronic, film, or other distribution and storage media, without the written consent of the publisher.

Photocopy Rights

Authorization to photocopy items for internal, personal, or educational classroom use, or the internal, personal, or educational classroom use of specific clients, is granted by ASTM International (ASTM) provided that the appropriate fee is paid to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923; Tel: 978-750-8400; online: <http://www.copyright.com/>.

Peer Review Policy

Each paper published in this volume was evaluated by two peer reviewers and at least one editor. The authors addressed all of the reviewers' comments to the satisfaction of both the technical editor(s) and the ASTM International Committee on Publications.

To make technical information available as quickly as possible, the peer-reviewed papers in this publication were prepared "camera-ready" as submitted by the authors.

The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of the peer reviewers. In keeping with long-standing publication practices, ASTM International maintains the anonymity of the peer reviewers. The ASTM International Committee on Publications acknowledges with appreciation their dedication and contribution of time and effort on behalf of ASTM International.

Foreword

This publication, *Landscape Ecology and Wildlife Habitat Evaluation: Critical Information for Ecological Risk Assessment, Land-Use Management Activities, and Biodiversity Enhancement*, contains selected papers presented at the symposium of the same name held in Kansas City, Missouri, on 7–9 April 2003. The symposium was sponsored by Committee E-47 on Biological Effects and Environmental Fate. The symposium chairmen and co-editors were Lawrence Kapustka, Hector Galbraith, Matthew Luxon, and Gregory Biddinger.

Contents

OVERVIEW	vii
SESSION I	
Selecting a Suite of Ecological Indicators for Resource Management— VIRGINIA H. DALE, PATRICK J. MULHOLLAND, LISA M. OLSEN, JACK W. FEMINELLA, KELLY O. MALONEY, DAVID C. WHITE, AARON PEACOCK, AND THOMAS FOSTER	3
Integrating Mineral Development and Biodiversity Conservation into Regional Land-Use Planning— DAVID G. RICHARDS	18
SESSION II	
Estimating Functional Connectivity of Wildlife Habitat and Its Relevance to Ecological Risk Assessment— ALAN R. JOHNSON, CRAIG R. ALLEN, AND KRISTI A. N. SIMPSON	41
Hierarchical Scales in Landscape Responses by Forest Birds— GERALD J. NIEMI, JOANN M. HANOWSKI, NICK DANZ, ROBERT HOWE, MALCOLM JONES, JAMES LIND, AND DAVID M. MLADENOFF	56
Type, Scale, and Adaptive Narrative: Keeping Models of Salmon, Toxicology and Risk Alive to the World— RONALD J. MCCORMICK, AMANDA J. ZELLMER, AND TIMOTHY F. H. ALLEN	69
Population Dynamics in Spatially and Temporally Variable Habitats— MARK C. ANDERSEN	84
Quantitative Habitat Analysis: A New Tool for the Integration of Modeling, Planning, and Management of Natural Resources— LAURA K. MARSH AND TIMOTHY HAARMANN	94
Predicting Biodiversity Potential Using a Modified Layers of Habitat Model— LAWRENCE A. KAPUSTKA, HECTOR GALBRAITH, MATT LUXON, JOAN M. YOCUM, AND WILLIAM J. ADAMS	107

