

Multiple Stressor Effects in Relation to Declining Amphibian Populations



STP 1443

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G. Linder, S. Krest, D. Sparling and E. Little, editors

ASTM Stock Number: STP1443



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

Multiple stressor effects in relation to declining amphibian populations
/ G. Linder . . . [et al.], editors.

p. cm. — (STP ; 1443)

"ASTM Stock Number: STP1443."

Includes bibliographical references.

ISBN 0-8031-3464-9

1. Amphibians—Effect of chemicals on—Congresses. 2. Toxicity testing—Congresses. 3. Endangered species—Congresses. I. Linder, Greg, 1950 May 28– II. ASTM International. III. Series. IV. ASTM special technical publication ; 1443.

QL669.2.M85 2003

571.9'5178—dc21

2003045244

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Foreword

This publication, *Multiple Stressor Effects in Relation to Declining Amphibian Populations*, contains papers presented at the symposium of the same name held in Pittsburgh, PA, on 16–17 April 2002. The symposium was sponsored by ASTM International Committee E47 on Biological Effects and Environmental Fate. The symposium co-chairpersons were Greg Linder, USGS/BRD/CERC, Sherry Krest, US Fish and Wildlife Service, Ed Little, USGS/BRD/CERC, and Don Sparling, USGS/BRD/Patuxent Wildlife Research Center.

Contents

OVERVIEW	vii
TOXICITY ASSESSMENT	
The History and Development of FETAX (ASTM Standard Guide, E-1439 on Conducting the Frog Embryo Teratogenesis Assay-<i>Xenopus</i>)—J. N. DUMONT, J. A. BANTLE, AND G. LINDER	3
The FETAX of Today—and Tomorrow—D. J. FORT, D. W. MCLAUGHLIN, AND J. G. BURKHART	23
AMPHITOX: A Customized Set of Toxicity Tests Employing Amphibian Embryos—J. HERKOVITS AND C. S. PÉREZ-COLL	46
FIELD AND LABORATORY STUDIES	
Investigation of Frog Abnormalities on National Wildlife Refuges in the Northeast U.S.—L. EATON-POOLE, A. E. PINKNEY, D. E. GREEN, D. R. SUTHERLAND, AND K. J. BABBITT	63
Evaluation of the Potential Impact of Water and Sediment from National Wildlife Refuge Sites Using a Modified Frog Embryo Teratogenesis Assay-<i>Xenopus</i> (FETAX)—S. D. TURLEY, L. EATON-POOLE, A. E. PINKNEY, M. A. OSBORN, AND D. T. BURTON	79
Determination of Malathion Aerial Drift and Associated Effects to the Endangered Wyoming Toad (<i>Bufo baxteri</i>) Using Surrogate Woodhouse's Toads (<i>Bufo woodhousii</i>) at Mortenson and Hutton Lake National Wildlife Refuges and Potential Reintroduction Sites—K. K. DICKERSON, M. J. HOOPER, T. HUANG, AND M. ALLEN	96
Synergistic Effects of a Combined Exposure to Herbicides and an Insecticide in <i>Hyla versicolor</i>—L. MAZANTI, D. W. SPARLING, C. RICE, K. BIALEK, C. STEVENSON, AND B. TEELS	111
Ammonium Perchlorate Disruption of Thyroid Function in Natural Amphibian Populations: Assessment and Potential Impact—J. A. CARR, L. J. URQUIDI, W. L. GOLEMAN, F. HU, P. N. SMITH, AND C. W. THEODORAKIS	130

Interaction Between Perchlorate and Iodine in the Metamorphosis of <i>Hyla versicolor</i>— D. W. SPARLING, G. HARVEY, AND V. NZENGUNG	143
Using Semipermeable Membrane Devices (SPMDs) to Assess the Toxicity and Teratogenicity of Aquatic Amphibian Habitats— C. M. BRIDGES AND E. E. LITTLE	159
Methods for Testing the Combined Effects of Contamination and Hibernation On Terrestrial Amphibians— S. M. JAMES	169
Integrated Field and Laboratory Tests to Evaluate Effects of Metals-Impacted Wetlands on Amphibians: A Case Study from Montana— G. LINDER	184

CAUSAL ANALYSIS

The Role of Multiple Stressor Causes in Declining Amphibian Populations: A Wingspread Workshop Summary— S. K. KREST, G. LINDER, AND D. W. SPARLING	207
Establishing Cause-Effect Relationships for Chemical Stressors in Amphibians: Providing Adequate Data for the ERA— D. J. FORT AND D. W. MCLAUGHLIN	219
Multiple Causes for the Malformed Frog Phenomenon— M. J. LANNOO, D. R. SUTHERLAND, P. JONES, D. ROSENBERRY, R. W. KLAVER, D. M. HOPPE, P. T. J. JOHNSON, K. B. LUNDE, C. FACEMIRE, AND J. M. KAPPER	233
Establishing Causality in the Decline and Deformity of Amphibians: The Amphibian Research and Monitoring Initiative Model— E. E. LITTLE, C. M. BRIDGES, G. LINDER, AND M. BOONE	263

Overview

This book represents the work of several authors who participated in the symposium entitled “*Multiple Stressor Effects in Relation to Declining Amphibian Populations*” convened 16–17 April, 2002, in Pittsburgh, Pennsylvania. Declines of amphibian populations of varying severity have been observed for many years, and in the last 8 to 10 years considerable progress has been made in documenting the status and distribution of a range of amphibian species. Habitat alteration and destruction are likely linked to many amphibian declines, but a variety of other factors, both anthropogenic and natural, have been observed or proposed to have caused declines or extinctions of amphibian populations. Unfortunately, determining the environmental causes for the decline of many species has proven difficult. The goals of this symposium were three-fold. First, highlight ASTM’s historic role in providing a forum for the standardization of amphibian toxicity test methods and the characterization of adverse effects potentially associated with chemical stressors. Second, demonstrate through case studies the current state of technical “tools” available to biologists, ecologists, environmental scientists and natural resource professionals for assessing amphibian populations exposed to various environmental stressors. And third, characterize a process that brings a range of interdisciplinary technical and management tools to the tasks of causal analysis, especially as those relate to a multiple stressor risk assessment “mind-set.” As part of the symposium, scientists and resource management professionals from diverse fields including ecotoxicology and chemistry, ecology and field biology, conservation biology, and natural resource management and policy contributed oral presentations and posters that addressed topics related to declining amphibian populations and the role that various stressors have in those losses.

The papers contained in this publication reflect the commitment of ASTM International committee E47 on Biological Fate and Environmental Effects to provide timely and comprehensive information to the technical community and the lay-public who have become increasingly aware of amphibians and their current plight. Common themes emphasized throughout the symposium can be found in this issue, including papers focused on (1) toxicity assessment, (2) integrated field and laboratory studies, and (3) causal analysis. In addition to historical accounts of the development of amphibian test methods and contemporary studies illustrating current applications of these methods, this publication addresses future needs by providing contributions focused on research requirements in these areas.

Toxicity Assessment

Contributed papers on the application of toxicity assessment methods effective for amphibians reflect the range of ASTM International E47’s involvement with the standardization process. Such methods range from long-established laboratory approaches for evaluating adverse chemical effects to amphibians to methods that link chemicals in surface waters, sediments, and soils with adverse effects observed among amphibians in the field. In addition, potential ASTM International standards were proposed during the symposium. These candidate tools and refinements are beginning to be added to existing standards and will likely be applied more frequently to future evaluations of chemical stressor effects on amphibians.

Field and Laboratory Studies

A series of case studies illustrated the importance of integrated field and laboratory studies in the evaluation of multiple stressor effects that may lead to declining amphibian populations. A range of laboratory and field studies of chemicals, such as herbicides, insecticides, chlorinated organic compounds, metals and complex mixtures were presented. The methods applied in these studies emphasized the role that ASTM International E47's standards play in current hazard and risk assessment practices. These contributed papers also clearly indicated that a number of additional assessment tools need to be developed in the future.

Causal Analysis

Nowhere are research needs more clearly identified than in our third theme, causal analysis. Here, a series of contributed papers illustrate the range of tools currently available for evaluating "cause-effect" relationships between environmental stressors and declining amphibian populations. Research needs identified in these presentations clearly informed the methods development community of methodological issues that must be advanced, if solutions for amphibian deformity and decline are going to be attained.

The editors of this collection of contributed papers would like to thank Dorothy Fitzpatrick, Hanna Sparks, and Maria Langiewicz from ASTM International Headquarters for their help in developing this STP. We are also grateful to the participants of this symposium. This publication would not have been possible without your interest in amphibians and concern for the quality of their widely diverse habitats.

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ISBN: 0-8031-3464-9
Stock #: STP1443