Habitat Ranking System for the Threatened Preble’s Meadow Jumping Mouse (Zapus hudsonius preble) in Eastern Colorado— THOMAS R. RYON, MIKE J. BONAR, KIRSTA L. SHERFF-NORRIS, AND ROBERT A. SCHORR	129
Development of HSI Models to Evaluate Risks to Riparian Wildlife Habitat from Climate Change and Urban Sprawl— HECTOR GALBRAITH, JEFF PRICE, MARK DIXON, AND JULIE STROMBERG	148
Application of Habitat Suitability Index Values to Modify Exposure Estimates in Characterizing Ecological Risk— LAWRENCE A. KAPUSTKA, HECTOR GALBRAITH, MATT LUXON, JOAN M. YOCUM, AND WILLIAM J. ADAMS	169
Sunflower Depredation and Avicide Use: A Case Study Focused on DRC-1339 and Risks to Non-Target Birds in North Dakota and South Dakota— GREG LINDER, ELIZABETH HARRAHY, LYNNE JOHNSON, LARRY GAMBLE, KEVIN JOHNSON, JOY GOBER, AND STEPHANIE JONES	202
GIS-Based Localization of Impaired Benthic Communities in Chesapeake Bay: Associations with Indicators of Anthropogenic Stress— BENJAMIN L. PRESTON	221
Estimating Receptor Sensitivity to Spatial Proximity of Emissions Sources— VLADIMIR P. RESHETIN	242
SESSION III	
Toward an Ecological Framework for Assessing Risk to Vertebrate Populations from Brine and Petroleum Spills in Exploration and Production Sites— REBECCA A. EFROYMSON, TINA M. CARLSEN, HENRIETTE I. JAGER, TANYA KOSTOVA, ERIC A. CARR, WILLIAM W. HARGROVE, JAMES KERCHER, AND TOM L. ASHWOOD	261
Risk-Trace: Software for Spatially Explicit Exposure Assessment— IGOR LINKOV, ALEXANDRE GREBENKOV, ANATOLI ANDRIZHIEVSKI, ALEXEI LOUKASHEVICH, AND ALEXANDER TRIFONOV	286
Incorporating Spatial Data into Ecological Risk Assessments: The Spatially Explicit Exposure Module (SEEM) for ARAMS— W. T. WICKWIRE, CHARLES A. MENZIE, DMITRIY BURMISTROV, AND BRUCE K. HOPE	297
Approaches to Spatially-Explicit, Multi-Stressor Ecological Exposure Estimation— BRUCE K. HOPE	311
INDEX	325

Overview

This book contains a collection of papers that were derived from papers presented at a symposium on *Landscape Ecology and Wildlife Habitat Evaluation: Critical Information for Ecological Risk Assessment, Land-Use Management Activities, and Biodiversity Enhancement Practices* that was held 7–9 April 2003 in Kansas City, Missouri. The purpose of the symposium was to bring together scientists with diverse interests in landscape ecology, ecological risk assessment, and environmental management. It was designed to explore contemporary knowledge of theoretical and applied ecology, especially embodied in landscape ecology and population dynamics, especially as they relate to characterizing environmental risks to wildlife and requirements of environmental managers addressing current situations and predicting consequences of actions.

Land-use patterns have been described as the most critical aspect affecting wildlife populations and regional biodiversity. Environmental contamination by chemicals often ranks fairly low in terms of factors limiting wildlife populations. Regulatory and legislative efforts have begun to promote “brownfield development” as an alternative to expansion into uncontaminated areas and with less stringent cleanup standards. Indeed, until recently, many areas which have low to moderate levels of chemical contamination were nevertheless subjected to intrusive remediation efforts; the consequence being substantial destruction of existing wildlife habitat and low potential for enhancing better quality habitat at the affected site. Nevertheless, current practices in Ecological Risk Assessment generally do a poor job of considering biological and physical factors as most focus entirely or nearly so on chemical effects. Therefore, the essential tool used to characterize sites does poorly in weighing the merits of alternative remediation options.

The opening session of the symposium provided three perspectives that drew upon the applied discipline of landscape ecology, approaches used to characterize wildlife habitat, and challenges of environmental management of biological resources from a global corporate perspective. The series of papers that followed, explored theoretical aspects of landscape ecology, population dynamics affected by landscape conditions, and tools and approaches in various stages of development that can be used in assessing environmental risks over different temporal and spatial scales. Finally, several presentations covered real-world applications of different tools and approaches.

The symposium was sponsored by the ASTM Committee E47 on Biological Effects and Environmental Fate. Financial assistance was provided by the American Chemistry Council and the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Health Effects Research Program. The Subcommittee E47.02 on Terrestrial Assessment and Toxicology anticipates development of two or more Standard Guides covering materials covered in this symposium.

Lawrence Kapustka

Ecological Planning and Toxicology Incorporated
Corvallis, OR
Symposium Chairman and Editor

Hector Galbraith

Galbraith Environmental Sciences
Boulder, CO
Symposium Chairman and Editor

Matthew Luxon

Winward Environmental LLC
Seattle, WA
Symposium Chairman and Editor

Gregory R. Biddinger

Exxon Mobil Refining & Supply Company
Fairfax, VA
Symposium Chairman and Editor

ISBN # 0-8031-3476-2
Stock #: STP1458

www.astm.org